



# GCMRC FY 2021-23 Triennial Workplan and Budget – First Draft

Technical Work Group Meeting  
April 15-16, 2020

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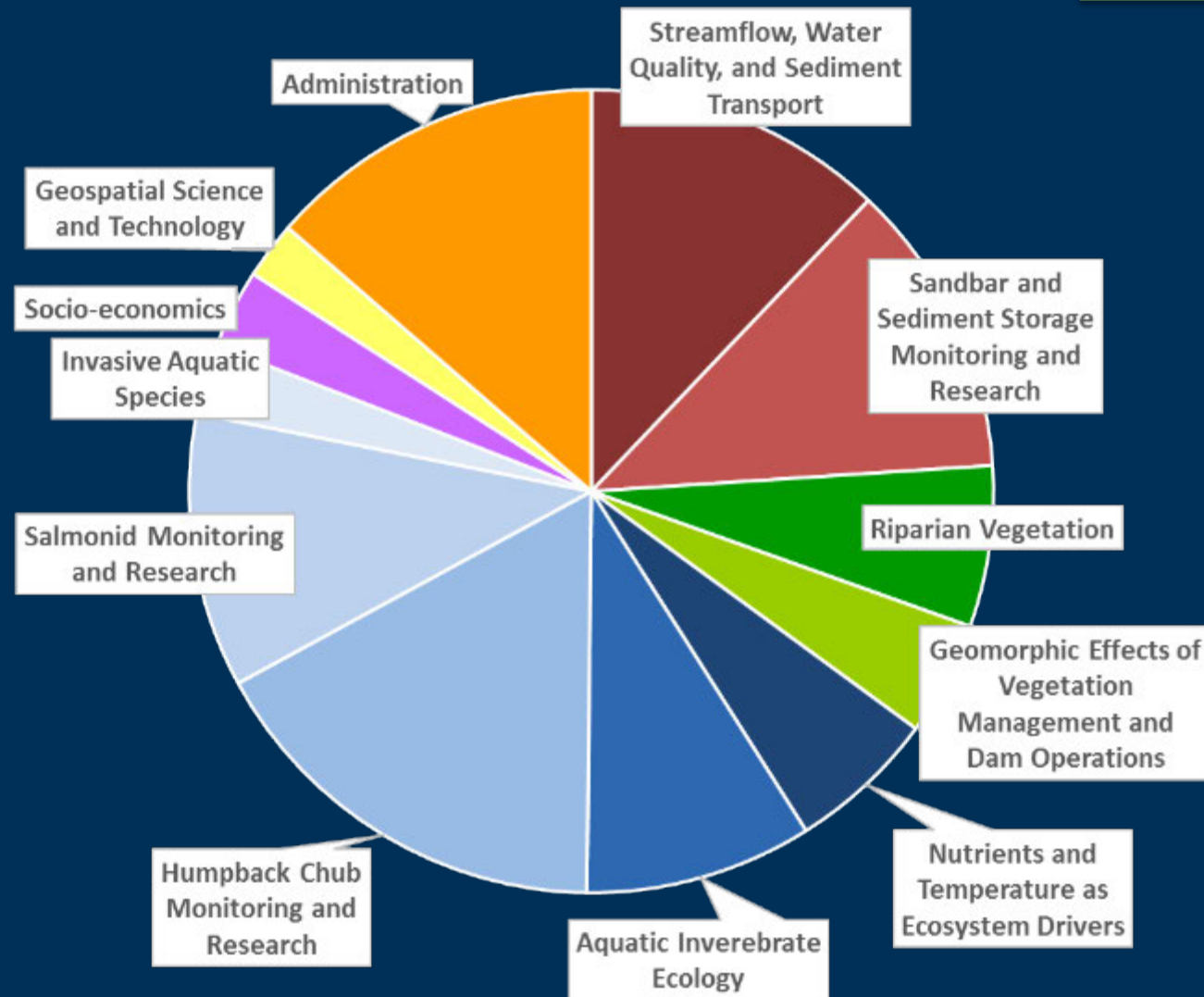
Southwest Biological Science Center

