Big Wood River Ground Water Management Area Advisory Committee
March 24, 2021 Meeting Materials

1. Wood River Basin Hydrologic and Hydrogeologic Relationships Prepared for the BWRGWMA Advisory Committee; IDWR Observations March 17, 2021
2. Response to IDWR Observations dated March 17, 2021 from the Galena Ground Water District and South Valley Ground Water District, March 24, 2017
3. Hydrologic Observations for the BWRGWMA; Presented to the BWR GWMA Advisory Committee by Sean Vincent, IDWR, March 24, 2021

Wood River Basin Hydrologic and Hydrogeologic Relationships
Prepared for the BWRGWMA Advisory Committee

IDWR Observations
March 17, 2021

Snow Water Equivalent (SWE)

1) Snowmelt runoff is the primary source of water for irrigation and other purposes in the Big Wood River basin. Based on snowpack measurements made by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS), the snow water equivalent (SWE) on March 15, 2021 for the Big Wood River basin was 78% of the median for the period 1981 to 2010.

Surface Water Supply Index (SWSI)

2) The Surface Water Supply Index (SWSI) is a predictive indicator of surface water availability in a basin compared to historic supply. The NRCS computes the SWSI by summing the two major sources of surface water supply for irrigation; streamflow from runoff and reservoir storage. According to the NRCS website, "*SWSI uses non-exceedance probabilities to normalize the magnitude of annual water supply variability between basins. The non-exceedance values are then rescaled to range from +4.1 (extremely wet) to -4.1 (extremely dry). A SWSI value of 0.0 indicates a median water supply as compared to historic occurrences.*"

Magic Reservoir Water Supply

3) At the beginning of each month, the NRCS publishes a SWSI for many of the irrigated basins in the western United States including the Big Wood River basin below Magic Reservoir. On March 1, 2021, the Big Wood SWSI for the most probable case (50% exceedance) was -2.2, which is in the bottom one-third of values for the period 1991 to 2020.

4) Based on an NRCS analysis of predicted runoff volumes for the Big Wood River and Camas Creek, IDWR estimates the probability that Magic Reservoir will fill this year is less than 30%.[1]

5) A notation at the top of the March 2021 SWSI table for the Big Wood River basin below Magic Reservoir states that the "*adequate water supply*" is 275 KAF. The corresponding SWSI is "*greater than 0.4*".

6) The Big Wood River basin SWSI was greater than 0.4 in 13 of the previous 30 years going back to 1991.

[1] Probability analysis and estimate completed by David Hokema, IDWR, March 2021.

7) During the previous 30 year period, Magic Reservoir filled to capacity (191.5 KAF) every year that the SWSI was greater than 0.4.

8) During years with a SWSI > 1.0, maximum reservoir fill typically occurs at the beginning of July. On years with a SWSI less than -1.0, maximum reservoir fill typically occurs at the beginning of May.

9) The shutoff date for irrigation water releases from Magic Reservoir can be determined by looking at the streamflow measurements at the Big Wood River below Magic Dam gage. Reservoir shutoff is typically seen as an abrupt, sustained decrease in the flow rate at the below Magic Dam gage from more than 500 cubic feet per second (cfs) to less than 10 cfs.

10) In each of the 13 years with a SWSI greater than 0.4, the shutoff date was either on September 25 or on one of the first few days in October (generally October 1).

11) In 12 of the 13 years with a SWSI greater than 0.4, there were early season releases from Magic Reservoir that caused flow at the below Magic gage to exceed the typical mid-season flow rate range of 800 to 1,000 cfs. Sustained releases above 1,000 cfs did not occur during any year with a SWSI less than or equal 0.4.

12) The duration of releases from Magic Reservoir varies each year. During an adequate water supply year, the period of reservoir releases generally includes the 147-day period from May 1 to September 25. Essentially uninterrupted reservoir releases extending into late September or early October occurred in 14 of the 30 previous years.

13) For a continuous release at a typical midseason rate of 900 cfs, one full reservoir volume (191.5 KAF) is depleted in 108 days. On years with an adequate water supply, the date of maximum reservoir fill occurs mid-summer (typically around July 1) and Magic Reservoir can sustain a 147-day irrigation season.

14) Reservoir storage on the shutoff date was approximately 25 KAF or greater in each of the 13 years with a SWSI of 0.4 or greater.

15) Reservoir storage on the shutoff date also exceeded 25 KAF in the four years with the highest SWSI values not meeting the NRCS's adequate water supply threshold (SWSI > 0.4). These years are 2005 (SWSI = -0.4), 2016 (SWSI = -0.1), 2009 (SWSI = 0.1), and 2010 (SWSI = 0.4). In each of these years, the reservoir failed to fill but the maximum fill was greater than 145 KAF. Also for these years, the shutoff date occurred sometime during September. An inadequate supply for both 2005 and 2016 is suggested by the fact that the irrigation season ended a few weeks early in both years. And in contrast to 2016, sustained releases didn't begin in 2005 until late May.

16) Magic Reservoir held less than 15 KAF storage on the shutoff date in each of the 13 years with a SWSI less than -0.4. Moreover, the shutoff date for these 13 lowest SWSI years often occurred well before September 25; twice the shutoff occurred at the beginning of September, twice in August, seven times in July, once at the end of June, and once in May. The May shutoff occurred during 1992, which had the worst surface water supply during the previous 30-year period and a SWSI of -3.9. Note that reservoir releases were briefly resumed in June and August 1992. Intermittent reservoir releases also occurred during the 2004 irrigation season, which had the third lowest water supply and a SWSI of -3.4.

17) Water supply shortages, sometimes significant, likely occurred during the 13 lowest SWSI years for water users reliant primarily on Magic Reservoir storage water.

18) During the period 1991 to 2020, the years with the most similar total supplies to the 50% exceedance forecast for this year (2021) are 2014 (SWSI = -2.3) and 2002 (SWSI = -2.0). In both analog years, maximum reservoir fill was less than 100 KAF, the shutoff date occurred in mid-July, and the reservoir was essentially empty on the shutoff date.

The WRWC Model

19) The predictive model developed by Dr. Kendra Kaiser for the Wood River Water Collaborative (WRWC) provides forecasts for irrigation season streamflow, total volume, and runoff timing for gages on the Big Wood (Hailey, Stanton Crossing), Silver Creek, and Camas Creek. The WRWC model also estimates annual diversions and curtailment dates for three water right priorities on each reach (Big wood above Stanton, Big Wood below Magic Reservoir, and Silver Creek). The WRWC model, like those used for NRCS water supply forecasts, is a suite of statistical models based on linear regressions between streamflow and predictive variables such as SWE, precipitation, antecedent streamflow, and climate teleconnection index. The curtailment date prediction is an attempt to automate a process that IDWR manually performs using NRCS runoff volume forecasts.

20) IDWR staff downloaded and ran the WRWC model and then compared WRWC model output with NRCS forecasts for runoff volume at the Big Wood at Hailey gage (no other gage sites are included in both forecast models). IDWR also contacted Dr. Kaiser and learned that the WRWC model is still in development and that modifications to the code are being made based on input from the WRWC. For this reason, IDWR has relied on NRCS forecasts for our water supply assessments.

AFRD#2 and the American Falls Reservoir Water Supply

21) The American Falls Irrigation District #2 (AFRD#2) place of use is almost identical to the Big Wood Canal Company (BWCC) place of use.

22) AFRD#2 has a contract with the United States Bureau of Reclamation (USBR) for 393,550 acre-feet (AF) of storage space in American Falls Reservoir. Based in part on the joint USBR and United States Army Corps of Engineers forecast for the period March 1 through July 31, the USBR is projecting that American Falls Reservoir will fill this year on or about April 1.

23) According to Water District 01 records, AFRD#2 has had a full (100%) storage allocation in 29 of the previous 30 years. AFRD#2 had an 82% allocation in 2004.

24) In contrast, Magic Reservoir has filled or substantially filled (i.e., maximum fill of > 170 KAF) in only 14 of the last 30 years. As a consequence, American Falls Reservoir is more reliable than Magic Reservoir as a source of irrigation water in the BWCC/AFRD#2 project area.

Magic Reservoir Inflows

25) Magic Reservoir inflow primarily comes from the Big Wood River and Camas Creek. On average, approximately 1/3 of the reservoir inflow comes from Camas Creek. After the snowmelt runoff period, flow occurs in the lower reaches of Camas Creek as the result of gains from the Camas Prairie aquifer system. Measured groundwater gains range from 1.3 to 2.8 cfs above USGS stream gage 13141500, and 2.7 to 6.9 cfs below the gage (Moody, 2018; Moody, 2020; Young, 1978).

Consumptive Groundwater Use

26) Because of groundwater/surface water communication, consumptive groundwater use reduces aquifer reach gains in Camas Creek. Similarly, consumptive groundwater use in the Wood River Valley reduces flow in the Big Wood River and in Silver Creek.

27) Assuming 85% of the diverted volume is consumptively used, IDWR estimates that the average annual groundwater consumptive use during the period 2016 to 2019 was approximately 8,900 AF on the Camas Prairie and 38,000 AF in the Wood River Valley.

Big Wood River Groundwater Management Area ("BWRGWMA")

28) The BWRGWMA, as shown in Figure 1 below, includes the Camas Creek/Camas Prairie drainage area above Magic Reservoir, the upper Big Wood River Valley above Magic Reservoir, and the Bellevue Triangle-Silver Creek drainage area between Bellevue and Picabo. Groundwater in the Wood River Valley and Bellevue Triangle-Sliver Creek areas comprise the Wood River Valley aquifer system which is located within Water District 37 ("WD37"). The Camas Prairie is underlain by an aquifer system located within Water District 37B ("WD37B").

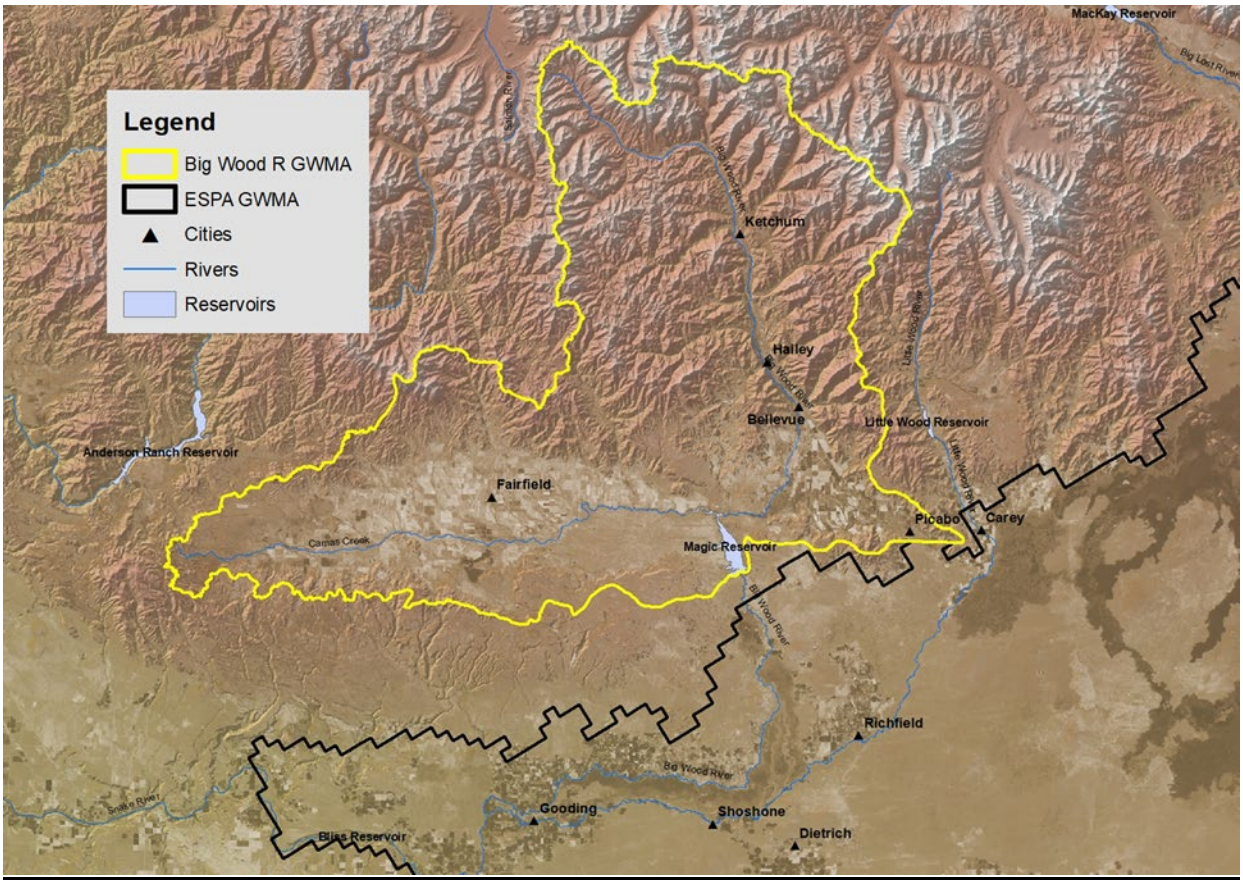


Figure 1. Big Wood River GWMA

<u>BWRGWMA Groundwater Use</u>

29) WD37 and WD37B are responsible for measuring and reporting groundwater use within the BWRGWMA. Both water districts report groundwater use to IDWR using IDWR's Water Measurement Information System ("WMIS").

30) Total annual reported groundwater diversions in the BWRGWMA and WD37 over the past five years has ranged from 33,673 AF in 2017 (a wet year) to 49,607 AF in 2020 (a dry year). *See Figure 2.* The total average annual groundwater diversions for the five year period is 40,764 AF. Most groundwater is used for irrigation of agriculture crops. In 2020, total municipal ground water diversions in WD37/BWRGWMA was over 8,300 AF, including about 5,300 AF diverted by the cities of Bellevue, Hailey, and Ketchum, and about 3,000 AF diverted by the Sun Valley Water and Sewer District. IDWR estimates about an additional 5,400 AF of groundwater is diverted per year within the Wood River Valley aquifer system by domestic wells that are exempt from water right and measurement requirements (includes estimate of exempt domestic irrigation use of one-half acre or less).

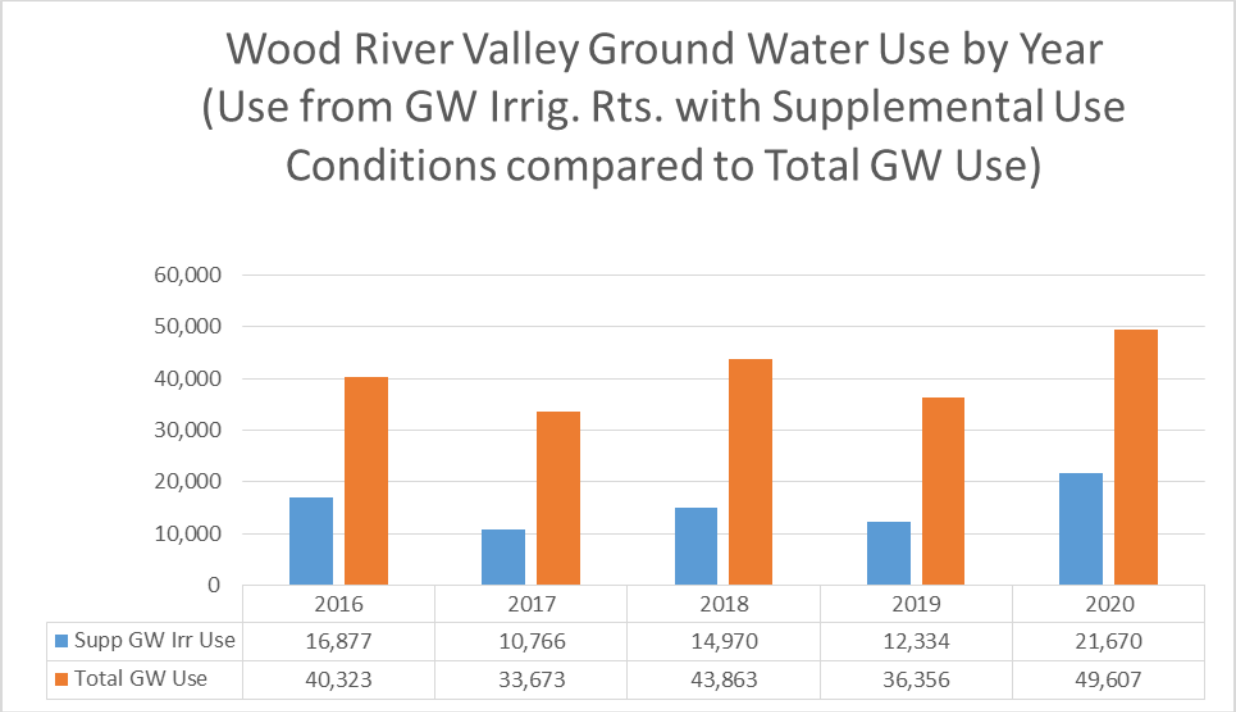
31) Annual reported groundwater diversions in WD37B from 2016 through 2020 has ranged from 9,122 AF (2017) to 11,940 AF (2018). Average groundwater diversions for the five year period was about 10,300 AF. Nearly all of the WD37B groundwater diversions is for

agricultural irrigation. IDWR estimates that exempt domestic wells in the Camas Prairie divert more than 800 AF of groundwater per year.

Supplemental Groundwater Use:

32) Water is diverted from a number of groundwater irrigation wells within the BWRGWMA and WD37 to supplement surface water sources. Most of the supplemental groundwater irrigation wells and rights are located in the Bellevue Triangle area and groundwater irrigates lands that are the place of use for water rights authorizing diversion the Big Wood River or Silver Creek and tributaries. More than 140 groundwater irrigation rights in the BWRGWMA include conditions that require full beneficial use of surface water available under surface water rights that are appurtenant to the same land. Some groundwater irrigation rights in the BWRGWMA may supplement surface water sources but lack specific conditions requiring full beneficial use of available surface water rights and sources. Only one groundwater irrigation right in WD37B includes a supplemental use condition.

