COLORADO
WATER SUPPLY CONDITIONS UPDATE

FROM THE OFFICE OF THE STATE ENGINEER: COLORADO DIVISION OF WATER RESOURCES
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July 2015

The Surface Water Supply Index (SWSI) developed by this office and the U.S.D.A. Natural Resources Conservation Service (NRCS) is used as an indicator of mountain-based water supply conditions in the major river basins of the state. It is based on streamflow, reservoir storage, and precipitation for the summer period of May through October (June 1 through November 1). During the summer period, streamflow is the primary component in all basins except the South Platte basin, where reservoir storage is given the most weight. The enclosed narratives are provided by the Division of Water Resources Office in each stream basin.

The statewide SWSI values for June (July 1) range from a high value of +3.4 in the South Platte River Basin to a low of -0.1 in the Yampa/White basin. The SWSI increased dramatically in the Rio Grande and San/Juan Dolores Basins over the last month. For both basins, this was the first month since October 2014 where the SWSI was greater than 0. Reservoir storage and streamflow continued to be strong and above normal for most locations in the state.

The following SWSI values were computed for each of the seven major basins for July 1, 2015. Additional information about SWSI calculations and the NRCS National Water and Climate Center SWSI by HUC are included on Page 10.

Basin	July 1 SWSI ("Old SWSI")	Change from Previous Month	Change from Previous Year
South Platte	3.4	-0.5	0.4
Arkansas	1.1	-0.4	0.1
Rio Grande	1.9	3.8	2.7
Gunnison	3.0	-0.6	2.8
Colorado	1.6	1.3	-0.2
Yampa/White	-0.1	-1.1	-0.8
San Juan/Dolores	2.4	4.0	3.0

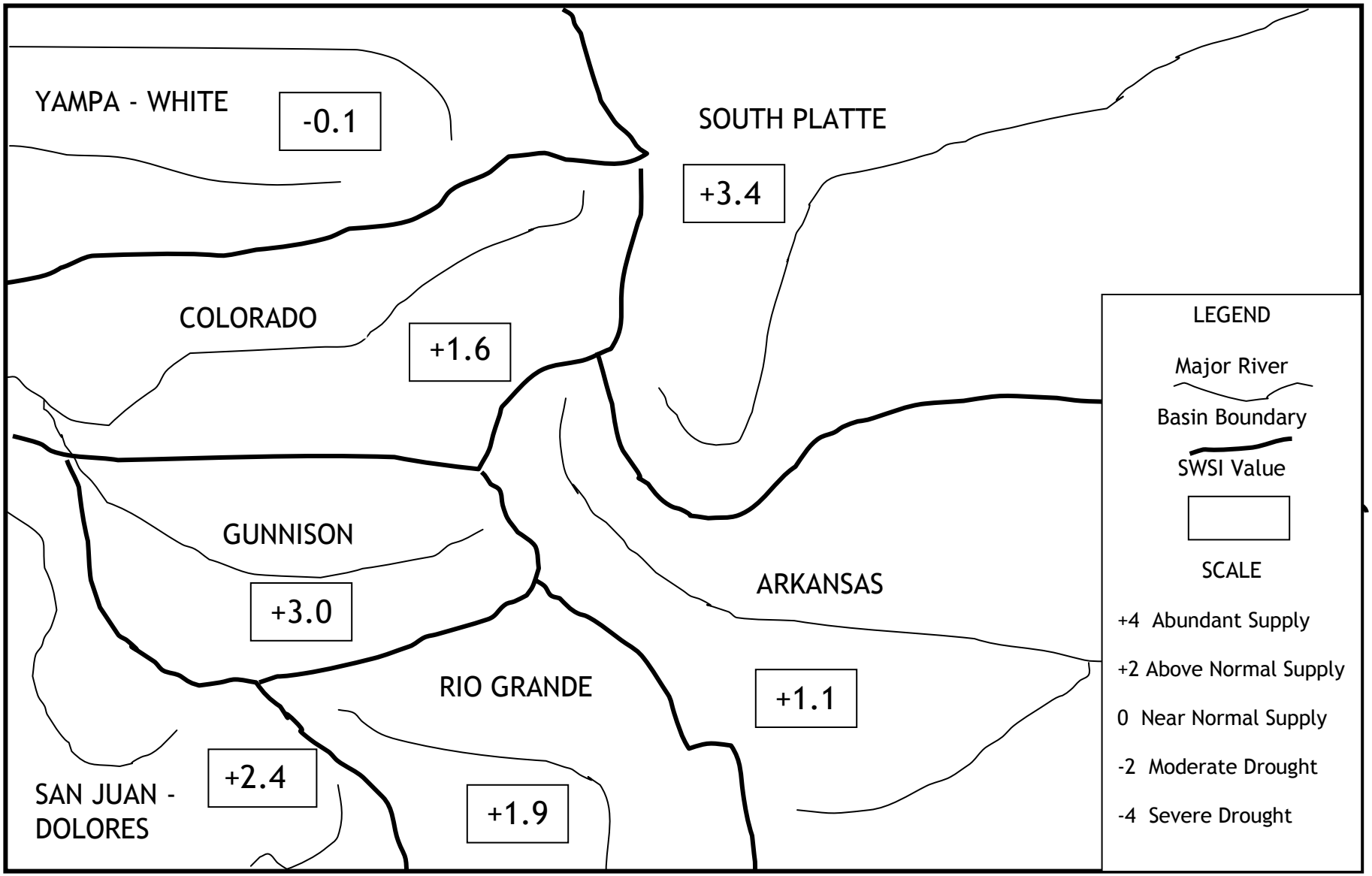
Transition to New Colorado DNR SWSI

July 1, 2015 represents the first month that the new SWSI developed jointly by the Colorado Water Conservation Board (CWCB) and Division of Water Resources (DWR) (both Divisions of the Colorado Department of Natural Resources) is published. The new SWSI is based on the 8-digit huc basin size and uses only water volumes with no weighting to produce an indicator of water availability. The new DNR SWSI and basic background information are included at the back of this report. Within a few months, DWR will discontinue calculation of the old SWSI.

SWSI Scale

4	-3	-2	-1	0	1	2	3	4
Severe Drought		Moderate Drought		Near Normal Supply		Above Normal Supply		Abundant Supply

"OLD SWSI" FOR COLORADO



July 1, 2015

Basinwide Conditions Assessment

The SWSI value for the month was 3.4. June was a month of change, contrast, and more of the same in the South Platte River basin. The overall weather pattern revealed both change and contrast while streamflow, call regime, and storage revealed more of the same.

