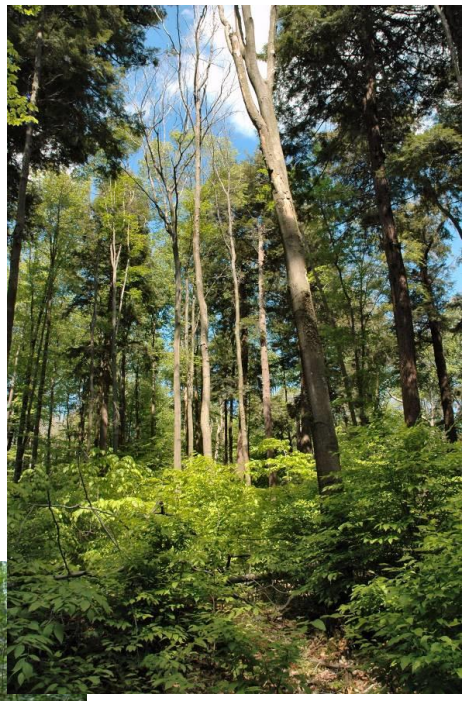
ANF Forest Health Collaborative

March-November, 2017

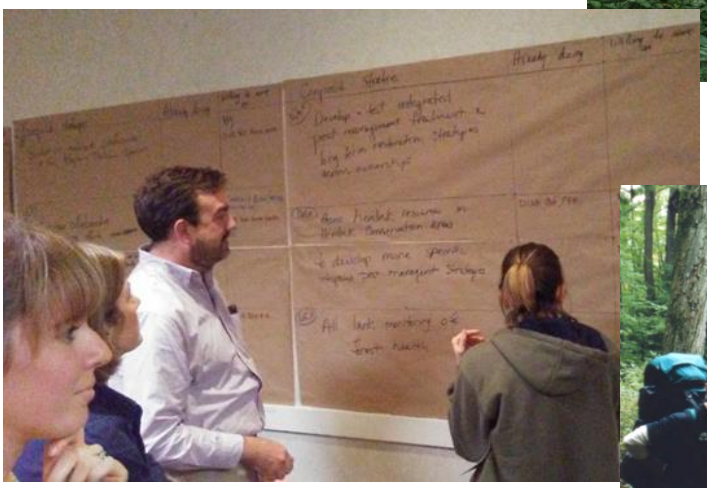




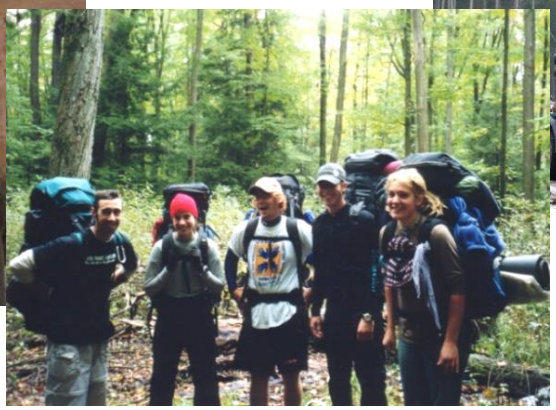












ANF Forest Health Collaborative

March-November, 2017

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1. Forest Health Briefing Paper

Allegheny National Forest
Forest Health Concerns

Forest ecosystems in northwestern Pennsylvania and western New York are threatened by a number of native and introduced forest pests and pathogens. Given the continued expansion of significant, damaging invasive forest insects, diseases, plants and animals on the Allegheny National Forest, and the intermingled nature of forest land ownerships across that landscape, a collaborative approach to addressing forest health issues on the High Allegheny Unglaciated Plateau would be appropriate.

The following insect, disease and non-native plant issues currently exist on the ANF:



Beech bark disease complex (left) been present on the ANF since the early 1980s and has spread across the entire forest. Host Species: American beech (~8% of forest basal area).



Hemlock woolly adelgid (right) has been present on the ANF since 2013 (northern to southern boundaries). Host Species: eastern hemlock (~7% of forest basal area).



Gypsy moths (left) have been established on the ANF since the early 1980s. Approximately 210,000 acres were defoliated 1997-1993; 190,000 acres defoliated in 2013. Host species: oaks, aspen, beech, birches, basswood (~24% of forest basal area)



Emerald ash borer (right) has been confirmed present on the ANF since 2013, but likely present since around 2008. Host Species: green and white ash (~2.5% of forest basal area).



Cherry scallopshell moth (left) **and fall webworm** (right) are native pests that periodically build up populations. Fall webworm defoliated 32,000 acres between 2011 and 2012. Cherry scallopshell moth defoliation occurred on hundreds of acres in 2014, over 56,000 acres in 2015 (all ownerships), and over 48,000 acres in 2016 (all ownerships). Host species: black cherry (~ 25% of forest basal area).



The proportion of standing dead cherry stems on monitoring plots containing black cherry on the ANF has increased from less than 10 percent in the 1998-2001 measurement cycle to more than 22 percent in the 2014-15 measurement cycle. Similarly, continuous forest inventory data collected on the Pennsylvania High Plateau (ANF region) noted an increase from around 3 percent dead black cherry stems in the 1997-2000 measurement cycle, to more than 30 percent in the 2009 to 2013 measurement cycle.

Several non-native invasive plants (NNIP) are present on the ANF with more within the region that have not been detected on the ANF. These plants occupy available growing space and use nutrients that could be used by more desired native species and threaten the sustainability of native forest vegetation on the ANF. Of the 1,200 plant species listed for the Allegheny National Forest, over 250 are non-native species, and 61 of these are considered invasive plants of concern. Of these species, 17 are considered highly invasive, with the potential to invade natural habitats and replace native species.



Non-native invasive plants often lack their natural biotic controls that coevolved with them at their place of origin to keep them 'in check'. There is often a lag phase between first introduction and rapid expansion of the NNIP. If left unchecked, invasive plants will limit many uses on lands now and in the future. Some of the priority species for treatment are: garlic mustard, Japanese knotweed, Japanese barberry, Japanese stiltgrass, multiflora rose, glossy and common buckthorn (photo).

Vegetation Management: Additionally, forests on the ANF are largely even-aged, with 62 percent of forest vegetation currently falling in the 81-110 year age class. Currently 3.8 percent of forest vegetation is less than 20 years old, compared to a Forest Plan objective of 8 percent. Forest stressors are increasingly disturbing forest vegetation across the plateau, but maintaining several structural-age classes and community composition and diversity at the landscape level helps to reduce the risk of insect and disease outbreaks and subsequent mortality (Nyland 1996, p. 466; Waring and O'Hara 2005).

Table 1 summarizes the list of potential both native and introduced insect and disease agents that have reasonable potential to cause mortality, dieback and defoliation. This threat is real and is increasing and is well-supported by our annual forest health surveys; the Pennsylvania State Forest Resource Assessment; the National Insect and Disease Risk Map; the Allegheny National Forest Final Environmental Impact Statement, and by a substantial amount of published scientific studies.

Table 1. Allegheny National Forest (ANF) forest types, acres and current and potential insect and disease threats.

Forest Type	Total Acres (Thousands)	Percentage of ANF	Pest Threats
Upland Hardwoods (red maple, American beech, black cherry, black birch)	154.0	30	Asian longhorned beetle, beech bark disease, bacterial leaf scorch, cherry scallopshell moth, fall webworm, pear thrips, and other native and introduced insect and disease threats
Allegheny Hardwood (black cherry, white ash, yellow poplar)	129.8	25	Cherry scallopshell moth, emerald ash borer, peach bark beetle, and other native and introduced insect and disease threats
Oaks (northern red, white, chestnut, black, scarlet oaks mixed with other hardwoods)	75.4	15	Gypsy moth, oak wilt, bacterial leaf scorch, sudden oak death, and other native and introduced insect and disease threats
Northern Hardwood (sugar maple, American beech, yellow birch, Eastern hemlock)	72.9	14	Asian longhorned beetle, beech bark disease, sugar maple decline, pear thrips and other native and introduced insect and disease threats
Hemlock	9.4	2	Hemlock woolly adelgid, elongate hemlock scale, and other native and introduced insect and disease threats
Conifer (spruce, red pine, white pine)	10.3	2	Sirex woodwasp, white pine blister rust, and other native and introduced insect and disease threats

2. Collaborative Process Summary

Allegheny National Forest – Forest Health Collaborative Process Timeline:

First meeting of the Collaborative – March 29, 2017 (Warren, PA)

- Present draft Working Agreement – gain clarity about Charge and Products
- Shared understanding of collaboration
- Provide management information from the ANF
- Gain input on process

June 8 Forest Health Collaborative Meeting (Sheffield, PA)

- Finalize Cooperative Working Agreement
- Review data (risk assessment and vegetation management activities on the ANF)
- Work on Product 1: Jointly identified and mapped forest attributes at risk from current and anticipated forest health issues.
- Begin work toward Product 2: prioritized list for integrated management strategies to improve landscape level resilience
- Identification of working groups associated with Short and Long-term threats
- Group decided there was a need for an additional working meeting of the Collaborative – Thursday, November 2nd in Warren, PA
- Meeting Product: Threats to Forest Values
    - Small Group's identified for further development of Short and Long-term Threats
- Continued to seek additional sources for data that helps the Collaborative do its work

July 20, 2017 Forest Health Collaboration Meeting (PA DOT facility in Clearfield, PA)

- Working meeting designed to define and better understand the forest health threats to the forests of the Allegheny High Plateau, and the strategies to address these threats.
- Follow-up immediately after meeting to share revisions to the Work groups and the additional groups. Encouragement for those not at meeting to sign up for a group.
- Significant time spent among working groups fully developing threats matrices through August.

September 7, 2017 Forest Health Collaboration Meeting (Warren, PA)

- Review of additional threat matrices and add comments
- Development of Strategies to address threats
- Prioritization – two phased process
    - Organizational support
    - Sense of Urgency
- Facilitators took the results from the meeting and created the "ANF – Forest Health Collaborative Composite Strategies Table".
- ANF provided information on Forest Plan Management Areas (MA), including maps summarizing overall Silvicultural approaches for each MA through October.
- Threat groups developed potential strategies to address threats.

- The ANF reviewed these strategies and provided a thorough response (presentation and written document) to the recommendations, including how they fit into existing ANF activities and moving forward.
- Facilitators worked with the ANF to identify themes/strategies within their response document.

November 2, 2017 Forest Health Collaboration Meeting (Warren, PA)

- Members of the collaborative gain a realistic awareness of what is actually occurring versus what is proposed regarding actions and activities associated with the forest health challenges that threaten the values and ecosystem services provided by the forests of this region.
- Finalization of Product 3, development of Products 4 and 5
- Opportunity to evaluate the experience and outcomes of the Collaborative.
- Identification of next steps as this phase of the Collaborative closes out.

December 6, 2017 ANF Forest Health Collaborative Coordination Team Meeting

- Close out this phase of the ANF Collaborative project – debrief on outcomes and define next steps for ANF
- Products as outlined in the Collaborative Working Agreement and review how they were completed.
  1. Jointly identified and mapped forest attributes at risk from current and anticipated forest health threats. Mapping exercise which lead to the threats matrices. ***Ongoing***
  2. Prioritized list for integrated and adaptive management strategies to improve landscape level resilience. Threat matrices → Composite strategies table → priorities
  3. Strategies for the ANF to achieve Forest Plan implementation. ***Ongoing.***
  4. A communication strategy to inform and engage those not directly involved in the collaborative. Communication strategies with volunteer for potential work groups. ***Ongoing.***
  5. A list of or map of benefits and voluntary projects on other lands. Context based work groups based on Ongoing Collaborative Strategies (new name for "Strategies Based on the Future Considerations"). ***Ongoing***
- Andrea Hille will assume ANF coordination to continue ANF Forest Health Collaborative.
  - ahille@fs.fed.us
  - 814-728-6161

February 27, 2018 AHUG hosts Forest land Manger Meeting

- First Annual Allegheny Plateau Forest Land Manager Meeting, a product of the Collaborative.
- Share information, challenges, management activities, and look for ways to work together.

3. Working Agreement

Allegheny National Forest Collaborative Forest Health Strategy
COLLABORATIVE WORKING AGREEMENT
Final July 20, 2017

Goal/Intent:

- To bring imagination, commitment, local knowledge and science together to identify the specific pathways through which forest health challenges threaten the values and ecosystem services our forests provide. This includes: forest settings for outdoor recreation; ecosystem functions and processes; valuable timber products; wildlife habitats; healthy functioning watersheds, or other values.
- Identify strategies to address these forest health issues.

Charge to the Collaborative Group:

1. Work collaboratively as part of a team consisting of USFS staff, representatives of tribal governments, academic institutions, local, state, federal governments and private and public stakeholders.
2. Seek out local knowledge and scientific data -- including history and information on forest ecosystems -- to validate and refine forest condition and health data.
3. Identify how forest health challenges threaten the values and ecosystem services the forest provides across the region.
4. Identify integrated and adaptive management strategies to mitigate forest health challenges, including a broad array of treatments and activities consistent with the ANF Forest Plan, acknowledging that there are unknown threats and uncertain outcomes.
5. Prioritize integrated and adaptive management strategies spatially and by vegetation type[1] to improve landscape level resilience[2].
6. Develop communication strategies to inform and engage people not directly involved in the collaborative.

Products:

1. Jointly identified and mapped forest attributes at risk from current and anticipated forest health threats.
2. Prioritized list for integrated and adaptive management strategies to improve landscape level resilience.
3. Strategies for the ANF to achieve Forest Plan implementation.
4. A communication strategy to inform and engage those not directly involved in the collaborative.
5. A list of maps or benefits and voluntary projects on other lands.

[1] **Vegetation Type** is a plant community with distinguishable characteristics. Forested vegetation types can be further described by **forest type**, which is a descriptive term used to group forest areas (stands) of similar character, species composition, and other ecological factors (ANF Land and Resource Management Plan glossary).

[2] Landscape resilience refers to the rate at which the vegetation on a landscape recovers after a disturbance. From Robert V. O'Neill, Carolyn T. Hunsaker, K. Bruce Jones, Kurt H. Riitters, James D. Wickham, Paul M. Schwartz, Iris A. Goodman, Barbara L. Jackson, and William S. Baillargeon. 1997. Monitoring Environmental Quality at the Landscape Scale. BioScience, Vol. 47, No. 8 (Sep., 1997), pp. 513-519.

Expectations:

1. All members of team are equal partners in the decision-making process for selection of recommendations.
2. Diverse opinions and values are respected and considered in a courteous manner during all verbal and written communications.
3. Discussions and results of the team effort will be shared in a respectful and accurate manner.
4. Team members are expected to be prepared for meetings and to participate in as many meetings possible.

Side Boards/Decision Space:

1. The team is limited to identifying and recommending forest health priorities, treatment options and focal geographic areas.
2. Complete the collaborative work in eight months.
3. Final decisions on specific actions to be implemented will be guided by local budget allocations and must follow applicable law. Laws will be provided to the group for reference through the collaborative period.
4. Any actions recommended through this process relative to ANF lands must be consistent with the ANF land and resource management plan (Forest Plan) and applicable laws and regulations.
5. Ongoing project level planning efforts and previous decisions must be considered.

Decision-Making within the collaborative:

1. Potential levels of agreement (for use in discussion and decisions)
    a. Endorse (“I like it”)
    b. Endorse with reservations or concerns
    c. Don’t like it, but can live with it
    d. Can’t live with it
    e. Unsure at this time
2. The team will make decisions using a consensus approach, where all members must be at a ‘Don’t like it, but can live with it” level of agreement or above.
3. If all team members (or their alternates) are not present to participate in decision-making, the decision will not be considered final until one week after the meeting at which the decision was made. This provides absent members the opportunity to respond.
4. Ensure all team members have an opportunity to request discussion of issues of concern, prior to request for a potential level of agreement (poll).
5. If a team member “can’t live with” a decision or is unsure, that individual must propose an alternative within 2 weeks. However, if this alternative is not supported by at least one other team member, and the “can’t live with” member has not changed his/her position, the team will move forward to other discussions without making a final decision. Opinions from all parties will be documented.
6. Decisions can be re-visited if a consensus cannot be initially achieved, if new information becomes available, or if team members request to re-visit a decision.

Meetings:

1. Virtual meetings will be used when agenda items are primarily limited to provision of information and initial discussions.
2. Face-to-face meetings will be used when there are decisions to be made. If a team member cannot attend a scheduled face-to-face meeting, virtual attendance will be acceptable, but is not preferred.
3. Meetings will be administered by the facilitators.
4. Detailed agendas will be prepared and distributed by the facilitators at least one week in advance of all meetings. Action items/decisions will be clearly identified and described. Additional agenda items will be requested of team members in advance.
5. Agendas will be confirmed at the beginning of meetings and additional items added as necessary.
6. Meeting information will be considered public, unless specifically identified as sensitive information by the team member sharing the information.

Facilitation:

1. Meetings will be facilitated by Maureen McDonough and Lisa Burban.
2. The facilitator's role is to keep the discussion on task, balance team participation, and help the team make decisions in a timely manner.

Meeting Guidelines:

1. Help search for common ground
2. Use specific examples
3. Agree on what important words mean
4. Focus on interests, not positions
5. It's O.K. to disagree, with respect
6. Keep comments brief
7. Expect unfinished business
8. One person at a time (don't interrupt)

Representation and Alternates:

1. To insure equal voice for all, each participating organization or agency will designate one person to be their representative.
2. An alternate may be appointed by a team member to act on their behalf when the team member cannot participate in a meeting. In these situations, alternates will hold decision-making authority.
3. Team members are expected to provide background information and prepare alternates.
4. Alternates are welcome to attend with their team member, but in a role of an observer.

Outside Input & Observers:

1. If a member of the public wishes to attend a team meeting and offer comments, s/he may do so. Requests for opportunities to provide such input must be made to the facilitator ahead of time. Due to the limited time-frame of the team's process, this input must be constructive, meaningful to the topic at hand and brief.
2. Other members of a participating organization will be encouraged to work through their organization's team representative to provide their input, rather than attending the meetings.
3. Collaborative members may also offer input provided by any other individual who has approached him/her, but the member must be transparent about the source of the input.

Evaluation:

1. After the recommendations are completed, the Collaborative team will conduct an evaluation of their efforts in completing its charges. This evaluation will consider the following:
   a. **Products** – Did they fulfill the charges to the team? If not, what are the gaps?
   b. **Agreement** – Was the structure outlined in this Working Agreement effective? If not, what changes are recommended?
   c. **Process** – Was the assessment process followed successful? If not, what changes are recommended?
   d. **Collaboration** – Did team members feel that they benefited from collaborating within the team environment? In what way?
   e. **Perspective** - How have your perspectives on forest health and/or collaboration changed?

Additions and Changes:

1. Issues that suggest the need for changes to this Agreement may be identified during any meeting, but will be 'parked' until the end of the meeting.
2. Proposed changes to this Agreement may be requested at the end of a meeting. Any individual proposing a change will be asked to describe and justify the proposed change. Changes will be made at the beginning of the next meeting by the decision-making process described above following discussion. As with all action items, decisions about proposed changes will be clearly indicated in meeting agendas and notes.

