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# 2021 Unuk River Eulachon (*Thaleichthys pacificus*) Monitoring Report



Forest Service

May 2021



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### EXECUTIVE SUMMARY

District 1 historically supported subsistence, personal use, and commercial fisheries for Eulachon (Ooligan) *Thaleichthys pacificus*, primarily in the Unuk River system (Figure 3). Little is understood about the annual returns of Ooligan in the Unuk River system (Figure 1, Figure 6, and Figure 7), despite their ecological and cultural importance. Annual harvest of Ooligan from the 1980's through the 1990's averaged over 12,000 pounds, with some harvest years exceeding 30,000 pounds (Figure 3). In 2001, the U.S. Forest Service (USFS) and the Alaska Department of Fish and Game (ADF&G) initiated a pilot study to learn more about the level of harvest, distribution, run timing, and life history characteristics of Ooligan in the Unuk River. By 2005, surveys found Ooligan to be nearly absent in the Unuk River system, with only one confirmed Ooligan observed (Van Alen, 2011 unpublished report), resulting in State and Federal closures of the Ooligan fishery on the Unuk River. Between 2006 and 2010, surveys by the USFS continued to document very few Ooligan returning to the Unuk River. In 2011, six years after the population collapse and harvest closure, Ooligan began returning to the Unuk River. The USFS has continued to monitor the system with aerial surveys, satellite camera monitoring, foot & boat surveys, and on-site reports from local cabin owners, indicating variable return levels from 2011 to present (Figure 2). Unconfirmed reports of "healthy" Ooligan returns to the Unuk River beyond what surveyors observed between 2011 and 2017, led to the development of improved monitoring efforts starting in 2018. In 2018, the USFS with the assistance of the Ketchikan Indian Community (KIC) performed intensive on-site Ooligan surveys to better determine the status of the Unuk River return. Because monitoring efforts have documented Ooligan returning consistently since 2011, the Federal fishery was opened on the Unuk River in 2021 to a limited harvest with gear restrictions to federally qualified subsistence users. One hundred twenty-nine permits were issued to federally qualified users, though only seven of these were used. Harvest was restricted to one five-gallon bucket per household and limited to cast net and dip net only methods. The State of Alaska Ooligan fishery remained closed. Based on the observations made by biologists and reports from local subsistence users the 2021 Ooligan run appeared to be moderate this season (Figure 2), and should be adequate to continue a limited harvest in 2022.



Figure 1. Lower Unuk River looking downstream March 18, 2021; note birds feeding on Ooligan in distance

### LOCATION and HISTORY

The Unuk River drains into Burroughs Bay (Figure 6 and Figure 7) on the mainland approximately 54 miles (87 km) northeast of Ketchikan Alaska and is an important system for Eulachon (Ooligan), *Thaleichthys pacificus*. Populations of Ooligan in District 1 have been at critically low levels since 2005. Monitoring efforts by the Forest Service, Alaska Department of Fish and Game, and local subsistence users since 2001 have provided base line information that indicated a decline in the populations of District 1 Ooligan.





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District 1 historically supported subsistence, personal use, and commercial fisheries for Ooligan, primarily in the Unuk River system. Annual harvest of Ooligan from the 1980's through the 1990's averaged over 12,000 pounds (Figure 3), with some harvest years exceeding 30,000 pounds (Van Alen, 2011 unpublished). By 2004, only 1500 pounds of Ooligan were harvested on the Unuk River and very low numbers of returning Ooligan were observed by subsistence fisherman and Forest Service personnel. Between 2005 through 2010, very little to no Ooligan were observed during annual surveys on the Unuk River (Figure 2). Only one fish was documented in 2005. This five-year absence of Ooligan alarmed managers because the Ooligan life cycle is typically only five years, suggesting an entire life cycle may have been lost.

With the stocks at these low levels, there were few options available to managers for conservation other than closure. Due to the sharp declines in the overall number of Ooligan, along with critically low numbers returning to the area, The Unuk River and other portions of District 1 have been closed to the harvest of Ooligan since 2005.

