



All Team PINEMAP meeting:

upcoming dates and logistics

January 14, 2016



Upcoming dates

- ATP meetings on Thursdays this spring (presenters):
 - 2/18 (bring integration platform/ big paper 2 sentence updates)
 - 3/17 (sapflux and WaSSI)
 - 4/21 (NEP and Tier II)
- Modeling summits (last Tuesdays):
 - 1/26, 2/23, 3/29, 4/21
 - Can we meet at noon instead of 2pm ET?
- Executive committee meeting 2/25 10am ET



Data needs

- Shift focus from data collection to collation and upload
- Uploading data in templates is a critical step for assembling region-wide datasets and creating value-added products
- Areas of especially high need:
 - Soil respiration (Rh:Rs)
 - Sapflow
 - Meteorological data (air temp, humidity, ppt, radiation)
 - Soil moisture (wireless & wired probes, and TDR)
 - Litter
 - LAI



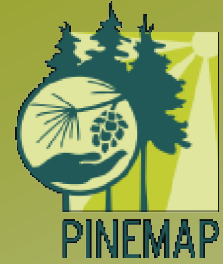
Final meeting

- Scheduled for May 24-26, 2016 at UGa
- Warnell School is providing meeting space
 - thank you!
- We have a hotel room block at the UGa conference center
- Full days on 5/24 and 25, likely ½ day on 5/26



Final meeting planning

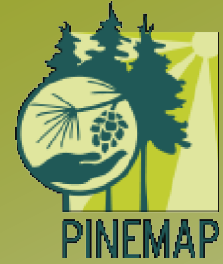
- Plenary presentations of the 1st level integrative papers
 - should be far enough along to submit in 1st cohort of final report articles this June
- Workshop sessions to develop the 2nd level integrative papers
 - Will include in the 2nd cohort of final report articles in September
- Final poster presentation opportunity
- Suggestions?
 - Please send ideas to Grace!



Education Aim (5)

Integrated Paper Updates

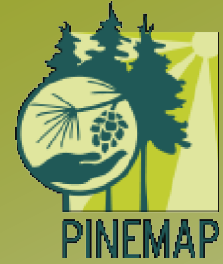
All Team PINEMAP
January 14, 2016



Roadmap

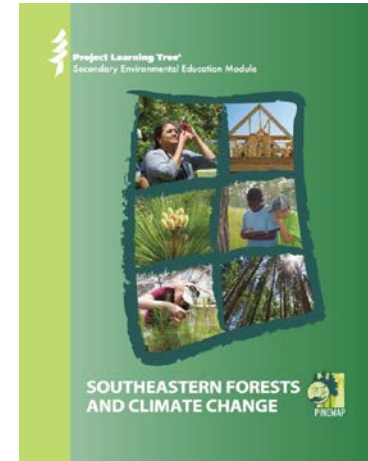
- Overview of Education programs and updates
- Research papers: published and planned
- Integrative papers
 - Education programs
 - Concepts and take home messages
 - Journal outlets
 - Discussion
 - Education recommendations
 - Recommendations for integrating education
 - Science's Education Forum





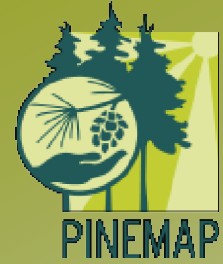
Glance at PLT Module Numbers

- More than 5,000 books distributed
 - 10 states outside SE ordered 2nd edition
- 440 website registrants
- Evaluation (summative and formative)
 - 76 teachers
 - Positive feedback and suggestions for improvement
 - Data from 2,073 students
 - Increased knowledge and hopefulness
- \$24,000 in mini-grants
 - 11 states in Southeast
 - So far: 34 workshops/presentations and 650 participants



