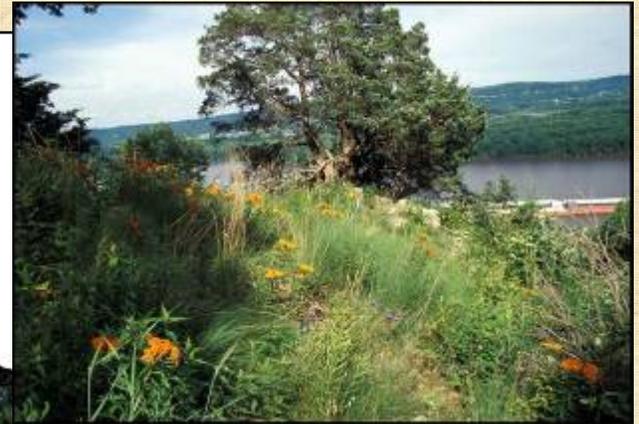
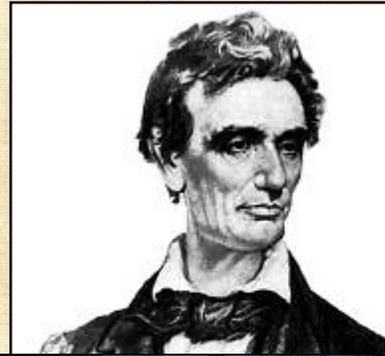
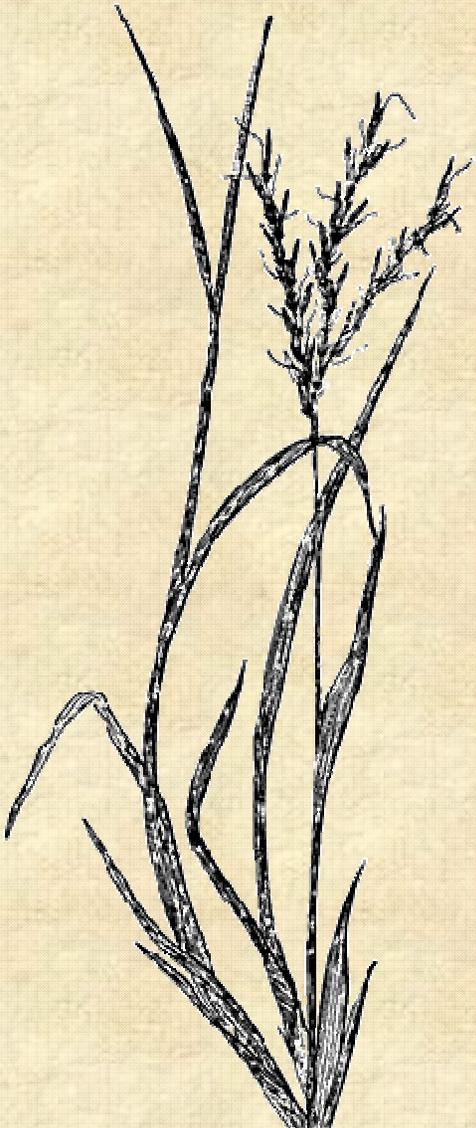


Heartland Network Natural Resource Monitoring Program



History of Natural Resource Management in NPS



- 1930's. Amidst an agency dominated by landscape architects and engineers, George Wright uses his private fortune to conduct the first faunal inventories of NPS units. (Note: the first national parks had been in existence nearly 60 years at this time).
- 1940's. War times conditions stress national resources reducing NPS natural resource staff from it's peak during Wright's and New Deal levels.
- 1956 – 66. Mission 66 initiative concentrates NPS resources and attention on development of visitor services to accommodate record visitation.
- 1970's - present. NPS takes greater responsibility for managing ecosystems, not just charismatic species, driven the by growth of ecological thinking.
- ~1993. Most NPS science staff transferred to the newly created National Biological Survey, which would later become the Biological Resources Division of USGS.

