



**Interior Alaska Climate Change  
Scenario Planning Workshop  
March 27-29, 2012**  
UAF Wood Center, Fairbanks Alaska  
*Noatak – Gates of the Arctic – Kobuk Valley*



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## Project Goals

The goal is to educate, build capacity, process and develop scenarios for climate change planning in SE Alaska. Products will include a report with recommendations; we have no authority to tell NPS what to do.

## DAY ONE

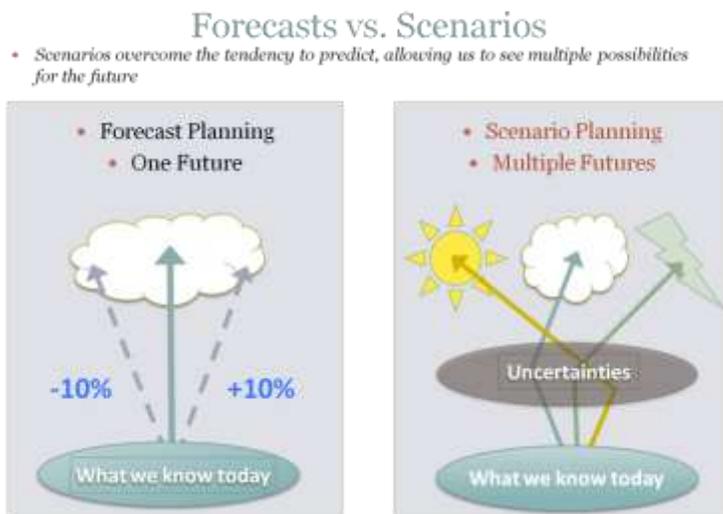
### Introduction to Scenario Planning

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.

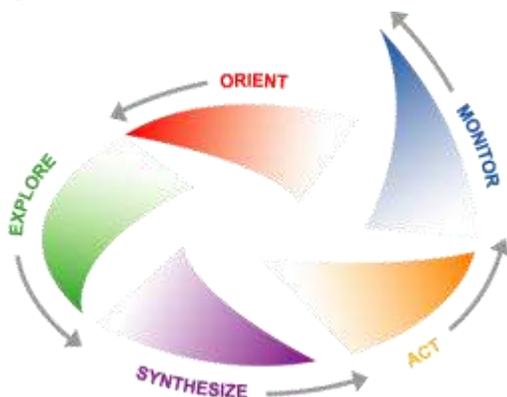
Unlike forecasting, scenario planning emphasizes multiple believable and plausible scenarios (Figure 1). These scenarios should be selected to be:

- 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)

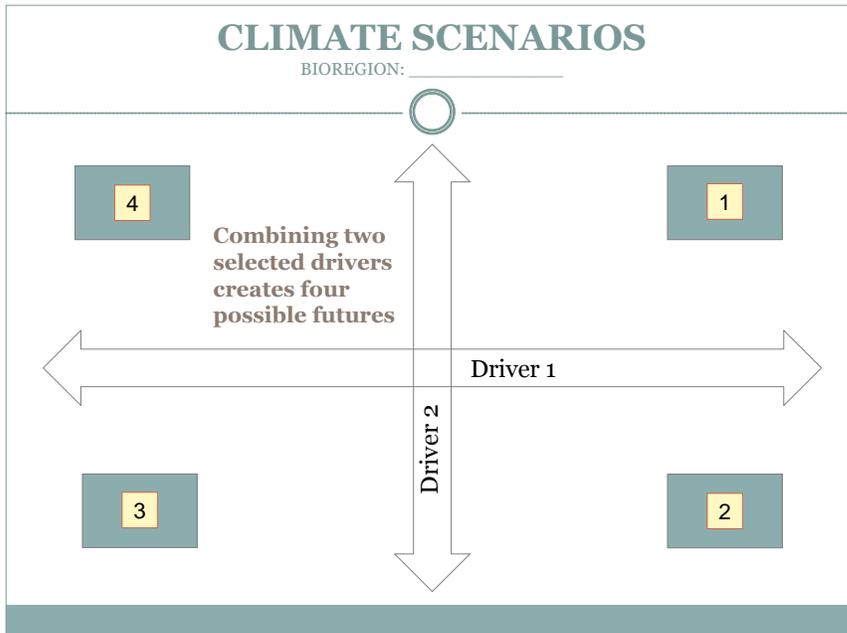
This planning process asks participants to orient on a focal question, explore and synthesize potential scenarios, base actions on these potential outcomes, and monitor the results of these actions (Figure 2). The latter two steps will occur after the workshop.

### **Focal question:**

**How can NPS preserve natural/cultural resources in the face of climate change?** [Note

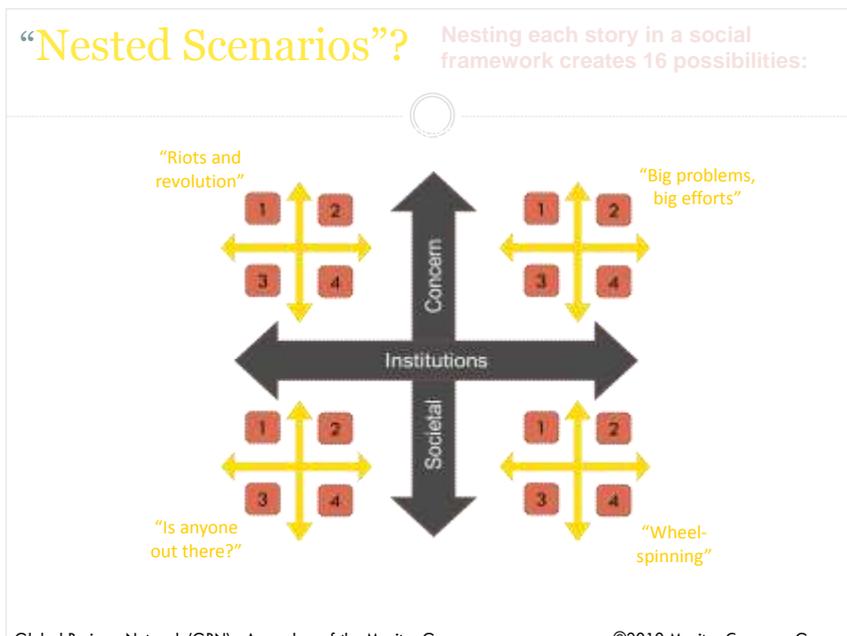
*that although parks are the focus, other perspectives are also important.]*

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 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 either robust actions, actions 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 (27 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) John Walsh | IARC/SNAP – Climate Drivers and Uncertainties**

- “Seasonal frequency of weather conducive to sightseeing” (defined as temps >40F, not raining or snowing, visibility at least 5 miles) graphed for King Salmon.
- Arctic Oscillation = not a big driver in Alaska, but significant in eastern Asia and Greenland.
- PDO = much greater influence on Alaska climate. PDO Index matches well with annual Alaska temperature anomalies. PDO is a “modulator of ocean temperatures”.
- Downscaling = taking coarse resolution data and adding them to finer resolution data for Alaska... PRISM data for 1961-1990 slide: can really make out influence of topography and of coastal influence.
- “Could be greater uncertainty in the shorter term than in the longer term.”

