



## Main Core Team Meeting – Notes

Date: Wednesday, 11/14/2012  
Time: 8:30 AM – Noon (EST)  
Location: BLRI Visitor Center (Asheville, NC)

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### Takehomes from Meeting – To Do's:

**\* Publications to aim for that integrate elements of LCC-VP:**

1. Forrest
  - a. Climate downscaling methods paper
  - b. Combined impacts of land use and climate change
2. Climate and impacts summary by park – John G., Tony C. and Bill M.
3. Land use summary by LCC, past to present and projected future – Dave T., Regan N., Sarah R., Bill M.
4. Vulnerability of 50 parks climate and land use change using Forrest's climate and Dave's land use as well as invasive spcs from NPSpecies – Andy H.
5. Vulnerability assessment of western US – John
6. Synthesis of recent efforts predicting eastern U.S. forest redistribution under climate change – Patrick, Scott Z.

**\* Develop TOPS resource brief, summarizing variables and datasets, and distribute to park collaborators so that we can engage in discussions of what data/models they are interested in for this and other projects (Bill, John, Forrest)**

**\* Contact Bill Hargrove regarding interest in LCC-VP/ForeCASTS collaborations and data sharing**

## Participants

MSU: Andy, Nate, Tony; CSU: Sarah; WHRC: Patrick, Tina, Scott; NASA: Forrest, Weile; USFS: Bill Hargrove; NPS: Dave, John, Bill Monahan

## Agenda

1. Review of approach and issues for afternoon meeting with collaborators
2. Ecological Forecasting
  - a. Integration of Climate data, SERGoM, TOPS for ecological hindcasting and forecasting.
  - b. Analysis and synthesis of climate, land use, ecological process data
  - c. Bill Hargrove's vegetation modeling approach
  - d. Vegetation niche modeling
  - e. Feedbacks to LPJ lifeform change.
3. Expert panels for vulnerability assessment
4. Development of management options
5. Implementation of management options
6. Decision support directions
7. Discussion of survey of collaborators
8. Next steps

## Meeting Notes

### Ecological Forecasting (Forrest)

- Initial TOPS runs complete using ensemble averages. Still doing diagnostics for RCP 4.5 and 8.5, CONUS
- CMIP5 done;
- Using PRISM and TOPONET weather data
- National DEM downscaled to 800 m
- TOPS – water stress, GPP, NPP, soil water potential – get list
- ISA – in first TOPS runs, clipped out urban areas,
- **? How do we incorporate drought into e.g. forest mortality? E.g. aspen paper and tree depth.**
- Google has agreed to host 100 TB of info; ongoing discussions with ORNL. Not yet clear what will be stored where.

### Ecological Forecasting (Cont.): ForeCASTS (Bill Hargrove) –

[www.geobabble.org/~hnw/first/northwoods](http://www.geobabble.org/~hnw/first/northwoods)

- ForeCASTS overview
  - Considering “9 earths”, global analysis – 4 km, PCM and Hadley, A1F1 and B1, Two futures: 2050 and 2100, 17 variables – use quarters, like bioclimatic (p and t),

- length of growing season, C and N (soil), Topographic index, Diurnal temp index, Water holding capacity of soil, Elevation (one run with, another without)
- Uses clustering (k-means) on all 9 earths – common set across current and future
- Models parameterized using FIA and gbif for occurrence data; same variables for each species (i.e., no “tuning”). Kevin Potter (Bill Hargrove’s colleague) processes FIA data
- 30,000 “ecoregions” = mapping units: identified and aggregated from clustering model
- Hadley results much more extreme than PCM
- All 17 niche axes are normalized, so most narrow axes are likely most limiting. Can easily list these to determine order of axes (? Not sure this is correct but it’s what Bill says. Seems like this also depends on the geographical distribution of these axes, and that geographical distribution is decidedly different so one narrow axis might be completely contained within another variable, so the narrow variable might be completely irrelevant – requires closer examination).
- Validation: Compare against Little’s range maps
- Models predict suitability, so expect some overprediction
- ForeCASTS developed in part to identify seed transfer zones; Also used for e.g. eastern hemlock – looking for places where it might be preserved in the face of HWA (or more generally where other “new refugia” might be considered for other threatened tree species)
- Ideas for additional uses
  - John: Could use ForeCASTS to define ecological systems based on climatic/biophysical variables rather than species maps. Would need to get alignment between both
  - AH – for global work, use ‘ecological realm’ as way to restrict display of potential species ranges. HOWEVER, there’s some value in locating very distant locations where a species might e.g. be protected from current pests. E.g. hemlock habitat in S America where woolly adelgid doesn’t exist. In version 4 (to be released soon...) Hargrove wants to look at invasive species, which need to be evaluated globally
  - Can easily look at climate space today, and where it goes in the future. E.g. NC climate ends up in N Virginia by 2050 or 2100.
  - CERL application – 75 military installations – and looked at present composition based on WWF ecoregions and how the ecoregions changed with CC.
  - Hargrove looking to add in enough spp to look at forest type, in place of individual spp
- Method seems to work remarkably well for trees. Maybe because trees are long-lived, and their habitat conditions are well represented by synoptic environmental conditions.
- Minimum required movement (MRM): inverse indicator of likelihood of local extirpation
- Euclidean distance required to reach in the future margin of climatic suitability

### **ALCC Efforts – Management targets and modeling concepts (Patrick, Tina, Scott)**

- First summarize results from Hargrove, Iverson, and McKinney
- Multi-scale: drawing upon Iverson’s work (thus far) for regional ALCC view
- Bringing in park and other data to for park/pace scale models
  - Follow with Bill’s approach for western forests at finer scale. Train at least one set of models with NPS data so parks have direct connection to results

- Andy: broad convergence of this approach to plans for GNLCC
- Andy: Use Bill Hargrove's work to get a better handle on our GN and ALCC potential dispersal zones (to replace the conceptual ovals)
- In GYE, come to approach of looking at niche needs of different life history stages of WBP. This works for WBP and would perhaps be useful for other species in ALCC. Andy has table with potential data sources, but still holes to fill. Desirable to produce similar "response data" table for ALCC.

#### **Nate**

- Big issue is how to define relevant climate variables – e.g. water balance, or extreme temperature/precip combinations that are key to models.
- Has working table of potential response data sources for different life histories
- Working on IDing and assembling predictors – which will minimally include climates, TOPs, and soils
- Separate project with GNLCC aiming to develop a statistical modeling toolkit