33) Groundwater diversions from irrigation wells authorized by groundwater rights in WD37 having supplemental use conditions account for about one-third or more of the total groundwater diversions in WD37. The graph and table below shows supplemental groundwater diversions compared to total groundwater diversions in WD37/Wood River Valley from 2016 through 2020.



	2016	2017	2018	2019	2020
Supp GW Irr Use	16,877	10,766	14,970	12,334	21,670
Total GW Use	40,323	33,673	43,863	36,356	49,607

Figure 2. Wood River Valley Groundwater Diversions by Year, including Supplemental Groundwater Diversions

Continuous Curtailment Model Run – Wood River Valley Aquifer

34) A simulation of continuous curtailment of groundwater consumptive use from 1995 through 2014 using Version 1.1 of the Wood River Valley Groundwater Flow Model predicted average annual increases in streamflow of 15,200 AF in Silver Creek, 8,400 AF in the Wood River above the Dry Bed, and 3,500 AF in the Wood River below the Dry Bed.

35) During the April through September irrigation season, the groundwater flow model predicted streamflow increases of 9,500 AF in Silver Creek, 5,500 AF in the Wood River above the Dry Bed, and 1,700 AF in the Wood River below the Dry Bed. During the October through March non-irrigation season, the groundwater flow model predicted average increases in streamflow of 5,700 AF in Silver Creek, 2,900 AF in the Wood River above the Dry Bed, and 1,800 AF in the Wood River below the Dry Bed.

36) During years with lower surface water supply and higher evapotranspiration, the predicted impacts of continuous curtailment on streamflow were higher than the curtailment period annual averages that were previously described in observation 34. For example, during the 2002 calendar year, the groundwater-flow model predicted increases in streamflow of 19,900 AF in Silver Creek, 10,000 AF in the Wood River above the Dry Bed, and 5,000 AF in the Wood River below the Dry Bed. During the 2014 calendar year, the groundwater-flow model predicted increases in streamflow of 23,500 AF in Silver Creek, 11,100 AF in the Wood River above the Dry Bed, and 6,700 AF in the Wood River below the Dry Bed.

Significance of Continuous Curtailment on Below Magic Water Supplies

37) If distributed evenly through the year, the modeled average annual increase in Silver Creek (15,200 AF) equates to 21 cfs, which is approximately 17% of the average flow rate in Silver Creek at the Sportsman's Access gage during the 2020 water year (126.2 cfs).

38) The predicted average annual benefit to the below Dry Bed reach of the Wood River (3,500 AF) is 1.8% of the capacity of Magic Reservoir (191,500 AF). For a typical reservoir release rate of 900 cfs, an additional 3,500 AF in the reservoir could be used to extend a shortened irrigation season by 2 days. During the previous 30 years, the irrigation season for Magic Reservoir water users was cut short approximately half the time.

39) The Dry Bed of the Big Wood River between Glendale Road and Heart Rock Ranch generally flows during snowmelt runoff until all flow is diverted into the Bypass Canal. During development of Version 1.1 of the Wood River Valley Groundwater Flow Model, IDWR reviewed Landsat photos and Water District 37 records to determine when the Dry Bed was flowing or dry during the 1995 through 2014 model simulation period. This analysis indicated the Dry Bed was flowing during 48% of the irrigation season months and 27% of the non-irrigation season months. The Dry Bed was dry during 52% of the irrigation season months and 73% of the non-irrigation season months.

40) When Big Wood Canal Company ceases delivery of storage for irrigation out of Magic Reservoir, delivery of natural flow rights directly out of the Big Wood River below Magic Reservoir also ceases.

Predicted Impacts of Curtailed Groundwater Use – Analog Years

41) The Wood River Valley Groundwater-Flow Model predicted impacts to stream flow in 2014 and 2002 in response to pumping groundwater in the Bellevue Triangle and in areas of the Big Wood River Valley upstream of the Bellevue Triangle are shown in Tables 1 and 2 below. The responses are shown on a monthly time step in average cfs, April through September.

Table 1. 2014 Groundwater Model Depletions

Month-Year	Depletions (cfs)	
	Silver Creek	Big Wood blw Dry Bed (incl. Willow Creek)
Apr-14	5.2	1.2
May-14	15.1	2.8
Jun-14	29.9	4.8
Jul-14	43.0	9.4
Aug-14	43.8	12.2
Sep-14	39.1	11.6

Table 2. 2002 Groundwater Model Depletions

Month-Year	Depletions (cfs)	
	Silver Creek	Big Wood blw Dry Bed (incl. Willow Creek)
Apr-02	7.0	1.3
May-02	13.8	2.2
Jun-02	23.0	2.7
Jul-02	36.6	4.8
Aug-02	38.0	7.8
Sep-02	34.4	9.2

Impacts of Modeled Groundwater Curtailment on Calculation of Water Right Priority Cuts

42) The WD37 watermaster makes separate water right priority cut determinations on the Big Wood River above and below Magic Reservoir, and on Silver Creek/Little Wood River. An explanation of priority cut determinations for all three river systems is given by the watermaster via correspondence to IDWR dated June 16, 2015, which is attached to, and summarized in an IDWR memorandum dated August 31, 2015, and available on IDWR's

website at: https://idwr.idaho.gov/files/legal/CM-DC-2015-001/CM-DC-2015-001-20150831-Staff-Memo-Attachments-BWLWWUA-Calls.pdf

The 2015 IDWR memo also generally describes the delivery systems for the Big Wood and Little Wood River systems, including delivery of storage water from Magic Reservoir.

43) The WD37 watermaster records show natural flow water rights with the following priority dates were curtailed during the 2014 irrigation season:

- Big Wood River below Magic Reservoir
    - On June 23, 2014, rights were cut to the May 1, 1900 priority date
    - On July 1, 2014, rights were cut to the June 15, 1890 priority date
    - On July 7, 2014, all rights were shut off, and the reservoir gates were shut off on July 17, 2014.

- Little Wood River and Silver Creek
    - Rights were cut to the April 1, 1887 and April 1, 1885 priority dates on May 20 and May 27 respectively
    - Rights were cut to the April 1, 1884 priority date on June 27
    - Rights were cut to the September, 1883 and April 6, 1883 priority dates on July 8 and July 17, respectively. The 1883 Little Wood priority rights are among the most senior priority rights on the river.

44) Using 2014 as an analog year, modeled curtailment of groundwater in the Wood River Valley would impact natural flow priority right deliveries on the Big Wood River and Little Wood River/Silver Creek as follows:

- Big Wood River below Magic Reservoir
    - Modeled curtailment of groundwater would add 4.8 cfs to the deliverable supply in June. Based on IDWR's review of priority rights, the priority cut on June 23, 2014 should have been about 10% of the May 15, 1897 priority rights. The additional 4.8 cfs of deliverable supply from groundwater curtailment would have advanced the priority cut to about 15% of the May 15, 1897 priority rights.
    - Based on IDWR's review of priority rights, the priority cut on July 1, 2014 should have been July 1, 1889. Modeled curtailment of groundwater would add 9.4 cfs to the deliverable supply and advance the priority cut to about 90% of the June 15, 1890 priority right (the next priority after July 1, 1889).
    - On July 7, 2014 when all rights below Magic were shut off, modeled curtailment of groundwater would add only 9.4 cfs to the river, making the total deliverable supply below Magic only 26 cfs, which is insufficient for delivery to right holders for beneficial use.

- Little Wood River and Silver Creek
    - Modeled curtailment of groundwater would add 15.1 cfs of flow to Silver Creek in May 2014. According to the WD37 watermaster, Kevin Lakey, this additional increase in flow could have advanced the priority cut on both May 20 (April 1, 1887 priority) and May 27 (April 1, 1885 priority) to April 1, 1890.
    - Modeled curtailment of groundwater would add 29.9 cfs of flow to Silver Creek in June 2014. According to the watermaster, the additional flow could have advanced the priority cut on June 27, 2014 from April 3, 1884 to April 5, 1885.
    - Modeled curtailment of groundwater would add 43 cfs of flow to Silver Creek in July 2014. According to the watermaster, the additional flow could have advanced the priority cut on both July 8 and 17, 2014 from September 9, 1883 and April 6, 1883, respectively, to May 31, 1885.
    - Modeled curtailment of groundwater would add 43.8 cfs of flow to Silver Creek in August 2014. According to the watermaster, the additional flow could have advanced the 1883 priority cuts in August to 1886 priority rights.

45) Using 2002 as an analog year, modeled curtailment of groundwater in the Wood River Valley would impact natural flow priority right deliveries on the Big Wood River and Little Wood River/Silver Creek as follows:

- Big Wood River below Magic Reservoir
    - Magic Reservoir was shut off on or about July 15, 2002, thus making delivery of reservoir inflow unavailable for delivery of natural flow rights below the reservoir. Modeled curtailment of groundwater at this time would add only 4.8 cfs to the river and reservoir inflow, making the total deliverable supply below Magic only 28 cfs, which is insufficient for delivery to right holders for beneficial use.

- Little Wood River and Silver Creek
    - From July 23 through September 30, 2002, natural flow water rights on the Little Wood River and Silver Creek were cut to 1883 priority dates. Modeled curtailment of groundwater would add 36.6 cfs, 38 cfs and 34.4 cfs of flow to Silver Creek respectively in July, August and September. According to the watermaster, the additional flow across the three months could have advanced the 1883 priority cuts to 1884 and 1885 priority dates.

Conclusions

1) During years when Magic Reservoir fills, the water supply for irrigators relying primarily on water from the reservoir generally is adequate and extends through the end of the irrigation season. Magic Reservoir completely or substantially fills about half the time.

2) During years when Magic Reservoir doesn't fill, the surface water supply generally is inadequate, sometimes by a significant amount.

3) Magic Reservoir will most likely not fill for the 2021 irrigation season.

4) Magic Reservoir is filled primarily by inflows from Camas Creek and the Big Wood River. Both Camas Creek and the Big Wood River are hydraulically connected to aquifer systems in the Big Wood Ground Water Management Area and are depleted by consumptive groundwater pumping.

5) AFRD#2 will very likely have a full allotment of storage from American Falls Reservoir this year, and water users relying primarily on AFRD#2 storage water will most likely have an adequate water supply.

6) American Falls Reservoir storage delivers a considerably more reliable water supply than Magic Reservoir delivers.

7) The benefits of consumptive groundwater pumping curtailment in the Wood River Valley were evaluated with version 1.1 of the Wood River Valley groundwater flow model. For continuous curtailment extending from 1995 to 2014, the model predicts average annual increases in streamflow of 15,200 acre-feet (AF) in Silver Creek, 8,400 AF in the Wood River above the Dry Bed, and 3,500 AF in the Wood River below the Dry Bed, which is the reach of the Wood River that flows into Magic Reservoir.

8) Water supplies in 2014 and 2002 are similar to the 2021 forecasted water supply as reported by the NRCS March 1 SWSI. In both 2014 and 2002, Magic Reservoir was shut off in mid-July, thereby ceasing the delivery of reservoir inflows for natural flow rights on the Big Wood River located below the reservoir. Also in both years, natural flow water rights on the Little Wood River and Silver Creek were curtailed to 1883 priority dates.

9) The Wood River Valley groundwater flow model predicts increases in streamflow on a monthly time step for years 1995 to 2014. The groundwater model predicts that curtailment of groundwater in the Wood River Valley in 2014 and 2002 increases the flow of Silver Creek by 15 to 44 cfs during the 2014 irrigation season, and by 34 to 38 cfs during the 2002 irrigation season. The model also predicts that curtailment of groundwater in the Wood River Valley increases flows to the Big Wood River above Magic Reservoir by 2.8 to 12.2 cfs in 2014, and by 2.2 to 9.2 cfs in 2002. In years similar to 2014 and 2002 when Magic Reservoir is shut off in mid-July, inflows to the reservoir, including any additional inflow resulting from curtailment of groundwater, cannot be delivered to the holders of senior priority natural flow rights below the reservoir.

Response to IDWR Observations dated March 17, 2021

From the GGWD and SVGWD
March 24, 2017

Observations

5) NRCS states that the “adequate water supply” for the Big Wood is 275 KAF. The adequate water supply for the Big Wood above Hailey is 135 KAF. What do these numbers mean, are they the amounts to fill water rights or actual need? What area is included in the Big Wood above Hailey water supply estimate?

8) IDWR identified maximum reservoir fill for SWSI greater than 1 and less than -1. What about between 1 and -1? This includes over 25% of the 30-year period. What about the projection for 2021 based on the NRCS March 1 report?

12) Uninterrupted reservoir releases for 147-days doesn’t tell the volume of water released. Did the management of the reservoir release more water early in years that releases were interrupted? Did releases account for water passed through the reservoir for senior downstream natural flow water rights?

13) Typical midseason diversion rate of 900 cfs is not necessary all season long, especially in spring and fall conditions. What is the average diversion rate required? Is 900 cfs required to push water through the delivery system? Is the 900 cfs inclusive of senior natural flow water delivered through the reservoir?

15) Were temperature data checked for 2005 and 2016 to determine if an early freeze was the cause of the early water shutoff from Magic Reservoir?

16) It is unclear how Magic Reservoir is able to store water during the irrigation season during poor water years when their storage water right would not be in priority against senior downstream natural flow irrigation water rights.

17) What are the data used to determine shortages, significant or not, occurred during those 13 years with the lowest SWSI?

18) No data or discussion are provided to explain the operation of Magic Reservoir. Are operations conducted in anticipation of needs in ensuing years? Was consideration given for the reservoir evacuation in 2012/2013 for maintenance? Did those operations influence water storage in 2014?

21) Matching the AFRD2 place of use to the BWCC place of use was early recognition of the typically short water supply for BWCC. The AFRD2 was formed and the Milner-Gooding Canal was constructed to offset frequent water shortages in the area served by the BWCC and to help provide a more reliable water supply to BWCC and river right irrigated land.

22) AFRD2 also has available a natural flow water right from the Snake River for up to 1,700 cfs in addition to the 393,550 AF of space in American Falls Reservoir. When

American Falls Reservoir fills, AFRD2 has access to the full 1,700 cfs while the right is in priority.

24) Why was 170 KAF picked as a substantially filled volume? In observation 15, IDWR observed that Magic Reservoir filled to 145 KAF for years around the SWSI value of 0.

25) Camas Creek does play an important role in filling Magic Reservoir. There are fewer surface water rights on Camas Creek than the Big Wood River, so in years of scarcity, the impact from Camas Creek may be even more.

26) Please explain why ground water use reductions to Camas Creek are treated as reductions to reach gains but ground water use in the Wood River Valley are treated as reductions in flow in the Big Wood River and Silver Creek.

27) Assuming 85% consumptive use for groundwater diversions is not justified and is high. For example, the highest diverters in 2019 and 2020 within the Big Wood Valley were municipalities. While all cities irrigate, they also return a substantial amount of in-house water to the system.

A uniform consumptive use value for all diverters in the valley is not justified or supported.

Using the consumptive use values from the simulation of continuous curtailment in Item 34, the annual consumptive use in the model area is about 27,000 AF. Assuming the diversions in the 1995 to 2014 period to be similar to the 2016 to 2019 period the overall consumptive use appears to be closer to 60% instead of 85%.

30) What kind of disposal systems are in place for the municipal water users in WD37? Ground water depletions vary widely for municipal water users depending on the method of sewage treatment and disposal by the municipal water users.

Please describe how the 5,400 AF of ground water diversion by exempt water users was estimated. What portion of the exempt water use was for exempt irrigation use?

Ground water uses by commercial users and homeowners associations should not be included with irrigation uses for agricultural crops.

31) Does the exempt domestic ground water use in excess of 800 AF/YR within WD37B include ground water use by/within Fairfield?

33) Please explain how the portion of ground water diverted as supplemental in Figure 2 was determined.

34) The WRV 1.1 ground water model for the Wood River basin north of Timmerman Hills is the best available tool to evaluate the interactions of ground water and surface water sources within the model boundaries. Given that the model was developed and calibrated for the period before measured ground water diversion data are available, how reliable are the estimates of ground water curtailment quantities for lands for which the ground water rights are supplemental? How were supplemental ground water rights

identified? How was the amount of ground water diverted for supplemental uses quantified?

It appears the WRV 1.1 projections for changes in the discharge of Willow Creek were incorrectly included in the Wood River above the Dry Bed instead of the Wood River below the Dry Bed. Making that change reduces the Wood River above Dry Bed gain to 7,000 AF and increases to 4,900 AF the gain to the Wood River below the Dry Bed.

35) In this item it again appears the gain to Willow Creek was incorrectly added to the Wood River above the Dry Bed instead of to the Wood River below the Dry Bed. The same incorrect addition appears to have occurred in both the irrigation season analysis and the non-irrigation season analysis.

36) The same incorrect addition identified in Items 34 and 35 occurred in this example.

37) Annual comparisons can be misleading when both values used in the comparison vary widely throughout the year.

38) Magic is not entitled to all water below the Dry Bed since senior downstream irrigation water rights must be filled ahead of Magic.

41) IDWR apparently made separate runs of the WRV 1.1 model for 2002 and 2014. Those model runs should be made available for review. See comments in Item 34 about model calibration.

42) The watermaster, through personal communication to IDWR, states that there are so many more senior water rights above Magic, that it has been impractical to administer the basin as a whole. (IDWR, 2015 Memo)

43) On October 29, 2012 Magic held over 55,000 AF but on December 8, 2012 had reduced the contents to less than 13,000 AF and Magic did not fill during the 2013 water year. How does this activity impact the 2014 water supply for Magic? BWCC released water from Magic Reservoir in the winter of 2012 to repair a leaking oil line at the power plant. BWCC patrons claimed that BWCC released 54,000 AF that winter that could have been stored if not for the problems with the power plant.

44) Assumes absolute timing and quantity of the WRV model. Model calibration report does not support absolute conclusion. See appendix A, https://idwr.idaho.gov/files/projects/wood-river-valley/20190627-Groundwater-Flow-Model-forthe-Wood-River-Valley-Aquifer-System.pdf We acknowledge that the WRV model is the best tool that is available, but the regional model still has imperfections and cannot predict exact values with certainty. Estimating extending the priority cuts of the surface water by the watermaster is outside of the scope of the WRV model.

