# Fish Surveys in the Northeastern NPR-A 2019

## December 2020

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# SURVEY OF STREAMS IN CONOCOPHILLIPS ALASKA, INC. NORTHEASTERN NPR-A – 2019

## Final Report

## December 2020


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# ACRONYMS AND ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| ADF&G | Alaska Department of Fish and Game |
| BLM | Bureau of Land Management |
| CPAI | ConocoPhillips Alaska, Inc. |
| NPR-A | National Petroleum Reserve-Alaska |
| UAF | University of Alaska - Fairbanks |

# UNITS OF MEASUREMENT

| Abbreviation | Definition |
|---|---|
| % | Percent |
| °C | Degrees Celsius |
| AOV | Analysis of Variance |
| CPUE | Catch Per Unit Effort (fish per day) |
| FL | Fork Length |
| KW | Kruskal-Wallis |
| LM | Linear meter/meters |
| m | Meter(s) |
| mg/L | Milligrams per Liter |
| mm | Millimeters |
| p | P-Value |
| n | Number of samples |
| pH | Potential Hydrogen |
| TL | Total Length |

# EXECUTIVE SUMMARY

This report documents the results of the third year of a study to collect 3 years of data at streams crossed by permanent gravel infrastructure as required by Operating Procedure E-14 of the Bureau of Land Management February 2013 Record of Decision for the Northeast National Petroleum Reserve – Alaska Integrated Activity Plan. Not all sites have been sampled for 3 years, as some were added in year 2 of the current study.

During summer 2019, 17 fyke and 8 seine net sites were sampled and distributed in the Iqalliqpik Creek (Judy Creek), Uvlutuuq Creek (Fish Creek), Kalikpik River, and Tinmiaqsiugvik River (Ublutuoch River) drainages throughout the open water season in the Northeastern National Petroleum Reserve- Alaska (NPR-A). Sampling was conducted during the post break-up period in June, mid-summer period in July, and just before freeze-up in late August. Fyke nets were arranged to sample fish moving both upstream and downstream as flow conditions allowed. Captured fish were identified and measured to the nearest millimeter (mm) in fork length (FL) and released. Fish longer than 180 mm FL were tagged with an individually numbered tag to evaluate movement patterns within and between drainages.

In 2019, a total of 56,403 fish from 12 species were captured at 17 fyke net sites with 10,185 effort hours during the June, July and August sampling events. Resident fish species were captured at all sites while anadromous fish species were captured at all sites except Willow 1 and Willow 3. The Tinmiaqsiugvik River, Uvlutuuq Creek, and the Kalikpik River were identified as migratory corridors for all species encountered based on the range of species and size classes captured through the season. Ninespine stickleback were the most abundant fish species captured and accounted for 83% of total catch. Excluding ninespine stickleback, Arctic grayling represented nearly 83% of the total catch, followed by pink salmon (6%), broad whitefish (4%), and least cisco (4%). All other species accounted for approximately 4% of the remaining total catch.

Over the 2017, 2018 and 2019 sampling seasons, a total of 214,102 fish comprised of 13 species were captured from 27 fyke net sites and 22,560 effort hours. The number of fish captured and fish catch rates differed among years sampled and was mostly due to differences in effort, sites sampled, and variable ninespine stickleback catches. Excluding ninespine stickleback, catch rates from 2017 to 2019 decreased by over 43%. Arctic grayling catch rates decreased by nearly 40% from 2017 to 2018 and decreased another 12% from 2018 to 2019. During the same periods, broad whitefish catch rates decreased by nearly 36% and 50%. Juvenile fish experienced the largest decrease in catch rates, while adults had similar catch rates across years sampled. The only notable increase in catch rates over the three years sampled was for pink salmon (only captured in 2019) and threespine stickleback (all but three captured in 2019). Decreases in catch rates over the years sampled was likely due to high flows in 2018 and 2019 and consequential reduced net efficiency. High flows often scoured nets, widened stream channels greater than net lengths, and inundated thick streamside vegetation, all of which fish could bypass and avoid being captured, particularly with smaller sized fish, like juveniles.

Trends in fish movement during 2019 were consistent with 2018 and 2017 data, as well as past surveys in the area, which show the bulk of fish moving upstream in June and early-July, immediately after spring break-up, and downstream in August, prior to freeze-up (Morris 2003, Moulton and Seigle 2007, Moulton and Moulton 2014).

Length frequency distributions of Arctic grayling, broad whitefish, and least cisco showed seasonal differences by length classes of fish using the sampled streams throughout the 2019 open water season. Distinct length classes likely representing age-0, age-1, and age-2 juvenile fish were captured across most drainages and months.

A total of 1,893 fish comprised of five species were tagged in 2019, with Arctic grayling accounting for over 75%. Broad whitefish, least cisco, humpback whitefish, round whitefish, and burbot accounted for 12%, 6%, 3%, 3%, and less than 1% of tags deployed. Nearly 50% of the tagged fish were released at sites W17401, BC2, UBLU 15.0, and W17201. Less than 1% of fish were tagged at sites W18302, W17301, and K1902 and no fish were tagged at site W18405. There were 658 recaptures of tagged fish in 2019. Arctic grayling comprised nearly 94% of fish recaptured. Broad whitefish, humpback whitefish, round whitefish, least cisco, and burbot accounted for 2%, 2%, 1%, 1%, and less than 1% of fish recaptured. Approximately 44% of the fish were recaptured at different sites than they were initially tagged and released from and about 14% of fish were recaptured in different streams. Recaptured fish were at large for a mean and median of 151.5 and 20.1 days, respectively.

Over the 2017, 2018 and 2019 sampling seasons, a total of 4,913 fish comprised of seven species were tagged and released. Fish tagging and recapture results compiled over the 2017 through 2019 sampling seasons suggest fish move seasonally and annually within and between streams in the study area. About 86% of fish were recaptured within the same stream they were tagged, while 14% were recaptured in a different stream.

Size distribution, mean FL, and growth of juvenile Arctic grayling differed between years sampled, with juvenile fish growing more in 2017 than in 2018 and 2019. In August at the end of the growing season, mean FL of all juvenile age classes of Arctic grayling were significantly greater in 2017 than in 2018 and 2019. Arctic grayling spawning success and annual production in drainages sampled over the 2017, 2018, and 2019 seasons varied, with the highest numbers of age-0 fish recorded in 2017 (n = 259) and lowest numbers recorded in 2018 (n = 17) followed by 2019 (n = 36). Despite low catches in 2018 and 2019, fishing effort hours in both those years were nearly triple that of 2017. Differences in juvenile Arctic grayling length, growth, and production between years sampled are likely related to differences in water temperature and flow. On average, water temperatures were warmer, flows were lower, and the ice-free season was longer in 2017 than in 2018 and 2019 (McFarland et al. 2017, 2019). Differences in fish size, growth, and production between sites and years sampled, highlights the annual differences in juvenile production and growth in the Arctic.

# 1. INTRODUCTION

ConocoPhillips Alaska, Inc. (CPAI) has been exploring for oil within the northeastern portion of the National Petroleum Reserve – Alaska (NPR-A) since the winter of 1999/2000. Oil reserves have been located in the region and permitting for a new producing field, Willow, has been initiated. Potential development in the Willow area may cross several drainages including Iqalliqpik Creek, Uvlutuuq Creek, and the Tinmiaqsiugvik River (Figure 1). Development is not expected to cross the Kalikpik River or substantial tributaries to the river; however, it is included in the study area as permanent infrastructure that will be constructed in the drainage (Figure 1). This report documents the results of the third year of a study to collect three years of data at streams crossed by permanent gravel infrastructure as required by Operating Procedure E-14 of the Bureau of Land Management February 2013 Record of Decision for the Northeast National Petroleum Reserve – Alaska Integrated Activity Plan (BLM 2013). Not all sites have been sampled for three years, as some were added in year 2 of the current study.

Several waterbodies in the study region have previously been investigated by Netsch et al. (1977) and Bendock and Burr (1984). These surveys consisted of 1-day visits at each site for inventory-level surveys over a wide area, with sampling by gill net, seine, minnow trap, and angling. Species reported from Uvlutuuq Creek and Iqalliqpik Creek included broad whitefish, Arctic grayling, round whitefish, slimy sculpin, and ninespine stickleback. The Tinmiaqsiugvik River was also reported to contain Arctic grayling, slimy sculpin, and ninespine stickleback.

An in-depth study of streams in this region began in 2001, with the first detailed examination of fish habitats and populations in the Northeastern NPR-A study area (Moulton 2002, 2003, 2005, 2006, 2009; Moulton and Moulton 2014; Moulton and Seigle 2007, and Morris 2003). The Alaska Department of Fish and Game (ADF&G) participated in the 2001 study with a radio-telemetry program to provide details of fish populations in the Northeastern NPR-A and the habitats used by those populations (Morris 2003). The University of Alaska Fairbanks (UAF) and BLM jointly conducted a study in 2016 that demonstrated fish use of small tundra streams in the Northeastern NPR-A as key summer rearing and foraging habitats for fish (McFarland et al. 2016). All studies were designed to help ensure oilfield facilities are sited, designed, and constructed in a manner to avoid or minimize impacts to fish resources. Sampling efforts were conducted under an Owl Ridge ADF&G research permit.

The goal of the current multi-year study is to develop information needed to evaluate fish populations using waterbodies that could potentially be impacted by oilfield development.

Objectives of the 2019 fish survey were to:

- Obtain information on the composition and seasonal distribution of fish populations within streams in the study area.
- Obtain information on fish movements within and between streams in the study area.

# 2. METHODS

## 2.1. Biological Sampling

During summer 2019, fyke and seine nets were used to sample waterbodies in the Willow Area (Figure 1). Sampling was conducted at 25 locations comprised of 17 fyke net sites and eight seine net sites throughout the open water season during the post break-up period in June, July, and in late August just before freeze-up (Table 1). Sampling timing and effort coincided with past studies in the area by Moulton (2001-2014) (Table 2). Fyke net sites were established in Uvlutuuq Creek and one tributary, the Kalikpik River and one tributary, four tundra stream/lake systems tributary to Iqalliqpik Creek, the Tinmiaqsiugvik River and one tundra stream/lake system tributary (Table 1; Figure 1). Seine and dip nets were used to sample eight wetland sites in the area once during the season to evaluate potential fish bearing habitat (Table 1; Figure 1).

Fyke nets were used to provide 24 hours per day sampling and subsequent release of caught fish unharmed. Three sizes of fyke nets were used to accommodate for differences in stream types, one with an opening of 0.9 meters (m) deep by 1.1 m wide, another with an opening of 0.9 m deep by 0.9 m wide, and a third with an opening of 1.2 m deep by 1.2 m wide. All three fyke nets had a 4.9 m-long trap end, made of 9.5 millimeters (mm) mesh, with 5-m long wings and a 15-m long center lead made of 12.7 mm mesh. Fyke nets were arranged to sample fish moving either upstream, downstream, or both. When possible, two nets were deployed – one facing upstream and one downstream to quantify directional fish movement (Figure 2). Nets were checked and fish released daily. The duration of each set was recorded to allow calculation of catch per unit of effort (CPUE) in number of fish per 24 hours.

Captured fish were identified, measured to the nearest mm in fork length (FL), and released near the site of capture. Fish without a forked tail (burbot, ninespine stickleback, threespine stickleback, and Alaska blackfish) were measured to total length (TL). Fish longer than 180 mm FL, excluding salmon, were tagged with individually numbered tags to evaluate movement patterns within the sampling area. Tags consisted of Floy® FF-94 T-bar anchor tags for fish between 180 and 249 mm FL and FD-94 T-bar anchor tags for fish 250 mm FL or larger.

## 2.2. Water Chemistry Sampling

Water chemistry parameters were measured at each net set and checked to assess habitat conditions during sampling periods. A calibrated YSI ProPlus water quality meter was used to measure stream temperature, specific conductance, potential hydrogen (pH), turbidity, dissolved oxygen percent (%) saturation, and dissolved oxygen concentration in milligrams per liter (mg/L). Sampling in 2019 was the first year in situ turbidity was measured using a multi parameter probe. In addition, to in situ turbidity measurements, a surface water sample was collected from the same location at some sites and returned to a field lab for secondary determination of turbidity with a Lamotte 2020 turbidity meter for comparison to field collected data. In June, factory calibration of the in situ probe was inadequate for the low turbidities encountered in the study area. Calibrations were corrected for future sampling.

## 2.3. Data Analysis

### *2.3.1. Fish Size and Growth*

Length frequency distributions were compared across years sampled, stream types, and sites to evaluate seasonal and annual differences in fish size and growth. Arctic grayling were selected as the study species due to the large sample size and range of size classes captured. Three distinct length classes of juvenile Arctic grayling representing age-0, age-1, and age-2 fish were captured during most months of sampling in 2017, 2018, and 2019. Ages of fish were not confirmed; age was assigned based on monthly length frequency distributions.

Descriptive statistics including mean, median, minimum, maximum, and standard error were calculated for fork length across years, months, and age classes. Kruskal-Wallis (KW) one-way analysis of variance (AOV) of the ranked data was used to compare the distributions of each age class by year and identify significant differences in distributions. Dunn's multiple comparison tests were used to identify statistically significant differences ($p \leq 0.05$) between each pair of the ranked data. The relationships between fish fork length and month for each year and age class were described by a suite of simple linear regressions, with the explanatory variable, month, as a factor, and the response variable as the continuous variable of fork length.

# 3. RESULTS AND DISCUSSION

## 3.1. Physical Environment

Sampling was conducted from June 13 to 20, 2019, when stream flows were receding from spring break-up. At the onset of sampling on June 13, the majority of the channel ice was melted, and water temperatures ranged from 2.7 to 7.2 ºC (Figure 3; Appendix A). Water temperatures generally increased over the period and ranged from 5.3 to 15.3 ºC (Figure 3; Appendix A). The lowest water temperatures were recorded at the two lake sets where ice was still present. Water temperatures from July 18 through 24 were considerably higher and less variable than in June. Water temperatures ranged from 10.4 to 18.6 ºC and remained somewhat stable throughout the sampling period (Figure 3; Appendix A). Water temperatures from August 21 through 27 were lower than in July and remained relatively constant. August water temperatures ranged from 6.1 to 8.4 ºC on August 21 to 5.7 to 8.0 ºC on August 27 (Figure 3; Appendix A).

Specific conductance remained relatively constant at sites during June sampling, though differed between sites (Figure 4; Appendix A). Site W17201 was the only site with a significant decrease in specific conductance over the sampling period. Specific conductance values in July and August were similar to those measured in June and were relatively constant during both sample periods. The pH was relatively constant throughout the summer at all sites sampled and measured between 7 and 8 units (Appendix A). Turbidity varied within and between sample periods. Turbidity was lowest in June and higher and more variable in July. During August, turbidity increased towards the end of the sampling period due to heavy precipitation and high flows. Turbidity was highest in Uvlutuuq Creek and the Kalikpik River, likely because of the higher stream order and downstream transport of suspended sediments related to the fine streambed substrates that characterize each river.

## 3.2. Biological Observations

### *3.2.1. Species Composition*

A total of 56,403 fish comprised of 12 species were captured at 17 fyke net sites with 10,185 effort hours during the June, July, and August sampling events in 2019 (Table 3a; Figure 5). Resident fish species were captured at all sites while anadromous fish species were captured at all sites except Willow 1 and Willow 3 (Table 2a). The Tinmiaqsiugvik River, Uvlutuuq Creek, and Kalikpik River were identified as migratory corridors for all species encountered based on the range of species and size classes captured through the season. Ninespine stickleback were the most abundant fish species captured and accounted for 83% of total catch (Table 3a; Figure 5). Excluding ninespine stickleback, Arctic grayling represented greater than 82% of the total catch, followed by pink salmon (6%), broad whitefish (4%), and least cisco (4%). All other species accounted for approximately 4% of the remaining total catch (Table 3a; Figure 5). Catch rates were highest at both sites in Willow 2 (sites W17201 and W18204) and Willow 4 (site W17401), with catch rates of 47.2, 54.8, and 43.6 fish per 24-hour period, excluding ninespine stickleback (Table 3b). Catch rates were lowest at Willow 4 (site W18405) and Willow 3 (sites W17301 and W18302) with catch rates 0.4, 0.8 and 0.8 fish per 24-hour period, excluding ninespine stickleback (Table 3b; Figure 5).

Over the 2017, 2018, and 2019 sampling seasons, a total of 214,102 fish comprised of 13 species were captured from 27 fyke net sites and 22,560 effort hours. The number of fish captured and fish catch rates differed among years sampled. Total fish captured in 2019 (56,403 fish) was less than in 2018 (119,682 fish) and greater than in 2017 (38,017 fish) (Table 4a) (McFarland et al. 2017, 2018). However, differences in total catch were mostly due to differences in effort, sites sampled, and variable ninespine stickleback catches. Excluding ninespine stickleback, catch rates from 2017 to 2019 decreased by over 43% (Table 4b). Arctic grayling catch rates decreased by nearly 40% from 2017 to 2018 and decreased another 12% from 2018 to 2019 (Table 4b). During the same periods, broad whitefish catch rates decreased by nearly 36% and 50%. Juvenile fish experienced the largest decrease in catch rates, while adults had similar catch rates across years sampled. The only notable increase in catch rates over the three years sampled was for pink salmon (only captured in 2019) and threespine stickleback (all but three captured in 2019). Decreases in catch rates over the years sampled was likely due to high flows in 2018 and 2019 and consequential reduced net efficiency. High flows often scoured nets, widened stream channels to greater than net widths, and inundated thick streamside vegetation, all of which can allow fish to bypass nets and avoid being captured, particularly smaller sized fish such as juveniles.

Species composition differed between sites in 2019. Eight or more fish species were captured at seven of the 17 sites sampled (Table 3a). Species diversity was greatest in Bill's Creek (site BC2), Willow 4 (sites W17401, W18401, W18402, W18405), and Willow 8 (sites FT1802, FT1803) with 10 species captured, comprised of mostly ninespine stickleback, Arctic grayling, and pink salmon (Table 3a; Figure 6). The least diverse catch occurred at Willow 3 (sites W17301, W18302) and Willow 1 (site W17101) with three species captured: ninespine stickleback, Alaska blackfish, and Arctic grayling (Table 3a; Figure 6a, Figure 6b). A total of 566 pink salmon were captured in six drainages at eight sites, while 12 chum salmon were captured in five drainages at six sites (Table 3a; Figure 6a, Figure 6b).

Fish species composition in the 2017, 2018, and 2019 sampling seasons remained relatively similar. In all three years, ninespine stickleback accounted for over 80% of total catch (Table 4a). Excluding ninespine stickleback, Arctic grayling accounted for nearly 80% of catch across years sampled, followed by broad whitefish, least cisco, and round whitefish (Table 4a). The three largest differences in species composition over the years sampled were relatively high catch rates of least cisco in 2018 and high catch rates of threespine stickleback and pink salmon in 2019 (Table 4a).

Ninespine stickleback dominated catch during each sampling period in 2019 at five sites: FT1803, W17301, W18302, W18402, and W18405. Catch rates per 24-hour period were similar across all three sampling events in 2019 and were highest at sites W17301 and W18405, which accounted for 91% of total ninespine stickleback captured across all sites (Table 3a). These sites are in proximity to headwater lake outlets and wetland connections. Ninespine stickleback also dominated catch in 2017 and 2018, with catch rates highest in August and at sites with similar habitat characteristics consisting of lacustrine environments, headwater lakes, and wetland complexes with defined stream channels (McFarland et al. 2017, 2018). In total, 188,104 ninespine stickleback were captured over the 2017, 2018, and 2019 sampling seasons.

Fyke net capture efficiency over the 2019 season in Uvlutuuq Creek (FC1801) and the Kalikpik River (K1902) was occasionally compromised by continuously shifting sand substrate, coupled with relatively high water velocities, which scoured and/or buried nets. Channel widths of these streams also exceeded the width of nets, leading to reduced channel coverage. During August, fyke net capture efficiency was

compromised at most other sites due to heavy precipitation and flood conditions. When possible, nets were placed in areas that provided shelter from high water velocities and closely monitored and maintained to maximize catch rate efficiency and reduce fish mortality. Results from these sites are an underestimate of seasonal fish abundance and possibly fish species composition.

As noted in Section 2.1, eight seasonal wetland habitats were each sampled once in August with seine nets and dip nets to evaluate their potential for use by fish. A total of 45 ninespine stickleback and one Arctic grayling were captured from six sites (SN1820 [Artic grayling only], SNW18102, SW1/SW8, SW14, SW2, SW7) over a combined 16 seine hauls and dip netting effort totaling 500 linear meters (LM) of habitat sampled. Fish were not captured at two of the eight seine sites (SW2019 and SW23). At seine net site SW2019, a combined nine seine hauls totaling 300 LM of habitat was sampled. At seine site SW23, a combined three hauls totaling 75 LM was sampled, in addition to 50 LM of habitat sampled with a dipnet.

Fish sampling results from the ten seasonal wetlands sampled in 2017, 2018, and 2019 suggest minimal fish use by ninespine stickleback and rarely by Arctic grayling. A total of 65 ninespine stickleback and one Arctic grayling were captured at the other seven sites over a combined 30 hauls and 660 LM of habitat sampled. Fish were not captured at three of the ten sites over a combined ten hauls and 137 LM of habitat sampled. All ten sites were sampled at least once with seine nets and dip nets over the three years sampled (Table 1). Most sites were sampled twice and during different periods to capture the seasonal variation in fish habitat use and flow conditions (Table 1).

### *3.2.2. Seasonal and Size Distribution*

Paired fyke nets were placed at six sites during the July 2019 sampling period (Tinmiaqsiugvik River [UBLU 15.0], Bill's Creek [BC2], Judy Creek Kayaaq [JK1703], Willow 2 [W17201], Willow 4 [W17401], and Willow 6 [W19601]), and five sites in August 2019 (Bill's Creek [BC2], Judy Creek Kayaaq [JK1703], Willow 2 [W17201], Willow 4 [W17401], and Willow 6 [W19601]) (Figure 1). Nets were positioned to catch fish moving upstream and downstream to evaluate seasonal patterns in fish movement. Fyke nets were not paired in June due to high stream flows, water velocity, and ice floes resulting from spring break-up. In July, paired nets were used at Bills Creek (BC2), Uvlutuuq Creek (FC1801), Judy Creek Kayaaq (JK1703), the Tinmiaqsiugvik River (UBLU 15.0), Willow 2 (W17201), Willow 4 (W17401), Willow 6 (W19601), and Willow 8 (FT1802). In August, paired fyke nets were used at all the same sites as during July, except for the Tinmiaqsiugvik River (UBLU 15.0) due to high flows and water velocities.

Trends in fish movement were observed in catch patterns. In July, Arctic grayling, broad whitefish, and least cisco were captured moving both upstream and downstream, though a greater percentage were captured moving upstream (Figure 7). In August, lower numbers of all three of these species were captured, though a greater proportion of the three species were moving downstream (Figure 7). Trends in fish movement during 2019 were consistent with 2018 and 2017 data, as well as past surveys in the area, which show the bulk of fish moving upstream in June and early-July, immediately after spring break-up, and downstream in August, prior to freeze-up (Morris 2003, Moulton and Seigle 2007, Moulton and Moulton 2014).

Length frequency distributions of Arctic grayling, broad whitefish, and least cisco showed seasonal patterns of different length classes of fish using the sampled streams throughout the 2019 open water season. Distinct length classes likely representing age-0, age-1, and age-2 juvenile fish were captured across most drainages

and months. Ages of fish were not confirmed; however, age was assigned based on monthly length frequency distributions. Adult fish were unable to be assigned age classes due to considerable overlap of length distributions, which is common across most long-lived freshwater species.

During June, juvenile Arctic grayling of two distinct age classes (age-1 and age-2 fish) were captured (shown by the bimodal distribution of fish between 50 and 150 mm), in addition to relatively low numbers of a wide range of larger sized fish (Appendix B). Juvenile Arctic grayling were likely moving upstream to rearing and feeding habitats. The bulk of the larger sized Arctic grayling (> 250 mm) were also likely moving upstream either to spawn or were headed downstream from spawning areas. During July, greater numbers of age-1 fish and equal numbers of age-2 fish were captured, while considerably fewer larger-sized fish were captured. During August, much lower numbers of all age classes were captured, as most fish had likely already moved downstream to overwintering habitats. Age-0 Arctic grayling, indicative of successful June spawning, were captured at three of the 11 streams sampled in July (Bill's Creek, Judy Creek Kayyaaq, Willow 8), and at five of the 11 streams in August (Bill's Creek, Judy Creek Kayyaaq, Kalikpik River, Willow 4, Willow 6). The majority of age-0 Arctic grayling were captured in August as they were likely moving downstream to overwintering habitats. Seasonal growth from June through August, is illustrated by minor shifts in the bimodal distribution of age-0, age-1, and age-2 Arctic grayling, and is further discussed below in Section 3.2.4.

Trends in broad whitefish length frequency distributions were also observed in 2019, though were not as clear as for Arctic grayling due to lower catch rates. Few age-1 or age-2 fish (75 to 150 mm) were captured in June (one each at Willow 4, Bill's Creek, and Judy Creek Kayyaaq) (Appendix B). However, many larger-sized fish of a wide range of lengths were captured in June, mostly at Bill's Creek. Most of the fish were likely moving upstream to summer feeding habitats in headwater lakes. During July, a few age-1 fish were captured in four streams (Willow 2, Willow 4, Judy Creek Kayyaaq, Bill's Creek) and fewer numbers of a wide range of larger size classes were caught across most sites. Age-0 broad whitefish were only captured during the August sampling period in seven streams: Kalikpik River, Tinmiaqsiugvik River, Bill's Creek, Uvlutuuq Creek, Willow 2, Willow 4, and Judy Creek Kayyaaq. Because age-0 fish were not caught until August, it is likely that significant overwintering or spawning areas for broad whitefish are a considerable distance from the project area, likely in the Colville River or potentially the lower Tinmiaqsiugvik River. Further, the majority of broad whitefish captured in August were moving downstream, likely towards overwintering and spawning habitats.

Length frequency distributions of least cisco caught in 2019 indicate summer rearing of mixed size classes throughout most drainages sampled. Low numbers of a wide range of length classes of least cisco were captured in June, likely moving upstream to rearing and feeding habitats (Appendix B). In July, greater numbers of least cisco were captured, particularly at Willow 4 and Willow 6. These fish were primarily juveniles consisting of age-1 and age-2 fish, with few numbers of larger size classes. This indicates that, similar to broad whitefish, overwintering habitats may be a considerable distance from the project area. In August, low numbers of a wide range of size classes of least cisco were captured, suggesting these fish were migrating to overwintering and spawning habitats.

Salmon were captured at eight fyke net sites in six streams in 2019. Two chum salmon were caught in the Tinmiaqsiugvik River in July, and another ten were caught in August between Bill's Creek, Willow 2, Willow 4, Uvlutuuq Creek, and a tributary of Uvlutuuq Creek (Table 3). A total of 566 pink salmon were

captured during August 2019 sampling; none were captured in 2017 or 2018. Nearly 93% of all pink salmon were caught at sites FT1802, W17201, and W17401(Table 3a). Pink salmon are known to occur in 12 main drainages east of Point Barrow, though it is unknown if any of these drainages support sustained runs or populations (Irvine et al. 2009, Johnson and Blossom 2019). The Anadromous Waters Catalog (AWC) lists the Tinmiaqsiugvik River, Uvlutuuq Creek, Inigok Creek, and Iqalliqpik Creek in the study area as having pink salmon present (Johnson and Blossom 2019). It is possible that many North Slope rivers do not support sustained or consistent populations of pink salmon, resulting in highly variable returns in the region. It has been hypothesized that the low sea ice levels in winter 2018-2019 lead to the high numbers of pink salmon returns across the North Slope in summer 2019 (*pers. comm.* V. von Biela).

### *3.2.3. Tag Returns*

A total of 1,893 fish comprised of five species were tagged in 2019, with Arctic grayling accounting for over 75% (Table 5). Broad whitefish, least cisco, humpback whitefish, round whitefish, and burbot accounted for 12%, 6%, 3%, 3%, and less than 1% of tags deployed (Table 5). Nearly 50% of the tagged fish were released at sites W17401, BC2, UBLU 15.0, and W17201. Less than 1% of fish were tagged at sites W18302, W17301, and K1902 and no fish were tagged at site W18405 (Table 5).

There were 658 recaptures of tagged fish in 2019 (Table 6; Appendix E). Arctic grayling comprised nearly 94% of fish recaptured. Broad whitefish, humpback whitefish, round whitefish, least cisco, and burbot accounted for 2%, 2%, 1%, 1%, and less than 1% of fish recaptured. Of the fish recaptured in 2019, two were initially tagged and released in 2014, 70 fish were released in 2017, 427 fish were released in 2018, and the remaining 339 fish were released in 2019 (Appendix E). Approximately 44% of the fish were recaptured at different sites than where they were initially tagged and released from and about 14% of fish were recaptured in different drainages. Recaptured fish were at large for a mean and median of 151.5 and 20.1 days, respectively (Appendix E). The two fish recaptured from 2014 were at large for 1,755 and 1,753 days, increased in length by 61 mm and 31 mm, and were each captured approximately eight river miles from their release location in the Tinmiaqsiugvik River (Figure 8; Appendix E).

In 2019, most fish were recaptured within a few days and miles of where they were initially tagged, however, some fish were at large for several years and traveled considerable distances. An Arctic grayling was tagged and released in Bill's Creek (Tinmiaqsiugvik River tributary) in 2018 and recaptured in 2019 at Willow 4 (Iqalliqpik Creek tributary) over 65 river miles away. The same Arctic grayling was recaptured again two days later in Willow 4, about 5 river miles upstream. Two other Arctic grayling were tagged and released in the Tinmiaqsiugvik River in 2018 and recaptured in 2019 at Willow 4 (Iqalliqpik Creek tributary), over 77 river miles away. Another two Arctic grayling were tagged and released in Tinmiaqsiugvik River in 2014 and were recaptured in 2019 in the same river, approximately 8 miles upstream (Figure 8).

Over the 2017, 2018, and 2019 sampling seasons, a total of 4,912 fish comprised of seven species were tagged and released (Table 7a, Table 7b). Arctic grayling comprised over 71% of total fish tagged, followed by broad whitefish, least cisco, humpback whitefish, and round whitefish (Table 7a). Alaska blackfish and burbot accounted for less than 1% of fish tagged. A total of 1,339 fish were recaptured over the three sampling seasons (Table 7b). Recapture rates differed among species, with Arctic grayling and burbot being the highest, and broad whitefish and humpback whitefish being the lowest (Table 7b). High recapture rates

for Arctic grayling are likely due to individual fish (mostly juveniles) rearing and feeding in proximity to sampling sites, thus being more susceptible to recapture. In contrast, low recapture rates of broad whitefish and humpback whitefish were likely due to fish using the sampling sites as migratory corridors to access feeding habitats (headwater lakes) and spawning and overwintering habitats (Colville River and possibly the lower Tinmiaqsiugvik River), thus less susceptible to recapture.

Fish tagging and recapture results compiled over the 2017, 2018, and 2019 sampling seasons show that fish move seasonally and annually within and among the streams in the study area (Table 8). About 86% of fish were recaptured within the same drainage they were tagged, while 14% were recaptured in different drainages (Table 8, Appendix E). Most fish were recaptured within a few days of being tagged, however, over 33% of fish were at large for over one year, two fish were at large for about four years, and four fish were at large for nearly five years (Appendix E). Most fish were recaptured within a few miles of their initial tagging location, however, some fish traveled more than 80 river miles, showing the importance of habitat connectivity for fish migration and habitat access.

### *3.2.4. Fish Size and Growth*

Differences in Arctic grayling length, growth, and fry production between habitat types and years sampled were detected and are described below in Sections 3.2.4.1 through 3.2.4.5.

#### 3.2.4.1. Tributary and Mainstem Habitat Growth

Differences in juvenile Arctic grayling size distribution, mean FL, and abundance between tributary and mainstem sites by age class were observed. In 2017, size distribution, mean FL, and abundance of nearly all age classes of juvenile Arctic grayling captured in tributary sites were greater than at mainstem sites (Figure 10). Due to low catch rates in mainstem habitats in 2018 and 2019, sample size was not adequate to make comparisons.

Differences in fish size distributions and abundance between tributary and mainstem environments in 2017 were likely a result of differences in habitat. Tributary habitats in the Willow area are often high quality and complex rearing habitats characterized by deep pools connected by shallow runs, vegetated undercut stream banks and channels, and direct connections to lacustrine environments, headwater lakes, and wetlands. In contrast, mainstem habitats are generally less complex, consisting of shifting sand substrates, wide barren floodplains, and frequently lacking vegetated or undercut stream banks that provide cover and food resources for rearing juvenile fish.

#### 3.2.4.2. Tributary Growth

During all years sampled, juvenile Arctic grayling length and growth differed among tributary sites sampled (Figure 12). Mean FL and growth of fish in 2017, 2018 and 2019 were greatest at small tributary sites connected to shallow wetland complexes, ponds, and lakes, such as Willow 1 (site W17101), and smallest at larger, cooler, and faster moving tributaries, such as Judy Creek Kayyaaq (sites JK1702 and JK1703) (Figure 11). Elevated water temperatures in small and slow-moving tributary sites may have accelerated primary production and, in turn, prey densities for rearing Arctic grayling, while slow water velocities may have reduced overall energy expenditure, resulting in increased growth and overall length of fish. Despite differences of juvenile Arctic grayling length and growth among tributary sites, sample size was not sufficient to make further comparisons among them.

#### 3.2.4.3. Spawning and Age-0 Annual Production

Arctic grayling spawning success and annual production in drainages sampled over the 2017, 2018, and 2019 seasons varied. In 2019, age-0 Arctic grayling were captured at 7 of the 11 streams, compared to only 2 of 9 sampled streams in 2018, and 5 of 6 sampled streams in 2017. Age-0 fish abundance also varied over years sampled, with the highest numbers recorded in 2017 (n = 259) and lowest numbers recorded in 2018 (n = 17) and 2019 (n = 36) (Table 9; Figure 15). Despite low catches in 2018 and 2019, fishing effort hours in both those years were nearly triple that of 2017. Willow 4 and Judy Creek Kayyaaq were the only streams age-0 Arctic grayling were captured in all years sampled, which indicates high importance of these habitats. As further described below in Section 3.2.4.4, the size and growth of age-0 fish produced in 2017 was also greater than age-0 fish in 2018 and 2019, which further highlights the large difference in size, growth, and annual production of juvenile Arctic grayling between years sampled.

#### 3.2.4.4. Annual Growth

Size distribution, mean FL, and growth of juvenile Arctic grayling differed between years sampled, with fish attaining a larger size, faster in 2017 than in 2018 and 2019 (Figure 12, Figure 13). In August at the end of the growing season, mean FL of all age classes of juvenile Arctic grayling were significantly greater in 2017 than in 2018 and 2019 (Figure 13).

*Age-0 Fish*

Mean FL of age-0 fish in August 2017, 2018, and 2019 was 64.1 mm, 54.0 mm, and 51.7 mm, respectively (Table 9). Age-0 fish in August 2017 were 10.2 mm and 12.5 mm larger than age-0 fish in 2018 and 2019 (KW= 47.7, $p < 0.0001$) (Table 9; Figure 13). Linear regressions for age-0 fish showed a significant relationship between FL and month in 2017 ($p = 0.01$, $R2 = 0.71$, $n = 259$) and in 2019 ($p = 0.04$, $R2 = 0.33$, $n = 36$). No significant difference between mean FL and month were found in 2018 ($p = 0.09$, $R2 = 0.04$, $n = 17$), due to low sample size (Fig 14. Age-0 growth (difference in mean FL) from July through August in 2017 was 16.1% and 54.4% greater than age-0 growth in 2018 and 2019.

*Age-1 Fish*

Mean FL of age-1 fish in August 2017, 2018, and 2019 was 127.5 mm, 103.0 mm, and 99.6 mm, respectively (Table 9). Age-1 fish in August 2017 were 25.3 mm and 28.7 mm larger than age-1 fish in August 2018 and 2019 (KW = 67.5, $p < 0.0001$) (Table 9; Figure 13). Linear regressions for age-1 fish showed a significant relationship between FL and month in 2017 ($p = < 0.001$, $R2 = 0.66$, $n = 3,254$), 2018 ($p = 0.01$, $R2 = 0.16$, $n = 3,700$), and in 2019 ($p = 0.01$, $R2 = 0.59$, $n = 2,097$) (Figure 14). Age-1 growth (difference in mean FL) from June through August in 2017 was 52.5% and 26.4% greater than in 2018 and 2019.

*Age-2 Fish*

Mean FL of age-2 fish in August 2017, 2018, and 2019 was 183.7 mm, 162.8 mm, and 171.9 mm, respectively (Table 9). Age-2 fish in August 2017 were 21.2 mm and 11.8 mm larger than age-2 fish in August in 2018 and 2019 (KW = 36.8, $p < 0.0001$) (Table 9; Figure 13). Linear regressions for age-2 fish showed a significant relationship between FL and month in 2017 ($p = < 0.001$, $R2 = 0.32$, $n = 1,052$), 2018 ($p = < 0.001$, $R2 = 0.20$, $n = 1,593$), and in 2019 ($p = < 0.001$, $R2 = 0.58$, $n = 3,253$)

(Figure 14). Age-2 growth (difference in mean FL) from June through August in 2017 was 42.5% greater than in 2018, however, was 0.7% less than in 2019.

#### 3.2.4.5. Size and Growth Discussion

Differences in Arctic grayling length, growth, and production between years sampled are likely related to differences in water temperature, flow, and length of the ice-free season. Average water temperatures during June, July, and August were warmer, flows were lower, and the ice-free season was longer in 2017 than in 2018 and 2019 (McFarland et al. 2017, 2018) (Figure 16). As a result, fry production was high and juvenile fish grew faster and larger in 2017 than other years. Age-0 production, growth, and mean fork length of all age classes of juvenile fish were the least in 2018. In 2018, Arctic grayling spawning and age-0 survival were most likely to have been impacted by differences in late May temperatures and high flows during and after spawning. Spawning initiates immediately after spring break-up, when daily maximum water temperatures reach about 4°C. Most spawning tributaries in the Willow area approached 4°C nearly two weeks later in 2018 than 2017, which appeared to result in a mostly failed spawning year in 2018. The low numbers and small size of age-0 Arctic grayling produced in spring 2018 is likely the result of the late spring warm-up and prolonged break-up period characterized by high flows and continued cool water temperatures. This extended cold period in 2018 delayed spawning, prolonged incubation, reduced survival, and shortened the overall growing season by 16% when compared to 2017.

In 2019, growth rates of age-2 Arctic grayling were higher than in 2017, yet lower for age-0 and age-1 fish. Growth rate differences may have been attributed to differences in stream flow and swimming capabilities of different sized fish. Flow conditions in 2019 were higher than previous years sampled, particularly in August (Figure 16). Season-long high water and flooding conditions inundated areas that in 2017 and 2018 were dry, resulting in increased rearing habitat available to fish capable of swimming upstream to access it, such as age-2 Arctic grayling. In contrast, high flows and water velocities may have created a two-fold disadvantage for smaller fish, particularly age-0 Arctic grayling, by 1) reducing access to rearing habitats due to limited swimming capabilities and 2), increasing energy expenditure in attempts to access such habitats. Results from this analysis demonstrate the high annual variance in fish growth and production in the Arctic.

# 4. CONCLUSIONS

The results of sampling from the 2017, 2018, and 2019 seasons indicate that study area streams are used by fish species common to the region, including Alaska blackfish, Arctic grayling, broad whitefish, burbot, chum salmon, humpback whitefish, least cisco, ninespine stickleback, pink salmon, round whitefish, slimy sculpin, and sockeye salmon. Resident fish were captured at all sites, while anadromous fish were captured at all sites except Willow 1 and Willow 3. Excluding ninespine stickleback, catch rates from 2017, 2018, 2019 for nearly all species decreased, except for pink salmon which were only captured in 2019. Fish species composition across sampling seasons remained relatively similar, with ninespine stickleback accounting for the majority of total catch, followed by Arctic grayling, broad whitefish, least cisco, and round whitefish. Fish length frequency distribution by month indicates that juvenile fish tend to use project area streams later in the season than larger sized adults, indicating that overwintering habitats are not nearby most project area streams. Trends in fish movement show the bulk of fish moving upstream in June and early-July, immediately after spring break-up, and downstream in August, prior to freeze-up. Fish tagging and recapture results suggest fish move seasonally and annually within and among drainages in the study area. Size distribution, mean FL, and growth of juvenile Arctic grayling differed between years sampled, with fish growing larger and faster in 2017 than in 2018 and 2019. Arctic grayling spawning success and annual production in drainages sampled over the 2017, 2018, and 2019 seasons varied, with the highest numbers of age-0 fish recorded in 2017 and lowest numbers recorded in 2018 and 2019. Variation in fish size, growth, and production between sites and years sampled highlights the large annual differences in juvenile production and growth in the Arctic.

# 5. REFERENCES

Bendock, T.N. and J. Burr. 1984. Freshwater fish distributions in the Central Arctic Coastal Plain (Ikpikpuk River to Colville River). Alaska Department of Fish and Game, Sport Fish Division, Fairbanks, AK. 52p.

BLM. 2013. Record of Decision: National Petroleum Reserve-Alaska, Integrated Activity Plan. U.S. Department of the Interior. Bureau of Land Management. Anchorage, AK. 114p.

Irvine, J.R., R.W. Macdonald, R.J. Brown, L. Godbout, J.D. Reist, and E.C. Carmack. 2009. Salmon in the Arctic and how they avoid lethal low temperatures. N. Pac. Anadr. Fish Comm. Bull. 5:39-50.

McFarland, J.J., W. Morris, C.R. Moulton, and L.L. Moulton. 2017. Fish populations in waterbodies of the Willow Project Area: 2017. Report by Owl Ridge Natural Resource Consultants, Inc. to ConocoPhillips Alaska, Inc. Anchorage, AK.

McFarland, J.J., W. Morris, C.R. Moulton, and L.L. Moulton. 2019. Fish populations in waterbodies of the Willow Project Area: 2018. Report by Owl Ridge Natural Resource Consultants, Inc. to ConocoPhillips Alaska, Inc. Anchorage, AK.

McFarland, J.J., M.S. Wipfli, and M.S. Whitman. 2017. Trophic pathways supporting Arctic Grayling in a small stream on the Arctic Coastal Plain, Alaska. Ecology of Freshwater Fish. 14p.

Morris, W. 2003. Seasonal movements and habitat use of arctic grayling (Thymallus arcticus), burbot (Lota lota), and broad whitefish (Coregonus nasus) within the Fish Creek drainage of the National Petroleum Reserve-Alaska, 2001-2002. Alaska Department of Natural Resources, Office of Habitat Management and Permitting. Technical Report No. 03-02. Fairbanks, AK. 71p. + appendices.

Moulton, L.L. 2000a. Fish utilization of lakes in eastern NPR-A – 1999. Report by MJM Research to ARCO Alaska Inc. Lopez Island, WA. 248p.

Moulton, L.L. 2000b. Fish utilization of lakes in eastern NPR-A – 1999-2000. Report by MJM Research to ARCO Alaska Inc. Lopez Island, WA. 124p.

Moulton, L.L. 2001a. Fish utilization of lakes in eastern NPR-A: 1999-2001. Report by MJM Research to Phillips Alaska Inc. Lopez Island, WA. 83p.

Moulton, L.L. 2001b. Harvest estimate and associated information for the 2000 Colville River fall fishery. Report by MJM Research to Phillips Alaska, Inc and BP Exploration (Alaska). Lopez Island, WA. 53p. + appendices.

Moulton, L.L. 2002. Baseline surveys of fish habitats in eastern NPR-A: 2001. Report by MJM Research to Phillips Alaska, Inc. Lopez, Island., WA. 130p.

Moulton, L.L. 2003. Fish utilization of lakes in eastern NPR-A: 1999-2001. Report by MJM Research to Phillips Alaska, Inc. Lopez, Island., WA. 83p.

Moulton, L.L. 2005. Baseline surveys of fish habitats in eastern NPR-A: 2004. Report by MJM Research to ConocoPhillips Alaska, Inc. and Anadarko Petroleum Co. Lopez Island., WA. 33p. + appendices.

Moulton, L.L. 2006. Monitoring fish populations in the Ublutuoch River drainage in eastern NPR-A: 2004-2005. Report by MJM Research to ConocoPhillips Alaska, Inc. and Anadarko Petroleum Co. Lopez Island., WA. 28p. + appendices.

Moulton, L.L. 2009. Fish populations in streams to be crossed by a proposed road to the GMT-1 well pad in eastern NPR-A: 2009. Report by MJM Research to ConocoPhillips Alaska, Inc. and Anadarko Petroleum Co. Lopez Island., WA. 20.p + appendices.

Moulton, L.L. and C.R. Moulton. 2014. Fish populations in streams to be crossed by a proposed road to the GMT-1 well pad in eastern NPR-A: 2013. Report by MJM Research to ConocoPhillips Alaska, Inc. and Anadarko Petroleum Co. Lopez Island., WA. 30p. + appendices.

