

# RECLAMATION

*Managing Water in the West*

## **Flaming Gorge Working Group**

## **Hydrology & Forecasted Operations**

**Vernal, Utah | April 19, 2018**

**Heather Patno & Jed Parker**  
Upper Colorado Region



U.S. Department of the Interior  
Bureau of Reclamation

# Outline

- ❑ **Flaming Gorge and Colorado River Storage Project (CRSP)**
- ❑ **Base Operations**
- ❑ **Record of Decision**
- ❑ **2017 Operations Review**
- ❑ **2018 Forecast Operations**
- ❑ **Comparison to Historic Operations**
- ❑ **Ongoing Updates**
- ❑ **Questions/Discussion**



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# Flaming Gorge and CRSP

## 1956 Colorado River Storage Project Act

- **Authorized construction of Flaming Gorge Dam and other projects for:**
  - Allowing Upper Basin States to utilize their 1922 Colorado River Compact apportionments
  - Regulating flow of Colorado River (and its main tributaries)
  - Storing water for beneficial consumptive use
  - Reclamation of arid and semi-arid lands
  - Flood control
  - Hydroelectric power generation

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# Outline

## ✓ Flaming Gorge and Colorado River Storage Project (CRSP)

### ❑ Base Operations

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### ❑ Comparison to Historic Operations

### ❑ Ongoing Updates

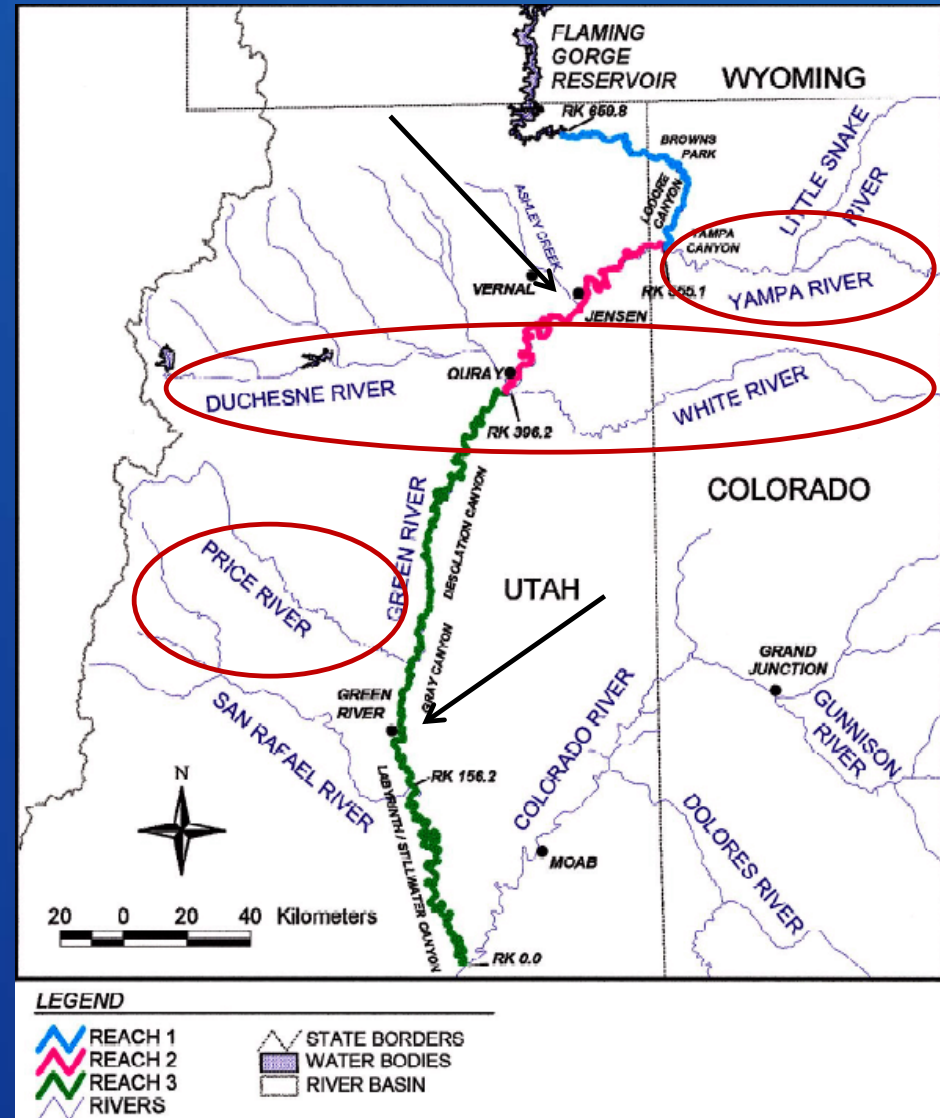
### ❑ Questions/Discussion



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# Base Operations – Geographic Scope

- **Reach 1 (Blue)**
  - Flaming Gorge Dam to Yampa River Confluence
- **Reach 2 (Pink)**
  - Yampa River Confluence to White River confluence
- **Reach 3 (Green)**
  - White River confluence to confluence of Green and Colorado Rivers



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# Flaming Gorge Decision Process

## Operations under the Record of Decision (2006 ROD)

### Four Step Process for Decision Making

1. Recovery Program Request for Research Flows  
<http://www.coloradriverrecovery.org/>  
ESA Section 7 Compliance and allows the States of Colorado, Utah, and Wyoming to continue utilizing their authorized apportionment under the 1922 Compact
2. Flaming Gorge Technical Working Group  
Informal Section 7 Compliance
3. Flaming Gorge Working Group  
Public Input and Comments
4. Reclamation makes the final decision of how to operate.

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# Percentage Exceedances and Hydrologic Classifications

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Hydrologic Classification	Percentage Exceedance Range
Wet	<10
Moderately Wet	30 to 10.1
Average	70 to 30.1
Moderately Dry	90 to 70.1
Dry	>90

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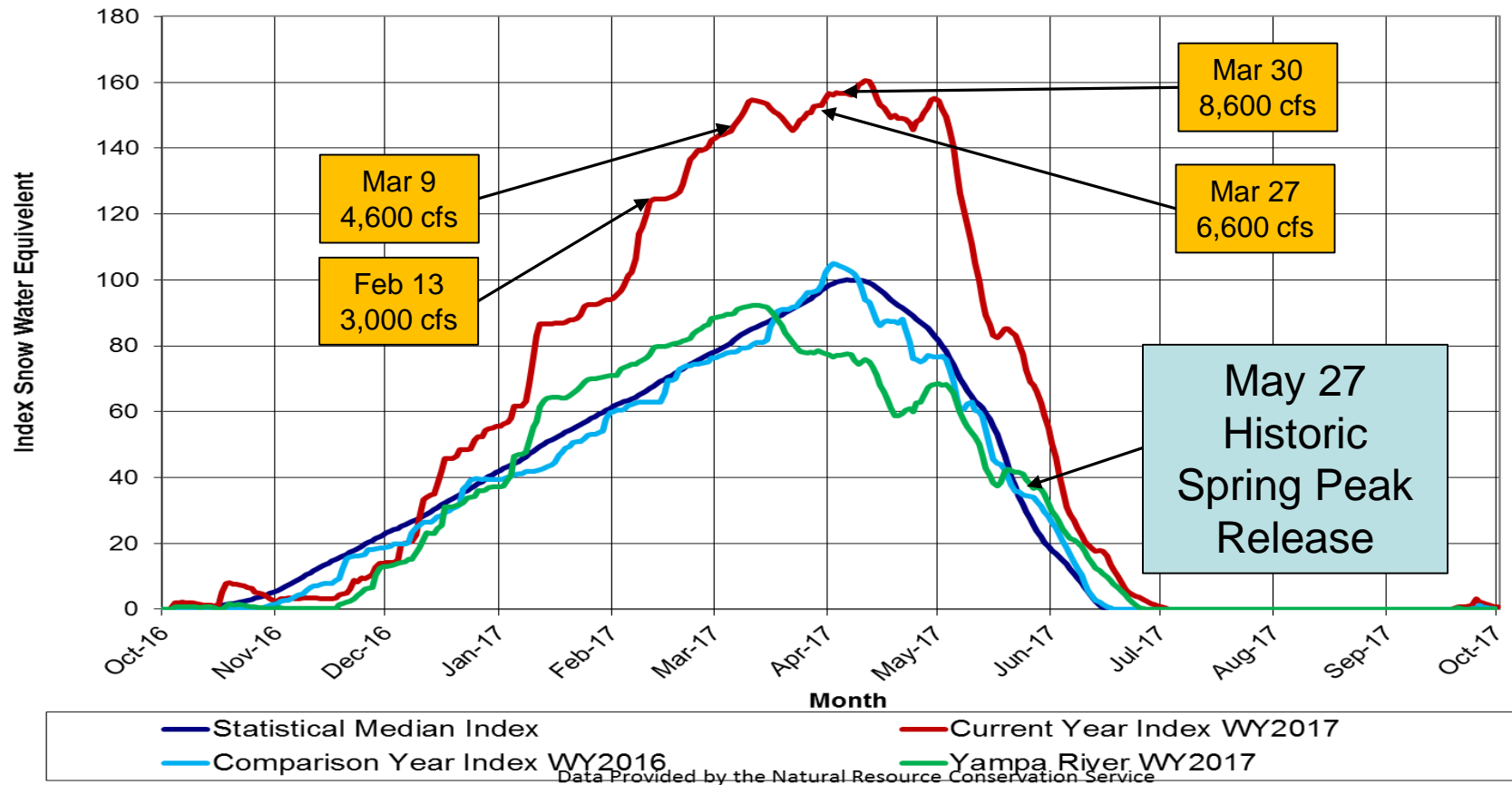


