Thoreau & Trees: A VISCERAL CONNECTION

HOW FORESTS PROFOUNDLY AND PERSONALLY IMPACTED AUTHOR HENRY DAVID THOREAU AND HIS RENOWNED WRITING.
Exclusive accommodations, spectacular wildlife and brilliant fall foliage with activities like fly fishing, biking, Jeep tours and hiking. A memorable adventure.

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Features

16 Big Tree Hunting in Colorado: A Case for the Numbers
By Robert T. Leverett
An adventure through the forests of Colorado to seek towering big tree champions.

24 Canine Conservationists
By Jodi Helmer
How a group of smart, hardworking dogs are sniffing their way to the frontlines of conservation.

32 Thoreau & Trees: A Visceral Connection
By Richard Higgins
The profound impact forests had on one of America’s greatest authors and his writing.
Vanishing Woodlands

BY SCOTT STEEN

WHEN MY PARENTS were children, the woods at the end of the street on which I grew up was connected to hundreds of acres of forestland that surrounded a local quarry. By the time I was a child, the quarry had grown, and the forest had become a small patch of woods, maybe a couple acres total.

There wasn’t a whole lot of nature in our large, working-class Boston suburb by that point, but this scruffy little patch of trees became my own solitary sanctuary — a place of cool and quiet in the depths of summer and a place of beauty as the maples and oaks turned in autumn. It was one of the first places I could actually hear birds distinctly. I would lie on the leaf-covered ground and watch the squirrels make daring jumps from tree to tree. In this place, I began to see nature not as something you drive to, but as something I was a part of.

It never occurred to me that this little patch of woods had an owner. But, one August day, my family returned from vacation to find the trees torn from the ground, a tangled pile of roots and branches plowed together in a mound.

A month later, my woods was a parking lot.

Looking back, it is difficult for me to be mad at the owner (although I was furious at the time). For him, this lot
“The more we understand and appreciate the connection between nature and our quality of life, the easier it becomes to see protecting our forests as true progress.”

was going to waste. The only value it had was the promise that it could be turned into something else — like a parking lot.

This, of course, happens all over the United States. Between 2007-2012, more than 1.4 million acres of forestland was developed — converted from forest into things like housing, parking lots and shopping malls.

Much of the loss occurred — and is still occurring — in parts of the country where forest is privately owned. This includes the southeastern U.S. (especially Florida, the Carolinas and the area around Atlanta); the I-95 corridor in the Mid-Atlantic states; New England, including southeast Maine, New Hampshire and Massachusetts; the Upper Midwest; the Northwest around Seattle and Portland; and along the California coast. Not surprisingly, you see it most around the edges of major urban areas, known as the wildland-urban interface or WUI (pronounced woo-ee).

This process is known as forest fragmentation: when large areas of forestland get chopped into smaller and smaller, unconnected bits. What was once hundreds or thousands of acres of contiguous woodland becomes a neighborhood, surrounded by a couple of acres of trees adjacent to a shopping center with a fringe of woods connected to another neighborhood.

And, while these small patches of woods may provide just enough room for a boy like me to discover nature, it is a very diluted version of nature. As a result, forest fragmentation is one of the biggest threats to biodiversity. As forests are carved into smaller and smaller patches, and the distance between these patches grows, the little areas of woods that remain become increasingly less able to sustain viable populations of animals and plants. Even when large numbers of these small “forest islands” remain, they cannot support anywhere near the level of biodiversity that a larger, contiguous forest can. So, as fragmentation increases, animal and plant populations take a nosedive, while pest and pathogen levels increase.

Along with declining biodiversity, forest fragmentation also results in a serious decline in water quality. In the Mid-Atlantic, for example, a 10 percent loss in forest cover leads to a 40 percent increase in nutrient pollution to streams.

We Americans tend to think of nature as true progress. Our lives depend on both. But, if we begin to see progress in terms of things built and money made. By this measure, nature can often seem like a barrier to progress. But, if we begin to see progress as achieving a better quality of life for all, that equation changes. Because, while it may be difficult for the average person to put a monetary value on things, like clean air, clean water and wildlife, we all know these things make life better.

Humans need both nature and progress. Our lives depend on both. And, the more we understand and appreciate the connection between nature and our quality of life, the easier it becomes to see protecting our forests as true progress."
Q&A
ASK A CONSULTING ARBORIST

Coming of Age
Q: Our 15-year-old incense-cedars are for the first time dropping millions of tiny seed-like things. Is this indicative of illness or just natural after so many years? Is there anything to do to stop it?
A: Being 15 years old, your incense-cedar trees are probably just beginning to be mature enough to produce many seeds. There is really nothing to do to stop the seeds — the trees produce more seeds some years than others. Sometimes, if they seed really hard, it signals stress or health issues. Last year, the summer and fall were very dry, which could have aided in seed production due to stress from the lack of water. If you are still concerned about the trees, get a hold of a local Consulting Arborist to look at your trees.
Answered by Consulting Arborist David Hunter of Forest Grove, Ore.; www.davidhunterarborist.com; (503) 319-0380

Close Calls
Q: I have a 60- to 70-foot sweetgum tree about 30 feet from my house, and one of the three main branches (about 30 feet up) broke on a windy day and barely missed coming down on my roof. Is it a good idea to take the tree down to avoid a possible disaster in the future? I live in central Florida, and we have occasional high-wind events. I’ve heard that sweetgums can be fragile, and I’m concerned that this could happen again.
A: Inspection of your tree by a Certified Arborist (from the ISA website under Find an Arborist) or a Registered Consulting Arborist (listing available on ASCA website) would be a recommended next step to help decide if the tree could be pruned and remain in your landscape or should be removed due to the extent of damage. Sweetgum is considered moderately wind resistant, but being multi-leader, is usually less wind resistant.
Answered by Consulting Arborist John Harris of Hollywood, Fla; www.landscapeeconomics.com; (954) 986-9405
I Will Survive

**Q:** We live next to woods and have six trees. We have noticed that there are certain woodpeckers that are just pecking the bark off the trees like crazy. When they peck, the bark goes flying, and there are bark pieces all over the ground. Are these trees dead? Is that why the birds are pecking them, or will they survive all the pecking?

**A:** The woodpeckers are looking for insects that may be residing on the exterior or interior of the tree. Most of the insects are not physically damaging the tree. However, when we see woodpeckers causing major damage to a tree as you have described, as an arborist we are concerned that there may be a larger underlying issue. This issue is usually associated with one of two things: 1. The tree is dying and insects are feeding on the dead or decaying tissue. 2. There is a major insect infestation in the trees. Emerald ash borer would be a good example of this. My recommendation would be to have an ISA Certified Arborist, or an arborist associated with the ASCA, visit the property and diagnose the problem.

Answered by Consulting Arborist Matt Evans of Lenexa, Kan; www.ryanlawn.com; (913) 381-1505

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Best Seat in the House

**Q:** I live in northeast Ohio. I’m wondering if a pine that has one main trunk and then branches off to three big trunks, creating a “seat” in the middle, is a certain species or a fluke. It drops cones but is very old. I would like to plant another like it if possible.

**A:** The three trunk feature is not specific to species but rather training. Usually, this happens as a result of the top breaking off, and multiple branches can form where there was once one.

Answered by Consulting Arborist Jon Butcher of Milford, Ohio; jon.butcher@mtcandl.com; (513) 576-6391
Richard Pouyat
National Program Lead for Air and Soil Quality, USDA Forest Service

RICHARD POUYAT received his Ph.D in ecology from Rutgers University in 1992, and an M.S. in forest soils and B.S. in forest biology at the College of Environmental Science and Forestry in 1983 and 1980, respectively. Dr. Pouyat is the National Program Lead for Air and Soil Quality Research for Research & Development at the USDA Forest Service in Washington D.C. He is currently on a detail to the White House Office of Science and Technology Policy (OSTP) and was recently elected president of the Ecological Society of America (ESA). Dr. Pouyat is an original co-principal investigator of the Baltimore Ecosystem Study, a long-term Ecological Research site funded by the National Science Foundation.

What led you to want to work for the Forest Service?
The simplest answer — the mission. The mission of the Forest Service is “To sustain the health, diversity and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations,” with a motto of “Caring for the land and serving people.” And, since the majority of Americans, and now the world’s population, live in urban areas, this mission has come to include urban forest ecological systems and their management. I could not have come up with a better mission for the research I do!

As a scientist with training in soil science and ecology, why have you taken time from your research to work in Congress and the White House?
I have always felt that the best available science should be used in the making of public policy with the ultimate goal to benefit people. Through my early experience of working in land management in New York and becoming familiar with environmental problems, such as air and water pollution, I found that the best available science was not always making its way to managers or planners. This was particularly true for cities and surrounding suburbs, where ecosystem services and the use of green infrastructure were not being considered as part of the strategic designs and decisions, nor a tool that urban planners were even aware of in many cases.

Who is your favorite fictional scientist and why?
Although he was technically a “First Officer” of the Starship Enterprise, Mr. Spock was the most impressive “science guy” in the Universe! His lack of emotions (or, at least suppression of them) separated him from biases that sometimes get in the way of logical thinking, or in the case of a scientist, objective thinking. Mr. Spock also knew a lot about everything, similar to the stereotype of scientists in the genre of science fiction films of the 1950s.

