

# Condit Hydroelectric Project Decommissioning FERC Project No. 2342

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## Anadromous Fish Upstream Passage Plan



Prepared by



May 18, 2011

## 1 INTRODUCTION

### 1.1 PROJECT DESCRIPTION

PacifiCorp Energy owns and operates the Condit Hydroelectric Project, which was completed in 1913 on the White Salmon River in Skamania County and Klickitat County, Washington. The project is regulated by the Federal Energy Regulatory Commission (FERC) as project number 2342. This project is located approximately 3.3-miles upstream from the confluence of the White Salmon and Columbia Rivers. Project facilities consist of a 125-foot high, 471-foot long concrete gravity diversion dam, an intake structure that directs water into a 13.5-foot diameter by 5,100-foot long woodstave flowline, and through a 40-foot diameter concrete surge tank. The flowline bifurcates inside the surge tank into two 9-foot diameter penstocks that supply water to the powerhouse. The powerhouse contains two double-runner horizontal Francis turbines with an installed capacity of 14,700 kilowatts. The project creates a reservoir, Northwestern Lake, which extends 1.8-miles upstream of the dam and covers approximately 92 acres. The project area is shown in Figure 1-1.

### 1.2 BACKGROUND

The FERC Order on Rehearing for the Condit Hydroelectric project (April 21, 2011, page 17) includes the following discussion on upstream fish passage:

#### **F. Fish Protective Pockets**

*49. Ordering Paragraph (N) of the Surrender Order requires PacifiCorp to file a plan to allow anadromous fish to safely pass the dam site during removal by excavating a series of protective pockets in each of the walls of the drain tunnel to allow fish to rest during upstream passage. The protective pocket measure was proposed in the Project Removal Summary submitted as part of the surrender application. PacifiCorp explains that, in the intervening years, it, Washington DOE, and other members of a working group that includes the Washington Department of Fish and Wildlife (Washington DFW), the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (FWS), and the Yakama Indian Nation have reconsidered the use of these protective pockets. PacifiCorp and these entities have concluded that the protective pockets are not only unlikely to be effective but might actually interfere with upstream fish migration during project removal by providing irregularities in the drain tunnel that could lead to intermittent debris jams. Therefore, PacifiCorp requests that we revise Ordering Paragraph (N) to require it to file a plan addressing upstream passage of anadromous fish at the dam site during removal, with the provision that such a plan might involve taking no action if such a result is supported by the consulting agencies.*

*50. The intent of staff's recommendations in the Final Supplemental EIS was to minimize the effects of dam removal activities on anadromous fish species attempting to migrate past Condit dam after the tunnel had been excavated and the reservoir had been drained. As a result, to facilitate upstream fish passage, staff supported PacifiCorp's recommendations contained in the settlement agreement and Removal Plan Summary to install protective pockets and to remove the existing cofferdams located upstream of Condit dam. We have no reason to insist on this approach in light of further analysis by state and federal fisheries agencies indicating that fish*

*protective pockets might be ineffective or harmful. Therefore, it would be beneficial to explore other options for providing upstream fish passage, as PacifiCorp suggests. Specifically, options that would avoid debris jams within the drain tunnel should be considered. Therefore, we have revised Ordering Paragraph (N) of our Surrender Order by eliminating the requirement for a plan to excavate fish protective pockets and replacing it with a requirement for an anadromous fish upstream passage plan. Revised Ordering Paragraph (N) also provides that, if the agencies to be consulted in the development of this plan collectively support the taking of no action by the licensee to aid in the upstream passage of anadromous fish, the plan shall provide a detailed description of why no action is preferred, including the benefits of no action to anadromous fish in the White Salmon River.*

In response to above, the Order on Rehearing modified the ordering paragraph to the following:

*(N) Order Paragraph (N) of the Commission's December 16, 2010 order is modified to read as follows:*

*Anadromous Fish Upstream Passage Plan. At least 90 days before starting dam removal activities, the licensee shall file, for Commission approval, a plan to allow anadromous fish to safely pass the site of the dam during project removal. The plan, at a minimum, shall include a detailed methodology of how anadromous fish will be passed upstream of the dam site and a schedule for implementation. Alternatively, in the event the consulting agencies identified below collectively support no action to be taken on the part of the licensee to aid in the upstream passage of anadromous fish during dam removal, the licensee's plan shall provide a detailed description of why no action is preferred, including the benefits of no action to anadromous fish in the White Salmon River.*

