Oregon Department of Environmental Quality

Temperature Delisting

2024 IR methodology update

From: DEQ WQ Assessment Program
Date: Sept. 20, 2022

Problem Statement

There is no temperature specific process for delisting based on new data specified in the Integrated Report Assessment Methodology. In the 2022 Integrated Report (IR), some Assessment Units were delisted based on data from only one or two years of data collection. To ensure Assessment Units are not delisted prematurely or without sufficient supporting evidence, temperature specific data minimums should be established.

Background

Section 303(d) of the Clean Water Act (CWA) requires states to prepare lists of "surface waters that do not meet applicable water quality standards," referred to as the impaired waters list, and to establish Total Maximum Daily Loads (TMDLs) for pollutants causing the impairment of these waters on a prioritized schedule. The 303(d) listing requirement provides Oregon Department of Environmental Quality with the opportunity to use scientifically and statistically valid information to assess Oregon water bodies and prioritize the water bodies and pollutants for TMDL development. Here, "delisting" is referred to as removal of a water body that has previously been placed on the 303(d) list either because the water is now attaining standards or because other conditions have changed.

The requirements to delist assessment units from the 303(d) list should be more stringent than the requirements to add to the list.[1] This is done to ensure that a water body is not de-listed prematurely or without sufficient supporting evidence. To maintain protection of aquatic resources, the agency should be certain that the delisting is appropriate before water body protections are removed (permit limitations, waste load allocations, TMDL developments, etc.).

The U.S. Environmental Protection Agency's 2002 Consolidated Assessment and Listing Methodology guidance specifically warns against basing attainment decisions on small data sets. With small datasets, data quantity or quality may be insufficient to capture exceedances, leading to incorrect designation of attainment. The guidance document warns that "larger data sets have a greater probability of detecting less frequent exceedances. If a small data set detects an exceedance, the water body is likely experiencing a higher frequency of exceedances. However, if a small data set does not detect an exceedance, it is difficult to say with statistical confidence that the water is attaining Water Quality Standards (WQS). Larger data sets are more powerful in terms of supporting decisions that a water is attaining WQS." and "EPA does not recommend making decisions based on small data sets of water column chemistry for attainment."[2] There is a need to establish minimum

[1] Listing and Delisting Procedures: Binomial and Large Data Set Assessment Options, Slide 51, 12/06/2017, https://www.oregon.gov/deq/FilterDocs/irimp-listingdelisting.pdf

[2] Office of Wetlands, Oceans, and Watersheds. (2022). Consolidated Assessment and Listing Methodology: Toward a Compendium of Best Practices. U.S. Environmental Protection Agency. https://www.epa.gov/waterdata/consolidated-assessment-and-listing-methodology-calm

data requirements when making designations of attainment, especially when delisting a water body with a history of water quality impairments.

The metric for Oregon's numeric temperature criteria is a maximum seven-day average of the daily maxima (7DADM). This metric was recommended for protection of sensitive cold water fish species in EPA Region 10 states because it describes an extended period of the maximum temperatures in a stream, without being overly influenced by the maximum temperature occurring in a single day.[3] Because the 7DADM metric limits the average maximum temperatures for the warmest several days of the year, there is an expectation that if the criterion is met during the summer maximum, temperatures will be lower than the criterion during most of the year. Therefore, two instances of an exceedance of the 7DADM metric in a three-year period was deemed sufficient to demonstrate and confirm non-attainment of the temperature standard.

History of delisting methodology development

The 2018/2020 IR Methodology document created a new listing methodology for criteria evaluated through synoptic, or grab, data. This was done to address the 2012 report's "lack of specific detail for delisting", and to create a process that is transparent and consistent for stakeholders.[4] The 2018/2020 IR adopted the binomial test as a statistical approach that mirrors its listing methodology. The binomial process adopted in the 2018/2020 IR states that waters will be removed from the 303(d) list if the number of sample excursions of the criteria supports a 90% confidence level that the water body exceeds criteria less than 10% of the time. See Appendix A- Critical Values for Delisting Conventional Pollutants for the conventional parameter delisting methodology from the 2018/2020 Assessment Methodology. The 2018/2020 delisting methodology did not establish a procedure to evaluate data generated by continuous data sensors, nor did it establish minimum data requirements beyond needing 15 grab samples in the data window.

