



The Environmental Synopsis

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

OCTOBER 2015



The Chairman's Corner

**Senator Scott E. Hutchinson,
Chairman**

Pennsylvania is about to be reintroduced to yet another forest pest. Oddly enough, this isn't

the first time. This pesky native insect is so elusive and unusual that people tend to forget about it, at least for a decade or so.

After 20 years, the cherry scallop shell moth is reappearing in the northeastern United States. The tube-like nest of the cherry scallop shell caterpillar is not exactly a welcomed sight, particularly when these pests feast on the leaves of Pennsylvania's black cherry tree, and other native cherries such as wild cherry and chokecherry trees.

The cherry family is one of the most valuable hardwood timber resources found in Pennsylvania's forests. Black cherry trees are used in making fine furniture such as tables, chairs, and veneer panels. The bark is used to make wood chips for smoking foods and its fruit is important for many birds, squirrel, deer, turkey, mice and moles.

Beginning in the early 1970s, defoliation by the cherry scallop shell moth has steadily increased in the western and northern regions of Pennsylvania. The last major outbreak in our region occurred in the late 1990s. At that time, the moth was defoliating tens of thousands of acres throughout the state. A tree is considered

defoliated when 30 percent or more of its leaves are eaten.

Unfortunately, the cherry scallop shell moth will be active again this year. The current problem areas are mainly concentrated in Warren, McKean and Elk counties. The insect is prevalent in other parts of the state too, though widespread defoliation has not yet occurred.

The cherry scallop shell moth belongs to the family Geometridae (Geo-metri-dee). They may not be familiar to you by name but the insects that comprise the family are well known to most people. The larval stage (caterpillars) are called loopers, inch-worms, spanworms, or measuring worms. These common names are derived from the

manner in which larvae walk with a looping motion, rather than crawling like a typical caterpillar; that is, they tend to "loop" or "inch" along.

The elusive cherry scallop shell moth only appears in Pennsylvania every 10 to 12 years, but the insect causes heavy defoliation of our state's valuable black cherry trees

Unlike most of the family, however, caterpillars of the scallop shell moth are gregarious and live in nests that contain a few to several individuals. The colony constructs an elongated structure of silk and leaves that are attached to one another and often wrapped around the twig on which the foliage occurs. Larvae feed

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Notes from the Director

Tony M. Guerrieri, Executive Director

For decades government at the state and federal levels has been preoccupied with improving the fuel economy of the nation's vehicle fleet. Lower profile environmental causes have also been in the mix, including replacing mercury in car switches and lead weights used to balance auto wheels. More recently, a new cause has been added to the list – automobile brake pads that contain copper.

Since the purpose of the brake pad is to provide friction against the rotors, the action typically creates a lot of heat and pressure. The rotor is spinning so fast that it shaves off some of the brake pad every time the two come into contact and a small dusting of copper and other metals are deposited on the roadway.

These metals are eventually washed into streams, rivers and lakes, where environmentalists say the metals could pose a hazard to aquatic life. With millions of drivers using their brakes each day, these small mounts significantly impact waterways. It is estimated that brake pads account for up to half the copper entering water systems in urban areas.

The issue has previously gained traction in the legislatures of two Pacific Coast states. In 2010, Washington and California adopted legislation drastically limiting the amount of copper in brake pads in an attempt to prevent harmful impact on salmon. Even minute amounts of copper upset a salmon's sense of smell, making it vulnerable to predators and unable to find its way to spawning streams.

The legislation mandates that brake pads sold in each state contain no more than 0.5 percent of copper by weight and must meet all applicable safety standards. The laws differ in timing, however. In Washington, the law takes effect in 2021. The California law goes into effect in 2025. The legislation ap-

plies to both disc and drum brakes. Similar legislation has been introduced in Rhode Island, Oregon and New York.

The 'Copper-free Brake Initiative' is a partnership between the EPA and automotive industry to phase out the use of copper in brake pads almost entirely by 2025

At one time, asbestos was a key ingredient in brakes because it effectively transferred away the heat produced when brake pads rub against rotors. Asbestos pad were cheap and soft enough to stop a car quietly. However, asbestos was found to be hazardous to human health and the U.S. Environmental Protection Agency proposed a ban of nearly all products containing asbestos, including brake pads, in 1986.