Grand Canyon Monitoring and Research Center

# LTEMP Implementation

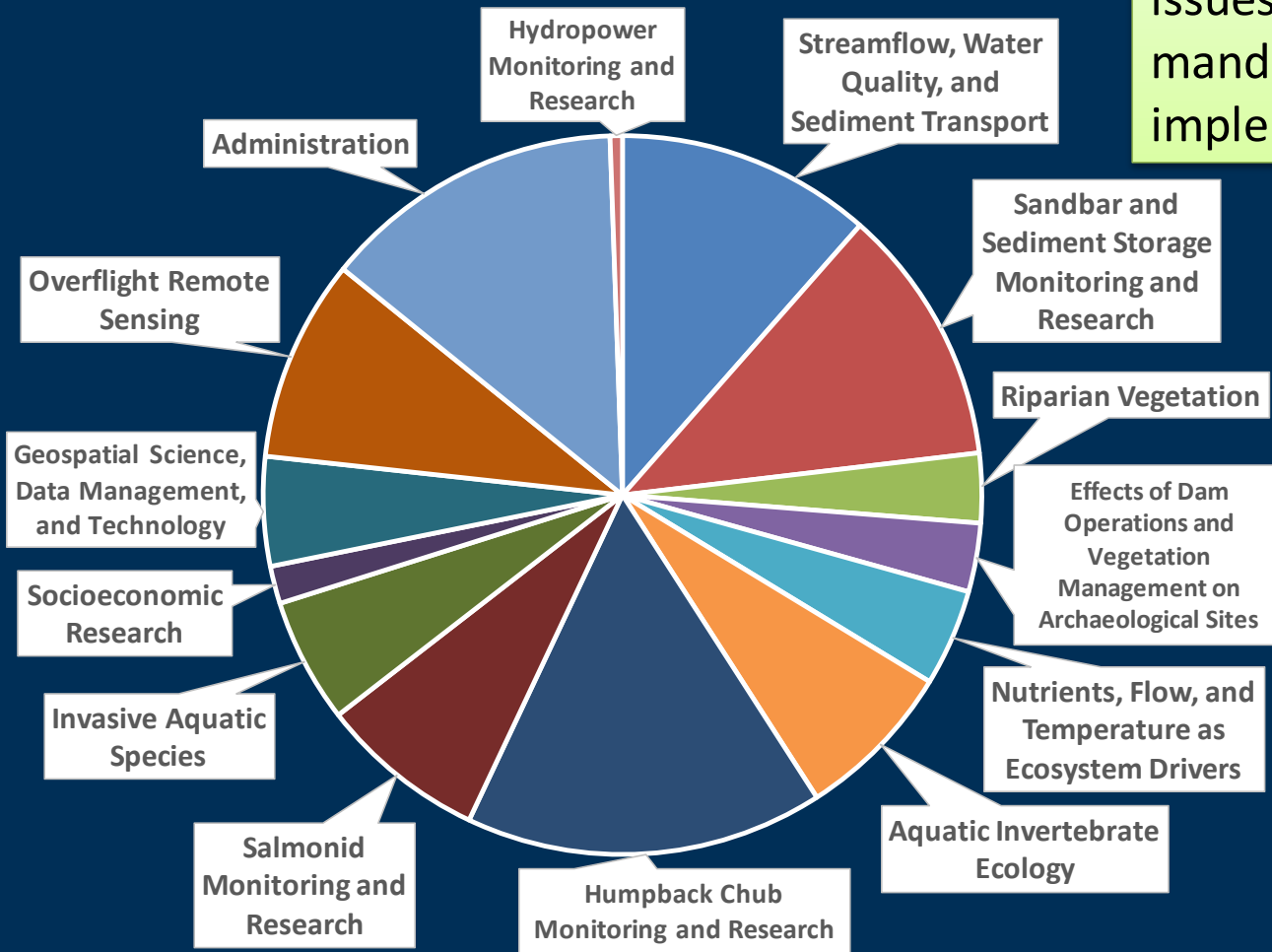
Resource Areas to be Evaluated and Considered Before Any Experiment	Objectives And Resource Goals Of The LTEMP
Water Quality and Water Delivery	Archaeological and Cultural Resources
Humpback Chub	Natural Processes
Sediment	Humpback Chub
Riparian Ecosystems	Hydropower and Energy
Historic Properties and Traditional Cultural Properties	Other Native Fish
Hydropower Production and WAPA's Assessment of the Status of the Basin Fund	Recreational Experience
Rainbow Trout Fishery	Sediment
Recreation	Tribal Resources
Other Resources	Rainbow Trout Fishery
	Nonnative Invasive Species
Tribal Concerns/Resources	Riparian Vegetation

