



**North Carolina Agriculture and Forestry Adaptation Working Group
(NC-ADAPT)
Agriculture and Forestry Adaptation Summit
Raleigh, NC
August 11, 2015**

The North Carolina Agriculture and Forestry Adaptation Work Group (NC-ADAPT) held its initial Adaptation Summit on August 11, 2015, at the McKimmon Center at North Carolina State University in Raleigh, NC. The NC-ADAPT Summit brought together farmers, livestock producers, forest managers, business and industry leaders, conservationists, government officials and academics to identify and forge a consensus on the unique adaptation challenges that North Carolina's agriculture and forestry sectors will face going forward. The Summit was sponsored by [Solutions From the Land](#), [Z. Smith Reynolds Foundation](#), [North Carolina Forestry Association](#) and [Homegrown Agriculture](#).

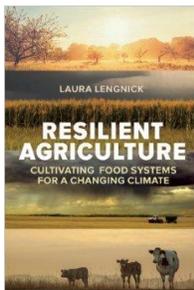
State officials and stakeholders are asking not just should we adapt, but asking how do we adapt to changing climatic conditions and other challenges that that are exacerbated by extreme weather. North Carolina is positioned to be a leader in building resilience and implementing measures that will ensure the viability of the state's agriculture, forestry, livestock and specialty crops sectors for the next generations.

1. Welcome and Opening Comments

R.C. Hunt, Co-Chair of the North Carolina Agriculture and Forestry Adaptation Work Group (NC-ADAPT), kicked off the North Carolina Adaptation Summit with remarks on the importance of the adaptive management planning work that would follow for agriculture and forestry, the main economic engines of North Carolina's economy. R.C. was followed by Eddie Reese of the North Carolina Forestry Association who stood in for the other NC-ADAPT Co-Chair, Chip Miller. Mr. Reese helped to reiterate R.C.'s point on the importance of adaptive management planning for the agriculture and forestry industries in North Carolina.



1. Keynote Address



The Summit keynote speaker was Laura L. Lengnick, Climate Resilience Planning Consultant for Fernleaf Solutions and Author of *Resilient Agriculture: Cultivating Food Systems for a Changing Climate*. Ms. Lengnick reflected on her research and travel around the country interviewing farmers and ranchers exploring how climate change is inextricably involved with agriculture. Ms. Lengnick has found that climate vulnerabilities are measured by exposure, sensitivity and adaptive capacity. By understanding adaptive capacity, a community can incorporate flexibility, planning and learning into a resilient

system as adaptive management is a “learn as you go” process. An adaptive management strategy should invest in a balanced portfolio of assets that include natural resources, human resources, social relationships, physical systems and financial resources. Ms. Lengnick believes that the U.S. has only invested in physical and financial assets. According to Ms. Lengnick, systems with adaptive capacity are resilient and resilient systems have adaptive capacity. A copy of Ms. Lengnick’s presentation can be found [here](#).

2. Project Overview and Opportunities for Adaptation

Ernie Shea, President of Solutions from the Land, then discussed the evolution of the NC-ADAPT Work Group and the work that was put in to developing the report, [Keeping North Carolina's Farms and Forests Vibrant and Resilient: An Adaptive Management Planning Strategy](#). The report was the result of a [yearlong exploration](#) of the impacts that increasingly extreme weather events and changing climatic conditions are having on the agricultural and forestry sectors of North Carolina. The report outlines NC-ADAPT's findings and recommendations and offers a roadmap for constructing an adaptive management plan to improve agriculture and forestry resiliency. Mr. Shea said the Work Group had made significant progress made to date, but recognizes the need to bring more people to the discussion table and therefore, invites action and participation from a wider set of interested parties. A copy of Mr. Shea’s presentation can be found [here](#).

