

Portland Water Bureau

Annual Watershed Control Program Report for Water Year 2019

December 2019



**Submitted to Oregon Health Authority
Public Health Division Drinking Water Services**



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1. Introduction

For unfiltered water systems, the federal Surface Water Treatment Rule and the Oregon Administrative Rules (OARs) require annual reporting of the control programs in place for these systems' watersheds "identifying any special concerns about the watershed, the procedures used to resolve the concern, current activities affecting water quality, and projections of future adverse impacts or activities and the means to address them" [OAR 333-061-0032 (2)(c)(B)]. This Annual Watershed Control Program Report for Water Year 2019 is submitted to the Oregon Health Authority (OHA) in fulfillment of requirements for unfiltered systems. Water Year 2019 started on October 1, 2018 and ended on September 30, 2019.

This report covers the Bull Run water supply drainage, referred to hereafter as the Bull Run Watershed. The Bull Run Watershed encompasses 102 square miles of land upstream of the intake for the Portland Water Bureau (PWB) drinking water supply and is within the Bull Run Watershed Management Unit (BRWMU). The BRWMU is a legal boundary defined by federal law (Public Law 95-200 as amended by the Oregon Resources Conservation Act of 1996 and the Little Sandy Act of 2001) for 147 square miles of land (see Figure 1). An additional 1.3 square miles of City-owned land on the western edge of the unit adds to the protected area and forms what is known as the Bull Run Watershed Closure Area.

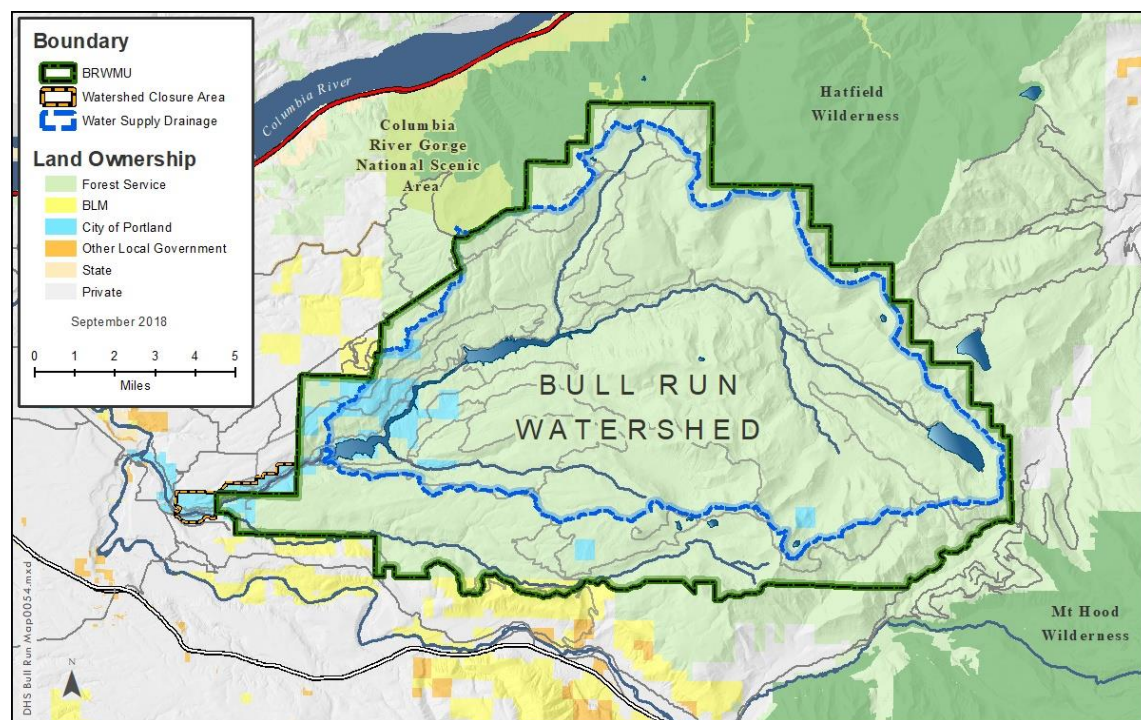


Figure 1. Bull Run Water Supply Drainage, Bull Run Watershed Management Unit, and Watershed Closure Area Boundaries

A separate report, the Bull Run LT2 Interim Measures Watershed Report for Water Year 2019, describes inspections and monitoring conducted in the Bull Run Watershed in fulfillment of conditions in the Bilateral Compliance Agreement signed with OHA in December 2017 to address the *Cryptosporidium* treatment requirements of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2). The Bilateral Compliance Agreement includes interim measures that PWB will take to protect public health until a new filtration plant is operational by September 30, 2027. The LT2 Interim Measures Watershed Report documents the results of field inspections and environmental monitoring conducted during each water year.¹

2. Land Ownership and Management

About 95 percent of the BRWMU is federal land administered by the U.S. Forest Service (Forest Service); 4 percent is owned by the City of Portland; and 1 percent is federal land administered by the U.S. Bureau of Land Management (BLM). In addition to operational agreements defined in the 2007 Bull Run Watershed Management Unit Agreement signed by the City of Portland and the Mt. Hood National Forest, the land in the Bull Run Watershed is protected through a variety of federal, state, and local legal controls, listed below.