Though a federal appeals court overturned part of the ban in 1991, brake manufacturers sought a safer alternative. They found it in copper and by the early 1990s, the element was a common component in brake products. Copper makes for a smooth braking experience, transfers heat efficiently and helps brakes' effectiveness in cold weather. Copper also has properties that help prevent brakes from squeaking and shuddering when used.

But with state-sponsored legislation gaining momentum, companies are exploring alternatives to copper and other potentially hazardous materials. A great deal of technology goes into engineering modern brake pads. These little pads are

responsible for stopping everything from compact cars to heavy commercial trucks. Many brake pads are made of steel, brass and copper fibers. Some contain ceramics, Kevlar and other non-metallic compounds.

Manufacturers have adopted a collaborative approach to the problem through the Brake Pad Partnership, a consortium consisting of the Brake Manufacturers Council, the EPA, Ford Motor Company, General Motors and various state environmental agencies.

In January 2015, the EPA reached a voluntary agreement with the industry to phase out most copper from brake pads by the year 2025. Adoption of the "Copper-free Brake Initiative" will reduce the total copper in brake pads to 5 percent or less by 2021, and 0.5 percent by 2025 nationwide.

The agreement also requires brake manufacturers to reduce the levels of lead, cadmium, mercury, asbestiform fibers, and chromium salts in brakes. Additional testing for potential alternatives to the materials will also be conducted under the terms of the deal.

In 2011, the auto industry produced 78.4 million vehicles worldwide. Each vehicle has two brake pads per wheel, which means the industry supplied 627 million brake pads that year, excluding the hundreds of millions manufactured for the aftermarket.

The goal of the 2015 initiative is to provide the motor vehicle industry with consistent copper reduction guidelines and eliminate the potential for disparate state regulations.



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.

Hotter Summers Mean Hotter 'Urban Heat Islands'

Tony M. Guerrieri
Executive Director

Cities are almost always hotter than the nearby countryside because their buildings and pavements readily absorb sunlight and raise local temperatures, a phenomenon known as the urban heat island effect. During the hottest times of the year, dark or paved areas soak up and store heat. These surfaces continue to release this heat throughout the day and night, preventing the area from cooling down after sunset.

A report by Climate Central, a news organization that reports on climate matters, predicts that in the future, urban heat islands combined with extreme heat events could raise urban temperatures to levels that threaten human health, strain energy resources, and compromise economic activity. The report, *Summer in the City: Hot And Getting Hotter*, indicates that summers in the U.S. have been warming since 1970. Across the country cities are even hotter, and have been getting hotter faster than their less developed surroundings.

With more than 80 percent of Americans living in cities, these urban heat islands – combined with the effects of climate change that will likely bring warmer summers to cities – can have serious health effects for hundreds of millions of people during the hottest months of the year. Heat consistently kills more people in the U.S. than any

other form of extreme weather, including hurricanes, earthquakes and tornados combined. The hottest days, particularly days over 90 degrees Fahrenheit, are associated with dangerous ozone pollution levels that can trigger asthma attacks, strokes, heart attacks and other serious health impacts.

Urban heat islands are posing serious risks to human health in many U.S. cities, to include Philadelphia, where city temperatures are nearly 4 degrees higher than the surrounding areas

Heat islands are not limited to humid, southern cities known to have scorching summers. According to the report, the top 10 cities with the most intense summer urban heat islands over the past 10 years are: Las Vegas (7.3 degrees), Albuquerque (5.9 degrees), Denver (4.9 degrees), Portland (4.8 degrees), Louisville (4.8 degrees), Washington, D.C. (4.7 degrees), Kansas City (4.6 degrees), Columbus (4.4 degrees), Minneapolis (4.3 degrees) and Seattle (4.1 degrees).

Philadelphia is one of the 15 hottest urban islands in the country. Since 2004, Philadelphia averaged a 3.8 degree

temperature difference from its surrounding areas. Pittsburgh made the list as well, with a 2.1 degree hotter temperature on average during the past decade.

