Theme 1: Forest BioProducts Sustainability

Linking dynamic forest ecosystems with societal demands for products and environmental protection

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MAINE

FOREST BIOPRODUCTS RESEARCH INITIATIVE

NSF EPSCoR

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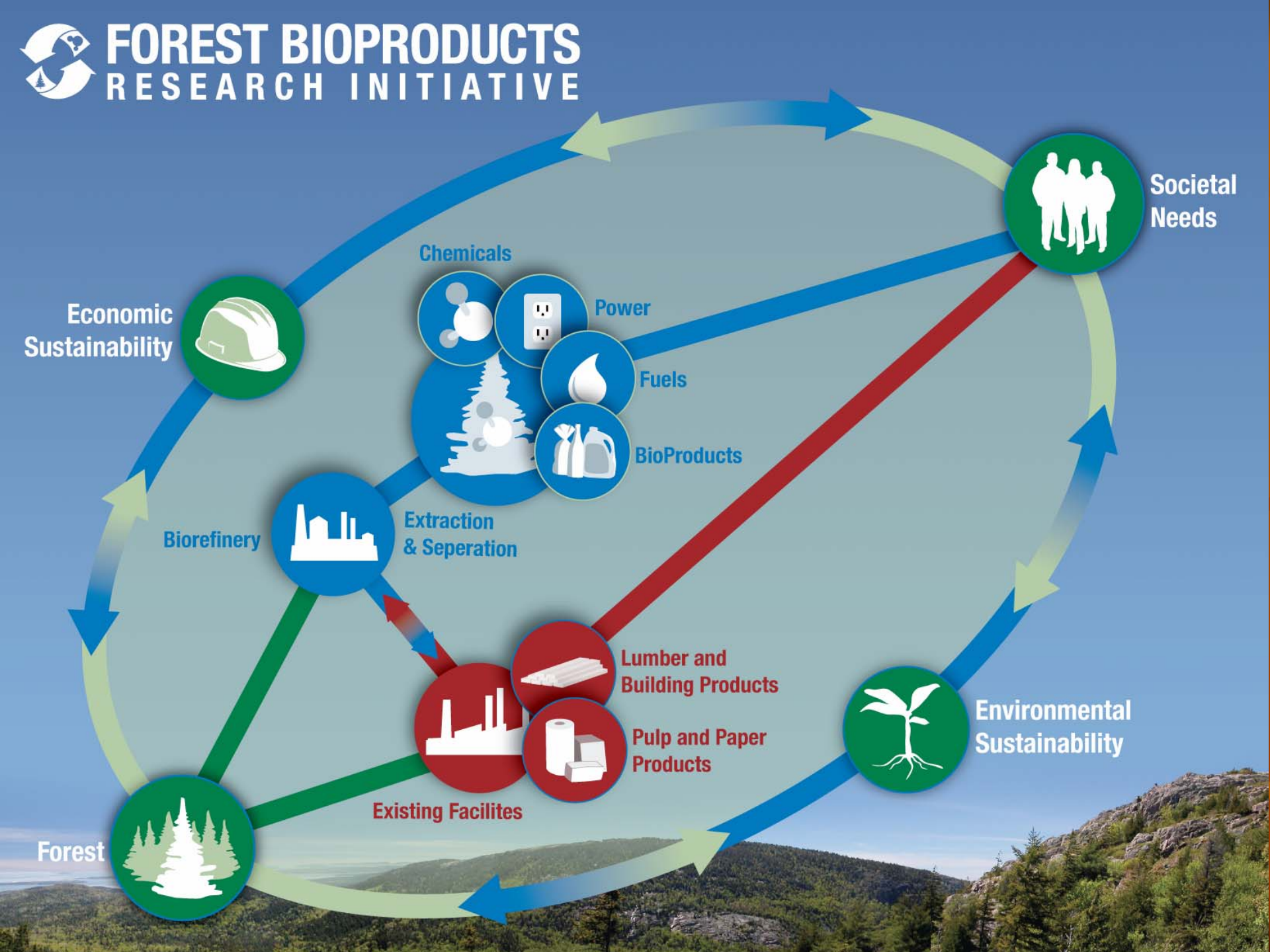