History of Natural Resource Management in NPS

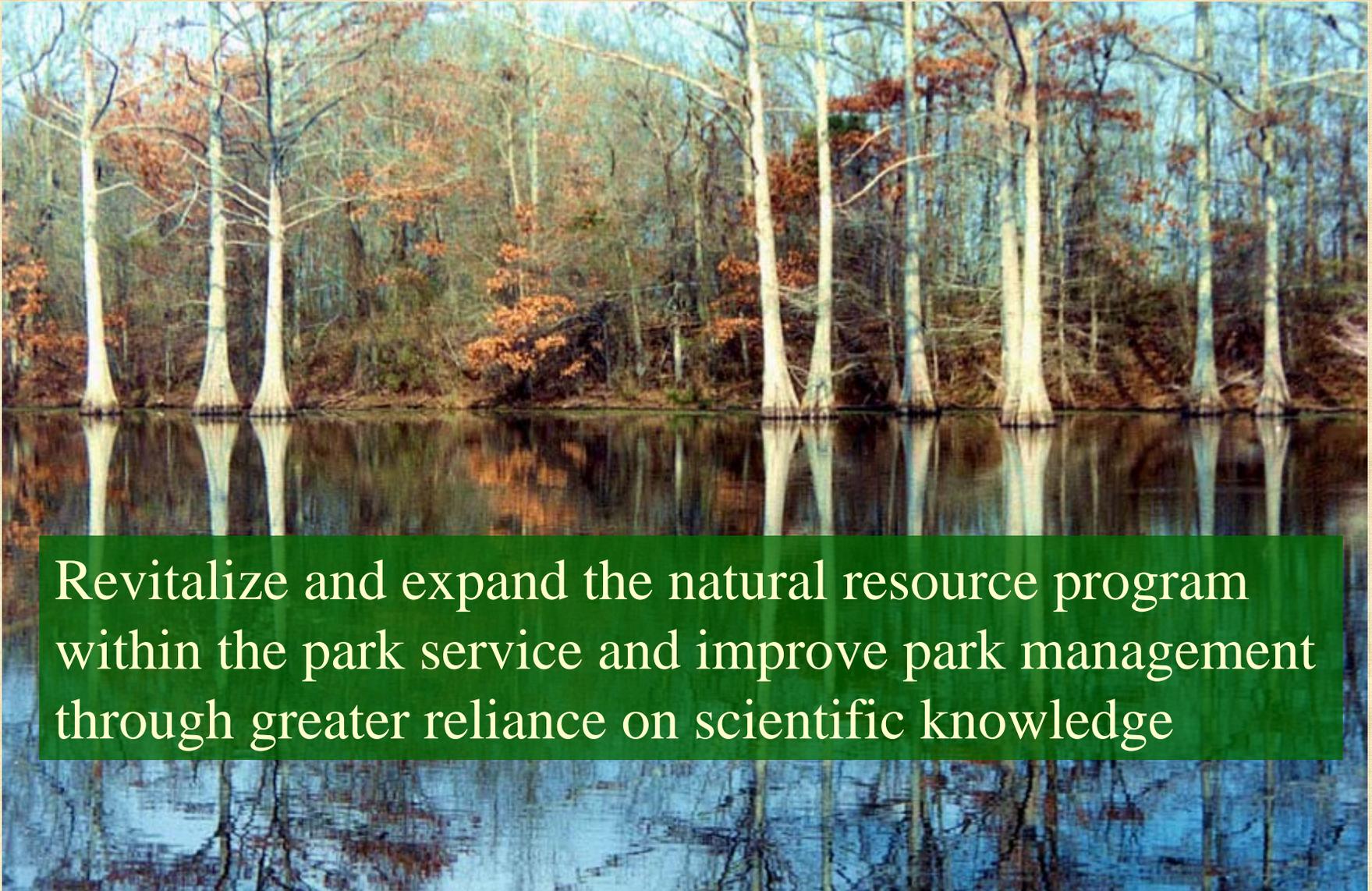
State of the Parks Report (circa 2000)



- 80 (1/3) of the “natural resource parks” had no professional natural resource manager.
- Another 84 parks had only 1 or 2 natural resource professionals.
- Almost all projects/studies were short-term; staff mostly deals with the “crisis of the day”.
- Science/data and management are not tightly connected.
- Parks unable to provide “desired future resource condition” or natural resource goals.