Further, extending priority cuts does not automatically mean there would be a demand for additional water. Thus far, surface water users have not quantified shortages that could, potentially, be the result of ground water pumping within the BWRGWMA.

45) The 2002 priority cut data is more reasonable to use, since it wasn't influenced by the artificial draining of the reservoir that occurred in 2012/2013. We acknowledge that the WRV model is the best tool that is available, but the regional model still has imperfections and cannot predict exact values with certainty. Estimating extending the priority cuts of the surface water by the watermaster is outside of the scope of the WRV model.

Further, extending priority cuts does not automatically mean there would be a demand for additional water. Thus far, surface water users have not quantified shortages that could, potentially, be the result of ground water pumping within the BWRGWMA.

Conclusions

1) How many irrigators rely solely on water from Magic Reservoir? Do some irrigators who receive water from Magic Reservoir have additional water supplies? What are the supplies? How reliable are they?

2) When water from Magic Reservoir is inadequate how do irrigators make up the shortage or can they?

4) There is also some indication Magic Reservoir receives inflow directly from the underflow from the Camas Prairie aquifer.

5) How many of the BWLWWUA receive or could receive water from AFRD2? AFRD2 also has natural flow from the Snake River in addition to storage in American Falls Reservoir.

7) See comments above about the continuous curtailment WRV 1.1 model run, limitations and incorrect reporting of the results.

8) See comments above about potential impact on 2014 Magic Reservoir water supply due to maintenance activity in 2012/2013.

9) See comments above concerning use of the WRV 1.1 ground water model for water administration purposes. The WRV 1.1 ground water model is the best tool available to understand the connection between surface and ground water in the Wood River Valley, but the model was not designed for water administration purposes.

No shortage data have been provided showing the effects of ground water pumping are creating shortages greater than those that occurred historically. There is no certainty changes to the discharge of Silver Creek at the Sportsman Access gage will reach the Little Wood River due to the channel conditions upstream of Highway 93.

Agree it would be futile to attempt to deliver simulated increases in discharge in the below Dry Bed reach of the Big Wood River to water users below Magic.

No Observations Made

1) The wetland area near Highway 93 may make any attempt to deliver water from Silver Creek to the Little Wood River futile. A significant water loss has been measured in this segment of Silver Creek. What effect does water loss in this area below the Triangle have on Little Wood water supplies?

2) Restrictions of the model, 2019 Model scenario report: “Because increased (streamflow in some reaches may be rediverted by surface water right holders prior to leaving the model area, and because of the complexity of water rights administration, the prediction of anthropogenic responses to increases in streamflow and the potential effects of those actions on the aquifer are beyond the scope of this scenario.”

3) The integration of AFRD2 water into the BWCC and BWLWWUA areas needs to be fully vetted. In particular the BOR contracts appear to require that AFRD2 water be made available to all BWCC and certain river right users and that an exchange is to take place for lands above the Milner-Gooding Canal. Are these requirements being carried out, and if so how, and what effect does the availability of AFRD2 water for these lands have on the water supply in the Big Wood and Little Wood?

4) No observations were made of water leaving the BWCC and AFRD2 service areas (spill) or the amount of spill near Gooding and to what extent that water could be captured and used to benefit the water users in those service areas.

5) No observations of ground water available for the BWCC and BWLWWUA lands, primary or supplemental.

Hydrologic Observations for the BWRGWMA

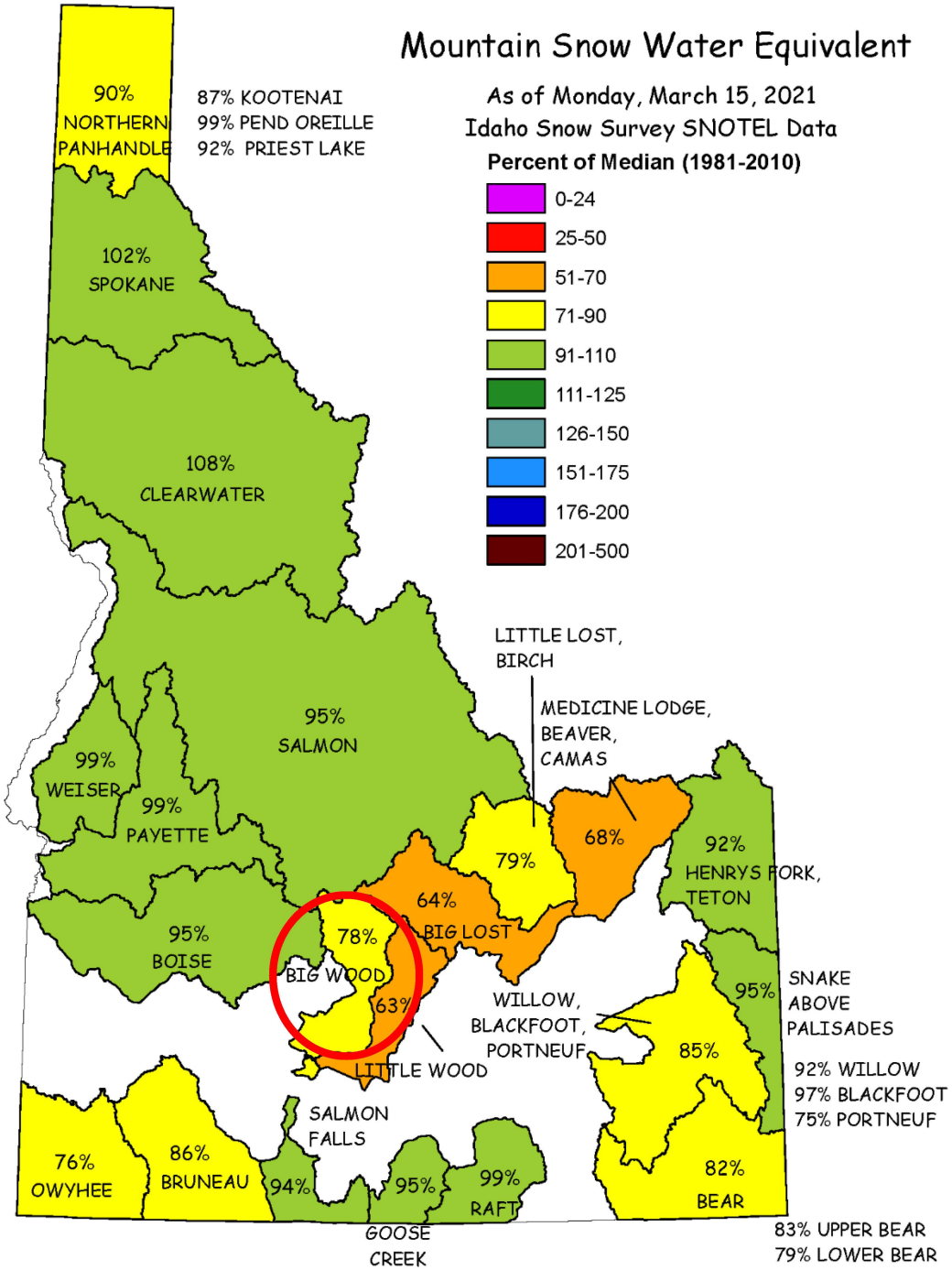
Presented to the Big Wood River GWMA Advisory Committee by Sean Vincent
March 24, 2021

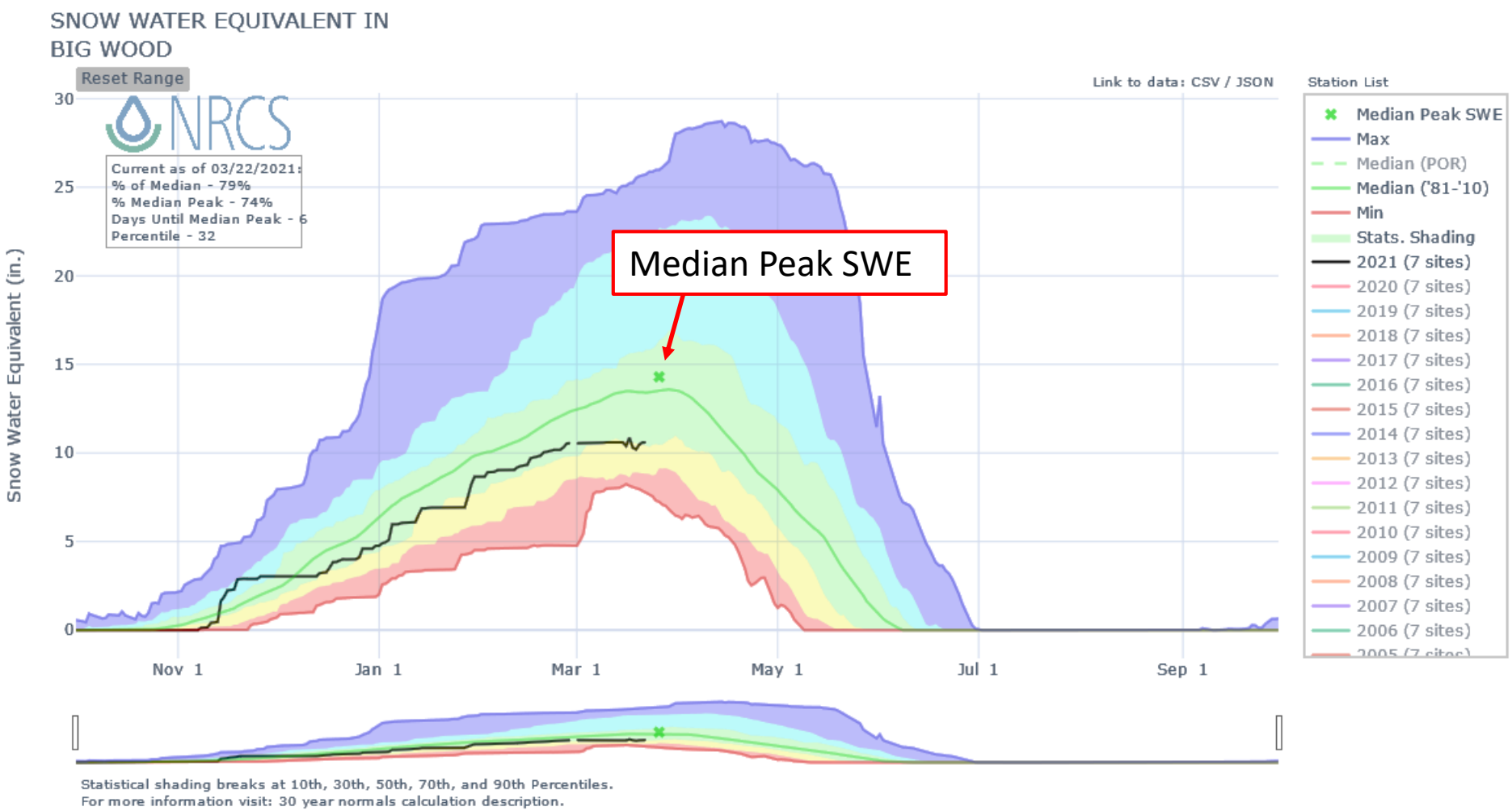
My homework assignment

- Assess surface water availability this year for below Magic water users

The first 3 tasks

1. Observe/look at current snowpack
   - Snow water content is below normal


Mountain Snow Water Equivalent
As of Monday, March 15, 2021
Idaho Snow Survey SNOTEL Data
Percent of Median (1981-2010)
0-24
25-50
51-70
71-90
91-110
111-125
126-150
151-175
176-200
201-500
90% NORTHERN PANHANDLE
87% KOOTENAI
99% PEND OREILLE
92% PRIEST LAKE
102% SPOKANE
108% CLEARWATER
95% SALMON
99% WEISER
99% PAYETTE
95% BOISE
78% BIG WOOD
63%
LITTLE WOOD
64% BIG LOST
79%
68%
LITTLE LOST, BIRCH
MEDICINE LODGE, BEAVER, CAMAS
92% HENRYS FORK, TETON
95%
SNAKE ABOVE PALISADES
WILLOW, BLACKFOOT, PORTNEUF
85%
92% WILLOW
97% BLACKFOOT
75% PORTNEUF
82% BEAR
83% UPPER BEAR
79% LOWER BEAR
76% OWYHEE
86% BRUNEAU
94%
SALMON FALLS
95%
99% RAFT
GOOSE CREEK

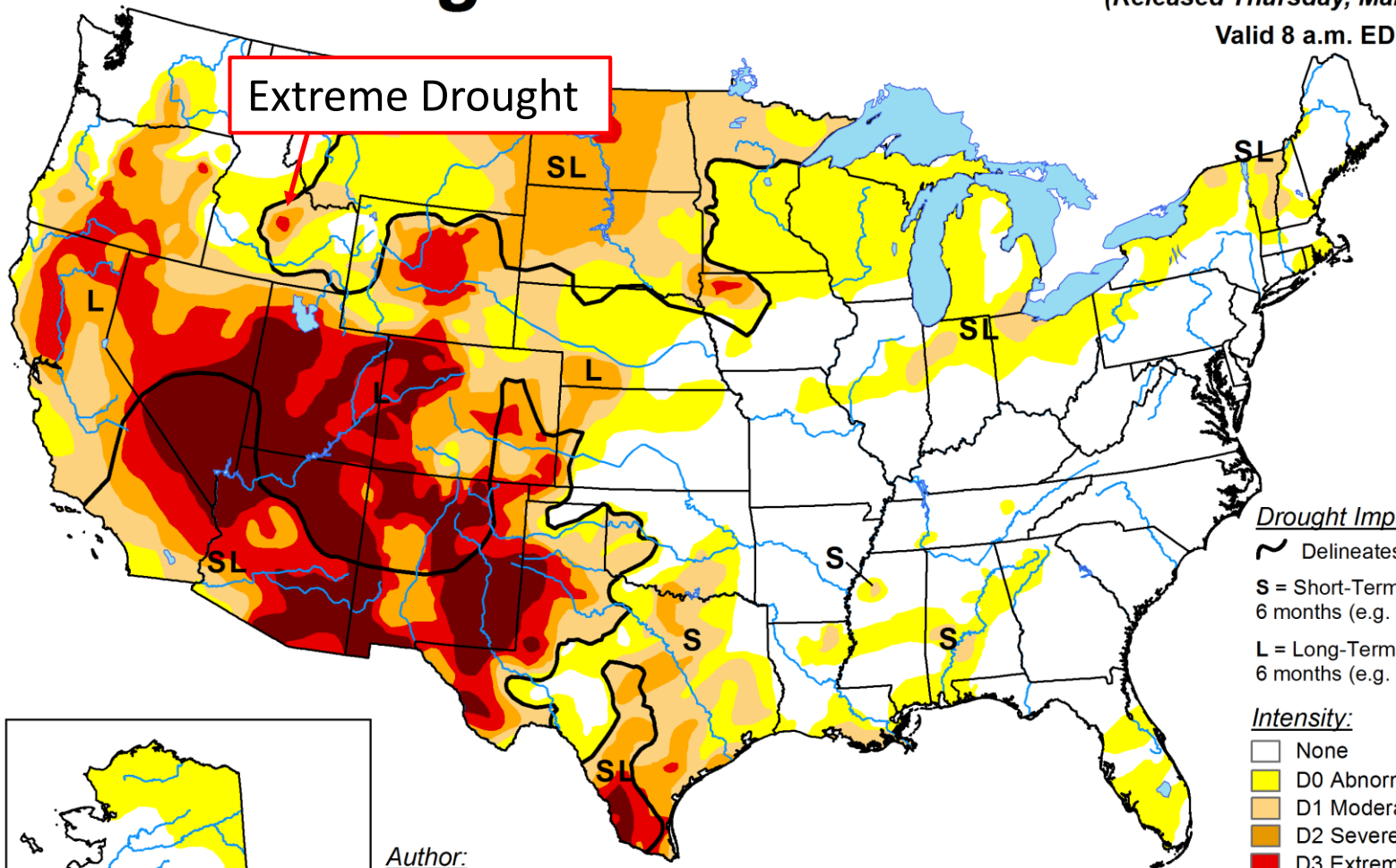

SNOW WATER EQUIVALENT IN
BIG WOOD
Reset Range
Link to data: CSV / JSON
Station List
NRCS
Current as of 03/22/2021:
% of Median - 79%
% Median Peak - 74%
Days Until Median Peak - 6
Percentile - 32
Median Peak SWE
Snow Water Equivalent (in.)
30
25
20
15
10
5
0
Nov 1
Jan 1
Mar 1
May 1
Jul 1
Sep 1
Median Peak SWE
Max
Median (POR)
Median ('81-'10)
Min
Stats. Shading
2021 (7 sites)
2020 (7 sites)
2019 (7 sites)
2018 (7 sites)
2017 (7 sites)
2016 (7 sites)
2015 (7 sites)
2014 (7 sites)
2013 (7 sites)
2012 (7 sites)
2011 (7 sites)
2010 (7 sites)
2009 (7 sites)
2008 (7 sites)
2007 (7 sites)
2006 (7 sites)
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: 30 year normals calculation description.