The 2022 IR methodology addressed these issues for dissolved oxygen (DO). A DO specific delisting methodology was created that, in addition to defining how continuous data is used, specified a minimum of three years of data that represent at least 80% of the critical period (July 1 – Sept. 30) in each year. However, there remains no temperature specific delisting methodology. This has led to the delisting of assessment units in the 2022 IR based on just a few years of data collection. In the 2022 IR, of the 28 assessments that resulted in a temperature delisting based on new data, 14 are based on datasets of two years or less. There is risk that in using datasets of two years or less the full range of climatic conditions in the IR data window are not captured and assessment units are being delisted based on data during short duration cooling events.

To determine a data minimum for delisting purposes, DEQ evaluated a suitable interval where stream temperatures must attain the criteria before being considered for delisting

Data analysis

[3] U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Region 10 Office of Water, Seattle, WA.

[4] Integrated Report Improvements- Delisting Methodology White Paper. 5/11/2018. https://www.oregon.gov/deq/FilterDocs/iri-delisting.pdf

To evaluate various minimum data requirements, DEQ first developed a dataset based on all the monitoring locations that had continuous temperature data for the full five-year IR 2022 data window (1/1/2016 - 12/31/2020). A total of 148 monitoring locations met this criterion. See Appendix A for a list of monitoring locations used in the analysis.

Using these monitoring locations, DEQ ran the data through the temperature assessment method outlined in the **Methodology for Oregon's 2022 Water Quality Report and List of Water Quality Limited Waters**[5], with the data grouped on a monitoring location basis, not on an Assessment Unit basis. Each year in the dataset (2016-2020) was evaluated and the counts of years with observed excursions of temperature criteria were tallied. Of the 117 monitoring locations with excursions in the five-year assessment period, 11 (9%) have excursions in only one or two years. This indicates that without a sufficient period of evaluation in the assessment window, excursions of temperature criteria may not be captured in the dataset and DEQ may propose delisting some assessment units with periodic exceedances of the criteria. Figure 1 shows the distribution of excursions at these monitoring locations.

