



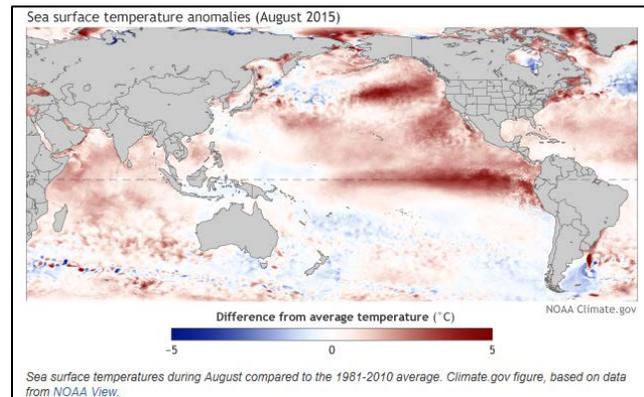
Drought Status Update #27

September 25, 2015

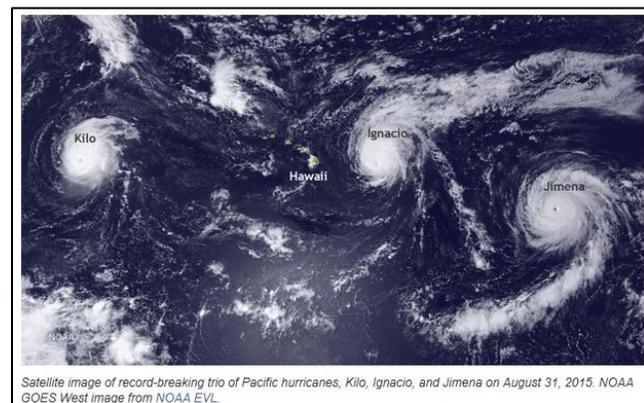
Note: This material is intended for, and contains elements of special interest to, WDFW agency staff. Non-agency readers or anyone having questions about the context, clarity, or content for items in this update should contact the author, WDFW Drought Response Lead Teresa Scott at (360) 902-2713 teresa.scott@dfw.wa.gov

This has been a week of contemplation regarding expectations for the coming winter and spring. A September 10 [ENSO Blog](#) from [Climate.Gov](#) provides one of the best summaries yet encountered of the current El Niño situation and what it means for winter weather conditions. Weighing in on the fight between El Niño and The Blob, Climate.Gov calls The Blob a “Fisher-Price Power Wheel” in comparison. We would do well to remember that El Niño is an engine that [affects the whole globe’s circulation](#).

The [weekly update by the Office of the Washington State Climatologist](#) (OWSC) is this writer’s go-to source for the best all-round understandable material on key topics. The Climate.Gov [September 22 blog](#) discusses the consequences of the millions of acres burned in wildfires so far this year.



Another Climate.Gov feature article highlights the [Central Pacific Hurricane Party](#) and discusses the above-normal hurricane activity in the Pacific. Turns out El Niño strongly influences the Pacific hurricane situation. The eastern Pacific hurricane season runs from 15 May through 30 November, with the peak of the season being July-September. The predicted ranges of activity for the 2015 season included 15-22 named storms, with 7-12 becoming



hurricanes, of which 5-8 could be major hurricanes. Total. So far in 2015 (September 10), the eastern Pacific Ocean has spawned eleven storms, with eight hurricanes, six of which have reached major hurricane status (i.e. winds greater than 110 mph, or Categories 3, 4, or 5). With 2.5 months yet to go, and a strong El Niño exerting its influence, this writer has been refreshing the household emergency kit (though NOAA is careful to point out that the hurricanes experienced so far posed little threat to land).

Severe Hazards

This week’s fire incidents map (below) from the [Northwest Interagency Coordination Center](#) shows Washington fires down to three major complexes. Again this week there are no NWS

[Severe Weather Hazards](#) predicted for the next 24 hours in Washington (other than small craft warnings off the coast). [Inciweb](#) again reports 29 active fires in Washington as of September 24. Inciweb also reports that the Okanogan-Wenatchee National Forest has assembled a [Burned Area Emergency Response \(BAER\) team](#) to analyze the post-fire condition of burned watersheds and to plan emergency stabilization treatments for the First Creek and Wolverine Fires, the Black Canyon Fire and the Twisp River and Limebelt Fires.

NWCC incident map for September 24



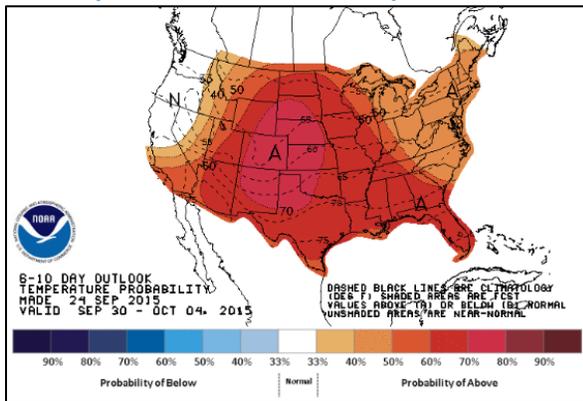
Incident map for September 17



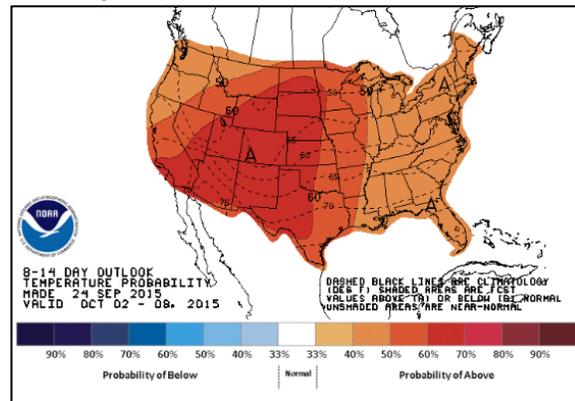
Temperature Forecasts

The [6-to-10 day temperature outlook](#) shows normal temperatures throughout Washington, trending toward above-normal in the [8-to-14 day temperature outlook](#). Hot and hotter everywhere but here.

6-10 day forecast on 9/24 for Sep 30-Oct 4



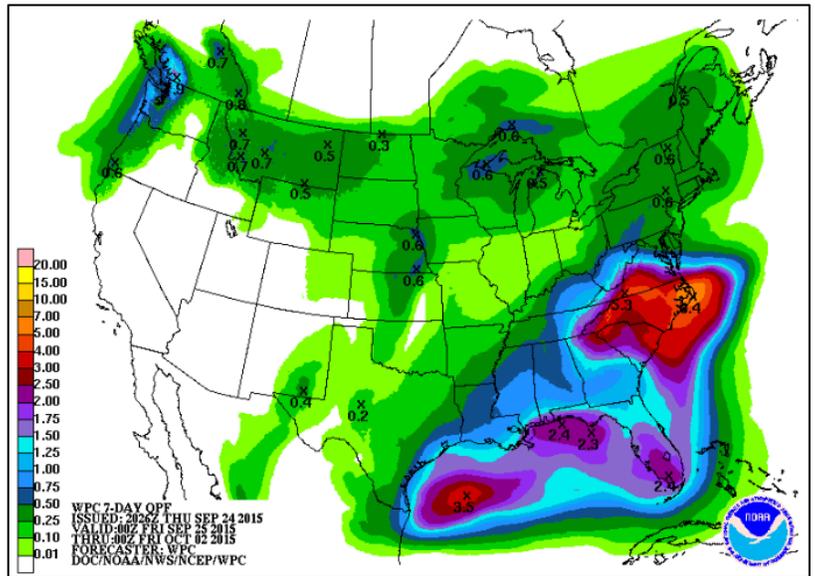
8-14 day forecast on 9/24 for Oct 2-Oct 9



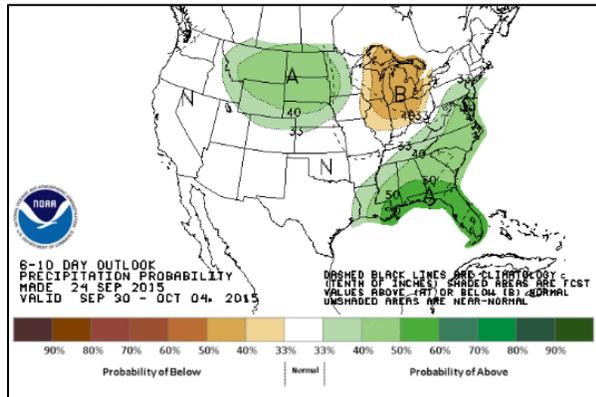
Precipitation Forecasts

NOAA is predicting [precipitation](#) in most of Washington over the coming week (right). Get local weather forecasts by clicking the map at [Weather.Gov](#). Satellite images are available by scrolling down the forecast page to “Additional Resources.”

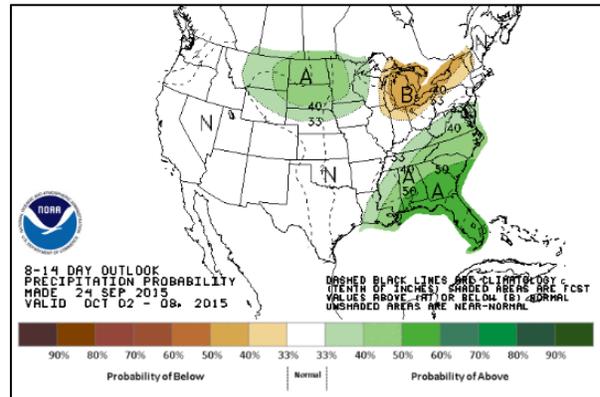
The [6-to-10 day probability of precipitation](#) (below) is for **normal** precipitation statewide, and this carries through to the [8-to-14-day precipitation probability outlook](#). “What’s normal?” you ask. Read on!



6-10 day precipitation forecast for Sep 30-Oct 4



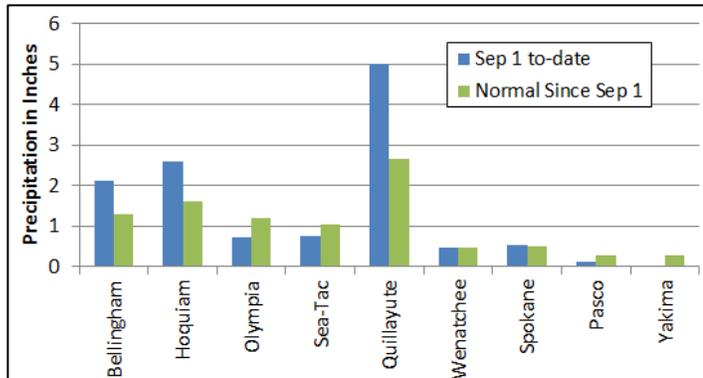
8-14 day precipitation forecast for Oct 2-Oct 9



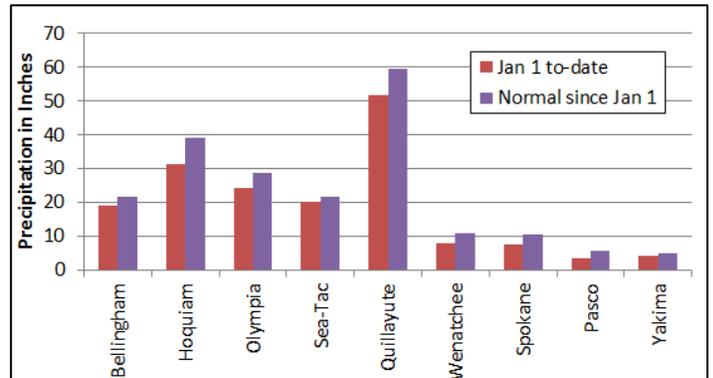
Precipitation History

Below is a chart showing the recent history of precipitation at nine Washington weather stations since September 1 and since January 1. Each is compared to month-to-date and year-to-date averages; these charts provide data through September 23, 2015. Bellingham, Hoquiam, and Quillayute stand out as having higher-than-normal September precipitation, but cumulative annual amounts are less-than-normal statewide, as expected.

