

**Project Title:** Improving Forest Regeneration and Engaging Pennsylvania's Beginning Forest Landowners through Peer-led Demonstration

**Project Number:** CIG 16-042

## **Final Report**

### **Background/Rationale:**

The forests of the eastern United States face a suite of threats to their future health and resilience. One of the more significant challenges is the lack of forest regeneration (c.f., Vickers et al 2019)<sup>1</sup> when stand-replacing events occur. The threats to forest regeneration often pare down to three elements 1) competitive plants, 2) deer pressures, and 3) light.

The lack of species diversity due to pressures such as historically high deer pressure, harvests that focus on the economic value of trees removed instead of the residual forest and forest sustainability, and the absence of younger trees to replace those in the forest canopy poses a risk to future forest health and resilience. Without active management to improve regeneration, the effects on species composition and tree diversity, which subsequently affects other forest related economic, ecological, and social values, will be detrimental.

With a majority of forestland in Pennsylvania (and across the eastern United States) in private ownership, work to improve the overall health and sustainability of woodlands, in particular the establishment of young forest, must include the people who own the land.

### **Summary of Methods:**

As privately-owned woodlands are subdivided among more landowners, challenges to maintaining forest health and resiliency are compounded. Few private forest landowners understand the complexity of the forested ecosystem, nor do they recognize that the process of succession accounts for diverse forest habitats (with varying wildlife habitats). Research repeatedly finds that private forest landowners consider wildlife as an important ownership value; yet they fail to appreciate the need for diverse forests (i.e., from young forest comprised of seedlings and saplings, to complex forest with significant horizontal and vertical diversity in age, species, and shade tolerance) is essential to ensure forests sustainability. USDA Forest Service Forest Inventory and Analysis (FIA) data shows a significant lack of young forest in Pennsylvania that provide not only rich wildlife habitat, but also become the next forest as overstories change through harvesting or natural disturbance events (e.g., wind, ice, insects and disease, natural mortality). Few landowners have a forest management plan, indicating a lack of planning, which can lead them to make decisions detrimental to their values and the health and well-being of their land. The risk is likely higher among beginning or naïve woodland owners who are often

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<sup>1</sup> Vickers, L.A., W.H. McWilliams, B.O. Knapp, A.W. D'Amato, D.C. Dey et al. 2019. Are Current Seedling Demographics Poised to Regenerate Northern U.S Forests? *J. of For.* 117(6):592-612.

unaware of educational materials and programs and professional resources available to aid them in making well-informed decisions relating to their forests.

This project sought to address the importance of forest regeneration and the lack of understanding common among woodland owners. To accomplish this, the goal was to create tools to help beginning landowners understand the development of forests toward regeneration with the intent to remove barriers for engaging active forest management practices leading to improved forest health. These barriers include lack of knowledge and understanding of forest ecology, as well as the mistaken belief that the forest is better served if left alone. Inactivity often relates to failing to realize the significance of anthropological disturbances that compromise natural system dynamics and function.

To accomplish this the project team set three objectives:

Objective 1: Facilitate the technology transfer of the forest regeneration assessment tool by training Woodland Ambassadors in peer-led demonstration and outreach to beginning forest landowners and evaluating and adjusting the tool as needed.

Objective 2: Support the transfer of the innovative social approaches described here by facilitating collaborative outreach and education efforts by Woodland Ambassadors and Woodland Owner Associations (WOAs) in 5 regions of Pennsylvania.

Objective 3. Facilitate the adoption of forest management activities to improve forest regeneration and health by training project partners to help beginning forest landowners identify and express forest management objectives through a value-based approach and to connect them with resources such as NRCS Forestry EQIP programs.

A key aspect of this work was the ability to adapt trainings and resources to reflect the interest and challenges of beginning woodland owners, and to refine the work to one aspect of forest health – the absence of advance regeneration to replace overstories when removed for economic values, silvicultural prescriptions, or natural disturbances. Over time the project focus evolved to:

- 1) Help landowners understand the complexity of the forest system through face-to-face workshops and technical support to understand forest ecology.
- 2) Help landowners understand the forest succession process as they grow and change over time, and how owners could identify where their forest was in its development stage.
- 3) Understand if their forest should have regeneration present, how could they assess barriers to its establishment – whether from competitive plants, deer, or light – and engage resources and professionals (including cost share practices) to address those barriers.

