

# Navajo Nation Tribal Survey

## Glen Canyon Dam management and the Colorado River



### Navajo Nation IRB Consent Form

#### Right to Ask Questions and Report Concerns:

This research study is voluntary and you have the right to ask questions about this research study. Information collected during this research study will be confidential. However, if you have concerns or would like to report injuries, problems, grievance and have those questions answered by the Navajo Nation Human Research Review Board please contact, Mrs. Beverly Becenti-Pigman, Board Chair, email: [bbp\\_pqih@yahoo.com](mailto:bbp_pqih@yahoo.com), (928) 871-6929, Fax 928-871-6255, PO Box 1390, Window Rock, AZ 86515 before, during or after the research. You may also contact the co-principal investigator of the study, Mr. Lucas Bair, at any time by email or telephone at [lbair@usgs.gov](mailto:lbair@usgs.gov) or 928-556-7362.

This research study will estimate values for resources downstream of Glen Canyon Dam and the socioeconomic impacts of Glen Canyon Dam operations to tribal communities on the Navajo Nation. This survey will take approximately two hours and you will be asked to participate in the survey on only one occasion. We value the time of the tribal members participating in our research and participants will be given compensation for their time.

**Paperwork Reduction Act Statement:** We are collecting this information subject to the Paperwork Reduction Act (44 U.S.C. 3501) to improve the proposed Glen Canyon Dam Adaptive Management Program tribal survey. Your response is voluntary and we will not share the results publicly. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB Control Number. OMB has reviewed and approved this survey and assigned OMB Control Number 1090-0011, which expires 10/31/2021.

**Estimated Burden Statement:** We estimate the survey will take you 120 minutes to complete, including time to read instructions, gather information, and complete and submit the survey. You may submit comments on any aspect of this information collection to the Information Collection Clearance Officer, U.S. Geological Survey, James Sayer, Information Collections Clearance Officer, Federal Advisory Committee GPO, Federal Register Liaison, Oracle License Officer, Office of Information Management and Delivery, Portland, Oregon 97201.

# Study Area

## Glen Canyon Dam management and the Colorado River

### **Glen Canyon Dam is located on the Colorado River in Arizona**

- It is just upstream from the Grand Canyon within Glen Canyon
- It was built to provide water supplies and hydroelectricity
- It controls the water flow through the lower portion of Glen Canyon and the Grand Canyon
- Revenues from the sale of hydroelectricity are used to repay costs of building and operating the dam
- An allocation of electricity from power production at the dam is distributed to the Navajo Nation Tribal Utility Authority



# Study Area

## Glen Canyon Dam management and the Colorado River



### **Study area impacted by Glen Canyon Dam**

- The impacted Study area consists only of the area in and along the Colorado River at the bottom of the Grand Canyon and part of Glen Canyon downstream of Glen Canyon Dam
- The area begins at Glen Canyon Dam and continues for nearly 300 miles downstream from the dam
- The area ends at Lake Mead near Las Vegas, Nevada
- Part of the impacted area is within Grand Canyon National Park and part of Glen Canyon National Recreation Area
- The impacted area is along Navajo Nation reservation land

# How Glen Canyon Dam Affects Colorado River Resources

## Glen Canyon Dam management and the Colorado River

**The natural and cultural resources in the Study area affected by dam operations are located in and along the Colorado River below Glen Canyon Dam.**



**Sediment deposits** of sand and mud called beaches or sandbars, are scattered along the river. Beaches with vegetation provide habitat for birds and other small animals. Beaches are used by river boaters for camping. Beaches also serve to protect ancestral sites.

