



# Possible LTEMP Experimental and Management Actions for 2018

**Adaptive Management Work Group Meeting  
February 14-15, 2018**

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# Communication and Consultation Process for Experiments

- Annual Reporting meeting
  - Present learning from previous experiments
  - Use best available science and information
- Meet w/ TWG to discuss experimental actions being contemplated for the year

## 1.4 COMMUNICATION AND CONSULTATION PROCESS FOR ALTERNATIVE D

In implementing the processes described in Section 1.3 and the associated decision process shown in Figures 4 and 5, the DOI will exercise a formal process of stakeholder engagement to ensure decisions are made with sufficient information regarding the condition and potential effects on important resources. As an initial platform to discuss potential future experimental actions, the DOI will hold GCDAMP annual reporting meetings for all interested stakeholders; these meetings will present the best available scientific information and learning from previously implemented experiments and ongoing monitoring of resources. As a follow-up to this process, the DOI will meet with the TWG to discuss the experimental actions being contemplated for the year.

LTEMP ROD, Appendix B



# Experimental Technical Team

- Implementation/planning meetings or calls
- Experimental team strive for consensus recommendation to bring to DOI
- Secretary retains sole discretion

## 1.4 COMMUNICATION AND CONSULTATION PROCESS FOR ALTERNATIVE D

To determine whether conditions are suitable for implementing or discontinuing experimental treatments or management actions, the DOI will schedule implementation/planning meetings or calls with the DOI bureaus (USGS, NPS, FWS, BIA, and Reclamation), WAPA, AZGFD, and one liaison from each Basin State and from the UCRC, as needed or requested by the participants. The implementation/planning group will strive to develop a consensus recommendation to bring forth to the DOI regarding resource issues as detailed at the beginning of this section, as well as including WAPA's assessment of the status of the Basin Fund. The Secretary of the Interior will consider the consensus recommendations of the implementation/planning group, but retains sole discretion to decide how best to accomplish operations and experiments in any given year pursuant to the ROD and other binding obligations.

# Consultation

- With Tribes, AGFD, States, as requested

## 1.4 COMMUNICATION AND CONSULTATION PROCESS FOR ALTERNATIVE D

DOI will also continue separate consultation meetings with the Tribes, AZGFD, the Basin States, and UCRC upon request, or as required under existing RODs.

# LTEMP Commitments to Tribes

## 6.5 Commitments to Tribes

- Traditionally Associated Tribes<sup>3</sup> shall be notified at least 30 days in advance of planned experimental flows (including HFEs, TMFs, MPFs, and LSFs).
- The DOI is committed to finding beneficial uses with Traditionally Associated Tribes for nonnative fish that are mechanically removed as part of the LTEMP actions to the extent practicable.
- The DOI recognizes the opportunities for cooperative and collaborative partnerships with tribes in the management of Federal lands and resources related to the LTEMP as stated in Secretarial Order No. 3342.



# 2018 Possible LTEMP Experiments

- No Experiments
- Bug Flows (May – Aug)
- Trout Management Flows (May – Aug)
- Fall HFE (Oct – Nov)
- Extended duration fall HFE (Oct – Nov)

# 2018 Spring/Summer Experiments

- Bug Flows (May – Aug)
- Trout Management Flows (May – Aug)
- Can we do both, or would results be confounding?
- Status of resources?
- What could we learn from these?
- Experimental design considerations?
- Are we prepared to implement? (scientifically, logistically)
- How could resources benefit from one or the other?

RECLAMATION



# 2018 Experimental Implementation Process

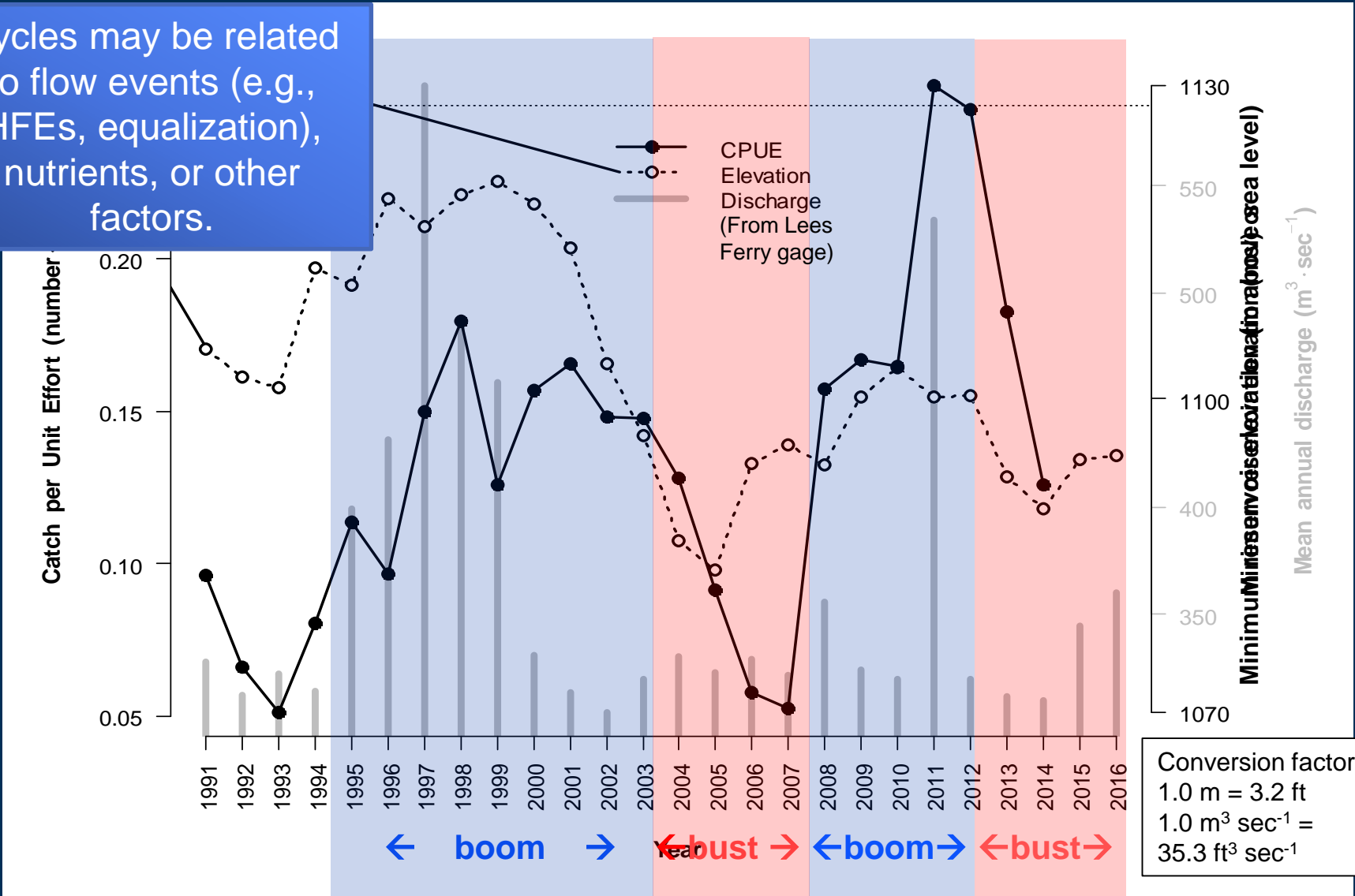
- Annual Reporting meeting (Jan, Mar?)
  - Learn from past experiments, other new information
- Discussion at TWG of possible 2018 experiments (Jan)
- Initial notification to Tribes, invitation to consult (Jan/Feb)
- Experimental Tech Team coordination (Jan-Mar)
  - Evaluate status of resources
  - consider input from Tribes, TWG, AMWG
  - develop recommendation for Leadership team (Mar 30)
- Notification to Tribes (minimum 30-days prior)
- Leadership Team recommendation, DOI decision (mid-April)
- Potential Experiment Implementation (earliest is May)