What is the most surprising thing that you have learned or discovered?
My biggest surprise, and one that continues to amaze me throughout our research of urban soils, is we have found these soils are often as, or in some cases more, productive than the native soils that they have replaced! Humans have introduced all types of essential plant nutrients, such as nitro-
gen and calcium, into urban environments, and in the right proportions and in the absence of disturbance, result in very productive and biologically diverse soils.

Do you have a favorite story from your years in the field?
I have often been amazed at city kids who enter a forest for the first time. These streetwise kids are typically terrified when they do! Their inability to see very far, fear of forest critters and unfamiliarity with the forest environment makes them extremely uncomfortable, and I am sure the reverse would be true — having a country kid walk down a city street. Keeping this discomfort in mind, many years ago while working for the Department of Parks and Recreation in New York City, we were in the midst of mapping vegetation for the park system. We had a wonderful administrative assistant who grew up in Harlem and hardly ever had the chance to experience nature at least outside of an urban park. So, one day we invited this office-bound colleague to accompany us to the “field” so she could see for herself what we were doing. We took her to a forest patch in Queens, which may have been Forest Park. After about 100 feet along the trail, a squirrel appeared in front of us. After seeing us, he continued running in front of us down the trail, presumably in fear of us humans; however, our presence was nothing compared to that of a red-tailed hawk that swooped over our heads and grabbed the squirrel and flew off with it. Needless to say, our city-bound colleague, who for the first time witnessed “nature,” was not amused!

GLOBAL RELEAF SHOWCASE

Transforming a Beloved Landscape

IMAGINE STANDING AT THE BASE OF TOWERING MOUNTAINS, a scene that should be breathtaking. Yet, what you see is so devastatingly bare...scorched. That’s what you would have seen if you stood in Oregon’s Deschutes National Forest in the early-2000s.

Then, you might have come to view the lunker Kokanee salmon and brown trout that migrate up the Deschutes River from the Wickiup Reservoir in September, or the bald eagles and osprey that are enticed by the spawning fish. Or, you may have delighted in watching the American dipper and the common merganser that fly up and down the river. Or, perhaps, you came to see the wildflowers that grow along the riverbanks and the hummingbirds — black-chinned, calliope and rufous — that the flowers attract.

But in 2012, lightning struck and the Pole Creek Fire wreaked havoc on more than 26,000 acres within the range of the Three Sisters, a popular recreation attraction for so many. The high severity of the fire left little to no surviving forest cover in many areas, and this just two years after the Rooster Rock Fire swept through Deschutes in 2010.

It’s because of recent disasters such as these that American Forests has continually stepped in to help restore devastated parts of Deschutes National Forest, after beginning to work there in 2007 as part of important riparian restoration and watershed protection efforts.

Over the course of six — out of the last nine — years, we’ve planted more than 1 million trees to help restore different areas within Deschutes. In 2015 alone, American Forests, along with partner Tiny Prints, planted 350,000 ponderosa pines and Douglas-fir across 2,000 acres of Deschutes. This work has not only helped to control erosion and maintain wildlife habitat, but it has also helped restore a highly utilized recreational area.

While these efforts are helping to breathe new life into the fire-stricken land, it’s about more than just restoring the forest for this beloved recreation destination. Our restoration work in Deschutes is also about teaching kids the importance of forest restoration. It’s about restoring to life an area enjoyed by so many. It’s about inspiring people to care for, help protect and do their part to help restore the forests they love.

Now...

Imagine standing at the base of those same towering mountains. But this time, the mountains are becoming clothed in shades of green. If you look closely, you can see the contrast between seedlings bearing new life for the forest and tall trees standing proud. That’s what you would see if you stood in Deschutes National Forest today. Yet, our work is not finished. There’s more restoration we need to do.
The Scotch pine is the most widely distributed pine in the world and has an altitude range of up to 8,000 feet.
PARTNERS SINCE 2009, American Forests’ and Origins’ work together has covered a variety of U.S. and international landscapes, with an eye to restoring wildlife habitat and forests damaged by wildfire.

Monarch butterflies, Kirtland’s warbler and moose are among the wildlife beneficiaries of restoration projects that Origins has supported. But, another exceptionally important wildlife habitat restoration has aided less famously charismatic recipients.

In 2015, Origins supported mangrove restoration in China as well as similar work the year before in the Phillipines. Within 50 years, China lost nearly three-quarters of its mangrove forests. In the last 20 years, the Phillipines has lost one-third of theirs.

Pressures on mangrove forests come from all angles. More than one-third of the world’s mangroves are believed to have disappeared between 1980 and 2000, mostly due to the rise of industrial shrimp farming and coastal development. Yet, mangroves are critical to both land and sea, to the foundation of marine life that supports the health of the oceans and to the food chain that delivers fish to our tables.

Growing along coastlines within 30 degrees of the equator, mangroves’ extraordinary stilt-like root systems allow the trees to grow in the sea and also serve as nurseries for fish, shrimp, oysters, crabs and other marine life. Their branches offer habitat for birds, monkeys and pollinators such as bees. Like other types of wetlands, mangroves also slow runoff coming from the land. They act as a filter for the sediments and as a scrubber for the nutrients that can destroy coral and sea grass beds.

Mangroves act as a buffer from intense storms by absorbing some of the wave energy of tsunamis, hurricanes and storm surges. Many realized the importance of mangroves after the 2004 tsunami in Southeast Asia, which devastated coastal communities, killing more than 225,000 people and displacing close to a million others. Because so many old-growth mangrove forests had been leveled in the area, waves encountered no resistance and caused more damage than if there had been a healthy mangrove coastline.

From a climate change perspective, mangroves may be among the most productive forests on Earth, sequestering carbon at a higher rate than other types of forest. A 2011 study found that mangroves can store as much as five times more carbon than other types of forests, including tropical rainforests.

In 2015, American Forests worked with Origins and local partners, like the China Mangrove Conservation Network — which is dedicated to mangrove restoration, education and research — hoping to build an involved network of mangrove stewards from local communities, schools, nonprofits and more. Approximately 800 volunteers helped plant these mangroves. In addition, 160 outreach events helped spread the message of the importance of mangroves to a larger audience.
AMERICAN FORESTS HAS A LONG history of restoring and protecting forests in the iconic Rocky Mountains. I was thrilled to be able to travel there last fall to plan for our next exclusive member experience on September 18-23, 2016. After all, bringing our supporters to the forests to see the work we do is one of the most exciting parts of my job!

The sights and sounds in Rocky Mountain National Park in the fall are like no other time of the year. Not only are the mountains covered in brilliantly colored golden aspen, but the majestic elk have entered their breeding season, called the rut. The elk rut generally lasts from mid-September to mid-October, and the sounds of a bull elk bugling is spectacular. These sounds were all around me as I watched bull elks and their harems appear throughout the park.

Our host hotel for the trip will be The Lodge at the historic Stanley Hotel in beautiful Estes Park, Colo. The Stanley Hotel is most famous because it is where author Stephen King was inspired to write “The Shining.” Not to worry, while The Stanley itself is believed by some to be haunted, The
Lodge, where we will be residing, is a newly-renovated, 40-room boutique hotel adjacent to the main hotel. However, nightly ghost tours are offered to anyone that may be interested in exploring the supernatural.

During our time in the park, I have lined up some very special adventures so you can experience this park in a way that few get to do. However, if adventuring isn’t really your cup of tea, you are more than welcome to curl up with a good book in front of the fire and enjoy The Lodge or go shopping in downtown Estes Park. On our itinerary, we will be given a private tour of the Rocky Mountain National Park greenhouse and then be led by a National Park Service ranger on a hike through one of the most beautiful areas of the park during the autumn season. We will also take an open-air jeep tour on an off-road adventure up an authentic wagon trail from the 1860s to incredibly scenic peaks and valleys. On another adventure, we will be taken 12,000 feet into the alpine tundra to enjoy a casual 29-mile downhill bike ride through many of the park’s ecosystems. Fly-fishing is a favorite past time in the park, so our guests will receive private lessons from a professional angler on a stream within the park. This is sure to be an incredible adventure for anyone on the trip.

As a special treat for guests interested in nature photography, American Forest’s Artist-in-Residence and renowned wildlife photographer, Chuck Fazio, will be joining us on this trip. Chuck is an incredible photographer and teacher and will be giving instruction along the way on how to best photograph the park and its wildlife.

While we have lots of fun and activities planned in the park, I have intentionally left plenty of time open so you can just relax and enjoy Estes Park on your own. This adventure with American Forest is not one that will be forgotten anytime soon. Please join our President & CEO, Scott Steen, and me on this once-in-a-lifetime opportunity. We would love to have you!

**DONOR PROFILE**

Whitney & Raja Chatterjee

WHITNEY AND RAJA Chatterjee are residents of both Manhattan and the rural, rolling hills of Washington, Conn. The Chatterjees enjoy sharing their time between the bustling city and a quieter, more serene landscape for two very important reasons. First, they are the parents of two young children. While the city provides their kids with many educational and cultural experiences, the country offers a chance to interact with nature in a way that is not possible in New York City. Additionally, in the country, surrounded by trees and wildlife, the stress of the city fades, and in its place they find the time to connect on a deeper level with their children and with good friends.

