



U.S. Fish and Wildlife Service
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Desert Tortoise Science Advisory Committee Meeting
Meeting Summary
March 4, 2011
Palm Desert, California
(includes follow-up material)

Meeting Goal

Review and improve underlying models within the desert tortoise spatial decision support system

Attendees

Earl McCoy, SAC-Univ. South Florida
Katherine Ralls, SAC-Smithsonian
Michael Reed, SAC-Tufts University
Bob Steidl, SAC-Univ. Arizona
Steve Campbell, SAC post-doc-Univ.
Arizona

Erin Zylstra, Univ. Arizona
Roy Averill-Murray, DTRO
Cat Darst, DTRO
Chris Mullen, DTRO
Nathan Strout – Redlands University
Philip Murphy – Redlands University

Meeting Summary

List of potential areas to focus on (November 2011 status updates indented):

Threat Increase vs. Recovery Action calculations: Consider how to handle immediacy of threats vs. longer-term potential good of recovery actions; think about how to handle the difference between deterministic (e.g., habitat loss) and probabilistic (e.g., crushing) population stresses.

We are working with U of A to handle the difference between deterministic and probabilistic population stresses: the approach separates the independent effects of any threat on demographic rates and habitat quality/carrying capacity

Sensitivity analysis: Include sensitivity of outcomes to structure, particularly where we believe we are seeing anomalous structure (single threat stresses and artifact threats such as public access).

A Spatial Sensitivity Workshop was held at the University of Redlands on 27-28 July 2011. The first day was a hands-on tutorial given by Dr. Arika Ligmann-Zielinska, Ph.D. from Michigan State University using a custom toolset for spatial sensitivity analysis featuring a cutting edge output variance decomposition approach. The second day focused on how that toolset could be converted into a modular tool and integrated with SDSS engines such as the Desert Tortoise system. Much progress was made, and we currently plan to have a modular tool ready for use project in Q2 2012. This will enable a more sophisticated assessment of error and uncertainty in outputs of solar energy development impact and mitigation calculations.



Model Structure: Recognize the hierarchy inherent in the stress-threat model. Reexamine model to see if a consistent level of hierarchy is being applied (to avoid artifacts and weird model behaviors). Make sure all stresses are at the "same level of organization." Drop or restructure "single contributors." Filter items with weights < threshold. Be careful about oversimplifying (e.g., habitat fragmentation may be "overlumping" because it leads to demographic factors in several different ways). Validate where possible from science.

A comprehensive revision of the conceptual model structure was undertaken in April 2011. Additional revision will incorporate the U of A's separation of the independent effects of any threat on demographic rates and habitat.

Demographics: Work with Bob/Erin/Steve to decide on best strategy given the current model, available data, and their expertise. Erin's role can be to help model/quantitate the stress links (e.g., how stresses manifest changes in demography); correlate against Leu et al. models.

Our approach working with Bob, Erin, and Steve will result in a lambda surface which we will "modify" based on spatially-explicit threats data and new threat-to-population change models which will be re-calibrated by absolute % contribution to population change for those threats for which data are available. We currently model the contribution of stresses to whatever population change is currently occurring as opposed to absolute population change.

Population Distribution: Look at innovative ways to arrive at a proxy for population distribution. Incorporate connectivity and habitat potential.

We have created a "Probability of Presence" layer which calibrates all of our "Risk to the Population" maps; Probability of Presence is created by incorporating the USGS habitat potential outputs with the new National Landcover Dataset's Impervious Surfaces layer. Anything with an "imperviousness" value greater than 0 was used and set to 0 habitat potential in our Probability of Presence layer to account for current anthropogenic impacts. We presented a webinar to the SAC about our methods to incorporate Probability of Presence into our population change calculations on June 1, 2011, where we received positive feedback about our proposed methods.

Landscape-scale effects: Research how best to handle stress/threats that aren't local but happen at landscape scales – immigration/emigration population effects, landscape permeability/population fragmentation. This might require looking beyond the population change goal. Would we run parallel models and weight changes in their goals to the goal of stabilizing populations?

We are dealing with population fragmentation in light of calculation requests from the California Energy Commission. Currently, we are using a cost-surfaces approach to connectivity, but are exploring other, more direct estimates of spatial fragmentation.

Weights: Research spatial weights variations from experts, think about how to use variation in characterizing uncertainty, consider expertise survey, consider weights validation/gathering at RITs.

A comprehensive revision of the conceptual model structure was undertaken in April 2011. Additional revision will incorporate the U of A's separation of the independent effects of any threat on demographic rates and habitat, as well as explicitly modeling temporal variation in these effects. We are exploring using the variation in weights from multiple experts (when available) in conjunction with the sensitivity analysis to estimate error bounds for model outputs. We will examine spatial variation in Q1 2012.

Public communication: Develop clear messages and look beyond static maps to communicate science, outcomes, assumptions, and uncertainty. Consider videos of creating the conceptual model. CEC System, in particular- sharpen our understanding of how the system will be used, by whom, and for what. Think carefully about how we present everything to the public: spatial scale, what the results mean and don't, replace weights with binned scale?

We continue to think about communication. We are currently developing 2 on-line tools: Data Explorer and Model Explorer to help the public learn about and navigate through the model structure and the data that we are using in the system, which can be accessed at deserttortoise.gov. We are also developing a RIT Application that will be for RIT members only, which will allow users to explore the input data, model structure, and results in the form of reports, maps, charts, tables, etc. along with documentation for the data and modeling process. For the scientific community, we are working on a series of manuscripts for publication.

June 1 Follow-up Webinar

- Be conscientious of what we *really* mean when communicating about "habitat potential" and "population proxy."
- What are the implications of making density-independence assumptions? Test with sensitivity analyses.
- What *exactly* does the Aggregate Population Stress calculation provide us with?
- How will we take into account threat-threat interactions when prioritizing recovery actions?
- Are threats always additive?