

AGENDA
Commission for the Environment
May 9, 2016
7:30 p.m.

Orange County Solid Waste Administration Building
1207 Eubanks Road, Chapel Hill

- | <u>Time</u> | <u>Item</u> | <u>Title</u> |
|-------------|-------------|---|
| 7:30 | I. | Call to Order |
| 7:32 | II. | Additions or Changes to Agenda |
| 7:35 | III. | Approval of Minutes – April 11, 2016
The CFE will consider approval of minutes from the last two meetings. (Attachment 1) |
| 7:45 | IV. | Regional Conservation Planning
Shaw will provide an overview of his ongoing work with various land conservation organizations to develop a plan for the protection of key landscape corridors that connect significant natural areas and open space in Orange, Durham, and Chatham counties. (Attachments 2-3) |
| 8:15 | V. | CFE Outreach Opportunities
Staff will review recent CFE outreach efforts (Earth Evening, news articles) and a revised list of outreach opportunities for 2016—each intended to educate/inform the public about issues highlighted in the State of the Environment. CFE members will provide guidance on the use of social media and using summaries of peer-reviewed articles on various topics (Attachments 4-5) |
| 8:45 | VI. | Committee Meetings (optional and as time allows)
The standing committees will review their list of priorities and next steps. (Attachment 6) |
| 9:15 | VII. | Updates and Information Items
Staff and/or CFE members will provide updates on the following items: <ul style="list-style-type: none">➤ Eno River hydrilla pilot study update - year two underway (Attachment 7)➤ Aquatic weed control clarification bill - HB 965 (Attachment 8)➤ Hollow Rock Nature Park opening May 21 (Attachment 9)➤ Clean Power Plan update (Attachment 10)➤ Renewable energy investments in NC for 2015 (Attachment 11)➤ Duke Energy ranks in top 3 for solar connections (Attachment 12)➤ Durham NET Power breaks ground on zero-emissions plant (Attachment 13)➤ Climate change: "the science is there; this is doable" (Attachment 14)➤ Mason Farm wetlands (Attachment 15)➤ State to remove SolarBees from Jordan Lake (Attachment 16)➤ <i>Any other new information from CFE members and staff</i> |
| 9:30 | VIII. | Adjournment

<i>Next meeting:</i> June 11 (Hillsborough) |

CFE Meeting Ground Rules (*Adopted 9/12/11*)

1. Keep to agenda topic under discussion
2. Share relevant information
3. One person speaks at a time after recognition by the Chair
4. Everyone is invited to participate in discussions / no one person should dominate discussions
5. Strive to reach consensus first before voting

Activities the CFE expects to carry out in 2016:

- Continue to update the Orange County State of the Environment 2014 report
- Continue to explore ways to improve the County's ability to foster local sustainable energy production and energy efficiency strategies, including developing incentives for increasing energy efficiency in new construction
- Recommend ways to reduce the County's "carbon footprint" and implement the County's Environmental Responsibility Goal (BOCC Priority #10)
- Continue to help with public outreach and management efforts related to hydrilla in the Eno River
- Help initiate the development of a comprehensive conservation plan for Orange Co
- Co-sponsor the annual DEAPR photography contest (*The Nature of Orange*)
- Help plan for and participate in County's annual Earth Evening event

Concerns or emerging issues the CFE has identified for 2016:

- The CFE will continue to advocate for an expansion of the County's commercial food waste pickup and composting services to reduce food waste in the solid waste stream
- The CFE remains interested in developing incentives for increasing energy efficiency in new construction
- The CFE will continue to learn more about environmental justice matters and incorporate relevant information and considerations in the State of the Environment report and its other activities
- The CFE will continue to follow the Solid Waste Advisory Group's discussions of how to improve the handling and disposal of Orange County's solid waste, and will advocate for better long-term solutions
- The CFE will continue to advocate for increased efforts to gather information related to water resources in Orange County and to increase public awareness and understanding of water supply sources, related concerns, and what steps can be undertaken to maintain or improve the quantity and quality of Orange County water supply resources
- The CFE will continue to address, as appropriate, the critical environmental issues for Orange County as enumerated on page 3 of the 2014 State of the Environment report, which include potential adverse effects from a) invasive, non-native, plant and animal species; b) reductions in State-led collection of water resources data; c) potential drilling for natural gas in the Deep River basin; d) urban sprawl; and CFE support for e) the responsible deployment of clean and appropriately-sited renewable energy and reductions in energy use to help fight climate change

**Orange County
Commission for the Environment**

DRAFT Meeting Summary

April 11, 2016

Richard Whitted Meeting Facility, Hillsborough

PRESENT: Lydia Wegman (Chair), May Becker, Peter Cada, Thomas Eisenhart, Lynne Gronback, Loren Hintz, Bill Kaiser, Bill Newby, Rebecca Ray, Sheila Thomas-Ambat

ABSENT: Jeanette O'Connor, David Welch

STAFF: Rich Shaw, Brennan Bouma

GUEST: Kathleen Smith

- I. **Call to Order** – Wegman called the meeting to order at 7:30 pm.
- II. **Additions or Changes to Agenda** – Shaw handed out a gift (flashlight) to CFE members from the Board of County Commissioners' office as a gesture of appreciation for the citizen volunteers who serve on this and other advisory boards.
- III. **Minutes** – Wegman asked for comments on the February 8 and March 14 meeting summaries. Kaiser noted that he should have been listed as present. Hintz motioned approval with that correction; seconded by Cada. Motion approved unanimously.
- IV. **CFE Outreach Opportunities / News Articles** – Shaw reviewed CFE's March meeting discussion of potential news articles for 2016, including articles on climate change, hydrilla, new parks, and the effects of poverty on the environment. Cada and Kaiser discussed ways of summarizing information from other sources rather than writing new content. CFE members agreed to change the frequency of news articles to quarterly.

Bouma reminded CFE members there are other outreach opportunities, such as the Last Friday events in Hillsborough, the upcoming Earth Evening event (April 29), and radio spots on WCHL radio and the new WHUP radio station in Hillsborough. Gronback, Kaiser, and Hintz agreed to help out at the Earth Evening event in Hillsborough.

CFE members discussed ways of engaging the public using social media, such as Facebook and Twitter. Ray and Cada described how these outlets can be used to provide news, photos, and links to more detailed information. Gronback noted how social media can be much more effective at reaching people than the newspaper. Hintz suggesting including content from some of the update items on CFE meeting agendas.

CFE members recalled that former CFE member Steve Niezgoda developed a CFE Facebook page, but it has not been used since May 2015. Gronback offered to contact Jeanette O'Connor to learn who has access to the Facebook account for providing new content. She noted that the CFE ought to develop some code of conduct for the use of this site. Hintz offered to post information about the Earth Evening event.

Kaiser asked for introductory information on the use of these and other forms of social media. Wegman asked Gronback and Cada to help lead a discussion on the use of social media at the May meeting. Cada will look into whether his source of summaries of peer-reviewed articles on various topics would be suitable for use by the CFE.

- V. **Clean Power Plan** – Bouma briefed the CFE on efforts to persuade state legislatures to follow through on the Obama Administration’s Clean Power Plan put forward by the USEPA. He noted the Town of Chapel Hill is among 50 or so cities and counties taking a stance on this issue. Bouma offered to contact John Richardson (Town of Chapel Hill) for more details on what the Town and other local governments intend to do about this and will monitor activities to consider whether Orange County ought to join the coalition.

- VI. **Committee Meetings** – Wegman asked if CFE members wished to break out into the standing committees to review the revised list of priorities provided by the staff. The CFE chose to review the list individually and the members of each committee to confer with one another about the list and to consider next steps.

- VII. **Updates and Information Items** – Information on the following subjects was provided in the meeting package; selected items were discussed: a) CFE membership roster, b) Eno River hydrilla management project, c) Jordan Lake water allocation, d) tour of forest management activities at OWASA Mitigation Tract, e) wind farmer testimonial, f) the need to modernize water data, g) February’s record heat, h) record low Arctic Sea ice, and i) “The Nature of Orange” photo contest 2016.

- VIII. **Adjournment** – Wegman adjourned the meeting at 9:00 pm.

Summary by Rich Shaw, DEAPR Staff

Collaborative Conservation Group

Name	Affiliation
Sara Childs	Duke Forest, Duke University
Rich Shaw	Orange County Lands Legacy Program
Kim Livingston	Eno River Association
Johnny Randall	NC Botanical Garden
Bo Howes	Triangle Land Conservancy
Bob Healy	New Hope Creek Corridor Advisory Committee
John Kent	New Hope Creek Corridor Advisory Committee
Steve Hall	Landscape Ecologist
Ron Sutherland	Wildlands Network
Jenna Schreiber	Duke Forest, Duke University
Maggie Earnest	Wildlands Network
Brooke Massa	NC Wildlife Resources Commission
Chuck Roe	Southern Conservation Partners
Allison Weakley	Chatham Conservation Partnership
Helen Youngblood	Durham City/County Planning Dept.

Purpose

To explore opportunities for various conservation/ natural resource entities to collaborate in identification and preservation of landscape corridors that connect significant natural areas and open space in Orange, Durham and Chatham counties.

