

Portland Water Bureau and United States Forest Service

# Bull Run Watershed Management Unit Annual Report

May 2020



**Bull Run Watershed Semi-Annual Meeting**





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## **COVID-19 UPDATE**

The Portland Water Bureau and U.S. Forest Service are continuing to monitor the COVID-19 pandemic situation and adhere to associated federal, state, local, and agency requirements and guidelines to reduce transmission of this virus. Health and safety of employees and the public continue to be paramount in all decisions regarding activities within the Bull Run Watershed Management Unit. All future activities described in this report will be conducted in accordance with these COVID-19 related policies, procedures, and guidelines which are being updated frequently; thus, all future activities and related timelines described herein are subject to change.

## **ERRATA**

Previous annual reports, from 2013 to 2018, contained an incorrect statement regarding the findings of Bull Run Lake cutthroat trout spawning surveys. These reports stated that there is no statistically significant relationship between redd counts and lake water surface elevation. There is, however, a relationship between redd counts and water surface elevation. See Section H for further discussion. The Portland Water Bureau regrets the error.

## **A. OVERVIEW**

This report fulfills the annual work plan reporting commitment described in the 2007 Bull Run Watershed Management Unit Agreement (“Agreement”) between the Portland Water Bureau (referred to as the “City” and “PWB” throughout report) and the US Forest Service (referred to as “USFS” and “Forest Service” throughout report). As part of the Agreement, the PWB and the USFS agree to use a working group format and annual work plan to update each other on pertinent projects and monitoring occurring within the Bull Run Watershed Management Unit (BRWMU). Specific topics covered in the Agreement and included in this report include: security and access management; emergency response planning; transportation system; fire planning and management; water quality and quantity monitoring; terrestrial and aquatic natural resources; conservation education; administrative use trails; and simplifying land ownership and occupancy arrangements. Other topics of interest to both agencies within the BRWMU can be added or removed depending on annual applicability.

## **B. SECURITY and ACCESS MANAGEMENT**

### **Bull Run Security Access Policies and Procedures**

PWB continues to implement the Bull Run Security Access Policies and Procedures Standard Operating Procedure, which include procedures for entering the Bull Run as an employee or contractor. Key components of the plan include a requirement for PWB employees and contractors to notify PWB Security Dispatch when entering and

exiting the watershed, and a vehicle permit designed to more clearly mark vehicles in the watershed, used by both PWB and the Forest Service. BRWMU gates are operated with a standard hard lock and key system. The main watershed gate also continues to be able to be opened by authorized electronic key-card holders.

Two full-time PWB Watershed Rangers conduct frequent foot and vehicle patrols, monitor surveillance cameras at the main gate, Dam 1, and Dam 2, and monitor remote trail cameras at undisclosed locations. They check for evidence of trespass, domesticated animal incursion, and other illicit activity. Rangers also regularly check the condition and functionality of all gates and locks and confirm the condition of boundary signage. Security Dispatch personnel provide additional continuous monitoring of surveillance cameras in the Bull Run. U.S. Forest Service Law Enforcement Officers also occasionally conduct patrols of the BRWMU for illegal activity.

Additional barrier fencing was installed in 2017 at the Homestead gate, along the southern border of the BRWMU near the Sandy Ridge bike trail system, and in 2019 at the Pete Creek gate located on the northern boundary of the BRWMU. This fencing has been effective in making trespass more difficult at both locations in and deterring potential trespassers.

PWB Security staff continue to regularly attend the Bull Run Community Planning Organization meetings as part of on-going community outreach efforts.

### **C. EMERGENCY PLANNING and RESPONSE**

The Forest Service and PWB exchange updated emergency contact information for key personnel in the fall and spring of each year.