As a result of this refinement in the assessment, the project team created a body of work that serves as a tool for understanding, assessing, and then taking action on private forestlands to address the absence of forest regeneration as appropriate to their woodland development stage and ownership values.

## **Results:**

*Numbers of Woodland Ambassadors trained: 8*

*Numbers of beginning landowners reached:* By the PI, 140 at the Woodland Owners of the Southern Alleghenies Annual Landowner Conference (2018). Presentation to the 2019 North Central Forest Landowners annual meeting reached 50 landowners with various experience levels. Displays focusing on the regeneration assessment were part of the overall display at Ag Progress Days 2019. An additional 190 woodland owners were engaged by the project team at that three-day event.

*Events held in conjunction with WOAs:*

- Bedford/Fulton – two events held in conjunction with the Woodland Owners of the Southern Alleghenies – 22 landowners of various experience levels. Two of the original Woodland Ambassadors coordinated and helped lead these events.
- Huntingdon – held in conjunction with the Junita Valley Audubon – 6 landowners of various experience levels. Two of the original Woodland Ambassadors coordinated and helped lead this event.
- Westmoreland – held in conjunction with the Westmoreland Woodlands Improvement Association – 26 landowners of various experience levels
- Mercer – held in conjunction with the Mercer County Woodland Owners Association – 13 landowners of various experience levels.
- Bradford and Sullivan Counties – held in conjunction with the Bradford Sullivan Forest Landowners Association – 18 landowners of various experience levels

At these events offered with WOAs across the state, participants learned how to assess woodland health and regeneration potential, as well as to identify next steps for action (e.g., removing invasive shrubs, stand improvement).

The project was also presented to the Pennsylvania NRCS State Technical Committee, promoting the need for and value of forestry-specific CIG and EQIP efforts and funds.

### **Challenges:**

Objective 1: Those trained to utilize the tool to assess overall forest health and current status and then help beginning landowners begin to see where challenges may lie were highly engaged. These participants were excited to learn the tools and expressed interest in learning the information. Unfortunately, due to small numbers and personal challenges for these folks, very few contributed time to share what they had learned with beginning landowners. We did not reach target numbers of Woodland Ambassadors trained nor did we reach the target number of beginning landowners reached by trained peer volunteers.

Objective 2: Many WOA members expressed interest in becoming Woodland Ambassadors; however, logistics for the training did not work for many. Due to conflicts, dates were frequently changed with little lead time to allow potential participants to adjust personal schedules. The second Woodland Ambassador training was canceled due to lack of interest/coordination.

Objective 3: Resources created to facilitate the training and serve as guidance for Woodland Ambassadors and beginning landowners underwent many iterations to be adaptable. In this process, it was important to the project team to remain true to the original research on which this work was based. Towards the end of the project, the original researchers who had created the *Managing Timber to Promote Sustainable Forests: A Second-Level Course of the Sustainable Forestry Initiative of Pennsylvania*<sup>2</sup> reflected that, in our attempts to make their science more accessible, the team had inadvertently reduced the rigor of their work. As such, the assessment resources were scaled back to only address regeneration for those landowners whose forests were at a point in development where regeneration should be present, or should be planned for.

The PI was unable to hire a subcontractor to provide technical assistance in the training offerings, GIS work to identify beginning landowners, and other support for the project team. As such, the project team, primarily PI Leslie Horner with assistance from Co-PIs Jim Finley and Allyson Muth as available, conducted the work contained in this project, with support from the original researchers. Because of this, we did not fully expend the expected budget amount and returned funds to NRCS.

Personnel changes during the grant also caused some elements of the project to go uncompleted. With revisions to the publications occurring near the end of the grant cycle, we were unable to send the resources out for revision and evaluation by Woodland Ambassadors and beginning woodland owners.

Additionally, during the grant, we lost two of the 21 WOAs in Pennsylvania as leaders stepped down and there were no leaders identified to step in and take on the convener role.

After the conclusion of the grant, the PI left Penn State University employment.

