



PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY

P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801

(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

March 23, 2017

VIA ELECTRONIC MAILING

Ms. Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637**
Notification of Temporary Change in Pumped Flow to Implement Chelan River Steelhead
Trout Egg to Emergence Survival Study

Dear Secretary Bose:

Public Utility District No. 1 of Chelan County (“Chelan PUD”) provides notification to the Federal Energy Regulatory Commission (the “Commission”) of temporarily reduced pumped spawning flows in the Chelan River Habitat Channel to implement the Chelan River Steelhead Trout Egg to Emergence Survival Study. Currently, the flow in the Chelan River Habitat Channel is approximately 285 cfs for steelhead spawning¹. In order to place egg boxes in artificial redds, flows will need to be reduced from approximately 285 cfs to near the Chelan River minimum instream flow of 80 cfs (no pumps operating) for most of the day on Thursday, March 23, 2017. Spawning flows will be returned to approximately 285 cfs later on the same day.

Background and Reason for Temporary Change to Flow

At the March 2, 2016, meeting of the Chelan River Fishery Forum (CRFF)², the CRFF directed Chelan PUD to conduct a study in 2017 to determine egg-to-emergence survival for Steelhead Trout in the Chelan River Habitat Channel. Results from the Steelhead Trout Egg to Emergence Survival Study will provide information regarding the achievability of one Biological Objective contained in the license, 401 Water Quality Certification for the Project (the “Certification”), and Settlement Agreement,

¹ *Public Utility District No. 1 of Chelan County*, 121 FERC ¶ 62,152 (2007) (Order Modifying and Approving Operations Compliance and Monitoring Plan, Article 405). On March 13, 2017, Chelan PUD filed an application with the Commission for approval of changing the minimum flow from 320 cfs to 260 cfs during the spawning periods.

² The CRFF is comprised of the federal and state fishery agencies, Tribes, and local governments that are signatories to the Lake Chelan Comprehensive Settlement Agreement (SA) and assist Chelan PUD with implementing terms and conditions of the Lake Chelan Hydroelectric Project license associated with the Chelan River. The CRFF consists of the following entities: Washington Department of Fish and Wildlife, USDA Forest Service, National Park Service, NOAA Fisheries, U.S. Fish and Wildlife Service, Colville Confederated Tribes, Yakama Nation, Washington Department of Ecology, Chelan PUD, and city of Chelan.

Attachment B, Chapter 7, Section 5 Implementation Plan. Artificial redds were constructed in the Habitat Channel at a flow of 85 cfs, and in some locations, the flow velocity and depths presented some challenges. Since March 15, the flow was increased to approximately 285 cfs for Steelhead Trout spawning. This spawning flow will be in effect until May 15, per license requirement. After recent attempts, Chelan PUD learned that installing the egg boxes at 285 cfs is not feasible. Therefore, the protocol for this study calls for flow reduction to 85 cfs for egg box placement. Pumps will be turned off one at a time, at one hour intervals, from 9:00 am to 12:00 pm (PDT). Egg boxes will be placed during the afternoon, and pumped flow will be restored to approximately the 285 cfs level by dusk on March 23. The urgency of placing egg boxes on March 23 is due to Steelhead Trout females being held for the study were expected to reach maturity the second week of April. However, personnel at the hatchery where the females were being held informed PUD staff on March 21 that three females had reached maturity and gamete collection was scheduled for March 23. The egg boxes must be placed in in the Chelan River Habitat Channel on the same day as gamete collection.

Settlement Agreement license article 7(c)(3) and Certification sections IV. C., D., and F. describe adaptive management approaches to implementing new or modified measures to meet Biological Objectives. Chelan PUD acknowledges these sections of the license as support for implementing temporary reduced Chelan River Habitat Channel flows for implementing the study. On March 21, 2017, Chelan PUD sent emails to the CRFF requesting their concurrence to support the flow reduction in order to implement the study. Subsequently, on March 22, 2017, Chelan PUD sent an email to the CRFF notifying them of the shift of one hour in the schedule. Support from the CRFF for implementing reduced flows as part of the study plan is included in Attachment A.

A steelhead spawning survey of the Habitat Channel was conducted on March 21 and no new steelhead redds were observed under construction. Also, no Chinook Salmon fry were observed rearing in the shallows and inundated willow areas, which is expected since water temperatures remain cold (6.5 degrees C), and emergence of Chinook is projected to start soon. Based on the observations during the survey, no adverse effects from a short-term reduction in flow in the Habitat Channel to either adult steelhead spawning activity or to rearing Chinook Salmon fry are expected. A survey to determine if any Steelhead are constructing redds actively will be conducted at the initiation of the flow reduction. If any redd construction activity is observed, then a follow-up survey will be conducted to determine if the Steelhead resume redd construction after the flow is returned to four pumps, with subsequent surveys to determine if the redd was completed. Monitoring and rescue operations to determine if any Chinook Salmon fry were stranded will also proceed during the reduction in pumped flows.

Please contact me (509) 661-4176 regarding any questions or comments.

Sincerely,



Jeffrey G. Osborn
License Compliance Supervisor
jeff.osborn@chelanpud.org

cc: Erich Gaedeke, FERC Portland Regional Office
Breean Zimmerman, Washington Department of Ecology
Chelan River Fishery Forum

Attachment A: Consultation Documentation

ATTACHMENT A CONSULTATION DOCUMENTATION

The table below identifies CRFF members and participants.