### **D. TRANSPORTATION SYSTEM**

In the BRWMU Agreement (2007), the Water Bureau and the Forest Service agreed that the City should become primarily responsible for the BRWMU transportation system, including capital reinvestment and regular maintenance. At the time, it was recognized that a legal agreement would be needed to formally recognize this arrangement. The Water Bureau and the Forest Service continue to work on completing an easement that fulfills the legal agreement envisioned by the two parties in the BRWMU Agreement. The easement provides the legal mechanism for the City to continue to use the roads and to accomplish routine road maintenance as well as capital road repair for the benefit of both City and USFS management purposes in the BRWMU. The easement is nearly complete, along with the accompanying Bull Run road management plan; it is the intent of both agencies to finalize the easement and road management plan as soon as possible following completion of the Bull Run Land Exchange (see page 15).

**2019 Projects: Road 10 (“10R”: MP 28.77 - 31.85; Road 10 Shoulder Repair: MP 1.47)**

A 3.1-mile section (“10R”) of road between MP 28.77 and 31.85 along the Road 10 in the upper Bull Run watershed was reconstructed in 2019. This area extends from approximately the intersection with Road 1000524 to the intersection with Road 1027 and is entirely located on USFS land. The project was needed to improve pavement condition, create better ditch lines, improve drainage, and address significant slumping and slides in the area. Several culverts were also replaced; many were significantly upsized to increase drainage capacity for current and future stream flows, improve aquatic habitat, and improve resilience of road infrastructure.

Repaving of the entire road segment was postponed in 2019 due to the onset of winter conditions and is expected to be completed in early summer 2020. The project ensures continuous, reliable, and safe access throughout the watershed for fire protection, monitoring, security, and other water supply operational and regulatory needs.

A project to repair a short, approximately 70-foot, segment of Road 10 at MP 1.47 was also completed in 2019. The project repaired significant cracking caused by a landslide that occurred along the road shoulder. The repair reduces the risk of unexpected road failure and helps to ensure continuous, reliable, and safe access to all facilities.

**2020 Project: Road 10 (“10E”: MP 6.2 to MP 8.2)**

Project design is complete for reconstruction of a 2.0-mile section of Road 10, from approximately MP 6.2 to the intersection with Road 1008 (MP 8.2). Most of the road segment is on PWB land, but approximately 0.4 miles is located on USFS land. The road segment will be reconstructed and repaved to improve pavement condition, create better ditch lines, improve drainage, and address slumping and slides. Several culverts will be replaced and upsized to improve drainage and reduce risks to water quality and aquatic habitat. Project design was completed in early 2020. Due to the complexity of the project and site conditions, construction will likely occur over two years, during the summer and fall of 2020 and the summer and fall of 2021.

**2021 Project: Hamilton Creek culvert replacement (MP 12.5)**

Project design is slated to begin in July 2020 for replacement of an undersized culvert on Hamilton Creek, a stream that feeds directly into Reservoir 1. The culvert is located on Road 10 at MP 12.5, just before the North Fork Bull Run River Bridge. The culvert is significantly undersized and failing, increasing the risk for a catastrophic road failure that could deposit sediment directly into the drinking water reservoir, damage the road, and damage fish habitat for cutthroat trout. A technical planning memo was completed in 2019 to assess alternative replacement options; the recommended option is to replace the existing 36-inch culvert with a precast, prestressed concrete bridge that meets the USFS Aquatic Organism Passage (AOP) requirements. The new bridge is expected to provide a 24-foot clear span. PWB staff are assisting with the preliminary design in coordination with USFS Mt Hood

National Forest staff and the USFS Regional AOP Design Assistance Team. Design and permitting are expected to be completed in early 2021 and construction is expected to occur during the in-water work window (July 15 to August 31) of 2021.

## **E. FIRE PLANNING, PREVENTION, DETECTION, and SUPPRESSION**

### **2019 Fire Season**

Fire season was quiet in 2019 owing to relatively mild summer temperatures and frequent precipitation pulses that kept fuel moisture high throughout the summer. No fires were reported within the BRWMU and only one fire occurred within 3 miles of the BRWMU boundary. That fire was in the Old Maid Flats area of the Mt. Hood National Forest, approximately 1.8 from the BRWMU boundary. It occurred in August and was caused by an escaped campfire. The fire was less than 0.1 acre and was extinguished by USFS fire staff the same day it was reported.

