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Proposed Approach and Core Elements of Long-term Experiment in the Grand Canyon

Scientific Approach and Duration of Treatments:

Because of the vicissitudes of hydrological conditions and the inability to control complicating exogenous variables that affect outcomes, it is difficult and expensive to conduct a large "field experiment" by sequential treatments of one management action at a time. We suggest a combined management approach; an experiment that includes all of the treatments that generally scientists agree, based on evidence available, will achieve the stated goals. We believe that participants in the AMP have a good sense of the goals we want to achieve. We also know what appears not to be working for certain resources and what occurred during historic operations.

The Combined Management Action (CMA) experiment we propose consists of both flow and non-flow management actions. The CMA experiment should probably last six to ten years (or longer, depending on how hydrological conditions vary the experimental period of time and what data gaps exist). We propose that the experiment be developed around the following core management actions.

Core Elements

1. Mechanical removal: This appears to be working. The GCMRC and the AMP participants are familiar with its success regarding trout.

   Variations:

   - Mechanical removal could be increased in frequency within a year to affect a higher removal rate and/or do it every second or third year to coincide with the best river conditions for young HBC survival, e.g., turbid conditions, reduction in trout from warm water.

   - Mechanical removal could be expanded to target other non-native species. It may be used in tandem with the TCD to combat the advance of warm-water species.

   - The geographical reach of mechanical removal could be increased.

2. Temperature Control Device: It is widely surmised that a barrier to the further establishment of a HBC population is cold temperatures in the mainstem.

   Improvements/variations:

- The current plan is for a pilot project that fits two penstocks with TCD devices. This would not appreciably affect the temperature in the river. Therefore, a more aggressive plan would be to accelerate the time frame of the pilot project, so that analysis and evaluation took place sooner and, if warranted, retrofit additional penstocks in order to create a temperature difference.

- Because of the possibility of an increase in competitive and predatory warm water fish as a result of increase temperatures, this action should be combined with other management actions, stated here – mechanical removal targeted at warm-water species and a HBC comprehensive plan.

3. Implementation of the Humpback Chub Comprehensive Plan: The plan developed by the HBC ad hoc committee includes 19 or so important actions to improve the condition of the Grand Canyon HBC population.

   Improvements:
   - There are other management actions that may be added.

   - The comprehensive HBC plan may form the basis of an action plan for a Grand Canyon Recovery Program

4. Increased Fluctuations in Daily Flows - during the trout spawning season. Spawning occurs over the entire year, but is concentrated in the late fall, winter and early spring. The last two years, this experiment has been conducted during the Jan. - March time frame. There is evidence that the months in which this experiment is run should be expanded.

   Experimental variations:
   - Small-bodied nonnative fish (including fingerling trout produced in winter/spring) may proliferate in backwaters if they become too stable in the summer. This will create too much predation and competition for survival of young HBC. Experimentation of increased fluctuation in the summer months is likely to benefit sediment conservation as well.

   - In order to complement the goal of sediment conservation, some variation in the ramp rates and the number of hours at peak flows vs. minimum flows would be included in the experimental design.

5. Beach Habitat Building Flows: BHBFs would be used in the late Summer, early Fall, following monsoonal rain events that delivers the "trigger" amount of sediment. The first of these experiments would be "HMF" - up to powerplant capacity. There needs to be criteria for defining success.

   Variations

- If it becomes necessary to experiment with releases above powerplant capacity, it will be clear that any management action that resulted from a successful experiment will only be put into place if bypass tubes will be retrofitted with turbines and generators.

Considerations

- The success of a CMA built around these core elements would be measured against ROD flows. Elements of a LT experiment would include ROD flows as a control if data gaps about the affect of ROD operations still exists,

- ROD operations would be the default operation for months and/or years in which experimental operations where not called for in the long-term plan,

- If the necessary scientific data can be gathered using inexpensive means, this should replace an expensive experiment,

- Retrofitting the bypass tubes with generators, if this action was deemed necessary to comply with the law and meet environmental goals would be subject to the availability of appropriated dollars and probably to standard government practices such as a benefit cost analysis,

- Considered over a range of hydrological conditions,

- Take advantage of opportunities,

- Concentrate on data gaps,

- Sensitive to effects of tributary inputs.

Boundaries

The LT experiment will need to be:

- Economically feasible,
- Consistent with hydrological conditions and reservoir levels,
- Consistent with USBR's maintenance schedule,
- Consistent with NPS mandates,
- Consistent with requirements of the NHPA and ESA,
- Is within the law of the river.