“I wish every family living in a dense urban environment had access to the trees and green that we do in Washington,” said Whitney. “On weekends we get to see our kids play outdoors in fields and forests. Not only are they able to run around, play sports, explore and make up their own games, but we know the air we’re all breathing is clean, the water pure — and psychologically and emotionally, we’re all getting a huge break from the pressure of life in the city.”

It’s part of the reason the Chatterjees first decided to become American Forests Sequoia Circle members in 2013. They value the organization’s work to restore the beauty and essential benefits that wildland forests provide, but also support American Forests’ work in cities, bringing greenspace to communities that really need it.
“I grew up in a relatively rural part of Massachusetts,” said Whitney. “Our careers took us into cities, and we now love living in Manhattan. But, I deeply appreciate the restorative qualities of the natural world and want not only my kids to have the chance to experience it but that other kids do, too. And, I want to ensure green spaces are there for their kids and future generations.”

As with many working parents, there is never enough time to do everything the family would like to do. But, the Chatterjees strive to keep their eyes on what is most important, for their family and for the future for all.

“I wish I had the time to be scouting out where in this country there were forests that need to be restored or cities that could offer improved green environments for their residents and planting trees, but I don’t,” said Whitney. “By supporting American Forests, I feel like I am standing up for that and supporting our environment.”

Whitney and Raja’s children picking wild blackberries
Earth Month 2016: The Elements of Forests

This Earth Month, we conducted a digital conversation around the theme of The Elements of Forests. The four classical elements — fire, earth, air and water — have had cultural significance in civilizations, both ancient and modern, around the world. We discussed how these elements shape our forests and, in turn, how our forests shape the elements. Here’s a recap of some of the themes we discussed for each element.

Fire
Despite the threat posed by high-intensity megafires, forests and fire can actually work together for the health of the ecosystem. Naturally occurring fires, or even controlled burns, clear out underbrush and help to prevent megafires. And, in fact, some tree species rely on heat in order to release their seeds, while some wildlife need it to create habitat.

Earth
The forest floor is made up of layers of organic material, which creates rich, fertile soil. Forests stabilize those soils, which helps to protect waterways and wildlife habitat. The tree roots growing beneath the forest filter out soil pollutants and improve soil structure. Even after trees have died, they return valuable nutrients back to the earth.

Air
Without forests, we would not have clean air to breathe every day. In fact, two trees provide enough oxygen for one person to breathe over the course of the year. And, specifically in the cities most of us live in, neighborhoods with more tree canopy cover have air quality that is improved by as much as 12 percent. By trapping and removing pollutants from our air, forests help us breathe easier and experience improved health.

Water
Forests play a crucial role in one of the most important resources we have — water. Actually, more than half of the drinking water in the U.S. originates in forests. A single large tree can filter up to 36,500 gallons of water per year. And, in addition to providing clean water for us to drink, forests help keep pollutants out of waterways and provide high-quality habitat for sensitive aquatic species.
ON APRIL 20, 2016, the Senate passed the Energy Policy Modernization Act (S. 2012), which contains positive provisions for both the Land and Water Conservation Fund (LWCF) and the National Parks. S. 2012 contains permanent reauthorization of LWCF as part of a bipartisan compromise provision negotiated by Chairman Lisa Murkowski (R-AK) and Ranking Member Maria Cantwell (D-WA). This is a historic victory for LWCF as it is the first time permanent authorization has passed the full Senate. Another sure win for LWCF was the voting down of Senator James Lankford’s (R-OK) anti-LWCF amendment that would have placed unnecessary restrictions on land conservation and significantly weakened LWCF’s central conservation mission. While American Forests is very pleased with the bipartisan commitment from the Senate to permanently reauthorize LWCF, there is still more to be done. Inclusion of LWCF permanent reauthorization on the House side is a tougher road. American Forests is dedicated to advocating for the inclusion of permanent reauthorization in the reconciled final Energy Bill or other vehicles as they present themselves.

National Park Centennial Act

ANOTHER BIG WIN in the Energy Policy Modernization Act is for our National Parks. Provisions in the bill include establishing a separate fund for addressing the National Park Service deferred maintenance backlog and a National Park Service Centennial Amendment, added by Senators Murkowski, Cantwell and Rob Portman (R-OH). With many components similar to the House National Park Service Centennial Act (H.R. 4680) led by Chairman Rob Bishop, this version provides an opportunity for strengthening the language during the conference committee reconciling the House and Senate energy bills.

The bipartisan H.R. 4680 would relieve insufficient funding issues by building on the latest federal investments for National Parks with leverage from private investments. It also would provide increased educational op-
opportunities and support for volunteer programs. These key solutions would be made possible through the major components of the Act, the Centennial Challenge Fund and the Second Century Endowment, along with several other policy provisions. Securing these resources for our National Parks would not only protect them for the future, but also allow them to continue supporting local economic activity of almost $30 billion annually.

While American Forests is very pleased with the bipartisan commitment from the Senate to permanently reauthorize LWFC, there is still more to be done.

**U.S. Forest Service Proposed Mitigation Policy**

IN RESPONSE TO Executive Order 13604: Improving Performance of Federal Permitting and Review of Infrastructure Projects and the Presidential Memorandum: Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment, the U.S. Forest Service sought recommendations from American Forests, and others, in formulating the agency’s policy on mitigating adverse impacts on National Forests and Grasslands. Here is a snippet of the comments we provided. We look forward to expanding upon these ideas in response to the formal public comment period when the draft proposed rule is published later on this summer.

“The development of an agency-wide mitigation policy gives the U.S. Forest Service the opportunity to integrate existing planning and restoration efforts into a landscape-scale green infrastructure plan. A green infrastructure approach can be used to guide development projects away from important natural resources and inform priority locations for mitigation and restoration. Green infrastructure has received more attention recently as a hybrid nature-based, engineered solution for stormwater management in urban settings. However, green infrastructure has a longer history as a process for developing a conservation network of large landscape blocks (i.e. hubs) and connecting bands of habitat (i.e. corridors) that allow for sustained natural benefits including wildlife and clean water. The size and shape of these networks can be designed and scaled depending on focal species and priority natural resources in each National Forest. For example, grizzly bears may need patches of habitat to create hubs of dozens of square miles, while hubs for interior forest birds, like the wood thrush, may need only a few square miles. Green infrastructure has been used successfully for mitigation planning, and American Forests recommends that the U.S. Forest Service take advantage of this opportunity to align its mitigation policy with a green infrastructure approach to inform development and mitigation decisions.”

Rebecca Turner writes from Washington, D.C., and is American Forests’ senior director of programs and policy. Keelin Arsenault was American Forests’ spring 2016 policy intern and is a junior at Holy Cross College in Massachusetts.
BIG TREE HUNTING IN COLORADO: A CASE FOR THE NUMBERS

BY ROBERT T. LEVERETT
WHAT COMES TO MIND
when Colorado is mentioned to lovers of the outdoors? Chances are images of snow-capped peaks will dance in their heads. The high summits of the Colorado Rockies are magnets for climbers and sightseers alike. Elite peak-baggers rank the Centennial State’s 53 “fourteeners,” comparing elevations and geographical prominence. The extent of their numeric comparisons speaks to the importance they place on exact measures. Numbers rule.

Colorado offers another landscape feature needing description through precise quantification: its treasure of big, tall trees. True, the Rockies do not grow behemoths like those on the West Coast, nor are her forests as varied as the deciduous woodlands of the East, but recent discoveries made by the Native Tree Society (NTS) and American Forests National Cadre of expert tree measurers, both groups with which I have been very closely involved, offer a fresh perspective on Colorado’s arboreal offerings.

Tree-hunter enthusiasm is undeniably boosted by numeric comparisons. Paraphrasing what Thoreau scholar and friend Richard Higgins once said to me, “Hard numbers trump soft adjectives.” Colorado’s cottonwoods reach impressive circumferences,
DURANGO — GENESIS OF MY CONNECTION

My wife, Monica, and I spend part of our summers in the colorful San Juan country of southwestern Colorado. Initially, I was searching for old-growth forests, and pursuing that mission in 2009, I met Laura Stransky, an old-growth inventory specialist for the U.S. Forest Service. Through Laura an informal connection between NTS and the San Juan National Forest developed. I began exploring the Hermosa Creek Wilderness north of Durango and the forested slopes of scenic Engineer Mountain. In both locations, I confirmed exceptionally tall trees that exceeded the expectations of botanists, foresters and naturalists alike. For example, along the Hermosa Creek Trail, I measured a 160-foot ponderosa pine, a matching 160-foot Douglas-fir only yards away and a 156-foot Colorado blue spruce a short distance uphill. These game changers alerted me to the untapped tree-hunting potential of the vast San Juan region.

My story made the Durango Herald, but it wasn’t all me. Steve Colburn of Laser Technology Inc. (LTI) participated in some of the early measurements. We employed LTI’s most accurate height-measuring device to achieve results to within half a foot. There were serious opportunities for further discovery, but the job required a team. I needed my NTS companions, living far away. First stepping forward were Don Bertolette (retired, U.S. Forest and National Park Service, living in Alaska), Dr. Lee Frelich (Director of the Center for Forest Ecology, University of Minnesota and NTS Vice President) and Rand Brown (tree hunter extraordinaire from Ohio). In 2010, they joined Laura Stransky and myself in an expanded search.