3. North Carolina: Scientific Perspectives on Climate, Agriculture and Forestry

A major objective of the Summit was to review the potential challenges that science is telling the North Carolina agriculture and forestry industries to expect in the future. To meet this objective the Summit organizers turned to the expertise of Dr. Ryan Boyles of the State Climate Office at North Carolina State University. Dr. Boyles offered empirical data collected by the State Climate Office showing projections of seasonal changes to the weather in North Carolina and the potential challenges that could present from these changes. Drought remains one of the largest threats to agriculture and almost every model and metric shows an increase in global temperatures. The diversity of North Carolina’s climate reflects the multiple weathers hazards experienced each year in the state and presents threats to agriculture, forestry, tourism, natural resources and other economic drivers. A copy of Dr. Boyles’ presentation can be found [here](#).



The next presenter was Dr. Steve McNulty, Director of the USDA Southeast Regional Climate Hub (SERCH). He shared the data collected by the USDA on changes to the national climate over the last few years, as well as some of the tools being offered by the USDA to help farmers and foresters prepare for future changes. In short, Dr. McNulty believes that we should apply soil and water conservation techniques that are already known to provide benefits and then look to new adaptive measures land managers can use to increase their resilience to climate variability and change. SERCH is currently performing a Vulnerability Assessment of the Southeast. A copy of Dr. McNulty’s presentation can be found [here](#).



4. Panel I: Partner Perspectives on Adaptation

The Summit then welcomed a panel of agriculture and forestry stakeholders as well as value chain partners to discuss efforts they have already engaged in to adapt to changes they have experienced on their fields and in their forests and the need for new measures to ensure the long-term sustainability of working lands.



The panel included David Heath a North Carolina farmer, and owner of Bountiful Blessings Farm in Ft. Barnwell, NC. Bountiful Blessings Farm grows soybeans, cotton, corn and wheat, and David serves as a Board Member of the North Carolina Soybean Producers Association, as well as a member of the North Carolina Cotton Producers Board of Directors. Mr. Heath shared his experience as a North Carolina farmer, and what he has done and seen done by his neighbors to improve resiliency to erratic weather and better prepare for changes in the future. Mr. Heath also shared that messaging to producers in regards to climate must continue to be framed in a financial impacts context. State and federal financial disincentives to implement innovative/experimental conservational measures must be removed. Adaptation is not a one-size-fits-all concept and generational impacts must be accounted for.

David Halley, a North Carolina Registered Forester and a Certified Forester of the Society of American Foresters, shared his thoughts regarding current challenges to forestland owners. Mr. Halley works as a Consulting Forester with True North Forest Management Services. Mr. Halley provided a foresters perspective to the changes he has seen in the North Carolina forests, but also raised the concern of foresters at having to make decisions with a much longer time horizon due to the time it takes for trees to mature. Mr. Halley recommends that better risk management tools and prediction models be developed.

Jeff Harris is a member of the North Carolina Association of Soil and Water Conservation Districts. Mr. Harris has been involved in agriculture throughout his entire career. His family's farm produces cotton, wheat and soybeans. He currently works as a Sales Executive with Agri Drain Corporation, a national leader in conservation and water management. Mr. Harris helped to provide a perspective on the national scale changes being undertaken to further more sustainable agriculture and forestry. He has witnessed adaptive management measures occurring all across the nation as farmers have implemented production practices that allow them to succeed and thrive in areas of the country with very diverse climate and weather systems. But more funding for technical assistance is needed at the local level.

Tami Schwerin represents Abundance North Carolina, an organization that helps promote sustainable agriculture in central North Carolina. Ms. Schwerin brought her years of experience in community activism and sustainable agriculture to help convey some of the practices that her organization has helped promote. Ms. Schwerin stated that she believed that climate impact

communication channels need to be expanded and more collaborative efforts implemented that include diverse voices.