[5] https://www.oregon.gov/deq/wq/Documents/IR22AssessMethod.pdf

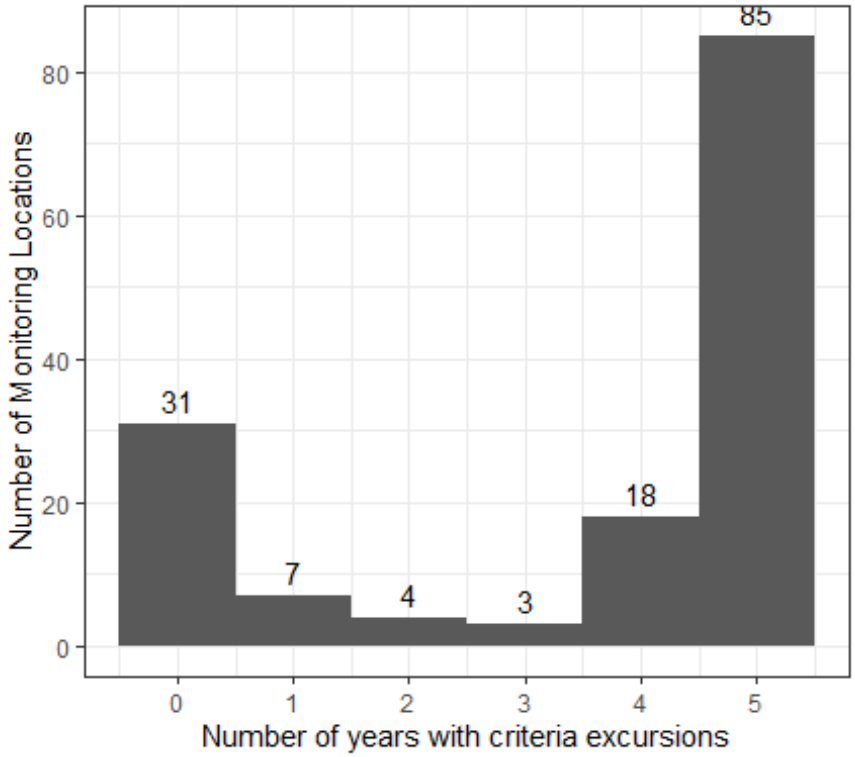

Figure 1: Histogram with the distribution of monitoring locations by number of years in a five-year data window that had excursions of the temperature criterion. For example, 7 monitoring locations had excursions in only 1 of 5 years. There were no excursions in 4 Histogram with the distribution of monitoring locations by number of years in a five-year data window that had excursions of the temperature criterion. For example, 7 monitoring locations had excursions in only 1 of 5 years. There were no excursions in 4 of 5 years at these locations. 18 monitoring locations had excursions in 4 of 5 years. If the minimum data window to delist was 1 year, and data was collected in only the 1 year without excursions, those monitoring locations would potentially be erroneously delisted.

This dataset can also estimate potential worst-case error rates of selecting a different number of minimum years. 117 monitoring locations receive an "impaired" designation when we have data for the full five-year data window. Error rates can be estimated by assuming for each monitoring location DEQ only has data for the minimum number of years, and the sampling happened to occur during the periods with no excursions. For example, if the minimum data requirement to delist was set at two years of data, a water body that had excursions in three of five years in the data window, could potentially be delisted assuming the sampling program only monitored for the two years with no excursions. Table 1 shows the potential "worst-case scenario" error rates.

Number of minimum years	Potential Error Rate
5	0%
4	6%
3	9%
2	12%
1	27%

Table 1: Worst case scenario potential error rate. This table shows the potential erroneous delisting of an impaired monitoring location if (1) the given monitoring locations only had data for the minimum number of years, and (2) the sampling happened to occur during the periods with no excursions. This table reflects figure 1, if all of the excursions were during unmonitored years.

It should be noted that most of the monitoring locations in our dataset are USGS gauging stations, which typically operate on larger waterbodies. DEQ does not have this level of data for lower order river and streams, but assume those waterbodies show a greater variation in the number of years that do not have excursions.

Discussion

The assessment methodology describes a general method to delist water bodies for conventional pollutants. "Waters will be removed from the section 303(d) list if the number of sample excursions above the numeric criterion threshold supports rejection of the null hypothesis as presented in Table 10 indicating that the water quality criteria are attaining. … The critical proportion of conventional pollutants is 10% of samples with 90% confidence."[6] However, the assessment methodology does not apply to the binomial test to listing or delisting process "where a statistical threshold or proportion used to determine attainment is already clearly expressed in Oregon's water quality standards," such as temperature.[7] In the case of temperature, the methodology specifies an impaired designation if any two instances of the seven-day-average daily maximum temperature exceed the applicable criteria within a three-year period.

However, if the 90% confidence level that the water body attains numeric temperature criteria is extrapolated, minimum data quantities can be set that are sufficient to ensure assessment units are appropriately delisted. By setting the minimum data quantities to at least three years of data that represent at least 80% of the critical period during each year, a 90% confidence level that the water body is attaining water quality criteria can be approximated.

[6] Methodology for Oregon's 2022 Water Quality Report and List of Water Quality Limited Waters, page 31. https://www.oregon.gov/deq/wq/Documents/IR22AssessMethod.pdf

[7] Integrated Reporting Improvements- Statistical Methods for Listing and Assessment of Large and Long Term Data Sets White Paper, Oregon DEQ, 5/11/2018. https://www.oregon.gov/deq/FilterDocs/ir-statmethods.pdf

Spawning critical periods

The critical warm period for year-round assessment is defined by July 1 through Sept. 30. This is the period in which DEQ expects the majority of excursions of the year-round temperature criteria to occur. To attain a Category 2 (Attaining) designation the dataset must include at least one year with 80% of the critical period dates represented. The assessment methodology does not include a critical period for assessment of the spawning criteria.

Due to access issues, data collection for many of Oregon's assessment units can be difficult in the winter. DEQ needed to establish a critical period for delisting temperature spawning listings. To meet minimum data requirements for a delisting, the dataset must include sufficient record of the period in which the majority of excursions occur.

To develop a critical period for temperature spawning listings, DEQ obtained all temperature 7ADM data within DEQ's Ambient Water Quality Monitoring System (AWQMS)[8]. This data was filtered to only include data within a spawning period. A dataset of 644,005 spawning period 7DADM temperature values were then run through the IR spawning temperature assessment code and 96,990 excursions of the spawning temperature criteria spanning from 1960 through 2021 were identified. The temporal distribution of these excursions can be seen in Figure 2.