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

- Hardly any climate records in the vicinity of the parks, i.e. only 4 locations even close: Climate is the “statistics” of weather. Presence of permafrost is important, but equally important is the change in the depth of the active layer. Alaska = peninsula, climate heavily dependent on sea ice and SST.
- 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.
- Real-world example of Bettles temperatures for Nov-Jan during Neg PDO (1946-1976) compared with Pos PDO (1977-2007). \*\*

### 3) Torre Jorgenson | UAF – Ecological inventory & monitoring

- Key processes in conceptual models of transitions from one ecosystem to another:
- Thaw lakes, thaw slump, lake drainage, landslides/fans, soil drainage, drying, sedimentation, glacier melting, fire, acidification-leaching, paludification, primary/secondary succession, dominance shift, plant migration, channel erosions, coastal erosion, drainage/migration, human development, thaw settlement.
- Disturbances: Fire, thermokarsts, shrub/forest expansion → positive and negative feedbacks
- Floodplains as migration corridors – floodplains can be really good corridors for the movement of seeds.
- Study of 57 bird species x 43 habitats to identify the most important habitats for the most species. Coastal plains are the most used, high alpine areas are the least used. However, need to keep in mind the amount of data available for those areas, i.e. very little data for high alpine areas.
- Use these models to predict bird and mammal responses based on habitat availability.

### 4) Nancy Fresco: Climate Change Effects

- How to choose drivers?
- Table of potential drivers—feel free to think outside this list
  - What effects are caused by which drivers?
- Important factors
  - Overall warming and especially changes in shoulder seasons
  - Earlier snowmelt
  - Reduced transportation
  - Changes in drainage and sewage issues
  - Increase in pest outbreaks

- Ecological tipping points that change shift in vegetation
- Permafrost thaw
- Change in species distribution/habitat
- Transportation of fuel/energy
- Discussion
  - Need to think about: what is core to your park?
  - Be willing to think of your own variables—what might make the most sense for your region or combine factors.
  - Don't make drivers contradict each other or correlate too closely with each other.

*[At this point, workshop participants divided into two groups for breakout sessions: Group 1 and Group 2. No natural break managed to divide the group in half, i.e. Riparian vs terrestrial, East vs. West, North vs. South, Tundra vs boreal forest, so groups divided this way: "If you are too similar with someone, avoid them."]*

## Group 1

### **Small Group Work: Discussion of Drivers**

- **How to choose drivers?**
  - Want widely variable
  - Most important and have some level of uncertainty
- **Brainstorm of important drivers**
  - Temperature
  - Snow depth
  - Rate at which precipitation changes state—transitions between ice/snow/water: Freeze/thaw rate—amplitude, duration and timing
  - Drought—water availability.
  - Length of growing season-how fast will water be used? Is there enough? Fire season?
  - Permafrost thaw—how rapidly does it occur?
  - Argument to stick with fundamental drivers (temperature and precipitation)
    - Other side is that more nuanced drivers may be more important for the local area.
  - Extreme events—importance of intensity of events
  - Timing is critical—coincident timing-birds w/insects/lake levels. Asynchrony is really important to address (between climate and daylight)
  - Permafrost thaw
  - Overall net primary productivity—may be more related to effects
  - Erosion/disruption of land: river margins, hill slope failures, etc...
  - Water (amount, nature, intensity of events)

- Four actual drivers there (amplitude, timing, duration)
  - Freeze thaw might capture a lot of the other variables
  - Peak spring flow (low to high), permafrost degradation (low through high)
    - Losing asynchrony
  - Temperature and extreme storms—exciting and makes a good story
  - Asynchrony (norm to late green up or normal to late hatch)
  - Timing of spring thaw important
  - Category: seasonal timing—capture freeze/thaw, length of growing season—little to no
  - Extreme events: ice events, rain/snow events, late winter storms

**Drivers for scenarios – final choices**

1. Frequency in extreme events from dry lightening to snow/ice/rain storm or less to higher extreme events
  - Types of extreme events that become more common (drought/dry lightening) to (snow/ice/rain storms)
2. Changes in seasonal timing—how to define endpoints? Status quo to changes in a week/month or more? (3 weeks)
  - Includes freeze/thaw, asynchrony, ice in/out, etc...

**Group 2**

This group’s assessment of the importance and uncertainty of selected drivers is shown in Table 1

**Table 1. Which climate drivers are the most important to Arctic-Interior?**

	<b>High uncertainty</b>	<b>Impact Importance</b>	<b>Predictable</b>
Temperature		X	X
PDO	X	X	
Extreme Events (Temperature)		X	X
Precipitation (duration & extent of snow)	X	X	
Extreme Precipitation (rain & icing)	X	X	
Length of ice-free season	X	X	

The group discussed details of drivers, including the following:

- Snow cover as a new variable  
*Time of snowfall to snowmelt - duration, how much land it covers - extent. Less snow = deeper freeze, affects permafrost, archeological sites, travel, transportation, etc. – Is this encapsulated by “length of ice-free season”?*
- Extreme events  
*Important because they cause the greatest sociological effects.*



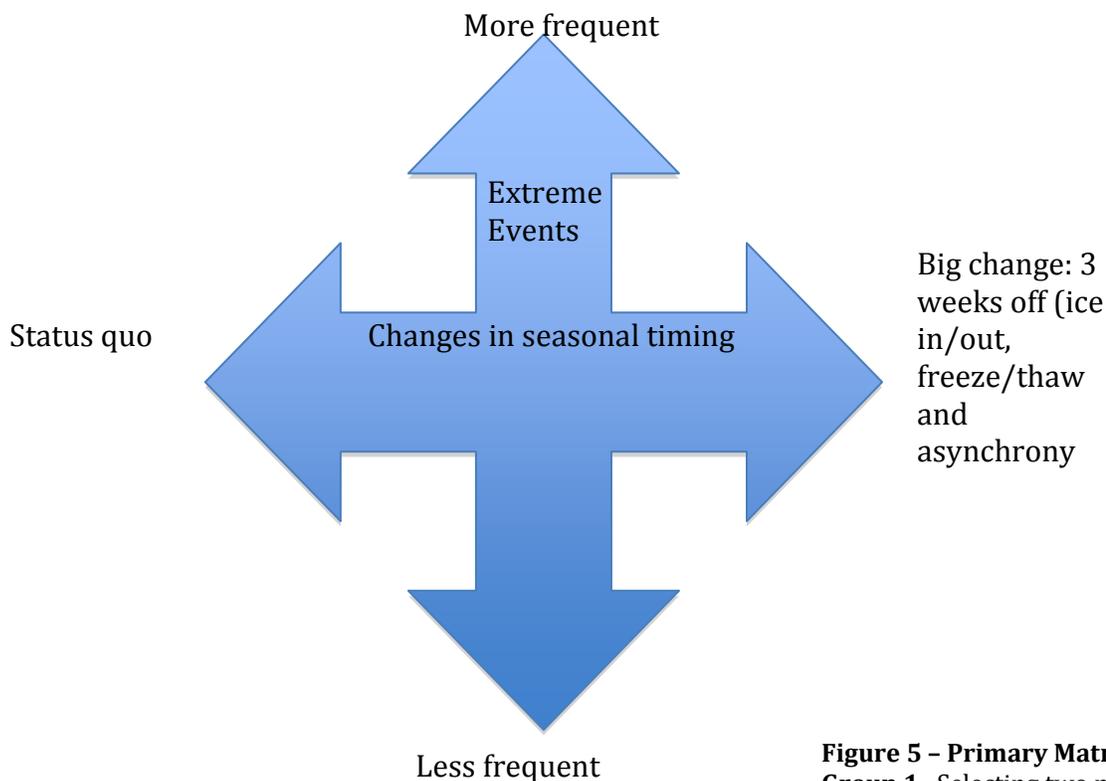
- Precipitation  
*Extreme events or timing of precipitation? i.e. warmer temperatures in the winter, rain-on-snow events. (Rick Thoman warns: More precipitation does not equal more snow cover. It is complicated by warmer temperatures creating more moisture. In the Arctic Interior, mid-winter precipitation will still be snow.)*
- Temperature  
*Is this is a larger driver that encompasses ice-free season? No, ice-free season is specific to temperature during the shoulder seasons.*
- Temperature and Precipitation  
*The group argues that all of the drivers seem to be derivatives of these two drivers, so why not just use the overarching temperature and precipitation?*