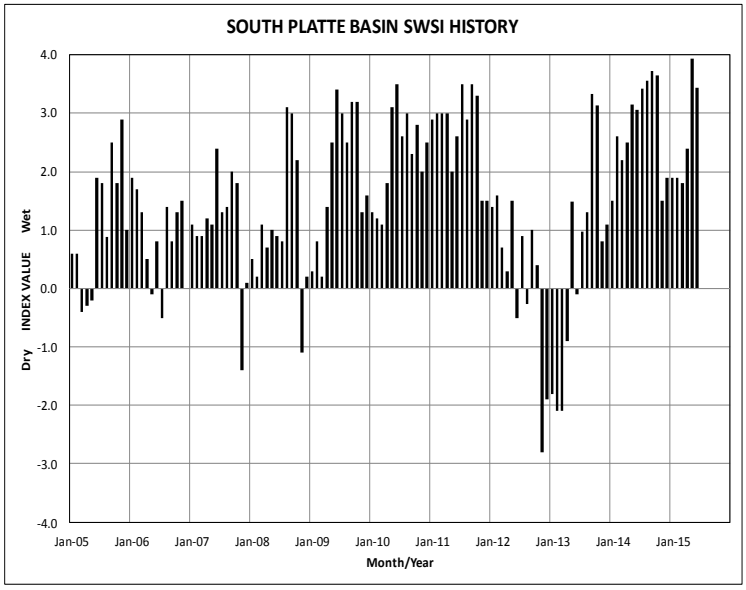
Temperatures and snowpack provided the change within the basin. Temperatures, though variable, moved from the below normal readings seen in May to above normal in June. Snowpack, as measured by the SNOWTEL network, went from 101% of the normal seasonal peak on May 24 to 0 by July 1.

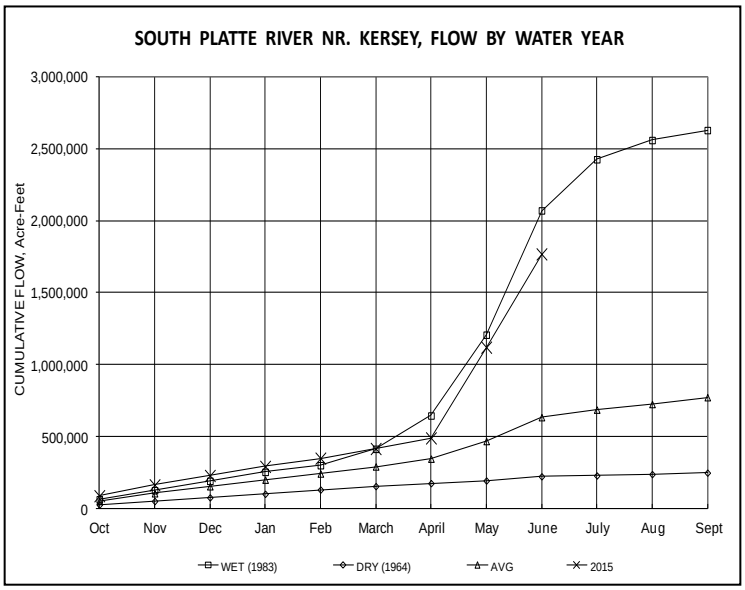
Precipitation provided the contrast in the South Platte basin in June. If a line was drawn from east to west across the basin roughly even with the north boundary of Adams County, precipitation south of that line was generally near or well above average while precipitation north of that line was at best near average and generally below average.

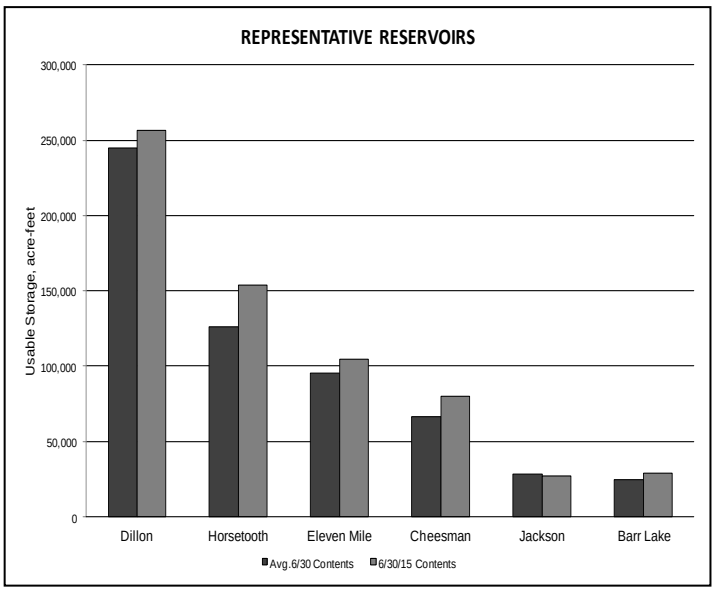
Flows at the Kersey and Julesburg key index gages moved from the almost unbelievably large May flow levels to even higher flow levels in June (though levels did drop as a percentage of the historic mean). Flows at the Kersey gage averaged 10,912 cfs (as compared to 10,260 cfs in May). This is approximately 473% of the historic June mean flow of 2,308 cfs (May was 594% of the historic May mean). Julesburg flows averaged 12,249 cfs (as compared to 9,660 cfs in May). This represents approximately 859% of the historic June mean flow of 1,426 cfs (May was 972% of the historic May mean). The June flows also represent the unusual circumstance of flows at Julesburg exceeding the flows at Kersey – for the fourth time in this unusual Irrigation Year.

The unusually high stream flows in June contributed to the continuing run of mostly free river conditions within the South Platte basin. However, the shift to declining snowmelt runoff did move things more toward normal by the end of the month. Portions of two streams, South Boulder Creek and the Cache la Poudre River, went under relatively junior calls on June 29. Other than that, the entire basin was under free river for the entire month of June.

Though reservoir storage was down slightly from the end of May, it continued to be excellent in June. The average end of June storage is approximately 85% of capacity. Actual storage on July 1, 2015 was approximately 93% of capacity (down slightly from the May 31, 2015 storage of approximately 95% of capacity).







Basinwide Conditions Assessment

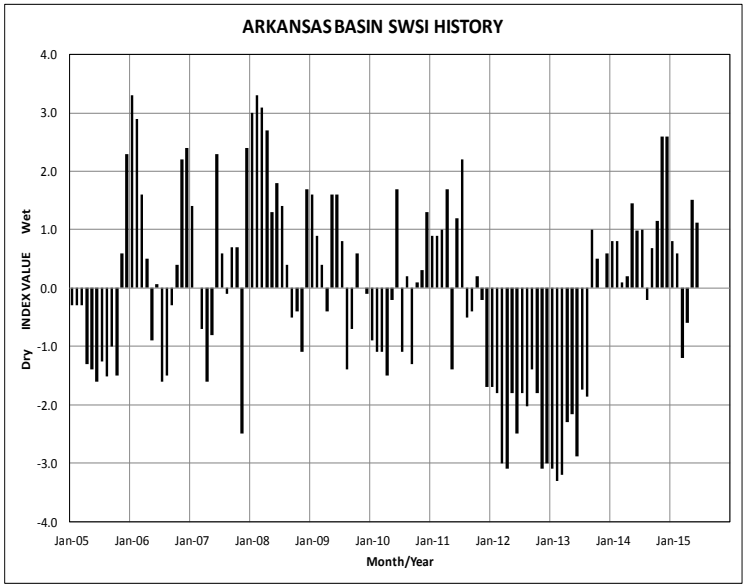
The SWSI value for the month was 1.1. Runoff, enhanced by rainfall runoff events, was remarkable in June. Flows were high enough to require flood control operations in Pueblo Reservoir where just over 40,000 acre-feet was detained while managing flows through the Arkansas River near Avondale gage as close to 6,000 cubic feet per second as possible. Due to localized flooding impacting some structures from Avondale downstream, flows were adjusted lower than 6,000 cfs at the direction of the U.S. Army Corps of Engineers in Albuquerque.