*The licensee shall prepare the plan after consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Yakama Nation, and Washington Department of Ecology. The licensee shall include with the plan or its proposal for no action, documentation of consultation, copies of consulted entities' comments and recommendations on the completed plan or proposal for no action, and specific descriptions of how the entities' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the entities to comment and to make recommendations before filing the plan or its proposal for no action with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.*

*The Commission reserves the right to require changes to the plan and schedule. No removal activities shall begin until the licensee is notified by the Commission that the plan and schedule, or its proposal for no action is approved. Upon Commission approval, the licensee shall implement the plan and schedule, including any changes required by the Commission.*

*A courtesy copy of the filed plan shall be sent to the Commission's Division of Dam Safety and Inspections-Portland Regional Office (D2SI-PRO) Regional Engineer and Director, Division of Dam Safety and Inspections.*

The original Condit Decommissioning Settlement Agreement anticipated the currently adopted method of dam removal which involves boring a tunnel in the lower portion of the dam on the downstream side and blasting a hole to complete the opening which will release all the water from Northwestern Lake. The Settlement Agreement Exhibit A, Removal Plan called for “fish pockets” to be excavated into the bottom of the tunnel to allow for resting pools as fish move through the tunnel.

As mentioned by FERC in the Order of Rehearing, the White Salmon River Fisheries Working Group determined that the fish Protective pocket activity is not necessary since access to habitat will be limited by the original construction cofferdams and excavation of these pockets could cause plugging of the tunnel.

The following is a detailed explanation as to why fish protective pockets and other efforts to address upstream anadromous fish passage at the dam site during demolition are not warranted.

### **1.3 ANALYSIS**

The drain tunnel, to be excavated in the base of Condit dam, is designed to be eighteen feet wide and 90 feet long. The tunnel will have a slope that drops 0.5 feet over the length of the tunnel, or approximately 0.5 percent. Figure 1 shows water elevations through the tunnel at various inflows/lake levels. The tunnel will be breached in October 2011 and will bypass the White Salmon River until approximately August 2012. From the October 2011 breach until May 2012, access to upstream habitat will be limited because the original construction coffer dam will continue to block fish passage. Per the Washington Department of Ecology’s 401 Clean Water Act Certificate for the project, the coffer dam must be removed by May 2012. For analysis, the period of impact to upstream migrating fish is the four months from May through August 2012.

The highest velocities in the tunnel will likely occur during the February through June period when White Salmon River flows are greatest. As mentioned in the Aquatic Resource Protection Plan, spring Chinook have been extirpated from the White Salmon River so, other than strays, we expect only a few spring Chinook to attempt passage through the drain tunnel. The species most likely to attempt upstream passage through the tunnel during dam removal is Mid-Columbia River Steelhead. The upstream migration period for steelhead is April through November. Other anadromous fish species found in the White Salmon River include Bull trout, fall Chinook and coho. Adults of these species migrate upstream during the fall. The construction schedule for dam removal is for all material to be removed from the river by August 2012 which should minimize any impact to these fall migrating fish.

The USGS gage (No. 14123500) has recorded data for over 90 years. The USGS website flows were summarized in the Condit Dam Removal Plan (see attachment No. 1). Basically, average high flow for the White Salmon River is approximately 1500 cubic feet per second (cfs) and average low flow is approximately 600 cfs. Kleinfelder analysts developed a graph titled Flow velocity at Drain Tunnel at Condit Dam (attached). Using the graph it is determined that, for a

flow of 600 cfs, depth would be about 3.5 feet and there would be a velocity of about 8.5 feet per second (fps) at the upstream end of the tunnel and about 10 fps at the downstream end. For a flow of 1500 cfs, depth will be 7 feet with a velocity of approximately 12 fps at the upstream end and about 14 fps at the downstream end of the tunnel.

