2025 Seasonal Water Supply Augmentation and Contingency Plan

June 23, 2025

1. BACKGROUND

Each year the Portland Water Bureau (bureau) prepares a seasonal water supply augmentation and contingency plan, referred to as the Seasonal Supply Plan (SSP). The plan focuses supply planning on the summer and fall months, when the Bull Run is in drawdown, as well as times when baseline primary resources may not be able to meet system demands. The SSP provides a comprehensive strategy for augmenting the bureau's baseline water resources, if needed, to meet year-round demands. An interdisciplinary team of bureau staff prepares the plan based on current supply and demand information and analysis of resource options.

The seasonal supply strategy is designed to make the best use of existing resources to meet multiple objectives. Key objectives include water supply reliability, high water quality, water use efficiency, fish recovery, system maintenance and cost management. A glossary of key terms is included at the end of this document.

Peak Season Supply

During the summer of 2025, the bureau expects that sufficient water will be available to meet the range of potential supply and demand conditions that could occur in the Portland water system. The bureau will continue to focus on water efficiency and augmentation of the Bull Run supply with groundwater from the Columbia South Shore Well Field (CSSWF) to meet peak season water demands. The bureau will also continue flow releases into the lower Bull Run River to enhance fish habitat and reduce river water temperatures. As the summer progresses, the bureau will coordinate with key stakeholders to ensure that interested parties are apprised of supply and demand conditions as they unfold.

Emergency Supply Planning

To meet customer needs when the Bull Run is unavailable and system demands exceed existing groundwater capacity, the bureau has developed contingency plans to supplement supply capacity. This contingency planning relies on the ability to off-load wholesale provider demands to other regional drinking water sources, combined with implementation of curtailment and utilization of other emergency contingency resources if needed.

The following document outlines the bureau's plan for managing water supplies during 2025.

2. SUPPLY PLANNING OBJECTIVES

The bureau wants to reliably meet the demands of all users with high quality water while effectively managing costs. To meet this overarching goal, the bureau is required to balance multiple objectives and coordinate the efforts of staff in several work groups.

Supply Reliability— Demand includes wholesale, residential, commercial and industrial users, as well as water loss. It also includes water used for bureau operations and water demand for fish, or in-stream demand. Supply reliability is ensured by carefully managing the use of primary water resources, employing conservation strategies, and preparing for the potential use of contingency resources.

Water Quality—Water quality for users involves meeting all drinking water quality regulations as they apply from the source water through the distribution system. Meeting the regulations is a minimum standard for the bureau; the bureau strives to supply water that has a better water quality than that defined by regulations. This means managing the system to keep a large suite of water quality parameters within optimal ranges. Water quality is also important for fish. Temperature and minimum flows are regulated for fish downstream of Headworks at Larson's Bridge. Managing stream temperature and flow are part of the bureau's larger objective to contribute to recovery of federally-listed steelhead, Coho salmon, and Chinook salmon (Endangered Species Act, ESA). The water quality component of managing summer supply is complex, with operational changes having varied effects on different water quality parameters.

Cost Management—Managing potential public and private costs is important to the bureau. The primary water supply, the Bull Run Watershed, provides water through a gravity-fed system that is efficient and cost-effective. Operation of the CSSWF, the bureau's main augmentation resource, involves greater energy costs. The bureau strives to balance use of its groundwater resource and other augmentation resources to keep water provisions cost-effective while meeting all other objectives.

System Maintenance—The bureau has a goal of maintaining the equipment and operational skills needed for using the bureau's main augmentation resource, the CSSWF. Exercising the wells and pump station help to keep equipment in good repair and to identify needed maintenance. Doing so also keeps operators up to date with the process of operating the groundwater system and ensures that the groundwater system will work properly when it is needed. As in past years, the bureau plans to conduct a maintenance operation of the groundwater system. In 2025, the operation is planned to last approximately twenty days and produce about 300 million gallons of groundwater. In addition to preventive maintenance, the operation will also use up the supply of sodium hypochlorite at the groundwater facility before it degrades which would require significant disposal costs.

Seasonal supply planning is a complex process that involves continually weighing multiple factors as conditions change throughout the year. The Supply Planning Group meets regularly during the reservoir drawdown period of the year to decide what operations are necessary to meet all these objectives.

3. ASSESSMENT OF PEAK SEASON DEMAND AND SUPPLY RESOURCES

In late winter and early spring of each year, the bureau evaluates information available about the upcoming summer peak demand season. The bureau monitors precipitation, snowpack, and streamflow, and evaluates current and projected water demands. The population supplied by the city's water system during the 2025 peak season will be approximately 1 million (including retail and wholesale customers and accounting for wholesale customer offloads). In an average weather year, the bureau estimates that peak season (122 days) daily average water demand would be about 120 million gallons per day (MGD). The actual average peak season daily average demand in 2024 was 111 MGD.

Fish in the Bull Run River also require water for their habitat needs. The bureau continues to work collaboratively with numerous partner organizations to improve habitat for federal Endangered Species

Act-listed fish species in the Sandy River Basin and to reduce summer season water temperatures in the lower Bull Run River. Federal rules require protection of the listed steelhead, Coho salmon, and Chinook salmon. State and federal rules also require meeting temperature objectives designed to protect aquatic habitat. The bureau will release flows into the lower Bull Run River consistent with the Bull Run Water Supply Habitat Conservation Plan (HCP) and final Temperature Management Plan that was approved in April 2009.

Supply Probability Analysis

The bureau employs its Groundwater Use Model to evaluate the need for and approximate timing of groundwater pumping. This model does not rely on weather forecasts but uses historic weather and streamflow data to construct a set of groundwater pumping curves that are compared to actual drawdown as it progresses. The Groundwater Use Model uses current-year demand projections, historical reservoir inflows, and anticipated fish flow releases into the lower Bull Run River to develop a series of reservoir drawdown curves – one for each weather year from 1940 to 2024. These projected drawdown curves are used to determine suggested groundwater pump rates based on the remaining volume of Bull Run storage above baseline elevations, and the calendar date. During drawdown, if the actual storage volume in the Bull Run reservoirs drops below a groundwater pumping curve, then the pumping rate corresponding to that curve is recommended to augment supply. The recommended groundwater pump rates should keep the Bull Run reservoirs above their baseline storage levels while minimizing the volume of pumped groundwater and attempting to maintain a relatively constant pumping rate throughout the drawdown season.

