EVALUATING THE ALBERTA RIPARIAN HABITAT MANAGEMENT PROGRAM

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B.A. (Geography, 1st Class Hons.), University of Calgary 1997

A Thesis
Submitted to the School of Graduate Studies
of the University of Lethbridge
in Partial Fulfillment of the
Requirements of the Degree

MASTER OF ARTS

LETHBRIDGE, ALBERTA, CANADA
August 2001

DEDICATION

for
LAF, CEB, LLG, BSB and EWB

ABSTRACT

This study illustrates a utilization-focused program evaluation approach newly applied to resource management. The Alberta Riparian Habitat Management (Cows and Fish) Program provides awareness programming to cattle producers to facilitate community-based action on riparian issues. The rationale is to develop producers' ecological literacy by increasing riparian knowledge and use of sustainable grazing management strategies by sharing appropriate ecological and management information. Attitude change is presumed to underlie the new behaviour(s).

Programming contributed to ecological literacy when it was community-based, producer-positive and partnership-oriented, and when opportunities existed for personal interaction among peers. Effectiveness declined when resources were insufficient and when programming seemed unrelated to local landscape or operational features. The attitude-behaviour relationship was weakly associated with ecological literacy; its complexity and relevance to ecological behaviours merits further investigation.

Program evaluation is of utility in resource management. Its potential will be fully realized by ensuring that research designs appropriately parallel programming rationale and evaluation requirements.

ACKNOWLEDGEMENTS

Sincere gratitude is expressed to those friends, family members, colleagues and members of the southwestern Alberta agricultural community who kindly offered their support and expertise throughout the course of this study, and to the many organizations that provided funding. Without them all, this evaluation research study and thesis would not have been possible.

Financial assistance was generously provided by the following.

- Alberta Riparian Habitat Management (Cows and Fish) Program, its Partners and Funding Associates

  Partners
  - Alberta Cattle Commission
  - Trout Unlimited Canada
  - Canadian Cattlemen's Association
  - Alberta Environment-Natural Resources Service
  - Alberta Agriculture, Food and Rural Development-Public Lands Branch
  - Department of Fisheries and Oceans
  - Prairie Farm Rehabilitation Administration

  Funding Associates
  - Alberta Conservation Association
  - Alberta Environmentally Sustainable Agriculture
  - Canada Alberta Beef Development Industry Fund
  - National Soil and Water Conservation Program

- Social Sciences and Humanities Research Council

- Wildlife Habitat Canada

- University of Lethbridge

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION AND PURPOSE

1.1 Overview

Human interaction with, and management of, the natural environment is a central theme in geography (Draper, 1998). This thesis describes an applied study that examined the theme with regard to the landscapes of southern Alberta, through the experiences, attitudes and actions of cattle producers. Specifically, this research evaluated the effectiveness of the Alberta Riparian Habitat Management (*aka* Cows and Fish) Program. The program is intended to help cattle producers gain a greater understanding of range and riparian ecology and, in so doing, to help them to make decisions about managing their range and riparian landscapes in a sustainable manner. In 1997, program representatives requested that independent evaluation research be undertaken to assess the program's effectiveness in advancing sustainable management by cattle producers in southwestern Alberta. Programming efforts had been focussed there until that time; the program itself evolved from the efforts of a small group of local producers and agency representatives.

The Cows and Fish Program, described fully in Chapter 3, was a response to growing public concern in Alberta about the environmental impacts of cattle grazing, which placed the province's cattle industry under scrutiny. The industry is a significant factor in the Alberta economy today, accounting for over $3 billion in agricultural cash receipts annually, or about 45% of total agricultural cash income. There are just over five million head of beef cattle in the province, managed by about 35,000 producers (Alberta Cattle Commission, 2001).

In 1992, the Alberta Cattle Commission, the advocacy organization for the province's cattle producers, responded to public concern by petitioning an independent environmental risk assessment for the industry. The objectives of the assessment were to identify areas in which the industry was vulnerable to potential legislative regulation, to determine how well the industry was performing in terms of environmental well-being and to recommend actions the industry could take to address environmental issues (Serecon Management Consultants Inc., 1992). Grazing management, water quality and wildlife habitat were identified as the priority environmental issues to be examined. The report acknowledged that past grazing management of rangeland and riparian landscapes had negatively affected these ecosystems, particularly with respect to water quality, and that it was appropriate for the industry to actively promote more sustainable grazing management. The 1992 report recommended extensive, improved research as well as education efforts to help both producers and non-producers develop greater understanding of range and riparian ecosystems, including explaining reasons for landscape deterioration, the relationship between grazing and wildlife, and the relationship between grazing and water (Fitch, 2000; Glaser, 2000, personal communication; Serecon Management Consultants Inc., 1992).

