Robbs Peak Powerhouse Entrainment Monitoring Plan

Sacramento Municipal Utility District

Hydro License Implementation • May 2015

Upper American River Project

FERC Project No. 2101

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Introduction

This Robbs Peak Powerhouse Fish Entrainment Monitoring Plan (Plan) addresses monitoring set forth in Condition 8.K of Appendix A (Water Quality Certification) and Condition Number 31 of Appendix B (USDA Forest Service section 4(e) conditions) of the new license issuance order (FERC 2014) for the Upper American River Project (UARP; FERC Project 2101), owned and operated by the Sacramento Municipal Utility District (SMUD). In addition, adaptive management measures are to be considered following analysis of the monitoring data as specified under Condition 9E of the Water Quality Certification and Condition Number 32 of the USDA Forest Service section 4(e) conditions. Language from the Water Quality Certification and USDA Forest Service 4(e) conditions as applicable to this monitoring plan are included in Attachment 1.

The UARP lies within El Dorado and Sacramento counties, primarily within lands of the Eldorado National Forest. The UARP consists of three major storage reservoirs—Loon Lake, Union Valley and Ice House (with a combined capacity of approximately 379,000 acre-feet), eight smaller regulating or diversion reservoirs, and eight powerhouses. The UARP has an authorized installed capacity of 637.3 megawatts (MW). The UARP also includes recreation facilities containing over 700 campsites, five boat ramps, hiking paths, and bicycle trails at the reservoirs.

The headwaters of the South Fork Rubicon River originate at an elevation of about 8,870 feet near Tells Peak. The South Fork Rubicon River flows generally westerly to the confluence with the Rubicon River at about elevation 3,850 feet, a distance of approximately 13 miles. Gerle Creek is the major tributary of the South Fork Rubicon River, entering the river about 4.8 miles upriver of its mouth. Robbs Peak Forebay is a 30 ac-ft impoundment (at maximum water surface elevation of 5,231 feet) created by a 44-foot-high, 320-foot-long concrete gravity overflow structure, with 12 steel bulkhead gates, all 6.2 feet high, on the spillway crest. The development primarily utilizes water released from the Loon Lake Development via Gerle Canal - an aboveground canal, 22 feet wide and 19 feet deep that extends 1.9 mile from Gerle Creek Reservoir to Robbs Peak Reservoir - and the South Fork Rubicon River (SFRR).

This Plan describes the monitoring of potential fish entrainment at Robbs Peak Powerhouse to determine when and at what flow fish migration is occurring, and at what flow entrainment, if any, is occurring.

SMUD will consult with the State Water Resources Control Board (SWRCB), California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS), and U.S. Fish and Wildlife Service as part of this monitoring plan.

Monitoring Plan Objectives

This monitoring plan is designed to simultaneously meet the objectives and rationale of the SWRCB Water Quality Certification Condition 8.k and USDA Forest Service 4(e) conditions of the new license. The rationale for fish entrainment monitoring at Robbs Peak Powerhouse is stated in the new license as follows:

There is potential for entrainment in Robbs Peak Powerhouse turbines that may contribute to declining fish populations in South Fork Rubicon River, upstream of Robbs Peak Reservoir Dam. The monitoring will assist in determining if fish are going through the powerhouse, and if so, how to minimize this entrainment.

Fish population monitoring shall be conducted to determine when and at what flow fish migration is occurring, and at what flow entrainment, if any, is occurring, using a method approved by the Deputy Director, in consultation with USFS, USFWS, and CDFW.

Methods

The general approach to determining when and at what flow fish migration is occurring in the vicinity of the Robbs Peak Powerhouse intake (intake, Figure 1) will be to conduct a mark-recapture study of resident trout occurring in South Fork Rubicon River using unique Passive Integrated Transponder (PIT) tags, and monitor migratory patterns with fixed antennas for two migratory seasons (October to December 2015, and January through December 2016). Resident trout will be captured and tagged from within the South Fork Rubicon River (Figure 1). Mark-recapture efforts will be conducted seasonally. Antennas will be installed in lower Gerle Canal, in South Fork Rubicon River upstream of the forebay, in the forebay, and at the intake. Monitoring will be conducted during potential migratory periods, from Fall 2015 through Fall 2016. Flows from within the canal and the South Fork Rubicon River will be continuously monitored during the period of study. Details of the approach are described below.

