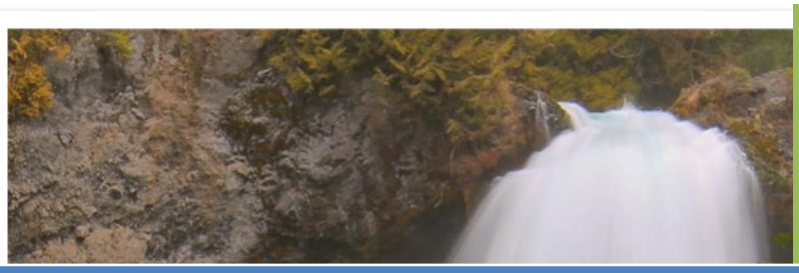
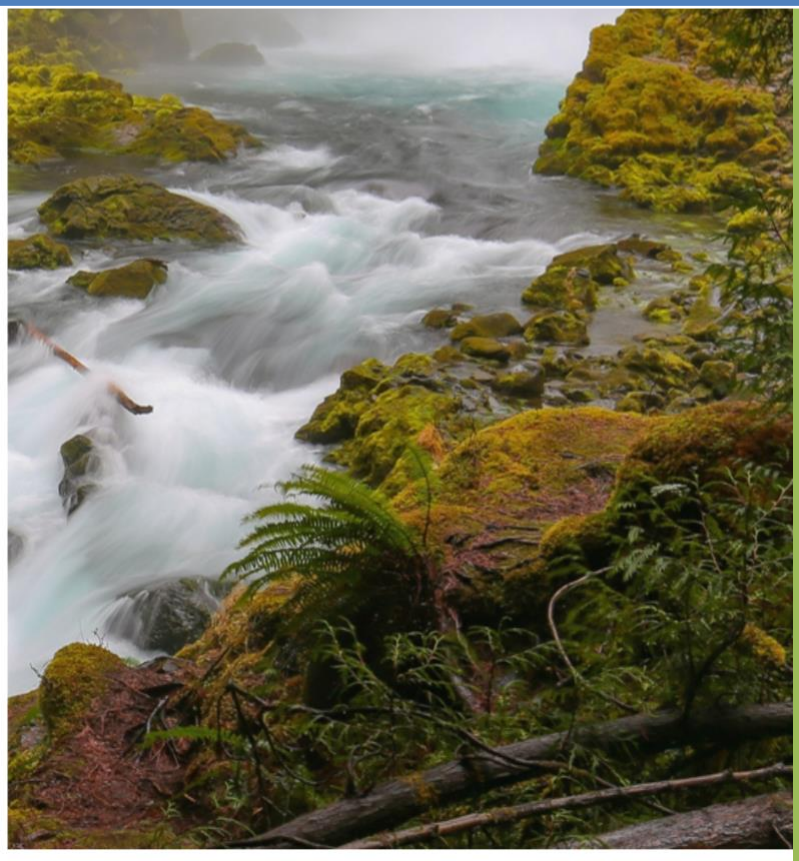


2020

State of the McKenzie Watershed Report

Eugene Water & Electric Board



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February 2021

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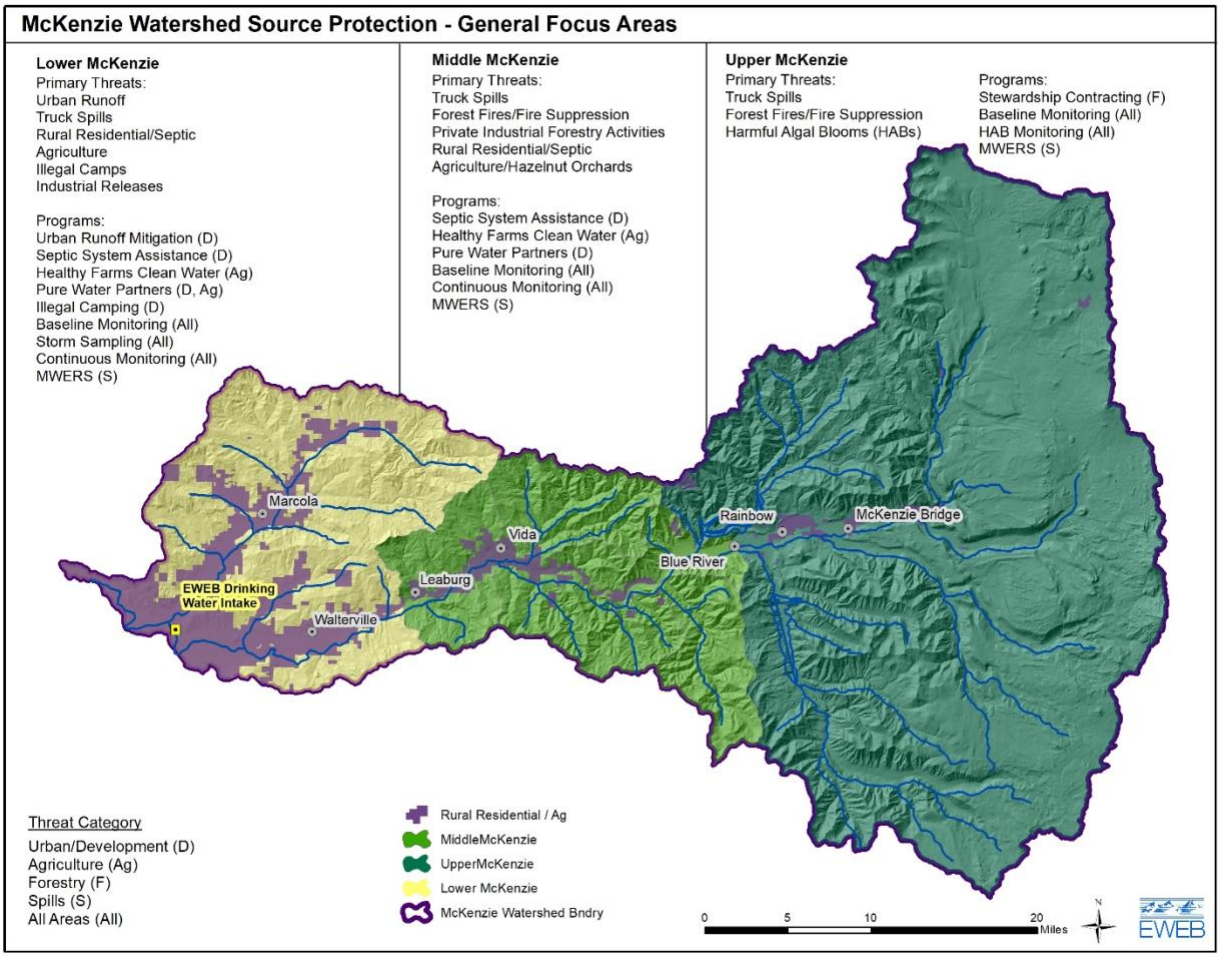
1.0 Executive Summary

The purpose of the State of the McKenzie Watershed Report (SMWR) is to highlight water quality trends, activities that threaten water quality, significant watershed events, and programs designed to mitigate or reduce impacts to water quality. This report is produced annually to show progress being made or challenges encountered as EWEB implements the Drinking Water Source Protection (DWSP) Program 10-year strategic plan throughout the McKenzie Watershed (see Figure 1-1). To keep the report brief, background information and programs details are contained in the Strategic Plan Technical Report and the previous SMWR. Both can be found at: http://www.eweb.org/community-and-environment/mckenzie-watershed-protection/drinking-water-source-protection-plan.

The report layout is designed to address goals and objectives, highlight major events in the watershed that had significant positive or negative impact and provide a summary of the health of the McKenzie Watershed (Section 1), followed by brief discussions of water quantity and quality trends and highlights (Section 2-3) and updates on the priority threats to water quality and how EWEB programs are responding to these threats (Sections 4-10). The final section focuses on operationalizing source protection as well as looking at efforts under development and future opportunities (Section 11).

Figure 1-1: Map of DWSP Program



1.1 Source Protection Goals & Objectives

The overarching goal of EWEB's Drinking Water Source Protection (DWSP) program is to measure the balance between watershed health and human use over time and implement actions that maximize the benefits EWEB receives through its investments in the McKenzie River Watershed. The primary objectives to accomplish this goal include:

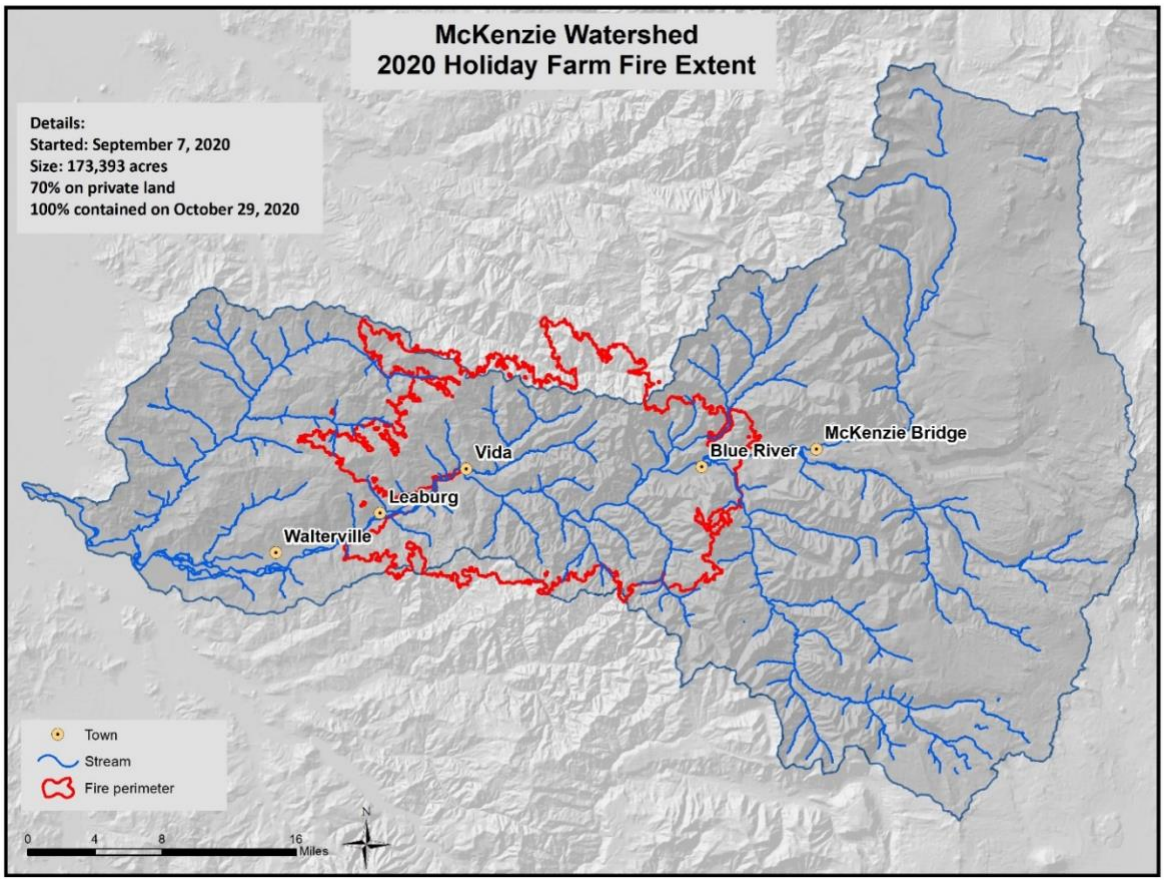
1. Plan and implement actions that maintain source water quality in a way that balances risks with benefits in partnership with others;
2. Prioritize source protection efforts that provide the greatest benefit to water treatment and electric generation in the McKenzie Watershed; and,
3. Promote public awareness and stewardship of a healthy watershed through targeted actions and programs.

