Eklutna River Minnow Sampling, 2022

Native Village of Eklutna

Kyle Robillard and Michelle Beadle, Native Village of Eklutna, Land and Environment Department

Abstract

The Native Village of Eklutna sampled juvenile salmonids in the Eklutna River June through September of 2022. Sampling was performed by means of minnow trapping and opportunistically dip-netting. Sampling was performed to document species presence and to identify potentially important habitat areas for juvenile salmon within the river. Sampling was performed in reaches 1-11 as described in the Native Village of Eklutna's 2020 Eklutna River Habitat Characterization Study (Native Village of Eklutna 2020), as well as in Thunderbird Creek (the main tributary in the lower river) and the Upper West Fork. This differs slightly from the trapping performed in the 2021 season where water conditions only permitted trapping through reach 9 and the Upper East Fork was sampled. One-hundred six trap deployments occurred during the season along with eight successful dip net deployments. Nine species were documented. This is the third year of the project, and it is scheduled to continue in 2023. This data will be used as a baseline for comparison as restoration measures are implemented in the Eklutna River system.

Methods

Minnow traps were deployed on 18 occasions during this study. 3-10 traps were deployed during each sampling event. Traps were baited with either commercially available salmon roe or with roe donated by fishermen and treated with betadine solution according to ADF&G recommendations. Traps were weighted down with rocks to prevent them from being caught in the flow and to provide shelter for fish caught in the trap. Deployment times varied from 1.5-24 hours, based on catch rates, crew availability, and weather and water conditions. Fish caught were identified, measured (fork length), and enumerated before being released. Fish were identified in the field using *Field Identification of Coastal Juvenile Salmonids* (Pollard et al. 1997) and *Juvenile Salmonid and Small Fish Identification Aid* (ADF&G Habitat and Restoration Division, 2003).

Sampling was performed from about 0.5 miles upstream from the Cook Inlet up to the lake dam with the exception of an approximately 1.5 mile stretch where there was insufficient water to trap. Due to above average precipitation and habitat changes due to experimental water releases in the Fall of 2021, more habitat was available for sampling in 2022 vs. 2021. Low water levels in the river above Thunderbird Creek are due to the absence of water flowing out of the lake. Currently, all the water from the lake outflow is diverted for hydropower generation and drinking water use for the Municipality of Anchorage.

Results/Discussion

Eklutna River

A total of 106 traps were deployed throughout the study period (Table. 1). This includes five trap deployments in the West Fork, on the southeastern end of Eklutna Lake. The only species that was found above the lake was Dolly Varden. 101 other trap deployment occurred in the Eklutna River below the lake. Chinook, coho, and sockeye salmon juveniles were found during sampling. The other species

encountered include Dolly Varden, stickleback sp., sculpin sp., and Alaska blackfish. The majority of sticklebacks caught were identified were threespine stickleback, but some ninespine sticklebacks were found in remote ponds. Sculpins appeared to be a mix of two or more different species but were not identified to the species level because of staff limitations. This is the second year that the Alaska blackfish has been documented in the Eklutna River by NVE staff. An invasive species report was filed with ADF&G and the fish were euthanized.

Table 1. Catch by Reach and Total Composition

Species	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Thunderbird Creek	Reach 6	Reach 7	Reach 8	Reach 9	Reach 10	Reach 11	Upper W.F.	Total	Percent
Chinook	1	2	0				3							6	0.8%
Coho	12	161	116	91	6		18							404	52.7%
Sockeye		1	5											6	0.8%
Pink														0	0.0%
Unidentified Salmonid			1											1	0.1%
Dolly Varden			17	37	15	3	69	9	3		35	4	6	198	25.8%
Sculpin sp.			2	5	2									9	1.2%
Stickleback sp.		77	60											137	17.9%
Alaska Blackfish		5												5	0.7%
Total Fish	13	246	201	133	23	3	90	9	3	0			6	766	100.0%
Total Traps Deployed	2	18	14	17	13	2	11	6	4	0	6	8	5	106	
Dipnet	0	0	3	3	0	0	2	0	0	0	0	0	0	8	

Reach 1

Reach 1 is a consistently tidally influenced area, with marsh grasses and sedges being the dominant vegetation. Water levels and clarity varied substantially with the tides. Because of these challenging sampling conditions only one trap was deployed in the main stem and one trap in a small drainage which emptied into this reach both on August 3rd, 2022. 12 juvenile coho were caught in trap set in the drainage after being deployed for only an hour. High numbers of juvenile salmon of different age classes were observed in this draining as well as large schools of juvenile sticklebacks. These high numbers indicate that this drainage is an important rearing area. This side-channel/drainage was included in a nomination to the Anadromous Waters Catalogue to ADFG. The only fish caught in trap set in the mainstem of this reach was a juvenile chinook. See Map 1 in Appendix.