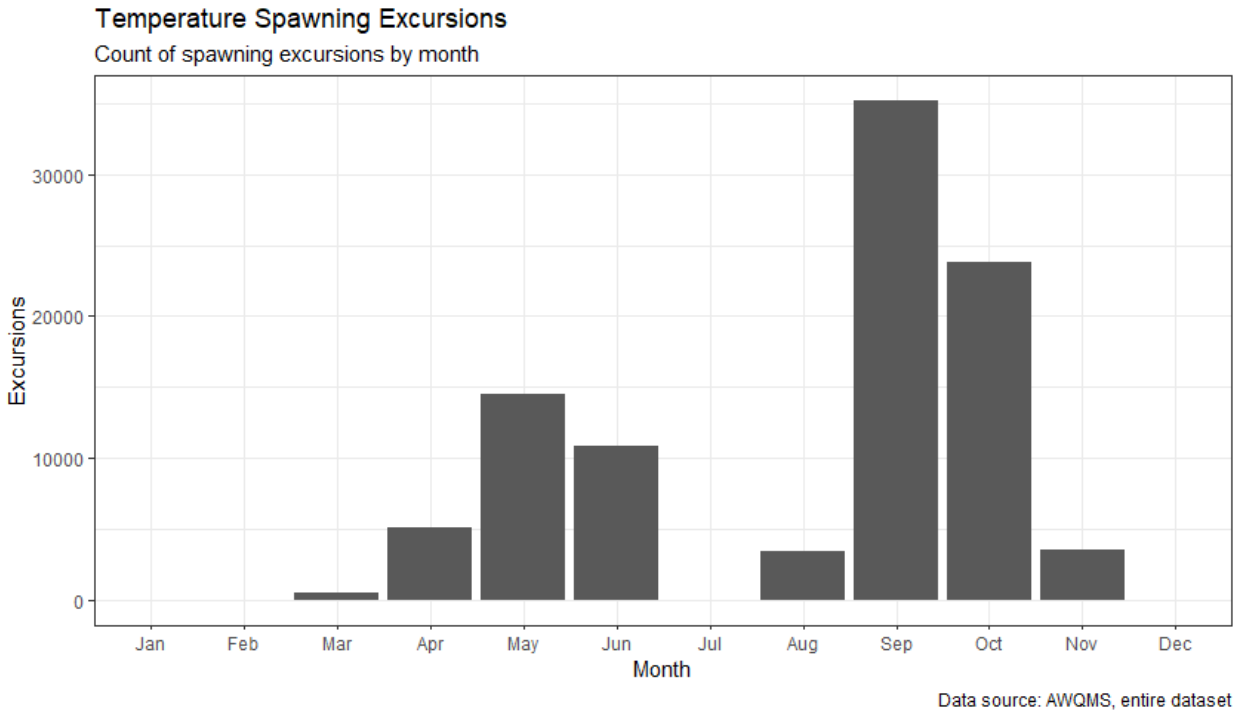

Figure 2: Histogram with the temporal distribution of temperature spawning excursions. 1960 – 2021.

Nearly all the spawning temperature excursions happen in the months between April and November. This pattern is observed for all the different spawning periods. Based on this analysis, the critical warm period for spawning can be defined as the portion of the spawning period that overlaps this critical warm period. For example, if an assessment unit has a spawning period from Sept. 1 – through June 15, the critical warm period can be defined as 2 distinct periods of Sept. 1 through Nov. 30 and April 1 through June 15. This approach

[8] https://www.oregon.gov/deq/wq/pages/wqdata.aspx

balances the need to ensure that a water body being delisted is truly meeting attaining conditions and is not just a reflection of when the data were collected, with the ability for monitoring programs to collect the needed data.

Proposed methodology delisting language

A water body is delisted and assigned Category 2: Attaining if there is sufficient information from the current assessment to evaluate the pollutant or parameter, and the information demonstrates that currently applicable water quality standards are being met. Data used for delisting must meet data quality requirements described below. An assessment unit will be eligible for delisting for temperature if the assessment unit meets the following scenario:

For year-round listings:

1. Assessment results in a Category 2 designation (no excursions of the 7DADM temperature criteria) ***and***
2. Dataset must include a minimum of three years (does not have to be consecutive) of data in the current IR data window that represent at least 80% of the critical period (July 1 through Sept. 30).