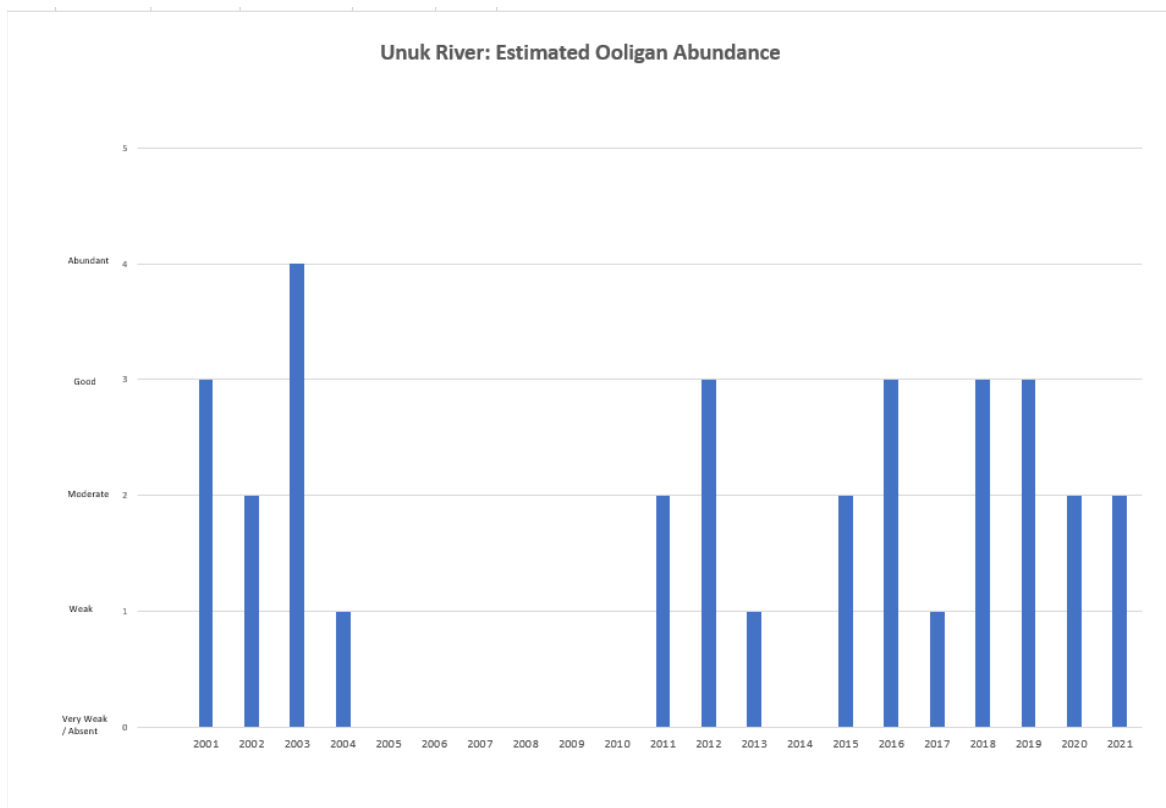


Figure 2. Estimated relative abundance from visual observations of Ooligan in the Unuk River from 2001 to 2021.

Starting in 2011, Ooligan began returning to the Unuk River. Between 2011 and 2015, Ooligan were observed in both the Unuk River, Burroughs Bay area, and in the Carroll Inlet area. Genetic analysis of Carroll Inlet fish showed these fish to be genetically similar to Unuk River Ooligan. Ooligan continued to show variable returns to the Unuk River area between 2016 and 2021 (Figure 2).

Though Ooligan appear to be returning to the Unuk River regularly since 2011, the stock sizes within District 1 remain at levels lower than those observed prior to the 2005 population collapse. Efforts to monitor populations within District 1 have proven difficult, despite intensive onsite survey efforts. With Ooligan returning to the Unuk River regularly since 2011, managers felt that allowing a harvest in 2021, limited to one five-gallon bucket per household, would aid in our efforts to obtain biological data and better assess run sizes, as well as provide Federally qualified subsistence users an opportunity to harvest.





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Data collected will help managers determine if the Ooligan population can support sustained harvest and if future harvest limits should be changed.

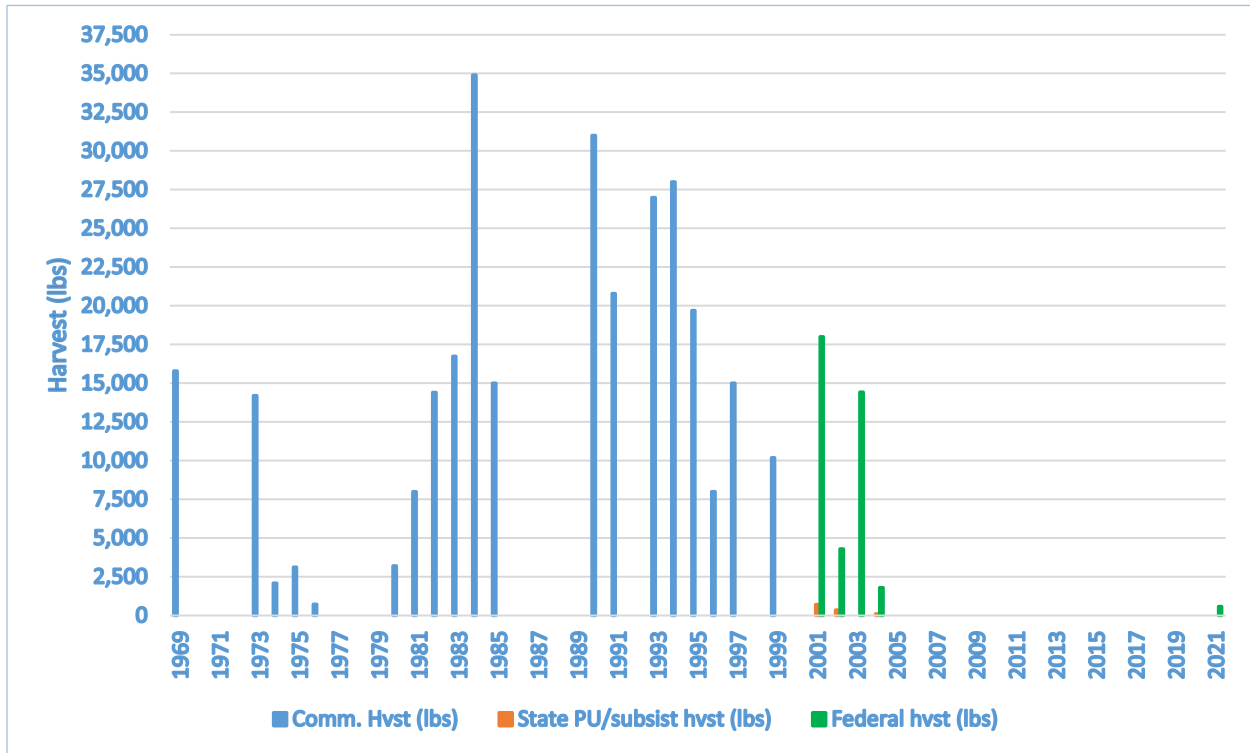


Figure 3. Harvest from 1969 to 2021 by harvest type in District 1 (Van Alen 2011 – Unpublished).