1.2 Watershed Highlights (or lowlights)

Holiday Farm Fire

On September 7th, 2020, a wildfire that started near the Holiday Farm RV Resort quickly spread to consume over 100,000 acres in less than 24 hours, and more than 173,000 acres within two weeks.

Figure 1-2: Holiday Farm Fire Extent



High winds and extremely dry conditions fanned flames that destroyed hundreds of homes and an untold number of trees within a matter of days. Although local, state, and federal agencies and organizations are conducting restoration efforts throughout the fire zone, the impact of the fire on communities, habitat and water quality will last for years.

Figure 1-3: Residences Destroyed by the Holiday Farm Fire

1.3 Statement of Overall Health

In the 2019 State of the McKenzie Watershed Report we indicated "it is anticipated that climate change impacts in the McKenzie will show up as extreme weather events (including flooding, drought, and loss of snow pack), resulting in increased wildfires, harmful algal blooms, and property damage in riparian and floodplain areas." This year's Holiday Farm Fire (HFF) was an example of such an extreme event that has had a devastating impact on the McKenzie Watershed. Widespread damage from the fire will continue to threaten water quality for years. EWEB's focus has been to work closely with our federal, state, and local partners to quickly stabilize the situation in a well-coordinated response.

EWEB worked with the United States Geological Survey (USGS) to install an additional real-time water quality station at Walterville to give early warning of high turbidity and organic carbon events due to fire impacts to the Hayden Bridge filtration plant in order to adjust treatment ahead of these pulses and maintain excellent drinking water quality for our customers. The next phase of response involves revegetation in high priority riparian areas and establishing an Early Detection Rapid Response (EDRR) partnership to address invasive weeds that may overrun large portions of the landscape if left unchecked. This disaster presents opportunities to rebuild smarter and scale up restoration and conservation actions in strategic areas to significantly reduce the long-term impacts from the fire, which is what EWEB is currently planning to implement with our partners. Many of the watershed health attribute trends listed in Table 1-1 were influenced either positively or negatively by the HFF.

The HFF overshadows the progress made on multiple fronts, including the Pure Water Partners (PWP) program that quickly pivoted from doing riparian health assessments to conducting burn assessments and designing erosion control best management practices on over 200 properties. The McKenzie Watershed Council and U.S. Forest Service (USFS) continued to implement the next phases of large-scale

floodplain restoration in Deer Creek and the South Fork McKenzie River in partnership with EWEB. The benefits realized from these projects informed the HFF restoration approach and prompted partners to pursue additional large-scale floodplain restoration in Gate Creek, Quartz Creek and the McKenzie Finn Rock Reach. This type of restoration can mitigate floods, turbidity, and organic carbon by spreading out and attenuating flows, dropping out sediment, and increasing the uptake of nutrients and organic carbon coming from upstream severely burned landscapes.

Table 1-1: Summary of Watershed Trends

Watershed Health Attribute	Maintain or Improve	Slight Decline	Significant Decline	Notes	Influence of the HFF
Wildfire				Section 1.2	Negative
Snowpack/Flows				Section 2.0	Likely Negative
Water Quality				Section 3.0	Negative
Algal Blooms				Section 3.2	Likely Negative
Hazmat Spills				Section 4.0	Negative
Urban Runoff Impacts				Section 5.0	Unknown
Illegal Camping				Section 6.0	None
Conservation				Section 7.0	Positive
Development Impacts				Section 7.0/8.0	Likely Negative
Agriculture				Section 9.0	Unknown
Forestry				Section 10.0	Negative
Watershed Investments				Appendix 2	Positive
Partnerships				Appendix 1	Positive

Urban runoff and hazardous material spills remain high priority threats to water quality. There were several major truck accidents in 2020 releasing diesel and oil that created sheens on the river but could have been a lot worse. The destruction from the HFF has created conditions on Hwy 126 that could lead to more accidents and major spills. The McKenzie Watershed Emergency Response System (MWERS) and years of interagency drills continues to provide the platform for effective communication and coordination in response to these incidents. Urban runoff continues to deliver the highest levels of pollutants to the river in the lower watershed. Major progress was made in 2020 to develop an effective Urban Waters & Wildlife Program that designs and implements green infrastructure in partnership with local businesses to treat storm runoff onsite before it enters the stormwater system above EWEB's intake. This partnership attracted hundreds of thousands of grant dollars from the U.S. Environmental Protection Agency (EPA) to scale these efforts up in Springfield and surrounding areas.

The completion of the new EWEB Water Quality Lab at Hayden Bridge and the addition of a Laboratory Technician increases the capacity and ability of the lab to support post-fire monitoring. The lab became accredited for cyanotoxin analysis by the Oregon Environmental Laboratory Accreditation Program (ORELAP) and is adding analytical capabilities for metals and organic carbon analysis, which will increase flexibility in watershed and distribution system monitoring, reduce turnaround times to get results, and save EWEB money in reduced analytical costs.

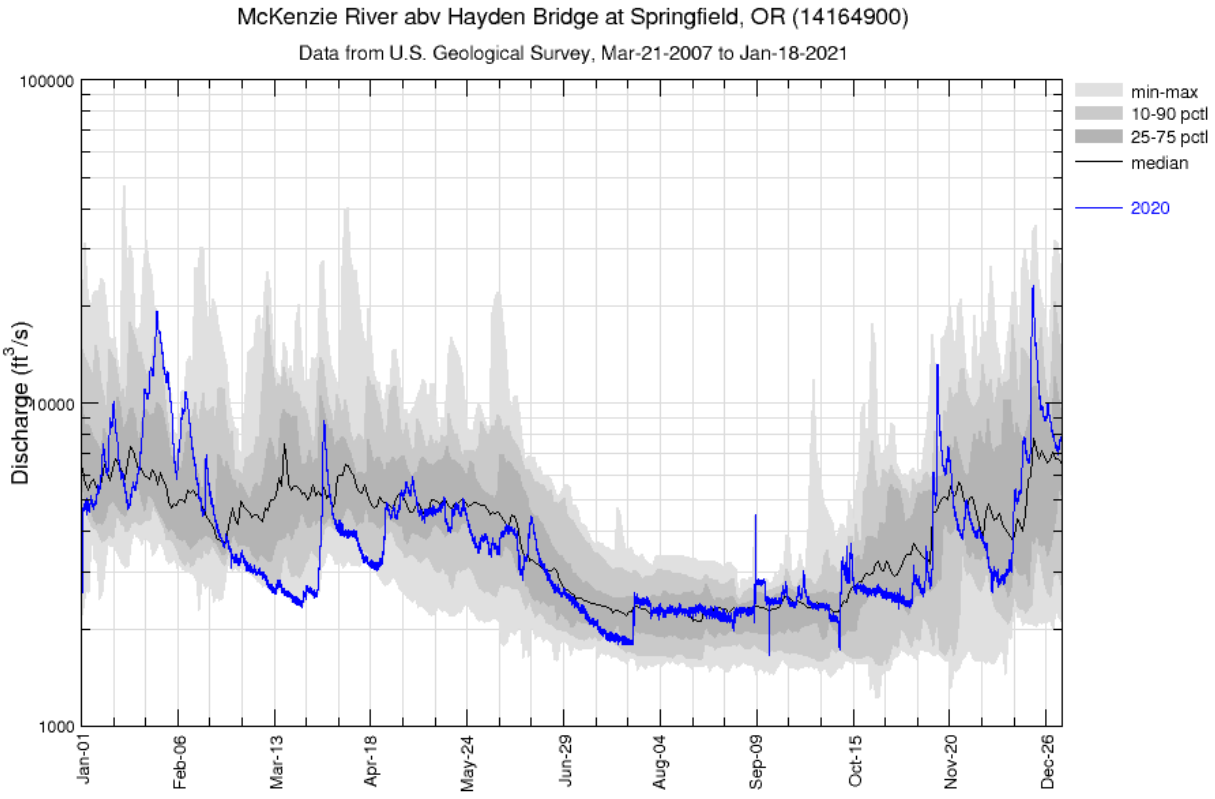
The remainder of this report provides details of these and other efforts to protect the McKenzie Watershed as the lifeblood of EWEB, our customers, and the region, respond to the Holiday Farm Fire and maintain or improve the excellent water quality we enjoy for future generations. See Appendix 1 for a complete list of all the partners EWEB actively works with to implement these source protection programs and Appendix 2 for list of current grants and other funding sources that EWEB leverages with its investment in watershed protection.

2.0 Water Year

Precipitation amounts in the upper McKenzie for the 2019/2020 water year (WY) fell approximately 10-20% below average precipitation levels when compared to a 30-year period from 1981 to 2010. Snowpack for the 2019/2020 WY, measured as snow water equivalent (SWE), also fell short of historical averages. However, the 2020/2021 WY, which began on October 1st, indicates precipitation and SWE through December were in alignment with historical averages.

