MAINE CLIMATE COUNCIL
Science and Technical Subcommittee (STS)
3rd Meeting – December 17, 2019
1-4 PM
Marquardt Building, Room 118, 32 Blossom Lane, Augusta

Members in attendance:


1:10 Welcome
1:10 1:25 MCC Update/Web and Communications
- Working groups (WGs) are now in their 2nd and 3rd meetings this month
- Some STS members have been attending other WGs to establish those linkages
- WGs are narrowing down their scopes of work, topic areas, and informs what strategies they will be recommending
- Also, several are identifying subgroup needs
  - Land use development has been identified as one area for a specific cross-WG subgroup
- MCC website is continually being updated with meetings, working group specific content, and with supporting resources.
  - Interested in hearing from members on resources to populate to the website
- GOPIF has just released an RFP for cost-benefit analysis, to find a vendor that will help perform economic feasibility analysis, and of emissions reduction pathways for different strategies
  - RFP proposals are due 1/10
  - Work will occur into spring and support the needs of all working groups
- MCC meeting January 29 at Augusta Civic Center. January 30 is snow date.
  - Will bring together all working groups and science and technical
  - Cover new emissions data from ME DEP
  - Will include report outs from all the working groups on progress so far

Q: should drafts of reporting be added to the website? No, not if a draft, and those can stay in the team site. Once more complete, can be added to the MCC website.

1:25 1:30 Framework for the Afternoon Discussion
- Goal for today is to walk through the status of each of the subgroups reporting and how that can be best delivered to the Climate Council for their January 29th meeting
- Are looking to cover exchange across the groups on both what they have done, and also what they may need from others
- Please keep in mind that the phase I report may be more comprehensive, and likely will be, than what is presented to the Climate Council on January 29th.
- On the template
  - the highlights sections will essentially be the executive summary that will be compiled across each of the subjects

**Progress Reports - Lead Writers and Others.**

**1:30 1:50 Climate (Sean Birkel Lead)**

- meteorology, climatology
- hydrology

- Covering: Temp, precipitation, extreme weather, drought
- Looking for input on ecological response
- Temp
  - Range is 1900-2100
  - NOAA data
    - Figure
      - Annual mean temps, and differences summer and winter min temps
      - Trend – overnight lows are increasing
  - Figure using RCP (CMIP5) 2.6, 4.5., 8.5., NOAA, and historical
    - CMIP6 to some extent can be used, but not wholly, not ready yet
  - Figure on natural and anthropogenic + natural forcing
    - Trend – uptick in temp since 1960s, and shown only when including anthropogenic
    - Question: what is lag in response? Depends on part of climate system. Could add section in the report to cover this. For example, the dips correspond to volcanic eruptions (aerosols).
  - Figure season length, and figure growing season (determined by freezing events, monthly means)
    - Trend – summer ~2 weeks longer, winter ~2 weeks shorter
    - Trend – growing season lengthening by ~16 days

- Precipitation and Drought
  - Precipitation trend increase ~6” since 1895, with significant increase recently, and climate models show increasing on avg. annual; however, can still see drought, but not yet an increase incidence in drought
    - Lowest rain and highest rain both came in the recent past

- Extreme Events
  - Have created a list of events and impacts
    - Have been documented to be increasing, perceived to be, or not yet determined
    - Will include wind storms
  - Heavy precipitation has been a major focus for communities
    - NCA4 55% increase in annual heavy daily precipitation
    - Looked at example for Farmington, what was increase in number for 1”, 2”, and 3” events
Example, Summer in March 2012 – record for that day was beaten by 17 degrees F (record back to 1893)

Example, wind storm Oct 31/Nov 1
  - Seeing increased likelihood of development of heat or cold waves due to changing weather in arctic
  - Possible teleconnection

- Late-Winter Snowpack
  - Decrease depth, increase density

Question: it may be helpful to look at what ‘we’ have done to control sulfates, and in turn the degree that has impacts on climate change.
- Answer: could include some reporting on effectiveness or degree that clean air act has made an impact on human caused aerosols

