

Upper Missouri Fish and Wildlife

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Montana's Water Needs

Water Use-Related Trends and Projections for Fish and Wildlife

- Background on fish and wildlife in the Upper Missouri River Basin
- The relationship between water, physical habitat and fish and wildlife
- What's working well
- Current areas/times of "oversupply"
- Current areas/times of "undersupply"
- Projections for the future
- Data gaps

Upper Missouri River Basin Fish and Wildlife

- As a whole, fish and wildlife are highly used in the Upper Missouri River Basin
 - 46% of all fishing in the state occurs in Upper Mo
 - 1,289,041 angler days
 - Generates around \$156,000,000
 - 483,447 (38%) of these days are by non-resident anglers
 - Hunting and wildlife watching (for the state)
 - Half a million people for around 4 million days
 - \$1.03 billion state-wide (~\$500,000,000)

Water's connection to Fish and Wildlife

- Streams, lakes, wetlands and associated riparian habitats are critical to most of Montana wildlife, and all of the fish!
- Riparian and wetland habitats make up less than 5% of the landscape in Montana, but are relied upon by:
 - 100% of the fish and amphibians
 - 25% of mammals
 - 41% of birds
 - 44% of reptiles
 - 87% of ESA related species (T&E or candidate)

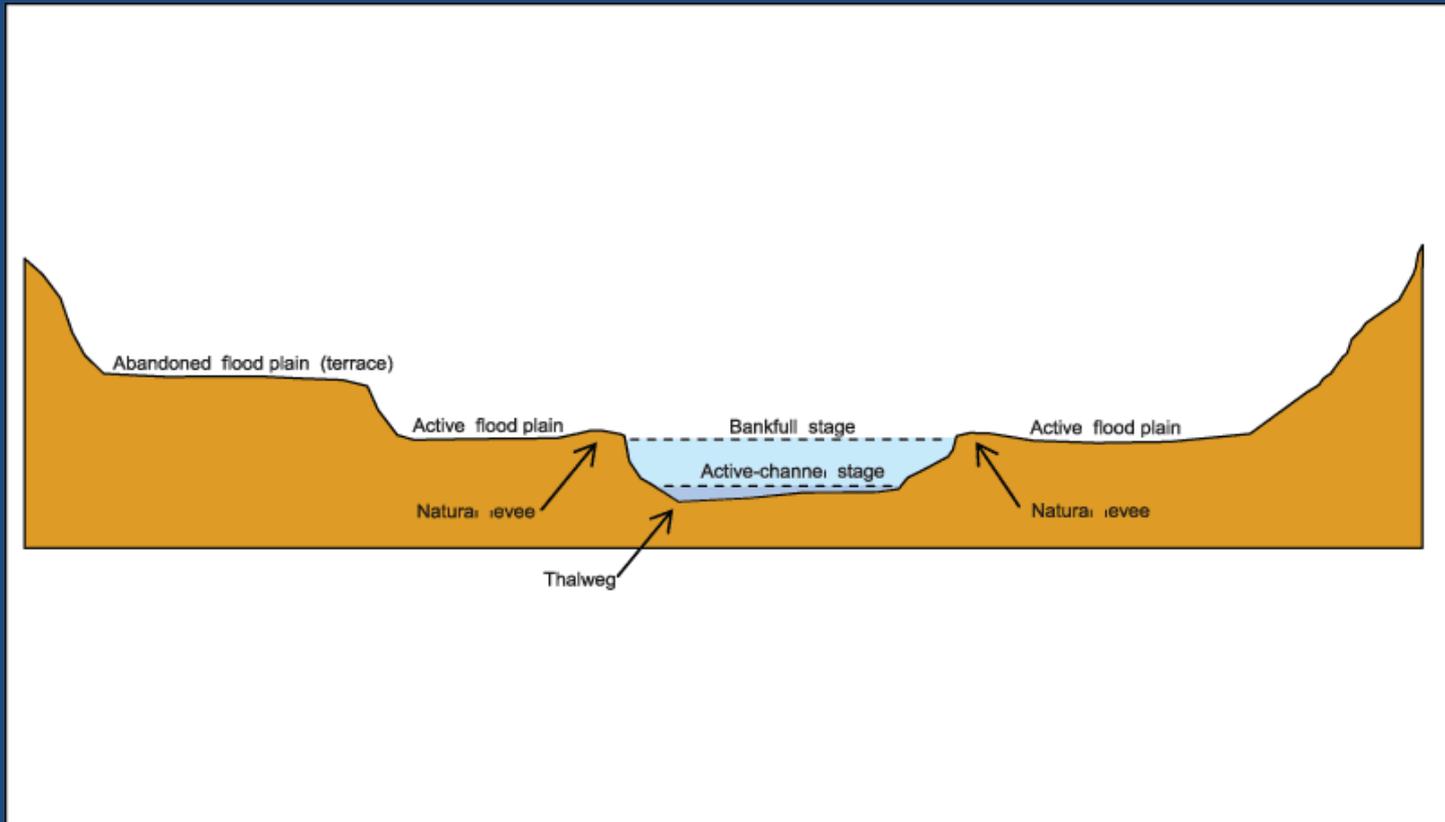
Habitat, Habitat, Habitat

- In Montana, the focus of fish and wildlife management has always focused on maintaining and improving habitat.
- Key Point: It isn't just about covering fish up with water, or providing water for wildlife to drink...the influence of water on habitat formation and maintenance is critical to fish and wildlife resources

Physical and Biological Connection

