



The Environmental Synopsis

A Monthly Update from the Joint Legislative Air and Water Pollution Control and Conservation Committee

OCTOBER 2016



The Chairman's Corner

**Senator Scott E. Hutchinson,
Chairman**

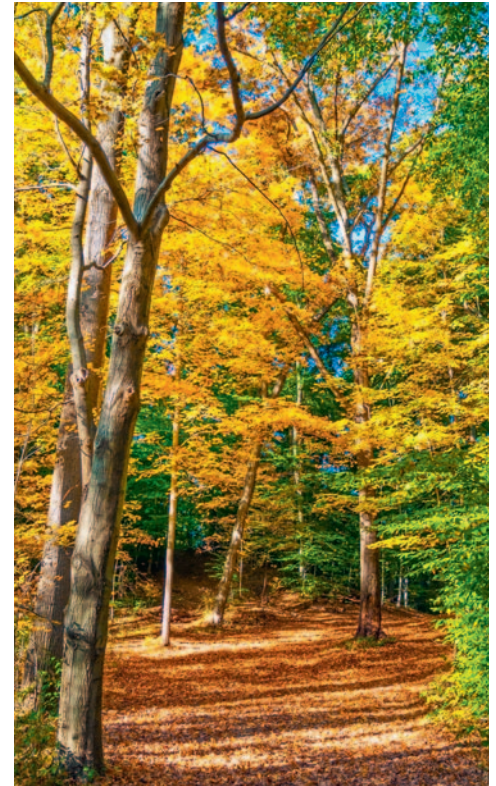
Last month, the Joint Legislative Conservation Committee concluded its 2015-16 Legislative Forestry Task Force with a final meeting in State College. The bipartisan initiative investigated critical issues facing Pennsylvania's forests and identified long-term forest management strategies. The work of the task force throughout the years has guided legislative action to protect our forestlands, and the economic benefit they generate.

Since our founding, Pennsylvania has been known for the health and beauty of our forests. Even our name, which translates to Penn's Woods, is indicative of the important role forests played throughout our history. Today, even after centuries of development, forests blanket nearly 60 percent of our state, totaling over 17 million acres. Twelve percent of the acreage is contained within the state forest system, while individuals and families own approximately 75 percent.

The beauty and recreation provided by our forests is unmatched, but they are also an important economic driver. Pennsylvania is home to a \$19 billion forest products industry that employs over 90,000 residents. We are the nation's largest producer of hardwood lum-

ber, churning out over 1 billion board feet per year. Despite this success, the forest products industry is directly tied to the productivity of our forests, which is facing numerous environmental and regulatory challenges. This symbiotic relationship spurred the formation of the Legislative Forestry Task Force.

The Legislative Forestry Task Force is not a new creation; in fact, it has been advising the General Assembly for over two decades. The task force was first created in response to a series of hearings conducted by the Committee on forest resource management in 1992. One of the recommendations from the hearings was to form an independent group to examine ongoing issues facing the state's



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Notes from the Director

Tony M. Guerrieri, Executive Director

Technology continues to advance in many industries and this is true in agriculture, where farmers and landowners continually endeavor to make the most of their land and resources. Perhaps the latest technological application in the agricultural industry is the use of unmanned drones, or the industry-preferred nomenclature “Unmanned Aerial Vehicles.”

Most people associate drones with the military, which use unmanned aircrafts primarily for surveillance. Businesses such as Amazon and UPS envision drones delivering packages to homes and businesses; however, drone use among farmers is surging. Farmers, and the companies who manufacture and design systems to collect data, are eager to incorporate them into their best management practices.

It is not surprising that the largest application of domestic drone use will likely come in the agricultural industry. Many agricultural operations span thousands of acres in lowly populated areas, virtually eliminating the privacy and safety concerns that come in more densely populated areas.

The Association for Unmanned Vehicle Systems International (AUVSI), the trade group that represents producers and users of drones, predicts that 80 percent of the commercial market for drones will eventually be for agricultural use. It is estimated that drone technology will balloon from a \$3 billion segment of the

agricultural industry to a \$10 billion market over the next six years.

