**Upper Columbia Basin Network
Inventory and Monitoring Program**

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Network Coordinator**

CSS 496
Monitoring Impacts in Protected Areas and Wilderness

February 2, 2006

- NPS Inventory and Monitoring Networks (Organization)
- NPS Inventory Program
- NPS Monitoring Program
- Sources for NPS Natural Resource Monitoring Information
- Citizen Science

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Legislation and Policy

➢ National Park Service Organic Act of 1916 - Mission of the NPS
Conserve the scenery and the natural and historic objects and the wildlife within…

➢ National Parks Omnibus Management Act of 1998
Requires that park managers know the condition of natural resources under their stewardship and **monitor long-term trends** in those resources…

The Secretary shall undertake a program of **inventory and monitoring** of National Park System resources to establish baseline information…

➢ 2001 NPS Management Policies
Natural systems in the national park system, and the human influences upon them, will be **monitored** to detect change.
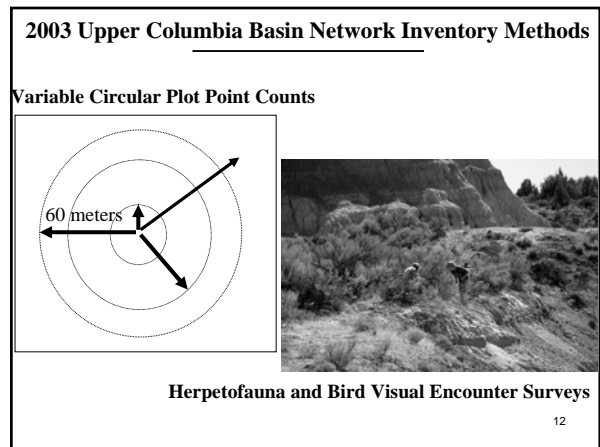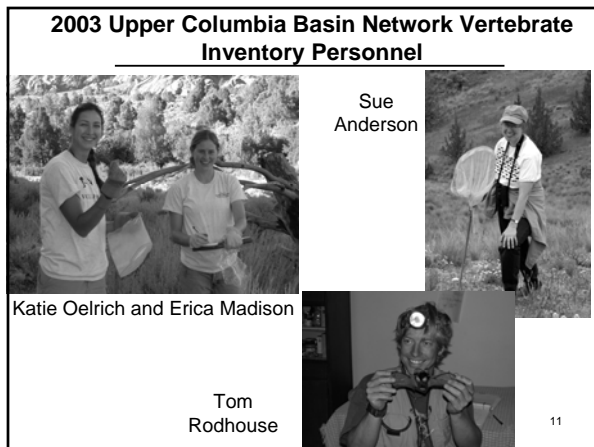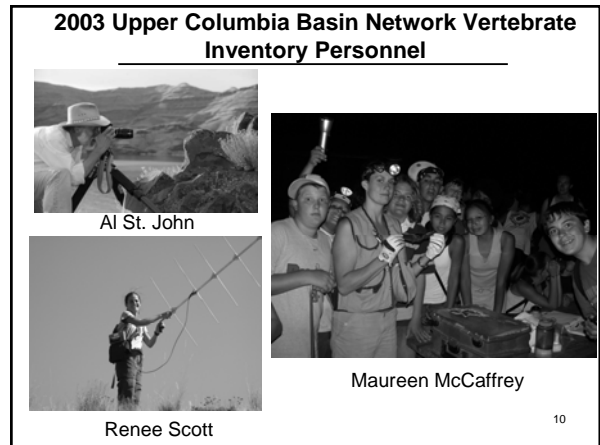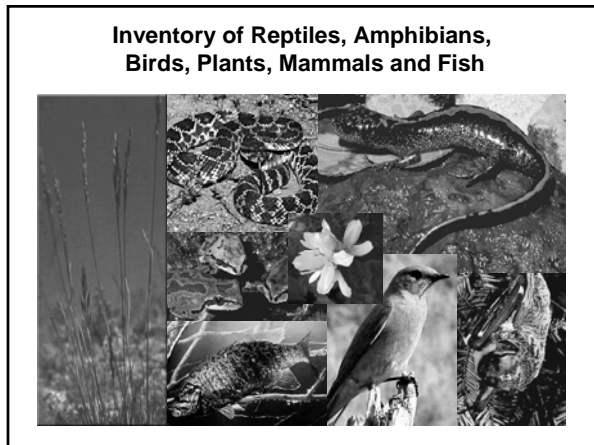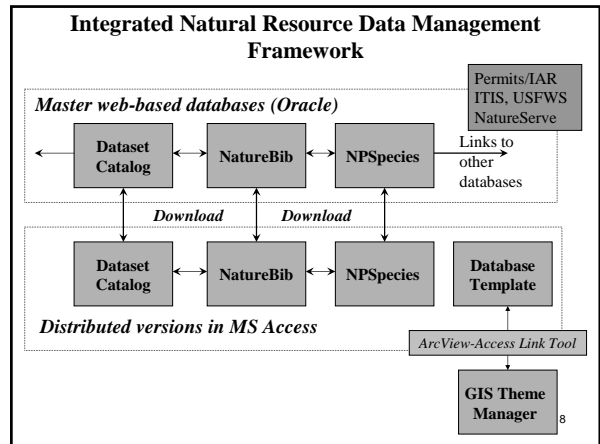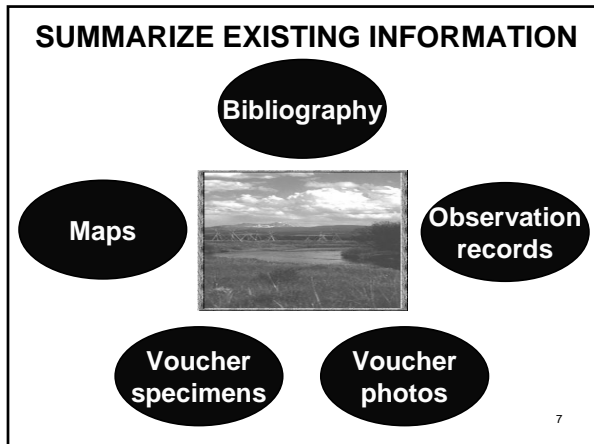
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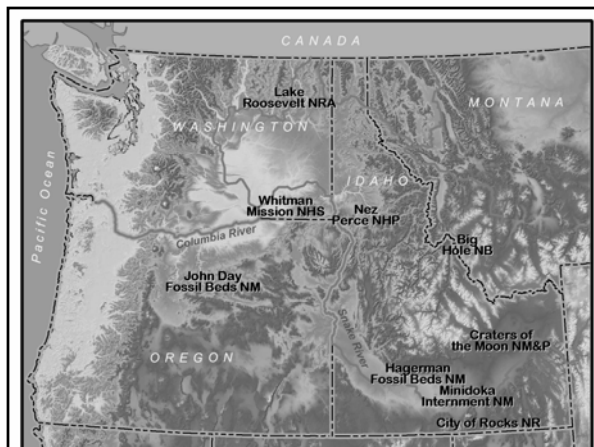
Goal of the
Upper Columbia Basin Network
Inventory Program