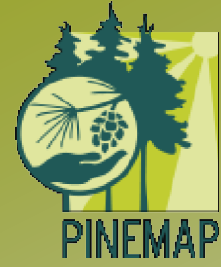
All events

- **57 workshops/presentations and 1140 participants**

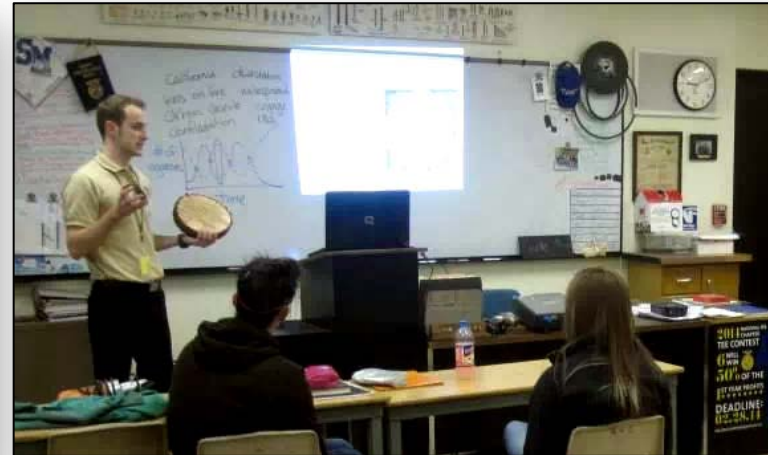


Graduate Class

- Seminar style, 2 credit online course
- Initial and revised iterations based on evaluations
- Two goals
 - Engage students in exploring climate change mitigation and adaptation issues
 - Build capacity for integration among disciplines and between research and Extension
- Outcomes
 - 41 students and 37 course evaluations
 - Evaluations suggest:
 - Valuable format
 - Better understanding of other disciplines and integration
 - Increased capacity to engage stakeholders



Fellowship Program



Root Biomass Response to Fertilization and Throughfall Reduction in a Loblolly Pine (*Pinus taeda* L.) Forest

Pinus Removal, Barkwood Pallet, "Tree Dying", Canopies Dead, Rupture, Soil, Abandon, Vague

Department of Forest Resources and Environmental Conservation, Virginia Tech; Department of Ecosystem Science and Management, Texas A&M University; Department of Natural Resource Energy and Management, Oklahoma State University

Introduction

Throughout the Southeastern part of the United States, loblolly pine plantations are of great significance due to their commercial timber value. A region study was conducted across the Southern US which included plots in Oklahoma, OK; Florida, FL; Georgia, GA; and Virginia, VA, by PINEMAP (Pine Integrated Network: Education, Mitigation and Adaptation Project) with the goal of understanding the new challenges being created through global climate change. Climate change threatens the growth and productivity in these plantations because of reduced precipitation and increasing annual temperatures. It is suspected that these conditions will affect the effect of fertilization on loblolly pine plantations influencing total forest productivity. A study has been performed to better understand how loblolly pine plantations will respond to precipitation reduction. The study was performed near Isabel, Oklahoma.

Site Information

The site receives 1000mm of annual rainfall in Isabel, precipitation with a mean annual temperature of 16.6°C. The through fall reduction (ThruFall) treatments were applied in spring 2012. Thru Fall treatments consisted approximately 30% reduction in throughfall. The fertilization treatment consisted of 204 kg ha⁻¹ nitrogen, 27 kg ha⁻¹ phosphorus, and 56 kg ha⁻¹ potassium applied as urea, diammonium phosphate, and potash. A micronutrient mix was also applied containing 6% sulfur, 2% boron, 2% copper, 6% manganese, and 5% zinc at a rate of 22.4 kg ha⁻¹.

Methods

For this experiment, there was 8 soil core samples taken from random locations within each plot in Oklahoma. A 4.5cm diameter soil core was used to collect samples at intervals of 0-10cm, 10-20cm, and 20-30cm of soil depth. During soil core processing, soil weight of each sample was recorded and roots were removed. The roots were sorted in to very fine (<1mm), fine (1-2mm), medium (2-10mm), and coarse (>10mm), size classes before being dried and weighed. A soil subsample was analyzed for each core and water content and bulk density was also calculated.

