

Hydrology and water management in the upper Snake River Basin



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Henry's Fork Foundation

HFWC and EIWRC Storage Seminar, August 19, 2025



Outline

- Hydrology: “wet” water
- Water rights: “paper” water
- Management and administration: wet water meets paper water
- Reservoir operations and potential for new storage

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This presentation

- Facts of science, law and administration as they are today
- Data from IDWR Water Rights Accounting Database
- Other sources:
 - Water District 1 procedures manual
 - IDWR water rights research tools
 - Agreements, orders, biological opinions, etc.
 - Scholarly publications: books, scientific papers, law reviews

Upper Snake River Basin: Headwaters to King Hill



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Key locations:

- Milner Dam



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Key locations:

- Milner Dam
- King Hill
- Swan Falls Dam



Climate and Irrigated Agriculture

Climate

- 10-12" precipitation annually on plain
- 12-20" on benches
- 20-60" in mountains, mostly November – March
- Sub-freezing winters, hot summers
- Evapotranspiration (ET) exceeds precipitation during growing season

Agriculture (including aquaculture)

- Supports ~\$20 billion economy
- ~2.5 million irrigated acres
- Alfalfa, feed corn, wheat, barley, potatoes
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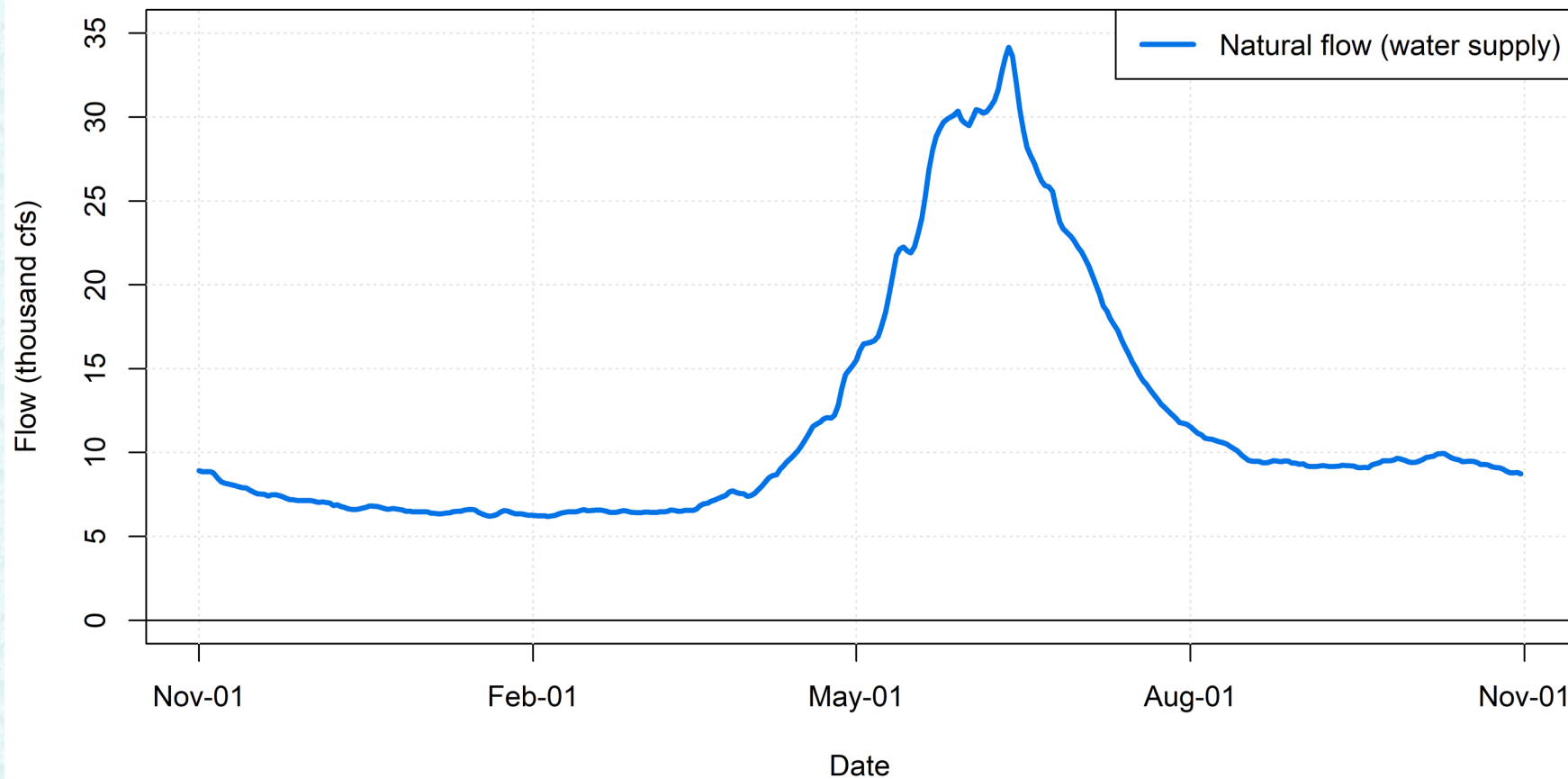
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Bottom line

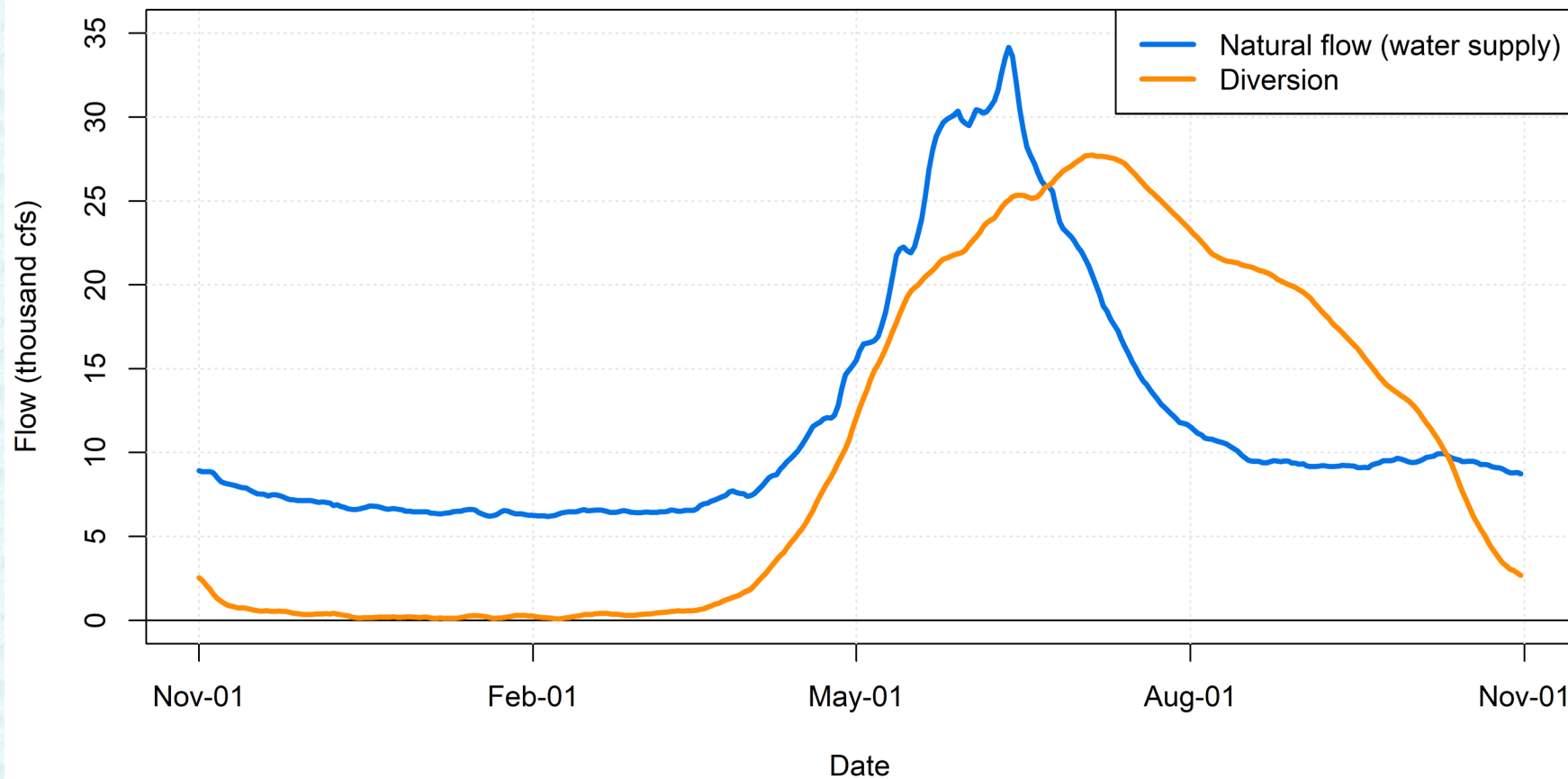
- Water supply comes from mountain snowpack
- Irrigation required for agriculture



