

HOPKINS MEMORIAL FOREST

The Year in Review

2017-2018



Center for Environmental Studies

Williams College

December 2018

SUMMARY

September 2017 through August 2018

This year continued to feature a full slate of activities at Hopkins Memorial Forest (HMF), Williams College's environmental field station. Just at the end of the reporting we hosted the ninth annual Bioblitz, which attracted scientists and nature enthusiasts from around the region. Much time was spent during the year working with partners to plan this event.

Researchers from the University of Basel in Switzerland conducted the first full year of field work and data collection for their study of the causes of geographic distribution limits in lyre-leaved rock-cress (*Arabis lyrata* var. *lyrata*) begun last year. Graduate students Antoine Perrier and Dario Sanchez Castro, of France and Spain respectively, established and planted their nursery near the Rosenberg Center, had the site monitored with the assistance of Williams personnel, and returned to process their data. The field component of their study will continue in part for another year at its HMF location.



We implemented another round of mowing treatments prescribed in the protocol of Joan Edwards' study of differential mowing regimes and their effects on late season wildflowers and pollinators. The fall featured another round of sampling all flowering individuals within the plots; Hopkins Forest caretakers were instrumental in assisting in this process. In addition, Prof. Edwards and her student assistants continued their study of population dynamics of garlic mustard at three sites in the Forest.

In addition to continuing their long-term meteorological and geochemical monitoring activities, David Dethier and Jay Racela published a paper looking at trends in acid deposition and neutralization from two headwater streams. Once again the Northern saw-whet owl banding station was in full operation during fall 2017 and we completed the annual breeding bird surveys in June 2018.

The Forest continued to serve as a focal point for College and regional educational programming. Indeed, Williams College Biology, Geosciences, and Environmental Studies classes made regular use of it for field trips and study sites and Winter Study courses were also active there. Classes from other regional colleges, including Massachusetts College of Liberal Arts (MCLA), visited for academic activities as well.

We continued our partnership with the Williams Center for Learning in Action (CLIA) and local school districts to carry out elementary school outreach programs during the spring and fall. Through the academic year ten Williams student educators were engaged in planning and leading 17 curriculum-based programs for regional schools. Student caretakers were again instrumental in helping us host a variety of public events highlighted by the annual Fall Festival and Maplefest. As usual the forest was used extensively for recreation, special permit deer hunting, and maple syrup production.

We continued to work with the Natural Resource Conservation Service (NRCS) on the conservation plan for our Pownal, VT parcel begun in 2014. This year the major effort was a 23-acre thinning and stand improvement treatment, which was completed in November.

In addition to our normal operations and maintenance activities, this year featured a refurbishing of the 50-meter Meteorological Tower (MET) atop the Taconic Crest. A contractor was brought in to assist with this three-day job that resulted in updating of the 13-year old sensors and the replacing of some aging hardware.

RESEARCH and MONITORING

The following scientific studies were underway during the past year.

Lyre-leaved rock-cress (*Arabydopsis lyrata*) Genetics

This year graduate students Antoine Perrier and Dario Sanchez Castro undertook their study of the causes of geographic distribution limits in plants using lyre-leaved rock-cress (*Arabydopsis lyrata* var. *lyrata*). This involved establishing a nursery with 1400 potted specimens of *A. lyrata* of different geographic stock in the field to the southeast of the Rosenberg Center. This nursery was monitored



Lyre-leaved rock cress
Rosette (over-winter form)

throughout the winter with the help of field cameras and the assistance of Debra Rogers-Gillig of the Biology Department (and HMF seasonal gardener). In addition to germination and survivorship counts, Debra weeded and thinned each pot down to one individual shortly after germination in the fall 2017 and kept the pots hydrated as needed.

In late spring and summer 2018 Perrier and Sanchez Castro returned to Williamstown to do final survivorship counts and take measurements of fitness (growth, reproduction, vigor, etc.) of the surviving plants. During late summer and into fall 2018 the researchers were busy analyzing their data to assess the resiliency of different geographically selected genotypes to overwintering in HMF (and four other sites in eastern North America). A second objective of this study is to test the “drift-load” hypothesis, which is

that hybrids from individuals taken from throughout each population fare better than offspring from parents taken from only the edge of a given population, where numbers are low and isolation and inbreeding tend to be high.