Results

Very fine root mass increased with throughfall reduction while decreasing in response to fertilization. The amount of root biomass in the fine earth fraction averaged 157 g m⁻², 82 g m⁻², and 288 g m⁻² in the <1 mm, 1-2 mm, 2-10 mm root fractions, respectively. The only significant results were for the <1 mm fine root fraction, with the main effect of F and TR both significant (p<0.05). These differences reflected an 18% reduction with fertilization, and an increase of 13% with throughfall reduction in the <1 mm fraction.

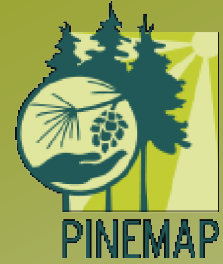
Figure 1 (Above): Displays total very fine root biomass according to treatment type and depth. **Figure 2 (Below):** Displays the total root biomass by size and treatment type.

Table 1: The figure above displays total very fine root biomass (<1 mm) according to treatment type and depth.

Factor	Degrees of Freedom	F Value	P Value
Fertilization	1	0.216	0.636
Throughfall	1	0.093	0.760
Depth	2	<0.0001	
Block	3	0.024	

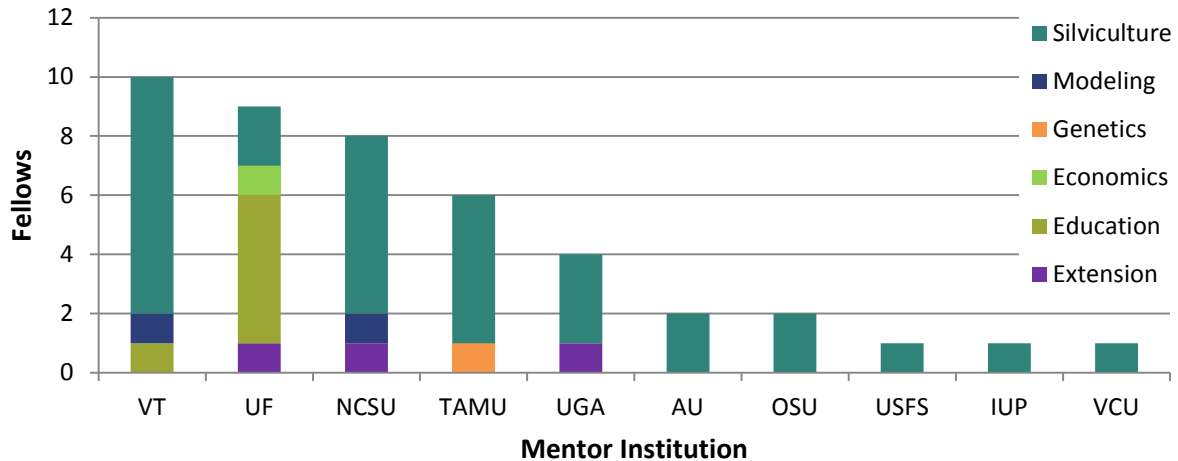
Discussion

The results suggest that loblolly pine will reduce above-ground biomass allocation in favor of root growth in reduced throughfall conditions. Fertilization treatments counteracted the effects of throughfall reduction (Figure 1) and reverse the context.