## DAY TWO

### Insights/Ideas

- Some people are frustrated with climate driver selection, and feel that we are leaving out important variables by only selecting two. John Morris explains that that is the nature of this process, to narrow down and focus on something specific.
- Status Quo – what about using that as an end member for a climate driver? Suggestion: use status quo as the middle (origin: 0,0), so that you get a greater range of change (DIVERGENT). However, this can only be done if the end members are PLAUSIBLE, e.g., is it plausible that temperature will decrease?
- We are not trying to forecast, just trying to find scenarios that are plausible.

### Group 1 primary matrix



**Figure 5 - Primary Matrix, Group 1.** Selecting two primary drivers creates four biophysical scenarios.



From this, four scenarios emerged:

1) Status Quo

2) Cool and Wet

- Nest flooding
- Tree mortality
- Increased fire frequency/intensity (+)
- Spring flooding/runoff
- Starving caribou (+)
- Small mammals down
- Increased turbidity
- Warmer water, changes in thermostratification
- Change in energy budget of lakes
- Some erosion increase
- More thermokarst

3) Warm and Wet

- Early river breakup & late freeze-up
- Easier river/harder snow-machine travel
- Deep snow & ice storms-starving caribou (++)
- Shorter duration of duck occupancy
- Impacts to ground nesting conditions
- Increased fire frequency/intensity (++)
- High erosion increase

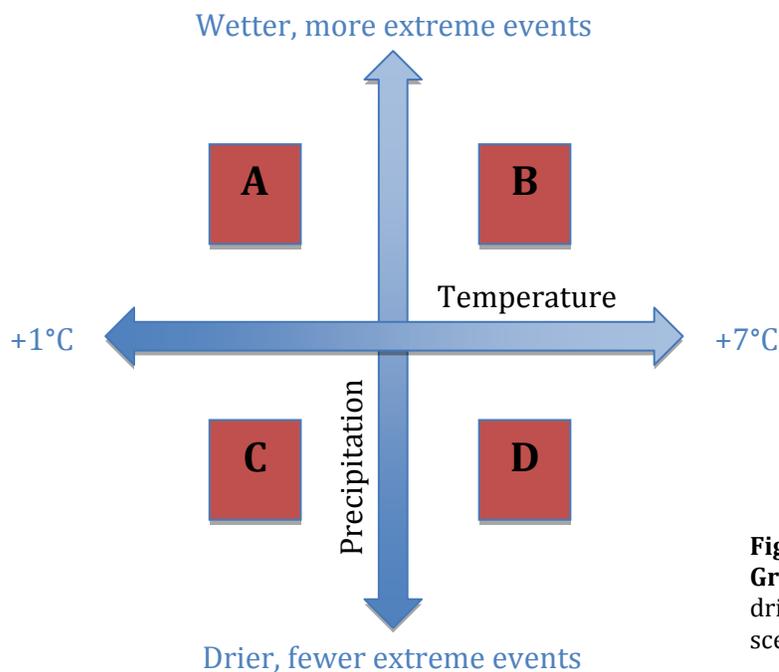
4) Warm and Dry

- Change in productivity of shore birds and water fowl
- Decreased water levels—difficult summer transportation on rivers
- Shift in peak flow—visitor season changing with hydrograph
- Impact for spring spawning fish populations
- Decrease in winter storage
- Increased active layer depth and decreased flow in some areas
- Decreased connectivity—impact fish migration during late summer.
- Increased fire activity

## Group 2

- Precipitation axis is still unclear, because snowfall and rainfall are such different things and have such different effects.
- What is the role of the PDO? It could increase/amplify or decrease/dampen projected temperature rise globally.
- What is the role of carbon dioxide?

Ultimately Group 2 decided to cross **Temperature x Precipitation** (Figure 6)



**Figure 6 - Primary Matrix, Group 2.** Selecting two primary drivers creates four biophysical scenarios.

From this, four scenarios emerged:

### **A = Blueberry Pie & Caribou = +1C and more precip/extreme events**

- Low to medium impact on cultural resources
- Flood events, bigger spring runoffs occur.
- Big snow events, snow persists longer.
- Short growing season.
- Less fires.
- More bugs, more disease (also human health issue). Distribution of yellowjackets changes.
- Permafrost remains.
- More and bigger wetlands. More biomass because more water.

- Migration of big game (caribou, moose). Caribou like snowpack (helps to protect from insects).
- Wet conditions affect pollen conditions: If it's raining at the wrong time the pollen doesn't spread and if it's raining at a good time then the berries will be big and juicy.
- More fog and cloudiness?

### **B = Wetastrophy = +7C and more precipitation**

- Increased flooding/extreme events affect cultural resources
  - People in communities have been forced to move because of flooding before.
- Permafrost thawing
  - Collapsing of food supplies (food security issue)
  - Release of carbon dioxide (accelerating the changes?)
  - According to climate researchers 5 degree of increase in temperature is kind of a limit for ecosystems, so 7 is very extreme and that it is hard to imagine what might happen.
- Steep snow, more icing.
- Vegetation changes, loss of tundra:
  - Lichen disappears, more shrubs, species migrating (happening already), more boreal forests (happening already in river valleys).
- Caribou suffer from deep snow, moose on the other hand succeeds.
- Loss of lakes, but also forming of lakes could occur. Does warming compensate the increased precipitation?
- Dynamic changes in hydrology are probable, changes in river channels (less rivers, less ponds, lower level).
- Artic water warms causing sediment flow changes and sea fish migrating to colder waters.
  - Pink salmon could move up to the north and new salmon species could replace it (in the arctic there are not so many salmon species there)
- More lightning due to more storms and more fuel (vegetation) thus more fires (if warming offsets the precipitation, then big fires).
- Loss of pollinators and phenology changes due to extreme weather conditions
- Dunes decreasing (stabilized) thus vegetation succession
- Expansion of active layer

### **C = “Hungry Country” = (drier, slightly warmer)**

Effects described by season ---

SUMMER:

- Small permafrost loss

- Low river level
  - Affects boat transportation
  - Migration of fish affected, fish spawning decrease
- Higher fire events
  - Reduced shrubs

**FALL:**

- Permafrost stable
- River level: extreme low
- Low berry crop
- Longer fire season with fewer late summer rains

**WINTER:**

- Small permafrost gain
- Low water freezes deeper – especially with reduced snow cover
- Less snowfall/less snow cover
  - Lower snow level kills off exposed tops of shrubs
  - Small mammal (subnivian) populations decreased
  - In turn affects owls, trappers
- Old berries aren't available through the winter – skinny caribou
- Drier wood for stove fires

**SPRING:**

- Permafrost stable
- Reduced stream flow
- Breakup is later
- Lower small mammal birth with reduced snow cover

**D= Smoked Salmon = +7C and less precip/extreme events**

- Major increases in fire
  - Deeper burning, longer duration
  - cultural resource sites affected, as well as current structures
  - reduced shrubs and lichen
- More thermokarst development
- Ponds and streams dry out. Ephemeral streams may disappear.
  - Loss of fish habitat
  - In turn affects water fowl
  - Loss of food harvesting opportunities
  - Decreased subsistence → migration to cities
- Transportation
  - Earlier breakup
  - Lack of snow cover for winter travel
- Significant permafrost loss/deepening of active layer
- Increase in riparian vegetation = Less favorable for caribou
- Potentially more moose



- Invasive plants/diseases/insect infestation
- Treeline moves north
- Fish dry better on racks

### Nested Scenarios

Each breakout group:

1. Places developed scenarios into crossed matrices: Degree of Societal Concern x Nature of Leadership
2. Fleshes out 2-3 scenarios within a sociopolitical context.
3. Develops narratives of what the world looks like for these scenarios to present a “story” rather than list of details.