FORUM PARTICIPANTS	AGENCY
Mark Peterschmidt	Washington State Department of Ecology
Jim Pacheco	Washington State Department of Ecology
Brean Zimmerman	Washington State Department of Ecology
Jeffrey Korth	Washington State Department of Fish and Wildlife
Graham Simon	Washington State Department of Fish and Wildlife
Travis Maitland	Washington State Department of Fish and Wildlife
Kari Grover Wier	United States Department of Agriculture Forest Service
Paul Willard	United States Department of Agriculture Forest Service
Emily Johnson	United States Department of Agriculture Forest Service
Ashley Rawhouser	National Park Service
Hugh Anthony	National Park Service
Steve Lewis	United States Fish and Wildlife Service
Justin Yeager	National Marine Fisheries Services
Bill Towey	Confederated Tribes of the Colville Reservation
Bob Rose	Yakama Indian Nation
Carl Merkle	Confederated Tribes of the Umatilla Indian Reservation
Robert Cooney	City of Chelan
Phil Archibald	Senior Scientist/citizen
Keith Truscott	Public Utility District No. 1 of Chelan County
Michelle Smith	Public Utility District No. 1 of Chelan County
Steve Hays	Public Utility District No. 1 of Chelan County
Debby Bitterman	Public Utility District No. 1 of Chelan County
Marcie Steinmetz	Public Utility District No. 1 of Chelan County
Jeff Osborn	Public Utility District No. 1 of Chelan County

Chelan PUD's Initial Email dated March 21, 2017

Sokolowski, Rosana

From: Hays, Steve
Sent: Tuesday, March 21, 2017 4:42 PM
To: 'Breean Zimmerman (bzim461@ecy.wa.gov)'; 'Peterschmidt, Mark F. (ECY) (mape461@ecy.wa.gov)'; 'david.bowen@ecy.wa.gov'; 'Jim Pacheco'; 'Korth, Jeffrey'; 'Graham Simon'; 'travis.maitland@dfw.wa.gov'; 'Kari Grover Wier'; 'pwillard@fs.fed.us'; 'Emily Johnson (ekjohnson@fs.fed.us)'; 'Alex Martinez (ramartinez@fs.fed.us)'; 'Ashley_Rawhouser@nps.gov'; 'Hugh_Anthony@nps.gov'; 'Steve Lewis (Stephen_Lewis@fws.gov)'; 'Rich Domingue (richard.domingue@noaa.gov)'; 'Bonnie.Hossack@noaa.gov'; 'Justin Yeager (Justin.Yeager@noaa.gov)'; 'Bill Towey'; 'Bob Rose (rosb@yakamafish-nsn.gov)'; 'Carl Merkle (carlmerkle@ctuir.com)'; 'mcooney@cityofchelan.us'; 'Phil Archibald (ndmarkey@gmail.com)'; 'Nick Elwell'; 'tom.ernsberger@parks.wa.gov'; 'nona.snell@rco.wa.gov'; 'Richard Uhlhorn (richard@richarduhlhorn.com)'; 'Thomas O'Keefe (okeefe@amwhitewater.org)'
Cc: Osborn, Jeff; Smith, Michelle; Sokolowski, Rosana; Clement, Marcie; Bitterman, Deborah; Buehn, Scott; Campbell, Rob; Willard, Catherine; Underwood, Alene
Subject: Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

To: Chelan River Fishery Forum
Washington Department of Ecology
Washington Department of Fish and Wildlife
United States Forest Service
National Park Service
United States Fish and Wildlife Service
National Marine Fisheries Service
CCT (Colville)
YN (Yakama)
CTUIR (Umatilla tribe)
City of Chelan
Lake Chelan Sportsman Association
United States Geological Survey
Washington State Parks and Recreation Commission
Washington State Recreation and Conservation Office
Lake Chelan Recreation Association
American Whitewater

From: Steven Hays, Fish & Wildlife Senior Advisor
Public Utility District No. 1 of Chelan County (Chelan PUD)
steve.hays@chelanpud.org
(509)661-4181

Re: Lake Chelan Hydroelectric Project No. 637 (Project)
Reduced Flow in Chelan River Habitat Channel To Implement Chelan River Steelhead
Egg to Emergence Survival Study

Dear Chelan River Fishery Forum and Other Parties:

As decided at the March 2, 2016 meeting of the Chelan River Fishery Forum (CRFF), Chelan PUD will conduct a study in 2017 to determine egg to emergence survival for Steelhead Trout in the Chelan River Habitat Channel. The portion of the meeting summary that relates to this study is as follow:

Steelhead egg-to-fry Survival Measurement

Jeff reported the high spawning success of cylindrical egg tubes (CETs) data for Chinook salmon to the CRFF and inquired whether this data would be a sufficient surrogate for steelhead spawning. One complication of measuring steelhead-spawning success is gathering test eggs. Coordination with Eastbank Hatchery staff to establish specific steelhead spawning timing and egg incubation would be necessary. Steelhead broodstock and eggs are collected and incubated significantly earlier than steelhead spawning in the wild. Using test eggs with similar temperature units to naturally spawned eggs would be required to perform a valid test.

Jeff proposed the following options to the CRFF for consideration:

- Option 1: Use Chinook salmon CET data as surrogate for predicting steelhead egg-to-fry survival in the Habitat Channel;

OR

- Option 2: Coordinate steelhead egg take and incubation with Eastbank Hatchery staff to “match up” hatchery egg temperature units with wild fish estimated temperature units, and perform a CET investigation in the Habitat Channel using the same methodology by WDFW for spring Chinook salmon. Conduct the investigation in 2016, if possible. If not schedule the investigation for 2017, and, possibly, 2018.

The CRFF supported Option 2. It was noted that due to lack of time, WDFW may not be able to schedule this study in 2016, which is the preferred starting time. It might be necessary that Chelan PUD contact other consultants to see if they may be able perform this study in 2016.

Phil suggested that Chelan PUD investigate as to whether any others (i.e. BioAnalysts) have done survival egg-to-fry studies.

Chelan PUD recognized that it will be necessary to contact the HCP committee to obtain permission to handle ESA eggs.

After discussing other options, the CRFF recommend to explore the use of a Vibert box methodology used by WDFW for spring Chinook salmon egg-to-fry survival evaluation for conducting the steelhead egg-fry survival study.

