

## City of Portland Sponsored Bull Run Watershed Projects and On-going Activities



### PROJECTS

No.	Project Name & Description	Location	Schedule/Status	Purpose
1	<p><b>Bull Run Land Exchange</b></p> <p>The project is exploring a land exchange to convey 2,890 acres of federal Forest Service land to the City of Portland in exchange for 2,200 acres of City owned lands within the Bull Run Watershed Management Unit. The goal is a land-for-land exchange of properties of equivalent financial value. City Council approved the Agreement to Initiate (ATI) for the land exchange in February 2010.</p>	<p>Selected parcels within the Management Unit</p>	<p>Forest Service staff completed the Environmental Assessment and published a Finding of No Significant Impact (FONSI). More information about the EA and FONSI is available on the Mt. Hood National Forest website.  <a href="https://www.fs.usda.gov/project/?project=33120">https://www.fs.usda.gov/project/?project=33120</a></p> <p>The agencies also signed a Memorandum of Agreement to address protection of historical and archeological resources located on land proposed to exchange out of federal ownership.</p> <p>Refer to PWB website for more information about next steps to complete the exchange. New information will be posted when those steps are scheduled.  <a href="https://www.portlandoregon.gov/water/69748">https://www.portlandoregon.gov/water/69748</a></p>	<p>To create a better alignment of land ownership responsibilities with the respective missions of the City and the Forest Service.</p>

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2	<p><b>Road 10 Shoulder Repair</b></p> <p>A short segment (approximately 70 feet) of Road 10 at MP 1.47 is scheduled for repair during the summer/fall of 2018. The project will repair a crack on the road shoulder that was detected in 2017.</p>	<p>Road 10 in the Bull Run Watershed Management Unit, at MP 1.47</p>	<p>Project design is complete. Construction is planned for the summer/fall of 2019.</p>	<p>Repair will reduce risk of unexpected road failure and ensure continuous, reliable, and safe access to all facilities. Also provides reliable access for monitoring and fire protection in the watershed.</p>
3	<p><b>Road 10 Improvement (“10H”)</b></p> <p>A 1.6 mile section of Road 10 was reconstructed and repaved to improve pavement condition, create better ditch lines, improve drainage, and address slumping and slides.</p>	<p>Road 10 in the Bull Run watershed, from approximately the Cougar Creek to the North Fork Bridge</p>	<p>The project was completed in the Fall of 2018.</p>	<p>To ensure continuous, reliable, and safe access to all facilities. Also provides reliable access for monitoring and fire protection in the watershed.</p>
4	<p><b>Road 10 Improvement (“10R”)</b></p> <p>A 3.1 mile section of Road 10 will be reconstructed and repaved to improve pavement condition, create better ditch lines, improve drainage, and address slumping and slides.</p>	<p>Road 10 in the Bull Run watershed, from approximately the intersection with Road 1000524 to the intersection with Road 1027</p>	<p>Project design was completed FY 17-18; construction scheduled for FY 19-20.</p>	<p>To ensure continuous, reliable, and safe access to all facilities. Also provides reliable access for monitoring and fire protection in the watershed.</p>
5	<p><b>Road 10 Improvement (“10E”)</b></p> <p>A 2.0 mile section of Road 10 will be reconstructed and repaved to improve pavement condition, create better ditch lines, improve drainage, and address slumping and slides.</p>	<p>Road 10 in the Bull Run watershed, from approximately MP 6.2 to the intersection with Road 1008</p>	<p>Project design is scheduled for FY 18-19; construction scheduled for FY 20-21.</p>	<p>To ensure continuous, reliable, and safe access to all facilities. Also provides reliable access for monitoring and fire protection in the watershed.</p>

