Ecological Flows Science Advisory Board (E-Flows SAB)
Meeting Summary
Nov 8, 2010

NC Wildlife Resources Commission Building
Centennial Campus—NC State University, Raleigh NC

____DRAFT (do not circulate) **__X__APPROVED (for distribution Feb 8, 2011)**

Attendance

Ecological Flows Science Advisory Board
Members
Mark Cantrell, US Fish and Wildlife Service
Bob Christian, NC Marine Fisheries Commission
John Crutchfield, Progress Energy
Tom Cuffney, U.S. Geological Survey
Linda Diebolt, Local Governments
Chris Goudreau, NC Wildlife Resources Commission
Jeff Hinshaw, NC Cooperative Extension (online)
James Mead, NC Division of Water Resources
Sam Pearsall, Environmental Defense
Judy Ratcliffe, NC Natural Heritage Program
Fritz Rohde, National Marine Fisheries Service
Jay Sauber, NC Division of Water Quality
Bill Swartley, NC Forestry Association

Alternates
Sarah McRae, U.S. Fish and Wildlife Service
Steven Reed, Division of Water Resources
Rick Studenmund, Nature Conservancy
Steve Reed, NC Division of Water Resources
Arlene Roman, Local Government (online)

Staff
Technical Resources
Tom Reeder, Division of Water Resources
Sarah Young, Division of Water Resources
Don Rayno, Division of Water Resources
Facilitation Team
Mary Lou Addor, Natural Resources Leadership Institute (NRLI)
Patrick Beggs, Watershed Education for Communities and Officials (WECO)
Christy Perrin, Watershed Education for Communities and Officials (WECO)
Nancy Sharpless, Natural Resources Leadership Institute (NRLI)

Guests:
Jeri Gray, Water Resources Research Institute (WRRI)
Peter Caldwell, USDA Forest Service
Erin Wynia, NC League of Municipalities (NCLM)
Haywood Phthisic, LNBA/NRCA
Tommy Steven, Stevens Lobby and Consulting
Vernon Cox, NC Department of Agriculture and Consumer Services
Amy Pickle, Nicholas Institute at Duke University
Upton Hatch, NCSU Agricultural & Resource Econ
Steven Levitas, Kilpatrick Stockton
Dan McLawhorn, Raleigh City Attorney

November 8th, 2010
Meeting Agenda

I. Welcome
II. Agenda Review and introductions
III. HB 1743 and Why We Are Here
IV. Presentation on Ecological Flows Background
V. Ecological Flows SAB Charter
VI. What is needed to move forward and to achieve the Board's purpose
VII. Meeting Logistics
VIII. Agenda for January

November 8th, 2010
Meeting Handouts

1. November 8 Meting Agenda
2. House Bill 1743 as ratified
3. Why We Are Here: Tom Reeder's presentation; HB 1743
4. Ecological Flows Background: Jim Mead's presentation
5. Ecological Flows SAB Charter (Draft)

The purpose of the Ecological Flows Science Advisory Board:

The Ecological Flows Science Advisory Board (EFSAB) will advise the NC Department of Environment and Natural Resources (NCDENR) on an approach to characterize the aquatic ecology of different river basins and methods to determine the flows needed to maintain ecological integrity.

Presentations, reports, and background information about the E-Flows SAB are available at: http://www.ncwater.org/Data_and_Modeling/eflows

November 8, 2010: Decisions Made/Actions to be Taken

1. The Facilitation Team:
    a. Is revising the EFSAB Charter proposed on November 8 to reflect discussions and decision points by the SAB.
    b. Will propose a process for how the EFSAB can make minor decisions by email.
    c. Will develop a process for handling questions from the public when time allows.
    d. Will email draft meeting summaries to EFSAB members within 3-4 weeks of the meetings for edits, corrections or amendments. A deadline will be provided to the EFSAB in order to provide any revisions. Corrections will be made; the second draft of the meeting summary will be distributed with recommended changes highlighted. The EFSAB will approve the summary at the next meeting before posting the summary on the NC Division of Water Resources (NC DWR) website and made available to non-EFSAB members and alternates.
2. The NC DWR:
    a. Will be responsible for requesting replacements to the EFSAB if a member leaves or if a new Board member is needed to ensure representation as specified in HB 1743. All EFSAB members were asked to designate an alternate who can serve in their stead as needed.
    b. Will be responsible for handling press releases about the EFSAB.
3. The EFSAB:
    a. If an EFSAB member is unable to attend a meeting, it is the responsibility of their alternate to provide input about the draft meeting summary prior to the deadline for comments and revisions; it is the responsibility of both to review the previous meeting information in preparation for the upcoming meeting.
    b. Members may have more than one alternate.
    c. Members and alternates may participate in the meetings in person or via webinar, including being able to ask questions or to provide comments via the webinar.
    d. Alternates may participate in meetings when the primary member is present, but only the member participates in any process for decision-making or recommendations.
    e. Will contribute to establishing a timeline.
4. Communication and outreach:
    a. The eflows-sab@lists.ncmail.net list serve is maintained for planning and communicating purposes between the science advisory board members and alternates, and the team supporting the meeting process.
    b. The EFSAB website and the WRRI listserv will inform a wider audience about the process of the EFSAB.
5. Meeting Locations:
    a. The January & March meetings will be held in Raleigh; later meetings may be held at other locations.

