



**National Park Service**



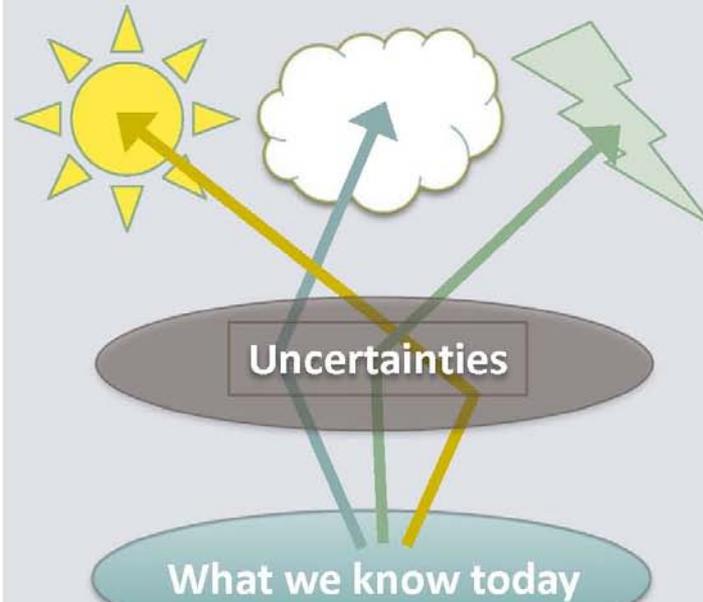
# Scenario Planning vs. Forecasting

- *Scenarios overcome the tendency to predict, allowing us to see multiple possibilities for the future*

