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# GCMRC FY2017 Work Plan and Budget

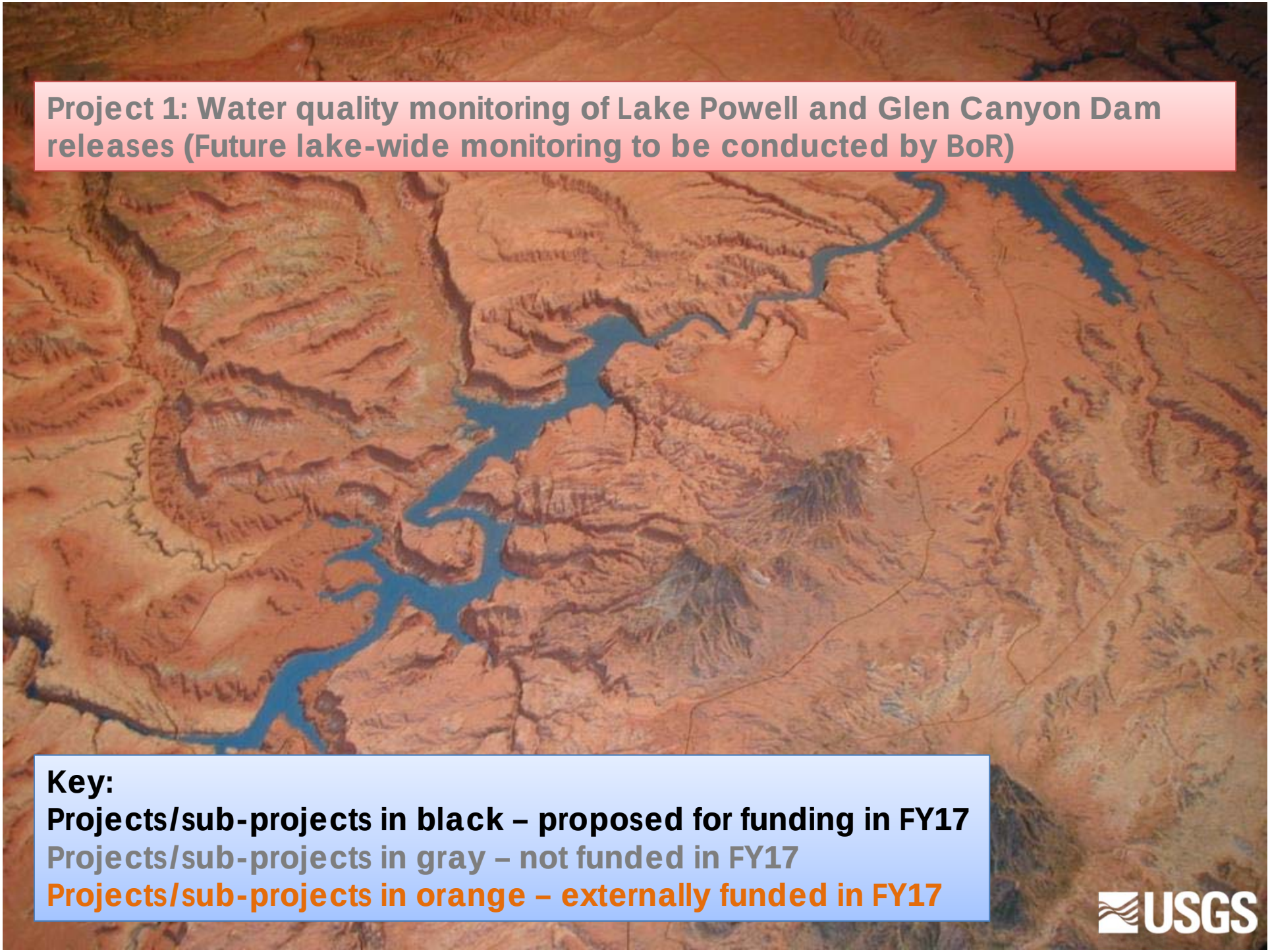
## Adaptive Management Workgroup Meeting

**August 24-25, 2016**

Scott VanderKooi

Grand Canyon Monitoring and Research Center
Southwest Biological Science Center

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


Project 1: Water quality monitoring of Lake Powell and Glen Canyon Dam releases (Future lake-wide monitoring to be conducted by BoR)
Key:
Projects/sub-projects in black – proposed for funding in FY17
Projects/sub-projects in gray – not funded in FY17
Projects/sub-projects in orange – externally funded in FY17
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## Project 2: Stream flow, water quality, and sediment transport