4. Participant List

Name	Organization
Aaron Heminway	Allegany State Park
Adam Elms	PennDot District 1 (Forest & Warren Counties).
Allyson Muth	Penn State Center for Private Forests
Amanda Hetrick	School District Representative
Andrea Hille	USFS Allegheny National Forest
Arthur Stewart	Pennsylvania Grade Crude Coalition
Autumn Kelley (A)	PennDot District 1 (Forest & Warren Counties).
Ben Jones (A)	Pennsylvania Game Commission
Ben Kafferlin	Warren County Commissioner
Bill Oldland	USFS State & Private Forestry, Forest Health Protection
Bob Kirchner	Allegheny Forest Alliance
Bob Lueckel (A)	USFS State & Private Forestry, Forest Health Protection
Bobby Snyder	Forest County Board of County Commissioners
Brad Nelson	Kinzua Quality Deer Cooperative
Brian Ensign	Pennsylvania Fish and Boat Commission
Bruce Snyder	Pennsylvania Independent Oil and Gas Association (PIOGA)
Cecile Stelter	Pennsylvania Bureau of Forestry
Cliff Lane	McKean County Commissioners
Dan Devlin	Pennsylvania Bureau of Forestry
Dan Glotz (A)	Warren County – Alternate for Ben Kafferlin
Dave Gustafson	Pennsylvania Game Commission
Dave Morgan (A)	Ed Kocjancic Inc.
Dave Sherman	Warren County Visitor's Bureau
Don Eggen	Pennsylvania Bureau of Forestry
Don Williams	Pennsylvania Governor's Advisory Council on Hunting, Fishing and Conservation
Ed Kocjancic	Ed Kocjancic Inc.
Edwin Atwood	Tionesta Valley Snowmobile Club
Elizabeth Johnson	The Nature Conservancy (TNC)

Name	Organization
Elyse Henshaw	Roger Tory Peterson Institute of Natural History
Fred Strathmeyer	Pennsylvania Department of Agriculture
Gene Odato	PA Forestry Association
George Kirik	Pennsylvania Forest Products Association
Glenn Howard (A)	USFS Allegheny National Forest
Howard Wurzbacher	Pennsylvania Game Commission
Jack Hedlund (A)	Allegheny Forest Alliance
James Miller	Pennsylvania Department of Environmental Conservation - Northwest Regional Office
Jeff Kepler (A)	School District Representative
Jeff Tome	Audubon Community Nature Center
Jim Decker	Warren County Chamber of Business and Industry
Jim Finley (A)	Penn State Center for Private Forests
Jim Miller	PA Department of Environmental Conservation
John Hallas	Pennsylvania Bureau of State Parks
John Murdock	Potter Lumber
John Saf (A)	Generations Forestry
John Weyant	USFS Allegheny National Forest
John Young	Allegheny Outdoor Club
Jonathan Geyer (A)	Pennsylvania Hardwood Development Council
Josh Hanson	USFS Allegheny National Forest
Karen Felton (A)	USFS State & Private Forestry, Forest Health Protection
Ken Kane	Generations Forestry
Kimberly Bohn	Penn State Cooperative Extension McKean County
Kirk Johnson	Friends of the Allegheny Wilderness
Lance Bowes (A)	Penn Soil RC&D (Forest & Warren Co.)
Linda Ordiway	Ruffed Grouse Society
Liz Krug	Pennsylvania State Snowmobile Association
Marc Rickard (A)	PennDot District 1 (Forest & Warren Counties)
Mary Hosmer	Pennsylvania Federation of Sportsmen's Clubs

Name	Organization
Matt Marusiak	Western Pennsylvania Conservancy - Allegheny Region
Mike DiRinaldo	Pennsylvania Bureau of State Parks Planning Department
Mike Messina	Penn State
Mike Tyree (A)	Indiana University of PA
Mitch Blake	National Wild Turkey Federation
Nadine Pollock	USFS Allegheny National Forest
Nancy McCloskey	Forecon, Inc.
Patrick Miller	Pennsylvania Falconry and Hawk Trust
Paul Lilja (A)	Pennsylvania Federation of Sportsmen's Clubs
Paul Lyskava	Pennsylvania Forest Products Association
Peter Hoagland	USDA NRCS
Peter Kempf	PennDot District 2 (Elk & McKean Counties)
Ron Simonsen (A)	Friends of the Allegheny Wilderness
Rowan Rose	Forest County Economic Development Corporation
Sarah Johnson (A)	Pennsylvania Bureau of Forestry
Sue Dube (A)	USFS Allegheny National Forest
Sue Swanson	Allegheny Hardwood Utilization Group
Susan Stout	USFS Northern Research Station
Tim Tomon (A)	Pennsylvania Bureau of Forestry
Tina Toole	North Country Trail Association Allegheny National Forest Chapter
Tom Harman (A)	Ed Kocjancic Inc.
Tom Kase	Kane Hardwood
Tom Schaffer	Penn Soil RC&D (Forest & Warren Counties)
Tyson Martin	Chapman State Park
Wayne Bender	Pennsylvania Hardwood Development Council
Will Miller	Seneca Nation of Indians

5. Threats Matrices

I. Group 1: Age Class Imbalance
II. Group 2: Emerald Ash Borer
III. Group 3: Safety and Aesthetics along Multi-modal Corridors
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Threats Template Matrix- Age Class Imbalance

1. Threat: ***(Age Class Imbalance)***

The current age class distribution of the ANF is very unbalanced, and the creation of early structural habitat is occurring far too slow …
Current condition of Management Area (MA) 3.0: 71% is 80 years of age or older; other MAs are comparable.

2. Location: *(Describe and/or display on a map)*

MAs suitable for timber harvest (1.0, 3.0, 2.1, 2.2, and 6.1)

3. Impact or Severity *(How significant is the threat?)*

Very significant–many of the other threats outlined by the collaborative would benefit from a more balanced age class distribution.

4. Desired Outcome:

A stated acreage goal for yearly regenerated acres (by MA). Consistent planning efforts that move the forest towards a balanced condition over time. This includes prescribing of sufficient shelterwood seed cut acreage to result in adequate shelterwood removal harvesting rates. Harvest activities would occur where they are most needed (hotspots). Initial efforts may exceed the annual target. The intent is to have a more balanced age class distribution – not a perfectly balanced distribution.

5. Strategies to Achieve the Desired Outcome *(Add more as needed)*

Strategy 1:

Define rotation ages (will vary by forest type and management area (MA); run models to calculate what level of annual activity is required to balance the age class distribution), or define desired objectives for early age class by MA and develop harvest schedules from those objectives.

Based on existing ANF Forest Plan direction, the following rotation ages can be inferred, and potential harvest schedules developed for each suited MA based on Forest Plan objectives for each:

MA 1.0 (7,937 acres): *50-100 year rotation (10-20% 0-10 years old, LRMP p. 102)*
Current Condition: *1.6% 0-20 years old*
MA 1.0 Potential Harvest Schedule: *Harvest 227 acres shelterwood seed cuts; 160 acres final harvest annually.*

MA 2.1 (2,387 acres): *90-150 year rotation (Use uneven-aged management on 500-750 acre per decade, assuming 3 entries to achieve 3 age classes in each treated area, LRMP p. 106)*
MA 2.1 Potential Harvest Schedule: *Harvest 75 acres annually using uneven-aged regeneration methods.*

Threats Template Matrix- Age Class Imbalance

MA 2.2 (121,176 acres- 23,301 acres oak types; 93,723 acres non-oak types; 4,152 acres non-forest): *Connectivity, predominantly managed using uneven-aged regeneration methods. 300-500 year rotation Oak forest types (4-6% 0-20 years old). 500-1,000 year rotation non-oak forest types (2-4% 0-20 years old). (ANF LRMP p. 109). Note: intent is not to regulate this Management area using even-aged regeneration methods. Management activities focused on sustaining mid-late structural habitat on >85% of area with contiguous high forest canopy.*

Current Condition: *Oak Types= 0.3% 0-20 years old, Non-oak types= 1.8% 0-20 years old.*

MA 2.2 Potential Harvest Schedule:

Oak forest types- *Harvest 100 acres shelterwood seed cuts; 70 acres final harvests annually.*

Non-oak forest types- *Harvest 268 acres shelterwood seed cuts; 187 acres final harvests annually.*

MA 3.0 (287,380 acres): *167-200 year rotation (10-12% 0-20 years old, ANF LRMP p. 113)*

Current Condition: *5.0% 0-20 years old*

MA 3.0 Potential Harvest Schedule 1 (LRMP modeled rate): *Harvest 2,224 acres shelterwood seed cuts; 1,556 acres final harvests annually.*

MA 3.0 Potential Harvest Schedule 2 (Accelerated rate): *Harvest 2,668 acres shelterwood seed cuts; 1,868 acres final harvests annually.*

MA 6.1 (16,421 acres): *286-333 year rotation (6-7% 0-20 years old, LRMP p. 126)*

MA 6.1 Potential Harvest Schedule: *Harvest 82 acres shelterwood seed cuts; 58 acres final harvests annually.*

When:

Prior to the next collaborative meeting (September 7th)

Who:

ANF staff and Group #1 members.

Cost:

--

Strategy 2:

Develop area control model for all suited MAs with decadal regeneration requirements. Develop an internal target (acres treated annually) that clearly defines annual planning expectations.

MA 1.0 Potential Harvest Schedule: *Harvest 227 acres shelterwood seed cuts; 160 acres final harvest annually.*

MA 2.1 Potential Harvest Schedule: *Harvest 75 acres annually using uneven-aged regeneration methods.*

Threats Template Matrix- Age Class Imbalance
MA 2.2 Potential Harvest Schedule: ***Oak forest types-*** *Harvest 100 acres shelterwood seed cuts; 70 acres final harvests annually.* ***Non-oak forest types-*** *Harvest 268 acres shelterwood seed cuts; 187 acres final harvests annually.* ***MA 3.0 Potential Harvest Schedule 1 (LRMP modeled rate):*** *Harvest 2,224 acres shelterwood seed cuts; 1,556 acres final harvests annually.* ***MA 3.0 Potential Harvest Schedule 2 (Accelerated rate):*** *Harvest 2,668 acres shelterwood seed cuts; 1,868 acres final harvests annually.* ***MA 6.1 Potential Harvest Schedule:*** *Harvest 82 acres shelterwood seed cuts; 58 acres final harvests annually.*
When: *Prior to the next collaborative meeting (September 7th)*
Who: *ANF staff and Group #1 members.*
Cost: --
Strategy 3: *Future projects should be commensurate with regeneration requirements and continue to incorporate the regeneration of larger contiguous areas and limit intermediate harvests; they should take advantage of low hanging fruit, e.g., uncut stands with adequate advanced regeneration already established, when possible.*
When/Frequency: *Beginning now/Annually. The priority for each District should be the completion of one vegetation management project annually.*
Who: *District personnel*
Cost: --
Strategy 4: *Silvicultural prescriptions should describe* ***desirable and acceptable*** *outcomes clearly, and the desired condition should be attainable. Most foresters strive for perfection, e.g., a fully stocked stand with a diverse mix of desirable species, and the reality is this condition may be impossible to obtain in poorly stocked stands with multiple forest health concerns.* **Desirable outcome +> 70% stocked with preferred seedling species-** including cherry, oaks, maples, tulip poplar, cucumbertee, hemlock, pine, etc.. **Acceptable outcome=>70-**% stocked with commercial species, including birch, The amount of birch that is acceptable will vary by site quality, pre-existing overstory condition, etc..
When/Frequency:

Threats Template Matrix- Age Class Imbalance
Beginning now/always.
Who: *Foresters – both ANF and other landowners. Researchers. Research can facilitate regular interactions among foresters from different landownerships to learn from each other's experiences.*
Cost: --
Strategy 4: *Develop local contractor pool to support and keep pace with implementation of forest health strategies. Local contractor base (e.g. chainsaw site preparation and broadcast herbicide application) is critical to implementation strategies to address this threat, and there is a need to develop additional service contracting resources.*
When/Frequency: *Beginning now/always.*
Who: *ANF, State, private landowners, contracting staff and Foresters.*
Cost: --
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: *Monitor status of stands in process of regeneration much more closely. Monitor and adapt … encourage foresters to utilize adaptive management and think outside the box.* *Strive to field visit all treatment areas at the end of their 2nd growing season to determine next appropriate action.*
When/Frequency: *Always*
Who: *District staff/Research (Administrative studies, for example)*
Cost: --
7. Additional Information Needs:
8. Other:

Threats Template Matrix- Emerald Ash Borer

1. Threat: The Emerald Ash Borer (EAB) has caused significant mortality to date and threatens to eliminate nearly 100% of the ash trees on the ANF in the next 15 years. (Handout 6/8 Meeting and anecdotal experience of committee members). Most ash trees are projected to fall or break within 5 year of mortality. (Handout 6/8 Meeting). This mortality will negatively affect all users and interests on the ANF. A Large concentration of trails and camping areas are within the mortality area, 13,000 active oil and gas wells are located on the ANF owned by approximately 120 operators; a conservative estimate of roads serving said wells is 985 miles. In addition, 401 miles of PA State Routes, 274 municipal road miles and 609 miles of utility lines are located on the ANF.

Ash mortality creates a major safety and economic threat to these parties in terms of cleanup costs, lost production, damage to infrastructure etc. The direct economic impact from lost timber volume to the municipalities and school districts could amount to millions of dollars in lost revenue if ash is not sold in to the timber industry (500,000 acres X 5,000 board feet per acre X 3% ash basal area X $500 per MBF stumpage= estimated present Ash stumpage value of $37,500,000.00; 25% timber sale revenue to school districts and municipalities would equal $9,375,000).

Clearly all interests and users of the ANF will suffer great economic loss and recreation access loss if the Ash species is not treated to prevent mortality or removed.

2. Location: The majority of projected ash mortality is located around the Kinzua impoundment, to the south of the New York Border and to the north of PA route 59, roughly speaking (see risk maps). Noteworthy regarding the location of the threat are the ANF designated Management Areas that a significant amount of project mortality will likely occur. Significant mortality is projected in Management Area 8.2 “National Recreation Area,” Management Area 2.2 “Late Structural Linkages” and Management Area 5.2 “Wilderness Study Area” (see Management Area maps). Each of these Areas have specifically defined roles and restrictions within the ANF as discusses in the Allegany National Forest Land and Resource Management Plan.

3. Impact or Severity This group believes it is hard to overstate the severity of the threat that is presented by Ash Mortality. The anecdotal experience of the members of this group is that on the in-holdings within the ANF and the parcels immediately surrounding the ANF, the attack of the EAB has been swift and relentless. Many ash trees which appeared healthy in the 2016 growing season did not leaf in 2017. In recognition of the problem, owners of private timber holdings in and next to the ANF have harvested in excess of 90% of the white ash, with work ongoing to harvest the remainder before mortality renders the trees valueless and/or too dangerous to harvest. The rapidly closing time-window within which to harvest is an additional element of severity that cannot be overstated.

Threats Template Matrix- Emerald Ash Borer

4. Desired Outcome: To eliminate, or reduce to practical means, the threat of dead and dying ash trees falling on people and property, public and private, as quickly as possible all while providing forest products to area industry and financially supporting municipalities and school districts.

5. Strategies to Achieve the Desired Outcome *(Add more as needed)*

Strategy 1: Expedite pre-mortality timber harvesting to treat the largest amount of acres at the lowest cost to the public.

Ash pre mortality-based timber sales should be designed to gather as much interest from the timber industry as possible to ensure projects are purchased in a timely manner. Ash timber harvests should have minimum stumpage pricing to ensure the market value of the timber exceeds the minimum estimated pricing. Ash timber harvests should not be included in the Stewardship contracting project. Ash timber sales should be exempted from small business concern timber sale bidder class restrictions. The categorical exclusion process should be employed at each possible opportunity.

Comments received from the ANF working group were generally filtered into two categories, aesthetic concerns and regeneration. Our group believes that a temporary change in crown structure in a controlled manor such as a timber harvest will have less visual impact and be more aesthetically pleasing than waiting for thousands of dead trees to fall over. One or the other will happen, this collaborative group and the ANF staff will make these decisions.

This group is not making stand level silvicultural, regeneration or timber harvest recommendations. Rather, it is an overall strategy for mitigating a forest health issue. Concerns such as competing vegetation, sunlight management, deer herd pressures, desirable regeneration (etc.) are better addressed on a casebycase basis by forest management staff of the ANF.

Ash Timber sales should be prioritized to treat areas of high public safety and high infrastructure concerns. Pre-salvage harvests should focus resources along road corridors, utility lines, OGM production locations, trails and campsites. Ash Timber sales should also be large in scope and size. A recent fine example is the **Hollow Trail** Timber sale with a sale area of 870 acres and harvest confined to 271 acres with a specific design to harvest ash.

Our Group recommends a Categorical Exclusion request to allow pre-mortality timber harvesting in Management area 8.2 to reduce risk to the public caused by having dead or dying trees close to high-use recreation areas. An added benefit will be reduction in costs to the ANF of cleaning and maintaining dead woody debris that will accumulate in recreation areas. The Pennsylvania DCNR has instituted these types of timber sales

Threats Template Matrix- Emerald Ash Borer

within the PA State Parks systems for the same reasons. To date, negative push back from the public for these projects in State Parks has been minimal.

Several concerns over this strategy have been raised:

1) Support for cutting in 8.2 and 5.2Management Area
    a. MA 5.2 allows for "Natural Succession, No Timber Harvest." An argument could be made that EAB infestation is not a Natural Succession event as it is an exotic invasive species. The management goals of this area have already been manipulated by human interference even if it is or was unintentional.
    b. MA 5.2 and 8.2 are logical areas within the ANF to introduce biological control measures as discussed below.

2) Leaving areas unharvested to facilitate the search for 'lingering ash' (see Strategy 3 below): Some areas will not be harvestable under any circumstances. These areas include riparian areas that, due to soil hydrology are excluded from timber harvesting, as well as locations in the forest that cannot be accessed by the current road system or examples of ash that are growing on extreme slopes and therefore are not accessible for a commercial timber harvest. These would be available areas where a search for lingering ash could be conducted.
3) Possible synergies with Group 1 (Age Class Imbalance) need to be further explored.
4) How much potential acreage would be treated by this strategy?
5) A limited number of corridors could be remediated through firewood harvesting. This can only be implemented if appropriate precautions regarding the hazards of dying ash are incorporated. (John M. Still struggles with this concept personally due to safety concerns. Also transporting firewood is the most efficient way for an exotic pest to spread, aren't we inadvertently encouraging the moving of this pest rapidly? That said the rest of the collaborative seems to support the idea so I will leave it in our Matrix.)

When: EAB Mortality has spread very rapidly across the forested landscape in the eastern United States. Action needs to take place to remediate its effects and attempt to preserve this species before a substantial percentage of the Fraxinus species succumbs.

Who:

Cost: This Strategy will provide economic benefits to local economies, school districts and municipalities.

Strategy 2: Biological control.

Strategy 2: Biological control. This strategy would consist of releasing three species of parasitoids for the control of emerald ash borer:

Threats Template Matrix- Emerald Ash Borer

- *Tetrastichus planipennisi*, larval parasitoid
- *Oobius agrili*, egg parasitoid
- *Spathius galinae*, larval parasitoid

The current goal of APHIS is to release in all EAB-infested counties. The Bureau of Forestry is already releasing in Forest and Elk Counties. The Forest County site is immediately adjacent to ANF land. The Elk County site is approximately 20 miles from the edge of the National Forest. A site has been identified and is awaiting approval for Warren County. A tentative site has been identified in the Management Area 5.2/8.2 area. This site still has to be finalized and sent to APHIS for approval These organisms are believed to move about 7 miles per year.

Tetrastichus planipennisi and *Oobius agrili* have established in other parts of Pennsylvania. In addition, there is scientific evidence that *T. planipennisi* is able to reduce EAB larval levels where there is thin bark (i.e. young trees and high branches) to levels that allow trees to survive. Neither *O. agrili* nor *Spathius galinae* have been released long enough to confirm their efficacy against EAB. The fact that *O. agrili* is established in Pennsylvania necessarily means that it is reducing the number of EAB eggs to some degree. Further, if *S. agrili* can establish, it should be able to attack larvae beneath thicker bark than *T. planipennisi*.

Unfortunately, it is still likely that a large percentage of larger size class ash will be lost. What is hoped at this point is that the next generation of ash trees will be protected by these parasitoids. Ash seedlings are abundant in many parts of the ANF, and getting these organisms established should offer them some protection.

Site requirements:

- Not to be harvested/developed in the next 5 years
- Diversity of size classes
- At least 40 acres
- At least 25% ash

These releases can also be conducted in the vicinity of chemically treated trees. This might be an option where hazard trees are a concern.

Refer to Tim Tomon's expertise on this topic. Management areas 5.2 and 8.2 seem to be logical concentration areas for these controls of experiments.

When: Starting late summer, 2017. Releases will continue through the 2018 season and possibly all or part of 2019.

Threats Template Matrix- Emerald Ash Borer

Who: Cooperating agency personnel will assist with assessing and setting up release sites. Parasitoids provided by APHIS-EAB Biocontrol Program.

Cost: The cost of the parasitoids is covered by APHIS. Costs for personnel to conduct site assessments and releases are covered by cooperating agencies.

Strategy 3: Lingering ash.

Strategy 3: Lingering ash. This strategy would consist of identifying ash in areas of mortality that express tolerance to emerald ash borer (EAB). The goal is to develop native ash that is tolerant of emerald ash borer.

In other parts of the country (i.e. Michigan and Ohio), following peak EAB populations, approximately 1% of ash remains alive with a healthy canopy and no woodpecker damage. Because there are reasons other than tolerance, that trees might survive, it is ideal to begin looking for candidate trees about two years after the peak of EAB populations. This allows us to know that the trees have been exposed and may be showing some level of tolerance. Over time a "library" of survivor trees can be built. The Allegheny National Forest is particularly suited for this work because EAB populations have been more consistently monitored, whereas in most of the state trapping was discontinued after EAB was initially found. It also has some very dense stands of ash.

Once these putatively resistant trees have been identified, we will work with Forest Service staff (Jennifer Koch and Therese Poland) to conduct additional testing. They will use existing bioassays to confirm these trees possess defense responses against EAB

When: This effort can begin immediately in areas that have already seen peak emerald ash borer populations. Monitoring in areas with lower EAB densities should continue so the appropriate time to initiate surveys can be identified.

