Conjoint analysis, therefore, provides a powerful analytical and management tool for increasing the economic viability of environmentally beneficial land use projects and addressing resource utilization by recreational specialists (Bryan 1977) other than "avid" quail hunters.

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FOOTNOTES

[1] In situations were higher numbers of attributes are used, a strategy may be employed in which subsets of attributes are presented to respondents to reduce the complexity of evaluating each profile. This process is referred to as a partial-profile design.

[2] The two respondents indicating values of $5,000 should not be dismissed as outliers or protest bids. These individuals are known to belong to a partnership owning over 17,000 acres for use as a private hunting preserve.

[3] $20/hour assumes two people working 40 hours/week each for 50 weeks of the year. $40/hour assumes one wage earner worked 40 hours/week for 50 weeks.

Table I

Levels of the Eight Hunt Attributes

	Levels					
Factors	**1**	**2**	**3**	**4**	**5**	***df***
COVER	Crop fields and edges	Cut-overs, Thickets, Young Timber	Crop Fields and Cut-overs	Mature Forests, Quail Plantations		3
FEE	$25	$75	$150	$225		
SIZE	100 acres	300 acres	500 acres	1000 acres		3
CONTACTS	1/day	5/day	10/day	15/day		3
HUNTERS	0	2	4	6		3
GUIDE	Present	Absent				1
MINUTES	0-30	31-60	61-90	>90		3
SATSUN	Sat. & Sunday	Saturday Only				

Table II

Response Inducement Techniques in the Quail Hunter Survey

Appropriate target population for the topic
Pretesting to ensure saliency to respondents
Personalization of envelopes and cover letters and inclusion of appeals for help
Survey sponsorship by recognizable organization
Monetary incentive in the form of a $400 raffle
User friendly format
Return envelop and prepaid postage
Limited inclusion of controversial and sensitive topics
Reasonable survey length with diverse format
Follow-up postcards and second survey mailing

Table III

Final Model: Logit Regression of Ratings on Eight Hunt Attributes and One Quadratic

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Coeff/(-.00862)
a_1	1.0086	0.1549	42.4172	0.0001	
a_2	0.4647	0.1542	9.0843	0.0026	
a_3	0.0196	0.1543	0.0161	0.8992	
a_4	-0.2872	0.1547	3.4445	0.0635	
a_5	-1.0199	0.1561	42.6658	0.0001	
a_6	-1.3641	0.1569	75.6134	0.0001	
a_7	-1.8271	0.1579	133.9380	0.0001	
a_8	-2.6516	0.1601	274.1974	0.0001	
a_9	-3.1655	0.1624	379.8014	0.0001	
COVER1	0.0147	0.0932	0.0250	0.8744	$ 1.71
COVER2	-0.2042	0.0946	4.6560	0.0309	($ 23.69)
COVER3	-0.0347	0.0944	0.1355	0.7128	($ 4.03)
CONTACTS	0.5499	0.0277	394.0140	0.0001	$ 63.79
GUIDE	-0.0758	0.0667	1.2916	0.2558	($ 8.79)
FEE	-0.00862	0.000461	350.3853	0.0001	
HUNTERS	-0.1295	0.0150	74.7644	0.0001	($ 15.02)
SIZE	0.00042	0.000099	18.0808	0.0001	$ .05
MINUTE	-0.0027	0.000991	7.4151	0.0065	($ .31)
SATSUN	0.1088	0.0666	2.6730	0.1021	$ 12.62
CONTACT2	-0.0223	0.00161	192.9364	0.0001	($ 2.59)

Table IV

Hunter Beliefs and Preferences Regarding Cover Types

Which area(s) did you:	COVER 1 Crop Fields/Edges		COVER 2 Cut-overs/ Thickets Young Timber		COVER 3 Crop Fields/ Cut-overs		COVER 4 Mature Forests/ Quail Plantation	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
most often hunt in?	1092	36.3	756	25.1	992	32.9	172	5.7
believe held the most birds?	652	21.0	1148	36.9	1104	35.5	204	6.6
find the most birds in?	800	25.6	1080	34.5	1044	33.4	204	6.5
harvest the most birds in?	972	31.2	844	27.1	1084	34.8	212	6.8
prefer to hunt in?	1804	58.2	260	8.4	816	26.3	220	7.1