Table 2. Reach 1 Catch Summary

Species	Number	Percentage
Chinook	1	7.7%
Coho	12	92.3%

Reach 2

Reach 2 is also tidally influenced, but this was only observed with very high tides (28+ ft.). It includes the main channel of the river, several small side channels, a beaver pond complex, and numerous ponds with intermittent channel connectivity. Because of the diversity in habitats and the observed high numbers of fish, this was one of the most heavily sampled reaches. 18 traps were deployed in this reach, yielding 246 fish representing at least 6 different species (Table 3). Chinook, sockeye, and coho salmon juveniles were sampled in this reach, along with Dolly Varden and stickleback sp. (both threespine and ninespine sticklebacks were observed). Pink salmon juveniles were observed, but none were captured. Additionally, Alaska blackfish were caught in several of the sampled ponds.

Table 3. Reach 2 Catch Summary		
Species	Number	Percentage
Chinook	2	0.8%
Coho	161	65.4%
Sockeye	1	0.4%
Stickleback sp.	77	31.3%
Alaska Blackfish	5	2.0%

161 coho, 1 sockeye, and 2 Chinook juveniles were sampled in this reach. The beaver pond complex and the numerous small side channels in this reach appear to be among the most productive rearing habitats available in the river though several coho were captured in remote ponds as well. These ponds were nominated to the AWC. The Alaska Blackfish were captured solely in the remote ponds. Notably, dissection of the blackfish did not reveal any evidence of predation on juvenile salmon or other fishes. Snails and insect larvae were observed in the gut contents. Also captured in these remote ponds were coho salmon juveniles and ninespine sticklebacks. See map 2 in Appendix.

Reach 3

This section of river saw the biggest changes in the lower river compared to the 2021 season. During the experimental water releases from the dam in the fall of 2021, what was formerly considered the main channel in this section was filled with sediment. As a result, an adjacent forest area was flooded, and a smaller side channel became progressively more carved out throughout the summer of 2022. This growing channel also contained many backwater and side-channel pools. Through the summer of 2022, many juvenile fish were found in this section of the river, indicating that more rearing habitat has been created. 14 traps were deployed in this reach throughout the study period. The first round of trapping in late June and early July yielded only 7 coho (6 trap deployments). The second round in early August yielded 15 coho and 5 sockeye (2 traps deployments). At the end of September during the final round, 88 coho salmon were captured in the three traps that were deployed. 60 sticklebacks were also captured in this reach, but only a single sculpin species and 17 Dolly Varden. See Map 3 in Appendix.

Table 4. Reach 3 Catch Summary		
Species	Number	Percentage
Chinook	0	0.0%
Coho	116	57.7%
Sockeye	5	2.5%
Unidentified Salmonid	1	0.5%
Dolly Varden	17	8.5%
Sculpin	2	1.0%
Stickleback sp.	60	29.9%

Reach 4

Reach 4 also saw habitat changes from the 2021 season. The lower portion of reach 4 changed from a single channel to a flooded forest and a growing side channel (basically an extension of reach 3). This lower area now contains ample habitat suitable for juveniles adjacent to the main channel in the form of side channels and backwater pools. Above this, the river becomes one channel surrounded by forest. This second section had higher flow rates and fewer off-channel pools for rearing. There were several small side channels that offered some protection from the higher velocity flows for smaller fish. A total of 17 traps were deployed in this reach, with a majority of traps set in the lower section of the reach due

to the presence of more suitable habitat. Reach 4 saw the same trend as reach 3 with juvenile salmon increasing in number throughout the season. The first round of trapping in July yielded only three coho in 12 traps deployed. When trapped again in August with four traps and September with two traps, 58 and 24 coho respectively were captured. 37 Dolly Varden and 5 sculpin species were also captured in reach 4 throughout the season. See Map 4 in Appendix.