Natural Resource Challenge



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



NPS Natural Resource Challenge

- Accelerate **Inventories**
- Design/Implement **Vital Signs Monitoring**
- **Collaboration** with scientists and others
- Improve **Resource Planning**
- **Natural Resource Condition Assessments**
- Control **Non-native species**
- Protect **Native and Endangered Species**
- Enhance **Environmental Stewardship**
- Expand **Air Quality** efforts
- Protect and restore **Water Resources**
- Establish **Research Learning Centers**



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."

Message from Congress:



“This involves a serious commitment from the leadership of the National Park Service to insist that the superintendents carry out a systematic, consistent, professional inventory and monitoring program, along with other scientific activities, that is regularly updated to ensure that the Service makes sound resource decisions based on sound scientific data”.

(FY2000 Appropriations Language)



Purpose of Presentation

- Describe planning products and available data that may be useful in the assessment
- Emphasize importance of incorporating vital signs data into the assessment process





Planning Process for Vital Signs Monitoring

- 1) Data mining and consolidation
- 2) Conceptual ecosystem models
- 3) Vital signs prioritization and selection
- 4) Protocol development and implementation



Data Mining and Consolidation



**Natural Resource Bibliography -
comprehensive list of all natural
resource related documents for the park**

**NPSpecies database – record of
vertebrate and vascular plant species
known to occur on the park**

**POC – Mike Williams
Heartland Network
417-836-5313**



Conceptual Ecosystem Models

- Identify important components and processes of park ecosystems
- Identify potential stressors and threats to park natural resources
- Identify potential indicators and measurements

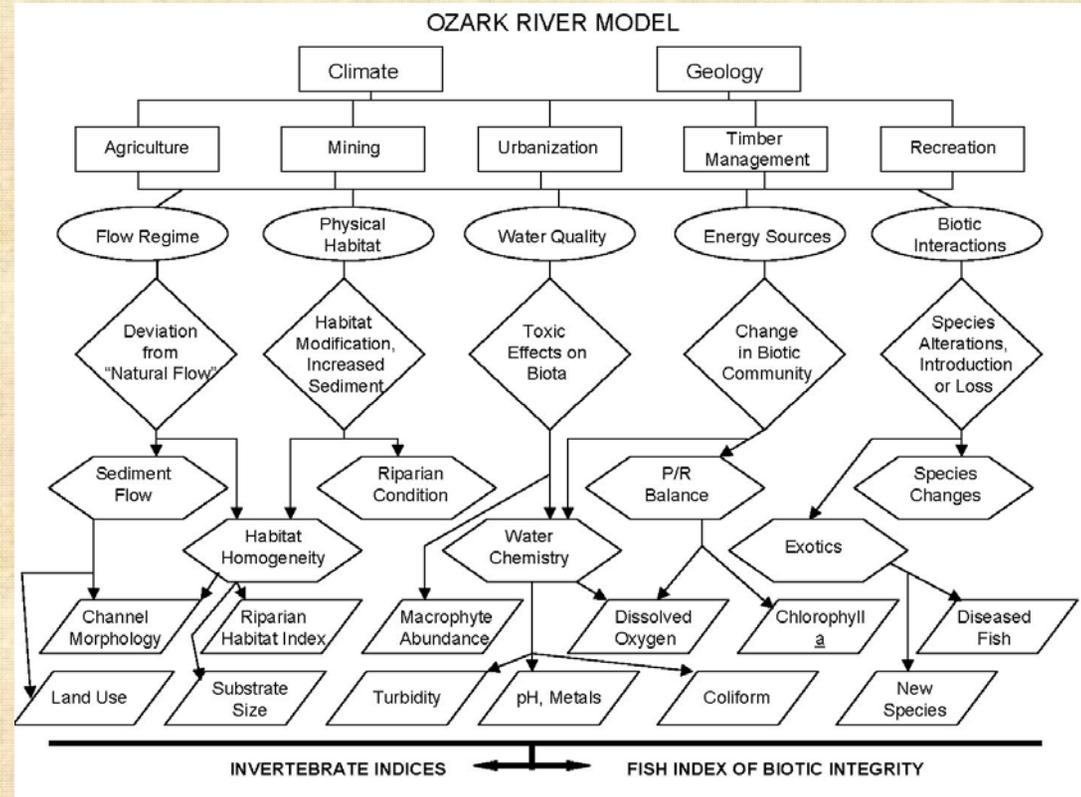




Conceptual Ecosystem Models

- K. E. Doisy, Dr. C. Rabeni, and V. Grant. Ozark Plateau River Conceptual Model

- K.E. Doisy and C.F. Rabeni. Ozark Riparian and Aquatic Systems: a literature review and information synthesis