A review of summer temperatures in 60 of the largest U.S. cities found that:

- 57 cities had measurable urban heat island effects over the past 10 years. Single-day urban temperatures in some metro areas were as much as 27 degrees higher than the surrounding rural areas, and on average across all 60 cities, the maximum single-day temperature difference was 17.5 degrees.
- Cities endure more searing hot days each year. Since 2004, 12 cities averaged at least 20 more days a year above 90 degrees than nearby rural areas. The 60 cities analyzed averaged at least 8 more days over 90 degrees each summer compared to adjacent rural areas.
- More heat can increase ozone air pollution. All 51 cities with adequate data showed a statistically significant correlation between higher daily summer



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temperatures and bad air quality, as measured by ground-level ozone concentrations. Temperatures are forced higher by increasing urbanization and climate change, which could undermine the hard-won improvements in air quality and public health made over the past few decades.

- In two thirds of the cities analyzed (41 of 60), urbanization and climate change appear to be combining to increase summer heat faster than climate change alone is raising regional temperatures. In three quarters (45 of 60) of cities examined, urbanized areas are warming faster than adjacent rural locations.
- On average across all 60 cities, urban summer temperatures were 2.4 degrees hotter than rural temperatures.

According to the report, urban heat islands are even more intense at night. Over the past 10 years, average summer overnight temperatures were more than 4 degrees hotter in cities than surrounding areas. The report defined an average summer as June – August.

The Climate Central report, *Summer in the City: Hot And Getting Hotter*, is available at: <http://www.climatecentral.org/wgts/filetracker.php?file2dl=UrbanHeatIsland.pdf>.

DEP's 2015 Climate Change Report

Coleen P. Engvall
Research Analyst

In 2008, the Department of Environmental Protection was tasked with writing a comprehensive overview of climate change impacts on the state and its economy. In May, the DEP released Pennsylvania Climate Impacts Assessment Update, which is a second review of their initial report prepared by a team at Penn State. This publication uses the newest

climate models and techniques developed in more recent years to analyze the potential impacts of climate change on the commonwealth's people and resources.

The report focuses on several sectors, such as forestry and human health separately.

The first sector assessed for vulnerability was agriculture, both as the largest industry in the state, as well as one that is especially sensitive to the climate. The warmer temperatures and increased precipitation have the potential to boost yields of certain crops. However, some products could suffer. For example, livestock subjected to the heat could experience stress and be less productive.

The energy industry is likewise expected to shift as the commonwealth becomes warmer and wetter. The report predicts that overall energy use will increase, despite lessened costs for winter heating.

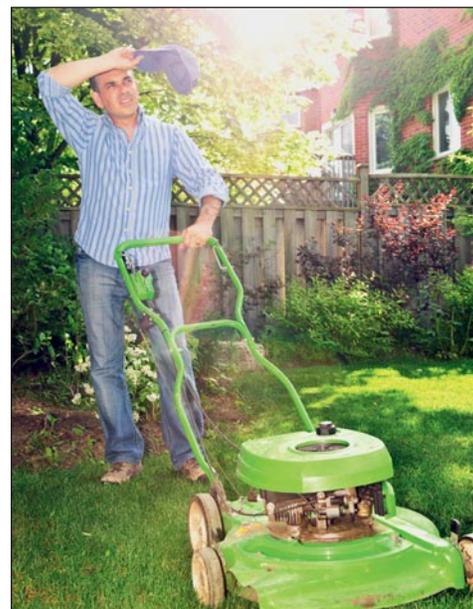
The Department of Environmental Protection's newest climate change report revisited the potential impacts to the commonwealth using the latest scientific findings, data and analytical tools

Climate change is projected to create a host of difficulties for the commonwealth's forests. Since trees cannot migrate, those which are not suited to living in warmer, wetter climates will likely see high mortality rates. Others will be potentially subjected to pests and diseases that were once confined to the warmer southern climate. As with the agricultural sector, the growing season will be longer, which could see greater annual growth in the forest, but it is not clear whether it will equal the amount of trees lost.

In terms of human health, there is the threat that heat-induced mortality could rise, but with the increased use of air conditioners, the magnitude of the danger is not clear. Higher temperatures are also expected to aggravate air quality-sensitive conditions such as asthma. Outdoor recreation is expected to be relatively unabated, with the exception of winter sports as snow coverage is expected to decrease by 20 to 60 percent.