Numerous studies have evaluated fish swimming speed capabilities, most notably Milo Bell and others in the 1960s and 1980s, and most recently, Theodore Castro-Santos in 2004-2009. For anadromous salmonids, analyses of fish passage capability commonly use the chart from Evans and Johnston (1980) (see attached). Using that chart, salmon and steelhead could theoretically pass through the tunnel without resting if the velocities were less than or equal to 5.5 fps. However, we chose to be more specific and calculate burst speeds and maximum swimming distance for Chinook and steelhead at 14 fps (Table 1).

**Table 1. Burst and prolonged swimming speeds and maximum swimming distance (@14 fps) for adult Chinook and steelhead that may attempt upstream passage through the Condit Dam drain tunnel (derived from Hunter and Mayor 1986).**

	<b>Burst speed (fps)</b>	<b>Maximum Swimming Distance (ft.)</b>
<b>Chinook</b>	7.91	77.93
<b>Steelhead</b>	5.77	69.25

Given the physiological attributes of adult Chinook and steelhead, it is unlikely that adults will make successful passage through the tunnel unless flows through the tunnel are less than the average low flow and velocity. Monthly average low flow values of 1,249 cfs and 880 cfs have been observed in the months of June and July, respectively, so it is feasible that some upstream passage could occur during the steelhead migration period. PacifiCorp will monitor the tunnel for debris jams and take actions to remove jams during the lower flow months until the dam is removed by August 2012.

In consideration of fish protective pockets, they would not serve the originally intended purpose of providing rest areas for fish passing through the drain tunnel because the confined space is not large enough to temper the velocities. Instead the pockets may create further turbulence in the tunnel at high flows thus creating complicated passage conditions that may cause injury to fish as they become exhausted in the tunnel and subject to a tossing effect as they make their way back down the tunnel. It is far better to at least allow for an uninterrupted laminar flow in the tunnel.

Given passage through the tunnel will likely be limited for spring Chinook and steelhead, consideration was given to capture and transport of fish around the construction site. This activity was dismissed for the reason that numbers of fish migrating through the area are low and it would require a concentrated effort of seining in the lower river over the extended migration time period to collect the few returning fish. Unlike the late summer and fall period when the fish weir can be used to collect fish (see PacifiCorp's Capture and Transport of Lower Columbia River Fall Chinook Salmon Plan) flows in the spring will be too great for the weir to properly function and direct all fish into the holding raceways.

## 1.4 CONCLUSION

Adult upstream fish passage during the dismantling of Condit dam will be limited until flows are low enough to allow fish access through the tunnel or after demolition of the tunnel is complete. PacifiCorp, the National Marine Fisheries Service, the US Fish and Wildlife Service and other members of the White Salmon Fisheries Working Group have considered options other than fish protective pockets as a means of allowing any spring Chinook or steelhead access to the river above the dam removal site, but select a no action alternative. The primary reason for no action is related to timing and extraneous conditions related to the dam removal process. For timing, the one species likely to benefit from fish protective pockets or any other means of transporting fish around the dam would be steelhead. For the most part, these fish are primarily dip-ins that will eventually migrate to Columbia upriver reaches later in the year. However, because there will likely be elevated turbidity levels in the White Salmon River due to deconstruction activities and sediment cutting, the dip-in fish may choose to migrate to another river with more hospitable conditions. The general thinking is that there will be very few fish in the White Salmon River until the dam removal process is complete.

Over the long term, the removal of Condit dam will provide uninhibited upstream and downstream fish passage. Representatives to the White Salmon Fisheries Working Group maintain that the likely absence of upstream adult fish passage for the first eight to ten months is an acceptable condition during the demolition period. As the U.S. Fish and Wildlife Service and National Marine Fisheries Service biological opinions state, the long-term benefit of dam removal far outweighs any short-term effects.