FY2020  
Funding \$9,088,000



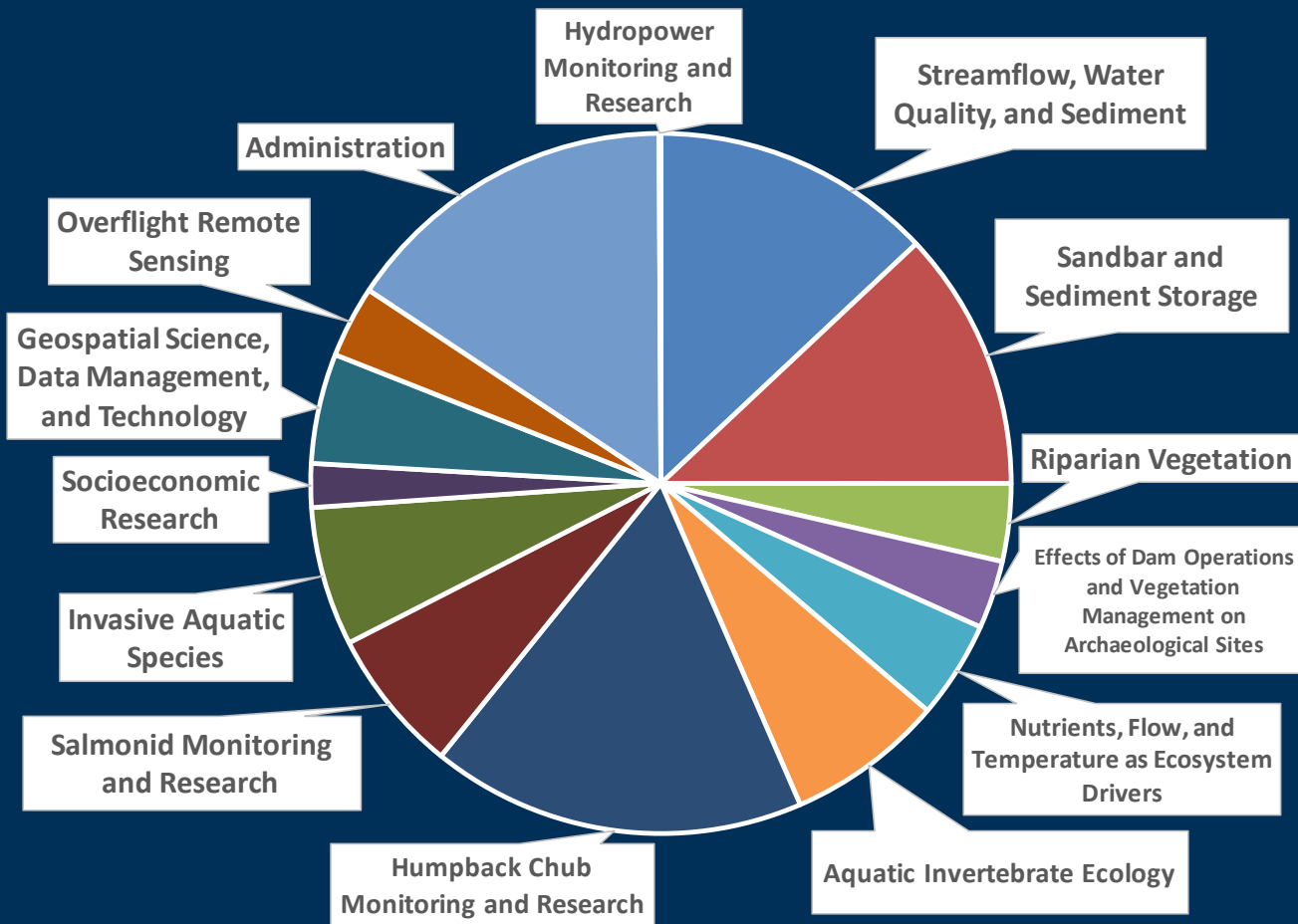
Geophysical sciences	24%
Vegetation & effects of management	11%
Aquatic and fish science	46%
Socioeconomics	3%
GIS and remote sensing	2%
Administration and support	14%

Potential Allocation of FY2021 budget based on initial GCMRC/agency assessment of stakeholder interests, scientific issues, and monitoring mandates in support of LTEMP implementation