**Document 90% of the
vertebrate species and
vascular plants that exist
in each park unit**

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SUMMARIZE EXISTING INFORMATION

- Bibliography
- Maps
- Observation records
- Voucher specimens
- Voucher photos

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Integrated Natural Resource Data Management Framework

Permits/IAR ITIS, USFWS NatureServe

Master web-based databases (Oracle)

Dataset Catalog ↔ NatureBib ↔ NPSpecies — Links to other databases

Download   *Download*

Dataset Catalog ↔ NatureBib ↔ NPSpecies   Database Template

Distributed versions in MS Access

ArcView-Access Link Tool

GIS Theme Manager

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Inventory of Reptiles, Amphibians, Birds, Plants, Mammals and Fish

2003 Upper Columbia Basin Network Vertebrate Inventory Personnel

Al St. John

Maureen McCaffrey

Renee Scott

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2003 Upper Columbia Basin Network Vertebrate Inventory Personnel

Sue Anderson

Katie Oelrich and Erica Madison

Tom Rodhouse

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2003 Upper Columbia Basin Network Inventory Methods

Variable Circular Plot Point Counts

60 meters

Herpetofauna and Bird Visual Encounter Surveys

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2003 Upper Columbia Basin Network Inventory Methods

Mammal Trapping

Bat Mist-Netting

2003 Upper Columbia Basin Network Inventory Methods

Anabat **Bat Acoustic Detection and Recording**

Inventory biologists Tom Rodhouse and Maureen McCaffrey record a Townsend's big-eared bat's echolocation call.

