Central Alaska Network (CAKN)
Climate Change Scenario Planning Workshop
April 16-18, 2012
UAF Wood Center, Fairbanks Alaska
Yukon-Charley ▪ Wrangell-St Elias ▪ Denali

Workshop Lead Team

Group 1

Bob Winfree: Regional Science Advisor – NPS Regional Office
Nancy Fresco: Coordinator – SNAP
Nancy Swanton: Subsistence Manager – NPS Regional Office
Corrie Knapp: Research Associate – ACCAP

Group 2

John Morris: Interpretation – NPS Regional Office
Bud Rice: Environmental Protection Specialist – NPS Regional Office
Lena Krutikov: Climate Science Analyst – SNAP
Piia Kortsalo: Visiting Scientist – SNAP

Workshop Participants

Group 1

1. Andrew Ackerman (NPS)
2. Paul Anderson (NPS)
3. Tara Callear (UAF)
4. Denny Capps (NPS)
5. Mark Clark (USDA)
6. Julie Collins (Denali resident)
7. John DeLapp (USFWS)
8. Elwood Lynn (NPS)
9. Philip Hooge (NPS)
10. Molly McCormick (NPS)
11. Sierra McLane (NPS)
12. Ingrid Nixon (NPS)
13. Rick Obernesser (NPS)
14. Carl Roland (NPS)
15. David Schirokauer (NPS)
16. Miriam Valentine (NPS)
17. Eric Veach (NPS)
18. Larry Weddle (NPS)

Group 2

1. Guy Adema (NPS)
2. Jennifer Barnes (NPS)

3. Deb Cooper (NPS)
4. Eileen Devinney (NPS)
5. Joe Durrenberger (NPS)
6. Steve Gray (USGS, CSC)
7. Kassie Hauser (UTenn)
8. Larry Hinzman (IARC)
9. Ken Hodges (USGS)
10. Maggie MacCluskie (NPS)
11. Suzanne McCarthy (PWSCC)
12. Judy Putera (NPS)
13. Amanda Robertson (FWS, LCC)
14. Pam Sousanes (NPS)
15. Gloria Stickwan (Ahtna, Inc.)
16. Todd Stoeberl (NPS)
17. Miranda Terwilliger (NPS)

Project Goals

The goal of this workshop was to educate, build capacity, and develop scenarios for climate change planning in Central Alaska. Products will include a report with management recommendations, as well as other outreach tools.

DAY 1

Introduction to Scenario Planning

Climate change is already occurring in Alaska. We can no longer manage for old goals and priorities that assume a static climate. Collaboration and knowledge sharing are necessary. The role of SNAP (the Scenarios Network for Alaska and Arctic Planning) is to connect planners and other individuals with data, in order to provide useful advice about adaptation to climate change. SNAP uses models to answer questions people are asking.

Unlike forecasting, scenario planning emphasizes multiple believable and plausible scenarios (Figure 1). These scenarios should be selected to be:

- Relevant
- Plausible
- Divergent
- Challenging

Scenario planning, as outlined by Global Business Network (GBN) has been used successfully by corporations and non-profits.

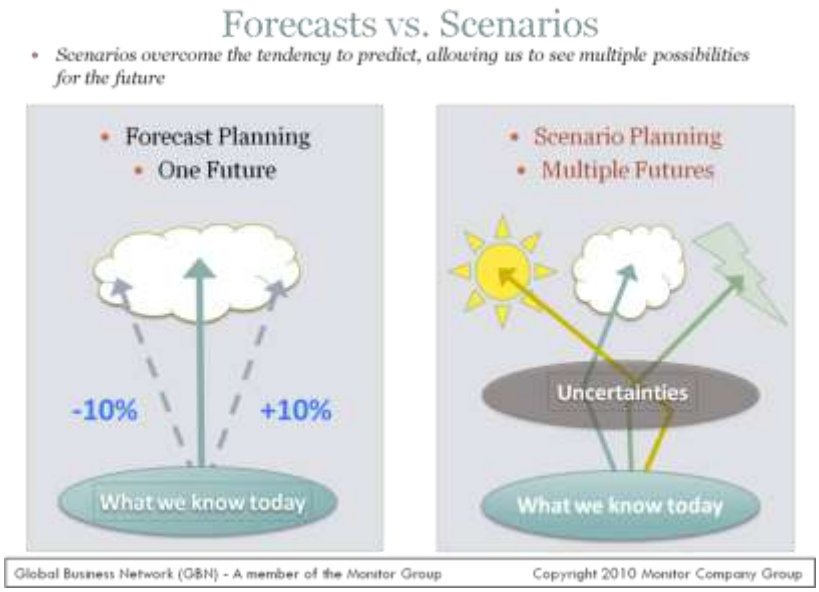


Figure 1 – The difference between forecasting and scenario planning. (courtesy of GBN)

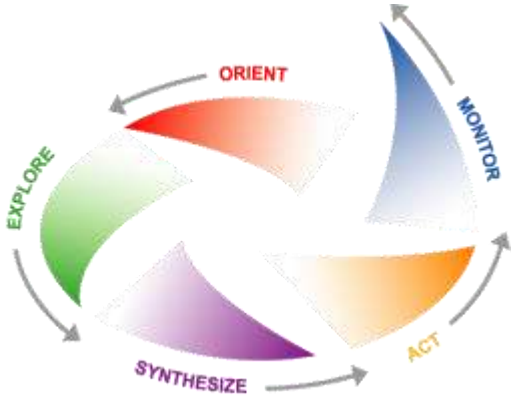


Figure 2 – The cycle of scenario planning. (courtesy of GBN)

This planning process asks participants to orient on a focal question, explore and synthesize potential scenarios, base actions on these potential outcomes, and monitor the results of these actions (Figure 2). The latter two steps will occur after the workshop.

