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General Core Monitoring Plan for the GCD-AMP

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Steps in Indentifying Core Monitoring Activities that Support GCD-AMP

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Background

Four Step Core Monitoring Process (as described in the 2007-11 MRP)

1 – General Core Monitoring Plan

2 – Information Needs Workshops

3 – Protocol Evaluation Panel Reviews

4 – Core Monitoring Program Reports

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General Core Monitoring Plan Purpose

Programmatic Assessment of GCD-AMP core monitoring activities

- Identifies Goals, Objectives, Scope, Schedule and Funding for each core monitoring project

- Indentifies general strategies for an integrated ecological monitoring approach

- Specifies data management, reporting and institutional arrangements

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General Principles for Ecological Monitoring Design

- Determine What, Where, When, and How
- Establish Data Management procedures
- Establish Reporting Procedures
- Document Monitoring Protocols
- Implement and Institutionalize Monitoring

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Determine What, Where, When, and How to Monitor

- **Selection of vital signs/components**
  - **Need Inventories and Conceptual Model**
- Determination of how Data will be Used
- Selection of Sites
- Selection of Sampling Frequency
- Selection of Sampling Techniques

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Selection of Ecological Components

- Examples of Different Ecological Components -
  - Special Legal Status
  - Endemic or Alien Taxa
  - Harvested Taxa
  - Community Dominants
  - Heroic Taxa with Public Support
  - Abiotics that are Ecosystem Drivers

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Ecological Components Channel Islands National Park

Sea	Land
Pinnipeds	Tide Pools
Sea Birds	Land Birds
Invertebrates	Invertebrates
Vegetation	Vegetation

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Ecological Components Channel Islands NP

- Fishes
- Amphibians
- Visitors
- Weather
- Reptiles
- Mammals
- Fisheries
- Water Quality

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Ecological Components
Organ Pipe National Monument

Special Status Plants

- Acuna Cactus
- Senita Cactus
- Organ Pipe Cactus
- Dahlia Rooted Cactus
- Desert Caper
- Ashy Jatropha

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Ecological Components
Organ Pipe National Monument

- Vegetation
- Small Mammals
- Near-by Ag Develop
- Invertebrates
- Depth of Ground Water
- Night-sky Brightness

- Lizards
- Birds
- Bats
- Weather
- Air Quality

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Determine What, Where, When, and How to Monitor

- Selection of vital signs/components
- Selection of Data to be collected
- Selection of Sites
- Selection of Sampling Frequency
- Selection of Sampling Techniques

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General Principles for Ecological Monitoring Design

- Determine What, Where, When, and How
- Establish Data Management procedures
- Establish Reporting Procedures
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General Core Monitoring Plan
Table of Contents

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Chapter 1-Intro and Background

- Resource Stewardship and Monitoring
- Strategic Planning, Performance Evaluation, Legislation, and Policy
- Boundary and Definition of the Colorado River Ecosystem being monitored
- Management Issues and Goals
- Definition of Core Monitoring

