



LTEMP Science Plan

Technical Workgroup Meeting

October 18-19, 2016

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Grand Canyon Monitoring and Research Center

Southwest Biological Science Center

U.S. Department of the Interior
U.S. Geological Survey

LTEMP EIS:

Final EIS released Oct 7

ROD in November

Implemented over the next 20 years



Glen Canyon Dam

Long-Term Experimental and Management Plan
Environmental Impact Statement



PUBLIC DRAFT

Volume 1—Chapters 1-8

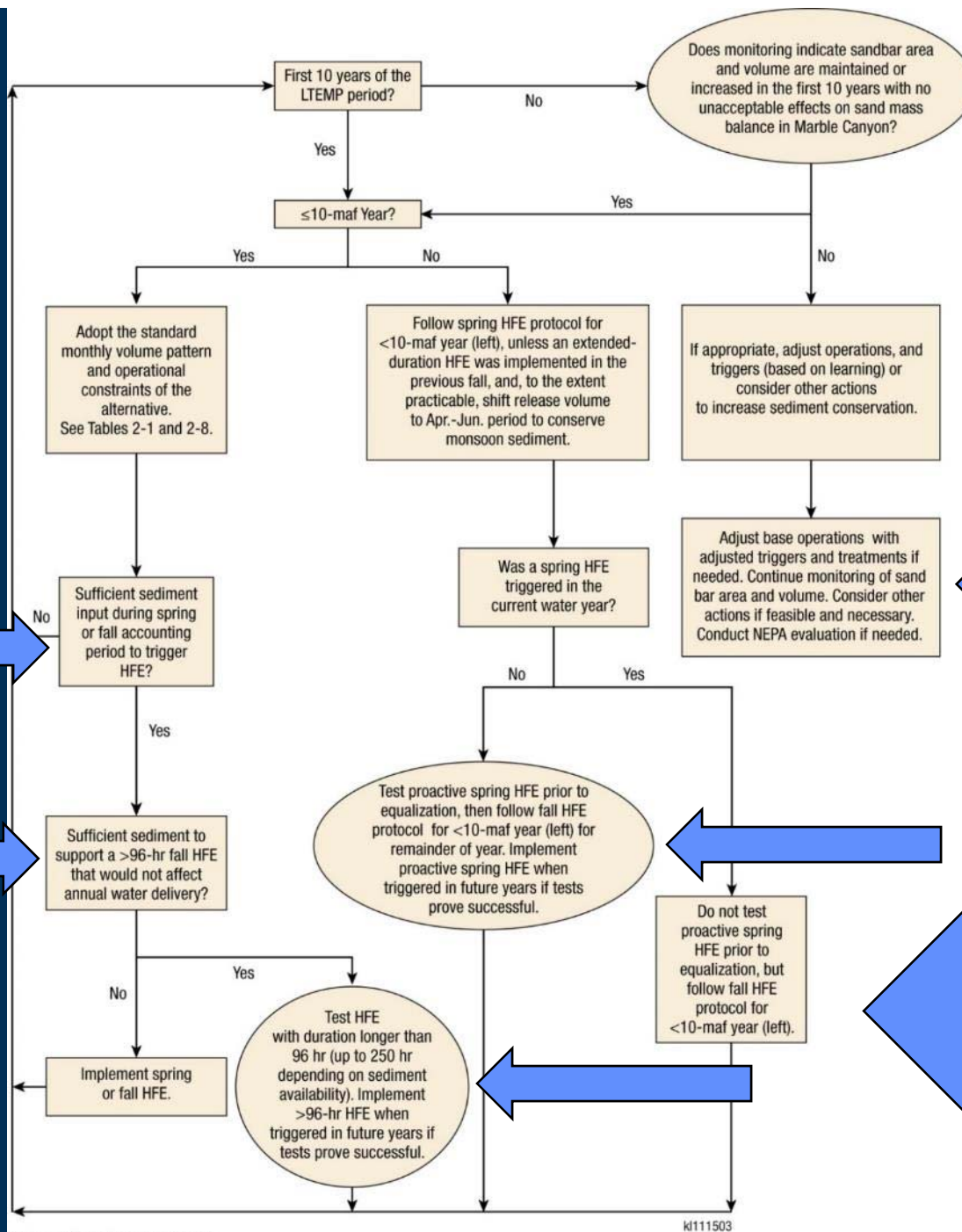
U.S. Department of the Interior
Bureau of Reclamation,
Upper Colorado Region
National Park Service,
Intermountain Region

December 2015



Preferred Alternative: Sediment-Related Adjustments to Base Operations

- Fall and spring HFEs (up to 96 hours)
- Proactive spring HFEs (initially 24 hours)
- Extended-duration HFEs (up to 250 hours)
- Trout management flows



