

THE STATE OF NATURAL AND CULTURAL RESOURCES  
IN THE COLORADO RIVER ECOSYSTEM:  
DRAFT ANNUAL REPORT OUTLINE, 15 MARCH 1998

EXECUTIVE SUMMARY

An overview of resource trends (ca. 10 pp.)

INTRODUCTION

Administrative background and purpose  
Study area, including geomorphic reach descriptions  
A general description of ecosystem processes and components, and management objectives  
Monitoring and research activities this year  
Flow and resource criteria triggering high flows  
Data management and availability this year  
Overview of contents of the annual SOTRE report  
Table: Master list of resources and processes  
Table: High flow triggering criteria and historical summary from past and this year  
Figure: Map of study area  
Figure: Flow diagram of river administration  
Figure: Flow diagram of ecosystem processes  
Figure: Flow diagram of cultural-ecosystem components  
Figure: Monitoring and research activities this year, coupled with the hydrograph

PHYSICAL COMPONENTS:

CLIMATE

Each of the following processes will be accompanied by a brief text describing their importance, how it interacts with other resources and processes, a description of the management questions, and who is presently working on this topic.

Monitoring

Descriptive text, with comparison to previous years and long-term trends.  
Describe scale issues, and describe any exceptional events or observations this year.

Figures: Temperature and precipitation at Phantom Ranch for period of record,

Runoff prediction

Tables: Minimum, mean and maximum monthly temperature and precipitation at Phantom Ranch for period of record.

Research analyses (new information)

Synthesis of this year's findings

## FLOW, SEDIMENT AND WATER QUALITY

Each of the following resources and processes will be accompanied by a brief text describing the importance of the various resources in this category, how they interact with other resources and processes, a description of the management questions, and who is presently working on this topic.

### Hydrology

Text describing this year's data, and comparing this year with past years, and long-term trends. Describe any exceptional events, including durations of low or high flows and ramping rates.

Figures: Daily minimum, mean and maximum daily flow for period of record from Glen Canyon Dam, Lees Ferry, LCR Phantom Ranch and Diamond Creek streamflow gages, as well as ungaged tributaries; elevations of Lake Powell and Lake Mead.

### Water quality

#### Lake Powell

Text describing this year's data, and comparing this year with past years, and long-term trends. Describe any exceptional events.

Figures: Seasonal minimum, mean and maximum monthly temperature, DO, specific conductance, and pH across depth in Lake Powell for period of record.

#### Downstream river

Text describing this year's data, and comparing this year with past years, and long-term trends. Describe any exceptional events.

Figures: Paria River, Little Colorado River, other gaged tributaries.

### Sediment

#### Mainstream sediment transport

Text describing this year's data, and comparing this year with past years, and long-term trends. Describe any exceptional events.

Figures: Lees Ferry, Phantom Ranch and Diamond Creek daily sediment transport.

#### Sandbars

Text describing this year's data, and comparing this year with past years and long-term trends. Describe any exceptional events.

Figures: Sand bar volumes over period of record by kilometer and reach.

#### Debris Fans and Rapids

Text describing this year's data, and comparing this year with past years and long-term trends. Describe any exceptional events.

Figures: Number of significant debris fans/yr that reach the river.

#### Tributary sediment inflow

Text describing this year's data, and comparing this year with past years, and long-term trends. Describe exceptional events.

Figures: Paria River, Little Colorado River, other gaged tributaries.

#### Research analyses (new information)

## BIOLOGICAL RESOURCES

Each of the following resource categories will be accompanied by a brief text describing the importance of the various resources in this category, how they interact with other resources and processes, a description of the management questions, and who is presently working on this topic. High flows (e.g., BHBF) triggering criteria will be identified in each resource category.

### Aquatic Food Base

Text describing this year's data, and comparing this year with past years and long-term trends. Describe the importance of resources and how they interact with other resources and processes, and describe the management questions. Describe any exceptional events or observations.

Figures: Water quality (temperature, DO, specific conductance, and pH), macrophyte standing mass, benthic invertebrate standing mass, drift (including plankton) mass over distance and time.

Research analyses (new information)

Synthesis of this year's findings

### Fisheries

#### Native Fish

Text describing individual and reach-based analyses of this year's spawning, larval, juvenile, and adult data for HBC, FMS and other species, and comparing this year with past years and long-term trends. Describe any exceptional events or observations.

Table: Gear-type and effort expended by reach and season.

Figures: Relative abundance, condition factor, and length frequency distribution of each species in mainstream and in tributaries by habitat type; other issues include spawning success, standing mass by habitat (e.g., mainstream, vegetated and unvegetated shoreline, backwater) and by geomorphic reach, as well as diet, and parasite loads.

#### Trout in Glen Canyon Reach

Text describing individual and reach-based analyses of this year's spawning, larval, juvenile, and adult data, and comparing this year with past years and long-term trends. Describe any exceptional events or observations.

