



National Park Service Grand Teton National Park Water Resources 101

Yvette Converse

Science and Resource Management Division Chief

Grand Teton National Park

for

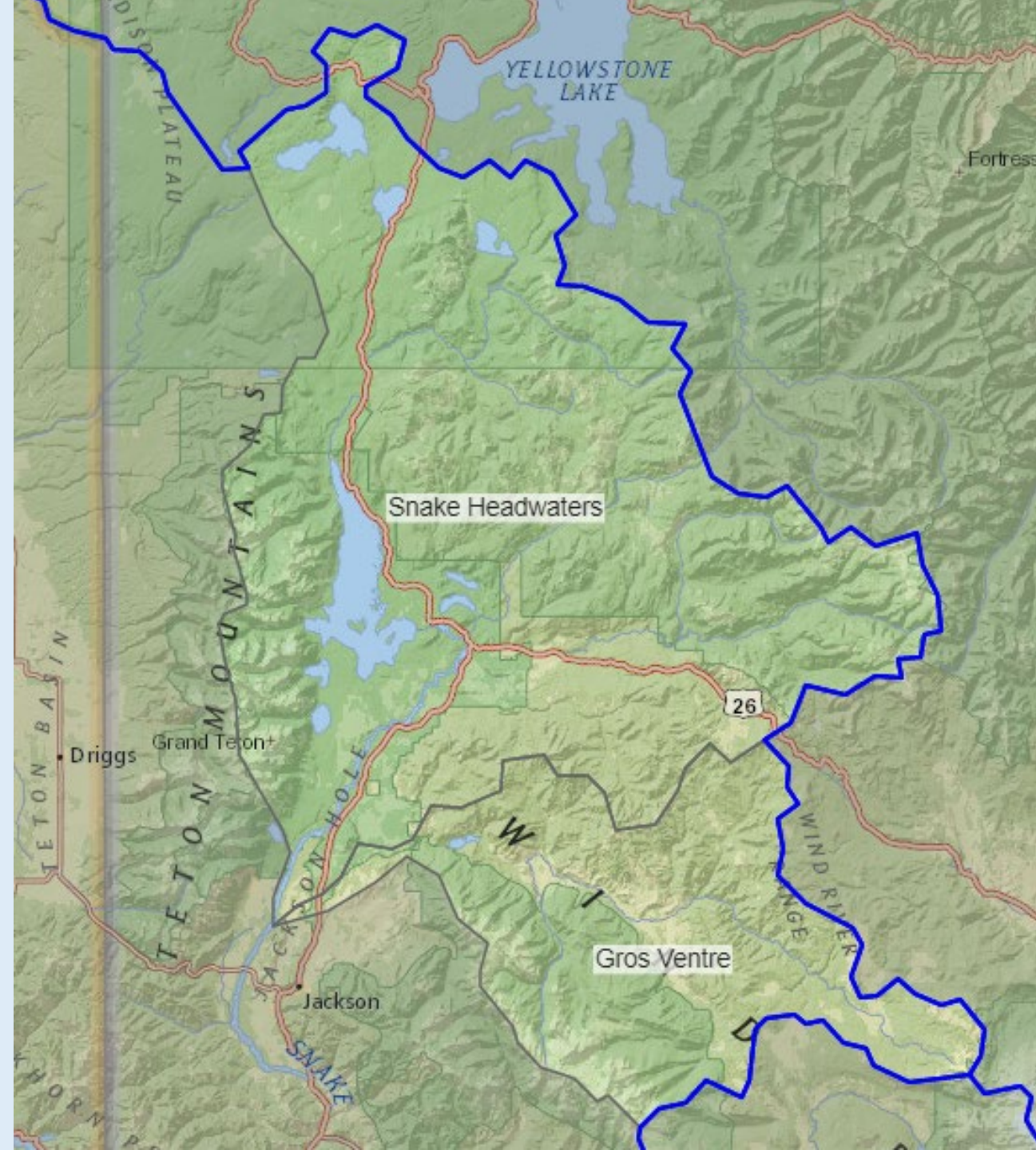
Bureau of Reclamation Public Meeting

May 2024

Watersheds of Grand Teton:

Snake River Headwaters & Gros Ventre

- 2,335 square miles
- 30% regulated, 70% unregulated



Mission of the NPS

*The National Park Service preserves **unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.***



NPS History, Authorities and Guiding Regulations

1916 National Park Service Organic Act, 16 U.S.C. 1.

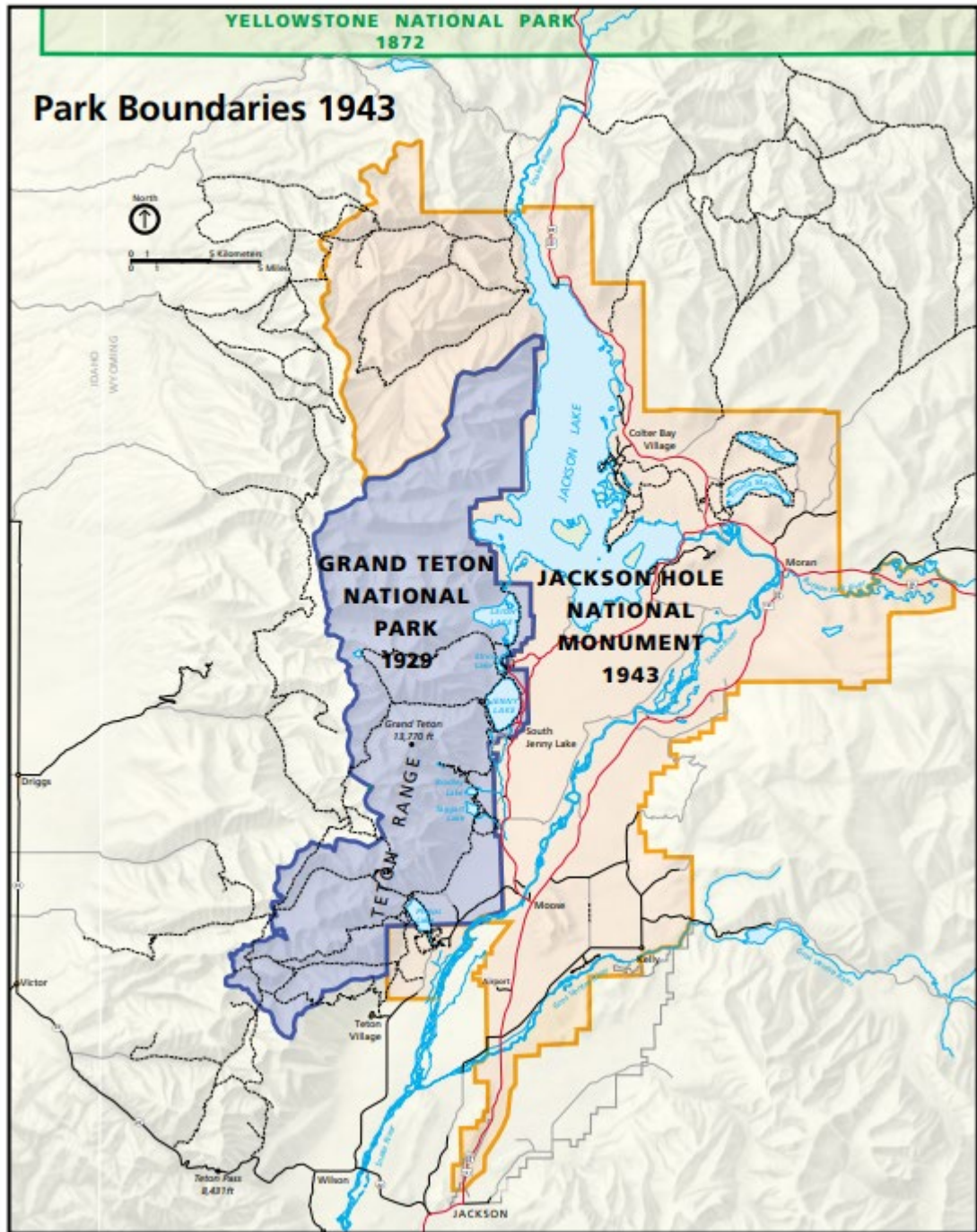
*“...to promote and regulate the use of the...national parks...which purpose is to **conserve the scenery and the natural and historic objects and the wildlife** therein and to provide for the enjoyment of the same in such manner and by such means as will **leave them unimpaired** for the enjoyment of future generations.”*



History of Grand Teton

- Pre 1850 - Indigenous people seasonal and year-round lands – hunting, gathering, living
- 1872 – Yellowstone National Park
- 1890 – Wyoming becomes 44th state
- 1897-1920s – first concepts for a park to include Tetons
 - 1917-19 - Albright and Mather propose adding the Tetons to Yellowstone
 - Proposed by Wyoming Congressman Mondell and passed house
 - Failed due to Senate (ID) concerns re sheep grazing and other
- 1927 – Snake River Land Company began buying private lands – 35K ac
- 1929 – Grand Teton National Park – 96K ac of mountains and 6 glacial lakes only
- 1943 – Jackson Hole National Monument – 221K ac
 - 35K ac donated land, USFS land, Jackson Lake
- 1950 – Combined 1929 and 1943 into current 310K ac Grand Teton National Park
- 1972 - John D. Rockefeller, Jr. Memorial Parkway – 24K ac





Historic Fire Records, GRTE-00552, Photographer LM Moe

'Grand Compromise' of 1950

- 1) Grazing
- 2) Teton County tax reimbursement
- 3) Elk reduction (hunt)
- 4) No future presidentially declared national monument in Wyoming
- 5) Access to forest lands and inholding (private) properties

A Park of many uses and complex management:

Dam, irrigation, airport, motorized watercraft, dude ranches, concessionaires, wildlife, alpinism, winter sports, inholdings



