

Ash Protection Experiment Town Hall Meeting  
December 7, 2021  
Executive Summary, Attendance, and Notes

Meeting Facilitator: Sarah Garlick  
Notes: Brendon Leonardi

### **Executive Summary**

On Tuesday, December 7th, the Hubbard Brook Research Foundation and lead investigators on the proposed ash protection project convened a town-hall style meeting to discuss the proposed experiment with Hubbard Brook scientists, students, technicians, and staff, along with partners from ArborJet and the State of New Hampshire. The two-hour meeting took place on Zoom with 27 attendees (see list below), with about 90 minutes in plenary and 30 minutes in small discussion groups. The topics covered included current research related to ash trees in the Hubbard Brook valley, the experimental design of the proposed project (proposed plot locations and rationale/constraints for locations), clarifying questions about the proposed treatment and its ecological impacts, funding sources, and opportunities for leveraging additional research to add value to the project. Key questions raised during the meeting focused on the impact of proposed site locations to ongoing research sites in the forest, the logistics of treating the ash trees, the mobility and fate of emamectin benzoate and its effect on invertebrates, salamanders, stream and soil chemistry in the forest, size and age and rot associated with the existing ash tree community in Hubbard Brook, and gaps in the plan to still be decided (i.e., who will do the actual treatment of insecticide, what measurements will be done across all sites, can we assess the effects of the insecticide compound on invertebrates and what work can be done prior to treatment to assess its effects on the ecosystem). Toward the end of the meeting, a live online poll asked participants: “How are folks feeling about the plan for this experiment?” Twenty-two people responded to the poll, with 82 percent selecting “thumbs up” and 18 percent selecting “unsure,” with no participants selecting “thumbs down” as a response.

In the chat (see transcript at the end of this document), the following next steps were identified:

- Need to address the safety concern for all researchers in the forest as the ash trees die
- Need to look into a younger cohort of ash in low-mid elevations of W101
- Consider soil morphology/chemistry monitoring and inclusion of black ash
- Matt Ayres to share a package of materials from Don Grosman on environmental studies on emamectin benzoate
- Need to discuss tree injection methods

The following people requested to be included in next steps:

- Peter Groffman, glad to help with a RAPID proposal
- Anthea Lavallee, Happy to help with next steps in terms of outreach, if that would be useful
- Nick Rodenhouse: Birders should be involved, so I would like to stay engaged
- Jackie Matthes, via email:

“I am interested in collaborating on this project, and I like the stratified design of the treatment and control plots to capture variation in soil types and easting. I'd be potentially interested in helping to measure the impacts of ash mortality and preservation on below-canopy microclimate and litter inputs, with a broader goal of understanding how ash mortality/protection might change aboveground-belowground ecosystem processes (decomposition rates, nutrient availability, etc). I'd also be interested in collaborating to produce a statistical model that aggregates multiple datasets to more broadly assess the impact of preservation versus mortality on ecosystem processes.”

The full recording of the event can be [found here](#).

Notes from the small-group discussions: [small group #1](#), [small group #2](#), [small group #3](#).

## Attendance

- Sarah Garlick
- Liz Studer
- John Diestch
- Matt Vadeboncoeur
- Jeff Garnas
- Nat Cleavitt
- Miranda Zamerielli
- Scott Bailey
- Kevin McGuire
- Don Grossman, ArborJet
- Matt Ayres
- Anthea Lavalle
- Amey Bailey
- John Campbell
- Mary Martin
- Geoff Wilson
- Nina Lany
- Bill Davidson, Forest Health Specialist with NH Division of Forest and Lands
- Emma Rosi
- Sara Kaiser
- Joe Docola, ArborJet
- Lindsey Rustad
- Ian Halm
- Dan Herms, Davey Institute
- Peter Groffman
- Nick Rodenhouse
- Raisa Kochmaruk