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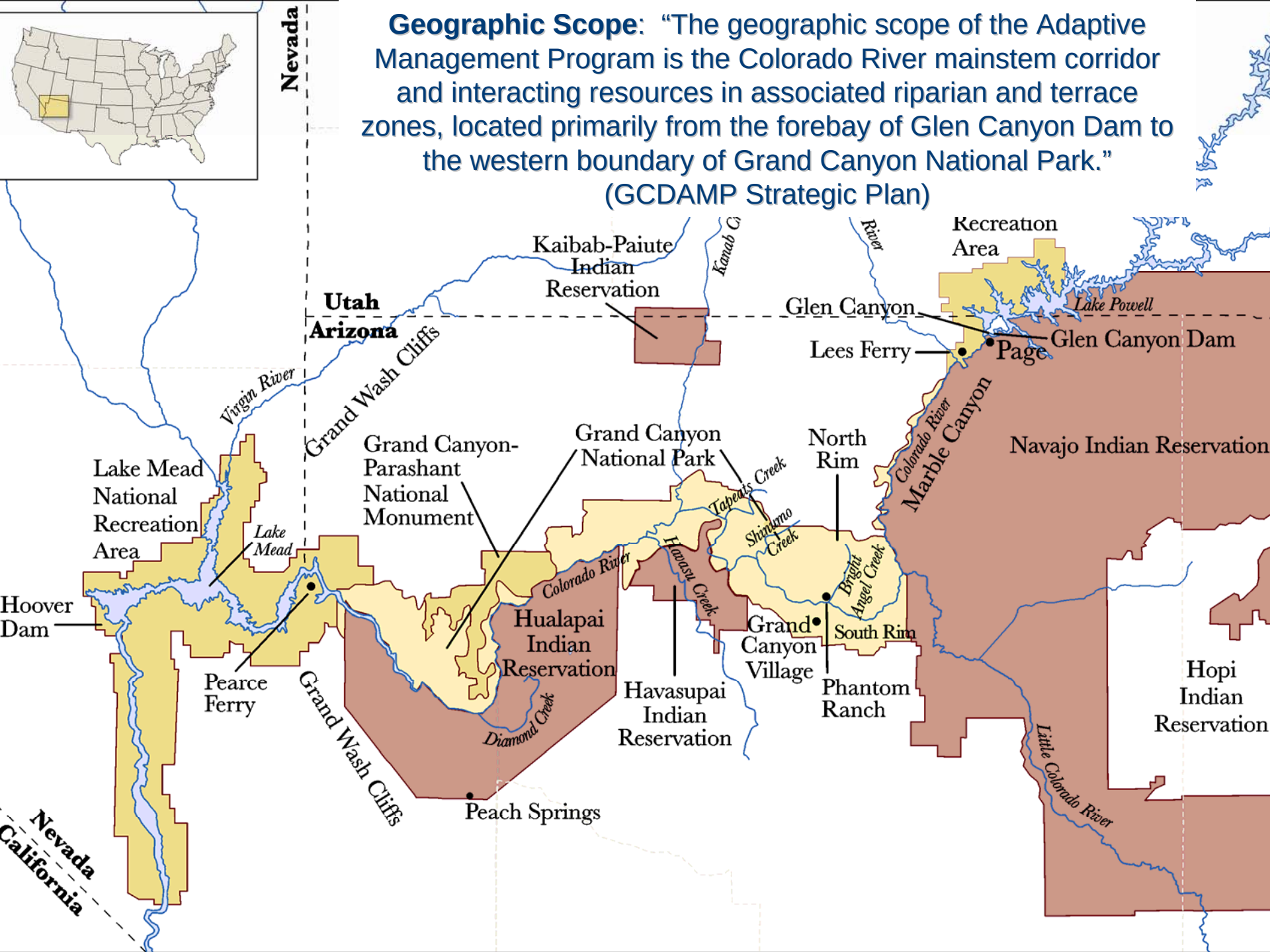
Geographic Scope: "The geographic scope of the Adaptive Management Program is the Colorado River mainstem corridor and interacting resources in associated riparian and terrace zones, located primarily from the forebay of Glen Canyon Dam to the western boundary of Grand Canyon National Park." (GCDAMP Strategic Plan)



Adaptive Management Program Goals

1. Protect/improve aquatic food base
2. Maintain/attain viable native fish pop (especially humpback chub)
3. Restore populations of extirpated species as feasible and advisable (no current activity)
4. Maintain a healthy rainbow trout pop
5. Maintain/attain a viable population of Knab ambersnail
6. Protect riparian and spring communities and related T&E species
7. Establish needed water quality, temperature and flow regimes
8. Maintain/attain needed sediment storage
9. Maintain/improve the quality of the recreation experience
10. Maintain/increase power production and energy generation
11. Preserve, protect, and restore cultural resources
12. Maintain a high quality research and adaptive management program

Note: Assumes core monitoring project will be developed and implemented for each resources goal

Chapter 2. Conceptual Ecosystem Models

- 2.1 Overview
- 2.2 Current Colorado River Model
- 2.3 Refining the Colorado River Model

