Southeast Alaska Network

Background

Scenario planning is a science-based decision support tool being used to explore the potential future impacts of climate change on the management policies and societal view of national parks. Scenario planning brings together stakeholders and experts from diverse backgrounds to develop compelling narratives describing future environmental conditions. The NPS Alaska Region teamed with several scenario planning leaders, to host workshops with park staff, managers, other agency representatives, and local and tribal leaders around the state. The Southeast Alaska Climate Change Scenario Planning workshop was held in February 2012 to discuss potential future impacts to Glacier Bay National Park and Preserve, Klondike Gold Rush National Historical Park, Sitka National Historical Park, and the coastal marine portion of Wrangell-St. Elias National Park and Preserve.

Workshop participants and trained facilitators prioritized local climate drivers and developed several climate change scenarios for Southeast Alaska national parks. Drivers can be defined as any natural or human influence that causes ecosystem change (Nelson et al. 2006). Three important drivers emerged during the workshop: streamflow, ocean acidification, and extreme weather events. The streamflow driver was prioritized by both terrestrial and marine focus groups, underscoring the fundamental value of freshwater to Southeast Alaska. Scenarios emerged from crossing these important drivers (see next page) and were used by participants to evaluate the uncertainty surrounding future environmental and social conditions and to create common management actions that consider this uncertainty.

Plan for Action

To address each of the common management actions, new and existing monitoring and planning efforts should actively collect and consider these data:

- **Timing and velocity of streamflow**
- **Abundance, timing, and harvest of salmon**
- **Presence and distribution of invasive species**
- **Knowledge and opinions of local community members**
- **Rigorous assessments of risks associated with climate change impacts in SE Alaska**

Six Common Management Actions

- **Incorporate traditional and local ecological knowledge into planning and history preservation**: Much knowledge of past and current changes to the environment is present in SE Alaska communities. This information provides vital context for the future effects of climate change.
- **Create stronger, more resilient facilities:** More intense and frequent storms and changes in streamflow have significant implications for park infrastructure and cultural resources.
- **Coordinate management among agencies and other stakeholders:** Potentially widespread climate change impacts demand active collaboration between land managers, scientists, engineers, community leaders, and other stakeholders.
- **Manage invasive species:** Changing climate may increase the range of some invasive species. Parks must monitor for this threat to the integrity of pristine ecosystems.
- **Budget accordingly:** NPS has mandated that climate change become a priority in future decision-making. To allow for this new consideration in park operations, budgets must be adjusted appropriately.
- **Make value-based decisions:** Future decision-making must use a transparent process that accurately reflects current or changing values of park stakeholders.

Photo: Chris Sergeant/NPS

Streamflow, snow, ice, and the nearshore marine habitat are all important components of the southeast Alaska landscape and are directly influenced by climate change.

Climate change projections , provided by the University of Alaska's Scenarios Network for Alaska and Arctic Planning, aided the discussion of important and realistic future drivers. Pairs of marine (top) and terrestrial (bottom) drivers were crossed to create four scenarios. The bullet points encapsulate most, but not all, potential outcomes.

Marine: Ocean Acidification and Streamflow

Shift from historic variability and timing

Clusterflood

- Biological mismatch (e.g., juvenile salmon migrate before ocean plankton bloom)
- Decrease in overall productivity of freshwater and marine systems
- Change in fisheries harvest patterns
- People abandon subsistence living for more dependable urban living
- Increases in flooding; impacts to cultural resources and park infrastructure
- Longer high flow period in glacial streams; Lower summer flow in non-glacial

Bad News

- Invasive species increase
- Decrease in overall productivity of freshwater and marine systems
- Disease on the rise
- Loss of food web diversity
- Resource, tourism, and cultural industries struggle

Flow

Ocean **Acidification**

-0.1 pH (slightly more acidic) *-.4 pH (much more acidic)*

Stream

Doing More with Less

- Lower ocean productivity
- More competition for fewer resources
- Greater demand for subsistence use in healthier park waters
- Tourism stable

Acceptable Losses

- Moderate overall biomass reductions in marine and freshwater systems
- Shifts in organism abundance and spatial distribution
- Much variability around historical averages
- Noisier marine environment due to decreased sound absorption

Near historic variability and timing

Terrestrial: Extreme Weather Events and Streamflow

More extreme storm events (+50%)

Yo-yo Snow and Blow

- Increased forest blowdown
- Abundance fluctuations among sensitive and resilient organisms
- Increased damage to park infrastructure
- Increased incidence of transportation disruptions
- Salmon populations relatively unaffected

Disaster Zone

- Higher frequency of catastrophic events
- Fire and drought more likely
- Drastic loss of quality salmon habitat (e.g., heavy bank erosion)
- Water availability fluctuates
- Tourism declines

Events

Stream **Flow**

Near historic variability and timing

Shift from historic variability and timing

Calm Before the Storm

- Tourism increases
- Invasive species increase
- Glacial retreat continues
- Increased competition for natural resources
- Salmon populations relatively unaffected

SE Identity Crisis

- Increased occurrence of flooding and drought
- Coastal marine salinity changes
- Shifts in species composition and spatial distribution
- Watersheds impacted (e.g., wetlands water budget changes)
- Change may be more predictable

Extreme

Less extreme events (-20%)

More information on climate change scenario planning
http://www.nps.gov/akso/nature/climate/scenario.cfm