Flooding is expected to be a larger problem although short term droughts could be easier to recover from. Despite this positive comment, they recommend revisiting storm water systems and policies dealing with drought and stream bank erosion. For the commonwealth's wetlands, the researchers have shown large seasonal differences, though the systems appear stable if examined on a yearly basis. They recommend caution especially for wetlands near agricultural areas and those that are expected to become drier as temperatures increase.

Coastal resources are of concern as higher temperatures will decrease oxygen levels in the water which will worsen the water quality further. Salt water is also expected to contaminate areas further upstream in summer, especially with sea level rise. These factors



could put Pennsylvania's rare freshwater tidal wetlands in danger.

The full report is available at <http://www.elibrary.dep.state.pa.us/dswb/Get/Document-108470/2700-BK-DEP4494.pdf>.

Congestion: What do Hours Stuck in Traffic Cost?

Tony M. Guerrieri
Executive Director

A report by the Texas A&M Transportation Institute and INRIX, a traffic monitoring firm, found what many drivers already know – sitting in traffic is a waste of time and money. The 2015 Urban Mobility Scorecard, based on 2014 traffic data, ranks traffic congestion in over 100 cities across the nation. By assigning a dollar amount to time spent in congestion, the report estimates a congestion cost for each city using a formula that takes into account both the value of lost time as well as excess fuel costs.

For example, each urban commuter in Philadelphia wastes 48 hours per year in traffic. The average for large cities with populations over 3 million, such as Washington, D.C., Dallas and Phoenix, is 63 hours, placing Philadelphia below the average and at number 22 for the worst traffic among this demographic.

The report also explains how much longer it takes to get somewhere during peak flow times versus free flow times. The ratio for Philadelphia is 1.24, meaning a 30 minute commute takes almost 40 minutes during high traffic times.

But it is not just about wasting time on the roads. The report also looked at exactly how much money the yearly congestion cost per auto commuter. Combine how much gas is wasted during commutes – 23 gallons of gas in

Philadelphia – with the value of travel time delay, and each commuter is throwing away \$1,112 a year sitting in traffic.

The cost to Pittsburgh's drivers is equivalent to 39 hours stuck behind the wheel, 21 gallons of gasoline and \$889 spent sitting in traffic every year. Allentown drivers are not doing much better. They spend an extra 30 hours, 15 gallons of gasoline and \$694 each year due to traffic congestion.

Nationwide travel delays due to traffic congestion caused commuters to spend an extra 42 hours in their cars and cost them \$960. This wasted more than 3 billion gallons of fuel and kept travelers stuck in their cars for almost 7 billion extra hours battling traffic in 2014 compared to 5.2 billion in 2000 and 1.8 billion in 1982. Excess fuel and lost productivity cost American commuters \$160 billion.

The report identified Washington, D.C. as the most congested city in the country, with 82 hours of delay and \$1,834 per commuter. Los Angeles, where typical commuters spend an additional 80 hours in traffic, was a close second.

According to researchers at Texas A&M, Philadelphians spend 48 hours per year sitting in traffic, representing over \$1,100 in wasted gas and time delays

Generally speaking, the larger the city the worse the congestion. Eight of the ten most congested cities have a population of over 3 million, including the nation's three largest cities, New York, Los Angeles and Chicago. Though the

cities with the worst congestion are spread throughout the nation, four are located in California.



The report predicts urban roadway congestion will continue to get worse and by 2020, with a continued good economy:

- Annual delay per commuter will grow from 42 hours to 47 hours.
- Total delay nationwide will grow from 6.9 billion hours to 8.3 billion hours.
- The total cost of congestion will jump from \$160 billion to \$192 billion.

It is also more than rush-hour headaches for workaday commuters. When considering the vagaries of traffic – bad weather, collisions and construction zones – for a trip at any time of day, drivers need to allot an average of 48 minutes for a trip that would take 20 minutes in light traffic.

