

## Lake Drawdown Workshop, June 2004, AMK Ranch, Grand Teton NP

### Attendees:

Susan O'Ney  
Hank Harlow  
Sue Consolo-Murphy  
Melissa Tramwell  
John Boutwell  
Darren Rhea  
Ralph Hudelson  
Steve Cain  
Kathy Gasaway  
Jim Bellamy  
Bill Gribb  
Nick Nelson  
Bruce Pugsek  
Dick Bauman  
Mike Beus  
Aida Farag

### Objectives

- Research priorities for Jackson Lake
- BOR will aid in funding top priority project(s)
- List of those best qualified to help accomplish tasks.

### ***Mike Beus - The History, Water Rights and Reclamation Authorities of Jackson Lake Dam.***

- 10 million acre feet to irrigation, 5 million crosses Wyoming border
- Input to Jackson Lake just shy of 1 million acre feet
- Majority of water from natural river flow
- How does BOR operate Jackson Lake?
  - History of western water rights
  - History of Reclamation
  - Specific project authorizations
  - Spaceholder repayment contracts
  - Flood Control Acts
- Nine reservoirs: Henry's Lake, Island Park, Grassy Lake, Jackson Lake, Ririe, Palisades, American Falls, Lake Wolcott, Milner
- Corps of Engineers are responsible for flood control under Section 7.
- Reclamation law recognizes State as regulator of water
- How can irrigators take water from National Parks?
  - Reclamation's right to fill Jackson Lake is based on irrigators beneficial use.
  - Irrigators paid for construction of Jackson Lake Dam.
  - Congress protected Jackson Lake for reclamation purposes

- Is agency looking for any ecological or biological information to document water flows?
  - Augmentation or lease may affect Jackson Lake at some point in time.
  - Endangered Species Act has “trumped out” biological and ecological issues (with respect to Missouri River)

***Hank Harlow - a short overview of different projects, to include work on lake drawdown by Carol Brewer and otter activity by Joe Hall.***

- UW-NPS Research Station unique because it is administered by the University.
- Over 200 projects funded jointly with NPS
- Selected studies related to Jackson Lake Workshop
  - Water Quality of Lakes & Streams
  - Trophic Status of Jackson Lake
  - Geodetic Evidence/ Seismic Activity
  - Revegetation on Jackson Lake
    - Lake Stability aided in revegetation
    - Greatest success: fine substrate and sand
    - Least success: coarse substrate & decaying vegetation
  - Effects on Birds & Aquatic Mammals (Otters & Beavers)
  - River Habitat Categories
    - Gravel Beach most abundant least used
    - Log jam beaver dams least abundant most use

***Sue Wolff – Eagles, osprey, swans and herons***

- Current Monitoring Programs
  - Bald Eagles
  - Osprey
  - Amphibians
  - Great Blue Herons
  - Trumpeter Swans
  - Carnivores
  - Ungulates
  - Migratory Birds
- Nesting, Population Trends
  - Bald eagles might be especially helpful due to park having 20 years of research
  - Blue Herons challenging because nesting and foraging are not in the same spot
    - Number of nests are declining
    - Not banding, but are monitoring productivity
  - Amphibians- Boreal Toads & Spotted Frogs
- Trumpeter Swans
  - Do not have nesting habitat on banks of lakes

- May not nest in lake but use in fall and spring for migration and nesting periods
- Habitat Snake River islands below dam in winter

***John Boutwell - Restoration and Monitoring of the Aquatic Plant Community within Jackson Lake after the reconstruction of Jackson Lake Dam***

- Overview of research on Jackson Lake 1988-1993
  - 7 area transects, 5 were not suitable
  - Collected samples
  - Primarily planted on east & west of Pilgrim Creek and Half Moon Bay
  - By 1991 had almost 20 aquatic plant species located within Jackson Lake
- Not much difference in number of species from major drawdown of 1992.
- Prior to refilling lake, took soil samples and found no carryover of macrophytes in soil composition
- Silt does not seem to be problematic on heavy drawdown
- Water fluctuations can be harmful to sago, but beneficial to Am Elodea