Fellowship Outcomes

Undergraduate Fellowship Summers, 2012-2015



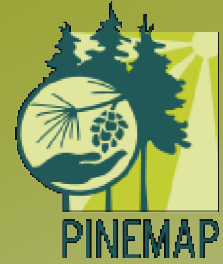
Undergraduate Fellowship Fall Course, 2012-2015

	2012	2013	2014	2015*	2012-2015
Fellowships	5 (6)	12	10 (12)	4 (14)	29 (44)
Presentations	54	107	81	39	281**
Schools	14	25	24	11	64**
Teachers	29	40	32	13	91**
Students	1060	2629	1518	783	5990

Completed (Enrolled)

*denotes incomplete data

**denotes unique numbers



Specific Research Papers

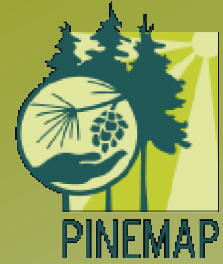
AIM 5 from UF and VT

1. **Teacher needs assessment from PLT module (in AEEC)**
2. **Testing climate and carbon activities (Hall thesis)**
3. **Online graduate course integrates R,E,Ex (Monroe, Ireland, Martin)**
4. Teachers and cultural cognition (Kunkle thesis) (and maybe more)
5. Factors influencing climate change hope (Li dissertation)
6. Measuring climate change hope (Li dissertation)
7. Changing climate change hope with curriculum (Li dissertation)
8. Measuring systems thinking (Ritchie dissertation)
9. Teaching systems (Ritchie)
10. Teacher efficacy – workshops and online (Li and Monroe)
11. Review of existing natural resources REU programs (Kidd dissertation)
12. NR REU program and participant outcomes (Kidd dissertation)
13. Case studies of REU programs in NR (Kidd dissertation)
14. Undergraduate course on communicating about natural resources (Kidd, Seiler)
15. Developing and running fellowship program (Kidd, Seiler)

AIM 6 from UF

1. **Message in a bottleneck (Wojcik et al.)**
2. **Homophily (Monroe et al.)**
3. **Finding common ground (Bowers et al.)**
4. **Forest landowner perceptions (Krantz et al.)**
5. **Framing video for forest landowners (Krantz)**
6. Extension agents perceptions (Sommers thesis)
7. SRECA evaluation (Clifford thesis)
8. Agent barriers to climate programming (Clifford thesis)

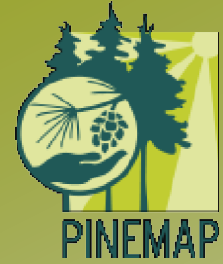
Bold items are published or accepted.



Integrated Education Initiatives Papers

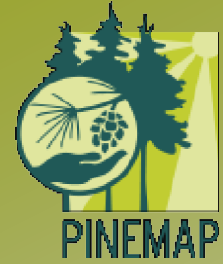
- Justification
 - Assumption that most grant-funded education is done through workshops for select educators
 - We have good projects to talk about!
 - We have reasonable recommendations for others.