RECLAMATION



# Boom-and-Bust Cycles in Glen Canyon Rainbow Trout

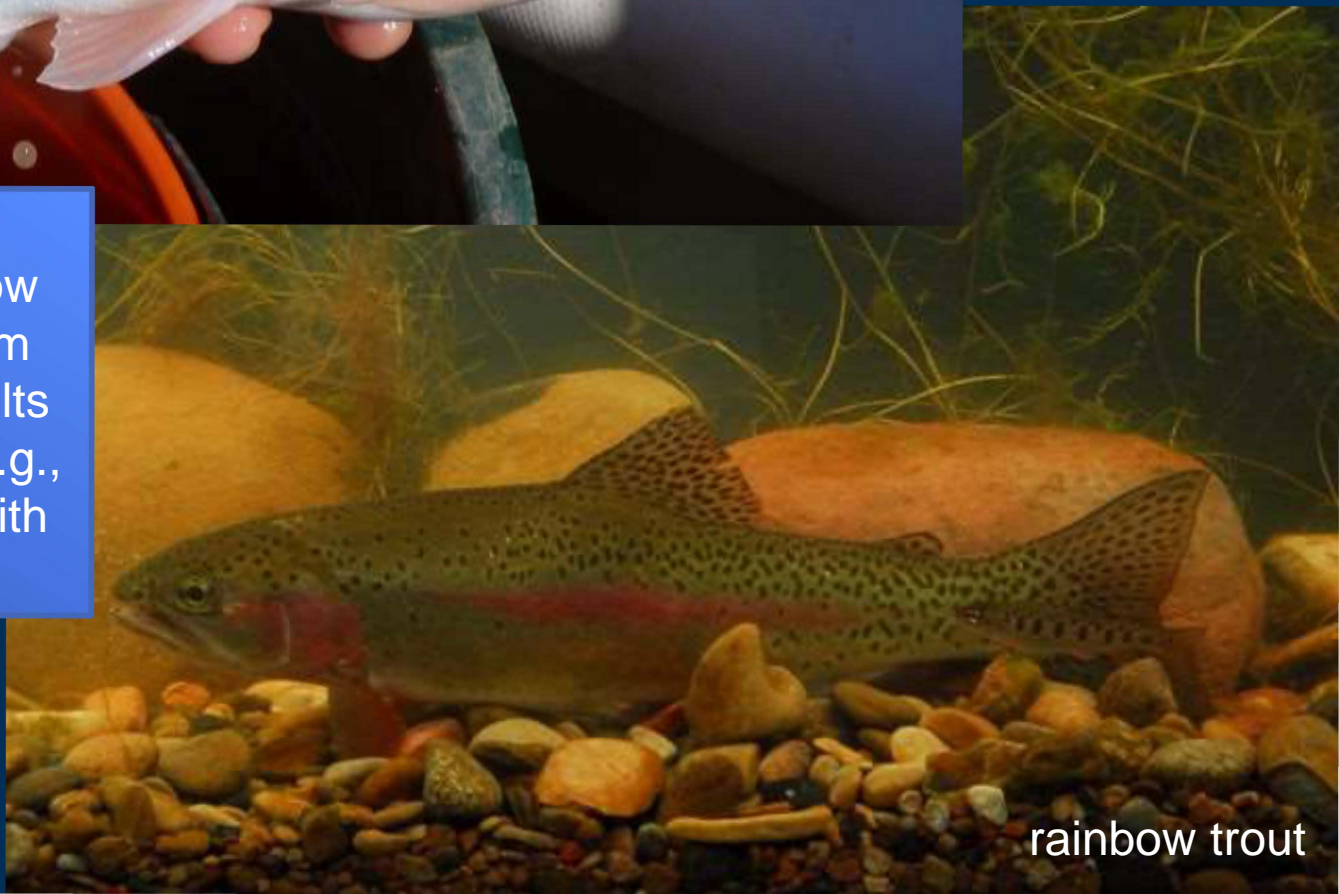
Cycles may be related to flow events (e.g., HFEs, equalization), nutrients, or other factors.