## Project 3: Sandbars and sediment storage dynamics

- 3.1.1 Monitoring sandbars using topographic surveys and remote cameras
- 3.1.2 Monitoring sand bars and shorelines…by remote sensing
- 3.1.3 Surveying with a camera: rapid topographic surveys
- 3.1.4 Analysis of historical images at selected monitoring sites
- 3.2 Sediment storage monitoring
- 3.3 Characterizing, and predictive modeling, of sand bar response
- 3.4 Connecting bed material transport, bed morphodynamics
- 3.5 Control network and survey support

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## Project 4: …Quantifying the relative importance of river-related factors that influence upland geomorphology and archaeological site stability

**4.1 Quantifying connectivity along the fluvial-aeolian-hillslope continuum at landscape scales**
**4.2 Monitoring of cultural sites in Grand and Glen Canyons**

# Project 5: Food base monitoring and research

**5.1 Are aquatic insect diversity and production recruitment limited?**

- **5.1.1 Insect emergence in Grand Canyon via citizen science**
- **5.1.2 Effects of hydropeaking on oviposition and egg mortality**
- 5.1.3 Synthesis of stressors and controls on EPT distributions (FY15-16)
- 5.1.4 Synthesis of the aquatic foodbase in western US tailwaters (FY15-16)
- 5.1.5 Natural history of oviposition for species in Grand Canyon (FY15-16)
- 5.1.6 Laboratory studies on insect oviposition and egg mortality (unfunded)
- *5.1.7 Comparative emergence studies in Upper Basin (WAPA funded)*
- *5.1.8 Natural history of oviposition for EPT in the Upper Basin (WAPA funded)*

**5.2 Patterns and controls of aquatic invertebrate drift in Colorado River tailwaters**

- **5.2.1 Characterize and monitor drift, emergence in Glen Canyon**
- **5.2.2 Drift monitoring in Glen, Marble, and Grand Canyons**
- 5.2.3 Link drift to channel bed shear stress (FY15-16)
- **5.2.4 Link drift patterns to substrate in Glen, Marble, Grand Canyons**
- *5.2.5 Comparative drift in Upper and Lower Basin tailwaters (WAPA funded)*

**5.3 Primary Production Monitoring in Glen Marble and Grand Canyons**

- 5.3.1 Synthesis and publication of Glen Canyon algae production (FY15-16)
- **5.3.2 Monitoring dissolved $O_2$ in Glen, Marble, and Grand Canyons**
- *5.3.3 Developing automated tools for estimating algae production (outside funding)*

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# Project 6: Main-stem Colorado River humpback chub aggregations and fish community dynamics

**6.1 Main-stem Colorado River humpback chub aggregation monitoring**
6.2 Aggregation recruitment (FY15-16)
**6.3 Monitoring main-stem aggregations with PIT tag antennas (pilot)**
**6.4 System wide electrofishing**
6.5 Brown trout natal origins through body pigmentation patterns… (unfunded)
**6.6 Direct main-stem augmentation of humpback chub (begin in FY17)**
**6.7 Rainbow trout early life stage survey**
**6.8 Lees Ferry creel survey (fund in FY16/17)**