I. Executive Summary

HB 1743 and Why We Are Here

Tom Reeder explained that with the passage of House Bill 1743, the N.C. Legislature directed the Department of Environment and Natural Resources (DENR) to develop basin wide hydrologic models for all 17 river basins in N.C. These models will be used as a planning tool for meeting projected long-term essential water needs while protecting the ecological health of the rivers and streams, as mandated by the Clean Water Act. NÇDWR has already begun developing models (OASIS models) for the river basins in the state, incorporating all of the mandated information, EXCEPT for the ecological flows. Tom pointed out that the ecological flow is a cornerstone of this modeling and the most difficult to quantify. HB 1743 directs DENR to establish the EFSAB to assist in characterizing ecology and flow requirements.

Questions, Comments, and Concerns Raised

One immediate concern raised was which comes first - ecological flow or regulations for water withdrawal? The response is that this will be a policy decision made further down the road by decision-makers. This was followed with another question about the requirement for withdrawal of surface water in N.C. Currently; there is not a withdrawal permitting program for surface water in N.C.

Proposed Actions or Identified Decisions to be made:

None

Presentation on Ecological Flows Background

Jim Mead presented information on ecological flows, how ecological flows differ from instream flow requirements, and how ecological flows figure into river basin planning. Ecological flow is defined as the flow needed to maintain ecological integrity. Ecological flows are targets to be used for medium and long range planning purposes to evaluate water availability throughout a basin.

Jim introduced the concept of the developing a hydrologic stream classification system by sorting N.C. streams and rivers by hydrology into seven classes, then further subdividing into subcategories. The ultimate goal is to develop a specific technical approach for determining ecological planning flows for each of the stream classifications. NCDWR would like to use the Eno River as a pilot project as a way for the EFSAB to determine whether it would be viable to use this technique for developing other stream classifications and other basins.

Jim stated he anticipates the formation of another advisory group that will focus on the societal issues of flow management in order to develop policy to balance resource protection with flow-altering water uses, and human demands with ecosystem needs. The EFSAB will maintain its focus on the science and technical aspects of ecological flows. Policy makers will consider the output of both advisory bodies in developing policy.

Questions, Comments, and Concerns Raised

Several questions were raised about the role of water quality in ecological flows, whether in-stream flow requirements to maintain water quality should be treated as a user demand that has to be included in the

ecological flows models, and the value of considering potential alternate flow management approaches.

Jim stated that there is some interest in the approach of setting the threshold for allowable hypothetical withdrawals as the amount that results in a change in the hydrologic stream classification, but we are not all that encouraged by that approach. To say that if a withdrawal results in a classification change, it would not be an acceptable amount to withdraw, for planning purposes, well, sometimes it would and sometimes it would not; it needs to be explored further as it may not be a good fit.

Proposed Actions or Identified Decisions to be made:

Consider Connecticut's classification system which focuses on degree of alteration and degree of protection, setting priorities that way.

Development of the EFSAB Charter

The facilitation team presented a group charter for the EFSAB members to consider. The charter provides information about the purpose of the group, the roles and responsibilities of NC DWR, the facilitation team, and the EFSAB members, who the list of members are on the EFSAB, and how decisions will be made in the group. During a discussion led by the facilitators, members recommended several changes to the Group Charter.