# NOTES FROM THE MEETING:

## Liz Studer Overview of her recent work:

- 60 total tree plots (plots by species, SM, YB, AB, WA). Each plot >50% basal area of focal tree species
- Plants
  - Red trillium 3x more abundant under ash, regardless of soil type
  - Painted trillium more abundant under SM, but only on Bh podzol soil type plots
- Microbial Community:
  - Higher AM fungi under ash, only on Bh podzols (surprisingly not so much for SM)
  - Gram positive bacteria lower under ash, regardless of soil type
  - No patterns with gram negative bacteria
- Animals (Brown food web):
  - More individuals under ash, but individuals are smaller
  - Few large animals under ash (compared to AB)
  - More prey organisms under ash ( 1 predator for every 10 prey individuals)
  - Liz suggests shooter food chain under ash could be one reason for higher prey:predator ratio)
- Thinning organic layer (combined Oa and Oe) under ash as compared to other species
  - This is expected due to faster nutrient cycling under higher AM fungi tree species. However, the other AM fungi species (SM) does not follow this pattern
- Soil Chemistry panel of Organic layer under Ash vs. YB, SM, AB
  - Ash (in Bh podzols only) has different exchangeable acids and cation exchange capacity
- Understory floristics:
  - Higher abundance and diversity of understory plants under ash
  - More life beneath canopy of ash trees
  - May reflect the extra 10 days of energy input that ash experience in early summer
- OVERALL, lots of interesting and unique things are going on under ash trees when compared to other species.

## Matt Ayres Overview of Research Questions (can be found in proposal materials)

- Soils influence trees (of course), but do trees influence the soils? We have an opportunity to explore this question
- General Outline of Study:
  - Treat no more than 300 trees
  - Distribute treatments as broadly as possible within HBEF
  - As much spatial intermixing as possible between treated/untreated plots
  - Distribute treatment and control plots across soil types to permit test for main effect and interactions involving soil type
  - No protection treatments within the bird study area

- Treatment would reduce food availability (by some unknown amount, for species that feed on caterpillars)
  - No undue burden to accessing the sites
- Following these guidelines, a list of possible sites was created (see proposal materials)
  - Some sites may need to be dropped due to EAB already detectable in those ash trees (treatments may be ineffective?)
  
- **Matt asks for general input: Does this general strategy make sense?**
  
- Dan Herms:
  - For this project, the experimental control is unprecedented. In the past they have looked at patterns of mortality and their effects over time, or compared areas with differing ash mortality over broad spatial scales (such as the entire state of Ohio) or looked at gaps in adjacent closed canopy forest (but there were no ash in those forests).
  - The experimental control we'll be able to maintain at HB and the time frame starting where we are is going to be pretty amazing
  
- Joe Doccola:
  - This will be some new science for studying controls, the possibility for herd immunity, and how close or far away do trees need to be to treated trees in order to gain that herd immunity.
  - The spatial variation of this study is important (clusters of closely spaced plots and plots clustered much farther away from each other)
  
- Bill Davidson:
  - Runs ash management program across the state of NH
    - Scheduled to be a 3 year program (currently on year 2)
    - Treat approximately 12 trees at 100 sites statewide
    - 10 sites in each of NH's 10 counties
    - $\frac{2}{3}$  of the sites are already treated
    - Treat healthy mature canopy ash (10-15in size class) in order to keep ash pockets alive and preserve local genetic diversity
    - IDea is that these treated trees (NH state study) will be producing seeds that will act as a seed source for the next generation of ash to take hold of openings created by ash die off
    - Hope to keep ash as a component of NH forests in at least some capacity
  - This HB proposal is somewhat complementary to the NH state work, but the state study isn't nearly as comprehensive as the HB study will be
  - HB project is not really a replicate of the NH State treatment project but will be highly valuable

Nat asked about a potential halo effect from the insecticide treatment, and if there was any potential for saving ash without poisoning them/saving ash that can also support caterpillars that only feed on ash?

- Joe Doccola: Insecticide is very potent toward lepidopterans. Unfortunately it is just not possible to protect ash and protect caterpillars at the same time

Matt A acknowledged Ian Halm and his work with NEPA grant/proposal/report

- Ian provided NEPA updates: this is a new process for him as well, most major hoops have been hurdled, as of now no major roadblocks anticipated in the future

Anthea asked Bill Davidson about his earlier mention of biological controls, What is it, where in NH and will it influence HB at all?

- Bill Davidson: Through the National Biological Control Program (and lab in Michigan)
  - 3 species of parasitic wasp have been released starting in 2014 when EAB was first detected in NH
  - Released in approximately 30 locations in the state
  - Follows the expanding edge of new EAB sites in the state determines new release sites, so no plans at this time to release in HB or WMNF
  - But the thought is that they will likely disperse on their own over time, so it is likely that they will make it to HB and WMNF eventually
- Jeff Garnas: Followed up on biological control question
  - Released approximately 12,000 parasitoid wasps, mostly in the merrimack valley
  - Currently applying for more funding to keep effort going
  - Certainty some future potential to release at HB through a research proposal standpoint
  - Found that these biological controls are not very efficient in saving larger ash
  - Smaller diameter stems can be protected through the this method of top-down control

Jeff Garnas: Asked for clarification on Matt A. earlier comments, that “once trees are infected with EAB, it is too late to treat them”. Jeff’s understanding is that it has more to do with the canopy decline/dieback of individual trees. If an infested tree has a mostly health canopy, then it is still okay to treat. Is this true?