U.S. Drought Monitor

March 16, 2021

(Released Thursday, Mar. 18, 2021)

Valid 8 a.m. EDT



Drought Impact Types:

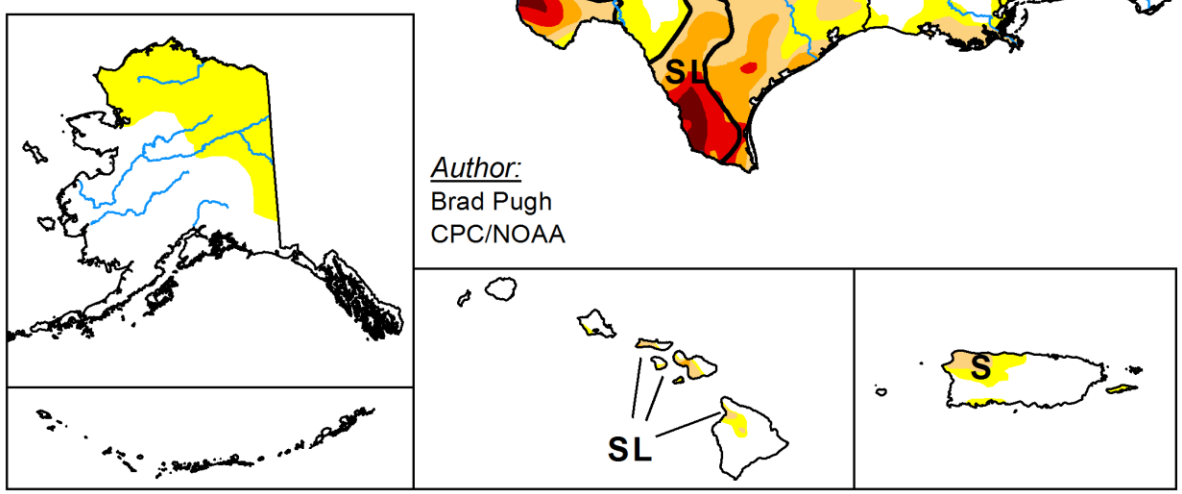
~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought



Author:
Brad Pugh
CPC/NOAA

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

droughtmonitor.unl.edu

The first 3 tasks

1. Observe/look at current snowpack
   - Snow water content is below normal

2. Observe/look at American Falls fill projections to determine if AFRD#2 will get a full allocation
   - American Falls projected to fill on April 1
   - Full allocation in 29 out of the last 30 years

3. Use Surface Water Supply Index to determine similar water supply years for Magic Reservoir water users
   - Analog years = 2002 and 2014

SWSI

- Product of USDA Natural Resources Conservation Service
- Sum end of month reservoir storage and projected April-September natural flow.
- Normalize forecasted volume with measured annual water supply volumes to put in historical context
  - SWSI ranges from -4.1 (extremely dry) to 4.1 (extremely wet) with median water supply year = 0.0
- SWSIs are computed at beginning of the month
  - SWSI tables for below Magic and above Hailey

SWSI (cont'd)

- March SWSI uses end of February storage & April – September natural flow → good for historical context but doesn't include March storage changes
  - April volume = 7 KAF higher than March volume in 2002
  - April volume = 24 KAF higher in 2014

- SWSI tables include "adequate water supply" value for irrigation season
  - SWSI > 0.4 = adequate supply for Big Wood below Magic
  - SWSI for 50% exceedance forecast = -2.2 → most likely an inadequate 2021 surface water supply
  - SWSI for 10% exceedance forecast = 0.5

Big Wood River Basin SWSI Adequate Water Supply Greater than 0.4 SWSI or 275 KAF

Station ID	Station Name	Period	Data Type	Years	# of Years	
13142500	Big Wood R blw Magic Reservoir	Apr-Sep	strm	1991-2020	30	Units KAF
13142000	Magic Reservoir	28-Feb	resv	1991-2020	30	Units KAF

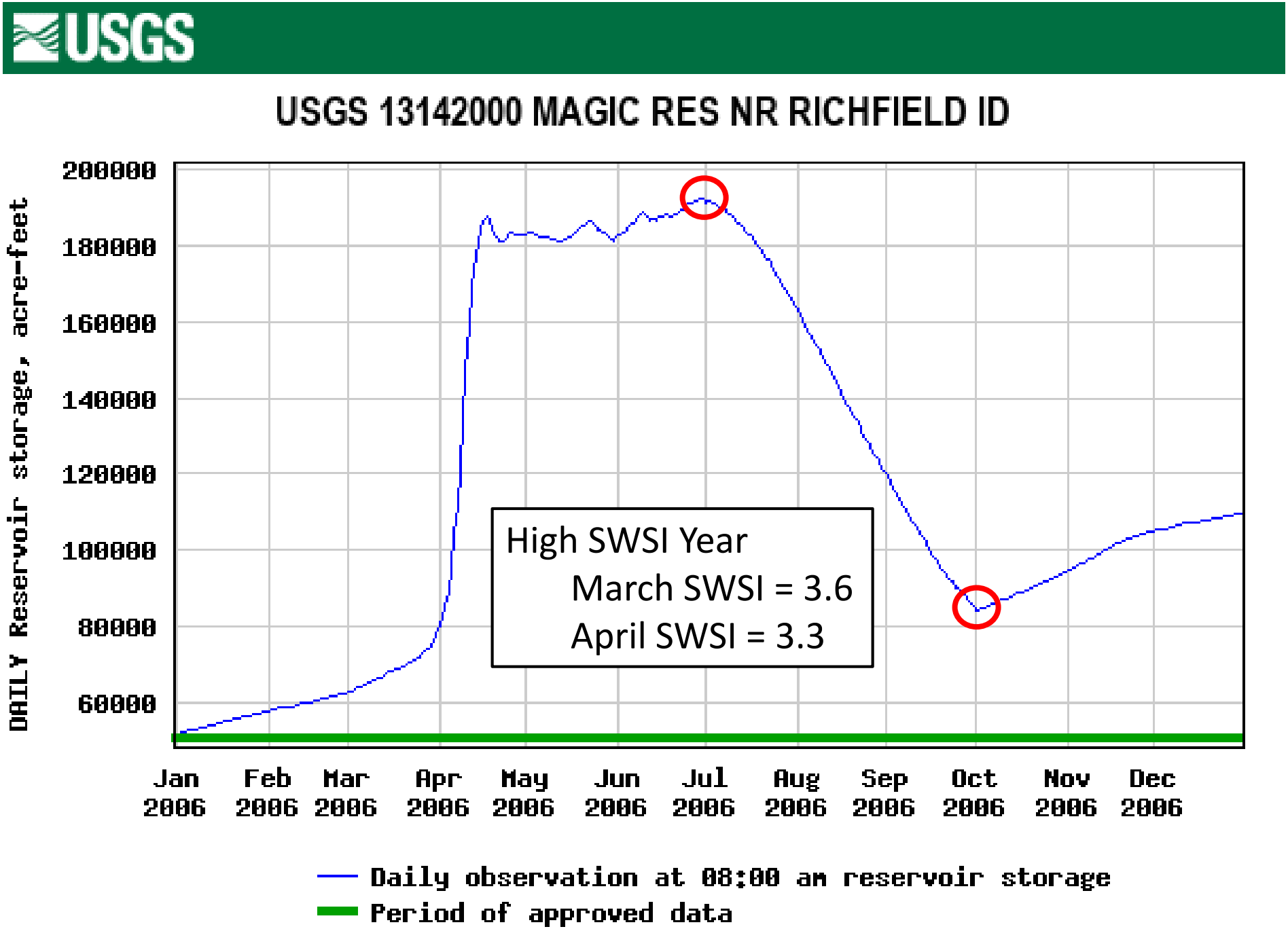
ENSO Classification

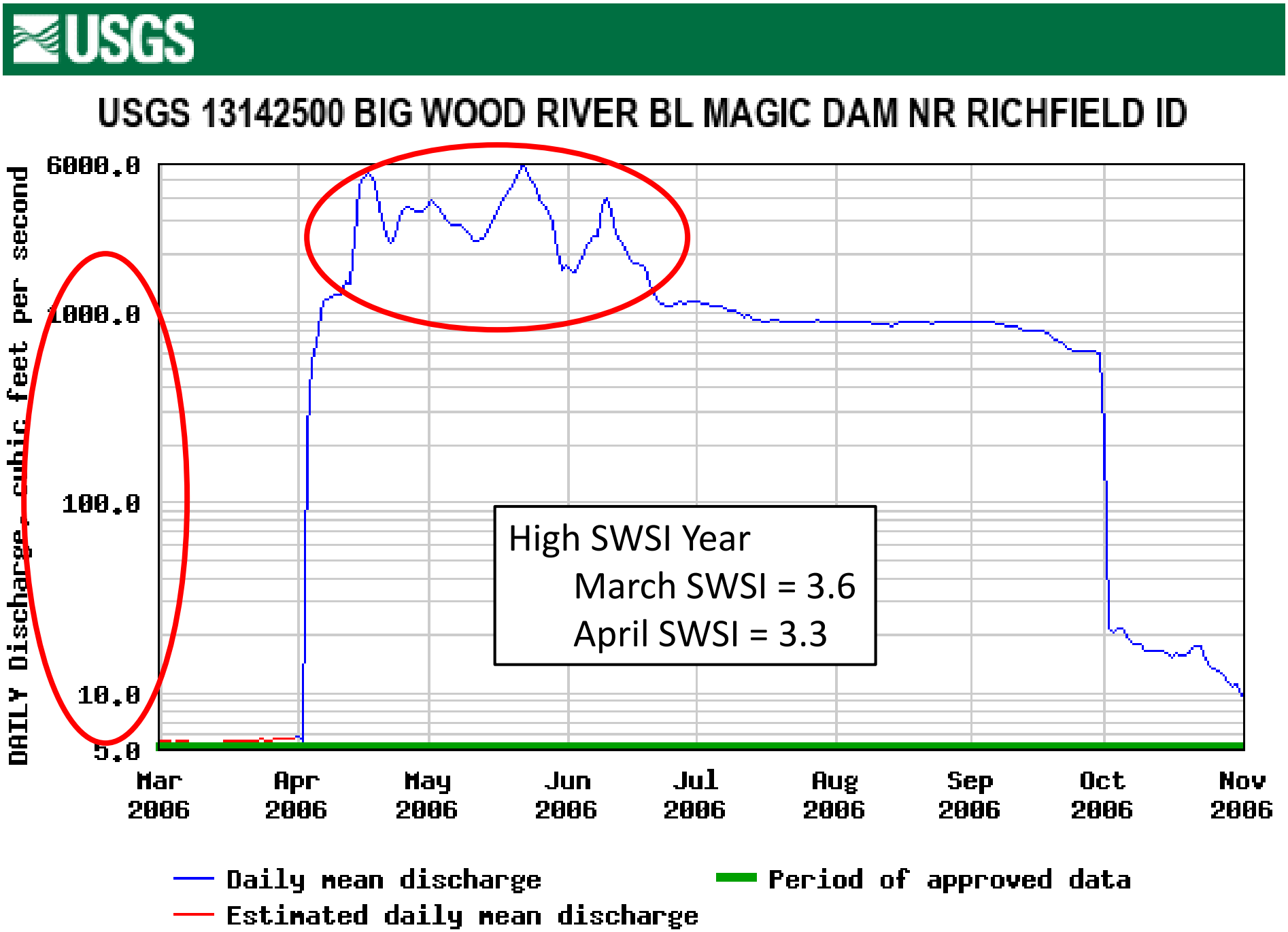
SE Strong El Nino - EN Mild El Nino - N Neutral - LN Mild La Nina - SL Strong La Nina

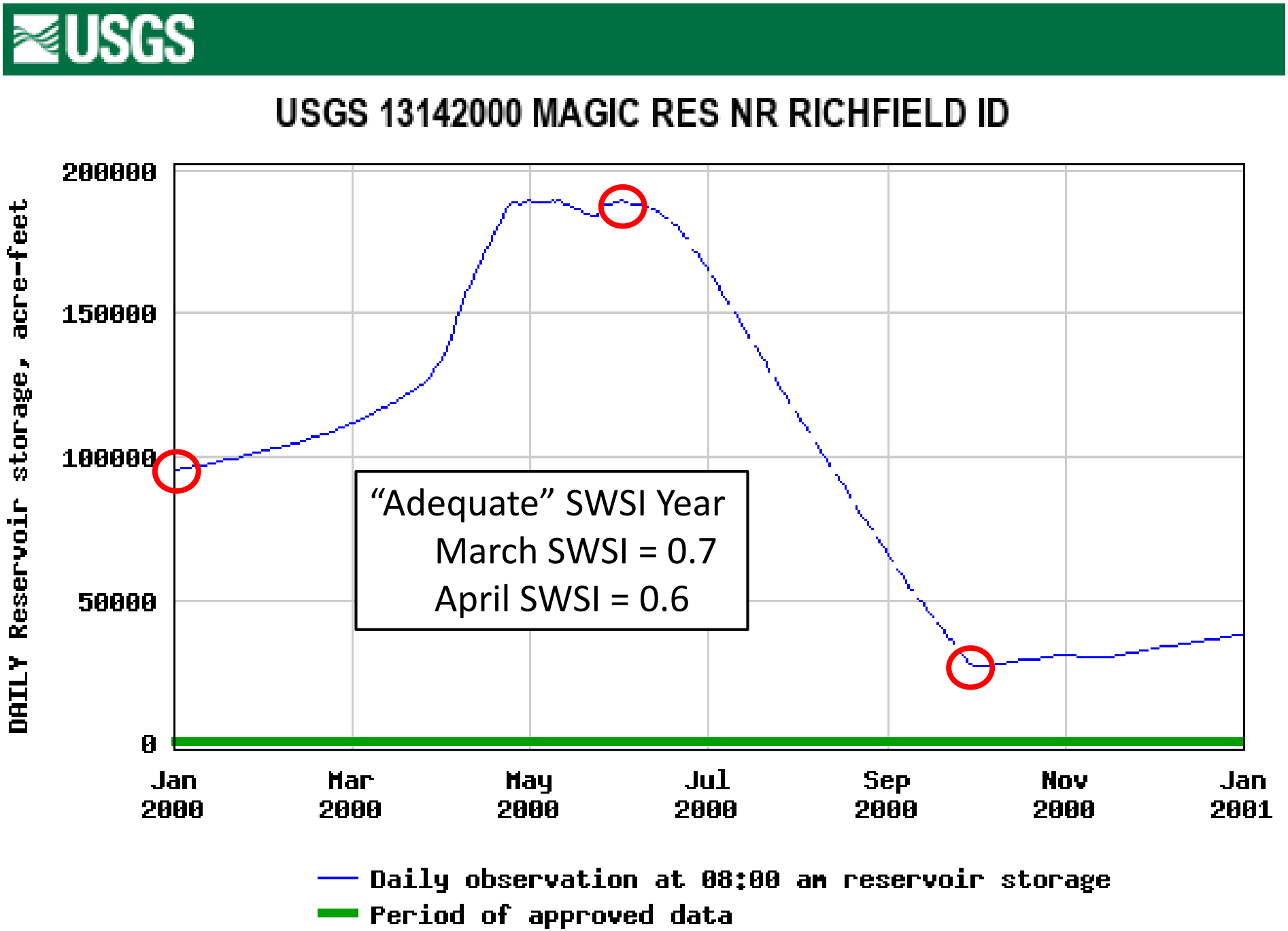
Rank	Year	Enso	Stream Flow Apr-Sep	Reservoir 28-Feb	Streamflow + Reservoir Sum	Non-Exceedance Probability	SWSI
1	2017	LN	710	99	808	97%	3.9
2	2006	N	636	62	699	94%	3.6
3	1997	N	605	78	683	90%	3.4
4	1998	SE	427	163	590	87%	3.1
5	1999	SL	420	120	540	84%	2.8
6	1995	SE	518	16	534	81%	2.6
7	2019	N	424	89	513	77%	2.3
8	1996	N	351	127	478	74%	2.0
9	2011	SL	322	91	412	71%	1.7
10	2018	LN	204	171	375	68%	1.5
11	1993	EN	355	14	369	65%	1.2
12	2012	LN	238	128	365	61%	0.9
13	2000	N	165	111	277	58%	0.7
2021 10% Chance Exceedance Forcast		?	240	27	267	56%	0.5
14	2010	EN	167	82	250	55%	0.4
15	2009	N	219	30	249	52%	0.1
16	2016	SE	187	36	223	48%	-0.1
17	2005	EN	194	26	219	45%	-0.4
18	2008	N	178	24	202	42%	-0.7
19	2020	?	56	135	190	39%	-0.9
2021 30% Chance Exceedance Forcast		?	158	27	185	37%	-1.1
20	2007	EN	60	124	184	35%	-1.2
21	2003	EN	140	23	163	32%	-1.5
22	2015	EN	79	61	140	29%	-1.7
23	2002	N	120	19	139	26%	-2.0
2021 50% Chance Exceedance Forcast		?	112	27	139	24%	-2.2
24	2014	N	84	49	133	23%	-2.3
25	1994	SE	31	86	117	19%	-2.6
2021 70% Chance Exceedance Forcast		?	74	27	101	18%	-2.7
26	1991	N	76	22	98	16%	-2.8
27	2013	N	66	28	93	13%	-3.1
28	2004	N	66	23	89	10%	-3.4
29	2001	LN	38	48	87	6%	-3.6
2021 90% Chance Exceedance Forcast		?	32	27	59	5%	-3.8
30	1992	EN	24	27	51	3%	-3.9