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# Flaming Gorge Activities 2017

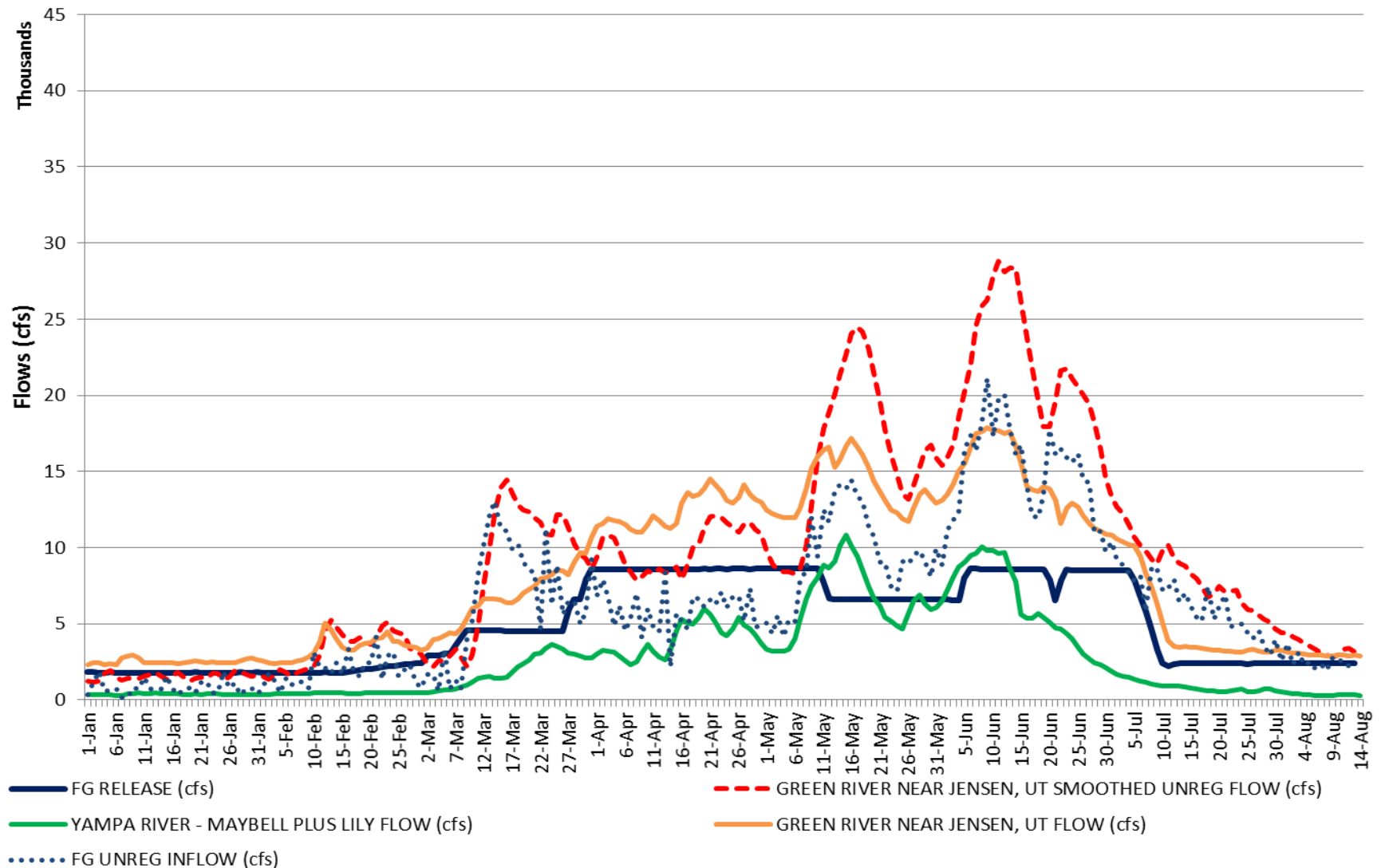
Jan	Feb	Mar	Apr
1230	1650	2260	2260
KAF	KAF	KAF	KAF
(126%)	(168%)	(231%)	(231%)

**Upper Green River Basin Snotel Tracking**  
Aggregate of 18 Snotel Sites above Flaming Gorge Reservoir



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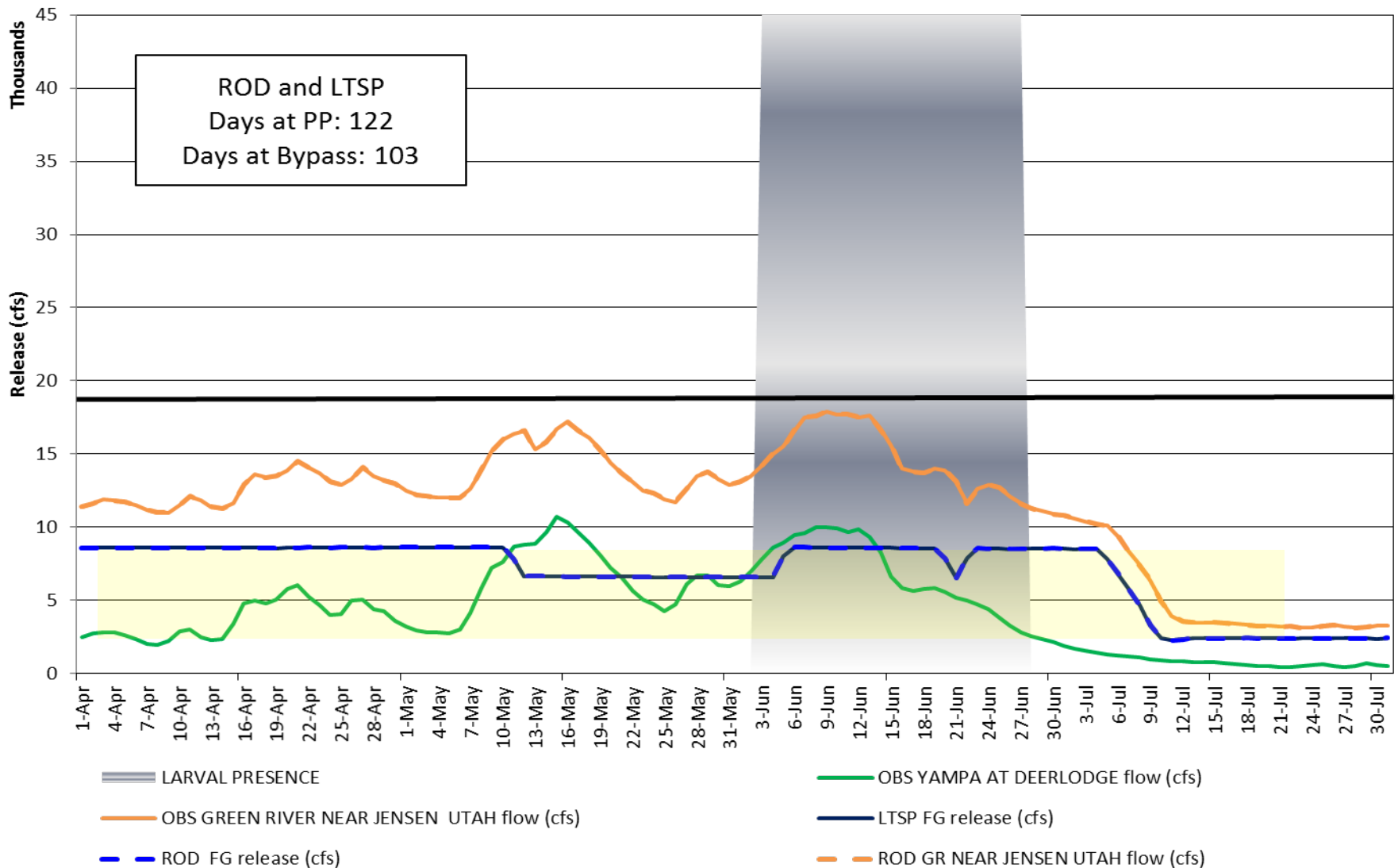
# Flaming Gorge Releases and Green and Yampa River Flows 2017



