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FROM: Rodney Siegel, Executive Director
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RE: Interim Progress Report for **Cooperative Agreement No. 80250BJ123** for the **fourth quarter of 2011**

Since our previous progress report we have made the following progress on our project, “*Assessing climate change vulnerability and developing a climate change conservation plan for Sierra Nevada birds*”:

1) Completed preliminary assessment of vulnerability according to various ecological characteristics and natural history traits for 170 bird species that breed in the Sierra Nevada Jepson Region, using the criteria developed for the *NatureServe Climate Change Vulnerability Index* tool. Those rankings are now under review by project partners (and bird experts) Chrissy Howell and Sarah Stock.

2) Calculated indices of historic climatic variation and predicted climate change within the Sierra Nevada Jepson Region for each of 170 breeding bird species. The analytical methods for this section are complicated and deserve more attention than I can give them in this brief progress report. Nevertheless I present here a very abbreviated description of what we have done, along with some visual ‘snapshots’. More detailed descriptions of methods will of course be included with project outputs.

For each species we clipped range maps to the extent of the Sierra Nevada Jepson Region (Figure 1).

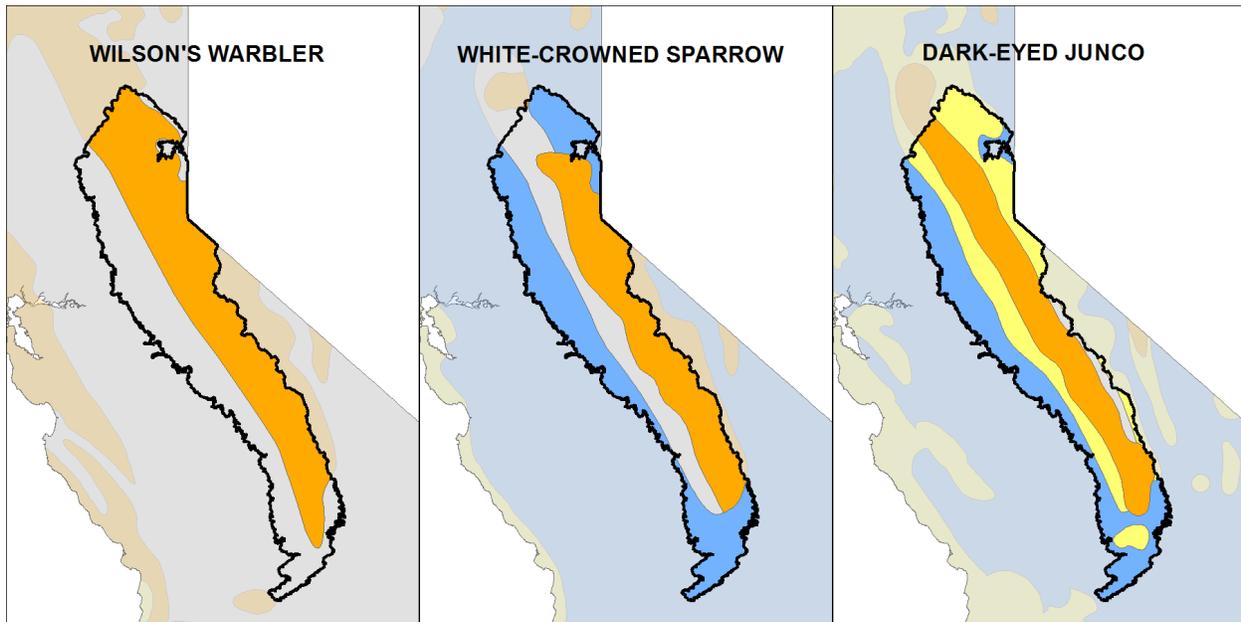


Figure 1. For each of 170 species, mapped ranges (breeding, winter, and yearlong) were clipped to the extent of the Sierra Nevada Jepson Region. In these sample species summer range shown in orange, winter range in blue, and yearlong range in yellow. After careful consideration we have decided to focus on breeding ranges of all species for our conservation assessment.