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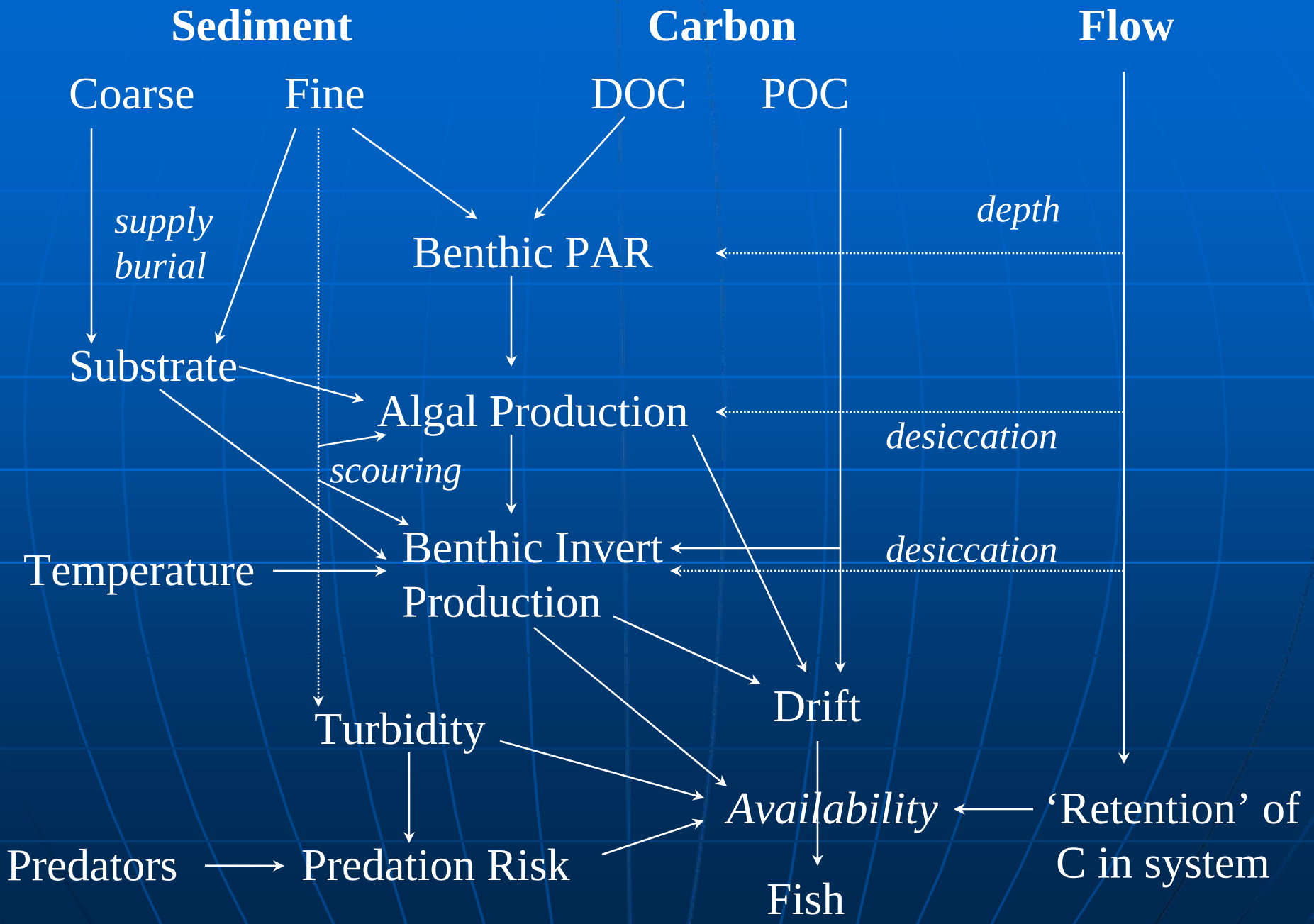