- Joe Doccola: Insecticide kills the insects in the tree, then it depends on the tree to either bounce back or decline and die.
- Normally they don’t like to treat anything past 40% canopy decline, because EAB damages vascular system through vascular mining, disrupts condition within the tree and thus conduction of the compound through the tree

Emma Rosi: Asked stream ecology related questions:

- How mobile are these pesticides in subsurface flow and how much will end up in streams? What are the effects on stream insects, and is there any evidence of anticipated concentration? Salamanders are both terrestrial and aquatic and may be affected in different ways?
- Why would plots span the entire valley? If there is chemical mobility, it could affect soils and streams throughout and leave no areas in the valley undisturbed
- Joe Docola:
  - Insecticide compound has high molecular weight and high carbon absorption coefficient. If it was applied directly to soils, it would get locked up in soil carbon
  - The treatment involves applying compound directly into the vascular tissue, and employ an arbor plug (backflow preventer) keeping the chemistry away from the environment and the applicator
  - This compound is different from true systemics in that it has a high carbon absorption coefficient, and as such resides in the plant tissues once applied. This is not to say that some compound is not lost to leaf fall, but much of the compounds moves very slowly and stays within the tree vascular system, which is why they do not have to inject or re-treat frequently. This slow movement also helps support longevity of compound following application
  - If sprayed on the bole of the tree, it would rapidly degrade via photodegradation (within 7-10 days, more than 50% would be gone).
    - It is indeed an insecticide, but it is protected under the bark after injection, and mostly stays within the tree system, moving slowly within that system
    - Cannot guarantee that there will be no exposure to the environment, but at this time it is the best technology available with reduced exposure
- Don Grossman:
  - Provided a list of publications that have utilized emamectin benzoate in tree injections (see list in meeting materials)
  - This list includes an environmental fate publication relative to the compound, which indicates the compound by and large does not have an impact on aquatics and degrades very rapidly as the leaves drop in fall

-Scott Bailey: 2 questions

- Question 1: Are any of the study plots close to streams or close to valley wide vegetation plots or other study areas? Also whether there might be any opportunity or discussion about whether we want to strategically preserve or let go of ash trees in proximity to valley wide plots or streams in support of other types of studies, and what kind of impacts this treatment might have on those studies?

- Nat: made notes of sites with drainages running through them. There were some sites with drainages running through them and we might want to consider taking those out of the treatment.

- None of the study plots are within valley wide plots, although the impacts of EAB are such that it will happen in those at some point
- Definitely not putting any experimentally treated plots on top of valley wide plots, and there are GPS points for those who want to compare and see if they affect other study sites in the forest
- Matt A: noted that there is some degree of freedom as far as swapping control and treatment plot locations and it would essentially be the same for the purposes of the experiment
- Scott suggested making zoomed in maps of each cluster of sites (sites seem to be in three clusters) with streams, valley wide plots and topography on these zoomed in maps to give people a better sense of where they are and their relationship to other things that are happening in the forest
- Question 2: Scott Knows that there are at least 2 stands of black ash in the valley, and although this has nothing to do with this study design, would people consider treating a black ash or two in order to conserve that component of biodiversity of the valley, and set us up in the future to work with indigenous groups that might be interested in reestablishing black ash in a post EAB world.
- Matt Ayres and others think this sounds like a wonderful idea and will discuss further

-Nat C. noted that a lot of our ash in HB have fungal rot at the base and is concerned about the ability of rot to impact the treatment of those trees

- Don Grossman: Standing protocol is to avoid areas of rot or wound sites that will prevent chemical movement within the tree. This is not a deal breaker for individual trees, but depends on how much infection and proportion of damage on the tree.