Table V

Negative Aspects of Site Congestion

	Number giving a Rating of 10	Percentage of Total Responses
Other hunters may have harvested birds that day from the site	541	56.8
Other hunters/dogs may have disturbed birds that day on the site	489	51.4
Other hunters are currently on the site resulting in crowding	699	73.5
Other hunters are currently on the site resulting in reduced safety	729	76.7

Table VI

Mode and Frequency of Responses by Hunting Location

Location	Total Days Hunted	Total Number of Respondents	Average Days/ Respondent
State Game Lands	675	119	5.67
National Forests	109	26	4.19
Private Land (excluding hunt club or leased land)	9,369	644	14.55
Corporate Land (excluding hunt club or leased land)	150	28	5.36
Hunt club(s) or leased land (Private land)	2,433	270	5.01
Hunt club(s) or leased land (Corporate land)	372	42	6.85
Military Land	309	27	11.44
Other	201	26	7.73

Chapter Four: Producer Perceptions of Economic Incentives for Conservation Practices

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This chapter is intended for submission to the Journal of Soil and Water Conservation, Soil and Water Conservation Society. To the extent reasonable, guidelines for submission to this journal have been followed in the preparation of this document.

Abstract: A qualitative evaluation of the willingness of landowners to adopt field borders in two agronomic regions of North Carolina was conducted. Producers viewed conservation practices primarily in terms of economic costs and benefits. For production-related practices, adoption hinged on whether expected benefits materialized and if these were sufficient to generate net increases in whole-farm profitability. Adoption of practices producers believed offered more environmental than economic benefits, however, evoked a more complex decision process involving personal, environmental and community concerns. Economic incentives alone may be inadequate to ensure adoption of field borders and similar conservation practices.

INTRODUCTION

Non-industrial private landowners and producers are often the focus of resource managers trying to change land management practices (Williams and Lathbury 1986). Managers have been frustrated, however, by an inability to encourage investments in conservation practices on individual, production farms. This difficulty stems partly from landowner uncertainty regarding the ecological, financial and management implications of conservation improvements (Morris et al. 1996). Wildlife management efforts are also made difficult by conflicts within and between prevailing economic and environmental policies (Lakshminarayan et al. 1995). To overcome these obstacles, managers must identify and reduce the many uncertainties producers face when evaluating investments in conservation practices. This will require consideration of other environmental resources as well as the technical, economic and cultural realities of modern farming and rural life. In fact, the farm wildlife issue can be seen as a special case of the larger social problem of integrating farming, the rural community and urban interests within progressive social policy (Wimberley 1993).

Bobwhite quail declines in eastern North Carolina mirror those in other southern states and have become an important management issue for the State's wildlife community (Brennan 1991). In response, field borders (FB) composed of approximately three meters of mixed, naturally-occurring vegetation have been installed on crop lands as part of landscape-scale experiments in this region (Bromley 1997). This research has provided opportunities to reduce producer uncertainty regarding the opportunity costs of field borders (FB) in foregone corn and soybean production and the marketability of quail hunting access. It can be argued that producer adoption of FB will depend upon the availability and reliability of this type of information which describes the agronomic tradeoffs and environmental benefits of FB (Morris et al. 1996). If quail and other farm wildlife will respond favorably to field borders and marketable recreational hunting opportunities result, will these compelling economic arguments be necessary and sufficient to motivate producer adoption of FB on production farms? Answers to this type of question are required to ensure efficient design of effective natural resource policies directed at altering land management practices of non-industrial private producers.

This paper presents a discussion of our efforts to develop and understand the role of economic incentives in adoption of FB on rowcrop areas in eastern North Carolina. Initial research using flush-count surveys found 4.3 times the number of quail on farms with field borders as on farms without (Puckett et al. 1995). To determine the significance of this information in providing economic incentives for field border adoption, fourteen producers were interviewed to construct a matrix of factors influencing

their land management decisions and to gather their perceptions on numerous aspects of eastern North Carolina's rural community. This qualitative approach to social and agronomic research provided necessary exploration of the spectrum of barriers to producer adoption of FB (Patton 1980).