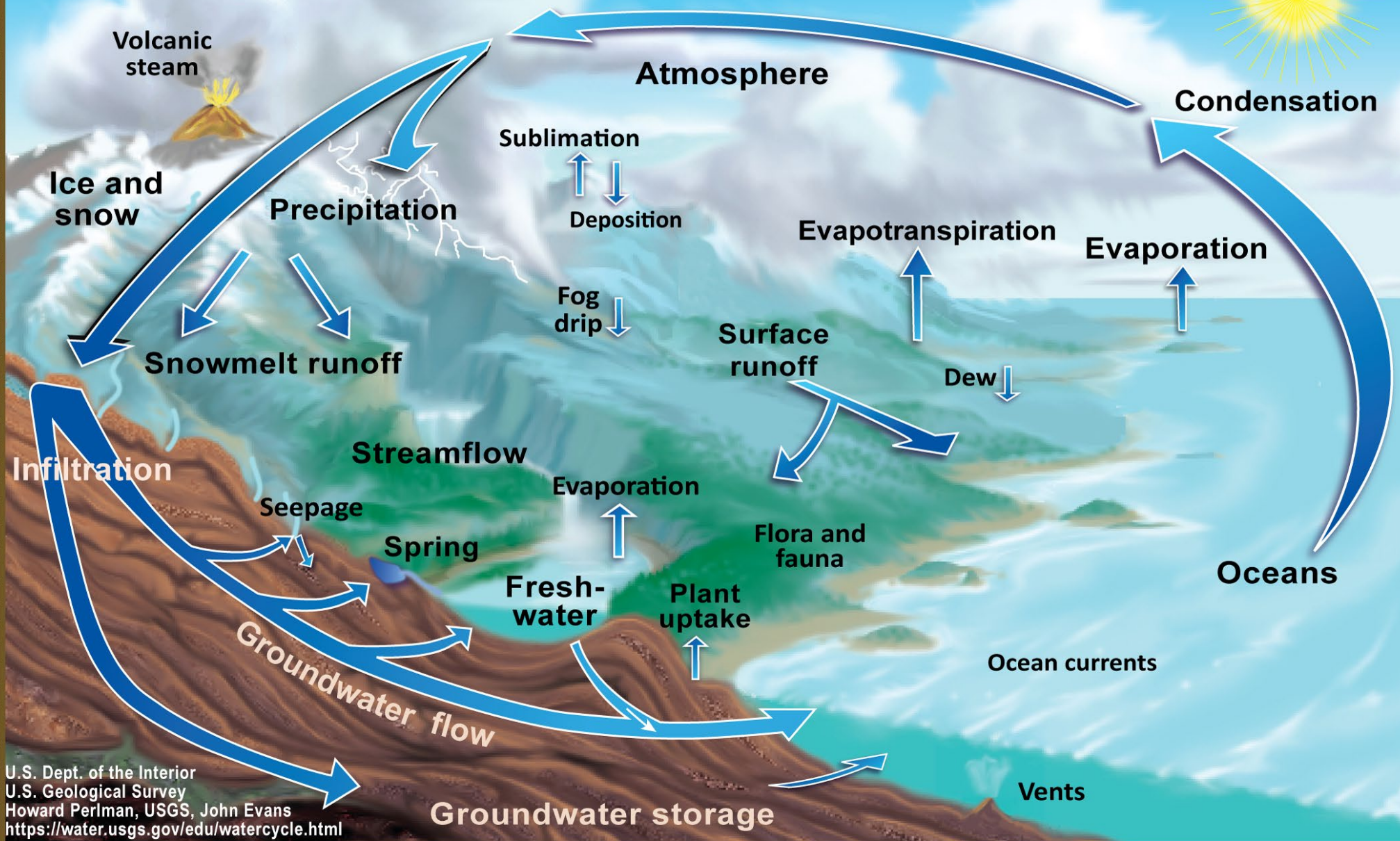
Grand Teton NP governing legislation

- 1916 – NPS established: PL 64-235 - the Organic Act
- 1950 – Grand Teton National Park: PL 81-787
- 1972 - John D. Rockefeller, Jr. Memorial Parkway: PL 92-404
- 1997 – Open Space Study Act: PL 105–81 – continued grazing
- 2007 – Grand Teton National Park Extension Action: PL 110–47
- 2009 – OPLMA Craig Thomas Snake River Headwaters Legacy Act of 2008
 - Wild and Scenic designations among 20+ reaches within NPS and USFS lands
- Other General Legislation
 - Lacey Act, MBTA, ADA, NEPA, FOIA, CWA, ESA, Wilderness Act, Wild and Scenic, Antiquities Act, NHPA, ARPA, NAGPRA, and many others

Resources in Grand Teton

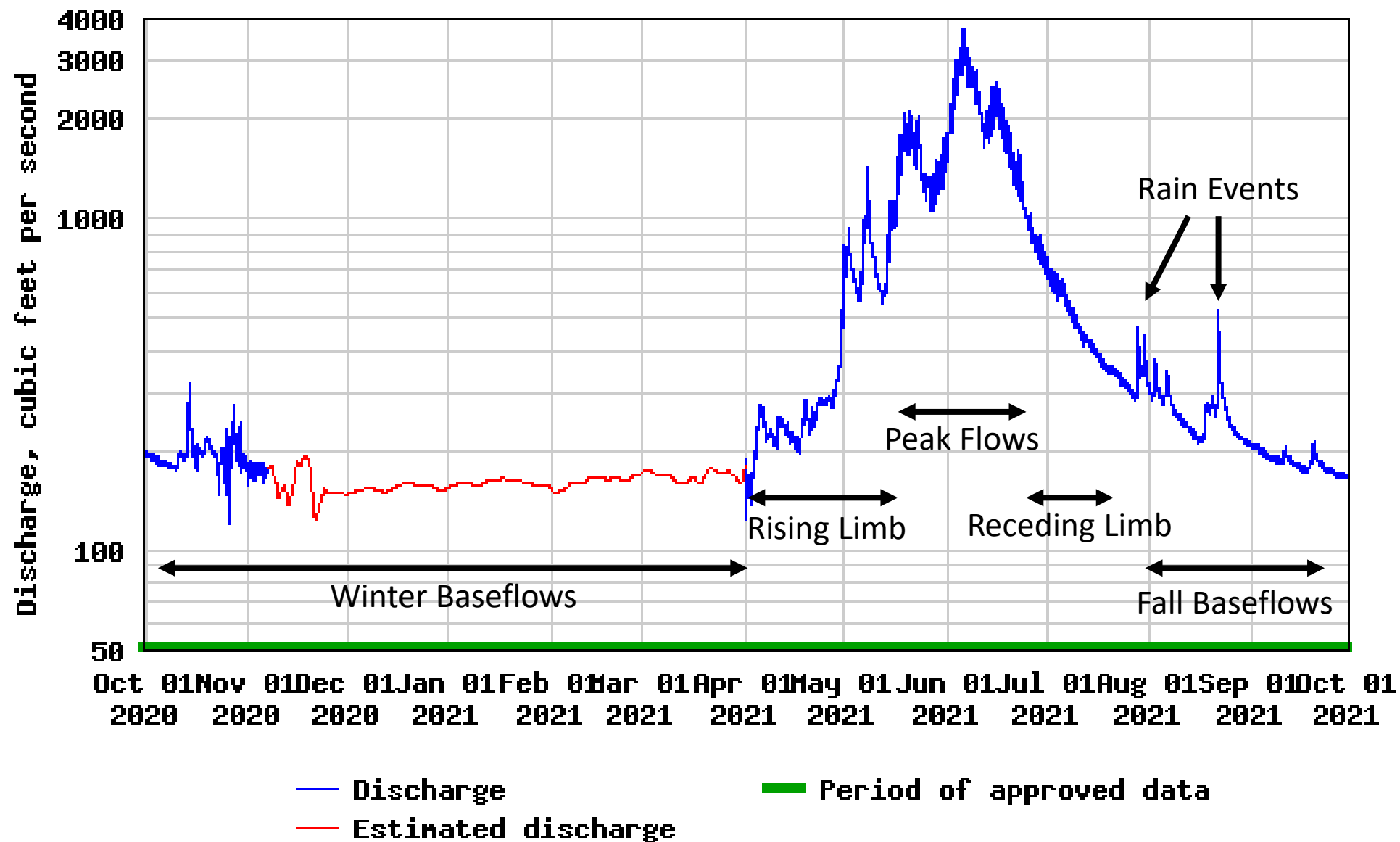


The Water Cycle



USGS 13011900 BUFFALO FORK AB LAVA CREEK NR MORAN WY

Snowmelt Hydrograph



2021 Water Year - Snake River below Jackson Lake Dam - Actual vs Estimated Unregulated Flow

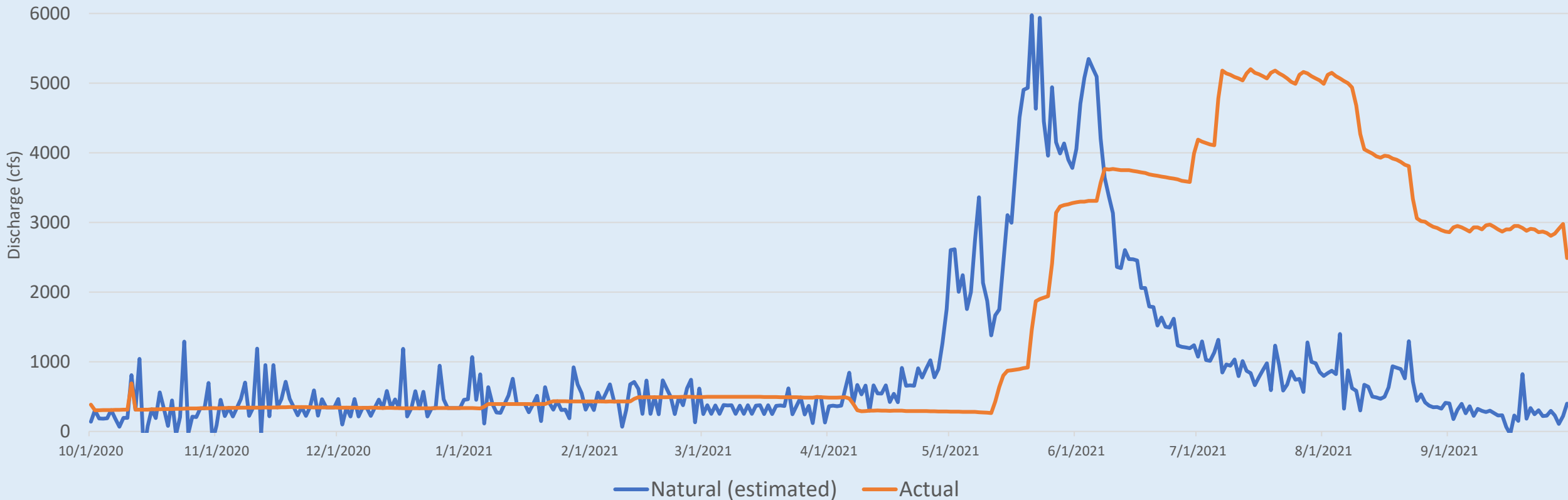
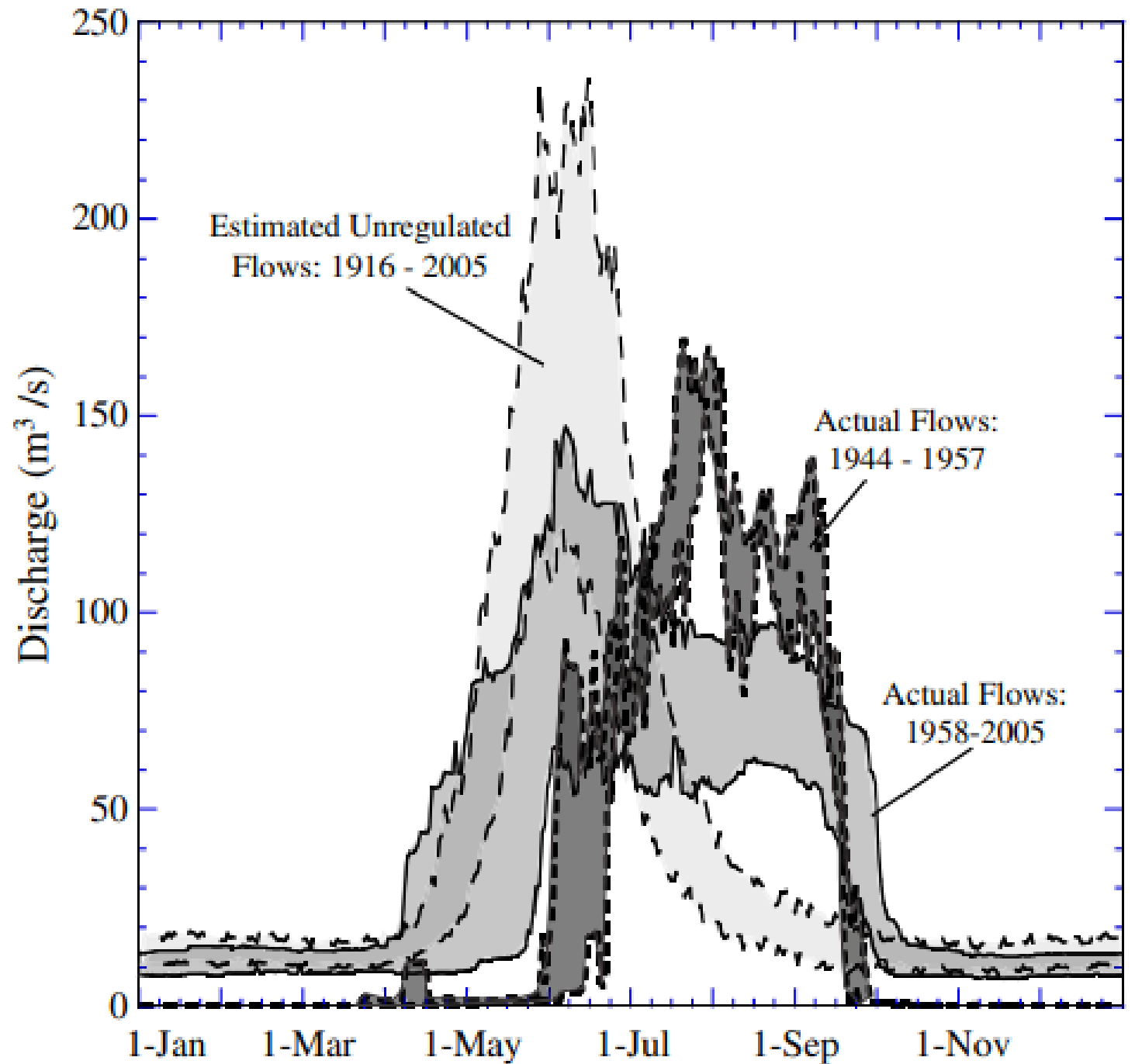
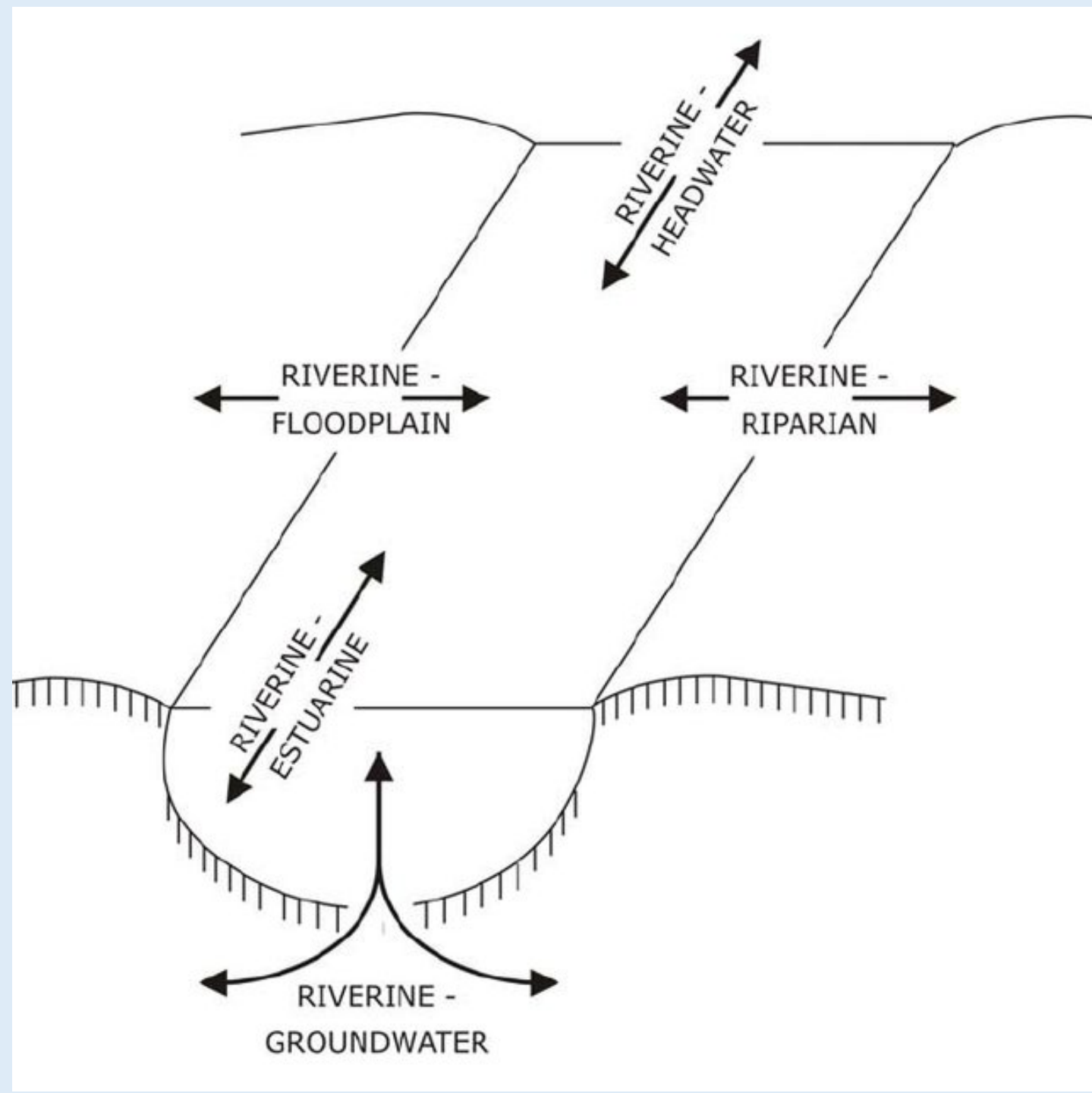


