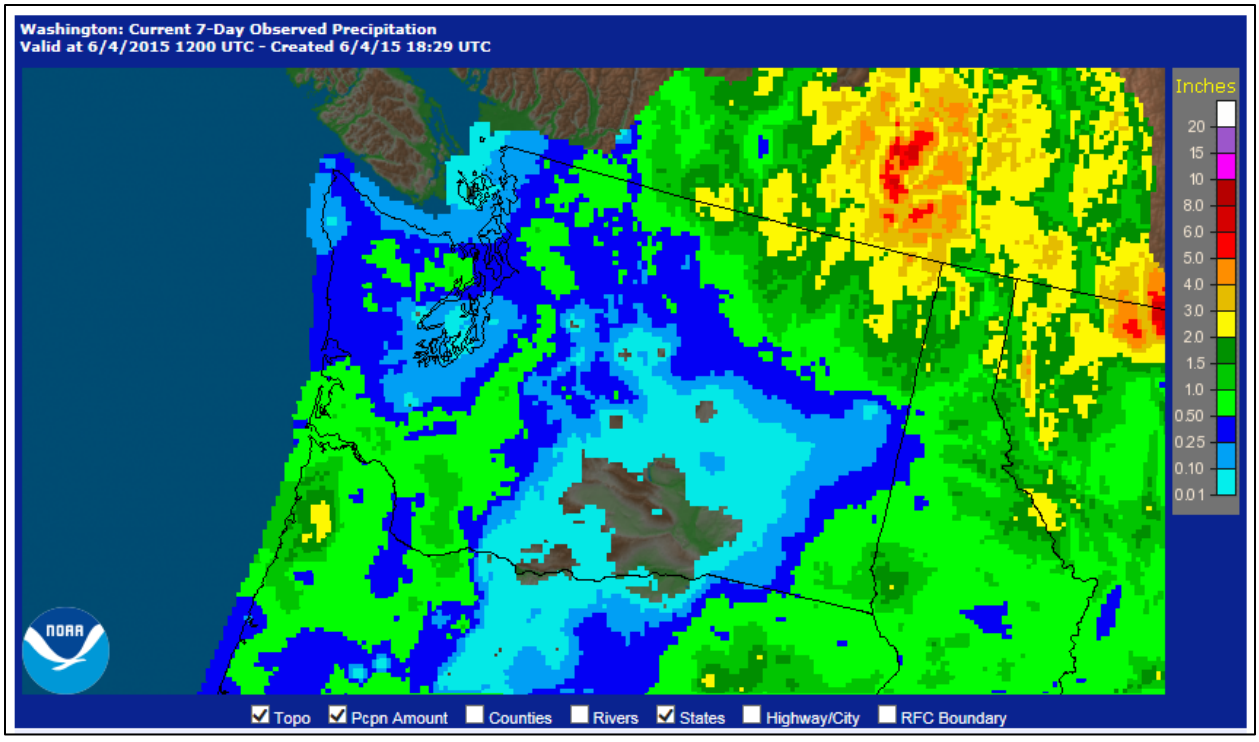
Drought Status Update #13
June 5, 2015

Note: This material is intended for, and contains elements of special interest to, WDFW agency staff. Non-agency readers or anyone having questions about the context, clarity, or content for items in this update should contact the author, WDFW Drought Coordinator Teresa Scott at (360) 902-2713 teresa.scott@dfw.wa.gov

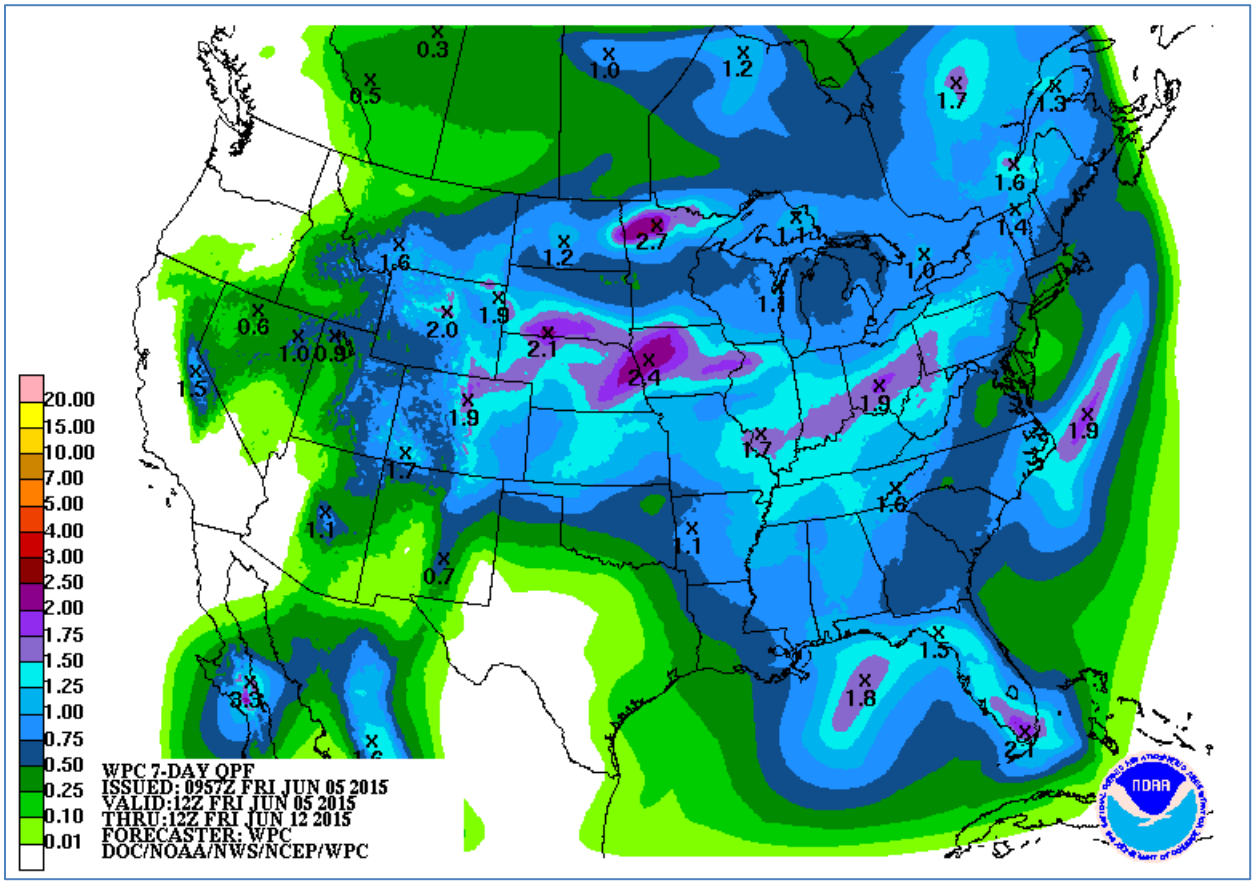
For an overview of this week's (air) temperature and precipitation anomalies and a peek at the extended outlook, check out the weekly 2015 drought update from the Office of the Washington State Climatologist at http://www.climate.washington.edu/events/2015drought/ . The OWSC also produces a monthly newsletter containing information on the current state of Washington's climate, including the current outlook and a review of notable climate and weather events at http://www.climate.washington.edu/newsletter/ .

Precipitation

Here's the analysis of the last 7 days of precipitation in Washington (below). Lots of rain in the upper Columbia River areas of British Columbia! http://water.weather.gov/precip/ .

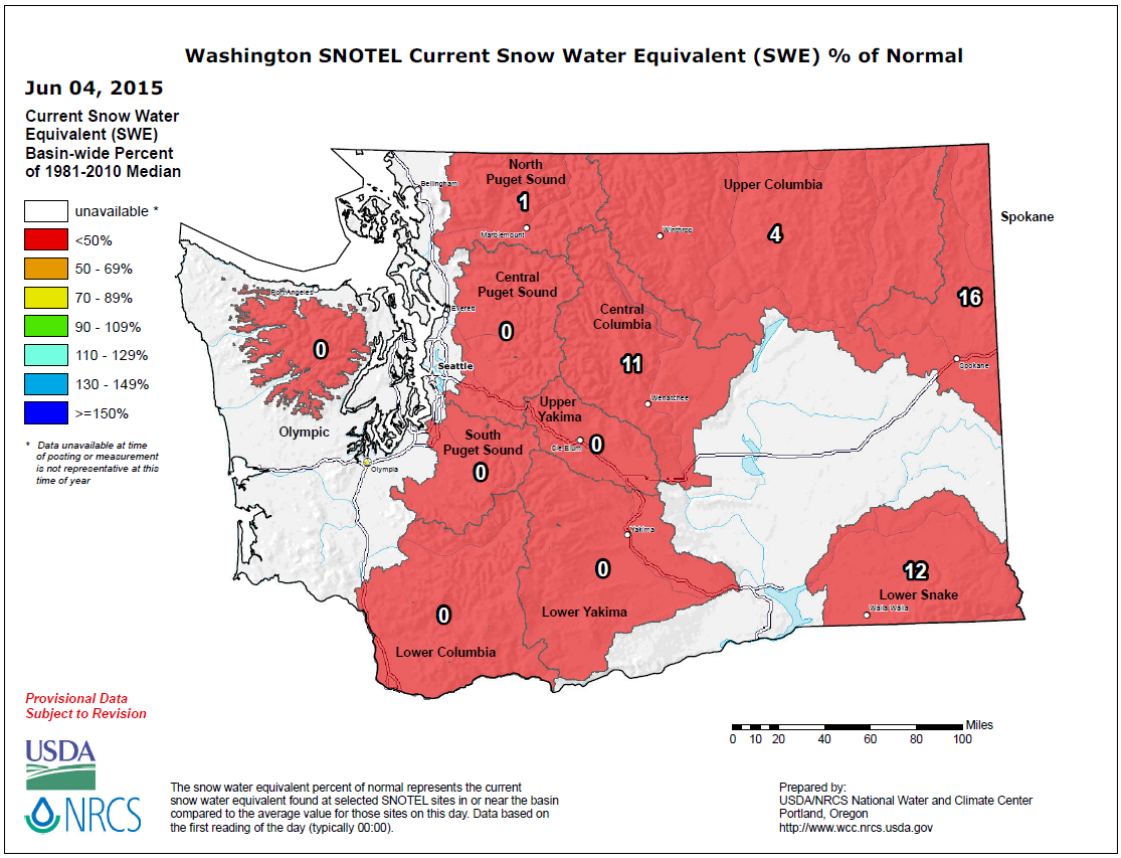


Network weather forecasters have been telling us skies will be clear next week; here's more evidence. There is no precipitation predicted anywhere in Washington during the next 7 days (below)! http://www.wpc.ncep.noaa.gov/qpf/p168i.gif?1432223698

