

**Review of Farmers' Attitudes and Experiences in the Process
of Adoption of Best Management Practices (BMPs) as
Currently Proposed for Critical NC Watersheds**

Prepared for the Corn Growers Association of North Carolina, Inc.

By

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I. Executive Summary

This project, *Review of Farmers' Attitudes and Experiences in the Process of Adoption of BMPs as Currently Proposed for Critical NC Watershed*, was funded by the Corn Growers Association of North Carolina, Inc. with the goal of better understanding producers' knowledge and attitudes about agricultural best management practices (BMPs) and their acceptance and adoption of these practices. A multidisciplinary, interagency group of selected staff members from public agencies interviewed producers from throughout the state of North Carolina. The fifteen agency personnel that were selected to participate in the project represented four agencies that provide information and support to farmers on both agricultural and environmental issues: NC Department of Agriculture and Consumer Services, NC Department of Environment and Natural Resources—Division of Soil and Water Conservation, NC State University, and USDA—Natural Resources Conservation Service. A secondary goal of the project was to foster interaction between agency personnel and to help assure that environmental policies imposed by state and federal agencies are better regarded as being fair and feasible by farmers, because both groups are more nearly “on the same page.”

The agency personnel working on this project developed the sampling protocol and questionnaire. Fifty-eight farmers from throughout North Carolina were nominated by their local Soil and Water Conservation Districts to participate in the project. These producers agreed to be interviewed by the interagency team. (The list of farms and the general nature of their farming operations is shown in a table in the report.) Of these, 45 were interviewed using an interactive standard interview of about ten questions. These farmers represented all geographic regions of the state, and included commercial producers of all of major field crops and animal operations (dairy, pork, broilers, eggs, turkeys), as well as a Christmas tree grower, an apple producer, and a fish producer. Included in the group were farmers “tending” from less than 500 acres to 12,000 acres. All were family farms, of which about half were single-ownership farms, another were organized as family partnerships and the remaining quarter were family-owned corporations.

Typically the interview team, consisting of three or four agency professionals, met with the producer on his farm. All interviews were tape-recorded and transcribed. All participants had ample opportunity to study the written interview summaries and contribute to the present project report. It must be emphasized that this was not a scientific survey in which a randomly selected, large number of people were interviewed, and where rigidly controlled questions were asked and the results tabulated and analyzed. Rather, this study was conducted to explore in a non-threatening way, the understandings, perspectives and attitudes of representative commercial farmers, so that our team participants and the overall project could benefit from the insights provided by the process.

Readers should bear in mind that, compared to “average” farmers of their regions, those whom we met were likely to be somewhat more interested and better informed about conservation programs, and perhaps had better established farm operations. The implication of this is that the need and opportunity for improved communication and cost-share support for BMPs by all farmers is even greater than that shown by the summary statements below, since many farmers would likely be less knowledgeable and less positively oriented to ready adoption of mandated BMPs than those we visited.

General findings on BMP adoption were that all of the livestock and poultry producers interviewed readily acknowledged familiarity with animal waste management concepts and plans, and with the training provided in recent years on this topic. Many of the farmers were actively providing wildlife habitat and some were involved in renting hunting rights. Some ninety percent had adopted the practice of conservation tillage for all of the crops where they believed it to be applicable. However, a significant portion of those did not always have the minimum 30 percent crop residue coverage, which is the current national standard for conservation tillage. Other producers, however, were more than meeting the residue standard, usually because of their participation in one of the current “long term no-till programs” that receive state cost share or financial incentive through the federal EQIP funds.

Major Conclusions and Implications

1. Farmers differ in their understanding of what constitutes a BMP and of the specific contributions of the practice under given crop and land situations. Growers were very familiar with practices that prevent erosion, but in general, their comments showed an incomplete understanding of how nutrients, especially nitrogen, move into water resources. Due to misunderstandings about nutrient movement (particularly nitrogen, but to some extent phosphorus), it was difficult for producers to understand the role of nitrogen-reducing BMPs. This lack of understanding is a real shortcoming when agencies try to encourage the acceptance and proper use of the most important BMPs in the basin programs: nutrient management, controlled drainage, vegetated buffers and cover crops. This same lack of understanding, and thus a less-than-positive attitude among farmers, looms as an impediment to requirements of the new NRCS nutrient management standard that will affect phosphorus management.

Implications:

- Agency personnel will need resources to work on providing information on nutrient movement and nutrient-reducing BMPs. All agencies should focus more intently on this area. Also, due to the confusion in BMP terminology, in work and educational efforts with producers, all agency personnel should define the BMPs, particularly clarifying in a unified way, the environmental and economic reasons for proper use of these practices.

2. The most frequently mentioned BMP was conservation tillage. The popularity of this practice was usually associated with the perceived cost savings. Economics and the need to preserve soil moisture had prompted more people to adopt conservation tillage than the desire to have an official practice in place. The benefits of cover crops and crop residue conservation, particularly as part of conservation tillage systems, is approaching

widespread adoption, although not universal. Done correctly, this BMP offers multiple and widespread environmental benefits, and also it often offers farmers needed improvements in production efficiency. Farmer interest in conservation tillage has been greatly increased by recent improvements in equipment and pest management technology, and aggressive educational efforts and various forms of commercial promotion. Still, as indicated above, farmers often do not fully understand the potential nutrient management benefits of these practices.

Implications:

- Cover crops need to be better understood and more financially attractive to increase acceptance by more growers. One solution is to offer cost-share funding for more uses of cover crops within conservation tillage systems.
- We should seek resources to increase research and educational efforts to provide data to farmers and agency professionals, showing the various ways in which cover crops and the resulting residue can contribute to the environmental objectives of today. This research should include the economic costs and alternative management implications of various cover crops within the actual cropping systems farmers are using across the state. Data from these studies could be used to determine if there are specific cover crop situations where added public cost share would be appropriate. Cost share could then be used to encourage more adoption of this increasingly popular practice that both benefits production efficiency and the environment.