Summary of Meetings thus far (Sept 2015 – April 2016)

The group consensus seems to focus toward the idea of developing a tri-county collaborative conservation plan that includes Durham, Orange, and Chatham counties. Characteristics of a collaborative conservation plan that the group would be satisfied with include the following:

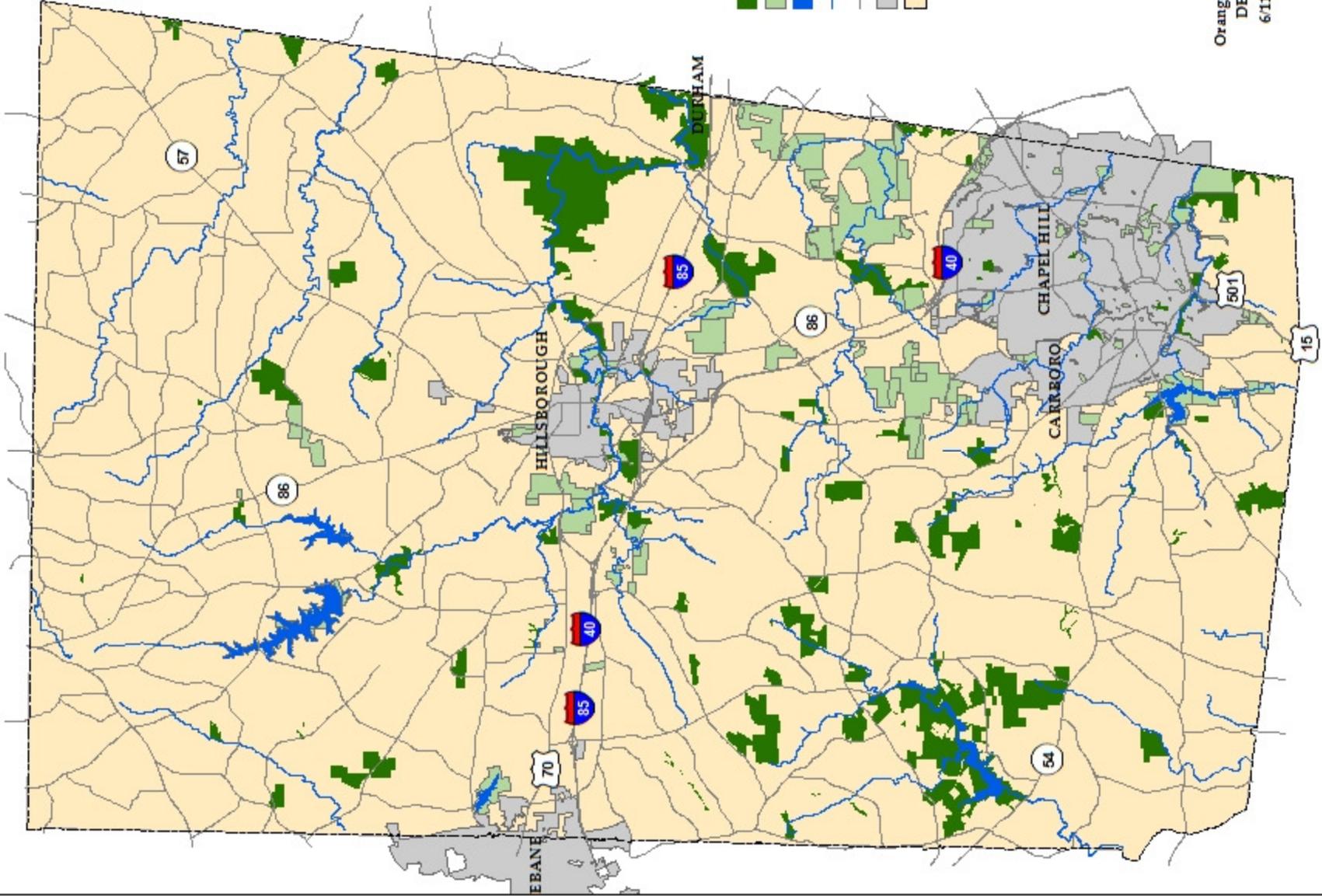
- a plan that has influence across a larger scale that is relevant and appropriate for maintaining landscapes for plants and animals, i.e. a plan that is “connectivity-centric”
- a plan that doesn’t reinvent the wheel and instead provided, where appropriate, a synthesis of existing tools and knowledge for implementing landscape conservation
- a plan that presents a *prioritized* package of locations in which to take action and potentially identifies the relevant potential partners for each
- a plan that can be shared/adopted by local municipalities

Potential Funding Mechanisms

The NC Wildlife Resources Commission offers grant funds for projects that help protect important wildlife habitat and key corridors. Pre-applications (250 words) are due end of May; full applications in July 2016. Orange County may have \$2,000 – \$4,000 in matching funds for such a project in FY 2016-17. Other potential funding sources include Triangle Community Foundation, the NC Department of Transportation, and the Climate Adaptation Fund. The group intends to use data from the North Carolina Conservation Planning Tool (NC DEQ) and the US EPA Environmental Atlas.

Next Steps

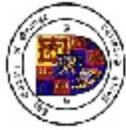
Develop grant application to the NC Wildlife Resources Commission with potential matching funds from Orange County and others. Consult with Chatham Conservation Partnership.



0 0.5 1 2 Miles



- Permanently protected lands
- Partially protected lands
- Reservoir & lakes
- Major streams
- Streets
- Towns
- County boundary



Orange County
DE APR
6/11/2013

May 1, 2016

ENVIRONMENT

Go native in the garden

ORANGE COUNTY
COMMISSION FOR THE
ENVIRONMENT

While some of us value plants in our landscapes primarily for the beauty they provide, we may not realize that plants are in fact critically important components of food webs and essential to the life cycles of birds and insects.

Author Doug Tallamy explains, "almost all North American birds other than seabirds - 96 percent - feed their young with insects." These insects require host plants on which to lay their eggs, plants with which they have evolved over millennia.

Replacing native plants (those species that have evolved with surrounding plants and animals, each influencing the evolution of the other) with species from other places can hinder the ability of some of these insects to reproduce.

One example can be seen in a comparison of the flowering dogwood (*Cornus florida*), which is native to Orange County, and the kousa dogwood (*Cornus kousa*), which is native to Korea, China, and Japan. The flowering dogwood supports 117 species of moth and butterfly larvae, while the kousa dogwood supports none.

Some gardeners point out that they also frequently observe insects on their non-native plants. For instance, butterflies can often be seen drinking nectar from the flowers of the non-native butterfly bush (*Buddleia davidii*). While this may

be beneficial food for the butterflies, unfortunately no species of butterfly native to North Carolina will use the butterfly bush as a host plant on which to lay its eggs. Better choices to provide breeding support for butterflies include oak-leaf hydrangea (*Hydrangea quercifolia*), redbud (*Cercis canadensis*), and fringe-tree (*Chionanthus virginicus*), to name a few.

Native plants are also important to our economy. Insects pollinate many of the foods we enjoy eating.

Some species, such as the monarch butterfly, have an estimated economic value in the billions of dollars. These insects will cease to exist without the correct host plants on which to lay their eggs. In fact, researchers estimate that the monarch butterfly population has declined by 80 percent over the past 21 years. The decline is attributed in large part to the disappearance of the milkweed plants, resulting in the U.S. Fish and Wildlife Service considering the monarch butterfly for protection under the Endangered Species Act (ESA).

In contrast to the high economic value of natives, many non-native species can be economically and environmentally devastating; such species are categorized as invasive by the federal government. They include English ivy, Japanese honeysuckle, autumn olive, tree of heaven, and multiflora rose. Nearly half of the species listed for protection under the ESA are in trouble due at least in part to invasive species.

Far from the economic

The series

This is the latest in an occasional series of articles by the Orange County Commission for the Environment. The commission is a volunteer advisory board to the Board of County Commissioners. Additional information can be found in the Orange County State of the Environment 2014 report at bit.ly/1mTE5K2

good of natives, invasive species are estimated to cost the U.S. more than 120 billion dollars in damages annually. It can take decades to determine that a species is invasive, and such a finding does not automatically lead states to ban the sale of the species.

While not all non-native plants are invasive or damaging to the environment, it is wise to understand whether a plant is invasive or in some way damaging to pollinators.

A number of resources exist to help residents figure out which native plants will thrive in your yard or garden. The N.C. Botanical Garden offers plant lists, classes, tours, family and youth programs, and knowledgeable people to help you in your hunt (not to mention a beautiful garden to stroll through to see spectacular natives year-round). In addition, from June to Oct. 3, the Botanical Garden is offering workshops, exhibits, talks and tours that highlight the importance of pollinators and what can be done to help secure a stable future for them.

2016 CFE Outreach Opportunities

May 2016

1. Event Table

- Last Fridays (Hillsborough: May 27, June 24, July 29, Aug 26, Sept 23
<http://www.hillsborougharts council.org/#!last-fridays/c22tz>)
- Festifall Arts Festival (Chapel Hill: October 1)

2. CFE Newspaper Articles

- Climate change
- Hollow Rock Nature Park opening (May 21)
- Hydrilla management
- Effects of poverty on the environment

3. Facebook and Twitter

- Hollow Rock Nature Park Opening
- Recruitment of New Members
- _____
- _____
- _____

4. WCHL and/or WHUP Radio

5. Other?

Orange County Commission for the Environment

CFE Committee Priorities

(updated May 2016)

Air and Energy Resources Committee

(May Becker, Tom Eisenhart, Bill Newby)

1. GHG Emissions Inventory – Consider whether it is feasible and worthwhile to conduct a comprehensive update of the County 2005 greenhouse gas emissions inventory.
2. Green Building – Help the County develop an incentive program for green construction.
3. Climate Change – Educate county residents about climate change, alternative energy sources and efficiency, and steps to reduce their (and County government's) carbon footprint.
4. Energy Efficiency – Partner with Piedmont Electric Membership Corp and/or Duke Energy to take advantage of USDA program for low-interest loans for energy efficient upgrades for its members/owners.

Water Resources Committee

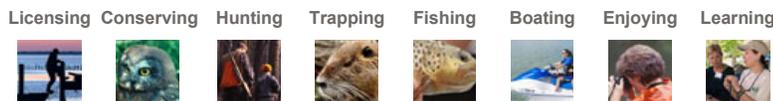
(Peter Cada, Rebecca Ray, Sheila Thomas-Ambat, Bill Kaiser)

1. Stream Buffers – Conduct a literature review of the science in support of maintaining vegetative buffers to protect water quality, aquatic habitat, and biodiversity.
2. Hydrilla Treatments – Continue to educate the public about hydrilla and other invasive species of concern; continue to monitor chemical treatments to assure they are not harmful to rivers.
3. Surface and Ground Water Quality – Increase the collection of data for surface and ground water quality; increase public education so it might lead to more funding for data collection.
4. Water Supply – Continue to educate county residents about our water supply and what steps can be taken to improve/maintain quality and quantity of future water supplies into the future.