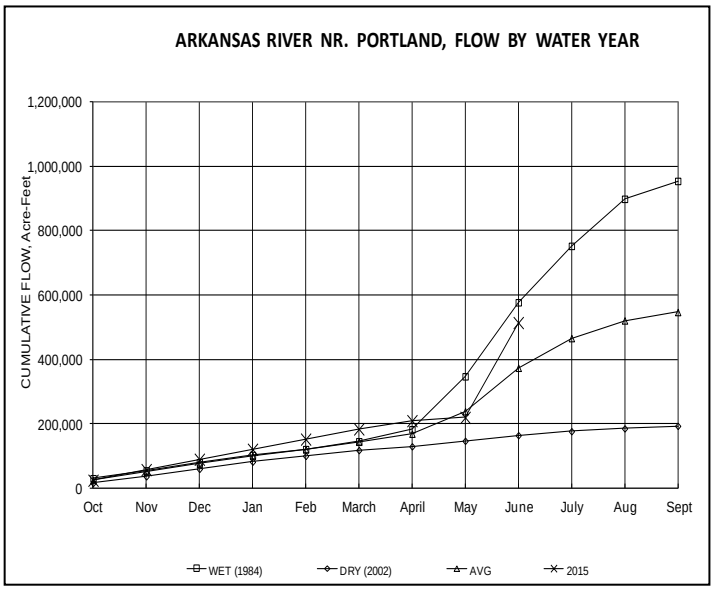
The above average flows and above average reservoir storage in the basin allowed Colorado Parks and Wildlife to team up with Pueblo Board of Water Works to execute an exchange to Trinidad Reservoir for the permanent fishery/recreation pool. Releases were made from Clear Creek Reservoir and Twin Lakes Reservoir and delivered to the confluence with the Purgatoire River near Las Animas allowing storage by exchange at Trinidad Reservoir.

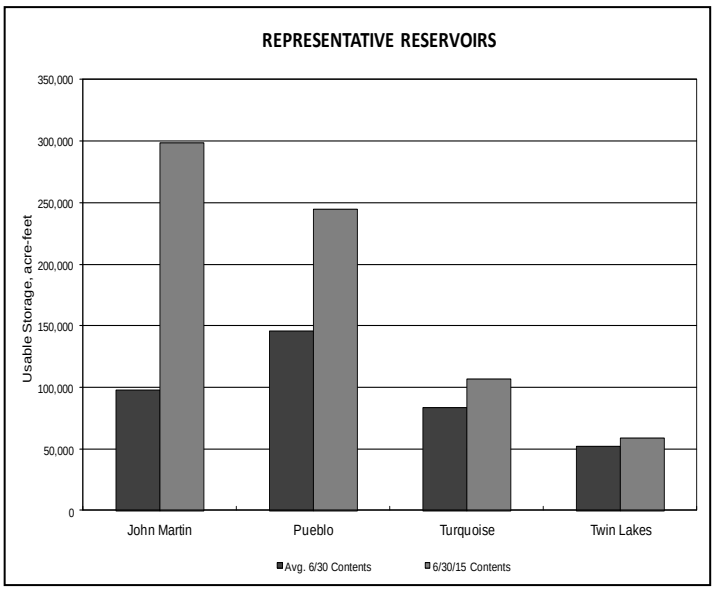
Administrative / Management Concerns

Both Pueblo Reservoir and John Martin Reservoir have some risk of spill. Southeastern Colorado Water Conservancy District is attempting to manage Fryingpan-Arkansas Project water deliveries down to Pueblo Reservoir in a manner that allows some space for transmountain imports during 2015 in Turquoise and Twin Lakes Reservoirs, while attempting to avoid a spill of account water in Pueblo Reservoir.

John Martin Reservoir continued to rebound significantly in June and ended the month with just less than 300,000 acre-feet of storage; a stark contrast to the low point of storage in late 2014 of around 6,000 acre-feet. Beginning of spill occurs at just under 340,000 acre-feet of storage in John Martin.







Basinwide Conditions Assessment

The SWSI value for the month was +1.9. Flow at the gaging station Rio Grande near Del Norte averaged 3980 cfs (134% of normal). The Conejos River near Mogote had a mean flow of 1157 cfs (105% of normal). Streamflow in the upper Rio Grande basin was generally well above the long-term average during June as the snowfall of May melted out. Some lower elevation drainages experienced maximum flow in April or May (i.e La Jara Creek, Rio San Antonio, etc.), but the majority of the streams in the San Luis Valley had a very welcome early June peak.

Reservoir storage and soil moisture conditions have improved vastly in the past 60 days.

The Valley floor received above average precipitation and temperatures during May.

Outlook

Due to the May snowstorms, streamflow is expected to be above average for streams north of US Highway 160 for the next several weeks. Drainages south of US Highway 160 will not be as fortunate.

National Weather Service outlooks for the next 90 days call for cooler and wetter than normal conditions in the upper Rio Grande basin.