Mark Sutherland, a retired U.S. Marine Colonel and current Senior Analyst with Marstel-Day, has spent a lot of his career helping local communities and the military live in harmony and support one another. He helped to contribute the valuable perspective held by the military in maintaining abundant adjacent working farm and forest lands in support of national defense. The military needs dark night sky and absence of tall structures to meet mission training goals. The Defense Department also recognizes natural resource and biodiversity vulnerabilities in adjacent lands as a threat to mission training and North Carolina has become the poster-child for successful partnerships.

Additional comments from the panel include: Funding for conservation initiatives have dropped at state and federal agencies as North Carolina continues to move from a rural state towards an urbanized state; As the Extension Service becomes financially strapped, more dependence on private consultants has grown; Fear of regulation does not always sit comfortably with landowners, even if framed in a profitability scenario.

5. Panel II: Adaptation Solutions and Examples of Effective Risk Reduction Tools

The second panel focused more on some of the potential tools and solutions that producers could use in improving resiliency to erratic weather and changing climatic conditions.



Dr. Mark Megalos of NC State University's Forestry Extension Department, shared from his many years of forestry experience—and personal experience as a home gardener—on some of the challenges he has encountered and expects others will face in the future. However, he was also keen to present suggestions of some basic practices that can be utilized to improve resiliency and maintain agricultural and forestry vibrancy. Dr. Megalos also provided a list of forecasting tools that landowners can access. A copy of Dr. Megalos' presentation can be viewed [here](#).

Adam Costanza, President of The Institute of Forest Biosciences (IFB), discussed how IFB fosters the use of science and technologies that create healthier and more productive forests now and for the future. Adam shared his experience in what he has seen done in local forests to better prepare for changing climatic conditions, as well as a unique tool offered by IFB to help the community support forestry by identifying various trees. He sees getting the information out to tree farmers as the most difficult challenge.

Daljit Singh, of Monsanto's Technology and Development Division, has spent many years studying agricultural genetics and helping to develop the next generation of row crops. According to Mr. Singh, agriculture is seeing an intensification of pest pressures. However, agriculture is increasing yields and adapting to local conditions through the use of traditional breeding technology, biotechnology and enhanced agricultural practices to meet future demands. He shared some of the technological advances that are offered by companies like Monsanto to

produce resilient agriculture varieties. These solution systems sometimes requires 15 year planning windows.

Professor Guido van der Hoeven helped provide a new perspective to the panel by sharing his experience in providing extension services including: tax policy, machinery economics, and farm business management and the profitable continuation of "family farms" to succeeding generations. He helped to shape the conversation around adaptation to that of common sense economics and business, explaining that agriculture and forestry need to cooperate and adapt to be better positioned to be successful economically in the future. Educating one's self on these issues in not a cost, it is an investment. An operation must be as financially resilient as they are natural resource resilient.

Dr. Mike Yoder of NC State University shared from his experience as the Associate Director of North Carolina State Extension and State Program Leader for 4-H and FCS. He provided some background on the history of the 4-H program and how it was originally founded to be an adaptation promotion mechanism by having young farmers engage their parents with new techniques. He also spoke to some of the extension services that are provided to agriculture and forestry to help them continue to be successful and the value of risk management practices employed to reduce impact of adverse actions. Dr. Yoder also believed that youth should be involved in the climate science discussion.

6. Breakout Sessions: Farmer/Forester Climate Smart Agriculture Priorities and Measures; Report Out to Summit Participants

North Carolina is one of the most productive states for growing crops, timber, and livestock. To maintain growth in North Carolina's economy, crop, forestry and livestock producers need to continue to change and adapt so they are better prepared for what the future holds. However, the future is increasingly more unpredictable, and that can make the work of any farmer, rancher and forester more difficult. Producers are beginning to see changes to the growing conditions that they depend on. Warmer winters, hotter summers, heavier rains, and other changes to the climatic conditions in the state present a major financial risk to every producer in the state. These same farmers, ranchers and foresters are eager to develop new strategies and tools to remain economically viable amidst these changes, so that their children and children's children can maintain their family legacy.