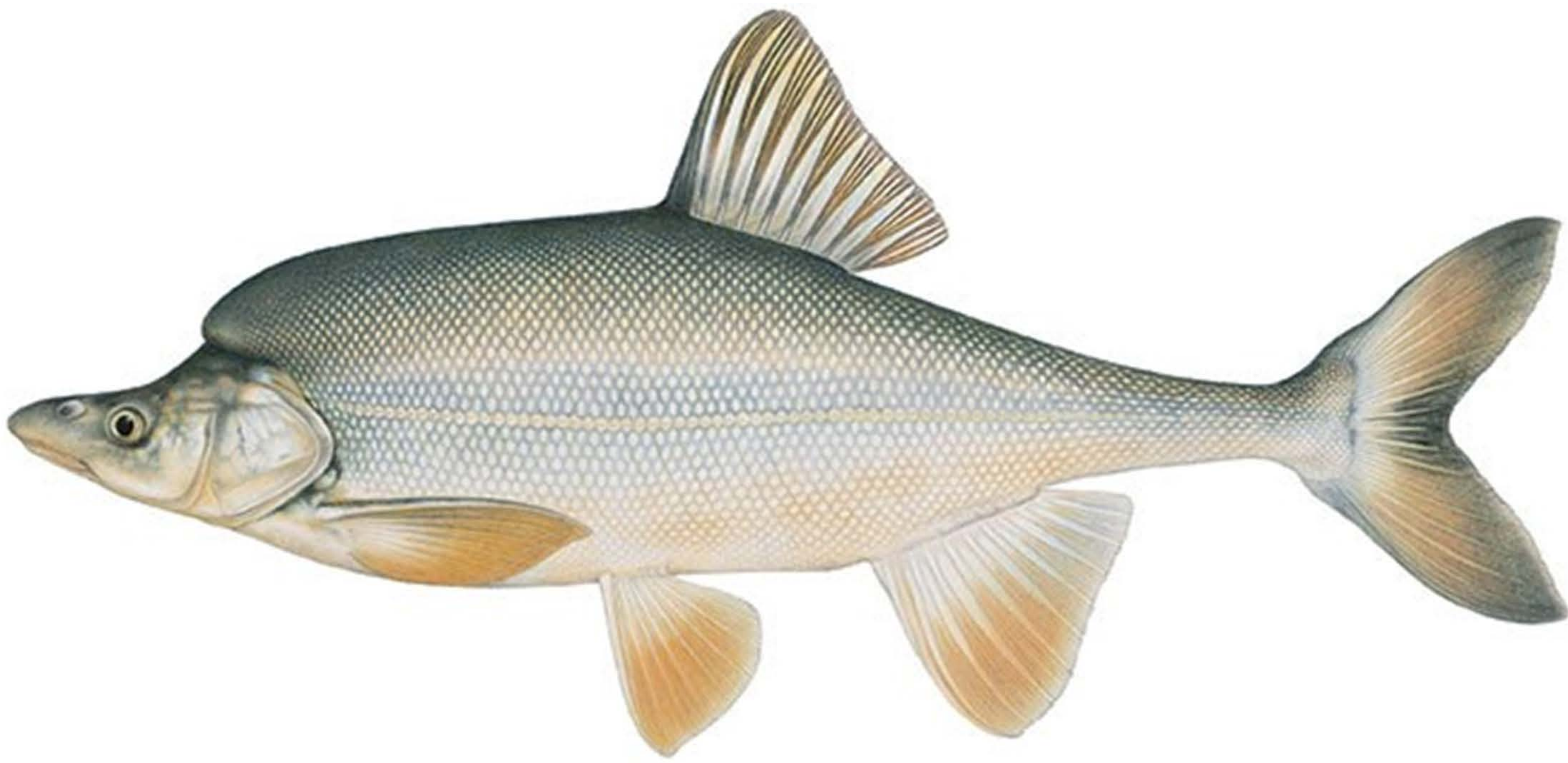
Because of a reduction in sediment supply below Glen Canyon Dam, erosion has decreased the number and size of beaches along the river.

- Over the past 30 years, the total area of beaches along the Colorado River downstream from Glen Canyon Dam has decreased by more than 25 percent.
- In the past 20 years, controlled floods released from Glen Canyon Dam have resulted in some periodic rebuilding of beaches, slowing the decline in size.
- The loss of beaches is most severe along the narrow sections of the Colorado River.

