

ASSESSING THE EFFECTIVENESS OF THE NATURAL ADVANTAGE PROGRAM

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EXECUTIVE SUMMARY

This report presents an evaluation of the effectiveness of an agri-environmental extension program, and makes recommendations on how to design future programs and conduct external evaluations of such programs. This research was undertaken by a research team at the University of Alberta, with support from the Alberta Land Institute (ALI) and the Linking Agricultural and Environment Research Network (LEARN).

In particular, we assess the effectiveness of the Natural Advantage Program (NAP), a free, intensive extension service offered by Ducks Unlimited Canada to Alberta-based producers between 2007-2009. The program provided participants with personalized reports identifying: 1) Stewardship practices that could be implemented on their farms; and, 2) Sources of financial and/or technical assistance to help implement those practices.

In late 2011, two types of surveys were developed for the purpose of this evaluation: a general survey designed to collect demographic and farm information from all participants, and a personalized survey designed to assess 2007-08 participants' completion of the specific actions and referrals recommended to them by DUC. Surveys were then distributed to 215 NAP participants, with 137 participants (63.7%) returning completed surveys.

Respondents from 2007-08 reported completing 52.6% of the 683 practices, and accessing 16.3% of the forms of assistance, recommended to them in their NAP reports. Action completion rates (but not assistance access rates) were significantly higher than those reported by 2009 respondents, who did not receive the NAP service due to its early termination. When asked why they did not comply with recommendations, 2007-08 respondents most frequently stated factors relating to resource constraints, irrelevance and forgetting, in that order.

Consistent with the conservation practice-adoption literature, the NAP saw greater practice adoption amongst producers who owned their land, and who planned to transfer it to their families. Farm size, watershed group membership, and interest in conservation also increased the likelihood of adoption. The actions most likely to have been adopted were those that required little investment of time or money while causing little inconvenience to the producer. Actions causing greater inconvenience or requiring a greater investment were still somewhat likely to have been adopted if they also provided visible, private benefits.

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INTRODUCTION

In recent decades, governments have channelled an increasing proportion of their agricultural budgets towards policies that attempt to achieve environmental objectives (Burrell 2012). To achieve these objectives, policy makers use a variety of mechanisms that blend different degrees of volunteerism and regulation (Pannell 2004). Programs relying more heavily on volunteerism are viewed as an attractive option for pursuing environmental objectives, as they tend to be less costly and more flexible than more regulatory approaches (Pretty *et al.* 2001). And indeed, governments and other organizations in and outside of Canada have developed and implemented a variety of such programs to encourage producers to voluntarily adopt actions that achieve environmental aims. Uptake of these actions by landholders, however, does not always meet targeted levels (Pannell *et al.* 1999). As a result, the positive environmental benefits accruing from these programs may be provided below socially or programmatically desirable levels.

One approach that has commonly been taken to encourage the adoption of voluntary practices is that of agricultural extension. Agricultural extension can be defined as “public and private sector activities relating to technology transfer, education, attitude change, human resource development, and dissemination and collection of information” (Marsh & Pannell 2000, 609). Extension operates in part on the pretense that a key contributor to a producer’s decision not to adopt a practice is their lack of adequate information about or awareness of the practice (Rogers 2003).

While extension programs can result in tangible environmental gains (e.g., Goodhue *et al.* 2009), the reasons for non-adoption of new, voluntary practices are not limited to producers’ lack of information. Comprehensive reviews of the international adoption literature suggest that the factors contributing to the adoption decision are multiple and diverse, extending beyond issues of inadequate information to factors like the trialability of the practice, its operational compatibility, and its relative advantage over existing practices (see e.g., Rogers 2003, Pannell *et al.* 2006, Knowler & Bradshaw 2007, and Prokopy *et al.* 2008).

Much of this evidence, however, comes from outside of Alberta. External evaluations of voluntary stewardship programs in Alberta are rare: a forthcoming Alberta Land Institute (ALI) review of stewardship programs implemented in the province over the past 25 years found that, of the 112 programs included in the review, only three had been subject to external evaluation. As such, opportunities exist to both expand our understanding of the factors contributing to the under- or non-adoption of environmental practices in the province, and to assess whether the extension process is a tenable strategy for addressing these factors.

Here, we evaluate a Canadian case in which extension was used as a strategy to increase the adoption of a particular suite of Beneficial Management Practices (BMPs) being promoted as part of a larger voluntary stewardship program. Our case is that of the “Natural Advantage” Program (NAP) – an intensive agricultural extension service offered from 2007-2009 by the Alberta branch of the non-governmental conservation organization, Ducks Unlimited Canada (DUC), with support from the federal government. This service was offered in response to the low uptake of wildlife habitat- and biodiversity-oriented BMPs

being funded by the joint federal-provincial/-territorial National Farm Stewardship Program (NFSP)¹. The basic tenant of the NAP was to encourage the conservation and remediation of wildlife habitat and biodiversity by recommending farm-specific actions the landowner could adopt to achieve such aims, and by providing the names of organizations that could provide relevant financial and/or technical assistance in implementing the actions.

The following report provides an overview of the research undertaken by the University of Alberta, with support from the ALI and the Linking Agricultural and Environmental Research Network (LEARN), to evaluate the effectiveness of the DUC extension program. In particular, we:

- 1) Assess outcomes relating to NAP participation, including action completion rates and referral access rates, and compare them with outcomes associated with non-participation in order to provide a general assessment of program success.
- 2) Identify factors linked to the adoption of actions and referred sources of assistance, focusing on how the NAP performed in promoting different types of actions to different types of individuals.

In addition, we use our findings from, and our reflections on, the evaluation process to:

- 3) Develop recommendations on how to improve the design of an extension effort such as the NAP.
- 4) Develop recommendations on how to conduct an external evaluation of an extension program.

The remainder of this report outlines the research undertaken to achieve these aims. An overview of the NAP and a brief review of the voluntary adoption literature are first provided to offer context for the work that follows. Next, the methods used to assess the program are outlined. Key findings are then discussed. Using these findings, a series of recommendations are offered.

BACKGROUND

The Natural Advantage Program

In 2006, the federal, provincial and territorial governments of Canada jointly introduced the National Farm Stewardship Program (NFSP). The NFSP was one of a number of policies introduced under the national agricultural strategy, the Agricultural Policy Framework (AFP), that were designed to improve environmental outcomes associated with agricultural production. The \$176-million NFSP offered eligible producers² access to financial and technical assistance to help them implement NFSP-approved BMPs (Office of the Auditor General of Canada 2008). A total of 30 BMPs were eligible for funding, including BMPs relating to structural practices (e.g., construction of manure storage facilities and shelterbelts), management practice changes (irrigation and pest management) and consultative services. Contributions of between 30-50% of the value of the project were offered, with the maximum contribution ranging from \$2,000 to \$30,000 depending on the BMP.

¹ In Alberta, the NFSP was delivered under the name Canada-Alberta Farm Stewardship Program (CAFSP).

² To be eligible to receive NFSP funding in Alberta, the applicant had to have a farm and to have completed an Environmental Farm Plan (EFP) – a voluntary, federal-provincial initiative designed to help interested producers identify on-farm environmental risks and capture environmental opportunities.

Upon review of the program in March 2006, the AFP *Environment* chapter found that national uptake of the NFSP-funded BMPs by producers was lower than anticipated (Office of the Auditor General of Canada 2008). In Alberta, uptake of BMPs dealing with wildlife habitat and biodiversity were particularly low relative to other funded BMPs (Schmitt & Boukall 2008).

In response to this low uptake in Alberta, the Alberta branch of Ducks Unlimited Canada successfully developed a proposal to provide a remedial extension service. In 2007, DUC launched this service – *Natural Advantage: The On-Farm Wildlife Habitat and Biodiversity Planning Service* (henceforth the Natural Advantage Program or NAP) – with support from NFSP-affiliated organizations including the Environmental Farm Plan and Greencover Canada. The main objective of the NAP was to aid Albertan landowners' efforts to conserve their on-farm wildlife habitat and biodiversity through the provision of information – including NFSP BMP information – free of charge. In doing so, DUC aimed to increase the likelihood that these environmental assets would be conserved – an outcome that DUC believed would stem from the increased knowledge and awareness created by the program's service (Schmitt & Boukall 2008).

Producers were recruited to the voluntary program through magazine and radio advertisements, at trade shows, and by word of mouth. Using an intensive one-on-one farm assessment process, DUC biologists developed a detailed assessment of participating producer's on-farm environmental assets. Using information gathered from the assessment, the biologist then developed a comprehensive report that provided participants with recommendations on how to improve his or her particular on-farm assets, for example by fencing habitat, planting shelterbelts or native crops, or by restoring wetlands. Also included in the report were the contact details for sources of financial and technical assistance that could aid in the implementation of the specific recommendations, including details of NFSP BMPs when relevant. The biologist then conducted an in-person review of the report with the participant, where they encouraged the individual to agree to implement various recommendations in the report, although concrete plans for implementation were not made. This review process marked the last planned contact between the biologist and the participant; participants from one program year were not involved in any way in subsequent program years and no plans were made to follow up on participants' progress.

During its two years of operation in 2007 and 2008, the NAP completed assessments and provided reports to 158 Alberta-based producers³. An additional 90 participants signed up to participate in the program in 2009, although these participants did not receive assessments or reports due to the unexpected cancellation of the NAP following the termination of its key funding source, the Greencover Program.

Following the completion of the first program year in 2007 the Praxis Group, a Calgary-based consultancy specializing in public consultation and survey research (Praxis Group 2012), undertook a third-party review of the program. This review, conducted by phone interview with 39 participants from the 2007 program year, focused on eliciting such details as participants' initial awareness of and introduction to the

³ Given that one of the primary objectives of the NAP was to promote NFSP cost-share programs, farmers recruited in the 2007 program year were required to hold an EFP, which was a precondition for consideration for funding from the Alberta branch of the NFSP. In 2008, the NAP relaxed this condition and simply encouraged, but did not require, that producers interested in receiving the NAP hold an EFP.

program, their assessment of the program's quality, and suggestions for its future development (Praxis Group 2008). This review did not address the efficacy of extension.

Agri-Environmental Extension & The Adoption of Agri-Environmental Practices

Given the voluntary nature of participation, understanding which factors contribute to an individual's participation decision is important for ensuring program efficacy. Given that the uptake of such programs has often fallen short of policy makers' goals and expectations, considerable efforts have been made over the past several decades to study the determinants of adoption (Pannell *et al.* 2006). Here, we provide an overview of the changing understanding of the adoption process and the implications for extension design.

In his review of agricultural extension theory and practice, Black (2000) notes that extension was initially viewed as a 'top-down' process, where the role of the extension agent was to communicate relevant information to producers about practices developed by the research community. This approach assumes that the provision of sufficient information about the practice will lead to the adoption of that practice and, by extension, that the primary cause of non-adoption is a lack of sufficient practice-related information. The producer is conceptualized as a largely passive participant in the adoption process, receiving and accepting information developed and delivered by researchers and extension agents (Vanclay 2004; Pannell *et al.* 2006).

Over the past two decades, research has resulted in a shifting away from the assumption that landholders passively accept information and adopt the associated conservation practices (Mendham *et al.* 2007). Instead, adoption is viewed as a complex and dynamic decision-making process whereby a producer considers numerous factors when choosing whether or not to adopt a practice (e.g., Pannell 1999; Vanclay 2004; Llewellyn *et al.* 2005).

According to Pannell *et al.* (2006, 3), adoption is a two-part learning process, involving the "collection, integration and evaluation" of information about the practice, followed by the acquisition of skills necessary to implement the practice. This process is dynamic, with various factors contributing to the outcomes associated with each stage. So while the process, and thus the decision to adopt, may be directly linked to factors like the individual's perception of the value of the practice or to the outcomes associated with subsequent trialing, these perceptions and outcomes are themselves influenced by the nature of the individual, their social and cultural context, and by the characteristics of the practice itself.

Numerous social, cultural and personal characteristics have been linked to the adoption decision. Some key characteristics, or factors, include the goals of the individual and their family, their relationship with other adopters and the organization promoting the practice (and thus their access to information about the practice), their personality (for example, their level of risk aversion), and various demographic factors including age, education and income (e.g., Vanclay 2004; Pannell *et al.* 2006; Mendham *et al.* 2007).

For some such factors, the relationship to the adoption decision is intuitive. For example, the quality of the potential adopter's relationship with the extension agency typically correlates positively with the adoption of conservation practices (e.g., Mendham *et al.* 2007). For other factors, the directionality of the

relationship is not consistent, but rather is dependent on contextual factors like the nature of the practice. For example, in a review of relevant literature, Pannell *et al.* (2006) found that the correlation between adoption and education levels tends to be positive for beneficial practices and negative for complex or disadvantageous practices. Similarly, Mendham *et al.* (2007) found that producers who expressed strong conservation goals differentially adopted integrated weed management strategies depending on their perception of the environmental credibility of the practice.

As suggested above, the characteristics of the practice may also influence the adoption decision (e.g., Pannell *et al.* 2006; Rogers 2005). According to Pannell *et al.* (2006), there are two broad categories of such practice-related characteristics. The first, relative advantage, or the degree to which the practice is viewed to offer an advantage over existing practices, is influenced by factors like the individual's perceptions of the practice's compatibility with existing practices and goals, its environmental credibility, and its complexity. This perceived relative advantage is "the decisive factor determining the ultimate level of adoption of most innovations in the long run" (Pannell *et al.* 2006, 8). The second category, trialability, or the ease with which the individual can learn about its performance and management, is influenced by perceptions of the practice's divisibility into smaller, more testable parts, its complexity and the physical observability of its environmental outcomes, among other things.

Generally, relative advantage, trialability and the factors that underlie them relate to the adoption decision in expected ways (Pannell *et al.* 2006). For example, practices that offer greater relative advantage and trialability by virtue of their simplicity or compatibility with goals are adopted at higher rates than those which are more complex or goal-incompatible (Pannell *et al.* 2006; Rogers 2005). However, as with social, cultural and personal factors, the directionality and strength of the relationship between these factors and the adoption decision may be influenced by other factors.

The factors identified in the framework provided by Pannell *et al.* (2006) are echoed elsewhere in the adoption literature, signalling a growing recognition that the adoption of conservation practices is driven not simply by information gaps but rather by a litany of factors that inform a complex decision-making process (e.g., see the comprehensive reviews provided by Knowler and Bradshaw 2007; Prokopy *et al.* 2008; Caswell *et al.* 2001).

In line with this changing view of the adoption process, the perception of extension is changing as well. Given the complex nature of the decision-making process, the traditional information provision approach identified by Black (2000) is no longer viewed as a universally appropriate approach. Instead, there is increasing recognition of the need for multiple models of extension, including models that incorporate producer knowledge, that cater to the differing needs and learning styles of differing producers, and that target key factors that influence the adoption decision (e.g., Black 2000; Vanclay 2004; Pannell *et al.* 2006). Furthermore, the ability of extension to influence the factors that contribute to the adoption decision has been questioned, suggesting that ambitious expectations for the effectiveness of extension may need to be tempered (Vanclay 2004; Pannell *et al.* 2006; Pannell 2008).

