New England Forestry Foundation
Climate Smart Commodities Project Acadian Forest Modeling Support
Request for Proposals

Summary

Through this RFP, NEFF seeks proposals from contractors to supply a growth and yield model that has been calibrated to give accurate long-term results for the Acadian forest region of New England (see map in Appendix I), and also to provide expertise to support the application of this model to forecast in-forest and wood product outcomes of climate-smart silvicultural practices in the Acadian forest using the Forest Carbon Accounting Tool (FCAT–see Appendix II) developed by Spatial Analytics Group (SIG). Contractors with expertise and experience calibrating and applying the Forest Vegetation Simulator (FVS) or similar models in the Acadian region of New England are encouraged to respond.

Application Deadline: 8/23/2024

Submit applications to: Colleen Ryan, at cryan@newenglandforestry.org. Please use the subject line: "Acadian Modeling RFP Submission" and include the name of the contractor in all file names.

Virtual Q&A Session: 8/16/2024, 1-2:30 pm EDT

Register to attend the Q&A session or submit questions by email to: cvear@newenglandforestry.org. All emailed questions are due by 8/19/24, and all questions and answers will be posted to NEFF's website by 8/20/24.

Project Context & Background

In May 2023, the New England Forestry Foundation (NEFF) was awarded $30M through the USDA's Partnerships for Climate-Smart Commodities Program—a highly innovative grant program linking verifiable climate-smart production practices on working lands with market development for the resulting commodities. With $3 billion in funding, this program represents a massive opportunity to pilot scalable, carbon-saving practices that benefit producers of all sizes.

Through this award, NEFF is anchoring a 5-year partnership which will launch a groundbreaking and nationally relevant pilot program in New England to build a climate-smart forest-based economy as a powerful tool for climate action. The project builds on a foundation constructed over decades by partners in the forestry and forest products sectors, and has three major components:

1. Implement forest management practices that store more carbon in the forest and in wood products that can be substituted for fossil fuel-based materials,
2. Quantify the resulting carbon gains, and
3. Build markets for climate-smart forest products so that such practices will eventually be self-sustaining and economically viable.

Analysis for New England shows that a holistic approach to forest-based climate mitigation—protecting forests, practicing climate-smart forestry, and strategically utilizing renewable wood products in place of fossil fuel-intensive materials—can deliver carbon savings equal to 30% of the emissions reductions needed to reach net zero by 2050.

As part of the Measurement, Monitoring, Reporting, and Verification (MMRV) effort for this project, NEFF plans to model the greenhouse gas (GHG) impacts of implementing a defined set of silvicultural practices across a range of forest types and stand conditions in New England. This will include in-forest carbon as well as carbon in products for a business-as-usual management scenario compared with a treatment scenario for a full rotation or relevant time period for each practice. The modeling efforts for the project as a whole will involve several components, as outlined in Appendix III.

RFP Details

Through this RFP, NEFF seeks proposals from contractors to supply a model based on FVS that is calibrated to the Acadian region of New England and can be used with SIG's FCAT, as well as the contractor's time to support SIG in getting the model to work with FCAT, to supply local expertise in adjusting silvicultural prescriptions, and to provide any further calibration needed to ensure that model outputs are consistent with available data from the region.

Representatives from SIG and NEFF will host a Q&A session via conference call to answer any questions about how the FCAT works and what will be needed to ensure that the contractor's model is compatible with it, as well as any other questions about the RFP.

The model supplied should be calibrated to address the following limitations of FVS-NE when applied in the Acadian forest of New England that have been encountered by NEFF in previous modeling projects or noted by local experts, as well as any other limitations that have been identified by the contractor:

- Long-term (30- to 100-year) projections of height and diameter growth
- Inaccurate growth projections in stands with very low or very high basal area
- Inaccurate growth projections in stands with very low or very high numbers of trees per acre
- Underestimates of basal area growth following thinning
- Underestimates of mortality over longer (20+-year) modeling periods

The model will be used by SIG, with support from the contractor, to project the outcomes from implementing the climate-smart forestry practices outlined in Appendix IV across the range of

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forest types and conditions present in the Acadian region of New England and relevant for each practice. A likely alternative management scenario will also be modeled for comparison. In the case of practices for which the likely alternative management scenario is active management, a no management scenario will also be run. The following examples are intended to illustrate the scope of modeling intended for each practice:

> Example 1: Precommercial thinning would be modeled for young stands with quadratic mean diameter less than 5 inches of 3-4 different forest types (spruce-fir, northern hardwood, mixed wood, and possibly spruce-fir with pine) with a range of site classes. The alternative scenario would be no thinning.
>
> Example 2: Maintain heavily stocked older stands. This practice would be modeled for stands with merchantable volume over a minimum threshold. The model would likely be run for 3-4 forest types, several site classes, and 2-3 different categories of initial stand age/volume. The alternative scenario would be an overstory removal harvest, and a no management alternative would also be run.