For centuries, much of farming has been legwork: walking down rows, through patches, going plant-by-plant to check for weeds, bugs, parched soil or any sign of distress. These methods often can be incomplete or time-consuming, and when data is collected, it can take a long time to process and analyze. As a result, it can be difficult or impossible for the farmer to react to a problem like a disease outbreak before it is too late or the costs have soared.

Agricultural drone technology is predicted to grow from a \$3 billion industry to over \$10 billion in the next six years.

One of the major benefits of agriculture drones is their ability to scout farm fields quickly and efficiently. Rather than having growers evaluate fields manually on foot or by tractor, drone technology allows farmers to gain immediate knowledge about the status of their fields in shorter periods of time. This information can be gathered whenever and wherever it is needed, minimizing the response time required to address issues and maintain crops.

New drone technology is very effective at collecting data to help farmers improve crop health. Equipped with sensors, drones flying over a field can collect plant height measurements by gathering range information from the plant canopy and the ground below. By measuring near infrared wavelengths through a multispectral sensor, drones can also create vegetation index images, indicating which plants are healthy and absorbing maximum sunlight.

Drones also create satellite maps that can help farmers make decisions about fertilizer – a major concern of farmers, as fertilizer represents up to 50 percent of input costs. By using high-tech sensors, drones make maps that can show where phosphorous and nitrogen are needed, or where there is an excess of nutrients. This way, more nutrients are applied where they are needed most, helping farmers increase production and efficiencies that lead to higher yields.

Thermal cameras are able to detect cooler, well-watered field regions as well as dry hot patches. Farmers can use this data to adjust field irrigation and avoid using excess water, which is particularly valuable in drought-stricken areas, such as California. In addition, by increasing water and fertilizer efficiency, drone technology helps reduce excess fertilizer that runs off into nearby rivers and streams. Less runoff decreases the algal blooms and dead zones in water systems.

Since the Federal Aviation Administration’s registration program took effect in December 2015, over 6,000 drones have been registered for business purposes, and another 400,000 recreational drone pilots registered their aircraft. Drones come in a range of prices, from \$500 simple quadcopters, to \$30,000 models with infrared sensors. The unmanned aerial vehicle industry expects more than 100,000 jobs to be created and nearly half a billion in tax revenue to be generated collectively by 2025, much of it from agriculture.

In fact, drone technology could be Pennsylvania’s next big area of growth. In a 2013 economic report by the AUVSI, Pennsylvania ranked tenth in the U.S. for the potential to reap the benefits of unmanned aerial systems. The report estimated the state’s potential economic growth at \$2.6 billion, which could generate 2,986 jobs.



Research Briefs

Each month, the committee's staff researches and prepares a number of "briefs" on several topics relevant to the committee's mission. Very often these briefs include references to reports and further research on the topics so that readers may pursue issues on their own. Please note that the information and opinions expressed in the Research Brief articles do not necessarily represent the opinions or positions of the Joint Legislative Air and Water Pollution Control and Conservation Committee, nor those of the Pennsylvania General Assembly.

Texas Coal-Fired Power Plants Face Retirement

Tony M. Guerrieri
Executive Director

The Institute for Energy Economics and Financial Analysis has released a report describing the decline of the coal-fired electricity industry in Texas, which is unlikely to recover in the face of rising competition from other energy sources.

The report, *The Beginning of the End: Fundamental Changes in Energy Markets Are Undermining the Financial Viability of Coal-Fired Power Plants in Texas*, looks specifically at seven of the state's 19 coal plants that will likely be retired for failure to compete with natural gas and renewables. Of the seven plants, all except one unit are more than 33 years old. The 8,100 megawatts (MW) of capacity from these seven aging plants represents a little more than 40 percent of the total coal-fired capacity which is administered by the state's electric grid operator – the Electric Reliability Council of Texas (ERCOT).

The key finding is that fundamental economic transformations are undermining coal plants in Texas and that six of seven Texas coal-fired generators highlighted in the report are at risk of retirement.

The report notes several forces arrayed against coal-fired generation that suggest retirement of coal-fired plants is likely:

- The collapse of natural gas prices and subsequent decline in the cost of

generating power and the increases in generation at natural gas-fired power plants.