Fig. 3. Graph showing interquartile range of flows for the Snake River at Jackson Lake dam for three periods: 1944–1957 is indicated by dark gray shading and bold, dashed lines; 1958–2005 is indicated by medium gray shading and thin, solid lines; and estimated unregulated flow between 1916 and 2005 is indicated by light gray shading and thin, dashed lines. Data for 1944–1957 and 1958–2005 are from USGS gage Snake River near Moran, WY (station number 13011000). Estimated unregulated data are from the U.S. Bureau of Reclamation (www.usbr.gov/pn/hydromet/arcread.html).

N.C. Nelson et al. / *Geomorphology* 200 (2013) 132–142



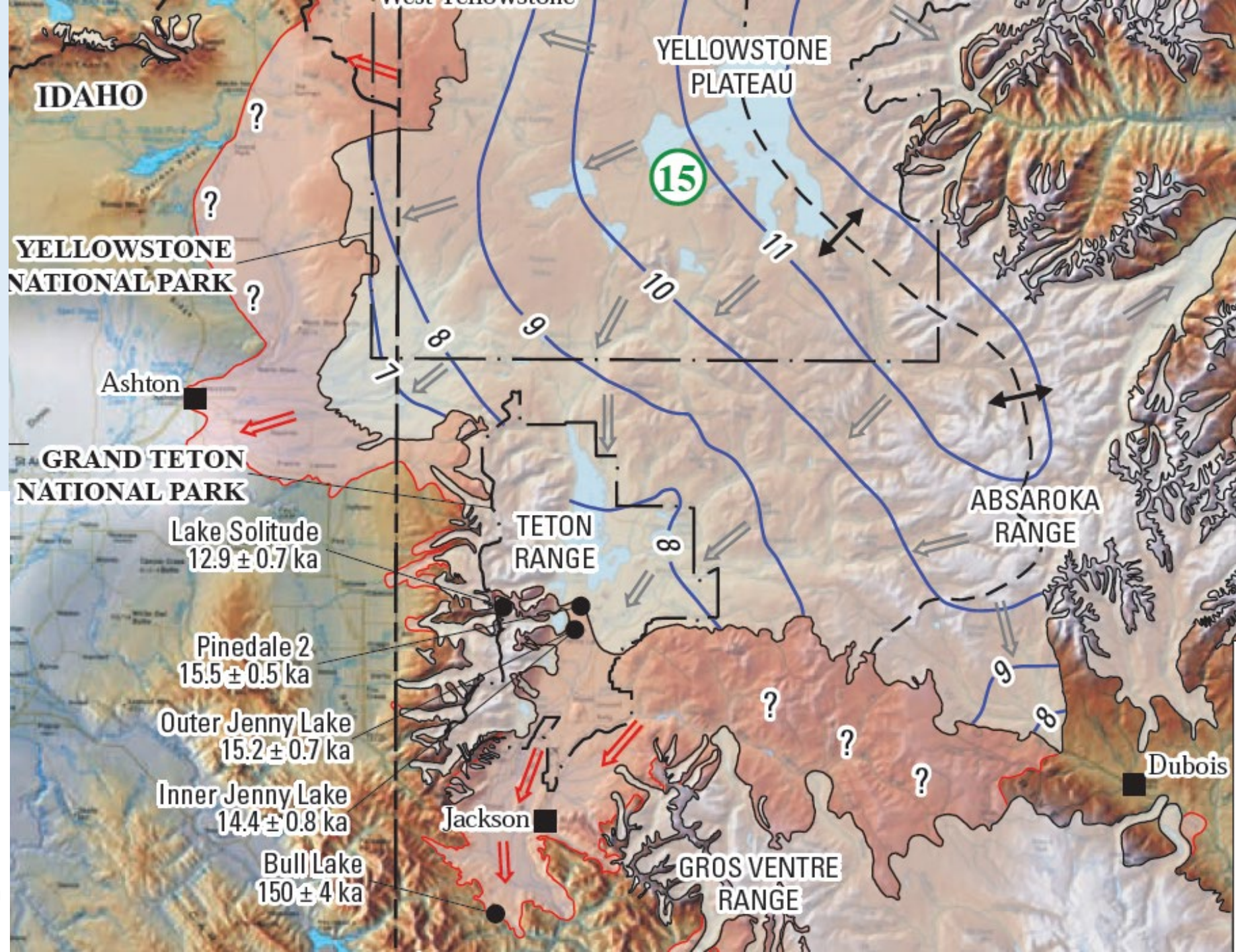
Lateral, hyporheic and downstream connectivity