Who: This could be anyone willing to look for lingering ash in areas in the aftermath of maximum EAB populations. This could include National Forest personnel, cooperating agency personnel, and various private groups willing to participate.

Cost: Costs for various agency personnel to survey for these trees would be covered by cooperating agencies. The Pennsylvania Bureau of Forestry will cooperate with the USFS to fund and carry out research and breeding. Some funding might be needed if searches would be performed by volunteer groups or other means.

When:

Threats Template Matrix- Emerald Ash Borer
Who:
Cost:
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: Continue monitoring the existing network of ash test plot as well as the 530 previously treated ash trees within the ANF.
When/Frequency: At least annually.
Who: ANF staff, PABOF if needed
Cost: Costs covered by existing agency funds.

Threats Template Matrix- Safety and Aesthetics along Multi-Modal Corridors

1. Threat: **Safety and aesthetics along multi-modal corridors (Group 3):** As the health of various species of trees continues to decline, the result will be many trees falling throughout the forest. The safety of the public is placed at risk due to the potential of the trees falling in developed or other public access areas. The risk to public safety may be direct, such as a tree falling directly on a camper or hiker, or indirect by falling into the path of a motorized vehicle and causing an accident. All multi-modal transportation corridors are at risk to numerous downed trees impeding the continuance of travel.

2. Location: *(Describe and/or display on a map)* All roadways, developed campgrounds, disperse campsites, trailheads, boat or canoe launches, hiking trails, biking trails, equestrian trails, ATV trails and other administrative public sites are at risk.

For locations, sites, & total miles: Utilize 1. *Allegheny National Forest Administrative Map;*
2. *ANF Geographic Information System (selected map layers and associated database);*
3. *Allegheny National Forest – Recreation Map Brochure*;
4. *Four county area of local school district's transportation needs (bus routes)*

3. Impact or Severity *(How significant is the threat?)* The roadways in the ANF with the highest average daily traffic hold the highest immediate risk to public safety. However, all dead and dying trees along trails, trailheads, campgrounds, campsites, boat or canoe launches, and other administrative sites utilized by the public pose a significant and immediate danger.

4. Desired Outcome: Mitigate the hazard to the traveling public along multi-modal transportation corridors by reducing the risk of injury from falling or fallen trees while maintaining the forest aesthetics, through selective reforestation and planting efforts. Utilized up-to-date public education and notification efforts, while establishing continuous monitoring and maintenance programs for the public access areas.

5. Strategies to Achieve the Desired Outcome *(Add more as needed)*

Strategy 1: Prioritize hazard tree removal on all roads accessible to the public. Priority should be given to open public roads such as US, PA State, Township, and open Forest Service system roads; including roads restricted to seasonal use and disabled forest users i.e. disabled hunter roads, recreational roads, etc. Concentrate efforts spatially around areas of highest tree mortality as a priority. Utilize reforestation of the cutting limits with low growing, pest tolerant species of trees and shrubs such as the techniques being developed through the University of Connecticut "Stormwise" program. http://stormwise.uconn.edu/.
Consider using ANF Scenery Implementation Guide, Version 1.2, December, 2009 for a list of existing Scenic Concern Level corridors (Appendix B) on the ANF and other strategies for implementation.

Threats Template Matrix- Safety and Aesthetics along Multi-Modal Corridors
When: Initiate projects as soon as possible and practical. Consider in USFS FY 2018 program of work and 3-Year Strategic Plan
Who: The USFS in cooperation with right-of-way ownership including state, township, private and other federal ownership to work collaborator on the planning and NEPA portion of the project. Consider using "Good Neighbor Authority" for work on other than federal lands. Also, consider PA State planning personnel and resources for areas on federal land.
Cost: The potential high costs can be decreased by including the select dead and dying tree removal with other timber sales. Consider using USFS stewardship sponsored projects as "goods for services agreements" to implement some of the projects through felling, chipping, or salvage of wood on selected sites for wood product utilization. Other considerations could include a firewood sale or revamping the ANF permit to allow fire wood gathering along selected routes or sites to retain wood product utilization.
Strategy 2: Increase the public awareness to the safety threat of the dead and dying trees through public education and outreach while also increasing the public's involvement through the creation of an all-encompassing electronic reporting platform. The platform/app can showcase unsafe areas, safe firewood harvest areas and threatening trees along modal corridors in real time. This platform/app can also be adapted from or merged with other apps to identify other Forest health conditions such as recognizing invasives etc… Consideration should be given to establishing an ANF Facebook page and/or establishing the application through the ANF public website. Responsible signing and education of the public for site specific projects.
When: ASAP
Who: ANF (Jeanne Hickey has explored the feasibility of the citizen reporting app). USFS Public affairs personnel for establishing or maintaining Facebook or ANF website internet options. Consider contracting options for Facebook establishment and/or monitoring.
Cost: Minimal, cost associated with personnel to establish application, and selected personnel to update, monitor, and transfer information.
Strategy 3: Address the threat of dead and dying trees during the construction of any new transportation multi-modal corridor or public access sites and maintenance of existing corridors or right-of-ways. Outreach to utility companies and owners of private right-or-ways for additional strategies or mutual benefits. Establish both a maintenance and monitoring plan for addressing the threat in any subsequent NEPA planning document. "Rapid Response"-establish a streamlined NEPA process to quickly respond to impending threats.
When: During the planning phase on any new project on the ANF. Consideration should be given to potential projects such as Knox, Kane Railroad corridor or any other potential new trail systems.
Who: USFS in cooperation with partners, volunteers, and landowners.

Threats Template Matrix- Safety and Aesthetics along Multi-Modal Corridors
Cost: By placing a maintenance and monitoring plan within a NEPA document, cost is minimal. Implementation costs – **See Strategy 1**
Strategy 4: Prioritize remaining multi-modal corridors and public access sites (other than roads addressed in Strategy 1) on the ANF. Utilize a risk assessment matrix flow chart that includes forest health conditions, scenery implementation guide and other strategies. Consider motorized trails, developed campgrounds facilities, trailheads, boat and canoe launches and other public assess sites as high priority and other pedestrian trails as a lower, but important areas for treatment. Various work areas at least 100 feet from modal- corridor or site will be considered. Techniques for planting recommended native trees and shrubs for both aesthetics and wildlife habitat will be explored. Adapted techniques to control Non-native invasive plants will also be utilized in conjunction with strategy. **See also Strategy 1**.
When: Consider in USFS FY 2018 program of work and 3-Year Strategic Plan. Explore the use of NEPA types to accelerate treatment for safety concerns. Consider on-going trail and campground maintenance, use of the Categorical Exclusions and NEPA documents that can be used repeatedly on a more programmatic or annual basis.
Who: USFS in cooperation with partners, volunteers, and landowners. Adopt-a-trail and Plant-a-Tree programs could be utilized if applicable.
Cost: **See Strategy 1** for implementation costs. Costs to produce additional NEPA would need to be considered. On-going maintenance costs of trails and facilities would be dependent on partnerships, volunteer groups, and other contractual costs.
Strategy 5: Provide aid and education to private landowners for hazard tree removal on private property within the ANF proclamation boundary along multi-modal corridors that are link to public land. Raise awareness, explore "good neighbor authority," work with trail groups and private landowners while also considering liability. Consider forums that include discussion of the PA Recreational Use of Land and Water Act and small educational seminars with Penn State Extension Office to raise awareness and generate solutions. *This is a research strategy-find what other states area doing/what programs exist.
When: Implement with strategies above. Further research is needed to see if there are programs at other agencies or jurisdiction levels that could be applied and implemented
Who: Consult other agencies for application. USFS in conjunction with state and private entities. Utilize Cooperative Extension Offices
Cost: A funding avenue will need to be researched based on any program adopted. Will include cost for education, tree removal, and any replanting efforts.

Threats Template Matrix- Safety and Aesthetics along Multi-Modal Corridors
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: Utilize the information from the electronic reporting platform/app to increase the monitoring of hazardous trees in priority corridor areas such as developed recreation sites and trails in highly affected areas of the forest. Explore the opportunity for volunteer groups to monitor contributions that keep areas cleared of dead and dying trees. Cameras could be considered to monitor some key site conditions in applicable areas that consider privacy etc… An example is Penndot's use of cameras for road and weather conditions.
When/Frequency: The current frequency is once every five years for developed campgrounds. Annual heavy and light maintenance for motorized trails currently in place. Apps and websites will supplement current program.
Who: ANF and citizen reporting platform/app
Cost: Personnel workload and associated costs. Potential costs for equipment (cameras), maintenance/updating of computer apps, signing etc…
Strategy 2:
When/Frequency:
Who:
Cost:
7. Additional Information Needs: 1. Costs associated with NEPA document development 2. Costs associated with App and Facebook, and public website development and maintenance 3. Agreement and partnership flexibility with other agencies and landowners and copies of agreements or authorities.
8. Other:

Threats Template Matrix- Loss of Diversity

1. Threat: ***Loss of Diversity***

- Forest Health-diseases, etc.
- Invasive pests, plants and animals
- Habitat loss-development, etc.
  - Loss of food resources for wildlife
  - Loss of nesting habitat for birds and mammals
- Sedimentation/erosion of stream banks

Causes of loss of diversity

- Loss of seed-bank
- Changes in soil affecting micro-communities
- Changes in leaf litter composition impacting macroinvertebrates and salamanders
- Poor response to drought and flood conditions
- Loss of habitat connectivity

Results of loss of diversity

2. Location: *(Describe and/or display on a map)*
Allegheny National Forest (in entirety) and adjacent landowners

3. Impact or Severity ***(How significant is the threat?)***
Significant and ongoing

4. Desired Outcome:
High-functioning ecosystems that support a wide diversity of plant and animal life and are resilient to change

5. Strategies to Achieve the Desired Outcome ***(Add more as needed)***

Strategy 1: **Supplemental planting research (similar benefits)** species to replace ash and in long-term beech that will provide similar benefits for wildlife and ecosystem as a whole. *Research needed. Look for in the research literature. (Look at TNC high Allegheny plateau project*). Ash only 2.4% BA on the ANF – Beech a double-edge sword – both trying to keep it and address beech brush to retain diversity Cherry – stress factors, declining crown, declining seed, big puzzle – are we going to lose it, return to historical values?

When: ongoing

Who: partnership with Northern Research Station (NRS) and Penn state, Morgantown office, etc.

Cost: minimal to moderate cost, possibly include some travel costs, dependent on partners and level of plantings needed

Threats Template Matrix- Loss of Diversity

Strategy 2: Manage for Younger Forests (attract wildlife) creating age diversity and its attendant structural diversity. Using appropriate silvicultural practices to allow for fostering young forest. Pay attention to adjacent invasive plant species that could impact the outcomes of management activities.

- Mapping and observation.
- Match management and site.
- Set goals for what wildlife to attract (e.g., game species, RTE species, habitat specialists)

When:

Who: NWTF, RGS, other wildlife interest groups to do active management

Cost:

Strategy 3: Determine Ecosystem Services Ecosystem services - assign value to see productivity, diversity of services, across the ANF. Find common denominator ($?) for valuation - demonstrate to the public and stakeholders the values the ANF provides, why these environments are so important - future action item. Listen to what the values are between partners and communities in order to share concise message.

When: ongoing

Who: NRS, ANF and other partners

Cost:

1. **Strategy 4: Create and Maintain Resilience** Adaptation Goals (from VT publication)
    - Maintain a continuous forest resource.
    - Focus on regeneration requirements.
    - Manage for high forest carbon storage.
    - Identify areas suitable as climate change refugia.
    - Understand tree silvics and climate adaptability.
    - Prevent extinction of rare, threatened, and endangered (RTE) species.
    - Support low-impact harvest operations.
    - Manage to limit impacts of increased water flow.
    - Monitor during and after management operations.
    - Monitor silvicultural outcomes and plan for adaptive management.
    - Carefully manage invasive plants.

Threats Template Matrix- Loss of Diversity
• Implement integrated pest management. • Identify goals for species shifts • Consider species shifts; allow recruitment of "new", more southern species as ranges shift.
When: ongoing, dependent upon forest health matter (react to sudden decline, etc.)
Who: ANF
Cost: dependent on tools used
Strategy 5: Hire specific forest health biologists that can be efficient and committed to such issues to be better prepared for future unknown risks etc. and identify other possible partners. • Create a full-time position on the ANF focused on forest health threats • Assist with citizen scientist monitoring program, reporting, and translating into action on the forest. • Assist public affairs position to do public notice and education • Continue partnership with Morgantown Field Office Forest Health office
When:
Who:
Cost:
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: Promote use of iMap Invasives and iNaturalist to encourage citizen scientists to assist with tracking invasive plant species locations and unique species habitats. Create other opportunities to link citizen science data with existing ANF data resources to identify areas of risk, opportunity, engagement… Adjacent landowners must be pulled into monitoring programs. *Look to other programs elsewhere that work well and could be used here as well*
When/Frequency: ongoing
Who: Create partnership with adjacent landowners and interested naturalist groups to assist with monitoring. (MN has great examples of citizen scientists monitoring invasive species.)
Cost: Volunteer based, but may require some Forest Service personnel time to provide training to volunteers (at least to get program started- can do train the trainer workshops, etc.)
Strategy 2: Sharing of data across the permanent study plots that exist on the ANF (over 100) – FIA, Morgantown Field Office, Northern Research Station, DCNR Bureau of Forestry

Threats Template Matrix- Loss of Diversity
When/Frequency: Need to determine if that number is sufficient
Who: Forest Service – across groups within the USFS (e.g., state and private, national forest system, research) and across agency – DCNR BOF
Cost: Determined by number of personnel needed
7. Additional Information Needs:
8. Other: (Notes) We know things are changing. How do we want to manage so that we retain diversity? What else can we support as well? What does the ANF want regenerating - how does that fit with current (and projected future) environmental conditions? Ecosystem services - assign value to see productivity, diversity of services, across the ANF. Find common denominator ($?) for valuation - demonstrate to the public and stakeholders that the values the ANF provide, why these environments are so important - future action item.

Threats Template Matrix- Threats to Eastern Hemlock

1. Threat: *(Description)*

Non-native species threats to Eastern hemlock, including hemlock woolly adelgid (HWA) and elongate hemlock scale (EHS), jeopardizing the ability of hemlock forests to protect riparian areas & water quality, provide wildlife habitat/thermal cover, and recreational opportunities. A native pathogen, Fabrella tsugae needle blight, can also add stress to hemlock particularly during drought; however this has not been detected on the ANF. Scirococcus tip blight, another pathogen, has been identified on the ANF, but has not normally cause high levels of stress or decline. The combination of all these stressors may produce faster decline and mortality rates than previously seen in other areas of northern and central PA.

2. Location: *(Describe and/or display on a map)*

Hemlock is widespread throughout the ANF, and is dense in many locations (Figure 1), especially higher gradient stream corridors. Hemlock woolly adelgid has been identified in various locations at low population levels both on the ANF and adjacent to ANF land, including at Cook Forest State Park and Millstone township to the south, Tionesta centrally located (HWA has not been found since cold winters of 13-14 and 14-15), and along the Allegheny River near the Kinzua Dam and at Webbs Ferry (though the Webbs Ferry infestation was not located again following cold winters). Elongate hemlock scale has not been found yet in any county that contains ANF land, the furthest point west that it has been positively identified thus far is around Clinton County directly west and in the Pittsburgh area to the south. High priority hemlock conservation areas have already been identified on the ANF (Figure 2).

3. Impact or Severity *(How significant is the threat?)*

The impact of HWA, and HWA in conjunction with EHS, could be severe to the ANF's hemlocks. In other parts of hemlock's range, especially to the east and south, mortality has been very high, and occurs on a time scale anywhere from about 5 to about 20 years with HWA alone. Hemlock on the ANF have more "climatic protection" at this point, since very cold winters keep the adelgid in check, however the impacts of climate change and potential HWA adaptation are unknown. It can be speculated that climate will not be a significant check on the population indefinitely into the future, and therefore once HWA and EHS are widespread, it is possible that a very high percentage of the ANF's hemlock will experience mortality within the next 2 decades.

4. Desired Outcome:

Protect at least some populations of eastern hemlock in priority areas from the impacts of non-native insects into the future, so as to protect riparian areas and old-growth forest ecosystems, maintain recreational opportunities (provide aesthetics) and to serve as future seed sources. Ecosystem function in priority riparian areas should be maintained, through treatment of hemlock to protect against pests, or mitigation of the impacts of hemlock mortality by enhancing resiliency of understory responses to disturbance by promoting natural regeneration, preventing or controlling invasive plants, and/or re-planting.

Threats Template Matrix- Threats to Eastern Hemlock
5. Strategies to Achieve the Desired Outcome *(Add more as needed)*
Strategy 1: Preventative chemical treatment of priority hemlock conservation areas (see Figure 2); and EDRR/rapid response treatments in other critical habitat or recreation areas where a small outbreak may be detected (see Monitoring section)
When: Once HWA is detected in a priority area/stand/management unit, treatments could begin. Spring is the best time for treatment, but Fall is also possible and especially desirable if flowering understory plants are present in Spring and treatments would pose a risk to pollinators. Treatments are technically possible any time of year as long as adequate soil moisture is present. Imidacloprid is very cost-effective for HWA, but once EHS shows up, dinotefuran (Safari) will be necessary. Figure 3 shows treatment areas for 2016-2017.
Who: Contractual crews and/or Forest Service employees potentially with volunteer assistance (volunteers have been used with many hemlock treatment programs, in PA and other states)
Cost: Anywhere from probably $0.75 to $1.50 per diameter inch treated for imidacloprid contract, and at least ~$2/inch for dinotefuran, maybe more. Can be as low at ~$0.50 per inch for imidacloprid materials with in-house labor.
Strategy 2: Use of biocontrols may be another treatment option. This could be done in the same areas as chemical treatments, or other places. May be useful in priority areas where the beetles are easy to release, collect, and where small hemlocks (planted as a hedgerow) could serve as "future insectaries". *Sasajiscymnus tsugae* was released widely in PA and other states. State and federal agencies are no longer releasing this beetle in PA though, because it is not as well-adapted to the climate conditions as other predatory beetle species (and one species of silver fly, collected in the Pacific NW; currently has been released and is being tested in the Finger Lakes area of NY by Dr. Mark Whitmore). There are two species of *Laricobius* that are more appropriate in PA, *L. nigrinus* and *L. osakensis*. Ln is capable of being reared in field insectaries (although also knocked back by cold winters), and Ln and Lo are also both available in small numbers for release on public lands from Forest Service-funded rearing labs. The numbers of insects (thousands) and the amount of time needed for success may make this option more prohibitive. This is a long-term solution, as it may take as much as 2 or more decades for biocontrols alone to "save" hemlock trees.

Threats Template Matrix- Threats to Eastern Hemlock
When: Biocontrols may be released once there is a suitable amount of HWA present for them to feed on. Thus far only one location on the ANF is known to have enough HWA for a release, near the Kinzua Dam along the Allegheny River. Biocontrols have also been released in Cook Forest State Park. Biocontrols should be released as often as possible in a limited number of locations, to allow populations to build.
Who: Forest service employees and PA DCNR Bureau of Forestry employees
Cost: Cost for lab-reared beetles already covered by federal funding for those labs, and beetles from field insectaries require the staff time spent to collect, transport and release.
Strategy 3: Maintaining/ enhancing resiliency of understory to HWA disturbance: including monitoring and control of invasive plants and re-planting/underplanting in priority stands with a mix of native or eastern hemlock, evergreen shrubs such as rhododendron and mountain laurel, and "surrogate conifer species", depending on what regeneration is already present at a given site and the site characteristics. Priority areas would include along a headwater drainage, where gaps are created in the overstory by HWA or some other natural or human disturbance- particularly near riparian corridors, or areas where HWA treatment isn't practical. Replanting of eastern hemlock, especially resistant hemlock, would be preferred. Potential surrogate species include native conifers such as tamarack, red and white spruces, balsam firs, cedars (appropriate for larger headwaters), and possibly white pine. Riparian hardwoods such as red maple, yellow birch, serviceberry, or tulip poplar are other choices. Group consensus is that Norway spruce not recommended. For some species, seedling protective measures from browsing, such as fencing or cribs, will be needed.
When: Planting could begin now in openings where there is no natural regeneration of hemlock, but should be deferred in areas where there is adequate hemlock regeneration or where shade is prohibitive to seedling establishment (see Monitoring strategy 4 to determine where these locations exist within the priority hemlock conservation areas).
Who: Forest Service staff and volunteers (would be good activity for school and youth groups)
Cost: DCNR can provide hemlock seedlings for free, other seedling costs; fencing costs?
Considerations/ Information needed: Debate exists about whether replanting should be limited to just eastern hemlock. More testing needs to be done to develop resistant hemlock. Western hemlock has been proposed for evaluation as a species to replant. It is more resistant to the adelgid but may not be adapted to the region. Selection of replacement species might also consider potential climate change and range shifts for some species.