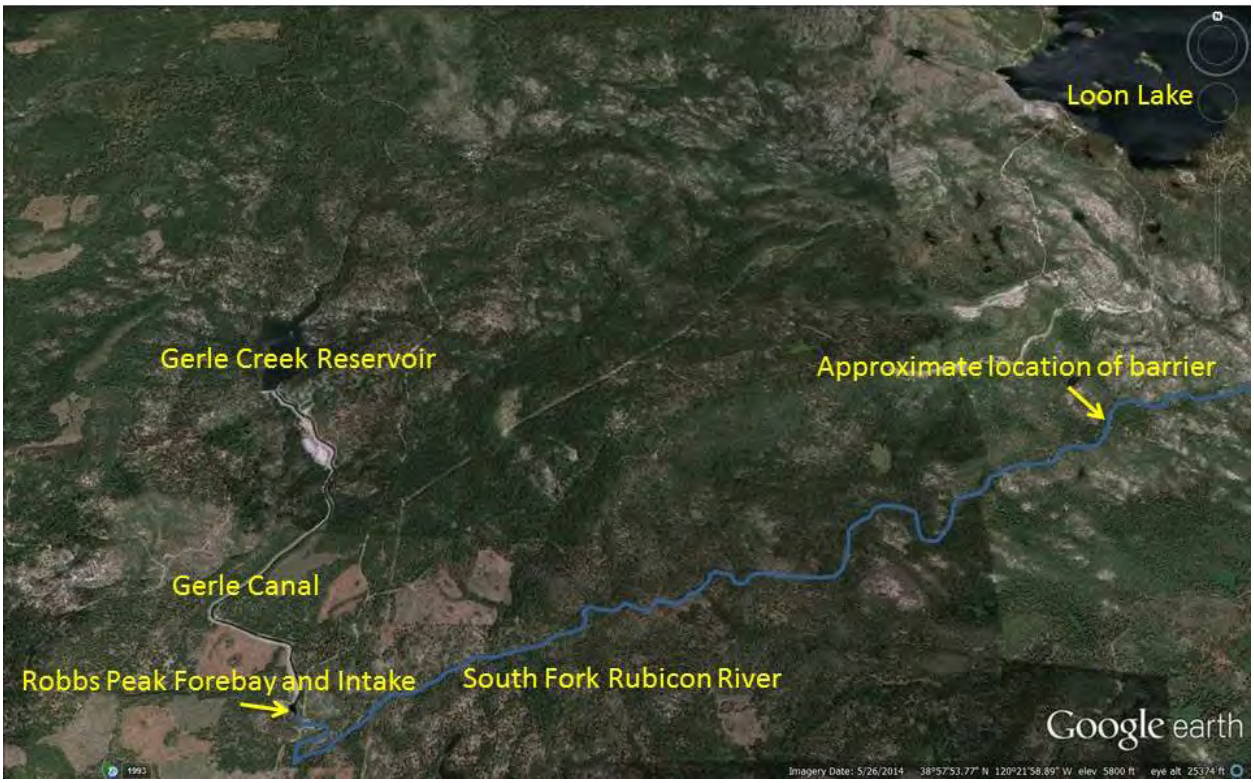

Figure 1. Study Area.

Mark-recapture

Based on prior reports (EA 1980, WESCO 1980, Stillwater Sciences 2004, 2007, 2009; DTA and Stillwater 2005), resident rainbow trout and brown trout are known to occur in the South Fork Rubicon River and the forebay. The sampling will occur as follows:

Fish capture associated with initial PIT tagging is scheduled to coincide with installation of PIT tag antennas (described below) during a planned outage of the Robbs Peak Powerhouse in Fall 2015 (Year 1). Additional mark-recapture events will also be conducted during spring (May/June), summer (July) and fall of Year 2, for a total of approximately 4 efforts. Any fish not tagged during the initial sampling effort in 2015 will be tagged in the spring and summer 2016 re-capture efforts to add more fish to the sample population.

During representative hydrologic conditions (Fall 2015), the entire reach from the forebay to the cascade falls will be habitat typed at the mesohabitat unit scale (e.g., pools, riffles, runs, and others) to identify, enumerate, and flag all habitat units for subsequent observations/sampling.

Fish capture within the South Fork Rubicon River will be conducted from the confluence with the forebay, upstream to the first fish passage barrier (“reach”). Three study sites of approximately 300 to 1,000 feet each will be selected from within the lower, middle, and

upper portions of the South Fork Rubicon River upstream of the forebay and downstream of the cascade falls barrier (Figure 1). Specific sites will be selected based on availability of representative habitat units, occurrence of habitat that is both safe and feasible for sampling, and access from existing roads. Consultation with the resource agencies will occur prior to selecting the final study sites.