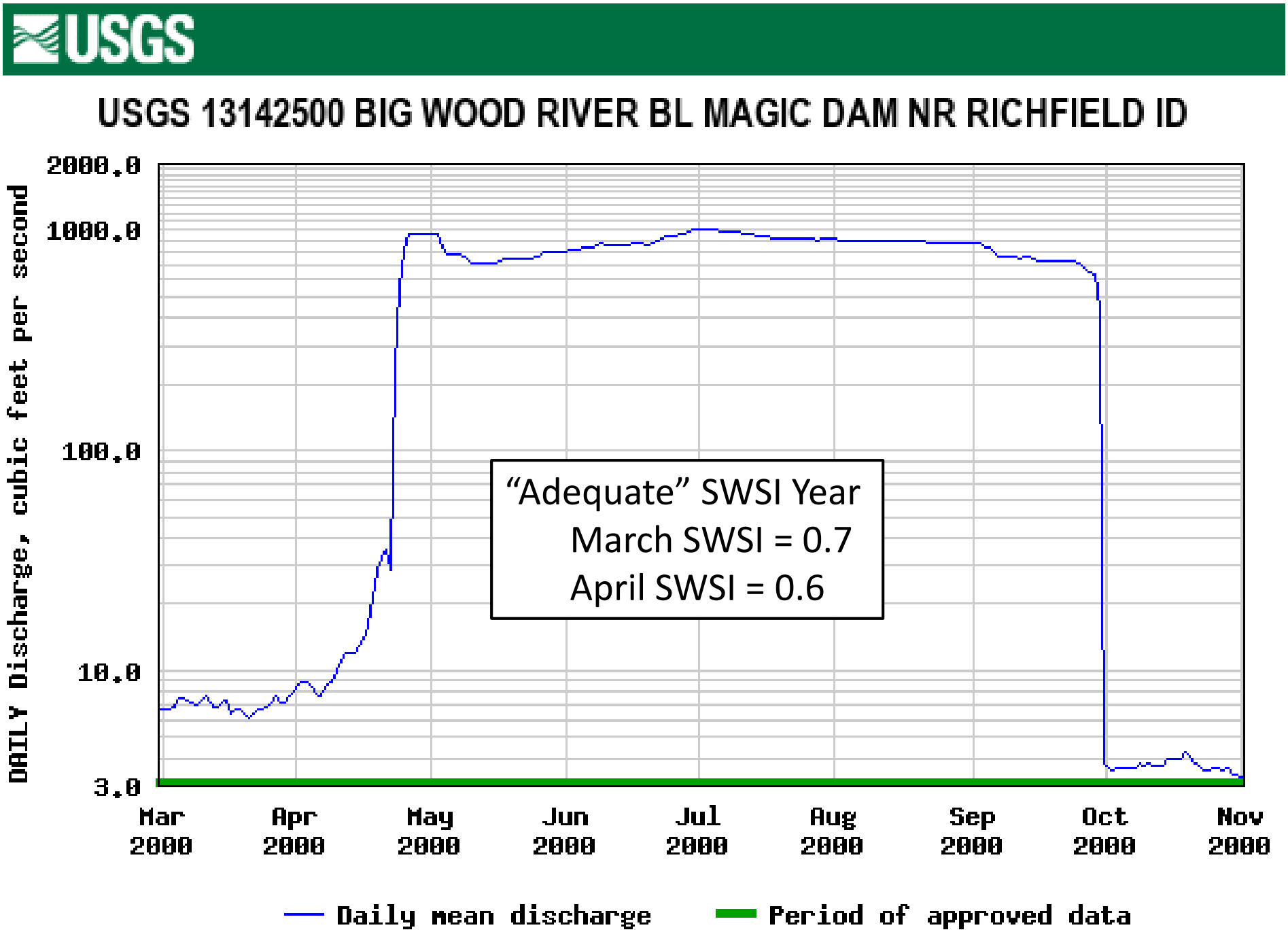
The last 3 tasks

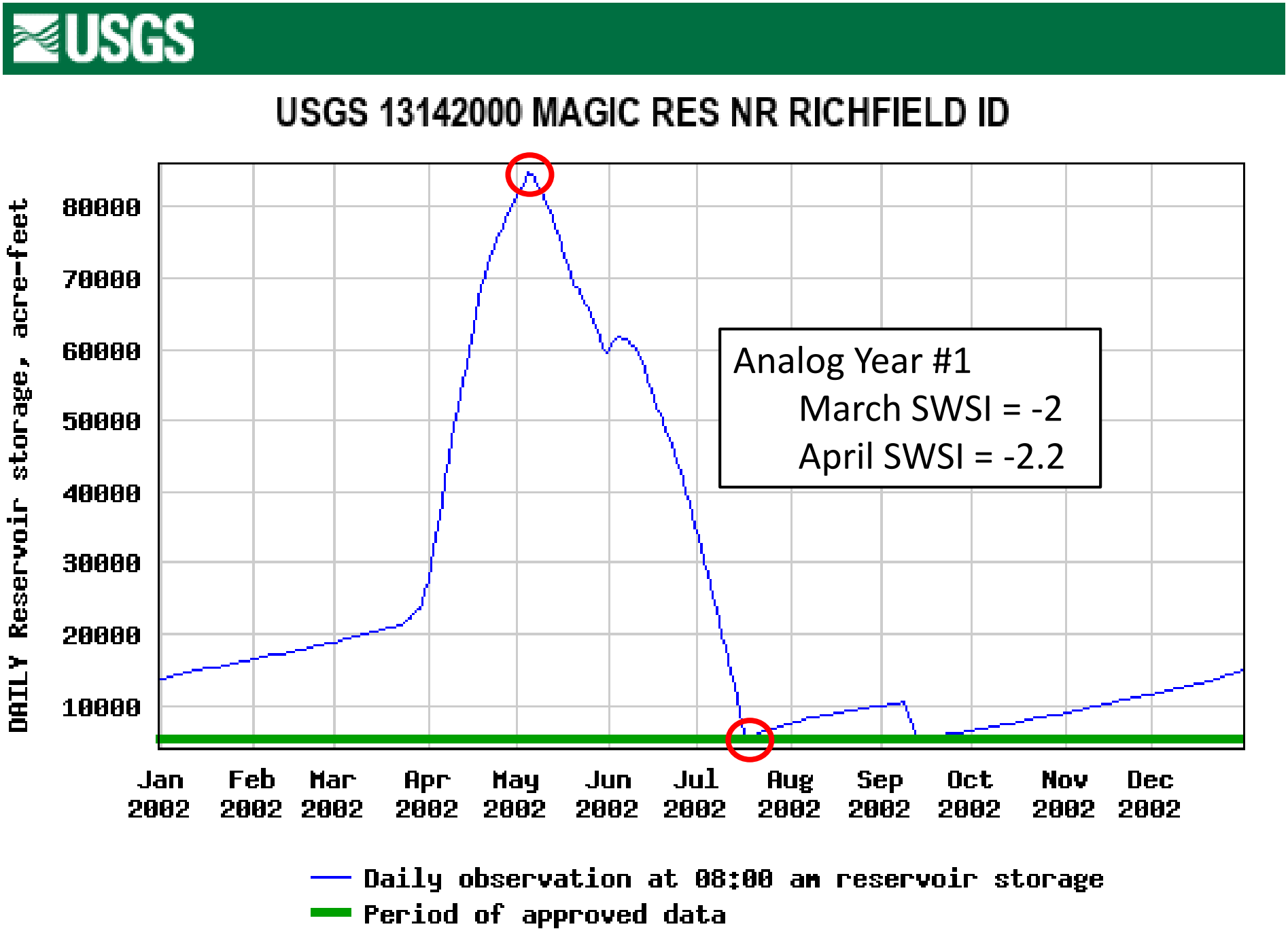
4. Use USGS gage data to evaluate relationships between historical SWSIs and reservoir fill, reservoir release rates, and irrigation season duration


USGS
USGS 13142000 MAGIC RES NR RICHFIELD ID
DAILY Reservoir storage, acre-feet
200000
180000
160000
140000
120000
100000
80000
60000
Jan 2006
Feb 2006
Mar 2006
Apr 2006
May 2006
Jun 2006
Jul 2006
Aug 2006
Sep 2006
Oct 2006
Nov 2006
Dec 2006
High SWSI Year
March SWSI = 3.6
April SWSI = 3.3
Daily observation at 08:00 am reservoir storage
Period of approved data


USGS
USGS 13142500 BIG WOOD RIVER BL MAGIC DAM NR RICHFIELD ID
DAILY Discharge, cubic feet per second
6000.0
1000.0
100.0
10.0
5.0
Mar 2006
Apr 2006
May 2006
Jun 2006
Jul 2006
Aug 2006
Sep 2006
Oct 2006
Nov 2006
High SWSI Year
March SWSI = 3.6
April SWSI = 3.3
Daily mean discharge
Estimated daily mean discharge
Period of approved data

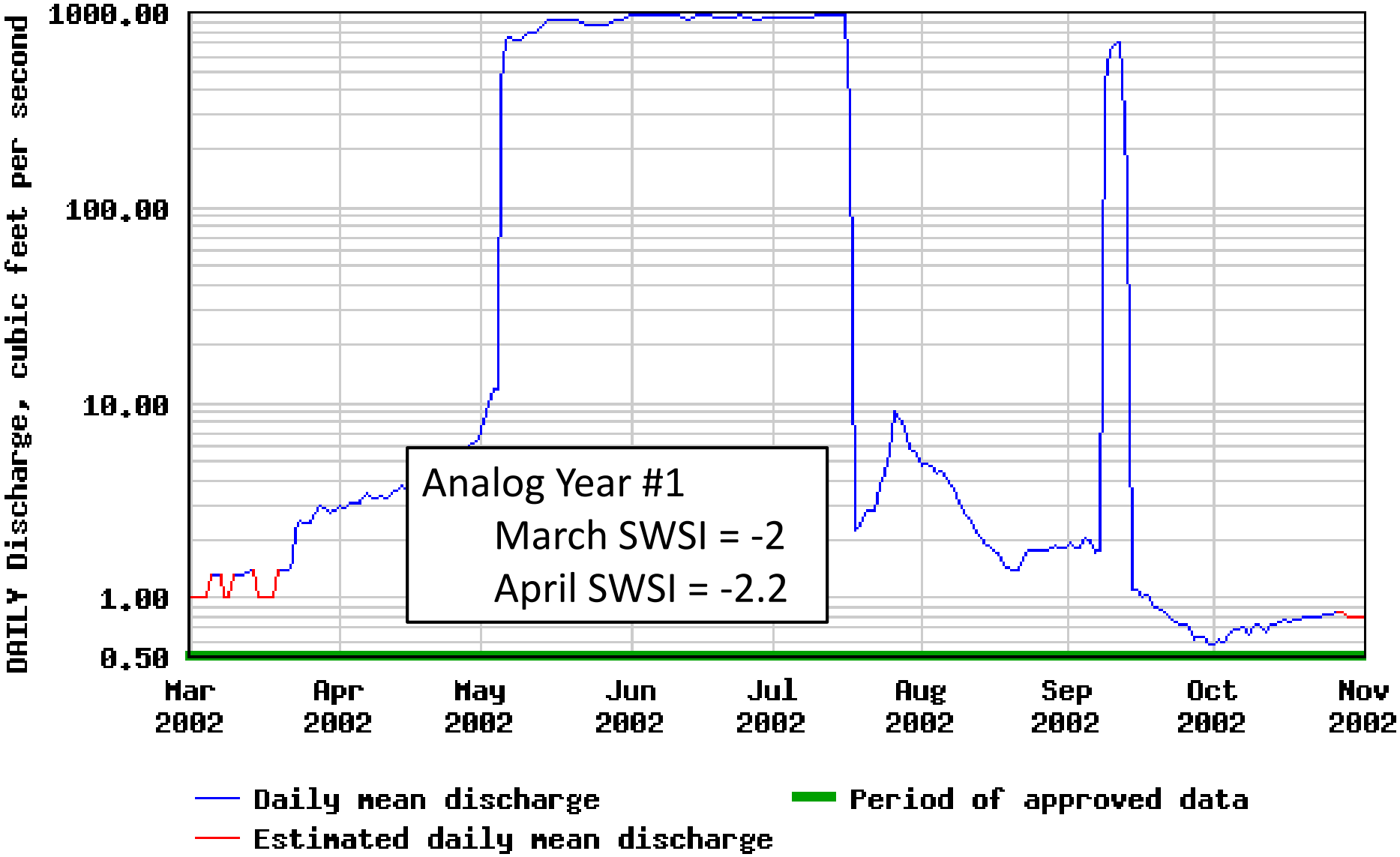

USGS
USGS 13142000 MAGIC RES NR RICHFIELD ID
DAILY Reservoir storage, acre-feet
200000
150000
100000
50000
0
Jan 2000
Mar 2000
May 2000
Jul 2000
Sep 2000
Nov 2000
Jan 2001
"Adequate" SWSI Year
March SWSI = 0.7
April SWSI = 0.6
Daily observation at 08:00 am reservoir storage
Period of approved data

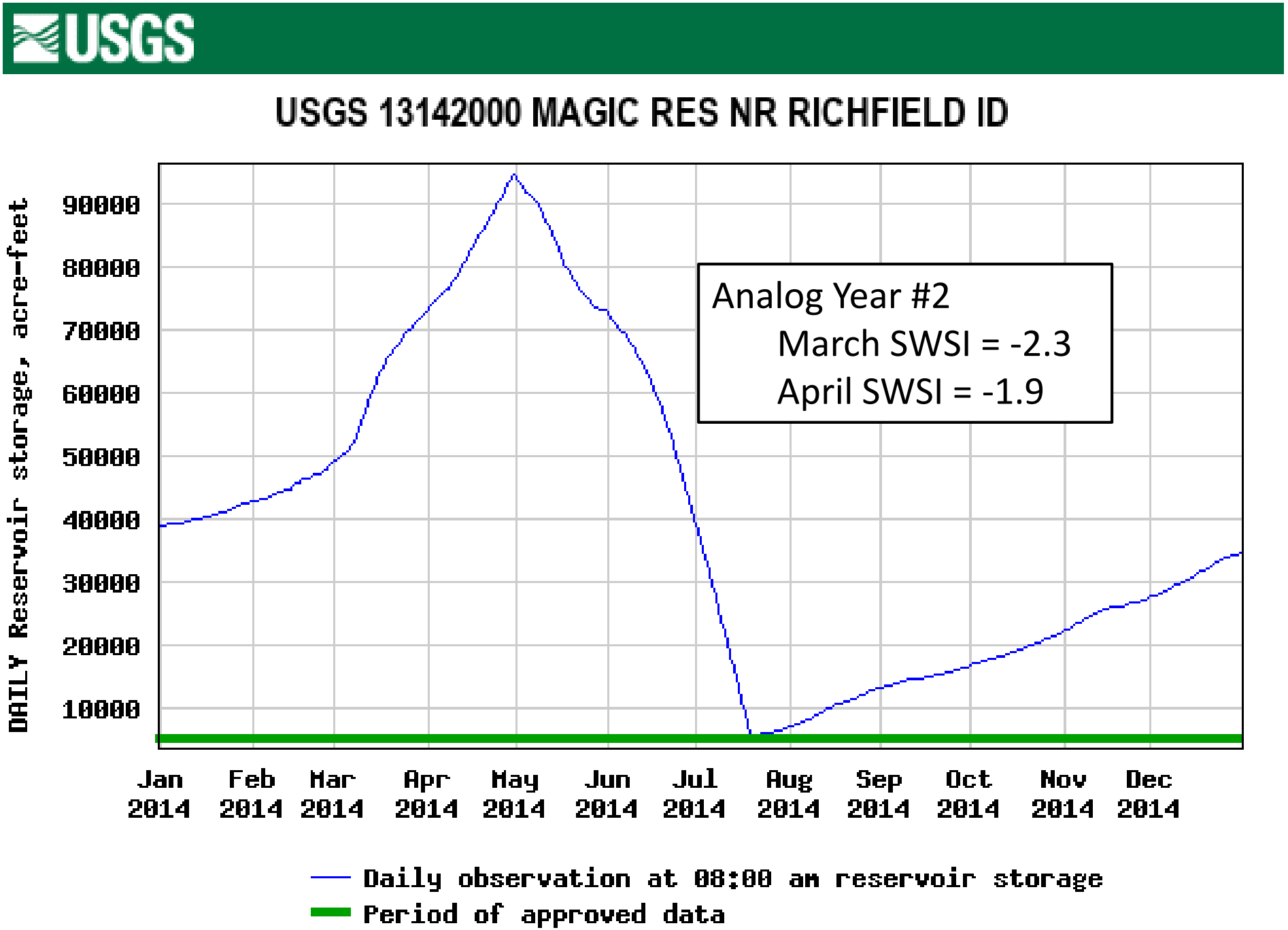

USGS
USGS 13142500 BIG WOOD RIVER BL MAGIC DAM NR RICHFIELD ID
DAILY Discharge, cubic feet per second
2000.0
1000.0
100.0
10.0
3.0
Mar 2000
Apr 2000
May 2000
Jun 2000
Jul 2000
Aug 2000
Sep 2000
Oct 2000
Nov 2000
"Adequate" SWSI Year
March SWSI = 0.7
April SWSI = 0.6
Daily mean discharge
Period of approved data


USGS
USGS 13142000 MAGIC RES NR RICHFIELD ID
DAILY Reservoir storage, acre-feet
80000
70000
60000
50000
40000
30000
20000
10000
Jan 2002
Feb 2002
Mar 2002
Apr 2002
May 2002
Jun 2002
Jul 2002
Aug 2002
Sep 2002
Oct 2002
Nov 2002
Dec 2002
Analog Year #1
March SWSI = -2
April SWSI = -2.2
Daily observation at 08:00 am reservoir storage
Period of approved data

