

**EAST LYME COMMISSION FOR THE CONSERVATION OF NATURAL RESOURCES
REGULAR MEETING MINUTES
MAY 8, 2019**

Present: Arthur Carlson, Chairman
Penny Heller, Secretary
Laura Ashburn, Member
Harvey Beeman, Alternate
Ron Nichols, Alternate

Absent: Don Danila, Member
Mark Christensen, Member

FILED IN EAST LYME
CONNECTICUT
May 20, 2019 AT 11:16 AM/PM
Penny Heller
EAST LYME TOWN CLERK

Also Present: Rosemary Ostfeld, Associate Professor at Wesleyan

CALL TO ORDER

Chairman Carlson called the May 8, 2019 Conservation of Natural Resources Regular Meeting to order at 7:05 p.m. Mr. Nichols and Mr. Beeman were asked to be seated.

I. PUBLIC DELEGATIONS

There was no comment at this time.

MOTION (1): Ms. Ashburn moved to add to this evening's Agenda under Old Business D. POCD Update and E. Stream Sampling. Seconded by Ms. Heller. (5-0) Unanimous.

II. MINUTES

A. Mr. Carlson asked for additions, deletions or corrections to the April 10, 2019 Conservation of Natural Resources Regular Meeting Minutes. (See corrected minutes).

MOTION (2): Ms. Heller moved to accept the April 10, 2019 East Lyme Commission for the Conservation of Natural Resources Minutes, as corrected. Seconded by Mr. Nichols. (5-0) Unanimous.

III. NEW BUSINESS

A. **Recycling – What, How.** Ms. Ashburn reported her students did a display case at the High School on recycling.

The Commission wishes to publish information on recycling in the Parks and Recreation September edition of East Lyme Events.

IV. OLD BUSINESS

A. **Progress in Putting Water Study Report Together.** Mr. Carlson reported the Water Study Report was reviewed by Brad Kargl, Municipal Utility Engineer, and Gary Goeschel, Planning Director. Its ready to go to press.

B. **Work on the Goodwin Trail.** Mr. Nichols expressed concern over ticks and mosquitos on the

Goodwin Trail. Mr. Carlson has contacted Mr. Putnam, Director of Parks and Recreation, regarding regular mowing of it, as well as the other walking paths on the Darrow Pond property.

C.SustainabilityCT.org. Ms. Heller reported the Town now has 50 points and needs 150 more points. The Subcommittee met prior to this meeting and discussed tasks that need to be shared to meet the August deadline for submission. Four hours from an Equity Coach are needed.

Ms. Ostfeld informed the Commission this semester her students worked on Sustainability Concepts in Action. (See attached Action 4.1).

The students suggested intergrating bike paths and pedestrian walking paths. Mr. Carlson felt East Lyme roads are very narrow and that white striping is needed.

D.POCD Update. Ms. Ostfeld informed the Commission her students have reviewed the current East Lyme POCD and have made recommendations.

E.Stream Sampling. Ms. Heller read correspondence she received from Don Danila, dated May 1, 2019 regarding DEEP RBV Report/Niantic River Watershed Plan Update. DEEP indicated that it feels Latimer Brook and CMB are healthy brooks. He will inform the Niantic River Water Commission that this Commission wishes to receive an invitation to participate in one of the upcoming public meetings.

V. REPORTS AND COMMUNICATIONS

A.Communications. There were no communications.

B.Agribusiness Subcommittee. Mr. Christensen was unable to be present, and there was no report.

C.Chairman's Report. Mr. Carlson distributed information on Greenhouse Gas and Nature Conservancy Summer 2018 article on the value of forests. He recommended reading Bright Future, a book on reducing carbon in the atmosphere over the next ten years by approximately 50%.

D.Ex-Officio Report. Ms. Hardy was unable to be present and there was no report.

VI. ADJOURNMENT

MOTION (3): Ms. Ashburn moved to adjourn the East Lyme Commission for the Conservation of Natural Resources May 8, 2019 at 8:20 p.m.
Seconded by Mr. Nichols. (5-0) Unanimous.

Respectfully submitted,

Frances Gheri, Recording Secretary

CORRECTED
EAST LYME COMMISSION FOR THE CONSERVATION OF NATURAL RESOURCES
REGULAR MEETING MINUTES
APRIL 10, 2019

Present: Arthur Carlson, Chairman
Penny Heller, Secretary
Don Danila, Member
Laura Ashburn, Member
Christensen Mark, Member
Harvey Beeman, Alternate
Ron Nichols, Alternate

CALL TO ORDER

Chairman Carlson called the April 10, 2019 Conservation of Natural Resources Regular Meeting to order at 7:05 p.m.

I. PUBLIC DELEGATIONS

There were no guests.

MOTION (1): Mr. Danila moved to add to this evening's Agenda under New Business POCD Update. Seconded by Ms. Heller. (6-0) Unanimous.

II. MINUTES

A. Mr. Carlson asked for additions, deletions or corrections to the March 13, 2019 Conservation of Natural Resources Regular Meeting Minutes.

MOTION (2): Mr. Danila moved to accept the March 13, 2019, East Lyme Commission for the Conservation of Natural Resources Minutes, as presented. Seconded by Ms. Ashburn. (6-0) Unanimous.

III. NEW BUSINESS

A. Recycling – What, How. Ms. Heller agreed that Mr. Danilla would contact the Public Works Department to determine how this Commission can help educate the public on recycling through the SustainabilityCT program the town has just signed on to.