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## FG Release and Green River Flows April-July 2017



Larval presence duration is estimated

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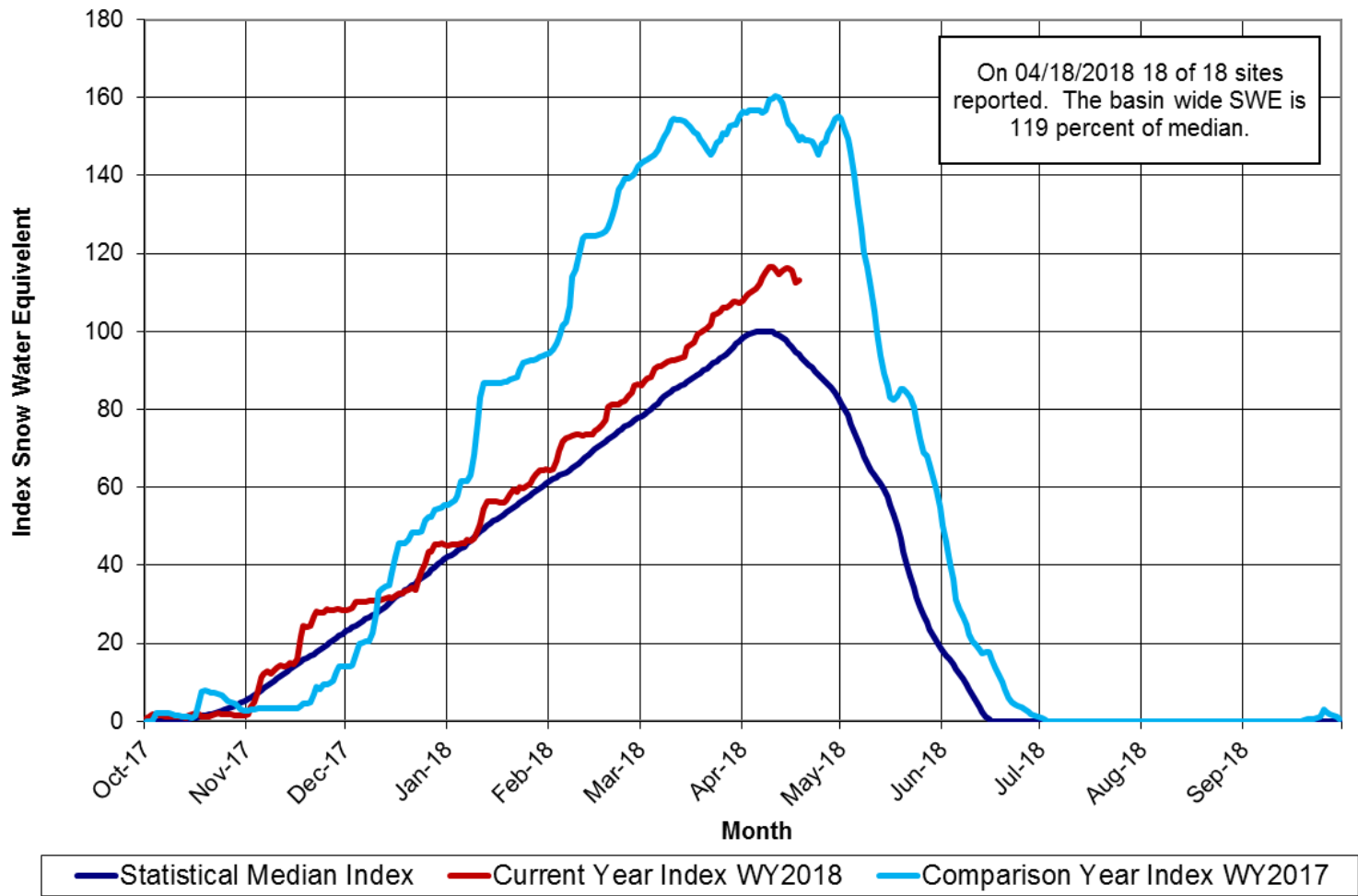


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# Snowpack above Flaming Gorge



**Upper Green River Basin Snotel Tracking**  
Aggregate of 18 Snotel Sites in the Upper Green River Basin



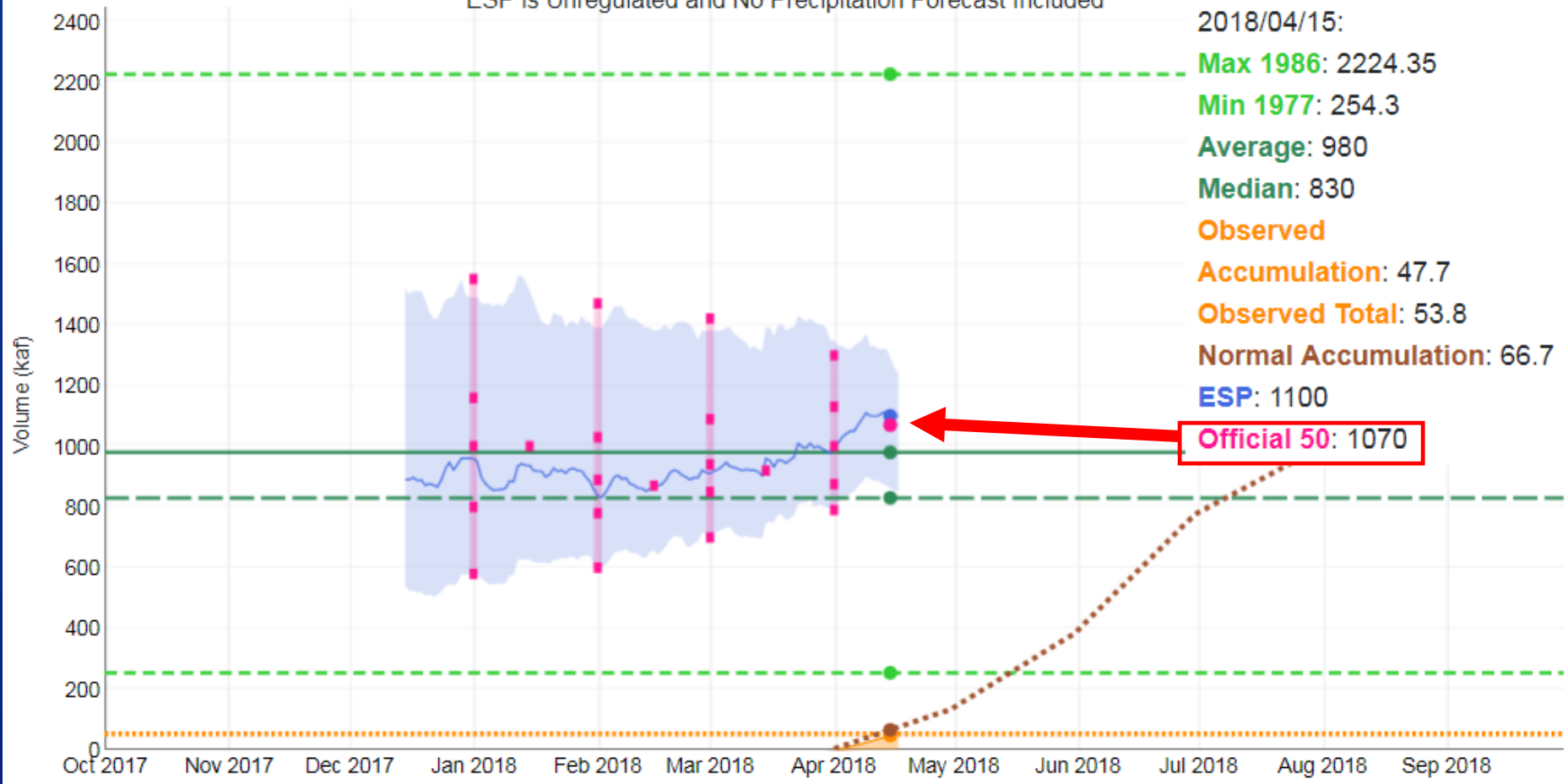
Data Provided by the Natural Resource Conservation Service

