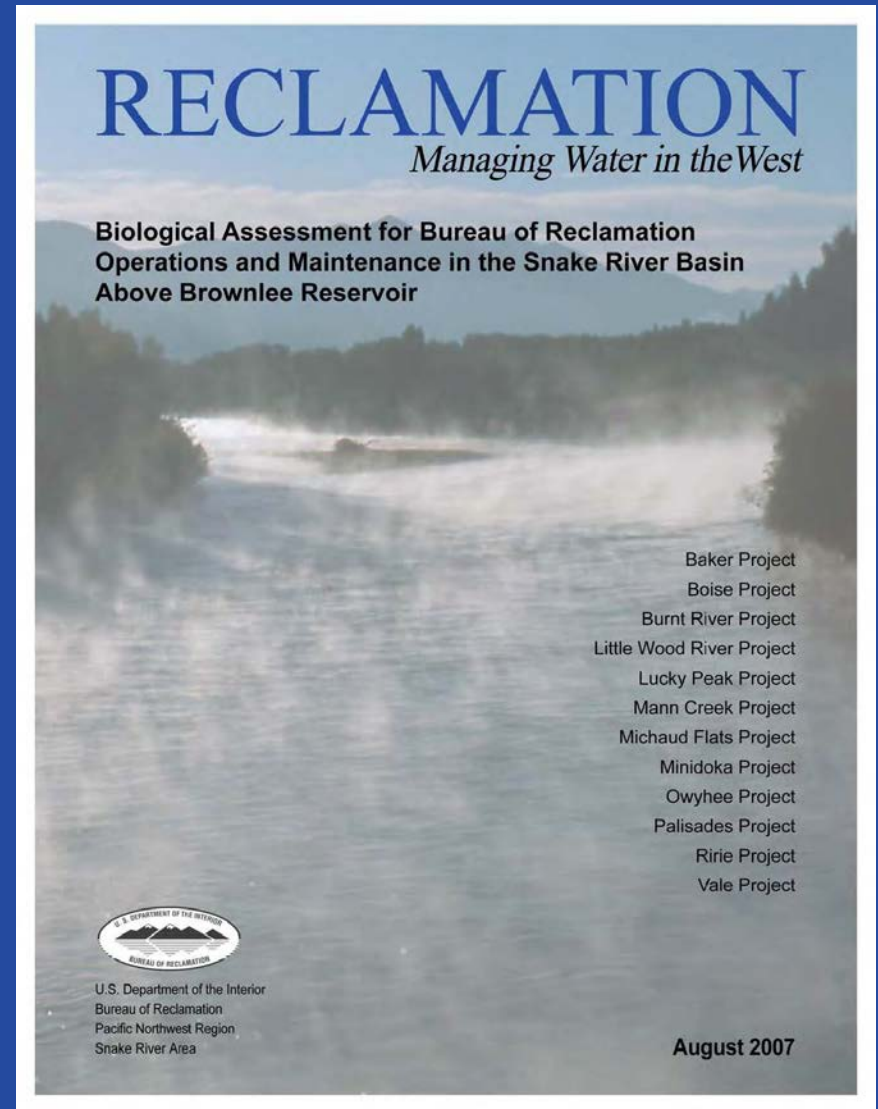


Upper Snake Flow Augmentation

**John Roache, Joel
Fenolio, and Peter Cooper**
**Water Management,
Bureau of Reclamation**



Overview

- **Purpose of Flow Augmentation (Flow Aug)**
- **Historic Timeline**
- **Current Sources of Flow Aug**
- **Reporting Requirements and Coordination**
- **Current Basin Specific Implementation**

What is Flow Aug?

- Upper Snake Flow Augmentation is one of several regional supplies of water used to help improve conditions for listed salmon and steelhead, specifically for out-migrating smolts. Upper Snake flow aug includes acquisitions from willing sellers and lessors
- Other Columbia/Snake flow augmentation sources: Dworshak, Grand Coulee, Hungry Horse, Libby, Banks Lake, Brownlee, Canada
- Upper Snake Flow Aug Sources: (1) Water stored in projects (the use of uncontracted space, water rentals through the State's rental pools, and powerhead space); and (2) Natural flow water rights (lease or purchase of natural flow rights).

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Upper Snake Flow Aug Timeline

- 1991- The start of flow aug from the Upper Snake
- 1993 – First year of 427 kaf of flow aug
- 1995, 1998, 2000 FCRPS Biological Opinions (BiOps)
- 2004 – Nez Perce Settlement
- 2004 Biological Assessment (BA) / 2005 BiOp
- 2007 BA / 2008 BiOp – shifted timing of flow aug releases from summer to spring

Historic Timeline

1991

- The first anadromous fish species to be listed by NMFS in the Columbia River Basin was the Snake River sockeye salmon, listed on November 20, 1991.
- Reclamation began providing additional flows from the Upper Snake