Overall, McKenzie River flow at Hayden Bridge during the 2020 calendar year was generally close to historical median flows (see Figure 2-1). During this time period, peak daily flows were evenly split between exceeding or falling below historical median flows. Flows did drop to near historical minimum levels during the month of March, but eventually climbed closer to median flows during late spring. The highest flow observed at Hayden Bridge for 2020 was 23,000 cubic feet per second (cfs), which occurred on December 21st.

Figure 2-1: Historic Flow Comparison, McKenzie River above Hayden Bridge



3.0 Water Quality and Watershed Health

Several long-term monitoring projects implemented by EWEB's Source Protection Program are used to assess water quality conditions throughout the watershed. Conditions are monitored in real-time and samples are routinely collected and analyzed to better understand overall watershed health, contaminant sources and emerging drinking water threats. The massive Holiday Farm Fire presented a significant threat to water quality in 2020. Monitoring plans were adjusted in September to better understand water quality impacts from the fire, particularly during times of prolonged rain and high flows, when contaminants are likely to be flushed into local waterways. Numerous sites impacted by the fire have been sampled every month since September (see Table 3-1). Continued monitoring emphasis on post-fire conditions will extend well into the foreseeable future to better understand both short- and long-term impacts. A variety of local, State and Federal partners are assisting with monitoring efforts and data analysis.

Table 3-1: Summary of Water Quality Monitoring Events Completed in 2020

Monitoring Project	Sites	Target Parameters	Annual Events	Purpose of Monitoring
Continuous Monitoring	7	General WQ parameters*	365 days	Early warning / trending
Harmful Algal Blooms	8	Algae, Nutrients, Toxins	18	HAB impacts / cyanotoxins
Baseline Monitoring	14	Bacteria, Metals, Nutrients, Organics**	4	Baseline conditions / trending
Holiday Farm Fire / Storm Events***	8-12	Bacteria, Metals, Nutrients, Organics**	6	Water quality impacts from fires

***** General WQ parameters include pH, temperature, dissolved oxygen, conductivity, turbidity, fluorescent dissolved organic carbon, phycocyanin, and chlorophyll.

****** Organics may include pesticides, semi-volatile organics, volatile organics, pharmaceuticals and personal care products, and petroleum products.

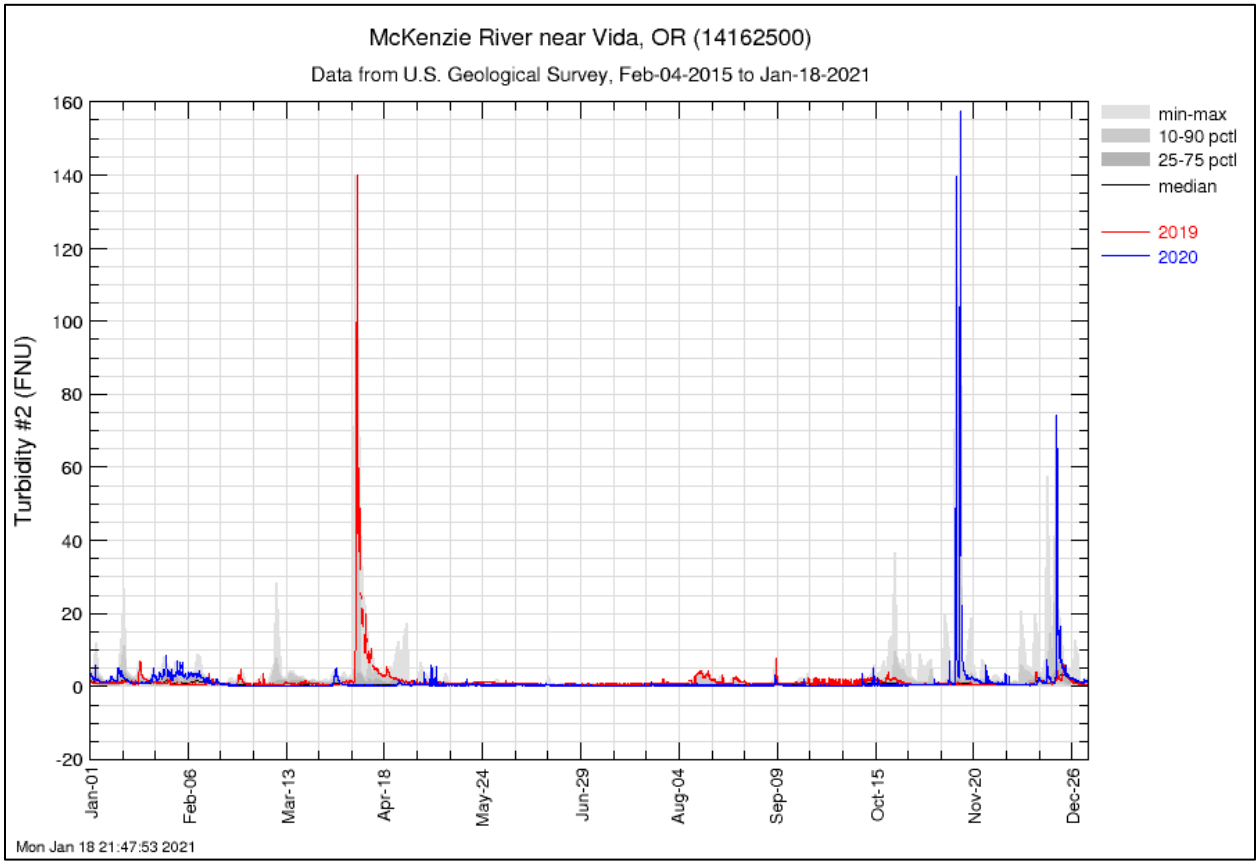
***** Two storm events were sampled in September. Another storm event related to the Terwilliger Fire was sampled back in January.**

3.1 Continuous Monitoring Network

EWEB's continuous monitoring network was expanded in 2020 to include a new water quality station on the McKenzie River near Walterville, which is located downstream of the Holiday Farm Fire. Two additional water quality stations are scheduled to be installed in early 2021, one in Gate Creek and one in the McKenzie River below Trail Bridge Reservoir. All three stations will be maintained by the USGS and provide access to real-time water quality data for monitoring potential fire and HAB impacts.

As illustrated in Figure 3-1, turbidity levels in the McKenzie River near Vida, measured in Formazin Nephelometric Units (FNU), peaked during November (158 FNU) and December (74.1 FNU) of 2020 during high flow events. Although flows during April of 2019 (25,600 cfs) were far greater than flows during November (10,600 cfs) and December (15,100 cfs) of 2020, peak turbidity levels were higher in 2020 (158 FNU) than 2019 (140 FNU). This is largely attributed to impacts from the Holiday Farm Fire. Turbidity levels in the McKenzie River near Vida are typically less than 3 FNU during most of the year.

Figure 3-1: Major Turbidity Event Comparison, McKenzie River near Vida, 2019-2020



3.2 Harmful Algal Bloom (HAB) Monitoring

Cyanobacteria blooms in 2020 in both Blue River Reservoir (BRR) and Cougar Reservoir (CR) followed a similar pattern observed in 2019. A significant *Dolichospermum* bloom first appeared in BRR beginning in April. By the beginning of June the bloom had largely faded. *Dolichospermum* numbers increased again later in June in both reservoirs and remained elevated in BRR into July before dissipating (see Figure 3-3). HAB monitoring efforts were put on hold in September during the Holiday Farm Fire area closure but were resumed in October and November. In early fall BRR had a noticeable late season *Gloeotrichia* bloom and CR had elevated *Dolichospermum* concentrations.

Some species within the *Dolichospermum* genus can produce cyanotoxins. However, cyanotoxin concentrations remained very low in both reservoirs throughout the year. Only a handful of non-estimated cylindrospermopsin concentrations were observed in BRR (see Figure 3-2), and all were well below health advisory levels (HALs).

Figure 3-2: Harmful Algal Bloom Monitoring Results – Cyanotoxins, 2020

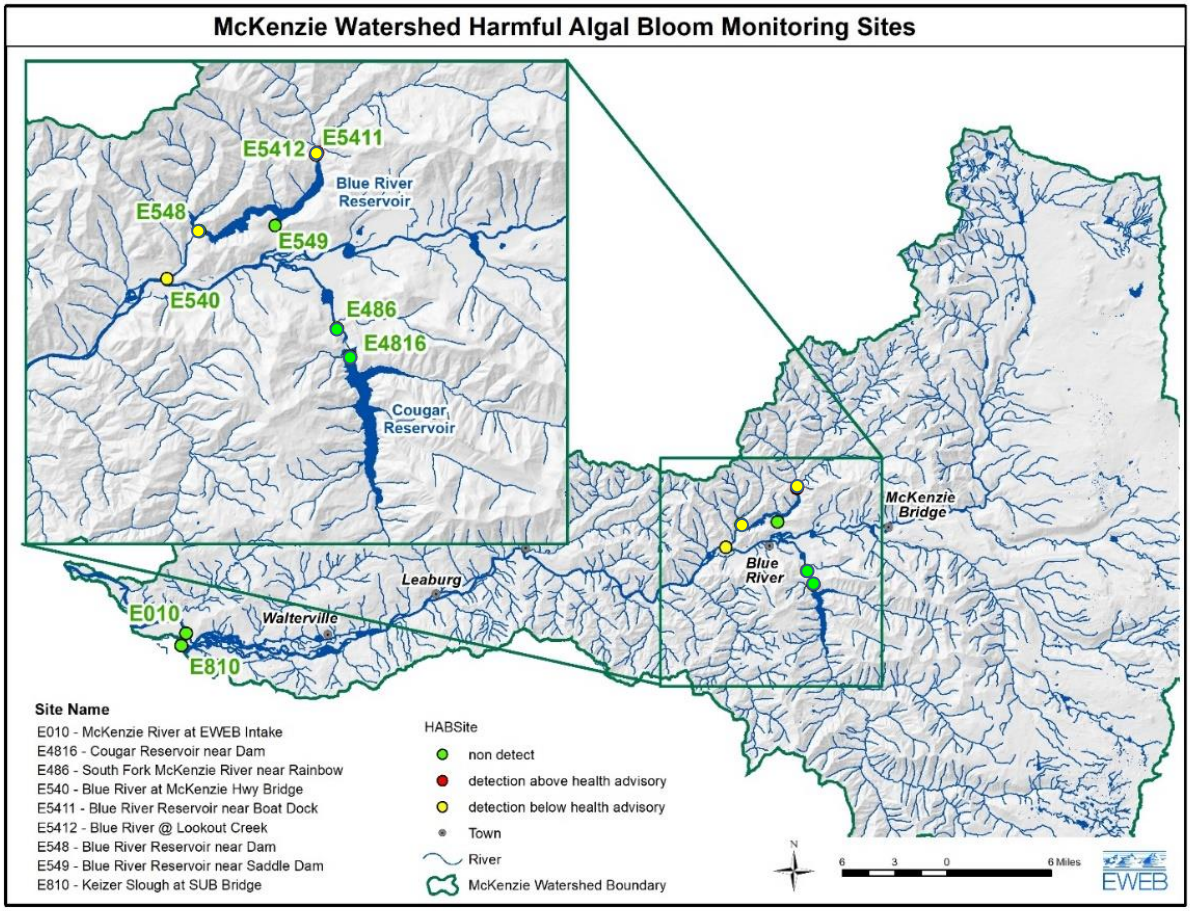


Figure 3-3: Cougar Reservoir (left) and Blue River Reservoir (right) on 7/13/2020