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# Flaming Gorge Forecast

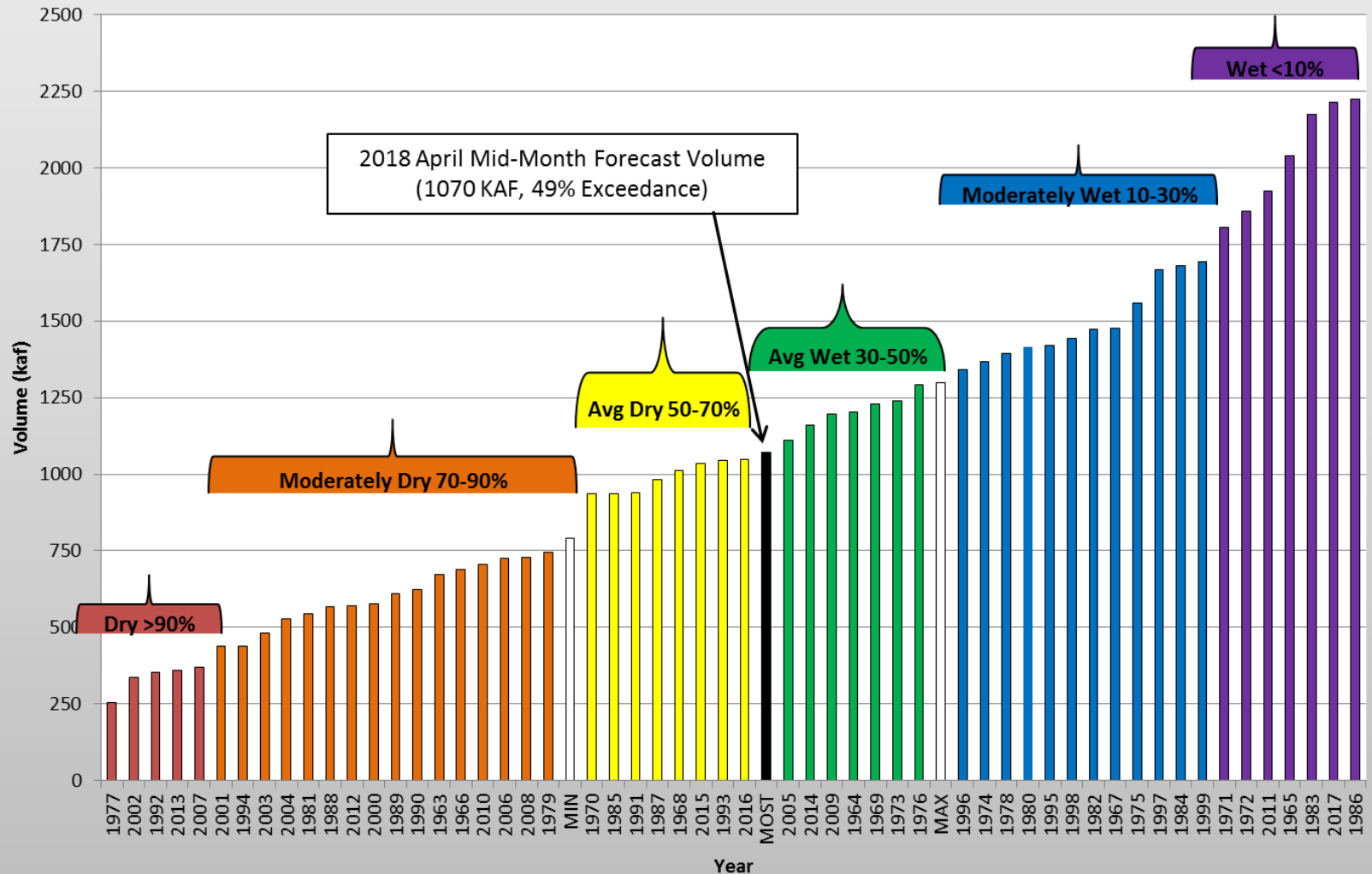
Green - Flaming Gorge Res, Flaming Gorge Dam, At (GRNU1)  
Period: Apr-Jul, Official 50% Forecast (2018-04-15): 1070 kaf (109% Average, 129% Median)  
ESP is Unregulated and No Precipitation Forecast Included



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# 2018 Forecast Operations - Inflow

Flaming Gorge Reservoir  
Historic April-July Unregulated Inflow Volume Ranking (1963-2017)



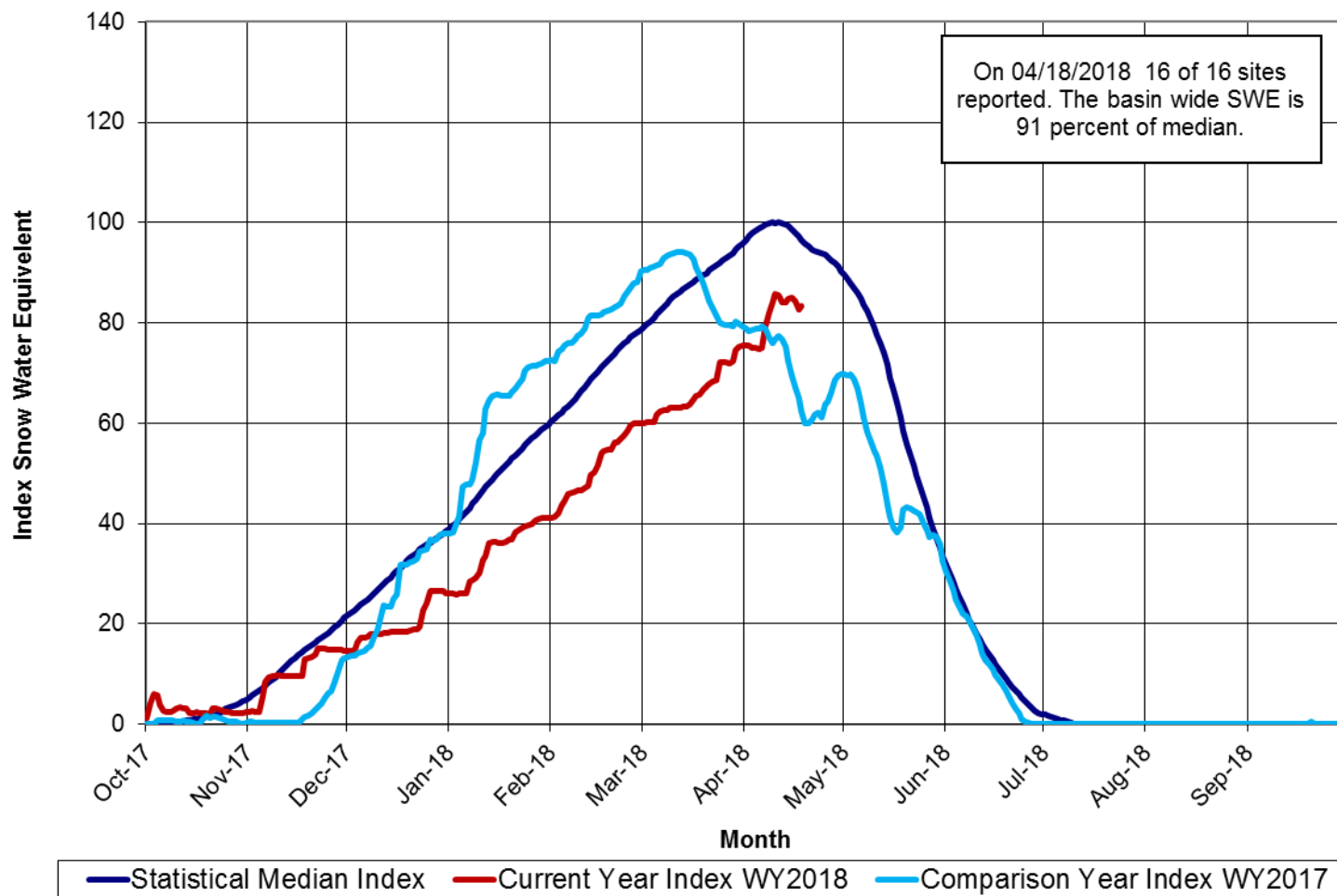
**Condensed Table 5.5.—Flow and temperature recommendations by hydrologic condition for Reach 2 (Yampa River to White River) to benefit endangered fishes in the Green River downstream of Flaming Gorge Dam.<sup>a</sup>**

