

LCC VP Webinar – 11 May 2012

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Partners: Jim Comiskey MIDL/SHEN, Jim Renfro, Jeff Troutman (Div Chief GRSM), Leslie Morlock DEWA- GIS, Matt Marshall (ERMN)

Not on call: Paul Super (tried unsuccessfully to connect to webinar), Mike Britten, Keith Langdon, Jim Schaberl, Sarah Reed, Andy Hansen

Project Introduction/Overview (Bill)

Intro to project, staff, and collaborators. (**slide 2**). Expect to increase the list of collaborators as we identify and engage in specific activities. Note dates – Aug. 2011 – July 2015 so still in first year.

Overarching Goal and objectives – see **slide 3**. Rely on collaborators for objectives 2-5, which require identifying resource priorities for evaluation and actions.

Generally following Glick et al in the approach to planning and implementing climate adaptation. More details on how we expect to do this are illustrated in **slide 5** – a rather complex image of our poster. One big contribution we bring to the table is access to predictive modeling of land use and land cover, and other very large data sources such as downscaled climate forecasts.

Assessing vulnerability is a big component – again following guidance in Glick et al., which focuses on three factors – Exposure, Sensitivity, and Adaptive Capacity.

We have the most current downscaled (IPCC Assessment Report 5 – AR5) climate forecasts that we'll use. These are provided by NASA-Ames. Also updated and improved land use modeling (SERGoM).

Slide 8 illustrates how the input data will be used with a variety of models that we'll use. These operate at coarse to finer scales – from biomes across the continent to habitats specific to the GNLCC and Appalachian LCC (ALCC).

Slide 10. SERGoM – is being updated to better account for urban and industrial areas, as well as agriculture. In the past SERGoM focussed primarily on housing density, whereas the newer version addresses a more complete suite of change probabilities.

TOPS – Ecological modeling framework that has received intensive work over the past decade. Just finished downscaling of latest climate projections (AR5/CMIP5 – these are be basis of next IPCC report). Some key outputs of models are listed in **slide 11**. These indicate things such as vegetation water stress. **Slide 12** has some examples of biome models driven by monthly climate projections, at 1 km grid scale.

Issue of scale (**Slide 13**) – diagram that illustrates the conceptual strategy we plan to use to link results across scales. At finest scale, we can use climate envelopes as in input to habitat suitability models. These can be linked up the chain – to incorporate disturbance, and accommodate the influences of dispersal ability and landscape connectivity.

Slide 14. For species-level approach, the proposal specifically mentioned tree species. One opportunity we have is to consider effects of CC on different life cycle stages. We fully expect to collaborate with and build on existing work, and don't want to reinvent the wheel.

Slide 15 – Crosswalk of project components to VAs at difference ecological levels.

Slides 16/17 – Conceptually, the link between the VA framework to management is via our ability to modify (via management) one of the elements – exposure, sensitivity, and adaptive capacity. Adaptive capacity, in particular, can be difficult to fully grasp, but it can be modified by e.g. connectivity and other landscape attributes.

Slide 18 – Identifies potential adaptation actions to achieve climate adaptation goals, based on the Yale Framework.

Slide 19 – Deliver management strategies that are clear/explicit about the spatial and temporal scales for implementation, and what implementation is intended to accomplish (e.g., broadly managing for resilience versus managing for change)

Slide 20. As an example, we're now working with the Greater Yellowstone Coordinating Committee on whitebark pine. We're refining the process and approach with the GNLCC before moving to Appalachian regions.

Slide 21 – table of products and scales to which the best apply.

Slide 22. Timelines and current status. A 4-year project initiated in Aug. 2011. Begin with GNLCC because organization structure in place and actively funding projects. ALCC follows and is staggered by about 1-year.

Questions following Overview slides

Questions of scale – TOPS model projections at 1 km and using monthly data, so will lose some resolution of shorter-term events, like extreme weather. Jim Renfro (JR): GRSM has lots of questions about spatial and temporal scales of climate change, but few answers. In particular, the park has many concerns over the lack of temporal resolution in many of the climate data and forecasts (e.g., monthly means; failure to include e.g. daily extremes). These are clearly relevant at the park-scale, perhaps less so for understanding certain broad-scale responses at the LCC.

John Gross (JG) – We're also working on a summary of data sources and tools for working with climate data. This includes some daily data, and at different spatial resolutions. The tools require different levels of technical expertise, so not all data or all tools will be useful for everyone (e.g. some will require expertise with the R statistical language, or use of a GIS). I&M identified a need for this in seeing the number of people overwhelmed by the variety of different climate data and models.