Table 5. Reach 4 Catch Summary		
Species	Number	Percentage
Coho	91	68.4%
Dolly Varden	37	27.8%
Sculpin sp.	5	3.8%

Reach 5

This section of the Eklutna begins just below the Glenn Highway Bridge and continues up to the confluence of Thunderbird Creek. It is wider than Reach 4, has lower flow velocity, with some pools and instream shelter. 13 traps were deployed in this section, yielding 15 Dolly Varden, 6 coho, and 2 sculpin. On several occasions, YOY salmon were observed in a pool adjacent to the confluence and 7 coho were captured by dipnet from this pool. See Map 5 in Appendix.

Table 6. Reach 5 Catch Summary		
Species	Number	Percentage
Coho	6	26.1%
Dolly Varden	15	65.2%
Sculpin sp.	2	8.7%

Thunderbird Creek

Two traps were deployed in the lower section of Thunderbird Creek, just above the confluence with the Eklutna River yielding 3 Dolly Varden. Dolly Varden were also observed from the confluence all the way up to Thunderbird Falls. Pools formed by large woody debris that were present in 2021 were displaced during a high-water event this spring resulting in nearly the entire tributary being high gradient with little available shelter.

Reach 6

This reach begins at the Thunderbird Creek confluence and ends above the old dam site (removed in 2018). It is confined by canyon walls and has low flow rates. A higher water table present this season combined with the experimental water releases in the fall of 2021 created pools and side channel habitat. These pools were further enhanced by naturally occurring rockslides resulting debris entering the water. This reach was not trapped in 2021 due to low flow and lack of suitable habitat. 11 traps were deployed resulting in the capture of 69 Dolly Varden, 18 coho, and 3 Chinook. See Map 5 in Appendix.

Table 7. Reach 6 Catch Summary

Species	Number	Percentage
Chinook	3	3.3%
Coho	18	20.0%
Dolly Varden	69	76.7%

Reach 7

Reach 7 is a single channel running through the upper canyon above the old dam site. There are numerous pools and high amounts of woody debris in this area. This reach contains several beaver ponds that represent promising rearing habitat. Six traps were deployed, catching 9 Dolly Varden. See Map 6 in Appendix.

Reach 8

This reach begins as the river valley opens above the canyon. It is a single channel with numerous pools and several small side channels. Several small tributaries contribute water to the flow in this reach. Towards the upper end of this reach, flow rates diminished significantly. Four traps were deployed in this reach, catching 3 Dolly Varden. See Map 7 in Appendix.

Reach 9

Reach 9 exhibited very little suitable habitat in 2022 due to the lack of water. Water levels were so low that the channel was dry for numerous stretches. Several alluvial fans contribute silt and gravel into the riverbed in this reach, but there is not enough flow to disperse this sediment. No suitable trapping locations were found during the 2022 season and no fish were captured or observed.

Reach 10

Reach 10 is a single channel and was continuously watered in 2022. It is fed by several small tributaries. Flow is low, but some deeper pools are present, and a very large beaver complex creates areas of potentially productive habitat. An access road maintained by the Anchorage Water and Wastewater Utility (AWWU) crosses the stream at several locations throughout this reach. Turbidity increases dramatically in this reach due to the sediment inputs from a alluvial fan. 6 traps were deployed and 35 Dolly Varden captured. This section of the river had not previously been trapped due to lower flow in previous seasons.

Reach 11

Reach 11 is a single channel and ends at the outlet from the Eklutna Lake dam. The flow in this section is

very low due to no water being allowed through the dam, and the channel was not continuously watered. There are a several small tributaries that feed this section and a few ponds adjacent to the stream that offer suitable habitat. 8 traps were deployed, 4 Dolly Varden captured, and numerous others observed what were too large to fit in the traps.

Upper Eklutna- West Fork

Additional trapping took place on the far side of Eklutna Lake in the West Fork area. The section of the West Fork mainstem that was sampled varied from the highly braided lower reaches with variable velocity (riffles and runs) to a single channel with higher velocity. A total of 5 traps were deployed in early June, catching 6 Dolly Varden. Several clearwater tributaries offered promising habitat, containing numerous pools and deposits of woody debris. Numerous Dolly Varden of various size/age classes were observed in these tributaries, but due to the difficulty of accessing these areas, no traps were deployed away from the mainstem. See Map 8 in Appendix.