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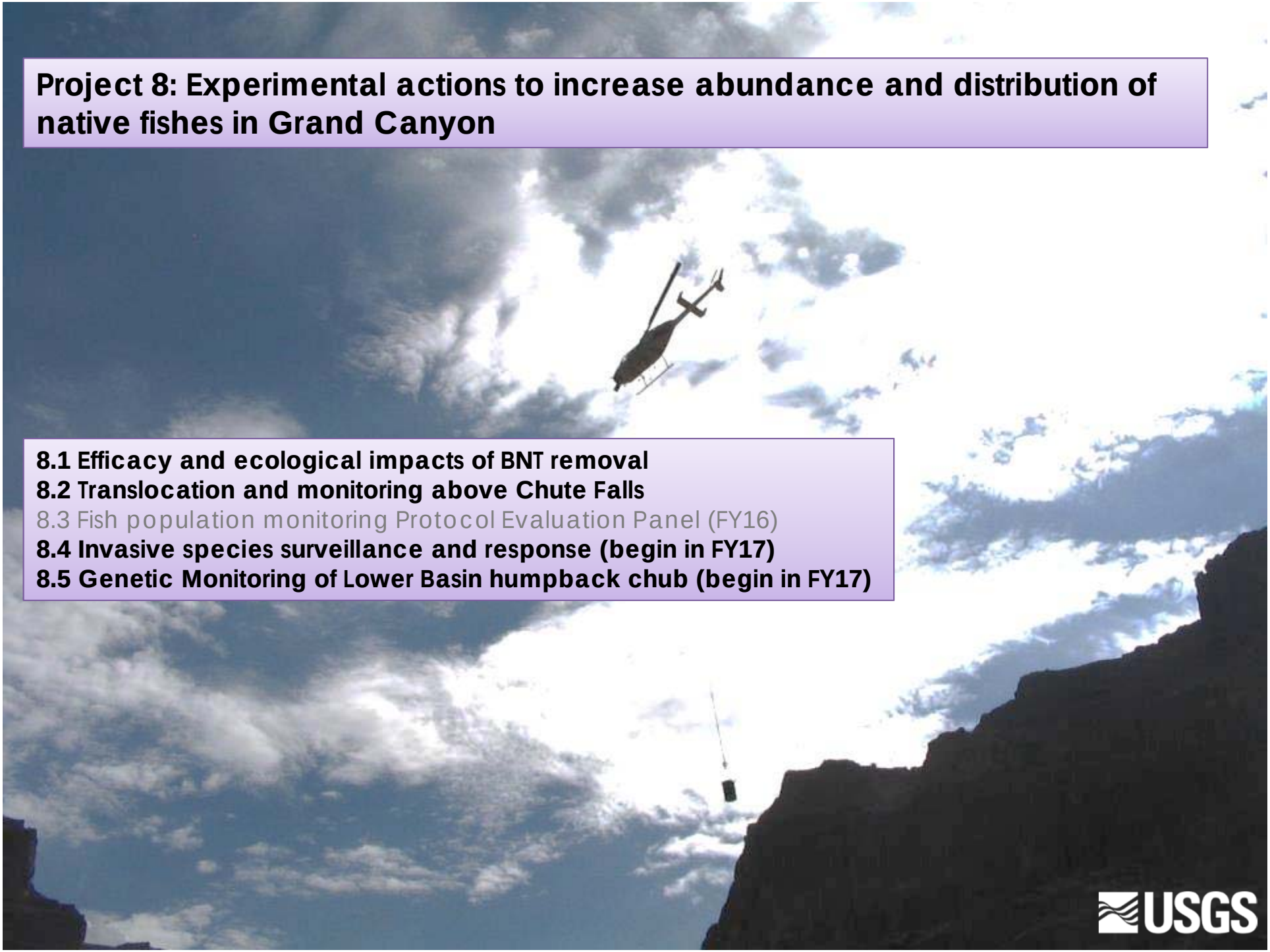
# Project 7: Population ecology of humpback chub in and around the Little Colorado River

**7.1 Spring/fall humpback chub abundance estimates in the LCR**
**7.2 Juvenile chub monitoring near the LCR confluence**
**7.3 July LCR juv. humpback chub marking to est. production and outmigration**
**7.4 Remote PIT tag array monitoring in the LCR**
**7.5 Food web monitoring in the LCR**
7.6 Gravel substrate limitation for humpback chub reproduction in the LCR (FY15-16)
**7.7 $CO_2$ as a limiting factor early life history stages of humpback chub in the LCR**
**7.8 Evaluate effects of Asian tapeworm infestation on Juvenile humpback chub**
**7.9 Development of a non-lethal tool to assess physiological condition of HBC**
**7.10 Humpback chub population modeling**

# Project 8: Experimental actions to increase abundance and distribution of native fishes in Grand Canyon



**8.1 Efficacy and ecological impacts of BNT removal**
**8.2 Translocation and monitoring above Chute Falls**
8.3 Fish population monitoring Protocol Evaluation Panel (FY16)
**8.4 Invasive species surveillance and response (begin in FY17)**
**8.5 Genetic Monitoring of Lower Basin humpback chub (begin in FY17)**