The team will use the nursery for another year to assess the over-wintering survivorship of individuals that were still alive after one full year (somewhat unexpected in this species). Additionally they will continue to use the site to over-winter seed stock of *A. lyrata* to test for cold hardiness of ungerminated seed from disparate populations.

Berkshire Bioblitz

On September 15/16, 2018 Hopkins Forest hosted the ninth annual Berkshire Bioblitz. The weekend featured warm and fair conditions and it attracted about 125 participants in addition to the registered scientists and volunteers. Aside from the scientific surveys, the event featured a number of educational sessions and guided walks, fellowships for area teachers, and a cook-out dinner and lunches for participants.

During the run-up to this event we spent considerable time working with the Berkshire Environmental Action Team (BEAT) and other partners to plan and prepare protocols, logistics, publicity and hospitality. In addition, we recruited approximately 30 scientists and naturalists to conduct taxon-specific surveys of various parts of the forest. Each search route was documented using GPS coordinates. A wide array of organisms ranging from fungi to algae to leaf miners to benthic macroinvertebrates to vascular plants and vertebrates was covered. At the time of writing the results were still being compiled; they will be reported soon.



Mammal trapping during the Bioblitz

Aside from BEAT, we had many partners in planning and carrying out the Bioblitz. Two among them merit special mention: Elizabeth Kolbert, whose vision helped to inspire and shape the event and Kaatje

White, of the Williams Center for Learning in Action, who was instrumental in outreach and providing funding for teachers.



Mitch Zajac in freshly mown plot, July 2018

Mowing Patterns and Their Impact on Flower Production and Pollinator Activity

Joan Edwards' study of the effects of differential mowing regimes on fall wildflowers and their pollinators continued this year. The goal of this study is to assess the impact of both timing and frequency of mowing on flower production and pollinator activity. The sixteen plots are divided into four blocks with treatments in a full-factorial randomized block design. This year, according to the schedule, we implemented both the annual and biennial treatments (eight plots were mowed in July with eight more slated for late October). During autumn 2017 faculty and students, including Hopkins Forest caretakers, spent time gathering data on the plots.

Garlic Mustard (*Alliaria petiolata*) in Three Different-Aged Stands

Three distinct sites -- early successional (near the Rosenberg Center), mid-successional (Red Oak Stand) and late-successional (Beineke Stand) -- have been the focus of Joan Edwards' garlic mustard study, which entered its 19th year. This ongoing investigation involves a complete annual survey of the three sites in mid-July when researchers count all rosettes, reproductives and seeds in 0.5m x 0.5m permanent quadrats. This year's field surveys were conducted by Kimberly Andreasson '20 and Patrick Zhuang '21 (Table I).

Ant/Tree Hopper Mutualism

Manuel Morales, going on leave, did not conduct field work on his continuing investigation of an insect-based mutualism in goldenrod fields during the summer, instead focusing his attention on lab work. The fields that host the study have not been mown in a few years and will be treated in the fall 2018.

Long-term Vegetation and Land-Use History Studies

No field work this was conducted during the summer of 2018 as Professor Art was on leave.

Table I. HMF Undergraduate Student Researchers—Summer 2018.

Student	Supervisor	Project
Kimberly Andreasson '20	Edwards	Garlic Mustard /pollinators
Patrick Zhuang '21	Edwards	Garlic Mustard
Maya Spalding Fecher '21	Racela	Hydro/Meteorology; Lab assistant
Morgan Dauk '21	Racela	Hydro/Meteorology; Lab assistant
Zoe Loughman '19 (University of Hartford)	Racela	Hydro/Meteorology; Lab assistant

Northern Saw-whet Owl (NSWO) Migration Banding

With the collaboration of Dr. Ken Schmidt of Texas Tech University, the Northern saw-whet owl (*Aegolius acadicus*) banding station was active once again in autumn 2017. We used our customary single-tier array of four 12-meter nets (with an audio-lure) along a trail south of the Rosenberg Center to catch migrating owls. The station was open on dry, calm evenings between October 1st and November 17th (a total of 35 nights of operation). During this period we