3.3 Baseline & Storm Data Analysis (including Holiday Farm Fire impacts)

All routine baseline sampling events were completed as scheduled in 2020. However, due to limited staff mobility during the first wave of Covid-19 restrictions, staff were unable to collect a round of spring storm samples within the urban interface. The Holiday Farm Fire further impacted storm monitoring priorities in the fall. Sampling efforts during the first few rain events in September focused on urban and rural sites west of the fire. The urban/rural focus was largely due to limited access within the fire perimeter, as well as assessing impacts from significant ash fall across the area. For the October storm, more attention was placed on sites within and immediately downstream of the fire perimeter. For large storm events in November and December, enhanced access within the fire perimeter allowed focused sampling across a range of different tributary sizes (see Figure 3-4), as well as mainstem McKenzie sites.

Figure 3-4: Simmonds Creek - Monitoring Site (left) and Entering Blue River (right), 12/20/2020

For comparison purposes, a selection of baseline and storm data have been compiled into Table 3-2 to highlight significant changes and potential emerging issues. Data directly related to the Holiday Farm Fire is reflected in the 2020 storm numbers since most samples were collected during periods of significant rainfall and increased runoff. Analytes have been separated into 4 distinct groups, which include Total Metals, Nutrients, Solids/Bacteria and Organic Compounds. With over 300 analytes being assessed over the course of 2020, criteria were established to narrow the field down to 20 analytes for this report. Analytes were selected that had at least 2 reportable values in 2020 above respective method reporting limits, and which showed a significant departure from maximum baseline or storm results over a 20-year period from 2000 to 2019.

Most of the peak values observed in 2020 were associated with just a handful of sites (Table 3-2). As expected, the 52nd Stormwater Channel (E520) and nearby sites in eastern Springfield are reflected extensively in the max data results. Due to the presence of a large beaver dam at the E520 location and resulting backwater issues, additional monitoring sites just upstream (E524) and further downstream (E523) were also sampled during September storm events. Keizer Slough (E810) and Camp Creek (E310) each claimed a few max values in 2020. The other significant source of maximum observed values came from tributaries heavily impacted by the Holiday Farm Fire. Heavy rain within the burn area resulted in major flow events in Gate Creek (E390) and other tributaries that generated significant turbidity events.

Table 3-2: Analytical Results Across Multiple Sites for Baseline and Storm Monitoring Events

	Analyte	Units*	Event	Median 2000-2019	Median 2020	Max 2000-2019	Max 2020	Max Site 2020*
Metals, Total	Aluminum	ug/L	Baseline	38.2	40.05	2,100	416	E310
			Storm	424	116.5	6,400	20,500	E390
	Barium (MCL = 2,000)	ug/L	Baseline	1.9	1.915	22.7	12.1	E520
			Storm	6.255	12.75	56	236	E390
	Beryllium (MCL = 4)	ug/L	Baseline	ND	ND	0.3	0.017	E310
			Storm	0.008	0.006	0.137	0.742	E390
	Iron	ug/L	Baseline	62.7	48.05	3,780	824	E520
			Storm	616	556.5	8,400	17,100	E390
	Manganese	ug/L	Baseline	3.8	3.495	552	250	E520
			Storm	32.3	58.8	490	1,510	E523
Nutrients	Nitrate (MCL = 10,000)	ug/L	Baseline	ND	9	4,350	2,500	E520
			Storm	80	40	1,710	1,800	E524
	Orthophosphate	ug/L	Baseline	16	25.5	250	75	E520
			Storm	40	52	190	1,100	E524
	Phosphorus	ug/L	Baseline	27.4	28.5	810	90	E520
			Storm	60	74	405	1,460	E390
	Dissolved Organic Carbon	ug/L	Baseline	750	330	5,000	2,510	E520
			Storm	1,900	1,380	16,000	76,000	E524
	Total Organic Carbon	ug/L	Baseline	690	550	13,400	2,600	E520
			Storm	2,100	2,265	32,200	91,000	E524
Solids/Bacteria	Chemical Oxygen Demand	ug/L	Baseline	ND	2,900	53,300	8,600	E520
			Storm	16,700	9,000	171,000	280,000	E524
	Total Dissolved Solids	ug/L	Baseline	42,000	48,000	160,000	150,000	E520
			Storm	50,500	50,000	130,000	250,000	E524
	Total Solids	ug/L	Baseline	46,200	48,000	168,000	175,000	E520
			Storm	62,500	77,000	478,000	794,000	E390
	Total Suspended Solids	ug/L	Baseline	ND	1,000	82,700	8,000	E310
			Storm	7,500	5,000	428,000	691,000	E390
	E. coli	MPN /100mL	Baseline	4.55	3.1	5,794	1,553	E520
			Storm	272	75	10,462	17,329	E524
Organic Compounds	PFOS (HA = .07)	ug/L	Baseline	0.000255	0.00031	0.0095	0.0071	E520
			Storm	0.00115	ND	0.0068	0.02	E524
	PFOA (HA = .07)	ug/L	Baseline	0.000445	ND	0.003	0.002	E520
			Storm	0.000875	ND	0.0076	0.018	E524
	Phenanthrene	ug/L	Baseline	ND	ND	ND	ND	ND
			Storm	ND	ND	0.06	0.09	E390
	Picloram (MCL = 500)	ug/L	Baseline	ND	0.063	0.13	0.18	E520
			Storm	ND	ND	5.5	ND	ND
	TTHMs (MCL = 80)	ug/L	Baseline	ND	ND	11	2.9	E810
			Storm	ND	ND	4.9	8.6	E810

Note: ND (non-detect) indicates the median value for a specific analyte was below the applicable detection limit. Maximum Contaminant Level (MCL) or Health Advisory (HA) Level set by the EPA for drinking water.
Red font = compound detected at a higher concentration than previously observed at similar sites.
*E520/523/524 = 52nd Street storm water channel; E310 = Camp Cr.; E390 = Gate Cr., E810 = Keizer Slough (See Figure 3-6 for locations). Units = micrograms/liter (ug/L) or most probable number/100 milliliters (MPN/100 mL).

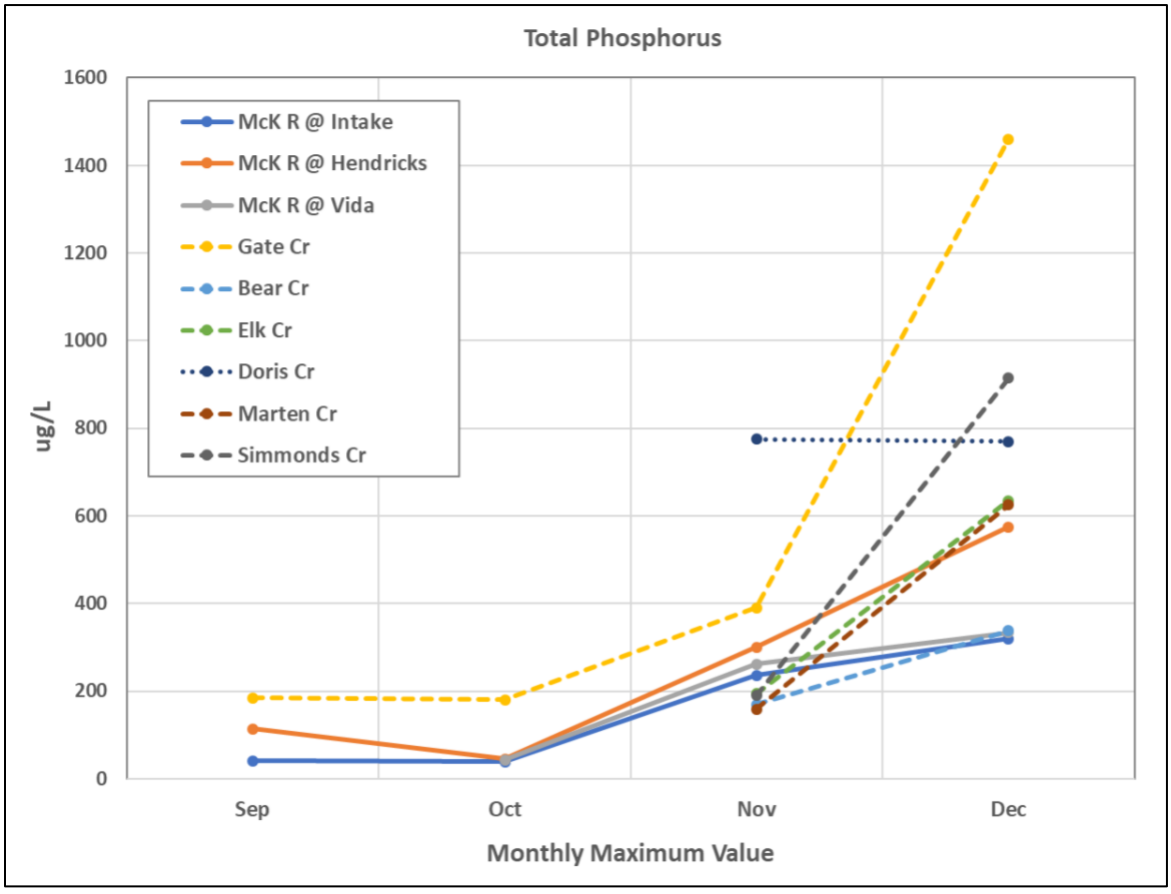
Metals

Consistent with major turbidity events and high suspended sediment concentrations observed within the Holiday Farm Fire area, most of the 19 total metal species showed maximum concentrations in tributaries within the burn area. This was especially true for aluminum and iron, with values an order of magnitude higher than previous observed maximum values. Almost all observed maximum dissolved metal concentrations for 2020 (not shown in Table 3-2) originated from an urban stormwater sample collected at E524 during a September first flush event.