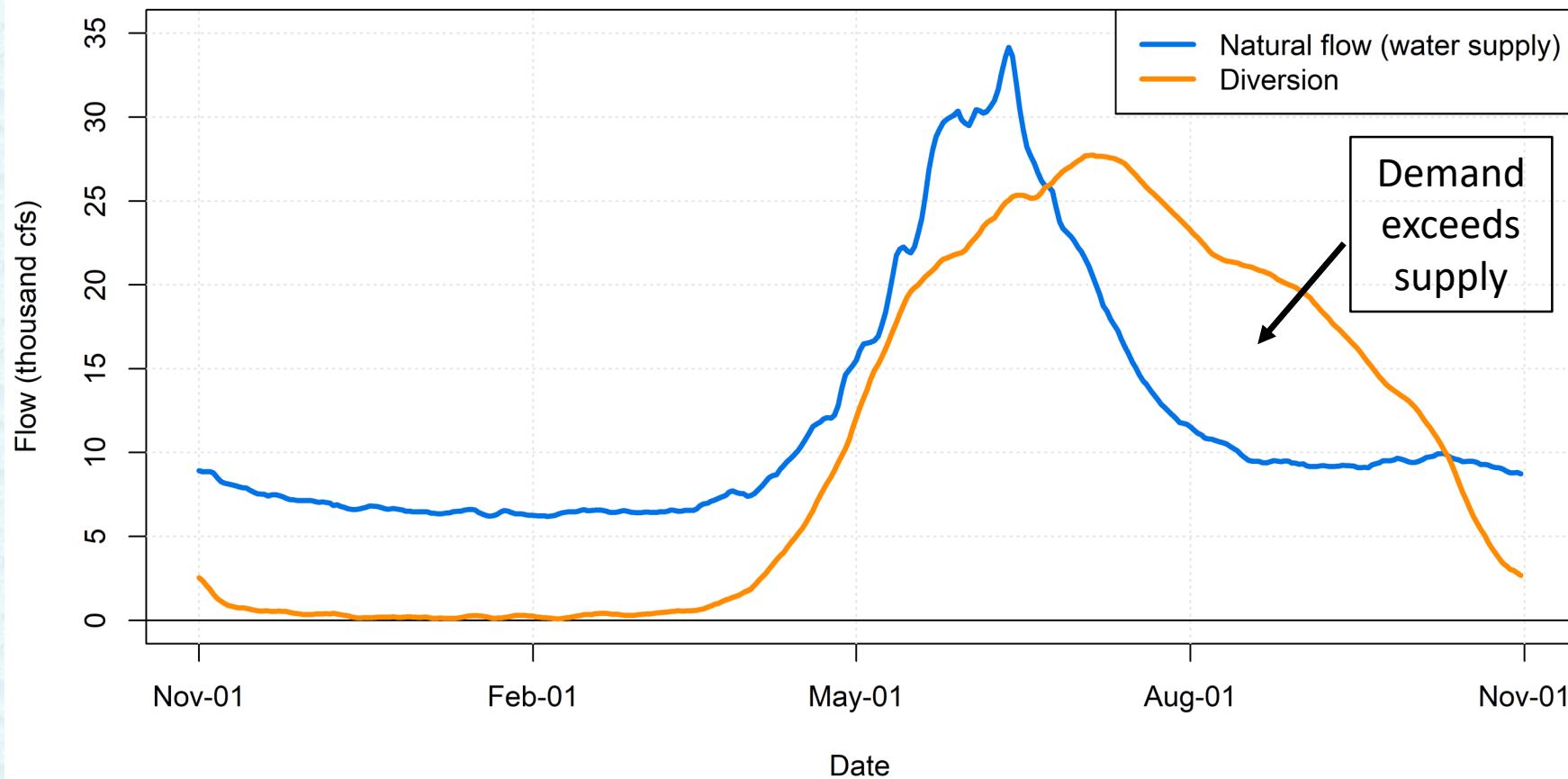
Basin-wide Surface Water Budget (at Milner Dam, 2000-2024 average)



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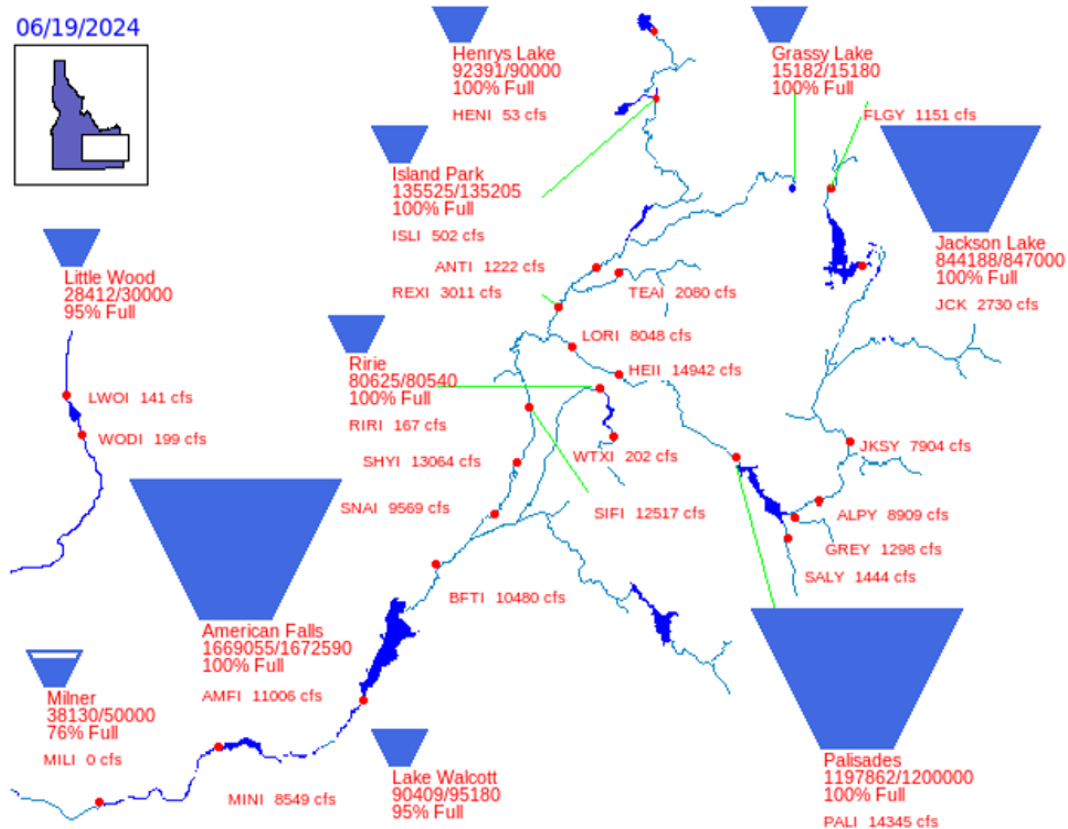
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Bureau of Reclamation, Pacific Northwest Region