- Two factors primarily influence a stream's ability to transport the water and sediment from the watershed
 - Land management
 - Water supply
- Water supply is our focus
 - The amount of water has to be appropriate for the channel characteristics (width, depth, sinuosity, etc) to transport sediment
 - The timing and magnitude of water supply is also important to maintaining channel form and function
- The stream form and function processes are extremely dynamic, depending on timing and amount of water and land management.
- **Dynamic physical processes = COMPLEX Habitat, complex habitat = healthy populations of plants and animals**

Carrying the Mountains to the Ocean



The stream's purpose is to transport the watershed's sediments and water

Big Hole River at Wisdom (06024450)

Composite Hydrograph 1988-2012





S. ZACKOWICS









What's working well?

Partnerships!



Cooperation

- Several watershed groups (Jefferson and Big Hole) have developed drought management plans to maintain flows for fish and wildlife
 - Anglers share the pain during low-flow periods (fishing restrictions)
 - Situations are all voluntary, and require trust and understanding among interests

Current Areas and Times of “Oversupply”

- At times, high water and weather can influence wildlife reproduction and rearing success
- Can be physical damage to habitat from extreme floods
- Oversupply isn't typically an issue for fish...
 - 2011 was a good year for recruitment of many fish species across Montana (Pallid sturgeon)

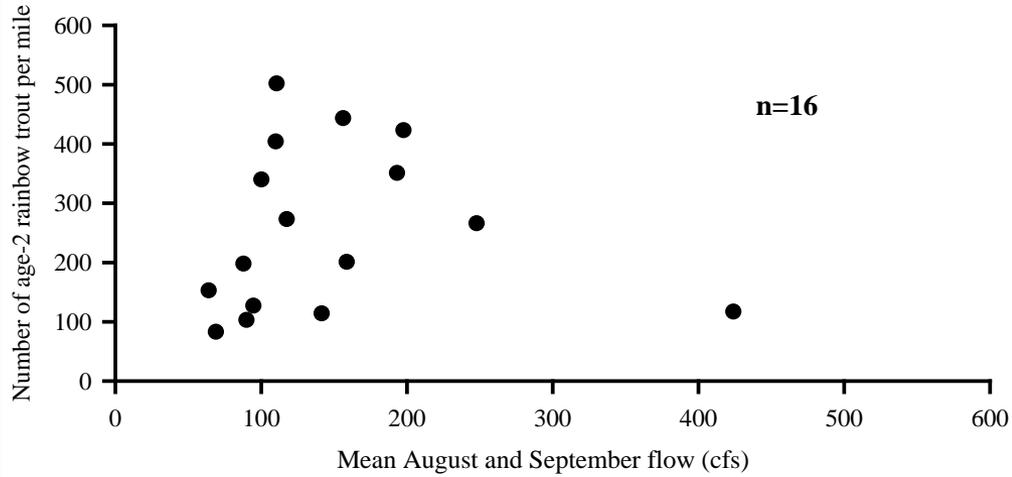


Figure 8. The relationship between the number of age-2 rainbow trout and the mean August and September flows (cfs) the year the fish were hatched.