But, before reporting on our exploits, I should acknowledge that we were certainly not the first to document big trees in the Centennial State. That distinction goes to others, and in particular, the Colorado Tree Coalition, and Neal Bamsberger, Coordinator of Colorado’s champion tree program who noted: “The Colorado Tree Coalition was developed to lead Colorado’s efforts to preserve, renew and enhance community forests. Our main focus is education, providing information on proper tree selection, planting and maintenance. In 1995 we achieved 501-c3 status as a nonprofit organization, which is celebrating its 25th silver anniversary in 2016.”

The Coalition’s champion tree list reveals the extent of their devotion and success. Colorado is in good hands, but as Neal reminded me, their focus is more urban, which leaves vast areas of the state as prime tree-hunting grounds.

I should also note that Iowa big tree hunter Mark Rouw visited and measured trees in the San Juans years before. We have named a tall Colorado ponderosa for him, recognizing his discoveries.

AN ERA OF DISCOVERY

During the summers of 2014 and 2015, our team grew. American Forests joined with the Native Tree
One of three big blues claiming national co-championship: height 165.5 feet, circumference 12.5 feet, average crown spread 33 feet. From left to right the Colorado A-team: Will Blozan (its discoverer), Matt Markworth, Chris Morris, Larry Tucei and Mark Rouw.
Society, San Juan National Forest (Laurie Swisher), Colorado State Forest Service (Kent Grant), Fort Lewis College and others to intensify exploration of the San Juans. American Forests Vice President of Communications, Lea Sloan, attended both the 2014 and 2015 events.

Our prior measurements supported our belief that the mountains of southwestern Colorado possessed trees of a half dozen species reaching record dimensions, particularly height. In 2014, confirmation came with a number of new discoveries by Matt Markworth, Will Blozan, Larry Tucei and Mark Rouw. In 2015, Don Bertolette, Eli Dickerson, Chris Morris, Dr. Robert Van Pelt and Bart Bouricius added depth to the effort, with Steve Colburn and I remaining the team anchors.

The 2014-2015 discoveries reinforced our thinking about what the Rocky Mountain Douglas-fir, ponderosa pine, white fir and Englemann spruce attain dimension-wise in the San Juans, but we were totally unprepared for a world height record: a blue spruce — serendipitously, Colorado’s state tree.

Justice cannot be done to the 2014-2015 explorations in one article. It is a story of the highest exercising of tree hunting and measuring skills, a tale of dogged persistence. The team spotted thin spires from long distances and then made perilous descents into steep gorges to take meticulous measurements — tree hunting at its most athletic. I leave to the reader’s imagination our combination of wild excitement, sore muscles and perpetual obsessing over accuracy (the distinguishing trait of Cadre members). Instead, I will settle for summarizing our findings and ponder their significance through some statistical tools: the convergence of science and big tree hunting.

SAN JUAN MOUNTAINS AND STATISTICAL MEASURES

How can we compare big trees for forest sites and larger geographical regions? One method developed by NTS computes a height index. The result is named for the late, great Colby Rucker.

We measure the tallest member of each of the 10 tallest species and average their heights. The result is the Rucker Height Index (RHI). We then compare indices for different locations. If the trees on a site are mature, we have a useful metric for assessing species growth potential. For large geographical regions, the index captures height maximums averaged over many variables to more fully reflect potential.

The chart to the right shows trees of 10 species. Note that a status of “Tallest in Colorado” simply means that it is the tallest we know of in Colorado. All trees were measured using methods approved by American Forests in their new Tree-Measuring Guidelines Handbook.

In addition to the height champions included in the chart, Will Blozan spotted a big blue in 2014, measuring 165.5 feet tall and 12.5 feet around. Will Blozan’s and Matt Markworth’s exciting discoveries are national co-champions, returning a share of the crown to Colorado’s state tree. Will’s tree earns 324 points and Matt’s tallies 322. A Utah giant certified by National Cadre apprentice Daniel Allen earns 323 points. We have three national co-champion blues. Sweet!

Where have these great trees been hiding? After all, this is 2016. The answer is: in steep ravines with dizzying cliffs and rock ledges that make off-trail travel a challenge and render useless traditional tape and clinometer-based tree-measuring methods.

The National Cadre was up to the job, especially Matt, and of course, perennial super star Will, who verified Matt’s 180.6-foot blue spruce. Incidentally, Matt also measured a 170-foot blue, using his Tru-
Pulse 200. Will employed a TruPulse 360. Matt and Will applied trigonometric sine-based measuring methods as required by the Cadre.

Readers can see for themselves how outstanding these blues are by perusing Internet sites describing Picea pungens. Maximum listed heights are as low as 60 feet (probably cultivars), with most around 100. Despite the best intentions of the authors, tree guides seldom provide reliable maximum dimensions for tree species. Guide offerings represent little more than repetition from other sources — basically, it’s the same information circulated ad infinitum.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>HEIGHT-FT</th>
<th>GIRTH-FT</th>
<th>MEASURERS</th>
<th>DATE MEASURED</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado blue spruce</td>
<td>180.6</td>
<td>11.5</td>
<td>Markworth &amp; Blozan</td>
<td>2015</td>
<td>Tallest known</td>
</tr>
<tr>
<td>Douglas-fir</td>
<td>169.0</td>
<td>10.3</td>
<td>Markworth</td>
<td>2014</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Ponderosa pine</td>
<td>165.3</td>
<td>10.9</td>
<td>Blozan &amp; Markworth</td>
<td>2015</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>White fir</td>
<td>162.3</td>
<td>9.9</td>
<td>Markworth</td>
<td>2014</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Englemann spruce</td>
<td>152.5</td>
<td>9.7</td>
<td>Markworth, Tucei, Others</td>
<td>2015</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Subalpine fir</td>
<td>133.0</td>
<td>7.0</td>
<td>Markworth, Others</td>
<td>2015</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Southwestern white pine</td>
<td>127.0</td>
<td>6.5</td>
<td>Leverett, Others</td>
<td>2014-2015</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Narrowleaf cottonwood</td>
<td>117.0</td>
<td>n/a</td>
<td>Markworth</td>
<td>2014</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Quaking aspen</td>
<td>115.0</td>
<td>n/a</td>
<td>Markworth</td>
<td>2014</td>
<td>Tallest in Colorado</td>
</tr>
<tr>
<td>Rio Grande cottonwood</td>
<td>112.0</td>
<td>26.6</td>
<td>Van Pelt, Leverett</td>
<td>2015</td>
<td>State Champion</td>
</tr>
</tbody>
</table>

Average 143.4
Returning to the table below, does the 143.4-foot RHI improve our understanding? At a minimum, it speaks to the capacity of the San Juan forests to grow larger, taller trees of several species than elsewhere in the Rockies. For wider geographical comparisons, a 143.4-foot RHI surpasses some entire states. Interestingly, the RHI of my home state of Massachusetts is 143.9. New York’s RHI is 144.4 — again, the entire state.

From the number of Colorado blues more than 160 feet tall, we conclude that the species maximum lies between 160 and 170 feet with a few statistical outliers reaching 180. I would argue that this conclusion provides us with a new scientific understanding of Colorado’s state tree.

**TREE STATURE AT HIGH ELEVATIONS**

The tall pines, spruces and firs described tell one story. Another is the unanticipated tree-heights measured at two miles above sea level and higher. Coal Bank Pass lies at 10,640 feet on US 550 between Durango and Silverton. Vehicles stream over the pass with occupants dazzled by the much-photographed profile of 12,972-foot Engineer Mountain looming high above the road. In the presence of such a gigantic landform, who would notice that down the ridge from the small lookout at Coal Bank an extraordinary Englemann spruce thrusts its pointed crown to record height for the altitude. In 2009, using my Nikon Prostaff 440 and a Suunto clinometer, I settled on between 141 and 142 feet for this tree growing at two miles above sea level. In the nearby La Platas, I measured an Englemann to 136.5 feet growing slightly above 10,500 feet, and still another to 119 feet at 11,200 feet near Kennebunk Pass.

I leave to the reader’s imagination our combination of wild excitement, sore muscles and perpetual obsessing over accuracy (the distinguishing trait of Cadre members).
In 2010, Don Bertolette and Rand Brown confirmed my Coal Bank numbers, but the discoveries had just begun. On Engineer Mountain, I measured an Englemann to approximately 135 feet, growing at 11,100 feet in elevation, another record. In 2014, that tree was reconfirmed with my friend Larry Tucei. Nobody I talked to expected such heights at elevations above two miles, and I assumed that we’d hit the maximums. Not so! In 2015, Will Blozan discovered an Englemann on Engineer topping 137.5 feet at 11,060 feet elevation. More 130-ft spruces grow above 11,000 feet, but how are other species performing?

The region’s subalpine firs demand their place in the sun. A few make between 100 and 110 feet with one reaching 118. Collectively, these exceptional spruce and fir represent what we think is the tallest forest growing in the western hemisphere north of Mexico. This astonishing statement is supported by no less an expert than Dr. Robert Van Pelt, forest ecologist and famed redwood researcher at the University of Washington. Bob announced his conclusion at the Durango Southwest Old-Growth Conference in June 2014.

Beyond Size There is Forest Aesthetics

I don’t want to leave readers with the impression that in my world only numbers matter. To the contrary, the greatest appeal of Colorado’s big trees lies in their artistically weathered shapes carrying imprints of drought, storms, and insect attacks stretched across centuries. Yet, the stalwart pines, spruces and firs persevere, asking nothing from us while providing an uninterrupted flow of ecosystem services.