Questions, Comments, and Concerns Raised
Major discussion points included:

- How to handle absences/alternates
- Withdrawal of members/new appointments
- Specify that the Board's decisions/contributions will be guided by the best available science/how affiliation will affect use of science
- Need to establish a mechanism for making decisions/recommendations between meetings
- Establishing a timeline
- Process for draft meeting summaries for revisions and publication
- Process for handling input/questions from anyone who is not a member or alternate of the EFSAB.

Proposed Actions or Identified Decisions to be made:
A revised Group Charter will be distributed one week prior to the Jan 18 meeting, along with the changes to the meeting summary.

II. Welcome

Tom Reeder, Director of the NC Division of Water Resources, welcomed everyone, thanking them for their willingness to serve on this significant task over the next couple of years to meet the legislative mandate.

III. Agenda Review and introductions

Mary Lou Addor introduced herself and the rest of the facilitation team and provided an overview of the meeting agenda and the meeting process, emphasizing that this Ecological Flows Science Advisory Board is only one part of a much larger process. She then invited all attendees to introduce themselves, naming their affiliation.

IV: HB 1743 and Why We Are Here

Tom Reeder explained that with the passage of House Bill 1743, the N.C. Legislature directed the Department of Environment and Natural Resources (DENR) to develop basin wide hydrologic models for all 17 river basins in N.C. These models will be used as a planning tool for meeting projected long-term essential water needs while protecting the ecological health of the rivers and streams, as mandated by the Clean Water Act. NÇDWR has already begun developing models (OASIS models) for the river basins in the state, incorporating all of the mandated information, EXCEPT for the ecological flows. Tom pointed out that the ecological flow is a cornerstone of this modeling and the most difficult to quantify. HB 1743 directs DENR to establish the EFSAB to assist in characterizing ecology and flow requirements.

The EFSAB provides a panel of experts in aquatic ecology, representing diverse stakeholders (specified by the Legislature), to collectively review all relevant studies, reports, and other pertinent information and to develop, in an advisory capacity to the Department of Environment and Natural Resources, a recommended approach to characterize the ecology of river basins and a recommended method to determine the flows necessary to maintain ecological health. The language used in this paragraph reflects further discussion at the January 18, 2011 meeting of the EFSAB, in order to clarify the role of the EFSAB]. This approach and methodology will be used by policy makers for planning purposes that will help users meet anticipated water needs in the long-term future (30-50 years) and address concerns at a watershed level that includes cumulative effects. The EFSAB will provide scientific input as part of a broader stakeholder process. Policy makers will make the final decision on whether to implement the methodology developed by the EFSAB. The EFSAB will advise on methods/approach, not determine specific flow numbers. The EFSAB will not be trying to develop a method to replace site-specific studies needed for a specific EA/EIS or permit review. The modeling is a tool to be used by policy makers for water supply planning. The models must be approved by the Environmental Management Commission (EMC).

The power point presentation is available at:
http://www.ncwater.org/Data_and_Modeling/eflows/sab/presentations/20101108w

DEBRIEF: Questions and Response

Q Which comes first—ecological flow or regulations for water withdrawal?
R That will be a policy decision to be made further down the road. The policy makers need information to make those decisions.

Q Can you talk about the schedule and how the EFSAB fits into that schedule?
R We are doing the models. Neuse River Basin is complete. We can add the ecological flow component as that is developed.

Q Is there going to be an official model or is it going to be continuously revised?
R Yes, it can be updated. NCDWR anticipates updating once every 10 years given resources we have today.

Q A comment regarding the chicken/egg question. There is no requirement to get permission for withdrawal of surface water in N.C.
R Correct. We do not have a withdrawal permitting program for surface water in N.C. at this time.

V: Presentation on Ecological Flows Background

Jim Mead presented information on ecological flows, how ecological flows differ from instream flow requirements, and how ecological flows figure into river basin planning. "Instream flow needs" is a broad generic term referring to the amount of water needed to maintain in-stream uses and is location (habitat type/species of interest/ drainage area/tributary inflow) and time (monthly/seasonal/inter-annual variation in water availability, critical life stages, recreation season) dependent. Instream flow needs are distinct from instream flow requirements, which are site-specific, project-specific determinations developed during preparation of environmental documents and permit reviews. Ecological flow is defined as the flow needed to maintain ecological integrity. Ecological flows are targets to be used for medium and long range planning purposes to evaluate water availability throughout a basin.