An example of groundwater pumping curves and a hypothetical drawdown curve (based on 2015 weather, a hotter and drier than average year) are shown in Figure 1. In this example, the dark blue storage curve remains above the pumping curves until July 2, at which point the storage curve crosses the 36 MGD pumping line. In response, two of the main groundwater pumps (18 MGD each) are turned on and reservoir drawdown is slowed measurably.

The blue, green, and yellow curves represent constant groundwater pump rates. The orange and red curves represent a constant supply from Bull Run with variable groundwater flow to meet demands. The orange curve is in effect from September 1 to September 30 and uses a flow of 20 MGD in each of the three conduits for a total Bull Run flow of 60 MGD. This maximizes the amount of groundwater that can be supplied while keeping all three conduits in service, as 20 MGD is currently the minimum flowrate that each conduit can supply. The red curve is in effect starting October 1 and uses two conduits for a total Bull Run flow of 40 MGD. This conserves additional water in the Bull Run Reservoirs if drawdown extends further into Fall. When conduit flows are constant, the groundwater flow rate varies from 35-80 MGD depending on demand.

The light blue storage line in Figure 1 shows what the progression of drawdown would have been if no groundwater had been used. Table 1 summarizes the subsequent changes in storage and groundwater pumping made in response.

Figure 1

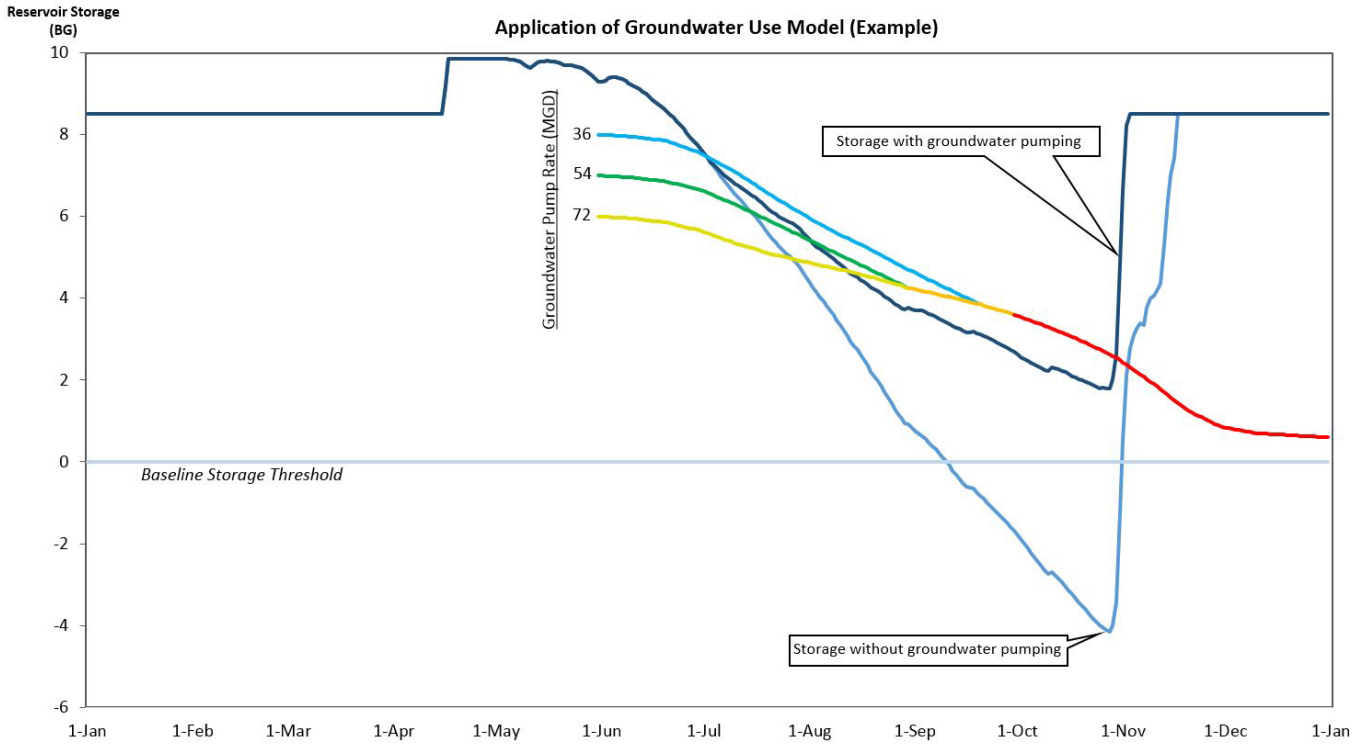

Table 1. Example of applying the Groundwater (GW) Use Model to determine the timing and rate of groundwater pumping.

Date*	Position of Storage Line Relative to GW Pumping Curves	Response	GW Pumping Rate
July 2	Cross 36 MGD curve	Turn on two main GW pumps	36 MGD
August 2	Cross 54 MGD curve	Turn on one additional main GW pump	54 MGD
August 13	Cross 72 MGD curve	Turn on one additional main GW pump	72 MGD
September 1	Under 3 conduit curve	Supply 60 MGD from Bull Run, GW makes up the remaining demand	Variable
October 1	Under 2 conduit curve	Supply 40 MGD from Bull Run, GW makes up the remaining demand	Variable
October 30	Cross above 2 conduit curve	Turn off all GW pumps	0 MGD

*Note: Dates listed are for demonstration purposes and do not reflect actual 2025 timelines.

In actual practice, the groundwater pumping curves inform supply decisions but do not dictate them. Other factors, such as short-range weather forecasts coupled with knowledge of antecedent hydrologic

conditions in the Bull Run Watershed, the state of distribution system storage, minimum conduit flows, water quality and the timing of the electric power billing cycle at the groundwater pump station are also taken into account in determining the timing and rate of groundwater pumping.

The groundwater pumping curves take into consideration continued flow releases from the Bull Run reservoirs into the lower Bull Run River for fish habitat needs. Released water helps reduce water temperatures in the lower river and maintain wetted habitat for spawning and rearing of steelhead, Coho salmon, and Chinook salmon. These fish species are listed as threatened under the ESA, and federal rules prohibit harming them or their habitat.

Habitat Conservation Plan Supply Provisions

The city's Habitat Conservation Plan (HCP) is a package of actions to improve habitat conditions for fish in the Bull Run and Sandy rivers. The HCP was developed in coordination with more than a dozen public and private organizations working on salmon recovery in the Sandy River Basin and it includes flow and water temperature commitments for the lower Bull Run River. The fifty-year HCP was approved by the Portland City Council in September 2008. The National Marine Fisheries Service approved the plan in April 2009 and issued the city an Incidental Take Permit which ensures regulatory compliance with the federal ESA. The flow commitments described within the HCP are now part of a regulatory compliance program for the bureau and will determine fish flow releases by the bureau for the duration of the plan. More information regarding the HCP is available on the bureau's web site, www.portland.gov/water/about-portlands-water-system/how-bull-run-protected.

