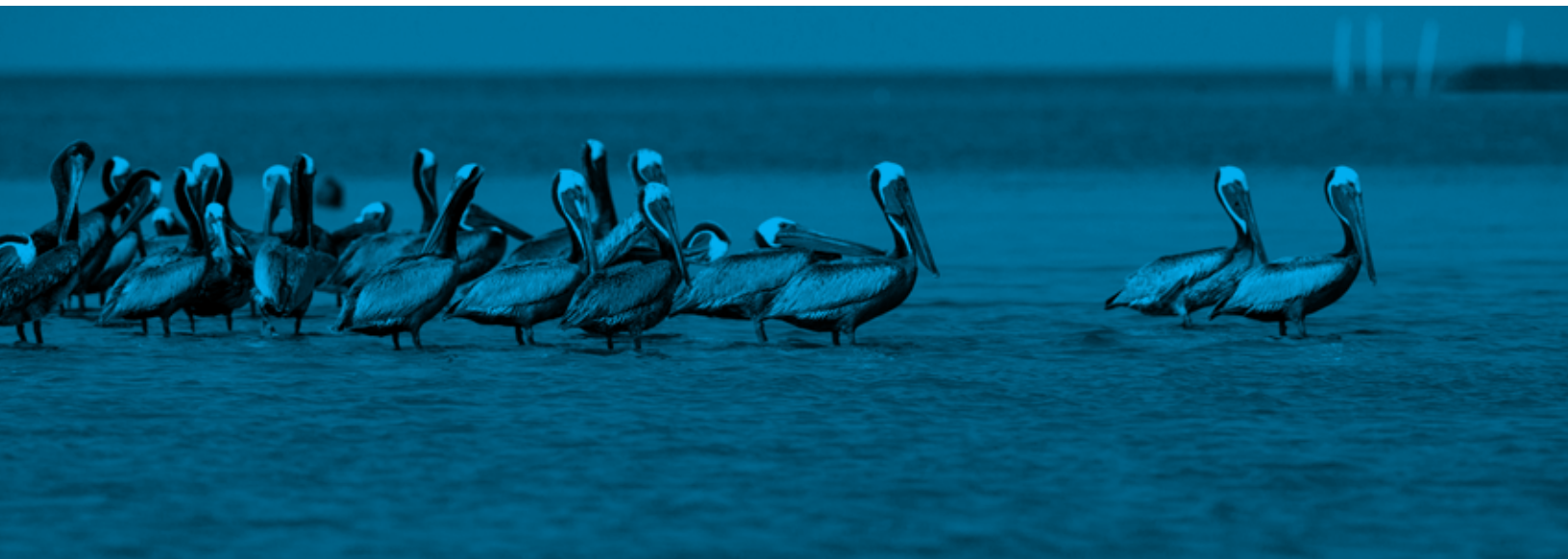




# Alabama's Return on Investment in Forever Wild





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The Trust for Public Land creates parks  
and protects land for people,  
ensuring healthy, livable communities  
for generations to come.

The Trust for Public Land's Conservation Economics team measures the economic value and fiscal impacts of parks and land conservation. We quantify these impacts using models developed in consultation with leading academics across the country and with our award-winning GIS team.

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# Contents

Executive summary.....	2
Introduction.....	4
Investment in land conservation.....	5
Natural goods and services.....	7
Highlighting the economic value of natural goods and services.....	9
Return on investment in land conservation.....	12
Land conservation supports the economy.....	14
Human health benefits.....	23
Economic development.....	24
Conclusion.....	25
About The Trust for Public Land.....	26
Bibliography.....	27
Appendix: Methodology.....	31

# Executive summary

The Trust for Public Land conducted an economic analysis of the return on Alabama's investment in land conservation through the Alabama Forever Wild Land Trust Program, which funds land acquisition statewide, and found that every public \$1 invested in land conservation returned \$5 in natural goods and services to the state. In addition, land conservation funded by Alabama supports key industries that depend on the availability of high-quality protected land and water. A summary of the key findings and the benefits of open space investments by the State of Alabama is presented below.<sup>1</sup>

**NATURAL GOODS AND SERVICES:** Lands conserved in Alabama provide valuable natural goods and services such as wildlife habitat, food production, flood control, and water quality protection. The Trust for Public Land used a benefits transfer methodology to analyze lands conserved using Forever Wild and found that every \$1 invested in land conservation returns \$5 in economic value of natural goods and services.

**TOURISM AND OUTDOOR RECREATION:** Conservation lands are critical to the state's tourism and outdoor recreation industries. Each year, tourists spend \$12.6 billion in Alabama: the state's scenery and opportunities for outdoor recreation play an important role in attracting visitors. A recent survey found that 18.9 percent of respondents were going to participate in outdoor recreation while in the area. In addition to tourists, at least 57 percent of Alabama residents participate in outdoor recreation each year. Together, tourists and residents spend \$7.5 billion annually on outdoor recreation, which generates \$494 million in tax revenues. This spending also supports 86,000 jobs with an associated \$2 billion in wages.

**HUNTING AND FISHING:** The conservation of Alabama's special lands and waters supports hunting, fishing, and wildlife watching. These activities are important to Alabama residents and to the economy. In 2011, 1.7 million residents and nonresidents fished, hunted, or viewed wildlife in Alabama and spent over \$2.1 billion on trips and equipment.

**FORESTRY, COMMERCIAL FISHING, AND AGRICULTURE:** Land conservation supports forestry, commercial fishing, and agriculture in Alabama by helping to maintain the intact working landscapes on which these industries depend. A 2013 study by Auburn University found that forestry, agriculture, and related industries in Alabama supported 580,000 jobs and contributed \$70.4 billion to Alabama's total economic output, representing 22 percent of Alabama's workforce and 40 percent of its gross domestic product. The state's commercial fishing industry landed 26.6 million pounds of seafood in 2015, at a value of over \$50.9 million.

**ECONOMIC DEVELOPMENT:** Land conservation contributes to Alabama's economy by maintaining the scenic beauty of the state, improving quality of life for residents, and enabling the state to attract and retain new businesses and high-quality workers.

**FISCAL HEALTH:** Land conservation saves Alabama communities money through avoided costs on expensive infrastructure and other municipal services required by residential property owners, such as schools, police, and fire protection. A nationwide study found that at the median, residential lands require \$1.16 in services for every \$1.00 paid in local taxes. At the same time, working and open lands require only \$0.35 in services for every dollar contributed in property taxes.

**HUMAN HEALTH:** Access to parks and conserved lands increases the physical activity and the health of residents and workers in Alabama. This reduces health care costs related to obesity, which, in Alabama, are estimated to reach between \$3.68 billion and \$7.50 billion by 2018. In 2014, 27.6 percent

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<sup>1</sup> All numbers reported in the text and tables are rounded to three significant digits unless otherwise noted. Because of rounding, some report figures and tables may appear not to sum.

of the state's adults were physically inactive. In addition, in 2014, 62.7 percent of adult women and 71.3 percent of adult men were overweight or obese. Availability of parks and proximity to such spaces increase the physical activity of adults and children. Researchers have found that as the percentage of park area within a child's neighborhood increases, so does a child's physical activity.

**LEVERAGE FEDERAL, PRIVATE, AND NONPROFIT FUNDS:** Forever Wild is a state funding program with an impact greater than that of its budget. The program facilitates cooperation between a range of partner organizations and catalyzes additional land conservation investments. Forever Wild plays a critical role in bringing together federal, private, and nonprofit sources of funding to complete often complicated and nuanced land acquisition projects.



HUNTER NICHOLS

**ABOUT THE TRUST FOR PUBLIC LAND:** The Trust for Public Land has extensive experience in determining the return on state investment in land conservation. Its Conservation Economics team has published return-on-investment analyses in states across the country, including Georgia, North Carolina, Virginia, Colorado, Illinois, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, and Wyoming. The Trust for Public Land has worked with leading academic partners to advance this research, including Georgia Institute of Technology, University of Georgia, Colorado State University, Dartmouth College, Plymouth State University, University of Minnesota, and University of Wyoming–Ruckelshaus Institute of Environment and Natural Resources.

# Introduction

Alabama is a geographically diverse state – covered by mountains, coastal beaches, grassland plains, forests, farms, lakes, and rivers. Residents and visitors benefit from the scenic beauty and natural resources that extend from the Cumberland Plateau to the Tennessee River, the Appalachian Mountains to the Piedmont Uplands, and the Piedmont Plateau to the Coastal Plain.

The Alabama Forever Wild Land Trust Program (Forever Wild) is essential for conserving these diverse natural assets, particularly in a state where protected public lands make up less than five percent of the total land area. Forever Wild has been used to purchase land for general recreation, nature preserves, wildlife management areas, and state parks. Some popular conservation lands that have been protected through Forever Wild include Little River Canyon, Sipsey River Complex, Cathedral Caverns, Ruffner Mountain, Weeks Bay Reserve, Splinter Hill Bog, and the Turkey Creek Nature Preserve. Wildlife Management Areas such as the Cahaba River, Coosa, and Skyline properties are likewise critical components of Forever Wild. Last, Forever Wild has enabled important additions to the Alabama State Parks System, including Monte Sano, Desoto, and Blue Springs State Parks.

Forever Wild was established in 1992 by constitutional amendment when ratified by Alabama voters with 84 percent support. In 2012, voters opted to extend the constitutional amendment to fund Forever Wild for another 20 years; the measure passed with 75 percent of the vote. The program receives 10 percent of the interest income from the Alabama Trust Fund, which comprises payments from the sale or lease of rights to explore and drill for oil and gas in areas off the coast of Alabama. The Alabama Trust Fund income distributed to Forever Wild cannot exceed \$15 million in any one fiscal year.

Forever Wild is a state program that plays a critical role in bringing together diverse funding in Alabama from federal, private, and nonprofit sources. For example, Forever Wild has leveraged federal investments through the U.S. Fish and Wildlife Service, U.S. Forest Service, National Oceanic and Atmospheric Administration, National Park Service, and Natural Resources Conservation Service to protect lands such as those in the Mobile-Tensaw Delta. As the catalyst for many additional state and private investments, Forever Wild as a program has been able to leverage funds, facilitate partnering, and create an overall environmental and economic impact greater than the program's bottom-line spending. While the impact of leveraged funding sources is not included in the analysis due to a lack of available comprehensive data, the qualitative importance of Forever Wild as a mechanism to leverage additional funding is illustrated in numerous case studies throughout the report.