Other finding is the report include:

- Trucks account for about 18 percent of urban congestion, although they represent just 7 percent of urban travel.
- The cost of congestion to the average auto commuter was \$960 in lost time and fuel in 2014, compared to an inflation-adjusted \$400 in 1982.
- About 40 percent of delays occur in midday and overnight hours, making it more difficult to avoid delays by avoiding commuter rush hours.

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- Severe or extreme congestion levels affected one of every four trips in 2014, up from one in nine trips in 1982.

The report calls for new and expanded public transit lines and larger bus fleets. It also calls for urban areas to build denser developments with a mix of retail outlets, residences and workplaces. This allows people to walk, bike or take public transit rather than city streets or highways.

Findings in the Urban Mobility Scorecard are drawn from traffic speed data collected by INRIX on 1.3 million miles of urban streets and highways, along with highway performance data from the U.S. Federal Highway Administration. The report, 2015 Urban Mobility Scorecard, is available at:

<http://mobility.tamu.edu/ums/report/>.

Green Gaming: Making Gaming Computers More Efficient

Coleen P. Engvall
Research Analyst

In recent years, homeowners are looking for different ways to make their homes more efficient. Whether to lighten their energy bills or to be better stewards of the environment, people are buying more efficient lightbulbs, energy star appliances and more. One technology statistic that stands out is the power consumption of laptop computers versus their desktop counterparts – laptops can consume up to 80 percent less electricity.

Despite the laptops efficiency, however, there is one demographic of American that is not likely to switch away from their tower and towards this compact, portable and efficient alternative: computer gamers. With modern technology, nothing beats a traditional com-



puter tower (often custom built) in terms of power, speed, and a thirst for electricity.

Berkeley researcher Evan Mills and his son Nathaniel conducted a study on the potential energy and cost savings hidden in the realm of computer gaming. They published their findings in a report entitled Taming the Energy Use of Gaming Computers.

The researchers acknowledge that cost savings and environmental consciousness are not likely to be enough to see gamers downgrading their graphics cards any time soon. The interesting stipulation in the article is that with modern technology, making the change away from power-guzzling desktop computers can occur without a loss to performance.

Berkeley researcher Evan Mills estimates that making high-performance gaming computers more energy efficient could save 18 billion dollars a year across the globe

So far, efforts to make personal computers more efficient have focused on laptops and “typical” computers, as opposed to the powerhouse gaming computers, which the researchers describe as “a very different animal.” On average, they consume as much as six times more

electricity than an average PC, or as much as three refrigerators.

This oversight is most likely due to the fact that performance gaming computers make up less than three percent of all personal computers. However, this number is expected to grow rapidly in the coming years as the demographic of gamers expands. In fact, the researchers estimate that this number will more than double in as little as five years.

In the study, the researchers built five custom PCs with various ranges of energy efficient components and performance ratings. They note that the two attributes are not necessarily correlated. In other words, less electricity use does not necessarily equal less performance. In fact, they were able to increase efficiency by up to 50 percent without compromising those coveted frame rates. In fact, the systems often ran more quietly and required less forced cooling.

So what can be done to promote these changes? The researchers advocate that policy makers expand the current efficiency guidelines that apply to monitors and power supplies to the other components in a computer that are currently unregulated. Additionally, Mills says that software developers must tackle this problem when they are programming games. When a computer is doing nothing more than checking email, the processor draws very little power. This is not the case when running a modern video game. Making the game software more efficient will benefit the entire computer system.

The report notes that energy efficiency is not emphasized in the gaming community, so external policies, such as those applied to laptop computers would be the most beneficial. Especially as the number of users expands in the coming years.

To read “Taming the Energy Use of Gaming Computers,” go to <http://link.springer.com/article/10.1007/2Fs12053-015-9371-1>.

On the Horizon *A Look at Upcoming Events*

Thursday, October 1, 2015, 10 a.m.

Public Hearing

Finleyville Community Center, 3547 Marion Ave, Finleyville, PA 15332

This hearing is the first in a series of two hearings on the environmental impact of natural gas vehicles. According to estimates from the U.S. Department of Energy, natural gas currently powers over 150,000 vehicles in the U.S. and 15.2 million vehicles worldwide. Representatives from the state Department of Environmental Protection, the natural gas industry, and local organizations will testify on how the use of natural gas vehicles can help reduce harmful emissions and promote domestic energy security.