USGS

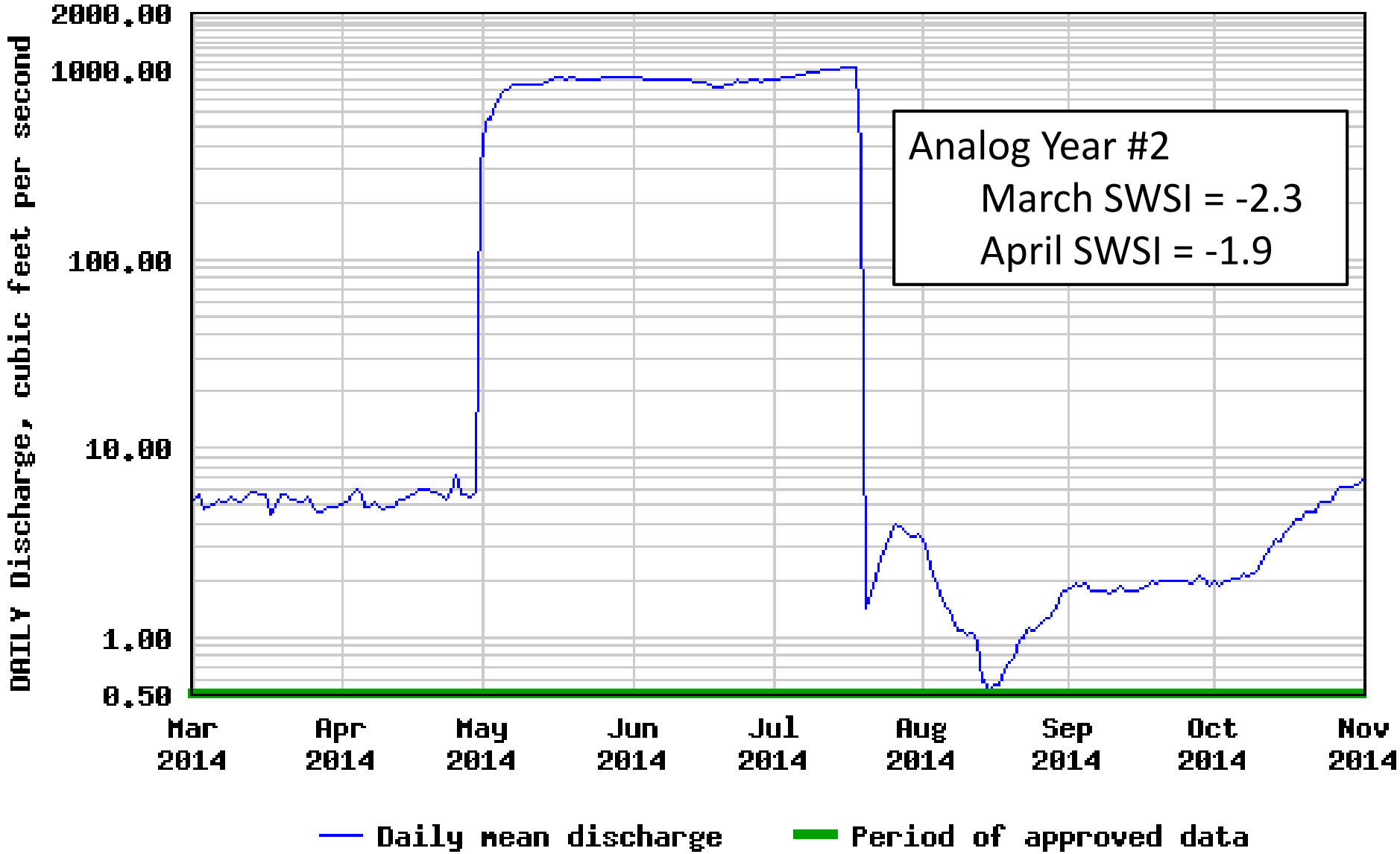
USGS 13142500 BIG WOOD RIVER BL MAGIC DAM NR RICHFIELD ID




USGS
USGS 13142000 MAGIC RES NR RICHFIELD ID
DAILY Reservoir storage, acre-feet
90000
80000
70000
60000
50000
40000
30000
20000
10000
Jan 2014
Feb 2014
Mar 2014
Apr 2014
May 2014
Jun 2014
Jul 2014
Aug 2014
Sep 2014
Oct 2014
Nov 2014
Dec 2014
Analog Year #2
March SWSI = -2.3
April SWSI = -1.9
Daily observation at 08:00 am reservoir storage
Period of approved data

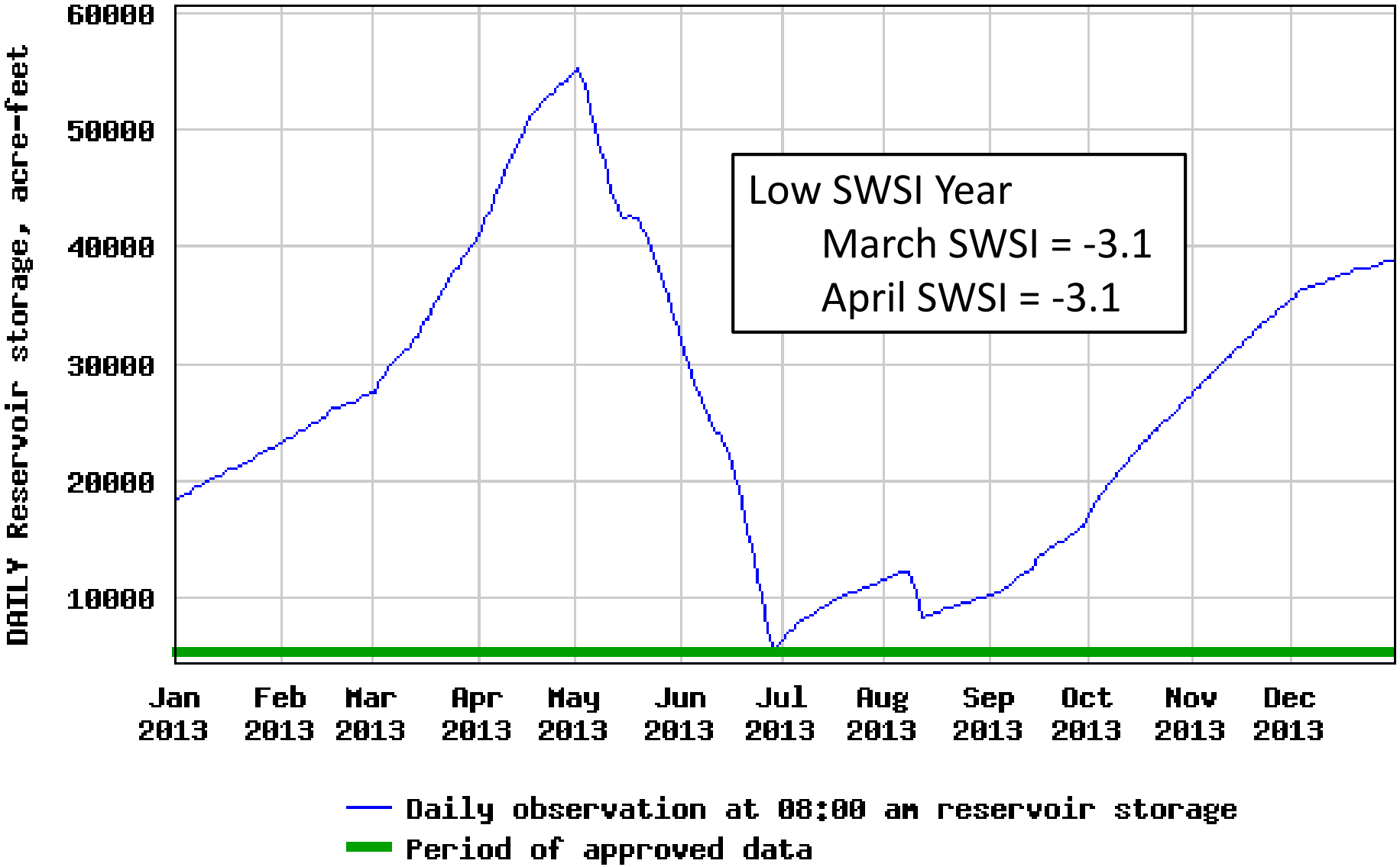
USGS

USGS 13142500 BIG WOOD RIVER BL MAGIC DAM NR RICHFIELD ID



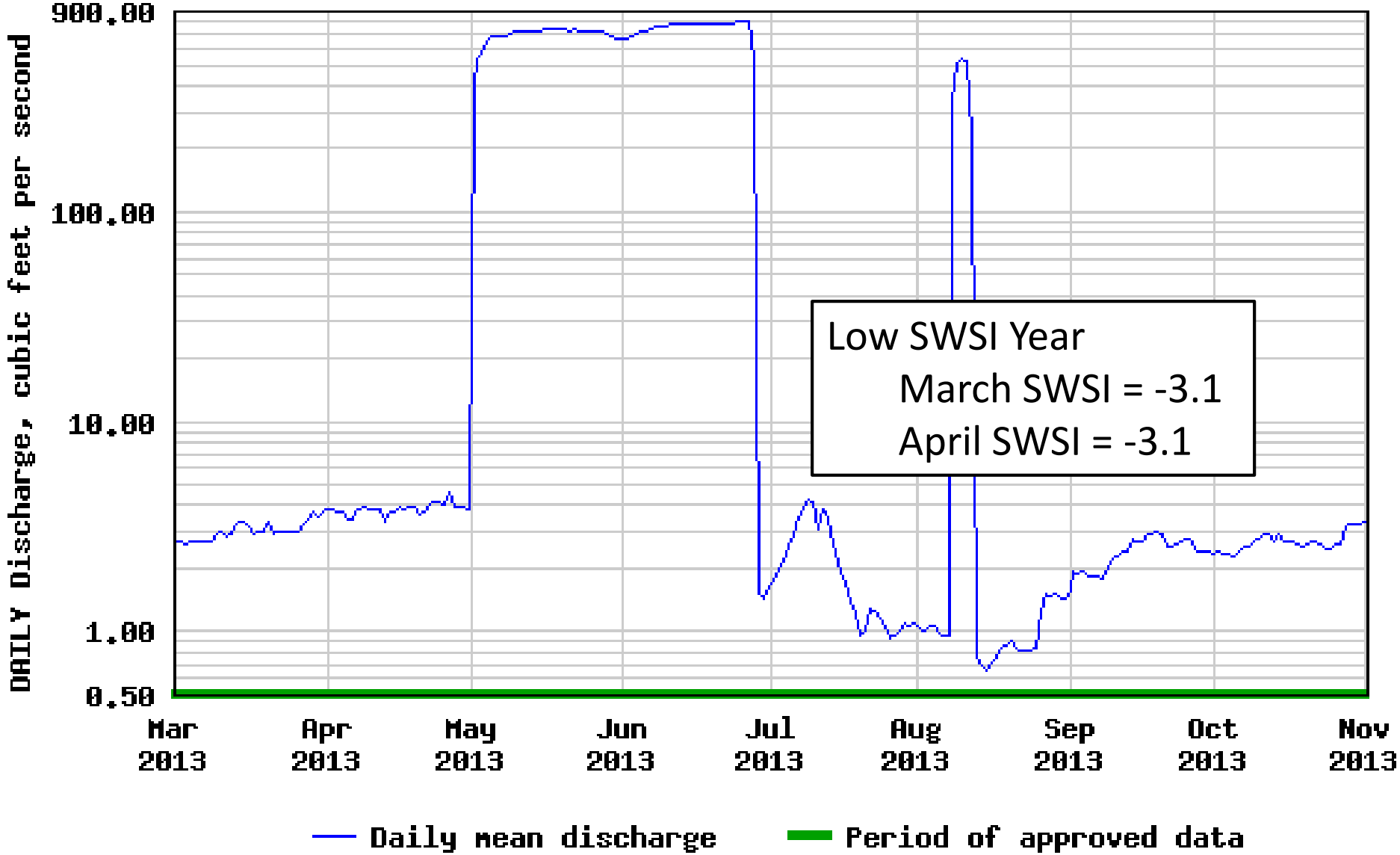
USGS

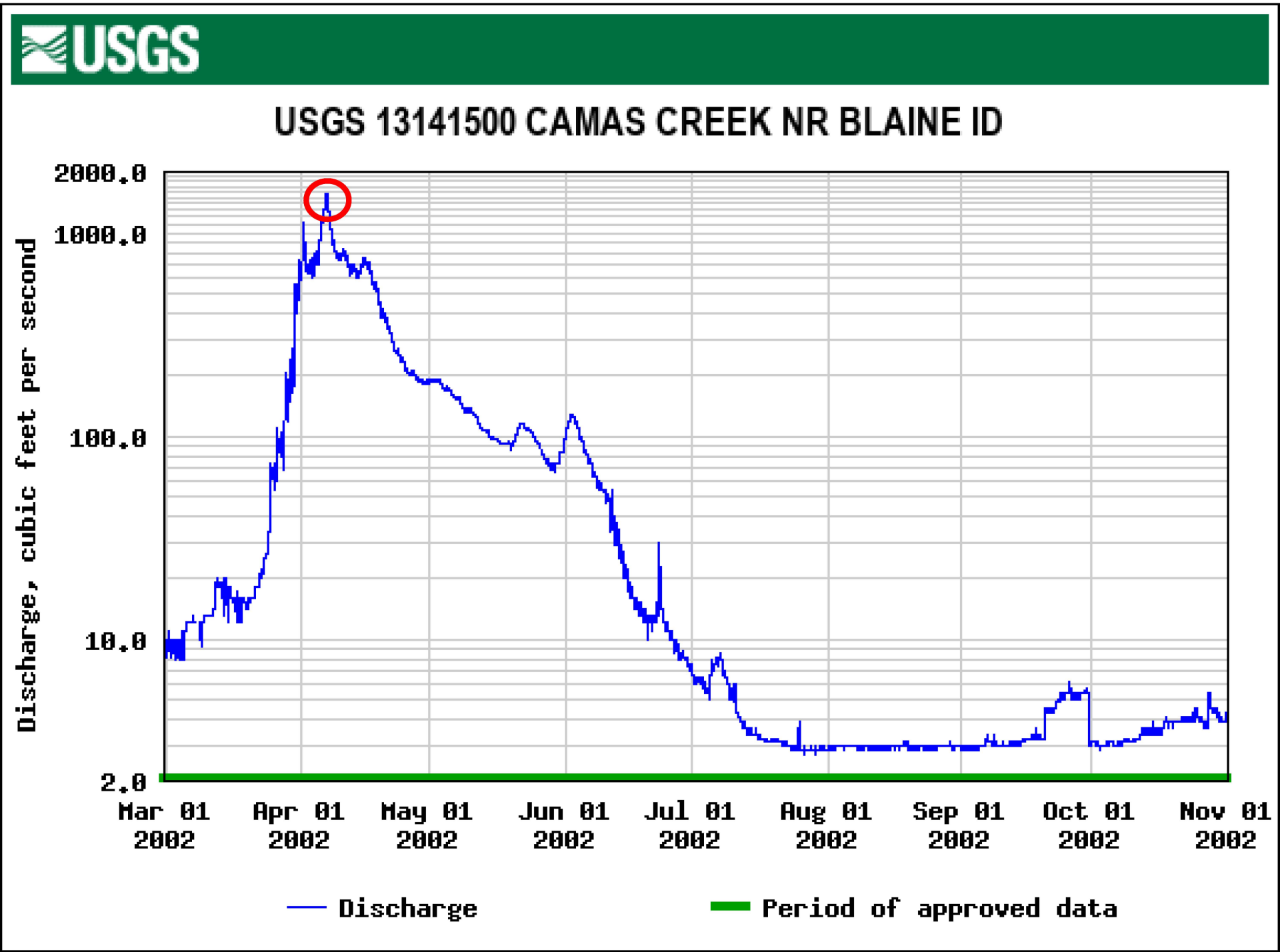
USGS 13142000 MAGIC RES NR RICHFIELD ID



USGS

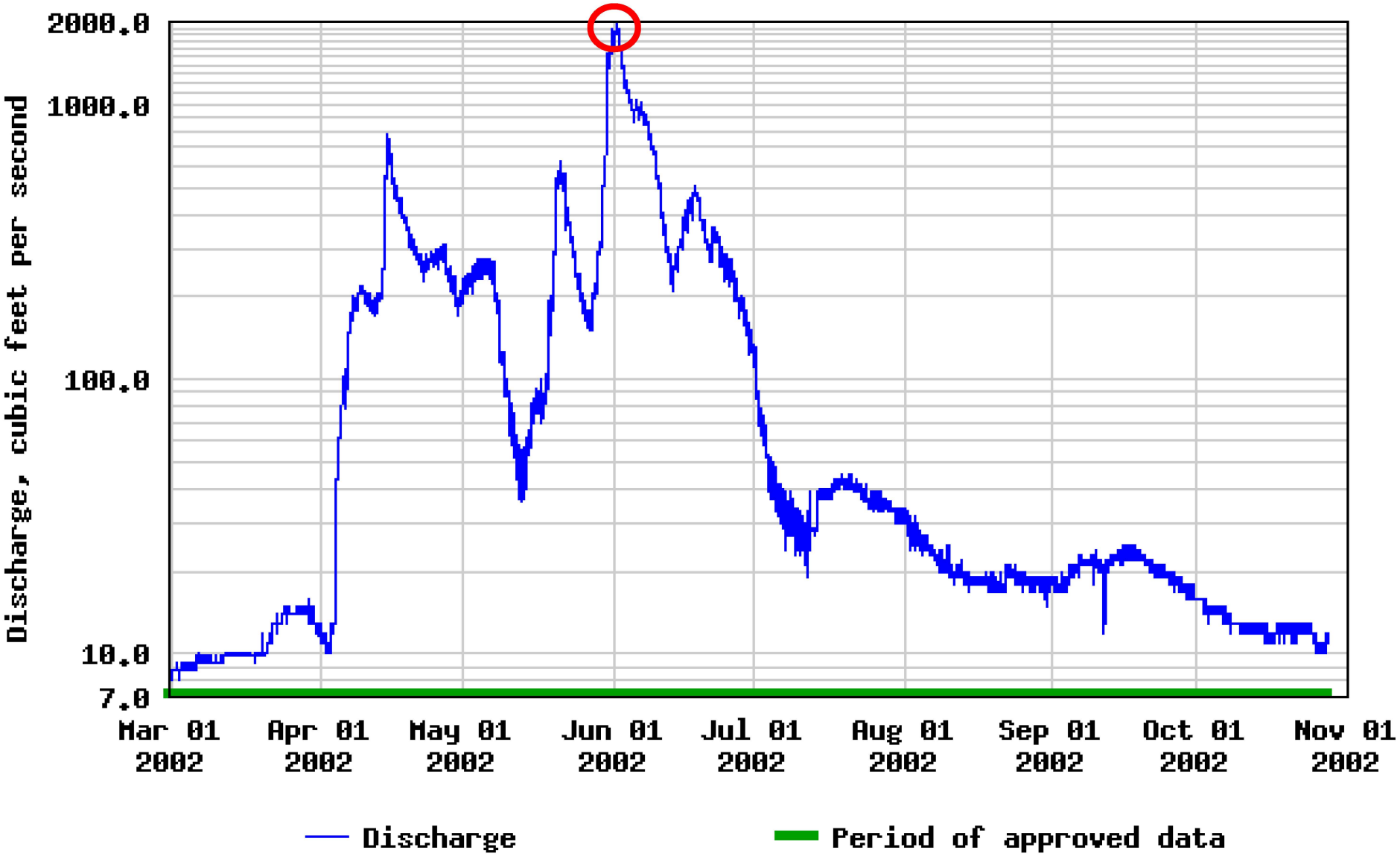
USGS 13142500 BIG WOOD RIVER BL MAGIC DAM NR RICHFIELD ID




