

NPS Climate Change Response Overview of Relevant I&M Activities





Today's Overview of I&M Activities:

1. Relevant efforts already well underway by I&M networks
2. Co-location and collaboration with FWS Refuge System
3. NPScape: landscape-scale data sets for parks and LCCs
4. Data synthesis and modeling efforts
5. Enhanced monitoring in 94 parks
6. Data integration and delivery – IRMA system
7. Vulnerability assessments

NPS Climate Change Response



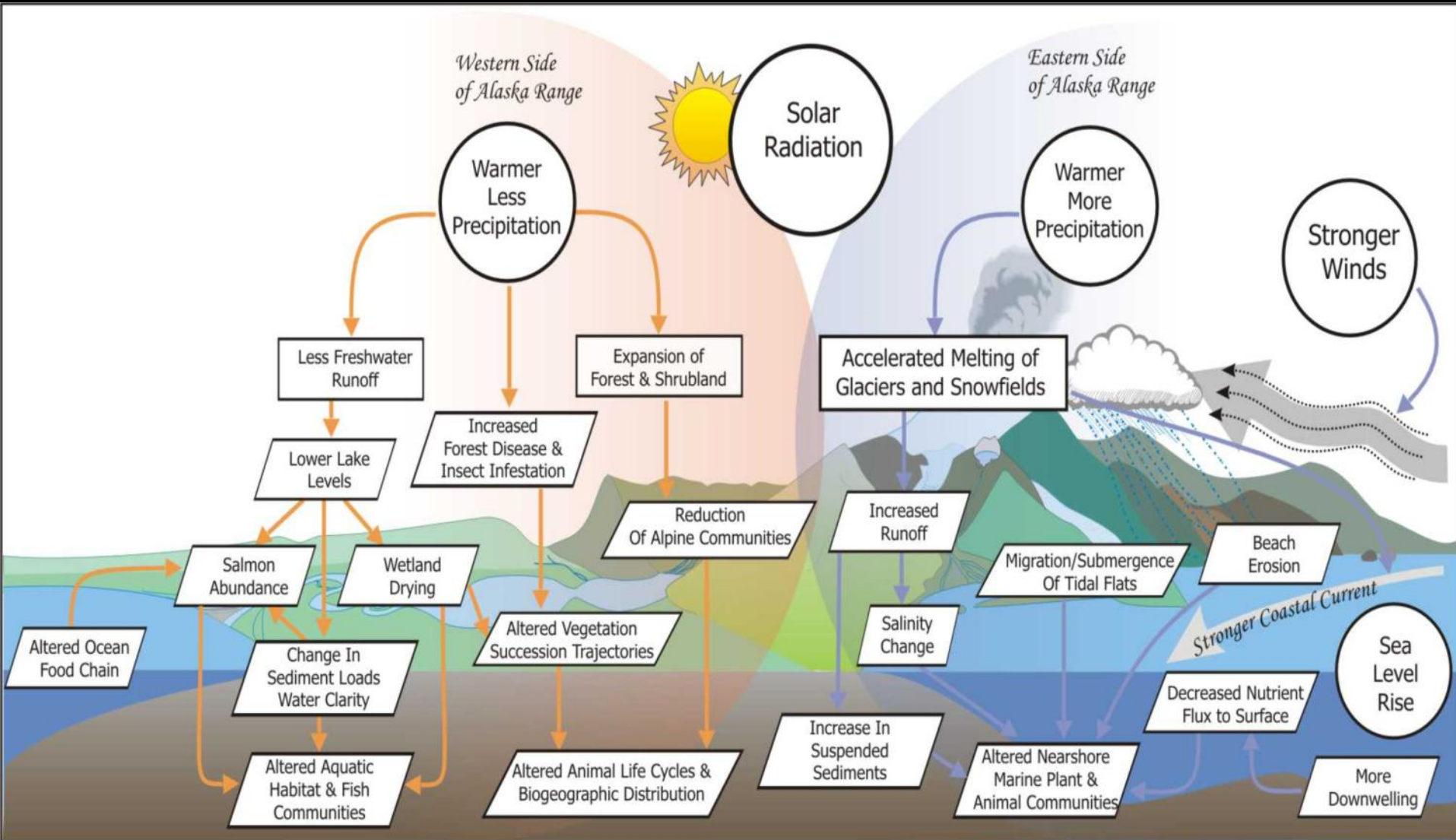
1. All 32 I&M networks are already producing and delivering data and information relevant to climate change effects to inform park management, park planning, and to help provide the scientific basis for interpretation and outreach by others (e.g., science literacy efforts). For example:
 - Inventory data sets (e.g., climate inventory; vegetation and soils maps very relevant for carbon sequestration calculations; soil organic carbon distribution maps and rapid soil assessment tools being developed for parks)
 - Most of the vital signs being monitored are relevant to understanding and telling the public about changes to park resources. Climate change was considered by most networks during the planning, design, and indicator selection process.
 - Successful mechanisms already in place for delivering products and sharing information (e.g., I&M websites, resource briefs, technical reports, briefings to managers)

What the 32 I&M Networks provide:



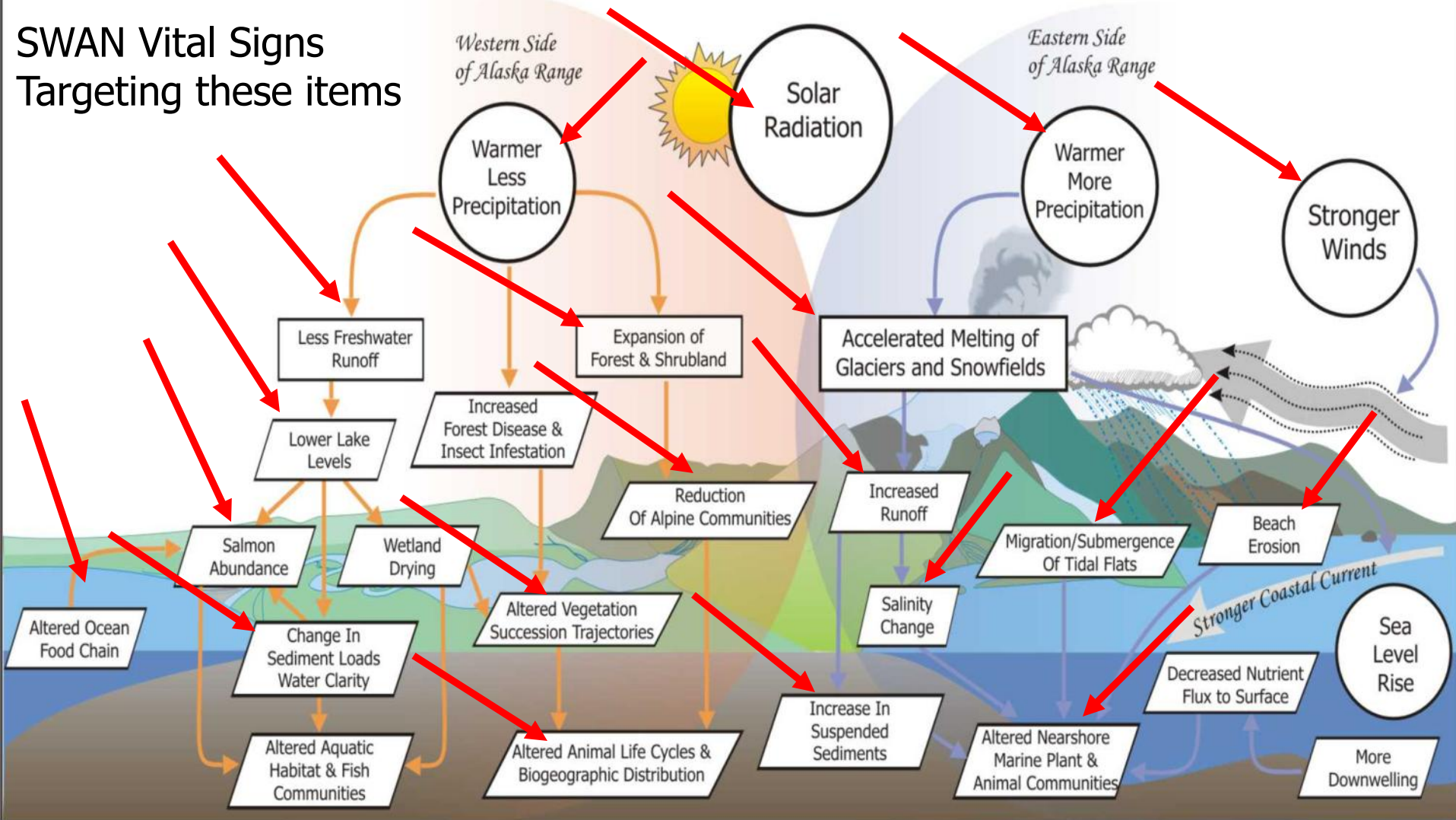
- Inventory and monitoring data from “boots on the ground” data collection, analysis, and routine reporting
- Compilation, analysis, translation, and delivery of data collected by other programs and agencies (e.g., climate data, air quality, landscape-scale datasets)
- Expertise (scientists, modelers, quantitative ecologists, data managers, science communication specialists).
351 FTEs funded by I&M last year; the core of the NPS science capacity.
- Connection/communication between land managers and scientists through each network’s Board of Directors and Technical Advisory Committee

Climate Warming Conceptual Model –for SWAN



Climate Warming Conceptual Model –for SWAN

SWAN Vital Signs
Targeting these items



Long-term Vital Signs Monitoring in the Southwest Alaska Network

Alagnak Aniakchak Katmai Kenai Fjords Lake Clark

Number of I&M parks that will monitor each vital sign category using existing funding (including partnerships with others where the networks will deliver data summaries to park managers and planners).

Vital sign category	Example measures (varies by network)	# of parks
Weather and Climate	Temperature, precipitation, wind speed, ice on/off	246
Water Chemistry	pH, temperature, dissolved oxygen, conductivity	211
Land Cover and Use	Area in each land cover and use type; patch size & pattern	203
Invasive/Exotic plants	Early detection, presence/absence, area	200
Birds	Species composition, distribution, abundance	189
Surface Water Dynamics	Discharge/flow rates (cfs), gauge/stage height, lake elevation, spring/seep volume, sea level rise	158
Ozone	Ozone concentration, damage to sensitive vegetation	140
Wet and Dry Deposition	Wet deposition chemistry, sulfur dioxide concentrations	114
Visibility & Particulate Matter	IMPROVE network; visibility and fine particles	113
Fire and Fuel Dynamics	Long-term trend of fire frequency, average fire size, average burn severity, total area affected by fire	105
Vegetation Complexes	Plant community diversity, relative species / guild abundance, structure / age class, incidence of disease	101
Mammals	Species composition, distribution, abundance	93
Forest/Woodland Communities	Community diversity, coverage and abundance, condition & vigor classes, regeneration	93
Soil Function and Dynamics	Soil nutrients, cover and composition of biological soil crust communities, soil aggregate stability	91
Stream/River Channel Characteristics	Channel width, depth, and gradient, sinuosity, channel cross-section, pool frequency and depth, particle size	89
Aquatic Macroinvertebrates	Species composition and abundance	86
T&E Species and Communities	Population estimates, distribution, sex & age ratios	85
Air Contaminants	Concentrations of SOCs, PCBs, DDT, Hg	71
Groundwater Dynamics	Flow rate, depth to ground water, withdrawal rates, recharge rates, volume in aquifer	69
Amphibians and Reptiles	Species distribution & abundance, population age/size structure, species diversity, percent area occupied	54
Grassland/Herb Communities	Composition, structure, abundance, changes in treeline	51
Fishes	Community composition, abundance, distribution, age classes, occupancy, invasive species	50
Insect Pests	Extent of insect related mortality, distribution and extent of standing dead/stressed/diseased trees, early detection	50
Riparian Communities	Species composition and percent cover, distribution and density of selected plants, canopy height,	45



- ☒ I & M
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Nature & Science »

I&M Home

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Parks: Nature & Science



Inventory & Monitoring

Discovering and protecting America's natural heritage

NPS » Nature & Science » **Inventory & Monitoring**

The Inventory and Monitoring Program

New: Climate Change Monitoring Briefs

Background

National Park managers across the country are confronted with increasingly complex and challenging issues that require a broad-based understanding of the status and trends of each park's natural resources as a basis for making decisions, working with other agencies, and communicating with the public to protect park natural systems and native species.