It is within this framework – of adoption as a complex process that necessitates varied approaches to extension – that we conduct our study. Our producer surveys (discussed in more detail below) collected information on the relevant decision-making factors identified above. This information was then analysed to evaluate the program's outcomes, and to identify statistical relationships between key factors and

outcomes. Results are interpreted to provide an assessment of the appropriateness of the NAP’s more traditional information-provision approach, given the nature of the practices being promoted, and to more generally assess whether the factors identified in the international literature are of relevance in an Alberta adoption decision-making context.

STUDY DESIGN

Sample Selection & Background Data Collection

In January of 2011, researchers from the University of Alberta (U of A) met with the program director and an extension biologist from DUC’s NAP to discuss the possibility of conducting a formal review of the NAP. At that meeting, DUC agreed to assist the U of A research team in conducting a review and plans were made to commence research that same month.

Working with a DUC extension biologist affiliated with the NAP, in February 2011 the U of A research team contacted by letter all NAP participants with valid mailing addresses to determine their interest in participating in the review and to obtain their consent for the U of A to access their NAP reports for the purpose of developing the evaluation survey. Although participants from 2009 did not receive reports due to the unexpected early termination of the NAP, they were nevertheless contacted so as to provide a comparison group. The use of such a group is intended to control for contemporaneous effects that may have impacted producers’ behaviour (see Ferraro and Pattanayak 2006).

Of the 220 participants contacted from all three program years, 70.9% agreed to both release their report information and participate in the study (Table 1).

Table 1. NAP Participants’ Initial Responses to U of A’s Request for Participation and Information Release

| | Yes to Study and Release | No to Study and/or Release | No Response Provided | Total Contacted |
|------------------------|--------------------------|----------------------------|----------------------|-----------------|
| 2007 | 56 | 3 | 3 | 62 |
| 2008 | 73 | 7 | 16 | 96 |
| 2009 | 27 | 4 | 31 | 62 |
| Total Responses | 156 | 14 | 50 | 220 |

The U of A research team compiled a database using data from consenting participants’ reports. These data included the specific practices and forms of assistance recommended to each participant, as well as participants’ farm types, farm sizes, and ownership arrangements. These data were compiled for use in future analyses and to inform the creation of the surveys.

Survey Design

Given the need to elicit from 2007 and 2008 participants details specific to their reports, and the fact that 2009 participants did not have reports, two survey instruments were developed: a general survey containing questions that were relevant to all participants, and a personalized survey with questions specific to the particular recommendations and referrals made to report recipients.

Survey development was guided by the voluntary adoption literature (e.g., Pannell *et al.* 2006; Greiner & Gregg 2011; Vanclay 2004; Baynes 2007; Mendham *et al.* 2007), Maybery *et al.*'s (2005) Farming Values Scale, Statistics Canada's 2006 Census of Agriculture (2006a) and 2008 General Social Survey (2009), input from experts at both the U of A and DUC, and details from the database. Physical design of the surveys was informed by Dillman *et al.* (2009). The specific instruments – the general survey and personalized survey – are discussed below.

General Survey (2007-2009)

The general survey was used to elicit attitudinal, demographic and farm-level characteristics that have been shown in the adoption literature to have bearing on the decision to alter one's farming practices. Two versions of this survey were designed: one for 2007-8 report recipients and one for 2009 non-recipients. These survey versions were designed to be as similar as possible, with the key difference being that the 2009 version excluded experiential questions related to NAP participation, and instead included questions designed to assess whether the participant independently completed actions or accessed sources of assistance. The 2007-8 version included a total of 24 questions, while the 2009 version included a total of 22 (Table 2 and Appendix I).

A unique feature of the attitudinal component of the survey is the inclusion of the Maybery *et al.* (2005) Farming Values Scale, a 15-item Likert scale designed to identify the degree to which producers identify with conservation, lifestyle and economic values and goals when considering their operation. Each overarching "value" is associated with five items: conservation items emphasize the importance of stewardship and environmental goals; lifestyle items emphasize the enjoyment received from the farming community and lifestyle; and economic items emphasize the business- and profit-oriented aspects of farming. Responses to each set of items are scored, resulting in three factor scores – one each for conservation, lifestyle and economic values – that provide a sense of that producer's farming orientation. To the best of our knowledge, this is the first study to use the Farming Values Scale in a Canadian context. This scale was included in both versions of the general survey.

Personalized Survey (2007-8 Only)

The personalized survey was used to assess 2007 and 2008 participants' behavior with regards to the specific actions and referrals recommended to them (Appendix I). A template survey included the following six questions:

Actions Questions

- 1) Indicate whether you have completed each of the recommended actions listed in your report.
- 2) Select from a list the reasons why you have not completed recommended actions.
- 3) Provide other reasons, if any, why you have not completed recommended actions.

Referral Questions

- 4) Indicate whether you have successfully accessed referrals and, if not, why.
- 5) Select from a list the reasons why you have not accessed referrals.
- 6) Provide other reasons, if any, why you have not accessed referrals.

Table 2. Specific Questions Included in the General Survey, by Question Type

| Question Type | Specific Questions |
|---------------|---|
| Attitudinal | <ul style="list-style-type: none">• Farming Values Scale (Maybery <i>et al.</i> 2005)• Attitudes towards organizations providing wildlife habitat- and biodiversity-related assistance• Preferences for different sources of extension |
| Demographic | <ul style="list-style-type: none">• Age• Marital status• Education• Number of children under 18 living with participant• Most recent form of coursework completed relating to wildlife habitat and biodiversity conservation• Hours worked off-farm by participant• Hours worked off-farm by other household decision makers• Participation in environmental organizations |
| Farm-level | <ul style="list-style-type: none">• Relationship to farm participating in the NAP• Means by which participant learned of the NAP• Change in acres in various types of land since participating in the NAP¹• Amount of tree clearing since participating in the NAP¹• Years managing <i>any</i> farm business• Years operating farm assessed by the NAP• Type of farm assessed by the NAP• Status of the assessed farm's Environmental Farm Plan• Current status of farm operation assessed by NAP |
| Experiential | <ul style="list-style-type: none">• Other forms of assistance accessed to implement NAP recommendations¹• Actions taken to preserve wildlife habitat and biodiversity <i>not</i> recommended in the NAP report¹• Actions taken to improve quantity and/or quality of wildlife habitat or biodiversity on farm, including details related to assisting organizations and assistance provided² |

¹Indicates that the question appeared only in the 2007-8 version of the survey.
²Indicates that the question appeared only in the 2009 version of the survey.

Participants' report-specific actions and referrals were inserted into questions 1 and 4, respectively. In order to minimize the response burden on participants, actions that were similar in nature were condensed and appeared only once, while vague or passive actions and referrals (e.g., those that did not require the producer to act) were omitted⁴. The number of items included in each participant's actions and referrals sections was dependent on the contents of each participant's NAP report, and ranged from 2-14 for recommended actions ($M = 8.69$, $SD = 2.69$) and 0-11 for recommended sources of assistance ($M = 4.95$, $SD = 3.00$).

⁴ One common passive recommendation made by DUC was for participants to maintain sensitive areas of land. In order to assess whether this recommendation was followed, participants in this study were asked to report whether the area of a particular land type had changed since participating in the program. The area of each land type at the time of the individual's participation in the NAP was provided in the survey.

The list of reasons for not completing actions and accessing referrals was informed by the voluntary adoption literature, as well as by conversations with DUC personnel and other experts. Due to the breadth of the extension program being evaluated and the need to keep the survey length manageable, participants were not asked to indicate how credible they considered the practices and sources of assistance recommended to be, or to indicate the scale of any projects undertaken.

As it was necessary to be able to match the survey responses to information in participants' NAP reports, it was not possible to design wholly anonymous surveys. To increase the confidentiality of the information provided, and to reduce the pressure for participants to respond in a socially desirable manner, each participant was assigned an ID number. This ID number was attached to the participants' database information and survey(s), but not to their name.

Final drafts of both survey instruments were completed in October 2011 and were reviewed by colleagues at DUC and the University of Alberta's Department of Resource Economics & Environmental Sociology. All survey versions were finalized in early November 2011.

Survey Implementation

Given the length of the surveys, which took approximately 25 minutes to complete together, and the sensitive nature of some of the questions, a pen-and-paper approach was deemed to be superior to a phone interview as it offered participants more flexibility and would place less pressure on participants to respond in a socially desirable manner. As fewer than 50% of Alberta farmers report having high-speed Internet access (Statistics Canada 2012), a web-based survey was seen as an undesirable option.

Survey packages were compiled in November 2011. Each survey package contained the following:

- 1) An introductory letter explaining the purpose of the project, the voluntary nature of participation, instructions on how to complete the survey and how to contact the research team, should the participant have questions.
- 2) The survey materials. For each participant, this included a general survey tailored to their program year. For 2007 and 2008 participants who consented to release the information of their report, this also included a personalized survey. Participants from 2007 or 2008 who did not consent to the release received only the 2007-08 general survey.
- 3) A prepaid return-addressed envelope, to be used to return the completed survey materials.
- 4) A \$5 gift card to the coffee chain, Tim Hortons, to serve as a small token of thanks and an incentive for participants to complete the survey materials.

In mid-November 2011, packages were mailed to 158 NAP participants. As the vast majority of NAP reports were listed as having been created for more than one individual (often couples or families), the invitation to complete the survey was extended to any of the operation's decision makers, so long as that individual had also been involved in the operation's participation in the NAP. In December 2011, a reminder card was sent to all participants to encourage them to respond to the survey. In January 2012 a second round of surveys was sent to the 58 participants who had not already responded to the previous requests for participation. In the summer of 2012, a final round of invitations was sent to all 2009 participants with valid contact information, including those who had not responded to the initial contact

letter, but excluding those who had actively declined to participate. To encourage greater participation among the 2009 group, individuals were invited to complete a condensed version of the general survey by telephone or mail.

Data Analysis Methods

Descriptive statistics of farm and respondent characteristics were compiled. To determine in a broad sense the generalizability of this review’s findings to the greater population of Alberta producers, these statistics were compared to provincial data, largely from Statistics Canada’s 2006 Census of Agriculture (2006b). Descriptive statistics were also compared between the 2007-8 and 2009 groups in order to determine whether the 2009 group was a suitable comparison against which to assess the impacts of NAP participation.

In order to determine whether responses to the Maybery *et al.* (2005) Farming Values Scale were fit for use in further analyses—namely, for use in the descriptive statistics described above and the models described below—responses were aggregated and subjected to Principle Component Analysis (PCA). This PCA verified that each of the 15 items included in the scale correlated significantly with the appropriate higher-level factors. As suggested by the authors, oblique rotation was used to allow for correlation between the factors (the lifestyle and conservation factors are predicted to be correlated) and the number of factors to extract was set to three (Maybery *et al.* 2005). A Cronbach’s alpha coefficient was also calculated for each of the three factors to determine whether the scale reliability of each factor was sufficient for exploratory research.

To assess stated action completion and referral access rates, descriptive statistics were calculated using 2007-8 participants’ personalized survey data. To assess very generally the NAP’s impact on a producer’s likelihood of acting on NAP recommendations, these descriptive statistics were compared to action- and assistance-related data provided by 2009 respondents in the general survey.

To provide insight into the factors contributing to 2007-8 participants’ decisions to follow NAP recommendations, stated reasons for non-compliance were compiled using personalized survey responses. Additionally, two econometric models, chosen for their complementary strengths, were estimated to identify the relative impacts of farm- and action-level factors on the likelihood of action adoption (below).

Econometric Methods

For each farmer, f , the conservation practice adoption decision was modeled for each practice, i . A_{fi} will represent the dichotomous choice of whether or not practice i is adopted, where $A_{fi}=1$ is observed if the practice was adopted, and $A_{fi}=0$ otherwise.

$$A_{fi}^* = X_{fi}\beta + u_f + \varepsilon_{fi}, \text{ and}$$

$$A_{fi} = 1 \text{ if } A_{fi}^* > 0, \text{ and } A_{fi} = 0 \text{ otherwise.}$$

A_{fi}^* represents farmer f ’s latent propensity to adopt the recommended practice, i . Thus, if $A_{fi}^* > 0$, the practice is adopted. X_{fi} is a row vector of all explanatory variables that may impact the adoption of i for farmer f . The error term, ε_{fi} , is normally distributed with a mean of zero. The u_f term represents farmer

specific attributes not picked up by the explanatory variables, which may include factors such as risk aversion, income, and time availability, among others. Due to the presence of the unobserved u_f error term, a standard binary choice model will be biased, as we may not assume that the overall model error ($u_f + \varepsilon_{fi}$) is independently and identically distributed with mean zero.

A probit model with robust cluster-corrected standard errors was estimated. This model employs a modified version of the Huber-White “sandwich estimator” (Huber 1967; White 1980), allowing for cluster-correlated variances (see Froot 1989) and providing robust standard errors. This method allows for the error of each observation for farmer f to be correlated, but also implies that each cluster itself is independent (see Wooldridge 2002 for a proof within a probit framework). By specifying clusters by farm, this model allows for errors to be correlated for all observations for each farm, but requires that error between farms are uncorrelated.

A second option is to employ a random effects model, which estimates unobserved farm heterogeneity. This is preferable over a fixed effects framework, as it does not require an independent intercept to be estimated for each farm. However, this model requires that no correlation exists between u_f and X_{fi} . Thus, we will follow the first stage model used in an extension evaluation by Goodhue *et al.* (2010), known as a Mundlak corrected random effects probit. Developed by Verbeek (1990) and Zabel (1992), this method allows for correlation between u_f and X_{fi} by including the group means of time-varying variables in the model (Wooldridge 2002). That is, the mean of each explanatory variable is calculated for each specific farm and is included as an explanatory variable. This mitigates any chance that a specific farm’s error term will be correlated with its set of recommended actions.

In our case, this will not correct for any correlation between farm-level explanatory variables and the unobserved heterogeneity, so the random effects probit is suitable if only action-specific variables are included in the model. Further, it is possible that the farm-level variables measured may eliminate the need for a random effects framework, as there may be minimal unobserved heterogeneity among farms. Thus, a random effects probit model with Mundlak correction was estimated using only action attributes to examine robustness of action-specific coefficients in the first model.

RESULTS & DISCUSSION

Demographic Characteristics of Respondents

Of the 215 participants who were sent surveys, 137 (63.7%) returned completed surveys (Table 3), with the highest response rates being found for the two years in which participants received reports. The lower response rates found for the 2009 group – 48.8%, compared to 71.4% and 74.7% for 2008 and 2009, respectively – may stem from participants’ lack of experience with service; having not received the service, they may have felt less interested in or qualified to participate in a NAP-related study. A DUC biologist responsible for delivering the program noted that DUC had to put more active effort into recruiting for the 2009 year, suggesting that the lower response rates for this group may also stem from a lesser degree of motivation or ability to engage in extension-related research.