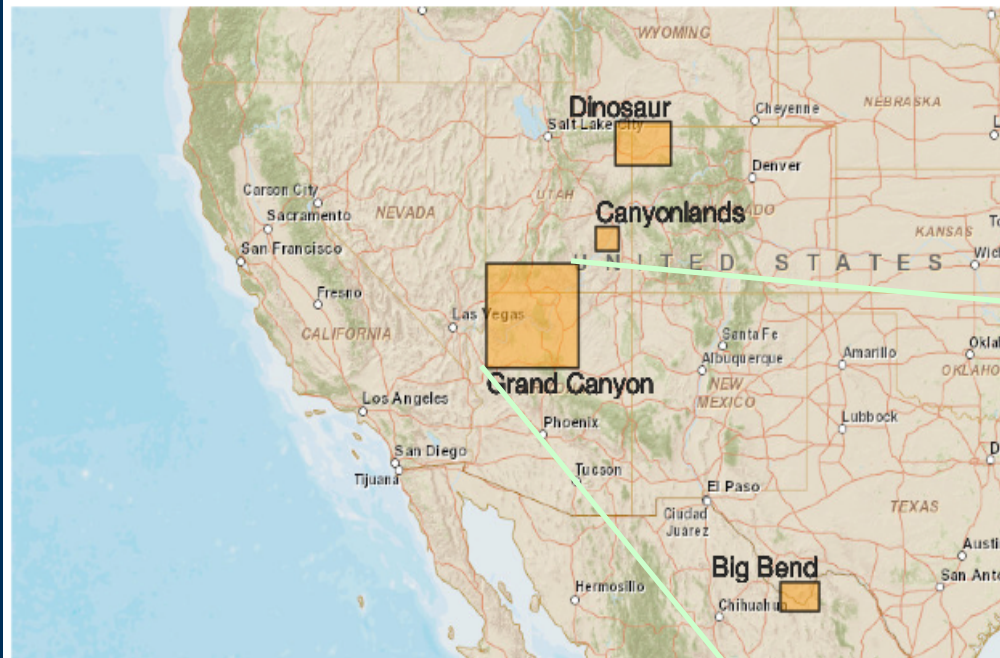
HFE = High-Flow Experiment
NEPA = National Environmental Policy Act

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Arrows show where scientific information needed

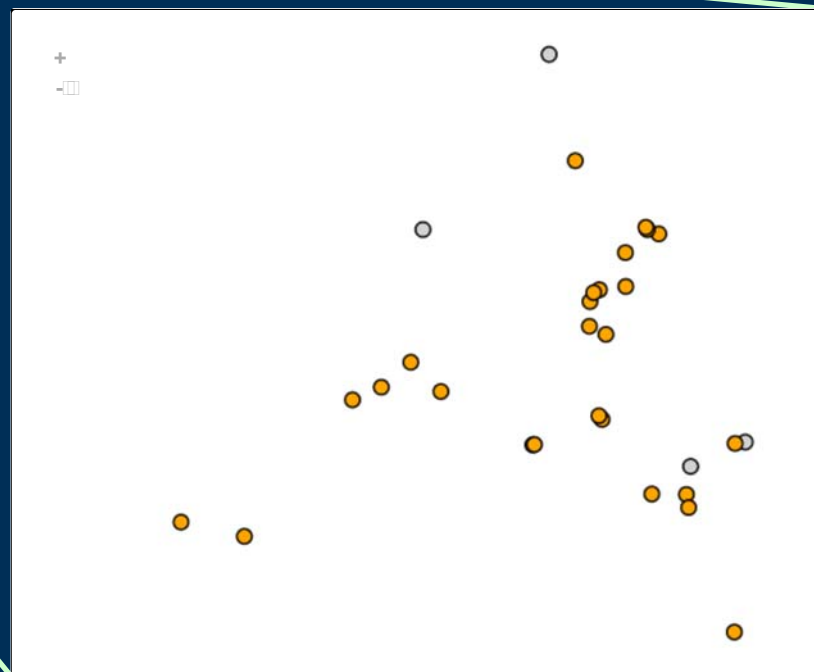
Streamflow, Sediment Transport, and Sand Budgets in the Colorado River





Provides technical data to managers and stakeholders in near real time to facilitate river management decisions