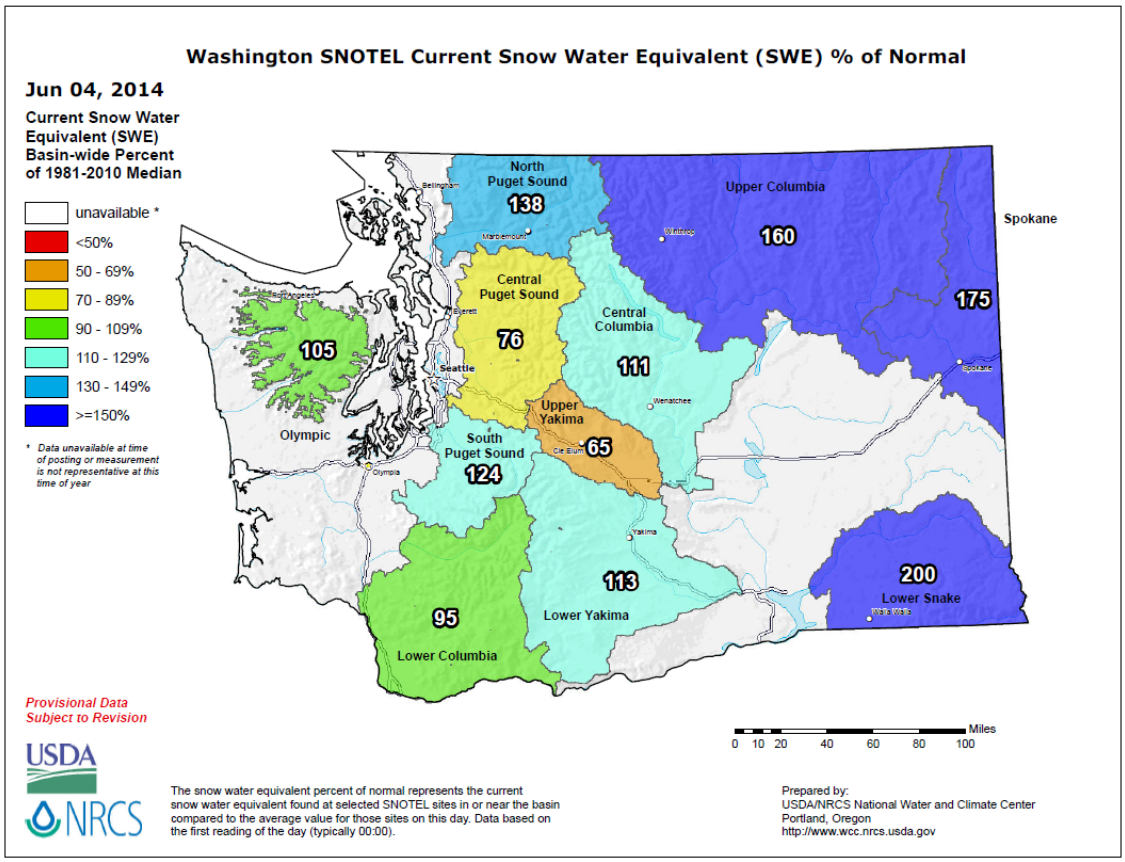


Snow Water Equivalents

Let's take one last look at the "Snow-Water Equivalents" (SWE) map, just because it's so dramatic. The map shows snow-water equivalents as a percent of normal. It's a little difficult to understand the relationship between the "average melt-off pattern" and "normal SWE", but the take-home message is that seasonal snow is flat-out gone in the Cascades and Olympics, perhaps a month ahead of schedule.



Below is a SWE map for this date in 2014; 2011, 2012, and 2013 are similar:



Hydrograph Sampler:

Several stream gauges have been added to help us understand how flows are progressing this year. We now have Stillaguamish, representing north Cascades unregulated streams, Issaquah Creek representing central-Puget Sound lowland systems, Dungeness representing itself, Hoko representing Strait of Juan de Fuca rain-driven tributaries, Calawah representing lowland coastal streams, Skookumchuck representing central Cascades rain-driven systems, Naselle representing itself, Speelyai representing southern Cascades unregulated streams, Klickitat representing southern Cascades snow-fed systems, Walla Walla representing itself, Methow representing north Cascades and Canadian snow-fed streams (pre-diversion), Okanogan because we get both flow and water temperature together, Colville representing itself, and Kettle representing northeastern Washington snow-fed systems.

The Hydrograph Sampler Charts have been moved to the end of the document.

Issaquah Creek, Methow, Okanogan, Colville, and Kettle are flowing well considering statewide conditions. Hoko, Calawah, Skookumchuck and Naselle are tracking the usual hydrograph, but tending toward the low end of historic flows. Speelyai Creek might not turn out to be a good indicator gauge for us - these flows are much worse than expected. Klickitat is tracking the low-snowpack story pretty well. Walla Walla is still showing benefits from recent precipitation – next week might be a different story. New to the Okanogan chart are bars showing water temperature. USGS "real-time water quality" site (see below) shows the Okanogan entering Washington at 21+ degrees already; this gauge downstream depicts cooler temps.

Selected Washington Streamflows Table

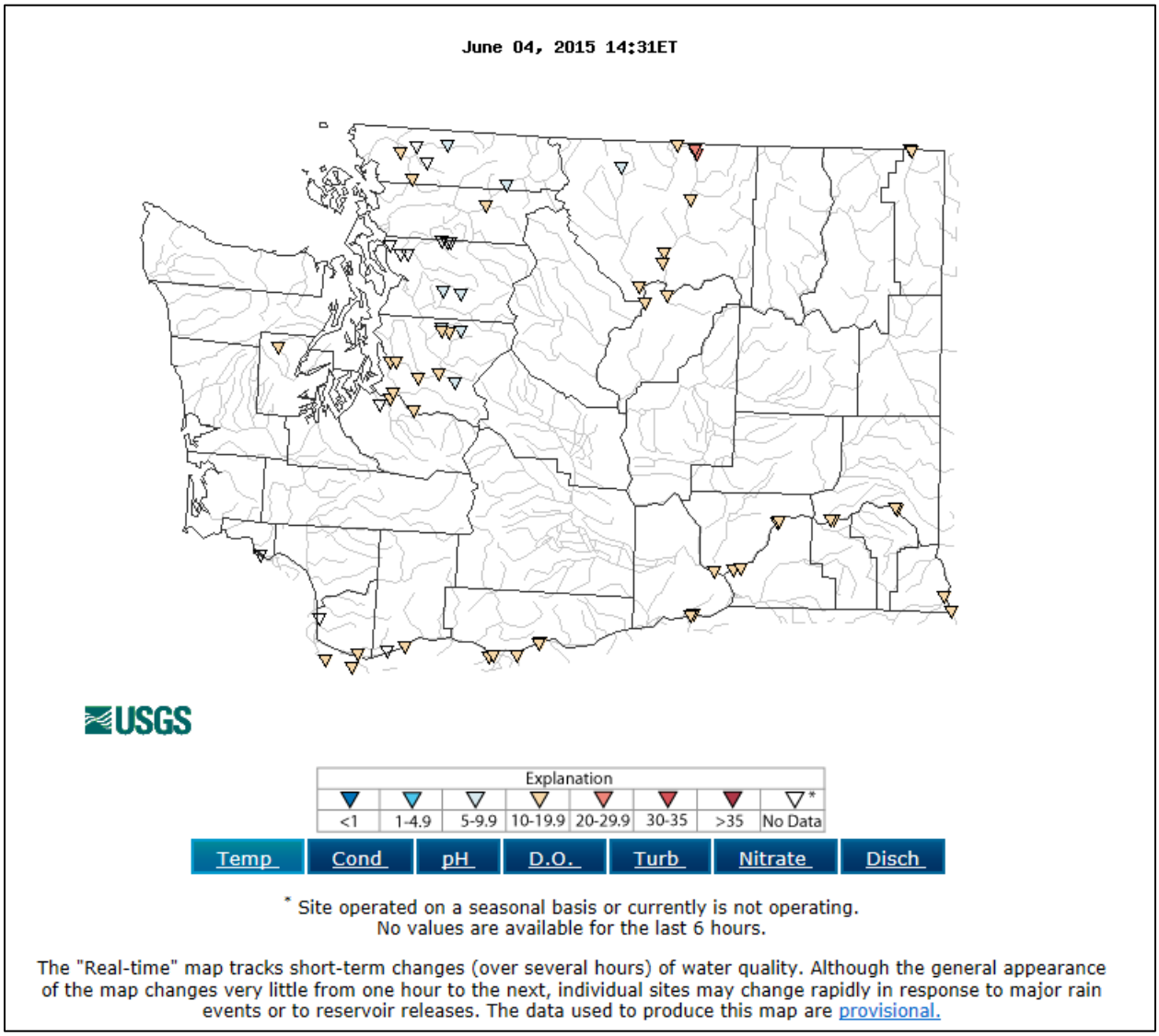
The table gives a quick visual reference for daily flows as a percent of normal for this date in the historic record. A lighter red/orange color is a higher percentage, with none topping 75% of average; anything that's a bright red is less than 50% of average. The dark red cells in the second column indicate that today's flows are record low for this date. The first column shows the gauge location, the second column shows today's stream flow readings, the third column shows today's flows as a percentage of average flows for this date throughout the period of record, column four shows the (previous) minimum flow for this date, and the fifth column shows in what year that minimum occurred. Eleven of our select set of 43 locations set record lows on June 4, 2015. Statewide streamflows are available from USGS at:
http://waterdata.usgs.gov/wa/nwis/current/?type=flow

Location	Today's Flow (cfs)	Percent of average for this date in the record	Min Flow (cfs)	Year of Min Flow
Mf Nooksack River Near Deming, Wa	245	30%	271	1992
Nooksack River At Ferndale, Wa	2,220	40%	2,300	1992

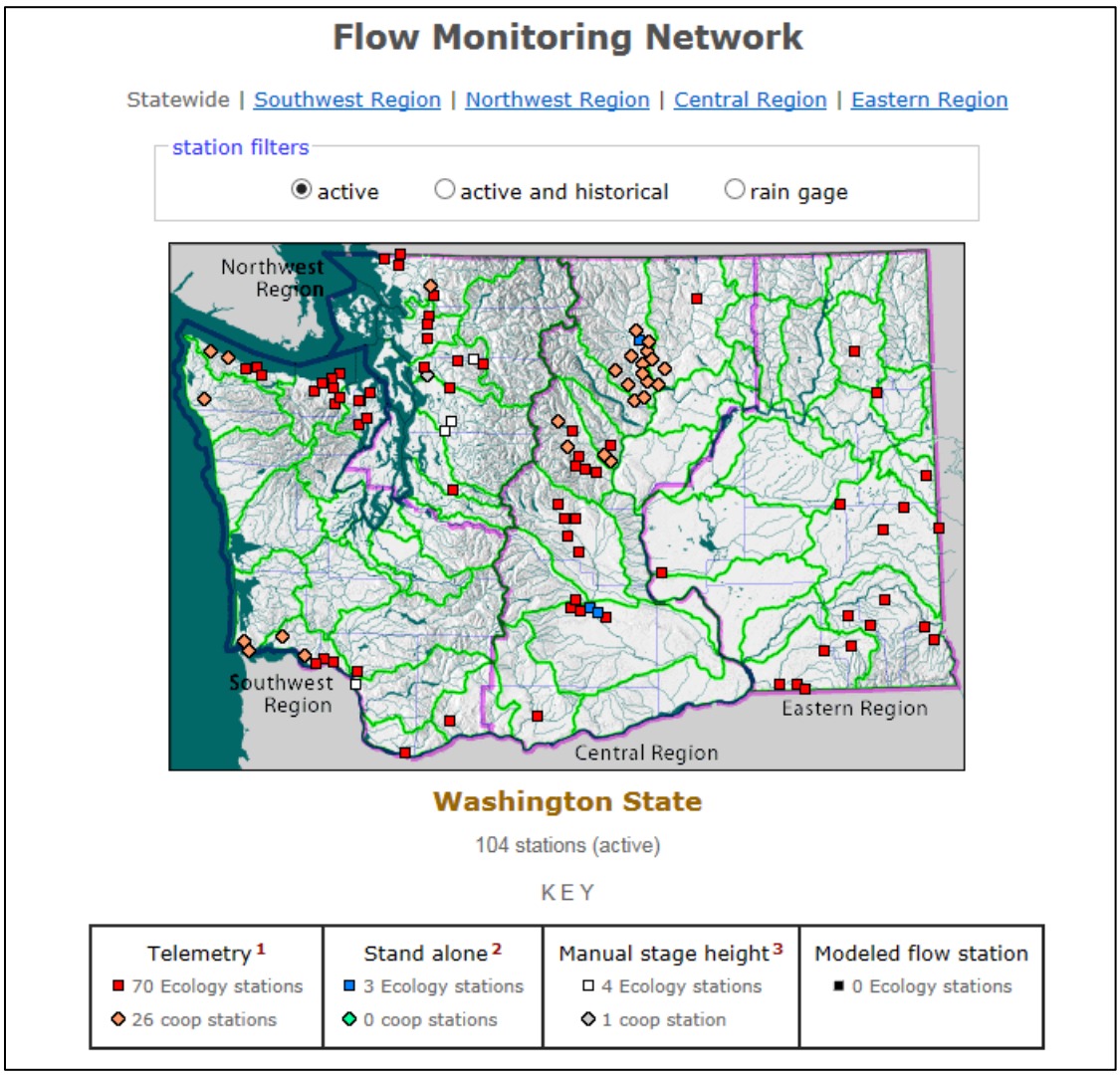
Skagit River Near Concrete, Wa	11,700	49%	10,700	1973
Sauk River At Darrington, Wa	1,460	43%	1,260	1915
Cascade River At Marblemount, Wa	1,300	45%	1,820	2013
NF Stillaguamish River Near Arlington, Wa	515	27%	477	1992
Snoqualmie River Near Carnation, Wa	1,500	30%	1,300	1992
Skykomish River Near Gold Bar, Wa	1,330	18%	2,290	1992
Issaquah Creek Near Mouth Near Issaquah, Wa	70	75%	31	1992
Cedar River Below Diversion Near Landsburg, Wa	267	50%	221	1992
Cedar River At Renton, Wa	293	41%	95	1963
Big Soos Creek Above Hatchery Near Auburn, Wa	39	43%	39	1992
Green River Near Auburn, Wa	378	27%	316	1973
South Prairie Creek At South Prairie, Wa	117	42%	57	1992
Puyallup River At Puyallup, Wa	1,620	35%	2,010	1994
Nisqually River At McKenna, Wa	562	47%	280	1965
Deschutes River Near Rainier, Wa	70	50%	48	1992
NF Skokomish R Bl Staircase Rpds Nr Hoodsport, Wa	100	15%	216	1992
Dungeness River Near Sequim, Wa	232	31%	326	1926
Hoko River Near Sekiu, Wa	36	24%	30	1995
Calawah River Near Forks, Wa	156	29%	104	1995
Hoh River At Us Highway 101 Near Forks, Wa	890	38%	1,140	1991
Satsop River Near Satsop, Wa	444	52%	413	1983
Chehalis River Near Grand Mound, Wa	737	68%	435	1934
Naselle River Near Naselle, Wa	71	44%	54	1931
Cowlitz River Below Mayfield Dam, Wa	3,060	42%	1,880	1977
Cowlitz River At Packwood, Wa	914	27%	1,100	1992
Lewis River At Ariel, Wa	2,370	56%	203	1931
White Salmon River Near Underwood, Wa	681	48%	626	1992
Klickitat River Above West Fork Near Glenwood, Wa	210	23%	220	2005
Walla Walla River Near Touchet, Wa	95	19%	23	1992
Tucannon River Near Starbuck, Wa	114	41%	85	1931
Grande Ronde River At Troy, Or	4,790	68%	1,990	1992
Yakima River At Kiona, Wa	2,370	41%	788	2001
American River Near Nile, Wa	153	20%	225	2005
Crab Creek At Irby, Wa	7	19%	4	1990
Wenatchee River At Plain, Wa	2,820	40%	2,010	1915
Methow River Near Pateros, Wa	4,220	57%	1,500	1977
Okanogan River At Malott, Wa	7,970	65%	2,990	2005
Okanogan River At Oroville, Wa	1,810			
Spokane River At Spokane, Wa	3,930	25%	2,140	1926
Colville River At Kettle Falls, Wa	297	63%	43	1931
Pend Oreille River Below Box Canyon Near Ione, Wa	30,000	47%	8,090	1992