Table: Gear-type and effort expended by sampling period.

Figures: Relative abundance, condition factor, and length frequency distribution of trout in mainstream and in downstream tributaries; other issues include creel census analysis, redd distribution and spawning success, standing mass by habitat (e.g., mainstream, vegetated and unvegetated shoreline, backwater), change by geomorphic reach downstream, as well as diet, and parasite loads.

### Non-Native Fish

Text describing individual and reach-based analyses of this year's spawning, larval, juvenile, and adult data, and comparing this year with past years and long-term trends. Describe any exceptional events or observations.

Table: Gear-type and effort expended by sampling period.

Figures: Relative abundance, condition factor, and length frequency distribution of each species in mainstream and in tributaries, by habitat; other issues include spawning success, standing mass by habitat (e.g., mainstream, vegetated and unvegetated shoreline, backwater) by geomorphic reach, as well as diet, and parasite loads.

### Fish Habitat

Text describing individual and reach-based analyses of this year's fish habitat availability, with emphasis on long-term trends. Describe any exceptional events or observations.

Figures: Fish habitat availability by reach.

Research analyses (new information)

Synthesis of this year's findings

### Terrestrial Processes and Biota

#### Wetland and Riparian Vegetation

Text describing individual site, reach-based and system-wide analyses of vegetation data, comparing this year with previous years, and with emphasis on long-term trends. Describe any exceptional events or observations.

Figures: Cover estimates and composition, and changes over time

#### Species of Concern: Endangered Kanab Ambersnail

Text describing population and habitat data, comparing this year with past years, and long-term trends. Describe any exceptional events or observations.

Figures: Population and habitat cover this year, and changes over time.

#### Species of Concern: Endangered Southwestern Willow Flycatcher

Text describing population and habitat data, comparing this year with past years, and long-term trends. Describe any exceptional events or observations.

Figures: Population size, nesting success and habitat availability this year, and changes over time.

#### Species of Concern: Other Listed Species (Bald Eagle, Peregrine Falcon)

Text describing population and habitat data, comparing this year with past years, and long-term trends. Describe any exceptional events or observations.

Figures: Population size, nesting success and habitat availability this year, and changes over time.

Species of Concern: Other Colorado River corridor fauna (Especially Northern Leopard Frog, Niobrara Ambersnail, Osprey, and Belted Kingfisher)

Text describing population and habitat data, comparing this year with past years, and long-term trends. Describe any exceptional events or observations.

Figures: Population size, reproductive success and habitat availability this year, and changes over time.

Species of Concern: Non-native Fauna

Text describing population and habitat data, comparing this year with past years, and long-term trends. Describe any exceptional events or observations.

Figures: Population size, reproductive success and habitat availability this year, and changes over time.

Research analyses (new information) and synthesis

Synthesis of this year's findings

## CULTURAL RESOURCES

Each of the following resource categories will be accompanied by a brief text describing the importance of the various resources in this category, how they interact with other resources and processes, a description of the management questions, and who is presently working on this topic. If high flows (e.g., BHBF) triggering criteria are identified, they will be presented for each resource category.

### Archeological Sites

Text describing individual and reach-based analyses of this year's data, comparing this year with past years, and long-term trends.

Description of exceptional events or observations.

Figures: Condition by resource, and over time.

Research analyses (new information) and synthesis

Synthesis of this year's findings.

### Traditional Cultural Properties

Text describing individual and reach-based analyses of this year's data, comparing this year with past years, and long-term trends.

Description of exceptional events or observations.

Figures: Condition by resource, and over time.

Research analyses (new information) and synthesis

Synthesis of this year's findings.

### Traditional Cultural Resources

Text describing individual and reach-based analyses of this year's data, comparing this year with past years, and long-term trends.

Description of exceptional events or observations.

Figures: Condition by resource, and over time.

Research analyses (new information) and synthesis of this year's findings

## Recreation

### Fishing

Text describing analyses of this year's data, comparing this year with past years and long-term trends. Description of exceptional events or observations.

Figures: Success over time in Glen Canyon reach and downstream.

### Day rafting

Text describing analyses of this year's data, comparing this year with past years, and long-term trends. Description of exceptional events or observations.

Figures: Condition by resource, and over time.

### Whitewater Boating

Text describing individual and reach-based analyses of this year's data, comparing this year with past years, and long-term trends. Description of exceptional events or observations.

Figures: Camping beach distribution over time.

### Economic Benefits

Text describing analyses of this year's data, comparing this year with past years, and long-term trends. Description of exceptional events or observations.

Figures: Condition by resource over time.

### Safety

Text describing individual and reach-based analyses of this year's data, comparing this year with past years, and long-term trends. Description of exceptional events or observations.

Figures: Incident rate by reach over time.