Moulton, L.L. and J. Seigle. 2007. Monitoring fish populations in the Ublutuoch River drainage in eastern NPR-A: 2004-2006. Report by MJM Research to ConocoPhillips Alaska, Inc. and Anadarko Petroleum Co. Lopez Island., WA. 28p. + appendices.

Netsch, N., E. Crateau, G. Love and N. Swanton. 1977. Freshwater fisheries reconnaissance of the coastal plain of National Petroleum Reserve-Alaska (NPR-A), July and August 1977. Preliminary report. USDI: U.S. Fish and Wildlife Service. Anchorage, AK. 214p.

# TABLES

**Table 1. Sampling locations and dates from streams surveyed in 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Sites | Location | 2017 Dates Fished | 2017 Latitude (NAD83) | 2017 Longitude (NAD83) | 2018 Dates Fished | 2018 Latitude (NAD83) | 2018 Longitude (NAD83) | 2019 Dates Fished | 2019 Latitude (NAD83) | 2019 Longitude (NAD83) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fyke Net Sites** | | | | | | | | | | |
| **Tinmiaqsiugvik River Sites** | | | | | | | | | | |
| UBLU 15.0 | Tinmiaqsiugvik River | - | - | - | - | - | - | Jun 13-19 | 70.23514 | -151.28639 |
| | | - | - | - | - | - | - | Jul 18-24 | 70.23514 | -151.28639 |
| | | - | - | - | - | - | - | Aug 21-27 | 70.23514 | -151.28639 |
| **Tinmiaqsiugvik River Tributary Sites** | | | | | | | | | | |
| BC1 | Bills Creek | - | - | - | Jun 21-28 | 70.21243 | -151.24730 | - | - | - |
| | | - | - | - | Jul 18-25 | 70.21230 | -151.24742 | - | - | - |
| | | - | - | - | Aug 22-29 | 70.21230 | -151.24742 | - | - | - |
| BC2 | Bills Creek | - | - | - | - | - | - | Jun 13-19 | 70.23598 | -151.28456 |
| | | - | - | - | - | - | - | Jul 18-24 | 70.23598 | -151.28456 |
| | | - | - | - | - | - | - | Aug 21-27 | 70.23598 | -151.28456 |
| **Uvlutuuq Creek Sites** | | | | | | | | | | |
| FC1801 | Fish Creek | - | - | - | Jun 24-Jul 2 | 70.25113 | -152.18906 | Jun 13-19 | 70.25047 | -152.18526 |
| | | - | - | - | Jul 18-25 | 70.25000 | -152.18979 | Jul 18-24 | 70.25047 | -152.18526 |
| | | - | - | - | Aug 22-29 | 70.25111 | -152.18286 | Aug 21-27 | 70.25047 | -152.18526 |
| **Uvlutuuq Creek Tributary Sites** | | | | | | | | | | |
| FT1802 | Willow 8 | - | - | - | Jun 23-30 | 70.26294 | -152.18381 | Jun 13-19 | 70.26345 | -152.18295 |
| | | - | - | - | Jul 18-25 | 70.26294 | -152.18381 | Jul 18-24 | 70.26345 | -152.18295 |
| | | - | - | - | Aug 22-29 | 70.26289 | -152.18391 | Aug 21-27 | 70.26345 | -152.18295 |
| FT1803 | Willow 8 | - | - | - | Jun 23-30 | 70.27795 | -152.18988 | Jun 13-19 | 70.27886 | -152.18787 |
| | | - | - | - | Jul 18-25 | 70.27795 | -152.18988 | Jul 18-24 | 70.27886 | -152.18787 |
| | | - | - | - | Aug 22-29 | 70.27795 | -152.18988 | Aug 21-27 | 70.27886 | -152.18787 |
| **Kalikpik River Sites** | | | | | | | | | | |
| K1802 | Kalikpik River | - | - | - | Jun 23-30 | 70.31631 | -152.24010 | - | - | - |
| | | - | - | - | Jul 18-25 | 70.31591 | -152.23885 | - | - | - |
| | | - | - | - | Aug 22-29 | 70.31591 | -152.23885 | - | - | - |
| K1902 | Kalikpik River | - | - | - | - | - | - | Jun 13-19 | 70.30552 | -152.24213 |
| | | - | - | - | - | - | - | Jul 18-24 | 70.30552 | -152.24213 |
| | | - | - | - | - | - | - | Aug 21-27 | 70.30552 | -152.24213 |

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| | | | 2017 | | | 2018 | | | 2019 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sites | | Location | Dates Fished | Latitude (NAD83) | Longitude (NAD83) | Dates Fished | Latitude (NAD83) | Longitude (NAD83) | Dates Fished | Latitude (NAD83) | Longitude (NAD83) |
| **Kalikpik River Tributary Sites** | | | | | | | | | | | |
| | W19601 | Willow 6 | - | - | - | - | - | - | Jun 13-19 | 70.30598 | -152.23984 |
| | | | - | - | - | - | - | - | Jul 18-24 | 70.30598 | -152.23984 |
| | | | - | - | - | - | - | - | Aug 21-27 | 70.30598 | -152.23984 |
| **Iqalliqpik Creek Sites** | | | Jun 17-24 | 70.18578 | -151.96089 | - | - | - | - | - | - |
| | J1701 | | Jul 21-28 | 70.18578 | -151.96089 | - | - | - | - | - | - |
| | | | Aug 27-30 | 70.18578 | -151.96089 | - | - | - | - | - | - |
| | J1702 | | Aug 27-Sept 2 | 70.15047 | -152.08235 | - | - | - | - | - | - |
| | J1703 | | Jul 21-28 | 70.146 | -152.108 | - | - | - | - | - | - |
| | J1704 | | Jun 17-24 | 70.14725 | -152.12787 | - | - | - | - | - | - |
| **Iqalliqpik Creek Tributary Sites** | | | | | | - | - | - | - | - | - |
| | JK1701 | Judy Creek Kayyaaq | Jun 17-19 | 70.20281 | -152.07515 | - | - | - | - | - | - |
| | JK1702 | Judy Creek Kayyaaq | Jun 17-24 | 70.18517 | -152.12392 | - | - | - | - | - | - |
| | | | Jul 21-28 | 70.18517 | -152.12392 | - | - | - | - | - | - |
| | JK1703 | Judy Creek Kayyaaq | - | - | - | Jun 24-Jul 1 | 70.18057 | -152.14136 | Jun 13-19 | 70.18286 | -152.14462 |
| | | | - | - | - | Jul 18-25 | 70.18057 | -152.14136 | Jul 18-24 | 70.18286 | -152.14462 |
| | | | Aug 26-Sep 2 | 70.18068 | -152.14101 | Aug 22-29 | 70.18075 | -152.14096 | Aug 21-27 | 70.18286 | -152.14462 |
| | W17101 | Willow 1 | Jun 17-24 | 70.16694 | -151.86176 | Jun 21-30 | 70.16703 | -151.85899 | Jun 13-19 | 70.16694 | -151.86070 |
| | | | Jul 21-28 | 70.16694 | -151.86176 | Jul 18-25 | 70.16710 | -151.85893 | Jul 18-24 | 70.16694 | -151.86070 |
| | | | Aug 28-Sep 2 | 70.16694 | -151.86176 | Aug 22-29 | 70.16710 | -151.85893 | Aug 21-27 | 70.16694 | -151.86070 |
| | W17201 | Willow 2 | Jun 18-24 | 70.17058 | -151.94106 | Jun 23-30 | 70.17316 | -151.94376 | Jun 13-19 | 70.16879 | -151.93584 |
| | | | - | - | - | Jul 18-25 | 70.17319 | -151.94368 | Jul 18-24 | 70.16879 | -151.93584 |
| | | | - | - | - | Aug 23-29 | 70.17323 | -151.94398 | Aug 21-27 | 70.16879 | -151.93584 |
| | W17202 | Willow 2 | Jun 18-19 | 70.15627 | -151.93256 | - | - | - | - | - | - |
| | | | Jul 24-28 | 70.15627 | -151.93256 | - | - | - | - | - | - |

**Table 1. Sampling locations and dates from streams surveyed in 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

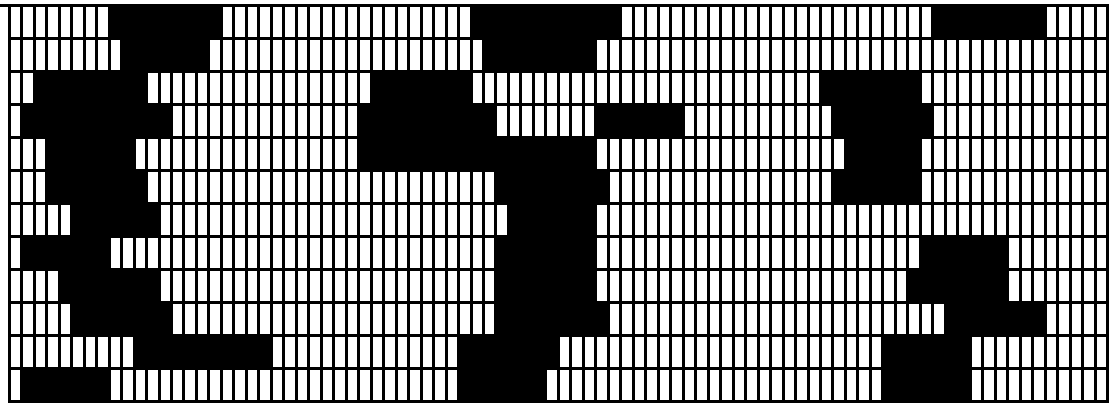
| Sites | | Location | 2017 Dates Fished | 2017 Latitude (NAD83) | 2017 Longitude (NAD83) | 2018 Dates Fished | 2018 Latitude (NAD83) | 2018 Longitude (NAD83) | 2019 Dates Fished | 2019 Latitude (NAD83) | 2019 Longitude (NAD83) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | W17203 | Willow 2 | Jul 21-28 | 70.1405 | -151.95709 | - | - | - | - | - | - |
| | | | Aug 26-Sep 2 | 70.1405 | -151.95709 | - | - | - | - | - | - |
| | W18204 | Willow 2 | - | - | - | Jun 23-Jul 1 | 70.13928 | -151.96359 | Jun 13-19 | 70.13928 | -151.96371 |
| | | | - | - | - | Jul 18-25 | 70.13923 | -151.96373 | Jul 18-24 | 70.13928 | -151.96371 |
| | | | - | - | - | Aug 22-29 | 70.13923 | -151.96373 | Aug 21-27 | 70.13928 | -151.96371 |
| | W17301 | Willow 3/Lake M0015 | - | - | - | - | - | - | Jun 14-19 | 70.11221 | -152.07718 |
| | | | Jul 21-24 | 70.11221 | -152.07718 | Jul 18-21 | 70.11221 | -152.07718 | Jul 18-24 | 70.11221 | -152.07718 |
| | | | - | - | - | - | - | - | Aug 21-27 | 70.11221 | -152.07718 |
| | W18302 | Willow 3 | - | - | - | Jun 26-Jul 2 | 70.12409 | -152.11249 | Jun 14-19 | 70.12417 | -152.11244 |
| | | | - | - | - | Jul 18-25 | 70.12419 | -152.11252 | Jul 18-24 | 70.12417 | -152.11244 |
| | | | - | - | - | Aug 22-29 | 70.12419 | -152.11252 | Aug 21-27 | 70.12417 | -152.11244 |
| | W17401 | Willow 4 | Jun 17-24 | 70.09472 | -152.1824 | - | - | - | Jun 13-19 | 70.09484 | -152.12231 |
| | | | Jul 21-28 | 70.09472 | -152.1824 | Jul 18-25 | 70.09472 | -152.18240 | Jul 18-24 | 70.09484 | -152.12231 |
| | | | Aug 26-Sep 2 | 70.09472 | -152.1824 | Aug 22-29 | 70.09472 | -152.18240 | Aug 21-27 | 70.09484 | -152.12231 |
| | W18401 | Willow 4 | - | - | - | Jun 23-Jul 2 | 70.07395 | -152.20070 | Jun 13-19 | 70.07395 | -152.20070 |
| | | | - | - | - | Jul 18-25 | 70.07395 | -152.20070 | Jul 18-24 | 70.07395 | -152.20070 |
| | | | - | - | - | Aug 22-29 | 70.07394 | -152.20074 | Aug 21-27 | 70.07395 | -152.20070 |
| | W18402 | Willow 4 | - | - | - | Jun 23-30 | 70.08125 | -152.12788 | Jun 13-19 | 70.08125 | -152.12788 |
| | | | - | - | - | Jul 18-25 | 70.07998 | -152.13721 | Jul 18-24 | 70.08125 | -152.12788 |
| | | | - | - | - | Aug 22-29 | 70.07998 | -152.13721 | Aug 21-27 | 70.08125 | -152.12788 |
| | W18405 | Willow 4 | - | - | - | Jun 23-30 | 70.03282 | -152.19400 | Jun 14-19 | 70.03360 | -152.19516 |
| | | | - | - | - | Jul 18-25 | 70.03604 | -152.20155 | Jul 18-24 | 70.03360 | -152.19516 |
| | | | - | - | - | Aug 22-29 | 70.03604 | -152.20155 | Aug 21-27 | 70.03360 | -152.19516 |
| **Seine and Dip Net Sites** | | | | | | | | | | | |
| | SW7 | Unnamed wetland tributary of Iqalliqpik Creek | 24-Jun | 70.19886 | -152.25694 | - | - | - | 22-Aug | 70.19877 | -152.25656 |
| | SN172 | Unnamed wetland tributary of Willow 3 | 24-Jun | 70.11557 | -152.09387 | - | - | - | - | - | - |

**Table 1. Sampling locations and dates from streams surveyed in 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | | 2017 | | | 2018 | | | 2019 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sites | | Location | Dates Fished | Latitude (NAD83) | Longitude | Dates Fished | Latitude (NAD83) | Longitude | Dates Fished | Latitude (NAD83) | Longitude |
| | SW14 | Unnamed wetland tributary to Willow 3 | - | - | - | 18-Jul | 70.123543 | -152.07906 | 22-Aug | 70.12354 | -152.07907 |
| | SW23 | Unnamed wetland tributary of Kalikpik River | - | - | - | 1-Jul | 70.31355 | -152.21393 | 23-Aug | 70.31353 | -152.21405 |
| | SW2 | Unnamed wetland tributary of Iqalliqpik Creek | - | - | - | 1-Jul | 70.12873 | -152.06277 | 22-Aug | 70.12819 | -152.06237 |
| | SN18102 | Unnamed wetland tributary of Willow 1 | - | - | - | 1-Jul | 70.24829 | -152.18876 | 23-Aug | 70.15169 | -151.82127 |
| | SN1820 | Unnamed wetland tributary of Uvlutuuq Creek | - | - | - | 1-Jul | 70.24829 | -152.18875 | 23-Aug | 70.24854 | -152.18726 |
| | SW1/SW8 | Unnamed wetland tributary of Iqalliqpik Creek | - | - | - | 1-Jul | 70.13580 | -152.01340 | 23-Aug | 70.13614 | -152.01369 |
| | SW2019 | Unnamed wetland tributary of Judy Creek Kayyaaq | - | - | - | - | - | - | 22-Aug | 70.19144 | -152.11200 |

**Table 2. Fyke net effort at sampling sites in 2001-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Year | Days | Sets | Effort (hours) |
|---|---|---|---|
| 2001 | 30 | 111 | 2,707 |
| 2002 | 16 | 83 | 1,954 |
| 2003 | 24 | 129 | 3,082 |
| 2004 | 38 | 192 | 4,594 |
| 2005 | 32 | 189 | 4,570 |
| 2006 | 24 | 123 | 2,935 |
| 2009 | 14 | 82 | 2,038 |
| 2013 | 22 | 101 | 2,592 |
| 2014 | 24 | 117 | 2,832 |
| 2017 | 24 | 155 | 3,714 |
| 2018 | 25 | 418 | 8,323 |
| 2019 | 21 | 421 | 10,185 |
| **Totals:** | **294** | **2,121** | **49,525** |




Note: Black cells represent sample timing.

**Table 3. Comparison of a) number of fish caught, and b) catch per unit effort (CPUE; fish per 24 hours) across fyke net sites in the Northeastern NPR-A, 2019, ConocoPhillips Alaska, Inc.**

**a)**

| | Bills Creek | Uvlutuuq Creek | Uvlutuuq Creek Tributaries (Willow 8) | | Judy Creek Kayyaaq | Kalikpik River | Kalikpik River Tributary (Willow 6) | Tinmiaqsiugvik River | Willow 1 | Willow 2 | | Willow 3 | | Willow 4 | | | | 2019 | 2019 | 2019 % Total (excluding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | BC2 | FC1801 | FT1802 | FT1803 | JK1703 | K1902 | W19601 | UBLU 15.0 | W17101 | W17201 | W18204 | W17301 | W18302 | W17401 | W18401 | W18402 | W18405 | **Total Catch** | **% Total** | Stickleback) |
| Alaska blackfish | -- | -- | 1 | 2 | 1 | -- | 3 | -- | 7 | 1 | -- | 12 | -- | 1 | 6 | -- | 6 | 40 | 0.1 | 0.4 |
| Arctic grayling | 917 | 41 | 166 | 216 | 234 | 26 | 411 | 724 | 754 | 1442 | 1140 | 3 | 16 | 1176 | 325 | 380 | 2 | 7973 | 14.1 | 82.2 |
| Broad whitefish | 144 | 86 | 68 | -- | 11 | 3 | 2 | 13 | -- | 15 | 5 | -- | -- | 37 | 7 | 7 | -- | 398 | 0.7 | 4.1 |
| Burbot | 1 | 4 | -- | 16 | -- | -- | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 23 | < 0.1 | 0.2 |
| Chum salmon | 4 | -- | 2 | -- | -- | -- | -- | 2 | -- | 2 | 1 | -- | -- | 1 | -- | -- | -- | 12 | 0.0 | 0.1 |
| Humpback whitefish | 55 | -- | 3 | -- | 3 | -- | -- | 17 | -- | -- | -- | -- | -- | 1 | 3 | -- | -- | 82 | 0.1 | 0.8 |
| Least cisco | 17 | 13 | 8 | -- | 35 | 13 | 102 | 6 | -- | 17 | 1 | -- | -- | 98 | 39 | 7 | -- | 356 | 0.6 | 3.7 |
| Ninespine stickleback | 13 | 7 | 8 | 1002 | 268 | 5 | 9 | 9 | 614 | 109 | 95 | 27059 | 367 | 148 | 147 | 1314 | 15535 | 46709 | 82.8 | 0.0 |
| Pink salmon | 24 | 1 | 270 | -- | -- | -- | -- | 10 | -- | 136 | 1 | -- | -- | 123 | -- | 1 | -- | 566 | 1.0 | 5.8 |
| Round whitefish | 46 | -- | 2 | -- | 4 | 1 | -- | 22 | -- | 14 | 4 | -- | -- | 18 | 2 | 5 | -- | 118 | 0.2 | 1.2 |
| Slimy sculpin | 3 | 2 | -- | -- | 1 | -- | -- | 8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14 | < 0.1 | 0.1 |
| Threespine stickleback | -- | 2 | -- | -- | 7 | 18 | 68 | -- | -- | -- | -- | -- | -- | 11 | -- | 1 | -- | 107 | 0.2 | 1.1 |
| **Total Catch** | 1224 | 161 | 528 | 1236 | 564 | 66 | 597 | 811 | 1375 | 1736 | 1247 | 27074 | 383 | 1614 | 529 | 1715 | 15543 | 56403 | 100.00 | 100.00 |
| **Number of Species** | 10 | 8 | 9 | 4 | 9 | 6 | 7 | 9 | 3 | 8 | 7 | 3 | 2 | 10 | 7 | 7 | 3 | 12 | 12 | 11 |
| **Effort (hours)** | 833.7 | 492.4 | 503.9 | 499.8 | 816.6 | 503.7 | 837.1 | 642.3 | 504.3 | 827.3 | 504.8 | 475.1 | 476.3 | 806.9 | 480 | 500.8 | 480 | 10185 | 10185 | 10185 |

**b)**

| | Bills Creek | Uvlutuuq Creek | Uvlutuuq Creek Tributaries (Willow 8) | | Judy Creek Kayyaaq | Kalikpik River | Kalikpik River Tributary (Willow 6) | Tinmiaqsiugvik River | Willow 1 | Willow 2 | | Willow 3 | | Willow 4 | | | | 2019 Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | BC2 | FC1801 | FT1802 | FT1803 | JK1703 | K1902 | W19601 | UBLU 15.0 | W17101 | W17201 | W18204 | W17301 | W18302 | W17401 | W18401 | W18402 | W18405 | **CPUE** |
| Alaska blackfish | -- | -- | 0.0 | 0.1 | 0.0 | -- | 0.1 | -- | 0.3 | 0.0 | -- | 0.6 | -- | 0.0 | 0.3 | -- | 0.3 | 0.1 |
| Arctic grayling | 26.4 | 2.0 | 7.9 | 10.4 | 6.9 | 1.2 | 11.8 | 27.1 | 35.9 | 41.8 | 54.2 | 0.2 | 0.8 | 35.0 | 16.3 | 18.2 | 0.1 | 18.8 |
| Broad whitefish | 4.1 | 4.2 | 3.2 | -- | 0.3 | 0.1 | 0.1 | 0.5 | -- | 0.4 | 0.2 | -- | -- | 1.1 | 0.4 | 0.3 | -- | 0.9 |
| Burbot | 0.0 | 0.2 | -- | 0.8 | -- | -- | 0.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.1 |
| Chum salmon | 0.1 | -- | 0.1 | -- | -- | -- | -- | 0.1 | -- | 0.1 | 0.0 | -- | -- | 0.0 | -- | -- | -- | 0.0 |
| Humpback whitefish | 1.6 | -- | 0.1 | -- | 0.1 | -- | -- | 0.6 | -- | -- | -- | -- | -- | 0.0 | 0.2 | -- | -- | 0.2 |
| Least cisco | 0.5 | 0.6 | 0.4 | -- | 1.0 | 0.6 | 2.9 | 0.2 | -- | 0.5 | 0.0 | -- | -- | 2.9 | 2.0 | 0.3 | -- | 0.8 |
| Ninespine stickleback | 0.4 | 0.3 | 0.4 | 48.1 | 7.9 | 0.2 | 0.3 | 0.3 | 29.2 | 3.2 | 4.5 | 1366.9 | 18.5 | 4.4 | 7.4 | 63.0 | 776.8 | 110.1 |
| Pink salmon | 0.7 | 0.0 | 12.9 | -- | -- | -- | -- | 0.4 | -- | 3.9 | 0.0 | -- | -- | 3.7 | -- | 0.0 | -- | 1.3 |
| Round whitefish | 1.3 | -- | 0.1 | -- | 0.1 | 0.0 | -- | 0.8 | -- | 0.4 | 0.2 | -- | -- | 0.5 | 0.1 | 0.2 | -- | 0.3 |
| Slimy sculpin | 0.1 | 0.1 | -- | -- | 0.0 | -- | -- | 0.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 |
| Threespine stickleback | -- | 0.1 | -- | -- | 0.2 | 0.9 | 1.9 | -- | -- | -- | -- | -- | -- | 0.3 | -- | 0.0 | -- | 0.3 |
| **2019 Total CPUE** | 35.2 | 7.6 | 25.1 | 59.4 | 16.6 | 3.1 | 17.1 | 30.3 | 65.4 | 50.4 | 59.3 | 1367.7 | 19.3 | 48.0 | 26.5 | 82.2 | 777.2 | 132.9 |
| **2019 Total CPUE (excluding stickleback)** | 34.9 | 7.3 | 24.8 | 11.2 | 8.7 | 2.9 | 16.9 | 30.0 | 36.2 | 47.2 | 54.8 | 0.8 | 0.8 | 43.6 | 19.1 | 19.2 | 0.4 | 22.8 |

**Table 4. Total fish catch a), and catch rate (CPUE; fish per 24 hours) b) of 2017-2019 sampling seasons in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**a)**

| | 2017 | | | 2018 | | | 2019 | | |
|---|---|---|---|---|---|---|---|---|---|
| **Species** | **Total Catch** | **% Total** | **% Total** (excluding stickleback) | **Total Catch** | **% Total** | **% Total** (excluding stickleback) | **Total Catch** | **% Total** | **% Total** (excluding stickleback) |
| Alaska blackfish | 98 | < 0.1 | 1.4 | 56 | < 0.1 | 0.6 | 40 | 0.1 | 0.4 |
| Arctic grayling | 5785 | 15.2 | 85.2 | 7400 | 6.2 | 77.8 | 7973 | 14.1 | 82.2 |
| Broad whitefish | 465 | 1.2 | 6.8 | 608 | 0.5 | 6.4 | 398 | 0.7 | 4.1 |
| Burbot | 1 | < 0.1 | < 0.1 | 5 | < 0.1 | < 0.01 | 23 | < 0.1 | 0.2 |
| Chum salmon | 11 | < 0.1 | < 0.1 | 3 | < 0.1 | < 0.01 | 12 | 0.0 | 0.1 |
| Humpback whitefish | 33 | < 0.1 | < 0.1 | 125 | < 0.1 | 1.3 | 82 | 0.1 | 0.8 |
| Least cisco | 293 | 0.8 | 4.3 | 1171 | 1.0 | 12.3 | 356 | 0.6 | 3.7 |
| Ninespine stickleback | 31224 | 82.1 | 0.0 | 110171 | 92.1 | 0.0 | 46709 | 82.8 | 0.0 |
| Pink salmon | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 566 | 1.0 | 5.8 |
| Round whitefish | 89 | < 0.1 | 1.3 | 136 | < 0.1 | 1.4 | 118 | 0.2 | 1.2 |
| Slimy sculpin | 14 | < 0.1 | < 0.1 | 3 | < 0.1 | < 0.1 | 14 | < 0.1 | 0.1 |
| Sockeye salmon | 4 | < 0.1 | < 0.1 | 1 | < 0.1 | < 0.1 | 0 | 0.0 | 0.0 |
| Threespined stickleback | 0 | 0.0 | 0.0 | 3 | < 0.1 | < 0.1 | 107 | 0.2 | 1.1 |
| **Total** | 38017 | 100 | 100 | 119682 | 100 | 100 | 56403 | 100 | 100 |
| **Number of Species** | 11 | 11 | 10 | 12 | 12 | 11 | 12 | 12 | 11 |

**b)**

| | CPUE (fish per 24 hours) | | | |
|---|---|---|---|---|
| **Species** | **2017** | **2018** | **2019** | **Net Difference** |
| Alaska blackfish | 0.58 | 0.16 | 0.09 | -0.49 |
| Arctic grayling | 34.27 | 21.34 | 18.79 | -15.48 |
| Broad whitefish | 2.75 | 1.75 | 0.94 | -1.82 |
| Burbot | 0.01 | 0.01 | 0.05 | 0.05 |
| Chum salmon | 0.07 | 0.01 | 0.03 | -0.04 |
| Humpback whitefish | 0.20 | 0.36 | 0.19 | 0.00 |
| Least cisco | 1.74 | 3.38 | 0.84 | -0.90 |
| Ninespine stickleback | 184.95 | 317.69 | 110.07 | -74.89 |
| Pink salmon | 0.00 | 0.00 | 1.33 | 1.33 |
| Round whitefish | 0.53 | 0.39 | 0.28 | -0.25 |
| Slimy sculpin | 0.08 | 0.01 | 0.03 | -0.05 |
| Sockeye salmon | 0.00 | 0.02 | 0.00 | 0.00 |
| Threespined stickleback | 0.00 | 0.01 | 0.25 | 0.25 |
| **Total CPUE** | 225.19 | 345.12 | 132.90 | -92.29 |
| **Total CPUE** (excluding stickleback) | 40.24 | 27.43 | 22.83 | -17.40 |
| **Number of Species** | 11 | 12 | 12 | - |

**Table 5. Fish tagged and released by site in 2019, Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | Bills Creek | Uvlutuuq Creek | Uvlutuuq Creek Tributaries (Willow 8) | | Judy Creek Kayyaaq | Kalikpik River | Kalikpik River Tributary (Willow 6) | Tinmiaqsiu-gvik River | Willow 1 | Willow 2 | | Willow 3 | | Willow 4 | | | | Total fish released | % Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | BC2 | FC1801 | FT1802 | FT1803 | JK1703 | K1902 | W19601 | UBLU 15.0 | W17101 | W17201 | W18204 | W17301 | W18302 | W17401 | W18401 | W18402 | W18405 | | |
| Arctic grayling | 202 | 11 | 26 | 36 | 26 | 5 | 70 | 228 | 64 | 125 | 72 | 2 | 1 | 339 | 143 | 79 | -- | 1429 | 75.5 |
| Broad whitefish | 83 | 1 | 65 | -- | 3 | 1 | 1 | 11 | -- | 10 | 2 | -- | -- | 35 | 6 | 4 | -- | 222 | 11.7 |
| Burbot | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 0.1 |
| Humpback whitefish | 43 | -- | 2 | -- | 2 | -- | -- | 14 | -- | -- | -- | -- | -- | 1 | 3 | -- | -- | 65 | 3.4 |
| Least cisco | 13 | 7 | 6 | -- | 8 | 3 | 18 | 3 | -- | 9 | 1 | -- | -- | 27 | 11 | 1 | -- | 107 | 5.7 |
| Round whitefish | 16 | -- | 2 | -- | 2 | 1 | -- | 13 | -- | 5 | 4 | -- | -- | 14 | 2 | 4 | -- | 63 | 3.3 |
| **Total fish released** | 358 | 25 | 101 | 36 | 41 | 10 | 89 | 269 | 64 | 149 | 79 | 2 | 1 | 416 | 165 | 88 | -- | 1893 | 100 |
| **% Total** | 18.9 | 1.3 | 5.3 | 1.9 | 2.2 | 0.5 | 4.7 | 14.2 | 3.4 | 7.9 | 4.2 | 0.1 | 0.1 | 22.0 | 8.7 | 4.6 | 0.0 | 100.0 | |

**Table 6. Fish recapture locations from 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | 2019 Recapture Sites | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bill's Creek | Fish Creek Uvlutuuq | Fish Creek Uvlutuuq Tribs. (Willow 8) | | Judy Creek Kayyaaq | Kalikpik River | Kalikpik River Trib. (Willow 6) | Tinmiaqsiu-gvik River Ublutuoch | Willow 1 | Willow 2 | | Willow 3 | | Willow 4 | | | | |
| **Release Sites - 2019 and earlier** | | BC2 | FC1801 | FT1802 | FT1803 | JK1703 | K1902 | W19601 | UBLU 15.0 | W17101 | W17201 | W18204 | W17301 | W18302 | W17401 | W18401 | W18402 | W18405 | **Total** |
| **Bill's Creek** | BC1* | 61 | - | - | - | - | - | - | 5 | - | - | - | - | - | 1 | 1 | - | - | **68** |
| | BC2 | 68 | - | - | - | - | - | - | 6 | - | - | - | - | - | - | - | - | - | **74** |
| **Fish Creek Uvlutuuq** | FC1801 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **1** |
| **Fish Creek Uvlutuuq Tribs. (Willow 8)** | FT1802 | - | 2 | 8 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **10** |
| | FT1803 | - | - | - | 14 | - | - | - | - | - | - | - | - | - | - | - | - | - | **14** |
| **Judy Creek Kayyaaq** | JK1702* | 1 | - | - | - | - | - | - | - | - | 5 | 1 | - | - | - | - | - | - | **7** |
| | JK1703 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | **1** |
| **Kalikpik River** | K1902 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **0** |
| **Kalikpik River Trib. (Willow 6)** | W19601 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | **1** |
| **Tinmiaqsiugvik River Ublutuoch** | U0901* | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | **2** |
| | UB26* | 5 | - | - | - | - | - | - | 14 | - | - | - | - | - | 2 | - | - | - | **21** |
| | UBLU 15.0 | 29 | 1 | - | - | - | - | - | 9 | - | - | - | - | - | - | - | - | - | **39** |
| **Willow 1** | W17101 | - | - | - | - | - | - | - | - | 70 | - | - | - | - | - | - | - | - | **70** |
| **Willow 2** | W17201 | 1 | - | - | - | 2 | - | - | - | - | 72 | 26 | - | - | 3 | - | 1 | - | **105** |
| | W17202* | - | - | - | - | - | - | - | - | - | 6 | 1 | - | - | - | - | - | - | **7** |
| | W17203* | - | - | - | - | - | - | - | - | - | 14 | 10 | - | - | 1 | - | - | - | **25** |
| | W18204 | - | - | - | - | - | - | - | - | - | 28 | 43 | - | - | - | 1 | - | - | **72** |
| **Willow 3** | W17301 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** |
| | W18302 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** |
| **Willow 4** | W17401 | 1 | - | - | - | 4 | - | - | - | - | 3 | - | - | - | 55 | 11 | 18 | - | **92** |
| | W18401 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 9 | 11 | 6 | - | **28** |
| | W18402 | - | - | 1 | - | - | - | - | - | - | 1 | 2 | - | - | 4 | - | 4 | - | **12** |
| | W18405 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** |
| **Judy Creek Iqalliqpik** | J1701* | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - | 1 | 1 | 1 | - | **6** |
| | J1702* | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | **1** |
| | J1703* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | **1** |
| | **Total** | **166** | **5** | **9** | **14** | **6** | **-** | **1** | **36** | **71** | **131** | **86** | **-** | **-** | **77** | **26** | **30** | **-** | **658** |

*Station established prior to 2019
Note: Shaded cells designate fish released and recaptured at the same station.

**Table 7. Fish tagged a), and recaptured b), in 2017-2019 sampling seasons in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**a) Sampling year and number of fish tagged**

| | Sampling year | | | | |
|---|---|---|---|---|---|
| **Species** | **2017** | **2018** | **2019** | **Total** | **Total %** |
| Alaska blackfish | 0 | 1 | 0 | 1.0 | 0.0 |
| Arctic grayling | 755 | 1337 | 1429 | 3521.0 | 71.7 |
| Broad whitefish | 64 | 373 | 222 | 659.0 | 13.4 |
| Burbot | 1 | 4 | 2 | 7.0 | 0.1 |
| Humpback whitefish | 25 | 105 | 65 | 195.0 | 4.0 |
| Least cisco | 80 | 154 | 107 | 341.0 | 6.9 |
| Round whitefish | 49 | 72 | 63 | 184.0 | 3.7 |
| Unknown | 0 | 0 | 5 | 5.0 | 0.1 |
| **Total** | **974** | **2046** | **1893** | **4913.0** | **100.0** |

**b) Sampling year and number of fish recaptured**

| | Sampling year | | | | | |
|---|---|---|---|---|---|---|
| **Species** | **2017** | **2018** | **2019** | **Total** | **Total %** | **Recapture Rate** (tagged/recaptured)*100 |
| Arctic grayling | 214 | 408 | 617 | 1239 | 92.5 | 35.2 |
| Broad whitefish | 2 | 22 | 13 | 37 | 2.8 | 5.6 |
| Burbot | 0 | 1 | 1 | 2 | 0.1 | 28.6 |
| Humpback whitefish | 1 | | 12 | 13 | 1.0 | 6.7 |
| Least cisco | 1 | 22 | 8 | 31 | 2.3 | 9.1 |
| Round whitefish | 6 | 4 | 7 | 17 | 1.3 | 9.2 |
| **Total** | **224** | **457** | **658** | **1339** | **100.0** | **27.3** |

**Table 8. Fish recapture locations from 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

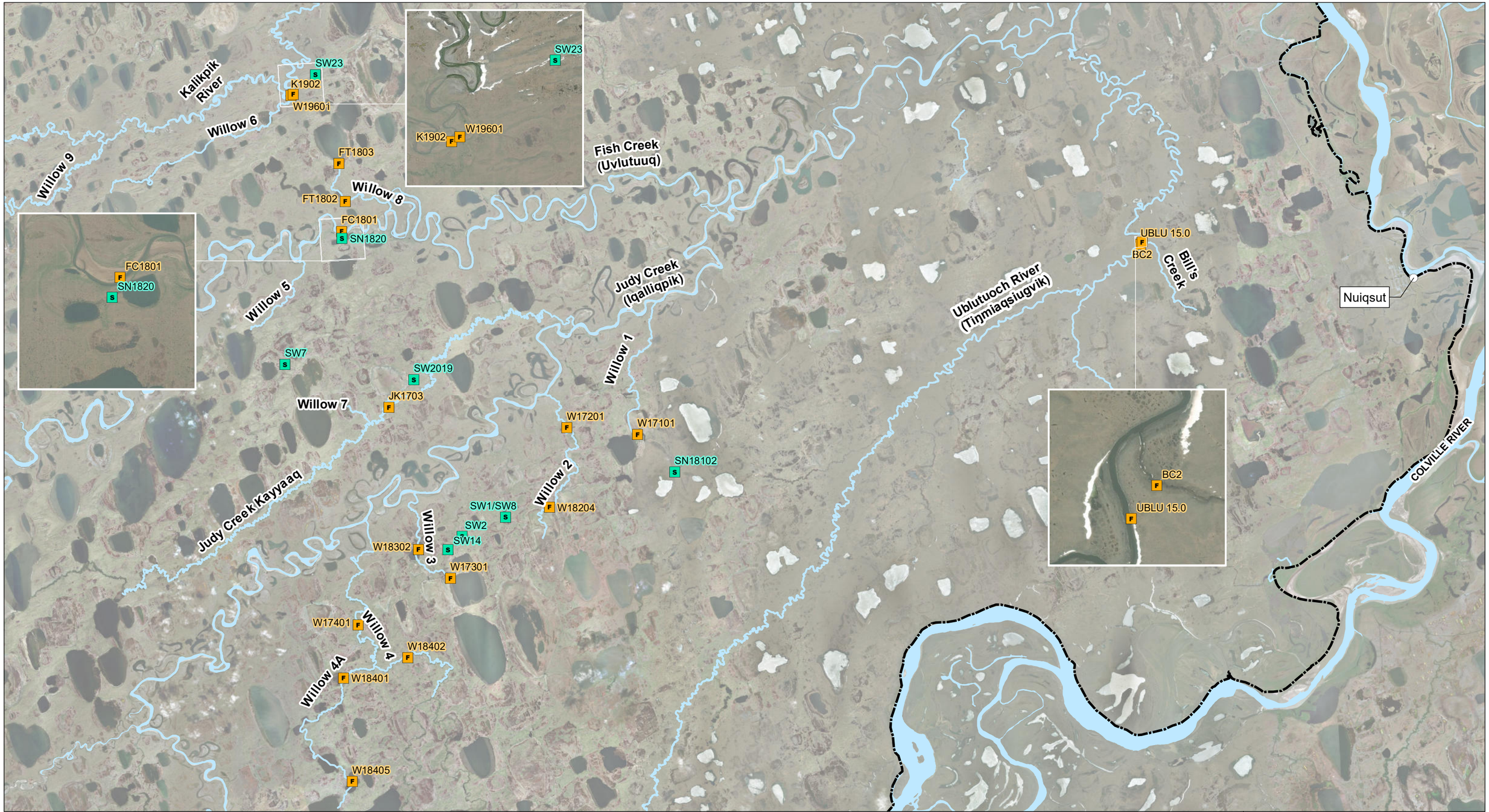
| | | 2017, 2018, and 2019 Recapture Sites | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bill's Creek | | Fish Creek Uvlutuuq | Fish Creek Uvlutuuq Trib. (Willow 8) | | Judy Creek Iqalliqpik | | | | Judy Creek Kayyaaq | | | Kalikpik River | | Kalikpik River Trib. (Willow 6) | Tinmiaqsiugvik River Ublutuoch | Willow 1 | Willow 2 | | | | Willow 3 | | Willow 4 | | | | Total Recaptured | Total Tags Deployed |
| **Release sites - 2019 and earlier** | | BC1 | BC2 | FC1801 | FT1802 | FT1803 | J1701 | J1702 | J1703 | J1704 | JK1701 | JK1702 | JK1703 | K1802 | K1902 | W19601 | UBLU 15.0 | W17101 | W17201 | W17202 | W17203 | W18204 | W17301 | W18302 | W17401 | W18401 | W18402 | W18405 | | |
| **Bill's Creek** | BC1 | 67 | 61 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 5 | - | - | - | - | - | - | - | 1 | 1 | - | - | **136** | **551** |
| | BC2 | - | 68 | - | - | - | - | - | - | - | - | - | - | - | - | - | 6 | - | - | - | - | - | - | - | - | - | - | - | **74** | **358** |
| **Fish Creek Uvlutuuq** | FC1801 | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | **4** | **95** |
| **Uvlutuuq Tribs. (Willow 8)** | FT1802 | - | - | 4 | 24 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | **29** | **241** |
| | FT1803 | - | - | - | - | 14 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **14** | **38** |
| **Judy Creek Iqalliqpik** | J1701 | - | - | 1 | - | - | 9 | - | - | - | - | 8 | 1 | - | - | - | - | - | 10 | - | 3 | 4 | - | - | 10 | 3 | 2 | - | **51** | **146** |
| | J1702 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | **1** | **6** |
| | J1703 | - | - | - | - | - | - | - | 8 | - | - | - | - | - | - | - | - | - | 2 | - | 1 | - | - | - | 1 | 2 | 1 | - | **15** | **59** |
| | J1704 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** | **11** |
| **Judy Creek Kayyaaq** | JK1701 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **1** | **11** |
| | JK1702 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | - | 26 | 1 | - | - | - | - | - | 6 | - | - | 2 | - | - | 2 | 1 | - | - | **43** | **247** |
| | JK1703 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | **1** | **115** |
| **Kalikpik River** | K1802 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **0** | **13** |
| | K1902 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** | **10** |
| **Kalikpik River Trib. (Willow 6)** | W19601 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | **1** | **89** |
| **Tinmiaqsiugvik River Ublutuoch** | U0901* | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | **4** | **-** |
| | U1302* | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **1** | **-** |
| | UB26* | 5 | 5 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 14 | - | 1 | - | - | - | - | - | 2 | - | - | - | **28** | **-** |
| | UBLU 15.0 | - | 29 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 9 | - | - | - | - | - | - | - | - | - | - | - | **39** | **269** |
| **Willow 1** | W17101 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 79 | - | - | - | - | - | - | - | - | - | - | **79** | **71** |
| **Willow 2** | W17201 | - | 1 | - | - | - | 1 | - | - | - | - | 5 | 2 | - | - | - | - | - | 189 | 3 | 10 | 42 | - | - | 5 | 1 | 1 | - | **260** | **488** |
| | W17202 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 6 | 2 | 3 | 3 | - | - | - | - | | - | **14** | **8** |
| | W17203 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | 42 | 1 | 55 | 38 | - | - | 2 | 1 | | - | **141** | **108** |
| | W18204 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | 52 | - | - | 92 | - | - | - | 1 | | - | **146** | **192** |
| **Willow 3** | W17301 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | **-** | **2** |
| | W18302 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | - | **-** | **1** |
| **Willow 4** | W17401 | - | 1 | - | - | - | 1 | - | 1 | - | - | 1 | 4 | - | - | - | - | - | 7 | - | - | 1 | - | - | 92 | 28 | 21 | - | **157** | **1030** |
| | W18401 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | 23 | 40 | 8 | - | **75** | **480** |
| | W18402 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | 2 | - | - | 6 | 4 | 9 | - | **23** | **274** |
| | W18405 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **-** | **-** |
| **Crea Creek** | C1301* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | **1** | **-** |
| | **Total** | **76** | **166** | **13** | **27** | **14** | **11** | **-** | **10** | **-** | **-** | **43** | **9** | **-** | **-** | **1** | **36** | **79** | **319** | **6** | **72** | **185** | **-** | **-** | **146** | **82** | **43** | **-** | **1338** | **4913** |

Note: Shaded cells designate fish released and recaptured at the same station.