B. POCD Update.

Mr. Carlson agreed to ask Mr. Goeschel to keep this Commission informed on the progress of the POCD. Mr. Carlson will update them on this Commission's Open Space Plan and Water Study Report.

IV. OLD BUSINESS

A. Progress in Putting Water Study Report Together. Mr. Carlson felt Mr. Goeschel did an excellent job on the Water Report: Protecting Drinking Water in East Lyme. A copy of the Water Study Report has been given to Brad Kargel with a request for his comments.

Mr. Danila reported on April 6 he attended a Water Monitoring Conference. An Environment Attorney

and a representative of DEEP were in attendance. The attorney informed all that residents and public comments are accepted.

Mr. Danila plans to attend a workshop sponsored by the Nature Conservancy on May 2 10:30 a.m. to 12:30 p.m. at Mystic Seaport Museum promoting healthy water

B.Work on the Goodwin Trail. Mr. Carlson expressed concern about motorcyclists speeding on the Goodwin Trail.

C.SustainabilityCT.org. Ms. Heller reported we will meet with Mr. Goeschel and Colleen Dollard from Eastern Connecticut State College on April 24 to attend a workshop on the overview of the program as it pertains to Zoning. The Subcommittee will meet on May 8 to continue its work on the SustainabilityCT.org.

V. REPORTS AND COMMUNICATIONS

A.Communications. There were no communications.

B.Agribusiness Subcommittee. Mr. Christensen reported we are planning on being in the Memorial Day Parade and will request Tim Londregan to join us.

A workshop will be held in May on septic systems for the Agribusiness Subcommittee. Mr. Danila reported Pat Young will give a power point presentation on septic systems.

Mr. Dinsmore made application to the Zoning Commission regarding regulations for bees on one-quarter of an acre lot zoned R-10. The regulation passed 5-1.

The state beekeeper came to East Lyme in March and reported bee hives are a structure and you cannot have it on a neighbor's property. It is also not allowed in a commercial zone.

C.Chairman's Report. The Chairman had no other comments.

D.Ex-Officio Report. Ms. Hardy was unable to be present and there was no report.

VI. ADJOURNMENT

MOTION (3): Mr. Danila moved to adjourn the East Lyme Commission for the Conservation of Natural Resources April 10, 2019 at 8:30 p.m.
Seconded by Ms. Heller (6-0) Unanimous.

Respectfully submitted,

Frances Gheri, Recording Secretary

Action 4.1 Sustainability Concepts in Action

As you integrate the following sustainability concepts into your community's Plan of Conservation and Development and/or Zoning Regulations, consider the following examples. Concepts must be integrated in a meaningful way to receive credit.

CONCEPT I. LAND USE ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence on fossil fuels, underground metals, and minerals by promoting:

1. Compact development that minimizes the need to drive.
2. A mix of integrated community uses — housing, shops, workplaces, schools, parks, civic facilities — within walking or bicycling distance.
3. Human-scaled development that is pedestrian-friendly.
4. Public transit-oriented development.
5. Home-based occupations and work that reduce the need to commute.
6. Local food production and agriculture that reduce the need for long-range shipping.

B. Reduce activities that encroach upon nature:

1. Guide development to existing developed areas and minimize development in outlying, undeveloped areas.
2. Maintain a well-defined "edge" around each community that is permanently protected from development.
3. Remediate and redevelop brownfield sites and other developed lands that suffer from environmental or other constraints.
4. Promote regional and local designs that respect the regional ecosystems, biotic corridors and natural functions which adequately support and protect people and native plants/wildlife.
4. Create financial and regulatory incentives to infill development; and eliminate of disincentives.

C. Meet human needs fairly and efficiently by:

1. Identify the communities impacted by environmental burdens and pollution.
2. Evaluate which communities are disproportionately impacted.

3. Engage in outreach/conversation with those communities. (See the Sustainable CT Equity Toolkit which can be found under "[Resources for your Team](#)").
4. Co-design, with input or in collaboration, with those communities, a plan to eliminate such burdens and pollution.

CONCEPT II. TRANSPORTATION ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence on fossil fuels:

1. Reduce vehicle trips and miles traveled through compact, infill, and mixed-use development.
2. Increase access to, and use of, alternatives to the drive-alone automobile, including walking, bicycling, public transportation, and in the case of communities without adequate population densities to support conventional public transit, strategic implementation steps toward generally broadening mobility options for municipal residents.
3. Calculate the municipality's transit propensity score (a measure of how likely the use of public transportation is), especially as it compares to the current regional and state scores.
4. Develop and use vehicles powered by renewable fuel sources.
5. Design local streets that encourage pedestrian and bicycle use and discourage high-speed traffic.
6. Design streets that support/enhance access between neighborhoods and to neighborhood-based commercial developments.

B. Meet human needs fairly and efficiently, by:

1. Providing access to affordable, efficient transportation alternatives for multiple populations, especially low-income households, elders, and others that cannot or do not own cars (for current and future residents).

CONCEPT III. HOUSING AND BUILDING ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence on fossil fuels, extracted underground metals, and minerals:

1. Design and develop solar-oriented housing & buildings.
2. Use regenerative heating and cooling energy alternatives.
3. Provide housing near places of employment.

4. Select building materials with low "embodied energy," which require less energy-intensive production methods and long-distance transport.