### **Building on Wildfire Preparation and Training**

Following up on lessons learned from the active fire seasons of 2017 and 2018, the PWB worked with the USFS and Oregon Department of Forestry (ODF) as well as other agencies to continue to improve upon training and preparedness for a large wildfire event in the Bull Run.

In 2019, PWB staff worked with USFS and ODF fire staff to develop and provide a fire awareness training for PWB staff that regularly work in the Bull Run during fire season. The training covered an overview of fire behavior, “watch out” weather conditions, and basic instruction on the use of fire tools. It is anticipated that this training will be repeated on a regular basis, approximately every 3 years, or as USFS and ODF fire staff resources permit.

PWB also worked with USFS and ODF fire staff to develop a guidance document for all PWB staff and contractors on fire season and Industrial Fire Precaution Level (IFPL) requirements. The goal of the guidance document was to help enhance PWB staff and contractors’ understanding of responsibilities, best practices, and legal requirements for conducting maintenance and construction activities in the Bull Run during fire season.

PWB also continues to work on developing a Memorandum of Agreement with Portland Fire and Rescue (PF&R) to augment structural fire protection in the Bull Run. The MOA will fund PF&R to purchase fire equipment for improving protection of PWB infrastructure in the BRWMU. In turn, PF&R will assemble and regularly exercise the equipment, providing additional training and improving familiarity of the Bull Run for PF&R staff. Under the Bull Run Fire Management Plan, developed by the USFS with assistance from PWB and ODF, Sandy Fire is the entity primarily responsible for structural fire protection within the BRWMU. However, during a

large fire such as the 2017 Eagle Creek fire, Sandy Fire resources can quickly become overwhelmed, triggering mutual aid assistance from PF&R. The new MOA will provide additional resources for protecting PWB water supply infrastructure during a large wildfire event and increase wildfire emergency preparedness.

### **Powerline Fire Prevention**

In response to a small fire in the BRWMU in 2018 that resulted from a tree touching a powerline as well as recent wildfire events in California, PWB has been implementing practices to further reduce risks of fires associated with Portland Hydroelectric Project (PHP) 57kV transmission lines within the Bull Run. In 2019, PWB began conducting regular patrols of powerlines during periods of high fire danger. In addition, PWB has been working with Portland General Distribution Service's (PGDS is a branch of Portland General Electric) which is contractually responsible for maintaining the PHP lines, to increase clearances of vegetation and hazard trees in and around the power transmission line right-of-way. This work is ongoing and expected to be incorporated into existing annual powerline right-of-way vegetation maintenance practices.

### **Hickman Butte Fire Lookout**

PWB and the Forest Service operate under a five-year interagency agreement to staff and maintain the fire lookout at Hickman Butte during fire season. The current agreement covers the period from 2017 to 2021 and includes authorization for a small maintenance fund to cover the cost of minor maintenance work on the tower.

An updated maintenance plan for the tower was developed by the Forest Service in 2015. Lumber and paint were purchased in 2019 and will be used in 2020 for general tower and cabin repair and upkeep. Other possible maintenance activities for 2020 include filling propane tanks, replacing wooden panels at the base of the cabin, and replacing solar panels.

## **F. WATER MONITORING (Quality and Quantity)**

The Water Bureau continues its cooperative agreement with the U.S. Geological Survey (USGS) to monitor stream flow, reservoir levels, and/or water quality at eleven stations within the Bull Run drinking water drainage as well as two additional stations, one on the Little Sandy and the other on the Sandy River below its confluence with the Bull Run River. PWB also continues to conduct water quality monitoring at the four tributary key stations as well as at Reservoir 1, Reservoir 2, and Bull Run Lake to meet regulatory and operational objectives.