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2003 Upper Columbia Basin Network Inventory Methods

Funnel and pitfall traps were used extensively at Hagerman in 2003.

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NPSpecies

"Reviewed and Certified"

	Vertebrates	Plants	Total
BIHO	371	402	773
CIRO	269	512	781
CRMO	317	1043	1360
HAFO	265	460	725
JODA	293	237	530
LARO	385	633	1018
NEPE	229	370	599
WHMI	282	171	453
Grand Total	2411	3798	**6239**

❖ 48 Lists
   (8 Parks, 6 Lists/Park)

❖ > 6200 Species

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http://science.nature.nps.gov/im/apps/npspp/index.htm
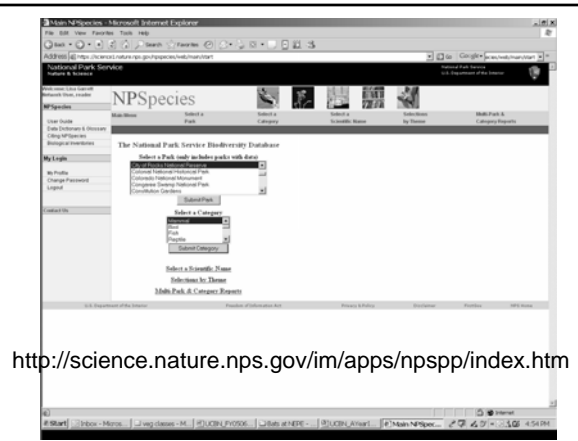
Why Monitor?

■ 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.

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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!

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VITAL SIGNS are a subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values.
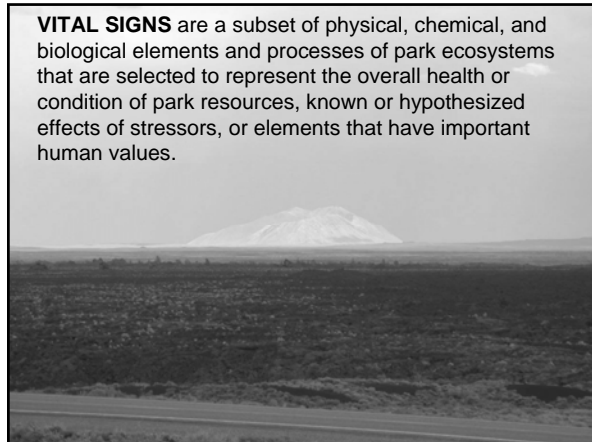
Level 1 Category	Level 2 Category	Level 3 Category
Air and Climate	Air Quality	Ozone
		Wet and dry deposition
		Visibility and particulate matter
		Air contaminants
	Weather and Climate	Weather and Climate
Geology and Soils	Geomorphology	Glacial features and processes
		Coastal features and processes
		Stream / river channel characteristics
	Subsurface Geologic Processes	Geothermal features and processes
		Caves / karst features and processes
	Soil Quality	Soil function and dynamics
Water	Hydrology	Groundwater dynamics
		Surface water dynamics
		Marine hydrology
	Water Quality	Water chemistry
		Nutrient dynamics
		Toxics
		Microorganisms
		Aquatic macroinvertebrates and algae