Moraines, Glacially Carved Valleys



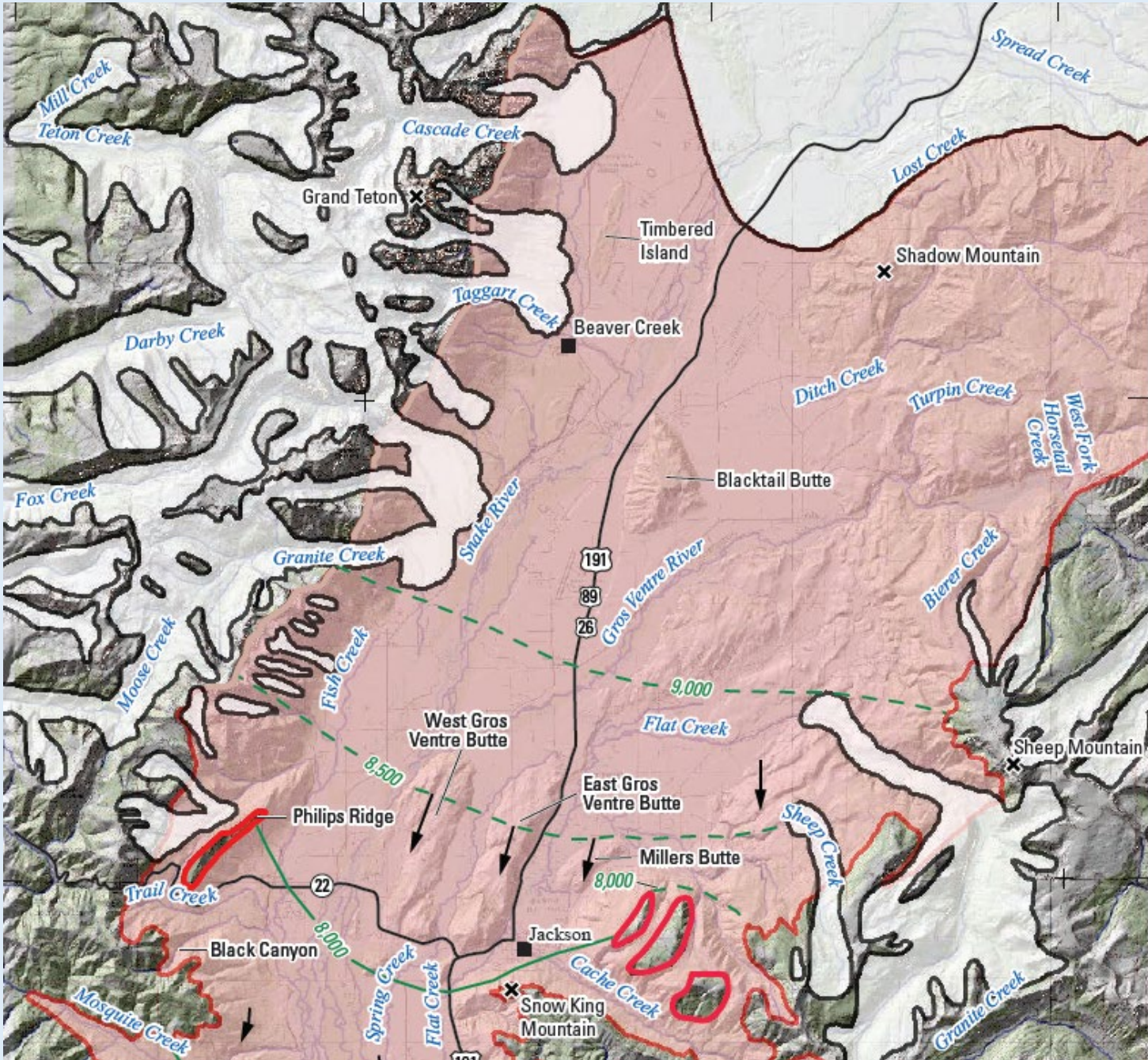
Yellowstone Icecap



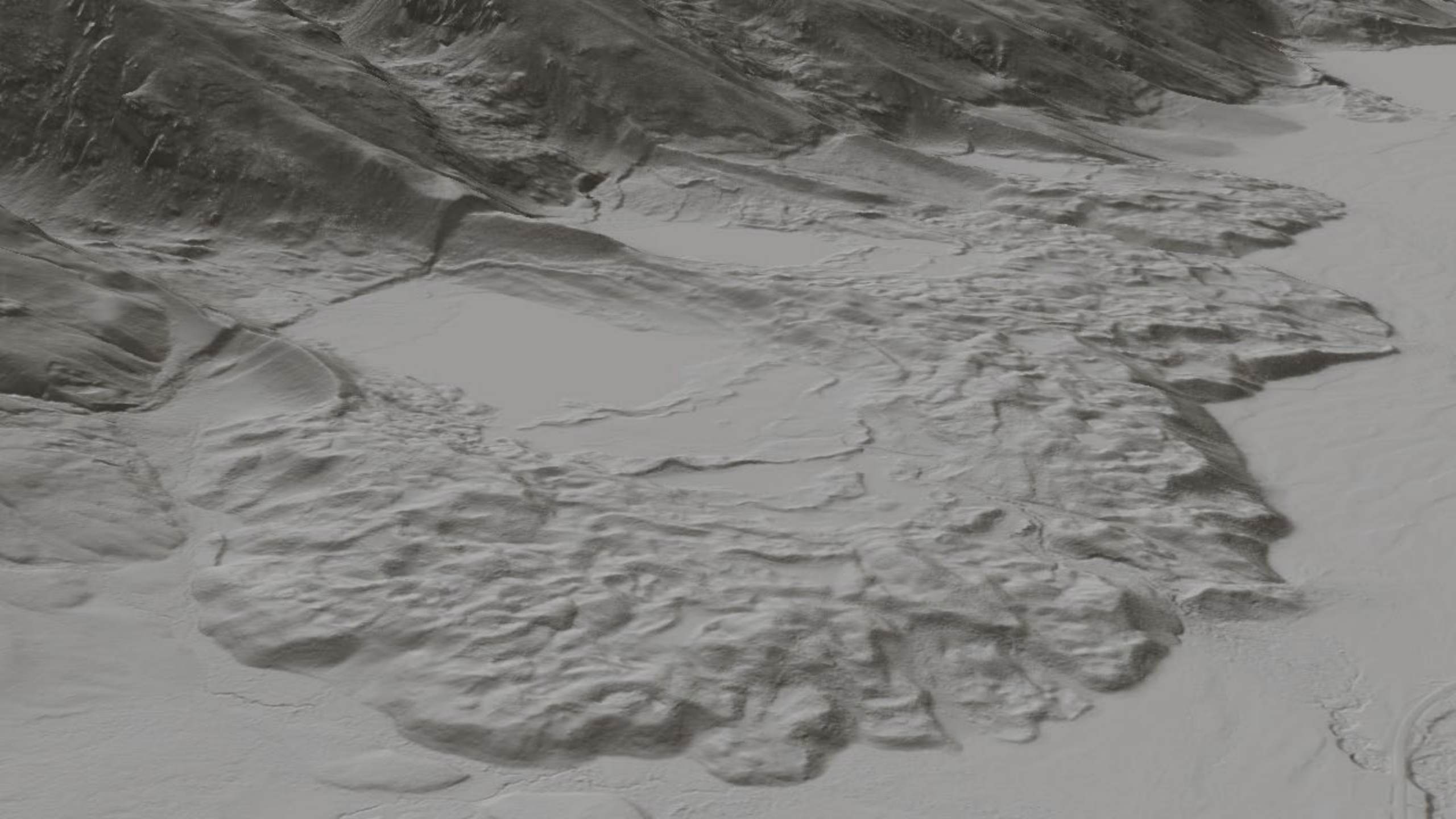
EXPLANATION

- Pinedale glaciation (late pleistocene)
- Bull Lake glaciation (penultimate)
- Pinedale glaciation limit
- Bull Lake glaciation limit
- Ice divide—Arrow shows direction of flow
- 8 Contour of Pinedale glacier in thousands of feet
- Pinedale glaciation direction of flow
- Bull Lake glaciation direction of flow
- Chico ● Moraine name and Cosmogenic age—Age in thousand years (ka)
- 17.1 ± 1.7 ka
- ? Extent of Bull Lake glaciation uncertain
- 15 Schematically depicts southwest migration of center of mass of icecap through time—Number is age in thousand years

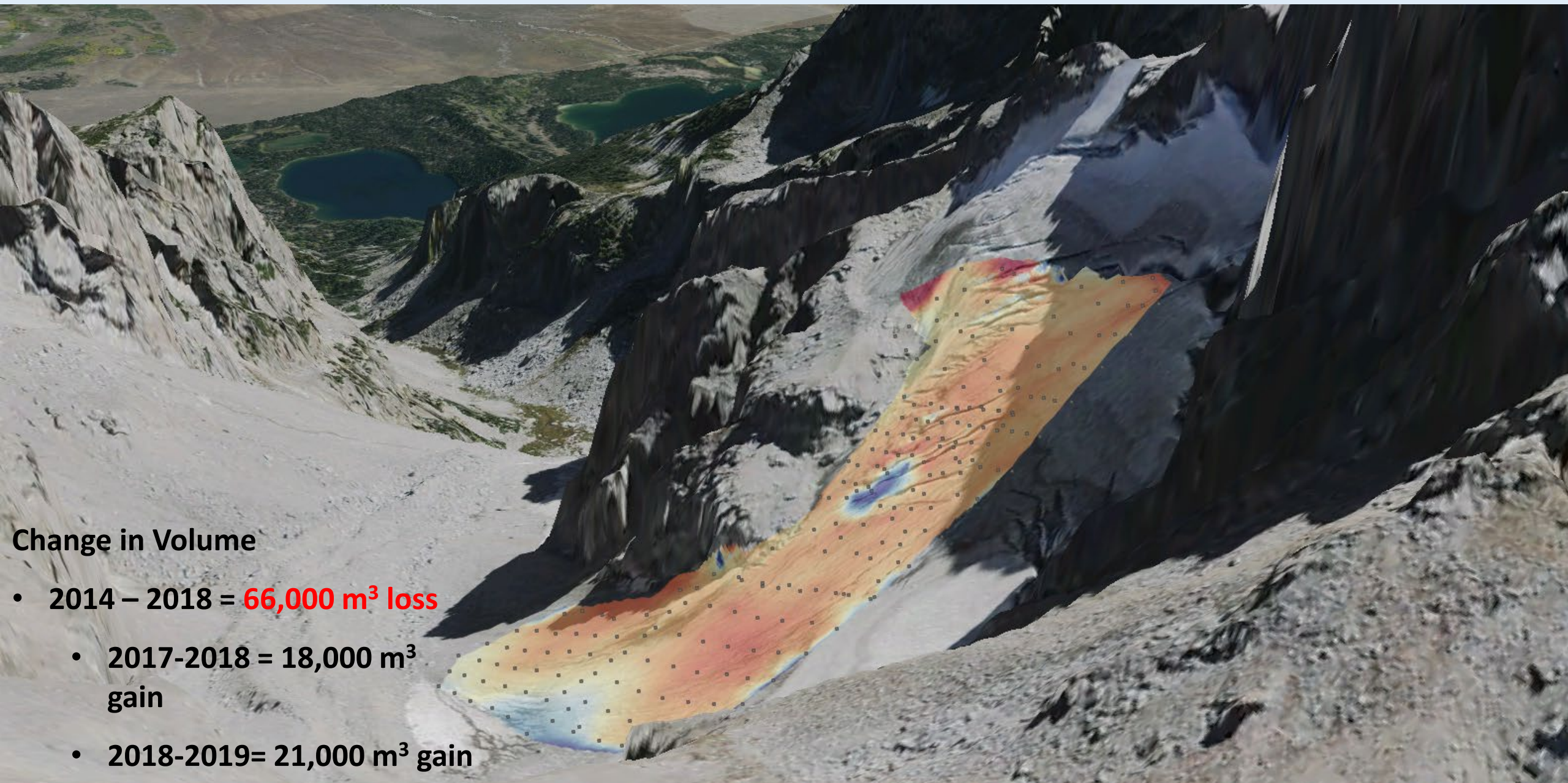
Jackson Hole Glaciation







MIDDLE TETON GLACIER – GEODETIC SURVEY

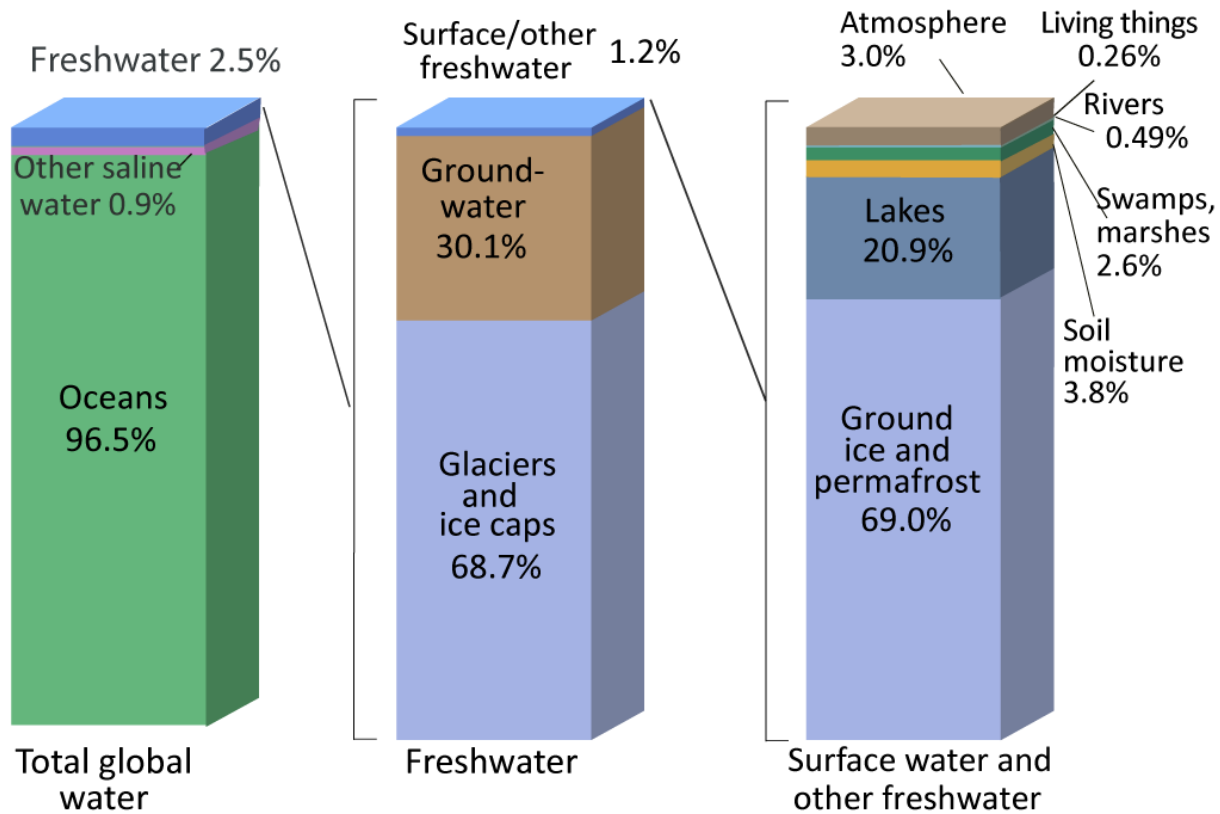


Change in Volume

- 2014 – 2018 = **66,000 m³ loss**
- 2017-2018 = 18,000 m³ gain
- 2018-2019= 21,000 m³ gain

TODAY'S GLACIERS

Where is Earth's Water?