Threats Template Matrix- Threats to Eastern Hemlock
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: Volunteers in adopted priority areas
When/Frequency: Nov – March during "wool-up", once yearly
Who: Volunteers – examples include Friends of Allegheny Wilderness members, Kinzua Fish & Wildlife Association, concerned citizens; Also train school and youth groups to help with monitoring
Cost: Administrative hours for someone to send reminders to volunteers, collect reports, and possibly provide training
Strategy 2: State/federal personnel in priority areas
When/Frequency: Nov – March during "wool-up" once yearly
Who: DCNR BOF employees, ANF staff/interns
Cost: Hourly wage for interns/salary & benefits for BOF Forest Health staff (not covered by ANF), estimated one week for each of 2 or 3 BOF staff?
Strategy 3: Permanent Hemlock Condition Monitoring plot re-measurement
When/Frequency: Plots are established (2016), could be re-measured every other year
Who: Contract crew (initially established and measured by Forecon, Inc)
Cost: Estimated at ~$15,000
Strategy 4: Monitoring should begin now to indicate the need for underplanting in: 1) high priority hemlock conservation areas, 2) in other areas where there is a lack of regeneration, and 3) where there are openings already in critical riparian areas.
When/Frequency: Do simultaneously with HWA monitoring
Who: ANF
Cost:

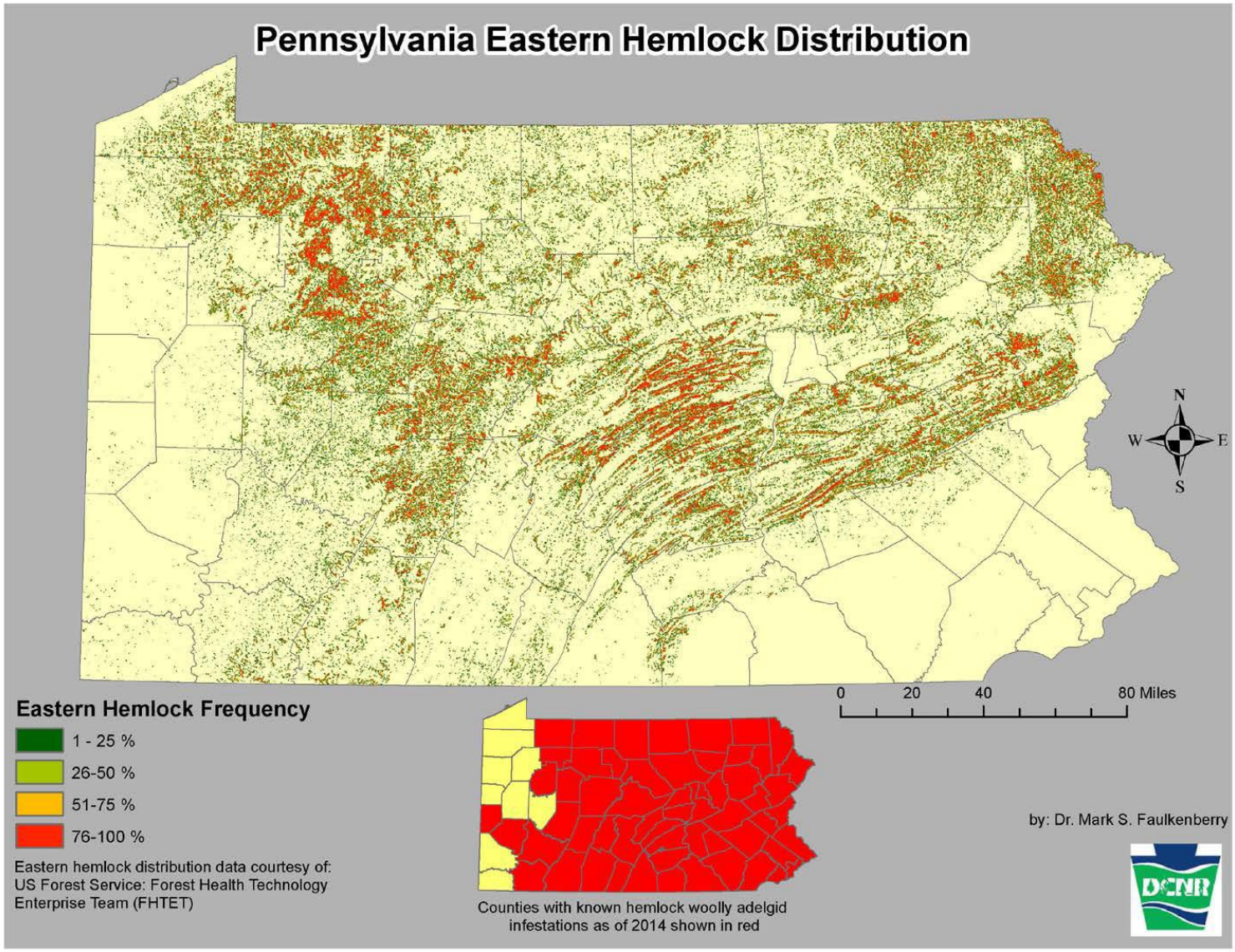


Figure 1. Hemlock distribution throughout Pennsylvania

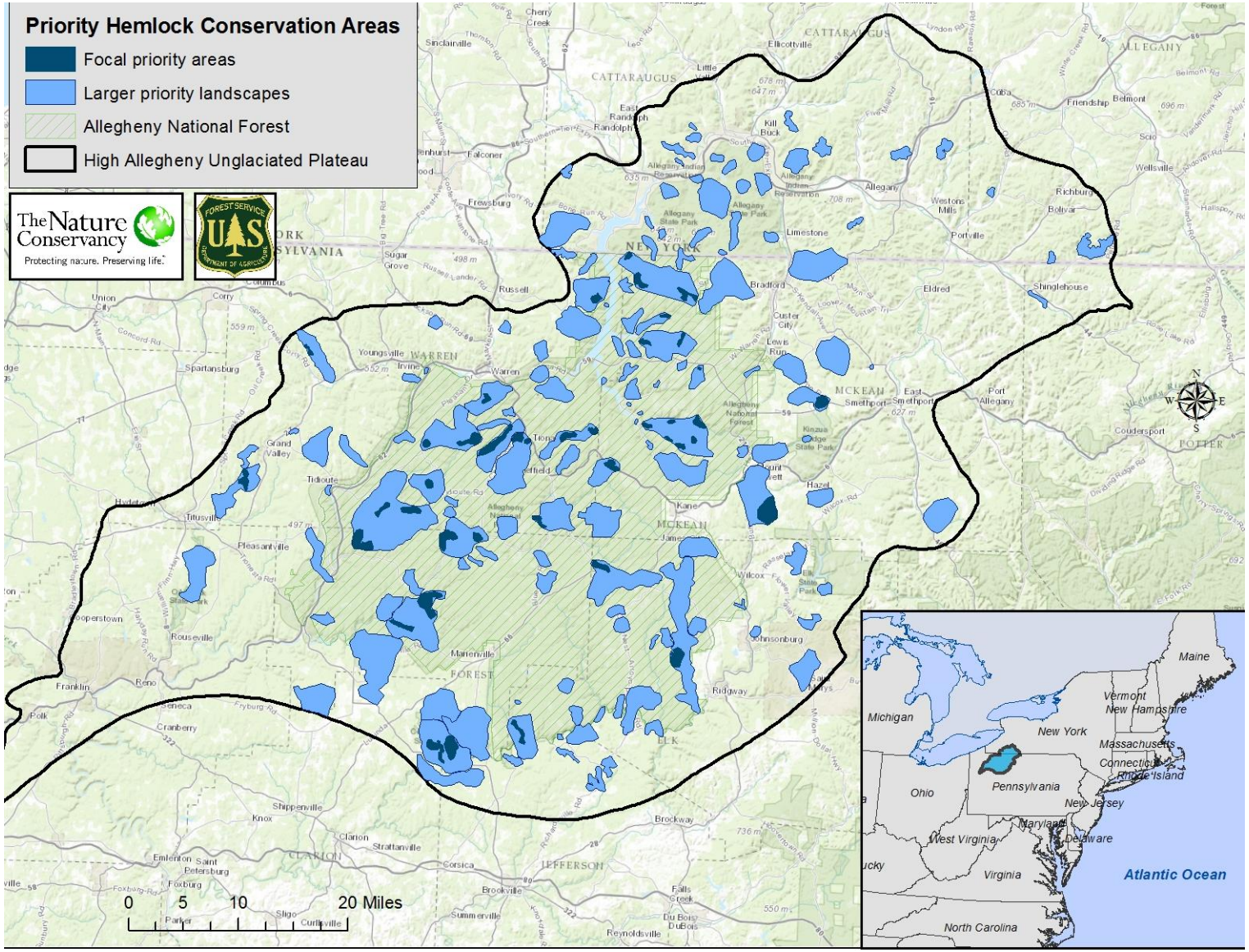


Figure 2. Priority areas for Hemlock conservation.

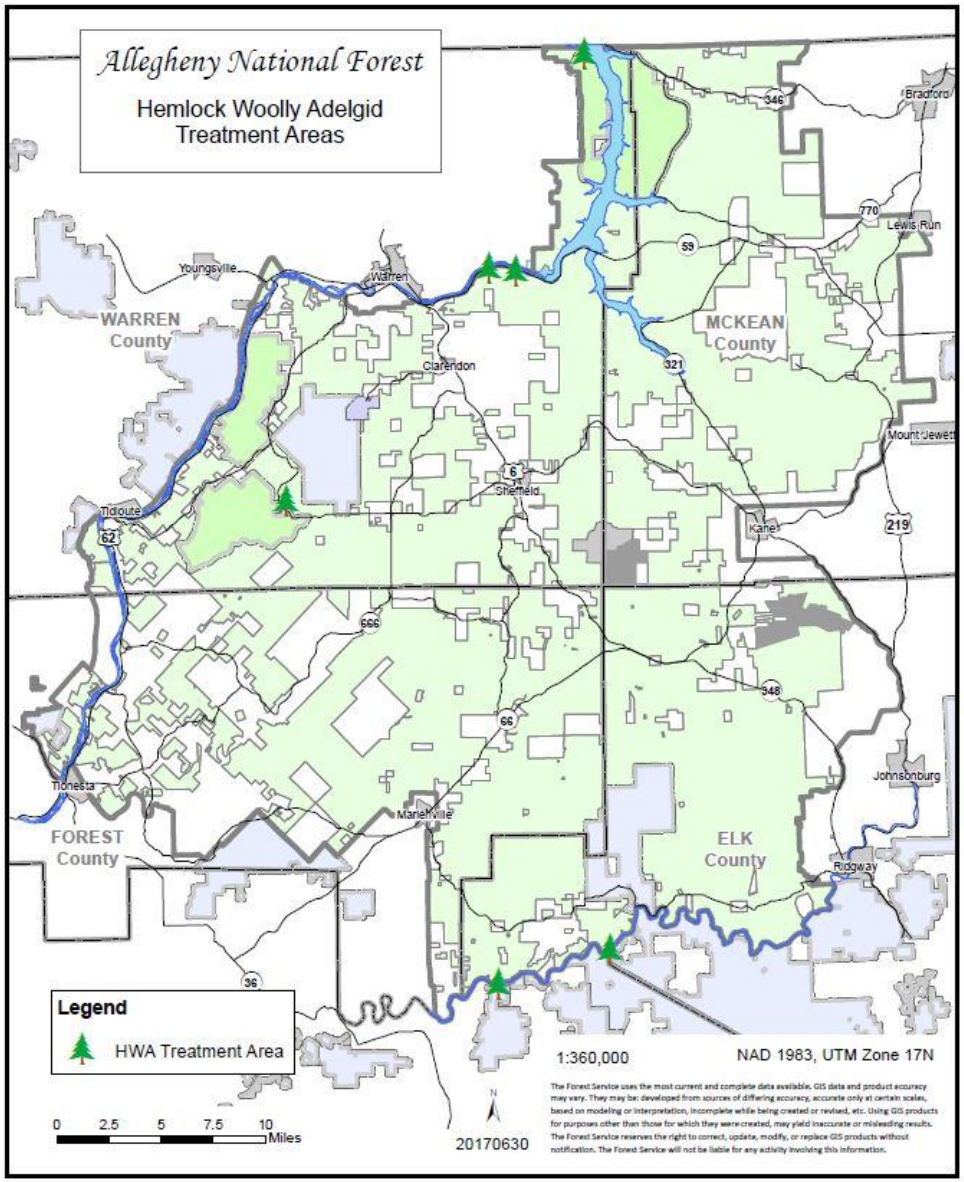


Figure 3. HWA treatment areas for 2016-2017

Table 1. **Species Considerations for Conifer Planting on the ANF**[i]

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Red Spruce *Picea rubens*	Lacking lower limb structure and thermal characteristics of hemlock. Best replacement species for northern flying squirrel, as it supports lichens (bryoria fremontii) required by northern flying squirrel for food and nesting material.	North of PA, and higher elevations in northern Appalachian mountains. Specimens in McKean County	Higher elevation, good moisture regime. Grows well on poor sites, acidic and shallow soils preferred.	Tolerant-Very Tolerant. Long-lived (350-400 years), slow growing.	Browsing occurs, but not preferred browse.	Spruce budworm, eastern spruce beetle, eastern dwarf mistletoe. Potentially sensitive to pollution (sulphur dioxide, nitrogen oxides and ozone).	Suitable habitat projected to occur north of ANF region in climate change models.
White Spruce *Picea glauca*	Retains lower limbs.	North of PA with specimens in a few counties south of the ANF. Planted on the ANF in the past.	Tolerant of wide range of sites in northern North America, from moist to dry, alkaline and acidic.	Intermediate shade tolerance. Long lived (250-300 years)	Not preferred as browse.	Can be susceptible to frost heaving. Seedlings can be damaged by rodents. Spruce budworm. European spruce needleminer. Tomentosus root disease. Various bark and wood boring beetles.	Considered a hardy tree. Strong affinity to local environments. Suitable habitat projected to occur in northern New York state and New England in climate change models.

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Black Spruce *Picea mariana*	Small dbh at maturity, retains lower limbs, shallow rooting.	North of PA with specimens in Tioga County	Moisture regime important, prefers dark brown peat, boggy areas and wet organic soils. Common in swamps or bogs. Pioneer species.	Tolerant. 200 year lifespan typical.	Not preferred as browse.	Eastern dwarf mistletoe, spruce budworm, bud and needle rusts.	Not a large tree, usually planted in pure stands. Suitable habitat projected to occur north of Canadian border in climate change models.
Balsam Fir *Abies balsamea*	Retains Lower Limbs, Fairly small crown area. Provides food and cover for wildlife. Second best species for northern flying squirrel.	Generally north of PA, and higher elevations in Appalachian mountains. Specimens in Warren County	Abundant moisture required, slightly acidic sites.	Very Tolerant. Slow growing, 80 year lifespan typical.	Browsing occurs, but not preferred browse.	Balsam wooly adelgid. Intermediate sensitivity to sulphur dioxide and tolerant of ozone.	Suitable habitat projected to occur north of ANF region in climate change models.

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Pitch Pine *Pinus rigida*	Lacking lower limb structure and thermal characteristics of hemlock.	Native to ANF and surrounding counties.	Dry, low quality sites- poor sandy soils. Mineral soil seedbed essential for regeneration. Pioneer species.	Intolerant. 200 year lifespan typical.	Limited to seedlings and sprouts.	Syrix wood wasp and various wood boring bark beetles.	Very good at surviving injury, has the ability to "green up" after fire or pests. Suited habitat not projected to migrate northward as much as other species in climate change models.
Virginia Pine *Pinus virginiana*	Lacking lower limb structure and thermal characteristics of hemlock.	Generally south of ANF and northern PA. Specimens in Potter County.	Requires well drained sites, prefers poor sandy soils. Mineral soil seedbed essential for regeneration.	Intolerant. 100 year lifespan typical.	Not preferred as browse.	Syrix wood wasp and various wood boring bark beetles. Sensitive to air pollution (ozone). Meadow mouse girdling.	Grows well in old fields, pioneer species, successful competitor. Suitable habitat projected to migrate northward into ANF region in climate change models.
Eastern Redcedar *Juniperus virginiana*	General Bush-like appearance, may lose lower limbs in forest grown areas.	Widely distributed through eastern and Midwestern U.S. Specimens in Forest County, but separate from ANF.	Can grow on a wide variety of conditions, prefers deep, moist, well drained sites. Prefers calacareous soils.	Intolerant-Very Intolerant. 150 year lifespan typical.	Intermediate preference/ Tolerant	Cedar gall. Tolerant of air pollution (sulphur dioxide and hydrogen fluoride).	Pioneer species. Can tolerate drought and temperature extremes. Suitable habitat projected to migrate northward into ANF region in climate change models.

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Red Pine *Pinus resinosa*	Lacking lower limb structure and thermal characteristics of hemlock.	Planted already on ANF, McKean County population. Generally native to counties east of ANF.	Dry sites but will grow on wetter sites.	Intolerant to very-intolerant. 200 year lifespan typical.	Not preferred/ Tolerant	Syrix wood wasp and various wood boring bark beetles. Sensitive to sulphur dioxide but tolerant of ozone.	Pioneer. Usually planted in pure stands. Suitable habitat projected to occur north of ANF region in climate change models.
Northern white-cedar *Thuja occidentalis*	General Bush-like appearance, may lose lower limbs in forest grown areas. Provides an abundance of food in cover for wildlife, especially in winter.	North of PA, mostly into Canada and Northern New England area.	Moist, nutrient rich sites, such as those along streams. Prefers calacareous soils.	Tolerant. Slow-growing, persistent. 300 year lifespan typical.	Preferred/ \ Not Tolerant	Carpenter ants/ Leafminers. Tolerant of sulphur dioxide and ozone.	Can withstand suppression for long time periods. Suitable habitat projected to occur north of Canadian border in climate change models.

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Eastern White Pine *Pinus strobus*	Lacking lower limb structure and thermal characteristics of hemlock.	Native to ANF and surrounding states.	Well drained, drier sites, with coarse textured soils.	Intermediate. 200 year lifespan typical, but can be long-lived (450 years).	Preferred/ Not tolerant.	White pine weevil, syrix wood wasp, white pine blister rust. Sensitive to ozone and sulphur dioxide.	Grows rapidly and is considered an excellent tree for reforestation projects. Suitable habitat projected to migrate northward but still remain ANF region in climate change models (could consider more southerly genotypes).
Shortleaf pine *Pinus echinata*	Lacking lower limb structure and thermal characteristics of hemlock.	South of ANF. Native to ridge and valley region of southeastern PA.	Wide range of sites from dry sites to deep well-drained soils.	Intolerant. 200 year lifespan typical.	Limited to seedlings and sprouts	Syrix wood wasp and various wood boring bark beetles. Intermediate air pollution sensitivity.	Pioneer- competes better on dry sites. Suitable habitat projected to migrate northward into ANF region in climate change models.

Species	Habitat Characteristics	Present Distribution*	Site Requirements	Shade Tolerance/Growth	Deer Palatability/ Browse Tolerance	Pest / Disease/ Pollution Considerations	Other Considerations/Climate Change Projections
Norway spruce *Picea abies*	Conical crown in young trees changing over to a columnar shape with age. Drooping, pendulous branches. Its drooping branching structure make it a potential candidate for planting in areas where the maintenance of shade is highly important such as excellent value streams, riparian areas, and known brook trout streams.	Not considered native to the United States, but widely distributed through plantings across the Eastern and Midwestern United States.	Grows best in cool, humid climates on rich soils but grows well on almost all types of soils. Not suited for dry or nutrient deficient soils or those that are permanently waterlogged	Tolerant. 200 year lifespan but can live up to 300 - 400 years	Not preferred		Can withstand suppression for long time periods. Widely used in reforestation programs in the eastern US. Has shallow rooting system similar to eastern hemlock. Norway spruce needle litter has a similar decay rate to eastern hemlock, possibly preserving some of the ecosystem function of the site.

*Note: Distribution column requires further work to separate indigenous from naturalized species.