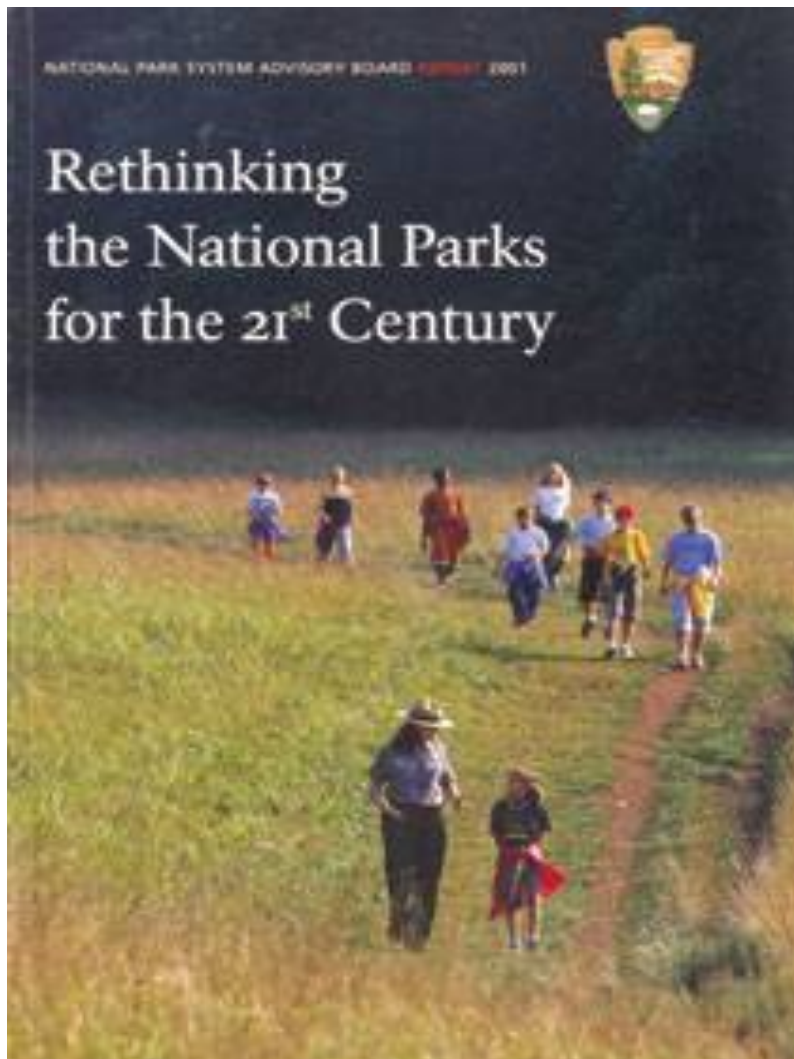
As part of the National Park Service's effort to "improve park management through greater reliance on scientific knowledge," a primary role of the Inventory and Monitoring (I&M) Program is to collect, organize, and make available natural resource data and to contribute to the Service's institutional knowledge by facilitating the transformation of data into information through analysis, synthesis, and modeling.



Click on Map for
I&M Networks

Climate change monitoring briefs for all 32 I&M networks:

<http://science.nature.nps.gov/im/climate/index.cfm>

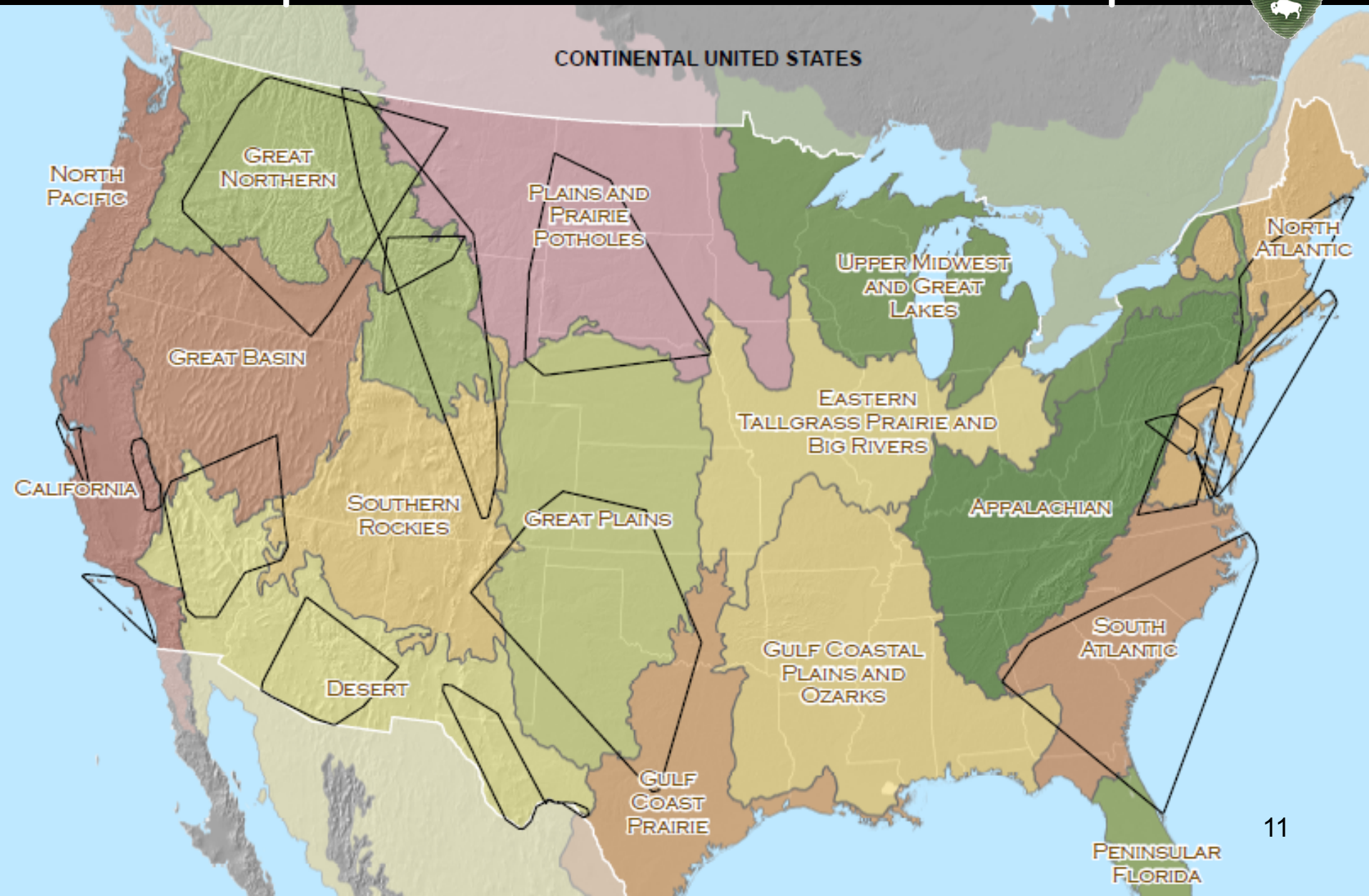


“A sophisticated knowledge of resources and their condition is essential. The Service must gain this knowledge through extensive collaboration with other agencies and academia, and its findings must be communicated to the public. For it is the broader public that will decide the fate of these resources.”

Source: Rethinking the National Parks for the 21st Century. A Report of the National Park System Advisory Board, July 2001



DOI Geographic Areas and examples of I&M Networks overlap



Climate change science positions:



Two of the NPS climate change science positions already in place and fully engaged w/ NPS and interagency efforts:



Dr. John Gross

Climate Change Ecologist

NPS Science Working Group Lead,
vulnerability assessments, modeling efforts



Dr. Shawn Carter

**Climate Change Monitoring Coord.
and I&M Washington DC Liaison**



#2. NPS - USFWS Collaboration on I&M

The FWS will be co-locating the national staff for their new NWRS (refuge system) I&M Program with our national staff in Fort Collins; we will collaborate closely on basic inventories, long-term monitoring, data systems development (IRMA), and data synthesis activities.

Quote from Mark Chase, new Director of FWS Natural Resource Program Center in Fort Collins:

"The SHORT of it:

The Inventory and Monitoring program of the NWRS will look remarkably similar to the Inventory and Monitoring Program of the NPS.

The Service will collaborate closely with NPS, USGS, and other partners to leverage resources and avoid duplication of effort.

We are NOT reinventing the wheel."

NPScape - Landscape dynamics monitoring



3. NPScape: Generating and delivering a suite of landscape-scale datasets, maps, other products for each park and each LCC geographic area to inform management and planning.



Dr. Bill Monahan

I&M Landscape Ecologist

NPScape project is very relevant to LCC efforts and climate change response.

BLM, FWS, and USGS have already requested copies of our data layers and products. We shipped out hard drives chocked-full of landscape-scale data for each LCC to I&M networks for sharing.

NP Scape Products and Deliverables



Initial analyses and delivery of products in Dec. 2009 were focused on six categories of indicators:

- Conservation Status and Ownership of lands
- Housing Density (historic, current, future projection)
- Landcover (area per landcover type; changes in natural vs. converted; % impervious surfaces)
- Pattern (patch size; grassland and forest morphology)
- Human Population (popn. density, historic, current, future)
- Roads (road density, distance from roads, area without roads)

NPScape Products and Deliverables



Generated a NPScape media drive for each park with 1,900 files

Products were generated for a 30-km area around each park, and for the entire LCC geographic area that the park occurs within.

6 NPScape measures

- Output products also include geo-enabled PDFs, report-ready graphics, and KMLs (Google Earth).

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Housing

Landcover

Pattern

Population

Reference

Roads

Utilities

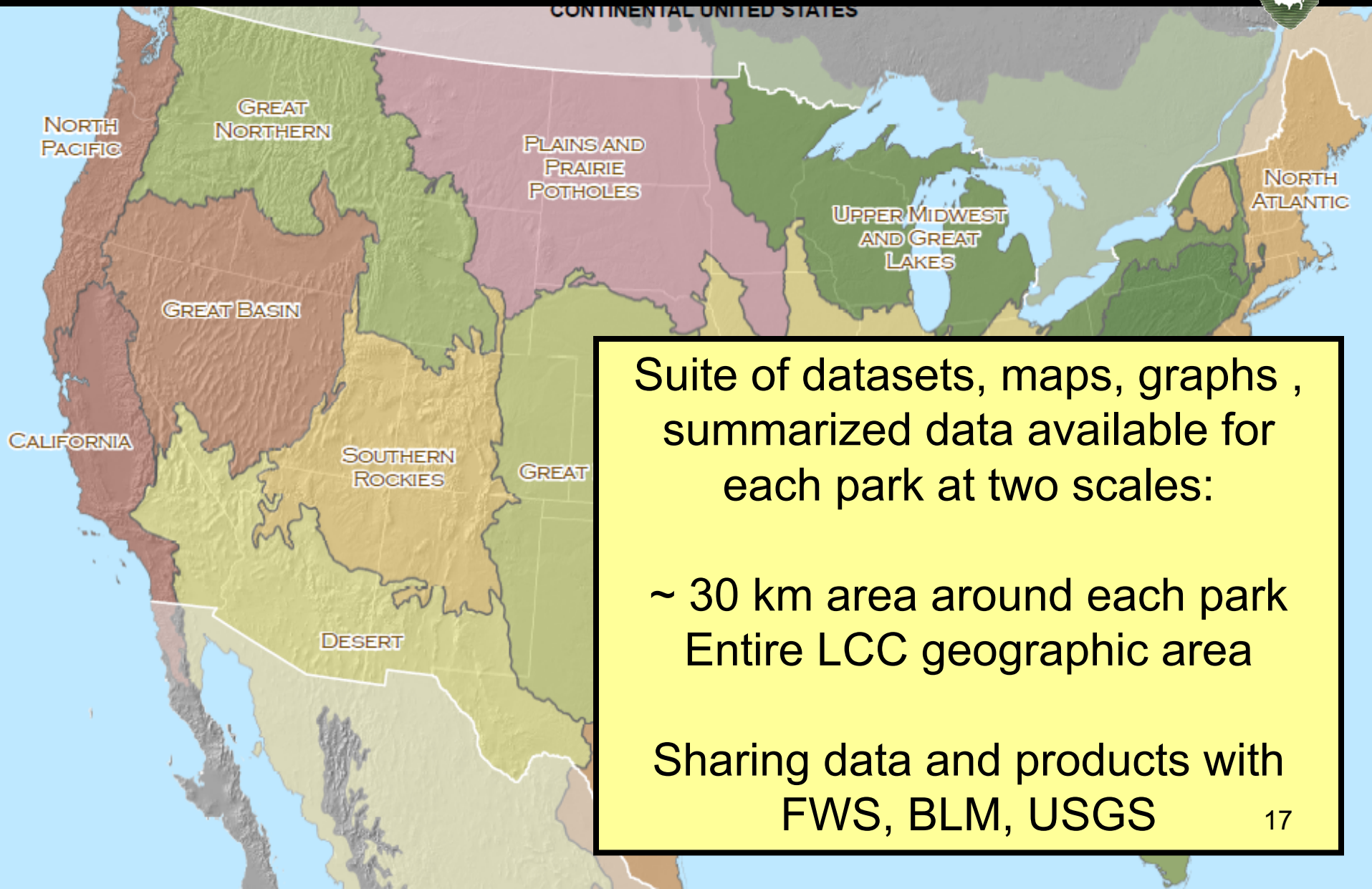
← Base GIS data

← General python scripts

non-GIS users

new GIS data
re

NP Scape - Landscape Dynamics



Suite of datasets, maps, graphs ,
summarized data available for
each park at two scales:

~ 30 km area around each park
Entire LCC geographic area

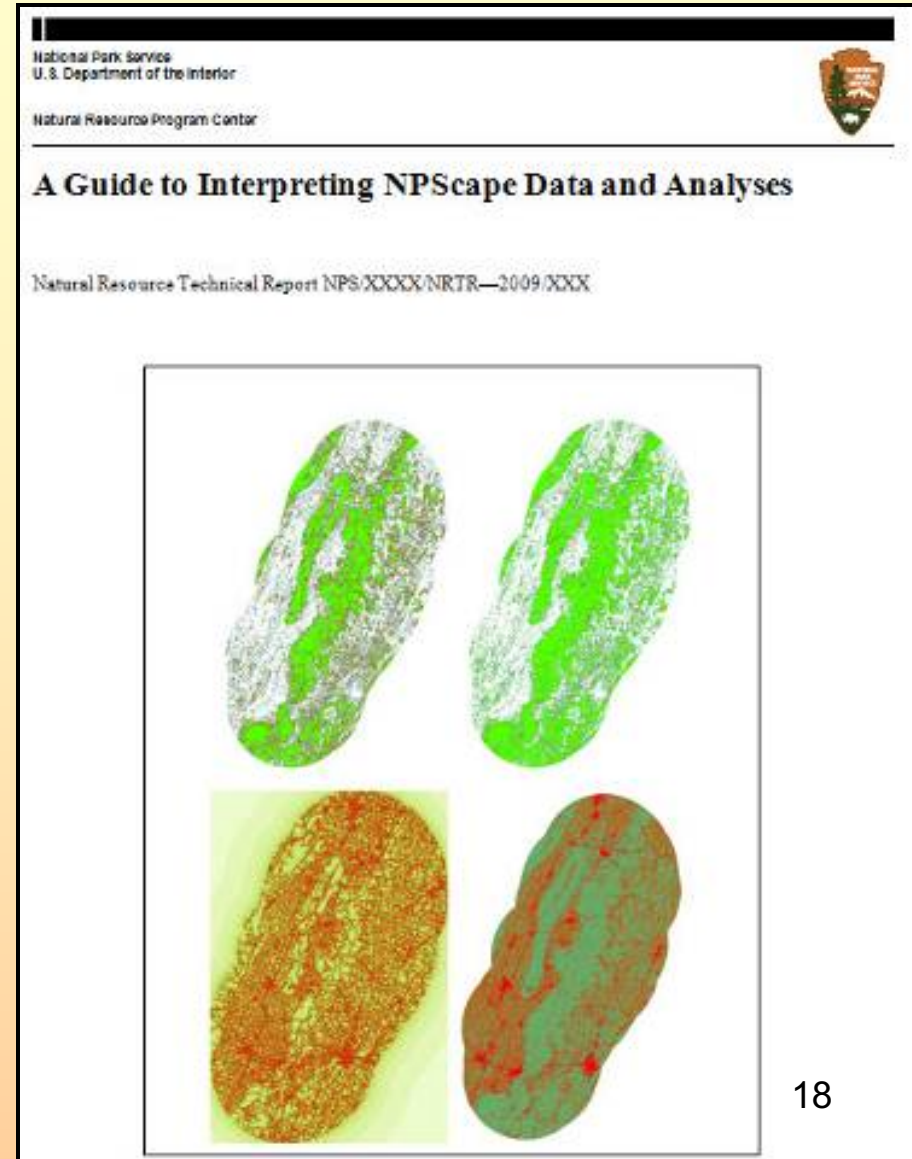
Sharing data and products with
FWS, BLM, USGS

NPScape Products and Deliverables

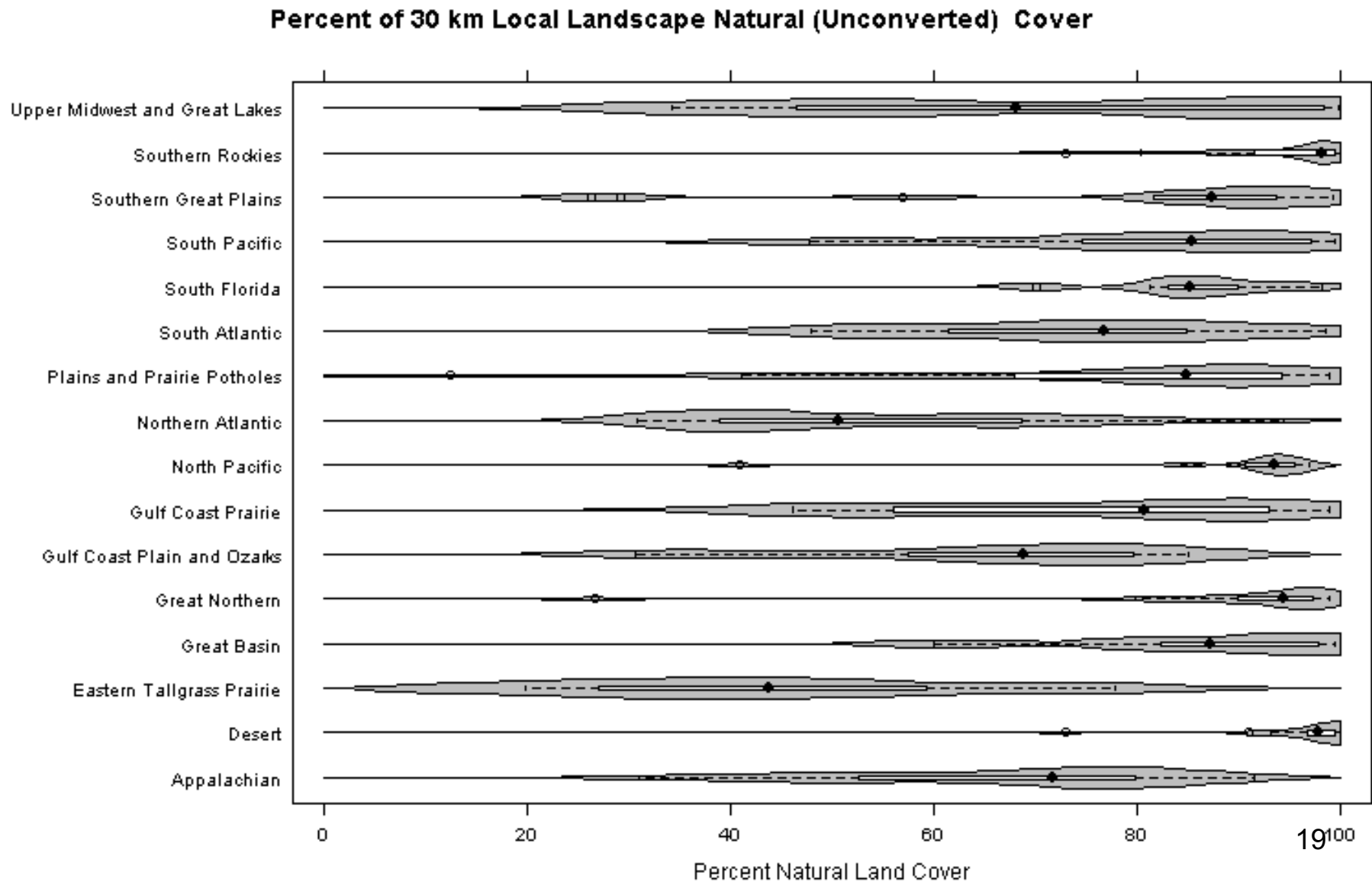


Interpretive Guide:

Documents the scientific basis, justification for measurements, literature summaries, citations, examples to put results in a broader context



Providing context: How do the measures for your park or LCC area compare to other parks or LCCs?



NP Scape Products and Deliverables



Geo-processing Tools and Scripts provided to re-run analyses for different size areas:

```
#YOU WILL NEED TO EDIT THE FOLLOWING PATHS
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NLCD1992_Reclass1 = "C:\\NPSCAPE\\Landcover\\SourceData\\lac1992_recode_level1classes.dbf"
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#END OF REQUIRED MODIFICATIONS
#####

from lac_AOACalculate_AreaPerCategory import lac_AOACalculate_AreaPerCategory
from lcc_AOACalculate_ChangeNaturalConverted import lcc_AOACalculate_ChangeNaturalConverted
from lnc_NaturalConverted import lnc_NaturalConverted
from lpi_AreaPerCategory import lpi_AreaPerCategory
from NP Scape_Uilities import *
```

Data Sets that we have available to share w/ others:

Land Cover

- Enhanced NLCD 1992
- NLCD 1992
- NLCD 2001
- NLCD Change Product
- NLCD Impervious Surface
- NLCD Tree Canopy
- Historic Natural Fire Regime
- LandFire - all products
- Land cover diversity (Simpson's)
- NatureServe Ecological Systems
- GAP/ReGAP
- Land cover characteristics
- Forest fragmentation
- Morphological pattern metrics
- Forest cover types
- Converted and natural landcover

Landform

- DEM - 10, 30, and 120 meter
- Slope and aspect
- Depth to bedrock
- Sand, silt, clay fractions
- Crop capability
- Geology

Climate

- Precipitation
- Temperature (min/max, variability)
- Growing season days
- NDVI
- Sea surface temperature

Transportation

- Roads (Multiple data sources)
- Railroads (U.S. and Canada)
- National Waterways

Population

- Nighttime lights (1992/93, 2000)
- Populated places
- U.S. cities
- U.S. urban areas
- 1990, 2000 Census, block group
- Population projections by county
- SEDAC census grids
- Housing density (1940-2040)
- Inventoried roadless area
- Agriculture census by county
- Water use by county
- Conservation risk index
- Wildland Urban Interface

Boundaries

- Omernick Ecoregions (and CEC)
- Bailey Ecoregions
- Physiographic Provinces
- UNEP Large Marine Ecosystems
- States
- Counties
- NPS Units (with various buffers)
- NPS Vital Sign Networks
- Protected Areas Boundaries
- Federal Lands
- National Wilderness Preservation System
- Continental Divide
- NCDC Climate Divisions
- NEON Domains

Hydrology

- Hydrologic Units (4, 6, 8, 12-digit)
- NHD (med and high resolution)
- Impoundments
- Aquifers
- Ground water climate response network
- Sea ice (North America)



Data Synthesis and Modeling Efforts underway:



4. I&M data, expertise, and funding contributing to data synthesis, modeling, research, and planning efforts:
 - NASA-NPS-USGS-FWS-Smithsonian research solicitation
 - USGS National Park Monitoring Project data synthesis to inform condition-based management
 - Park Analysis of Landscapes and Monitoring Support (PALMS) - Ecosystem modeling and forecasting project
 - I&M networks contributing to NR Condition Assessments, Scenario Planning, interagency LCC workshops

Points of Contact Concerning This Call for Proposals



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RESEARCH
CLIMATE SCIENCE
LAND PLANNING STRATEGIES
ADAPTATION APPLICATIONS

Call for Proposals is available at <http://nspires.nasaprs.com/>

*Climate and Biological Response: Research and Applications
(ROSES-2010 A.30)*

Joint Research Solicitation

NASA

USGS

NPS

FWS

Smithsonian

<http://nspires.nasaprs.com>

ROSES-2010 Appendix A.30

Earth Science for Society: An Interagency Effort to Apply Earth
Science Data to Improve Scientific Knowledge and Enhance
Natural Resource Management

NASA-NPS-FWS-USGS Joint Solicitation:



- “Data synthesis and Modeling to support National Park Ecosystem and Water Resource Management”; part of Section A.30 of “Research Opportunities in Space and Earth Sciences (ROSES)” request for proposals.

NASA agrees to:

- Include NPS scientists in review and selection of proposals for which NPS is intended as the host agency.
- Ensure that NPS staff are involved in successful proposals for which the NPS would ultimately host the forecasting tools or other products; and
- Proposals must include a plan and schedule for the transition of the forecasting tools or other products into the NPS.



National Park Monitoring Project

<http://www.fort.usgs.gov/brdscience/ParkMonitoring.htm>





Status and Trends of Biological Resources Program





USGS National Park Monitoring Project

Current Research







Prototype Parks:

-  [Elk Monitoring Protocol](#)
-  [Big River Protocol Development](#)

Ecological Thresholds

-  [Aggregate Measures](#)
-  [Aquatic Macroinvertebrates](#)
-  [Dryland Ecosystems](#)
-  [Structured Decisions](#)
-  [Salt Marsh](#)

Data Analysis & Synthesis

-  [Amphibian Distribution](#)
-  [Analysis of Linkages and Trends](#)
-  [Climate Change](#)
-  [DNA-Based Methods](#)
-  [Glacial-Marine Ecosystem](#)
-  [Hierarchical Models](#)

The USGS Status and Trends of Biological Resources Program ([S&T](#)), National Park Monitoring Project supports [USGS](#) research on priority topics (themes) identified by the National Park Service ([NPS](#)) Inventory and Monitoring Program ([I&M](#)). We fund research on major issues that may require a 2- to 5-year effort involving several principal investigators and several I&M networks. Our emphasis on longer-term research complements the emphasis of the Park Oriented Biological Support ([POBS](#)), which focuses on short-term technical assistance and exploratory research efforts and the emphasis of the Natural Resources Preservation Project (NRPP), which funds short-term, tactical research to meet natural resource management needs identified by NPS.