- Forecast Planning
  - One Future

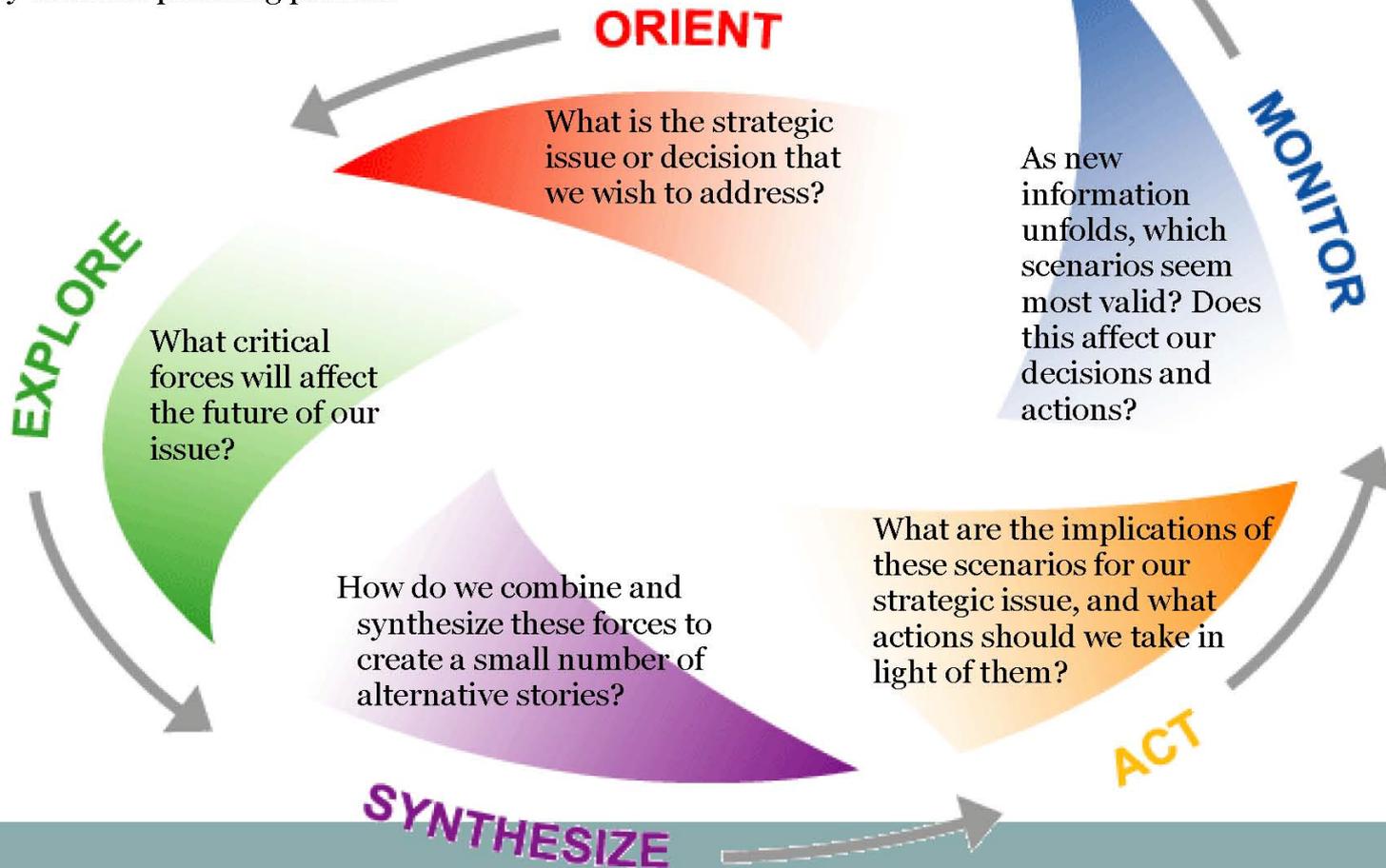


- Scenario Planning
  - Multiple Futures



# Explaining Scenarios: A Basic GBN Scenario Creation Process

This diagram describes the 5 key steps required in any scenario planning process



Global Business Network (GBN) -- A member of the Monitor Group

