COLORADO WATER SUPPLY CONDITIONS UPDATE

FROM THE OFFICE OF THE STATE ENGINEER: COLORADO DIVISION OF WATER RESOURCES ROOM 818, 1313 SHERMAN ST., DENVER, CO 80203 303-866-3581; <u>www.water.state.co.us</u>

October 1, 2015

The Surface Water Supply Index (SWSI) is used as an indicator of mountain-based water supply conditions in the seven major river basins of the state and in each of the 8-digit HUC basins. Colorado's original SWSI was been published beginning in the 1980s. The Colorado Water Conservation Board (CWCB) completed a major revision to the Colorado Drought Plan in 2010. At that time, Colorado adopted a new SWSI analysis based on the components shown below, which vary depending on the time of year. The new SWSI is based on a ranking of total volume in a HUC (watershed) or major river basin ranked against similar volumes in historical years. The Natural Resources Conservation Service (NRCS) has been producing a version of the new SWSI for the last few years.

Time Period	SWSI Components
January 1 - June 1	Forecasted Runoff + Reservoir Storage
July 1 - September 1	Previous Month's Streamflow + Reservoir Storage
October 1 - December 1	Reservoir Storage

Recently, CWCB and the Division of Water Resources (DWR) (both Divisions of the Colorado Department of Natural Resources) completed a software project to implement a revised version of the new SWSI and to document the underlying hydrologic data. July 1, 2015 was the first month that the new DNR SWSI was published. The SWSI is produced for the seven river basins and 41 HUCs in Colorado and the results are summarized at both scales within this monthly report. Additional information & data is available at: <u>http://water.state.co.us/DWRDocs/Reports/Pages/SWSIReport.aspx</u>. This document also contains reports about conditions prepared by each DWR Division Office.

The SWSI calculation for the fall season is based only on reservoir storage. For some HUCs, there is not a reservoir that is considered in the SWSI, and those HUCs do not have a SWSI calculated in the fall. The statewide SWSI values for September (October 1) range from a high value of +4.0 in the Yampa-White Basin to a low of 1.1 in the Colorado River basin. All of the major river basins have near normal to above normal levels of water in storage. On a HUC-basis, there are some low SWSIs due to either locally dry conditions or low reservoir storage due to maintenance activities. The following SWSI values were computed for each of the seven major basins for October 1, 2015.

Basin	October 1 SWSI	Change from Previous Month*	Change from Previous Year
Arkansas	2.8	0.2	2.0
Colorado	1.1	1.4	-1.1
Gunnison	2.8	0.6	3.7
Rio Grande	1.5	0.4	2.0
San Juan-Dolores	1.6	0.4	1.6
South Platte	3.0	-0.1	-1.1
Yampa-White	4.0	3.9	0.0

*Last month, the SWSI calculation also considered streamflow

				SWSI Scale				
4	-3	-2	-1	0	1	2	3	4
Severe Drought		Moderate Drought		Near Normal Supply		Above Normal Supply	А	bundant Supply