	<b>Hydrologic Condition<sup>b</sup></b>				
	<b>Wet (0 to 10% Exceedance)</b>	<b>Moderately Wet (10 to 30% Exceedance)</b>	<b>Average (30 to 70% Exceedance)</b>	<b>Moderately Dry (70 to 90% Exceedance)</b>	<b>Dry (90 to 100% Exceedance)</b>
<b><i>SPRING PEAK FLOW</i></b>					
<b><i>Magnitude</i></b>	≥ 26,400 cfs	≥ 20,300 cfs	≥ 18,600 cfs in 1 of 2 avr yrs; ≥ 8,300 cfs in other avr yrs	≥ 8,300 cfs	
<b><i>Duration</i></b>	>22,700 cfs 2 weeks +, and >18,600 cfs >4 weeks	>18,600 cfs for 2 weeks or more	>18,600 cfs at least 2 weeks in 1 of 4 avr yrs.	at least 1 week.	2 days or more except in dry years (≥ 98% exceedance)
<b><i>Timing</i></b>	<b>Peak flows should coincide with peak flows in the Yampa River</b>				
	<b>Hydrologic Condition<sup>b</sup></b>				
	<b>Wet (0 to 10% Exceedance)</b>	<b>Moderately Wet (10 to 30% Exceedance)</b>	<b>Average (30 to 70% Exceedance)</b>	<b>Moderately Dry (70 to 90% Exceedance)</b>	<b>Dry (90 to 100% Exceedance)</b>
<b><i>SUMMER THROUGH WINTER BASE FLOW</i></b>					
<b><i>Mean flow</i></b>	2,800 - 3,000 cfs	2,400 - 2,800 cfs	1,500 - 2,400 cfs	1,100 - 1,500 cfs	900 - 1,100 cfs
<b><i>Approximate period</i></b>	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1



# Yampa/White Basin Snowpack

**Upper Yampa River Basin Snotel Tracking**  
Aggregate of 16 Snotel Sites in the Yampa River Basin

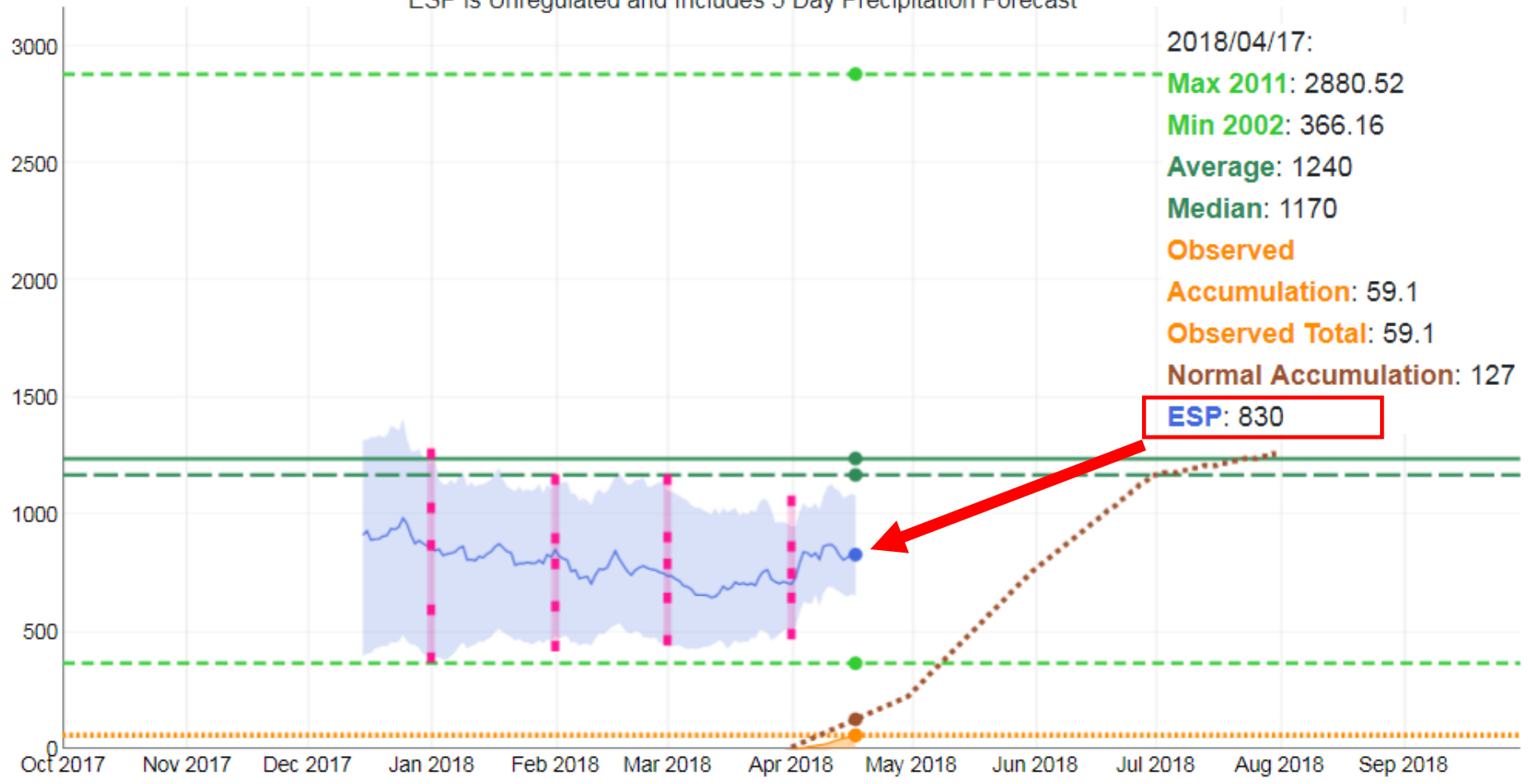


Data Provided by the Natural Resource Conservation Service

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# Yampa at Deerlodge Forecast

Yampa - Deerlodge Park (YDLC2)  
Period: Apr-Jul, Official 50% Forecast (2018-04-01): 750 kaf (60% Average, 64% Median)  
ESP is Unregulated and Includes 5 Day Precipitation Forecast

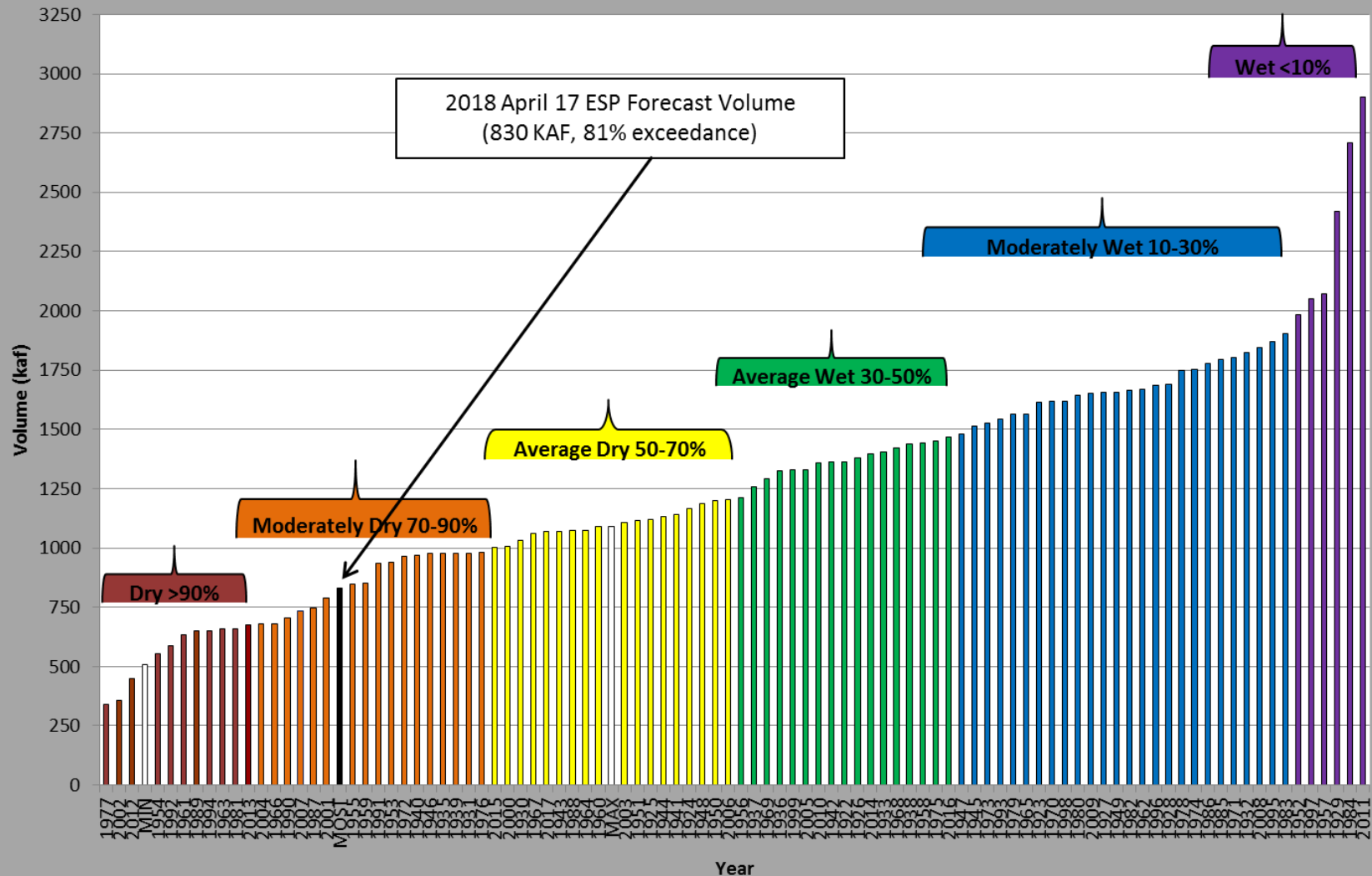


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# 2018 Forecast Operations - Inflow