METHODS

More so than mail and telephone surveys, personal interviews provide a flexible, adaptive format for gaining insights into private land management decisions. Nine producers from the Wilson County area, in the upper coastal plain, and five from Hyde County, in the lower coastal plain of North Carolina, were selected from lists available from local county extension agents. Each approximately hour-long interview sought to cover a list of standard topics, such as types and amounts of crops grown and willingness to lease hunting access, while allowing for free-form discussion of other topics as they arose. This approach required no assumptions be made about what of importance might be learned by talking to producers but allowed the interviews to be highly responsive to individual differences and situational changes.

Each grower was asked seven questions (**Figure One**). These questions were general in nature to allow for a range of interpretation by individual respondents and hence a greater opportunity to understand producers' production activities as well as their perceptions of conservation practices. The first six questions addressed landowner beliefs about the interactions between agricultural production and natural resources. Question

seven presented interviewees with a hypothetical scenario involving field border establishment under a cost-share, compensation-type program and the leasing of access rights for quail hunting. This question was designed to evaluate whether an economic incentive was necessary and/or sufficient to motivate producer installation of FB on lands they farmed.

RESULTS AND DISCUSSION

Unlike quantitative research results, qualitative data provides information about individuals and their relationships within systems. Qualitative findings provide insights rather than a numerical basis for statistical analysis. A matrix was constructed to categorize predominant producer characteristics, beliefs and perceptions as well as factors important in their land management decisions (**Figure Two**). Respondents were divided by county to allow attitude comparisons across these two distinct agronomic regions. For questions one through six, only those characteristics, attitudes and perceptions supported by at least four or more of the fourteen respondents were included. For question seven, the hypothetical scenario, all responses regarding the necessity and sufficiency of the proposed economic incentives were included, as well as the other factors producers felt should be considered in such an investment decision.

Hyde and Wilson Counties represent two agronomic regions of North Carolina. Producers in Hyde County grew primarily corn, wheat and soybeans but also some

vegetables (mostly cucumbers) and peanuts. Growers in Wilson County also raised corn, wheat and soybeans but in addition produced the "money crops" tobacco and cotton. Differences in regional terrain were indicated by the use of cover crops, in addition to no-till cultivation and associated crop residues, on the relatively diverse topography of Wilson County. Differences in the average farm size were indicated by a focus on the future use of geo-referenced farming technology in Hyde but not Wilson County. Economies-of-scale from larger farmed areas are likely factors encouraging adoption of this technology in Hyde County.

In both regions, producers indicated a belief that their farming practices impacted, positively or negatively, the soil, water and wildlife resources on their farms. However, producers also stated the primary benefits of their current conservation practices (i.e. conservation tillage) accrued as reduced equipment, fuel and labor expenses from fewer required trips across fields. None of the producers referred to their use of geo-referencing technology as a conservation practice. Those using the technology discussed it as a business management tool. These findings suggest that despite understanding farming's impact on natural resources, producers view conservation practices primarily in terms of economic costs and benefits. Eight of the landowners stated the primary obstacle to adoption of conservation measures was the time and effort required to identify, learn about, compare and properly utilize new tillage and land management practices. These statements support comments by resource professionals who indicate difficulty "selling" conservation practices and programs to landowners facing numerous recommendations with diverse guidelines from multiple agencies (Personal communication Albert G. Henry

1998). These statements also emphasize the importance of providing producers accurate information on the agronomic-environmental tradeoffs of conservation practices.

Thirteen of the fourteen producers indicated they farmed leased land. Only two (in Hyde County), leasing from a national wildlife refuge and a private hunting preserve, faced any specific farm management requirements. Both were required to leave areas of ditch banks unmowed as wildlife habitat. In general, however, landlords required just basic clean-farming practices be observed and most renters said they simply farmed leased land as if it were their own. Community consensus and emphasis on what constitutes "clean" farming and landlord insistence on clean-farming practices have been identified as barriers to adoption of conservation practices (Morris et al. 1996). In addition, producers indicated the year-to-year nature of many farm leases was a clear disincentive to installing FB or other practices on leased land. The cost of no-till cultivation equipment was cited as the greatest obstacle to adoption of this conservation regime.