***Jim Tilmant – NPS drawdown issues***

- 11 NPS units with reservoirs
- Blue Mesa, Curecanti NRA (CO)
  - Very large annual drawdowns that create mudflaps
  - Tributaries have large number of beavers
  - No effect on algal bloom
  - O<sub>2</sub> sag during late summer drawdowns
- Lake Mead NRA (NV)
  - Fluctuates 20-30 feet annually
  - Level dropped 85 feet since 2000
  - No well defined riparian area
  - Tamarisk at various water levels
  - Increased algal production
- Lake Meredith NRA (TX)
  - 10K acre reservoir
  - 36 ft drop over past 4 years
  - Aggressive tamarisk activity
  - Decreased beaver activity
- Bighorn Canyon NRA (MT)
  - Fluctuation does not affect shoreline
  - Water controlled by BOR, fluctuates considerably in given year
  - Siltation is biggest problem
- Lake Roosevelt NRA (WA)
  - Controlled by BOR, 30-40 ft drawdown
  - Reptiles and amphibians have decreased or disappeared
  - Noxious weed problem
  - Large exposed mudflaps which lead to dust problems
- Ross Lake NRA (WA)

- Annual drawdown 100 ft
  - Cavity and shore nesting birds have nests flooded
  - Fish reproduction impacted by excluding tributaries
- Lake Chelan NRA (WA)
  - Fluctuation ~20 feet
  - Dust problems
- Common Impacts & Concerns
  - Exotic plants (increased capability for establishment and spread)
  - Loss of riparian zone
  - Impacts of shoreline nesters
  - Bank erosion/ increased dust
  - Water, O2 and temperature changes
  - Increased access of vehicular travel
  - Exposure of Archeological and Historic Sites

***Ralph Hudelson – History of fish management in Jackson Lake***

- 1890- introduction of lake trout to Shoshone Lake
- 1890-1892- first generation of lake trout into Jackson Lake
- 1906- became usable fish density
- Also benefited from brown trout at that time as well
- Fisheries Management prior to WWII mostly planning to stock lakes
- 1932- 25k steelhead introduced to Jackson Lake
  - No evidence of survival
- Used lake trout to augment natural reproduction
- 1937-1964- Planted ~75-200k/ year
- Tried to lean towards “trophy fishing” in the latter of those years
- 1964- Considered introducing forage to increase relative weights
- 1964-1973- Planted fingerlings
- 1990- large landslide caused large brown spotted to be introduced to Jackson Lake
- Population of lake: 65% lake trout, 27% cutthroat, 8% brown trout/ nongame species
- Fish population seems to be relatively in check despite density problems
- Next year (2005) planting will reduce to 12k, by 2006 will not be planting

***William J. Gribb – Where have all the beavers gone?***

- Beaver Interests
  - Lake elevation
  - Amount of stream-flow into lake
  - Amount and timing of lake drawdown
- 1974-77 Collins identified 101 beaver colonies
  - 40-49 located on Snake River flood plain
- Research 2002-03
  - Snake River – Jackson Lake Dam to Moose
  - 74.6% surveyed

- 8 active lodges or dens
- Tributaries, Buffalo Fork & Pacific Creek
  - 21.2km surveyed, 2 active lodges
- Lakes & Ponds have significant decrease in amount of dens
- Literature tells us:
  - Low flow, colonies contracted into main channels
  - Abandonment of colonies due to exposure, distance to food
  - Low flow, willows & cottonwoods not available, large sandbars exposed separating river from vegetation
  - Regulated flow has substantial effect on ability of stream ecosystems to resist & recover from disturbance

***Jacquelin St. Clair – Effects of lake drawdown on cultural resources***

- Looting is largest problem
- 40+ sites along Jackson Lake
- Mostly firehars
- Range from 500-10,000 years
  - Diagnostic artifacts to verify/ justify dates
- Majority of artifacts on northern end of lake
- Suggestion of a no motorized zone

***Mark Wildehaber – Understanding the Effects of Drawdown on Interrelationships of the Fish & Invertebrate Communities of Jackson Lake: USGS Potential Contributions***

- Lowhead dams impacts habitat
- Impacts reproductive biology
- Bioenergetics model (Consumption, growth, respiration, excretion, egestion) will be started on Jackson Lake
- Potential Research
  - Telemetry- lake & cutthroat trout in Jackson Lake
  - Fish & Invertebrate Communities
    - Shallow water fish & invertebrates
    - Invertebrates relative to Jackson Lake dam
    - Predator-prey relationships
  - Reproductive success of lake & cutthroat trout
  - Population & community level monitoring
  - Water quality, contaminants difference between natural lake and reservoir