For spawning listings:

1. Assessment results in a Category 2 designation (no excursions of the spawning 7DADM temperature criteria) ***and***
2. Dataset must include a minimum of three years (does not have to be consecutive) of data in the current IR data window that represent at least 80% of the spawning critical period (spawning period overlap of April through November). If the spawning period extends across the non-critical period months, the dataset must include 80% of the period from each of the fall and spring critical periods.

The critical spawning period for each spawn code can be found in Table 2.

Spawn Code	Spawn Dates	Total Spawning Days	Fall Critical Period	Spring Critical Period
12	September 1 - May 15	257	9/01 - 11/30	4/01 - 5/15
13	September 1 - June 15	288	9/01 - 11/30	4/01 - 6/15
14	September 15 - May 15	242	9/15 - 11/30	4/01 - 5/15
15	September 15 - June 15	273	9/15 - 11/30	4/01 - 6/15
16	October 23 - April 15	174	10/23 - 11/30	4/01 - 4/15
18	October 1 - June 15	257	10/01 - 11/30	4/01 - 6/15
19	October 15 - May 15	212	10/15 - 11/30	4/01 - 5/15
20	October 15 - June 15	243	10/15 - 11/30	4/01 - 6/15
21	November 1 - May 15	195	11/01 - 11/30	4/01 - 5/15
22	November 1 - May 1	181	11/01 - 11/30	4/01 - 5/01
23	November 1 - June 15	226	11/01 - 11/30	4/01 - 6/15
24	January 1 - May 15	134	-	4/01 - 5/15
25	January 1 - June 15	165	-	4/01 - 6/15
27	August 1 - June 15	318	8/01 - 11/30	4/01 - 6/15
28	August 15 - June 15	305	8/15 - 11/30	4/01 - 6/15
29	August 15 - May 15	273	8/15 - 11/30	4/01 - 5/15
30	October 15 - March 31	167	10/15 - 11/30	-

Table 2: Spawning Critical Period dates by Spawn Code.

Appendix A- Monitoring Locations used in Analysis.