Patrick –discussion of species modeling emphases for ALCC study area

Slide 23. Overview of coarse vs. fine filter approach for vegetation modeling in the ALCC.

Coarse: Climate envelope modeling of major ecological system types in the ALCC (e.g. South-Central Interior Mesophytic Forest, Appalachian (Hemlock-) Northern Hardwood Forest). Fine: Detailed modeling of high priority species or ecological system types within management units. Candidate species include Fraser Fir, Red Spruce, and Eastern Hemlock.

Slide 24/25. Overview of other published vegetation modeling studies, interpreted in the context of the number of species and the grain size (spatial resolution) of the underlying data/models.

Slide 26. An example climate forecast model from Iverson et al., illustrating potential major forest type changes expected for the Eastern US.

Slide 27. Building off an earlier question about scale and the need for higher resolution data, opportunities to integrate into our work Lidar data for transects flown over mostly BBS route sin the east.

Slide 28. The Lidar data provide both high vertical and horizontal spatial resolution and thus can be used to evaluate e.g. forest structure.

Slides 29-32. Summary of ALCC science needs that emerged from science symposium (11/29/2011: <http://applcc.org/page/workshop2011>). LCC-VP especially poised to contribute to or complement “Terrestrial Landscapes” and “Climate Change”.

Questions / General Discussion

Jim Renfro (JR) – Great project. Has data at very fine scales. GRSM is completing 5-yr VS strategy. Has lots of data – point and other, and integrating soils, vegetation, animals. Whole host of other issues that climate will affect.

Bill Monahan (BM) – two scale issues – spatial and need 1-4 km. Other is thematic – focus on habitats and key tree species. Are thematic issues ones that are important to park? JR: Not ready to name species or forest types, but likely many at risk, starting with spruce-fir at high elevations, but changes could be greater at lower elevations. Cloud cover and increased cloud cover may result in less change at higher elevation. If lower elevations have to move up, then there’s less area. And if upper areas change less, then there will be a squeeze at mid(?) elevations.

JR: Hope LCC-VP can scale down to GRSM level, and inform responses of many factors that are being monitored at the park level (e.g., water quality, air quality, vegetation). But, again, many big questions as to how to match the spatial and climatic scales. For spatial scales, LCC-VP data and models could be useful if we can get down to the 1-4 km, or watershed, scale.

JR: Interest in groundwater, and water resources in general, and whether we can quantify and model. FM: Although groundwater per se not included by TOPS, other important measures that

relate to e.g. runoff are. Such data/models are of interest, and may eventually be used by other researchers developing other (e.g., hydro) types of models.

JR: Phenology is another focus GRSM.

Jim Comiskey (JC): Interest in the vegetation forecast for ES and species in part because they can inform interpretation of ongoing monitoring. For example, as we see trends emerge, to what extent might they be interpreted as early changes encapsulated over longer time by the forecasts? Brook trout, water quality (including temperature), and hemlock are all key resources of interest in the context of climate change. Hemlock is challenged by the woolly adelgid, where there is interest in more active management and restoration.

BM: Hemlock is somewhat remindful of whit bark pine (wbp, GNLCC) in that its range is mostly tied to our LCC, it's found throughout our focal parks, it is threatened by an (introduced) insect, its long-lived, and it's a keystone species (along streamside forests of So App). Certainly there are other factors that make it quite different (e.g., its elevational range), but nonetheless an interesting possibility for a focal species.

Tom Olliff (TO): On the subject of working with managers to identify management options and eventually implement management strategies. For wbp our study may be outpacing efforts underway with the Greater Yellowstone Coordinating Committee (GYCC), so an alternative approach might be to focus our management efforts more on the parks we include in the proposal.

Communication. Questions and interest about how we will continue to communicate with our collaborators. No special/particular guidance was provided by collaborators. JR indicated that most have busy schedules and are already inundated with emails and meetings; he suggested using our website as much as possible, and updating it to include a section dedicated to our ALCC study area. Leslie thought it was important for us to communicate regularly enough, at least with short updates, so that our project stays on people's radar. Both strategies are likely needed. We might periodically send out short emails that point people to updates/briefings posted on the LCC-VP website. That way our collaborators can stay informed about new postings, but choose to look at them on their own time (outside of email). Also, the website will be handy for our collaborators to direct others to (e.g., during meetings or conversations). JG suggested that some of our updates be short briefings, with a quick summary of e.g. recent data acquired or models processed, plus a graphic for context.