humpback chub

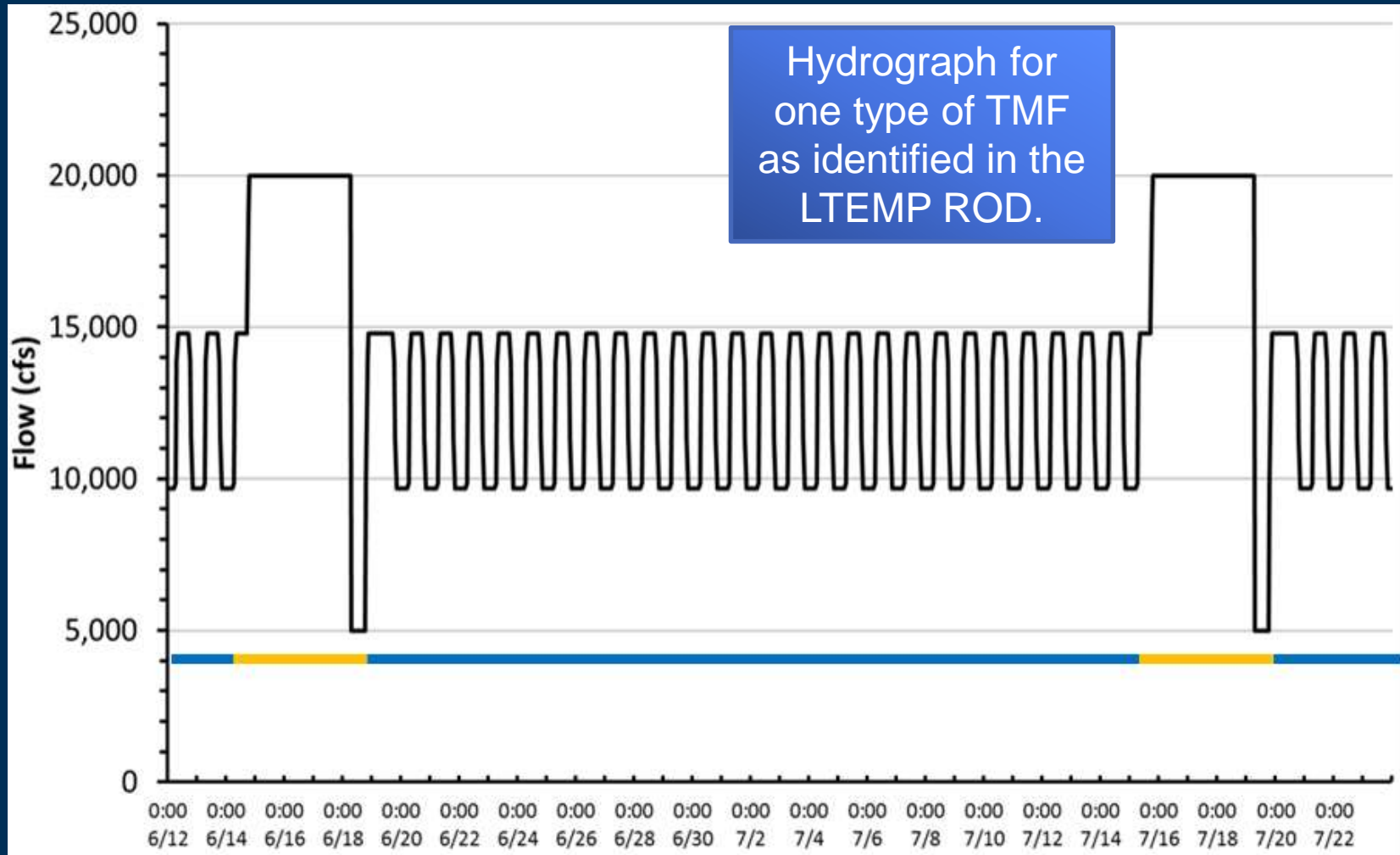
Concern is that an overabundance of rainbow trout leads to downstream dispersal which then results in negative interactions (e.g., predation, competition) with humpback chub.