SURFACE WATER SUPPLY INDEX FOR COLORADO BY MAJOR RIVER BASIN

October 1, 2015



SURFACE WATER SUPPLY INDEX FOR COLORADO BY HUC

October 1, 2015

				Res Storage	
	HUC ID	HUC Name	SWSI	NEP	Total Vol (AF)
	11020001	Arkansas Headwaters	1.8	72	227,000
S	11020002	Upper Arkansas	2.4	78	195,700
nsa	11020005	Upper Arkansas-Lake Meredith	2.7	82	36,100
rka	11020006	Huerfano	-2.7	18	0*
∢	11020009	Upper Arkansas-John Martin Reservoir	2.8	83	273,300
	11020010	Purgatoire	2.1	75	22,000
	14010001	Colorado Headwaters	2.6	81	133,300
op	14010002	Blue	-1.7	30	103,100
lora	14010003	Eagle	No reservoirs considered, no SWSI calculated		
Co	14010004	Roaring Fork	-3.0	15	80,700
	14010005	Colorado Headwaters-Plateau	0.3	54	9,510
	14020001	East-Taylor	-1.2	36	71,700
	14020002	Upper Gunnison	1.3	66	838,900
uos	14020003	Tomichi	4.0	98	800
siuc	14020004	North Fork Gunnison	1.0	61	3,700
eni	14020005	Lower Gunnison	No res	servoirs considered, no	SWSI calculated
	14020006	Uncompahgre	0.2	53	60,200
	14030003	San Miguel	No reservoirs considered, no SWSI calculated		
	13010001	Rio Grande Headwaters	3.4	91	42,314
o opc	13010002	Alamosa-Trinchera	0.0	50	5,354
Grai	13010004	Saguache	No res	servoirs considered, no s	SWSI calculated
Ŭ	13010005	Conejos	-1.8	29	15,900
	14030002	Upper Dolores	0.9	60	273,100
έø	14080101	Upper San Juan	1.7	70	76,300
Juai	14080102	Piedra	No res	servoirs considered, no s	SWSI calculated
, ni Dolo	14080104	Animas	-0.9	42	17,300
Sc I	14080105	Middle San Juan	0.0	50	152
	14080107	Mancos	1.6	69	5,400
	10190001	South Platte Headwaters	-0.7	41	137,214
	10190002	Upper South Platte	1.9	72	317,400
tte	10190003	Middle South Platte-Cherry Creek	1.0	62	58,700
Pla	10190004	Clear	No res	servoirs considered, no s	SWSI calculated
South	10190005	St. Vrain	-2.0	26	58,300
	10190006	Big Thompson	1.8	72	527,100
	10190007	Cache La Poudre	2.8	84	132,400
	10190012	Middle South Platte-Sterling	4.0	99	99,300
	10180001	North Platte Headwaters	No res	servoirs considered, no s	SWSI calculated
e a	14050001	Upper Yampa	4.0	99	42,400
hit	14050002	Lower Yampa	No res	servoirs considered, no	SWSI calculated
∠ ≺	14050003	Little Snake	No res	servoirs considered, no	SWSI calculated
	14050005	Upper White	No res	ervoirs considered, no	SWSI calculated

October 1, 2015 SWSI Values by HUC and Component Non Exceedance Probabilities (NEP)

NEP is non exceedance probability for total reservoir storage in HUC (if there is more than one of each type of component, their volumes are added together). Total Vol is the volume of reservoir storage plus in HUC combined. NEP is calculated compared to active storage data for the period 1970-2010.