B. Reduce dependence on chemicals and unnatural substances:

1. Use chemical-free and toxin-free building materials.
2. Use eco-friendly, non-toxic cleaners in municipal buildings and encourage residents and business owners to use such cleansers.
3. Reduce waste, recycle building waste materials, and promote recycling by residents.
4. Create a community standard for landscape design that minimizes the use of pesticides and herbicides and promotes native/naturalized landscapes.

C. Reduce activities that negatively impact nature:

1. Reuse existing buildings and sites for development.
2. Develop compact and clustered residential areas with reduced minimum lot sizes.
3. Adopt water conservation measures, to minimize environmentally destructive side effects of developing new water sources.
4. Manage stormwater responsibly by reusing and restoring the quality of on-site runoff (for example, constructed marsh or wetlands systems).
5. Reduce or eliminate impervious paving materials.
6. Use recycled building materials, thus helping to minimize the mining of virgin materials.
7. Use "cradle-to-cradle" (life cycle) analysis when choosing materials and construction techniques.
8. Recycle building construction waste materials and use appropriate deconstruction techniques.

D. Meet human needs fairly and efficiently, by providing for:

1. Communities and housing developments that are socially cohesive, in order to reduce isolation, foster community spirit, and enhance resource sharing (for example, cohousing).
2. Housing within the same community that residents in many levels of income can afford.

3. Diverse occupancy in terms of age, social, and cultural groups.
4. Housing located near employment centers.

CONCEPT IV. ECONOMIC DEVELOPMENT ACTIONS TOWARD SUSTAINABILITY

A. Encourage businesses that reduce dependence upon fossil fuels, extracted underground metals, and minerals; for example, businesses that:

1. Reduce employee and product transport vehicle trips.
2. Use regenerative energy alternatives to replace fossil fuels, or reduce dependence on fossil fuels.
3. Do not use or reduce the use of cadmium, lead, and other potentially toxic metals and minerals that can accumulate in the biosphere.
4. Are locally-based or home-based, reducing or eliminating the need to commute.

B. Encourage businesses that reduce dependence upon chemicals and unnatural substances; for example, enterprises that:

1. Actively seek ways to minimize the use of toxic manufactured substances.
2. Meet or exceed clean air standards.
3. Minimize or reduce use of chemicals and employ proper disposal and recycling mechanisms for these.
4. Use agricultural methods that reduce or minimize use of pesticides, herbicides, and manufactured fertilizers.
5. Use byproducts of other processes or whose wastes can be used as the raw materials for other industrial processes.

C. Encourage businesses that reduce activities that negatively impact nature; for example, enterprises that:

1. Use recycled or by-products of other businesses, minimizing the use of virgin raw materials.
2. Prevent activities that emit waste or pollutants into the environment.
3. Use agricultural approaches that build up rather than deplete topsoil, and conserve or minimize water use.

4. Maintain natural terrain, drainage, and vegetation, minimizing disruption of natural systems.
5. Re-use processed water.

D. Encourage businesses that meet human needs fairly and efficiently; for example, enterprises that:

1. Fulfill local employment and consumer needs without degrading the environment.
2. Promote financial and social equity in the workplace.
3. Create vibrant community-based economies with employment opportunities that allow people economic self-determination and environmental health.
4. Encourage local agriculture, providing a nearby source of fresh, healthy food for urban and rural populations (for example, farmers' markets, community supported agriculture (CSA), independent health-food stores).

CONCEPT V. OPEN SPACE/RECREATION ACTIONS TOWARD SUSTAINABILITY

A. Reduce dependence upon fossil fuels, extracted underground metals, minerals:

1. Provide recreational facilities within walking and bicycling distance.
2. Use local materials and native plants in facility design to reduce transport distances and reduce maintenance.
3. Maintain landscapes and parks with minimal fossil-fuel-powered equipment.

B. Reduce dependence upon chemicals and synthetic substances:

1. Use alternatives to chemical pesticides and herbicides in park and facility maintenance (for example, integrated pest management, planting natives that require fewer inputs).

C. Activities that reduce negative impacts upon nature:

1. Fund open space acquisition.
2. Preserve wilderness areas.
3. Create urban gardens and community gardens.
4. Preserve wildlife habitats and biological diversity in area ecosystems.

5. Establish on-site composting of organic waste.
6. Restore damaged natural systems through regenerative design approaches.
7. Create systems of green spaces and biotic corridors within and among communities.
8. Develop responsible alternatives to solid waste landfills.
9. Use regionally native plants for landscaping.
10. Encourage landscape and park maintenance that reduces the use of mowers, edgers, and leaf blowers.

CONCEPT VI. INFRASTRUCTURE ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence upon fossil fuels, extracted underground metals, minerals, by promoting:

1. Facilities that employ renewable energy sources, or reduce fossil fuel use for operations and transport needs.

B. Reduce dependence upon chemicals and synthetic substances, by promoting:

1. Treatment facilities that remove or destroy pathogens without creating chemically-contaminated by-products.
2. Design approaches and regulatory systems that focus on pollution prevention, re-use and recycling.

C. Reduce activities that negatively impact nature:

1. Promote innovative treatment for sewage and effluent to meet or exceed federal drinking water standards while minimizing or eliminating the use of chemicals (for example, greenhouse sewage treatment facilities).
2. Recognize the "cradle-to-grave" and "cradle-to-cradle" costs of waste generation and disposal.
3. Promote composting and gray-water reuse systems, and remove regulatory barriers to those systems.

