



The Environmental Synopsis

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

MARCH 2016



The Chairman's Corner

**Senator Scott E. Hutchinson,
Chairman**

Good news this month if you are among nearly 2 million hunters and anglers here

in Pennsylvania. The U.S. Fish and Wildlife Service (USFWS) announced that our state will receive \$33.5 million in federal grants this year from the Pittman-Robertson Wildlife Restoration and Dingell-Johnson Sport Fish Restoration acts. The announcement comes at an appropriate time, as the start of both trout season and spring turkey are right around the corner.

The award is part of nearly \$1.1 billion being distributed to state wildlife agencies across all 50 states to support critical state environmental conservation and recreation projects. The fund is derived from excise taxes paid by the hunting, boating and angling industries on firearms, bows and ammunition, as well sport fishing tackle, some boat engines and small engine fuel.

These acts originated in the late 1930's, at a time when the chaos created by the Dust Bowl brought conservation efforts to the forefront of the national agenda. In 1936, President Franklin D. Roosevelt called for the first North American Wildlife Conference, bringing together a broad range of conservation interests. Roosevelt hoped that "from it

will come constructive proposals for concrete actions ... and that through those proposals state and federal agencies and conservation groups can work together for the common good."

In the following year, 1937, a foundational partnership was formed and solidified with the Federal Aid in Wildlife Restoration Act. This act would later come to be known as the Pittman-Robertson Wildlife Restoration Act, in honor of the lawmakers who championed it.

The Federal Aid in Sport Fish Restoration Act, also known as the Dingell-Johnson Sport Fish Restoration Act, wasn't introduced for another 13 years, until 1950. This act provided financial



assistance to state fish restoration management projects and plans. The act was largely based upon the success of its wildlife-focused predecessor.

Together, these acts can be viewed as a collaboration between hunters and anglers who pay license fees; outdoor sporting industries who support the excise tax; state fish and wildlife agencies who provide scientific knowledge of game management; and the USFWS, who

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Notes from the Director

Tony M. Guerrieri, Executive Director

Other than the “Ents” from the Lord of the Rings film series, trees are not generally known for their mobility. But do you know of any trees that have traveled over 238,000 miles? A select group of extraordinary trees have traveled farther than most humans – more specifically, to the moon and back again!

“Moon trees” actually traveled around the moon as seeds aboard the Apollo 14 command module in February, 1971. The seeds were the personal forestry project of command module pilot Stuart Roosa. While Alan Shepard and Edgar Mitchell made their historic third lunar landing of Apollo 14, Roosa orbited the moon alone with 500 tree seeds, including loblolly pines, sycamores, sweetgum, redwoods, and Douglas fir. Part of Roosa’s early career was spent as a smokejumper for the U.S. Forest Service, trained to parachute into wildfires to help extinguish them.

All the seeds came from USFS genetics labs. The parent trees were identified so that post genetic studies could be conducted. After the seeds were returned to Earth, they were sent to labs in Mississippi and California where they were planted. Nearly all the seeds germinated successfully, and in just a few short years, forestry experts had some 420 to 450 seedlings.

By 1976, the moon trees were ready to leave the labs. They were in such demand that the agency produced additional seedlings from rooted cuttings of the original trees. The trees were distributed for planting in all of the 50 states, where planting sites were picked based on where the tree species would best take root and grow.

Moon trees were planted at famous sites such as the White House, Independence Square and Valley Forge. Some were given to foreign heads of state.

Then over time, it seems, everyone forgot about them. Complete records of

where all the moon trees were sent were not kept. Mr. Dave Williams, a curator at the National Space Science Data Center in Greenbelt, Maryland, has been trying for more than two decades to build an inventory of these special trees and their offspring. When he started in 1996, he only knew where 22 trees were found. Now that number has climbed to 80 trees in 22 states and Washington, D.C., plus one in Brazil.

“A select group of extraordinary trees have traveled farther than most humans – more specifically, to the moon and back again!”

Some he’s found are marked with plaques, but there are scores of other that wound up in small parks or private land, locations known today only to the few who obtained or planted them decades ago.