*Cucharas Reservoir is empty due to Division Engineer filling restriction

**Long Hollow Reservoir is newly constructed and therefore does not have a history of storage for comparison

HUC ID	HUC Name	Component Name	Component Volume (AF)	Component NEP for Month
		CLEAR CREEK RESERVOIR	7,300	72
11020001	Arkansas Hoadwators	TURQUOISE LAKE	118,400	64
11020001	Aikalisas neauwaleis	TWIN LAKES RESERVOIR	59,300	62
		HOMESTAKE RESERVOIR	42,000	81
11020002	Upper Arkansas	PUEBLO RESERVOIR	195,700	78
11020005	Upper Arkansas-Lake	MEREDITH RESERVOIR	28,700	79
11020003	Meredith	LAKE HENRY	7,400	99
11020006	Huerfano	CUCHARAS RESERVOIR	0*	18
11020000	Upper Arkansas-John	ADOBE CREEK RESERVOIR	47,400	91
11020009	Martin Reservoir	JOHN MARTIN RESERVOIR	225,900	83
11020010	Purgatoire	TRINIDAD LAKE	22,000	75
14010001	Colorado	WILLIAMS FORK RESERVOIR	87,900	82
1-010001	Headwaters	WOLFORD MOUNTAIN RESERVOIR	45,400	74
14010002	Blue	GREEN MOUNTAIN RESERVOIR	103,100	30
14010004	Roaring Fork	RUEDI RESERVOIR	80,700	15
14010005	Colorado Headwaters-Plateau	VEGA RESERVOIR	9,510	54
14020001	East-Taylor	TAYLOR PARK RESERVOIR	71,700	36
	Upper Gunnison	BLUE MESA RESERVOIR	725,600	73
		MORROW POINT RESERVOIR	104,500	1
14020002		FRUITLAND RESERVOIR	0	25
		CRAWFORD RESERVOIR	5,400	60
		SILVER JACK RESERVOIR	3,400	32
14020003	Tomichi	VOUGA RESERVOIR NEAR DOYLEVILLE	800	98
14020004	North Fork Gunnison	PAONIA RESERVOIR	3,700	61
14020006	Uncompahgre	RIDGEWAY RESERVOIR	60,200	53
	Die Grande	RIO GRANDE RESERVOIR	22,983	88
13010001	Headwaters	SANTA MARIA RESERVOIR	19,331	92
		CONTINENTAL RESERVOIR	0**	6
13010002	Alamosa-Trinchera	TERRACE RESERVOIR	2,809	48
13010002		MOUNTAIN HOME	2,545	60
13010005	Conejos	PLATORO RESERVOIR	15,900	29
14030002	Upper Dolores	GROUNDHOG RESERVOIR	18,800	99
		MCPHEE RESERVOIR	254,300	60
14080101	Upper San Juan	VALLECITO RESERVOIR	76,300	70
14080104	Animas	LEMON RESERVOIR	17,300	42
14080105	Middle San Juan	LONG HOLLOW RESERVOIR	152	50
14080107	Mancos	JACKSON GULCH RESERVOIR	5,400	69
	South Platta	ANTERO RESERVOIR	14**	4
10190001	Headwater	ELEVENMILE CANYON RESERVOIR	100,100	91
		SPINNEY MOUNTAIN RESERVOIR	37,100	63
10190002	Upper South Platte	CHEESMAN LAKE	70,400	73
		DILLON RESERVOIR	247,000	61

	October 1,	2015 9	SWSI Com	ponent Inf	ormation I	Bv H	IUC
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HUC ID	HUC Name	Component Name	Component Volume (AF)	Component NEP for Month
		BARR LAKE	15,800	90
10100003	Middle South Platte-	MILTON RESERVOIR	1,100**	4
10190003	Cherry Creek	STANDLEY RESERVOIR	36,500	72
		HORSECREEK RESERVOIR	5,300	79
		GROSS RESERVOIR	31,300	44
		MARSHALL RESERVOIR	6,000	82
10190005	St. Vrain	BUTTONROCK (RALPH PRICE) RESERVOIR	6,400	1
		TERRY RESERVOIR	4,100**	26
		UNION RESERVOIR	10,500	57
		BOYD LAKE	30,200	58
		CARTER LAKE	56,200	69
		LAKE LOVELAND RESERVOIR	4,200	14
10190006	Big Thompson	LONE TREE RESERVOIR	2,000	16
		MARIANO RESERVOIR	1,200	80
		LAKE GRANBY	425,800	75
		WILLOW CREEK RESERVOIR	7,500	42
	Cache La Poudre	BLACK HOLLOW RESERVOIR	3,100	75
		CACHE LA POUDRE	4,800	78
		CHAMBERS LAKE	3,500	71
10190007		COBB LAKE	18,800	84
10170007		FOSSIL CREEK RESERVOIR	5,600	81
		HALLIGAN RESERVOIR	4,000	90
		HORSETOOTH RESERVOIR	89,700	73
		WINDSOR RESERVOIR	2,900	48
10190012		EMPIRE RESERVOIR	19,600	98
	Middle South Platte-	JACKSON LAKE RESERVOIR	19,300	92
		JULESBURG RESERVOIR	9,400	74
	Sterling	POINT OF ROCKS RESERVOIR	13,600	80
		PREWITT RESERVOIR	17,100	87
		RIVERSIDE RESERVOIR	20,300	95
14050001	Unner Vampa	STAGECOACH RESERVOIR NR OAK CREEK	35,300	99
	оррег татпра	YAMCOLO RESERVOIR	7,100	92