**Table 9. Arctic grayling descriptive statistics by per size class and year at sites during 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | Size-0 | | | Size-1 | | | Size-2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | June | July | August | June | July | August | June | July | August |
| **2017** | | | | | | | | | |
| Mean FL (mm) | NA | 44.3 | 64.1 | 70.3 | 93.5 | 127.5 | 129.4 | 153.2 | 183.7 |
| N | NA | 187 | 72 | 2032 | 1181 | 41 | 804 | 220 | 28 |
| SE | NA | 0.3 | 0.9 | 0.2 | 0.3 | 2.5 | 0.6 | 0.8 | 1.7 |
| Minimum | NA | 29 | 50 | 48 | 67 | 96 | 96 | 131 | 166 |
| Median | NA | 45 | 64 | 70 | 92 | 125 | 125 | 153 | 184 |
| Maximum | NA | 53 | 78 | 95 | 129 | 156 | 170 | 180 | 199 |
| **2018** | | | | | | | | | |
| Mean FL (mm) | NA | 50.7 | 54.0 | 76.6 | 80.8 | 103.0 | 131.1 | 139.6 | 162.7 |
| N | NA | 3 | 14 | 76 | 3445 | 179 | 802 | 728 | 63 |
| SE | NA | 6.4 | 1.9 | 0.9 | 0.2 | 1.1 | 0.5 | 0.4 | 1.9 |
| Minimum | NA | 38 | 43 | 59 | 61 | 79 | 96 | 121 | 141 |
| Median | NA | 55 | 54 | 76.5 | 79 | 100 | 130 | 138 | 160 |
| Maximum | NA | 59 | 68 | 94 | 120 | 140 | 165 | 170 | 194 |
| **2019** | | | | | | | | | |
| Mean FL (mm) | NA | 42.8 | 51.7 | 59.2 | 79.7 | 99.6 | 113.3 | 138.3 | 171.9 |
| N | NA | 6 | 30 | 218 | 1756 | 123 | 2261 | 734 | 258 |
| SE | NA | 2.4 | 0.9 | 0.5 | 0.2 | 1.2 | 0.3 | 0.5 | 1.0 |
| Minimum | NA | 36 | 43 | 45 | 58 | 76 | 74 | 96 | 130 |
| Median | NA | 43.5 | 51 | 58 | 79 | 97 | 112 | 138 | 173 |
| Maximum | NA | 50 | 60 | 76 | 105 | 140 | 155 | 176 | 205 |

# FIGURES




**2019 Sampling Location**

- F Fyke Net
- S Seine Net

NHD Named Streams

Study Area

National Petroleum Reserve - Alaska


# WILLOW FISHERIES OVERVIEW

ConocoPhillips Alaska

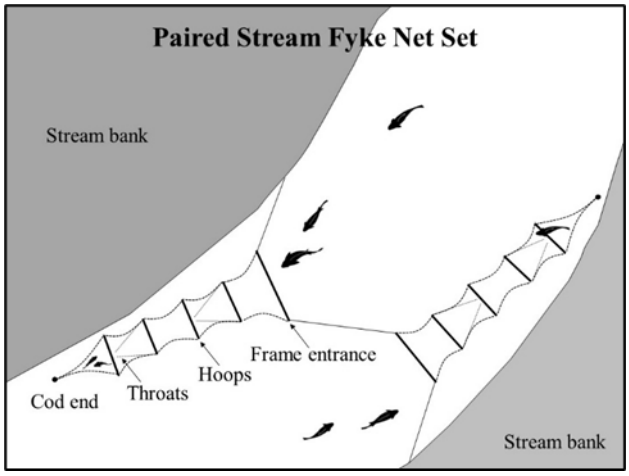
SCALE: 0 1.5 3 mi

FIGURE: 1

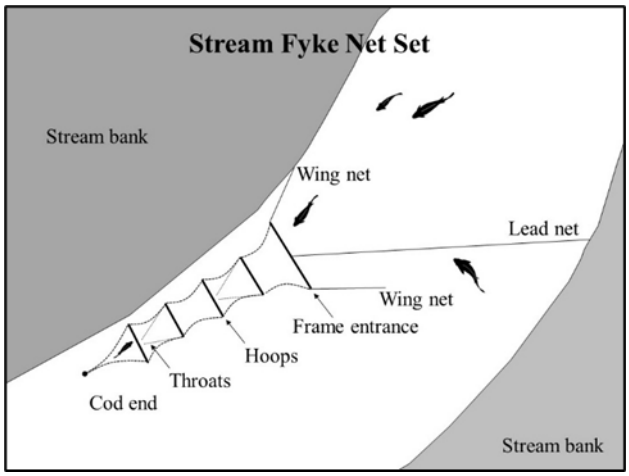
CPAI_043.mxd, 4/1/2020 12:38:23 PM, R03

**Figure 2. Fyke net schematics of a paired stream set (a), a single stream set (b), and a lake set (c) used to capture fish in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

(a)




(b)




(c)

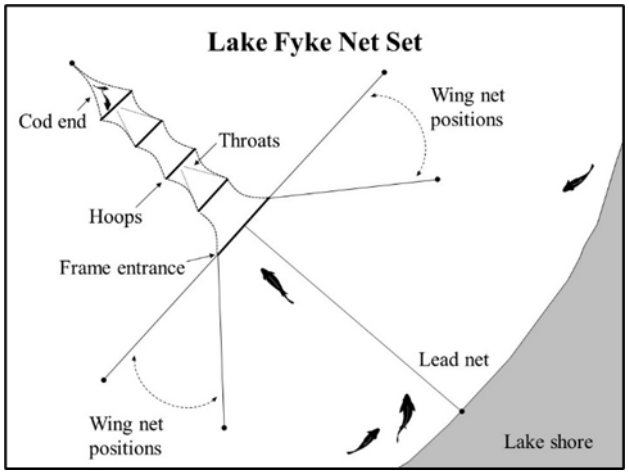


**Figure 3. Water temperature at sites sampled in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

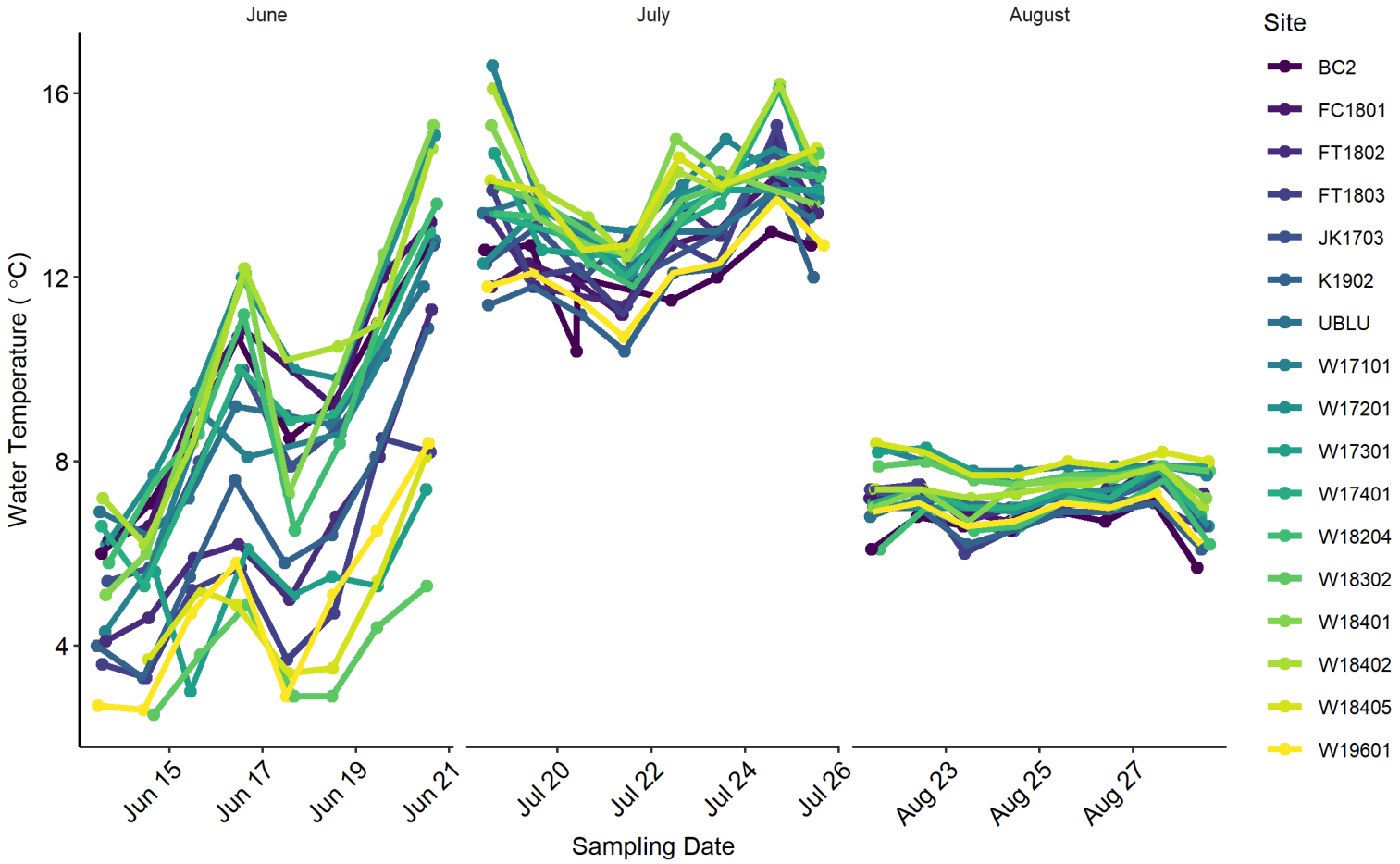


**Figure 4. Specific conductivity at sites sampled in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

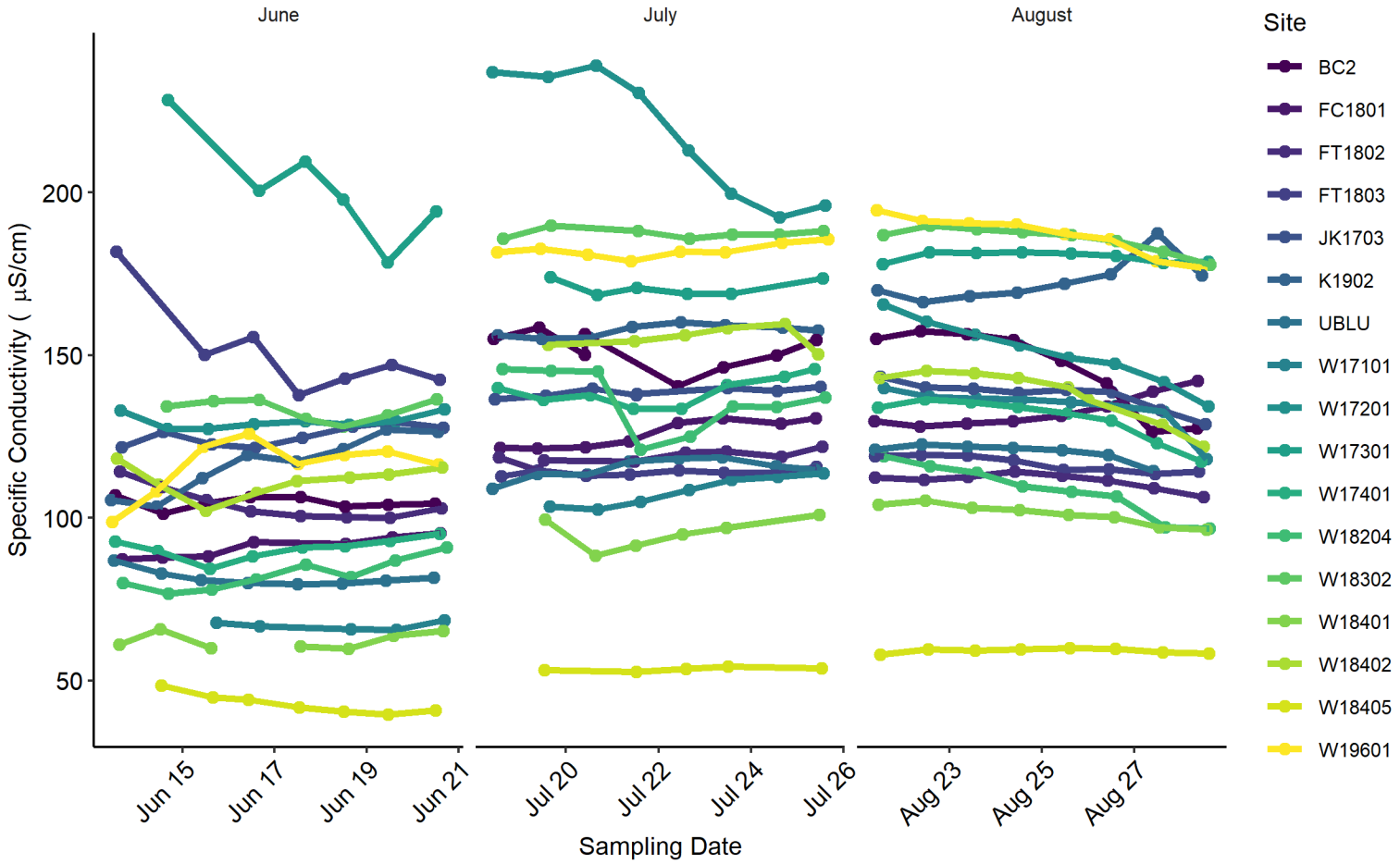


**Figure 5. Species composition with and without ninespine stickleback at sites sampled in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

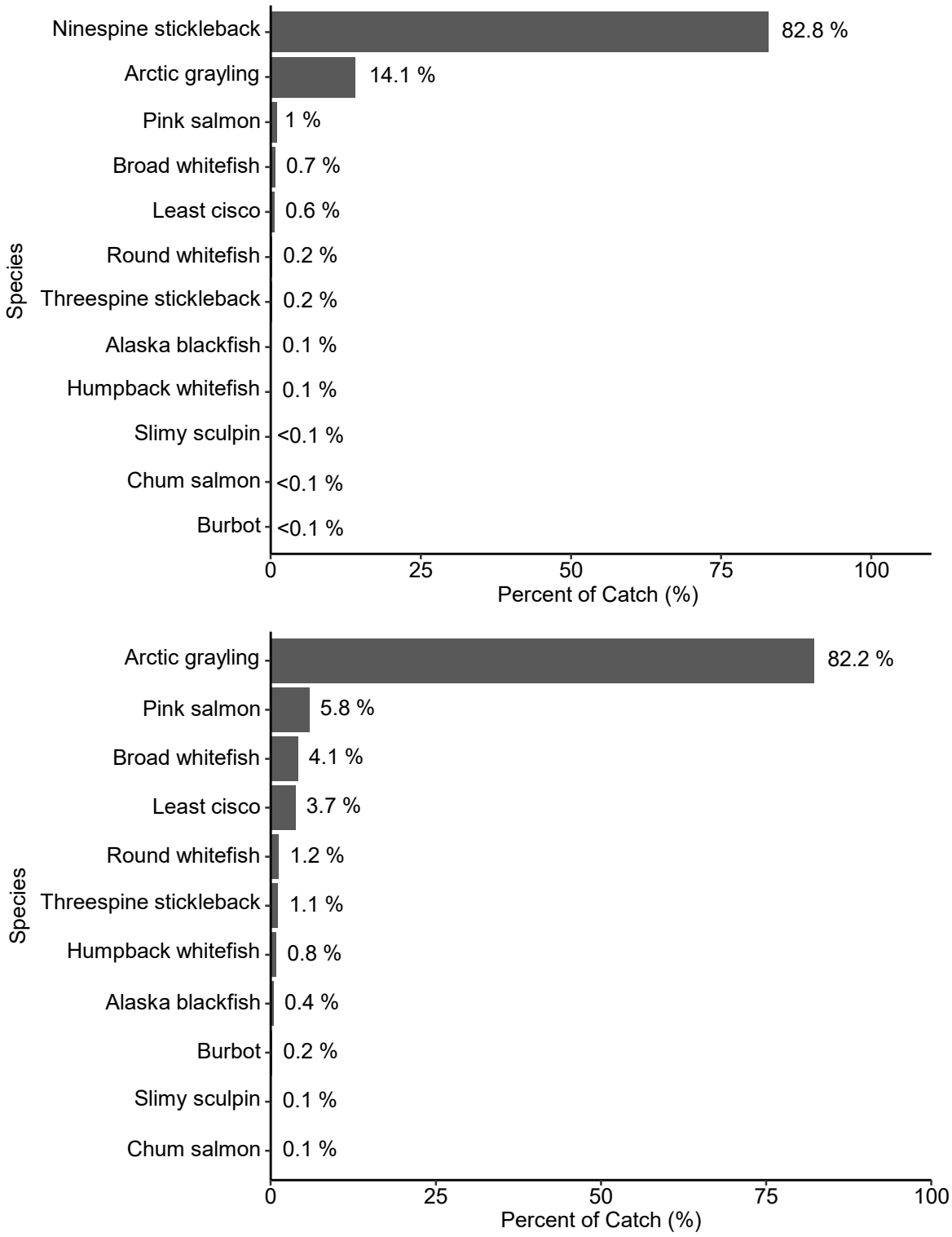


**Figure 6. Catch per unit effort (CPUE; fish per 24 hours) across streams sampled in 2019 of a) all species captured and b) excluding ninespine stickleback in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

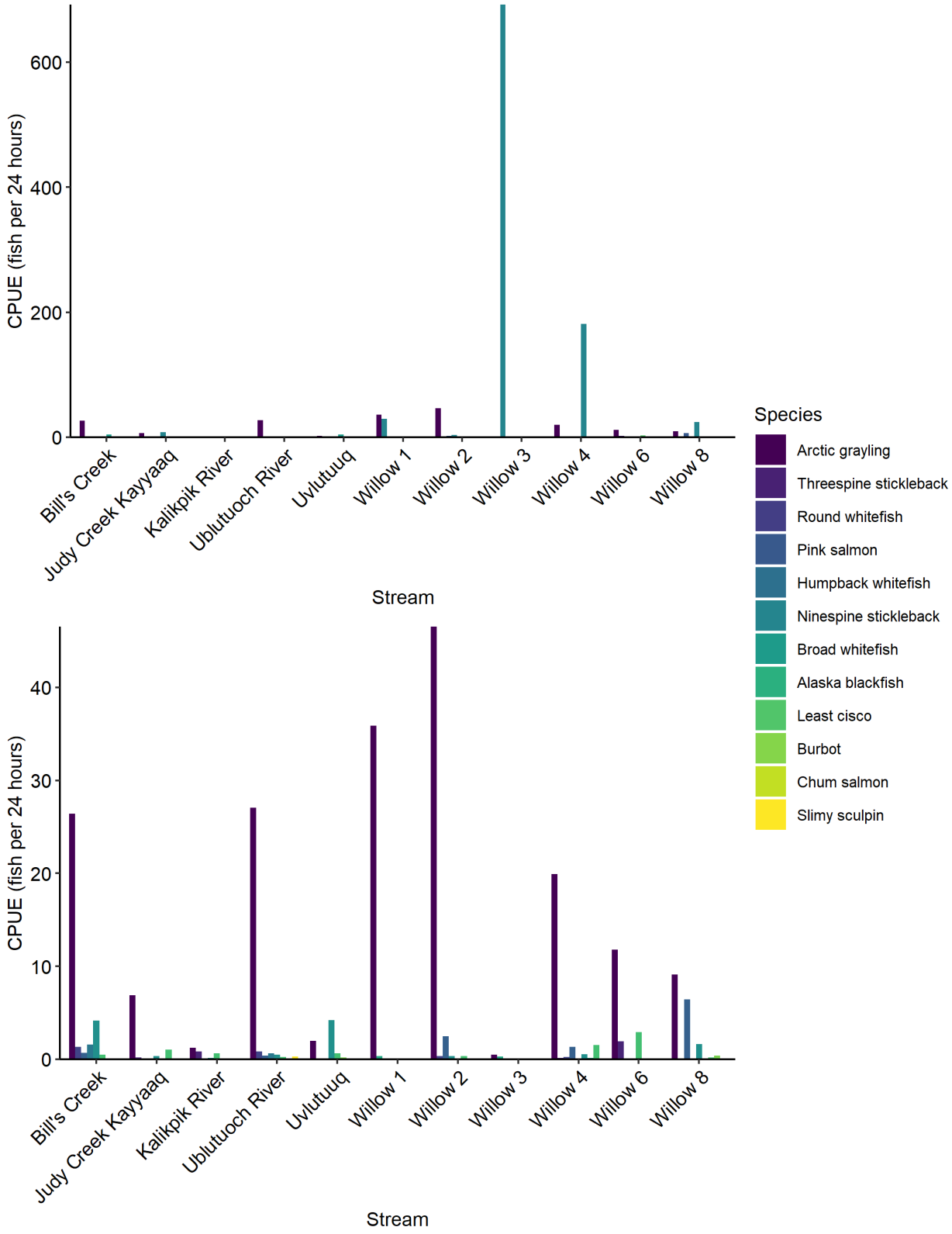
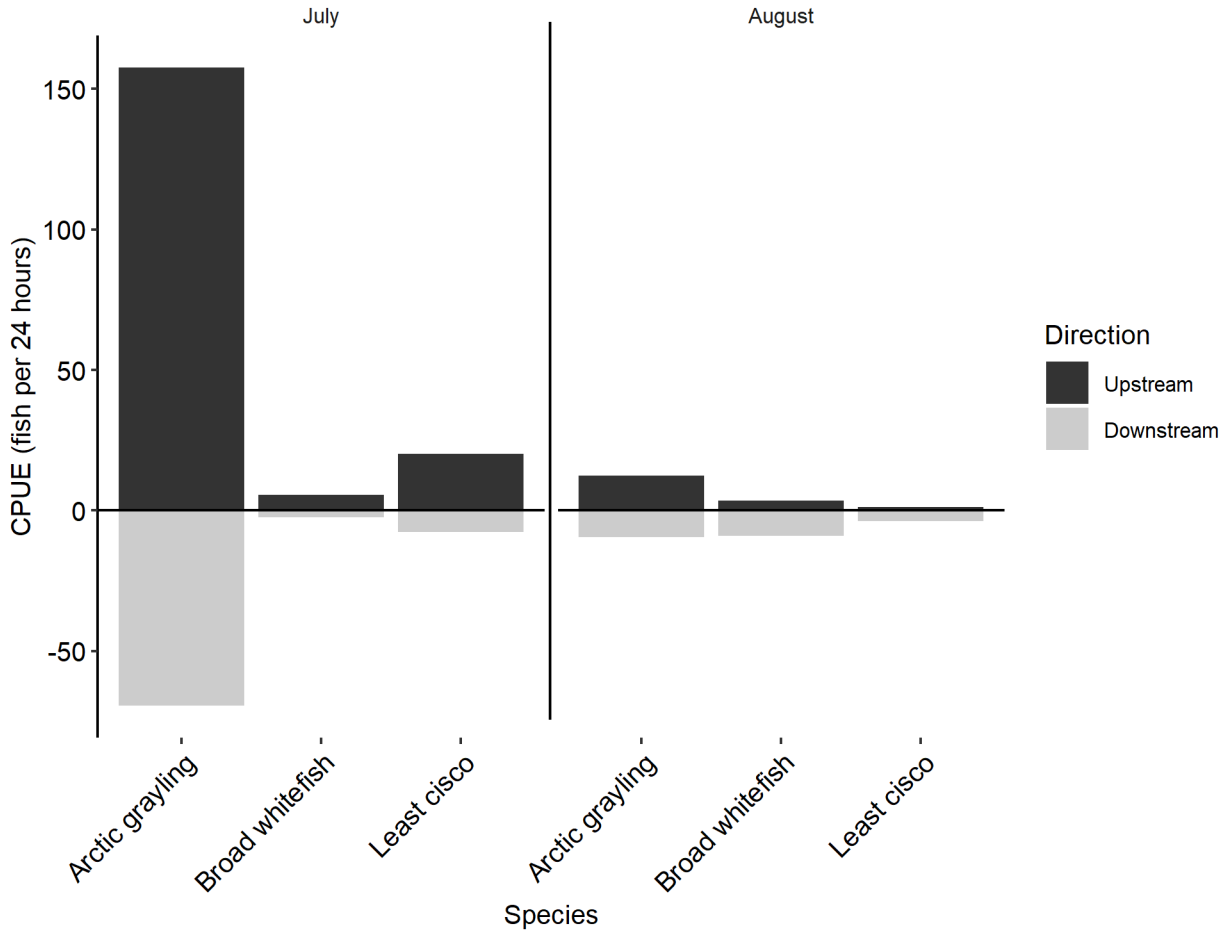
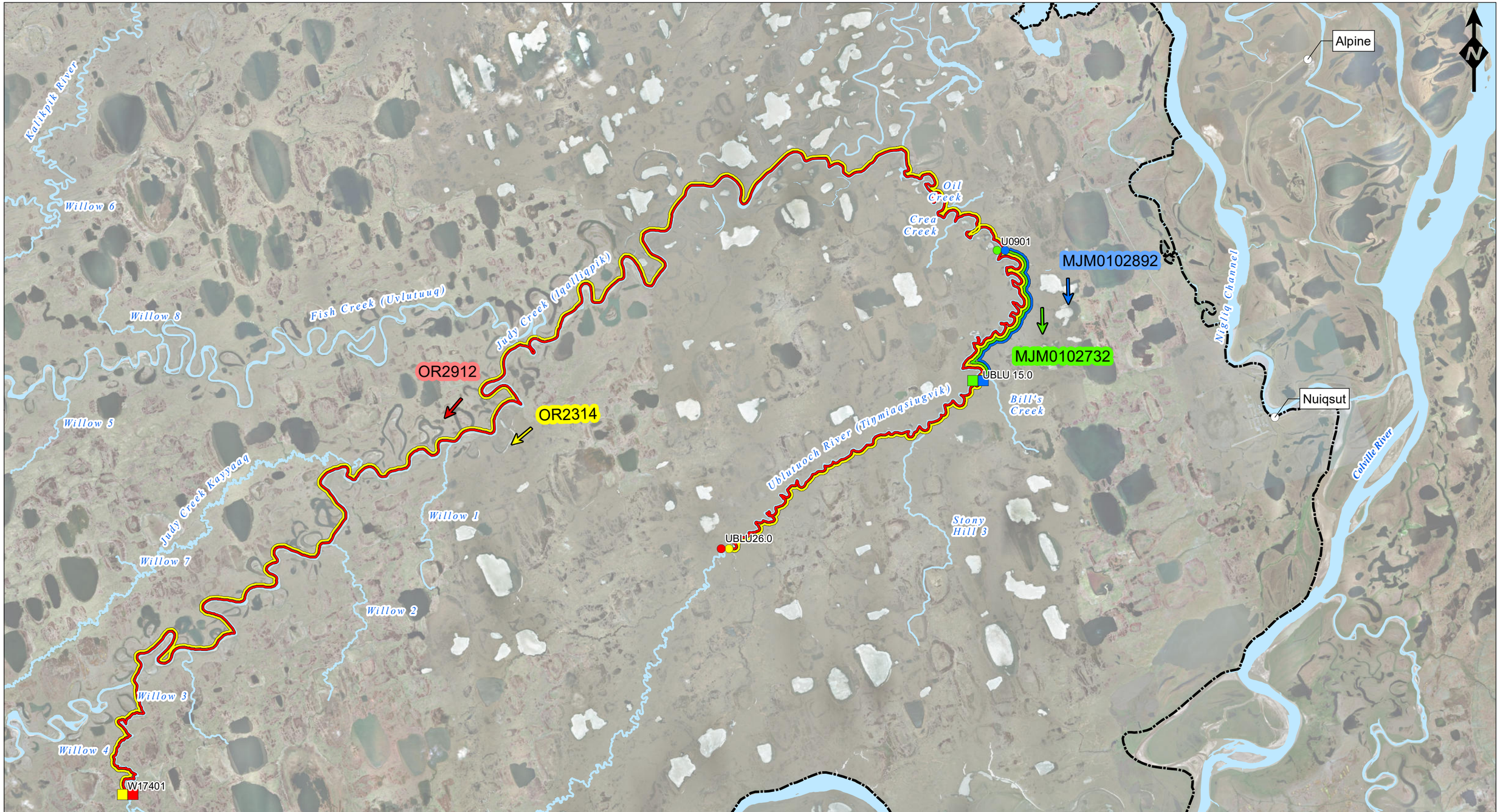


**Figure 7. Directional movements in catch per unit effort (CPUE; fish per 24 hours) of the three most abundant fish species (excluding ninespine stickleback) captured in July and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**






| Tag Number | Species | Capture Date | Recapture Date | Days at large | Growth (mm) | Distance traveled (mi) |
|---|---|---|---|---|---|---|
| MJM0102732 | Round whitefish | 8/30/2014 | 6/20/2019 | 1755 | 61 | 8 |
| MJM0102892 | Round whitefish | 8/26/2014 | 6/14/2019 | 1753 | 33 | 8 |
| OR2314 | Arctic grayling | 6/23/2018 | 6/16/2019 | 358 | 25 | 78 |
| OR2912 | Arctic grayling | 6/23/2018 | 6/18/2019 | 360 | N/A | 78 |

NHD Named Streams
Study Area
National Petroleum Reserve - Alaska
Recapture Location
Direction of Travel
Capture Location


# SELECT TAGGED ARCTIC GRAYLING AND ROUND WHITEFISH RECAPTURE LOCATIONS, 2019

ConocoPhillips Alaska

SCALE: 0 1.5 3 mi

FIGURE: 8

CPAI_047.mxd, 4/2/2020 12:48:42 PM, R03

**Figure 9. Length frequency distributions of Arctic grayling captured across sites during June, July, and August 2017 - 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

Note: Length distributions of each size class are depicted by brackets shown above bars. Note the slight right shift (growth) of all size classes of fish through the season, particularly in 2017. Also, note the relative abundance and length difference of size-0 fish during July and August across years sampled.

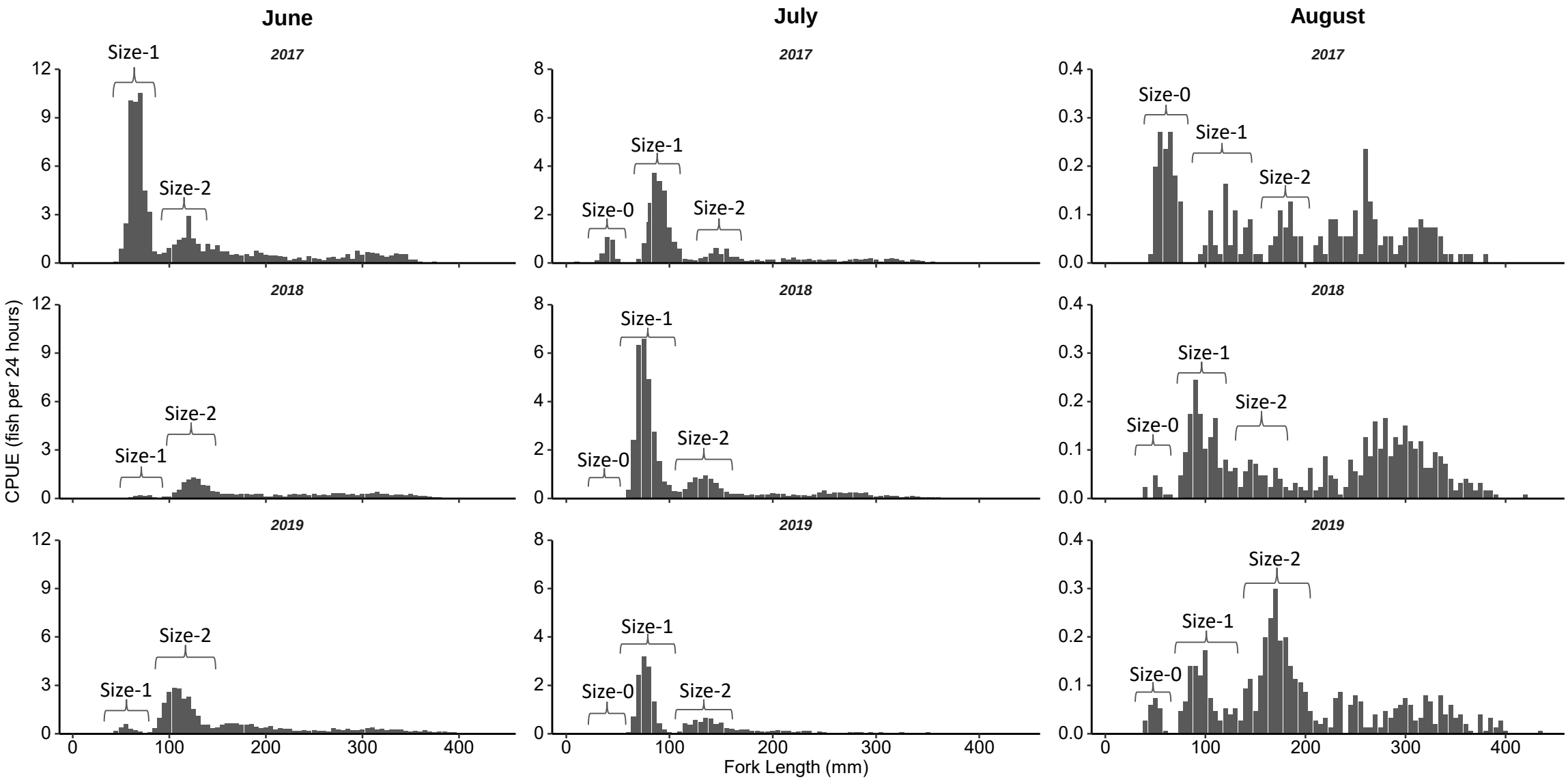
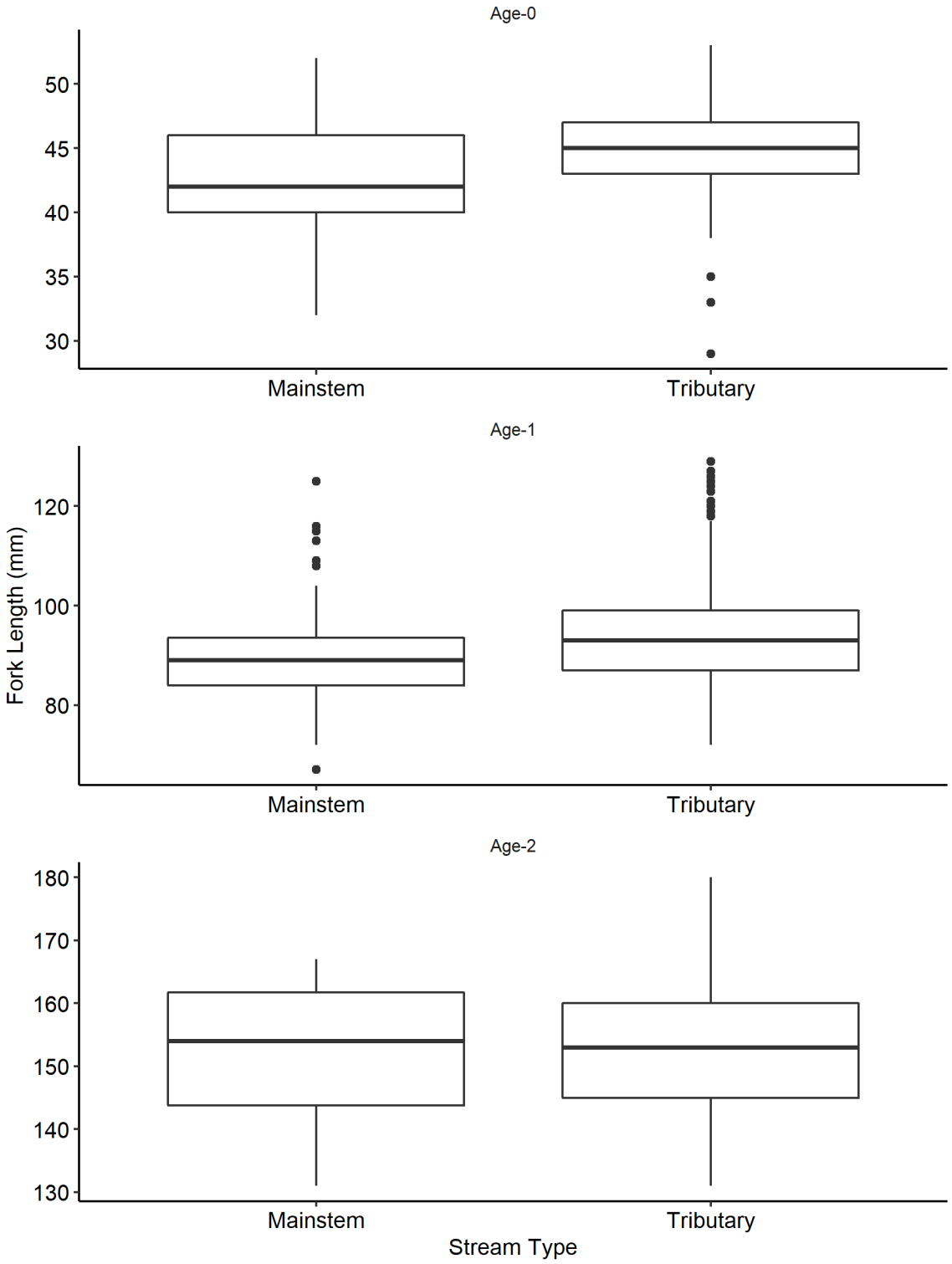
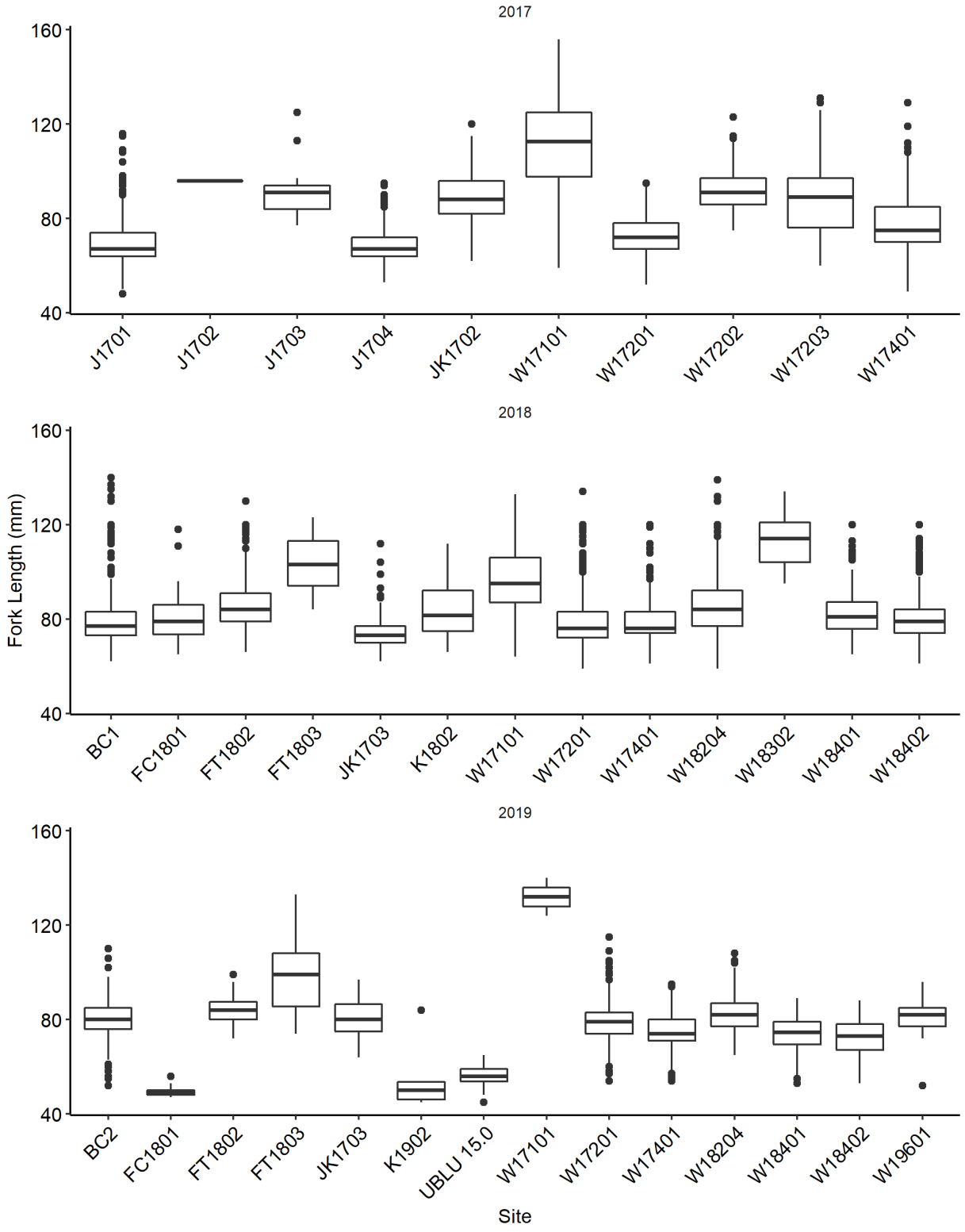


**Figure 10. Mean fork length comparisons of age-0 (a), age-1 (b), and age-2 (c) Arctic grayling captured from tributary and mainstem sites in July 2017 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**



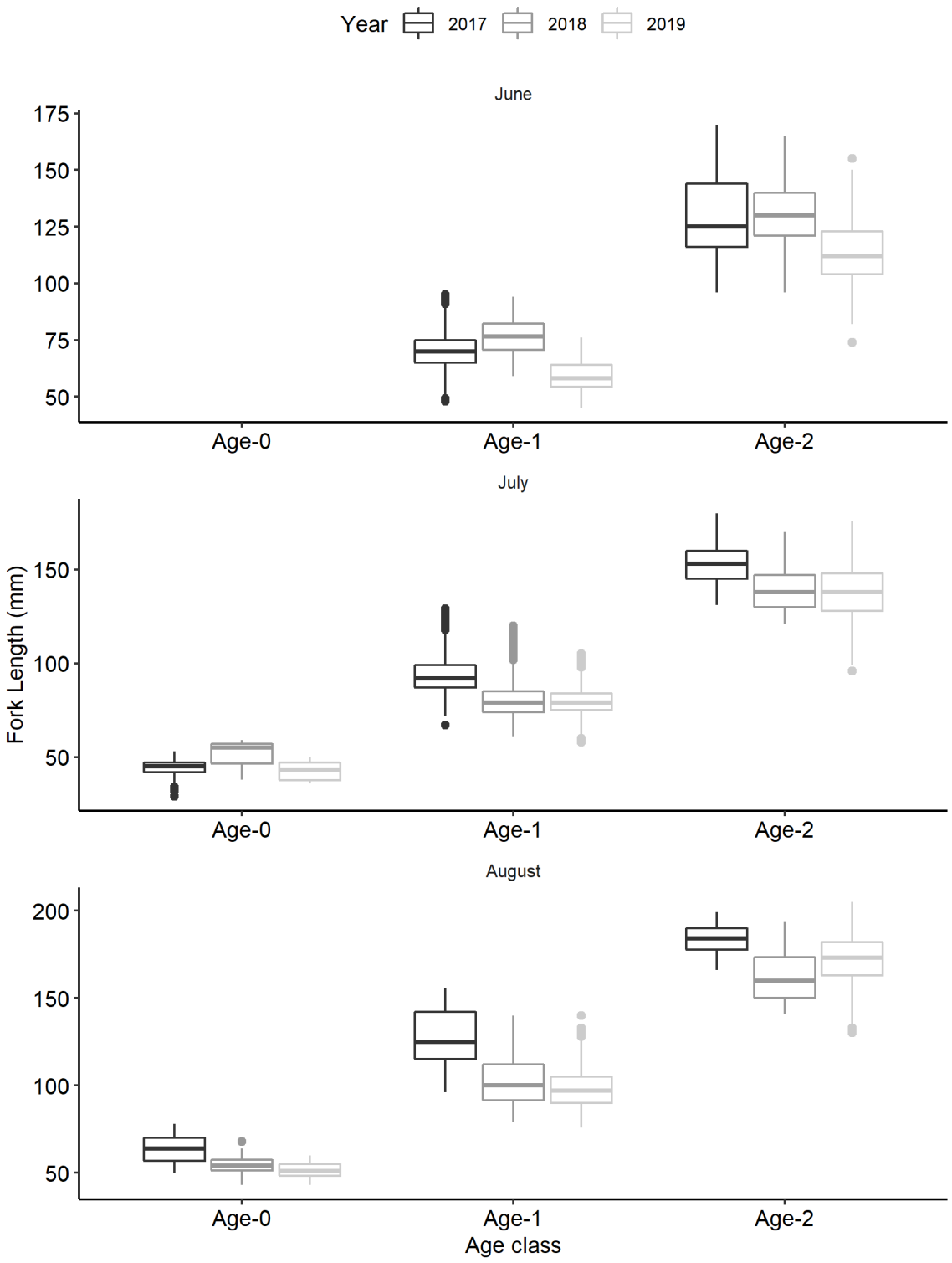

NOTE: Points represent outliers beyond 1.5 times the interquartile range past the 25th and 75th percentiles of the data.

