MONDAY NOV. 12

Arrive in Ashville by the evening.

TUESDAY NOV. 13

LCC-VP Participants
      MSU – Andy Hansen, Nate Piekielek, Tony Chang
      WHRC – Patrick Jantz, Tina Cormier, Scott Zolkos
      NPS I&M – John Gross, Bill Monahan, Dave Theobald
      CSU – Sarah Reed
      NASA Ames – Forrest Melton, Weile Wang

8:00–10:00 LCC-VP Team Meeting.

New participants / ideas / suggestions for field trip
- From Woods Hole
  - Tina Cormier – RS and GIS technical
  - Scott Zolkos – LiDar, water quality and chemistry
- From MSU
  - Nate Piekielek – Phenology, WBP (NCCSC)
  - Regan Nelson, Erica Garrotte (EPSCoR)
  - Linda Phillips, Sondra Torma
- Outline ideas for papers by group and synthesis papers
  - How do we pull everything together from this project?

Suggestions for local projects
  - John G.
    - N deposition air inputs but not coming out the watersheds; where is it going? Opportunity for Forrest modeling?
    - Good water quality data from lots of streams
    - Micro-climatology – moist north facing appear to be more resilient to warming and provide refugia
    - Amphibians and herps conservation
    - Grassy balds – small proportion of the park but high biodiversity, globally rare

Summary of progress by group
Andy / MSU

- MSU – Linda Phillips, Sondra Torma
- EPSCoR – Regan Nelson, Erica Garrotte. Statewide ecological forecasting by Steve Running; trying to cast as ecosystem services.
- NCCSC – Impacts group, Barry Noon, Diane Debinski, Bill Lauenroth; Nate funded on this.
    - Funded by Dennis and Jeff.
    - Meeting in Ft Collins day before ROMO
    - Ben had breakfast with Tom & Andy at YELL science meeting.
- Recent meetings
    - Apr – Whitebark pine subcommittee
    - May – NCCSC
    - July – YNP / GTNP cons priorities (Tom O)
    - Nov – ZSL, WCS, IUCN PA symp
    - Nov – NCCSC impacts group
    - Nov – ROMO
    - Jan – YCR
- Ann Rodman – now in charge of climate program. Dave Hallack has different view – wants to start with step 3 – what are mgmt. opportunities then back to science. Will be interesting to see how this evolves.
- VA of PACES for 57 Parks
    - Impacts of climate, invasive plants (NPSpecies), and land use change in PACES (Uses PACES from Cory's work); from IUCN mtg: Lots of interest in PACE concept for PAs worldwide
    - Cumulative impacts – PACE based in large part on LUC exposure – now adding climate and invasives
    - Then add biome shifts – Anndregg, Allen et al., etc = tree dieoff, etc.: what % of parks are projected to undergo a biome shift (under this particular analysis, few/now shifts in eastern parks)?
    - Biome shifts – Rehfeldt et al. 2012 – what proportion of parks undergo biome shifts?
    - Some parks with high climate change show now/few biome shifts – sensitivity
    - Management paradigms: naturalness vs. future condition
    - Possible case study: Pac NW (thought to have high adaptive capacity? In historic range of variation – manage for naturalness) vs. SAMO (future condition)

Tony & Andy

- GYA climate and climate change
- Comparing weather station vs. 4 km PRISM data. See strong warming in stations. Warming, less pronounced, in grids (1981-present)

- Most gridded warming at higher elevations
- Compared to McFarlane et al. (2010) – high res map of WBP mortality – seems to be highly correlated with high rates of warming

Nate
- Bioclimate niche modeling = 5 spc
- Stat models 4 life history stages
    - Have climate data and some response data identified
    - Will acquire additional response data, develop models, forecast
- Phenology – focus on green patches
    - Patch dynamics of forest phenology
    - Methods – NDVI
    - Current conditions described
    - Will forecast, possibly expand to ROMO, look for collaborations Use for climate refugia?