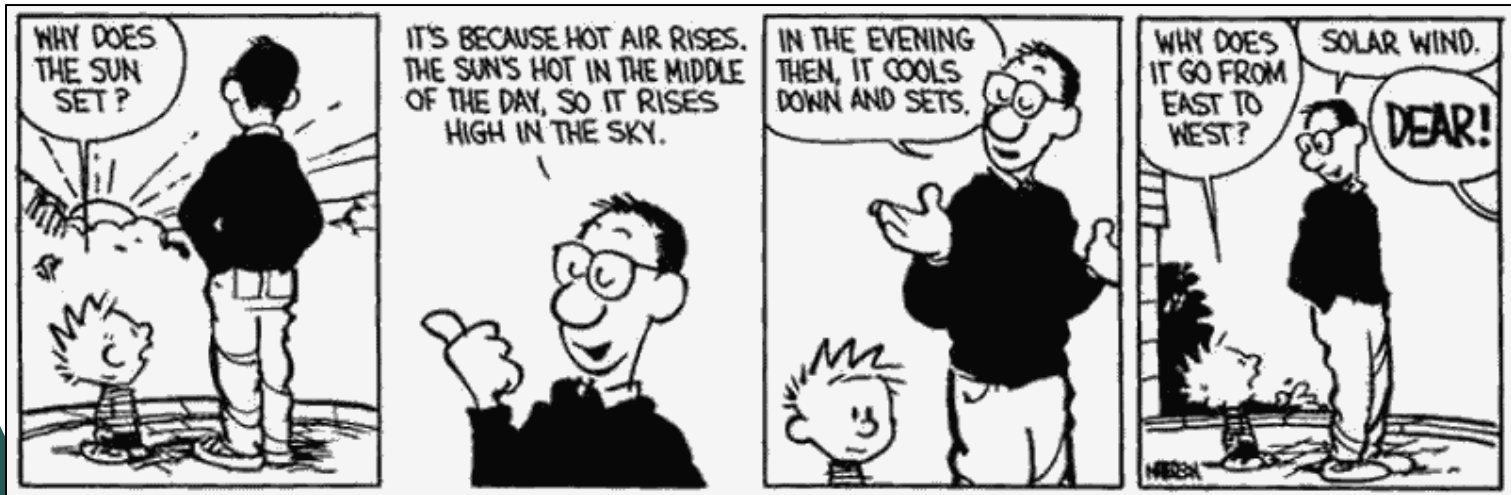
Integrated Education Initiatives

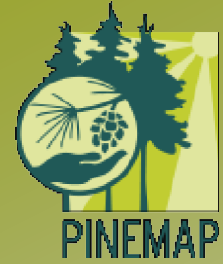
- Take home messages
 - PINEMAP has capacity for integrating education at all levels and is a model for adoption/ adaptation
 - Common threads across education projects
 - Projects are research-based
 - Making science relevant through multiple methods
 - Multidisciplinary and interdisciplinary activities
 - Integration with stakeholders in development or in contact with audience
 - Implementing standards / expected learning objectives
 - Building learner capacity / preparation for the future
 - Iterative process of program development



Integrated Education Initiatives

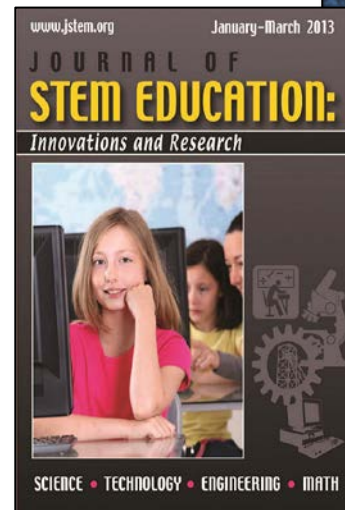
- Broad impacts
 - Education integration yields:
 - Broader awareness of the project
 - Capacity building (internal and external) for future collaboration
 - Greater communication and teaching skills
 - Greater science literacy

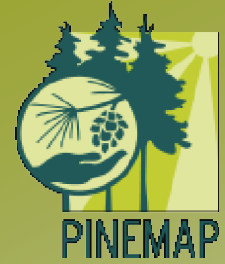




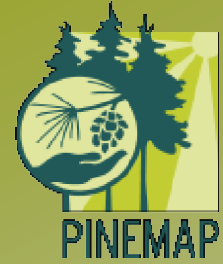
Integrated Education Initiatives

- Potential Journal outlets
 - J. of Forestry
 - J. STEM Education: Innovations and Research
 - Natural Sciences Education





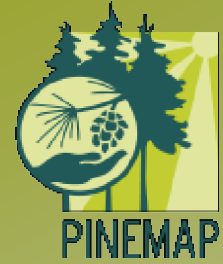
And a second paper idea...



Synthesizing what we've learned

- We think our experience is worth sharing
- Of interest to those writing proposals for federal funding that requires education to be integrated with research
- *Science* Education Forum articles are 2000 words and **not** research reports
- Planning to synthesize recommendations based on literature and experience
- You can help!

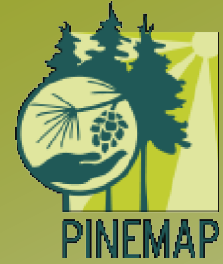




What made Aim 5 projects successful?