Federal Controls

- Bull Run Management Act (PL 95-200 (1977), as amended by PL 104-208 (1996) and PL 107-30 (2001)); 16 U.S. Code, Section 482b Notes
- 1990 Mt. Hood National Forest Land and Resource Management Plan (pages 4-295 through 4-317)
- 1994 Northwest Forest Plan
- 2016 BLM, Northwestern and Coastal Oregon, Record of Decision and Resource Management Plan
- 2012 Mt. Hood National Forest Closure Order for the Bull Run Watershed Management Unit—Closure Order MH-2012-05 [pursuant to 36 Code of Federal Regulations (CFR) 261.50(a) and (b), 36 CFR 261.52(a), 36 CFR 261.53(e), 36 CFR 261.54(e), and 36 CFR 261.55(a)]
- 2011 BLM Permanent Closure Order for the Bull Run Watershed Management Unit (pursuant to 43 U.S.C. 1733(a), 43 CFR 8360.0-7, and 43 CFR 8364.1)

¹ The LT2 Interim Measures Watershed Report is available on the Portland Water Bureau website at <https://www.portlandoregon.gov/water/InterimMeasuresWatershedReport>

State Controls

- Oregon Revised Statute (ORS) 448.295 to ORS 448.325
- State of Oregon Department of Forestry Regulated Closure Proclamations (for the Bull Run Regulated Use Area during fire season, pursuant to ORS 477.35 to 477.550)
- Bilateral Compliance Agreement between the Oregon Health Authority and the Portland Water Bureau, December 18, 2017

Local Controls

- Portland City Code Chapter 21.36, Bull Run Watershed Protection
- Section 00203, Bull Run Watershed Closure Area, of Portland Water Bureau contract specifications for construction projects in the Bull Run Watershed Closure Area²
- Section 00202, Security, of Portland Water Bureau contract specifications for construction projects in the Bull Run Watershed Closure Area²

PWB continues to implement several Standard Operating Procedures (SOPs)³ within the Closure Area to protect the water supply, ensure compliance with state and federal regulations, and reduce risks to the watershed from the introduction and spread of invasive species. Current SOPs include: (1) Access, (2) Human Sewage Containment (“Sanitation”), (3) Invasive Plant Species, (4) Aquatic Invasive and Nuisance Species (“Aquatic Invasive Species”), (5) Tree Protection, and (6) Livestock Incursions.

PWB and the Mt. Hood National Forest are also pursuing a land exchange to better align land ownership responsibilities with the respective missions of the two agencies, while also reducing administrative burdens. The exchange would consolidate City holdings to lands surrounding the reservoirs and associated infrastructure. The two agencies signed a formal

² Available at www.portlandoregon.gov/water/47998.

³ Portland Water Bureau Standard Operating Procedures:

- (1) Bull Run Watershed Security Access Policies and Procedures (S.02). Final Revision. 2012.
- (2) Human Sewage Containment for Bull Run Water Supply Drainage Standard Operating Procedure. Final Revision. 2018.
- (3) Invasive Plant Standard Operating Procedure for the Bull Run Watershed Management Unit. Final Revision. 2013.
- (4) Bull Run Watershed and Sandy River Basin Aquatic Invasive and Nuisance Species Standard Operating Procedure. Final Revision. 2016.
- (5) Tree Protection Standard Operating Protocol for City Land within the Bull Run Watershed Closure Area. Final Revision. 2013.
- (6) Standard Operating Procedure for Livestock Incursions in the Bull Run Watershed Closure Area. Final Revision. 2014.

agreement, referred to as the Agreement to Initiate (ATI), in February 2010. Forest Service personnel have since completed an Environmental Assessment and Finding of No Significant Impact (FONSI) to comply with the National Environmental Policy Act (NEPA), and contract personnel completed a professional appraisal of land values. In September 2018 the City and the Region 6 office of the Forest Service executed a formal agreement to exchange lands. Completion of the land transaction is anticipated in 2020.