Dave T. and Sarah R.
- 30-m res land use (63 classes) across the US
    - Based on housing density, PAD, transportation, employment etc.
- Degree of human modification and/or landscape integrity
- Cleaning up NLCD impervious surface at national scale
    - Reduce % urban area by up to 50% in places by removing linear features (i.e. transportation corridors)
- Comparison of soils datasets and fine-scale resolution of SSURGO, STATSGO etc.
    - What underlies TOPS algorithms?
    - Compiling datasets nationally from ESRI by HUC-8
        - Includes soil-water holding capacity
- 1:24k scale NHD to create 30-m resolution with complete flow-paths linked etc. for GNLCC first as pilot study
- Connectivity as component of adaptive capacity
    - Account simultaneously for changing climate and land use on connectivity
    - Run multiple scenarios to determine uncertainty
    - Run for multiple levels of biological organization
    - Velocity of climate change like ?? Science paper
        - Crosby and Lawler UW interested as well
    - Connectivity as flow-accumulation model
    - Assemblage models based on co-occurrence of species assemblages
        - Have a pronghorn model for western US
        - Nested approach of terrestrial generalists to species assemblages; also by biome type?

Patrick J. and Woods Hole
- Link changes in composition to changes in ecosystem process (ET, stream flow, carbon uptake etc.)
- Iverson and McKenney already done modeling for eastern spcs
  - Summarize existing knowledge
- High-res modeling at park unit scale (800m)
- Northern expansion of slash pine potential habitat in Iverson data
- Contraction of sugar maple from Iverson data
- Spruce-fir suitability down to ~13% by 2065-2099 in GRSM
- Upcoming
  - Sub 1km pixel downscaling based on topographic complexity?
  - Link structure and composition using lidar
  - Build working relationships at GRSM, other parks and agencies

John G.
- ClimateSmart group – follow-up to Glick et al.
  - Climate adaptation book
  - Stein and Glick main editors, Gross lead on 2 chapters
    - How to use vulnerability assessment?
    - How to monitor under CC?
  - DeBeaurs phenology proposal using NPS data
  - Downscaling model selection? Consequences etc.
    - Ryan Boyles NC State climatologist
    - Southeast CSC producing evaluation of downscaling techniques
    - Dettinger constructed analogs best for use in the west
    - Dynamic down-scaling probably going to be used for water stress in SE
  - Enduring refugia work persistently green areas as refugia
    - Marc Anderson
    - S. Dobrowski
      - Micro-refugia Global Change Biology (2011)

Bill Monahan
- WBP range-wide modeling setting context for GYE work
  - Simple physio-informed model based on June max T, % sun, and soil
  - Does good job of explaining current range-wide distribution of WBP, including major/minor components of distribution and new translocation sites in northern BC
- ROMN limber-pine similar effort as WBP vulnerability
  - ROMN mentioned in LCC-VP proposal but WBP does not occur that far south; Limber closely related to WBP and interest in learning what aspects of VA are/are not transferrable to Limber (via principal of niche conservatism)

- o Using park-based inventory data and PRISM to build niche-models
- o Projected to future using PRISM-downscaled CMIP5 models
- o Useful for guiding conversation with managers about new research needs and possible management scenarios

WEDNESDAY NOV. 14

8:30–12:45 LCC-VP team meeting and working lunch
- Review of approach and issues for afternoon meeting with collaborators
- Ecological Forecasting
  - o Integration of Climate data, SERGoN, TOPS for ecological hindcasting and forecasting.
  - o Analysis and synthesis of climate, land use, ecological process data
  - o Bill Hargrove's vegetation modeling approach
    - ▪ Bills approach and results could be used for the global PA network. Look at his web site. Google forecasts to get to web site. Kevin potter fia data specialist. Do this for our two lccs as our coarse characterization.
    - ▪ Let bills data drive our dispersal zones.
  - o Vegetation niche modeling
    - ▪ Partick
      - • 1. Synthesize current studies on range shifts
      - • 2. Finer scale modeling.
  - o Feedbacks to LPJ lifeform change.
  - o Expert panels for vulnerability assessment
- Development of management options
- Implementation of management options
- Decision support directions
- Discussion of survey of collaborators
- Next steps
  - o Compile new project team email list
  - o Monthly calls. Continue, pick key topics to be discussed. Video conference may be good. Have designated moderator. Join me, or go to meeting. Set up dec conf call
  - o Next team meeting: Austin, mid april, schedule this.
  - o Follow up with Bill Hargrove.
  - o List of potential publications.
    - ▪ Downscale climate methods – Forrest
    - ▪ Climate and land use change impacts – Forrest
    - ▪ Climate and impacts summaries by parks – John, Tony
    - ▪ Past to present climate and validation in GYA – Tony, Andy
    - ▪ Grassland phenology – Nate, Andy
    - ▪ Land use change – Dave/Regan/Bill/Sara
    - ▪ Vulnerability assessment of 57 parks – Andy et al.

- Vulnerability assessment of western NA – John et al.
- Tree species range shifts across LCCs – John, Bill Hargroves, Bill