USGS
USGS 13141500 CAMAS CREEK NR BLAINE ID
Discharge, cubic feet per second
2000.0
1000.0
100.0
10.0
2.0
Mar 01 2002
Apr 01 2002
May 01 2002
Jun 01 2002
Jul 01 2002
Aug 01 2002
Sep 01 2002
Oct 01 2002
Nov 01 2002
Discharge
Period of approved data

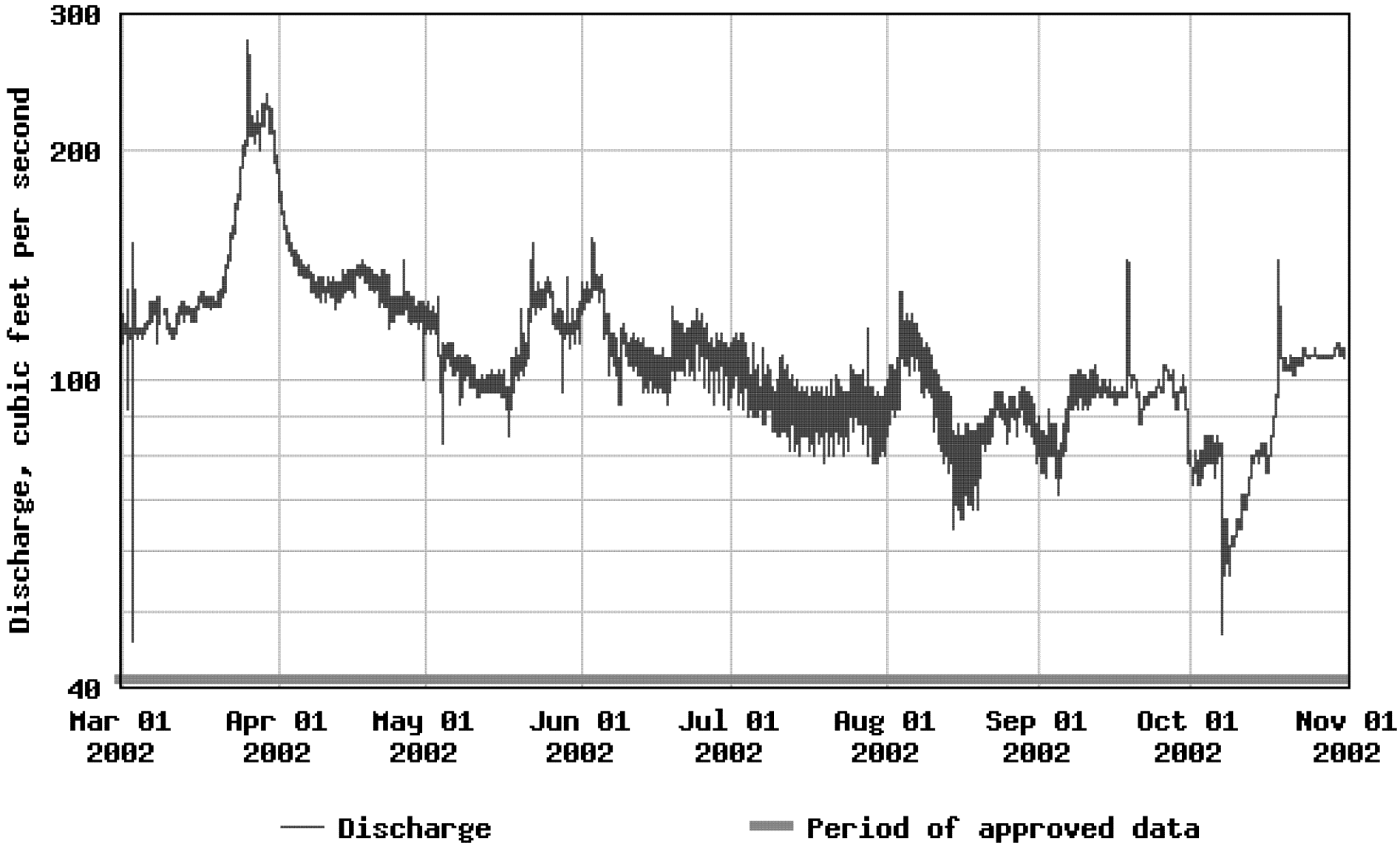
USGS

USGS 13140800 BIG WOOD RIVER AT STANTON CROSSING NR BELLEVUE ID



USGS

USGS 13150430 SILVER CREEK AT SPORTSMAN ACCESS NR PICABO ID

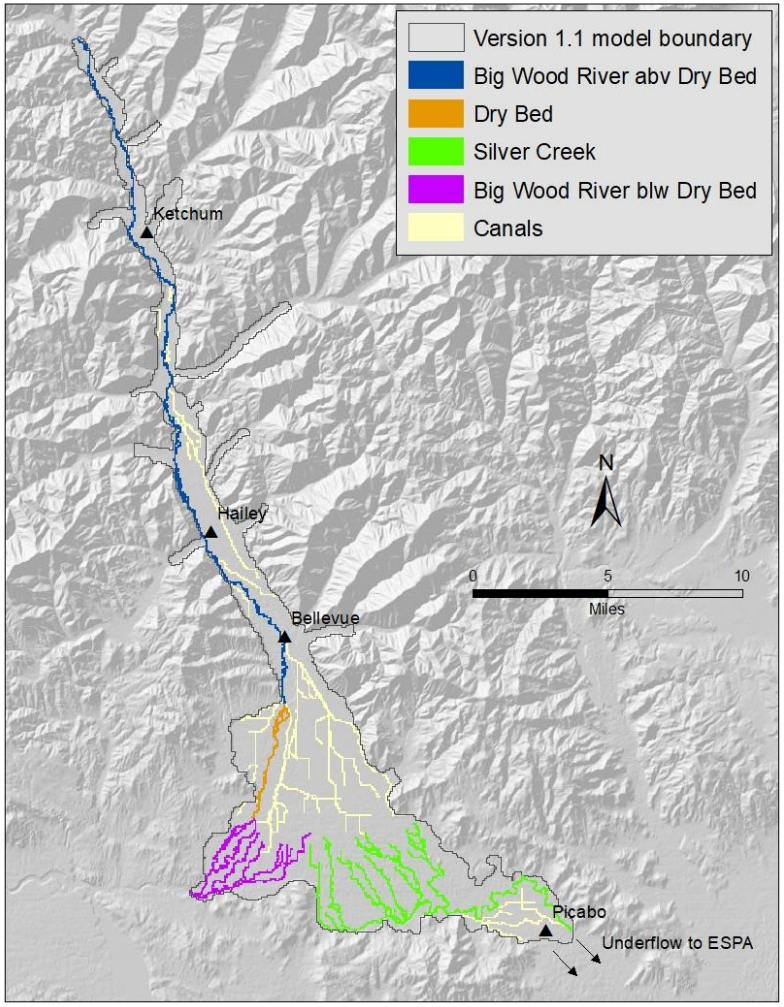


The last 3 tasks

4. Use USGS gage data to evaluate relationships between historical SWSIs and reservoir fill, reservoir release rates, and irrigation season length

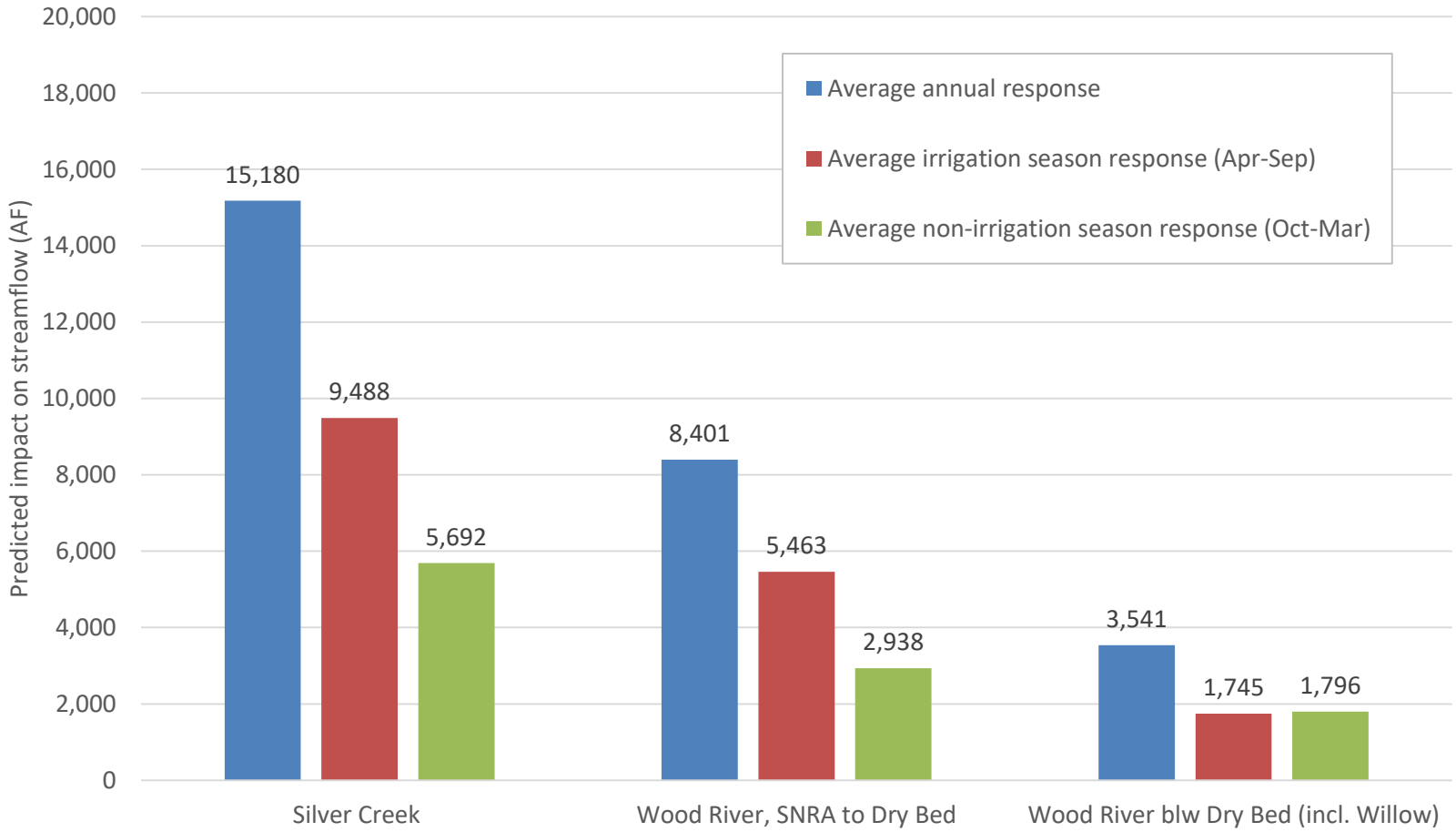
5. Quantify timing and spatial distribution of impacts resulting from continuous consumptive groundwater use/curtailment in Wood River Valley (Jennifer Sukow)

Generalized Big Wood River and Silver Creek reaches for discussion of impacts, Wood River Groundwater Flow Model, Version 1.1

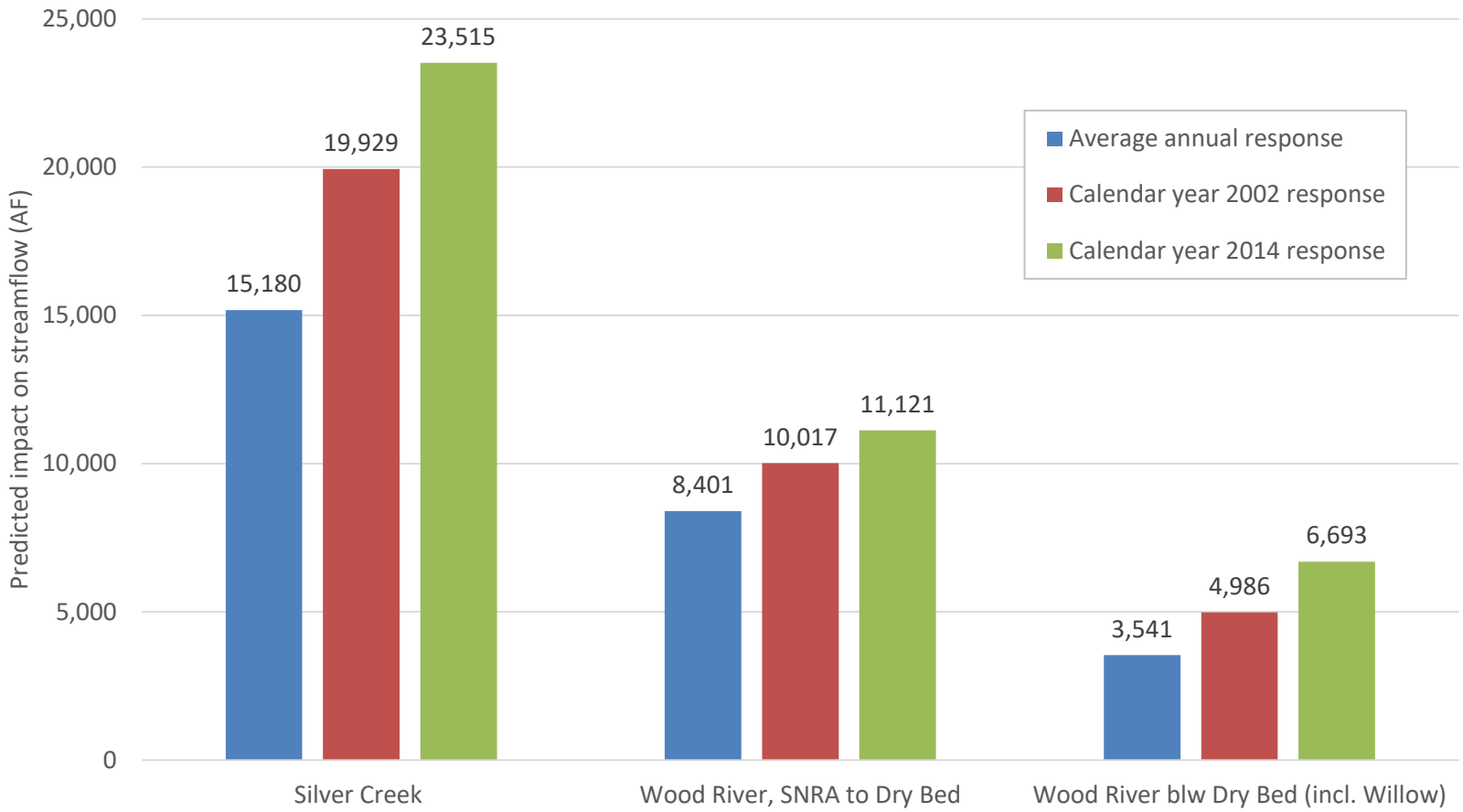


- Dry Bed typically flows during snowmelt runoff until mid-irrigation season when all water is diverted into the Bypass Canal
- During 1995-2014 model simulation period
  - Dry Bed was dry during 52% of irrigation season months
  - Dry Bed was dry during 73% of non-irrigation season months

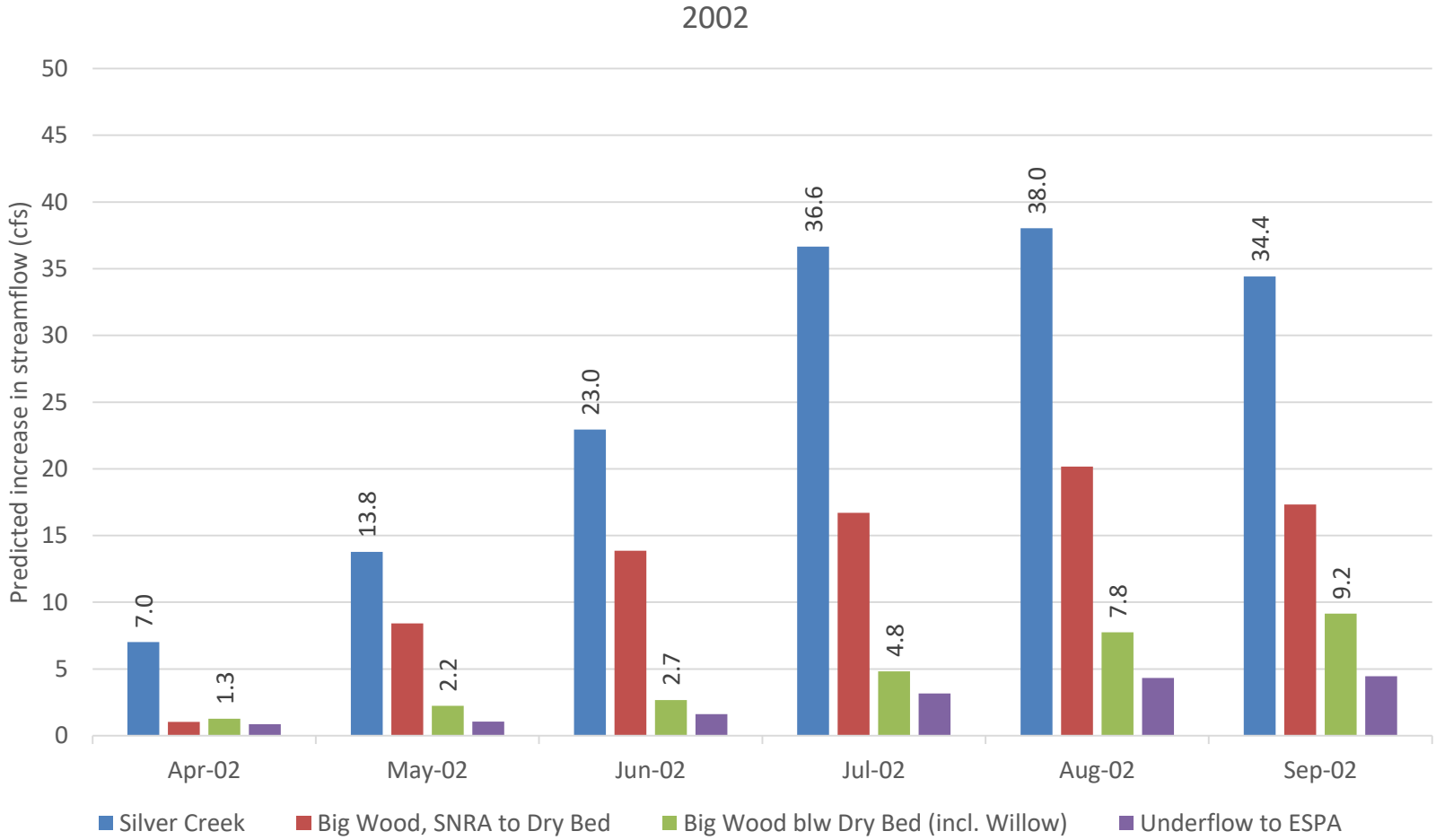
Average annual response to groundwater pumping (1995-2014) from Wood River Valley Groundwater Flow Model, Version 1.1