### Insights/Discussion

- Significant change on the landscape could inspire more institutional support and societal change. “Big problems, big solutions” may seem implausible now, but we could see a major change in the next 20 years.
- In the villages, agency inaction → riots and revolution at a local level but not on a global level? Though we take global, widespread conditions into account, we are focused on our specific bioregion.
- Could it be useful to plug the same biophysical scenario into different socio-political quadrants to compare?
- “Wheel spinning” – Is it implausible that institutional support would be there without public support/societal concern? Perhaps an issue of scale – local concern vs. global concern, local support vs federal support?

### **1) Wetastrophy in Big Problems, Big Solutions (12 votes) = “Sweatopia”**

Describe the world in 2030:

- All villages on rivers threatened by flooding
- issues with permafrost thaw
  - High solutes in the water
  - Issues with food storage and preservation
- Subsistence concerns
  - Fish
  - Caribou
- Ice roads no longer feasible
- Enterprise teams of resource specialists to mitigate change, shadowed by interpretation team: PR
- Ample funding for mitigation/education

Major Impacts on the Bioregion:

- More boreal forest



- Succession
- Caribou\* – import woodland caribou from Canada?
- Replacement of traditional subsistence resources with:
  - More fisheries
  - More moose
- Fewer sheefish and whitefish, replaced with:
  - Innoko
  - Pike?
- Birds: major changes in migratory routes and duration that birds stay = some winners, some losers
- Tourism
  - caribou around longer (“Red Dog Cruises”)
  - demand for tourism increases
- TEK = now CEK (contemporary ecological knowledge)
- Increase in invasive species → NPS teams help prevent introduction of invasives

#### Issues Facing Management:

- Build fuel load (and more lightning strikes), so if there is a dry year, could have massive fires
- Emergency response for floods, fires
- Minor infrastructure issues in the parks (ranger stations)
- Major issues in surrounding villages
- Resource extraction demands increase (including REE)?
  - Ambler Mining district developed, operational
  - Be able to compete with mining and oil companies
- More roads built
- Adverse effects on cultural and natural resources
- Permafrost thaw
- Inventory and monitoring

#### 2) Smoked Salmon in Wheel-Spinning (8 votes) = “EDO”

##### Describe the world in 2030:

- Increased fire
- Low rivers, dried up ponds
- Decreased fish populations
- Early breakup, later snow
- New development mining
- Permafrost loss
- Lichen loss
- Increased predator(oil companies) control
- Increased insects & disease
- Increased shrub
- Reduced aquatic habitat



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- Culture resource loss due to fire
- Pressure from outside on decision making: lobbyist, oil money
- Decline in tourism "because Russia blew up Red Dog mine"
- Greater need for assistance in villages
- Less berries, less caribou
- Transportation restrictions
- Decrease or changes in subsistence resources
- Subsistence camps in parks
- Cost in fuel increase leads in urbanizations
- Back to nomadic life ways
- More intervillage transportation for trading reindeer/ caribou

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- New roads
- New fish hatcheries
- Structure protection from fires
- New BC ranger station & staff

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- Enticing ER messages
- Partner with popular groups
- Use cutting edge virtual technology
- Cadre of educators shared by agencies
- Multi-lingual interpreters
- Restrictions on hunting, competition for hunting grounds
- Increased tourism
- Wilderness issues (air traffic)
- Fire management shift to suppression
- More airplanes + pilots for patrols

#### Management Actions:

- Hard core facilitation training
- Hire/train technology innovators
- Partner with agencies (NHSA) for remote connectivity
- Well-funded meetings for all groups in an issue
- Increased fire staff for suppression
- More "fire wise" fuels reduction
- Infrastructure for tourism
- Technology & cultural resource surveys needed
- Greater need for fire ecology studies
- Coordinate data collection & analysis between groups
- Produce education products from meetings for community presentation



- Native life education in classrooms

### 3) Hot and Dry in Is anyone out there

#### Fire

- More on the landscape, more caribou habitat burned – and it takes a long time to recover – 60 to 70 years, and might not come back at all. Shrubs might take over, or it might burn again before lichens can come back. Post fire more moose habitat
- Call for fire suppression, call to change fire management plan, but that's resisted based on budget concerns. Little strategic planning, more spending on response. Status quo is "let it burn" and lack of pre-planning will tend to leave it in that category.

#### Subsistence

- People prefer caribou over moose for eating, but might be willing to switch
- Moose are currently much lower, order of magnitude.
- Cabellas hunter might stick around longer in the fall if it's warmer
- Increased conflict between local hunters and indigenous hunters
- Shorter time period in which to get caribou if they migrate later
- Current way of determining the hunting season would hold up ok, but the management system wouldn't deal well with the new competition in hunting.
- Berries reduced

#### Permafrost

- Active layer gets deeper due to burning off insulation, permafrost loss
- More degradation, more thermokarst, infrastructure compromised on communities, villages, water sources affected, loss of safe water.
- Slope failure due to thermokarst, mass waste, sloughing and slumping

#### Fish/Rivers/lakes

- Spawning affected due to water contamination
- More insects in water
- Some overwintering fish may do better with increased temperature, but salmon likely to suffer.
- Beavers make more dams, stop water from flowing freely
- Northward migration of invasive species
- Salmon shark washed up in Kotzebue
- Higher siltation, salmon species moving farther north
- Sheefish negatively impacted
- More southern salmon might benefit as they shift north
- Less access to harvest areas due to not being able to go up rivers in boats, reduced harvest of sheefish, chum salmon, whitefish, also less access for hunting Increased nutrients going into lakes
- Oxygen concentration in lakes decreasing, so fish kills occurring.

#### Ice



- Loss of what's left of the glaciers
- Thinner ice – winter travel hazardous with snowmachine, for caribou hunting, ice fishing, geese hunting
- Might get thicker ice due to less snow

#### Tourism/business

- Longer summer season makes tourism more cost effective
- Visitor use for non hunters goes up, enhancing the value of the park
- Birdwatching, sightseeing, river floating
- Some river floating may be curtailed by lower flow, but that affect would be minimal
- Economic opportunities to make money from these tourists
- Poor planning for new infrastructure to deal with increased visitor use
- More ice free days equals more mining activity eg Noble Gold
- Passing caribou should take precedence over mining, but little management might lead to conflict between subsistence hunters and miners, diversion of caribou migration
- Less season for oil exploration due to limited ice roads
- Lack of monitoring of air strips, land use, hunting
- Unregulated development , unregulated transport. People may not both to get permits for access.
- More visitors might mean more support for the park, more pressure to get funding to protect it, more TV time.
- Fewer bugs means better park experience for visitors
- Extended climbing season for Arrigetch.