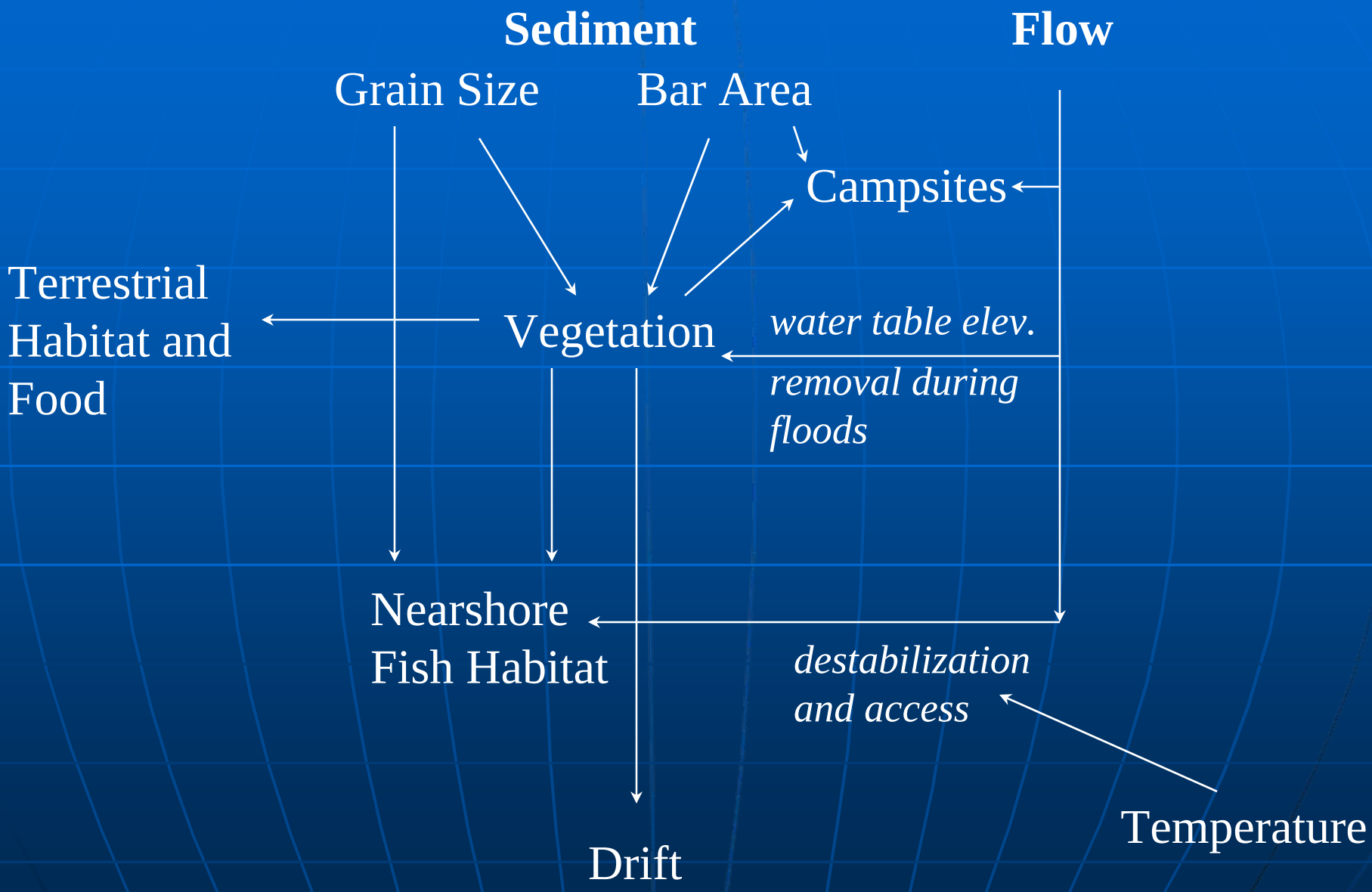
Aquatic - (Ecometric Research, 1999)