Although most of the trees are long-lived species expected to last centuries, some have started to die off. According to Williams’ most recent count, 21 of the 80 known trees are dead, including the loblolly pine outside the White House, five sycamores and two pines outside the U.S. Space and Rocket Center in Huntsville, Alabama, and one New Orleans pine that was damaged in Hurricane Katrina.

Pennsylvania has eight moon trees and they are all American sycamores. They can be visited at these locations:

Philadelphia, Pennsylvania – On May 6, 1975 a moon tree was planted in what is now Independence National Historic Park. In 2011, the ailing moon tree was replaced by a second generation seedling grown by the Morris Arboretum

of the University of Pennsylvania from cuttings taken from the original tree.

Dillsburg, Pennsylvania – A sycamore was originally planted on April 30, 1976 at Northern Elementary School. It was transplanted on Arbor Day, April 29, 1983 to its current location at Dillsburg Elementary School.

Ebensburg, Pennsylvania – A sycamore was planted on June 29, 1976 on the grounds of the Cambria County Courthouse.

Holidaysburg, Pennsylvania – A sycamore was planted on May 5, 1976 at Highland Hall.

King of Prussia, Pennsylvania – The moon tree in King of Prussia is planted at the Lockheed Martin Space Systems facility. The sycamore was planted on June 30, 1976 at what was then the Valley Forge Space Technology Center.

Middletown Township, Pennsylvania – A sycamore was planted April 30, 1976 in Core Creek Park in Middletown Township, Bucks County.

Topton, Pennsylvania – The sycamore moon tree was planted in front of Borough Hall in Topton (Berks County) on June 20, 1976.

Coudersport, Pennsylvania – A moon tree sycamore is located in Coudersport Area Recreational Park.

Unfortunately, Stuart Roosa died in December, 1994. The trees now stand as a tribute, not only to the Apollo program, but to astronaut Stuart Roosa and to his botanical and forest interests.

The story of the moon trees, including their present whereabouts, is posted on the NASA web site, http://nssdc.gsfc.nasa.gov/planetary/lunar/moon_tree.html. If you know of a moon tree that is not on the list, NASA would like to hear from you. Send your message to dwilliam@nssdc.gsfc.nasa.gov.

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.

Taller Turbines Could Unlock More Wind Power

Tony Guerrieri
Executive Director

Advances in wind power technology and deployment could help the nation vastly expand its wind generated electricity, throwing new weight behind a wind industry push to reach higher into the air, according to a report by the U.S. Department of Energy (DOE).

The report, *Enabling Wind Power Nationwide*, argues that all 50 states have the capability to mine their gusts and breezes for electricity. It details new technology that can reach higher into the sky to capture more energy and more powerful turbines to generate more gigawatts (GW).

Technological advancements, such as taller wind turbine towers of 110 and 140 meters above the ground – currently under development by the DOE and its private sector partners – can more efficiently capture the stronger and more consistent wind resources typically found at greater heights above ground level, compared with the average 90-meter wind turbine towers installed in 39 states today, the report states.

New technologies could also help use wind energy from U.S. regions such as the Southeast which would represent an additional 700,000 square miles – or about one-fifth of the United States – bringing the total area of technical wind potential to 1.8 million square miles.

As of 2015, installed wind power is a significant contributor to the nation's

electricity generation portfolio, with more than 65 GW installed across 39 states supplying 4.9 percent of the nation's electricity demand in 2014. The technical potential for land-based wind energy for the contiguous United States is estimated to be 12,000 GW of generating capacity at 300-foot hub height – assuming a net capacity factor of at least 26 percent; and the technical potential for offshore wind energy is estimated to be 4,150 GW, according to the DOE. These resources combined are greater than 10 times current total U.S. electricity consumption.

New technology can greatly increase the nation's capacity of wind-generated electricity – as much as 10 times the current U.S. electricity consumption, according to recent estimates.

In the report detailing its plans, the DOE outlined key topics, including:

Economic benefits: The report found that an increase in wind power production to provide 20 percent of the country's electricity production by 2030 would provide an estimated annual benefit of \$30 billion in 2030 from air pollution and greenhouse gas emissions reductions. The industry could also account for around 40,000 jobs by 2030 and provide billions of dollars annually in property tax payments.