Table 3. NAP Participant Numbers and Survey Response Rates, by Program Year

| Program Year | Total Program Participants (#) | Participants Mailed Surveys (#) | Returned Relative to Mailed (%) |
|--------------|--------------------------------|---------------------------------|---------------------------------|
| 2007 | 62 | 56 | 71.4 |
| 2008 | 96 | 75 | 74.7 |
| 2009 | 90 | 84 ^a | 48.8 ^b |
| Total | 248 | 215 | 63.7 |

^a 27 of these individuals were recruited via DUC's initial contact letter, with the remaining 57 contacted by mail or phone in the summer of 2012 to request that they complete a condensed version of the survey.

^b Individuals recruited through DUC's initial contact letter returned 14 full-length surveys and 11 condensed phone surveys. Individuals recruited in the summer of 2012 completed 9 condensed mail-out surveys and 7 condensed telephone surveys.

Survey respondents as a whole were similar in age to Alberta producers (55.3 years and 52.2 years, respectively) and in the proportion of individuals reporting to work more than 40 hours per week off their farm, (20.9% and 24.2%, respectively). In contrast, respondents reported much larger average farm sizes (2270.6 acres versus 970.3 acres) and higher university completion rates (37.6% versus 9.3%) than Alberta producers. Respondents were also more likely to have developed, or to be in the process of developing, an Environmental Farm Plan (58.2% and 24.7%), and more than 30% of reported belonging to an environmental organization.

Comparing survey respondents from 2007-08 and 2009, similarities were found on characteristics related to the adoption decision. In particular, respondents across years were similar in age and in the level of membership in agricultural and environmental organizations. Respondents from 2007-08 were slightly more likely to have completed a university degree than 2009 participants, while 2009 participants were slightly more likely to work more than 40 hours per week off farm and intend to transfer their farm to family members. The most substantial difference found between program years relates to EFP completion, with respondents from 2007 being by far the most likely to have completed, or be in the process of completing, an EFP – a finding that likely stems from the relaxation of NAP eligibility criteria in 2008 away from requiring that participants hold an EFP. All of these factors considered, the 2007-08 and 2009 groups were seen as being similar enough to warrant retaining the latter group as a comparison against which to assess the impact of the NAP on 2007-08 respondents.

Farming Values Scale

In total, 101 respondents fully completed the 15-item Maybery *et al.* (2005) Likert scale designed to identify the degree to which a producer identifies with lifestyle-, conservation- and economically-oriented farming values. The results of the principal component analysis found that 14 of the 15 items loaded on the three higher-level factors – lifestyle, conservation and economic – as predicted. One item, meant to capture economic motivations, was dropped from the scale due to poor factor loading scores. Scale reliability tests, conducted on the remaining 14 items to determine whether factor scales showed sufficient reliability for use in additional analysis, produced alpha values for the lifestyle, conservation and economic measures of 0.800, 0.761 and 0.824 respectively. As all of these alpha values exceed Nunnally's (1978) suggested minimum value for exploratory research of 0.70, the three scales – the first containing five items and the latter two containing four – were retained for use in subsequent analysis.

Table 4. Individual and Farm Characteristics of NAP Respondents and Alberta Producers

| | Natural Advantage Participants | | | | Alberta Producers ^a |
|--|--------------------------------|-----------|-------------------|------------|--------------------------------|
| | 2007 | 2008 | 2009 | All Years | |
| Individual Characteristics (approx. % total, unless otherwise specified) | | | | | |
| Average age (years) | 55.5 | 56.8 | 53.1 | 55.3 | 52.2 |
| Completed a university degree | 41.0 | 40.0 | 30.0 | 37.6 | 9.3 ^b |
| Have or are developing an EFP | 85 | 54 | 39* | 58.2 | 24.7 ^c |
| Work more than 40 hours per week off-farm | 22.5 | 17.9 | 28.6 ^d | 20.9 | 24.2 ^b |
| Own majority of farm | 74.0 | 92.0 | N/A | 84.0 | N/A |
| Belong to environmental org. | 32.0 | 31.0 | 29.0 | 31.0 | N/A |
| Belong to agricultural org. | 48.0 | 47.0 | 49.0 | 48.0 | N/A |
| Plan to transfer farm to family | 58.0 | 53.0 | 71.0 | 60.0 | N/A |
| Farm Characteristics (approx. % total, unless otherwise specified) | | | | | |
| Average farm size (acres) | 1546.3 | 3671.6 | 1268.8 | 2270.6 | 970.3 ^e |
| Farm type – crop | 20.0 | 11.1 | 26.8 | 18.5 | 36.3 |
| Farm type – livestock | 47.5 | 37.0 | 22.0 | 35.6 | 60.1 |
| Farm type – mixed | 25.0 | 44.4 | 34.1 | 35.6 | N/A ^f |
| Farm type – other | 2.5 | 1.9 | 7.3 | 3.7 | 2.9 |
| Approx. total reporting | 40 | 56 | 41 | 132 | 49,431 |

^aUnless otherwise indicated, values for Alberta producers are from Statistics Canada's 2006 Census of Agriculture (Statistics Canada, 2006b). Farm type for Alberta producers is drawn from the same census's classification of farm type by industry group.

^bTotal reporting here was 71,660.

^cEnvironmental Farm Plan statistics for Alberta producers are drawn from Agriculture and Agri-Food Canada (2011).

^dSample size for the 2009 group for the 40+ hours per week question is 13.

^eTotal reporting here was 53,652.

^fStatistics Canada does not report values for "mixed" operations. Combined values for crop, livestock and mixed operations for both program years – 2007 and 2008 – both equal 92.5%, which is quite similar to the 96.4% reporting crop and livestock.

*Indicates a significant difference between 2007-08 and 2009 respondents at the 95% confidence level.

Nine additional respondents provided incomplete responses to the farming values scale, choosing to respond to some but not all of the 15 scale items. These responses were excluded from the analyses described above, but were included in the data used to calculate the mean factor scores reported in Table 5.

An additional 27 respondents from the 2009 program year completed a condensed version of the Maybery *et al.* (2005) scale containing only the five items relating to conservation values. The resulting data were combined with the conservation data for the 13 respondents from 2009 who completed the full 15-item scale. Mean conservation factor scores for this combined group are reported in the table below, while lifestyle and economic factor scores are reported for only the 13 respondents who completed the full scale.

Across all program years, mean factor scores – the average of respondents' total factor scores, calculated by adding together the 4-5 item scores underlying a particular factor – were highest for the conservation factor, indicating that respondents identified most strongly with items emphasizing conservation values

and goals (Table 5). Here, mean factor scores for all three program years exceeded 20 out of a maximum score of 25, indicating that respondents' average level of agreement associated with each of the five underlying items fell between "agree" and "strongly agree". As predicted by Maybery *et al.* (2005), lifestyle scores were similar but not identical to conservation scores, with respondents expressing a slightly lower level of agreement, falling between "neutral" and "agree", to the five lifestyle-related items. Finally, agreement with the four economic items was lowest across all three years, with respondents expressing an average level of agreement falling between "disagree" and "neutral".

Table 5. Mean Factor Scores on Farming Values Scale for 2007-2009 Respondents

| Program Year | | Lifestyle (M out of 25) | Conservation (M out of 25) | Economic (M out of 20) |
|--------------|----------------|----------------------------|-------------------------------|---------------------------|
| 2007 | Mean score | 18.6 | 22.3 | 10.6 |
| | N | 38 | 39 | 37 |
| | Std. deviation | 1.77 | 2.05 | 3.29 |
| 2008 | Mean score | 18.3 | 20.8 | 11.0 |
| | N | 54 | 54 | 54 |
| | Std. deviation | 1.80 | 2.67 | 3.44 |
| 2009 | Mean score | 18.5 | 21.4 | 10.2 |
| | N | 13 | 39 | 13 |
| | Std. deviation | 1.9 | 3.3 | 3.2 |

The low level of variation observed across program years suggests that respondents are fairly homogenous in their expressed preference for items that emphasize conservation and lifestyle values over economic values. This consistency suggests that the observed differences in the behaviour of 2007-08 and 2009 respondents are unlikely to stem from differences in conservation values, providing additional support for the use of the 2009 group as a comparison against which to measure the impact of the NAP on respondents from 2007-08. These stated values are concordant with the demographic data described in the preceding section, which found NAP respondents to be engaged in more conservation-related activities than the general producer population.

Program Perceptions

Respondents' perceptions of the NAP, and of DUC, were overwhelmingly positive. Respondents provided an average rating of the quality of their experience working with DUC of 4.22 out of 5, with the maximum value of 5 representing a "very positive" experience. Of the 57 respondents who provided concluding remarks in the survey, 15 addressed the quality of the program, with only one providing a neutral rather than positive review. Respondents praised the NAP primarily for its ability to increase their awareness of available stewardship opportunities. The quality of the personal experience was also highly regarded, with four respondents thanking by name the program staff who assisted them four to five years prior.

Stated Action Completion

In total, 683 actionable items were presented in personalized surveys to the 96 survey respondents who received NAP assessments in 2007 or 2008, with respondents reporting to have completed 52.6% of these

actions (Table 6). Suggested reasons for the variation in completion rates are provided in the subsection, *Factors Linked to Action Completion and Assistance Access*, below.

Certain actions have been grouped together to simplify the analysis in that subsection. Groupings are based on similarities in the effort actions require to implement, the conservation goals they address, their conservation benefits and their adoption rates (as outlined in Table 6). The category, “small operational changes”, refers to actions requiring minimal effort, such as moving mineral blocks away from wet areas or retaining small amounts of plant litter after harvest. “Haying and grazing adjustments” are actions that involve delaying haying or grazing for conservation purposes, and actions relating to the implementation of rotational grazing systems (not including fencing). In the NAP reports, the term “buffer” was used in recommendations not to request the planting of additional vegetation, but rather to instruct farmers to avoid harvesting or grazing within a certain distance of a sensitive ecosystem. The use of “buffer” in Table 6 and the subsequent analysis follows the NAP’s use of the term. “Add vegetation” involves establishing shelterbelts or planting deep-rooted vegetation around wetlands and riparian areas. Since this category involves planting additional vegetation rather than leaving certain segments of land untouched, it is separated from the buffer category. “Plant new crop” most often involves planting winter wheat or converting pastures to native grasses. “Install nest boxes or flushing bars” refers to the installing of birdhouses on the farmland, and installing a flushing bar on the front of harvesting equipment to reduce bird mortalities. The remaining categories are composed of a single, self-explanatory recommendation.

Table 6. 2007-08 Respondents’ Stated Completion Rates for Actions Recommended by the NAP

| Action Type | Completion Rate (%) | Total Recommended (#) |
|--|---------------------|-----------------------|
| Small operational changes | 81.3 | 75 |
| Haying/grazing adjustments | 74.4 | 82 |
| Install remote watering | 71.7 | 60 |
| Leave buffer strip | 63.3 | 60 |
| Fence critical/sensitive habitat | 57.0 | 128 |
| Restore wetland | 45.0 | 20 |
| Add vegetation (excluding buffers) | 43.6 | 78 |
| Plant new crop | 23.5 | 81 |
| Sign conservation easement agreement | 23.1 | 26 |
| Take part in riparian health course/assessment | 21.4 | 14 |
| Install nest boxes or flushing bars | 20.4 | 54 |
| Bank stabilization | 20.0 | 5 |
| Total | 52.6 | 683 |

To provide a coarse assessment of the impact of the NAP on action adoption, the number of actions undertaken by 2007-08 respondents, both at the suggestion of the NAP and independently, was compared to the number of actions undertaken independently by 2009 respondents. Controlling for group size, this comparison found that 2007-08 respondents adopted significantly more actions than 2009 respondents, both overall and relating specifically to small operational changes, grazing adjustments, conservation easement agreements, and the installation of remote watering, buffers and fencing (Table 7).

Unlike 2007-08 respondents, who received a list of the actions and referrals recommended to them by the NAP, 2009 respondents were not prompted with such a list when asked to recall their behaviours. As a

result of the different methods of questioning, it is likely that 2009 respondents were at a relatively higher risk of underreporting relative behaviours due to forgetting or the exclusion of relevant actions they considered to be too minor to be worthy of mention. When the small operational changes reported by 2007-08 respondents are removed from the comparison in an attempt to address this possible bias, it is found that 2007-08 still completed significantly more actions than 2009 respondents.

Table 7. Total Number of Actions¹ Undertaken by 2007-08 Respondents (Independently and at the Suggestion of the NAP) and 2009 Respondents (Independently)

| Action Type | 2007-08 | 2009 |
|--------------------------------------|------------|-------------|
| Small operational changes | 61 | 0** |
| Delay haying/grazing | 35 | 4* |
| Implement rotational grazing | 29 | 4* |
| Install remote watering | 43 | 2** |
| Leave buffer | 41 | 4* |
| Fence critical/sensitive habitat | 75 | 13* |
| Restore wetland | 10 | 2 |
| Add vegetation (excluding buffers) | 24 | 6 |
| Plant new crop | 19 | 4 |
| Sign conservation easement agreement | 8 | 0* |
| Install nest boxes | 11 | 3 |
| Install flushing bars | 3 | 0 |
| Install shelterbelt | 25 | 7 |
| Total actions | 389 | 49** |
| Total respondents | 96 | 41 |

¹Excludes riparian health course and bank stabilization. Breaks up delay haying/grazing and rotational grazing, and nest box and flushing bar

*Indicates 2009 respondents undertook significantly fewer of those actions than 2007-08 respondents, controlling for the total number of respondents, at the 95% confidence level.

** Indicates 2009 respondents undertook significantly fewer of those actions than 2007-08 respondents, controlling for the total number of respondents, at the 99% confidence level.

The above findings suggest that the NAP did succeed in encouraging participants to adopt conservation practices. As significant differences in completion rates were found for only half the action types presented in the surveys, it seems that the approach taken by the NAP was generally more successful in promoting the adoption of *particular types* of conservation actions. Certain action types showed no significant difference in completion rates between participants who received the program and those who did not. A program promoting only these actions may not succeed in encouraging participants to adopt significantly more actions than they would without the program.

Stated Assistance Access

The 96 survey respondents from 2007-08 received a total of 454 referrals to 29 different types of assistance, with the vast majority of referrals – 358 – made to three national organizations offering various forms of financial or technical assistance (Table 8). An additional eight referrals were made to other organizations offering conservation easements, and 88 to organizations offering informational assistance – largely free, web-based information relating to environmental management. Respondents were asked to indicate whether they had attempted to access each referred source of assistance and, if so, whether or not they were successful in receiving that assistance.