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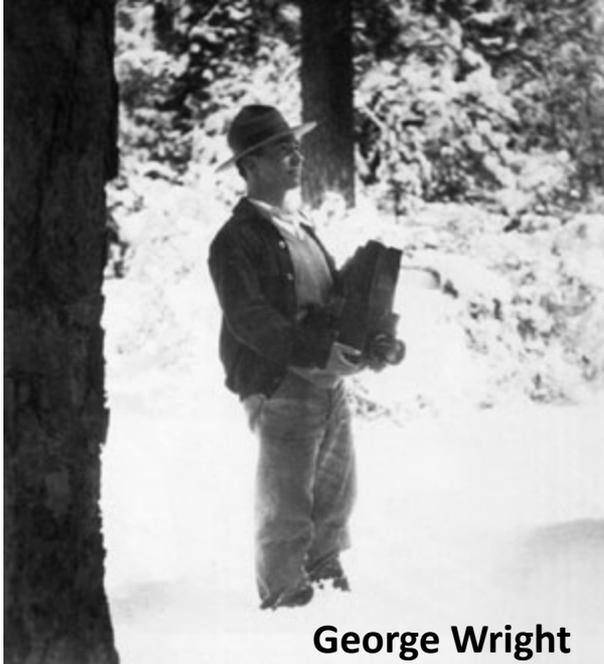
A FILM BY KEN BURNS

# THE NATIONAL PARKS

America's Best Idea

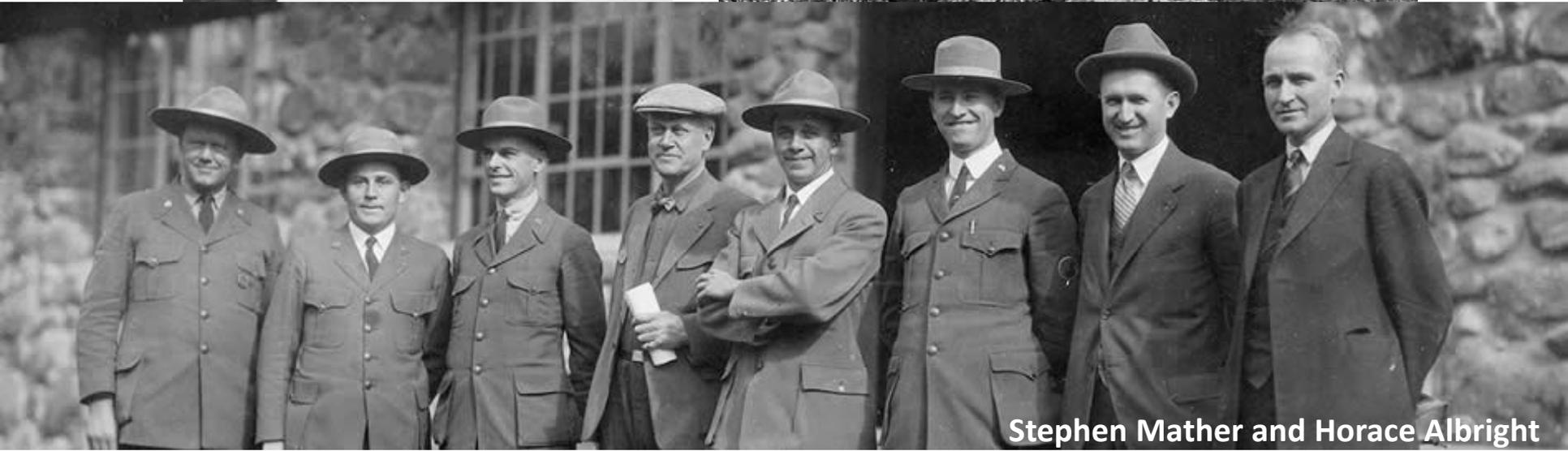
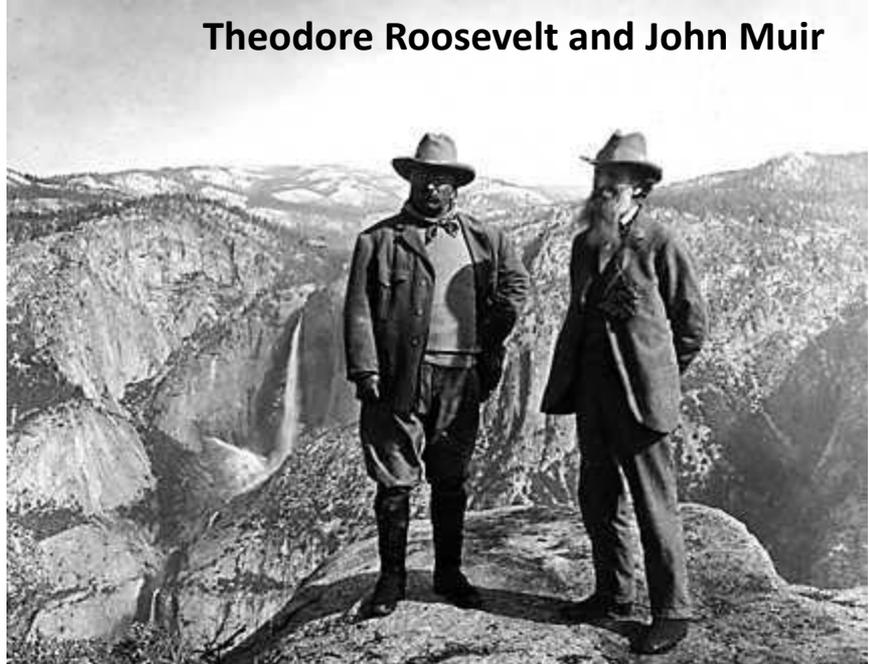
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**George Wright**