Minimum flow releases from Headworks during this summer's drawdown period will typically range from 20 to 50 cubic feet per second (cfs) from July 1 through September 30. Release volumes change in response to the temperature of the water being released and the expected (forecasted) maximum air temperature. In October and November, minimum release volumes are a percentage of the total inflow to the Bull Run reservoirs, with a minimum of 70 cfs (October) to 150 cfs (November) during normal water years. The total volume of the downstream flow releases that occur during drawdown varies from year to year.

The total volume of the Bull Run downstream flow releases during drawdown can also change depending on the amount of precipitation that the Bull Run Watershed receives during the year. With low amounts of precipitation, two types of critically dry seasonal conditions, or triggers, can result in lower downstream flow releases: 1) a dry spring that causes early reservoir drawdown; and/or 2) dry fall conditions. These triggers provide the bureau with the option to respond by altering the flow releases for fish in the lower Bull Run River. The altered flow regime would be an earlier ramp down from spring flows after June 1, and/or lower fall season releases (based on a percentage of inflow and both minimums and flow caps).

A critical spring can be declared anytime drawdown begins prior to June 15. If this trigger is met in 2025, the bureau may decrease the flow as early as June 1 in the lower Bull Run River down to approximately 30-40 cfs while following a down-ramping rate of 2 inches per hour of water stage as measured at the United States Geological Survey (USGS) gauge site on the lower Bull Run River. Modeling conducted during the development of the HCP suggests that critical spring conditions can be expected about one year in five on average, though the past 13 years have had a high incidence of critical spring conditions. Table 2 shows conditions starting in 2010.

The trigger for a critical fall season is based on whether the August and September inflows to the Bull Run reservoirs are within the lower 10% of historical flows for that time period. Critical fall flows cannot be implemented more frequently than two years in a row and cannot be implemented four years after a year that has had critical fall flows implemented. For example, because critical fall flows were implemented in 2014 and 2015, the bureau could not apply critical fall flows in 2016 (two consecutive year rule) and could not apply them in 2018 or 2019 (four years later rule). In all cases, critical fall flows can be implemented in a given year only if the August-September low flow criterion is met that year. By definition, the city can expect to experience critical fall conditions one year out of ten on average, although a high frequency of record and near-record low stream flows have resulted in several instances in the last 10 years. The city has not always chosen to implement critical fall flows even when conditions are met. The city will have the option to implement critical fall flows in 2025. Table 2 shows conditions starting in 2010.

Table 2. History of critical spring and fall conditions starting in 2010.

Year	Spring		Fall	
	Conditions	Flow Implemented	Conditions	Flow Implemented
2010	Normal	Normal	Normal	Normal
2011	Normal	Normal	Normal	Normal
2012	Normal	Normal	Normal	Normal
2013	Normal	Normal	Normal	Normal
2014	Critical	Critical	Critical	Critical
2015	Critical	Critical	Critical	Critical
2016	Critical	Critical	Normal	Normal
2017	Normal	Normal	Normal	Normal
2018	Critical	Critical	Critical	Normal
2019	Critical	Critical	Normal	Normal
2020	Normal	Normal	Normal	Normal
2021	Critical	Critical	Normal	Normal
2022	Normal	Normal	Critical	Normal
2023	Critical	Critical	Critical	Critical
2024	Normal	Normal	Critical	Normal

4. EMERGENCY SUPPLY RESOURCES

When the Bull Run source is not available (for a turbidity event or other situation), the bureau plans to rely on the CSSWF. However, if the Bull Run were to be unavailable when system demands are greater than CSSWF capacity, the bureau will need to reduce system demands and increase supply. Several contingency resources identified in Table 3 will be instrumental to meet customer needs.

5. 2024 BASELINE AND SEASONAL CONTINGENCY RESOURCES

The following section of this plan outlines the baseline and contingency resources available to help the bureau meet demand in 2025. Available resources are shown in Table 3. This table reflects conservative assumptions to ensure that the bureau can manage even extreme supply shortage situations. For example, the estimated duration of the drawdown period shown in Table 3 is 151 days. Based on historic information, this is a conservative estimate because the drawdown period should be shorter than 151 days in the large majority of years. In addition, the hypothetical date when drawdown will begin per Table 1 is June 1, which is approximately one month earlier than the average historical drawdown date. For planning purposes, the seasonal supply plan uses 151 days (June 1 – October 29) for the potential duration of drawdown. Actual drawdown and refill vary each year.

"Baseline Primary Resources" include Bull Run streamflow, Bull Run reservoirs, CSSWF maintenance operation, and ongoing water efficiency. "Baseline Augmentation Resources" includes wells from the Columbia South Shore Well Field, and Bull Run Lake Increment #1. The bureau manages these resources to meet water demand and to provide the multiple benefits described in Section 2.

Based on current demand and supply projections, baseline primary, augmentation and contingency resources available for 2025 should be sufficient to meet peak season demand even in a hot, dry summer.

Table 3. Baseline, Augmentation, and Seasonal Contingency Resource Availability for Peak Season 2025.

Seasonal Water Supply Resources	Potential Rate of Use (Million Gallons a Day)	Potential Volume (Billion Gallons)	Potential Use Period (Drawdown = 151 days, 6/1– 10/29)
BASELINE PRIMARY RESOURCES			
Bull Run Watershed			
– Streamflow	Variable	9.5 – 52.5 BG[1]	Year-Round
– Reservoirs 1 and 2	Variable	9.8 BG (usable storage)	Drawdown
Water Efficiency	Incorporated into demand forecast	Incorporated into demand forecast	Drawdown
Columbia South Shore Maintenance Operation	36-43 MGD	0.3 BG	20 days
BASELINE AUGMENTATION RESOURCES			
Columbia South Shore Wells SGA, BLA and TSA Wells[2] (Max excludes wells off-line for repairs. 30/90/151 accounts for WQ and mechanical redundancy for large wells)	86 / 75 / 61 / 55 MGD (Max / 30 / 90 / 151 days)	2.2 / 5.9 / 9.2 BG (30 / 90 / 151 days)	Year-Round
Bull Run Lake Increment #1 (above elevation 3,164 ft)	Up to 27 MGD	An estimated 0 BG Dependent on lake refill levels.	Drawdown (release not permitted prior to July 15) [3]
CONTINGENCY – TIER 1[4]			
Wholesale Requested Interruptible Water	0.24-0.41 MGD; Incorporated into demand forecast	0.04 BG; Incorporated into demand forecast	122 days max (June through September)
Bull Run Lake Increment #2 (elevation 3,164 to 3,154 feet)	Up to 27 MGD	Approximately 1.2 BG	Drawdown (release not permitted prior to July 15)[3]
PWB Operations Curtailment ▪ Bubbler shut-downs ▪ Limit hydrant permits ▪ Limit flushing	0.25 MGD	0.01 – 0.03 BG	Year-Round
Citywide Operations Curtailment (Parks seasonal uses, irrigation, splashpads, fountains)	1.2 MGD 0.002 MGD	0.04 – 0.2 BG 0.0001 BG	June 1 – Oct. 31 Nov. 1 – May 31
Voluntary Customer Curtailment (10% demand reduction)	12 MGD 8 MGD	0.36 BG 0.24 BG	30 days June 1 – Oct. 31 30 days Nov. 1 – May 31
Wholesale Demand Offloads	5 – 22 MGD	0.9 BG	Year-Round