September to Date



January 1 to Date

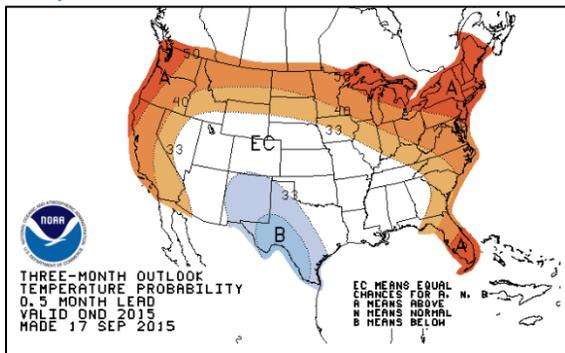


Climate Predictions

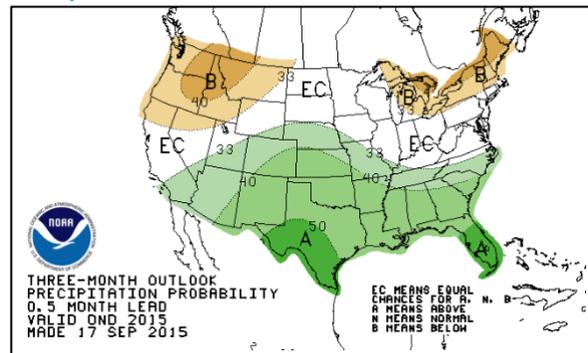
My apologies to all you climate specialists! What I really meant to say last week is that your support in 2015 has helped WDFW staff understand how weather and climate work and what all of that means for our critters! This writer especially appreciates the time you've taken to interact and adapt your presentation materials (and dumb-down your explanations) in a way that makes your products extremely meaningful for supporting decisions WDFW is making on a day-to-day basis. Many thanks to you, Karen, Nick, Brent, and all the other local, state (that's you, Jeff), and federal experts that have been supporting WDFW in 2015! You rock!

Following is a look, again, at the [seasonal climate outlook](#) for October, November, and December. OK, so this lecture is getting boring, but it bears repeating: Don't lose sight of the general outlook for warmer- and drier-than-normal conditions for this fall and winter! I know many of you are ready to move on from WDFW's drought alert status, and weather blogger Cliff Mass says we can all relax. Constant vigilance must be maintained until rains return on a more consistent basis this fall!

October, November, December Outlook Temperature



October, November, December Outlook Precipitation

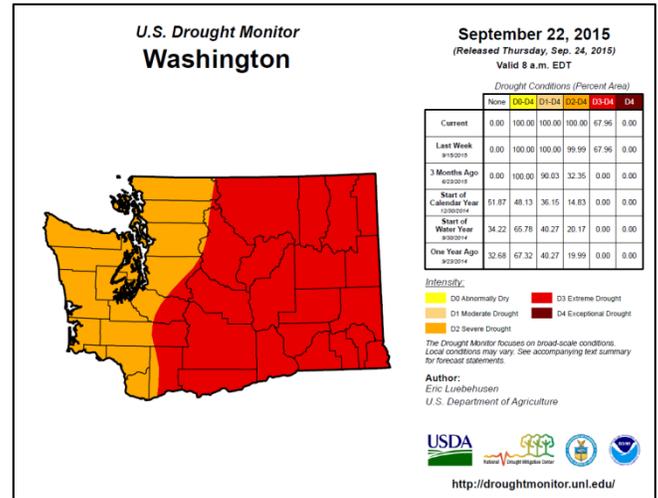


El Niño Update

The September 10th [El Niño/Southern Oscillation](#) diagnostic discussion predicts El Niño to continue in the northern hemisphere into spring 2016, with a peak in late fall/early winter (3-month sea surface temperature values of +1.5°C or greater). The next El Niño/Southern Oscillation update will be issued October 8, 2015. The NOAA Climate Prediction Center (CPC) and the International Research Institute for Climate and Society at Columbia University (IRI) partner to develop ENSO forecasts. IRI sponsors a website with coherent [El Niño Southern Oscillation \(ENSO\) resources](#) and discussions, and is worth a look if you're interested to dig into this topic further.

Federal Drought Status

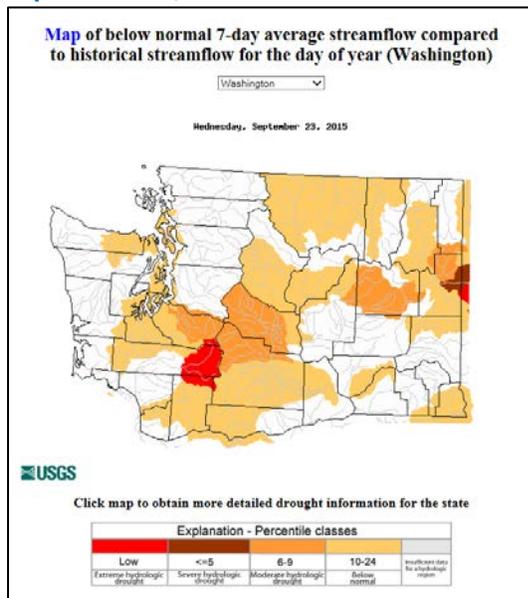
There were no changes in Washington's drought status this week. The [U.S. Drought Portal](#) provides the weekly drought status for the nation. Find out more about U.S. Department of Agriculture disaster status and relief programs at the [USDA Disaster Assistance](#) web page.



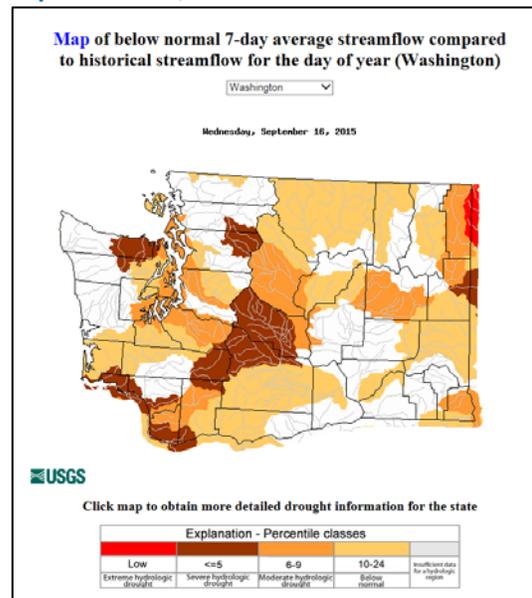
Stream Flows

The USGS figure showing [stream gauges with below normal streamflow](#) for 7 days or more shows streamflows improving statewide this week. Upper Cowlitz and Spokane are our remaining bad boys. Read on...

Below-normal 7-day average stream flow September 23, 2015



Below-normal 7-day average stream flow September 16, 2015



Selected Washington Streamflows Table

Cowlitz at Packwood and Yakima at Kiona show record low flows for this date in the record for September 24. Never mind the Yakima (highly-regulated), but the Cowlitz at Packwood is upstream from any regulation of flows. Hmmmmm. Also note that north coast streams appear to be doing pretty well, but the Dungeness is still in pretty poor condition flow-wise. More narrative with the hydro graphs (below).

This [Statewide Streamflows](#) tables from USGS gives a quick visual reference for daily flows as a percent of normal for this date in the historic record. We selected 43 out of a total of 254 flow gauges in Washington as a subjectively representative sample of Washington conditions. 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. Colors in the table emphasize flows less than 100% of average (orange-yellow) and less than 50% (red) for this day in the record. Flows at 100% or more of average are green-colored, changed from 75% or more in previous versions.

SELECTED WASHINGTON STREAMFLOWS FOR 43 OUT OF 254 GAUGES IN WASHINGTON	TODAY'S FLOW (CFS)	PERCENT OF AVERAGE FOR THIS DATE IN THE RECORD	MIN FLOW (CFS)	YR OF MIN FLOW	MEAN FLOW (CFS)
Mf Nooksack River Near Deming, Wa	202	54%	85	2007	377
Nooksack River At Ferndale, Wa	1,680	83%	713	2005	2,030
Skagit River Near Concrete, Wa	9,690	113%	4,110	2001	8,540
Sauk River At Darrington, Wa	617	64%	285	1930	968
Cascade River At Marblemount, Wa	372	61%	317	2007	614
Nf Stillaguamish River Near Arlington, Wa	515	63%	123	1938	824
Snoqualmie River Near Carnation, Wa	932	58%	402	1938	1,610
Skykomish River Near Gold Bar, Wa	795	51%	377	2007	1,550
Issaquah Creek Near Mouth Near Issaquah, Wa	23	48%	14	2003	48
Cedar River Below Diversion Near Landsburg, Wa	222	92%	148	1995	241
Cedar River At Renton, Wa	217	80%	58	1958	271
Big Soos Creek Above Hatchery Near Auburn, Wa	31	79%	18	1995	39
Green River Near Auburn, Wa	444	98%	197	1989	454
South Prairie Creek At South Prairie, Wa	30	45%	23	2003	66
Puyallup River At Puyallup, Wa	935	58%	610	1995	1,600
Nisqually River At Mckenna, Wa	581	108%	32	1962	540
Deschutes River Near Rainier, Wa	22	50%	20	2002	44
Nf Skokomish R Bl Staircase Rpd Nr Hoodsport, Wa	68	48%	17	1930	142
Dungeness River Near Sequim, Wa	93	58%	77	2005	159
Hoko River Near Sekiu, Wa	116	99%	13	1998	117
Calawah River Near Forks, Wa	230	106%	20	1899	218
Hoh River At Us Highway 101 Near Forks, Wa	1,200	94%	370	2005	1,270
Satsop River Near Satsop, Wa	562	98%	197	1951	572
Chehalis River Near Grand Mound, Wa	206	54%	98	1951	383
Naselle River Near Naselle, Wa	30	27%	19	1951	110
Cowlitz River Below Mayfield Dam, Wa	2,510	97%	1,100	1940	2,580
Cowlitz River At Packwood, Wa	182	33%	217	2005	548
Lewis River At Ariel, Wa	886	42%	574	1945	2,090
White Salmon River Near Underwood, Wa	466	75%	373	1994	620
Klickitat River Above West Fork Near Glenwood, Wa	78	79%	53	2001	99
Walla Walla River Near Touchet, Wa	11	22%	2	1994	50
Tucannon River Near Starbuck, Wa	64	86%	47	1929	74
Grande Ronde River At Troy, Or	514	69%	381	1994	740

Yakima River At Kiona, Wa	577	31%	718	1979	1,880
American River Near Nile, Wa	33	60%	31	2005	55
Crab Creek At Irby, Wa	2	19%	0	1992	8
Wenatchee River At Plain, Wa	326	52%	198	2005	630
Methow River Near Pateros, Wa	240	56%	229	2001	426
Okanogan River At Malott, Wa	617	57%	399	1988	1,080
Okanogan River At Oroville, Wa	246	47%	74	1944	519
Spokane River At Spokane, Wa	767	42%	660	1966	1,810
Colville River At Kettle Falls, Wa	52	52%	26	1930	100
Pend Oreille River Below Box Canyon Near Lone, Wa	14,400	91%	6,680	1957	15,900

Real-Time Water Temperature from USGS and Ecology

Water temperatures are down across the state, with only the Columbia and Snake mainstems, and Lake Osoyoos (Canadian Okanogan) showing potentially harmful levels. There are no stations reporting temperatures above 20 degrees C!!!