## 2021 FIELD INVESTIGATION METHODS and FINDINGS

Personnel from Ketchikan Indian Community accompanied Forest Service staff during the ground surveys in 2021. Also assisting in surveys was a local cabin owner on the Unuk River, and Alaska Department of Fish and Game with aerial surveys. Surveys included a mixture of aerial, walking, and boat on multiple areas within the Unuk drainage (Figure 6 and Figure 7), with boat surveys being the most common. Areas surveyed included the Unuk River Upper & Lower Landing Sloughs and Matney Sloughs, the Eulachon and Klahini Rivers and Lower Unuk River (Figure 7).

An Alaska Department of Fish and Game Fisheries Resource Permit for collections was issued to Forest Service personnel in 2021, with intentions to assess genetics, length, and weight of Ooligan. Approximately 120 fish were collected by biologists for delivery to an Alaska Department of Fish and Game laboratory. Permit holders were encouraged to submit a small number of harvested fish for biological samples. To date, 12 fish total were dropped off by two local fishermen to US Forest Service personnel to be sent to the Alaska Department of Fish and Game lab.

Field surveys in 2021 began with communications with local landowners. Contact with local landowners on March 1, 2021 reported no Ooligan in the system, but some seals had showed up. Follow up reports from local landowners on March 8 spoke of lots of seals present, as well as porpoise in Burroughs bay, and eagles along the river, but no Ooligan observed yet.

Forest Service biologists flew the Unuk River Tuesday March 9, 2021 and noted the Unuk River was very low and clear, with no visible signs of fish, marine mammals, or birds. Additional scheduled flights were canceled this season due to internal Forest Service contracting issues.







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Local Unuk River landowner reports on Monday, March 15 reported no Ooligan presence yet, but seals, sealions, and birds are present.

Reports from landowners on Tuesday, March 16 stated “the Ooligan have finally arrived!”.

Forest Service Biologists and Ketchikan Indian Community personnel traveled to the Unuk River Thursday March 18 and observed a large number of Ooligan spread out within the northern channels from salt water in the Lower Unuk River (Figure 7) up the north shoreline through the Lower Landing Slough and up the Upper Landing Slough (Figure 4). Numbers appeared to be high, though few large high-density schools were observed, fish were spread out almost evenly across the channel over a large area, suggesting a moderate-sized run. Local landowners also reported “good numbers” of Ooligan further up the Upper Landing Slough, Main Stem Unuk River, and the Klahini River. However, due to low water levels biologists were unable



Figure 4. Small school of Ooligan on Unuk River -Upper Landing Slough, March 18.

to boat up these channels to confirm. Several hundred Dall’s porpoise were observed in North Behm Canal from Herman Creek to Burroughs Bay. One to two hundred seals were observed feeding throughout the Lower Unuk River and Lower Landing Slough, and many hundreds (>500) of sea lions were observed feeding (thrashing) in the Lower Unuk River and in Burroughs Bay. Hundreds of gulls were also observed diving into the Lower Unuk River channel near Burroughs Bay, around the highest concentrations of sea lions. Stunned or dead Ooligan were observed drifting in the channel in this area.

On March 19, Alaska Department of Fish and Game personnel flew the lower Unuk River system, including Upper Landing Slough, Eulachon River, Lower Landing Slough, Lower Unuk, and Klahini River, and noted three schools of fish (two in Upper Landing Slough, and one in Lower Unuk near Burroughs Bay) and reported “*Ooligan presence appeared ok on distribution, but there was not a large density to any of the schools*” (Personnel communication with Bo Meredith- Alaska Department of Fish and Game).

Local landowner reports on March 21 reported Ooligan still present in the system in low numbers, and one small school was noted all the way up stream to about a half mile below Lake Creek (~6 miles upstream) on the upper Mainstem Unuk River, and a second small school of Ooligan was noted on the upper Mainstem Unuk River at the Alaska Department of Fish and Game’s lower set net site (~ 3 miles upstream).





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On Thursday, March 25 Forest Service Biologists and Ketchikan Indian Community personnel traveled to the Unuk River and noted only two smaller schools of fish in the Upper Landing Slough and a handful of Ooligan (less than 20) scattered through the Eulachon River, and that almost all bird and marine mammal activity was focused in or near Burroughs Bay. Several hundred seals were observed beached on shore of the Lower Unuk River and Klahini River, and less than a hundred sea lions were observed in Burroughs Bay. Bird activity in the Burroughs Bay area was significant (numbering in the thousands) and concentrated in one of the side channels to the Lower Unuk draining into the middle of Burroughs Bay. This side channel was too low for boat access. Of the Ooligan observed up river, one small school of Ooligan about half the size of a 18 foot skiff was observed in Upper Landing Slough near Bishop's Slough (Figure 7), and the second larger school, about the size of two 18 foot skiffs, was observed about 0.4 miles upstream of the previous school in Upper Landing Slough. The Eulachon River was very low and clear (Figure 8), and the Unuk River was dark and high flowing (Figure 5). Ice was present on both systems in small amounts, mostly confined to shoreline. Surveys on March 25 covered Upper Landing Slough, Lower Landing Slough, Matney Slough, Lower Unuk, Eulachon River, and the Klahini River.