# How Glen Canyon Dam Affects Colorado River Resources

## Glen Canyon Dam management and the Colorado River

**The natural and cultural resources in the Study area affected by dam operations are located in and along the Colorado River below Glen Canyon Dam.**



**Five native fish** species, including the humpback chub shown, live in the Study area. Only one of these native species is found outside the Colorado River and its tributaries.

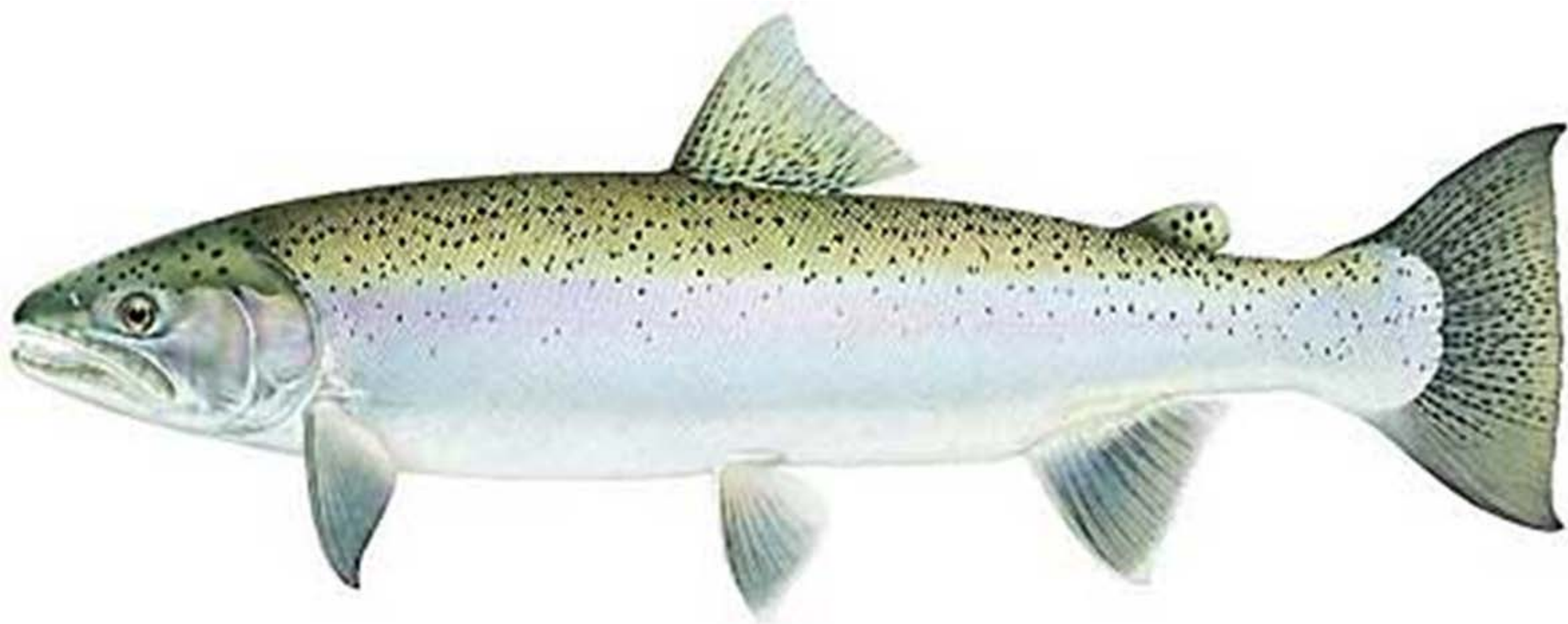
Populations of native fish in the Study area declined during the 1990s, but have increased over the last ten years.

- There are five native fish species found in the Study area.
- Two of five remaining native species, the humpback chub and razorback sucker, are in danger of becoming extinct.
- Cold water released from Glen Canyon Dam may be the most important cause of the decline of native fish populations.
- Predation and competition from non-native fish (trout and catfish) may have contributed to the decline of native species.