Follow this link to see the USGS [Real Time Temperature Stations map](#) for Washington. Below is a table showing September 23 [water temperature at all Washington gauges](#) having that attribute, in degrees C. Colors emphasize lethal (red, above 20 degrees C), dangerous (yellow, above 18 degrees), and acceptable (green) temperatures for salmon. Note that this sample of gauges is heavily weighted by stations at Columbia-Snake hydropower facilities, so statistics like *percent-of-Washington-gauges* would not be representative of overall status in Washington.

WATER TEMPERATURE FOR 65 GAUGES IN WASHINGTON ON SEPTEMBER 24, 2015	DEGREES C
Nf Skokomish R Bl Staircase Rpds Nr Hoodsport, Wa	12.6
White River At Headworks Ab Flume Nr Buckley, Wa	11.6
White River At R Street Near Auburn, Wa	13.3
Lake Tapps Diversion At Dieringer, Wa	12.6
Ysi 6920v2-2 At Wsu 2 At Puyallup, Wa	10.6
Duwamish River At Golf Course At Tukwila, Wa	15.6
Cedar River Near Cedar Falls, Wa	10.9
Cedar River At Cedar Falls, Wa	15.3
Cedar River Below Diversion Near Landsburg, Wa	12.1
Cedar River At Renton, Wa	13.2
South Fork Sultan River Near Sultan, Wa	9.4
Sultan River Below Diversion Dam Near Sultan, Wa	12.7
North Fork Tolt River Near Carnation, Wa	9.9
South Fork Tolt River Near Index, Wa	9.7
South Fork Tolt River Near Carnation, Wa	12.5
Sf Tolt River Bl Regulating Basin Nr Carnation, Wa	11.5
Nf Stillaguamish East Pooled Slide Area Nr Oso, Wa	6.4
Skagit River At Newhalem, Wa	10.3
Skagit River At Marblemount, Wa	10.9
Nf Nooksack River Bl Cascade Creek Nr Glacier, Wa	8.4
Sf Nooksack River At Saxon Bridge, Wa	11.4
Nooksack River At North Cedarville, Wa	10.4

Boundary Reservoir At Forebay Nr Metaline Falls	16
Pend Oreille River At International Boundary	16.1
Columbia River At Bridgeport, Wa	17.8
Osoyoos Lake Near Oroville, Wa	18.9
Okanogan River At Oroville, Wa	17.8
Similkameen River Near Nighthawk, Wa	14.5
Okanogan River Near Tonasket, Wa	15.7
Okanogan River At Malott, Wa	16.8
Okanogan River Nr Wakefield Br South Of Malott, Wa	15.9
Andrews Creek Near Mazama, Wa	8.2
Methow River Near Mouth Near Pateros, Wa	13.6
Wells Powerplant Headwater Near Pateros, Wa	17.7
Wells Powerplant Headwater Near Pateros, Wa	17.6
Wells Powerplant Headwater Near Pateros, Wa	17.6
Snake River Bl Mcduff Rapids At China Gardens, Id	19.9
Snake River Near Anatone, Wa	19.4
North Fork Clearwater River At Ahsahka, Id	9.7
Clearwater River Nr Peck Id	12.8
Clearwater River Nr Peck Id	12.2
Clearwater River Near Lewiston, Id	15.2
Snake River (Right Bank) Bl Lower Granite Dam, Wa	17.8
Snake River Below Little Goose Dam, Wa	17.9
Snake River Below Lower Monumental Dam, Wa	18.4
Snake River Bl Goose Island Bl Ice Harbor Dam, Wa	18.8
Columbia River Below McNary Dam Near Umatilla, Or	18.8
Columbia River At The Dalles, Or	18.7
Columbia River, Right Bank, Near Cliffs, Wa	19

Ecology's [Flow Monitoring Network](#) provides water temperature monitoring at several Ecology and co-op stations. Definitely check out whether there is an Ecology gauge in your area and spend a little time looking at the information. Data for the Lake Washington Ship Canal can be found [here](#).

Drought Impacts to Fish and Wildlife

Hatchery Returns To-Date

New in our report this week is this table showing hatchery rack returns at each WDFW facility. Apologies for not providing goals and averages for comparison. These are year-to-date figures.

Total Adult Salmon Returned to WDFW Facilities by Species and Run Type

Hatchery Returns through 9/24/2015 - Total does not include jacks. Numbers are preliminary estimates only.

FACILITY	SPECIES	CHINOOK			CHUM	COHO	PINK	SOCKEYE	STEELHEAD	
	RACE	FALL	SPRING	SUMMER	TOTAL	TOTAL	TOTAL	TOTAL	SUMMER	WINTER
Kendall Cr Hatchery			2,908				144	4		446
Whatcom Cr Hatchery		18				4	88			
Glenwood Springs		841								
Samish Hatchery		1,583				23				
Baker Lk Hatchery						5		6,301		
Marblemount Hatchery		1,723	56		172	51				
Whitehorse Pond				4					10	172
Reiter Ponds									581	
Sunset Falls Fcf				260		574	15,222	6	675	
Tokul Cr Hatchery		35								
Wallace R Hatchery				1,650		50	880		668	
Cedar River Hatchery		17						661		
Issaquah Hatchery		1,850				1		1		
Soos Creek Hatchery		2,178					30		57	
Voights Cr Hatchery		1,910				1,000	663			
Garrison Hatchery		40				1				
Minter Cr Hatchery		2,740	187			488	118			
Tumwater Falls Hatchery		1,400								
George Adams Hatchery		5,707				140				
Hoodsport Hatchery		2,014			3	9	6,435			
Dungeness Hatchery		6								
Hurd Cr Hatchery			191							
Morse Creek Hatchery		21				1	13		2	
Bogachiel Hatchery									120	
Solduc Hatchery				509		4,208			9	
Humptulips Hatchery		25							20	
Lk Aberdeen Hatchery		12				10			303	
Forks Creek Hatchery		1,425				20				
Naselle Hatchery		4,013				153				17
Cowlitz Trout Hatchery								853		
Cowlitz Salmon Hatchery		1,757	17,589		1	173	3	6	7,359	
Kalama Falls Hatchery		2,924	2,641			3			5,013	
North Toutle Hatchery		761				91			51	
Fallert Cr Hatchery			1						6	

Lewis River Hatchery	19	218		576		1	92
Merwin Dam Collection	91	690		97		30	3,831
Merwin Hatchery							314
Modrow Trap	22,951			742			1,396
Speelyai Hatchery		881		229			
Skamania Hatchery							1,685
Washougal Hatchery	1,592						168
Washougal River Fish Weir	5,616			1			294
Lyons Ferry Hatchery	1,439	341					
Tucannon Hatchery		622					
Priest Rapids Hatchery	3,743					1	8
Ringold Springs Hatchery	1,636						63
Chiwawa Hatchery		450					2
Chelan Hatchery							
Methow Hatchery		3,388					
Omak Hatchery							
Eastbank Hatchery		291	768			950	64
Wells Hatchery			1,939				162
Spokane Hatchery							

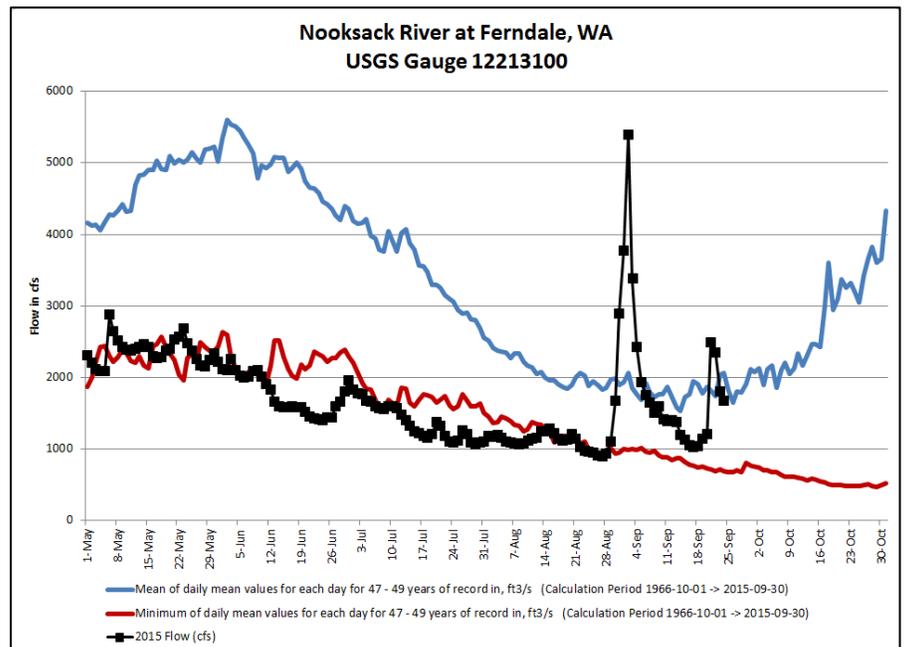
Nooksack River

Nooksack flows are sensitive to precipitation, and don't appear to be rebounding to record low levels, which is a good thing for the fish returning there.

Fishing for all species on the South Fork Nooksack (Whatcom Co.) from the mouth to Skookum Creek, and from Wanlick Creek to headwaters including Wanlick and all tributaries is re-opened effective October 1.