#### Food and food security

- spoiled foods, greater dependence on groceries, less on soul food. Fatter kids, fewer teeth, health problems.
- Underground freezers are melting—ice cellars – increased costs and energy use from switching to electrical freezers.
- Aboveground caches useful for a shorter season.
- Contaminated food supplies
- A transition to gardening wouldn't occur systematically via education in the schools, because of lack of cohesiveness.

#### Wildness

- Its perception would be in danger, due to absence of a planned response
- Wildness is dependent on human intent – or lack thereof. More trash, garbage left by outside visitors, landfills filling up, outsiders deciding to stay because there was no one to tell them not to. Range expansion of Caucasian males.
- Loss of sense of Park mission – gap between agency tradition and where it finds itself going. Park is still trying to preserve things unimpaired, and is failing at that. Agency culture would lack resilience.

## Contamination

- Smoke from fires – impacts on health and on access. Air quality impacted by too many vessels
- Potential for gold, copper, jade mining – contamination
- New road across from Fairbanks to Bettles, across Kobuk.
- Decreased wetland extent, decreased birds, migratory birds. Ducks and geese would be hit hard. More predator access. Less geese soup, ptarmigan soup etc.
- Increased river erosion – Ambler already has a problem with erosion, might impact water supply line. Sewage lagoons might be compromised. Vacuum system might not work as connections shift, and communities might have to resort to honey buckets.

## 4) Wheel spinning in Wetastrophy

- Tourism: Parks near are going to attract more people because it's expensive to go far. Crowded villages won't attract the climbers and backpackers anymore.
- Vegetation: Shrubs are going to be fine, pine will probably be pushed back.
  - Conversation about communication: How to make people listen the message about climate change and the effects? How to make kids involved, how to educate, how to motivate?
- How to take advantage of new technologies: should hire people who are interested in using new technology in education. Group also thought of possibility to use public speakers.
- Wilderness was valued highly and the consensus was that wilderness shouldn't be sacrificed for development.
- Management:
  - Increased fire: The increased need for more fire ecology researchers was mentioned, and also the question of burn permit enforces. The group predicted increased human caused fires (e.g. from cigarette butts).
  - Fire control: inventorying, monitoring, knowing how to analyze information about fires was emphasized.
- The group also discussed whether there should be more regulations on pollutants like mercury and methane. There should be also more information about which resources are in threat (e.g. fish). The question about how to adapt to more poison was also asked.
- Subsistence: The consensus was that the subsistence opportunities have to be secured for communities, although it is up to the people whether they want to harvest or not. James also pointed out the question about whether the children know how to harvest and live in communities and if native lifestyle is dying. So if the children aren't interested in continuing there isn't



- much that managers can do. Ways to support managers should be found to educate. According to James communities have tried to incorporate new teachers with new skills and new technology to make children interested.
- The group thought there is more need for regulations to help to maintain the subsistence. Also again communication was emphasized and the ways people in villages could be reported on the things discussed in the workshop (TV?). The key point seemed to be to have an educator who would help representing the message from workshops to people.



## DAY THREE

### Narrative presentations

#### Group 1

##### *Hot and Dry in "Is Anybody Out There?"* **"Gussock the Tussock"**

Far to the north, where the grasses still grow  
Though the winds blow with smoke and soot when they blow  
And the rivers are silty and slow when they flow  
A young boy takes pause, 'cause... he just needs to go.

"Hey!" growls a voice, "Don't you pee on my head!"  
The young Eskimo jumps and his face turns all red  
He tugs at his pants and he swivels his head  
"What's that? Who are you? And what's that you said?"

The words spring from where a small grassy mound  
Competes with willows and shrubs on the ground.  
"I am the Gussuq the tussock, I speak for the land  
For the birds, and the rivers, the bugs, beasts, and sand.

Sprout, you are young, and to you this seems strange  
But I've weathered the years, and I've seen this land change  
Once, winters were longer, and summers were shorter  
And all of the north was much richer in water."

The child considers. "My grandma says that.  
She says that the berries were once ripe and fat.  
And grandpa says once there was caribou meat  
For every day, and not just for a treat."

Grunts the tussock, "There are few caribou now."  
They are gone." The Eskimo boy asks, "But how?  
And why? Why did the caribou go?  
And Gussaqa the tussock replies, "Don't you know?"

For seasons and decades and then decades more  
The climate grew different from decades before  
But all of you humans just couldn't agree  
And so you did nothing. Now what do you see?



The warm, early springs make the caribou late  
But the ice is too thin and it won't bear their weight  
Pale hunters have come where there used to be few.  
They rival and bitterly bicker with you.

The miners, I hear, have been doing the same  
Digging and dredging and scaring the game  
Our lake is all silty from sloughing and slumping  
And my caribou friends say there's also been dumping."

Young Sprout is nodding, but asks the grass clump  
"What of the guests who don't litter and dump?  
My father – he works with the folks at the park  
Who float and watch birds and don't leave a mark.

Gussuck still growls. "But what of the fish?"  
Sprout is uncertain. "There are some... I wish  
There were more in our cellar under the ground  
But our cellar is thawing, and the trout aren't around.

There's not much goose soup, it's too dry for ducks  
When Dad tries to go in his boat he gets stuck.  
Other kids like Doritos and pop..."  
Gussaqa snaps, "When their teeth all fall out, they will stop.

We tussocks are hardy," he goes on, with a groan,  
But you humans – you can't survive on your own.  
Your air is all clouded with ashes and smoke  
And the filth in your water supply makes you choke.

"Gussaqa," the boy cries, "I know it is true.  
Everything's changing -- but what can I do?  
There's no money, no answers, no one will agree...  
How can I get them to listen to me?

"Tell this story," the tussock says, quick as a wink.  
Tell them to plan, and to hope, and to THINK.  
Tell your people about all the changes I see  
And next time... watch out where you pee."



***Warm & Wet in Wheel Spinning:  
They used to call it breakup***

They call me Kalla – I grew up near there and have been running the Koyukuk/Kobuk road since I took over the trapline from my old man in the 60's – now I drive the route with mail, fuel, sourdoughs and cheechako's – it just ain't the same.

They used to call it break up, but now it's just mush. And I'm not talking about dog mushing. Spring's coming earlier; and it's not freezing as hard in the fall and winter as it used to. There's more open water longer; I've lost two snogos because I've gone through the thin ice twice. Stopped mushing dogs in the '60's and now I've given up on the iron dogs too.

Look at all the bushes and trees; they didn't used to be here like they are now. It used to be mostly tundra. And I mean frozen ground, not this mushy stuff you see now.

I never thought I'd see the day when I'd say this but this road to the mines would not have been built this way if the feds hadn't done such a good job working with folks. They helped get this great road that runs to the prettiest country in the state. There are a few places where you can get supplies rather than a bunch of things thrown up. They even look like the old roadhouses that used to be here back when there was enough cold weather for the old winter sled roads. The locals are working these spots, along with a few campgrounds and guiding from the recreation points along the road. Many are working at the mines - I see 'em coming back to the village every now and again. Bring some money home....it's not caribou or fish but I guess it probably helps. The way I see it, it is a damn good thing that there are a couple of families in each village doing things the old ways. It's got to be tough as they only thing there is more of is berries and I think that is what holds it together. The village even had to move to more stable ground that ain't so wet, but it looks like this site will last a good long time.