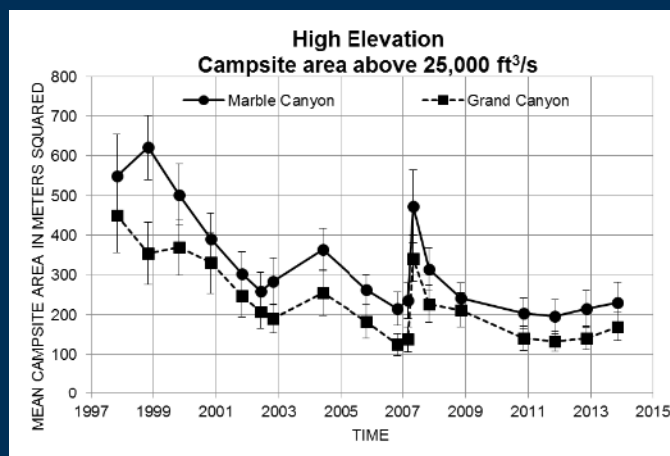
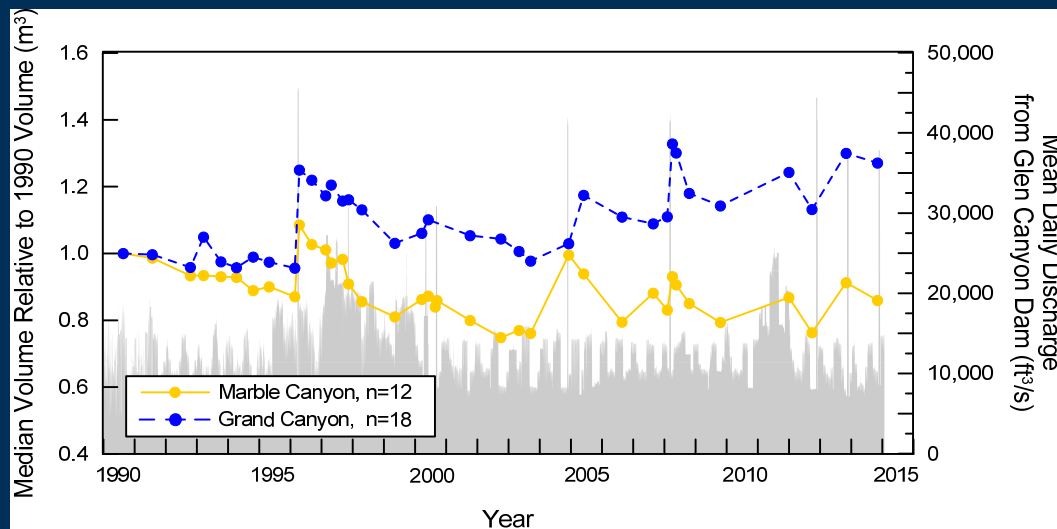
- Suspended- and bed-sediment data
- Sediment loads (silt and clay loads and sand loads)
- User-interactive sand budgets in 6 reaches from Lees Ferry to Lake Mead



www.gcmrc.gov

http://www.gcmrc.gov/discharge_qw_sediment/

Annual Sandbar and Campsite Monitoring



Data at www.gcmrc.gov/sandbar/

Preliminary data, do not cite

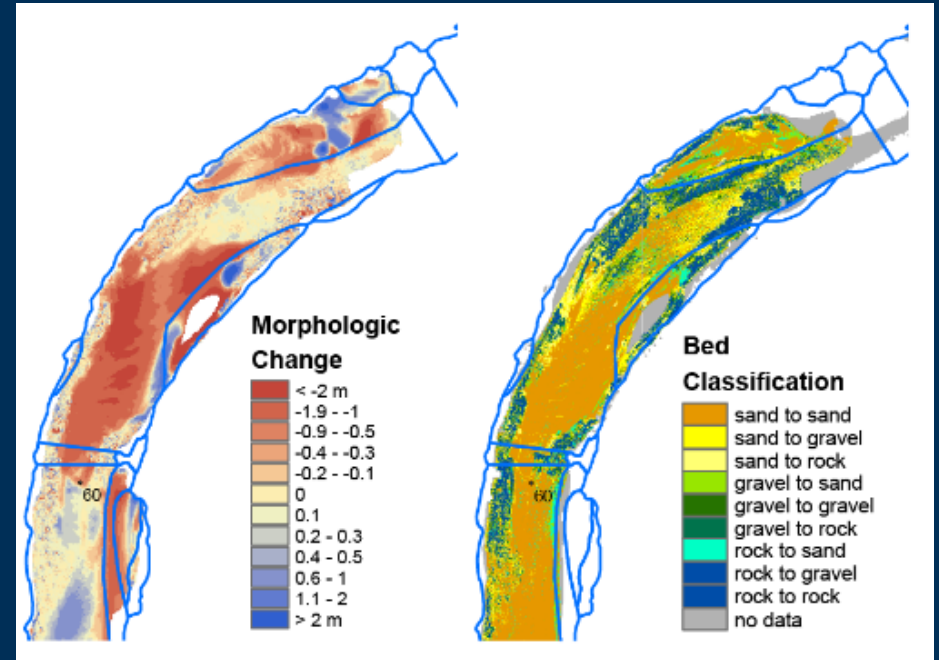


Remote Cameras: Immediate sandbar response to HFEs



Photos at www.gcmrc.gov/sandbar/

Channel Mapping: Long-term trends in sand storage and bed composition



- Monitor long-term changes in sand storage and bed composition
 - Marble Canyon and eastern Grand Canyon
 - Possibly other reaches

Preliminary data, do not cite



Remote sensing

- Aerial, lidar, and satellite imagery and data.
- Data are used for:
 - Maps to support field data collection and river navigation
 - Analysis and change detection of sandbars, riparian vegetation, backwater and near-shore habitats, and other ecosystem-wide mapping