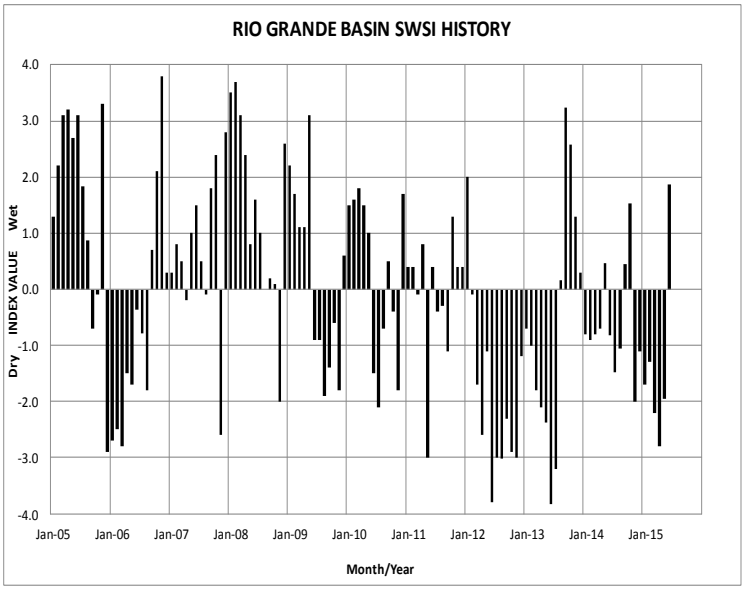
Administrative/Management Concerns

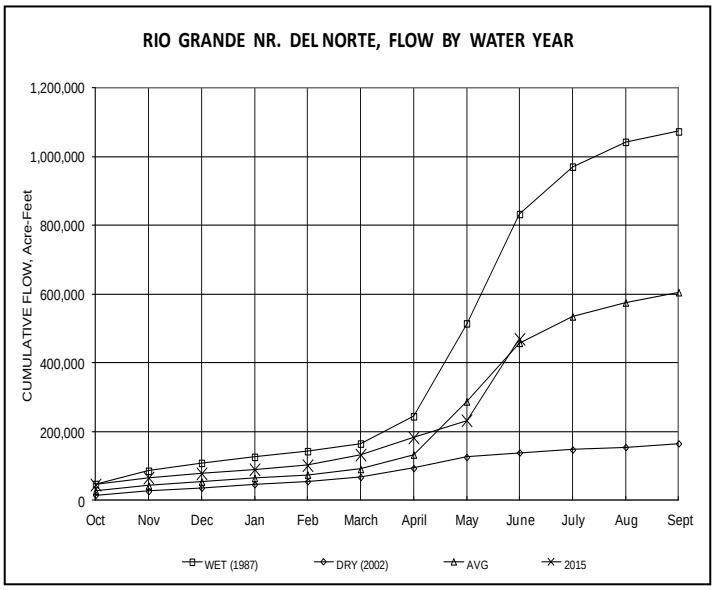
Unexpected and increased runoff has been a welcome problem to deal with. Minor flooding occurred in parts of Saguache County without significant property damage.

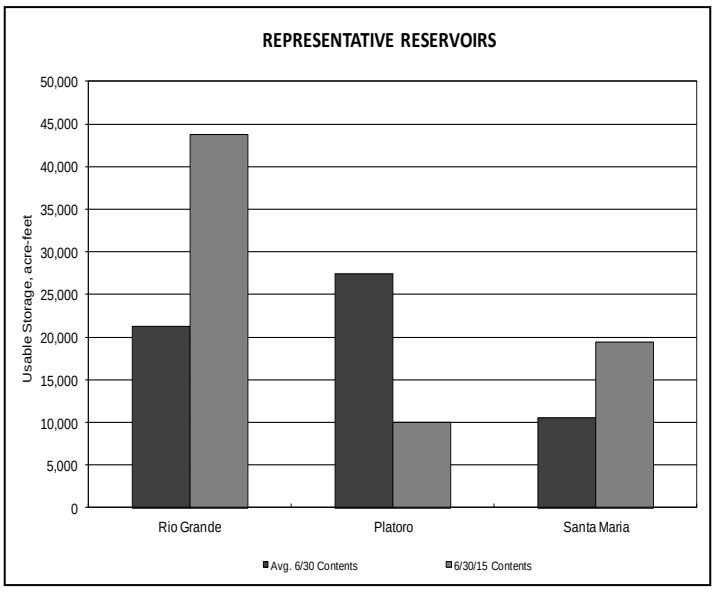
With the additional runoff, Colorado's delivery obligation under the Rio Grande Compact increased. In response, the Division Engineer adjusted the curtailment percentages on the Rio Grande and Conejos river systems accordingly. Colorado expects to meet the annual water delivery requirement to the downstream states. Long-time Engineer Adviser for the state of Texas, Herman Settemyer, has announced his retirement. He served in that capacity for over 20 years.

Public Use Impact

The extraordinary runoff in most area streams during June put many junior water rights into priority longer than expected. The resulting standing water in low areas has created a mosquito problem and difficulty getting hay and alfalfa baled.







Basinwide Conditions Assessment

The SWSI value for the month was 3.0. June started with a continued wet and cool pattern that resulted in most of the basin receiving greater than 150% of average precipitation, with the exception of the East and Taylor Rivers that were between 90-100% of average. However, the last two weeks of June were hotter and drier than average with temperatures in the lower valleys reaching the 100's many days, which interestingly pushed the monthly temperature to 1-3 degrees above average. The cool and wet weather through the middle of the month helped preserve high mountain snowpack that rapidly melted during the hot period, which produced higher than average flows on most streams in the basin. Streamflows stayed up until June 25th at a level that kept calls off of even the most highly administered areas such as Surface Creek.

Due to all the late season precipitation and the difficulty of including rainfall in the runoff models, April to July runoff forecasts from the Colorado Basin River Forecast Center (CBRFC) were exceeded in every stream in Water Division 4. For example, the June 1st forecasted inflow to Blue Mesa Reservoir was 84% of the 30-year average while the actual runoff appears like it will come in closer to 104%!

Outlook

Climate Center forecasts show the Gunnison basin within an area expected to receive greater than average precipitation during the next three months. The current El Nino is expected to strengthen, which correlates with heavier than average monsoon precipitation in the fall for the Gunnison.

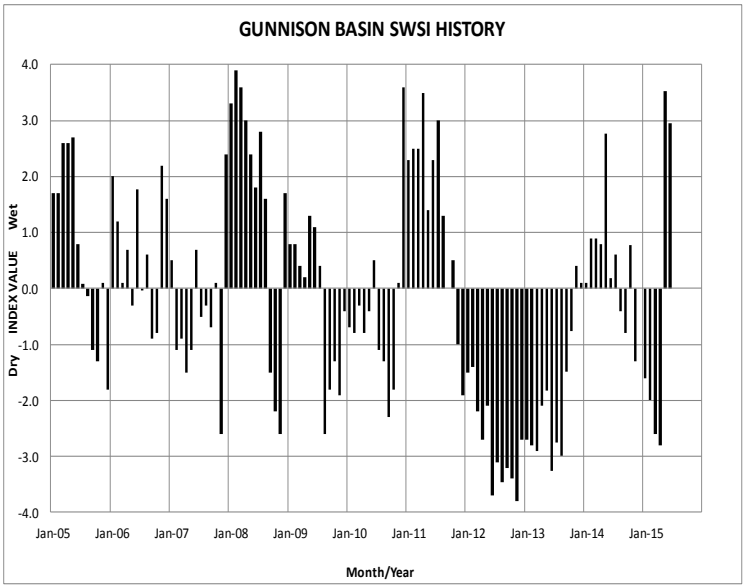
Administrative/Management Concerns

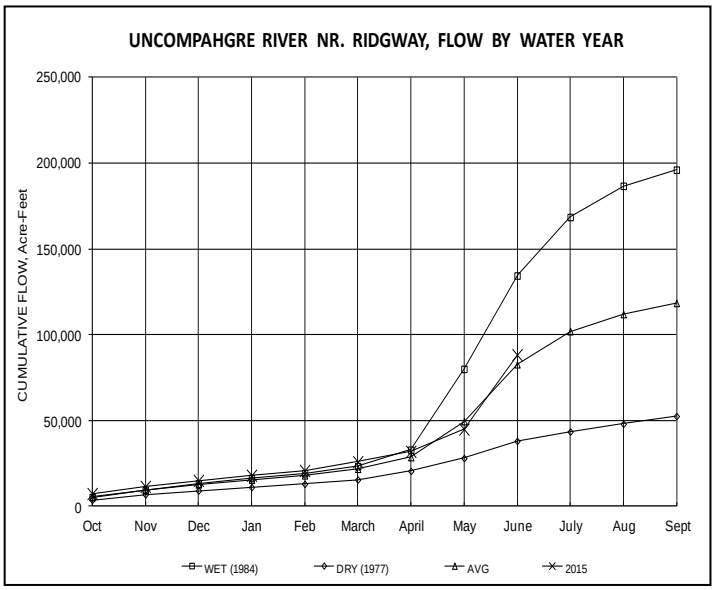
Out of the ordinary administrative concerns have pretty much been eliminated due to the late spring rains and an early start to the monsoon season during the second week of July. Almost all reservoirs in the basin filled to capacity, including the over 90 on the Grand Mesa that supply water to orchards below.