Action Items:

- Jeff and Steve will contact Catherine Willard, Chelan PUD, who is Chelan PUD’s Hatchery Committee representative. They will request that this study be discussed in the HCP Hatchery Committee so that the 2016-2017 Broodstock Collection planning include steelhead eggs for this study. Chelan PUD will request permission and their input using the WDFW Vibert Box methodology for the steelhead egg-to-fry survival study.

Chelan PUD has been working through the logistics of conducting this study and has proceeded with preparation, including the reservation of five pairs of surplus steelhead adults of hatchery origin that were obtained from the Wells Hatchery. A study protocol and methodology is attached for your information and review. This protocol has been evolving as procurement of the egg boxes, construction of artificial redds and procurement of the adult steelhead for the gametes has come together in the past three weeks. Until today, the anticipated timing of the adult steelhead was expected to be around the second week of April. However, today personnel at the Eastbank Hatchery where the fish are being held determined that three of the adult females have reached maturity and they have scheduled this coming Thursday, March 23, for collection of gametes. Gamete collection and placement of egg baskets in the artificial redds constructed in the Habitat Channel will also take place on March 23.

Please Note That It Will Be Necessary To Reduce Flow In The Habitat Channel For Part Of The Day In Order To Install The Egg Boxes

The artificial redds were constructed at a flow of 85 cfs and in some locations the flow velocity and depths presented some challenges. Since March 15, the flow was increased to approximately 285 cfs, which is the flow from four pumps operating in the canal and approximately 85 cfs coming from Reaches 1-3 of the Chelan River. This flow will be in effect until May 15, as called for by previous decision of the CRFF. However, it is not feasible to install the egg boxes at this high flow. Therefore, the protocol for this study calls for flow reduction as follows:

Placement of the egg boxes with fertilized gametes will require that pumped flows be reduced because water depths and velocities at many of the artificial redd locations will be unmanageable at the higher flows. The procedure for reducing flows on the day or days when egg boxes will be installed will be to turn off pumps at the rate of one pump per hour, which past experience has been successful in preventing the stranding of Chinook Salmon fry in the shallow water rearing habitat in the HC. Thus, beginning three hours prior to the initiation of egg box placement, pumped flow will be reduced by turning off one pump. A second pump will be turned off two hours prior to egg box placement and the third pump at one hour prior. Preparation for initiation of gamete fertilization and egg box placement will proceed during this time. The fourth pump will be turned off and egg box placement will begin. At the conclusion of egg box placement, the 285 cfs flow with four pumps will be resumed. A survey to determine if any steelhead are actively constructing redds will be conducted at the initiation of the flow reduction. If any redd construction activity was observed, then a follow-up survey will be conducted to determine if the steelhead resume redd construction after the flow is returned to four pumps, with subsequent surveys to determine if the redd was completed. Monitoring and rescue operations to determine if any Chinook Salmon fry were stranded will also proceed during the reduction in pumped flows.

Therefore, please be advised that reduction in flows to the Habitat Channel will begin on March 23, 2017, at approximately 0800, with flow reduced by one pump at that time. Flow will be reduced by additional pumps at 0900, 1000 and 1100, with the flow in the Habitat Channel reaching about 85 cfs by 1130. Meanwhile, steelhead spawning and gamete collection will be concluding around 1030 and the gametes will arrive at the Habitat Channel at around 1130. Egg baskets will be seeded with fertilized gametes and placed in the artificial redds until all redds have received an egg basket according to the protocol. If a fourth female has not matured by March 23, then one female will be used for ten of the redd locations, with the other two females used for five redds each. When all the redds have received an egg box with fertilized gametes, the pumps will be returned to operation and the flow will return to 285 cfs.

Today I conducted a steelhead spawning survey of the Habitat Channel with Scott Hopkins and we did not observe any new steelhead redds under construction. A steelhead redd that was initiated on March 8 was observed to be complete during a survey the following week and today there were no adult steelhead observed guarding that redd or staging elsewhere in the Habitat Channel. Also, no Chinook Salmon fry were observed rearing in the shallows and inundated willow areas, which was expected since water temperatures remain cold (6.5 degrees C) and emergence of Chinook is just beginning. Based on the observations during the survey and information from last year's snorkel surveys, we do not expect any adverse effects from a short-term reduction in flow in the Habitat Channel to either adult steelhead spawning activity or to rearing Chinook Salmon fry.



Chelan River
steelhead egg to ..

If you have any questions, please do not hesitate to contact me at (509-661-4181) or by email.

Steven Hays
Fish and Wildlife Senior Advisor
steve.hays@chelanpud.org
(509) 661-4181

<< File: Macroinvertebrate Investigation Chelan River 2016 Draft Annual Report.docx >>

SECTION 1: METHODS

1.1 Study Area

The study area for determination of steelhead egg-to-emergence survival is the Chelan River Reach 4 Habitat Channel (HC). Steelhead redds have been observed in this constructed habitat area every year since 2010, except for 2014 when no redds were observed. The HC has seven sections, five of which are pool-riffle sections with suitable spawning gravel, depths and velocities. Steelhead redd locations documented in these sections in 2012 – 2015 are shown in Figures 7-1 – 7-5. In an effort to increase the amount of suitable substrate in these sections, small gravel in the 0.5 – 2.5 inch size range was added in the late summer of 2014, shown as red oval areas on these figures. Very high flow in May, 2016, has likely moved some of this gravel into other areas. In the summer of 2016, sand and gravels excavated from the area upstream of the HC was placed in Section 7, with the expectation that this material would move downstream and replenish some of the gravel areas during summer runoff flows in 2017. The figures below represent the study area at 80 cfs flow in September, 2011, which provides clarity for mapping steelhead redds but does not represent current riparian vegetation and there have been some changes in the wetted area near the shorelines due to natural thalweg development over time. Current conditions in the study area are shown in Figure 7-6.