Of the total 454 referrals made by the NAP to survey respondents, respondents reported successfully accessing 74 (16.3%) of these (with success indicating that the respondent received the referred financial, technical or informational assistance). Respondents reported attempting, unsuccessfully, to access an additional 31 (6.8%) referred sources of assistance (with lack of success indicating that no assistance was provided by the referred organization). Of the remaining 349 referrals made by the NAP, respondents reported making no attempt to access 324 (71.4% of the total referred), and provided no response for 25 (5.5%).

Attempt rates – the combined “successful attempt” and “unsuccessful attempt” rates – were below 50.0% for all organizations referred, ranging from 0.0% for organizations offering easements to 44.5% for assistance offered by the Prairie Farm Rehabilitation Administration (PFRA), a federal program providing producers with free technical assistance and tree and shrub seedlings. Successful attempt rates ranged from 0.0% to 36.3%, again for organizations offering easements and for the PFRA, respectively. No attempt rates were consistently above 50.0% for all organizations referred, ranging from 52.2% for the PFRA to 100.0% for organizations offering easements.

Notably, attempt and no attempt rates for the considerable financial and technical assistance offered by the CAFSP and DUC, which in some cases required a considerable application, did not differ substantially from the attempt and no attempt rates for organizations offering more easily accessible and financially or technically less substantial forms of informational assistance. Reported attempt rates for CAFSP, DUC and informational assistance measured 23.7%, 16.0% and 20.5% respectively, while no attempt rates for the same sources measured 68.3%, 77.3% and 78.4% respectively.

Possible explanations for the low attempt rates for referred sources of assistance are provided in the sections, *Factors Linked to Action Completion and Assistance Access: Stated Reasons* and *Recommendations: Extension Design*.

To provide a coarse assessment of the impact of the NAP on assistance access, the percentage of 2007-08 respondents accessing assistance and the total number of sources they accessed (both independently and at the suggestion of the NAP) were compared to the percentage of 2009 participants accessing assistance and the total number of sources they accessed (independently) (Table 9). An initial comparison finds that a higher percentage of 2007-08 respondents accessed assistance relative to 2009 respondents, and in particular that a higher percentage of 2007-08 respondents accessed assistance from the PFRA and the CAFSP. However, as 2009 respondents were unable to access CAFSP-related assistance due to the cessation of CAFSP funding prior to 2009, it is unsurprising that the percentage of participants accessing assistance, both specifically relating to the CAFSP and overall, is higher for respondents from 2007-08. Percentages for other forms of assistance are largely comparable between the two groups.

Table 8. Percentage of NAP-referred Sources of Assistance Accessed by 2007-08 Respondents.

| Organization Offering Assistance & Specific Types of Assistance Offered | Successful (%) | Unsuccessful (%) | No Attempt (%) | No Response (%) | Total Referrals (#) |
|---|----------------|------------------|----------------|-----------------|---------------------|
| Canada-Alberta Farm Stewardship Program BMPs – Total (9) | 15.1 | 8.6 | 68.3 | 7.9 | 139 |
| R – Enhancing Wildlife Habitat & Biodiversity | 22.9 | 5.7 | 65.7 | 5.7 | 35 |
| I – Riparian Area Management | 11.4 | 8.6 | 74.3 | 5.7 | 35 |
| Q – Shelterbelt Establishment | 16.1 | 16.1 | 58.1 | 9.7 | 31 |
| V – Grazing Management Planning | 7.1 | 7.1 | 85.7 | 0 | 14 |
| F – Wintering Site Management | 18.2 | 9.1 | 54.5 | 18.2 | 11 |
| Z – Riparian Health Assessment | 0 | 0 | 100 | 0 | 6 |
| J – Erosion Control Structures | 20 | 0 | 60 | 20 | 5 |
| S – Species at Risk | 0 | 0 | 100 | 0 | 1 |
| D – Farmyard Runoff Control | 0 | 0 | 0 | 100 | 1 |
| Ducks Unlimited Canada – Total (8) | 10.0 | 6.0 | 77.3 | 6.7 | 150 |
| Winter Wheat | 10.3 | 3.4 | 82.8 | 3.4 | 29 |
| Native Grass Seed | 0 | 0 | 100 | 0 | 23 |
| Conservation Easement | 8.7 | 13 | 60.9 | 17.4 | 23 |
| Cavity Nest Boxes | 9.5 | 4.8 | 81 | 4.8 | 21 |
| Wetland Restoration | 10.5 | 15.8 | 63.2 | 10.5 | 19 |
| Flushing Bar | 27.8 | 0 | 66.7 | 5.6 | 18 |
| Remote Watering | 0 | 6.2 | 87.5 | 6.2 | 16 |
| Rangeland Grazing | 100 | 0 | 0 | 0 | 1 |
| Prairie Farm Rehabilitation Administration – Total (2) | 36.3 | 7.2 | 52.2 | 4.3 | 69 |
| Shelterbelt Program | 38.9 | 9.3 | 48.1 | 3.7 | 54 |
| Deep-rooted Vegetation | 26.7 | 0 | 66.7 | 6.7 | 15 |
| Conservation Easement Organizations (excluding DUC) – Total (3) | 0.0 | 0.0 | 100.0 | 0.0 | 8 |
| Organizations Offering Informational Assistance – Total (7) | 14.8 | 5.7 | 78.4 | 1.1 | 88 |
| Total – All Sources (29) | 16.3 | 6.8 | 71.4 | 5.5 | 454 |

Table 9. Number of Respondents Accessing Assistance and Number of Sources of Assistance Accessed for 2007-08 Respondents (Independently and at the Suggestion of the NAP) and 2009 Respondents (Independently).

| Organization Offering Assistance | 2007-08 | | 2009 | |
|---|--|------------------|--|------------------|
| | Number Accessing Assistance (% of total) | Sources Accessed | Number Accessing Assistance (% of total) | Sources Accessed |
| CAFSP | 11 (11%) | 21 | 1 (2%) | 1 |
| DUC | 15 (16%) | 16 | 8 (20%) | 13 |
| PFRA | 27 (28%) | 27 | 4 (10%) | 4 |
| Conservation Easement Organizations (excluding DUC) | 1 (1%) | 1 | 0 (0%) | 0 |
| Organizations Offering Informational Assistance | 8 (8%) | 13 | 1 (2%) | 1 |
| Groups Not Recommended by NAP | 7 (7%) | 7 | 1 (2%) | 3 |
| Total^a | 45 (47%) | 85 | 14 (34%) | 22 |
| Total Respondents | 96 | 96 | 41 | 41 |

^aNote that the Total Respondents Accessing Assistance does not equal the sum of values listed in the associated column, as any one individual may have accessed assistance from multiple organization types.

Respondents from 2007-08 were more likely to access multiple forms of assistance relative to respondents from 2009, with 45 individuals accessing 85 sources in the former group, compared to 14 individuals accessing 22 sources in the latter. Again, this number is somewhat inflated by the inclusion of CAFSP data and may also be inflated by possible forgetting and underreporting of minor activities by 2009 respondents, as identified in the preceding section. With these caveats in mind, a conservative interpretation of the assistance-related behaviours suggests that the NAP’s main impact was to encourage a greater percentage of respondents from 2007-08 to access assistance from the PFRA and, more tentatively, to encourage individual respondents from 2007-08 to access multiple forms of assistance.

Factors Linked to Action Completion & Assistance Access: Stated Reasons

Consistent with the international adoption literature, respondents indicated that a wide variety of personal, social, and practice-related factors influenced their decision to adopt actions and access assistance.

Two lists of factors drawn from the literature, one each for actions and assistance, were presented to 2007-08 participants, who were asked to select from those lists the factors that influenced their decision not to adopt actions and access assistance. Participants were also asked to indicate the two factors, one for actions and one for assistance, which most strongly influenced their decision not to comply with NAP recommendations; unfortunately however, the vast majority of respondents did not complete this second task, likely due to placement of the question, which could be easily overlooked. Consequently, the results below indicate only which factors were more and less likely to be selected by respondents, and not the stated relative strength of those factors on the decision-making process.

For both actions and assistance, the most frequently selected factors related to constraints on time and money (Table 10). Considering that many of the actions adopted at lower rates were relatively substantial

in scale (Table 6), participants may have perceived the costs of implementation to outweigh the benefits. More surprising is the finding that these resource-related factors were selected at nearly the same rates for assistance access. This suggests that, even when assistance is available, respondents may perceive the financial and/or temporal contributions that they are required to make to implement the associated action as being too high to warrant accessing that assistance. The previous finding that attempt and no attempt rates are similar for both substantial and relatively insubstantial forms of assistance suggests that the individual contributions may be too high regardless of the degree of assistance being offered, at least when considerable effort is required to access substantial forms of assistance. The relatively higher access rates seen for assistance offered by the PFRA, which offered a simple application process, suggests that higher access rates may be achieved for programs that require less paperwork.

Table 10. Factors Contributing to 2007-08 Respondents' Decisions Not to Adopt Recommended Actions and Access Recommended Sources of Assistance

| Paraphrased Factors, with Key Component Bolded | Respondents Selecting Factor (%) | |
|---|----------------------------------|----------------|
| | Actions | Assistance |
| The action/assistance was too time consuming | 49.4 | 47.1 |
| The action/assistance required too much money | 44.2 | 36.8 |
| The action/assistance was not relevant to my farm | 35.1 | 25.0 |
| I forgot that I had meant to adopt the action or access assistance | 22.1 | 35.3 |
| I felt I did not have enough control over outcome | 13.0 | 10.3 |
| I did not have enough information about the action/assistance | 10.4 | 20.6 |
| Conservation and land management are not priorities right now | 5.2 | 5.9 |
| The action/assistance required too much paperwork | 3.9 | 11.8 |
| I could not test the action before fully adopting it | 2.6 | – ^a |
| I was worried that my cooperation would lead to regulation | 2.6 | – ^a |
| I was discouraged from acting by family/friends | 1.3 | 1.5 |
| I was worried what others would think if I acted | 1.3 | 0.0 |
| The action/assistance was too risky | 1.3 | 0.0 |
| My past efforts in this realm were unsuccessful | 1.3 | – ^a |
| I did not want to share my information with the organization | – ^a | 1.5 |
| I did not want to work with the organization offering assistance | – ^a | 10.3 |
| Total Respondents^b | 77 | 68 |

^a These factors were not provided as response options for the category – actions or assistance – under which they are listed.

^b Totals reported here do not equal the total number of 2007-08 survey respondents (96). The 19 respondents not providing answers regarding action completion was comprised of 7 respondents who could not complete the question (either because no actions were recommended or because all actions had been completed), and 12 who refrained from completing the question. Of the 28 respondents who did not provide responses regarding assistance, 12 could not complete the question (for the same reason described above), and 16 refrained from doing so.

Given that the actions and sources of assistance listed in participants' reports were tailored specifically to their operation, it is noteworthy that irrelevance was cited by over one third of respondents as contributing to the decision not to adopt practices, and by one quarter of respondents as contributing to the decision not to access assistance. While some respondents provided explanations of why particular actions or forms of assistance were not suited to their operations, the majority of respondents did not. As such, it cannot be said with certainty whether issues of relevance stemmed primarily from true relevance of the actions recommended by the NAP, or by participants' *perceptions* of the relevance of those actions (for a discussion of the importance of perceived relevance see, for example, Llewellyn *et al.*, 2005). If respondents' responses accurately reflect the factors contributing to their decision-making process, these

results reflect a shortcoming of the program, which aimed to ensure that all recommendations provided to participants were relevant, both in practice and perception.

Notably, a lack of information – one of the key issues that traditional extension services, including the NAP, work to address – was selected at relatively lower rates. Taking into account respondents' comments about the quality of the NAP as an awareness-raising tool, this finding may reflect a success on the part of the NAP to supply respondents with information critical to the decision-making process, though it is also possible that respondents simply placed less weight on informational issues relative to other concerns. And indeed, it must be recognized that the key stated drivers behind the 47.7% of actions left uncompleted and the 71.6% of referrals not accessed were factors that NAP's information-extension approach was not designed to directly address.

Factors Linked to Action Completion: Econometric Modeling

The econometric modeling results quantify the relative impact of personal characteristics, farm characteristics and action type, on the likelihood of action adoption (Table 11). For each model, the coefficient estimates provide the marginal utility associated with each variable, which has minimal policy relevance. Hence, marginal effects are provided, which indicate the percent increase in the likelihood of adopting a recommended action. For continuous variables, such as farm size, this means a one-unit increase in the variable will influence the likelihood of adoption by the percentage listed. For binary variables, such as farm ownership, the marginal effect measures the change in probability of adoption if the variable is true for an observation.

The marginal effects for action-specific attributes are very similar between both models, suggesting robust results. Model 1 yields 72.3% correct predictions, which is good considering the mean completion rate for data used in the model is 53.9% (higher than in Table 6 due to missing responses). This implies that Model 1 correctly predicts action-related outcomes in 72.3% of cases. As this is significantly higher than the observed 53.9% action-completion rate, Model 1 is performing significantly better than chance. In Model 2, the standard deviation of the random intercept is significant, implying unobserved farm heterogeneity exists when demographic variables are excluded from the model. The value of ρ is 0.207, implying 20.7% of the model variance is explained by unobserved differences between farmers.

Dummy variables specifying action-type are only included for actions with a sufficient number of observations (greater than 50), and are excluded for wetland restoration, riparian health assessment/courses, conservation easements, and bank stabilization. Thus, the marginal effects listed in Table 11 for action-type variables indicate the average change in probability of an action with this trait being adopted, relative to the group of actions excluded. The excluded actions are adopted at a rate of 29.2%, so a significant positive coefficient implies the action is adopted at a rate higher than 29.2% when controlling for demographics. The marginal effect associated with an action can be added to the baseline adoption rate of 29.2% to get an approximation of the likelihood of that action being adopted. When comparing this metric to the results in Table 6, predicted and real adoption rates line up well, and the order of actions by adoption rate is the same.

As subsidies are linked to a portion of multiple action types, the subsidy variable was used to compare completion of actions linked to assistance to the completion of actions that were not. It was found that,

when controlling for farm and action attributes, actions that were directly linked in NAP reports to significant forms of financial or technical assistance were no more likely to be completed than the baseline actions. While this finding does not imply that the opportunity to receive assistance to implement *certain* actions has no impact on the likelihood of those actions being completed, it does suggest that assistance alone is not a sufficient cause for action adoption in general. This suggestion aligns with the finding that the majority of actions completed by 2007-08 participants were completed without financial or technical assistance. (Note that the source of financial/technical assistance with the highest access rate – the PFRA Shelterbelt Program – was referred for every shelterbelt project, making it difficult to assess whether the assistance influenced adoption outcomes.) Consistent with the adoption literature, and as seen from the survey and model results discussed in this section, other factors may also contribute to the adoption decision.

