Fostering Adaptation and Navigating Change in the National Park Service

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Diverse stewardship responsibilities

- 419 parks; every state and District of Columbia, American Samoa, Guam, Puerto Rico, and the Virgin Islands
- over 84 million acres
- national parks, monuments, battlefields, military parks, historical parks, historic sites, lakeshores, seashores, preserves, recreation areas, parkways, scenic rivers and trails, and the White House.
- over 44 million acres designated wilderness (in 61 areas)
- over 80% NPS lands managed as wilderness
- hunting; oil and gas extraction authorized in some parks
- largest: Wrangell-St. Elias National Park and Preserve, 13.2 million acres
- smallest: Thaddeus Kosciuszko National Memorial, Pennsylvania 0.02 acres
Climate change affects...
Climate change affects...

...everything we protect
Historical climate change, 1895–2010. Fractions (%) of the US national park area (NPS) and the US (USA) experiencing changes in (a) mean annual temperature (°C century⁻¹) and (b) annual precipitation (% century⁻¹) (relative to 1895–2010 average precipitation). Mean (dark bar) and standard error (shaded rectangle) indicated for each area as a whole.

Gonzalez et al. 2018
Historical climate change, 1895–2010. Fractions (%) of the US national park area (NPS) and the US (USA) experiencing changes in (a) mean annual temperature (°C century\(^{-1}\)) and (b) annual precipitation (% century\(^{-1}\)) (relative to 1895–2010 average precipitation). Mean (dark bar) and standard error (shaded rectangle) indicated for each area as a whole.

Gonzalez et al. 2018

Historical Change
High exposure of NPS lands to warming
Over 80% of national parks: past 10-30 years warmer than 95% of historical range of conditions (1901-2012)

Historical Change

High exposure of NPS units to warming
NPS Climate Change Response
“I believe climate change is fundamentally the greatest threat to the integrity of our national parks that we have ever experienced.”

Former NPS Director Jon Jarvis
NPS Climate Change Response Program

Program structure & key components

- communication / interpretation / education
- science
- planning / adaptation
- mitigation
- next generation
- policy
next generation: *Future Park Leaders of Emerging Change*

Internships have been filled.

America's Natural Parks

Challenges

In National Parks
Key strategic documents

- Addressing Climate Change and Natural Hazards
  Facility Planning and Design Considerations
  January 2015
  Level 3 Handbook

- Cultural Resources Climate Change Strategy

- National Climate Change Interpretation and Education Strategy

...for infrastructure and facilities

...for cultural resources

...for interpretation and education
Workforce Climate Change Literacy: Needs Assessment and Strategy
Regional, Coastal, Cultural
Welcome to Park Planning!

Planning in the National Park Service guides informed and insightful decisions that provide relevant and timely direction to park management, and informs future decision-making for each national park system unit in accord with its stated mission. Planning also provides methods and tools for resolving issues in ways that minimize conflicts and promotes mutually beneficial solutions - solutions that articulate how public enjoyment of the parks can be part of a strategy for ensuring that resources are protected unimpaired for future generations.

The National Park Service prepares a variety of planning and environmental documents to help guide management of park resources and visitor use and activity. The Park Planning and Special Studies Division in the national office provides overall direction for park planning. It works closely with the seven regional planning offices, which are responsible for plan production and technical assistance to parks. Additional capacity for plan production and planning services is provided by the Denver Service Center Planning Division. Planning is accomplished through collaboration with various NPS programs, such as Facilities, Transportation, Wilderness, Cultural Resources, and Natural Resources, to meet park planning needs.
why focus on planning?