- Suggested sharing photos of particular trees in question with ArborJet so they can provide consultation on those and suggestions relative to including or not including certain trees

Ian Halm: Question on size of trees

- We have very large trees at HB, does the treatment work better on mid size trees versus large ash trees, and if this study goes over a number of years, some of those trees may be towards the end of their natural life cycles, so major consideration will be trying to avoid having trees die from systems other than EAB before the study is complete
- Joe Docola: The older the tree, the less live mass you have, but injection is mg/kg, and lowest to highest rates in larger trees have been done, and found that the middle rates have been effective for the period of study (ie. followed for 5 years and injection did preserve those trees after treatment)
- Don Grossman: Obviously the health of the tree will dictate whether the treatment is warranted/justified and if it has a good canopy, treatment is probably warranted. If it is

struggling because of age or other things, you may want to reconsider treatment for that individual tree

- Provided an example relative to large trees: ArborJet regional tech manager up in Michigan has been treating and 80 inch White Ash for the past 50 years or so and its is still doing very well. Treating large trees is not an issue as far as injection treatment

## Breakout Group Recap:

Group: Matt Ayres (Raisa as note taker)

- Talked about how many ash trees will be left after the mortality of the overstory (orphan cohort)
- Logistics of the actual treatment, whether it would be conceivable to treat this many trees
- Potential funding sources for doing this treatment and study
- Seems like there is general support for this project, and as such some of us (PI's) should be in touch with NSF ASAP to see if there is any interest or possibility for a RAPID grant (funding needs to be secured for this project)
- Don Grossman discussed teams for the treatments:
  - 2-3 person teams, 2 teams of 3 could get it done within a week/week and half without too much difficulty
  - Size of the trees will dictate how long it takes to treat each tree
  - Don said he can be there to provide any training as long as needed\
- Bill Davidson discussed his experience in treatment, his 2 person team can treat 12 trees in about an hour and half

Group: Nat Cleavitt and Matt Vadeboncoeur

- Some concern about how ash may be in some sort of age related decline across the valley and need to design this project in such a way that is hopefully somewhat independent of that (ie. selecting healthy trees, avoiding the basal rot that Nat has mentioned)
- Discussed what are the advantages of doing this work specifically at HB?
  - Clearly logistical advantages
  - But also need to think about cost/drawbacks and what is the benefit of doing it exactly where we are to justify these drawbacks
- Birds and Lepidopterans- Very little is known about what species are occurring an ash and contributing to the food sources for birds
  - Is there an opportunity to learn from control trees before they are gone? Idea is to learn what we are losing, learn what insect specific to ash may disappear

Group: Jeff Garnas

- Focused on opportunities for adjacent research that can really add value to this project
- Looking at the fate of emamectin benzoate, where it will wind up and how it moves through the HB ecosystem

- Discussed stream chemistry in the context of open canopy gaps on a large scale (in untreated plots). More light, more woody debris could change the stream chemistry, temperature and biodiversity
- Discussed a need to consider safety with overstory canopy dying. Branch fall may be a concern and we may want to consider restricting movement in these plots during the critical time of dieback and decline (in the control plots)
  - Related to that, managing the movement of people to and from these sites via paths, or design movement corridors to minimize impacts of researchers on these plots over time
- Discussed a bit about the RAPID and that maybe we try to engage a bit with the Ice Storm folks who were successful in their RAPID proposal

### Poll Results:

- 82% thumbs up
- 18% unsure
- 0% thumbs down

Names were put in the chat for next steps

Prompt:

Of all these issues we talked about, which is the most important that is not solved yet?

- Matt Ayres: Who will do the work?
  - Injection treatments (1st and recurring treatments)
  - What measurements will be done across all of the plots?
- Peter Groffman (late to meeting): How many non-targeted effects are there? Are there going to be secondary effects, and are there ways to assess them? Questions have been raised about indiscriminate killing of lepidopterans on ash trees on a landscape scale and that is a concerning issue.
  - Suggested that David Wagner (UCONN) could be a good source to contact, published a paper on lepidopterans on Ash trees
  - Emma Rosi noted that streams at HB are already stress with low pH, and it is unclear how this context will matter to streams, if at all
- Jeff Garnas highlighted some of his ongoing work through pesticide impact proposal funded by the USFS, looking at the fate of emamectin benzoate, both in the canopy leaf litter and decomposition, and has not looked at stream litter but could add that to the list. They are also looking at soil invertebrate communities., Currently has preliminary data to share.
- Nick Rodenhouse- Noted this is a great opportunity to learn a lot about the control trees, which is very important. Perhaps it would be a good idea to do tree climbing, bagging/clipping of leaves to learn more about ash trees

- John Campbell- Noted there are people in Durham who specialize in pests and could be excellent resources in the future
- Nick Rodenhouse again: Is this a before/after control experimental design, meaning we will have a few years to study all the ash before treatment begins or is the treatment going to begin immediately at the beginning of the study?
  - Matt Ayres responded that treatment needs to begin immediately because trees will start dying/being affected, but the majority of the untreated plots won't be hit by EAB for some time, giving us a window to do a before/after on these plots
- Nick Rodenhouse: Finally comment, positive effects on beetle community at HB through the increase in CWD on the forest floor due to dying ash trees, could be an interesting area of study