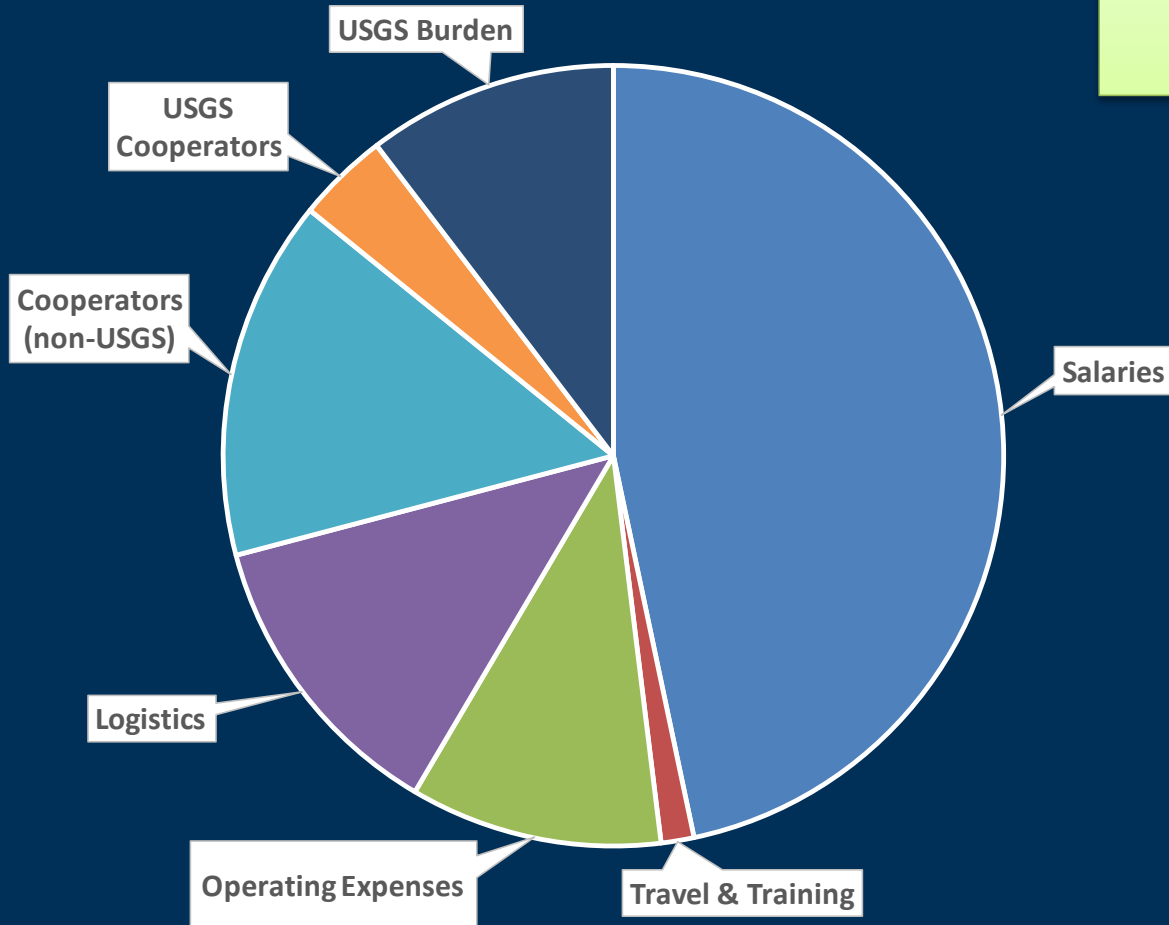
Geophysical sciences	23%
Vegetation & effects of management	6%
Aquatic and fish science	41%
Socioeconomics	2%
GIS and remote sensing	14%
Administration and support	14%

Proportions remain relatively unchanged for potential allocations in FY2022 and FY2023 (FY2023 shown)



Geophysical sciences	25%
Vegetation & effects of management	7%
Aquatic and fish science	42%
Socioeconomics	2%
GIS and remote sensing	8%
Administration and support	16%