Real-Time Water Temperature from USGS and Ecology

Water temperatures are already reaching lethal levels in some areas. Follow the link to this map of USGS temperature stations in Washington; click points on the map for more data: http://waterwatch.usgs.gov/wqwatch/map?state=wa&pcode=00010. Okanogan River at and immediately downstream from Lake Osoyoos are already above 20 degrees C.



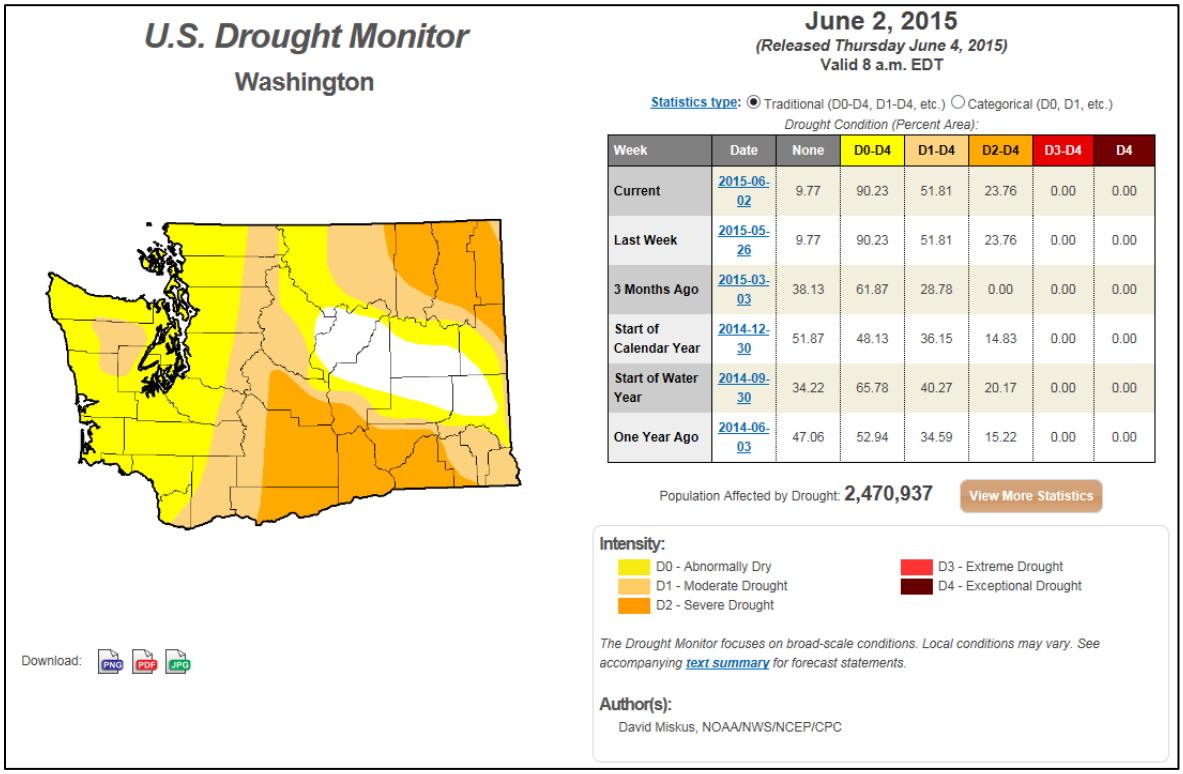
Ecology provides air and water temperature monitoring at several Ecology and Co-op stations; just follow the link, click on a dot and a pop-up window will show the most recent readings: https://fortress.wa.gov/ecy/wrx/wrx/flows/regions/state.asp



Data for the Lake Washington Ship Canal can be found at http://www.nwd-wc.usace.army.mil/nws/hh/www/index.html# .

Federal Drought Status

This is week 6 at D2 "Severe Drought" for south central Washington, and week 3 for northeastern Washington. No new areas were added to last week's drought ratings. Two more weeks at D2 will get us a federal drought declaration in south central counties; 5 more weeks in northeast Washington. Federal drought officials are already beginning to mobilize for a federal designation in Washington State, which will allow farmers and others to avail themselves of additional federal resources for crop loss. Check out Washington Department of Agriculture drought page for more information: http://agr.wa.gov/PestFert/natresources/Drought.aspx



Washington Department of Fish and Wildlife Drought Response

Water Typing and drought flows

WDFW, Ecology, and DNR have been working together since early in 2015 to provide guidance to forest landowners and agency staff regarding the appropriate use of protocol surveys for determining water type breaks (upper extent of fish use) during drought conditions. Additional guidance was prepared and distributed in the wake of the Governor's statewide drought declaration in mid-May. The agencies recommend that staff carefully review proposals for changes in water type that are based on 2015 surveys. Advice for determining the drought status of the river basin in question is provided, and cross-agency and tribal coordination is recommended prior to submitting concurrence or non-concurrence with water type change proposals. Staff with questions on this topic should contact Don Nauer at 253-863-7979 or via e-mail to donald.nauer@dfw.wa.gov .

Fish in nature:

High water temperatures can block fish migration as effectively as a physical blockage, but there is not much that can be done to reduce temperatures in the short term. Water temperatures are becoming a concern throughout Washington.

WDFW's actions relating to fish in nature include:

Low-flow migration blockage intervention: District teams, with tribal and local

partners, should begin thinking about how/whether to remediate low-flow fish migration blockages in their areas. Stay tuned for more assistance on this topic in the coming weeks. Conditions are deteriorating much faster than anticipated! It's also important to note that not all blockages require remediation: many streams develop isolated pools as summer progresses. Our decisions regarding action for these blockages must consider the immediate benefit or harm to migrating fish as well as the environmental impacts from the remediation action.

Hydraulic Project Approval: Ecology now provides a notice on its main drought web pages regarding the need to obtain an HPA for in-water projects. Look for more from Pat Chapman about internal HPA procedures for drought-related projects. Staff are working on developing templates for common drought response projects.

Let 'em Pass Signs: Please let your regional Habitat or Fish program manager or Drought Coordinator Scott know by June 16 how many signs you can use in your area.

Please remain vigilant, and report looming, suspected, or real-time blockages to your regional program manager and to Drought Coordinator Teresa Scott at teresa.scott@dfw.wa.gov .

Fish in hatcheries:

Drought response is well underway for the WDFW Hatchery program. Managers are planning drought-preparation or response projects as follows.

Water Supply improvements: Kendall Creek hatchery is having wells updated this summer. Tokul, Dungeness, Naselle, Kalama Falls, Vancouver, and Naches hatcheries also have water supply issues to solve.

Disease treatments: WDFW estimated treating fish at a minimum of 18 locations for three months starting in July-August 2015. There will likely be many more treatments than originally estimated.

Aerators and re-circulation pumps: Hatchery facilities without backup water supplies are gearing up to recirculate and re-oxygenate water supplies.

Moving fish: It might become necessary to move fish among facilities in emergency situations.

Pumping costs: Costs for pumping backup water supplies will increase for 2015 at many facilities.

Broodstock collection: Most hatcheries have structures through which adult fish return to the facility. At low flows, the access to these structures can be blocked. This means hatchery staff must collect adult fish from a location off the hatchery

grounds. Managers are considering whether such an approach will be needed in 2015.

Water access:

Maintain water access: Project pre-development is completed; decisions can be made regarding which ramp extension projects to move forward when funds become available. Ramps that are unsafe for users and can't be fixed this year will be closed when their use becomes unsafe.

Water Access Danger Signs: WDFW posts signs at water access sites warning boaters of hazards that are uncovered at low water. New signs will be printed soon for posting around the state. Please let Steve Sherlock know how many signs you need for your area.

North Puget Sound

Biologist Jennifer Whitney asked about temperature data this week, so we added temperature information to this update (above). Thanks, Jennifer, for the nudge! Temperatures in the lower reaches of the Stillaguamish are creeping up! Data for the Lake Washington Ship Canal can be found at http://www.nwd-wc.usace.army.mil/nws/hh/www/index.html# . Fish ladder temperatures have spiked to 64 degrees F in the past week; surface water temperatures (to 8 feet) at the University Bridge are higher.

Dungeness

A team of WDFW and tribal biologists is planning to meet June 16 in Blyn to begin planning for remediation of expected blockages in the Dungeness River basin.

Washington Northwest Coast

Biologist Chris Byrnes reports concern for western Strait of Juan de Fuca stream blockages given the early blockages seen at the mouths of Siebert and McDonald Creek in the Dungeness basin. For example, Clallam River is notorious for blockages at the mouth in summer months. We are working on ways to monitor streams in the more remote Olympic Peninsula locations.

Southwest Washington

Biologist George Fornes investigated some streams in southwest Washington last week with staff from DNR and Ecology. George reports that streams they viewed are running low, but still flowing. Last week's notice regarding water type protocol surveys (above) was timely; flow levels are probably too low to conduct these surveys now.