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6	<p><b>Repairs of North Tower at Dam 2</b></p> <p>The project will remove failed stilling wells and equipment from the interior of the wet wells and outlet works as well as replacement of the interior cathodic protection system and replacement of various sensors.</p>	Dam 2	Failed stilling wells and equipment were removed from wet wells in the Fall of 2016. Replacement of interior cathodic protection system and level sensing instrumentation is currently scheduled for 2019.	To repair monitoring equipment on the North Tower.
7	<p><b>Camp Creek Microwave Improvement Project</b></p> <p>This is one component of a project to improve and update microwave communication in the Bull Run Watershed Management Unit (BRWMU). All existing microwave equipment will be replaced with new equipment, and the system is being changed from a passive design to active. This will result in an increased bandwidth, and is expected to provide a stronger signal and improved communications throughout the year.</p>	Camp Creek Microwave Reflector site	Design of the project is complete. A geotechnical assessment was completed in Summer 2017. Permitting was completed in 2018. Construction of the tower, installation of the building and power source, and replacement of the equipment is planned for Summer/Fall 2019. Creation of the secondary fire break is tentatively scheduled for Winter 2018-2019.	The Camp Creek communication site will be upgraded from a passive microwave reflector to an active microwave tower. 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. This is expected to improve data transmission and reliability in the BRWMU.
8	<p><b>Dam 1 - Needle Valve Replacement Project</b></p> <p>This project will replace three Lerner-Johnson Needle Valves from the face of Dam 1 with three new valves. The existing needle valves are 89 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.</p>	Dam 1	Final design of the project was completed in December 2018. Construction is scheduled to begin November 2019.	The project will replace existing valves with fixed-cone valve with hoods. It will also improve operation and access and is intended to reduce annual maintenance costs. Visual impacts to the valve house structure will be minimized.
9	<p><b>Conduit Inspections</b></p> <p>Inspections are being conducted on conduit pipes to assess the condition of the pipe and their anticipated remaining lifespan.</p>	Intermittent locations along length of conduits.	Conduit 2 and Conduit 3 inspections were completed in 2017-2018. Conduit 4 inspection is anticipated to be done in Winter 2019-2020.	Conduits are critical infrastructure needed to transport water from the Bull Run watershed to the City of Portland. Inspections have not occurred in at least 25 years and are needed to assess repair needs and remaining life-expectancy of the conduits.

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10	<p><b>Dam 2 Spillway Repair</b></p> <p>Safety improvements were made within the spillway of Dam 2 in accordance with FERC requirements based on a September 2017 inspection. Slabs and walls were repaired with new concrete in a few areas where concrete had failed, and joints were sealed with new sealant.</p>	Dam 2	Repairs were completed in 2018.	Compliance with FERC requirements
11	<p><b>Dam 2 Spillway Subdrain Repair</b></p> <p>In 2018, an inspection of the Dam 2 spillway upper subdrain system discovered a section of collapsed subdrain pipe. Further investigation is required to determine the extent of the collapsed pipe; repairs will be made based on outcomes of the investigation.</p>	Dam 2 spillway	Subject FERC approval, PWB proposes to investigate the extent of the collapsed pipe in 2019 and complete the repairs in 2020.	Regular spillway maintenance; Compliance with FERC requirements

### ON-GOING ACTIVITIES

No.	Project Name & Description	Location	Schedule/Status	Purpose
1	<p><b>Water Treatment Operations</b></p> <p>Apply chlorine and monitor for finished water quality residuals. Monitor and control river flow below Dam 2 to meet fish flow requirements. Control conduit flows to meet customer demand.</p>	Headworks	Year-round	To disinfect water to protect public health and meet all state and federal water quality standards for unfiltered water system; create beneficial habitat conditions in lower Bull Run River; supply potable water to Portland metro area.