Small operational changes were approximately 49% more likely to be adopted compared to the baseline actions. This is likely explained by the low financial and time costs, high trialability, and simplicity associated with these actions. Likewise, haying/grazing adjustments were 42.5% and 40.5% more likely to be adopted compared to the set of excluded actions at the 99% confidence level, according to Models 1 and 2 respectively. This is likely explained by the minimal inconvenience associated with delaying harvest past July 15 in certain areas, or with having to strategically rotate cattle through different pastures for environmental goals. A review by Briske *et al.* (2008) finds that although rotational grazing is perceived positively, the benefits of the practice are uncertain. The extension reports received by NAP participants outline benefits of rotational grazing with a degree of certainty, which may help explain the high adoption rate in this category.

Producers are more likely to fence off critical habitat than to implement the baseline actions. Model 1 estimates a 28.3% increased likelihood of adoption and Model 2 estimates a 30.9% increased likelihood compared to baseline actions, both at the 99% confidence level. According to research conducted by Miller *et al.* (2010) in southern Alberta, fenced riparian zones display visibly noticeable increases in health of the riparian area, which suggests that the practice may be perceived by producers to be credible and the benefits more observable. According to Unterschultz *et al.* (2004), private benefits of fencing riparian areas on farms exist, but are less than the cost of fencing in most cases. However, Unterschultz *et al.* (2004) note that their model does not incorporate public benefits, and that personal preferences will likely impact the adoption decision. The characteristics of the present sample – producers who self-selected into the extension program and seem to place a higher emphasis on conservation goals – likely explains higher adoption rates for fencing.

Remote watering systems are 39.8% and 40.6% more likely to be adopted in comparison to the baseline actions, significant at the 99% confidence level in both Models 1 and 2 respectively. Remote watering requires relatively high financial and time costs to implement, but has proven private (Willms *et al.* 2002) and environmental benefits (Sheffield *et al.* 1997) within a growing season, suggesting that the action is likely perceived by producers to be credible. This may be in part due to the relatively short time span in which benefits can be realized (Sheffield *et al.* 1997). When paired with personal preferences for conservation, it is not surprising why a conservation-oriented group of farmers are more willing to adopt this practice than the baseline actions.

Actions aimed at planting more non-harvested vegetation are more likely to be adopted at levels 17.9% and 17.3% higher than the baseline actions with 95% confidence in Model 1 and with 90% confidence in Model 2, respectively. This category of actions is comprised largely by the planting deep-rooted vegetation along riparian areas or wetlands, or establishing shelterbelts. These practices may require high monetary and time resources to implement, and are thus expected to be adopted at a relatively low rate. At the same time, these actions were consistently linked in reports to PFRA assistance, which provided seedlings free of cost. Given the relatively high access rate of PFRA assistance (Table 8), it seems that some respondents perceived the benefits of the practice to outweigh the costs, at least when PFRA assistance was available.

Leaving buffer areas around riparian and wetland areas are 34.1 and 34.2% more likely to be adopted in comparison to the baseline actions, significant at the 99% confidence level in Models 1 and 2. These actions are separated from the “add vegetation” category, as the NAP reports recommend only to avoid harvesting the buffer zones, and not to plant additional vegetation. While taking segments of marginal land out of production will reduce farm revenue, this is a relatively simple and low effort task, and higher adoption rates are again explained by the higher emphasis NAP participants place on conservation goals relative to average farmers.

Farms are no more or less likely to plant an environmentally beneficial crop or pasture when compared to the set of baseline actions, according to both models. In the case of winter wheat, the different planting and harvest times may not be compatible with producers’ lifestyles or business operations. In the case of native crop or pasture, native seeds are often more expensive than conventionally planted seeds and offer few private benefits, which may explain why this action is adopted less frequently than the average rate. In both models, flushing bars and nest boxes are adopted at a rate that does not differ significantly from the baseline actions. While flushing bars are provided free of charge by DUC, leading one to expect a reasonably higher adoption rate, some producers commented that flushing bars create an unacceptable nuisance when harvesting and thus are incompatible with their operation. Respondents also noted that DUC often did not have any nest boxes available for free, suggesting that they may be unwilling or unable to invest the time or money necessary to build birdhouses themselves. As these actions offer few visible operation-specific benefits and may seem somewhat minor from a conservation perspective, these actions may be given lower priority by producers, relative to actions perceived as having higher operational or conservation benefits.

Producers more likely to retain the benefits associated with actions are more likely to adopt any given action according to Model 1. Respondents over the age of 65 are 12.9% less likely to adopt any conservation practice, significant at the 95% confidence level. As many conservation actions require a long term to recover implementation costs, producers who are closer to retirement may not receive the full benefit of implementing an action, either while operating their land or in the land sale price, should they sell their land upon retirement. Declining physical ability may also play a role, as implementing certain actions may require high amounts of physical effort. Producers who own the land on which a conservation action is meant to be implemented are 22.5% more likely to adopt any action, significant at the 99% level. This finding is intuitive, as there is less incentive for producers to make out-of-pocket investments in actions whose benefits are tied to the land on which they are implemented when that land does not belong to them. Those who stated an intention to transfer their farmland to a family member in the

future are 13.8% more likely to adopt any action, significant at the 95% confidence level. These individuals may be willing to invest in conservation actions knowing that the conservation and other operational benefits will accrue to their family, and that those actions are unlikely to be overturned by the future operator.

Table 11. Increase in Likelihood of a 2007-08 Respondent Completing an Action When the Action is of a Particular Type, or When a Personal/Farm Attribute is Present

| Variable | Cluster-Corrected Probit (Model 1) | | Random Effects with Mundlak Correction (Model 2) | |
|--|---------------------------------------|-----------------|---|-----------------|
| | Coefficient | Marginal Effect | Coefficient | Marginal Effect |
| Action type | | | | |
| Small operational change | 1.751*** | 0.490*** | 1.775*** | 0.491*** |
| Haying/Grazing Adjustment | 1.333*** | 0.425*** | 1.253*** | 0.405*** |
| Remote watering | 1.257*** | 0.398*** | 1.297*** | 0.406*** |
| Buffer | 1.003*** | 0.341*** | 1.009*** | 0.342*** |
| Fence | 0.765*** | 0.283*** | 0.849*** | 0.309*** |
| Add vegetation | 0.471** | 0.179** | 0.453* | 0.173** |
| Change crop | -0.076 | -0.030 | -0.233 | -0.093 |
| Flushing bar/nest boxes | -0.132 | -0.053 | -0.389 | -0.154 |
| Subsidy referred | 0.081 | 0.032 | 0.044 | 0.018 |
| Farm attributes | | | | |
| Age (over 65) | -0.324** | -0.129** | - | - |
| Own farm (D) | 0.576*** | 0.225*** | - | - |
| Farm size (acres x 100) | 0.009*** | 0.004*** | - | - |
| Farm type (ranch) (D) | -0.227 | -0.090 | - | - |
| Intend to transfer land to family (D) | 0.350** | 0.138** | - | - |
| Participation year (2007) (D) | 0.366** | 0.144** | - | - |
| Conservation score | 0.039 | 0.016 | - | - |
| Watershed group member (D) | 0.454*** | 0.176*** | - | - |
| Boreal ecoregion (D) | 0.221 | 0.087 | - | - |
| Grassland ecoregion (D) | -0.056 | -0.022 | - | - |
| Constant | -2.501*** | | | |
| Random Parameters | | | | |
| Constant: Mean | | | -0.704 | |
| Std. deviation | | | | 0.511*** |
| ρ | | | | 0.207*** |
| Observations (groups) | 618 (85) | | 683 (91) | |
| Wald χ^2 | 119.1 | | 114.33 | |
| Log-Likelihood | -347.778 | | -396.826 | |
| % Correct Predictions | 72.33 | | | |

* denotes 90% confidence level, ** denotes 95% confidence level, and *** denotes 99% confidence level
(D) – Dummy variable

Farm size is linked to an increased likelihood of adopting a conservation action at the 99% confidence level, with a 100-acre increase resulting in a 0.4% greater likelihood of adoption. This is likely attributable to economies of scale, as larger farms may have access to greater amounts of capital, labour, or income.

Numerous studies also attribute this size effect to a higher willingness to invest in farmland (Knowler & Bradshaw 2007).

Respondents participating in the first year of the NAP are 14.4% more likely to adopt a conservation action than respondents from 2008, significant at the 95% confidence level. This is most likely evidence of diminishing marginal impacts of extension programs. Given that farmers self-select into the program, those that sign up first may have the best understanding of the program or may be the most keen to receive assistance in prioritizing conservation efforts. While the results of the Maybery *et al.* (2005) farming values scale suggest that participants from 2008 did not differ in their overall conservation orientation from 2007 participants, participants from 2008 were less likely to have completed an EFP and required, according to a DUC extension agent who delivered the NAP, more active effort to recruit into the NAP. These findings suggest that 2008 respondents may have been less interested in the specific program or in receiving conservation recommendations specifically via extension. As further recruitment efforts reach participants with lower interests in conservation or in receiving conservation advice via extension, it is logical that these producers will be less willing to adopt. As the group of extension agents delivering the program differed between 2007 and 2008, however, it is possible that the likelihood of adoption is confounded with “quality” of the extension agent.

Watershed group members are 17.6% more likely to adopt a conservation action, significant at the 99% confidence level. This may be evidence of a social network effect, as farmers belonging to networks supporting the information given by extension agents are more likely to adopt suggested practices (Pannell *et al.* 2006). This may be further reinforced by the fact that some environmental benefits, especially those surrounding riparian health, are regional in scale. Thus, these participants may be more willing to work with other nearby farms to increase regional environmental quality, mitigating free-riding issues. Finally, it is probable that individuals who join watershed groups have a higher level of environmental concern, and that it is this concern, rather than group membership in its own right, that contributes to their increased likelihood of adopting environmentally oriented actions.

Several variables had no significant impact on the likelihood of adoption. First, the ecoregion in which the farm resides was not a significant determinant of adoption. This finding is perhaps surprising as, when taken as a proxy for climate and soil quality, farms in less favourable ecoregions are often found to adopt environmental practices at higher rates (Prokopy *et al.* 2008). However, in the present sample, conditions may have opposing effects, with farms in regions with better climatic conditions having less abundant water resources and mixed soil conditions. Farm type also has no significant impact on the likelihood of adoption.

RECOMMENDATIONS: EXTENSION DESIGN

Using the findings outlined above, recommendations that build upon both the NAP’s aims and its outcomes were developed. The intention here was not to provide the components necessary to create a universally applicable extension program, nor to identify all of the strategies available to program managers interested in improving the uptake of stewardship actions and associated sources of assistance. Rather, the recommendations below should be seen as general principles, informed by the results of this evaluation, that can be used by program managers and policy makers to inform the design,

implementation and evaluation of programs like the NAP, which support producers in identifying and implementing stewardship actions for which financial and technical support exist.

Recommendation 1: Recognize the limits of traditional, information-based extension.

The review of the NAP found that respondents who received the service completed a significantly greater number of conservation practices than those who did not receive the service. This relationship, however, did not hold for some types of actions, nor for the accessing of assistance to help implement those actions.

This finding is particularly noteworthy when one considers the nature of the individuals participating in the program. Respondents represented an environmentally oriented subset of producers, whose interest in conservation led them to participate in the NAP and who received from the NAP recommendations tailored to their operation. As such, one would expect the alignment between producers' goals and the practices being promoted to be high – a factor noted by Pannell *et al.* (2006) to be one of the key factors contributing to the adoption decision. Hence, it is unlikely that substantially greater adoption rates would be achieved by other, similar programs extended to similar groups, and likely that lower adoption rates would be achieved by similar programs extended to individuals who place less emphasis on conservation goals.

This idea is echoed in the extension literature: Vanclay (2004) and Pannell *et al.* (2006) argued that extension may not alter the overall level of adoption, while Baynes (2007) concluded, on reviewing a forestry extension program, that a scaled-up program would be unlikely to appeal to producers who differed socio-economically than those who opted into the original program. So while the remaining recommendations provided below aim to improve upon the existing program structure, these recommendations are provided with the understanding that the impact of even the most thoughtfully designed extension program is likely to be limited.

Recommendation 2: Direct program resources strategically towards action type to improve adoption outcomes.

As agricultural extension budgets in Canada decline, there is a growing need to ensure that the extension approaches taken achieve goals in a cost-effective manner (Rejesus *et al.* 2012). As the results of this review have shown, the NAP's approach – which provided information relating to practices but did not provide direct financial or technical assistance to help implement those practices – was only partially successful in encouraging the adoption of conservation practices and related sources of assistance. A more diversified approach that attempts to address both informational and non-informational factors may improve adoption outcomes.

Consistent with the international adoption literature, certain types of actions promoted by extension were more likely to be adopted than others. In particular, actions that were of low cost, caused little inconvenience, and offered visible private benefits were associated with higher levels of adoption. As respondents who received the NAP service were, on average, more likely to adopt such practices than those who did not, it seems that participation in the NAP may have contributed to the decision to adopt

such practices. Given the NAP's structure, it can be argued that the NAP's main contribution to the adoption decision here was through the provision of practice-relevant information.

With this in mind, the adoption of practices that are of low cost, minimal inconvenience and visibly beneficial could possibly be encouraged using less resource-intensive approaches. Producers in Canada and other industrialized countries are often extended information about new practices using newsletters, bulletins, pamphlets and other relatively low-cost approaches (Rejesus *et al.* 2012). Given producers' familiarity with such an approach, the NAP or a similar program could test the efficacy of using a combination of mail-out techniques, Internet resources and other inexpensive communication tools to communicate information about practices and associated sources of assistance. Given the importance of the alignment between conservation actions and operational goals (e.g., Pannell *et al.* 2006), highlighting in extension materials the contributions that such practices make not only to conservation goals, but to other operational and personal goals as well, may increase the effectiveness of such materials. Outcomes achieved using such an approach could be compared to outcomes achieved by the NAP, which embedded referrals to relevant information in broad, lengthy reports.

Actions that were more complex or costly were adopted less readily than those mentioned above. Notably, the NAP was designed to address issues of complexity and cost, directing participants to substantial sources of financial and technical assistance they could access to help implement actions. However, the availability of assistance was found to have no significant link with adoption outcomes, with respondents who received the program making no attempt to access the majority of sources of financial or technical assistance recommended to them. It seems, then, that the NAP's approach of simply informing producers of the existence of relevant sources of assistance was not a wholly effective strategy for encouraging the adoption of complex or costly actions.

Redirecting program resources towards incorporating a more diverse and active set of extension approaches may improve outcomes. Diversifying the approaches taken can provide more channels for learning (e.g., Baynes 2007, Llewellyn *et al.* 2005), with particular mechanisms sometimes being more suited to particular types of producers (e.g., Rejesus *et al.* 2012). Drawing from the results of the evaluation and the relevant literature, some suggested approaches are outlined below.