Terrestrial - (Ecometric Research, 1999)



Chapter 3. Framework and Context of the Core Monitoring Program

3.1 AMP Goals and Desired Future Conditions
3.2 Core Monitoring Information Needs
3.2 Develop Resource Monitoring Protocols
- Inventory
- Protocol development and pilot testing

3.3 Targeted Research
3.4 Management and Experimental Actions
3.5 Integration of Monitoring Activities
3.6 Integration with Other Monitoring Activities in the Region

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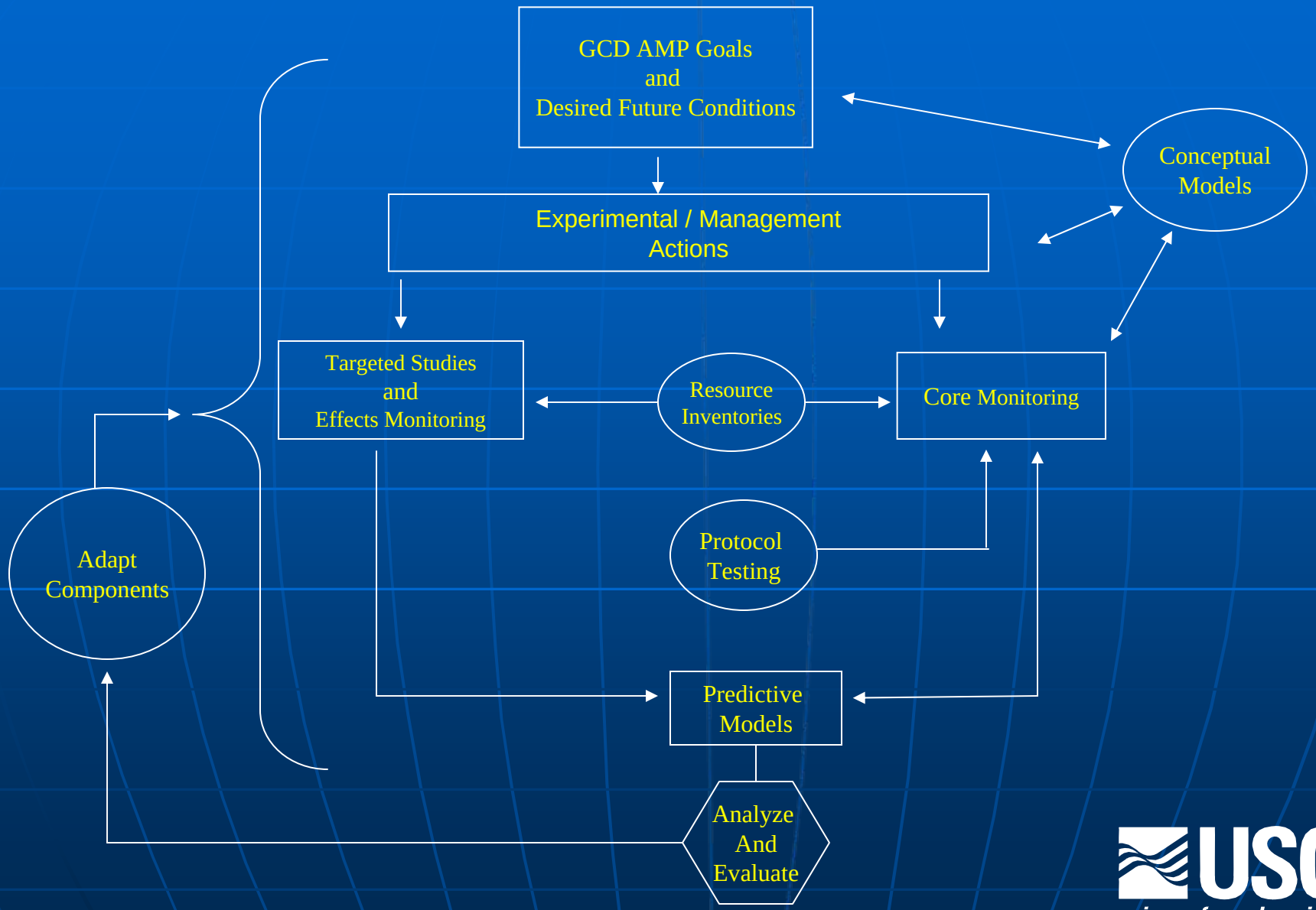
Context of the Core Monitoring Program



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Chapter 4. General Long-Term Core Monitoring Proposals

- 4.1 Overview
- 4.2 Core Monitoring Proposals by GCD AMP Goal
  - Goal 1 Aquatic Food Base
  - Goal 2 Native and Nonnative Fishes
  - Goal 4. Lees Ferry Trout
  - Goal 5. Kanab Ambersnail
  - Goal 6. Riparian Vegetation and Springs
  - Goal 7 Water Quality Monitoring
  - Goal 8. Sediment
  - Goal 9. Recreation
  - Goal 10. Power Generation
  - Goal 11. Cultural Resources
- 4.3 Core Monitoring Proposals for Remote Sensing and Habitat Mapping