*Cucharas Reservoir is empty due to Division Engineer filling restriction **Water level low for maintenance

The SWSI value for the month was 3.0. September continued what has felt like a weather "roller-coaster" during the 2015 Irrigation Year. While in August things seemed to be moving more toward "normal", in September they dipped to well below normal for precipitation and well above normal for temperatures. Precipitation over northeast was generally below average to, for a large area primarily in Larimer and Weld Counties, nonexistent. Only the highest elevations and the far eastern edge of the state saw anything close to normal precipitation. As is often the case in northeast Colorado, low precipitation goes hand-in-hand with high temperatures. Average temperatures throughout northeast Colorado were anywhere from 4 to 8 degrees above normal.

The September dryness is also indicated by the unwelcome return of a U.S. Drought Monitor rating of D0 "Abnormally Dry" to northeast Colorado. The September 1 Drought Monitor indicated no part of northeast Colorado with a D0 rating; while the September 29 Drought Monitor indicated well over half of northeast Colorado with a D0 rating.

A further indication of the dry September was the low flows at both the Kersey and Julesburg gages. For the first time since August 2013, the September mean flow at both the Kersey and Julesburg gages was

below the long term average. The flow at one of the two gages has been below the mean during the August 2013 through September 2015 period, but not both simultaneously. The September Julesburg mean gage flow was about 193 cfs or 68% of the long term September mean flow of 284 cfs. The overall September Kersey gage mean flow was about 398 cfs or 74% of the long term September mean flow of 539 cfs.

As could be expected with the low flows, most of the South Platte basin was under call for most of the month. The surprise was that the calls were generally more junior than is typical of September and there was free river on the mainstem below the St. Vrain-South Platte confluence for roughly the last half of the month. This free river was mainly due to limited physical ability to take water by Jackson and North Sterling Reservoirs because inlet damage from the high water during the spring was still being repaired.

The bright spot amid all the dry and low flow conditions continued to be reservoir storage. The end of September overall storage was at approximately 60% of capacity. This compares to an overall average end of September storage of approximately 53% of capacity. It is probable the storage would be even higher if Antero Reservoir was not drained for repairs and North Sterling or Jackson had been able to divert in September.







South Platte-DataComposite-SWSI

The SWSI value for the month was 2.8. River calls during September ranged from a senior call of 12/3/1884 Catlin Canal to 3/1/1887 Fort Lyon Canal. Below Fort Lyon Canal, John Martin Reservoir remained in conservation storage with a 1949 river call.

Administrative / Management Concerns

With reservoirs in the basin much fuller than seen in the last fifteen years, planning has begun to anticipate whether storage capacities might be exceeded in key reservoirs for winter storage. A major canal maintenance project will cause the Fort Lyon Canal to be unavailable for winter storage diversions and the Fort Lyon Canal and Amity Canal have prepared an alternative approach utilizing the Fort Lyon Storage Canal to attempt to maintain storage operations.





Arkansas-DataComposite-SWSI

The SWSI value for the month was 1.5. Flow at the gaging station Rio Grande near Del Norte averaged 364 cfs (73% of normal). The Conejos River near Mogote had a mean flow of 106 cfs (71% of normal). The Conejos River and its tributaries continue to languish with below average precipitation and streamflow. The southern part of the San Luis Valley did not experience the good runoff in 2015 like most of the other drainages. Streamflow in the majority of the northern part of the San Luis Valley is still near average. The streams in the western part of the basin are dropping below average due to lack of recent precipitation.