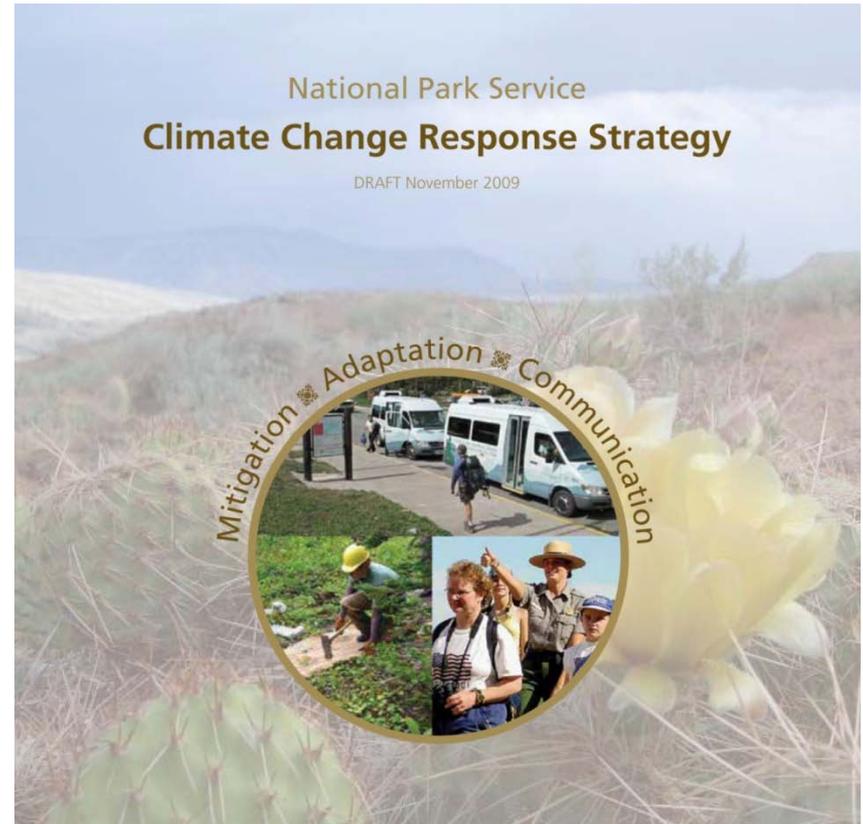
**Theodore Roosevelt and John Muir**



**Stephen Mather and Horace Albright**

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## National Parks of Alaska

National Park Service





## A Tool for Decision-Making in a Era of Uncertainty

### Background

#### Statement of Need

Managers need conceptual as well as quantitative tools for climate change adaptation planning.

#### Approach

Scenario Planning is being developed as a structured framework to help managers identify actions that will be most effective across a range of potential futures or that promote desired outcomes.

### Summary

Resource management decisions must be based on future expectations. Climate change is generally expected to bring highly consequential and unprecedented changes, but specific future conditions are very difficult to accurately predict. Scenario planning offers a tool for developing a science-based decision-making framework in the face of an uncertain future. Climate change scenario planning involves exploring qualitative as well as quantitative models in order to envision future outcomes under a variety of different decisions, policies, or societal pathways.