**Figure 11. Mean fork length comparison of age-1 Arctic grayling across sites during 2017- 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**



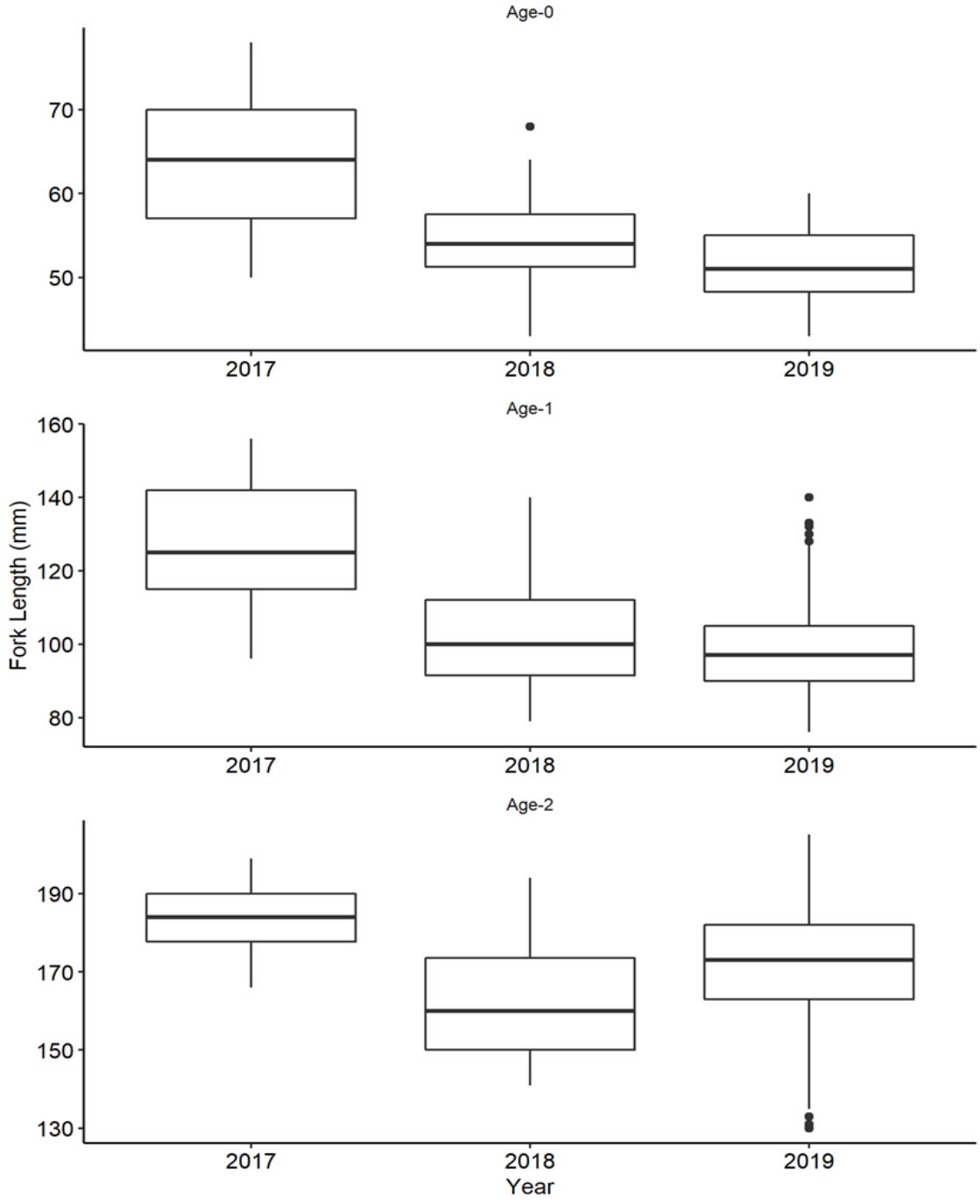

NOTE: Points represent outliers beyond 1.5 times the interquartile range past the 25th and 75th percentiles of the data.

**Figure 12. Comparison of Arctic grayling mean fork length per age group and year in June, July, and August in 2017–2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**



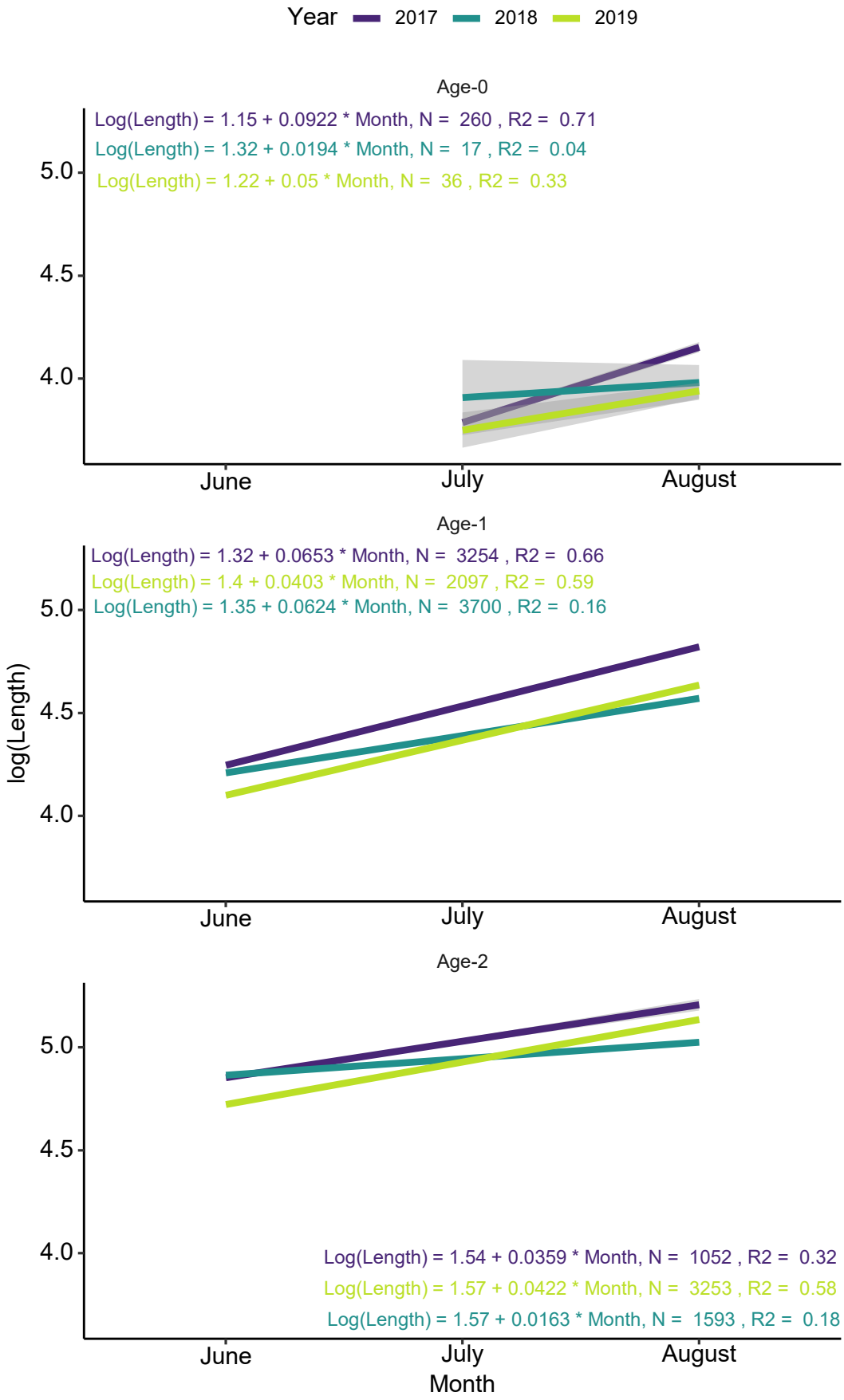

NOTE: Points represent outliers beyond 1.5 times the interquartile range past the 25th and 75th percentiles of the data.

**Figure 13. Mean fork length of Arctic grayling by age class during August 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**




NOTE: Points represent outliers beyond 1.5 times the interquartile range past the 25th and 75th percentiles of the data.

**Figure 14. Arctic grayling mean fork length (FL) and month linear regressions (growth rates) during August 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**




NOTE: Shaded line borders represent 95% confidence intervals.

**Figure 15. Age-0 Arctic grayling length frequency distributions during August 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

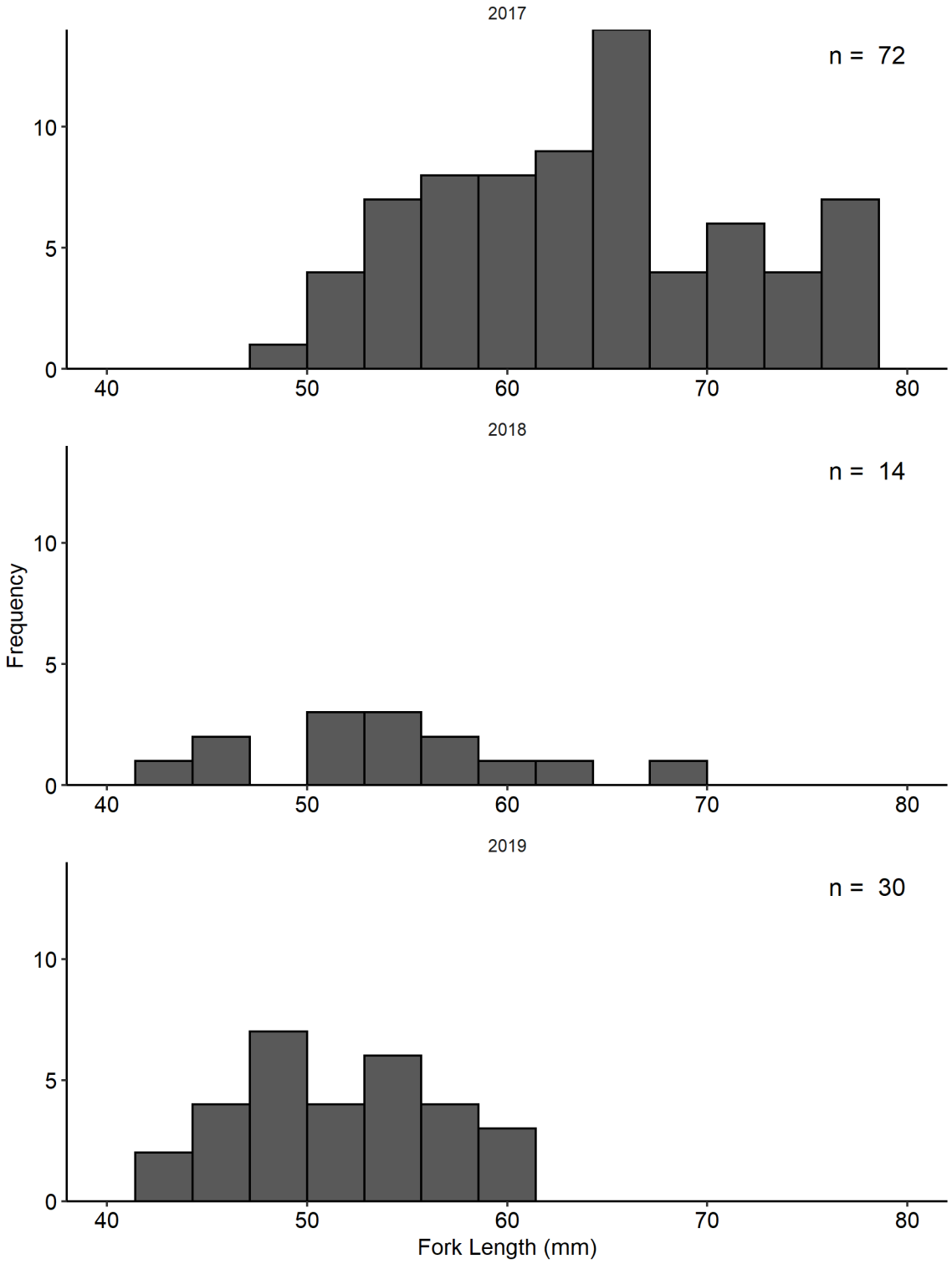
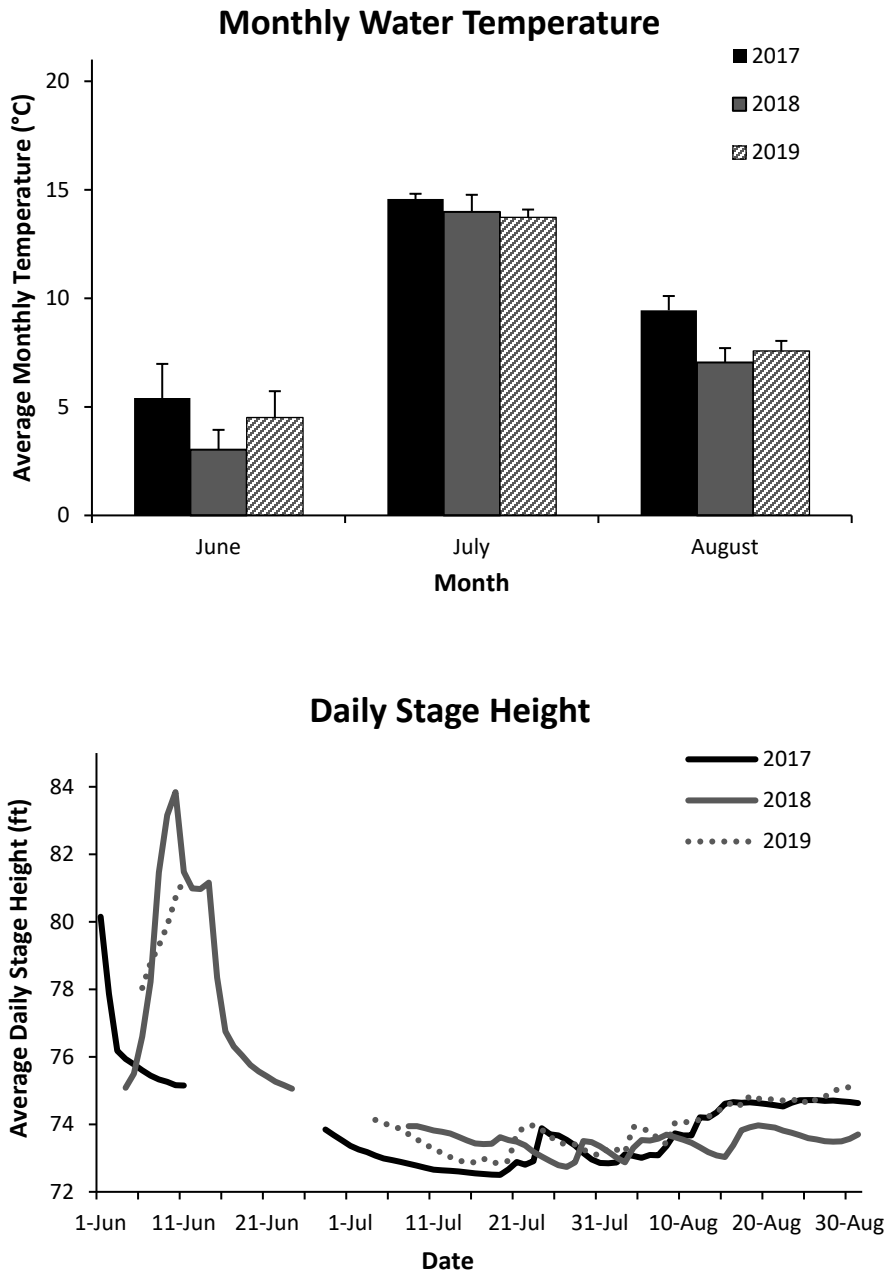


**Figure 16. Water temperature and stage height in Willow 2 from 2017-2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**




NOTE: Stage height is arbitrary. 2017 values were corrected to compare with 2018 and 2019 values. Data courtesy of Garett Yager, Michael Baker Intl. 2020.

# APPENDIX A

## Water Chemistry from 2019 Fyke and Seine Net Sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| BC2 | 6/13/2019 12:52 | 6.0 | 107.0 | NA | 6.87 |
| | 6/14/2019 13:49 | 7.1 | 101.4 | NA | 7.29 |
| | 6/15/2019 11:17 | 8.5 | 104.5 | NA | 7.33 |
| | 6/16/2019 11:05 | 10.7 | 106.4 | NA | 7.29 |
| | 6/17/2019 13:30 | 8.5 | 106.4 | NA | 7.37 |
| | 6/18/2019 12:46 | 9.3 | 103.6 | 0.45 | 7.34 |
| | 6/19/2019 11:07 | 11.0 | 104.0 | 0.42 | 7.33 |
| | 6/20/2019 11:42 | 12.6 | 104.4 | 0.51 | 7.59 |
| | 7/18/2019 10:32 | 12.6 | 155.0 | 0.60 | 6.98 |
| | 7/19/2019 10:05 | 12.7 | 158.5 | 1.50 | 7.48 |
| | 7/20/2019 9:38 | 10.4 | 150.2 | 1.41 | 7.26 |
| | 7/20/2019 9:47 | 12.0 | 156.6 | 1.48 | 7.40 |
| | 7/22/2019 10:02 | 11.5 | 140.5 | 0.94 | 7.50 |
| | 7/23/2019 9:38 | 12.0 | 146.4 | 0.86 | 7.57 |
| | 7/24/2019 13:23 | 13.0 | 149.9 | 0.77 | 7.62 |
| | 7/25/2019 9:42 | 12.7 | 154.7 | 0.72 | 9.50 |
| | 8/21/2019 9:46 | 6.1 | 155.0 | 0.26 | 7.30 |
| | 8/21/2019 9:46 | 6.1 | 155.0 | 0.26 | 7.30 |
| | 8/22/2019 8:58 | 6.8 | 157.5 | 1.06 | 7.37 |
| | 8/22/2019 8:58 | 6.8 | 157.5 | 1.06 | 7.37 |
| | 8/23/2019 8:49 | 6.6 | 156.5 | 0.89 | 7.39 |
| | 8/23/2019 8:49 | 6.6 | 156.5 | 0.89 | 7.39 |
| | 8/24/2019 9:08 | 6.5 | 154.7 | 0.95 | 7.43 |
| | 8/24/2019 9:08 | 6.5 | 154.7 | 0.95 | 7.43 |
| | 8/25/2019 9:46 | 6.9 | 148.4 | 1.06 | 7.35 |
| | 8/25/2019 9:46 | 6.9 | 148.4 | 1.06 | 7.35 |
| | 8/26/2019 9:33 | 6.7 | 141.4 | 1.08 | 7.32 |
| | 8/27/2019 9:15 | 7.2 | 126.5 | 1.87 | 7.27 |
| | 8/27/2019 9:15 | 7.2 | 126.5 | 1.87 | 7.27 |
| | 8/28/2019 8:38 | 5.7 | 127.6 | 1.28 | 7.20 |
| | 8/28/2019 8:38 | 5.7 | 127.6 | 1.28 | 7.20 |
| FC1801 | 6/13/2019 16:29 | 6.3 | 87.4 | NA | 7.11 |
| | 6/14/2019 13:26 | 6.6 | 87.8 | NA | 7.72 |
| | 6/15/2019 13:20 | 9.3 | 88.2 | NA | 7.93 |
| | 6/16/2019 13:10 | 10.9 | 92.6 | NA | 7.98 |
| | 6/18/2019 12:55 | 9.2 | 92.1 | 1.20 | 7.98 |
| | 6/19/2019 13:26 | 12.0 | 94.1 | 8.70 | 8.00 |
| | 6/20/2019 14:33 | 13.2 | 95.4 | 7.70 | 8.04 |
| | 7/18/2019 13:52 | 11.8 | 121.5 | 2.90 | 7.66 |
| | 7/19/2019 9:02 | 12.3 | 121.4 | 2.17 | 7.68 |
| | 7/20/2019 10:02 | 11.9 | 121.8 | 3.19 | 8.05 |
| | 7/21/2019 8:43 | 11.2 | 123.6 | 4.45 | 7.93 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 7/22/2019 9:58 | 12.7 | 129.2 | 5.33 | 7.87 |
| | 7/23/2019 9:20 | 13.0 | 130.7 | 5.85 | 7.90 |
| | 7/24/2019 15:28 | 14.2 | 129.1 | 2.46 | 8.07 |
| | 7/25/2019 9:24 | 13.4 | 130.6 | 4.99 | 7.96 |
| | | | | | |
| | 8/21/2019 8:47 | 7.2 | 129.8 | 4.69 | 7.83 |
| | 8/22/2019 8:34 | 7.4 | 128.1 | 3.27 | 7.79 |
| | 8/23/2019 8:56 | 6.9 | 129.0 | 3.66 | 7.74 |
| | 8/24/2019 8:56 | 6.7 | 129.8 | 4.35 | 7.78 |
| | 8/25/2019 9:54 | 7.3 | 131.4 | 4.35 | 7.81 |
| | 8/26/2019 9:42 | 7.2 | 134.4 | 5.30 | 7.82 |
| | 8/27/2019 9:33 | 7.9 | 138.9 | 9.80 | 7.69 |
| | 8/28/2019 9:01 | 6.8 | 142.2 | 18.42 | 7.76 |
| | | | | | |
| FT1802 | 6/13/2019 15:05 | 4.1 | 114.2 | NA | 7.20 |
| | 6/14/2019 13:00 | 4.6 | 109.6 | NA | 7.44 |
| | 6/15/2019 12:24 | 5.9 | 105.5 | NA | 7.68 |
| | 6/16/2019 11:25 | 6.2 | 102.0 | NA | 7.52 |
| | 6/17/2019 13:36 | 5.0 | 100.6 | NA | 7.50 |
| | 6/18/2019 13:40 | 6.8 | 100.2 | 0.44 | 7.57 |
| | 6/19/2019 12:05 | 8.1 | 100.0 | 0.53 | 7.55 |
| | 6/20/2019 15:00 | 11.3 | 103.0 | 0.63 | 7.50 |
| | | | | | |
| | 7/18/2019 13:19 | 13.3 | 118.6 | 0.22 | 6.32 |
| | 7/19/2019 9:36 | 12.0 | 114.7 | 0.45 | 7.54 |
| | 7/19/2019 12:28 | 11.8 | 117.7 | 0.44 | 7.72 |
| | 7/21/2019 11:31 | 11.4 | 117.3 | 0.70 | 7.61 |
| | 7/22/2019 13:53 | 13.6 | 120.1 | 0.68 | 7.50 |
| | 7/23/2019 11:15 | 12.9 | 120.4 | 0.60 | 7.51 |
| | 7/24/2019 15:45 | 15.0 | 118.8 | 0.24 | 7.84 |
| | 7/25/2019 12:58 | 13.4 | 122.0 | 0.65 | 7.51 |
| | | | | | |
| | 8/21/2019 9:22 | 7.4 | 112.5 | 0.80 | 7.43 |
| | 8/22/2019 10:41 | 7.5 | 111.8 | 0.14 | 7.68 |
| | 8/23/2019 9:37 | 6.7 | 112.7 | 0.12 | 7.58 |
| | 8/24/2019 9:55 | 7.0 | 114.3 | 0.10 | 7.62 |
| | 8/25/2019 10:30 | 7.2 | 113.0 | 0.08 | 7.52 |
| | 8/26/2019 10:16 | 7.4 | 111.6 | 0.05 | 7.70 |
| | 8/27/2019 10:14 | 7.6 | 109.2 | 0.09 | 7.61 |
| | 8/28/2019 12:00 | 7.3 | 106.5 | 0.20 | 7.75 |
| | | | | | |
| FT1803 | 6/13/2019 13:15 | 3.6 | 181.8 | NA | 6.97 |
| | 6/14/2019 11:39 | 3.3 | 120.2 | NA | 7.45 |
| | 6/15/2019 11:20 | 5.2 | 150.2 | NA | 7.66 |
| | 6/16/2019 12:40 | 5.7 | 155.7 | NA | 7.57 |
| | 6/17/2019 12:32 | 3.7 | 137.8 | NA | 7.62 |
| | 6/18/2019 12:34 | 4.7 | 142.9 | 1.00 | 7.57 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 6/19/2019 13:10 | 8.5 | 147.1 | 1.06 | 7.72 |
| | 6/20/2019 14:14 | 8.2 | 142.5 | 1.48 | 7.68 |
| | | | | | |
| | 7/18/2019 14:28 | 13.9 | 112.8 | 2.82 | 7.23 |
| | 7/19/2019 9:36 | 12.0 | 114.7 | 0.45 | 7.54 |
| | 7/20/2019 10:28 | 12.2 | 113.0 | 1.72 | 7.59 |
| | 7/21/2019 9:12 | 11.2 | 113.3 | 4.05 | 7.66 |
| | 7/22/2019 10:33 | 12.8 | 114.6 | 1.80 | 7.58 |
| | 7/23/2019 9:50 | 12.3 | 114.0 | 2.40 | 7.64 |
| | 7/24/2019 16:10 | 15.3 | 113.9 | 0.95 | 7.72 |
| | 7/25/2019 9:47 | 12.8 | 115.7 | 2.38 | 7.67 |
| | | | | | |
| | 8/21/2019 9:10 | 7.4 | 119.1 | 0.90 | 7.49 |
| | 8/22/2019 9:07 | 7.5 | 119.4 | 0.24 | 7.60 |
| | 8/23/2019 9:17 | 6.0 | 119.2 | 1.80 | 7.52 |
| | 8/24/2019 9:16 | 6.5 | 117.8 | 0.62 | 7.56 |
| | 8/25/2019 10:58 | 7.0 | 114.9 | 0.65 | 7.45 |
| | 8/26/2019 10:44 | 7.2 | 115.0 | 0.17 | 7.71 |
| | 8/27/2019 10:38 | 7.1 | 113.5 | 0.75 | 7.69 |
| | 8/28/2019 9:25 | 6.6 | 114.2 | 0.18 | 7.73 |
| | | | | | |
| JK1703 | 6/13/2019 16:01 | 5.4 | 121.8 | NA | 7.41 |
| | 6/14/2019 13:46 | 5.7 | 126.5 | NA | 7.51 |
| | 6/15/2019 15:12 | 8.0 | 122.7 | NA | 7.72 |
| | 6/16/2019 13:48 | 10.0 | 121.6 | NA | 7.62 |
| | 6/17/2019 14:20 | 7.9 | 124.7 | NA | 7.62 |
| | 6/17/2019 14:20 | 7.9 | 124.6 | NA | 7.62 |
| | 6/18/2019 16:42 | 8.8 | 128.1 | 5.09 | 7.73 |
| | 6/19/2019 14:00 | 10.3 | 129.5 | 3.94 | 7.64 |
| | 6/20/2019 15:54 | 12.7 | 127.8 | 5.83 | 7.70 |
| | | | | | |
| | 7/18/2019 11:05 | 12.3 | 136.5 | 1.55 | 6.70 |
| | 7/18/2019 11:05 | 12.3 | 136.5 | 1.55 | 6.70 |
| | 7/19/2019 13:19 | 13.1 | 137.6 | 1.56 | 7.86 |
| | 7/19/2019 13:19 | 13.1 | 137.6 | 1.56 | 7.86 |
| | 7/20/2019 13:42 | 12.0 | 139.8 | 1.94 | 7.86 |
| | 7/21/2019 12:28 | 12.9 | 137.8 | 2.96 | 7.67 |
| | 7/21/2019 12:38 | 11.9 | 138.2 | 1.62 | 7.86 |
| | 7/23/2019 11:48 | 13.0 | 139.9 | 3.15 | 7.77 |
| | 7/24/2019 13:25 | 14.7 | 139.1 | 2.48 | 7.87 |
| | 7/25/2019 11:53 | 14.1 | 140.4 | 2.99 | 7.84 |
| | | | | | |
| | 8/21/2019 12:02 | 7.3 | 143.5 | 3.25 | 7.64 |
| | 8/22/2019 11:16 | 7.4 | 140.1 | 1.24 | 7.61 |
| | 8/23/2019 12:15 | 7.1 | 139.8 | 1.32 | 7.56 |
| | 8/24/2019 11:40 | 7.0 | 138.5 | 1.30 | 7.72 |
| | 8/25/2019 12:29 | 7.3 | 139.5 | 1.66 | 7.58 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 8/26/2019 12:19 | 7.2 | 138.6 | 1.72 | 7.53 |
| | 8/27/2019 13:27 | 7.6 | 133.3 | 3.03 | 7.53 |
| | 8/28/2019 12:54 | 6.6 | 128.8 | 2.36 | 7.56 |
| | | | | | |
| K1902 | 6/13/2019 10:28 | 4.0 | 105.5 | NA | 5.63 |
| | 6/14/2019 10:16 | 3.3 | 103.5 | NA | 7.61 |
| | 6/15/2019 10:15 | 5.5 | 112.3 | NA | 7.75 |
| | 6/16/2019 9:41 | 7.6 | 119.4 | NA | 7.95 |
| | 6/17/2019 11:15 | 5.8 | 117.4 | NA | 8.01 |
| | 6/18/2019 11:42 | 6.4 | 121.2 | 4.30 | 7.96 |
| | 6/19/2019 10:13 | 8.1 | 127.2 | 4.31 | 8.01 |
| | 6/20/2019 13:03 | 10.9 | 126.4 | 4.22 | 8.06 |
| | | | | | |
| | 7/18/2019 12:34 | 11.4 | 156.2 | 2.07 | 7.13 |
| | 7/19/2019 11:10 | 11.8 | 155.0 | 2.17 | 7.96 |
| | 7/20/2019 11:45 | 11.2 | 155.5 | 10.30 | 7.95 |
| | 7/21/2019 10:18 | 10.4 | 158.8 | 2.61 | 8.01 |
| | 7/22/2019 11:28 | 12.1 | 160.2 | 4.90 | 7.93 |
| | 7/23/2019 10:38 | 12.2 | 159.2 | 4.60 | 7.96 |
| | 7/24/2019 16:21 | 14.0 | 158.6 | 4.05 | 7.97 |
| | 7/25/2019 10:51 | 12.0 | 157.6 | 4.98 | 7.98 |
| | | | | | |
| | 8/21/2019 10:31 | 7.0 | 170.1 | 3.93 | 7.91 |
| | 8/22/2019 10:08 | 7.0 | 166.3 | 2.01 | 7.84 |
| | 8/23/2019 10:28 | 6.2 | 168.1 | 3.08 | 7.87 |
| | 8/24/2019 11:00 | 6.5 | 169.3 | 4.12 | 7.89 |
| | 8/25/2019 11:45 | 6.9 | 172.1 | 2.61 | 7.78 |
| | 8/26/2019 11:38 | 6.9 | 175.0 | 4.16 | 7.81 |
| | 8/27/2019 11:54 | 7.1 | 187.5 | 11.51 | 7.81 |
| | 8/28/2019 10:59 | 6.1 | 174.6 | 7.72 | 7.85 |
| UBLU 15.0 | 6/13/2019 12:00 | 6.9 | 87.0 | NA | 6.96 |
| | 6/14/2019 12:50 | 6.4 | 83.0 | NA | 6.93 |
| | 6/15/2019 9:40 | 7.2 | 81.0 | NA | 7.40 |
| | 6/16/2019 9:52 | 9.2 | 80.1 | NA | 7.42 |
| | 6/17/2019 12:00 | 9.0 | 79.7 | NA | 7.40 |
| | 6/18/2019 11:10 | 8.8 | 79.8 | 1.38 | 7.41 |
| | 6/19/2019 9:59 | 10.2 | 80.7 | 1.41 | 7.41 |
| | 6/20/2019 10:53 | 11.8 | 81.6 | 1.32 | 7.61 |
| | | | | | |
| | 7/18/2019 9:52 | 13.4 | 109.0 | 0.66 | 6.11 |
| | 7/18/2019 9:52 | 13.4 | 109.0 | 0.66 | 6.11 |
| | 7/19/2019 9:05 | 13.7 | 113.6 | 1.48 | 7.65 |
| | 7/20/2019 10:54 | 13.0 | 113.4 | 1.81 | 7.55 |
| | 7/21/2019 8:55 | 12.1 | 117.3 | 1.90 | 7.55 |
| | 7/22/2019 10:43 | 13.0 | 118.3 | 0.92 | 7.71 |
| | 7/23/2019 8:54 | 13.0 | 118.6 | 0.89 | 7.71 |
| | 7/24/2019 12:53 | 13.8 | 116.0 | 1.09 | 7.84 |
| | 7/25/2019 9:04 | 13.3 | 114.9 | 0.97 | 7.84 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 8/21/2019 9:07 | 6.8 | 121.0 | 0.70 | 7.32 |
| | 8/22/2019 9:24 | 7.2 | 122.6 | 2.08 | 7.37 |
| | 8/23/2019 9:16 | 7.1 | 122.0 | 1.44 | 7.41 |
| | 8/24/2019 8:50 | 7.0 | 121.6 | 1.44 | 7.37 |
| | 8/25/2019 10:26 | 7.3 | 120.9 | 1.77 | 7.41 |
| | 8/26/2019 10:31 | 7.1 | 119.3 | 1.90 | 7.39 |
| | 8/27/2019 9:58 | 7.7 | 114.5 | 2.79 | 7.34 |
| W17101 | 6/13/2019 14:36 | 4.3 | 170.0 | NA | 6.47 |
| | 6/14/2019 14:00 | 5.7 | 170.4 | NA | 7.38 |
| | 6/15/2019 17:27 | 9.0 | 67.9 | NA | 7.28 |
| | 6/16/2019 16:00 | 8.1 | 66.8 | NA | 7.23 |
| | 6/18/2019 15:45 | 8.6 | 65.8 | 0.74 | 7.49 |
| | 6/19/2019 15:23 | 10.4 | 65.7 | 2.36 | 7.65 |
| | 6/20/2019 16:34 | 12.8 | 68.6 | 0.93 | 7.56 |
| | 7/18/2019 14:32 | 16.6 | NA | 15.30 | 7.64 |
| | 7/19/2019 15:42 | 13.5 | 103.5 | 0.19 | 7.69 |
| | 7/20/2019 16:28 | 13.1 | 102.6 | 0.42 | 7.95 |
| | 7/21/2019 14:28 | 13.0 | 105.0 | 1.10 | 7.86 |
| | 7/22/2019 15:49 | 14.0 | 108.6 | 11.52 | 7.46 |
| | 7/23/2019 14:01 | 15.0 | 111.7 | 1.55 | 7.70 |
| | 7/24/2019 13:48 | 14.3 | 112.6 | 1.59 | 7.63 |
| | 7/25/2019 13:30 | 13.7 | 113.8 | 1.24 | 7.58 |
| | 8/21/2019 13:44 | 8.3 | 140.0 | 1.01 | 7.57 |
| | 8/22/2019 13:25 | 8.0 | 137.2 | 0.12 | 7.51 |
| | 8/23/2019 13:42 | 7.8 | 136.6 | 0.18 | 7.68 |
| | 8/24/2019 13:23 | 7.8 | 136.5 | 0.10 | 7.69 |
| | 8/25/2019 14:56 | 7.9 | 135.5 | 0.14 | 7.83 |
| | 8/26/2019 14:25 | 7.9 | 134.5 | 0.14 | 7.75 |
| | 8/27/2019 15:28 | 7.9 | 132.7 | 0.89 | 7.59 |
| | 8/28/2019 13:35 | 7.7 | 118.1 | 0.17 | 7.71 |
| W17201 | 6/13/2019 15:22 | 6.2 | 133.0 | NA | 6.84 |
| | 6/14/2019 15:52 | 7.7 | 127.4 | NA | 7.44 |
| | 6/15/2019 13:22 | 9.5 | 127.4 | NA | 7.48 |
| | 6/15/2019 13:22 | 9.5 | 127.4 | NA | 7.48 |
| | 6/16/2019 13:10 | 12.0 | 128.8 | NA | 7.46 |
| | 6/17/2019 16:00 | 10.0 | 129.7 | NA | 7.56 |
| | 6/18/2019 14:53 | 9.8 | 128.7 | 0.79 | 7.49 |
| | 6/19/2019 15:05 | 12.3 | 129.8 | 1.14 | 7.54 |
| | 6/20/2019 16:41 | 15.1 | 133.4 | 1.13 | 7.50 |
| | 7/18/2019 9:55 | 12.3 | 237.0 | 2.52 | 6.53 |
| | 7/18/2019 9:55 | 12.3 | 237.0 | 2.52 | 6.53 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 7/19/2019 14:40 | 13.5 | 235.5 | 2.46 | 7.88 |
| | 7/20/2019 15:39 | 12.9 | 239.0 | 4.80 | 7.91 |
| | 7/21/2019 13:34 | 12.0 | 230.7 | 7.83 | 7.76 |
| | 7/22/2019 15:23 | 13.8 | 213.0 | 4.41 | 7.56 |
| | 7/23/2019 13:34 | 14.2 | 199.7 | 3.95 | 7.59 |
| | 7/24/2019 14:41 | 14.8 | 192.4 | 3.05 | 7.58 |
| | 7/25/2019 14:30 | 14.3 | 196.1 | 5.70 | 7.55 |
| | | | | | |
| | 8/21/2019 13:24 | 7.1 | 165.6 | 1.15 | 7.64 |
| | 8/22/2019 11:55 | 7.0 | 160.4 | 0.37 | 7.50 |
| | 8/23/2019 13:15 | 7.0 | 156.4 | 0.75 | 7.58 |
| | 8/24/2019 12:11 | 6.9 | 153.0 | 0.64 | 7.50 |
| | 8/25/2019 13:54 | 7.3 | 149.2 | 0.83 | 7.58 |
| | 8/26/2019 13:54 | 7.4 | 147.5 | 0.75 | 7.56 |
| | 8/27/2019 15:24 | 7.8 | 141.7 | 4.42 | 7.51 |
| | 8/28/2019 14:28 | 6.6 | 134.3 | 0.69 | 7.73 |
| | | | | | |
| W17301 | 6/14/2019 16:20 | 5.6 | 228.5 | NA | 7.32 |
| | 6/15/2019 10:40 | 3.0 | 147.8 | NA | 7.22 |
| | 6/16/2019 15:53 | 6.1 | 200.6 | NA | 7.21 |
| | 6/17/2019 15:47 | 5.1 | 209.6 | NA | 7.43 |
| | 6/18/2019 11:43 | 5.5 | 197.9 | 1.26 | 7.50 |
| | 6/19/2019 10:57 | 5.3 | 178.6 | 0.93 | 7.60 |
| | 6/20/2019 12:11 | 7.4 | 194.3 | 1.09 | 7.57 |
| | | | | | |
| | 7/18/2019 15:24 | 14.7 | NA | 29.00 | 7.31 |
| | 7/19/2019 15:50 | 12.6 | 174.1 | 1.36 | 7.86 |
| | 7/20/2019 16:10 | 12.5 | 168.6 | 5.67 | 7.62 |
| | 7/21/2019 12:54 | 12.5 | 170.7 | 2.55 | 7.80 |
| | 7/22/2019 14:57 | 13.5 | 169.0 | 6.58 | 7.95 |
| | 7/23/2019 13:30 | 13.9 | 168.9 | 12.68 | 7.79 |
| | 7/25/2019 13:13 | 13.9 | 173.7 | 2.01 | 7.93 |
| | | | | | |
| | 8/21/2019 13:10 | 8.2 | 178.0 | 1.65 | 7.78 |
| | 8/22/2019 13:33 | 8.3 | 181.6 | 2.91 | 7.88 |
| | 8/23/2019 13:54 | 7.8 | 181.5 | 2.42 | 7.92 |
| | 8/24/2019 13:28 | 7.5 | 181.7 | 4.07 | 7.93 |
| | 8/25/2019 14:59 | 7.7 | 181.3 | 3.22 | 7.91 |
| | 8/26/2019 14:32 | 7.8 | 180.6 | 3.33 | 7.91 |
| | 8/27/2019 15:01 | 7.9 | 178.4 | 2.65 | 7.84 |
| | 8/28/2019 14:18 | 7.9 | 178.8 | 2.22 | 7.89 |
| | | | | | |
| W17401 | 6/13/2019 12:45 | 6.6 | 92.7 | NA | 6.85 |
| | 6/14/2019 11:00 | 5.3 | 89.8 | NA | 6.83 |
| | 6/15/2019 14:03 | 7.8 | 84.4 | NA | 7.43 |
| | 6/16/2019 12:29 | 10.0 | 88.3 | NA | 7.41 |
| | 6/17/2019 14:19 | 8.9 | 90.9 | NA | 7.51 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 6/18/2019 12:47 | 9.0 | 91.4 | 1.07 | 7.58 |
| | 6/19/2019 12:04 | 10.6 | 92.9 | 0.91 | 7.56 |
| | 6/20/2019 13:59 | 13.0 | 95.2 | 1.14 | 7.53 |
| | | | | | |
| | 7/18/2019 12:44 | 13.4 | 140.0 | 2.40 | 7.46 |
| | 7/18/2019 12:44 | 13.4 | 140.0 | 2.40 | 7.46 |
| | 7/19/2019 12:12 | 13.1 | 136.4 | 2.68 | 7.94 |
| | 7/19/2019 12:12 | 13.1 | 136.4 | 2.68 | 7.94 |
| | 7/20/2019 12:37 | 12.8 | 137.7 | 2.83 | 7.81 |
| | 7/21/2019 10:49 | 12.0 | 133.5 | 2.44 | 7.68 |
| | 7/22/2019 11:53 | 13.1 | 133.5 | 1.41 | 7.70 |
| | 7/23/2019 11:27 | 13.6 | 140.9 | 1.16 | 7.83 |
| | 7/24/2019 17:21 | 16.1 | 143.5 | 2.37 | 8.08 |
| | 7/25/2019 8:47 | 14.4 | 145.7 | 2.23 | 7.82 |
| | | | | | |
| | 8/21/2019 10:38 | 7.1 | 134.0 | 0.57 | 7.37 |
| | 8/21/2019 10:38 | 7.1 | 134.0 | 0.57 | 7.37 |
| | 8/22/2019 11:01 | 7.4 | 136.5 | 1.37 | 7.43 |
| | 8/22/2019 11:01 | 7.4 | 136.5 | 1.37 | 7.43 |
| | 8/23/2019 11:09 | 7.0 | 135.6 | 1.49 | 7.51 |
| | 8/23/2019 11:09 | 7.0 | 135.6 | 1.49 | 7.51 |
| | 8/24/2019 11:22 | 7.0 | 134.1 | 1.43 | 7.50 |
| | 8/24/2019 11:22 | 7.0 | 134.1 | 1.43 | 7.50 |
| | 8/25/2019 13:06 | 7.4 | 132.1 | 1.68 | 7.47 |
| | 8/25/2019 13:06 | 7.4 | 132.1 | 1.68 | 7.47 |
| | 8/26/2019 11:58 | 7.2 | 129.9 | 1.62 | 7.42 |
| | 8/26/2019 11:58 | 7.2 | 129.9 | 1.62 | 7.42 |
| | 8/27/2019 11:46 | 7.9 | 123.1 | 2.26 | 7.39 |
| | 8/27/2019 11:46 | 7.9 | 123.1 | 2.26 | 7.39 |
| | 8/28/2019 10:37 | 6.8 | 117.3 | 2.07 | 7.32 |
| | | | | | |
| W18204 | 6/13/2019 16:40 | 5.8 | 80.0 | NA | 6.73 |
| | 6/14/2019 16:41 | 7.6 | 76.7 | NA | 7.48 |
| | 6/15/2019 15:00 | 8.6 | 78.1 | NA | 7.32 |
| | 6/16/2019 14:12 | 11.2 | 81.2 | NA | 7.27 |
| | 6/17/2019 16:20 | 6.5 | 85.7 | NA | 7.55 |
| | 6/18/2019 15:38 | 8.4 | 81.8 | 0.40 | 7.26 |
| | 6/19/2019 14:47 | 11.4 | 87.0 | 8.70 | 7.35 |
| | 6/20/2019 17:42 | 13.6 | 90.9 | 0.61 | 7.36 |
| | | | | | |
| | 7/18/2019 15:08 | 13.4 | 145.8 | 9.01 | 7.28 |
| | 7/19/2019 16:13 | 13.3 | 145.3 | 3.00 | 7.64 |
| | 7/20/2019 16:38 | 12.3 | 145.1 | 3.28 | 7.54 |
| | 7/21/2019 14:41 | 11.8 | 121.0 | 3.01 | 7.45 |
| | 7/22/2019 16:17 | 13.3 | 125.1 | 2.21 | 7.38 |
| | 7/23/2019 14:31 | 14.1 | 134.3 | 2.71 | 7.46 |
| | 7/24/2019 13:23 | 14.3 | 134.2 | 2.64 | 7.40 |
| | 7/25/2019 14:18 | 14.2 | 137.1 | 1.58 | 7.68 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 8/21/2019 13:58 | 6.1 | 119.0 | 0.16 | 7.51 |
| | 8/22/2019 13:48 | 7.0 | 116.0 | 0.10 | 7.41 |
| | 8/23/2019 14:15 | 6.5 | 113.9 | 0.16 | 7.63 |
| | 8/24/2019 13:53 | 6.6 | 109.7 | 0.16 | 7.50 |
| | 8/25/2019 15:22 | 7.2 | 108.1 | 0.15 | 7.66 |
| | 8/26/2019 14:51 | 7.0 | 106.7 | 0.27 | 7.56 |
| | 8/27/2019 16:06 | 7.6 | 97.2 | 0.33 | 7.39 |
| | 8/28/2019 15:11 | 6.2 | 96.8 | 0.25 | 7.62 |
| W18302 | 6/14/2019 15:41 | 2.5 | 134.3 | NA | 7.38 |
| | 6/15/2019 16:00 | 3.8 | 136.0 | NA | 7.26 |
| | 6/16/2019 15:58 | 4.9 | 136.3 | NA | 7.25 |
| | 6/17/2019 16:10 | 2.9 | 130.4 | NA | 7.56 |
| | 6/18/2019 11:35 | 2.9 | 128.2 | 0.82 | 7.21 |
| | 6/19/2019 10:48 | 4.4 | 131.6 | 0.81 | 7.58 |
| | 6/20/2019 12:25 | 5.3 | 136.5 | 0.77 | 7.61 |
| | 7/18/2019 15:30 | 14.0 | 185.9 | 3.28 | 7.69 |
| | 7/19/2019 16:20 | 13.6 | 189.8 | 1.16 | 7.81 |
| | 7/21/2019 13:16 | 12.4 | 188.2 | 2.84 | 7.44 |
| | 7/22/2019 15:57 | 13.7 | 185.9 | 1.30 | 7.92 |
| | 7/23/2019 14:08 | 14.0 | 187.2 | 1.17 | 7.86 |
| | 7/24/2019 14:37 | 14.3 | 187.2 | 0.82 | 7.93 |
| | 7/25/2019 13:36 | 14.7 | 188.2 | 0.61 | 7.74 |
| | 8/21/2019 13:30 | 7.9 | 187.0 | 0.63 | 7.67 |
| | 8/22/2019 13:55 | 8.0 | 189.9 | 1.37 | 7.75 |
| | 8/23/2019 14:15 | 7.6 | 188.8 | 1.57 | 7.81 |
| | 8/24/2019 13:50 | 7.5 | 187.9 | 2.30 | 7.89 |
| | 8/25/2019 15:18 | 7.7 | 186.9 | 1.99 | 7.87 |
| | 8/26/2019 14:52 | 7.7 | 185.2 | 1.77 | 7.86 |
| | 8/27/2019 15:11 | 7.9 | 181.9 | 2.75 | 7.74 |
| | 8/28/2019 15:14 | 7.8 | 177.8 | 1.85 | 7.67 |
| W18401 | 6/13/2019 15:03 | 5.1 | 61.1 | NA | 6.95 |
| | 6/14/2019 12:11 | 6.0 | 65.8 | NA | 7.49 |
| | 6/15/2019 14:39 | 9.3 | 60.0 | NA | 7.38 |
| | 6/16/2019 14:57 | 12.1 | NA | NA | 7.50 |
| | 6/17/2019 13:25 | 7.3 | 60.6 | NA | 7.45 |
| | 6/18/2019 14:25 | 9.8 | 59.8 | 0.97 | 7.58 |
| | 6/19/2019 14:00 | 12.5 | 63.9 | 1.66 | 7.49 |
| | 6/20/2019 15:50 | 15.3 | 65.2 | 0.76 | 7.62 |
| | 7/18/2019 14:05 | 15.3 | NA | 10.56 | 7.08 |
| | 7/19/2019 13:15 | 13.3 | 99.6 | 24.30 | 7.46 |
| | 7/20/2019 15:21 | 12.7 | 88.4 | 13.16 | 7.61 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 7/21/2019 12:03 | 12.5 | 91.6 | 4.71 | 7.61 |
| | 7/22/2019 12:26 | 15.0 | 94.9 | 7.20 | 7.56 |
| | 7/23/2019 11:02 | 14.3 | 96.9 | 11.50 | 7.67 |
| | 7/25/2019 11:13 | 13.6 | 100.9 | 12.40 | 7.50 |
| | | | | | |
| | 8/21/2019 10:58 | 7.0 | 104.0 | 0.42 | 7.27 |
| | 8/22/2019 11:27 | 7.4 | 105.4 | 1.23 | 7.30 |
| | 8/23/2019 11:40 | 6.7 | 103.1 | 6.35 | 7.44 |
| | 8/24/2019 12:09 | 7.5 | 102.4 | 3.30 | 7.51 |
| | 8/25/2019 13:47 | 7.6 | 100.9 | 1.43 | 7.53 |
| | 8/26/2019 13:26 | 7.6 | 100.2 | 1.36 | 7.51 |
| | 8/27/2019 12:53 | 7.9 | 97.2 | 1.38 | 7.33 |
| | 8/28/2019 13:24 | 7.2 | 96.5 | 1.37 | 7.27 |
| | | | | | |
| W18402 | 6/13/2019 13:34 | 7.2 | 118.3 | NA | 6.93 |
| | 6/14/2019 11:15 | 6.2 | 110.2 | NA | 7.40 |
| | 6/15/2019 11:57 | 8.4 | 102.3 | NA | 7.38 |
| | 6/16/2019 14:32 | 12.2 | 107.8 | NA | 7.43 |
| | 6/17/2019 11:43 | 10.2 | 111.3 | NA | 7.43 |
| | 6/18/2019 15:06 | 10.5 | 112.4 | 0.91 | 7.61 |
| | 6/19/2019 11:29 | 11.0 | 113.4 | 0.68 | 7.70 |
| | 6/20/2019 15:11 | 14.8 | 115.6 | 0.98 | 7.65 |
| | | | | | |
| | 7/18/2019 14:51 | 16.1 | NA | 25.96 | 7.25 |
| | 7/19/2019 14:50 | 13.9 | 153.2 | 1.95 | 7.89 |
| | 7/20/2019 15:44 | 13.3 | 53.7 | 7.54 | 7.64 |
| | 7/21/2019 11:34 | 12.4 | 154.4 | 3.05 | 7.72 |
| | 7/22/2019 13:33 | 14.3 | 156.1 | 1.40 | 7.91 |
| | 7/23/2019 11:41 | 13.9 | 158.3 | 1.04 | 7.88 |
| | 7/24/2019 17:31 | 16.2 | 159.7 | 0.90 | 8.08 |
| | 7/25/2019 10:35 | 14.5 | 150.3 | 0.79 | 7.85 |
| | | | | | |
| | 8/21/2019 11:35 | 7.4 | 143.0 | 0.54 | 7.42 |
| | 8/22/2019 12:01 | 7.4 | 145.2 | 1.24 | 7.50 |
| | 8/23/2019 12:49 | 7.2 | 144.5 | 1.21 | 7.61 |
| | 8/24/2019 11:48 | 7.3 | 143.0 | 1.20 | 7.63 |
| | 8/25/2019 13:31 | 7.5 | 140.1 | 1.24 | 7.52 |
| | 8/26/2019 0:00 | 7.5 | 136.4 | 1.28 | 7.49 |
| | 8/27/2019 14:33 | 7.9 | 128.6 | 1.39 | 7.40 |
| | 8/28/2019 11:54 | 7.0 | 121.9 | 1.52 | 7.34 |
| | | | | | |
| W18405 | 6/14/2019 12:53 | 3.7 | 48.5 | NA | 7.29 |
| | 6/15/2019 15:38 | 5.2 | 44.9 | NA | 7.20 |
| | 6/16/2019 10:14 | 4.9 | 44.2 | NA | 6.97 |
| | 6/17/2019 12:52 | 3.4 | 41.8 | NA | 7.47 |
| | 6/18/2019 12:00 | 3.5 | 40.6 | 1.36 | 7.71 |
| | 6/19/2019 11:11 | 5.4 | 39.6 | 0.95 | 7.72 |
| | 6/20/2019 11:48 | 8.1 | 40.9 | 1.31 | 7.33 |