Reservoir storage in the basin is in generally poor to fair condition. The summer irrigation demand dropped storage levels. Repairs to Beaver Park Reservoir are complete and the reservoir is slowly storing back by exchange. Repair work to Continental Reservoir is nearly complete. That reservoir should start storing again by exchange of its previous contents very soon.

<u>Outlook</u>

Recently-released National Weather Service 90-day precipitation and temperature outlooks call for a chance of above average precipitation for November, 2015 through April 2016 for this region. In fact, the southern part of the nation is forecasted for above average precipitation this winter. Maybe the Conejos and its tributaries will finally get a deep blanket of snow this winter.

Administrative/Management Concerns

On September 23, 2015 the State Engineer filed the long-awaited "Rules Governing the Withdrawal of Groundwater in Water Division No. 3". This historic event was held at the Alamosa County Courthouse with a public gathering. The filing was the culmination of over six years of rule development. The original (1975) attempt to enact groundwater use rules in this basin met with much resistance, delay, and stipulation. The drought of 2002 - 2004 amplified the effect of nonexempt well use on the over-appropriated water system in the San Luis Valley. Rules are necessary to prevent injury to vested water rights, set sustainability standards for the stressed aquifers, and eliminate well impacts on compliance with the Rio Grande Compact. More space will be committed to this topic in the coming months.

These Rules also seek to establish criteria for the beginning and end of the irrigation season in Water Division No. 3 for all irrigation water rights. By previous SEO policy, the Rio Grande, its tributaries, and the other areas of the San Luis Valley had a presumptive November 1st shut-off date and April 1st start-up date for decreed irrigation rights. The Rules seek to formalize this policy.

Public Use Impact

The autumn weather patterns have been very comfortable and have had little or no effect on crop harvest.









The SWSI value for the month was 2.8. Weather in the Gunnison basin was beautiful during September, with warm temperatures and very little precipitation. In fact, temperatures were between 3 to 5 degrees above average and no area received greater than 69% of average precipitation during September. As a result, many streamflows fell to below normal levels by the end of the month, but due to the extensive precipitation previously it didn't cause a big problem.

<u>Outlook</u>

The Gunnison basin is on the northern edge of the area that is expected to receive El Nino enhanced precipitation during the next three months. The current El Nino is one of the strongest on record for this time of year and is expected to continue, but doesn't necessarily correlate with heavy winter precipitation in central Colorado.

Administrative/Management Concerns

Gunnison Tunnel demand exceeded inflows into the Aspinall Unit for all but three days in September, meaning that the Uncompany Valley Water Users used 10,300 acre-feet of Taylor Park water to satisfy demand in the Uncompany Valley.

Although use of reservoir water accelerated in September due to dry conditions, most reservoirs, including those on the Grand Mesa, will end the year in better condition than average. For example, the 90 plus reservoirs on the Grand Mesa will carryover approximately 42% of their capacity, which is better than average.

Despite the dry fall, it doesn't appear that irrigators on the North Fork Gunnison River will exhaust all the Paonia project water prior to shutting down their systems this year. This is unusual and is important because Paonia Reservoir water is used in the Ragged Mountain Exchange, which allows ditches above the Reservoir to continue running during a call.











<u>Basinwide Conditions Assessment</u> The SWSI value for the month was 1.1.

<u>Outlook</u>

Colorado River flows continue to fall to slightly around average with tributary flows running near or below average throughout October. Average to below average precipitation with above average temperature is forecast for western Colorado through October.

Administrative/Management Concerns

As of October 1, the call on the Colorado River main stem at Shoshone is the senior Shoshone Hydro Power right for 1250 cfs and the call on the Colorado main stem at Cameo remains the junior Grand Valley Canal water right. The call on the Blue River is the Green Mountain hydro right per the Green Mountain Administration Protocol. Accordingly, Green Mountain Reservoir is releasing to pass inflows, provide replacement water and HUP obligations. Grand Valley Irrigation diversions (Government Highline/Orchard Mesa Irrigation, Grand Valley Irrigation canals) continue at or near full capacity. Ruedi Reservoir is ramping down their outflows to meet their winter target of 70 cfs. Wolford Reservoir is bypassing inflows and releasing for contracts.

