# Glen Canyon Dam Adaptive Management Program

## Brown Trout Workshop

**21-22 September 2017**
**Tempe, Arizona**



# Context

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## Slide 2

**BRP1** Billerbeck, Rob P, 9/15/2017

# Context

- Brown trout is one of several non-native, cold-water fish species found in the Colorado River below Glen Canyon Dam.

- Over the period 2014-2016, as part of their fish monitoring program in the Lees Ferry reach of the Colorado River, downstream of Glen Canyon Dam, the AZGFD **noticed an increase in an index of abundance of brown trout** and increased spawning behavior.

- These recent observations of increases in apparent abundance of brown trout have **raised concerns about their potential effects on the endangered humpback chub and the rainbow trout fishery.**

# Notable Increase in Lees Ferry Brown Trout from 2013-2016

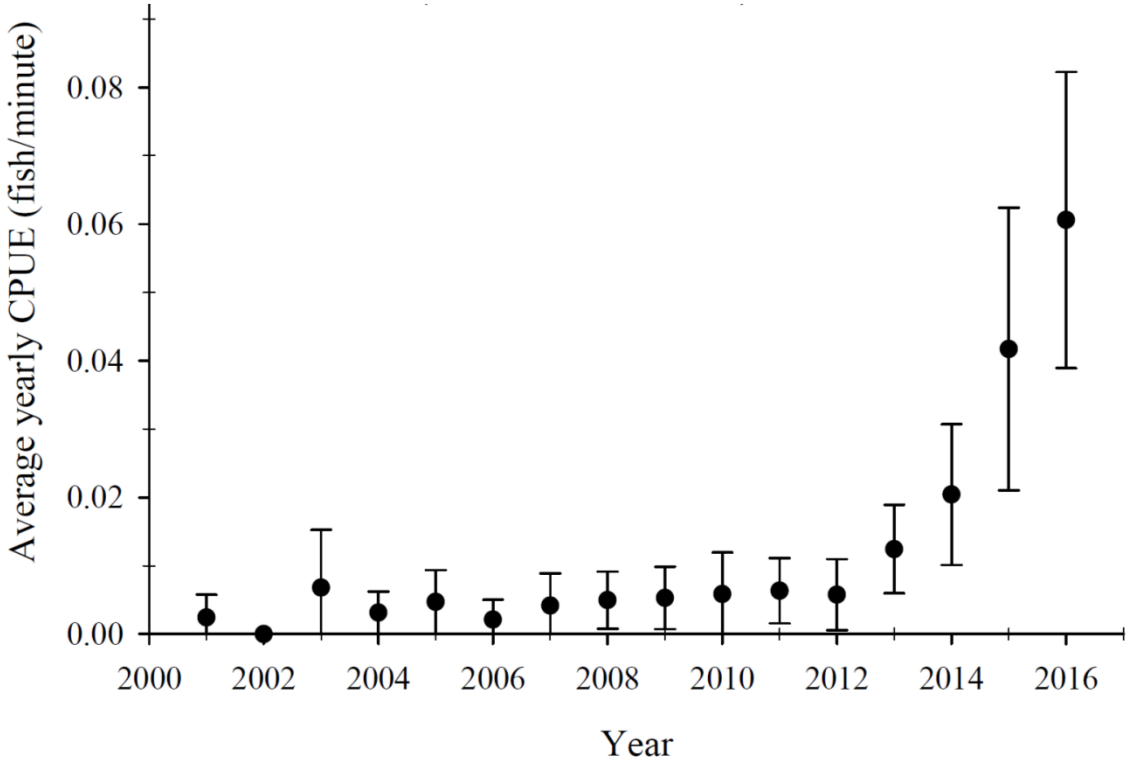


**Figure 1.** Index of brown trout abundance (mean fish caught per minute of electrofishing) in Lees Ferry, 2001-2016. The closed circles show the mean value; the whiskers show the 95-percent confidence intervals. Source: David Rogowski, AZGFD.

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# Charge from Secretary's Designee for Brown Trout Workshop

- In February 2017, the Adaptive Management Working Group (AMWG), a group convened under the Federal Advisory Committee Act to advise the Secretary of Interior on aspects related to the operations of Glen Canyon Dam, **passed a motion recommending a workshop on brown trout**.

- In late June 2017, the acting **Secretary's designee to AMWG asked NPS, GCMRC, AZGFD, Reclamation, USFWS, and WAPA to begin planning** for such a workshop.

