Virginia Forests

FALL 2017

Technology at Work in the Forest
A VIEW FROM ABOVE

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We promote the stewardship and wise use of the Commonwealth's forest resources for the economic and environmental benefits of all Virginians.

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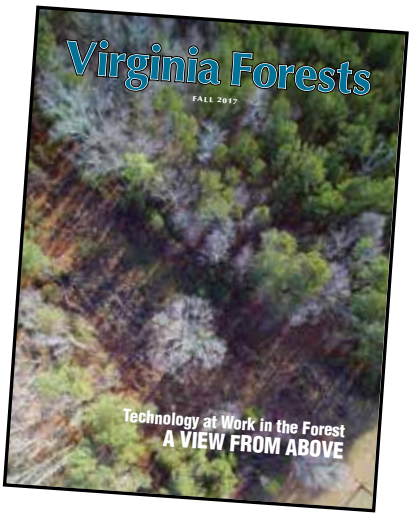
Aerial view of the Clinch River at Kyles Ford, TN

DANIEL CROSS, VT CMI PILOT

DEPARTMENTS



ON THE COVER: American Forest Management uses Unmanned Aircraft Vehicles and software applications to see forests in many different views.

Modern Day Logging and Chipping with Old Fashioned Values

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NAMED 2016 VIRGINIA LOGGER OF THE YEAR BY VIRGINIA FORESTRY ASSOCIATION

Movin' On

In case you haven't heard, VFA's Deputy Executive Director Shannon McCabe will assume the role of Executive Director with one of our partners, the Association of Consulting Foresters (ACF) in early 2018. ACF is the organization serving as a networking and informational hub for private forestry consultants nationwide. We are certain that ACF will benefit from Shannon's exceptional meeting management skills (developed at VFA of course!) as she will plan and implement the ACF national convention at venues around the country. ACF, like VFA, also produces a periodic magazine for its membership and provides other services as well.

The temptation is to be disappointed by this development. However, I see Shannon's rising star in the forestry association world as a testimony to the support and nurturing provided by VFA members. She has done—and will continue to do—good work. And that is true for us, too. I expect VFA and ACF will serve the threads of common services and causes in a way that will see our organizations stitched together for some time to come.

PICTURED (top to bottom)

Shannon McCabe and Executive Director Paul Howe plotting the next move at the 2017 Summit Welcome Reception held at Soaring Ridge Brewery.

The dynamic duo: Shannon and Leisa Weatherford, VFA's Director of Member Services & Finance.

Shannon holds the Tree Farm 75th Anniversary proclamation with Virginia's Secretary of Agriculture & Forestry Basil Gooden and VFA staff in 2016.

VFA leadership has begun to interview and hire new staff to carry out the growing and challenging VFA duties that reflect current and future needs of our membership. We are pleased to introduce our new Programs Coordinator Sarah Kammer, and you can read more about her on page 23. Sarah will provide support for Tree Farm, PLT and SFI®, among others, and we know that this important work will continue and expand. VFA has also identified a need for active coordination to continue our premier meetings and communications, and we look forward to filling that position in the near future.

Shannon will remain at VFA until the end of 2017, and the plan is for her to provide orientation to new staff before she departs. I expect her highly effective use of color-coded and detailed organizational charts, outlines, and to-do lists will continue to infiltrate the work at VFA, one of only several positive legacies of Shannon's tenure!

Best wishes Shannon, and thanks for your service. Onward and upward ACF and VFA.

VIRGINIA FORESTRY ASSOCIATION

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The Virginia Forestry Association, chartered in 1943, is a non-profit, non-governmental, privately-supported association of forest landowners, wood product industries and businesses, loggers, foresters, forest use groups, and conservation-minded citizens. New board members are elected annually by mail ballot to all VFA members. To ensure a balanced geographical representation, the state is divided into five areas and one "at large" category. Any VFA member may be a candidate for the board.

PRESIDENT'S COLUMN

We Have Come a Long Way

John Hancock

Given the opportunity, those of us working in forestry for more than a few years like to reminisce about how far things have come during our careers. Because working in the woods has its own set of challenges (such as terrain, weather, and critters), we have always looked for new tools to make our jobs a bit easier. This issue of *Virginia Forests* is taking a look at technology that has made an impact on how we look at and work in forests today.

I recently stumbled across an old "Certificate of Merit" I had received as a teenager while participating in the Virginia Forestry Training Camp. Forestry Camp made a big impression on me and was one of the early influences that led me to pursue forestry. A part of the training was learning how to use the many contemporary tools. Many of those are now antiquated, but at the time all the gadgets that foresters used impressed me.

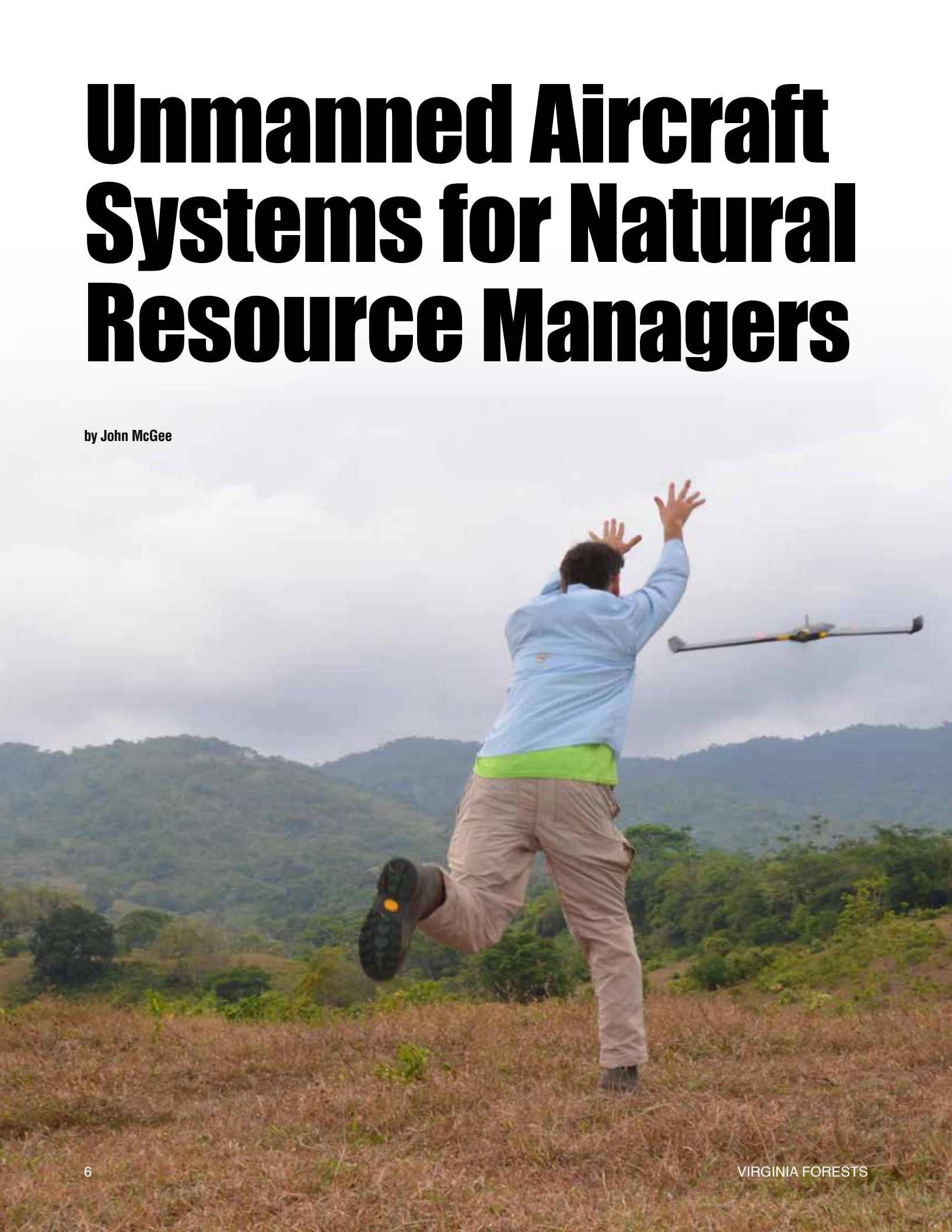
There were several things on the certificate that caught my eye. SFI in those days meant "Southern Forest Institute" and not "Sustainable Forestry Initiative." It shows a lot of outdated equipment and all the pulpwood looked like it was five-foot. A ride-behind tree planter is shown right above the fire tower. There's a rocket in there to give it a modern look, perhaps a nod to satellites? Maybe they anticipated GPS?