3. Security and Trespass

The BRWMU is closed to public entry, except for authorized public tours. Domesticated animals are also prohibited inside the BRWMU. Security measures and trespass restrictions are in place to protect the ecological features that make the Bull Run a source of high-quality water. PWB Watershed Rangers patrol the watershed regularly. Forest Service law enforcement officers may also occasionally provide additional watershed patrols. PWB controls watershed access through policies that limit entry privileges to approved staff and contractors; procedures that control gate keys and access badges; and surveillance at the main watershed gate including cameras. The limited-entry access policy³ includes a requirement for entry permits. Law-enforcement and emergency-response personnel can enter the BRWMU when necessary to perform their duties. The Forest Service has similar policies and practices limiting access.

Forest Service lands in the BRWMU are closed through an administrative closure order issued by the Mt. Hood Forest Supervisor. The access restrictions in the closure order are authorized by federal law in the form of the Bull Run Act (Public Law [PL] 95-200, as amended in 1996 and 2001). The BLM is the other federal agency that administers land in the BRWMU. The BLM also maintains an administrative closure of the lands that the agency manages within the BRWMU.

In addition to the Forest Service and BLM closure regulations, the City of Portland City Code Chapter 21.36 prohibits entry into the Closure Area.

The security and access measures implemented by PWB, the Forest Service, and BLM support the legal direction to manage the watershed in a way that protects the ecological features of the water source. PWB and the Forest Service coordinate access policies and security efforts. A list of specific access, entry, and security control measures follows.

Access and Entry

- All roads leading into the Bull Run Watershed are gated.
- All gates accessing the Closure Area are locked with a standard hard lock and key system. The main watershed gate can also be opened by authorized electronic key-card holders. The access card reader records the time and date of entry every time the access card is used.

- Access cards and/or hard keys are issued through a security control process and only to employees, partner agencies, and contractors with a demonstrated need for watershed access.
- In addition to the access controls, PWB and the Forest Service issue vehicle permits to contractors to authorize the use of contractors' vehicles in the Bull Run Watershed.
- Contractors are typically only issued access cards for entry and exit through the main gate. If contractor access via a remote gate is needed, alternative access arrangements are made on a case-by-case basis with the project manager.
- A new secondary lock and key system was deployed in late spring of 2019 to reduce the risk of the primary lock and key system being compromised by loss or unauthorized duplication of keys when contractor access to remote gates is needed. This secondary key system allows contractors to access specific locks, which are deployed seasonally in various locations based on access needs and are then removed once access is no longer needed. These locks look identical to and function the same as the primary hard lock and key system used throughout the watershed, but can be more easily deployed, removed, and replaced than the primary system.
- All authorized public access into the watershed is through escorted public tours or escorted access by PWB, Forest Service, or BLM staff.
- Recreational trail access inside the BRWMU is prohibited except for a 1.0-mile segment of the Oneonta Creek trail on the northern edge and an 8.3-mile segment of the Pacific Crest Trail (PCT) and the Huckleberry Trail, on the eastern edge. The 1.0-mile segment of the Oneonta Creek trail borders, or is just inside, the Bull Run water supply drainage area. The PCT, except for a 1.2-mile section, and the Huckleberry Trail are located outside of the water supply drainage. Steep terrain and thick vegetation also act as natural barriers deterring trespass from the trail system.
- The open segments of the PCT, Huckleberry, and Oneonta Creek trails within the BRWMU are posted with Bull Run "No Trespassing" signs instructing hikers not to trespass on the drainage side of the trail. Informational signage about the BRWMU is also posted at trailhead kiosks at Larch Mountain, Lolo Pass, and Lost Lake.
- The BLM Sandy Ridge bike trail system abuts the southern border of the BRWMU but is located approximately two miles from the water supply drainage boundary. In addition to the locked and fenced boundary gate, the steep terrain in this area provides an additional natural deterrent against human incursion into the water supply drainage boundary.

Security

- PWB owns a property at the main gate that provides an office ("Ranger Station") and residence for the Water Bureau's Lead Watershed Ranger who conducts security patrols for trespassers in the Bull Run Watershed Closure Area.