OrgID	MLocID	Description
CITY_BEND(NOSTORETID)	TC 4.00	Shevlin Park
CITY_GRESHAM(NOSTORETID)	COG_BeaverDSKelly	Beaver Creek downstream of confluence with Kelly Creek
CITY_GRESHAM(NOSTORETID)	COG_BeaverUSKelly	Beaver Creek upstream of confluence with Kelly Creek
CITY_SALEM(NOSTORETID)	BAT12	Battle Creek at Lone Oak Rd.
CITY_SALEM(NOSTORETID)	BAT3	Battle Creek at Commercial Ave.
CITY_SALEM(NOSTORETID)	CLK1	Clark Creek at Bush Park
CITY_SALEM(NOSTORETID)	CLK12	Clark Creek at Ewald Ave.
CITY_SALEM(NOSTORETID)	GLE12	Glenn Creek at Hidden Valley Rd.
CITY_SALEM(NOSTORETID)	GLE3	Glenn Creek at Wallace Rd.
CITY_SALEM(NOSTORETID)	MIC12	Mill Creek at Turner Rd.
CITY_SALEM(NOSTORETID)	MIC3	Mill Creek at North Salem High School
CITY_SALEM(NOSTORETID)	PRI12	East Fork of Pringle Creek at Trelstad Ave.
CITY_SALEM(NOSTORETID)	PRI3	Pringle Creek at Pringle Park
CRITFC(NOSTORETID)	CBW05583-425130	Minam River
CRITFC(NOSTORETID)	MNM00001-000081	Little Minam River
CRITFC(NOSTORETID)	MNM00001-000096	Minam River
CRITFC(NOSTORETID)	MNM00001-000229	Minam River
CRITFC(NOSTORETID)	MNM00001-000369	Little Minam River
CRITFC(NOSTORETID)	MNM00001-000393	Minam River
CRITFC(NOSTORETID)	MNM00001-000397	Little Minam River
CRITFC(NOSTORETID)	MNM00001-000445	Little Minam River
DRA(NOSTORETID)	DRA31617	Deschutes River approx. 1 mi. d/s of Pelton/Rnd. Butte Re-Reg. Dam
IPC(NOSTORETID)	Snake_River_216.3_LB	Snake River at river mile 216.3, left bank
IPC(NOSTORETID)	Snake_River_269.8_LC	Snake River at river mile 269.8, left half channel
IPC(NOSTORETID)	Snake_River_283.9_LC	Snake River at river mile 283.9, left half channel
OregonDEQ	30143-ORDEQ	Windy Creek at Glendale
OregonDEQ	30147-ORDEQ	Camp Creek at mouth
OregonDEQ	30154-ORDEQ	Calapooya Creek above Cabin Creek
OregonDEQ	30161-ORDEQ	Pass Creek at mouth
OregonDEQ	35208-ORDEQ	Lousignont Creek Below State Forest Boundary at RM 1.6 (Nehalem)
OregonDEQ	37477-ORDEQ	North Myrtle Creek at Evergreen Park
USFS(NOSTORETID)	MHNF-024	Clear Creek trap HOBO temperature site
USFS(NOSTORETID)	MHNF-049	Little Sandy at waterfall WT site
USFS(NOSTORETID)	MHNF-050	Little Sandy R at Bull Run_LTWT
USFS(NOSTORETID)	MHNF-051	Little Sandy R at Rd1228_LTWT
USFS(NOSTORETID)	MHNF-052	Little Sandy R Homestead_LTWT
USFS(NOSTORETID)	MHNF-077	Salmon R at Forest Boundary_LTWT
USFS(NOSTORETID)	MHNF-078	Salmon River trap WT site
USFS(NOSTORETID)	MHNF-085	Still Creek_LTWT
USFS(NOSTORETID)	MHNF-099	ZigZag R at Forest Boundary_LTWT
USFS(NOSTORETID)	MHNF-100	Zigzag River trap site HOBO
USFS(NOSTORETID)	MNF-011	Calamity Creek_LTWT
USFS(NOSTORETID)	MNF-035	East Fork Wolf Creek_Temp_H2O