[1] Based on measured tributary inflows 1976-2020.
[2] Rates of use and potential volumes are maximums that may be achieved if the CSSWF is used at 100% capacity for full duration of the season. Normal operations apply low pumping rates early in the season and higher rates late in the season, resulting in a likely maximum of about 7 BG of augmentation.
[3] Potentially longer period, if the gravity flow rate or temperature considerations require a more prolonged discharge.
[4] Contingency resources within a given tier are not listed in priority order.

Seasonal Water Supply Resources	Potential Rate of Use (Million Gallons a Day)	Potential Volume (Billion Gallons)	Potential Use Period (Drawdown = 151 days, 6/1– 10/29)
CONTINGENCY – TIER 2			
Mandatory Curtailment (20% of demand)	25 MGD 12.5 MGD	0.8 BG 0.4 BG	30 days (June 1 – Oct. 31) 30 days (Nov. 1 – May 31)
Additional draft of Bull Run Reservoirs 1 & 2 below 9.8 BG usable storage	Unspecified	Unspecified	Unspecified
CONTINGENCY - EMERGENCY			
Bull Run Lake Increment #3 (elevation 3,154 to 3,143 feet)[5]	Up to 27 MGD	Approximately 1.4 BG	Drawdown (release not permitted prior to July 15)[3]
Emergency Curtailment (50% of Demand)	60 MGD (June 1–Oct. 31) 40 MGD (Nov. 1–May 31)	0.8 BG (June 1–Oct. 31) 0.6 BG (Nov. 1–May 31)	14 days
CSSWF BLA wells **PW-17** **PW-18**	 3.6 / 3.2 / 2.9 MGD 9.4 / 8.4 / 7.5 MGD (30 / 90 / 151 days)	 0.1 / 0.3 / 0.5 BG 0.3 / 0.8 / 1.2 BG (30 / 90 / 151 days)	Year-Round
Milwaukie Intertie (with portable pump)	2.0 MGD	0.3 BG	Drawdown
Vivian Wells (pump to distribution)	2.5 / 2.3 / 2.0 MGD (30 / 90 / 151 days)	0.1 / 0.2 / 0.3 BG (30 / 90 / 151 days)	Year-Round
Clackamas Intertie (with portable pump)	2.0 MGD	0.3 BG	Year-Round

A. Baseline Primary Resources

Bull Run Water Supply

Bull Run Streamflow

Historical averages for total reservoir inflow, by month, are shown below in Table 4.

Table 4: Monthly statistics for inflow volumes to Bull Run reservoirs in billions of gallons (BG) based on flows from 1976-2024.

Month	Minimum Inflow Volume (BG)	Maximum Inflow Volume (BG)	Mean Inflow Volume (BG)
June	2.1	29.6	9.7
July	1.7	11.4	3.7
August	1.4	6.7	2.4
September	1.5	10.9	3.2
October	1.3	27.2	8.5

[5] A temporary pump setup would be required to access this increment. Considerable coordination with the U.S. Forest Service would be necessary to gain approval for using this increment of Bull Run Lake.

Bull Run Reservoirs 1 and 2 – 9.8 BG Total Usable Storage

Routine usable storage is defined as the amount available above 970 feet elevation for Reservoir 1 and above 840 feet elevation for Reservoir 2. The analysis supporting these levels is documented in a January 2002 memorandum titled "Definition of Water Quality Based Threshold Elevations in the Bull Run Reservoirs and Resulting Conclusions about Volume Available for Water Supply." In addition, the Habitat Conservation Plan includes commitments to draw reservoirs down no further than 970 feet and 832 feet in Reservoir 1 and 2, respectively. A detailed bathymetric sonar survey was completed in 2022, and a correction of an elevational datum error dating back to the 1970s was identified in recent years. A new analysis incorporating the survey results and the datum correction have updated the total usable storage value from 9.9 to 9.8 BG.

Columbia South Shore Well Field Maintenance Operation

As mentioned in Section 2, the bureau plans to conduct a maintenance operation of the CSSWF. This involves daytime operations for 5-6 days a week producing approximately 15 - 17 MGD of groundwater for approximately 20 days for an estimated total of 300 to 350 MG groundwater. Timing of this operation will be coordinated with electrical meter read dates at the groundwater pump station and degradation of the sodium hypochlorite solution in order to minimize electrical and disposal costs. In 2025, the maintenance operation is tentatively planned to begin on August 4 but may be adjusted in response to seasonal conditions.

Water Efficiency

Our demand reflects customer water use patterns including ongoing efficiency practices that demonstrate that Portlanders use water wisely. Water efficiency programs and messages as well as distribution system water loss reduction actions are a key component of the bureau's ongoing seasonal supply strategy. These programs help reduce water demand and stretch water supplies. Water savings from water efficiency are embedded in demand forecasts.

In 2020, the bureau received approval of the city's Water Management and Conservation Plan. This plan contains State-mandated conservation and water curtailment elements. Bureau water efficiency programs, including activities associated with the Regional Water Providers Consortium (RWPC) are detailed in the plan.

The bureau's Water Efficiency Program offers technical resources and information about efficient water use to all customer classes. Programs include public education, toilet rebates, meter flow recording, consumption evaluation, and onsite water efficiency surveys for commercial and multifamily customers. Water efficiency devices are also distributed to all customer classes. More information about the bureau water efficiency programs can be found at portland.gov/water/water-efficiency-programs.