My first forestry job during college began in the bays and pocosins of southeastern North Carolina. I was told at the time that this area had the most challenging field conditions in the country, and I still believe it. The brush and

—continued on page 27

Unmanned Aircraft Systems for Natural Resource Managers

by John McGee



MICHAEL ROY, DIRECTOR, CONSERVATION THROUGH RESEARCH, EDUCATION, AND ACTION

How Did We Get Here?

Unmanned aircraft have long been employed by military services, and for years, mapping grade unmanned aircraft systems have been featured at vendor's exhibits at conferences and technical meetings. However, the introduction of small, inexpensive recreational aircraft seems to have happened almost overnight. A few years ago, I remember walking into a 'big box' store at the local mall to find an assortment of drones on the shelves. Later that same week, I encountered recreational drones on the counter at my grocery store. But I fully realized that drones were going mainstream when I found some (albeit, the toy variety) for sale next to the ice cream cooler at my local rural gas station. As one of my colleagues observed, "It was almost as if someone flipped on a light switch. It seemed like, within a week's time, different flavors of these aircraft were suddenly available for sale everywhere."

So what provoked this sudden influx of new technology? Certainly news reports of military applications have played an important role in promoting public awareness of this technology. We can also trace the lineage of consumer and mapping drone technologies to that little device that is likely within an arm's reach right now—your smartphone. Not only did smartphones pave the way for smaller and more powerful batteries, but these mini-computers (that also just happen to make phone calls) also came equipped with powerful sensors, GNSS chips, gyroscopes, accelerometers, wireless communication, abundant and compact data storage, and increasingly powerful processors. These high-resolution cameras take true color photographs, and some devices also collect information in other wavelengths, such as the CAT S60 smartphone's thermal sensor. Smartphones also serve as a platform for miniaturization of these powerful components that function as a single unit. So in essence, the evolution from a smartphone to an unmanned vehicle was not a huge technical leap.

Learning The Lingo

These aircraft were on the shelves for sale long before the public even knew what to call them. These systems are often referred to as drones, unmanned aircraft (UA), and/or unmanned aircraft vehicles (UAVs). Typically, the terms drone, UA, and UAV are most often associated with the flying component, or the aircraft itself. An unmanned aircraft system (UAS) is associated with an entire system that supports the operation of the aircraft and the collection of data from it. In addition to the aircraft itself, a UA "system" also includes: sensors, flight planning software, flight operation software (typically supporting autonomous flight), flight operation hardware (manual flight controller), a ground control station, data processing and analysis software. And, many would argue that human expertise forms an important component of the system as well.

Each component within the system is essential to the overall operation of the aircraft as well as the collection and analysis of data. A UAS can often be purchased as a turnkey system, or can be cobbled together using an array of individual hardware and software components. Throughout this article, we will use the term "small unmanned aircraft system" (sUAS) to refer to an unmanned

True Color Imagery from Clermont Farm, VA

aircraft system that weighs less than 55 pounds.

A sUAS is a potentially disruptive technology because it is affordable, transportable, easy to use, and provides rapid deployment to support short decision-making time lines. The sUAS has the potential to change how many of us collect data, monitor landscapes and assets and support management of our resources and operations. The sUAS is already redefining key aspects of many businesses.

Flight Planning Software Supports Autonomous sUAS Flights

Benefits of Unmanned Aircraft

Regardless of how these unmanned aircraft are referenced, it is no wonder that these data collection tools have garnered a lot of attention. The adoption of these technical systems transcend many different industries, professions, and disciplines. The Association for Unmanned Vehicles International (AUVSI), for example, estimated that the economic impact of the integration of sUAS into the national airspace will total more than $13.6 billion in the first three years of integration and could potentially grow sustainably for the foreseeable future, accumulating to total of more than $82.1 billion between 2015 and 2025.

Although economic implications of sUAS loom large, the importance of sUAS is really not about the aircraft itself, nor and not even about the operation, or flying, of the aircraft. The importance of the sUAS for most natural resource operations resides in its ability to support more efficient processes and workflows to plan, collect, process and analyze data to facilitate actionable decisions.

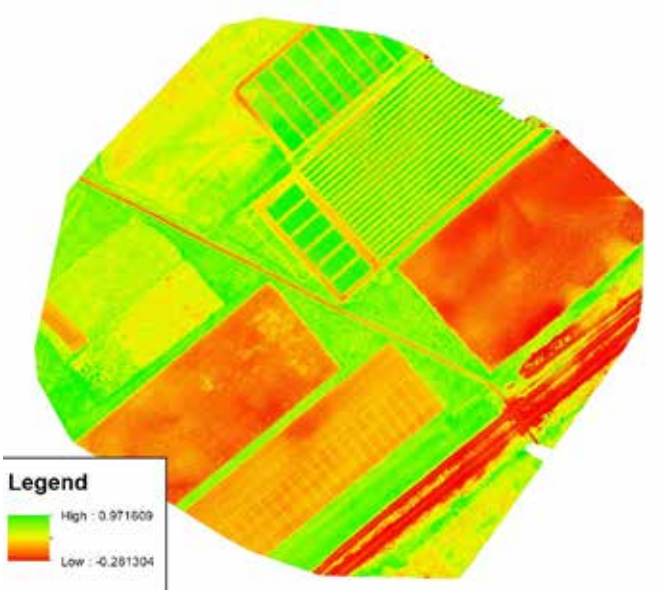
To put this into perspective, natural resource managers historically have been limited to available aerial imagery archives to support a given project. Imagery was often selected because it was the only imagery available, or because it most closely met the needs of the project, relative to other imagery options. This is despite the fact that the available imagery might not have conformed to the needs of the project. For example, decision makers may use imagery that is out-of-date, or records an unfavorable temporal window. Or perhaps available imagery was collected using a less-than-optimal sensor, maybe one with less than desirable spatial resolution. Unfortunately, aerial imagery is not a 'one size fits all' proposition. Aerial

imagery collected to support one particular application (for example, local planning) is not likely the most appropriate imagery required to support another application (monitoring prescribed burns or conducting agricultural assessments, for example).