PWB continues to contract with the Natural Resources Conservation Service (NRCS) to monitor snow depth, snow water equivalent, and meteorological conditions at three sites in the watershed.

PWB is currently operating under the interim measures of the 2017 Bilateral Compliance Agreement with Oregon Health Authority (OHA) until *Cryptosporidium* treatment facilities are operational, no later than September 30, 2027. PWB continues to conduct routine monitoring at the intake for *Cryptosporidium*. Watershed inspections and environmental sampling are also required as part of a state-approved Watershed Inspection and Monitoring Plan. Results of watershed inspections and environmental sampling for each water year (Oct 1 – Sep 30) are submitted to OHA in an annual [Watershed Report](#) each December. Additional information on *Cryptosporidium* and the Bilateral Compliance Agreement can be found on the PWB's *Cryptosporidium* website: <https://www.portlandoregon.gov/water/crypto>

The Forest Service continues to implement stream temperature monitoring in the Little Sandy watershed. Water temperature is monitored during the summer at five locations in the Little Sandy River and at the outlet of Upper Goodfellow Lakes.

## **G. NATURAL RESOURCES – TERRESTRIAL**

### **Invasive Species - Plants**

The PWB continues to implement the Invasive Plant Standard Operating Protocol (SOP). The SOP is consistent with Forest Service requirements for invasive plant management within the BRWMU. The PWB continues to maintain a wheel wash station on Road 10, just inside the main gate, to clean City vehicles entering the BRWMU and minimize the risk of the spread of invasive non-native plant species.

In developing the Invasive Plant SOP, the PWB identified high priority invasive plant species based on how the species could become established in the BRWMU and affect water-supply operations. PWB continues to monitor and control high priority invasive plant species inside the watershed along the primary roadways, trails, reservoirs, and near infrastructure as well as sites of recent road projects. A database of high priority invasive species occurrences inside the BRWMU is maintained by the PWB.

PWB also coordinates with the Oregon Department of Agriculture on the control of A-listed Noxious Weeds and on the release of bio-controls for scotch broom.

Based on monitoring conducted since 2010, PWB discontinued the practice of cutting and removing invasive reed canary grass along the north bank of the upper Reservoir 1 in 2019. This activity was included as Measure R-3 of the City's Bull Run Water Supply Habitat Conservation Plan. The practice was intended to benefit reproduction of western toads and red-legged frogs. Monitoring data, however, did not support the assumption that better habitat would be created by cutting the grass. Annual toad monitoring will be continued by the City to gain additional information.

### **Aerial Survey for Forest Health /Insects & Disease**

The Forest Service flies aerial surveys in Oregon and Washington each year to survey for forest disturbances. The aerial surveys cover all forested lands and are flown on a 4-mile grid. The surveys in Oregon are conducted in cooperation with the Oregon Department of Forestry. The results of the survey flights from 2019 and previous years are posted on the [Aerial Detection Survey website](#). Portions of the Bull Run watershed area are mapped on the following quadrangle maps: Vancouver, Hood River, Oregon City, and Mt. Hood.

### **Bull Run Wildlife Monitoring**

The Water Bureau conducts ongoing wildlife monitoring within the Bull Run watershed to improve its knowledge of wildlife as a potential source of *Cryptosporidium*. Wildlife scat monitoring and wildlife related inspections are conducted under terms of the 2017 Bilateral Compliance Agreement (see Water Monitoring section above). Activities and results of scat monitoring and other wildlife-related investigations are submitted to OHA in an annual [Watershed Report](#).

Planned work for 2020 includes: (1) using live traps for collecting small mammal scat near the diversion pool and reservoirs and (2) deer surveys around Headworks.

## **H. NATURAL RESOURCES - AQUATIC**

### **Invasive Species - Aquatic**

PWB staff continue to implement preventative measures outlined in the City's Aquatic Invasive and Nuisance Species Standard Operating Protocol for both contractors and in-house maintenance and operations work, including boat and equipment decontamination, for safe use in the reservoirs and Bull Run River.