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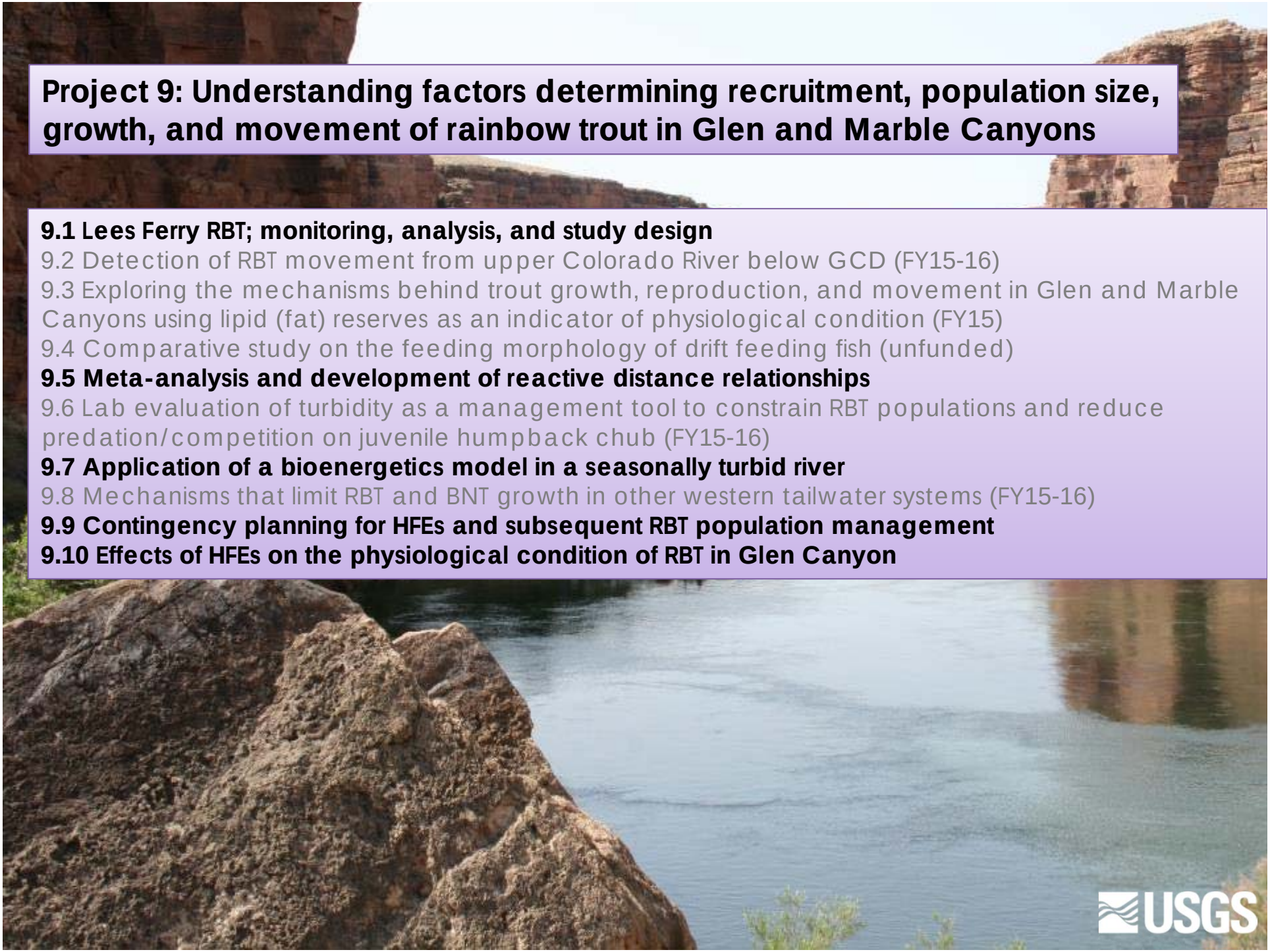

# Project 9: Understanding factors determining recruitment, population size, growth, and movement of rainbow trout in Glen and Marble Canyons

**9.1 Lees Ferry RBT; monitoring, analysis, and study design**
9.2 Detection of RBT movement from upper Colorado River below GCD (FY15-16)
9.3 Exploring the mechanisms behind trout growth, reproduction, and movement in Glen and Marble Canyons using lipid (fat) reserves as an indicator of physiological condition (FY15)
9.4 Comparative study on the feeding morphology of drift feeding fish (unfunded)
**9.5 Meta-analysis and development of reactive distance relationships**
9.6 Lab evaluation of turbidity as a management tool to constrain RBT populations and reduce predation/competition on juvenile humpback chub (FY15-16)
**9.7 Application of a bioenergetics model in a seasonally turbid river**
9.8 Mechanisms that limit RBT and BNT growth in other western tailwater systems (FY15-16)
**9.9 Contingency planning for HFEs and subsequent RBT population management**
**9.10 Effects of HFEs on the physiological condition of RBT in Glen Canyon**