- Increased competition from thousands of megawatts of new wind and solar resources due to steep declines in installation prices, improved operating efficiencies and transmission upgrades. For example, wind energy costs in Texas decreased from \$54 per MW-hour to about \$22.42 in 2014.
- Low energy market prices in ERCOT's deregulated wholesale markets driven by lower natural gas prices and increased generation from renewable resources. Unlike in some regions of the country, ERCOT does not have a "capacity" market, which often serves to subsidize older plants and keep them online when they are no longer cost competitive.
- Sharp reductions in generation from coal-fired plants as their output has been displaced by increased output from renewable and natural gas-fired capacity. Many coal-fired plants in Texas no longer act as "baseload plants," and are instead limited to operations during the peak load seasons. Although coal-fired plants generated 39 percent of the electricity in ERCOT in 2015, by May of 2016 they provided only 24.8 percent.
- Public health and environmental regulations, including the U.S. Environmental Protection Agency's regional haze rule, that are forcing coal-fired power plant owners to decide whether to make expensive investments in their aging coal fleet.



These circumstances have combined to undermine the profitability of the companies and public power utilities and power agencies that own coal-fired power plants.

It is estimated that up to 18,000 megawatts of Texas' coal-fired electric generating capacity is at risk for retirement between 2017 and 2031.

According to the report, the units are not financially viable, as none can be expected to produce earnings for their owners. The seven plants – including four privately-owned and three public utility or agency-owned plants – are likely to lose more than \$160 million a year. One coal-fired plant could lose anywhere from \$60 million to \$100 million each year from 2017 to 2024, according to the report.

The report concludes that it is highly probable that these plants – and many like them – will be retired, a view that is consistent with those of other inde-

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pendent energy-market observers. ERCOT itself has concluded that 8,000 to 18,000 MW of coal-fired generating capacity is at risk for retirement between 2017 and 2031. The report recommends shifting the discussion to how to phase out these plants, what to replace them with, and how to retrain their workers.

The Cleveland-based IEEFA conducts research and analyses on financial and economic issues related to energy and the environment. The report included financial information reported to Wall Street investors, data from government agencies and other public statements.

The report, *The Beginning of the End: Fundamental Changes in Energy Markets Are Undermining the Financial Viability of Coal-Fired Power Plants in Texas*, presented by the IEEFA in partnership with consumer advocacy non-profit Public Citizen is available at: http://ieefa.org/wp-content/uploads/2016/09/The-Beginning-of-the-End_September-2016.pdf.

The Impact of Artificial Lights on Bat Behavior

Coleen P. Engvall
Research Analyst

Artificial light has been shown to have a variety of impacts on living creatures, from disrupting human sleep cycles, to carpeting Lancaster bridges in swarms of insects. Light pollution near population centers has become the norm and some animals have learned to take advantage of it. Insects, which are drawn to the UV rays that traditional outdoor lighting emits, swarm around streetlamps, as Pennsylvania saw last year when mayflies coated a bridge, shutting it down for two days. While this was dangerous for us, and a perhaps a little unsettling, it was a feast for the local bat population.

The night environment, however, is going through yet another change. In order to save electricity, many street lights are now lit with LEDs. These energy-efficient lights do not emit light on the UV spectrum, and this difference is already having an impact on the composition of urban environments.



Researchers from the Leibniz Institute for Zoo and Wildlife Research decided to see exactly how these nighttime ecosystems were shifting and if there were downsides accompanying the cost-saving LED lights. They published their findings in the *Journal of Applied Ecology*. The study, *Transition from Conventional to Light-Emitting Diode Street Lighting Changes Activity of Urban Bats*, was released in August.

While LED street lamps save energy, researchers at the Leibniz Institute have expressed concern over the potential interactions with urban wildlife.

The researcher's experiment consisted of measuring the number of bats, as well as the distribution of species near LED and traditional mercury vapor street lamps. Additionally, mercury

vapor lamps that had been changed to LEDs were monitored.

The researchers noted a discrepancy in the reactions. Some bats gather in larger numbers around mercury vapor street lamps because of the high concentrations of insects. Some bats are sensitive to UV spectrum light, however, causing them to avoid mercury vapor lights, despite the promise of food. Sites lit by LEDs saw an increase in these light-sensitive species, sometimes by a factor of five, but only because their normal activity was first stunted by the original mercury vapor lamps.