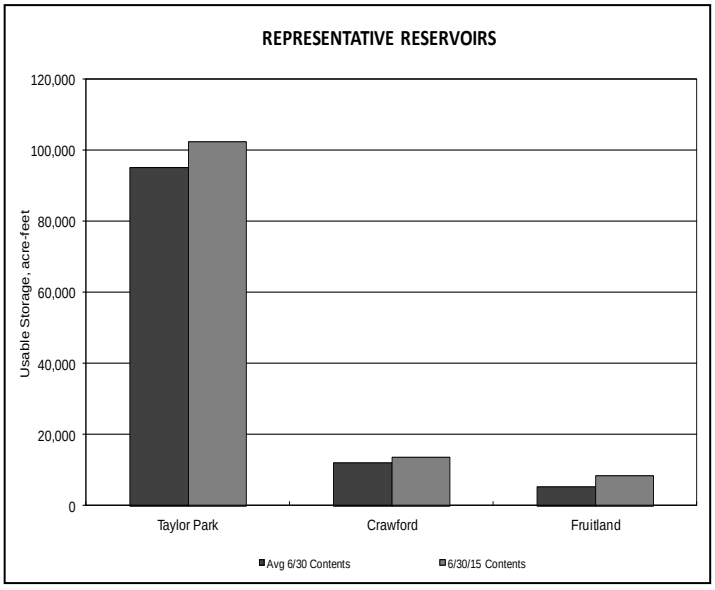
Blue Mesa and Taylor Park filled to within an inch of spilling on June 20th. The reservoirs were managed during this period to prevent a spill by increasing releases to follow or exceed the inflows. In fact, Taylor Park released 1,390 cfs through its outlet for the first time since 1996. Reservoir accounting kept by the Division of Water Resources shows that inflows into the Aspinall Unit exceeded demands by the Gunnison Tunnel by a minimum of 3,162 cfs during June and reached an amazing 10,317 cfs on June 12th. In fact, as of July 14th, natural inflows have continued to exceed demand and therefore, no storage water from Taylor Park's first or second fill have been used to satisfy the Gunnison Tunnel yet this year.

Pubic Use Impacts

Although the warm up in late June helped some of the Olathe Sweet Corn recover, it is still behind the normal schedule and will not be available until later than usual. In addition, there will be some gaps in availability due to planting issues caused by the wet and cool spring weather. Unfortunately, much of the fruit crop in the North Fork valley also froze because of the early warm up in March and early April followed by a prolonged cold period in late April and May. This has limited the availability of cherries and apricots, which has hurt the bottom line for the farmers in those areas.





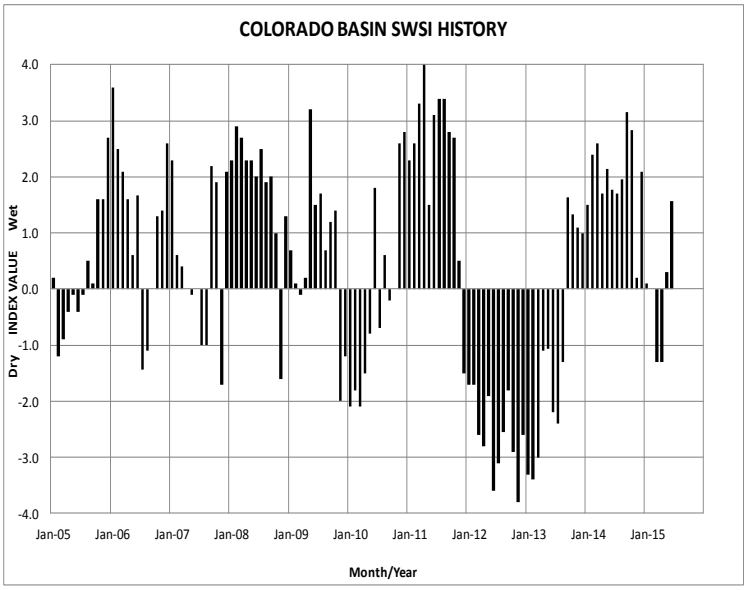


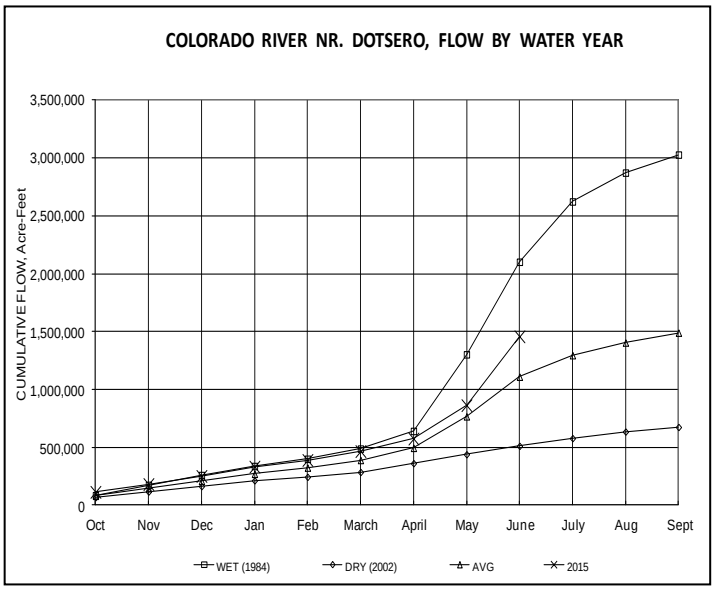
Basinwide Conditions Assessment
The SWSI value for the month was 1.6.

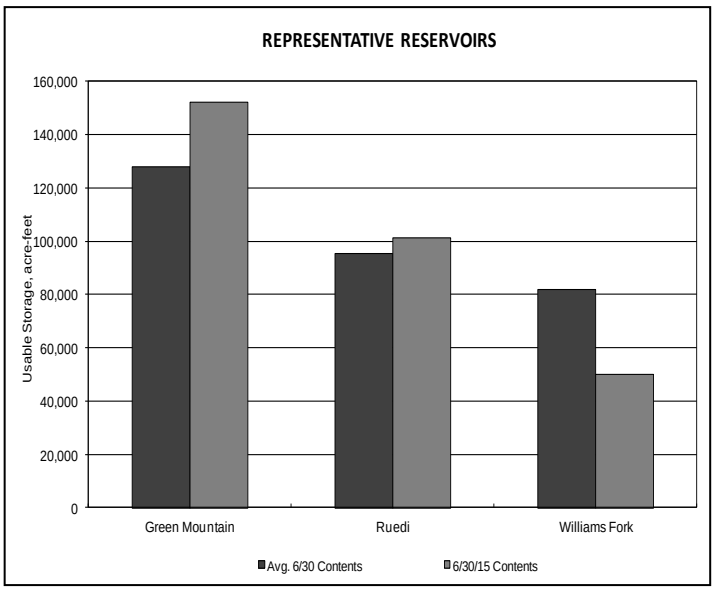
Outlook
Colorado River flows are gradually falling, but continue above average with all tributary flows running near or above average throughout July. Average to above average precipitation is forecast for western Colorado through July. Reservoir releases in general, will gradually decrease throughout July as inflows fall.