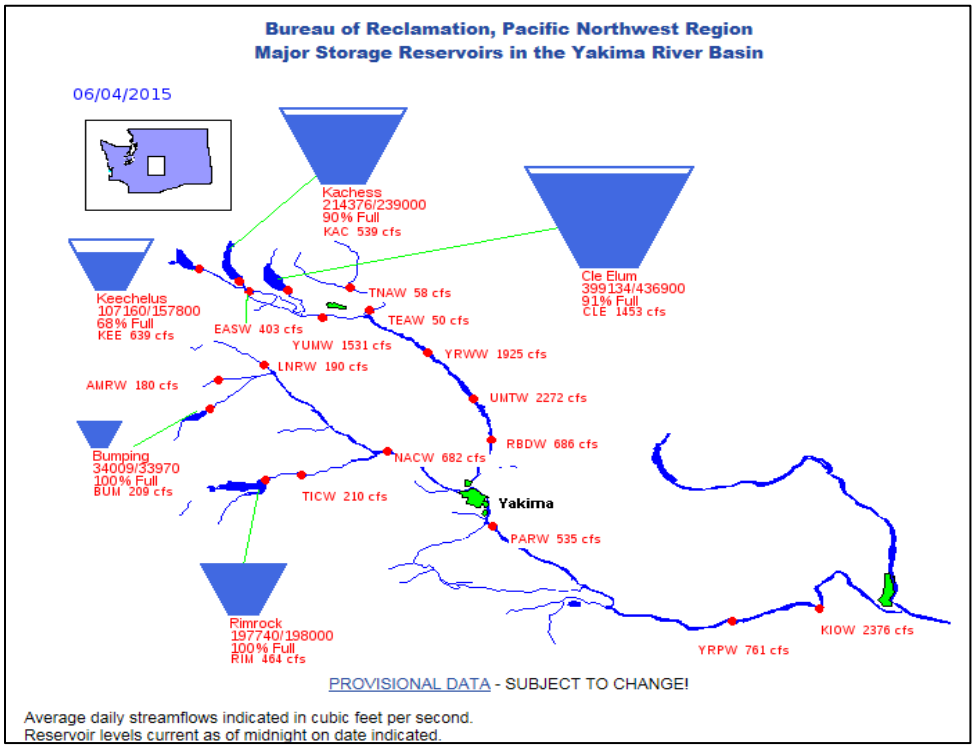
Yakima

Roza Irrigation District restored flows to its irrigation system this week: http://www.tri-cityherald.com/2015/06/01/3587823/roza-irrigation-district-starts.html . Flows in Manastash Creek are low. Projects to install siphons in Kittitas Valley irrigation canals will provide flows to five similar Yakima tributaries whenever those canals are receiving water. http://www.yakimaherald.com/news/local/kittitas-county-irrigators-to-divert-canal-water-for-fish/article_a1fd942e-0a7f-11e5-8905-e7212fa8ad8a.html

Manastash Creek at Cove Road June 1, 2015 taken by Water Science Team biologist Ryan Steele (right)

Manastash Creek at Cove Rd in a "wet" year - June 6, 2006 (below)

The Reclamation Teacup Diagram for Yakima Basin shows Lake Keechelus volume down to 68%:



News Clips:

Washington farmers, wildlife managers prepare for drought

The Olympian - May 31, 2015

The Olympic Peninsula Faces A Summer Without Snowmelt

KUOW - June 01, 2015

U.S. Senate Energy and Natural Resources Committee hearing on the status of drought conditions throughout the western United States (Tom Loranger Washington Ecology Water Resources Program at 53:15)
Archived webcast & pdfs of testimony - June 02, 2015

What drought? Meteorologist Cliff Mass vs. nearly everyone

Crosscut - June 02, 2015

State leases water from Olympic Peninsula farmers for fish

Capital Press - June 03, 2015

Why Seattle Should Care About the Statewide Drought

Seattle Weekly - June 02, 2015

Warm temperatures having impact on area's water supply

Sequim Gazette – June 03, 2015

U.S. Senator Maria Cantwell (D-WA) Calls for Bold 21st Century Solutions to Drought Crisis - Secures Agreement from the Department of the Interior on Next Steps for Yakima Basin Project

Senator Cantwell's Office - June 02 2015

Low streams mean concerns mounting for fish, farms

Goskagit.com - June 05, 2015

Don't play politics with drought-relief funding

The Seattle Times - June 04, 2015

Links

Ecology Drought Watch 2015: http://www.ecy.wa.gov/drought/index.html

Office of the State Climatologist now offers a weekly drought update for Washington State:
http://www.climate.washington.edu/events/2015drought/

State departments of Health and Agriculture have posted drought web pages:

http://agr.wa.gov/PestFert/natresources/Drought.aspx

http://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/HotTopics#2015drought

Pacific Northwest Drought Portal:

http://www.drought.gov/drought/regional-programs/pacific/pacific-northwest-home

NOAA El Nino Portal: http://www.elnino.noaa.gov/

Monthly and Seasonal climate outlooks are continuously updated and available at this site:
http://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.php

Northwest River Forecast Center Water Supply: http://www.nwrfc.noaa.gov/ws/

Real time stream data for Washington: http://waterdata.usgs.gov/wa/nwis/rt

U.S. Army Corps of Engineers Seattle District Reservoir Control Center http://www.nwd-wc.usace.army.mil/nws/hh/www/index.html#

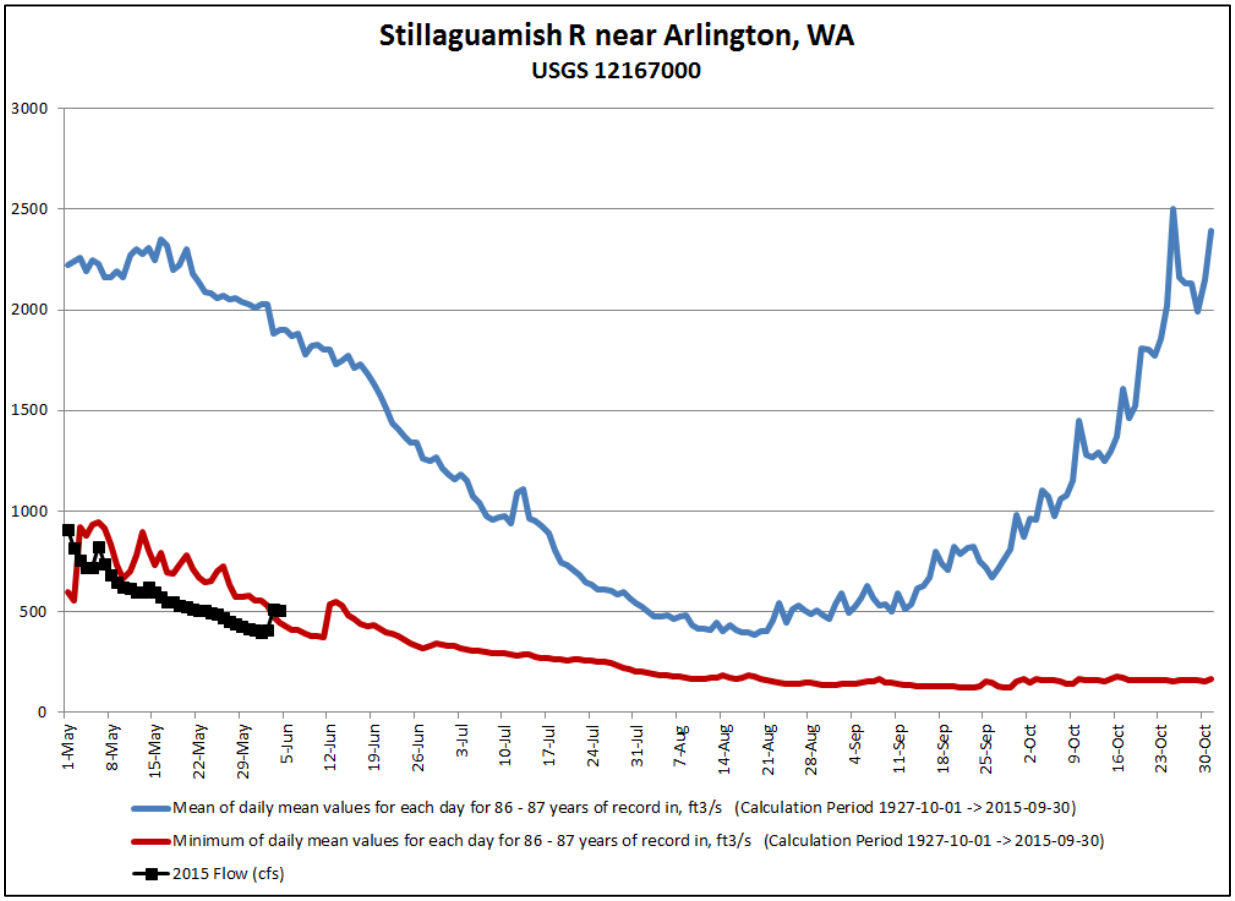
For Further Information:

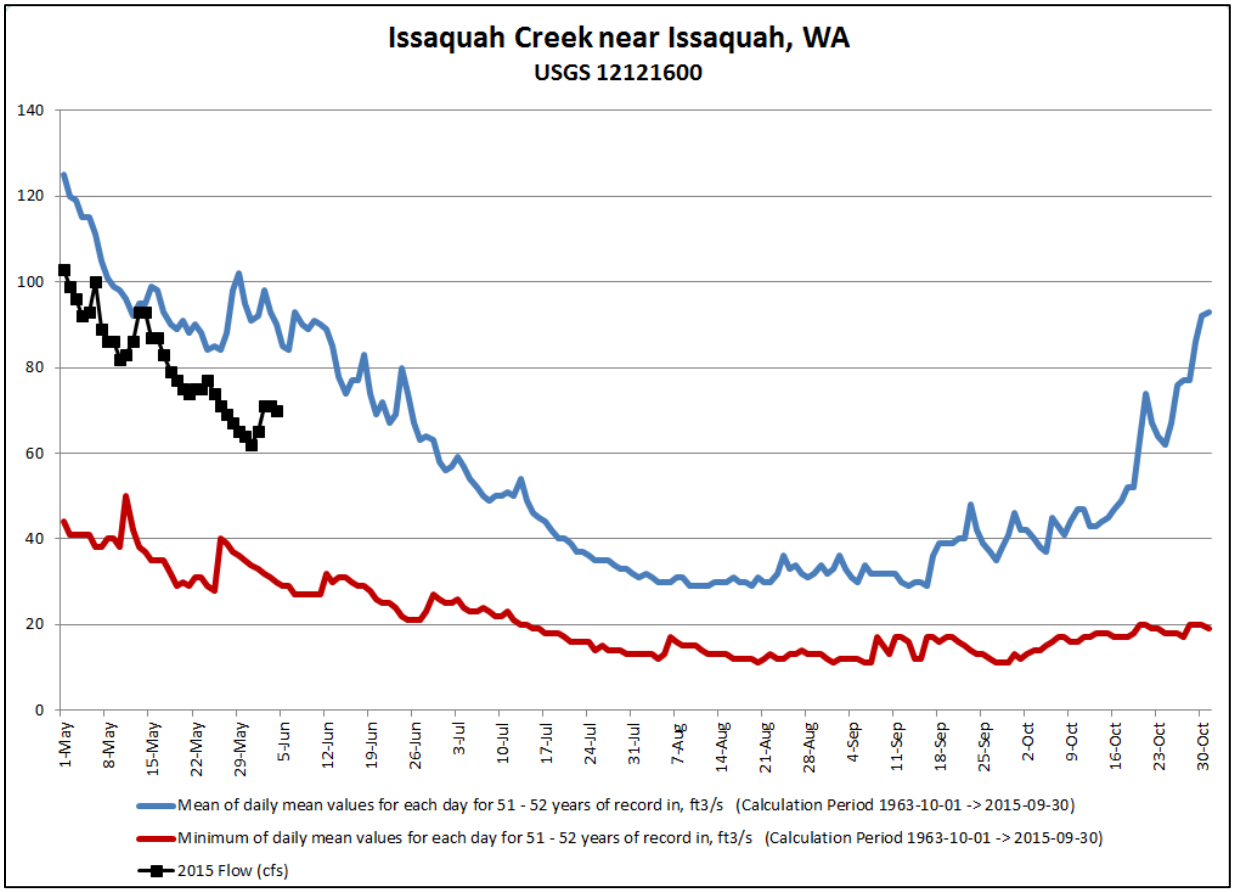
Copies of these Status Updates and other materials of interest are available on the WDFW common drive at s:\All Agency\Shared Projects\DROUGHT 2015. Presentations and other materials are also posted there.

