CMs & Triggers
(LTEMP BO)

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Today:

1) Conservation Measures - overview/Q&A
   See CMs in BO, highly abridged here (e.g. lots and lots of coordination/planning, etc. ID'd).

2) Action Triggers – overview/Q&A
   (if there is time) see details in doc!

<Handouts for both in back and posted>

Conservation Measures (CM) are designed to minimize or reduce the effects of the proposed action or benefit or improve the status of listed species. Becomes a part of the proposed action.

CMs address 5 listed species: Humpback Chub, Razorback Sucker, Southwestern Willow Flycatcher, Yuma Ridgway's Rail, and Kanab Ambersnail.

Humpback Chub -- Ongoing actions

Translocations & Translocation Monitoring:

- Marble & Grand canyon tributaries
- LCR above Chute Falls
- Control or removal of nonnative fish in tributaries prior to translocations
- Explore means to expand aggregations outside LCR; Evaluate feasibility of mainstem augmentation

Humpback Chub Ongoing Actions cont.

Monitoring LCR:

- LCR - Annual Spring and Fall population estimate
- LCR mainstem aggregation - annual monitoring
- LCR mainstem & LCR - periodic multistate model

Humpback Chub Ongoing Actions cont.

Monitoring/Evaluating Mainstem HBC:

- Mainstem – annual aggregations monitoring (status & trends, investigate pop. est. methods)
- Mainstem – periodic surveys to identify new populations
- Mainstem – evaluate and determine drivers for aggregations
- Mainstem – continue & expand parasite monitoring (HBC or surrogates)

Humpback Chub Ongoing Actions cont.

Misc:

- Maintenance of HBC refuge population

Humpback Chub New Actions

- Feasibility study for translocation of HBC into Upper Havasu Creek incollaboration with Havasupai Tribe

- Explore and evaluate other tributaries for potential translocations

Razorback Sucker Ongoing/New actions:

- Extent of hybridization in Flannelmouth and Razorback Sucker larvae in western Grand Canyon;
- Determine habitat use and distribution of life stages
- Assess the effects of TMFs and other dam operations

All Native Aquatic Species Ongoing Actions

- Feasibility of renovating Bright Angel and Shinumo creeks with a chemical piscicide, or other tools, as appropriate
- Fund removal of Brown Trout and other nonnative species from Bright Angel Creek its inflow, and from other areas (2017 evaluation of 5-year effort)

All Native Aquatic Species - **New Actions**

- Efficacy of a temperature control device at the dam
- Pursue means of preventing the passage of deleterious invasive nonnative fish through Glen Canyon Dam
- Alter the backwater slough at RM-12, making it unsuitable or inaccessible to warmwater nonnative species

All Native Aquatic Species - **New Actions**

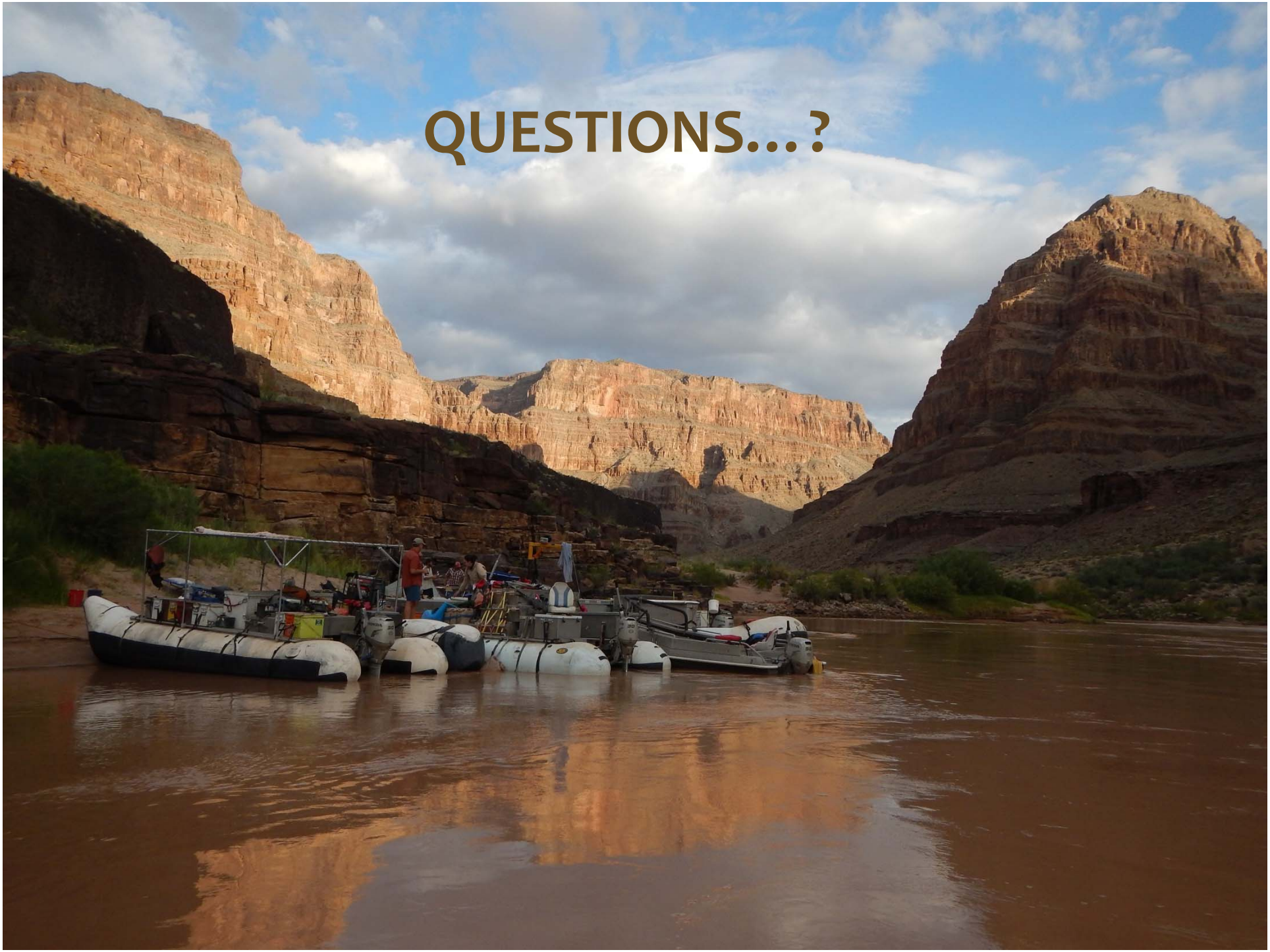
- Rapid response control efforts for newly establishing or existing deleterious invasive nonnative species
- Consider experimental use of TMFs to inhibit brown trout spawning and recruitment in Glen Canyon, or other mainstem locations