- A second permanent, full-time PWB Watershed Ranger provides additional staffing coverage in the watershed.
- PWB Watershed Rangers conduct frequent patrols to check for trespass, evidence of trespass, domesticated animal incursion, and other illicit activity. Rangers also regularly check the condition and functionality of all gates and locks, confirm the condition of boundary signage, and post additional signage as needed.
- Security patrols are also provided on occasion by the Forest Service law enforcement officer assigned to Zigzag Ranger District of the Mt. Hood National Forest, usually in response to an incident. The Multnomah and Clackamas County Sheriff's Offices as well as Oregon State Police may also be available to assist with incidents.
- The main gate surveillance cameras are monitored by PWB's security staff. PWB monitors surveillance cameras on Dam 1 and Dam 2—the live video feed is monitored by Headworks operators who staff the facility 24 hours a day, 365 days a year. PWB's Security Dispatch Center and Water Control Center staff also continually monitor the video daily. Both PWB Watershed Rangers can access, monitor, and review these video feeds, along with the main gate camera feeds, from the Ranger Station.
- Motion-activated cameras provide surveillance at many undisclosed locations. PWB's Lead Watershed Ranger collects digital image and video files from these cameras as part of regular surveillance and patrols. The use of trail cameras in Water Year 2019 was consistent with use in Water Year 2018.
- During Water Year 2019, PWB conducted one trail patrol on a section of the PCT from Indian Mountain to Lolo Pass. The Oneonta Creek Trail from Larch Mountain Road to the junction with the Bell Creek and Horse Creek trails was also patrolled once. The area near the BLM Sandy Ridge bike trails to the south was also frequently patrolled.
- Additional barrier fencing was installed at the Homestead gate (near the Sandy Ridge bike trail system) at the end of Water Year 2017. This fencing is intended to dissuade potential trespassers and/or make trespass more difficult. It has been effective to date, virtually eliminating trespass via the Homestead Gate, with no trespass incidents occurring in Water Year 2019. Future installations of additional barrier fencing are being considered at other boundary gates.

Human and Domesticated Animal Incursion

Two full-time Watershed Rangers patrolled the watershed for the full year during Water Year 2019. PWB Watershed Rangers reported a total of 82 incidents in or at the boundary of the Closure Area. Seventy-six of the incidents involved human trespass, of which 12 included leashed or unleashed dogs. There were 5 separate cases of at-large dogs. The remaining report of an unsecured boundary gate did not result in human trespass. Eight of the total 82 incidents reported during Water Year 2019 occurred within the water supply

drainage. Of these, 5 incidents comprised human-only trespass, 1 incident included human trespass with dog, and 2 incidents involved at-large dogs. Based on the evaluation of the circumstances around the trespass events, there were no concerns for water supply contamination that required further investigation.

4. Wildlife

Wildlife in the Bull Run are potential sources of microbial contamination. PWB monitors wildlife in the watershed as part of its *Cryptosporidium* monitoring program. Wildlife monitoring primarily involves: scat sampling focused on areas near the reservoirs and water intake structures to test for the presence and types of *Cryptosporidium*. The LT2 Interim Measures Watershed Report for Water Year 2019¹ contains detailed information on the wildlife monitoring conducted by PWB.

5. Hydrology, Turbidity, and Erosion

Water Year 2019 was, overall, drier than average in the Bull Run Watershed. A total of 71 inches of precipitation was recorded at Headworks during the Water Year. The long-term average annual precipitation for this location is 79 inches. A comparison of monthly total precipitation levels at Headworks is shown in Figure 2. The Water Year started out slightly wetter than average in October but started to trail behind average with a dry November. January and March were also notably drier than average. April, however, was much wetter than average, particularly in the first half of the month. After the early April rains, conditions transitioned quickly to drier than average for the second half of April and through May and June. July and August had average precipitation, and September above average.

Continuous snow accumulation for Water Year 2019 in the Bull Run began in mid-November at the high- and mid-altitudes and early-February at the lower altitudes. Snow water equivalent (SWE) values lagged behind average values at all sites until mid-February, when significant snow accumulation resulted in above average SWE values at low- and mid-elevation sites. Average SWE values were reached at the highest elevation site in mid-March. Persistence of snow compared to average varied, with snow melting two weeks earlier than average at the high-altitude site, approximately average timing at the mid-altitude site, and five weeks later than average at the low-altitude site.

Figure 3 shows mean daily flows at Key Station 18, located on the main stem of the Bull Run River upstream of Reservoir 1. A flow of 5,000 cubic feet per second (cfs) at this station typically heightens the concern that a turbidity event that approaches or exceeds 5 nephelometric turbidity units (NTU) may occur.⁴ The maximum mean daily flow recorded at this site during Water Year 2019 was 3,280 cfs on April 8, 2019 and was not associated with a

⁴ The source-water criteria for unfiltered systems include maintaining turbidity levels at less than 5 nephelometric turbidity units (NTU) for source water.

turbidity event.

A landslide on the South Fork Bull Run tributary to Reservoir 2 occurred in January 2012. The landslide caused two turbidity spikes at the raw water intake resulting in one shutdown in January 2012 and reduced conduit flows in February 2012. The landslide was most recently inspected from an airplane in June of Water Year 2019. This inspection showed that there were no signs of further large-scale sediment movement toward the stream and vegetation was becoming well established.