We then used the resulting range maps and followed Nature Serve instructions to calculate the following:

a) Nature Serve Section C2ai – Historical Thermal Niche

Historic temperature variation (Figure 2) was calculated by subtracting January Tmin (1971 - 2000) from July Tmax (1971 - 2000) for each cell in each species' summer range. Following guidance provided by Nature Serve, these values were then classified into the following bins:

- $\leq 20.8^{\circ}\text{C}$
- > 20.8 and $\leq 26.3^{\circ}\text{C}$
- > 26.3 and $\leq 31.8^{\circ}\text{C}$
- > 31.8 and $\leq 43.0^{\circ}\text{C}$
- $> 43.0^{\circ}\text{C}$

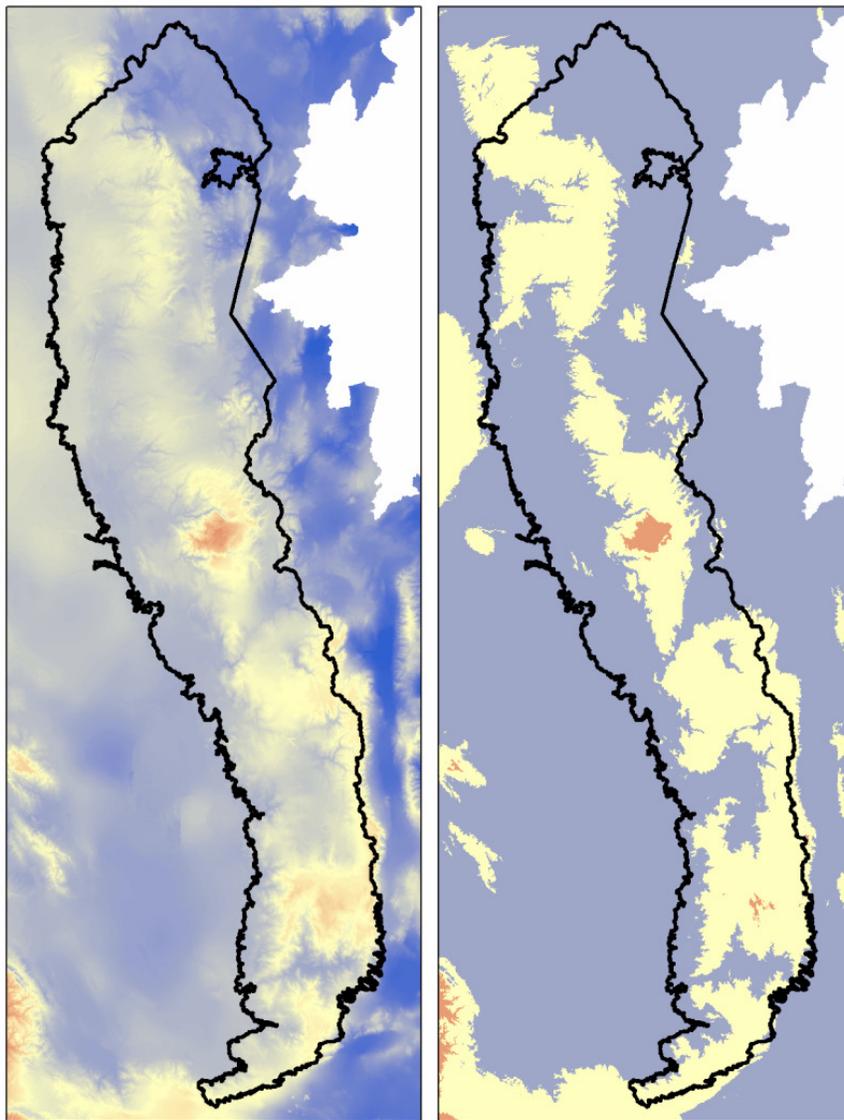


Figure 2. Temperature variation (July Tmax – January Tmin) and temperature variation classes for the entire Sierra Nevada region.

b) Nature Serve Section C2bi – Past Precipitation

Historic precipitation variation (Figure 3) was calculated by quantifying annual average values for each cell in each species' summer range. Following guidance provided by Nature Serve, these values were then classified into the following bins using standard deviations of the distribution of cell values for the Sierra Nevada region.