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Outline
Core Monitoring Proposals
(by resource goal)

- Introduction
- Core Monitoring Information Needs
- Geographic Scope
- Summary of previous work
- Development/implementation schedule
- Data Management and Reporting Plan
- Estimated Budget

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Example Summary Table

Goal	Focus/Topic	Geo. Scope	Parameters	Frequency	Ann. Budget
1. Aquatic Foodbase					
1.a Aquatic Food Base	Total organic carbon budget	Glen Canyon Dam to Pearce Ferry	Primary production; tributary inputs	Annually	$150,000
1.b Diet, density, and predation	Invertebrate production	Glen Canyon Dam to Pearce Ferry	Biomass and density of dominant taxa		
2. Native Fishes					
2.a Lower 1200 m LCR	Maintain reproduction, evaluate recruitment	lower 1200 m LCR	Population status, trends, and condition factors		$40,000
2.b Lower 15 km LCR	Evaluate survival and recruitment	lower 15 km LCR	Population status, trends, and condition factors		$375,000
2.c Mainstem native fishes	Evaluate survival and recruitment	GCD to DC	Population status, trends, and condition for multiple size classes	3 times annually	$400,000

Chapter 5. Data Management

- 5.1 Overview
- 5.2 Goals and Objectives
- 5.3 Roles and Responsibilities
- 5.4 Infrastructure/Architecture
- 5.5 Project Work Flow (see next slide)
- 5.6 Data Acquisition and Processing
- 5.7 Quality Assurance/Quality Control
- 5.8 Data Documentation
- 5.9 Data Dissemination [incl. sensitive data]
- 5.10 Data Maintenance, Storage and Archiving

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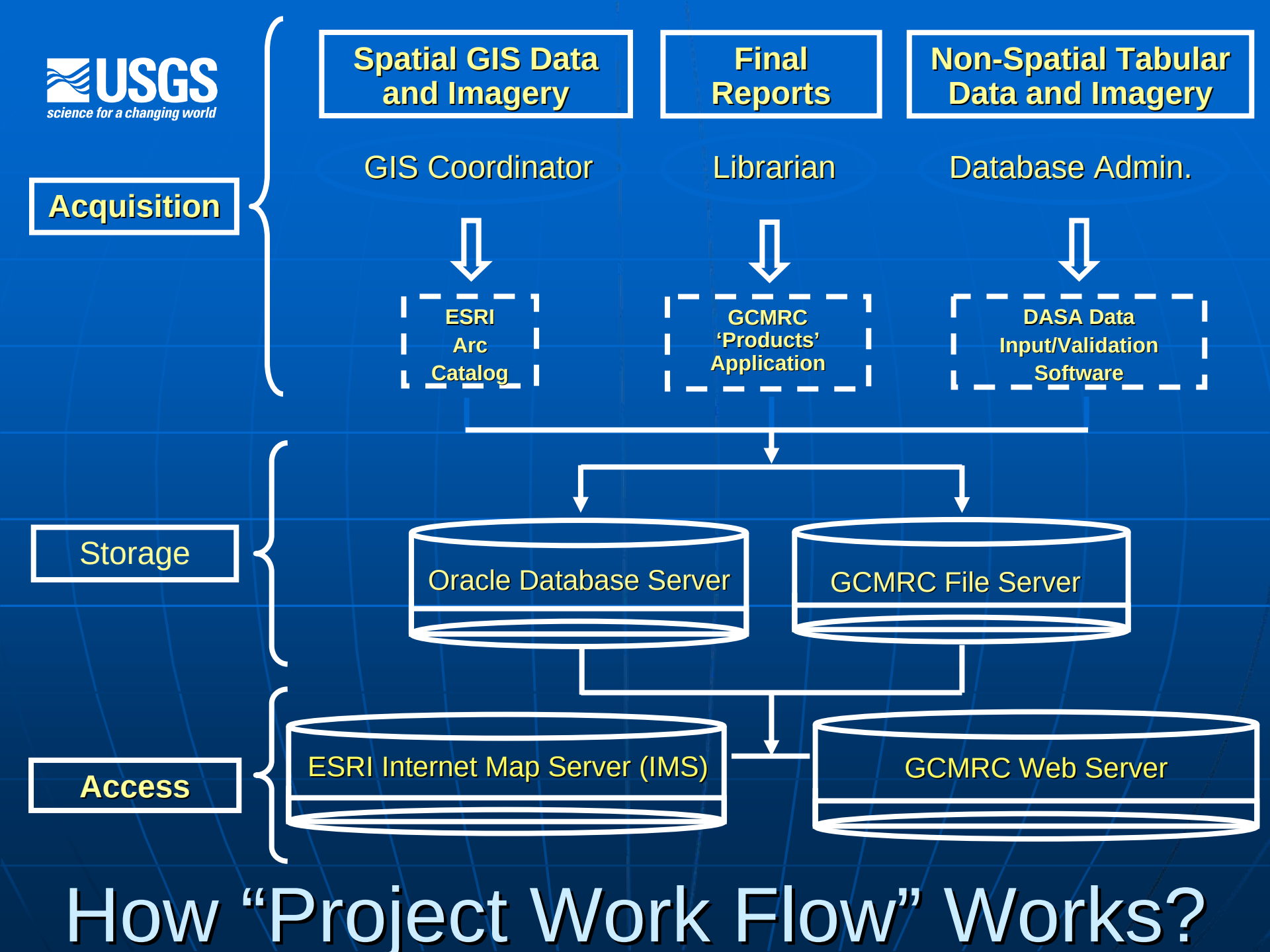