### Visitor Satisfaction

Text describing analyses of this year's data, comparing this year with past years, and long-term trends. Description of exceptional events or observations.

Figures: Condition over time.

### Research analyses (new information) and synthesis

Synthesis of this year's findings.

## POWER

This discussion will be accompanied by a brief text describing the importance of this resources, who and how many are served, how power production interacts with other resources and processes, a description of the management questions, the monitoring of power production, and impacts of planned and unplanned high flows on power production. The data will consist of the energy generated, in comparison with previous years, and long-term trends, as well as a description of exceptional events or observations.

ACKNOWLEDGEMENTS

LITERATURE CITED

APPENDICES

- List of contracts and contacts for the work performed this year
- Hydrologic criteria triggering high flows
- Natural (and cultural?) resource criteria triggering high flows

# HIGH FLOWS (>POWERPLANT CAPACITY) EFFECTS ON COLORADO RIVER RESOURCES

SCALE: -3 = STRONG NEGATIVE IMPACT, 0 = NO IMPACT, 3 = STRONG POSITIVE IMPACT

RESOURCE CATEGORY	INDIVIDUAL COMPONENTS	MONTH						
		JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY
WATER	Streamflows							
	Lake Powell Stratification N=2	0.6	1	1.3	1.3	1	0.6	0.6
	Downstream Water Quality N=3	0.3	0.3	0.6	1.6	1.3	1.3	1.3
SEDIMENT	Riverbed sand N=3	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	After 20 years							
	After 50 years							
	Sand bars N=4	2.6	2.6	2.6	2.6	2.6	2.6	2.6
AQUATIC RESOURCE	Aquatic food base N=5	0	0	0	0	-1	-1	-1
	Native Fish habitat N=3	-1	-1	-1	-1	-1	-1	-1
	Non-native fish habitat N=3	0	-1	0	0	-1	-1	-1
	Humpback Chub Spawning N=2	-1	-1	0	0	0	0	0
	Larval N=4	0	0	-1	-1	-2	-2	-2
	Juvenile N=4	0	0	0	-1	-1	-1	-2
	Adult N=4	0	0	0	0	0	0	0
	Flannelmouth Sucker spawning N=5	0	0	0	0	0	0	0
	Larval N=5	0	0	0	-1	-1	-1	-1
	Juvenile N=4	0	0	0	0	0	-1	-1
	Adult N=4	0	0	0	0	0	0	0

RESOURCE CATEGORY	INDIVIDUAL COMPONENTS	MONTH						
		JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY
AQUATIC RESOURCES	Trout							
	Spawning N=2	-1	-1	-1	0	0	0	0
	Larval N=5	-1	-1	-1	-1	-1	-1	-1
	Juvenile N=5	0	0	-1	-1	-1	-1	-1
	Adult N=5	0	0	0	0	0	0	0
VEGETATION	Emergent marsh plants N=4	0	0	-1	-1	-1	0	0
	Woody Plants N=4	0	0	0	0	0	0	0
	Preventing Tamarix Germ'n N=3	1	1	0	-1	-1	-1	-1
	Riparian habitat N=2	0	0	0	-1	-2	-2	-2
WILDLIFE & HABITAT	Waterbirds N=2	-1	-1	-1	-2	-2	-2	-1
	Terrestrial Invertebrates	0	0	0	0	0	0	0
	Breeding birds N=2	0	0	0	0	-2	-2	-1
	Overwintering birds N=2	-2	-2	-2	-1	-1	0	0
LISTED & SPECIAL STATUS SPECIES	Bald Eagle N=3	-1	-1	-1	0	0	0	0
	Peregrine Falcon N=2	0	0	0	0	0	0	0
	Kanab Ambersnail+Habitat N=5	-15	-2	-2	-2	-2	-2	-2
	SW Willow Flycatcher+Habitat N=	0	0	0	0	0	0	0
CULTURAL-SOCIO. RESOURCES	Archaeological sites N=2	0	0	0	0	0	0	0
	Traditional cultural properties N=2	1	1	1	1	0	0	0
	Traditional cultural resources N=2	0	0	0	0	0	0	0
	Regional air quality N=1	0	0	0	0	0	0	0
RECREATION	Fishing N=3	-1	-1	-2	-1	-1	0	0
	Day rafting N=5	0	0	0	0	0	0	0
	Whitewater boating N=5	0	0	0	0	0	0	0
	Economic benefits N=1	0	0	0	0	0	0	0
POWER	Annual economic costs N=1	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
	Wholesale rate N=1	0	0	0	0	0	0	0
	Retail rate N=1	0	0	0	0	0	0	0
	<b>ALL RESOURCES</b>	<b>-8</b>	<b>-10.5</b>	<b>-13.5</b>	<b>-14.5</b>	<b>-21.5</b>	<b>-19.5</b>	<b>-18.5</b>



# RESOURCE CRITERIA DIAGRAM