Hydrology
- Timing of snowmelt – related runoff
  - Trend is towards early flooding events
  - And increase magnitude and frequency of small floods
  - Signal is less clear on degree large flood events are changing with climate change
- Heavy precipitation events are increasing
- Changes in snowpack and antecedent conditions
- Projected 100-year 3-day peak flows, are decreasing
- Lake ice-out dates (records back as far as 125 years)
  - Overall, all are coming earlier around the state
- Groundwater
- Streamflow
  - Little significant change in 7-day

Question: Looking for people to provide expertise on lakes, harmful algal blooms, stream flow

1:50 2:10 Marine (Andy Pershing Lead)
- SLR, SST, OA
- Ecosystems and Biodiversity

Sea Level Rise
- Have created a number of bulleted highlights
  - Flooding
    - Sea level rise trends, rates, over time (several millions of years to present), will include discussion of abrupt sea level rise experienced more recently and some impacts on beaches (as example of how these are significant to impacts), includes sea level rise scenarios including probability of scenarios, nuisance flooding (occurring at high tide, and is occurring more frequently and may be an area where people may focus more), geological history (isostatic rebound, etc. in context, that is currently mostly done/not occurring).
• More than half of the sea level rise is from after 1993
  ▪ Storm surge
    o Erosion
      ▪ Discussion of sand dunes, bluffs, beaches, marshes, coastal management policies, coastal barrier resources, shoreland zoning
    ▪ Discussion of mechanisms that can create flooding/over-topping, migration of systems or not, and erosion rates
    o Starting to work on description of priority needs
      - Can include SLR maps for Climate Council presentation in January, and could do by county

SST, OA
- Can utilize work done for GOM 2050 International Symposium papers
- Figure - sea surface temperature change using scenarios (using RCP 2.5 and 8.5)
  o 1900-2080
    o Annotated scenarios with points where climate would feel like that of RI, or in other words, at this temp, Maine would feel like RI.
- Diagram – triple threat from ocean (temp, less oxygen, more acidic)
  o May also include message on how we can focus on certain risks among these, but may not focus on others

Ecosystems and Biodiversity
- Ecosystem team is working with the sea level rise team
- Sent materials around for others to review a few weeks ago
- Also communicating with transportation group, specifically on shipping
- Potentially will look into blue carbon
  o 2018 TNC identified 12 natural climate solution pathways in US. Could focus on wetlands, and ability to capture carbon. Could inform management strategies - eelgrass and marsh restoration
  o Also has good information on forests and agriculture
- Also plan to report on green crabs
  o Trends in population changes with temperature changes, and impacts on shellfish as a result of population increases with warmer temps
- Looking at changes in lobster abundance over time
- 2019 thesis looked at carbon footprint changes in lobster fishery with changes in harvesting, closer or further to shore....
  o Found that could be a carbon reduction in fishery with specific changes

2:10 2:25 Forested Landscape (Adam Daigneault Lead)
- Forests
- Ecosystems and Biodiversity

- 83% of state area Is forest
- Annually sequester greater than 50% of state emissions, not at 100%
- Transitional ecosystem, temperate hardwood of south, migration north
- M. Janowiak assessment
- Tree species winners and losers
  - Birch and maple biggest winners
- Greater variability of forest productivity
  - Greater push towards hardwoods over time
- Biomass and carbon impacts
  - Biomass and C stocks could increase by 7% relative to 2010 under RCP 8.5, land use change could reduce carbon stocks by 16% in next 50 years
- Forest management and operations
  - Greater reliance on adaptive management and flexibility in operations