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Level 1 Category	Level 2 Category	Level 3 Category
Biological Integrity	Invasive Species	Invasive/Exotic plants
		Invasive/Exotic animals
	Infestations and Disease	Insect pests
		Plant diseases
		Animal diseases
	Focal Species or Communities	Coral communities
		Marsh/Estuary communities
		Wetland communities
		Riparian communities
		Freshwater communities
		Desert communities
		Grassland vegetation
		Forest vegetation
		Marine invertebrates
		Terrestrial invertebrates
		Fishes
		Amphibians and Reptiles
		Birds
		Mammals
	At-risk Biota	T&E species and communities
Human use	Point-Source Human Effects	Point-source human effects
	Non-point Source Human Effects	Non-point source human effects
	Consumptive Use	Consumptive use
	Visitor and Recreation Use	Visitor usage
Ecosystem Pattern and Processes	Fire	Fire and fuel dynamics
	Land Cover and Use	Land cover and use
	Extreme Disturbance Events	Extreme disturbance events
	Soundscape	Soundscape

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TABLE 3.2 List of vital signs for the Greater Yellowstone Network of parks.

Level 1	Level 2	Vital Sign	BICA	GRTE	YELL
Air and Climate	Air Quality	Atmospheric deposition	✧	•	•
		Oversnow emissions	–	•	•
		Visibility	–	•	•
	Weather	Climate	+	+	+
Geology and Soils	Geomorphology	Glaciers	–	✧	–
		Stream sediment transport	•	•	•
	Subsurface Geologic Processes	Geothermal features	–	–	•
		Geothermal water chemistry	–	–	•
		Seismic activity	✧	•	•
	Soil Quality	Soil structure and stability	+	–	–
		Soil biota	✧	✧	✧
Water	Hydrology	Ground water quantity	✧	•	•
		Arid seeps and springs	+	–	–
		Reservoir and lake elevation	•	•	•
		Streamflow	+	+	+
	Water Quality	Biogeochemical flux	✧	✧	✧
		Water chemistry	+	+	+
		Ground water quality	✧	✧	•
		E. coli	•	•	✧
		Algae	✧	✧	✧
		Aquatic invertebrate assemblages	+	+	+

3-Phase Monitoring Design

- **Phase 1:** Background work prior to selecting vital signs
  – goals and objectives for monitoring
  – identify, evaluate, synthesize existing data and understanding (identify and catalog existing data sets)
  – draft conceptual models

- **Phase 2:** Initial selection and prioritization of vital signs
  – update and expand upon Phase I work; select vital signs

- **Phase 3:** Development of full monitoring plan
  – Detailed design work; protocols, spatial sampling design
  – Design database
  – Write Data Management Plan

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Recommended Approach for Developing a Monitoring Strategy:

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

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Included in Phase 1 Report:

- Draft lists of important management issues for each park

- Draft lists of important natural resources and focal species or processes for each park

- Draft lists of known stressors that may cause changes in park resources

- Draft conceptual models of portions of the ecosystem that are relevant to the monitoring program

- Draft list of measurable objectives for the monitoring program

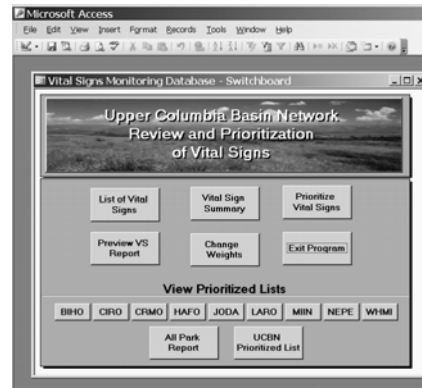- Criteria for indicator ranking and selection

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Phase 2 – Selection of Vital Signs

✓ **Completed 9 vital signs prioritization workshops in 6 weeks and compiled a list of 13 network vital signs**

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Management Significance, Ecological Significance, Legal Mandate

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Phase II Vitals Signs Monitoring Plan

Upper Columbia Basin Network (UCBN)
June 1, 2005

Completed

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Upper Columbia Basin Network Parks

Big Hole National Battlefield (BIHO)
City of Rocks National Reserve (CIRO)
Craters of the Moon National Monument & Preserve (CRMO)
Hagerman Fossil Beds National Monument (HAFO)
John Day Fossil Beds National Monument (JODA)
Lake Roosevelt National Recreation Area (LARO)
Minidoka Internment National Monument (MIIN)
Nez Perce National Historical Park (NEPE)
Whitman Mission National Historic Site (WHMI)

Submitted for Review

**3 Academic reviews
2 Regional reviews
1 WASO review**

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**Phase III
Outline for a Network Vital Signs Monitoring Plan**