Towers: The United States has vast wind resources in all 50 states. Continued advancements in turbine technology



– including those that enable higher hub heights (calculated at the center of the rotor), larger rotors, and improved energy capture – can access the stronger and more consistent wind resources typically found at greater heights above ground level.

Turbines: Based on an advanced turbine concept and assuming hub heights of 330 feet (which are already in wide commercial deployment in Germany and other European countries), the technical potential for wind deployment is estimated to grow to 4.3 million square kilometers, a 54 percent increase compared to current technology with 80-meter hub heights. By pursuing hub heights of 140-meters, the technical potential for wind deployment is estimated to grow to 4.6 million square kilometers.

Locations: Improvements in siting practices have contributed to the deployment of 65 GW in cumulative installed wind capacity (as of 2014). Pursuing more moderate resource quality sites can and should be done in coordination with the broad stakeholder community for wind to coexist with the environmental and federal and state agency missions, the DOE report stated.

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Birds and bats: Anything that would increase the size and height of wind towers would likely have more of an impact on bats and birds. For example, the DOE report says dedicated research is needed to understand the biological and ecological factors related to potential interactions between Bald Eagles and wind.

Big trucks, little roads: Transporting long, wide wind turbine blades is difficult due to turns, narrow passages, and overhead obstructions on U.S. roads and railways, with the length of blade that can be transported over roadways generally limited to between 53 meters and 62 meters. Transportation of large diameter tower sections encounters similar difficulties, with diameters limited to 4.3 meters to 4.6 meters, far below the optimum diameter for the taller towers discussed in the report.

Big cranes: Hoisting wind turbine nacelles onto taller towers requires the largest crane capacity of all wind turbine components to install due to the lift height onto the tower and mass of the nacelle, and issues associated with transporting and hoisting heavier drivetrains onto tall towers is expected to become increasingly important as these systems grow in size.

The DOE report is available at: http://www.energy.gov/sites/prod/files/2015/05/f22/Enabling-Wind-Power-Nationwide_18MAY2015_FINAL.pdf.

Advanced Treatment of Dairy Farm Waste Still Falls Short

Coleen Engvall
Research Analyst

Pennsylvania's farmland is iconic. Much of the landscape is dedicated to crops and livestock, with agriculture being the commonwealth's largest sector. However, these activities are not without cost. Farms and farm animals

are a well-known source of materials that can be harmful when concentrated in streams and rivers. Fertilizer that runs into water can cause algal blooms and make the environment inhospitable for fish and other vital organisms.

Scientists have recently found more chemicals that are making it from farms into the environment. Antibiotics, which are given to livestock, end up in their waste. Additionally, dairy cows produce a great deal of estrogen, which also ends up in their waste.

In a study conducted by the University of Buffalo, researchers examined the ways dairy farms process this waste to determine if this is an effective way to keep these pollutants out of the environment. The study found that even techniques that are considered "advanced" for pollutant removal failed to reduce antibiotics and estrogen. The study, Chemical and Biological Assessment of Endocrine Disrupting Chemicals in a full Scale Dairy Manure Anaerobic Digester with Thermal Pretreatment, was published in the journal *Science of the Total Environment*.



Antibiotics are a well-known treatment for bacterial infections, and estrogen is a naturally occurring hormone. So why is it so important to monitor these chemicals, which can otherwise be beneficial? The scientists point out that over-exposure to antibiotics can make bacteria resistant to it, which could lead to more persistent outbreaks of illness. Estrogen, while naturally occurring, can affect an organism's reproductive systems when they are exposed to unregulated

amounts. Reports of fish, particularly trout, being found with intersex traits are becoming more common, and are a threat to population stability.

The University of Buffalo found that advanced forms of waste treatment at dairy farms is still insufficient to remove antibiotics and endocrine disruptors, such as estrogen.