From an historical perspective, capturing aerial imagery from manned aircraft has been a specialized and expensive process. Imagery collection incurs tremendous overhead costs (large planes, expensive cameras, sensors, and personnel costs) and often requires planning months in advance. After long-term contracts are signed, weather does not always cooperate, potentially leading to further delays and additional costs. Furthermore, while larger aircraft are very good for collecting imagery over large areas, they are not well-suited for capturing data over small areas efficiently. In addition, manned aircraft just cannot safely operate at low altitudes.

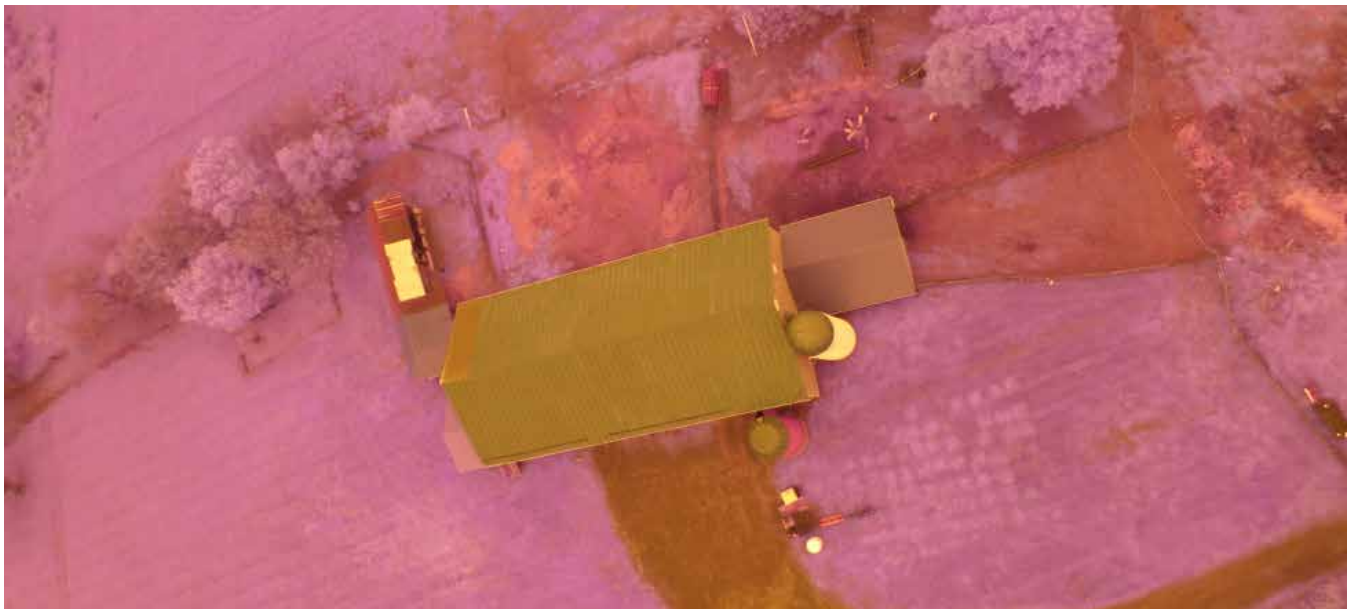
A sUAS, can often reduce time and monetary investments associated with image acquisition from manned aircraft. These sUASs can be employed within a day's notice, and are highly efficient in gathering data to over small project areas. And these platforms can operate at very low altitudes without jeopardizing human safety.

Using a sUAS, it is now possible for natural resource managers to collect aerial imagery in support of specific needs much like a physician prescribes a unique course of action for an patient. In many cases, sUAS can capture data on demand. This means that sUAS operators can now gather imagery and data over specific project areas, during specified seasons, even times of the day, when using an appropriate platform, supported by the most effective sensor and under favorable weather conditions. sUAS operators can check the weather, and literally go out and capture imagery that day or later in the week. After the flights have been conducted and the data have been captured, these images can be quickly processed and analyzed (sometimes while in the field), and can, therefore, better match the needs associated with the application.



NDVI image from Kentland Farm, VA DANIEL CROSS, VT CMI PILOT

Once collected, imagery may be archived so that it can be reviewed and compared to imagery collected over time. Perhaps equally significant, flight paths associated with the sUAS operation are saved and stored. By using these archived flight paths, we can develop a precise and autonomous monitoring program resulting in tremendous time savings over traditional field-based data collection methods.



NIR Imagery captured from Clermont Farm, VA

True color oblique image from the New River

DANIEL CROSS, VT CMI PILOT

Ready for Launch?

Before dashing out the door to launch your new sUAS, there are several items that you should be aware of. Safety for you and those around you is vital. The Federal Aviation Administration (FAA) has implemented regulations designed to facilitate the safe operation of unmanned aircraft. This oversight is critical because the U.S. maintains the busiest airspace in the world. Understanding airspace classifications and avoiding interference with manned aircraft is paramount.

The FAA divided the sUAS regulatory environment into two different categories: Hobbyists and Commercial operators. Commercial operators include anyone operating a sUAS for profit. These could include timber companies, real estate agents, agricultural operators, property or structural inspectors, surveyors, aerial mapping companies, aviation schools, etc. The Hobbyist Rules classification includes recreational operators, and, to some extent, educators. Commercial sUAS operators must be at least 16 years old, and they must acquire a Remote Pilot Airman's Certificate (which requires taking a proctored exam). These individuals must also be vetted by the Transportation Security Administration (TSA).

In addition to obtaining a commercial license, commercial sUAS operators must adhere to basic rules of the sky. As outlined by the FAA, commercial sUAS operators must:

- Operate in class G airspace;
- Operate an aircraft that weighs less than 55 pounds;
- Keep the aircraft in sight / unaided (within visual line-of-sight or VLOS);
- Fly below 400 feet above ground level (AGL);
- Fly during the day;
- Fly at or below 100 mph;
- Yield right of way to manned aircraft;
- Avoid operating over people and/or moving vehicles;
- Avoid operating in special flight rule areas.

Before you head out to the field, make sure that you understand and conform to federal and local regulations. Keep in mind that the most experienced sUAS flight operators typically spend much more time during the flight planning stage than they do actually flying the aircraft. And of course, make sure that you understand your application data requirements and the final product that you would like to have as a result of your sUAS operation. Reflecting on your project will influence some of your operational decisions and considerations associated with data collection. Some of these considerations may include:

- Type of sUAS platform (fixed wing or rotor aircraft)
- Flight operation (autonomous or manual)
- Sensor type (true color, thermal, near-infrared, multispectral, Lidar, etc.)
- Size of the coverage area
- Desired flight elevation
- Pixel size
- Temporal parameters
- Geographic coverage (i.e. number of acres)
- Terrain (flat or hilly, forested or cleared)
- Prevailing weather conditions
- Launching and landing options
- Safety

Experienced sUAS operators recognize that the operation of the sUAS is typically the easy part of the data collection effort. In 2016, the Geospatial Technician Education for Unmanned Aircraft Systems (GeoTEd-UAS) project hosted a panel of sUAS Operation Technicians (OT) from across the U.S. This focus group identified some of the major tasks and responsibilities associated with operating a sUAS. Not