Land conservation provides economic benefits to local communities and the people of Alabama in the form of natural goods and services, opportunities for tourism, outdoor recreation, hunting, and fishing, support for productive forests, waterfronts, and farms; increased quality of life that attracts business and employees; avoided costs on expensive infrastructure; and places to improve health. Forever Wild is a flagship program in a state that has a modest amount of protected lands. Investments to conserve these crucial lands and the economic benefits they ensure are essential to maintaining a high quality of life for the state's residents and visitors.

The economic analysis conducted for this report focuses on a subset of conserved lands in Alabama – those lands that have been conserved, through fee simple purchase using state dollars. Although additional lands are conserved by federal programs, nonprofit partners, and private landowners exclusively, these lands are not included because the goal of the analysis was to better understand the return on Alabama's direct investment in land conservation through Forever Wild.



# Investment in land conservation

The Trust for Public Land's Conservation Almanac research team, which tracks and maps public spending for land conservation across the country, collected data on specific state investments in land conservation through Forever Wild in Alabama. State investment, location, and acreage information was derived from primary data. Data adhere to the following guidelines:

- Funding and acreage information is representative of activity between 1994 and 2015. Forever Wild was created in 1992 and began protecting land in 1994.<sup>2</sup>
- Funding represents expenditures to protect land via fee acquisition;<sup>3</sup>
- Investments represent only state contributions made through Forever Wild;<sup>4</sup>
- Acres represent land acquisitions using state funding either in-part or in-full; and
- Expenditures and acres are assigned to the year in which the project was completed.

From 1994 to 2015, Alabama funded the conservation of 188,000 acres, including lands protected through fee simple acquisitions (i.e., lands purchased outright from willing sellers).<sup>5</sup> During this time, an average of 8,540 acres were protected annually through state spending, using an average of \$8.26 million each year (this is nominal spending, i.e., not in today's dollars). The average expenditure per acre conserved during this period was \$968. Table 1 breaks out the dollars spent and historical acres conserved by Forever Wild.



BETH MAYNOR YOUNG

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2 The Trust for Public Land, Conservation Almanac, accessed October 13, 2016, <http://www.conservationalmanac.org/secure/almanac/southeast/al/programs.html>.

3 The Trust for Public Land's methodology only includes acres directly acquired using public funding and does not include methods of incorporating land into a system such as land exchanges, donations, or matching tracts. Conservation easements are allowed under Forever Wild's enacting legislation; however, in the history of the program, Forever Wild funds have not been used to acquire a conservation easement.

4 This analysis focuses on the return on the state's investment only and does not include federal, private, and nonprofit funding streams that are critical to the success of the program.

5 Historical acres and state funding for land conservation were determined using The Trust for Public Land's Conservation Almanac ([www.conservationalmanac.org](http://www.conservationalmanac.org)). The Conservation Almanac is a powerful online resource for discovering, analyzing, and mapping the results of federal, state, and local funding for land conservation across the United States.

**TABLE 1. HISTORICAL ACRES AND STATE FUNDING FOR LAND CONSERVATION**

ACQUISITION YEAR	ALABAMA FOREVER WILD SPENDING	ACRES ACQUIRED
1994	\$1,000,000	1,500
1995	\$350,000	316
1996	\$1,370,000	3,430
1997	\$754,000	256
1998	\$4,170,000	5,030
1999	\$23,100,000	38,800
2000	\$936,000	2,140
2001	\$17,300,000	33,800
2002	\$1,100,000	2,450
2003	\$1,820,000	2,020
2004	\$15,600,000	20,800
2005	\$1,990,000	3,680
2006	\$10,500,000	10,500
2007	\$14,900,000	10,400
2008	\$9,070,000	4,970
2009	\$13,900,000	7,970
2010	\$20,400,000	13,600
2011	\$7,560,000	4,270
2012	\$15,200,000	11,000
2013	\$7,110,000	3,030
2014	\$10,700,000	4,900
2015	\$3,050,000	2,920
<b>Total</b>	<b>\$182,000,000</b>	<b>188,000</b>



ROGER MANGHAM / THE NATURE CONSERVANCY

# Natural goods and services

Some of the key economic benefits of land conservation come in the form of natural goods and services, including fish and game habitat, food production, flood control, water quality enhancement and protection, stormwater management, and other necessary functions.<sup>6</sup> The following list qualitatively describes some of the natural goods and services provided by different types of ecosystems:

## Forests protect water and air quality

- Forests purify water by stabilizing soils and filtering contaminants. They also regulate the quantity of available water and seasonal flow by capturing and storing water. In fact, forests process nearly two-thirds of the freshwater supply, providing water to about 40 percent of all municipalities or approximately 180 million people across the United States.<sup>7</sup>
- Forests defray costs of erosion-related damage (e.g., repairing damaged infrastructure, treating contaminated water) because their stabilized soil reduces erosion and stormwater runoff.<sup>8</sup>
- Forests improve air quality by absorbing carbon, releasing oxygen, and filtering particulates.<sup>9</sup>

## Wetlands support biologically diverse habitats, reduce flooding, and improve water quality

- Wetland habitats are some of the most productive habitats on earth, providing habitat for fish, amphibians, birds, reptiles, and mammals.<sup>10</sup>
- A one-acre wetland can typically store about one million gallons of water. Water storage by wetland vegetation can enhance community resilience by lowering flood heights, slowing the speed of floodwaters, and reducing the destructive power of floodwaters.<sup>11</sup>
- Wetlands act as a natural filtration system to improve water quality by absorbing excess nutrients from fertilizers, manure, and sewage. In their role as natural purifiers, wetlands reduce water treatment and infrastructure costs.<sup>12</sup>
- Wetlands provide other natural services such as erosion control and resilience to storms. These lands support a range of services that depend on water, including agricultural production, fisheries, and tourism.<sup>13</sup>

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6 This analysis only includes natural goods and services, which are sometimes referred to as ecosystem services, natural capital, nature's benefits, and environmental goods and services. Additional values provided by conserved lands (including option, bequest, existence, spiritual, and aesthetic values) are not included in this analysis owing to the complexity of their measurement. Ecosystem services such as recreation and tourism have not been included in the per-acre values of natural goods and services but are discussed separately in the "Land conservation supports the local economy" section on page 14. The return on investment in land conservation would presumably be higher if these additional values had been included in the analysis: their omission results in a more conservative estimate (i.e., underestimates the "true" value).

7 National Research Council of the National Academies, Committee on Hydrologic Impacts of Forest Management, Water Science and Technology Board, Division of Earth and Life Studies, *Hydrologic Effects of a Changing Forest Landscape*, Washington, DC: The National Academies Press, 2008.

8 Ibid.

9 Neil Letson, *Forests at the Crossroads: Alabama's Forest Assessment and Resource Strategy*, Montgomery, AL: Alabama Forestry Commission, 2010; National Research Council of the National Academies, Committee on Hydrologic Impacts of Forest Management, Water Science and Technology Board, Division of Earth and Life Studies, *Hydrologic Effects of a Changing Forest Landscape*.

10 Randy C. Shaneyfelt, *Alabama's Wetlands*, Mobile, Alabama: Alabama Department of Environmental Management, 2012.

11 U.S. Environmental Protection Agency, *Wetlands: Protecting Life and Property from Flooding*, EPA843-F-06-001, 2006.

12 U.S. Environmental Protection Agency, *Economic Benefits of Wetlands*, EPA843-F-06-004, 2006.

13 D. Russi et al., *The Economics of Ecosystems and Biodiversity for Water and Wetlands*, London and Brussels: The Institute for European Environmental Policy; Gland, Switzerland: Ramsar Secretariat, 2013.

## Agricultural lands, grasslands, pasturelands, and shrublands protect water quality, provide habitat, and boost agricultural production

- Agricultural lands, grasslands, pasturelands, and shrublands provide habitat for waterfowl, wildlife, and native pollinators that are essential to agricultural production.
- Agricultural lands, grasslands, pasturelands, and shrublands sequester and store carbon.<sup>14</sup>

## Water bodies provide clean drinking water, flood control, and recreational opportunities

- Water bodies, such as rivers and lakes, provide flood control and clean drinking water by storing runoff from stormwater, retaining sediment, and recharging groundwater.
- Water bodies support livelihoods through irrigation for crops and drinking water for livestock.
- Water bodies create opportunities for recreation, tourism, and transportation.<sup>15</sup>



ROGER MANGHAM

14 "Ecosystem Services from National Grasslands," U.S. Forest Service, accessed October 13, 2016, <http://www.fs.fed.us/grasslands/ecoservices/>; Insu Koh et al., "Modeling the Status, Trends, and Impacts of Wild Bee Abundance in the United States," *Proceedings of the National Academy of Sciences* 113, no. 1 (2016): 140-145, doi: 10.1073/pnas.1517685113; "Waterfowl Habitat: The Benefits of Two Key Waterfowl Habitat Types," Ducks Unlimited, accessed October 13, 2016, <http://www.ducks.org/Conservation/Waterfowl-Habitat>.

15 Russi et al., *The Economics of Ecosystems and Biodiversity for Water and Wetlands*.

# Highlighting the economic value of natural goods and services

The following section describes the economic value of select natural goods and services provided by conserved lands in Alabama.

## Drinking water protection

Alabama’s conservation lands help maintain and improve the state’s water quality. By providing vegetation and pervious soils, these areas can capture runoff, enhance infiltration, and remove sediments and pollutants. A growing body of research suggests that high-quality source water and well-controlled flow can lead to treatment cost savings.<sup>16</sup> For example, research in the J.B. Converse Lake Watershed, which supplies the majority of water to the city of Mobile,<sup>17</sup> found that conversion of forest to urban land substantially increases water treatment costs, from an average of \$870,000 to \$912,000 per year.<sup>18</sup>

Approximately 44 percent of Alabama residents get their drinking water from groundwater sources.<sup>19</sup> The quality of drinking water supplies is affected by land use in surrounding watersheds. Natural lands filter contaminants from stormwater runoff. Protecting these lands prevents contaminated runoff from developed areas from entering drinking water supplies. As Table 2 shows, 13 percent of Alabama’s public water systems were not in compliance in 2014.<sup>20</sup>

**TABLE 2. ALABAMA WATER SYSTEMS, 2014**

WATER SYSTEM TYPE	SYSTEMS	POPULATION SERVED	NOT IN COMPLIANCE
CWS*	523	1,870,000	11.5%
NTNCWS**	21	37	19.0%
TNCWS***	54	1,800	25.9%
<b>Total</b>	<b>598</b>	<b>1,870,000</b>	<b>13.0%</b>

\* A community water system (CWS) is a public water system that supplies water to the same population year-round.

