

Eklutna River Spawning Surveys, 2021-2022

Native Village of Eklutna

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Abstract

Historically, the Eklutna people subsisted on the plentiful salmon of the Eklutna River. Beginning in 1929, a series of dams were constructed for hydroelectric projects, leading to the disruption of natural stream hydrology and connectivity. The lower dam (constructed in 1929) blocked fish passage to the upper ~8.5 miles of the river and to the lake/upper tributaries until its removal in 2018 (Fig. 1). The upper dam (at the Eklutna Lake outlet) and the associated power project, which came online in 1955, prevent the release of water from Eklutna Lake and deprive the river of its main water source. Most of the water remaining in the system comes from a small tributary- Thunderbird Creek. During September of 2021, water was released from the upper dam with a maximum discharge of 150 cfs for about three weeks. The intention of this release was to calibrate hydrologic and habitat models to inform the mitigation process necessitated by the sale agreement put in place when the power project was sold in 1991. As a result of these brief water releases, a large amount of sediment was mobilized, new pools were scoured out and existing pools were deepened, and side-channel habitat was opened. These changes increased habitat complexity within the study area and should result in an increase in both spawning habitat for adults and rearing habitat for juveniles. To assess the current state of Eklutna River salmon, salmon spawning surveys were conducted weekly during the spawning seasons of 2021 and 2022. Previous salmon spawning surveys were conducted by Native Village of Eklutna in 2002-2003 (Native Village of Eklutna 2003). The data obtained from these surveys will provide a baseline index by which the effects of potential mitigation and/or restoration measures can be compared.



Figure 1. Site of lower dam removal in the Eklutna River, with characteristic low flows

Methods

Spawning surveys were performed on a weekly basis from June through October in both years of the study. Surveys were conducted from the lower, tidally influenced section of the Eklutna river (beginning about 0.5 mi upstream of the river mouth) up to the site of the lower dam removal. Thunderbird Creek, the largest tributary and documented anadromous stream (Alaska Department of Fish and Game, 2001), was also included in the study area. The study area was divided into 7 reaches. Reaches 1-6 are on the mainstem of the Eklutna and these designations came from a habitat characterization study performed by Native Village of Eklutna (Native Village of Eklutna 2020). Thunderbird Creek is the 7th reach. Surveys were performed by foot in an upstream direction by two surveyors (when available) wearing polarized lenses to enhance fish detection/identification. Location (GPS coordinates), species, and numbers of observed salmon were

recorded on a field data sheet, as well as redd locations. Survey methods were based on recommendations found in *The Salmonid Field Protocols Handbook: Techniques for Assessing Status and Trends in Salmon and Trout Populations* (Johnson et al. 2007). In 2022, redds were marked with a painted rock to prevent recounting on future surveys. Salmon and redds were identified to species when possible, usually by the presence of adult fish. Chinook and coho carcasses that were encountered were measured (fork length), checked for evidence of spawning, and the head was removed for submittal to Alaska Department of Fish and Game for otolith extraction and analyses to determine presence/absence of hatchery markings. In 2021, surveys on 9/20 and 9/28 were limited to Thunderbird Creek due to the high flows associated with the experimental water release from the Eklutna Lake Dam. In 2022, surveys were not conducted during the weeks of 9/19 and 10/17 due to high flows and turbidity in the mainstem Eklutna River during high rain events.

Results

Adult Chinook, pink, chum, and coho salmon were observed and documented as spawning during the 2022 season. No returning adult sockeye were observed despite the presence of juveniles, which were found during a minnow trapping study. Overall, spawning was observed in reaches 1-6 and Thunderbird Creek. Spawning was observed in reach 6 in 2022, but not in 2021. Spawning was documented in Thunderbird Creek in 2021, but not in 2022 (though several Chinook were observed). At least 5 pairs of chum and two pairs of coho were observed in reach six resulting in three documented chum redds and two coho redds. In addition to the observed spawning coho pairs, two unspawned male Chinook carcasses and one unspawned male coho carcass were recovered from reach 6. Reach 6 encompasses the mainstem of the Eklutna River above the confluence with Thunderbird Creek up to the site of the removed dam (Fig. 1). This reach continues to be impacted by sedimentation from the site of dam removal and by extremely low flows. Several new pools were formed during the water releases of 2021, providing better habitat for spawning salmon. Additionally, above average rainfall in 2022 contributed to slightly higher water levels throughout this reach. Before dam removal, this was a productive chum spawning area, and coho were documented spawning in the reach as well (Native Village of Eklutna 2003).