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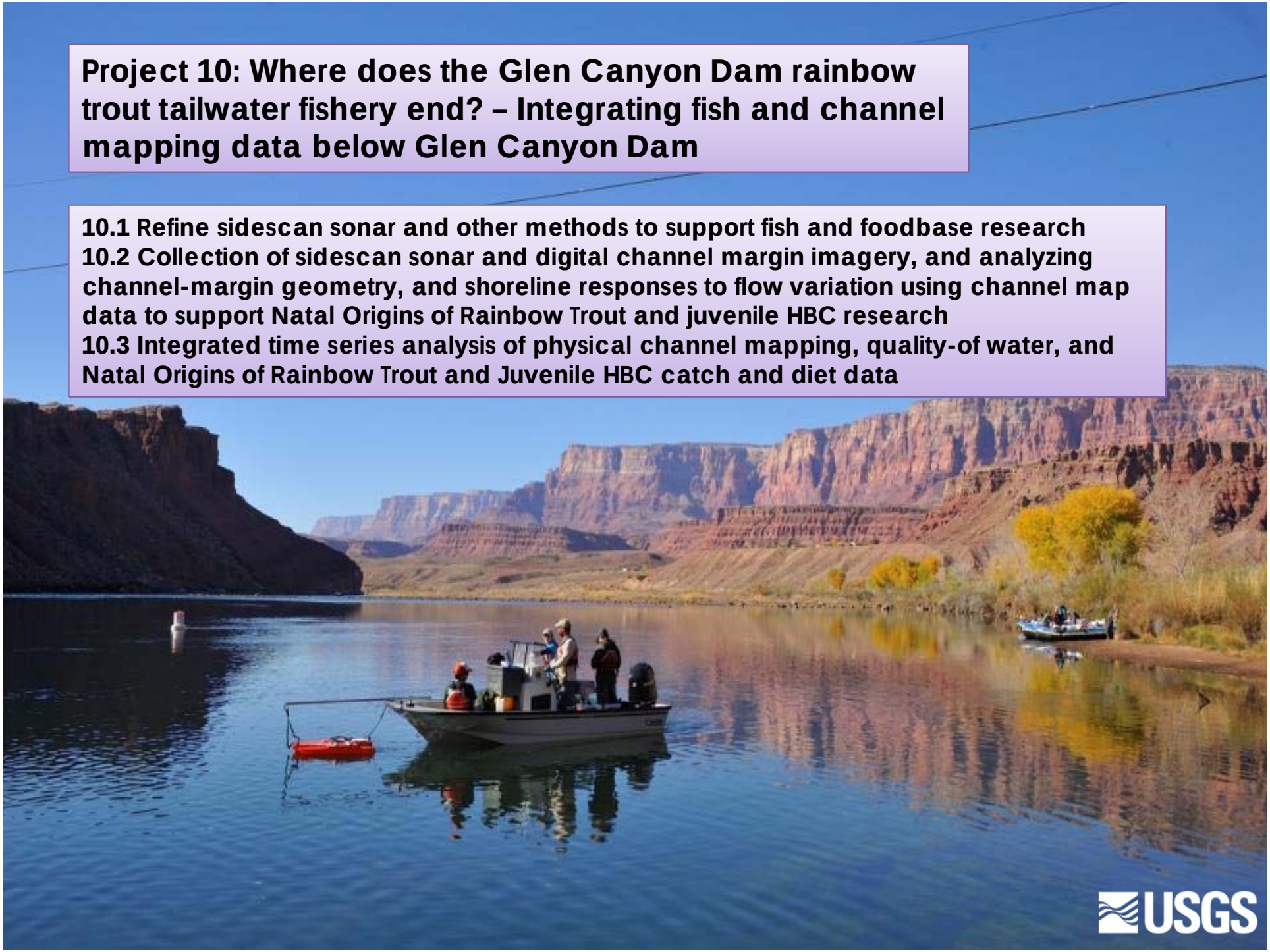
# Project 10: Where does the Glen Canyon Dam rainbow trout tailwater fishery end? – Integrating fish and channel mapping data below Glen Canyon Dam

**10.1 Refine sidescan sonar and other methods to support fish and foodbase research**
**10.2 Collection of sidescan sonar and digital channel margin imagery, and analyzing channel-margin geometry, and shoreline responses to flow variation using channel map data to support Natal Origins of Rainbow Trout and juvenile HBC research**
**10.3 Integrated time series analysis of physical channel mapping, quality-of water, and Natal Origins of Rainbow Trout and Juvenile HBC catch and diet data**

