Interior Alaska / Dene Regional Listening Session Notes

Record summer rainfall starting in 2014, summer rainfall 3rd highest in over 110 years.

Denali Park past 6 years have been warm and wet, rains in 2019. August after snow melted in March. Tremendous impacts from variability more than averages. We've transitioned to something different.

Climatic Change article defined "summer temperature regimes," multi-decadal, tree ring growth so responsive to warm and dry, cool, and moist, able to run reconstructions back for 200 years. We can have multi-decadal periods of time, cool-moist, warm-dry. Never had warm-moist. Warm-moist regime is unique in that time window. Barber, V.A., G.P. Juday and B.P. Finney. 2004. Reconstruction of Summer Temperatures in Interior Alaska: Evidence for Changing Synoptic Climate Regimes. Climatic Change 63 (1-2): 91-120.

Dave Swanson is looking at the same thing for Arctic parks. Driven by warm summers in 04-05 vs drought stress or moisture issues. 04 was summer warming, more recently, all seasons.

Precipitation in fall over last 6-7 years – eventually that would fill soil profile. What is causing that? Snow has little moisture in it in his area. Seems like precipitation in summer and fall would be much more valuable to fill up the soil.

In forests, boreal forest trees are very shallow rooted. All the nutrient availability is right at the surface. The dependability factor, the one thing the trees could depend on was the melting of the accumulation of 5-6 months of precipitation and soaking into the ground. Trees do a lot of growth early on and depend on snowmelt infiltration to be a source of moisture that they really rely on. Lag effect in growth of tree rings. Snowmelt is golden. Cold-climate, conifer-dominated forests.

Annual crops rely on spring rain. We have 2" less snow than stubble height. Very little is absorbed into the soil from snowmelt. Windbreaks every ¼ mile capture snow that melt into fields, slowly. No-till practices help with soil moisture such that crops can germinate and ripen more evenly.

Drought doesn't have to be a significant precursor to fire season; more fuel to burn and hotter burning fires in drought years, but droughts don't have to be extended.

Early snowmelt can lead to early fire season, but this doesn't necessarily indicate a more severe fire season. Lightning is a more important condition for indicating how much area will burn. Lack of precipitation in June and July can have a much greater effect than lack of precipitation earlier.

Does low precipitation in winter constitute a drought, even if there's a "good" snowpack from October and November before precipitation shuts off? Said another way, if early winter snow is adequate, is it a drought if precipitation is below normal in mid-winter. Answer: Yes, it's a meteorological drought but may not have impacts.

Summer impacts of drought were summer wildfires (particularly August), low drinking water and streamflow, disrupted water transportation, fish die-offs, ecology issues around permafrost (low amounts of melting permafrost), poor hunting conditions.

Can get water increases in rivers near glaciers over hot periods. Any rivers which drain the Alaska Range will have significant glacial contribution, Brooks Range, these days, is more rain driven, as glaciers have melted off. Without large amounts of data, important to use what you have, taking care to properly interpret it.

In tree growth, soil temperature study with 29 sites, seeing more deciduous vegetation, which stores and uses a lot of water. Removing snow melt is devasting to spruce. Trees can handle changing or low precipitation for 25 years, but changing or low snow melt is death in two years for spruce. Deciduous trees love disturbance.

Conifers are the most vulnerable trees to water stress.

Can farmers afford to buy no-tillage drills? Bob is advising gardeners on how to increase mulching to reduce need for water. Alaska cannot grow much food. Alaskans can grow cool season crops, and maybe more under increasing drought conditions.

2013 poster-child year for drought and wildfires. Already seeing more fires because of quick succession of deciduous plants following fire. If there were deciduous trees prior to fir they will be first to rejuvenate.

Fairbanks

State of Alaska and USGS have (or at least had) near real-time data from a few wells in the Fairbanks area, but much of our info comes from less formal interactions (casual conversations).

Observed lots of spruce cones last Fall (2020).

Roads impacted by high snowpack in 2018, and rains in 2020, as road had to accommodate more water – more potholes. Noticed a continuing warming trend. The area reached - 50 degrees in previous years, but now the temperature rarely gets reaches - 40 degrees.

There has always been a challenge with rains at the end of the summer – conductive precipitation. Just from increased temperatures, we will have more conductive precipitation, more lightening, and more wildfires.

Galena

It is difficult to define drought as well as its impact to different plants and animals. Spring lake recharge (and early season water level in grass lakes) is not dependent on winter snowpack alone. If a dry fall precedes a winter with heavy snowpack, a lot of the snowmelt will seep into the soil and lakes will not fill. Likewise, when the fall is wet and soils are saturated at the onset of winter, even a low to average winter snowpack can result in increased snowmelt runoff into waterbodies.

In 2019, we had a dry summer and then record snowfall in 2019-2020, which resulted in a huge crop of white spruce cones.

The strategy of producing bumper crops of cones/seeds in the year following a hot dry summer has an adaptive benefit for white spruce. White spruce germinates on bare mineral soil following fire, but the cones do not survive the fire the way black spruce cones do. So surviving white spruce adjacent to burns are the seed source to regenerate the population in burns. When a large seed crop comes the year following high fire conditions, it helps ensure seeds are available for burn colonization.

Delta Junction

South winds dry the area out quickly. Last year had more convective rains. Local farm is dependent on weather conditions. Baling of hay has been challenging due to wetter seasons. Wet hay can deteriorate and is difficult to bale. The convective precipitation makes it difficult to tell when best to bale hay, which can lead to economic costs because hay goes bad and hard to sell. Convective precipitation is hard to forecast.

Usually gets 14” of liquid precipitation (rain & snow).

Adaptation / Actions

Assisted migration for natural vegetation and crops.

Forestry, drought, climate papers to consider for developing drought metrics/impacts

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