Nearly half of respondents selected both time and financial constraints as being key factors contributing to their decision not to adopt actions, with the assistance offered by supporting organizations being insufficient to minimize these constraints. While research would caution against expecting full adoption of conservation practices even if they came at no cost to the producer, minimizing these constraints may encourage some additional adoption, especially in the case of a conservation-oriented group of producers like those participating in the NAP. With this in mind, extension services could be directed towards working directly with producers to leverage support by assisting in the completion of paperwork (11.8% of producers cited an unwillingness to complete necessary paperwork as a reason for not accessing assistance) and identifying and applying for new sources of funding as they arise.

Respondents expressed concern relating to the implementation of the actions recommended, with 13.0% expressing concern over their lack of control over practice outcomes, 10.4% citing a need for additional information about the practice, and 2.6% wanting the opportunity to trial the action before fully adopting it. For complex actions where producers express similar concerns, an alternative approach to traditional

extension could be to host field days or workshops, where experienced and respected producers demonstrate techniques and address questions. In cases where producers have practice-specific concerns, the expertise of experienced producers may seem more credible and thus may carry more weight in encouraging practice adoption (e.g., Simpson *et al.* forthcoming). Rejesus *et al.* (2012) note that such an approach may be particularly advantageous for inexperienced producers with low literacy levels. While few NAP respondents were new to farming, their stated need for more experience with specific practices and comments made by a number of respondents regarding the benefits of presenting information in a comprehensible fashion suggest that field days to demonstrate more complex practices may have provided a valuable complement to the NAP approach.

Expanding the extension service to provide direct technical assistance in implementing recommended practices represents a large departure from the NAP approach, and seems infeasible given the wide variety of practices recommended by the program. As the purpose of the recommendations is to build upon the existing structure of the NAP, efforts to incorporate broad technical assistance will not be discussed here. For an example of an extension program that provides direct technical assistance, in addition to informational assistance, in order to achieve a very focused objective, see Baynes (2007).

The decision of whether to incorporate multiple approaches into a single extension program is no doubt a complex process, requiring consideration not only of the ability of each approach to help achieve a program's goals, but also of the costs that each approach contributes to the design, implementation and administration of that program. Future programs like the NAP, which aim to promote a diverse set of practices, could test the efficacy of restructuring program resources to support a set of scientifically informed extension approaches targeted towards the type of practice being promoted. Consideration could also be given to testing the efficacy of extending the same practices through independent programs, rather than as part of a suite of recommendations made under the direction of a single program like the NAP.

Recommendation 3: Continue fostering positive program-participant relationships to improve adoption outcomes.

The quality of an extension recipient's relationship with the extension organization can have a considerable impact on the outcome of the program (e.g., Pannell *et al.* 2006, Mendham *et al.* 2007). In general, respondents who received the NAP service were very positive about their experience working with DUC and the affiliated NAP extension biologists. A number of steps can be taken to maintain and build upon the positive relationships fostered by the program.

A key component of the NAP process was to identify actions and related forms of assistance that aligned with participating producers' operational practices. And while respondents largely expressed satisfaction with the design of the program, several steps could be taken to increase this alignment. Though the program was designed to be producer-specific, templates and standard recommendations were sometimes used. And while this approach undoubtedly allowed for greater quality control and program participation, in its current form it may have impacted program outcomes and satisfaction. Thirty-five percent and 25% of respondents stated that certain practices and forms of assistance, respectively, were not relevant to the operation, while 10% stated that they did not access assistance because they did not want to work with the associated organization. To improve program satisfaction and outcomes while

maintaining the benefits of a template approach, resources could be directed away from developing less essential elements of the report and towards working more directly with participants to ensure that recommendations inserted into the templates are acceptable, relevant and perceived to be relevant. Ensuring participants correctly perceive the value of a practice may be a particularly fruitful approach for improving outcomes of a program like the NAP, as a producer's perceptions of the effectiveness and economic value of a practice can have considerable bearing on the adoption decision (e.g., Baynes 2007; Llewellyn *et al.* 2005). Given that the NAP promoted certain practices whose efficacy, though perceived to be high, is scientifically unclear (e.g., see Briske *et al.* 2008 for a discussion of the efficacy and perceptions of rotational grazing), it is important too to ensure that extended practices are scientifically sound. Promoting sound practices will not only aid in achieving ecological outcomes, but will likely help increase perceived credibility of the program.

Numerous studies have found that program outcomes are linked not only to the quality of the extension officers, but also the length of their relationship with participants, with follow-up visits serving to maintain confidence in, and commitment to, the practice and to provide opportunities to address setbacks (e.g., Mendham *et al.* 2007; Baynes 2007; Simpson *et al.* forthcoming; see Rejesus *et al.* 2012 for an opposing finding). While respondents who received the NAP did report favourable attitudes towards DUC, in some cases referring specifically to the quality of the extension agents, their relationship with the NAP was short-lived. The NAP service concluded upon delivery and explanation of the NAP report, with no follow-up strategy built into the program. Follow-up services can help identify and assist in addressing new obstacles and opportunities, such as implementation issues or changes in available sources of funding. These services may also help remind producers of their goals and reduce non-action caused by forgetting – cited by 22.1% and 35.3% of 2007-08 participants as contributing to their non-compliance with recommended practices and sources of assistance, respectively.

In short, though the efficacy of extension is limited, efforts may be taken to build upon the shortcomings and successes of the NAP. In particular, future gains may be made by diversifying the approach taken to extend relevant practices, and by building upon the positive participant relationships fostered by the program. Designing effective extension programs is a complex process, so while these recommendations should be considered, if a program similar to the NAP is to be created, consideration should be given too to the relevant literature, the goals and budget of the program being created, the relevant policy context, and the objectives and design of related programs, among other relevant factors.

RECOMMENDATIONS: PROGRAM EVALUATION

As the assessment of the NAP illustrated, program evaluation can offer valuable information about how a program has performed and how that performance may be improved. Given the scarcity of program evaluation in Alberta, recommendations drawn from the experience of assessing the NAP are provided here to advise program designers and evaluators on how to conduct meaningful program evaluation. These recommendations are broad in scope, and are meant as a starting point for further discussion rather than as a manual for designing and conducting an evaluation.

Recommendation 1: Encourage program designers to consider evaluation when developing program objectives, methods and tools.

In evaluating the NAP, the research team faced a number of challenges that could potentially be alleviated by giving greater consideration to evaluation when designing the program.

In order to assess compliance with NAP recommendations, the research team needed to access participants' reports, where the recommendations were held. As these reports contained participants' personal information, the consent of NAP participants was sought by the research team to access the information in these reports. A substantial portion of NAP participants did not respond to this request, resulting in a smaller sample size for evaluation. Given the importance of evaluation for assessing program outcomes, future programs could obtain consent to release information relevant to evaluation to research organizations at the outset of the program to help mitigate this issue.

In order to compare outcomes across participants, the research team developed a master list of all of the NAP recommendations provided, from which recommendations provided to a particular participant could be inserted into their personalized report. Upon reviewing the reports of all consenting participants, it was found that recommendations that encouraged a particular action were often worded in slightly different ways. As a result, considerable time was spent by the research team trying to carefully word the master recommendations in a way that did not change the meaning of the particular variant that appeared in any one participant's original report.

Future programs could improve the quality and efficiency of evaluation by, when appropriate, taking a more standardized approach to the development or delivery of recommendations, where deviations from the standardized approach are carefully documented. In practical terms, a program like the NAP could, for example, develop a carefully worded master list of recommendations as the extension service is being developed and participant information is being collected, to be referenced when developing personalized reports.

A number of frequently provided recommendations had to be excluded from the master list drafted by the research team because they provided participants only with broad goals, and not concrete actions for which compliance could be assessed. To improve the likelihood that the impact of the full suite of recommendations can be assessed, and to identify more clearly the things participants can do to comply with the recommendations, program designers should strive to ensure that key components of a program are framed in a way that directs participants to undertake concrete, measurable actions.

In summary, evaluation is simpler when a program has been designed with the intent of being evaluated. Such an approach can be encouraged by providing opportunities for program designers to work with evaluation experts, by building basic evaluation criteria and planning exercises into program funding application requirements, or by collating useful guiding material in a place accessible to extension professionals. To further improve the feasibility of evaluation, program objectives and methods could be developed with consideration given to the suite of tools available for evaluation, as explained in more detail in *Recommendation 2*.

Recommendation 2: Consider the appropriate evaluation framework.

The goals of the NAP were to improve on-farm wildlife habitat and biodiversity through the provision of detailed, farm-specific information including actions- and assistance-related conservation recommendations. With these goals in mind, an evaluation of the outcomes or “successes” of the program could have logically focused on environmental outcomes, changes in conservation attitudes, the efficacy of the goal-setting mechanism used to encourage practice implementation, among other approaches. In choosing how to narrow the focus of the present evaluation, consideration was given to a number of factors. A brief discussion of these factors is provided to help guide future evaluation and to encourage program designers to consider the factors that influence the feasibility of evaluating program outcomes when designing program objectives. For clarity, factors are provided in list form, with each factor being accompanied by an explanation of its relevance to the NAP evaluation.

Factors Considered When Choosing an Evaluation Approach for the NAP

- **Program Goals:** In order to measure the efficacy of the program, the research team focused the evaluation around outcomes related to a measurable objective. As mentioned previously, the goals of the NAP could logically lead to a number of evaluative approaches, including ecological and social approaches. As such, other factors were taken into consideration to help further narrow the focus of the evaluation.
- **Provincial & International Evaluation Context:** As Llewellyn *et al.* (2005, 1631) note, when determining the scope of and investment in an evaluation, consideration should be given to the “potential for the information generated by the program to be of value beyond the core participants and the potential for the findings to inform other programs”. In the context of Alberta, the relative lack of evaluation means that program designers and evaluators have few Alberta-specific research findings to help inform their work. With this in mind, the research team wanted to conduct an evaluation that would provide value not only to DUC and the NAP, but to the provincial stewardship programming community as well. As such, the evaluation was focused broadly on the efficacy of the traditional, information-based approach to extension and in addressing key factors that contributed to the outcomes of the program. The design of the research questions and survey tools was informed by international research, in part to determine whether Alberta-based respondents behaved similarly to producers elsewhere and thus gain a rough sense of the suitability of this existing body of research to informing future design and evaluation in Alberta.
- **Expertise:** The research team’s social science expertise influenced the focus of the evaluation. Efforts were directed towards evaluating recommendation compliance, identifying key variables associated with compliance, and placing the findings in the context of economic- and psychology-focused adoption research. Had other factors permitted (including funding and data availability), consideration could have been given to performing a detailed cost-benefit analysis of the program, or including the expertise of a physical scientist to evaluate ecological outcomes.
- **Funding Source:** The objectives of the research project aimed to align broadly with the objectives of its two funding sources – the Alberta Land Institute and the Linking Environment and Agriculture Research Network – to undertake policy-relevant research. Emphasis was thus placed

on evaluating the efficacy of the NAP's approach in encouraging compliance with conservation recommendations, with the intention of helping inform future agri-environmental policy, which often employs voluntary, extension-based programming to achieve environmental goals.

- **Funding Availability:** The project budget was considered when designing the evaluation approach. For example, the level of detail to include in the survey and the mode of administration was determined in part by cost.
- **Data Availability:** The approach taken was influenced by the data available, which included a list of all actions recommended to participants, but not detailed information about pre-participation attitudes towards conservation or the pre-participation ecological measures associated with the operation. This necessitated a narrowing of the focus of the evaluation, which centred on compliance with recommendations, and away from changes in attitudes or environmental quality. The presence of a group of participants who signed up for, but did not receive, the program allowed the research team to plan a comparative evaluation that assessed the impacts of the program on conservation behaviour. An initially low response rate from the comparison group suggested that this comparative evaluation might have to be abandoned; however, further successful recruitment efforts allowed this component of the evaluation to be retained.
- **Appropriate Timeline:** Following the first year of the program, DUC recommended assessing program outcomes five and ten years following the administration of the NAP (Schmitt & Boukall 2008). The present evaluation was conducted between 2011 and 2012, slightly earlier than DUC's recommended timeline. This timeline was chosen in an attempt to strike a balance between giving participants time to implement recommended actions and with concerns that participants may move or may forget details related to their participation in the program and their conservation behaviours. This approach is by no means the only one available. For example, assessments of individual extension services offered by a forestry extension program in the Philippines were conducted as the services were provided, while the efficacy of the program as a whole was evaluated upon its completion (Baynes 2007). In the case of similar learning- or information-based extension programs, where behaviour changes are expected to take place over a longer time horizon, evaluations of the *perceptions* of the practices being promoted may be used to get a rough sense of expected behavioural outcomes (Llewellyn *et al.* 2005).

The list above is by no means exhaustive of the factors that can be considered when choosing an evaluation approach, nor is the resulting evaluation representative of a perfect evaluation. Instead, the list is meant to illustrate some of the factors considered in attempting to provide an evaluation that was feasible and provided value to an audience that extended beyond those directly involved in the NAP. Future program evaluators may wish to undertake a similar exercise, using these and other relevant factors as guidance. At the other end of the program evaluation process, delivery and funding agencies may wish to build into the program design phase an exercise that encourages designers to consider the above factors when designing their program's objectives, tools and budget to increase the chance that the resulting programs can be more easily and appropriately evaluated.

Recommendation 3: Present results of evaluation in ways useful to the extension community.

In designing this evaluation, the research team found that there were few Alberta-specific evaluations from which they could draw guidance. Among those available, documentation suitable for informing evaluation design was limited.

To help ensure that this evaluation is of use to both the applied stewardship and research communities, a number of documents have been created. First, a one-page fact sheet outlining the key design-related recommendations of the evaluation has been developed, with the intention of quickly communicating the results of the evaluation to anyone interested in extension delivery and design. Second, a more in-depth technical summary of the document was developed to provide a thorough overview of the results and recommendations, and is targeted towards extension professionals. Both of these documents are written in language suitable for a general audience, and will be formatted by a communications professional in a way that is easy to read and which emphasizes key messages. Third, this report provides an in-depth discussion of methods and results, and is targeted towards a more technical audience interested in designing and conducting an evaluation. Finally, a research paper will be written, with the intention of submitting the paper to a peer-reviewed publication, to add to the body of research from which future evaluators can draw. Oral and poster presentations delivered at policy-oriented conferences in Canada were used to gather feedback on the design of the evaluation and to communicate relevant results and recommendations. These outputs will be held on the Alberta Land Institute and Linking Environment and Agriculture Research Network web pages to ensure that they can be accessed well after the evaluation has concluded.

Producing and presenting these output requires a considerable investment of resources. As such, individuals responsible for conducting evaluations are encouraged to give consideration to the costs and benefits of the various types of output available to them when budgeting for their evaluation. At the very least, the research team would urge other evaluators to produce a report providing an overview of the methods and the results at a level of detail that allows evaluators and program designers alike to draw guidance from the work completed. As outlined in *Recommendation 4* in this section, a discussion of who should bear the responsibility for funding and conducting program evaluations may help clarify questions relating to the appropriate outputs of evaluations.