**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| | 7/18/2019 13:36 | 14.1 | 0.0 | 2.39 | 7.55 |
| | 7/19/2019 12:44 | 13.9 | 53.3 | 1.65 | 7.46 |
| | 7/20/2019 12:58 | 12.6 | 153.1 | 2.06 | 7.80 |
| | 7/21/2019 12:26 | 12.7 | 52.8 | 3.42 | 7.69 |
| | 7/22/2019 14:10 | 14.6 | 53.6 | 1.99 | 7.84 |
| | 7/23/2019 12:02 | 14.0 | 54.3 | 1.24 | 8.06 |
| | 7/25/2019 12:31 | 14.8 | 53.8 | 0.30 | 7.71 |
| | 8/21/2019 12:03 | 8.4 | 58.0 | 0.42 | 7.33 |
| | 8/22/2019 12:52 | 8.2 | 59.7 | 1.02 | 7.44 |
| | 8/23/2019 13:08 | 7.7 | 59.3 | 2.61 | 7.47 |
| | 8/24/2019 13:00 | 7.7 | 59.6 | 3.75 | 7.48 |
| | 8/25/2019 14:35 | 8.0 | 60.0 | 1.72 | 7.46 |
| | 8/26/2019 14:01 | 7.9 | 59.9 | 2.38 | 7.43 |
| | 8/27/2019 14:47 | 8.2 | 58.7 | 7.45 | 7.50 |
| | 8/28/2019 14:40 | 8.0 | 58.4 | 2.72 | 7.37 |
| W19601 | 6/13/2019 11:05 | 2.7 | 98.8 | NA | 6.82 |
| | 6/14/2019 10:26 | 2.6 | 108.2 | NA | 7.41 |
| | 6/15/2019 10:52 | 4.7 | 121.9 | NA | 7.64 |
| | 6/16/2019 10:27 | 5.8 | 125.9 | NA | 7.56 |
| | 6/17/2019 12:12 | 2.9 | 116.7 | NA | 7.67 |
| | 6/18/2019 12:15 | 5.1 | 119.3 | 1.21 | 7.72 |
| | 6/19/2019 10:49 | 6.5 | 120.5 | 1.03 | 7.72 |
| | 6/20/2019 13:22 | 8.4 | 116.4 | 3.97 | 7.73 |
| | 7/18/2019 12:10 | 11.8 | 181.6 | 0.64 | 6.85 |
| | 7/18/2019 12:10 | 11.8 | 181.6 | 0.64 | 6.85 |
| | 7/19/2019 10:49 | 12.1 | 182.8 | 0.58 | 7.86 |
| | 7/19/2019 10:49 | 12.1 | 182.8 | 0.58 | 7.86 |
| | 7/20/2019 11:18 | 11.5 | 180.9 | 0.99 | 7.74 |
| | 7/21/2019 9:45 | 10.7 | 178.9 | 0.85 | 7.81 |
| | 7/22/2019 11:12 | 12.1 | 181.8 | 1.65 | 7.71 |
| | 7/23/2019 10:23 | 12.3 | 181.7 | 2.50 | 7.83 |
| | 7/24/2019 16:07 | 13.7 | 184.6 | 1.39 | 7.94 |
| | 7/25/2019 16:00 | 12.7 | 185.7 | 1.35 | 7.91 |
| | 8/21/2019 10:10 | 6.9 | 194.6 | 1.01 | 7.75 |
| | 8/22/2019 9:57 | 7.1 | 191.3 | 1.20 | 7.65 |
| | 8/23/2019 10:14 | 6.6 | 190.6 | 0.40 | 7.53 |
| | 8/24/2019 10:37 | 6.7 | 190.2 | 0.39 | 7.77 |
| | 8/25/2019 11:38 | 7.1 | 187.4 | 0.41 | 7.72 |
| | 8/26/2019 11:29 | 7.0 | 185.6 | 0.30 | 7.67 |
| | 8/27/2019 11:29 | 7.3 | 178.9 | 0.33 | 7.60 |
| | 8/28/2019 10:38 | 6.2 | 176.9 | 0.29 | 7.64 |

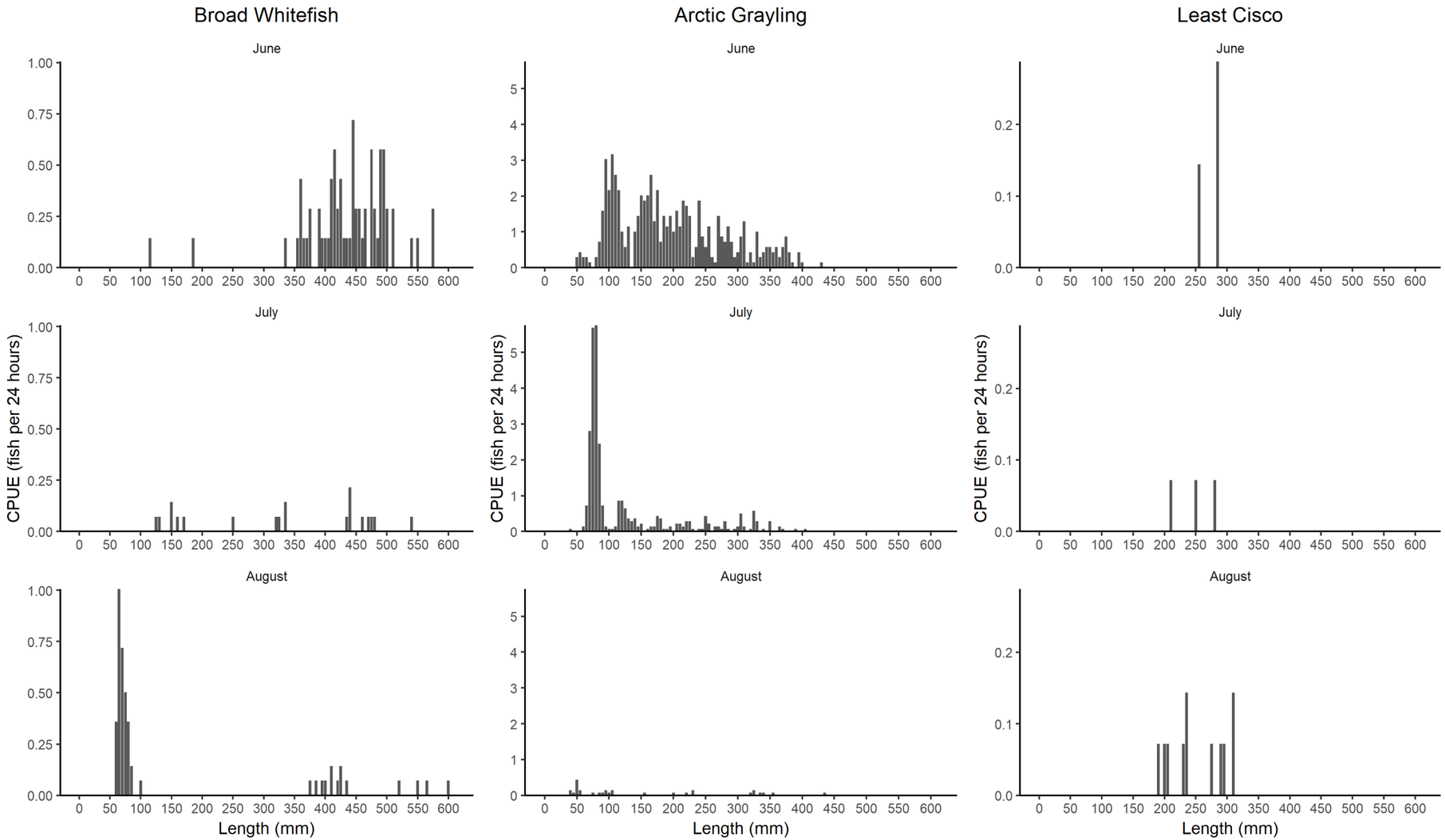
**Appendix A: Water chemistry from 2019 fyke and seine net sites in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site | Date Time | Water Temperature (°C) | Specific Conductivity (µS/cm) | Turbidity (NTU) | pH |
|---|---|---|---|---|---|
| SNW18102 | 8/23/2019 15:54 | 9.6 | 107.9 | 1.20 | 7.64 |
| SW1/SW8 | 8/23/2019 14:10 | 8.8 | 117.9 | 0.91 | 7.37 |
| SW2019 | 8/22/2019 14:20 | 8.7 | 157.3 | 0.21 | 7.03 |
| SN1820 | 8/23/2019 11:20 | 7.0 | 194.4 | 0.55 | 7.22 |
| SW2 | 8/22/2019 15:00 | 8.2 | 126.5 | 0.86 | 7.10 |
| SW14 | 8/22/2019 14:25 | 10.2 | 176.0 | 0.38 | 7.64 |
| SW7 | 8/22/2019 14:40 | 9.3 | 143.8 | 0.31 | 7.49 |
| SW23 | 8/23/2019 10:50 | 5.4 | 180.0 | 0.01 | 7.27 |

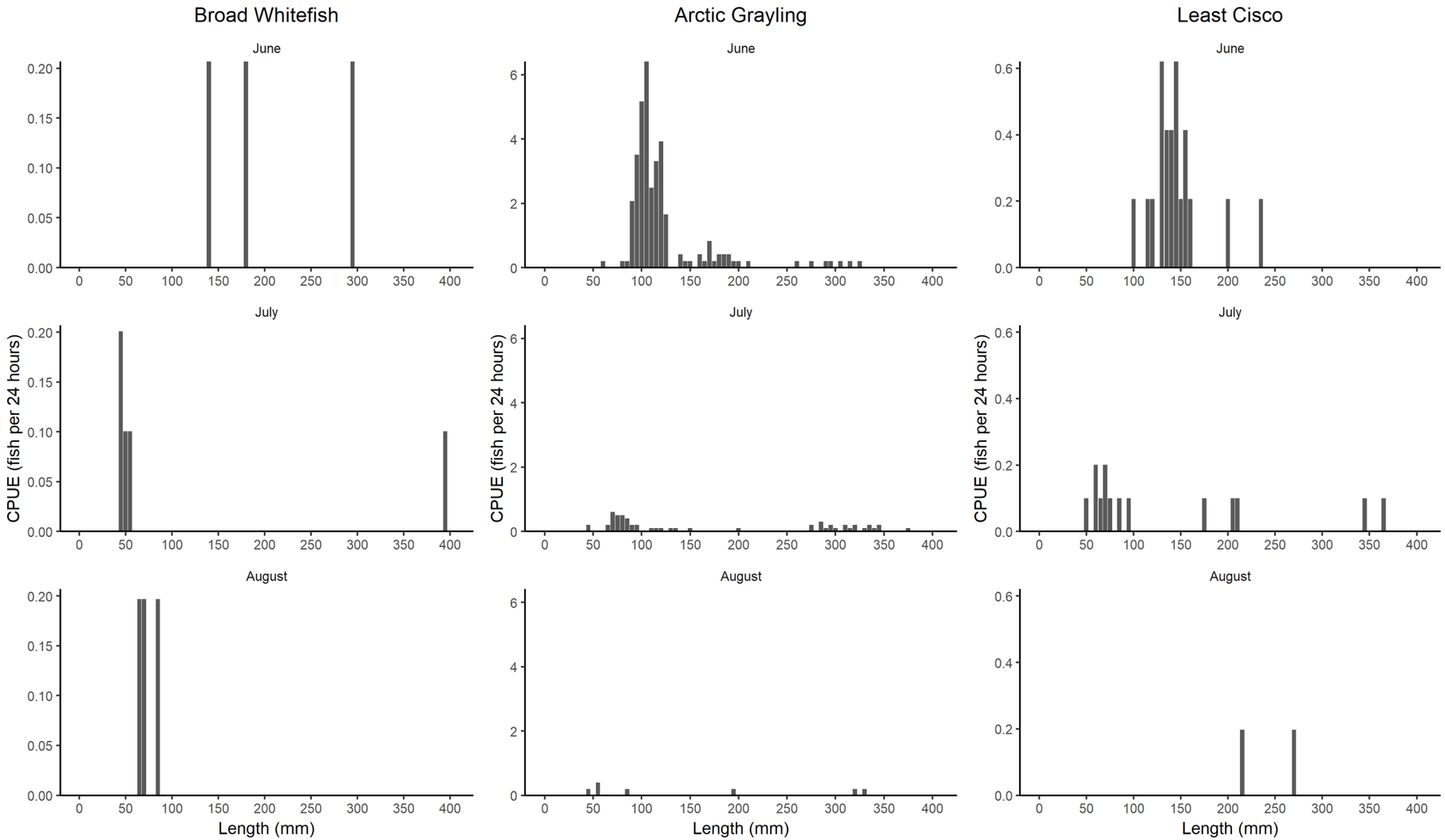
# APPENDIX B

## Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.

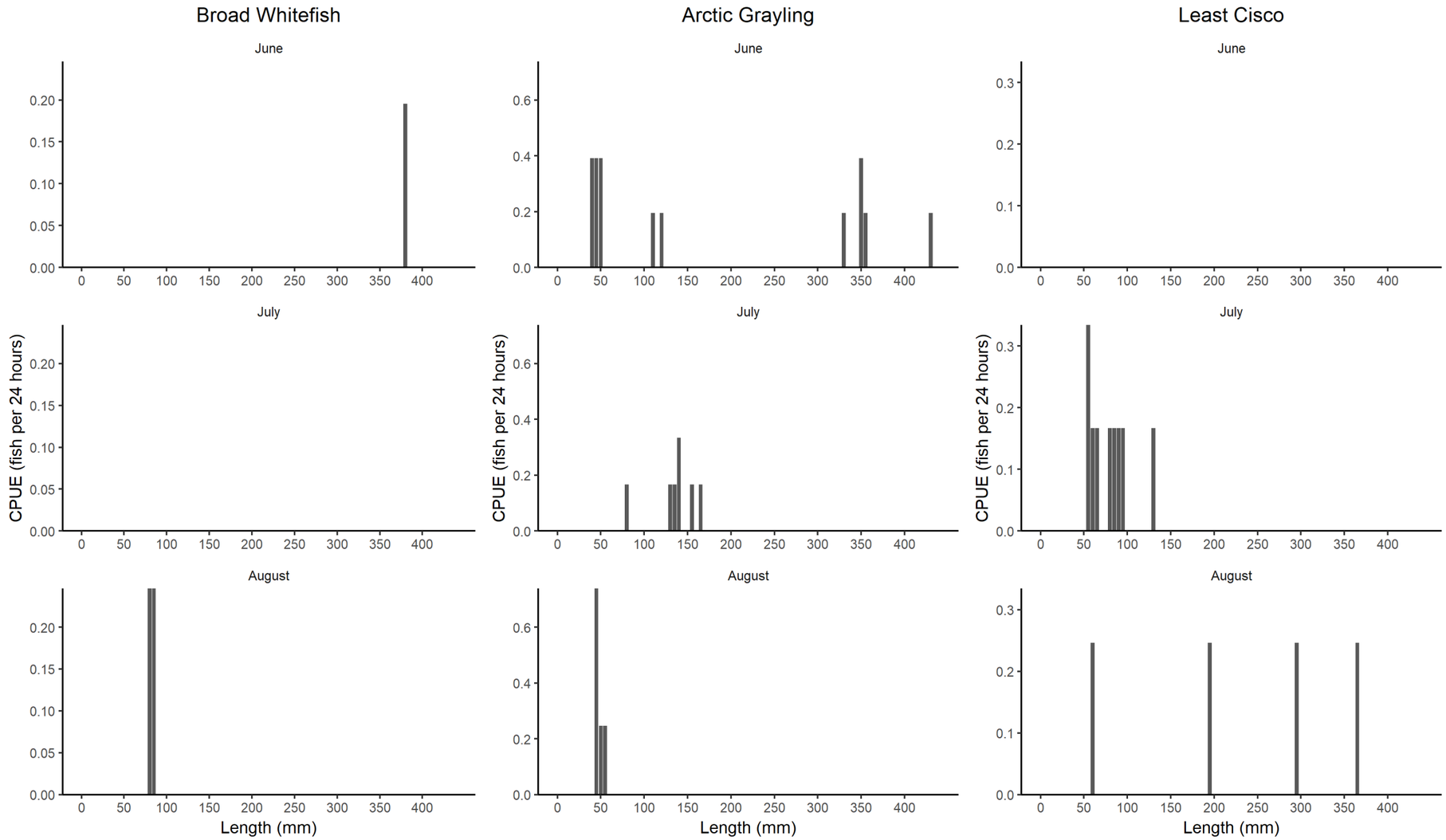
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Bill's Creek**



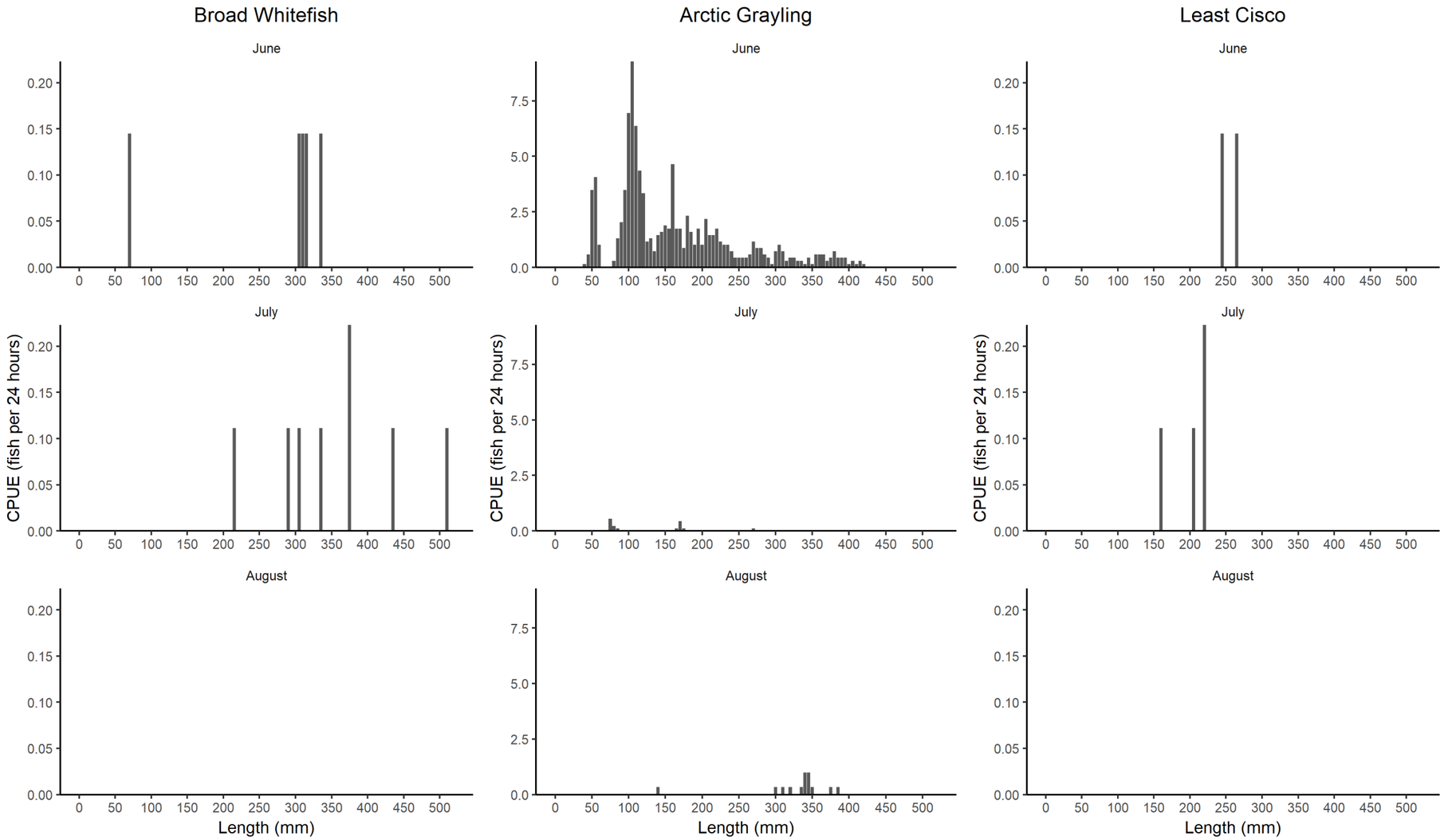
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Judy Creek Kayyaaq**



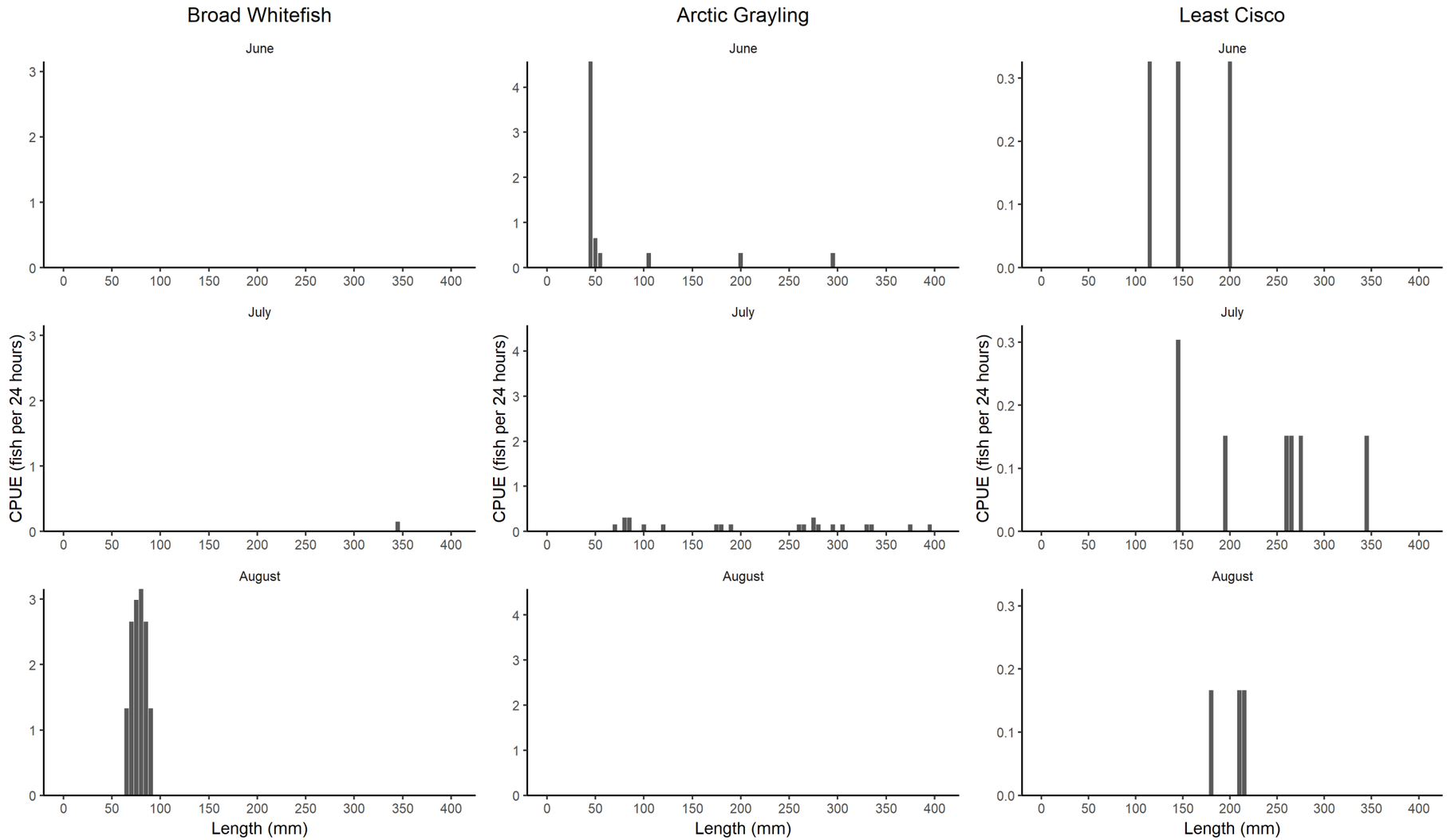
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Kalikpik River**



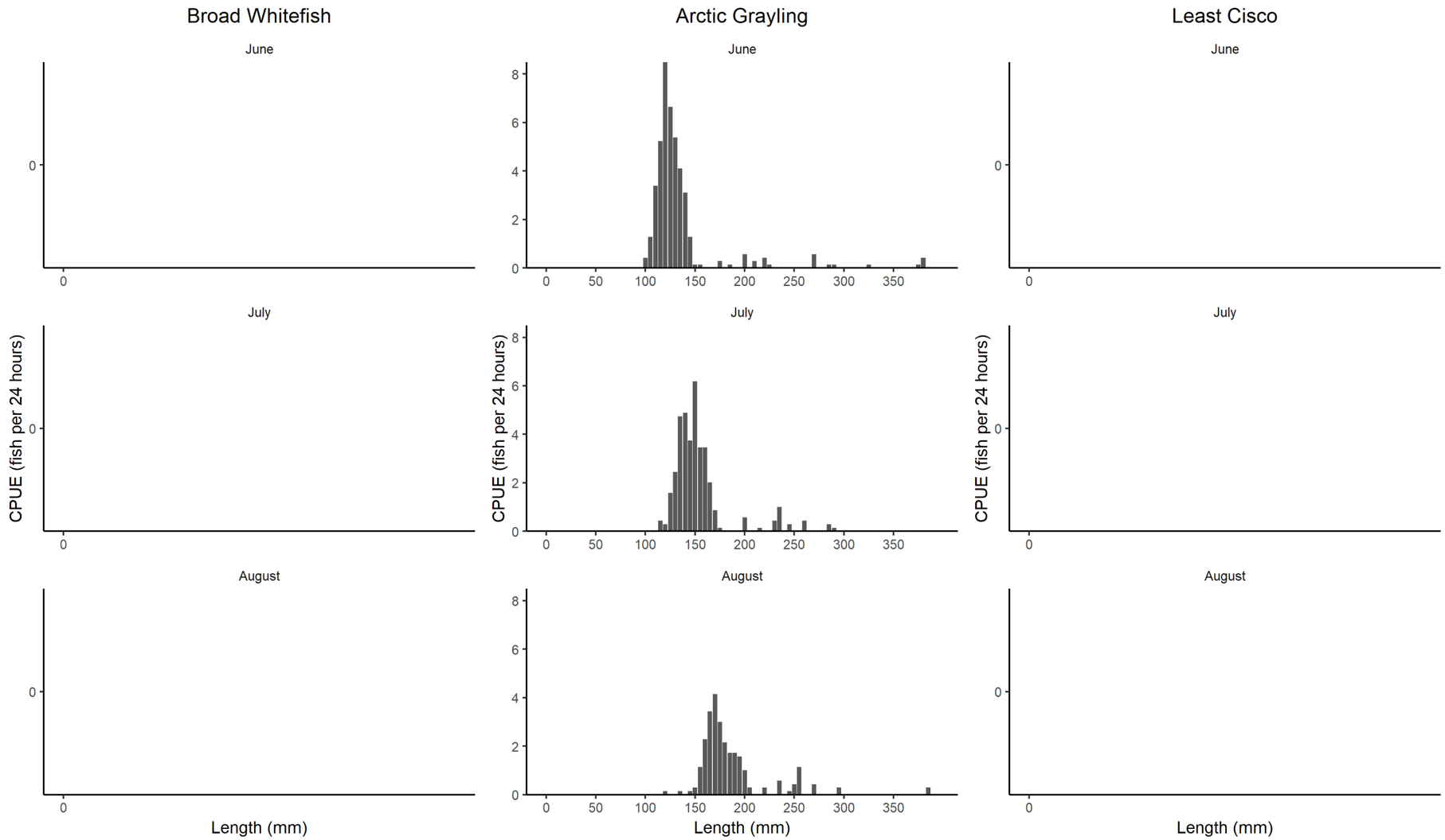
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Ublutuoch**



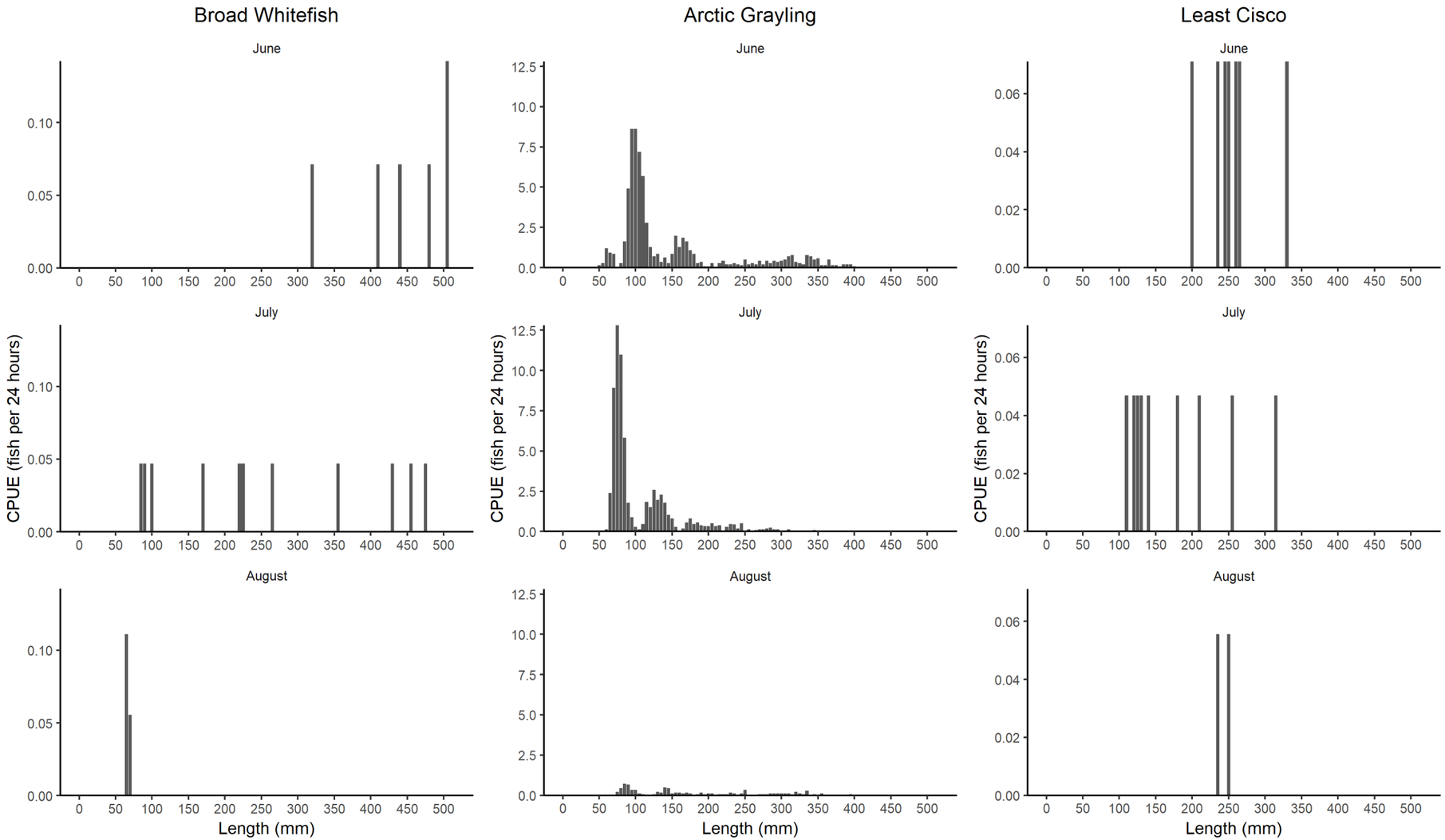
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Uvlutuuq**



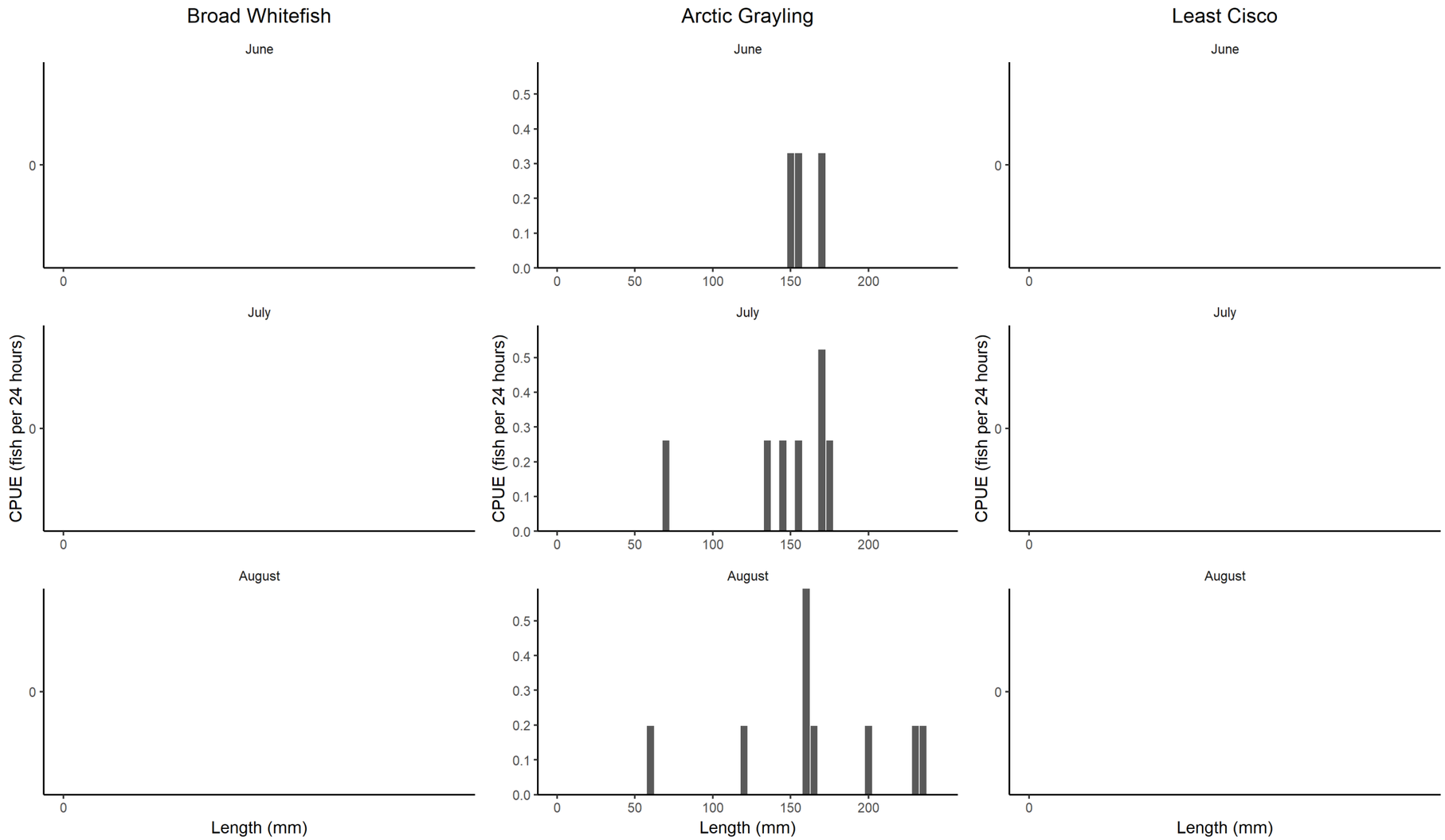
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 1**



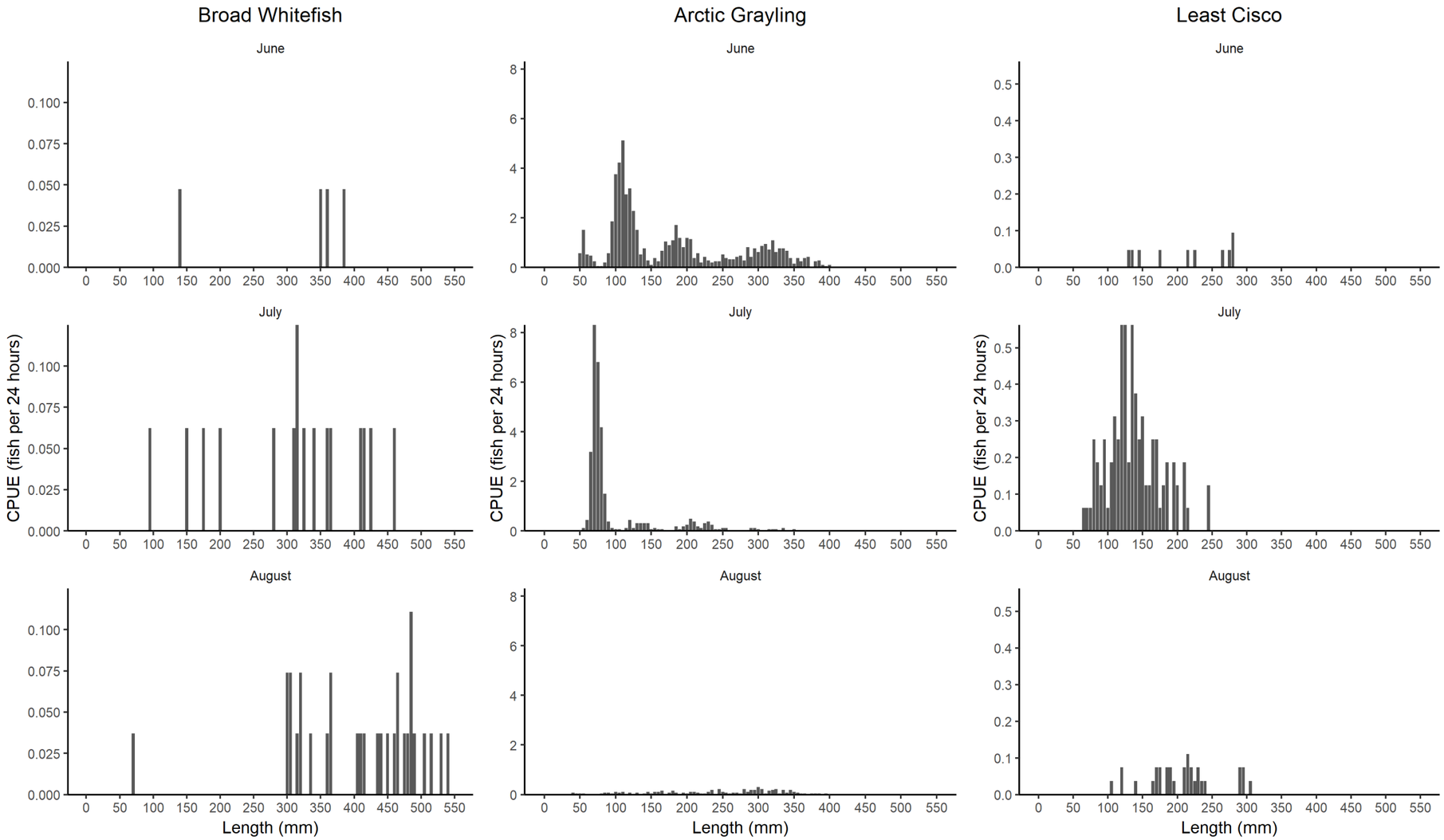
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 2**