1993

- First year that approximately 427 kaf of flow aug was provided

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Historic Timeline

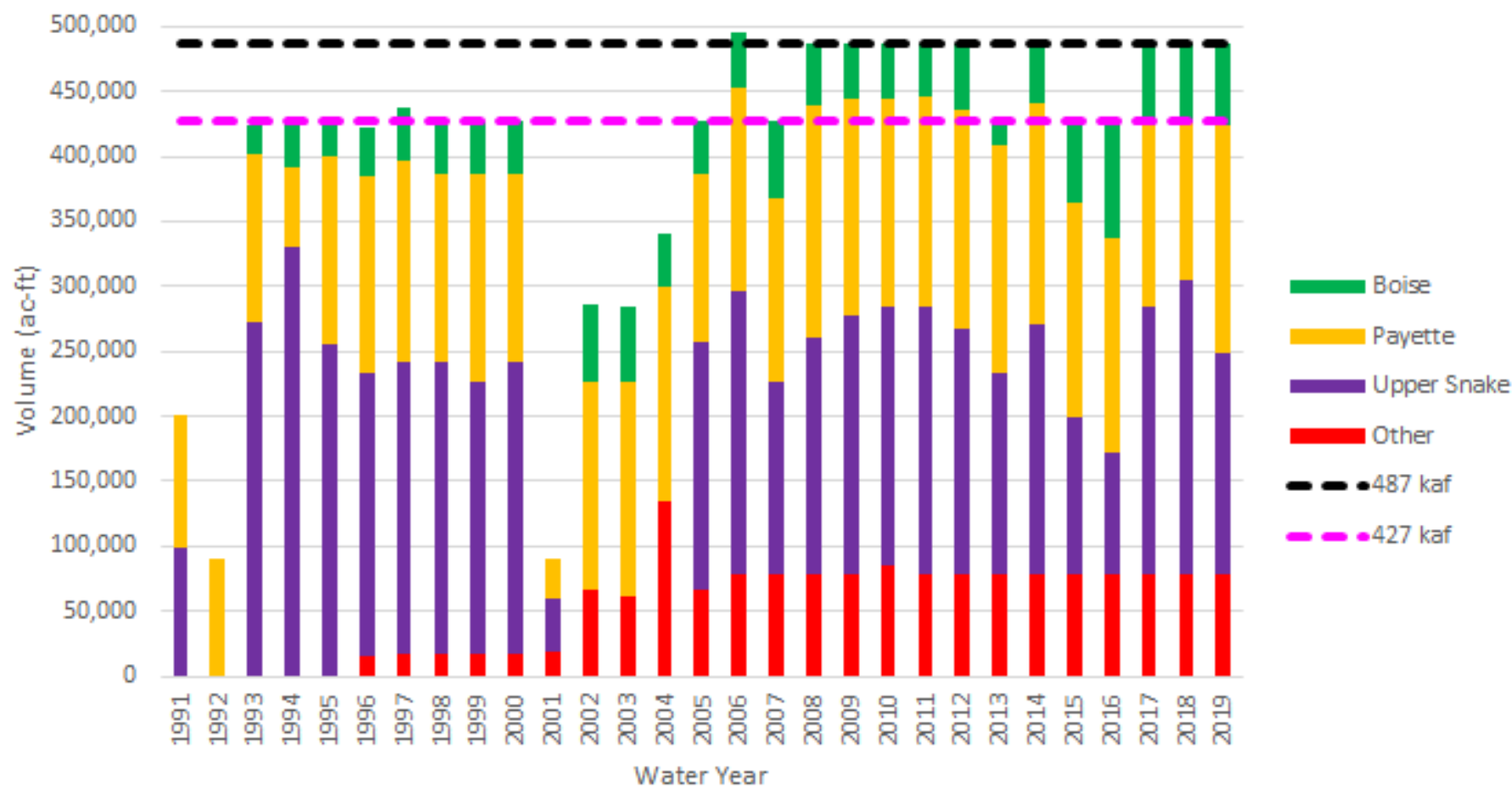
2004

- **The Nez Perce Water Rights Settlement** – Snake River Water Rights Act ratified the Nez Perce term sheet and formally created the current flow augmentation program. Maximum volume increased from 427 kaf to 487 kaf
- **2004 Upper Snake BA / 2005 Upper Snake BiOp**

2007

- **2007 Upper Snake BA / 2008 Upper Snake BiOp** - NMFS recommended that upper Snake flow augmentation delivery be shifted to an earlier release to provide more benefit to spring and early summer migrants.

Upper Snake above Brownlee Flow Augmentation Volumes 1991-2019



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Current Upper Snake Flow Aug Sources (2018)

SOURCE	AMOUNT (acre-feet)	DATES OF DELIVERY
Upper Snake above Milner Dam		
Reclamation Uncontracted Space	22,463	July 2 – July 31
Reclamation Powerhead Space	0	
Rentals – Water District 01	205,000	
Subtotal	227,463	
Payette		
Reclamation Uncontracted Space	95,000	June 14 – August 30
Rentals	25,202	
Subtotal	120,202	
Boise		
Reclamation Uncontracted Space	40,932	May 28 – June 22
Reclamation Powerhead Space	0	
Rentals	20,754	
Subtotal	61,686	
Natural Flows		
IWRB Lease (Idaho)	60,000 ^A	April 3 – August 31 ^B
Skyline Farms (Oregon)	17,649	
Subtotal	77,649	
TOTAL	487,000	

Storage from the Boise, Payette, and Upper Snake

- Reclamation uncontracted space
- Rentals
- Powerhead (only to get to 427 kaf)

Natural flows

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Average Annual Rentals (2009-2019)

- Willing buyer/willing seller
- Payette – 60,142 acre-ft
- Boise – 9,474 acre-ft
- Upper Snake above Milner – 150,429 (“the rainbow chart”)
- \$20 per ac-ft rental rate (increases to \$23 per ac-ft in 2023)
- 2019:
251,139 ac-ft rented
\$5,022,780 Paid

“The Rainbow Chart”*

November 1	Stipulated Augmentation Rental Dist 01						
Carryover	April 1 - Sept 30 Heise Forecast 1000s AF						
1000s AF	< 2,450	< 2,920	< 3,450	< 4,208	< 5,042	< 5,670	> 5,670
0	0	0	0	0	150000	185000	185000
100	0	0	0	0	150000	185000	185000
200	0	0	0	0	150000	185000	185000
300	0	0	0	0	150000	185000	185000
400	0	0	0	0	150000	185000	185000
500	0	0	0	0	150000	185000	185000
600	0	0	0	60000	150000	185000	185000
700	0	0	0	60000	150000	185000	185000
800	0	0	0	60000	150000	185000	185000
900	0	0	60000	60000	150000	185000	185000
1,000	0	0	60000	60000	150000	185000	185000
1,100	0	0	60000	60000	150000	185000	185000
1,200	0	0	60000	60000	150000	185000	185000
1,300	0	0	60000	60000	150000	185000	185000
1,400	0	0	60000	60000	150000	185000	185000
1,500	0	0	100000	150000	185000	185000	185000
1,600	0	0	100000	150000	185000	185000	185000
1,700	0	0	100000	150000	185000	185000	185000
1,800	0	0	100000	150000	185000	185000	185000
1,900	0	0	100000	150000	185000	185000	185000
2,000	0	0	100000	150000	185000	185000	185000
2,100	0	0	100000	150000	205000	205000	205000
2,200	0	0	100000	150000	205000	205000	205000
2,300	0	0	100000	150000	205000	205000	205000
2,400	0	0	100000	150000	205000	205000	205000
2,500	0	0	100000	150000	205000	205000	205000
2,600	0	0	185000	185000	205000	205000	205000
2,700	0	0	185000	185000	205000	205000	205000
2,800	0	0	185000	185000	205000	205000	205000
2,900	0	0	185000	185000	205000	205000	205000
3,000	60000	60000	185000	185000	205000	205000	205000
3,100	60000	60000	185000	185000	205000	205000	205000
3,200	100000	100000	185000	185000	205000	205000	205000
3,300	100000	100000	185000	185000	205000	205000	205000
3,400	100000	100000	185000	185000	205000	205000	205000
3,500	100000	100000	185000	185000	205000	205000	205000
3,600	100000	100000	185000	185000	205000	205000	205000

*1981-2010 Ave Apr-Sep HEII = 3,787 kaf

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Basic Tenets of Flow Aug

- Flow augmentation must be water that would otherwise not be there.
- Flood control releases cannot be counted as flow augmentation.
- Must occur between Apr 3 – Aug 31.
- Must be able to clearly report on the volumes and timing.