NPS has many plans

• Vegetation, wildlife (bison, elk, raccoon, deer, trout, goats, pigs)
• Fire, invasive species
• Historical structures, archaeological sites, cultural landscapes
• Visitor services, trails, visitor transportation, safety
• Facilities, snow removal
• Law enforcement, search and rescue
• Compliance – EIS, EA, air quality

The NPS planning group routinely works with parks on more than 50 different types of plans, and helps many non-routine planning needs.
Fundamental Goals

Adaptation = “part of doing business”
Fundamental Goals

Recognition that the future will not look like the past

Source: IPCC
Source: NCA 2014
Fundamental goals
Expect surprises
Fundamental Goals

Plan for more than one future

Source: IPCC

Source: NCA 2014
Fundamental Goals

Plan for more than one future

[Image adapted from Global Business Network]
Fundamental Goals

Plan for more than one future – scenario planning
Fundamental Goals

Plan for more than one future – scenario planning

- Since 2007
- Participatory workshops
- 95+ parks/regions/networks
- 125+ partners represented
Planning for a Changing Climate
Climate-Smart Planning and Management in the National Park Service

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1. Define planning purpose and scope
2. Assess climate impacts and vulnerabilities
3. Review/revise conservation goals and objectives
4. Identify possible adaptation options
5. Evaluate and select adaptation actions
6. Implement priority adaptation actions
7. Track action effectiveness and ecological response
8. Re-assess vulnerability as needed
Revisit planning as needed

1. Define planning purpose and scope
2. Assess climate drivers, impacts, and vulnerabilities
3. Review goals, refine as needed
4. Identify possible adaptation options
5. Evaluate and select adaptation strategies/actions
6. Implement adaptation strategies/actions
7. Track effectiveness and conditions

Scenarios
Fundamental Goals

Plan for more than one future – scenario planning
Adaptation example – NPS Facilities

Flamingo, in Everglades National Park following Hurricane Irma
High tide floods (black) and projected increases in number of annual flood events based on four sea level rise scenarios for Fort Pulaski, near Savannah, Georgia.

SOUTHEAST CHAPTER, NCA4
Adaptation example, Natural Resources

Translocation of Bull trout in Glacier National Park

Reducing the population’s exposure to climate change and competing exotic species by moving it upstream beyond a natural barrier.

Above: Release of first juvenile bull trout upstream of Grace Lake
Left: Juvenile bull trout
(Chris Downs / NPS photo)

Translocation release sites (June 2017)
Climate change impacts are evident

For Yellowstone Park, July was the busiest month ever

By JURGEN FREYOS | August 17, 2015

Visitors traverse the boardwalk for a close-up look at Grand Prismatic Spring, the largest hot spring in Yellowstone National Park.

Yellowstone Saw Nearly 1 Million Visitors In July; Is That A Good Thing?

By Kurt Repanshek on August 26th, 2015

One million visitors.

That seems like a lot for an entire year, and definitely a lot in one month for Yellowstone National Park, which came within 19,000 odd visitors of reaching 1 million visitors during July.

A little more than halfway through 2015, the National Park System seems to be heading to surpass last year’s record-setting visitation of not quite 293 million visitors.

Yellowstone, after seeing 360,703 visitors in July, is riding a 17 percent increase in traffic over last year. Rocky Mountain National Park is up 16 percent; Acadia National Park is up 9 percent, and Yosemite National Park is up 16.5 percent, just to look at how some parks are doing this year.

While it’s great to see folks heading out to the national parks, crowds are not always what folks want to contend with on their vacations, and the resources can take a pounding, too.

“As a former park ranger, I would advise visitors who want to avoid the large crowds to go on the off-season,” stated one comment on the "Traveler.” Stay away on free days if possible; those are packed with visitors. I went last fall to Rocky Mountain and yikes the traffic was bad. Hard to enjoy yourself when you are in a traffic jam. So, no more free days for me as much as I like to save money. It’s just not worth it.”
Protected Area Tourism in a Changing Climate: Will Visitation at US National Parks Warm Up or Overheat?

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Abstract

Climate change will affect not only natural and cultural resources within protected areas but also tourism and visitation patterns. The U.S. National Park Service systematically collects data regarding its 270+ million annual recreation visits, and therefore provides an opportunity to examine how human visitation may respond to climate change from the tropics to the polar regions. To assess the relationship between climate and park visitation, we evaluated historical monthly mean air temperature and visitation data (1979–2013) at 340 parks and projected potential future visitation (2041–2060) based on two warming-climate scenarios.