One page preproposals due June 15, 2010

Final proposals due August 15, 2010

We will probably continue this theme next year with the same due dates.

FY09, FY10 and FY11 Theme: Integrated Analysis, Modeling, and Synthesis of NPS Inventory and Monitoring Data to inform Condition-based Management

See [RFP](#)



Paul Geissler, Paul_Geissler@usgs.gov, 970-226-9482
Tom Philippi, Tom_Philippi@nps.gov, 970-225-3586

Examples of USGS-NPMP funded projects:

Climate Change & Plant Community Composition in National Parks of the Southwestern US:
Forecasting Regional, Long-term Effects to Meet Management Needs

(SODN parks and ORPI; Jayne Belnap, Munson, Dettinger, Andy Hubbard, Sue Rutman)

Hierarchical Models of Distribution and Density of Birds across Coastal Parks of SW Alaska

(SWAN parks; Coleen Handel, Bill Thompson)

Integrated phenological monitoring, analysis, and synthesis to track ecosystem responses to climate change

(Appalachian Trail; Jake Weltzin, Brian Mitchell)

Using Advanced Satellite Products to Better Understand I&M Data within the Context of the Larger Ecoregion

(Heartland parks; Jeff Morisette, Kevin James)

Integrated analysis, modeling, and synthesis of the impacts of blister rust and mountain pine beetle mortality to whitebark pine in the Greater Yellowstone Ecosystem

(Greater Yellowstone area; Chuck Schwartz, Stacey Ostermann-Kelm)

Synthesizing Vital Signs Data from Klamath (KLMN) and San Francisco Bay Area (SFAN) Networks: Analysis of Linkages and Trends in Climate, Stream Flow, Vegetation, Salmon, and Ocean Conditions

(KLMN and SFAN parks; Madej, Torregrosa, Woodward; Dan Sarr, Marcus Koenen)



Nature & Science »

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Parks & Networks

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NARSEC 2007 Proceedings

Landscape Scale

Monitoring

Parks: Nature & Science

NPS » Nature & Science » Inventory & Monitoring » Vital Signs Monitoring » Land Cover Land Use

PALMS - Park Analysis and Monitoring Support

A joint project of the NPS, Montana State University, Woods Hole Research Institute, Colorado State University, and NASA Ames Research Center

This site describes the PALMS project, and provides access to project products, related and supporting publications, instructions to access data, presentations, reports, and associated project materials. As products mature and are finalized, they will be uploaded and available via the NPS NRInfo portal via IRMA (intranet only).

Ecological condition of US National Parks: Enhancing decision support through monitoring, analysis, and forecasting

PALMS Products

Key documents

PALMS Fact Sheet, 2008.

NASA Project Proposal, 2005.

PALMS Assessment Report, 2009.

PALMS Indicator Summary table March 2009

Procedures and Standard Operating Procedures (SOPs)

Park Analysis of Landscapes and Monitoring Support



- Pilot projects at Delaware Water Gap, Rocky Mountain, Yellowstone, Yosemite
- Provides landscape-level indicators to support vital signs monitoring
- Establish procedures to transfer and incorporate NASA data products and models into monitoring
- Use ecological expertise to guide analyses, interpretation, and communication.

PALMS indicators relevant to climate change response:

- Landscape-scale phenology
- Access to high-resolution climate data (historical, projections)
- Connectivity (multiple measures)
- Population and land use projections

Data Synthesis and Modeling Efforts underway:



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 - USGS National Park Monitoring Project data synthesis to inform condition-based management
 - Park Analysis of Landscapes and Monitoring Support (PALMS) - Ecosystem modeling and forecasting project
 - I&M networks contributing to NR Condition Assessments, Scenario Planning, interagency LCC workshops

Enhanced Monitoring in 94 parks



5. Additional permanent funding in FY10 to build on existing natural resource monitoring (including data management, analysis, synthesis, modeling, and stronger collaboration with partners). Targeted for 94 highly-vulnerable parks in 6 groups:
- High Latitude parks in 4 Alaska I&M networks
 - Southwest Desert parks in the SODN, CHDN, and MOJN networks
 - High-elevation parks in the ROMN, GRYN, and UCBN
 - Atlantic Coastal parks in the SECN (emphasis on coastal and marine parks)
 - Atlantic Coastal parks in the NETN, NCBN, and NCRN networks (emphasis on coastal and marine parks)
 - Pacific Island parks

(We will request funding for additional groups of parks in future years)

Enhanced Monitoring - Alaska

(Preliminary plan being fleshed out)



- Glacier monitoring:
 - Complete much-needed glacier extent mapping
 - Develop summary statistics on condition of glaciers in all 4 I&M networks
 - Leverage surface elevation monitoring to calculate rates of volume change in future
- Permafrost: Protocols being developed by CAKN and ARCN
 - Leverage with other DOI agencies and university to monitor ice distribution and condition
- Phenology:
 - Partner w/ National Phenology Network; biological and physical indicators
 - Provides continental context for Alaska events
- GLORIA plots for alpine vegetation and soil monitoring
 - Anchor the high-latitude end of a gradient that starts in southern Rockies
- Remote sensing specialist shared across 4 I&M networks
- Science communication specialist
 - Packaging and delivery of scientific information to park managers and the public; contributing to science literacy

Enhanced Monitoring - SW Deserts

(Preliminary plan being fleshed out)



- Spring Distribution and Water Availability:
 - water availability (timing, amount)
- Phenology and Snowpack:
 - MODIS and similar technologies for broad-scale monitoring of phenology, snowpack, and productivity
- Science Communication and Science Literacy
 - Enhance Learning Center of the American Southwest (LCAS) to report climate change information across the LCC
- Leading Indicators of Climate Change
 - Enhance existing protocols to collect additional information for species most sensitive to climate change
- Climate protocol development
 - Consistent protocol for Desert LCC area for summarizing and delivering weather and climate data based on park needs and at the LCC scale

Enhanced Monitoring being considered for High Elevation parks in ROMN-GRYN-UCBN



(very preliminary – workshop with parks and partners held just last week)

- Enhanced long-term monitoring efforts involving field work:
 - 5-needle pines (e.g., white-bark, limber pine consistent across networks)
 - High elevation lakes (water chemistry)
 - Add GLORIA alpine monitoring sites at YELL, GRTE (already in other parks)
 - Sage steppe/shrublands monitoring
 - Invasive plants early detection protocol implementation
- Analysis and delivery of data collected by other programs to parks in a more useable format:
 - Fire frequency, extent, timing (from fire program)
 - NPScape; e.g., land cover and use, landscape context
 - Weather and Climate data summary/delivery
 - Water quantity (e.g., USGS and other stream gauging efforts)
 - Insects and Disease outbreaks (e.g., Forest Service)
 - Phenology

Enhanced Monitoring - South Atlantic Coastal Parks (preliminary)



- More salt-marsh SET elevation stations. (45 sites, each with three stations planned)
- Addition of tidal gages at CALO and CANA (there's a gap in the existing gage network)
- Adding some groundwater monitoring wells to fill the data gaps identified in our groundwater inventory/protocol.
- Adding automated weather data recorders to our data sondes at CAHA, CALO, CUIS, and CANA to plug data gaps identified in the climate inventory.
- Additionally, at a minimum, our stream habitat, bird monitoring, coastal shoreline monitoring, stream water quantity, and land use change protocols will be tied into existing monitoring efforts underway by the USGS project, and will be reviewed to ensure that we are collecting and reporting data in a way that will be useful to the modelers. Except for coastal shoreline monitoring, tying into the models will not be limited to only our coastal parks.

Enhanced Monitoring



North Atlantic Coastal Parks: (preliminary; still being developed)

- Enhance Salt Marsh Sediment Elevation Table (SETs) monitoring, data analysis, reporting and management.
 - Install SETs at ACAD and COLO and enhance existing sites at FIIS, CACO, BOHA, and GATE.
 - Shared position to manage SET monitoring for 10 parks across 3 Networks (NCBN, NETN and NCRN).
- Implement marsh bird monitoring program in 11 North Atlantic Coast parks.
 - Citizen science marsh bird monitoring program being developed.
 - Shared position to manage Marsh Bird monitoring program and coordinate collaboration with coastal FWS Marsh Bird monitoring program.
- Enhance data management (including data harvesting and synthesis) and science communication for climate change monitoring via shared data manager/communications specialist.
 - May share a position with FWS I&M Program in the Northeast.

Enhanced Monitoring – Pacific Islands



(PACN has been involved in interagency monitoring and coordination efforts since the network began years ago; examples of recent enhancements using existing I&M and other funds as well as \$100K additional funds this year):

- Consistent interagency monitoring of forest birds along elevation and habitat gradients in cooperation with State of Hawaii, Univ. Hawaii, USGS, and The Nature Conservancy. Major support for Hawaii Interagency Forest Bird Database Project and data synthesis efforts.
- Collaboration with USGS on invasive plant species early detection including alert and reporting system for new invaders, identification of invaders of high concern, map-based invasive species tracking tool, and educational materials to allow identification by non-experts.
- Developing web-, classroom-, and field-based learning materials on coral reef resources (with an emphasis on climate change) for four PACN parks.

Data Integration and Delivery



- 6. Accelerating the development of an integrated data system for interagency data sharing and integration.
IRMA (Integrated Resource Management Applications).**



IRMA



- Integration of Resource Management Applications
- Service-oriented Architecture (SOA): build once, use many times services that can be re-used by many applications
- Using DOI and industry standards to allow data exchange and integration among data systems
- DOI award for "Best Agency SOA Application"

DOI Climate Change Response



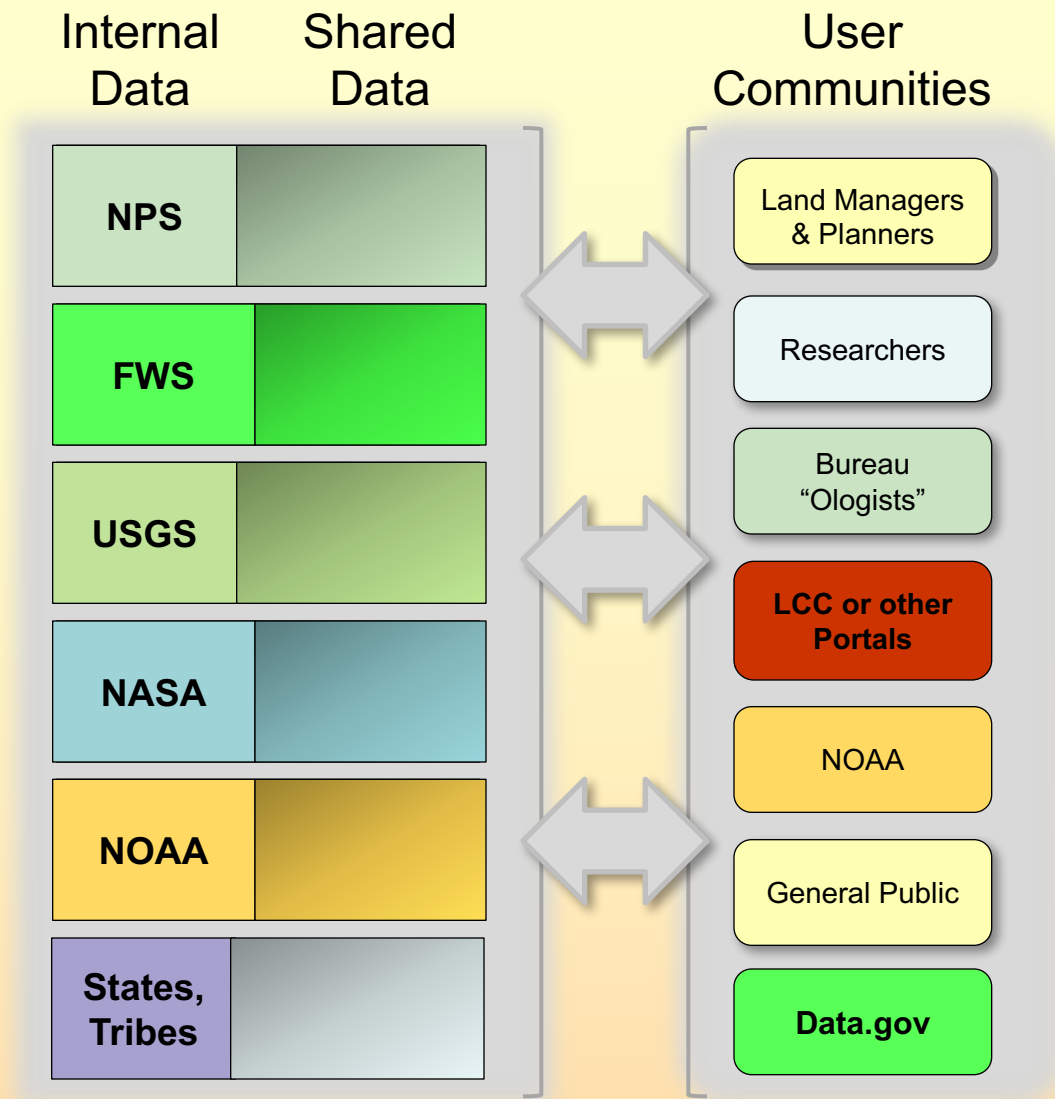
“Addressing climate change impacts will require a monumental effort by DOI”

“The data piece is probably the most important component of all of this”

David Hayes, Deputy Secretary of the Interior

Key Points from DOI Data Management/Integration Subcommittee:

- Data and information sharing and integration are the key to collaboration among DOI bureaus and their many partners in addressing the significant climate change challenges.
- We need a significant DOI response to develop effective and efficient means of finding, retrieving, using, and sharing the best available data and information. This will require both a top-down and bottom-up approach to addressing Department-wide data management issues.
- The key to data sharing and integration is modernization of data systems using reusable and sharable building blocks (“web services”) based on DOI and industry standards to allow data exchange across multiple data systems.



