From: chris@bighornec.com
To: Jay_Martini@fws.gov
Subject: [FWD: RE: Question about your Mitigation effectiveness paper]
Date: Monday, March 30, 2015 3:05:27 PM

If you are interested. See below.

> -------- Original Message --------
> Subject: RE: Question about your Mitigation effectiveness paper
> From: <chris@bighornec.com>
> Date: Mon, March 30, 2015 12:43 pm
> To: "Chi, Renee" <rchi@blm.gov>
> Cc: "Quincy Bahr" <qfbahr@blm.gov>, "Tom Maechtle" <tom@bighornec.com>
>
> Hi Renee,
> Sorry about my late response. I was out last week. The differences in habitat quality prior to development and on-site mitigation is something we were thinking about early in this research. Because this is obviously a big issue in regards to our main research objective. Does on-site mitigation help reduce impacts to sage-grouse?
>
> We believe (and the paper reviewers agreed) that we took a conservative approach to control for differences in habitat quality in our research design and statistical analysis. This is similar to how researchers control for differences in habitat quality between years (i.e., some years may have a better forb and grass understory due to higher precipitation). Here is some text from the paper that explains how we did this:
>
> "We developed environmental and anthropogenic variables at scales known to be biologically relevant to
> female sage-grouse during the reproductive period (Holloran and Anderson 2005, Aldridge and Boyce 2007, Doherty
> et al. 2010)"
> See table 1. these environmental variables all relate to habitat quality known through prior research to be important to sage-grouse. The environmental variables are largely independent of development and mitigation.
>
> "Relationships between environmental characteristics (i.e. vegetation and terrain features) and sage-grouse nest survival have been well documented in previous research (Holloran 2005, Aldridge and Boyce 2007, Dzialak et al. 2011, Webb et al. 2012, Kirol et al. 2015). We included environmental variables in our modeling effort to facilitate interpretation of anthropogenic effects and mitigation by controlling for habitat variability (habitat quality) related to environmental differences in our nest sample."
>
> "The environmental model containing study year (Year) and Sage_0.35, SageSD_2.0, ShrubHgtSD_5.0, TWI_2.0, and VRM_0.35 had the lowest AIC c of the 1025 environmental combinations considered (Supplementary material
> Appendix 1 Table A1)." "Therefore, the variables Sage_0.35, SageSD_2.0, ShrubHgtSD_5.0, TWI_2.0, VRM_0.35, ExposureType_2.0 and Year formed our base model (Table 2)."
> Or you could call the base model our control for habitat quality and year variability model.
>
> "Prior to adjusting for nest exposure to different environmental conditions (e.g.

environmental and terrain predictor variables), the LE nest survival estimates for non-mitigated nests (level 3) were 14% lower than mitigated nests (level 2)." See Table 4.

So if we didn't control for habitat quality (environmental conditions) we would have concluded that mitigated nests had a 14% higher survival rate than non-mitigated nests. However, we know this is not a fair comparison because of differences in habitat quality prior to development. To further support our models and control for habitat quality differences our top model (all important variables combined), on the right in Table 4, predicts only a 1% difference in nest survival between mitigated and non-mitigated. This suggests that are model is explaining the differences between these two levels very well. But it also suggests that something else is going on in level 4 that our variables in our top model are not explaining (18 or 19% survival difference when compared to mitigated and non-mitigated development). We bring this up in our discussion also.

"After adjusting for all the predictors in our top model, environmental factors plus water edge, there was little difference between nest survival predictions (1%) for nests in mitigated development and non-mitigated development. This suggests that the predictors comprising our top model are accounting for the majority of difference in nest survival between these areas; thus, giving us greater confidence in our top model as well as the importance of water edge (e.g. man-made reservoirs)."

Back to your question "Was the habitat quality deemed similar or were there differences in habitat quality that could have influenced the results you observed?" No we think that our research suggests that the 5% difference was a result of better development practices (on-site mitigation). Such as reduced surface disturbance (reduced sagebrush loss) and moving away from constructing on-site reservoirs.

Hope this long email addresses your question.

Chris Kirol

> -------- Original Message --------
> Subject: Question about your Mitigation effectiveness paper
> From: "Chi, Renee" <rchi@blm.gov>
> Date: Wed, March 25, 2015 1:44 pm
> To: <Chris@bighornec.com>
> Cc: Quincy Bahr <qfbahr@blm.gov>
>
> Hello Chris,
>
> I just read your "Mitigation effectiveness..." paper and had a general question about habitat quality throughout the Level 1,2,3,and 4 areas.
>
> Was the habitat quality deemed similar or were there differences in habitat quality that could have influenced the results you observed?
>
> Thanks!
> Renee
>
> --
> *Renee Y. Chi*
> *Wildlife Biologist*
> *Utah BLM State Office*
> *440 West 200 South, Suite 500*

Salt Lake City, UT 84101-1345
rchi@blm.gov
(801) 539-4058