[i] References include:

Burns, Russell M., and Barbara H. Honkala, tech. cords. 1990. Silvics of North America: 1. Conifers. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. Vol. 1, 675 p (website: http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/vol1_Table_of_contents.htm)

Latham RE, Beyea J, Benner M, Dunn CA, Fajvan MA, Freed RR, Grund M, Horsley SB, Rhoads AF, Shissler BP. 2005. Managing white-tailed deer in forest habitat from an ecosystem perspective: Pennsylvania Case Study. Report by the Deer Management Forum for Audubon Pennsylvania and Pennsylvania Habitat Alliance. Harrisburg, PA. pp. 53-58

USDA Natural Resources Conservation Service Plants Database (website: http://plants.usda.gov/java/)

USDA Forest Service Climate Change Tree Atlas. Anantha M Prasad, Louis R Iverson, Steve Matthews, Matt Peters. NRS-4151, USDA Forest Service, Northern Research Station, Delaware, Ohio (website: http://www.nrs.fs.fed.us/atlas/tree/tree_atlas.html)

Threats Template Matrix – BLACK CHERRY DECLINE

1. Threat: ***(Description)***

Black cherry health and regeneration in the Allegheny Plateau ecoregion have undergone dramatic changes in the 21st century. Black Cherry is highly valued for its economic and ecological values. It is a significant portion of area tree cover, comprising around 25 percent of the overall basal area on the ANF, for example, and important on the surrounding landscape as well.

Overstory mortality has increased much more in this species than in all other species combined, and many surviving trees have thinning crowns. Hypothesized causes include defoliation by native insects (cherry scallop shell moth and fall webworm), sometimes repeatedly, as well as changes in nutrient inputs from the atmosphere. While not demonstrated, there is reason to be concerned that declining cherry will become increasingly vulnerable to peach bark beetle infestation and associated quality degrade and value loss.

- **Seed production** has become irregular and infrequent, seedling establishment less common, and the health and competitiveness of seedlings has also declined. Hypothesized factors include spotted wing drosophila and pollinator asynchrony affecting seed production, pythium (a root rotting fungus demonstrated to limit cherry seedling establishment near overstory cherry), cherry leaf spot fungal disease of seedlings, changes in nutrient inputs from the atmosphere, and potentially changes in climatic factors.
- The result is that areas with a high proportion of black cherry in the overstory are at risk of **value loss and regeneration failure**. This is especially significant where other overstory species, like ash and beech, are themselves declining. These stands are at risk of very poor regeneration outcomes unless regeneration processes are begun while there is still adequate seed source available.
- Black Cherry from the Allegheny Plateau has historically been recognized as the best cherry in the world and demanded high prices. Since 2010, the values of cherry have declined. **Without strong domestic and international markets** for black cherry, it becomes harder to support the cost of forest management. Improving markets for cherry and all Pennsylvania hardwoods would financially improve options for forest management on the ANF and support a stronger forest products industry in the region as well as improve local communities through the 25% fund.

2. Location: *(Describe and/or display on a map)*

Black cherry has been declining across the High Allegheny Plateau, which includes the ANF and a variety of other ownerships. The areas of highest modeled risk are in the central eastern part of the Forest, which is also where the most recent cherry scallop shell moth defoliations have been most severe.

3. Impact or Severity (How significant is the threat?)

The most recent estimates of mortality in black cherry are more than twice as high as the average mortality in all other species combined (22.5% standing dead trees in black cherry vs. 10.0% in other species based on remeasurements of 92 plots sampled 3 times since 1998). Monitoring on other ownerships has indicated similar results, with continuous forest inventory data collected on the Pennsylvania High Plateau (ANF region) by the Pennsylvania DCNR Bureau of Forestry indicating more than 30 percent of dead black cherry stems were dead in the most recent remeasurement cycle, compared with 17% dead for other species.

Threats Template Matrix – BLACK CHERRY DECLINE

According to the 2016 USDA Forest Inventory Analysis, black cherry represents 11.4% of the standing sawtimber in Pennsylvania – third highest after soft maple (15.2%) and northern red oak (12.8%). With a higher concentration of cherry in northwestern Pennsylvania, cherry decline threatens to become a major financial loss to the local communities, the region, and the state.

Black cherry seed production has also decreased in regularity and abundance, based on assessments of stands sampled in the 70s and at present. While evidence about seedling survival, growth, and competitiveness is more anecdotal, these all appear to sharply decline as well.

4. Desired Outcome:

Sustain high value, diverse, resilient, and well stocked forests on the Allegheny Plateau, that continue to contain a cherry component. Regenerate stands with abundant declining black cherry (and other species such as American beech and ash) in the overstory to a mix of species, featuring red maple, tulip polar, cucumber tree, oaks, hemlock, pine, and birch, while recovering optimal value from black cherry wood for community and industry benefit. Strive to regenerate a black cherry component to the extent possible.

5. Strategies to Achieve the Desired Outcome *(Add more as needed)*

Strategy 1: As ANF focuses on achieving better age class balance in suited Management Areas, prioritize stands with either declining overstory black cherry or abundant healthy black cherry advance regeneration for creating younger age classes with a diversity of high quality hardwood species, while recouping value of existing black cherry value and regenerating black cherry to the extent that is possible.

Apply the following definitions for successful regeneration:

- Desirable Outcome = >70% stocking with “preferred” species; cherry, oaks, maples, tulip, cucumber, hemlock, pine, etc.
- Acceptable Outcome = >70% stocking with “commercial” species; this adds birch into the mix.
- The amount of birch that is acceptable can be analyzed by the site quality, and the pre-existing conditions of the mature overstory when the regeneration process began.

When: As soon as possible

Who: ANF and collaborative participants

Cost: If completed while majority of black cherry is alive, should be profitable, even at lower cherry prices

Strategy 2: Develop adaptive silvicultural Decision Guides for more effectively regenerating forest stands with declining overstories. Emphasize retaining a component of black cherry in the regen to the extent feasible through adaptive management**.** While it is notoriously difficult to project future timber values, that of black cherry has been consistently high and it is the signature species of our region and our commonwealth. Black cherry also has very high wildlife values.

- Develop adaptive regeneration strategies for various forest types/overstory conditions- decision charts with trigger points/range of conditions for treatment selection.

Threats Template Matrix – BLACK CHERRY DECLINE
• Incorporate strategic approach to packaging herbicide treatments and overstory removals to optimize contractor participation and reduce overall costs • Implement structured program to monitor (adaptive) prescription effectiveness in achieving broad forest plan desired conditions, sustaining healthy forests, and achieving stand level objectives. • Collaborate with partners in the forest health collaborative on this task. Current strategies for adaptive management to retain black cherry in regenerating stands include NPK fertilization of stands with a significant cherry component after overstory removal and lower residual densities after shelterwood seed cuts. Develop a communication strategy for regularly sharing success stories.
When: Begin immediately
Who: ANF, collaborative participants (especially PA DCNR Bureau of Forestry), and research scientists.
Cost: $50,000/year for 5 years; includes regular meetings of cooperating foresters and scientists; formal and informal research studies.
Strategy 3: Develop adaptive, innovative strategies for understory treatment (weight-scaled biomass sales, for example, where an understory of beech and or birch is interfering with mixed species regeneration establishment and growth) and develop management guidelines for various proportions of birch in regenerated stands where other seed source is not available.
When: Begin immediately
Who: May require partnerships with industry and state to certify weight-scaling and implement some test stands. ANF collaboratively develop management guidelines with NRS scientists, State agency, and industry staff.
Cost:
Strategy 4: Work with the Northern Research Station, State and Private Forestry, and university cooperators to sustain a research-management partnership to understand black cherry stressors and test adaptive management strategies. Develop short and long term research strategies focused on understanding current black cherry health and regeneration challenges on the Allegheny Plateau. These could include collaborative approaches to better understand black cherry interaction with pythium fungus, cherry leaf spot, and spotted wing drosophila. There is a need to better understand the impact and relative abundance of fungal pathogens (cherry leaf spot, Pythium) in stands with different overstory cherry densities and differing environmental and soil chemical conditions.

Threats Template Matrix – BLACK CHERRY DECLINE
Continue the dominance probability study initiated by NRS in 2013 to follow competitive status of different species of seedlings; Install several new blocks of that study with smaller seedlings.
When: Begin immediately
Who: ANF, collaborative participants (especially PA DCNR Bureau of Forestry), Northern Research Station, Northeastern Area State & Private Forestry, university cooperators, granting agencies
Cost: From multiple partners (not just ANF) $3 million/year
Strategy 5: Develop a flexible planning/NEPA process that allows rapid response when new hot spots of decline or mortality occur, or when abundant healthy advance regeneration is found. Options may include categorical exclusions and newer Farm Bill categorical exclusions (for insect and disease treatment and regeneration), or perhaps more programmatic approaches.
When: Within six months.
Who: ANF
Cost:
Strategy 6: Develop a marketing program for black cherry at the regional, state, national, and international levels that includes participation in consumer based trade shows, home builder shows, and architect/design shows or seminars. With increased consumer demand for cherry domestically and internationally, the values of cherry will improve.
When: Immediately
Who: Pennsylvania Hardwoods Development Council, Allegheny Hardwood Utilization Group, Keystone Wood Products Association, Northern Tier Hardwood Association, and Regional and state forest product companies
Cost:
6. Monitoring Strategies *(Add more as needed)*
Strategy 1: Continue to monitor Forest Health Plots with high proportions of black cherry, including monitoring of crown health, peach bark beetle, and regeneration.

Threats Template Matrix – BLACK CHERRY DECLINE
When/Frequency: Five-year intervals would imply next cycle of remeasurement to begin in 2019
Who: University partners with State and Private Forestry Forest Health Program funding. There is a need to identify a new principle investigator for this work to continue, starting in 2018.
Cost: $25,000 year for three years.
Strategy 2: Develop systematic monitoring approach on the Allegheny Plateau for more closely monitoring insect and disease trends (more intensive than FHM plot network), including monitoring of defoliation events. Include analyses to detect correlations among stressors and relationships to predict vulnerability and sustainability, such as age of stands, site factors, etc. Establish all lands network for monitoring and consider development of drone technology for aerial surveillance. Continue collaboration with the U.S. Forest Service Forest Health Technology Enterprise Team (FHTET) on use of satellite imagery and remote sensing (e.g. FORWARN and Forest Disturbance Mapper) for monitoring forest canopy health and disturbances.
When/Frequency: Annually and as needed during defoliator outbreaks
Who: ANF, NRS, S&PF, State and larger landowner partners.
Cost: $15,000 per year for one monitoring technician and 15,000 per year for traditional aerial surveillance.
7. Additional Information Needs: Continued monitoring of dominance probability study initiated by NRS in 2013 to follow competitive status of different species of seedlings; Installation of several new blocks of that study with smaller seedlings. Also need study to understand the impact and relative abundance of fungal pathogens (cherry leaf spot, Pythium) in stands with different overstory cherry densities and differing environmental and soil chemical conditions.
8. Other:

Threats Template Matrix- Insects and diseases

1. Threat: *(Description)*
Non-native invasive (and some native) insects and diseases impacting native trees, causing decline and mortality and leading to undesirable successional trajectories and loss of biodiversity.

2. Location: *(Describe and/or display on a map)*
Throughout Allegheny National Forest and region

3. Impact or Severity *(How significant is the threat?)*
Severity has been and can be very high, but ranges depending on host/damage casual agent relationship

4. Desired Outcome:
Maintenance of native biodiversity and resilience by protection of native trees, breeding resistant native trees, and accomplishing diverse and vigorous regeneration through silvicultural operations.

5. Strategies to Achieve the Desired Outcome *(Add more as needed)*

Strategy 1: Decision Tree for Response to Non-Native Forest Insects & Diseases

Create a Threat Response Decision Tree that includes prioritization of sites and strategies. Framework that could be applied to any non-native invasive insect or disease to determine best course of action, or best location to take which action among the available strategies – maybe just a list of questions that could be asked anytime a new invasive is faced. E.g., How much of the host is there ANF-wide and in what configuration; how much mortality is expected in the next 10 years ANF-wide; how much ecological value of host species; how much social/economic value of host species; is effective chemical control available; is effective biocontrol available; is there potential for resistance. Each question would lead to "do something in the short term", "wait and monitor" or "focus on longer term solutions" such as genetic conservation. No pest should be addressed with only one strategy, IPM should be the goal (see strategy 3). Ideally, the Threat Response Decision Tree would aid prioritization – both prioritization of actions and prioritization of locations. As another way of considering action steps, a general list of steps/guidelines to follow might be: 1) identify priority locations for protection as well as high-risk locations, 2) monitor for insect/disease in high-risk locations to undertake EDRR, 3) once EDRR no longer makes sense in priority locations, use controls strategies such as chemical and biological, if appropriate, in priority areas only, 4) continue with longer term monitoring to determine landscape-scale effects of insect/disease (adapted from ANF/Partnership Hemlock Conservation work, eastern hemlock and HWA). Of course with each of these steps, various considerations would require deviation depending on the particular insect or disease. For many of the insects/diseases of concern, EDRR already does not make sense. For others, priority locations are dictated more by risk than by eco/social values provided. Seed collection would be efficacious with any host of a non-native invasive insect or disease, and trees that pose a public hazard must be dealt with no matter what the host/agent.

Threats Template Matrix- Insects and diseases
Synergy with other groups – Age class diversity group concerned with increasing stand resilience, diversity group concerned with increasing native diversity; these actions, using identified strategies (silvicultural, management of invasive plants, etc), will possibly protect against future unknown invasives. NEPA rapid-response framework, categorical exclusion for response to black cherry decline, could assist with decreasing response time to other non-native invasive insects and diseases.
When: develop draft Threat Response Decision Tree by spring 2018?
Who: Allegheny National Forest staff, with collaborative input
Cost: Staff time, travel to collaborative meetings
Considerations/ Information needed: Input from all collaborators would be desirable, however would collaborators be willing to extend partnership work to develop a decision tree?
Strategy 2: Monitoring & Surveys Including permanent intensive FIA Forest Health plots, general surveys – ground and aerial, and targeted surveys (trapping) for early detection. Also useful are remote sensing tools such as ForWarn forest disturbance model, and infrared satellite imagery, tools such as NDVI, etc. Surveys and monitoring will drive adaptive management, and information collected will feed into the Threat Response Decision Tree detailed in Strategy 1. Current efforts: BOF general hemlock survey, aerial survey for cherry scallopshell moth defoliation (could use flights for more than just CSSM), FIA plot network including Forest Health monitoring plots, Permanent Hemlock Condition Monitoring plot network including plots on adjacent partner lands Synergy with existing permanent plot networks for hemlock condition monitoring, FIA FH plots – already established permanent plots may provide locations for collection of more intensive forest health data
When: Once yearly for most general surveys, once per 3-5 years for permanent plot networks, as needed for trapping
Who: Forest Service staff (ANF and State & Private), BOF staff, citizen scientists (use of apps such as iMapInvasives, Collector, etc)
Cost: Forest Service (FIA) staff time; BOF Forest Health staff time for general hemlock survey and leading edge HWA/EHS survey; as a guide, contractual cost for 82 permanent hemlock plots to be established and surveyed was ~$19,000 (Forecon, Inc)
Considerations/ Information needed: Need to consider priority NNI species for survey of presence/absence or damage in a given year, and priority tree or shrub species for survey of health. Need to consider the frequency and timing of re-visitation (e.g., yearly in late July/early August during CSSM outbreak; once every 2 or 3 years for hemlock health/condition monitoring, etc).

Threats Template Matrix- Insects and diseases
Strategy 3: Integrated Pest Management 1) Prevention 2) Early Detection-Rapid Response 3) Cultural controls – cleaning clothing & equipment, operating during non-sensitive times, Don't Move Firewood 4) Chemical – insecticides, fungicides 5) Biological – classical and native, once pest populations are high enough to support biocontrol populations 6) Silvicultural – thinnings, salvage and pre-salvage 7) Tree Breeding – seed collection for genetic conservation and planting out, finding resistant/tolerant/lingering trees
When: Ongoing, depending on insect or disease
Who: Forest Service (ANF, NRS, S&P) and public and private partners (including outreach efforts, surveys and monitoring, thinning and salvaging, and use of chemical and biological controls on various hosts/insects & disease. Also includes seed collection and breeding efforts for American beech, ash, and hemlock, etc)
Cost: ????
Considerations/ Information needed: Research for some aspects of IPM needed for certain host/insect & disease interactions, for example: how long does it take overstory American beech trees to die as a result of Beech Leaf Disease?

Threats Template Matrix- Non-native Invasive Plants

1. Threat: *(Description)*

Non-native invasive plants pose threats to native plants, wildlife, and ecological function across the ANF. Invasive plants are a serious impediment to obtaining desirable tree regeneration and can compromise stream health along riparian areas. Large expanses of invasions may also impact recreational opportunities. The most pervasive invasive plants on the ANF include, but are not limited to, glossy buckthorn, multiflora rose and Japanese barberry in forest interiors; Japanese stiltgrass along trails/roadways, rights-of-ways, and other disturbed areas; and Japanese knotweed along streamsides. Additional species of concern in or on properties surrounding the ANF include bush honey suckles, crown vetch, canary reed grass, purple loosestrife, and goat's rue.

2. Location: *(Describe and/or display on a map)*

Areas of high concentrations of invasive plants, and particularly glossy buckthorn, multiflora rose, and Japanese knotweed have been mapped (and prioritized ?) by ANF. Glossy buckthorn predominates across thousands of acres of the southeast portion of the forest (including the Marienville district), while multiflora rose predominates on the western portion of the forest. Japanese knotweed is pervasive along the Allegheny River and tributaries on the northern portion of the forest.

3. Impact or Severity *(How significant is the threat?)*

Non-native invasive plants are notably limiting recruitment of native plants and trees across the ANF. This is highly problematic in areas where gap openings from harvesting or natural disturbance, including mortality from non-native insects and pathogen, are occurring. Non-native invasive shrubs have also been documented to reduce nesting success of many bird species, and berries from non-native species are of lower nutritional value than native plants such as Rubus spp. Much of the riparian areas in the Allegheny River watershed, in and surrounding the ANF, are choked with knotweed and lack any other vegetative cover. Lack of management of non-native invasive plants in the last decade has led to major infestations (over thousands of acres) which will take coordinated effort to control and keep in check. Impacts are also likely to increase where human activity and disturbance will occur in the future.

4. Desired Outcome:

The desired outcome for invasive plant management would be to reduce established populations significantly enough to allow for native herbaceous and woody plants to re-establish and thrive. Complete eradication is unlikely except at very small spatial scales or over a long time-frame. Several strategies should be employed to limit new introductions of non-native invasive in areas where they are not currently found.