When the powers to be decided that the road was going to happen, they decided to do it differently this time. In the old days, we would just take a cat out and push a road in – you can still see evidence of that now back next to the old camps– usually all mucked up with a bunch of junk and an old blue tarp to hide it a bit. They've been working to keep the fish running and helping to keep a subsistence lifestyle possible. I don't know - maybe it's working. I had my doubts with big old culvers that were big enough to be mucked out with cats, but the water runs through better and the road don't wash out like some of those old cat trails did. There ain't a bunch of crappy weeds, either, as the State and Feds used clean pits and clean vehicles. That just helped keep the old creatures around to eat what they always ate.



Most of the other village kids I drive are working in town and every so often they pack up to come see the family/elders. They don't get as much chance to hunt and trap the animals because there aren't as many and some of them don't do what they used to do. But – there seems to be more younger folks staying around as they have some livelihood and they aren't all heading south to Fairbanks or Anchorage. I don't think my kids, Kiana and Ruby, would be staying out in the bush if it was just running a trapline in wet snow and soggy ground. It ain't the same, but it seems to work.

I don't know what the future will bring but everyone worked together to get a way into the mines and they did it by working together rather than fighting each other every step of the way. Oh - that doesn't mean that there weren't fights, but the fights were over how to do it better rather than just on the short term cheap – that didn't seem the Alaskan way at the time, but it looks like the final result will help keep most of the bush lifestyle while allowing people a chance to make a living.

I never get tired of driving this road and talking with folks coming home.

### ***They used to call it breakup***

My name is Joe – I have been running the Koyukuk/Kobuk since I took over the trapline from my old man in the 60's – now I drive the route with mail, fuel, sourdoughs and cheechako's – it just ain't the same.

They used to call it break up, but now it's just mush. And I'm not talking about dog mushing. Spring's coming earlier; and it's not freezing as hard in the fall and winter as it used to. There's more open water longer; I've lost two snogos because I've gone through the thin ice twice. Stopped mushing dogs in the '60's and now I've given up on iron dogs too.

Look at all the bushes and trees; they didn't used to be here like they are now. It used to be mostly tundra. And I mean frozen ground, not this mushy stuff you see now.

I never thought I'd see the day when I'd say this but the feds sure have done good working with folks. They helped get this great road that runs to the prettiest country in the state. There are lots of little places springing up all over making burgers and fishing trips. The locals are working all over these days at gas stations, campgrounds, up in the mines - I see em coming back to the village every now and again. Bring some money home....it's not caribou or fish but I guess it probably helps. The way I see it, it is a damn good thing that there are a couple of families in each village doing things the old ways. It's got to be tough as they only thing there is more of is berries and I think that is what holds it together. The village even had to move to more stable ground that ain't so wet, but it looks like this site will last a good long time.



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Most of the other village kids I drive are working in town and every so often they pack up to come see the family/elders. They don’t get as much chance to hunt and trap the animals because there aren’t as many and some of them don’t do what they used to do.

## Group 2

### ***Wetastrophy in Big Problems, Big Solutions***

James Nageak, Cheryl Rosa – ICAN Agreement, presidential address from New Noatak.

### ***Smoked Salmon in Wheel Spinning***

“EDO (Enoch Decadal Oscillation): Enoch Mitchell, Linda Jeschke – the world in 2012 compared with 2040, Google Earth file with locations of change.

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## **Management Implications & Actions**

“We use scenario planning to rehearse the future to avoid the management surprises.”  
(Jeff Mow)

### **Insights/Ideas**

- How do we apply all of the great ideas that have been brought up in the past few days to tangible, current issues that we are facing?
- NPS managers have an opportunity to engage rural communities in the dialogue with EPA.

### **Sweatopia Group – Implications & Actions**

#### Natural Resources:

- Wildlife species populations/compositions change
- Ecotype shifts
- Fisheries change
- Severe effects with heavy sediment, shifting river channels
- Permafrost degradation – thermokarsts, CO<sub>2</sub> & methane release, erosion
- WACH population and migration changes
- Disturbance corridors for invasives to move in
- More insects and arthropods
- Precipitation – more snow in winter, shorter season

#### Socio-cultural Resources:

- Significant erosion and damage to cultural sites from floods/thermokarsts
- Subsistence foods & preserving/storing methods change: food security
- Disruption in TEK sharing, but new opps for sharing with new media (Facebook)
- Transportation = snow season shorter, boating seasons lengthens
- Increased tourism → increased demand for facilities, services
- Increased need for integrating local knowledge and scientific research

#### Facilities:

- New ‘green’ facilities
- Increased development: hatcheries, tourism, mining
- Village relocation

#### Education and Interpretation

- User conflicts increase
- Public demands for information
- Increased use of less acceptable

#### Important Management Actions

- Amend the Organic Act & other NPS policies (new ICAN Agreement?)
- Collaborative scenario planning with communities
- Establish effective method of gathering community input Enterprise teams



- Implement more research, interpretive outreach, resource protection, etc.

#### Research & Information Needs

- Increased I&M, support/money for science-based data collection
- Needs assessment for ARCNI I&M
- Investigate potential issues with new species introduction (e.g., woodland caribou, fish hatcheries)

#### Other Issues?

- Enterprise teams
- Track & allow for range expansion, natural adaptation
- Cooperation with other large-scale climate change initiatives – reduce redundancy
- Increase local staff

### **Strange Bedfellows – Implications and Actions**

#### **Natural Resources**

- Changes in vegetation (introduction of invasives/new species)
- Change in range conditions and fluctuating ungulate populations
- Management of reindeer herds
- Shift in surface water/ groundwater
- Permafrost degradation affects water quality and flow dynamics (increased incision)
- Increased bear/human interactions
- Road corridor attracts wildlife and becomes a wildlife corridor for some species.
- Asynchrony
- Increased turbidity and reduction/loss in fish due to habitat changes
- Increased fire and change in habitat—increase in shrubs
- Changing wildlife populations
- Winter kill of caribou, small mammals, ptarmigan and overall reduction of ungulate species
- Increase in insect infestations

#### **Cultural Resources**

- Loss of known sites and un-surveyed areas
- Accelerate “ice patch” exposing archeological sites
- Increased exposure of cultural sites
- Retrogressive thermal slumps
- Cultural resource conditions will have greater importance
- Cultural landscape changes-negative impacts/potential destruction



## **Subsistence**

- Changes in sharing networks (disrupted/destroyed)
- Reduction in subsistence resources and opportunities due to changing wildlife/fish populations and access to fish populations
- Proxy fisher/hunter may take on increased significance
- Local knowledge as less useful (??)
- Current subsistence harvest regulations are no longer applicable

## **Facilities**

- Need for a “front country”
- Failure of infrastructure: waste/fuel systems, permafrost damage/settlement, need for new water treatment
- Need to expand or rethink infrastructure for new visitor pressure
- More casual visitors to the park and RV use—need to change facilities
- Change in standard practices for building
- Change in hydrology leads to need for potable water
- Increase need for renewable energy

## **Interpretation and Education**

- Increase in visitors—increased need for interpretation of resources
- Need to address the virtual visitor
- Need to engage stakeholders in meaningful ways so all can pull together on climate change need
- Change in view sheds