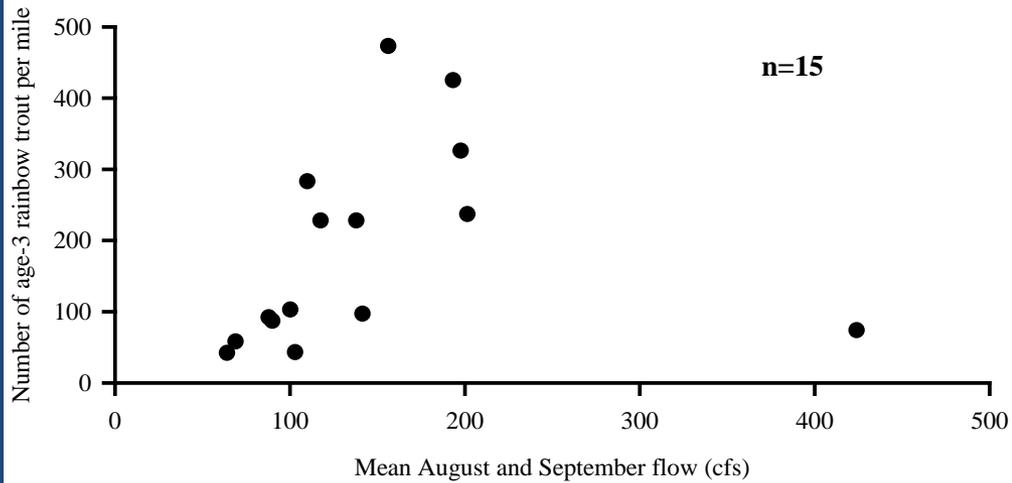
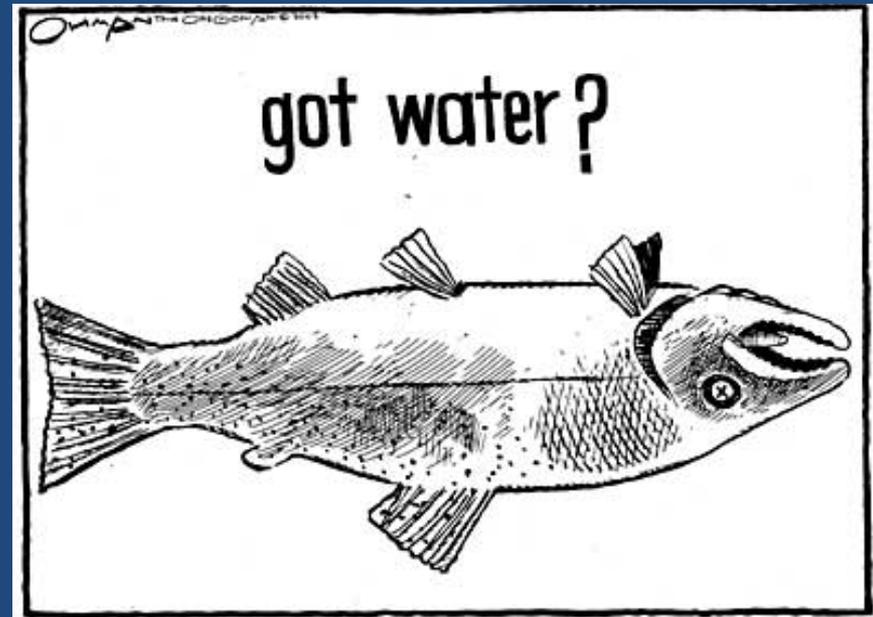


Figure 9. The relationship between the number of age-3 rainbow trout and the mean August and September flows (cfs) the year the fish were hatched.



Current areas/times of “shortages”