Scenario planning is currently being developed for use within the National Park Service as a long-range planning tool for incorporating climate change into a range of park management processes and documents, including General Management Plans and Resource Stewardship Strategies. Major benefits of this approach are:

- identification of key uncertainties
- incorporation of alternative perspectives into conservation planning
- improved capacity for adaptive management to promote resource sustainability

There are many different approaches to scenario planning. However, all of them rely on the development of story lines that capture the critical uncertainties about a system. Using these narratives and uncertainties, managers can play out a variety of different futures and develop responses that could be implemented if one or more of the stories unfold. Building scenarios is an iterative and adaptive process that allows participants to explore uncertainties, synthesize their meaning and implications, act, and monitor their success.

Since 2007, the National Park Service has held three workshops exploring five different case studies. Additional workshops will be held in 2010 and 2011, including a series of training workshops to foster workforce capacity in applying this tool to land management planning and climate change adaptation. These workshops can involve a variety of scales and focal issues; for example, management of



The most recent scenario planning exercise took place in the Crown of the Continent Ecosystem, involving managers and scientists in the transboundary region of Montana, Alberta, and British Columbia. Discussions centered on how to manage across jurisdictional lines under various future conditions. NPS photo.

iconic species in Joshua Tree National Park, or identifying landscape management options in the multi-jurisdictional region of the Crown of the Continent. Efforts engage a range of federal, academic, and private partners to explore approaches that are tailored to management-relevant questions regarding the future of natural and cultural resources. Documentation of workshop preparation, exercises, trainings, and follow-up reports are being produced to allow others to build their own scenarios, increasing capacity to understand and adaptively manage uncertainty.

### More Information

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Climate Change SharePoint: <http://nrpc.sharepoint.com/climatechange>

April 2010





“Finally, the park system is going to scenario planning and seeing what places will be the most vulnerable and how to adapt. The new visitor center for the USS Arizona in Pearl Harbor is designed for a three-foot sea-level rise, as an example.”

Jon Jarvis, The Big Outside Blog, 12/21/2011





“We use scenario planning to rehearse the future to avoid the management surprises”



# Assateague Island National Seashore

Established in 1965

...to preserve the outstanding Mid-Atlantic coastal resources and natural ecosystem conditions and processes upon which they depend while providing high quality resource-compatible recreational opportunities.



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# Assateague Island

- 57 km long; varies from less than 1 km to nearly 4 km wide
- Approximately 19,700 hectares
  - 7,000 hectares land
  - 12,700 hectares water
- Three agencies with differing missions manage parts of Assateague Island
  - National Park Service
  - US Fish and Wildlife Service
  - State of Maryland

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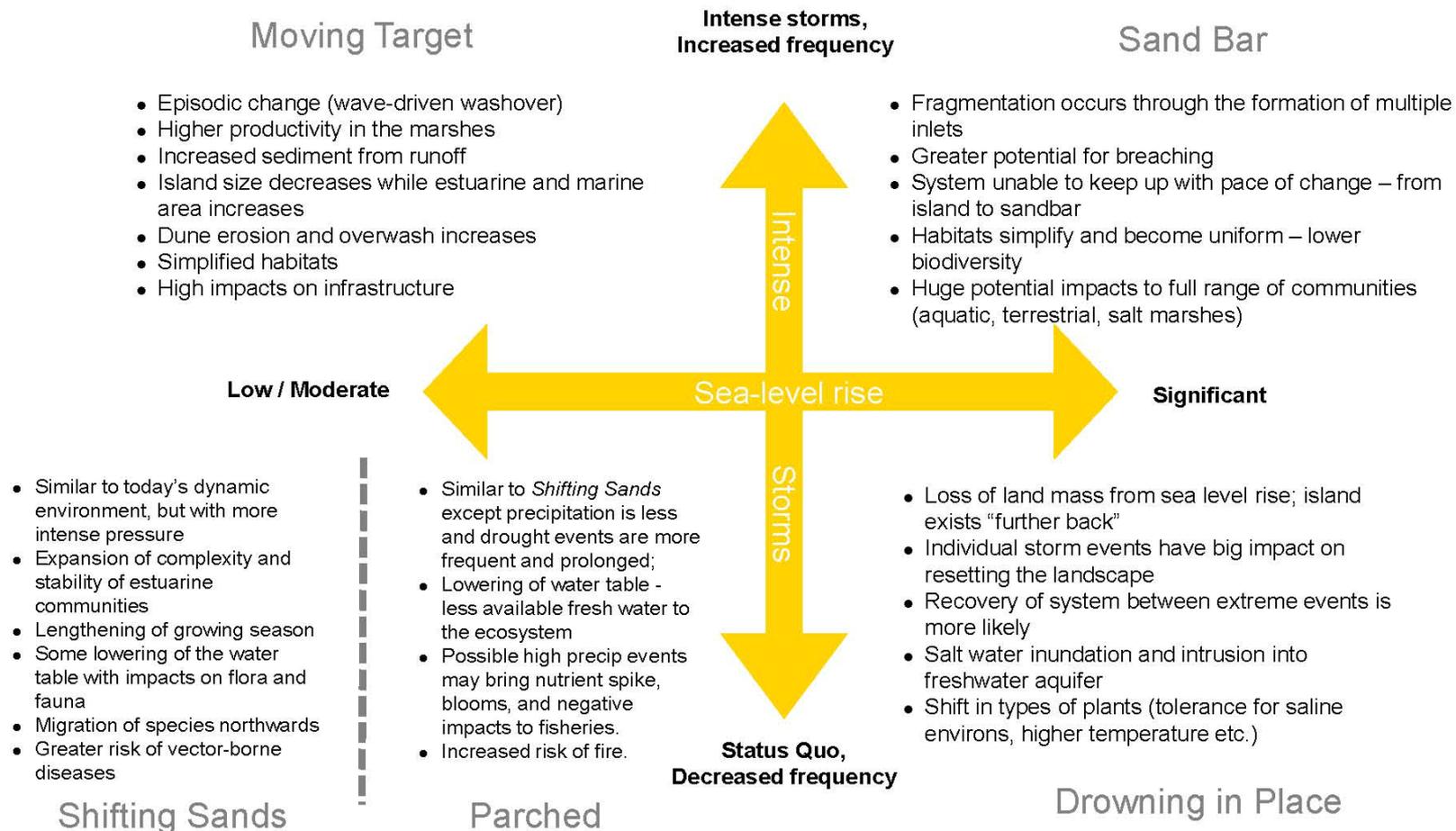