OrgID	MLocID	Description
USFS(NOSTORETID)	MNF-090	Wolf Creek Upper_LTWT
USFS(NOSTORETID)	WWNF-032	Chesnimnus.26I.2_LTWT
USFS(NOSTORETID)	WWNF-096	Grouse.09F.2_WT
USFS(NOSTORETID)	WWNF-119	LittleSheep.07J.1_LTWT
USFS(NOSTORETID)	WWNF-131	Mud.24I.1_WT
USGS-OR	10396000	DONNER UND BLITZEN RIVER NR FRENCHGLEN OR
USGS-OR	11501000	SPRAGUE RIVER NEAR CHILOQUIN, OR
USGS-OR	11502500	WILLIAMSON RIVER BLW SPRAGUE RIVER NR CHILOQUIN,OR
USGS-OR	11507500	LINK RIVER AT KLAMATH FALLS, OR
USGS-OR	11507501	LINK RIVER BELOW KENO CANAL, NEAR KLAMATH FALLS,OR
USGS-OR	11509500	KLAMATH RIVER AT KENO, OR
USGS-OR	13331500	MINAM RIVER AT MINAM, OR
USGS-OR	14034470	WILLOW CREEK ABV WILLOW CR LAKE, NR HEPPNER, OR
USGS-OR	14034500	WILLOW CREEK AT HEPPNER, OR
USGS-OR	14043840	MF JOHN DAY RIVER ABV CAMP CREEK, NR GALENA, OR
USGS-OR	14046890	PINE CREEK NEAR CLARNO, OR
USGS-OR	14076500	DESCHUTES RIVER NEAR CULVER, OR
USGS-OR	14087400	CROOKED RIVER BELOW OPAL SPRINGS, NEAR CULVER, OR
USGS-OR	14091500	METOLIUS RIVER NEAR GRANDVIEW, OR
USGS-OR	14092500	DESCHUTES RIVER NEAR MADRAS, OR
USGS-OR	14103000	DESCHUTES RIVER AT MOODY, NEAR BIGGS, OR
USGS-OR	14105700	COLUMBIA RIVER AT THE DALLES, OR
USGS-OR	14138720	BULL RUN RIVER AT LOWER FLUME NR BRIGHTWOOD, OR
USGS-OR	14138850	BULL RUN RIVER NEAR MULTNOMAH FALLS, OR
USGS-OR	14138870	FIR CREEK NEAR BRIGHTWOOD, OR
USGS-OR	14138900	NORTH FORK BULL RUN RIVER NEAR MULTNOMAH FALLS, OR
USGS-OR	14139800	SOUTH FORK BULL RUN RIVER NEAR BULL RUN, OR
USGS-OR	14140020	BULL RUN R AT LARSON'S BRIDGE, NEAR BULL RUN, OR
USGS-OR	14141500	LITTLE SANDY RIVER NEAR BULL RUN, OR
USGS-OR	14144800	MIDDLE FORK WILLAMETTE RIVER NR OAKRIDGE, OR
USGS-OR	14144900	HILLS CR AB HILLS CR RES, NR OAKRIDGE, OR
USGS-OR	14145500	MF WILLAMETTE RIVER ABV SALT CRK, NEAR OAKRIDGE,OR
USGS-OR	14147500	N FK OF M FK WILLAMETTE R NR OAKRIDGE, OR
USGS-OR	14148000	MF WILLAMETTE RIVER BLW N FORK, NR OAKRIDGE, OR.
USGS-OR	14150000	MIDDLE FORK WILLAMETTE RIVER NEAR DEXTER, OR
USGS-OR	14150290	FALL CREEK ABOVE NORTH FORK, NEAR LOWELL, OR
USGS-OR	14150800	WINBERRY CREEK NEAR LOWELL,OR
USGS-OR	14151000	FALL CREEK BLW WINBERRY CREEK, NEAR FALL CREEK, OR
USGS-OR	14152000	MIDDLE FORK WILLAMETTE RIVER AT JASPER, OR
USGS-OR	14153500	COAST FORK WILLAMETTE R BLW COTTAGE GROVE DAM, OR
USGS-OR	14154500	ROW RIVER ABOVE PITCHER CREEK, NEAR DORENA, OR
USGS-OR	14155500	ROW RIVER NEAR COTTAGE GROVE, OR
USGS-OR	14158100	WILLAMETTE RIVER AT OWOSSO BRIDGE AT EUGENE, OR
USGS-OR	14158740	MCKENZIE RIVER BL PAYNE CR, NR BELKNAP SPRINGS, OR
USGS-OR	14159200	SO FK MCKENZIE RIVER ABV COUGAR LAKE NR RAINBOW OR
USGS-OR	14159500	SOUTH FORK MCKENZIE RIVER NEAR RAINBOW, OR
USGS-OR	14161100	BLUE RIVER BELOW TIDBITS CREEK, NR BLUE RIVER, OR
USGS-OR	14161500	LOOKOUT CREEK NEAR BLUE RIVER, OR