The researchers analyzed waste from a New York dairy farm that was receiving two different kinds of treatment. The first process examined is pasteurization, which uses heat to destroy pathogens. After that, microorganisms are introduced to break down the material into useful byproducts, such as liquid fertilizer and solid materials. This process is called anaerobic digestion.

After each stage of processing, the researchers measured both antibiotic and estrogen levels and discovered some surprising results.

The level of antibiotics was lower in the liquid fertilizer that was produced by the anaerobic digestion process. However, this was not because the antibiotics were being neutralized. Instead, the microorganisms were concentrating the antibiotics in the solid byproduct, which the farm repurposed for animal bedding. Two other antibiotics that the researchers tested for appeared to have been removed by the treatment process.

Alarmingly, the treatment process was converting the existing estrogen in the waste into a more potent form of the chemical. Before being processed, the majority of the estrogen was in a specific form that is less disruptive to the endocrine system, which produces the hormones needed for reproduction,

growth and other critical functions. After the treatment, almost 75 percent of the estrogen in the waste consisted of the more disruptive form.

Because this report was a case study of just one farm's waste treatment system, the researchers note that their first recommendation is for further research to be conducted. Within current methods, best practices for estrogen and antibiotic removal should be identified. The researchers emphasize that these are very common chemicals found in agricultural waste, and they have the potential to be very damaging to the environment.

As agricultural practices change and evolve, treatment processes must change with them. The researchers express concern that current waste treatment practices on dairy farms are outdated and should be addressed by farms, the scientific community and government.

A summary of the study is available at: <http://www.buffalo.edu/news/releases/2016/02/020.html>.

The Impact and Growth of PA's Heritage Areas

Michael McKelvey
Intern

Since its founding, the Pennsylvania Heritage Area Program has established the Commonwealth as a leader in the national movement towards heritage area designation. According to a recent study designed to preserve history and to promote tourism development, the Heritage Area Program appears to be paying off.

Following a decade of cooperative planning at the local, state, and federal levels, the Pennsylvania Heritage Areas Program was officially authorized in 1989. Since then, the Commonwealth has designated 12 regions as official heritage areas. Five of these regions have received national heritage designation. With recreation and conservation at its core, the program grew; advancing the development of the



state's tourism industry while simultaneously preserving man-made history and conserving natural resources.

A new study by the Center for Rural Pennsylvania and the Department of Conservation and Natural Resources, The Economic Impact of Pennsylvania Heritage Areas, analyzes the impact of heritage areas on the Commonwealth. It looked at economic impact as well as interviews and questionnaires to measure the total value.

Tourists spent an estimated 7.5 million days and nights in Pennsylvania's heritage areas during 2014, purchasing approximately \$2 billion in goods and services.

The study determined that tourists spent an estimated 7.5 million days and nights in heritage areas during 2014. Further, tourists purchased approximately \$2 billion in goods and services, contributing to over 19,000 jobs and \$478 million in labor income. Through interviews and questionnaires, researchers determined that as much as 70 percent of economic impact would be lost without specific core attractions within heritage areas. Core attractions, such as the U.S. Brig Niagara in the Route 6 Heritage Corridor or the Carrie Blast Furnace in the Rivers of Steel Heritage Area, captivate the attention of tourists and often serve as important symbols for the region.

Interviews and surveys further illustrated several noneconomic impacts on the regions, such as the preservation of unique local tradition and pride in communities located in heritage areas. Additionally, the report highlighted the positive impact of the Heritage Area Program on developing beneficial partnerships between businesses, nonprofits, municipalities and state agencies.

The study listed several observations and recommendations for future improvement. The report suggests that a summit meeting be held to improve the efficiency of interaction and communication between DCNR and that a common survey technique be implemented to improve understanding of public opinion and visitation. Furthermore, the study suggests a simplification of the grant process in the interest of streamlining future studies and projects.

A second report, by DCNR and Heritage PA entitled Pennsylvania's Heritage Areas Program: The Next Five Years describes the program's strategic plan for the future. A major focus of this report was on an effort to modernize the program's communications and marketing. This report noted the implementation of a new slogan "Heritage is Now," and new vision that "by 2020, Pennsylvania's Heritage Areas Program is recognized, and celebrated as a key component of Pennsylvania's cultural and economic vitality, thereby warranting dedicated program funding and collaborative state support."