Question seven investigated the necessity and sufficiency of cost-share payments and quail hunting leases in producer adoption of FB. Producers were presented with a hypothetical scenario in which all foregone crop production profits from installing FB on five percent of their tillable acres would be reimbursed and all the tillable acres leased to quail hunters for $1 per acre. The four responding producers in Hyde County were evenly divided in requiring the economic incentive. Two of the four stated the proposed monetary incentive would also be sufficient to ensure adoption. One producer objected

based on concerns of pest intrusion from field border vegetation while another indicated the incentive was sufficient but unnecessary in light of his strong sense of stewardship. Additional concerns regarding personal hunting opportunities were also expressed. One producer continued to object over the loss of crop production, possibly indicating a disbelief that the hypothesized payment would actually materialize. In Wilson County, four of five growers responding stated an economic incentive was necessary and three of six stated the proposed incentive alone was sufficient. Yield effects from field border vegetation were again a concern and producers in this region expressed a much greater diversity of concerns relating to the presence of hunters on their farms.

In Wilson County, producers were concerned about hunting occurring in areas near houses and other development. They desired strong control of access lease contracts to prevent "strangers", "slob hunters" and other undesirable persons from using their land. This concern regarding strangers highlighted the strongest objection Wilson County producers had to leasing hunting access: the displacement of local deer hunters and subsequent leasing to local and out-of-town quail hunters. Producers indicated rapid growth in North Carolina's deer population in conjunction with the decline in quail and quail hunters, appears to have placed a majority share of the socio-political power structure of North Carolina's hunting community in favor of deer hunters. In this environment, respondents found increased trespassing and damage were common and attempts to control unwelcome visitors often resulted in costly vandalism. Ultimately, producers in Wilson County felt these types of community concerns would prevent them from adopting FB for bobwhite quail even if attractive economic incentives were

available from quail hunters and government conservation programs. Producers in Hyde County stated they did not share these concerns given the small population of people in their area and a relative lack of competition for hunting opportunities. A long tradition of waterfowl hunting leases in Hyde County may also have made the proposed quail hunting leases more acceptable.

CONCLUSION

Personal, on-farm interviews with fourteen producers in two agronomic regions of North Carolina provided insights into issues affecting landowner adoption of naturally vegetated field borders on rowcrop areas. First, regional requirements of agricultural production, heterogeneity of producers and diversity among rural communities make it unlikely a one-size-fits-all incentive package will achieve landscape-scale results needed to solve many of today's environmental problems. Second, while producers understand the impacts of their operations upon natural resources, they may view the costs and benefits of conservation practices in their own economic terms when making land management decision. This appears to support emphasis in the resource management profession on the need for compelling economic arguments tailored to non-industrial private producers. It must be stressed, however, that while producers appear to maintain a strong economic perspective regarding conservation-oriented production practices, this perspective may weaken when non-production practices, such as FB, are evaluated. It is unsafe, therefore, to assume that economic incentives alone will always provide sufficient

adoption incentives to all landowners. Finally, many barriers to producer adoption of conservation practices are born out of uncertainty, be it ecological, financial or social, and the risks these uncertainties represent.

This qualitative research effort identified obstacles facing natural resource mangers working to change land management practices within the agricultural community in eastern North Carolina. While economic incentives for producers will likely be an essential part of future resource enhancement programs, documentation of environmental benefits and education of the rural community are also necessary for an integration of farming, rural community and urban interests within progressive social policy (Wimberley 1993).

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Figure One

Interview guide and questions

This first set of questions concerns the natural resources which may be influenced by your operations. I want to learn how you believe your production operations interact with the land and other resources.

1) Please tell me about the crops or livestock you produce.
2) Which natural resources do you believe you influence? Please describe how you see your management impacting these resources.
3) Which of the resource consequences that you've described do you believe are outside your control? Why?
4) When you think about the results of your management, which resources do you believe could benefit from additional efforts made by you or your employees?
5) When you are farming leased or rented land, how is your control over the natural resources affected?
6) Please describe the conservation practices you currently use. What benefits do you believe have resulted and what problems have you encountered?