Local landowner reports on March 29 reported very few fish present, but birds are still getting some, and sea lions are still coming through on the late tides.

Landowner also stated overall fish presence this season was at a three on a ten scale.

Based on the observations made by biologists this season and reports from local subsistence users, the Ooligan run appeared to be moderate this season.

This year, 129 harvest permits were issued to Federally qualified subsistence users for the first time since 2005. Though interest appeared high, actual harvest was light with only seven anglers reporting fishing the Unuk River system.

Based on the limited amount of harvest in 2021, and the decent sized run of Ooligan observed this season allowing a limited harvest with gear restrictions could continue on the Unuk River in District 1.

### Other Ooligan Monitoring

On March 9, the Chickamin River (Figure 6) was flown with similar findings to the March 9 Unuk surveys, low clear water and no signs of any animal or fish activity. Forest Service biologists also surveyed Carroll River (Figure 6), located at the head of Carroll Inlet about 24 miles NNE of Ketchikan, on March 24 and did not observe any signs of Ooligan. No eggs, no carcasses, no fish, and no bird or marine mammal activity.

The recently installed water quality and stream gauge station installed by the U. S. Geological Survey provides data on current stream flow and water quality conditions on the Unuk River (USGS 2021) (APPENDIX A.).



Figure 5. Surveyors traveling up Unuk River: Lower Landing Slough March 25.







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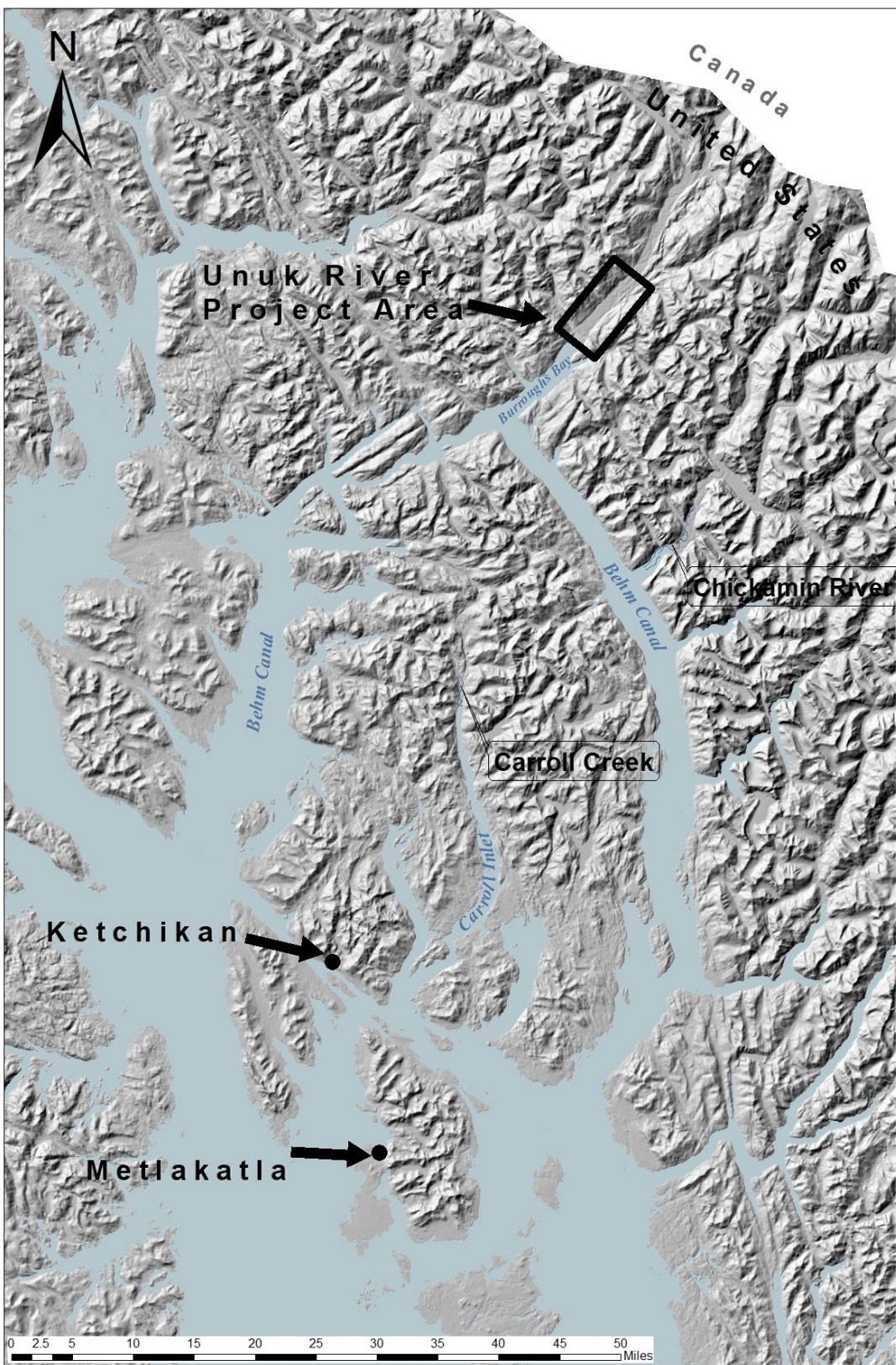