Biodiversity
- Will be getting together in January, with members of the other groups to discuss linkages
- At an ecological transition zone, species at southern end and northern end of ranges
- Relative to northeast, ME has high biodiversity b/c of transition zone
- Bullets on knowns/unknowns on species, range shifts, behavioral changes, etc. as a result of climate change – winners and losers... and unknowns
- Message on conserving Nature’s stage – conserve geodiverse landscapes
- Can utilize 2014 Manomet species/habitat study and vulnerability to change
- Also 2015 State Wildlife Action Plan, 378 species vulnerable to climate change, break out taxonomically vulnerable
- Messaging on ecosystem case studies.
- Looking for examples that people can relate to across different habitat types
  - Moose and winter tick, 70% calves dying from anemia
  - Birds study by Audubon showing that with 3F warming scenario, the vulnerability of different species groups by habitat type
  - Aerial insect biomass, on natural protected lands saw 75% decline
  - Lynx highly vulnerable to less snowpack, and also can increase conflicts with bobcat as there is less snowfall (bobcat move north with less snowpack, and push out lynx that are there)
  - Seabirds, increasing temps, decreasing ocean productivity
  - Brook Trout, increasing storm events, more sediment, warming waters, and ME is also identified as last stronghold for this species

Question: should include veterinary piece, so we know that someone is covering it

2:25 2:40 Agriculture and Food Systems (Glen Koehler Lead)
- Crops and Soil Health
- Dairy/Livestock
- Food Systems

- Effects on Maine AG are mixed
- In a 30-year timeframe, going out to 2050, b/c is meaningful to sector, and most times are looking at a few years, even more so are looking at day-to-day, month-to-month timeframes
- Overall will be messaging on incremental changes, rather than to focus on rapid changes, but need to remain cognizant of more rapid changes
- Overall change mean adapting within a growing season – and are adapting to weather as opposed to climate change
  - E.g. if flooding happens at end of season
  - E.g. if frost does not allow starting earlier, or does allow starting earlier
- Crop insurance is a likely management strategy to buffer variability
- Trend currently is towards environmental management, such as irrigation, as opposed to relying on rain. Same with hoop houses, and netting. These strategies may become even more important.
- CO2 fertilization effect, in controlled settings may be demonstrated, but not clear in outdoor environment, and also does not necessarily translate to nutritional density/changes.
- Pests tend to thrive in systems that have a lot of disruption, and so will need to be cognizant of this; however, don’t see major changes/new pests yet. We are seeing new pests but are coming primarily from movement from outside areas into Maine. Once established here can exacerbate under climate change conditions.
- Also, what happens outside of Maine affects growing in Maine, b/c is market driven and primarily by cost. Ex. apples from Washington, even if transportation cost is there (small overall), we may continue to get apples/crops from west unless it gets to point where those regions cannot grow these crops.
- Hay is biggest crop in Maine. Relates to carbon storage. Specifically, in how we determine to account for this from a cost/payment credit system. If implemented, may need to be based on management practices.
- Potato 55K acres
- In last 5 years, Maine has doubled cover crop % up to 85%. Is about 50K acres in Maine, but compared to other states’ acreage we are a small amount. Matters in terms of any federal policy and funding support.
- Seaweed > cow diet, lower methane emissions
- Soil sequestration will become important, and so a data need is to determine how much net carbon is stored.
- Large portion of Maine food comes on I95 through NH across bridge. If something were to happen to the bridge, a major storm, etc. we could lose a large amount of food quickly, as turnover on shelves could likely be a couple of days
  - Could connect with food suppliers to see what their operations/management systems are
- Could look at productivity curves, or at least include some information on how we ought to be able to keep up with productivity in order to meet population needs.