OrgID	MLocID	Description
USGS-OR	14162500	MCKENZIE RIVER NEAR VIDA, OR
USGS-OR	14164900	McKENZIE RIVER ABV HAYDEN BR, AT SPRINGFIELD,OR
USGS-OR	14166000	WILLAMETTE RIVER AT HARRISBURG, OR
USGS-OR	14174000	WILLAMETTE RIVER AT ALBANY, OR
USGS-OR	14178000	NO SANTIAM R BLW BOULDER CRK, NR DETROIT, OR
USGS-OR	14179000	BREITENBUSH R ABV FRENCH CR NR DETROIT, OR.
USGS-OR	14180300	BLOWOUT CREEK NEAR DETROIT, OR
USGS-OR	14181500	NORTH SANTIAM RIVER AT NIAGARA, OR
USGS-OR	14184100	NORTH SANTIAM R AT GREENS BRIDGE, NR JEFFERSON, OR
USGS-OR	14185000	SOUTH SANTIAM RIVER BELOW CASCADIA, OR
USGS-OR	14185800	MIDDLE SANTIAM R NEAR CASCADIA, OR
USGS-OR	14185900	QUARTZVILLE CREEK NEAR CASCADIA, OR
USGS-OR	14186200	MIDDLE SANTIAM R BLW GREEN PETER DAM NR FOSTER, OR
USGS-OR	14187200	SOUTH SANTIAM RIVER NEAR FOSTER, OR
USGS-OR	14189050	SANTIAM RIVER NEAR JEFFERSON, OR
USGS-OR	14202980	SCOGGINS CK BLW HENRY HAGG LAKE, NR GASTON, OR
USGS-OR	14203500	TUALATIN RIVER NEAR DILLEY, OR
USGS-OR	14205400	EAST FORK DAIRY CREEK NEAR MEACHAM CORNER, OR
USGS-OR	14206694	TUALATIN RIVER AT RIVER MILE 24.5, NR SCHOLLS, OR
USGS-OR	14206950	FANNO CREEK AT DURHAM, OR
USGS-OR	14207200	TUALATIN RIVER AT OSWEGO DAM, NEAR WEST LINN, OR
USGS-OR	14209710	CLACKAMAS RIVER AT CARTER BRIDGE, NEAR ESTACADA,OR
USGS-OR	14210000	CLACKAMAS RIVER AT ESTACADA, OR
USGS-OR	14211010	CLACKAMAS RIVER NEAR OREGON CITY, OR
USGS-OR	14211400	JOHNSON CREEK AT REGNER ROAD, AT GRESHAM, OR
USGS-OR	14211499	KELLEY CREEK AT SE 159TH DRIVE AT PORTLAND, OR
USGS-OR	14211500	JOHNSON CREEK AT SYCAMORE, OR
USGS-OR	14211550	JOHNSON CREEK AT MILWAUKIE, OR
USGS-OR	14211720	WILLAMETTE RIVER AT PORTLAND, OR
USGS-OR	14316460	NORTH UMPQUA R AT SODA SPGS, NR TOKETEE FALLS, OR
USGS-OR	14316500	N UMPQUA RIVER ABV COPELAND CK NR TOKETEE FALLS,OR
USGS-OR	14317450	NORTH UMPQUA RIVER NEAR IDLEYLD PARK, OR
USGS-OR	14318000	LITTLE RIVER AT PEEL, OR
USGS-OR	14319500	NORTH UMPQUA RIVER AT WINCHESTER, OR
USGS-OR	14320934	LITTLE WOLF CREEK NEAR TYEE, OR
USGS-OR	14330000	ROGUE RIVER BELOW PROSPECT, OR
USGS-OR	14335072	ROGUE R AT COLE M RIVERS F HATCHERY NR MCLEOD, OR
USGS-OR	14337600	ROGUE RIVER NEAR MCLEOD, OR
USGS-OR	14338000	ELK CREEK NEAR TRAIL, OR
USGS-OR	14339000	ROGUE RIVER AT DODGE BRIDGE, NEAR EAGLE POINT, OR
USGS-OR	14359000	ROGUE RIVER AT RAYGOLD NEAR CENTRAL POINT, OR
USGS-OR	14361500	ROGUE RIVER AT GRANTS PASS, OR
USGS-OR	14362000	APPLEGATE RIVER NEAR COPPER, OR
USGS-OR	14366000	APPLEGATE RIVER NEAR APPLEGATE, OR
USGS-OR	14369500	APPLEGATE RIVER NEAR WILDERVILLE, OR
USGS-OR	14372300	ROGUE RIVER NEAR AGNESS, OR
USGS-OR	421401121480900	LINK RIVER DAM
USGS-OR	422042121513100	RATTLESNAKE POINT - RPT

OrgID	MLocID	Description
USGS-OR	422305121553800	MID-TRENCH - LOWER - MDTL
USGS-OR	422305121553803	MID-TRENCH - UPPER - MDTU
USGS-OR	422622122004000	MID-NORTH - LOWER - MDNL
USGS-OR	422622122004003	MID-NORTH - UPPER - MDNU
USGS-OR	422719121571400	WILLIAMSON RIVER OUTLET - WMR
USGS-OR	453004122510301	BEAVERTON CREEK AT 170TH AVE, BEAVERTON, OR
USGS-OR	453030122560101	ROCK CREEK AT BROOKWOOD AVENUE, HILLSBORO, OR
USGS-OR	453040123065201	GALES CREEK AT OLD HWY 47, FOREST GROVE, OR
USGS-OR	453630122021400	COLUMBIA RIVER, LEFT BANK, NEAR DODSON, OR

Alternate formats

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