Conceptual approach showing a few agencies: Each agency maintains their data systems, yet make portions of their data available for sharing by using a common set of standards and processes



U.S. Drought Portal

www.drought.govSearch: [HOME](#)[WHAT IS NIDIS?](#)[CURRENT DROUGHT](#)[FORECASTING](#)[IMPACTS](#)[PLANNING](#)[EDUCATION](#)[RESEARCH](#)[RECOVERY](#)

Area Drought Information

Select State... Select Region...

Maps & Tools

- [Map Viewer - updated!](#)
- [GIS Resources](#)
- [Geodata Portal](#)
- [Drought Monitor Graphics](#)
- [Data Visualizations](#)

Events & Announcements

- [NADM Workshop - April 20-23, 2010](#)
- [Scoping workshop ACF Basin - Lake Blackshear, GA - December 2009](#)
- [Map Viewer now includes US Drought Outlook - New!](#)
- [CRN Soil Data - New!](#)
- [Drought Monitor Forum - Austin 2009](#)
- [Drought Index Evaluation Workshop - Boulder, CO - August 2009](#)
- [ESA Millenium Conf - November 2009](#)

[View Archive](#) | [Portal Release Notes](#)

Drought In The News

- [Big Island areas reach intense-drought classification - Hawaii News - Starbulletin.com](#)
- [Water forecast heightens Wash. drought concerns | Seattle Times Newspaper](#)
- [Governor seeks Klamath drought declaration - Sacramento Bee](#)
- [USDA to provide 10 million to California farmers - Sacramento Bee](#)
- [Wet winter leaves Sierra snowpack](#)

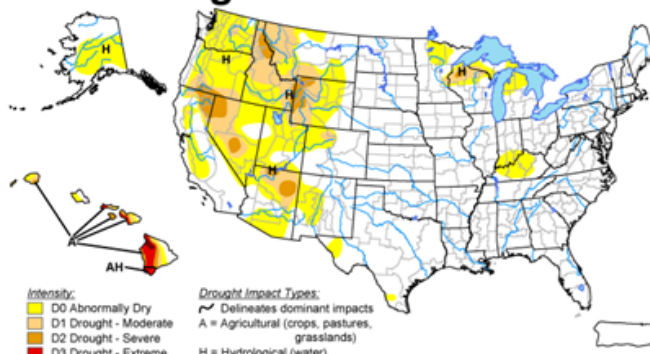
Featured Products

[Where are Drought Conditions Now?](#)[How is the Drought Affecting Me?](#)[Will the Drought Continue?](#)

U.S. Drought Monitor

March 16, 2010

Valid 7 a.m. EST



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

Released Thursday, March 18, 2010
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

NIDIS Feature

Energy and Water Programs within the United States

Department of Agriculture

Journal of Contemporary

Water Research & Education

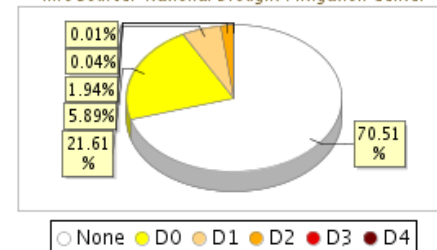
Issue 143
December 2009



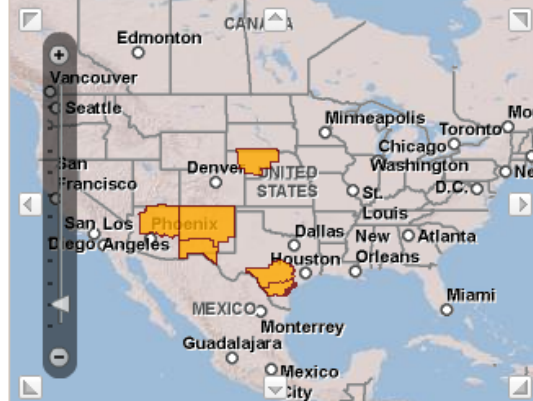
Drought Conditions

% Area for U.S., including, AK, HI & PR
(As of 3.16.2010)

Info Source: National Drought Mitigation Center

[Drought Classifications](#) | [View Time Series - updated!](#)

Drought Information Statements



Click on a highlighted area to view the current NWS Drought Information Statement or [Click Here to select from a list](#)

[View larger map](#)

Featured Application

41

DOI Climate Change Response



“The Department of Interior has committed to a unified monitoring and data management effort that will promote state of the art data integration procedures to facilitate data sharing.”

- Interior’s Plan for a Coordinated, Science-based Response to Climate Change Impacts on our Land, Water, and Wildlife Resources

- The technology exists for a coordinated, distributed system
- We know how to do this – several DOI efforts already underway
- Lots of other agencies, universities, NGOs, industry contributing
- Congress and OMB want to eliminate redundancy and see true interagency collaboration ... the DOI could be a national leader if we got our data integration act together
- DOI CIO office is developing a “business area” for climate change so that each bureau can modernize their segments.

What the NPS and others are doing now



- IRMA system has already integrated 6 separate applications; eventually will integrate 19 applications; serious about data integration and data sharing
- Natural Resource Database Template
 - ✓ Consistent core data structure in MS Access
 - ✓ Hundreds of successful NRDT databases nationwide
 - ✓ Long-term datasets will be available through IRMA or data.gov – can be discovered and accessed by others
- FWS I&M Program co-locating with us in Fort Collins
 - ✓ Setting up contract with same SOA-GIS-IT company and will “join at the hip” with us; comparable inventory and monitoring data sets for the Natl. Wildlife Refuge System and National Park System.
- USGS – talking about 7-10 regional data centers where researchers would submit their data; working on web services and metadata and data structure standards – sending team here next week to learn from us.
- States – Western Governor’s Assn. 17 states serious about this
- BLM sending team here soon; we are sharing NP Scape data with them already

Recent demos of NPS, FWS, USGS integration

Natural Resource Information Portal

National Park Service
U.S. Department of the Interior
Natural Resource Program Center



HomeReferencesBiologyMapsAir & ClimateGeology & SoilsWaterLandscapesHuman UseTools



Welcome

Welcome to the Natural Resource Information Portal


These pages are the beginning of a "one-stop shopping" gateway to NPS natural resource data and information.

To get started click on one of the subject tabs above.

This portal is part of the [IRMA project](#) (Integration of Resource Management Applications). The goal of IRMA is to simplify finding, downloading, and sharing essential NPS natural resource information.

These pages will be growing steadily as we add content and capabilities. We welcome your comments, and you can submit your feedback via [email](mailto:Irma_FeedBack@den.nps.gov) (Irma_FeedBack@den.nps.gov).

For now, the NRInfo Portal is limited to NPS users; however, the goal is to eventually make much of this information available to the public by late 2010.



NRInfo Navigation and News

- Navigation
 - [Get a Park Species List](#)
 - [Search for Docs or Data](#)
 - [Search Taxonomy](#)
- New for Release 7
 - [Enhanced Text Searching](#)
 - [Updated Unit Selectors](#)
 - [Web Services](#)

- Currently available to NPS users; read-only, non-sensitive data
- Additional functionality and data added every few months
- Legacy systems no longer needed by end of 2010
- Non-sensitive data expected to be publically available in 2011



[Home](#) [References](#) [Biology](#) [Maps](#) [Air & Climate](#) [Geology & Soils](#) [Water](#) [Landscapes](#) [Human Use](#) [Tools](#)



Search

Search » Results

Search Results

http://nrinfo



▲ Search Criteria Definition

Search Type: Quick
Reference Type: Document, Journal Article, Thesis, Book, Book Chapter, Conference Proceeding, Report, Map, Dataset, Multimedia, Picture, Movie, Collection
Data Source: All
Units
Containing: climate inventory

Download Options:

Text



Download...

Results

Type	Display Citation	Attached File	Attac
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_10_18_ncrninventory_final.pdf (0.87 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and climate inve...	2006_08_11_pacninventory_final.pdf (2.49 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_09_11_ermninventory_final.pdf (2.24 Mb)	F
Report	Redmond, K. T. and D. B. Simeral. 2006. Weather and Climate Inventory, Nationa...	2006004_Redmond_CAKN_WeatherInventory...	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and climate inve...	2006_08_07_ncpninventory_final.pdf (18.15 ...	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_09_21_ncbninventory_final.pdf (1.86 Mb)	F
Report	Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inve...	2006_11_27_ucbninventory_final.pdf (2.65 Mb)	F



[Home](#) [References](#) [Biology](#) [Maps](#) [Air & Climate](#) [Geology & Soils](#) [Water](#) [Landscapes](#) [Human Use](#) [Tools](#)



Welcome: Guest

- References

- Search

Search

[Search](#) » [Results](#) » [Profile](#)



Reference Summary

Information current as of 2/25/2010

Davey, C. A., K. T. Redmond and D. B. Simeral. 2006. Weather and Climate Inventory, National Park Service, National Capital Region Network. National Park Service, Fort Collins, CO. NPS/NCRN/NRTR—2006/009

Report

Legacy System: NatureBib

Legacy ID: 643918

▲ Content Description

Climate drives many of the environmental processes in the park units of the National Capital Region Inventory and Monitoring Network (NCRN). Climate variations are responsible for short and long-term changes in ecosystem fluxes of energy and matter and they have profound effects on underlying biogeochemical processes. Future changes in climate will, in turn, have tremendous impacts on these processes. Monitoring climate facilitates interpretation of other vital sign measurements. The responses of the NCRN landscape to these climate variations highlight the region's sensitivity to possible future climate changes. Climate changes could also adversely affect the important cultural resources protected by NCRN park units. For these reasons, climate was identified as a high-priority vital sign for NCRN and climate is one of the 12 basic inventories to be completed for all Inventory and Monitoring Parks. Because of the importance of climate to almost every aspect of both ecology and park management, this project was initiated to inventory past and present climate monitoring efforts. The primary objective of climate and weather monitoring for the NCRN is to provide monthly and annual summaries of climate data, including precipitation and