Focal question:
How can NPS preserve natural/cultural resources in the face of climate change?

[*Note that although parks are the focus, other perspectives are also important.]*

The first task is to select **critical forces** (climate drivers) with high impact and high uncertainty. Next we will use two climate drivers to create a "grid" of four possibilities (Figure 3).

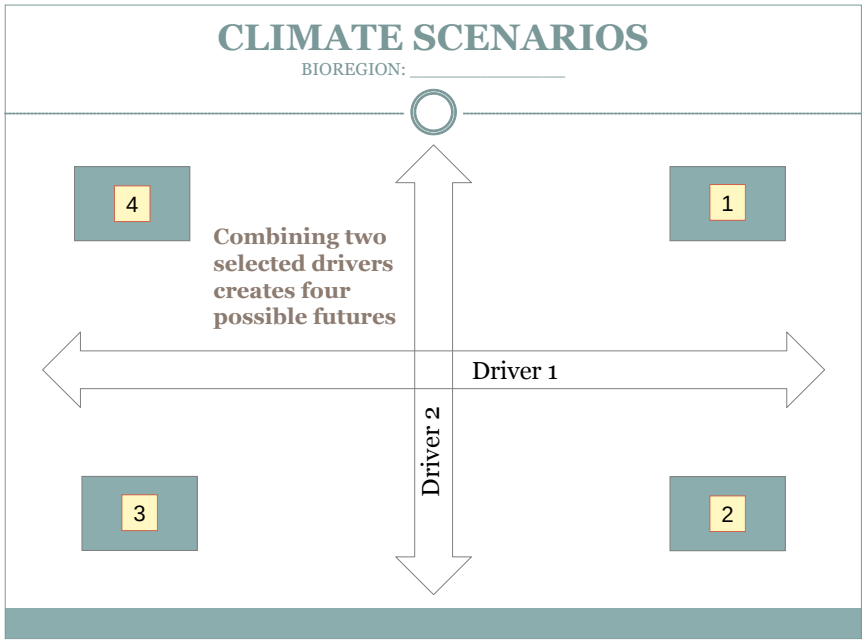


Figure 3 – The primary scenarios framework. Each driver has a range, as indicated by the arrows.

Each of these driver grids will be nested in a social/political framework, creating 16 futures (Figure 4), from which we will select 3-4 and describe them. Next we will set strategies for managing some or all of these diverse futures, using actions that are either robust or those that address only some possible futures, or a combination of both.

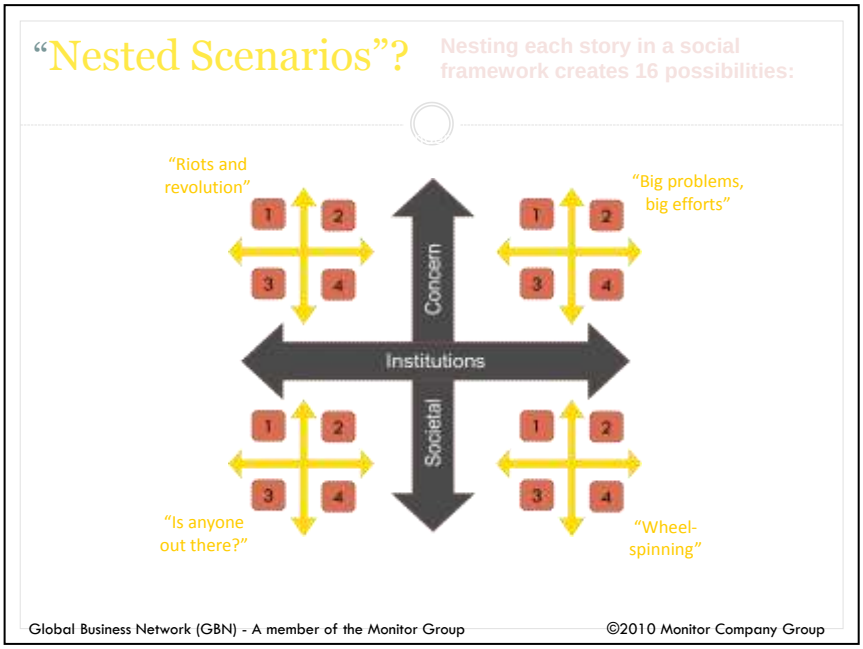


Figure 4 – The nested scenarios framework. All 4 primary scenarios can occur in any one of 4 sociopolitical futures.

Scientific Background

Climate Drivers

The first planning step is to select drivers with high impact and high uncertainty. It is also important to consider whether drivers have a wide range of effects, impacts in all parks, and impact multiple sectors.

Drivers can be more general (e.g. temperature change) or more specific (e.g. water temperature).

- Future projections of temperature, precipitation and linked variables are provided by SNAP model data.
- The Pacific Decadal Oscillation (PDO) is a wildcard variable that can exaggerate or dampen underlying change.
- In selecting drivers, there is no need to ignore changes with greater certainty. These can be integrated into scenarios based on more uncertain drivers.

Climate effects

Results of our pre-workshop survey (20 participants) emphasized the importance of a range of effects, including air temperature, shifts in spring/fall temperatures to above freezing, later onset of freeze-up, ecological tipping points, reduced winter transportation, outbreaks of pests and diseases, increased fire hazards, species losses, social and cultural losses, and impacts to subsistence.