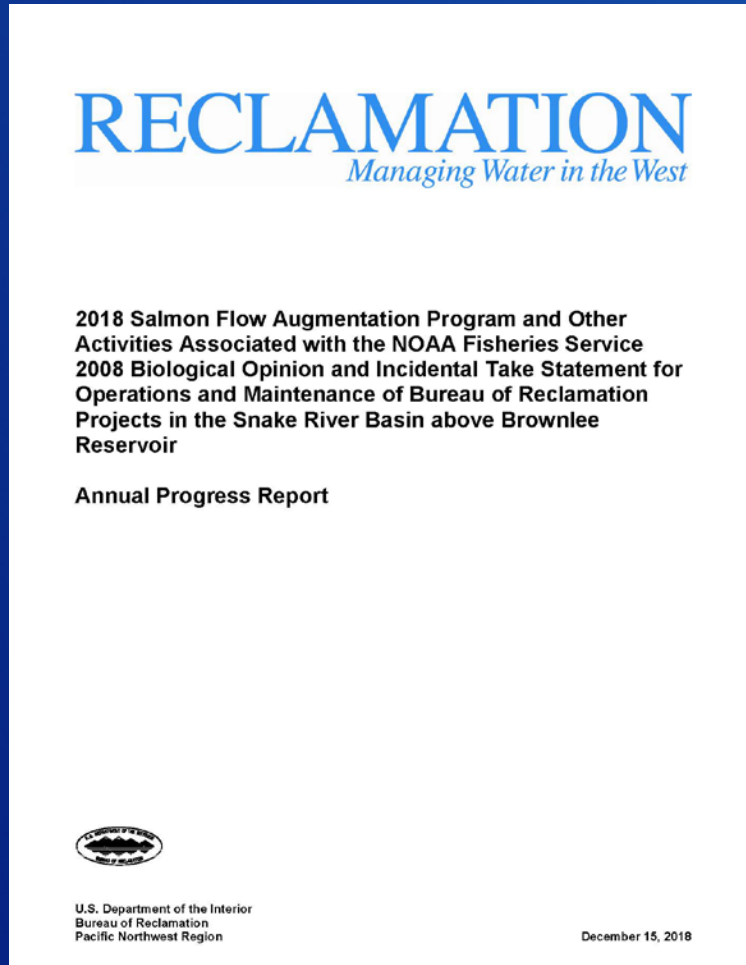
IDWR Coordination

- Reclamation works closely with IDWR and Water District 1, 63, and 65 staff prior to, during, and following flow aug releases
 - April 1 Flow Aug Prospects Letter to IDWR Director
 - Flow aug rental coordination
 - Flow aug accounting
 - Flow aug shepherding through system



Reporting Requirements

- Annual Report to NOAA Fisheries
- In-season coordination with Columbia River Technical Management Team (TMT)



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Every Year is different

The shift from summer to spring releases following the 2007 BA/2008 BiOp resulted in new challenges and an in-season management approach

- Each basin (Boise, Payette, Upper Snake) is unique
- Each water year is different (hydrology, uncertainty of source availability)
- Earlier releases in spring may not always be possible (wet years with later timing of flood control releases)
- Basin specific operations are summarized in the 2007 BA/2008 BiOp – operate consistent with those documents

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Basin Specific Operations for Flow Aug

Payette Basin:
Drainage Area: 3,200 mi²

Upper Snake Basin:
Drainage Area: 15,000 mi²

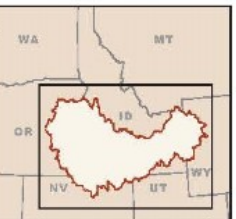
Boise Basin:
Drainage Area: 2,700 mi²

Features and
Facilities for
Bureau of
Reclamation
Projects

*in the
Snake River Basin
above
Brownlee Reservoir*

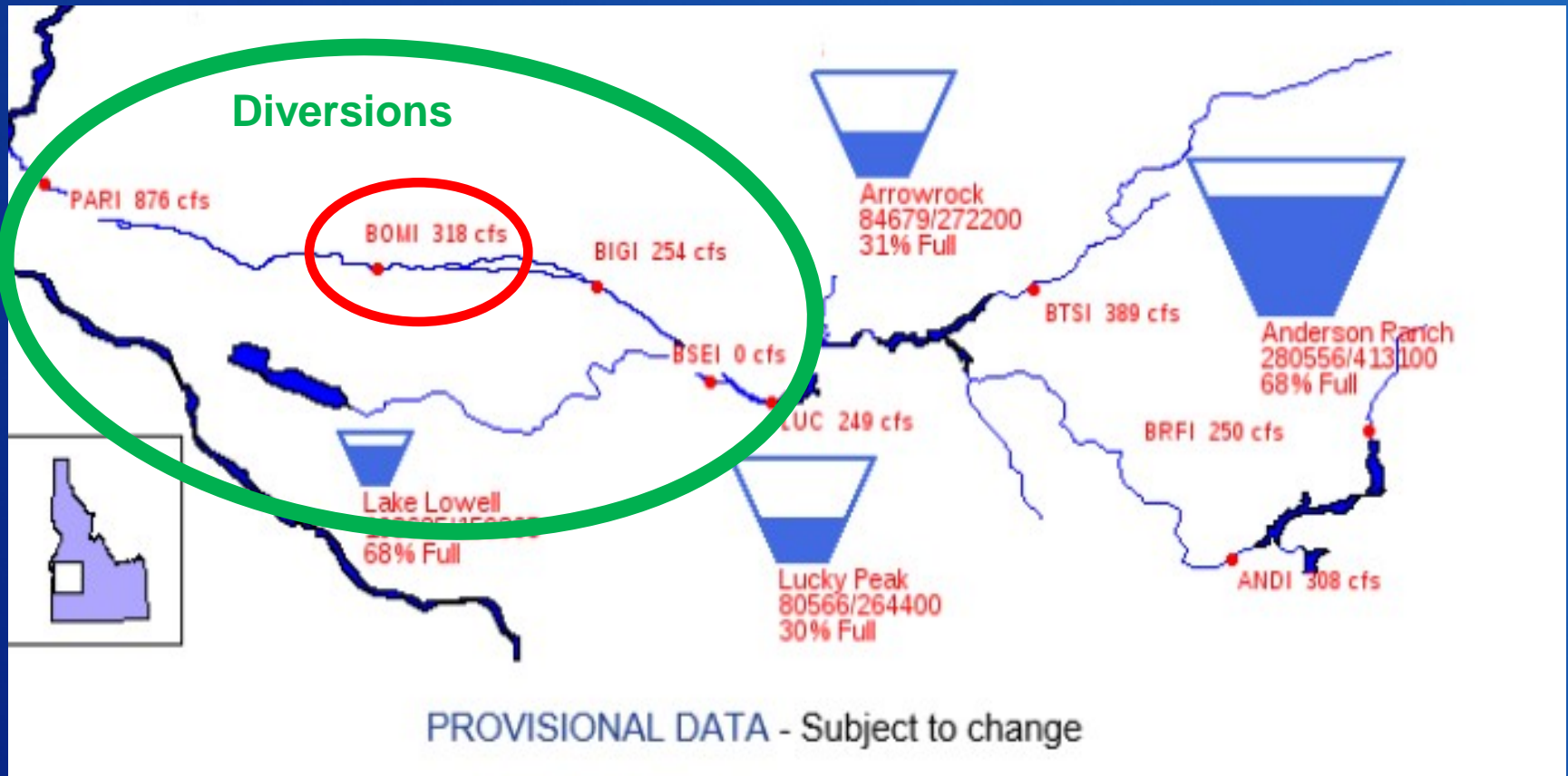
- Reclamation Dam
- Other Dam
- Reclamation Project Areas
- Upper Snake River Basin