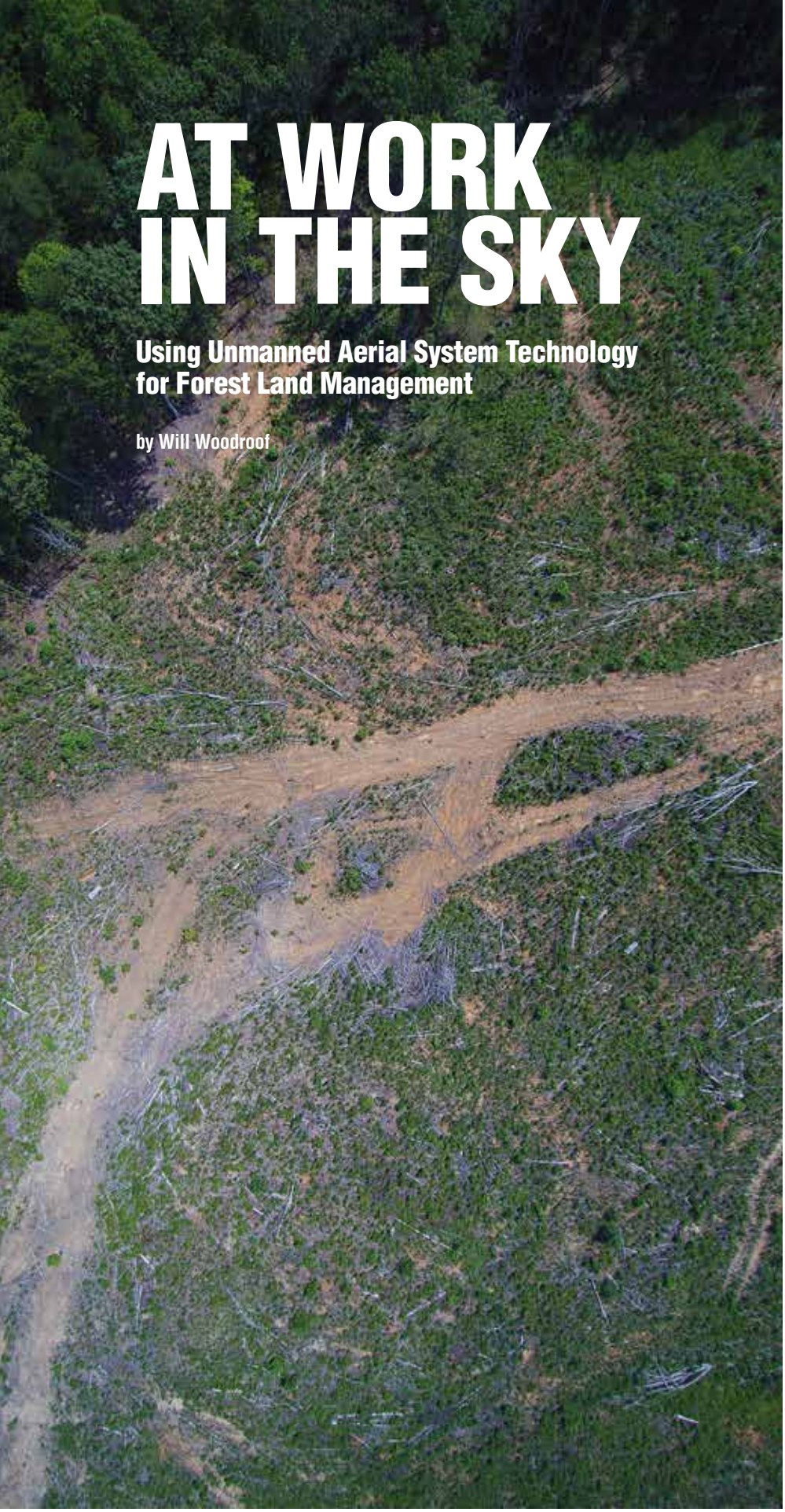
surprisingly, the operation of the vehicle was identified as a small component of the many tasks and duties associated with a sUAS Operations Technician. These tasks and duties have been charted, and are available from the GeoTEd-UAS website (http://geoted-uas.org/wp-content/uploads/2015/07/sUAS-operator-DACUM-chart.pdf).

Application Driven

While the integration of sUAS to support monitoring and mapping is promising, not every application forms a perfect fit for sUAS data collection. sUAS have limited flight times and are therefore unable to efficiently cover as much area as do larger manned aircraft. Federal regulations may limit some applications for sUAS operations. For example, one component of the FAA's sUAS regulations (also known as Part 107) requires that the aircraft must remain within visual line of sight (VLOS) at all times. Maintaining VLOS can be challenging in hilly or forested terrain. Under the current regulatory environment, urban forestry data collection using sUAS is also difficult, because the FAA restricts operation of sUAS over people (not involved in the project) and moving vehicles.

The application serves to drive the project requirements, and professional experience makes it happen. The Virginia Geospatial Extension Program, in partnership with the Conservation Management Institute at Virginia Tech, the GeoTEd-UAS project, VirginiaView, and Virginia Cooperative Extension, have logged hundreds of hours of flight time. These sUAS projects have supported projects from New England, across the Mid-Atlantic, to the tropical forests of Central America. We have found that developing expertise through hands-on experience is essential. sUAS work is challenging, because no two flights are ever the same—every single sUAS flight is different. While flight characteristics create complexity, they also reflect the real benefit of sUAS—each flight can be tailored to directly support the application, thereby providing data on demand.

John McGee is a Professor in the Department of Forest Resources and Environmental Conservation at Virginia Tech, where he serves as the Virginia Geospatial Extension Specialist. He has more than 30 years of experience working on natural resource management issues in the U.S. and overseas.



AT WORK IN THE SKY

Using Unmanned Aerial System Technology for Forest Land Management

by Will Woodroof

For several years, the FAA (Federal Aviation Administration) has struggled to regulate the United States airspace with the advent of the sUAS. (Small Unmanned Aerial System, sometimes called a drone) Prior to 2016, it was difficult and time consuming to get an FAA exemption to use drones for commercial purposes. Finally, there is a certification in place that allows a company to use its drones legally, and this has had a great impact on forestry land management decisions.

Before drones, land managers relied on sources such as the USGS, USDA, National Agriculture Imagery Program, and other, mainly state or federally funded projects as sources of data. They also relied heavily on foresters with GPS units to collect data in a labor-intensive and time-consuming discipline. Now land managers have the technology to capture on-demand data themselves. The technology of drones and software are changing rapidly as it has so many uses in different industries.

As of August 29, 2016, the FAA requires a Remote Pilot Certificate to use drones for business purposes and with the intention of making a profit. There are still a lot of restrictions when you fly, but having a certification in place has allowed American Forest Managment, Inc. to use drones for land management and marketing purposes in the world of forestry.

Video Capture and Marketing Material

American Forest Management (AFM) has experimented with drone footage for both marketing land sales as well as practical land management applications. We think the benefits of the marketing angle are pretty obvious. The drone footage gives a great and unique perspective of a property that you just can't get by any other means.

There is a lot to consider when buying a drone, and as you can imagine, the cost can vary greatly. There are countless drones and camera options on the market today, and you should spend some time doing some research to determine the best

option that meets your objectives.

AFM uses a Blade Chroma with a 4K CG03 camera, purchased over a year ago for about $800. There were some additional expenses like extra batteries and protective cases as well, making our total investment around $1100.

This drone has some great features for the price. The ease of use is one of its best attributes. We were able to feel very comfortable flying within the first few hours of operation. It flies very smoothly and creates beautiful videos and pictures straight out of the box. However, there are some shortcomings. Dense tree cover tends to interfere with the Wi-Fi connection between the drone and the first person view (FPV) handheld, making camera control an issue at times. It will generally regain connection quickly, but this makes it tough if you are trying to capture video or rely on viewing the camera footage from the FPV while flying.