Figure 7-1: Steelhead redd locations in Habitat Channel Section 2.

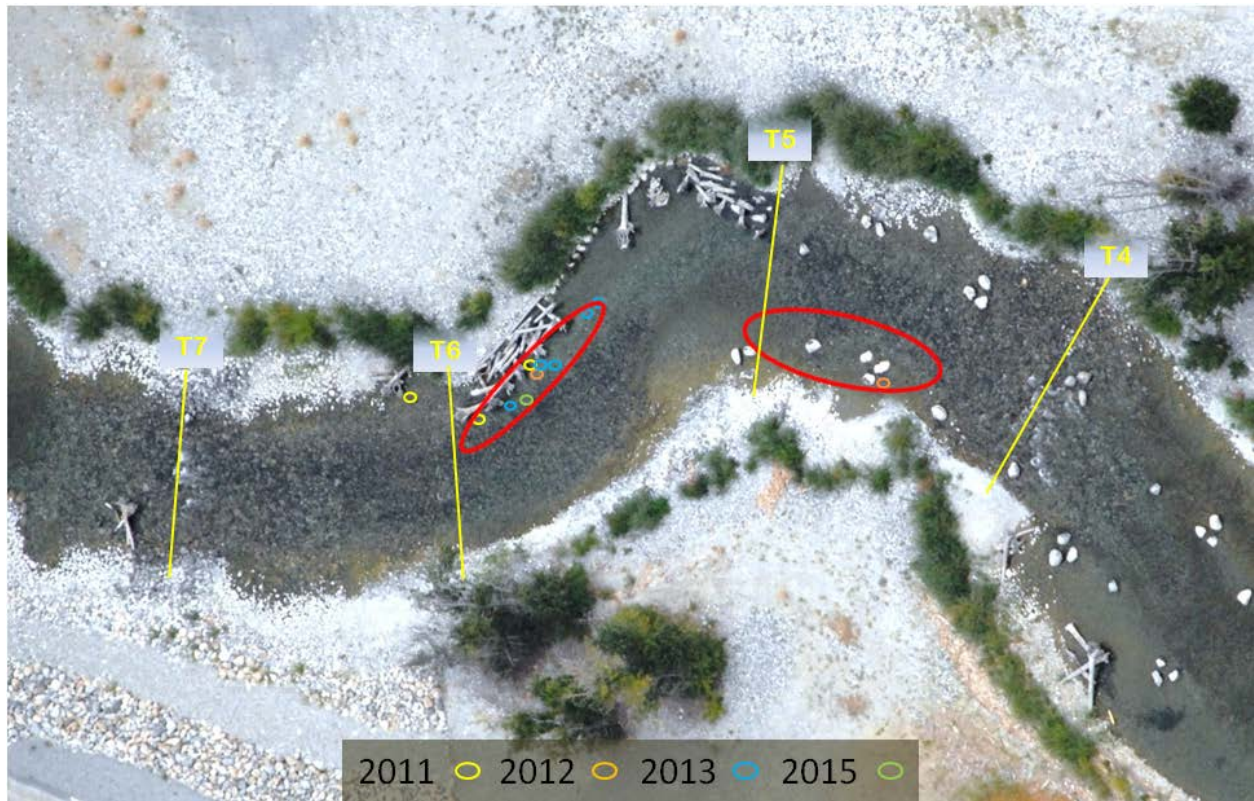


Figure 7-2: Steelhead redd locations in Habitat Channel Section 3.

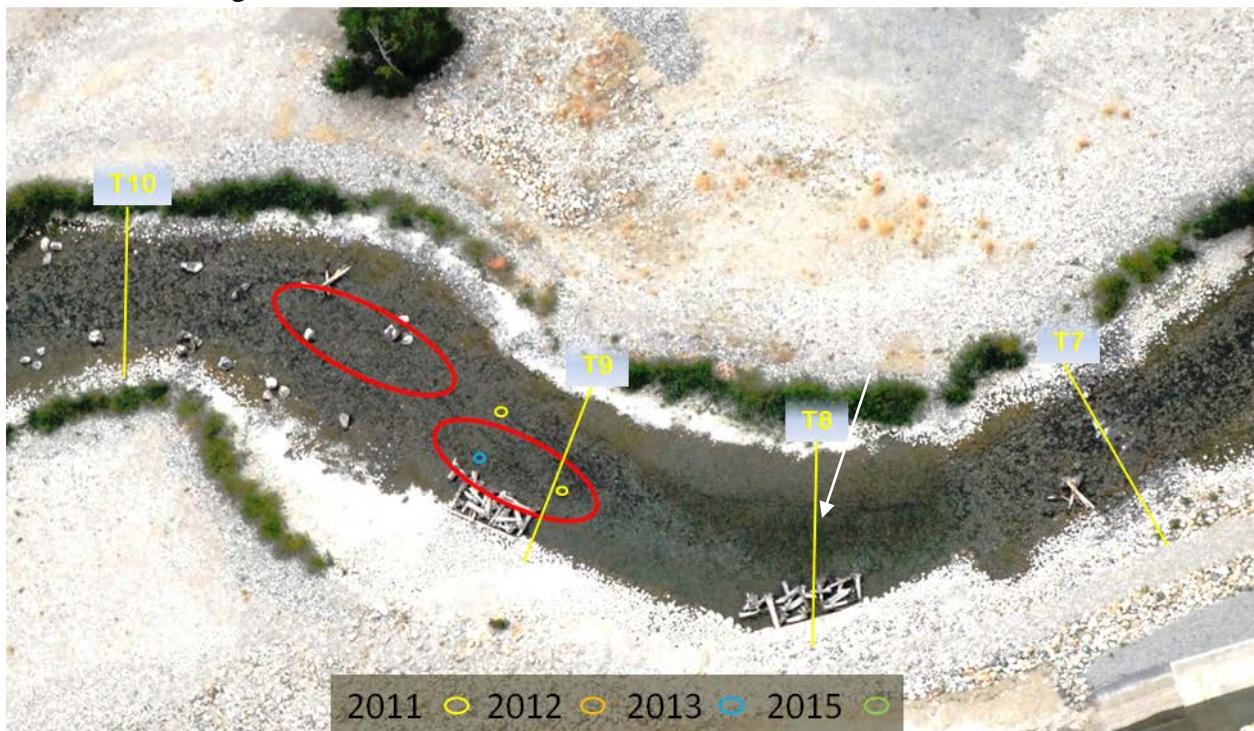


Figure 7-3: Steelhead redd locations in Habitat Channel Section 4.