Source:
Bureau of Reclamation, PN Region GIS
October 2004



RECLAMATION

Boise River System



BOMI = Boise River nr Middleton, ID

RECLAMATION

Boise River System

- 3 Reservoir system => 949,700 ac-ft capacity
- Section 7 Flood Control
- Drainage Area: 2,700 mi²
- Average Annual Runoff: 1.9 maf*
- # of Accounting Diversions: 82
- Peak Diversion Rate: 4,500 cfs
- Accounting Travel Time: 1 Day

*1981-2010 Average Oct-Sep Boise River at Lucky Peak
Unregulated Flow

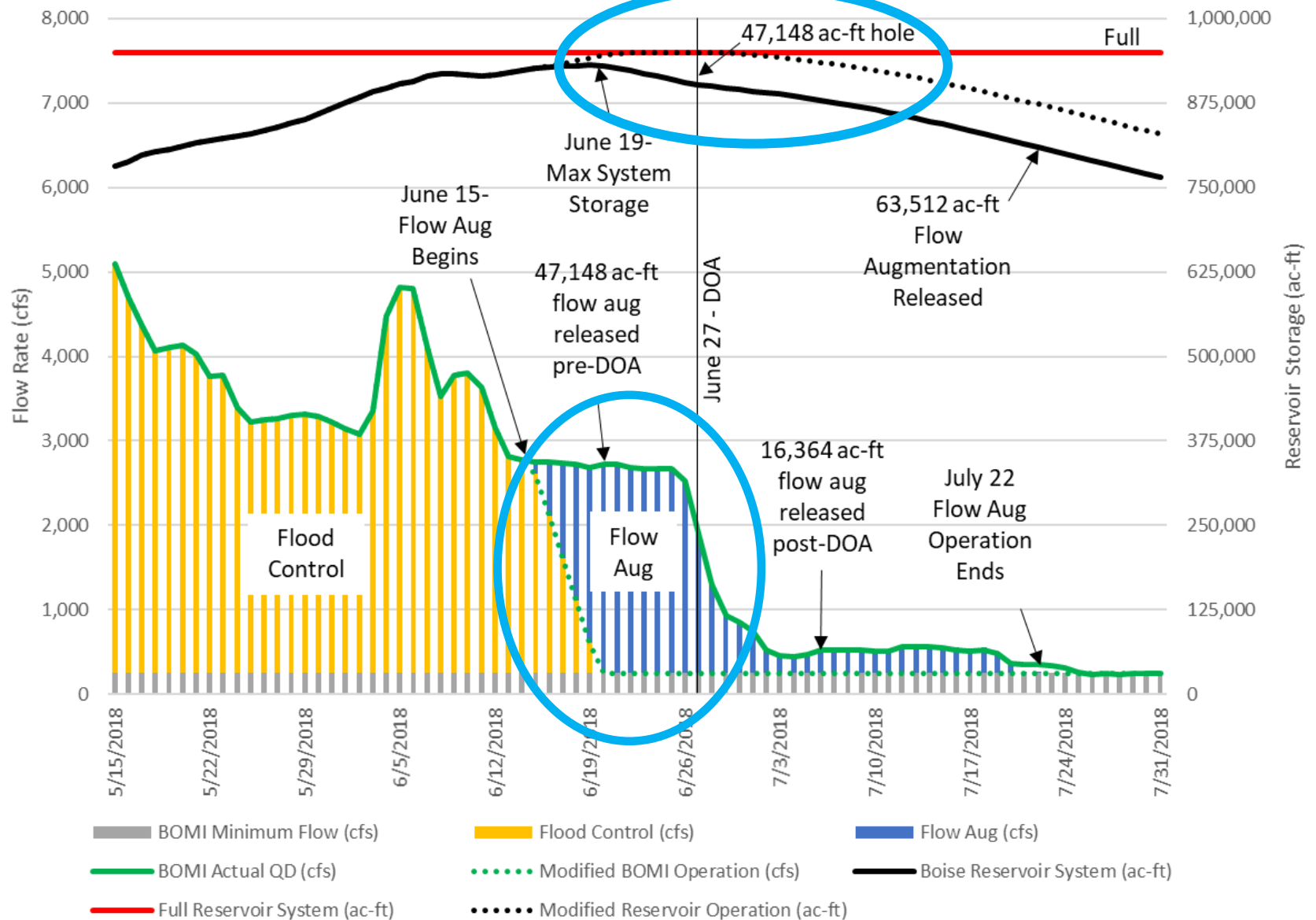
RECLAMATION

Boise River System Flow Aug Sources

- **Willing Seller Rentals**
 - 2009-2019 average = 9,474 ac-ft
- **Uncontracted Space**
 - Lucky Peak 40,932 ac-ft
- **Powerhead Space**
 - Anderson Ranch 36,956 ac-ft