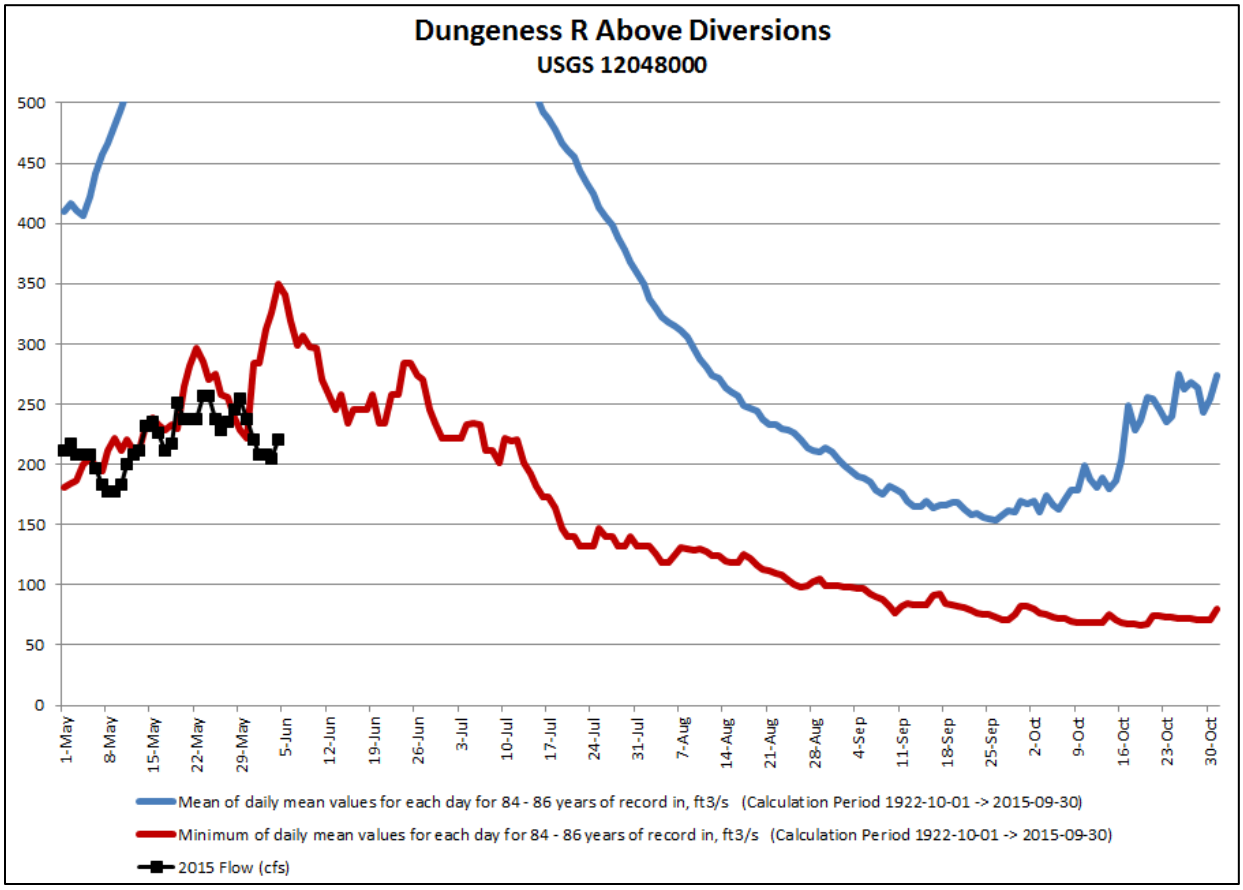
Contact WDFW Drought Coordinator Teresa Scott at teresa.scott@dfw.wa.gov or (360) 902-2713 with questions and suggestions.

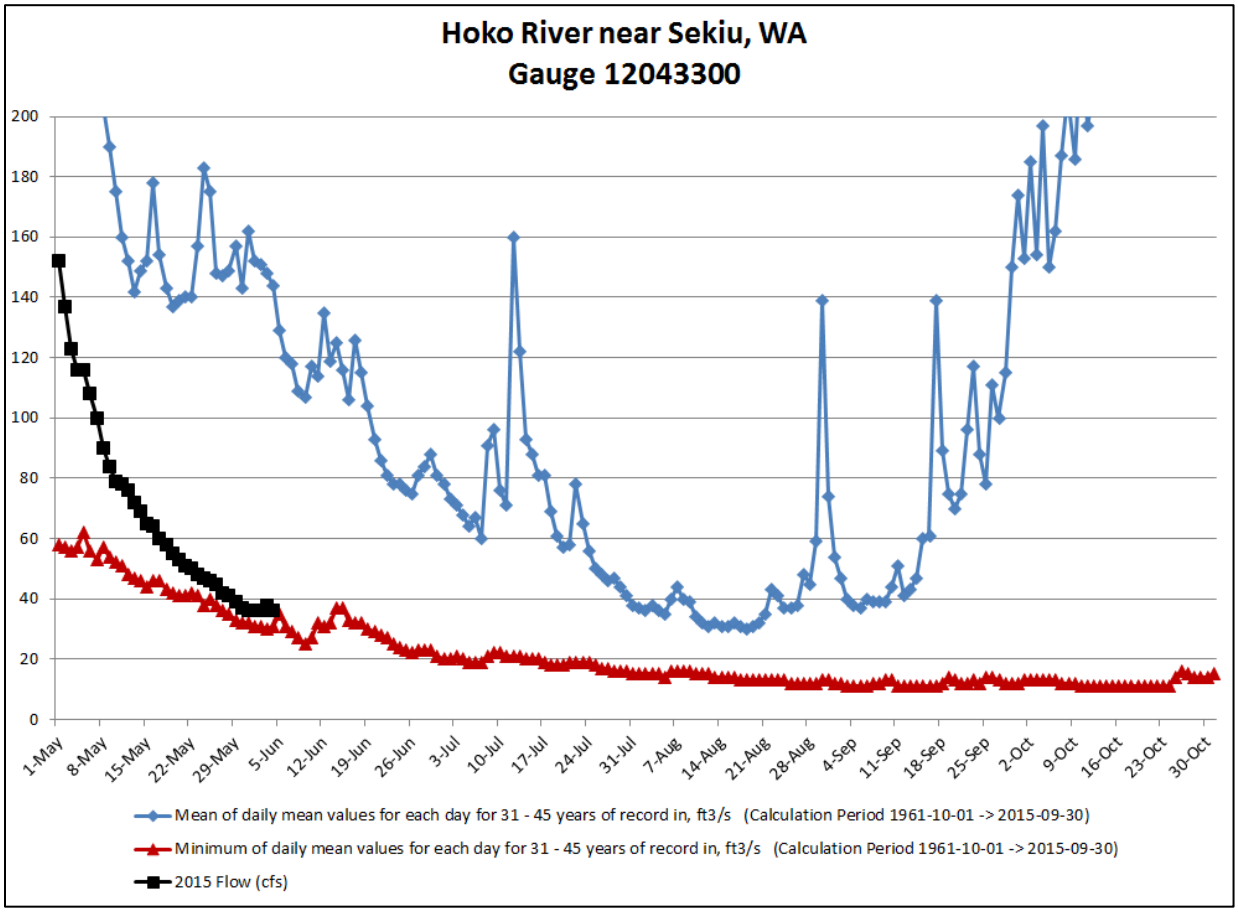
Hydrograph Sampler Charts

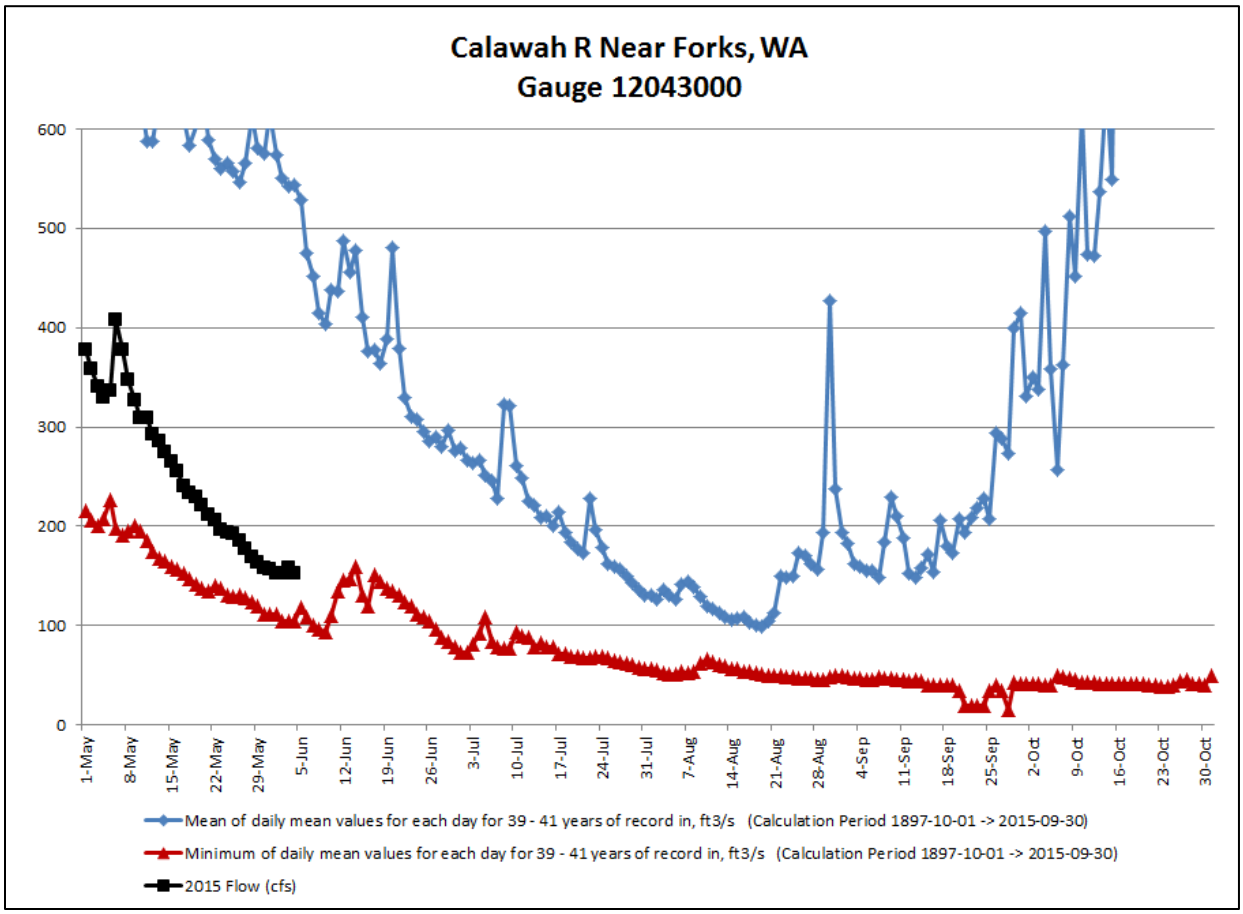
Blue line represents the average daily flows for the period of record; red line shows the minimums of daily flows in the period of record, and the black line depicts 2015 flows. I adjusted some vertical axis maximum values so more detail can be seen for 2015 values; this cause a loss of some of the mean value (blue) line off the top of the chart. I don't think we will miss that part of the picture this year. These flows are through mid-day June 4, 2015.