Figure 6. Project Area



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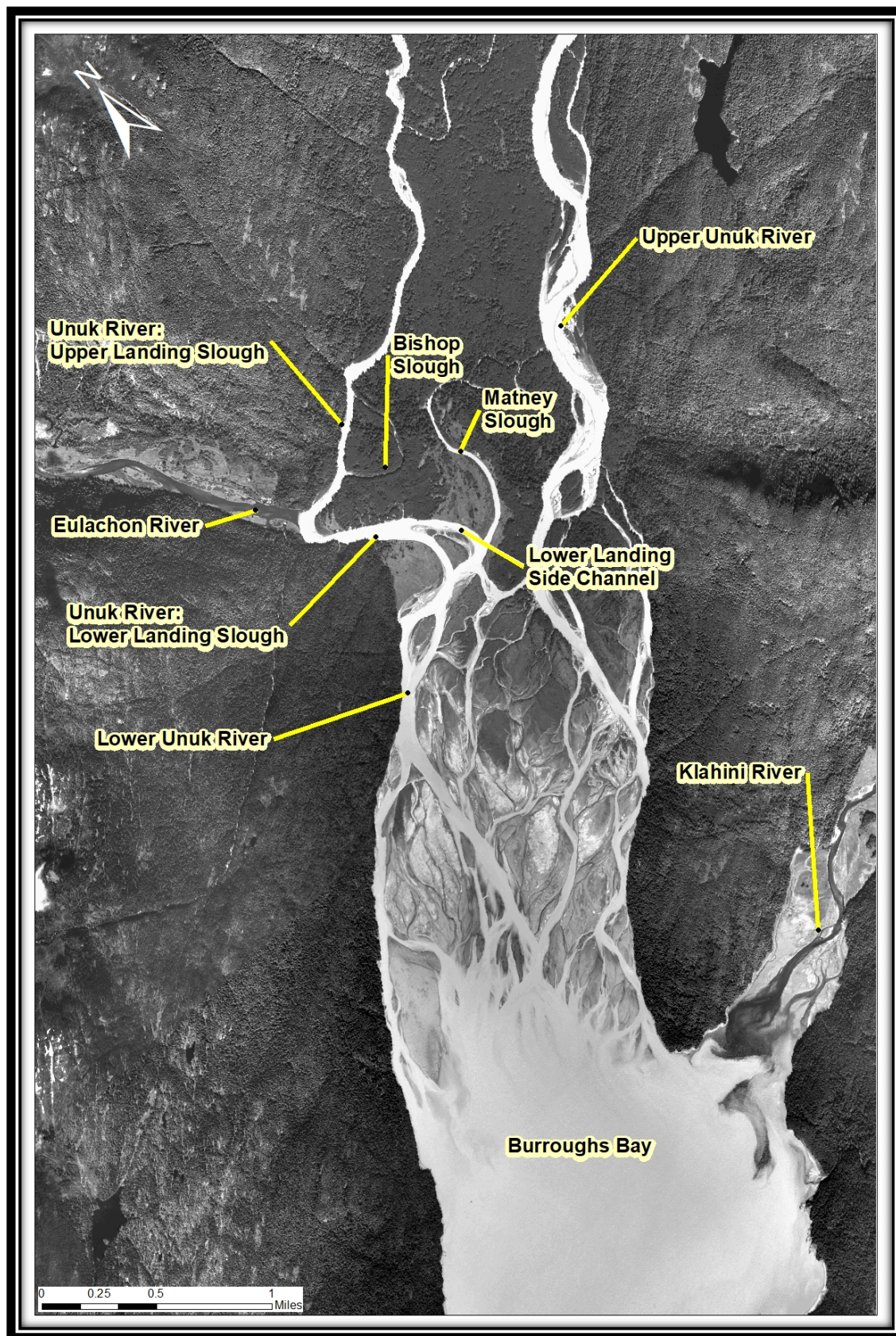


Figure 7. Lower Unuk River system, including major side channels and main tributaries.





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### CONCLUSION & RECOMMENDATIONS

Based on observed numbers of Ooligan and reported observations from local subsistence users and landowners the 2021 Ooligan run appears to be sufficient to continue allowing limited harvest on the Unuk River with gear restrictions. Future surveys should continue to utilize partners and increase the number of personnel and boats to maximize survey efforts to better cover the multitude of channels within the Unuk River system. One boat crew cannot reasonably cover a sufficient area to adequately assess run size.

The small size of Ooligan, their schooling behavior and their wide and often variable distribution within the Unuk River system makes enumeration difficult. Utilization of a limited test fishery with feedback and reporting from local users combined with onsite surveys by biologists appears to be the most successful methods in obtaining biological information on the Unuk River system. Test fisheries alone can suggest abundance through catch per unit effort (CPUE), however they may not provide accurate estimates by themselves as CPUE can be artificially high during low abundance years due to the Ooligan's shoaling nature (Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife 2001). Setting up sample sites to determine CPUE, like Marston et al. (2002), may add to the data collected from visual survey methods.



*Figure 8. Looking up the Eulachon River March 18, note water levels too low for boat travel.*

With run duration on the Unuk River being shorter than on larger rivers, in combination with the presence of multiple tidally influenced channels, it is highly doubtful that other methods of monitoring, such as mark/recapture estimates (similar to the Chilkoot River study), would be successful. To better quantify amounts of Eulachon present, visual observations combined with harvest reports and/or sampling efforts matching what a harvester would gather (e.g. five-gallon bucket) would be highly beneficial, as well as determining weight of those volumes. Both managers and subsistence users would benefit as future permit data could become more accurate and easier to visualize.