Major Storage Reservoirs in the Upper Snake River Basin

06/19/2024



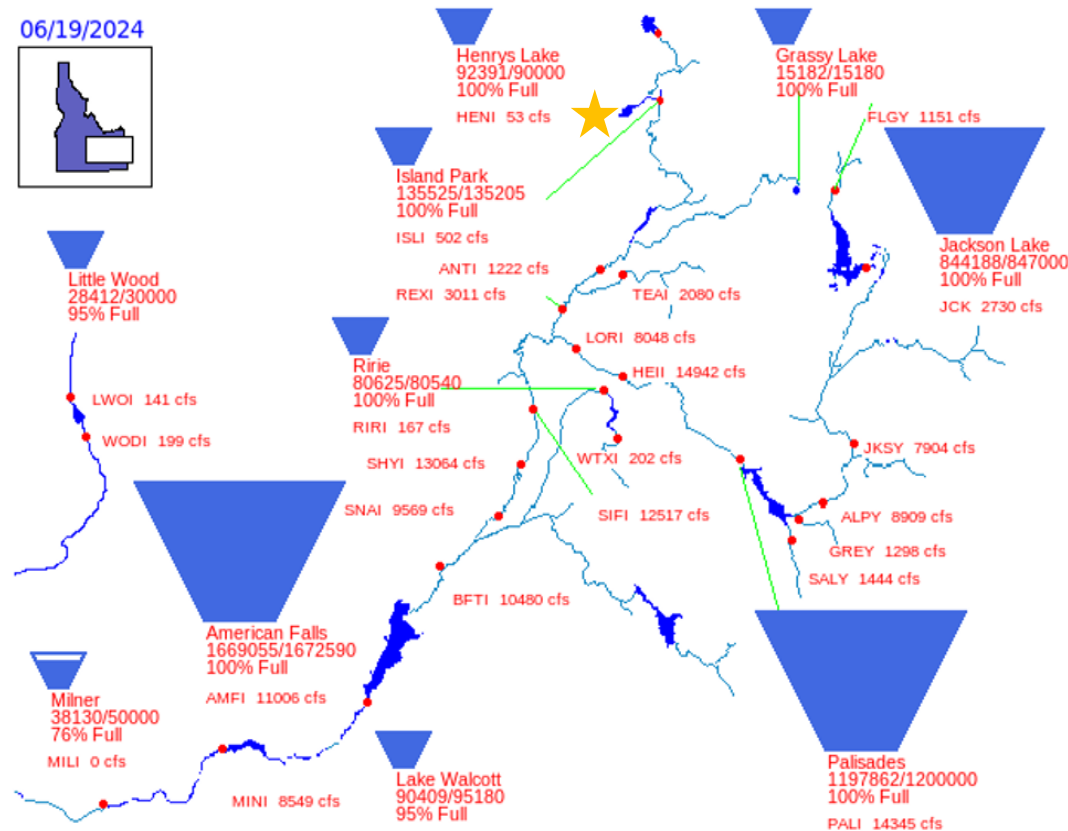
PROVISIONAL DATA - Subject to change

Upper Snake
Reservoir
System:
4.1 M ac-ft
(~40% of
supply)