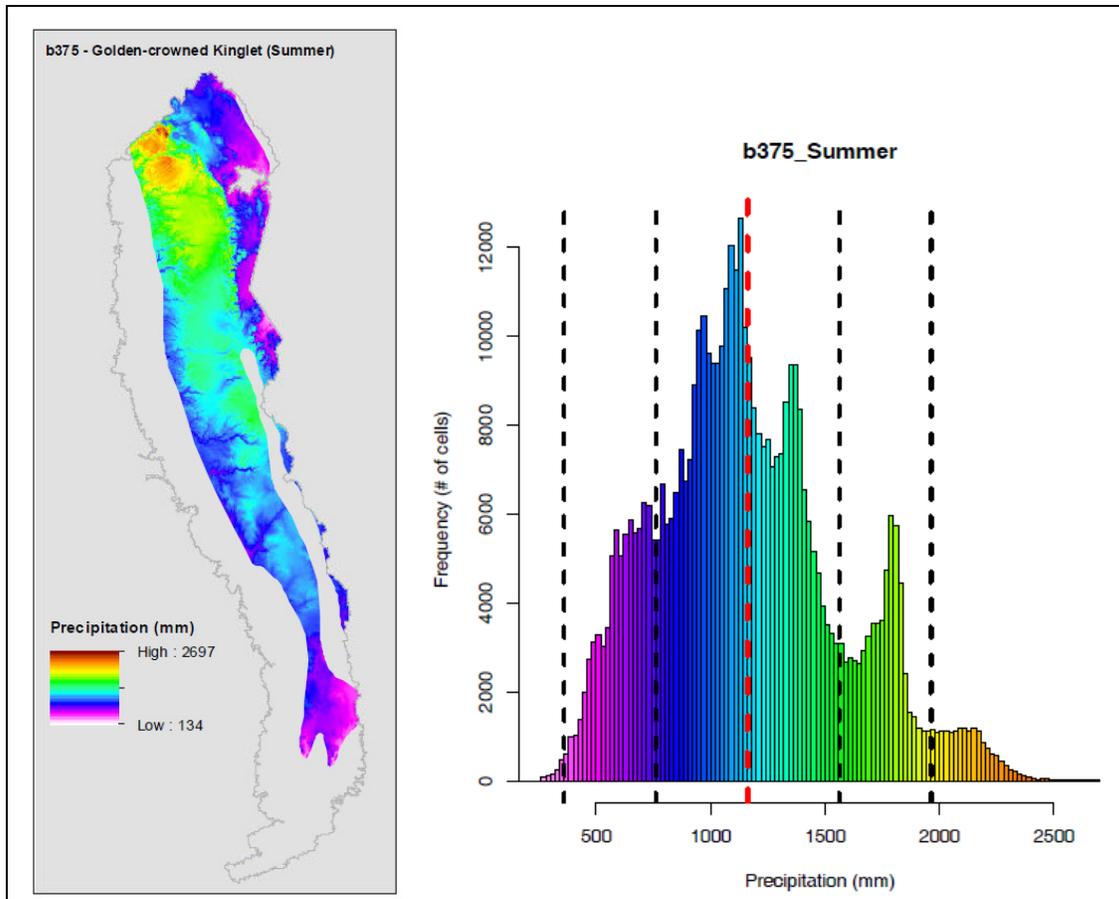


Figure 3. Map of historical (1970 – 2000) annual precipitation within the range of Golden-crowned Kinglet, and histogram of cell values (color coded to correspond with the map). In the histogram, red dashed line indicates mean value; black dashed lines indicate standard deviations, which we used to classify values into bins.

c) Nature Serve Section A, Predicted Exposure to Local Climate Change – Temperature

The predicted change in temperature (Figure 4) was calculated by subtracting the Tmean of the historic data (1971-2000) from the Tmean of the future data (2140-2069). Following guidance from Nature Serve, the precise temperature bins used to produce data for Section A were:

- ≥ 3.1°C
- ≥ 2.8 and < 3.1°C
- ≥ 2.5 and < 2.8°C
- ≥ 2.2 and < 2.5°C

The Section A temperature assessment was completed under both GCMs (GFDL and PCM) considered in this analysis.