Plenary Talks

1) Nancy Fresco | SNAP – Climate Drivers and Uncertainties

- Effects of the PDO (Pacific Decadal Oscillation) in exaggerating or masking underlying climate trends over decadal time periods.
- The benefits and uncertainties of downscaling

2) Rick Thoman | NWS – Climate Variability and Climate Change

- **"**Climate is what you expect, weather is what you get." "Climate is the statistics of weather."
- Climate variability vs. change = question of scale. Variability = years to decades, Change = decadal to millennial scale.
- ENSO and PDO are both linked to ocean temperatures.
- ENSO shows very little correlation with weather in Alaska.
- PDO = cool phase (cold N. Pacific) = warm for Alaska, and vice versa.
- Climate change = changes in the probability distribution function of some climatically relevant quantity over climatically relevant time scales. "changes in the way that individual values are distributed." Affects distribution, not extrema.

3) Nancy Fresco SNAP – Scenario Planning Process

- Focal question, selecting drivers
- Linking potential effects/impacts to selection of scenario drivers

[At this point, workshop participants divided into two groups for breakout sessions: Group 1 and Group 2.] Group 1 included participants from or related to Denali National Park & Preserve and group 2 included participants related to Yukon-Charley Rivers National Preserve and Wrangell-St Elias National Park & Preserve.

GROUP 1 Denali Park (DENA)

Drivers to consider

Assessment of climate driver importance and uncertainty are shown in Table 1. Not all potential drivers were discussed at length.

Table 1.

Climate variable, driver	DENA Impact (Importance)	Uncertainty
Temperature	X	Low with respect to direction, but wide range
Precipitation (rain and snow)	X	High
Length of Warm Season	X	High certainty that it will increase, uncertain range
Permafrost	X	Some very likely, uncertain as to timing and area
Snow	X	High with respect to both timing and total amount
Extreme Events	X	High with respect to type and frequency

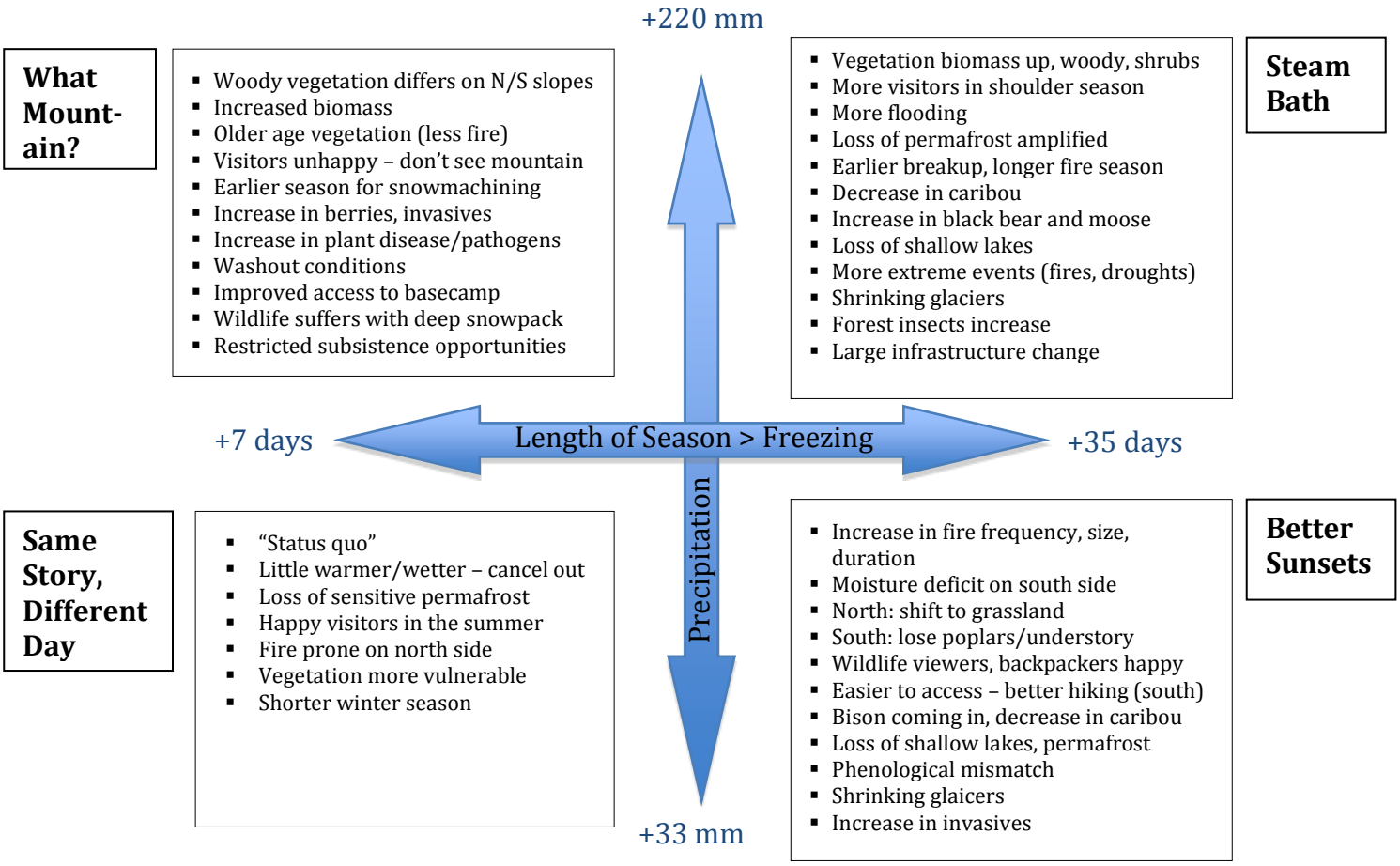
Climate Drivers Selection Discussion

Discussion centered on the drivers that were likely to present the greatest management challenges, including changes in fire, snow cover, wildlife dynamics, and subsistence resources. The group narrowed down the options to four preferred pairings.