D. Meet human needs fairly and efficiently, by:

1. Cleaning, conserving, and reusing wastewater at the site, neighborhood or community level, reducing the need for large, expensive collection systems and regional processing facilities.

CONCEPT VII. GROWTH MANAGEMENT ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence upon fossil fuels, extracted underground metals, minerals, by promoting:

1. Development near existing transport systems; minimizing need for new road and highway construction.

B. Reduce activities that negatively impact nature, by promoting:

1. Appropriate development and population growth policies linked to carrying capacity of natural systems and community facilities.
2. Development patterns that respect natural systems such as watersheds and wildlife corridors.

C. Meet human needs fairly and efficiently, by promoting:

1. Understanding current demographics and projected demographics for the community.
2. Planning and promoting growth management policies that recognize the values of a diverse local population and economy. (See the Sustainable CT Equity Toolkit which can be found under "[Resources for your Team](#)").

CONCEPT VIII. FLOODPLAIN MANAGEMENT ACTIONS TOWARD SUSTAINABILITY

A. Promote activities that provide protection for the community from flooding and other damages:

1. Guide development away from floodplains.
2. Guide development away from barrier beaches.
3. Preserve or restore wetland areas along rivers for natural flood control.

CONCEPT IX. WATERSHED PLANNING/MANAGEMENT ACTIONS TOWARD SUSTAINABILITY

A. Reduce activities that negatively impact nature:

1. Preserve and enhance water quality.
2. Reduce water use.
3. Recharge groundwater basins.

4. Use flood control and stormwater techniques that enhance and restore natural habitats.
5. Prevent wetlands destruction; restore degraded wetlands.

CONCEPT X. RESOURCE CONSERVATION ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence upon fossil fuels, extracted underground metals, and minerals:

1. Minimize energy use.
2. Encourage the development and local siting of renewable energy generation.
3. Discourage the use of products that utilize packaging derived from non-renewable, non-degradable resources.
4. Promote recycling, especially of waste materials derived from non-renewable, non-degradable resources.
5. Develop community gardens that reduce the need for long-range transport of food and associated consumption of fossil fuels.

B. Promote activities that have multiple benefits to the community:

1. Preserve and plant trees and other vegetation that absorb carbon dioxide and air pollutants.

CONCEPT XI. PLANNING PROCESSES/EDUCATION ACTIONS TOWARD SUSTAINABILITY:

A. Reduce dependence upon fossil fuels, extracted underground metals, and minerals; for example, by:

1. Encouraging and enabling residents to use transport other than diesel- and gasoline-powered vehicles.

B. Reduce dependence upon chemicals and unnatural substances; for example, by:

1. Educating citizens and public servants about both short- and long-term risks associated with the use and disposal of hazardous materials.

C. Reduce activities that negatively impact nature; for example, through:

1. Educational efforts to reduce levels of consumption and waste generation at the household and community levels.

D. Meet human needs fairly and efficiently by:

1. **Integrally involving local residents in setting the vision for and developing plans for the community and region.**
2. **Establish avenues for meaningful participation in decision-making for all residents and in particular for historically disadvantaged people.**
3. **Provide for equitable educational opportunities for all members of society.**
4. **Promote retraining of those workers displaced in the short-term by a shift of industries and businesses to a more sustainable economy.**

M

MIKE SCHMALZER AND ROGER UNANGST ARE WALKING through the woods in the Poconos of northeastern Pennsylvania when they come across the duck. Both are members of the Hiawatha Hunting and Fishing Club, whose 1,305-acre property stretches north-south near the Delaware Water Gap and New Jersey.

The downy carcass lies in the leaves next to a fallen red oak. Normally the sight of abandoned game would suggest poaching, but Unangst smiles wryly instead.

"Domesticated duck," he says.

"Muscovy," Schmalzer adds.

The bird was probably a pet that had escaped, most likely from one of the neighborhoods that border the club's western property line. Thirty years ago, when Schmalzer and Unangst joined the club, the adjoining acres were intact woodlands like this, laced with streams and dotted with ponds.

"The houses came in when gas prices were low," Schmalzer says, as he continues into the forest. "Everybody migrated out from New Jersey and New York City." When gas prices rose again, many of the homes went into foreclosure. Some became rentals; others were abandoned altogether.

A lot has changed in these forests since the club was founded more than a century ago, but recently the pace has picked up significantly—and not for the better. In addition to nearby development, there are gypsy moths munching on the oaks and aphids ravaging the hemlocks. Ten-foot fences around the neighboring state forest help keep deer out, allowing the vegetation to regenerate, but they also deter animals from entering the club's land.

As recruitment slowed, club members feared for their property's future. To raise money, the club started allowing some timber operations on its property in the 1940s. Members have not been happy with the results. Would they have to allow more operations, or even start selling acreage, to stay afloat?



In 2016 the group found a solution. As the first hunting and fishing club to enroll in The Nature Conservancy's Working Woodlands program, the Hiawatha Club grants TNC a working-forest conservation easement that prevents future development and promotes sustainable forestry practices. The club will eventually receive revenue from limited sustainable timber harvesting and the sale of carbon credits. The forest will be managed under a plan certified under the Forest Stewardship Council, which ensures that the forest stays healthy for future generations.