***Bruce Pugeseck – USGS Greater Yellowstone Initiative***

- Choice of study sites is critical
- Wants to try to collaborate with existing research if possible
- Need to measure variability or control for it
- See model/ diagram

***Melissa Trammel-***

- Experience with fluctuating rivers and dam operations
- Adaptive Management
  - Research-Monitoring-Recommendations-Implementation-Recovery
  - Monitoring Programs
    - Establish Baseline Conditions
    - Evaluate management actions
    - Track long-term trends
  - Research
    - Identify limiting factors
    - Evaluate specific management actions (i.e. flow-dam operations, temperature, habitat availability and quality, water quality, fish community, food base)
- Management Implications
  - Re-operate dams
  - Increased & focused nonnative removal
  - Selective fish passage
  - Reservoir & pond screening
  - Acquired in stream flow rights & reservoir storage for flow augmentation
  - Levee removal/habitat restoration
  - Stocking programs
  - Fish passage
- Non-native Fish (problems)
  - Predation & competition
  - Disease
  - Parasites
- Monitoring Needs
  - Lake trout & Snake River cutthroat abundance
  - Recruitment
  - Methods (tagging)
- Research Topics for Jackson Lake
  - Feasibility of lake trout removal
  - Cutthroat spawning success (passage, vulnerability to predation)
  - Cutthroat recruitment success (juvenile habitat, whirling disease)
  - Downstream resources
  - Temperature profiles of water going in and out

***Brainstorming Session***

- How much habitat change and of what type occurs at different water levels
- Bentic topography or other bathymetry
- Temperature in lake affecting nutrients(are there any models- ex: full in June & when lake levels are down) and what effects does it have on the movement of fish

- What are the temperature profiles of Jackson Lake and how are they affected by lake levels?
- Model lake flow dynamics
- What can we use as a control
- Temperature regime affects primary productivity affects fish distribution
- How much littoral zone do you have?
- What is the recovery rate of vegetation after refill?
- Physical data of river upstream as well as downstream
- Invertebrate/zooplankton census of Jackson Lake vs. control lake
- Prey species usually forage on plankton, lake trout eggs- if got rid of lake trout would sacrifice the suckers as well who forage on lake trout eggs
- Model for vegetation, invertebrates/zooplankton based on loss of exposed shoreline & exposure at various levels
- Where do fish reproduce?
- Food is secondary, temperature is primary to fish
- Drawdowns may force fish to have interactions with other species of fish
- What is the distribution of fish species in Jackson Lake (extent, depths)?
- How are we defining “healthy fishery”? (in balance with the habitat we currently have)
- Does drawdown favor one fish species over the other? How does this affect upper trophic levels?
- Monitor lake trout & cutthroat populations with respect to lake drawdown and reduced lake trout stocking by WYGF.
- Inventory & distribution of amphibians.
- How useful would thermatic maps be?
- Do we have mudflaps that go down to depth?
- What is the substrate?
- Thermal temperature at different elevations of lake
- Relative abundance of habitat types
- Determine the temp, DO, conductivity, pH, N profiles for Jackson Lake. How do changes in levels affect that?
- Develop model to predict loss/gain of primary productivity based on incremental levels of drawdown
- Model fish relative abundance per habitat type
- Determine absolute abundance of fish using hydro-acoustic monitoring.
- Census of amphibian breeding sites in adjacent wetlands
- Compare vegetation, habitat, etc with unregulated similar system to see if any negative effects.
- Flow regime changes- not based on empirical data
- To what levels can we raise flows without flooding out the people downstream
- Dynamic of historic flow compared to current situation (regulated flow)
- Try to simulate the most natural flow of river

- Timing of peak, magnitude of peak, duration of peak and elevated summer flows
- Amount of macro invertebrates and zooplankton, fish mobility
- What changes have occurred due to regulation?
- Identify if we have a problem
- What are the pressures to keep flow up? Boating, rafting, fishing
- Base flow 280cfs, average is 500cfs, natural around 300-600cfs
- Has river suffered any damage due to unnatural flows?
- Can/will lake drawdown get to a point where it can not maintain flow due to contractual obligations?
- Compare existing hydrographs with unregulated hydrograph
- Evaluate the effects of flow regime on resources/dynamics of Snake River.
- Develop model to predict vegetation changes over time as a result of water fluctuation and grazing.