Administrative/Management Concerns
There is currently no call on the Colorado River. Grand Valley Irrigation diversions (Goverrnment Highline/Orchard Mesa Irrigation, Grand Valley Irrigation canals) continue at or near full capacity. Ruedi, Dillon, Williams Fork and Green Mountain Reservoir releases are generally decreasing but running above average. Reservoir storage is at or near capacity.

Public Use Impacts
A Water-Supply planning committee endorsed a revised transmountain diversion document on how to evaluate a future potential transmountain diversion in Colorado. It includes seven principals for negotiation of a future transmountain diversion to guide future negotiations between proponents of a new transmountain diversion and those communities who may be affected were it to be built. It presents a lot of requirements for any kind of transmountain diversion, so it could be beneficial for the West Slope.

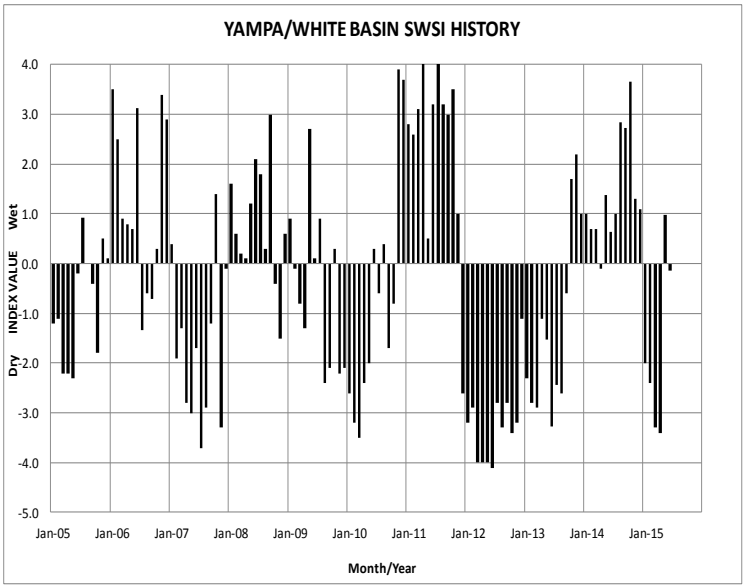






Basinwide Conditions Assessment

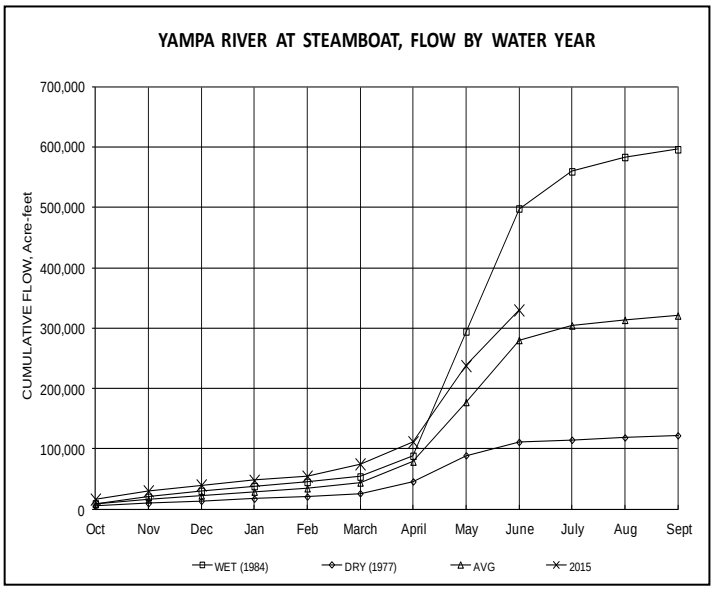
The SWSI value for the month was -0.1. June precipitation was well below average in the Yampa, White, and North Platte River basins. Precipitation for the month, as measured at the SNOTEL sites operated by NRCS, was reported at 42% of average for the combined Yampa, White, and North Platte River basins. Total precipitation for the water year as a percent of average to date in the combined basins at the end of June decreased to 86%.



Outlook

As of June 30th Fish Creek Reservoir was storing approximately 4,167 AF, 100% of capacity. The capacity of Fish Creek Reservoir is 4,167 AF. Yamcolo Reservoir was storing 8,100 AF at the end of June 2015. The capacity of Yamcolo Reservoir is 8,700 AF. On June 30th Elkhead Creek Reservoir was storing 23,347AF. The capacity of Elkhead Creek Reservoir is 24,778 AF. On June 30th, 2015; Stagecoach Reservoir was storing 36,300 AF which is 109% of capacity.

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.



Public Use Impacts

At Stagecoach State Park anglers are reporting that fly fishing at the Tail Waters has been steady with anglers catching lots of trout. The new renovation project has increased fish reproduction and size tremendously. The waters below the dam are at perfect conditions and the fish are hungry! Fishing in the morning, afternoon, and on overcast days are the prime times to catch fish.

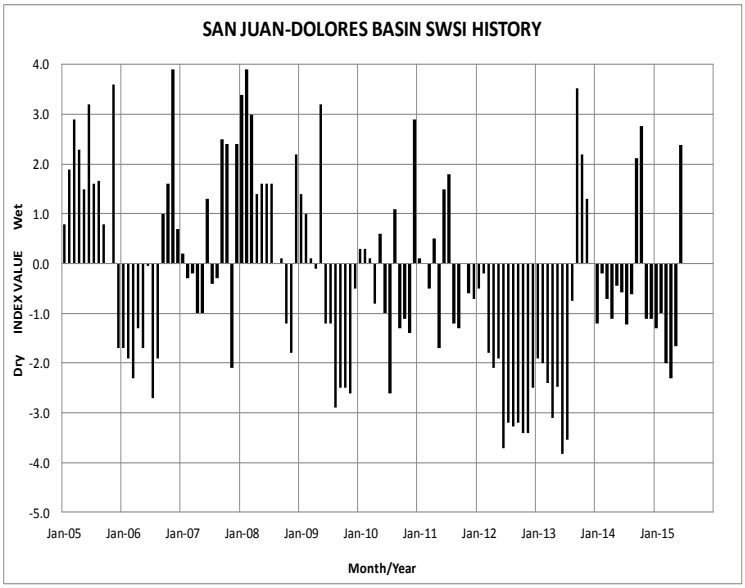
At Steamboat Lake State Park the water is warming up so shore fishing is slowing down, evening and early morning has been better, the streams have slowed down. Boat fisherman are doing well.