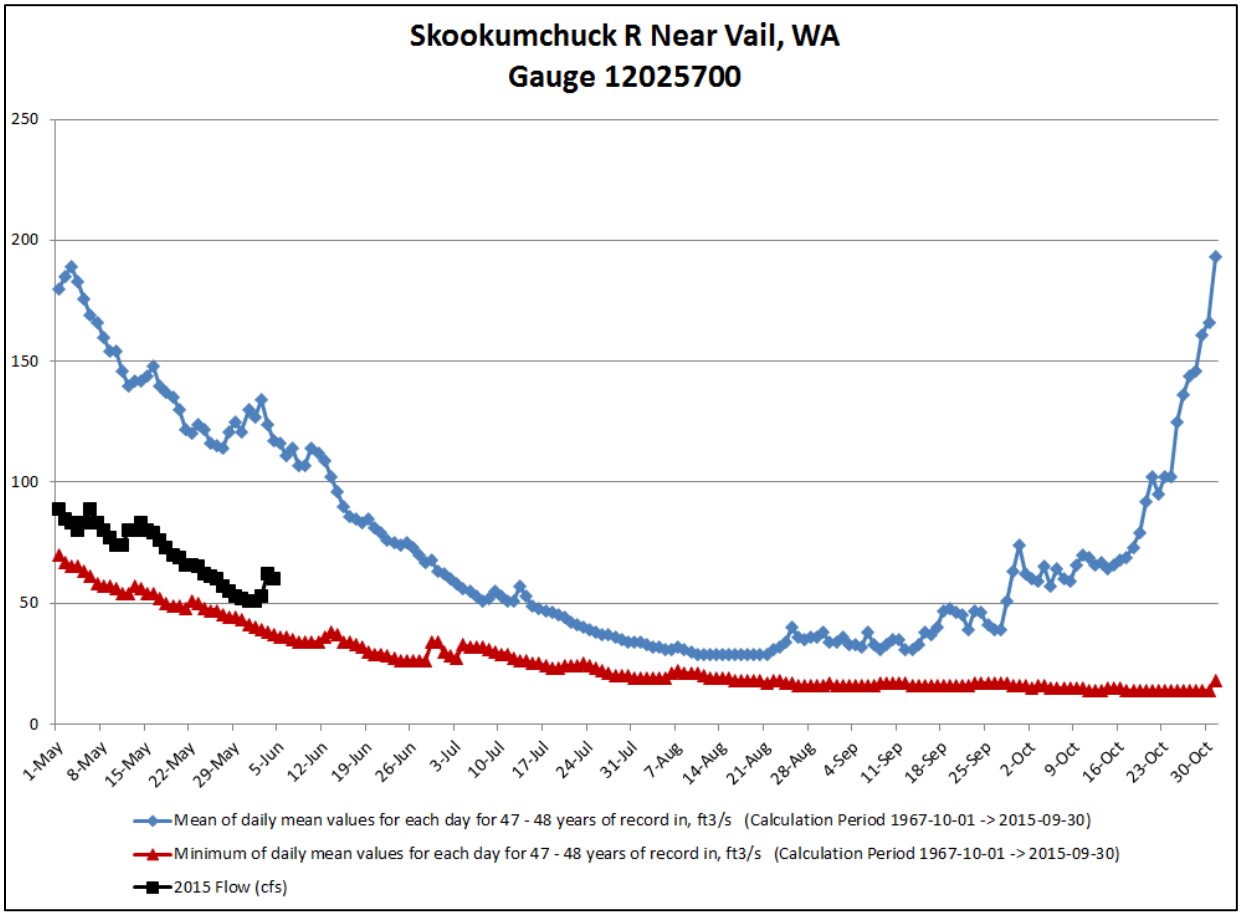


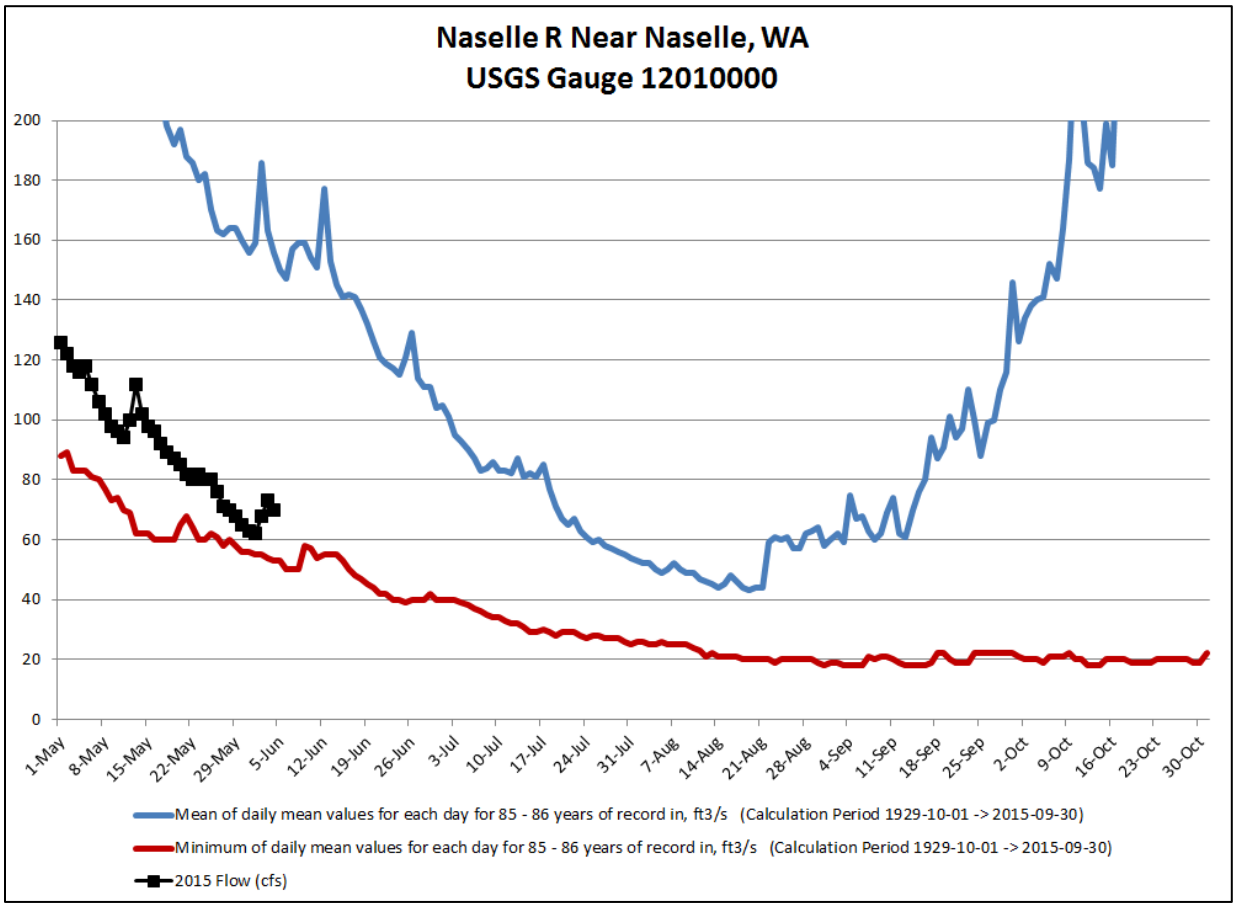

Issaquah Creek near Issaquah, WA
USGS 12121600
140
120
100
80
60
40
20
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 51 - 52 years of record in, ft3/s (Calculation Period 1963-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 51 - 52 years of record in, ft3/s (Calculation Period 1963-10-01 -> 2015-09-30)
2015 Flow (cfs)

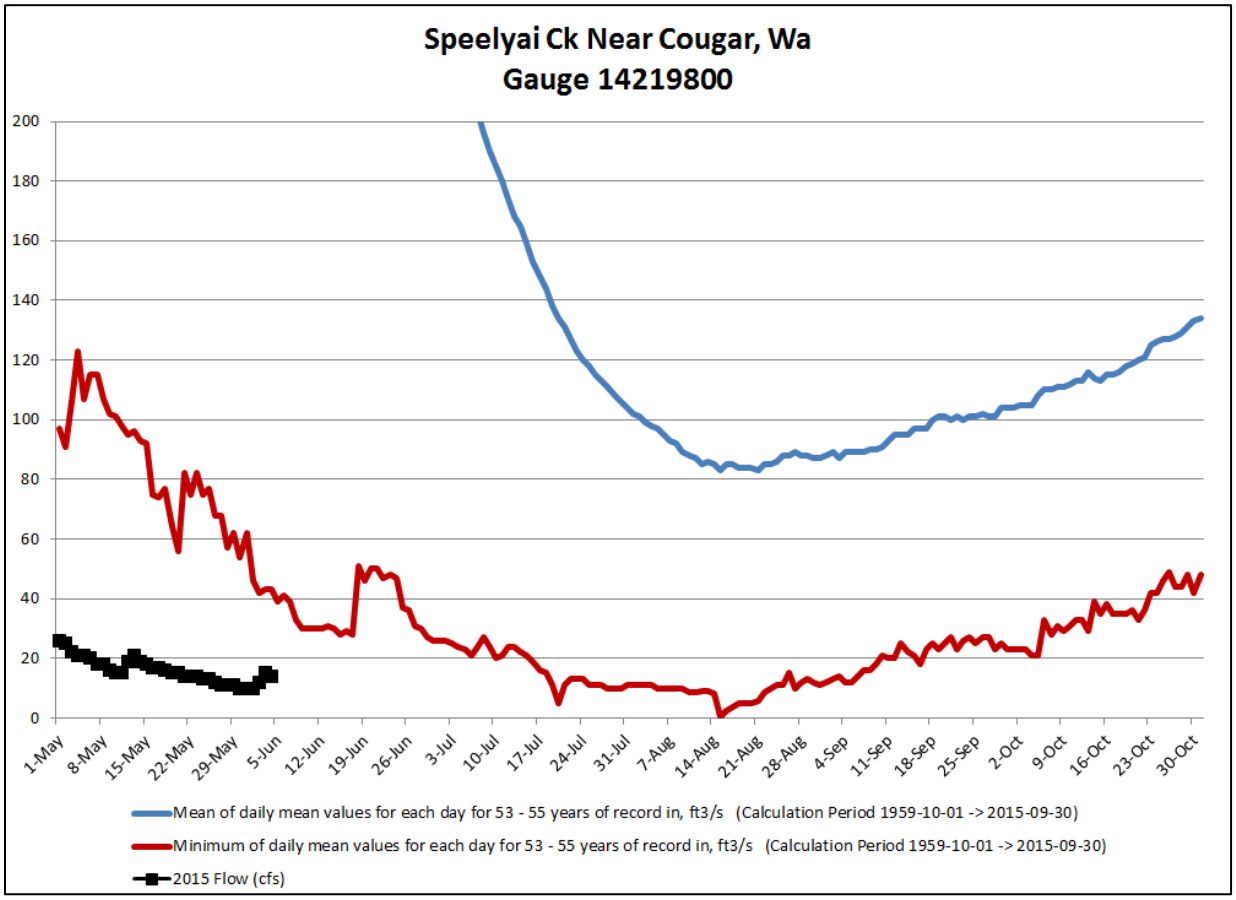

Dungeness R Above Diversions
USGS 12048000
500
450
400
350
300
250
200
150
100
50
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 84 - 86 years of record in, ft3/s (Calculation Period 1922-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 84 - 86 years of record in, ft3/s (Calculation Period 1922-10-01 -> 2015-09-30)
2015 Flow (cfs)

