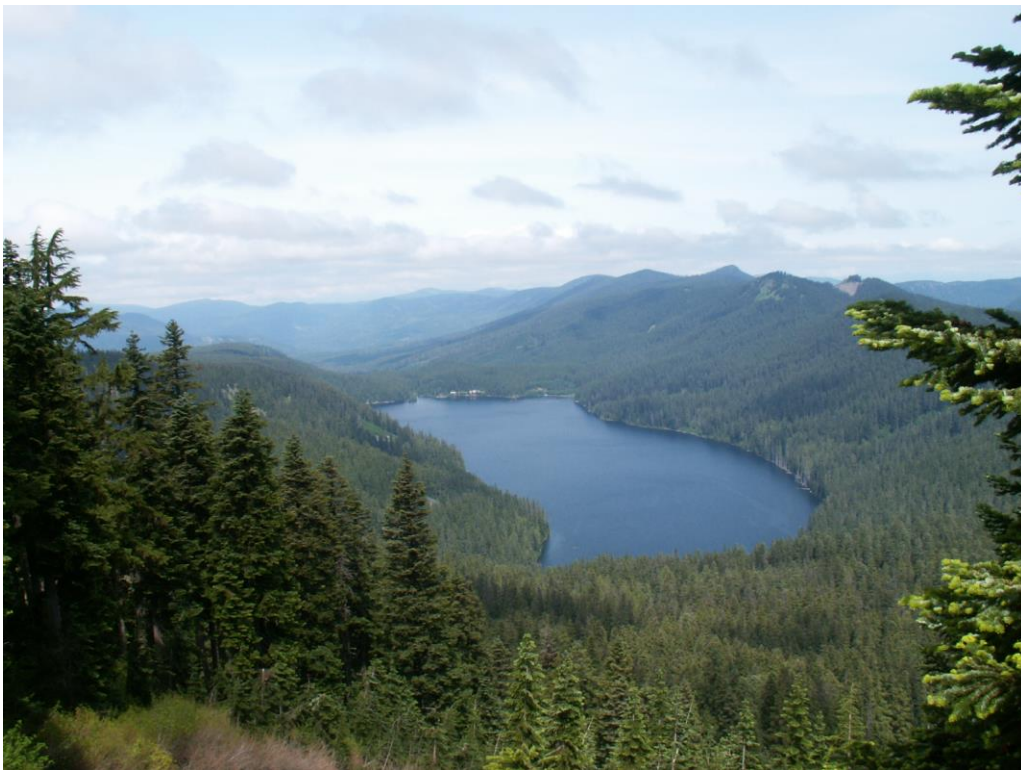


Portland Water Bureau and United States Forest Service

# Bull Run Watershed Management Unit Annual Report

April 2018



**Bull Run Watershed Semi-Annual Meeting**





## CONTENTS

A. OVERVIEW .....	4
B. SECURITY and ACCESS MANAGEMENT .....	4
Bull Run Security Access Policies and Procedures .....	4
C. EMERGENCY PLANNING and RESPONSE.....	5
Life Flight Helicopter Landing Zones.....	5
D. TRANSPORTATION SYSTEM .....	5
2018 Projects: Road 10 (“10H”: MP 10.95 – MP 12.56; Road 10 Shoulder Repair: MP 1.47) .....	6
2019 Projects: Road 10 (“10R”: MP 28.77 - 31.85).....	6
E. FIRE PLANNING, PREVENTION, DETECTION, and SUPPRESSION.....	6
Other Fires - 2017 .....	8
Hickman Butte Fire Lookout .....	8
F. WATER MONITORING (Quality and Quantity) .....	8
G. NATURAL RESOURCES – TERRESTRIAL.....	10
Invasive Species - Plants.....	10
Aerial Survey for Forest Health /Insects & Disease .....	10
Bull Run Wildlife Monitoring .....	10
H. NATURAL RESOURCES - AQUATIC.....	11
Invasive Species - Aquatic.....	11
Bull Run Lake.....	11
Salmon & Steelhead Monitoring and Spawning Gravel Placement in lower Bull Run River .....	12
Salmon & Steelhead Monitoring in Little Sandy River .....	12
I. CONSERVATION EDUCATION.....	13
J. ADMINISTRATIVE USE TRAILS.....	13
K. LAND OWNERSHIP and LAND OCCUPANCY ARRANGEMENTS.....	14
Land Exchange.....	14
L. OTHER ACTIVITIES .....	14
Dam 1 Needle Valve Repair .....	14
Camp Creek Microwave Improvement Project .....	14

## **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 utilize 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; water quality/quantity monitoring; terrestrial and aquatic natural resources; conservation education; administrative 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 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. In 2017, due to ongoing lock failures, the PWB discontinued the electronic CyberKey and lock system for the BRWMU gates, replacing it 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. U.S. Forest Service Law Enforcement Officers also occasionally conduct patrols of the BRWMU for illegal activity.