### **Bull Run Lake**

PWB operates and maintains drinking-water supply facilities at Bull Run Lake under a 20-year easement with the Mt. Hood National Forest. The easement expired June 30, 2017. The USFS has issued an extension to the PWB for the existing easement until the renewed easement is complete. The PWB and the Forest Service are continuing the process of renewing the easement under terms and conditions very similar to the existing agreement. An appraisal to determine the new fee and fee structure is expected to be completed by the USFS in 2020. Once the fee is determined the PWB will seek City Council authorization for the easement renewal. PWB also continues to work with Oregon Department of Environmental Quality (DEQ) to obtain the 401-certification required for issuance of the special use authorization.

Due to an outlet pipe separation and lower water demands, no releases were made from Bull Run Lake in years 2001 through 2014. In 2015 and 2016, the outlet pipe was repaired. This was followed in 2016 by a test release, and results from that test release are summarized in the [2017 BRWMU Annual Report](#). In 2018, the PWB made a small release of water from Bull Run Lake as summarized in the [2018 BRWMU Annual Report](#).

The operation of the pump in 2018 stressed the outlet pipe. With further testing and inspections, PWB determined that the pipe is damaged but remains operable; the pump is no longer functioning. PWB is assessing options to repair the pipe. Releases are currently limited to gravity (lower limit of approximately 3,154-foot lake surface elevation) until a determination is made regarding future options for repairing the pipe.

The PWB continues to implement mitigation and monitoring measures as required by the easement and in agreement with the Forest Service. A Decision Memo (DM) for the Bull Run Lake Special Use Reauthorization was signed by the Forest Service on September 30, 2019. The DM updates the mitigation and monitoring requirements somewhat from the current terms based on information gained in 20 years of monitoring.

Various monitoring activities have been conducted at Bull Run Lake from 1998 through 2019; monitoring is expected to continue for the duration of the easement extension until the easement is renewed. The goal of the monitoring is to assess potential effects of lake water withdrawals on the fish population and provide information for mitigation. In 2019, activities included: bird surveys, fish spawning surveys, fish population estimates (hydroacoustic surveys), a survey of lake shoal spawning gravel, and limnological monitoring. The same activities, except for the lake shoal spawning gravel survey, are scheduled for 2020.

Spawning surveys are typically conducted in the tributaries of Bull Run Lake each spring and summer documenting adult abundance, spawning timing and redd counts of coastal cutthroat trout. The annual spawning surveys, from 1998-2019, have been completed either by Forest Service personnel from the Zigzag Ranger District or, more recently (2004, 2009-2019), by contractors hired by PWB. PWB plans to use a contractor to conduct spawning surveys in 2020.

The annual spawning surveys have shown a relationship between lake water surface elevation and cutthroat trout spawning success. In addition, the hydroacoustic surveys conducted by PWB document fish population size. To date, these surveys show high variability but no statistically significant change (95% level of confidence) in the lake's cutthroat trout population over time.

## **Salmon & Steelhead Monitoring and Spawning Gravel Placement in lower Bull Run River**

PWB continues to conduct salmon spawning and snorkel surveys in the lower Bull Run River in adherence to the terms of the City's Incidental Take Permit and Habitat Conservation Plan ("HCP"). Spawning surveys for adult Chinook salmon are conducted annually, from August through December, to monitor adult salmon numbers. The spawning surveys began in 2006 and are expected to continue through 2029 (HCP Years 1–20).

Snorkel surveys are also conducted annually in the lower Bull Run River, from the mouth of the Bull Run River to the location of the former rock weir (below spillway of Dam 2). Snorkel surveys monitor juvenile salmon and steelhead populations and support HCP fish management activities. Snorkel surveys have been performed annually since 2009 and are expected to continue indefinitely.