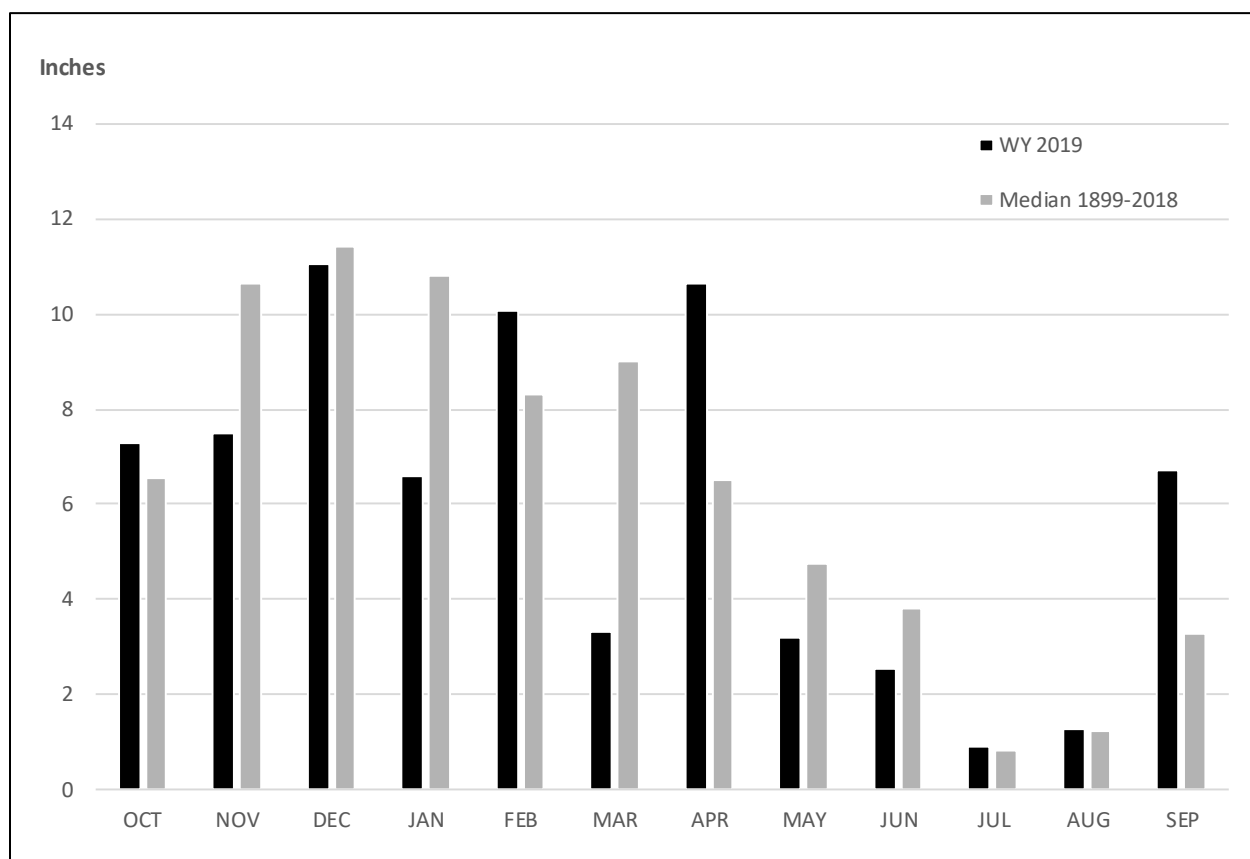


Figure 2. Monthly Precipitation at Headworks, Bull Run, Oregon: Historical Monthly Medians and Water Year 2019 Monthly Totals

During Water Year 2019, PWB used pairs of HF Scientific MicroTOL 3 process online turbidimeters at each raw water intake location—the Primary Intake Structure and Screenhouse 3—for compliance with the Surface Water Treatment Rule. All four online turbidimeters were set up to read turbidity in the range of 0–20 NTU. Bureau staff performed a two-point calibration of these turbidimeters with a styrene-divinylbenzene co-polymer monthly at minimum and verified them twice weekly using the mid (7.0 NTU) and low (0.2 NTU) secondary standards. In addition, an HF Scientific Micro 1000 laboratory bench-top

turbidimeter was used for routine measurement of grab samples. This bench-top turbidimeter uses the same technology as the online turbidimeters and is also calibrated per required standards.