Recommendation 4: Consider how to distribute responsibility for conducting program evaluations.

As found by a recent Alberta Land Institute review, the tendency for stewardship programs to go unevaluated in the province may stem in part from uncertainty over who is responsible for funding and conducting program evaluation (Simpson *et al.* forthcoming). Given the potential for evaluation to identify opportunities to build upon and improve stewardship programming and thus provide greater impact for resources expended, efforts to resolve this uncertainty are undoubtedly valuable. In the case of the NAP, three reviews were conducted by three groups, under different funding arrangements. A brief discussion of the reasons behind and results of this approach helps to identify some of the questions that may be worth considering when determining how to distribute responsibility for conducting program evaluations.

Based on the findings of the Alberta Land Institute review, it seems that the NAP was rare in that it planned for evaluations to be undertaken. Following the first year of programming in 2007, DUC

conducted an internal review of the program delivery costs and projected outcomes and commissioned an external review from the Praxis Group to assess participants' feelings towards the program. While neither of these programs provided an indication of the success of the program in delivering expected outcomes, DUC determined as a result of the former review that a follow-up evaluation of actual outcomes, five or ten years following the initiation of the program, was warranted. However, when funding for the Greencover Program was unexpectedly terminated in 2009, the NAP was cancelled and, presumably, the funding that would have been allocated for such a review disappeared. Such an evaluation was nevertheless undertaken, with researchers from the University of Alberta independently approaching DUC with funding to conduct the evaluation. However, if a key goal of a stewardship program or its funding agency is to ensure that quality evaluation occurs in an objective and timely fashion, relying on such an approach is risky.

In relying on a volunteering group, presuming such a group exists, the delivery organization and the associated funding agency may have say only over whether or not to allow the evaluation to occur, and not over how the evaluation takes place. Certainly, evaluations that take place at arms-length from the delivery organization offer more objectivity and credibility. However, in leaving to chance the nature of the organization that conducts the evaluation (which, in such a case, can be the organization that delivered the program), the ability of the funding agency to ensure that critical questions are evaluated may be considerably lessened. Even in cases where the volunteering group is willing to work with the delivery organization or funding body to ensure that policy-relevant questions are addressed, there is no system in place to verify that the financial and/or technical resources of the group undertaking the evaluation are adequate.

In the case of publicly funded programs such as the NAP, where the need to demonstrate public value is evident, steps can be taken to improve the likelihood that evaluation is not left to chance. In the case of the NAP, securing funding for evaluation at the outset of program initiation would ensure that an external program evaluation could be commissioned even following the program's termination. Given that, as shown in *Recommendation 2 (Program Evaluation)*, there are numerous ways to conduct an evaluation, identifying the appropriate amount to set aside for evaluation is unlikely to be a simple task. Cooperation between funding agencies, delivery organizations and evaluation experts to establish budgets and basic criteria for evaluation of different types of stewardship programs may alleviate some of this uncertainty. As always, such cooperation will come at a cost; however, such an investment may increase the value the public receives from future stewardship programming.

CONCLUSIONS

This report presented research undertaken at the University of Alberta, with the support of the Alberta Land Institute and Linking Agriculture and Environment Research Network, to assess the Natural Advantage Program (NAP), a free extension service offered by Ducks Unlimited Canada to Alberta-based producers between 2007-2009. This research assessed the effectiveness of the NAP, which aimed to improve on-farm wildlife habitat and biodiversity through the provision of participant-specific reports identify relevant stewardship actions that could be implemented and relevant forms of assistance that could be accessed to help offset the financial or technical requirements needed to implement those actions.

Two types of surveys were developed in late 2011: a general survey with questions relating to demographic and farm information, and a personalized survey designed to assess participants' completion of the specific actions and referrals recommended to them in their NAP reports. Participants from 2007 and 2008 received both a general and personalized survey. Participants from 2009 – who signed up for, but did not receive, the NAP service due to its unexpected termination in 2009 – received only a customized version of the general survey, and served as a control group against which to measure the impact of the NAP on participants from 2007-08. Surveys were distributed to 215 NAP participants from all three program years, with 137 of those participants (63.7%) returning completed surveys.

Respondents from 2007-08 reported completing 52.6% of the 683 actions recommended to them in their reports, with completion rates for specific action types ranging from 20.0% for bank stabilization to 81.3% for small operational changes, such as moving salt blocks and retaining plant litter. Respondents from 2007-08 reported accessing 28.4% of the forms of assistance recommended to them in their NAP reports, with access rates ranging from 0.0% for assistance offered by conservation easement organizations to 36.3% for assistance offered by the Prairie Farm Rehabilitation Administration. Reported aggregate action completion rates and assistance access rates for respondents from 2007-08 were higher than those for respondents from 2009, suggesting that participation in the NAP had some positive impact on stewardship behaviour; however, a number of caveats suggest that the NAP's impact may be limited to specific types of actions and forms of assistance. When asked why they did not comply with recommendations, respondents from 2007-08 most frequently selected factors relating to resource constraints, relevance of the recommendation, and forgetting.

In line with the relevant literature, certain farm- and practice-related characteristics were associated with higher levels of practice adoption. Specifically, greater adoption was seen amongst producers who owned the land on which they worked, and who planned to transfer their operation to their family. Farm size, membership in a watershed group, and a stated interest in conservation were also associated with a higher likelihood of practice adoption. The availability of a subsidy appears to have had no impact on the likelihood of an action being adopted.

Actions that required minimal resources to implement and that caused little inconvenience to the producer were most likely to be adopted. Actions considered more inconvenient or requiring more time or money were still somewhat likely to have been adopted if they also offered visible, private benefits.

Based on the findings of this assessment, recommendations were developed to help guide both the design of future extension programs with aims similar to the NAP's, and the evaluation of such programs. Recommendations relating to extension design include: Recognize the limits of traditional, information-based extension; direct program resources strategically towards action type to improve adoption outcomes; and, continue fostering positive program-participant relationships to improve adoption outcomes. Recommendations relating to extension evaluation include: Encourage program designers to consider evaluation when developing program, methods and tools; consider the appropriate evaluation framework; present results of evaluation in ways useful to the extension community; and, consider how to distribute responsibility for conducting program evaluations.

GLOSSARY OF TERMS

Agricultural Policy Framework (APF): Canada's joint provincial-territorial-federal agricultural strategy in operation between 2003-2008.

Beneficial Management Practices (BMPs): On-farm practices designed to improve the quality of water quality, soil and riparian health and other environmental parameters.

Canada-Alberta Farm Stewardship Program (CAFSP): The Alberta branch of the National Farm Stewardship Program.

Ducks Unlimited Canada (DUC): A not-for-profit conservation organization focused on managing, conserving and restoring wetlands and other waterfowl habitat in primarily in North America, but also in Latin America and Oceania.

Environment Farm Plan (EFP): Farm-specific plans that helped agricultural producers in Canada take actions to improve the environmental outcomes associated with their agricultural practices. EFPs were offered as part of Canada's National Environmental Farm Plan Initiative, a component of the APF. The national initiative began in 2003 and ended in 2009, though some provinces still offer EFPs.

Farming Values Scale: A psychometric scale developed in Australia by Maybery *et al.* (2005) to assess farmers' predominant farming values.

General Survey: The survey designed for use in this study to used to elicit from participants relevant attitudinal, demographic and farm-level characteristics that have been shown in the literature to have bearing on the decision to alter one's farming practices.

Greencover Canada: A five-year (2003-2009) Government of Canada program offered under the APF to help agricultural producers improve particular components on their on-farm environmental management. Greencover Canada supported DUC's NAP.

National Farm Stewardship Program: A \$176-million program, introduced under the APF, that offered eligible producers access to financial and technical assistance to help them implement NFSP-approved BMPs. The NFSP program was first offered in 2003 and ended in 2008.

Natural Advantage Program: An intensive extension service offered by the Alberta branch of DUC, with the support of Greencover Canada, to encourage participating Alberta-based producers to implement conservation actions that would help maintain or improve wildlife habitat and biodiversity. The NAP was first offered in 2007 and was cancelled in 2009 with the cessation of Greencover Canada.

Natural Advantage: The On-Farm Wildlife and Biodiversity Planning Service: The full name for the NAP service.

Personalized Survey: The survey used in this study to assess 2007 and 2008 participants' behavior with regards to the specific recommendations and referrals that were provided to them in their NAP reports.

The Praxis Group: A Calgary-based consultancy group that undertook a third-party review of the NAP following the completion of the 2007 program year, focusing on assessing experiential factors associated with program participation.

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APPENDIX

General Survey 2007-2008: Example

**An Assessment of
Ducks Unlimited Canada's
Natural Advantage Program:
General Survey**



“uplifting the whole people”

— HENRY MARSHALL TAPPIN, FOUNDRING PRESIDENT, 1888

INSTRUCTIONS

Thank you for agreeing to participate in our survey – your help is greatly appreciated! Before you get started, please take a moment to read through the survey instructions below.

SURVEY INSTRUCTIONS

1. This survey should be completed by the same individual(s) who signed up to participate in the Natural Advantage program. If this is not possible, please have the survey completed by someone familiar with the farming operation.
2. Please print your responses using a blue or black pen.
3. Please read all of the questions and response options carefully, as some questions differ by only a few words.
4. Please complete the survey questions in the order in which they are presented.
5. We have included a few questions where we ask you to provide comments. If you run out of room in the comments section, please use the extra sheet of paper provided and reference the question number in your response.
6. Once you have completed the survey, please return your survey to us within two weeks of the date you received it, using the prepaid addressed envelope provided.

Should you have any questions about the survey or our research, please do not hesitate to contact us!

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Thank you for your help!

SECTION 1

1. In 2007, what was your relationship to the farm that signed up to participate in the Natural Advantage Program?

Please select one answer from the list below.

- Sole decision maker for the farm
- One of ___ decision makers 18-years of age and older for the farm
(please specify total number of farm decision makers, including yourself)
- Not a farm decision maker, but familiar with the operation

2. How did you first learn about the Natural Advantage Program?

Please select one answer from the list below.

- Ducks Unlimited Canada newsletter
- Ducks Unlimited Canada website
- Environmental Farm Plan website
- National Conservator Magazine
- Radio or newspaper advertisement
- Family or friends
- Other: _____ *(please specify)*

SECTION 2

Please complete the BLUE booklet before proceeding with Question 9.

9. Your Natural Advantage report recommended specific actions, and referred related sources of assistance to help you complete those actions. Since receiving your report, have you received any forms of assistance from *other* sources to complete the actions recommended to you in your Natural Advantage report?

- No
 Yes



If yes, please indicate the source(s) of that assistance.
Please check all that apply.

- Government agency: _____ (*please specify*)
 Industry (input supplier, processor, etc.)
 Environmental non-governmental organization
 College/university
 Environmental Farm Plan advisor/facilitator
 Agrologist
 Other: _____ (*please specify*)

10. Since participating in the Natural Advantage Program, have you engaged in any actions related to wildlife and/or biodiversity that were not recommended to you in the Natural Advantage report?

- No
 Yes



If yes, please list the most significant action(s), and associated source(s) of assistance (if applicable).

Action 1: _____

Assistance 1: _____

Action 2: _____

Assistance 2: _____

Action 3: _____

Assistance 3: _____

4

11. Your Natural Advantage report lists the number of acres you had in various land types in the year your farm was assessed by Ducks Unlimited. For each land type, please indicate whether the area has changed since your assessment and, if so, by what amount (reported to the nearest half-acre).

| Habitat Type | Area reported in year of NAP assessment (acres) | Direction of Change in Acres (+, -, no change) | Change in Number of Acres (nearest half-acre) |
|---------------------------------|---|--|---|
| <i>Example Land Type</i> | 4000 | + | 15.5 |
| Native and Naturalized Upland | | | |
| Riparian | | | |
| Wetland Basin | | | |
| Cropped and Other Modified Uses | | | |

12. Since receiving your Natural Advantage report, have you cleared 0.5 acres or more of forested/treed area from your land?

- No
- Yes



If yes, please indicate the number of acres you have cleared (round to the nearest half-acre).

Acres

SECTION 3

13. For how many years have you managed a farm business?

Please provide a whole number with no decimal points.

14. In what year did you begin operating the farm that you signed up to be reviewed by the Natural Advantage Program?

 (YYYY)

15. What is the total land area of this operation at present?

Please round to the nearest whole number (acres).

16. Which of the following options best describes this farming operation?

Please select one answer from the list below.

- Crop
- Livestock
- Horticulture/Greenhouse
- Mixed
- Hobby
- Other: _____ (please specify)

17. Does this farm currently have a formal, written Environmental Farm Plan?

- No
- Yes



If yes, in what year was this Environmental Farm Plan developed?

 (YYYY)

18. Are you currently operating this farm?

- No
- Yes

If no, please indicate the current status of that farm.
Please select one answer from the list below.

- Rented out to family member
- Rented out to someone other than family
- Sold or transferred to family member
- Sold or transferred to someone other than family
- Temporarily out of business
- Out of business
- Other: _____ (please specify)

If yes, please indicate your intentions for the farm once you retire from farming.
Please select one answer from the list below.

- Rent out to family member
- Rent out to someone other than family
- Sell or transfer to family member
- Sell or transfer to someone other than family
- Other: _____ (please specify)

SECTION 4

19. Below is a list of statements about farming. For each statement, please circle the **one** number that best reflects the extent to which you disagree or agree with that statement.

Note: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|-------------------|----------|---------|-------|----------------|
| <i>Dollars and cents is what farming is all about.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I view my farm as first and foremost a business enterprise.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>When planning future farming activities I only focus on how profitable they will be.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>A maximum annual return from my property is my most important aim.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Money and profit are not the most important things about farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>The lifestyle that comes with being on the farm is very important to me.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Farming communities are a great place to live.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I enjoy the peace and quiet that comes with farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>A rural environment is a great place to raise children.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>We do not make a fortune from farming but the lifestyle is great.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Good farmers regularly make land stewardship improvements to their land.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>The most important thing is leaving my property in better shape than I found it.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Land stewardship by farmers is more important than anything else about farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Managing environmental problems on my farm is a very high priority.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I like to look after my land, making it work for me, without destroying it.</i> | 1 | 2 | 3 | 4 | 5 |

20. Below is a list of organizations that may have appeared in your report or are relevant to this survey. For each organization, please circle the one number that best reflects how positive or negative your dealings with that organization have generally been.