## **Resource Protection**

- Need for road-based and response capability

## **Important Management Actions?**

- Decide on new allocation scheme
- Expand and adapt monitoring and research needs as environmental changes occur.
- Integrate monitoring results with subsistence activities in the community
- Assess ways to attain additional climate data
- Increased attention to employee health and safety



- Reassess customary and traditional use (rely to both wilderness and subsistence)
- MRMT changes with changing environment (Wilderness)
- Need to reassess staffing and training needs in a changing environment (road rangers; traffic control skills)
- Park needs to decide it's role in road management
- Assess visitor use monitoring needs in regards to the new road
- Increase in federal-state-private-community collaborations and coordination. Collaborate on climate change research needs that are in common.
- Conduct vulnerability assessment, assess relocation needs of communities and assist with site selection and cultural
- Improve capability for rapid response to emergency situations.
- Acknowledge changing species populations and change baseline for monitoring
- Setting new harvest allocations b/c of changes in fish/wildlife species

### **Research & Information Needs?**

- Need to conduct ungulate surveys
- Research to understand predator/prey relationships
- Documenting newly emerged cultural resources
- Vulnerability and risk assessments of known sites and unsurveyed areas
- Increase survey and assessments
- Prioritize site protections
- Research interplay of groundwater and surface flow
- Sustainability assessment for green development
- Need for more climate monitoring stations
- Assess the carbon footprint and sustainability of energy and design locally appropriate
- Increase coordination of research efforts.
- Share best management practices on science, adaptation, mitigation, implementation and communication.
- Need to understand changing subsistence opportunities and sharing networks
- Need better soils surveys and maps to document permafrost integrity and composition (ice content)
- Need for renewable energy generation in a distributed manner

### **Other Issues?**



- History may not be the guide for management in the future—New focus: how to protect basic wilderness values?

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**Other notes:**

- What is traditional/customary use? The process is customary (go where you are able to)—not the route itself.
- Wilderness is based on lines drawn on a map: cc is going to change these areas.
- Next time: populate the implications before the discussion. Focus the discussion on management actions.
- Comparison between groups—are they similar? Interesting to see where are/are not

**Gussuq the Tussock – Implications and Actions**

- **Natural Resources**
  - Fire, biome shift, hydrological/permafrost changes
  - More fire
  - Increase in contaminants/infestations
  - New ecological communities: fish and wildlife (winners & losers)
  - Shallower water on the Kobuk—potential for contamination
  - Changing transportation (winter and summer)
  - Changes in biodiversity and communities (asynchrony)
  - Increase in invasive plants/animals
  - Change in water bodies across environment—species that go with them (beaver)
- **Cultural Resources**
  - Exposure/loss of cultural resources
  - Talk about community survival. Shift from subsistence/traditional villages. Potential loss of subsistence communities
  - Contemporary Ecological Knowledge grows
  - Community changes with changing role of elders
  - Connectivity of communities with other resources
  - Greater opportunity/need for a cash economy with decline of subsistence. Growth of agriculture and farming
  - Challenge getting fuel into communities
  - Potential shift to dog team use—increase in use of fish
- **Facilities**
  - Fire threat to infrastructure is up.
  - Need to help inholders to mitigate fire damage

- Human waste systems impacted—potential to impact water quality
- Lots of bandaids to fix systems
- **Interpretation & Education**
  - Changes in available food resources—education for health/harvest techniques
  - Education one thing—also important to change habits (work with values/behaviors)
  - Educate public and NPS staff about what the mission is that managers are trying to accomplish
- **Management Actions**
  - GT
    - Regulations for fish and game need to change to provide access in changed conditions
    - Climate change needs to be brought into interagency discussions
    - Need for new/different types of expertise and more well rounded staff (contaminants, etc...)
      - Awareness of challenges in rural AK
      - Emergency response/hazmat
- **Research and Informational Needs**
  - Better baseline information—esp. hydrology (temp/flow), inventory of what is out there
  - Vulnerability assessments (sensitive ecosystems, communities & economies)
  - Disease transmission monitoring
  - Better conservation planning
  - Need to manage the change with limited knowledge

### Common Management Implications

- John group : Warm/Wet and Warm/Dry scenarios, high agency support
  - Enterprise teams—ability to address issues quickly
  - More efficient facilities
  - Need to hire and train new technology innovators
  - Need to create a highly efficient meeting structure—to develop the capacity to send people home with materials to share
  - More local hire to deal with staffing needs
  - Need for good data sets and share analysis of data sets. Need to have comprehensive monitoring system to track new changes as they occur
  - Need managers who can be facilitators—not presenters
- Nancy group
  - Collaboration and coordination
  - Need to get buy in from larger community

- Need to have appropriate staffing for new issues and understand rural Alaskan issues
- Recognizing that the baseline is changing—change monitoring based on changes
- Need to look at implications of changing hydrology
- Many issues re: facilities—need sustainable designs for roads/buildings. Need to think smartly about system
- Assessment of infrastructure and where breaking points are
- Assist with community shifts to find alternatives to subsistence (farming/agriculture). Need strong educational effort to parallel.
- Decision-makers need to be grounded with community perspective.
- Proactive choices about how we will manage (let it go/try to keep it the same). Sometimes this will mean planning to do nothing.

### **EDO – Implications and Actions**

- Some of these might be things we already thought would be good to do—are they out of the box enough?
    - Feel like there is some brain-stretching, but also interested in how some of the things are common across
    - Also need them to be appropriate for local communities
  - Did the issue of responsiveness come up? Yes, esp. in terms of subsistence resources.
  - Sustainability as a way of doing business-integrate into all parts of management
  - This process expands our perspective—makes us think about our decision space. We aren't often used to looking at the large picture.
  - This addresses the what (collaboration) but we aren't looking at the how (that is the hard part).
  - Process also helps to reaffirm what we are already doing
  - Worried that this isn't out of the box enough for how to do this—we need to get pushed a little further—need people who are experts at helping us think larger.
  - Potential to start reindeer herding, woodland caribou/bison and introduce replacement fish
- Increased fire
  - Low rivers, dried up ponds
  - Decreased fish populations
  - Early breakup, later snow
  - New development mining
  - Permafrost loss
  - Lichen loss
  - Increased predator(oil companies) control
  - Increased insects & disease



- Increased shrub
- Reduced aquatic habitat

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- Culture resource loss due to fire
- Pressure from outside on decision making: lobbyist, oil money
- Decline in tourism "because Russia blew up Red Dog mine"
- Greater need for assistance in villages
- Less berries, less caribou
- Transportation restrictions
- Decrease or changes in subsistence resources
- Subsistence camps in parks
- Cost in fuel increase leads in urbanizations
- Back to nomadic life ways
- More intervillage transportation for trading reindeer/ caribou

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- New roads
- New fish hatcheries
- Structure protection from fires
- New BC ranger station & staff

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- Enticing ER messages
- Partner with popular groups
- Use cutting edge virtual technology
- Cadre of educators shared by agencies
- Multi-lingual interpreters
- Restrictions on hunting, competition for hunting grounds
- Increased tourism
- Wilderness issues (air traffic)
- Fire management shift to suppression
- More airplanes + pilots for patrols

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- Hard core facilitation training
- Hire/train technology innovators
- Partner with agencies (NHTSA) for remote connectivity
- Well-funded meetings for all groups in an issue
- Increased fire staff for suppression
- More "fire wise" fuels reduction
- Infrastructure for tourism