More than 70 percent of Pennsylvania's 17 million acres of forest are privately owned, representing a portion of the Appalachian range critical to the region's biodiversity. To date, the Working Woodlands program has enrolled more



FAMILY FOREST: Anna Parrish walks along a white ash tree on her family's property, with her mother, Amanda, and sister Evelyn nearby. The Parrishes own 211 forested acres in Pennsylvania.

than 56,000 acres of forests in Pennsylvania and four other states, with more on the way. A wide variety of landowners have already signed on, from families to government agencies. But they all share the same goal as this hunting club: keeping the forests healthy and productive.

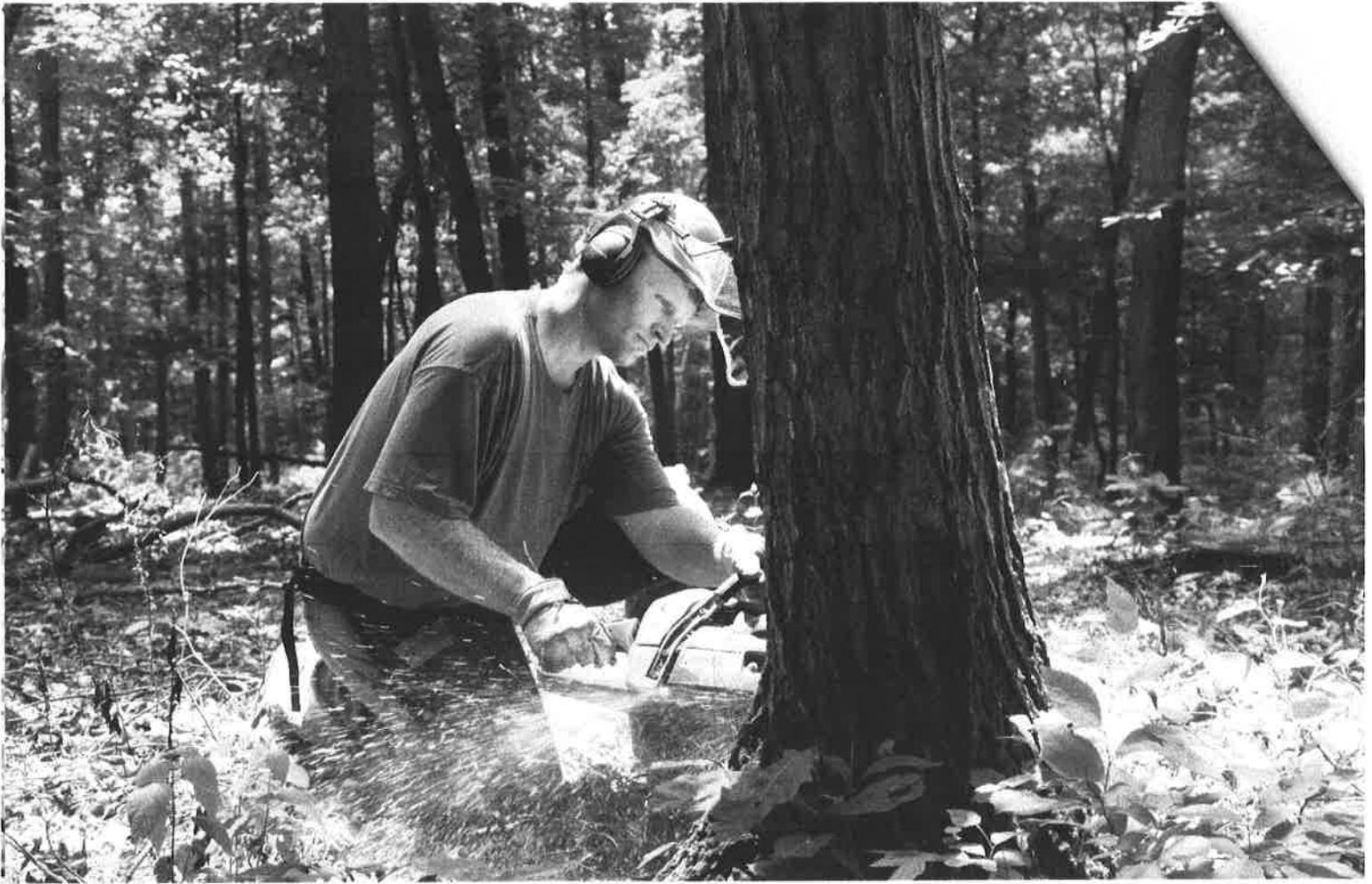
"That's why we're preserving it," Schmalzer says, as leaves crunched underfoot. "We don't want it turned into houses and ski lodges."

MORE THAN HALF OF AMERICA'S 750 MILLION ACRES OF forests are privately owned. With individual trees selling for hundreds or even thousands of dollars, landowners in Pennsylvania and elsewhere are tempted to harvest their timber. And few landowners have the money to create and implement

resource management plans, without which timber harvesting can leave forests vulnerable to erosion, pests and disease.

Josh Parrish, director of TNC's Working Woodlands Program, knew this firsthand. Growing up in south-central Pennsylvania's rural Perry County, northwest of Harrisburg, he'd developed his love of nature as a child, playing and exploring in the woods. He came to understand that woods were important for people; at 14, he began cutting trees on his family's woodlot and building furniture from the timber. Today, Parrish and his wife own 211 acres of Pennsylvania forest. They harvest low-quality oak logs to grow shiitake mushrooms, based on a sustainable management plan.

