Eklutna Hydroelectric Project

Fish & Wildlife Program Development
Site Reconnaissance Trip Report

Purpose

The primary goal of the Eklutna River site reconnaissance was to provide the project owners' technical and regulatory staff with the chance to review and observe site conditions and project facilities. In addition, site reconnaissance allowed technical staff to assess the potential scope of study efforts needed to provide the Governor and his/her staff with data to establish the Fish and Wildlife Program required by the 1991 Fish and Wildlife Agreement.

Observations

Day 1 – August 26, 2019. Eklutna Lake Campground Area, Project Tailrace and Powerhouse Area. Attendees: Samantha Owen (McMillen Jacobs), Cory Warnock (McMillen Jacobs), Chuck Sauvageau (McMillen Jacobs), and Steve Padula (Hydro Regulatory Services, LLC)

Eklutna Lake Dam and spillway area: Earthen dam with an ogee spillway that only releases water when lake elevation exceeds 871 feet[1]. A concrete lined outflow canal exits the spillway, creating a large scour pool at the start of the natural channel. Residual water in the canal and scour pool observed. Eklutna River is a dry channel, just downstream of the spillway area.

Figure 1: Spillway looking downstream

Figure 2: "Pond" between old and current dam

Original Eklutna Lake Dam area: Relic sheet piling and wooden piles were observed along the margins of natural lake outflow channel. Lake elevation was 865.69 feet during the site visit and connectivity from lake downstream to the earthen dam was not interrupted by the relict dam structure. The "pond" that is intermittently connected to the lake and flows to the current dam site would be an important feature to consider in the study effort. A small tributary stream was observed entering this pond from the eastern shore approximately 200 yards up from the current dam. A small delta where the stream enters the pond was more evident during a previous site visit on July 17, 2019.

[1] There is a 30"x30" gate at the base of the spillway that was designed to drain the pond between the old and current dam during winter to allow for spillway maintenance. Due to lake elevation, this gate was not observed during the site reconnaissance.

Figure 3: Remnants of old dam structures at lake outlet

Inflow tributary near the start of Lakeside Trail: Small shallow tributary (about 10-15 feet wide) that drains the Twin Peaks area was flowing at about 3-5 cubic feet per second (cfs) near its confluence with Eklutna Lake. Agencies have described a re-routing point upstream that directed the tributary to drain into Eklutna Lake as opposed to the Eklutna River. Efforts to find this diversion location were not possible due to private property limiting access. Earlier efforts (July 17, 2019) to locate the point of re-routing from the Twin Peaks trail were also not successful.

Intake and lake level monitoring area: Intake structure is completely submerged with the power project tunnel and AWWU tunnel buried below ground. A short section of the existing lakeside trail was walked to the location of the power project intake. Some concerns about trail erosion if lake levels were raised for spill events were mentioned by Kurt Hensel with Chugach State Park during the initial consultation meeting in April 2019. During the site visit, the lake elevation (865.69 feet) was well below the trail elevation at the project intake and some areas of exposed banks were observed.

Figure 4: Power tunnel intake

Figure 5: USGS gage at intake

Project tailrace area: Constructed channel that drains into the Knik River and serves as the tailrace outflow for the project. There is currently a non-operational and unstaffed hatchery located at the upstream end of the tailrace with facilities still being used by ADF&G as an acclimation and release location for Chinook salmon. As a result, relatively large numbers of Chinook return annually to the tailrace area in an effort to spawn. This has led to a rather robust recreational fishing opportunity for the local population. A well-established parking area with bathrooms and rudimentary camping areas were observed along with a comprehensive kiosk outlining the fishing regulations for each species. Trails and cleared-out areas along the bank were also observed indicating areas of high fishing activity over many years. Multiple individuals were observed fishing in the tailrace area during our visit.