During the summer of 2017, significant crowds looking for solar eclipse viewing locations were anticipated near the BRWMU, especially along the Lolo Pass Road, south of the BRWMU. Additional signage was posted and security patrols were enhanced before and during the event. The number of people that turned out to view

the eclipse along roads near the BRWMU was significantly less than anticipated; no fire or security incidents occurred in or near the BRWMU as a result of the event.

Also in 2017, additional barrier fencing was installed at the Homestead gate (along the southern border of the BRWMU near the Sandy Ridge bike trail system). This fencing is intended to dissuade potential trespassers and/or make trespass more difficult.

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.

#### **Life Flight Helicopter Landing Zones**

PWB and the Forest Service worked with the program aviation manager for the local Life Flight program to identify potential Life Flight landing zones in the watershed, all of which are located on roadways, previously cleared storage areas or rock quarries. In 2016, staff from Life Flight held a landing zone training session for PWB staff. Criteria for landing zones were provided during the training. In 2017, PWB and USFS personnel evaluated several potential sites for their ability to meet Life Flight criteria and serve as possible heli-spot landing zone sites during a fire event. Except for one site, all sites were deemed acceptable locations.

### **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 negotiations for 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.

**2018 Projects: Road 10 (“10H”: MP 10.95 – MP 12.56; Road 10 Shoulder Repair: MP 1.47)**

Project design for a 1.6 mile segment (“10H”) of Road 10, from approximately Cougar Creek to the North Fork Bull Run bridge, is complete. This segment will be reconstructed and repaved during the summer/fall of 2018 to improve pavement condition, enhance ditch lines, improve drainage, and address slumping and sliding. Several culverts, including two stream-crossing culverts, are also currently planned for replacement to improve drainage and reduce risks to water quality. The project will ensure continuous, reliable, and safe access to all facilities and access throughout the watershed for fire protection, monitoring, security, and other water supply operational and regulatory needs.

Project design is also complete for the repair of a short, approximately 70-foot, segment of Road 10 at MP 1.47. Construction is also scheduled during the summer/fall of 2018. The project will repair significant cracking occurring along the road shoulder. Repair will reduce the risk of unexpected road failure and help to ensure continuous, reliable, and safe access to all facilities and access throughout the watershed for fire protection, monitoring, security, and other water supply operational and regulatory needs.

**2019 Projects: Road 10 (“10R”: MP 28.77 - 31.85)**

Project design is underway for a 3.1 mile section (“10R”) of Road 10 that will be reconstructed and repaved to improve pavement condition, create better ditch lines, improve drainage, and address significant slumping and slides in the area. Several small culverts are also expected to be replaced. Completion of project design is planned for 2018, with construction currently scheduled for the summer/fall of 2019. The project is located between MP 28.77 and 31.85 along the Road 10 in the upper Bull Run watershed. This area extends from approximately the intersection with Road 1000524 to the intersection with Road 1027. The project will ensure continuous, reliable, and safe access throughout the watershed for fire protection, monitoring, security, and other water supply operational and regulatory needs.

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

Fire season was very active in 2017, with two fires, the Indian Creek fire and the Eagle Creek fire, occurring near the BRWMU.

One fire, the Eagle Creek fire, burned slightly into the BRWMU in 2017, but remained outside the water supply drainage. The Eagle Creek fire started on September 2, 2017, in the Eagle Creek drainage of the Columbia Gorge National Scenic Area (CGNSA). It was a human-caused fire. At the time it started, the fire was located more than 5 miles from the BRWMU boundary. The fire quickly grew and

expanded 13 miles across the CGNSA and the Mt. Hood National Forest between September 4 – 5, 2017. Likely during September 5, the Eagle Creek fire also burned together with a smaller fire, the Indian Creek fire, that was also located in the Eagle Creek drainage. The Indian Creek fire was approximately 3 miles northeast of the BRWMU and had been burning since July 4, 2017; it was managed by the Forest Service and national Incident Command teams prior to the start of the Eagle Creek fire.

Specific data on the extent of the Eagle Creek fire or proximity of the fire to the BRWMU was not available until September 6, due to heavy smoke across the fire area and a focus of fire resources on life and safety concerns within the CGNSA. On September 6, infrared data of the fire perimeter obtained during the previous evening (September 5) indicated that the fire was approximately 31,000 acres and had burned approximately 100-150 acres in the northeastern edge of the BRWMU, but had not entered the water supply drainage. The southern edge of the fire perimeter surrounded the northern boundary of the BRWMU, with various points along the fire perimeter ranging from 0.1 – 1.5 miles away from the BRWMU boundary and/or the water supply drainage boundary.