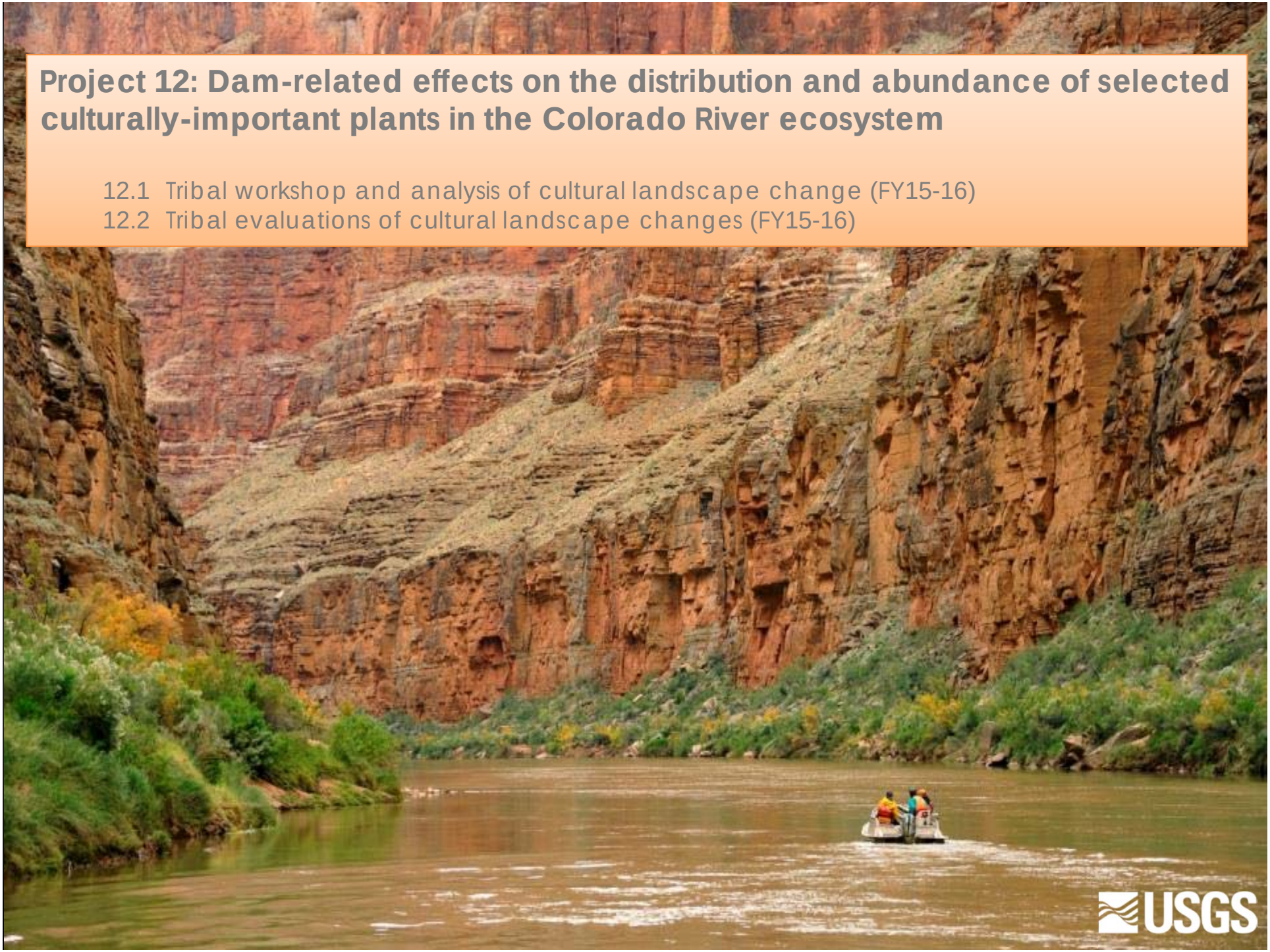


# Project 11: Riparian vegetation studies: ground-based and landscape-scale riparian vegetation monitoring and plant response-guild research associated with sandbar evolution and wildlife habitat analysis

**11.1 Ground-based vegetation monitoring**
**11.2 Periodic landscape scale vegetation mapping and analysis using remotely sensed data**
**11.3 Influence of sediment and vegetation feedbacks on the evolution of sandbars in Grand Canyon**
**11.4 Linking dam operations to changes in terrestrial fauna**
11.5 Science review panel of successes and challenges in non-native vegetation control in the Colorado River and Rio Grande watersheds (FY15)

# Project 12: Dam-related effects on the distribution and abundance of selected culturally-important plants in the Colorado River ecosystem

12.1 Tribal workshop and analysis of cultural landscape change (FY15-16)
12.2 Tribal evaluations of cultural landscape changes (FY15-16)