## Yampa River Basin - Maybell Plus Lily

Historic April-July Unregulated Inflow Volume Ranking (1922-2017)





**Condensed Table 5.5.—Flow and temperature recommendations by hydrologic condition for **Reach 2** (Yampa River to White River) to benefit endangered fishes in the Green River downstream of Flaming Gorge Dam.<sup>a</sup>**

	<b>Hydrologic Condition<sup>b</sup></b>				
	<b>Wet (0 to 10% Exceedance)</b>	<b>Moderately Wet (10 to 30% Exceedance)</b>	<b>Average (30 to 70% Exceedance)</b>	<b>Moderately Dry (70 to 90% Exceedance)</b>	<b>Dry (90 to 100% Exceedance)</b>
<b><i>SPRING PEAK FLOW</i></b>					
<b><i>Magnitude</i></b>	≥ 26,400 cfs	≥ 20,300 cfs	≥ 18,600 cfs in 1 of 2 avr yrs; ≥ 8,300 cfs in other avr yrs	≥ 8,300 cfs	
<b><i>Duration</i></b>	>22,700 cfs 2 weeks +, and >18,600 cfs >4 weeks	>18,600 cfs for 2 weeks or more	>18,600 cfs at least 2 weeks in 1 of 4 avr yrs.	at least 1 week.	2 days or more except in dry years (≥ 98% exceedance)
<b><i>Timing</i></b>	Peak flows should coincide with peak flows in the Yampa River				
	<b>Hydrologic Condition<sup>b</sup></b>				
	<b>Wet (0 to 10% Exceedance)</b>	<b>Moderately Wet (10 to 30% Exceedance)</b>	<b>Average (30 to 70% Exceedance)</b>	<b>Moderately Dry (70 to 90% Exceedance)</b>	<b>Dry (90 to 100% Exceedance)</b>
<b><i>SUMMER THROUGH WINTER BASE FLOW</i></b>					
<b><i>Mean flow</i></b>	2,800 - 3,000 cfs	2,400 - 2,800 cfs	1,500 - 2,400 cfs	1,100 - 1,500 cfs	900 - 1,100 cfs
<b><i>Approximate period</i></b>	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1	Aug 15 to Mar 1

# Larval Trigger Study Plan Peak Flows

Peak Flow (x) as Measured at Jensen, Utah	Proposed Study Wetlands <sup>(a, b)</sup>	Number of Days (x) Flow to Be Exceeded and Corresponding Hydrologic Conditions <sup>(c)</sup>		
		$1 < x < 7$	$7 \leq x < 14$	$x \geq 14$
$8,300 \leq x < 14,000$ cfs	Stewart Lake (f), Above Brennan (f), Old Charley Wash (s) <sup>(d)</sup>	Dry	Moderately dry	Moderately dry and average (below median)
$14,000 \leq x < 18,600$ cfs	Same as previous plus Escalante Ranch (f), Bonanza Bridge (f), Johnson Bottom <sup>e</sup> (s), Stirrup (s), Leota 7 (s)	Average (below median)	Average (below median)	Average (below median)
$18,600 \leq x < 20,300$ cfs	Same as previous	Average (above median)	Average (above median)	Average (above median)
$20,300 \leq x < 26,400$ cfs	Same as previous plus Baeser Bend (s), Wyasket (s), additional Leota units (7a and 4), Sheppard Bottom (s)	Moderately wet	Moderately wet	Moderately wet
$x \geq 26,400$ cfs	Same as previous	Wet	Wet	Wet

(a) f = flow-through wetland, s = single-breach wetland

(b) Up to eight wetlands would be sampled in a given year with the three in the lowest flow category being sampled in all years.

(c) Exceedance percentages and peak flow recommendations for each hydrologic condition as described in Muth et al. 2000. Note that the hydrologic conditions presented are the driest that could support a particular combination of peak flow magnitude and duration. For any combination, wetter hydrology could also support an experiment.

(d) Access to the Old Charley Wash floodplain has been denied since 2012.

(e) In 2015, Johnson Bottom was re-contoured and canals were cleaned; this wetland can now entrain larvae when flows are <14,000cfs.

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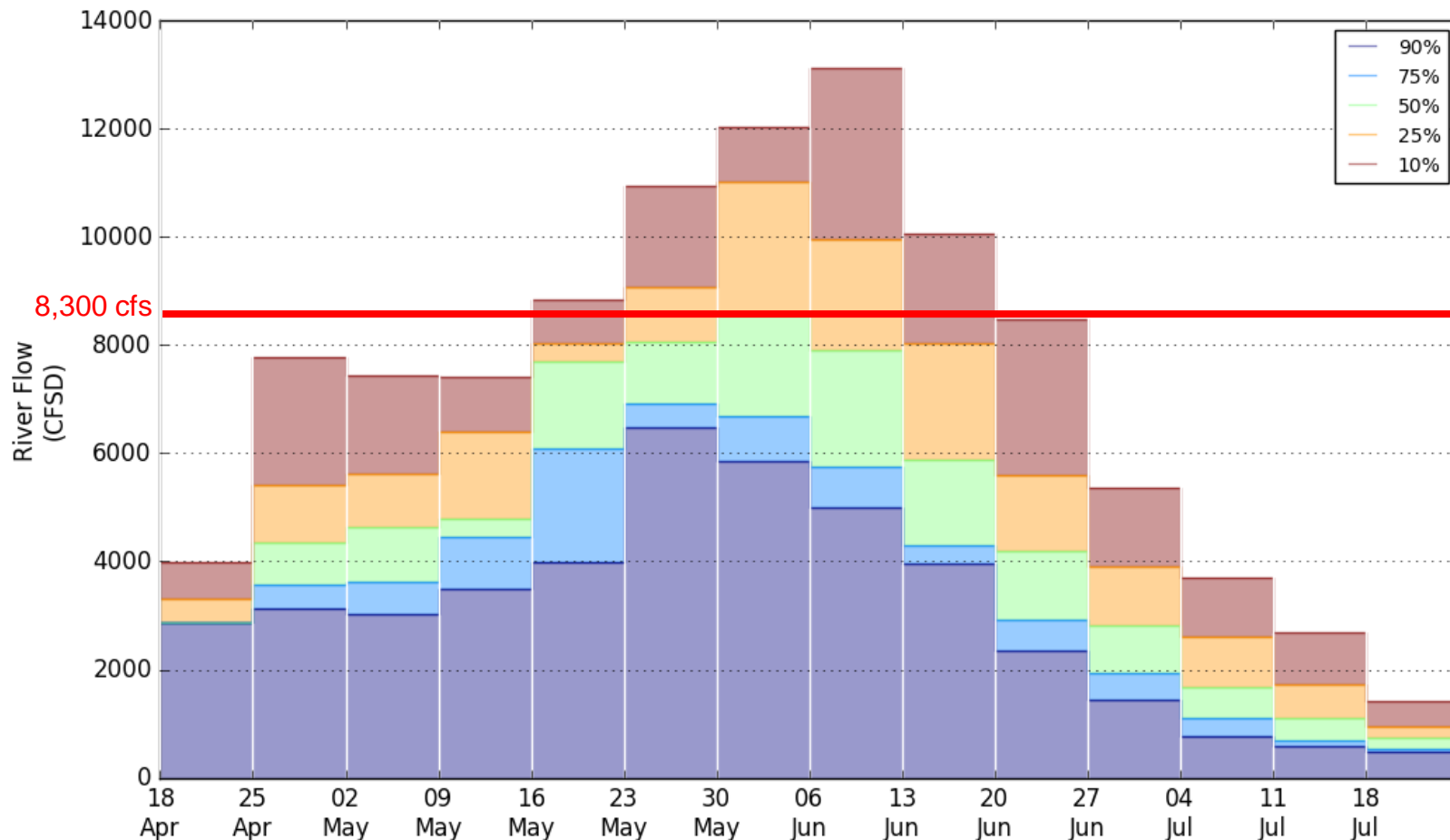
# Colorado Pikeminnow base flows

Table 10. Comparison of base flow levels in Muth et al. (2000) and those proposed in this report for the middle and lower Green River, Utah. The higher upper ends of flow ranges in Muth et al. (2000) for the lower Green River reflect uncertainty about tributary inputs, while proposed targets represent preferred ranges.