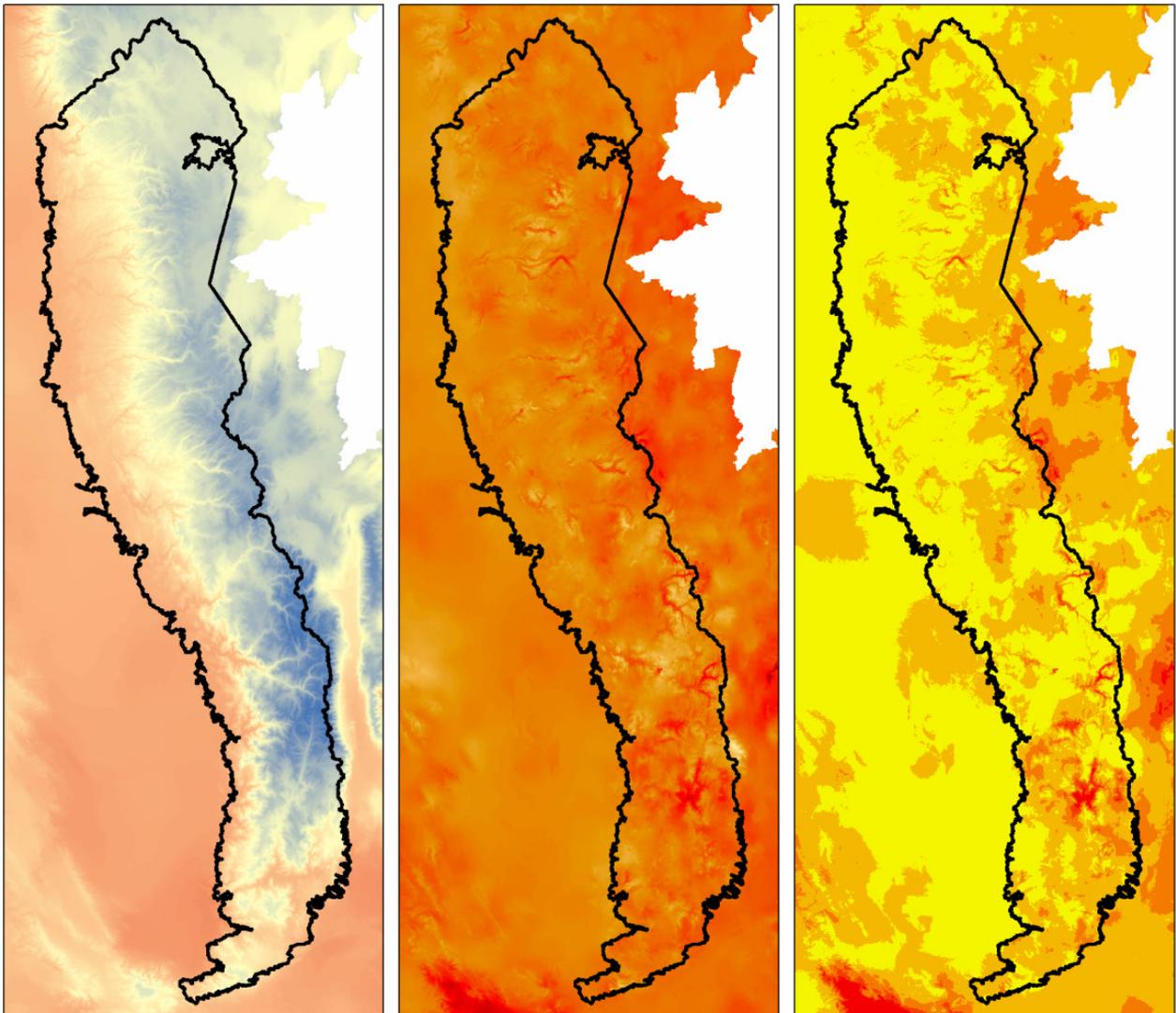


Figure 4. Tmean (1940-2069), Tmean change, and Tmean change classes for the entire Sierra Nevada region under one of two GCMs considered.