1. Integrating education at the beginning
 - Expectation and norm
 - Respect and collaboration
 - Communication
2. Basing educational product on research framework
 - But not waiting for findings, using foundation and process
 - This allows the product development to occur over the entire grant period
 - Enables needs assessment and evaluation
3. Creating activities that integrate, engage, build capacity
4. Engaging experts, learners and stakeholders in design and improvement of products
5. Maximize efforts with partnerships
 - Advisors, Pilot testers, Marketing, Dissemination

What else?



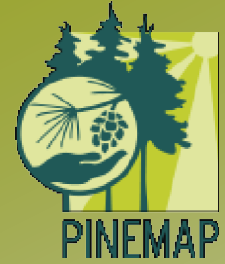
Specific recommendations

For proposal and project design

- Put education leaders on the proposal design/writing team
- Support research that advances education
- Set expectations, provide incentives for collaboration between researchers and educators

For education coordinators

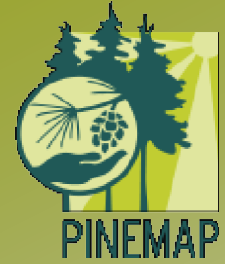
- Use research framework as the core
- Build understanding across disciplines
- Promote problem solving skills for societal issues
- Develop training programs to advance skills & understanding
- Provide for interaction between researchers and educators and students



Education Recommendations Paper

- Estimated timeline

	January	February	March	April	May
ATP meeting	■				
Outlining	■				
Develop draft document		■ ■ ■ ■ ■ ■ ■ ■			
AIM 5 review			■ ■ ■ ■		
Revise draft document				■ ■ ■ ■ ■	
Share with all Aims				■ ■ ■ ■ ■	
Revise draft again					■ ■ ■ ■ ■
Annual meeting					■



Other Ideas?



PINE
RESILIENCE
RECIPES

NEW

GOALS FOR PINEMAP

- Minimize risk
- Sequester carbon
- Reduce nitrogen fertilizers and water usage
- ✓ Goal: Resilient forests grow *and* sequester more carbon



STRAIGHT AND NARROW PINES

RECIPE WILL PROVIDE ENOUGH TREES FOR ONE SAWMILL OR TWO BOUTIQUE WOODWORKING FACILITIES, ADDITIONAL TREE LIMBS OR FIRST THINNINGS MAY BE USED FOR BIOENERGY

Ingredients:

- 435 improved seedlings per acre
- Specially prepared site
- Favorable planting season
- Fertilizer

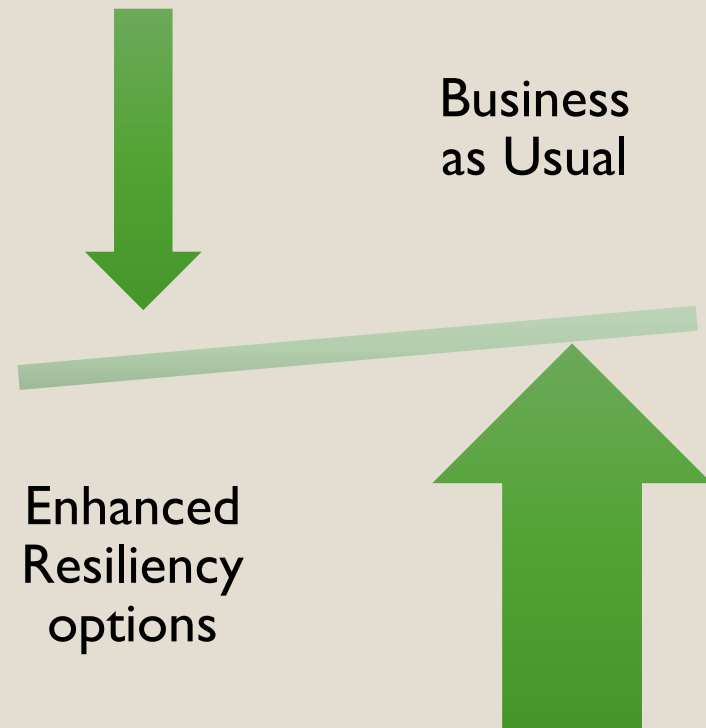
Steps

1. Prepare your site.
2. Select your seedlings based on your location and your goals.
3. Plant seedlings at the right density for disease and drought, but sufficient to survive any calamities.
4. Grow the seedlings for 15-35 years, consider thinning at opportune times. We recommend 240-300 trees per acre.
5. Harvest and repeat.



