Second day schedule

- Morning: LTER structure and management
  - Program structure/future planning: Chapin
  - Regionalization/site management: Hollingsworth
  - Information management: Riordan
  - Education and outreach: Sparrow and Rupp
  - ISSE and the LTER Network: Ruess
- Afternoon: Report preparation
  - Committee prepares report
  - Committee meets with BNZ LTER group (4pm)
  - Evening potluck (Chapins)

What is the Bonanza Creek LTER?

- Jointly funded by National Science Foundation (55%) and Forest Service (45%)
- 28 Scientists
- 6 Universities
- 2 Agencies (USFS, USGS)

BNZ Program Components

- Leadership team
  - PI and 4 co-PIs
- Site management
  - Site manager and staff
- Information management
  - Data manager and collaborators
- Education and outreach
- 28 Individual investigators

Evolution of BNZ Leadership

- Current leadership team
  - PI: Chapin
  - Co-PIs: Ruess, McGuire, Lloyd, Hanley (USFS)
- 2010 leadership team
  - PI: Ruess
  - CoPIs: McGuire, Forest Service Rep
  - 2 additional young scientists
    - Strong group already engaged in active leadership: Hollingsworth, Johnstone, Kielland, Kofinas, Lloyd, Jones, Mack, Mulder, Rupp, Schuur, Taylor, Turetsky