An important supplement to Portland's own water efficiency programs is the Regional Water Providers Consortium's (RWPC) regional water conservation program. The RWPC's program operates year-round, but targets most of its resources toward reducing summer peak season demands. The RWPC's program consists of five key elements: television and radio ads; a comprehensive website; educational materials and conservation devices; youth education; and community events and workshops geared toward homeowners, commercial property managers, landscape professionals, gardeners, and kids. Information on the RWPC's conservation program can be found at www.conserveh2o.org/.

B. Baseline Augmentation Resources

Baseline Augmentation Resources are sources of supply that are readily available for use, but are not used on a routine, ongoing basis. In 2025, they consist of the CSSWF and the Bull Run Lake Increment #1.

Columbia South Shore Well Field (CSSWF)

The bureau is prepared, if necessary, to augment the Bull Run surface water supply by pumping groundwater and blending it with the Bull Run supply. Groundwater augmentation contributes to supply reliability, including meeting seasonal peak daily demands and/or making up seasonal supply deficits. If seasonal forecasting indicates a potential supply deficit, groundwater augmentation early in the summer helps the bureau maintain a desirable groundwater to surface water blend ratio. Maintaining a lower blend ratio can help minimize impacts on water quality-sensitive customers, aesthetic effects, and other potential customer inconveniences associated with water chemistry fluctuations in the system. If groundwater is needed for supply augmentation, the target for the groundwater blend ratio is determined by the projected or actual supply deficit, water demand, and the timing, magnitude, and duration of groundwater use.

The baseline augmentation CSSWF wells have a theoretical installed capacity of 95 MGD and 12-13 BG over a 151-day peak season. This assumes 100% reliability of the well field and disregards interference effects that may require wells to be cycled on and off. When wells are out of service for routine maintenance (routine maintenance occurs to the wells throughout the year and typically only one well is out of service at any given time) or unavailable due to unexpected equipment failures, and well rotation is considered, the total volume of groundwater available for augmentation is incrementally reduced by the capacity of the unavailable wells. At the start of the 2025 peak season, two production wells (PW-6 and PW-37) are out of service and are expected to be unavailable during the 2025 drawdown season. To represent planned maintenance and potential unplanned equipment failure, the largest capacity well (PW-13) is also removed from the planned capacity. This results in a 30-day production capacity of 75 MGD after the capacities of these wells have been subtracted. Additionally, production from PW-12 is halted after 30-days to protect the BLA from further manganese incursion. The maximum volume produced is also reduced by interference effects that accumulate throughout the pumping operation. The exclusion of PW-12 after 30 days further reduces the remaining planned baseline augmentation capacity to approximately 61 MGD, resulting in a total 151-day production volume of 9.2 BG. This is the maximum that could be achieved if the well field were operated at full capacity for the entire duration of the season. In practice, the CSSWF is not activated until the season is underway and is operated at lower production rates early in the season and higher rates late in the season. After accounting for operational choices and aquifer response, the likely maximum volume of groundwater that would be produced in a 151-day season under normal operations is roughly 7 BG[6].

Operation of the CSSWF involves balancing a number of factors including water demand, water quality, infrastructure capacity, and the cost of electricity required to run the well pumps and the pump station.

The three Blue Lake Aquifer (BLA) wells are the bureau's shallowest and highest yielding wells, with the highest specific capacities and the smallest hydraulic lifts. As a result, the BLA wells produce water more efficiently (i.e., at lower electrical costs) than wells in the deeper Troutdale Sandstone Aquifer (TSA) and

[6] Operational scenario is 15 idle days, 36 MGD for 45 days, 54 MGD for 60 days, and 71 MGD for 30 days.

Sand and Gravel Aquifer (SGA). The BLA would be the bureau's first choice of aquifers because of this higher efficiency.

The SGA is the bureau's deepest confined aquifer with the best natural protection from surface contamination. With 15 installed wells, the SGA is also the aquifer with the greatest total production capacity. Although SGA pumping costs are higher, the bureau's wells in this aquifer have good yields and specific capacities, and are therefore a mainstay of the bureau's groundwater usage.

The TSA, with seven production wells, is a moderately deep confined aquifer with fairly good protection from surface contamination and desirable water quality characteristics (e.g., high pH) for blending. However, specific capacities and yields of the TSA wells are generally lower than either the BLA or SGA wells, and the bureau has the capability to make pH and other water quality adjustments at the groundwater treatment facility. Furthermore, maintaining hydraulic pressure in the TSA serves to help protect the underlying SGA from possible downward migration of contaminants. Therefore, the TSA would be used by the bureau in a more limited manner than either the BLA or the SGA. The primary reasons for TSA use would be to make up shortfalls in overall production capacity and for matching well field output with the booster pump station output.

Since 1985, the bureau has used groundwater for seasonal surface water supply augmentation 20 times. The cumulative volume of groundwater pumped for seasonal supply augmentation since 1985 is 42 BG and the maximum single seasonal groundwater augmentation volume to date was 5.8 BG in 2015, which included an extended maintenance run in June and the subsequent augmentation run from July-November. A history of groundwater use is available on the bureau's website at: portland.gov/water/about-portlands-water-system/groundwater-use.

The method used to calculate the theoretical 151-day yield of the well field during typical summer supply augmentation was revised in 2021 to better match observed reductions in the production rates of the wells during extended well field use in 2017 and 2018. The CSSWF Groundwater Model was used to simulate well field usage based on past performance and operational practices. Operational practices include both well selection and the increase in pumping rate as summer supply augmentation progresses.

The well field can also be used in an emergency scenario in which the available wells are pumped at maximum capacity at start-up with the 2025 maximum capacity of available wells being 86 MGD. Production rates are subsequently reduced by well interference as the emergency event continues. The method used to calculate the theoretical 151-day yield of the well field during typical emergency use was revised in 2018 to better match observed reductions in the production rates of the wells during extended well field use in 2015 and 2017. These temporary reductions result from groundwater pumping level declines and well interference effects. Wells return to their initial capacity after extended pumping operations stop and groundwater levels recover. The time-dependent reduction in CSSWF emergency capacity is calculated in the following way:

- From well field start-up to 30 days of pumping, an average pumping rate was calculated for each well using the observed yields over the first 30 days of pumping in 2015 and 2017;
- Between 30 and 90 days of pumping, it is assumed that 90% of the 30-day well capacities are available; and
- Between 90 and 151 days of pumping, it is assumed that 80% of the 30-day well capacities are available.