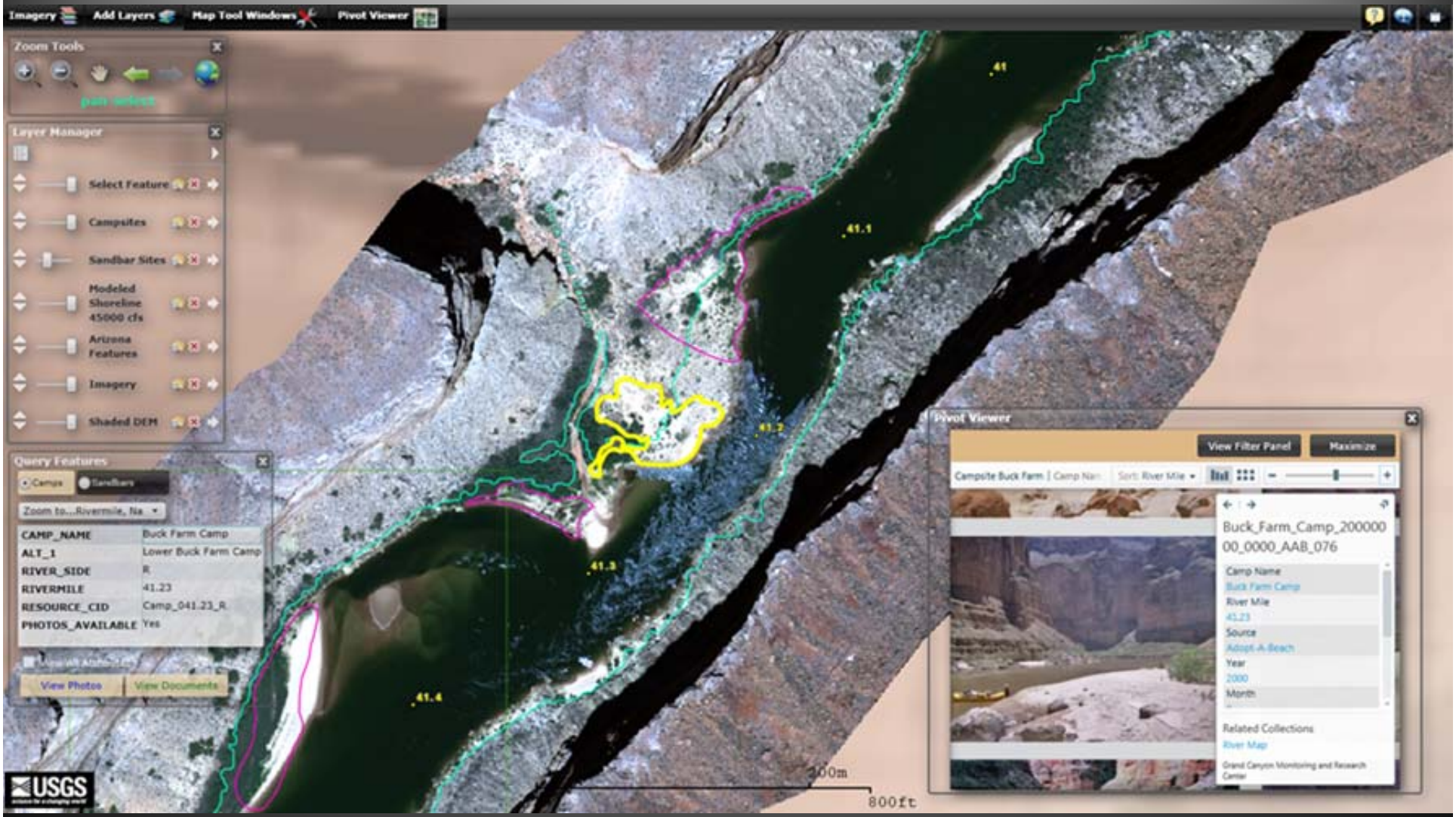
# Project 13: Socio-economic monitoring and research

13.1 Economic values of recreational resources along the Colorado River – Grand Canyon whitewater floater and Lees Ferry angler values (FY15-16)

**13.2 Tribal values and perspectives of resources downstream of Glen Canyon Dam (begin in FY17)**

**13.3 Applied decision methods for the Glen Canyon Adaptive Management Plan**

## Project 14: Geographic information systems, services, and support




## Project 15: Administration and Support

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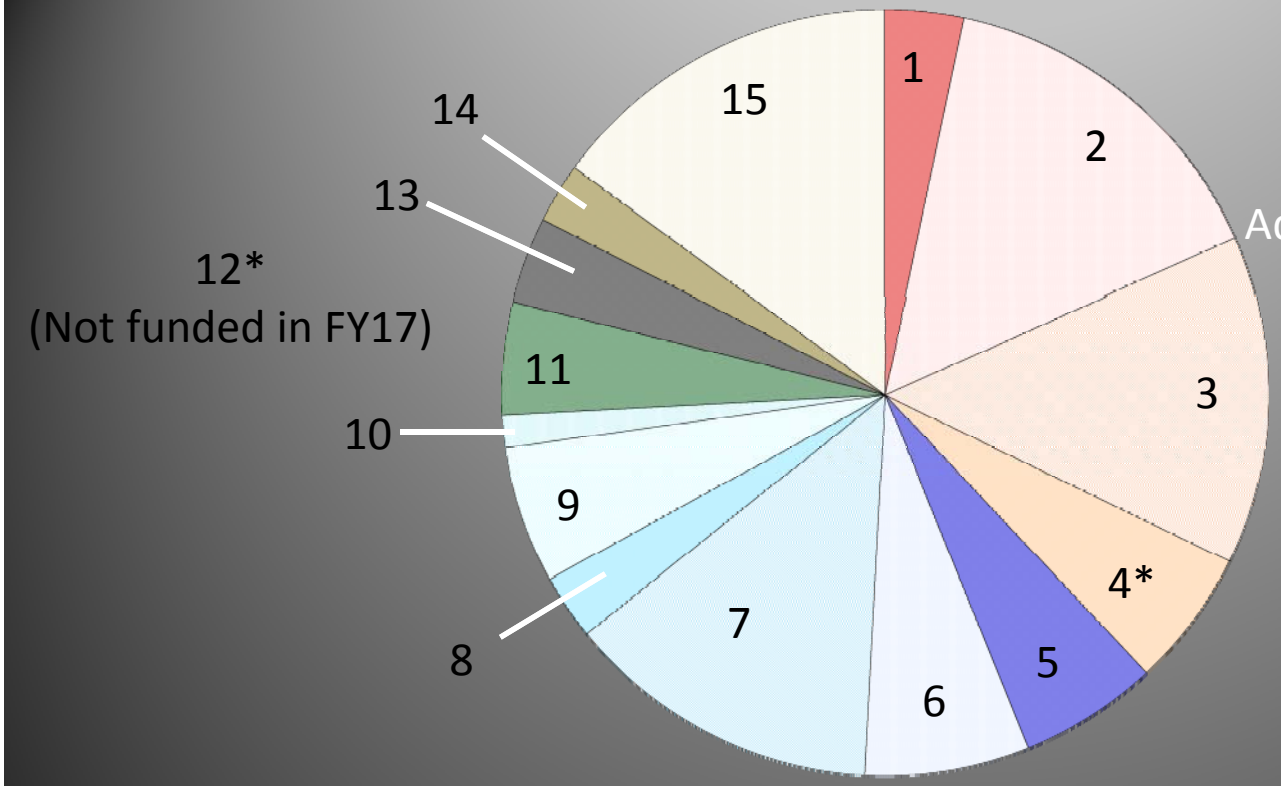