| Climate Variable                   | General Change Expected   | Confidence Level  |
|------------------------------------|---|-------------------|
| Temperature                        | Increase, but not uniform   | Virtually certain |
| Precipitation                      | Probable decrease in total annual precipitation                                   | Low               |
| Sea Level                          | Increase  | Moderate          |
| Drought                            | A modest increase in drought frequency in the warm season                         | Moderate          |
| Snow cover                         | Increase in snow-free days; decreased snow accumulations                          | High              |
| Length of growing season           | Increase  | High              |
| Extreme Events: Temperature        | Warm Events Increase / Cold Events Decrease                                       | Moderate to high  |
| Extreme Events: Precipitation      | Possible decrease of frequency of heavy rain, but countered by rise in intensity. | Low to moderate   |
| Extreme Events: Cold Season Storms | Increased intensity.  | Low to moderate   |
| Extreme Events: Warm Season Storms | Increased intensity; possible decrease in frequency                               | Low               |



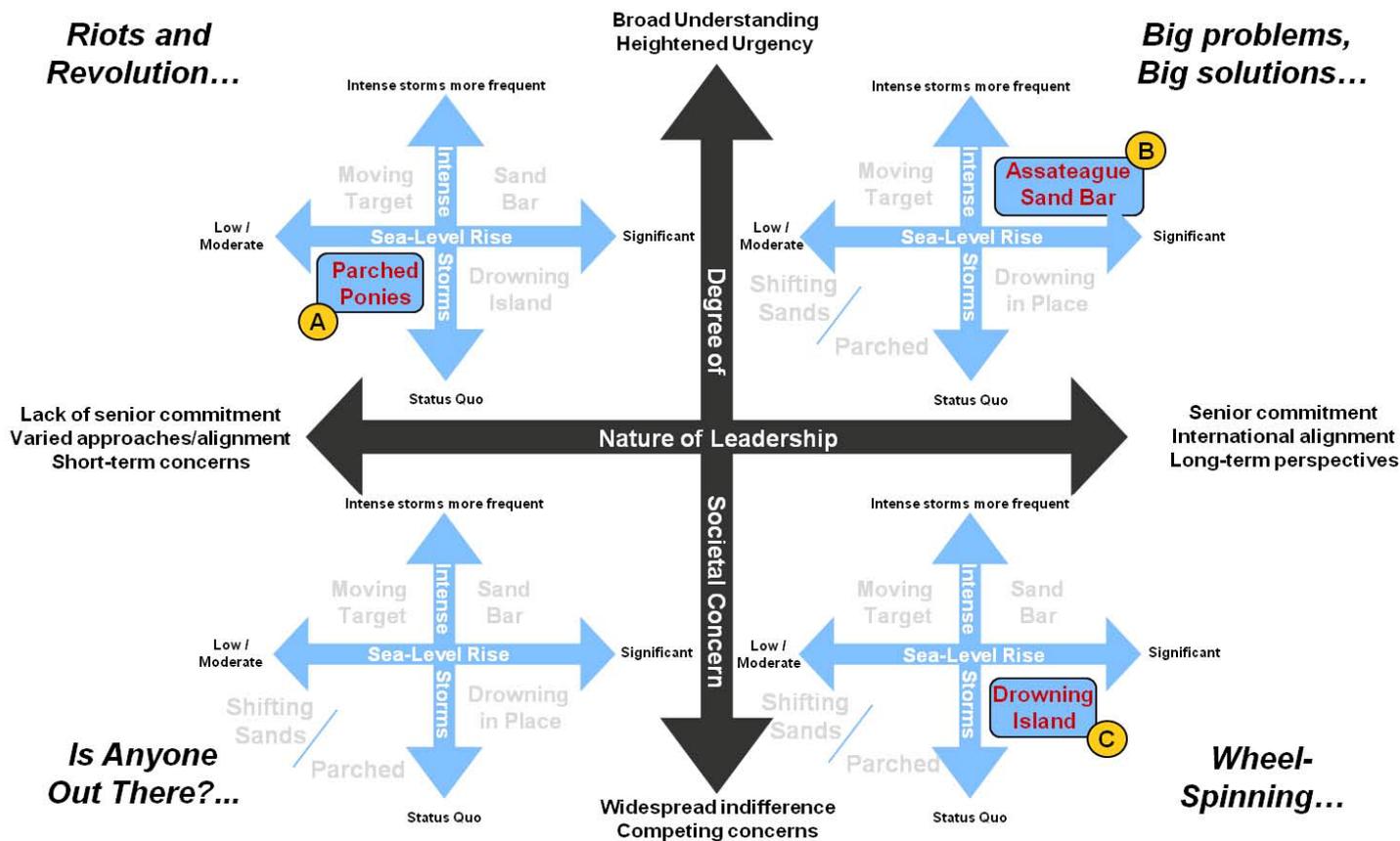
# ASIS Local Scenario Framework

Through conversations before and during the April workshop, the ASIS team identified the most important and most uncertain climate drivers that will affect conditions in the Park over the next 40 years. The decided upon uncertainties relating to the intensity of storms and the rate of sea-level rise. These were combined in the following matrix.



# Case Study 1: ASIS Nested Scenarios

In the workshop, the ASIS team combined their local scenario framework with the high-level framework to create a set of "nested scenarios". They highlighted 3 nested scenarios (A, B, C) that seemed most important to consider further.



## High-Level Scenario

### Riots and Revolution

## Local Scenario

### Parched

*“Parched Ponies” is a world in which societal concerns around climate change are heightened, yet there is little real leadership shown to address challenges at a global or national level. At the same time, ASIS experiences a storm intensity similar to today and low/moderate sea-level rises. Additionally, precipitation drops, creating drought events that are more frequent and prolonged.*

- Lowering of the water table, leading to less available freshwater to the ecosystem
- The main impacts to the park under are migrating waterfowl, mammals, and declining or static shorebird habitat
- Resources changes include a smaller island, a shift from freshwater to brackish water (greater salinity), and more woody plant growth on beach areas.
- Possible high precipitation events may bring nutrient spike, blooms and negative impacts to fisheries.
- Impacts to plant and amphibian communities (especially those requiring freshwater and intolerant of warm water)
- Increased risk of fire
- Land use changes would require partnerships with other agencies, increased emphasis on coastal monitoring, an evaluation of the dune protection program, and greater land impact by ponies.
- Protection of resources would involve reprioritizing access needs and physically maintaining shorebird nesting habitat
- Monitoring capacity would need to be increased as would education and outreach.

# Assateague Implications and Actions

## Resiliency

- Changes to infrastructure which would make it more temporary, consolidated, and innovative
- Sediment supply – competition with Ocean City and the mainland, possibly lead to an augmentation of the salt marsh
- Easements, land exchanges, migration corridors, changing boundaries
- Reduce existing stressors
- Create and protect critical habitats



# Assateague Implications and Actions

## Indicators to Monitor

- Relative sea level rise
- Geomorphology
- Species changes
- Groundwater
- Landscape level changes
- Migration phenology

# Assateague Implications and Actions

## Research and Study

- Saltmarshes, freshwater systems
- Impacts and vulnerabilities of ecosystems
- Ecological integrity and resiliency
- Adaptation strategies
- Social science – visitors and changing uses
- Geomorphological change with sea level rise and storms

# Assateague Implications and Actions

## Capacity Building

- Coordination and collaboration with state, federal, and local communities. Shared infrastructure, common messages, and public education and outreach
- Specialized expertise
- Landscape/regional approaches to habitat conservation
- Educate and train agency staffs



# Trish Kicklighter – Interview - 2011

- ASIS is on the front lines of CC
- We're one storm breach away from the tipping point at which the entire islands breaks up
- CC is overarching to all our planning
- What we have now is not what we'll have in 20-30 years
- What we do for future managers...