\*\* A non-transient non-community water system (NTNCWS) is a public water system that regularly supplies water to at least 25 of the same people at least six months per year but not year-round. Some examples are schools, factories, office buildings, and hospitals that have their own water systems.

\*\*\* A transient non-community water system (TNCWS) is a public water system that supplies water to places such as gas stations or campgrounds where people do not remain for long periods.

Forestlands are critical to drinking water supplies. The National Research Council reports that nearly two-thirds of the country’s clean water supply is provided by forests – an additional value of

16 Todd Gartner, et al., “Protecting Forested Watersheds is Smart Economics for Water Utilities,” *Journal of American Water Works Association* 106, no. 9 (2014): 54–64.

17 U.S. Geological Service, *Assessment of Water-Quality Conditions in the J.B. Converse Lake Watershed*, Mobile County, Alabama, 1990–98, accessed December 29, 2015, <http://pubs.usgs.gov/wri/wri014225/>.

18 Emile Elias, David Laband, and Mark Dougherty, “Estimating the Public Water Supply Protection Value of Forests” *Journal of Contemporary Water Research and Education* 152 (2013): 94–104.

19 Groundwater Assessment Program, Geological Survey of Alabama, “Water Information,” accessed November 8, 2016, [http://www.gsa.state.al.us/gsa/water/water\\_information.html](http://www.gsa.state.al.us/gsa/water/water_information.html).

20 Alabama Department of Environmental Management, *2014 Public Water Systems Report*.

conservation lands.<sup>21</sup> In fact, the more forestland around a source of drinking water, the better the water quality and lower the treatment costs.<sup>22</sup>

Land conservation in Alabama has focused on forest protection for drinking water quality in cities and rural communities across the state. For example, there are four national forests in Alabama, including Bankhead, Conecuh, Talladega, and Tuskegee National Forests. These national forests protect municipal watersheds for seven cities, serving about 350,000 people.<sup>23</sup> Additional community efforts have focused on protecting sources of drinking water throughout Alabama, including an ongoing effort in the Paint Rock River Landscape Conservation Area. One recent example is a project implemented by a local coalition that included the Tennessee Valley Authority, the U.S. Fish and Wildlife Service, and The Nature Conservancy in Alabama. The group conserved the 860-acre Gully Tract Conservation Easement, which protected significant hardwood forestlands in Jackson County. These forestlands contain critical headwaters, and their protection will safeguard water quality in Burks Creek, Wheeler Reservoir, and the Tennessee River, which provide a substantial portion of the drinking water used by residents of the Huntsville area.<sup>24</sup> In conjunction with the many other land protection efforts in the Paint Rock River Landscape Conservation Area, these projects protect the quality of drinking water on which numerous local communities depend.

## Flood control and prevention

Conserved lands can provide flood protection services. Since January 2006, there have been three emergency declarations (e.g., Hurricane Gustav in 2008) and 14 major disaster declarations in Alabama that included flooding.<sup>25</sup> Between 2006 and 2015, 241 floods caused \$62.6 million in property damage and \$1.10 million in crop damage in Alabama, according to the Hazards and Vulnerability Research Institute.<sup>26</sup> The damages that result from flooding can include major road washouts, extensive debris on and damage to state and local road infrastructure and facilities, and damage to private residences. Conserving land in floodplains can help avoid related expenses by preventing development in flood-prone areas. Wetlands and natural areas near rivers and streams also prevent costly property damage by absorbing and storing potentially devastating floodwaters.



ROGER MANGHAM

- 21 National Research Council of the National Academies, Committee on Hydrologic Impacts of Forest Management, Water Science and Technology Board, Division of Earth and Life Studies, *Hydrologic Effects of a Changing Forest Landscape*.
- 22 The Trust for Public Land and American Water Works Association, *Using Land Conservation to Protect Drinking Water Supplies: Source Protection Handbook*.
- 23 "Land & Resources Management," U.S. Department of Agriculture, Forest Service, accessed October 25, 2016, <http://www.fs.usda.gov/land/alabama/landmanagement>.
- 24 "The Nature Conservancy in Alabama Acquires Largest Conservation Easement in Chapter History," The Nature Conservancy, January 5, 2016, accessed October 20, 2016, <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/alabama/newsroom/alabama-gully-tract-conservation-easement.xml>.
- 25 "Disaster Declarations for Alabama," U.S. Department of Homeland Security, Federal Emergency Management Agency, accessed October 17, 2016, [https://www.fema.gov/disasters/grid/state-tribal-government/28?field\\_disaster\\_type\\_term\\_tid\\_1=6837](https://www.fema.gov/disasters/grid/state-tribal-government/28?field_disaster_type_term_tid_1=6837).
- 26 Hazards and Vulnerability Research Institute, *The Spatial Hazard Events and Losses Database for the United States, Version 15 [Online Database]*, Columbia: University of South Carolina, 2016. Damages in 2015 dollars.

## Conservation builds partnerships, provides win-wins in the “Grand Canyon of the Southeast”

BY THE NATURE CONSERVANCY

**Jacobs Mountain**, in the Paint Rock River Valley, is a key driver of tourism for Jackson County, an important watershed for the surrounding communities, and a critical area of biodiversity within the state. The Forever Wild acquisition of 11,400 acres on Jacobs Mountain includes a gently rolling mountaintop plateau that falls away to coves and steep slopes. Also contained on the property are Appalachian hardwood forests and a vast network of 65 known caves located along the headwaters of the Paint Rock River, which supplies water to many communities in the region. Peter Howell, an executive vice president at the Open Space Institute, notes that the parcel is “among the most important in the entire Southern Appalachians for its wildlife habitat and breeding areas. The conservation of these large, contiguous swaths of forest also protects a spectacular network of underground caves and helps maintain water quality for residents of the region.”

Local residents and tourists are drawn to this wild gem, and these amenities have become a critical economic driver for the region. Rick Roden, president and CEO of the Greater Jackson County Chamber of Commerce, puts it this way: “It is with great appreciation to our partners that we in Jackson County have several ‘wonders’ to offer Alabamians and all who venture here. Outdoor recreation and tourism has [sic] grown 41.3% in the last eight years. In 2015, the economic impact of tourism reached \$55.5 Million.”

The Jacobs Mountain acquisition involved private, public, and nonprofit partners to preserve this landscape and open the area to tourism. The landowner offered the land for sale—the largest individually owned parcel in Jackson County—at a discounted price. The Nature Conservancy helped secure \$1 million of funding from the Open Space Institute and private donors. The commitment of these funds made it possible for the Alabama Department of Conservation and Natural Resources to add \$3 million in federal Pittman-Robertson funds to the land purchase.<sup>27</sup> As the culmination of over a decade of interest and intense work from partners behind the scenes, Forever Wild was the final piece of the puzzle to make this acquisition a reality.

Conserving land is an inherently complex process. Questions of land use, funding, and management must all be navigated for the successful implementation of projects. While the benefits can be great, the process needed to navigate such acquisitions can be so complex that these gains are never realized. The acquisition of Jacobs Mountain in collaboration with the State of Alabama was no exception in complexity, yet was made possible by Forever Wild.



ALAN CRESSLER

<sup>27</sup> The Federal Aid in Wildlife Restoration Act, also known as the Pittman-Robertson Act, was passed in 1937 to tax the sale of firearms and ammunition to help fund wildlife conservation.

# Return on investment in land conservation

The Trust for Public Land conducted an analysis of the return on Alabama's investment in land conservation by comparing the state's investment with the economic value of the natural goods and services provided by conservation lands. Every \$1 invested by Alabama in land conservation through Forever Wild returns \$5 in economic value of natural goods and services.

## Methodology

To determine the natural goods and services provided by conserved lands, The Trust for Public Land analyzed the ecosystem types found within conserved lands using a geographic information system (GIS) analysis. To complete this analysis, data from The Trust for Public Land's Conservation Almanac database were utilized. This database contains GIS data (i.e., mapped boundaries) of purchased conservation lands that were protected with state funding.<sup>28</sup> The Trust for Public Land collected the best available information on the land conservation investments made by Forever Wild. The information utilized in this analysis was derived from a list of Forever Wild Land acquisitions made publicly available by Forever Wild.<sup>29</sup>

The Trust for Public Land analyzed a total of 188,000 acres protected through state investments between 1994 and 2015. These acres were protected using \$182 million in state funding (nominal spending, i.e., not adjusted to present value). The projects that were included in the analysis represent most of the state's land conservation activity through Forever Wild during that period (i.e., 97.1 percent of direct spending and 96.1 percent of acres protected through direct spending).<sup>30</sup> Owing to the complexities of aligning spending records to spatial records, a small number of parcels could not be aligned spatially and those were excluded from the analysis.

The Trust for Public Land then determined the underlying ecosystem types using the 2011 National Land Cover Database (NLCD 2011), which features a land cover classification scheme created using satellite imagery to identify different types of land cover at a spatial resolution of thirty meters.<sup>31</sup> With this analysis, The Trust for Public Land calculated the number of acres of each of the ecosystem types found within conserved lands included in the study. The most commonly acquired land cover type is deciduous forest, representing 33.6 percent of all conserved land. Table 3 breaks out the full results of the land cover analysis.

The natural goods and services provided by the distinct ecosystem types found within Alabama's conserved lands, and their monetary values, were determined using the benefits transfer methodology. That is, The Trust for Public Land conducted a thorough literature review of the types of natural goods and services provided by the 15 ecosystem types identified in conserved lands using recent, relevant, and scientifically sound sources. The Trust for Public Land then used the economic values of the different ecosystem types identified in that literature to estimate a per-acre economic value of the natural goods and services provided. Benefits transfer methodology has become a common approach in environmental economics because it is a practical alternative to time-intensive and data-intensive original research. Please see the appendix for a complete methodology.