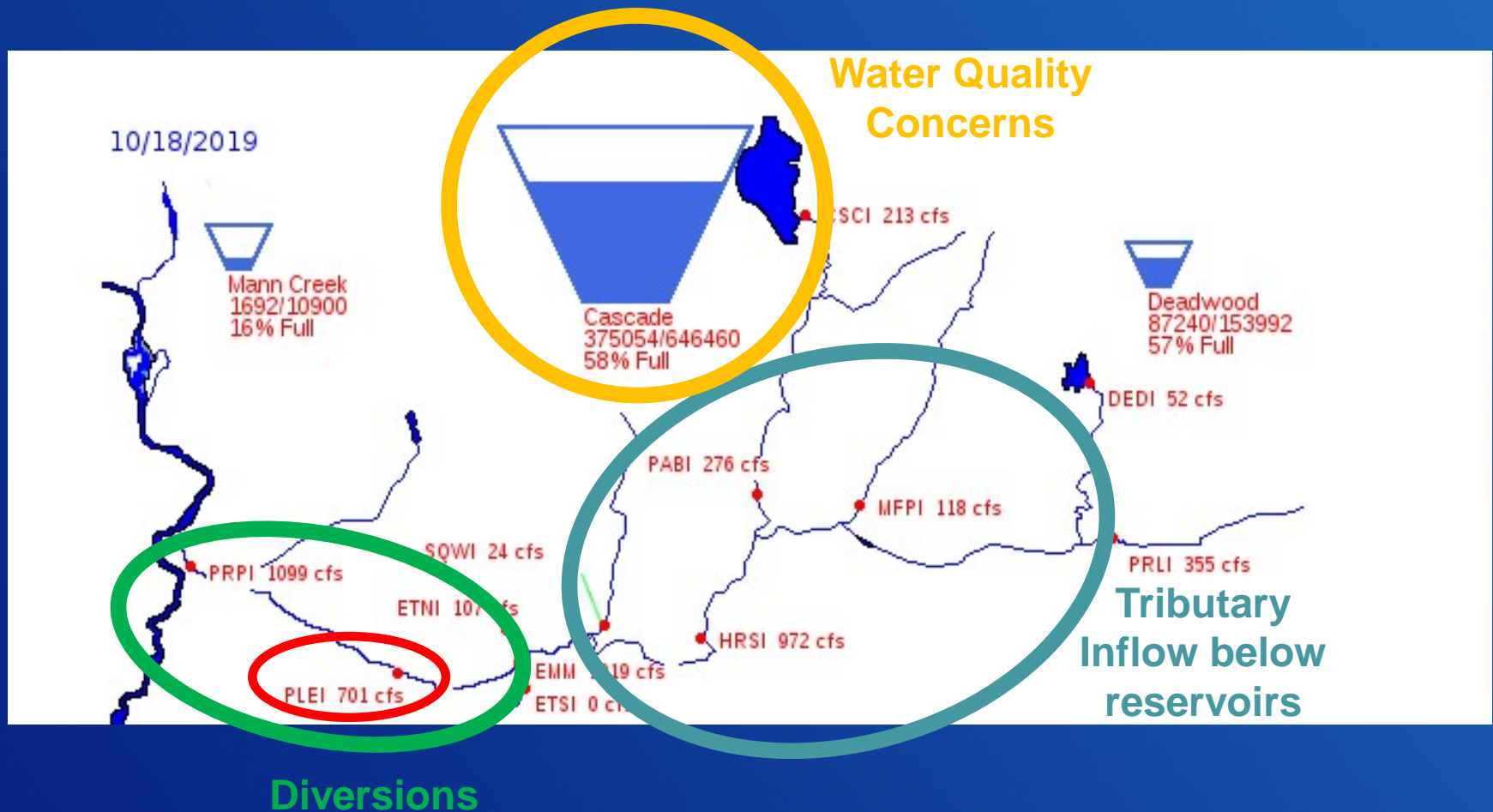
2009-2019 Average Flow Aug Contribution: 53 kaf

2019 Boise Flow Augmentation



RECLAMATION

Payette River System



PLEI = Payette River nr Letha, ID

RECLAMATION

Payette River System

- 2 Reservoir system => 800,452 ac-ft capacity
- Informal flood control
- Drainage Area: 3,200 mi²
- Average Annual Runoff: 2.2 maf*
- # of Accounting Diversions: 199
- Peak Diversion Rate: 3,000 cfs
- Accounting Travel Time: 2 Days