3. Soil testing was used by all farmers we met, and most readily recognize its potential as a BMP for efficient nutrient management, and thereby, as a means of reducing nutrient pollution of waters. Some believed in sampling nearly all fields every year, some less frequently, and a few were actively using intensive grid sampling in some fields to resolve variability in needs for liming and fertilization within the fields. Some mainly used their soil test reports to determine liming rates, showing reluctance to search for different fertilizer ratios or suppliers to closely match the soil test results of fertilizer applications. Others used all the soil test information to make fertilizer application decisions. Farmers following animal waste management plans generally make more consistent and complete use of all of the information and recommendations provided by their soil test results.

Implications:

- Additional efforts are needed by all agencies to educate growers on utilization of realistic yield expectations and N factors to determine recommended N rates for crop production and emphasize the importance of following soil test recommendations for improved phosphorus management. Nutrient management education programs for producers, who have not already attended this type of training, can be designed and implemented stressing both the environmental protection and economic savings of nutrient management.
4. Farmers are doing an excellent job of managing pesticides. In fact, there seemed to be greater awareness of pesticide management BMPs than of nutrient management BMPs. Growers generally accept the concepts of integrated pest management and overall pesticide safety issues. Those interviewed understood the importance of

reading and following labels, using appropriate mixing and loading practices and recycling pesticide containers. Long-term pesticide education and certification programs, and the ongoing product education provided by pesticide manufacturers undoubtedly can be credited with this status. Many producers would welcome cost-share for portable pesticide loading facilities.

5. Cost share has proven effective as an incentive in helping farmers make desired changes. Several of the livestock producers we met readily described their satisfaction with the environmental improvements in their waste management systems, made possible through state cost share funds. Some also frankly stated that this assistance had allowed them to remain in business today.

Many crop farmers also describe the help of cost share, especially in making costly conversions to the new and more effective conservation tillage equipment. Some farmers, however, have received little cost share, and some even are reluctant to request it. For some, cost-share programs were confusing; some had experienced unreasonable delays in approval and had lost interest in the process. Several felt inclined to install environmental practices without cost-share funding, especially on rental land, rather than be forced to accept what they expected would be difficult discussions with landowners. In some instances, BMPs were perceived as having excessively rigid designs and specifications, which was considered to be a deterrent to BMP implementation.

Implications:

- More emphasis should be put on streamlining cost share programs and making them easier for producers to understand and use.
- There appears to be an important opportunity for Conservation Districts and at the state level to provide better awareness and education on this topic for the general public. Any educational program should give more explanation of the justification for cost share to farmers and offer effective representations of specific examples in differing regions and agricultural situations, where solid, documented progress has been achieved through cost-shared BMP use by farmers.

6. Across the entire state there was honest suspicion among farmers that urban centers are causing more pollution problems than agriculture. Too, there seemed to be a considerable amount of misinformation about “river rules” and BMPs. Often the information they had received was simply incorrect. For example, many had heard that buffers were always mandatory and that these buffers had to extend a hundred feet from streams or ditches.

Implications:

- Various communication vehicles can be used, such as inviting professionals working in these areas to give presentations and write articles for commodity newsletters.
- Agencies, commodity groups and public-spirited organizations need to help producers strengthen their defense for cost-share and the use of BMPs. These groups should jointly consider the merits of carefully planned, quality public information programs. These types of programs would take a more visible, pro-

active stance to increase public awareness about the accomplishments underway in reducing the environmental impact of agricultural production.

II. Project Rationale

Producers who live in regulated river basins are often required to use particular management practices (BMPs). In some instances, the rationale for these BMPs is not understood by producers and may even cause ill will. Since agricultural activities in two of these seventeen river basins are recurrently regulated, as well as producers with animal facilities that fall under 0200 regulations, the Corn Growers Association of North Carolina wanted to be proactive, especially by facilitating dialogue between agency professionals involved in these matters and a broad range of farmers across the state. As such, this organization funded the *Review of Farmers' Attitudes and Experiences in the Process of Adoption of BMPs as Currently Proposed for Critical NC Watersheds* project. The goal of the project is to help Agencies better understand the knowledge and attitudes farmers hold toward acceptance (adoption) of agricultural BMPs. In other words the intent is to help assure that policies imposed by Agencies are better regarded as being fair and feasible by farmers, because both are more nearly "on the same page."

Objectives for the project were:

1. Provide an opportunity for dialogue among professionals involved in aspects of technology and/or policy development with regard to the adoption and use of BMPs by farmers in the critical state watersheds.
2. Involve professionals from several campus departments and several state or federal agencies. These professionals will meet to develop the sampling protocol, make farm visits, and develop the final report, which will include suggestions for policymakers.
3. Seek to enhance progress on water quality improvements in the watersheds by examining the adoption of BMPs by farmers, noting steps that could be taken in education, design, implementation, and cost share to participating farmers and/or others whom may be involved in the process.
4. Provide information for use by grower associations, community leaders, nonprofit and nongovernmental organizations, Cooperative Extension and other public agencies, which may help these agencies better work together to enhance the progress in environmental improvement in these critical state watersheds.

III. Project Description

The first two objectives of this project were to involve a multidisciplinary team. As such, the project was designed to involve an interdisciplinary, interagency team of professionals. Team members included six members from NC State University: Steve Hodges, George Naderman (now retired), and Deanna Osmond (Soil Science Department); Noah Ranells (Crop Science Department); and, Ada Wossink and Guido vander Hoeven (Agricultural and Resource Economics). Other agency professionals included: Kent Messick, Richard Reich and Jim Cummings (NCDA & CS); Steve Coffey and David Williams (NCDENR - Div. of Soil and Water); and, Jim Boggs (retired), Bobby Brock, Emmet Waller (retired), and Lane Price (USDA - NRCS).