Hydrologic classification	Reach 2, Middle Green River flows		Reach 3, Lower Green River flows	
	2000 (Muth et al.)	Proposed	2000 (Muth et al.)	Proposed
Dry (10% of years, 0 to 10% exceedance)	26-31 m <sup>3</sup> /s (900-1,100 ft <sup>3</sup> /s)	48-51 m <sup>3</sup> /s (1,700-1,800 ft <sup>3</sup> /s)	37-74 m <sup>3</sup> /s (1,300-2,600 ft <sup>3</sup> /s)	48-57 m <sup>3</sup> /s (1,700-2,000 ft <sup>3</sup> /s)
Moderately dry (20% of years)	31-43 m <sup>3</sup> /s (1,100-1,500 ft <sup>3</sup> /s)	51-57 m <sup>3</sup> /s (1,800-2,000 ft <sup>3</sup> /s)	42-96 m <sup>3</sup> /s (1,500-3,400 ft <sup>3</sup> /s)	57-65 m <sup>3</sup> /s (2,000-2,300 ft <sup>3</sup> /s)
Average (40% of years)	43-68 m <sup>3</sup> /s (1,500-2,400 ft <sup>3</sup> /s)	57-74 m <sup>3</sup> /s (2,000-2,600 ft <sup>3</sup> /s)	51-119 m <sup>3</sup> /s (1,800-4,200 ft <sup>3</sup> /s)	65-79 m <sup>3</sup> /s (2,300-2,800 ft <sup>3</sup> /s)
Moderately wet (20% of years)	68-79 m <sup>3</sup> /s (2,400-2,800 ft <sup>3</sup> /s)	62-79 m <sup>3</sup> /s (2,200-2,800 ft <sup>3</sup> /s)	77-133 m <sup>3</sup> /s (2,700-4,700 ft <sup>3</sup> /s)	74-91 m <sup>3</sup> /s (2,600-3,200 ft <sup>3</sup> /s)
Wet (10% of years, 90 to 100% exceedance)	79-85 m <sup>3</sup> /s (2,800-3,000 ft <sup>3</sup> /s)	68-85 m <sup>3</sup> /s (2,400-3,000 ft <sup>3</sup> /s)	91-133 m <sup>3</sup> /s (3,200-4,700 ft <sup>3</sup> /s)	79-108 m <sup>3</sup> /s (2,800-3,800 ft <sup>3</sup> /s)

# Yampa Peak

Chance of Exceeding River Levels for:  
YDLC2L\_F  
Forecast Period: 2018-04-18 - 2018-07-31 Simulation date: 2018-04-18

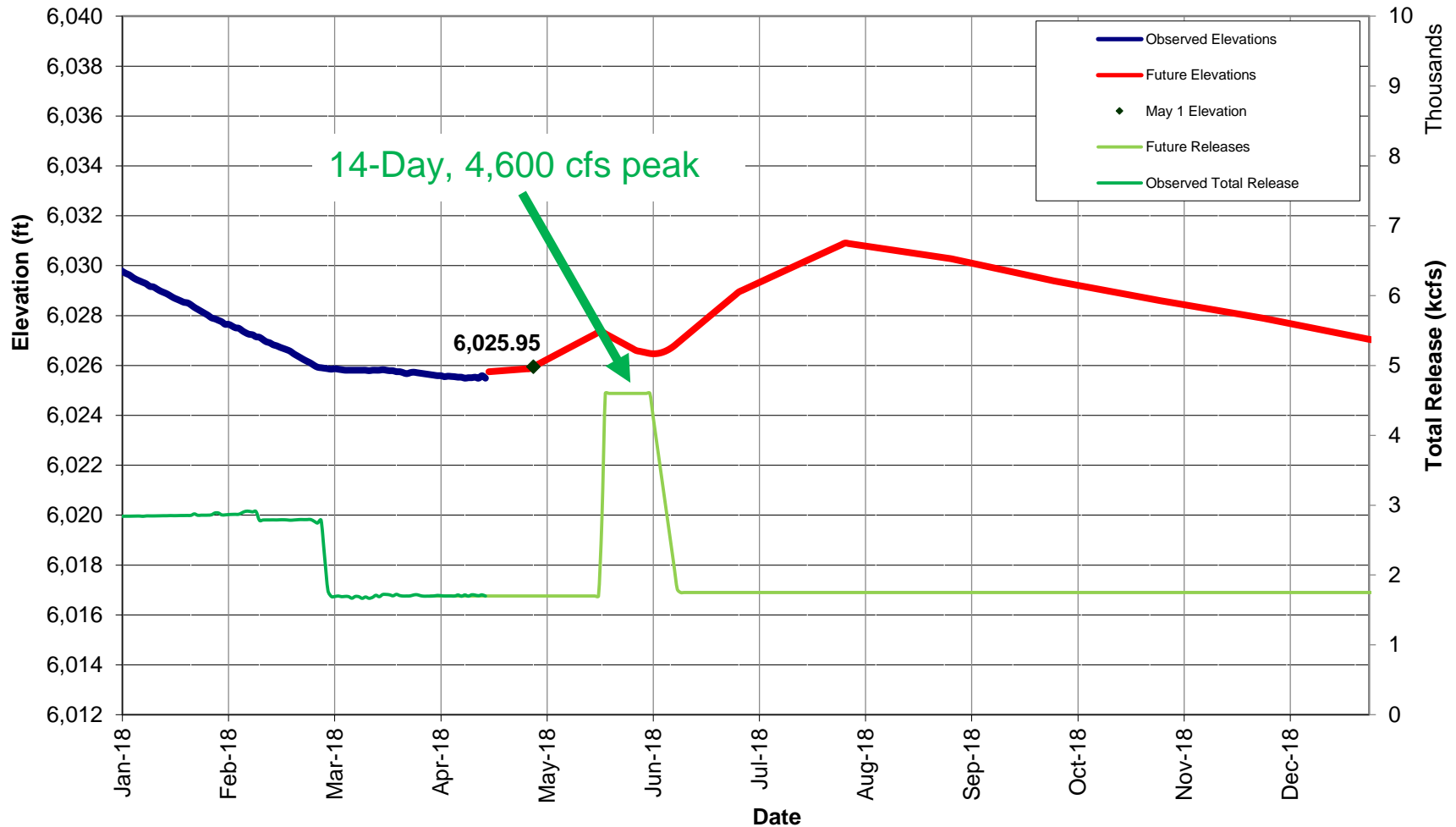


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# Current and Future Operations - 2018

Flaming Gorge Operations WY2018-2019  
Most Probable Operations April Final Forecast



