

Colorado River

Passage 1

At the time Glen Canyon Dam was constructed (1956–63), little consideration was given to how dam operations might affect downstream resources in Grand Canyon National Park. In fact, the dam
Line 5 was completed before enactment of the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973. By the late 1950s, public values began to shift, and throughout the 1960s and 1970s recognition of the environmental consequences of
10 Glen Canyon Dam and its operation grew. National Park Service and U.S. Geological Survey scientists and river recreationists observed the physical transformation of the river in Grand Canyon, including the loss of large beaches used for camping,
15 narrowing of rapids so as to reduce navigability, and changes in the distribution and composition of riparian vegetation. The humpback chub and Colorado pikeminnow, species found only in the Colorado River Basin, were listed as endangered in 1967 by
20 the U.S. Fish and Wildlife Service, which concluded in 1978 that the dam and its operation jeopardized the continued existence of humpback chub in Grand Canyon.

Annual spring snowmelt floods were the defining
25 attribute of the pre-dam flow regime. Before the Colorado River was regulated by dams, streamflow gradually increased from mid-December to March, precipitously increased in April and May, and reached its peak in early June.

30 Pre-dam floods disturbed the aquatic ecosystem,
and native fish species developed strategies to survive
periods when the velocity in the main part of the
channel was high and large amounts of suspended
sediment were being transported. For example, several
35 of the native fish species share unusual body shapes,
including a large adult body size, small depressed
skulls, large humps on their backs, and small eyes,
which presumably developed as adaptations to life in a
turbid and seasonably variable riverine environment.
40 Sandbars, riverbanks, and their accompanying aquatic
habitats were reshaped during floods. Additionally, the
increased elevation of the river surface during floods
provided water to native riparian vegetation otherwise
principally dependent on precipitation.

45 Decline in the size and abundance of sandbars
since the pre-Glen Canyon Dam era has been
documented by analysis of old aerial and ground-level
photographs and by topographic surveys that began in
the mid-1970s. Scientists have estimated that sandbar
50 area in the upstream 100 miles of Glen, Marble, and
Grand Canyons was 25 percent less in 2000 than in
average pre-dam years. This decline occurred because
releases of water from Lake Powell are virtually free of
sediment. The tributaries that enter the Colorado River
55 downstream from the dam supply only a fraction of
the pre-dam sand supply, and the capacity of the post-
dam river to transport that sand greatly exceeds this
limited supply. Normal dam operations, therefore, tend
to erode, rather than build, sandbars.

60 By experimentation, scientists have learned that
controlled floods, if released from the reservoir
immediately following large inputs of sand from
tributaries, can build sandbars. These sandbars are
built during controlled floods when sand is carried
65 from the riverbed and temporarily suspended at high
concentration in the flow. The suspended sand is
transported into eddies where it is then deposited in
areas of low stream-flow velocity. Sandbars enlarged
by this process provide larger camping beaches for
70 river-rafting trips and create backwater habitats used
by native fish. Newly deposited sandbars also provide
areas for riparian vegetation to grow and are a source
of windblown sand. Windblown sand carried upslope
from sandbars helps to cover and potentially preserve

75 some of the culturally significant archeological sites in
Grand Canyon.

Scientists have also learned that controlled
floods may erode sandbars if the concentration of
suspended sand during a controlled flood is too low.

80 The concentration of sand during a flood is directly
proportional to the amount of the riverbed covered by
sand and the size of that sand. Higher concentrations
of suspended sand occur when the sand is relatively
fine and large amounts of the riverbed are covered by
85 sand. These findings are incorporated in the current
reservoir-release management strategy for Glen
Canyon Dam, which involves releasing controlled
floods— administratively referred to as High Flow
Experiments (HFEs)—whenever the Paria River
90 has recently delivered large amounts of sand to the
Colorado River. The magnitude and duration of the
controlled floods is adjusted to transport just the
amount of sand that has recently been delivered from
the Paria River.

1. The author of Passage 1 most likely believes that the Glen Canyon Dam

- A. is a useful tool for managing scarce water resources.
- B. was built with a lack of foresight.
- C. has decimated native fish populations.
- D. has had a calming effect on the aquatic ecosystem.

2. Which choice provides the best evidence for the answer to the previous question?

- A. Lines 1-4 ("At the time...Park")
- B. Lines 17-23 ("The humpback...Canyon")
- C. Lines 24-25 ("Annual...regime")

D. Lines 30-34 ("Pre-dam floods...transported")

3. The author of Passage 1 mentions scientists and river recreationists primarily to

- A. provide support for the idea that post-dam river looks drastically different.
- B. draw a contrast between scientific observations and casual observations of river conditions.
- C. emphasize the spirit of collaboration between the science community and the public in conservation efforts.
- D. prove that the Glen Canyon Dam has had a ruinous effect on the river.

4. Passage 1 suggests that the humpback chub

- A. is now extinct in the Grand Canyon.
- B. has a small, depressed skull.
- C. can survive in changing environments.
- D. thrives in high velocity river channels.

5. As used in line 25, "regime" most nearly means

- A. government.
- B. tenure.
- C. system.
- D. management.

6. As used in line 65, "suspended" most nearly means

- A. stopped.
- B. mixed.
- C. withheld.
- D. hanging.

7. It is reasonable to conclude that controlled floods

- A. successfully simulate pre-dam snowmelt floods.
- B. contain large amounts of suspended sediment.
- C. may be detrimental to the health of the Colorado River.
- D. should be done during the months that snowmelt floods typically occur.

8. Which choice provides the best evidence for the answer to the previous question?

- A. Lines 58-59 ("Normal...sandbars")
- B. Lines 66-68 ("The suspended...velocity")
- C. Lines 71-73 ("Newly...sand")
- D. Lines 77-79 ("Scientists...low")

9. The author of Passage 1 would most likely respond to the High Flow Experiments described in Passage 2 by

- A. appreciating the efforts of scientists to maintain the sand supply below the dam.
- B. warning of the calamity of interfering with the river ecosystem.
- C. questioning the ability of controlled floods to build up sandbars.

D. worrying that reshaped habitats will harm native fish.

10. Which of the following best describes the structure of the two passages?

A. Passage 1 introduces a problem, and Passage 2 proposes a solution to the problem.

B. Passage 1 offers a historical discussion, and Passage 2 describes the implications of a scientific practice.

C. Passage 1 gives background information, and Passage 2 details recent changes.

D. Passage 1 describes an experiment, and Passage 2 offers suggestions for future action.

11. Which of the following statements is true of Passage 1, but not of Passage 2?

A. The passage gives details of scientific studies conducted on the river.

B. The passage offers documented evidence of topographic change in the river.

C. The passage indicates the importance of floods to the river ecosystem.

D. The passage gives specific examples of species affected by the dam.www.cracksat.net