Bias between observers will be a continuing issue as visual surveys can be affected by light and weather conditions, tide levels, ice buildup, river turbidity, observer turnover, and the variation of the observation methods (e.g. boat vs snorkel surveys). Future surveys may be more replicable by setting up defined survey reaches and increasing the number of survey-teams and repeating at regular intervals.

Multiple crews on site at the same time would provide opportunity for more detailed surveys of specific branches of the river. With limited ideal tidal conditions, areas such as the Mainstem Unuk cannot be surveyed easily or at times cannot be surveyed at all. Also, the aggressive tidal fluctuations during ebbs and floods, can limit time in areas such as Matney Slough and the Eulachon River. The quantity and quality of surveys would increase if separate crews were responsible for each side of the river valley each day to provide for more thorough surveys during the daily tidal cycles.

Developing a partnership or working group with local Tribes and landowners may be the best method to adequately survey the Unuk River system. Although further improvement of monitoring is desired, current survey methods are believed to provide valuable information to managers about the current distribution and relative abundance within the system.





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### LITERATURE CITED

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[https://waterdata.usgs.gov/ak/nwis/uv?cb\\_all=on&cb\\_00010=on&cb\\_00020=on&cb\\_00060=on&cb\\_00065=on&cb\\_00095=on&cb\\_00300=on&cb\\_00400=on&cb\\_63680=on&cb\\_70969=on&format=gif\\_default&site\\_no=15015595&period=&begin\\_date=2021-03-08&end\\_date=2021-03-31](https://waterdata.usgs.gov/ak/nwis/uv?cb_all=on&cb_00010=on&cb_00020=on&cb_00060=on&cb_00065=on&cb_00095=on&cb_00300=on&cb_00400=on&cb_63680=on&cb_70969=on&format=gif_default&site_no=15015595&period=&begin_date=2021-03-08&end_date=2021-03-31). March 08 to March 31, 2021.

Van Alen, B. W. 2011 Unpublished. Unuk River Eulachon Stock Assessment, 2001 to 2010. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Final Report Study No. 08-607. Anchorage, Alaska.

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APPENDIX A.

USGS Stream Gage Data: USGS 15015595 UNUK R BL BLUE R NR  
WRANGELL AK (USGS 2021)

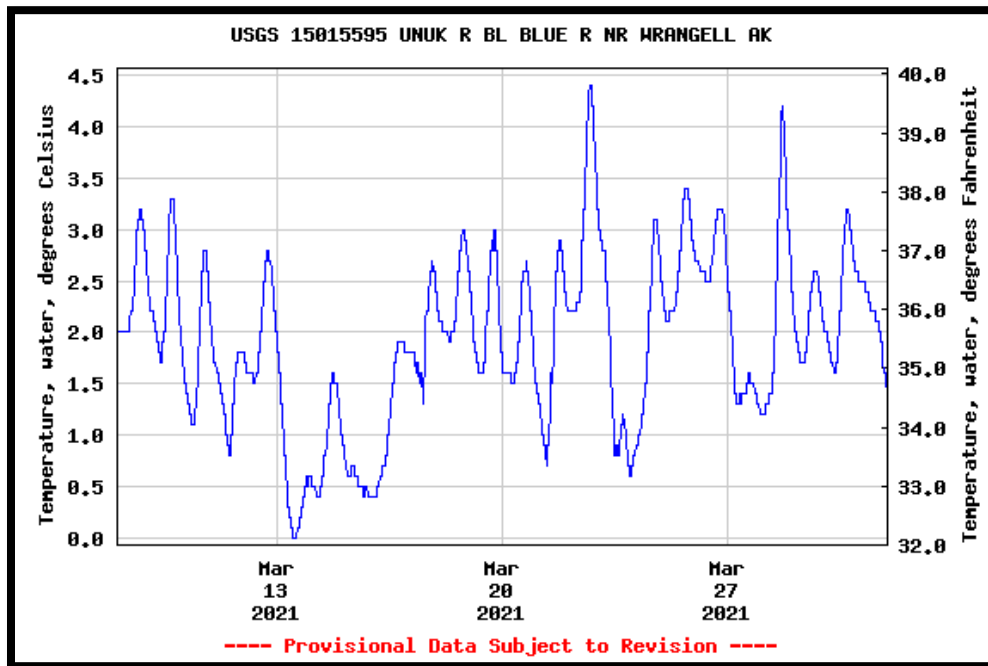


Figure 9. Temperature, water, degrees Celsius (USGS 2021)