The biggest issue we have had with this particular drone is its potential to lose GPS connection while in flight. This has happened on more than one occasion. In one instance, the drone flew away and never returned. We have since replaced the unit and determined there are certain flying modes you must employ if you lose GPS connection to regain control of the drone.

Image Post-Processing, GIS Analysis and Mapping

There are incredible software applications on the market now that can do some amazing things with your drone images. We have been experimenting with a product called Agisoft Photoscan. We can use this software to post-process and orthomosaic all the photos from a drone mission to produce a mapping image for GIS consumption. You can reference the orthophoto in Agisoft with ground control points for a more accurate geo-rectification. You can also do this in the GIS after you produce your stitched-together image with another reference image.

Agisoft can create a 3D model with just your images as well. From this model, you can create fly-throughs that are viewable in Adobe, create digital surface models, and perform distance, area, and volume calculations.

The Blade Chroma does not allow you to preset a flight path and have the drone fly autonomously, while capturing images at set intervals, then return back to your start location. This type of drone flight functionality is ideal for orthophoto and other mapping data capture. There are numerous drones on the market now that have this capability and this really improves mapping products and removes human error in the flight process. We have learned to fly the Blade in a systematic grid and capture pictures in intervals as best we can, but occasionally we will miss a section that we intended to capture.

One very popular drone model is the DJI Phantom. The Phantom has the ability to fly waypoints from previous missions. There are other apps that allow you to build a preflight mission via a map.

With the orthophotos collected on drone missions, we have calculated acres of a timber harvest, assessed seedling survival, monitored logging jobs, performed storm (ice, tornado and flood) damage assessments and acres calculations. Also, having the ability to provide a landowner with a new image map or model can be very valuable to them, especially if they are not near the property. This is something that can be done quickly and with relative ease with some basic technical flying ability and GIS knowledge.

Multispectral cameras can now be mounted to your drone to simultaneously collect five discrete bands of imagery, bringing affordable scientific multispectral imagery to the land managers, allowing for easier and more precise forest health monitoring. With autonomous flying drones, multispectral imagery cameras, and sophisticated image processing software, you can optimize treatment and make better land management decisions on demand while monitoring forest health with relative ease and in a cost effective way.

To obtain your Remote Pilot Certification, you must:

- **Be at least 16 years old**
- **Have a valid government-issued picture ID**
- **Register your drone with the FAA**
- **Pay $150 and pass the part 107 Aeronautical Knowledge Test at a FAA test center near you**
- **After passing the knowledge test, apply for your Remote Pilot Certificate**
- **Complete a TSA Background Check**

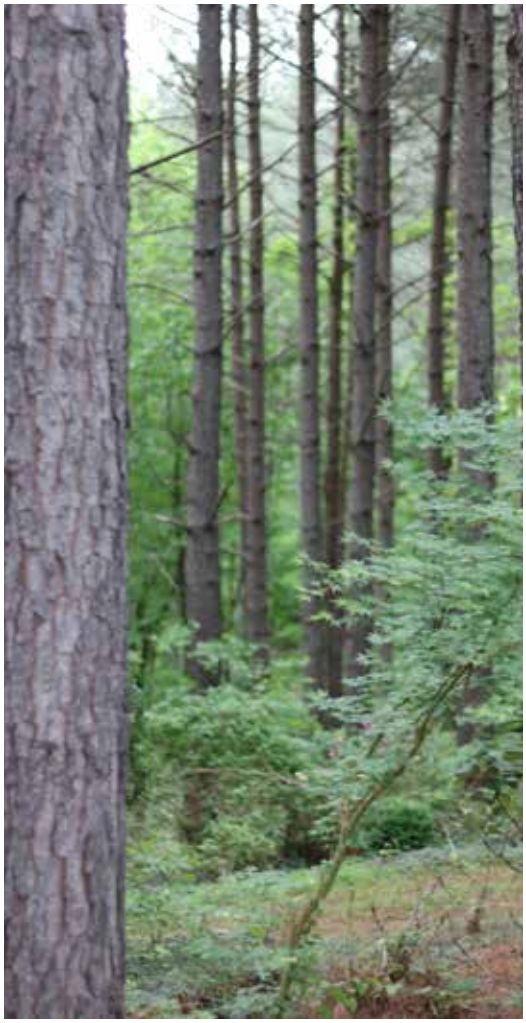
NOTE: The Remote Pilot Certification is only applicable for drones weighing less than 55 pounds. If your drone weighs 55 pounds or more, including anything you attach to the drone in flight, you must obtain a 333 Exemption from the FAA. These can be difficult to get and generally require a pilot's license.

Will Woodroof, Technology and Training Coordinator at American Forest Management, assists with inventory design, data creation, real estate mapping, data management, and GIS application development/technology solutions for internal and external clients. Will is a graduate of Appalachian State University and a Certified Geographic Information Systems Professional (GISP).

VIRGINIA TREE FARM FOUNDATION

Sustainable Intervention

by John Matel, President, Virginia Tree Farm Foundation



I would describe the practice of beneficial land management as "sustainable interventionism." That is, human intervention in a natural environment that leads to a more desirable result, is itself self-perpetuating, or nearly so, over the long run, and is sustainable if given a start. Practitioners seek to understand and use natural processes and respect natural relationships without trying to bring back a specific "natural" environment of the past, ostensibly not one influenced by humans. Frankly, there is no part of our world untouched by human intervention. Human "management" is happening. Factors like climate change and invasive species make this ever clearer. The choices we make to manage well or poorly, by design or default, have consequences.

The goals of sustainable interventions ought to be to increase the land's value each decade, if not each year, with practices that will help achieve richer soils, better water quality, and better and more diverse habitats. Do this and profit of many kinds follow. "

Sustainable interventionism does not mean we try to preserve nature as it is or even as it was. This is not possible in our dynamic world. It also does not mean that we conserve natural resources so we use none. It may mean that we recognize and work at slowing the loss. Sustainable interventionism has aspects of both these approaches

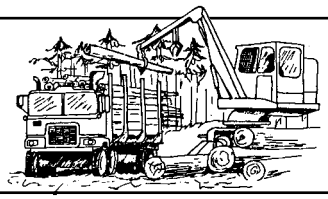
but adds factors of regeneration and adaptation, rejecting the narrative of loss and embracing different possibilities. It requires iterative learning, constant adaptation, local decisions and hands-on methods, but with a light touch that leverages natural processes, so that the continuing outcomes result from natural processes.

All this requires commitment and attention from tree farmers. Nobody can tell you not to make money from your land. Profit is a price of survival, of sustainability, since few can afford to hold land that does not pay. But monetary profit is only one goal and rarely the most important.

The goals of sustainable interventions ought to be to increase the land's value each decade, if not each year, with practices that will help achieve richer soils, better water quality, and better and more diverse habitats. Do this and profit of many kinds follow. This is what adds value for us, our communities and our environment. And acting in the context of natural processes, being part of them for years, for a lifetime and even for generations, is something that helps us find meaning in life. It really is that big.

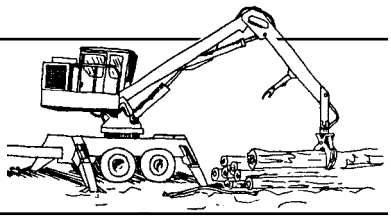
At Virginia Tree Farm Foundation, we face the challenge of certifying farms around the Commonwealth. We require a commitment to sustainable, even regenerative forestry. My concern, and that of my colleagues, is that as certified wood becomes more desirable, some landowners will just seek certification only to "get their wood across the scales" at the local mill. This not only dilutes the value of certification, but I see it as an offense to our values. We do not certify wood; we certify healthy forests.