The fire continued to burn and grow for several weeks, particularly along the eastern edge, but did not again exhibit the explosive growth that it had on September 4 - 5. As of September 16, the fire was estimated at approximately 48,000 acres. Acreage burned within the BRWMU remained at approximately 100-150 acres, with no fire burning within the water supply drainage. During the fire, no fire retardant or other fire suppression chemicals were used within the BRWMU and no helicopter dipped water from any water body within the BRWMU. A rain event that began on September 17 largely extinguished the fire except for a few hot spots and along the far eastern edge toward Lindsey Creek State Park in the CGNSA. After September 20, 2017, the fire was no longer considered a threat to the BRWMU by the national Type I Incident Management Team (IMT) in command of the Eagle Creek fire.

As part of the fire suppression efforts, fire personnel, under the direction of the IMT, implemented suppression actions (e.g., creation of shaded fuel breaks along existing roads and opening of a decommissioned road) within the northern edge of the BRWMU and upper water supply drainage area intended to protect the watershed from the advancing fire. Once the fire was no longer considered a threat, fire crews repaired areas where suppression activities had occurred. All suppression-related work, including repair work, by fire crews was completed by October 9, 2017. The number of fire personnel working within the BRWMU from mid-September through mid-October varied widely from day to day, depending on resource availability, need, and weather conditions. Daily firefighter numbers ranged from 0-5 up to approximately 160-180 during peak activity levels.



PWB and USFS Mt Hood National Forest personnel coordinated with fire crews throughout the duration of the Eagle Creek fire to provide local knowledge about the watershed terrain, water supply facilities, and watershed protection policies and practices. The bureau also limited watershed access to only PWB employees essential for maintaining the water supply; many activities in the watershed were postponed until the fire was no longer considered a threat.

### **Other Fires - 2017**

Aside from the Eagle Creek fire, no other fires occurred inside the BRWMU during the 2017 fire season. In addition to the Indian Creek Fire mentioned above, another small fire, called the “Old Maid Fire,” started on August 3, 2017, on the Mt. Hood National Forest near an area called “Old Maid Flats,” south of the BRWMU. The fire was located approximately 2.75 miles from the water supply drainage boundary and approximately 1 mile from the southern BRWMU boundary. The fire was one acre in size and was believed to have been human-caused. Forest Service fire personnel reported that it was 100% contained on August 4, 2017. This fire had no impact on the BRWMU.

### **Hickman Butte Fire Lookout**

PWB and the Forest Service completed a renewal of an interagency agreement to staff the fire lookout at Hickman Butte in 2017. The agreement covers the five-year period from 2017 to 2021 and includes authorization for a small maintenance fund to cover the cost of minor maintenance work on the tower.

A draft maintenance plan for the tower was developed by the Forest Service in 2014-2015 and is continuing to be refined. In 2016, small (<12” diameter) trees were cleared that encroached on the site-line visibility, heli-spot landing zone, and the defensible space around the tower. The small debris piles were burned in October 2017, after the fall rains returned and the vegetation and ground were sufficiently wetted. Nearly all debris material was consumed and the burns were extinguished within a few days by rain and snow. Supplies for the cabin, including a new refrigerator and stove, were installed in June 2017. Maintenance on the tower support joists is being considered for 2018.

## **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 11 stations within the Bull Run watershed as well as 2 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 key stations as well as Reservoirs 1 and 2 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 continues to conduct routine monitoring at the intake for *Cryptosporidium*. From 2012 to 2017, the Portland Water Bureau operated under a variance from treating Bull Run drinking water for *Cryptosporidium*. The treatment variance was issued in accordance with federal and state law. After a series of *Cryptosporidium* detections in early 2017, Oregon Health Authority (OHA) revoked the variance and on December 18, 2017, OHA and PWB entered into a Bilateral Compliance Agreement for the purpose of establishing a schedule for *Cryptosporidium* treatment as well as for protective interim measures until treatment facilities are operational, no later than September 30, 2027. Watershed inspections and environmental sampling is also required as part of a 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 at the Information tab on the *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.

The Forest Service is also conducting watershed monitoring in the Bull Run in the summer of 2018 as part of the Aquatic and Riparian Effectiveness Monitoring Program (AREMP). Surveys were originally scheduled for 2017, but were postponed until 2018 due to the Eagle Creek fire. 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. The Middle Bull Run is scheduled to be sampled in 2018. A pilot project with the U.S. Forest Service Pacific Northwest Research Station is also planned in conjunction with the AREMP surveys to detect invasive species using eDNA. Water samples will be collected at AREMP survey sites in the Middle Bull Run sub-watershed and potentially at sample locations lower in the watershed to discern where invasive species may be present in the watershed.

