National Park Service Inventory and Monitoring Program

Revitalize and expand the natural resource program within the park service and improve park management through greater reliance on scientific knowledge

Organ Pipe Cactus N.M. © D. Liggett

Why Monitor?

- Protect park resources and save money.
- Reduce the uncertainty of guessing about the status or trend of park resources and consequently reduce the costs of stewardship.
- Provide park managers with the information they need to evaluate their management strategies and practices or to confront and mitigate threats to the park in legal and political arenas.

The Law:

NATIONAL PARKS OMNIBUS MANAGEMENT ACT OF 1998

"The Secretary shall undertake a program of inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources. The monitoring program shall be developed in cooperation with other Federal monitoring and information collection efforts to ensure a cost-effective approach."

"The Secretary shall … assure the full and proper utilization of the results of scientific studies for park management decisions.

2001 NPS Management Policies

“Natural systems in the national park system, and the human influences upon them, will be monitored to detect change. The Service will use the results of monitoring and research to understand the detected change and to develop appropriate management actions”.

“The Service will: Identify, acquire, and interpret needed inventory, monitoring, and research, including applicable traditional knowledge, to obtain information and data that will help park managers accomplish park management objectives provided for in law and planning documents.”

The National Park Service Inventory & Monitoring

Provide funding and technical support to parks with significant natural resources

LONG-TERM GOAL: Implement ecological monitoring in all units of the NPS.

SHORT-TERM GOALS (as of 1992):

1. Complete baseline resource inventories.
2. Learn how to design and conduct monitoring programs.

12 Basic Inventory Datasets

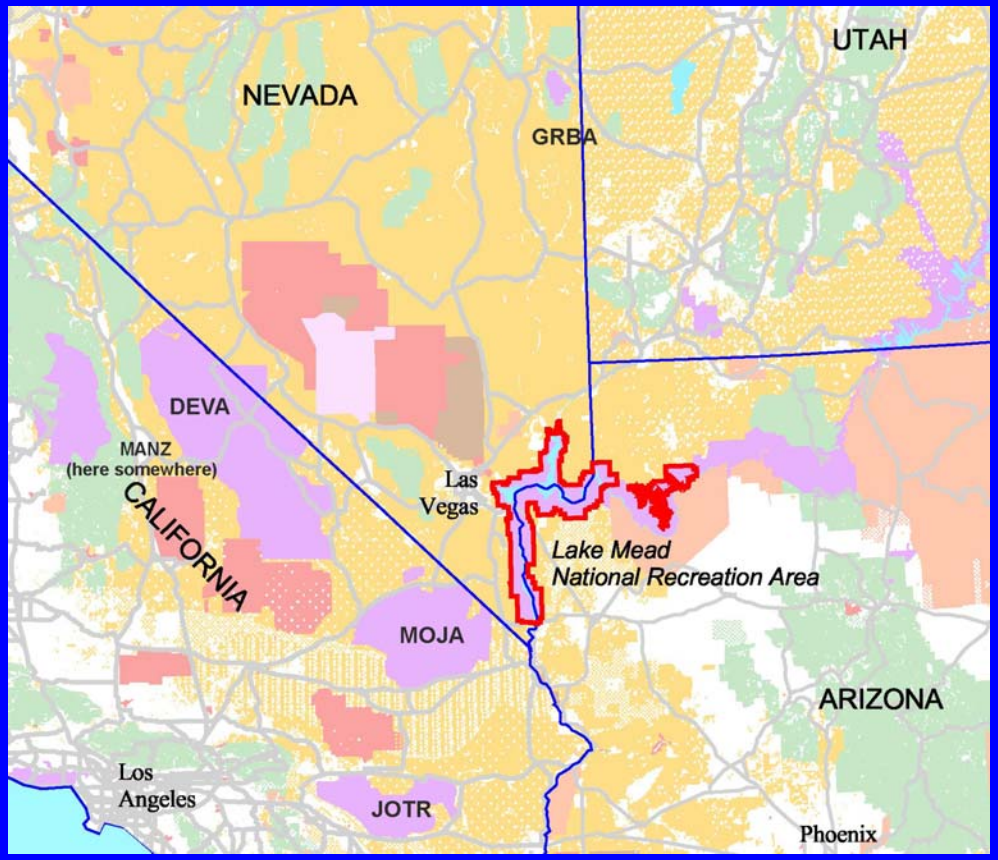
Natural resource bibliography
Base cartographic data
Geology map
Soils map
Weather data
Air quality
Location of air quality monitoring stations
Water body location and classification
Water quality data
Vegetation map
Species list of vertebrates and vascular plants
Species distribution and status of vertebrates and vascular plants of high priority to each park

Integrate data sets and make them more available to managers using GIS Theme Manager.