While these changes seem dramatic, the researchers emphasize that the baseline of mercury vapor lamps was already skewed in favor of light-tolerant bats. A decrease in these species, as well as an increase in light-sensitive species, actually serves to normalize the levels of competition in urban environments. With neither bat species favored, populations have adjusted to a more natural composition, more closely resembling populations away from human population centers. While this sounds neutral, the researchers express concern that this redistribution will further stress an already-strained group of animals.

Bats are currently facing an unprecedented level of vulnerability. White-nose syndrome, a fungal disease responsible for almost 6 million bat deaths, has devastated the eastern United States. Habitat destruction and human encroachment have also taken their toll. These small creatures consume thousands of insects per night, including agricultural pests and mosquitoes, making their population health critical to local ecosystems.

The researchers emphasize that LED light fixtures are only going to increase in the near future. In order to prepare

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for the potential changes to urban ecosystems, they urge further research into the issue now, while the impacts are minimal. They warn that LED lighting itself does not seem to be harmful to bats, but this should not be used as an excuse to further illuminate urban spaces at night, despite lower energy costs. Artificial lighting disrupts ecosystems and should be used only when necessary.

To read *Transition from Conventional to Light-Emitting Diode Street Lighting Changes Activity of Urban Bats*, go to: <http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12758/abstract;jsessionid=12FD61011E07F0E0E35BC891628621C3.f01t04>.

Non-native Forest Pests and Their Effects

Stephanie J. Applegate
Intern

T Invasive forest pests are insects and pathogens that are unintentionally brought into the U.S. via trade or travel and capable of swiftly devastating entire tree species. The effects that these pests have are not only damaging to the environment but also to the economy.

The two main ways that forest pests are introduced into the U.S. are through wood packaging material and live plants. In their article entitled *Non-native Forest Insects and Pathogens in the United States: Impacts and Policy Options*, researchers from the Cary Institute of Ecosystem Studies suggest that over 90 percent of the wood-boring insects arriving in the U.S. entered by way of wood packaging material, and almost 70 percent of all pests arrived by way of live plants. The recent increase in the threat of forest pests is directly tied to the spike in international trade that has occurred over the last few decades.

Once established in the U.S., these forest pests wreak havoc in every state across the nation; however, the Northeastern region, specifically New York and Pennsylvania, is particularly susceptible due to (1) the high volume of trade activity, (2) taxonomic similarities between Northeastern tree species and those of international trade partners and (3) the large variety of tree species in the Northeast.

Over 90 percent of forest pests in the U.S. entered by way of wood packaging material, and almost 70 percent of all pests arrived by way of live plants.

The impact that forest pests can have on the environment is extensive and costly to reverse once the disease or insect has latched onto the host population. Both rural, urban and suburban areas experience the effects of pests in different ways. Urban and suburban areas suffer changes in property values, air quality, shading, storm water runoff and human health. Rural areas experience effects throughout their entire ecosystem, such as changes in productivity, nutrient cycling and wildlife habitat. The most severe impact, however, is the potential destruction of entire tree species.

The economic effects of forest pests are just as serious as the environmental impact. The health benefits that trees provide to U.S. citizens are worth \$6.8 billion per year, all of which could translate into an economic loss if the tree population declined or disappeared. Even more concerning is the fact that homeowners and local governments disproportionately bear almost 10 times the costs of other stakeholders. The annual cost of imported insect pests to local governments is \$2 billion; \$2.5

billion for homeowners; and \$216 million for the federal government.

Researchers have developed an acronym that encompasses five policy recommendations for improving the infiltration of forest pests: "SMART." The goal is to shift the economic burden to the source of the pests and to craft preventative measures that will stop pests from entering the U.S. in the first place. According to researchers, "Tree-SMART Trade" can be achieved by:

- Switching to non-solid wood packaging
- Minimizing new pest outbreaks by expanding early detection and rapid response programs
- Augmenting international pest prevention programs with key trade partners
- Restricting or eliminating imports of live woody plants
- Tightening enforcement of penalties for non-compliant shipments

Cary Institute experts also recommend creating private sector partnerships to rally citizen involvement, establishing a forest pest fund in case of emergencies, and organizing outreach efforts to inform citizens of the causes and effects of forest pests.

The ecological and economic impacts of non-native forest insects and diseases can be devastating. Unfortunately, the establishment of these pests in the U.S. is only expected to increase as foreign trade continues to expand. Policies and regulations on the local, state and national level will help to eliminate or diminish the negative effects that forest pests can have on the environment and the economy.