Actual pumping data from extended groundwater operations in 2003 and 2006 provided the basis for this approximation of declines in yield over time. Data from more recent operations and hydrologic model analyses continue to support this magnitude of declines over time.

The bureau prepares an annual CSSWF pumping plan that describes current agreements with the Oregon Department of Environmental Quality and provides additional details about well field operation.

Bull Run Lake Increment #1 (projected fall elevation down to 3,164 feet)

The bureau considers water supply from Bull Run Lake as three distinct increments. Increment #1 is described here. The other two increments are described in subsequent sections. Bull Run Lake Increment #1 is defined as the amount of water available above a minimum fall lake surface elevation of 3,164 feet. This elevation provides a 75% probability of the lake refilling to the full pool elevation of 3,174 feet the following spring. As an example, if the minimum fall elevation is projected to be 3,168 feet in a given year, the amount of water available for use would be the increment between 3,168 feet and 3,164 feet, or approximately 0.6 BG. A portion of this increment is naturally contributed to the Bull Run reservoirs without releasing the water through the deep-water intake, as water seeps out of the lake and into the Bull Run River. The lake elevation is a key factor in the ability of cutthroat trout living in the lake to access tributary habitat for spawning. Until snowmelt and spring rains have played out (usually by early June), it is uncertain how much supply will be available from Bull Run Lake. As of May 27, 2025, the lake level was 3173.3 feet elevation, 0.7 feet below full pool elevation. The projected minimum lake level that will occur without a release is 3162.7 feet, below the bottom of Bull Run Lake Increment #1. Therefore, no water is expected to be available for additional release. The water from this increment is expected to be released naturally via underground seepage into the upper Bull Run River.

Under the terms of the city's easement from the U.S. Forest Service for use of Bull Run Lake, mitigation requirements are triggered if, as a result of releasing water from the lake, the lake does not refill to full pool the following spring in more than one year of the remaining term of the easement when it would have refilled naturally.

C. Seasonal Contingency Resources

The categories of contingency resources are presented in Table 3 and described below. Tier 1 contingency resources are simpler and less costly to use than Tier 2 contingency resources, and are thus assigned a higher priority for use. In an actual situation in which the use of seasonal contingency resources is required, the bureau will consider operational issues, constraints, and opportunities existing at the time before selecting the appropriate combination of resources to meet identified needs. The resources listed within each tier are not shown in priority order. If the need for additional supply augmentation called for the use of contingency resources, the order of resource use would be decided at that time. Contingency resources to meet water demands during 2025 will be available if necessary to manage unexpected circumstances.

Tier 1 Contingency Resources

Tier 1 resources include the simpler and/or less costly contingency resources available for use in summer supply augmentation.

Elimination of Wholesale Requested Interruptible Water

In the event of an emergency or other condition under which continued supply of interruptible water jeopardizes the reliability of the water system, the bureau may cease providing interruptible water at any time on one day's written or verbal notice to the Purchaser. Under all other circumstances, including any augmentation to supply, the city may cease providing interruptible water at any time on 21 days written or verbal notice to the Purchaser.

Bull Run Lake Increment #2 (elevation 3,164 down to 3,154 feet)

If available, the bureau can obtain up to 1.4 BG by releasing water from Bull Run Lake Increment #2, bringing the lake down to a surface elevation of 3,154 feet. Limiting the drawdown to 3,154 feet provides 90% chance that the lake will refill to 3,164 feet the following spring but a very low probability of refilling to 3,174 feet. Based on winter refill, in 2025, the full 1.2 BG is expected to be available in this increment.

Portland Water Bureau Operations Curtailment

When Portland's supply appears likely to be stressed, the first step in curtailment would be a reduction of water use by the bureau. These reductions could include shutting off free-flowing Benson Bubblers, minimizing flushing activities and reducing hydrant use permits. It is estimated that this could save approximately 0.25 MGD. In previous supply seasons, PWB operations curtailment included a pause in keeping reservoirs 5 and 6 at Mt Tabor full, current operations are to fill the reservoirs before the start of drawdown and not refill until the end, as repairs have been made to limit the water loss.

Citywide Operations Curtailment

The City of Portland itself is one of the bureau's largest users. In particular, the Portland Parks and Recreation Bureau uses a lot of water in the summer months for irrigation and recreational facilities. The Portland Water Bureau Efficiency group has established contacts with Portland Parks to be able to request a reduction in water use during stress seasons.

Voluntary Customer Curtailment

In a water supply shortage, it may be necessary and appropriate to ask customers to voluntarily reduce their water use. Issuing voluntary reduction messages informs customers of a water shortage situation. The bureau estimates that voluntary curtailment messages can reduce water use by 10%, which is estimated to be 8 - 12 MGD of water savings; however, the amount of savings would vary depending on the timing and intensity of the messages. The bureau included a curtailment analysis as a part of its 2023 Water Conservation Planning Study. The results of this analysis estimate that up to 8.8 MGD could be reduced by strictly restricting all outdoor irrigation. Indoor water curtailment potential in a voluntary curtailment could be between 3-6 MGD. Because media messages are not limited by utility service area boundaries, it is important to coordinate the delivery of curtailment messages with other Portland area water providers and stakeholders. The bureau's Water Management and Conservation Plan, updated and approved in 2020, outlines implementation measures for voluntary curtailment. In addition, Section 14 of the wholesale water sales agreement, entitled "Water Curtailment and Protection of the Water System," provides direction for implementing curtailment actions. In Winter 2025, PWB and its wholesale providers adopted an updated Water Managers Advisory Board Curtailment Plan that includes mitigation measures to support regional water demands in the event of a water supply shortage.

Wholesale Demand Offloads

The bureau's water sales agreement states that each wholesale customer can purchase a guaranteed quantity of water each month. Some of the wholesale customers may be able to "off-load" a portion of water demand on the Portland system through the use of other resources. The wholesale customers' alternative sources include a groundwater system developed jointly by Rockwood Water People's Utility District (Rockwood) and the City of Gresham (Gresham), and Tualatin Valley Water District's (TVWD) partial ownership of the Joint Water Commission (JWC). The baseline forecast for the SSP accounts for regular usage of these alternative sources by these wholesale customers. The alternative sources may also be able to provide additional offloads during an extreme water supply shortage or an emergency. Rockwood and Gresham could provide up to 8 MGD from their groundwater system depending on current pumping volumes. TVWD could provide between 5 and 14 MGD from the JWC depending on storage and treatment capacity.

Tier 2 Contingency Resources

The group of Tier 2 Contingency Resources also includes a variety of options. Tier 2 resources are significantly more complex, costly and take more time to use than Tier 1 resources. Yet they provide critical flexibility to respond to an extreme supply shortage or an emergency.