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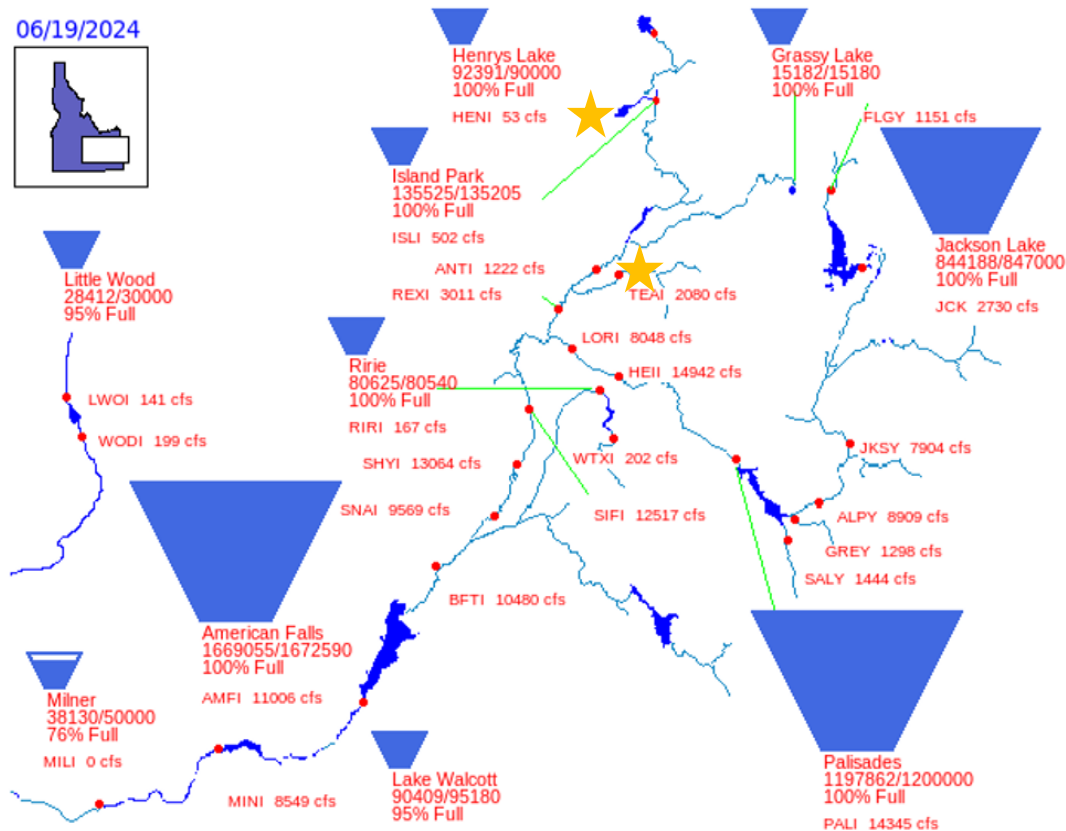
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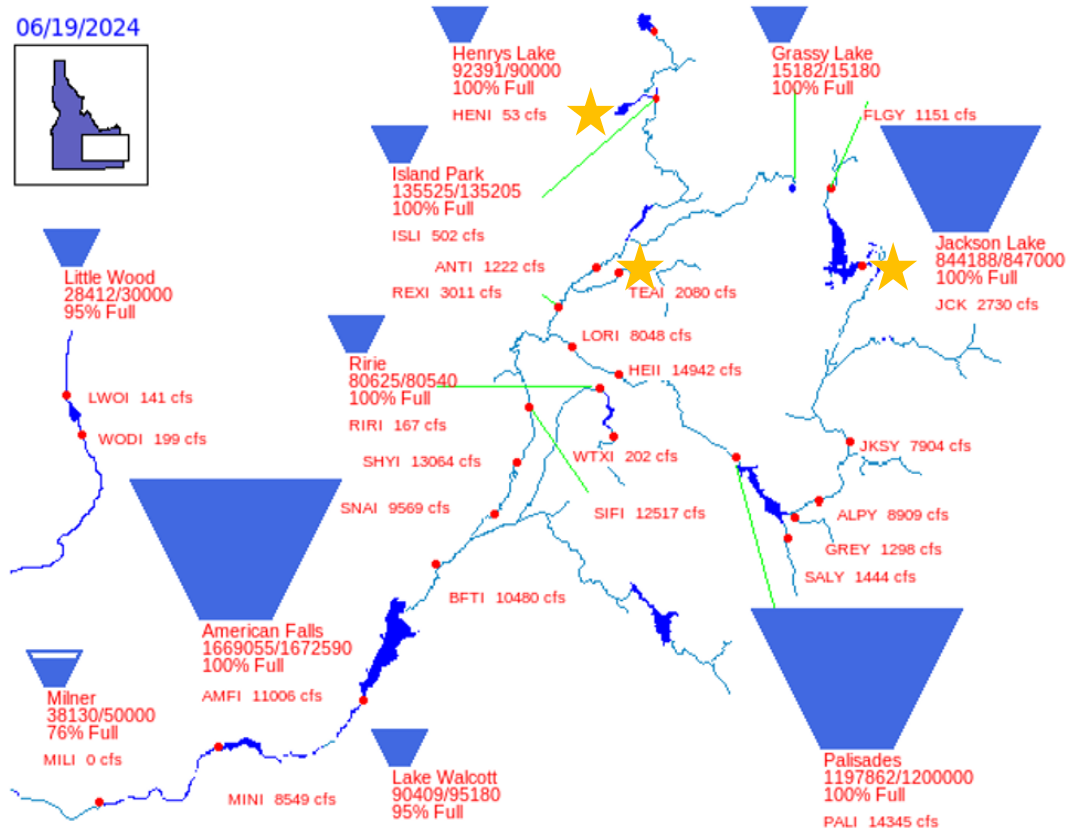
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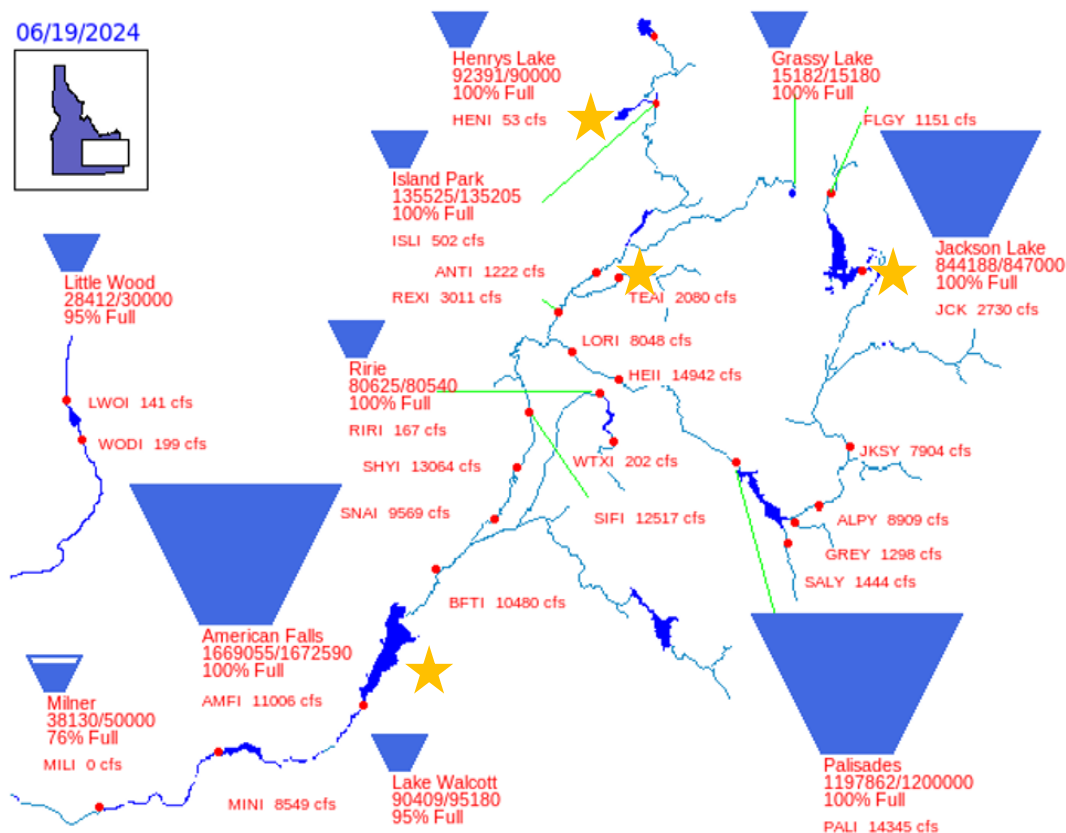
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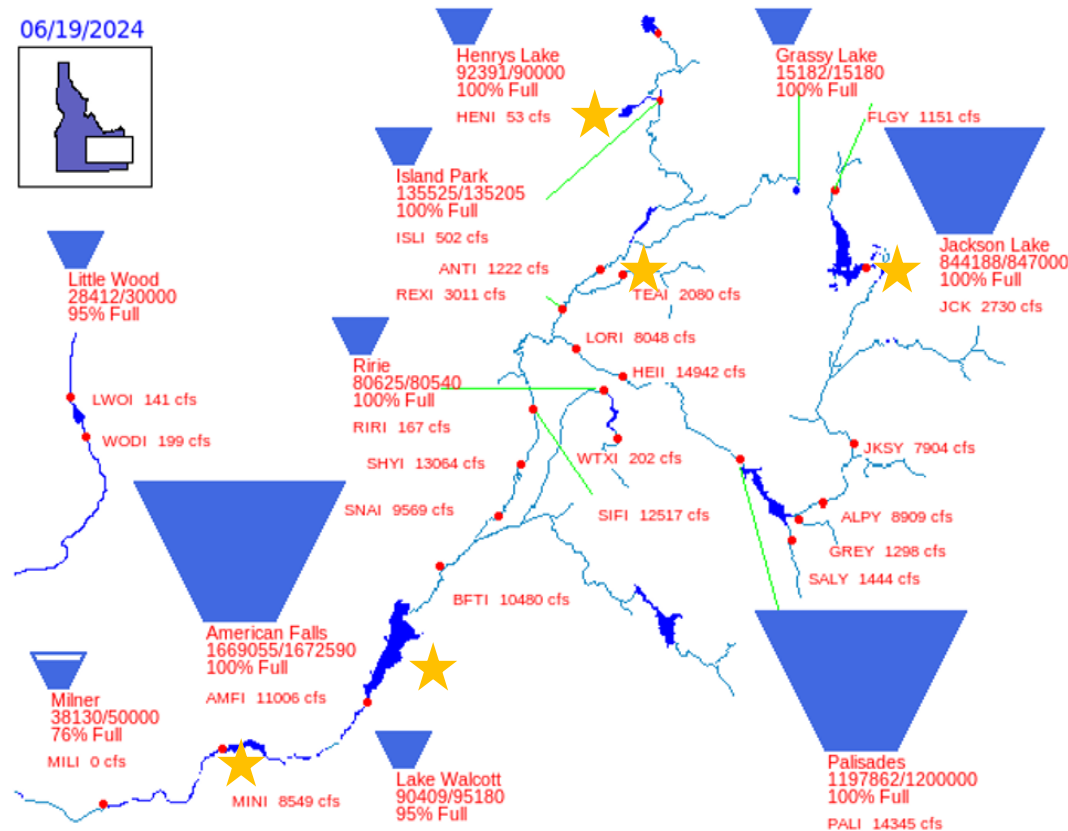
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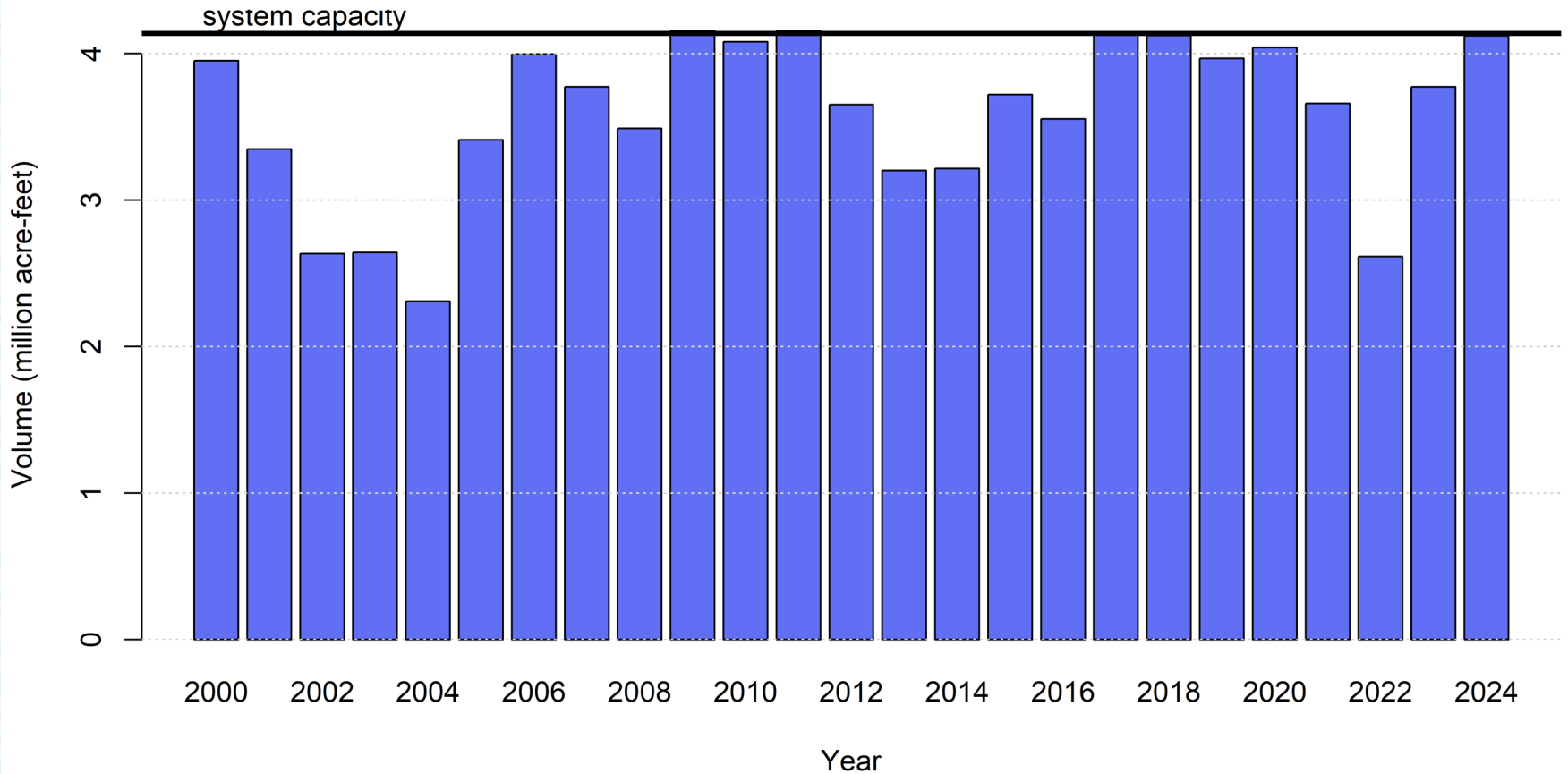
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Maximum Reservoir System Storage