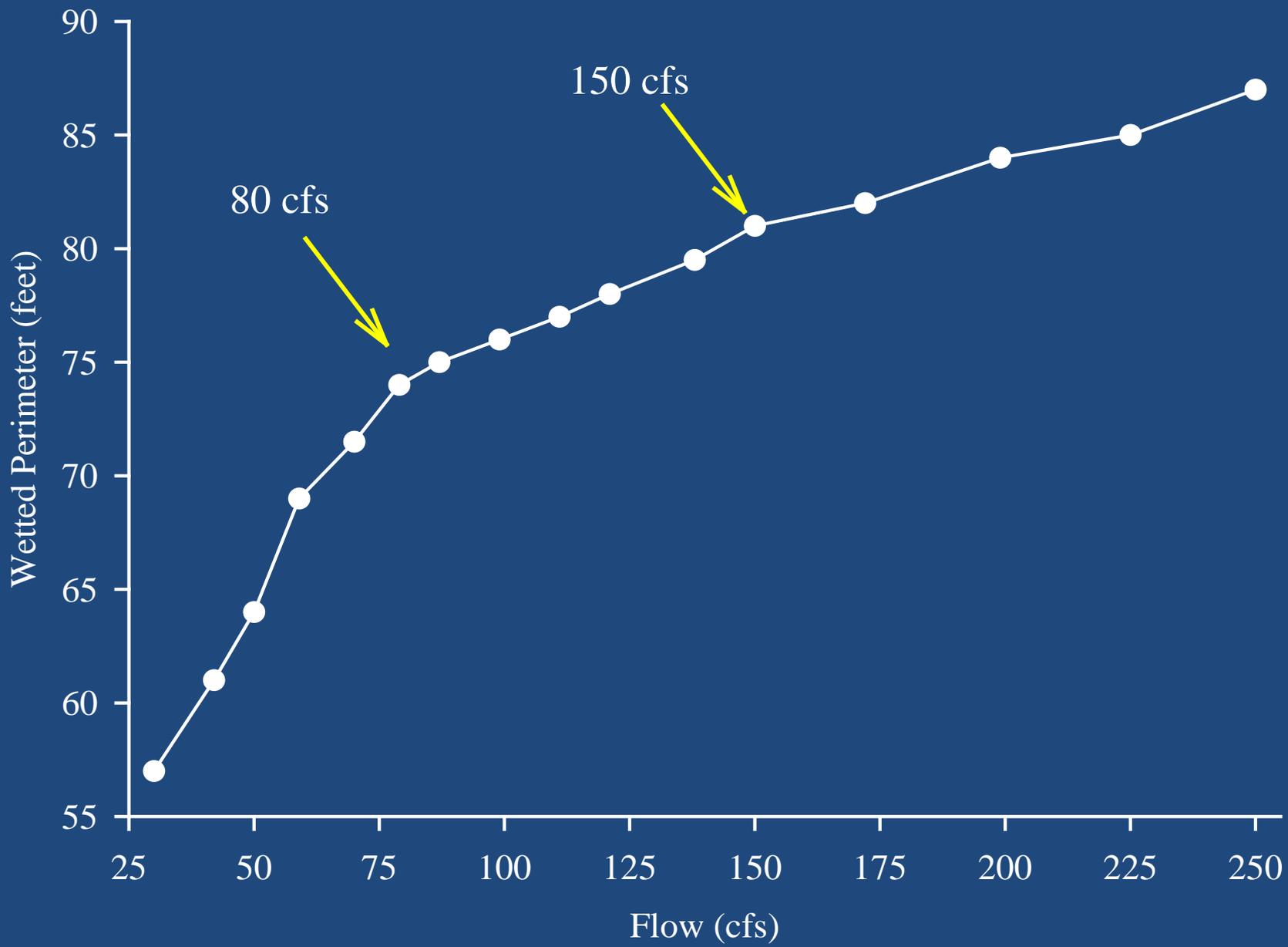
- Shortages of water are the rule for streams and rivers throughout the Upper Missouri River with a few exceptions
- Some areas are worse than others (Jefferson, Sun, Teton)
- Shortages can cause issues in seasons other than summer



Fish Kills on the Lower Smith River in 2000



Relationship between available habitat in riffles (wetted perimeter) and flow in the Smith River