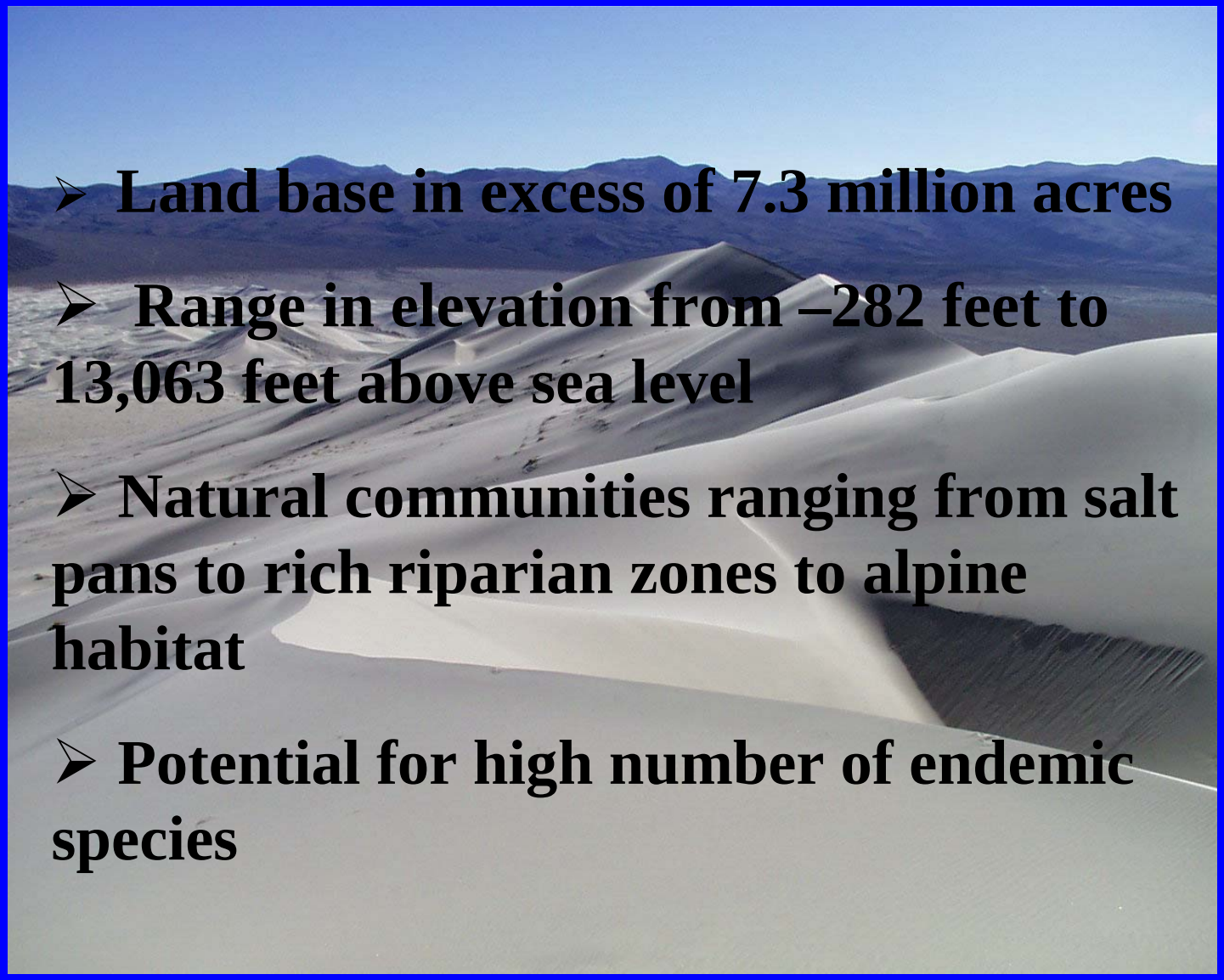
Vital Signs Monitoring Networks

Mojave Inventory and Monitoring Network

- Death Valley National NP
- Great Basin National Park
- Joshua Tree National Park
- Lake Mead NRA
- Manzanar NHS
- Mojave National Preserve