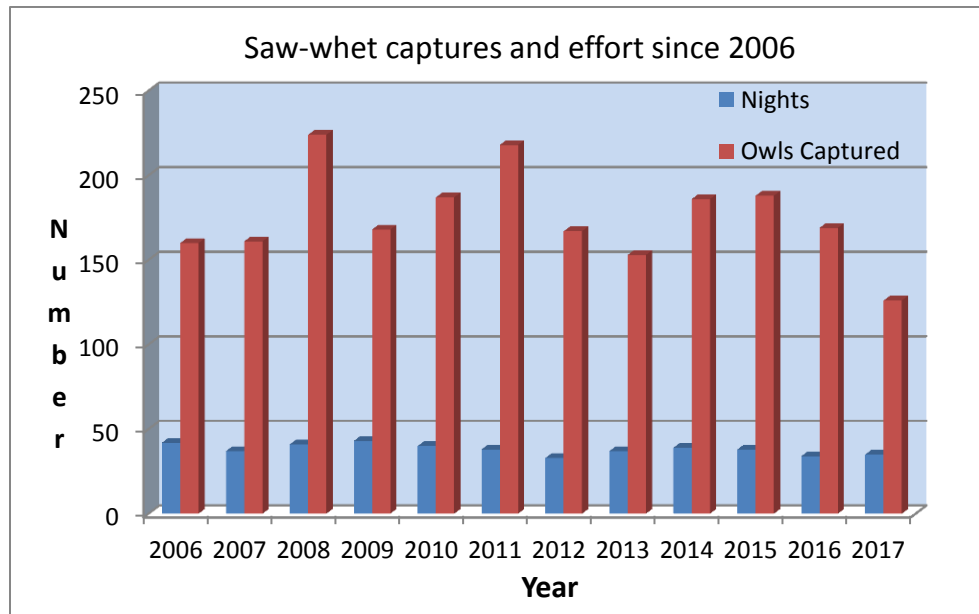


Saw-whet owl net lane

captured 126 individual saw-whet owls (Figure I) including nine that had been previously banded at other stations.

The HMF station also served as the basis for education, hosting visits from Williams Biology classes as well as Environmental Science and Biology classes from MCLA and Berkshire Community College. In total, the station attracted 217 registered visitors during the season.

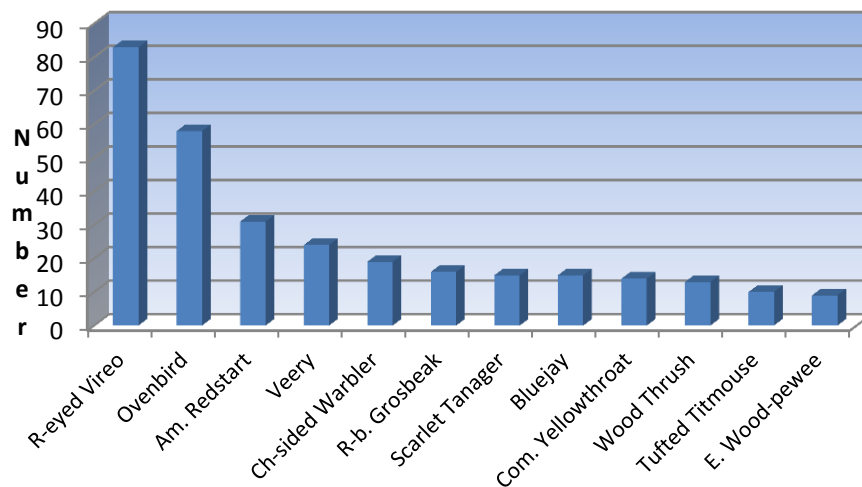
Figure I. Saw-whet Owl Banding Results.



Breeding Bird Point Surveys

In June 2018, I sampled singing males at the 44 breeding bird monitoring points around the Forest for the 18th consecutive year. The year's total of 420 individuals was low for this site while the number of species, 50, was somewhat typical. This year the most abundant species were the red-eyed vireo, ovenbird, American redstart, veery and chestnut-sided warbler (Figure II). These points will continue to be surveyed on an annual basis.