During the Fall 2015 effort, sampling within the sites will be conducted to estimate the fish density and relative abundance of both rainbow trout and brown trout from within each site. Electrofishing field methods will use procedures identified by Reynolds (1996), Meador et al. (2003), and Temple and Pearsons (2007). Electrofishing manpower needs will follow Temple and Pearsons (2007), who recommend one backpack electrofishing crew for streams less than 7.5 meters (m) wide and two backpack electrofishing crews for streams from 7.5 to 15 m wide. In streams wider than 15 m, the number of electrofishing crews will be increased as necessary to ensure effective fish sampling. Where population estimates are to be performed, each site will be block-netted at the upstream and downstream end, and all habitats will be sampled using a multi-pass depletion approach to estimate density and abundance. All sampling will be conducted using one or two backpack electrofishers and a team of net handlers. Backpack electrofishers will initially be set at 120 volts and 45 Hz, which works well in small pools, but may not be sufficient to capture fish in deep pools. A higher voltage setting will be considered in larger units, with the consideration of avoiding injury to fish, and thus the settings will likely be kept under 160 volts. Pulse rate (32-45 HZ) and pulse width (4.5 – 6.3 mS) will be adjusted as needed to prevent any branding. Stunned fish will be captured in D-frame nets and placed in labeled buckets full of cold creek water.

In addition to sampling within selected sites, sampling will also occur upstream and downstream of each site with at least one pass with the electrofisher. Sampling will occur for up to three, 8 hours-of-effort days within the vicinity of each site until; 1) the target PIT tag sample size of 1,000 total fish is achieved or, 2) a total of nine 8 hours-of-effort days of sampling is completed. If, prior to meeting either of the milestones above, over 65% of the wetted habitat has been sampled or if sampling is resulting in greater than 10% recaptures from previous days of sampling, the effort will be halted to ensure that sampling does not affect an inappropriate proportion of the fish populations. The resource agencies will be immediately consulted to determine if sampling should be continued.

During recapture efforts all three study sites and adjacent habitat will be re-sampled for at least one 8 hours-of-effort day with at least one-electrofishing pass in previously sampled habitat.

Fish processing

All captured resident trout will be transferred to a bucket containing a non-toxic anesthetic, such as clove oil (concentration of 20-60 mg/l), following the procedures of Neiffer and Stamper (2009). The location (+/- 25 ft) of all captured fish will be recorded

based on habitat unit, a GPS location, and/or noted on an aerial photograph. Once fully anesthetized, fork length (FL) will be measured to the nearest millimeter with a wetted fish measuring board. Before measuring, all fish will be scanned with a hand-held PIT tag reader. The PIT tag identification, size, and location will be recorded for all recaptured fish.

All previously unmarked fish will be tagged. During each subsequent fish capture effort all previously tagged fish will be re-sighted, and all untagged fish will be tagged with a PIT tag. Both half-duplex and full-duplex tag technology is available, and one tag type will be selected. Minimum size of tagged fish will depend on the tag type selected, and is anticipated to be between 65 and 100 mm. PIT tags can be subsequently detected during recapture efforts using a hand-held PIT tag reader, or at PIT tag antennas described below.

Tag insertions will be made with a small incision into the body cavity anterior to the pelvic fin, or in the dorsal sinus (generally on fish greater than 250 mm FL) using a clean, sharp scalpel. Just before insertion, tags will be scanned with a hand-held PIT tag reader to make sure they were functioning. The tag will be pushed gently into the incision point and closed with a drop of sterile VetBond tissue adhesive. The fish will then be gently placed into a recovery bucket and monitored until it resumes activity. All fish will be returned to the habitat unit where they were captured as quickly as possible.

PIT tag antennas

An instream channel-spanning PIT tag antenna system will be constructed in order to monitor fish migration at four locations: 1) lower Gerle Canal, 2) South Fork Rubicon River upstream of the forebay, 3) in the forebay at the trash rack, and 4) in the forebay at the intake. Monitoring will be conducted during potential migratory periods, from Fall 2015 through Fall 2016. Fall 2015 is the soonest that maintenance is scheduled to occur at the Robbs Peak Powerhouse, which is necessary to reduce flows enough for antenna installation in Gerle Canal and at the intake. Fish capture and tagging will occur during antenna installation, to ensure that no fish are tagged prior to the ability to detect migration. Based on typical ice-over conditions during winter resulting in reduced fish migration, monitoring may be reduced during winter, depending on feasibility.

Construction of a full-duplex and half-duplex antenna system are both feasible, and a specific antenna system will be selected based on site specific considerations, including channel width, flow conditions, access to power, and debris risk. Based on the remote location, and potential for high flows, a system will be selected that is secure, stable, and includes redundancy to minimize lost data.