Mojave Inventory and Monitoring Network



- **Land base in excess of 7.3 million acres**
- **Range in elevation from –282 feet to 13,063 feet above sea level**
- **Natural communities ranging from salt pans to rich riparian zones to alpine habitat**
- **Potential for high number of endemic species**

Inventory Objectives

"1. To document through existing, verifiable data and targeted field investigations the occurrence of at least 90 percent of the species of vertebrates and vascular plants currently estimated to occur within the park.

2. To describe the distribution and relative abundance of species of special concern, such at Threatened and Endangered species, exotics, and other species of special management interest occurring within park boundaries.

3. To provide baseline information needed to develop a general monitoring strategy and design that can be implemented by parks once inventories have been completed, tailored to specific park threats and resource issues" (NPS 1999).

Inventories: 2002-2004

- Amphibians: GRBA, MANZ
- Birds: JOTR, MANZ
- Mammals: All Parks
- Reptiles: GRBA, DEVA MANZ, MOJA
- Plants: MANZ, MOJA, (GRBA?)

Inventories: 2005

- Amphibians: DEVA, LAME, MOJA
- Birds: DEVA, GRBA, MOJA
- Mammals
- Reptiles
- Plants: DEVA, LAME, JOTR, GRBA?

Key Aspects of the NPS Approach to Vital Signs Monitoring

- Monitoring is a central aspect of park management, performance management, and meeting the NPS mission.
- Funding from WASO will only build a core program. Use of existing personnel, base funds, and partnerships are critical to success.
- Monitoring is done primarily to meet the information needs of the Park Managers. This necessitates a flexible program with local control to address the most critical information needs of each park and allow parks to build local partnerships.
- Clearly defining the goals and measurable objectives for monitoring at the outset is critical for success. Who is interested in the information and WHY?
- Data Management and reporting are a major, critical component of the overall program.

Key Features of New Park/Network Monitoring Program

(moving away from the stovepipe model)

- Integrated monitoring program: physical and biological resources including weather, air, water, geoindicators, T&E species, exotic plants, other flora & fauna

- Integrate NR information with other park operations including interpretation, maintenance, law enforcement

- Emphasis on making information more useable; tools such as Synthesis, GIS Theme Manager, NR Database template, interconnected web and distributed databases

Key Features of New Park/Network Monitoring Program

- Each network receives approx. 5-9 new positions and funding to develop a core program to monitor key components and trends.
- New positions and funding are shared by parks and augmented by existing personnel and funds
- Based on each park's priorities and needs; flexible

•Assumes that data are being collected primarily to meet the information needs of the park manager.

Economics 101

$26.5 Million divided evenly among 270 parks

= approx. $100,000 /park

= 1 professional level position + $30-40 K operating $$

Water Quality funds: $2.9 Million = approx. $10K / park

Conclusions:

Without additional funding, parks can only monitor a few vital signs to address issues of highest concern;

Leveraging of funds and Partnerships are very important;

Efficient use of existing personnel and funds from park base and other sources are needed to build an integrated monitoring program that provides the information needed by park managers and for tracking performance towards NR goals.

Funding from Servicewide Program will NOT allow comprehensive monitoring

"Focus on most significant indicators of long-term ecological trends and highest concerns among the parks in each network"

"The park operating base is the primary source of funding for fulfilling the Service's mission of protecting park resources while providing for enjoyable and safe visitor experiences. Base funding is supplemented by regional and national program funds, including those from the Servicewide I&M program."

