

Opportunities in North Carolina for Producing Woody Biomass for Energy on Liability, Marginal, and Non-productive Lands

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The Push for Renewable Energy Continues Worldwide

- Most of the important development policy driven



Examples of Policies That Encourage Biomass for North Carolina

- Long-standing ethanol subsidies (U.S.)
- Renewable Fuels Standard of 2007 (U.S.)
- Interests of the US Military
- Senate Bill 3 from 2007(the REPS) – (North Carolina)
- The Biofuels Center of NC
- 20-20-20* (EU)

*http://ec.europa.eu/clima/policies/package/index_en.htm

In Response, Biomass Energy in North Carolina is Rapidly Developing

- **Three private electricity (power) plants have converted to woody biomass**
- **New biomass power plants planned**
- **Various-scale CHP conversions completed or underway using woody biomass and agricultural residues**
- **Wood pellet plants being constructed or planned for EU power markets**
- **Cellulosic ethanol plant**

Much Pushback to Some Aspects of Biomass in NC as Elsewhere

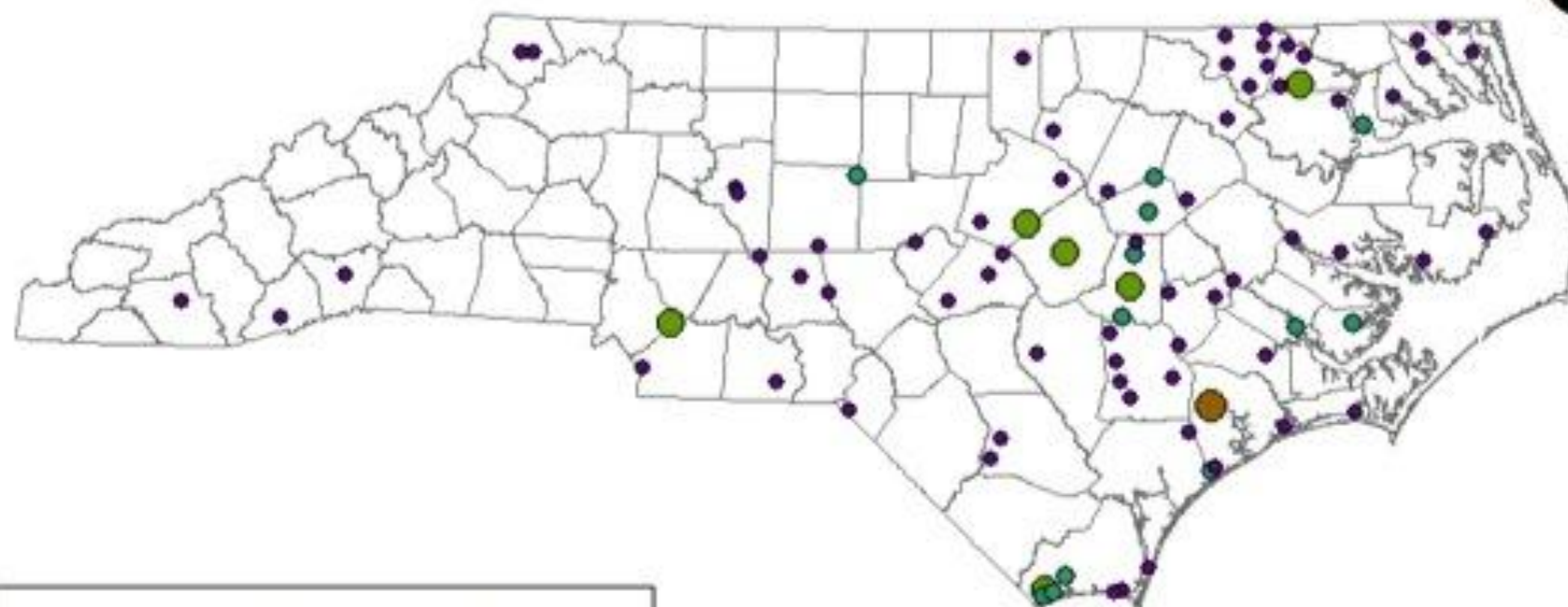
- **Much publicized “food versus fuels” issue with corn ethanol**
- **Concerns about loss of ecosystem services due to over-gleaning forest biomass**
 - **Biomass Harvesting Guidelines (BHG) being discussed as in many states**
- **Concerns about pressure to convert natural forests to managed plantations**

Many Do Not Want to See This!