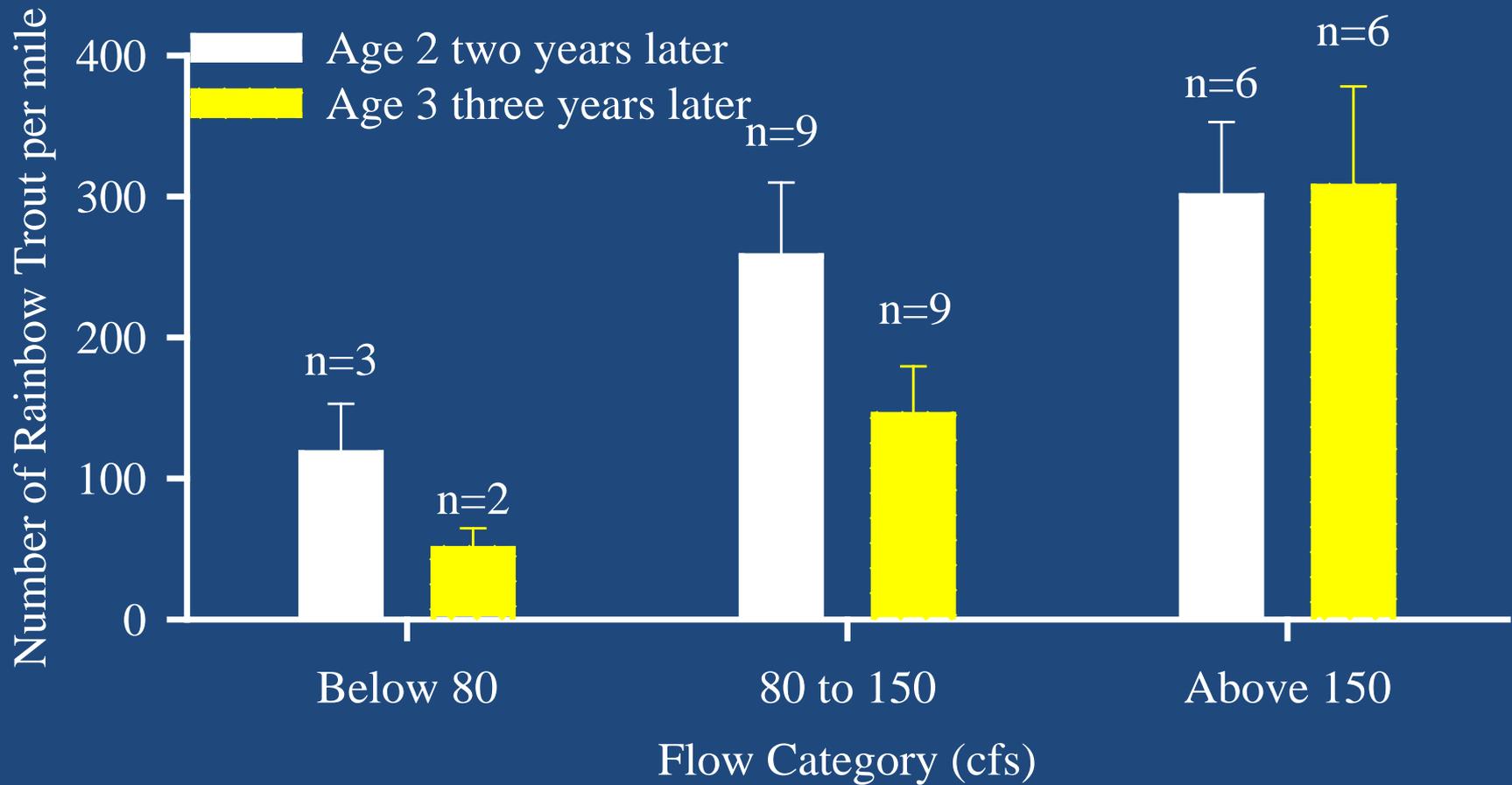
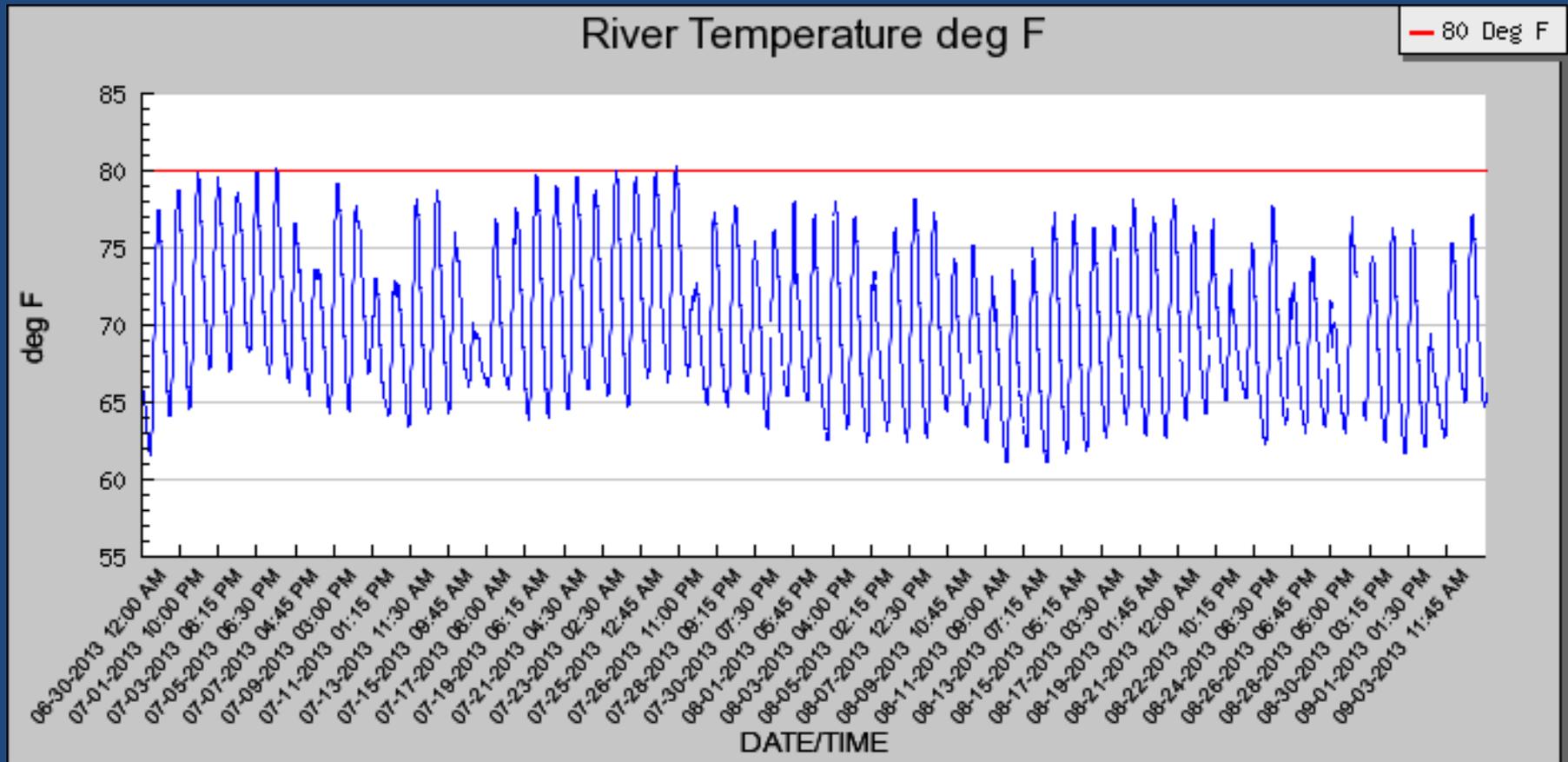