# **Attachments to the January 11, 2011 memo for the Big White Salmon Working Group**

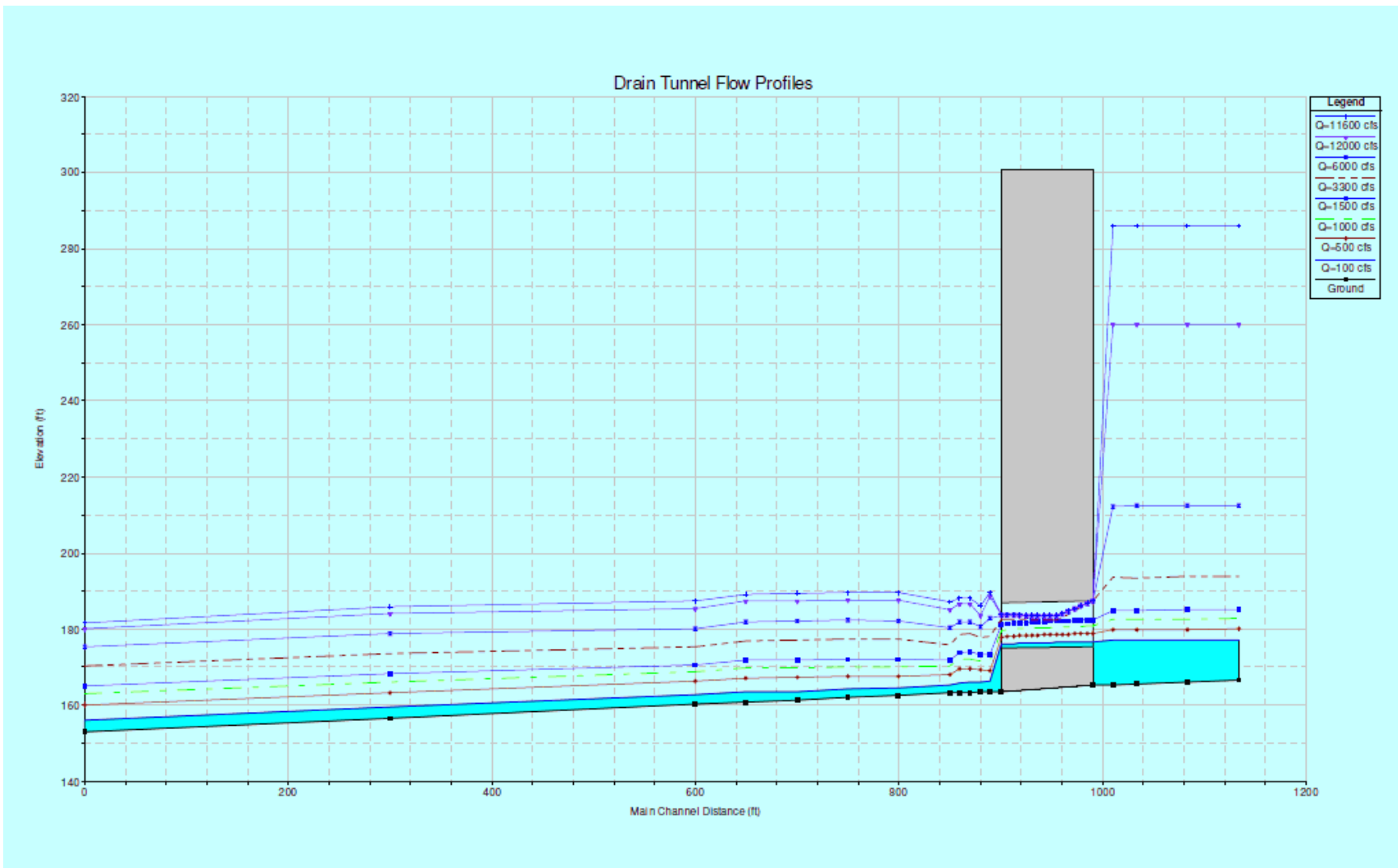


Figure 4-2 Maximum, Minimum, and Mean Daily Flows at USGS gage 14123500, White Salmon River