# Potential Allocation of FY2021 budget proportions by general categories

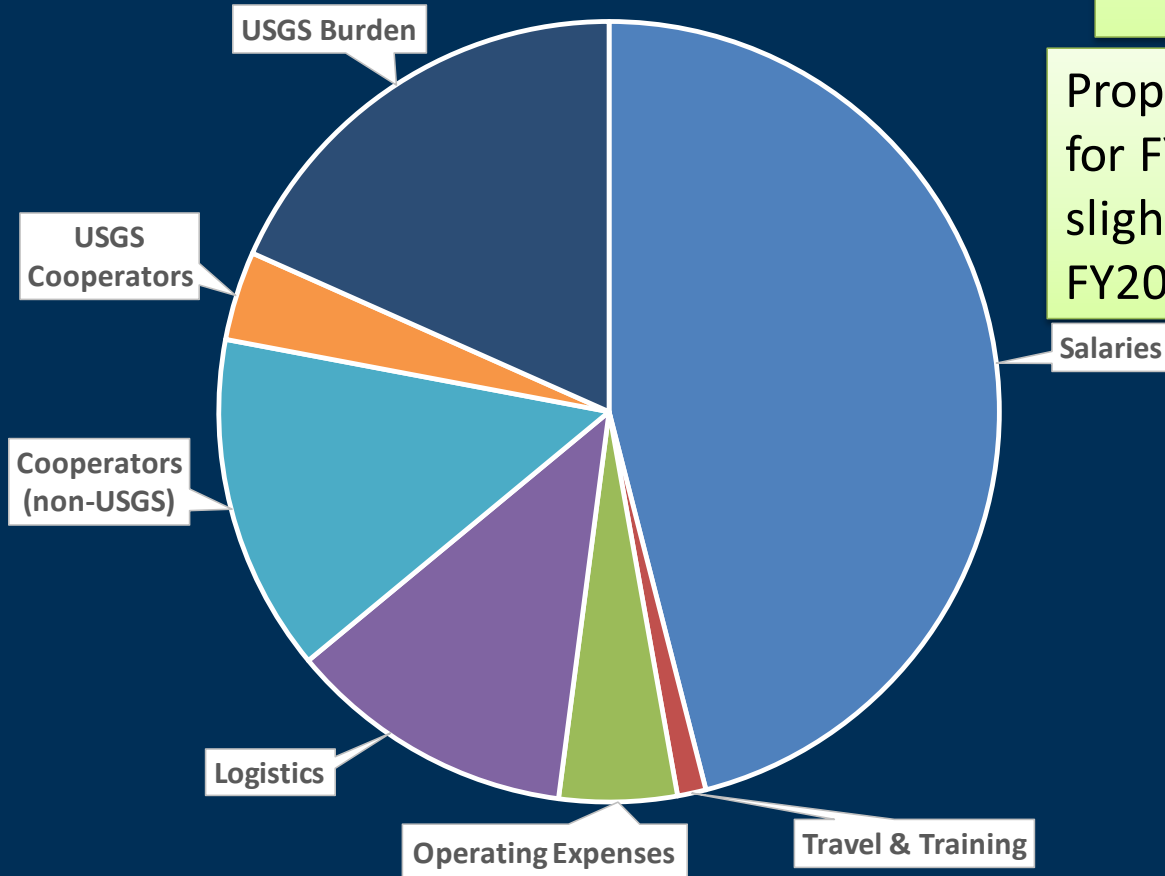


Categories	
Salaries	47%
Travel & Training	1%
Operating Expenses	11%
Logistics	12%
Cooperators (non-USGS)	15%
USGS Cooperators	4%
USGS Burden	10%

Burden rates:  
USGS – 14%  
Pass through – 3%  
Sub-allocation – 0%

# Potential Allocation of FY2023 budget proportions by general categories

Proportions are relatively similar for FY2022 and FY2023, with a slight increase in burden rate in FY2023



Categories	
Salaries	46%
Travel & Training	1%
Operating Expenses	5%
Logistics	12%
Cooperators (non-USGS)	14%
USGS Cooperators	4%
USGS Burden	18%

Burden rates:  
USGS – 28%  
Pass through – 3%  
Sub-allocation – 0%

# Streamflow, Water Quality, and Sediment Transport and Budgeting in the Colorado River Ecosystem

## LTEMP Resource Areas:

- Water Quality and Water Delivery
- Sediment
- Natural Processes

FY18: \$1,230,000

FY19: \$1,201,000

FY20: \$1,280,000

## Project Elements

1. Stream gaging and hydrologic analyses
2. Water quality
3. Sediment transport and budgeting
4. HFE monitoring (Experimental Fund)

FY21: \$1,270,000\*

FY22: \$1,394,000\*

FY23: \$1,468,000\*



# Sandbar and Sediment Storage Monitoring and Research

## Project Elements

1. Monitoring sandbars using topographic surveys and remote cameras
2. Bathymetric and topographic mapping for monitoring long-term trends in sediment storage
3. Control network and survey support
4. Bank erosion, bed sedimentation, and channel change in the Colorado R. arm of the Lake Mead Delta in Grand Canyon
5. Streamflow modeling
- 6-9. Sandbar and riverbed response to experimental actions (Experimental Fund)