Discussion/Conclusions

Juvenile anadromous salmon distribution within the Eklutna River showed significant year-year variation between 2021-2022. Juvenile distribution was highly concentrated in reach 2 in 2021, whereas distribution was more widespread throughout reaches 2-4 in in 2022 (figure 1). Additionally, higher numbers of juvenile salmon were found in reach 6 in 2022 versus 2021 (figure 1). These findings are likely explained by habitat changes resulting from experimental water releases from Eklutna Lake in late 2021 and by higher water levels in 2022 due to above average precipitation. Reaches 3 and 4 held much more off-channel habitat in 2022 vs. 2021, providing more suitable rearing habitat for juveniles.

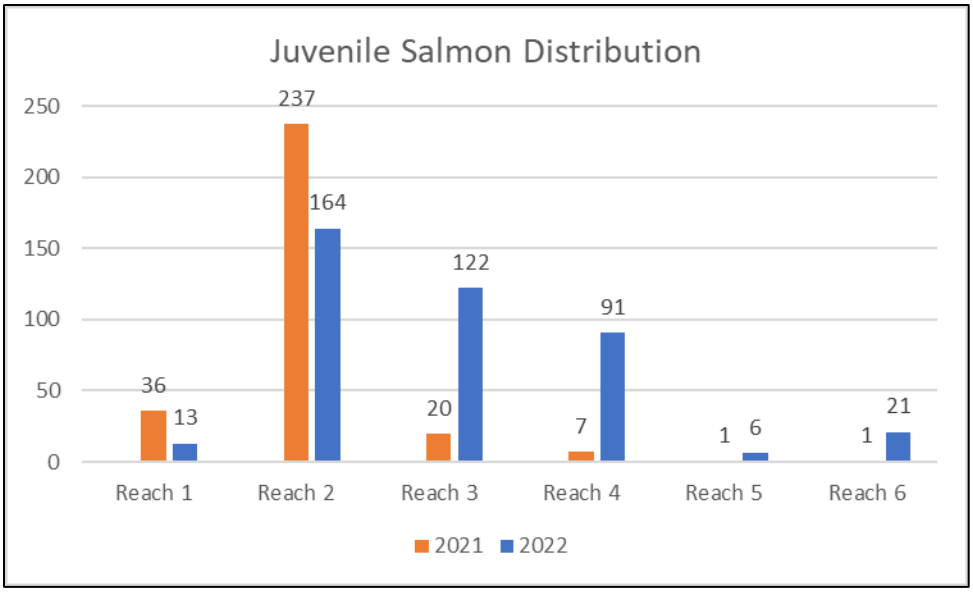

Figure 1. Comparison of the distribution of salmon juveniles in the lower reaches of the Eklutna River, 2021 vs. 2022. Juveniles exhibited a much wider distribution in the 2022 sampling season.

After finding such high concentrations of juveniles in reach 2 in 2021, efforts in 2022 included additional

trapping throughout the beaver pond complex, to include the more remote ponds exhibiting intermittent hydrologic connectivity to the beaver ponds complex and the mainstem on the river. Trapping these areas revealed additional coho rearing habitat, and these ponds have been submitted to the AWC.

Results from this season of minnow trapping indicate that the lower river, with its greater habitat complexity and lower gradient, still contains the majority of salmon rearing habitat currently available in the Eklutna River. However, 2022 showed an extension of that rearing habitat from reach 2 into reaches 3 and 4. There were significant habitat changes observed in these reaches (as well as reach 6) resulting from the Fall 2021 water releases and the natural high-water events from the summer of 2022. This seems to have resulted in a wider distribution of rearing juveniles. With increased flows, more side channel habitat was created and there was a noticeable expansion in the areas utilized by juveniles throughout the 2022 season. These findings provide evidence that a restoration of water flows into the river will improve habitat and aid in the recovery of the salmon of the Eklutna River.

References

Native Village of Eklutna (NVE). 2020. Eklutna River Salmon Habitat Assessment and Collaboration to Recommend Restoration Flows. Report prepared by Carrie Ann Brophil and Marc Lamoreaux. Available online: eklutna-nsn.gov/download/Eklutna-River-Salmon-Habitat-Assessment-2020.pdf

Pollard, W.R., G.F. Hartman, C. Groot, and P. Edell. 1997. Fish Identification of Coastal Juvenile Salmonids. Harbor Publishing, Madeira Park, BC Canada. 32 pp.

Weiss, E. 2003. Juvenile and Small Fish Identification Aid. Alaska Department of Fish and Game Habitat Restoration Division.