Where Can We Grow These Crops?

- **“Liability Lands”**
 - Contaminated sites
 - Lands receiving municipal waste treatment effluent or biosolids
 - Land fills
 - Highway right of ways
 - Airport properties
 - Power transmission line right of ways
- **“Marginal” crop lands**
 - Cleared agricultural lands that will not produce conventional crops profitably



Wastewater Land Application Facilities

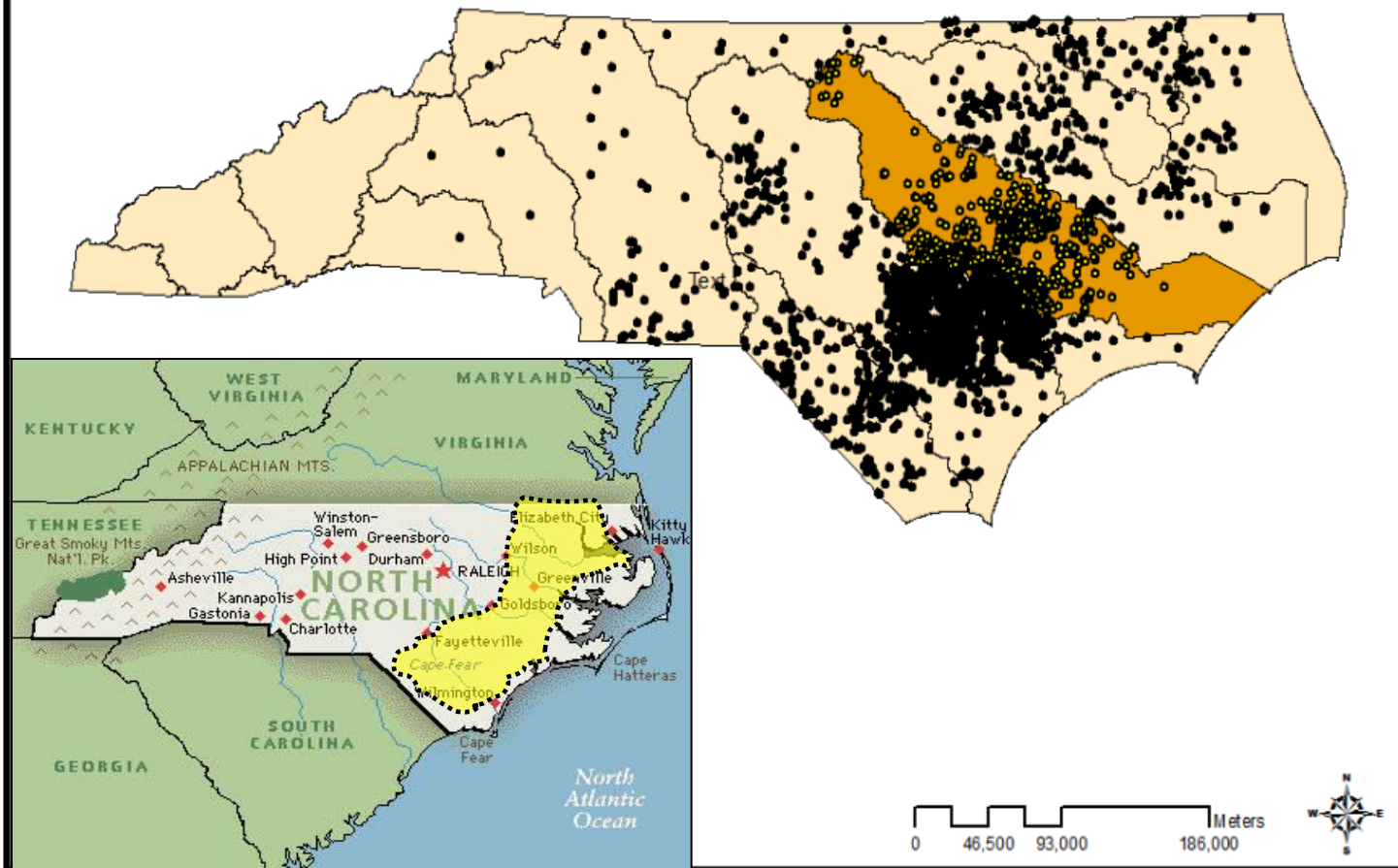
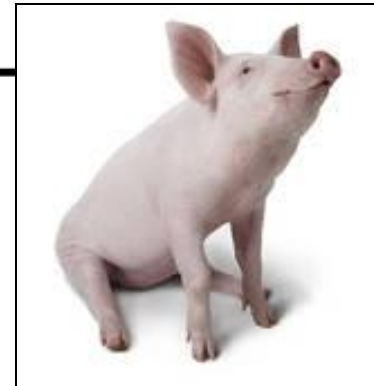
- 0 - 50 Ha
- 51 - 100 Ha
- 101 - 200 Ha
- 944 Ha