The fragrant orange bark of arrow-straight ponderosas set against the rugged peaks and blue sky of the Hermosa Creek Wilderness leave indelible impressions, as do the needle-sharp spires of the blues and Englemanns. None of these fine old trees need measurement to project their power.

Purple Mountain Majesties

Who would have believed that hidden in the San Juan’s rugged gorges and even along well-traveled trails still grow conifers that set new records for species height. It took a team effort to locate and measure them, and yes, we truly may have found the western hemisphere’s tallest forest north of Mexico.

Colorado’s state tree has many cultivars. Homeowners love their symmetrical shapes and blue foliage. Urban planners prefer their modest size, but these tame landscape adaptations fall far short of the potential of their wilderness progenitors. The 2014-2015 tree-hunting coalition’s discoveries reveal Nature’s design for the Colorado blue spruce. The wild and free form of this charismatic species continues to reign in the remoteness of the San Juans — towering spires to match the towering peaks.

Robert T. Leverett is a member of American Forests Measuring Guidelines Working Group & National Cadre, co-founder of the Native Tree Society, co-founder and President of Friends of Mohawk Trail State Forest, and Chairperson for the Forest Reserves Scientific Advisory Committee for the Massachusetts Department of Conservation and Recreation.
WITH HER NOSE IN THE AIR and tail wagging, Tia moved between a stand of trees, sniffing their trunks. The German shepherd passed countless trees before she stopped and sat. The action alerted her handler, Alice Whitelaw, that she had found an ash tree infested with emerald ash borer.

Tia is one of a trio of dogs trained to detect ash wood or emerald ash borer as part of the invasive species team at Working Dogs for Conservation, a nonprofit organization that puts dogs on the front lines of environmental conservation.

“Seeing the raw potential of the dogs and watching them develop these skills over time is super rewarding,” says Whitelaw, co-founder and director of programs for Working Dogs for Conservation. “I’m amazed at their potential to play an important role in conservation.”
By sniffing out invasive insects, highly skilled dogs are on the frontlines of forest conservation.

By Jodi Helmer

Conservationists
The idea of using dogs for scent detection isn’t new: Law enforcement agencies and the military have long trusted dogs to use their superior sense of smell to locate suspects, drugs and bombs. Working Dogs for Conservation uses the same strategies to train their canine conservationists to sniff out invasive species.

Formed in 2000, the Montana-based organization partners with agencies around the globe to help protect wildlife and wild places by dispatching dog/handler teams in the field.

Over the last 16 years, handlers have traveled across the globe, using dogs to sniff out invasive zebra mussels in Alberta, poached rhino horns in Zambia and brown tree snakes in Guam. In the U.S., the dogs have the potential to save forests by identifying the emerald ash borer (EAB), a destructive beetle that is wreaking havoc on ash trees.

“Combined with all of the other tools we have, dogs are a really good application for a lot of conservation issues, including emerald ash borer,” explains Whitelaw.

**APPETITE FOR DESTRUCTION**

Native to Asia, emerald ash borer arrived in the U.S. around 2002 via shipping crates containing infested ash wood. The insects lay their eggs on the bark of ash trees; as the larvae emerge and bore under the bark, they cut off the flow of water and nutrients, killing the trees.

To date, emerald ash borers, which have no natural predators in the U.S., have spread to more than 20 states and threaten to kill most of the nearly nine billion ash trees found in North America — and the problem continues to escalate. New research indicates that the invasive beetles have started attacking white fringetree, a native tree that grows wild throughout most of the country. By 2019, it’s estimated the emerald ash borer will have caused $10 billion in damage.

“Emerald ash borer is hard to find and that makes it easier to spread,” notes Mark Abrahamson, en-
tomologist and lead scientist for emerald ash borer with the Minnesota Department of Agriculture.

Although insecticide is effective for killing the invasive insects and saving trees, the number of infestations and wide swaths of infected trees in Minnesota forests makes it impossible for rangers to keep up with infestation identification. For infested trees that go untreated, Abrahamson notes, “emerald ash borer is 100 percent lethal.”

In Minnesota, emerald ash borer spread from four counties in 2012 to 12 counties (and counting) in 2016.

After learning about the successes Working Dogs for Conservation had using dogs to sniff out other invasive species, the Minnesota Department of Agriculture reached out to the nonprofit in 2012 to see if the dogs could help with their emerald ash borer infestation. The hope: The
dogs could help identify infestations that might go unnoticed and help the state get a jump on treatment.

“Our current inspections are visual and, with ground-up stuff, it’s impossible to detect,” Abrahamson says. “The idea of bringing in the dogs was to improve detection and help prevent the spread of emerald ash borer because we have too many colonies to effectively deal with on our own.”

**TRAINED TO SUCCEED**

Working Dogs for Conservation trained three dogs for the project: Tia, a German shepherd that has worked on several projects, including rosy wolf snail detection in Hawaii; Lily, a yellow Labrador trained to detect quagga mussels and white-footed vole scat; and Wicket, a black Labrador mix that recognizes 26 scents, including Chinese moon bear scat.

Tia and Lily were trained to detect emerald ash borer infestation while Wicket learned to sniff out ash trees and wood. (Abrahamson notes that identifying ash wood — in a pile of firewood or mulch — can help prevent infested wood from being moved into emerald ash borer-free areas, reducing the risk of new infestations).

Working Dogs for Conservation devotes significant efforts to finding and training their conservation dogs. Their handlers rotate the dogs between projects depending on the needs; when new invasive species projects come up, like the emerald ash borer work, the dogs are trained to detect new scents. As the need for dogs increases, Working Dogs for Conservation continues expanding its canine conservation team. And, while a few dogs come from breeders who specialize in breeding working dogs, most of the dogs come from shelters where families have surrendered them for being too wild.
“These dogs have a high drive that makes them great working dogs but not great pets,” Whitelaw explains.

The organization has relationships with shelters that understand what kinds of dogs excel at field work; the shelters contact Working Dogs for Conservation when a dog that seems to fit the criteria comes through their doors. Still, trainers can meet 300 dogs before finding just one that has the drive to succeed as working dogs; of the dogs that are chosen for training, about 50 percent fail and are dropped from the program.

The dogs that succeed are evaluated and placed on jobs that fit with their skills and personalities.

"Not every dog is good at every job," Whitelaw explains. "Knowing what we know about how detailed the project is going to be and knowing the dogs' skills, we decide who we're going to put on the project."

Currently, there are 17 trained with Working Dogs for Conservation working on various projects across the globe, and the organization is looking to add a few more conservation canines to their team.

Of the nine U.S.-based dogs, Whitelaw chose Tia, Lily and Wicket for their abilities to handle detailed work like searching a brush pile for a piece of ash

“Seeing the raw potential of the dogs and watching them develop these skills over time is super rewarding. I'm amazed at their potential to play an important role in conservation.”

— ALICE WHITELAW, CO-FOUNDER AND DIRECTOR OF PROGRAMS FOR WORKING DOGS FOR CONSERVATION
After several weeks of training, the trio traveled to Minnesota to put their new scent skills to work. Funding from the Farm Bill covered the cost of the pilot project. During a two-month period in 2012, Whitelaw, along with Working Dogs for Conservation co-founder and dog handler Aimee Hurt, worked alongside Tia, Lily and Wicket to test their skills in the field and search for emerald ash borer infestations in Minnesota.

During the project, the dogs excelled in identifying ash wood and infested wood in firewood facilities, compost facilities and parks in multiple counties. During timed trials against experienced Minnesota Department of Agriculture staff, the dogs proved more accurate than their human competitors.

“We were faster but not as thorough and it was easier for us to be fooled and miss a piece [of ash wood],” says Abrahamson.

Although their skills in the brush piles proved superior, Whitelaw admits that the dogs are not perfect at locating infested trees.

“The infestation needs to be low enough on the trunk for dogs to get the scent,” she explains. “So, for new infestations that are higher up in the trees, the dogs are not as accurate.”

Even so, the Minnesota Department of Agriculture recognized the possibilities for using the dogs’ superior scent skills to assist with emerald ash borer detection and treatment.

At the end of the pilot project, the team recommended employing a detection dog/handler team (trained by Working Dogs for Conservation) to inspect firewood facilities, county brush piles and wood products producers to prevent the movement of infested wood into non-infested counties or partnering with Working Dogs for Conservation to perform frequent seasonal inspections.

“Emerald ash borer doesn’t move quickly unless we help it,” says Whitelaw.

In forests, Abrahamson believes the dogs could be useful to detect new areas of emerald ash borer infestation, helping forest managers by pinpointing what trees are infested and need treatment.

Although there was a lot of excitement about the project, securing funding proved difficult and the project was discontinued.

“It was unfortunate that their funding fell through because they were great partners and we saw a lot of potential,” says Whitelaw.

Despite the disappointment, it wasn’t long before Tia, Lily and Wicket were called back to work.

ADORABLE EDUCATORS

Working Dogs for Conservation received calls from other states interested in their successes using dogs to find ash wood and emerald ash borer, including Texas Parks and Wildlife.

Laura Speight, a wildlife biologist with Texas Parks and Wildlife, had heard about the Minnesota project and invited the nonprofit to help with emerald ash borer-related outreach and education in Texas.