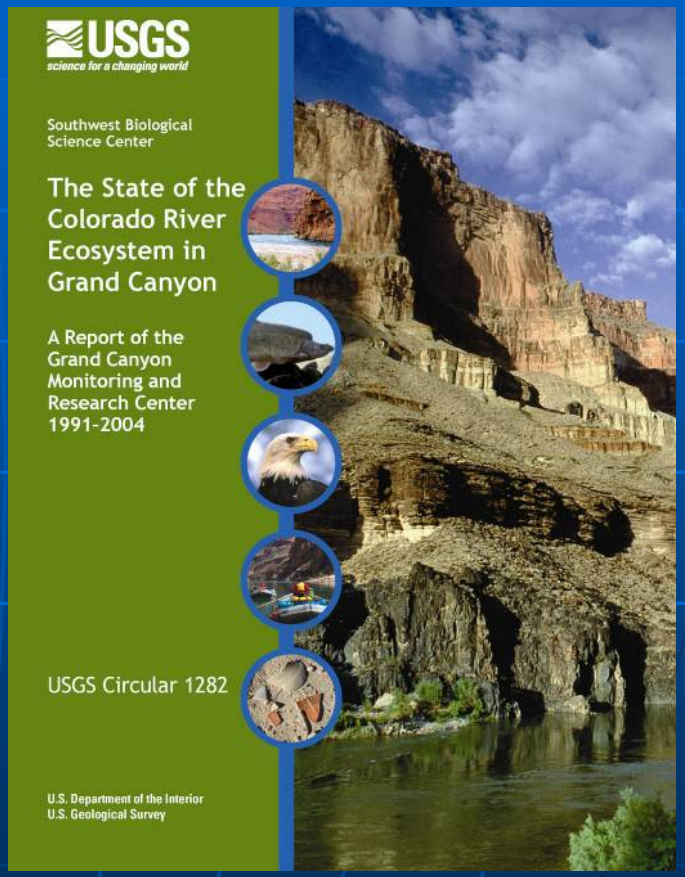
How "Project Work Flow" Works?

Chapter 6. Data Analysis and Reporting

6.1 Overview

6.2. Communications and Reporting

- Project reporting schedule – (varies by resource area)
- SCORE (every 5 years)
- Knowledge Assessments (every 5-years)
- Biennial Science & Management Symposia
- GCMRC web access to data
- USGS Technical Reports & Journal Literature



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Chapter 7. Administration and Implementation of the Core Monitoring Program

- 7.1 Administrative Structure
- 7.2 Monitoring Staff
- 7.3 Program integration and Partnerships

  [NPS Monitoring Program, BOR, BIA, others?]

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Chapter 8. Budget and Schedule

Chapter 9. Literature Cited

Next Steps

- Draft Plan to TWG – Fall 2008
- Presentation to AMWG– Winter 2008
- AMWG Recommendation– Spring 2009

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