Nutrients

Significant nutrient increases were observed across many urban sites and tributaries within the burn area during major runoff events. Similar to dissolved metal peak concentrations, most maximum nutrient concentrations were observed at E524. One notable exception is total phosphorus, where the maximum concentration was observed in Gate Creek. Although nitrate levels may have peaked in November, total phosphorus appears to be on an upward trend across many sites (see Figure 3-5). Phosphorus is considered a limiting nutrient for many algae species, including cyanobacteria. One possible consequence of elevated phosphorus levels is increased primary benthic growth in local tributaries and mainstem reaches. Some of the highest values for both total and dissolved organic carbon, 76,000 and 91,000 ug/L respectively, were reported at E524. These values are extremely high and may reflect significant ash/soot deposition on impervious surfaces and subsequent flushing.

Figure 3-5: Monthly Maximum Total Phosphorus Concentrations Related to the Holiday Farm Fire



Solids, Bacteria and General Chemistry

Major flow conditions within the Holiday Farm Fire area stemming from prolonged periods of rain in December contributed to dramatic increases in total suspended solids (TSS) and total solids (TS). With soils likely saturated from previous rainfall events, overland runoff appears to have mobilized ash and bare soil. The highest TSS and TS levels were observed in Gate Creek, where a 5-foot rise in water level likely scoured and mobilized sediment along creek banks. Turbidity in several tributaries within the fire perimeter recorded values as high 300 to 400 FNU, while mainstem McKenzie sites exceeded 100 FNU.

Conversely, the highest values reported for total dissolved solids, chemical oxygen demand and *E. coli* were observed at E524 during a relatively minor first fall flush event in September. The unusually high values for all three parameters, especially the *E. coli* value of 17,329 MPN/100 mL, suggests that in addition to significant ash deposition, the stormwater runoff also contained elevated urban contaminants commonly associated with first fall flushes after prolonged dry periods.

Organic Compounds

Low level concentrations of several organic compounds were commonly observed during initial rain events in September. Several polyfluoroalkyl and perfluoroalkyl substances (PFAS) were detected in urban stormwater samples. At site E524, both perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) were detected at elevated concentrations compared to historical observations, although all values were below the health advisory level of .07 ug/L for combined PFOA and PFOS concentrations.

Although not detected in storm samples, several sites reported low level concentrations of Picloram during baseline events. Picloram is an herbicide used to control woody plants and broad-leaved weeds. Observed concentrations were well below drinking water criteria.

Several polycyclic aromatic hydrocarbons (PAHs), including phenanthrene and naphthalene, were reported at low levels during September runoff events. Gate Creek reported the highest phenanthrene concentration at .09 ug/L. Although both compounds have been detected during previous storm events in urban runoff, they are also commonly associated with forest fires.

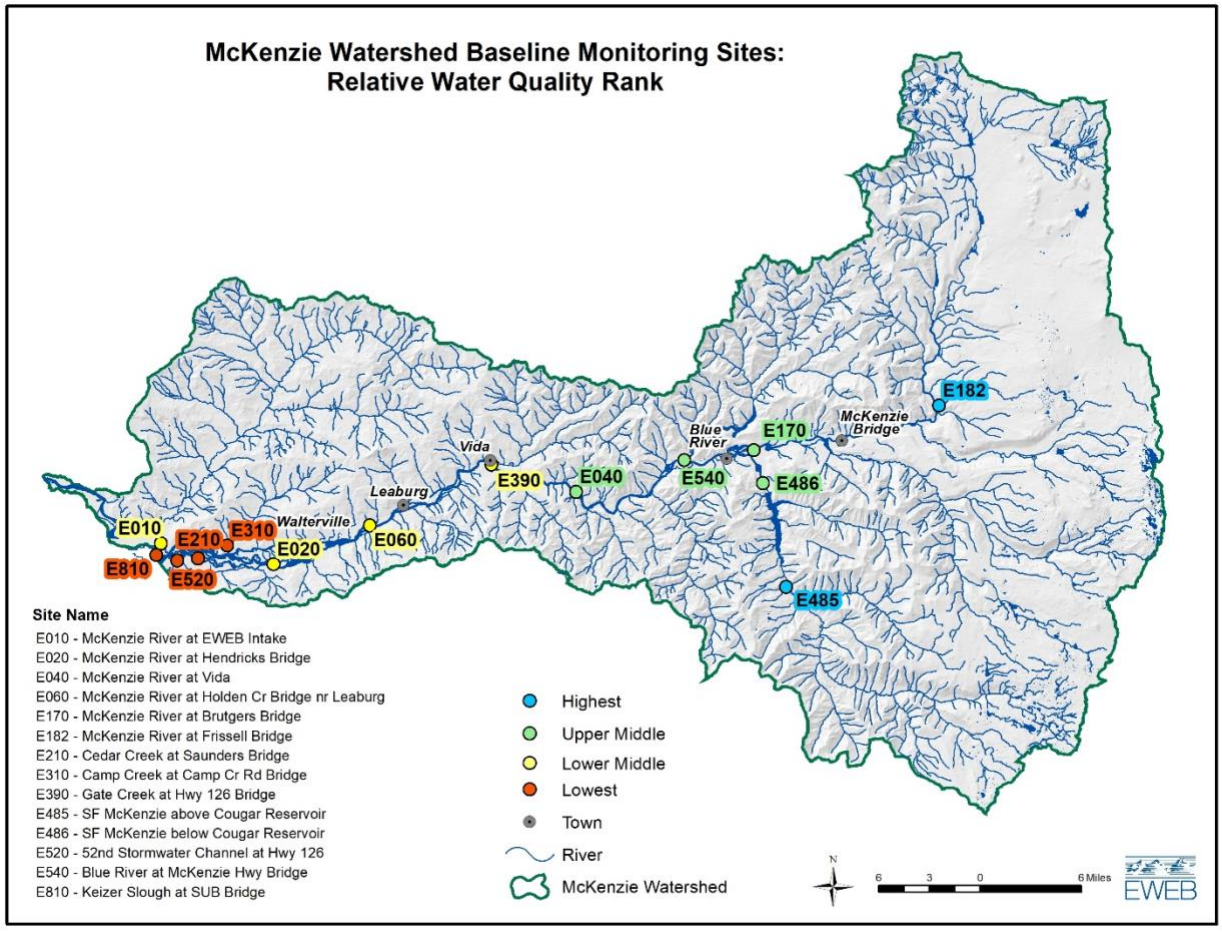
Lastly, Keizer Slough (E810) continues to be a source of total trihalomethanes (TTHMs), with chloroform being the primary constituent. Although levels are well below the 80 ug/L drinking water criteria, further investigation needs to be done to determine the source.

3.4 Baseline Data Summary and Trends

Water quality conditions in the McKenzie Watershed throughout the first half of 2020 were largely unremarkable. Lows flows and abundant sunshine in March did result in early bloom conditions in Blue River Reservoir, but cyanotoxin levels remained very low throughout the year. However, conditions quickly changed in September when the massive Holiday Farm Fire burned approximately 173,000 acres in the middle portion of the McKenzie Watershed. Although multiple sites have been sampled frequently over the past 4 months during storm events, only one quarterly baseline monitoring event has been completed since the fire. Additional baseline data points in 2021 will give a better understanding of how ambient conditions compare across the watershed postfire.

Figure 3-6 is a map illustrating the relative water quality rank of baseline monitoring sites across a variety of water quality parameters, including metals, nutrients, bacteria and general chemistry. Ranked values for numerous analytes were aggregated and assessed to determine how baseline sites compare to one another. The first group, colored blue, represents sites with the highest or best water quality conditions compared to other sites, and generally reflects the exceptional water quality conditions of the High Cascades. The second group, or the upper middle group highlighted in green, consists of sites with generally great water quality conditions, but slightly higher metal and nutrient values when compared to the highest group. The third group, highlighted in yellow and designated the lower middle, consists of sites with very good water quality, but noticeable increases in most analytical concentrations when compared to upstream sites. The fourth group, or lowest ranked group, is highlighted in red. Water quality conditions at sites within the lowest ranked group are generally the poorest and yield the highest analytical concentrations when compared to all other baseline sites within the watershed.

Figure 3-6: Map of Monitoring Locations with Relative Water Quality Rank



One minor change from last year to this year is that site E170 was moved into the upper middle category from the highest category. Sites E182 and E485 clearly stand out as reference sites with exceptional water quality. Site E170 also has excellent water quality, but compared more favorably to sites E486, E540 and E040. Please note that sites E480 and E482 from the 2019 report were replaced with sites

E486 and E485 respectively. The new monitoring locations are collocated with USGS gage stations and represent minor shifts from previous locations.

4.0 Hazardous Material Spills or Releases

Hazardous material spills remain a substantial threat in the McKenzie Watershed due to the presence of a major highway (126) running along the length of EWEB's sole source of drinking water. In addition, spills from urban areas reaching stormwater outfalls that discharge directly to the McKenzie River above EWEB's intake remain a significant concern. Finally, the Holiday Farm Fire also increased the risk of potential hazardous material releases, both during the fire, and after, with ongoing efforts focused on clean-up, restoration, logging and rebuilding.

4.1 Summary of Spills in the McKenzie Watershed

Several significant truck accidents in 2020 resulted in environmental releases (see Table 4-1). A semi-truck accident last January, that resulted in a significant diesel release, occurred only a few hundred feet from the McKenzie River. Another accident involving a dump truck in October created an oily sheen that traveled several miles downstream (see Figure 4-1). EWEB staff deployed absorbent booms and pads at Leaburg Dam to collect a very light sheen. Also evident in the aftermath of the fire was the untold number of chemical containers that where either totally or partially burned, potentially releasing contents to surrounding soils.