Threats Template Matrix- Non-native Invasive Plants
5. Strategies to Achieve the Desired Outcome *(Add more as needed)*
Strategy 1: Treatments for large-scale infestations: a. Herbicides are likely to be the most effective treatment method, but can be used in conjunction with mechanical treatments, Generally, shrub species can be treated by foliar herbicide application, or 'hack and squirt' for individual stems, or by 'cut stump' treatments. For large acreages, foliar application with a mist blower may be most efficient, but directed sprays may be needed in areas where native plants or seedbank is present and should be maintained. Mechanical 'mowing' using a brush hog or Gyrotract, followed by herbicide to cut stumps, may also be appropriate on areas amenable to machinery. (See note below about using cut materials for chips if the market develops). Effective treatments for Japanese knotweed includes early season cutting followed by foliar herbicide treatment in late Summer, using herbicides with aquatic labeling. Pre-emergent herbicides are effective for stiltgrass seed bank. b. Biocontrol's- rose rosette for multiflora rose; and others as they develop. There may be some emerging biocontrols for buckthorn c. Mechanical treatments alone are often ineffective for woody invasives that resprout, but can be used as a maintenance tool for low level populations, or where herbicide use may be limited d. Cultural- goats, burning. Goats may be useful as a maintenance tool but not complete eradication. Also make for good PR. Note: prioritization of treatment areas will be key to controlling invasive plants across the landscape. Areas with only moderate infestations may be easier to control than larger infestations, but require more time to move from site to site and may require more directed spray or individual stem treatment than a broadcast application or mechanical treatment.
When: 2017-2020 Priority treatment areas should be considered in conjunction with harvest operation schedules as well, to time understory vegetation management with promotion of desirable tree regeneration.
Who: ANF/ contract sprayers
Cost: $150-$250/ acre
Strategy 2: Early Detection and Rapid Response: a. Incorporate into programatic NEPA. This strategy in combination with monitoring will be most effective in limiting the establishment of small populations of non-native invasive plants in new areas (see more under 6. Monitoring)
When: 2018?
Who: ANF staff, natural resource contractors

Threats Template Matrix- Non-native Invasive Plants
Cost
Strategy 3: Limiting and preventing spread: a. Promote Best Management Practices among natural resource industry and employees for limiting the introduction of non-native invasive plants to new areas is to clean equipment (and clothing) when moving from site to site, and using designated native seed mixes for reseeding ROW's, log landings, well pads, etc. Similar guidance for BMP's could be suggested for Penn Dot when mowing. Keep up to date on new BMP's for Invasive Plants, new seed mixes, herbicides in PA and learn from other states b. Work with Penn Dot and other mowing crews to clean equipment, c. Also work with recreation groups to limit spread on hiking and ATV trails
When: 2018?
Who: ANF staff, natural resource contractors
Cost:
Strategy 4: Restoration: Once invasive plants have been controlled to suitable levels (see Additional information needs below), establishment of native plants need to occur rather quickly to prevent re-infestations or establishment of other non-native plants. For example, Japanese stiltgrass commonly invades barren areas where Japanese knotweed was treated and controlled. In forested areas, measures such as deer fencing, vegetation management of native problem plants and appropriate silvicultural methods to promote desirable tree regeneration should be used. In riparian areas and rights of ways, promoting natural herbaceous regeneration, or seeding in with native herbaceous seed mixes can be used to quickly establish vegetation. Consider specific regional species mixes, for example that could be designed for the Allegheny Plateau or mixes that consider shifting species migrations with climate change.
When: Varies site to site, depending on level of control
Who: ANF staff, contractors?, possibly volunteer groups
Cost: Varies by seed mix from $11-$20/lb, and suggested rates of application are 75 lb/ac.
6. Monitoring Strategies
Strategy 1: Utilizing natural resource employees including staff foresters, as well tenders and ROW workers, to monitor areas used for natural resource development or extraction. Develop an easy checklist for top species of concern (this could be combined with monitoring for forest pests such as Hemlock Wooly Adelgid). Might be combined with the "rapid response" treatments of EDRR if some workers also certified pesticide applicators.
When/Frequency: during routine inspection

Threats Template Matrix- Non-native Invasive Plants
Who: ANF Staff, Well tenders, line workers, and other contractors
Cost:
Strategy 2: Utilizing volunteer groups and organizations for monitoring recreational areas and hiking trails
When/Frequency: 2018-2019; 2-3 times through growing season
Who: Trail groups, hiking clubs, bird clubs, Trout Unlimited, ATV/bike clubs, and volunteer citizens.
Cost: low to none
7. **Education and Outreach:** Utilize and work with Allegheny Plateau Invasive Plant Management Area (APIPMA) cooperative for education and training of volunteer network, natural resource workers, recreation groups to ID and map invasive (utilizing iMapsInvasive and/or iNaturalist) on the ANF. APIPMA is currently applying for funding for volunteer training for 2018-2019. Other educational topic areas include but are not limited to prevention, limiting movement of soil/ road construction, updates on new herbicides. Also Consider signage, boot cleaning stations, etc in recreational areas.
8. Additional Information Needs: Complete eradication of invasive plants across the ANF is costly, labor intensive, and likely unachievable. Little research and scientific literature is available (?) to provide guidelines on when non-native invasive plant cover or densities are low enough that native plants may establish and outcompete invasives (though that threshold is likely very, very low). It will be important to understand the most effective timing for promoting native plant establishment (either naturally or by planting) following treatment of invasive species.
9. Other: In other parts of the country, trials to incorporate invasive plant control with timber harvesting operations have occurred. This includes mechanically cutting shrubby and woody non-native invasive plants concurrently with overstory tree removals. Understory woody material is piled and chipped on site, and chips transported and used for fuel at nearby plants. This has worked well for privet in the Southeastern United States. This may be a consideration for the future with management of buckthorn and multi-flora rose.

6. Composite Strategy Table

The following pages contain a composite grouping of the strategies that were developed by the members of the ANF Forest Health Collaborative during their September 7, 2017 meeting. This description and organization of the table is as follows:

1. A colored band contains the heading for each set of Composite Strategies. The color of the band reflects the following:
   - Deepest green for the ones that seemed to have the most support and highest level urgency.
   - Lighter green for next level.
   - Yellow (one) for very high level support and urgency, yet included a "don't".
   - Orange for lower support and less urgency.
   - Pale red for lowest support, urgency, and multiple don'ts.
2. The Row immediately beneath the color band contains one or more strategies (i.e. the "composite strategies"). During the meeting, participants worked together to organize and group (when appropriate) the various strategies that had been developed by individual threat working groups. Each set of composite strategies contains 1 to 6 strategies, and there are a total of 15 composite groups labeled "Composite Strategies A through O". To group these, the participants were tasked to look for overlap and sameness in strategies, and then group any that were similar.
3. The row entitled: Organizational Support represents a composite scoring. Each organization selected one of the following responses to indicate their organization's support with each set of composite strategies.
   - Green: My organization supports this composite grouping of strategies
   - Blue: My organization supports this with caution composite grouping of strategies
   - Red: My organization does not support this composite grouping of strategies
4. The row entitled: "Sense of Urgency" represents the second composite scoring. Each organization selected one of the following responses to indicate their organization's sense of overall urgency with each set of composite strategies.
   - MUST: Essential, Compelling, Necessary
   - SHOULD: Out to or Need to
   - COULD: Desirable, Nice to do
   - WOULD: Can be postponed for consideration later
   - DON'T: Do not do

Prioritization was done for each of the composite groups of strategies via a two-phased prioritization process. The first phase focused on the overall level of support and comfort for each composite grouping. After this first scoring phase was completed, each composite grouping was revisited, and any organization that scored a blue or red (see description below) could offer their explanation, share their cautions and concerns, or ask a question with the full group. These comments were captured on the flipcharts. The second phase of prioritization indicated an organization's sense of urgency for the composite grouping. The following table of Composite Strategies are organized to reflect the combination of comfort/support and urgency, listing the most comfortable, supportive and urgent at the beginning.

Composite Strategies A	Composite Strategies B	Composite Strategies C
Diversity: Create and maintain resilient forests (age and structural diversity, carbon storage, climate change refugia, RTE species, low-impact harvesting operations, adaptive management, invasives, species shifts…) **Age class**: Silvicultural prescriptions should define outcomes as desirable (greater than 70% desirable species and acceptable (greater than 70% commercial species). Need a decision chart. **Age class:** Limit intermediate harvests and focus on regeneration and shelterwood efforts (especially low hanging fruit) **Black cherry:** Collaboratively develop adaptive silvicultural guides to regenerate stands with declining overstories including black cherry regeneration.	**Black cherry:** Develop and sustain short and long-term research strategies to understand and manage black cherry health and regeneration challenges and test adaptive management strategies.	**Black Cherry:** Develop a flexible planning/NEPA process that allows for rapid response to address: - cherry decline - mortality - regen opportunities - insect infestations (native or invasive) - * plant (invasives) **Invasive Insects and Disease:** Create threat response decision tree - NEPA/flexible process - Prioritization plans **Invasive Plants:** Early Detection and Rapid Response - Programmatic NEPA - Using Contractors to Monitor - Citizen Scientists **Safety**: Address threat of dead + dying trees on new + existing corridors + public access sites/right-of-ways. - Rapid response-streamlined NEPA
Organizational Support: Green : 30 Blue: 0 Red: 0	**Organizational Support:** Green: 25 Blue: 0 Red: 0	**Organizational Support:** Green: 26 Blue: 1 Red: 0
Sense of Urgency: Must: 25 Should: 0 Could: 0 Would: 0 Don't: 0	**Sense of Urgency:** Must: 20 Should: 2 (expand to more species) Could: 2 Would: 0 Don't: 0	**Sense of Urgency:** Must: 21 Should: 5 Could: 1 Would: 0 Don't: 0

Composite Strategies D	Composite Strategies E	Composite Strategies F
Invasive Insects and Diseases: Integrated pest management approach: (Prevention, EDRR, Cultural control and BPM's, Chemical control, Biological control, Genetics/tree breeding, Silviculture) **EAB:** Biological control (parasitoids) **Invasive Plants**: Treatments for large scale infestations - Mechanical - Chemical - Biocontrol - Cultural (burning) **Invasive Plants:** Limiting and preventing the spread of invasive plants. **Hemlock**: Use of biocontrols for HW in areas where there is enough HWA to support beetles .Could be done in same areas as chemical treatments. **Hemlock:** Preventative chemical treatment of priority hemlock conservation areas. EDRR treatments in critical habitat or recreation areas where small HWA may be detected. - EV streams - HQ streams - CWF streams	**Hemlock:** Maintaining and enhancing resiliency of understory to HWA disturbance. - Monitoring and control of invasive plants - Re-planting and underplanting in priority stands with native eastern hemlock, evergreen shrubs or surrogate conifer species. - Clarify that Norway spruce is a last resort. - Large water bodies- look at strong pines for future raptors and thermal cover. - Small headwaters- look for conifers with low limb structures and food value **Diversity:** Supplemental planting research (similar benefits) **Invasive plants:** Reforestation post-treatment - Replanting with natives - Natural regeneration **Black cherry:** Develop adaptive innovative strategies for understory treatment.	**Invasive Insects and Diseases:** Monitoring program: - Permanent forest health plots - General surveys (Ground & Aerial) - Targeted surveys (traps, species specific) - EDRR - Citizen science - Forwarn/Disturbance Mapper **EAB Strategy:** Lingering Ash (Beech, others…) Tolerant ash identification → Looking for ash that are alive with a healthy crown **Invasive Plants Strategy:** Monitoring: - Utilize forest users to monitor for invasive plant species **EAB Strategy:** Ongoing monitoring of Ash plots **Diversity – Monitoring:** Share data across agencies with permanent study plots **Diversity – Monitoring:** Citizen scientists to track invasive plant locations and spread
Organizational Support Green: 30 Blue: 0 Red: 0	**Organizational Support:** Green: 25 Blue: 3 Red: 0	**Organizational Support:** Green: 28 Blue: 1 - Spend resources on monitoring or just acknowledge cyclical nature of disease and regeneration Red: 0
Sense of Urgency: Must: 15 Should: 11 Could: 0 Would: 0 Don't: 0	**Sense of Urgency:** Must: 11 Should: 13 Could: 1 Would: 0 Don't: 0	**Sense of Urgency:** Must: 5 Should: 14 Could: 6 Would: 1 Don't: 0

Composite Strategies G	Composite Strategies H	Composite Strategies I
Safety: Prioritize hazard tree removal on all roads accessible to the public including: - US, State, town - Forest Service - Seasonal use – hunting rec., etc.	**Safety:** Prioritize remaining multi-model corridors + public access sites on the ANF - Trails - Campgrounds - Etc.	**Safety:** Provide aid and education to private landowners for hazard tree removal on private property within ANF proclamation boundary along multi-modal corridors linked to public land. Research good neighbor authority, working with trail groups, liability, existing programs, etc.
Organizational Support: Green: 24 Blue: 1 - Who is going to do the work? - Liability? Red: 0	**Organizational Support:** Green: 21 Blue: 5 - Liability once hazards are identified - What is the prioritization process? And liability? Red: 0	**Organizational Support:** Green: 20 Blue: 9 - Who is going to do this and pay for it? Red: 0
Sense of Urgency: Must: 2 Should: 15 Could: 7 Would: 0 Don't: 0	**Sense of Urgency:** Must: 3 Should: 15 Could: 6 Would: 0 Don't: 0	**Sense of Urgency:** Must: 1 Should: 2 Could: 19 Would: 5 Don't: 0

Composite Strategies J	Composite Strategies K	Composite Strategies L
Age Class: Define rotation ages (by forest type and Management Area) and create models to balance age class (define annual harvest goals by acres) **EAB:** Expedite pre-mortality timber harvest **Age Class:** Develop area control model for all suitable Management Areas with decadal regeneration requirements. **Black Cherry:** Focus on achieving age class balance in areas with black cherry for regeneration and/or declining black cherry overstory **Diversity**: Manage for younger forests (structural and age diversity)	**Black Cherry**: Optimize black cherry (all hardwoods?) markets – increase value	**Age Class:** Develop local contractor pool: - Loggers - Herbicide applicators - Private forest consultants - Other professionals, for example, Environmental Assessments (Good Neighbor?)
Organizational Support: Green: 28 - Fix age-class in <u>all</u> Management Areas that allow timber harvest Blue: 0 Red: 1* *MA 8.2, MA 5.2, MA 7.2, etc.	**Organizational Support:** Green: 17 Blue: 7 - Connotes placing value of black cherry above anything else – broader array of species Red: 0	**Organizational Support:** Green: 22 Blue: 5 - <u>Who</u>?? Private Sector? - Develop "list" → has to be maintained and agency is <u>responsible</u> for their actions - Is the <u>role</u> of the ANF and Collaborative to develop skilled labor? - Is this really a <u>critical need</u> to accomplish forest health goals? - Existing contractors (service) are maxed out - Provide stability of demand so people want to do this work Red: 0
Sense of Urgency: Must: 25 Should: 0 Could: 0 Would: 0 Don't: 1* * MA 8.2, MA 5.2, MA 7.2, etc.	**Sense of Urgency:** Must: 0 Should: 11 Could: 6 Would: 6 Don't: 1	**Sense of Urgency:** Must: 0 Should: 14 Could: 8 Would: 5 Don't: 1

Composite Strategies M	Composite Strategies N	Composite Strategies O
Safety: Increase public awareness and involvement - Reporting app - Unsafe areas - Firewood harvest areas	**Diversity**: Ecosystem Services – common denominator for valuation; demonstrating diverse values to stakeholders	**Diversity**: Hire (or re-assign?) forest health biologists to respond to the future (as yet unknown) risks (Integrative point person)
Organizational Support: Green: 13 Blue: 15 - Investment in training in apps - When you get information, how do you respond? - Awareness vs. participation - Liability → safe areas Red: 1 - $$ to deal with identified hazards	**Organizational Support:** Green: 10 Blue: 9 - Ecosystem services $ is constantly changing - Not a top priority - Valuation is subjective Red: 1	**Organizational Support:** Green: 7 Blue: 10 - Power across agencies and expertise → need diversity of ideas - Do we need a point person (one) - Use $$ to get work done on the ground - ++Is this at expense of another program area? - This is all of our emphasis moving forward Red: 9
Sense of Urgency: Must: 1 Should: 4 Could: 15 Would: 2 Don't: 2	**Sense of Urgency:** Must: 0 Should: 1 Could: 15 Would: 6 Don't: 2	**Sense of Urgency:** Must: 0 Should: 0 Could: 5 Would: 5 Don't: 16

7. ANF Composite Strategies Response

Composite Strategies A, J:

- **A – Sustaining Forest Resilience**
- **J – Improving Age Class Balance**

Overview:

Vegetation management on the ANF has been more focused on regeneration. Implementation of recent decisions will move the ANF towards structural objectives outlined in the Forest Plan.

What We Have Done:

Projects, like Salmon East, Bradford Emerald Ash Borer Remediation, Bradford Restoration and Farnsworth, have prioritized treatments in areas with substantial forest health concerns, and proposed regeneration treatments with the intent of creating early structural habitat that is both more diverse and resilient than the existing communities. These treatments, combined with other previously approved regeneration treatments, will be moving the ANF towards structural objectives outlined in the Forest Plan.

Currently, existing early structural vegetation (Table 1) comprises 3.4% of forest vegetation on the ANF (USDA-FS 2014, pg. 120), compared to a Forest Plan objective of 8% (USDA –FS 2007a, page 11 and 19).

Table 1. Allegheny National Forest Existing Early Structural Vegetation (7/14/17)

MA[1]	Description	Acres	LRMP Objective 0-20 Year-old Forest (Percent)	Actual 0-20 Year-old Forest (acres)	Percent of MA 0-20 years old
1.0	Early Structural Habitat	7,937	20-40%	130	1.6%
2.1	Uneven-aged Management	2,837		12	0.4%
2.2	Late Structural Linkages	121,176	4-6% Oak, 2-4% non-oak	1,858	1.5%
3.0	Even-aged Management	287,380	10-12%	14,443	5.0%
6.1	Late Structural Habitat	16,421	6-7%	161	1.0%
	ANF Total	**506,474**	**8%**	**17,376**	**3.4%**

Regeneration harvest prescriptions underway

- Approximately 33,365 acres approved for regeneration
- 13,420 acres of regeneration harvests in projects being analyzed.

[1] The five Management Areas (MA) suited for scheduled timber production (435,751 acres or 86% of the ANF)

Early structural vegetation (0-20 years old) on the ANF

- Currently 3.4%
- Previously approved projects will sustain 4.5 to 6% over the next 20 years.
- Projects being analyzed and previously approved projects together are projected to sustain 5.3 to 8.8% over the next 20 years.
- Projects currently being analyzed are focused on forest health and stand regeneration, and will contribute towards sustained early structural vegetation.

Additional actions that are in line with some of the other identified strategies

- The Bradford Emerald Ash Borer Remediation EA included 3,232 acres of treatments in areas with substantial concentrations of ash. Treatments were prioritized to focus ANF resources on the most operable, accessible, and heaviest concentrations of ash. Greater Stickney included 3,841 acres of treatments, and many of these areas contained a substantial component of ash.
- A professional forestry services contract, to increase the Forest's silvicultural capacity, was awarded to two private consulting groups in the spring of 2017.
- Staff have been considering site characteristics and treatment history, as well as desirable and acceptable outcomes when making decisions concerning removals.

What We Are Doing:

- Areas with high concentrations of black cherry to the north and west of Kane that have experienced multiple CSSM defoliations have been prioritized; 16,048 acres of common stand exams have been awarded, and these areas will be included in upcoming projects.
- Future vegetation management projects will continue to limit intermediate harvests and focus on regeneration in an effort to move each project area towards the desired future conditions outlined in the Forest Plan.
- The ANF would like collaborative efforts to continue, particularly with the development of rotation ages and area control models for suitable management areas. These concepts may become integrated into next ANF Forest Planning efforts.
- The ANF would like to establish a collaborative working group to develop, monitor, and share information on adaptive silvicultural guidelines to regenerate declining stands.

Future Considerations:

Project development, analysis, and implementation are only pieces of the puzzle. We need to improve our efficiency in other areas, e.g. consultation with other agencies such as the State Historic Preservation Office and US Fish and Wildlife Service, as these also affect project timelines; and because structural changes are ephemeral, we need to be consistent in our planning to sustain an even flow of early structural vegetation–year after year after year...

We also need to continue investigate emerging tools, like the Good Neighbor Authority. Do our neighbors have the capacity to assist? And do we have the capacity to handle additional project planning decisions (NEPA)? These are just a few of the questions that have not yet been answered.

Composite Strategy B:

- **B - Black cherry:** Develop and sustain short and long-term research strategies to understand and manage black cherry health and regeneration challenges and test adaptive management strategies.

Overview:

The ANF, the Northern Research Station, State and Private Forestry Forest Health Protection staff in Morgantown, WV, and the Pennsylvania Bureau of Forestry are collaborating on a number of projects to better understand the changes in black cherry silvics and ecology and to develop appropriate and flexible management guidelines for managing stands with substantial components of black cherry trees.

What We Have Done:

Monitoring Black Cherry Overstory Health

- **Monitoring Black Cherry Health** on Forest Health Monitoring (FHM) network plots on the ANF – Long, Hille, Turcotte and others have remeasured 102 plots with at least 5 ft^2/ac of black cherry. They find:
    - Sharp increases in the proportion of standing dead black cherry, to 23 percent of trees ≥ 5" dbh in the 2014-2016 remeasurement. Continuous Forest Inventory (CFI) plots remeasured by the PA Bureau of Forestry in the same ecoregion show a similar trend, while those measured by the PA Game Commission do not.
    - Mortality appears to be higher in lower landscape positions (toe and back slopes)
    - Plots on which cherry was defoliated during the fall webworm outbreak in2011-2013 had higher levels of mortality than those that were not defoliated in that outbreak.
    - Crown density and live crown ration of living cherry have decreased since previous measurements.
    - Monitoring on these plots has shown presence of spotted wing drosophila, but little is yet known about the impact of this on seed production and viability.

On-going defoliation monitoring

- **The Allegheny National Forest and partners conduct aerial detection surveys** as defoliation events occur. Most recently, this has meant the 2015-2017 cherry scallop shell moth outbreak, with defoliation acres estimated at 57, 49, and 27 thousand acres in 2015, 2016, and 2017, respectively.

Regeneration Research and monitoring

- **Long-term regeneration studies** synthesized informally by Brose and the entire NRS-Irvine Research Team appear to show that black cherry seedlings became less competitive with black birch seedlings as early as 1995.
- **Black cherry seed production studies** conducted by Long involving stands as young as 70 and as old as 200 suggest that there is an overall decline in the frequency, regularity, and size of black cherry seed crops and that older stands produce as much or more seed as younger ones.

- **Black cherry seed establishment studies** conducted by Royo and others show that soil pathogens (*Pythium* and *Phytytopthora*) negatively impact black cherry seedling establishment and survival, and that the impact is stronger near mature black cherry trees

SILVAH Management Guidelines

- **SILVAH software and training sessions** are being updated as research results come in. Regeneration stocking standards that reflect the period of high black cherry health, regular and prolific seed production, and high competitive status have been withdrawn. New inventory procedures that highlight species diversity have been incorporated. Users may set the proportion of regeneration plots that are accepted as desirable when dominated by black birch.