rainbow trout



# Trout Management Flows (TMF)



# Trout Management Flow Design & Assessment

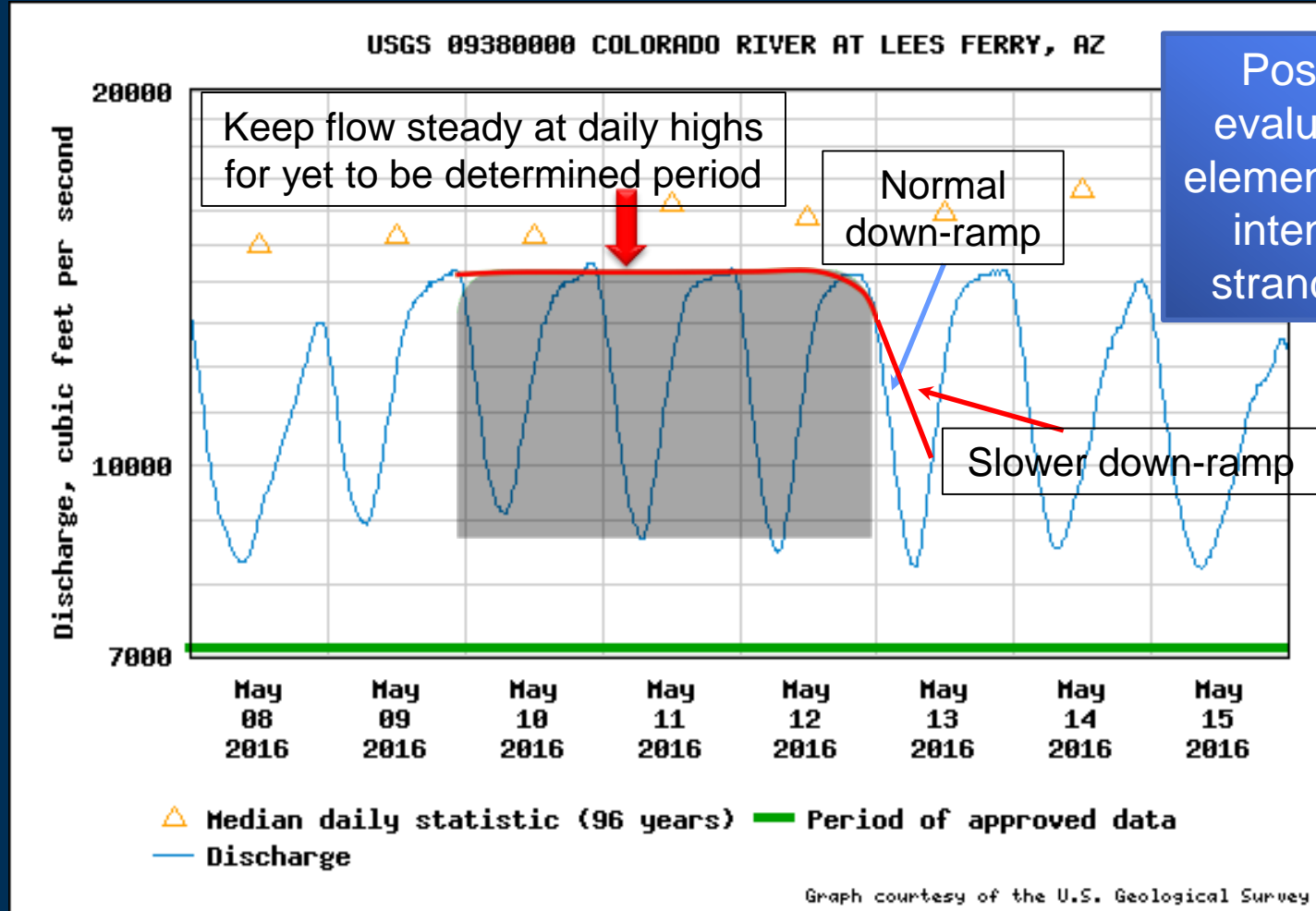
- Literature review
- Optimization of flow design
  - Bathymetry data
  - GIS analysis
- Field experiments
  - Mesocosm experiments
  - Field studies to evaluate TMFs or TMF elements (Exp. Projects)
  - Study to assess annual recruitment of YOY (Project H)





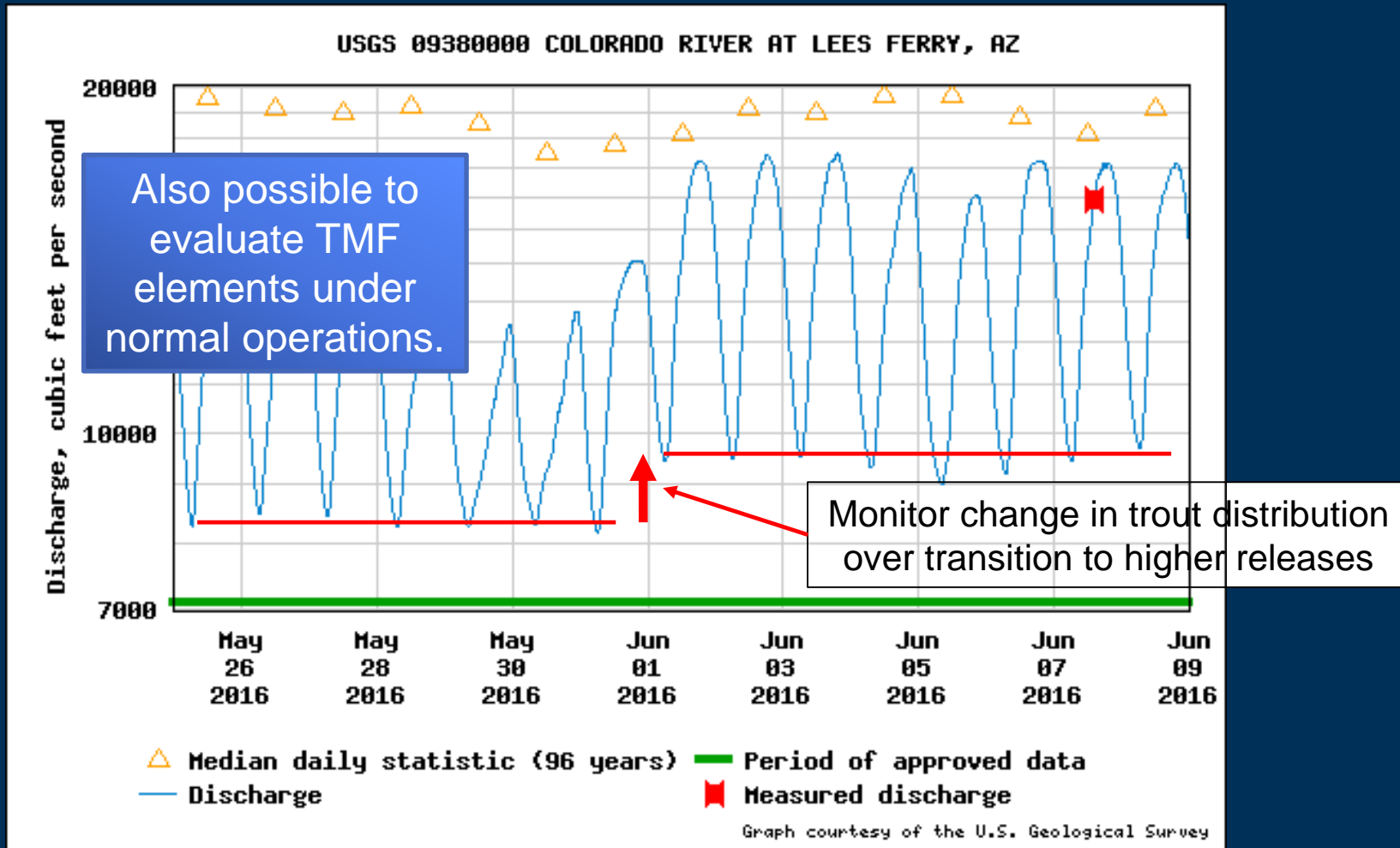
Example half-TMF: discharge at Lees Ferry

# Trout Management Flow Design & Assessment



Possible to evaluate TMF elements without intentionally stranding fish.