WDFW Correspondent Natasha Geiger reports that spawner

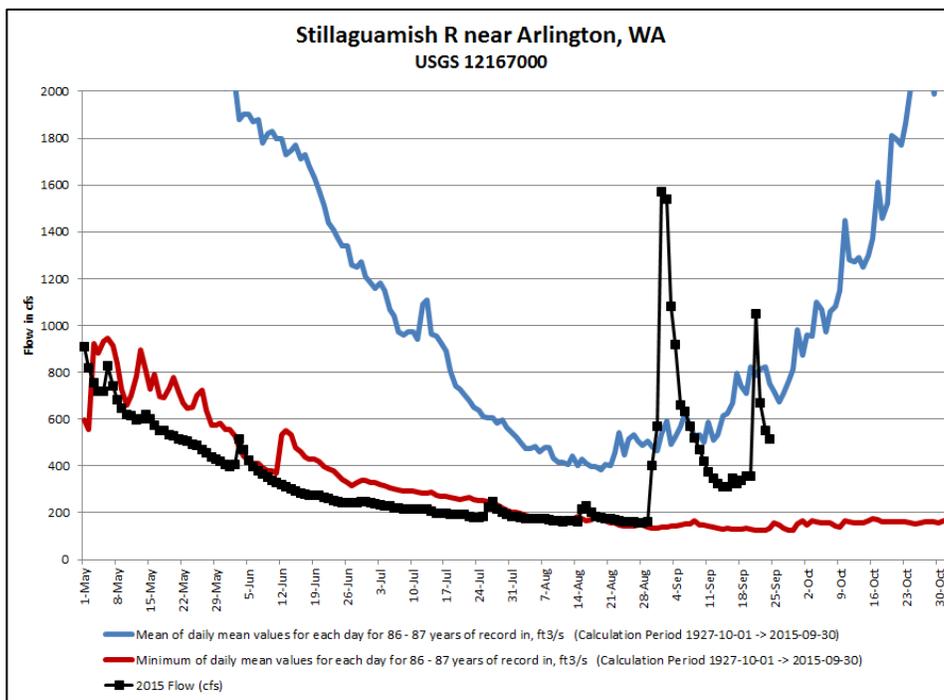
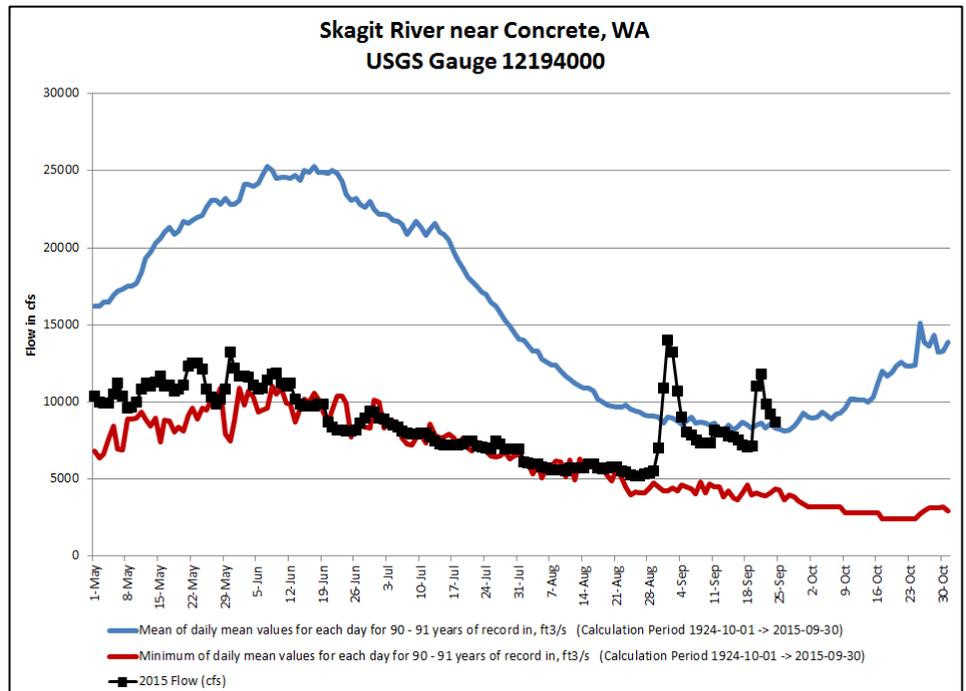
surveys started September 1st in the North Fork Nooksack River. Natasha reports a lot of happy fish spawning in areas that were not accessible before the early September rains. Pink Salmon and Spring Chinook have been getting into some of the tributaries that now have running water. The rain came at the peak of the Nooksack Pink run, but North Fork Nooksack Spring Chinook had already passed the peak of their run when the rain happened. Flows in the North Fork rose from about 500 cfs to over 3,000 cfs, which could have scoured eggs that had already been deposited. This underscores the fact that it will be difficult if not impossible to



sort out drought-caused mortality from all the other mortality sources in freshwater and marine life stages.

Skagit Basin

Skagit rain response and recovery are pushing flows closer to “normal” this week, which is a good thing for fish. Like the Nooksack, there is a possibility of egg loss with the sudden high flows caused by recent rain events.



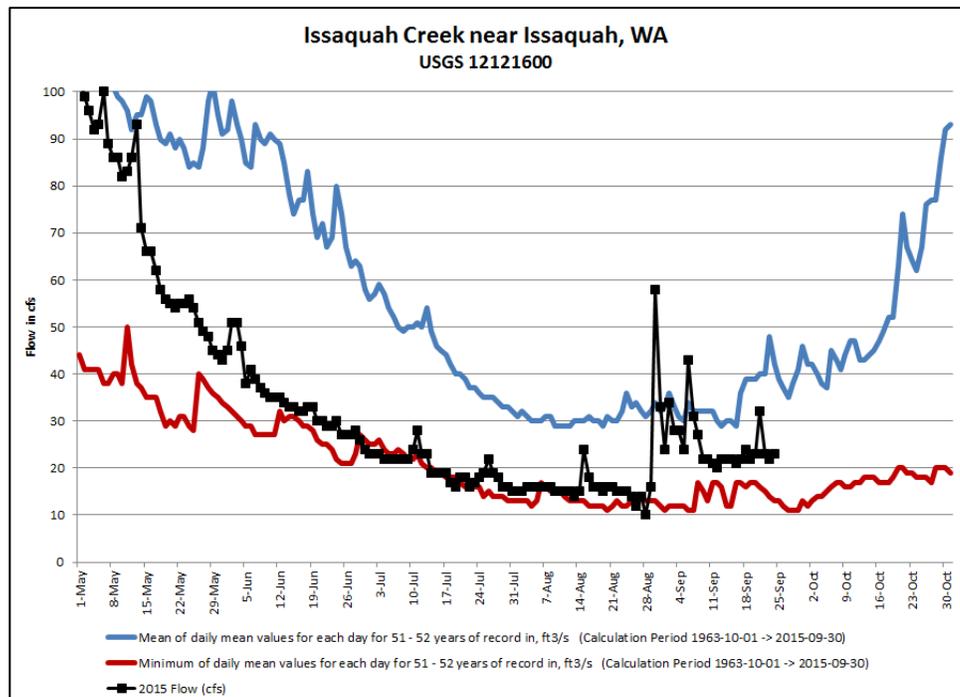
Stillaguamish

Stillaguamish flows are recovering to levels right in the middle of the below-average range, and spiking above average with each rain event. It's still too early to determine whether the Stillaguamish hydrograph will increase on schedule, but it's looking pretty good.

Lake Washington/Cedar and Green/Duwamish

Here is an example when hatchery escapement goals and average returns-to-date would help us interpret this information. I am willing to go out on a limb, though, and suggest that the sockeye run is all but complete, and the returns look poor.

Spikes in flow from recent rains show clearly. Flows are not returning to the low levels of earlier in the summer; they are mid-way between the minimum and the mean.



King County Flow and Temperature Conditions for the week of September 14 through September 20

Following is a report compiled by Curtis DeGasperi and distributed by Jim Simmonds from King County Department of Natural Resources and Parks. King County presents weekly summaries of local river and creek flows and temperatures. Get more information about this report from Jim.Simmonds@kingcounty.gov or Curtis.DeGasperi@kingcounty.gov. These summaries are being discontinued for now, and Curtis and Jim would like feedback on what readers liked, wanted but didn't see, etc. Please let them know how much you appreciated their having shared this information with WDFW this summer!

HEADLINES FROM THE WEEK

As we transition from an extremely unusual warm and dry spring and summer to hints of cooler and wetter weather to come, attention is turning to the discussion of the El Niño forecast. One of the strongest El Niños in decades is developing and is expected to result in warmer temperatures and slightly lower snowpack than normal in the mountains. A recent study published in Nature Geoscience suggests that the British Columbia Coast could experience higher tides, flooding and erosion in low-lying coastal areas in response to the coming "monster" El Niño according to one of the study's authors. News story here:

<http://www.theglobeandmail.com/news/british-columbia/bc-coast-should-brace-for-monster-el-nino-year-uvic-professor/article26468934/> Published study can be found here:

<http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo2539.html>

WATER SUPPLY STATUS

- The second stage water shortage response plan (voluntary reduction) initiated on August 11 by Seattle, Everett, Tacoma, and the Cascade Water Alliance remains in effect. Customers have been asked to continue to help by voluntarily reducing water use by 10 percent. More information available here: <http://www.seattle.gov/util/MyServices/Water/AbouttheWaterSystem/WaterSupply/index.htm> and here <http://www.savingwater.org/>.
- As of September 14, Seattle Public Utilities (SPU) reports that the combined reservoir storage of Chester Morse Lake, Masonry Pool, Lake Youngs and South Fork Tolt Reservoir remains below the long term average for this time of the year. See summary graphs from SPU below.
- Cascade Water Alliance has been maintaining the agreed-upon recreational level for Lake Tapps (<http://cascadewater.org/news/lake-tapps-news/> for more information). The lake is now within the agreed-upon recreation level and will likely remain so into October. However, minimum instream flows in the White River below the diversion to Lake Tapps were not generally met last week (see White River flow graph below).

FLOW AND TEMPERATURE STATUS

- Flows in undammed rivers remained low as eight of 12 unregulated rivers with over 15 years of data and real-time data delivery were at least lower than typical with four reaching record lows for this time of year. Flows in the creeks were similar to last week; six creeks had flows higher than typical for this time of year (four last week) and six creeks still had record low flows for this time of year (same as last week).
- Only 1 of the 16 rivers/streams with over 15 years of temperature data and real-time data delivery had the highest temperatures ever recorded for the week (Jenkins), though 9 of the 16 were still higher than typical for the week (down from 11/16 last week). No temperatures exceeded 20°C.
- Water levels in Lakes Washington and Union did not decrease substantially over the past week, remaining above 20 ft. For the week of September 14 to September 20, the 2015 levels are the 9th lowest on record (1940-2015). Maximum daily water temperatures at the fish ladder at the Ballard Locks have remained below 20°C, remaining near the average temperature for the week of September 14 to September 20 (2004-2015). See figures below.
- The elevation of Lake Sammamish is the fifth lowest since the weir modification in 1998 and is ~ 1 inch below the median lake elevation (1999-present) for the week of September 14 to 20. See figure below.

ECOLOGICAL IMPACTS

- Data collected by the Muckleshoot Tribe show that 5,444 adult Chinook salmon and almost 34,000 sockeye salmon had migrated past the Ballard Locks into the Lake Washington

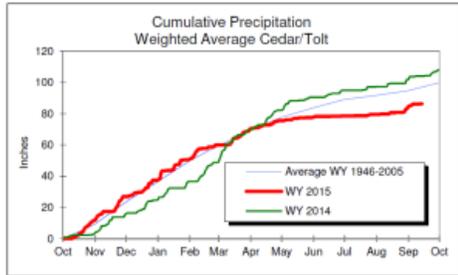
watershed as of September 18. This is about 49% of the 10-year average Chinook return and about 27% of the 10-year average sockeye return by September 18. Over the past 10 years, an average of about 98% of the Chinook run and almost 100% of the sockeye run had passed the Ballard Locks by September 18. Coho have also begun to appear at the locks with 4,281 counted as of September 18. This is about 44% of the 10-yr average return by this time.

- Low flows and high temperatures may hinder adult salmon from reaching upstream spawning grounds. Temperatures above 20 to 21 degrees C are generally considered to be a migratory barrier to migration. Pink salmon in Alaska have shown increased mortality above 17 degrees C combined with lower than typical dissolved oxygen. Temperatures between 20 degrees C and 23 degrees C can cause thermal stress to many salmonids and increase disease outbreaks and infection, while temperatures above 23 degrees C can cause substantial health impacts or mortality to many salmonids. Low flows also decrease available wetted habitat for spawning and rearing, limit food availability, and increase predation.
- Starting in mid-August, over 600,000 pink salmon are projected to return to the Green/Duwamish and over 1.6 million pink salmon are projected to return to the Snohomish River. Recreational salmon fishing has opened on the Snoqualmie and Green-Duwamish rivers, including fishing for pink salmon. 2015 pink run size will be estimated based on spawning ground surveys conducted in mid-September. We have no quantitative information on the current run, but returning pink salmon have been observed in both rivers.