The City also annually augments spawning gravel in the lower Bull Run River and monitors the effects of the gravel placements in accordance with the terms of the City's Incidental Take Permit and HCP. Gravel is placed at three sites in the river each year. Gravel augmentation is intended to mitigate the effects of Dam 1 and Dam 2 on transport of natural spawning gravel to the lower Bull Run River. The project constitutes Measure H-1 of the Bull Run HCP. Gravel augmentation began in 2010 and is expected to continue through 2059 (HCP Years 1–50). Summaries of the gravel augmentation monitoring and Chinook spawning surveys are included in the 2019 [Bull Run Water Supply Habitat Conservation Plan Annual Compliance Report](#) (available in June 2020).

## **Salmon & Steelhead Monitoring in Little Sandy River**

PWB continues to conduct two activities in the Little Sandy River: (1) maintenance of a smolt trap just upstream of the former Little Sandy Dam site and (2) fish habitat surveys and snorkel surveys from the mouth of the river to the former dam site. These activities are done in accordance with terms of the City's Incidental Take Permit and HCP. The smolt trap is operated from roughly mid-March through mid-June. Results of the fish trapping effort are summarized in the 2019 [Bull Run Water Supply Habitat Conservation Plan Annual Compliance Report](#) (available in June 2020).

Oregon Department of Fish and Wildlife (ODFW) continues to conduct spawning surveys for spring Chinook salmon, coho salmon, and winter steelhead above and below the former Little Sandy Dam site. All three species have been documented above the former dam site and appear to be re-colonizing their former habitat.

## **Aquatic Habitat and Fish Distribution Surveys**

PWB occasionally surveys small streams throughout the BRWMU, above and below potential fish barriers such as road crossings or waterfalls. These are done to determine the presence or absence of fish in streams potentially affected by PWB activities such as road maintenance and to inform planning for culverts and other stream-crossing structure replacements. Two surveys were conducted in 2019; no surveys are currently planned for 2020.

The Forest Service conducts watershed monitoring in the BRWMU as part of the Aquatic and Riparian Effectiveness Monitoring Program (AREMP). AREMP is used to evaluate effectiveness of the Northwest Forest Plan's aquatic conservation strategy in achieving the goals of maintaining and restoring the condition of watersheds. Physical habitat data, macroinvertebrates and water temperature are collected to assess stream conditions. These surveys occur every five years in selected streams of the Blazed Alder, Middle Bull Run and South Bull Run sub-watersheds. No surveys were conducted in 2019; due to COVID-19, surveys planned for 2020 have been postponed. More information on the AREMP program and available reports can be found at the [USFS Northwest Forest Plan Watershed Monitoring](#) program webpage.

ODFW also conducts fish habitat surveys on select short stream segments in the BRWMU. These surveys provide reference data to support on-going monitoring and research for salmon recovery and conservation. Sampling in the BRWMU began in 2015; ODFW usually surveys 2 to 3 segment per year. Data on habitat in the Bull Run is provided to the PWB or USFS upon request.

## **I. CONSERVATION EDUCATION**

The Portland Water Bureau offers educational field trips and tours of the Bull Run Watershed for students and the general public. All tours are planned and guided by a professional Water Resources Educator.

Participants on adult tours learn about the history of the watershed, its natural resources, the water supply infrastructure and operations, and the cooperative partnership between PWB and the Mt. Hood National Forest. These tours generally occur June through September.

Tours for school groups are generally scheduled in May, June, September, and October. During PWB's tours for school groups, students are divided into small groups at Bull Run Dam 1 to tour the dam, to measure the temperature and turbidity of the reservoir water, and to learn about the role of forest protection in providing high-quality raw water.

PWB led a total of 91 tours in the Bull Run during calendar year 2019. The total number of tours was 94 in the 2018 calendar year and 85 in the 2017 calendar year.