FY18: \$1,039,000

FY19: \$1,050,000

FY20: \$1,015,000

FY21: \$1,281,000\*

FY22: \$1,197,000\*

FY23: \$1,371,000\*

## LTEMP Resource Areas:

- Sediment
- Archaeological and Cultural Resources
- Natural Processes
- Recreational Experience

(\*Provisional estimates, subject to revision)

# Riparian Vegetation Monitoring and Research

## Project Elements

1. Ground-based riparian vegetation monitoring
2. Mechanistic experiments with plant species of interest
3. Predictive modeling of vegetation responses to dam operations
4. Vegetation management decision support

FY18: \$585,000

FY19: \$515,000

FY20: \$515,000

FY21: \$345,000\*

FY22: \$395,000\*

FY23: \$405,000\*

### LTEMP Resource Areas:

- Riparian Vegetation
- Natural Processes
- Recreational Experience

(\*Provisional estimates, subject to revision)



# Effects of Dam Operations and Vegetation Management for Archaeological Sites

FY18: \$262,000

FY19: \$269,000

FY20: \$284,000

FY21: \$349,000\*

FY22: \$359,000\*

FY23: \$363,000\*

## LTEMP Resource Areas:

- Sediment
- Riparian Vegetation
- Archaeological and Cultural Resources
- Natural Processes

## Project Elements

1. Dam operations, vegetation management, archaeological sites
2. Monitoring landscape-scale ecosystem change with repeat photography
3. Cultural Program Administrative History
4. Holocene Map of Fluvial Sediment in the Colorado River Corridor

(\*Provisional estimates, subject to revision)

# Controls on Ecosystem Productivity: Nutrients, Flow, and Temperature

## Project Elements

1. Phosphorus budgeting in the Colorado River  
Identify the relative importance of different phosphorus sources to the productivity of the Colorado River system
2. Rates and composition of primary producers in the Colorado River  
Identify patterns and controls on primary productivity in the Colorado River
3. Productivity at higher trophic levels  
Fish metabolism and ecosystem modeling

FY18: \$343,000

FY19: \$254,000

FY20: \$284,000

FY21: \$481,000\*

FY22: \$499,000\*

FY23: \$509,000\*

### LTEMP Resource Areas:

- Water Quality and Water Delivery
- Other Resources (Food Base)
- Natural Processes

(\*Provisional estimates, subject to revision)

# Aquatic Invertebrate Ecology (Food Base)

## Project Elements

1. Aquatic invertebrate monitoring in Marble and Grand Canyons
2. Aquatic invertebrate monitoring in Glen Canyon
3. Aquatic invertebrate monitoring of Grand Canyon tributaries
4. Fish diet studies
5. Spring powerplant capacity flow (Experimental Fund)

FY18: \$771,000

FY19: \$746,000

FY20: \$718,000

FY21: \$797,000\*

FY22: \$807,000\*

FY23: \$820,000\*

## LTEMP Resource Areas:

- Other Resources (Food Base)
- Natural Processes



# Humpback Chub Population Dynamics Throughout the Colorado River

## LTEMP Resource Areas:

- Humpback Chub
- Natural Processes

## Project Elements

1. Humpback chub population monitoring
2. Annual spring/fall abundance estimates of humpback chub in the lower 13.6 km of the LCR
3. Juvenile Chub Monitoring near the LCR Confluence
4. Remote PIT Tag Array Monitoring in the LCR
5. Monitoring Humpback Chub Aggregation Relative Abundance and Distribution
6. Juvenile Humpback Chub Monitoring – West
7. Chute Falls Translocations
8. Backwater Seining
9. Assessing yearly variability in humpback chub hatch dates

(\*Provisional estimates, subject to revision)

FY18: \$1,506,000

FY19: \$1,637,000

FY20: \$1,632,000

FY21: \$1,780,000\*

FY22: \$2,012,000\*

FY23: \$1,956,000\*

# Salmonid Research and Monitoring

## Project Elements

1. Rainbow Trout Monitoring in Glen Canyon
2. Trout Reproductive and Growth Dynamics
3. Brown Trout early life history stages in Glen Canyon
4. Salmonid modelling

FY18: \$683,000

FY19: \$717,000

FY20: \$667,000

FY21: \$828,000\*

FY22: \$785,000\*

FY23: \$754,000\*

## LTEMP Resource Areas:

- Rainbow Trout Fishery
- Humpback Chub
- Nonnative Invasive Species
- Recreational Experience
- Natural Processes

(\*Provisional estimates, subject to revision)