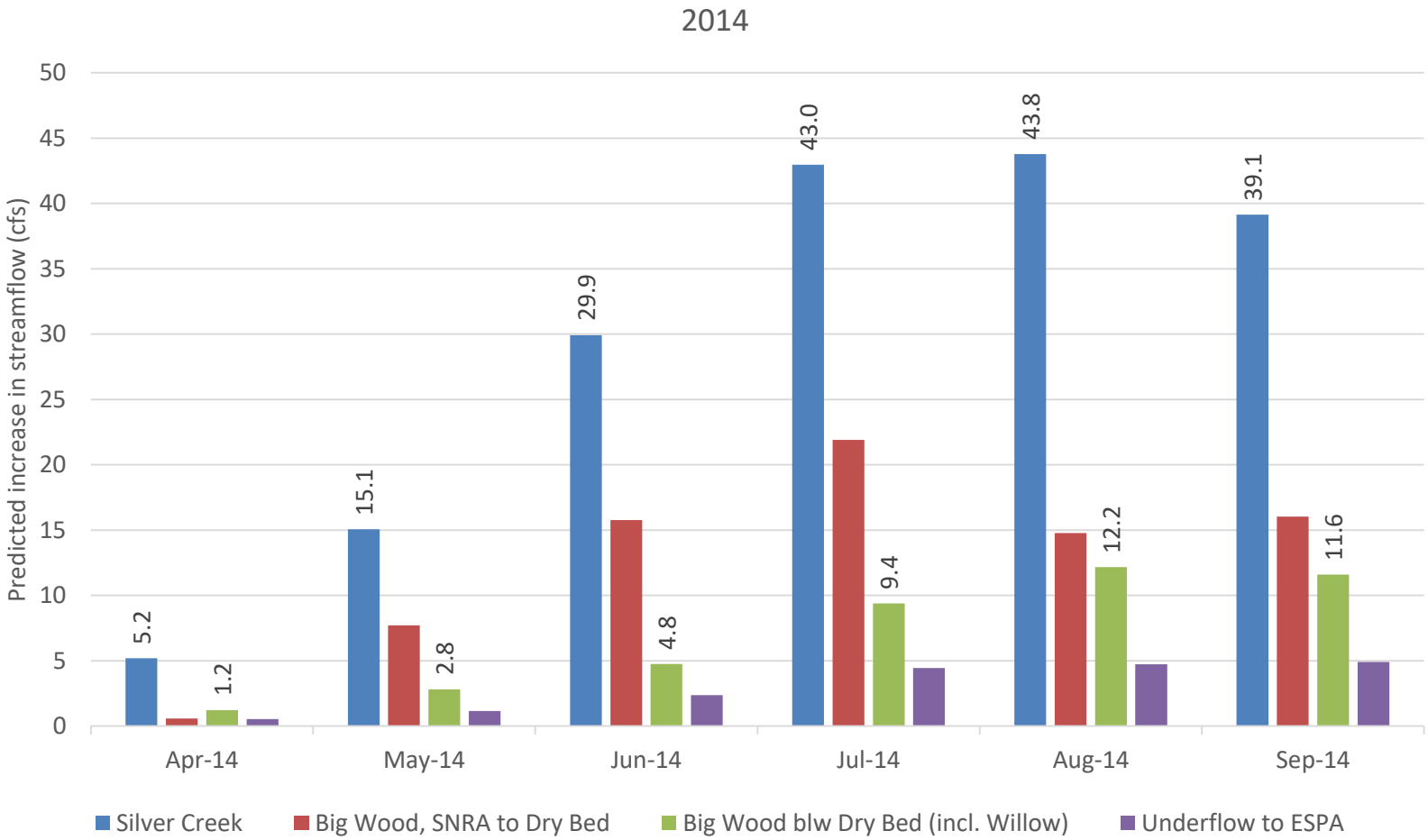
Analog year response to groundwater pumping from Wood River Valley Groundwater Flow Model, Version 1.1



Irrigation season response to groundwater pumping in analog year 2002 from Wood River Valley Groundwater Flow Model, Version 1.1



Irrigation season response to groundwater pumping in analog year 2014 from Wood River Valley Groundwater Flow Model, Version 1.1



The last 3 tasks

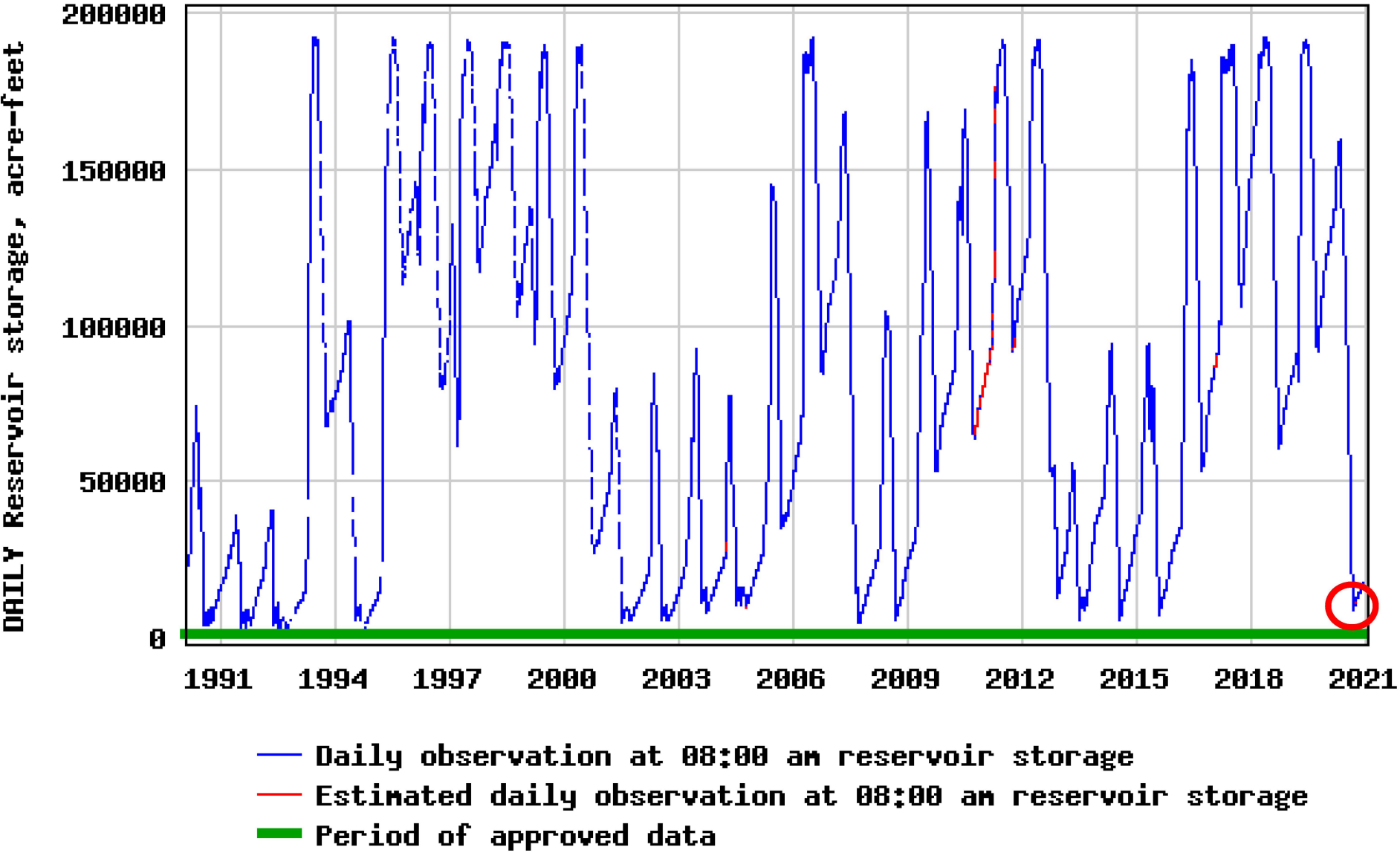
4. Use USGS gage data to evaluate relationships between historical SWSIs and reservoir fill, reservoir release rates, and irrigation season length

5. Quantify timing and spatial distribution of impacts resulting from continuous consumptive groundwater use curtailment in Wood River Valley (Jennifer Sukow)

6. Compare modeled benefits of groundwater consumptive curtailment in below Dry Bed reach of the Wood River to typical, mid-season reservoir release rate
   - For Magic water users, benefit ~ 2 extra days of irrigation water during a shortened season

USGS

USGS 13142000 MAGIC RES NR RICHFIELD ID



BIG WOOD RIVER BELOW MAGIC RESERVOIR

Date Priority Cut Made	Date of Priority Cut to and including:	Remarks
June 23, 2014	May 1, 1900	
July 1, 2014	June 15, 1890	
July 7, 2014	April 3, 1882	
August 6, 2014	August 11, 1884	Reinstate
August 11, 2014	April 27, 1896	Reinstate
August 18, 2014	April 3, 1882	

SILVER CREEK & LITTLE WOOD RIVER

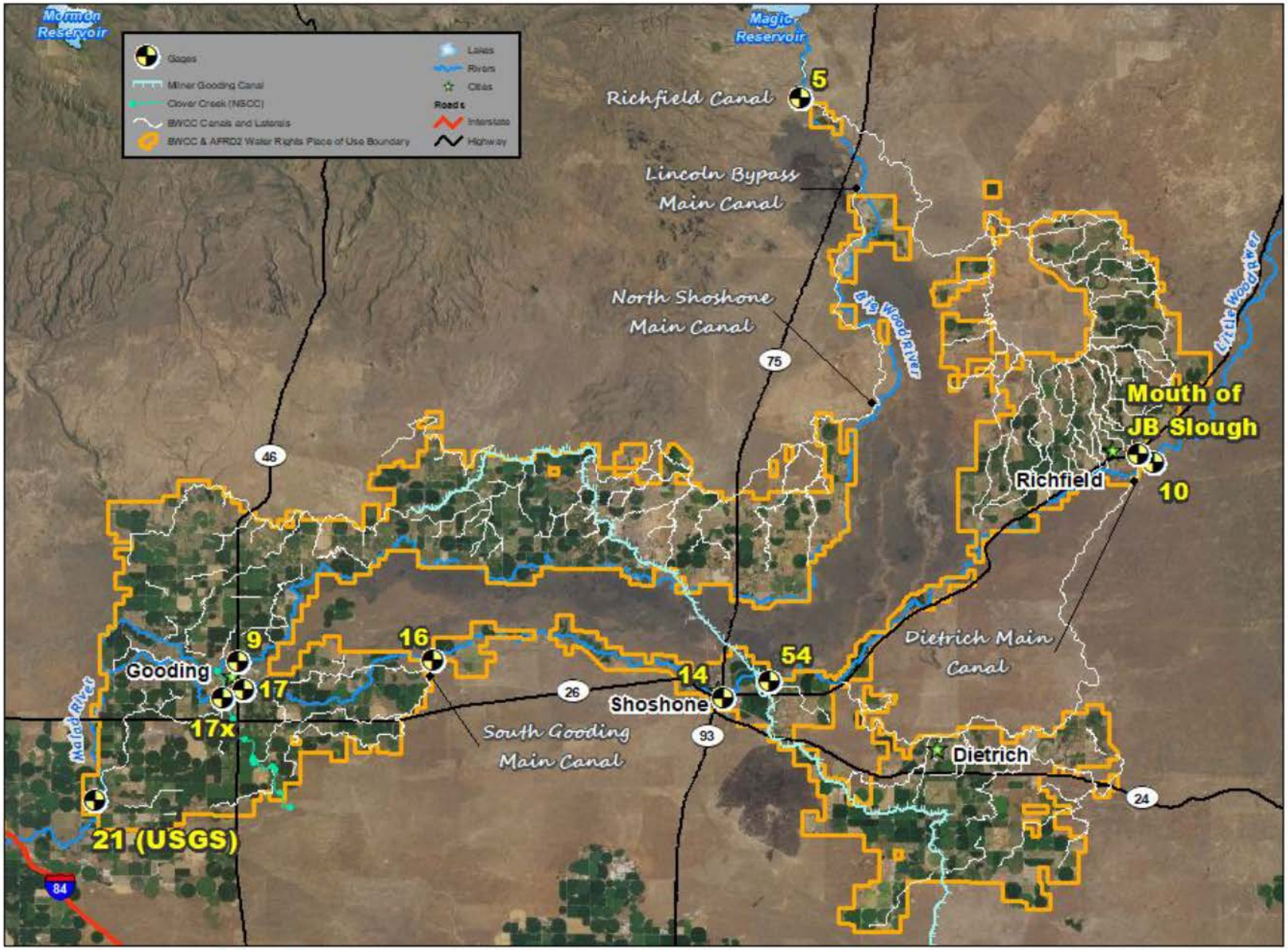
Date Priority Cut Made	Date of Priority Cut to and including:	Remarks
May 20, 2014	April 1, 1887	
May 27, 2014	April 1, 1885	
June 26, 2014	April 3, 1884	
June 27, 2014	April 1, 1884	
July 2, 2014	May 27, 1899	Cottonwood Decree
July 8, 2014	September 1, 1883	Cut 50%
July 17, 2014	April 6, 1883	
August 7, 2014	April 6, 1883	Reinstate
August 11, 2014	September 1, 1883	Reinstate

Date	Stanton Xing	Willow Creek	Camas Creek	Rock Creek	Unnamed Streams	Total Inflow	Increased Inflow from GW Curtail blw Dry Bed + Willow Ck.	Total Inflow + Increased Inflow from GW Curtailment	Deliverable Supply (Inflow + Increase - 60.6 cfs)	Curtailment Comment
6/23/2014	95.6	35.6	3	5	20	159.2	4.8	164	103.4	Priority cut to 5/1/1900 per Black Bk;
6/24/2014	89.8	37	2.9	5	20	154.7	4.8	159.5	98.9	
6/25/2014	89.2	36.8	2.79	5	20	153.79	4.8	158.59	97.99	
6/26/2014	92	38.5	2.8	5	20	158.3	4.8	163.1	102.5	
6/27/2014	95.4	38.3	2.66	5	20	161.36	4.8	166.16	105.56	
6/28/2014	88.7	38	2.56	5	20	154.26	4.8	159.06	98.46	
6/29/2014	72.8	34.8	2.46	5	20	135.06	4.8	139.86	79.26	
6/30/2014	63	34.1	2.66	5	20	124.76	4.8	129.56	68.96	
7/1/2014	51.3	33.3	2.63	5	20	112.23	9.4	121.63	61.03	Cut to 6/15/1890 per Black Bk
7/2/2014	33.8	30.9	2.4	5	20	92.1	9.4	101.5	40.9	
7/3/2014	31.4	26.8	2.41	5	20	85.61	9.4	95.01	34.41	
7/4/2014	29.8	24	2.23	5	20	81.03	9.4	90.43	29.83	
7/5/2014	27.1	25.1	2.06	5	20	79.26	9.4	88.66	28.06	
7/6/2014	25.9	25.3	1.75	5	20	77.95	9.4	87.35	26.75	
7/7/2014	25.4	24.9	1.7	5	20	77	9.4	86.4	25.8	All rights off per Black Bk
7/8/2014	25.6	27	1.7	5	20	79.3	9.4	88.7	28.1	

Deliverable Supply/Inflow on July 7: 77 cfs inflow – 60.6 cfs loss = 16.4 cfs (not deliverable);
Magic Reservoir gates shut off July 19, 2014;
GW Curtailment increases supply on July 7 by 9.4 cfs (25.8 cfs total); physical delivery of increased inflow is likely not feasible.

Date	Sta 54 cfs	Increase from GW Curtail Silver Ck	Sta 54 Adj Flow from Curtailment	2014 Priority Cut Comments	Kevin Lakey Priority Adjustment/Comment
7/7/2014	14	43	57		
7/8/2014	8	43	51	Priority cut to 9/1/1883 50% per BB	Advance priority to 5/31/1885 deliverable. 6/15/1885 would be off
7/9/2014	4	43	47		
7/10/2014	2	43	45		
7/11/2014	5	43	48		
7/12/2014	9	43	52		
7/13/2014	10	43	53		
7/14/2014	12	43	55		
7/15/2014	8	43	51		
7/16/2014	5	43	48		
7/17/2014	6	43	49	Priority cut to 4/6/1883 per Black Bk;	Priority would stay at 5/31/1885 deliverable
7/18/2014	6	43	49		

Watermaster determines priority cut based on flow at Station 54 (L. Wood R upstream of Shoshone & MG Canal); one priority cut for all of L. Wood R & Silver Ck.
Watermaster determined priority cut with additional flow from groundwater curtailment.



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0 1 2 4 6 8 10 Miles

IDWR - pdillon 12/10/2020

Gage Locations

Thank You!