FOREST BIOPRODUCTS
RESEARCH INITIATIVE

Theme 1: Forest BioProducts Sustainability

Theme 1 – Year 1 Plan

- Assemble a Theme 1 Working Group
- Develop key questions
- Assemble research teams and projects to address key questions
- Allocate three graduate research assistantships to projects
- Fill two faculty positions (biometrics, LCA) and post-doc (LCA)
- Begin work on projects addressing key questions
- Pursue extramural grants

Theme 1
Interdisciplinary Working Group

- Kathleen Bell
  - Natural resource economics
  - Spatial modeling (GIS)
- Jeff Benjamin
  - Forest operations and wood science
- Darrell Donahue
  - Risk assessment modeling
  - Life cycle analysis
- Ken Laustsen
  - Forest growth and yield
  - Wood supply modeling
- Jessica Leahy
  - Environmental education & policy
- Rob Lilieholm
  - Forest economics and policy
- Greg Norris
  - Life cycle inventory analysis
- Terry Porter
  - Environmental business & policy
- Russell Read
  - Economics & investments
- Jonathan Rubin
  - Economics of alternative fuels
  - Environmental policy
- Bob Wagner (Working Group Chair)
  - Silviculture
  - Forest ecology
- Jeremy Wilson
  - Forest management
  - Landscape analysis

Theme 1 Working Group: Organizational Linkages

- Cooperative Forestry Research Unit (CFRU)
- Department of Chemical and Biological Engineering
- Department of Resource Economics & Policy
- Maine Business School
- Maine Forest Service
- Margaret Chase Smith Policy Center
- Parks, Recreation & Tourism Program
- School of Forest Resources
- Sylvatica (LCA)

Theme 1 Working Group Monthly Meetings

Key Questions

- How does the life cycle (energy, waste, carbon footprint, etc.) of forest bioproducts compare to alternative products?
- What effect will sprawl and public opinion have on the social acceptability of a future forest bioproducts economy?
- Does a forest biofuels/bioproducts industry make economic sense for Maine and the Northeast?

Key Questions

- What is the character and composition of the future sustainable supply of biomass feedstock and other wood products from Maine's forest?
- What impact will demand for biomass have on Maine's future forest?
- What is our logging capacity and are there improvements that need to be made to current harvest technologies?

Projects

Project Title	Investigators	Collaborators	Graduate Students	Undergraduate Students
Landowner and Public Acceptance of Bioproducts in Maine	R. Lillieholm T. Porter J. Leahy	Linda Kruger (USFS)	Jim Marciano, MS (starts Sep 07) Ana Zivanovic (Apr to May 2007) Gretchen Heldmann	Kersi Contractor
Literature Review on Forest Capacity for Fuel Production in Maine and New England	J. Rubin K. Bell D. Donahue			Nikki D'Alessandro Dale Kollmetz
Land Use Components of Life Cycle Analysis	G. Norris	Sylvatica		
Biomass Harvesting	J. Benjamin R. Wagner	CFRU Huber Resources	Chuck Coup, MS (started July 07) Andrew Nelson	Nathaniel Vir
Incremental Biomass Availability	J. Wilson R. Wagner J. Benjamin	K. Lautsen (MFS)	Julia Briedis, MS (starts Sep 07)	Kersi Contractor Sep 06 – May 07 Honors Thesis