The project team worked together to determine the sampling protocol. The state was divided into six regions (Mountains, Southwest/Southcentral Piedmont, Northwest/Northcentral Piedmont, Middle/Upper Coastal Plain, Lower Coastal Plain, and Tidewater). This was done in recognition of the differing environmental challenges faced by farmers in these regions. Production differences are manifested in slope, soil erosion rates, leaching potential, drainage conditions, and the inherent crop productivity and profit potential. There are also the differing challenges and mixes of livestock, poultry and crop production, farm size, land ownership and the pressures from encroachment by urbanization. Within each region, two to six counties were selected. County-level Soil and Water Conservation District employees were contacted in these counties and asked to provide names of three producers. It was suggested that these local employees select producers representing different likelihoods of BMP adoption: rapid adopter, possible adopter, and not likely to adopt.

Before the names of the producers were selected for participation, the Soil and Water Conservation District employees acquired the farmers' permission to be interviewed. Fifty-eight producers were selected in this process and forty-five, representing all of the regions, were actually interviewed (Table 1). Project interviews of farmers were conducted at their homes, offices, shops, barns, or occasionally in a nearby restaurant. The interviews were conducted in an interactive manner, to help people feel comfortable in expressing their own understanding of the practices. All interviews (except two) were recorded on tape and generally two separate written summaries of these discussions were provided to project team members. Whether they attended the interview or not, project participants had the chance to review the proceedings of all interviews. It is important to note that because of the nature of the selection of participating farmers, this IS NOT a random farmers survey; RATHER it is a survey of the candid responses of a diverse sample of North Carolina farmers, who are known reasonably well by local Soil and Water Conservation District personnel, and who were not averse to making themselves and their farms available to a visit by "state and federal specialists."

District personnel in each region selected what they believed to be a range of producer adoption likelihood. Often, however, their perceptions of a person's likelihood to adopt BMPs did not match the responses provided during the interviews. Some counties selected participant stores to reflect diverse agricultural interests in the various areas rather than adoption readiness. In most cases the farmers we met were possibly somewhat more

interested in conservation programs, and, perhaps, somewhat better informed or better established than the average farmers for the regions.

Shown below are the fifty-eight producers selected, and the forty-five that were interviewed. Because of time constraints, nine producers were sent written questionnaires (those marked with a “**”), of which one questionnaire was returned. Due to illness, scheduling conflicts and other reasons, we did not interview four farmers (those marked with a “***”).

Table 1. Producers selected for interviews

Producer	Major Region	County	Production Type
Conley Hyder**	Mountains	Henderson	Sweetcorn
Ken & Vic Pryor	Mountains	Henderson	Corn silage/beef cows
Kenny Barnwell	Mountains	Henderson	Apples
Curtis & Dale Hawkins	Mountains	Buncombe	Christmas trees/pasture/beef
R. Larry Jones**	Mountains	Buncombe	Tomatoes
David Harris (Harris Bros. Dairy)	Mountains	Buncombe	Dairy and field crops
Terry Blalock	SW-SCPiedmont	Stanly	Mixed grain & cotton/beef
Charles Brooks	SW-SCPiedmont	Stanly	Leased Dairy; Mixed grain/Silage and cotton
Rodney Huneycutt	SW-SCPiedmont	Stanly	Mixed grain/pigs/poultry/beef
Frank Small	SW-SCPiedmont	Rowan	Mixed grain/pigs
Johnny C. Moore	SW-SCPiedmont	Rowan	Dairy/Mixed grain/hay
Ted & Greg Hargett**	SW-SCPiedmont	Union	Cotton/Mixed grain/beef
Ronnie Laney	SW-SCPiedmont	Union	Poultry/Mixed grain
CMS Farms	SW-SCPiedmont	Union	Poultry/Mixed grain
Russell Angell	NC-NWPiedmont	Davie	Mixed grain/beef
Arnold Weatherman	NC-NWPiedmont	Davie	Mixed grain/poultry/beef/tobacco
Ray Crotts	NC-NWPiedmont	Davie	Mixed grain
George Teague	NC-NWPiedmont	Guilford	Dairy/Mixed grain/silage/hay
Larry Spencer	NC-NWPiedmont	Guilford	Tobacco/Mixed grain
Steve Troxler	NC-NWPiedmont	Guilford	Tobacco/Wheat
Fred Sutton	NC-NWPiedmont	Iredell	Dairy/Silage/soybeans
Wayne Robertson	NC-NWPiedmont	Iredell	Dairy/Silage/pasture
Ray Lowman	NC-NWPiedmont	Iredell	Dairy/Silage/poultry
Ray Styer	NC-NWPiedmont	Rockingham	Silage/hay/beef/sheep
Hassell Thigpen	Mid-UpperCP	Edgecombe	Mixed grain/cotton/vegetables
Floyd Harrell	Mid-UpperCP	Edgecombe	Mixed grain/cotton/tobacco/veg
David Walton	Mid-UpperCP	Robeson	Cotton/mixed grain
Rufus Cox	Mid-UpperCP	Robeson	Tobacco/Mixed grain
Eddie Carmichael	Mid-UpperCP	Scotland	Cotton/Mixed grain/pigs
James Kitchin	Mid-UpperCP	Halifax	Cotton/Peanuts