Little Colorado River
Confluence



Glen Canyon Slough



Upper Chevron Camp



National Canyon 2009



National Canyon 2013



Kanab Creek 2009



Kanab Creek 2013

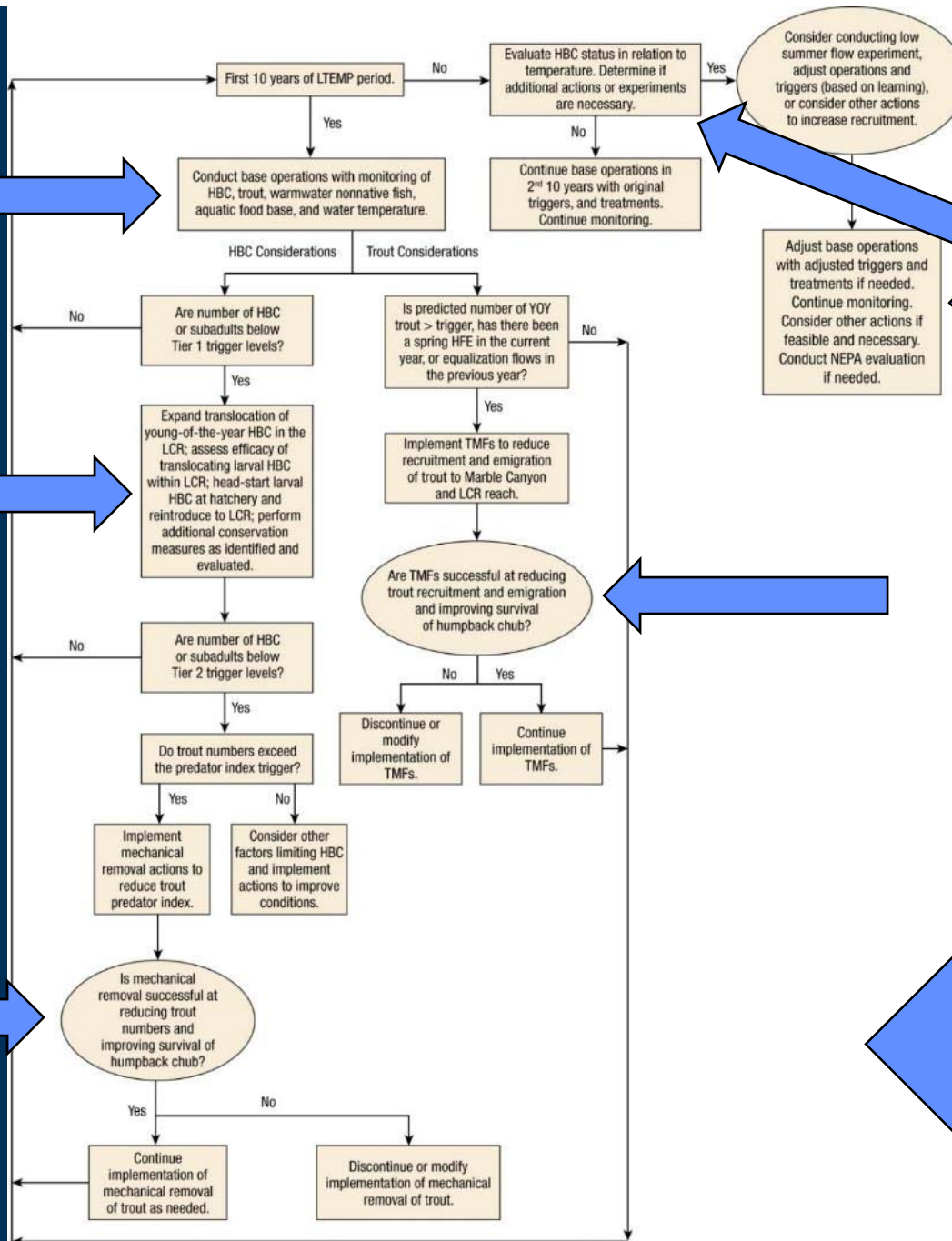


Extended Duration and Proactive HFE Monitoring

- Temporal and longitudinal changes in suspended sediment concentration during floods
- Lateral changes in concentration in eddy deposition zones
- Temporal and longitudinal comparisons of sandbar topography during floods to determine changes in deposition rates of fine sediment in eddies
- Suggest establishing contingency fund to support more extensive evaluation

Preferred Alternative: Aquatic Resource-Related Adjustments to Operations and Non-Flow Actions

- Trout control actions
 - Trout management flows (TMF)
 - Mechanical removal from the LCR reach
- Macroinvertebrate production flows
- Low summer flows
- Non-flow vegetation treatments



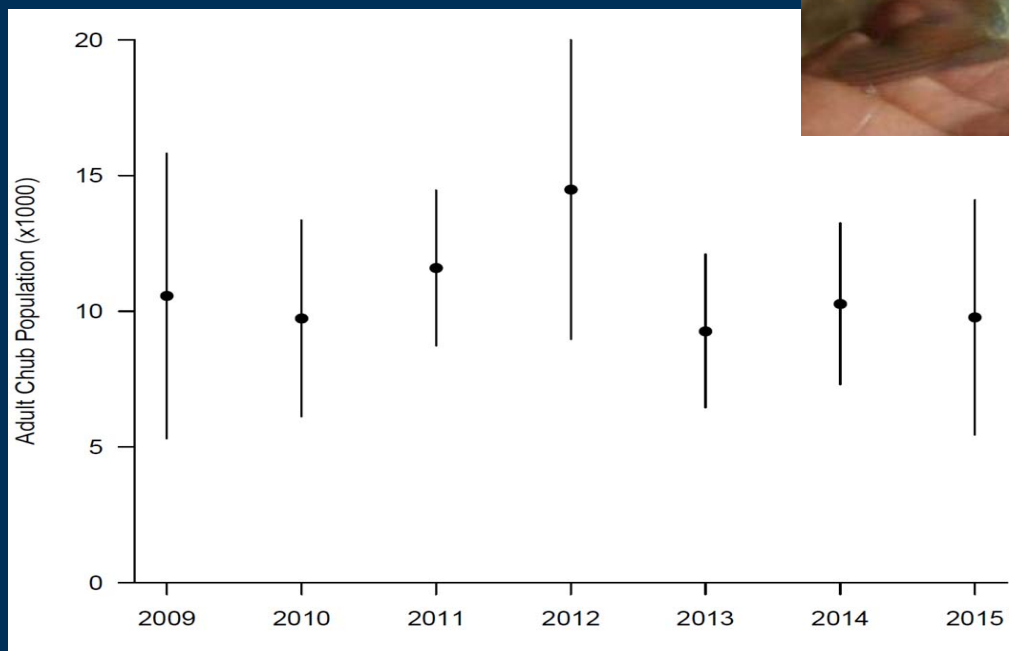
HBC = Humpback Chub
HFE = High-Flow Experiment
LCR = Little Colorado River