SOUTHERN PINE FOREST RESILIENCE MANAGEMENT GUIDEBOOK

- Summarize good forestry management *and* PINEMAP results
- Make useable for foresters/layman
- Link to the DSS
- Provide Enhanced Resiliency options
- Provide specifics



SOUTHERN PINE FOREST RESILIENCE MANAGEMENT GUIDEBOOK

- Three (or 2) regional versions
 - Western Gulf
 - Piedmont
 - Coastal Plain
- Four Key Sections
 - Pine Woodland Establishment
 - Young Woodlands
 - Mature Woodlands
 - Enhancing Neglected Woodlands
 - Harvesting Sustainably

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RECIPE CARD

- Overview
- Time consideration
- Preparation (shopping list)
 - Related activities
- Materials (ingredients)
- Prescription (directions) – for Business as Usual process
- Prescription for Enhanced Resiliency Variation
 - Definition of Terms / concepts (side boxes)
 - Additional Resources
 - References



PINE ESTABLISHMENT

- **Introduction- Recipe cards contained in this section with brief description**
- **Site Preparation**
 - Disposal of logging debris
 - Controlling unwanted competition
 - Controlling regeneration pests
 - Improving Site and Soil conditions and Nutrition
 - Protection measures: fire, erosion, theft, trespass
- **Planting Pine Seedlings**
 - Genetics
 - Stock type: Plugs, Bare roots
 - Stocking Levels
 - Planting season
- **Improving species composition**
- **Wildlife**



SECTION 1: ESTABLISHMENT PLANTING PINE SEEDLINGS

- Overview and Objectives

Standard Recipe

Preparation

- Explore future climate opportunities/Risks at Pine Explorer DSS
- Determine number of seedlings needed
- Order seedlings
- Set up planting contractors
- Monitor weather patterns and conditions
 - Submit application for EQIP payment



SECTION 1: ESTABLISHMENT

PLANTING PINE SEEDLINGS

Ingredients

- 600-700 bare root seedlings per acre

Directions

- Winter planting
- Spacing
- Weather conditions at time of planting
- What to avoid



SECTION 1: ESTABLISHMENT PLANTING PINE SEEDLINGS

Added Resiliency Variation on Recipe

- **Preparation**
- **Ingredients**
 - 430 - 530 containerized seedling/acre, suitable family
 - treated for regeneration pests and tip moth
- **Directions**
 - Fall planting
 - Weather and soil moisture conditions
 - What to avoid
- **Modify / Personalize the Recipe**
 - 430 – 530 bare root seedling planted early winter



**SO TELL ME WHAT YOU
REALLY THINK OF OUR IDEA**



NO REALLY, I INSIST

NEED YOUR HELP!!!

Need a **contact person** from each **Integration area!**



NEED YOUR HELP!!!

- Need research “nuggets”
- Need your recommendations




NEED YOUR HELP!!!

- Help us flesh out the “working” draft of this guidebook
- Top five points that this guidebook needs from your research!



WHAT SHOULD YOU EXPECT

- Co-authorship (hoo-yeah!)
- Warm, fuzzy feelings
- Bi-monthly or periodic online meetings
- Emails with requests for review or input



I FEEL
ALL WARM
& FUZZY
INSIDE,
LIKE I SWALLOWED A
KITTEN.



To review the guidebook!
(a few somebodies)

NOW, WHO'S WITH ME!



GRADUATE STUDENTS AND



POST-DOCS ARE INVITED TO HELP!