Bill&Jimmy Wilson	Mid-UpperCP	Halifax	Cotton/Mixedgrain
NickDickens,Jr.	Mid-UpperCP	Halifax	Cotton/Mixedgrain
DaleNorris*	Mid-UpperCP	Bladen	Mixedgrain
DanWard*	Mid-UpperCP	Bladen	Mixedgrain/tobacco
P.R.Barker	Mid-UpperCP	Cumberland	Mixedgrain/hay
LarryEason	Mid-UpperCP	Cumberland	Cotton/tobacco/soybeans/hay
ThomasWaller	LowerCP	Jones	Mixedgrain/tobacco/hay/pigs
FranklinAndrews**	LowerCP	Jones	Corn/tobacco/cotton/beef
MichaelShepard	LowerCP	Jones	Tobacco/cotton/soybeans
BillySavage*	LowerCP	Pender	Mixedgrain/tobacco
JayPorter*	LowerCP	Pender	Mixedgrain/tobacco
SteveSutton	LowerCP	Pitt	Cotton/tobacco/poultry/fish
CharlesDavenport	LowerCP	Pitt	Tobacco/Peanuts/Cotton/Mixed grain
Carl&Johnny Briley	LowerCP	Pitt	Tobacco/Cotton/Mixedgrain
W.C.Moore*	LowerCP	Pitt	Cotton/Tobacco/Mixedgrain
TimStancill	LowerCP	Pitt	Cotton/Mixedgrain
JohnReddenLewis	LowerCP	Pitt	Mixedgrain/pigs
GaryHardison	LowerCP	Onslow	Cotton/Tobacco/Poultry/Mixed grain
JimParrott	LowerCP	Lenoir	Tobacco/Mixedgrain/
C.E.Buster Manning*	Tidewater	Washington	Mixedgrain
DougMaxwell	Tidewater	Washington	Mixedgrain/pasture/sheep
GeraldAllen*	Tidewater	Washington	Mixedgrain/pasture
GuyDavenport	Tidewater	Washington	Potatoes/Mixedgrain
Charles&Dennis Allen	Tidewater	Washington	Mixedgrain/potatoes/Wildlife
Donald&Jim Sparks*	Tidewater	Tyrrell	Mixedgrain
LonnieCahoon*	Tidewater	Tyrrell	Mixedgrain/snapbeans
Joe&MarkLandino	Tidewater	Tyrrell	Mixedgrain/
HarrySpruill	Tidewater	Tyrrell	Mixedgrain

The interagency team developed the survey instrument through a series of meetings and exchanges (see *Project Results* section for the survey). The primary focus of the survey was to determine a producer's understanding of BMPs, what types of BMPs he thought were being used on his farm, and his knowledge, opinions and uses of cost shares related to those BMPs. The 11-question survey was administered only after the project had been introduced, which included assurances that producers' statements would be kept confidential, but that the names of each farmer would appear in the final report. Most farmers received these questions, but because of the interactive format followed, there was

some variation in the questioning. Project interviews took between one and two hours, with farm visits occurring along with some of the interviews.

The number of interagency team members interviewing producers on any given day ranged from two to a high of six team members; typically three or four were present. The final report has the contributions of all of the interagency team members, except that of Steve Hodges, who moved to Virginia Tech where he is currently the head of the Agronomy Department. Team members worked on the outline for the final report and each member was asked to summarize the project results. Project results received from the team members were then synthesized into the *Project Results* section below. All agency personnel were asked to use the synthesized *Project Results* to contribute to the *Conclusions and Implications* section. Team members met to reach consensus on the information contained in the *Conclusions and Implications* section. The draft of this final report was available for review and input by all team members.

IV. Project Results

The information below is a synopsis of all the producers' responses to each question.

1. *When did you first hear about best management practices or BMPs?*

Many of the interviewees could not remember, but of those who could, most heard about the concept either from participation in programs of their Soil and Water Conservation Districts or from NCC Cooperative Extension (NCCES). A few had heard the term for the first time during nutrient management training for the 0200 regulations or by participating in meetings of the Neuse or Tar-Pamlico Basins.

2. *What is a BMP to you?*

The term "BMP" was coined in the early 70's to collectively identify practices that would reduce water pollution. The BMP phrase has been slow to "catch on" and this was implied over and over by producers who were not sure just what constitutes a BMP. Most of the livestock producers seemed to have an edge on understanding the term.

The majority of producers thought of BMPs as specific practices, some of which reduce the environmental impacts of farming. Perhaps a third of these producers were also keenly aware that these environmentally protective practices were important and appropriate to current state policy. About a quarter saw BMPs mostly as important techniques of management that increase the efficiency and productivity of the farm. For some, this productivity was associated directly with agronomic management practices like frequent soil testing and using the recommendations to keep fertilizer applications and costs to a minimum without loss of yields. For others it was associated with a management practice, including record keeping under the 0200 regulations. There were some, especially Soil and Water Conservation District Supervisors, who could describe BMPs. One younger farmer, who is probably a graduate of NC State's Agriculture and Life Sciences School and a Conservation District Supervisor, gave the exact textbook definition of BMPs. A few respondents did not recognize the term.

Once BMPs were defined, producers could relate the concept to specific practices. Everyone was familiar with practices that control erosion, reduce sediment and reduce pesticides or other damaging chemicals in water. However, many have a very incomplete understanding of how the different nutrients in fertilizers move across and through soils, and sometimes into shallow groundwater. A result of this misunderstanding is that most producers we interviewed had an incomplete understanding of how vegetative buffers reduce the nitrogen already within the soil through the natural cycling that this element undergoes. This same weak understanding could lead to confusion and disbelief among farmers about the need for the new NRCS nutrient management standard with regard to phosphorus losses.

3. Please list all the BMPs you use on your farm?

- Buffers
- Cattle exclusion
- Consultant services (for pest management; sometimes for soils sampling and record keeping and advice) nutrient
- Cover crops
- Crop rotations
- Field borders
- Filter strips
- Hoed rains (fewer and shallower)
- Integrated Pesticide Management (IPM)
- Land leveling
- Manure analysis
- Manure systems (lagoons & irrigation; dry stacking)
- No-till, strip till, conservation tillage, minimum tillage
- Nutrient management
- Pest and weed scouting
- Pesticide container recycling
- Pesticide loading
- Pesticide storage
- Petiole monitoring or plant tissue testing
- Record keeping
- Soil testing, sometimes including grid sampling
- Stock trails
- Terraces
- Waterways
- Wildlife habitat

Some producers used only a few of these practices, whereas other producers listed as many as ten practices. With further questioning, we found that many producers were using more of these practices than they initially recognized.