Graduate Research Assistantships

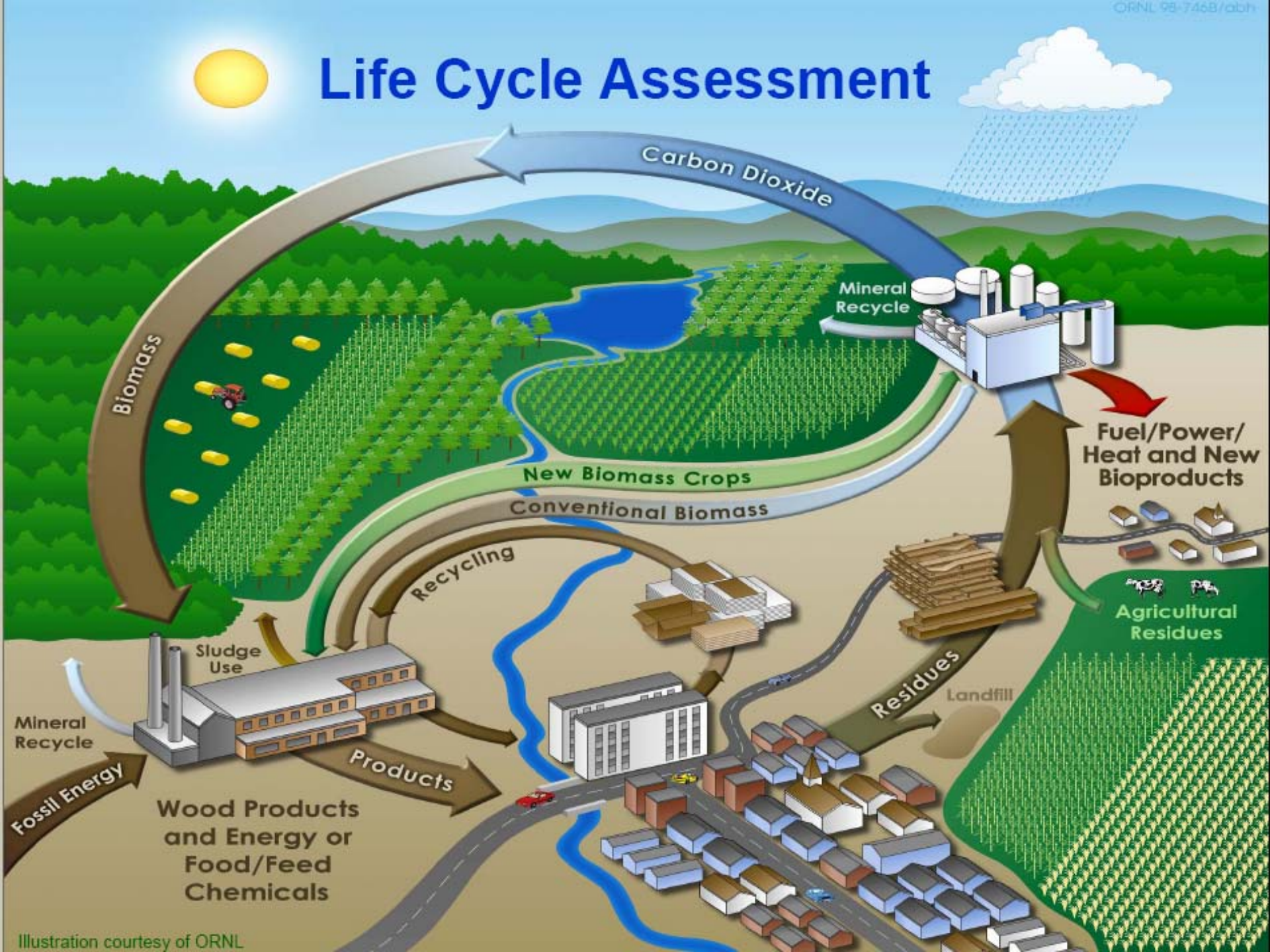
- **Chuck Coup**, MS (started July 07) - Forest biomass harvesting, Advisor: Benjamin
- **Julia Briedis**, MS (starts Sept 07) – Incremental biomass availability, Advisor: Wilson
- **Jim Marciano**, MS (starts Sept 07) - Landowner and Public Acceptance of Bioproducts in Maine, Advisor: Lillieholm

Faculty Positions

- Forest Biometrician – Search complete! Dr. Aaron Weiskittel (OSU & Weyerhaeuser) to join School of Forest Resources January ’08
- Industrial Ecology & LCA – Ads complete. Applications due end of August
- LCA post-doc – remains unfilled, searching for options

ORNL 98-7468/abh

Life Cycle Assessment



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Life Cycle Analysis of Forest Bioproducts (Norris, Shaler, Wagner)

- Objectives
  - Build LCA skills at UMaine and other campuses in the state; including making UMaine one of the leaders within the LCA field
  - Advance the practice of LCA in application to bio-products:
    - Use LCA to help advance sustainable bioproduct design and evaluation
    - Develop and demonstrate new methods for LCA, including:
      - land use impacts of forestry and agriculture
      - forest and economic modeling