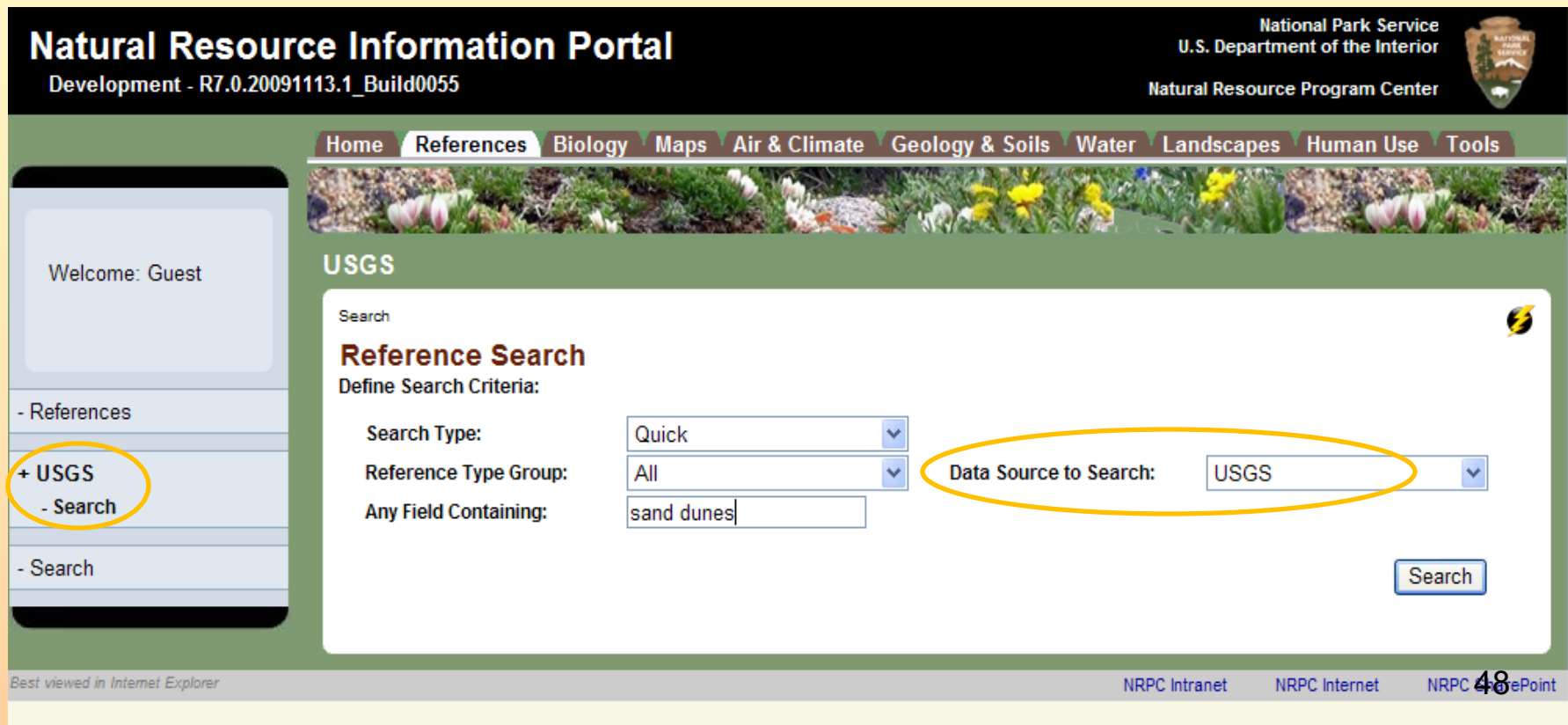
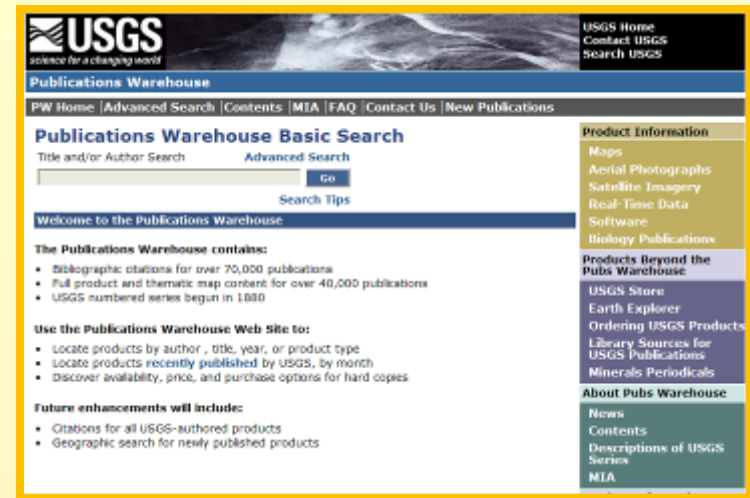
Weather and Climate Inventory National Park Service National Capital Region Network

Natural Resource Technical Report NPS/NCRN/NRTR—2006/009



Data Sharing and Integration among DOI Agencies

USGS Prototype
Access to Publications Warehouse –
70,000 records





[Home](#) [References](#) [Biology](#) [Maps](#) [Air & Climate](#) [Geology & Soils](#) [Water](#) [Landscapes](#) [Human Use](#) [Tools](#)



Welcome: Guest

USGS

USGS

[Search](#) » [Results](#) » [Profile](#)

Reference Summary

Frank, F. J. , 1970, Ground-water resources of the Clatsop Plains sand-dune area, Clatsop County, Oregon: Water Supply Paper 1899-A, iv, 41 p. :illus., maps (part col.) ,24 cm.

Water Supply Paper
System: USGS-1376

▲ Content Description

Although the average annual precipitation of the Clatsop Plains is 78.5 inches, the area is not without problems of water supply. The Clatsop Plains area is underlain by Tertiary bedrock of low permeability that stores and yields small quantities of ground water, which may be of poor chemical quality. This Tertiary bedrock furnishes only minor ground-water discharge to maintain the base flow of streams. The flow of rivers and creeks, normally abundant during the wet season, decreases greatly during the dry summer months. The lowlands are overlain by extensive deposits of dune and beach sand. The dune sand is permeable and can absorb and store, as fresh water, a large percentage of the annual precipitation. In the central part of the dune area, the saturated thickness of the sand ranges from 95 to more than 150 feet. Most of the ground water in the sand discharges to the ocean through beach-line seeps and underflow. Much of the water now being discharged to the ocean could be recovered by pumping from properly located, designed, and constructed wells. Three test wells drilled as part of this study are capable of yielding 100 gallons per minute although they are equipped with only short lengths of well screen. It is estimated that 2,500 acre-feet of ground water per year per square mile of area may be available for withdrawal in the 10 square mile area that is most favorable for development. The water from the dune sand is soft to moderately hard, has a low chloride concentration, and is of generally good chemical quality; however, at places it is weakly acidic and contains sufficient dissolved iron to make iron removal necessary for some uses. Ground water from shallow depths beneath a few swampy low-lying areas is brown and contains excessive concentrations of iron.

▲ Date Of Issue

12/31/1993

▲ Attachments

[wsp_1899-A.djvu](#)

DJVVU viewer required [Download](#)

In the future, we will provide the ability to automatically translate djvu formats to pdf)

▲ Author Information

- References

+ USGS

- Search

- Search

Data Sharing and Integration among DOI Agencies

USFWS ECOS data system

U.S. Fish & Wildlife Service
Endangered Species Program

Search

Search the Endangered Species Program Site

Search

Search For a Species:

Search

Endangered Species Program home page

Kids Corner

Species Information

Learn, Policies and Federal Register Notices

ESA & What We Do

- Candidates
- Consultations
- Grants
- InciPy
- International Activities

Species Information

Before a plant or animal species can receive protection under the [Endangered Species Act](#), it must first be placed on the Federal list of endangered and threatened wildlife and plants. [Our listing process](#) follows a [strict legal process](#) (50 CFR 17.226-17.226.5) (PDF) to determine whether to list a species, depending on the degree of threat it faces. An "endangered" species is one that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is one that is likely to become endangered in the foreseeable future. The Service also maintains a list of plant and animals native to the United States that are [candidates](#) or [proposed](#) for possible addition to the Federal list. All of the Service's actions, from proposals to listings to [removals](#) ([Delisting](#)) (50 CFR 17.226-17.226.5) (PDF), are announced through the [Federal Register](#).

(Please note: To view [PDF](#) documents, you may need to download and install the Adobe Acrobat Reader, free from [Adobe Inc.](#))

Get the regulatory profile for a listed species using its common or scientific name:

Submit

For more information on a particular species, you may want to check out our [Species in the Spotlight](#) page. This page focuses on those species most often in the news.

How many and which species...

- [are listed in the U.S. as threatened or endangered?](#)
- [are listed in each State?](#)
- [are listed in other countries?](#)
- [are listed and are under the primary responsibility of the NOAA Fisheries DWFSC?](#)
- [are the first species to be listed?](#)

National Park Service
U.S. Department of the Interior
Natural Resource Program Center

System Conservation
Book by the Sophie Torrance

Natural Resource Information Portal

Development - Release7_20090831.3

Home References Biology Maps Air & Climate Geology & Soils Water Landscapes Human Use Tools

Welcome: Guest

Welcome

Welcome to the Natural Resource Information Portal

These pages are the beginning of a "one-stop shopping" gateway to NPS natural resource data and information.

The [References](#), [Biology](#), [Maps](#), [Landscapes](#), and [Tools](#) navigation tabs above currently have content. Content for the other subject tabs will be posted in the future.

This portal is part of the [IRMA project](#) (Integration of Resource Management Applications), which was launched in 2007 by the NPS Natural Resource Program Center. The goal of IRMA is to simplify finding, downloading, and sharing essential park natural resource information.

These pages will be growing steadily as we add content and capabilities. We welcome your comments, and you can submit your feedback via [email](#) ([Irma_FeedBack@den.nps.gov](#)).

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Quick Links

- [NRInfo Portal FAQ's](#)
- [Get a Park Species List](#)
- [Search for Docs or Data](#)
- [Search Taxonomy](#)
- [TESS search](#)
- [Search USFWS](#)



Home References **Biology** Maps Air & Climate Geology & Soils Water Landscapes Human Use Tools



USFWS

Welcome: Guest



Search TESS by Family

Define Search Criteria

Select Family:

Canidae

Search

TESS Search Results

Population Code	Scientific Name ▲	Common Name	Family	Listing Status	Listing Status Text	Range
V01	Canis lupis	Gray wolf	Canidae	NS	Error in entry; not a legitimate taxon	Holarctic
V16	Canis lupus	Gray wolf	Canidae	DM	Delisted Taxon, Recovered	
V15	Canis lupus	Gray wolf	Canidae	E	Endangered	
V01	Canis lupus	Gray wolf	Canidae	E	Endangered	Holarctic
V04	Canis lupus	Gray wolf	Canidae	EXPN	Experimental Population, Non-Essential	Holarctic
V17	Canis lupus	Gray wolf	Canidae	EXPN	Experimental Population, Non-Essential	
V03	Canis lupus	Gray wolf	Canidae	EXPN	Experimental Population, Non-Essential	Holarctic
V09	Canis lupus	Gray wolf	Canidae	RT	Resolved Taxon	Holarctic
V13	Canis lupus	Gray wolf	Canidae	RT	Resolved Taxon	Holarctic

37 species found

- Biology

+ NPSpecies

+ USFWS

- Search

- TESS Search

+ Taxonomy

May 31st release of IRMA will incorporate geospatial search tools

Home References Biology **Geospatial** Air & Climate Geology & Soils Water Landscapes Human Use Tools

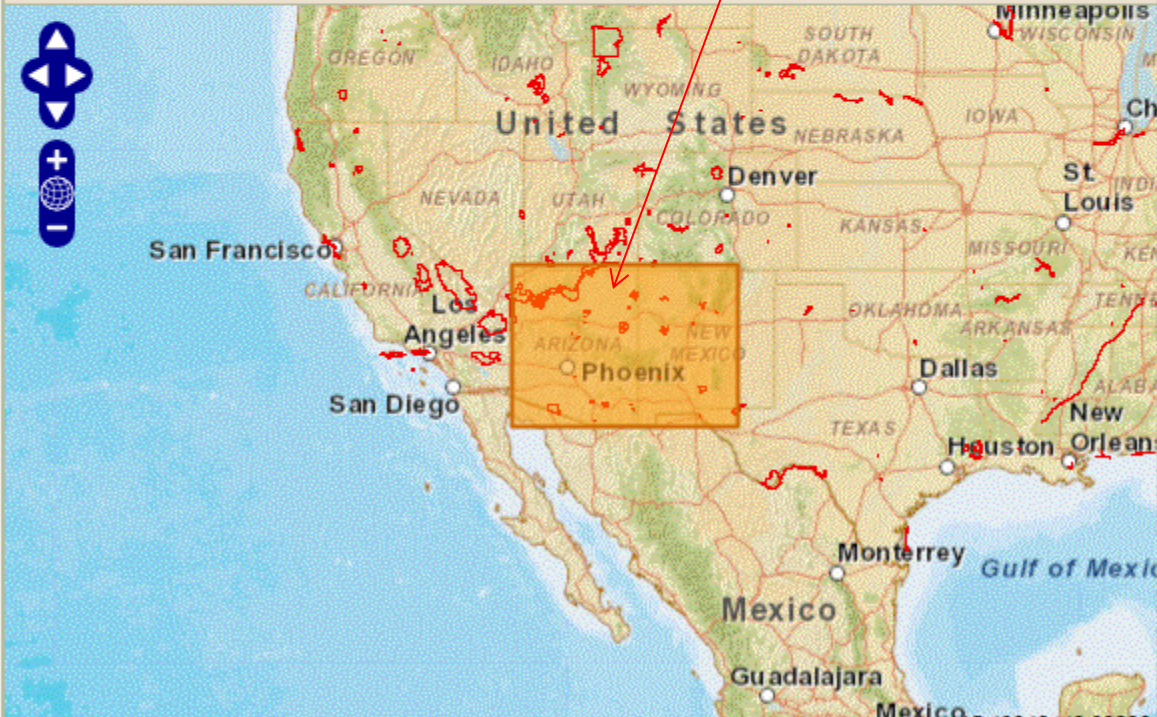
Geospatial Search

Geospatial Search for References and Species

Define Search
Search References:

Navigate Draw Search Box Move Search Box Clear Layers

Enter search term and draw search box for area of interest



Map Layers

- ☒ Search Box
- ☒ Selected Units
- ☒ Search Results
- ☒ NPS Park Boundaries
- ☐ ESRI Imagery
- ☐ ESRI Topo Map
- ☒ ESRI Street Map

Data Sharing and Integration – You don't need to use the web portal (this is the real power of our approach)

REST-style Searches (representational state transfer)

Example: link to fetch data and documents on elk in ROMO:

<http://services.nrinfo.nps.gov/reference/reference/list/romo/elk>

The screenshot shows the NPS Web Services page. The top navigation bar includes links for Home, References, Biology, Maps, Air & Climate, Geology & Soils, Water, Landscapes, Human Use, and Tools. A sidebar on the left contains a 'Welcome: Guest' message and a list of tools: Tools, Unit Search, and Web Services (with sub-links for NPSpecies, Taxonomy, Reference, and Unit). The main content area is titled 'Web Services' and contains the following text:

Web Services

Data from several services within the NRInfo Portal can now be fetched directly by using REST (REpresentational State Transfer) style web services. REST allows users to compose a URL using specific patterns, which then executes the data. The documentation pages for supported operations are organized under the four domains in the left navigation panel (NPSpecies, Taxonomy, Reference, and Unit).