For some of the practices (no-till or strip-tillage, nutrient management and buffers), it was critical to have the respondent describe how he implemented the practice. With a more detailed description of how the practice was being implemented, it was difficult to determine whether it met specifications for that practice. For instance, when a farmer listed no-till, he may have been practicing conservation tillage (e.g. cover crop following cotton) or he may not have included a cover crop and therefore was not meeting the 30% cover requirement. Some farmers mentioned buffers that were probably too narrow to meet the specification to be considered a BMP.

4. Does the value of BMPs go beyond the farm?

Nearly all respondents answered this question affirmatively in that practices do provide benefits to others far beyond their own farm. "What we are doing is helping the fisherman at the coast." "Conservation practices probably benefit the neighborhood more than

me." "I know that it is good because the water running from the fields is cleaner." "Several respondents were resentful that the public does not appreciate what the farmers are doing to protect water. One said, "There is not a careless farmer left."

5. What are the environmental aspects of BMPs?

Most farmers mentioned cleaner water, specifically the reduction of sediment losses from fields. Some also mentioned the reduction of nutrients in the water. There seemed to be a stronger correlation between understanding the effects of nutrients on water quality and proximity to coastal waters. Producers living in Washington and Tyrrell counties articulated this concept much more consistently than farmers living in counties further west. In counties where droughty, sandy soils are common, the reduction in dust because of the use of cover crops and conservation tillage was noted.

Some of the producers are applying BMPs on rented land because they feel strongly that some practices pay for themselves. In some cases producers install buffers and water control structures on rented land, for example, to keep themselves and the landlords in compliance with policies. At least two producers emphasized being "considerate and neighborly" (regarding pesticide and animal waste applications) to landlords and their neighbors. Their interest is to maintain working relationships with their landlord and their heirs in order to continue rental agreements.

6. Have you received cost-share payments?

Many of the producers have received cost share for the following reasons: to help defray the cost of installation, to help with the cost of new or additional equipment, or merely to act as an incentive for trying a practice. Several mentioned the tax benefits available with the purchase of conservation tillage equipment. Of this group, many farmers had received cost share for one to three practices, even though state income tax credits are not considered cost share. Some of these received cost-share payments as long ago as 30 years, and many have received little or none in recent years. Within this group, we interviewed some farmers who had tried obtaining cost-share payments once and found the process too slow or too restrictive. There was, however, a small group of producers who well understood the cost-share program and had taken advantage of it often.

Typical comments from the producers who received cost-share payments were as follows: "With the commodity prices the way they are now, and without some assistance we would not be able to do a lot of this stuff." "Cost share was critical for the water control structures, but because of the economics and convenience of it, conservation tillage just works for us and it makes sense." "You have to have cost share if you are going to do this stuff - I don't see any other way to get it accomplished."

More than a few producers had never received cost share. Some indicated they did not want to receive cost share because they would have to go beyond the level of the installation that they desired. Some had not been able to receive cost-share payments, generally because the county or federal funds were insufficient.

There did not seem to be a good relation between BMP implementation and cost-share payments. Some of the producers who had the greatest BMP implementation had never received cost-share payments or had not received much recently. Some farmers just prefer to do themselves what they think “is right.” “Do you yourself expect to receive anything from your own life insurance?” was the rhetorical answer to the question “do all BMPs pay for themselves?” Sometimes they wish to avoid the government assistance, as well as the restrictions, and even the “surveillance of whistleblowers” in the community. Many mentioned the unwanted visibility and criticism they have felt recently because of the website that published information about market-related government payments individual farmers have received. A few also questioned the appropriateness of the way cost share for a certain BMP has been administered in their area. It was not clear if the perceived problems in cost-share administration were related to state or federal programs.

One group for whom cost-share payments have been critical, however, were the dairy and livestock producers working to comply with the 0200 regulations. Cost-share payments for their animal waste management systems were critical for BMP implementation, and most recognized and took pride in the greatly improved manner in which they now farm. Many indicated that cost share for their waste management system had allowed them to continue farming under the demands of the new regulations.

7. *What did you receive cost share for?*

A frequently cited cost-shared practice was for conservation tillage. Below is the list of the other practices mentioned:

- Animal waste management (including lagoons, irrigation equipment)
- Buffer installation through the Conservation Reserve Enhancement Program
- Cattle exclusion
- Conservation tillage planter
- Controlled drainage structures
- Drainage canals (these were installed several decades ago.)
- Field borders
- Filter strips
- Grassed waterways
- High residue conservation tillage
- Lagoon closeout
- Livestock trails
- Long-term conservation tillage
- Manure storage sheds
- Nutrient management
- Pest scouting
- Pesticide loading
- Stream restoration
- Strip cropping
- Terraces

Best management practices that producers would like to see supported by the cost-share program include mobile pesticide loading pads, land leveling, and cover crops.

8. Do you think cost-share funding is useful for getting people to use BMPs?

Except for those averse to receiving assistance, essentially all answers (at least to some degree). Some believed that the practices are over-engineered, which is an impediment to adoption. Most believed that the practices they are using pay for themselves, with the exception of waste management systems, buffers and for some cover crops.

The most mentioned negative fact about cost share dealt with lack of funds and the priorities assigned to use of the limited funds. Some of the producers interviewed did not think the cost-share funds were being administered to the greatest needs or adequately to accomplish the objectives.

“There is either plenty available or none available.” Others indicated that a transaction cost or delays associated with getting the payments are so high that they don’t bother: “We rent so much land that getting involved with the landlords makes it too complicated.” “Cost share for breaks in a stream bank need to be speeded up” (currently this takes 6 weeks).

9. Would you talk to someone you knew (non-farmer) about cost-share payments?

Most said yes, and saw it as an important opportunity; a few said they would not have been comfortable answering this question. Many producers would answer the question by discussing the benefits to the environment, such as cleaner water or more wildlife. Most, however, would like to answer the question, or at least include in their answer, their consistent belief that we have a “cheap food policy.” This policy benefits everyone, and that for this to continue people must be willing to support the farmer when world markets do not bring in enough for him to survive. Many cite the safety, abundance and quality of our food supply, and feel that our nation will decline if this is not supported.