* 1981-2010 Average Oct-Sep Payette River nr Horseshoe Bend
Unregulated Flow

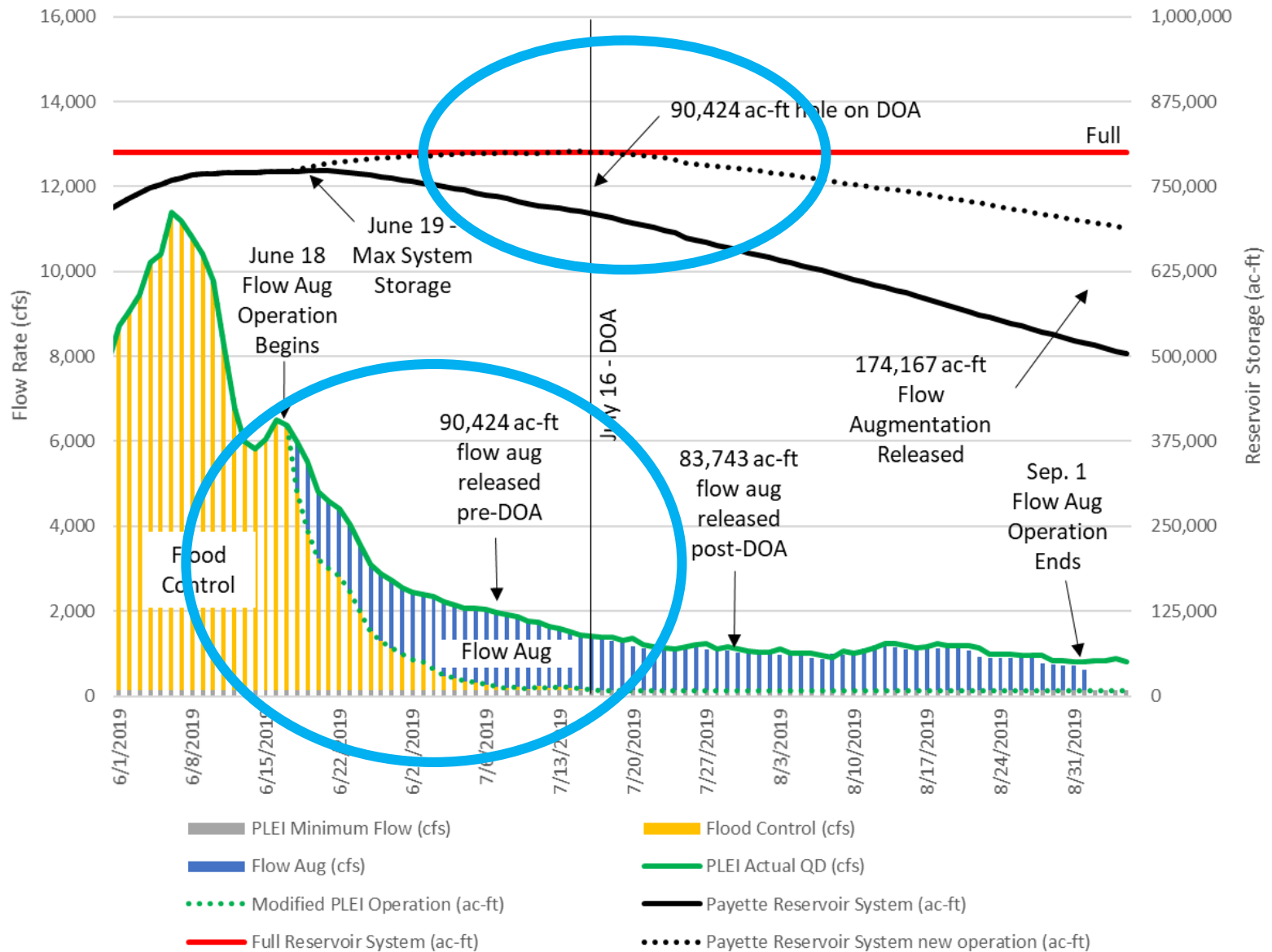
RECLAMATION

Payette River System Flow Aug Sources

- **Willing Seller Rentals**
 - 2009-2019 average = 60,142 ac-ft
- **Uncontracted Space**
 - Cascade 69,600 ac-ft
 - Deadwood 26,008 ac-ft

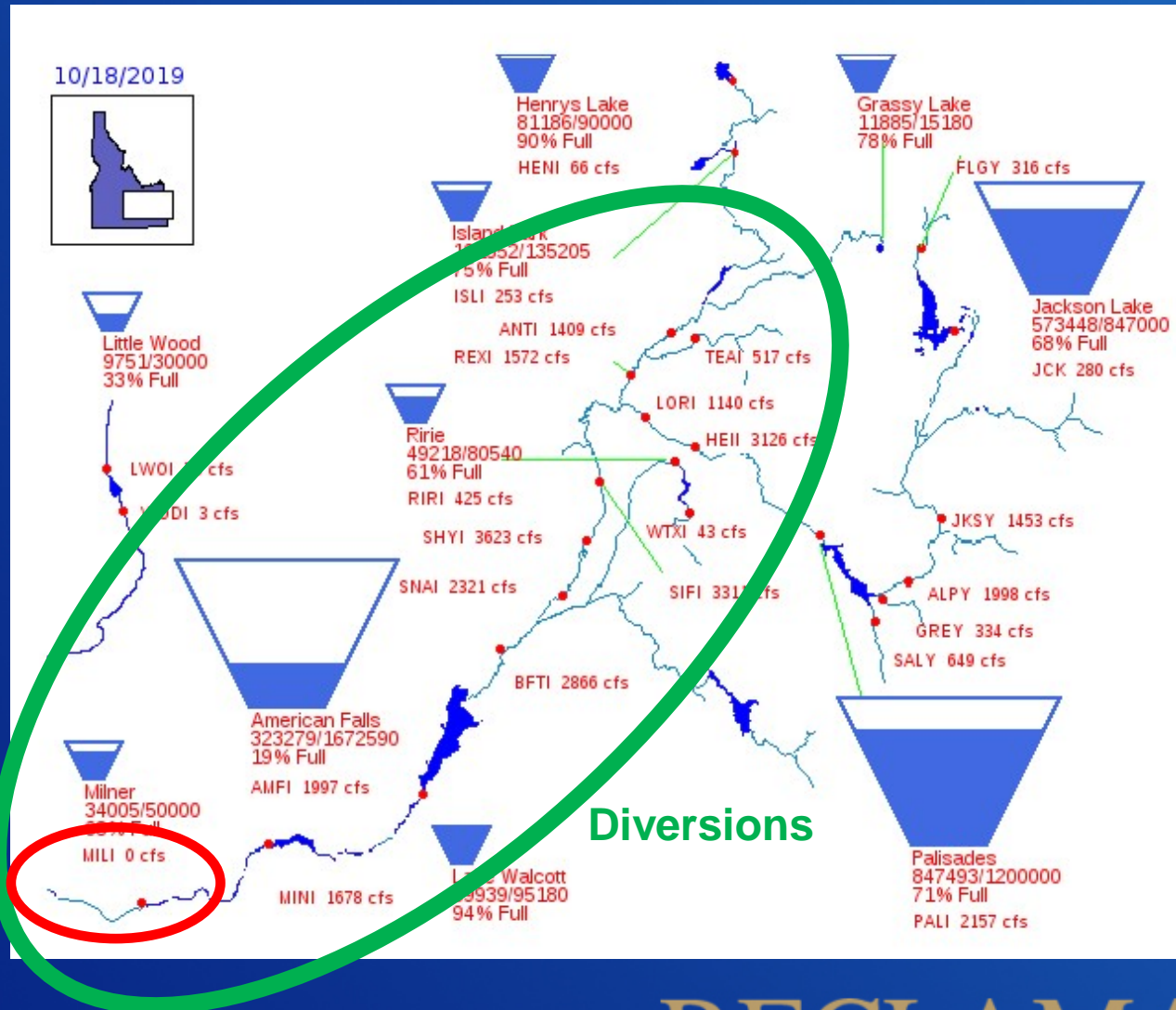
2009-2019 Average Flow Aug Contribution: 160 kaf