Mandatory Curtailment

In an extreme water shortage, the City could require water use curtailment under authority of City Code Chapter 21.32, Water Curtailment Policy. The code authorizes the bureau's Administrator to establish curtailment rules as appropriate to the situation. The bureau's Water Management and Conservation Plan outlines potential measures that would be implemented in the event of an extreme water shortage. Mandatory curtailment also applies to wholesale customers. The Curtailment Plan with wholesale customers specifies an allocation methodology on water usage reduction for the wholesale customers. The bureau estimates that a 20% reduction in water use, or about 12-25 MGD of water savings could be obtained through mandatory reductions; however, the amount of savings would vary depending on the timing and intensity of the messages. It may be very challenging to get sustained water use reductions from a curtailment outside of the summer irrigation season.

The city last imposed mandatory restrictions in the summer of 1992 when the CSSWF was not available for use. Mandatory curtailment can cause substantial inconvenience for a broad range of customers. For certain business sectors (e.g., landscape and nursery), mandatory curtailment can also cause significant economic hardship. For these reasons, mandatory curtailment would be implemented only if absolutely necessary.

Additional Draft of Bull Run Reservoirs 1 & 2 below 9.9 BG Usable Storage

The bureau could also draw the Bull Run reservoirs down below the Baseline Storage Threshold. However, because the Bull Run system is not filtered, extensive reservoir drawdown poses an increased risk of creating water quality related issues.

Emergency Contingency Resources

The group of Emergency Contingency Resources includes a variety of options to respond to an extreme supply shortage or an emergency. These resources can be used in addition to, or in lieu of other baseline, tier 1 and tier 2 resources identified above.

Bull Run Lake Increment #3 (elevation 3,154 down to 3,143 feet)

Using Bull Run Lake Increment #3 would involve drawing the lake down to an elevation of 3,143 feet to provide about 1.4 BG of additional supply. This increment is not readily available in 2025 due to inoperability of the outlet pump and would require the use of a temporary pump. It would take considerable agency coordination to obtain approval to use a temporary pump to access increment #3. Use of the lake to this level could have significant impacts on resident fish, which in turn would trigger federal permit conditions requiring expensive mitigation measures to restore and protect fish and wildlife habitat. The lake, if drawn to this level, would also likely take multiple years to refill; thus, limiting its availability as a water supply. (Bull Run reservoirs refill every winter because they are relatively small impoundments in a large basin. By contrast, Bull Run Lake is a large lake in a small basin).

Emergency Curtailment – Critical Water Shortage

In the event of a critical water shortage the bureau has outlined in its Water Management and Conservation Plan a curtailment stage that restricts water use to only uses critical for health and safety. This means a reduction greater than 50% of water use.

CSSWF PW-17 and PW-18

If needed, the bureau expects to be able to bring either of the BLA Production Wells 17 (PW-17) and/or 18 (PW-18) on-line. Wells PW-17 and PW-18 are not operated due to high concentrations of naturally occurring manganese. PW-17 can provide between 2.9-3.6 MGD and PW-18 can add between 7.5-9.4 MGD[7]. Prior to 2021, PW17 and PW18 were considered Tier 2 contingency resources, however, due to the likelihood of their use resulting in discolored water and manganese levels above the Canadian health advisory, it has been decided that these wells would only be used as an emergency water source.

Vivian Wells

The Vivian Wells (former Powell Valley Road Water District (PVRWD) wells) include two Troutdale Gravel Aquifer (TGA) wells and two Upper Gravel Aquifer (UGA) wells with a total combined production capacity of about 6 MGD. These wells are classified as an Emergency Resource because they are not currently piped into terminal storage at Powell Butte and can only provide supply to the local distribution system. In 2021, repairs to PVRWD Well 9 were indefinitely postponed due to the costs relative to the benefits of this incremental emergency supply. The potential combined capacity of the remaining three Vivian wells (#6, 7, and 8) is approximately 2-3 MGD.

Milwaukie and Clackamas Interties (with portable pump)

Interties exist between Clackamas and the City of Milwaukie's system and Portland's system. Utilizing a portable pump, each intertie could provide about 2.0 MGD.

[7] Constraints in collection system piping limit the operation of BLA wells to no more than roughly 30 MGD of total production volume, so PW-17 & 18 can be operated provided that no more than one or two other BLA wells is also in use. In a scenario where the bureau is already using PW-12, 13 & 19, therefore, PW-17 & 18 may not contribute additional capacity.

6. CONCLUSIONS

The Seasonal Supply Plan provides a comprehensive strategy for augmenting the bureau's baseline water resources, if needed during the peak demand season. Every year the Portland Water Bureau revisits the planning process and revises the Seasonal Supply Plan according to current situations and needs. During the summer of 2025, the bureau expects that sufficient water will be available to meet the range of potential supply and demand conditions that could occur in the Portland water system.

The bureau continues to refine its approach to supply planning by integrating new tools and utilizing the increasing wealth of experience gained each supply season. The Supply Planning Group meets regularly to review the current supply conditions and discuss how to utilize supply resources throughout the season.

GLOSSARY OF TERMS

1. Baseline Augmentation Resources – Sources of supply that are readily available for use but not used on a routine, ongoing basis. In 2025, this consists of the Columbia South Shore wells and the Bull Run Lake Increment #1.

2. Baseline Primary Resources – The basic supply and demand management resources that are used each year. In 2025, these include Bull Run streamflow, Bull Run reservoirs, groundwater produced in a maintenance operation, and ongoing water efficiency.

3. Baseline Storage Threshold – The point at which usable baseline storage in the two Bull Run reservoirs equals zero, even though there will be 6.7 BG left in the reservoirs. The distance of a plotted line above the Baseline Storage Threshold in Figure 1 indicates the amount of routine usable storage in the Bull Run reservoirs (9.8 BG when the reservoirs are full). The distance of a plotted line below the Baseline Storage Threshold represents the amount of water (or demand reduction) that would be needed to augment the Bull Run supply to meet peak season demand. The bureau could also draw the Bull Run reservoirs down below the Baseline Storage Threshold. However, water quality risks increase substantially below this threshold. Because the Bull Run system is not filtered, extensive reservoir drawdown poses an increased risk of exceeding federal turbidity standards. Additionally, cold reservoir bottom water reserved for downstream management for endangered salmon species would be at risk of heating or mixing with warmer layers of water.

4. Bull Run Reservoirs Baseline Storage – The amount of water available above 970 feet elevation for Reservoir 1 and above 840 feet elevation for Reservoir 2 (9.8 BG when the reservoirs are full).