Figure 2. Number of age-2 and age-3 rainbow trout per mile in the Eagle Creek section of the Smith River, in relation to average flow during August & September in the hatching year. Flow years are grouped into categories (i.e., <80 cfs, between 80 & 150 cfs, and >150 cfs). Trout cohorts were produced during the years 1978-2000.

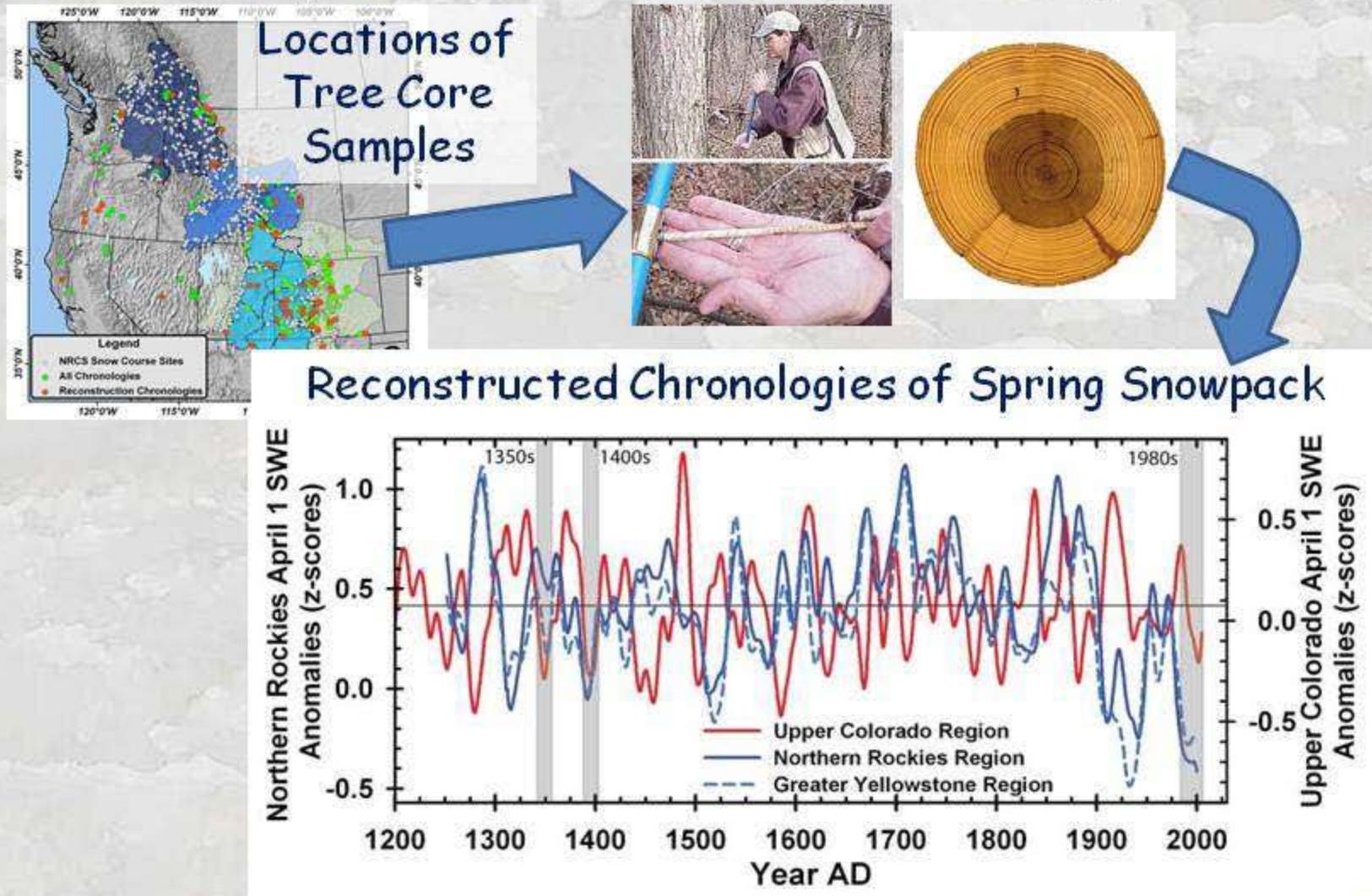
Madison River Temperatures 2013



Projections for the future?