Figure II. Most abundant bird species from 2018 point surveys.



Watershed/Meteorological Monitoring (Environmental Analysis Lab)

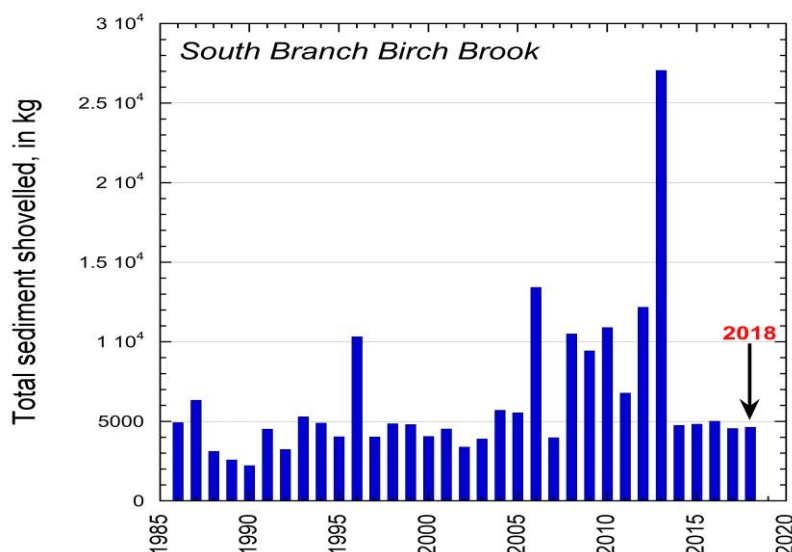
As in previous years, the Center for Environmental Studies' Environmental Analysis Lab--under the guidance of David Dethier (Geosciences) and Lab Supervisor and Lecturer Jay Racela--continued to gather, analyze and archive meteorological, hydrological and biogeochemical data from the forest and surrounding areas. Four standard weather stations, one 50-m tower and two stream gaging stations, all using digital data loggers, ran continuously throughout the year. Data from the main weather station are streamed to the campus information network and displayed (<http://geosciences.williams.edu/weather/>) along with data from the Taconic Ridge 50-m MET tower and the Morley Science Labs photovoltaic array. We also continued bi-weekly and monthly collection and laboratory analysis of rain and stream water, respectively, as part of ongoing forest geochemical research that focuses on acid deposition (1983-present) and how it and other pollutants are "processed" by the forest ecosystem.

The biggest news coming out of the Envi Lab this year: after collection more than 30 years of hydrological and geo-chemical data from our research stations in Hopkins Memorial Forest, we successfully published a subset of the data! The manuscript entitled: *"Thirty-year trends in acid deposition and neutralization in two headwater catchments, northwestern Massachusetts, USA,"* appears in *Hydrologic Processes*, vol. 32, iss. 23, pgs. 3464-3478.

Working with the Office of Information Technology (OIT), the main weather display site previously mentioned was upgraded to a Wordpress format to align it with the rest of the college sites and to enhance security.



During November 2017 we hired technicians from NRG Systems to perform much needed maintenance on our Taconic Ridge 50-m MET tower, which they had installed in November 2004. With their help and proper equipment, we lowered the tower, replaced the 13-year old wind speed and direction sensors with new ones, and upgraded the data-logger to enable continued operation. Due to mechanical difficulties and the lack of available daylight, the job took a day more than anticipated but still came in within the budgeted cost.



Once again HMF and lab personnel and volunteers dredged and weighed sediment in the weirs along the South Branch and Main Stem of Birch Brook in August. Similar to the previous four years, the sediment load removed from the South Branch weir was about average, reflecting average streamflow from the fall of 2017 through the summer of 2018 and the absence of large precipitation events (Figure III).

Figure III. Record of annual sediment transport at the South Branch Birch Brook gaging station.