Fig 1. Third-order polynomial glm relationship of historical (1979–2013) monthly mean temperature and monthly park visitation (proportion of annual). Mean (black circles) and error bars (+/- twice the standard error) from observed data are based on 2.5°C bins. Mode estimate (dark gray solid line), ± 1 standard error (light gray shaded area). R² = 0.69.
Challenges
Wildlife Management in the National Parks, 1963  aka “Leopold Report”

Addressed:

(1) What should be the goals of wildlife management in the NPS?

(2) What general policies of management are best to achieve the goals?

(3) What are some of the methods suitable to implement the policies?
“As a primary goal, we would recommend that the biotic associations within each park be maintained, or where necessary recreated, as nearly as possible in the condition that prevailed when the area was first visited by the white man. A national park should represent a vignette of primitive America.”

_Wildlife Management in the National Parks_ ("Leopold Report," A. Starker Leopold)
The Service will...try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, genetic / ecological integrity of plant and animal species native to those ecosystems. Just as all components of a natural system will be recognized as important, natural change will also be recognized as an integral part of the functioning of natural systems. By preserving these components and processes in their natural condition, the Service will prevent resource degradation and therefore avoid any subsequent need for resource restoration.

(NPS Management Policies, 2006, 4.1)
The term “natural condition” is used to describe the condition of resources that would occur in the absence of human dominance over the landscape.

What is “natural” in an era of climate change?
Challenges in Navigating Change

Existing or anticipated management issues for which policy is lacking, unclear, or conflicting.

If we can, should we?

What species / systems might do okay on their own?

What species / systems may become locally or regionally extinct? Should we move them?

What species / systems may eventually need intervention to survive?
Mitigating Altered Fire Regime and Increasing Fire Size

Should we begin prescribed fires to reduce the potential size of the larger fires we are seeing now and that we expect to increase in both size and frequency?
Looking ahead...

Key recommendation

“...steward NPS resources for continuous change that is not yet fully understood.....”
“The pervasiveness of climate change requires that we reexamine our approaches to park management and consider what a larger magnitude of change means for our responsibilities....”
NPS conservation “evolution”

“Conserve unimpaired for present and future generations...”
Organic Act, 1916

“Vignettes of primitive America...”
Leopold Report, 1963

“Maintain naturally evolving park ecosystems...”
NPS Management Policies 4.1, 2006

“Steward [parks] for continuous change that is not yet fully understood...”
Revisiting Leopold: Resource Stewardship in the National Parks, 2012
In short, it is increasingly clear that naturalness is no longer the umbrella under which all protected area values comfortably sit. We must choose among protected area values and among the traditional meanings of naturalness. In particular, we must confront the dilemma of intervention. Then we must articulate desired future conditions for park ecosystems in terms that carry greater clarity and specificity than traditional notions of naturalness.

D. Cole, et. al. 2008
Climate Change Adaptation Guidance

Key concepts

1. Act with intentionality
2. Integrate adaptation into existing work
3. Reconsider goals, not just strategies
4. Manage for change, not just persistence

http://www.nwf.org/pdf/Climate-Smart-Conservation/NWF-Climate-Smart-Conservation_5-08-14.pdf
New management considerations

Resist Change – maintain current/past conditions of a resource

Accept Change - resource responds to change; management may support its capacity to respond, without “steering”

Direct Change – actively direct resource towards a specific desired new (novel) condition

Adapted from Fisichelli, Schuurman, & Hoffman 2016
Progress in NPS Climate Change Adaptation

...huh?

2019

routine
How much management intervention is warranted to protect an iconic species that is vulnerable to climate change?

Options:

1) promote the species within the park on more mesic sites that are currently uninhabited by sequoia,...or outside current habitat, in more northerly latitudes and/or at higher elevations

2) increase genotypic variability by regenerating with seed from lower elevation or more southerly groves; or,

3) habitat modification (e.g. irrigation).