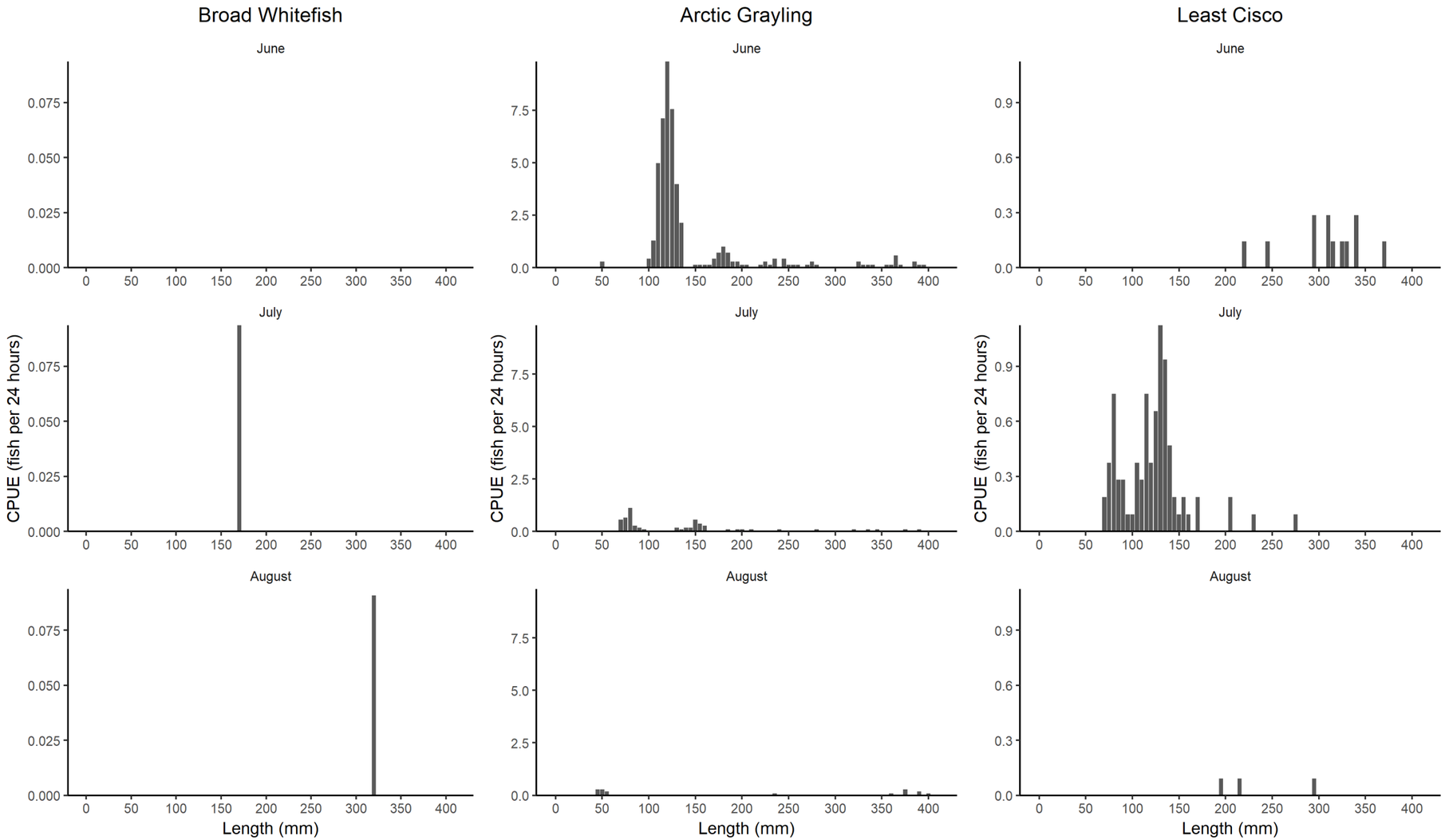
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 3**



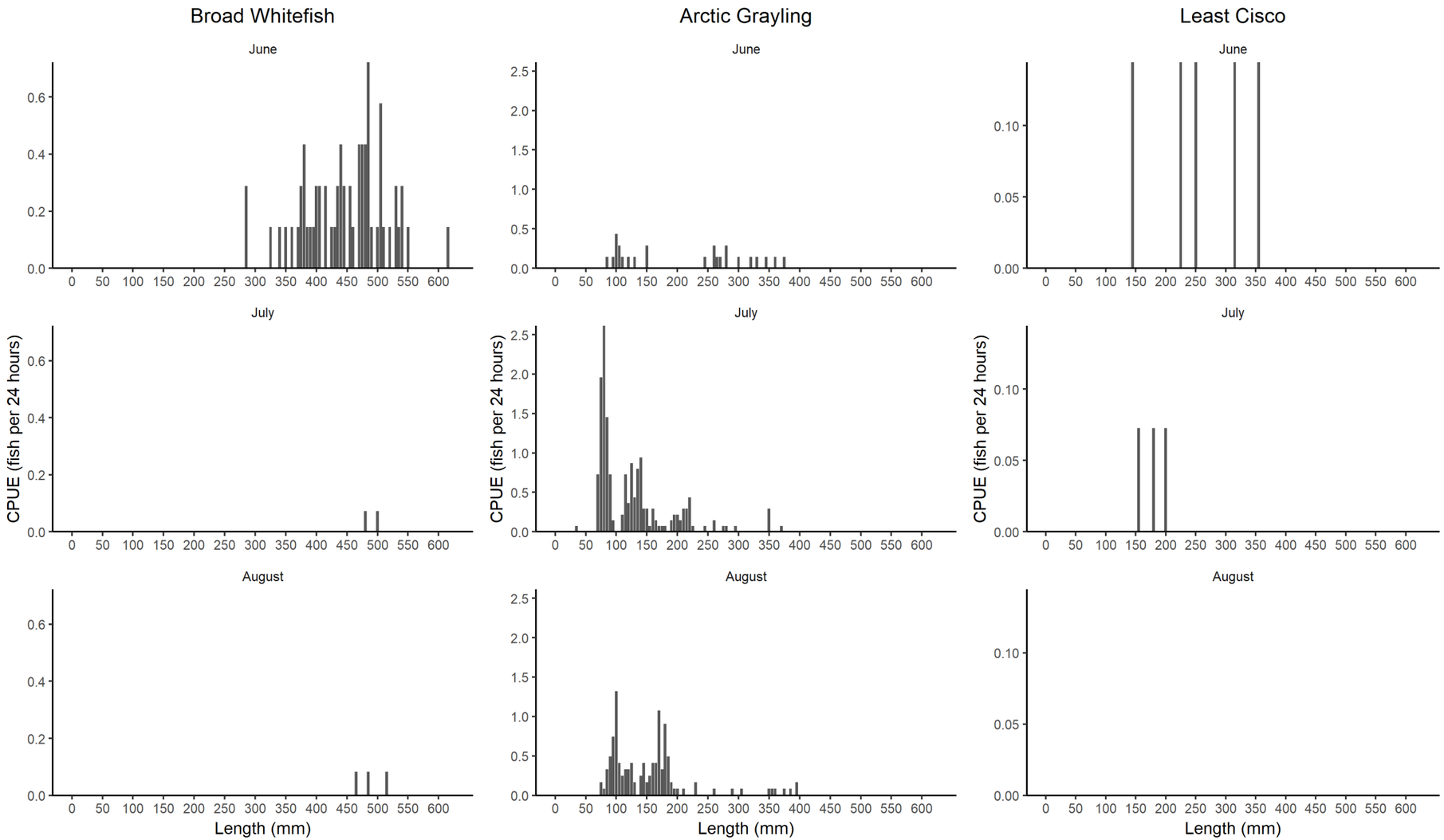
**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 4**



**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 6**



**Length Frequency Distributions of Broad Whitefish, Arctic Grayling, and Least Cisco Captured During June, July, and August 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.: Willow 8**



# APPENDIX C

## Number of Captured Fish by Direction and Season Captured at Willow Fyke Net Sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.

**Appendix C. Number of captured fish by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**Site: BC2- Bill's Creek**

| | June | | July | | August | | |
|---|---|---|---|---|---|---|---|
| **Species** | US | DS | US | DS | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | 66 | 6 | 14 | 42 | 16 | 144 | 11.8 |
| Burbot | -- | -- | -- | -- | 1 | 1 | 0.1 |
| Chum Salmon | -- | -- | -- | 3 | 1 | 4 | 0.3 |
| Arctic Grayling | 479 | 102 | 305 | 14 | 17 | 917 | 74.9 |
| Humpback Whitefish | 44 | 9 | 1 | 1 | -- | 55 | 4.5 |
| Least Cisco | 3 | 3 | -- | 6 | 5 | 17 | 1.4 |
| Ninespine Stickleback | 1 | -- | 1 | 3 | 8 | 13 | 1.1 |
| Pink Salmon | -- | -- | -- | 19 | 5 | 24 | 2.0 |
| Round Whitefish | 3 | 17 | 21 | 5 | -- | 46 | 3.8 |
| Slimy Sculpin | 3 | -- | -- | -- | -- | 3 | 0.2 |
| **Total Catch** | 599 | 137 | 342 | 93 | 53 | 1224 | |
| **Number of Species** | 7 | 5 | 5 | 8 | 7 | 10 | |
| **Effort Hours** | 166.5 | 166.5 | 166.8 | 167.1 | 166.8 | 833.7 | |

**Site: FC1801 - Uvlutuuq Creek**

| | June | July | August | | |
|---|---|---|---|---|---|
| **Species** | US | US | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | -- | 1 | 85 | 86 | 55.1 |
| Burbot | 2 | -- | 2 | 4 | 2.6 |
| Arctic Grayling | 20 | 21 | -- | 41 | 26.3 |
| Least Cisco | 3 | 7 | 3 | 13 | 8.3 |
| Ninespine Stickleback | 2 | -- | 5 | 7 | 4.5 |
| Pink Salmon | -- | -- | 1 | 1 | 0.6 |
| Slimy Sculpin | -- | 1 | 1 | 2 | 1.3 |
| Threespine Stickleback | -- | 2 | -- | 2 | 1.3 |
| **Total Catch** | 27 | 32 | 97 | 156 | |
| **Number of Species** | 4 | 5 | 6 | 8 | |
| **Effort Hours** | 166.1 | 158.3 | 168 | 492.4 | |

**Site: FT1802 - Willow 8**

| | June | July | August | | |
|---|---|---|---|---|---|
| **Species** | US | US | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | 63 | 2 | 3 | 68 | 12.9 |
| Alaska Blackfish | -- | 1 | -- | 1 | 0.2 |
| Chum Salmon | -- | -- | 2 | 2 | 0.4 |
| Arctic Grayling | 26 | 125 | 15 | 166 | 31.4 |
| Humpback Whitefish | 3 | -- | -- | 3 | 0.6 |
| Least Cisco | 5 | 3 | -- | 8 | 1.5 |
| Ninespine Stickleback | 4 | 4 | -- | 8 | 1.5 |
| Pink Salmon | -- | -- | 270 | 270 | 51.1 |
| Round Whitefish | 2 | -- | -- | 2 | 0.4 |
| **Total Catch** | 103 | 135 | 290 | 528 | |
| **Number of Species** | 6 | 5 | 4 | 9 | |
| **Effort Hours** | 166.1 | 167.5 | 170.3 | 503.9 | |

NOTE: Upstream (US), downstream (DS).

**Appendix C. Number of captured fish by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**Site: FT1803 - Willow 8**

| | June | July | August | | |
|---|---|---|---|---|---|
| **Species** | US | US | US | **Total Catch** | **% of Catch** |
| Alaska Blackfish | -- | -- | 2 | 2 | 0.2 |
| Burbot | -- | -- | 16 | 16 | 1.3 |
| Arctic Grayling | -- | 96 | 120 | 216 | 17.5 |
| Ninespine Stickleback | 121 | 588 | 293 | 1002 | 81.1 |
| **Total Catch** | 121 | 684 | 431 | 1236 | |
| **Number of Species** | 1 | 2 | 4 | 4 | |
| **Effort Hours** | 168.4 | 163.2 | 168.2 | 499.8 | |

**Site: JK1703 - Judy Creek Kayaaq**

| | June | | July | | August | | |
|---|---|---|---|---|---|---|---|
| **Species** | US | DS | US | DS | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | 3 | 1 | 4 | -- | 3 | 11 | 2.0 |
| Alaska Blackfish | -- | -- | -- | -- | 1 | 1 | 0.2 |
| Arctic Grayling | 170 | 1 | 56 | -- | 7 | 234 | 41.5 |
| Humpback Whitefish | -- | 3 | -- | -- | -- | 3 | 0.5 |
| Least Cisco | 19 | 2 | 12 | 2 | -- | 35 | 6.2 |
| Ninespine Stickleback | 195 | -- | -- | 1 | 72 | 268 | 47.5 |
| Round Whitefish | 1 | -- | -- | 2 | 1 | 4 | 0.7 |
| Slimy Sculpin | -- | -- | 1 | -- | -- | 1 | 0.2 |
| Threespine Stickleback | -- | 1 | 5 | -- | 1 | 7 | 1.2 |
| **Total Catch** | 388 | 8 | 78 | 5 | 85 | 564 | |
| **Number of Species** | 5 | 5 | 5 | 3 | 6 | 9 | |
| **Effort Hours** | 165.9 | 168.2 | 168.4 | 145.2 | 168.9 | 816.6 | |

**Site: K1902 - Kalikpik River**

| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
|---|---|---|---|---|---|
| Broad Whitefish | 1 | -- | 2 | 3 | 4.5 |
| Arctic Grayling | 8 | 7 | 11 | 26 | 39.4 |
| Least Cisco | -- | 9 | 4 | 13 | 19.7 |
| Ninespine Stickleback | -- | -- | 5 | 5 | 7.6 |
| Round Whitefish | -- | 1 | -- | 1 | 1.5 |
| Threespine Stickleback | -- | 17 | 1 | 18 | 27.3 |
| **Total Catch** | 9 | 34 | 23 | 66 | |
| **Number of Species** | 2 | 4 | 5 | 6 | |
| **Effort Hours** | 142.1 | 166.2 | 195.4 | 503.7 | |

NOTE: Upstream (US), downstream (DS).

**Appendix C. Number of captured fish by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**Site: UBLU 15.0 - Ublutuoch River**

| | June | July | | August | | | |
|---|---|---|---|---|---|---|---|
| **Species** | US | DS | US | | **Total Catch** | **% of Catch** |
| Broad Whitefish | 5 | 1 | 7 | -- | 13 | 1.6 |
| Chum Salmon | -- | -- | 2 | -- | 2 | 0.2 |
| Arctic Grayling | 695 | 3 | 12 | 14 | 724 | 89.3 |
| Humpback Whitefish | 3 | 10 | 3 | 1 | 17 | 2.1 |
| Least Cisco | 2 | 1 | 3 | -- | 6 | 0.7 |
| Ninespine Stickleback | 8 | -- | 1 | -- | 9 | 1.1 |
| Pink Salmon | -- | -- | -- | 10 | 10 | 1.2 |
| Round Whitefish | 10 | 1 | 11 | -- | 22 | 2.7 |
| Slimy Sculpin | 7 | -- | -- | 1 | 8 | 1.0 |
| **Total Catch** | 730 | 16 | 39 | 26 | 811 | |
| **Number of Species** | 7 | 5 | 7 | 4 | 9 | |
| **Effort Hours** | 139.9 | 167.3 | 165.9 | 169.2 | 642.3 | |

**Site: W17101- Willow 1**

| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
|---|---|---|---|---|---|
| Alaska Blackfish | 3 | 3 | 1 | 7 | 0.5 |
| Arctic Grayling | 250 | 261 | 243 | 754 | 54.8 |
| Ninespine Stickleback | 345 | 206 | 63 | 614 | 44.7 |
| **Total Catch** | 598 | 470 | 307 | 1375 | |
| **Number of Species** | 3 | 3 | 3 | 3 | |
| **Effort Hours** | 144.5 | 166.9 | 192.9 | 504.3 | |

**Site: W17201 - Willow 2**

| | June | | July | | August | | |
|---|---|---|---|---|---|---|---|
| **Species** | US | DS | US | DS | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | 4 | 2 | 6 | -- | 3 | 15 | 0.9 |
| Alaska Blackfish | -- | 1 | -- | -- | -- | 1 | 0.1 |
| Chum Salmon | -- | -- | -- | 1 | 1 | 2 | 0.1 |
| Arctic Grayling | 684 | 303 | 421 | 8 | 26 | 1442 | 83.1 |
| Least Cisco | 7 | 6 | 2 | 2 | -- | 17 | 1.0 |
| Ninespine Stickleback | 30 | 67 | 1 | 9 | 2 | 109 | 6.3 |
| Pink Salmon | -- | -- | -- | 88 | 48 | 136 | 7.8 |
| Round Whitefish | 5 | 3 | 4 | 2 | -- | 14 | 0.8 |
| **Total Catch** | 730 | 382 | 434 | 110 | 80 | 1736 | |
| **Number of Species** | 5 | 6 | 5 | 6 | 5 | 8 | |
| **Effort Hours** | 142.9 | 172.4 | 172.2 | 145.6 | 194.2 | 827.3 | |

**Site: W17301 - Willow 3**

| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
|---|---|---|---|---|---|
| Alaska Blackfish | 3 | 5 | 4 | 12 | 0.0 |
| Arctic Grayling | 1 | -- | 2 | 3 | 0.0 |
| Ninespine Stickleback | 9877 | 7434 | 9748 | 27059 | 99.9 |
| **Total Catch** | 9881 | 7439 | 9754 | 27074 | |
| **Number of Species** | 3 | 2 | 3 | 3 | |
| **Effort Hours** | 140.1 | 165.8 | 169.2 | 475.1 | |

NOTE: Upstream (US), downstream (DS).

**Appendix C. Number of captured fish by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site: W17401 - Willow 4 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | June | July | | August | | | |
| **Species** | | DS | US | DS | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | 1 | 7 | 7 | 20 | 2 | 37 | 2.3 |
| Alaska Blackfish | -- | -- | -- | -- | 1 | 1 | 0.1 |
| Chum Salmon | -- | -- | -- | 1 | -- | 1 | 0.1 |
| Arctic Grayling | 788 | 68 | 261 | 33 | 26 | 1176 | 72.9 |
| Humpback Whitefish | 1 | -- | -- | -- | -- | 1 | 0.1 |
| Least Cisco | 7 | 38 | 37 | 16 | -- | 98 | 6.1 |
| Ninespine Stickleback | 26 | -- | 18 | 6 | 98 | 148 | 9.2 |
| Pink Salmon | -- | -- | -- | 62 | 61 | 123 | 7.6 |
| Round Whitefish | 6 | 1 | 3 | 8 | -- | 18 | 1.1 |
| Threespine Stickleback | -- | 1 | 10 | -- | -- | 11 | 0.7 |
| **Total Catch** | 829 | 115 | 336 | 146 | 188 | 1614 | |
| **Number of Species** | 6 | 5 | 6 | 7 | 5 | 10 | |
| **Effort Hours** | 167.1 | 164.2 | 164.1 | 167.2 | 144.3 | 806.9 | |

| Site: W18204 - Willow 2 | | | | | |
|---|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
| Broad Whitefish | 2 | 3 | -- | 5 | 0.4 |
| Chum Salmon | -- | -- | 1 | 1 | 0.1 |
| Arctic Grayling | 312 | 712 | 116 | 1140 | 91.4 |
| Least Cisco | -- | 1 | -- | 1 | 0.1 |
| Ninespine Stickleback | 46 | 8 | 41 | 95 | 7.6 |
| Pink Salmon | -- | -- | 1 | 1 | 0.1 |
| Round Whitefish | 3 | 1 | -- | 4 | 0.3 |
| **Total Catch** | 363 | 725 | 159 | 1247 | |
| **Number of Species** | 4 | 5 | 4 | 7 | |
| **Effort Hours** | 168.9 | 166.9 | 169 | 504.8 | |

| Site: W18302 - Willow 3 | | | | | |
|---|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
| Arctic Grayling | 2 | 7 | 7 | 16 | 4.2 |
| Ninespine Stickleback | 171 | 163 | 33 | 367 | 95.8 |
| **Total Catch** | 173 | 170 | 40 | 383 | |
| **Number of Species** | 2 | 2 | 2 | 2 | |
| **Effort Hours** | 140.7 | 165.9 | 169.7 | 476.3 | |

| Site: W18401 - Willow 4 | | | | | |
|---|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
| Broad Whitefish | -- | -- | 7 | 7 | 1.3 |
| Alaska Blackfish | 5 | -- | 1 | 6 | 1.1 |
| Arctic Grayling | 170 | 73 | 82 | 325 | 61.4 |
| Humpback Whitefish | 3 | -- | -- | 3 | 0.6 |
| Least Cisco | 2 | 22 | 15 | 39 | 7.4 |
| Ninespine Stickleback | 136 | 6 | 5 | 147 | 27.8 |
| Round Whitefish | 2 | -- | -- | 2 | 0.4 |
| **Total Catch** | 318 | 101 | 110 | 529 | |
| **Number of Species** | 6 | 3 | 5 | 7 | |
| **Effort Hours** | 168.9 | 141 | 170.1 | 480 | |

NOTE: Upstream (US), downstream (DS).

**Appendix C. Number of captured fish by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site: W18402 - Willow 4 | | | | | |
|---|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total Catch** | **% of Catch** |
| Broad Whitefish | 3 | 2 | 2 | 7 | 0.4 |
| Arctic Grayling | 266 | 99 | 15 | 380 | 22.2 |
| Least Cisco | 1 | 6 | -- | 7 | 0.4 |
| Ninespine Stickleback | 4 | 1304 | 6 | 1314 | 76.6 |
| Pink Salmon | -- | -- | 1 | 1 | 0.1 |
| Round Whitefish | 4 | -- | 1 | 5 | 0.3 |
| Threespine Stickleback | -- | 1 | -- | 1 | 0.1 |
| **Total Catch** | 278 | 1412 | 25 | 1715 | |
| **Number of Species** | 5 | 5 | 5 | 7 | |
| **Effort Hours** | 169.7 | 163.4 | 167.7 | 500.8 | |

| Site: W18405 - Willow 4 | | | | | |
|---|---|---|---|---|---|
| | **June** | **July** | **August** | | |
| **Species** | | US | | **Total Catch** | **% of Catch** |
| Alaska Blackfish | -- | -- | 6 | 6 | 0.0 |
| Arctic Grayling | -- | -- | 2 | 2 | 0.0 |
| Ninespine Stickleback | 4595 | 7713 | 3227 | 15535 | 99.9 |
| **Total Catch** | 4595 | 7713 | 3235 | 15543 | |
| **Number of Species** | 1 | 1 | 3 | 3 | |
| **Effort Hours** | 142.5 | 166.9 | 170.6 | 480 | |

| Site: W19601 - Willow 6 | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **June** | | **July** | | **August** | | |
| **Species** | US | DS | US | DS | US | **Total Catch** | **% of Catch** |
| Broad Whitefish | -- | -- | 1 | -- | 1 | 2 | 0.3 |
| Alaska Blackfish | -- | 1 | 1 | -- | 1 | 3 | 0.5 |
| Burbot | -- | -- | 2 | -- | -- | 2 | 0.3 |
| Arctic Grayling | 331 | 14 | 49 | 10 | 7 | 411 | 68.8 |
| Least Cisco | 12 | 2 | 85 | -- | 3 | 102 | 17.1 |
| Ninespine Stickleback | 9 | -- | -- | -- | -- | 9 | 1.5 |
| Threespine Stickleback | -- | 39 | 25 | 4 | -- | 68 | 11.4 |
| **Total Catch** | 352 | 56 | 163 | 14 | 12 | 597 | |
| **Number of Species** | 3 | 4 | 6 | 2 | 4 | 7 | |
| **Effort Hours** | 168.5 | 165.8 | 166.3 | 167.9 | 168.6 | 837.1 | |

NOTE: Upstream (US), downstream (DS).

# APPENDIX D

## Fish Catch Per Unit Effort (CPUE; fish per 24 hours) by Direction and Season at Willow Area Fyke Net Sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.

**Appendix D. Fish catch per unit effort (CPUE; fish per 24 hours) by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

**Site: BC2 - Bill's Creek**

| | June | | July | | August | |
|---|---|---|---|---|---|---|
| **Species** | US | DS | US | DS | US | **Total CPUE** |
| Broad Whitefish | 9.51 | 0.86 | 2.01 | 6.03 | 2.30 | 4.15 |
| Burbot | -- | -- | -- | -- | 0.14 | 0.03 |
| Chum Salmon | -- | -- | -- | 0.43 | 0.14 | 0.12 |
| Arctic Grayling | 69.05 | 14.70 | 43.88 | 2.01 | 2.45 | 26.40 |
| Humpback Whitefish | 6.34 | 1.30 | 0.14 | 0.14 | -- | 1.58 |
| Least Cisco | 0.43 | 0.43 | -- | 0.86 | 0.72 | 0.49 |
| Ninespine Stickleback | 0.14 | -- | 0.14 | 0.43 | 1.15 | 0.37 |
| Pink Salmon | -- | -- | -- | 2.73 | 0.72 | 0.69 |
| Round Whitefish | 0.43 | 2.45 | 3.02 | 0.72 | -- | 1.32 |
| Slimy Sculpin | 0.43 | -- | -- | -- | -- | 0.09 |
| **Total CPUE** | 86.34 | 19.75 | 49.21 | 13.36 | 7.63 | 35.24 |
| **Number of Species** | 7 | 5 | 5 | 8 | 7 | 10 |
| **Effort Hours** | 166.5 | 166.5 | 166.8 | 167.1 | 166.8 | 833.7 |

**Site: FC1801 - Uvlutuuq Creek**

| | June | July | August | |
|---|---|---|---|---|
| **Species** | US | US | US | **Total CPUE** |
| Broad Whitefish | -- | 0.15 | 12.14 | 4.19 |
| Burbot | 0.29 | -- | 0.29 | 0.19 |
| Arctic Grayling | 2.89 | 3.18 | -- | 2.00 |
| Least Cisco | 0.43 | 1.06 | 0.43 | 0.63 |
| Ninespine Stickleback | 0.29 | -- | 0.71 | 0.34 |
| Pink Salmon | -- | -- | 0.14 | 0.05 |
| Slimy Sculpin | -- | 0.15 | 0.14 | 0.10 |
| Threespine Stickleback | -- | 0.30 | -- | 0.10 |
| **Total CPUE** | 3.90 | 4.85 | 13.86 | 7.60 |
| **Number of Species** | 4 | 6 | 6 | 9 |
| **Effort Hours** | 166.1 | 158.3 | 168 | 492.4 |

**Site: FT1802 - Willow 8**

| | June | July | August | |
|---|---|---|---|---|
| **Species** | US | US | US | **Total Catch** |
| Broad Whitefish | 9.10 | 0.29 | 0.42 | 3.24 |
| Alaska Blackfish | -- | 0.14 | -- | 0.05 |
| Chum Salmon | -- | -- | 0.28 | 0.10 |
| Arctic Grayling | 3.76 | 17.91 | 2.11 | 7.91 |
| Humpback Whitefish | 0.43 | -- | -- | 0.14 |
| Least Cisco | 0.72 | 0.43 | -- | 0.38 |
| Ninespine Stickleback | 0.58 | 0.57 | -- | 0.38 |
| Pink Salmon | -- | -- | 38.05 | 12.86 |
| Round Whitefish | 0.29 | -- | -- | 0.10 |
| **Total CPUE** | 14.88 | 19.34 | 40.87 | 25.15 |
| **Number of Species** | 6 | 5 | 4 | 9 |
| **Effort Hours** | 166.1 | 167.5 | 170.3 | 503.9 |

NOTE: Upstream (US), downstream (DS)

**Appendix D. Fish catch per unit effort (CPUE; fish per 24 hours) by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site: FT1803 - Willow 8 | | | | |
|---|---|---|---|---|
| | June | July | August | |
| Species | US | US | US | Total CPUE |
| Alaska Blackfish | -- | -- | 0.29 | 0.10 |
| Burbot | -- | -- | 2.28 | 0.77 |
| Arctic Grayling | -- | 14.12 | 17.12 | 10.37 |
| Ninespine Stickleback | 17.24 | 86.47 | 41.81 | 48.12 |
| **Total CPUE** | 17.24 | 100.59 | 61.50 | 59.35 |
| **Number of Species** | 1 | 2 | 4 | 4 |
| **Effort Hours** | 168.4 | 163.2 | 168.2 | 499.8 |

| Site: JK1703 - Judy Creek Kayaaq | | | | | | |
|---|---|---|---|---|---|---|
| | June | | July | | August | |
| Species | US | DS | US | DS | US | Total CPUE |
| Broad Whitefish | 0.43 | 0.14 | 0.57 | -- | 0.43 | 1.57 |
| Alaska Blackfish | -- | -- | -- | -- | 0.14 | 0.14 |
| Arctic Grayling | 24.59 | 0.14 | 7.98 | -- | 0.99 | 33.71 |
| Humpback Whitefish | -- | 0.43 | -- | -- | -- | 0.43 |
| Least Cisco | 2.75 | 0.29 | 1.71 | 0.33 | -- | 5.07 |
| Ninespine Stickleback | 28.21 | -- | -- | 0.17 | 10.23 | 38.61 |
| Round Whitefish | 0.14 | -- | -- | 0.33 | 0.14 | 0.62 |
| Slimy Sculpin | -- | -- | 0.14 | -- | -- | 0.14 |
| Threespine Stickleback | -- | 0.14 | 0.71 | -- | 0.14 | 1.00 |
| **Total CPUE** | 56.13 | 1.14 | 11.12 | 0.83 | 12.08 | 81.29 |
| **Number of Species** | 5 | 5 | 5 | 3 | 6 | 9 |
| **Effort Hours** | 165.9 | 168.2 | 168.4 | 145.2 | 168.9 | 816.6 |

| Site: K1902 - Kalikpik River | | | | |
|---|---|---|---|---|
| Species | June | July | August | Total CPUE |
| Broad Whitefish | 0.17 | -- | 0.25 | 0.41 |
| Arctic Grayling | 1.35 | 1.01 | 1.35 | 3.71 |
| Least Cisco | -- | 1.30 | 0.49 | 1.79 |
| Ninespine Stickleback | -- | -- | 0.61 | 0.61 |
| Round Whitefish | -- | 0.14 | -- | 0.14 |
| Threespine Stickleback | -- | 2.45 | 0.12 | 2.58 |
| **Total CPUE** | 1.52 | 4.91 | 2.82 | 9.25 |
| **Number of Species** | 2 | 4 | 5 | 6 |
| **Effort Hours** | 142.1 | 166.2 | 195.4 | 503.7 |

NOTE: Upstream (US), downstream (DS)

**Appendix D. Fish catch per unit effort (CPUE; fish per 24 hours) by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site: UBLU 15.0 - Ublutuoch River | | | | | |
|---|---|---|---|---|---|
| | June | July | | August | |
| **Species** | US | DS | US | | **Total CPUE** |
| Broad Whitefish | 0.8577555 | 0.14 | 1.01 | -- | 2.01 |
| Chum Salmon | -- | -- | 0.29 | -- | 0.29 |
| Arctic Grayling | 119.22802 | 0.43 | 1.74 | 1.99 | 123.38 |
| Humpback Whitefish | 0.5146533 | 1.43 | 0.43 | 0.14 | 2.53 |
| Least Cisco | 0.3431022 | 0.14 | 0.43 | -- | 0.92 |
| Ninespine Stickleback | 1.3724089 | -- | 0.14 | -- | 1.52 |
| Pink Salmon | -- | -- | -- | 1.42 | 1.42 |
| Round Whitefish | 1.7155111 | 0.14 | 1.59 | -- | 3.45 |
| Slimy Sculpin | 1.2008578 | -- | -- | 0.14 | 1.34 |
| **Total CPUE** | 125.23231 | 2.30 | 5.64 | 3.69 | 136.86 |
| **Number of Species** | 7 | 5 | 7 | 4 | 9 |
| **Effort Hours** | 139.9 | 167.3 | 165.9 | 169.2 | 642.3 |

| Site: W17101- Willow 1 | | | | |
|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total CPUE** |
| Alaska Blackfish | 0.50 | 0.43 | 0.12 | 1.05 |
| Arctic Grayling | 41.52 | 37.53 | 30.23 | 109.29 |
| Ninespine Stickleback | 57.30 | 29.62 | 7.84 | 94.76 |
| **Total CPUE** | 99.32 | 67.59 | 38.20 | 205.10 |
| **Number of Species** | 3 | 3 | 3 | 3 |
| **Effort Hours** | 144.5 | 166.9 | 192.9 | 504.3 |

| Site: W17201 - Willow 2 | | | | | | |
|---|---|---|---|---|---|---|
| | June | July | | August | | |
| **Species** | US | DS | US | DS | US | **Total CPUE** |
| Broad Whitefish | 0.67 | 0.28 | 0.84 | -- | 0.37 | 2.16 |
| Alaska Blackfish | -- | 0.14 | -- | -- | -- | 0.14 |
| Chum Salmon | -- | -- | -- | 0.16 | 0.12 | 0.29 |
| Arctic Grayling | 114.88 | 42.18 | 58.68 | 1.32 | 3.21 | 220.27 |
| Least Cisco | 1.18 | 0.84 | 0.28 | 0.33 | -- | 2.62 |
| Ninespine Stickleback | 5.04 | 9.33 | 0.14 | 1.48 | 0.25 | 16.24 |
| Pink Salmon | -- | -- | -- | 14.51 | 5.93 | 20.44 |
| Round Whitefish | 0.84 | 0.42 | 0.56 | 0.33 | -- | 2.14 |
| **Total CPUE** | 122.60 | 53.18 | 60.49 | 18.13 | 9.89 | 264.29 |
| **Number of Species** | 5 | 6 | 5 | 6 | 5 | 8 |
| **Effort Hours** | 142.9 | 172.4 | 172.2 | 145.6 | 194.2 | 827.3 |

| Site: W17301 - Willow 3 | | | | |
|---|---|---|---|---|
| **Species** | **June** | **July** | **August** | **Total CPUE** |
| Alaska Blackfish | 0.51 | 0.72 | 0.57 | 1.81 |
| Arctic Grayling | 0.17 | -- | 0.28 | 0.45 |
| Ninespine Stickleback | 1691.99 | 1076.09 | 1382.70 | 4150.78 |
| **Total CPUE** | 1692.68 | 1076.82 | 1383.55 | 4153.04 |
| **Number of Species** | 3 | 2 | 3 | 3 |
| **Effort Hours** | 140.1 | 165.8 | 169.2 | 475.1 |

NOTE: Upstream (US), downstream (DS)

**Appendix D. Fish catch per unit effort (CPUE; fish per 24 hours) by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| Site: W17401 - Willow 4 | | | | | | |
|---|---|---|---|---|---|---|
| | June | July | | August | | |
| Species | | DS | US | DS | US | Total CPUE |
| Broad Whitefish | 0.14 | 1.02 | 1.02 | 2.87 | 0.33 | 5.39 |
| Alaska Blackfish | -- | -- | -- | -- | 0.17 | 0.17 |
| Chum Salmon | -- | -- | -- | 0.14 | -- | 0.14 |
| Arctic Grayling | 113.18 | 9.94 | 38.17 | 4.74 | 4.32 | 170.35 |
| Humpback Whitefish | 0.14 | -- | -- | -- | -- | 0.14 |
| Least Cisco | 1.01 | 5.55 | 5.41 | 2.30 | -- | 14.27 |
| Ninespine Stickleback | 3.73 | -- | 2.63 | 0.86 | 16.30 | 23.53 |
| Pink Salmon | -- | -- | -- | 8.90 | 10.15 | 19.05 |
| Round Whitefish | 0.86 | 0.15 | 0.44 | 1.15 | -- | 2.60 |
| Threespine Stickleback | -- | 0.15 | 1.46 | -- | -- | 1.61 |
| **Total CPUE** | 119.07 | 16.81 | 49.14 | 20.96 | 31.27 | 237.24 |
| **Number of Species** | 6 | 5 | 6 | 7 | 5 | 10 |
| **Effort Hours** | 167.1 | 164.2 | 164.1 | 167.2 | 144.3 | 806.9 |

| Site: W18204 - Willow 2 | | | | |
|---|---|---|---|---|
| Species | June | July | August | Total CPUE |
| Broad Whitefish | 0.28 | 0.43 | -- | 0.72 |
| Chum Salmon | -- | -- | 0.14 | 0.14 |
| Arctic Grayling | 44.33 | 102.38 | 16.47 | 163.19 |
| Least Cisco | -- | 0.14 | -- | 0.14 |
| Ninespine Stickleback | 6.54 | 1.15 | 5.82 | 13.51 |
| Pink Salmon | -- | -- | 0.14 | 0.14 |
| Round Whitefish | 0.43 | 0.14 | -- | 0.57 |
| **Total CPUE** | 51.58 | 104.25 | 22.58 | 178.41 |
| **Number of Species** | 4 | 5 | 4 | 7 |
| **Effort Hours** | 168.9 | 166.9 | 169 | 504.8 |

| Site: W18302 - Willow 3 | | | | |
|---|---|---|---|---|
| Species | June | July | August | Total CPUE |
| Arctic Grayling | 0.34 | 1.01 | 0.99 | 2.34 |
| Ninespine Stickleback | 29.17 | 23.58 | 4.67 | 57.42 |
| **Total CPUE** | 29.51 | 24.59 | 5.66 | 59.76 |
| **Number of Species** | 2 | 2 | 2 | 2 |
| **Effort Hours** | 140.7 | 165.9 | 169.7 | 476.3 |

| Site: W18401 - Willow 4 | | | | |
|---|---|---|---|---|
| | June | July | August | |
| Species | | US | | Total CPUE |
| Broad Whitefish | -- | -- | 0.99 | 0.99 |
| Alaska Blackfish | 0.71 | -- | 0.14 | 0.85 |
| Arctic Grayling | 24.16 | 12.43 | 11.57 | 48.15 |
| Humpback Whitefish | 0.43 | -- | -- | 0.43 |
| Least Cisco | 0.28 | 3.74 | 2.12 | 6.15 |
| Ninespine Stickleback | 19.33 | 1.02 | 0.71 | 21.05 |
| Round Whitefish | 0.28 | -- | -- | 0.28 |
| **Total CPUE** | 45.19 | 17.19 | 15.52 | 77.90 |
| **Number of Species** | 6 | 3 | 5 | 7 |
| **Effort Hours** | 168.9 | 141 | 170.1 | 480 |

NOTE: Upstream (US), downstream (DS)

**Appendix D. Fish catch per unit effort (CPUE; fish per 24 hours) by direction and season at Willow fyke net sites in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| **Site: W18402 - Willow 4** | | | | |
|---|---|---|---|---|
| | **June** | **July** | **August** | |
| **Species** | | US | | **Total CPUE** |
| Broad Whitefish | 0.42 | 0.29 | 0.29 | 1.00 |
| Arctic Grayling | 37.62 | 14.54 | 2.15 | 54.31 |
| Least Cisco | 0.14 | 0.88 | -- | 1.02 |
| Ninespine Stickleback | 0.57 | 191.53 | 0.86 | 192.95 |
| Pink Salmon | -- | -- | 0.14 | 0.14 |
| Round Whitefish | 0.57 | -- | 0.14 | 0.71 |
| Threespine Stickleback | -- | 0.15 | -- | 0.15 |
| **Total CPUE** | 39.32 | 207.39 | 3.58 | 250.29 |
| **Number of Species** | 5 | 5 | 5 | 7 |
| **Effort Hours** | 169.7 | 163.4 | 167.7 | 500.8 |

| **Site: W18405 - Willow 4** | | | | |
|---|---|---|---|---|
| | **June** | **July** | **August** | |
| **Species** | | US | | **Total Catch** |
| Alaska Blackfish | -- | -- | 0.84 | 0.84 |
| Arctic Grayling | -- | -- | 0.28 | 0.28 |
| Ninespine Stickleback | 773.89 | 1109.12 | 453.97 | 2336.99 |
| **Total CPUE** | 773.89 | 1109.12 | 455.10 | 2338.11 |
| **Number of Species** | 1 | 1 | 3 | 3 |
| **Effort Hours** | 142.5 | 166.9 | 170.6 | 480 |

| **Site: W19601 - Willow 6** | | | | | | |
|---|---|---|---|---|---|---|
| | **June** | | **July** | | **August** | |
| **Species** | US | DS | US | DS | US | **Total CPUE** |
| Broad Whitefish | -- | -- | 0.14 | -- | 0.14 | 0.29 |
| Alaska Blackfish | -- | 0.14 | 0.14 | -- | 0.14 | 0.43 |
| Burbot | -- | -- | 0.29 | -- | -- | 0.29 |
| Arctic Grayling | 47.15 | 2.03 | 7.07 | 1.43 | 1.00 | 58.67 |
| Least Cisco | 1.71 | 0.29 | 12.27 | -- | 0.43 | 14.69 |
| Ninespine Stickleback | 1.28 | -- | -- | -- | -- | 1.28 |
| Threespine Stickleback | -- | 5.65 | 3.61 | 0.57 | -- | 9.83 |
| **Total CPUE** | 50.14 | 8.11 | 23.52 | 2.00 | 1.71 | 85.48 |
| **Number of Species** | 3 | 4 | 6 | 2 | 4 | 7 |
| **Effort Hours** | 168.5 | 165.8 | 166.3 | 167.9 | 168.6 | 837.1 |

NOTE: Upstream (US), downstream (DS)