Land Resources Committee

(Loren Hintz, Jeanette O'Connor, Lydia Wegman, David Welch, Lynne Gronback)

1. Comprehensive Conservation Plan – Collaborate on the development of a comprehensive conservation plan for Orange County for Legacy program and others to protect natural areas and wildlife habitat. Consider ways to ensure conservation land is distributed equitably throughout the county so that everyone has reasonable access to enjoy these areas.
2. Native Plant Habitats - Renew collaboration with NC Botanical Garden and others to identify significant roadside habitat for native plants; then ask NCDOT and other utilities to eliminate the use of herbicides to manage vegetation in those special roadside habitats.
3. Native Landscaping - Educate homeowners and businesses on reasons to choose a diversity of regionally native species for landscaping and other ways to promote biodiversity.



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Second Year of Hydrilla Management Pilot Study in Eno River Begins First Week of May

29 April 2016 Number of views: 104

DURHAM, N.C. (April 29, 2016)

— The second year of a two-year pilot project to treat parts of Eno River for a hydrilla infestation will get underway the first week of May and last through September.



Hydrilla in the Eno River in September 2014

The Eno River Hydrilla Management Task Force once again has hired SePRO Corporation to apply the herbicide Sonar Genesis® in a 16-mile target zone of the river from Lawrence Road to N.C. Hwy. 501 (Roxboro Road) in Orange and Durham counties.

SePRO will apply the herbicide in a concentration well below the limits approved by the U.S. EPA (Environmental Protection Agency) — a concentration that is both safe for swimmers and boaters and non-toxic to fish and wildlife.

The task force contracted with SePRO to perform the initial application last year, which was the first time the herbicide had been used in a North Carolina river to combat hydrilla. Initial results indicate that the first application worked well, and task force members hope this second year will bring even greater results. SePRO is based in Carmel, Ind., with research and manufacturing facilities in eastern North Carolina.

“The first year of treatment showed a high degree of success, with a significant lowering of the amount of hydrilla in the treatment area as compared with areas of the river that were not treated,” said Eno River State Park Superintendent Keith Nealon. “We are hoping in this second year to add on to that success.”

Hydrilla is a highly invasive, nonnative aquatic plant that originated in Asia and creates nearly impenetrable mats of stems and leaves on the surface of lakes, rivers and other waterways. It crowds out native vegetation, reduces recreational opportunities, and ultimately can harm native populations of fish and other aquatic and bird species. The plant also can clog intakes where rivers and reservoirs are used for drinking water supplies and irrigation.

Task force members say the herbicide worked well on hydrilla in the treatment area last year and had little to no impact on native, non-target plants. Even so, they are advising the public not to use treated water for irrigation without consulting a task force member first.

As they did last year, task force members are contacting owners of properties adjacent to parts of the river being treated with specific restrictions and precautions regarding irrigation use, despite the fact that members are not aware of any irrigation use within the management zone.

News Archives

2016	75
2015	301
2014	262
2013	240
2012	232
2011	191
2010	94
2009	1

News Categories

- Alerts (3)
- Boating (296)
- Conserving (321)
- Fishing (456)
- Enjoying (622)
- Hunting (413)
- Hunting Safety (69)
- Learning (381)
- License (152)
- News (1396)
- Outdoor Heritage (4)
- Public Notices (229)
- Trapping (106)

Hydrilla was first discovered in the Eno River basin in the early 1990s in Lake Orange, which is located upstream of Hillsborough. In 2009, biologists confirmed hydrilla in another upstream reservoir, West Fork Eno Reservoir. The N.C. Division of Water Resources is actively managing hydrilla in both upstream reservoirs.

Members of the task force conducted a survey in fall 2013 and found that about 25 miles of the Eno River contained hydrilla at differing densities. The most infested area was a 15-mile stretch from the N.C. Highway 70 Bridge east of Hillsborough to Guess Road in Durham.

"Hydrilla has significantly affected recreational opportunities in the Eno River," said Mark Fowlkes, the Piedmont aquatic habitat coordinator with the N.C. Wildlife Resources Commission. "Specifically, when hydrilla has reached its full growth for the year, it is almost impossible to fish, kayak, or wade in the river."

Biologists say because hydrilla grows so quickly and can form new plants from tiny fragments, it could easily get established in Falls Lake and become a serious nuisance there in terms of recreation and water supply.

The Eno River Hydrilla Management Task Force comprises a group of local, state and federal government representatives, including the N.C. Wildlife Resources Commission, N.C. Division of Water Resources, and N.C. State Parks, which has been working since 2007 to evaluate and address the hydrilla threat in the Eno River.

For more information on the pilot project, visit <http://nc-ipc.weebly.com/eno-river-hydrilla-project.html> or contact Mark Fowlkes at mark.fowlkes@ncwildlife.org or 336-527-1547.

Media Contact: Jodie B. Owen
919-707-0187
jodie.owen@ncwildlife.org

Photographer: [Download a high-resolution photo of the above.](#) Please credit Tom Davis/Orange County Department of Environment, Agriculture, Parks and Recreation

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[Report Website Issue](#)

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2015

H

1

HOUSE BILL 965*

Short Title: Aquatic Weed Control Clarification. (Public)

Sponsors: Representatives McElraft and West (Primary Sponsors).

For a complete list of sponsors, refer to the North Carolina General Assembly web site.

Referred to: Environment

April 27, 2016

A BILL TO BE ENTITLED

AN ACT TO RENAME AND CLARIFY THE USES OF THE SHALLOW DRAFT
NAVIGATION CHANNEL DREDGING AND LAKE MAINTENANCE FUND, AS
RECOMMENDED BY THE JOINT LEGISLATIVE OVERSIGHT COMMITTEE ON
AGRICULTURE AND NATURAL AND ECONOMIC RESOURCES.

The General Assembly of North Carolina enacts:

SECTION 1. Part 8B of Article 21 of Chapter 143 of the General Statutes reads as
rewritten:

"Part 8B. Shallow Draft Navigation Channel and Lake Dredging Fund.

**"§ 143-215.73F. Shallow Draft Navigation Channel Dredging and ~~Lake Maintenance~~ Aquatic
Weed Fund.**

(a) Fund Established. – The Shallow Draft Navigation Channel Dredging and ~~Lake
Maintenance~~ Aquatic Weed Fund is established as a special revenue fund. The Fund consists of
fees credited to it under G.S. 75A-3 and G.S. 75A-38, taxes credited to it under G.S. 105-449.126,
and funds contributed by non-State entities.

(b) Uses of Fund. – Revenue in the Fund may only be used for the following purposes:

(1) To provide the State's share of the costs associated with any dredging project
designed to keep shallow draft navigation channels located in State waters or
waters of the state located within lakes navigable and safe.

(2) For aquatic weed control projects in waters of the State ~~located within lakes~~
under Article 15 of Chapter 113A of the General Statutes. Funding for aquatic
weed control projects is limited to five hundred thousand dollars (\$500,000) in
each fiscal year.

...."

SECTION 2.(a) G.S. 75A-3(c) reads as rewritten:

"(c) The Boating Account is established within the Wildlife Resources Fund created under
G.S. 143-250. Interest and other investment income earned by the Account accrues to the Account.
All moneys collected pursuant to the numbering and titling provisions of this Chapter shall be
credited to this Account. Motor fuel excise tax revenue is credited to the Account under
G.S. 105-449.126. The Commission shall use revenue in the Account, subject to the Executive
Budget Act and the Personnel Act, for the administration and enforcement of this Chapter; for
activities relating to boating and water safety including education and waterway marking and
improvement; and for boating access area acquisition, development, and maintenance. The
Commission shall use at least three dollars (\$3.00) of each one-year certificate of number fee and
at least nine dollars (\$9.00) of each three-year certificate of number fee collected under the



1 numbering provisions of G.S. 75A-5 for boating access area acquisition, development, and
2 maintenance. The Commission shall transfer on a quarterly basis fifty percent (50%) of each
3 one-year certificate of number fee and fifty percent (50%) of each three-year certificate of number
4 fee collected under the numbering provisions of G.S. 75A-5 to the Shallow Draft Navigation
5 Channel Dredging and ~~Lake Maintenance~~Aquatic Weed Fund established by G.S. 143-215.73F."

6 **SECTION 2.(b)** G.S. 75-38(b) reads as rewritten:

7 "(b) The Commission shall charge a fee of thirty dollars (\$30.00) to issue a new or transfer
8 certificate of title. The Commission shall transfer on a quarterly basis at least ten dollars (\$10.00)
9 of each new or transfer certificate of title to the Shallow Draft Navigation Channel Dredging and
10 ~~Lake Maintenance~~Aquatic Weed Fund established by G.S. 143-215.73F. The Commission shall
11 charge a fee of ten dollars (\$10.00) for each duplicate title it issues and for the recording of a
12 supplemental lien."

13 **SECTION 2.(c)** G.S. 105-449.126 reads as rewritten:

14 "**§ 105-449.126. Distribution of part of Highway Fund allocation to Wildlife Resources Fund
15 and Shallow Draft Navigation Channel Dredging and ~~Lake Maintenance~~Aquatic
16 Weed Fund.**

17 ...

18 (b) The Secretary shall credit to the Shallow Draft Navigation Channel Dredging and ~~Lake
19 Maintenance~~Aquatic Weed Fund one percent (1%) of the amount that is allocated to the Highway
20 Fund under G.S. 105-449.125 and is from the excise tax on motor fuel. Revenue credited to the
21 Shallow Draft Navigation Channel Dredging and ~~Lake Maintenance~~Aquatic Weed Fund under this
22 section may be used only for the dredging activities described in G.S. 143-215.73F. The Secretary
23 shall credit revenue to the Shallow Draft Navigation Channel Dredging and ~~Lake
24 Maintenance~~Aquatic Weed Fund on a quarterly basis. The Secretary must make the distribution
25 within 45 days of the end of each quarter."