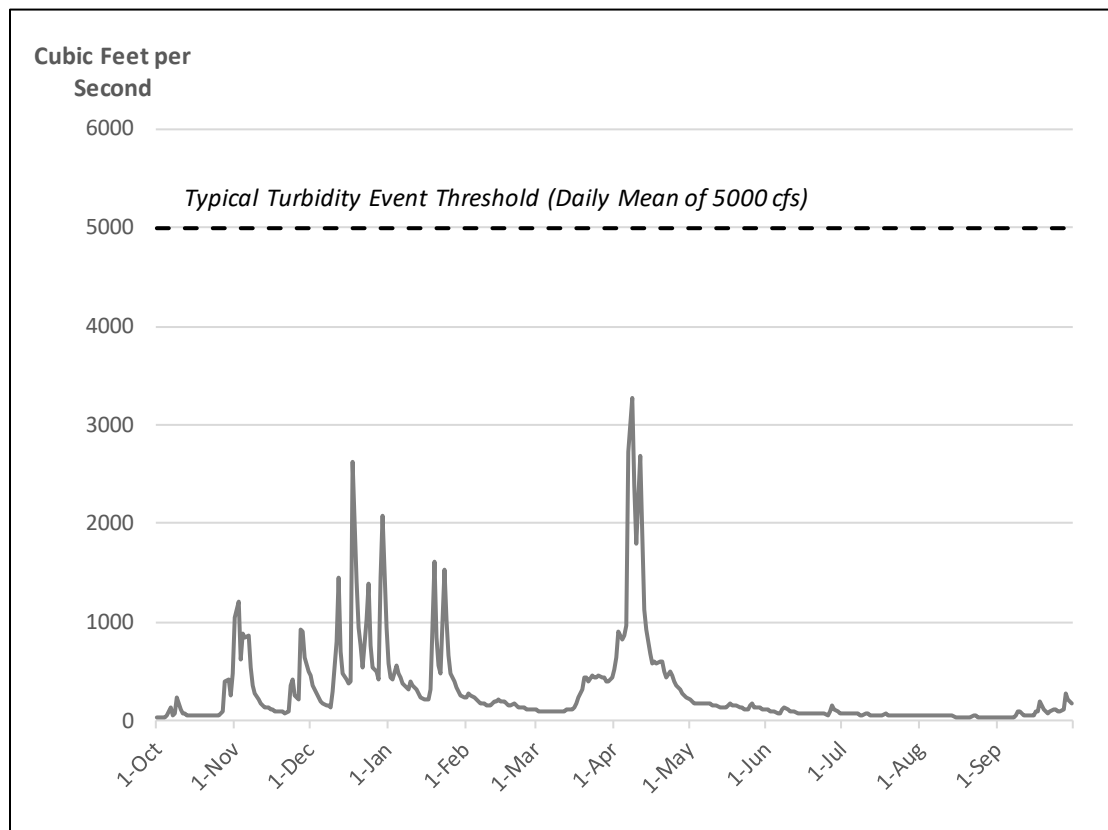


Figure 3. Mean Daily Stream Flow in the Main Stem Bull Run River Measured at Key Station 18 above Reservoir 1, Water Year 2019⁵

6. Fire Protection

Wildfire protection responsibilities for the BRWMU are shared among the Forest Service, the Oregon Department of Forestry (ODF), and PWB. In 2006, staff from the Forest Service, ODF, and PWB prepared the Bull Run Fire Management Plan; it was last updated in 2014. The plan identifies fire suppression resources available to respond to fires in the BRWMU, defines policies on the use of aerial resources, and defines the roles and responsibilities of the three agencies.

⁵ Dashed line indicates stream flow threshold commonly associated with a turbidity event based on past observations. Turbidity events may occur at higher or lower stream flows depending on numerous case-specific factors.

The Forest Service's Closure Order for the BRWMU was updated in 2012 to prohibit hikers from building and using a fire, campfire, or fire stove (except for a pressurized liquid or gas stove) on trails inside the boundaries of the unit. (See Section 3, Security and Trespass, for more information about trails located within the unit.)

Fire Suppression Resources

The Forest Service has the primary responsibility for initial attack on Forest Service lands and ODF has primary responsibility for initial attack on City and BLM land. However, those two parties operate under the "closest forces" incident command concept, whereby the agency that arrives at the fire earliest assumes the role of incident commander until authority is transferred to the primary agency.

The Sandy Fire Department has responsibility for protection of structures in the Bull Run Watershed because the wildland fire protection agencies are not trained in extinguishing structure fires. Portland Fire & Rescue plays a secondary role and would respond to a structure fire or vehicle fire in the watershed if the Sandy Fire Department determined that it needed additional resources. Other local agencies (e.g., Corbett, Hoodland) may also respond, depending on circumstances and resource availability.

Fire Prevention and Detection

Everyone entering the Closure Area, including PWB and Forest Service staff and contractors, are required to comply with the Industrial Fire Precaution Level guidelines on projects and maintenance activities that involve use of heavy equipment, power saws, and other spark-emitting equipment during fire season. PWB provides funding to the Forest Service to staff a fire lookout on Hickman Butte, located on the southern boundary of the Bull Run Watershed, from early July through mid-to-late September. Lightning data is also tracked throughout the fire season by PWB, ODF, and Forest Service staff; locations of lightning strikes that occur within the Closure Area are subsequently monitored for fire starts. Aerial surveillance of the BRWMU from fixed-wing aircraft is also routinely conducted after intense lightning storms. In 2019, PWB also began implementing practices to reduce risks of fires associated with Portland Hydroelectric Project (PHP) 57kV transmission lines within the watershed, including increased frequency of vegetation maintenance along the powerline rights-of-way and conducting patrols of powerlines during periods of high fire danger.