- 2016: Leadership team
  - To evolve from the 2010-2016 leadership group

Site and Data Management

- Site manager (Jamie Hollingsworth; Ruess)
- Data manager (Brian Riordan; McGuire)
- Monthly meetings with leadership team and on-site Forest Service representative
  - Establish long-term goals and short-term targets
  - Address problems
  - Discuss implementation of plans

Education

- K-12 SLTER (Elena Sparrow)
  - Long-term student research programs in Fairbanks schools
  - Outreach to Alaska Native village schools
- Undergraduate (PIs and grad students)
  - REUs and other research projects
  - Summer technicians
- Graduate
  - Thesis research

Outreach

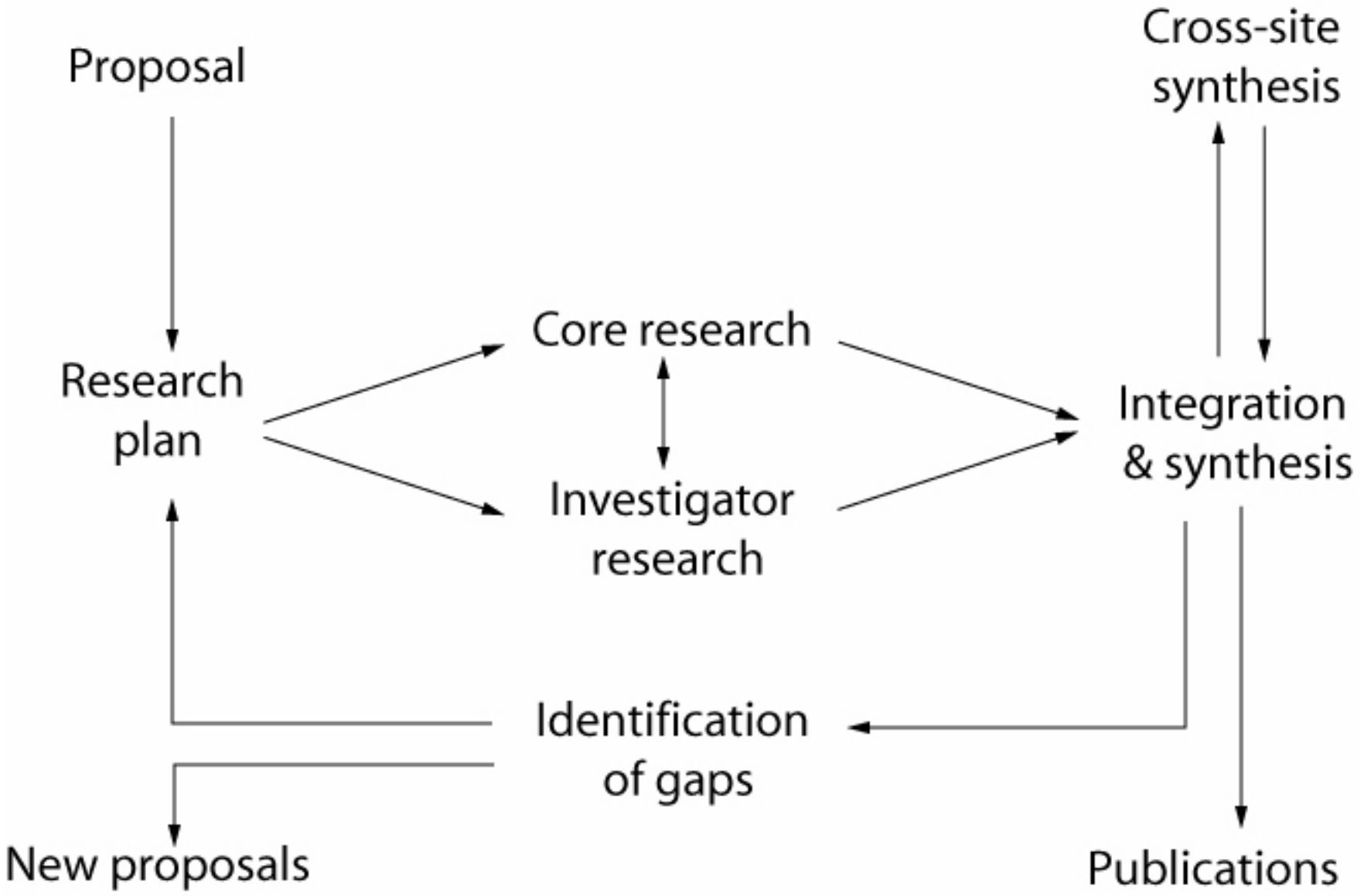
- Evolving from individual commitments into more programmatic efforts
- State agencies
  - Individuals (e.g., Wurtz)
  - Programmatic effort now initiated (Rupp)
- Communities and tribes
  - Individuals (e.g., Kofinas)
  - Plan for community engagement in supplement activities
- Media and the press
  - Individuals (e.g., Juday)
- Writers' workshop 2007
  - Collaboration with HJ Andrews