1. Temperature x Precipitation: These are the "Uber drivers"—the group coul build any story off of these— but there was concern that they might be too broad.
2. Length of season x snow: Season length is driven by temp, snow by precip and temp. Huge impacts on flora/fauna and visitorship—fire season, biota survival.
    - End points: Length of season (extended 7 days to 35days), snow (depth/cover/water content/duration). Depth (less to more—but it is also WHEN—timing is important)

3. Permafrost x extreme weather events
4. Fire v. Permafrost

<u>Selected pairing</u>: Length of Season > Freezing x Snow (later amended to include all precipitation (increase in summer rainfall and winter snow depth)



GROUP 2 Yukon-Charley (YUCH) and Wrangell-St Elias (WRST)

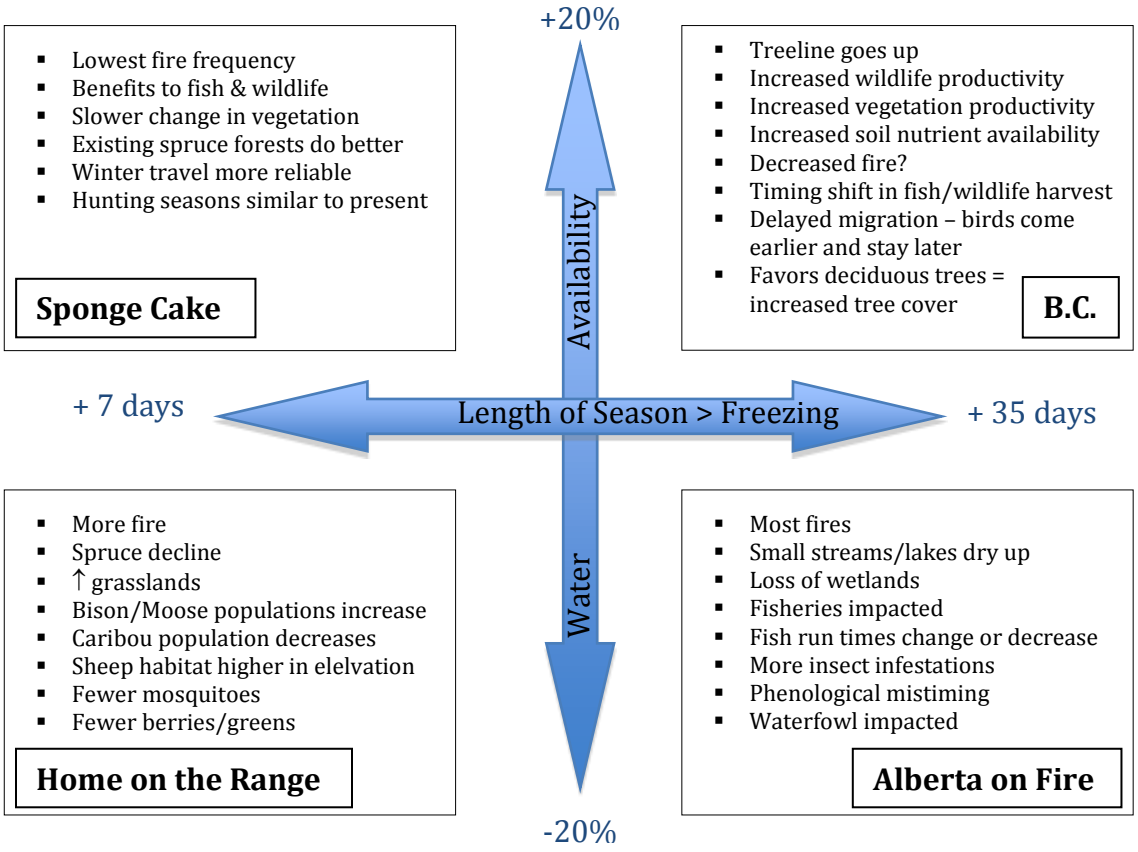
Drivers to consider

The climate drivers selected by group 2 for Yukon-Charley and Wrangell-St Elias are shown in Table 2. Assessment of climate driver importance, uncertainty and confidence are also shown.

Table 2.

Climate variable, driver	WRST/YUCH Impact (Importance)	High uncertainty	High confidence
River/Stream temps	X		X
Mean Annual temp above freezing	X (varies by elevation and latitude)		X
Precipitation (snow/rain %, timing)	X	X	
Extreme Events / Precipitation	X (especially near coasts)	X	
Water availability	X	X	
PDO	X	X	
Length of season (above 0° C)	X		X
Wind Events	X		X

<u>Selected pairing</u>: Length of Season > Freezing x Water Availability



DAY 2

SCENARIOS FLESHED OUT

GROUP 1

Group one returned to their discussion of drivers and decided to change the selection of "snow depth" to "precipitation" (both summer and winter), while still including a clear implication of greater snowfall.

BETTER SUNSETS → +33 mm precipitation and +35 day length of season

- Increase in fire frequency
- Size and duration of fires are up—burning off insulative layer
- Longer potential fire season
- Moisture deficit on the south side
- North-shift into grassland
- South-shift the trees-lose poplars and understory (herbaceous)
- Lose forage
- Easier to access—better hiking (south side)
- Wildlife viewers and backpackers are happier
- Bison coming in
- Decrease in caribou
- Hungry bears
- Loss of shallow lakes high
- Loss of permafrost—slumping/landslides
- Phenological mismatch
- Shrinking glaciers—new habitat
- Diminished fish populations
- Increase in invasives
- Poor access to Denali base camp
- More frequent fires—but smaller
- Maintain fundamental purpose—wildlife/mountain viewing—increased visitor season
- Potential for high smoky days
- Highest fire-driven ecological change
- Most archeological uncovering
- Least winter access