Maya Spalding Fecher '21, Morgan Dauk '21, and Zoe Loughman (Univ. of Hartford '19) worked as research assistants with Jay Racela during the past summer. During their tenure, in addition to regular field and lab research duties, Maya, Morgan and Zoe worked with Molly Lohss '21, Summer-Solstice Thomas '20, Jose Constantine, Nick Howe, and Lauren Stevens of the Hoosic River Watershed Association (HooRWA) to analyze and survey both the thermal and physical characteristics of several tributaries of the Hoosic River. From the summary they produced, HooRWA may have a better understanding of the effect of these tributaries on the Hoosic River temperatures and ultimately its trout population.

Students, faculty and staff shoveling and weighing accumulated sediment in the South branch of Birch Brook, July 2018. (picture by Brad Wakoff)



EDUCATION and OUTREACH

Undergraduate Classes

During the fall semester, BIOL/ENVI 203 -- *Ecology* (Ronald Bassar) held about half of the course's lab sessions at the Forest. ENVI 102 -- *Introduction to Environmental Science* (Cook and Carasquillo) again used HMF for its lab exercise on sampling tree biomass and carbon estimation in the spring. BIOL 102-- *The Organism* (multiple instructors) made visits for laboratory exercises on amphibian breeding and plant development in the spring and BIOL 220—*Field Botany and Plant Natural History* (Art) came out for several investigations. Several Environmental Studies courses (Nicolas Howe, Laura Martin and Elizabeth Kolbert) explored various stretches of the forest in their classes as well.

Perhaps most noteworthy, Mea Cook introduced an intensive lab investigation for her course GEOS 405-- *Geochemistry*. This lab, which used field sampling to gather plant and animal material for stable isotope analyses, ran daily for the better part of two weeks.

For a fifth consecutive year, HMF provided the venue for the Winter Study Course, BIOL 18 -- *Animal Tracking* with Dan Yacobellis. In addition, Nicholas' Whitman's Natural Photography course made use of the forest for subject inspiration.

MITs Teachers Workshop

This summer we again hosted a workshop for science teachers sponsored by the Museum Institute for Teaching Science (MITs). This year it was a shorter program as Jay Racela and I led a walk that focused on questions of forest carbon and hydrologic cycles.

Elementary Education

This was our sixth year partnering with the College's Center for Learning in Action (CLIA) to provide field-based educational experiences for regional elementary school classes. Working with Lindley Wells, we hired a team of Student Educators (Table II) to develop place-based outdoor education curricula and host field trips for elementary schools. There were a total of nine programs in the fall involving 374 children from elementary schools around our region.

In the spring, our team of Educators hosted a series of eight programs (293 children total) for elementary schools from throughout North Berkshire County. The spring field trips highlighted themes of maple sugaring and biodiversity. Two ended up being deferred into the summer season and were therefore hosted by our summer caretaker crew. The student educators were employed by CLIA, while Hopkins Forest provided funds for transportation to several schools that requested such assistance.

Summer 2018 saw a continuation of youth education programs as the caretakers hosted two visits from the Williamstown Children's Center.

Table II. Student Educators 2017-18.

Michael Chen '18	Maddie Grant '18
Grace McCabe '18	Kimberly Andreasson '20
Natalie DiNenno '18	Megan Powel '20
Katy Dix '18	Alec Wyatt '21
Natasha Baranow '18	Danielle Sturm '21

Community Events

Once again HMF hosted a variety of events for the public and College community:

- **Fall Festival**— Saturday, September 30th. On a chilly, overcast afternoon 211 people come out to partake of the traditional activities including shake-splitting, cross-cut sawing, apple butter and cider production and live music. Unfortunately, the canopy walkway had to be closed due to drizzle.
- **Pollinator Walk**— On October 1st Joan Edwards led a community educational walk designed to point out fall wildflower diversity and the role of insect pollinators, especially bees, in their propagation. She was joined by 38 local residents.
- **Animal Tracking**— Naturalist Dan Yacobellis conducted his annual wildlife tracking workshop on February 10th 2017. This year we divided the program into two shorter walks which seemed to work well; 27 people, many Williams students, took part.
- **Maple Festival**— “Maplefest” was staged on Saturday, March 10th. Thanks to the more seasonable conditions this year, the event drew 219 people to take part in maple sugaring related activities and to taste HMF-produced syrup served over pancakes and 'on snow'.
- **Amphibian & Reptile Program**— Tom Tynning of Berkshire Community College led his annual amphibian foray in Hopkins Forest on Saturday, April 14th. The event attracted about 30 people including Williams students and local families.
- **Birdwalk**— On Saturday May 28th, with assistance from Alec Wyatt '21, I lead a birdwalk for students and local bird enthusiasts, 11 in total.
- **Wildflower Foray**-- A week later, on a cool Saturday morning, Hank Art led a wildflower walk for 17 community members. Due to the cool spring many of the blooms were behind schedule this year.
- **Alumni Day**— We again offered a variety of activities, including a bird walk, two hikes, canopy walkway, and children's activities during this year's Alumni Weekend (June 9th). The fair weather helped to attract solid numbers of participants to each activity including the student-led hike on the Taconic Crest Trail.