d) Nature Serve Section A, Predicted Exposure to Local Climate Change – Moisture Index

After consulting with Bruce Young at Nature Serve, we selected climate water deficit (cwd) as our index for assessing magnitude of predicted change in moisture regime. The predicted change in climate water deficit (Figure 5) was calculated by subtracting cwd of the historic data (1971-2000) from the cwd of the future data (2140-2069) for each cell in the region (Figure 5). Values were extracted and classified into bins for each species' unique breeding range within the region, using the following bins:

mean - 2sd: -13.139
mean - 1sd: 40.473
mean: 94.084
mean + 1sd: 147.695
mean + 2sd: 201.307

The Section A moisture assessment was completed under both GCMs (GFDL and PCM) considered in this analysis.

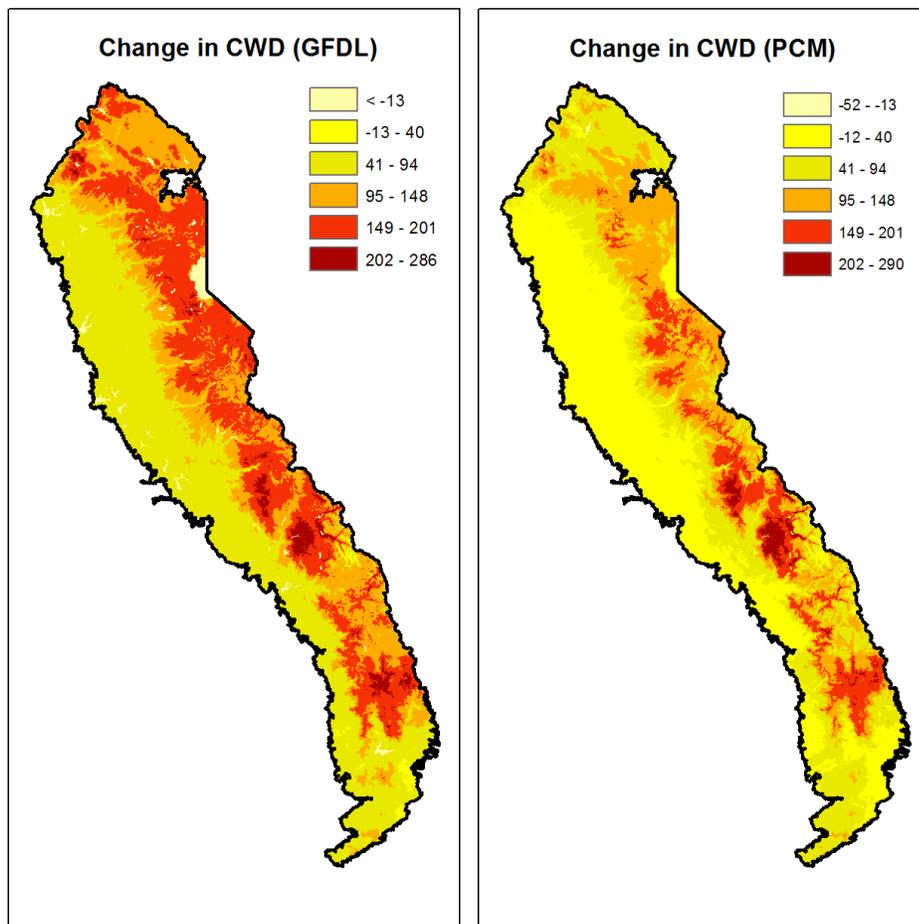


Figure 5. Predicted change in climatic water deficit (CWD) under two different GCM's (GFDL and PCM).

Sierra Nevada birds and climate change vulnerability – progress report for fourth quarter, 2011

Our next steps, already begun this month, are to run the values for each species through the Nature Serve Index tool and rank species according to climate change vulnerability, and then begin preparing our Conservation Strategy.

I hope you will agree that our project is proceeding well and is on track for successful completion within the intended time frame.