What We Are Doing:

Dominance Probability Studies

- **The Oak Dominance Probability Study** now being conducted by Brose and funded throughout by the PA Bureau of Forestry provides valuable information about the relationships among site, seedling attributes, and competitive outcomes of early stand development in oak sites across the state. Nearing its 15th year, it provides important insights for the ANF.
- **The Allegheny Hardwood Dominance Probability Study** on 9 sites in the Allegheny Plateau region and now nearing its 5th year will provide much more information about early stand development in stands with high proportions of black cherry. It includes an ANF stand and 8 stands on other ownerships in the ecoregion.

Fertilization Studies and Monitoring

- **Operational Fertilization Monitoring** conducted by Long and Ristau is assessing the seedling growth response in stands treated operationally with 200 and 400 lbs. of nitrate nitrogen per acre. Shelterwood seed cut stands and post-overstory removal stands are included. Preliminary results suggest that red maple benefits from these treatments when present in shelterwood seed cut stands and that black cherry benefits in post-overstory removal stands.
- **Deposition Replacement Fertilization Study** conducted by Ristau and Long is assessing seedling and overstory responses in stands treated annually with nitrate nitrogen in amounts that result in levels provided by acid deposition at its peak in the late 1980s. It is too early to report results from that study.

Quantifying and Treating Black Birch Interference in Developing Stands

- **A new study recently funded by the PA Bureau of Forestry** to be conducted by Brose and Dave Jackson will quantify the quantity of black birch stocking associated with inevitable black birch dominance, and test a variety of manual, herbicide and fire treatments to allow competing species to succeed. Discussions are underway to fund some replicates of this study on the ANF.

Future Considerations:

These efforts and projects are in the discussion or planning phase

- **Studies on Seedling Pathogens and Their Treatment** – NRS scientists are seeking partners with expertise in soil pathogen and fungal identification, ecology and treatment, as well as funding to conduct studies on this topic. There is particular interest in better understanding and management of cherry leaf spot.
- **Studies on nutrient preferences of key Allegheny Plateau species** and the effects of changes in soil nutrition on health, vigor, seed production, and competitiveness.
- **Continuous improvements in SILVAH** – As new information becomes available through research and monitoring, SILVAH's seedling stocking criteria and recommended prescriptions will reflect new knowledge. In addition, current efforts to develop and integrate information about levels of invasive plant species that pose a threat to ecosystem function and methods of treating these invasives when they reach those levels will be captured in SILVAH as results accumulate. **In particular, we will participate in the Forest Health Collaborative-originated Working Group on decision strategies to see whether any or all of the output from that Working Group can be incorporated into SILVAH.**

Composite Strategy C:

- **C – D**evelop a planning process that is responsive to declining forest health, invasive species, and safety concerns.

What the ANF is doing in the next 12 months

1. **Signing decisions on eight environmental assessments for vegetation management.** Combined, these projects look at nearly 20% of the ANF land base and propose more than 13,000 acres of even-aged management. Uneven-aged management (less than 200 acres), thinning (less than 600 acres), and salvage are also proposed.

2. **Signing a decision on daylighting and hazard tree removal along State Route 59.** The ANF is working with PennDOT to clear encroaching vegetation and remove hazard trees along 3.6 miles (from the Warren/McKean county line to State Route 321 south).

3. **Changing the Forest Service's approach to project development.** A nationwide effort has begun to improve the Forest Service's approach to environmental analysis and decision making. The goal is to authorize projects in a timelier manner, eliminate unnecessary steps, and increase the amount of on the ground work.

The procedural options we have for future projects

1. **Categorical exclusions**, which involve a comparatively brief analysis of the proposal to determine whether extraordinary circumstances are present and merit a more in-depth review. There are categorical exclusions for:
    a. Regenerating areas to native tree species.
        a. Restriction: cannot use herbicide or convert vegetation type.
    b. Improving timber stands.
        a. Restriction: cannot use herbicide; limited road construction.
    c. Harvesting up to 70 acres of live trees.
        a. Restriction: cannot be used for even-aged management; cannot convert vegetation type; limited road construction.
    d. Salvaging up to 250 acres of dead or dying trees.
        a. Restriction: limited road construction.
    e. Forest restoration treatments to reduce the risk or extent of, or increase resilience to, insect and disease infestations (often called the Farm Bill CE).
        a. Restrictions:
            i. must either occur within the WUI or condition classes 2 or 3 of fire regime groups I, II, and III;
            ii. maximum size of 3,000 acres in size;
            iii. cannot build permanent roads;
            iv. must maximize the retention of old-growth and large trees, as appropriate;
            v. must be developed through a collaborative process.

2. **Environmental assessments**, which are what the ANF currently prepares for most moderate to large vegetation management projects**.** A decision based on an EA can only be signed after finding that the project will not have significant impacts.

3. **Environmental impact statements**, which are somewhat longer than EAs and have additional requirements about content and procedure. One benefit of an EIS is that a decision can be signed even if the project will result in significant impacts.

Future Considerations:

1. **New categorical exclusions**. The Forest Service intends to create new categorical exclusions as one way to improve our approach to project development. Early discussions suggest there could be a new restoration category that allows for more harvesting than our current categorical exclusions**.** Specifics regarding the new categories, and any potential restrictions, are still under development.

2. **Re-ordering the project development process to expedite implementation**. The ANF currently completes most or all field work required for a project before signing a decision. While this approach often makes it easier to analyze effects in detail, it also means that we might need to conduct field surveys on several thousand acres before implementation occurs in any single stand. As a result, work on one stand can be held up by survey needs in an unrelated area. Shifting from pre-decision to post-decision survey work could help us avoid this situation.

3. **Developing an adaptive management project to regenerate declining stands**. Our current approach to forest health largely focuses on identifying stands on a downward trajectory, developing a proposal for vegetation management, and then completing the environmental analysis and decision-making process. Depending on the specifics, several years can elapse between when a treatment need is first identified and when action is ultimately approved. We could potentially reduce that timeframe down to a few months by developing a forestwide NEPA document that allows us to regenerate declining stands in general. This is fairly different than our traditional NEPA approach, and would likely rely on a set of fixed parameters that identify when to act, what to do, and how to mitigate effects. Additional work would still be needed before implementation occurs (like biology surveys, cultural resource surveys, and consultation), so implementation would not occur instantaneously. It could, however, provide rapid response ability in a way that complements our current vegetation management program.

4. **Streamlining field survey methodologies.** Field surveys are needed to assess proposed treatment areas in order ensure protections are provided for threatened and endangered species, Regional Forester Sensitive Species, water courses and wetlands, and historic/archaeological resources. We are evaluating ways to streamline these processes, including evaluating survey protocol and methodologies, sampling intensities, timing, the degree of information/data is needed, and what measures are appropriate to provide suitable protection for these resources.

Composite Strategies D, E, F- Invasive Insects & Diseases:

- **D- Integrated pest Management Approaches** for invasive insects and diseases
- **E- Maintaining Resiliency and Restoring** impacted ecosystem services and processes
- **F- Monitoring** invasive species and resistance in host species

Overview:

A variety of methods and tools have been used to address invasive insects, and diseases on the ANF for nearly 30 years. The chestnut blight has been present on the ANF since the early 1920s, beech bark disease (BBD) complex has been present since the early 1980s, gypsy moth since the late 1980s, and emerald ash borer and hemlock woolly adelgid both present here since 2013.

What We Have Done:

Integrated Pest Management approaches to maintain and/or restore resilience

1. Butternut

Cooperated with PA BOF to propagate healthy butternut saplings to establish a butternut seed orchard for long term restoration efforts.

2. American Chestnut

ANF staff developed a GIS landscape model to help with long term American chestnut restoration efforts, in partnership with the USFS Northern Research Station and American Chestnut Foundation.

3. American beech

Reduce American beech densities in treated stands, while identifying and reserving healthy, apparently resistant beech for long term retention to sustain a healthy American beech component on the landscape.

Propagate healthy American beech grafted saplings to establish a seed orchard of healthy American beech for long-term restoration efforts (partnership with USDA Northern Research Station and State and Private Forestry, and the Pennsylvania Bureau of Forestry).

Reduce beech bark disease susceptible beech brush densities in forest understories through chainsaw site preparation and/or herbicide application on 4,000-5,000 acres annually.

4. Ash

Cultural Approaches

I. Salvage ash in all open timber sale units and all accessible areas in open timber sales and recoup economic value where feasible.
II. Reduce ash densities in partial harvest prescriptions
III. Regenerate stands heavily stocked with tree species at risk (ash, American beech, declining black cherry, and declining sugar maple).

Inventoried Ash on the ANF

- Ash > 5" in diameter comprises an estimated 1% of overall basal area in all trees >5 inches in diameter in inventoried areas on the ANF.
- Ash merchantable cubic volume (>5" in diameter) comprises an estimated 5% of total timber volume in inventoried areas on the ANF.
- Inventoried ash in suited Management Areas:
    - 53% in projects emphasizing salvage of ash and addressing forest health, or projects currently being implemented (ash is being salvaged where feasible and appropriate).
    - 37% in project areas in that are in the early phases of planning or nearing a decision.
    - 7% not currently included in any project areas.

ANF Ash Volume Sold - FY 2012 Through FY 2017

Fiscal Year	Ash Volume (MBF)	Ash Volume (CCF)	Total Timber Volume (CCF) Sold	Ash Value	Total ANF Timber Value Sold
2012	190	331	57,781	$19,025	$7,179,161
2013	207	345	53,675	$25,921	$7,804,060
2014	149	249	58,612	$26,542	$8,603,813
2015	385	641	53,178	$108,981	$6,130,652
2016	2,161	3,601	58,401	$790,208	$6,383,115
2017	2,617	4,362	55,735	$1,028,629	$7,798,724
TOTALS	5,709	9,529	337,382	$1,999,306	$43,899,525
2018 Estimated*	3,700	6,000		$1,000,000	

*Note: Predominantly Ash Remediation Offer plus additional salvage volume estimated in other open sale areas. Total value is estimated.

- Ash volume offered 2012-2015 comprised less than 1% of overall volume sold.
- Ash volume offered 2016-2017 increased to 7% of overall volume sold.
- Ash volume is estimated to comprise nearly 10% of FY2018 ANF timber offer.

Conservation on ANF-

- Treated 536 trees on 278 plots across the ANF in 2015, using individual stem injection of insecticides. Part of a collaborative study with USFS Northern Research Station and State and Private Forestry focused on genetic and seed tree conservation, and developing techniques to sustain ash in forested landscapes. Plan to re-treat these trees in 2018 if funding permits.
- Treated 137 high value ash trees in dispersed and developed recreation sites in 2015, using individual stem injection of insecticides, to sustain aesthetics and shade. Plan to retreat these trees in 2018.

Biological Control of EAB-

- PA Bureau of Forestry staff released over 4,500 emerald ash borer parasitoids (3 species) on ANF land in August and September, 2017.

5. Eastern Hemlock-

Collaborative Hemlock Conservation Strategy-

- Partnered with The Nature Conservancy, USFS Northern Research Station and State and Private Forestry, PA Bureau of Forestry, and nearly 50 private landowners/consultants, conservation organizations, and other partners, to develop an all lands hemlock conservation strategy for the High Allegheny Unglaciated Plateau.
  Strategy includes:
  - Mapping of hemlock resources across ownerships
  - Collaboratively identifying values and ecosystem services provided by eastern hemlock
  - Collaboratively identifying 146 priority Hemlock Conservation Areas across ownerships
- Following 5 public training workshops, volunteers have adopted a number of Hemlock Conservation Areas for annual monitoring.

Treatments to sustain priority eastern hemlocks on the ANF-

- The ANF completed a Hemlock Woolly Adelgid Suppression EA in 2015 which allows for chemical and biological controls.
- We treated 2,882 eastern hemlock trees in 4 Hemlock Conservation Areas, using soil injected insecticides from 2016 to 2018, including preventative treatment targeting 100% of old growth eastern hemlock in Hearts Content Scenic Area.
- Predatory beetle may be released to suppress hemlock woolly adelgid populations (when needed and available).

Monitoring invasive species and potential resistance

1. Monitoring

- ANF staff utilize a number of technologies to monitor overall forest canopy health and disturbances such as defoliations and wind events. Techniques include:
  - Field assessments and reports from ANF staff in the field.
  - Collection of crown dieback and health conditions during stand examinations.
  - Collection of non-native plant species occurrences during stand examinations.
  - Focus on monitoring tree species identified in national and local forest risk assessments.
  - Monitoring of satellite imagery tools such as the Forest Disturbance Mapper.
  - Periodic aerial surveillance and mapping of larger scale disturbances such as defoliation events, in partnership with PA Bureau of Forestry
  - Long-term monitoring of forest health conditions on permanent plot network, conducted by USDA Forest Inventory and Analysis group.

2. Identifying and Sustaining Resistance

- ANF staff have been striving to identify BBD resistant American beech trees and trying to develop a geodatabase of resistant trees since 2003.
- Assessed and mapped 124 remnant butternut trees for long term conservation and restoration efforts.

- Working with citizen scientists and the American Chestnut Foundation to assess and map remnant American chestnut for long term restoration efforts.
- ANF staff are looking to identify lingering ash for long term study and conservation in partnership with USFS Northern Research Station and State and Private Forestry, PA Bureau of Forestry, and academic institutions such as Penn State University.
- Similarly, we will look for lingering or potentially resistant eastern hemlock on the ANF.

3. Restoring Ecosystem Function

- Strategies to develop health seed sources for American beech, American chestnut and butternut will assist with long term efforts to sustain and restore ecosystem functions.
- ANF has developed table of coniferous species to consider planting to provide a few of the ecosystem services provided by eastern hemlock trees, and has been underplanting a few species in limited numbers in anticipation of eastern hemlock mortality.

What We Are Doing:

- Continuing to address overall stand health and landscape resilient to disturbances, where ash, American beech, declining cherry and maple species are more abundant and where defoliation events have occurred in the past decade. Treatments typically focus on stand regeneration, and regeneration harvests greater than 40 acres are frequently needed and are anticipated to continue. Projects that emphasize addressing species at risk include:

Project	Status	Total Project Area Evaluated	Silvicultural Treatments
Bradford Emerald Ash Borer Remediation	Final Decision 5/1/17	103,000 acres	3,232 acres
Salmon East	Final Decision 2/9/17	13,000 acres	2,111 acres
Chaffee	Draft Decision 8/15/17	16,700 acres	2,699 acres
Bradford Forest Restoration	Draft Decision 9/15/17	28,400 acres	5,058 acres
Farnsworth Restoration	Draft Decision 9/22/17	45,400 acres	3,070 acres
DeYoung Supplemental EA	Draft EA for Public Comment 6/1/17		263 acres
Pine Bear Supplemental EA	Scoped 9/22/16		1,155 acres
Porkey Heights Supplemental EA	Scoped 9/22/16		721 acres
Hoover	Scope November 2017	8,800 acres	~1,400 acres
KEF 2017 Blowdown Salvage CE	Final Decision 10/2/17	140 acres	140 acres
FR195 2017 Blowdown Salvage CE	Scope December 2017	198 acres	198 acres
2017 Blowdown EA	Scope December 2017	636 acres	636 acres
Otter	Scope Fall 2018	13,400 acres	~1,630 acres
Cherry Run	Scope Fall 2018	7,500 acres	~1,300 acres
East Branch of Tionesta	Scope Fall 2019	15,800 acres	1,500-3,000 acres (contracted)
TOTALS		**253,000 acres**	**25,100-26,600 acres**

- We hope to keep developing libraries of resistant individuals, test restoration approaches, prepare for new disturbances, and continue laying groundwork for future efforts to sustain and/or restore ecosystem resilience and function.

Future Considerations:

Potential to collaboratively increase monitoring efforts (including identification of resistant individuals of species at risk), develop and test treatment effectiveness, and improve overall effectiveness and capacity across ownership boundaries-

- Good Neighbor Agreements (https://www.fs.fed.us/managing-land/farm-bill/gna)
- Citizen scientists
- University partnerships and agreements
- Conservation organization partnerships and agreements
- Expand contract use for more professional services (e.g. silviculture support)

There is a need for leadership/coordination of efforts across the Plateau for monitoring, citizen scientist coordination, information sharing, and cooperative treatment strategies.

Potential for cooperative pest management area too address forest insects and diseases.

Need exists to develop and test integrated pest management treatment and long-term restoration strategies across ownerships.

Need exists to better assess hemlock resources in broad Hemlock Conservation Areas, in order to develop more specific integrated pest management strategies for those areas.

Need exists for all lands monitoring of forest health (overstory and understory) conditions, disturbance events, invasive insects, diseases and plants, including:

- Permanent plot networks
- Consistent data collection, reporting, and data warehousing protocols
- Open access to datasets across ownerships
- Established communication venues for information sharing
- Explore new technologies, such as real time satellite monitoring technologies such as Forest Disturbance Mapper and experimental drone use.

Composite Strategies D, E, F- Non-native Invasive Plants:

- **D- Integrated pest Management Approaches** for invasive plants
- **E- Maintaining Resiliency and Restoring** impacted ecosystem services and processes
- **F- Monitoring** invasive plants

Overview:

A variety of methods and tools have been used to address non-native invasive plants on the ANF:

- Treatments for large scale infestations: mechanical, chemical, biocontrol, cultural (burning),
- Limiting and preventing the spread of invasive plants,
- Reforestation post-treatment – planting with natives,
- Monitoring: utilize forest users to monitor for invasive plant species, citizen scientists to track invasive plant locations and spread.

What We Have Done:

- The ANF Land and Resource Management plan (Forest Plan) was revised and signed in 2007, allowing the use of glyphosate and sulfometuron methyl (see Forest Plan for approved formulations) for herbicide treatment.
- The Forest Plan would need to be updated for the use of bio-controls for non-native invasive plant species.
- Site specific environmental analysis for invasive plant treatment using glyphosate only has occurred on approximately 80% of the ANF (see map).

Treatments for large scale infestations: mechanical, chemical, biocontrol, cultural (burning)

1. Invasive plant treatment on the ANF began in earnest in 2001:
   - Manual/mechanical means (hand-pulling, cutting) with herbicide treatment beginning in FY11.
   - Species treated to date include, but not limited to:
     - garlic mustard (*Alliaria petiolata*),
     - Japanese knotweed (*Fallopia japonica*),
     - Japanese barberry (*Berberis thungbergii*),
     - purple loosestrife (*Lythrum salicaria*),
     - spotted knapweed (*Centaurea stoebe* ssp. *micranthos*),
     - bull thistle (*Cirsium vulgare*)
     - giant hogweed (*Heracleum mantegazzianum* - chemically treated by the PA Dept. of Ag.)
     - goats rue (*Galega officinalis* L.)
   - Since 2001, over 1,900 acres of invasive plant treatment have been accomplished either manually/mechanically or through chemical treatment for several different species.

2. The ANF has developed a Non-Native Invasive Plant Species of Concern list
   - Updated prior to each field season.
   - The 2017 field season list contained :
     - 20 species identified as 'Early Detection/Rapid Response Species (EDRR)',
     - 62 species with documented occurrence within the ANF

    - All 82 species are categorized for treatment based on their PA Noxious Weed List Status and site characteristics (e.g. new infestations, threatened resource values, risk for spread)

3. Stewardship contracting authority has increased the amount of acres treated and without it, limited appropriated funding is insufficient to make much headway.

4. Limiting and preventing the spread of invasive plants:
    - Equipment cleaning is required in timber sale and other service contracts.

5. Reforestation post-treatment – planting with natives:
    - ANF Forest Plan has guidelines when revegetating areas on species/genotype considerations.

Monitoring invasive plants

1. Utilize forest users to monitor for invasive plant species, citizen scientists to track invasive plant locations and spread.

2. Reinvigorate prior efforts such as developing volunteer 'Certified Weed Warriors'.

3. Current efforts are working with The Allegheny Plateau Invasive Plant Management Area to utilize iMapInvasives. The iMapInvasives Partnership facilitates the management and sharing of invasive species information, including the extent of infestations, search efforts, and treatment outcomes. https://www.imapinvasives.org/pennsylvanialogin

What We Are Doing:

Potential to collaboratively increase monitoring, develop and test treatment effectiveness, and improve effectiveness and capacity across ownership boundaries-

- Good Neighbor Agreements (https://www.fs.fed.us/managing-land/farm-bill/gna)
- Citizen scientists
- University partnerships and agreements
- Conservation organization partnerships and agreements

Future Considerations:

There is a need to update the ANF Forest Plan to add additional chemicals and techniques for treating non-native invasive plants.

There is a need for leadership/coordination of efforts across the Plateau for monitoring, invasive mapping, citizen scientist coordination, information sharing, and cooperative treatment strategies.

Needed greater consistency in seed mixes for site restoration following soil disturbance, across all agencies and ownerships- we work with many of the same contractors.

Need exists to develop and test landscape non-native plant treatment and long-term revegetation and restoration strategies across ownerships.