Table 4-1: Reportable Spills/Releases in the McKenzie Watershed, 2020

Date	Responsible Party	Material Released	Quantity (gallons)	Details	Response
1/16/20	Private	Diesel	25-100 gal	Semi-truck crash	Land only, boom/pads
1/29/20	Private	Vehicle fluids	Minor	Jeep in river, above Hendricks Bridge	Jeep removed from river on 3/17/20
2/10/20	Private	Vehicle fluids	Minor	Vehicle crash, Deerhorn	Absorbents
7/1/20	ODFW	Diesel	Minor	Fish truck stuck at ramp	Absorbents
10/15/20	Private	Vehicle fluids	Unknown	Dump truck crash	Absorbent boom/pads

4.2 Oregon Watershed Emergency Response System (OWERS) Updates

EWEB continues to work with consultant Mason Bruce & Girard on fixes and enhancements to the OWERS system as needed. Recently, the Springfield Utility Board (SUB) decided to invest in expanding a limited set of OWERS capabilities into the Middle Fork Willamette Watershed. This includes the ability to enter incidents, send/receive spills notifications, and calculate time of travel for locations below Dexter Dam. This is advantageous because several local agencies respond to spills in both the McKenzie and Middle Fork Willamette watersheds and the spill notification component has been a helpful tool. In addition, as EWEB moves forward with plans to implement our second drinking water source on the Willamette, we will want to monitor any hazardous spills that occur in that watershed.

Figure 4-1: Truck Crash in the McKenzie River

4.3 Annual Spill Drill

Although EWEB staff and many other partners were busy responding to the Holiday Farm Fire, members of the Region II Hazmat team conducted a spill drill on October 8th along the Willamette River. Equipment from the McKenzie Watershed Emergency Response System (MWERS) program was used to deploy boom across a segment of the river and give Eugene and Springfield Fire staff a chance to practice deployment techniques (see Figure 4-2). A full interagency drill will be conducted in 2021.

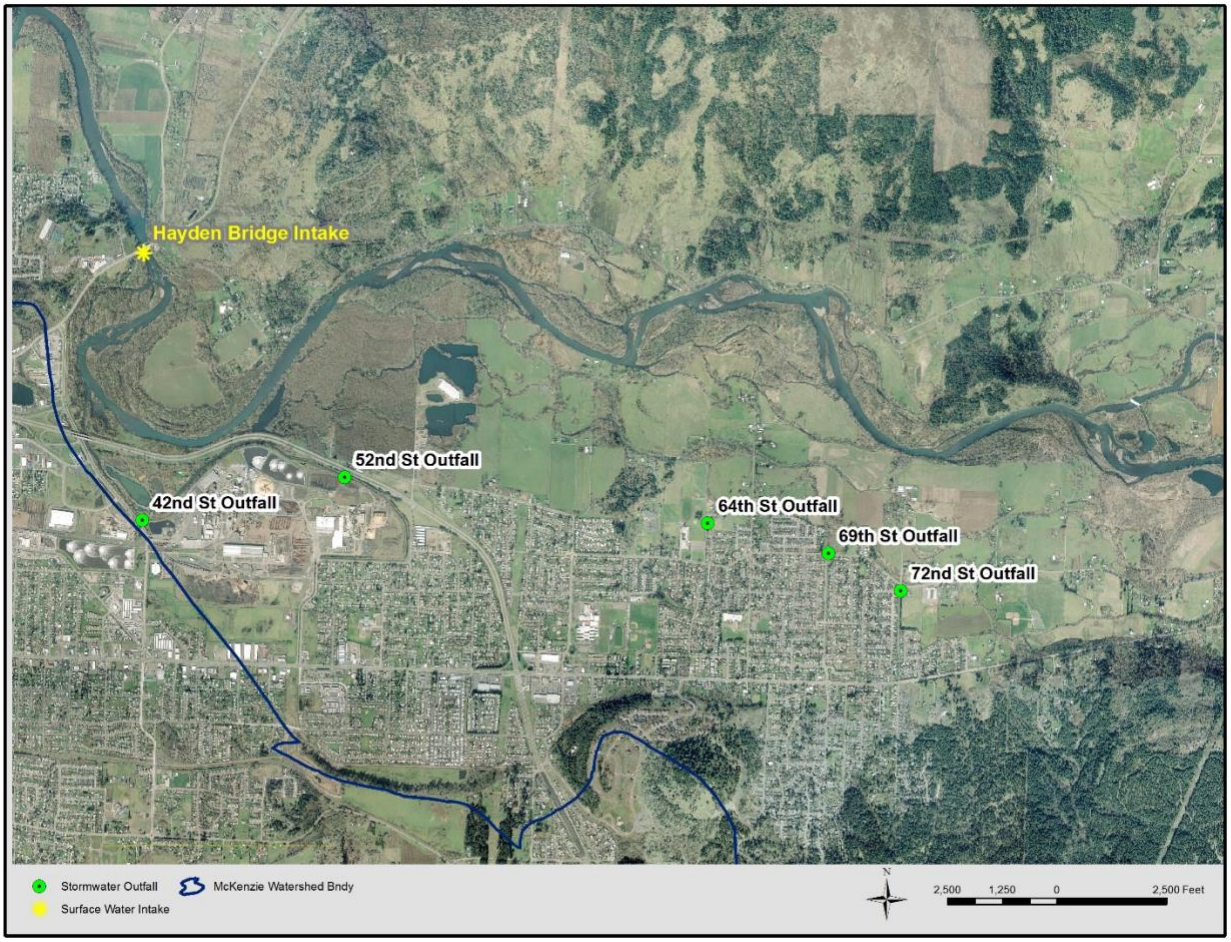
Figure 4-2: Boom Deployment Drill, Willamette River, 2020

5.0 Urban Runoff Mitigation

Urban runoff from developed areas (construction, roads, parking lots, roofs, and other impervious surfaces) can be a significant source of pollution during rainfall events that quickly and efficiently deliver runoff containing numerous contaminants into a nearby stream or river. Stormwater runoff often contains a variety of metals, such as arsenic, cadmium, chromium, copper, iron, manganese, nickel, lead and zinc, petroleum products including poly aromatic hydrocarbons, nutrients from fertilizers, *E. coli* bacteria from pet waste, pesticides, and other chemicals. These pollutants present a significant threat to aquatic organisms for short duration and long-term exposures. In addition, they can also pose a risk to human health.

Urban runoff is a concern especially in the lower part of the McKenzie Watershed which includes parts of East Springfield. Several stormwater outfalls (i.e., 42nd St., 52nd St., 64th St., 69th St., and 72nd St.) discharge into Cedar Creek and Keizer Slough, and then into the McKenzie River just upstream from EWEB's intake (see Figure 5-1). This area also contains a number of Springfield Utility Board (SUB) and Rainbow Water municipal well fields.

Figure 5-1: Stormwater Outfalls in East Springfield



5.1 Continuous Monitoring Network Expansion

Plans to expand EWEB's continuous water quality monitoring network in 2020 to include new monitoring stations at Keizer Slough (E810) and Cedar Creek (E210) were temporarily put on hold to accommodate increased monitoring focus around the Holiday Farm Fire. Equipment originally destined for urban sites will either be returned or replaced as priorities are reassessed in 2021.

5.2 48th Street Channel Wetland Enhancements

The McKenzie Watershed Council continued work on the 48th Street wetland enhancement project. This year's work included conducting site preparation activities, invasive species removal, and planting a variety of native plants, including trees, sedges, and reeds. The purpose of the project is to enhance the wetland area and increase its ability to treat stormwater before it flows into Keizer Slough and then into the McKenzie River.

5.3 Green Infrastructure/Urban Waters & Wildlife Program

The Urban Waters & Wildlife program (formerly called the Upper Willamette Urban Water Program) is a regional expansion of the Long Tom Watershed Council's successful Trout Friendly Landscape (TFL) Program to engage businesses to install voluntary green stormwater infrastructure retrofits within the Upper Willamette Metropolitan area (Eugene, Springfield, Glenwood) and develop a monitoring framework to identify trends and effectiveness of treatment.

This year, partners began conceptual work on a project in the Hayden Bridge area to address stormwater issues that involves Oregon Industrial Lumber, The Child Care Center, and EWEB's Hayden Bridge treatment plant. A more detailed design is expected in the first half of 2021. Part of this project is funded by a $30,000 Oregon Health Authority Grant.

The partnership also received a $250,000 grant from the EPA. This grant project will expand an existing stormwater retrofit program that fills a regulatory gap by working with businesses on a voluntary basis who do not have a regulatory requirement to install stormwater facilities or otherwise manage site-produced toxins that impact urban stormwater runoff. These retrofits reduce or eliminate pollution and runoff, improve water quality, and protect habitat while promoting citizen engagement and knowledge. The project will develop a new, regional partnership, including activities to refine and align program objectives, extend the area of work, expand and align monitoring and evaluation processes, and engage the Latinx community with a focus on workforce expansion in green stormwater infrastructure through collaborative training. Appendix 1 shows the many agencies and organizations working together as part of this partnership.