Figure 6: Fisherman at project tailrace

Day 2 – August 27, 2019. Upper Eklutna River Areas – Downstream of Eklutna Lake Dam to terminus of AWWU pipeline/access road. Attendees: Samantha Owen (McMillen Jacobs Associates), Cory Warnock (McMillen Jacobs Associates), Chuck Sauvageau (McMillen Jacobs Associates), Steve Padula (Hydro Regulatory Services, LLC), Paul Risse (Chugach Electric), Brian Yonkoske (Anchorage Water and Wastewater Utility), Joe Sanks (Anchorage Water and Wastewater Utility), and Sean McDermott (National Marine Fisheries Service)

Eklutna Lake Dam to 2019 USFWS study site: Dry channel with a gradient ranging from 2-4% that has a dominant/sub-dominant substrate class of cobble/small boulder with very limited gravels (i.e. potential spawning habitat). Primary habitat appears to be riffles with intermittent pools. It is notable that these habitat designations are conceptual in nature and cannot be accurately defined in great detail without persistent water flow in the channel. In addition, many small, dry side channels were observed as the channel meanders through a relatively well confined valley. This area was completely dry with the exception of a few areas where groundwater and/or a small tributary create sporadic and intermittent pockets of water. In one such pocket, 3 Dolly Varden were observed.

NOTE: Channel morphology of the 2019 USFWS study site continues downstream to the first AWWU access road bridge crossing.

Figure 7: 2019 USFWS study site looking downstream

Figure 8: Upstream of 2019 USFWS study site

Figure 9: Eklutna riverbed at 1st AWWU bridge crossing

Eklutna River 2nd AWWU bridge crossing/Portal Valve Area and downstream: Channel remains dry, but an appreciable amount of fine silt is detected in this area. Many steep, eroding cliffs are observed in the surrounding valley and are most likely contributing to the detectable sedimentation. Cobble remains the dominant substrate class and the channel gradient slightly decreases to 1-3%. Certain areas however, are so overwhelmed with fine sediment that the embedded coarser substrate that lies below cannot be observed. Progressing downstream from the portal valve area, the AWWU road fords the channel at several locations with intermittent water seepage and dry sections of channel. At GPS Waypoint 083, approximately 4 miles downstream of the current dam, the Eklutna River has a consistent, stable flow of approximately 1-2 cfs. Approximately 4.6 miles below the earthen dam (GPS waypoint 084), the wetted channel width ranges from 15-18 feet, flows slightly increase to approximately 2-3cfs, and silt is still observed infilling the interstitial spaces of the cobble/boulder substrate.

Figure 10: Fine silt between cobble

Figure 11: Fine sediment covering coarser substrate

Figure 12: Sedimentation source adjacent to river

Figure 13: Eroding cliffs contributing to sedimentation

Figure 14: AWWU access road fords the Eklutna river

Eklutna River downstream terminus of AWWU access road upstream to large landslide area: Channel retains flow of 2-3 cfs, turbidity appears to decrease, and cobble substrate size decreases in

comparison to the upper river sections. A large active landslide area of sand and gravel was observed on the right side of the channel (looking downstream). The active slide area is immediately adjacent to the channel and constricts the wetted channel width to about 5-6 feet.

The streambed was also observed at the approximate location of the AWWU pipeline drain valve. Some limited infrastructure indicated that we were close to the actual outlet, but the specific drain outlet location was not located. During our visit to this drain valve area, it was noted by AWWU personnel that this location was the entry/exit point for heavy equipment that was used during the lower dam removal. Some damage to the stream banks was observed in this area along with several areas downstream to the lower dam site.

Figure 15: Large active landslide area

Figure 16: Eklutna river with sustained flow of 2-3 cfs

Day 3 – August 28, 2019. Lower Eklutna River Areas – Railroad bridge upstream to lower terminus of AWWU pipeline/access road. Attendees: Samantha Owen (McMillen Jacobs Associates), Cory Warnock (McMillen Jacobs Associates), Chuck Sauvageau (McMillen Jacobs Associates), Steve Padula (Hydro Regulatory Services, LLC), Paul Risse (Chugach Electric), and Sean McDermott (National Marine Fisheries Service)

Eklutna River at the railroad bridge crossing upstream to Thunderbird Creek confluence: Low gradient (1-2%) channel with a dominant/sub-dominant substrate class of cobble/gravel. Channel flows through an unconfined delta, but mainly stays as a single channel of approximately 30 feet wide with approximately 30 cfs. Downstream of the Glenn Highway, there are areas with short side channels and one area of braided channel. Evidence of higher water events included debris (e.g., propane tanks) in the short side channels. The braided stretch represents the majority of quality anadromous rearing habitat in the lower section of the river. Upstream of the braided area, about 15-20 chum salmon were observed digging redds from the Glenn Highway bridge upstream to the confluence with Thunderbird Creek. At the Thunderbird Creek confluence, it was estimated that about 75-85% of the low turbidity water flow originates from Thunderbird Creek. The Eklutna River water has a distinct greyish color with fines observed in the cobble dominated channel. Water temperatures of the two waterbodies were similar based on tactile observation. No adult salmon were observed in the Eklutna River upstream of this point; however, multiple fish were seen moving upstream into Thunderbird Creek.