- Climate change projections are inconclusive with regard to amount of precipitation in the future
 - However, timing and type will likely change (hydrograph; channel maintenance, biological cues, reproduction, etc.)
- In general, outlook is not good for fish and wildlife

How Do Western US Snowpacks Today Compare to 1,000 years ago?

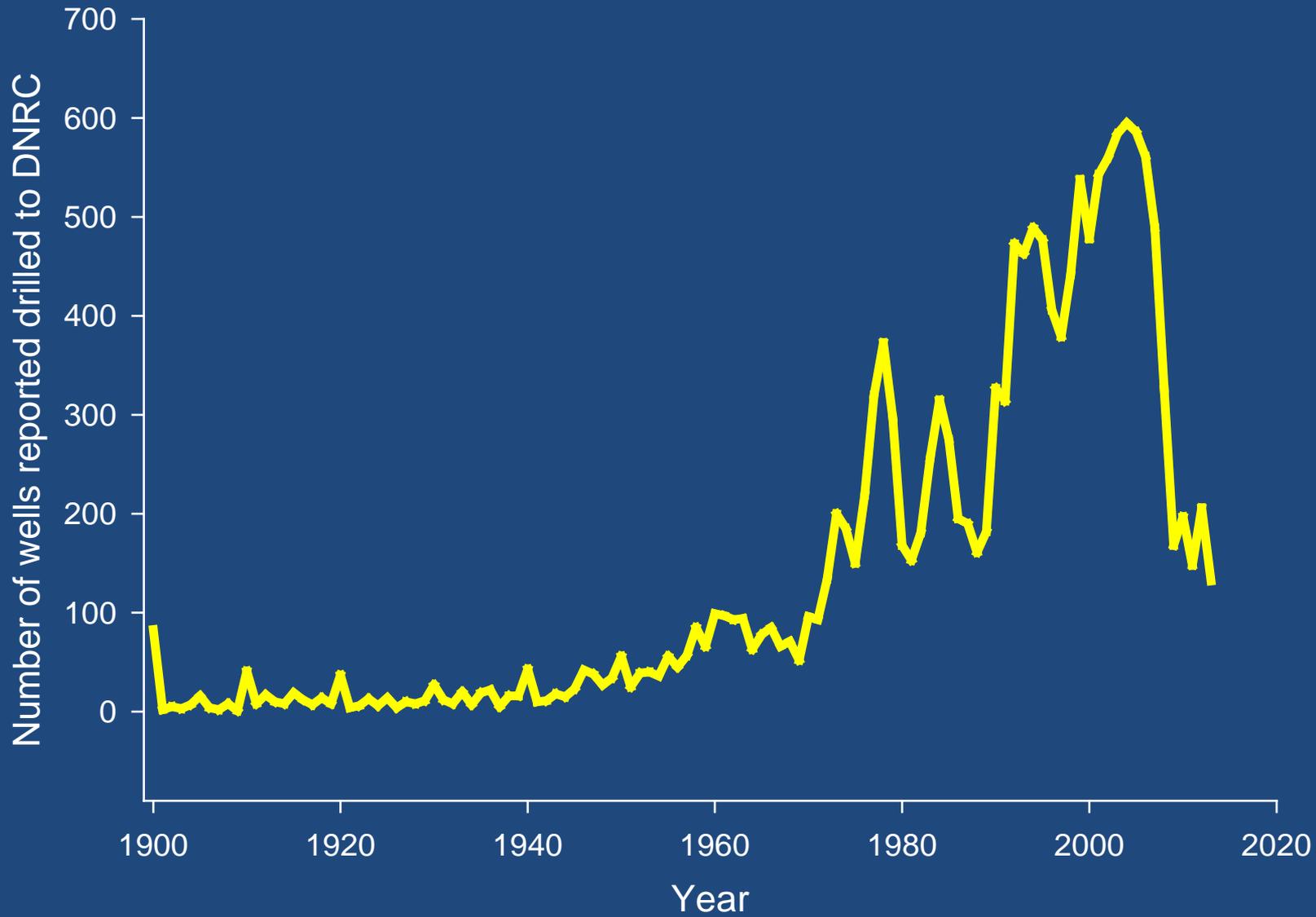


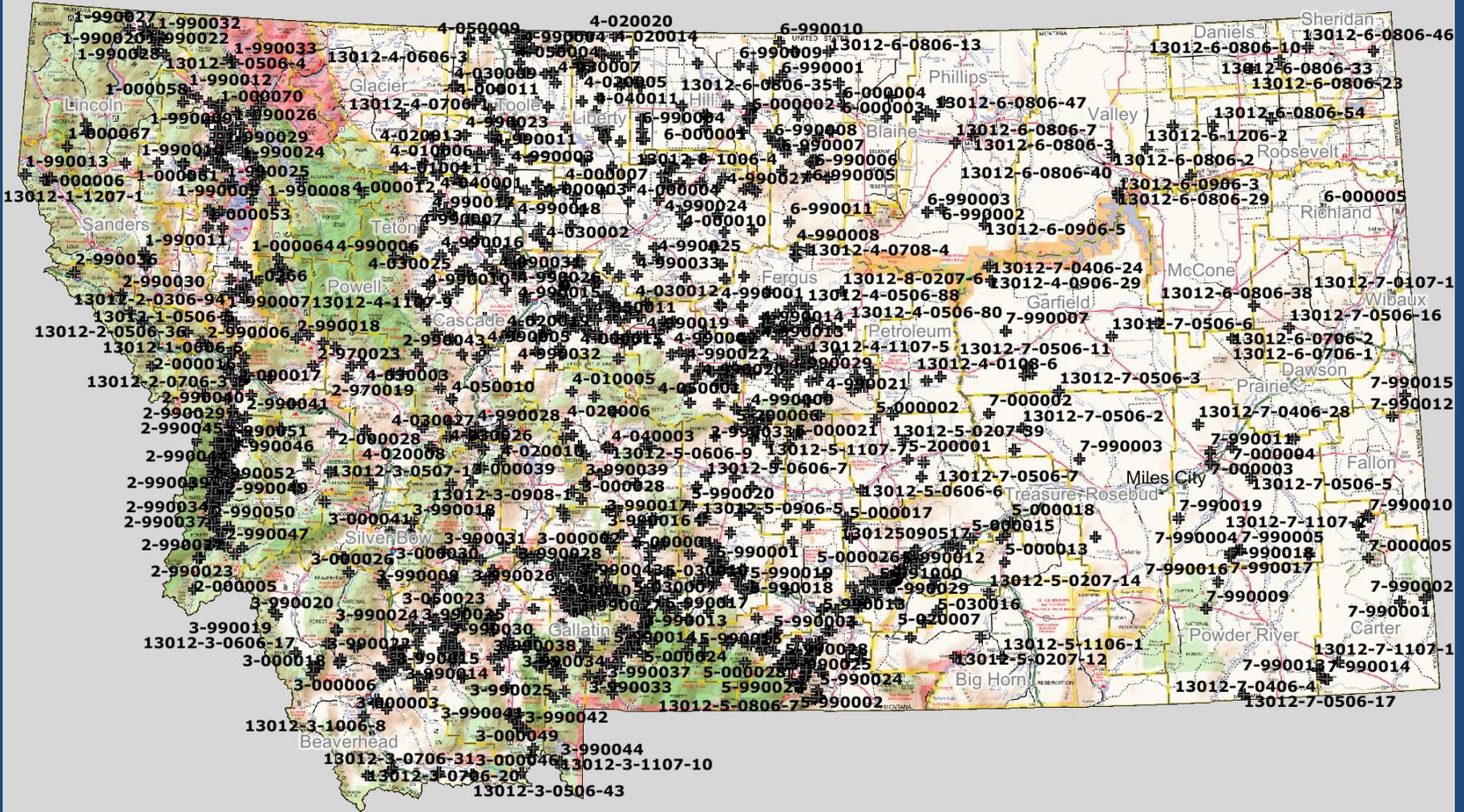
Pederson, et al. 2011. The unusual nature of recent snowpack declines in the North American cordillera. *Science* 333:332-335.

Big Hole River at Wisdom (06024450)

Composite Hydrograph 1988-2012







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Data Gaps

- How have exemptions to the basin closure (groundwater; household, lawn and garden, ponds) affected water supplies, senior water rights and instream flows? With the same severity of drought, do we see lower stream flows, are irrigators less able to satisfy their diversionary needs in drought periods?
- Illegal use of water? Urban sprawl along rivers? Are all of those surface water pumps permitted?
- Percentage of time that instream water reservations for fish and wildlife are being met?