In 2022, Chinook were observed in the system for eight weeks from July 12 to September 1. This is a longer presence than was documented in 2021, when they were only observed for 5 weeks (July-early August)(Fig. 3). Weekly counts ranged from 1-6 individuals (Table 1). Two redds were documented in each season (Table 2) (see maps in Appendix for locations). One Chinook carcass was recovered in 2021, and no hatchery markings were detected. Two Chinook carcasses were recovered during the 2022 season, and both were unspawned males determined to be from the William Jake Hernandez Sport Fish (WJHSF) hatchery (Fig. 2).



Figure 2. Chinook carcass found in reach 6 in 2022. This fish was determined to be of hatchery origin

Pink salmon were observed from July 29 to September 15 in 2022, which is the same timeframe of pink presence as was observed in 2021 (Figure 3). Weekly counts ranged from 3-136 individuals in 2021 and 6-104 in 2022 (Table 1). 120 redds were documented in 2021, and 69 in 2022. Spawning activity occurred in Reaches 1-5, with the heaviest concentrations in Reach 4 followed closely by reach 5. Of note, during the 2021 season, pink redds were predominantly found in reach 5, while 2022 showed a wider distribution of redds in reaches 1-5.

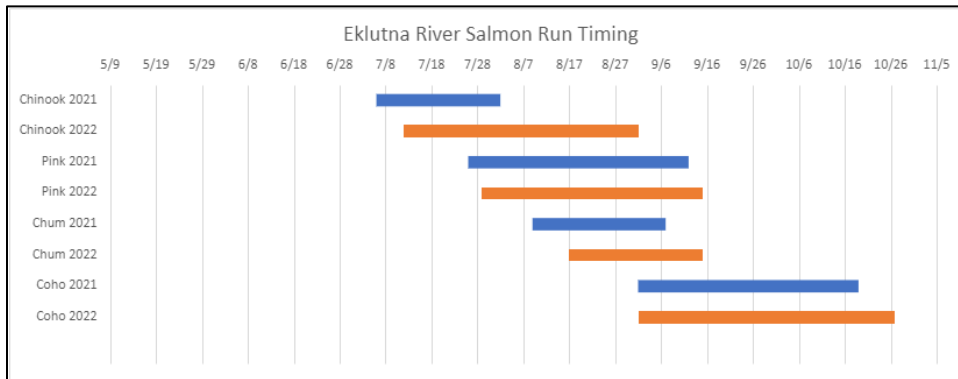


Figure 3. Timing of salmon observations during the spawning surveys of 2021-2022.

Chum salmon were observed from August 9th to September 7th in 2021, and August 17 to September 15 in 2022 (Figure 3). Highest weekly counts were nine in 2021 and eight in 2022 (Table 1). Six total redds were observed in 2022, up from four in 2021. Chum salmon were observed spawning in reach 6 in 2022.

Coho were observed in system from September 1- October 19 in 2021 and September 1- October 27 in 2022 (Figure 3). The highest weekly counts were eight in 2021 and 18 in 2022 (Table 1). Five coho redds (Fig. 4) were observed in 2021, primarily in Thunderbird Creek in 2021. In 2022, 13 redds were observed mostly in reach 5 (Table 1)(See maps in Appendix). Coho were likely present in the river prior to September 1 and holding in deep pools found in reaches 1 and 2, but poor pool visibility prevented positive identification of the salmon. Two carcasses were recovered in 2021- one showed hatchery markings, the other did not. Two carcasses were recovered and are being submitted to ADFG for otolith analysis.