(Source: NPS FY2002 Annual Performance Plan)

Goals of Vital Signs Monitoring

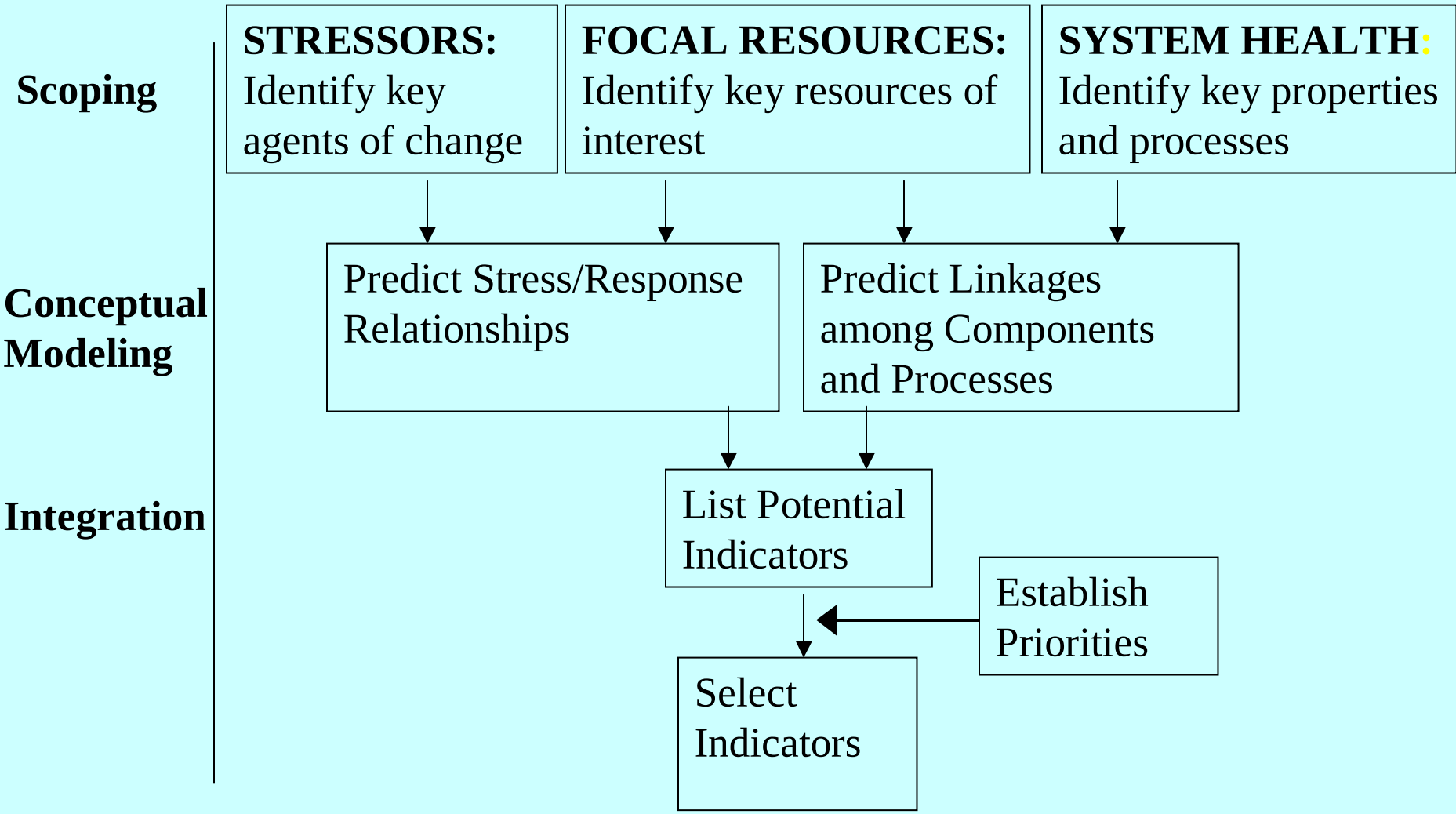
- Identify status and trends in ecosystem health
- Define normal limits of variation
- Provide early warning of situations that require intervention
- Suggest remedial treatments and frame research hypotheses
- Determine compliance with laws and regulations

Initial Steps in Designing a Monitoring Program

- Clear statements of Monitoring Goals and specific Objectives
- Compile/summarize available data and understanding of park ecosystem
- Develop conceptual models
- Select indicators for monitoring and determine the appropriate sampling design and protocols

Do it Right the First Time approach

Indicator Selection



Source: Kurt Jenkins, USGS/BRD Olympic Field Station

Recommended Approach for Developing a Monitoring Strategy:

1 - Form a Board of Directors and Technical committee

2 - Summarize existing data and understanding (1 Year)