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2	<p><b>Security</b></p> <p>Two full-time Watershed Rangers conduct vehicle and foot patrols for trespass; monitor a private-vehicle identification system; deploy and maintain a camera system for remote area monitoring; and coordinate emergency access in an emergency event. Security staff conduct fire patrols during the summer months and conduct security site surveys of all water system facilities and infrastructure sites throughout the year.</p>	Entire watershed	Year-round	To enforce the public closure of the Bull Run Watershed Management Unit (BRWMU) and maintain effective security program for the Unit.
3	<p><b>Road Maintenance</b></p> <p>Brushing (cutting roadside brush), mowing, tree-fall removal, slide removal, ditch maintenance, culvert cleaning and repair, sub-grade repair, snow plowing, chip-seal, and bridge inspections.</p>	Entire watershed	Year-round	To ensure continuous, reliable, and safe access to all facilities, as well as maintenance of other city-owned infrastructure within the watershed.
4	<p><b>Trail Maintenance</b></p> <p>Brushing, debris removal and safety-related maintenance on trails that provide access to water monitoring stations.</p>	Trails associated with USGS gauging stations located through watershed	Year-round	To provide access to facilities and natural resources.
5	<p><b>Conduit Maintenance</b></p> <p>Brushing, mowing, and tree-fall removal on conduit right-of-ways, leak repair, blow-off and air valve maintenance, bridge inspection, and intertie operations.</p>	Conduit right-of-ways between Headworks and main gate	Year-round, as required	To provide access on right-of-way as required to maintain operation of conduits.
6	<p><b>Facilities Maintenance</b></p> <p>Mowing at Headworks and Bear Creek house, monitor for storm damage, storm clean-up and repair.</p>	Facilities located throughout watershed	Year-round, as required	To maintain structural integrity, upkeep and access to facilities.

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7	<p><b>Waterway Debris Removal &amp; Disposal</b></p> <p>Removal of logs and debris captured by upper log boom in Reservoir 1. Inspection and repair of log booms in Reservoirs 1 &amp; 2 and Bull Run Lake.</p>	Reservoir 1, Reservoir 2 and Bull Run Lake	Late spring and summer, and as required	To protect dams and dikes, and other water system infrastructure.
8	<p><b>Danger/Hazard Tree Removal</b></p> <p>Removal of danger and hazard trees that pose a risk to life, property, and infrastructure, as required by federal and state laws. Identification of danger and hazard trees is performed by a certified danger tree specialist.</p>	Selected locations throughout the watershed	Year-round, as required	To keep workers and visitors safe while traveling and working in the watershed; to protect water system property and infrastructure
9	<p><b>Winter-Season Facility Maintenance Surveys</b></p> <p>Use of snow cat to conduct snow survey measurements at Bull Run Lake; assess condition of outlet structures at Bull Run and Boody lakes, assess condition of gauging flumes at Upper and Lower Springs; and provide access to Hiyu Mtn. telecommunications tower for ComNet staff. ComNet provides microwave communication service to the city.</p>	Selected locations throughout watershed	Winter months (generally November – May)	To maintain seasonal access to facilities; monitor condition of resources; repair failed infrastructure.
10	<p><b>Dam Maintenance</b></p> <p>Weekly piezometer readings in Dams 1 &amp; 2; operation and maintenance of gates; perform Federal Energy Regulatory Compliance (FERC) requirements such as annual flushing of piezometers, face drains and foundation drains; brushing on dam abutments.</p>	Dam 1 and Dam 2	Year-round	To maintain operational and structural integrity of dams and satisfy FERC requirements.
11	<p><b>Road Inclinometer Monitoring</b></p> <p>Measure angles of slope, elevation or inclination. Inclinometer locations are all in close proximity to the conduits.</p>	Road 10 between main gate and Headworks	Readings are made twice a year (spring and fall)	To determine presence of ground movements that could affect conduits. The locations are either in areas of historic slides or in areas that were determined to have a potential to slide.

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12	<b>Road Piezometer Monitoring</b> Use piezometer to measure water levels in porous surfaces and near potential slide areas.	Road 10 between main gate and Headworks	Readings are made twice a year (spring and fall)	To determine risk potential to protect critical water system infrastructure from slope failure.
13	<b>Stream Flow &amp; Temperature Gauging and Reservoir Level Monitoring</b> Cooperative program with the U.S. Geological Survey (USGS) to monitor flow and water quality measurements at selected stream stations. Measure water levels at Bull Run Lake and Bull Run reservoirs.	Selected locations throughout watershed	Continuous automated monitoring. Validation by on-site inspection performed on as-needed basis	To monitor volume of water entering the reservoirs for summer supply planning and flow and temperature management in lower Bull Run River.
14	<b>Snow Gauging</b> Cooperative program with the federal Natural Resource Conservation Service (NRCS) to monitor snow depth, snow water equivalent, precipitation, and temperature at three monitoring stations.	Selected locations throughout watershed	Continuous automated monitoring. Validation by on-site inspection performed annually or as needed	To monitor snow levels and hydrologic conditions.
15	<b>Stream Key-Station Monitoring</b> Collect water quality data at the mouths of the four main tributaries that flow into the reservoirs.	North Fork, South Fork, Main Stem and Fir Creek key stations	Scheduled: monthly Storm events: 6-8 times per year	To monitor water quality at the four main tributaries.
16	<b>Reservoir Monitoring</b> Collect water quality data and temperature profiles from the reservoirs.	Reservoirs 1 and 2	Bi-weekly	To monitor conditions, physical processes and water quality in source water reservoirs.
17	<b>Fish Surveys - Bull Run Reservoirs</b> Estimate of fish populations in reservoirs using hydroacoustic surveys	Reservoirs 1 and 2	Surveys began in 2008 and occur annually, alternating each year between reservoirs.	To estimate the size of each reservoir's fish population and maintain a record of changes through time in preparation for FERC relicensing.