Programs like Forest Stewardship Council (FSC) certification help ensure that wood is cut under sustainable



FIRST CUT

Josh Parrish, director of the Working Woodlands program, salvages a dying red oak on his property to help promote diverse new growth. Tending this land inspired Parrish to develop the program as a tool to help other private forest owners create sustainable forest-management plans.

forestry practices, which reduce impact and conserve biodiversity, and allow sellers to earn more by giving access to preferred markets and carbon exchanges. Parrish knew that many private forest owners forgo certification because of the added costs and time commitments. For properties larger than 1,500 acres, it can cost upward of \$20,000 to create a management plan and conduct the required audit. So around 2007, he and fellow conservators came up with a plan in which TNC could do it for free.

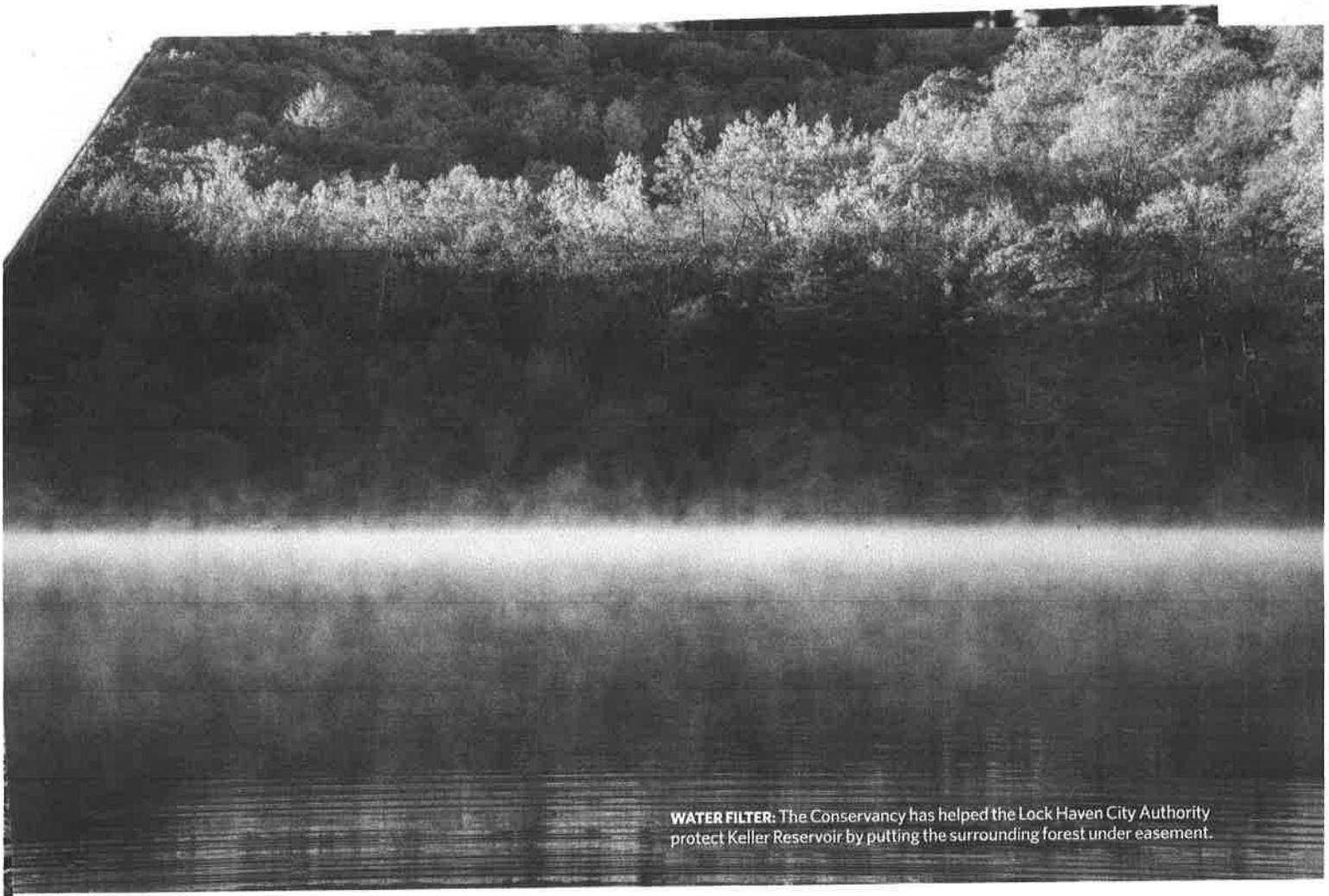
The problem is that a few centuries of logging in the eastern United States have reduced diversity on millions of acres. That's because common logging practices reset all generations of trees on a given plot to age zero—while tending to leave weaker trees untouched. So a few decades later, the canopy on that site will likely be dominated by whatever tree species grows the fastest. On the other hand, a diverse forest supports more species of animals, better resists the effects of invasive species and climate change, and even absorbs more carbon dioxide.