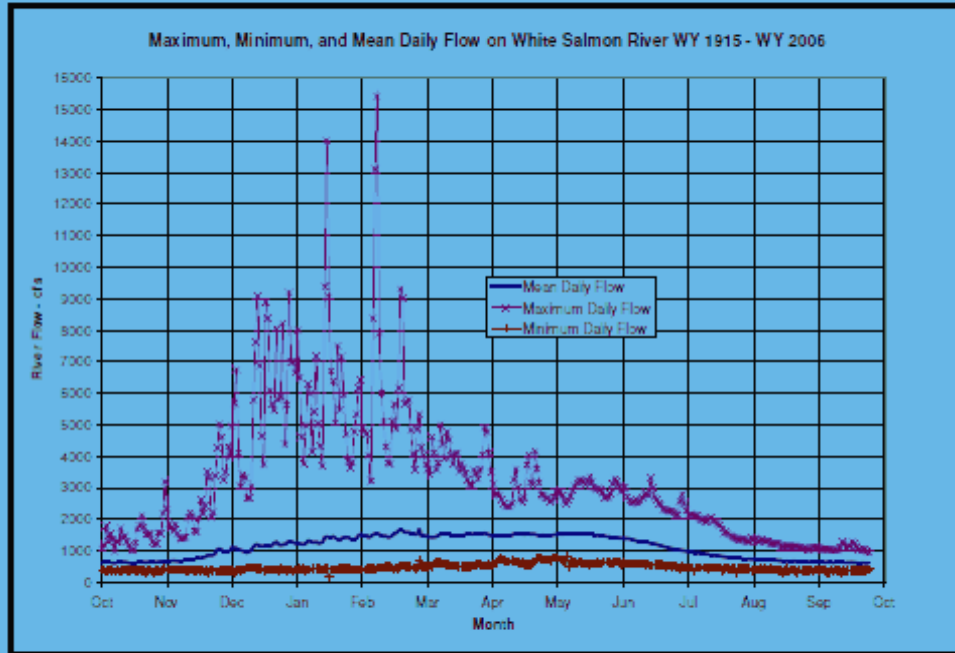
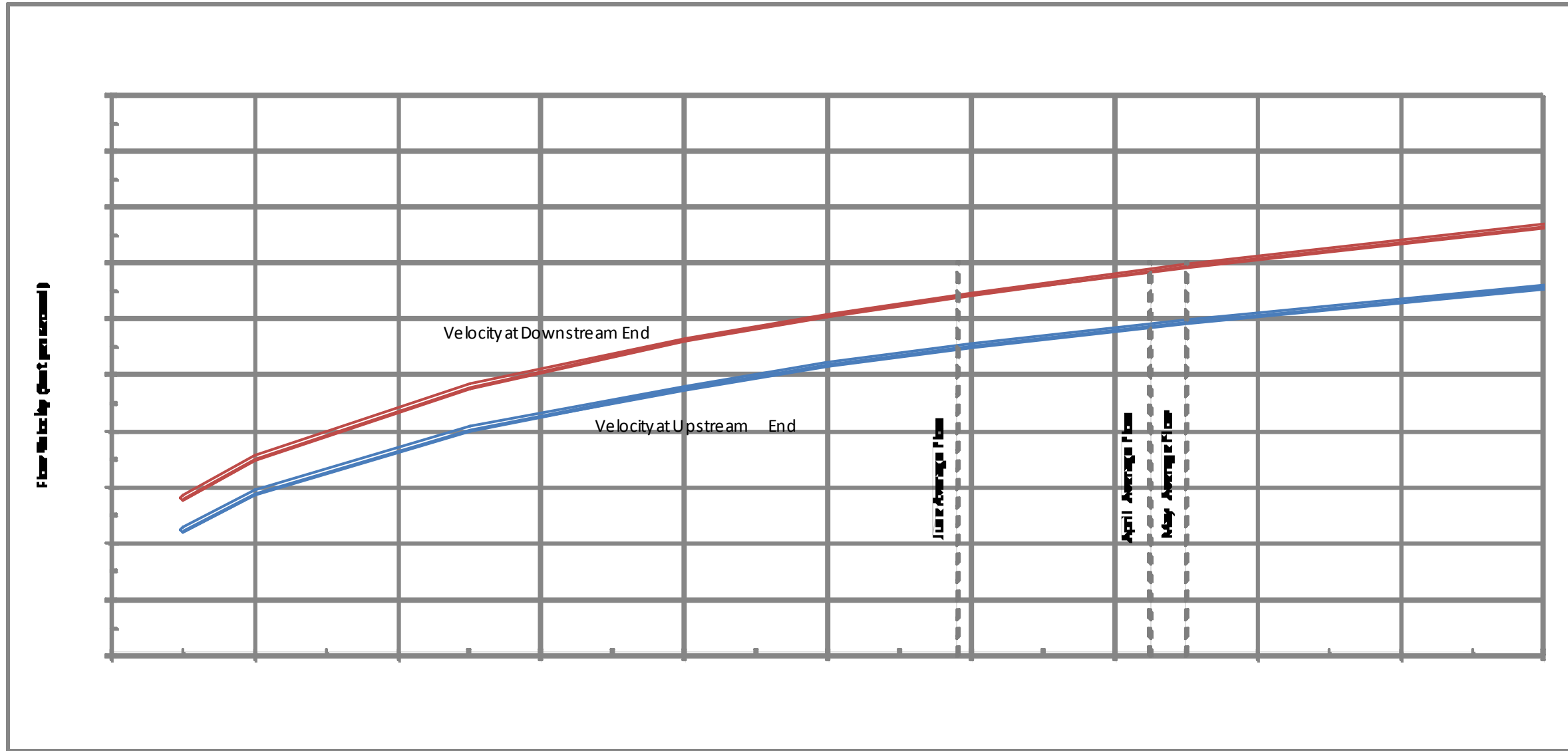