STEAM BATH → +220 mm precipitation and +35 day length of season

- Vegetation
    - Most increase in biomass & woody vegetation(overall)
    - Increased berries
    - Potential increase in beetle kill
    - Tree-line is moving up

    - Entire vegetation shifts
    - Patchy vegetation shift
    - Lichens are down
    - Change in types of wetlands—permafrost driven to local groundwater discharge—increase in collapse scar bogs
- More icing events-challenging for wildlife
- High permafrost loss
- More fire due to woody vegetation—fire size goes up
- Caribou are down—moose are up
- Loss of pika
- Increase in grayling habitat, dal sheep will suffer
- More blackbears come in, decline in grizzlies
- Mixed benefit/challenge for salmon
- Permafrost, fire and erosion impacts siltation of rivers—worsen spawning habitat
- Winter access for subsistence difficult—summer may be easier b/c of swamp drying but hiking worse—shift in access season
- Shift in dates of hunting season and availability of resources
- Less winter activities in park—more challenging hiking
- Change in demand in Preserve
- Access to areas increase—more impact throughout the season and to areas usually less used.
- Unhappy visitors due to viewsheds and hiking challenge, increase in smoke
- Floods and slumping threaten the road and facilities
- Base camp has a very short season
- Operational shift in season and needs for staffing/resources
- Ice on snow impacts on wildlife
- Avalanche danger increases
- Fundamental shift in visitor expectations
- Longer season for tourists-commercial operators happy

WHAT MOUNTAIN? → + 220 mm precipitation and + 7 day length of season

- Vegetation
    - Slightly increased biomass (overall)
    - More woody biomass
    - Increased berries
    - Potential increase in root rot/pathogens
- Wildlife
    - Success of predators increase—caribou/moose decrease
    - Aging population of moose—poor calf survival
    - Small mammals benefit in winter—may suffer in rain
    - Potentially more wetland/beaver and birds
    - Bad for coyotes and cougars
    - Overall negative impact for sheep—loss of grass & icing

- Subsistence
    - Permafrost slumping—access
    - Additional willows-challenge for access
    - Earlier snow machine use—longer snow machine use
- Hydrology/Permafrost
    - Some loss of permafrost
    - More streamflow and wetlands
    - Flash floods
    - * Glacier growing is highly unlikely (?). Others think that it might grow. Glaciers are relatively stable. Rate of loss may be relatively slow.
- Recreation
    - Pressure to create trails
    - Basecamp access stays the same
    - Flight seeing decrease—worse experience (viewing/safety)
    - More disappointed visitors along park road
- Loss of infrastructure
- Net benefit for fish?? Runoff still rapid
- Increase in the variability of fire (infrequent large intense fires during dry years)

SAME STORY, DIFFERENT DAY → +33 mm precipitation and + 7 day length of season

Woody vegetation increase-slower—will vary on N/S slopes. S more productive, N less productive

- Increased biomass
- Community structure d/n change a lot without fire
- Change in acidity
- Little fire
- Visitors unhappy—will not see the mountain
- Older age vegetation
- Less loss of riparian habitats—healthier—but may make pollutants more bioavailable.
- Wildlife suffers with deep snowpack
- Wolves increase—loss of moose to predation
- Earlier season for snow machine
- Increase in berries
- Increase in landslides
- Restricted subsistence opportunities
- Glaciers stable-growing at higher elevations??
- Increase in invasives
- Washout conditions
- Improved access to base camp
- Plant disease/pathogens increase

GROUP 2

SPONGE CAKE → +20% water availability and +7 day length of season

- Increased water levels in some streams and rivers
- Trumpeter swan and other waterfowls succeed
- Possibly more flooding and due to that more erosion and more contaminants into rivers
    - Runoff of silt affecting for example salmon
    - Unpredictable spawning success and locations of salmon
    - Changes in harvesting quota (also in commercial fishing)
- Timing of floods shifts
- Vegetation regime:
    - White and black spruces succeed, increase in mosses increase
- Decrease in magnitudes of fires, possibly no change in number of fires
- Fires less deep
- Permafrost maintains, active layer decreases
- Moose succeed with willow habitats
- Caribou habitats better in YUCH than in WRST due to less fires
- Decrease of bison
- Productivity increases generally across the landscape
- More sage affects trails thus parks will have transportation (ORV) issues
- Subsistence harvest will become difficult for example in higher level rivers
- More mosquitos

B.C. → +20% water availability and +35 day length of season

- Glaciers accumulate in higher elevations and ablate in lower elevations
- Persistence of wetlands
- Increased spring flooding
    - Potential loss of cultural resources
    - Communities on river banks flooded
    - Roads, infrastructure washed out
- Winter overflow worsens
- Less frozen rivers – river barriers to travel
- Higher water temperatures
    - Can fish species adapt quickly?
    - Will fish simply relocate (more northward)?
    - Macroinvertebrate species affected
- Habitat progression and shift
    - From tundra to shrub
    - Treeline moves up
    - Increased deciduous tree cover (spruce forest maintained)
- Phenological mismatch and mistiming
- Increased vegetation productivity
- Increased species variation

- Increase of waterfowl
- Negative effect on salmon and positive effect on pike (?)
- Increased soil nutrient availability
- More frequent and less severe fires
- Visitor season extended
- Shoulder seasons not as good for travel
- Range shift