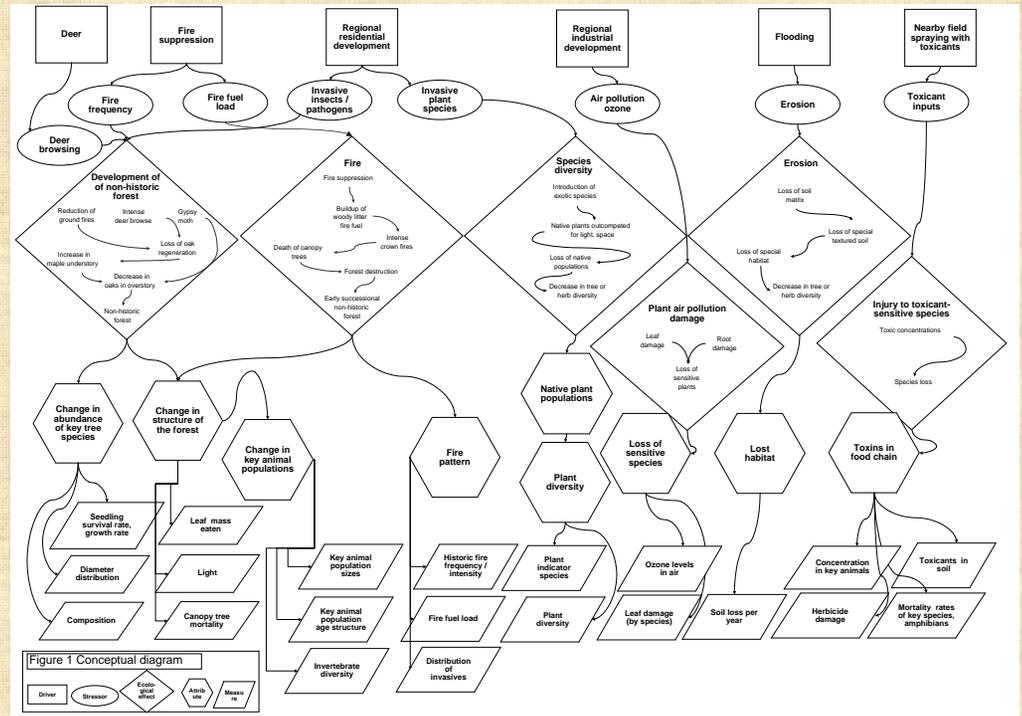
Supplemental documents 16 and 17 in the HTLN Vital Signs Monitoring Plan



Conceptual Ecosystem Models

• D.A. Weinstein. Forest Ecosystem Conceptual Model

• Andrew Hansen and Danielle Gryskiewicz. Interactions between Heartland National Parks and Surrounding Land Use Change: Development of Conceptual Models and Indicators for Monitoring



Supplemental documents 20 and 23 in the HTLN Vital Signs Monitoring Plan

Vital Signs Prioritization



Vital Signs Priority Rankings for Effigy Mounds NM

Category	Attribute	EFMO
Rivers & Streams	Physical-Stream Discharge	3.8
Rivers & Streams	Stream Core elements	3.5
Rivers & Streams	Stream Pathogens	3.4
Rivers & Streams	Fluvial geomorphology	3.2
Rivers & Streams	Fish Community	3
Rivers & Streams	Mussel communities	3
Rivers & Streams	Stream Habitat quality	2.9
Rivers & Streams	Stream Macroinvertebrates	2.8
Rivers & Streams	Nutrient Loading	2.6
Rivers & Streams	Stream Toxics	2.6
Rivers & Streams	Sound-Natural sound levels	2.5
Rivers & Streams	Toxicity in water and sediments	2.4
Rivers & Streams	Water Clarity	2.3
Rivers & Streams	Chemical-Pollutant Source	2.3
Rivers & Streams	Metal Contaminants	2.1
Rivers & Streams	Groundwater dynamics	1.2
Terrestrial	Exotic Forest Species	3.8
Terrestrial	Forest Disturbance/Succession	3.7
Terrestrial	Gypsy moths	3.6