Thursday, October 29, 2015, 11 a.m.

Public Hearing

The Ben Franklin TechCelerator, 453 Lincoln St, Carlisle, PA 17013

This hearing is the second in a series of two hearings on the environmental impact of natural gas vehicles. According to estimates from the U.S. Department of Energy, natural gas currently powers over 150,000 vehicles in the U.S. and 15.2 million vehicles worldwide. Representatives from the state Department of Environmental Protection, the natural gas industry, and local organizations will testify on how the use of natural gas vehicles can help reduce harmful emissions and promote domestic energy security.

Please call the committee office at 717-787-7570 if you plan to attend the Environmental Issues Forums.

And be sure to check the committee website at <http://jcc.legis.state.pa.us> for more details and events as they are added to the schedule.

Check Us Out on Social Media!

You can now receive updates on committee events, new research and more by following the Joint Legislative Conservation Committee on social media. You can find us on Facebook at www.facebook.com/jointconservationcommittee, or on Twitter at www.twitter.com/PA_JLCC. Take a moment and follow us today for the latest on issues related to Pennsylvania's diverse natural resources!

Committee Chronicles *A Review of Memorable Committee Events*

At our September Environmental Issues Forum, Mr. Andrew Heath, executive director of the Growing Greener Coalition, discussed the current state funding landscape for local conservation, preservation and outdoor recreation projects. Andrew's presentation covered the major sources of state assistance and offered a look at the future of state funding for outdoor and conservation-related projects.

Tony Guerrieri (pictured at right), executive director of the Joint Legislative Conservation Committee, welcomed Andrew Heath and the Growing Greener Coalition to the first Environmental Issues Forum of the fall legislative session.



Andrew Heath (pictured at right) offered those in attendance a copy of the Growing Greener Coalition's detailed guide to state funding for local conservation, preservation and recreation projects, appropriately titled "Finding the Green." An electronic version is currently available on the organization's website.





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The Chairman's Corner

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within the nest on the upper surfaces of the leaves.

In extreme cases, when populations are high, the larvae may eat all the leaves on a particular tree, stunting growth the following year and subjecting some stands to rapid decline. If severe cherry scallop shell moth damage coincides with other stress events such as drought, a late spring frost, or defoliation by other insects, a further loss of growth or even tree mortality may result.

The moth's wings have a characteristic pattern of alternating dark and light scalloped lines, hence the insect's name. When emergence is at its peak, from early June through mid-July, it is common to see large concentrations of resting moths during the day.

According to a recent article in the Pittsburgh Post-Gazette, the cherry scallop shell moth has defoliated cherry trees on more than 17,000 acres of the Allegheny National Forest and a total of 56,000 acres in the public and private forests in the north-western corner of the state.

The cherry scallop shell moth occurs naturally on a 10 to 12 year cycle. They tend to build up their population for several years, suddenly collapse and then gradually

build up again after a few years have passed. This cyclical trend results in a lack of attention given to this harmful pest, at least until it reappears and begins its destructive behavior.

The moths were particularly severe from 1972 into 1975, and again from 1983 to 1986. Hundreds of thousands of acres were impacted during these time periods. Cherry production again took a hit from the cherry scallop shell moth in 1995 and 1996 – mainly in Forest and Warren counties.

What triggers an outbreak of cherry scallop shell moth is not known. This makes it impossible to determine when and where outbreaks are likely to occur. However, stands that are predominantly black cherry, or those with black cherry mixed in, appear to be most susceptible.

Typically, after two or three years of heavy defoliation, a parasitic wasp will attack and severely damage 60 to 100 percent of the moth egg masses. The wasp is often responsible for the cyclical population collapse of the cherry scallop shell moth. For particularly susceptible tree species, however, this natural mortality may not occur soon enough to avoid heavy losses.

It's still not clear why cherry scallop shell moths experience a population explosion every 15 to 20 years. Regardless, our state will soon become reacquainted with this

native pest again. Hopefully we'll have a better understanding of the cherry scallop shell moth when they next appear in large numbers somewhere around the year 2035.



James B. Hanson, USDA Forest Service, Bugwood.org



Steven Katovich, USDA Forest Service Bugwood.org

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