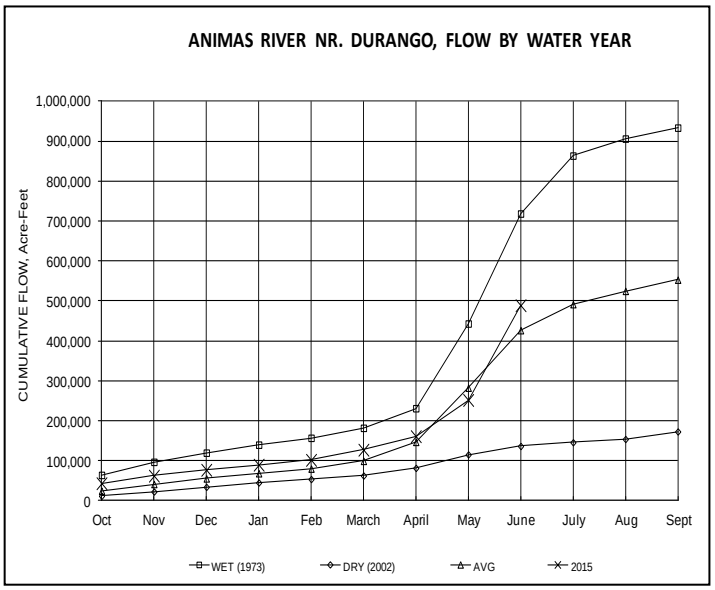
Basinwide Conditions Assessment

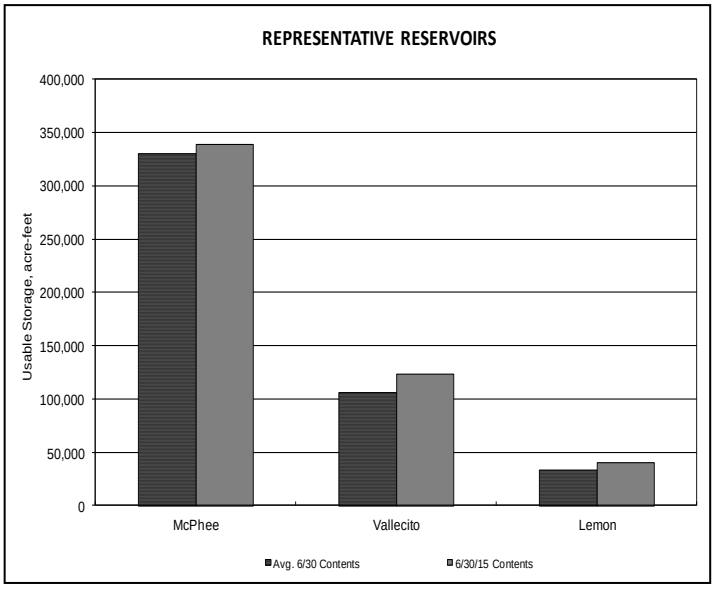
The SWSI value for the month was 2.4. Flow at the Animas River at Durango averaged 3,856 cfs (140% of average). The flow at the Dolores River at Dolores averaged 1,834 cfs (142% of average). The La Plata River at Hesperus averaged 143 cfs (116% of average). Precipitation in Durango was 2.20 inches for the month, 356% of the 30-year average of 0.62 inches. Precipitation was the 6th highest amount recorded in June, in Durango, out of 121 years of record. Precipitation to date in Durango, for the water year, is 14.67 inches, 112% of the 30-year average of 13.15 inches. End of last month precipitation to date, for the water year was 101% of average. The average high and low temperatures for the month of June in Durango were 84o and 47o. In comparison, the 30-year average high and low for the month is 82o and 46o. At the end of the month Vallecito Reservoir contained 123,780 acre-feet compared to its average content of 104,606 acre-feet (118% of average). McPhee Reservoir was up to 338,578 acre-feet compared to its average content of 335,326 (101% of average), while Lemon Reservoir was up to 39,850 acre-feet as compared to its average content of 32,919 acre-feet (121% of average).

Outlook

Precipitation (2.20 inches) was well average for June in Durango. The above average precipitation was thanks in part to the remnants of two hurricanes that entered the basin from the southwest. Lemon and Vallicito Reservoir filled. Most other reservoirs within the basin were not able to fill to capacity but added a sizable amount to their storage. There were 5 years out of 121 years of record where there was more precipitation than this year. Flows in the rivers within the basin finally gained enough to flow above average. There were 21 out of 104 years of record where the total flow past the Animas River at Durango stream gauge was more than this year. There were 25 out of 105 years of record where the total flow past the Dolores stream gauge was more than this year and 33 out of 98 years of record where the total flow past the La Plata River at Hesperus gauge was more than this year.







ADDITIONAL INFORMATION ABOUT COLORADO "OLD SWSI" CALCULATIONS - July-15

The SWSI for each basin is based on probability of nonexceedance (PN) curves for each of three components: reservoir storage, streamflow, and precipitation (current month, rather than cumulative for the season, which is used in winter). The weighting, or importance, for each component in the SWSI calculation varies by basin as shown below.

Summer "Old SWSI" Component Weights

Basin	Reservoir Storage	Streamflow	Precipitation (this month only)
South Platte	0.65	0.25	0.1
Arkansas	0.35	0.55	0.1
Rio Grande	0.05	0.9	0.05
Gunnison	0.3	0.6	0.1
Colorado	0.25	0.7	0.05
Yampa/White	0	0.9	0.1
San Juan/Dolores/Animas	0.1	0.85	0.05

The PN curves were developed in the 1980s and are generally based on a period of record of 1950-1979. As reservoir storage (and streamflow for the summer SWSI) is affected by human action, the reservoir storage PN curves may not reflect current practices for reservoir operation. DWR and NRCS are currently considering options for modifying the SWSI to address this and other concerns about its computation.