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28 The Trust for Public Land, Conservation Almanac.

29 Alabama Forever Wild Land Trust Program, *Forever Wild Program Acquisitions: Current as of 1/13/2016*.

30 The Trust for Public Land's methodology only includes acres directly acquired using public funding and does not include methods of incorporating land into a system such as land exchanges, donations, or matching tracts.

31 C. G. Homer et al., "Completion of the 2011 National Land Cover Database for the Conterminous United States—Representing a Decade of Land Cover Change Information," *Photogrammetric Engineering and Remote Sensing* 81, no. 5 (2015): 345–354.



**TABLE 3. LANDS CONSERVED BY LAND COVER TYPE**

LAND COVER TYPE	ACRES	PERCENT LAND COVER
Deciduous Forest	63,100	33.6%
Woody Wetland	62,800	33.4%
Evergreen Forest	25,300	13.4%
Shrub/Scrub	12,800	6.82%
Mixed Forest	5,780	3.08%
Grassland/Herbaceous	5,390	2.87%
Emergent Herbaceous Wetland	5,220	2.78%
Pasture/Hay	2,730	1.46%
Developed Open Space/Parks*	2,310	1.23%
Open Water	1,660	0.88%
Cultivated Crops	663	0.35%
Developed**	96	0.05%
Barren Land	40	0.02%
<b>Total</b>	<b>188,000</b>	<b>100.0%</b>

\* Developed open space/parks are areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total land cover.

\*\*The developed category combines low-, medium-, and high-intensity development land cover types. This includes areas with a mixture of constructed materials and vegetation with impervious surface accounting for between 20 percent and 100 percent of the total land cover.

## Results

Based on the per-acre economic values, 188,000 acres of conserved land provide \$1.91 billion (present value, i.e., the value of past investments in today’s dollars) in total economic value in the form of natural goods and services from the date of purchase (i.e., beginning in 1994) to 2025 (i.e., starting in 2016 and extending ten years into the future).

The Trust for Public Land used this value to estimate the return on \$299 million (present value) invested in 188,000 acres of land conservation by Alabama from 1994 to 2015. The comparison of this investment with the economic value of natural goods and services generated by these lands in the past (i.e., 1994 to 2015) and future (starting in 2016 and ten years into the future, ending in 2025) finds that every \$1 invested returns \$5 in economic value. These goods and services will continue to be provided well beyond 2025, increasing the total return on investment beyond that calculated in this analysis.

# Land conservation supports the local economy

Forever Wild lands are critical components of a broader landscape of conservation in Alabama. Through the leveraging of other funding streams and the strategic choices of conservation acquisitions, Forever Wild buttresses a mosaic of conservation lands that support numerous industries, including those that rely on intact natural landscapes, providing economic benefits beyond the provision of natural goods and services. For example, conservation bolsters the tourism industry by providing outdoor amenities for people to visit, creating jobs, and strengthening local economies. Alabama residents and nonresidents enjoy opportunities for outdoor recreation, hunting, fishing, and wildlife watching. Land conservation also supports the forestry, commercial fishing, and agriculture industries, all the while reducing the costs of municipal services to local governments. The marginal impact of conservation land on these benefits is not directly quantifiable, however; this section details the magnitude of these industries on the economy.

## Providing opportunities for tourism and outdoor recreation

From the sandy beaches of Gulf State Park to the craggy formations at Rickwood Caverns, land conservation preserves the beautiful areas that attract our-of-state visitors as well as residents to Alabama. The tourism and outdoor recreation industries benefit greatly from Alabama's wild places. Unfortunately, the information necessary to isolate the direct contribution of conservation lands toward the two industries is not currently available in Alabama. And further, because there is significant overlap between each sector, The Trust for Public Land uses a qualitative approach to describe the value of conservation lands to each industry.<sup>32</sup>

In 2015, over 25 million people visited Alabama.<sup>33</sup> Tourists spent \$12.6 billion, which generated \$797 million in state and local taxes and represented 6.2 percent of Alabama's gross domestic product (GDP).<sup>34</sup> Tourism is a significant industry within Alabama's economy and is becoming increasingly important over time. Between 2005 and 2015, for instance, Alabama's GDP grew by 29.3 percent, while the tourism industry grew by 69.1 percent.<sup>35</sup> More tourists are visiting Alabama each year and enjoying Alabama's conservation lands. Alabama's scenery and outdoor recreation play an important role in this industry and in its growth. A 2015 survey by the Alabama Tourism Department found that 18.9 percent of respondents were going to participate in outdoor recreation while in the area.<sup>36</sup> Meanwhile, in 2015, Baldwin County's Gulf Shores and Orange Beaches contributed to the county's fifth consecutive year of growth in tourism attendance.<sup>37</sup> Finally, the Alabama State Park System expects to have its highest attendance in seven years at over five million visitors in 2016.<sup>38</sup> As more

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32 Some tourists come to Alabama primarily to visit conservation lands or to participate in outdoor recreation, or will do so while visiting the State for other primary reasons. Further, both residents and tourists participate in outdoor recreation.

33 Alabama Tourism Department, *Travel Economic Impact 2015*, Montgomery, AL: Sweet Home Alabama.

34 Ibid.

35 These figures were calculated by The Trust for Public Land based on information from the Bureau of Economic Analysis and the Alabama Tourism Department. Sources: Bureau of Economic Analysis, "Regional Data—Alabama," accessed October 14, 2016, <http://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=10&isuri=1&7003=200&7035=-1&7004=naics&7005=-1&7006=01000&7036=-1&7001=1200&7002=1&7090=70&7007=-1&7093=levels>; Alabama Tourism Department, *Travel Economic Impact 2015*.

36 Pam Smith, Alabama Tourism Department, e-mail message to author that included 2004 survey results, December 15, 2015.

37 John Sharp, "All of Alabama Cashes In on Beach Boom as Tourism Records Shatter," AL.com, June 5, 2016, accessed October 14, 2016, [http://www.al.com/news/mobile/index.ssf/2016/06/all\\_of\\_alabama\\_cashes\\_in\\_on\\_be.html](http://www.al.com/news/mobile/index.ssf/2016/06/all_of_alabama_cashes_in_on_be.html).

38 Tim Lockette, "Alabama Parks See Highest Number of Visitors in Years," *The Anniston Star*, September 27, 2016, accessed October 20, 2016, [http://www.annistonstar.com/news/state/alabama-parks-see-highest-number-of-visitors-in-years/article\\_8aa4a232-8507-11e6-9590-0b0e028f4dcc.html](http://www.annistonstar.com/news/state/alabama-parks-see-highest-number-of-visitors-in-years/article_8aa4a232-8507-11e6-9590-0b0e028f4dcc.html); Cynthia Williford, "Alabama State Parks Projected to Reach Record Attendance This Year; Chewacla Sees Steady Growth," *Oanow*, September 30, 2016, accessed October 20, 2016, [http://www.oanow.com/news/auburn/alabama-state-parks-projected-to-reach-record-attendance-this-year/article\\_d8be5574-86ad-11e6-9e23-2fef7738e803.html](http://www.oanow.com/news/auburn/alabama-state-parks-projected-to-reach-record-attendance-this-year/article_d8be5574-86ad-11e6-9e23-2fef7738e803.html).

people spend time and money visiting conservation lands in Alabama, the economic benefits from those lands continue to increase.

### Jobs and local economies

Tourism spending in Alabama supported 176,000 jobs in 2015. This represents a 5 percent increase from 2014 and 9 percent of all nonagriculture employment in the state. The majority of direct travel-related employment (73 percent) is supported by lodging facilities and eating and drinking establishments. The state's General Fund received \$46.8 million from lodgings taxes in 2015, and the total state and local tax revenues generated by travel and tourism activities represented \$424 in savings per household on municipal services.<sup>39</sup> Meanwhile, outdoor recreation generates \$7.5 billion in consumer spending and \$494 million in state and local revenues each year.<sup>40</sup> This spending directly supports 86,000 Alabama Jobs associated with \$2 billion in wages in salaries.<sup>41</sup>



NATIONAL PARK SERVICE

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39 Alabama Tourism Department, *Travel Economic Impact 2015*.

40 This includes the spending of residents, 57 percent of whom participate in outdoor recreation. Source: Outdoor Industry Association, *Alabama: The Outdoor Recreation Economy*.

41 Outdoor recreation includes both Alabama residents and tourists from outside the state. Source: Outdoor Industry Association, *Alabama: The Outdoor Recreation Economy*.

## Forever Wild acquisitions bring tourism and recreation to Coldwater Mountain in Calhoun County

BY THE NATURE CONSERVANCY

The Doug Ghee Nature Preserve and Recreation Area comprises four Forever Wild acquisitions on Coldwater Mountain. Dedicated in recognition of a former Alabama legislator and Forever Wild board member, the 4,180 acres of mountainous pine-hardwood in Calhoun County exemplifies the type of balanced land use made possible by Forever Wild acquisitions, where conservation, recreation, and economic development objectives are all supported.

The tracts protect a large part of the Coldwater Spring watershed, an extremely high quality source of drinking water for 16,500 households in the cities of Anniston and Oxford in Calhoun County.<sup>42</sup> Meanwhile, visitors to Coldwater Mountain can bike down its trails, hike its beautiful forests, and spy the area's abundant wildlife. Its location at the halfway point between Birmingham and Atlanta, Georgia, attracts riders from the entire region and across the country. Coldwater Mountain has a total of 25.5 miles of bike trails ranging from beginner level to expert. In the short time since these trails opened in 2012, this "mountain bike mecca"<sup>43</sup> has received national accolades for the quality of its trail system. In 2013, for example, the International Mountain Biking Association designated the Forever Wild's Coldwater Mountain tract near Anniston a Bronze-Level Ride Center, one of only 37 such centers in the world.<sup>44</sup>

Coldwater Mountain is also home to the Coldwater Mountain Fat Tire Festival, a three-day, family-friendly event that drew nearly 200 cyclists in 2016,<sup>45</sup> as well as visitors from across the region. Participants can enjoy a nighttime trail ride, movies under the stars, individual and group rides for all levels, cycling games, contests, and live music.