# How Glen Canyon Dam Affects Colorado River Resources

## Glen Canyon Dam management and the Colorado River

**The natural and cultural resources in the Study area affected by dam operations are located in and along the Colorado River below Glen Canyon Dam.**



**Invasive fish** also live in the river. Rainbow trout are not native to the Colorado River. They were introduced to this section of the Colorado River for recreational fishing following the construction of Glen Canyon Dam. People fish for rainbow trout primarily in the first 15 miles downstream from Glen Canyon Dam. Smaller populations of other invasive fish species, including brown trout and channel catfish also live in the Study area.

Conditions for trout are affected by daily fluctuations in water level.

- Juvenile rainbow trout can be stranded along the river shore at high water levels if water levels drop rapidly.
- The diversity of aquatic insects may be reduced because of exposure of eggs during daily low-water periods. This may reduce food options for juvenile and adult rainbow trout to a very small number of insect species.

# What can be done to protect the resources?

## Glen Canyon Dam management and the Colorado River

The condition of downstream resources in the Study area are monitored as part of the Glen Canyon Dam Adaptive Management Program. The Program's objective is to provide a process for coordinated Glen Canyon Dam operations and downstream resource protection and management.

Dam managers can change the water releases from the dam to make changes to the timing, fluctuations and average river levels. These modifications affect sandbar erosion, native and non-native fish, and hydropower.

### **Sediment (sandbar) management tools**

- Frequent short periods of high water releases, or controlled floods, increase the rebuilding of sandbars in the Grand Canyon.

