

**State of Natural and Cultural Resources in the  
Colorado River Ecosystem  
Draft Outline**

- I. Executive Summary**
- II. Introduction and Program History**
  - i. Study Area Defined
  - ii. Administrative History
  - iii. Adaptive Management Program
  - iv. Adaptive management
  - v. Role of Science
- III. Part 1: Physical Resources: Lake Powell Hydrology, Quality-of-Water, Climate and Drought, and Power**
  - A. Lake Powell Hydrology and Limnology (Scott Wright, Ph.D.; Bill Vernieu; and Susan Hueftle)
    - i. Inflow/outflow volumes
      - Lake elevations
      - Projections
    - ii. Lake Powell limnology
      - Reservoir hydrodynamics
      - Long-term cycling of salinity and DO
      - Trends in water quality
        - Nutrients
        - Primary and secondary productivity
        - Clarity
  - B. Downstream Quality of Water (Scott Wright, Ph.D., and Susan Hueftle)
    - i. Introduction
    - ii. Background
      - DIQWP
    - iii. Status and trends
      - Tailwater conditions
      - Long-term drought and flood cycles
      - Downstream temperature
      - Downstream multi-parameter measurements
    - iv. Recent Findings
      - MLFF
      - Drought
    - v. Discussion

- C. Climate and Drought (Bob Webb, Ph.D.)
- D. Power (David Harpman, Ph.D., and Aaron Douglas, Ph.D.)
  - i. Background (Demand-based production, load, peaking power, and ramp rate)
  - ii. Economic value of hydroelectricity
  - iii. Glen Canyon Dam power production and distribution
  - iv. Analysis method
  - v. Experimental flows

#### **IV. Part 2: Aquatic Ecosystem Resources**

- A. Sandbars and Fine Sediment Resources (includes terrestrial resources) (Dave Rubin, Ph.D.; Scott Wright, Ph.D.; and Ted Melis, Ph.D.)
  - i. Overview
  - ii. Recent findings
  - iii. EIS hypothesis
  - iv. Update on current experimental plan
- B. Coarse Sediment (Robert Webb, Ph.D., and Ted Melis, Ph.D.)
  - i. Debris fans and rapids
- C. Aquatic Food Base (Ted Kennedy, Ph.D., and Steve Gloss, Ph.D.)
  - i. Vegetation
  - ii. Invertebrates
  - iii. Trophic linkages
- D. Fisheries Resources (Steve Gloss, Ph.D., and Lew Coggins)
  - i. Historic fish populations
  - ii. Uniqueness of Grand Canyon fishes
  - iii. Changes in the fish fauna of Grand Canyon and the Colorado River
    - Introduced species
    - Dam impacts
    - Other issues (parasites, etc.)
  - iv. Status and trends
    - Life histories
  - v. Cause and effect relationships
  - vi. Potential management options

#### **V. Part 3: Terrestrial Ecosystem Resources**

- A. Terrestrial vegetation (Barb Ralston, Ph.D., and Michael Kearsley, Ph.D.)
  - i. Introduction
  - ii. Status and trends
    - Vegetation dynamics
  - iii. Recent findings

iv. Discussion

B. Wildlife

i. Avifauna (Barb Ralston, Ph.D., and Helen Yard, Ph.D.)

Introduction

Status and trends

Waterfowl and raptors

Southwest willow flycatcher

ii. Federally listed endangered and special status species (Barb Ralston, Ph.D.)

Kanab ambersnail

Northern leopard frog

VI. **Part 4: Human Component of the Grand Canyon Ecosystem**

A. Cultural Resources (Helen Fairley, Ph.D.)

i. National register eligible archeological sites

ii. Traditional cultural resources

iii. Cultural resources not eligible for listing

Ethnobotanical resources

Ethnozoological resources

B. Recreational Resources (Helen Fairley, Ph.D.)

i. Quality of recreational experience

Lees Ferry trout fishing

10 year creel data

White water rafting

ii. Campsite monitoring

iii. Recreation economics & non-use values (Aaron Douglas, Ph.D.)

VII. **Integrating Science (Jeff Lovich, Ph.D., and Ted Melis, Ph.D.)**

VIII. **Back Matter**

A. Glossary

B. Index