# Outline

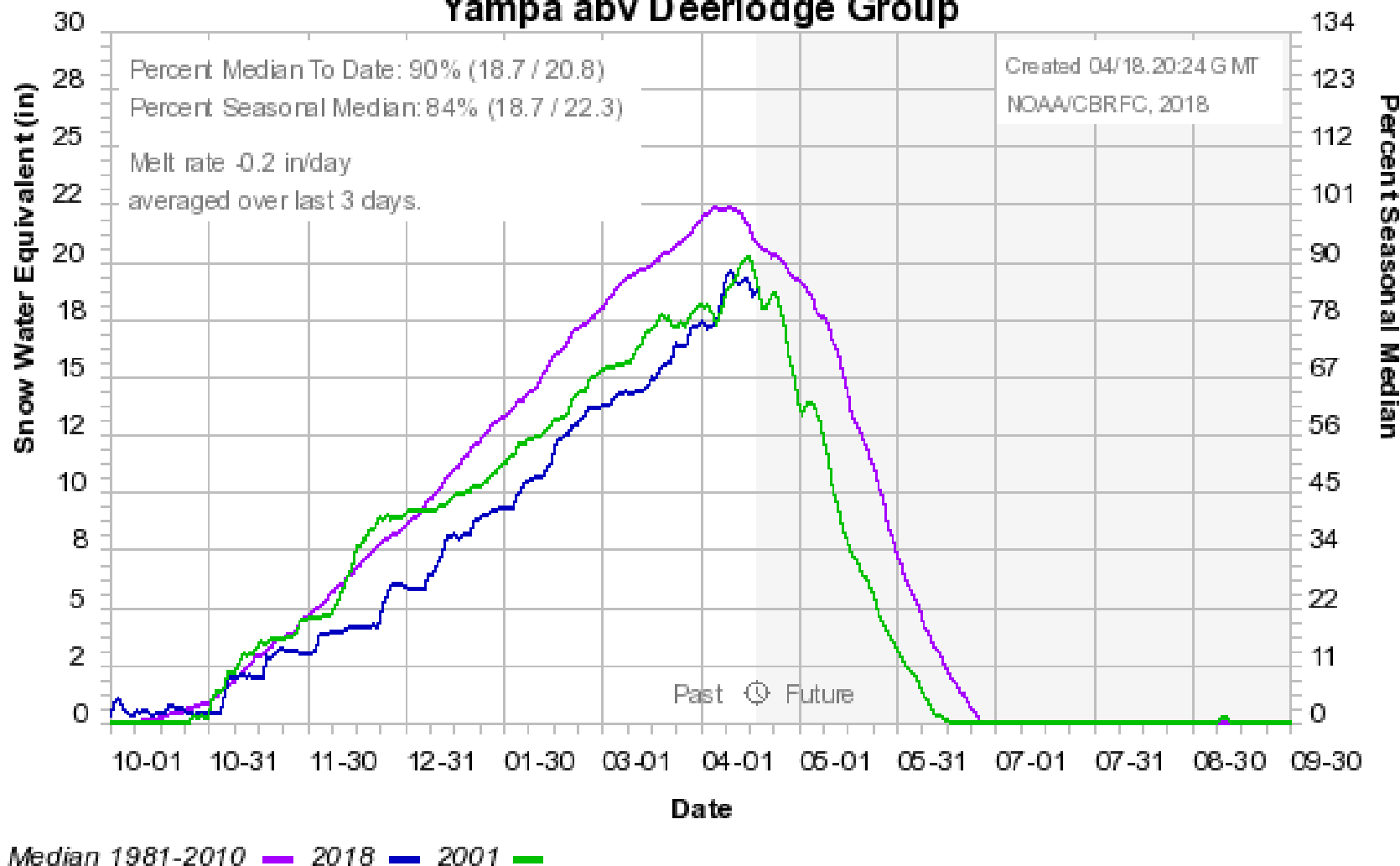
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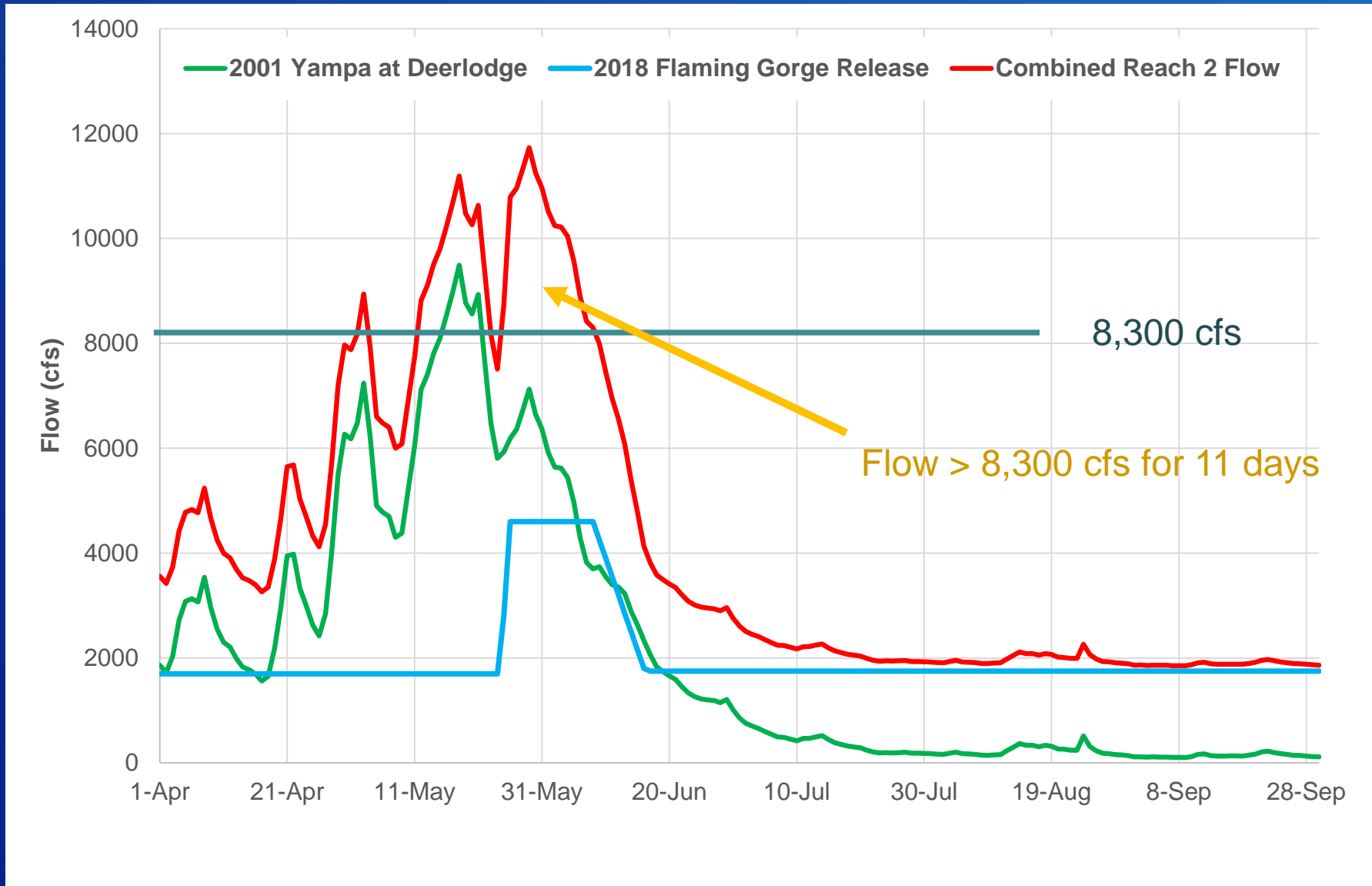
# Analogous Years

## Colorado Basin River Forecast Center Yampa abv Deerlodge Group



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# 2018 Operations with 2001 Yampa Hydrology



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# Updates

- **Fishery assessment (electro fishing)**
  - April 23 – April 24
  - Flows to be reduced from 1,750 cfs to 1,600
  - Directive and notification to be sent out this week
- **Baseflow request**
  - Flow request of 1,750 cfs subject to continued FGTTWG discussions

# Ongoing Updates

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## Upper Colorado Region

Encompassing all or parts of Arizona, Colorado, Idaho, Nevada, New Mexico, Texas, Utah and Wyoming

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### UPPER COLORADO WATER OPERATIONS

RESERVOIR DATA

CURRENT CONDITIONS

REPORTS AND STUDIES

HISTORICAL DATA

GENERAL INFO & LINKS

## Water Operations

**NEW** 01/18/2017 UPDATE: Please note the UC Snowpack product is now live and has moved to a new web address. Clear your cache or refresh the page if it is not showing correctly.

### Reservoir Data

Data Retrieval (elevation, storage, inflows, & releases)

40-Day Data  
Historic Data  
Site Map

### Current Conditions

~~System Overview~~  
Weekly Hydrology Summary

Weekly Hydrology

Storage  
Teacup Diagrams

~~Seasonal Notices~~  
Snowpack Map

Snowpack Map

### Reports and Studies

Reports

24-Month Study  
Monthly Summary Reports  
Annual Operating Plans  
Consumptive Use and Loss Reports

Studies

Colorado River Basin Water Supply & Demand Study  
Climate Research & Development in the Colorado River Basin  
Colorado River Basin Natural Flow & Salt Data

Legislation and Guidance

Colorado River Interim Guidelines  
Law of the River

### Operational Data

Upper Colorado River

Aspirational Unit  
Flaming Gorge  
Fontenelle  
Navajo  
Lake Powell

Current Flaming Gorge Operation

Other Operational Data  
Lower Colorado River Basin

### General Info & Links

USGS Data

USGS Water Data  
USGS Water Alert

Climate & Weather Data

Colorado Basin River Forecast Center  
NRCS Snow/Precipitation Data  
Drought Monitor

State Engineer's Offices

Colorado Division of Water Resources  
New Mexico Office of the State Engineer  
Utah Division of Water Resources  
Wyoming State Engineer's Office

Upper Colorado Region  
Water Operations Group

*ResourceMgr@usbr.gov*

Monthly, weekly and daily updates:  
<https://www.usbr.gov/uc/water/index.html>

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**Questions?**

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