Figure 7-4: Steelhead redd locations in Habitat Channel Section 5.



Figure 7-5: Steelhead redd locations in Habitat Channel Section 6.



Figure 7-6: Habitat Channel in May 2015.

1.2 Study Methodology

The steelhead egg-to-emergence survival will be estimated by placing fertilized eggs into artificial redds, with the eggs contained in Whitlock-Vibert (WV) boxes modified to prevent emerging steelhead alevins from escaping (Johnson et al. 2012). Four artificial redds have been constructed in each of the five sections of the HC in the vicinity of previous steelhead redd sites. Redd sites were selected that have suitable gravel, depths and velocities, based on literature information for steelhead preference and information collected on steelhead redds in the HC in 2012 and 2013. The artificial redds were constructed on March 7-8, 2017 (Figure 7-7). There were no areas of gravel suitable for spawning at shallow (wadeable) depths in Section 6, but steelhead were constructing a redd in the upstream Section 7 in the sandy gravels that were placed in that area in summer 2016. Thus, the four artificial redds intended for Section 6 were instead constructed in Section 7. Three additional artificial redds were constructed in Sections 2 and 3 that will be used as “test” sites for monitoring development of alevins for pre-emergence status prior to removing the remaining egg boxes and documenting the survival rate.

The WV boxes will be placed between the last two weeks of March and the first two weeks in April, when HC water temperatures are favorable and past steelhead activity has been observed. Egg boxes will be filled with gravels collected during the construction of the artificial redds and seeded with 100 steelhead eggs that are fertilized on site. Water temperatures will be monitored and the WV boxes will be removed in June when accumulated temperature units (ATUs) indicate that steelhead fry emergence is likely to begin. Egg boxes will be gently excavated to avoid loss of fines that may have accumulated in the box and placed in a submerged plastic tray and transported to the bank for enumeration of live alevins, dead alevins and dead eggs.



Figure 7-7: Locations of artificial redds, test redds and water temperature probes.

1.2.1 Source of gametes

Steelhead gametes will be obtained from surplus broodstock collected for hatchery programs that are under the oversight of the HCP Hatchery Committee. Due to the timing of steelhead spawning in the Chelan River, the steelhead broodstock may be somewhat late spawning compared to the timing of most steelhead spawning activities at hatcheries in the vicinity of the Chelan River (i.e., Eastbank Hatchery and Wells Hatchery). However, broodstock that ripen late may be available from these programs. Currently, five pairs of surplus steelhead from the Wells Hatchery program are being held at Eastbank Hatchery and will be monitored until they are ripe. These fish and any additional surplus fish that may be obtained from other sources will be used for this study.

Ideally, gametes would be collected from several fish on the same day and held separately for 1x1 pairings. However, in the event that not enough ripe fish are available at the same time, there may be gamete collection and egg box placement on more than one day. In addition, fertilized eggs from the study fish will be incubated at Eastbank Hatchery facility to the eyed egg and shocking stage, about 400 ATUs as a control for variability in the fertility of the gametes used in the study.

Gametes will be collected from 4 females and 4 males for separate 1x1 pairings, with gametes from each pairing used for one egg box in each section. A total of 600 eggs will be needed from each female (500 for the in-stream study and 100 for the hatchery control). A few hundred additional eggs will be needed to place in “test” redds that can be dug up prior to full emergence to check development without biasing the actual study redds. Mixing of the gametes for the hatchery control will occur at Eastbank just prior to placement into egg trays. Fertilized eggs from each of the four crosses will be placed in individual trays into an isolated incubation rack system. Water from this system will be non-recirculated to ensure biosecurity within the facility at Eastbank.

1.2.2 Redd construction, egg fertilization and placement

Artificial redds were constructed on March 7-8, 2017, prior to gamete fertilization and placement, in order to assure that WV boxes can be placed on the same day that gametes are available. Egg pocket depth was standardized at 30 cm. Redd size was standardized at approximately 25 square feet, which is typical of redd sizes observed in the HC. As reported by Johnson, et al. 2012, the egg pockets are protected with a covered, bottomless bucket until the WV boxes are placed.

The WV boxes have been modified by removing the egg tray to increase its ability to evaluate sediment infiltration. Slots on the sides and lid of the boxes have been covered with 1.65 mm mesh netting to prevent alevines from escaping the enclosure after hatching. Each egg box will also contain a temperature logger and a PIT tag to facilitate relocating the egg box when incubation is complete. Each egg box also has a fishing float on a short string attached to two sides to aid in location of the egg box at time of excavation.

Prior to placement, the egg boxes will be filled with gravels from the artificial redd that have been agitated in a perforated bucket to remove fines. The egg boxes will be filled to approximately 2.5 cm from the box lid to allow sufficient interstitial space for the eggs and to prevent the box lid from contacting the eggs. The egg boxes will be placed in a plastic tray filled with river water so that the egg box is submerged prior to placement of eggs. Milt will be mixed with the eggs, set aside to water harden, then the fertilized eggs will be poured evenly over the gravel in the egg box. The egg box will have the lid secured and be gently transferred to the preconstructed redd and held at the gravel floor of the bottomless bucket protecting the egg pocket while cleaned gravel from the redd is placed over the egg box until the bucket is filled to the level of the redd surface. The bucket will be removed and the artificial redd will be contoured as necessary to resemble the bowl and tailspill of a natural redd shape.