The Working Woodlands program, Parrish thought, could help develop management plans for landowners who would

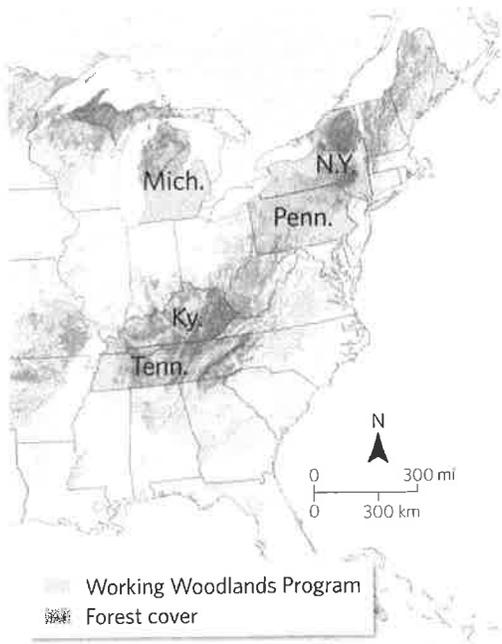
agree to put their properties into decades-long conservation easements. The easements protect the forest from development or unsustainable logging. Meanwhile, TNC helps the owners maintain a healthier, more diverse forest that still turns a profit through lower-intensity selective timber cutting and carbon credits.

With the nuts and bolts of Working Woodlands laid out, all Parrish needed was a potential landowner to pitch; ideally an entity with lots of acreage, good forest stock to work with and a strong desire to preserve it. He had one in mind—one that TNC had been trying to get an easement with for more than 30 years.

FILTERING WATER AND PREVENTING EROSION ARE JUST two of the many ecosystem benefits that forests provide. And they're at the top of the list for government agencies tasked with supplying drinking water, such as the Bethlehem Authority. It is the source of water for 116,000 residents of Bethlehem, Pennsylvania, and 11 surrounding municipalities, thanks in part to 22,388 acres of forest that surround Long Pond and Wild Creek Reservoir, where the city draws its supply.



WATER FILTER: The Conservancy has helped the Lock Haven City Authority protect Keller Reservoir by putting the surrounding forest under easement.



GROWTH
The Working Woodlands Program, which started in Pennsylvania in 2013, has been adopted in other Appalachian states. The program already protects more than 50,000 acres of private forest.

In 2009, the water authority's forest-management plan was more than two decades old and needed a major update. So the agency was receptive when TNC proposed the Working Woodlands idea. The authority would get a new management plan that would be FSC-certified and comply with the latest

best practices. In exchange, it would grant TNC a 60-year easement on the forest. A year and a half of negotiations resulted in the largest private conservation agreement in Pennsylvania's history.

"It was a learning experience for everybody," says Stephen Repasch, director of the water authority. "But it's been a real good experience."

The new management plan would have clinched the deal by itself, Repasch says. But what made the deal even better was the chance to earn money on the global carbon market. Recent studies have shown that some forests can be managed to absorb more carbon than unmanaged forests, and the easement ensures the property will be maintained to meet high sustainability standards. So Working Woodlands properties are eligible to sell credits on the carbon market through TNC.

Since the water authority agreement was signed, Chevrolet Motors and the Walt Disney Company have signed up to buy credits. The water authority has sold carbon credits annually since 2012, with annual sales often exceeding \$200,000. Any logging will be done in accordance with the forest-management plan, which calls for very selective cutting, aimed at reducing overgrown species and improving biodiversity.

And the FSC certification may add to the value of individual trees. Demand for sustainably harvested materials is rising, which is why Domtar Paper Mills helped fund the



TRADITION

The view from inside the main living room of the Hiawatha Hunting and Fishing Club's lodge. The Conservancy now holds a permanent easement on this 1,300-acre property, and in return is helping the club develop its forest-management plan. Soon the club may begin selling carbon credits.

Working Woodlands program early on. The Bethlehem Water Authority deal turned out to be just the beginning. Within months of its signing, Parrish began talking with other landowners with forest holdings larger than 1,000 acres—the minimum to become part of the program. The list included the Hiawatha Club, another water authority and even private families.

REBECCA SHAFER TUUK AND HER HUSBAND, ROGER, own about 3,120 acres of mixed hardwood forest in White County, Tennessee. The property is mostly yellow poplar and oaks, with a large stream-fed waterfall and more than 30 miles of caves underground. Rebecca's father, John Shafer Jr., originally bought the land in the 1940s for the family lumber business. Some of it had been cut.

"My father was a scientist," she says. "He was always interested in new things, always asking foresters about carbon." John Jr. split the property into several separate tracts to ensure that not too much would be harvested at any one time, keeping it healthy. He was still concerned about its welfare at age 104 in 2015, when Parrish came to talk to the

Tuuks about Working Woodlands. "We talked with my dad about it, and he was very excited," Tuuk says.

The timing couldn't have been better, says Trisha Johnson, director of forest conservation for TNC's Tennessee chapter. "We were looking for a new approach to engaging with private landowners, and the Working Woodlands program provided the innovation that we needed."

Just over half of the state is covered with forest, and 83 percent of that, roughly 11.6 million acres, is privately owned. "Tennessee is at the base of a connectivity corridor that spans the eastern half of the U.S.," Johnson says. "These are the primary corridors for migration in the face of a changing climate."

In 2016 the Tuuks became the first in Tennessee to enroll in the program, granting TNC an easement in perpetuity that prevents development, agricultural conversion or unsustainable forestry practices.

"We're happy to have our timber forest FSC certified," Rebecca Tuuk says. "It's exciting to get paid and not even have to cut trees." Her father died a month before the easement deal was signed, she says—but he would have been



LONG VIEW

Jessica Welshans bow hunts for deer at a property owned by the Lock Haven City Authority in Pennsylvania. This forest—now also managed with the help of TNC's Working Woodlands Program—has been open to the public for hunting for many decades.

proud. The Tuuks expect carbon payments to start at the end of this summer.