Forever Wild acquisitions in Coldwater Mountain are not just preserving lands locally; they fit into, and leverage, a larger landscape that balances conservation alongside economic development. In addition to the habitat it protects, Coldwater Mountain is located very close to the terminus of the Chief Ladiga and Silver Comet Trails. Former rail lines, they cover more than 95 miles between Alabama and Georgia and form the longest paved trail in the United States. Work is under way to connect existing trails to Anniston Amtrak, opening up the area to recreationalists from cities such as Atlanta and other stops along the Amtrak line. Conscientious landscape-scale planning like this is allowing the Forever Wild acquisitions to leverage existing work, provide synergistic gains, and increase the effectiveness of new conservation sites.

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42 Seth Boster, "Local Officials Feel Fortunate for Drinking Water Sources," *Anniston Star*, February 9, 2016.

43 Kenny Johnson, *Forever Wild Spotlight: Coldwater Mountain Doug Ghee Nature Preserve and Recreation Area*, Alabama Department of Conservation and Natural Resources, July 2013.

44 "Coldwater Mountain (AL) Bronze-Level," International Mountain Bicycling Association, accessed November 11, 2016, <https://www.imba.com/ride-centers/current/coldwater-mountain>.

45 Faith Dorn, "Faces of Fat Tire," *Anniston Star*, October 23, 2016, accessed November 11, 2016, [http://www.annistonstar.com/features/faces-of-fat-tire/collection\\_166f3eb2-9700-11e6-b062-274e5a6d9309.html#1](http://www.annistonstar.com/features/faces-of-fat-tire/collection_166f3eb2-9700-11e6-b062-274e5a6d9309.html#1).

## Providing opportunities for hunting, fishing, and wildlife watching

The conservation of Alabama's special lands and waters supports hunting, fishing, and wildlife watching. These activities are important to Alabama residents and to the economy. The most recent national survey of hunters, anglers, and wildlife watchers, conducted by the U.S. Department of the Interior, found that in 2011, 1.7 million residents and nonresidents fished, hunted, or wildlife-watched in Alabama and spent over \$2.1 billion on trips and equipment.<sup>46</sup>

### Hunting

Alabama ranks seventh in the country in the number of resident hunters, of whom there were 492,000 in 2011.<sup>47</sup> Hunting by Alabama residents and nonresidents generates a substantial economic impact. For example, resident and nonresident hunters in Alabama spent \$913 million in 2011.<sup>48</sup> All hunting activities in Alabama support 27,300 jobs, produce \$613 million in wages, and generate \$104 million in state and local taxes.<sup>49</sup> Conservation lands play an important role in supporting this industry by providing areas for hunting to take place. For instance, a 2016 survey of 12,800 Alabama hunters found that 13 percent of hunters in Alabama primarily hunt on public land.<sup>50</sup>



ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

### Fishing

Conserved lands and open space help improve and protect water sources, which are important to Alabama's robust recreational and commercial fishing industries. With more than 77,000 miles of rivers

46 A portion of these 1.7 million residents and nonresidents 16 years old and older participated in more than one wildlife-related activity. Source: U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Alabama*.

47 Tom Allen, Rob Southwick, and Doug Howlett, *Hunting in America: An Economic Force for Conservation*, Fernandina Beach, FL: Southwick Associates, 2013.

48 U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Alabama*.

49 Allen, Southwick, and Howlett, *Hunting in America: An Economic Force for Conservation*.

50 "January 2016 Hunter Survey Results," Alabama Department of Conservation and Natural Resources, accessed October 14, 2016, <http://www.outdooralabama.com/january-2016-hunter-survey-results>.

and streams and 41 public lakes and reservoirs,<sup>51</sup> along with one of the largest artificial reef programs in the nation,<sup>52</sup> Alabama has some of the most varied fishing habitat in the United States and is the most diverse state in terms of freshwater species and fish.<sup>53</sup> This habitat was bolstered in 2016, when Alabama’s state waters were extended by six miles from three to nine miles offshore.<sup>54</sup> Recreational fishing attracts residents and non-residents alike. In 2011, 638,000 anglers – 210,000 of whom were nonresidents (30.7 percent) – spent \$456 million while fishing Alabama’s waters.<sup>55</sup>

### Wildlife watching

Alabama’s diverse and varied conservation lands enhance biodiversity and provide abundant opportunities for wildlife watching. Alabama is consistently among the top five states in the United States noted for biodiversity.<sup>56</sup> This diversity leads to economic benefits. In 2011, 1.1 million residents and nonresidents participated in wildlife-watching activities and spent \$734 million on trip and equipment-related expenditures in Alabama to do so. Interestingly, 96 percent of Alabama residents who participated in wildlife watching did so close to home.<sup>57</sup> This suggests that not only are the “marquee” lands, rivers, and streams being visited, but that lands close to home also provide value.



BETH MAYNOR YOUNG

- 51 Alabama Department of Public Health, Alabama Department of Environmental Management, Alabama Department of Conservation and Natural Resources, *Alabama Fish Consumption Advisories 2015*, Montgomery, AL: Alabama Department of Public Health, 2015.
- 52 “Alabama’s Rigs to Reefs Program Off to Great Start,” Alabama Department of Conservation and Natural Resources, November 18, 2015, accessed October 14, 2016, <http://www.outdooralabama.com/alabamas-rigs-reefs-program-great-start>.
- 53 “Aquatic Biodiversity Center,” Alabama Department of Conservation and Natural Resources, accessed November 3, 2016, <http://www.outdooralabama.com/aquatic-biodiversity-center>.
- 54 “Alabama State Waters Extended to 9 Miles for Reef Fish Management,” Alabama Department of Conservation and Natural Resources, January 5, 2016, accessed October 14, 2016, <http://www.outdooralabama.com/alabama-state-waters-extended-9-miles-reef-fish-management>.
- 55 U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Alabama*.
- 56 “Watchable Wildlife,” Alabama Department of Conservation and Natural Resources, August 24, 2014, accessed October 14, 2016, <http://www.outdooralabama.com/watchable-wildlife>.
- 57 U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, *2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Alabama*.

## State conservation leads to the national spotlight for sporting dog events

BY THE NATURE CONSERVANCY

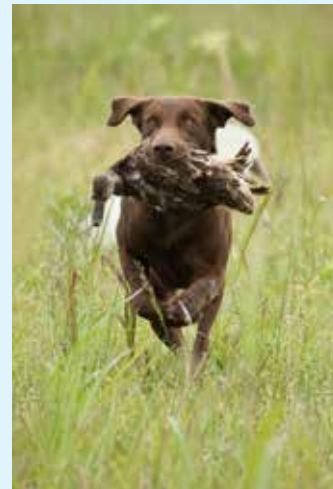
**M. Barnett Lawley Forever Wild Field Trial Area** in Hale County encompasses 3,340 acres of stunning Black Belt prairie grassland and pine-hardwood forest. Catalyzed by Forever Wild and enabled by a combination of state and local partnerships in conjunction with Alabama's avid hunting community, the tract has been transformed into a national stage for sporting dog competitions.

The transformation began in 2012, when, against a national pool of candidate sites, M. Barnett Lawley Forever Wild Field Trial Area was selected as the host for the American Kennel Association (AKA)'s Master National Retriever Club competition. The tract's rolling landscape and large area made it an ideal location for marquee sporting dog events. The 2012 competition was the largest AKA event at the time, with 712 dogs entered into the competition. This led to an estimated impact in the area of 3,000-5,000 motel night stays and a total economic impact of \$6 million in spending in the region.<sup>58</sup>

The 2012 Master Nation was just the beginning of the area's current renown for hosting sporting dog competitions, which now hosts upward of twenty local, regional, national, and even international events each year during the sporting dog season from October to April.<sup>59</sup>

Like many Forever Wild acquisitions, the success of these conservation lands is the result of partnering to make these lands reach their full potential. As Read Holland of the Black Warrior Retriever Club told Outdoor Alabama in regard to being selected to host the 2012 showcase, "I think the tipping point was the support the state provided to host the Master National here... The letter from Commissioner Lawley made quite an impact. The club couldn't have done it without the partnership with Forever Wild. In my view, they have done an outstanding job of getting the grounds ready for a Master National."<sup>60</sup>

M. Barnett Lawley Forever Wild Field Trial Area is more than just a boon to the local economy because of its ability to attract sporting dog participants and spectators. From spring through fall, there are innumerable opportunities for participants in Alabama's renowned birding trails. A jewel in the Forever Wild program, this area preserves an invaluable patch of prairie grassland in the State Cattle Ranch tract, providing nesting habitat for such notable species as dickcissels, loggerhead shrikes, American kestrels, grasshopper and lark sparrows, bobwhites, wild turkeys, and barn owls. The area is also open for fishing to families and small groups, with three catfish and three bass and bream ponds on-site. With these diverse benefits and partnerships, M. Barnett Lawley Forever Wild Field Trial Area is another example of how Forever Wild is creating thriving landscapes for Alabama's present and future generations.



ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

58 David Rainer, "Master National Showcases Lawley Field Trial Area," Alabama Department of Conservation and Natural Resources, accessed November 11, 2016, <http://www.outdooralabama.com/master-national-showcases-lawley-field-trial-area>.

59 "Sporting Dog Event Schedule," Forever Wild Land Trust, accessed November 11, 2016, <http://www.alabamaforeverwild.com/sporting-dog-event-schedule>.

60 David Rainer, "Retrievers Offer Preview of Master National," Alabama Department of Conservation and Natural Resources, May 3, 2012, accessed November 11, 2016, <http://www.outdooralabama.com/retrievers-offer-preview-master-national>.

## Forever Wild was the linchpin by which to protect one of the most geographically and biologically diverse watersheds in the country

BY THE NATURE CONSERVANCY

The 25,200 acres of Forever Wild's eight acquisitions in the Paint Rock River Valley of Northeast Alabama were originally part of a 60,000-acre property owned by Texas oil magnate Harry Lee Carter. With 200-foot sheer rock walls, the highest concentration of cave ecosystems, and the highest diversity of subterranean invertebrates in the world, this region contains incredible geological and natural splendors.