The contractor will support SIG in initializing the model and troubleshooting any problems with using the model with the FCAT. The contractor will also supply local expertise to assist SIG with any further calibration of the model that is needed when the initial results are examined. The initial contract will include up to 40 hours of the contractor's time to collaborate with SIG in developing a detailed work plan, testing the function of the model with the FCAT, running some sample scenarios, discussing and troubleshooting results, etc. Once a workplan has been developed and the needed level of effort established, the initial contract may be amended to compensate the contractor for additional hours.

Proposal Components:

Respondents are requested to supply the following information in their proposals:

1. Describe the calibrated model and whether/how it addresses the limitations of FVS-NE as outlined above.
2. Outline any other limitations of FVS-NE that the model addresses, as well as any other limitations the contractor is aware of that have not been addressed in the calibrated model.
3. Briefly describe the contractor's relevant experience, with particular reference to New England forests. Optionally, provide references for projects in which this model has been used successfully.
4. Outline any further work that is expected to be necessary to adapt the model for use in this project.

5. Provide a price for unlimited use by NEFF of the model. NEFF will share the model with SIG for use in its work for NEFF, but SIG will not be entitled to use the model for other purposes.
6. Provide an hourly rate for up to 40 hours of the contractor's time. After development of the work plan, NEFF will negotiate an addendum to this contract for any necessary additional time, as agreed upon by NEFF, SIG, and the contractor.
7. Outline any constraints on the contractor's availability to work on this project through the remainder of 2024.

Project Selection Criteria:

1. Contractors with a track record of successful forest modeling, preferably in the Acadian forest region. 15%
2. Contractors with demonstrated understanding of FVS and similar models, including their strengths, limitations, and strategies for addressing those limitations. 20%
3. Model that has been calibrated to address as many of the limitations listed above or identified by the contractor as possible. 30%
4. Model that can be adapted to work with FCAT with a reasonable amount of effort. (prerequisite for selection)
5. Contractor qualified and available to support SIG in applying the model in this landscape, including potential troubleshooting as the model is linked to the FCAT and any additional calibration needed to address issues identified in the course of the modeling. (prerequisite for selection)
6. Price of model 15%
7. Cost of contractor's time 20%

Proposal Submission and Questions:

All proposals should be submitted by email to: Colleen Ryan, at cryan@newenglandforestry.org, with a copy to cvear@newenglandforestry.org. Please use the subject line: "Acadian Modeling RFP Submission" and include the name of the contractor in all file names.

To register to receive updates about this RFP, please email Catrina Vear at cvear@newenglandforestry.org. Vendors who register will receive an invitation to attend the Q&A session, which will be held by Zoom on 8/16/2024, 1-2:30 pm EDT.