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, *Water in Crisis: A Guide to the World's Fresh Water Resources*. (Numbers are rounded).



Wind Rivers

- Glaciers in Bull Lake Creek Watershed contributing 55.6% of streamflow (late summer)

Rocky Mountain National Park

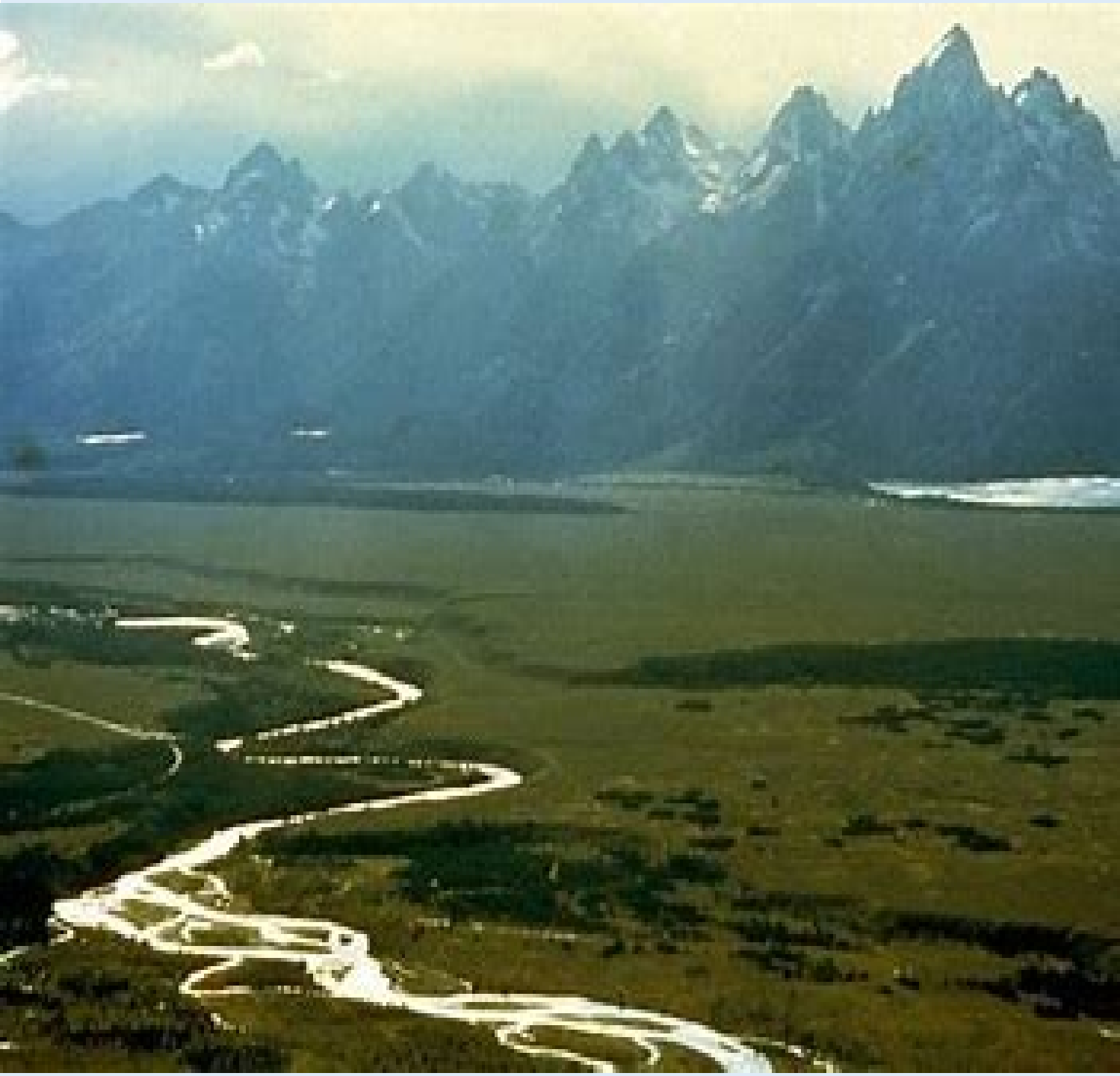
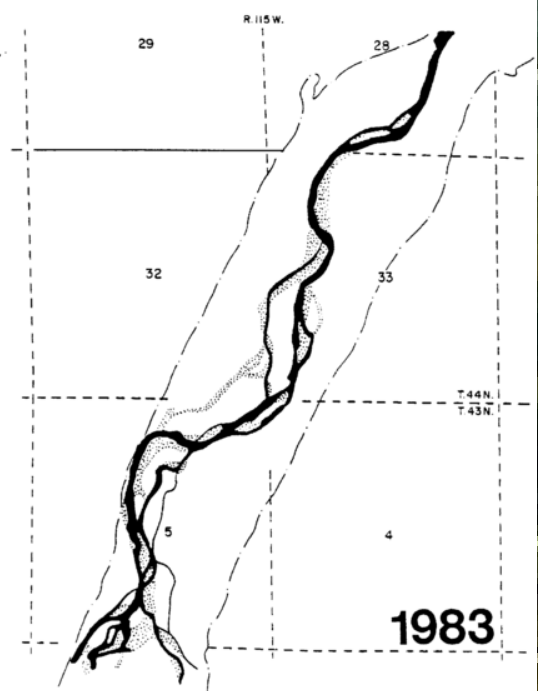
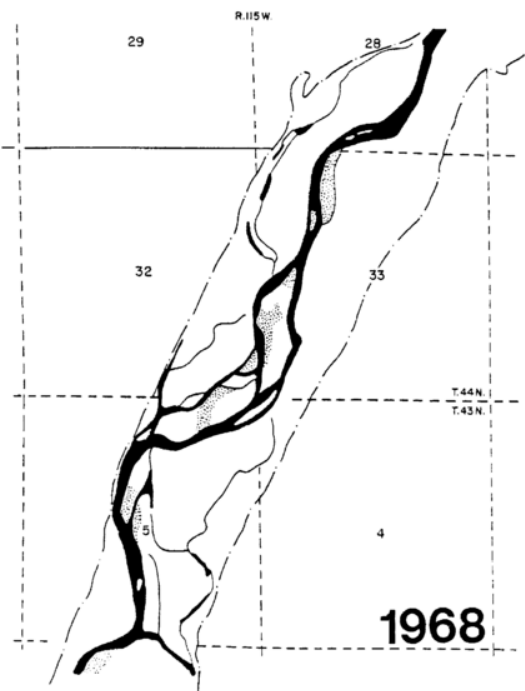
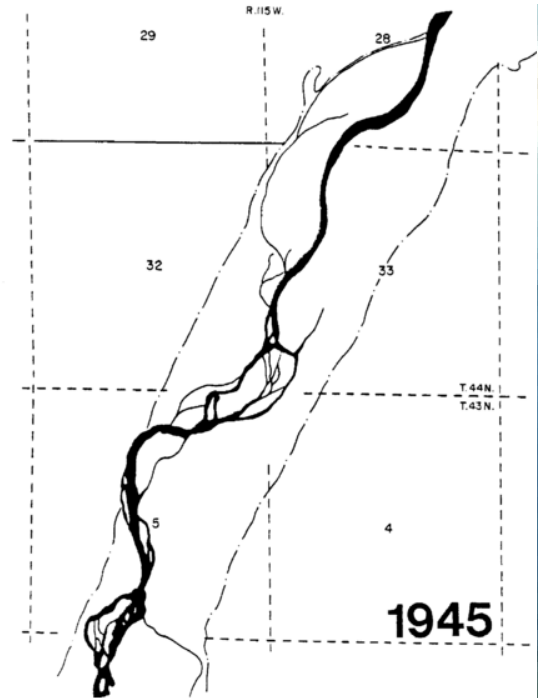
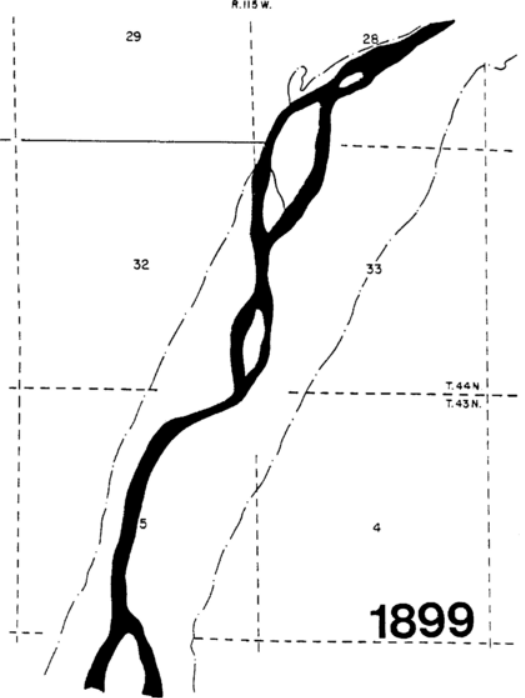
- Stream temps 2-3°C warmer in non-glaciated basins



River, Lake and Marina - Recreation

- Bureau of Reclamation forecasting
 - Jackson Lake to be at or near full this summer
 - Colter Bay
 - Boat Ramp (6753') operational this season
 - ~June-September
 - Signal (6737') and Leek's (6735')
 - boat ramps already operational based on current lake elevation (6741')







Main Channel



Side Channel

1975

Seasonal Side Channel



Main Channel

2018

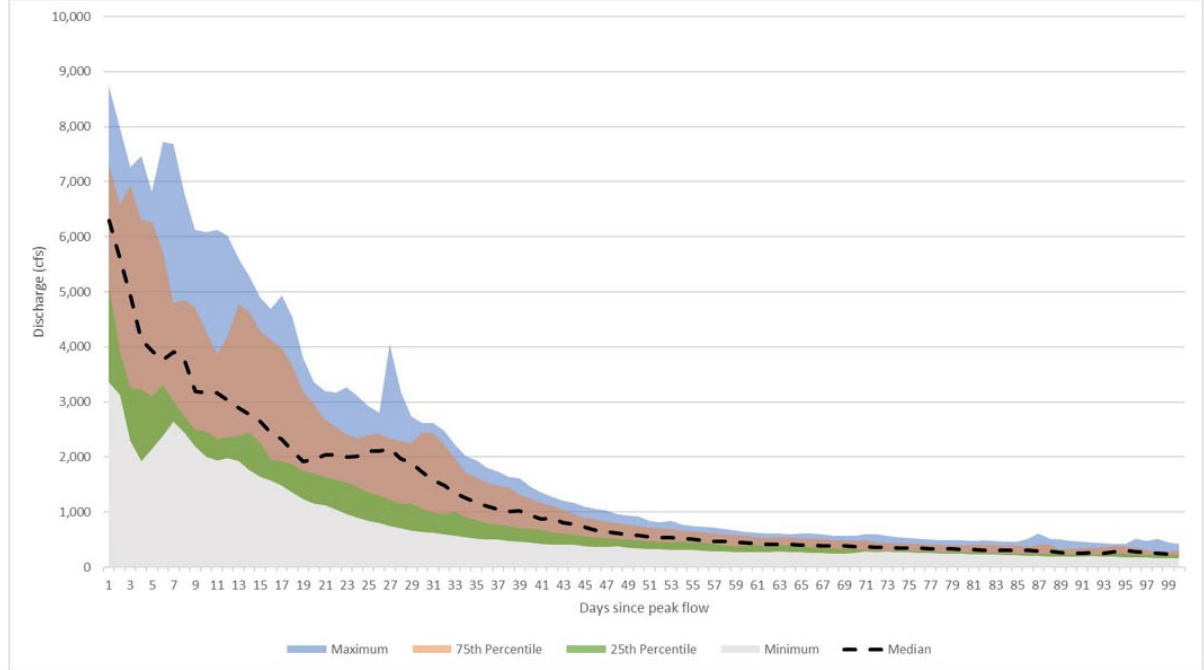


Figure 2. Snake River Above Jackson Lake Dam at Flagg Ranch WY Spring Snowmelt Recession