Although Texas doesn’t have a problem with emerald ash borer — yet — forests in neighboring states, including Arkansas and Louisiana, have recorded infestations of the invasive insects. Speight hopes that being proactive could help keep emerald ash borer from crossing the border into the Lone Star State.

“It’s hard to explain to the public why they should care about a little beetle,” she says. “If it comes to Texas, we know it’s going to be tough to stop it so we thought, ‘Wouldn’t it be cool to bring the dogs to northeast Texas to capture people’s attention and educate them about emerald ash borer?’”
In February, Working Dogs for Conservation traveled to Texas with Wicket and Tia. During the trip, handlers spent three weeks meeting with stakeholders and demonstrating the dogs’ skills.

The canine conservationists got rave reviews from representatives of organizations like Texas A&M Forest Service and the USDA Natural Resources Conservation Service — and Speight believes the public will respond the same way.

“These dogs know how to work a crowd,” she says. “The public might not remember me talking about emerald ash borer but they are going to remember the dogs; that kind of engagement is the key to invasive species education.”

The dogs were once again the stars of the show when they returned to execute the Texas Parks and Wildlife-created outreach and education plan in May. Staff from Texas Parks and Wildlife and Texas A&M Forest Service visited parks, campgrounds and forests with the dogs and their handlers, asking campers for permission to search firewood. While the dogs searched for ash wood, staff talked to campers about emerald ash borer and their role in preventing its spread.

“Even if campers don’t have ash wood, the search still works because it gives the forest service a chance to talk to people about the issue,” Speight says.

In fact, talking to people about the issue — and their role in preventing the spread of emerald ash borer — might be the key to keeping the invasive insects from crossing the border into the state.

“We’d like not to have emerald ash borer in the state; if that’s not possible, we want to minimize the impact, slow the spread and take action to minimize losses,” says Allen Smith, forest health coordinator for Texas A&M Forest Service. “To make that happen, we’re making a pretty hard effort to educate as many people as we can.”

Like Minnesota, Texas is struggling with the budget for emerald ash borer prevention, especially because no infestations have been recorded. To cover the costs of the project, Speight got creative with funding, using a grant earmarked for other invasive species prevention and rolled emerald ash borer education into the project. The effort, she believes, is worth the investment.

Smith believes education and outreach events (with dogs as the tail-wagging, face-licking representatives for the issue) are essential to maintaining the state’s emerald ash borer-free status.

“The real value of the dog is a conduit to open discussion,” he says. “We can talk to [campers] about emerald ash borer and if we find ash or infested wood, we can dispose of it before the beetles have a chance to emerge.”

From Speight’s perspective the dogs’ involvement with the initiative will have a more powerful and longstanding impact on the public’s awareness of such an important environmental issue.

“It’s hard to make people aware of a problem if it’s not on their radar,” Speight says. “The dogs will help us get people’s attention and educate them about how destructive emerald ash borer can be — that awareness can help save trees.”

North Carolina-based journalist Jodi Helmer shares her home with five rescue dogs who can sniff out treats but not much else. Her work has appeared in National Geographic Traveler, Modern Farmer and Entrepreneur.
How the American writer saw trees as miracles that encapsulate all that is good about nature.

BY RICHARD HIGGINS • PHOTOGRAPHY BY RICHARD HIGGINS
HENRY DAVID THOREAU WAS CAPTIVATED BY TREES and they played a significant role in his artistic creativity, philosophical thought and even his inner life. He responded emotionally to trees, but he also understood them scientifically as a naturalist. As a writer, Thoreau portrayed them so perfectly that it was as if he could see the sap flowing beneath their bark. When he wrote in The Maine Woods that the poet loves the pine tree as his own shadow in the air, he was speaking about his connection to trees. In short, he spoke their language.
What drew him to trees? Their beauty and form delighted his eye. Their wildness struck a chord in him. Their patience reminded him that we will sooner overtake the dawn by remaining here, where we are, than by chasing the sun across the western hills. By spending his life rooted in Concord, Thoreau emulated trees’ tenacious hold on earth.

If Thoreau thought human nature was bent, he saw trees as upright and virtuous, as the nobility of the vegetable kingdom. Their very stance spoke of the “ancient rectitude and vigor of nature.” Nothing, he said, “stands up more free from blame than a pine tree.”

Old trees connected Thoreau to a realm of time not counted on the town clock, an endless moment of fable and possibility. Such trees reminded him “that I, too, am a remote descendent of the heroic race of men of whom there is tradition.”

And, they were his teachers. Although he called the shedding of leaves in fall a “sylvan tragedy,” he knew that the fallen leaves would enrich the soil and, in time, “stoop to rise” in new trees. By falling so airily, so contentedly, he wrote, they teach us how to die.

SPEAKING FOR TREES

Thoreau wrote prolifically about trees from 1836 to 1861. Although he observed them closely and described them in detail, he did not presume to fully explain them. He respected a mysterious quality about trees, a way in which they point beyond themselves. They bore witness to the holy for him. Trees emerge in his writings as special emblems and images of the divine.

During Thoreau’s lifetime, New England was all but deforested. While he hated the loss of familiar trees or woods — “Thank God, they cannot cut down the clouds!” — he was all the more aggrieved for knowing the ecological and psychological value of trees. “A town is saved,” he wrote, “not more by the righteous men in it, than by the woods and swamps that surround it.” Every tree “sends its fibers forth in search of the Wild” — and in the latter, he famously wrote, is the preservation of the world.

Today’s recognition of trees as “carbon sinks” that reduce global warming makes his vision of their value seem clairvoyant.

Thoreau was ahead of his time about trees in other ways. A century before nurse logs became a popular term in forest ecology, he called pines “nurses” to the oak saplings that take root around them. He did not use the word ecology, but he saw forests as whole landscapes that ignored public and private boundaries and urged that they be
preserved as such. He depicted forest trees as “communities” and villages, anticipating, if only through metaphor, our discovery of trees’ “social networks.” And, despite the cutting of woods all around him, Thoreau, nevertheless, foresaw that “one day they will be planted and nature reinstated to some extent.”

Loggers had the upper hand, however, in his own day. Thoreau’s response was to use his gifts as a writer to challenge the petty calculus that reduced forests to so many board feet of lumber. He knew that without trees, nature would wither, and, thus, human life would as well. Trees, he said with customary frugal eloquence, “are good for other things than boards and shingles.” They should be allowed to “stand and decay for higher uses.”

Thoreau responded to trees on multiple levels. Five characteristic ways he did so were with his eye, his heart, his muse, his mind and his soul.

A SIGHT TO BEHOLD
Thoreau delighted in observing the shape, color, texture and stance of trees. He sketched them, interpreted their expressions and appraised their character. His eye took in all — root, trunk, bark, branch and crown, leaf, blossom and cone. It was the real trees he knew that made those he imagined so solid on the page. And, he knew them all over Concord — birches, basswoods and hornbeams in pastures and on hills, a pine or hemlock that stood “like a pagoda in the woods.” His eye never tired of the details that differentiate one tree from another. “A tree seen against other trees is a mere dark mass, but against the sky it has parts, has symmetry and expression.”

Thoreau loved to look at big trees — pasture oaks astride the fields, elms whose graceful crowns created a canopy of calm below, pines that rose like spires in the forest. But, he loved small or common trees no less. Rotting logs and dead leaves fascinated him. “Pitch pine cones very beautiful,” he wrote, “not only the fresh leather-colored ones but especially the dead gray ones.” The smallest oak, the shrub oak, was a favorite. It was “rigid as iron, clean as the atmosphere, hardy as virtue, innocent and sweet as a maiden.” Pulling apart willow catkins, he found the tree’s seeds “exceedingly minute,” as small as one-twentieth of an inch. Examining such details was more than observation for Thoreau. It was an act of contemplation. The eye, he wrote, “has many qualities which belong to God more than man.”

THOREAU’S SOFTER SIDE
Thoreau also responded to trees with his heart. It is well known that Thoreau had a stern, prickly side. He was quick to judge or take offense, and he held unyielding opinions. Trees brought out another side to him. They stirred a boyish joy and drew bursts of praise from his pen. Their tops against the sky delighted him; lichen elicited his awe. Thoreau found an “inexpressible happiness” and “barely repressed mirth” in the woods.
“For each successive new idea or bud, a new rootlet in the earth.”

—Journal, May 20, 1851
Autumn exhilarated him. In the observer, he wrote, trees stir “an analogous expression of joy and hilarity.” He called trees his friends and even his “distant relations.”

His affection led him to romanticize trees. As Concord began to shed its rural character in the 1850s, Thoreau used trees as symbols of a simpler, more heroic past and imbued them with noble qualities he thought society lacked. When a huge, century-old, landmark elm in Concord was suddenly felled in 1856, Thoreau angrily delivered a mock eulogy. He cast it and all of Concord’s elms as beacons of moral principle — and as local residents who discharge their civic duties more faithfully than Concord’s citizens.