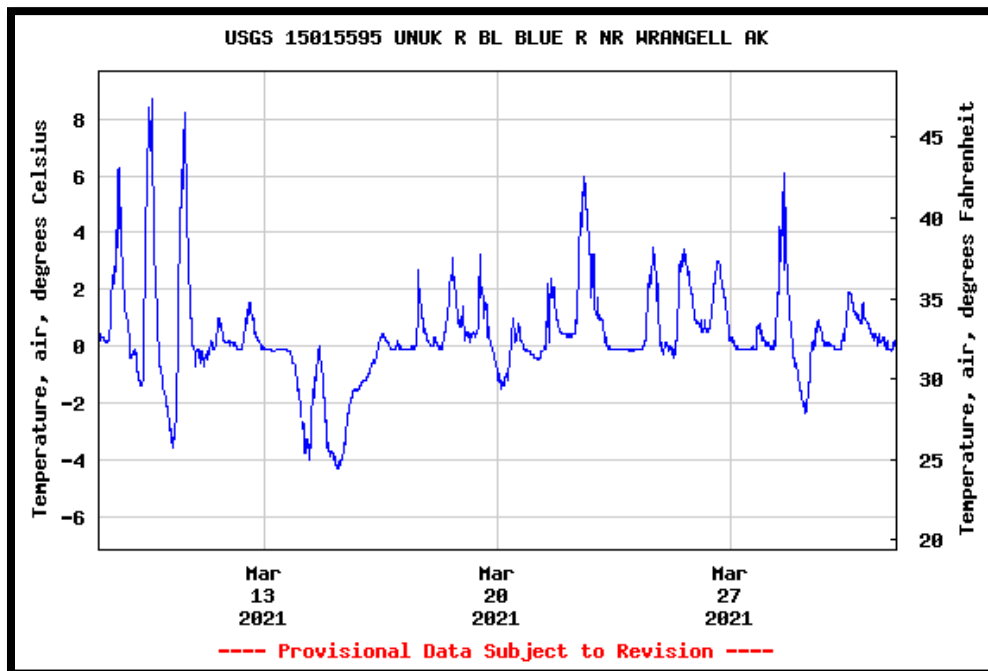


Figure 10. Temperature, Air, degrees Celsius (USGS 2021)





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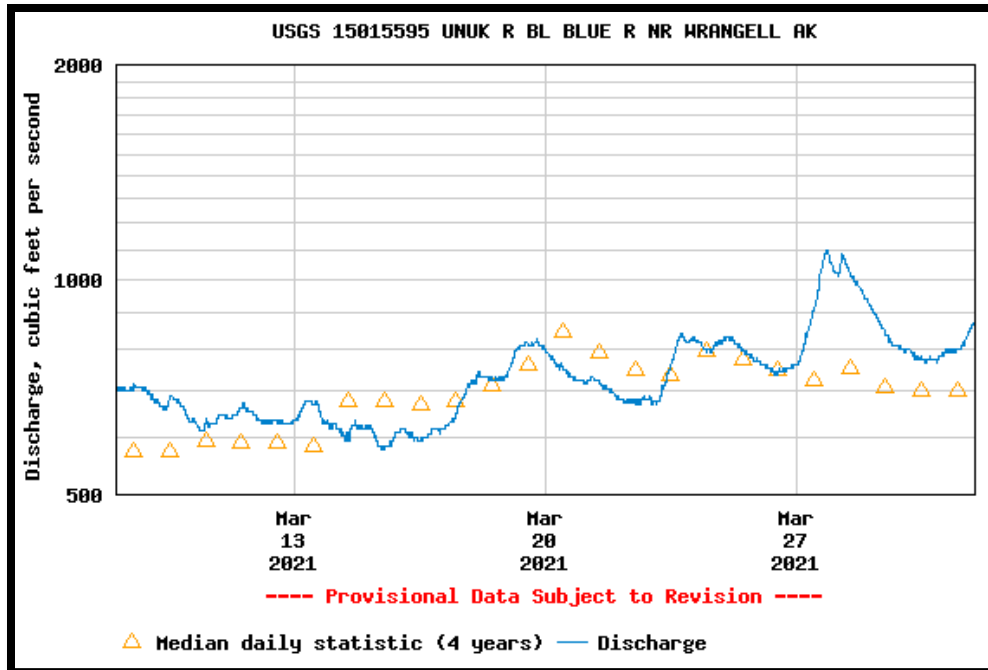


Figure 11. Discharge, cubic feet per second (USGS 2021).



Figure 12. Gage height, feet (USGS 2021).







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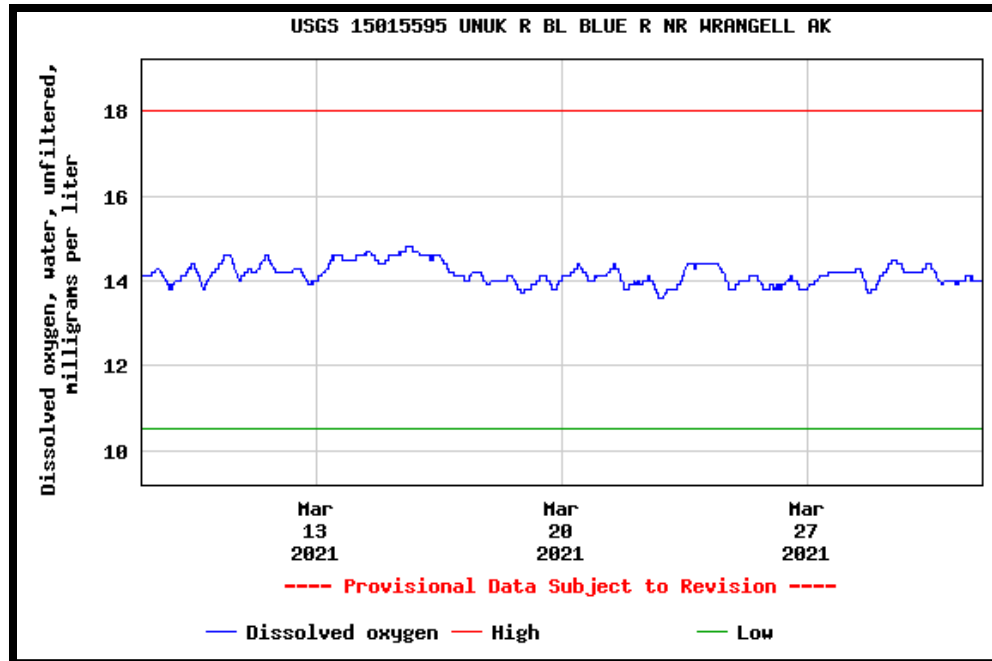


Figure 13. Dissolved oxygen, water, unfiltered, milligrams per liter (USGS 2021).