2019 Payette Flow Augmentation



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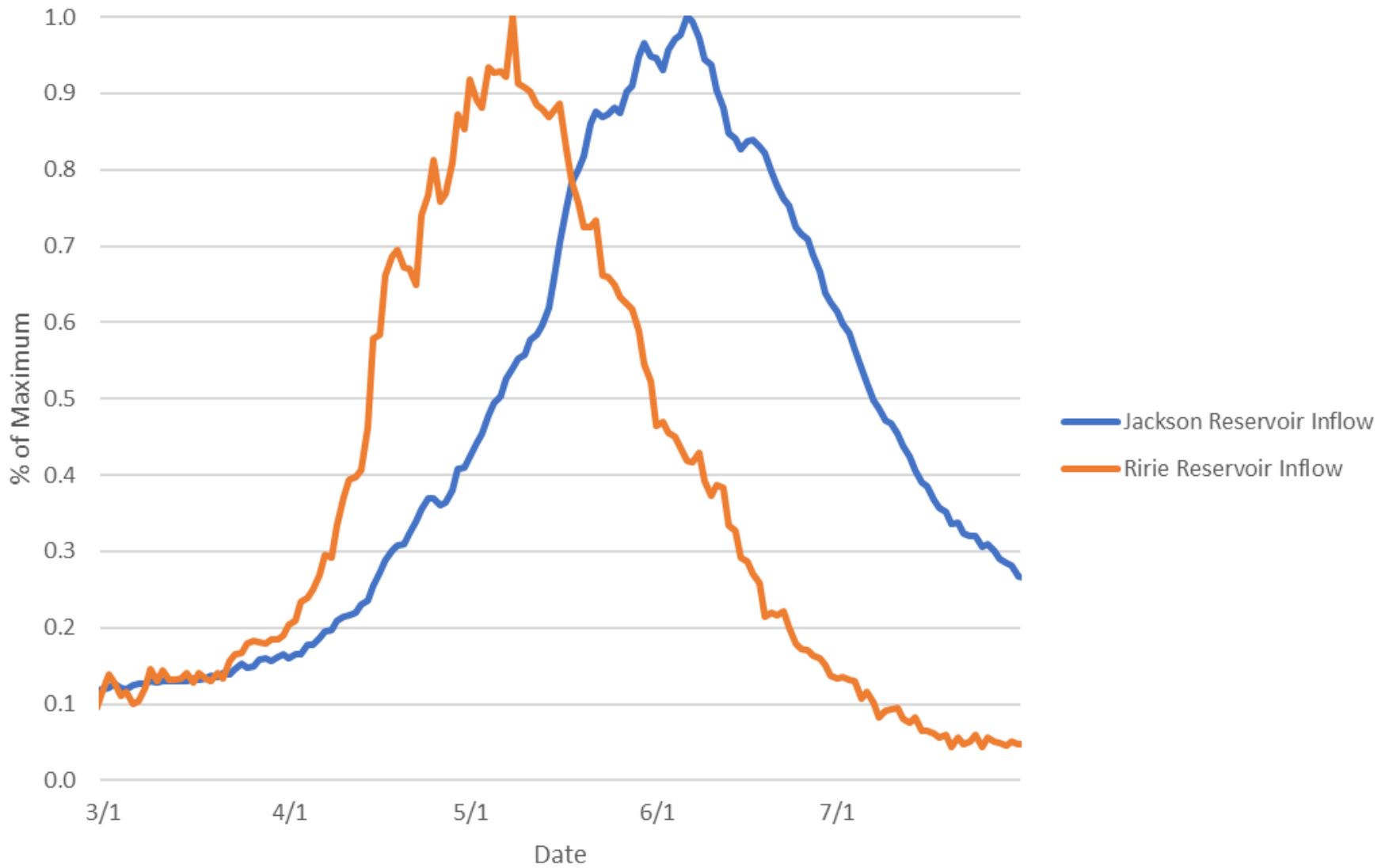
Upper Snake Above Milner



MILI = Snake River at Milner, ID

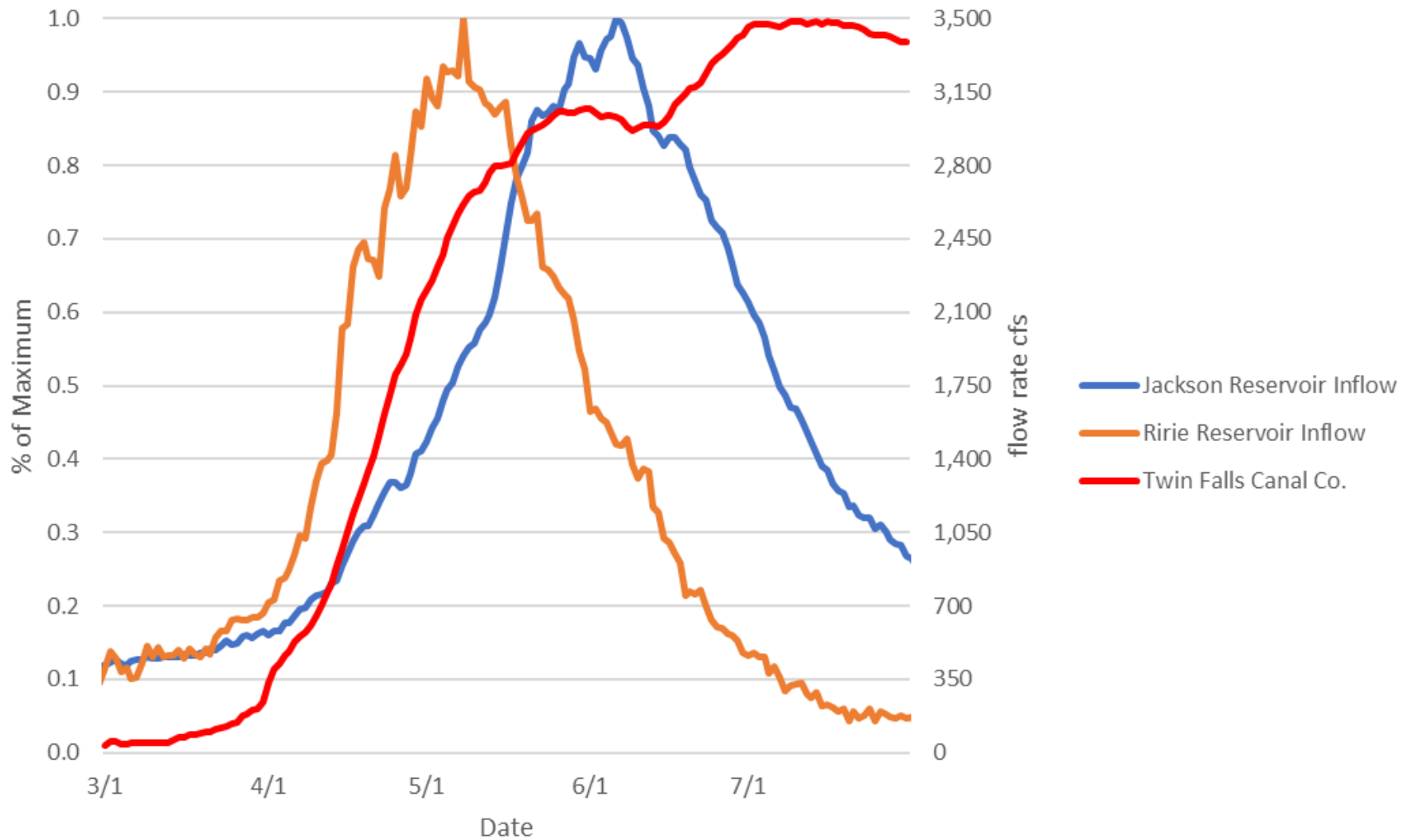
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Runoff Timing