I would now like to present you with a hypothetical situation to understand how you might respond. This situation concerns the use of habitat enhancements to increase wildlife populations and farm income.

7) Would you be willing to place five percent of your tillable land into naturally vegetated field borders to benefit bobwhite quail if all your lost crop profit were covered by some program and you could generate additional income of $1/acre on all the tillable acres by leasing quail hunting access.

Figure Two

Agriculture and Conservation Perspectives from 14 Producers in Eastern North Carolina

Part A: Catalogued responses to questions one through six: Each listed response was from at least four producers.

Location	Primary Crops Produced	Natural Resources Impacted	Current Conservation Practices	Cost of Conservation Practices	Benefits of Conservation Practices	Anticipated Conservation Practices	Farm Leased Land?	Landowner Requirements	Barriers To Adoption
Wilson Co. n=9	Corn Cotton Soybeans Tobacco Wheat	Soil Water Wildlife	No-till Crop debris Winter cover	Information Learning	Equipment, Labor & Fuel Savings	No-till	Some	No specific, General cleanliness	Equipment Expense
Hyde Co. n=5	Corn Soybeans Wheat	Soil Water Wildlife	No-till Crop debris	Information Learning	Equipment, Labor & Fuel Savings	No-till	Some	No specific, General cleanliness	None

Part B: Catalogued responses to question seven. All responses were included

Location	Monetary Incentives Necessary?	Monetary Incentives Sufficient?
Wilson Co.	4-yes 1-no	6-yes 3-no
Hyde Co.	2-yes 2-no	2-yes 2-no

Location	Lost Crop Production	Suburban Sprawl	Don't Want Strangers or Slobs On Land	Locals Displaced, Locals vs. Outsider	Control Of Vegetation	Control, Contract Flexibility	Short-term Nature of Farm leases	Landowner Concerns	Self Use
Wilson Co.		2	3	5	4	3	1	3	4
Hyde Co.	1[a]				2				1

[a] Each number indicates the number of landowners stating each concern.

CONCLUSION

This study began by identifying barriers to producer adoption of field borders in eastern North Carolina. Producer uncertainty regarding the ability of field borders to improve quail populations, the opportunity costs in foregone crop production and the impacts of field border vegetation on adjacent crops presented obstacles. After accepting field border benefits for quail as a working premise, it was hypothesized that providing accurate information to producers on the remaining issues would reduce these uncertainties and encourage adoption.

Opportunity costs of field borders in foregone corn and soybean production were quantified in two agronomic regions. No-till corn along field edges in the upper coastal plain, especially next to wooded areas, was found to be unprofitable and hence offered areas where field borders could be economically viable. Hunter willingness-to-pay for wild quail hunting opportunities was found to be potentially sufficient to overcome opportunity costs of field borders on profitable acres, especially when added to government conservation program payments. Producers were interviewed to assess whether the data on opportunity costs and hunter willingness-to-pay was necessary and sufficient to motivate field border adoption.

In the more densely populated upper coastal plain, producers exhibited a more complex adoption decision process due to more intense competition for farming and recreational opportunities and greater community emphasis on "clean farming" practices.

Producers in this area emphasized the necessity for economic inducements, possibly responding to these additional concerns. Ironically, these same concerns meant economic incentives alone were less likely to be sufficient motivation for producer adoption in the upper coastal plain. These additional cultural concerns may prevent the desired incentives from being sufficient whereas, in the less populated lower coastal plain, economic incentives are more likely to be sufficient.

This qualitative research effort identified obstacles facing natural resource mangers working to change land management practices within the agricultural community in eastern North Carolina. While economic incentives for producers will likely be an essential part of future resource enhancement programs, documentation of environmental benefits and education of the rural community are also necessary for an integration of farming, rural community and urban interests within progressive social policy as described by Wimberley (1993). Natural resources agencies must recognize the regional requirements of agricultural production, the heterogeneity of producers and the diversity among rural communities as each of these makes it unlikely a one-size-fits-all incentive package will achieve landscape-scale results needed to solve many of today's environmental problems.