3 - Hold scoping workshop(s)

4 - Write workshop report and have it widely reviewed

5 - Decide on priorities and implementation approaches

6 - Draft the Monitoring Strategy

7 - Review and approval of Monitoring Strategy

Recommended Approach for Developing a Monitoring Strategy:

Board of Directors

- **Led by Superintendents or their designee (must have authority to make on-the-spot decisions on personnel, funding, office space, and resource management issues.**
- **Network I&M coordinator acts as staff to the Chair.**
- **Board makes decisions on budgeting, scheduling, hiring, based on recommendations from Technical Committee.**
- **Promotes accountability for the program.**
- **Operate under a Network Charter**

Recommended Approach for Developing a Monitoring Strategy:

Science Advisory (Technical) Committee

- **Comprised of natural resource managers and other scientists from within and outside of NPS, plus Network I&M Coordinator and Regional I&M Coordinator.**
- **Chaired by network I&M coordinator.**
- **Responsible for compiling existing information, preparing for scoping workshop, writing monitoring plan.**
- **Makes recommendations to Board of Directors for approval.**

Recommended Approach for Developing a Monitoring Strategy:

2 - Summarize existing data and understanding

- Literature review
- Data inventory (e.g., dataset catalog)
- Interview superintendents and key managers concerning major issues
- Review GMPs and RMPs
- Evaluate existing monitoring, and learn what monitoring is being done by neighboring agencies, partners, and related parks

Recommended Approach for Developing a Monitoring Strategy:

3 - Hold scoping workshop(s)

Before the meeting:

- Define goals and objectives for the monitoring program
- Draft lists of known stressors and other management issues
- Draft lists of important resources
- Begin drafting conceptual models
- Define criteria for indicator selection

Recommended Approach for Developing a Monitoring Strategy:

3 - Hold scoping workshop(s)

Design the meeting:

- Purpose:
  - To review, modify, and develop additional conceptual models
  - To identify and prioritize potential indicators
  - To provide information concerning available methodologies and costs

Recommended Approach for Developing a Monitoring Strategy:

4 - Write workshop report and have it widely reviewed, including individuals who did not attend scoping workshop

Recommended Approach for Developing a Monitoring Strategy:

5 - Decide on priorities and implementation approaches

Board of Directors based on recommendations from Science Advisory Committee and NR staff:

- Select indicators to be monitored
- Address protocols
- Decide on positions to be hired and where to locate them
- Decide on data management and reporting methods for the network

Recommended Approach for Developing a Monitoring Strategy:

6 - Draft the Monitoring Strategy

- Describe the process
- Explain why some indicators were selected and others weren't:
- Describe sampling design and protocols
- Description of conceptual models
- Include staffing plan
- Include data management plan

Recommended Approach for Developing a Monitoring Strategy:

7 - Review and Approval of Monitoring Strategy

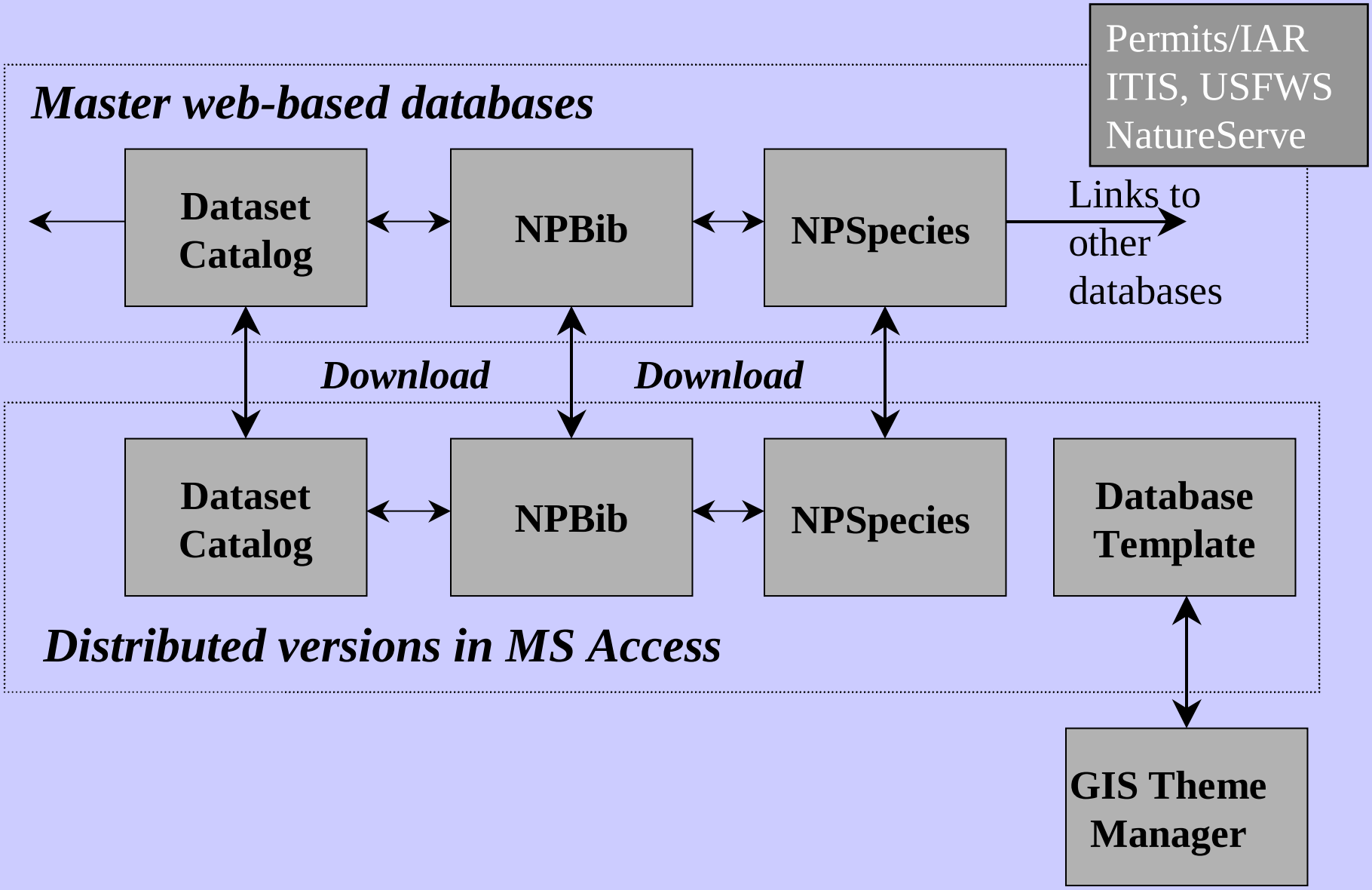
- Peer review
- WASO review and approval