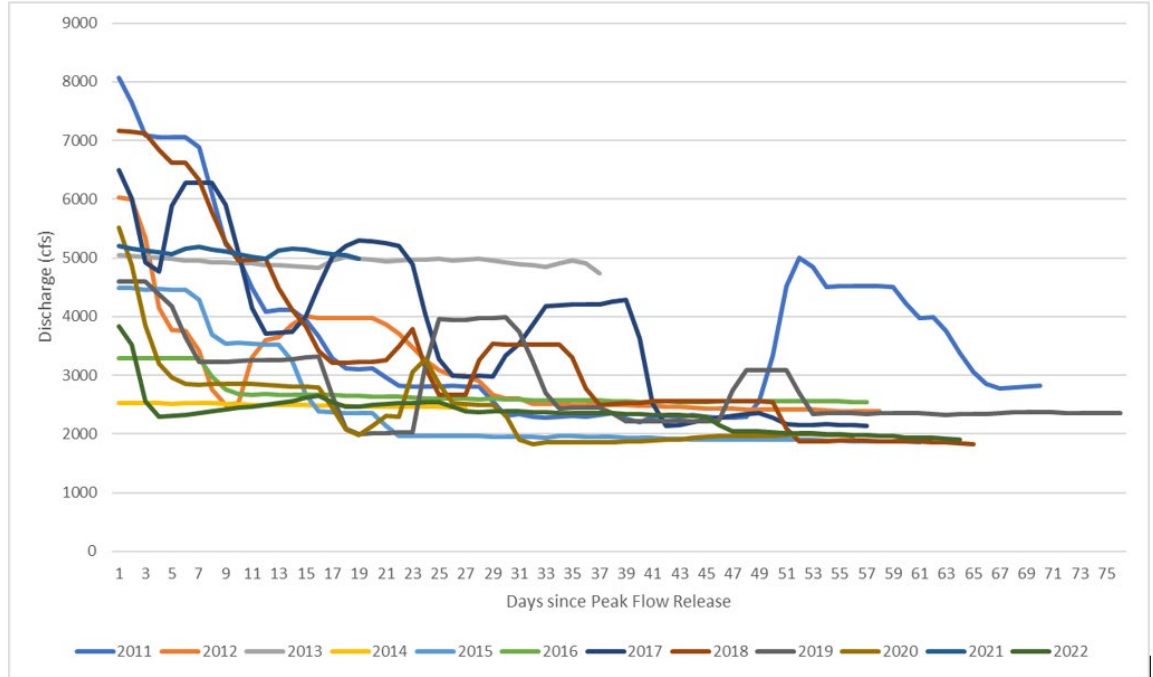
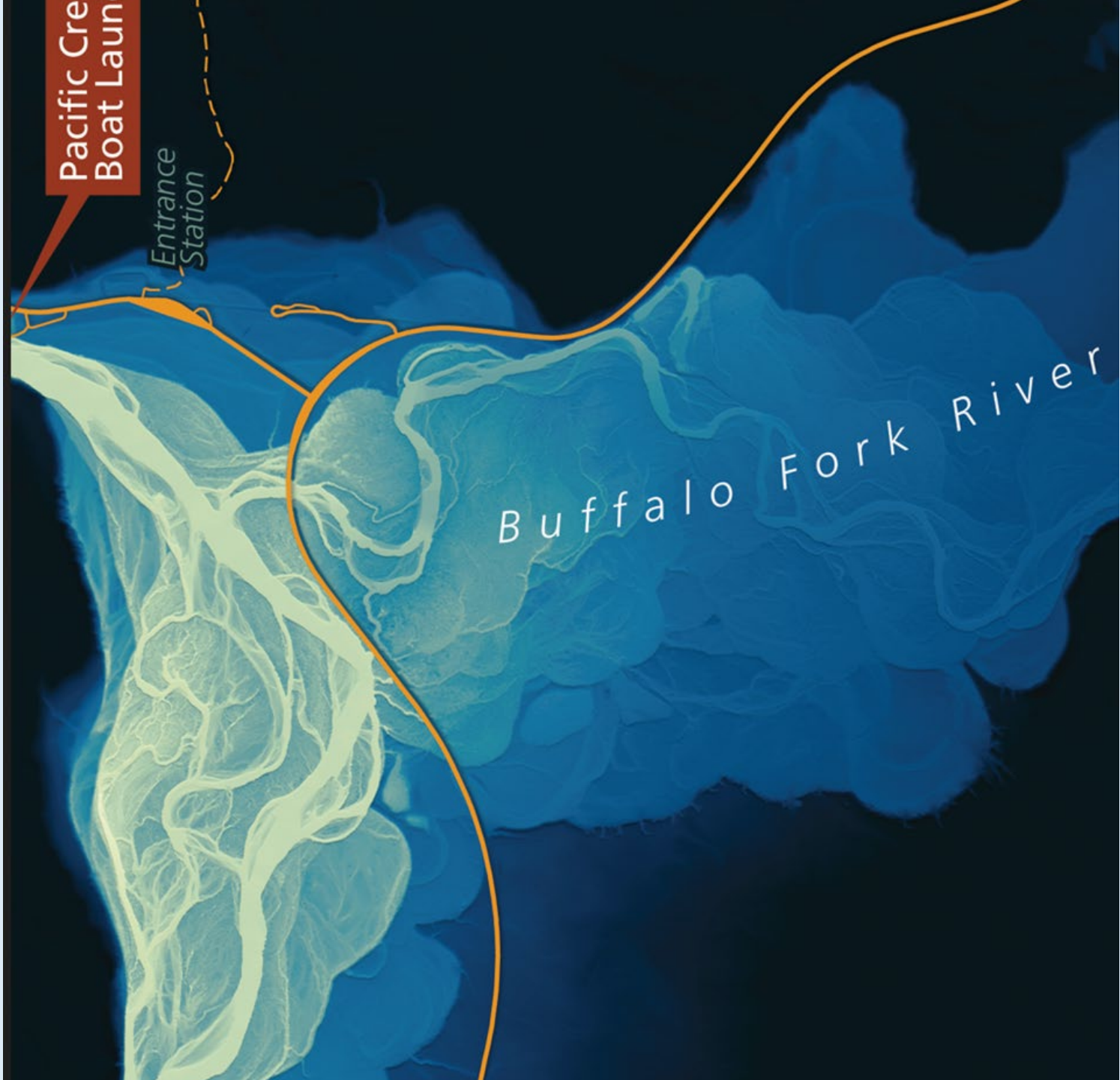


Figure 5. Regulated spring snowmelt releases at Jackson Lake Dam from 2011-2022



Figure 6. Repeat photo comparisons downstream of culvert, looking downstream on Snake River near Moran, WY (J. Gore, 2022).

(J. Gore, 2022).

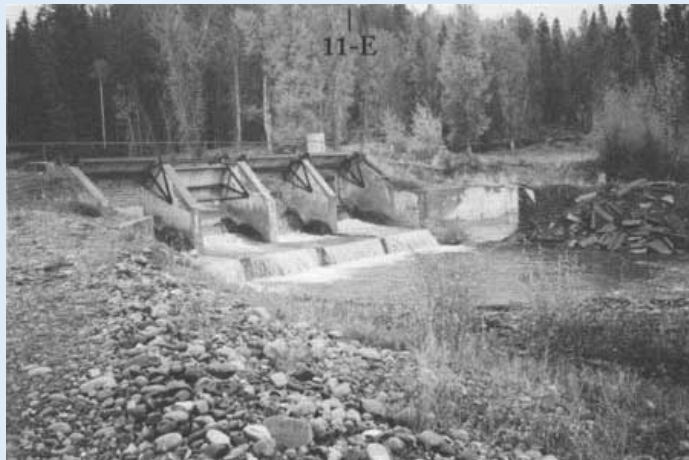


Pacific Cree
Boat Laun

Entrance
Station

Buffalo Fork River

Spread Creek Diversion: TU, NPS, USFS





Spinnaker Creek | Wyoming



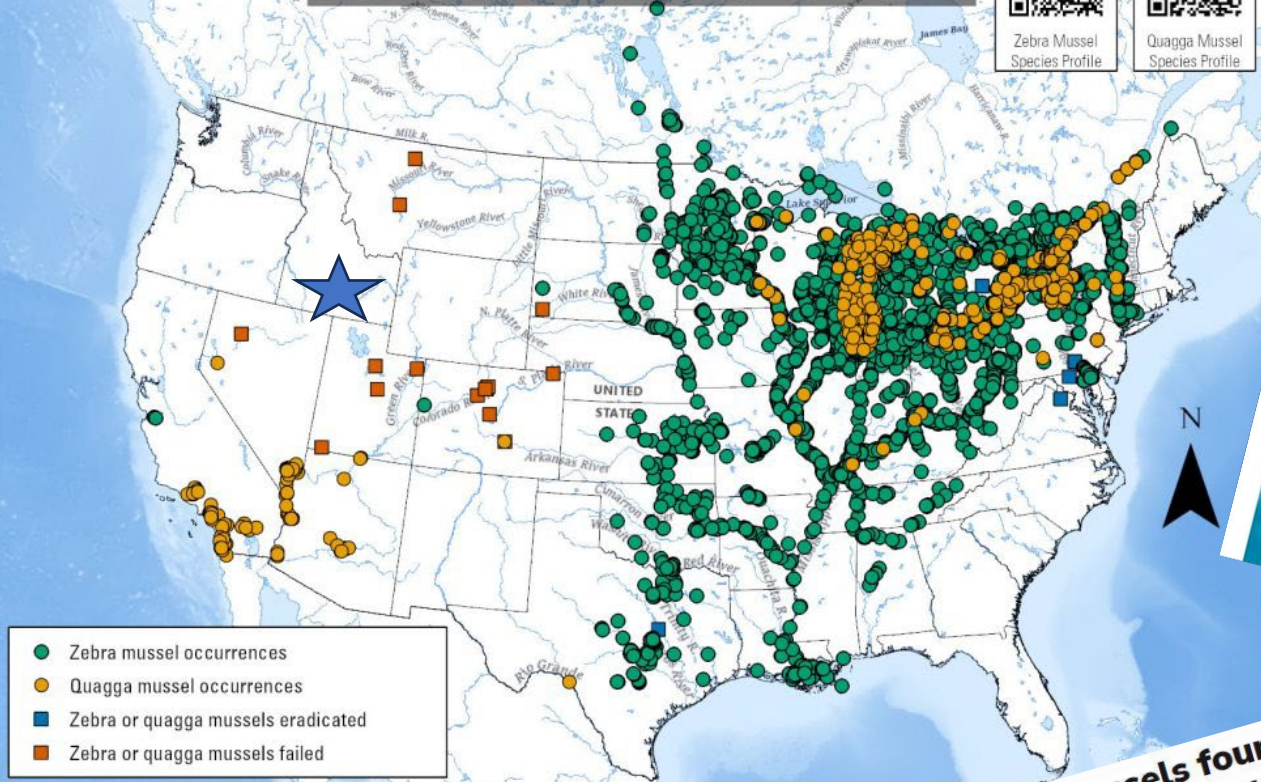
Zebra and Quagga Mussel Sightings Distribution
Dreissena polymorpha and *Dreissena bugensis*