5.4 Pentachlorophenol (PCP) Plume

According to Progress Report Number 91, submitted by PES Environmental on behalf of International Paper to the Department of Environmental Quality on October 15th, 2020, along with a sampling update email received by EWEB staff on October 14th, 2020, results for all samples collected in 2020 from Springfield Utility Board/Rainbow Water District (SUB/RWD) wells were non-detect for chlorinated

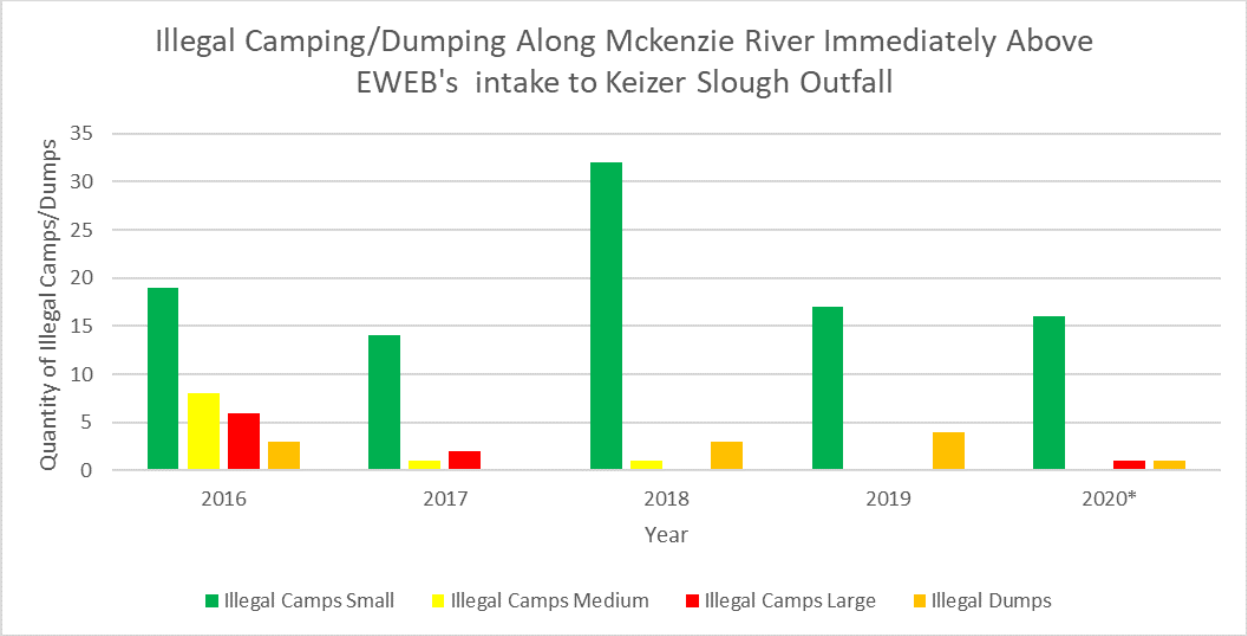
phenolic and volatile organic compounds. Analytical results for groundwater monitoring wells sampled in 2020 showed continued decreasing PCP concentrations at both intermediate and deep well depths. Two exceptions are well MW-18D, which appears to be relatively constant, if not slightly increasing over the past 10 years, and well MW-19D, where PCP concentrations have flat-lined over the past few years. Also of note, 14 PCP samples that EWEB staff collected in 2020 from nearby stormwater outfalls or at the raw water intake were all non-detect.

6.0 Illegal Camping

EWEB's Source Protection staff continue to partner with Willamalane Parks, City of Springfield, and Lane County to reduce the impacts of illegal camping and dumping in riparian areas along the McKenzie River immediately above EWEB's intake. Figure 6-1 shows the locations of illegal camps that were cleaned up in 2020. Figure 6-2 illustrates the downward trend of illegal camping due to the coordinated efforts of these agencies and use of the illegal camping application that identifies camps early and notifies agencies of a camp's existence. Although Covid-19 precautions and the Holiday Farm Fire impacted efforts in 2020, coordinated surveys are expected to resume in 2021.

Figure 6-1: Map of Illegal Camps and Dumps, 2020

Figure 6-2: Illegal Camping/Dumping Activity, 2020



*EWEB did not participate in Illegal Camp Surveys March 11th-June 11th due to COVID-19. EWEB did not participate in Illegal Camp Surveys October 1st-December 31st due to the Holiday Farm Fire. Willamalane conducted patrols during these times; however, not every camp was recorded.

7.0 Pure Water Partners (PWP)

The Pure Water Partners (PWP) Program is designed to reward McKenzie landowners who protect high quality land along the river and/or restore degraded areas, assisting EWEB in protecting water quality and helping to avoid future water treatment costs (see 2018-2019 State of the Watershed report for more information).

This past year was a challenging year for PWP recruitment given both the pandemic and the Holiday Farm Fire. Our annual PWP Informational Meeting where we generally recruit a number of landowners was canceled due to Covid, and although we did host a similar webinar session in the spring, this was not as well attended as our in-person meetings. However, we still worked with several new landowners and continue to advertise the program. The current metrics for this year are summarized in Table 7-1.

The Holiday Farm Fire in September drastically affected the McKenzie Watershed, burning more than 173,000 acres and destroying over 430 homes in the middle McKenzie, and inflicting significant damage to Eugene's sole source of drinking water. The focus of EWEB's initial response was to identify high priority properties for intervention and stabilize them until the EPA and State agencies could respond to remove and dispose of the hazardous waste, ash/debris, asbestos, and other materials. EWEB worked with the Pure Water Partners (PWP) to pivot the coalition's work to assist fire-affected landowners with evaluating their properties to identify high priority burn areas, designing erosion control measures to

address these areas and then using Northwest Youth Corps crews or contractors to install these erosion control measures.

Table 7-1: PWP Landowners

Landowners in PWP Program*	Current Totals	2020 Totals
Initial PWP Intake Phase	14	--
PWP Riparian Assessment Phase	19	--
PWP Management Plan Phase	8	--
Signed PWP Agreements	9	1
PWP Naturescaping Landowners	36	--
Signed Naturescaping Agreements	17	3
Total Landowners in PWP	89	12
Total Acres in PWP Program	515	180
Total Acres Under PWP Agreements	53	10.5

* For a diagram of the PWP process, see the 2018-2019 State of the Watershed Report.

The Pure Water Partners members decided to use the PWP framework and processes that had been developed over the past few years and pivot to conducting 'burn' or 'post-fire' assessments on landowner properties, rather than streamside health assessments. The PWP had the basic technology to engage landowners and track communications/participation and EWEB Customer Solutions helped to set up a Docusign process for efficiently obtaining signed access agreements from landowners.

Lane Council of Governments (LCOG) helped to design a GIS-based system for capturing information from burn assessments. EWEB's strong relationships with partner organizations allowed this program to be setup and functional within two weeks of the post-fire response. The McKenzie Watershed Council, Upper Willamette Soil & Water Conservation District and McKenzie River Trust mobilized staff resources to allow 5-7 survey teams to work concurrently surveying landowner sites on the ground. In this way 15-20 properties could be surveyed in a day.

As of mid-January, over 200 burn assessments have been conducted on landowner properties and over 85 additional erosion control measures were implemented. These erosion control measures included hydroseeding, check dams, wattles, silt fencing, jute mats, mulching, and other measures (See Figure 7-1). LCOG developed a dashboard to track these immediate waste stabilization efforts, burn assessments, and post-assessment best management practices that were implemented: https://lcog.maps.arcgis.com/apps/opsdashboard/index.html#/90a22d5830f048e5aa6bf568ff23b938

Figure 7-1: Hydroseeding, Wattles, and Silt Fences

The next phase of the HFF response focuses on riparian replanting efforts on high risk properties. PWP is currently working to schedule and implement replanting work between the beginning of February to mid-March. Landowners will need to sign a 7-year agreement with EWEB to receive free planting, maintenance, and monitoring assistance through the PWP program.

Despite the pandemic and Holiday Farm Fire, one great success of 2020 was the passing of the Upper Willamette Soil & Water Conservation District's tax base measure on the November ballot. A multi-organizational planning committee supported this effort, which was then passed by the SWCD Board and placed on the November ballot. The tax base, which was approved by over 60% of voters, will greatly increase the capacity of the SWCD to conduct watershed restoration work and provide support to the PWP program.

8.0 Septic System Assistance

Since EWEB began its Septic System Assistance Program (SSAP) in 2008, 976 septic systems have been inspected and pumped out (see Table 8-1). A number of systems were also repaired as needed. EWEB's program currently consists of two components:

1) ***Cost-share program:*** This program provides a 50% cost-share for McKenzie homeowners to have their septic systems inspected and pumped out, if needed. The cost-share also includes performing minor repairs to the system.
2) ***Zero-interest loan program:*** This program allows homeowners who need to make major repairs or replace their septic tank or drainfield to apply for a zero-interest loan of up to $10,000 from EWEB. Fifteen zero-interest loans have been issued to McKenzie homeowners.

See www.eweb.org/septic for more information about the program.

Feedback around this program has always been extremely positive. The septic system assistance program is now run by the Customer Solutions Department, though Source Protection staff collects data on septic system inspections/results by address in a database and in GIS. In 2020, 75 septic systems were inspected and pumped out (see Table 8-1).

Table 8-1: Septic System Participation over Time

Year	Participants	Cumulative
2008/2009*	439	439
2011	48	487
2012	38	525
2013	43	568
2014	33	601
2015	17	618
2016	17	635
2017	69	704
2018	151	855
2019	46	901
2020	75	976

*The 2008-2009 period was a grant-funded, when we hired a contractor to do free inspections and pump-outs for participating landowners. 2011 was the beginning of our cost-share program.

9.0 Healthy Farms Clean Water

EWEB's Healthy Farms Clean Water Program is designed to support growers, helping to keep farmland as farmland (and not be sold off for development) and protect water quality. EWEB continues to offer free soil and leaf sampling to growers in the watershed, which helps them with nutrient management efforts. In addition, EWEB is working with the Upper Willamette Soil & Water Conservation District and local Natural Resources Conservation Service (NRCS) to offer growers cost-share assistance for projects which have a water quality benefit, such as fencing and off-stream watering, composting and nutrient management.

9.1 Hazelnut Pesticide Reduction Project

EWEB has been working with McKenzie hazelnut growers for years on mating disruption and monitoring to alleviate impacts of the filbert worm on their crops while reducing the amount of pesticides used. EWEB pays a contractor during the summer months to set up moth traps, monitor them throughout the growing season, and share this information with growers so that they can determine the best time to

spray for filbert worm, if needed. Monitoring alone has helped to reduce pesticide use on hazelnut crops by 50%.

Partners including Oregon Solutions staff and researchers from Oregon State University are exploring how the McKenzie Watershed monitoring program can be scaled up to a larger area in the Willamette Basin.

10.0 Healthy Forests Clean Water

10.1 Forestry

The McKenzie Watershed is comprised of 88% forested land, with a mixture of private, state, and federally owned lands. Forested watersheds, like the McKenzie, produce better water quality than any other surface water source. However, forest management activities that may adversely impact downstream water quality include: the use of chemical applications for industrial forest stand treatment; road building; and various timber harvest techniques. These activities may adversely impact water quality due to increased runoff that carries pesticide residues and higher sediment loads that can increase turbidity levels, making it harder and more expensive to treat the water, as well as increasing the likelihood of producing disinfection by-products (DBPs).

Forest Spray and Harvest Tracking

Lane Council of Governments has been tracking forestry planned timber harvests and spray activities for EWEB since 2003. The data is collected by sub-watershed on industrial timberlands over time. The data reported by Oregon Department of Forestry provides only planned activities by timberland owners, but this at least provides where harvest and spray activities are occurring over time. As a result of the Holiday Farm Fire, salvage logging in the McKenzie will eclipse all previous harvest levels and that data was not available at the time of this report.