Upper Snake River Basin

Eastern Snake Plain Aquifer Boundary

0 20 40 60 Miles

Thousand
Springs

Blackfoot-
Neeley Reach
(American Falls
Reservoir)

Eastern Snake Plain Aquifer (ESPA).

Recharged by:

1. Irrigation
seepage
2. River channel
seepage
3. Precipitation
4. Managed aquifer
recharge

Discharges water
back to the river.

Map from IDWR

Groundwater declining in many areas due to:

1. Increased irrigation efficiency
2. Groundwater pumping
3. Loss of irrigated agricultural land



Three key aspects of Prior Appropriation

1. “First in time is first in right”
2. “Without beneficial use there is no water right”

Over 70 recognized beneficial uses, including:

- Irrigation
- Domestic
- Stock water
- Commercial
- Groundwater recharge
- Storage for various uses

3. “Use it or lose it”

Key elements of a water right

- Right for private use of waters of the State
- Property right guaranteed by Idaho Constitution
- Key components:
 - Establishment basis
 - Beneficial use and season of use
 - Priority date
 - Point of Diversion
 - Place of Use
 - Source
 - Amount
- Right may be used only when water is available

Priority Dates

- Nez Perce Tribe: 6/11/1855
- Shoshone-Bannock Tribes: 6/14/1867
- Senior surface-water rights in upper valley: 1870s-1880s
- Junior surface-water rights in upper valley: after 1890
- Senior surface-water rights in Magic Valley: 1900-1905
- Most storage rights: 1906-1939
- Most groundwater irrigation rights: 1950s-1980s
- Most groundwater recharge rights: 1980-2024

Major Water-Administration Actions

- 1972: Idaho Water Resource Board issued first State Water Plan
- 1984: Swan Falls Settlement Agreement (Idaho Power & State)
- 1992: ESA listing of Snake River salmon
- 1993: Moratorium on new groundwater irrigation on ESPA
- 1994: Conjunctive Management Rules
- 2009: Eastern Snake Plain Aquifer Comprehensive Mgmt. Plan
- 2012: Revision of State Water Plan; Swan Falls reaffirmed
- 2014: Snake River Basin Adjudication Completed
- 2015: Groundwater-surface water user settlement 1
- 2022: Moratorium on new water rights upstream of Swan Falls
- 2024: Groundwater-surface water user settlement 2
- 2025: Legislative changes to domestic well use

Water Rights Accounting

- How prior appropriation is interpreted and applied
- Administered by water districts
- Water District 1 administers surface-water above Milner
- All water rights from headwaters to Milner are a single system
- Groundwater and surface water are administered together

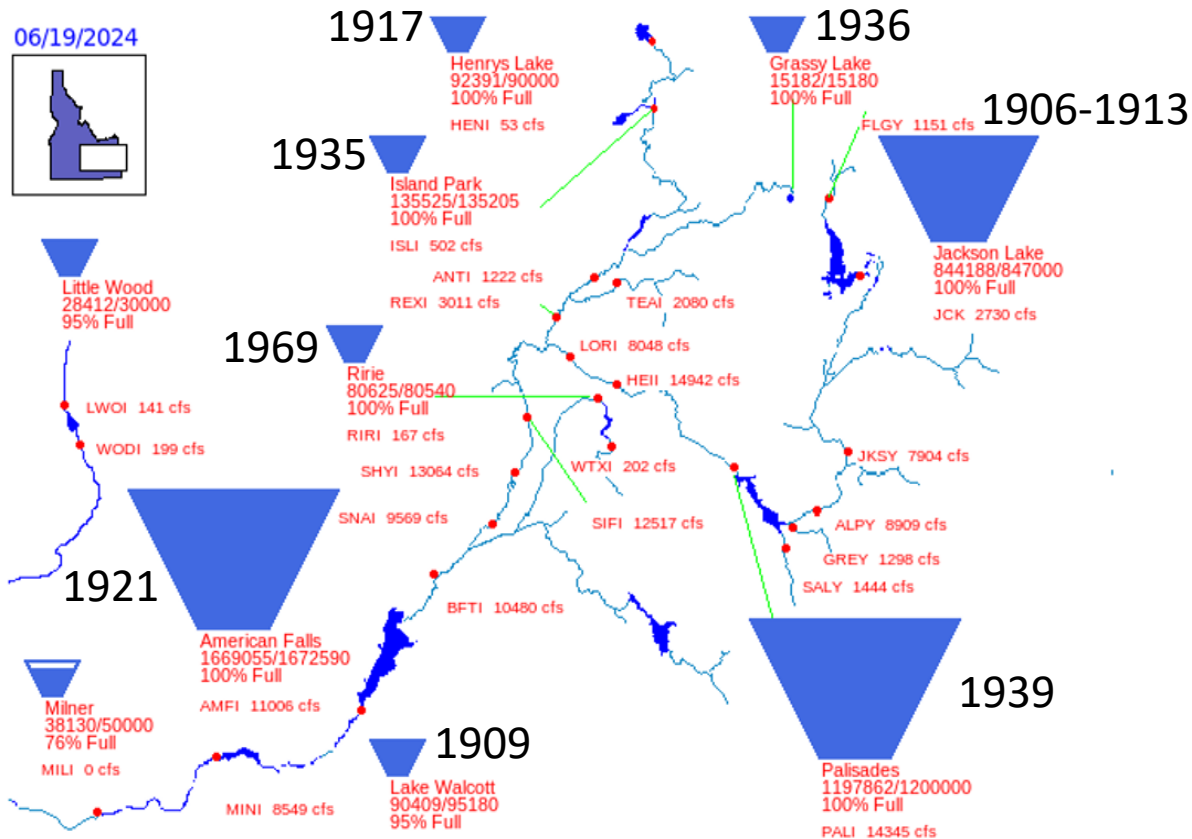
Groundwater vs. Surface Water

- On a given day, surface-water diversion limited by available water.
- Junior users must quit diverting when supply < demand.
- On a given day, groundwater use is NOT limited by supply.
- Real-time conjunctive administration is impossible.
- Groundwater-surface water interactions calculated with a computer model.
- Administration primarily done through settlement agreements.