Participants of the NC ADAPT Summit were asked to break into four teams, to discuss the challenges faced by their respected industry in North Carolina, and to highlight any successful practices that have been implemented or solutions being considered. The four teams represented producers and stakeholders of commodity crops, forestry, livestock and specialty crops. As time allowed, the teams were asked to respond to the following questions:

1. What challenges do we anticipate in the future?
2. How can we adapt to be better prepared for these unpredictable scenarios?
3. Have weather changes exacerbated the spread of disease or harmful insects?
4. What other challenges have we faced in trying to produce more goods with limited space?
5. How do we continue to increase production without harming the lands that we depend on?
6. Who is doing innovative things now to prepare for the challenges of the future?
7. In the areas listed below, what do we need going forward to be able to maintain our incredible economic advantage in producing crops/wood/livestock?
 - a. Risk management tools

- b. Research priorities
- c. Planning and decision support tools
- d. Production and conservation systems and practices
- e. Producer communications and outreach

Breakout I - Commodity Stakeholders Team

Crop producers recognized several challenges. First is finding new markets and gaining access to those markets. Improvements with transportation infrastructure and the ports would be helpful. It was recognized that North Carolina is a grain deficient state because livestock demand more grain than can produced in state. Swine and poultry production impacts 10% of the state's GDP. Grain producer profitability is important in order to keep them producing grains and not switch to other, more profitable crops. At the same time, research efforts are underway in the state to find alternative crops to corn for feeding livestock in North Carolina. Also, while new precision agriculture technologies have been developed to assess the needs of crops, these tools are not always calibrated to the soil and climate conditions in North Carolina.

To be better prepared for unpredictable climatic scenarios and production challenges, stakeholders recommend the following: Improve soil and water management to minimize the impacts of extreme weather; Embrace the land diversity of the state but recognize that planning is not a one size fits all solution; Utilize precision agriculture technology for crop management and prove these systems work at scale, and; Encourage better service from traditional providers (Extension Service).

Stakeholders found that there are barriers to the adoption of new technologies, tools and management practices. Some growers are not yet convinced that they need a new technology. And scale of production (large vs. small) impacts ability to invest and experiment with new systems. Also, the average farmer is getting older and the benefits may not pay off by the time he retires or transfers his business.

Commodity stakeholders were asked what needs to be done going forward to improve and make more resilient crop production in the state. Risk management tools such as the SERCH Tool Shed and Nutrient Management Toolkit from Environmental Defense Fund are useful but how do you get the end users to use it? EDF has partnered with Murphy Brown to access its grower network.

Research priorities should focus on heat and drought tolerant cultivars for plants and livestock. Sorghum is drought tolerant and close in nutrition to corn, but need more sustainable yields and more stable markers. Research on water use and irrigation, precision agriculture tools monitoring and calibration, and social drivers that will convince growers that these practices are worthwhile is needed.

Finally, production and conservation systems and practices needs are reflected in a desire for increased soil and water conservation investments such as the AgWRAP program and in local BMPs, which can become state BMPs. The stakeholders also expressed a desire for the Extension Service to lead on producer communications and outreach.

Breakout II – Forestry Stakeholders Team

North Carolina has one of the most diverse forestry landscapes in the country, and this industry has been one of the most productive aspects of the state's economy. With bioenergy markets expected to grow in the future, the demand for North Carolina timber could continue to grow and reach new heights. The forestry breakout team was by far the largest group of stakeholders and

brought a wealth of knowledge and awareness to the discussion. The group began by looking at potential solutions and strategies to reduce risk from a series of threats.