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

### **Invasive Species - Plants**

The PWB continues to implement the Invasive Plant Standard Operating Protocol (SOP). The SOP is consistent with USFS 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 management unit 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 continues to remove reed canary grass, which inhibits egg incubation for western toads and red-legged frogs, along the north bank of the upper end of Reservoir 1. Removal includes cutting and raking. The site is accessed by boat from the reservoir and by trail. The work is performed annually and constitutes Measure R-3 of the City's Bull Run Water Supply Habitat Conservation Plan.

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

### **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 2017 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 is conducting ongoing wildlife monitoring within the Bull Run watershed to improve its knowledge of wildlife as a potential source of *Cryptosporidium*. In 2012, the bureau began ongoing scat sampling and wildlife-related inspections as a condition of the Bull Run Treatment Variance. Wildlife scat monitoring continues under the 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 2018 includes: (1) using live traps for collecting small mammal scat near the diversion pool and reservoirs and (2) monthly 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.

Until 2016, water withdrawals at Bull Run Lake had not occurred since 2000. In 2016, PWB conducted a test release of 20 cfs between July 20-August 17, 2016, to test a pipe repair and evaluate effects of a release on downstream stream flows and temperature. Results from that test release are summarized in the [2017 BRWMU Annual Report](#).

The Water Bureau continues to implement mitigation and monitoring measures as required by the easement and the Bull Run Lake Mitigation and Monitoring Implementation Plan. The Forest Service and the Water Bureau continue to evaluate the monitoring and mitigation plan. The plan was last revised in September 2012, and was signed by the Forest Service in 2013. The revised plan expired with the term of the existing easement in 2017, but has been extended along with the existing easement until the renewed easement is complete. A new plan, expected to be very similar to the existing plan, will accompany the renewed easement.

Various monitoring activities have been conducted at Bull Run Lake from 1998 through 2017; 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 2017, activities included: bird surveys, fish spawning surveys, and fish population estimates (hydroacoustic surveys). The same activities are scheduled for 2018. 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 1998-2017, have been completed either by Forest Service personnel from the Zigzag Ranger District or, more recently (2004, 2009-2017), by contractors hired by PWB. PWB plans to use a contractor to conduct spawning surveys in 2018.

The annual spawning surveys have not shown a statistically significant 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 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 [2017 Bull Run Water Supply Habitat Conservation Plan Annual Compliance Report](#) (available in May 2018).

### **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 2017 [Bull Run Water Supply Habitat Conservation Plan Annual Compliance Report](#) (available in May 2018).

Oregon Department of Fish and Wildlife (ODFW) continues to conduct spawning surveys for spring Chinook, coho, 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.

## **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 No. 1 to tour the dam, to measure the turbidity of a reservoir water sample, and to learn about the role of forest protection in providing high-quality raw water.

PWB led a total of 85 tours in the Bull Run during calendar year 2017. Approximately 10 tours were cancelled during summer of 2017 due to watershed access restrictions associated with the solar eclipse event and Eagle Creek fire. The total number of tours was 85 in the 2016 calendar year and 75 in the 2015 calendar year.

## **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. PWB plans to do routine maintenance on several of these trails during the 2018 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.

The Forest Service awarded a contract for the property appraisal in the fall of 2016. The contract appraiser completed a draft appraisal in 2017 and a supplemental appraisal to equalize property values in early 2018. The goal of the equalization is to enable a land-for-land exchange of properties of equal financial value. The NEPA Preliminary Assessment was available for public comment in summer 2017. The NEPA analysis is expected to be completed in summer 2018. Forest Service and City personnel also continue to discuss a historic properties management plan and draft agreements for use, maintenance, and ownership of roads on exchanged lands. Timing for completion of the exchange is not yet known.

## **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 89 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 scheduled to be completed in late 2018. Construction is planned for 2019. Visual impacts to the valve house structure will be minimized during the project.

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

This 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. The Camp Creek communication site, located on City owned property in the BRWMU, will be upgraded from a passive microwave reflector to an active microwave tower. This will result in an increased bandwidth, and is expected to provide a stronger signal and improve data transmission, communications and reliability throughout the year. The project will include construction of the

microwave tower, installation of a small building adjacent to the tower to house equipment, and addition of a propane and/or solar power source. A geotechnical assessment was completed in Summer 2017, and design and permitting of the project is currently underway. Construction of the tower, installation of the building and power source, and replacement of the equipment is tentatively planned for the summer of 2019, but may occur as early as the summer of 2018.