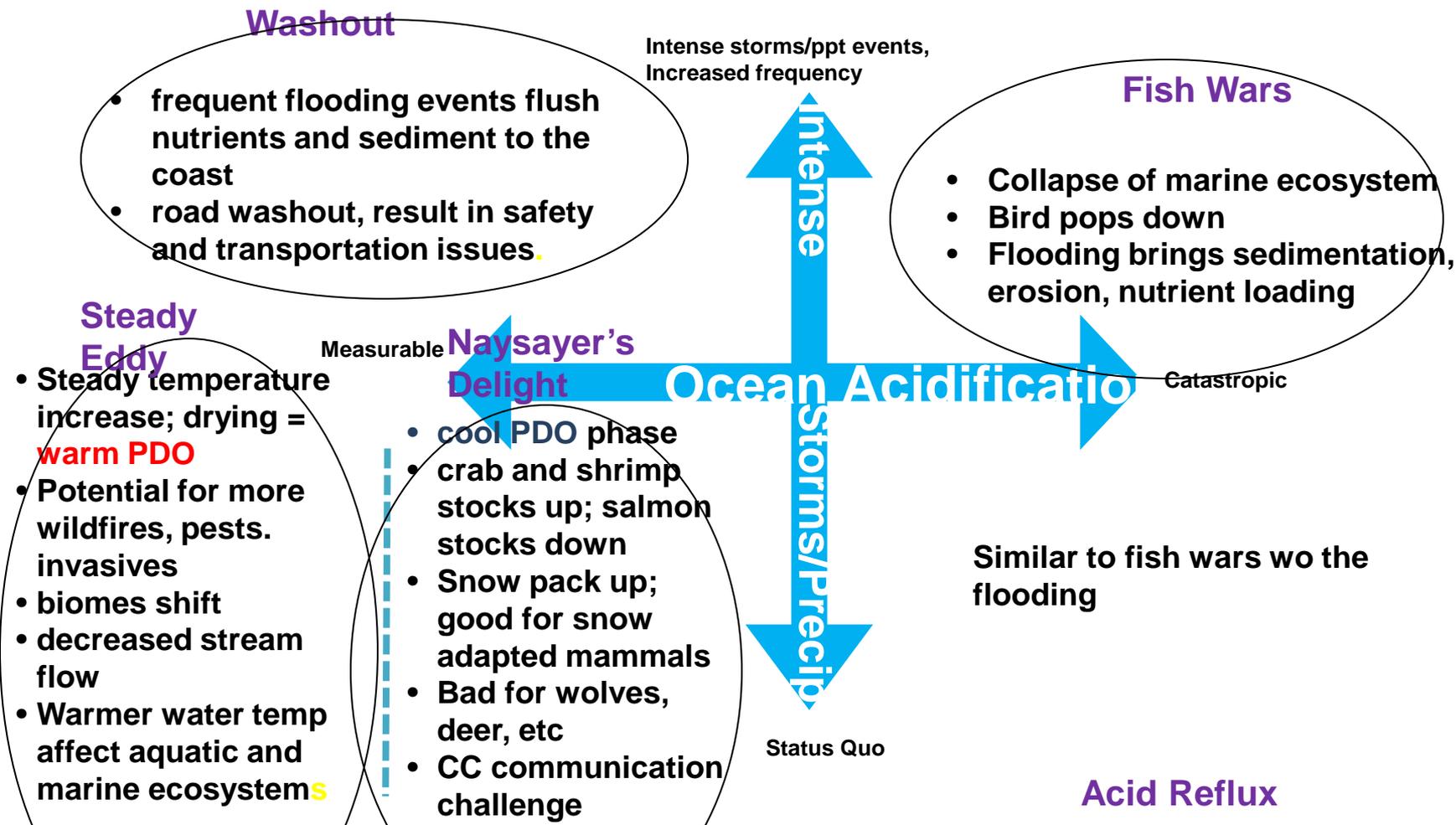
# ASIS Management Actions

- Incorporate SP into ongoing GMP Process
- Rollout a Public Outreach Piece for SP
- Need to Monitor Groundwater – new protocol
- Two New Rules (No Regrets)
  - No more pavement on the island
  - Any new infrastructure on island must be portable