NEPA = National Environmental Policy Act
TMF = Trout Management Flow

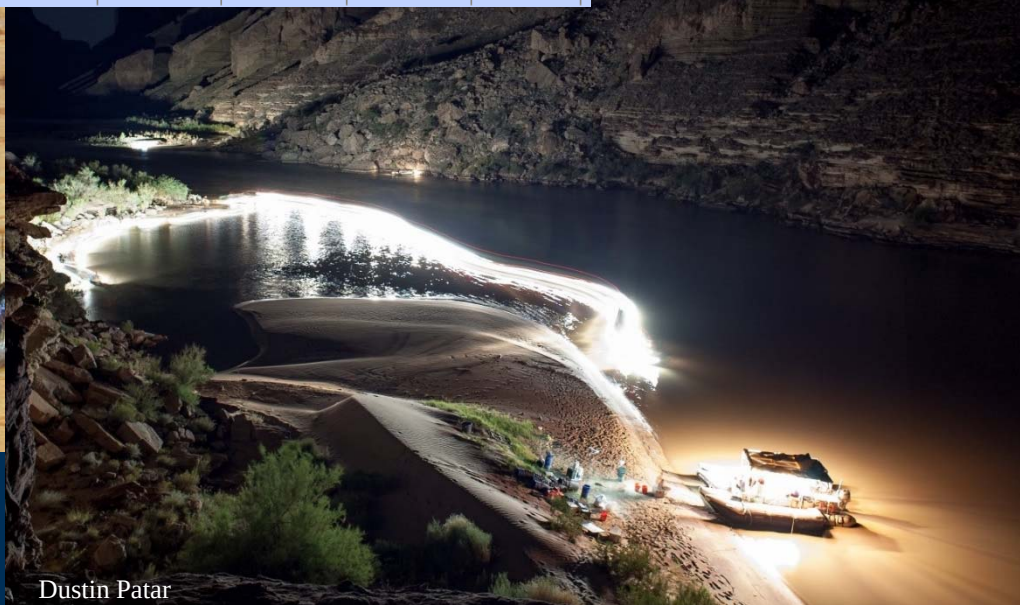
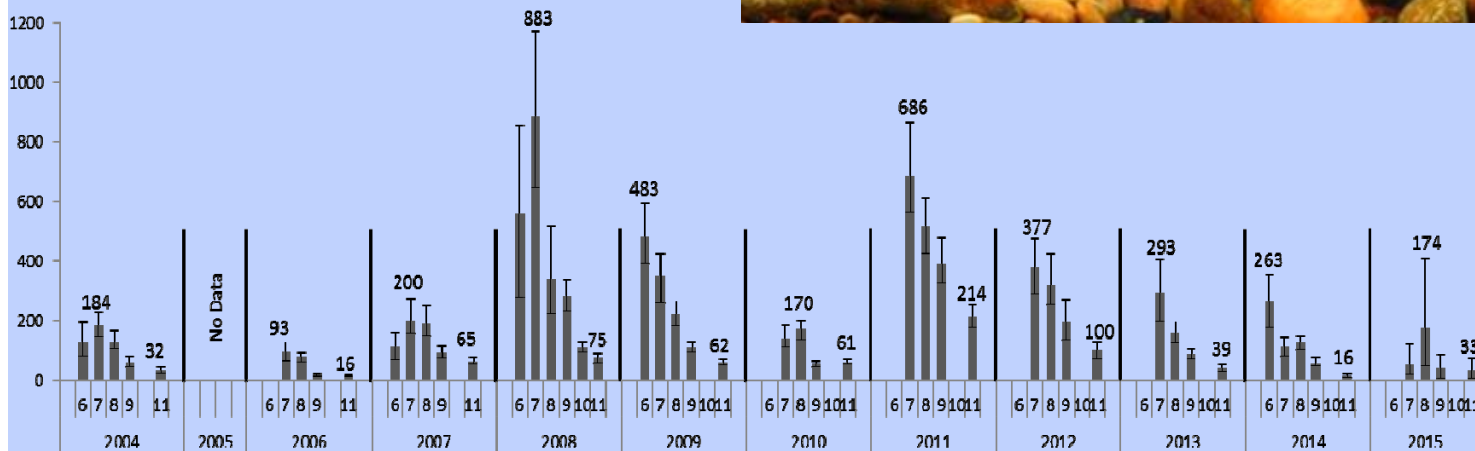
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Arrows show where scientific information needed