Executive Summary
Chapter 1   Introduction and Background   } Phase I
Chapter 2   Conceptual Ecological Models   }
Chapter 3   Vital Signs (selection and prioritization) } Phase II
Chapter 4   Sampling Design
Chapter 5   Sampling Protocols
Chapter 6   Data Management
Chapter 7   Data Analysis and Reporting
Chapter 8   Admin./Implementation of Monitoring Program
Chapter 9   Schedule
Chapter 10   Budget
Chapter 11   Literature Cited
Glossary
Appendices

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Monitoring Protocols

- Oakley, K.L., L.P. Thomas, and S.G. Fancy. 2003. Guidelines for long-term monitoring protocols. Wildlife Society Bulletin 31:1000-1003.


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3 sections – Monitoring Protocol

✓Narrative: justification, background information, linkage to management, overview of protocol components (objectives, sampling design, field methods, data analysis and reporting, personnel, training, etc.), history of development

✓Standard Operating Procedures: step-by-step instructions.

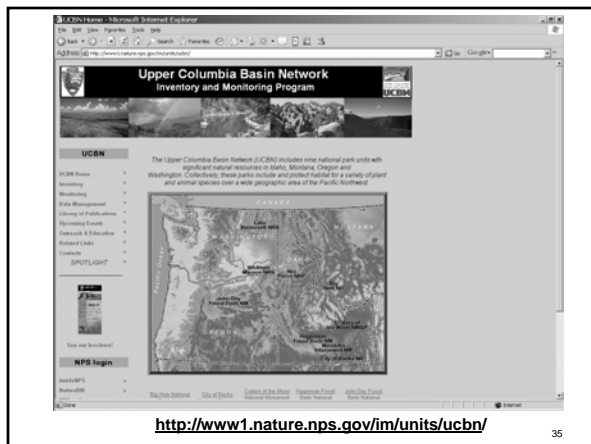✓Supplementary Materials: example databases, supporting data and reports, data analysis tools, etc.

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Knowledge Is Power

Where to find NPS natural resource monitoring information!!

http://science.nature.nps.gov/im/monitor/index.cfm

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http://www1.nature.nps.gov/im/units/ucbn/
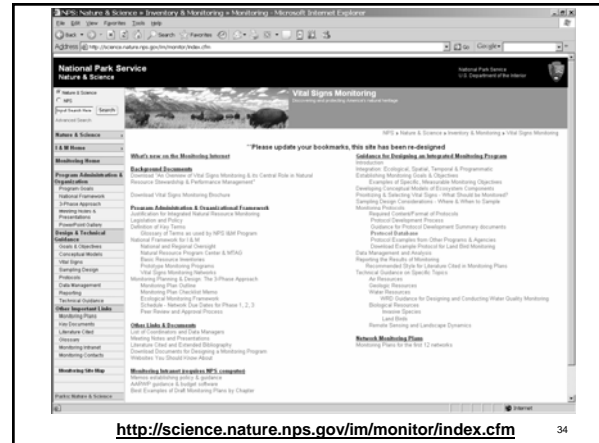
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Web-based Clearinghouse of Protocols and Database Components

Amphibian Call Counts	Protocol	Database*	Data Analysis
Bird VCP counts	Protocol	Database	Data Analysis
Breeding Bird Survey	Protocol	Database	Data Analysis
Coral reef video sampling	Protocol	Database	Data Analysis
Rare plants	Protocol	Database	Data Analysis
Rare plants	Protocol	Database	Data Analysis
Weather	Protocol	Database	Data Analysis
Weather	Protocol	Database	Data Analysis
Weather	Protocol	Database	Data Analysis

* Database is an MS Access .mdb file with tables, queries, forms, reports designed for a particular protocol.

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"Citizen Science"
Upper Columbia Basin Network

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OMSI "tent-and-van" based research teams launched in 2004 to assist with inventories

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Emphasis has been on "start-to-finish" research programs that engage students in objectives, data collection, analysis, and reporting

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OMSI's Salmon Camp is participating in camas lily protocol development at Weippe Prairie and Big Hole Battlefield

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Upper Columbia Basin Network

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