To read the full working paper, go to: <http://www.caryinstitute.org/science-program/research-projects/tree-smart-trade>.

Lake Champlain: Water Quality has Economic Impact

Tony M. Guerrieri
Executive Director

Vermont's Lake Champlain is one of New England's crown jewels. Local residents depend on the 120-mile-long lake for fishing, swimming, boating and other recreational pursuits. It provides drinking water and summer tourism, and property values are tied to its health and beauty.

A report by the University of Vermont and Lake Champlain Basin Program concludes that water clarity has a direct impact on communities along the lake and the state as a whole. The report, *An Assessment of the Economic Value of Clean Water in Lake Champlain*, is the first to investigate the impact of water quality on tourism and housing values.

The report found that a positive change in water quality would raise the value of homes along the lake, and that lower housing values were associated with poorer water quality. Similarly, poor water quality in July and August had a negative impact on tourism, with fewer visitors to shoreline communities when water quality was low.

Comparing data from water gauges with revenue from the rooms and meals tax in selected communities over a four-year period, the report suggests a direct correlation between water clarity, as measured by a device known as a Secchi disk, and tourism revenues.

Water clarity is the measure of how far down light penetrates through water. A team of researchers use a Secchi disk to measure the water clarity of Lake Champlain. They drop the 10-inch white Secchi disk attached to a rope into the water and when the disk gets

to a level where it cannot be seen anymore, they measure the depth. The farther down the Secchi disk is visible, the clearer the water is. The more quickly the disk disappears from sight, the more nutrients, algae and sediment are present in the water.

For every meter the disk remained visible, researchers found an increase in expenditures on rooms by tourists. In the six communities that were included in the report a one-meter increase in the depth of disk visibility would result in \$110,544 more in room rentals during the month of August alone.

According to the University of Vermont, meeting the EPA's phosphorus reduction requirements would increase property values on Lake Champlain by over \$15,000.

That data was added to a model of the economy along the lake, which maps how money moves from one sector of the economy to another. For example, money spent at a restaurant then becomes part of the pay for employees, which they, in turn, spend. Vermont's four lakeside counties generate \$300 million in tourism income each year and an additional \$72 million as that money moves through the economy. More than 1,000 jobs result from tourism along the lake.

Applying the evidence from the analysis of room rentals in the five lakeside communities to the model of the regional economy, the report suggests that a decrease in water quality equal to one-meter of Secchi disk depth would lead to a loss of 195 full time jobs, a \$12 million reduction in

tourism and a \$16 million reduction in overall economic activity just during July and August.

Looking at the values of Vermont properties within 100 meters of the lake, researchers found a direct connection between water quality and housing values. Lakeside properties are generally valued at 30-49 percent more than similar properties not located along the lake, according to the report.

Looking at housing sales and water quality data for August, researchers found that an improvement in water quality equal to one more meter of Secchi depth would lead to a 3 percent increase in the price of a single family home. For seasonal homes, the impact was even greater, raising the value of the property 37 percent.

Extrapolating from their findings, researchers determined that meeting the phosphorous reduction requirements in the Total Maximum Daily Load (TMDL) established by the U.S. Environmental Protection Agency would increase the value of homes along the lake by an average of \$15,200.

Conversely, the increased runoff of sediment and nutrients associated with agriculture and rapid development will lead to a decrease in lakeside housing values of \$7,000 on average, unless checked.

The report suggests that water quality is not just an environmental issue, it is an economic one. By quantifying Lake Champlain's water woes, the report gives state and federal officials economic data to justify investments.

The Lake Champlain Basin Program is a congressionally designated initiative to restore and protect the lake. The 53-page report, *An Assessment of the Economic Value of Clean Water in Lake Champlain*, is available at:

http://www.lcbp.org/wp-content/uploads/2013/03/81_VoigtEconomics-FinalReport1.pdf.

Committee Chronicles *A review of memorable committee events*

On Thursday, September 29, the Committee convened the final meeting of its 2015-16 Legislative Forestry Task Force. Sponsored by Senator Scott Hutchinson, Senate Resolution 55 directed the Committee to establish a task force to examine critical issues facing Pennsylvania's forests and the forest products industry. Over the course of the legislative session, the task force studied four important topics: DCNR's revised State Forest Management Plan, invasive species, state and local regulatory relationships and the decline in forestry occupations.