ANF – information to respond to threats and strategies from the Forest Heath Collaborative

Composite Strategies G, H, & I:

- **G-** Prioritize Hazard Tree removal along Multi-modal corridors and Public access sites on the ANF
- **H-** Prioritize remaining multi-model corridors + public access sites on the ANF
- **I-** Provide aid and education to private landowners for hazard tree removal on private property corridors linked to corridors.

Overview: A variety of methods and tools have been used to address hazardous trees on corridors and public access sites in the last 5-7 years.

What We Have Done:

1. **Heavy Motorized Trail Maintenance Contract**
   Who: Contractor, typically 1-4 people **What:** Removes hazard and downed trees
   When: Annual, but typical when the trails are closed. Contract(s) has been around since 1998
   Where: Marienville ATV, Timberline, Penoke Bike Trail, and Bradford Rocky Gap Trail - 98 Miles

2. **Light Motorized Trail Maintenance Contract**
   Who: Contractor, 1-3 people **What:** Typically both down trees and some hazardous trees
   When: Annual, work when the trails are both open and closed for approximately 20 years
   Where: All Forest OHV trails – 108 miles

3. **Spring Creek Horse Trail Volunteers**
   Who: Volunteers, 3-6 people **What**: Some hazard or down material
   When: Annual; Seasonal/summer, 1 time/ week, since opening of trail – 2012
   Where: Spring Creek Horse Trail – 38 miles. ROWs on SGL and Collins Pine Land

4. **Motorized Trail Volunteers**
   Who: Volunteers, 2-4 people **What:** Mainly down trees to clear trails
   When: Summer/Fall up to 3 days/week or less for the last four years.
   Where: Marienville Motorized trails – 89 miles

5. **Non-motorized trail clubs, groups, volunteers**
   Who: Volunteers, 1-10 people, SCA, NCTA, IMBA **What**: Some tree clearing, not hazardous trees
   When: Summer/Fall, NCTA long history. IMBA new to the ANF. SCA 5 years+
   Where: FY 17 - Laurel Mill Trail (10.7 miles), Jakes Rocks (12 miles), NCT at Minister/Morrison

6. **Cost Share Snowmobile Agreements and Volunteers**
   Who: Three snowmobile clubs, approximately up to 30 people. **What:** Clear down trees on the trail
   When: Annual, Winter, Summer/Fall, agreements from 1-5 years
   Where: ASL and Connectors, approx. 50% of mileage under agreement/volunteer – 180+ miles

7. **FR 503 – CE Kiasutha Recreation Area Sanitation – 2016/2017.** Harvest of insect and disease affected trees on 89 acres - Winter/Spring 2017. Removed over 1000 trees, mostly ash/snags. Contractor felled/commercial harvest and FS did cleanup (break down slash/chip) in visually sensitive areas.

ANF – information to respond to threats and strategies from the Forest Heath Collaborative

8. **2012 Hazardous Tree Removal – Developed Recreation Sites.** 624 campsites in 13 campgrounds, along with 6 day use areas and 3 boat launches were assessed. Est 500 trees were identified and felled by FS personnel and in 2012 and 2013.

   Campgrounds: Hearts Content, Twin Lakes, Loleta, Minister Creek, Red Bridge, Willow Bay, Buckaloons, Kiasutha, Dewdrop, Morrison, Hooks Brook, Hopewell, Pine Grove; **Boat Launches:** Elijah Run, Kiasutha, Willow Bay; **Day Use Areas:** Jakes Rocks Overlook, Kiasutha Picnic/Swim Area, Kinzua Beach Swim/Picnic Area, Red Bridge Fishing Area, Rimrock Overlook/Picnic Area and Willow Bay Picnic Area

   Follow up: In 2013/14 Marienville field reviews were accomplished on an estimated 125 disperse campsites sites, trial heads, and canoe launches. Hazard trees were removed on sites along the Clarion River, Millstone, trailhead (s) at Buzzard Swamp, Brush Hollow, Little Drummer, Laurel Mill and canoe launches at Irwin Run, Dark Hollow, and Millstone.

9. **Special Use Concessionaire Permit** –ID hazard trees at campgrounds under permit every year. Site manager removes a limited amount of trees and FS/Prison Crew removes remainder.

10. **Emergency Contract(s) Example** – After May 1, 2017 storm, Contractor cleared hazardous trees on trails affected by the storm – Marienville ATV & Bike Trail and Spring Creek Horse Trail

11. **Existing Timber Sale Contracts (70+)** includes felling hazard trees as provided in contract provision: BT2.32 Construction Clearing…."All dead or unstable live trees designated for cutting that are sufficiently tall to reach Purchaser's landings or the roadbed of Specified roads". We have been utilizing this to remove diseased trees.

12. **Bradford Restoration EA, Ash Remediation EA (Example)**: Hazard trees near trails, such as North Country National Trail, have been cut as a result of these recently signed documents.

13. **SUP permits** issued for maintenance on utility lines/pipelines that affect privately owned infrastructure.

14. **FS Review Roads open for Hunting Season** - Roads are cleared prior to hunting season and occasional hazard tree is cut, including disabled hunter roads.

What We Are Doing:

Vegetation Enhancement Project – State Route (SR) 59 - (PennDOT Upgrade Partnership Agreement) Cooperative project with PennDOT, McKean County, 3.6 miles includes daylighting and hazard tree removal within 100 feet of the highway. Project out for public comment.

Future Considerations: These efforts and projects are in the discussion or planning phase

- Vegetation enhancement for SR(s) 321, 219, 62, and 66 are being discussed with PennDOT.
- Brush Hollow Hiking and Ski-Trail Restoration from 2017 Windstorm/Tornado storm event.
- Recreation Program: 20% of the developed campgrounds are in plan to be accomplished every year, volunteers, public reporting, trail groups, contracts, partnerships, SUP are ongoing.
- Future NEPA: Programmatic documents: EAs or individual maintenance CEs?
- Education and Aid to Private Landowners?

8. Ongoing Collaborative Strategies (Working Groups)

ONGOING COMPOSITE FOREST HEALTH STRATEGIES – *Next Steps*

Composite Strategies A,J (Sustaining Forest Resilience, Improving Age Class Balance	
Ongoing Strategy 1:	**Investigate emerging trends like the Good Neighbor Authority**
Agencies Working on Strategy	DCNR-BOF and USFS-ANF
Agencies Willing to Work on Strategy	NWTF, BOF, Potter Lumber Company (Murdock), USFS-ANF, AHUG
Lead	Nadine Pollock (USFS-ANF) and Cecile Stelter (DCNR-BOF)
Members	
Next Steps	Meeting on Wednesday, 11/8/17. In the process of drafting GNA master agreement for signature.
Composite Strategy B (Research & adaptive strategies to manage black cherry health and regeneration)	
Ongoing Strategy 1:	**Studies on seedling pathogens and their treatment**
Agencies Working on Strategy	
Agencies Willing to Work on Strategy	USFS-ANF, USFS-NRS, USFS-S&PF, DCNR-BOF Forest Health
Lead	Susan Stout (USFS-NRS)
Members	
Next Steps	Need expert (Penn State and others- look for Contact Committee)
Ongoing Strategy 2:	**Working group to develop decision strategies/guides to address declining forest stands, regeneration changes, and invasive species**
Agencies Working on Strategy	
Agencies Willing to Work on Strategy	
Lead	Susan Stout (USFS-NRS)
Members	Tom Kase (Collins Pine) Andrea Hille (USFS-ANF) Josh Hanson (USFS-ANF)

	John Saf (Generations Forestry)
Next Steps	First meeting 11/13/17 at NRS Irvine lab at 12:30pm
Ongoing Strategy 3:	**Studies on nutrient preferences of key Allegheny Plateau Species**
Agencies Working on Strategy	USFS-NRS
Agencies Willing to Work on Strategy	Ruffed Grouse Society, DCNR-BOF Forest Health, USFS-ANF
Lead	Susan Stout (USFS-NRS)
Members	
Next Steps	Susan Stout will share a test with Todd Ristau and report out at February meeting/meet with others willing to work on.
Composite Strategies D,E,F (Integrated pest management approaches to address invasive insects & diseases, maintain resilience, restore impacted areas, and monitor)	
Ongoing Strategy 1:	**Increase collaborative monitoring efforts across ownerships (need for leadership and coordination)**
Agencies Working on Strategy	DCNR-BOF Forest Health Protection
Agencies Willing to Work on Strategy	DCNR-BOF Forest Health, USFS S&PF, Penn State Extension/APIPMA (Kimberly Bohn), AHUG, HDC (Wayne Bender), PIOGA (Bruce Snyder)
Lead	Kimberly Bohn (Penn State Extension)
Members	
Next Steps	Building capacity: Kimberly Bohn submitted a grant for project coordination; citizen scientists training. USFS preparing grant for drone project to test forest health monitoring approaches across ownerships.
Ongoing Strategy 2:	**Cooperative Pest Management Area to address forest insects & diseases**
Agencies Working on Strategy	DCNR-BOF Forest Health, PA Department of Agriculture- Bureau of Plant Industry

Agencies Willing to Work on Strategy	DCNR-BOF Forest Health, PA Department of Agriculture- Bureau of Plant Industry, USFS-ANF
Lead	Sarah Johnson (DCNR-BOF), Andrea Hille (USFS-ANF)
Members	
Next Steps	Reinvigorate hemlock conservation strategy, broaden participation, and finalize MOU for cooperative pest management area
Ongoing Strategy 3:	**Develop and test integrated pest management treatments and long term restoration strategies across ownerships.**
Agencies Working on Strategy	
Agencies Willing to Work on Strategy	USFS-S&PF, USFS-ANF
Lead	Bill Oldland (USFS-S&PF)
Members	Andrea Hille (USFS-ANF)
Next Steps	
Ongoing Strategy 4:	**Assess hemlock resources in hemlock conservation areas to develop & test more specific integrated pest management strategies**
Agencies Working on Strategy	DCNR-BOF Forest Health, Friends of Allegheny Wilderness, USFS S&PF, USFS-ANF
Agencies Willing to Work on Strategy	DCNR-BOF Forest Health, Friends of Allegheny Wilderness, USFS S&PF, USFS-ANF, Susan Stout (Emeritus), Roger Troy Peterson Institute (Elyse Henshaw), Ruffed Grouse Society, KQDC (Brad Nelson)
Lead	Andrea Hille (USFS-ANF)
Members	
Next Steps	Identify top conservation priority areas and meet with group to develop approach.
Ongoing Strategy 5:	**All lands monitoring of forest health**
Agencies Working on Strategy	Collins Pine, DCNR-BOF Forest Health, USFS-S&PF

Agencies Willing to Work on Strategy	Collins Pine, DCNR-BOF Forest Health, USFS-S&PF, AHUG, USFS-FIA
Lead	
Members	
Next Steps	Bill Oldland (USFS-S&PF) to contact FIA for monitoring information and trends. Update at AHUG meeting (Wayne Bender of HDC to contact Sue Swanson of AHUG)
Ongoing Strategy 6:	**Develop common restoration techniques across ownerships following disturbance (e.ge. seed mixes)**
Agencies Working on Strategy	
Agencies Willing to Work on Strategy	Ruffed Grouse Society, DCNR-BOF Forest Health, USFS S&PF, Penn State Extension (Kimberly Bohn), USFS-ANF (ecology/botany), PIOGA (Bruce Snyder), PGC (??)
Lead	Needed
Members	
Next Steps	Kimberly Bohn (Penn State Extenion) develop list to reach out to landowners to identify where disturbances have occurred (e.g. tornado, timber harvesting, etc.)
Ongoing Strategy 7:	**Develop and test landscape level non-native plant treatments & long term revegetation and restoration strategies across ownerships**
Agencies Working on Strategy	Ruffed Grouse Society, PA Department of Agriculture- Bureau of Plant Industry, USFS-S&PF, USFS-ANF
Agencies Willing to Work on Strategy	Ruffed Grouse Society, PA Department of Agriculture- Bureau of Plant Industry, USFS-S&PF, USFS-ANF, APIPMA (Kimberly Bohn), PIOGA (Bruce Snyder)
Lead	
Members	

Next Steps	Fred Strathmyer (PA Department of Agriculture) to share PA Act for control of plants and noxious weeds with the group. Compare list of invasive species on this list and use to support and determine actions. Bill Oldland (USFS-S&PF) to check with S&PF invasive plant staff to define the landscape (APIPMA) and evaluate 1 or 2 problems, try treatments, study effectiveness.
Composite Strategies G,H,I (Prioritize hazard tree removal along multi-modal corridors and public access sites, prioritize remainder, provide aid and education to private landowners)	
Ongoing Strategy 1:	**Monitoring in recreation and other programs for hazard trees, including along oil and gas roads**
Agencies Working on Strategy	USFS-ANF
Agencies Willing to Work on Strategy	PennDOT (Peter Kempf), Cameron Energy (Arthur Stewart), Roger Troy Peterson Institute (Elyse Henshaw), DCNR-BOF/BOSP, USFS-ANF (recreation/engineering staff)
Lead	
Members	
Next Steps	Maureen to send list to Peter for next steps & specific project (and engage group)
Ongoing Strategy 2:	**Education and aid to private landowners for trails & corridors (or other forest health topics)**
Agencies Working on Strategy	Ruffed Grouse Society, Roger Troy Peterson Institute (Elyse Henshaw), DCNR-BOF, Pennsylvania Forestry Association
Agencies Willing to Work on Strategy	PennDOT (Peter Kempf), Ruffed Grouse Society, Roger Troy Peterson Institute (Elyse Henshaw), DCNR-BOF, Pennsylvania Forestry Association, Penn State Extension, USFS-ANF (recreation staff)
Lead	
Members	

Next Steps	Cecile Stelter (PA BOF) to contact Allyson Muth (Penn State Center for Private Forests) to see about leading this group. Conference call to identify connections to ANF-share what is learned about hazard tree management broadly- target key landowners adjacent to ANF.
Composite Strategy C (Develop a planning process that is responsive to declining forest health, invasive species, and safety concerns)	
Ongoing Strategy 1:	**Develop an adaptive management project to test a rapid response approach to regenerate declining stands**
Agencies Working on Strategy	USFS-ANF, Collins Pine
Agencies Willing to Work on Strategy	USFS-ANF, Collins Pine, NWTF, PFSC (Paul L. & Mary H.), USFS-S&PF
Lead	Glenn Howard
Members	
Next Steps	Host a call to discuss what has been done (learn from other forests) to develop what a proposed action would look like. Reach out to Region 8 environmental coordinator for insights
Ongoing Strategy 2:	**Streamline field survey methodologies**
Agencies Working on Strategy	USFS-ANF, Collins Pines
Agencies Willing to Work on Strategy	USFS-ANF (ecology and archaeology), Collins Pines, USFS-S&PF, Roger Tory Peterson Institute (Elyse Henshaw)
Lead	Andrea Hille (USFS-ANF) to contact Collin Shephard (USFS-ANF)
Members	
Next Steps	Look at, assemble what we are doing/surveying now and why? What information is needed and why?

Annually Reconvene to

- Share Information
- Discuss Forest Health Trends & Observations
- Treatments and Strategies
- Research Updates
- Market Trends

Lead: AHUG to host in February 2018

Members: All Collaborative Members and others

9. Communication Strategies (Working Groups)

PRODUCT 4 ~ Communication messages and strategies of delivery to inform and engage those not directly involved in the collaborative

Communication Message #1	**"A community of people came together around serious forest health problems and identified strategies to address the problems including NEPA efficiencies."**
Audience (To Who?)	Forest Chief and FS leaders.
Communication Approach	Field trip with FHC and ANF
Already working on	
Willing to do	AFA, AHUG – Sue Swanson, DCNR-BOF Forest Health, PDA (Fred S.), USFS-S&PF
Communication Message #2	"**Develop categorical exclusions that treat invasive species quickly and that can be used on a programmatic basis."**
Audience (To Who?)	ANF Leadership (Rich Hatfield and Sherry Tune)
Communication Approach	ANF Leadership Team communicates need and urgency to Regional office for action in DC.
Already working on	
Willing to work on	
Communication Message #3	**"The ANF should be mainly management by local stakeholders. Give professionals latitude to do their work effectively."**
Audience (To Who?)	Congress, US Federal Government and Washington DC..
Communication Approach	Encourage citizens to contact Congress members.
Already working on	Forest Area School District, AFA
Willing to do	Forest Area School District, AFA, Penn State University (Mike Messina), NWTF, PDA (Fred S.)
Communication Message #4	**"Keep a larger portion of the money made here on the ANF."**
Audience (To Who?)	Congress, USFS leadership and state legislators.
Communication Approach	Encouraging citizens to contact their local representative
Already working on	AFA
Willing to do	Forest Area Schools, AFA, Cliff Lane, PDA (Fred S.), USFS-ANF, Penn State University (Mike Messina)
Communication Message #5	**"Economic and environmental implications and impacts of the changed actions (from Collaborative)."**
Audience (To Who?)	Local and state officials. .
Communication Approach	Meetings with the officials.
Already working on	Forest Area Schools, AFA

Willing to do	Forest Area Schools, AFA, Cliff Lane, Pennsylvania Forestry Association
Communication Message #6	**"Our forest affects everyone in the region e.g., health, education, environment, jobs, schools and recreation. The ANF and others have embarked on a collaborative effort to address forest health and develop sustainable solutions. The ANF welcomes collaboration in the traditional and non-traditional ways. This is the beginning of an ongoing and inclusive process."** **"More than seventy groups were invited to participate in the collaborative."** **"Some groups or individuals chose to participate and other chose to receive email updates."** **"This was a fully collaborative and interactive process."** **"Broad collaborative came together and identified activities to increase resilience and accelerate ANF forest plan implementation."**
Audience (To Who?)	General public, county, state, and local government, schools, elected officials, environmental organizations, state agencies, visitors/tourist, landowners, industry and internal forest staff. Local, state, federal and tribal interest, agencies/organizations, commercial interest and the general public.
Communication Approach	Kiosk, brochures, social media, field meeting, media communications, periodic updates. Media outlets (local and social), presentations, and public involvement activities.
Already working on	
Willing to do	DCNR-BOF, PFSC/PRL, Roger Troy Peterson Institute (Elyse Henshaw), HDC (Wayne Bender), Ruffed Grouse Society (Linda Ordiway), Susan Stout, USFS S&PF, USFS-ANF
Communication Message #7	**"This is a forest health collaborative project improvement area… by whom… signage."**
Audience (To Who?)	All forest visitors
Communication Approach	Branding/Signage
Already working on	
Willing to do	
Communication Message #8	**"Management for resilient forest will occur without changing special area designations."**
Audience (To Who?)	General Public.
Communication Approach	News releases, signage and exhibits.

Already working on	Friends of Allegheny Wilderness
Willing to do	Susan Stout, DCNR-BOF, Friends of Allegheny Wilderness, Roger Troy Peterson Institute (Elyse Henshaw), USFS-ANF
Communication Message #9	**"Use active management to develop a more resilient forest. Forest health is at risk from existing and unforeseen challenges."** **"Cutting is good for Economy and Environment."** **"The forest is threatened, but we can help."** **"The immediate forest health needs and urgency."**
Audience (To Who?)	All forest users (visitors and local public). Decision Makers, public, politicians, users, special interests and stakeholders. General public.
Communication Approach	Social media, interpretative signage, ANF web site, lobbies in the forest service offices, interactive kiosks. Talk about the challenges and how they will affect users. Ad campaign, tv/radio, lobbyist, Smokey the Bear. Open houses and field trips.
Already working on	AFA
Willing to do	PRSC/PRL, AFA, DCNR-BOF, Penn State Extension (Kimberly Bohn), Cliff Lane, Dan Glotz (Warren County), USFS-S&PF, USFS-ANF
Communication Message #10	**"Sustainable forest for future generations."**
Audience (To Who?)	Forest landowners.
Communication Approach	Workshops and meetings/conferences.
Already working on	WPC, DCNR-BOF, PFA, FAW
Willing to do	PRSC/PRL, Ruffed Grouse Society (Linda Ordiway), Susan Stout, DCNR-BOF, PFA, FAW, USFS-S&PF, USFS-ANF
Communication Message #11	"AHUG sponsored collaborative information sharing 'meeting' with focus on 1-3 year sales/harvests networking observation on forest health research market trends."
Audience (To Who?)	ANF, DCNR, PGC, Industry Large land owners, consulting foresters.
Communication Approach	AHUG
Already working on	AHUG, KQDC – B. Nelson, Collins Pine (Tom Kase), AFA, DCNR-BOF, DCNR-BOF-Forest Health, PDA (Fred S.), HDC (Wayne B.)
Willing to do	

Note: Mary Hosmer (PA Sportsmens' Federation) and Amanda Hetrick (Forest Area School District) are willing to help with communication strategies wherever needed.