Typical responses were: “The cost share isn’t really for my land, it is for the environment.” “... BMP cost share contributes to keep the water clean for others.” “Cost share is public money provided by legislators to our own benefit and that of our neighbors.” “The messages should be that we are in this together.” “We need to be more pro-active about what we are doing.” “If we don’t explain this now, or we make them mad, it will come back to us again later.”

10. Do commodity groups have an additional role in agriculture and environmental issues?

This question was not put to all respondents. Of those who were asked the question, most said that commodity groups did have a role. One individual suggested that commodity newsletters run articles about particular BMPs, especially those that are more controversial, such as buffers. The articles should contain both pro and con opinions, and should present it from the perspective of producers of that commodity. Some suggested

that the commodity groups should merge efforts on some topics in order to increase the presence in the discussions of BMPs. ir

11. Please list where you get your technical advice.

This was highly dependent on county. Some producers receive considerable technical advice from NCCES or from their Soil and Water Conservation District programs and cooperating Agencies. In a few counties, the producers noted that NCCES no longer had sufficient staff to help the producers and was primarily focused on the urban population. Several producers use private consultants and some producers work almost exclusively with the Regional Agronomist of NCDA & CS. Many cited agricultural publications as a useful source of information. y ionsasa

12. Other comments

Many of the producers had comments about the administration of cost share. This may be more related to misunderstanding as to how much money is available and the priorities from the administrative level. This may be just another need for additional education. s

V. Project Conclusions and Implications

Project conclusions are indicated by the “€” symbol, whereas the implications of the conclusions are indicated by the “•” symbol.

Best Management Practices Definition

- Many different definitions of BMPs exist within the agricultural community, while some farmers had no definition for BMPs. Many growers defined BMPs based on business management objectives or agronomic concepts, and thus, they generally did not describe them in terms of the environmental guidelines of ‘BMPs’ that most agency personnel use. Once these environmental aspects of BMPs were explained, producers were better able to relate the term to their own specific practices. Livestock farmers and producers who served on their local Soil and Water Conservation District Board of Supervisor had a much better understanding of the environmental criteria and the objectives of BMPs. Practices (such as grassed waterways, field borders, and even some versions of conservation tillage) were often practiced by some farmers long before the current use of the term BMP. Some growers were not clearly aware that they are practicing BMPs, or near versions of them.
 - When making presentations or working with producers, all agency personnel should clearly define BMPs, particularly clarifying in a unified way, the environmental and economic reasons for the BMP emphasis.
 - Knowledge brings about new terms and usage of language. This is true of BMPs. As experienced during the conduct of interviews, definitions of terms can mean the same, similar or something entirely different depending on the speaker. This illustrates the need to utilize accepted and understood terms by all parties: agency personnel, policymakers, farmers, etc. Each professional specialty will develop its own language, and in doing so can remove adherents to that specialty from the stream of clear communication. Continuing efforts, in education and information supply, need to use commonly agreed to definitions.
 - As farming systems mature and further knowledge comes to the forefront, emerging trends from a demanding society change perceptions and definitions of BMPs and their usage within agencies. One such emerging trend is that of payment to farmers and rural landowners for the maintenance of a “pastoral landscape” or “open space”. Taxpayers, policymakers, farmers and rural landowners joined effort to define BMPs for this emerging issue.

Understanding How Best Management Practices Work

- Growers were well aware of the value of the use of BMPs to society, and they particularly mentioned better water quality and reduction in sediment losses as environmental benefits.
- Growers were very familiar with practices that prevent erosion and they understood how the practices worked. Producers were using many of these practices, including conservation tillage, waterways, and terraces. Evidence of their understanding of BMPs in reducing sediment was apparent in the recurring theme of clean runoff water and streams that are not muddy. This observation was made by grower after grower. Many producers believe that if surface movement of soils is stopped by

conservation practices, then no further concerns regarding nutrients need to be addressed. For example, some growers saw the need for cover crops and were doing excellent jobs of using them. However, the producer's main motivations in using cover crops were to build organic matter in the soil, capture runoff, limit soil erosion, or reduce sandblasting from wind erosion; they generally did not understand or emphasize the merit of trapping nutrients and the possible recycling of nutrients in the plant biomass. In general, growers had an incomplete understanding of how nutrients, especially nitrogen, move into water resources. Especially poorly understood by most of our interviewees was nutrient movement through the soil and potentially into the shallow groundwater. This lack of understanding is a real shortcoming when we try to encourage the acceptance and proper use of the most important BMPs in the basin programs: nutrient management, controlled drainage, vegetated buffers and cover crops. Due to this understanding about nutrient movement (particularly nitrogen movement), it was difficult for producers to understand the role of nitrogen-reducing BMPs such as buffers, field borders, or cover crops.

- Agency personnel should work on providing information on nutrient movement and nutrient-reducing BMPs.
- The required use of tree buffers seem to be strongly opposed unless the trees already exist. Continued research on alternative buffers systems, such as buffers should be pursued.

- Some growers in the Coastal Plain mentioned the need for tiled drainage without realizing that tiled drainage often causes environmental concerns that are more serious than the reasons the grower has for his interest in this practice.

Best Management Practice Adoption

- Some practices that were cutting edge 25-years ago are now part of the standard operating procedure for many farmers. Conservation tillage, in some situations, was often viewed as experimental and somewhat risky even 10-years ago and strongly resisted by many producers. There is still some resistance to the adoption of conservation tillage. The widespread adoption of practices such as this did not come without a few bumps in the road. And, if widespread adoption occurs, it usually is accompanied by definite progress that addresses the problematic aspects of the practice, as well as with lots of education and various forms of promotion.
- Acceptance of some of the newer practices will take time and further research and demonstration.