Mr. Marc Lewis (pictured above) of Dwight Lewis Lumber Company offers his perspective on the relationship between state and local government in the forestry industry. Members of the task force come from various backgrounds including government, academia and the forest products industry.



Mr. Ron Rohall (left) and Mr. Chuck Coup (right) pose for a photo following their presentations. Mr. Rohall is a former president of the Pennsylvania Association for Conservation Districts and Mr. Coup is program manager for the Pennsylvania Sustainable Forestry Initiative.



The media event (pictured above), which preceded the bike ride, featured remarks by Secretaries Dunn and Richards, along with several members of the local steering committee, known as the Pike2Bike Coalition.

Committee staff (pictured at right) did their best to keep up as officials peddled along the Abandoned Turnpike, located in the heart of the Buchanan State Forest. Hikers and bicyclists have unofficially used the roadway since its retirement in the 1960s, despite its somewhat rough condition.

On October 5, Committee staff joined the Pike2Bike Coalition and the secretaries of DCNR and PennDOT for a biking tour of the Abandoned Turnpike in Bedford and Fulton counties. The media event and tour highlighted the potential of the 13-mile abandoned roadway as a recreational bike path. Secretary Cindy Adams Dunn (DCNR) and Secretary Leslie Richards (PennDOT) offered support for the project, which was previously examined by the Committee in 2015.





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The Chairman's Corner

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forestlands. In 1995, the first task force was established, with the Committee charged with its administration.

Since its inception, the task force has examined a wide array of issues that have affected the health and productivity of Pennsylvania's forests. Some issues studied during the early '90s are still plaguing the industry today, for instance invasive species and forest pests. Others, however, have been successfully resolved, often through the efforts and recommendations of the task force.

A major legislative initiative was enacted in the mid-2000s, when the task force examined the effects of conducting prescribed burns on private and state-owned forestland. Recognizing the benefit these controlled fires could provide in combatting invasive plants, Representative Gary Haluska (D-Cambria) introduced legislation to regulate the practice through the Department of Conservation and Natural Resources (DCNR). On July 14, 2009, Governor Rendell signed the Prescribed Burning Practices Act, which is now an essential tool for managing forest vegetation.

In 2010, the task force took another proactive stance, this time in combatting new federal regulations. The U.S. Environmental Protection Agency (EPA) issued a controversial proposal to require facilities with industrial boilers to use maximum achievable control technology (MACT) in an effort to curb emissions. The proposal caused serious concern in the forest products industry, faced with a \$21 billion price tag to meet the new standards. The task force backed House Resolution 879, also introduced by Rep. Haluska, which urged the EPA to reconsider the new standards. Other states passed similar resolutions, and the EPA soon withdrew its proposal entirely.

During the 2015-16 Session, with the passage of Senate Resolution 55, the task force reconvened to address several issues on the minds of those involved with state forestry. The four topics studied were DCNR's revised State Forest Resource Management Plan, invasive species, local forestry ordinances and the decline in forestry occupations. Presenting on the topics were experts from organizations such as DCNR, the Department of Agriculture, the Pennsylvania Association of Conservation Districts and The Nature Conservancy.

The membership of the task force has been an important part of the initiative's success over the years. Representatives from the industry, government and academia form the core of the task force's advisory committee, lending knowledge and expertise on all aspects of forest management. Joining me this session as legislative members were Rep. Kathy Rapp (R-Warren/Crawford/Forest), Rep. Jaret Gibbons (D-Beaver/Butler/Lawrence) and Sen. Sean Wiley (D-Erie). These members were selected for their ongoing commitment to promoting Pennsylvania's forests.

As the session comes to an end, the Committee staff will begin to prepare a report for the General Assembly with the task force's findings. The report will contain a detailed summary of the topics discussed, the challenges that were identified and policy recommendations that could be enacted by the legislature during the new term. The goal of the report is to generate conversation in the State Capitol on ways to safeguard Pennsylvania's forests for generations to come.

For more information on the Legislative Forestry Task Force, including copies of the meeting minutes and presentations, visit the Committee website at <http://jcc.legis.state.pa.us>.