RECREATION

This past year numerous hikers, joggers, horse-back riders, skiers, and nature observers took to the trails of the Forest in their recreational pursuits. This year saw an uptick in reports of lost or distressed hikers: on three occasions from March to July we had to send crews of volunteers out on the trails to retrieve hikers, none of whom turned out to be seriously injured in the end, although one did require treatment in a local hospital. Search and rescue teams from local jurisdictions in New York, Massachusetts and southern Vermont were involved in two of these “rescues”.

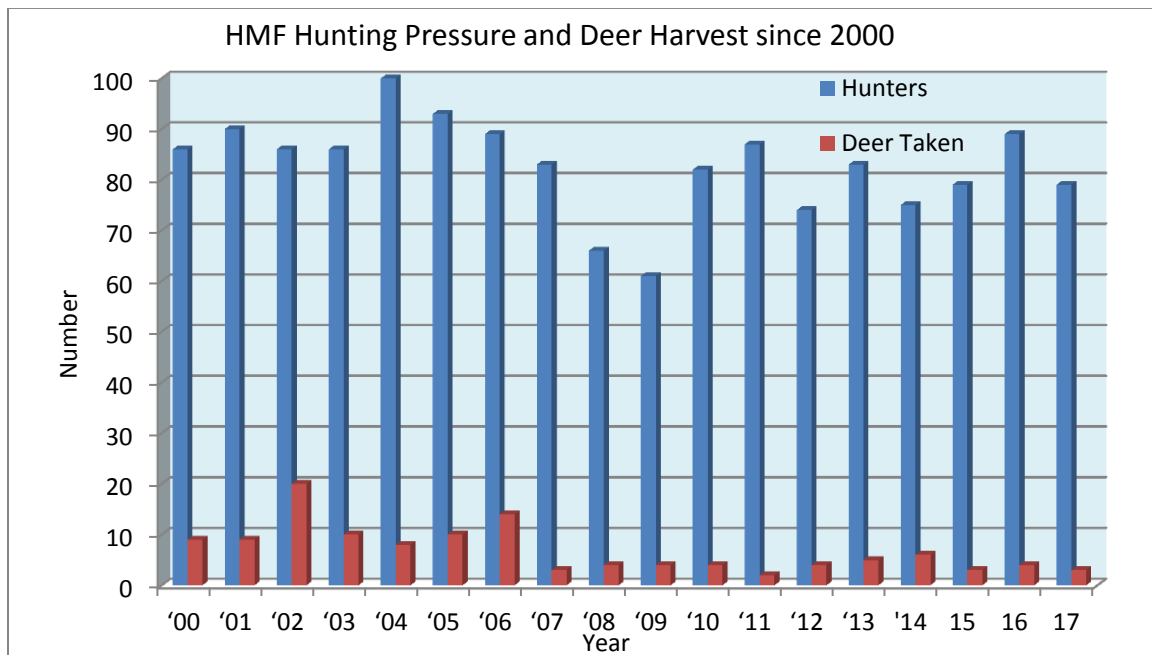
Williams Outing Club (WOC)

The Outing Club cabin accommodated overnigheters regularly and it was integral to our hosting of the *Maplefest* event in March 2018. The Outing Club lean-to was used by students for First-year orientation activities.

Hunting

The 2017 special permit shotgun hunt for deer went off without a hitch. During the 12-day season seventy-nine registered hunters harvested three white-tail deer according to our unofficial sign-in. This hunting pressure and harvest rate is consistent with levels going back to 2007 (Figure IV). Once again Williams College security officers were hired to provide surveillance during the busiest days of the hunt. With their help the season ran smoothly and no major problems were reported.