Upper Snake Reservoir Guidelines

- Store water as high in the system as possible
- Draft reservoirs only as needed to meet total diversion and key streamflow targets
- Flood risk management & dam safety apply as needed
- Hydropower, fish, wildlife, recreation subordinate
- Wet water and paper water are not the same

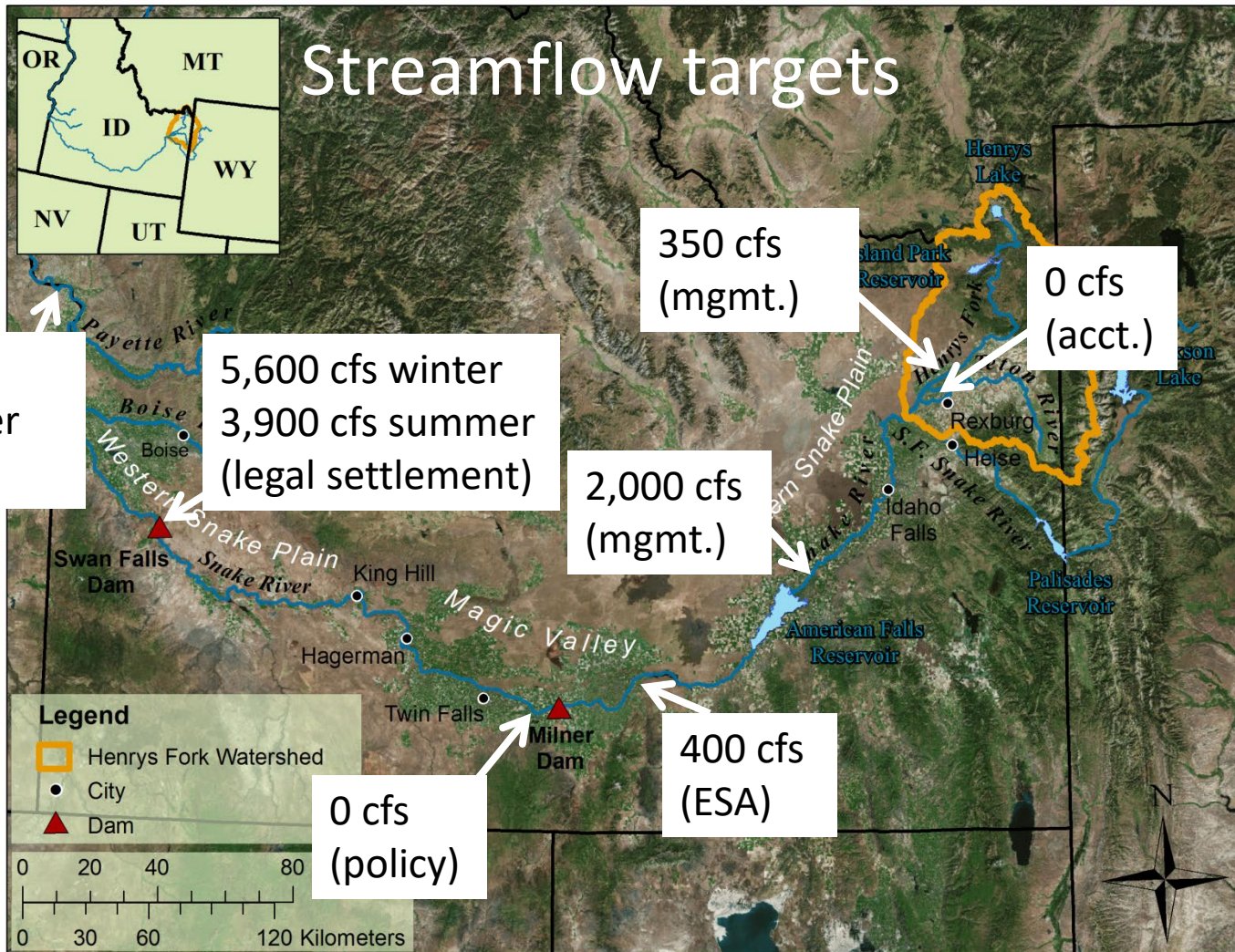
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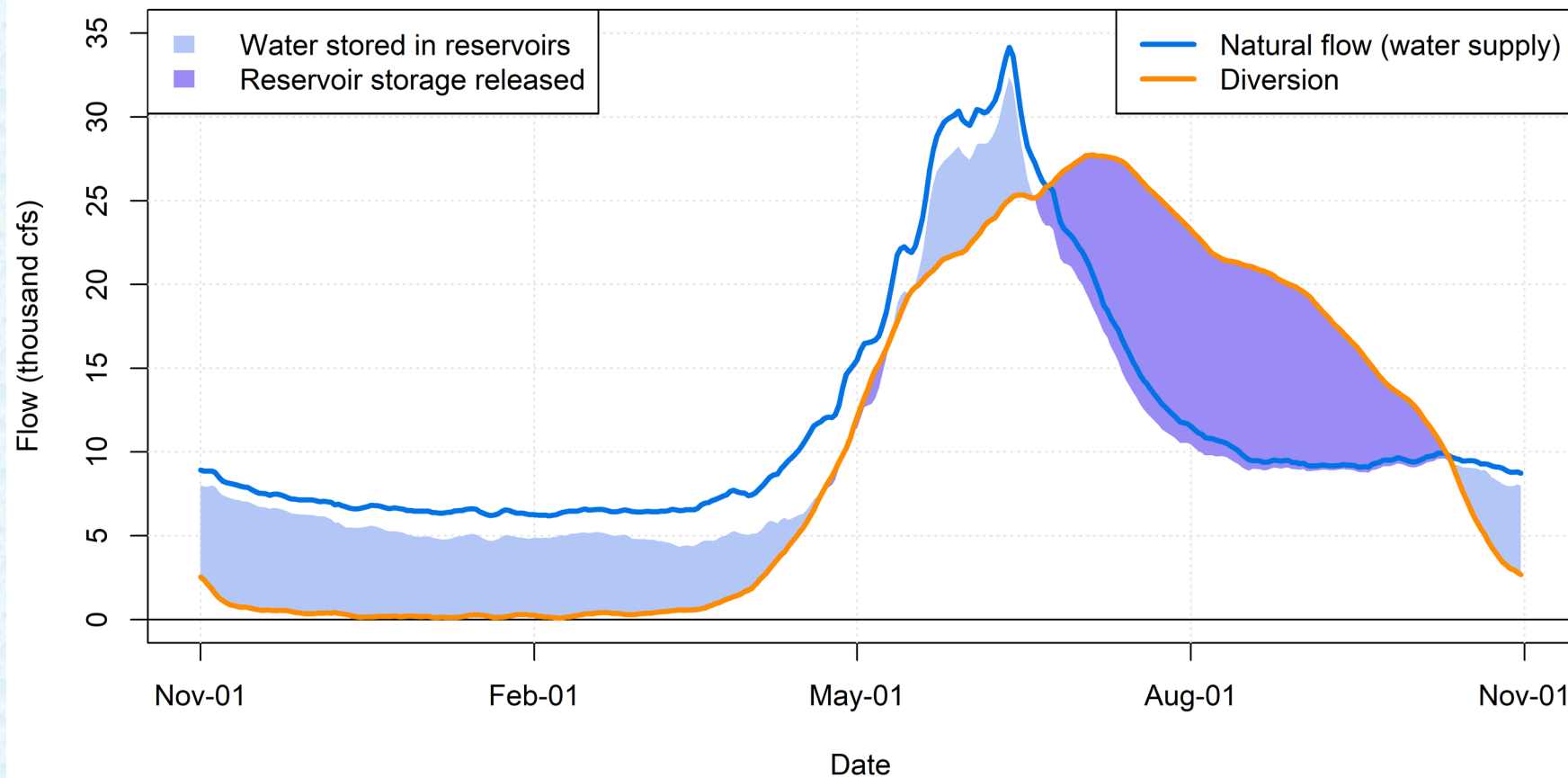
Priority dates of largest storage rights