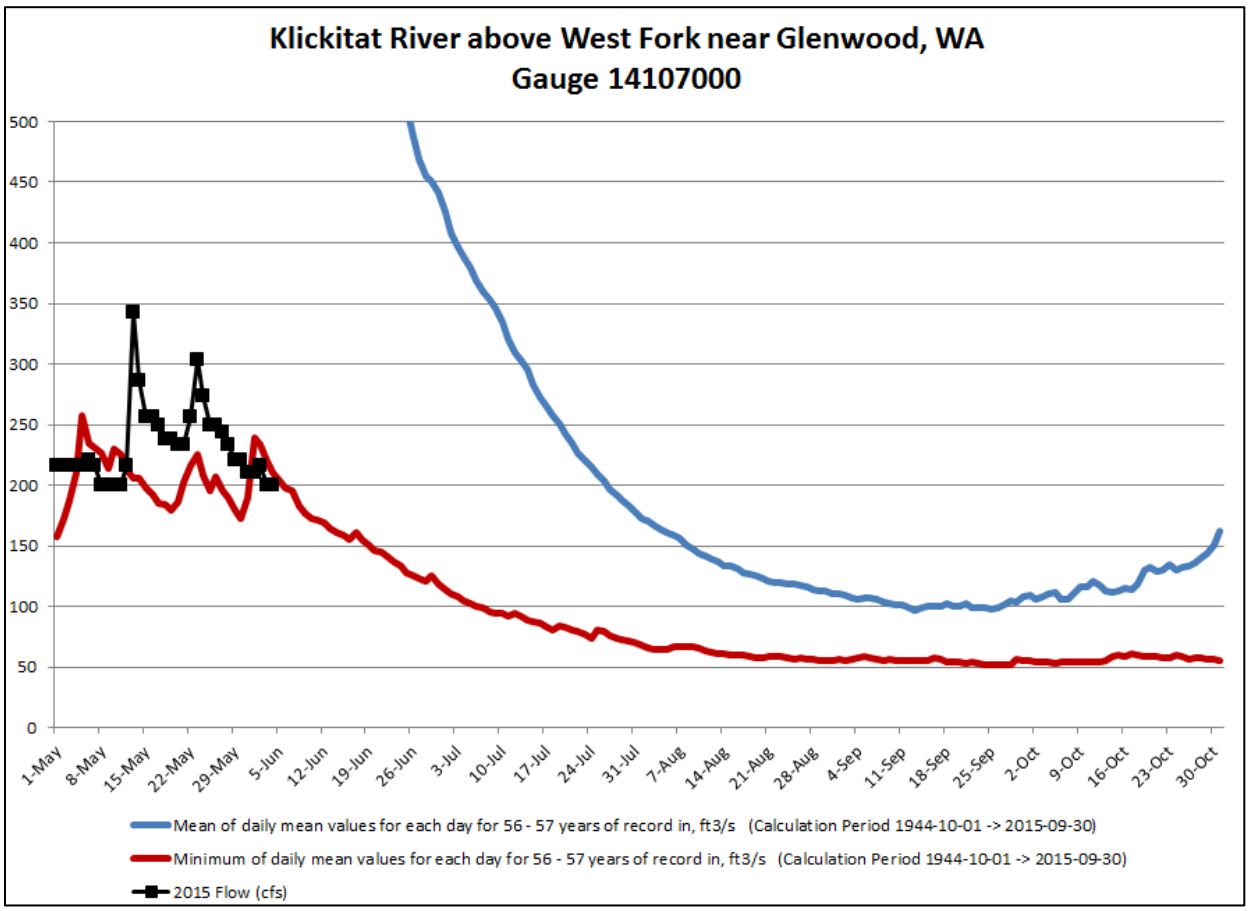

Hoko River near Sekiu, WA
Gauge 12043300
200
180
160
140
120
100
80
60
40
20
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 31 - 45 years of record in, ft3/s (Calculation Period 1961-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 31 - 45 years of record in, ft3/s (Calculation Period 1961-10-01 -> 2015-09-30)
2015 Flow (cfs)

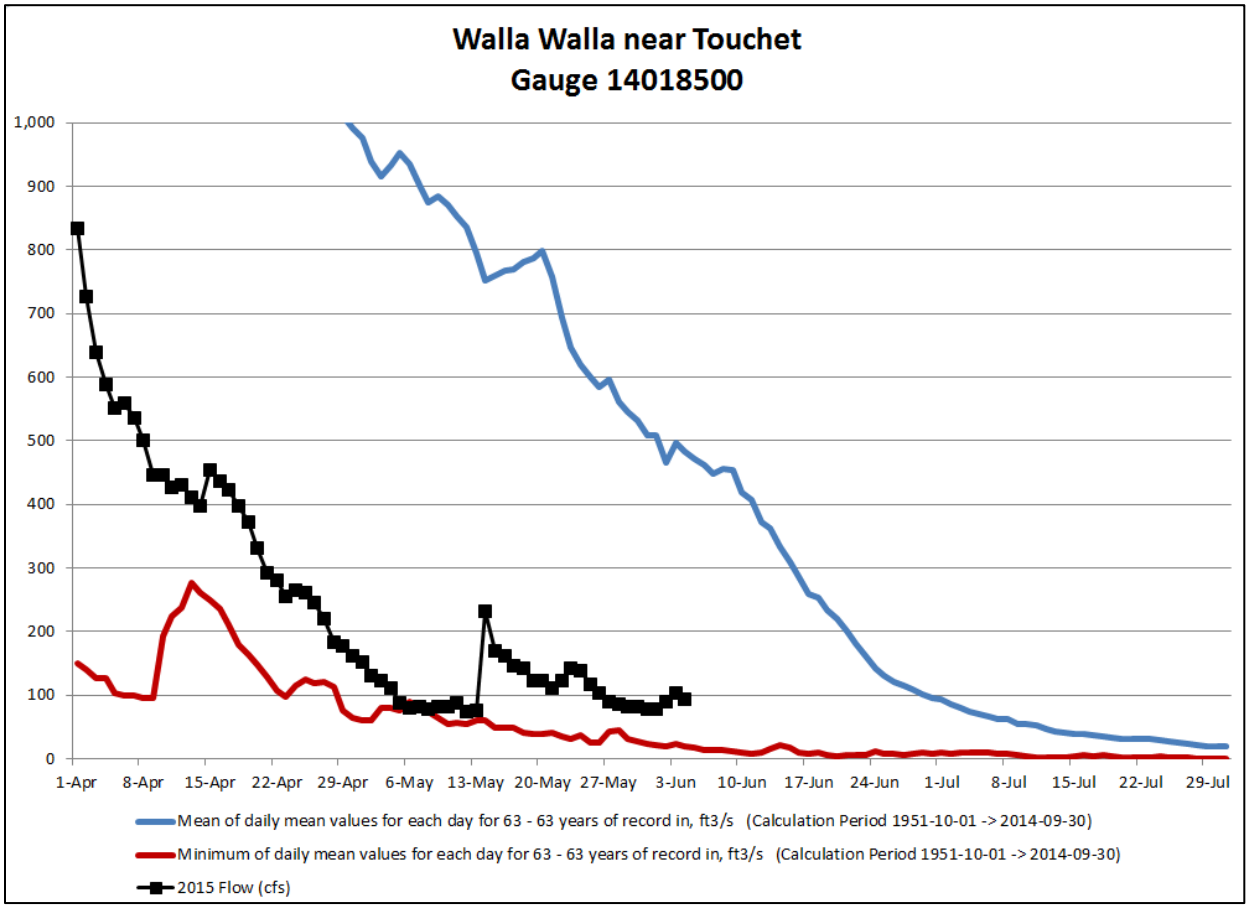

Calawah R Near Forks, WA
Gauge 12043000
600
500
400
300
200
100
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 39 - 41 years of record in, ft3/s (Calculation Period 1897-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 39 - 41 years of record in, ft3/s (Calculation Period 1897-10-01 -> 2015-09-30)
2015 Flow (cfs)

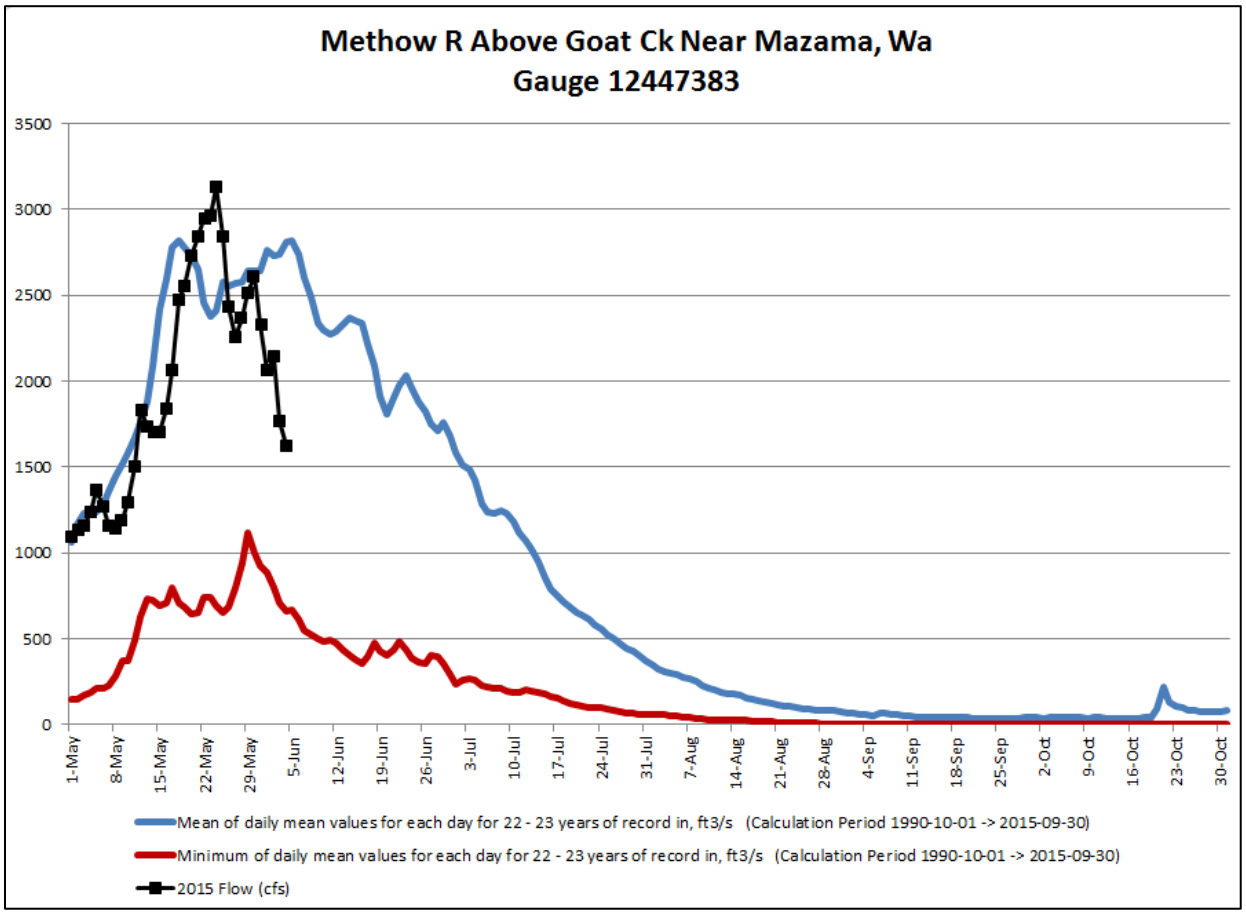

Skookumchuck R Near Vail, WA
Gauge 12025700
250
200
150
100
50
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 47 - 48 years of record in, ft3/s (Calculation Period 1967-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 47 - 48 years of record in, ft3/s (Calculation Period 1967-10-01 -> 2015-09-30)
2015 Flow (cfs)