**POETIC INSPIRATION**

Trees also stirred the muse in Thoreau. He “browsed,” or fed, his poetic imagination on them and made the forest a fount of figurative language for his pen. Pines and maples encircled Walden Pond like “slender eye-lashes” fringing earth’s “liquid eye,” and the wooded hills beyond were “its overhanging brows.” The shadows of trees checker the ground at night “like chandeliers of darkness.” A line of treetops jutting up a hillside were to him “the plumes and standards and bayonets” of soldiers on the march. In November, “the wind roars among the shrouds of the wood.” As preachers, maple trees surpass the pallid ministers of New England by delivering blazing sermons. Trees themselves were poems to Thoreau, “living poetry,” written by nature on the landscape.

**A CURIOUS MIND**

Trees deeply engaged Thoreau’s mind as well. He began identifying trees by species and studying them around 1851. Next to his lyrical words about trees, he noted the order in which they leaf out — “the yellow birch first, then the black or the paper birch, then the white” — and turn color in fall. Botany gave him a way to see the invisible energies of trees and new words to describe them. Through years
of close observation, he learned how trees disperse their seeds and regenerate the forest. He was not the first to notice this, but he understood the process in detail, documented it and coined the term succession. He dated trees by their growth rings and calculated their rates of growth.

Yet Thoreau always wrote about them as parable as well as fact. Rather than narrowing his view of trees, botany deepened his philosophical view of them. A tree’s trunk, root, branch and leaf were universal templates of form he found everywhere in nature. The earth “expresses itself outwardly in leaves” because “it so labors with the idea inwardly.” Realizing that a plant’s root in the dark soil and topmost leaf in the air are but opposite ends of a single stem excited him. A new idea is like a bud on a branch, reaching up for light and down to the earth for nourishment. The airiest thoughts are “womb’d and rooted in darkness... like the tree of life.” Thoreau merged these lenses in his unsurpassed ode to trees, “Autumnal Tints.” On one level a tree-by-tree kaleidoscope of the shifting hues in a New England autumn, on another it is a profound meditation on death in nature and affirmation of nature’s deep impulse for renewal.
MORE THAN JUST TREES
Trees also gave expression to Thoreau’s deeply religious nature. They were his spiritual guides and companions to his soul. This does not contradict Thoreau’s withering criticism of formal religion. He railed against churches not because they stood for religion, but rather because they misrepresented it. So, he searched for a truer expression of religion in nature. Trees often led him to it. They were “shrines” and “burning bushes” that disclosed the divinity in nature to him. The forest was Thoreau’s cathedral, the woods his “sanctum sanctorum,” his holy of holies, where he got “what others get from churchgoing.”

While Thoreau wrote of sensing the divine in the woods, he did not claim to understand it. Trees intimated the presence of God in mysterious ways. He wrote that they knew things that he did not and would never know. “You are never so far in them as they are far before you. Their secret is where you are not and where your feet can never carry you.” Still, they symbolized an immortality in which Thoreau could believe. A tall white pine in Maine, he wrote, was “as immortal as I am, and perchance will go to as high a heaven, there to tower above me still.”

A NEW PERSPECTIVE
In “Walking,” Thoreau tells of climbing a tall white pine in June. Near the top he found some tiny, delicate, reddish blossoms, “the fertile flower of the white pine looking heavenward.” He took one down and, as he walked around town, showed it to whomever he met. “Not one had ever seen the like before,” he wrote, “but they wondered as at a star dropped down. The pines have developed their delicate blossoms on the highest twigs of the wood every summer for ages...yet scarcely a farmer or hunter in the land has ever seen them.”

Two hundred years after his birth on July 12, 1817, Thoreau is still helping us see trees in new ways. How they stand or change with the seasons, their solid presence and fleeting beauties — such things take on deeper meanings as we look at trees through Thoreau’s eyes. They were wordless poems to him, and the message he got from them was one of life itself. His writing about trees illustrates the power they exert on us all.

Richard Higgins is a writer and editor in Concord, Massachusetts, and the author of “Thoreau and the Language of Trees,” from which this essay and the photos are drawn. His book will be published by University of California Press in March 2017.
Innovations in Urban Forestry

**Urban forestry’s next era focusing on integrating different disciplines.**

BY IAN LEAHY

**THE IDEA OF ACTIVELY MANAGING TREES IN CITIES**

and towns goes back to some of the world’s oldest civilizations; ancient Egyptians, Greeks, Persians, Chinese, Japanese and Romans all invested in green spaces within the expanses of their bustling cities. They created groves around their places of worship and planted trees around buildings, each in their own way recognizing the inherent value of engaging with nature, not just on great excursions but on a daily basis.
By the 19th century, as modern cities began to take shape, this tradition continued. Paris became defined by its tree-lined streets. The much younger United States, still grappling with its relationship to an untamed wilderness frontier, perceived forests as a threat and hindrance more than an asset. The only value many thought trees had was in planting them as a reminder of their homeland. Not surprisingly, many invasive species were introduced during this period.

There were, however, exceptions. Famed landscape architect Frederick Law Olmstead forged a green aesthetic for numerous college campuses, the National Zoo and parks. Most famously, he was part of a visionary team of city leaders and activists who saw the need for green space for working-class residents in a still relatively small, but rapidly developing, New York City. Even as farms could still be found in the middle of Manhattan, Olmstead created a landscape design which resulted in an 800-acre urban park, Central Park, whose value would only be fully realized decades later.

Toward the turn of the 20th century, a more scientifically-based concept began to emerge, finding voice through horticultural societies that favored native species. In a 1911 address to American Forests, then a professional association of foresters, horticulturists and conservationists known as the American Forestry Association, J.J. Levison, a forester for the Brooklyn and Queens Parks Department, urged the organization to “set down for its object furtherance of proper care, planting and study of city trees throughout the country.”

Levison was voicing a growing need for national leadership on urban tree care, and American Forests responded by expanding its conservation scope to include urban areas in addition to its historical wildlands-focused work, which protected wildlife habitat and provided water and timber to the centers of commerce and expanding populations that demanded use of that water and timber. American Forests in that era helped forge the modern standards of arboriculture and later created jobs planting trees through the Civilian Conservation Corps, giving people dignified employment and stability through the Great Depression.

As a precursor to modern day urban tree canopy assessments, American Forests also supported a national inventory of the country’s urban elm trees, anticipating the threat of Dutch elm disease that was affecting Europe in the 1930s.

By the mid-20th century, it was clear that the management of individual green...
spaces and individual trees needed to evolve further. A more science-based, comprehensive approach to managing tree canopy in and around cities was needed. Not coincidentally, the term “urban forestry” was coined in 1965, at the University of Toronto.

This more sophisticated effort to study and manage, as a cohesive ecosystem, the natural resources of even the most intensely built environments, needed a national convener and voice. American Forests once again stepped into that role, organizing a first-of-its-kind National Urban Forestry Conference in 1978, and helping to forge and implement a vision that would become, in the 1990 Farm Bill, the U.S. Forest Service’s Urban and Community Forestry Program, which remains dedicated to addressing the unique needs of tree canopy in urban landscapes.

In 1982, American Forests formalized its years of urban forest education, outreach and discussions by creating, for the first time, a separate urban forestry program. In an address at the second National Urban Forestry Conference that same year, American Forests’ then-Vice President, Rexford A. Resler, described urban and community forestry as “the scientific and systematic management of all natural resources in and near our cities.” He challenged attendees to “work together to take our American public through the process of exposure, involvement and commitment to the urban and community forestry concept.”

A DISCIPLINE COMES INTO ITS OWN

In the ensuing 34 years, urban forestry has grown into a robust, sophisticated field. World-renowned scientists from the U.S. Forest Service urban field stations and other federal and state agencies, universities and private companies use leading-edge technologies and techniques, growing our understanding of the impacts of trees, and often specific species, on water and air quality, economic viability and human health. Human health and economic research, in particular, have changed people’s perspectives of the role trees can play in urban environments. From studies showing impacts on crime, domestic violence, ADHD symptoms, cultural isolation, neighborhood stability, student grades and even birth weight, trees are proving their worth in urban landscapes in many ways.

We recognize that urban forests are not a panacea for our many complex urban challenges. When addressing stormwater management and air quality, or crime and cultural isolation, there are many considerations, both technical and socioeconomic. But, when urban forests are designed and managed properly as part of the solution, there is strong scientific and experiential evidence showing that they can be a significant contribution.

To that end, in disciplines as diverse as education, healthcare, city planning and transportation, there is newfound interest in better understanding how to harness the urban forest to address their different needs. Yet, in spite of the advances, these voices are often isolated within their own fields. Restoring urban forests is not a strategy included at the decision-making table often enough because the research and technical knowledge of how urban forests function and their benefits is not yet fully incorporated into how built-environments are designed.

A PLATFORM, NOT A SINGLE ISSUE

A coalition of national urban forestry organizations came together 10 years ago to figure out how to better work together to advance a unified urban forest agenda for our nation’s communities. Named the Sustainable Urban Forests Coalition (SUFC), this network has solidified that foundation and become, in recent years, a space to engage diverse disciplines, including city planners, educators, landscape architects, nonprofit leaders, scientists, arborists, foresters, nursery managers and many other professionals who care for, monitor and advocate for trees and our urban forests.

Urban forests provide perfect outdoor opportunities for children to play, but they also can help with asthma, ADHD symptoms and improve student grades
as a whole. With a strong and enthusiastic membership, the coalition is working to expand even further the diversity of disciplines that are represented.