26 **SECTION 3.** This act becomes effective July 1, 2016.



Hollow Rock Nature Park Grand Opening!



Saturday, May 21st, 2016 9:30 a.m.

692 Erwin Road, Durham NC 27707

PARKING AT FOREST VIEW ELEMENTARY

3007 Mount Sinai Road

Shuttle to Park Site

Join us May 21st as we celebrate the grand opening of Hollow Rock Nature Park! This 75 acre natural park offers two miles of hiking trails, open fields, and a connection to Duke Forest, with more amenities planned for phase 2!

For information, email Brendan Moore at brmoore@dconc.gov

FOR IMMEDIATE RELEASE: April 1, 2016

CONTACT: Emma Stieglitz, estieglitz@climatenexus.org, 646-559-8284

More Than 50 Cities Press Court to Uphold Clean Power Plan, Citing Climate Change Risks

As 'First Responders' to Floods and Storms, Cities from Coast to Coast File Amicus Brief Supporting Federal Efforts to Curb Carbon Pollution

New York, NY—More than 50 city and county governments from 28 states, together with The U.S. Conference of Mayors (USCM), the National League of Cities (NLC), and the mayors of Dallas, Knoxville, and Orlando have signed an [amicus brief](#) explaining why the U.S. Environmental Protection Agency's Clean Power Plan is critical to the safety and economic security of local communities across the United States. The brief was authored by the Sabin Center for Climate Change Law at Columbia Law School, and filed in federal court on Friday, April 1st.

The signatories represent a diverse geographic, economic, and political mix and include Miami Beach, Miami and other southeast Florida cities; Tucson; Salt Lake City; Los Angeles; San Francisco; Houston; Jersey City; Pittsburgh; and Boston. Twenty-three of the signatories are local governments within states that have joined the lawsuit against the EPA. In all, the signatories represent 51 localities—home to more than 18 million Americans—and more than 19,000 additional cities, villages and towns that are part of the USCM and NLC networks.

"The nation's mayors are pleased to join in the defense of the Clean Power Plan, which is an essential part of our nation's ability to respond to climate change," said **Baltimore Mayor Stephanie Rawlings-Blake, President of The U.S. Conference of Mayors**. "This Plan will significantly cut carbon pollution from U.S. power plants; we must implement it now. Mayors know cities have the most to gain, as well as the most to lose in this debate because climate change and rising sea levels threaten the physical structure of our cities. Cities have been combating climate change for over a decade through our Mayors' Climate Protection Agreement, but we need a national response."

"Supporting the administration's Clean Power Plan efforts is not just the right thing to do, but necessary for Miamians as we fight for the very survival of our city," said **Commissioner Ken Russell of Miami, Florida**. "I am proud to have led the effort within Miami's government to sign on to this amicus brief and look forward to taking the lead wherever I can in combating and adapting to sea level rise."

The impact of climate change on urban areas is amplified by their dense concentrations of people, infrastructure, and commerce. More than 80 percent of Americans live in urban areas, making local governments responsible for protecting the wellbeing of an overwhelming majority of Americans.

"Cities have an essential voice to add to the legal debate over the Clean Power Plan," says **Michael Burger, executive director of the Sabin Center for Climate Change Law at Columbia Law School**. "All around the country, local governments have had to contend with the devastating impacts that sea level rise, heat waves and severe storms have on people and the infrastructure they depend on. At the same time, they have been among the first to seek innovative ways to reduce emissions and increase sources of clean energy. These cities

know as well as anyone how important the Clean Power Plan is to the security and well-being of Americans, and how reasonable EPA's rule really is."

City and county governments are the first line of defense in weather disasters and climate impacts, which grow increasingly frequent and severe as greenhouse gas emissions cause the climate to change. Many cities are already experiencing — and paying for — damage caused by climate change. The amicus brief provides examples:

Faced with flooding propelled by rising sea levels, Miami Beach is investing \$400 million in an adaptation strategy that includes pumping stations, raised roads, and seawalls. Rising seas likewise put Miami at risk for "losing insurability," and threaten drinking water supplies across southeast Florida.

The 2011 Texas heat wave not only filled hospital emergency departments in Houston but also burst pipes and water mains, draining 18 billion gallons of drinking water and with it millions in revenue for the city. Disruptive heat waves in Grand Rapids, Los Angeles and Pittsburgh have caused electricity brownouts and blackouts; in Arlington County, Evanston, Dallas, Minneapolis, and Salt Lake City they have compromised an airport runway, buckled roads and warped rails.

Cities and counties disproportionately shoulder the impact and bear the costs of continued inaction on climate change, and many are acting on their own to reduce the emissions under their direct control. However, local governments' ambition to act on climate change is limited by their lack of control over many aspects of this worldwide problem. According to the brief:

Cities' efforts to adapt to a changing climate and to mitigate its causes are highly sensitive to national policies like the Clean Power Plan, which shape national markets, steer state action, and have the largest impact on nationwide emissions ... Cities working to shoulder the burdens of adaptation would therefore face an ever harder—and ever more expensive—task in the absence of the Clean Power Plan.

The local government brief recognizes and builds on strong demand for climate action by cities and counties, which view the Clean Power Plan as a "legally necessary step toward addressing the extraordinary threat posed by climate change." In 2015, more than two dozen mayors sent a letter to President Obama urging him to "provide a path forward to make meaningful reductions in carbon pollution while preparing for the impacts of climate change." Furthermore, more than 125 U.S. cities have already committed to the [Compact of Mayors](#), a global coalition of more than 460 mayors pledging to reduce their greenhouse gas emissions, track their progress transparently and enhance their resilience to climate change. Of the 52 cities signed onto the brief, more than half are committed to the Compact.

"This amicus brief shows how cities across America are leading the way in the fight against climate change—and how eager they are for state governments to join them," said **Michael R. Bloomberg, founder of Bloomberg LP, three-term mayor of New York City and the UN Secretary-General's Special Envoy for Cities and Climate Change**. "Mayors are responsible for people's health and safety, and with their cities already feeling the effects of climate change, they can't afford to let ideological battles slow the great work they're doing to clean the air, strengthen local economies, and protect people from risks."

Read the full brief: <https://web.law.columbia.edu/climate-change/document-login/document-access>

Amicus Brief Signatories

The U.S. Conference of Mayors; The National League of Cities; **ARIZONA:** Tucson; **CALIFORNIA:** Berkeley, Los Angeles, Oakland, San Francisco, West Hollywood; **COLORADO:** Boulder County, Fort Collins; **FLORIDA:** Coral Gables, Cutler Bay, Miami, Miami Beach, Orlando Mayor Buddy Dyer, Pinecrest, West Palm Beach; **GEORGIA:** Clarkston; **IDAHO:** Boise; **ILLINOIS:** Aurora, Elgin, Evanston, Highland Park; **INDIANA:** Bloomington, Carmel; **MAINE:** Portland; **MASSACHUSETTS:** Boston, Holyoke; **MARYLAND:** Baltimore; **MICHIGAN:** Ann Arbor, Grand Rapids; **MINNESOTA:** Minneapolis; **MONTANA:** Missoula; **NEVADA:** Henderson, Reno; **NEW JERSEY:** Hoboken, Jersey City; **NEW YORK:** Rochester, Syracuse; **NORTH CAROLINA:** Chapel Hill; **OHIO:** Newburgh Heights; **OREGON:** Eugene, Milwaukie, Portland; **PENNSYLVANIA:** Pittsburgh, West Chester; **RHODE ISLAND:** Providence; **TENNESSEE:** Knoxville Mayor Madeline Rogero; **TEXAS:** Houston, Dallas Mayor Mike Rawlings; **UTAH:** Salt Lake City; **VIRGINIA:** Arlington County; **WASHINGTON:** Bellingham, King County; **WISCONSIN:** Madison, Washburn

Voices from the Local Government Coalition

Mayor David Bieter of Boise, Idaho

"It's well known that the best way to affect true change in policy is at the local level. There are many policies one can pursue to impact climate change, but the first order of business is being mindful about your organization's footprint and being thoughtful in how to reduce it. Being more sustainable is something local policy makers all over the globe can work toward, just as we do every day at the City of Boise. That is why we support the Clean Power Plan."

Mayor Jim Brainard of Carmel, Indiana

"Having served as mayor for over 20 years and as a lifelong Republican, I am proud to support the Clean Power Plan. There is no question that the climate is changing and we must adapt to this reality, which includes investment and programs that support the shift from coal to clean and renewable energy sources. While these are contentious issues in Indiana, I believe we cannot hide from facts and must work together to sensibly plan for our future. In Carmel, we have examined every area of city government from adding hybrid cars, investing in solar programs, creating bicycle and pedestrian facilities, and designing the city for people not cars, with the goal of making our city as environmentally friendly as possible."

Mayor Rosalynn Bliss of Grand Rapids, Michigan

"The Clean Power Plan is among the key elements in furthering the City's plans to mitigate the devastating impact of greenhouse gas emissions. Without such a critical national plan in place, our city's efforts to be more resilient — as outlined in our sustainability plan — would fall short."

Mayor Sylvester Turner of Houston, Texas

"Houston has made a commitment to investing in clean energy, and now uses more renewable energy than any other city in the United States," said Houston Mayor Sylvester Turner. "We are also a leader in the area of emissions reductions initiatives like our LED street light program, which is proving to be a very smart investment. As a city government entity located in the Energy Capital of the World, we understand the need to diversify our energy use and economy. Houston is well positioned to lead the country in the shift to clean energy. The Clean Power Plan provides a sensible framework for helping us to do so."

Mayor Madeline Rogero of Knoxville, Tennessee

“Clean energy jobs are some of the fastest-growing in Tennessee – nearly triple the state’s overall employment growth. There’s opportunity in the Clean Power Plan to further accelerate job creation in energy efficiency and renewable energy industries. These are the energy jobs of the future. The City of Knoxville looks forward to working with state officials and utilities as they develop their plan for compliance.”