5. Contingency Resources – Tier 1 and Tier 2 contingency resources of supply and demand management require some advance planning to implement. Tier 1 contingency resources are simpler and less costly to use than Tier 2 contingency resources and are thus assigned a higher priority for use. Emergency contingency resources are more costly and complicated to utilize and pose additional risks, therefore they are reserved for extreme and/or emergency situations.

6. Critical Fall – A management option for reduced fish flows that can be implemented in certain years when August and September cumulative inflow is in the lowest 10^{th} percentile of flows since 1940. If implemented, summer flow for temperature control continues from October 1-15. From October 16-31, 50% of reservoir inflow with a minimum of 30 cfs (20 MGD) and a maximum of 250 cfs (160 MGD) is implemented. From November 1-15, 40% of reservoir inflow with a minimum of 30 cfs and a maximum of 250 cfs is implemented. From November 16-30, 40% of reservoir inflow with a minimum of 70 cfs and a maximum of 350 cfs (225 MGD) is implemented. Critical fall flows may not be implemented in more than two consecutive years and also may not be implemented in the fourth year following a critical fall flow implementation.

7. Critical Spring – A management option for reduced fish flows that can be implemented in any year that drawdown begins before June 15. If implemented, winter fish flows of 120 cfs are maintained until at least June 1; after June 1, flow can be decreased to 30 cfs until July 1, at which time summer flow for temperature control is implemented. There is no limit on recurrence of critical spring flows.

8. Curtailment – Restriction of water use due to emergencies or drought. Voluntary and mandatory curtailment include similar actions and methods, but mandatory curtailment has an enforcement component associated with it.

9. Drawdown – The period of the year when the amount of water stored in the Bull Run reservoirs is decreasing because demand from the reservoirs (water sent downstream and into conduits) exceeds inflow to the reservoirs.

10. Flow Releases – Flows of water released from the reservoirs into the lower Bull Run River to meet flow and temperature targets developed to protect ESA listed fish. The Bull Run Water Supply Habitat Conservation Plan (HCP) has been approved by regulatory agencies and the flow release commitments are legally enforceable.

11. Groundwater Maintenance Operation – Production from the CSSWF to maintain equipment and make repairs. This is typically groundwater production of 15 MGD for 20 days for a total of approximately 300 MG.

12. Interruptible Water - Water that a wholesale purchaser may purchase over and above its guaranteed purchase quantities under the terms and conditions in the water sales agreement section 6. According to the agreement the city may cease to provide interruptible water at any time in the event of an emergency, under all other circumstances, including any augmentation to supply, the city may cease providing interruptible water at any time on 21 days written or verbal notice to the Purchaser.

13. Peak Season – The period of highest water use due to warm weather and/or low incidence of rain. A 122-day period from June to September is considered for demand forecasting purposes.

14. Refill – The period when the streamflow into the reservoirs exceeds demand to town and downstream flows for fish. Refill begins when drawdown ends.

15. Regional Water Providers Consortium (RWPC) – A group of 22 water providers in the Portland Metropolitan Area. The Consortium is operated under an intergovernmental agreement and is staffed by the bureau. The Consortium has been in operation since 1997, and since 2000 has implemented a cost-effective regional water conservation campaign designed to encourage the efficient use of the region's water supply. The Consortium also works together to prepare for, respond to and recover from emergency events. The Consortium provides a forum for study and discussion of water supply issues and coordinates the implementation of the Regional Water Supply Plan. www.regionalh2o.org.

16. Water Efficiency – The reduction of water use through more water efficient technologies, practices, and behavior changes.

17. Wholesale Demand Offloads – The reduction of demand on Portland's system when wholesale providers utilize other sources of water.

Table 1. **Historical Peak Season Demand, Bull Run and Groundwater Seasonal Supply Conditions**

Year	Demand		Bull Run					Groundwater					
	Peak Season (6/1 - 9/30) (MGD)	Peak Day (MGD)	Drawdown Start	Drawdown End	Days of Drawdown	BR Lake (MG)	Min. Storage (BG)	GW on	GW off	# Days	Rate (MGD)	Total Volumne (BG)	Maint. or Aug.
2024	111	134	6/28/2024	10/26/2024	120	0	1.6	8/1/2024	8/20/2024	14	4 - 20	0.24	Maint.
								10/10/2024	11/6/2024	18	13 - 40	0.823	Aug.
2023	118	127	6/1/2023	9/25/2023	116	0	2.3	8/24/2023	11/15/2023	83	36 - 72	3.2	Aug.
2022	111	140	7/3/2022	10/21/2022	110	500	0.8	8/2/2022	9/1/2022	23	40	0.3	Maint.
								10/13/2022	11/3/2022	22	56	0.9	Aug.
2021	115	148	6/18/2021	10/10/2021	114	0	3	8/3/2021	8/25/2021	23	56	1.3	Aug.
2020	110	133	7/11/2020	10/9/2020	90	0	3.4	8/4/2020	9/3/2020	23	54	0.4	Maint.
2019	111	131	5/7/2019	9/17/2019	133	0	3.6	7/10/2019	8/27/2019	48	36-45	1.8	Aug.
2018	118	139	5/20/2018	10/27/2018	160	0	1.6	6/20/2018	10/17/2018	119	18-45	4.6	Aug.
2017	121	153	6/22/2017	9/17/2017	87	0	3.2	-	-	0	-	0	-
2016	117	147	6/30/2016	10/4/2016	96	0	3.6	7/25/2016	8/10/2016	17	18	0.28	Maint.
2015	128	159	5/18/2015	10/25/2015	160	0	1.3	6/11/2015	6/19/2015	19	9 - 51	0.5	Maint.
								7/16/2015	11/4/2015	112	27 - 69	5.3	Aug.
2014	124	146	7/3/2014	10/22/2014	111	0	1.1	7/1/2014	7/9/2014	6	7 - 28	0.12	Maint.
2013	120	147	7/3/2013	9/22/2013	81	0	4.3	7/30/2013	8/8/2013	9	4	0.03	Maint.
2012	120	149	7/17/2012	10/14/2012	89	0	2.6	8/6/2012	8/23/2012	11	7 - 19	0.03	Maint.
2011	121	153	7/23/2011	10/6/2011	75	0	4.2	8/9/2011	8/17/2011	6	17 - 22	0.03	Maint.
2010	121	159	7/7/2010	9/17/2010	72	0	4.6	8/9/2010	8/18/2010	6	17 - 22	0.03	Maint.