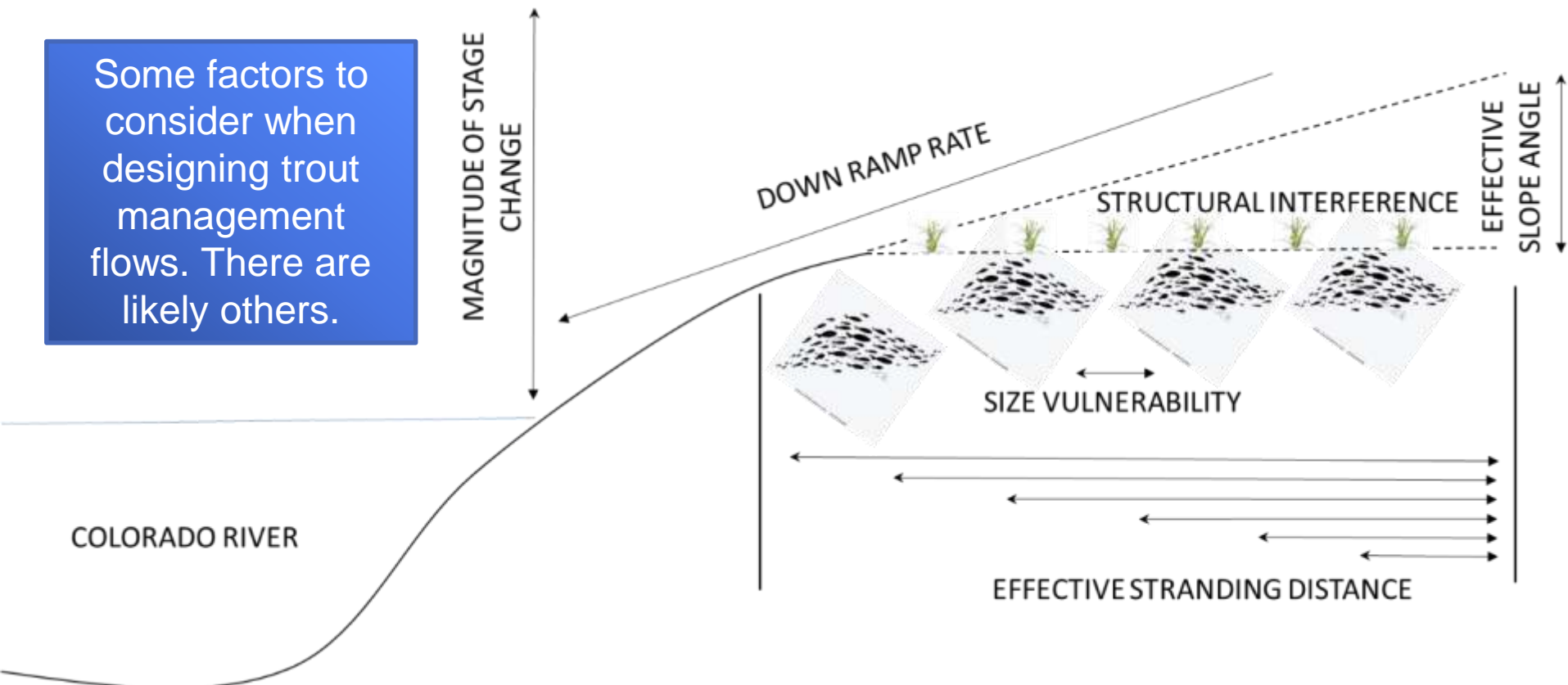
# Trout Management Flow Design & Assessment





# Trout Management Flow Design & Assessment

Some factors to consider when designing trout management flows. There are likely others.



## Some Questions:

- What is the dispersal rate of young-of-year rainbow trout (YOY) up slope from the initial minimum discharge to the new minimum discharge?
- When there is an increase in discharge, what is the proportion of YOY that move upslope across the newly wetted zone?
- Is the YOY density distribution narrowly confined to the newly wetted edge or is it broadly distributed across the newly wetted zone?
- Is upslope movement YOY size dependent?
- What flow recession rates are effective at stranding YOY?