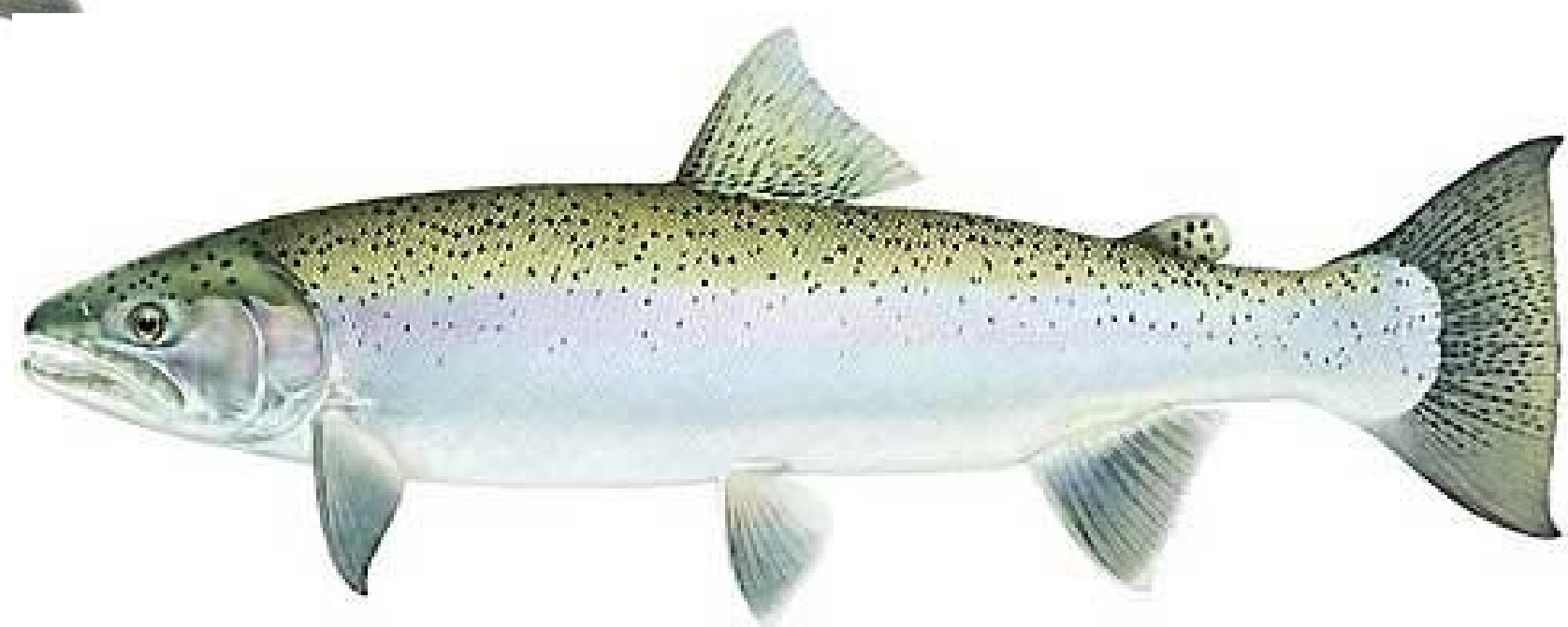
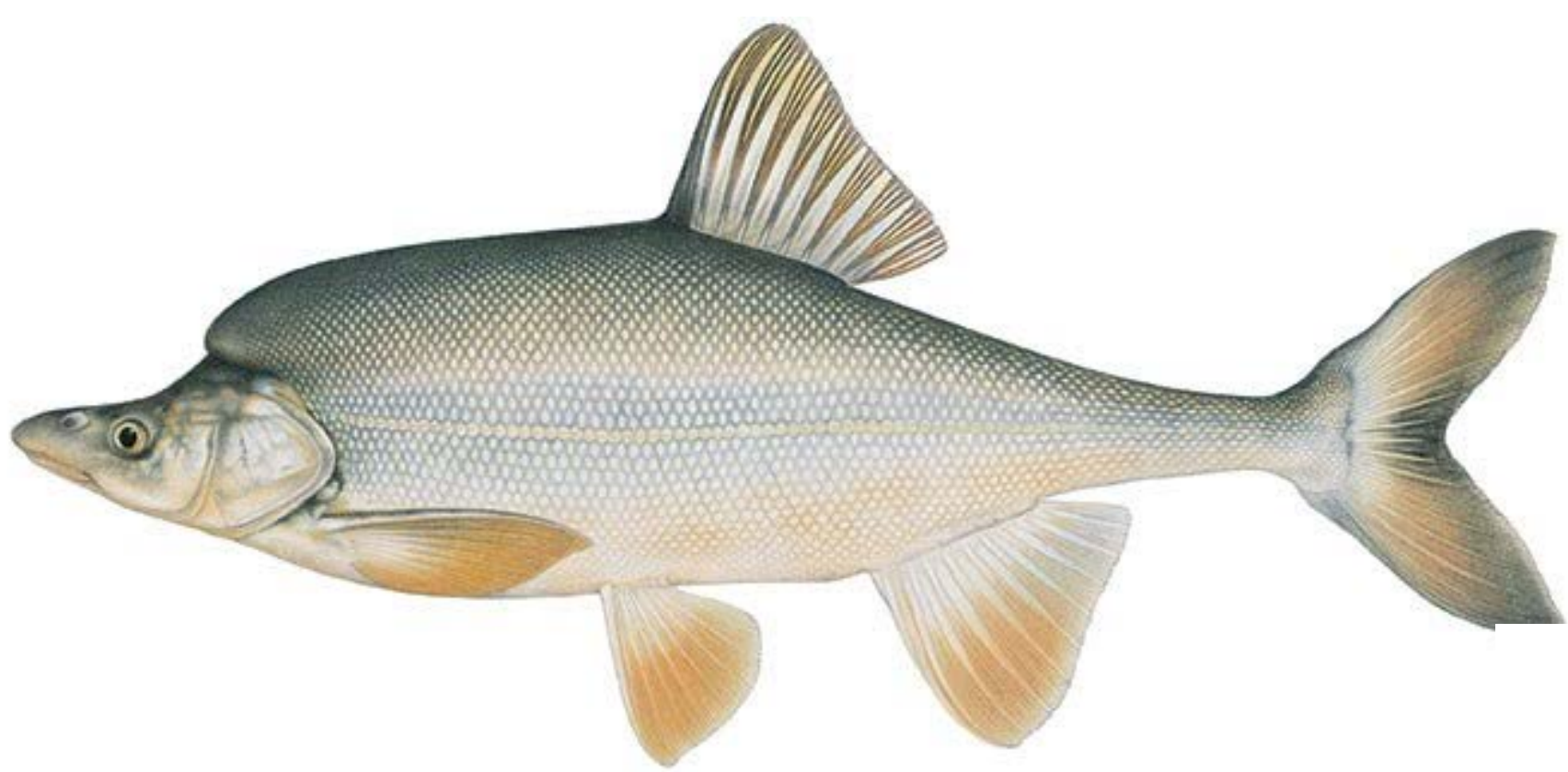