LCA Accomplishments

- Four LCA workshops held (three on UMaine campus and one in Augusta)
  - Augusta meeting included outreach to industry and government (standing-room only)
  - UMaine sessions included two introductions and one advanced hands-on session with SimaPro LCA software
- LCA research - Focus so far has been on the development of impact assessment methods for land use and biodiversity impacts in North America:
  - Reviewed existing life cycle inventory (LCI) databases in relation to land use and biodiversity
  - Reviewed existing impact assessment methods in relation to land use and biodiversity
  - Developing proposal to address land use and biodiversity in North America

LCA Accomplishments

- Reviewed interface between forest certification and LCA, and developing a proposal for a method to integrate the two.
- Norris advised Steve Shaler's graduate student on LCA modeling challenges for life cycle inventory modeling for some forest products in Northeast
- Year 2 focus - Practical application of LCA to forest products coming from Maine, including at least one bioproduct that is of interest to FBRI researchers

Landowner & Public Acceptance of BioProducts Harvests
(Lilieholm, Leahy, Porter)

- **Objectives**
  - Investigate the social acceptability of biomass harvesting
  - Determine potential social challenges of a forest bioproducts economy
- **Approach**
  - Quantify social acceptability from on-the-ground evaluations of harvest aesthetics to building social network maps of the forestry community.
  - Network mapping of stakeholder groups is a new method quantifying social networks
- **Progress**
  - Leahy to provide update

Forest Capacity for Fuel Production
(Rubin, Bell, Donahue)

- **Objective**
  - Conduct an analysis of the possibility and uncertainties surrounding the economic viability of cellulosic fuel ethanol in Maine & NE
- **Approach**
  - Examine economics of a transition to cellulosic ethanol production in Maine & NE
    - Given the identified candidate bioproducts, identified biomass feedstock availability, project regional fuel demand
  - Identify important national and regional policy incentives and likely impacts
    - Wholesale & retail infrastructure
    - Regional markets
- **Progress**
  - Limited due to difficulty finding suitable graduate student
  - Using funds to begin work with current employees

Evaluation of Biomass Harvest Systems (Benjamin & Wagner)

- Objectives
  - Develop feasible biomass harvest systems and to establish work standards of those systems for multiple sites and stand conditions
- Approach
  - Two full tree harvest systems are be tested for performance to harvest biomass from different sites & silvicultural objectives
  - Time and motion studies will be conducted using on site data collection and video analysis
  - Integrated with factorial experiment of silvicultural options to rehabilitate beech stands in Maine
- Progress
  - MS student (Chuck Coup) began work July 2007
  - Pre-harvest field work completed and awaiting harvest treatments

Northeast Forest Bioproducts Puzzle

- Forest Products Society (Northeast Section) and FBRI are co-sponsoring conference on strategic directions over the next 5 - 10 years for Forest Bioproducts Industry in the NE.
- Event will feature a series of speakers that will address strengths, weaknesses, opportunities and threats (SWOT) of a bioproducts industry in the NE as they relate to:
  - Production Capacity
  - Forest Resource
  - Public Policy
  - Economic Development

Woody Biomass Availability After Harvesting (Wilson, Wagner, Benjamin)

- Objectives
  - Determine additional biomass availability after conventional harvests
  - Evaluate the potential impact of additional biomass removals on future stand conditions
- Approach
  - Post-harvest stand conditions will be measured to determine amount of woody biomass available using current harvest methods
  - Assess amount of biomass available from precommercial thinning
  - Project future stand conditions in to determine the long-term impact of biomass harvests on future stand conditions.
- Progress
  - MS student (Julia Briedis) has been accepted
  - Works begins Sept 2007

Extramural Grants

- Evaluation of biomass harvest systems for improvement of low quality beech-dominated hardwood stands in Maine - Benjamin and Wagner, Cooperative Forestry Research Unit (CFRU), $41,176 over 3 yrs (successful)
- Sustainable harvest levels and characteristics of biomass feedstock from Maine's forest - Wagner et al., DOE and USDA, $800K (Pending)
- Regional public attitudes toward ethanol based transportation - Rubin and Teisl, Sun Grant, $340K (unsuccessful)

Theme 1 -Plans for Year 2

- Make progress on five ongoing projects addressing key questions
- Engage new EPSCoR faculty (biometrician & LCA) in ongoing and new research
- Make progress on graduate student research projects
- Build on extramural grant opportunities