Table 1. Weekly species counts.

*Only Thunderbird Creek Surveyed due to water releases

**No weekly survey due to water conditions

2021 Weekly Salmon Counts					2022 Weekly Salmon Counts					
Date	Chinook	Coho	Chum	Pink	Date	Chinook	Coho	Chum	Pink	Unidentified
6/8/2021										
6/15/2021										
6/22/2021										
6/29/2021					6/30/2022					
7/6/2021	2				7/6/2022					
7/13/2021	5				7/12/2022	4				
7/20/2021	4				7/18/2022	1				
7/26/2021	6		10		7/29/2022			6		
8/2/2021	1		38		8/4/2022	3		69		
8/9/2021		4	125		8/11/2022			15		
8/18/2021		9	136		8/17/2022	3	5	104	3	
8/24/2021		3	105		8/24/2022	6	7	68		
9/1/2021	4	5	42		9/1/2022	2	2	25	5	
9/7/2021	4	1	11		9/8/2022	3	8	19	11	
9/12/2021	6		3		9/15/2022	11	4	9		
9/20/2021*	0				9/22/2022**					
9/28/2021*	4				9/30/2022	11				
10/5/2021	8				10/6/2022	14				
10/13/2021	3				10/12/2022	18				
10/19/2021	1				10/20/2022**					
10/27/2021					10/27/2022	1				
Total Observations:	18	30	22	470	Total Observations:	19	60	26	315	19



Figure 4. Coho redd in reach 4, 2022. Photo shows characteristic turbidity conditions during the 2022 spawning season.

Table 2. Weekly redd counts.
*Only Thunderbird Creek Surveyed due to water releases

2021 Weekly Redd Counts					2022 Weekly Redd Counts				
Date	Chinook	Coho	Chum	Pink	Date	Chinook	Coho	Chum	Pink
6/8/2021									
6/15/2021									
6/22/2021									
6/29/2021					6/30/2022				
7/6/2021					7/6/2022				
7/13/2021	1				7/12/2022				
7/20/2021					7/18/2022				
7/26/2021					7/29/2022				
8/2/2021	1				8/4/2022	1			9
8/9/2021				23	8/11/2022				1
8/18/2021			2	43	8/17/2022			1	23
8/24/2021				31	8/24/2022	1		2	25
9/1/2021			2	18	9/1/2022			1	6
9/7/2021				5	9/8/2022			1	5
9/12/2021		2			9/15/2022		3	1	
9/20/2021*					9/22/2022**				
9/28/2021*		1			9/30/2022			3	
10/5/2021		1			10/6/2022			3	
10/13/2021		1			10/12/2022			4	
10/19/2021					10/20/2022**				
10/27/2021					10/27/2022				
Total:	2	5	4	120	Total:	2	13	6	69

No adult sockeye were observed in either 2021 or 2022, though juveniles were observed during minnow trapping activities.

Discussion

Returns of all species of salmon except pink were down during the 2021-2022 study when compared to those in the previous 2002- 2003 fish counts (Fig. 5). Chum salmon had the largest observed decline, going from max counts of 1051 and 272 down to 9 individuals in 2021 and 8 in 2022. Coho declined from max counts of 131 and 39 to 8 in 2021 and 18 in 2022. Chinook declined from 36 and 29 down to 6 in both 2021 and 2022. Sockeye were observed in low numbers in 2002-3 (2 and 21, respectively), but none were observed in the Eklutna in 2021 and only juveniles were observed in 2022. Pink salmon, however, increased in number to a max count of 136 individuals in 2021 and 102 in 2022 compared to 42 and 18 in 2002-3. It should also be noted that during the height of the pink run in 2022, the turbidity level in the water was extremely high, possibly leading to low counts.