# What can be done to protect the resources?

## Glen Canyon Dam management and the Colorado River

### Fish management tools

- Flows designed to kill young trout in Glen Canyon, leading to fewer but larger trout and improve the growth and survival of native fish species,
- Flows designed to increase the temperature of water through low summer flows to improve the growth and survival of native fish species, and
- Flow experiments to improve aquatic insect production within the river system to improve food availability for native and non-native fish.



### Cost of tools

- River managers are able to use these tools in combinations in order to benefit the river corridor resources. All of these tools have costs associated with them. These costs would be passed on to the Navajo Nation tribal members through higher electric power bills for households.



# Approval of River Management Tools

## Glen Canyon Dam management and the Colorado River

Please look at the following list of actions which could be used to improve Colorado River resources below Glen Canyon Dam.

Please check whether you **APPROVE** or **DO NOT APPROVE** of using each river management tool.

<b>River management tools</b>	<b>I approve</b>	<b>I neither approve or disapprove</b>	<b>I do not approve</b>
Frequent short periods of high water releases, or controlled floods, increase the rebuilding of sandbars in the Grand Canyon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flows designed to kill young trout in Glen Canyon, lead to fewer but larger trout, and improved survival of native fish species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flows designed to increase the temperature of water through low summer flows improve the growth and survival of native fish species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flow experiments to improve aquatic insect production within the river system improve food availability for native and non-native fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

# Willingness to Pay for River Management Tools

## Glen Canyon Dam management and the Colorado River

The use of any of the tools listed above would reduce the amount and value of power generated by Glen Canyon Dam. This would raise costs of power to Navajo Nation tribal households.

What is the most you would be willing to pay per month in order to have the river management tools you approve of used to manage the Colorado River ecosystem?

Please check the amount you would be willing to pay per month in an increased household electric power bill:

- I would not be willing to pay anything
- 50 cents per month (\$6 per year)
- \$1 per month (\$12 per year)
- \$1.50 per month (\$18 per year)
- \$2 per month (\$24 per year)
- \$2.50 per month (\$30 per year)
- \$5 per month (\$60 per year)
- \$10 or more per month (\$120 or more per year)

# Implementation of River Management Tools

## Glen Canyon Dam management and the Colorado River

**The implementation of river management tools at the dam involve tradeoffs, such as**

- Varying flows from the dam to reduce rainbow trout may help native fish species, but might also reduce power generation, which would raise electricity costs for Navajo Nation tribal households.
- Having periodic controlled floods will rebuild downstream sandbars, but will also result in lower hydropower production from the dam.
- Existing dam management would maintain invasive rainbow trout and can lead to lower populations of native fish, such as humpback chub.

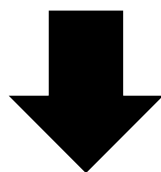
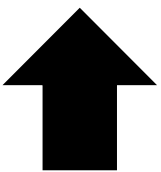




**In the next set of questions, we would like you to tell us what types of changes in resources along the Colorado River in the Grand Canyon you would most prefer. There are no right or wrong answers. We just want your best opinion on which of the two plans shown in each of the following XX questions you would most prefer.**



# Implementation of River Management Tools

## Glen Canyon Dam management and the Colorado River

Different people prefer different policies for managing the Colorado River Ecosystem below Glen Canyon Dam. Please look at the two management plans for the river shown below. Each has a different affect on river sandbars, endangered chub populations and trout populations. Please check which plan you prefer.