Geophysical sciences (38%)
Aquatic and fish science (36%)
Vegetation (5%)
Socioeconomics (3%)
Administration and support (18%)

*Projects directly related to cultural resources (6%)

1. Lake Powell and Glen Canyon Dam Release Water-Q
2. Stream Flow, Water Quality, and Sediment Transp
3. Sandbars and Sediment Storage Dynamics
4. Connectivity along the Fluvial-Aeolian-Hillslop
5. Food Base Monitoring and Research
6. Mainstem Colorado River Humpback Chub Aggregati
7. Population Ecology of Humpback Chub in and arou
8. Experimental Actions to Increase Abundance and
9. Understanding Factors Determining Recruitment,
10. Mapping and Assessment of Aquatic Habitats bel
11. Riparian Vegetation Studies: Ground-based and
12. Dam-Related Effects on the Distribution and Ab
13. Socio-economic Monitoring and Research
14. Geographic Information Systems, Services, and
15. Administration and Support

*FY17*

*$9,286,900 - GCDAMP approved*

*$9,060,000 - Requirement w/ 12% estimated overhead rate*

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# FY2017 Project Budgets

| Project Number | Project Title | FY17 Requirement (w/ revised overhead) |
|---|---|---|
| 2 | Stream Flow, Water Quality, and Sediment Transport | $ 1,412,000 |
| 3 | Sandbars and Sediment Storage Dynamics | $ 1,325,000 |
| 4 | Connectivity along the Fluvial-Aeolian-Hillslope Continuum | $ 530,000 |
| 5 | Food Base Monitoring and Research | $ 528,000 |
| 6 | Mainstem Colorado River Humpback Chub Aggregations and Fish Commuity Dynamics | $ 688,000 |
| 7 | Humpback Chub in and around the Little Colorado River | $ 1,254,000 |
| 8 | Experimental Actions to Increase Abundance and Distribution of Native Fishes | $ 278,000 |
| 9 | Rainbow Trout in Glen and Marble Canyons | $ 536,000 |
| 10 | Mapping and Assessment of Aquatic Habitats below Glen Canyon Dam | $ 117,000 |
| 11 | Riparian Vegetation Studies | $ 460,000 |
| 12 | Dam-Related Effects on the Distribution and Abundance of Selected Culturally-Important Plants | $ - |
| 13 | Socio-economic Monitoring and Research | $ 335,000 |
| 14 | Geographic Information Systems, Services, and Support | $ 224,000 |
| 15 | Administration and Support | $ 1,373,000 |
| | Total | $ 9,060,000 |

(Amounts rounded to nearest $1,000)

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# FY2017 Budget

## (Amounts rounded to nearest $1,000)

| FY17 Projects @ 100% (w/ 12% Overhead*) | $9,060,000 |
|---|---|
| Fisheries Monitoring: JCM/Lees Ferry | $246,000 |
| Total FY17 Costs | $9,306,000 |

| FY17 AMP Funding @ 0% CPI | $8,672,000 |
|---|---|
| FY17 Cultural Funding: Project 4 | $173,000 |
| Total FY17 Funding | $8,845,000 |

| Projected FY17 Long/Short | ($461,000)* |
|---|---|
| Projected FY15-16 Carryover Funding | $775,000* |
| Projected FY15-17 Long/Short | $314,000* |

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*Preliminary & subject to change

Questions?