The artificial redds were constructed at a flow of 80 cfs. Pumped flows for the steelhead spawning season were initiated on March 15, which raised the flow in the HC to approximately 285 cfs. Placement of the egg boxes with fertilized gametes will require that pumped flows be reduced because water depths and velocities at many of the artificial redd locations will be unmanageable at the higher flows. The procedure for reducing flows on the day or days when egg boxes will be installed will be to turn off pumps at the rate of one pump per hour, which past experience has been successful in preventing the stranding of Chinook Salmon fry in the shallow water rearing habitat in the HC. Thus, beginning three hours prior to the initiation of egg box placement, pumped flow will be reduced by turning off one pump. A second pump will be turned off two hours prior to egg box placement and the third pump at one hour prior. Preparation for initiation of gamete fertilization and egg box placement will proceed during this time. The fourth pump will be turned off and egg box placement will begin. At the conclusion of egg box placement, the 285 cfs flow with four pumps will be resumed. A survey to determine if any steelhead are actively constructing redds will be conducted at the initiation of the flow reduction. If any redd construction activity was observed, then a follow-up survey will be conducted to determine if the steelhead resume redd construction after the flow is returned to four pumps, with subsequent surveys to determine if the redd was completed. Monitoring and rescue operations to determine if any Chinook Salmon fry were stranded will also proceed during the reduction in pumped flows.

1.2.3 Egg box excavation and survival tabulation

The egg boxes and survival tabulation will be conducted when approximately 600 ATUs have been reached based on water temperature recordings at the two temperature loggers in piezometer tubes placed in the gravel at the upper and middle sections of the habitat channel. The three development monitoring egg boxes will be used to evaluate progression of alevin development prior to removal of the egg boxes and survival calculation at the conclusion of the study. If alevin development in the first box excavated is not yet at the emergence stage, then an estimate of ATUs needed for egg sack absorption will be made to determine the date for excavation of the remaining development monitoring boxes.

The egg box sites will be located from the GPS coordinates and with a PIT tag detector. The egg boxes will be removed by gently excavating the area around the area of the egg pocket until the box is encountered. Then gravel will be removed from the perimeter of the box until it can be

gently lifted and placed in a submerged tray. The tray and box will then be taken to the bank for counting of live and dead alevins and dead eggs.

1.2.4 Literature Cited

Christopher L. Johnson , Philip Roni & George R. Pess (2012) Parental Effect as a Primary Factor Limiting Egg-to-Fry Survival of Spring Chinook Salmon in the Upper Yakima River Basin, Transactions of the American Fisheries Society, 141:5, 1295-1309, DOI: 10.1080/00028487.2012.690815

Chelan PUD's Second Email dated March 21, 2017

Sokolowski, Rosana

From: Hays, Steve
Sent: Tuesday, March 21, 2017 5:29 PM
To: 'Breean Zimmerman (bzim461@ecy.wa.gov)'; 'Peterschmidt, Mark F. (ECY) (mape461@ecy.wa.gov)'; 'david.bowen@ecy.wa.gov'; 'Jim Pacheco'; 'Korth, Jeffrey'; 'Graham Simon'; 'travis.maitland@dfw.wa.gov'; 'Kari Grover Wier'; 'pwillard@fs.fed.us'; 'Emily Johnson (ekjohnson@fs.fed.us)'; 'Alex Martinez (ramartinez@fs.fed.us)'; 'Ashley_Rawhouser@nps.gov'; 'Hugh_Anthony@nps.gov'; 'Steve Lewis (Stephen_Lewis@fws.gov)'; 'Rich Domingue (richard.domingue@noaa.gov)'; 'Bonnie.Hossack@noaa.gov'; 'Justin Yeager (Justin.Yeager@noaa.gov)'; 'Bill Towey'; 'Bob Rose (rosb@yakamafish-nsn.gov)'; 'Carl Merkle (carlmerkle@ctuir.com)'; 'mcooney@cityofchelan.us'; 'Phil Archibald (ndmarkey@gmail.com)'; 'Nick Elwell'; 'tom.ernsberger@parks.wa.gov'; 'nona.snell@rco.wa.gov'; 'Richard Uhlhorn (richard@richarduhlhorn.com)'; 'Thomas O'Keefe (okeefe@amwhitewater.org)'
Cc: Osborn, Jeff; Smith, Michelle; Sokolowski, Rosana; Clement, Marcie; Bitterman, Deborah; Buehn, Scott; Campbell, Rob; Willard, Catherine; Underwood, Alene; Hopkins, Scott
Subject: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study
Importance: High

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

To: Chelan River Fishery Forum
Washington Department of Ecology
Washington Department of Fish and Wildlife
United States Forest Service
National Park Service
United States Fish and Wildlife Service
National Marine Fisheries Service
CCT (Colville)
YN (Yakama)
CTUIR (Umatilla tribe)
City of Chelan
Lake Chelan Sportsman Association
United States Geological Survey
Washington State Parks and Recreation Commission
Washington State Recreation and Conservation Office
Lake Chelan Recreation Association
American Whitewater

From: Steven Hays, Fish & Wildlife Senior Advisor
Public Utility District No. 1 of Chelan County (Chelan PUD)
steve.hays@chelanpud.org
(509)661-4181

Re: Lake Chelan Hydroelectric Project No. 637 (Project)
Schedule and Request for Statement of Concurrence - Reduced Flow in Chelan River Habitat Channel
To Implement Chelan River Steelhead Egg to Emergence Survival Study

Dear Chelan River Fishery Forum and Other Parties:

My apologies for the very lengthy email that I sent regarding the Steelhead Egg to Emergence Survival Study, which was a lot of information to digest at one time. For that reason, I am sending you this email with just the schedule for the reduced flow operations in the Habitat Channel that are necessary to conduct this study.