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18	<p><b>Invasive Plant Surveys</b></p> <p>Ongoing monitoring, removal and control of invasive species. Surveys for invasive plant species occur along the primary roadways, trails, reservoirs, and near infrastructure, as well as sites of recent road projects. Aquatic surveys of the Bull Run reservoirs and rare plant surveys of two prairies are also conducted to monitor potential impacts of invasive plant species on these habitats and populations.</p>	Selected locations throughout watershed	Annually	To protect native vegetation and retain ecological function.
19	<p><b>Water Resources Education Program</b></p> <p>Supervised Bull Run tours are administered by the Water Bureau's education staff.</p>	Selected locations throughout watershed	Ninety-four tours were completed during the 2018 calendar year.	To educate participants about the Bull Run watershed and Portland's water system. Topics include history, ecology, source water protection, water quality, system operations, and stewardship.
20	<p><b>Spawning Surveys -- Lower Bull Run River</b></p> <p>Collect adult Chinook salmon information for the lower Bull Run River.</p>	Lower Bull Run River	<p>HCP Years 1–20 (2010-2029)</p> <p>Takes place annually from August through December.</p>	To monitor adult salmon numbers and comply with terms of the City's Incidental Take Permit.
21	<p><b>Spawning Gravel Placement and Monitoring</b></p> <p>The City augments spawning gravel in the lower Bull Run River and monitors the effects of the gravel placements. Project constitutes Measure H-1 of the Bull Run HCP.</p>	Lower Bull Run River	<p>HCP Years 1–50 (2010-2059)</p> <p>Gravel at three sites is placed in the river each year.</p> <p>Surface area of spawning gravel patches in the lower Bull Run River is estimated annually (2007-2019).</p> <p>Depth of the spawning gravel scour by high flows is monitored in certain years. Gravel scour was monitored during the fall/winter of 2014-2015, 2016-2017, and monitoring is on-going during the</p>	To mitigate the effects of Dam 1 and Dam 2 on transport of natural spawning gravel to the lower Bull Run River and comply with the terms of the City's Incidental Take Permit.



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			fall/winter 2018-2019. Scour depth will be monitored in at least two additional years beyond 2018-2019.	
22	<p><b>Salmon Monitoring -- Little Sandy River and lower Bull Run River</b></p> <p>PWB continues to do two activities in the Little Sandy River: 1) maintenance of a smolt trap and 2) fish habitat surveys and snorkel surveys. Snorkel surveys are also conducted in the lower Bull Run River.</p>	<p><i>Smolt trap:</i> just upstream of the former Little Sandy Dam site</p> <p><i>Little Sandy fish habitat and snorkel surveys:</i> from the mouth of the river to the former dam site</p> <p><i>Lower Bull Run River snorkel surveys:</i> from the mouth of the Bull Run River to the site of the former rock weir (just below Dam 2 spillway)</p>	<p>The smolt trap is operated from roughly mid-March through mid-June annually (2009 – 2059).</p> <p>Habitat surveys are conducted 7 times over a 20-year period (2007-2027).</p> <p>Snorkel surveys have been performed annually since 2009 and are expected to continue indefinitely.</p>	<p>The purpose of the smolt trap is to monitor juvenile salmon and steelhead production. Habitat surveys monitor the effectiveness of fish habitat restoration measures. Habitat and smolt surveys comply with terms of the Bull Run HCP. Snorkel surveys monitor juvenile salmon and steelhead populations; these surveys support HCP fish management activities.</p>
23	<p><b>Reed Canary Grass Removal</b></p> <p>The City continues to remove reed canary grass, because it may inhibit development of larval western toads and red-legged frogs, where these two species breed along the north bank of the upper end of Reservoir 1. Removal includes cutting and raking. The City accesses the site by boat from the reservoir and by trail. Project constitutes Measure R-3 of the Bull Run HCP.</p>	Reservoir 1	<p>HCP Years 1–50 (2010-2059)</p> <p>Performed annually</p>	<p>To remove reed canary grass for the benefit of western toads and red-legged frogs and comply with the terms of the City's Incidental Take Permit.</p>