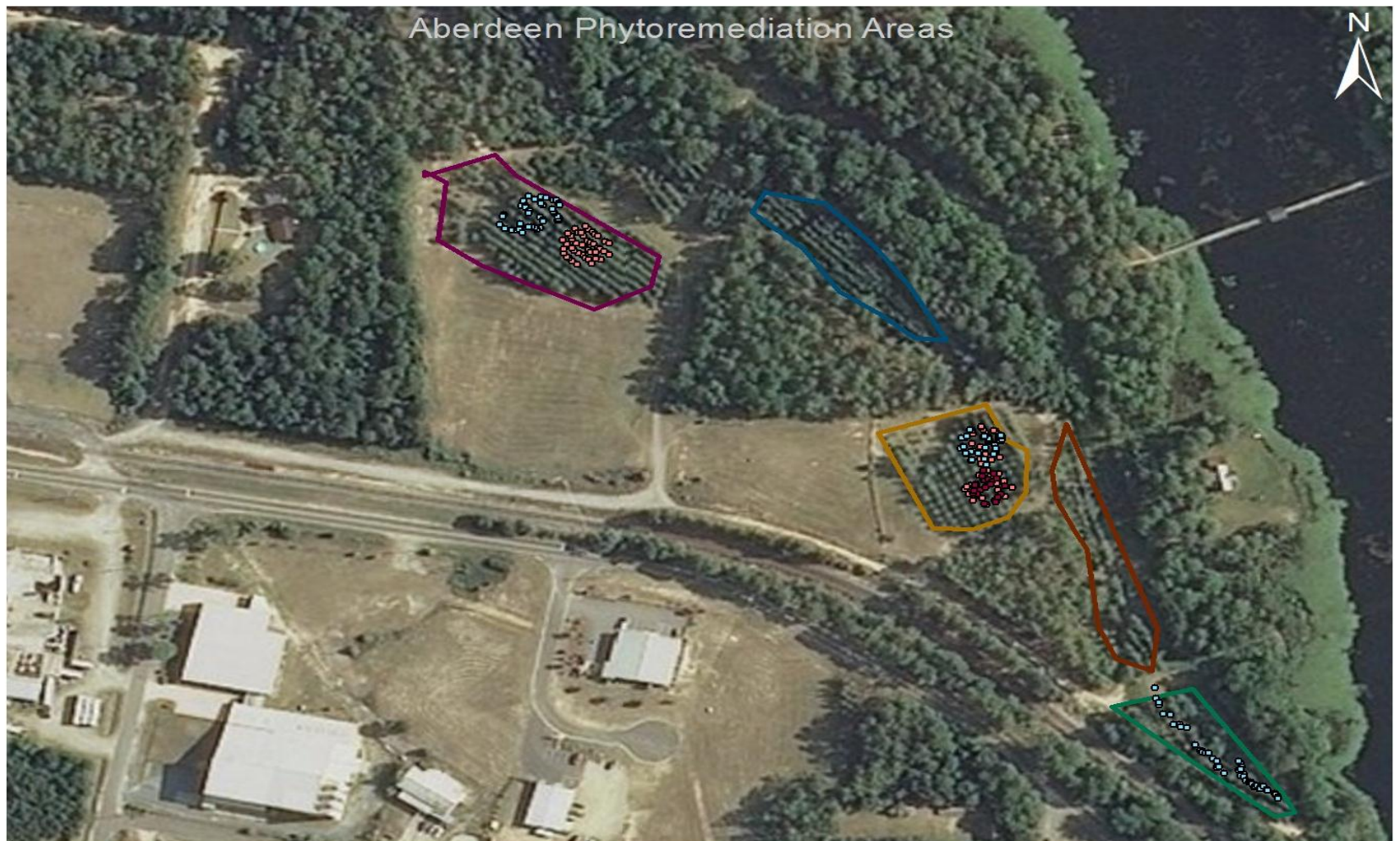
Swine Lagoons NC Total (2003): ~ 4100

Neuse River Basin (2003): ~ 850

Note: Open Lagoons, Active/Non-Active



Phyto Sites (ex. Lindane was with Buried Here - Gamma-Hexachlorocyclohexane)