As lovers of forests, we know that trees are more than wood, and forests are more than trees. As the Tree Farm Foundation, we are committed to those who are committed to the health of Virginia's forests in the long run, as long as we live, and even beyond. We hope that all forest loving landowners will join us.



THE LOGROLL

Notes & News for Loggers



by Scott Barrett, Ph.D.
SHARP Logger Program Coordinator
Extension Specialist, Forest Operations, Virginia Tech Department of Forest Resources and Environmental Conservation

Technology and the Logging Industry

New technologies and their ability to improve efficiency, safety, and profitability are changing the logging business and in many cases have already made substantial changes. One of the most common and most remarkable pieces of technology on logging operations—and in our everyday lives—is probably the smartphone. This technology has exploded in the past decade to become so common in our lives that we don't really even stop to think about its power.

The ability to communicate effectively from remote locations is enough of a reason to have a smartphone, but the variety of available apps is incredible. While not all rural areas have good cell phone coverage, a large portion of the state does. GPS and mapping features are part of the smartphone operating systems and allow you to have turn-by-turn driving directions to nearly any destination. In the forest, GPS along with map software enables you to see your location on an aerial photo and determine where you are in a stand. You can use your phone to watch the radar and see when a storm may hit, and it can even let you know when a storm is approaching.

Some new smartphones apps even enable participating truck drivers and logging business owners to track the turnaround times at mills. (For an example, look at www.phloem-app.com that was presented by its developers during the 2017 Virginia Forestry Summit).

Smartphones have become so common that it is easy to forget just how remarkable it is to do all of these things while in remote areas, with a device that is relatively inexpensive and fits in your pocket. The capabilities of smart-

phones and their ability to let logging business owners manage their operations from the woods would have been almost unthinkable 15-20 years ago.

Of course, the smartphone is not the only technological change that has happened in logging—not by a long shot. Equipment manufacturers have developed engines that are more fuel efficient and quieter than ever before. Many newer machines also come with built-in diagnostics capabilities that can communicate maintenance needs to the dealership and alert an owner to a problem that the operator might not even be aware of.

Technology changes have affected educational programs as well. With the SHARP logger program (http://SHARPlogger.vt.edu) our primary trainings have always focused on face-to-face classes. However, we also have an option for earning continuing education credits online. The feedback we receive from loggers on these online trainings is mostly positive. The biggest advantages they see with the online trainings is that they can earn credits at any time when it suits their schedule. As you might have guessed, they can even complete the online trainings using their smart phones!

At a SHARP Logger class recently I asked about new technology use on their operations. One thing mentioned was dash cams. As the cost of dash cams has decreased, many truck drivers and others have started using these, and some employers require their use. Dash cams can record incidents on the road. If there is an accident, this footage can potentially be a valuable piece of information to help determine exactly what happened.

Another useful technology mentioned was drones. Drones, or UAVs (unmanned aerial vehicles) continue to be more affordable, and there are potential applications on logging jobs. One person at the class mentioned using a drone on his logging job for entertainment, and to see what it could do. However, he noted, the ability of drones to capture photos from the air could be a useful tool. There are a variety of instruments that can be installed on a drone, and it is not out of the question that they may be commonly used on logging operations in the future.

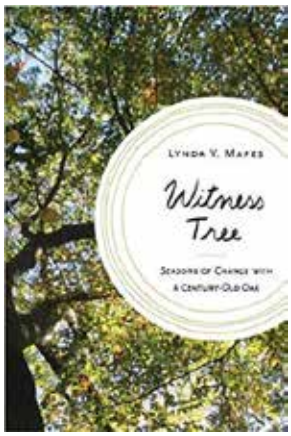
It is hard to imagine what future technologies will do to improve our lives and professions. However, it is how you apply the technology that matters. While technologies have a huge potential to make logging businesses more efficient, safer and more productive, they can also be a distraction that can cause problems and must be managed like any other aspect of the operation. Even with advances in equipment and communications, logging is still a dangerous business that often requires workers to operate in a difficult environment. Any technological advances that can make operations more efficient or improve safety will likely be welcomed by many in the profession.

Witness Tree

Seasons of Change With a Century-Old Oak

By Lynda V. Mapes

Reviewed by Lesha Berkel, Magazine Editorial Committee



During her year as a Bullard Fellow in forest research at Harvard University's Harvard Forest, Lynda Mapes selected a 100-year-old red oak in the forest to be a focal point for her book, *Witness Tree*. The big oak, she explains, will serve as her "marker and narrator, a living timeline of cultural and ecological change." While the timeline she follows to tell us about the forests and people in New England expands far beyond 100 years, the author circles back to the big oak throughout the book as a touchstone to frame her experiences and observations.

Harvard Forest (harvardforest.fas.harvard.edu) is a 4,000 acre laboratory and classroom that was established in 1907. Research, according to their website, "examines ecological dynamics in the New England region resulting from natural disturbances, environmental change, and human impacts." With this focus, Mapes looks at changes in the landscape that occurred over time—from colonialists who cleared much of the early forests for agriculture to the opening of the Erie Canal that helped shift farming into the Midwest and resulted in regenerating the forest where her Witness Tree thrives today. A particularly fascinating chapter includes her description of the evidence from a devastating hurricane in 1938 that is still being observed, measured and studied by Harvard researchers.

Mapes writes for the nature lover and naturalist, and she does a wonderful job of explaining complex biologic and scientific topics such as the physiology of trees, carbon sequestration, the impact of invasive species, and more. Her appreciation for the interconnectedness and constant change that is part of our natural world is beautifully detailed in a chapter about a part of the forest known as Hemlock Hollow that is being devastated by the hemlock woolly adelgid.

"History written in the land," she writes, "tells us that over the long march of time there has never been a constant or steady state in nature." Her description of looking at pollen preserved in the soil from hemlocks more than 8,000 years ago, helps us imagine what the forest may look like again, one day far into the future.

Mapes also does not shy away from citing human impact as a cause of accelerated climate change over the last 100 years. She considers the effects of today's "super-size" growing season—that she contends has resulted from burning fossil fuels like coal, rapidly increasing the amount of carbon dioxide in the atmosphere—as one reason for the growth surge she measures in a boring taken from her own Witness Tree.

Throughout the book, Mapes writes about advances in science and technology related to the study of wildlife, trees, forests and the environment. In particular, she notes how drones, cameras and smartphones allow scientists to constantly monitor forests from anywhere in the world by connecting to the internet to view these images. A camera mounted below the Witness Tree during her stay at Harvard Forest still allows the author—and all of us—to view the big oak just by visiting the website. Take a look!

The Witness Tree at Harvard Forest, December 3, 2017.

An Important Link to Careers in Forestry

by Carolyn Mulligan, VFEF Board of Directors

Having worked in the forestry consulting business for quite a few years, I have often met with timberland owners and heard them say, "I know nothing about my forest." Their ownership may be sizeable and worth many thousands of dollars, yet they are uneducated about things like the worth of their timber, the benefits of wildlife management, and the importance of water quality. They don't know what to do or how to plan for the future, and one bad decision can have a devastating financial effect on their investment. Timberland owners are in need of foresters to help them understand the world of forest management and what options are best suited for their unique circumstances and goals.