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Runoff Timing vs. Diversion Timing



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Upper Snake River System

- 9 Reservoir system => 4,185,695 ac-ft capacity
- Section 7 Flood control Jackson, Palisades, Ririe
- Drainage Area: 15,000 mi²
- Average Annual Runoff: 8.4 maf*
- # of Accounting Diversions: 348
- Peak Diversion Rate: 30,000 cfs
- Accounting Travel Time: 7 Days

* 1981-2010 Average Oct-Sep Snake River at American Falls
Unregulated Flow (as reported by Northwest River Forecast
Center)

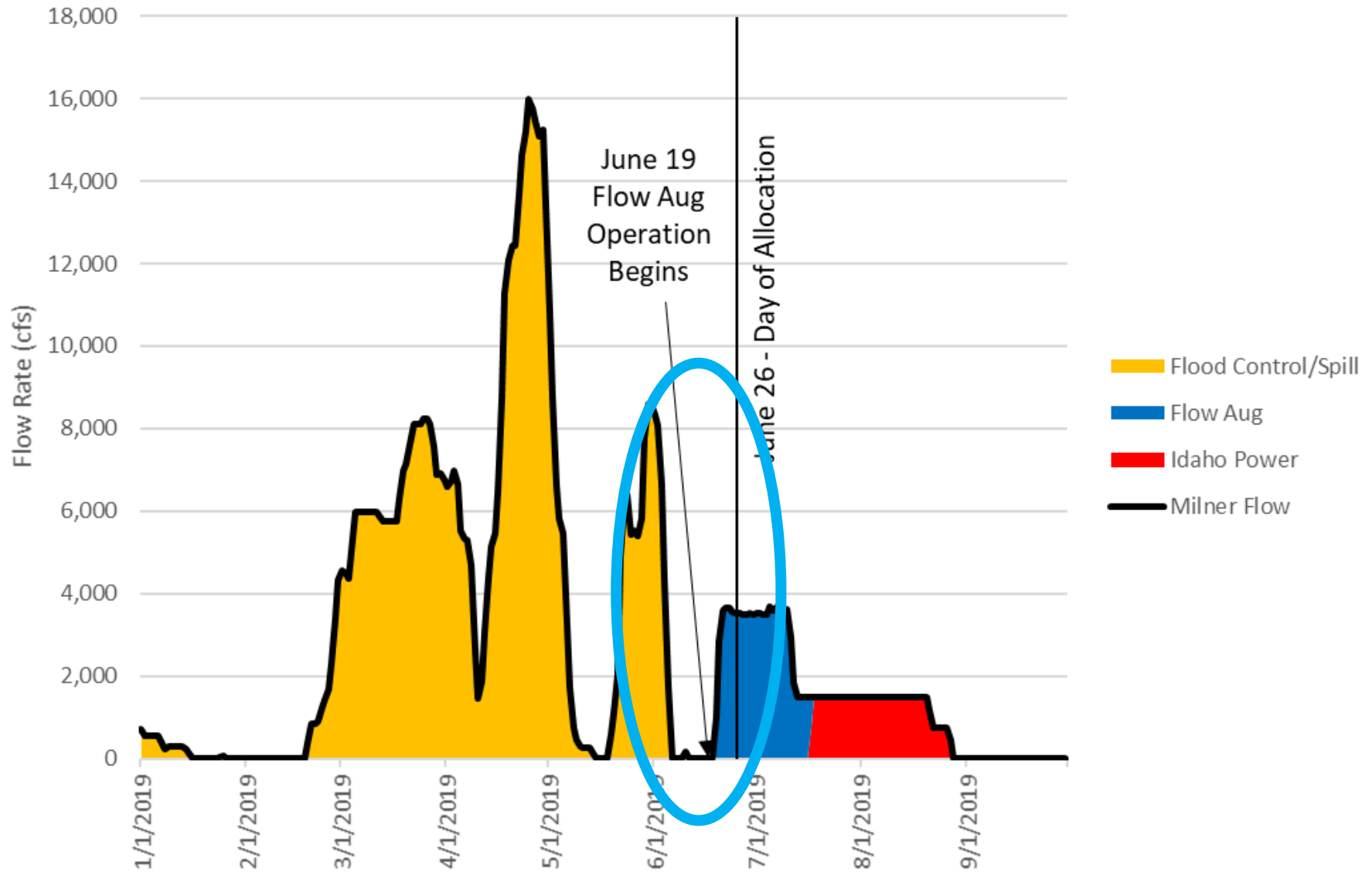
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Upper Snake above Milner Flow Aug Sources

- **“Rainbow Chart” Rentals**
 - 0 ac-ft to 205,000 ac-ft
- **Uncontracted Space**
 - American Falls 8,950 ac-ft
 - Palisades 10,022 ac-ft
 - Jackson 3,923 ac-ft
- **Powerhead**
 - Palisades 157,000 ac-ft

2009-2019 Average Flow Aug Contribution: 179 kaf

2019 Upper Snake Flow Augmentation



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Questions?

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