# Warm-water Native and Non-Native Fish Monitoring and Research

## LTEMP Resource Areas:

- Nonnative Invasive Species
- Recreational Experience
- Natural Processes

## Project Elements

1. System-wide native fish and invasive aquatic species monitoring
2. Invasion and colonization dynamics of warm-water invasive fishes
3. Impacts of channel catfish on native fish in the Little Colorado River

FY18: \$557,000

FY19: \$581,000

FY20: \$598,000

FY21: \$619,000\*

FY22: \$730,000\*

FY23: \$725,000\*

(\*Provisional estimates, subject to revision)



# Socioeconomic Research

## Project Elements

1. Predictive Models for Adaptive Management
2. Brown Trout Incentivized Harvest
3. Recreation Monitoring and Research

## LTEMP Resource Areas:

- Humpback Chub
- Sediment
- Nonnative Invasive Species
- Recreational Experience

FY18: \$281,000

FY19: \$237,000

FY20: \$243,000

FY21: \$187,000\*

FY22: \$222,000\*

FY23: \$228,000\*



(\*Provisional estimates, subject to revision)

# Hydropower Monitoring and Research

FY18: \$11,000  
FY19: \$12,000  
FY20: \$13,000

FY21: \$61,000\*  
FY22: \$23,000\*  
FY23: \$10,000\*

## LTEMP Resource Areas:

- Hydropower and Energy

## Project Elements

1. The Economic Impact of Electrical Production at Glen Canyon Dam: Hydropower's Role in Facilitating Renewable Energy Integration and Mitigating Emissions

(\*Provisional estimates, subject to revision)