A few years ago, a group of 25 urban forestry leaders from diverse perspectives across the country were selected to serve on a “Vibrant Cities and Urban Forests Task Force.” They were tasked with defining what characteristics make a community “vibrant,” and how enhancing urban forestry at all levels can positively impact quality of life. The primary lessons learned from that process were enlightening:

1. Urban forestry is a platform that addresses numerous concerns, it’s not a single issue.
2. Urban forestry is a successful topic, applicable to any issue of interest to community advocates.
3. Bring urban forestry to people rather than expecting people to come to urban forestry.

This seemingly subtle shift represents an evolution of thinking about our field, from the 1980s when Rexford Resler spoke of bringing the American public to the concept of urban forestry. It is clear today that a more effective approach lies in bringing urban forestry as a platform to other disciplines to incorporate into their overall objectives.

One of the outcomes of the Urban and Community Forestry Program authorization in the 1990 Farm Bill was the creation of the National Urban and Community Forestry Advisory Council (NUCFAC). This group of appointed advisors to the Secretary of Agriculture is responsible for synthesizing into a consistent vision the full spectrum of views on urban forestry, as a foundation for practical policy. Just this year, NUCFAC released a “Ten-Year Urban Forestry Action Plan” that was developed by, and for, the urban forestry community to guide its efforts for the next decade. Building on those Vibrant Cities lessons, the goals of this Action Plan feature engagement with other disciplines as fundamental to urban forestry work going forward: integrating with all scales of urban planning and human health, diversifying funding sources by collaborating with other disciplines and harnessing the next generation of technology.

**URBAN FORESTRY’S THIRD EVOLUTION**

Taken together, these elements make it clear that the field of urban forestry is ready for its third transformational evolution: from individual tree care in the early-20th century to comprehensive urban ecosystem management in the mid-20th century to now fully integrating with other disciplines in the 21st century. Once again, there is need for a national voice and convener to lead this integration. Once again, American Forests is stepping into that role, working closely with partners to build the infrastructural and organizational capacity that can bring the technical knowledge of urban forestry fundamental to urban forestry work going forward: integrating with all scales of urban planning and human health, diversifying funding sources by collaborating with other disciplines and harnessing the next generation of technology.
as a platform to diverse disciplines, such as those focused on housing, labor, transportation, public health and energy.

The first step in this process is building online capacity. In partnership with The U.S. Forest Service’s National Urban Technology and Science Delivery Team, American Forests is developing a new co-branded website. This platform will synthesize leading research, present best practices and spotlight innovative projects focused on an array of topics, including human health, education, economic impact and workforce development, water and sewer management, transportation, social equity, urban waste utilization, public safety, city planning and smart cities technology. The goal is to make it easy for mayors, city managers and professionals who are grappling with complex issues to learn how urban forests can be part of the solution.

As this online resource drives curated content to targeted audiences, we seek to build a cross-disciplinary community that can deliver our field’s vast body of research, technical knowledge and practitioner experience to inform decision-making processes that impact urban livability across the country. As part of that effort, American Forests, through its ongoing support in cities around the country, will pilot innovative greening projects that put these ideas into practice.

If successful, when it comes time to do the next “Ten-Year Urban Forestry Action Plan,” we will find the informed integration of tree canopy and healthy green space embedded in the decision-making process and funding allocation for an array of disciplines that may appear, at first, to have nothing to do with trees. We will find police unions and school districts, stormwater and transportation managers, as well as mayors responsible for it all, seeing tree canopy from different perspectives, but seeing tree canopy nonetheless.

Ian Leahy writes from Washington, D.C. and is American Forests’ director of urban forest programs.
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IT'S HARD NOT TO NOTICE the large swaths of forests around the world that succumb to irresponsible management, many left barren, seeming to echo a nuclear fallout zone. Bulldozers have sat static after the fact, seemingly in regret of what they have just done. Our dependence on industry has its costs.

When forests disappear, they take with them the most essential resources of all: clean water and fresh air. The cloud of carbon dioxide left behind has politicians and scientists scrambling to mediate its effects.

Chadwick Dearing Oliver, Professor of Forestry and Environmental Studies and Director of Yale’s Global Institute of Sustainable Forestry, is one of those scientists. He is urging us to save forests from poor management so that they can save us through the many benefits they provide.

“What I would like is for us to begin a dialogue on the subject of how forests can best serve society,” Oliver says. “That means everything from biodiversity to water, jobs to bio-safety and carbon to greenhouse gasses.”

Forests are one of the greatest providers of ecosystem services. But, when restoring and managing forests, we must follow responsible management protocol. Tree monocultures have little ecological value, compared to a diverse forest. Crowded trees compete harder for resources and sunlight, which can compromise their health and make a forest susceptible to fires and insects.

Diverse forest cover at all levels — the canopy, understory and forest floor — is an indication of a healthy forest with resources and habitats for all.

As humans tamper with forests’ natural growth, healthy tree cover diminishes. But, what if we tampered with them in a positive way?

Through examining satellite imagery and forests’ behavior relative to greenhouse gasses, Oliver is developing the technology to determine how to best utilize and manage forests in relation to wildlife and biodiversity.

“Making a forest sustainable requires some technical ability to be sure that you always have enough of every habitat,” he says.

In order to improve our forests’ current situation, and improve the benefits they provide, Oliver believes we can adapt a new kind of natural management behavior.

The eco-friendly forestry management practices Oliver speaks of have an impact on the environment and the communities that depend on forests for their livelihood. By implementing these practices, we can help ensure the future of our forests and the health of our planet.

Building a Better Forest

BY SHANDRA FURTADO

An example of a managed forest, in this case, managing for stream restoration in Brush Creek, Ore., where logs and boulders are placed in the stream to create habitat for salmon and trout that is conducive to spawning.
uncanny likeness to the idea of farming free-range chicken. Packing thousands of live chickens into small living quarters may produce a lot of chicken, but quality is compromised. Allowing chickens to grow and interact with their environment, ultimately, yields better quality chicken.

Similarly, “free-range” forestry will provide us with better quality ecosystem services to accompany the wood we harvest. However, right now, large-scale tree plantations are lacking in the ecosystem services they could be providing.

“The big issue is how to get people to move forward and accept this way of [managing],” Oliver says.

A focus of these practices is to provide a user-friendly interface which allows people to manage forests with minimal intervention.

Technology that allows less dependence on heavy machinery will keep roads out of forested areas. Managing forests through human involvement in the field, rather than relying on big expensive machinery, will redirect money towards creating more jobs.

“The irony is that we are harvesting so little of our wood — only about 20 percent of what grows every year — so we could be harvesting a lot more and forests would probably be doing better,” he says.

In the last few decades, Oliver has been interested in the role forest plays in the world’s ecosystem.

“[Global] forests are just not living up to their potential,” Oliver says. “They’re not providing the biodiversity that they could; they don’t have the species that they could, and they don’t contribute as much to carbon sequestration as they could. They’re getting pests and fires that are unnecessary and catastrophic; they could provide more water, and they could provide more jobs.”

Proper forest management will provide more biodiversity, clean water and prevent catastrophic forest fires, Oliver expects. He wants to provide more wood products, avoid steel and concrete and, through these technologies, employ more people.

Providing the proper tools to do so has been a focus throughout Oliver’s career. For his work, he has been recognized for multiple accomplishments in forestry and has won the Host Country Scientific Achievement Award from the International Union of Forest Research Organizations for his contributions to forest science. He wrote “Forest Stand Dynamics” in 1990, and is currently working on another book called “Global Resources and the Environment.”

Aside from such achievements, Oliver’s personal satisfaction has come in more subtle forms.

“From the perspective of a scientist, there’s what we call ‘the eureka’ moment, or the ‘aha!’ moment,” he says. “It’s when you’re trying to figure out a problem — whether it’s how the forest grows or how the water flows — and all the sudden the answer hits you.”

As a teacher, his proudest moments come from helping students achieve their own “eureka moments.”

“Sometimes, I work with students from other countries who haven’t had a strong educational tradition in their culture, and it’s so satisfying to see them grasp and understand science,” he says.

Thus, Oliver is optimistic for the future of forestry. He expects that, as younger generations enter their careers, there will be a shift towards looking at forests dynamically, rather than simply setting it aside and preserving it.

“They are not growing up with this kind of old paradigm of stable state forests; they are looking at them as more dynamic, something that’s beautiful in that way,” he says.

To Oliver, every forest has its own unique beauty, whether it be the subtle, charming deciduous forests of the eastern United States, or the spectacular redwoods and old-growth forests of the Pacific Northwest.

To those who share this appreciation and want to see their own forest land flourish, Oliver advises to begin looking at all of the different habitats they can provide on their land. Through proper management forests will give back what is put into them and more in the form of clean water, clean air and happy community members.

Shandra Furtado was American Forests’ spring 2016 communications intern and is a rising junior at George Washington University, pursuing a degree in environmental studies.
Photographer Jason Liske’s passion for visual storytelling leads him to explore spaces in depth. His photographs reflect his appreciation for bold forms and landscapes that resonate in their surroundings. Jason has been shooting landscapes and gardens professionally since 2003. He has collaborated with some of the leading garden and landscape design firms in the western U.S., capturing and expressing firms’ projects and identities in the digital medium. Jason was also an Honorable Mention winner in American Forests’ 2015 Trees Please photo contest.

To see more of Jason’s beautiful photography, check out our web exclusive!
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