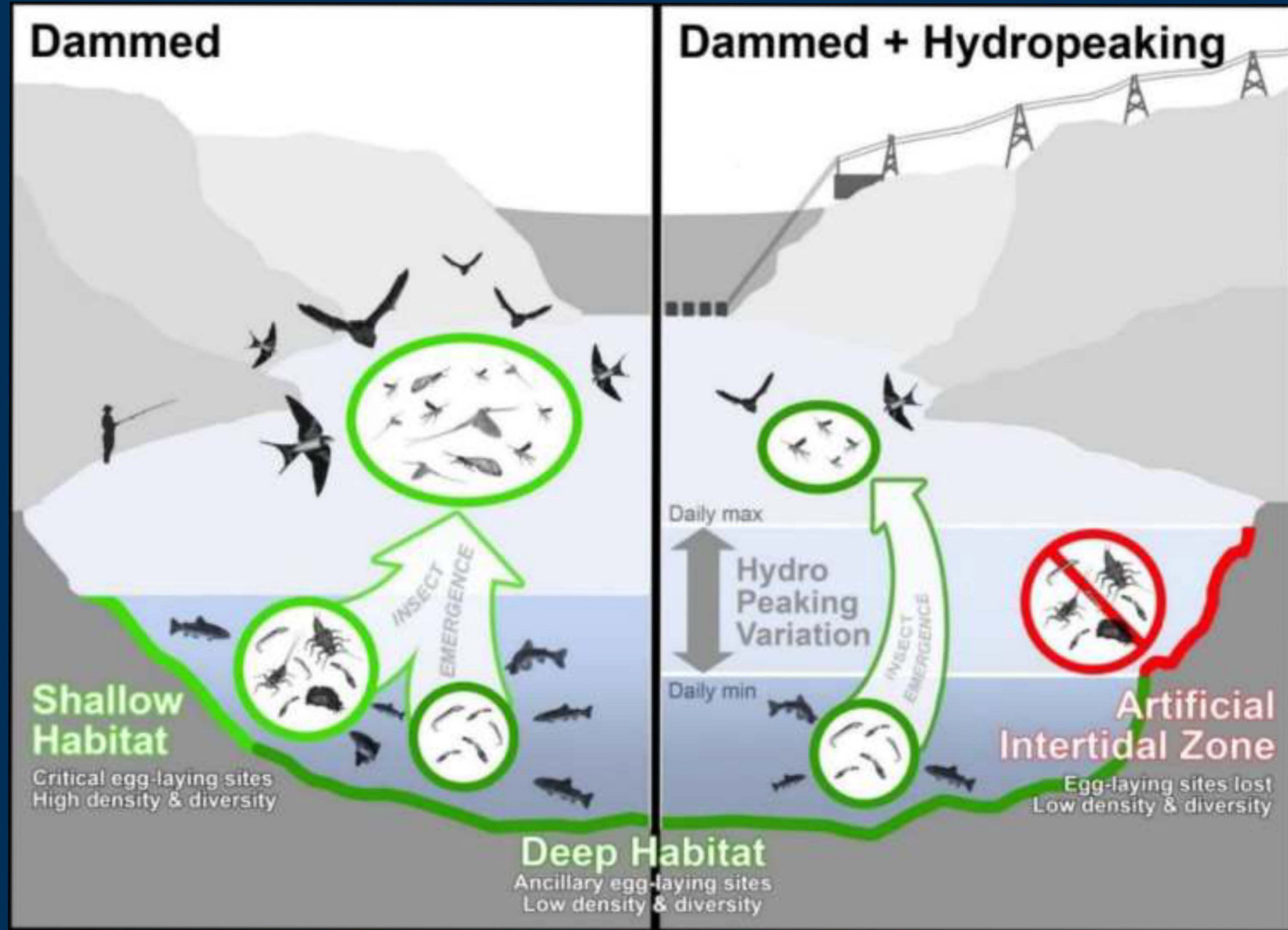


## Some More Questions (there are likely others):

- When flows recede, are there differences in the YOY size that are vulnerable to stranding?
- When flows recede, what is the effective stranding distance for YOY in relation to the distance required to return back to receding wetted edge?
- Is there a difference in stranding YOY due to structural interference (bare substrate vs. vegetation)?
- Does shoreline slope effect stranding; and if so, what is the maximum slope that is effective at stranding YOY?
- Is the distribution or behavior of YOY affected by time of day (daytime vs. nighttime)?