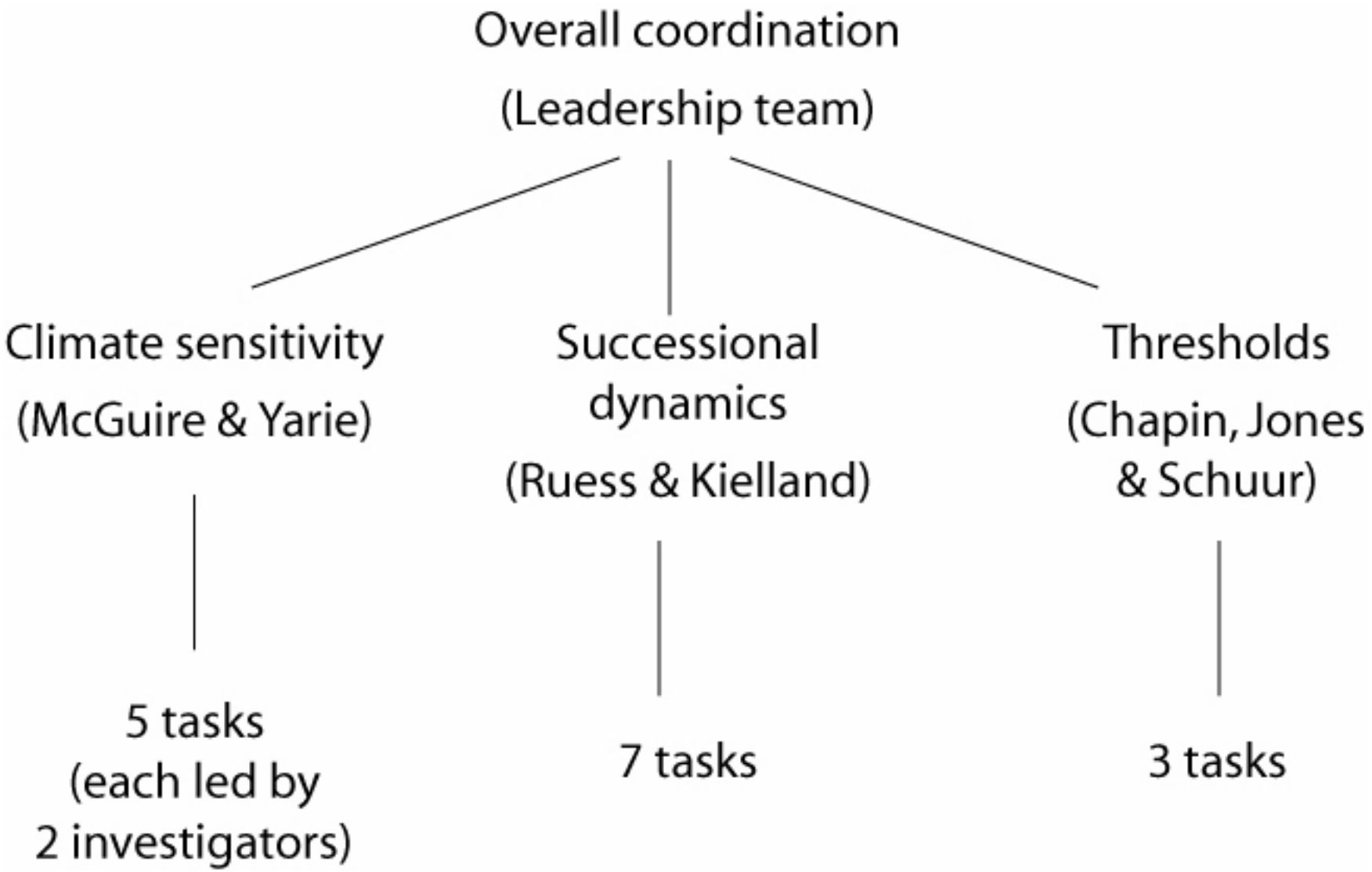
LTER Science Program

- LTER-funded science (NSF and USFS)
  - Core research
  - Watershed research
  - Investigator-implemented research
  - Integration and synthesis
- Other LTER-related research projects of LTER PIs
- Student research
- Research by other scientists (often collaborations)
  - Agency science programs
  - Research by LTER affiliates
  - Visiting scientists

Core Research

- Long-term measurements
  - Structure of program
    - Data collection: Site management team
    - Data analysis and synthesis: Investigator responsibility
  - Focal parameters
    - Environment
    - LTER core areas (e.g., NPP, diversity, etc.)
    - Watershed research
- Long-term experiments
  - Largely investigator responsibility
  - May have greater focal role in the future


Proposal
Cross-site synthesis
Core research
Research plan
Integration & synthesis
Investigator research
Identification of gaps
New proposals
Publications


Overall coordination
(Leadership team)
Climate sensitivity
(McGuire & Yarie)
Successional dynamics
(Ruess & Kielland)
Thresholds
(Chapin, Jones & Schuur)
5 tasks
(each led by
2 investigators)
7 tasks
3 tasks

Example of investigator role (Climate sensitivity)

- Task C1: Climate-process correlations
  - McGuire: Test correlations based on core data
    - Downward trend in NPP
  - J. Hollingsworth: Maintain long-term data collection
- Task C2: Tree-ring correlation with climate
  - Juday: Extend ring-width analyses to all tree species
    - Negative correlation with temperature, due to drought
  - (Lloyd): Ensure integration with paleo and regional perspectives
- Task C3: Climate-veg-predator effects on herbivores
  - Kielland: Interannual variability in hares/predators
    - Snowshoe hare cycle
  - Werner: Interannual variability in insects
    - Changing outbreak dynamics
  - (Hanley): Implications of population cycles for management

Example of investigator role (Climate sensitivity-contd.)