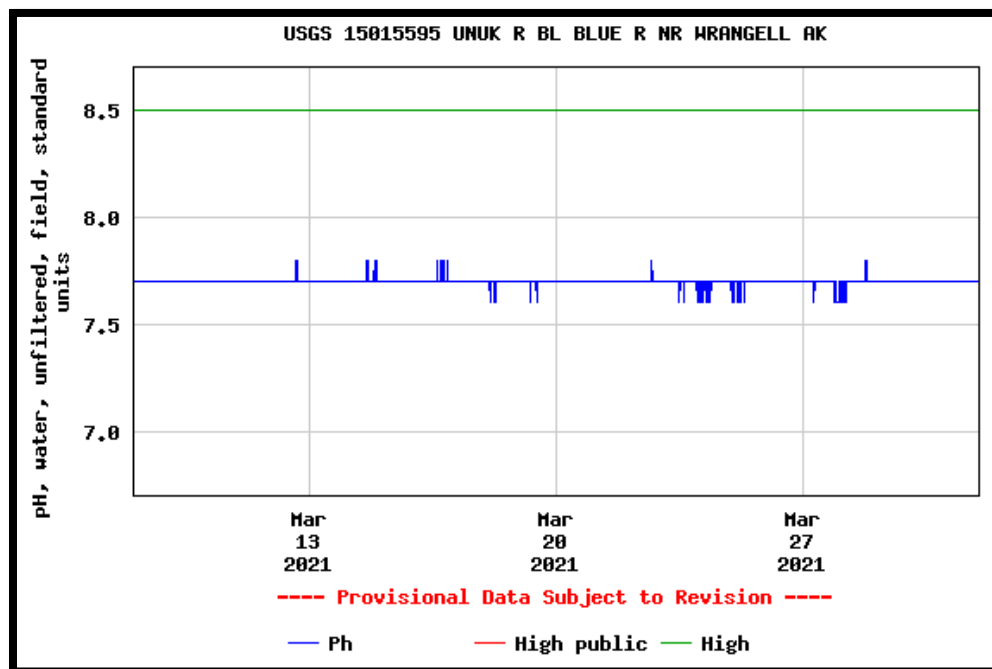


Figure 14. pH, water, unfiltered, field, standard units (USGS 2021).





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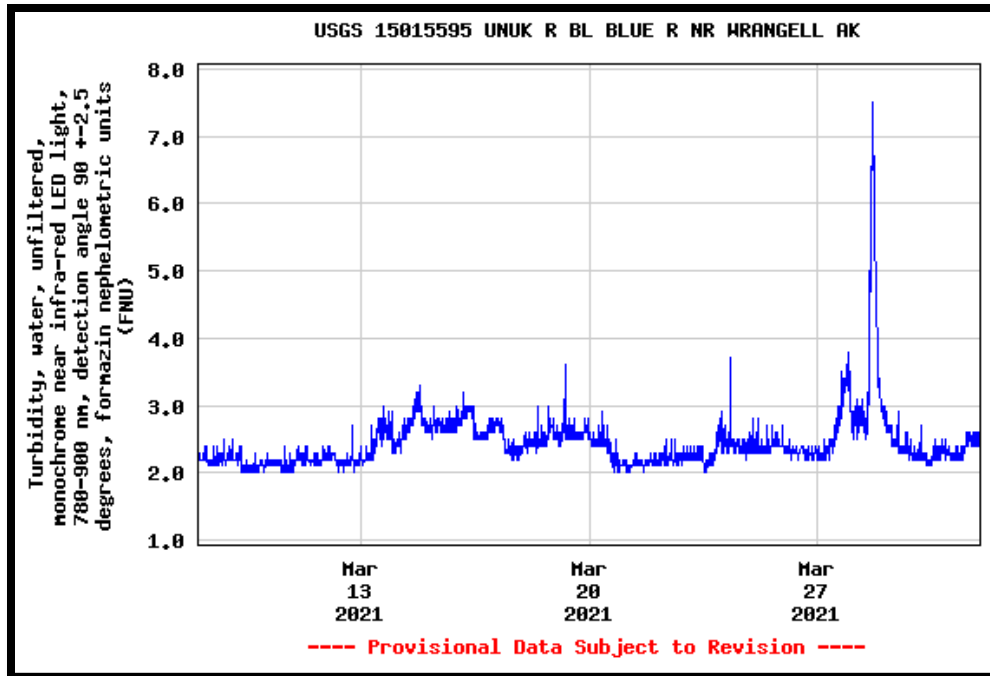


Figure 15. Turbidity, water, unfiltered, monochrome near infra-red LED light detection angle 90  $\pm$  2.5 degrees, formazin nephelometric units (FNU) (USGS 2021).