List of all vital signs considered for monitoring at each park and their priority ranking (hand out provided)

**Utility:
Provides a “long list” of potential attributes to be included in the assessment**

Long term data are (will) be provided for a subset



Overview of Vital Signs Monitored

OZAR

Region

Land use / land cover
Air Quality
Weather and Climate

Aquatic Ecosystems

Community Monitoring

Aquatic invertebrates
Fish communities

Population Monitoring

Ozark Hellbender

Environmental Monitoring

Fluvial Geomorphology
Water chemistry
Discharge

EFMO

Region

Land use / land cover
Air Quality
Weather and Climate

Terrestrial Ecosystems

Community Monitoring

Prairie plant communities
Forest communities

Population Monitoring

Invasive, exotic plant species



Inventory and Monitoring Data - EFMO

- Savanna restoration recommendations (1997)
- Goat prairie vegetation status report (1998, 2001)
- Forest vegetation monitoring design and baseline data (2003)
- Changes in land use and land cover in the EFMO region - 1930 to 2000. (2004)
- Forest vegetation monitoring status report (2004)
- Vegetation inventory (2006)
- Invasive non-native plant species monitoring (initiated in 2006)

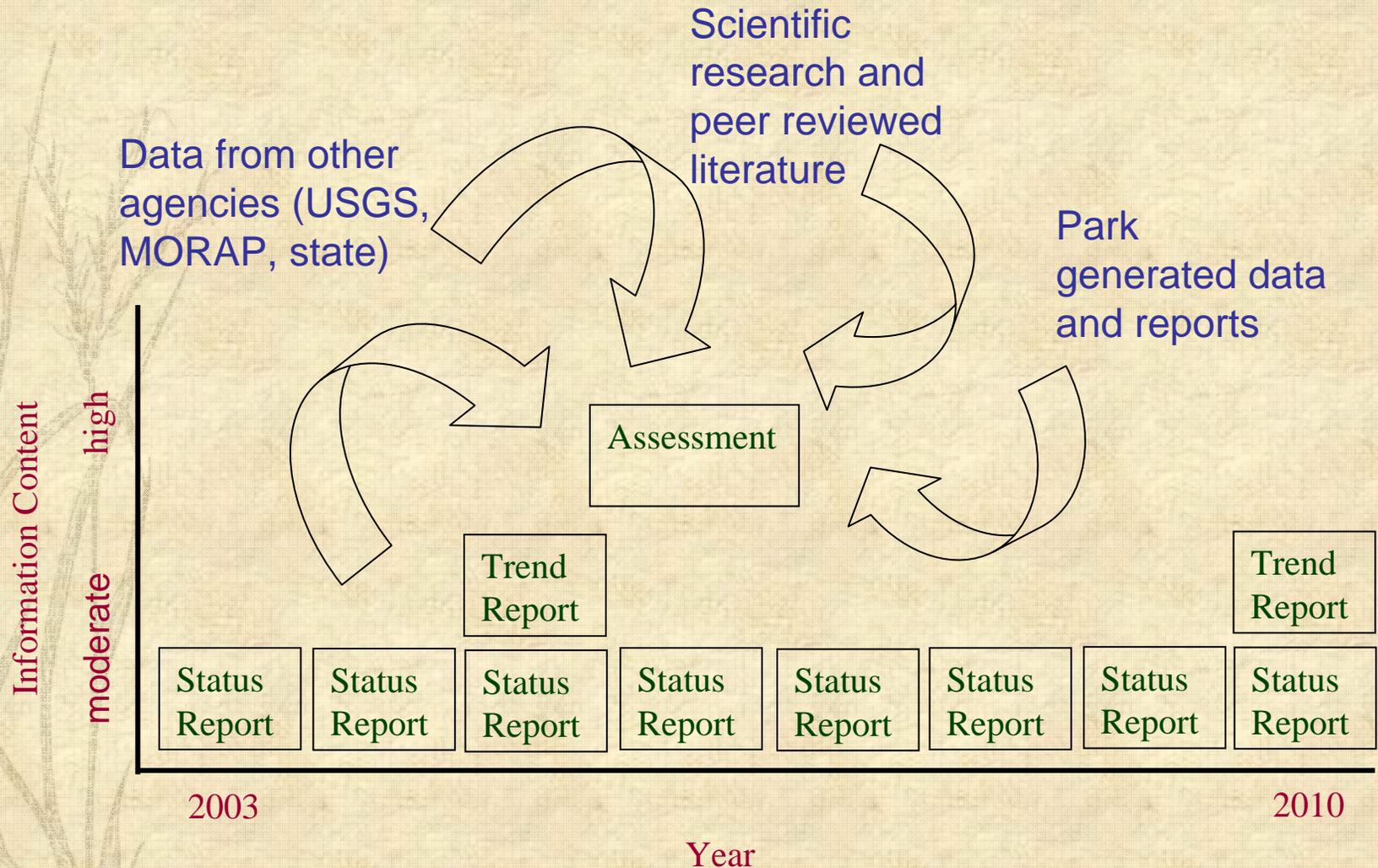
Inventory and Monitoring Data - OZAR



- Pilot data collected for fish and invertebrates (2005)
- Upland and riparian bird inventories
- Herpetofauna inventory
- Coming soon:
 - Full implementation of fish, invertebrate and habitat monitoring
 - Fluvial geomorphology
 - Water chemistry



Integrating Vital Signs into an Assessment



Integrating Vital Signs Data into an Assessment Framework



Essential Ecological Attributes	Available Data	Source
Landscape Condition		
Landscape composition	vegetation map	USGS /TNC Narumalani, S., et. al. 2004. http://www1.nature.nps.gov/im/units/htln/pdf/R eports/LULC .pdf
Landscape pattern / structure	land use change analysis	
Biotic Condition		