Humpback Chub Monitoring



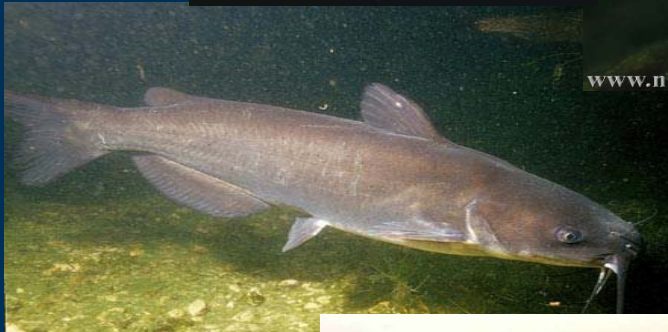
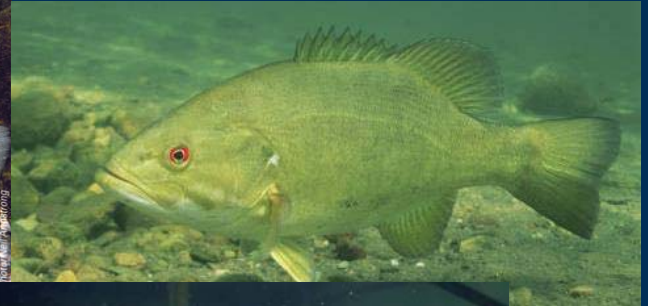
Rainbow Trout Monitoring



