A Collaborative Approach to Integrating Climate Science into State Wildlife Action Plans

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Background: Habitat Suitability Modeling
Background: Collaboration
Objectives

• **Process**: Describe how involving resource managers can improve climate change research
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• **Research & Communication Strategy**: Better understand how climate change research can be made more relevant to the needs of resource managers
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• **Research & Communication Strategy**: Better understand how climate change research can be made more relevant to the needs of resource managers

• **Workspace**: Document the utility of a collaborative workspace
Methods

- SWAP
- Colorado Natural Heritage Program
- Colorado Parks & Wildlife
- 9 Habitats
Methods

• Workshop
  – Day 1: technical modeling
  – Day 2: presentations, feedback, revisions
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• Participant-observation
  – Pre- & post-workshop questionnaires (expectations & evaluations)
  – Filming & observation
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• Expert Elicitation
  – Iteration with CNHP & CPW
Methods

• Resource for Advanced Modeling (RAM)
  – 15-20 people
• Mini-cluster
• VisWall
  – 24 monitors

www.fort.usgs.gov/ram/
Results: Process

• Appropriate use of climate data
• Modeling capabilities, limits, do’s & don’t’s

“Today has been important to me. I’ve learned a lot just in terms of the climate modeling…

“Can I ask a layperson question?”

“Bringing together a diverse set of people (including ecologist, climatologist, modelers, managers, and decision makers) to be part of this process is fantastic and will probably go a long ways in terms of relationship building.”
Results: Process

• “I am likely to use the output of habitat suitability models if no resource managers (i.e., only scientists) participated.”
  – Pre-workshop: 6 of 8 agreed or strongly agreed
  – Post-workshop: 3 of 8 agreed or strongly agreed
Results: Process

• “I am likely to use the output of habitat suitability models if no resource managers (i.e., only scientists) participated.”
  – Pre-workshop: 6 of 8 agreed or strongly agreed
  – Post-workshop: 3 of 8 agreed or strongly agreed

• “I am likely to use the output of habitat suitability models if a resource manager (other than myself) participated.”
  – Post-workshop: 7 of 8 agreed or strongly agreed
Results: Process

• What to present
  – Fundamental vs. realized niche

“Whether it’s this pixel versus this pixel, I don’t think that that matters... [we need] a more descriptive way of saying, ‘this is how things may change, and these are the drivers of those systems, and this is how those drivers are going to change’ -- precipitation, temperature, those kinds of things.”
Results: Process

• What to present
  – Fundamental vs. realized niche

• How to present it
  – Narratives
  – Color Schemes

“Whether it’s this pixel versus this pixel, I don’t think that that matters... [we need] a more descriptive way of saying, ‘this is how things may change, and these are the drivers of those systems, and this is how those drivers are going to change’ -- precipitation, temperature, those kinds of things.”
Results:

Research & Communication Strategy

• Compiled list of potential daily climate predictors
• Modeled habitat with historical climate
• Iterated with CPW (habitat coordinators) to determine ecologically relevant parameters
Results:
Research & Communication Strategy

• 2050 projections for top 5 climate predictors for each habitat
  – Selected 2 GCMs (Global Climate Models) for each predictor that captured the range of variation for the middle 80% of GCMs
Results:
Research & Communication Strategy

- Capture uncertainty while providing reasonable planning end-points
2050 projected change in total winter precipitation, driest scenario

Spruce-Fir
Precipitation change (cm)

-8 - 7
-7 - 6
-6 - 5
-5 - 4
-4 - 3
-3 - 2
-2 - 1
-1 - 0
0 - 1
Results: Workspace

• Technical Capacity
  – Fast turnaround
  – Presentations & Screen Sharing
Results: Workspace

• Technical Capacity
  – Fast turnaround
  – Presentations & Screen Sharing

• Space & format
  – Engagement
    • Breakout groups
    • Discussion
    • Informal Q&A
Conclusions

• **Workspace**
  – Efficiency
  – Engagement
Conclusions

• **Workspace**
  – Efficiency
  – Engagement

• **Process**
  – Strengths & limitations of climate data & habitat suitability modeling
  – Concerns about the *certainty* of model outputs, but confidence in the *quality* of model outputs, as long as managers involved
Conclusions

• **Workspace**
  – Efficiency
  – Engagement

• **Process**
  – Strengths & limitations of climate data & habitat suitability modeling
  – Concerns about the *certainty* of model outputs, but confidence in the *quality* of model outputs, as long as managers involved

• **Research & Communication Strategy**
  – Co-developed an iterative & data-directed form of expert elicitation
  – Choice of variables corroborated by habitat models, experts, & lit.
  – More intuitive & relevant variables that matched advice of climatologists
Conclusions

• Engage the land management community rather than provide “right” answer

• Increase chance of producing a robust & useful product

“However painful the process, we were able to agree on a path forward. It was essential to have participants from all groups together for that agreement.”
Acknowledgements
Current climatic range for nine habitat types and projected mid-century region of change

* Circles are historic means with error bars representing one S.D.
* Squares represent the middle 80% percent of the range of mid-century projections
2050 projected change in mean spring temperature, hottest scenario

Shortgrass

Temperature change (°C)

- 1.8 - 2.0
- 2.0 - 2.2
- 2.2 - 2.4
- 2.4 - 2.6
- 2.6 - 2.8
- 2.8 - 3.0
- 3.0 - 3.2