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24	<p><b>Dam Safety Inspections of PHP Facilities</b></p> <p>Bureau of Hydropower staff periodically visit and inspect the Portland Hydroelectric Project's (PHP) two Bull Run Dams and powerhouses.</p>	Dam 1 and Dam 2	Monthly	To ensure the stability and safety of the hydroelectric facilities and that any changing conditions at the dams and powerhouses can be monitored and addressed.
25	<p><b>FERC Annual Operations Inspections</b></p> <p>Hydropower staff accompanies representatives from the Federal Energy Regulatory Commission (FERC) and the Oregon Water Resources Department on periodic inspections of Bull Run Dams Nos. 1 &amp; 2.</p>	Dam 1 and Dam 2	Annually	To inspect and assess the physical condition of the two Bull Run dams and comply with Federal Energy Regulatory Commission (FERC) regulations.
26	<p><b>FERC Quinquennial (5-year) Part 12 Inspection and Report</b></p> <p>Inspection of the Portland Hydroelectric Project (PHP).</p>	Dam 1 and Dam 2	Completed in 2017; reoccurring every 5 years; next review scheduled for 2022	Required reoccurring 5-year extensive review of the PHP Dam Safety program and facility infrastructure. Inspection is conducted by an outside independent consultant to report back to FERC on the status of the project and associated programs to protect the BRR and downstream population.
27	<p><b>EWEB and ENW Normal Ongoing PHP Operations</b></p> <p>As contract operators for the City, Eugene Water and Electric Board (EWEB) routinely starts and stops the two Portland Hydroelectric Project's (PHP) powerhouses remotely from their control room in Eugene. A second contractor, Energy Northwest (ENW), has operating personnel operating from the City's Headworks facility. They work in both PHP powerhouses every day conducting the daily preventive checks and maintenance procedures to maintain both power plants at a fully operational capability.</p>	Dam 1 and Dam 2	Daily	To verify the proper functioning of powerhouse equipment; and perform regular operation and maintenance functions. Monitor crests of both BR Dams to verify the actual reservoir water levels against what is being recorded in the PHP SCADA monitoring system.

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28	<p><b>Annual Overhauls of the two PHP Powerhouses</b></p> <p>Energy Northwest schedules annual individual two-week long power generation outages at each of the Portland Hydroelectric Project's (PHP) powerhouses, during which time they have a variety of its maintenance and repair crews visit and do work at both of the powerhouses.</p>	Dam 1 and Dam 2	Annually – for usually two weeks at each powerhouse - in the summer / fall period.	To accomplish a range of testing, measuring, repair and maintenance work that cannot be accomplished while the units are in operation.
29	<p><b>Deliveries to and Removals from the PHP Powerhouses</b></p> <p>On an “as-needed” basis, diesel fuel and supplies are delivered to both of the Portland Hydroelectric Project's (PHP) powerhouses.</p>	Dam 1 and Dam 2	As needed - infrequent	To ensure adequate fuel for emergency backup generators and other supplies as needed. Both PHP powerhouses have diesel generators that provide emergency power during electricity outages.
30	<p><b>PHP Power Transmission Line Assessment &amp; Maintenance</b></p> <p>Portland General Distribution Service's (PGDS is a branch of Portland General Electric) designated forester periodically conducts site visits to assess the condition of the Portland Hydroelectric Project's (PHP) power transmission line corridor. In consultation with the City and Forest Service (if on federal land) recommendations and decisions are made on proposed brushing and hazard tree removal.</p>	Power line Right of Way between Dam 1 and main gate	<p>Assessment: annually</p> <p>Maintenance: on average, once every three years.</p>	To protect the safety and integrity of the transmission line.
31	<p><b>PHP Power Line Repairs</b></p> <p>Portland General Distribution Service's power line repair crews periodically visit the Portland Hydroelectric Project's (PHP) transmission line corridor to repair any storm caused damage that may have occurred.</p>	Power line Right of Way between Dam 1 and main gate	As needed following events causing damage to the PHP transmission lines.	To ensure continued operation of powerhouses and minimize the duration of power outages.