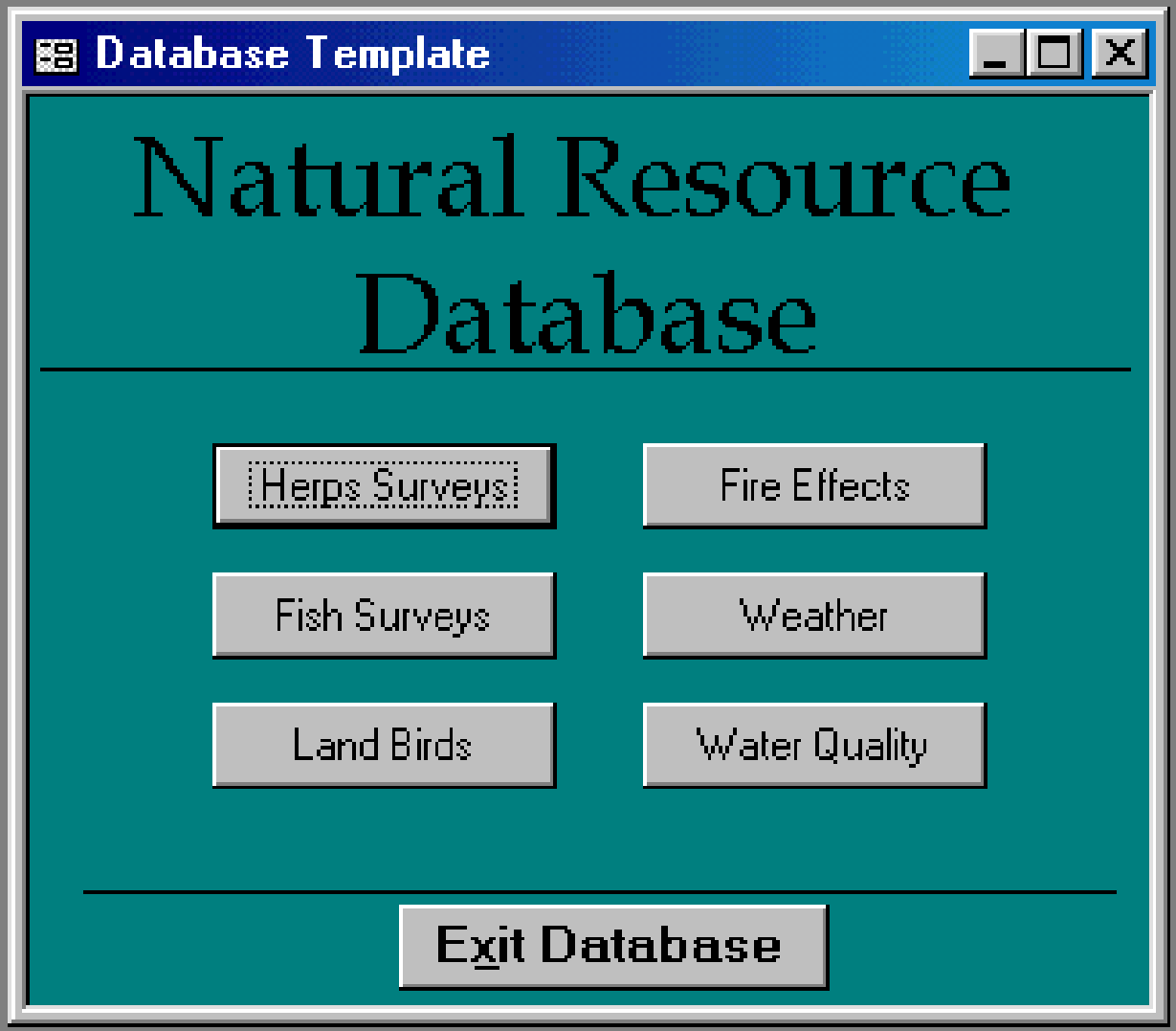
Recommended Approach for Developing a Monitoring Strategy:

What WASO will be doing:

- Provide overall coordination among regions and networks to improve effectiveness of monitoring and reduce duplication of effort
- Develop guidance documents with examples of how to monitor various types of biotic and abiotic resources
- Provide technical assistance to regions and networks
- Assist regional staff in helping to coordinate scoping workshops

Integrated Natural Resource Data Management Framework





One or more databases in MS Access that can be linked together through front-end switchboard/interface

NPSpecies

- Database system to manage species lists for each park
- Functionality to link multiple references, vouchers and observations to each species in each park

NPBib

- A card catalog for traditional library materials (books, reports, maps, etc.) that may not be cataloged in an "official" NPS library

PROTOCOL DATABASE

PROTOCOL NAME	PARK	STATUS	SUMMARY	PROTOCOL	MS ACCESS	ANALYSIS
Adjacent Land Use	PRCL	R&D Phase	Summary			
Air Quality	DENA	Completed	Summary			
Amphibians	CACO	R&D Phase	Summary			
Amphibians	NOCA	R&D Phase	Summary			
Bald Eagles	NOCA	Completed	Summary			
Bats	ORPI	Completed	Summary	Protocol		
Black Bear	GRSM	Completed	Summary			
Black-tailed Prairie Dog	PRCL	Completed	Summary	Protocol		
Coral Colonies	VIIS	R&D Phase	Summary			
Coral Reefs	VIIS	Completed	Summary			
Data Management	DENA	R&D Phase	Summary	Protocol		
Estuarine Nekton	CACO	R&D Phase	Summary			
Estuarine Nutrient Enrichment	CACO	R&D Phase	Summary			
Fish - Brook Trout	GRSM	Completed	Summary			

An Effective Program Will:

- Enable managers to make better informed management decisions;
- Provide early warning of abnormal conditions in time to develop effective mitigation measures;
- Provide data to convince other agencies and individuals to make decisions benefiting parks;
- Satisfy certain legal mandates;
- Provide reference data for comparison with more disturbed sites.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Visit us at our website
www.nature.nps.gov/im/monitor