# Southwest Alaska Local Scenario Framework

Criteria for good scenarios = challenging, **plausible, relevant**, & divergent



# Generating a Broad Range of Options

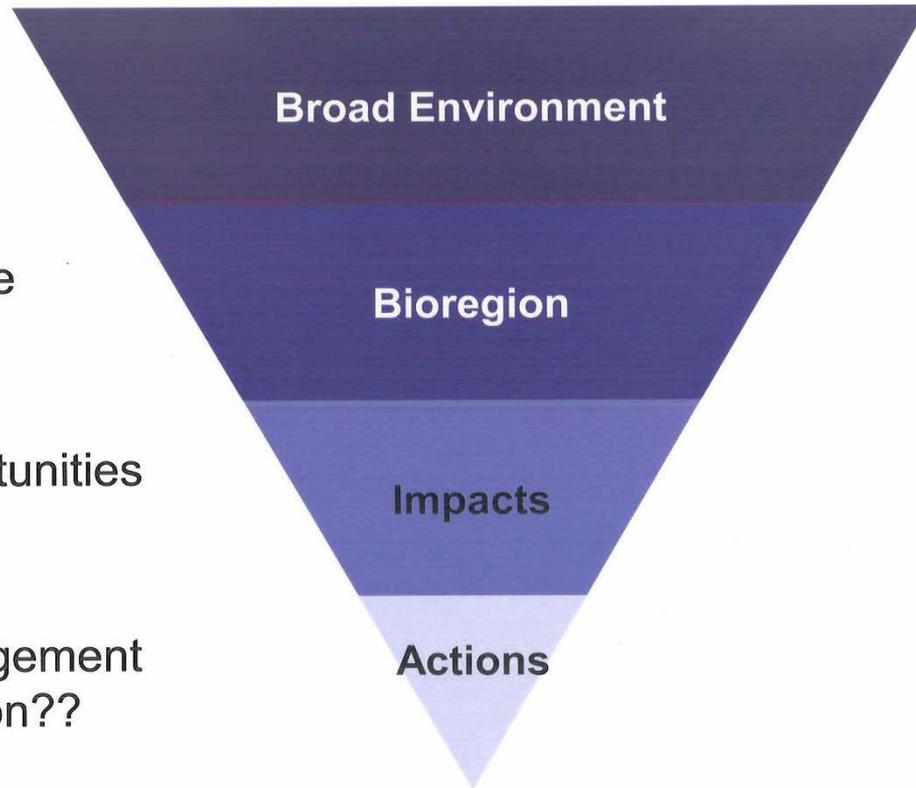
For each scenario . . .

What is this world like?

What effects does this have on the bioregion?

What pressures and opportunities will management face?

What could / should management do if faced with this situation??



## Implications

*The conditions under which you will need to operate*

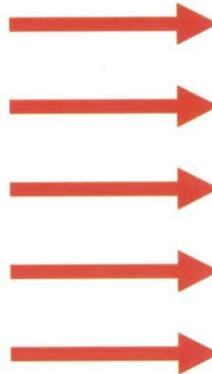
Challenges

Bottlenecks

Shortages

Emergent needs

Emergent capabilities



## Options

*The range of actions you will take in light of the conditions*

Responses

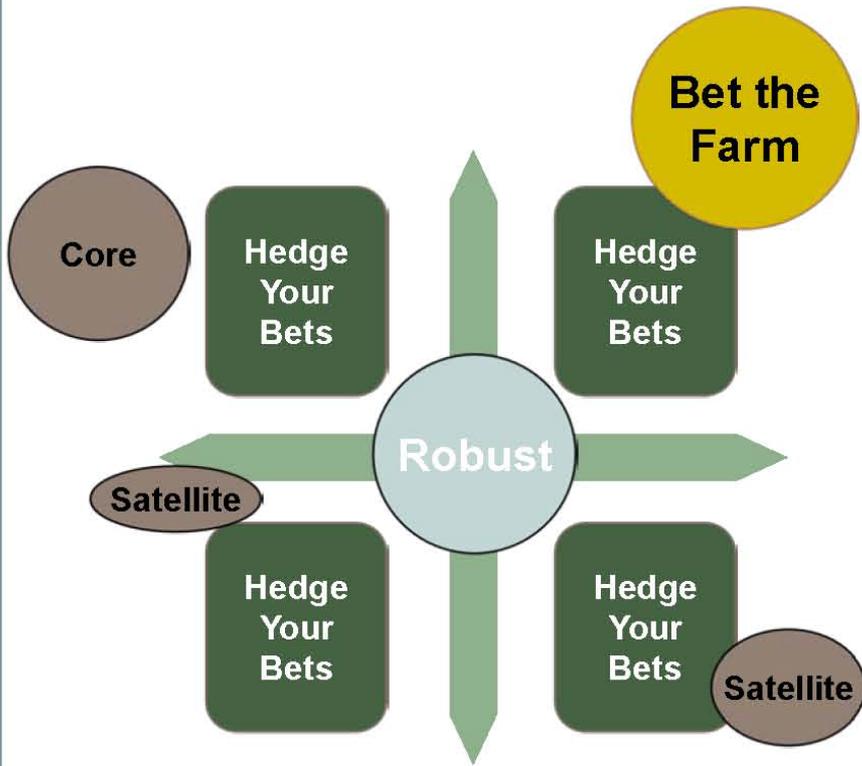
Workarounds and fixes

New supplies and suppliers

Product or service offerings

Specific investments, development activities





**Robust:** Pursue only those options that would work out well (or at least not hurt you too much) in any of the four scenarios

OR

**Bet the Farm / Shaping:** Make one clear bet that a certain future will happen — and then do everything you can to help make that scenario a reality

OR

**Hedge Your Bets / Wait and See:** Make several distinct bets of relatively equal size

OR

**Core / Satellite:** Place one major bet, with one or more small bets as a hedge against uncertainty, experiments, and real options

# Management Response

## Addressing Infrastructure & Safety



## Promoting Science Literacy



## Supporting Research & Monitoring



# Questions?



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