Resources fetched via REST can be output in the form of xml or json. NRInfo services can also transform lists of resources into csv or Excel 2007 types of documents. If no format is specified, the response data is provided, by default, in an xml format. All format types must be provided in the URL, as lower case strings. The valid format types are likewise xml, json, csv, and excel. Those using Excel 2003 may download a csv file and import into Excel.

The documentation pages describe input parameters (including valid format types) and output values for particular operations. Diagrams of the structure of the URL's are also provided, with the following conventions:

- {token} – tokens enclosed in curly braces are required and variable components of a URL, and directly affect how the operation is performed.
- [token] – tokens enclosed by square brackets are considered optional components of the URL, but otherwise affect the operation's functionality in the same way as a required token.

Below is an example of a URL diagram. All URL's begin with <http://services.nrinfo.gov>.

<http://services.nrinfo.nps.gov/reference/reference/list/{unitCode}/{searchString}?format={type}>

The diagram shows the URL components with labels and arrows:

- Specified Domain: <http://services.nrinfo.nps.gov>
- Resource: [reference/reference](#)
- Request list of references: [list](#)
- Specified Unit(s): [{unitCode}](#)
- Search String: [{searchString}](#)
- Optional output format: [?format={type}](#)

Example: The following URL uses this operation pattern to fetch a list of references for Rocky Mountain National Park that contain the text string " elk", returned in csv format

<http://services.nrinfo.nps.gov/reference/reference/list/romo/elk?format=csv>

bibe/vegetation
sodn/water
arcn/permafrost

Data Sharing and Integration within NPS

nps.gov

(home)

search

go

Search this park

Search nps.gov

Rocky Mountain

National Park

view map

PARK HOME

PLAN YOUR VISIT

PHOTOS & MULTIMEDIA

HISTORY & CULTURE

NATURE & SCIENCE

Animals

Birds

Fish

Mammals

Beaver

Bighorn Sheep

Black Bear

Coyote

Elk

Marmot

Moose

Mountain Lion

Mule Deer

Pika

Snoeshoe Hare


Squirrels and Chipmunks

Amphibians and Reptiles

Butterflies

Insects

Elk



NPS PHOTO

Bull Elk

North American elk are the Rocky Mountain Americans settled intensively sending Denver. By 1890

In 1913 and 1914 park, the Estes Valley United States Forest Yellowstone National same time, an all predators — including bear. The resulting hastened the recovery of Rocky's elk population.

Currently, the elk population in the park fluctuates dramatically. Concentrations of 3,200 elk in summer may dwindle to 1,000 at elevations and move to areas outside the park.


Accelerating development along the park boundary is diminishing traditional migration routes, thus decreasing winter forage and

Elk research

Report	Andrews, T. 1991. A survey of Rocky Mountain National Park and surrounding areas of Arapaho and Roosevelt National Forests for wolverine and lynx, winter 1990-1991.
Conference Proceeding	Armstrong, D. M. 1985. Effects of the Lawn Lake flood on the local distribution of mammals. 56th Annual Meeting, Colorado-Wyoming Academy of Science. University of Denver, Center for Interdisciplinary Studies and University Museum, University of Colorado, Boulder, CO April 27, 1985.
Report	Armstrong, D. M. 1985. Effects of the Lawn Lake Flood on the local distribution of mammals: second annual report. Center for Interdisciplinary Studies and University Museum, University of Colorado-Boulder, Boulder, CO.
Report	Armstrong, D. M. 1986. A three-year study of the effects of the Lawn Lake Flood on the local distribution of mammals. Natural Science Program & University Museum, University of Colorado, Boulder, CO.
Report	Armstrong, D. M. 1988. The effects of the Lawn Lake Flood on the local distribution and abundance of mammals. Natural Science Program & University Museum, University of Colorado, Boulder, CO.
Journal Article	Baker, B. W. 2003. Beaver (<i>Castor canadensis</i>) in heavily browsed environments. <i>Lutra</i> . 46:173 - 181
Report	Baker, B. W., D. C. S. Mitchell, H. C. Ducharme, T. R. Stanley and H. R. Peinetti. n.d. Why aren't there more beaver in Rocky Mountain National Park?.
Report	Baker, B. W., D. Cooper, C. Westbrook, K. Czarnowski, T. Johnson, R. Monello, H. R. Peinetti, T. Stanley and D. Mitchell. 2005. Declining beaver populations in Rocky Mountain National Park. <i>FORT</i> , Fort Collins, Colo. NRPP 99-04 (ROMO)
Report	Baker, B. W., H. C. Ducharme, D. C. S. Mitchell, T. R. Stanley and H. R. Peinetti. 2003. Interaction of beaver and elk herbivory suppresses standing crop in willow.
Report	Baker, B. W., H. C. Ducharme, D. S. Mitchell, T. R. Stanley and H. R. Peinetti. 2003. Interaction of beaver and elk herbivory suppresses compensatory growth in willow.
Report	Baker, B. W., H. R. Peinetti and M. B. Coughenour. 2005. Resilience of willow stems after release from intense elk browsing.
Journal Article	Baker, D. L. and N. T. Hobbs. 1982. Composition and Quality of Elk Summer Diets in Colorado. <i>Journal of Wildlife Management</i> . 46:694-703.
Report	Bender, L. C. and J. G. Cook. 2002. Condition and health of elk (<i>Cervus elaphus nelsoni</i>) in Rocky Mountain National Park with reference to elk-carrying capacity relations.
Journal Article	Bender, L. C. and J. G. Cook. 2005. NUTRITIONAL CONDITION OF ELK IN ROCKY MOUNTAIN NATIONAL PARK. <i>Western North American Naturalist</i> . 65:329 - 334
Thesis	Buttery, R. F. 1955. Range conditions and trends resulting from winter concentrations of elk in Rocky Mountain National Park. Thesis. Colorado State University, Fort Collins, CO Thesis.

Search code can be embedded in web pages; search is dynamically executed each time

Data Sharing and Integration within NPS



Greater Yellowstone Science Learning Center

CONNECTING PARKS, PEOPLE, AND PLACES

[Home](#)

Topics

- BIOLOGICAL RESOURCES
- PHYSICAL RESOURCES
- LANDSCAPE PROCESSES
- HUMAN USE
- ARCHEOLOGY
- HISTORY
- ETHNOGRAPHY
- MUSEUMS & COLLECTIONS
- SCIENCE-BASED MANAGEMENT

Park Units

- BIGHORN CANYON
- GRAND TETON

Arctic Grayling References & Links

[Legislation and Management Documents](#)
[Yellowstone Science Articles](#)
[Selected References](#)
[Yellowstone Fisheries and Aquatic Sciences Annual Reports](#)
[Internet Links](#)

Legislation and Management Documents
For more Legislation and Management documents, [click here](#)

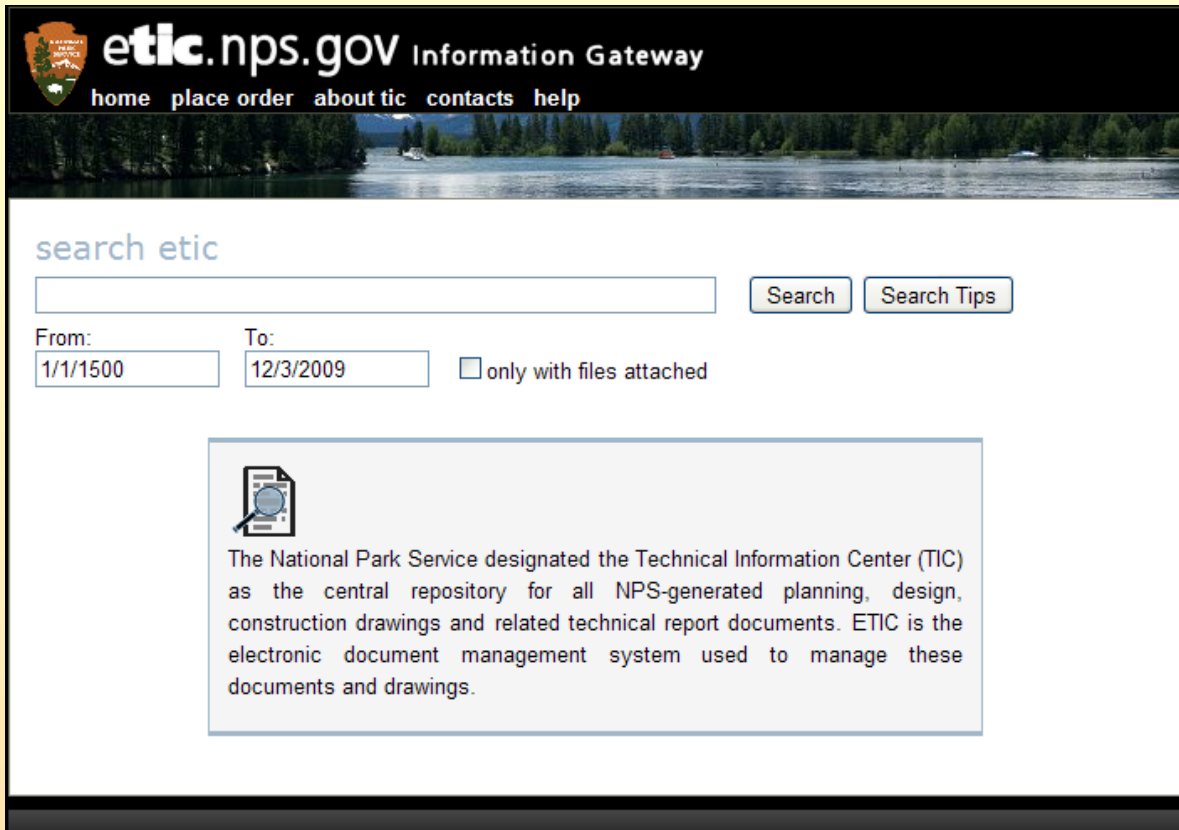
Yellowstone Science Articles
Kaya, C. Arctic Grayling in Yellowstone National Park, [8:3](#)

Selected References
Arnold, B. B. 1967. A ninety-seven year history of fishery activities in Yellowstone National Park. Unpublished report to the U.S. Department of the Interior, Bureau of Sport Fisheries Management, Albuquerque, New Mexico.
Benson, N. G., O. B. Cope, and R. V. Bulkley. 1959. Fishery management studies on the Yellowstone River system in Yellowstone National Park. U.S. Dept. of the Interior, Fish and Wildlife Service Scientific Report, Fisheries No. 307.
Evermann, B. W. 1893. A reconnaissance of the streams and lakes of western Montana. Wyoming. Bulletin of the U.S. Fish Commission 11:3-60.
Henshall, J. A. 1907. Culture of the Montana grayling. Rep. of the Commissioner of Fish and Game, Montana.