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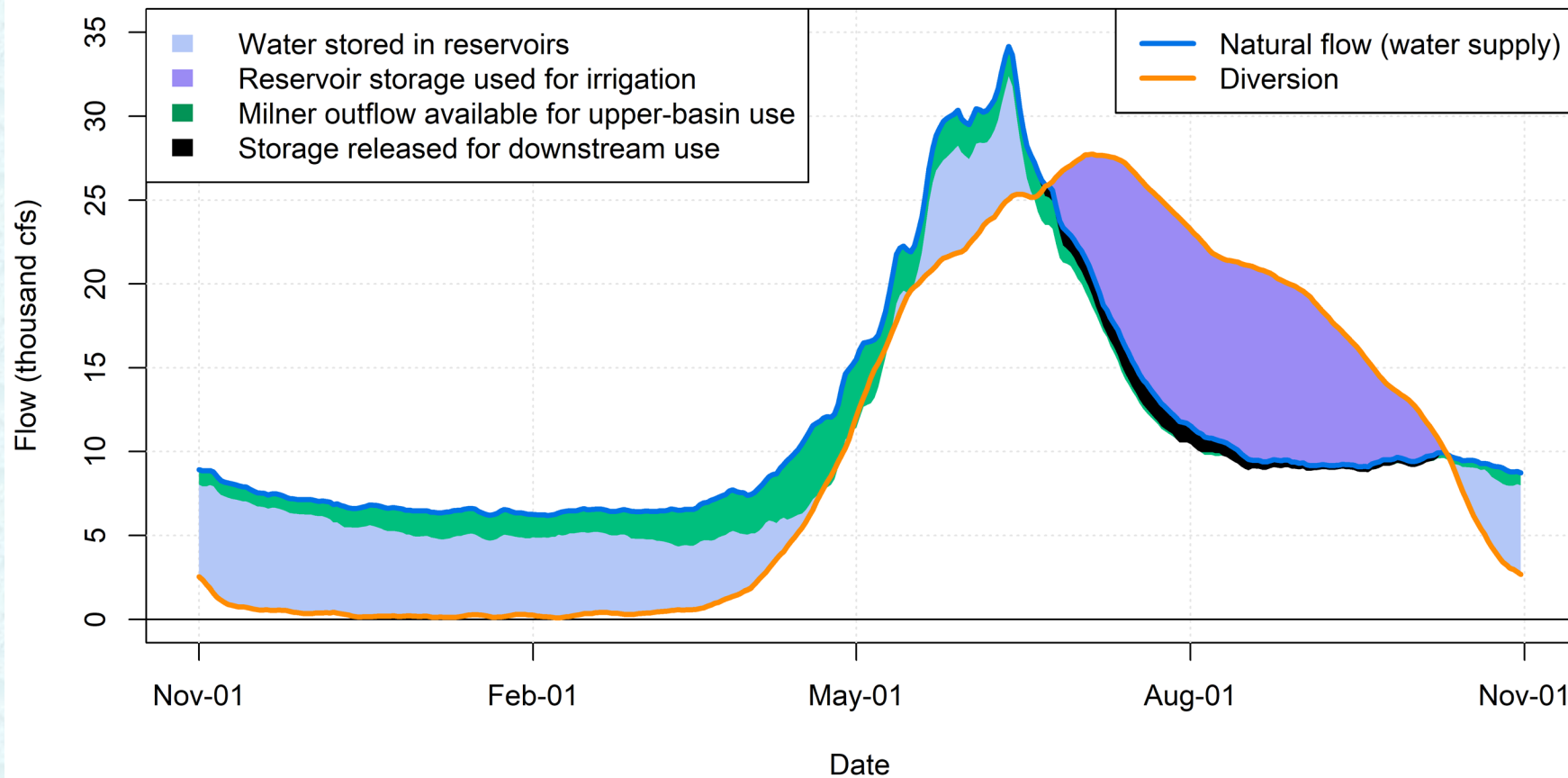
Streamflow targets