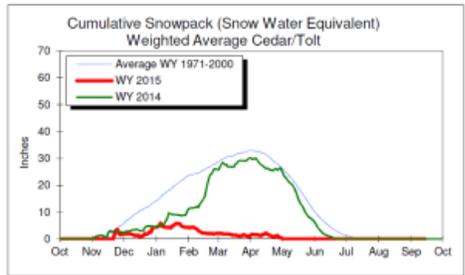
REGULATORY AND LEGAL CONSIDERATIONS

- The increase in the flow of the Snoqualmie River above the minimum instream flow levels last week was temporary. Flows have again fallen below the instream flow target. See figure below.
- The Green River at Auburn had a similar response as the Snoqualmie with a decline in flow over the last week. Flows remain higher than instream flows required during drought years for Tacoma Public Utilities to withdraw water from the Green River using its primary water right claim under agreements with the Muckleshoot Tribe, but are still below the minimum instream flow for Tacoma Public Utilities to withdraw water from the Green River with its second diversion water right claim. See figure below.
- Flows in the Cedar River remain higher than the normal minimum flow required by the Habitat Conservation Plan to be maintained by Seattle Public Utilities during normal years. See figure below.
- Flows in the White River were generally below the minimum flow required by the White River Management Agreement between the Puyallup Tribe of Indians, the Muckleshoot Indian Tribe and the Cascade Water Alliance. See figure below.

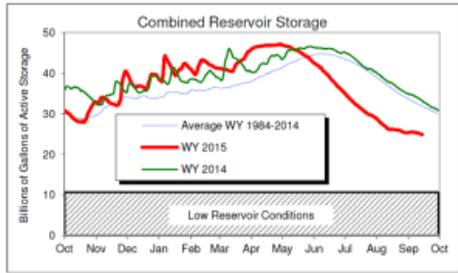
Seattle Public Utilities Water System Synopsis as of September 14, 2015



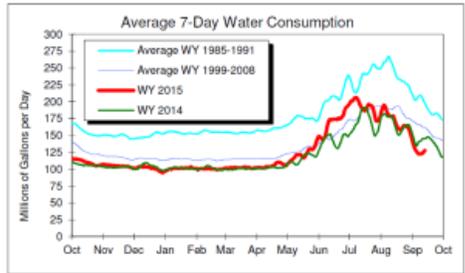
Little precipitation was recorded in the Cedar River and South Fork Tolt River Watersheds over the past week.



The average snow accumulation across the sites that we monitor is estimated to be about 0.0 inches snow water equivalent which is at the long term average for this time of the year.

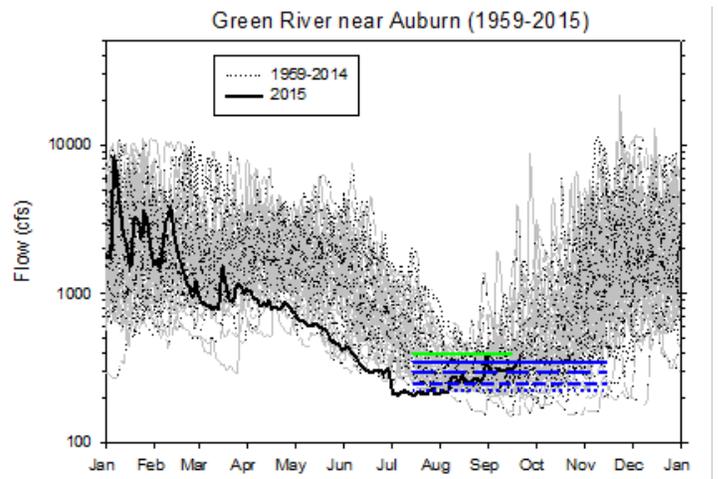
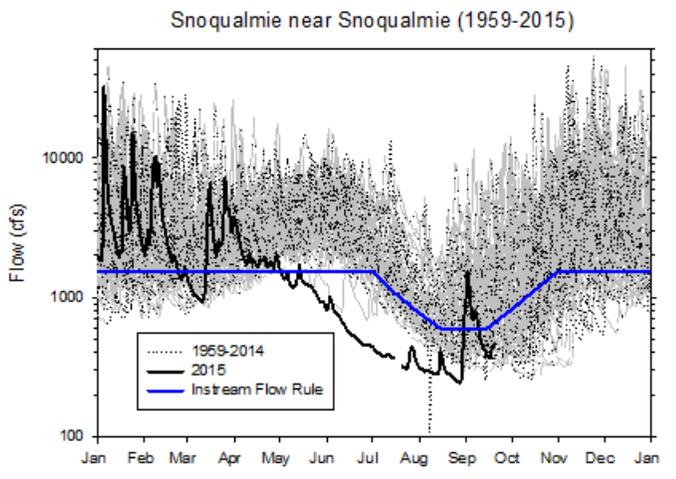


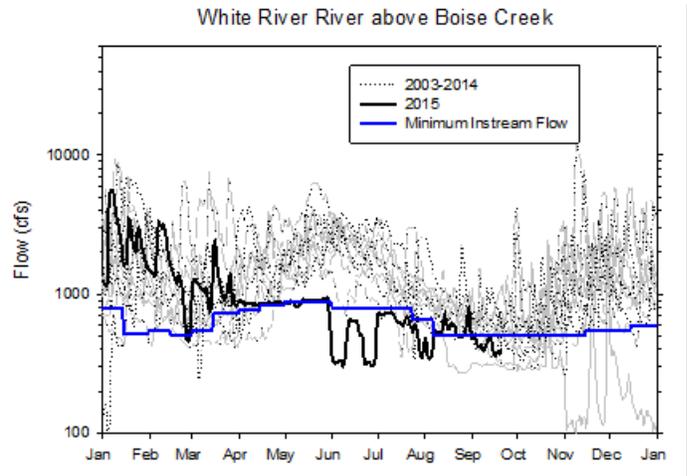
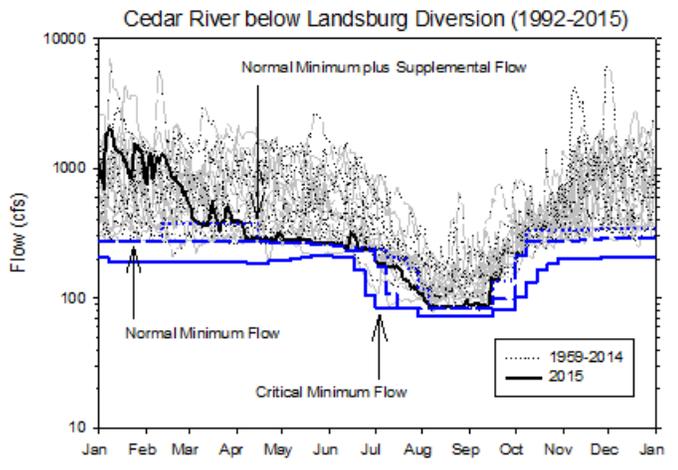
The combined reservoir storage of Chester Morse Lake, Masonry Pool, Lake Youngs and South Fork Tolt Reservoir is below the long term average for this time of the year.



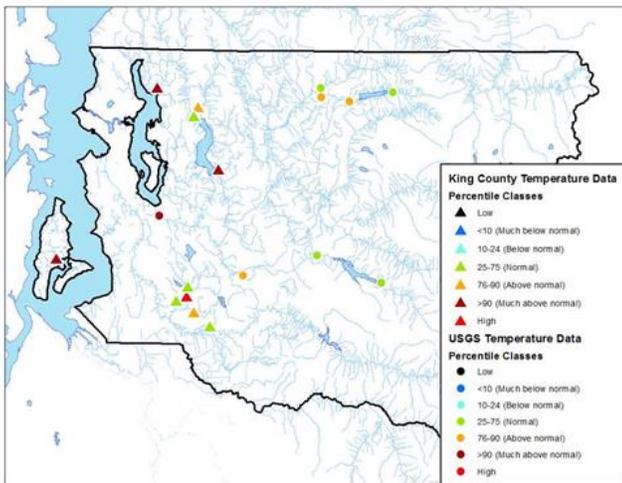
Water use over the past week averaged about 128 million gallons per day (mgd), which is less than the 162 mgd used during the same period over the years 1999-2008.

All data is provisional and subject to revision.