Mayor Bill Peduto of Pittsburgh, Pennsylvania

“The Clean Power Plan presents an opportunity to strengthen the nation's economy while enhancing and preserving the environment. Pittsburgh's industrial past has helped us to understand how to prepare for and be competitive in the midst of inevitable economic shifts. There are important lessons to be learned from the 'Steel City' as we move into a clean energy future. The Clean Power Plan sets a framework for the country's essential energy transition, acknowledging that both the climate and markets are changing. From energy efficiency and optimization to finding pathways for implementation of tools such as micro-grids and district energy, cities stand as key partners for their states and the federal government.”

Councilmember David Bobzien of Reno, Nevada

"The Clean Power Plan supports the City of Reno's economic revitalization strategy to lead in the renewable energy economy. It also supports our goals for creating a more sustainable future for our community. Nevada ranks first in the country in solar and geothermal resources and is well poised for meeting and exceeding the requirements of the Clean Power Plan. We are proud to join the impressive and wide ranging network of cities that also view the Clean Power Plan as of major importance to their city and citizens."



*The National League of Cities (NLC) is the oldest and largest organization representing municipal governments throughout the United States. Working in partnership with 49 state municipal leagues, NLC serves as a national advocate for more than 19,000 cities, villages, and towns, representing more than 218 million Americans. **Contact: Tom Martin, martin@nlc.org, 202-626-3186***

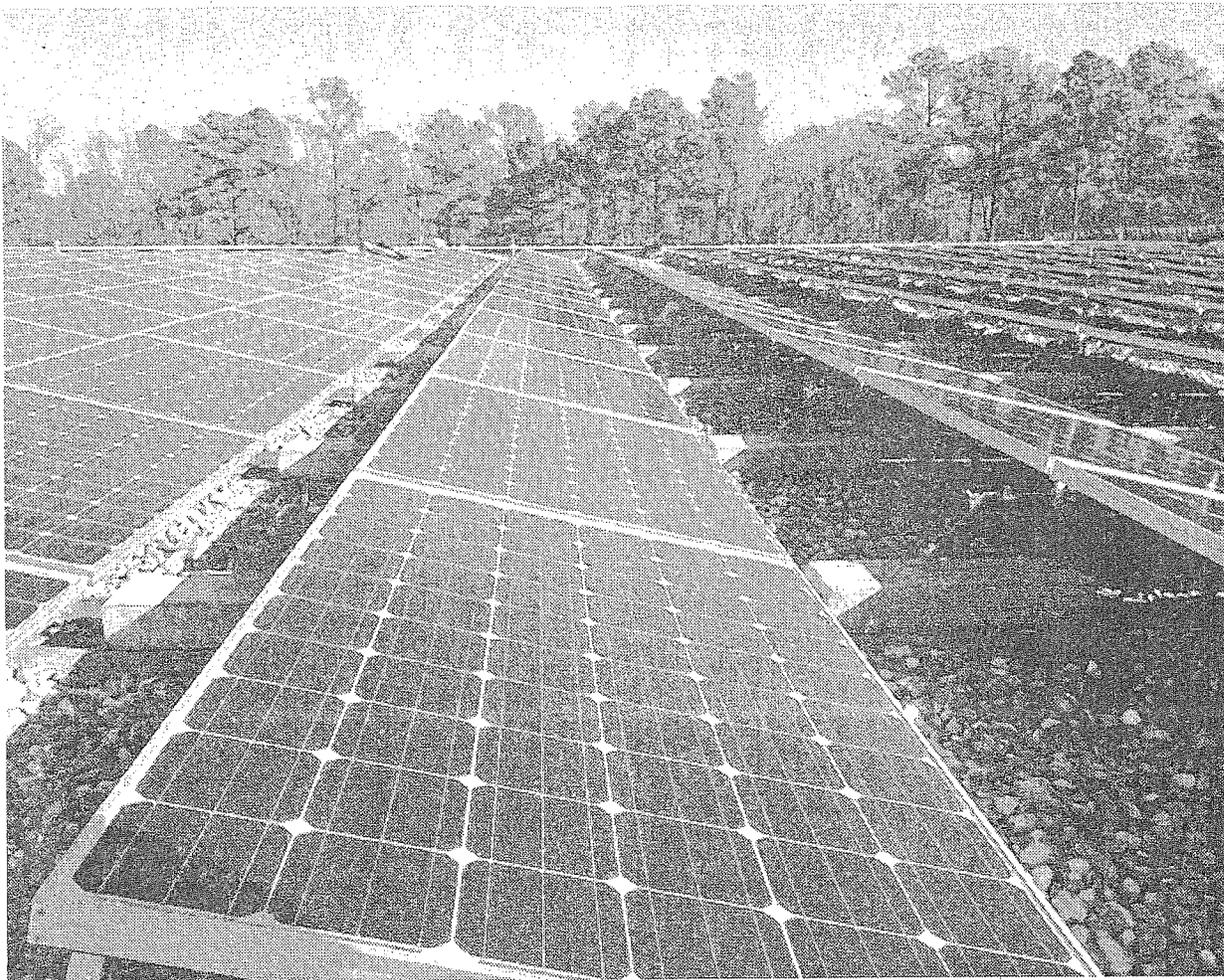


*The U.S. Conference of Mayors (USCM), founded in 1932, is the official nonpartisan organization of all United States cities with a population of more than 30,000 people, which includes over 1,400 cities at present. **Contact: Elena Temple-Webb, etemple@usmayors.org, 202-861-6719***



*The Sabin Center at Columbia Law School develops legal techniques to fight climate change and provides up-to-date resources on key topics in climate law and regulation. **Contact: Michael Burger, michael.burger@law.columbia.edu, 212-854-2372***

###



News & Observer file photo

Residents and businesses in N.C. last year claimed \$136.3M in renewable tax credits, up slightly from \$126.7M in 2014.

May 3 2016
News & Observer

TAX CREDITS

N.C. renewable energy investments grew at slower rate in 2015

BY JOHN MURAWSKI
jmurawski@newsobserver.com

RALEIGH

North Carolina's investment in renewable energy appears to be peaking.

For the first time since 2007, the amount of money that residents and businesses have claimed in the state's renewable energy tax credit has barely budged.

Last year, the amount claimed was \$136.3 million, only 7.5 percent more than the \$126.7 million claimed in 2014, according to a report issued Friday by the N.C. Department of Revenue.

In previous years, the

amount claimed would roughly double every year as Duke Energy and other utilities raced to meet the state's mandate for renewable energy. The smaller increase in 2015 does not have an obvious explanation, said Charlotte tax accountant Randy Lucas, who advises investors in renewable energy projects.

"It's a mystery," Lucas said, "but I don't think you can conclude that the industry is on the decline."

SOLAR CREDIT EXPIRES

The unexpected slowdown of 2015 tax credit claims largely reflects North Carolina's solar energy boom, which has propelled the state to third place nationwide in total

solar capacity installation. Over the past 8 years, North Carolina has added more than 2,000 megawatts of solar energy, equivalent to two nuclear power plants in total output capacity.

The tax credit is the amount of state taxes avoided by those who installed solar panels or 17 other renewable technologies in a given year. Solar farms represent the vast majority of the tax credits claimed in recent years.

The total amount claimed in 2014 was so large that it prompted the Republican-led state legislature last year to eliminate a generous state tax credit that was fueling

North Carolina's solar energy boom. The tax credit expired at the end of 2015.

However, the tax credit could continue increasing because the tax credit is spread over five years for corporate tax filers, and will show up in reports for the next four years. Additionally, renewable energy projects not yet completed but under construction last year were granted a "safe harbor" provision and allowed to file for their tax credit in the year after the credit expired.

"Maybe some projects spilled over into 2015 and will be reflected in 2016," Lucas said.

Solar expansion did not flatline in 2015. According

to an analysis by the N.C. Sustainable Energy Association, solar energy capacity installed in 2015 totaled 860 megawatts, nearly double the 442 megawatts installed in 2014.

STIMULATED INVESTMENT

At 35 percent, North Carolina's renewable tax credit was one of the most generous state tax credits in the nation, and cut a third of the cost of building a solar farm. When paired with the federal 30 percent tax credit, a developer could cut the cost of a renewable energy project by more than half.

The North Carolina legislature also eliminated the state tax credit for solar pool heaters, solar space heaters, biomass, landfill gas, geothermal heat pumps, wind turbines and anaerobic digestors.

The rationale for the state tax credit was that it promoted alternative energies and it stimulated economic investment. For example, the \$136.3 million tax credit claimed in 2015 resulted in nearly \$892 million in spending and other investment.

The biggest claimers of the state tax credit for renewables in 2015 were Duke Energy (\$13.8 million), N.C. Farm Bureau Mutual Insurance Co. (\$6.8 million), and Wells Fargo Bank (\$5.8 million). Some residents claimed less than \$100 last year for their renewable investments.

A single corporation can heavily influence the state's tax credit profile. In 2014, Duke claimed \$62.9 million in renewable energy tax credits, nearly half the total amount claimed by all tax filers that year.

Back in 2007, when the state imposed a renewable requirement on electric utilities, a policy known as the Renewable Energy Portfolio Standard, the amount that residents and businesses claimed in the state tax credit was just \$440,137.

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April 13, 2016

Solar rankings: Duke Energy among Top 3 in the nation

- **Duke Energy Progress ranks #3 among 300 U.S. electric utilities in 2015 for adding new solar power for customers**
- **Duke Energy increases resources to respond to tremendous growth**
- **Company expects more solar projects in 2016**

CHARLOTTE, N.C. – Duke Energy continues to be a national leader for the amount of solar energy connected to the grid for its retail customers.

In the Top 10 utility solar lists compiled by the Smart Electric Power Alliance (SEPA), Duke Energy Progress (DEP) was ranked third among all utility companies for bringing on new solar capacity during 2015.