These resources provide many recreation opportunities, and the area is a cornerstone of the Alabama Birding Trails. A mosaic of habitats provides for spectacular diversity of bird species, enabling visitors to spy the plumage of the yellow-breasted chats and hear the call of the male ruffed grouse. Alabama's birding economy is not nearly as slight as many of the species its followers track. A 2013 national survey of fishing, hunting, and wildlife-related recreation recorded 607,000 birders in Alabama in 2011. They all spent money on food, lodging, equipment, and transportation in pursuit of birding adventures.<sup>61</sup>

Camping, hunting, and horseback riding are also popular in the valley, which is located less than forty miles from Huntsville, Alabama, the state's fourth-largest city. Proximity to an urban center means the area also helps secure clean water for residents and many local, unique species. Steve Northcutt, director of protection for The Nature Conservancy in Alabama, notes, "The acquisition of the Walls of Jericho and Skyline WMA go far beyond the grand vistas and outdoor recreation activities. It helps to protect our most precious resource—clean water—which supports an extremely diverse array of aquatic life, including approximately 100 species of fish and 45 species of mussels, some found in no other place on Earth."

Over the last several decades, many tracts in this area began to change hands; historically open lands were closed to the public, and others were threatened with further fragmentation. The economic and environmental benefits of having a vast, interconnected network of natural corridors were in jeopardy. At this point of uncertainty, Forever Wild became the tool by which to attract and leverage diverse investments in the watershed. Forever Wild catalyzed these acquisitions through partnerships with the Alabama Department of Conservation and Natural Resources, The Nature Conservancy in Alabama, Alabama Forestry Commission, Alabama Forest Resources Center, and the Open Space Institute. Other critical tracts were acquired with funds provided by the U.S. Forest Service's Forest Legacy grant program. The total result was that the conservation community was able to protect a broader mosaic of mountains, woods, springs, caves, rocky bluffs, grass coves, intermittent wetlands, and riparian forests that greet visitors to the Walls of Jericho today.

The partnering leveraged by Forever Wild has been critical to make this happen. J.P. Parsons, vice president of tourism and destination marketing for the Jackson County Chamber of Commerce, says, "Ever since the Walls of Jericho opened to the public in 2004, outdoor enthusiasts and youth groups have been the boost we were looking for from a tourism and economic perspective. We are so thankful that there are partners like The Nature Conservancy and Forever Wild that will protect this legacy for generations yet to come."

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61 U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, *Birding in the United States: A Demographic and Economic Analysis*.



## Forestry, commercial fishing, and agriculture

Land conservation supports forestry, commercial fishing, and agriculture in Alabama by helping to maintain the intact working landscapes on which these industries depend. A 2013 study by Auburn University found that forestry, agriculture, and related industries in Alabama supported 580,000 jobs<sup>62</sup> and contributed \$70.4 billion to Alabama's total economic output, representing 22 percent of Alabama's workforce and 40 percent of its GDP.<sup>63</sup>

### Forestry

Alabama is a major producer of both softwood and hardwood timber and has the third most timberland in the continental United States behind Oregon and Georgia.<sup>64</sup> Each year, 30.6 million tons of softwood and 10.6 million tons of hardwood are harvested in Alabama.<sup>65</sup> Approximately 70 percent of the state, or thirty million acres, is timberland, and 94 percent of this timberland is privately held while 6 percent is publicly owned.<sup>66</sup> Timber production and processing contributes \$21 billion annually to the state's economy, employing an estimated 122,000 people across the state.<sup>67</sup>

### Commercial fishing

Alabama's commercial fishing industry, meanwhile, saw 26.6 million pounds of seafood landed in 2015, at a value of over \$50.9 million. This includes \$27.7 million in brown shrimp, \$12.9 million in white shrimp, \$2.76 million in pink shrimp, \$1.44 million in red snapper, and \$1.23 million in blue crab. Landings of royal red shrimp, striped mullet, Spanish mackerel, and unclassified general finfishes were also over \$500,000 each.<sup>68</sup>

### Agriculture

Although agricultural lands have not been a primary focus of Forever Wild, the program does support the tapestry of conservation across the state and therefore is related to the industry. There are approximately 42,700 farms in Alabama encompassing over 8.80 million acres.<sup>69</sup> In 2012, these farms generated agricultural sales totaling over \$5.57 billion.<sup>70</sup> From floriculture in coastal Mobile County<sup>71</sup> to poultry and egg production in northern DeKalb County,<sup>72</sup> to peanut production in eastern Houston County,<sup>73</sup> agriculture is an important part of Alabama's statewide economy. In Alabama, 91.2 percent of farms are owned by families or individuals.<sup>74</sup> However, the total number of farms in the state is decreasing at a greater rate than it is nationally; the same is true for the total acreage being farmed.<sup>75</sup>

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62 This number represents the employment impact, including direct, indirect, and induced effects. Source: Department of Agricultural Economics and Rural Sociology, Auburn University et al., *Economic Impacts of Alabama's Agricultural, Forestry, and Related Industries, Alabama Cooperative Extension System*.

63 Ibid.

64 "Alabama Forest Facts," Alabama Forestry Commission, accessed October 14, 2016, [http://www.forestry.state.al.us/forest\\_facts.aspx](http://www.forestry.state.al.us/forest_facts.aspx).

65 Alabama Forestry Commission, *Forest Resource Report 2015*, Montgomery, AL, 2016.

66 "Alabama Timberland," Auburn University, accessed October 14, 2016, <http://aers.auburn.edu/conner-bailey/alabama-timberland/>.

67 Auburn University et al., *Economic Impacts of Alabama's Agricultural, Forestry, and Related Industries*.

68 National Marine Fisheries Service, *Annual Landings by Species for Alabama as of 04-NOV-16*, accessed November 4, 2016, <https://www.st.nmfs.noaa.gov/commercial-fisheries/commercial-landings/annual-landings-with-group-subtotals/index>, 2015.

69 "2015 State Agriculture Overview—Alabama," U.S. Department of Agriculture, National Agriculture Statistics Service, accessed October 20, 2016, [https://www.nass.usda.gov/Quick\\_Stats/Ag\\_Overview/stateOverview.php?state=ALABAMA](https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=ALABAMA).

70 National Agriculture Statistics Service, *2012 Census of Agriculture*, accessed October 17, 2016, [https://www.agcensus.usda.gov/Publications/2012/Full\\_Report/Volume\\_1,\\_Chapter\\_1\\_State\\_Level/Alabama/](https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Alabama/).

71 Alabama Cooperative Extension System, *Mobile County Agriculture, Forestry and Related Industries*.

72 Alabama Cooperative Extension System, *DeKalb County Agriculture, Forestry and Related Industries*.

73 Alabama Cooperative Extension System, *Houston County Agriculture, Forestry and Related Industries*.

74 U.S. Department of Agriculture, National Agriculture Statistics Service, *2012 Census of Agriculture*.

75 Between the 2007 and 2012 U.S. Department of Agricultural Censuses, the number of farms in Alabama decreased by 11 percent, from 48,800 to 43,200, while nationally, the rate of decrease was 4 percent. Sources: United States Department of Agriculture, National Agriculture Statistics Service, *2012 Census of Agriculture*; Challen Stephens, "Number of Farms Dropping Across Alabama," AL.com, March 19, 2014, accessed October 17, 2016, [http://blog.al.com/wire/2014/03/number\\_of\\_farms\\_dropping\\_across.html](http://blog.al.com/wire/2014/03/number_of_farms_dropping_across.html).

## Forever Wild funding catalyzes support for vast delta of global importance

BY THE NATURE CONSERVANCY

The Mobile-Tensaw Delta is the second-largest river delta in the United States. It encompasses 260,000 acres—more than twice the area of the city of Mobile. With innumerable boat launches, vast hunting grounds and fishing holes, and more than fifty endangered species, the delta is a place bursting with both biodiversity and recreational opportunities. There are 13 Forever Wild acquisitions in the delta consisting of more than 48,000 acres in Baldwin and Mobile Counties. A vast, diverse, and enchanting landscape, the delta and surrounding area were described by Pulitzer Prize-winning scientist and Alabama native E. O. Wilson as having “more species of plants and animals than any comparable area anywhere in North America ... it is a place yet completely unexplored, sort of like the upper Amazon.”<sup>76</sup>

Not just a sanctuary for plants and wildlife, these Forever Wild lands offer a wide array of recreational activities for individuals and families to explore this “upper Amazon.” The Upper Delta, Mobile-Tensaw Delta, and W. L. Holland Wildlife Management Areas provide Alabamians and tourists opportunities for hunting, fishing, canoeing, camping, and wildlife watching. The Bartram Canoe Trail can be found in the waterways in the upper reaches of the delta where paddlers can explore 200 miles of trails, and use four floating platform campsites. With forty species of mammals from black bears to wild pigs, 69 species of reptiles, including the largest alligator ever caught in the United States, and more than 300 species of birds, the delta provides innumerable wildlife-watching opportunities.<sup>77</sup>

As important as the Mobile-Tensaw Delta is for Alabamians, tourists and biodiversity, against a backdrop of many other state needs, coordinating the resources needed to preserve and enhance this vast river almost did not happen. Investments by Forever Wild have played a crucial role in catalyzing a variety of funding sources to create impacts far above its initial funding. To make these conservation acquisitions possible, Forever Wild has leveraged private donations from landowners and conservation organizations, support through local and county investments, and additional funding from the Alabama Department of Conservation and Natural Resources and federal agency programs such as the U.S. Fish and Wildlife Service’s Coastal Impact Assistance Program.

Of the 260,000 acres of the delta, a total of 100,000 are publicly owned or managed, approximately half of which is protected through Forever Wild. Preserving key habitats and recreation sites in the wider context of the delta has allowed Forever Wild acquisitions to create an impact not only greater than its direct spending, but also over an area greater than what is strictly protected through the fund.

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76 Ben Raines, “Where the Rivers Meet the Sea, the Mobile-Tensaw Delta, Is Important On a Global Scale,” AL.com, November 30, 2014, accessed November 11, 2016, [http://www.al.com/news/index.ssf/2014/11/americas\\_amazon\\_where\\_the\\_rive.html](http://www.al.com/news/index.ssf/2014/11/americas_amazon_where_the_rive.html).