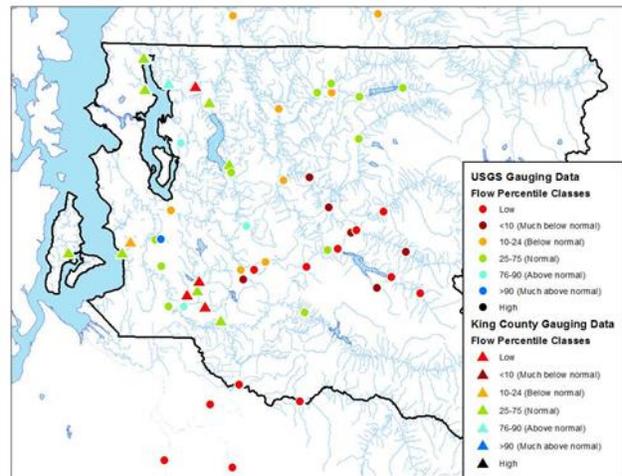




Temperature

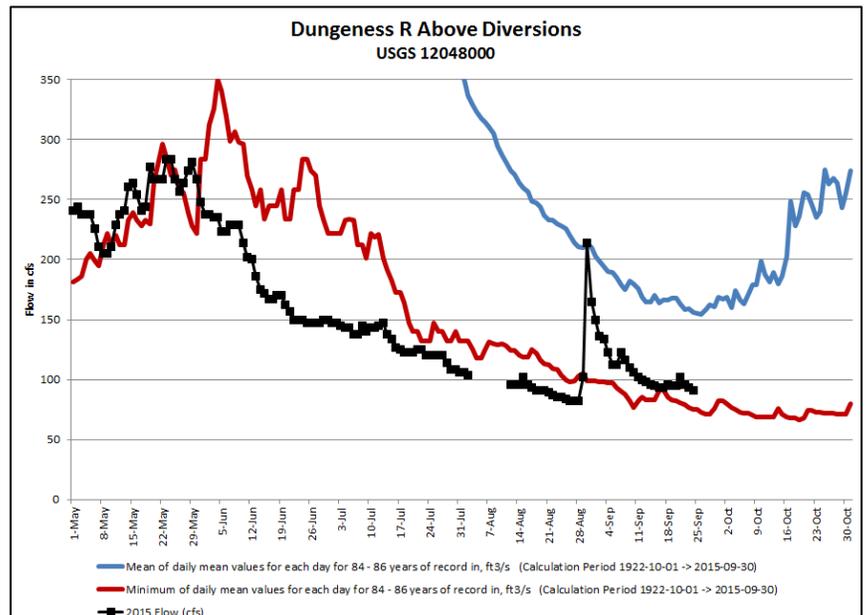


Flow

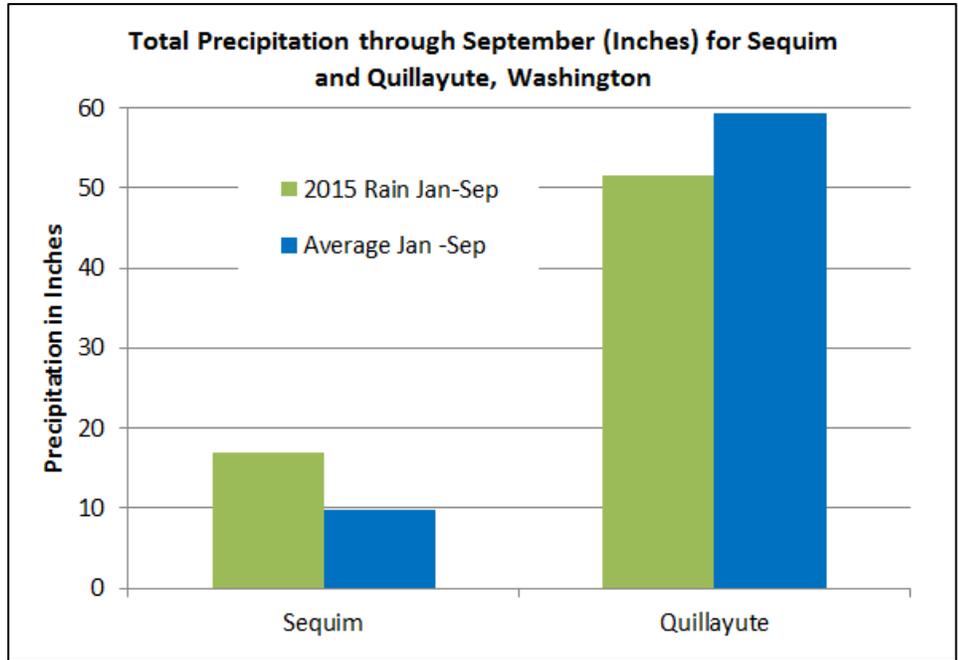


Dungeness & Western Strait

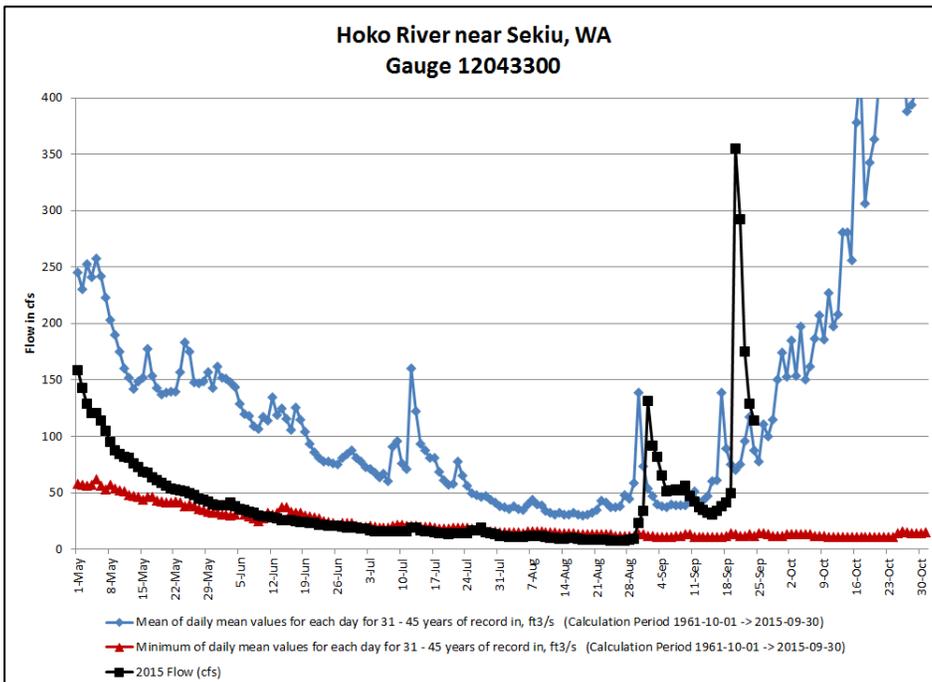
Flows in the **Dungeness** don't look good and returns don't look good either. Again, without goals and averages it's difficult to know. Dungeness flows look especially anemic in comparison to west-end and north coast streams. I guess that's why they call it the rainshadow.



Speaking of rainshadow, here is a comparison of Sequim versus Quillayute precipitation since the first of January. 2015 precipitation totals from January through September 23 are shown in green; annual average precipitation for January through September is shown in blue. Sequim's precipitation to-date is right on the average for the whole calendar year. The Sequim average rainfall through September is low compared to the annual total because most of



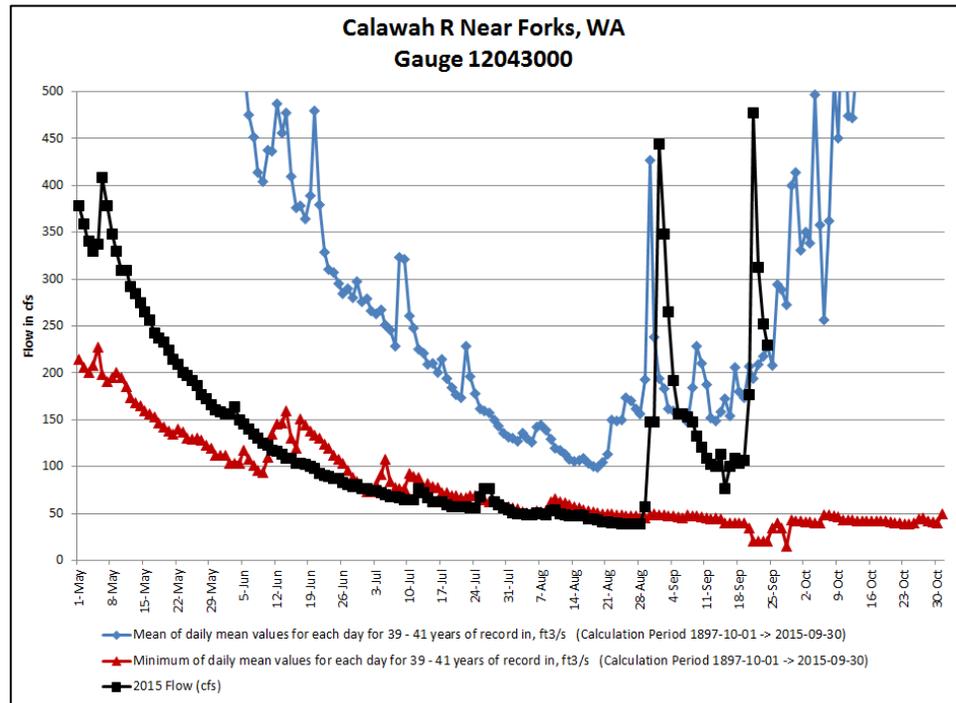
Sequim's rain falls in October through December each year. So, how about this: How about we hope for Sequim rains to be a lot higher than average for the rest of 2015, even though it's been a severe drought year. Maybe Quillayute total might also exceed averages. Might be a bit difficult to explain at first, given the poor fish passage in the Dungeness and a drinking water shortage in Forks, but our team is up to the challenge!



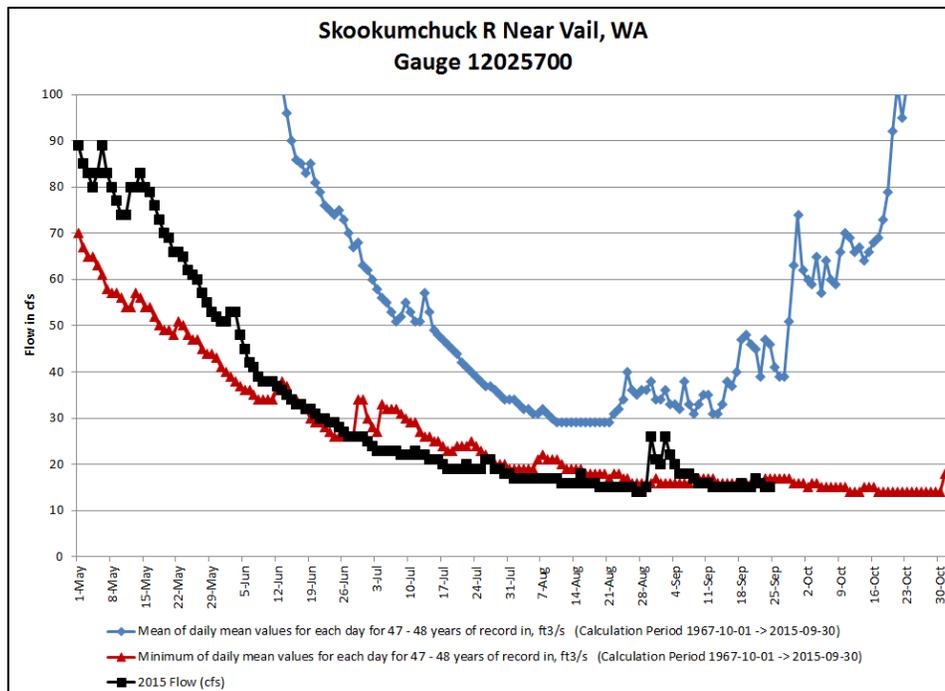
Hoko flows are responding famously to the local rainfall, and are following the historic hydrograph very well.

North Coast

Calawah River values give us an indication of conditions in the Bogachiel, Dickey, Sol Duc, and Quillayute Rivers. Flows have not rebounded to record-lows; the next two weeks will tell is if Calawah is climbing out of the summer drought period.



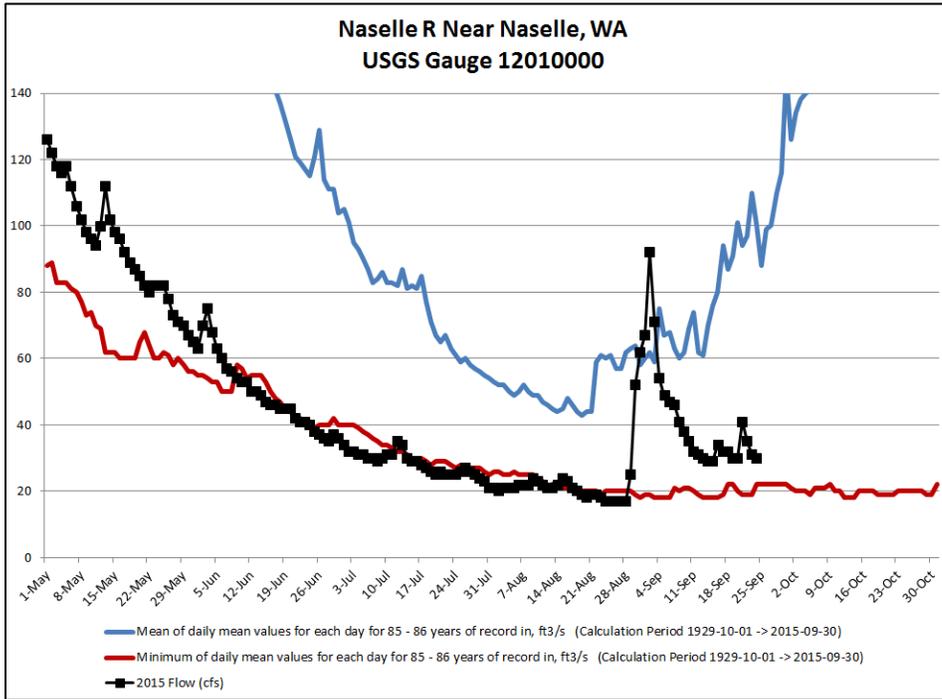
Chehalis Basin



Skookumchuck:

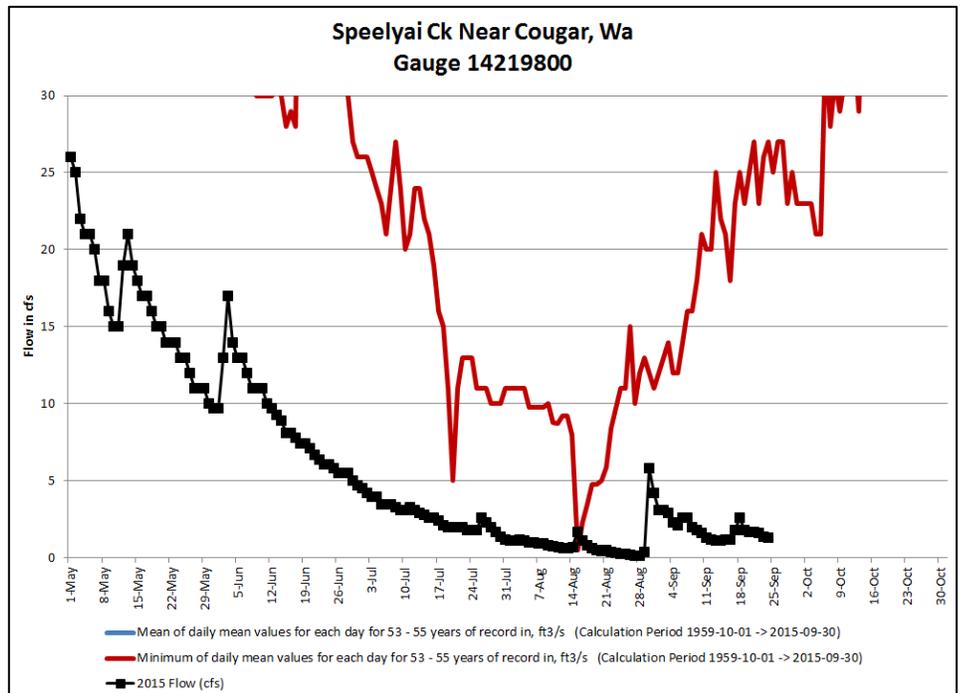
Flows in the figure represent inflow to the Skookumchuck Reservoir. After a bump from the rains in early September, flows have returned to near-minimum historic levels. This curve looks similar to flow on the Cowlitz at Packwood, which was discussed in the daily minimum flows section.