# Guidance and Compliance

- Management of brown trout takes place in the context of many existing guidance documents
- Such management plans are also subject to compliance with a number of laws, including ESA and NEPA
- The 2016 Long-term Experimental and Management Plan (LTEMP) is an overarching management plan for the operations of Glen Canyon Dam and associated activities

- The evaluations of brown trout discussed in this workshop were couched in the context of the existing guidance and compliance

# Purposes

The workshop is intended to address:

(1) The **root causes** of the increases in brown trout

(2) The **risks associated with an expanding brown trout** population to a quality rainbow trout fishery in Lees Ferry and the recovery and conservation of humpback chub and other native fish down river

(3) The **pros and cons of different experimental and management options** to address those risks, including but not limited to, mechanical removal, trout management flows, and the current High Flow Experiment protocol

(4) The **research needs** to support more informed decisions moving forward

(5) The expressed **tribal concerns regarding the taking of life**, and how those are addressed in any management options under consideration

# Management Objectives


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# Management Objectives

- Management of brown trout below Glen Canyon Dam takes place in the context of management of a complex system with many desired outcomes.
- LTEMP ROD adopted resource goals as the guide for the future of the Adaptive Management Program.
- Any evaluation of management actions related to brown trout will need to consider the effects on these, and possibly other, objectives.

# Management Objectives

Regarding management of brown trout, the February 2017 AMWG letter and the charge from the Secretary's designee both suggest that objectives related to the following are important:

- Compliance with the ESA
- Tribal concerns with the taking of life
- Condition of the rainbow trout fishery
- Potential interactions with high flow experiments

# Management Objectives

- ***Compliance with the ESA***.
- Humpback chub are **listed as endangered** under the Endangered Species Act. One of the threats to humpback chub is competition with and predation by nonnative fish, including brown trout

- LTEMP resource goal: "Meet humpback chub recovery goals including **maintaining a self-sustaining population, spawning habitat, and aggregations** in the natural range of the humpback chub in the Colorado River and its tributaries below the Glen Canyon Dam"

- LTEMP performance metric: the **expected minimum number of adult humpback chub** in the Little Colorado River population during the 20 years of the LTEMP implementation period

# Management Objectives

- ***Tribal concerns with the taking of life***.
- To many tribes associated with the Colorado River, **life is sacred**, and human activities should promote life, not destroy it. These tribes have expressed that **taking of life should be minimized** and should be carried out in a manner that is respectful.

- **Pueblo of Zuni have expressed their particular concerns** that the taking of life through mechanical removal is contrary to their cultural values and could have adverse effects on their people because of their familial and spiritual relationships to all aquatic life, including native and nonnative fish and macroinvertebrates.

- **LTEMP performance metrics** may help with evaluation of options:
  - the frequency of mechanical removal
  - the frequency of trout management flows, but these were acknowledged to be coarse measures

- Other ways of qualifying these concerns may come from **further consultation** with Pueblo of Zuni and other associated tribes.

# Management Objectives

- ***The condition of the rainbow trout fishery***.
- Important recreational resource worth an estimated $2.7 million annually
- Important to consider how any management options, such as flow manipulations or mechanical removal, might also affect the rainbow trout fishery.

- LTEMP resource goal: "Achieve a healthy high-quality recreational rainbow trout fishery in the Glen Canyon National Recreation Area and reduce or eliminate downstream rainbow trout migration…"
- AZGFD 2015 fisheries management plan for Lees Ferry objectives:
  - "**Maintain a healthy population** of Rainbow Trout at Lees Ferry to support recreational fishing"
  - "**Provide a quality trout fishing experience…**"
  - "**Grow quality sized trout…**"
  - "**Avoid catastrophic failure** of the trout population…"
- Potential performance metrics:
  - **the rainbow trout catch rate** (age 2+ fish per angler-hour)
  - **the rainbow trout emigration rate** (number of age-0 trout moving into Marble Canyon per year)
  - **the abundance of high-quality rainbow trout** in the Glen Canyon reach

# Management Objectives

- ***Potential interactions with high-flow experiments***.
- The HFEs deposit fine sediment at higher elevations
  - for its value to riparian vegetation
  - for its use at camping sites
  - and for its role in protecting historical sites
  - LTEMP resource goal: "**Increase and retain fine sediment** volume, area, and distribution in Glen, Marble, and Grand Canyon reaches above the elevation of the average base flow for ecological, cultural, and recreational purposes."
  - LTEMP performance metric: **Sand Load Index** (the cumulative sand load transported by high flows [greater than 31,500 $ft^3$/sec] divided by the cumulative sand load transported in total).
  - If any of the options considered for management of brown trout alter flow actions (including HFEs) from the specifications of the LTEMP ROD, **the effect on sediment delivery will need to be weighed against the benefits to humpback chub and the rainbow trout fishery**.