Report	Kaeding, L. R. and Et Al. 1995. Fishery and Aquatic Management Program in Yellowstone National Park: Annual Project Technical Report for 1994. United States Fish and Wildlife Service.
Report	Van Kirk, R. R. n.d. Ecological integrity and conservation of salmonid communities and aquatic habitats in Greater Yellowstone.
Journal Article	Brown, C. J. 1938. Feeding habits of the Montana grayling (<i>Thymallus montanus</i>). Journal of Wildlife Management. 2:135-145.
Journal Article	Kruse, T. E. 1959. Grayling of Grebe Lake, Yellowstone National Park, Wyoming. Fishery Bulletin. 149:307-351
Report	Vyse, E. R. 1976. Genetic analysis of grayling populations in Yellowstone National Park, progress report June 30, 1976.
Report	Vyse, E. R. and J. C. Lynch. 1975. Genetic analysis of grayling populations in Yellowstone National Park, completion report for the July 1, 1975 - June 30, 1977 period.
Report	Post, G. G. 1971. The Diphyllbothrium cestode in Yellowstone Lake, Wyoming. Agricultural Experiment Station, University of Wyoming, Laramie, WY.
Report	Dean, J. L. and J. D. Varley. 1974. Annual project report, Yellowstone Fishery Investigations, Yellowstone National Park, calendar year 1973. US Department of the Interior Fish and Wildlife Service Division of Technical Assistance.
Report	Dean, J. L. and L. E. Mills. 1971. Annual project report, fishery management program, Yellowstone National Park, calendar year 1970. US Fish and Wildlife Service.
Report	US Fish and Wildlife Service. 1971. Annual project report calendar year 1970 Yellowstone National Park. US Fish & Wildlife Service.
Report	Dunn, W. A. 1945. Annual report of operations, Yellowstone Park Station, calendar year 1944. National Park Service for the Bureau of Fisheries.

Reference lists can be dynamically created instead of hard-coded


Data Sharing and Integration with NPS Technical Information Center



etic.nps.gov Information Gateway
home place order about tic contacts help

search etic

From: 1/1/1500 To: 12/3/2009 ☐ only with files attached



The National Park Service designated the Technical Information Center (TIC) as the central repository for all NPS-generated planning, design, construction drawings and related technical report documents. ETIC is the electronic document management system used to manage these documents and drawings.

e-TIC

SOA framework
(Documentum software);

Two-way data exchanges possible: user has option to include eTic in NRInfo searches and vice versa

Data Sharing and Integration among Agencies



ITIS
Integrated Taxonomic
Information System

What's New
About ITIS
Data Access
Submit Data
Tools
Bee Checklist
NBII Links
Web Services
Comments

Welcome to ITIS, the Integrated Taxonomic Information System! Here you will find authoritative taxonomic information on plants, animals, fungi, and microbes of North America and the world. We are a [partnership](#) of U.S., [Canadian](#), and [Mexican](#) agencies ([ITIS-North America](#)); other organizations; and taxonomic specialists. ITIS is also a partner of [Species 2000](#) and the [Global Biodiversity Information Facility \(GBIF\)](#). The ITIS and Species 2000 [Catalogue of Life \(CoL\)](#) partnership is proud to provide the taxonomic backbone to the [Encyclopedia of Life \(EOL\)](#).

Quick search on:

☒ Any Name or TSN* ☐ Common Name ☐ Scientific Name ☐ TSN*

In: Kingdom

* Taxonomic Serial Number (TSN)

[Go to Advanced Search and Report](#)

New & Edited Scientific Names this month: **2489**

Monthly Export	Scientific Names (any rank, any usage)	Common Names
28-Sep-2009	487,592	109,254
10-Sep-2009	487,043	109,254

Last Updated: Tuesday, 01-Dec-2009 21:28:30 MST
[Privacy statement and disclaimers](#)
<http://www.itis.gov/index.html>

ITIS

Collaborating on exchange specifications;

Receive taxonomy record updates via web services

NPS is a partner to the MOU and we have provided funding since 2000 for the development of ITIS

Data Sharing and Integration with Other Portals:

The screenshot shows the NBII website interface. At the top, the NBII logo and name are displayed, along with a search bar containing the term 'canyonlands' and a 'search' button. Below the header, there's a navigation bar with 'Clusters' and 'Sources' tabs. The 'All Results' section on the left lists various categories like 'Canyonlands National Park, Utah (61)', 'Resources Division (45)', 'Geologic, Resources (42)', 'Park Science (38)', 'Balcones Canyonlands (26)', 'Natural Resource (16)', 'Ozone (19)', 'Canyon de Chelly (14)', 'Soil (11)', and 'Photo (12)'. The main content area displays a list of search results for 'canyonlands'. The first result is 'Wilderness Areas of Canyonlands National Park, Utah Generated in 1999 by Canyonlands National Park', which includes a description, publisher information (National Park Service Intermountain Region GIS Support Office), and source information (NBII FGDC Metadata Clearinghouse). The second result is 'Canyonlands National Park Utah', which includes a description, publisher information (National Park Service), and source information (National Park Service). The third result is 'Air Resources Division-Permits:ARIS: Canyonlands NP', which includes a description, publisher information (National Park Service), and source information (National Park Service). The fourth result is 'Canyonlands National Park Geologic Resources Evaluation Report', which includes a description, publisher information (National Park Service), and source information (National Park Service). The fifth result is 'Canyonlands National Park Geologic Resources Evaluation Report', which includes a description, publisher information (National Park Service), and source information (National Park Service).

Font size: A A A A

Refine Results

► Publisher

► File Format

Search portal by Vivísimo

Top 306 unique results | [Details](#)

☐ Select/deselect all on this page Save selected: 0

- ☐ [Wilderness Areas of Canyonlands National Park, Utah Generated in 1999 by Canyonlands National Park](#) [\[find similar\]](#) [map](#)
This coverage contains boundaries for Recommended Wilderness, Potential Wilderness, and Non-Wilderness in **Canyonlands National Park (CANY)**, Utah. This ...
Publisher: National Park Service Intermountain Region GIS Support Office
Source: NBII FGDC Metadata Clearinghouse
[metadata.nbii.gov/.../html/nps/nrdata.nps.gov_gos_19477.html](#) - 38K - [cache](#)
- ☐ [Canyonlands National Park Utah](#) [\[find similar\]](#)
Explore Geology **Canyonlands National Park Utah** **Canyonlands National Park, U**
Publisher: National Park Service
Source: National Park Service
[www.nature.nps.gov/geology/parks/cany/index.cfm](#) - 44K - [cache](#)
- ☐ [Air Resources Division-Permits:ARIS: Canyonlands NP](#)
Explore Air **Canyonlands National Park Air Quality Information Overview Canyon**
Utah **Canyonlands Nation...**
Publisher: National Park Service
Source: National Park Service
[www.nature.nps.gov/air/Permits/ARIS/cany](#) - 20K - [cache](#)
- ☐ [Canyonlands National Park Geologic Resources Evaluation Report](#) [\[find similar\]](#)
Canyonlands National Park Geologic Resource Evaluation Report Natural Resource
NPS/NRPC/GRD/NRR—2005/003 Nationa...
Publisher: National Park Service
Source: National Park Service
[www.nature.nps.gov/.../reports/cany_gre_rpt_view.pdf](#) - 1MB - [cache](#)
- ☐ [Canyonlands National Park Geologic Resources Evaluation Report](#) [\[find similar\]](#)
Canyonlands National Park Geologic Resource Evaluation Report Natural Resource Report
NPS/NRPC/GRD/NRR—2005/003 Nationa...
Publisher: National Park Service
Source: National Park Service

NBII: currently integrating our publicly-available data; they'll be able to integrate our non-sensitive data from IRMA next year

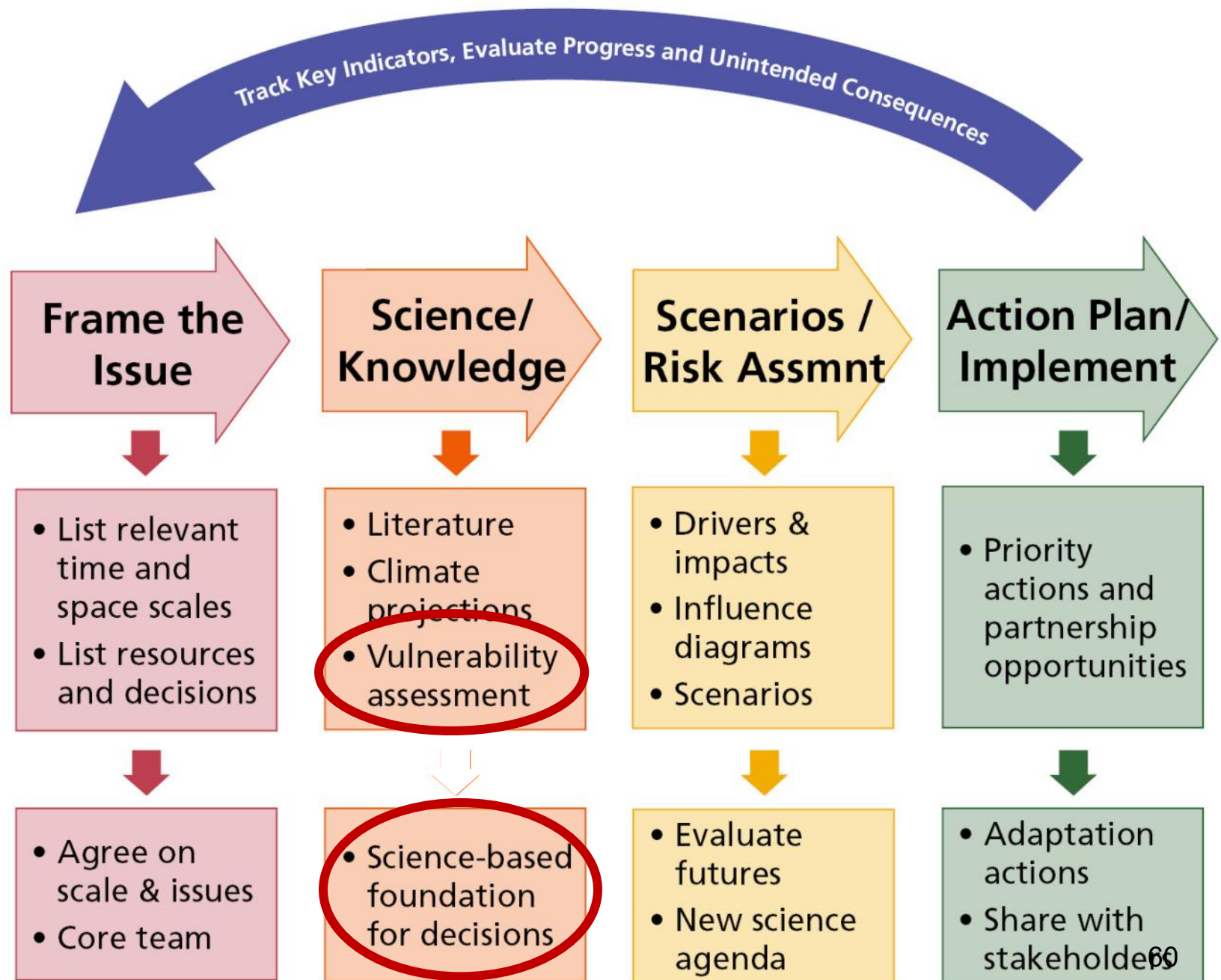
Vulnerability Assessments



Purpose of Vulnerability Assessments:

To **identify** resources at risk and **understand why** they are vulnerable.

- NPS is partnering with National Wildlife Federation, States, other federal agencies to figure out how to approach this
- VAs needed for natural resources, cultural resources, infrastructure
- Multiple scales – e.g., species, communities, ecosystems, landscapes
- Several different approaches are needed:
 - ✓ “Rapid assessment” for some resources
 - coarse filter; spreadsheet approach
 - ✓ Detailed (slow and expensive) for certain high-priority resources
 - Requires extensive databases, complex modeling



Climate Change Vulnerability Guide:



- Collaborators include NWF, FWS, USGS, NPS, USFS, universities, NGOs
- Explains role of VAs in CC adaptation
- Uses IPCC framework: exposure, sensitivity, adaptability
- Describes the elements of VAs
- Seven case studies:
 - ✓ simple to complex
 - ✓ species to broad habitats



SCANNING THE CONSERVATION HORIZON

A Guide to Climate Change Vulnerability Assessment



DRAFT
May 2010

Available on Sharepoint site in Vulnerability Assessment Info folder:
<http://nrpcsharepoint/climatechange/Science/Forms/SciDocsSorted.aspx>

Projects Contributing to NPS Vulnerability Assessments:



Projects funded by Climate Change Response Program that support Vulnerability Assessments:

- Acadia - salt marshes and sea level rise
- Beach mouse and sea level rise
- Vulnerability to sea level rise - tidal reaches of Potomac & Anacostia Rivers
- Pikas in Peril: multi-regional vulnerability assessment
- Climate refugia and connectivity for desert bighorn sheep
- Effects of climate change on the Karner blue butterfly
- Multiregional evaluation of pollinator response to CC
- Shenandoah salamanders – effects of climate change

Next steps for Vulnerability Assessments:



- Figuring out how to better coordinate VAs with scenario planning
- Park-based vulnerability assessments
 - ✓ (e.g., initial discussions with Northern Great Plains parks, National Capital Region parks)
- NPS – Forest Service coordination on VAs
- Training park and regional staff to conduct VAs

Questions?