Resources impacted by river management tools	Management Plan A	Management Plan B
River beaches for recreation and protection of ancestral sites (Size and number)	 20%, or moderate, decrease in size and number	 20%, or moderate, <u>increase</u> in size and number
Endangered native fish (humpback chub) populations	 Remain at present levels	 25%, or moderate, <u>increase</u> in humpback chub populations
Trout populations for angling	 Remain at present condition	 50%, or large, <u>increase</u> in large trout
I would vote for (check only one ✓)	<input type="checkbox"/>	<input type="checkbox"/>

OR

**How certain do you feel about the choice you made above?**

- Very certain
- Somewhat certain
- Not certain at all

# Attitudinal Questions

## Glen Canyon Dam management and the Colorado River

Thinking about the choices you just made, please rate how much you agree or disagree with each of the following statements. **(Circle one number for each statement)**

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
It is important to restore and protect the Colorado River ecosystem no matter how much it costs.	1	2	3	4	5
I do not believe the management tools will actually improve the Colorado River natural and cultural resources.	1	2	3	4	5

People often have different views about environmental issues. On a scale of 1 to 5, with 1 being strongly agree, and 5 being strongly disagree, please indicate how you feel about each statement written below. **(Circle one number for each statement)**

Statement	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I have a great deal of concern for protecting wildlife habitat.	1	2	3	4	5
Endangered species should be protected even if they don't provide any benefit to humans.	1	2	3	4	5

# Attitudinal Questions

## Glen Canyon Dam management and the Colorado River

Now I would like you to read some statements about how you personally feel about the Colorado River and other land and water resources. Please check how strongly you agree or disagree with each statement. **(Circle one number for each statement)**

Statement	Strongly Agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree
Rivers and streams have spiritual or cultural values for me.	1	2	3	4	5
For me the Colorado River has spiritual significance because some of my Tribe's origins and oral history are centered on the area.	1	2	3	4	5
I know of or visit sites along the Colorado River for cultural reasons or to collect spring water, plants, and minerals (salts).	1	2	3	4	5
I feel it is fine for anyone to use the Colorado River in Glen and Grand Canyons for fishing, hiking, or boating at any time.	1	2	3	4	5
It is important to protect the Colorado River for cultural use by future generations.	1	2	3	4	5

# Demographic Questions

## Glen Canyon Dam management and the Colorado River

**Are you male or female?**

- Male
- Female

**What is your age?**

\_\_\_\_\_ years old

**How many people live in your household?**

\_\_\_\_\_ people 18 years old or older

\_\_\_\_\_ people under the age of 18

\_\_\_\_\_ total number of people in the household

**What is the highest degree or level of school you have completed?**

- No high school diploma
- High school diploma or GED
- Some college credit but no degree
- Associate's degree (for example: AA or AS)
- Bachelor's degree (for example: BA or BS)
- Some graduate school or professional school credit or a graduate or professional degree

**Do you or either of your parents belong to any of the following tribes in addition to the Navajo Tribe? (Check all that apply or leave blank if not applicable)**

- Apache
- Havasupai
- Hopi
- Hualapai
- Pueblo
- Paiute
- Zuni
- Other (please specify): \_\_\_\_\_

# Demographic Questions

## Glen Canyon Dam management and the Colorado River

**Are you an enrolled member of the Navajo Tribe?**

- Yes
- No

**Do you have formal training in cultural or traditional practices?**

- Yes
- No

**Which of the following categories best describes your employment status? (Check all that apply)**

- Employed full time
- Employed part time
- Retired
- Student
- Work in the household (for example, raise children)
- Unemployed
- Other (*please describe*) \_\_\_\_\_

**If employed, are you a Tribal employee?**

- Yes
- No

**What was your total pre-tax household income, including all earners in your household, in 2016?**

Under \$25,000

- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$199,999
- \$200,000 or more
- I do not wish to answer



# Contact Information

## Glen Canyon Dam management and the Colorado River



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