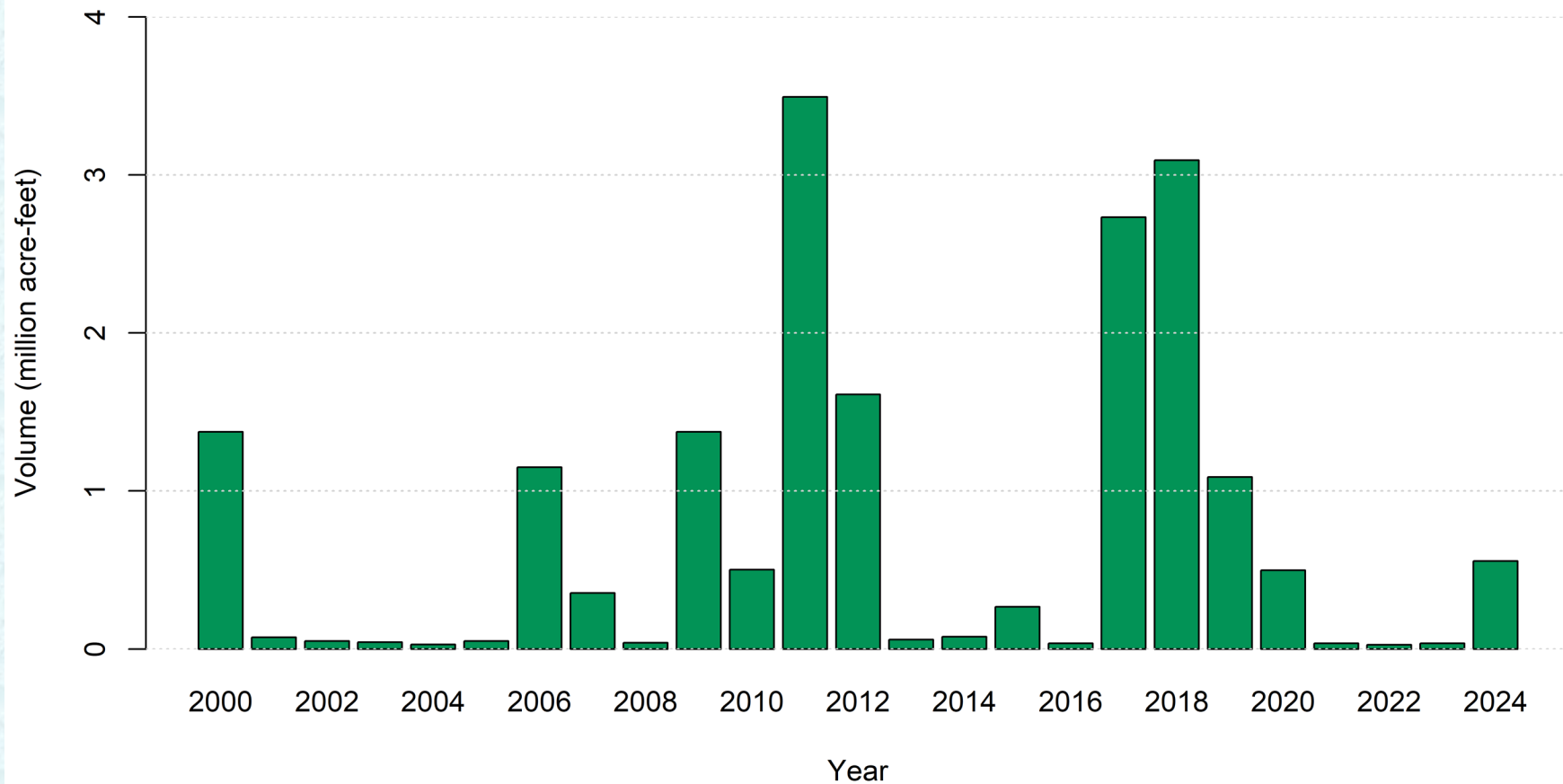
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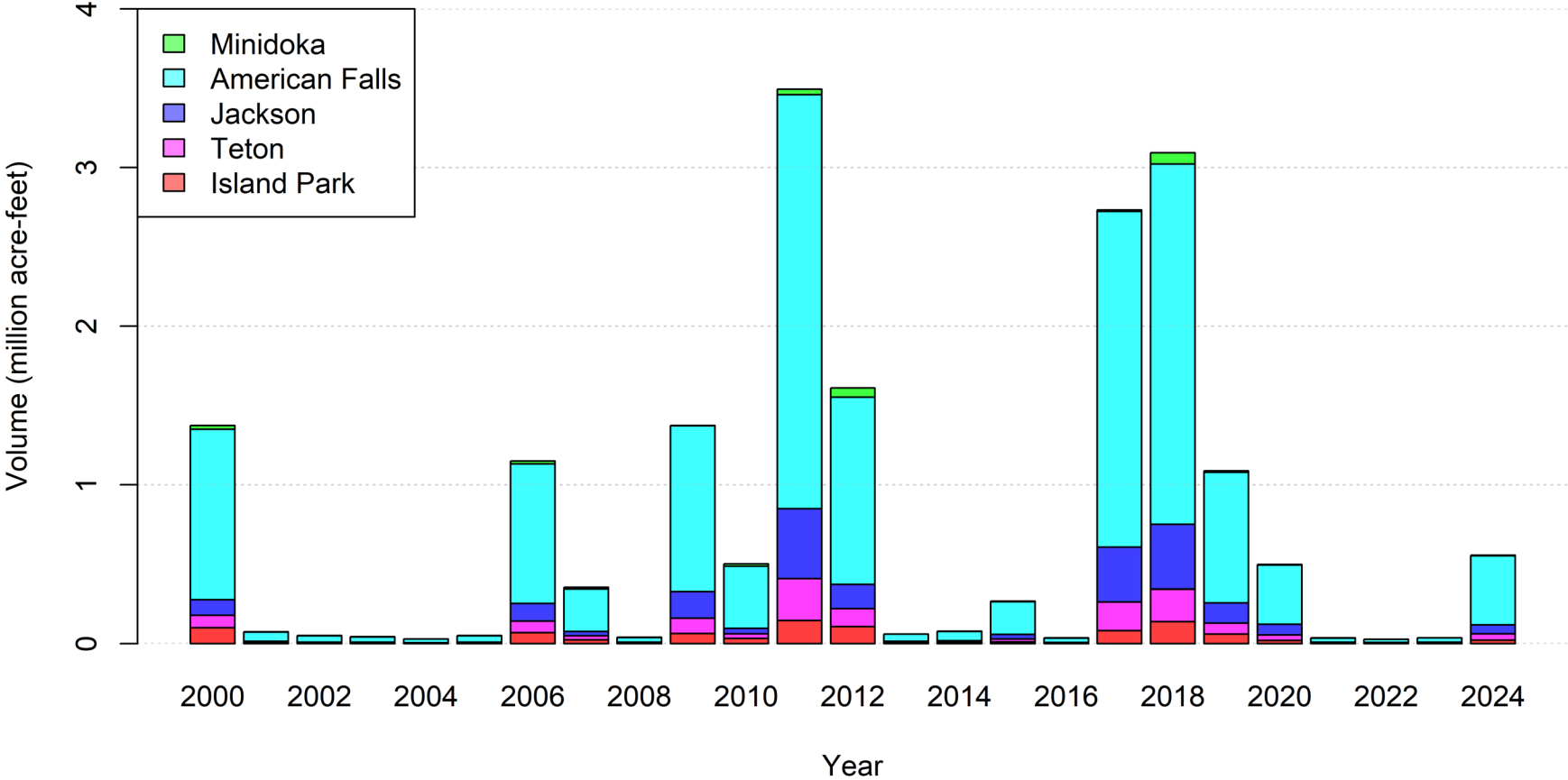
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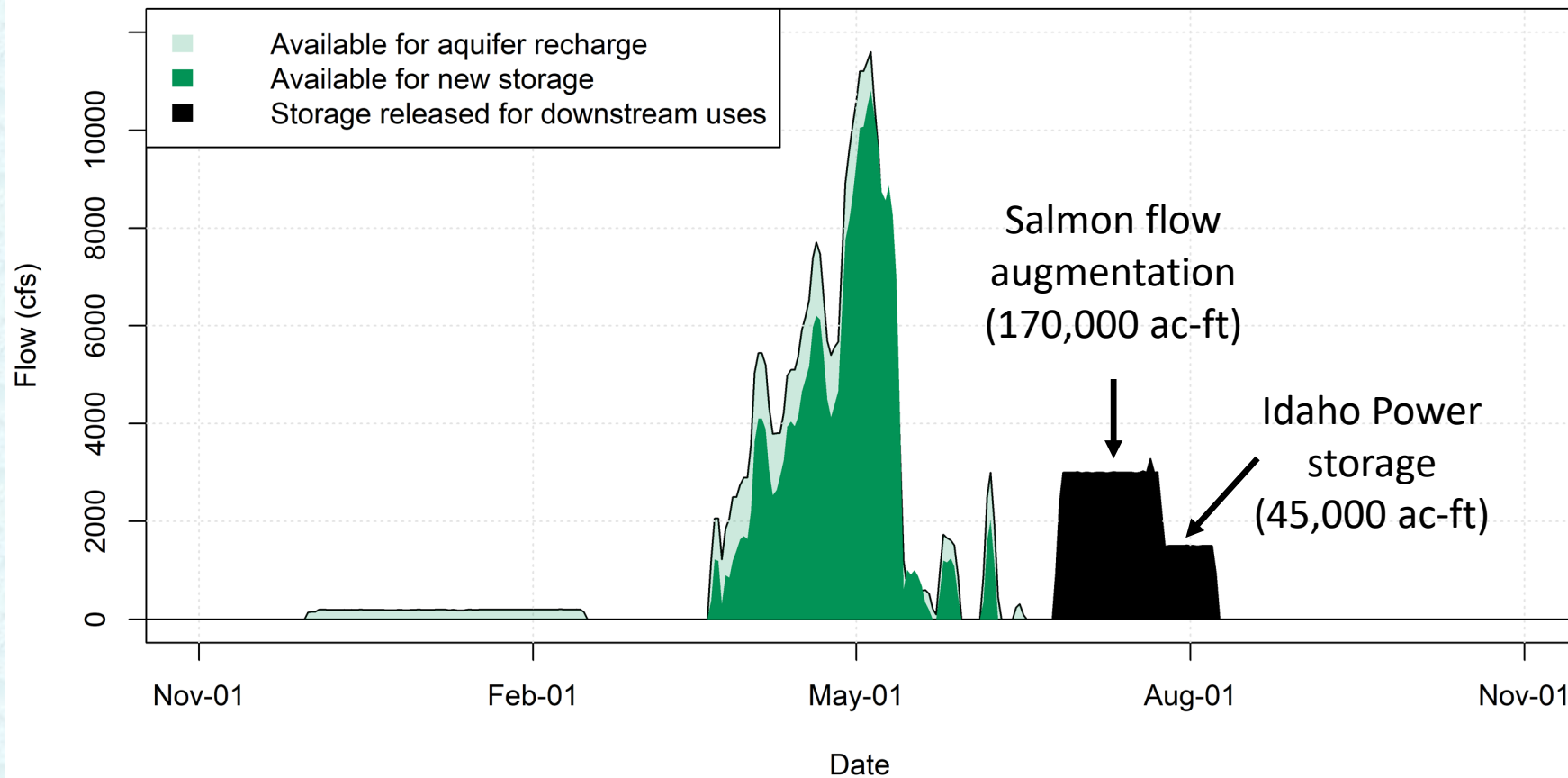
Milner Outflow Available for New Storage



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Flow at Milner Dam, Irrigation Year 2024



Considerations for New Storage

1. Snowpack is our water supply
2. Water rights consistent with 2022 moratorium
3. “Store high in system” vs. “capture more water more often”
4. Obligations and stakeholders downstream of Milner Dam

Thank you!

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