77 “Discover the Mobile Tensaw-Delta with: WildNative Delta Safaris,” WildNative Tours, accessed November 11, 2016, <http://wildnativetours.com/delta-safaris/>; Raines, “Where the rivers meet the sea, the Mobile-Tensaw Delta, is important on a global scale.”

# Human health benefits

In addition to protecting clean air, clean drinking water, and local food sources, land conservation promotes a physically active lifestyle and helps individuals maintain mental health.<sup>78</sup> Studies have linked access to parks and open space to increased physical activity and better health,<sup>79</sup> which translates into fewer missed days of work, higher productivity at work, and fewer visits to the doctor. The Trust for America's Health reports 27.6 percent of Alabama adults were physically inactive in 2014.<sup>80</sup>

In addition, 62.7 percent of adult females and 71.3 percent of adult males in the state were overweight or obese in 2014.<sup>81</sup> Access to places for physical activity along with informational outreach has been shown to produce a 48 percent increase in the frequency of physical activity.<sup>82</sup> Availability of parks and proximity to them increase the physical activity of children. Researchers have found that as the percentage of park area within a child's neighborhood increases, so does a child's level of physical activity.<sup>83</sup> While the health benefits are impressive on their own merit, they also translate into improved economic health. The costs of obesity are substantial and include direct medical expenses and the reduced productivity of obese workers. Studies have shown that the very obese lose one month of productive work per year without considering the extra sick days taken. This costs employers an average of \$3,790 per very obese male worker and \$3,040 per very obese female worker each year.<sup>84</sup> Higher rates of obesity also mean higher medical costs. On average, obese people have medical costs \$1,430 higher than those of normal weight.<sup>85</sup> Health care spending related to obesity in Alabama is predicted to reach between \$3.68 billion and \$7.50 billion by 2018.<sup>86</sup>



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# Economic development

## Quality of life

Quality of life plays a critical role in Alabama's economic development because the most sought-after employees in today's economy consider more than salary when choosing places of employment. For example, focus groups conducted by Carnegie Mellon University found that young creative workers, particularly those in high-technology fields, consider lifestyle factors, such as environmental and recreational quality, more heavily than the job itself when choosing where to live.<sup>87</sup>

Alabama's Governor Robert Bentley recently touted his administration's accomplishments within the Department of Conservation and Natural Resources, including projects that enhance the state's quality of life and boost tourism. Specifically mentioned was a project to develop mountain-biking trails within a system that provides significant economic impact for the community, as well as a partnership with the Department of Tourism that created a statewide system of birding trails that will enhance tourism in the state.<sup>88</sup> The governor also recently recognized the importance of land conservation and trails in the state, announcing \$1.6 million in grant funding for trails. In the press release he noted that "Alabama is truly an outdoor paradise and trails are a wonderful way to experience the wonders of our state."<sup>89</sup>

In addition, businesses are drawn to these places to recruit the best workers. In its marketing material, the Economic Development Partnership of Alabama touts Alabama's state parks, wildlife management areas, and beaches, as essential outdoor recreation-, hunting-, and fishing-related resources that enhance the state's quality of life.<sup>90</sup>

Parks, trails, and open spaces can enhance a community's quality of life. Places with beautiful scenery, clean air and water, and diverse opportunities for outdoor recreation attract skilled workers and businesses to Alabama.

## Fiscal health

Land conservation saves Alabama communities money through avoided costs on expensive infrastructure and other municipal services required by residential property owners, such as schools, police, and fire protection. A nationwide study sampling counties across the country found that at the median, residential lands require \$1.16 in services for every \$1.00 paid in local taxes. At the same time, working and open lands require only \$0.35 in services for every dollar contributed in property taxes.<sup>91</sup> In other words, while open and working lands may generate less direct tax revenue than residential, commercial, or industrial properties, they require little public infrastructure and few services. In fact, as opposed to residential lands, they generate more tax revenue than they require back in community services.

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# Conclusion

Alabama's investments in land conservation are critical to creating and protecting the places and amenities that make the state a great place to live and work. Land and water conservation contributes to a high quality of life while also stimulating economic activity across the state. This study found that every \$1 invested in land conservation by Alabama returns \$5 in economic value of natural goods and services.

In addition, because the state is able to leverage additional funds from many diverse sources, every dollar invested is maximized in terms of the economic benefits it generates for the people, communities, and businesses of Alabama.

Furthermore, conservation lands contribute to the economic well-being of the state by attracting visitors who spend money in local communities. Protected lands also bolster the state's outdoor recreation economy, as well as forestry, commercial fishing, and agriculture. These industries generate billions of dollars in output and support tens of thousands of jobs.

Finally, land conservation enhances Alabama's economic development opportunities by making the area a more desirable place to live, work, and play. Conservation lands also help communities maintain their fiscal health, and by providing a place for physical activity, these lands lead to major savings in health care costs.



ROGER MANGHAM / THE NATURE CONSERVANCY

# About The Trust for Public Land

The Trust for Public Land has extensive experience in determining the return on state investment in land conservation. Its Conservation Economics team has published return-on-investment analyses in states across the country, including Georgia, North Carolina, Virginia, Colorado, Illinois, Maine, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, and Wyoming. The Trust for Public Land has worked with leading academic partners to advance this research, including Georgia Institute of Technology, University of Georgia, Colorado State University, Dartmouth College, Plymouth State University, University of Minnesota, and University of Wyoming–Ruckleshaus Institute of Environment and Natural Resources.



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# Appendix: Methodology

The natural goods and services provided by the distinct ecosystem types found within Alabama’s conserved lands, and their monetary values, were determined using the benefits transfer methodology. That is, The Trust for Public Land conducted a thorough literature review of the types of goods and services provided by the 15 ecosystem types identified in conserved lands using recent, relevant, and scientifically sound sources. The Trust for Public Land then used the economic values of the different ecosystem types identified in that literature to estimate a per-acre economic value of the goods and services provided.

Benefits transfer methodology has become a common approach in environmental economics because it is a practical alternative to time-intensive and data-intensive original research.<sup>1</sup> This methodology is not without its limitations, though, which can include the levels of uncertainty that may come from utilizing data collected in one region to describe another. In addition, there may be other, more specific land types (such as urban wetlands) that are not available in existing data sets for Alabama.<sup>2</sup> However, until more time- and resource-intensive, wide-scale primary data collection can take place, benefits transfer provides a conservative estimate of the value of natural goods and services.

The Trust for Public Land followed the steps below in conducting the benefits transfer:<sup>3</sup>

- STEP 1.** Define the policy context. This definition should include various characteristics of the program site, what information is needed, and in what units.
- STEP 2.** Locate and gather original research outcomes. Conduct a thorough literature review, and obtain copies of potentially relevant studies.
- STEP 3.** Screen the original research studies for relevance. How well does the original research context correspond to the policy context? What is the quality of the original research?
- STEP 4.** Select a point estimate or average of a range of point estimates. Convert each to dollars per acre.
- STEP 5.** Transfer the point estimate or average value estimate. Aggregate the point estimate or average value estimate by multiplying it by the total number of acres, providing a total value for the good or service at the program site.

The Trust for Public Land considered a broad set of natural goods and services based on the availability of high-quality sources, but did not examine each and every natural good and service.

An analysis of additional natural goods and services would reveal further benefits and therefore is likely to underestimate the “true” economic value and return on investment examined in this study. For example, as shown in Table A, forests provide air quality improvements, carbon sequestration, and carbon storage benefits. Alabama’s forests also provide other services, such as wildlife habitat-related benefits; however, the per-acre value of these benefits have not been measured in the literature. As such, they are not included in the analysis, and the value of each land cover type underestimates the true value of these goods and services.

Based on existing research, The Trust for Public Land determined the natural goods and services provided and estimated their values for each land cover type, as shown in Table A.

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1 Robert J. Johnston and Randall S. Rosenberger, “Methods, Trends and Controversies in Contemporary Benefit Transfer,” *Journal of Economic Surveys* 24, no. 3 (2010): 479-510.  
2 If more detailed data were available, it can be assumed that the analysis would result in a more specific estimate.  
3 Randall S. Rosenberger and John B. Loomis, “Benefit Transfer” in *A Primer on Nonmarket Valuation*, ed. Patricia Champ, Kevin Boyle, and Thomas Brown (Norwell, MA: Kluwer Academic Publishers, 2003), 445-482.

**TABLE A. ESTIMATED ANNUAL PER-ACRE VALUE OF NATURAL GOODS AND SERVICES  
BY LAND COVER TYPE**

LAND COVER TYPE*	NATURAL GOODS AND SERVICES	ANNUAL VALUE PER ACRE (2016\$)
Deciduous Forest	Air pollution removal, carbon sequestration, carbon storage	\$317
Woody Wetland	Wildlife habitat	\$564
Evergreen Forest	Air pollution removal, carbon sequestration, carbon storage	\$316
Shrub/Scrub	Habitat/biodiversity, carbon sequestration	\$16
Mixed Forest	Air pollution removal, carbon sequestration, carbon storage	\$317
Grassland/Herbaceous	Carbon sequestration, habitat/biodiversity, and pollination services	\$120
Emergent Herbaceous Wetland	Wildlife habitat	\$564
Pasture/Hay	Carbon sequestration, habitat/biodiversity, livestock/livestock products, and pollination services	\$142
Developed Open Space/Parks	Air pollution removal, carbon sequestration	\$295
Open Water	Freshwater regulation and supply, wildlife habitat	\$105
Cultivated Crops	Food production	\$55
Developed**	No natural goods and services provided	N/A
Barren Land	No natural goods and services provided	N/A

\*In order from the most commonly conserved to the least commonly conserved.  
 \*\*Combines low-, medium-, and high-intensity cover types. This includes areas with a mixture of constructed materials and vegetation with impervious surface accounting for between 20 percent and 100 percent of the total land cover.

## Natural goods and services included in annual value per-acre calculation

### FORESTS (DECIDUOUS, EVERGREEN, AND MIXED)

The Trust for Public Land analyzed three natural services provided by Alabama forests: air pollution removal, carbon sequestration, and carbon storage. The annual per-acre value of these services is \$317 for deciduous forest, \$316 for evergreen forest, and \$317 for mixed forest.