- Cover crops are used more in the Piedmont and upper parts of the Coastal Plain area. Again, the emphasis from the producers was on the control of erosion. Some growers in the Coastal Plain do not see a need for cover crops, and some even dislike them because of risk of slow soil warming, and wet soil conditions. This was mentioned in the dark, flatland of the Tidewater region. There is little understanding of how cover crops capture and recycle nutrients. There is also a group that believes that voluntary natural vegetation following harvest provides adequate cover. This indicates a lack of understanding of how cover crop biomass contributes to soil structure and soil

nutrient sequestering. Some growers have had bad experiences with cover crops, such as a poornockdown with herbicides or the cover crop utilizing too much soil moisture. Cover crop planting varied from broadcasting to drilling seed. Generally, drilling of seed provided a much better final cover, although seeding over standing cotton or peanut offers the important advantage of earlier, timelier planting. Drilling of a cover crop was advantageous when soil moisture was limiting or the window of planting was past the optimum time. However, drilling cover crops is generally more costly and time-consuming, and tends to be a lower priority during harvest time. As is the case with similar production practices, the cost of cover crop planting and the destruction of it at planting are deterrents to the use of this practice, unless the farmer clearly sees the benefits of the practice, or receives some compensation for these extra expenses.

- Cover crops need to be better understood and more financially attractive to increase acceptance by more growers. One solution is to have cover crops qualify for cost-share funding.
- Farmers who truly like and believe in the value of cover crops in their systems need to share their beliefs and preferred methods of establishing and managing these cover crops, just as they do their methods for other crops. We can learn from these farmers, gathering as much from them and their results as possible. Also, “farmer-to-farmer” sharing of experience has already been effective here and in other states. This is sometimes done by farm tours, forming county “clubs” and other means.
- Increase research and education efforts to provide data to farmers and agency professionals, showing the various ways that cover crops and their residue contribute to environmental protection. These research efforts should emphasize management strategies that stress the understanding of different cover crop species, noting the regional differences and applications across the state. This will help to enhance cover crop use across the state. At the same time, applied research efforts are needed to provide accurate information, including costs and benefits to the farmers, such as improved yields or improved soil conditions. Any information on undesirable implications to the farmer and natural resources, such as increased insect or disease risk as well as reduced stand emergence, must also be shared with farmers.
- These data could be used to advocate for increased cost share for specific cover crop situations, where appropriate, according to the following criterion: that the farmer and society should share proportionately as to the costs of the cover crop practice and the value of its benefits to the farmer as compared to the benefit to the society. Cost share could then be used to achieve this balance, to demonstrate fairness.

- The most frequently mentioned BMP was conservation tillage. The popularity of this practice was usually associated with the perceived cost savings due to fewer trips over a field and less wear-and-tear on machinery, as well as the reduction in labor. After two or three years, a portion of the producers cited some advantage in yields and ground bearing strength for equipment operations. Simple economic had prompted some growers to change to conservation tillage practices. Improvements in equipment

and chemicals made these conservation-tillage practices possible. Economics and the need to preserve soil moisture had prompted more people to adopt conservation tillage than the desire to have an official BMP in place.

- Some BMPs, such as conservation tillage, that are perceived to be economically beneficial are readily adopted, even without cost-share funds. These offer important opportunities to build farmer and community support for the environmental contributions of this and other BMPs.
 - Additional research should continue and be expanded on cropping systems, residue management and tillage practices. These studies need to be multi-disciplinary.
- It was critical to have the interviewees define “no-till” and to establish how producers were using this practice. In some cases farmers were meeting the conservation tillage criterion of 30% residue cover, but residue cover was sometimes inadequate.
- When discussing minimum tillage practices, agency personnel need to use common and consistent terminology and define those terms. The reasons and criteria for the environmental effect of the practice need to be consistent and explained by professionals. This will require some coordination and perhaps even some jointly planned demonstrations and research.
- Many growers sample early and use their soil test reports to make nutrient management decisions. Some mainly used their soil test reports to determine lime rates, showing reluctance to search for different fertilizer ratios or suppliers to closely match the soil test results to fertilizer applications. Others used all the soil test information to make fertilizer application decisions. Detailed questioning was often needed to determine how soil tests were used and whether nutrient management was being adequately practiced. A number of producers have recently begun to use soil test reports to apply phosphorus. Several cite the increasing costs and narrow profits, and feel they must look carefully for ways to cut costs without hurting their yields and quality of product. For some of these producers, changes to their phosphorus management strategy occurred when they switched to grid sampling. For others the change in phosphorus management was due to concerns about the new NRCS nutrient management standard. The situation for nitrogen was somewhat different. A few producers, particularly those that had livestock, used the soils’ realistic yield expectation (RYE) formula to determine nitrogen application rates. Some farmers have traditionally used the general suggestions for nitrogen fertilization in their soil test reports to make nitrogen fertilizer decisions and are not fully aware or accepting of the RYE concept.

There seemed to be a greater awareness of pesticide BMPs than nutrient management BMPs. This is probably due to the pesticide certification program and information provided by product suppliers, as well as costs and risk awareness. Those producers, who had completed mandatory nutrient management training associated with either

.0200ortheNeuseBasinrules,usuallyhadabetterunderstandingofnitrogen management.