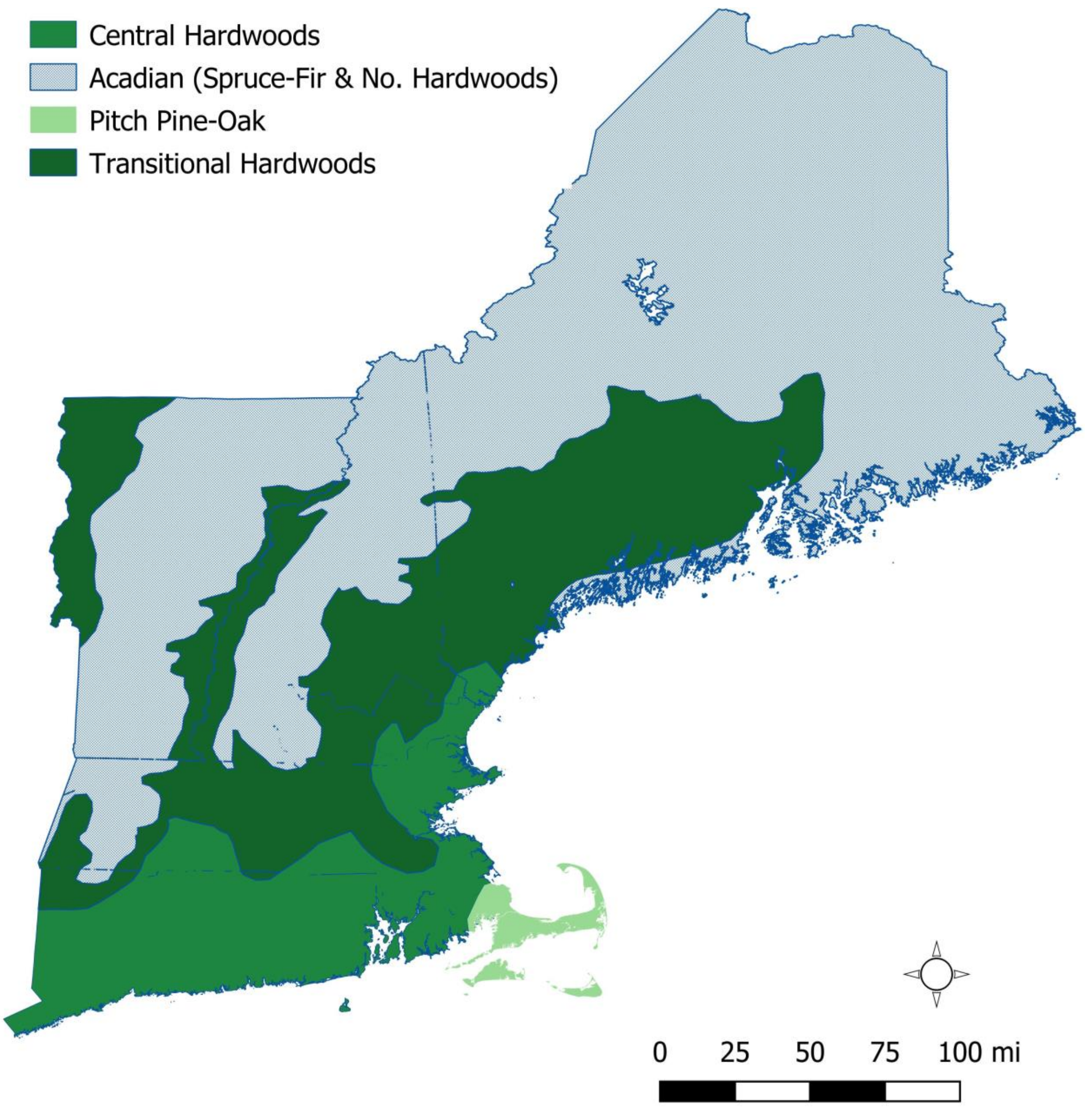
Questions may also be emailed to the same address. All emailed questions are due by 8/19/24, and all questions and answers will be posted to NEFF's website by 8/20/24.

This RFP is issued based upon work supported by the U.S. Department of Agriculture, as part of the Climate-Smart Commodities Partnership project under agreement number NR233A750004G017. USDA is an equal opportunity provider, employer, and lender.

Appendices

I. **Map of the Acadian forest region of New England**
II. **Description of the FCAT**
III. **Summary of modeling work required for NEFF's CSC project and where this RFP fits in**
IV. **Draft list of eligible climate-smart forest management practices for the commercial and Tribal landowner portions of this project**

Appendix I: Map of the Acadian forest region of New England



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Appendix II: Description of SIG's Forest Carbon Accounting Tool

The Forest Carbon Accounting Tool (FCAT) is a command-line tool entirely designed to evaluate landscape forest growth and carbon stocks as well as to gauge the potential for mitigating greenhouse gas emissions through fuel treatments. It relies entirely on publicly available datasets and (modeling) tools. FCAT employs the methodology for calculating GHG emission savings as specified under the Reduced Emissions from Megafires (REM) framework which in turn enables listing of fuel treatments in the carbon market under Climate Forward, a sub-platform of the Climate Action Reserve's registry.

FCAT employs forest growth, carbon flux, and fire spread simulations based on pixel-based measurements of vegetation type, structure, and wildland fuels. Its components encompass GIS processing, Forest Vegetation Simulator modeling for forest growth, fuel treatments, and wildfire, Monte Carlo GridFire simulations, FOFEM smoke emission model estimates, and carbon quantification. FCAT's adaptability allows these components to serve as microservices for various projects beyond GHG mitigation assessment alone. Moreover, FCAT can be integrated with another SIG tool, Planscape, to aid in evaluating emission profiles associated with different treatments at the landscape level.