Fire Season – 2019

Fire season was quiet in 2019 owing to relatively mild temperatures and frequent pulses of precipitation that kept fuel moisture high throughout the summer. No fires were reported within the Closure Area and only one fire occurred within 3 miles of the Closure Area boundary. That fire was located in the Old Maid Flats area of the Mt. Hood National Forest, approximately 1.8 from the Closure Area boundary and 2.8 miles from the water supply

drainage boundary. It occurred on August 14 and was caused by an escaped campfire. The fire was less than 0.1 acre and was extinguished the same day it was reported.

7. Project Planning and Construction

Several planning and construction projects on roads and other water supply facilities occurred within the Closure Area during Water Year 2019. PWB's erosion control, invasive species, and human waste containment requirements are part of PWB's standard contract for all construction projects occurring within the Closure Area. Contractors are also subject to all Industrial Fire Precaution Level requirements during fire season. PWB inspectors check for conformance to these requirements as part of standard construction project inspections.

Road Management

In December 2007, PWB and the Forest Service entered into a 20-year intergovernmental agreement called the Bull Run Watershed Management Unit Agreement. The agreement identifies the roles and responsibilities for the two agencies and formally assigns responsibility for roads maintenance to PWB. PWB has assumed responsibility for the maintenance, repair, and upgrades of nearly all roads in the BRWMU necessary for long-term access. Routine maintenance includes activities such as trimming vegetation and cleaning ditches and culverts. Major repairs and upgrades are implemented as capital road construction projects. In addition to major road projects, PWB conducts annual culvert condition assessment surveys for a subset of culverts. The technical details of the road management program are described in the Bull Run Transportation System Maintenance Plan, which has been completed and is awaiting signature by the PWB and Forest Service. The maintenance plan will accompany a new easement for PWB use and maintenance of roads on federal land. The new easement is expected to be completed following completion of the Bull Run Land Exchange.

One major roadway project occurred in Water Year 2019 for a 3.1-mile segment of Road 10 between MP 28.77 and MP 31.85. Road 10 is the primary access route to the upper Bull Run watershed, critical for access to Bull Run Lake, other water supply infrastructure, and fire protection. The project included several large culvert replacements, wall construction to address slumping and sliding issues, and several subgrade repairs. Most of the project was completed in Water Year 2019; paving is expected to be completed in Water Year 2020.

A second small shoulder/slide repair project located at MP 1.47 on Road 10 was also completed during Water Year 2019. This project was located along the lower Road 10, which serves as the primary access route to Headworks and other water supply infrastructure throughout the watershed. The project repaired a small landslide in the road shoulder that was detected in 2017. Construction of this project occurred in Water Year 2019 in conjunction with the MP 28.77 to MP 31.85 project previously described.

Another major road project began in Water Year 2019 for a 2.0-mile segment of Road 10

between MP 6.2 and MP 8.2, between Reservoir 2 and Dam 1. Road 10 is the primary access route to the dams, reservoirs, and other water supply infrastructure throughout the watershed, and provides fire protection access. The project includes several large culvert replacements, wall construction to improve landslide stability, several subgrade repairs, and pavement overlay. Design for this project began in Water Year 2019 and is on-going at the time of this report. Project permitting and construction is expected to begin in Water Year 2020.

Water Supply Facilities

Several water supply facility projects occurred during Water Year 2019 near Headworks, Dam 1, and Dam 2.

Bull Run Treatment Pilot Plant

During Water Year 2019, a pilot treatment plant was installed at Headworks to inform development of the Bull Run Treatment Project. The objective of the pilot is to demonstrate improved water quality, inform process selection and detailed design for the full-scale Bull Run Treatment Project, obtain regulatory approval, optimize treatment processes, and train treatment operator staff.

The pilot plant consists of multiple trailers that house small-scale water treatment equipment, including flocculation, sedimentation, ozonation, and filtration. The pilot uses raw water from the diversion pool and passes it through conventional surface water treatment processes. Water passes through a solids handling tank, activated carbon, and dechlorination while being monitored daily to mitigate any risk of ecologic impact before being returned to the Bull Run River.

Equipment runs continuously and is staffed during normal work hours. Continuous operation is planned at least through late-2021.

Dam 2 Spillway Repair

In Water Year 2019, an inspection of the Dam 2 spillway upper subdrain system discovered a section of collapsed subdrain pipe. Further investigation found the extent of damaged pipe was less than 4 linear feet. During Water Year 2019, PWB began a project to replace the subdrain pipe and comply with FERC requirements; project completion is slated for early in Water Year 2020, prior to the onset of water releases over the spillway.

