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| **From:** | DElia, Jesse |
| **To:** | Davis, Dawn |
| **Cc:** | Freifeld, Holly; Amy Nicholas; Angela Burgess; Craig Hansen; Genevieve Skora; Lara Drizd; Lief Wiechman; Joy Gober; Kate Norman; Sarah Backsen; Rich Young; Kevin Doherty |
| **Subject:** | Re: GRSG 2015 - RSVP: climate change and maps for species report (rephrased request for your input....) |
| **Date:** | Monday, November 17, 2014 5:20:59 PM |

I would add to Dawn's comments that from a fire-cycle perspective it will be important to look at changes in spring precip - as this drives the growth of fine fuels....and summer precip - as dryer summer conditions mean higher probability of large wildfires, especially following years of high spring precip.

Annual precip is not as good an indicator of fire probabilities. So my vote is for spring and summer precip and max daily temp in the summer.

Jesse

On Mon, Nov 17, 2014 at 3:54 PM, Davis, Dawn <dawn_davis@fws.gov> wrote:

> Holly,
>
> Just re-reading a paper by Blomberg et al. (2012) which evaluated the ability of climate variables to characterize temporal variation in sage-grouse population dynamics. The study found that climatic processes, indexed by annual rainfall and maximum summertime temperatures (May-Aug) had a strong relationship with recruitment and adult survival. In addition, annual variation in precipitation variables (e.g., rainfall or snow depth) explained ~75% of the annual variance in population size. From a demographic perspective, I would look at annual precipitation/rainfall, max. daily temperature for summer (Jun-Aug) and mean monthly snow pack.
>
> Another paper that is available online early (also by Blomberg et al.) found postfledging survival was nearly twice as great following the coolest and wettest growing season (F = 0.77 0.05 SE) compared with the hottest and driest growing season (F = 0.39 0.05 SE). The premise of this paper is that the potential response of species to climate change may be evaluated by quantifying demographic responses to short-term variation in characteristics of climate, such as weather. These predictable relationships can then be used to evaluate species' vulnerability to future climate change by integrating long-range climate projections with prospective population models (see attached).
>
> Still digging through the literature to see how we can tie these variables to vegetation attributes related to sage-grouse life history traits (e.g., links between changes in plant production).
>
> On Mon, Nov 17, 2014 at 3:23 PM, Freifeld, Holly <holly_freifeld@fws.gov> wrote:
>
> > Hi all,
> >
> > I'm working with Rich Young to pull together data and submit a GIS request for some climate maps for the species report. These maps -- current conditions and a couple sets of

future conditions -- will be important visual aids to set the stage in our overall review of potential climate change impacts to sage-grouse. This review will include the results from quantitative models that Kevin's group is working on as well as our review of all the rest of the "best available."

My question is: what climate variables will be most salient to see on these maps? See the matrix below. This is the range of climate variables available from our potential data sources. It's probably reasonable, in terms of workload, to aim for maps (again, current and future conditions) of two variables, maybe three at most. I've put in straw-man Xs for the maps that seem good to me, but I have scant knowledge of this ecosystem. What do you-all think? Add your Xs wherever you think they should go. I will compile.

I hope this will only take a few minutes - please respond this week. And please fire away if you have any questions!

Thanks,
Holly

| **SEASON** | Annual | Dec-Feb | Mar-May | Jun-Aug | Sep-Nov |
|---|---|---|---|---|---|
| **CLIMATE VARIABLE** | | | | | |
| Maximum daily temperature | | | | **X** | |
| Minimum daily temperature | | | | | |
| Diurnal temperature range | | | | | |
| Average daily specific humidity | | | | | |
| Average daily precipitation amount | **X** | | | | |
| Average daily wind speed | | | | | |
| Average daily eastward component of wind | | | | | |
| Average daily northward component of wind | | | | | |
| Downward shortwave radiation | | | | | |
| Runoff | | | | | |
| Snow | | | | | |
| Soil storage | | | | | |

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