HOME ON THE RANGE → -20% water availability and +7 day length of season

- Warming up earlier, higher flow in spring
- Rivers and lakes freeze-up later
- Glacial rivers increase and flow earlier
- Non-glacier river flows decrease and some streams dry up
- Wetlands dry up
- Trumpeter swan populations stop expanding, waterfowl populations decrease
- Salmon population decreases due to dry up of spawning and rearing areas
- Fires burn deeper due to drier soils
- Earlier green-up of vegetation
- Shift to more drought resistance vegetation, aspens, scrubs, grasses
- Shift from spruce forest to deciduous
- Permafrost active layer deepens
- Permafrost slumps are already occurring and they are causing erosion into the rivers (affecting trails and roads)
- Due to permafrost melting soil structure changes and that affects soil and water chemistry
- Increase of bison, a small increase in moose
- Burning of lichen and old coniferous forests causes decrease in caribou habitats
- Slight decrease in caribou and shift in migration (less snow benefits caribou)
- Wolves following caribou shift their occurrence as well (migrating to new areas)
- Different vegetation regime (plants moving up/north, increase of dry bluffs with sagebrush)
- Animals will not be able to meet the changed regime of vegetation (nutriment)
    - Forage timing mismatch for sheep and their kids in spring
- Subsistence season is effected and some decreasing in amount of subsistence
    - Decrease in berry production
    - Timing of trapping, berry picking, fishing shifts
- Decrease in mosquitos, increase in spruce beetles
- Historical structures and communities are in risk due fires
- Shift in season of park visitation to earlier in May
- Archeology sites are exposed because of slumping and snowpack retreat

ALBERTA ON FIRE → -20% water availability and +7 day length of season

- Loss of permafrost and snowpack
- Glacial fed rivers increase and downglacial rivers decrease (smaller rivers)
- Riverbeds become less braided and less vegetated
- Loss of wetlands
- Shrubification at high elevation and more grasslands at lower elevations
- Loss of spruce forest, introduction of lodgepole pine
- Decreasing moose and caribou populations
- Increasing bison, mule deer and cougar populations
- Shifts in bird species (some species will over-winter that never did before)
- Increased pest outbreaks and infestations
- Decreased salmon populations
- Increase of invasive species
- Loss of species unique to YUCH
- Increased fire frequency and intensity
    - Loss of cultural resources
    - Increase of morel mushrooms
    - Poor air quality
- Road to Eagle won't wash out as much (Holland America returns?)
- Roads on permafrost? = sections of road to Eagle and Nabesna Rd.
- "Snowpatch archeology" ?

NESTED SCENARIOS

GROUP 1

Steambath in "Big Problems, Big Solutions" = DENALI, NOT DENIAL

Describe this world in 2030:

- Subsistence hunting seasons shifted—proactive change to align seasons with use. Diverse subsistence types
- In Cantwell: either building trails or legal challenge
- Sufficient moose population but potentially bad access
- Woody vegetation will change wildlife viewing experience—questions about burning to maintain vistas. Or give up on purpose? Potential to burn mosaic on the landscape.
- Denali driver of 30% tourist economy-alignment for making transitional purpose and create experience in Park.
    - Not all areas will be brushy
    - Brush/fire/divertion
    - Educate public about management
- Fires set—ecological and viewership reasons
- Shift in park resources—where will be allocated?
    - Fewer bear, more vegetation

- Shift in climbing season
- Decline in funding (soft money)
    - $ comes from elderly visitors
    - $ spent on climbers
    - 1/3 is entrance fees and franchise fees
- Potential for climate change education—change in interpretation resources
- Needs for infrastructure improvements/ maintenance costs on infrastructure, education, research.
- Climbing season restricted
- Change in visitor seasons
- Summer season earlier—earlier opening of the park road
- Increase in shoulder season tourists
- Plasticity in plant populations—colors change?
- Public support for telling climate change stories
- Desire/pressure for more hiking trails—trail-less wilderness a thing of the past. More people using trails—increase number of people getting off the bus. People will funnel to the social trails. Need to provide places for people.
- Increase backcountry use—can't see each other
- Would assisted migration work? Would it happen in this scenario? Is it now "natural" habitat?
- Wood bison reintroduction (grazers). Mammoth return.
- Speed up natural migration—potentially increase visitorship.
- May lose caribou, but new reasons to visit the park
- Increased predator control?
- Sheep
    - Replaced by mastodons?
    - Problem—migration corridors important
    - Open spaces might not be good with increased shrubs—may not move.
    - High elevation species are blocked—another reason for fires
- As wetter, will system change faster
- Types of wetlands changing-favor migratory species
- Need more flexibility with wildlife that is present
- Proactive management to limit genetic isolation
- Coordination re: fire—increased human populations—increase in fire suppression.
- Economic cascade from Denali
- Fishing decrease around park, park resources more important to the economy. Switch from salmon to grayling.
- Change in salmon spawning areas
- Change in tourist activities—little known secrets promoted. Packraft/hike options. Biking in the park. Fringe activities increase. Increase in use of Denali State Park.

- Northern park-post-fire—broad leaf (burn mat), white spruce (d/n burn mat). Larger species coming in. Change from giant sponge—new opportunities? Access issue—more hikable, but could have deep moss mats. Acidic environments—will limit change in vegetation. After fire—still acidic—trend towards black spruce. Forest composition will be similar, but productivity will rise and will look different. Thaw stable landscapes—possibility of putting infrastructure in. Potential that Stampede road would become new access.
- Stampede road
    - Float from one road to another.
    - Dogsled out into the park
    - Whole new road—whole new experiences
    - Big push for development
- Different access points for different activities (Canyonlands, Grand Canyon comparisons)
- Youth education-week in Denali for all AK youth

How to communicate: Map-what the landscape looks like with text boxes.

Describe this world

- Alaskans actively working to adapt to climate change with strong leadership from civil service to capitalize on opportunities and minimize biotic and economic losses.