# APPENDIX E

## Fish Recapture and Release Data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| MJM0102892 | Arctic grayling | U0901 | 8/26/2014 | 335 | UBLU 15.0 | 6/14/2019 | 368 | 1753 | 33 |
| MJM0102732 | Round whitefish | U0901 | 8/30/2014 | 293 | UBLU 15.0 | 6/20/2019 | 354 | 1755 | 61 |
| OR1524 | Arctic grayling | J1701 | 6/18/2017 | 288 | W18401 | 6/16/2019 | 360 | 728 | 72 |
| OR1512 | Broad whitefish | W17401 | 6/18/2017 | 457 | W18401 | 8/23/2019 | 485 | 796 | 28 |
| OR1540 | Arctic grayling | W17401 | 6/18/2017 | 363 | W17201 | 6/17/2019 | 400 | 729 | 37 |
| OR1540 | Arctic grayling | W17401 | 6/18/2017 | 363 | W17201 | 6/16/2019 | 401 | 728 | 38 |
| OR1663 | Arctic grayling | W17201 | 6/19/2017 | 344 | W17201 | 6/20/2019 | 372 | 731 | 28 |
| OR1721 | Arctic grayling | W17201 | 6/20/2017 | 293 | W17201 | 6/19/2019 | 319 | 729 | 26 |
| OR1721 | Arctic grayling | W17201 | 6/20/2017 | 293 | W17201 | 6/14/2019 | 320 | 724 | 27 |
| OR1721 | Arctic grayling | W17201 | 6/20/2017 | 293 | W17201 | 6/16/2019 | 323 | 726 | 30 |
| OR1680 | Arctic grayling | W17201 | 6/20/2017 | 306 | W17201 | 6/17/2019 | 340 | 727 | 34 |
| OR1680 | Arctic grayling | W17201 | 6/20/2017 | 306 | W17201 | 6/16/2019 | 340 | 726 | 34 |
| OR1717 | Arctic grayling | W17201 | 6/20/2017 | 347 | W17201 | 6/16/2019 | 391 | 726 | 44 |
| OR1717 | Arctic grayling | W17201 | 6/20/2017 | 347 | W17201 | 6/17/2019 | 393 | 727 | 46 |
| OR1681 | Arctic grayling | W17201 | 6/20/2017 | 272 | W17201 | 8/22/2019 | 334 | 793 | 62 |
| OR0229 | Arctic grayling | W17201 | 6/20/2017 | 189 | W18204 | 6/20/2019 | 298 | 730 | 109 |
| OR0154 | Arctic grayling | J1701 | 6/20/2017 | 223 | W18204 | 8/27/2019 | 321 | 798 | 98 |
| OR0070 | Arctic grayling | J1701 | 6/20/2017 | 194 | W18402 | 8/23/2019 | 306 | 794 | 112 |
| OR0256 | Arctic grayling | W17203 | 6/20/2017 | 233 | W18204 | 6/16/2019 | 311 | 726 | 78 |
| OR1685 | Arctic grayling | W17203 | 6/20/2017 | 280 | W18204 | 8/23/2019 | 360 | 794 | 80 |
| OR0256 | Arctic grayling | W17203 | 6/20/2017 | 233 | W18204 | 8/27/2019 | 324 | 798 | 91 |
| OR1596 | Arctic grayling | W17401 | 6/20/2017 | 275 | W17401 | 6/17/2019 | 326 | 727 | 51 |
| OR1623 | Arctic grayling | W17203 | 6/22/2017 | 255 | W17201 | 6/20/2019 | 305 | 728 | 50 |
| OR1619 | Arctic grayling | W17201 | 6/22/2017 | 318 | W17201 | 6/20/2019 | 355 | 728 | 37 |
| OR1610 | Arctic grayling | W17201 | 6/22/2017 | 256 | W18204 | 8/22/2019 | 338 | 791 | 82 |
| OR1606 | Arctic grayling | W17201 | 6/23/2017 | 354 | W17201 | 6/14/2019 | 379 | 721 | 25 |
| OR0467 | Arctic grayling | J1701 | 6/23/2017 | 187 | W18204 | 6/14/2019 | 210 | 721 | 23 |
| OR0452 | Arctic grayling | J1701 | 6/23/2017 | 210 | W17201 | 6/16/2019 | 281 | 723 | 71 |
| OR1852 | Arctic grayling | JK1702 | 6/23/2017 | 317 | BC2 | 6/16/2019 | 347 | 723 | 30 |
| OR1794 | Arctic grayling | W17401 | 6/23/2017 | 308 | W17401 | 6/15/2019 | 353 | 722 | 45 |
| OR1794 | Arctic grayling | W17401 | 6/23/2017 | 308 | W17401 | 6/14/2019 | 354 | 721 | 46 |
| OR1785 | Arctic grayling | W17203 | 6/24/2017 | 343 | W18204 | 6/15/2019 | 366 | 721 | 23 |
| OR1784 | Arctic grayling | W17203 | 6/24/2017 | 350 | W17201 | 6/19/2019 | 386 | 725 | 36 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR1784 | Arctic grayling | W17203 | 6/24/2017 | 350 | W17201 | 6/18/2019 | 387 | 724 | 37 |
| OR0129 | Arctic grayling | W17203 | 6/24/2017 | 215 | W17201 | 6/17/2019 | 295 | 723 | 80 |
| OR0127 | Arctic grayling | W17203 | 6/24/2017 | 242 | W18204 | 6/16/2019 | 324 | 722 | 82 |
| OR1830 | Arctic grayling | J1701 | 6/24/2017 | 308 | W17401 | 6/16/2019 | 356 | 722 | 48 |
| OR0500 | Arctic grayling | W17101 | 7/22/2017 | 196 | W17101 | 6/16/2019 | 290 | 694 | 94 |
| OR0500 | Arctic grayling | W17101 | 7/22/2017 | 196 | W17101 | 6/15/2019 | 291 | 693 | 95 |
| OR1909 | Arctic grayling | JK1702 | 7/22/2017 | 337 | W18204 | 6/16/2019 | 370 | 694 | 33 |
| OR0276 | Arctic grayling | W17203 | 7/24/2017 | 186 | W17201 | 6/17/2019 | 273 | 693 | 87 |
| OR0276 | Arctic grayling | W17203 | 7/24/2017 | 186 | W18204 | 7/24/2019 | 295 | 730 | 109 |
| OR0276 | Arctic grayling | W17203 | 7/24/2017 | 186 | W18204 | 7/23/2019 | 295 | 729 | 109 |
| OR2055 | Arctic grayling | JK1702 | 7/24/2017 | NA | W17201 | 8/22/2019 | NA | 759 | |
| OR2092 | Arctic grayling | JK1702 | 7/24/2017 | 305 | W17201 | 6/19/2019 | 325 | 695 | 20 |
| OR2092 | Arctic grayling | JK1702 | 7/24/2017 | 305 | W17201 | 6/18/2019 | 327 | 694 | 22 |
| OR2114 | Arctic grayling | J1703 | 7/24/2017 | 285 | W18401 | 6/18/2019 | 343 | 694 | 58 |
| OR0312 | Arctic grayling | W17203 | 7/25/2017 | 211 | W18204 | 6/14/2019 | 281 | 689 | 70 |
| OR0312 | Arctic grayling | W17203 | 7/25/2017 | 211 | W18204 | 6/17/2019 | 282 | 692 | 71 |
| OR0312 | Arctic grayling | W17203 | 7/25/2017 | 211 | W17201 | 7/24/2019 | 289 | 729 | 78 |
| OR1335 | Arctic grayling | W17203 | 7/26/2017 | 240 | W17201 | 6/17/2019 | 305 | 691 | 65 |
| OR2013 | Arctic grayling | JK1702 | 7/26/2017 | 262 | W17201 | 6/15/2019 | 320 | 689 | 58 |
| OR2013 | Arctic grayling | JK1702 | 7/26/2017 | 262 | W17201 | 6/14/2019 | 320 | 688 | 58 |
| OR1369 | Arctic grayling | W17202 | 7/27/2017 | 203 | W17201 | 6/19/2019 | 264 | 692 | 61 |
| OR1368 | Arctic grayling | W17202 | 7/27/2017 | 213 | W17201 | 6/18/2019 | 276 | 691 | 63 |
| OR1369 | Arctic grayling | W17202 | 7/27/2017 | 203 | W17201 | 7/21/2019 | 272 | 724 | 69 |
| OR1369 | Arctic grayling | W17202 | 7/27/2017 | 203 | W18204 | 7/23/2019 | 274 | 726 | 71 |
| OR1369 | Arctic grayling | W17202 | 7/27/2017 | 203 | W17201 | 8/27/2019 | 284 | 761 | 81 |
| OR1368 | Arctic grayling | W17202 | 7/27/2017 | 213 | W17201 | 8/23/2019 | 298 | 757 | 85 |
| OR1365 | Arctic grayling | W17202 | 7/28/2017 | 229 | W17201 | 7/22/2019 | 303 | 724 | 74 |
| OR2211 | Arctic grayling | W17401 | 8/28/2017 | 327 | W18401 | 8/27/2019 | 361 | 729 | 34 |
| OR2618 | Arctic grayling | W17203 | 8/29/2017 | 273 | W17201 | 6/14/2019 | 320 | 654 | 47 |
| OR2612 | Arctic grayling | J1702 | 8/30/2017 | 369 | W17401 | 8/22/2019 | 384 | 722 | 15 |
| OR2609 | Arctic grayling | W17203 | 8/30/2017 | 336 | W17201 | 7/22/2019 | 348 | 691 | 12 |
| OR2609 | Arctic grayling | W17203 | 8/30/2017 | 336 | W17201 | 7/21/2019 | 350 | 690 | 14 |
| OR2723 | Arctic grayling | W17203 | 8/31/2017 | 280 | W17201 | 6/16/2019 | 315 | 654 | 35 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR2723 | Arctic grayling | W17203 | 8/31/2017 | 280 | W17201 | 7/22/2019 | 320 | 690 | 40 |
| OR2723 | Arctic grayling | W17203 | 8/31/2017 | 280 | W18204 | 8/27/2019 | 327 | 726 | 47 |
| OR2716 | Arctic grayling | W17401 | 9/1/2017 | 267 | W17401 | 6/19/2019 | 304 | 656 | 37 |
| OR2713 | Arctic grayling | W17203 | 9/1/2017 | 283 | W17401 | 6/19/2019 | 324 | 656 | 41 |
| OR2712 | Arctic grayling | W17203 | 9/1/2017 | 265 | W17201 | 8/27/2019 | 337 | 725 | 72 |
| OR2574 | Arctic grayling | W17203 | 9/2/2017 | 281 | W17201 | 6/20/2019 | 315 | 656 | 34 |
| OR2284 | Broad whitefish | BC1 | 6/22/2018 | 478 | BC2 | 6/18/2019 | 483 | 361 | 5 |
| OR2870 | Broad whitefish | BC1 | 6/22/2018 | 424 | BC2 | 6/20/2019 | 430 | 363 | 6 |
| OR2739 | Arctic grayling | BC1 | 6/22/2018 | 284 | BC2 | 6/15/2019 | 313 | 358 | 29 |
| OR2739 | Arctic grayling | BC1 | 6/22/2018 | 284 | BC2 | 6/16/2019 | 314 | 359 | 30 |
| OR2857 | Arctic grayling | BC1 | 6/22/2018 | 290 | BC2 | 7/19/2019 | 330 | 392 | 40 |
| OR2738 | Arctic grayling | BC1 | 6/23/2018 | 347 | UBLU 15.0 | 6/19/2019 | 339 | 361 | 0 |
| OR0807 | Arctic grayling | UB26 | 6/23/2018 | 267 | UBLU 15.0 | 6/20/2019 | 305 | 362 | 38 |
| OR2912 | Arctic grayling | UB26 | 6/23/2018 | NA | W17401 | 6/18/2019 | NA | 360 | |
| OR2314 | Arctic grayling | UB26 | 6/23/2018 | 300 | W17401 | 6/16/2019 | 325 | 358 | 25 |
| OR1271 | Arctic grayling | UB26 | 6/23/2018 | 199 | UBLU 15.0 | 6/14/2019 | 233 | 356 | 34 |
| OR2913 | Arctic grayling | UB26 | 6/23/2018 | 291 | BC2 | 8/22/2019 | 345 | 425 | 54 |
| OR2899 | Arctic grayling | W18402 | 6/24/2018 | 314 | W18204 | 6/14/2019 | 337 | 355 | 23 |
| OR2026 | Arctic grayling | W18402 | 6/24/2018 | 316 | W17401 | 8/28/2019 | 348 | 430 | 32 |
| OR2897 | Arctic grayling | W18402 | 6/24/2018 | 320 | FT1802 | 8/27/2019 | 362 | 429 | 42 |
| OR5674 | Arctic grayling | UB26 | 6/24/2018 | 356 | UBLU 15.0 | 6/17/2019 | 382 | 358 | 26 |
| OR1057 | Arctic grayling | UB26 | 6/24/2018 | 189 | UBLU 15.0 | 6/20/2019 | 217 | 361 | 28 |
| OR2235 | Arctic grayling | UB26 | 6/24/2018 | 269 | UBLU 15.0 | 6/16/2019 | 308 | 357 | 39 |
| OR1494 | Arctic grayling | UB26 | 6/24/2018 | 236 | UBLU 15.0 | 6/17/2019 | 278 | 358 | 42 |
| OR2945 | Arctic grayling | FT1802 | 6/24/2018 | 324 | FC1801 | 7/24/2019 | 334 | 395 | 10 |
| OR2943 | Arctic grayling | FT1802 | 6/24/2018 | 330 | FT1802 | 6/19/2019 | 350 | 360 | 20 |
| OR2927 | Arctic grayling | FT1802 | 6/24/2018 | 283 | FT1802 | 6/15/2019 | 325 | 356 | 42 |
| OR2889 | Arctic grayling | W18401 | 6/24/2018 | 253 | W17401 | 6/15/2019 | 296 | 356 | 43 |
| OR2842 | Arctic grayling | W18204 | 6/24/2018 | 350 | W18204 | 6/14/2019 | 365 | 355 | 15 |
| OR2842 | Arctic grayling | W18204 | 6/24/2018 | 350 | W17201 | 6/16/2019 | 367 | 357 | 17 |
| OR2639 | Arctic grayling | BC1 | 6/24/2018 | 280 | BC2 | 6/16/2019 | 311 | 357 | 31 |
| OR2626 | Arctic grayling | BC1 | 6/24/2018 | 341 | BC2 | 6/14/2019 | 374 | 355 | 33 |
| OR0935 | Arctic grayling | W17201 | 6/24/2018 | 180 | W17201 | 7/24/2019 | 237 | 395 | 57 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR2967 | Arctic grayling | JK1703 | 6/25/2018 | 273 | W18204 | 6/16/2019 | 301 | 356 | 28 |
| OR5616 | Humpback Whitefish | BC1 | 6/25/2018 | 414 | BC2 | 6/15/2019 | 418 | 355 | 4 |
| OR5531 | Arctic grayling | BC1 | 6/25/2018 | 373 | BC2 | 6/20/2019 | 385 | 360 | 12 |
| OR5531 | Arctic grayling | BC1 | 6/25/2018 | 373 | BC2 | 6/17/2019 | 385 | 357 | 12 |
| OR5617 | Arctic grayling | BC1 | 6/25/2018 | 310 | BC2 | 6/17/2019 | 325 | 357 | 15 |
| OR5617 | Arctic grayling | BC1 | 6/25/2018 | 310 | BC2 | 6/14/2019 | 325 | 354 | 15 |
| OR5543 | Arctic grayling | BC1 | 6/25/2018 | 304 | BC2 | 6/14/2019 | 332 | 354 | 28 |
| OR5543 | Arctic grayling | BC1 | 6/25/2018 | 304 | BC2 | 6/15/2019 | 333 | 355 | 29 |
| OR5620 | Arctic grayling | BC1 | 6/25/2018 | 257 | BC2 | 6/15/2019 | 298 | 355 | 41 |
| OR0931 | Arctic grayling | W18204 | 6/25/2018 | 194 | W18204 | 7/24/2019 | 245 | 394 | 51 |
| OR0650 | Arctic grayling | UB26 | 6/25/2018 | 209 | BC2 | 7/21/2019 | 249 | 391 | 40 |
| OR4730 | Arctic grayling | UB26 | 6/25/2018 | 319 | BC2 | 7/22/2019 | 341 | 392 | 22 |
| OR1028 | Arctic grayling | UB26 | 6/25/2018 | 191 | UBLU 15.0 | 6/17/2019 | 220 | 357 | 29 |
| OR0650 | Arctic grayling | UB26 | 6/25/2018 | 209 | BC2 | 7/19/2019 | 247 | 389 | 38 |
| OR4749 | Arctic grayling | UB26 | 6/25/2018 | 287 | UBLU 15.0 | 6/14/2019 | 327 | 354 | 40 |
| OR2792 | Arctic grayling | W18402 | 6/25/2018 | 330 | W18204 | 6/14/2019 | 351 | 354 | 21 |
| OR0540 | Arctic grayling | UB26 | 6/26/2018 | 239 | UBLU 15.0 | 6/17/2019 | 266 | 356 | 27 |
| OR2955 | Arctic grayling | UB26 | 6/26/2018 | 254 | UBLU 15.0 | 6/14/2019 | 285 | 353 | 31 |
| OR0544 | Arctic grayling | UB26 | 6/26/2018 | 222 | UBLU 15.0 | 6/19/2019 | 272 | 358 | 50 |
| OR2199 | Humpback whitefish | BC1 | 6/26/2018 | 382 | BC2 | 6/18/2019 | 387 | 357 | 5 |
| OR2328 | Arctic grayling | BC1 | 6/26/2018 | 330 | BC2 | 6/20/2019 | 337 | 359 | 7 |
| OR5082 | Arctic grayling | BC1 | 6/26/2018 | 390 | BC2 | 6/19/2019 | 398 | 358 | 8 |
| OR2346 | Arctic grayling | BC1 | 6/26/2018 | 408 | UBLU 15.0 | 6/17/2019 | 418 | 356 | 10 |
| OR2952 | Arctic grayling | BC1 | 6/26/2018 | 351 | BC2 | 7/22/2019 | 370 | 391 | 19 |
| OR2200 | Arctic grayling | BC1 | 6/26/2018 | 358 | BC2 | 6/15/2019 | 379 | 354 | 21 |
| OR0867 | Arctic grayling | BC1 | 6/26/2018 | 245 | BC2 | 6/19/2019 | 271 | 358 | 26 |
| OR2329 | Arctic grayling | BC1 | 6/26/2018 | 279 | BC2 | 6/18/2019 | 308 | 357 | 29 |
| OR0855 | Arctic grayling | BC1 | 6/26/2018 | 233 | UBLU 15.0 | 6/19/2019 | 262 | 358 | 29 |
| OR0529 | Arctic grayling | BC1 | 6/26/2018 | 245 | BC2 | 6/20/2019 | 276 | 359 | 31 |
| OR0529 | Arctic grayling | BC1 | 6/26/2018 | 245 | BC2 | 6/19/2019 | 278 | 358 | 33 |
| OR0858 | Arctic grayling | BC1 | 6/26/2018 | 211 | BC2 | 6/15/2019 | 245 | 354 | 34 |
| OR0530 | Arctic grayling | BC1 | 6/26/2018 | 248 | BC2 | 6/15/2019 | 293 | 354 | 45 |
| OR4526 | Arctic grayling | W18401 | 6/26/2018 | NA | W17401 | 8/23/2019 | NA | 423 | |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR4596 | Arctic grayling | W18204 | 6/26/2018 | 253 | W18204 | 6/17/2019 | 272 | 356 | 19 |
| OR4593 | Arctic grayling | W18204 | 6/26/2018 | 292 | W17201 | 6/14/2019 | 313 | 353 | 21 |
| OR4596 | Arctic grayling | W18204 | 6/26/2018 | 253 | W17201 | 6/18/2019 | 275 | 357 | 22 |
| OR1211 | Arctic grayling | W18204 | 6/26/2018 | 220 | W17201 | 7/22/2019 | 259 | 391 | 39 |
| OR1211 | Arctic grayling | W18204 | 6/26/2018 | 220 | W17201 | 7/21/2019 | 259 | 390 | 39 |
| OR4598 | Arctic grayling | W17201 | 6/26/2018 | 338 | W17201 | 6/16/2019 | 350 | 355 | 12 |
| OR4598 | Arctic grayling | W17201 | 6/26/2018 | 338 | W17201 | 6/14/2019 | 350 | 353 | 12 |
| OR4599 | Arctic grayling | W17201 | 6/26/2018 | 334 | W17201 | 6/17/2019 | 354 | 356 | 20 |
| OR4599 | Arctic grayling | W17201 | 6/26/2018 | 334 | W17201 | 6/16/2019 | 354 | 355 | 20 |
| OR4507 | Arctic grayling | W17201 | 6/27/2018 | 327 | W17201 | 6/19/2019 | 339 | 357 | 12 |
| OR0965 | Arctic grayling | W17201 | 6/27/2018 | 199 | W17201 | 7/23/2019 | 237 | 391 | 38 |
| OR0968 | Arctic grayling | W17201 | 6/27/2018 | 192 | W18204 | 7/23/2019 | 248 | 391 | 56 |
| OR4523 | Arctic grayling | W18204 | 6/27/2018 | 256 | W17201 | 7/21/2019 | 287 | 389 | 31 |
| OR6000 | Arctic grayling | W18204 | 6/27/2018 | 255 | W17201 | 6/19/2019 | 288 | 357 | 33 |
| OR4523 | Arctic grayling | W18204 | 6/27/2018 | 256 | W17201 | 7/22/2019 | 290 | 390 | 34 |
| OR6000 | Arctic grayling | W18204 | 6/27/2018 | 255 | W17201 | 6/18/2019 | 290 | 356 | 35 |
| OR6000 | Arctic grayling | W18204 | 6/27/2018 | 255 | W18204 | 8/27/2019 | 305 | 426 | 50 |
| OR5925 | Humpback whitefish | BC1 | 6/27/2018 | 425 | BC2 | 6/17/2019 | 431 | 355 | 6 |
| OR5922 | Humpback whitefish | BC1 | 6/27/2018 | 400 | BC2 | 6/16/2019 | 408 | 354 | 8 |
| OR4765 | Arctic grayling | BC1 | 6/27/2018 | 365 | BC2 | 6/15/2019 | 381 | 353 | 16 |
| OR5920 | Arctic grayling | BC1 | 6/27/2018 | 284 | BC2 | 6/20/2019 | 306 | 358 | 22 |
| OR0770 | Arctic grayling | BC1 | 6/27/2018 | 184 | BC2 | 6/16/2019 | 209 | 354 | 25 |
| OR5946 | Broad whitefish | BC1 | 6/27/2018 | 388 | BC2 | 6/20/2019 | 419 | 358 | 31 |
| OR5946 | Broad whitefish | BC1 | 6/27/2018 | 388 | BC2 | 6/16/2019 | 420 | 354 | 32 |
| OR0769 | Arctic grayling | BC1 | 6/27/2018 | 231 | BC2 | 6/16/2019 | 272 | 354 | 41 |
| OR5995 | Arctic grayling | W18402 | 6/27/2018 | 356 | W17401 | 6/17/2019 | 370 | 355 | 14 |
| OR5976 | Arctic grayling | W18401 | 6/27/2018 | 271 | W18402 | 6/15/2019 | 310 | 353 | 39 |
| OR5982 | Arctic grayling | W18401 | 6/27/2018 | 252 | W17401 | 6/15/2019 | 294 | 353 | 42 |
| OR5935 | Arctic grayling | BC1 | 6/28/2018 | 315 | BC2 | 6/14/2019 | 335 | 351 | 20 |
| OR5940 | Arctic grayling | BC1 | 6/28/2018 | 317 | BC2 | 6/15/2019 | 340 | 352 | 23 |
| OR5939 | Arctic grayling | BC1 | 6/28/2018 | 306 | BC2 | 7/24/2019 | 331 | 391 | 25 |
| OR5939 | Arctic grayling | BC1 | 6/28/2018 | 306 | BC2 | 7/25/2019 | 332 | 392 | 26 |
| OR4553 | Arctic grayling | UB26 | 6/28/2018 | 345 | UBLU 15.0 | 6/14/2019 | 361 | 351 | 16 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR0882 | Arctic grayling | UB26 | 6/28/2018 | 226 | UBLU 15.0 | 6/17/2019 | 277 | 354 | 51 |
| OR5861 | Arctic grayling | W17201 | 6/29/2018 | 305 | W17201 | 6/17/2019 | 331 | 353 | 26 |
| OR5872 | Arctic grayling | W17201 | 6/29/2018 | 296 | W17201 | 6/18/2019 | 323 | 354 | 27 |
| OR4018 | Arctic grayling | W17201 | 6/29/2018 | 187 | W17201 | 6/20/2019 | 221 | 356 | 34 |
| OR4019 | Arctic grayling | W17201 | 6/29/2018 | 196 | W18204 | 6/20/2019 | 232 | 356 | 36 |
| OR4023 | Arctic grayling | W17201 | 6/29/2018 | 195 | W18204 | 7/19/2019 | 239 | 385 | 44 |
| OR4018 | Arctic grayling | W17201 | 6/29/2018 | 187 | W17201 | 7/21/2019 | 234 | 387 | 47 |
| OR4018 | Arctic grayling | W17201 | 6/29/2018 | 187 | W17201 | 7/22/2019 | 235 | 388 | 48 |
| OR5873 | Arctic grayling | W17201 | 6/29/2018 | 252 | W17401 | 8/22/2019 | 303 | 419 | 51 |
| OR5873 | Arctic grayling | W17201 | 6/29/2018 | 252 | W17401 | 8/23/2019 | 305 | 420 | 53 |
| OR4019 | Arctic grayling | W17201 | 6/29/2018 | 196 | W18204 | 7/22/2019 | 254 | 388 | 58 |
| OR4018 | Arctic grayling | W17201 | 6/29/2018 | 187 | W18204 | 8/26/2019 | 252 | 423 | 65 |
| OR4019 | Arctic grayling | W17201 | 6/29/2018 | 196 | W18204 | 8/27/2019 | 271 | 424 | 75 |
| OR5856 | Arctic grayling | W18204 | 6/29/2018 | 285 | W17201 | 7/22/2019 | 313 | 388 | 28 |
| OR1090 | Arctic grayling | W18204 | 6/29/2018 | 210 | W18204 | 6/20/2019 | 242 | 356 | 32 |
| OR5856 | Arctic grayling | W18204 | 6/29/2018 | 285 | W18204 | 8/28/2019 | 318 | 425 | 33 |
| OR1092 | Arctic grayling | W18204 | 6/29/2018 | 180 | W18204 | 7/23/2019 | 235 | 389 | 55 |
| OR0896 | Arctic grayling | W18402 | 6/30/2018 | 235 | W17401 | 6/17/2019 | 283 | 352 | 48 |
| OR1078 | Arctic grayling | W17201 | 6/30/2018 | 200 | W17201 | 6/19/2019 | 225 | 354 | 25 |
| OR3348 | Arctic grayling | W17201 | 6/30/2018 | 185 | W17201 | 6/20/2019 | 221 | 355 | 36 |
| OR3348 | Arctic grayling | W17201 | 6/30/2018 | 185 | W17201 | 7/21/2019 | 231 | 386 | 46 |
| OR5964 | Arctic grayling | W18204 | 6/30/2018 | 263 | W17201 | 6/20/2019 | 294 | 355 | 31 |
| OR0515 | Arctic grayling | W18204 | 6/30/2018 | 184 | W17201 | 7/22/2019 | 236 | 387 | 52 |
| OR2559 | Arctic grayling | W18401 | 7/1/2018 | 288 | W18401 | 6/17/2019 | 315 | 351 | 27 |
| OR5960 | Arctic grayling | W18401 | 7/1/2018 | 308 | W17401 | 8/26/2019 | 346 | 421 | 38 |
| OR5954 | Arctic grayling | W18204 | 7/1/2018 | 285 | W17201 | 6/19/2019 | 314 | 353 | 29 |
| OR5954 | Arctic grayling | W18204 | 7/1/2018 | 285 | W18204 | 8/27/2019 | 330 | 422 | 45 |
| OR5951 | Arctic grayling | W18401 | 7/2/2018 | 315 | W18402 | 6/15/2019 | 332 | 348 | 17 |
| OR2450 | Arctic grayling | W18401 | 7/2/2018 | 290 | W17201 | 6/19/2019 | 312 | 352 | 22 |
| OR2448 | Arctic grayling | W18401 | 7/2/2018 | 299 | W17401 | 7/19/2019 | 340 | 382 | 41 |
| OR5246 | Arctic grayling | W17401 | 7/19/2018 | 324 | W17401 | 6/17/2019 | 339 | 333 | 15 |
| OR4871 | Arctic grayling | BC1 | 7/19/2018 | 270 | BC2 | 6/20/2019 | 291 | 336 | 21 |
| OR1130 | Arctic grayling | BC1 | 7/19/2018 | 217 | BC2 | 6/19/2019 | 240 | 335 | 23 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR1130 | Arctic grayling | BC1 | 7/19/2018 | 217 | BC2 | 6/18/2019 | 240 | 334 | 23 |
| OR5822 | Arctic grayling | W17201 | 7/19/2018 | 327 | W18402 | 6/16/2019 | 335 | 332 | 8 |
| OR0510 | Arctic grayling | W17201 | 7/19/2018 | 235 | W17201 | 6/14/2019 | 257 | 330 | 22 |
| OR0510 | Arctic grayling | W17201 | 7/19/2018 | 235 | W18204 | 6/17/2019 | 260 | 333 | 25 |
| OR0510 | Arctic grayling | W17201 | 7/19/2018 | 235 | W18204 | 8/27/2019 | 290 | 404 | 55 |
| OR5648 | Arctic grayling | W18204 | 7/19/2018 | 285 | W18204 | 6/19/2019 | 287 | 335 | 2 |
| OR5648 | Arctic grayling | W18204 | 7/19/2018 | 285 | W18204 | 7/23/2019 | 289 | 369 | 4 |
| OR5648 | Arctic grayling | W18204 | 7/19/2018 | 285 | W18204 | 8/26/2019 | 293 | 403 | 8 |
| OR0566 | Arctic grayling | W18204 | 7/19/2018 | 214 | W17201 | 6/19/2019 | 237 | 335 | 23 |
| OR0566 | Arctic grayling | W18204 | 7/19/2018 | 214 | W17201 | 7/20/2019 | 246 | 366 | 32 |
| OR0566 | Arctic grayling | W18204 | 7/19/2018 | 214 | W17201 | 7/23/2019 | 247 | 369 | 33 |
| OR0566 | Arctic grayling | W18204 | 7/19/2018 | 214 | W17201 | 7/22/2019 | 250 | 368 | 36 |
| OR0566 | Arctic grayling | W18204 | 7/19/2018 | 214 | W17201 | 7/21/2019 | 250 | 367 | 36 |
| OR0567 | Arctic grayling | W18204 | 7/19/2018 | 200 | W18204 | 7/25/2019 | 240 | 371 | 40 |
| OR0563 | Arctic grayling | W18204 | 7/19/2018 | 202 | W17201 | 7/23/2019 | 245 | 369 | 43 |
| OR0563 | Arctic grayling | W18204 | 7/19/2018 | 202 | W18204 | 8/23/2019 | 246 | 400 | 44 |
| OR0567 | Arctic grayling | W18204 | 7/19/2018 | 200 | W18204 | 7/24/2019 | 245 | 370 | 45 |
| OR0567 | Arctic grayling | W18204 | 7/19/2018 | 200 | W18204 | 8/22/2019 | 246 | 399 | 46 |
| OR5161 | Arctic grayling | W17401 | 7/20/2018 | 295 | W17401 | 6/14/2019 | 307 | 329 | 12 |
| OR5174 | Round whitefish | W17401 | 7/20/2018 | 309 | W17401 | 6/16/2019 | 325 | 331 | 16 |
| OR5061 | Arctic grayling | FT1802 | 7/20/2018 | 274 | FT1802 | 6/19/2019 | 284 | 334 | 10 |
| OR5634 | Arctic grayling | W18204 | 7/20/2018 | 285 | W17201 | 8/26/2019 | 324 | 402 | 39 |
| OR5024 | Arctic grayling | W17201 | 7/20/2018 | 285 | W17201 | 6/16/2019 | 310 | 331 | 25 |
| OR3377 | Arctic grayling | W17201 | 7/20/2018 | 227 | BC2 | 6/17/2019 | 245 | 332 | 18 |
| OR5344 | Arctic grayling | W17401 | 7/21/2018 | 271 | W17401 | 6/15/2019 | 301 | 329 | 30 |
| OR5344 | Arctic grayling | W17401 | 7/21/2018 | 271 | W17401 | 6/19/2019 | 302 | 333 | 31 |
| OR5321 | Arctic grayling | W17401 | 7/21/2018 | 308 | W17401 | 6/16/2019 | 318 | 330 | 10 |
| OR5314 | Arctic grayling | W18401 | 7/21/2018 | 312 | W17401 | 6/18/2019 | 319 | 332 | 7 |
| OR5318 | Arctic grayling | W18401 | 7/21/2018 | 282 | W17401 | 6/16/2019 | 300 | 330 | 18 |
| OR5307 | Arctic grayling | W18401 | 7/21/2018 | 314 | W18402 | 6/17/2019 | 333 | 331 | 19 |
| OR5304 | Arctic grayling | W18401 | 7/21/2018 | 296 | W17401 | 6/19/2019 | 325 | 333 | 29 |
| OR0844 | Arctic grayling | W17101 | 7/21/2018 | 184 | W17101 | 6/15/2019 | 221 | 329 | 37 |
| OR0844 | Arctic grayling | W17101 | 7/21/2018 | 184 | W17101 | 8/28/2019 | 274 | 403 | 90 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR0841 | Arctic grayling | BC1 | 7/22/2018 | 238 | W17401 | 6/17/2019 | 253 | 330 | 15 |
| OR0841 | Arctic grayling | BC1 | 7/22/2018 | 238 | W18401 | 6/19/2019 | 255 | 332 | 17 |
| OR5182 | Arctic grayling | W17401 | 7/22/2018 | 269 | JK1703 | 7/25/2019 | 300 | 368 | 31 |
| OR5182 | Arctic grayling | W17401 | 7/22/2018 | 269 | W18401 | 8/28/2019 | 307 | 402 | 38 |
| OR5144 | Arctic grayling | FT1802 | 7/22/2018 | | FT1802 | 8/23/2019 | 295 | 397 | 295 |
| OR2751 | Arctic grayling | W18401 | 7/22/2018 | 271 | FC1801 | 6/15/2019 | 297 | 328 | 26 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 6/15/2019 | 225 | 328 | 41 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 6/18/2019 | 227 | 331 | 43 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 7/21/2019 | 249 | 364 | 65 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 7/24/2019 | 250 | 367 | 66 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 8/22/2019 | 271 | 396 | 87 |
| OR0839 | Arctic grayling | W17101 | 7/22/2018 | 184 | W17101 | 8/28/2019 | 273 | 402 | 89 |
| OR0835 | Arctic grayling | W18204 | 7/22/2018 | 217 | W17201 | 6/16/2019 | 247 | 329 | 30 |
| OR0618 | Arctic grayling | W18204 | 7/22/2018 | 210 | W18204 | 7/23/2019 | 250 | 366 | 40 |
| OR0616 | Arctic grayling | W18204 | 7/22/2018 | 192 | W17201 | 7/21/2019 | 235 | 364 | 43 |
| OR3342 | Arctic grayling | W17201 | 7/22/2018 | 248 | W18204 | 6/16/2019 | 268 | 329 | 20 |
| OR3342 | Arctic grayling | W17201 | 7/22/2018 | 248 | W18204 | 6/15/2019 | 268 | 328 | 20 |
| OR3342 | Arctic grayling | W17201 | 7/22/2018 | 248 | W17201 | 7/21/2019 | 275 | 364 | 27 |
| OR3342 | Arctic grayling | W17201 | 7/22/2018 | 248 | W17201 | 7/22/2019 | 276 | 365 | 28 |
| OR5894 | Arctic grayling | W17201 | 7/22/2018 | 303 | W17401 | 6/16/2019 | 314 | 329 | 11 |
| OR0611 | Arctic grayling | BC1 | 7/23/2018 | 234 | BC2 | 6/14/2019 | 248 | 326 | 14 |
| OR0611 | Arctic grayling | BC1 | 7/23/2018 | 234 | BC2 | 7/21/2019 | 256 | 363 | 22 |
| OR2475 | Arctic grayling | W17401 | 7/23/2018 | 270 | JK1703 | 7/24/2019 | 294 | 366 | 24 |
| OR2490 | Arctic grayling | W17401 | 7/23/2018 | 294 | W17401 | 6/19/2019 | 315 | 331 | 21 |
| OR2481 | Arctic grayling | W17401 | 7/23/2018 | 270 | JK1703 | 7/25/2019 | 313 | 367 | 43 |
| OR5292 | Arctic grayling | W18401 | 7/23/2018 | 296 | W18401 | 6/15/2019 | 321 | 327 | 25 |
| OR5355 | Arctic grayling | UB26 | 7/23/2018 | 276 | BC2 | 6/20/2019 | 293 | 332 | 17 |
| OR5283 | Arctic grayling | W18402 | 7/23/2018 | 279 | W17401 | 6/20/2019 | 305 | 332 | 26 |
| OR4905 | Arctic grayling | W17401 | 7/24/2018 | 285 | W17401 | 6/17/2019 | 312 | 328 | 27 |
| OR4908 | Arctic grayling | W17401 | 7/24/2018 | 265 | W17401 | 6/17/2019 | 293 | 328 | 28 |
| OR5695 | Arctic grayling | UB26 | 7/24/2018 | 268 | UBLU 15.0 | 6/20/2019 | 287 | 331 | 19 |
| OR5030 | Arctic grayling | W17201 | 7/24/2018 | 337 | W17201 | 6/19/2019 | 345 | 330 | 8 |
| OR1474 | Arctic grayling | W18401 | 7/24/2018 | 241 | W18401 | 6/16/2019 | 277 | 327 | 36 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR5266 | Arctic grayling | W18401 | 7/24/2018 | 254 | W18402 | 8/24/2019 | 296 | 396 | 42 |
| OR5266 | Arctic grayling | W18401 | 7/24/2018 | 254 | W18402 | 8/23/2019 | 296 | 395 | 42 |
| OR5257 | Arctic grayling | W18401 | 7/24/2018 | 267 | W18401 | 8/25/2019 | 316 | 397 | 49 |
| OR1458 | Arctic grayling | W17401 | 7/25/2018 | 193 | W17401 | 6/18/2019 | 230 | 328 | 37 |
| OR1458 | Arctic grayling | W17401 | 7/25/2018 | 193 | W17401 | 6/17/2019 | 230 | 327 | 37 |
| OR5126 | Arctic grayling | W17201 | 7/25/2018 | 281 | W17201 | 6/19/2019 | 296 | 329 | 15 |
| OR4930 | Arctic grayling | W17401 | 8/23/2018 | 303 | W18401 | 6/18/2019 | 314 | 299 | 11 |
| OR2589 | Arctic grayling | FT1802 | 8/23/2018 | 345 | FT1802 | 7/19/2019 | 355 | 330 | 10 |
| OR4605 | Arctic grayling | BC1 | 8/23/2018 | 345 | BC2 | 7/22/2019 | 351 | 333 | 6 |
| OR4605 | Arctic grayling | BC1 | 8/23/2018 | 345 | BC2 | 7/24/2019 | 352 | 335 | 7 |
| OR3545 | Arctic grayling | BC1 | 8/24/2018 | 210 | BC2 | 6/15/2019 | 215 | 295 | 5 |
| OR3545 | Arctic grayling | BC1 | 8/24/2018 | 210 | UBLU 15.0 | 6/14/2019 | 217 | 294 | 7 |
| OR3549 | Arctic grayling | BC1 | 8/24/2018 | 208 | BC2 | 6/19/2019 | 219 | 299 | 11 |
| OR3549 | Arctic grayling | BC1 | 8/24/2018 | 208 | BC2 | 6/18/2019 | 220 | 298 | 12 |
| OR3549 | Arctic grayling | BC1 | 8/24/2018 | 208 | BC2 | 6/17/2019 | 220 | 297 | 12 |
| OR3549 | Arctic grayling | BC1 | 8/24/2018 | 208 | BC2 | 6/16/2019 | 220 | 296 | 12 |
| OR3537 | Arctic grayling | W17101 | 8/24/2018 | 186 | W17101 | 6/19/2019 | 205 | 299 | 19 |
| OR3537 | Arctic grayling | W17101 | 8/24/2018 | 186 | W17101 | 6/18/2019 | 205 | 298 | 19 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 7/23/2019 | 239 | 333 | 45 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 7/20/2019 | 239 | 330 | 45 |
| OR3537 | Arctic grayling | W17101 | 8/24/2018 | 186 | W17101 | 8/27/2019 | 240 | 368 | 54 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 8/23/2019 | 254 | 364 | 60 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 8/26/2019 | 256 | 367 | 62 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 8/22/2019 | 256 | 363 | 62 |
| OR3538 | Arctic grayling | W17101 | 8/24/2018 | 194 | W17101 | 8/24/2019 | 257 | 365 | 63 |
| OR5269 | Arctic grayling | W18204 | 8/24/2018 | 287 | W18401 | 6/16/2019 | 297 | 296 | 10 |
| OR3533 | Arctic grayling | BC1 | 8/25/2018 | 222 | BC2 | 6/14/2019 | 230 | 293 | 8 |
| OR7117 | Arctic grayling | BC1 | 8/25/2018 | | BC2 | 6/17/2019 | 291 | 296 | 291 |
| OR4646 | Humpback whitefish | BC1 | 8/27/2018 | 388 | BC2 | 6/20/2019 | 387 | 297 | 0 |
| OR3526 | Arctic grayling | BC1 | 8/27/2018 | 208 | BC2 | 6/20/2019 | 218 | 297 | 10 |
| OR4632 | Arctic grayling | BC1 | 8/27/2018 | 290 | BC2 | 6/19/2019 | 296 | 296 | 6 |
| OR4673 | Arctic grayling | BC1 | 8/27/2018 | 303 | BC2 | 6/18/2019 | 315 | 295 | 12 |
| OR3571 | Arctic grayling | BC1 | 8/27/2018 | 247 | BC2 | 7/22/2019 | 270 | 329 | 23 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR4635 | Arctic grayling | BC1 | 8/27/2018 | 320 | UBLU 15.0 | 8/23/2019 | 345 | 361 | 25 |
| OR4663 | Arctic grayling | BC1 | 8/28/2018 | 315 | BC2 | 7/22/2019 | 328 | 328 | 13 |
| OR4663 | Arctic grayling | BC1 | 8/28/2018 | 315 | BC2 | 7/23/2019 | 329 | 329 | 14 |
| OR3566 | Arctic grayling | BC1 | 8/28/2018 | 187 | BC2 | 6/14/2019 | 194 | 290 | 7 |
| OR3566 | Arctic grayling | BC1 | 8/28/2018 | 187 | BC2 | 6/15/2019 | 195 | 291 | 8 |
| OR5843 | Arctic grayling | FT1802 | 8/28/2018 | 266 | FT1802 | 6/16/2019 | 273 | 292 | 7 |
| OR5493 | Arctic grayling | W18401 | 8/28/2018 | 295 | W18401 | 6/16/2019 | 307 | 292 | 12 |
| OR5483 | Arctic grayling | W17401 | 8/28/2018 | | W17401 | 8/23/2019 | 349 | 360 | 349 |
| OR5481 | Arctic grayling | W17401 | 8/28/2018 | 338 | W18402 | 6/14/2019 | 344 | 290 | 6 |
| OR6548 | Arctic grayling | W17401 | 8/29/2018 | 354 | W17401 | 6/14/2019 | 354 | 289 | 0 |
| OR6534 | Arctic grayling | W17401 | 8/29/2018 | 325 | W17401 | 6/14/2019 | 325 | 289 | 0 |
| OR6547 | Arctic grayling | W17401 | 8/29/2018 | 341 | W18402 | 6/15/2019 | 348 | 290 | 7 |
| OR4287 | Arctic grayling | W17401 | 8/29/2018 | 297 | W18402 | 6/19/2019 | 304 | 294 | 7 |
| OR5474 | Arctic grayling | W17401 | 8/29/2018 | 280 | BC2 | 6/20/2019 | 289 | 295 | 9 |
| OR4348 | Arctic grayling | W17401 | 8/29/2018 | 280 | W17401 | 6/16/2019 | 289 | 291 | 9 |
| OR6575 | Arctic grayling | W17401 | 8/29/2018 | 348 | W17401 | 6/19/2019 | 358 | 294 | 10 |
| OR5474 | Arctic grayling | W17401 | 8/29/2018 | 280 | W17401 | 6/15/2019 | 290 | 290 | 10 |
| OR4295 | Arctic grayling | W17401 | 8/29/2018 | 313 | W17401 | 7/20/2019 | 328 | 325 | 15 |
| OR4342 | Arctic grayling | W17401 | 8/29/2018 | 236 | W18401 | 6/17/2019 | 252 | 292 | 16 |
| OR4277 | Arctic grayling | W17401 | 8/29/2018 | 280 | W18401 | 8/28/2019 | 310 | 364 | 30 |
| OR5053 | Arctic grayling | FT1802 | 8/29/2018 | 262 | FT1802 | 7/19/2019 | 283 | 324 | 21 |
| OR5784 | Arctic grayling | W17401 | 6/14/2019 | 267 | W17401 | 6/15/2019 | 267 | 1 | 0 |
| OR5778 | Arctic grayling | W17401 | 6/14/2019 | 307 | W18402 | 6/15/2019 | 306 | 1 | 0 |
| OR6634 | Arctic grayling | W17401 | 6/14/2019 | 341 | W18401 | 6/16/2019 | 342 | 2 | 1 |
| OR3380 | Arctic grayling | W17401 | 6/14/2019 | 187 | W18402 | 6/19/2019 | 188 | 5 | 1 |
| OR3671 | Arctic grayling | W17401 | 6/14/2019 | 181 | W18401 | 6/15/2019 | 183 | 1 | 2 |
| OR5791 | Arctic grayling | W17401 | 6/14/2019 | 346 | W17401 | 8/24/2019 | 356 | 71 | 10 |
| OR4688 | Arctic grayling | UBLU 15.0 | 6/14/2019 | NA | BC2 | 6/15/2019 | NA | 1 | |
| OR4785 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 365 | BC2 | 6/16/2019 | 360 | 2 | 0 |
| OR4695 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 295 | BC2 | 6/15/2019 | 295 | 1 | 0 |
| OR4689 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 281 | BC2 | 6/16/2019 | 281 | 2 | 0 |
| OR4689 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 281 | BC2 | 6/15/2019 | 281 | 1 | 0 |
| OR4686 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 423 | UBLU 15.0 | 6/15/2019 | 420 | 1 | 0 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR4684 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 309 | BC2 | 6/15/2019 | 307 | 1 | 0 |
| OR4794 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 395 | BC2 | 6/20/2019 | 396 | 6 | 1 |
| OR4794 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 395 | BC2 | 6/15/2019 | 396 | 1 | 1 |
| OR4698 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 307 | BC2 | 6/15/2019 | 308 | 1 | 1 |
| OR4697 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 402 | BC2 | 6/15/2019 | 403 | 1 | 1 |
| OR4681 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 369 | UBLU 15.0 | 6/15/2019 | 370 | 1 | 1 |
| OR1324 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 239 | UBLU 15.0 | 6/15/2019 | 240 | 1 | 1 |
| OR3429 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 237 | BC2 | 6/15/2019 | 240 | 1 | 3 |
| OR4794 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 395 | FC1801 | 7/23/2019 | 399 | 39 | 4 |
| OR3429 | Arctic grayling | UBLU 15.0 | 6/14/2019 | 237 | BC2 | 6/16/2019 | 245 | 2 | 8 |
| OR6650 | Arctic grayling | W18402 | 6/14/2019 | 342 | W18402 | 6/16/2019 | 347 | 2 | 5 |
| OR6650 | Arctic grayling | W18402 | 6/14/2019 | 342 | W18402 | 8/23/2019 | 355 | 70 | 13 |
| OR3412 | Arctic grayling | BC2 | 6/14/2019 | 222 | BC2 | 6/20/2019 | 221 | 6 | 0 |
| OR4846 | Broad whitefish | BC2 | 6/14/2019 | 501 | BC2 | 6/17/2019 | 499 | 3 | 0 |
| OR4782 | Arctic grayling | BC2 | 6/14/2019 | 287 | BC2 | 6/17/2019 | 286 | 3 | 0 |
| OR4782 | Arctic grayling | BC2 | 6/14/2019 | 287 | BC2 | 6/15/2019 | 287 | 1 | 0 |
| OR4780 | Arctic grayling | BC2 | 6/14/2019 | 365 | BC2 | 6/17/2019 | 362 | 3 | 0 |
| OR4847 | Arctic grayling | BC2 | 6/14/2019 | 371 | BC2 | 6/15/2019 | 373 | 1 | 2 |
| OR3412 | Arctic grayling | BC2 | 6/14/2019 | 222 | BC2 | 6/15/2019 | 224 | 1 | 2 |
| OR3423 | Arctic grayling | BC2 | 6/14/2019 | 170 | UBLU 15.0 | 6/20/2019 | 173 | 6 | 3 |
| OR4847 | Arctic grayling | BC2 | 6/14/2019 | 371 | BC2 | 6/16/2019 | 377 | 2 | 6 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 6/15/2019 | 380 | 1 | 0 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 6/18/2019 | 380 | 4 | 0 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 6/19/2019 | 382 | 5 | 1 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 6/20/2019 | 383 | 6 | 2 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 8/22/2019 | 386 | 69 | 5 |
| OR6605 | Arctic grayling | W17101 | 6/14/2019 | 381 | W17101 | 8/26/2019 | 388 | 73 | 7 |
| OR4840 | Arctic grayling | W17201 | 6/14/2019 | 384 | JK1703 | 7/25/2019 | 380 | 41 | 0 |
| OR4834 | Arctic grayling | W17201 | 6/14/2019 | 310 | W18204 | 6/15/2019 | 308 | 1 | 0 |
| OR4835 | Arctic grayling | W17201 | 6/14/2019 | 349 | W17201 | 6/16/2019 | 348 | 2 | 0 |
| OR4844 | Arctic grayling | W17201 | 6/14/2019 | 317 | W17201 | 6/19/2019 | 315 | 5 | 0 |
| OR4844 | Arctic grayling | W17201 | 6/14/2019 | 317 | W17201 | 6/18/2019 | 317 | 4 | 0 |
| OR4837 | Arctic grayling | W17201 | 6/14/2019 | 346 | W18204 | 6/15/2019 | 344 | 1 | 0 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR4836 | Arctic grayling | W17201 | 6/14/2019 | 338 | W18204 | 8/23/2019 | 338 | 70 | 0 |
| OR4841 | Arctic grayling | W17201 | 6/14/2019 | 311 | W18204 | 6/17/2019 | 312 | 3 | 1 |
| OR3406 | Arctic grayling | W17201 | 6/14/2019 | 172 | W18204 | 6/16/2019 | 173 | 2 | 1 |
| OR4838 | Round whitefish | W17201 | 6/14/2019 | 354 | W17201 | 6/19/2019 | 357 | 5 | 3 |
| OR3406 | Arctic grayling | W17201 | 6/14/2019 | 172 | W18204 | 6/20/2019 | 175 | 6 | 3 |
| OR3401 | Arctic grayling | BC2 | 6/15/2019 | 209 | UBLU 15.0 | 6/17/2019 | 208 | 2 | 0 |
| OR6022 | Broad whitefish | BC2 | 6/15/2019 | 493 | BC2 | 6/19/2019 | 491 | 4 | 0 |
| OR3402 | Arctic grayling | BC2 | 6/15/2019 | 230 | BC2 | 6/16/2019 | 230 | 1 | 0 |
| OR4164 | Arctic grayling | W17401 | 6/15/2019 | 232 | W17401 | 6/16/2019 | 226 | 1 | 0 |
| OR4164 | Arctic grayling | W17401 | 6/15/2019 | 232 | W17401 | 6/18/2019 | 228 | 3 | 0 |
| OR4164 | Arctic grayling | W17401 | 6/15/2019 | 232 | W18402 | 6/20/2019 | 229 | 5 | 0 |
| OR6625 | Arctic grayling | W17401 | 6/15/2019 | 273 | W18402 | 6/16/2019 | 270 | 1 | 0 |
| OR5834 | Arctic grayling | W17401 | 6/15/2019 | 334 | W18402 | 6/16/2019 | 336 | 1 | 2 |
| OR3225 | Arctic grayling | W17201 | 6/15/2019 | 227 | W18204 | 6/16/2019 | 228 | 1 | 1 |
| OR6044 | Arctic grayling | W18204 | 6/15/2019 | 369 | W18204 | 6/17/2019 | 367 | 2 | 0 |
| OR6041 | Arctic grayling | W18204 | 6/15/2019 | 341 | W17201 | 6/17/2019 | 344 | 2 | 3 |
| OR6045 | Arctic grayling | W18204 | 6/15/2019 | 356 | W17201 | 6/16/2019 | 360 | 1 | 4 |
| OR6703 | Arctic grayling | W18401 | 6/15/2019 | 251 | W18401 | 6/19/2019 | 260 | 4 | 9 |
| OR6039 | Arctic grayling | W17101 | 6/15/2019 | 274 | W17101 | 6/16/2019 | 274 | 1 | 0 |
| OR3223 | Arctic grayling | W17101 | 6/15/2019 | 221 | W17101 | 8/23/2019 | 259 | 69 | 38 |
| OR3222 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 188 | BC2 | 6/17/2019 | 187 | 1 | 0 |
| OR3220 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 187 | BC2 | 6/17/2019 | 186 | 1 | 0 |
| OR3373 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 205 | BC2 | 6/19/2019 | 205 | 3 | 0 |
| OR3373 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 205 | BC2 | 6/18/2019 | 205 | 2 | 0 |
| OR3219 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 197 | BC2 | 6/17/2019 | 197 | 1 | 0 |
| OR3373 | Arctic grayling | UBLU 15.0 | 6/16/2019 | 205 | UBLU 15.0 | 6/17/2019 | 206 | 1 | 1 |
| OR7068 | Arctic grayling | BC2 | 6/16/2019 | 271 | BC2 | 6/17/2019 | 272 | 1 | 0 |
| OR7073 | Broad whitefish | BC2 | 6/16/2019 | 450 | BC2 | 6/19/2019 | 450 | 3 | 0 |
| OR7084 | Round whitefish | BC2 | 6/16/2019 | 373 | BC2 | 6/20/2019 | 365 | 4 | 0 |
| OR3369 | Arctic grayling | BC2 | 6/16/2019 | 198 | BC2 | 6/17/2019 | 198 | 1 | 0 |
| OR3367 | Arctic grayling | BC2 | 6/16/2019 | 228 | BC2 | 6/17/2019 | 229 | 1 | 1 |
| OR7064 | Humpback whitefish | BC2 | 6/16/2019 | 400 | BC2 | 6/20/2019 | 402 | 4 | 2 |
| OR7063 | Humpback whitefish | BC2 | 6/16/2019 | 413 | BC2 | 7/25/2019 | 415 | 39 | 2 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR7064 | Humpback whitefish | BC2 | 6/16/2019 | 400 | BC2 | 8/25/2019 | 403 | 70 | 3 |
| OR7090 | Humpback whitefish | BC2 | 6/16/2019 | 383 | BC2 | 6/20/2019 | 392 | 4 | 9 |
| OR6939 | Arctic grayling | W17201 | 6/16/2019 | 352 | W17201 | 6/18/2019 | 354 | 2 | 2 |
| OR3360 | Arctic grayling | W17201 | 6/16/2019 | 181 | W18204 | 6/20/2019 | 180 | 4 | 0 |
| OR7061 | Arctic grayling | W17201 | 6/16/2019 | 295 | W17201 | 6/17/2019 | 295 | 1 | 0 |
| OR7060 | Arctic grayling | W17201 | 6/16/2019 | 400 | W17201 | 6/17/2019 | 400 | 1 | 0 |
| OR7058 | Arctic grayling | W17201 | 6/16/2019 | 328 | W17201 | 6/17/2019 | 327 | 1 | 0 |
| OR6940 | Arctic grayling | W17201 | 6/16/2019 | 316 | W17201 | 6/17/2019 | 316 | 1 | 0 |
| OR6939 | Arctic grayling | W17201 | 6/16/2019 | 352 | W17201 | 6/20/2019 | 351 | 4 | 0 |
| OR3362 | Arctic grayling | W17201 | 6/16/2019 | 185 | W17201 | 6/17/2019 | 185 | 1 | 0 |
| OR3361 | Arctic grayling | W17201 | 6/16/2019 | 184 | W17201 | 6/17/2019 | 184 | 1 | 0 |
| OR7055 | Arctic grayling | W17201 | 6/16/2019 | 274 | W17201 | 6/17/2019 | 275 | 1 | 1 |
| OR3362 | Arctic grayling | W17201 | 6/16/2019 | 185 | W17201 | 6/20/2019 | 186 | 4 | 1 |
| OR7059 | Arctic grayling | W17201 | 6/16/2019 | 338 | W17201 | 6/17/2019 | 340 | 1 | 2 |
| OR6938 | Arctic grayling | W17201 | 6/16/2019 | 284 | W17201 | 6/17/2019 | 286 | 1 | 2 |
| OR7051 | Arctic grayling | W17201 | 6/16/2019 | 320 | JK1703 | 8/27/2019 | 325 | 72 | 5 |
| OR6944 | Arctic grayling | W17201 | 6/16/2019 | 268 | W17201 | 6/18/2019 | 278 | 2 | 10 |
| OR3365 | Arctic grayling | W17201 | 6/16/2019 | 235 | W17201 | 7/19/2019 | 249 | 33 | 14 |
| OR3365 | Arctic grayling | W17201 | 6/16/2019 | 235 | W17201 | 7/22/2019 | 250 | 36 | 15 |
| OR6244 | Arctic grayling | W17401 | 6/16/2019 | 318 | W17401 | 6/17/2019 | 317 | 1 | 0 |
| OR6233 | Arctic grayling | W17401 | 6/16/2019 | 251 | W17401 | 6/17/2019 | 251 | 1 | 0 |
| OR6227 | Arctic grayling | W17401 | 6/16/2019 | 350 | W17201 | 6/19/2019 | 350 | 3 | 0 |
| OR3931 | Arctic grayling | W17401 | 6/16/2019 | 196 | W18402 | 6/18/2019 | 196 | 2 | 0 |
| OR3930 | Arctic grayling | W17401 | 6/16/2019 | 208 | W18402 | 6/20/2019 | 208 | 4 | 0 |
| OR3930 | Arctic grayling | W17401 | 6/16/2019 | 208 | W17401 | 6/17/2019 | 208 | 1 | 0 |
| OR3933 | Arctic grayling | W17401 | 6/16/2019 | 213 | W18402 | 6/18/2019 | 214 | 2 | 1 |
| OR3941 | Arctic grayling | W17401 | 6/16/2019 | 187 | W18402 | 6/18/2019 | 189 | 2 | 2 |
| OR3903 | Arctic grayling | W17401 | 6/16/2019 | 206 | W17401 | 6/17/2019 | 208 | 1 | 2 |
| OR6723 | Arctic grayling | W17401 | 6/16/2019 | 322 | W18401 | 8/26/2019 | 337 | 71 | 15 |
| OR6250 | Arctic grayling | W17401 | 6/16/2019 | 258 | W18401 | 8/27/2019 | 281 | 72 | 23 |
| OR3354 | Arctic grayling | W18204 | 6/16/2019 | 185 | W18204 | 6/17/2019 | 183 | 1 | 0 |
| OR6935 | Arctic grayling | W18204 | 6/16/2019 | 344 | W18204 | 6/20/2019 | 344 | 4 | 0 |
| OR6935 | Arctic grayling | W18204 | 6/16/2019 | 344 | W18204 | 6/18/2019 | 345 | 2 | 1 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR6937 | Arctic grayling | W18204 | 6/16/2019 | 301 | W17201 | 8/22/2019 | 310 | 67 | 9 |
| OR3356 | Arctic grayling | W18204 | 6/16/2019 | 235 | W17201 | 7/21/2019 | 249 | 35 | 14 |
| OR3358 | Arctic grayling | W18204 | 6/16/2019 | 216 | W18204 | 8/23/2019 | 239 | 68 | 23 |
| OR3358 | Arctic grayling | W18204 | 6/16/2019 | 216 | W18204 | 8/22/2019 | 239 | 67 | 23 |
| OR6934 | Arctic grayling | W18204 | 6/16/2019 | 251 | W18204 | 8/23/2019 | 278 | 68 | 27 |
| OR6993 | Arctic grayling | W18402 | 6/16/2019 | 337 | W17201 | 6/19/2019 | 338 | 3 | 1 |
| OR6039 | Arctic grayling | W17101 | 6/16/2019 | 274 | W17101 | 6/18/2019 | 275 | 2 | 1 |
| OR10014 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 217 | BC2 | 6/20/2019 | 210 | 3 | 0 |
| OR3484 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 193 | BC2 | 6/18/2019 | 189 | 1 | 0 |
| OR3497 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 190 | BC2 | 6/20/2019 | 187 | 3 | 0 |
| OR10016 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 247 | BC2 | 6/18/2019 | 244 | 1 | 0 |
| OR3480 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 182 | BC2 | 6/20/2019 | 180 | 3 | 0 |
| OR3494 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 189 | UBLU 15.0 | 6/20/2019 | 188 | 3 | 0 |
| OR3489 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 209 | BC2 | 6/19/2019 | 208 | 2 | 0 |
| OR3484 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 193 | BC2 | 6/19/2019 | 192 | 2 | 0 |
| OR10014 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 217 | BC2 | 6/20/2019 | 216 | 3 | 0 |
| OR6272 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 319 | BC2 | 6/18/2019 | 318 | 1 | 0 |
| OR3498 | Arctic grayling | UBLU 15.0 | 6/17/2019 | 184 | BC2 | 6/19/2019 | 184 | 2 | 0 |
| OR10009 | Arctic grayling | BC2 | 6/17/2019 | 244 | BC2 | 6/20/2019 | 242 | 3 | 0 |
| OR6258 | Arctic grayling | BC2 | 6/17/2019 | 281 | BC2 | 6/18/2019 | 280 | 1 | 0 |
| OR10010 | Arctic grayling | BC2 | 6/17/2019 | 208 | BC2 | 6/18/2019 | 207 | 1 | 0 |
| OR6920 | Arctic grayling | BC2 | 6/17/2019 | 376 | BC2 | 6/18/2019 | 376 | 1 | 0 |
| OR6264 | Arctic grayling | BC2 | 6/17/2019 | 254 | BC2 | 6/20/2019 | 252 | 3 | 0 |
| OR10011 | Arctic grayling | BC2 | 6/17/2019 | 200 | BC2 | 6/18/2019 | 200 | 1 | 0 |
| OR3473 | Arctic grayling | BC2 | 6/17/2019 | 227 | BC2 | 6/18/2019 | 228 | 1 | 1 |
| OR3917 | Arctic grayling | W17401 | 6/17/2019 | 195 | W17401 | 6/19/2019 | 187 | 2 | 0 |
| OR3917 | Arctic grayling | W17401 | 6/17/2019 | 195 | W17401 | 6/18/2019 | 187 | 1 | 0 |
| OR4139 | Arctic grayling | W17401 | 6/17/2019 | 180 | W17401 | 6/19/2019 | 178 | 2 | 0 |
| OR3920 | Arctic grayling | W17401 | 6/17/2019 | 206 | W17401 | 6/18/2019 | 204 | 1 | 0 |
| OR4149 | Arctic grayling | W17401 | 6/17/2019 | 195 | W17401 | 6/18/2019 | 194 | 1 | 0 |
| OR4147 | Arctic grayling | W17401 | 6/17/2019 | 196 | W17401 | 6/18/2019 | 195 | 1 | 0 |
| OR3925 | Arctic grayling | W17401 | 6/17/2019 | 189 | W17401 | 6/18/2019 | 188 | 1 | 0 |
| OR4150 | Arctic grayling | W17401 | 6/17/2019 | 208 | W17401 | 6/18/2019 | 208 | 1 | 0 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR4144 | Arctic grayling | W17401 | 6/17/2019 | 190 | W17401 | 6/18/2019 | 190 | 1 | 0 |
| OR4139 | Arctic grayling | W17401 | 6/17/2019 | 180 | W17401 | 6/18/2019 | 180 | 1 | 0 |
| OR3472 | Arctic grayling | W17201 | 6/17/2019 | 220 | W17201 | 6/20/2019 | 220 | 3 | 0 |
| OR3472 | Arctic grayling | W17201 | 6/17/2019 | 220 | W17201 | 7/21/2019 | 228 | 34 | 8 |
| OR3472 | Arctic grayling | W17201 | 6/17/2019 | 220 | W17201 | 7/19/2019 | 228 | 32 | 8 |
| OR3472 | Arctic grayling | W17201 | 6/17/2019 | 220 | W17201 | 7/25/2019 | 230 | 38 | 10 |
| OR3472 | Broad whitefish | W17201 | 6/17/2019 | 220 | W17201 | 7/23/2019 | 230 | 36 | 10 |
| OR3464 | Arctic grayling | UBLU 15.0 | 6/18/2019 | 245 | BC2 | 6/19/2019 | 245 | 1 | 0 |
| OR4814 | Broad whitefish | BC2 | 6/18/2019 | 551 | BC2 | 7/25/2019 | 545 | 37 | 0 |
| OR4816 | Humpback whitefish | BC2 | 6/18/2019 | 409 | BC2 | 6/19/2019 | 407 | 1 | 0 |
| OR3459 | Arctic grayling | BC2 | 6/18/2019 | 242 | UBLU 15.0 | 6/20/2019 | 240 | 2 | 0 |
| OR3455 | Arctic grayling | BC2 | 6/18/2019 | 208 | BC2 | 6/19/2019 | 206 | 1 | 0 |
| OR3452 | Arctic grayling | BC2 | 6/18/2019 | 220 | BC2 | 6/19/2019 | 218 | 1 | 0 |
| OR3099 | Arctic grayling | BC2 | 6/18/2019 | 197 | BC2 | 6/19/2019 | 195 | 1 | 0 |
| OR4818 | Arctic grayling | BC2 | 6/18/2019 | 257 | BC2 | 6/19/2019 | 256 | 1 | 0 |
| OR3462 | Arctic grayling | BC2 | 6/18/2019 | 195 | BC2 | 6/19/2019 | 194 | 1 | 0 |
| OR3460 | Arctic grayling | BC2 | 6/18/2019 | 227 | BC2 | 6/19/2019 | 226 | 1 | 0 |
| OR3459 | Arctic grayling | BC2 | 6/18/2019 | 242 | BC2 | 6/19/2019 | 241 | 1 | 0 |
| OR3458 | Arctic grayling | BC2 | 6/18/2019 | 243 | BC2 | 6/19/2019 | 242 | 1 | 0 |
| OR3453 | Arctic grayling | BC2 | 6/18/2019 | 247 | BC2 | 6/19/2019 | 248 | 1 | 1 |
| OR3451 | Arctic grayling | BC2 | 6/18/2019 | 224 | BC2 | 6/19/2019 | 225 | 1 | 1 |
| OR4811 | Arctic grayling | BC2 | 6/18/2019 | 432 | BC2 | 8/28/2019 | 436 | 71 | 4 |
| OR6496 | Burbot | FC1801 | 6/18/2019 | 540 | FC1801 | 6/19/2019 | 537 | 1 | 0 |
| OR10214 | Arctic grayling | W17401 | 6/18/2019 | 189 | W18402 | 6/19/2019 | 187 | 1 | 0 |
| OR10207 | Arctic grayling | W17401 | 6/18/2019 | 199 | W18402 | 6/19/2019 | 197 | 1 | 0 |
| OR4133 | Arctic grayling | W17401 | 6/18/2019 | 202 | W17401 | 6/19/2019 | 202 | 1 | 0 |
| OR10223 | Arctic grayling | W17401 | 6/18/2019 | 205 | W18402 | 6/19/2019 | 205 | 1 | 0 |
| OR10222 | Arctic grayling | W17401 | 6/18/2019 | 189 | W17401 | 6/19/2019 | 189 | 1 | 0 |
| OR10221 | Arctic grayling | W17401 | 6/18/2019 | 184 | W17401 | 6/19/2019 | 184 | 1 | 0 |
| OR10217 | Arctic grayling | W17401 | 6/18/2019 | 203 | W17401 | 6/19/2019 | 203 | 1 | 0 |
| OR10220 | Arctic grayling | W17401 | 6/18/2019 | 195 | W18402 | 6/20/2019 | 196 | 2 | 1 |
| OR10206 | Arctic grayling | W17401 | 6/18/2019 | 186 | W17401 | 6/19/2019 | 187 | 1 | 1 |
| OR10220 | Arctic grayling | W17401 | 6/18/2019 | 195 | W18402 | 7/19/2019 | 209 | 31 | 14 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR10216 | Arctic grayling | W17401 | 6/18/2019 | 204 | W18402 | 7/19/2019 | 230 | 31 | 26 |
| OR3098 | Least cisco | W17201 | 6/18/2019 | 238 | W17201 | 6/19/2019 | 238 | 1 | 0 |
| OR4806 | Arctic grayling | W17201 | 6/18/2019 | 252 | W17201 | 6/20/2019 | 254 | 2 | 2 |
| OR10239 | Arctic grayling | W18402 | 6/18/2019 | 209 | W18402 | 6/20/2019 | 210 | 2 | 1 |
| OR3095 | Arctic grayling | W18204 | 6/18/2019 | 222 | W17201 | 7/21/2019 | 238 | 33 | 16 |
| OR3095 | Arctic grayling | W18204 | 6/18/2019 | 222 | W17201 | 7/22/2019 | 239 | 34 | 17 |
| OR6039 | Arctic grayling | W17101 | 6/18/2019 | 275 | W17101 | 6/20/2019 | 275 | 2 | 0 |
| OR3764 | Arctic grayling | W17101 | 6/18/2019 | 213 | W17101 | 7/24/2019 | 235 | 36 | 22 |
| OR3765 | Arctic grayling | W17101 | 6/18/2019 | 205 | W17101 | 8/28/2019 | 257 | 71 | 52 |
| OR6899 | Arctic grayling | UBLU 15.0 | 6/19/2019 | 358 | BC2 | 6/20/2019 | 357 | 1 | 0 |
| OR3087 | Arctic grayling | UBLU 15.0 | 6/19/2019 | 239 | UBLU 15.0 | 6/20/2019 | 239 | 1 | 0 |
| OR3080 | Arctic grayling | BC2 | 6/19/2019 | 211 | BC2 | 6/20/2019 | 209 | 1 | 0 |
| OR6879 | Arctic grayling | BC2 | 6/19/2019 | 366 | UBLU 15.0 | 6/20/2019 | 365 | 1 | 0 |
| OR6800 | Arctic grayling | BC2 | 6/19/2019 | 282 | UBLU 15.0 | 6/20/2019 | 281 | 1 | 0 |
| OR3081 | Arctic grayling | BC2 | 6/19/2019 | 223 | BC2 | 6/20/2019 | 222 | 1 | 0 |
| OR6886 | Arctic grayling | BC2 | 6/19/2019 | 286 | UBLU 15.0 | 6/20/2019 | 286 | 1 | 0 |
| OR6795 | Humpback whitefish | BC2 | 6/19/2019 | 366 | BC2 | 7/21/2019 | 367 | 32 | 1 |
| OR6800 | Arctic grayling | BC2 | 6/19/2019 | 282 | BC2 | 7/24/2019 | 283 | 35 | 1 |
| OR6822 | Arctic grayling | W17401 | 6/19/2019 | 318 | JK1703 | 7/25/2019 | 322 | 36 | 4 |
| OR6815 | Arctic grayling | W18401 | 6/19/2019 | 277 | W18402 | 6/20/2019 | 272 | 1 | 0 |
| OR3052 | Arctic grayling | W17201 | 6/19/2019 | 192 | W17201 | 6/20/2019 | 194 | 1 | 2 |
| OR3552 | Arctic grayling | W17201 | 6/19/2019 | 201 | W17201 | 7/22/2019 | 216 | 33 | 15 |
| OR6039 | Arctic grayling | W17101 | 6/20/2019 | 275 | W17101 | 7/21/2019 | 288 | 31 | 13 |
| OR9195 | Arctic grayling | W17201 | 6/20/2019 | 207 | W17201 | 7/20/2019 | 217 | 30 | 10 |
| OR9195 | Arctic grayling | W17201 | 6/20/2019 | 207 | W17201 | 7/19/2019 | 218 | 29 | 11 |
| OR3694 | Arctic grayling | W18204 | 6/20/2019 | 193 | W18204 | 7/21/2019 | 207 | 31 | 14 |
| OR3694 | Arctic grayling | W18204 | 6/20/2019 | 193 | W18204 | 7/22/2019 | 208 | 32 | 15 |
| OR6847 | Humpback whitefish | UBLU 15.0 | 7/19/2019 | 406 | UBLU 15.0 | 7/20/2019 | 405 | 1 | 0 |
| OR6846 | Broad whitefish | UBLU 15.0 | 7/19/2019 | 376 | UBLU 15.0 | 7/20/2019 | 376 | 1 | 0 |
| OR3691 | Least cisco | UBLU 15.0 | 7/19/2019 | 221 | UBLU 15.0 | 7/21/2019 | 225 | 2 | 4 |
| OR3688 | Arctic grayling | BC2 | 7/19/2019 | 185 | BC2 | 7/20/2019 | 185 | 1 | 0 |
| OR6836 | Arctic grayling | BC2 | 7/19/2019 | 302 | BC2 | 7/25/2019 | 303 | 6 | 1 |
| OR3687 | Arctic grayling | BC2 | 7/19/2019 | 207 | BC2 | 7/20/2019 | 209 | 1 | 2 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR6834 | Arctic grayling | BC2 | 7/19/2019 | 327 | BC2 | 7/20/2019 | 330 | 1 | 3 |
| OR6832 | Round whitefish | BC2 | 7/19/2019 | 263 | BC2 | 7/20/2019 | 266 | 1 | 3 |
| OR6830 | Arctic grayling | BC2 | 7/19/2019 | 325 | BC2 | 8/26/2019 | 329 | 38 | 4 |
| OR3172 | Arctic grayling | W19601 | 7/19/2019 | 196 | W19601 | 7/20/2019 | 190 | 1 | 0 |
| OR3680 | Arctic grayling | W17401 | 7/19/2019 | 195 | W17401 | 8/25/2019 | 207 | 37 | 12 |
| OR3680 | Arctic grayling | W17401 | 7/19/2019 | 195 | W17401 | 8/27/2019 | 209 | 39 | 14 |
| OR3680 | Arctic grayling | W17401 | 7/19/2019 | 195 | W17401 | 8/24/2019 | 210 | 36 | 15 |
| OR6375 | Arctic grayling | W17401 | 7/19/2019 | 258 | W17401 | 7/20/2019 | 259 | 1 | 1 |
| OR3819 | Arctic grayling | W17401 | 7/19/2019 | 205 | W17401 | 7/20/2019 | 206 | 1 | 1 |
| OR3818 | Arctic grayling | W17401 | 7/19/2019 | 198 | W17401 | 7/20/2019 | 200 | 1 | 2 |
| OR6783 | Arctic grayling | FT1802 | 7/19/2019 | 278 | FC1801 | 7/25/2019 | 280 | 6 | 2 |
| OR3814 | Least cisco | W18401 | 7/19/2019 | 196 | W18401 | 7/22/2019 | 201 | 3 | 5 |
| OR3801 | Arctic grayling | BC2 | 7/20/2019 | 226 | BC2 | 7/21/2019 | 226 | 1 | 0 |
| OR4396 | Arctic grayling | W17401 | 7/20/2019 | 237 | W17401 | 7/23/2019 | 237 | 3 | 0 |
| OR4393 | Arctic grayling | W17401 | 7/20/2019 | 187 | W17401 | 7/21/2019 | 188 | 1 | 1 |
| OR3155 | Arctic grayling | W17201 | 7/20/2019 | 185 | W17201 | 8/26/2019 | 206 | 37 | 21 |
| OR6400 | Arctic grayling | BC2 | 7/21/2019 | 353 | BC2 | 7/22/2019 | 351 | 1 | 0 |
| OR6351 | Arctic grayling | BC2 | 7/21/2019 | 311 | BC2 | 7/22/2019 | 310 | 1 | 0 |
| OR6353 | Arctic grayling | BC2 | 7/21/2019 | 310 | BC2 | 7/22/2019 | 310 | 1 | 0 |
| OR4386 | Arctic grayling | W17401 | 7/21/2019 | 212 | W17401 | 7/22/2019 | 210 | 1 | 0 |
| OR3596 | Arctic grayling | W17201 | 7/21/2019 | 212 | W18204 | 7/24/2019 | 211 | 3 | 0 |
| OR6765 | Arctic grayling | W17201 | 7/21/2019 | 281 | W17201 | 7/22/2019 | 280 | 1 | 0 |
| OR3596 | Arctic grayling | W17201 | 7/21/2019 | 212 | W18204 | 7/23/2019 | 212 | 2 | 0 |
| OR3597 | Arctic grayling | W17201 | 7/21/2019 | 205 | W17201 | 7/22/2019 | 206 | 1 | 1 |
| OR3596 | Arctic grayling | W17201 | 7/21/2019 | 212 | W18204 | 7/25/2019 | 213 | 4 | 1 |
| OR3600 | Arctic grayling | W17201 | 7/21/2019 | 208 | W17201 | 7/22/2019 | 210 | 1 | 2 |
| OR3594 | Arctic grayling | W17201 | 7/21/2019 | 207 | W17201 | 7/24/2019 | 209 | 3 | 2 |
| OR3592 | Arctic grayling | W17201 | 7/21/2019 | 229 | W18204 | 7/25/2019 | 231 | 4 | 2 |
| OR6764 | Arctic grayling | W17201 | 7/21/2019 | 265 | W17201 | 7/22/2019 | 268 | 1 | 3 |
| OR3594 | Arctic grayling | W17201 | 7/21/2019 | 207 | W17201 | 7/22/2019 | 210 | 1 | 3 |
| OR3590 | Arctic grayling | W17101 | 7/21/2019 | 203 | W17101 | 7/25/2019 | 202 | 4 | 0 |
| OR3588 | Arctic grayling | W17101 | 7/21/2019 | 236 | W17101 | 7/24/2019 | 235 | 3 | 0 |
| OR3588 | Arctic grayling | W17101 | 7/21/2019 | 236 | W17101 | 7/22/2019 | 235 | 1 | 0 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR6039 | Arctic grayling | W17101 | 7/21/2019 | 288 | W17101 | 7/23/2019 | 287 | 2 | 0 |
| OR3590 | Arctic grayling | W17101 | 7/21/2019 | 203 | W17101 | 7/23/2019 | 203 | 2 | 0 |
| OR3589 | Arctic grayling | W17101 | 7/21/2019 | 238 | W17101 | 7/24/2019 | 238 | 3 | 0 |
| OR0838 | Arctic grayling | W17101 | 7/21/2019 | 264 | W17101 | 7/22/2019 | 264 | 1 | 0 |
| OR3590 | Arctic grayling | W17101 | 7/21/2019 | 203 | W17101 | 7/22/2019 | 205 | 1 | 2 |
| OR3588 | Arctic grayling | W17101 | 7/21/2019 | 236 | W17101 | 8/24/2019 | 250 | 34 | 14 |
| OR3588 | Arctic grayling | W17101 | 7/21/2019 | 236 | W17101 | 8/23/2019 | 252 | 33 | 16 |
| OR3588 | Arctic grayling | W17101 | 7/21/2019 | 236 | W17101 | 8/22/2019 | 253 | 32 | 17 |
| OR3587 | Arctic grayling | W17101 | 7/21/2019 | 238 | W17101 | 8/27/2019 | 257 | 37 | 19 |
| OR3587 | Arctic grayling | W17101 | 7/21/2019 | 238 | W17101 | 8/27/2019 | 257 | 37 | 19 |
| OR3589 | Arctic grayling | W17101 | 7/21/2019 | 238 | W17101 | 8/26/2019 | 259 | 36 | 21 |
| OR3589 | Arctic grayling | W17101 | 7/21/2019 | 238 | W17101 | 8/27/2019 | 260 | 37 | 22 |
| OR3583 | Arctic grayling | BC2 | 7/22/2019 | 253 | BC2 | 7/23/2019 | 252 | 1 | 0 |
| OR3585 | Round whitefish | BC2 | 7/22/2019 | 243 | BC2 | 7/23/2019 | 243 | 1 | 0 |
| OR6391 | Arctic grayling | FT1803 | 7/22/2019 | 352 | FT1803 | 7/23/2019 | 352 | 1 | 0 |
| OR6392 | Arctic grayling | FT1803 | 7/22/2019 | 265 | FT1803 | 7/24/2019 | 265 | 2 | 0 |
| OR4382 | Arctic grayling | FT1803 | 7/22/2019 | 201 | FT1803 | 7/24/2019 | 201 | 2 | 0 |
| OR6391 | Arctic grayling | FT1803 | 7/22/2019 | 352 | FT1803 | 7/24/2019 | 353 | 2 | 1 |
| OR4381 | Arctic grayling | FT1803 | 7/22/2019 | 209 | FT1803 | 7/24/2019 | 210 | 2 | 1 |
| OR4379 | Arctic grayling | FT1803 | 7/22/2019 | 213 | FT1803 | 7/24/2019 | 214 | 2 | 1 |
| OR3578 | Least cisco | W17401 | 7/22/2019 | 248 | W18401 | 7/23/2019 | 247 | 1 | 0 |
| OR3847 | Arctic grayling | W18401 | 7/22/2019 | 213 | W18401 | 8/27/2019 | 234 | 36 | 21 |
| OR6383 | Arctic grayling | W17201 | 7/22/2019 | 299 | W17201 | 7/23/2019 | 299 | 1 | 0 |
| OR4448 | Arctic grayling | W17201 | 7/22/2019 | 212 | W18204 | 7/25/2019 | 212 | 3 | 0 |
| OR4448 | Arctic grayling | W17201 | 7/22/2019 | 212 | W18204 | 7/24/2019 | 212 | 2 | 0 |
| OR4443 | Arctic grayling | W17201 | 7/22/2019 | 236 | W17201 | 7/23/2019 | 235 | 1 | 0 |
| OR4446 | Arctic grayling | W17201 | 7/22/2019 | 200 | W17201 | 7/23/2019 | 201 | 1 | 1 |
| OR0838 | Arctic grayling | W17101 | 7/22/2019 | 264 | W17101 | 7/23/2019 | 264 | 1 | 0 |
| OR4437 | Arctic grayling | W18204 | 7/22/2019 | 180 | W18204 | 7/25/2019 | 180 | 3 | 0 |
| OR4433 | Arctic grayling | W18204 | 7/22/2019 | 209 | W18204 | 7/24/2019 | 209 | 2 | 0 |
| OR4433 | Arctic grayling | W18204 | 7/22/2019 | 209 | W18204 | 7/23/2019 | 210 | 1 | 1 |
| OR4434 | Arctic grayling | W18204 | 7/22/2019 | 184 | W18204 | 7/23/2019 | 186 | 1 | 2 |
| OR3845 | Round whitefish | BC2 | 7/23/2019 | 235 | BC2 | 7/24/2019 | 233 | 1 | 0 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR7022 | Broad whitefish | BC2 | 7/23/2019 | 442 | BC2 | 7/24/2019 | 442 | 1 | 0 |
| OR7021 | Arctic grayling | BC2 | 7/23/2019 | 253 | BC2 | 7/24/2019 | 253 | 1 | 0 |
| OR4432 | Arctic grayling | FT1803 | 7/23/2019 | 225 | FT1803 | 7/24/2019 | 225 | 1 | 0 |
| OR4429 | Arctic grayling | FT1803 | 7/23/2019 | 222 | FT1803 | 7/24/2019 | 223 | 1 | 1 |
| OR4430 | Arctic grayling | FT1803 | 7/23/2019 | 196 | FT1803 | 7/24/2019 | 198 | 1 | 2 |
| OR7017 | Arctic grayling | W18401 | 7/23/2019 | 298 | W18401 | 8/28/2019 | 300 | 36 | 2 |
| OR6039 | Arctic grayling | W17101 | 7/23/2019 | 287 | W17101 | 7/25/2019 | 291 | 2 | 4 |
| OR3587 | Arctic grayling | W17101 | 7/23/2019 | 237 | W17101 | 8/27/2019 | 257 | 35 | 20 |
| OR3587 | Arctic grayling | W17101 | 7/23/2019 | 237 | W17101 | 8/27/2019 | 257 | 35 | 20 |
| OR4497 | Arctic grayling | W18204 | 7/23/2019 | NA | W18204 | 7/24/2019 | NA | 1 | |
| OR4500 | Arctic grayling | W18204 | 7/23/2019 | 192 | W18204 | 7/24/2019 | 192 | 1 | 0 |
| OR4496 | Arctic grayling | W18204 | 7/23/2019 | 203 | W18204 | 7/24/2019 | 203 | 1 | 0 |
| OR4496 | Arctic grayling | W18204 | 7/23/2019 | 203 | W18204 | 7/25/2019 | 204 | 2 | 1 |
| OR4494 | Arctic grayling | W18204 | 7/23/2019 | 218 | W18204 | 7/24/2019 | 219 | 1 | 1 |
| OR4426 | Arctic grayling | W18204 | 7/23/2019 | 181 | W18204 | 7/24/2019 | 182 | 1 | 1 |
| OR4499 | Arctic grayling | W18204 | 7/23/2019 | 181 | W18204 | 7/25/2019 | 183 | 2 | 2 |
| OR4426 | Arctic grayling | W18204 | 7/23/2019 | 181 | W18204 | 8/27/2019 | 194 | 35 | 13 |
| OR4497 | Arctic grayling | W18204 | 7/23/2019 | 217 | W18204 | 8/23/2019 | 232 | 31 | 15 |
| OR4497 | Arctic grayling | W18204 | 7/23/2019 | 217 | W18204 | 8/22/2019 | 232 | 30 | 15 |
| OR4489 | Arctic grayling | W18204 | 7/24/2019 | 181 | W18204 | 7/25/2019 | 182 | 1 | 1 |
| OR6094 | Arctic grayling | W18204 | 7/24/2019 | 285 | W18204 | 7/25/2019 | 287 | 1 | 2 |
| OR7011 | Broad whitefish | BC2 | 7/24/2019 | 340 | BC2 | 7/25/2019 | 340 | 1 | 0 |
| OR7009 | Arctic grayling | BC2 | 7/24/2019 | 257 | BC2 | 7/25/2019 | 257 | 1 | 0 |
| OR7008 | Arctic grayling | BC2 | 7/24/2019 | 307 | BC2 | 7/25/2019 | 308 | 1 | 1 |
| OR7007 | Arctic grayling | BC2 | 7/24/2019 | 334 | BC2 | 7/25/2019 | 335 | 1 | 1 |
| OR7006 | Arctic grayling | BC2 | 7/24/2019 | 308 | BC2 | 7/25/2019 | 309 | 1 | 1 |
| OR7014 | Arctic grayling | BC2 | 7/24/2019 | 270 | BC2 | 7/25/2019 | 272 | 1 | 2 |
| OR7010 | Arctic grayling | BC2 | 7/24/2019 | 368 | BC2 | 7/25/2019 | 371 | 1 | 3 |
| OR6039 | Arctic grayling | W17101 | 7/25/2019 | 291 | W17101 | 8/22/2019 | 299 | 28 | 8 |
| OR7041 | Arctic grayling | W18204 | 7/25/2019 | 250 | W18204 | 8/22/2019 | 253 | 28 | 3 |
| OR7040 | Arctic grayling | W18204 | 7/25/2019 | 295 | W18204 | 8/27/2019 | 303 | 33 | 8 |
| OR3894 | Arctic grayling | FT1803 | 8/22/2019 | 183 | FT1803 | 8/23/2019 | 182 | 1 | 0 |
| OR3895 | Arctic grayling | FT1803 | 8/22/2019 | 181 | FT1803 | 8/24/2019 | 182 | 2 | 1 |