The 2020 tour season will be significantly impacted by COVID-19. Due to pandemic-related school closures and stay-at-home orders, all 2020 spring school field trips to Bull Run have been cancelled. Recognizing the likelihood that some level of social distancing practices will continue through summer, the Water Bureau is also suspending the 2020 summer Bull Run tour season. The PWB Education Team plans to post educational videos and resources to the Water Bureau website and will share new opportunities with schools and the public using established communication mechanisms and social media channels.

## **J. ADMINISTRATIVE USE TRAILS**

Several trails in the BRWMU provide access to stream gauges operated by the U.S. Geological Survey (USGS) and water-quality monitoring stations maintained by PWB.

In 2018, USGS staff notified the PWB that one of the trees anchoring the cableway for Key Station 18 was failing and that the cableway would need to be relocated. The new location of the cableway caused the cable to cross low across the existing trail, resulting in unsafe conditions. PWB continues to work on completing a reroute of a small section (approximately 300 feet) of the Key Station 18 trail to accommodate the cableway relocation.

PWB plans to do routine maintenance on several of these trails during the 2020 field season.

## **K. LAND OWNERSHIP and LAND OCCUPANCY ARRANGEMENTS**

### **Land Exchange**

The Land Exchange process between the Forest Service and the City of Portland continues. The primary purpose of the exchange is to create a better alignment of land ownerships with the respective missions of the City and the Forest Service, including consolidating City ownership to lands where water system facilities are located and significantly reducing City-owned inholdings in upland forest areas surrounded by national forest. The land exchange involves approximately 5% of the BRWMU land area.

City Council voted to authorize signing the Exchange Agreement on July 31, 2019. The agreement authorizes the City and USDA Forest Service to complete the exchange. Both agencies signed the agreement in September 2019. Completing the transaction involves a variety of process steps to prepare the deeds. The property transaction is currently expected to be completed by the end of 2020.

## **L. OTHER ACTIVITIES**

### **Dam 1 Needle Valve Repair**

This project will replace three Larner-Johnson Needle Valves from the face of Dam 1 with three new valves of modern equivalence. It will improve operation, access, and worker safety, and is intended to reduce annual maintenance costs. The existing needle valves are 91 years old and are antiquated, leak, require significant occasional maintenance, are difficult to operate, and have been proven to be unsafe in certain operational conditions. The final project design is complete. The Memorandum of Agreement with the State Historic Preservation Office was finalized in 2019. Construction was planned to begin in late 2019 but has been postponed until late 2020; the project is expected to be completed by the end of April 2021. Visual impacts to the valve house structure will be minimized during the project.

### **Camp Creek Microwave Improvement Project**

This project is one component of a phased project to improve and update microwave communication in the BRWMU. All existing microwave equipment will be replaced with new equipment. In 2019, the Camp Creek communication site, located on City owned property in the BRWMU, was upgraded from a passive microwave reflector to an active microwave tower. This upgrade is expected to increase bandwidth and provide a stronger signal to improve data transmission, communications and reliability throughout the year. The project included construction of the microwave tower, installation of a small building adjacent to the tower to house equipment, addition of a propane and solar power source, and replacement of equipment. Establishment of the secondary fire break, required by the County permit, was also completed and must be maintained for the lifetime of the facility. Minor testing and modifications of equipment are on-going but expected to be completed in 2020.

### **Bull Run Cabin Chimney Repair**

In 2019, PWB began a small project to repair a damaged chimney for the historic south cabin at Bull Run Lake. All three cabins at Bull Run Lake are eligible for listing on the National Register of Historic Places (NRHP). The project will remove an existing safety hazard of falling stones and ensure the long-term protection of this recently restored cabin by eliminating the water and snow entry that threatens to damage the structure. The repair project includes demolition of the existing chimney, salvage of suitable stones, and reconstruction of the chimney with a design similar to the original 1917 chimney. A temporary access ramp to the site was constructed in Fall of 2019 to facilitate movement of materials; the ramp will be removed upon completion of the project. The project was started in 2019 but was curtailed in November 2019 due to the onset of winter conditions; it is expected to be completed in 2020.