The team first examined strategies to build resilience against large and more frequent storms. Recommendations included:

- Higher quality seedlings (stronger/more straight) would help at margins and in the wind.
- Spacing of trees (stronger stem with wider spacing).
- Consider private, small forests and national forest.
Learn from natural systems that have already faced these issues. (Longleaf Pine is more resistant to drought, etc.).
- Need models that simulate different zones (What works in coastal won't work in Piedmont).
- Timing of message is important.
- Shorter rotation times to account for storms that may come at an increased frequency. How can you get message across to industry? Market is product driven.
- Once you have a catastrophic event, it's good to have info on what trees should be planted considering how environment is changing. Establish pipeline of information.
- Damage Assessment Recovery Tool: If we know we will have worse storms, we need to have supply chain in place to deal with that. Need better assessment tools and damage recovery (from trained teams). Have response units in place for major disasters so infrastructure is in place. Assessments must be done in a timely manner.
- Large scale recovery plan: Overlay and a central database that industry could use to see where those events could have taken place (such as ice storms).
- Develop capacity to process storm-felled wood.

The team then assessed how to mitigate the impacts of drought/higher temperatures. Recommendations included:

- Shorter rotations.
- Grow and develop seedlings that can be planted under adverse conditions.
- Better forecasts for planting.
- Stronger planting force.
- Recognize that trees grow a lot better under drought conditions than crops do.
- Use tree species that are more resilient to drought than other (Longleaf Pine, elite clones, Texas Lost Pines, etc.).
- Better information for the smaller landowners.

Mitigating and adapting to the challenges of more frequent wildfires was the next area of examined by the forestry stakeholder team. Recommendations included:

- Work with the public to educate on why burning is important. More and more people moving to areas that need prescribed burning treatments makes the practice more difficult due to smoke sensitive social issues.
- Let wildfires burn as long as possible without damaging a structure. Implement "Let it burn" policy.
- Promote thinning when burning isn't an option.
- Promote policies that encourage diverse markets for growing wood and markets for thinning material (biomass).
- Mandate local wildfire response plans? Counties struggle to get funds to implement plans. Should be part of volunteer fire department's mission to provide support on wildfires.

- Construct and maintain fire lanes/breaks with financial support from rural homeowner associations.

The forestry stakeholders then examined how invasive species should be considered going forward. Recommendations and observations included:

- North Carolina does not have a robust invasive species eradication plan.
- Can keep some out but others (Kudzu) it may be too late.
- May need to get DOT involved because of their role in spread of invasive plants (mowing and roadside activities).
- Department of Agriculture does have a “hotshot” crew to handle invasive species.

Lastly, the forestry breakout team looked at threats from pests including insects and disease. Recommendations included:

- Urban trees and commercial forestry are both impacted (Emerald Ash Borer major factor in urban landscapes).
- Early Detection Rapid Response, Bugwood.com, etc. are tools.
- Social media might be an important tool in building awareness and best practices to prevent introduction and spread of insect pests and disease.

The forestry breakout participants were asked what they would like to see in an adaptation plan for North Carolina. Recommendations included:

- Must address the different regions of the state: Coastal, Piedmont, Mountain (a unique set of problems for each region).
- Must talk about water (Do we talk about building more reservoirs now? Do we irrigate more? Does anyone get excess water?) Need to implement a water management plan.
- More risk assessment tools and a way to communicate those tools to organizations and public.
- Must frame climate change and water management gently to the public.
- Refer back to recent work that has been conducted in North Carolina: *Climate-Ready North Carolina: Building a Resilient Future* (2012) contained a forestry section. And the North Carolina Climate Action Plan Advisory Group’s *Recommended Mitigation Options for Controlling Greenhouse Gas Emissions* (2008) included challenges and opportunities for the forestry sector. May be important to go back and look over recent data/information. The Nature Conservancy has a workbook on how to create an adaptive management plan (references a number of other resources and research done on adaptive management plans).
- Implement small changes that are easily demonstrated. (Change is difficult and people aren’t willing to make a jump until they see it working for others.)
- It’s important to have communication between foresters and professional organizations.
- Utilize the cooperative extension model to take research and synthesize it for users.
- Many meetings are starting to talk more about resiliency. Isn’t good forest management a good response to climate change? The most productive response to climate change is a well-managed forest.
- Any management practice must first make financial sense, and then ecology gains are recognized through good forest management.