We need to remember that foresters are not just people who "know the woods." They are professionals with college degrees who are skilled in the science and art of managing Virginia's forests. There are quite a few different kinds of foresters, with different areas of expertise, all playing an important role in the growth, management, and harvesting of our timber resource. Consulting foresters assist landowners with advice on stewardship planning and selling timber, procurement foresters purchase timber and coordinate getting harvested trees from the woods to the mills. Investment foresters guide the activities of substantial timber investment and real estate firms. Geographic Information System foresters are skilled at mapping and imagery and can make forest planning a lot easier. County foresters help with fire control, cost share programs, and

At Holiday Lake Forestry Camp, youth get a chance to learn about skills, educational opportunities and careers related to forestry and natural resources.

ensuring state laws are followed while the role of extension foresters is primarily educational. The bottom line is that there are a variety of expertly trained foresters working in Virginia's timberlands to ensure these lands remain a well-managed and sustainable resource.

So how do we make sure we have an adequate number of foresters to get the job done? With more families living in urban areas these days, children don't always get exposure to nature and the outdoors. They need the opportunity to learn about trees, forest products, conservation and ecological diversity. Regular school curriculum doesn't always include things such as these, and state budget constraints often remove the opportunity for specialized learning and educational program enhancements. The Virginia Forestry Educational Foundation creates a link to generate enthusiasm in young people for the forest. Providing funds to Project Learning Tree helps get curriculum into schools for youth from preschool through grade 12 to facilitate learning about topics such as how trees grow and the products they provide. At 4-H camps supported by the Foundation, students can acquire skills in the wise use of our natural resources and get a better understanding of environmental issues. Holiday Lake Forestry Camp offers the chance for campers to experience a week of engagement in forestry practices. And one of the biggest impacts the Virginia Forestry Educational Foundation has is through providing scholarships to forestry students at Virginia Tech as they work to become the next generation to manage Virginia's forests. As the Foundation continues to champion programs like these, we can feel confident that Virginia timberland owners will have access to the forestry professionals they need and all Virginians can enjoy the benefits of these expertly and sustainably managed forests.

VFEF welcomes your support! *You can give online at www.vfef.net or mail your contribution to VFEF, 3808 Augusta Ave., Richmond, VA 23230.*

VAForestPAC: Aiming for Success

by Ken Morgan

Virginia's elections are behind us, but our work continues! We now have an opportunity to work closely with these elected officials and keep forestry in the forefront. VFA has supported many of these legislators in the past and provided financial support through our Virginia Forest Resources PAC. During 2017, VFA staff, Directors, and members attended 38 fundraisers for Virginia delegates. All of these legislators have been supportive of our forestry issues and legislation, chair important committees, and/or are in rural districts with VFA members as constituents.

The VAForestPAC exists to financially support candidates for elected office who have demonstrated understanding, interest, and leadership with legislation that favors the mission of VFA, who support legislation of value to VFA members, and who oppose legislation detrimental to VFA members.

During the past three years, VFA has experienced exceptional success with its General Assembly legislative initiatives. These include:

- Passage of a new favorable forest products truck weight law in 2015.
- Helpful changes to the Forest Products Tax and Reforestation of Timberlands Program in 2016, gaining the state match to industry's severance tax contribution.
- In 2017, defeating a proposed fee on loggers for each harvesting job and restoring proposed budget cuts to the RT program gained the previous year.

VFA Executive Director Paul Howe is a recognized and respected face with an ever-increasing number of legislators. The fundraisers he attends often can set the stage for subsequent meetings and conversations. The VAForestPAC Board of Trustees has distributed funds wisely and with the aim of communicating with legislators on a level equal to other advocacy groups with much bigger budgets.

VFA has benefitted from judicious application of VAForestPAC funds that have increased opportunities to meet and persuade General Assembly members to consider issues important to the forestry community as they weigh legislation and govern. If you are a forest landowner and/or have an investment in any phase of forest industry or serve in a supportive role, donating to our PAC is a direct return on investment for you. Our gain should be our mutual responsibility.

With the magnitude of our industry and landowner base we really should have a large, well-funded PAC. I ask each of you today to donate to the Virginia Forest Resources PAC. Contribute online at www.vaforestry.org/vaforestpac or mail your donation to the Virginia Forest Resources PAC, c/o Virginia Forestry Association, 3808 Augusta Avenue, Richmond, VA 23230-3910.

Resource Review

VFA Welcomes New Programs Coordinator Sarah Kammer

Virginia Forestry Association is pleased to introduce its new Programs Coordinator Sarah Kammer. Sarah is a Williamsburg native and a 2016 graduate of Virginia Tech where she received her bachelor's degree in forest resources and environmental conservation, studying environmental resource management.

Sarah participated in an internship with The Wildlife Foundation of Virginia and was a Bay Watershed Riparian Buffer Intern with the Virginia Department of Forestry (VDOF). Prior to accepting her position with VFA, Kammer served as the Bay Watershed Project Coordinator for VDOF. Welcome, Sarah!

Virginia buys part of Oakley Farm for Wildlife Management Area

—adapted from an article at Fredericksburg.com by Jeff Branscome, The Free Lance-Star

Virginia's new Oakley Forest Wildlife Management Area, a 2,900-acre wildlife preserve located in western Spotsyvania County, was dedicated by Governor Terry MacAuliffe on November 29.

The land was purchased by the state with federal Wildlife Restoration Program grants that are funded by excise taxes on guns, ammunition and archery equipment.

The Oakley property dates to 1777 in Spotsylvania land records, said Lee Walker, spokesman for Virginia's Department of Game and Inland Fisheries. It changed ownership several times until 1926, when George C. Beals of Massachusetts bought the property.

A 245 acre site that includes a 19th century home and a second 400 acre parcel including an 18th century home are owned by Beals family members and were not part of the sale.

VFA member Anne Beals, who is on the state's Board of Forestry, said her extended family has a history of conserving property in Massachusetts and that she's ecstatic the same thing will happen in Spotsylvania.

"It took awhile for the deal to be finalized, but it finally was, and now we're going to celebrate it," she said. She added

Resource Review

that her late husband George was a "big outdoorsman and conservationist, and I'm so happy to see that this 2,900 acres is going to be preserved in perpetuity."

George Beals was named Conservation Farmer of the Year in 1986 by the Tri-County/City Soil and Water Conservation District. He also was a chairman of the local district and later of the Virginia Association of Soil & Water Conservation Districts.

The state organization's George Beals Conservation Endowment Fund provides $5,000 annually to help develop leadership skills for Virginians who are passionate about conservation.

Oakley Farm was named the Outstanding Virginia Tree Farm in 1988 and one of three nationally recognized Good Earth conservation farms in 1990. The National Endowment for Soil and Water Conservation named the Beals family a Good Earth Family in 1991.

The preserve will be open to hunters, campers and hikers.

Two UK Importers to Buy From Virginia Lumber Companies

Gov. Terry McAuliffe announced new Virginia lumber export sales to the United Kingdom (UK) during a trade and marketing mission to Europe in November. The sales were struck between several Virginia forest products companies and two UK importers. Virginia companies met James Latham Ltd., one of the oldest distributors of timber and panel products in the UK, and Brooks Bros Ltd., a major UK wood products importer, during separate visits to Virginia, hosted by Virginia

Department of Agriculture and Consumer Services (VDACS).