- Additional efforts are needed by all agencies to educate growers on utilization of RYE and N factors to determine recommended N rates for crop production and emphasize the importance of following soil test recommendations for improved phosphorus management.
 - Implement nutrient management education program for producers who have not already attended this type of training. Part of this training would incorporate data from producers' fields that show significant cost savings for nutrient management.
- Farmers are doing an excellent job of managing pesticides. Producers are giving great attention to the concepts of integrated pest management and overall pesticide safety issues. Those interviewed understood the importance of reading and following labels, using appropriate mixing and loading practices and recycling pesticide containers. Some, however, found the specifications on mixing and loading facilities cost shared under state funds to be too rigid. Many producers would welcome cost share for portable pesticide loading facilities.
- Portable mixing and loading facilities should be approved for state cost-share funding as soon as possible.
- Many growers had received cost-share funds but they did not seem to be a clear relationship between BMP implementation and cost-share payments, with the exception of dairy and livestock producers working under .0200 regulations. For this group, cost-share payments have been critical to their survival as an agricultural enterprise.
- Continued cost-share payments, both from federal and state funds, are important for BMP implementation.
 - Nearly twenty years ago, relationships between farmers and the technical advisory agencies began a transformation. With new legislation, additional responsibilities were given to agency personnel that included enforcement of regulations that were mandated by law. Farmers and agency personnel entered a new era of interaction in their relationship. With increasing regulation, policymakers, agency personnel and agricultural producers must work toward a full understanding of the issues from all perspectives.

Cost-share Funding

- Cost-share funding is limited and often inadequate to encourage BMP implementation. Some producers feel funds are sometimes abused by a minority of farmers (such as litter structures that only store equipment). Other producers feel that the specifications for BMPs are too stringent.
- Cost-sharing agencies need to evaluate program objectives and favor cost share for those BMPs that either do not produce revenue for the producer or have the most environmental benefit for the cost. Clearly some BMPs provide an economic benefit to farmers while also providing important sediment, nutrient, or pesticide nonpoint source pollution control.

- Cost-share rates need to be sufficient to reimburse the farmer for out-of-pocket costs. The periodic review of standards for cost-sharing of BMPs must ensure quality installation without overdesign.
 - Local agencies need to inform farmers, other interested residents and leaders of the community about the environmental objectives of the cost-shared BMPs.
 - Agencies need to emphasize the recipients' responsibilities in using and maintaining the practices and the flexibilities that are considered in the local application of the cost-share practices.
 - Agencies should better explain why the standards and specifications exist and not just focus on cost-share amount.
- For some producers who rented land, landowners were impediments to BMP implementation. Obtaining consent from the landowner for BMP implementation can be difficult: often it requires long-term education by the producer.
 - Term requirements for cost-shared BMPs need to be more flexible for rented land, or a better incentive package needs to be developed for landowners who rent their land under conservation contracts.
 - Except for those growers averse to receiving any assistance, essentially all growers thought that cost share is a useful economic incentive for BMP adoption. Cost-share programs, however, can be confusing.
 - More emphasis should be put on streamlining programs and making them easier for producers to understand and use.
 - Farmers were asked about their willingness to explain and defend cost-share benefits, assuming the person asking was perhaps a friend or family member who was not personally familiar with farming. Most did give a defense for receipt of cost share for BMPs, gradually becoming more comfortable and clear about their reasons as they talked. For most, however, the cost-share benefits seemed to overlap in their thinking with the benefits presently received from commodity market support payments. Most producers appear to be ready and willing to defend commodity payments based on resulting environmental benefits to everyone and the assurance of cheap and ample food supply. To be fair, though, most feel defensive about this situation, and would far prefer that market prices were adequate for the government market support to be unnecessary. Often, however, their defense of cost share seems to get lost and grouped into the commodity program defense.

Public Education on Best Management Practices

- Several producers suggested that the commodity groups work together to inform the general public, as well as community professionals and political leaders, about the accomplishments of the agricultural community in being good stewards of the land, water, air and wild life resources. These groups might also consider helping their own members to better understand BMPs by providing accurate and updated information for them in the various settings and methods they have available.

- Several growers express interest, and some would strongly support, carefully planned programs in which a more pro-active stance would be developed to increase the public's awareness of what has been accomplished to reduce the negative environmental effects of agricultural production. This should also include examples of the substantial environmental contribution to rural communities and to wildlife habitat.
 - Agencies and commodity groups need to help producers strengthen their justification for cost-share of BMPs, such as by emphasizing that these practices also provide cheap clean water, affordable wildlife, less nutrient and chemical pollution, energy conservation, air quality protection, etc.

Additional Issues

- Across the entire state, there is a suspicion that urban centers are causing more pollution problem than agriculture. Time and time again, a grower would mention that cities in their region were causing problems with sewage treatment plants and fertilizerrunoff from lawns. It was interesting that agricultural growers seemed to understand that urban centers could be contributing to nutrient levels in our waters but there was less understanding of their own contribution.
 - There needs to be continued publicity of what all sectors are doing to cause nonpoint source pollution, and, more importantly, what successes have been made by both the urban and agricultural communities in improving surface water quality.
 - Professionals working in these areas should be invited to give presentations or write articles for inclusion in commodity newsletters.
- There seemed to be a considerable amount of misinformation about the “riverrules” and BMPs. Several people outside the Neuse River Basin mentioned the Neuse River rules and how the rules would not work for them. Producers in the Tar-Pam River Basin often did not understand the rules in their own basin because the informal information they had received was incorrect. For example, many had heard that buffers were always mandatory and that these buffers had to be extended a hundred feet from streams or ditches.
 - It will take a continued education effort to get the correct word out to growers. All misinformation will never be eliminated but the best effort must be made.
 - Use as many different communication methods as possible to educate producers in and outside the affected basin on the rules and how the rules will be implemented.
- The majority of the general public does not understand agricultural production and natural resource relationships. This results in low public support for agricultural needs. Most farmers still in business today have reason to take pride in the fact that they are farming in ways more friendly to the environment than even a decade ago, and dramatically so as compared with 1930s to 1970s. Today we have less marginal land being farmed, less tillage, lower rates and safer chemicals in use, and better technology and equipment. Yet for so many of the public today that was their last period of direct family connection to farming and their nostalgic “good old days.” It

is not easy to attract the concern and interest of the public in the true realities of farming today, yet this is increasingly critical because so few are entrusted with so much; that being our natural resource protection, food production, the health of our rural communities and farming as a source of livelihood and family security.

- Producers need to continue to seek the support of non-farm organizations and agencies.

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