Southwest Willow Flycatcher & Yuma Rail

- Partially fund Southwestern Willow Flycatcher (every 2 years) and Yuma Ridgway's Rail (every 3 years) surveys throughout the life of the LTEMP.

Kanab Ambersnail **Ongoing**

- Ongoing monitoring of population


QUESTIONS…?


BUREAU OF RECLAMATION

Previous Triggers (HFE BO):

I. RBT>760 (MS @ LCR reach)

BNT>50 (MS @ LCR reach)

HBC<7000 (ASMR)

---OR---

II. RBT>760 (MS @ LCR reach)

BNT>50 (MS @ LCR reach)

150-199mm HBC <910 3 of 5 years (LCR)

Water Temp $\leq$ 12 C 2 Consecutive Years

40-99mm HBC decline 25% from preceding year (MS @ LCR reach)

Why Change?

- Mechanical Removal
  - Controversial - taking of life
  - Expensive
  - Efficacy?
- Challenged to reduce reliance on MR

Concept proposed – to use conservation actions to bridge temporary population declines due to predators →Two Tier Approach

Who's We?

Developed by an Ad Hoc group of Grand Canyon Aquatic Biologists from USFWS, USGS-GCMRC, AZGFD, NPS, USBR (Kirk Young, David Van Haverbeke, Scott Vanderkooi, David Ward, Charles Yackulic, Mike Yard, Brian Healy, Melissa Trammel, David Rogowski, Marianne Crawford)

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Tier 1 Trigger – Early Intervention Through Conservation Actions:

1a. Adult HBC (LCR & Agg) point estimate <9,000 (e.g., multi-state).

-OR-

1b. Recruitment of sub-adult HBC (150-199mm) does not equal or exceed estimated adult mortality:

1) LCR sub-adult abundance 3-year running average <1,250 (Spring LCR estimate)

-OR-

2) JCM Sub-adult abundance 3-year running average <810 (JCM annual fall population estimate; RM 63.45-65.2)

Tier 1 Response: Conservation actions implemented in the LCR or in the adjacent mainstem. Conservation actions focus on increasing growth, survival and distribution of HBC in the LCR & LCR mainstem aggregation area.

Tier 2 Trigger - Reduce threat using mechanical removal if conservation actions in Tier 1 are insufficient to arrest a population decline:

Adult HBC point abundance estimate (LCR & Agg) <7,000, as estimated by the currently accepted HBC population model.

Tier 2 Response:

Mechanical removal will ensue and terminate if:

Predators depleted to less than 60 RBT/km for at least two years in the JCM reach and immigration rate is low (the long term feasibility of using immigration rates as a metric still needs to be assessed),

--OR --

Adult HBC population estimates exceed 7,500 and recruitment of sub-adult chub exceed adult mortality for at least two years.

Caveats

- Assumes predation is 1^{o} driver in HBC declines
- Intended to be adaptive – reviewed as needed, no less than every 5 years
- Actions and triggers will need to adapt if HBC are found to be impacted by other factors
- Re-evaluation if a new deleterious nonnative aquatic species is detected in or adjacent to the LCR Reach, mechanical removal likely necessary

Thank You

Photo by D. Van Haverbeke