Dam 1 Needle Valve Replacement

Design for replacement of the needle valves on Dam 1 was completed during Water Year 2019. This project will replace three Larner-Johnson Needle Valves from the face of Dam 1 with three new valves. The existing needle valves are 90 years old and are antiquated, leak, require significant occasional maintenance, are difficult to open/close, and have been proven

to be unsafe in certain operational conditions. Construction is scheduled for Water Year 2020.

Communication System Upgrades and Repairs

PWB is working to improve and update microwave communications throughout the Closure Area. All existing microwave equipment will be replaced with new equipment, and the system is being changed from a passive design to active, requiring installation of a power source. This will result in an increased bandwidth and is expected to provide a stronger signal and improved communications throughout the year.

The Camp Creek project is one component of the larger microwave improvement and update project; the project will convert a passive microwave reflector to an active microwave tower. The Camp Creek project site is located on a ridge south of Reservoir 1. Construction of a 195-foot tower occurred during Water Year 2019. The remainder of the project, including installation of an equipment building and power sources (solar panels and propane tank) is expected to be completed early in Water Year 2020.

8. Hazardous Materials Spills

Hazardous materials spills are handled in accordance with PWB's Emergency Operations Plan. PWB also takes measures to prevent spills. For any contractor project, a detailed plan is required to address potential problems—for example, machine operators are required to use absorbent spill pads. PWB personnel conduct on-site inspections for all projects with the potential to affect water quality.

No hazardous materials spills occurred during Water Year 2019.

9. Tours

PWB typically conducts escorted public tours of the Bull Run Watershed from May through October. The purpose of public tours is to provide the public with access to the otherwise closed watershed to educate the participants about the history, natural resources, and function of the watershed within Portland's drinking water system.

All public tours are conducted with an emphasis on protecting water quality. PWB staff inspect tour vehicles for fuel and other possible automotive leaks before entering the watershed. At the beginning of the tour, educators inform all participants of the watershed rules, which include requirements that participants use only the provided sanitary facilities as restrooms and that they avoid contact with Bull Run raw water. To prevent the spread of invasive species, educators also require all tour participants to use a boot brush to clean shoes prior to boarding the tour vehicle.

In Water Year 2019, PWB conducted 96 tours, with a total of 2,506 participants.

10. Compliance with Unfiltered Criteria

The criteria for unfiltered systems include source water and site-specific criteria. The source water criteria include the following source water bacteriological quality and turbidity requirements:

- The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months.
- The turbidity level cannot exceed the maximum contaminant level of 5 NTU (as prescribed in OAR 333-061-0030(3)(a)(A)).

These are reviewed in the Annual On-Site Watershed Control Program Inspection Report prepared by OHA staff.

The site-specific conditions include the following:

- Meet disinfection requirements:
 - (a) Three-log inactivation of *Giardia* cysts and four-log inactivation of viruses
 - (b) Redundant disinfection components or automatic shutoff of delivery of water to the distribution system when the chlorine residual is below 0.2 milligrams per liter (mg/L)
 - (c) The residual disinfection concentration at the entry point cannot be less than 0.2 mg/L for more than four hours.
 - (d) Disinfectant residuals in distribution system cannot be undetectable in more than 5% of the samples each month for any two consecutive months.
- Maintain a watershed control program and submit an annual watershed control program report
- Be subject to an annual on-site inspection of the watershed control program and the disinfection treatment by OHA
- Not be identified by OHA as a source of waterborne disease outbreak
- Comply with total coliform requirements for 11 of the previous 12 months
- Comply with requirements for total trihalomethanes, haloacetic acids, bromate, chlorine, chloramines, and chlorine dioxide

PWB has met all of these criteria during Water Year 2019.

11. Results of OHA 2019 Annual On-Site Watershed Inspection

The watershed and disinfection system inspection for Water Year 2019 was conducted on September 23, 2019. OHA transmitted its annual on-site watershed control program inspection report to PWB on October 28, 2019. OHA's overview of the site visit states the following:

“Overall, the watershed is well protected and the treatment facilities have redundant disinfection options with auxiliary power. The Portland Water Bureau continues to do an excellent job maintaining the water quality from Bull Run and being proactive with the watershed control program.”

No significant deficiencies were noted and the report concludes with the following:

“While the Portland Water Bureau continues to meet all of the criteria for the exemption from filtration, treatment for *Cryptosporidium* is not yet installed. The Bilateral Compliance Agreement signed December 18, 2017 requires Portland to install treatment for *Cryptosporidium* by September 30, 2027. Portland has indicated that they will install rapid sand filtration.”