"We are thrilled to expand Virginia's lumber exports and further strengthen the relationship we have built between Lathams and Virginia lumber suppliers," said Governor McAuliffe. "I am excited to see our efforts paying off and contributing to our new Virginia economy."

Virginia suppliers met earlier in 2017 with Latham in efforts to develop a Virginia yellow poplar program with a UK importer. Latham now regularly sources the product from several Virginia companies, including Robert S. Coleman Lumber Company in Culpeper, and has also begun sourcing white oak hardwood lumber from Virginia. Since visiting Virginia for the first time in June 2016, Lathams has purchased over $2 million of Virginia lumber.

Brooks Bros visited Virginia in September and met with several Virginia lumber suppliers. As a result of the trip, the company has now begun purchasing lumber from some of the Virginia companies they were introduced to during the visit.

"Exports are vital for our forest products industry," said Basil Gooden, Secretary of Agriculture and Forestry. "We are committed to assisting our companies with sales in all international markets, and are especially proud to see Virginia products succeeding in a mature and competitive market like the UK."

Virginia Forests Service Directory

FALL 2017

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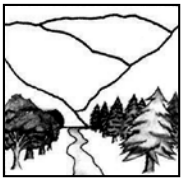

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"We know Virginia produces quality lumber, so we were happy to be invited to meet with some new suppliers at the forest products convention," says Lloyd Chaplin, Buyer for Brooks Bros. Ltd., who met with Meherrin River Forest Products at the Virginia Forest Products Association in September. "Meherrin River is a relatively new company and new exporter, so we're excited to help it grow its export portfolio."

Virginia agricultural and forestry exports to the UK were valued at $60.6 million in the first half of 2017. Forest products, including wood pellets, lumber, logs and further processed products, accounted for more than 70 percent of the total value of exports.

Take a (Virtual) Walk in the Woods with VDOF

Area Forester Lisa Deaton features photos and stories from her forest walks in *Field Notes*, a new blog on the Virginia Department of Foresetry's website. Visit my vaforest.org for a look at "What's In the Woods Today."

VFA also keeps you up to date on the news, events and issues that impact Virginia's forests and forestry community with its eNewsletter, ***What's Happening in Virginia Forestry Today.*** *Check your inbox or contact VFA at 804-278-8733 if you would like to subscribe.*

PRESIDENT'S COLUMN, continued from page 5

briers were so thick that you couldn't see more than a few feet, and we always cruised timber in pairs. Our distance-measuring technology consisted of a metal chain that we tied to our belt and pulled through the woods, and our partner would yell out "chain!" so that we knew to mark the spot before moving further forward. We carefully kept up with our location with our compass and hand-drawn map, created as we pulled chain and offset our cruise lines. Snakes, ticks, and mosquitos were so bad that we wore long-sleeved shirts and snake leggings year-round, and taped our pants to our boots, combined with spray, to help slow down the ticks.

Back at the office, we drew our maps by hand, normally in ink on mylar, traced on a light table from old aerial photos. Now that's a test in patience! And we always kept a good set of colored pencils for hand-coloring our stand maps. Any forester under 40 is probably laughing at that last sentence.

We've come a long way since then. We now do many tasks more accurately and efficiently with the help of computers, GPS, data recorders, smart phones, and downloadable maps.

But there is one thing I have found that we cannot replace, and that is an old-fashioned field reconnaissance. At some point the landowner, forester, and logger need to go out on the ground, evaluate local conditions, and come up with a management and harvesting plan. While drones could help with this, I doubt they will ever fully replace. Let's hope they don't.

Virginia Forestry Association supports technological advancements in forestry in many ways. We partner with educators through the Educational Foundation, Project Learning Tree, and Cooperative Extension. This issue of *Virginia Forests,* along with similar articles routinely published, provide the latest information. Our meetings have always had a significant educational component. The 2017 Summit included a number of speakers presenting the latest advances in research and technology, and the 2018 Summit in Richmond will take a look at what might be just over the horizon.

We have made great strides in the 42 years since I received my certificate, and it will be interesting to watch how we continue to progress.

Log a Load Playroom Mural, Artwork by Ira Khroniuk, Image provided by APEM, Inc.

A Home Away From Home

Community Support Makes Redesigned 7th Floor Family Common Areas Possible

by Anika Kempe

IF A CHILD HAS BEEN ADMITTED TO A HOSPITAL'S INTENSIVE CARE UNIT, the only place a family wants to be is not far from his or her bedside.

At UVA Children's Hospital, this often means that UVA Medical Center's seventh floor—which includes both the neonatal and pediatric intensive care units—becomes a very familiar environment for patients and their families. During the past year, the space was renovated and transformed into a colorful and imaginative space, the same look and feel brought to life by UVA Children's Hospital clinics at the Battle Building just across from the Medical Center.

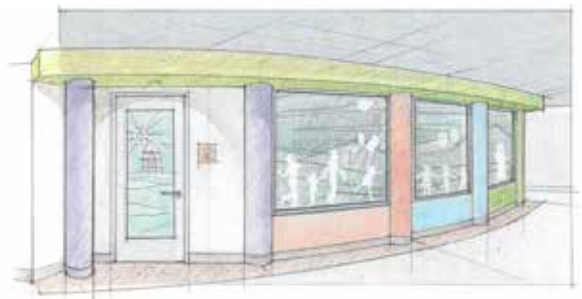
This transformation has been made possible by both hospital funding and private philanthropy, including proceeds from the 2017 Main Event Gala. The gala, held at Keswick Hall & Golf Club, brought together more than 400 members of the community and raised more than $296,000 to help with the seventh floor's renovations.

Within the seventh floor, two special common areas have been designed specifically with families in mind.

"When your child is sick, you never want to be more than a few minutes away from them," says Karin Skeen, MSN, RN, associate chief of women's and children's services. "We wanted to provide families with spaces that allow kids to play and to get away—without really leaving at all."

Thanks to the generous philanthropic support of Panera Bread and its Change for Children campaign, a round-up initiative continuing into 2018 at 16 local and regional cafes, and the Log a Load for Kids Foundation, two new common areas on the seventh floor will be just that—large, colorful, modern rooms just down the hall from patients and their caregivers.

"Our Log a Load for Kids play area is meant for families and siblings, for playtime and gatherings," Skeen says. "It will be a fun, new space for anyone who spends much of their time on the seventh floor."



Panera Family Room Rendering by Jason Maloney AIA, HKS Architects

Meanwhile, the Panera "Change for Children" Family Room is meant as a comforting sanctuary for patient families, and will have a private area as well as a kitchen—a new and improved home away from home.

"We're incredibly appreciative of our customers and proud of our employees who, through the Change for Children campaign, have made this new space a reality for patients and families," says Rick Postle, UVA Children's Hospital Committee member and owner of Blue Ridge Bread, Inc., which operates the Panera franchises participating in the campaign. "This was truly a community fundraising effort, and we're so excited for the room to open in November."

The Log a Load for Kids Foundation has pledged $100,000 over the course of three years, and its play area will open in December of 2017.

"Log a Load for Kids is very excited about this renovation," says Rich Palermo, local chairman for the Log a Load for Kids Foundation. "We have been partnering with UVA Children's Hospital for more than 25 years, so to be able to make this pledge is truly special for all of us."

To learn more about supporting UVA Children's Hospital, please visit http://healthfoundation.virginia.edu/areas-to-support/childrens-hospital.

Learn more about **Log A Load for Kids** at logaload.org.

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