For a river basin approach to planning, a one-size fits all approach to ecological flows is not appropriate given the diversity of rivers and streams. Differences in hydrology result in different habitats, which result in different ecological communities with different flow needs. Thus, the first step was to develop a hydrologic stream classification system, sorting N.C. streams and rivers by hydrology into seven classes, then further subdividing four of those categories into subcategories. The ultimate goal is to develop a specific technical approach for determining ecological planning flows for each of the stream classifications.

NCDWR would like to use the Eno River as a pilot project. They have the Neuse River Basin Hydrologic Model; they have existing habitat models for the Eno; and they could evaluate the effects of different flow management approaches on aquatic habitat. A question for the EFSAB is whether it would be viable to use this technique for developing other stream classifications and other basins.

Jim concluded by emphasizing the advisory and scientific-technical role of the EFSAB. Additionally, Jim stated he anticipates the formation of another advisory group that will focus on the societal issues of flow management in order to develop policy to balance resource protection with flow-altering water uses, and human demands with ecosystem needs. The EFSAB will maintain its focus on the science and technical aspects of ecological flows. Policy makers will consider the output of both advisory bodies in developing policy [the final language used in this paragraph reflects further discussion at the January 18, 2011 meeting of the EFSAB, in order to further clarify the EFSAB's role].

Power point presentation available at:
http://www.ncwater.org/Data_and_Modeling/eflows/sab/presentations/20101108w

DEBRIEF: Questions and Response

Q Where does water quality as opposed to quantity fit into all of this?
R The definition of ecological integrity does talk about biological, physical, and chemical integrity, and chemical standards of water quality (dissolved oxygen, for example) fall under chemical quality. There are discussions underway between NCDWR and NC Division of Water Quality (NCDWQ) about integrating to some extent because NCDWQ has their own river basin models just for quality. We have our own models that are saying how much water is going to be in the streams now and in the future, and that, of course, plays into assimilative capacity. Factoring flow changes, resulting in the future from off-stream uses, into water quality (WQ) modeling is a whole separate issue. When we say ecological integrity we are focusing on in-stream aquatic habitat as it's affected by flow, not the quality ramifications of that flow change because that is part of NCDWQ's assimilative capacity modeling.

Q Would it be fair to say that the in-stream flow requirements to maintain water quality should be treated as a user or demand that has to be included in the model that ecological flows must adjust to?
R I think that is actually a good discussion for this board.

Q A couple of the potential alternate flow management approaches you mentioned seem to be relatively simple approaches to this. I have seen a lot of modeling that goes way overboard in expenditures of effort and time pursuing stuff to unachievable levels of precision. It seems that the purpose of all this is to come up with water allocation, water supply management regimes. I just wonder if it may be best to have a relatively simple methodology, layer that in with your hydrologic uses, then if we have a problem with it, then try to take it to another level of refinement. We could be here a long time trying to do 17 river basins at some sort of conceptually pure level of understanding.
R Let me comment on one of the approaches. There is some interest in the approach of setting the threshold for allowable hypothetical withdrawals as the amount that results in a change in the hydrologic stream classification, but we are not all that encouraged by that approach. The problem is that there's a large range of hydrology that falls into the seven classifications of streams. It is inevitably difficult to say where a stream falls. Is it smack in the middle or right on the edge because 22 variables go into determining those classifications? Depending on how these variables interrelate, it could be in the middle or near the margins. If it is near the margins, it may not take much hydrologic change to push it into a new classification when really there is little change at all in flow. On the other hand, it may be a big change in hydrology. To say that if a withdrawal results in a classification change, it would not be an acceptable amount to withdraw, for planning purposes, well, sometimes it would and sometimes it would not. We are going to explore this option further. It may not be a good fit. With percentage of inflow, again, what is the percentage you pick? This Board's going to be trying to pick a pretty technical approach.

Q Your stream classification system includes an impounded water body, so is the system intended to say that there can be no more impoundments?
R Certainly not. We have not included impoundments because we are addressing flows. Impoundments have a different ecology altogether.

Q (Comment) Whatever means we use for determining ecological baselines or flows, there is not a presumption that it won't be expressed in a simple easily understood form, which might vary from basin to basin or reach to reach.

Q Has anyone looked at Connecticut? Their classification system focuses on degree of alteration, I believe.
R Yes, their work is something we would want this Board to look at. Their classification system depends on degree of alteration and degree of protection, setting priorities that way.

Q The hardest thing I am hearing in the front end of things is the question of scale. We have the ability to model instream flows for specific projects and there's a basin wide model (OASIS) and that we are trying to merge those?
R OASIS can be quite specific too because it uses nodes. We only have a scattering of those site-specific habitat models so we don't want to have to do more of them. We may want to apply it and transfer to other situations.