In the South Fork Rubicon River upstream of the forebay a site for antenna installation will be selected near the confluence with the forebay where the creek is narrow, flow is approximately laminar, and there is access from the road (Figure 2). This site will be established to monitor the migration of fish either upstream into the South Fork Rubicon

River, or downstream into the forebay. Paired antennas will be installed at this site so the direction of movement of detected fish can be determined. Although the specific construction will depend on site-specific conditions, in general each antenna will consist of a single loop of antenna wire running from the tuner unit into the water, along the bottom of the channel, then back along a steel cable spanning the channel above the water surface, to an antenna tuner box. A robust and protected cable will be used for the bottom antenna wire; this will be connected on the opposite bank to a smaller antenna wire that is “zip tied” to a spanner cable which leads back across the channel. This allows for a full channel-width antenna. The antenna will be secured to boulders and/or stakes on each bank. The tuner boxes will be placed on the same side of the river as the computer system, in a tree at a higher elevation than that typical elevation of flood flows. A length of coaxial cable will be connected from each tuner box to the PIT tag computer system, which will include a reader board, multiplexor and data logger. Other arrangements will be made, as necessary, to enhance security of the site.

Figure 2. PIT tag antenna locations.

In lower Gerle Canal (Figure 3) paired antennas will be constructed, using a similar approach as described above so that direction of movement can be detected. This site will monitor the potential migration of fish upstream within the Gerle Canal or into Gerle Reservoir, or downstream into the forebay. Each antenna will run along the Canal substrate and water surface to form a loop, and all fish swimming through the loop within the read-range will be detected. Based on water depth and width of the site, two

antennas may be constructed side-by-side, with each covering half the canal width. Therefore, it may be necessary to construct up to four synchronized antennas (two pairs of two antennas side-by-side) to cover the entire area where fish passage could occur.

At the Robbs Peak Powerhouse intake (Figure 3) antennas will be constructed as described above, taking advantage of the trash rack and intake concrete infrastructure to locate a pair of secure antennas at the opening to the tunnel. If feasible, the paired antennas will determine direction of movement. However, based on the facility, it may not be possible to install a paired antenna. It will likely be challenging to install a series of two to four antennas to cover the intake, and it may not be possible to construct a pair.. As described below, analysis of detection data at this location will take this into account. Placing an array at the trash rack will likely provide information on potential milling behavior in the forebay, as well as to assess entrainment probability of fish detected at the powerhouse intake array. For example, fish detected at the intake, and subsequently detected at the trash rack array, can be assumed to have not been entrained at the intake. Placing an array at the trash rack provides a unique opportunity to determine entrainment because it is the only access pathway for tagged fish to get near or away from the powerhouse intake structure.

Power will be supplied by SMUD at the Gerle Canal and Robbs Forebay locations. Where on-site power is not available, it will be supplied by six 6-volt deep cycle batteries arranged in series to supply a nominal 12 volts. Other arrangements to increase to 18 volts may be considered, which can increase the read-range of an antenna. A solar panel will be used to trickle charge the batteries, and reduce the frequency of battery replacement. It is anticipated that each month during the monitoring period deep cycle batteries will replaced, antenna function will be checked, and adjustments will be made as necessary.

The read range of the antennas will vary, and will be measured by obtaining an average of the farthest distance that a PIT tag is readable from the horizontal plane of the antenna loop. Vertical read range will be determined by placing a PIT tag on the bottom antenna wire and measuring the read range while the tag was slowly moved up within the antenna, along a vertical plane. The antennas will be tuned and adjusted to maximize the read range of each antenna. At all locations when a PIT-tagged fish passes within the antennas read range, the unique tag number, the antenna ID, and the date and time of passage will be recorded on the data logger.

The operational efficiency goals of antenna arrays will be 80% detection. An initial calibration will be conducted at each antenna by passing a minimum of 10 PIT tags along numerous gridded points in the detection area to identify any detection gaps and calculate detection efficiency. Calibrations will be repeated monthly and detection efficiency will be recorded. If calibration is less than 80% for any antenna, SMUD will coordinate with the agencies to determine how best to evaluate efficiency rates and how to adjust for time periods when efficiency tests are less than 80%. In addition, during any power outage or other maintenance that occurs during the monitoring period,

antennas will be cleaned and upgraded as appropriate. Detection calibration results will be used to determine the maximum percent efficiency expected during monitoring.