# Geospatial Science, Data Management and Technology

FY18: \$302,000

FY19: \$274,000

FY20: \$320,000

FY21: \$543,000\*

FY22: \$542,000\*

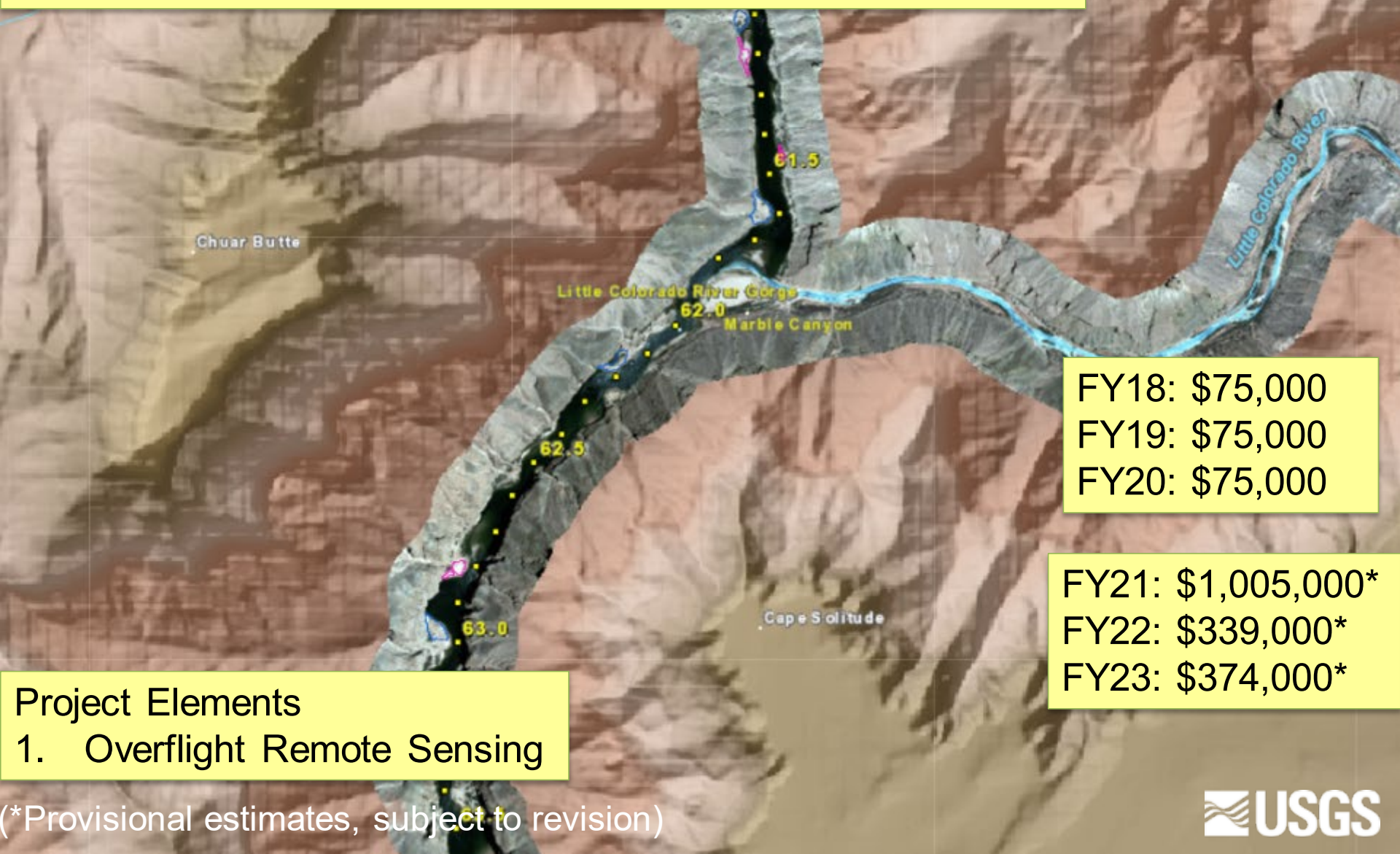
FY23: \$574,000\*

## Project Elements

1. Enterprise GIS, geospatial analysis and processing
2. Data management and database administration
3. Remote monitoring and advanced technology support

(\*Provisional estimates, subject to revision)

# Remote Sensing Overflight in Support of Long Term Monitoring and LTEMP



FY18: \$75,000

FY19: \$75,000

FY20: \$75,000

FY21: \$1,005,000\*

FY22: \$339,000\*

FY23: \$374,000\*

## Project Elements

### 1. Overflight Remote Sensing

(\*Provisional estimates, subject to revision)



# Administration and Support

FY18: \$1,375,000  
FY19: \$1,356,000  
FY20: \$1,444,000

FY21: \$1,505,000\*  
FY22: \$1,674,000\*  
FY23: \$1,763,000\*

## Project Elements

### 1. Salaries

Leadership  
Program managers  
Support staff  
Logistics staff

### 2. Travel and training

### 3. Vehicle costs

### 4. IT supplies and support

(\*Provisional estimates, subject to revision)

# Lake Powell Water Quality\*

## Project Elements

1. Description of water-quality status and trends in Lake Powell and Glen Canyon Dam releases
2. Documentation of historical record of Lake Powell water-quality conditions

FY18: \$197,000

FY19: \$208,000

FY20: \$212,000

FY21: \$219,000\*\*

FY22: \$224,000\*\*

\*Not Funded by the GCDAMP

(\*\*Provisional estimates, subject to revision)





# Proposed FY2021-23 Triennial Workplan

Project	FY2021*	FY2022*	FY2023*
Streamflow, Water Quality, and Sediment Transport	\$1,270,000	\$1,394,000	\$1,468,000
Sandbar and Sediment Storage Monitoring and Research	\$1,281,000	\$1,197,000	\$1,371,000
Riparian Vegetation	\$345,000	\$395,000	\$405,000
Effects of Dam Operations and Vegetation Management for Archaeological Sites	\$349,000	\$359,000	\$363,000
Nutrients, Flow, and Temperature as Ecosystem Drivers	\$481,000	\$499,000	\$509,000
Aquatic Invertebrate Ecology	\$797,000	\$807,000	\$820,000
Humpback Chub Monitoring and Research	\$1,780,000	\$2,012,000	\$1,956,000
Salmonid Monitoring and Research	\$828,000	\$785,000	\$754,000
Invasive Aquatic Species	\$619,000	\$730,000	\$725,000
Socioeconomic Research	\$187,000	\$222,000	\$228,000
Hydropower Monitoring and Research	\$61,000	\$23,000	\$10,000
Geospatial Science, Data Management, and Technology	\$543,000	\$542,000	\$574,000
Overflight Remote Sensing	\$1,005,000	\$339,000	\$374,000
Administration	\$1,505,000	\$1,674,000	\$1,763,000
<b>Proposed Total - First Draft*</b>	<b>\$ 11,051,000</b>	<b>\$ 10,978,000</b>	<b>\$ 11,320,000</b>
<b>Anticipated AMP Funding Available*</b>	<b>\$9,088,000</b>	<b>\$9,088,000</b>	<b>\$9,088,000</b>
<b>Long/Short*</b>	<b>(\$1,963,000)</b>	<b>(\$1,890,000)</b>	<b>(\$2,232,000)</b>

# Questions?