VI. EFSAB Charter

Patrick Beggs facilitated a review and discussion of the proposed EFSAB Group Charter, which was proposed by the facilitation team. A revised Group Charter will be distributed one week prior to the Jan 18 meeting, along with the changes to the meeting summary.

Purpose of the Board
The group will advise NCDENR on an approach to characterize the aquatic ecology of different river basins and method(s) to determine the flows needed to maintain ecological integrity.

The EFSAB will strive toward agreement using a scale with gradients of agreement to determine a level of consensus. If EFSAB members cannot reach consensus on any substantive EFSAB recommendation regarding direction of modeling, or use of data or methodologies, the NCDWR staff will proceed according to their best judgment while keeping the EFSAB apprised of their decision or direction. EFSAB members are encouraged to utilize the NCDWR website to publicize the activities of the EFSAB.

Major points of discussion included:

- How to handle absences/alternates
- Withdrawal of members/new appointments
- Need to specify that the Board's decisions/contributions will be guided by the best available science/how affiliation will affect use of science
- Need to establish a mechanism for making decisions/recommendations between meetings
- Establishing a timeline
- How to draft meeting summaries for revisions and publication
- How to handle input/questions from anyone who is not a member or alternate of the EFSAB.

A list of decision points is listed on page 2.

VII: What do you need to move forward, to help you achieve the purpose of this board?

Each member of the Ecological Flows Science Advisory Board was asked to list what he or she needed in order to move forward and achieve the purpose of the EFSAB. The members wrote their ideas down

on note cards (which were collected at the end of the meeting). During the remaining meeting time, each member offered one idea, comment, or suggestion he or she had until the group either began to repeat ideas or had contributed all of their ideas.

The facilitation team then organized the ideas, comments, and suggestions into various headers (as described below), which can be altered or revised by the EFSAB; the individual comments of the members are captured below.

Purpose/Vision

1. Clearly enumerated objectives within the overall charge

Timeline comments

1. Detailed path forward-- timeline or detailed objectives with schedule even if schedule is tentative (several comments on timeline)
2. Need a schedule of steps toward defining ecological flows- range of flows, list of in-stream communities, ecological functions, processes, etc.

Sense-Making: Terms, Definitions, Acronyms, & Concepts

1. Need a common understanding of the ecological flow concept
2. Present stream classification from Jim Mead's powerpoint
3. Additive brainstorm of necessary descriptors of ecological flows [what are the descriptors of ecological flows?]

Contributions of Members

1. Better understanding of what a science advisory member formally brings as outside resources and information to the EFSAB.

Learn About Other Models or Methods

1. Review of models existing and those underway in NC
2. Present OASIS Model for Neuse
3. Exposition of Habitat models – Instream Flow Incremental Methodology (IFIM) and PHABSIM
4. Exposition of RTI Model
5. Present stream classification [J.Mead powerpoint]
6. Models or methods that other states are doing for ecological models
7. Demonstration of Neuse basin models-- mechanics of hydrologic model developed by NCDWR
8. NCDWR stream classification
    a. Variables that were considered
    b. 22 variables that were chosen as part of the classification
    c. Methods behind classification
    d. Variability associated with classification
    e. How do the 22 hydrologic variables correspond to the literature on eco-hydrology
9. NC Division of Water Quality (NCDWQ) – has extensive bio-monitoring program
    a. Reference sites exist and represent a de facto ecological classification system
    b. How does this classification system compare to NCDWR's hydrologic classification?
    c. Can hydrologic variables be extracted that separate NCDWQ reference sites?
    d. How do these hydrologic variables compare to the 22 in NCDWR stream classification

e. Compare NCDWQ classification to NCDWR classification as a supplement to the Eno study

Presentations

1. Detailed presentation of EFS (Environmental Flows Specialists, Inc.) process & software
2. Southeastern Instream Flow Network (SIFN) presentation of their approach
3. Provide background information on approaches already under consideration from NCDWR, other states, and researchers. These presentations should include a critical review of shortcomings and a concentrated offering listing issued for potential consideration of objectives.
4. EFSAB review of hydrologic stream classification system and advisability of using it to determine ecological flows

Experience from other states: What are other states doing?