Flow monitoring

Flows in the project area will be monitored using a combination of the Gerle Canal gage flows, Robbs Peak Powerhouse flows, Gerle Creek gage flows, South Fork Rubicon River gage flows below the Gerle Creek confluence, and a gage in the South Fork Rubicon River downstream of the forebay. These sources will allow calculation of flows out of upper South Fork Rubicon River into the forebay. In addition, an additional gage is scheduled for construction downstream of Robbs Peak Forebay in 2015. Flows that occur during the period of monitoring will be compared with fish migration patterns, as described in "Analysis."

Analysis

Analysis will be focused on determining when and at what flow fish migration is occurring, and at what flow entrainment, if any, is occurring. This will be based on assessing detections from mark-recapture efforts, and PIT tag antenna detections. The locations of all fish detected at antennas or recaptured during fish mark-recapture efforts will assessed to determine the distance moved, direction of movement, timing of movement, relationship to season and flows, whether they were entrained, as well as the species and initial size of recaptured fish.

Potential entrainment will be defined as fish detected at the intake antenna(s) when the powerhouse is operating that are not subsequently detected at another location. Based on fish behavior, it is possible that fish will feed from within the higher water velocities that occur at the intake trash rack, and thus be detected without actually being entrained. In many cases this "milling" behavior can be observed based on multiple detections of individual fish at the intake. Therefore, any fish that are detected at the intake, and then subsequently detected at another location upstream of the intake will be assumed to have not been entrained at the intake.

Based on this analysis, the percentage of fish PIT tagged in the South Fork Rubicon River that are observed to be entrained will be calculated. All entrained fish will be analyzed to describe entrainment patterns, such as flows, timing, species, size, tagging location, distance upstream from forebay, etc. The general migratory patterns of resident trout will also be described, with specific emphasis on the flows, species, size, and timing of the use of habitat in the forebay. Fish detected that remain within their location of capture, and the growth patterns of all recaptured fish will also be described.

In addition, the population abundance within the South Fork Rubicon River will be estimated based on the Fall 2015 sampling effort. Multi-pass depletion sampling will be used to estimate fish density (e.g., fish/ft^2, fish/mile) that can be extrapolated to obtain a reach (downstream of cascade falls to forebay) estimate of abundance.

Abundance estimates (with confidence intervals) will also be generated using Program Mark based on the mark-recapture data from the sequences of surveys (including multi-pass and single-pass surveys), and antenna detections.

Adaptive management

Pursuant to the SWRCB Water Quality 401 Certification and USDA Forest Service 4(e) conditions (Attachment 1), “If monitoring indicates that fish are being entrained in Robbs Peak Powerhouse during fish migration, and USFS, USFWS, Deputy Director or CDFW determine that the entrainment is having a substantial negative impact on the South Fork Rubicon River fishery, the Licensee shall develop adaptive management measures…” Results of monitoring and analysis will be examined with the resource agencies to discuss if a substantial negative impact from entrainment is occurring.

As stated in the rationale for this monitoring plan (Attachment 1), “The monitoring will assist in determining if fish are going through the powerhouse, and if so, how to minimize this entrainment.” If a substantial negative impact on the South Fork Rubicon River fishery is considered to be occurring in this study, the data collected on timing, seasonality, and relationship of migration to flow and other variables will be assessed to inform and direct management, as appropriate.

Plan Revisions

If SMUD, USFS, CDFW, or SWRCB collaboratively determine that revisions should be made to the plan, SMUD will make any revisions to the Plan in coordination and consultation with the listed resource agencies. Any revisions to the plan must be approved by USFS, CDFW, and SWRCB. Any revisions shall be filed with FERC for approval prior to implementing.

Schedule

Condition 8.K of the Water Quality Certification and Condition Number 31 of the USDA Forest Service section 4(e) conditions requires monitoring in Years 1 and 2, which will be 2015 and 2016. Also as stated in the new license, within 6 months of license issuance, the licensee shall develop a Robbs Peak Powerhouse Entrainment monitoring plan in consultation with FS, CDFG, FWS, and SWRCB. The licensee shall provide FS, CDFG, FWS, and SWRCB a 90-day review and approval period for the monitoring plan prior to implementation. Lastly, Article 401a of the FERC License requires SMUD to file the Plan for FERC approval no later than 10 months post-License issuance. SMUD shall implement the plan upon FERC approval. Therefore the timing of monitoring is constrained by: 1) plan approval, 2) installation of antennas during scheduled maintenance at Robbs Peak Powerhouse during fall 2015, 3) conducting monitoring in

Years 1 and 2 (2015 and 2016), and 4) report completion in 2017. The anticipated schedule development and implementation for this plan is summarized in Table 1.

Table 1. Anticipated schedule for plan development and implementation.