- Task C4: Soil moisture manipulations
  - Turetsky: Water table manipulation in wetlands
  - Yarie: Rainout/snow removal manipula in uplands
    - Rain removal reduces tree growth in floodplains
  - (McGuire): Ensure integration with modeling
  - (Valentine): Biogeochemical measures in manipulations
- Task C5: Summer vs. winter climate effects
  - Kielland: Summer/winter observations uplands
    - Half of N min occurs in winter
  - Turetsky/Harden: Summer/winter observations wetlands
  - (McGuire): Ensure integration with modeling

Integration and Synthesis

- Planned synthesis (defined in proposal)
  - Part of overall research plan
    - Each science task is a focus of synthesis
  - Modeling a critical component
- Discovery-driven synthesis (investigator initiated)
  - Annual workshop designs synthesis
  - Monthly meetings summarize knowledge and gaps
    - Root allocation explains much of interannual ANPP
  - Publications, proposals, and/or revised research plan
- LTER-Network-driven synthesis
  - Next slide

BNZ involvement in LTER Network Science

- Participation in Network Planning
  - ISSE (cryosphere: Ruess)
  - Long-term social-science research (Kofinas)
- Response to Network needs
  - TRENDS: provision of datasets
  - ANPP workshop
- Initiation of network activities
  - BNZ grad student leadership of x-site watershed study
  - Ecosystem services workshop
  - Disturbance synthesis
- Participation in network activities
  - Next slide

Examples: BNZ participation in Network science

- Ecophylogenetics (Hollingsworth)
- ANPP (Ruess, McGuire, Chapin)
- Climate network (Hinzman)
- Lidet (litter decomp; Valentine, Yarie)
- Log decomposition (Yarie)
- Fine root dynamics (Ruess)
- Hydrologic processes (Hinzman)
- Climate variability (Juday)

Steps taken to enhance integration

- Changes in research team
  - Discontinue projects that failed to integrate
  - Add new scientists to fill knowledge gaps
- Increased focus on intra-site synthesis
  - Annual Symposium
  - Monthly meetings
- Designate responsibility for every research task

BNZ-related major research initiatives

- TRENDS (LTER Network)
- NEON (Planned in collaboration with ARC)
- Western Arctic Linkage Expt. (WALE)
- Cross-site roots project
- Organic N cycling
- Resilience and Adaptation (IGERT)
- Resilience and Complexity (EPSCoR)
- Scenarios Network for Alaskan Planning (SNAP)

Self-evaluation and change

- Project evaluation and change
  - Mini-proposals every two years
  - 6-year NSF renewal cycle
- Program evolution
  - Gradual evolution of research focus
  - Distributed responsibility as basis for fostering future leadership

LTER Accomplishments 2000-2006

- 247 Peer-reviewed journal articles
  - e.g., 8 in Science or Nature
- 5 Books
  - e.g., BNZ synthesis volume, Alaska Trees and Shrubs
- 56 Book chapters
  - e.g., Forest chapter for ACIA, Polar chapter in MEA
- 12 Reports
  - e.g., Insect populations, fuel flammability, morel harvest
- 42 PhD and MS theses
  - e.g., Top-ranked dissertation in U.S., 2006
    - Field of math, physical sciences, engineering

Examples of BNZ Contributions to Science

- Expand state factors concept re climate change
- Reshape successional paradigm
- New view of the nitrogen cycle (dissolved organic N)
- Mammalian impacts on biogeochemistry
- Root turnover and C/N dynamics
- Changing role of fire in the boreal forest
- Climate effects on tree growth and biome shifts
- Modeling boreal climate feedbacks
- Scarification unnecessary for forest regeneration
- Streams as integrators of watershed biogeochem.

BNZ funding summary ($/yr) (for 2005)

- NSF LTER funding $820,000
- USFS LTER funding 700,000
- Integrated research 1,456,751
  - (e.g., Microbial Observatories)
- Individual research 5,840,824
- Total $8,817,575
  - (10-fold leveraging of NSF LTER funding)

The Future

- Big opportunities
  - LTER Collaborations (Arctic, LTER Network)
  - NEON
  - Yukon Basin Initiative (USGS)
- Big challenges
  - Working with communities
  - Integrating science with management
    - Projecting future climate and ecology (SNAP)
  - Integrating molecular, ecological, and social processes

Example: BNZ-ARC Collaboration

- Builds on past collaborations
  - Field observations along gradients
  - Ecosystem modeling
- Some researchers work in both sites
  - Mack, Kofinas, Bret-Harte, Hinzman
- Plans for the future
  - Jointly designed NEON program for Alaska
  - Reciprocal attendance at annual meetings
  - Synthesis of watershed, experimental, and observational research