Zebra Mussel Species Profile



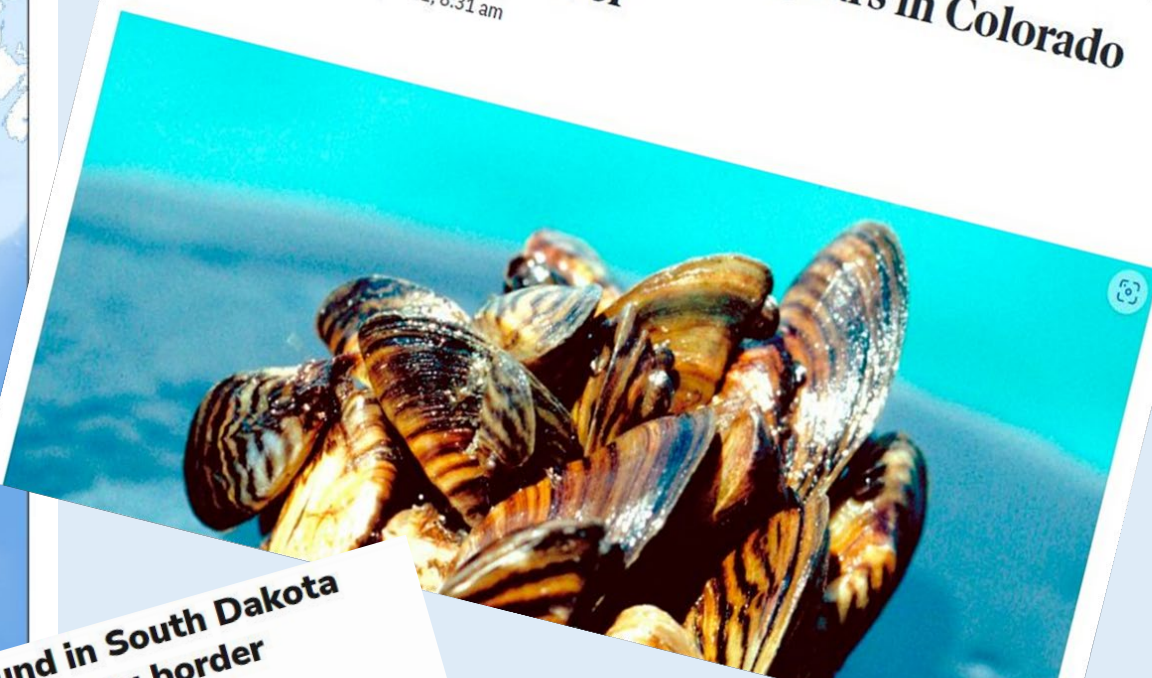
Quagga Mussel Species Profile



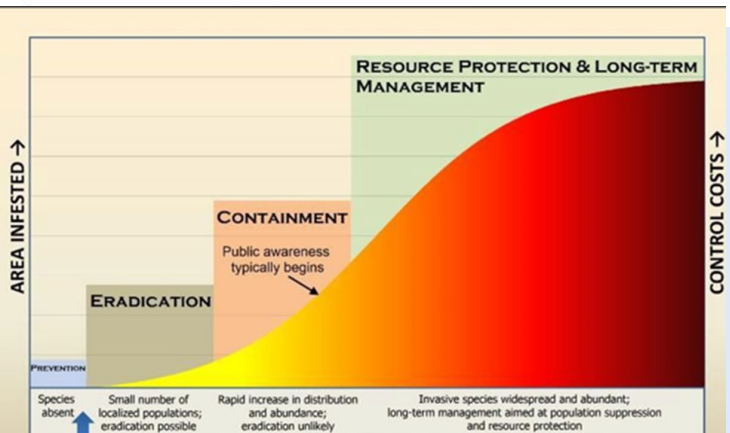
- Zebra mussel occurrences
- Quagga mussel occurrences
- Zebra or quagga mussels eradicated
- Zebra or quagga mussels failed

U.S. Geological Survey
Nonindigenous Aquatic Species Database (<https://nas.er.usgs.gov>)
Map produced on 2023-02-06

Highly invasive zebra mussel appears in Colorado
By Paolo Zialcita · Sep. 20, 2022, 8:31 am



Invasive zebra mussels found in South Dakota reservoir 27 miles from Wyoming border
By BRENDAN LACHANCE | July 21, 2022



WATERCRAFT INSPECTIONS

NATIONAL PARK SERVICE

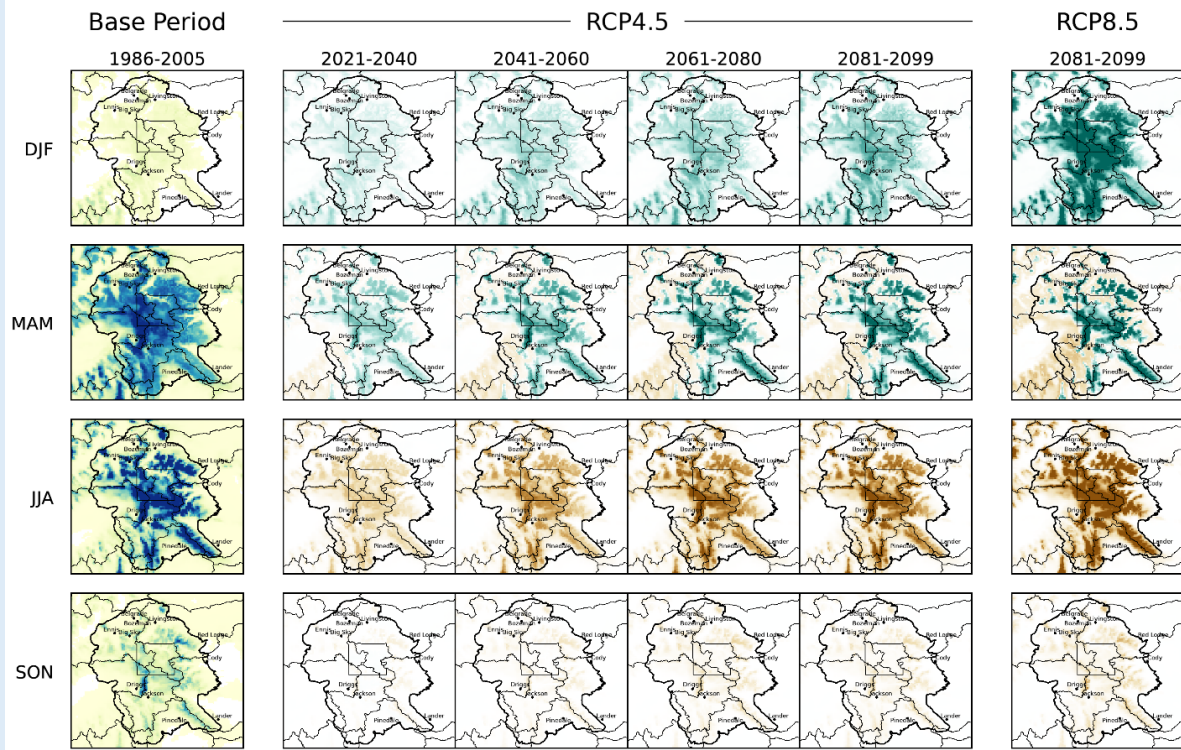
WATERCRAFT INSPECTIONS



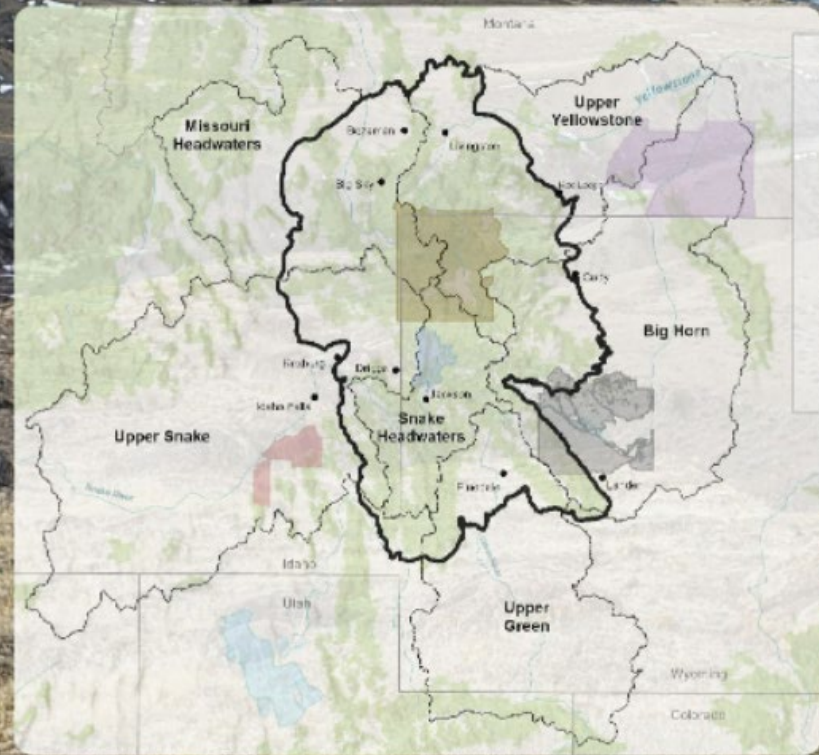


Climate Change

HUC6 Watershed	Change between 1950-2018			
	Temperature	Snowfall		Peak stream flow
GYA	2.3°F warmer	23 inches less	25% loss	8 days earlier
Snake Headwaters	1.1°F warmer	16 inches less	11% loss	15 days earlier



GREATER YELLOWSTONE CLIMATE ASSESSMENT
Past, Present, and Future Climate Change in Greater Yellowstone Watersheds





Harlow Summer Seminar - Special Event

AT THE UW-NPS RESEARCH STATION AT THE AMK RANCH, BEROL LODGE
OPEN TO THE PUBLIC

WEDNESDAY, AUGUST 31ST, 2022, NOON-2PM

Imagining the future of the Tetons

Bryan Shuman

Director, UW-NPS and Professor
of Geology & Geophysics, UW



WyACT: Wyoming Anticipating Climate Transitions

WyACT facilitates co-production of knowledge to enable cutting edge science that helps Wyoming communities anticipate and adapt to climate change impacts on water.

Vision

WyACT will establish lasting and nationally competitive capabilities and infrastructure that improves predictive understanding of the coupled human-environment impacts of climate change on water availability. WyACT will enable Wyoming's communities to anticipate and prepare for significant and lasting changes in water availability.

Mission

Our mission is to 1) implement a transdisciplinary framework of co-production of knowledge that directly involves Wyoming communities, sovereign tribes and government; 2) improve representation of socioeconomic, ecological, and hydrological interactions in integrated models that predict responses to climate change induced reductions in water availability and associated disturbances; and 3) enhance the economic development of Wyoming by leveraging investments in cyberinfrastructure, workforce development and statewide, regional and national partnerships.

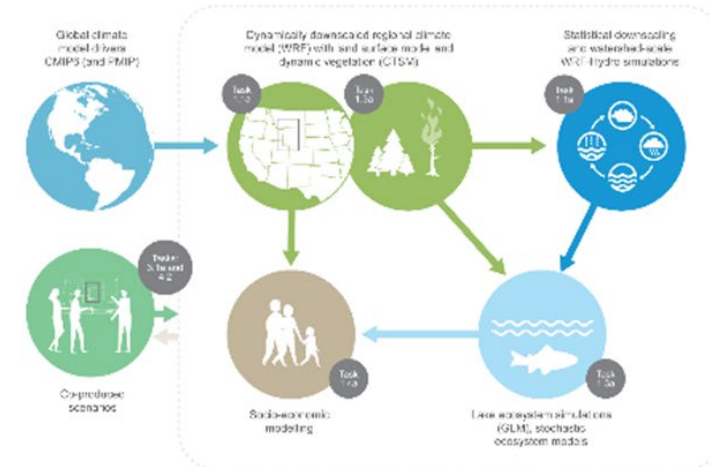


Diagram showing the links in biophysical and socioeconomic models to be used and their integration using co-produced scenarios

News & Updates



Small Grants Competition - Adapting to Climate Change in Wyoming

Feb 24, 2023, 1:45 PM admin

The University of Wyoming and Western Water Assessment (WWA) are pleased to announce the Adapting to Climate Change in Wyoming grant competition. Funding will support climate change adaptation projects for traditionally underserved, Indigenous, and small rural communities and organizations.