Public Use Impacts

Reservoir operations at Grizzly Reservoir are returning to normal. Due to a failure of an outlet gate at Grizzly Reservoir, the reservoir was drained which increased flows to Lincoln Creek and the Roaring Fork River. The Roaring Fork River near Aspen jumped from near 70 cfs to 160 cfs in only a few hours. It also caused the release of a large amount of sediment from the bottom of the reservoir containing elevated levels of several dissolved metals.







Colorado-DataComposite-SWSI

The SWSI value for the month was 4.0. September precipitation was below average in the Yampa, White, and North Platte River basins. Precipitation for the month, as measured at the SNOTEL sites operated by NRCS, was reported at 71% of average for the North Platte River basin and 84% of average for the Yampa and White River basins combined. Total precipitation for the water year as a percent of average to date at the end of September was 94% and 87%, respectively.

<u>Outlook</u>

As of October 5, 2015, Fish Creek Reservoir was at a level of 74.7% of capacity; a storage of 3,113 AF. The capacity of Fish Creek Reservoir is 4,167 AF. Yamcolo Reservoir was storing 8,085 AF at the end of September 2015. The capacity of Yamcolo Reservoir is 8,700 AF. On September 30th, Elkhead Creek Reservoir was storing 16,162 AF. The capacity of Elkhead Creek Reservoir is 24,778 AF. The reservoir level for Elkhead Creek Reservoir has been dropped significantly in order to prepare for the installation of a fish screen near the spillway of the reservoir. Releases from the reservoir, to drop the water level, will continue into October. On September 30th, 2015; Stagecoach Reservoir was storing 35,342 AF. The capacity of Stagecoach Reservoir is 36,439 AF.

Water stored in Fish Creek Reservoir is used primarily for municipal purposes, Yamcolo Reservoir for

irrigation purposes, and Elkhead Creek Reservoir for municipal, industrial, recreational, and fish recovery releases. Stagecoach Reservoir is primarily used for recreation though a significant amount of stored water is allocated for municipal, industrial, irrigation and augmentation uses.







SAN JUAN-DOLORES BASIN

Basinwide Conditions Assessment

The SWSI value for the month was 1.6. Flow at the Animas River at Durango averaged 275 cfs (60% of average). The flow at the Dolores River at Dolores averaged 125 cfs (69% of average). The La Plata River at Hesperus averaged 7.6 cfs (38% of average). Precipitation in Durango was 2.05 inches for the month, 83% of the 30-year average of 2.48 inches. Precipitation was the 53 highest amount recorded in September, in Durango, out of 121 years of record. Precipitation to date in Durango, for the water year, is 20.99 inches, 108% of the 30-year average of 19.43 inches. End of last month precipitation to date, for the water year was 109% of average. The average high and low temperatures for the month of September in Durango were 81° and 46°. In comparison, the 30-year average high and low for the month is 76° and 45°. At the end of the month Vallecito Reservoir contained 76,290 acre-feet compared to its average content of 57,731 acrefeet (132% of average). McPhee Reservoir was up to 254,289 acre-feet as compared to its average content of 268,328 (95% of average), while Lemon Reservoir was up to 17,960 acre-feet as compared to its average content of 18,742 acre-feet (96% of average).

Outlook

Precipitation (2.05 inches) was slightly below average for September in Durango. There were 53 years out of 121 years of record where there was more precipitation than this year. Flows in the rivers within the basin remained below average for the month. There were 80 out of 105 years of record where the total

flow past the Animas River at Durango stream gauge was more than this year. There were 62 out of 106 years of record where the total flow past the Dolores stream gauge was more than this year and 80 out of 99 years of record where the total flow past the La Plata River at Hesperus gauge was more than this year.















































