I am requesting that CRFF members who represent agencies with management authority provide a response to this email indicating that they either agree with the flow reduction or, if they object, to provide a statement regarding the reason for their objection.

As stated in the previous email, this flow reduction is necessary to conduct this study, which is a requirement of the terms contained in the Lake Chelan Hydroelectric Project's License. Chelan PUD, for reasons stated in the preceding email, is certain that this short-term flow reduction, according to the schedule below, will not have any adverse effects on aquatic life in the Habitat Channel. This flow reduction will be kept to the minimum duration necessary for conduct of the study.

Thank you in advance for your response.

Steve Hays

SCHEDULE FOR FLOW REDUCTION OPERATIONS - 3/23/2017

Initial Flow Conditions	Approximately 290 cfs (88 cfs from Reaches 1-3 and 205 cfs from pumped flow with four pumps in operation)
0800 - 0830 (three pumps remain in operation)	Reduce flow to approximately 240 cfs by turning off one pump
0900 - 0930 (two pumps remain in operation)	Reduce flow to approximately 190 cfs by turning off one pump
1000 - 1030 (one pump remains in operation)	Reduce flow to approximately 140 cfs by turning off one pump
1100 - 1130 (all pumps turned off)	Reduce flow to approximately 90 cfs by turning off one pump
Late Afternoon - dusk operation)	Restore flow to approximately 290 cfs (four pumps in operation)

The reduction in flow at one hour intervals is in order to avoid rapid decreases in water level and dewatering of shallow water habitats to prevent fish stranding.

Compilation of the Agencies' Responses dated March 22, 2017

Sokolowski, Rosana

To: Sokolowski, Rosana

Compilation of email responses:

From: Lewis, Stephen [mailto:stephen_lewis@fws.gov]

Sent: Wednesday, March 22, 2017 2:09 PM

To: Hays, Steve

Subject: Re: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

Yes Steve, the USFWS concurs with this action and thanks for coordinating with us!

From: Simon, Graham A (DFW) [<mailto:Graham.Simon@dfw.wa.gov>]

Sent: Wednesday, March 22, 2017 12:02 PM

To: Hays, Steve

Cc: Maitland, Travis W (DFW); Osborn, Jeff

Subject: RE: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

Steve,

Thanks for sending this out and reaching out by phone today on the PUD's need for temporary flow reduction as described below. WDFW supports the PUD's need to reduce the flow in order for the safe installation of egg boxes as part of the study as long as the sites are monitored during reduced flow for impacts to fish like stranding.

If you have questions please give me a call

Regards,

Graham Simon
Fish & Wildlife Biologist
WDFW Habitat Program
509-670-0742

From: Zimmerman, Breean (ECY) [<mailto:bzim461@ECY.WA.GOV>]

Sent: Wednesday, March 22, 2017 10:45 AM

To: Hays, Steve

Subject: RE: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

Hi Steve,

Thank you for your email and follow up phone call today. There are no objections from Ecology on the proposed flow reduction for this study.

Breean Zimmerman | **Hydropower Projects Manager**
Water Quality Program | Central Regional Office
(509) 575-2808 (w) | (509) 406-5130 (c) | bzim461@ecy.wa.gov

From: Pacheco, James (ECY) [<mailto:JPAC461@ECY.WA.GOV>]

Sent: Wednesday, March 22, 2017 8:24 AM

To: Hays, Steve

Subject: RE: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

Ecology concurs.

Good luck.

Jim

From: Justin Yeager - NOAA Federal [<mailto:justin.yeager@noaa.gov>]

Sent: Wednesday, March 22, 2017 11:11 AM

To: Hays, Steve

Cc: Dale Bambrick

Subject: Re: Schedule and Request for Statement of Concurrence - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study

Steve,

We approve the reduced flow operations in the Chelan habitat channel for the steelhead egg emergence study. Please keep us apprised of any changes or complications with the flow reduction or during flow restoration. If you have any questions feel free to contact me.

Thanks,

Justin Yeager

National Marine Fisheries Service

Columbia Basin Branch

304 S Water Street, Suite 201

Ellensburg, WA 98926

(509) 962-8911 x805

(509) 962-8544 fax

www.nmfs.noaa.gov

On Tue, Mar 21, 2017 at 5:29 PM, Hays, Steve <steve.hays@chelanpud.org> wrote:

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY

P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801

(509) 663-8121 • Toll free [1-888-663-8121](tel:1-888-663-8121) • www.chelanpud.org

To: Chelan River Fishery Forum
Washington Department of Ecology
Washington Department of Fish and Wildlife
United States Forest Service
National Park Service
United States Fish and Wildlife Service
National Marine Fisheries Service
CCT (Colville)
YN (Yakama)
CTUIR (Umatilla tribe)
City of Chelan

Lake Chelan Sportsman Association
United States Geological Survey
Washington State Parks and Recreation Commission
Washington State Recreation and Conservation Office
Lake Chelan Recreation Association
American Whitewater

From: Steven Hays, Fish & Wildlife Senior Advisor
Public Utility District No. 1 of Chelan County (Chelan PUD)
steve.hays@chelanpud.org
[\(509\)661-4181](tel:(509)661-4181)

Re: Lake Chelan Hydroelectric Project No. 637 (Project)
**Schedule and Request for Statement of Concurrence - Reduced Flow in Chelan River
Habitat Channel**
To Implement Chelan River Steelhead Egg to Emergence Survival Study

Dear Chelan River Fishery Forum and Other Parties:

My apologies for the very lengthy email that I sent regarding the Steelhead Egg to Emergence Survival Study, which was a lot of information to digest at one time. For that reason, I am sending you this email with just the schedule for the reduced flow operations in the Habitat Channel that are necessary to conduct this study.