Communities	forest community structure, composition & diversity	HTLN (http://www1.nature.nps.gov/im/units/htln/reports/reports.htm), Stolt, Joie L. and Evelyn Howell. 2005. Inventory of forest structure and diversity at Effigy Mounds National Monument.
	prairie community structure, composition, & diversity	HTLN (http://www1.nature.nps.gov/im/units/htln/reports/reports.htm), Stolt, Joie L. and Evelyn Howell. 2005. Inventory of forest structure and diversity at Effigy Mounds National Monument.
Populations	invasive, non-native plant distribution and abundance monitoring	HTLN
	stream pathogens	Iowa DNR
Natural Disturbance		
Fire regime	wildland and prescribed fire history	EFMO
Flood regime		Iowa DNR
Chemical / Physical		
Air quality	deposition of sulfur and inorganic nitrogen	http://www2.nature.nps.gov/air/Permits/ARIS/networks/htln.cfm
	visibility and particulate matter	http://www2.nature.nps.gov/air/Permits/ARIS/networks/htln.cfm
	ozone	http://www2.nature.nps.gov/air/Permits/ARIS/networks/htln.cfm
Water chemistry	PH, temperature, conductivity, dissolved oxygen	Iowa DNR
	discharge	Iowa DNR

From Vital Signs Monitoring to Performance Reporting



Vital Signs Monitoring

- **Specific** – e.g. populations of rare plants and animals
- **Quantitative** – rigorous methods documented in protocols
- **Focused** – intensively monitor a few, information rich indicators of ecosystem health



Assessments

- **Synthetic** – incorporates existing information from many sources
- **Semi -Quantitative** – uses best professional judgment to determine the desired condition of natural resources
- **GIS based** – provides spatially explicit, comprehensive coverage of parks



Performance Goals

- **Generic** – uplands, wetlands, riparian
- **Qualitative** – number of acres in good/fair/poor condition?
- **Inclusive** – overall condition of riparian areas reflects the condition of the constituent flora, fauna, and ecological processes



Heartland Network