The Conservancy is now working to enroll other landowners across the state in the program, Johnson says. “The program is a win for the landowner and for TNC.”

ONCE A FOREST OWNER SIGNS ON WITH A WORKING Woodlands management plan, the meticulous process of inventorying begins, to assess the forest's carbon content and estimate future growth.

On the first morning of the Hiawatha Club's inventory in April 2017, the lodge feels like a war room. Schmalzer, Unangst, and other club members hover over a circular table, studying a map of the property and sipping coffee. Mike Eckley, a TNC for-ester, explains the basics of how an inventory is taken. At some point, independent carbon auditors will visit Hiawatha and check the work. If anything seems off, they'll look even closer, like the IRS, so at this stage it's better to err on the side of over-kill. “Too much information is better than too little,” Eckley says.

Twelve people from TNC and Hiawatha head into the field beneath gray skies. They measure and document trees for

hours. Even dead, fallen and sick trees are accounted for. The hunt club members don't have to do any of this—it's TNC's job to conduct the inventory—but they want to know what is going on with their property.

The management plan for the Hiawatha Club forest includes controlling undesirable competing plants, including trees, shrubs and vines. That allows species like oak, hickory, cherry and poplar to establish and grow. This will improve habitat for species including wild turkey, ruffed grouse and black bear. It will allow canopy trees to grow faster and store more carbon. The plan also includes selectively controlling invasive plants like Japanese barberry, monitoring for forest pests like hemlock woolly adelgids and even upgrading hiking trails.

If the Working Woodlands program works as it should, it will improve the condition of the forest by promoting the healthiest and most diverse range of tree species possible. It will also help ensure the Hiawatha Club is around for another century to manage and enjoy it. •

Jason Kersten is an author and writer who has contributed to *The New Yorker* and *GQ* magazines. The article includes additional reporting by Julian Smith.

HEART LAKE PROPERTY GREENHOUSE GAS

Forest Is Absorbing

COMPILED BY ADK'S SUSTAINABILITY WORKING GROUP

The inventory documented the carbon dioxide emissions from fossil fuels that were consumed on the property, and estimated the carbon dioxide absorbed by natural processes on its one square mile.

In 2014, SUNY Environmental Science and Forestry (ESF) student Zachary Campbell interned at ADK's Heart Lake property. During his internship, he started a greenhouse gas inventory of the property, with advisement by Dr. Timothy Volk of SUNY ESF. The inventory was completed in January 2015.

The inventory documented the carbon dioxide emissions from fossil fuels that were consumed on the property, and estimated the carbon dioxide absorbed by natural processes on its one square mile. Data from each source were taken nominally over a one-year period, with the periods beginning at several different times in 2013.

Emissions

Sources of emissions that occurred directly on site were:

- Fuel oil used for space heating
- Propane used for cooking
- Unleaded gasoline and diesel fuel used by maintenance vehicles for work on the property

Additionally, electricity used on site resulted in emissions that occurred in remote locations as the Heart Lake property is served by Lake Placid Village, Inc., which has a hydroelectric allocation from New York Power Authority. In the study, it was estimated that 95 percent of the electricity consumed was from the hydro allocation, and 5 percent was from the typical fuel mix in the New York market.

Table 1. Annual emissions estimates

Emissions source	Quantity consumed	Estimated emission, metric tons CO2
Fuel oil	4097 gallons	42.1
Propane	3862 gallons	20.2
Unleaded gasoline	1766 gallons	15.7
Diesel fuel	55 gallons	0.6
Purchased electricity	243,772 kilowatt-hours+delivery losses	2.8
Total emissions		81.4

Carbon Dioxide Sequestration Analysis

The study predicted the Heart Lake property's ability to absorb carbon dioxide from the atmosphere. Beginning with an assessment of the property's one square mile, it analyzed 1000 points on the property, and developed the percentage cover as shown in Table 2. The forest on the property was classified as Spruce/Fir Forest Type.

Table 2. Percentage of each cover class

Cover Class	Number of Points	Percent Cover	Standard Error
Non-tree	15	1.5	+0.4
Deciduous tree	378	37.8	+1.5
Coniferous tree	557	55.7	+1.6
Water	43	4.3	+0.6
Rock	7	0.7	+0.3

INVENTORY SHOWS Emissions

These data were then used to estimate the carbon uptake of the forested portions of the property. Two different estimates were made, a conservative estimate and a liberal estimate. The conservative results are shown in Table 3.

Table 3. Conservative estimate of carbon uptake of the Heart Lake property forest

Parameter	Quantity
Carbon dioxide equivalent stored in live biomass	50,028 metric tons
Annual growth rate	1.9 percent
Annual carbon dioxide sequestered	950 metric tons
Results are based on "New York's Forests 2007" data (Widman, et al., 2012)	

Based on these data, carbon dioxide uptake of the Heart Lake property forest fully absorbs the 81.4 tons of carbon dioxide emissions from club activities on the property. The additional 869 metric tons of carbon dioxide that are absorbed on the property each year come from emissions made by non-club activities, or come from emissions made off of the property. A carbon flow diagram is shown in Figure 1. The full report is available on the ADK website. ▲

Carbon dioxide uptake of the Heart Lake property forest fully absorbs the 81.4 tons of carbon dioxide emissions from club activities on the property.

MARK BOWIE

Figure 1. Carbon generation and absorption at Heart Lake.