According to these two reports, the Pennsylvania Heritage Areas Program has provided the Commonwealth with both economic and social benefits in the past and present. The strategic plan report intends to expand these benefits even further in the near future.

To read The Economic Impact of Pennsylvania Heritage Areas, go to: <http://www.pitt.edu/~mcgrath/assets/pa-heritage-study-final-report-060215.pdf>.

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To read Pennsylvania's Heritage Areas Program: The Next Five Years, go to: http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_20031475.pdf.

Montana's Outdoor Recreation Threatened by Climate Change

Tony Guerrieri
Executive Director



Outdoor recreation in Montana generates over \$1 billion in wages and salaries and supports 42,000 jobs. Hunting, fishing, park visits, wildlife watching, skiing and snowmobiling are vital to Montana's economy, and the effects of climate change on the state's ecology and wildlife will have a big impact on its outdoor industry.

The cost of unabated climate change in Montana could be 11,000 jobs and \$281 million in labor earnings by 2050, according to a report by the Montana Wildlife Federation that attempts to quantify its economic impact on the state's outdoor economy. The report, *Economic Impact of Climate Change in Montana*, predicts warmer, drier summers will lead to increased wildfires and reduced snowpack with impacts projected not just for fish and wildlife habitat but also the people who make their living off the state's natural resources.

For example, skiers and snowmobilers will face shorter, warmer seasons with less snowpack. Ski areas will be forced to make more snow. Snowmobilers will be forced to travel farther and higher to find favorable conditions. Reduced snow recreation will mean about 1,500 lost jobs and \$37 million in lost labor earnings.

Among the report's other findings:

- Montana's traditional archery hunting season from September to early October and rifle hunting season from late October to late November will be warmer and drier, and big game will move into the high country and stay longer to avoid higher temperatures because snowfall will come later.
- Hotter, longer and drier summers, combined with less snowpack and earlier runoff of snowmelt, will lead to lower and warmer stream flows in late spring and summer, leading to more frequent and longer restrictions on fishing to protect fish from heat stress. Reduced angling will mean 1,800 lost jobs and \$49 million in lost labor earnings.
- Montana faces the possibility of 33 percent fewer angling days and the loss of 1,800 jobs and \$49 million in labor earnings if current changes in temperature remain unchanged.
- Big game hunting will see a 15 percent decline resulting in 1,600 lost jobs and \$39 million in lost labor earnings.
- Glacier and Yellowstone national parks will see a decrease in visitation due to hotter summers and longer fire seasons, resulting in the loss of 3,300 jobs and \$94 million in labor earnings.
- Wildlife watching will become more difficult due to wildfire, reduced habitat and changes in animal behavior, resulting in the loss of 2,800 jobs and \$61 million in income.
- Wildfires in Montana are predicted to double by 2050. At the same time, more and more Montanans are projected to build their homes on the pri-

vately owned land adjacent to public forests, putting development and wildfire on a collision course. This will result in potential annual losses of 227 homes worth \$53 million.

The report used economic data that already exists on how fires, low water flows or less snowfall have influenced the behavior of skiers, anglers and visitors, as well as the resulting economic impact to businesses that serve them. Then it looked at global climate models used by the Intergovernmental Panel on Climate Change, and "downscaling" models being used by the National Oceanic and Atmospheric Administration.

Unabated climate change could cost Montana's outdoor recreation industry nearly 11,000 jobs and \$281 million in labor earnings by 2050, according to a new report.

The climate change projections were overlaid with past economic data to come up with economic loss projections related to lost skiing, visitation and angling days.

Montana will see a temperature rise of up to 5 degrees by 2055, resulting in warmer, drier summers, increased wildfires and reduced snow packs. Northeast Montana could see an increase in temperature of 6.5 degrees. There will be 20 to 40 fewer days when the temperature drops below 32 degrees, according to the report.

The Montana Wildlife Federation's report, *The Impact of Climate Change on Montana's Outdoor Economy*, is available at: <http://montanawildlife.org/wp-content/uploads/2015/12/Impact-of-Climate-Change-on-the-Montana-Outdoor-Economy-Dec-2015-Final-Report.pdf>.

