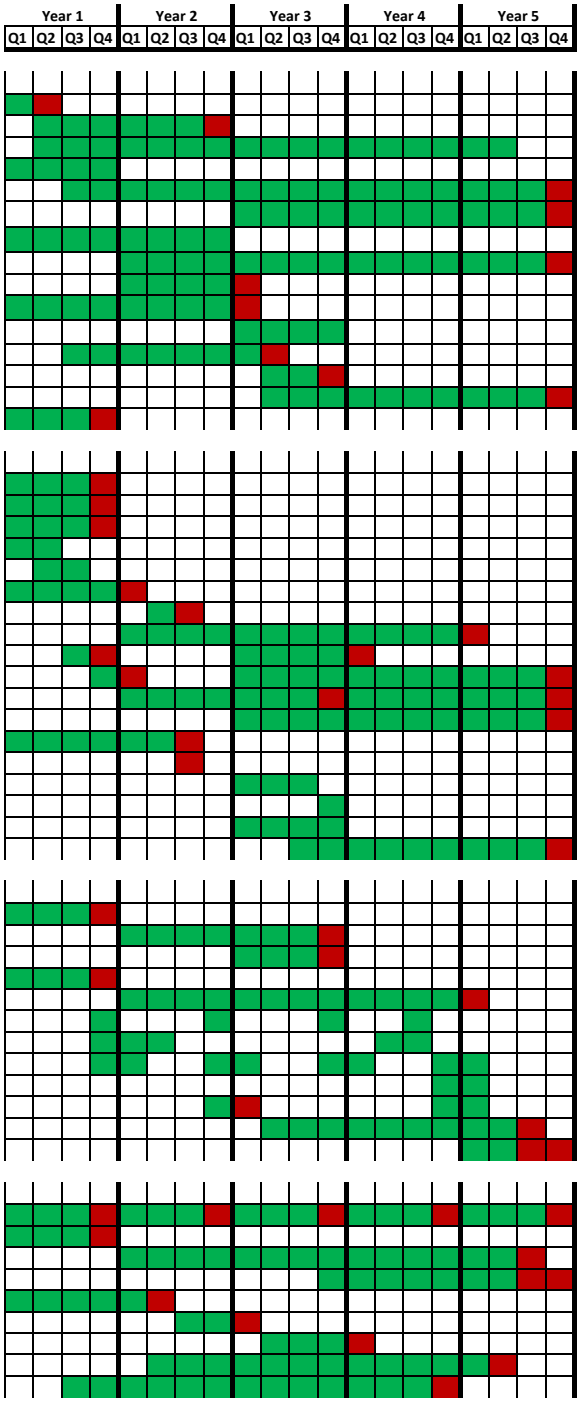
**PINEMAP Timeline for Tasks & Deliverables**




**Aim 1. Ecosystem Ecology/Silviculture**

1 Standardize methods for C, N, N20, H20 foot prints
1 Initial regional C and nutrient baselines from Tier 1 data
1 Measure Tier 2 sites, C, nutrient, soil respiration….
1 Install Tier 3 sites
1 Measure Tier 3 sites
1 Regional C, $H_20$, baseline with tier 2 data
1 Regional C, $H_20$, baseline with with responses to field manipulation
1 Quantification of regional variation in soil respiration
1 Initial regional quantification cross-region fertility rating and stomatal response functions
1 $\delta^{18}O$ & $\delta^{13}C$ from Tier 2 wood samples
1 Refine regional stomatal response and transpiration functions based on clonal & regional $\delta^{13}C$ data
1 Characterize tree water use efficiency (WUE) of different provenances and clones
1 Regionalize estimates of WUE for application in 3PG and WaSSI
1 Assess genotypic and treatment differences in carbon use efficiency (NPP:GPP) and regional variation in carbon sequestration efficiency (NEP:GPP)
1 TerraC Training

**Aim 2. Modeling**

2 Preliminary assessment/case study of management effects on loblolly pine C budget over a rotation cycle
2 Preliminary assessment/case study of climate change factors on loblolly pine carbon and water exchange
2 Assessment of the resolution of alternative methods for quantifying forest water use
2 Modeling team coordinates w Aim Leaders on field measurements
2 Compile regional satellite, meteorological (including climate scenarios), soils and data needed for model runs
2 Develop & assess management alternatives w/ Tier I data & existing models of C seq.
2 Adapt 3PG to run as real time geoprocessing server
2 Improved process & hybrid models parameterized from network measurements
2 Predict C pool dynamics at varying scales for alternative land use, management, & climate scenarios
2 Improved growth & yield models with climate inputs & C balance
2 Regional map of potential climate or anthropogenic limitations to productivity
2 Assess tradeoffs btwn regional C sequestration, forest products, & maintenance of ecosystem services
2 Refinement of forest management modules for integration into DSS
2 Prototype carbon management decision support tools to solicit structured feedback - Forest Management
2 Refinement of climate scenario modules for integration into DSS
2 Prototype carbon management decision support tools to solicit structured feedback - Climate Scenarios
2 Refinement of climate, landuse, genetics, pests/fire risk, fertilizer modules for integration into DSS
2 Prototype & refine carbon management decision support tools to solicit structured feedback - Climate, landuse, genetics, pest/fire risk, fertilizers