Stewardship Contracting

EWEB, the US Forest Service and a number of local partners have been participating in the McKenzie Watershed Stewardship Group (MWSG) for the past 7 years. Stewardship contracting is a mechanism where timber receipts from harvests designed to increase forest health and reduce wildfire risk remain in the watershed to fund restoration on public and private lands. Retained receipts are one of the multiple funding sources for PWP. This collaborative group meets monthly and works to discuss upcoming harvests and provide recommendations to the Forest Service around potential stewardship sales and how to spend retained receipts that result from these projects.

The Green Mountain Ridge Sale is currently in process and expected to generate over $1.0 million in retained receipts in 2021-2022. A portion of the retained receipts support restoration projects on PWP landowner properties. EWEB is leading efforts to monitor the effects of shelterwood harvest in this sale on water quality, macroinvertebrates, and bird populations in the area. In addition, the West Quartz stewardship sale was sold during 2020. The MWSG is also working with the Forest Service to learn about future planning areas in the McKenzie Watershed and their suitability for stewardship contracting sales.

11.0 Operationalizing Source Protection

11.1 Hayden Bridge and Generation Integration Projects

The McKenzie River Information System (MRIS) was enhanced in 2020 with a user interface for EWEB staff to modify alarm thresholds for various real-time water quality parameters. Several new water quality stations were also added to MRIS to give EWEB staff greater real-time access to water quality conditions throughout the watershed. This information feeds the SCADA system at Hayden Bridge to provide early warning of changing conditions upstream that may impact treatment operations.

Source Protection, Water Quality Lab and Hayden Bridge staff worked closely together during the harmful algal bloom season to test the efficiency of biofiltration in removing cyanotoxins. This was accomplished by obtaining buckets of contaminated reservoir water from nearby watersheds that were experiencing blooms, analyzing samples of the water for toxin levels, then feeding this tainted water through the pilot biofilter and measuring removal at various ports as it passes through the pilot biofilter. The 2020 efforts helped refine the process for subsequent years and will be an ongoing study.

Source Protection staff coordinated with the Carmen Smith Relicensing team on identifying wildlife mitigation opportunities that also benefit source protection and management of the Leaburg Forest. Generation has been instrumental in supporting watershed recovery efforts by allowing use of the Lloyd Knox Park as a staging area for erosion control materials, native seed, and seedlings, as well as providing a camp area for the Northwest Youth Corps.

11.2 Programmatic Infrastructure for Watershed Protection & Restoration

The 10-Year strategic plan pointed to the building of programmatic infrastructure as a key component to establishing long-term consistency in implementing watershed protection and restoration priorities. The Pure Water Partners program, McKenzie Watershed Emergency Response System, and the Urban Waters & Wildlife Partners program are all examples of development of programmatic infrastructure that increases collaboration and efficiencies in doing the work, as well as attracting outside funding to support the work. The added advantage of this approach was exemplified in the Holiday Farm Fire response when the PWP program quickly pivoted from riparian health assessments to conducting burn assessments and designing erosion control measures.

Table 11-1 summarizes the funding levels for the various source protection programs that leverage other funds as a result of the programmatic approach in collaboration with watershed partners. This table under-reports outside contributions since it only accounts for funds provided and does not track staff and other resources partners contribute to making these efforts successful.

Table 11-1: Summary of Funding by Source Protection Program (2020)

Source Protection Program	EWEB Funds*	Outside Funds**	Total Funding	Notes
Water Quality	$268,000	$146,000	$414,000	Section 3.0
Hazmat Spills	$37,000	$5,000	$42,000	Section 4.0
Urban Runoff Impacts	$11,000	$6,000	$17,000	Section 5.0
Illegal Camping	$2,400	$2,000	$4,400	Section 6.0
PWP	$240,000	$188,000	$428,000	Section 7.0
Septic	$19,000	$19,000	$38,000	Section 8.0
Agriculture	$14,000	$25,000	$39,000	Section 9.0
Forestry***	$63,000	$27,000	$90,000	Section 10.0/11.3

*- O & M funds, does not include labor.
**- See Appendix 2 for detailed list of outside funding sources (pending grants not included).
***- Forestry funds include carbon research efforts.

11.3 Future Opportunities

Fires and Harmful Algal Blooms

As realized with the Holiday Farm Fire, one of the likely impacts of climate change is increased wildfires and more frequent algal blooms that can produce cyanotoxins. EWEB continues working with OSU and USGS to gain a better understanding of the impacts from wildfires as a source of nutrients that can fuel future harmful algal blooms. Given the devastation from the Holiday Farm Fire, this effort has gained importance and will put more focus on understanding increased benthic algal blooms in the river and the potential for production of cyanotoxins, which is not well understood. This effort will continue over time in order to build a library with algae types and determine which types produce cyanotoxins.

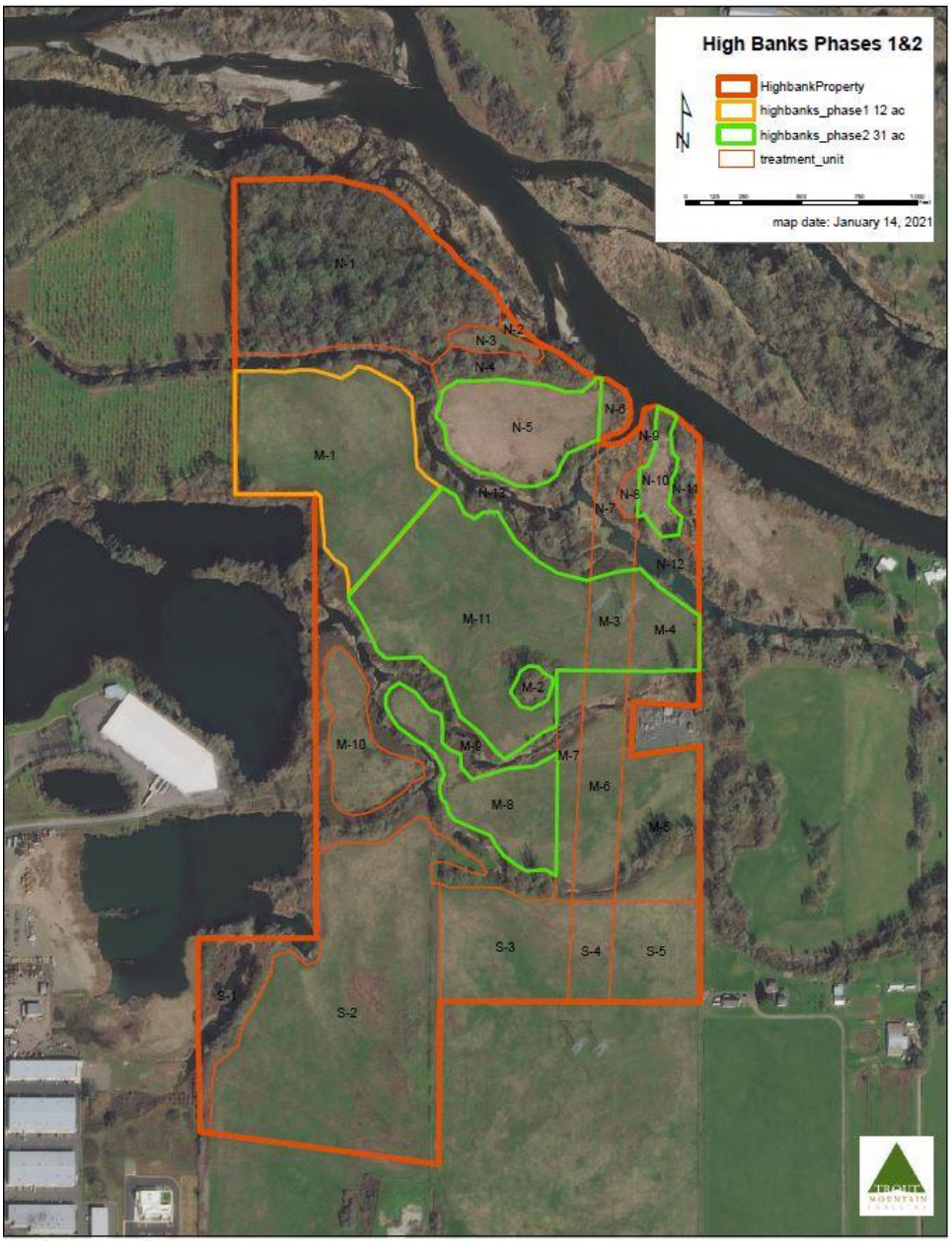
In 2020, EWEB worked with the USGS to establish a real-time early warning system with water quality stations in South Fork McKenzie and Blue River below the dam outfalls. These water quality stations can identify when algal blooms may be occurring in Blue River and Cougar reservoirs that could be producing cyanotoxins. EWEB continues working with the Army COE and USGS to complete installation of a vertical profiling system in Cougar Reservoir that will provide real-time data on the depth that bloom activity is occurring. This can direct targeted monitoring and allow the Army COE to respond to presence of cyanotoxins by releasing water from a different depth and changing reservoir operations to reduce discharge flows so adequate dilution of toxins is achieved when mixing with the McKenzie River.

Carbon Sequestration Projects and Market Development

EWEB is continuing to explore the creation of two new product lines for our customers to voluntarily contribute to through monthly donations: carbon offsets and watershed stewardship. To support development of these products, EWEB entered a 5-year IGA with the University of Oregon Department of Environmental Studies to establish long-term carbon research areas associated with forests, wetlands, and natural prairie/shrub ecosystems. This research will help inform design of a carbon offset program that invests in the McKenzie Watershed and provides water quality benefits as well as carbon

sequestration. This research is currently focused on development of a carbon research forest on the 140-acre High Banks Road property that EWEB recently acquired to support the Thurston substation expansion project. Research plot design was completed and will be implemented in three phases. Phase 1 is being implemented in January/February 2021. Figure 11-1 shows the research units and phases of implementation.

Figure 11-1: Map of Carbon Sequestration Research at High Banks Road Property



The Holiday Farm Fire has opened up potential opportunities to scale-up carbon sequestration through conservation easements or land acquisitions to move more actively-managed timberlands into long-term conservation.