Table 4-1 summarizes the maximum, minimum, and mean daily flows for the proposed construction period of October through April, along with individual months.

Table 4-1 Maximum, Minimum, and Mean Daily Flows by Month			
Daily Flow – cubic feet-per-second			
Month(s)	Maximum	Minimum	Mean
October ~ April	15,400	158	1,205
January	14,000	158	1,344
February	15,400	396	1,522
March	5,000	489	1,504
April	4,770	527	1,506
May	3,360	497	1,503
June	3,300	486	1,249
July	2,800	326	880
August	1,410	270	694
September	1,310	304	626
October	3,210	269	628
November	5,100	278	809
December	9,200	321	1,143



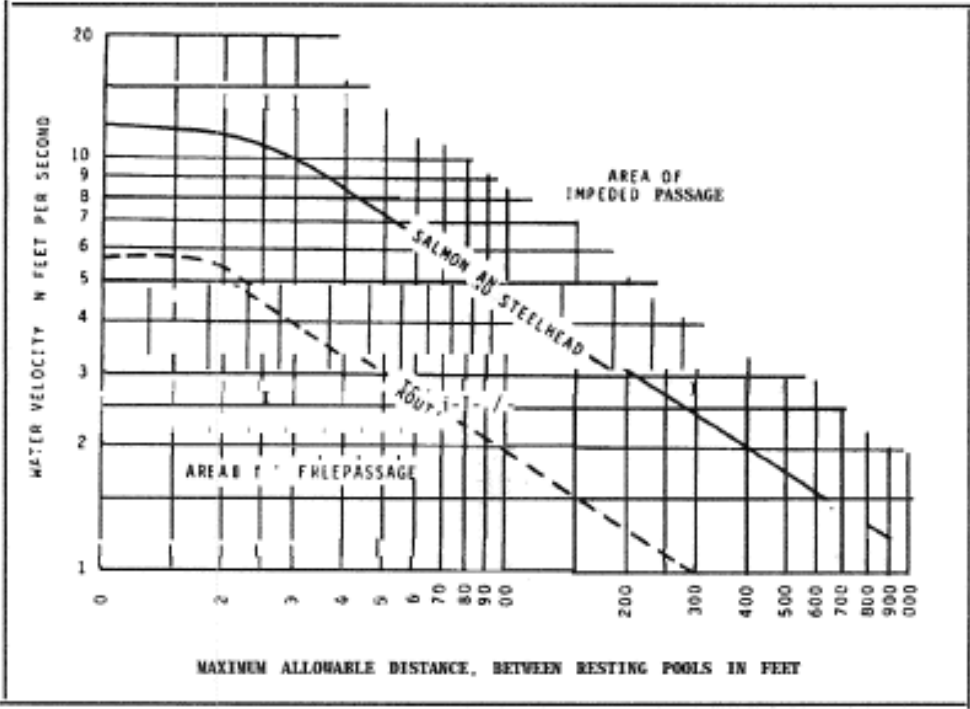


Figure 13. Swimming performance of salmon and trout from Evans and Johnston (1980). Curve developed by Ziener, State of Alaska, Department of Fish and Game.