Note: 1 = very negative, 2 = negative, 3 = neutral, 4 = positive, 5 = very positive, N/A = have not dealt with this organization

| Organization | Very Negative | Negative | Neutral | Positive | Very Positive | Have not dealt with organization |
|--|---------------|----------|---------|----------|---------------|----------------------------------|
| Ducks Unlimited Canada | 1 | 2 | 3 | 4 | 5 | N/A |
| Alberta Environmental Farm Plan Program | 1 | 2 | 3 | 4 | 5 | N/A |
| Canada-Alberta Farm Stewardship Program | 1 | 2 | 3 | 4 | 5 | N/A |
| Prairie Farm Rehabilitation Administration | 1 | 2 | 3 | 4 | 5 | N/A |
| Agricultural and Research Extension Council of Alberta | 1 | 2 | 3 | 4 | 5 | N/A |
| Nature Conservancy of Canada | 1 | 2 | 3 | 4 | 5 | N/A |

SECTION 5

21. In what year were you born?

(YYYY)

22. What is your marital status?

Please select one answer from the list below.

- Legally married
- Common-law partner
- Separated
- Divorced
- Widowed
- Other single

23. What is your highest level of education?

Please select one answer from the list below.

- Some high school
- High school diploma
- Some college or university
- University degree/certificate/diploma
- Other: _____ (please specify)

24. How many children under the age of 18 live with you?

25. Since 2005, have you completed coursework pertaining to wildlife habitat and biodiversity conservation?

- No
- Yes

↳ **If yes**, please specify the following:

Course name: _____

Organization offering course: _____

Year completed: _____ (YYYY)

26. In the past four years, did you personally receive a wage or salary from another job or operate another business not involved with this agricultural operation?

- No
- Yes

↳ **If yes, please indicate the average time per week you spend on this off-farm job.**

Please select one answer from the list below.

- Fewer than 20 hours per week
- 20 to 29 hours per week
- 30 to 40 hours per week
- More than 40 hours per week

27. In the past four years, did any other household decision makers receive a wage or salary from another job or operate another business not involved with this agricultural operation?

- No
- Yes

↳ **If yes, please indicate the average time per week this individual spends on this off-farm job.**

Please select one answer from the list below.

- Fewer than 20 hours per week
- 20 to 29 hours per week
- 30 to 40 hours per week
- More than 40 hours per week

28. In the past year, have you actively participated in any of the following activities or organizations?

Please check all that apply.

Activities

- Fishing or hunting
- Wildlife viewing
- Outdoor recreation

Organizations

- Agricultural Organization
- Environmental or conservation organization
- Watershed group

An Assessment of Ducks Unlimited Canada's Natural Advantage Program: General Survey



"uplifting the whole people"

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5. We have included a few questions where we ask you to provide comments. If you run out of room in the comments section, please use the extra sheet of paper provided and reference the question number in your response.
6. Once you have completed the survey, please return your survey to us within two weeks of the date you received it, using the prepaid addressed envelope provided.

Should you have any questions about the survey or our research, please do not hesitate to contact us!

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Thank you for your help!

SECTION 1

1. In 2009, what was your relationship to the farm that signed up to participate in the Natural Advantage program?

Please select one answer from the list below.

- Sole decision maker for the farm
- One of ___ decision makers 18-years of age and older for the farm
(please specify total number of farm decision makers, including yourself)
- Not a farm decision maker, but familiar with the operation

2. How did you first learn about the Natural Advantage Program?

Please select one answer from the list below.

- Ducks Unlimited Canada newsletter
- Ducks Unlimited Canada website
- Environmental Farm Plan website
- National Conservator Magazine
- Radio or newspaper advertisement
- Family or friends
- Other: _____ *(please specify)*

SECTION 2

3. Since 2009, have you engaged in any actions designed to improve the quantity and/or quality of wildlife habitat or biodiversity on your farm?

- No
 Yes

4. If you answered "Yes" to Question 3, please list in the table below the most significant actions you took. If you received any technical or financial assistance to help you implement an action, please record the name of the assisting organization and briefly describe the assistance provided in the appropriate columns.

| | Brief description of action | Assisting organization | Brief description of assistance |
|-----------------|---|--|--|
| <i>Example</i> | <i>Installed fence around wetlands</i> | <i>Alberta Conservation Association</i> | <i>ACA provided 50% of fencing costs</i> |
| <i>Example</i> | <i>Planted shelterbelt along field edge</i> | <i>Prairie Farm Rehabilitation Administration</i> | <i>PFRA provided 100 trees free of charge</i> |
| <i>Example</i> | <i>Improved quantity and quality of cover on cropped land</i> | <i>Agricultural Fieldman found through Alberta Agriculture and Rural Development</i> | <i>Agricultural Fieldman provided technical advice</i> |
| Action 1 | | | |
| Action 2 | | | |
| Action 3 | | | |
| Action 4 | | | |
| Action 5 | | | |

2009

5

SECTION 3

5. For how many years have you managed a farm business?

Please provide a whole number with no decimal points.

6. In what year did you begin operating the farm that you signed up to be reviewed by the Natural Advantage Program?

 (YYYY)

7. What is the total land area of this operation at present?

Please round to the nearest whole number and specify units (acres, hectares).

8. Which of the following options best describes this farming operation?

Please select one answer from the list below.

- Crop
- Livestock
- Horticulture/Greenhouse
- Mixed
- Hobby
- Other: _____ (please specify)

9. Does this farm currently have a formal, written Environmental Farm Plan?

- No
- Yes

→ **If yes, in what year was this Environmental Farm Plan developed?**

 (YYYY)

10. Are you currently operating this farm?

- No
- Yes

If no, please indicate the current status of that farm.
Please select one answer from the list below.

- Rented out to family member
- Rented out to someone other than family
- Sold or transferred to family member
- Sold or transferred to someone other than family
- Temporarily out of business
- Out of business
- Other: _____ *(please specify)*

If yes, please indicate your intentions for the farm once you retire from farming.
Please select one answer from the list below.

- Rent out to family member
- Rent out to someone other than family
- Sell or transfer to family member
- Sell or transfer to someone other than family
- Other: _____ *(please specify)*

SECTION 4

11. Below is a list of statements about farming. For each statement, please circle the one number that best reflects the extent to which you disagree or agree with that statement.

Note: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

| Statement | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|-------------------|----------|---------|-------|----------------|
| <i>Dollars and cents is what farming is all about.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I view my farm as first and foremost a business enterprise.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>When planning future farming activities I only focus on how profitable they will be.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>A maximum annual return from my property is my most important aim.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Money and profit are not the most important things about farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>The lifestyle that comes with being on the farm is very important to me.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Farming communities are a great place to live.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I enjoy the peace and quiet that comes with farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>A rural environment is a great place to raise children.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>We do not make a fortune from farming but the lifestyle is great.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Good farmers regularly make land stewardship improvements to their land.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>The most important thing is leaving my property in better shape than I found it.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Land stewardship by farmers is more important than anything else about farming.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>Managing environmental problems on my farm is a very high priority.</i> | 1 | 2 | 3 | 4 | 5 |
| <i>I like to look after my land, making it work for me, without destroying it.</i> | 1 | 2 | 3 | 4 | 5 |

12. Below is a list of organizations that often provided assistance with improving on-farm wildlife habitat and biodiversity. For each organization, please circle the one number that best reflects how positive or negative your dealings with that organization have generally been.

Note: 1 = very negative, 2 = negative, 3 = neutral, 4 = positive, 5 = very positive, N/A = have not dealt with this organization

| Organization | Very Negative | Negative | Neutral | Positive | Very Positive | Have not dealt with organization |
|--|---------------|----------|---------|----------|---------------|----------------------------------|
| Ducks Unlimited Canada | 1 | 2 | 3 | 4 | 5 | N/A |
| Alberta Environmental Farm Plan Program | 1 | 2 | 3 | 4 | 5 | N/A |
| Agriculture and Agri-Food Canada | 1 | 2 | 3 | 4 | 5 | N/A |
| Alberta Agriculture and Rural Development | 1 | 2 | 3 | 4 | 5 | N/A |
| Agricultural and Research Extension Council of Alberta | 1 | 2 | 3 | 4 | 5 | N/A |
| Nature Conservancy of Canada | 1 | 2 | 3 | 4 | 5 | N/A |
| Prairie Farm Rehabilitation Administration | 1 | 2 | 3 | 4 | 5 | N/A |
| Alberta Environmentally Sustainable Agriculture | 1 | 2 | 3 | 4 | 5 | N/A |
| Cows & Fish | 1 | 2 | 3 | 4 | 5 | N/A |

SECTION 5

13. In what year were you born?

(YYYY)

14. What is your marital status?

Please select one answer from the list below.

- Legally married
- Common-law partner
- Separated
- Divorced
- Widowed
- Other single

15. What is your highest level of education?

Please select one answer from the list below.

- Some high school
- High school diploma
- Some college or university
- University degree/certificate/diploma
- Other: _____ (please specify)

16. How many children under the age of 18 live with you?

17. Since 2005, have you completed coursework pertaining to wildlife habitat and biodiversity conservation?

- No
- Yes

→ **If yes**, please specify the following:

Course name: _____

Organization offering course: _____

Year completed: _____ (YYYY)

18. In the past four years, did you personally receive a wage or salary from another job or operate another business not involved with this agricultural operation?

- No
- Yes

→ **If yes, please indicate the average time per week you spend on this off-farm job.**

Please select one answer from the list below.

- Fewer than 20 hours per week
- 20 to 29 hours per week
- 30 to 40 hours per week
- More than 40 hours per week

19. In the past four years, did any other household decision makers receive a wage or salary from another job or operate another business not involved with this agricultural operation?

- No
- Yes

→ **If yes, please indicate the average time per week this individual spends on this off-farm job.**

Please select one answer from the list below.

- Fewer than 20 hours per week
- 20 to 29 hours per week
- 30 to 40 hours per week
- More than 40 hours per week

20. In the past year, have you actively participated in any of the following activities or organizations?

Please check all that apply.

Activities

- Fishing or hunting
- Wildlife viewing
- Outdoor recreation

Organizations

- Agricultural Organization
- Environmental or conservation organization
- Watershed group

Personalized Survey: Example

Personalized Survey

Please complete this survey before proceeding with Question 9

3. Below is a table outlining some of the actions that were recommended to you in your Natural Advantage report. Column 1 lists the section of your report in which each action is located. Column 2 lists the actions. For each action, please indicate whether you completed that action by checking YES (“Yes, I completed this action”) or NO (“No, I did not complete this action”) in Column 3.

*Note: The actions listed in the table below have been selected from the Opportunities, Goals and Referrals components of each section of your report. We may not have listed every action identified in your report. If you have completed other actions **suggested to you in your report**, let us know in the comments box in Question 5! If you have completed actions **not suggested to you in your report**, let us know in Question 10.*

| Land Type | Action | Action Completed? |
|-------------------------------------|---|---|
| Native & Naturalized Upland Habitat | Consider DUC Conservation Easement on NW13 | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Wetland Basin Habitat | Obtain conservation easements for NW13 and SW27 | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | Restore wetlands on NE28, NW27, NE4 | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Riparian Habitat | Obtain conservation easement for NW1 | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | Leave 100-150 ft buffer on either side of stream when farming along creek | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Cropped and Other Modified Land Use | Seed NW13 to hayland | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | Seed some areas to increase native perennial cover | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | Delay haying to mid-July when possible | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| | Plant winter wheat | <input type="checkbox"/> Yes <input type="checkbox"/> No |

4. If you checked the NO box for any of the actions listed above, please indicate what factors contributed to your decision not to engage in the action(s) for which you selected NO.

Please:

- 1. Check all that apply (you do not need to link factors to specific actions) AND,**
- 2. Circle the ONE factor that was the most important overall.**

- | | |
|---|---|
| <input type="checkbox"/> I did not have enough information to decide whether the action was relevant to my farm | <input type="checkbox"/> I was concerned about what others would think of me if I acted |
| <input type="checkbox"/> The action was not relevant to my farm | <input type="checkbox"/> The action was too risky for me |
| <input type="checkbox"/> The action was too costly financially | <input type="checkbox"/> My past effort to engage in this action did not go well enough for me to try again |
| <input type="checkbox"/> The action required more of my time than I was able/willing to give | <input type="checkbox"/> I could not test the action first before fully adopting it |
| <input type="checkbox"/> There was too much paperwork involved | <input type="checkbox"/> Conservation and land management are not my primary concerns right now |
| <input type="checkbox"/> My friends/family discouraged me from undertaking the action | <input type="checkbox"/> I was worried that my cooperation would lead to government regulation |
| <input type="checkbox"/> I did not feel I had enough control over the action to deliver the desired outcome | <input type="checkbox"/> I forgot that I had meant to engage in the action |

5. If there are any other reasons why you did not engage in the action(s) referred to you, or if you have any additional comments, please write them in the box below.

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6. Below is a table outlining some of the materials and organizations that were referred to you in your Natural Advantage report. Please let us know whether you attempted to access technical or financial assistance from the materials/organizations listed in Column 1 by checking the appropriate box in Column 2.

If you answer “Yes, successfully”, please tell us what assistance you received AND what actions you took using that assistance in Column 3.

If you answer “Yes, unsuccessfully”, please tell us why you were unsuccessful in Column 3.

| Material or Organization | Attempted Access? | Assistance Received & Action Taken OR Reason for Unsuccessful Attempt |
|---|---|---|
| CAFSP BMP R - Enhancing Wildlife Habitat and Biodiversity | <input type="checkbox"/> Yes, successfully <input type="checkbox"/> Yes, unsuccessfully <input type="checkbox"/> No | |
| Ducks Unlimited - Conservation Easements | <input type="checkbox"/> Yes, successfully <input type="checkbox"/> Yes, unsuccessfully <input type="checkbox"/> No | |
| Ducks Unlimited - Wetland Restoration | <input type="checkbox"/> Yes, successfully <input type="checkbox"/> Yes, unsuccessfully <input type="checkbox"/> No | |

7. If you checked the NO box for any of the referrals listed above, please indicate what factors contributed to your decision not to access assistance from the referral(s).

Please:

- 1. Check all that apply (you do not need to link factors to specific referrals) AND,**
- 2. Circle the ONE factor that was the most important overall.**

- | | |
|---|---|
| <input type="checkbox"/> I did not want to work with the referred organization | <input type="checkbox"/> My family/friends discouraged me from accessing assistance |
| <input type="checkbox"/> I did not have enough information to decide whether the assistance offered was relevant to my farm | <input type="checkbox"/> I was concerned about what others would think of me if I accessed assistance |
| <input type="checkbox"/> The assistance offered was not relevant to my farm | <input type="checkbox"/> The activity associated with the assistance was too risky for me |
| <input type="checkbox"/> The assistance required more money than I was willing/able to commit | <input type="checkbox"/> Conservation and land management are not my primary concerns right now |
| <input type="checkbox"/> The assistance required more of my time than I was willing/able to commit | <input type="checkbox"/> I did not want to give the organization information about my farm |
| <input type="checkbox"/> There was too much paperwork involved | <input type="checkbox"/> I forgot that I had meant to access assistance from the referred organizations |
| <input type="checkbox"/> I did not feel I had enough control over the situation to deliver the desired outcomes | |

8. If there are any other reasons why you did not access assistance from the organization(s) referred to you, or if you have any additional comments, please write them in the box below.

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