[Read more...](#)

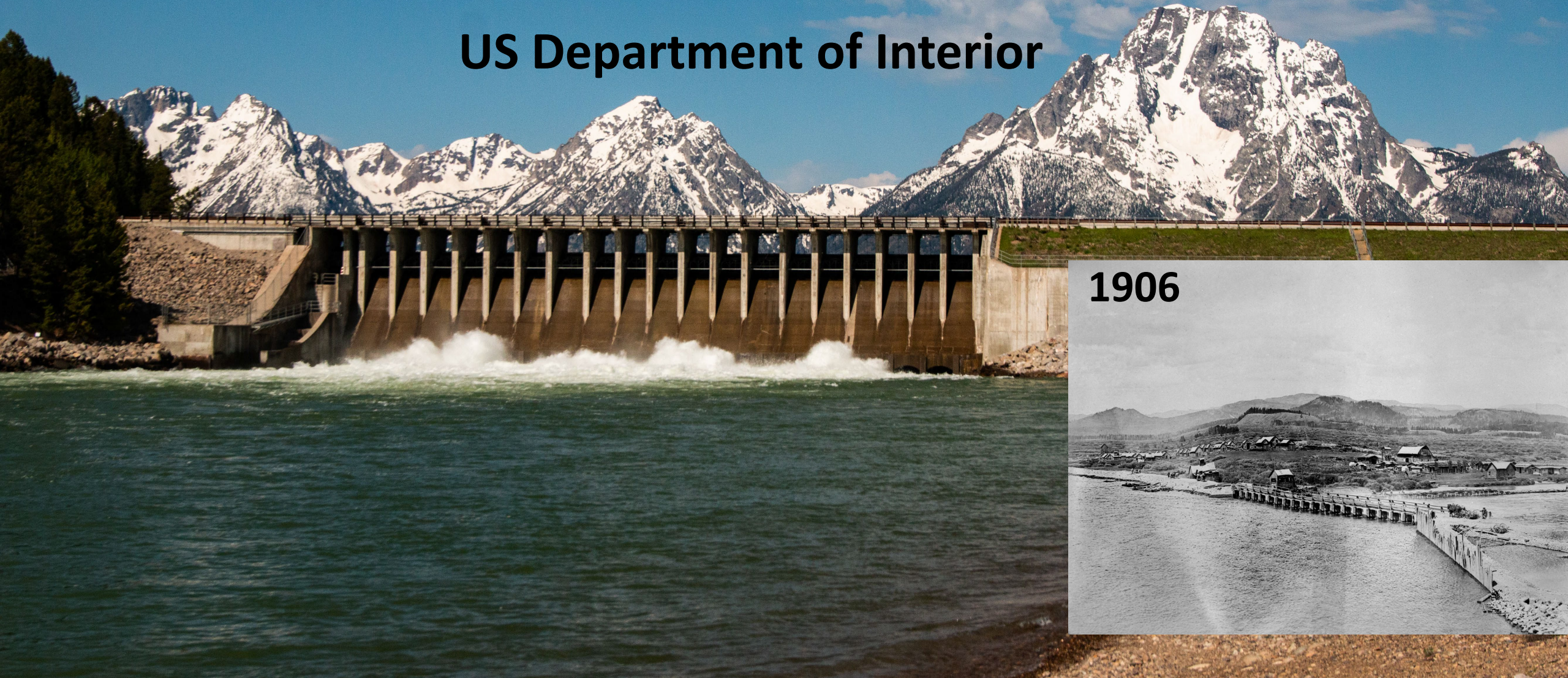


Study of Snakes: Diver has darters

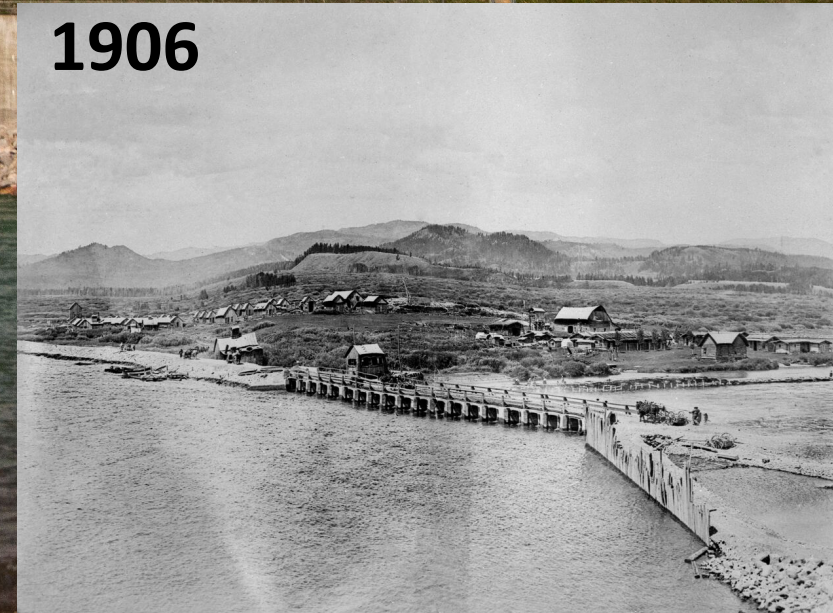
Jackson Lake Dam in Grand Teton National Park

Bureau of Reclamation & National Park Service

US Department of Interior



1906







Federal Reserve Water Right

What is a Federal Reserved Water Right?

- In 1908, the US Supreme Court (in *Winters v. U.S.*) ruled that when land is withdrawn from the public domain and reserved for a federal purpose (in this case the Fort Belknap Indian Reservation), it also reserves water, then unappropriated, to the extent needed to accomplish the purpose of the reservation.
 - The Winters Doctrine - *Winters v. United States*. Fort Belknap Reservation / Milk River, MT

Do Federal Reserved rights apply to all federal lands or only Native American Indian Reservations?

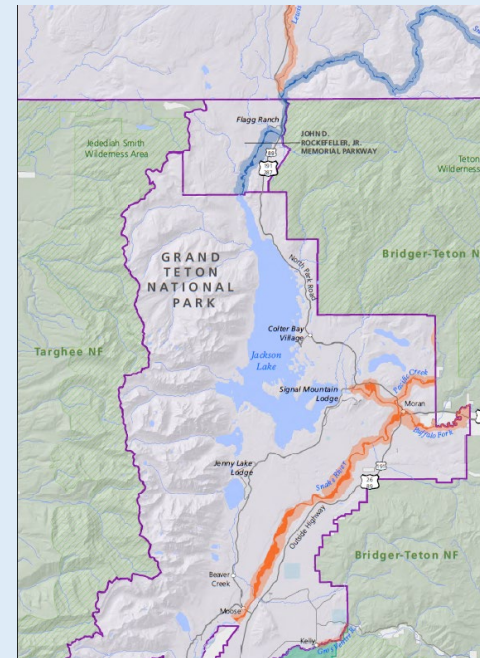
- In 1963, the US Supreme Court (in *Arizona v. California*) extended federal reserved rights beyond Indian Reservations, to include national forests, parks, monuments, wildlife refuges, etc.
- In 1976, the US Supreme Court (in *Cappaert v. United States*) extended federal reserved rights to include groundwater.

How much water does a Federal reserved water right get?

- In 1978, the US Supreme Court decided that a Federal reserved water right is entitled to the minimum amount of water necessary to fulfill the purpose(s) of the reservation.
 - [Mimbres Decision. *United States v. New Mexico*. Rio Mimbres, Gila National Forest]

Does the NPS have Federal reserved water rights in Grand Teton NP?

- NPS does not have any quantified Federal reserved water rights on the Snake River or trib.
- In 2009, Congress designated 23 river segments Wild and Scenic
- **AND** directed the United States to quantify water rights in accordance with State requirements
- NPS and USFS are quantifying flows to protect the ORVs
 - 414 miles (121 miles in Grand Teton)
 - 12 tributaries of the Snake River
 - Supported by GYC, TU, NPS, USFS, WY and others

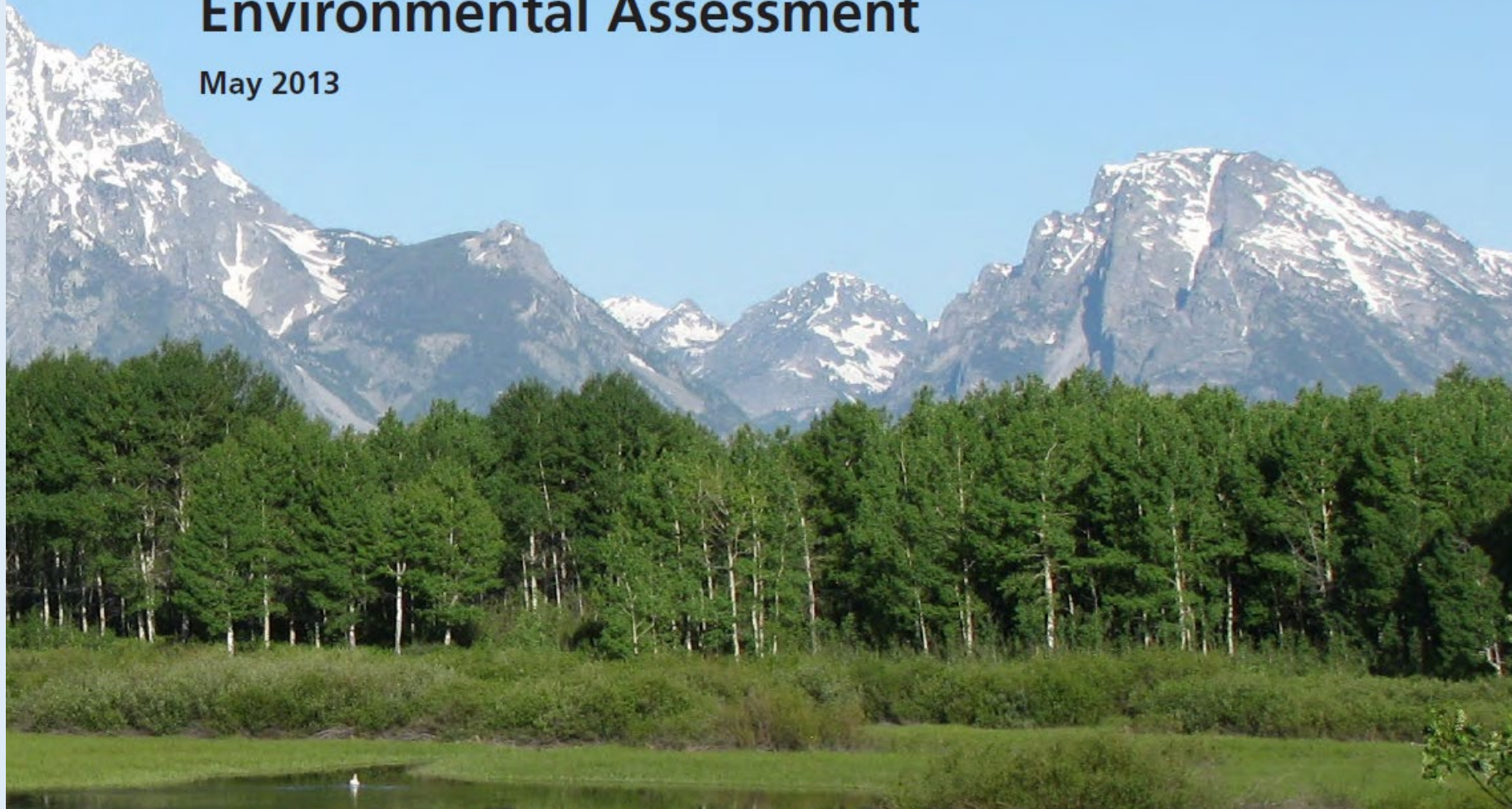




Snake River Headwaters

Comprehensive River Management Plan / Environmental Assessment

May 2013



Collaborating: shared resources

- Jackson Dam pre-dates the park by decades
- 1956 MOU – currently being revised 2024? MOU
- Jackson Lake Dam is wholly within Grand Teton National Park
 - Dam operations
 - Contractual water delivery to Idaho
 - Flood control
 - Jackson Lake Recreation
 - Marinas and boat access
 - Snake River flows below the Dam
 - Native cutthroat fishery
 - Bluehead sucker
 - Waterbirds and aquatic life
 - Terrestrial Wildlife
 - Wetlands
 - Ecological Function
 - Boating and Angling
 - Scenic Values