Figure 17: Looking downstream at the railroad bridge

Figure 18: River between railroad and highway bridges

Figure 19: Looking upstream at Glenn Highway bridges

Figure 20: Eklutna River upstream of highway bridges

Figure 21: Confluence of Thunderbird Creek (right) and Eklutna River (left)

Eklutna River from Thunderbird Creek confluence to Old Dam Removal Site: Low gradient (1-2%) channel continues with fines as the dominant substrate class and a variable mix of cobble, small gravel and sand. The fines are so thick in some locations that typical areas of pool formation (e.g. lateral scour of a steep bedrock bank) are filled with fine sediment and remain relatively shallow. ADF&G cross section #6 was detected downstream of the old dam and was the only XS that was observed with headpins and tailpins to accurately delineate XS width and stations. This appears to be the only ADF&G cross section suited to track temporal changes to the Eklutna River below the old diversion dam location. The channel gradient remains relatively similar moving upstream of

Thunderbird Creek, except for a detectable break in streambed morphology where a significant increase in gradient (falls) was noted over an extremely short longitudinal area. While the falls aren't a passage barrier, they were anomalous enough to the rest of the stream profile to deduce that some "event", possibly a recent earthquake, had caused it. Increased sediment load was detectable upstream of this steep channel segment all the way to the lower dam site. No fish (anadromous or resident) were observed in this section.

Figure 22: Eklutna River above Thunderbird confluence

Figure 23: Channel constriction from landslide

Figure 24: Approaching lower dam site from below

Lower dam removal site: Extensive unconsolidated sediments adjacent to each bank were observed. In addition, there was construction debris such as wood, lengths of metal, plastic tubing, tires and other refuse at this location. It's unknown but seems possible that additional debris and refuse may be located in the sediments. Progressing upstream, the channel steepens and narrows (4-6 feet wide) for several hundred feet through unconsolidated streambanks while slowly cutting a channel through the middle section of the significant amount of fines. After exiting the influence of the lower dam site, the gradient lessens to about 1-3% and the water clarity noticeably improves.

Figure 25: Lower dam site looking upstream

Figure 26: Lower dam site looking downstream

Figure 27: Plastic tubing construction debris

Figure 28: Miscellaneous construction debris

Figure 29: Conditions within lower dam reservoir site

Figure 30: Upstream of lower dam site

<u>Eklutna River above the lower dam removal site to the downstream terminus of the AWWU access road:</u> Low gradient (1-3%) channel with improved water clarity, but still a noticeable input of fines. Approximately 1,000 feet beyond the influence of the diversion dam site, a beaver dam and pond were encountered. Leading up to the beaver pond, a large berm was constructed along the left bank (looking downstream) presumably to move heavy equipment out of the channel. This berm creates a pinch point, narrowing and increasing the channel gradient leading up to the beaver pond. Upstream of the beaver pond, the Eklutna River returns to a low gradient, cobble-dominated channel with riffle-pool habitat features. Several resident fish were observed between the beaver pond and the

downstream terminus of the AWWU access road. Channel modification is evident upstream to the AWWU pipeline drain location for moving heavy equipment out of the lower dam removal site.

Figure 31: Sedimentation input upstream of lower dam site

Figure 32: Eklutna River above lower dam site

Figure 33: Beaver dam and pond

Overall Summary

The Eklutna River has major inputs of sediment from natural processes as well as from the removal of the lower dam. The fine sediment currently in the stream from the existing dam at Eklutna Lake downstream to the Thunderbird confluence makes it difficult to accurately document habitat conditions and quality. Understanding the sediment dynamics of this system and the short and long-term impacts of those dynamics to fish presence and success will be important. Limited spawning habitat was observed except for the river reach downstream of Thunderbird Creek. There is a resident population of salmonids present in the area above the old dam site that has likely persisted for a considerable amount of time. While chum salmon were observed up to and in Thunderbird Creek, no anadromous species were observed in the Eklutna River upstream the Eklutna/Thunderbird confluence.