Major impacts to bioregion

- More woody vegetation
- Decreased permafrost
- Increase in moose, decrease in caribou and sheep
- Bigger fires
- Wetland Shift

Issues facing management

- Changes in recreational opportunities (less viewability, less climbing ops)
- Pressure to provide for appropriate opportunities and showcase sustainability
- Sensitive and proactive to changing subsistence patterns. Adapting to changing subsistence patterns and seasons.

Interactive Map Idea

- Text associated with static google image
- Could be part of an EIS
- Need to show what the changes are and how they are meaningful—how proactive.
- Draw vignettes on map-new view

GROUP 2:

Sponge Cake in Is "Anyone out there?" = BOGGED DOWN

7 days longer growing season and 20 % increase in water availability

Describe this world in 2030:

- Not so much attention to these parks (arctic areas are more extreme and events more dramatic so attention is drawn there)
    - Subtle bio-physical changes fail to attract attention of public, institutions and regulators
- Native people are first to notice the changes so they try to talk but it is needed more to be the front page news (federal agencies don't care)
    - Non-unified local response
- Roads will be overflown (are already) so new bridges and possibly new locations of roads may be needed
    - ATVs are more sophisticated and reliable
    - Demand for improved ORV access
    - McCarthy road improved
- Increased jet boat and guided fishing and in general more river travel
    - Management plan won't change, but fishing becomes harder due to river level rise
    - Not as many fish caught in Copper River system due to higher flows
- Increased demand for easier wildlife harvest
- Old oil sources have dried up and new pipelines have been built
- Electric power grid is connected along main highways
- Human population has decreased near YUCH and continues to decrease near WRST (unless there's a new gas pipe)
- U.S. Federal Deficit is in crisis

Major Impacts on the Bioregion:

- Vegetation is more forested and brushier
- Less intense fires with less burning depth
- Permafrost retains due to thin active layer and moss layer thickens
- Wet lands are expended, ponds persist and waterfowl succeed

Issues Facing Management:

- Continuing monitoring of bio-physical changes, particularly hydrology and salmon runs
- Decreasing visitation, expect for affluent travelers (e.g. travelling in McCarthy and participating in guided hunters).
- Difficult for National Park Service to get funding and remain relevant to American public (lock of funding to manage issues)
- Primary issues remain subsistence management
- Co-management of loads inside WRST by NPS & Ahtna
- ORV-trails require management and maintenance
- Resource development of inholdings for forestry and mining

Alberta on Fire in "Riots & Revolution" = SMOKED SALMON RIOTS

Describe this world in 2030:

General
- Shortage of food supplies/fuel (very expensive)
- More conflict between state and feds
- Endless meetings and committees

Major subsistence resource changes – more marked change in the span of a lifetime
- salmon dying
- overfishing to non-sustainability
- commercial fishing depletes resources
- declining moose, caribou
- increasing deer, bison, cougar

PDO cool phase for next 20ish years, but could flip to warm phase by 2030
- Flip to warm phase increases societal concern

Agency distress
- Not enough cultural expertise
- Lack of funds = fewer employees

Public response
- Local citizens concerned over changing subsistence resources
- Bad economy: people on the edge
- More reliance of native groups on international coalition
- More public demonstrations

Major Impacts on the Bioregion:
- Loss of spruce = shrubification at higher altitudes, grasslands at lower altitudes
- Increased fire frequency and intensity
    - Smoke/air quality affect large population centers
- More local agriculture
- Increase in visitors, McCarthy Rd paved
- Loss of smaller, non-glacial streams/rivers
- Wildlife
    - Bears extrapated (extinction of local subpopulation)
- Ocean Acidification increases, salmon declines
- Phenological mistiming

Issues Facing Management:
- Pressure from urban areas to manage fires
- Protection of people and infrastructure from fire
- Loss of firewood = loss of spruce
- Flight services affected by large-scale fires
- Fishery disputes = lawsuits against agencies
- Hunting and fishing regulations not keeping up with changes

- Demand for moose increases = moose farming
- Visitor accommodation needs outpace facilities
- Fire management (no campfires in the park!)
- Parks significantly understaffed
- Move from revolutions → riots
- Demand for species relocation, hatcheries = introducing southern genetics
- Reaction to endless emergencies
- Demand for increased energy extraction on park lands (mining, drilling, cutting, etc.)

NARRATIVES – available online

http://snap.uaf.edu/webshared/Nancy%20Fresco/NPS/2012_Central_Alaska/Narratives/

Sponge Cake in Is Anyone out there? = Bogged Down

Report: Superinterdent's annual report for WRST & YUCH = WRYCH

Alberta on Fire in "Riots & Revolution" = Smoked Salmon Riots

Song: Northland a-Changin'
CAKN_Narrative_PrettySunsets.docx

Steambath in "Big problems big solutions" = Denali, Not Denial

Interactive map: Changes in the future

Better Sunsets in "Is Anyone Out There?" = Arctic Safari: Saunas & Sunsets

Performance: Gaia – Mother Earth
CAKN_Narrative_PrettySunsets.docx

DAY 3

IMPLICATIONS AND ACTIONS

GROUP 1

Important Common Management Actions between two groups (1A & 1B)

- Revisit management policies
- Identify bottlenecks to change in mgmt and address need to expedite process
- Increased invasive/introduced species management
- Cooperative planning with tribes to address changing resources, etc.
- Policy and harvest regulations for new species
- Adjust harvest regulations and seasons for traditional species
- Cross-boundary collaborative approach – need to partner with other countries, agencies, stakeholders, etc.
- Access planning (e.g., erosion)
- Development plan model (for permafrost, trails, road, access, facilities, etc.)
- Increased development of alternative energy sources (response to cost of fuel)

Research and information needs common between two groups (1A & 1B)