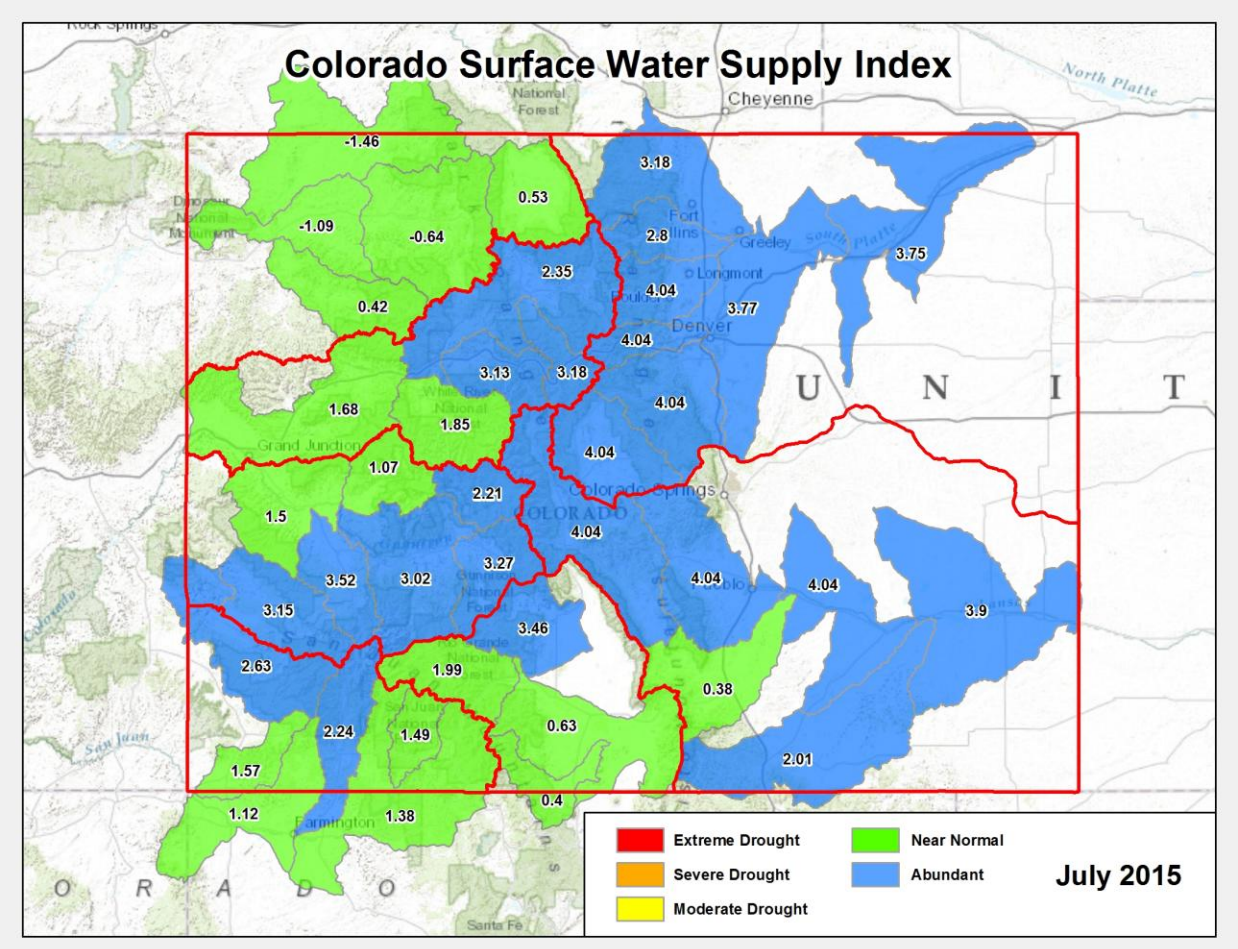
TRANSITION TO NEW COLORADO DNR SWSI - July-15

DWR has continued producing the original SWSI in accordance with the Colorado Drought Plan since 1981. In 1993, Dave Garen from NRCS proposed a revised SWSI calculation to improve upon the known deficiencies of the original SWSI calculation.[1]

CWCB completed a major revision to the Colorado Drought Plan in 2010. At that time, Colorado adopted a revised SWSI analysis based on the components shown below, which vary depending on the time of year. The new SWSI does not include any weighting, but is based on a ranking of total volume in a HUC ranked against similar volumes in historical 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

Since 2011, the NRCS has been producing a SWSI product for the WATF similar to the revised SWSI called for in the 2010 Drought Plan. The NRCS SWSI process relies on Excel spreadsheets to compute values for eight-digit Hydrologic Unit Codes (HUC) with considerable surface water supplies. In 2014, the State of Colorado undertook the SWSI Automation Tool Enhancement project, which resulted in the development of an automated SWSI calculation tool based on the criteria set forth in the 2010 Drought Plan. The results are similar to what has been produced by NRCS, although the stations included in the SWSI for each HUC have been re-verified with staff of DWR's various division offices. The following information is based on the new DNR SWSI.



[1] Garen, David. (1993). "Revised Surface-Water Supply Index for Western United States". ***Journal of Water Resources Planning and Management***, Vol 119, No. 4, July/August. Pages 437-454.

July 1, 2015 New DNR SWSI Values by HUC and Component Non Exceedance Percentages

	HUC ID	HUC Name	SWSI	Res Storage Non Exceedance	Prev Month's Stream Flow Non Exceedance
Arkansas	11020001	Arkansas Headwaters	4.0	61	99
	11020002	Upper Arkansas	4.0	99	98
	11020005	Upper Arkansas-Lake Meredith	4.0	99	98
	11020006	Huerfano	0.4	14*	70
	11020009	Upper Arkansas-John Martin Reservoir	3.9	88	98
	11020010	Purgatoire	2.0	76	81
Colorado	14010001	Colorado Headwaters	2.4	71	73
	14010002	Blue	3.2	85	87
	14010003	Eagle	3.1	None	88
	14010004	Roaring Fork	1.9	79	72
	14010005	Colorado Headwaters-Plateau	1.7	50	70
Gunnison	14020001	East-Taylor	2.2	71	72
	14020002	Upper Gunnison	3.0	91	73
	14020003	Tomichi	3.3	96	89
	14020004	North Fork Gunnison	1.1	11	63
	14020005	Lower Gunnison	1.5	None	68
	14020006	Uncompahgre	3.5	64	82
	14030003	San Miguel	3.1	None	88
Rio Grande	13010001	Rio Grande Headwaters	2.0	74	73
	13010002	Alamosa-Trinchera	0.6	40	63
	13010004	Saguache	3.5	None	91
	13010005	Conejos	0.4	38	59
San Juan-Dolores	14030002	Upper Dolores	2.6	59	65
	14080101	Upper San Juan	1.4	93	66
	14080102	Piedra	1.5	None	68
	14080104	Animas	2.2	97	77
	14080105	Middle San Juan	1.1	50**	63
	14080107	Mancos	1.6	96	68
South Platte	10190001	South Platte Headwater	4.0	70	99
	10190002	Upper South Platte	4.0	54	99
	10190003	Middle South Platte-Cherry Creek	3.8	67	95
	10190004	Clear	4.0	None	98
	10190005	St. Vrain	4.0	99	99
	10190006	Big Thompson	2.8	73	92
	10190007	Cache La Poudre	3.2	97	79
	10190012	Middle South Platte-Sterling	3.7	36	95
Yampa-White	10180001	North Platte Headwaters	0.5	None	56
	14050001	Upper Yampa	-0.6	99	37
	14050002	Lower Yampa	-1.1	None	37
	14050003	Little Snake	-1.5	None	32
	14050005	Upper White	0.4	None	55

*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

Basin	July 1 SWSI ("New SWSI")	Change from Previous Month	Change from Previous Year
Arkansas	3.8	2.0	3.9
Colorado	2.1	1.8	-0.8
Gunnison	2.6	2.2	1.7
Rio Grande	1.6	3.2	2.3
San Juan-Dolores	2.6	3.8	4.2
South Platte	4.0	0.3	0.9
Yampa-White	-0.7	1.1	-0.8