Highway
Right of Ways
in North Carolina

This aerial map illustrates the right-of-way for Highway 74 and Highway 13 in North Carolina. Highway 74 is a multi-lane highway running diagonally from the top left to the bottom right. Highway 13 is a two-lane road that intersects Highway 74 at two points. The first intersection is near the top center, where Highway 13 crosses Highway 74. The second intersection is further down, where Highway 13 crosses Highway 74 again. The map shows the surrounding landscape, including dense green forests, open fields, and some residential areas. Road names visible include 'Doas Rd' at the top, 'High Ridge Rd' on the left, and 'Park Dr' at the bottom right. Highway shields for 74 and 13 are placed at the intersections. The text 'Highway Right of Ways in North Carolina' is overlaid on the right side of the map.

Most SRWCs in the Ground Today are Phytoremediation Projects?

PHYTOREMEDIATION

Using Nature to Clean Itself Up

U.S. Department of
Homeland Security
**United States
Coast Guard**



From 1942 until 1991, the surrounding area was used as a fuel farm for aircraft refueling. The fuel farm consisted of multiple underground and aboveground storage tanks which were decommissioned and removed from the site. Evidence of a release was observed during the tank removal activities, resulting in impacts on subsurface soils and groundwater by petroleum hydrocarbons.

Phytoremediation was the selected remedy to control and contain contaminated groundwater migration and to remediate impacted soil and groundwater. Phytoremediation is an innovative and cost-effective technology that refers to the use of plant-based systems to remove, degrade, or stabilize environmental contaminants present in soil and/or groundwater.

The use of deep-rooted trees is designed to intercept and, in some cases, remediate shallow groundwater plumes.



The plant roots can reach and extract groundwater, altering groundwater flow patterns by maximizing water uptake by the phytoremediation system and increasing microbial activity in the root zone. The net result of using the plants used for phytoremediation is twofold: both improved hydraulic control and enhanced bioremediation.

Both poplar and willow trees have been planted across the site to remediate subsurface soils and groundwater. The use of both poplar and willow trees within a phytoremediation plot can capitalize on the favorable phytoremediation potential specific to each species.

The phytoremediation project is being performed in a combined effort with the United States Coast Guard, ARCADIS, North Carolina Department of Environment and Natural Resources, United States Geological Survey, and North Carolina State University.



NC STATE UNIVERSITY



However, In NC We May Be on the Verge of SRWCs for Energy

Cellulosic Transportation Fuels



(slide borrowed from Alex Hobbs)

- Is the technology that will be judged by “food vs. fuels”
- In the U.S. is the technology that will be most subsidized to facilitate development
- Not many other renewable alternatives

August Announcement in Eastern North Carolina

- **Italian biofuels company announces new cellulosic ethanol plant to be constructed**
- **“The project, deemed ‘Project Alpha,’ plans to use dedicated non-food “energy grass” feedstock crops, which can be grown on low-value and marginal land...*”**

*ClintonNC.com (August 30, 2012)

Lots of Questions About Building an Industry on Non-Traditional Forest Feedstocks on Those Produced On Non-Food Lands

- **How many parcels will be large enough to present an economic opportunity?**
- **Is there enough potential anywhere to support a biofuels plant without transporting feedstocks excessive distances?**
- **Will these lands have reasonable productivity?**
- **Will landowners be interested?**

Some Voices of Negativity!

- **“We need to grow wildflowers along our highways – people donate money.”
(NC DOT)**
- **“Well, don’t forget. Marginal crop land is called ‘marginal’ for a reason! (NCSU Ag Prof)**
- **“All we care about is keeping the Division of Water Quality off our back.”
(Municipal waste plant manager)**

For more information

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- **For woody biomass see:**
 - **<http://www.ces.ncsu.edu/forestry/biomass.html>**