Southwest Region

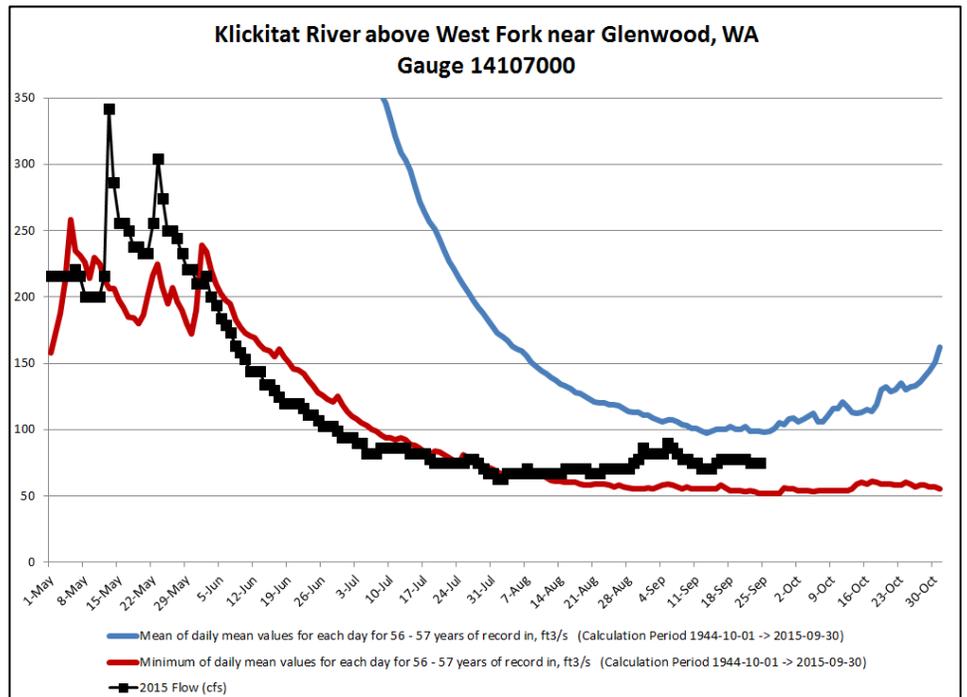


Naselle River shows a good response to recent rains.

Speelyai Creek (spelling corrected for this week's report!) bumped above 5 cfs and is slowly dwindling. We are hoping flows here increase soon to match the rise in the historic hydrograph.



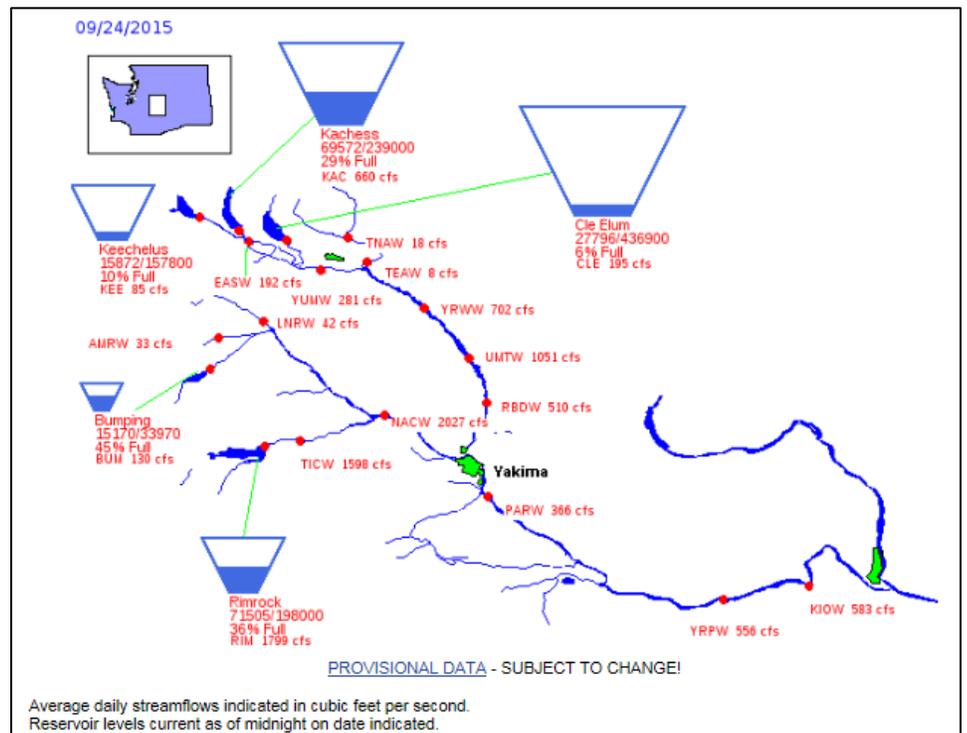
Upper Klickitat should be on its seasonal ascent, but the last week's flows haven't confirmed (or contradicted) this hypothesis.



Yakima

The Reclamation Teacup Diagram for Yakima Basin shows Lakes Keechelus at 10%, Kachess at 29%, and Cle Elum at 6% full. Bumping is at 45%, and Rimrock is 36% full. Storage is 60.2% of average (1981-2010).

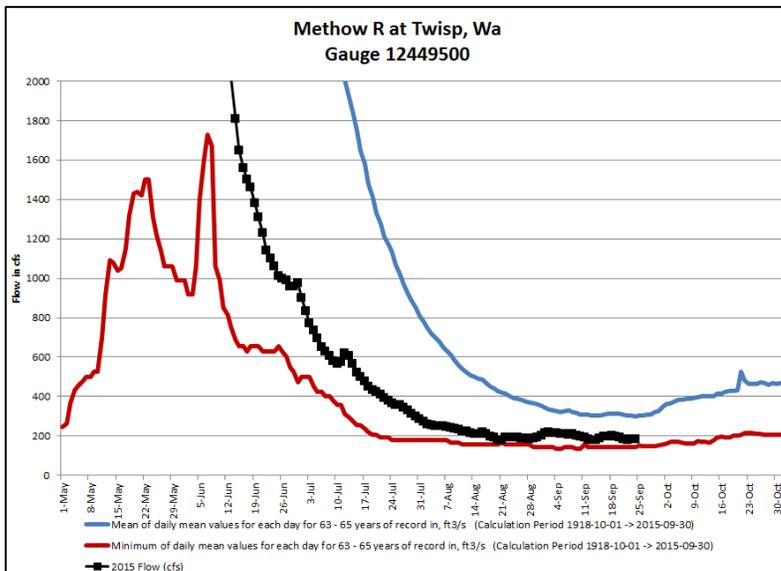
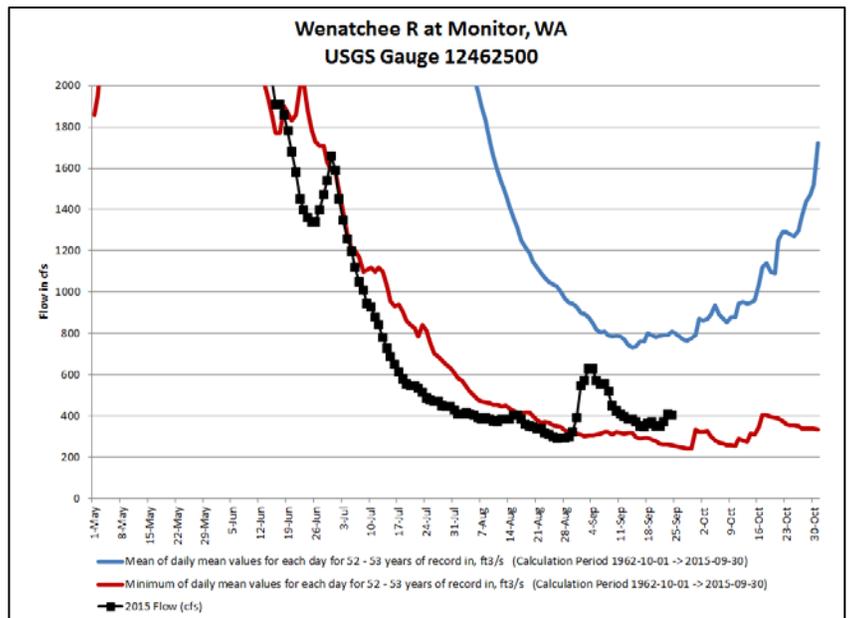
An early-bird October Water Supply Available estimate indicates that in October, the non-proratable water rights will receive 100% of October entitlements and the proratable water rights will receive 39% of October entitlements



Inflow to the five reservoirs is 76%, releases from the five are 89% and major canal diversions are 82% of average for September 17th.

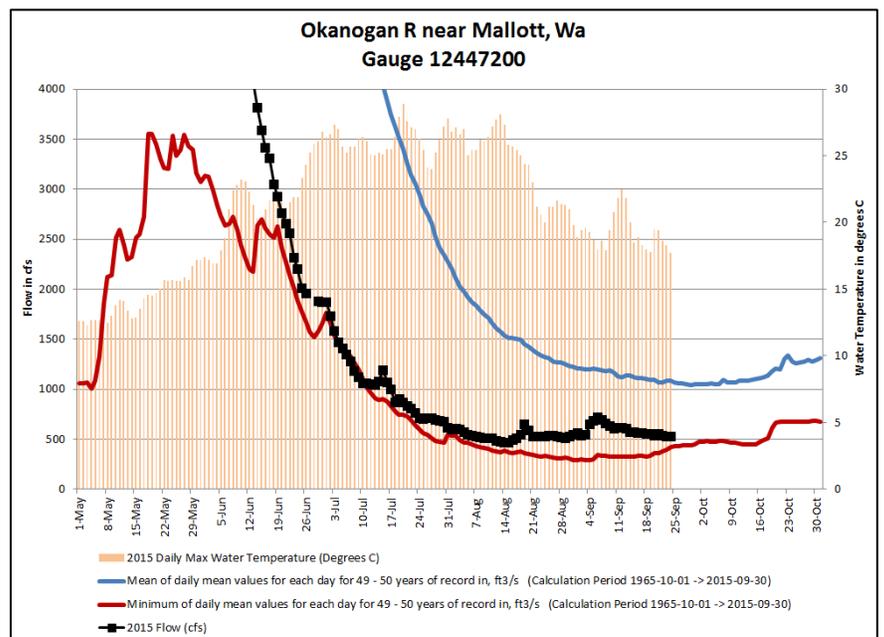
North Central Washington

Wenatchee flows recovered to a little above historic low flow levels, and we should be able to detect the seasonal ascent of flow levels through the next couple of weeks. We hope. Ecology has curtailed 91 Wenatchee basin water users through August 28.