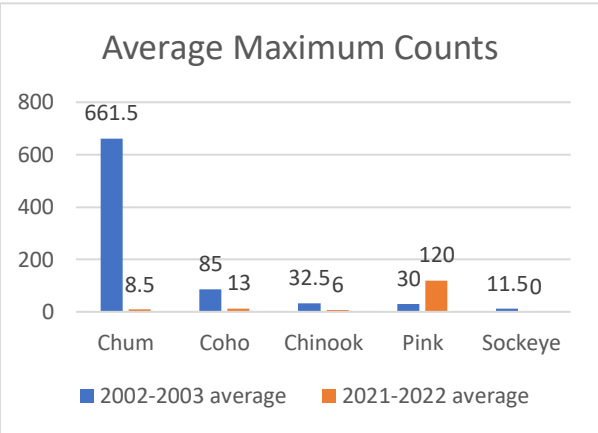


Figure 5. Average maximum counts per species. 2002-2003 vs. 2021-2022

NVE’s previous counts in 2002-3 (Native Village of Eklutna 2003) documented heavy concentrations of spawning chum and some spawning coho in Reach 6 of the Eklutna. No redds were observed in Reach 6 in 2021. 2022 showed Reach 6 is once again accessible and contains some suitable spawning habitat for adult salmon. This reach has undergone changes due to both the removal of the lower dam and the experimental water releases in September of 2021. Chum and Coho were observed spawning in the reach, and two male carcasses were recovered from the reach in 2022. The productivity of this reach is currently limited by the low water levels present.

The 2021 water releases combined with natural high-water events during the summer of 2022 moved large amounts of sediment to the lower reaches, rerouted several sections of river, scoured out numerous pools, and opened side-channel habitat in reaches 1-6. Redds found in 2022 were much more widely distributed throughout the lower reaches compared to 2021 observations, when much of the observed spawning activity occurred in Reach 5 (Fig. 6). It should also be noted that the turbidity levels and presence of deep pools likely had an impact on adult salmon and redd counts in 2022. The observed numbers of adults and redds are likely skewed low as a result.

Data from this study were submitted to Alaska Department of Fish and Game to supplement the Anadromous Waters Catalogue entries for the Eklutna River and Thunderbird Creek.

NVE will continue spawning surveys in 2023-24 under a recently awarded Tribal Wildlife Grant from the U.S. Fish and Wildlife Service.

The work conducted in 2021-2022 was funded under another Tribal Wildlife Grant awarded to the Native Village of Eklutna from U.S. Fish and Wildlife Service.

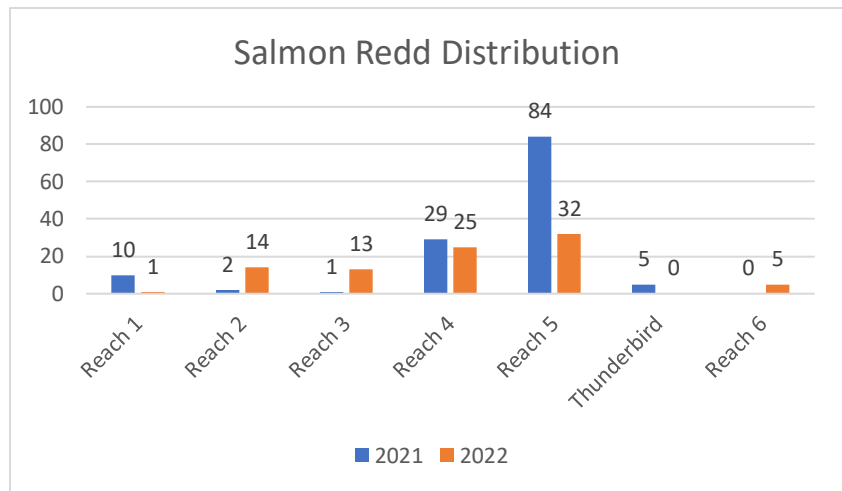


Figure 6. Salmon redd distribution was much more widely distributed in 2022 vs. 2021, when spawning activity was highly concentrated in reach 5.

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