Breakout III – Livestock Stakeholders Team

North Carolina ranks as the number one producer of poultry and eggs, as well as number two for hogs, pigs, and farm-raised trout. These numbers just go to show the economic importance of

animal agriculture in the state of North Carolina. However, this industry depends on inputs from other sectors that can be drastically affected by unpredictable extreme weather events. These same extreme situations can lead to other issues within the livestock industry in terms of mitigating pollutant runoff and dealing with diseases. In order to continue to benefit from our economic advantage in this industry it is important that we assess the challenges we will face in the future and prepare to handle them today.

The team first examined some of the issues, concerns, as well as opportunities that can arise from higher temperatures and more erratic weather events. The group considered:

- Waste Management
 - Managing excess rainfall in winter at swine farms
 - Costly to pump excess water from lagoons
 - Farmers can use cover crops to mitigate nutrient/waste loss
- Water availability
 - Especially in hot summer months
 - Varied landscapes make it difficult to access some groundwater resources
- Overall heat stress on animals
 - Both confinement and pasture-based
- Aquaculture
 - Drought and warmer temperatures
 - Greater economic returns in real estate sales than aquaculture
- Biosecurity/Fly issues/Other parasites
 - Traveling disease from other regions
 - Migrating fowl and avian bird flu from the Midwest
- Potential for longer grazing seasons

Water security, usage, and management were major issues that the breakout team addressed. They discussed the value of improvements in irrigation, but that the technology can be difficult to implement and that there are concerns over reducing groundwater resources. Some of the considerations included:

- How to approve new irrigation technology through DSWC?
- Groundwater impacts
- Potential for conflict over water availability
- Water storage
 - AgWRAP
 - Regulatory issues and cost

Lastly, the livestock breakout team looked into some risk management tools and practices that could be adopted to make North Carolina livestock producers more resilient and successful. Some of the suggestions included:

- Look at other states with similar or warmer climates
- Locally adapted seed varieties
 - Research and development seem to be focused on the Midwest
- Conservation tillage
 - Addressing the first few years
- Innovations needed to positively impact the bottom line
 - Communication/outreach
- Extension programs/DSWC/NRCS

- Commodity groups
- Overall Planning
- Take advantage of windows of opportunity

Breakout IV – Specialty Crop Stakeholders Team

North Carolina ranks in the top ten nationally in the production of fresh market sweet potatoes, cucumbers, strawberries, tomatoes, cabbage, snap beans, watermelons, sweet corn, bell peppers, peanuts, squash, blueberries, grapes, and Christmas trees. The vast array of specialty crops produced in North Carolina is a testament to the state's importance in the domestic and global food market. Therefore, it is imperative that the industry be prepared to address the challenges of the future.

The specialty crops breakout team discussed how weather events impact production. Extreme wetness or dryness can have immediate impacts. Groundwater may not be a long-term solution due to increasing populations putting demands on water resources. Even temperatures have a noticeable impact on yields due to chill times and planting delays. But last 5 years have not experienced a killing frost in early spring.

Extension Service was a key tool for expertise, but shifting priorities have reduced access to this expertise. New producers in the specialty crop sector need the correct information and technology resources from the start to be successful and economically viable. It is easy to fail and these are often small farms. Private consultants may not be appropriate for specialty crops support if volume is not high enough as consultants can consume limited profits. Technology transfer at a reasonable cost is very important.

A new generation is looking back at the farm and at local distribution and seeking ways to innovate to become more efficient and meet the demands of consumers. Tunnels houses, row covers, plastics and innovative textiles help to create better growing conditions. Automated harvesting, on-site freezing and new processing methods open the door for new markets. Can also incorporate ornamental plant growth with irrigation water recovery systems. Rotating planting to meet local markets ensure income year around represents an adaption focus.