- Technology & cultural resource surveys needed
- Greater need for fire ecology studies
- Coordinate data collection & analysis between groups
- Produce education products from meetings for community presentation

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- Native life education in classrooms

#### Comments:

- Reality check with native people (what's actually happening, is these scenarios possible?)
- Documentation from native people
- Paying for natives, compensating the knowledge they share (experience in earlier workshops)
- How to approach native people
- Enterprise teams key people
- New green note: Appropriate compensation to rural communities for valuable in food & loss of resources

#### **Common Implications & Actions – All 4 groups**

- Hire/train technology innovators
- Partner with agencies (NHSA) for remote connectivity
- Increased fire staff for suppression
- Infrastructure for tourism
- Coordinate data collection + analysis between groups
- Produce education products from meetings for community presentations
- Native life education in classrooms
- Collaborative scenario planning area communities
- Amend NPS policies to address CC: review, refine and make relevant
- Support for science based information to inform decisions
- Enterprise teams for response to climate change impacts
- Increased energy efficient facilities & vehicles
- Needs assessment & GAP analysis or ARCN I&M program
- Track & allow movement of new species expanding area
- Enterprise teams cooperate with composed of other local, state & federal personnel
- Need to address increased staff & more local hire

#### **Next Steps: How do we move forwards?**

- Alaska region is the first group to take scenario planning on across the region
- Comprehensive report will be written up afterwards
- Power point summary will be created to share with other people
- Draft report will be created and shared with this group
- 2005 is when scenario planning started
  - Work with GBN to develop how-to manual
- We've done it. Where to go from here? What is this good for?
  - Reasons: 1) education—develop scenarios, identify where confidence and uncertainty are, 2) charged with inserting climate change in the planning documents.
  - Other elements: 1) funding to develop interpretive/educational projects with USGS and SNAP.
  - Need your thoughts: where should we go from here? How can we make this more usable?
- Educational products
  - Audiences: you (this group), others (the public)
  - Website is built and will be put online.
  - 2-pg flyer giving framework
  - Exhibits/displays in the Parks
    - Need to know what you want—what messages to convey
  - Pod-casts and videos
- **Feedback from audience**
  - Parks should take the lead—the purposes of the parks haven't been mentioned. Confusing about how this matches with missions of the parks. Realize that villages/parks are interconnected, but seems like this isn't focused enough on wilderness. Feel like we are beyond our reach (Roger).
  - Can see application to project planning immediately. Think that this can immediately inform management (Joe)
  - How cc can inform NEPA: might be important to consider different future situations. New guidance coming out. Need to alter alternatives so that you think about the potential implications.
    - Could occur during scoping (Nancy).
  - Who is the audience? (Jon)
    - You are: park management, resources, operations and stakeholders. (Bob)
    - Need to frame/tailor outreach to local communities with simpler concepts.
    - SE Alaska—would like to do this in local communities (Tlingit-Haida). (Bud)

- Key communities that might be interested in the process
- Could work with EIS/EA process
  - Way to address potential impacts of future development
- NW Arctic Borough—would be great to approach them.
  - Broad-scale (regional) approach is good b/c people are tied to land/communities
  - Gravel source for community may be within the park
- Managed as islands in the past, but were they ever one thing? Were they always changing? (Bob) We need people outside parks who care about what is happening inside the parks.
- In the future may spend more time in orientation phase. What interests/purposes are we managing for? (Nancy)
- Report of the workshop will occur—what more do we need to do?
  - Try to take this report and connect it with policy makers. Start the conversation and figure out how best to communicate with policy makers.
    - Presentations to inter-agency policy groups
    - Want to reach out to tourism community: Alaska tourism industry meeting next fall—what kinds of boats/buses should they be buying?
    - A lot of our ability to address will be about funding—need to start working on it early.
- Projections of climate change
  - Many different projections (temperature/precipitation/permafrost/etc...)
  - Community chart with projections for temperature and precipitation change online
  - Products will be on a shared website
  - Poster regarding the process of scenario planning
- How can products be fun/engaging and not misleading
  - Present scenario to community and get the community to respond/engage with the scenario and flesh out the impacts and how it will relate to resources. (Jon)
  - Way to communicate—left v. right brain. (Bob). Some will like the tables, others will like the story.
    - Problem of one story—being misinterpreted. Need a preamble to frame it.
  - Confusion about what process is about—feels like this is a good process—something that can help the communities. Take each of the issues and work through

them, but this is a lot of detail. Want to contribute because he is from Noatak. Easier to get up than to talk. God gave two ears and one mouth—hear more than talk. When the ears go bad need to use eyes. Two demonstrations (Inock):

- Tell the story: Go out to the house, can't get out on the ice b/c too dangerous to get through so shoot the caribou and spear it and go home.
- Using motions communicating with boat driver and motions of rifle, waiting for it to turn just right—shoot it. Grab his spear and wait for the bouy to come up, pull it up. Holler: We got it! Alright!
- He could tell this story in two ways, but you can't understand the joy/details of the hunt. Communicate the emotion, not just the story. Demonstration was easier to understand. See the details in a more specific way.
- The way the story is told is very important.
- Looking at implications/actions chart. These things are written on papers but it doesn't tell the specifics. They aren't just berries but big juicy berries that you find on the high bushes. Less caribou—you can understand, but you don't feel it.
- Communication needs to be more detailed. Need to show it.
  - Videos might help to show this.
  - Did the stories work for you?
- Workshop at Denali with scientists/artists
- Scenario is like Moses walking down the mountain with two tablets (James)
  - One: implications and actions
  - Two: release your anxiety, heartburn and constipation
  - Go back to his hope: 85 aunty, cousin: can he present how he heard about PDO and climate change, can he talk about thermokarst and ecological oscillations and carbon and it is all right in your backyard. I don't think many people would understand what he was saying.
    - Presentation in his own language about the caribou and what it will mean for the caribou.
    - Need to inform in his own language this message—to a very specific population.

- Comment: talking in your own language, I feel like an alien. We are often talking like that and make you feel lost.
- May want to interpret some of this in Upiat, Might be good to present some of the ideas in theatre—might have a more emotional impact (Bud)
- There are ways of telling stories in your language/culture. They make a “motion dance” after hunting. His son composed and made a motion dance for his father—a whaling dance song.
  - This might be one way of storytelling
  - Can feel the emotion from the stories. Webinars and teleconferences are hard b/c emotion isn't there.
  - Science requires removal of emotion—but there are many ways to communicate.
- How to best communicate what we've learned?
  - Bullet lists of ways that people have created scenarios in the past—will provide all the past narratives
  - Pod-cast of Inupiat dance or James telling about the process
  - Multimedia presentation. Could make it really interactive—instead of presenting it to you you are a part of it. Could develop an app to interact with.
  - Need to have a whole batch of ideas in order to move forwards. Ideas:
    - Video interview with James/others. Have videos of these events—pull them together—make it real.
    - Create different stories with information from scenarios—can animate the story.
    - History channel has great way of doing this
    - Need colorful captivating story
    - Work with children to create stories
      - Need to bring future into the room
- Scale has been an issue—what scale to do this at?
  - Started out with one training workshop
  - Inventory/monitoring networks/regions
  - Scale of the issues is very broad—not particular parks/resources
- Next step: follow-up webinar with draft summary report: 4/13/12 at 1pm
  - Will get more feedback
  - Who should be at the workshop? Provide advice.
  - Thanks to everyone for being here.



- Quote from Ang Sun Su Ji: I don't believe in hope without endeavor.