Item	Duration	Date
License Issuance		23 July 2014
Monitoring Plan for Consultation Group Review	30 days	11 December 2014 – 12 January 2015
Monitoring Plan for Agency Review/Approval	90 days	23 January 2015 – 23 April 2015
Monitoring Plan to FERC for Approval		On or before 23 May 2015
Simultaneous habitat typing, antenna installation, and initial fish marking		September–October 2015
Year 1 monitoring		October– December 2015
Year 2 monitoring		January– December 2016
Draft Report		Late February 2017

Literature Cited

DTA (Devine, Tarbell and Associates) and Stillwater Sciences. 2005. Stream Fisheries Technical Report for Upper American River Project (FERC Project No. 2101) and Chili Bar Project (FERC Project No. 2155). Prepared by Devine, Tarbell and Associates and Stillwater Sciences for Sacramento Municipal Utility District, Sacramento, CA and Pacific Gas and Electric Company, San Francisco, CA.

Ecological Analysts, Inc. 1980. A Study of the Instream Resources of South Fork Rubicon River, El Dorado County, California. Prepared by Ecological Analysts, Inc. for Sacramento Municipal Utility District, Sacramento, CA.

FERC (Federal Energy Regulatory Commission). 2014. Order issuing new license. Project 2101-084, 148 FERC ¶ 62,070. Issued July 23, 2014.

Meador, M.R., J.P. McIntyre, and K.H. Pollock. 2003. Assessing the efficacy of single-pass backpack electrofishing to characterize fish community structure. *Trans. Amer. Fish. Soc.*, **132**:39-46.

Neiffer, D. L., and M. A. Stamper. 2009. Fish sedation, anesthesia, analgesia, and euthanasia: considerations, methods, and types of drugs. ILAR Journal 50: 343-360.

Reynolds, J. B. 1996. Electrofishing. Pages 83-120 in B.R. Murphy and D.W. Willis, editors. Fisheries Techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Stillwater Sciences. 2004. 2004 Gerle Canal Fish Salvage. Prepared by Stillwater Science, Davis, CA for Sacramento Municipal Utility District, Sacramento, CA.

Stillwater Sciences. 2006. Stream Fisheries Summary Report for the Upper American River Project. Prepared by Stillwater Sciences, Davis, CA for Sacramento Municipal Utility District, Sacramento, CA.

Stillwater Sciences. 2007. Gerle Canal Fish Salvage. Prepared by Stillwater Sciences, Davis, CA for Sacramento Municipal Utility District, Sacramento, CA.

Stillwater Sciences. 2009. 2009 Gerle Canal Fish Salvage. Prepared by Stillwater Sciences, Davis, CA for Sacramento Municipal Utility District, Sacramento, CA.

Temple, G. M., and T. N. Pearsons. 2007. Electrofishing: backpack and drift boat. Pages 95–132 in D. H. Johnson, B. M. Shrier, J. S. O'Neil, J. A. Knutzen, X. Augerot, T. A. O'Neil, and T. N. Pearsons, editors. Salmonid field protocols handbook: techniques for assessing status and trends in salmon and trout populations. American Fisheries Society, Bethesda, Maryland.

WESCO (Western Ecological Services Company). 1980. Fishery investigations, South Fork American River between Slab Creek Dam and Chili Bar Reservoir. Prepared for SMUD, Sacramento, CA.

Attachment 1

State Water Resources Control Board 401 Certification for the UARP Condition 8.K Robbs Peak Powerhouse Entrainment

Within six months of license issuance, the Licensee shall develop a Robbs Peak Powerhouse Entrainment monitoring plan in consultation with USFS, CDFW, USFWS, and the State Water Board to determine if operations of the Robbs Peak Powerhouse are causing fish entrainment. The Licensee shall provide the Deputy Director with any comments provided by the agencies during the consultation process. The Licensee shall submit the plan to the Deputy Director for review and approval after agency consultation. The Licensee shall provide the Deputy Director with at least 90 days to review and approve the plan prior to submittal to the Commission, if applicable. The Deputy Director may require modifications as part of the approval. The Licensee shall file the Deputy Director's approval, together with any required plan modifications, with the Commission.

Method: Fish population monitoring shall be conducted to determine when and at what flow fish migration is occurring, and at what flow entrainment, if any, is occurring, using a method approved by the Deputy Director, in consultation with USFS, USFWS, and CDFW.

Frequency: Years 1 and 2 following license issuance.