# Hypothesized Aquatic Insect Recruitment Limitation



# Spatial Periodicity in Midge Abundance

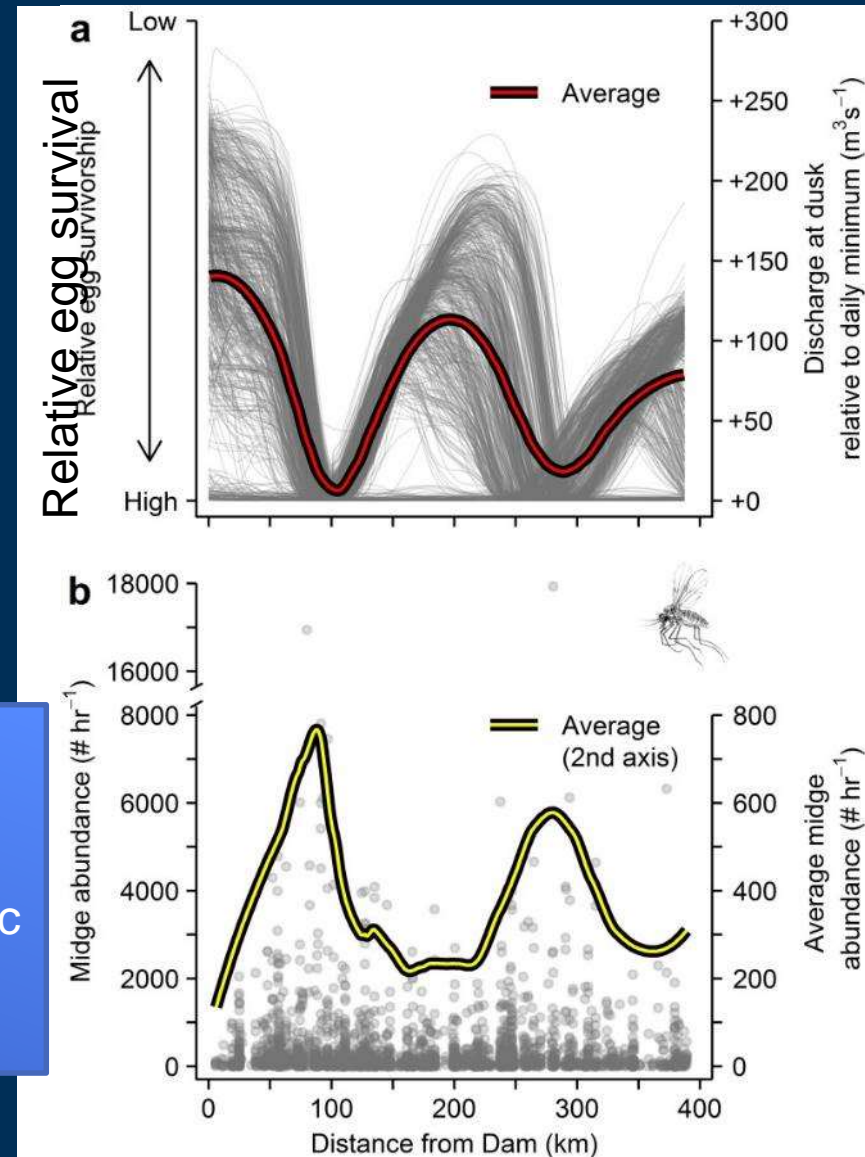
Midges: 3X greater at nodes



Timing of midge egg laying consistent with observations of greatest midge abundance at sites where flows are low at dusk. Supports hypothesis that daily flow variation limits aquatic insects that lay eggs along river margins. Supports rationale for testing bug flows.

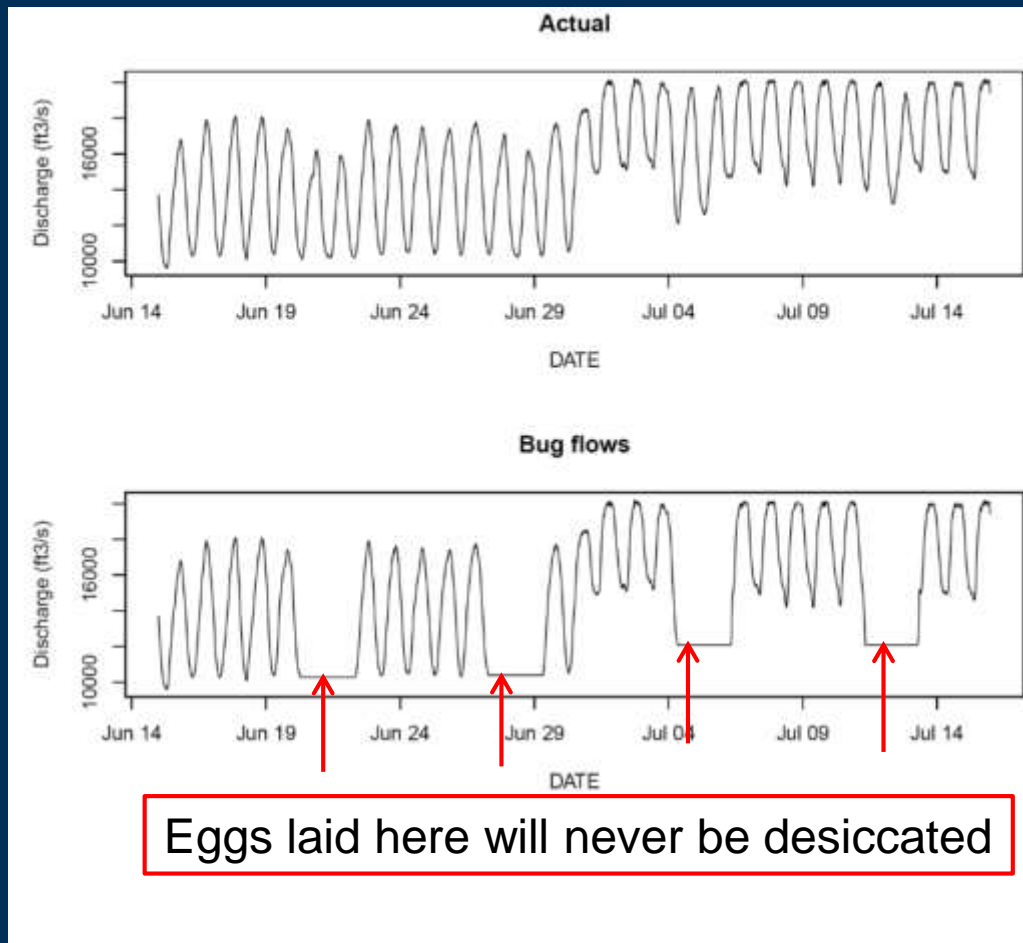


Kennedy et al. 2016  
*BioScience*



# Macroinvertebrate Production Flows (i.e., Bug Flows): Give bugs the weekend off!!

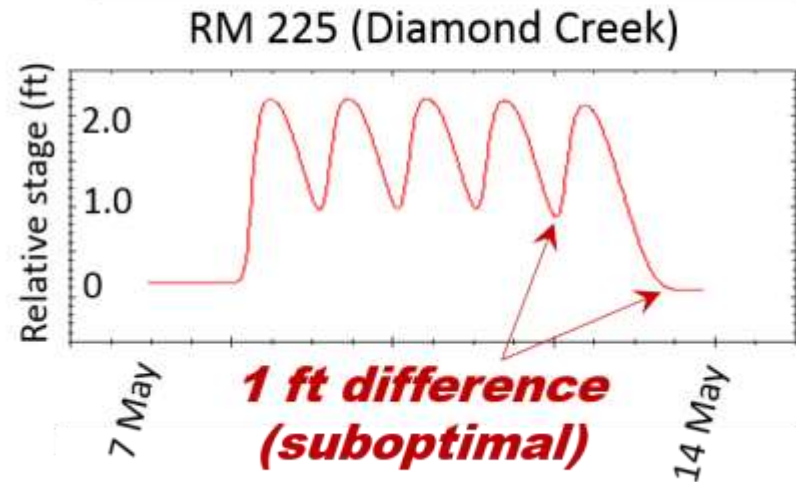
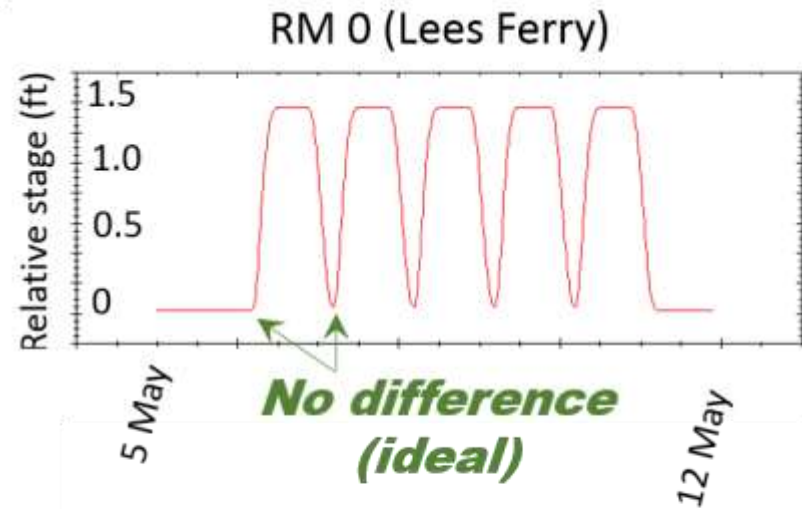
- Steady/low flows weekends May-Aug (36-38 d/yr)
- Periodically create ideal egg-laying conditions