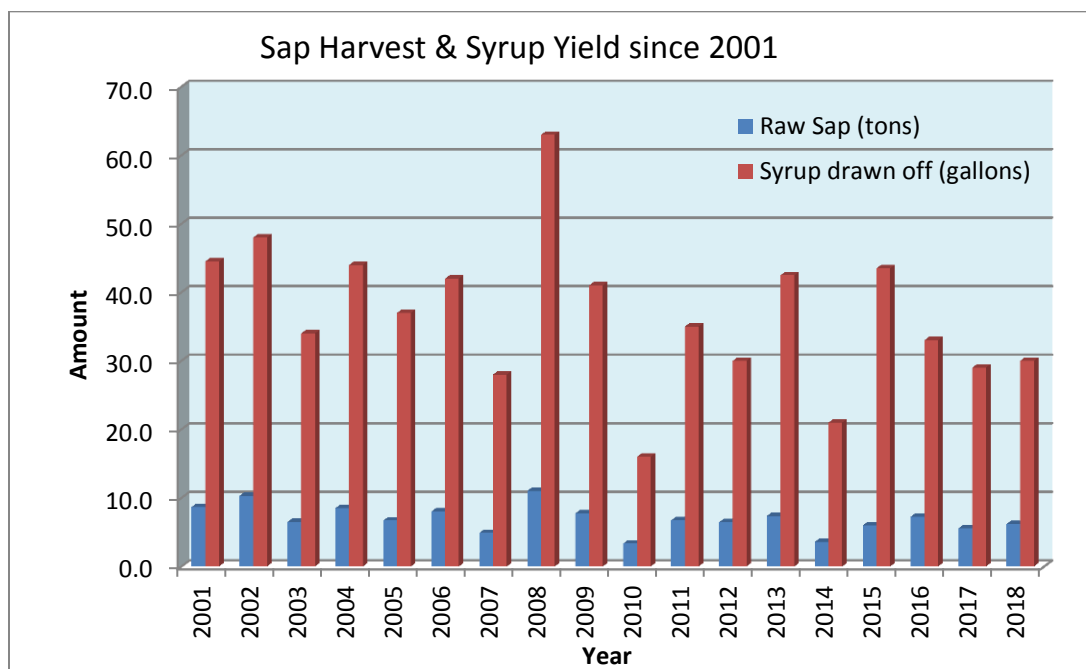
Figure IV. HMF Deer Hunting Results.



MAPLE SYRUP PRODUCTION

The 2018 maple syrup season was another underwhelming one in terms of production -- with 30 gallons of raw syrup produced for the second year in a row (Figure V). This quantity was boiled from a total of 1560 gallons of raw sap collected by student caretakers. This year's sap was low in sugar content, averaging just 2.13 percent, thus explaining the rather low yield of finished syrup. Again the Hopkins Forest sugar house served as the focus for several school field trips and our annual “Maplefest” celebration.

Figure V. Hopkins Forest Maple Syrup Production 2000-2018.



LAND MANAGEMENT & CARETAKING

Forest Management—Vermont Parcel

During fall 2017 we implemented a forest stand improvement treatment on 23 acres near the top of the Taconic Range. This treatment was designed primarily to regenerate northern hardwood stands that were beleaguered by beech bark disease. To this end many infested pole-size beeches were removed to favor more vigorous yellow birch, sugar maple and red oak trees. In between the patches we did single tree thinnings to release potential timber crop trees, mostly of the same three species. The work was laid out by Calfee Woodland Management, LLC of Dorset, Vermont and the cutting itself performed by Marshal Squier of Tinmouth Vermont, who had done several other jobs on the parcel in the past. The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture provided funding for most of the work by way of our 2014 contract (Table III).

We were scheduled to have a prescribed burn done on 25 acres of the lower slopes of the parcel in spring 2018; however the contractor, Fire Management Services, Inc., declined to go ahead with the job, citing costs and operational challenges with the site. To this point we have not found another company to do the job and it remains to be determined if/when this practice will ever take place.