State Water Resources Control Board 401 Certification for the UARP Condition 9.E. Fish Entrainment in South Fork Rubicon River

If monitoring indicates that fish are being entrained in Robbs Peak Powerhouse during fish migration, and USFS, USFWS, Deputy Director or CDFW determine that the entrainment is having a substantial negative impact on the South Fork Rubicon fishery, the Licensee shall develop adaptive management measures, in consultation with USFS, CDFW, and USFWS, that shall be submitted to the Deputy Director for review and approval. The Licensee shall provide the Deputy Director with any comments provided by the agencies during the consultation process. The Deputy Director may require modifications as part of the approval. The Licensee shall file the Deputy Director's approval, together with any required plan modifications, with the Commission. The Licensee shall implement the appropriate adaptive management measures upon approval of the Deputy Director, and any other necessary regulatory agency approvals.

USDA Forest Service 4(e) conditions, Condition No. 31- Monitoring Program for Robbs Peak Powerhouse Entrainment

Within 6 months of license issuance, the licensee shall develop a Robbs Peak Powerhouse Entrainment monitoring plan in consultation with FS, CDFG, FWS, and SWRCB. The licensee shall provide FS, CDFG, FWS, and SWRCB a 90-day review

and approval period for the monitoring plan prior to implementation. The licensee shall implement the plan upon approval.

Method: Population monitoring as described in number 1, above. Monitoring to determine when and at what flow fish migration is occurring using a method approved by FS, FWS, and CDFG.

Frequency: Years 1 and 2.

Rationale: There is potential for entrainment in Robbs Peak Powerhouse turbines that may contribute to declining fish populations above Robbs Peak Reservoir Dam. The monitoring will assist in determining if fish are going through the powerhouse, and if so, how to minimize this entrainment.

USDA Forest Service 4(e) conditions, Condition No. 32 - Adaptive Management Program for fish entrainment in South Fork Rubicon River

If monitoring indicates that fish are being entrained in Robbs Peak Powerhouse during fish migration, and FS, FWS, and CDFG determine that the entrainment is having a substantial negative impact on the South Fork Rubicon fishery, the licensee shall develop appropriate adaptive management measures that are approved by FS, CDFG, FWS, and SWRCB. The licensee shall implement the appropriate adaptive management measures upon approval of FS, CDFG, FWS, and SWRCB.

152 FERC ¶ 62,072
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Sacramento Municipal Utility District Project No. 2101-106

ORDER MODIFYING AND APPROVING ROBBS PEAK POWERHOUSE ENTRAINMENT MONITORING PLAN PURSUANT TO ARTICLE 401(A)

(Issued July 30, 2015)

1. On May 21, 2015, Sacramento Municipal Utility District (licensee) filed its Robbs Peak Powerhouse Entrainment Monitoring Plan with the Federal Energy Regulatory Commission (Commission) pursuant to Article 401(a) of the Upper American River Project license.[1] The project is located on the Rubicon River, Silver Creek, and South Fork American River in El Dorado and Sacramento counties, California and occupies lands within the Eldorado National Forest.

REQUIREMENTS

2. Article 401(a), in part, requires the licensee to file, for Commission approval, a Robbs Peak Powerhouse Entrainment Monitoring Plan (Plan) within 10 months of license issuance, or May 23, 2015. The Plan is also required by the project's Water Quality Certification (WQC), Condition No. 8(k) and the U.S. Forest Service (FS) 4(e) Condition No. 31.12.[2] These requirements specify that the Plan should include a fish population monitoring program that seeks to determine when and at what flow fish migration is occurring, and at what flow entrainment, if any, is occurring as fish pass through the Robbs Peak Powerhouse. The licensee must develop the Plan in consultation with the State Water Resource Control Board (SWRCB), U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), and the California Department of Fish and Wildlife (DFW).

[1] Order Issuing New License. 148 FERC ¶ 62,070 (issued July 23, 2014).

[2] The water quality certification and U.S. Forest Service 4(e) Conditions were incorporated into the project license via Appendices A and B, respectively.

LICENSEE'S PLAN

Mark-Recapture Study

3. The licensee's proposed Plan includes a mark-recapture study using passive integrated transponder (PIT) tags and fixed antennas. The study would continue for two study seasons during the migratory period for resident trout (October to December) in 2015 and 2016 in order to determine when, and at what flows, fish are migrating in the vicinity of the Robbs Peak Powerhouse intake. Prior to the start of the study, the licensee would install receiver antennas in lower Gerle Canal, in the South Fork Rubicon River upstream of the forebay, in the forebay at the trash rack, and in the powerhouse intake to monitor fish activity as they pass by the antenna. The details of the capture and tagging efforts, as well as flow monitoring, are discussed below.