FCAT Modeling Process (automated as a series of microservices):

1. GIS pre-processing to prepare AOI, treatments, & disturbances
2. Identify every unique combination from TreeMap ID, past disturbance, and future treatment rasters
3. Build an USFS Forest Vegetation Simulator input database
    1. Each unique combination is simulated as an individual forest stand
    1. Instructions are embedded for simulating disturbances and treatments
4. Execute FVS
    1. R script to automate building and executing FVS keyfiles for various FVS simulations
    1. FVS post-processing
    1. Compute the acreage represented by each FVS stand
5. USFS First Order Fire Effects Model (FOFEM)
    1. Automate data formatting and execution of FOFEM
6. Pyregence's GridFire
    1. Automate data setup and execution of GridFire
    1. Calculate CBP ratio for each stand
7. Final processing to produce carbon tables

With this process SIG can:

1. Efficiently update TreeMap inventory data to current year with rFVS
2. Update the initial spatial fuels data going into FVS and GF with FireFactor dismethods (and eventually FuelsMap data)
3. Run rFVS at full TreeMap resolution (30-m pixels) on large areas (possibly unprecedented)

4. Simulate virtually any disturbance, management, or fuels treatment at any point in the future
5. Run virtually any AOI on demand and into the future as far as needed
6. Query data on carbon, forest stand, fire behavior, fire effects, and emissions data with and without treatments at every timestep

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Appendix III: Summary of Modeling Requirements for NEFF CSC Project

This is to provide context for this RFP. Item #1 is included in this RFP; other elements will be included in future RFPs or carried out by NEFF and its project partners.

1. **Model in-forest impacts of implementing approximately 13 potentially climate-smart silvicultural treatments in representative stand conditions for the Acadian Forest**. Use a version of FVS calibrated to the Acadian forest of New England in combination with SIG's FCAT (see Appendix II) to predict the response of representative stand conditions defined by USDA TreeMap data to each potential practice and estimate expected impacts on production of wood and in-forest and wood product carbon.
2. **Model in-forest impacts of implementing approximately five silvicultural treatments in representative stand conditions for the Central and Transition Hardwoods region of New England (see Appendix I)**. This will include the same elements as #1, but addressing a different region and a different set of practices.
3. **Incorporate stochastic events.** Develop a process to incorporate the best available data on stochastic events, such as major insect and disease outbreaks, hurricanes, ice storms, and fire, into the modeling of treatment, BAU, and no management scenarios.
4. **Model carbon benefits from wood products produced from CSC-funded treatments.** Develop a methodology to model and predict the net carbon benefits of wood products coming off CSC enrolled lands, including net carbon storage and substitution benefits of wood products projected to be harvested on CSC-enrolled lands based on FVS outputs from 1 and 2 above. The minimum requirement for this analysis could be to use the carbon in product estimates from FVS and apply a generic substitution factor from existing literature, ideally using regionally specific data improve the carbon in product projections from FVS, estimates of substitution benefits using regionally specific assumptions about likely end products, and some estimate of likely changes to markets over the next 30 years (e.g., new markets for low-value materials; expanded demand for mass timber products).
5. **Model outcomes from real treatments on enrolled lands.** Use the same methodology from the modeling efforts above to estimate net carbon benefits, storage in the forest and in product, and substitution benefits of wood products for a sample of actual treatments funded by the CSC program, using data from post-treatment inventories.

Appendix 4: New England Climate-Smart Commodities Partnership Project
DRAFT Forest Practices List for Commercial and Tribal Landowners, 8/1/24

This list is still under development. NEFF is open to suggestions for additional climate-smart practices, and Design Phase applicants will be invited to help refine and improve this list in a collaborative process with NEFF staff and partners. Commercial landowners are defined for this project as those owning at least 10,000 acres (not necessarily for-profit entities).

Detailed specifications for each practice will be developed in consultation with regional silvicultural experts. Specifications will be designed primarily with the Acadian forest in mind, but practices may be adapted for other forest types.

NEFF's intention is that all practices, even those primarily aimed at increasing productivity or carbon storage, will be implemented in a way that increases **adaptation** (defined as increasing the forest's capacity for **resistance**, **resilience**, and/or **transition** to future climate) where feasible (e.g., by favoring species adapted to future climate).