Table III. Summary of the remaining practices supported by the 2014 contract with the Natural Resources Conservation Service.

Practice	Purpose	Scope	Progress
Forest Health/Stand Improvement	Pre-commercial Thinning	23 acres	Completed fall 2017
Prescribed Burning	Prescribed Burn Implementation	25 acres	Postponed until spring 2019

Wire Bridge Farm

Joel Burrington of Pownal, Vermont continued to cultivate hay on the Wire Bridge Farm. No academic activities involving the farm took place during this year although the area continued to be used occasionally for recreation and wildlife viewing.

Roads/Trails

Again caretaking crews performed routine trail maintenance throughout the forest. This year we made a special effort to blaze some of the more remote trails and to update signs, especially on the Taconic Crest. In June 2018, the entry road to the Rosenberg Center was resurfaced and graded by a contractor hired by the College's Facilities Department.

Caretaking

As is customary we employed student caretakers to assist with maintenance, upkeep and outreach activities in the Forest (Table IV). Each semester had crews of six to twelve students, each working three to six hours per week. This year we had an increase in interest and more robust crews, especially during the fall semester (pictured on title page). Beyond their routine duties, maintenance, groundskeeping, etc., these teams assisted with research activities in addition to maple syrup production and hosting our two main public events -- *Maplefest* and the *Fall Festival*.



Table IV. Student Caretakers academic year 2017-18.

Katy Dix '18	Anna Lietman '20
Jonah Levy '18	Jared Bathen '20
Maria Hanson '18	Forest Williams '20
Conor Dunham '18	Abraham Steinberger '20
Maria Hanson '18	Kenneth Marshall '20
Christopher Washington '18	Cristina Mancilla '20
Kieran Scannell '18	Isabelle Furman '20
Liliana Bierer '19	Alex Wyatt '21
Matias Korfmacher '19	James Fitzgerald '21



A seasonal caretaking crew comprising William Keating '19 and Cleveland Lavalais '21 was employed for 10 weeks during the summer of 2017. The crew worked on many of the regular summer tasks—mowing, gardening, grounds-keeping, trail and water-bar maintenance, controlling invasive vegetation, blazing trails and making new trail signs. They also served as docents for our summer educational and outreach programs including the Alumni weekend.

Rounding out our summer crew, Debra Rogers-Gillig again served as part-time seasonal gardener, focusing on the Buxton Garden. Debra has been crucial to the rejuvenation and flourishing of the garden over the last several summers. In addition to her gardening expertise, Debra contributed substantially to the *Arabidopsis* study throughout the year.

FACILITIES

Rosenburg Center/Moon Barn

The Rosenburg Center continued to function as a focal point for classes, lab set-ups, public events, and school field trips as well as an exhibit space for visitors. The Moon Barn was also used as public exhibit space during special events such as the Fall Festival and school visits. Due to a shortage of outdoor storage structures, we continue to have to use part of this historic building for storage. It is in need of rewiring to get the lighting back up and running.

Canopy Walkway

This year the canopy walkway was open during the summer alumni event. In May 2018 the walkway was inspected by Canopy Construction Associates.

FUTURE – What's in store for 2018-19?

In the coming year we will continue to facilitate and expand our educational and research activities at Hopkins Forest. This will include introducing a new monitoring study of stable isotopes in aquatic and soil ecosystems, which will be headed by Dr. Mea Cook in collaboration with Jay Racela. In addition we will aim to accommodate the research and teaching needs of the incoming Biology Faculty member (Ecologist) to the full extent possible.

We will continue to support ongoing research, including the study of differential mowing regimes on late season wildflowers and pollinators. Additionally, the *Arabidopsis* will be in its final stages as researchers return to make final tallies of plant and seed survivorship.

We will continue our efforts to broaden the scope and quality of both undergraduate class use and elementary school field trips in the Forest.

Lastly, in fall 2019 the Center for Environmental Studies will host a visiting committee that will review our programming. Of course, as the Forest is an integral part of the Center, we will be involved with this process to the appropriate extent.

Special thanks to Jay Racela, Dee Dee Lewis and Roger Bolton for their contributions to this report.