### **Summary of Outputs:**

Over the course of the project, the outputs changed from a broad assessment of forest structure and health, with regeneration as a component of forest health, to a more narrowed focus on regeneration. The outputs evolved to reflect the process of the field events and to guide beginning landowners in a process to:

- 1) Assess where their forest is in its development – utilizing the stand development research
- 2) If their forest is at a place where it should have forest regeneration, to assist the landowner in assessing its presence and adequacy.
- 3) If the forest is at a place where regeneration should be present and is, how can a landowner understand the potential future threats to regeneration and encourage those seedlings to move into sapling stage and eventually into the forest canopy.

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<sup>2</sup> Finley, J.C., S.L. Stout, T.G. Pierson, and B.J. McGuinness. 2006. *Managing Timber to Promote Sustainable Forests: A Second-Level Course of the Sustainable Forestry Initiative of Pennsylvania*. USDA Forest Service, Northern Research Station, General Technical Report NRS-11.

- 4) If the forest is at a place where regeneration should be present and is not, how can a landowner assess the current threats to regeneration and determine the barriers (of the three most common: light, deer, and competitive vegetation) to creating the next stand of trees.

To do this, we created three publications to guide beginning woodland owners' understanding of their forest and assess regeneration, a data sheet, a video showing the process of assessment, and a guide for sharing this methodology with others.

- *Forest Regeneration Assessment Series #1: Forest Ecology: How Forests Grow* is a foundational publication to help landowners understand how forests establish, grow, and change, and the ways biotic and abiotic factors influence where tree species occur and how they grow.
- *Forest Regeneration Assessment Series #2: What's Getting in the Way of Your Woodland's Potential to Regenerate?* – sets the stage for helping woodland owners of diverse experience understand the challenges affecting successful forest regeneration and sets them up to undertake the Regeneration Assessment Protocol.
- *Forest Regeneration Assessment Series #3: Evaluating Stand Conditions: Implementing and Interpreting the Regeneration Assessment* – guides users through the process of establishing plots within stands of their forest, how to collect and record data to assess light conditions, competitive plants, and deer impacts in order to interpret existence, diversity, and abundance of regeneration and the potential barriers to establishing the future forest. The protocol also includes guidance on interpreting results.
- Data Sheets – created to accompany the Assessment protocol, two data sheets complete the assessment. One is a plot data sheet that contains guidance for assessing overstory canopy closure, competitive interference, and diversity on a 1/10<sup>th</sup> acre plot, and an assessment of regeneration diversity and abundance on a 1/1000<sup>th</sup> acre plot. The second is a stand summary data sheet that combines the plot data for each stand and allows the participant to interpret levels of canopy closure, interfering vegetation (including mid story and vegetative and woody understory), and regeneration abundance in aggregate across the stand, which allows participants to identify challenges and lead to options for actions based on data collected. Deer impacts are also assessed at the stand level as part of this summary.
- *Forest Regeneration Assessment Series #4: A Guide for Leading a Woodland Regeneration Assessment Event* – gives general guidance on adult and peer to peer learning, as well as the woodland owner segments as based on the work of the Sustaining Family Forest Initiative at Yale University. This guide goes into specific guidance for hosting a regeneration assessment event, using a field day as an example, and introduces users to setting objectives, creating audience profiles, crafting a message, and marketing to attract new and beginning woodland owners to learn more about forest regeneration.
- Video – the video serves as a visual guide to conducting the regeneration assessment, highlighting the process of creating plots to collect data, and explaining the importance of forest regeneration and the threats to its success.

All of these resources can be found on the Center for Private Forests at Penn State's website:  
<https://ecosystems.psu.edu/research/centers/private-forests/outreach/forest-regeneration>

**Potential Next Steps:**

Refinement of the resources created as part of this grant continued until the very end of the grant period. These materials represent final versions of a multi-year process to create useful materials that would guide beginning landowners in their understanding of the importance of forest regeneration and challenges to it. As these resources continue to be shared in trainings and workshops, it is expected that additional refinement will occur and additions made to the body of work helping landowners, and professionals, understand the state and condition of our forest and how we must act to ensure its continued existence and functionality.