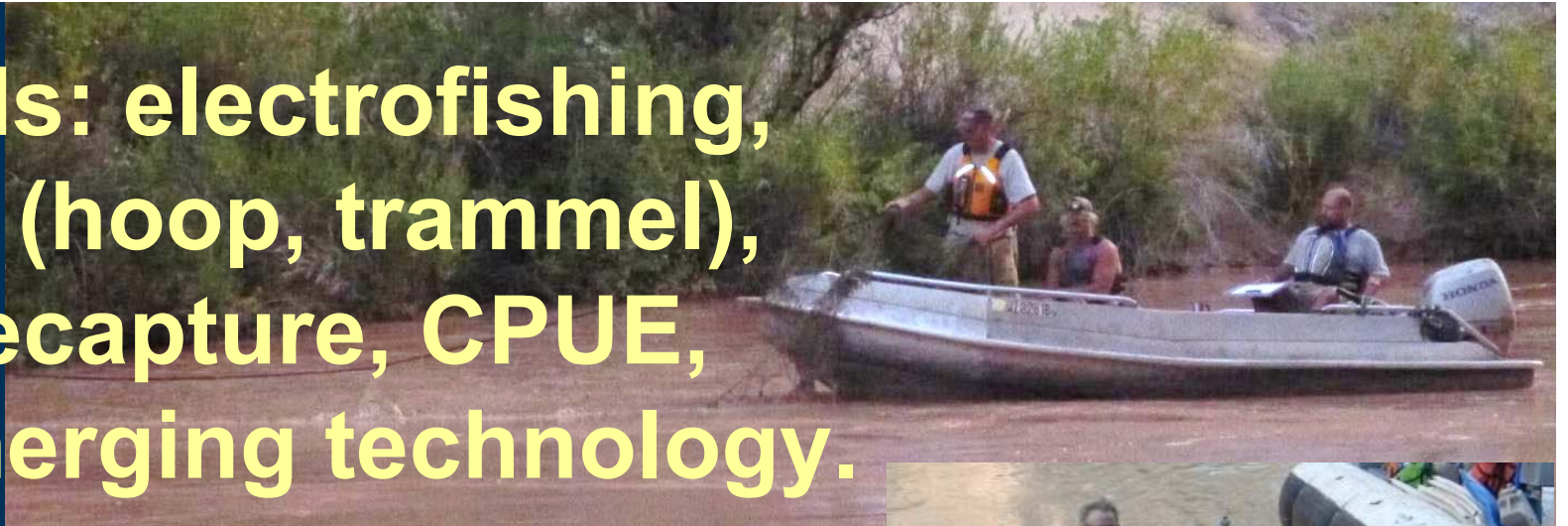
Preliminary data, do not cite

Dustin Patar

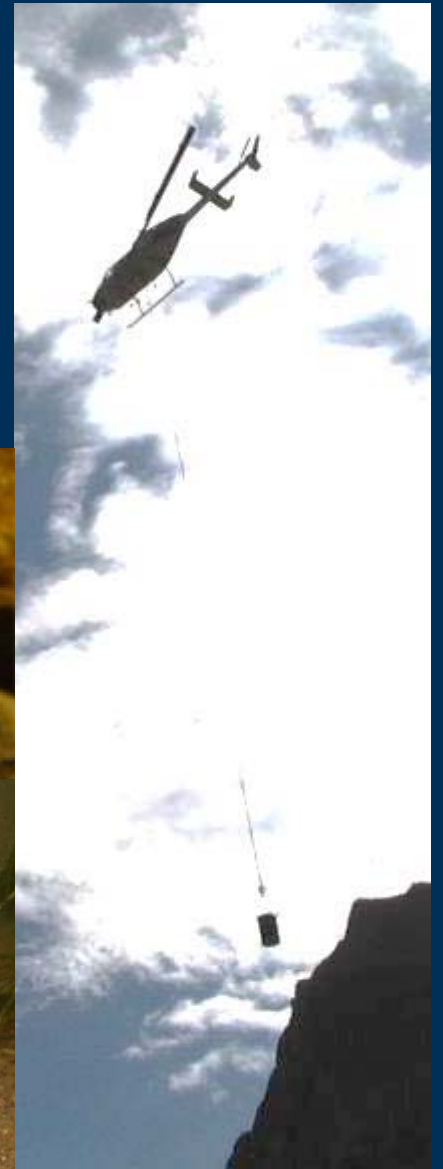
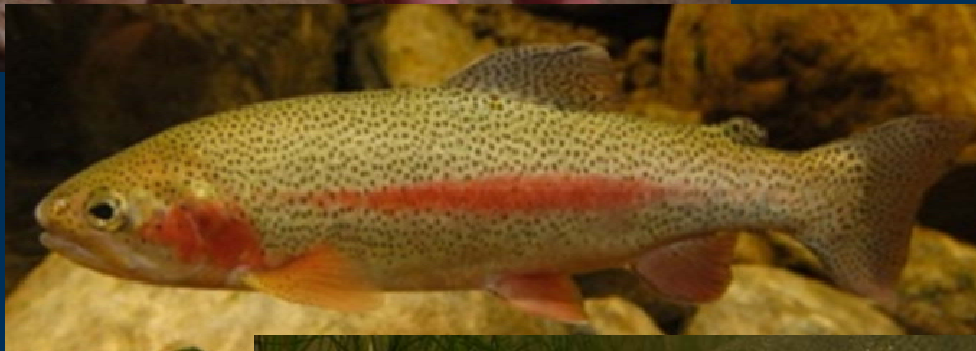
Nonnative/Invasive Fish Monitoring



**Methods: electrofishing,
netting (hoop, trammel),
mark-recapture, CPUE,
and emerging technology.**

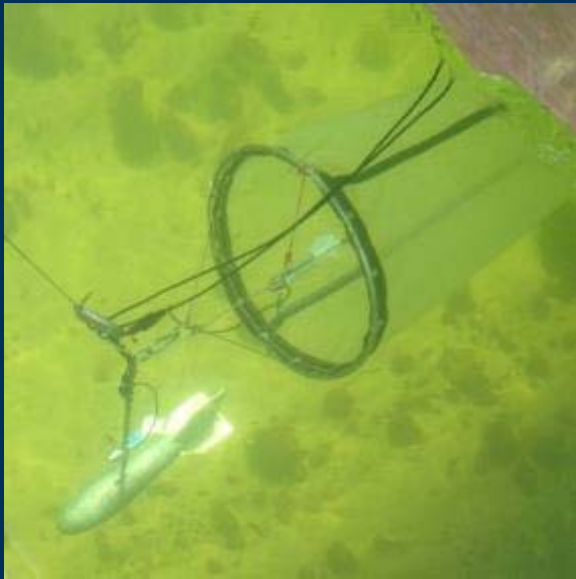


Fisheries Program Protocol Evaluation Panel



Monitoring the prey base

Invertebrate Drift



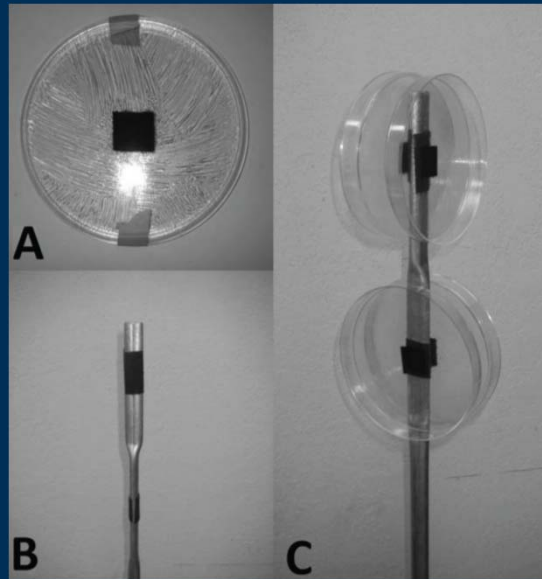
Plankton nets

Optimized for large rivers

Proportional to benthic density

Direct measure of prey
availability for drift feeding fishes

Insect emergence



Sticky traps

Developed new methods that are quick
and easy to deploy

Proportional to benthic density

Understudied life stage



Light traps

Has shed light on why so few insects

Studying insect egg laying

Artificial substrates



Natural substrates



Multiple approaches will be used to determine how “bug flows” affects the environment for insect egg laying and rearing

Preferred Alternative: Other Resources

- **Vegetation**
 - nonnative plant removal
 - revegetation with native species
 - mitigation at specific and appropriate cultural sites
- **Cultural Resources**
 - Preservation of historic properties through a program of research, monitoring, and mitigation
 - archeological and ethnographic sites
 - *National Register* historic properties

Riparian vegetation

- Future issues
 - Vegetation removal/restoration per LTEMP
 - Tamarisk and tamarisk beetles
 - Continued vegetation expansion onto sandbars