# Optimizing “Bug Flows”

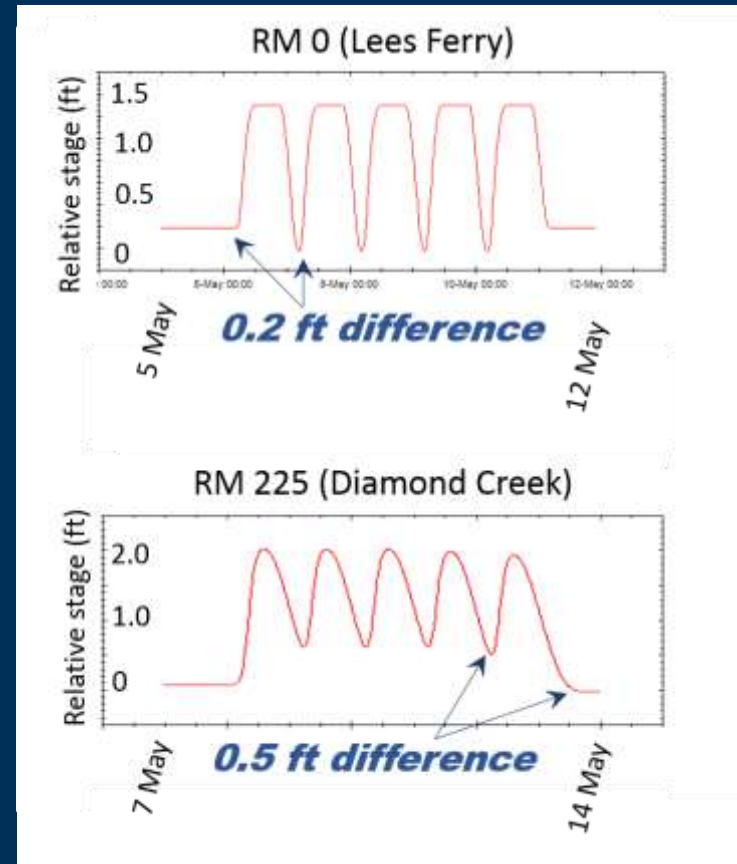
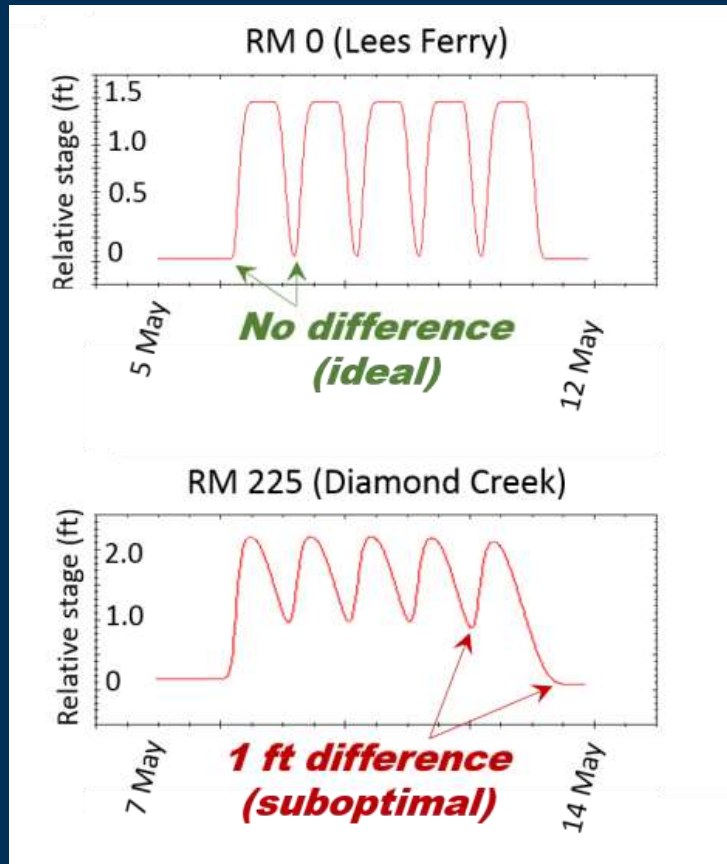
- Goal of bug flows is to reduce stage on weekends
  - Provides ideal egg-laying habitat 2 days out of 7
  - Eggs laid on weekends (min weekly stage) never dry out
- But an ideal bug flow at Lees Ferry is less ideal at Diamond Creek, as daily waves move downstream



# Optimizing “Bug Flows”

Raise weekend flow by ~1000+ CFS

Optimize conditions river-wide, not just at Lees Ferry!



# Questions?