On the Horizon *A Look at Upcoming Events*

Monday, March 21, 2016, 9 a.m.
Public Hearing

Room 8E-A, Capitol East Wing, Capitol Complex, Harrisburg, PA

The Committee will hold a public hearing on Act 108 of 2010, the Covered Device Recycling Act. The act established a program for consumers, retailers, the waste and recycling industries, and manufacturers to manage the life cycle of certain “covered devices” including: desktop computers, laptop computers, computer monitors, tablets, computer peripherals, televisions, and e-readers. The hearing will provide a legislative review of the Covered Device Recycling Act, its implementation, and the challenges experienced under the existing law.

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

On March 3, members of the Committee staff participated in the DCNR Green Ribbon Task Force on Forest Products, Conservation and Jobs in Selinsgrove, Snyder County. Among the speakers were Scott Basehore, a world-renowned turkey call maker who uses Pennsylvania hardwoods for his products, and the Pennsylvania Wilds Center for Entrepreneurship, a non-profit that helps local artisans, many using local hardwoods, better market their goods and services.

Following the main program, the task force toured Wood-Mode, one the nation’s largest manufacturers of custom cabinetry. Wood-Mode’s Snyder County facility employs over 1,200 Pennsylvanians, and uses various species of Pennsylvania hardwood in their high-end product line. The tour included an in-depth look at the manufacturing process and a discussion of why healthy, productive forests result in a stronger economy.

Members of the Green Ribbon Task Force (pictured top right) brainstorm on ways to better market career opportunities available in the forest products industry, to include opportunities offered through Penn State’s forestry and wood products programs.

Employees of Wood-Mode (pictured at right) highlight the various stages of the cabinet-making process. Wood-Mode sources much of their hardwood from Pennsylvania forests.





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The Chairman's Corner

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ultimately supplies state agencies with supplemental funding, such as the \$33.5 million that the Commonwealth will receive this year.

Over \$33 million in federal grants will benefit the Commonwealth's fish and wildlife populations through habitat restoration projects, public education and outreach.

The Pennsylvania Game Commission is scheduled to receive nearly \$25 million from the Pittman-Robertson Act in 2016, while the Fish and Boat Commission will receive almost \$9 million from the Dingell-Johnson Act. The award totals are the fourth highest in the nation behind Texas (\$50,198,179), Alaska (\$47,586,623), and Michigan (\$33,887,394), all of whom boast large populations of resident sportsmen.

If you are interested in knowing more about the specific allocation of restoration funds, you can find more information by visiting the USFWS's website at www.fws.gov.

The funds Pennsylvania receives through the Pittman-Robertson and Dingell-Johnson acts will greatly benefit conservation of the Commonwealth's fish and wildlife populations through habitat restoration projects, public education and outreach.

Pennsylvania's Hunter Trapper Education course and the Keystone Aquatic Resource Education (KARE) program, in particular, have thrived with the help of USFWS funding. These programs encourage compliance with hunting, fishing and conservation regulations and en-

courage community involvement with conservation efforts. Our state's KARE program showcases the success of this funding partnership, which has allowed for the training of over 10,000 Pennsylvania educators in aquatic workshops and participation of several hundred school groups in our popular "Trout in the Classroom" program.

Though Pennsylvania's sportsman population is large, it is not as large as it once was. As part of a national trend, our state is seeing a gradual decline in the number of people buying licenses to hunt and fish each year. It is important to try and reverse this trend in the Commonwealth, as sporting activities play an important role in our economy and our heritage.

Reversing this trend will require efficient and effective management of our fish and wildlife. Without a healthy bass or deer population, for example, our citizens will be less likely to buy a fishing or hunting license and will contribute less to the economies surrounding these recreational activities. Funding from the Pittman-Robertson Wildlife Restoration and Dingell-Johnson Sport Fish Restoration acts helps our state fish and wildlife agencies to do what they do best: conserve and maintain our state's wildlife resources for the benefit of all its citizens.



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