**Appendix E. Fish recapture and release data in 2019 in the Northeastern NPR-A, ConocoPhillips Alaska, Inc.**

| | | Release Data | | | Recapture Data | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tag Number** | **Species** | **Site** | **Date** | **Length** | **Site** | **Date** | **Length** | **Days at Large** | **Length Increase** |
| OR6327 | Least cisco | W18401 | 8/22/2019 | 300 | W17401 | 8/24/2019 | 300 | 2 | 0 |
| OR3278 | Arctic grayling | W18402 | 8/22/2019 | 184 | W18402 | 8/23/2019 | 185 | 1 | 1 |
| OR3888 | Arctic grayling | W17101 | 8/22/2019 | 193 | W17101 | 8/23/2019 | 192 | 1 | 0 |
| OR3885 | Arctic grayling | W17101 | 8/22/2019 | 240 | W17101 | 8/27/2019 | 239 | 5 | 0 |
| OR6039 | Arctic grayling | W17101 | 8/22/2019 | 299 | W17101 | 8/28/2019 | 299 | 6 | 0 |
| OR3889 | Arctic grayling | W17101 | 8/22/2019 | 197 | W17101 | 8/27/2019 | 197 | 5 | 0 |
| OR3889 | Arctic grayling | W17101 | 8/22/2019 | 197 | W17101 | 8/24/2019 | 198 | 2 | 1 |
| OR3888 | Arctic grayling | W17101 | 8/22/2019 | 193 | W17101 | 8/27/2019 | 194 | 5 | 1 |
| OR3886 | Arctic grayling | W17101 | 8/22/2019 | 181 | W17101 | 8/24/2019 | 182 | 2 | 1 |
| OR3888 | Arctic grayling | W17101 | 8/22/2019 | 193 | W17101 | 8/25/2019 | 195 | 3 | 2 |
| OR3893 | Arctic grayling | W17101 | 8/22/2019 | 181 | W17101 | 8/26/2019 | 186 | 4 | 5 |
| OR6328 | Least cisco | BC2 | 8/23/2019 | 295 | BC2 | 8/24/2019 | 298 | 1 | 3 |
| OR3881 | Arctic grayling | FT1803 | 8/23/2019 | 187 | FT1803 | 8/24/2019 | 190 | 1 | 3 |
| OR3879 | Arctic grayling | FT1802 | 8/23/2019 | 234 | FT1802 | 8/27/2019 | 235 | 4 | 1 |
| OR6349 | Arctic grayling | W18401 | 8/23/2019 | 251 | W18401 | 8/24/2019 | 253 | 1 | 2 |
| OR3286 | Arctic grayling | W18401 | 8/23/2019 | 212 | W18401 | 8/26/2019 | 214 | 3 | 2 |
| OR10199 | Arctic grayling | W17101 | 8/23/2019 | 183 | W17101 | 8/24/2019 | 183 | 1 | 0 |
| OR10200 | Arctic grayling | W17101 | 8/23/2019 | 196 | W17101 | 8/27/2019 | 198 | 4 | 2 |
| OR10196 | Arctic grayling | W17101 | 8/23/2019 | 222 | W17101 | 8/26/2019 | 224 | 3 | 2 |
| OR10200 | Arctic grayling | W17101 | 8/23/2019 | 196 | W17101 | 8/28/2019 | 202 | 5 | 6 |
| OR6296 | Least cisco | BC2 | 8/24/2019 | 311 | BC2 | 8/25/2019 | 314 | 1 | 3 |
| OR10192 | Arctic grayling | FT1803 | 8/24/2019 | 183 | FT1803 | 8/25/2019 | 187 | 1 | 4 |
| OR6294 | Arctic grayling | W17401 | 8/24/2019 | 283 | W17401 | 8/25/2019 | 282 | 1 | 0 |
| OR10186 | Arctic grayling | W17101 | 8/24/2019 | 201 | W17101 | 8/26/2019 | 201 | 2 | 0 |
| OR10186 | Arctic grayling | W17101 | 8/24/2019 | 201 | W17101 | 8/25/2019 | 201 | 1 | 0 |
| OR1228 | Arctic grayling | BC2 | 8/25/2019 | 234 | BC2 | 8/26/2019 | 234 | 1 | 0 |
| OR3867 | Arctic grayling | FT1803 | 8/25/2019 | 192 | FT1803 | 8/27/2019 | 192 | 2 | 0 |
| OR3862 | Arctic grayling | W17101 | 8/25/2019 | 180 | W17101 | 8/26/2019 | 181 | 1 | 1 |
| OR3861 | Arctic grayling | W17101 | 8/25/2019 | 182 | W17101 | 8/26/2019 | 183 | 1 | 1 |
| OR3860 | Arctic grayling | W17101 | 8/25/2019 | 192 | W17101 | 8/26/2019 | 193 | 1 | 1 |