Forests provide clean air by removing harmful air pollutants. The Trust for Public Land considered the removal value of four major air pollutants: ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub>), and sulfur dioxide (SO<sub>2</sub>). The volume of pollutants removed from the air on an annual per-acre basis was derived from a U.S. Forest Service analysis of community forests in Alabama.<sup>4</sup> Pollution-removal dollar values on a per-volume basis were obtained for each of the air pollutants from the U.S. Forest Service’s iTree Vue model. The model estimates the value of these changes for each pollutant based on values established by i-Tree researchers, primarily on savings in health care costs. These values were derived from the Environmental Protection Agency’s environmental Benefits Mapping and Analysis Program (BenMap) as well as other externality values used in energy decision making developed by a well-cited study.<sup>5</sup>

4 David J. Nowak and Eric J. Greenfield, *Urban and Community Forests of the South Central East Region: Alabama, Kentucky, Mississippi, Tennessee*, Syracuse, NY: U.S. Department of Agriculture Forest Service, Northern Research Station, General Technical Report NRS-58, 2010.

5 U.S. Department of Agriculture, Forest Service, *i-Tree Vue User’s Manual*, v. 5.0, accessed October 20, 2016, [https://www.itreetools.org/resources/manuals/Vue\\_Manual\\_v5.pdf](https://www.itreetools.org/resources/manuals/Vue_Manual_v5.pdf).

Forests remove carbon from the atmosphere, referred to as carbon sequestration. Carbon sequestration rates for deciduous and evergreen forests in the state were obtained from published research on how to calculate carbon in forests.<sup>6</sup> The Trust for Public Land utilized regional estimates of average carbon stocks for the three most predominant forest types<sup>7</sup> in the South Central Region at time of clear-cut and at the maximum length of tree life.<sup>8</sup> The amount of carbon sequestered per acre per year was calculated by subtracting the average carbon density at the time of clear-cut from the average carbon density at the maximum length of tree life for each forest type, and dividing by the maximum length tree life. The social cost of carbon was used as the dollar value of carbon to calculate an annual per-acre value for carbon sequestration by forests in the state.<sup>9</sup>

The Trust for Public Land also utilized this report to estimate the value of carbon storage by forests, including carbon stored in live trees, standing dead trees, the understory, downed dead wood, and the forest floor. Carbon stored in the soil was not included.<sup>10</sup> The value of carbon storage per acre was based on the regional estimates of forestlands immediately after clear-cut harvest for the same forest types as used for the carbon sequestration benefit.<sup>11</sup>

#### WETLANDS

The Trust for Public Land estimates the value of woody and emergent herbaceous wetlands in Alabama to be \$564 per acre per year for wildlife habitat. This value is based on a published meta-analysis that predicted wetland service values per acre across the country.<sup>12</sup>

#### PASTURE

The Trust for Public Land estimates the annual value of carbon sequestration, wildlife habitat, pollination services, and the production of livestock goods to be \$142 per acre of pasture. The value of carbon sequestration was calculated using the social cost of carbon and the minimum grassland carbon sequestration volume per acre from a national study of carbon sequestration.<sup>13</sup>

The Natural Resources Conservation Service (NRCS)'s former Grassland Reserve Program (GRP) provides a proxy measure of the value of pastureland for wildlife habitat. The program provides landowners financial incentives to conserve their land for wildlife habitat. This report used the statewide average of GRP rates to calculate an annual per-acre value.<sup>14</sup>

To estimate the value of livestock production, this analysis used the rental rate paid for pastureland, which is an implicit value for the production of food and goods from livestock. Rent represents the most accurate value of land compared with values associated with production and income, which reflect a variety of other forces and inputs. Annual data on pastureland rent (per acre) were obtained from United States Department of Agriculture's National Agricultural Statistics Service (NASS).<sup>15</sup>

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6 James E. Smith et al., *Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States*, U.S. Department of Agriculture, Northeastern Research Station, General Technical Report NE-343.

7 Loblolly-shortleaf pine makes up 38.5 percent of Alabama's forests, while oak-hickory and oak-pine make up 30.7 and 12.9 percent, respectively. Source: U.S. Department of Agriculture, *Forests of Alabama*, 2014.

8 The oak-hickory forest type was used to estimate the carbon value of deciduous forests, while the average of the loblolly-shortleaf pine was used for evergreen forests and oak-pine was used for mixed forests.

9 "The Social Cost of Carbon," U.S. Environmental Protection Agency, accessed February 28, 2014, <http://www.epa.gov/climate-change/EPAactivities/economics/scc.html>.

10 Smith et al., *Methods for Calculating Forest Ecosystem and Harvested Carbon with Standard Estimates for Forest Types of the United States*.

11 Ibid.

12 Richard T. Woodward and Yong-Suhk Wui, "The Economic Value of Wetland Services: A Meta-Analysis," *Ecological Economics* 37 (2001): 257-270.

13 Stephen Earsom et al., *Carbon Sequestration Pilot Program: Estimated Land Available for Carbon Sequestration in the National Highway System*, U.S. Department of Transportation, Federal Highway Administration, 2010, accessed June 28, 2016, [https://www.researchgate.net/publication/273138611\\_Carbon\\_Sequestration\\_Pilot\\_Program\\_Estimated\\_Land\\_Available\\_for\\_Carbon\\_Sequestration\\_in\\_the\\_National\\_Highway\\_System](https://www.researchgate.net/publication/273138611_Carbon_Sequestration_Pilot_Program_Estimated_Land_Available_for_Carbon_Sequestration_in_the_National_Highway_System).

14 U.S. Department of Agriculture, *Rental Rates for GRP*.

15 U.S. Department of Agriculture, National Agricultural Statistics Service, *Alabama County Estimates: Cash Rents - Pasture 2014 and 2016*, September 2016, accessed October 10, 2016.

The per-acre value of pollination services was calculated based on five of Alabama's top farm commodities, including soybeans, cotton lint, peanuts, hay, cottonseed, and peaches, which also were included in a recent study on crop dependence on native pollinators.<sup>16</sup> The Trust for Public Land used this information to determine each crop's dependence on native bees and then calculate the average annual crop production that is dependent on native bees.

#### SHRUB/SCRUB

The annual value of shrub/scrubland is estimated to be \$16 per acre for the provision of habitat and carbon sequestration.

NRCS's former Grassland Reserve Program provides a proxy measure of the value of shrub/scrubland for wildlife habitat. The program provides landowners financial incentives to conserve their land for wildlife habitat. The Trust for Public Land used the statewide average of GRP rates to calculate an annual per-acre value. Values for carbon sequestration were averaged from the mixed-forest and grassland land cover types because of the characteristics of shrub/scrub ecosystems in Alabama.<sup>17</sup>

#### CULTIVATED CROPS

Alabama receives \$55 per acre in annual value for each acre of cropland for food production. The rent paid by farm operators for nonirrigated cropland was used as the value of cropland for food production. Rent represents the most accurate value of land compared with values associated with production and income, which reflect a variety of other forces and inputs. Annual per-acre rent data were obtained from NASS.<sup>18</sup>

#### DEVELOPED OPEN SPACE (I.E., PARKS)

Open space near developed areas is typically parkland or characteristically similar to parks. The Trust for Public Land analyzed the value of air pollution removal and carbon sequestration provided by parks in Alabama. The annual per-acre value of these services is \$295.

The volume of pollutants removed from the air on an annual per-acre basis was derived from a U.S. Forest Service analysis of urban forests in Alabama.<sup>19</sup> Pollution-removal dollar values on a per-volume basis were obtained for each of the air pollutants from the U.S. Forest Service's iTree Vue model.<sup>20</sup> The per acre value of carbon sequestration for mixed-forest trees, immediately after clear-cut harvest, is transferred to the per acre value of carbon sequestration for parks.

#### GRASSLAND

Grassland provides an annual economic value of \$120 per acre in carbon sequestration, pollination services, and wildlife habitat. Values for carbon sequestration, pollination services, and wildlife habitat were transferred from the pasture calculation because of the similar levels of services provided by both land cover types; however, the value of livestock products was not included.

#### OPEN WATER

The annual value of open (surface) water of \$105 per acre for freshwater regulation and supply and wildlife habitat was obtained from a published study that calculated a region-specific ecosystem service value for a variety of ecosystem types found on U.S. National Wildlife Refuges.<sup>21</sup>

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16 U.S. Department of Agriculture, *Economic Research Service, Farm Income and Wealth Statistics: Cash Receipts by State, Commodity Ranking and Share of U.S. Total*, 2015, accessed October 20, 2016, [http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/cash-receipts-by-state.aspx#Pdd3065c89cc947bdaceeab228bc2c697\\_2\\_16iT0R0x1](http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/cash-receipts-by-state.aspx#Pdd3065c89cc947bdaceeab228bc2c697_2_16iT0R0x1); John E. Losey and Mace Vaughan, "The Economic Value of Ecological Services Provided by Insects," *BioScience* 56, no. 4 (2006): 311-323.

17 U.S. Department of Agriculture, *Rental Rates for GRP*.

18 U.S. Department of Agriculture, National Agricultural Statistics Service, *Alabama County Estimates: Cash Rents—Irrigated and Non-Irrigated Cropland 2014 and 2016*, September 2016.

19 Nowak and Greenfield, *Urban and Community Forests of the South Central East Region: Alabama, Kentucky, Mississippi, Tennessee*.

20 U.S. Department of Agriculture, Forest Service, *i-Tree Vue User's Manual*, v. 5.0.

21 Molly Ingraham and Shonda Gilliland Foster, "The Value of Ecosystem Services Provided by the U.S. National Wildlife Refuge System in the Contiguous U.S.," *Ecological Economics* 67 (2008): 608-618.





The Trust for Public Land  
306 North Monroe Street  
Tallahassee, FL 32301  
850.222.7911

PHOTOS:  
FRONT TOP: ALAN CRESSLER  
FRONT BOTTOM: BETH MAYNOR YOUNG  
BACK: HUNTER NICHOLS

[tpl.org](http://tpl.org)