## Meeting Chat

13:01:49 From Sarah Garlick to Everyone:

Agenda

1:00-1:10 introductions

1:10-1:30 overview of the project

1:30-1:40 clarifying questions

1:40-2:00 small group discussion #1

2:00-2:10 debrief

2:10-2:15 biobreak

2:15-2:35 small group discussion #2

2:35-3:00 general discussion

13:12:37 From Sarah Garlick to Everyone:

Here is a link to the pdf overview of the proposed experiment that we sent via email:  
<https://drive.google.com/file/d/1F4R33MKhIPGpS10bewq8dHDnuiR-og3Z/view?usp=sharing>

13:20:27 From Scott Bailey to Everyone:

exciting, intriguing results Liz!

13:51:26 From Sarah Garlick to Everyone:

This is an important conversation so we're revising the agenda on the fly. Please keep your questions coming!

13:55:04 From Matthew Vadeboncoeur to Everyone:

its a bit hard to tell from the way the map is shown in the writeup, but the plots don't go all the way up the valley. The last pair that's within 500m of the main Hubbard is below the W7/8/9 road junction

13:55:18 From Emma Rosi to Everyone:

Oh thanks. That is very helpful

13:57:34 From Sarah Garlick to Everyone:

Revised Agenda

1:00-1:10 introductions

1:10-1:30 overview of the project

1:30-2:00 clarifying questions

2:00-2:30 small group discussion

2:30-2:40 debrief small groups

2:40-3:00 general discussion

14:01:01 From Matthew Vadeboncoeur to Everyone:

Nat - Is this Armillaria or something similar? Is this predisposing the tree to death or tipping?

14:01:55 From nat to Everyone:

Yes, tipping and not sure if death happens before or after. more than Armillaria - I collected a bunch of fruiting bodies

14:06:04 From Sarah Garlick to Everyone:

\* What opportunities exist for leveraging this idea for other research questions?

\* How can we design this experiment to maximize future value?

\* Are there existing efforts or sensitive areas that this project could negatively impact?

\* Are there other existing datasets that could help to inform the sampling design or data analysis?

\* Discuss the proposed plot locations. Do we need to make any amendments to the criteria for site locations?

\* What things should we measure?

14:43:33 From Sarah Garlick to Everyone:

<https://app.sli.do/event/zkxctdrq>

14:43:37 From Matthew Vadeboncoeur to Everyone:

safety will be a concern all across the ash-heavy parts of the forest for quite a while! this will affect many projects beyond just us

14:45:04 From Matthew Vadeboncoeur to Everyone:

I just remembered one thing I missed - Amey mentioned that the one place we might be able to find a younger cohort of ash would be in the low-mid elevations of W101. I think that's really worth looking into!

14:46:40 From ASRC ESI to Everyone:

Peter Groffman, glad to help with a RAPID proposal.

14:47:23 From Scott Bailey to Everyone:

next step re: possible soil morphology/chemistry monitoring & inclusion of black ash

14:48:47 From Anthea Lavalley (she/her) to Everyone:

Happy to help with next steps in terms of outreach, if that would be useful

14:50:49 From Nick Rodenhouse to Everyone:

Birders should be involved, so I would like to stay engaged

14:52:00 From Matt Ayres to Everyone:

We will share a package of materials from Don Grosman on environmental studies on emamectin benzoate.

14:54:32 From Matthew Vadeboncoeur to Everyone:

agreed, Nick - it's an odd project design but the way I look at it is that the non-protected trees are the "impact" or "treatment" side of the study. The protected trees are the reference or baseline that we're comparing them to in terms of ecosystem processes

14:55:47 From Joseph Docola to Everyone:

next step re: tree injection methods

14:59:34 From Sarah Garlick to Everyone:

<https://drive.google.com/drive/folders/1LyhNgWWOD27Dfe-3GbaBP06DGFga02Pu?usp=sharing>

14:59:43 From Sarah Garlick to Everyone:

<https://docs.google.com/document/d/1nyO8aFNn-ckL1DINQO-W2-Y9yOkgb9lCm0EfYjvYa20/edit>

15:01:07 From Sarah Garlick to Everyone:

[https://docs.google.com/document/d/1qQu6PQqGMP3\\_fYuckWyvgRkWSPfDjdK4SlgYFYT4IVY/edit](https://docs.google.com/document/d/1qQu6PQqGMP3_fYuckWyvgRkWSPfDjdK4SlgYFYT4IVY/edit)