(Critical: understand the context – the legal and institutional framework other states are operating in)

1. Reeder discussed other states' efforts- provide a summary of these efforts
2. Review other states' programs for determining hydrologic flows
3. Input from upstream and downstream states- what could they add to help our process? review our process?
4. Critique of EFSAB end products by leading experts in eco-flow (out-of-state, in-state?)
5. Examples of ecology classes and ecological flow requirement from other states

Compile a Literature Review

1. Summaries of studies, reports on ecological flows from literature
2. Need something to review, to comment on (example: Eno River pilot study, methodology); several comments on needing materials to review – studies and methodologies)
3. Catalog of existing flow alterations, withdrawals, losses, transfers, etc.
4. Compile a literature catalog, annotated bibliography, latest info – help describe parameters.
5. Look at work by McCrodden in Colorado
6. Methods to estimate unregulated/undocumented withdrawals
7. Identify key research papers on topic for review by Board – current, best available scientific research

Action Requested

Technological Support

1. Provide a site for one-stop file sharing between the scientists like a webdrive or intranet. Members may need a repository to share studies and meeting materials. How can we do this?
2. Members and alternates who attend meetings online will require monitoring by the facilitation/NCDWR team to ensure that they are able to participate. [Members and alternates participating online will need to sign on with their first and last name, followed by a comma and the word member in order to be recognized in the process.]

Public Outreach

1. Communicate to other states about the NC effort

VIII. Meeting Logistics

Those present decided that the Board will tentatively meet the third Tuesday of January, March, May, July, September, and November from noon to 4pm (no lunch provided). During follow up calls and

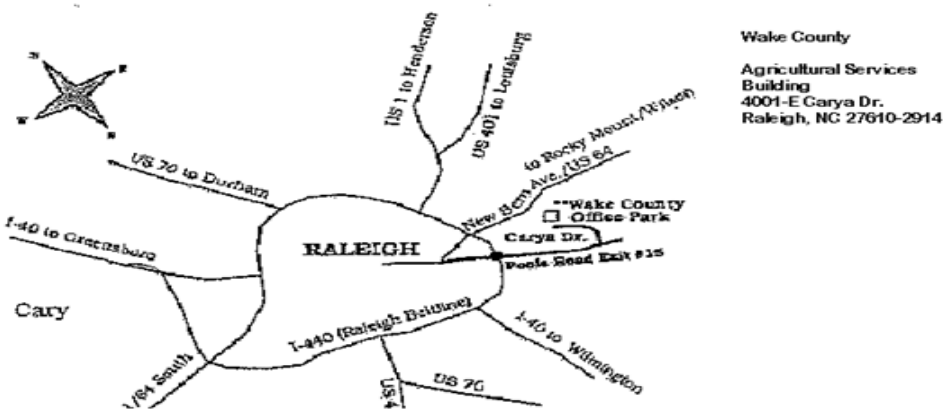
emails with members unable to attend the November 8 meeting, the third Tuesday of the month is also acceptable except the time. An acceptable time frame is from 12:30-4:30pm and thus the meetings will begin at 12:30pm.

Members are encouraged to bring their own refreshments for the duration of the meetings as refreshments will not be provided.

The January meeting will be held at the NC Cooperative Extension Wake County Building, in Raleigh, NC. The address is:

NC Cooperative Extension - Wake County Center
4001-E Carya Drive Raleigh, NC 27610
919/ 250-1103 – Office phone number

The conference meeting room is located in the Agricultural Building, third door on your left down the hall. From the I-440 Beltline, take the Poole Road Exit, #15 and head east taking your first left into the Wake County Complex Center. A map is provided on the next page; additional directions are available at: www.wakegov.com/locations/environmental/agsvcsbldg.htm



Wake County

Agricultural Services Building
4001-E Carya Dr.
Raleigh, NC 27610-2914

DIRECTIONS TO THE EXTENSION CENTER:
The Wake County Extension Center is located on the east side of Raleigh. From the beltline take the Poole Road exit and go towards Wendell for 200 yards. Turn left into the Wake County Office Park, marked by a large sign at the stop light. Follow Carya Drive to the parking lot on your right at the end of the street. Walk to the Agriculture Services Building where the Extension offices will be found on the right as you enter.

IX. Agenda for January 18, 2011

The following items were proposed for the agenda for the January meeting:

1. Begin to establish a process for operation and an aspirational timeline.
2. Overview of modeling in general
3. Overview of OASIS and classification system
4. Brainstorm ecological descriptors