4. During initial capture efforts in 2015, the licensee would conduct electrofishing sampling at three study sites in the lower, middle, and upper portions of the South Fork Rubicon River, upstream of the forebay and downstream of a known migration barrier.[3] The study sites would contain representative habitat types. From this sampling, the licensee would estimate fish density and relative abundance of both brown and rainbow trout and also insert the PIT-tags into the fish under anesthesia. The licensee would repeat the capture effort in the spring, summer and fall to improve the sample population and better characterize the fish population in these areas.

5. Throughout the study, the licensee would continuously monitor flows using a combination of Gerle Canal gage flows, Robbs Peak Powerhouse flows, Gerle Creek gage flows, South Fork Rubicon River gage flows below the Gerle Creek confluence, and South Fork Rubicon River gage flows downstream of the forebay. The licensee would use these sources to determine flows out of upper South Fork Rubicon River into the forebay. The licensee would also install an additional gage downstream of the Robbs Peak forebay in 2015 as part of the study. The licensee would cross-reference flows at these locations to fish migration patterns in order to determine flows at which migration is taking place.

6. Upon completion of the study, the licensee would analyze the data to determine when and at what flows, migration is occurring. The licensee would assess the locations of all fish detected by the antennas or recaptured during mark-recapture efforts in order to determine the distance moved, direction of movement, timing of movement, and relationship to season and flows. The data would also be analyzed to determine at what flow, if any, entrainment is occurring. This determination would be based on assessing detections from mark-recapture efforts and PIT-tag antenna detections. The licensee

[3] The location of the barrier is noted in the licensee's Plan.

would consider entrainment to have occurred if fish detected at the intake antennas during powerhouse operation are not subsequently detected at another location. The licensee's Plan contains more information on its rationale for determining whether entrainment occurred. All entrained fish would be analyzed to identify entrainment patterns such as flows, species, size, and timing of the use of habitat within the forebay.

Reporting

7. Following the two-year study, the licensee would compile a report of its findings and file it with the FS, FWS, SWRCB and DFW for review and comment in late February 2017. Based on the results of the study, the licensee may develop adaptive management measures in consultation with the resource agencies to address entrainment issues.

AGENCY CONSULTATION

8. The licensee provided its Plan to the aforementioned agencies for review and comment on January 23, 2015. Based on comments provided by the resource agencies, the licensee revised its Plan multiple times, filing the final version of the Plan with them for approval on May 14, 2015. The FS, DFW and SWRCB approved the Plan. The FWS did not comment on the Plan.

DISCUSSION AND CONCLUSIONS

9. The study described in the licensee's Plan should effectively determine when and at what flows fish migration is occurring, and at what flow, entrainment, if any, is occurring at the Robbs Peak Powerhouse. The data collected under the Plan should allow the licensee to determine whether adaptive management measures are needed to reduce entrainment, if it is found to occur, at the Robbs Peak Powerhouse.

10. As proposed, the Plan includes a provision to provide the agencies with the final study report. As proposed, it is unclear if and when the licensee would file the report with the Commission. In order to keep the Commission apprised of activities taking place under the Plan, the licensee should be required to file the report with the Commission after it has provided the resource agencies sufficient time to review and comment on the report. Taking into account the licensee's February 2017 reporting schedule, the licensee should file the report, documentation of consultation with the resource agencies, and its response to agency comments, with the Commission by May 15, 2017. The Commission should reserve the right to require changes to the Plan based on the study results.

11. Sacramento Municipal Utility District's proposed Robbs Peak Entrainment Monitoring Plan fulfills the requirements of the 401 (a) in part, Water Quality

Certification Condition No. 8(k), and the FS' 4(e) Condition No. 31.12, and as modified, should be approved.

The Director orders:

(A) Sacramento Municipal Utility District's (licensee) Robbs Peak Entrainment Monitoring Plan (Plan), filed on May 21, 2015, pursuant in part to Article 401 (a), Water Quality Certification Condition No. 8(k), and the U.S. Forest Service (FS) 4(e) Condition No. 31.12 for the Upper American River Project (FERC No. 2101), as modified in paragraph (B), is approved.

(B) The licensee's final study report must be filed with the Commission by May 15, 2017. The report must include documentation of consultation with the FS, U.S. Fish and Wildlife Service, State Water Resource Control Board, and the California Department of Fish and Wildlife, and the licensee's response to any agency comments. The Commission reserves the right to require changes to the Plan based on the final study report.

(C) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2015). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

(for) Thomas J. LoVullo
Chief, Aquatic Resources Branch
Division of Hydropower Administration
and Compliance

Document Content(s)