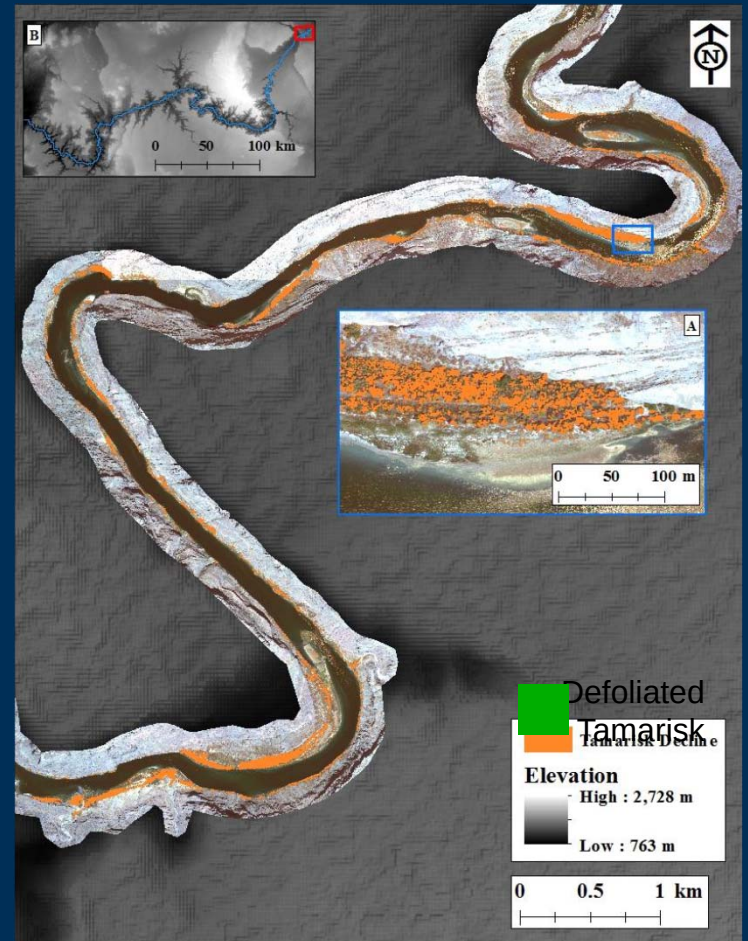


Kanab Creek 2009



2013

Tamarisk Beetle

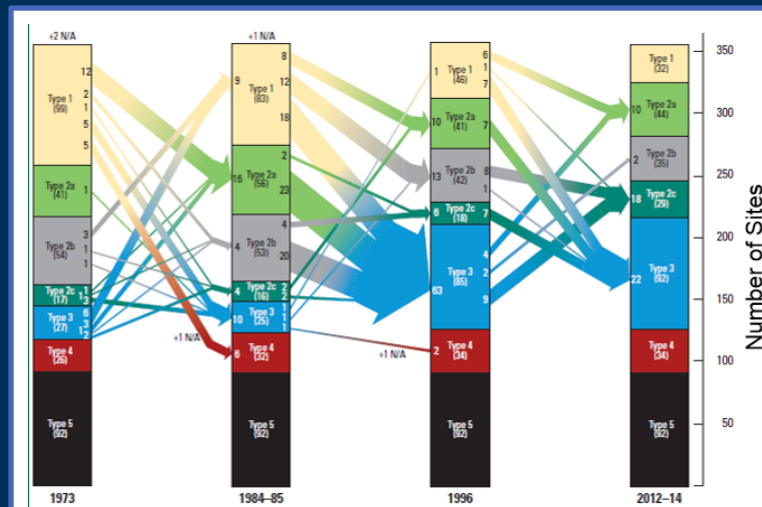


Dam Operations, Geomorphic Processes & the Future of Archaeological Sites

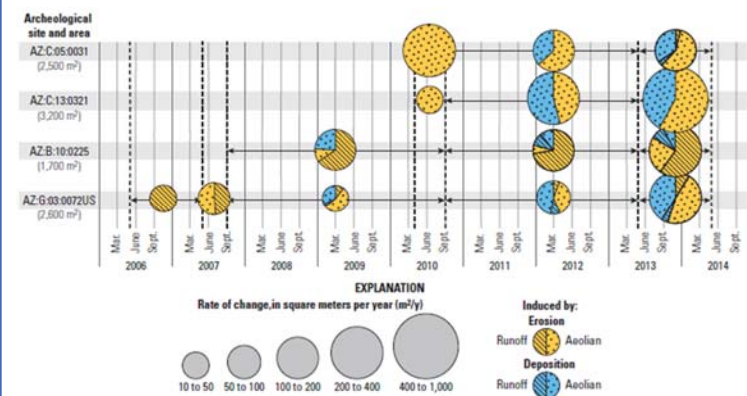
DRAFT

Draft plan for monitoring effects of geomorphic processes at archaeological sites in Grand & Glen Canyon

Draft prepared as originally proposed in: Project Element 4.2. of the Glen Canyon Dam Adaptive Management Program Triennial Budget and Work Plan—Fiscal Years 2015–2017



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Time →

(East et al. 2016)

Questions?