I am requesting that CRFF members who represent agencies with management authority provide a response to this email indicating that they either agree with the flow reduction or, if they object, to provide a statement regarding the reason for their objection.

As stated in the previous email, this flow reduction is necessary to conduct this study, which is a requirement of the terms contained in the Lake Chelan Hydroelectric Project's License. Chelan PUD, for reasons stated in the preceding email, is certain that this short-term flow reduction, according to the schedule below, will not have any adverse effects on aquatic life in the Habitat Channel. This flow reduction will be kept to the minimum duration necessary for conduct of the study.

Thank you in advance for your response.

Steve Hays

SCHEDULE FOR FLOW REDUCTION OPERATIONS - 3/23/2017

Initial Flow Conditions	Approximately 290 cfs (88 cfs from Reaches 1-3 and 205 cfs from pumped flow with four pumps in operation)
0800 - 0830	Reduce flow to approximately 240 cfs by turning off one pump (three pumps remain in operation)
0900 - 0930	Reduce flow to approximately 190 cfs by turning off one pump (two pumps remain in operation)
1000 - 1030	Reduce flow to approximately 140 cfs by turning off one pump (one pump remains in operation)
1100 - 1130	Reduce flow to approximately 90 cfs by turning off one pump (all pumps turned off)
Late Afternoon - dusk	Restore flow to approximately 290 cfs (four pumps in operation)

The reduction in flow at one hour intervals is in order to avoid rapid decreases in water level and dewatering of shallow water habitats to prevent fish stranding.

Chelan PUD's Email re Updated Schedule dated March 22, 2017

Sokolowski, Rosana

From: Hays, Steve
Sent: Wednesday, March 22, 2017 2:58 PM
To: 'Breean Zimmerman (bzim461@ecy.wa.gov)'; 'Peterschmidt, Mark F. (ECY) (mape461@ecy.wa.gov)'; 'david.bowen@ecy.wa.gov'; 'Jim Pacheco'; 'Korth, Jeffrey'; 'Graham Simon'; 'travis.maitland@dfw.wa.gov'; 'Kari Grover Wier'; 'pwillard@fs.fed.us'; 'Emily Johnson (ekjohnson@fs.fed.us)'; 'Alex Martinez (ramartinez@fs.fed.us)'; 'Ashley_Rawhouser@nps.gov'; 'Hugh_Anthony@nps.gov'; 'Steve Lewis (Stephen_Lewis@fws.gov)'; 'Bonnie.Hossack@noaa.gov'; 'Justin Yeager (Justin.Yeager@noaa.gov)'; 'Bill Towey'; 'Bob Rose (rosb@yakamafish-nsn.gov)'; 'Carl Merkle (carlmerkle@ctuir.com)'; 'mcooney@cityofchelan.us'; 'Phil Archibald (ndmarkey@gmail.com)'; 'Nick Elwell'; 'tom.ernsberger@parks.wa.gov'; 'nona.snell@rco.wa.gov'; 'Richard Uhlhorn (richard@richarduhlhorn.com)'; 'Thomas O'Keefe (okeefe@amwhitewater.org)'
Cc: Osborn, Jeff; Smith, Michelle; Sokolowski, Rosana; Clement, Marcie; Bitterman, Deborah; Buehn, Scott; Campbell, Rob; Willard, Catherine; Underwood, Alene; Hopkins, Scott
Subject: Updated Schedule - Reduced Flow Operations To Implement Chelan River Steelhead Trout Egg to Emergence Survival Study
Importance: High

PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

To: Chelan River Fishery Forum
Washington Department of Ecology
Washington Department of Fish and Wildlife
United States Forest Service
National Park Service
United States Fish and Wildlife Service
National Marine Fisheries Service
CCT (Colville)
YN (Yakama)
CTUIR (Umatilla tribe)
City of Chelan
Lake Chelan Sportsman Association
United States Geological Survey
Washington State Parks and Recreation Commission
Washington State Recreation and Conservation Office
Lake Chelan Recreation Association
American Whitewater

From: Steven Hays, Fish & Wildlife Senior Advisor
Public Utility District No. 1 of Chelan County (Chelan PUD)
steve.hays@chelanpud.org
(509)661-4181

Re: Lake Chelan Hydroelectric Project No. 637 (Project)
Schedule - Reduced Flow in Chelan River Habitat Channel
To Implement Chelan River Steelhead Egg to Emergence Survival Study

Dear Chelan River Fishery Forum and Other Parties:

This is just an update to reflect a shift of one hour in the timing for flow reductions in the Chelan River Habitat Channel to start one hour later in the day. The reason for the change is to allow more time for the Eastbank Hatchery crew to spawn the fish and sort the eggs into 100 egg containers.

This is the new schedule, which also reflects a tighter 15 minute time period for exactly when each pump will be turned off.

Thanks,

Steve

Please reduce pump station flows on the following schedule. The flow rates are approximate due to the variation in pump flow quantity at different tailwater elevations. This schedule is for pump station operations only. There is no change to settings at the Low Level Outlet.

SCHEDULE FOR FLOW REDUCTION OPERATIONS – 3/23/2017

Initial Flow Conditions with four pumps in operation)	Approximately 290 cfs (88 cfs from Reaches 1-3 and 205 cfs from pumped flow
0900 – 0915 remain in operation)	Reduce flow to approximately 240 cfs by turning off one pump (three pumps
1000 – 1015 remain in operation)	Reduce flow to approximately 190 cfs by turning off one pump (two pumps
1100 – 1115 remains in operation)	Reduce flow to approximately 140 cfs by turning off one pump (one pump
1200 – 1215 turned off)	Reduce flow to approximately 90 cfs by turning off one pump (all pumps

Upon notification by Scott Hopkins:

Late Afternoon - dusk cfs (four pumps in operation)	Restore flow to approximately 290
--	-----------------------------------