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32	<p><b>Bull Run Lake Special Use Authorization Monitoring Activities</b></p> <p>PWB is required to conduct various wildlife and fish monitoring activities on an annual basis to maintain its special use authorization with the Forest Service for Bull Run Lake. Activities planned for 2019 include: avian surveys, spawning surveys, fish population estimates, and limnological monitoring.</p>	Bull Run Lake	Ongoing during field season (late spring through late fall)	To comply with mitigation and monitoring requirements of the Bull Run Lake Special Use Authorization.

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33	<p><b>Bilateral Compliance Agreement Interim Measures: Monitoring and Inspections</b></p> <p>From 2012 to 2017, the Portland Water Bureau operated under a variance from treating Bull Run drinking water for <i>Cryptosporidium</i>. The treatment variance was issued in accordance with federal and state law. After a series of <i>Cryptosporidium</i> 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 <i>Cryptosporidium</i> treatment as well as for protective interim measures until treatment facilities are operational.</p> <p>PWB is conducting routine monitoring at the intake for <i>Cryptosporidium</i> to meet the Bilateral Compliance Agreement requirements. Watershed inspection and environmental sampling is also required as part of a Watershed Inspection and Monitoring Plan. Results of watershed inspection and environmental sampling for each water year (Oct 1 – Sep 30) must be submitted to OHA in an annual Watershed Report each December.</p> <p>Summary status reports are also submitted to OHA quarterly.</p>	<p>Water sampling at Headworks and Key Stations. Inspections and scat collection throughout the watershed.</p> <p>Inspection categories include: security, diversion pool, soil erosion areas and sanitary facilities.</p>	<p>PWB must sample at the intake at least 100 liters of water per week over at least two days, and test for <i>Cryptosporidium</i>. If <i>Cryptosporidium</i> is detected, PWB must increase sampling to 200 liters per week over at least four days for at least three weeks.</p> <p>The Bull Run LT2 Interim Measures Watershed Report for Water Year 2018 contains all monitoring and inspection results for Water Year 2018 (Oct 2017 – Sep 2018). The report was submitted to OHA in December 2018.</p> <p>Results from the third quarter of 2018 (July - September) are found in the Bilateral Compliance Agreement Quarterly Status Report submitted to OHA on November 8, 2018.</p>	<p>PWB is currently operating under the requirements of the Bilateral Compliance Agreement until treatment facilities are operational, no later than September 30, 2027.</p> <p>Additional information on <i>Cryptosporidium</i> and the Bilateral Compliance Agreement can be found on <i>Cryptosporidium</i> website. <a href="https://www.portlandoregon.gov/water/75112">https://www.portlandoregon.gov/water/75112</a></p>

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34	<p><b>Bull Run Wildlife Monitoring (related to <i>Cryptosporidium</i>)</b></p> <p>The Water Bureau is conducting ongoing wildlife monitoring within the Bull Run watershed to improve its knowledge of wildlife as a potential source of <i>Cryptosporidium</i>.</p> <p>Activities completed in 2018 included: (1) using live traps for collecting small mammal scat near the diversion pool and reservoirs and (2) deer surveys around Headworks. The same activities are planned to continue in 2019.</p>	Monitoring occurs throughout the watershed.	Year round, depending on wildlife species being monitored	To support PWB's compliance monitoring for <i>Cryptosporidium</i> under the terms of its 2017 Bilateral Compliance Agreement.