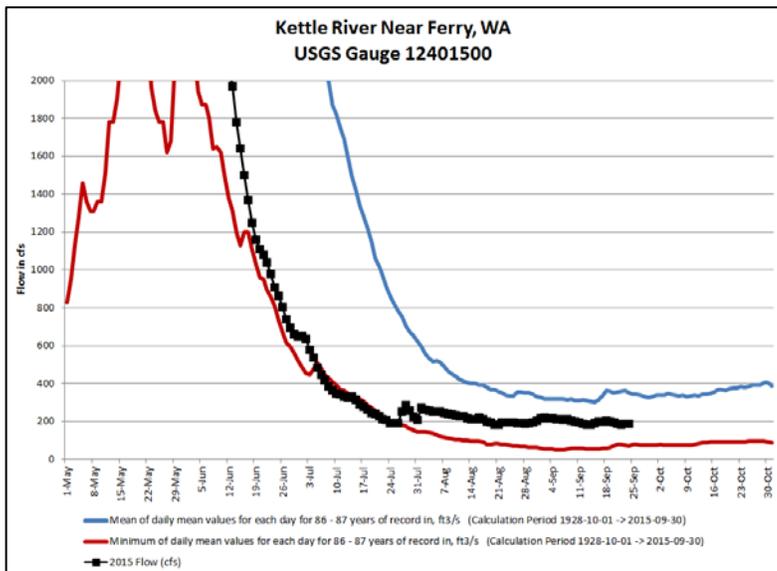
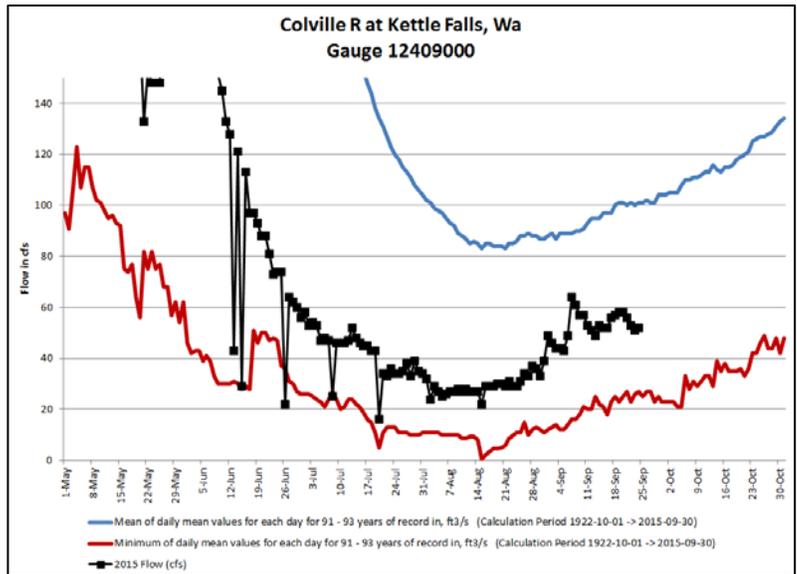
Methow flow is currently tracking with its historic hydrograph and low base flows with almost no discernable response to precipitation.

Okanogan River flows have tapered off, and temperatures continue to reduce. Conditions in Lake Osoyoos, just over the Canadian border, are still inhospitable for salmon, with water temperatures still close to lethal levels. I will search out, or someone could volunteer, some sockeye spawning information for next week.



Spokane, Northeast, and Southeast Washington

Colville River flows have begun their seasonal ascent, and remain in the middle of the lower-than-average range.

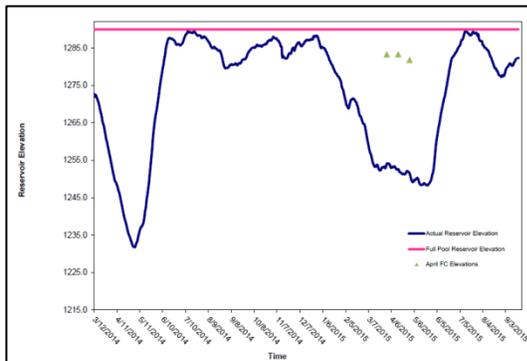


Kettle River flows are low and are leveling off; still in mid-low range.

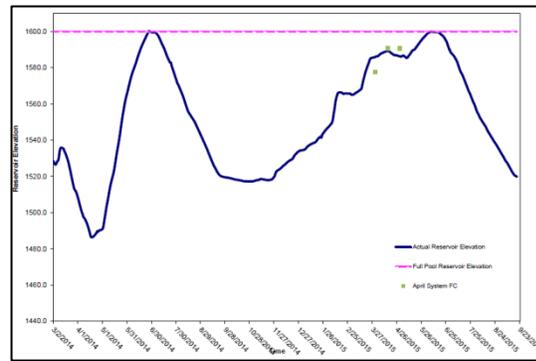
Snake & Columbia Rivers

Grand Coulee Reservoir is at 1,282.3 feet (9-20-15) and has held steady over the last week. Outflows at Grand Coulee have ranged between 64.3 and 68.3 Kcfs over the last week. Dworshak is currently at an elevation of 1,519.9 feet (9-20-15) and drafted 2.7 feet over the last week. Outflows have been reduced from 5.9 to 1.8 Kcfs over the last week. Following are charts showing reservoir elevations for Lake Roosevelt and Dworshak; "FC" means "flood control" elevation (ask me directly for full translation).

Grand Coulee Reservoir Elevation (Lake Roosevelt)



Dworshak Reservoir Elevation



Drought-related impacts to fish at hatcheries

Mortalities are shown for drought-caused losses only. “% Production” represents the % lost of the total production of the identified species at that facility.

REGION	FACILITY (SPECIES)	MORTALITY (% PRODUCTION)	TRANSFERS & RELEASES
3	Naches Hatchery	-0-	Two new wells have been drilled at this facility to replace the previous unreliable water supply.
4	Bellingham (Rainbow Trout)	5,760 (80%)	
4	Issaquah (Coho)	6,728 (1%) cum.	
4	Soos Creek (Summer Steelhead)	41,308 (60%)	
4	Soos Creek (Coho)	172,963 (21%)	Transferred 480,000 coho to Keta Creek Complex (Muckleshoot). This is a normal activity that was executed early this year.
4	Icy Creek (chinook)	-0-	107,000, or 33%, of the population was released early into the Green River on 7/29.
5	Grays River (Steelhead)	150,300 (93%)	450k type S coho were transferred to Cowlitz Trout Hatchery on July 28th and 29 th due to low water supply at Grays.
5	North Toutle (Coho)	101,746 (76%)	On July 14, the remaining 33,600 Type S Toutle Stock Coho were transferred to Cowlitz Trout Hatchery. The move was prompted by the losses due to columnaris (left).
5	Lewis (chinook)	-0-	On Mon. Aug. 3rd 500k Spring were released (~38% of the Lewis Spring program); standard release in Oct.
5	Speelyai (kokanee)	-0-	Fall Kokanee program released early due to construction of new intake at facility.
5	Vancouver	-0-	Well level is dropping so plans are underway to plant 15K brown trout early .
5	Washougal (Coho)	37,000 (2%)	
6	Elwha	0 (0%)	Staff is working to develop a replacement well at this facility
6	Forks Creek (Steelhead)	14,489 (24%)	
6	Lake Aberdeen (Steelhead)	64,903 (22%)	
6	Naselle (Steelhead)	64,989 (22%)	
6	Naselle (Coho)	639,646 (44%)	
6	Voights Creek (Coho)	347,000 (44%)	

Information about status of drought-related fisheries changes can be found at <http://wdfw.wa.gov/conservation/drought/>.

News Clips

[Drought in 2016 for Washington State?](#)

Cliff Mass Weather Blog - 25 September 2015

[Officials say drought conditions likely to continue into 2016](#)

Yakima Herald - 24 September 2015

[Washington drought expected to continue next year](#)

King5.com - September 24, 2015

[State Officials Are Preparing for Another Year of Continued Drought](#)

The Stranger - September 25, 2015

[Fall and winter forecast: warm and dry across the Northwest](#)

Seattle Times - September 24, 2015

[Columbia River chinook returns shattering records, and is second largest run since construction of Bonneville Dam in 1938](#)

The Seattle Times - September 23, 2015

[The Fire May Be Out Above Ground But Not Below](#)

NW Public Radio - September 24, 2015

[Columbia River at a 6-year low but trending upward, river forecasters say](#)

The Oregonian - September 23, 2015

[Why Are Humpback Whales In The Columbia River?](#)

OPB - September 23, 2015

[As Fires Grow, a New Landscape Appears in the West](#)

NY Times - September 22, 2015

[Razor clamming remains closed along entire Oregon Coast](#)

KVAL CBS 13 - September 21, 2015

[Marine toxins still too high in razor clams](#)

The Columbian - September 21, 2015

[Pink salmon run underwhelming, but there's a chance it'll pick up](#)

Goskagit.com - September 20, 2015

[Inland Northwest wildfires slowing down](#)

Northwest Cable News - September 20, 2015

[WDFW Monitoring Large Bluetongue Outbreak Amongst Eastside Whitetails](#)

Northwest Sportsman - September 18, 2015

[Spike in marine toxin puts razor-clam season on hold](#)

The Seattle Times - September 19, 2015

[Drought impacts](#)

Daily Sun News - September 18, 2015

Links

[Ecology's "Washington Drought 2015"](#)

Washington State Climatologist [weekly drought update for Washington State](#).

Drought web pages for State departments of [Health](#) and [Agriculture](#)

National Integrated Drought Information System [Pacific Northwest Drought Portal](#)

NOAA [El Nino Portal](#)

[NOAA's Climate Prediction Center](#) and [North American Multi-Model Ensemble](#)

[Northwest River Forecast Center Water Supply](#)

USGS [Real time stream data for Washington](#)

WRCC [Washington Climate Anomaly Maps and Tables](#)

U.S. Army Corps of Engineers [Seattle District Reservoir Control Center](#)

[Rich Landers Outdoors Blog](#) Spokesman Review – ongoing

[Concerns mount as drought deepens](#) Columbian Special Project July 11, 2015

[Washington Wildfire Resources](#)

Ecology Dam Safety web page [Wildfire Impacts on Dams](#)

Social media fire updates are available on #waWILDFIRE

[Get Everett water supply information.](#)

[Get Seattle water supply information.](#)

[Get Tacoma water supply information.](#)

[Saving Water Partnership](#)

For Further Information:

Drought-related staff resources are available on WDFW shared drive at [S:\All Agency\Shared Projects\DROUGHT 2015](#). Contact WDFW Drought Coordinator Teresa Scott at teresa.scott@dfw.wa.gov or (360) 902-2713 with questions and suggestions. Starting with the October 2 edition of this report, status updates will be distributed biweekly, with the last update planned for the week of November 2. A comprehensive report of drought activities and impacts in 2015 will be prepared before the end of December. Drought news will be distributed as needed, and it is currently anticipated that regular drought status updates will resume in February 2016.

While this writer prefers sunny fall days, a fair number of fish would be very happy if it rained straight through till the holidays. I leave you this week with a glimpse of precipitation in the last 12 hours in Washington. Green is the footprint of past precipitation; blue polygons represent

precipitation start time with the darkest blue happening right now, lightest blue starting in 2+ hours. The eastern flank of the Cascades is getting showers now, and all I can say is Yee Haw!