“Our customers are experiencing the benefits of Duke Energy’s work to support the growth and expansion of solar generation in this region,” said David Fountain, Duke Energy’s North Carolina president. “We are proud to put more and more solar energy to work for our customers in a way that works for everyone.”

DEP’s 461 megawatts of owned and purchased capacity for customers in 2015 helped it climb to third in the nation after being fourth the previous year. Overall, North Carolina is fourth in the nation for installed solar capacity. You can [view the rankings here](#).

“We saw record installations of solar in 2015 across the United States. Our Top 10 survey results detail the scale of this growth, and the active role an increasing number of utilities are playing in it,” said Julia Hamm, SEPA’s President and CEO. “Consumers want solar, and their interest is driving change and innovation at utilities nationwide.”

The rankings were announced at the organization’s Utility Solar Conference in Denver. The ninth annual survey includes figures from more than 300 utilities across the country.

Since 2007, more than 1,000 projects representing more than 5,000 megawatts of generation have sought interconnection in Duke Energy’s North Carolina service territory. To support this growth, Duke Energy has added a Renewable Service Center, a customer call center designed to help with the high volume of residential solar-related interconnection requests. The company has also increased its engineering, support resources and construction crews for solar power.

During 2015, Duke Energy worked on a \$500 million solar expansion in North Carolina, including sites in Bladen, Duplin, Onslow and Wilson counties.

Already in 2016, Duke Energy has announced new solar projects in Davie, Rowan and Union counties. Overall, Duke Energy utilities purchases solar energy from almost 800 facilities in North Carolina – in addition to 3,500 solar rooftop customers.

Nationwide, Duke Energy has invested more than \$4 billion in solar and wind energy and plans to invest another \$3 billion over the next five years. In addition to North Carolina, the company is currently looking to expand utility-owned projects in Florida, Indiana and South Carolina.

Overall, Duke Energy companies own or purchase more than 1,700 megawatts of solar capacity.

About Duke Energy

Headquartered in Charlotte, N.C., Duke Energy is a S&P 100 Stock Index company traded on the New York Stock Exchange under the symbol DUK. More information about the company is available at duke-energy.com.

The [Duke Energy News Center](#) serves as a multimedia resource for journalists and features news releases, helpful links, photos and videos. Hosted by Duke Energy, [illumination](#) is an online destination for stories about remarkable people, innovations, and community and environmental topics. It also offers glimpses into the past and insights into the future of energy.

Follow Duke Energy on [Twitter](#), [LinkedIn](#), [Instagram](#) and [Facebook](#).

About SEPA

The Smart Electric Power Alliance (SEPA) is an educational nonprofit that facilitates the utility industry's smart transition to a clean energy future. Through education, research and collaboration SEPA enables the integration and deployment of solar, demand response, other distributed energy resources, and supporting technologies onto the grid.

###

Durham's NET Power breaks ground on zero-emissions plant

By John Murawski jmurawski@newsobserver.com



This artist's rendering shows an experimental non-polluting power plant designed by Durham-based NET Power. The 25 megawatt facility is under construction in Texas and is expected to start generating electricity for the Texas power grid in the first quarter of 2017. NET Power

A Durham energy company's \$140-million quest to create the world's first zero-emissions power plant is advancing from the laboratory to the real world.

NET Power broke ground last month on an experimental power plant near Houston, Texas, and expects to start generating electricity there in March 2017. Some are predicting that if NET Power's experiment works and produces power without polluting, scores of these futuristic energy projects would sprout in the coming years in the U.S. and around the world.

"This is no longer vaporware," NET Power chief executive Bill Brown said of the Texas project. "We have invented something that might save the planet."

Among the pollutants the power plant is designed to block: carbon dioxide, the greenhouse gas that's blamed for global climate change. Instead of releasing CO₂ into the atmosphere, the NET Power plant would capture carbon dioxide and store it for permanent injection underground or for industrial applications.

NET Power's plant would be so clean it would not require a smokestack. The ultimate selling point is that NET Power's technology would cost about the same to build as a conventional power plant, thus obliterating the principal obstacle to pollution-free energy.

Brown said that a number of U.S. utilities have expressed interest in building a full-scale version of the plant if the 25-megawatt trial version succeeds in Texas. Brown, who spent years financing deals on Wall Street, is also co-founder of [8 Rivers Capital](#), the Durham technology commercialization firm behind NET Power.

Even if the project proved to be an engineering miracle, however, the NET Power plant would not please everyone. For one thing, it is designed to burn natural gas. The dependence on a fossil fuel, typically extracted by means of fracking, automatically renders NET Power's "zero-emissions" claim a non-starter for some environmental advocates.

Additionally, NET Power intends to make its excess carbon dioxide available to energy companies for use in dislodging crude oil from subterranean geologic formations, a key step in advanced oil recovery. So the technology would either benefit from gas drilling or it would promote oil drilling.

‘Black swan technology’

Still, NET Power has attracted some high-profile environmental advocates, as well as prestigious industrial partners. Tim Profeta, director of Duke University’s [Nicholas Institute of Environmental Policy Solutions](#), is chairman of 8 Rivers Capital’s board of advisers.

He acknowledges the tradeoffs but said NET Power is a “worthy bargain.”

“It is truly a black swan technology that could change the game in power generation,” Profeta said. “The company expects it will become the preferred technology for power generation.”

Another supporter is John Thompson, the Fossil Transition Project director at the Boston-based [Clean Air Task Force](#).

“If this technology works, it creates an entirely new pathway to economically cut CO₂ at a massive scale in a very short period of time,” Thompson said. “Even if half of what they claim pans out, it’s a big deal. If 25 percent of what they claim pans out, it’s still potentially important.”

The technology in question is called the [Allam Cycle](#), in which natural gas is not burned with air, but with a blend of pure oxygen and carbon dioxide. In this combustion process, the natural gas, oxygen and carbon dioxide burn at a pressure more than 10 times the pressure used in a conventional gas turbine.

This thermodynamic feat, which will be tested under real-life conditions next year in La Porte, Texas, approximates a rocket engine and has never been attempted by the power industry. Unlike a disposable rocket booster, however, the NET Power combustor would have to operate reliably for the duration of a power plant’s expected lifespan, anywhere from 25 to 50 years.

“The technical challenge here lies in designing durable hardware capable of thousands of hours of continuous operation and efficient combustion over the range of conditions required in a power plant,” according to a paper presented at the June 2015 proceedings of the [American Society of Mechanical Engineers Turbo Expo](#) in Montreal, Canada.

The ASME paper’s presenters are researchers at the Toshiba Corp., one of NET Power’s corporate partners in the zero-emissions venture. Another partner is Chicago-based [Exelon Corporation](#), the nation’s largest operator of nuclear power plants.

Also involved is the [Chicago Bridge & Iron Co.](#), a construction conglomerate commonly known as CB&I, which inherited its share of the NET Power project in 2013 when it acquired one of the original partners, the Shaw Group, a global engineering and construction firm.

That makes NET Power a virtual company without a staff of its own, drawing on outside experts and business partners for its intellectual property and R&D.

Disposing of the CO₂

A logistical challenge for NET Power will be the disposal of carbon dioxide. NET Power says utilities that build its power plants could sell the CO₂ they capture to energy companies for [oil exploration](#). The other option is [dumping it underground](#) in regions with adequate geological formations for permanent deep injection.

Currently, injecting CO₂ underground – called [sequestration](#) – has been tried in pilot projects but remains too costly to be adopted as an industry practice. That’s because capturing and compressing carbon dioxide at a conventional power plant would require multimillion-dollar retrofits. The NET Power plant skips the retrofit stage because it is designed and built to compress and capture the gas.

The other option, [advanced oil recovery](#), already represents [nearly 6 percent](#) of U.S. onshore oil production. But this carbon dioxide is not sourced from the utility industry. Rather, the energy industry obtains its CO₂ from a handful of natural geologic domes where the gas has naturally accumulated over eons. NET Power says its power plants can supply CO₂ as well as the geologic domes.

A 295-megawatt NET Power plant, the size of the company's planned commercial-scale design, would generate about 800,000 tons of carbon dioxide annually. NET Power estimates the utility that owns the facility could sell the gas for as little as \$5 per ton and up to \$50 per ton for use in advanced oil recovery, depending on the cost of oil and on other factors.

Thus a NET Power plant would generate between \$4 million and \$40 million in additional revenue from CO2 sales for its utility owner, according to the company's estimates.

Or the utility could simply "vent" the CO2 into the air until disposal options become available. That's the plan for NET Power's pilot project under construction in Texas.

Good timing

Meanwhile, depressed energy global costs could be a boon for NET Power.

"The technology would be much in demand because we have such an abundance of low-cost natural gas," said Jim Rogers, who retired as CEO of Duke Energy in 2013 and now teaches a [Renewables and the World's Poor](#) course with Profeta at Duke University.

"If this technology works – and we'll soon know – it would be transformative," Rogers said. "It would be a way to produce zero-carbon electricity using natural gas. If this happens, we'll have zero-carbon nuclear, zero-carbon renewables and zero-carbon natural gas."

With scores of power plants in the United States slated for retirement and replacement over the next two decades, the timing for NET Power is opportune, noted Julio Friedmann, a senior fellow at the [Lawrence Livermore National Laboratory](#) in California and immediate past principal deputy assistant secretary in the U.S. Department of Energy's Office of Fossil Energy.

"It speaks volumes that they have strong support from industrial leaders and utilities," said Friedmann, who has been following NET Power for five years. "They've chosen the right thing at the right time and they're doing it the right way."

John Murawski: 919-829-8932, [@johnmurawski](#)

THE SCIENCE IS THERE. THE NUMBERS ADD UP. THIS IS DOABLE.

May 27, 2015 - 8:00 pm

Featuring Drew Shinell

Contact: Tim Lucas, 919-613-8084, tdlucas@duke.edu



Drew Shindell sees real opportunity for us to make progress on global warming, air pollution and food security if we work smarter.

Drew Shindell is a man on a mission. Since 2011, he's been leading the charge to promote a new, more winnable approach to fighting the war against climate change.