Finally, there are virtually no crop insurance tools or options to serve as a risk management tool and protect against financial losses from outside threats. Usually, one member of the farm family must have an off-the-farm job to ensure steady income and mitigate financial risk.

Group Discussion – Full Summit Participants

Following the reports from the Breakout Teams, the floor was opened to comments from all Summit participants. Comments, suggestions and recommendations included:

- Establish a baseline of economic impact data and technical support assistance and work from that baseline in the promotion of adaptive management solutions.
- Improved soil quality is a pathway to resilience.
- Focus on an integrated approach to adaptation.
- Expand aquaculture stakeholders to include coastal fisheries and commercial fisherman. However, we were cautioned to promote measure that could pit public fisheries resources against private land management practices.
- Adaptive Management Training need to be a part of the final report and should focus on long-term strategies.
- Include wildlife/biodiversity considerations as Adaptive Management Strategies are implemented.

7. Summit Impressions and New Paths



Dr. Mary Watzin, Dean of the North Carolina State University College of Natural Resources, offered her praise for the Summit participants and then offered a brief recap of all that she had seen, heard, and discussed during the day. Dean Watzin emphasized how valuable it was to have scientific commentary as the basis of the discussion, and thanked Dr. Ryan Boyles and Dr. Steve McNulty for providing the valuable scientific introduction to the Summit. She then remarked about how impressed she was to see such a diverse group of people involved in the vital discussion of adaptation and preparation for an uncertain future for agriculture and forestry in North Carolina.

Dean Watzin concluded by thanking all of those in attendance for coming to North Carolina State University for this critical first step on an important path, and she was excited to see the progress that would follow from the Summit and into the next phase of work.

Scott Bissette, N.C. Department of Agriculture and Consumer Services Assistant Commissioner for North Carolina Forest Service, offered his views on the Summit and the day's discussions. Mr. Bissette recognized that a wide variety of partners were present at the meeting and was glad to see agriculture and forestry working together as most farmers have both on the operations. Mr. Bissette indicate that capacity and resilience were some of the key words mentioned throughout the day at the Summit. Mr. Bissette found the breakout sessions to be very productive and recognized that forestry had the largest group.

Mr. Bissette talked about some the issues important to North Carolina and how adaptive management could play a role. The NCDA&CS Highly Pathogenic Avian Influenza preparation planning is underway. The NC Forest Service is responding to the Bald Knob in McDowell County and has the fire under control.



Furthermore, NCDA&CS Commissioner Troxler is committed to the success of the Got to Bee NC Pollinator program. Mr. Bissette thanked the Summit leaders for staying on time during the summit as well as on the accomplishments represented in the project timeline in the NC ADAPT planning report. He recognized that there is not one answer for all situations. But cooperative efforts such as this help the NCDA&CS achieve its goal of agriculture and forestry having an impact of \$100 billion by 2020.

8. Next Steps

Closing

Co-Chair of the NC-ADAPT Work Group, R.C. Hunt, concluded the Summit by thanking all of the participants for being a part of such an important exercise, and reminding them that the Summit was not the end of the work, but just the beginning. He stressed the value of the focus on engaging agricultural and forestry leaders on a peer-to-peer basis, and how he felt that would help the message be best received by all in the state. He also reiterated the importance of the work being based on sound science and that for North Carolina's leading economic industries—agriculture and forestry—to remain economically strong in the future it is important for them to begin planning for the changes ahead. Finally, Mr. Hunt expressed to the group that the road ahead will require continued participation and engagement of stakeholders on this important

issue. He invited all stakeholders to follow, join and participate in the adaptive management planning process meetings (through the Stakeholder Sub Teams) that will take place in the coming months with the objective of releasing a North Carolina Adaptive Management Strategy in 2016.