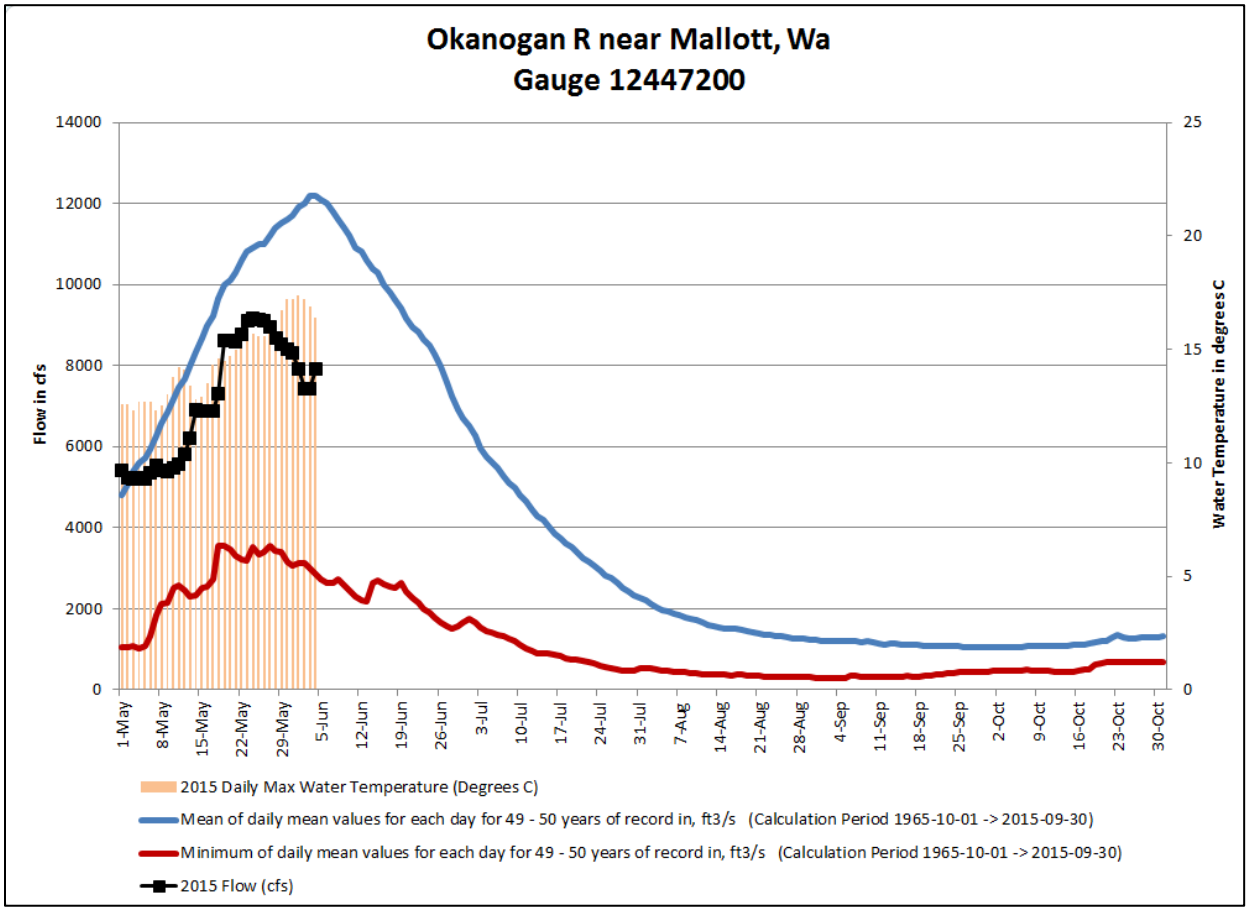

Naselle R Near Naselle, WA
USGS Gauge 12010000
200
180
160
140
120
100
80
60
40
20
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 85 - 86 years of record in, ft3/s (Calculation Period 1929-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 85 - 86 years of record in, ft3/s (Calculation Period 1929-10-01 -> 2015-09-30)
2015 Flow (cfs)

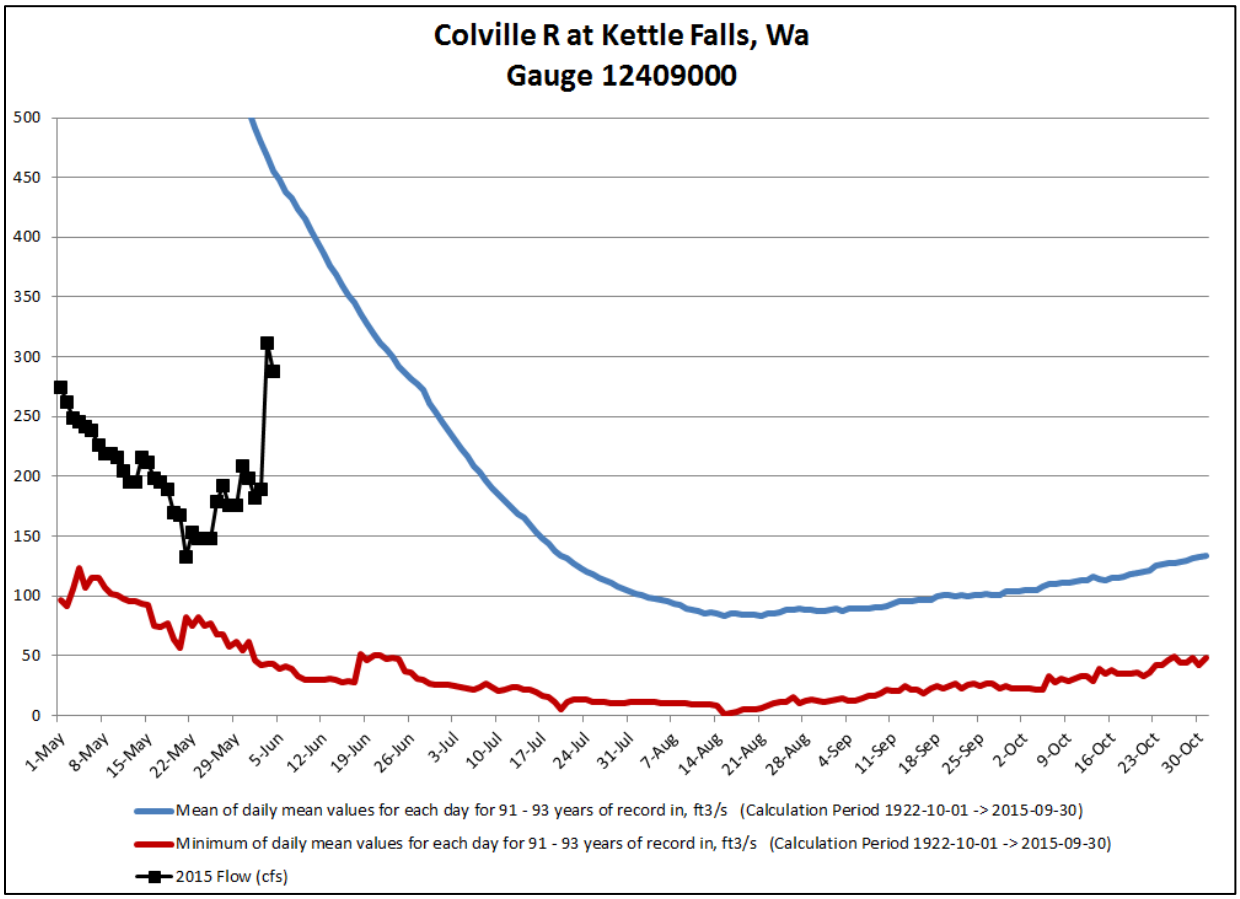

Speelyai Ck Near Cougar, Wa
Gauge 14219800
200
180
160
140
120
100
80
60
40
20
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 53 - 55 years of record in, ft3/s (Calculation Period 1959-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 53 - 55 years of record in, ft3/s (Calculation Period 1959-10-01 -> 2015-09-30)
2015 Flow (cfs)

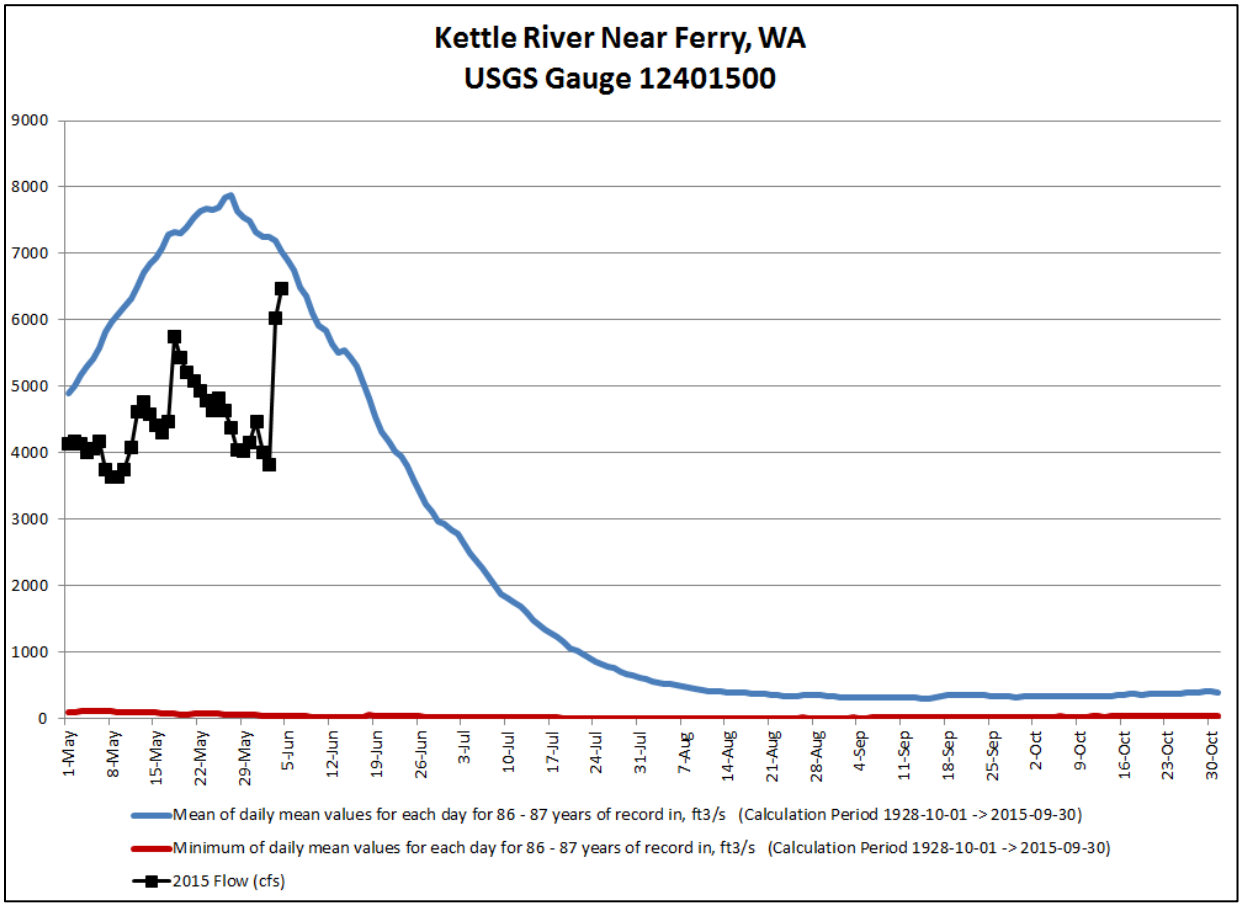

Klickitat River above West Fork near Glenwood, WA
Gauge 14107000
500
450
400
350
300
250
200
150
100
50
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 56 - 57 years of record in, ft3/s (Calculation Period 1944-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 56 - 57 years of record in, ft3/s (Calculation Period 1944-10-01 -> 2015-09-30)
2015 Flow (cfs)


Walla Walla near Touchet
Gauge 14018500
1,000
900
800
700
600
500
400
300
200
100
0
1-Apr
8-Apr
15-Apr
22-Apr
29-Apr
6-May
13-May
20-May
27-May
3-Jun
10-Jun
17-Jun
24-Jun
1-Jul
8-Jul
15-Jul
22-Jul
29-Jul
Mean of daily mean values for each day for 63 - 63 years of record in, ft3/s (Calculation Period 1951-10-01 -> 2014-09-30)
Minimum of daily mean values for each day for 63 - 63 years of record in, ft3/s (Calculation Period 1951-10-01 -> 2014-09-30)
2015 Flow (cfs)


Methow R Above Goat Ck Near Mazama, Wa
Gauge 12447383
3500
3000
2500
2000
1500
1000
500
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 22 - 23 years of record in, ft3/s (Calculation Period 1990-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 22 - 23 years of record in, ft3/s (Calculation Period 1990-10-01 -> 2015-09-30)
2015 Flow (cfs)


Okanogan R near Mallott, Wa
Gauge 12447200
Flow in cfs
Water Temperature in degrees C
2015 Daily Max Water Temperature (Degrees C)
Mean of daily mean values for each day for 49 - 50 years of record in, ft3/s (Calculation Period 1965-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 49 - 50 years of record in, ft3/s (Calculation Period 1965-10-01 -> 2015-09-30)
2015 Flow (cfs)


Colville R at Kettle Falls, Wa
Gauge 12409000
Mean of daily mean values for each day for 91 - 93 years of record in, ft3/s (Calculation Period 1922-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 91 - 93 years of record in, ft3/s (Calculation Period 1922-10-01 -> 2015-09-30)
2015 Flow (cfs)


Kettle River Near Ferry, WA
USGS Gauge 12401500
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1-May
8-May
15-May
22-May
29-May
5-Jun
12-Jun
19-Jun
26-Jun
3-Jul
10-Jul
17-Jul
24-Jul
31-Jul
7-Aug
14-Aug
21-Aug
28-Aug
4-Sep
11-Sep
18-Sep
25-Sep
2-Oct
9-Oct
16-Oct
23-Oct
30-Oct
Mean of daily mean values for each day for 86 - 87 years of record in, ft3/s (Calculation Period 1928-10-01 -> 2015-09-30)
Minimum of daily mean values for each day for 86 - 87 years of record in, ft3/s (Calculation Period 1928-10-01 -> 2015-09-30)
2015 Flow (cfs)