2:40 3:05 Human Health (Rebecca Lincoln Lead)
- One Health
- Environmental exposure > health outcomes
- Areas of research need are better linkages on several health outcomes back to environmental exposure
- Have made initial priority focus areas for climate changes in Maine as they relate to health impacts/outcomes we are seeing/likely to see
- Break out to direct and indirect impacts
  - Direct – heat and cold illnesses; flood and storms; winter/storms
- Data needs – projected number of extreme heat/cold days; projected measure of extreme precipitation
- Figure – change over time heat and cold related hospitalizations
  - Have adjusted data available by age, gender, etc.
  - Is it possible to forecast these events?
- Figure – as a result of 75 vs. 95-degree days, see about 10% increase in ED visits and deaths. Looks like Maine be more vulnerable to this than other states, and may be b/c low air condition prevalence
- Also, looking into food and water-borne diseases, and air quality
- Cross-group work with ag group will be helpful
- Figure – on Lyme disease over time
- Figures together – showing that as growing season gets longer, relates to tick survival
  - Also need to look at deer population and invasive species, that are both linked to deer tick survival. There may be other factors contributing to a recent levelling out.
  - Don’t currently have a population of lone start tick, but there is in MA, and may be here in the future
- Example, 2009 first outbreak of EEE and several horses died
- Air quality
  - PM and Ozone
    - Compared to rest of country, ME is generally in better shape.
  - Pollen is growing concern they may focus on
    - Currently have a data gap, only two stations in Maine.

3:05 3:20 Maine’s Economy (Jonathan Rubin Lead), presented by Adam Daigneault

- We know what the important sectors are and what they contribute
  - Started to put together data on what sectors contribute
    - Portions of GDP – and focused on sectors of concern
    - Could also look at how this breaks out geographically
    - MCC needs to look at economic impacts in different sectors and regions
    - Does not currently include lifeline sectors, adaptation needs
  - But don’t have good data on impacts to those sectors
- GHG and GDP decoupling figure
  - Should look at other market forces, e.g. what happened to emissions from paper mills as results of RGGI or from other market forces.
  - Should we look at displacing emissions elsewhere by changing our in-state practices/management strategies – e.g. if manufacturing moves out-of-state the emissions still exist but are coming from somewhere else. Should we look into other GHG inventory methodology?
- Creating a snapshot of every sector

3:20 3:45 Additional Discussion / 3:45 3:55 Jan. 29 MCC Planning / 3:55 4:00 Goals for STS January 22 Conference Call

Outline for Council meeting presentations
- Who is the audience? Are we informing the state, or are we informing others – ex. business owners?
- Will have 6, 15-minute presentations
- Cassy will send slide template for all to populate UPDATE: No template. Use 16:9 dimensions for slides.
- Ideally slides could be sent to Cassy one week before, by January 22, so they can be reviewed for consistency UPDATE: Draft slides to Cassy by Jan. 20, Monday, so we have that insight for discussion on STS conference call on Jan. 22.

How should we fit this together?
- Climate Migration
  - Trying to figure out what subgroup in STS should investigate this, and who has good data
    - Economic group has identified, but notes that research is needed
- Need to continue to reach out others, members, or non-members of STS
- Groups getting together in January, etc. with members of the other groups to discuss linkages
- Continue to focus on the science of the effects, before spending too much time on the solutions
- In terms of making linkages – we can establish those now, but don’t necessarily need to be fully developed by January Climate Council meeting, can continue dialog.
- What is the way we are going to create some consistency about this work?
  - Example, 30 years ago, today, and future to 2030 and 2050
  - In some cases, don’t have quantitative data to go back in time, or project future – e.g. human health
  - For phase I, lets focus on what we know and what is most relevant
  - For phase II, lets create a template – to report on qualitatively and/or quantitively to best of ability for each topic area

Additional knowledge/existing materials and resources
- Should we have presentations from our STS groups to the WGs, going forward in January/February, etc.
- Please reach out directly to co-chairs and to GOPIF staff if you would like to make knowledge more integrated into WGs – for presentations, or sharing otherwise
  - Coast and Marine group is holding webinars on specific topics
  - Could also be in the form of an informational session

How should policy be included? We’re not sure on whether we should include policy around issues?
- Need to inform policy recommendations
- Policy relevant, but not policy prescriptive
- We should highlight the areas to consider going into the January meeting
- We can dig into them more following and formulate them into recommendations

Should we do peer-review?
- MA did similar, and would be good discussion for Steering Committee,
- Should determine if possible, in January so STS can get going in February on this review
- Timeline for 2020 climate council updated plan unlikely to include a peer reviewed report, so peer review possibilities would be a parallel activity if STS wishes to pursue.