Productivity-oriented Practices

NEFF CSF Practice Name	Method(s)[1]	Purpose(s)[2]
1. **Planting for restoration/adaptation**	Potential methods under this practice: Direct seeding hardwood Planting conifer seedling Planting mixed hardwood and softwood Planting hardwood bareroot	Improve species composition to favor adaptation and increase timber productivity, including but not limited to current non-forested areas and forest areas clear-cut to replace unproductive or understocked stands with species best suited to the site and future climate.
2. **Pre-commercial thinning (PCT)**—includes thinning in stands less than poletimber size and thinning in poletimber-sized stands where no wood is removed as product	Potential methods under this practice include chop and drop, girdling, and herbicide treatment (e.g., basal stem treatment)	Favor species composition best suited to the site and future climate, improve growth rates, or improve future forest health or stand conditions.

[1] Note that control of invasive species is expected to be included in the implementation of practices on any site where they are a concern.
[2] Many of these practices can have other benefits (e.g., benefits to wildlife), but here we focus on the climate benefits.

3. **Early commercial thinning (ECT)**—includes uneconomic thinning where some wood is removed as product	Potential methods under this practice can include harvesting trees, chop and drop, girdling, or use of herbicides including but not limited to Basal Stem Treatment	Improve production of climate-smart wood and/or improve forest adaptation to future climate conditions, particularly by guiding stand composition toward climate-adapted species.
4. **Crop Tree Release**	Potential methods under this practice can include harvesting trees, chop and drop, girdling, or use of herbicides including but not limited to Basal Stem Treatment	Accelerate growth and improve vigor of trees selected for future production of climate-smart wood products or as legacy trees. Crop trees should be of species well suited to changing climate conditions.
5. **Timber Stand Improvement**	Potential methods under this practice can include harvesting trees, girdling, or use of herbicides including but not limited to Basal Stem Treatment	Increase timber production, including uneconomic thinning in sawtimber-sized stands to remove poor quality trees. Improve adaptation of stand by reducing density and favoring climate-adapted species. Keep scattered older trees as part of the residual stand in stands larger than those eligible for early commercial thinning to increase structural complexity.
6. **Beech control**	Potential methods under this practice can include harvesting trees, girdling, or use of herbicides including but not limited to Basal Stem Treatment	Reclaim growing space from dense growth of diseased, low-productivity beech for other species with more potential to become long-lived wood products and to form stable, resilient stands.
7. **Emerald Ash Borer Control**	Methods can include use of insecticides (injected or applied around the tree) or other recommended strategies	Maintain carbon storage and sequestration; improve prospects for adaptation to future climate; maintain wood production; maintain seed trees threatened by insect or disease outbreaks (e.g. brown ash used by Native Americans for traditional purposes)

De-intensification Practices

8. Protect late successional and old growth stands	Methods can include either no management or light thinning, ideally aimed at anticipating mortality.	Maintain carbon storage and sequestration in late successional and old growth stands. Can include expanding stream buffers, which will have both carbon storage and adaptation benefits.
9. Maintain heavily stocked older stands	Implement continuous cover forestry as an alternative to harvesting that results in larger reductions of carbon in the stand.	Mitigate climate change by maintaining or increasing carbon storage in the forest and wood production, and assist stands to adapt to climate change. Can include expanding stream buffers, which will have both carbon storage and adaptation benefits.
10. Retain more legacy trees[3]	Do not harvest scattered patches of older, large-diameter legacy trees.	Maintain carbon storage and sequestration in legacy trees; foster adaptation by adding structural diversity to the future stand.

[3] Consider including ash seed trees if they can be treated to reduce risk of mortality from emerald ash borer.

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Landscape-scale Silvicultural Adaptation Practices

11. **Implement Exemplary Forestry** as laid out in the Exemplary Forestry Standards for the Acadian Forest	In general, this will involve entries every 20 years to create very small patch cuts to regenerate mature stands or create complexity, with thinning between the patches.	Mitigate climate change by maintaining or increasing carbon storage in the forest and wood production and assist stands to adapt to climate change.
12. **Implement continuous cover forestry**	A selection system with removal of approximately 35% of standing volume every 30 years	Mitigate climate change by maintaining or increasing carbon storage in the forest and wood production and to assist stands to adapt to climate change.
13. **Implement the Triad system**	Combine intensive forestry and ecological reserves in appropriate locations with some kind of light touch "ecological" forestry in the matrix landscape	Mitigate climate change by maintaining or increasing carbon storage in the forest and maintaining wood production and to assist stands to adapt to climate change.