In a series of landmark studies and assessment reports, he's shown that by aggressively curbing emissions of methane, black carbon and other potent short-lived climate pollutants (SLCPs) in addition to much longer-lived carbon dioxide, we could slow the rate of global warming by half over the next several decades and save 45 million lives.

"Short-lived climate pollutants are the low-hanging fruit of the climate world. They remain in the atmosphere for only a brief time but account for as much as 30 to 40 percent of the total short-term rise in global temperatures," says Shindell, who joined the Nicholas School faculty as professor of climate sciences in 2014.

Expanding our mitigation strategies to target these short-lived drivers of global warming makes sense economically, politically and in terms of human health, he says.

Air pollution linked to SLCPs is the leading environmental cause of premature death. Reducing our exposure to these pollutants, particularly soot and other particles, would annually save up to seven million lives worldwide and improve respiratory and cardiovascular health for tens of millions of people. It would prevent 180,000 non-fatal heart attacks, 18 million missed work days and 11 million missed school days in the United States alone.

Curbing emissions that lead to tropospheric ozone, another potent SLCP, would boost agricultural economies and enhance food security for millions of people by increasing global crop yields by about 1 billion metric tons a year.

These gains could send skeptics and vacillating world leaders a message that meaningful progress is possible, and perhaps set an example that helps us tackle more persistent carbon dioxide.

Many of the technologies and tools needed to reduce SLCP emissions already exist or could be developed and scaled up for widespread use at a fairly modest cost, Shindell stresses.

Emissions of black carbon, or soot, can be reduced through measures as simple as installing filters on diesel engines, replacing inefficient cookstoves, and banning the open burning of agricultural waste. Methane can be reduced through retrofits or upgrades to existing emissions-control technologies where most leaks occur: oil and gas wells, leaky pipelines, municipal landfills and wastewater treatment plants. Many of these actions pay for themselves, as the captured methane can be used for energy.

<https://nicholas.duke.edu/about/news/science-there-numbers-add-doable>

Quantifying and communicating the benefits of this integrated approach to climate change and air pollution has become a core focus of Shindell's scholarly output.

In addition to his ongoing research, he chairs the scientific advisory panel to the international Climate and Clean Air Coalition, chaired the 2011 Integrated Assessment of Black Carbon and Tropospheric Ozone by the UN Environment Programme (UNEP) and World Meteorological Organization, and was a coordinating lead author of the key chapter on anthropogenic and natural radiative forcing in the 2013 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

He's also testified on climate change and air quality before both houses of Congress, the World Bank and the United Nations Framework Convention on Climate Change. "The point I'm trying to drive home is that by working smarter we have a real opportunity to make progress on three critical issues: global warming, air pollution and food security," he says. "The science is there. The numbers add up. This is doable."

A PHYSICIST IN SEARCH OF PURPOSE

Although it's too early to gauge its full impact in science and policy circles, Shindell's call to action appears to have struck a chord.

As a result of his leadership, the 2013 IPCC report shifted focus from measuring the causes of climate change in terms of concentrations of greenhouse gases in the atmosphere to including emissions of all climate pollutants.

Membership in the Climate and Clean Air Coalition—which was founded in 2012 in direct response to the UNEP report Shindell chaired and a related paper he published in *Science*—has grown from its initial roster of six nations to a current roster of 44 nations and 54 nongovernmental organizations, including big guns like the World Bank and World Health Organization.

"This has been the most direct link from science project to policy initiative that I've ever been part of," he says. "I'm honestly floored."

He shouldn't be.

With more than 170 peer-reviewed papers and dozens of high-profile assessment reports, invited testimonies, book chapters and keynote presentations to his credit over the last two decades, Shindell is arguably one of the most influential voices in climate science and atmospheric chemistry today.

His discipline-blending work has reshaped scientists' understanding of the natural and human drivers of climate change and air quality and how they interact. NASA, the National Science Foundation, the American Geophysical Union, the American Association for the Advancement of Science and other leading agencies and organizations have all bestowed high honors on him for his contributions to climate research and outreach.

All things considered, it's not a halfbad list of honors and accomplishments for someone who once looked down his nose at environmental science, and applied science in general. "I only got into environmental research by coincidence," Shindell admits with a laugh.

<https://nicholas.duke.edu/about/news/science-there-numbers-add-doable>

Growing up in 1970s in the East Bay region of California, a short drive from San Francisco and Berkeley, he was aware of the growing interest in the environment occurring all around him but didn't see a future in it, at least not for him.

"I preferred the intellectual challenge of physics," he says.

The connection between physics and the environment, and basic and applied sciences, didn't crystalize for him until he was an undergrad at the University of California-Berkeley and took part in a research project studying a deadly gas eruption in Lake Nyos, one of two so-called "killer lakes" located in the central African nation of Cameroon.

In 1986, a large gas cloud erupted unexpectedly from volcanic Nyos, giving off large amounts of carbon dioxide that suffocated more than 1,700 people in surrounding villages. Shindell and the other members of the Berkeley team were tasked with explaining why the eruption had occurred with no advance warning, and what could be done to improve scientists' ability to predict similar eruptions in the future.

"Applying physics to the study of such an event intrigued me," he says. "It showed that environmental applications were relevant and interesting."

After finishing his bachelor of arts in physics at Berkeley in 1988, he began doctoral studies in physics at the State University of New York at Stony Brook and spent the summer of 1989 conducting research on fundamental physics at the nearby Brookhaven National Lab synchrotron.

It was a life-changing experience. Just not in the way he anticipated.

"It was fascinating from an intellectual perspective, but by summer's end I realized I didn't want to spend the next few decades of my life doing something so esoteric," he says. "I started looking for something more applied."

A group of other physicists at Stony Brook had recently begun exploring the complex chemistry responsible for the ozone hole over Antarctica. Reviewing their work, Shindell realized he could help shed light on what was going on by building a model that would help the scientists better understand the measurements they were taking of ozone-depleting chemicals in the atmosphere. He joined the team.

"Here was a chance to apply my work in way that had clear benefits to society and involved travel," he says. "I was in!"

His newfound focus took him to Antarctica three times and northern Greenland twice and became the basis for his doctoral thesis, for which he developed a photochemical model that calculated changes in atmosphere chemistry by comparing measurements of ozone depleters and ozone itself.

After graduating in 1995, he was hired by the NASA Goddard Institute for Space Studies at Columbia University to integrate his atmospheric photochemistry model into a climate model recently developed by NASA scientists.

"Back then, most climate models had no atmospheric chemistry whatsoever," he explains. "Scientists knew ozone and other shorter-lived chemicals in the atmosphere affected

climate, but the two areas of study had always been viewed as separate. We were just starting to realize we needed a more integrated understanding.”

For Shindell, it was a case of being in the right place at the right time, with the right skill set.

ANSWERING THE SKEPTICS

Major papers soon followed, including two seminal works published one month apart in 1999.

The first study, published in March in *Nature*, revealed that the greenhouse effect from burning fossil fuels was affecting weather and stratospheric wind patterns over the northern hemisphere more than previously thought, partially as a result of chemical processes. This was causing dramatic regional shifts in median temperatures. Some Arctic regions such as Greenland were warming during winter at a rate nearly 10 times that of the global average. The second study, published in April in *Science*, showed that the interaction of increased solar activity and anthropogenic chemicals in the upper atmosphere also affected wind patterns and caused regional climate shifts.

Taken together, the two studies yielded strong new proof that increased emissions of manmade pollutants in Earth’s atmosphere were inextricably linked to climate change, especially on regional scales.

What the studies didn’t prove was equally important, Shindell stresses. Neither study found evidence to support skeptics’ claims that increased solar activity or natural variability was the primary driver of global temperature increases.

“Our model clearly confirmed that greenhouse gases were playing the dominant role,” he says.

A third paper, published in *Science* two years later, built on this foundation and, in the process, took aim at one of the denier camp’s most oft cited objections to mainstream climate change theory: the Little Ice Age of the 17th century.

“During the Maunder Minimum, or the so-called Little Ice Age, there were almost no sunspots, and it got really cold in the eastern United States and Europe. This was the only time in recorded history that New York harbor froze over completely,” Shindell explains. In 1998, however, when climatologist Michael Mann and two colleagues published their now-famous large-scale reconstruction of Earth’s climate dating back to the year 1400, their model showed only slight changes in climate during the 17th century.

The only major global temperature flux reflected in the model was rapid warming in the modern era, represented by a short, sharp upward spike at the end of a long, relatively flat line of temperature averages, giving the model a shape that vaguely resembled a hockey stick.

The following year, Mann and his team published a revised large-scale reconstruction dating back to 1000. Once again, it showed only slight changes during the 17th century. To compound matters, the new model also showed only a modest change during a time prior to 1250 known as the Medieval Warm Period.

Critics pounced. The flaws in Mann's reconstruction were proof that climate data were unreliable, they claimed. And the so-called "hockey stick controversy" was born.

With the credibility of climate data at stake, Shindell decided to weigh in. With Mann as one of his co-authors, he ran his own model, which included the impact of atmospheric chemistry. It confirmed that the reduced solar output of the 17th century, combined with chemical feedback in the atmosphere—ozone—caused major regional climate changes but not a big overall change in global patterns.

Europe and parts of North America got colder, but other areas, including Africa and Australia, showed no major cooldown.

"This is why Mann's large-scale reconstructions showed only slight global changes," Shindell says. "It was a major finding, not only to validate Mann's work and the agreement between climate data and models in general, but also to show that atmospheric chemistry played a much larger role than previously thought in affecting climate change, and that regional changes could be large even if global change was slight."

The success of the paper, which has since been cited in nearly 570 other peer-reviewed studies, spurred Shindell to turn his sights to an even bigger challenge.

"The question I wanted to answer next was: Why do some regions change in one way, while others don't? That was not well understood at all, but it was clearly crucial," he says.

AN INTEGRATED APPROACH

To unearth the answer, Shindell began to study tropospheric chemistry and the interactions of all SLCPs, not just ozone.