**Aim 3. Genetics & Breeding**

3 Develop uniform response functions with provenance trial data & version 1 of genetic deployment tool
3 Version 2 of genetic deployment tool with progeny data
3 Regional variation in tree water use efficiency by genotype & age from Tier II data
3 Determine appropriate genome reduction methods for genotyping by sequencing
3 Genotyping of ADEPT2, CCLONES & PSSSS populations
3 Phenotyping Cold Tolerance Traits in ADEPT2 & CCLONES
3 Phenotyping insect resistance traits in ADEPT2 & CCLONES
3 Phenotyping growth and responsiveness to nutrition in ADEPT2 & CCLONES
3 Phenotyping wood density and lignin content of ADEPT2
3 Discover alleles associated with nitrogen responsiveness
3 Discover & validate alleles and genes associated with growth and adaptive traits in 3 populations
3 Tools for accelerating tree improvement and deployment

**Aim 4. Economics & Policy**

4 Assessment of policies & programs that may affect C mitigation in planted pine forests
4 Regional market impacts modeled based on business-as-usual assumptions
4 NPV analysis & regional market impacts of adaptive management impacts
4 Document landowner adoption of mitigation and adaptation strategies
4 Life cycle inventory for key physiographic regions
4 Cradle to gate life cycle inventory for wood products
4 Cradle to gate life cycle inventory for pulp & paper products
4 Bioeconomic modeling of nontimber market ecosystem services
4 Landonwer & regional economic losses from altered disturbance risks

**Aim 5. Education**

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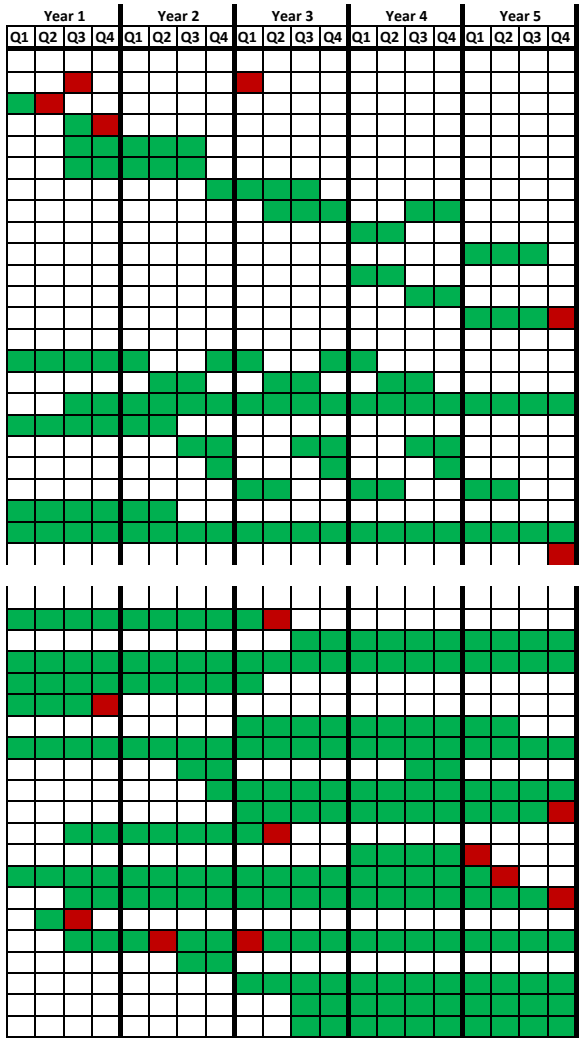
|---|---|
| 5 | Education advisory council meets |
| 5a | conduct audience assessment on climate and LCA and southern pine -- teachers, ext specialists, landowners |
| 5a | draft scope and sequence, revise with input |
| 5a | assess existing activities and provide to Ugs and Advisory Committee |
| 5a | begin designing activities to fill gaps and provide to Ugs |
| 5a | draft PLT module |
| 5a | Revise PLT module |
| 5a | pilot test PLT module |
| 5a | Rollout PLT module to K-12 |
| 5a | Develop test and market online training |
| 5a | develop and launch state workshops for PLT module |
| 5a | evaluate PLT module at multiple levels |
| 5 | Deliver research and teaching FORCure undergraduate internship program |
| 5b | create application and selection process; market program; select grad students |
| 5b | UG interns in new states for the summer |
| 5b | create and maintain web site for program |
| 5b | develop distance course on education |
| 5b | run distance course on education |
| 5b | attract middle school teachers and introduce program |
| 5b | support UG presentations in classrooms |
| 5 | Distance class on climate change education and interdisciplinary research project |
| 5 | Training of graduate and postdocs in multi-disciplinary research |
| 5 | Trained graduates in forest & climate science |

**Aim 6. Extension**

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| 6 | Develop project website (portal) and Pilot |
| 6 | Maintain/improve project website and market to audience |
| 6 | Implement and Strengthen forestry Extension/climatologist partnership |
| 6 | Assess audiences needs |
| 6 | Create State Teams for deployment of Outreach materials and programs |
| 6 | Establish Result Demonstrations |
| 6 | Develop extension products for region |
| 6 | Face-to-face training workshops for educators, extension professionals and practitioners |
| 6 | Web-based continuing education for educators, extension professionals and practitioners |
| 6 | State teams implement extension program |
| 6 | Develop User Interface to DSS and Pilot Test |
| 6 | Make Changes as Needed to DSS Interface and conduct trainings |
| 6 | eXtension modules |
| 6 | Assess impacts of outreach |
| 6 | Open source Decision Support System design based on audience needs |
| 6 | DSS development |
| 6 | DSS training for Extension Specialists, refinement |
| 6 | DSS rollout to landowners and consultants |
| 6 | DSS assessment, refinement |