9. Timeline for North Carolina Adaptive Management Plan

	2015												2016											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Finalize Phase I Report	█	█	█																					
Release Phase I Report			█																					
Adaptation Summit Planning				█	█	█	█																	
Adaptation Summit Event								█	█															
Stakeholder Sub Teams Input									█	█	█	█												
Develop Adaptive Management Strategy													█	█	█	█	█							
Organize Communications and Outreach Team														█	█									
Develop Producer Outreach and Engagement Program																█	█							
Release Adaptive Management Strategy																		█						
Adaptive Management Strategy Outreach and Plan Implementation																			█	█	█	█	█	█

10. Summit Participants

Those in attendance included:

Adam Costanza, *Institute of Forest Biosciences*; Allison Medlin, *NCDA&CS/Bioenergy Research Initiative*; Barry New, *NC Forest Service*; Caitlin Burke, *Conservation Trust For North Carolina*; Charles Hall, *NC Soybean Association*; Clay Altizer, *NC Forest Service*; Daljit Singh, *Monsanto*; Daniel Geller, *Southern Regional Extension Forester*; David Gladden, *Jordan Lumber & Supply*; David Halley, *True North Forest Management Services*; David Heath, *Bountiful Blessings Farm*; David Salvesen, *Institute for the Environment*; Debbie Hamrick, *NC Farm Bureau*; Deborah Thompson, *NCSU College of Agriculture and Life Sciences*; Eddie Reese, *NC Forestry Association*; Bill Shaver, *HW Culp Lumber Company*; Emrys Treasure, *USDA Forest Service*; George Miller, *Food & Fuel 4 the Forces*; Gerry Cohn, *CROPP Coop/Organic Valley*; Greg Conner, *MC Chapter of the Assoc. of Consulting Foresters*; Guido van der Hoeven, *NCSU Dept. of Agriculture and Resource Economics*; Hawley Truax, *Z Smith Reynolds Foundation*; Helene Cser, *NCSU*; Jack Swanner, *Carolina Loggers Association*; Jaime Teel, *North Carolina SFI Committee Chair*; Jeff Harris, *North Carolina Association of Soil and Water Conservation Districts*; Jenna Schreiber, *Duke University*; Jennifer Grantham, *NC State Dept. of Forestry & Enviro. Resources*; Jessica Whitehead, *NC Sea Grant*; John Bonitz, *Bonitz Biocarbon Consulting*; John Hastings, *NCSU*; Katie Anderson, *Environmental Defense Fund*; Keith Larick, *NC Farm Bureau*; Laura L. Lengnick, *Fernleaf Solutions*; Laurel Kays, *NCSU*;



Linda Rimer, *EPA*; Lindsey Smart, *NCSU*; Mark Megalos, *NCSU College of Natural Resources*; Mark Sutherland, *Marstel-Day*; Dean Mary Watzin, *NCSU College of Natural Resources*; Michael Burke, *Duke University*; Mike Yoder, *NC State Extension*; Mike Yoder, *North Carolina 4-H*; Okan Pala, *Center for Geospatial Analytics*; Pryor Gibson, *NC Forestry Association*; R.C. Hunt, *NPPC*; Ricardo Majette, *MAKDA Inc.*; Ryan Boyles, *NC Climate Office*; Sam Brake, *NCDA&CS/Bioenergy Research Initiative*; Sarah Wiener, *Southeast Regional Climate Hub*; Scott Bisette, *NC Forest Service Asst. Commissioner*; Steve McNulty, *United States Forest Service*; Susan McCord, *Institute of Forest Biosciences*; Tami Schwerin, *Abundance Foundation*; Tom Ellis, *NC State Grange*; Tony Doster, *Resource Management Service*; Tyler Felgenhauer, *Iron Oak Energy*; Tom Hunt, *Crop Protection Association*; Dave Dewitt, *WUNC Radio*; and Ernie Shea, Brent Bailey and Ethan Gilbert, *Solutions from the Land*.

Respectfully submitted,

Ernie Shea & Brent Bailey, Facilitators
Ethan Gilbert, Recorder

September 11, 2015