- Baseline data on river flow
- Baseline archeological research to address potential loss
- Research on phonological timing/mis-timing
- Increase capacity for interpretation/education
- Improved monitoring = fire effects, glaciers, fisheries, megafauna
- Increase social science to reach technology and citizen scientists

Other Issues

- Secondary effects of ocean acidification
- Predator control
- Lack of funding/personnel/support
- Economic limitations (beyond park funding, e.g. for communities)
- Increased pressure for resource extraction
- Motivate management to focus on climate change issues
- Moose farming? Reindeer herding? More fish hatcheries?
- Wilderness designation?
- Pressure to redefine park boundaries/zoning (split up large parks?)
- Volcanic eruptions/earthquakes
- RS2477s becoming roads
- Prepare for evolving health & safety issues
- More hazards management and training for NSF employees

GROUP 2

Important Common Management Actions between two groups (2A & 2B)

- Assisted migration, e.g. wood bison – develop a strategy
- Maintaining genetic diversity for core species (Dall sheep)
- Managed fire and prescribed burns by park staff
- Creating interpretive materials, interacting with existing and new educational groups, and direct one on one interactions
- Big-picture planning
- Redo all park plans to be robust under climate change
- Build new roads to improve recreation opportunities and to offset lost visitors, and megafauna viewing
- Shift the climbing season
- Explore and address issues for climbers given basecamp challenges
- Build stewardship and contact with children
- Expand school programs with longer season
- Build capacity for climate change messaging
- Develop in-park messaging that addresses climate change issues and implications to ensure improved and more consistent understanding among park staff
- Engage more with subsistence leaders to improve understanding of chand and collaborate to create messages and garner support to address issues
- Change the regulation process to be more flexible and provide a quicker response to the needs of subsistence users. Work with SRC, OSM, RAC
- Foster and encourage subsistence lifestyles and sources of knowledge
- More fuels reduction – firewise
- Greater work with communities
- Examine whether fire can be used as a tool to help avoid catastrophic fires
- Partner with DEC to address health issues related to smoke

Research and information needs common between two groups (2A & 2B)

- Identify and study ecological change so as to attribute cause and effect, e.g. caribou fading due to CC not bus traffic. Collect into fon hunting seasons and wildlife viewing.
- Improved monitoring of rare plants
- Assess human preferences and tolerances regarding smoke and fire effects from natural and prescribed fire
- Anticipate consequences of ecological actions:
    - Bringing in bison
    - Losing caribou, Dall sheep, pika

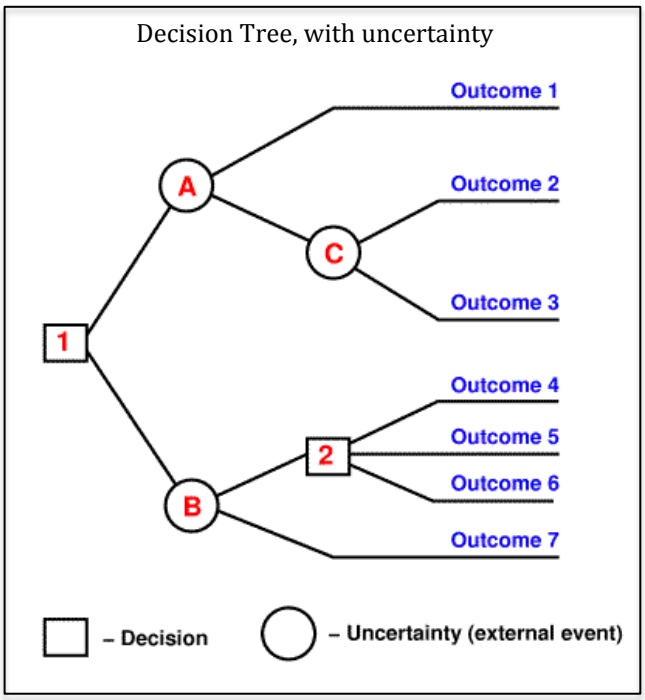
Next Steps

Products to come out of NPS CCSP workshop series

- Technical report
- Non-technical report
- Maps = individual parks, derived SNAP data, ALFRESCO and GIPL outputs
- Interpretive and education products (in conjunction with the Alaska CSC)
- Guidebook – training manual – for climate change scenario planning

Suggestions from CAKN

- Guidance for this process on a smaller project level
- Inject climate change into "scoping" into projects
- Follow-up with smaller focus groups with more intimate expertise would give a more trustable outcome. Broad perspective with full range is great with the diversity of this big group. You might get something more tangible with more focused groups.
- Is a 1-day mini-workshop possible – in the interest of time and money?
- Transition from internal to external audience – need to show the science. How to communicate to a new audience when the language changes, the culture changes, etc?
- The "**uncertainty**" piece is going to be difficult to bridge. (Jeff M.= in the business world, people understand the idea of uncertainty.)
- (for NEPA in particular): Write flexibility into Environmental Impact Statement = **adaptive management** = similar to "Monitor" step in the GBN Scenario Planning Model



* If our decision-making is still based on the idea that we know what the future will be, we are not following scenario planning. Need to keep in mind that conditions *will* change.

Other Resources/Ideas/Coming Soon

- Guidebook: in the works. Training manual
- Future steps
    - Post-webinars, survey (iPad and survey monkey), webpage
    - Could we get link from NPS website?
    - Potential for college credits for scenario planning workshop (potentially)
- GBN video: Jonathan Starr
- New culture of planning
- Biome shifts related to climate change: SNAP resources (Nancy)
    - Large planning/research group with many partners
    - D/N predict species but does look at climate envelopes
    - Can share if people are interested.
- WildCAST project (Torre Jorgenson) USGS: looking at habitat shifts south of the Brooks Range. Nearing completion
- Park Science—Developing new issue of Park Science