The more he discovered about the uneven distribution of SLCPs in the troposphere, their uneven contributions to anthropogenic forcing, and how they interact with longer-lived greenhouse gases like carbon dioxide, the more certain he grew that it was neither logical nor efficient to segregate climate change and air pollution as separate problems.

"Through my work with UNEP, the U.S. Climate Change Science Program and other initiatives, I was coming into contact with medical and agricultural researchers and economists who were studying the broader health impacts of air pollutants," he says. "It became clear that we were not dealing with global warming or air pollution, it was global warming and air pollution. They were directly related and we had to attack them as one."

Working with these experts from other fields, Shindell expanded the focus of the assessment report he was chairing for UNEP. "We quantified health impacts, we quantified crop yield impacts and we quantified climate impacts. It was like preparing a menu ready-made for policymakers," he says.

"We showed that we had 16 measures through which we could demonstrate that there were multiple benefits of reducing short-lived climate pollutants."

UNEP published the assessment report in 2011 and founded the Coalition for Climate and Clear Air the following year to achieve the objectives Shindell and his colleagues had set forth. By 2013, the IPCC had shifted its focus as well.

Shindell's mission to promote an integrated approach to climate change and air quality had reached critical mass.

But he's not slowing down anytime soon.

Since joining the Nicholas School faculty last summer, he's presented a policy talk about the benefits of SLCP reductions to delegates at COP15 in Lima, Peru, at the invitation of the U.S. State Department. He's testified before Congress to support passage of the Super Pollutants Act of 2014, which would provide financing to help underwrite costs associated with emissions reductions. And he's written another major research study.

The newest study, published in *Climatic Change* in February, calculated the true costs of our energy choices once the full environmental and health damages associated with their emissions are figured in.

Among other eye-opening findings, the study showed that a gallon of gasoline should cost around \$3.80 more a gallon than we currently pay, the cost of heating our homes with natural gas should more than double; and the cost of our monthly bills for coal-fired electricity should more than quadruple. Solar and wind power, by contrast, are cheap. "This builds on everything I've ever worked on: climate change and air quality, agriculture and human health, SLCPs and carbon dioxide. And it brings it down to a ground-floor policy-relevant level," he says.

When he's not working, Shindell, 48, likes to unwind by playing strategy games with his wife Miriam, a psychologist, and their three children: Cary, 15; Oliver, 12; and Leah, 6.

He also enjoys a good run. "Preferably something from a 5K up to maybe a halfmarathon," he says. "At those distances, it's not all about speed or endurance. It's a balancing act. You have to pace yourself and know when to kick it in."

Tim Lucas is senior writer for Dukeenvironment magazine and is the Nicholas School's director of marketing communications.

2016 WETLAND TREASURES OF THE CAROLINAS



MASON FARM WETLAND TYPES:

Photo by Johnny Randall

Piedmont swamp forest, alluvial forest, bottomland forest



MASON FARM WETLANDS

Property Owner: North Carolina Botanical Garden—UNC-Chapel Hill, public
Recognitions & Designations: Important Birding Area (National Audubon Society),
part of the Carolina Birding Trail, NC Significant Natural Heritage Area

carolinawetlands.org

ECOLOGY & SIGNIFICANCE

This site includes two valuable wetland areas—Big Oak Woods and Morgan Creek Floodplain Forest—that are part of the NC Botanical Garden's Mason Farm Biological Reserve. The Reserve and adjacent undeveloped tracts adjoin with the 41,000-acre New Hope Game Lands to the south, creating landscape connectivity that amplifies the ecological value of these wetlands. Mason Farm Wetlands are highly significant both for wildlife habitat and for water quality. Big Oak Woods is one of the largest tracts of mature bottomland swamp forest remaining in the Piedmont, with some trees exceeding 300 years of age. Morgan Creek Floodplain Forest is part of one of the largest, most intact tracts of Piedmont swamp forest remaining, and also includes mature Piedmont alluvial forest.

FLORA & FAUNA

Morgan Creek Floodplain Forest is dominated by sycamore, boxelder, sweetgum, tulip poplar, and bitternut hickory, while the canopy of Big Oak Woods includes large willow oak, swamp chestnut oak, cherrybark oak, Shumard's oak, overcup oak, and shagbark hickory trees. Spring ephemerals like atamasco and trout lilies, toothworts, and spring beauties blanket the Big Oak Woods floor in springtime. Numerous



Four-toed salamander—photo by Alvin Brasswell

species of breeding birds have been documented at this site, including American redstart, Louisiana waterthrush, Philadelphia vireo, prothonotary warbler, Swainson's warbler, northern parula, hairy and pileated woodpeckers, great horned owl, barred owl, woodcock and red-shouldered hawk. More than 50 other animal species use these wetlands, including the regionally rare bobcat, marsh rabbit, river otter, American mink, and four-toed salamander, a state-listed species of special concern.

THREATS

Impacts from continued suburban development in the area—including the spread of invasive species and stormwater runoff—may affect the ecological integrity of these wetlands. Invasive species such as privet have already gotten a foothold in parts of the site.

ACCESS

These wetlands are located east and south of the NC Botanical Garden's Education Center. Access is by permit only, available for free at the Education Center reception desk. For details, see ncbg.unc.edu/mason-farm-biological-reserve.

SOURCES

Inventory of Significant Natural Areas and Wildlife Habitats
Orange County, NC
North Carolina Botanical Garden



State says it will pull SolarBees from lake

May 6, 2016

N.C. Department of Environmental Quality report from March said SolarBees don't work

Secretary says he'll recommend lawmakers pursue other options for Jordan Lake

*News Observer
May 6, 2016*

BY PAUL A. SPECHT
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RALEIGH

The N.C. Department of Environmental Quality announced Thursday that it will remove the controversial water-churning devices known as SolarBees from Jordan Lake because they aren't working.

The move came as the department faced mounting scrutiny for how it has handled reports about the SolarBees and dealt with water quality advisers who have questioned their effectiveness.

The Republican-led General Assembly turned to SolarBees in 2014 as a cheaper water-cleaning alternative to establishing strict construction and development restrictions on upstream communities such as Greensboro that a Democrat-led legislature approved in 2009.

Donald van der Vaart, secretary of the state environmental agency, said Thursday that he'll recommend that state lawmakers find an alternative to the SolarBees in Jordan Lake because they haven't significantly improved the water quality after 21 months in operation.

Jordan Lake, which provides drinking water to 300,000 Triangle residents, has been designated as impaired under the federal Clean Water Act. It often exceeds state standards for chlorophyll a, the green pigment in algae and plants that thrive off nutrient pollutants like nitrogen and phosphorus entering the lake.

FROM PAGE 1A

SOLARBEES

The state spent \$1.3 million to maintain 36 leased SolarBees on Jordan Lake and will save an estimated \$1.5 million by removing them.

"I appreciate the work our staff has done over the last two years to evaluate the potential of the SolarBee technology to improve water quality at Jordan Lake," van der Vaart said.

SolarBees are floating devices equipped with solar-powered pumps that churn the water in an attempt to reduce the effects of algae. DEQ reports they can make a difference in small- to moderately-sized water bodies but have yet to improve the water in Jordan Lake and have even floated away from their

anchored positions.

Environmentalists praised DEQ's decision and urged lawmakers to install pollution protections in upstream communities.

"SolarBees don't work because they just move water around; they don't actually treat or remove the pollution, and they are simply too small to have much impact in a large lake," said Grady McCallie, policy director for the North Carolina Conservation Network.

"It is past time to better control stormwater runoff from new development upstream."

Van der Vaart's announcement comes in the wake of allegations from environmentalists that his department doctors the

work of experts to better fit the administration's political agenda.

Earlier this week, DEQ published what it's calling the final version of a report on SolarBees that it posted and then retracted in March. Unlike the March report, which called on DEQ to remove SolarBees from Jordan Lake, the final version doesn't predict whether or not the devices will make a difference if given more time on the lake.

The revisions showed DEQ was trying to cover up the inefficiencies of the SolarBees in order to "support a politically predetermined conclusion," said Dustin Chicurel-Bayard, spokesman for the N.C. Sierra Club.

Environmentalists and Rep. Chuck McGrady, a Henderson Republican who co-chairs the legislature's Environmental

Review Commission, criticized DEQ for retracting the March report and then misleading the public about missing the April 1 deadline for producing the report, which the General Assembly set last year when it approved the state budget.

A DEQ spokeswoman said the state's Legislative Analysis Division granted the department an extension, but the division's leader denied that claim and said his division had no legal authority to do so.

Environmentalists cried foul again after a water expert was demoted from his role on the Environmental Management Commission, a 15-member group of DEQ advisers responsible for adopting rules for protecting the state's air and water.

Steve Rowlan, whom Gov. Pat McCrory appointed as EMC chairman in

January, removed Steve Tedder from his role as chairman of the Water Quality Committee a few days after Tedder questioned DEQ for retracting the March SolarBee report. Tedder's committee was scheduled to review the report, and his removal prompted another commissioner, Thomas Craven, to resign from his role as chairman of a separate committee in protest of Rowlan.

Rowlan rejected the notion that his decision to remove Tedder and two others from their committee assignments was a reaction to their opinions of SolarBees.

Several lawmakers from Guilford and Wake said Thursday that they haven't identified other strategies for cleaning up the lake, but it's clear they prefer different approaches.

Rep. Nelson Dollar, a

Cary Republican, said he thinks lawmakers should seek a solution that addresses the concerns of Jordan Lake users and upstream communities. McGrady, meanwhile, suggested taking a "polluter-pays" approach.

"I don't want to be critical when I think they've done the right thing," McGrady said, referencing DEQ's "curious" past actions on SolarBee reports.

"I presume that they're doing it (removing SolarBees from Jordan Lake) for the reason they suggested, which is science-based," McGrady said. "Why don't we make a science-based decision to keep pollutants out? ... As I understand the Jordan Lake Rules, that was the concept."

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