An ecosystem is a dynamic community of organisms that act interdependently with each other and functions in such a way that the system maintains ecological balance and diversity unless subjected to severe external stress (Draper, 1998; Miller, 2000). Riparian ecosystems make up the interface between aquatic zones (including lakes, ponds, rivers, streams and wetlands) and higher terrestrial areas (uplands), providing a functional link between uplands and lower elevations. Water is the fundamental characteristic of a riparian ecosystem. A healthy riparian ecosystem serves a number of ecological functions. Landscape equilibrium is maintained by regulation of stream

stability and energy, thereby maintaining water quality and quantity and, accordingly, meeting an essential human need. Riparian ecosystems represent less than 5% of the landscape, but play a fundamental role in maintaining biodiversity by promoting forage and non-forage vegetation as well as fish, bird and wildlife habitat (Allan, 1995; Hansen et al., 1995; Ohmart, 1996; Meehan and Platts, 1978). Healthy riparian ecosystems offer cool, uncontaminated water as well as areas of deeper pools and escape cover required for maintenance of fish populations. Habitat is provided by the vegetation structure and shelter in riparian ecosystems, promoting species richness, biodiversity, number of rare species, number of breeding pairs and biomass. In Alberta, it is estimated that about 80% of wildlife utilize riparian ecosystems for all or part of their lifecycles (Fitch, 1998).

Abundant and nutritious vegetation, combined with cooler and moister conditions than are available in surrounding uplands, attract cattle and other livestock to riparian ecosystems. These features tend to cause animals to loiter and cause damage in riparian ecosystems unless managed actively (Ohmart, 1996). Managing for healthy riparian ecosystems is important, therefore, to those whose livelihoods depend upon livestock production, to those who assign recreational or aesthetic values to rangeland and riparian landscapes, and to the downstream public who depend on a clean, reliable water source (Fitch, 2000).

1.2 Program Rationale and Evaluation Research Context

The Cows and Fish Program provides awareness programming to assist cattle producers to manage for healthy riparian ecosystems. Programming content takes a broad landscape approach, emphasizing the ecological functions of riparian ecosystems

and their relationship to landscape disturbances such as grazing. Programming also addresses grazing management strategies that are suitable for riparian ecosystems (Fitch, 2000). Grazing management is broadly defined as the manipulation of grazing to achieve a desired result (Kothmann, 1974). The area within a riparian ecosystem that is identified for management efforts is usually referred to as the riparian zone (Hansen et al., 1995). At the time this evaluation commenced, Cows and Fish programming had focused on lotic riparian zones. Unlike lentic riparian zones that include lake systems, lotic riparian zones feature ephemeral or perennial flowing water. They are generally delineated by a channel and floodplain, and include rivers, streams and other drainageways such as springs and seeps, as well as their associated ponds (Fitch and Adams, 1998a; Hansen et al., 1995).

The goal of the Cows and Fish Program evaluation was to assess the efficacy of the rationale underlying the program design and delivery. The program's rationale is that providing appropriate and relevant information about riparian ecology and options for riparian grazing management will assist a cattle producer to:

(a) increase his or her ecological awareness by developing knowledge about riparian ecology; and

(b) as a consequence, change his or her riparian grazing management, the change being signified by the producer using any of a variety of sustainable riparian grazing management strategies, defined in Chapter 3 (Fitch, 1999, personal communication; Fitch, 2000).

The process of developing ecological knowledge leading to sustainable riparian grazing management is referred to within the program as the development of ecological literacy

(Fitch, 1999, personal communication, Fitch, 2000). Several programming tools, including brochures, workshops and field training, have been used by program representatives in a variety of settings to help producers develop ecological literacy. The Cows and Fish Program, the process of developing ecological literacy and the programming tools are described fully in Chapter 3.

The process of developing ecological literacy is based on two assumptions. First, the design (including specific content messages) and delivery of the programming tools is assumed to result in building the producer's knowledge about riparian ecology. Second, a change in behaviour occurs, assumed to be indicative of an attitude change. The behaviour is manifest in the producer then using any one of a number of sustainable riparian grazing management strategies. These two assumptions framed this evaluation of the program's effectiveness.

An investigation into whether the riparian grazing management strategies suggested by the Cows and Fish Program are ecologically or economically sustainable lies outside the scope of this research. However, it is important to note that the Cows and Fish Program design and delivery is itself framed by the tenets of sustainable resource management. Sustainable resource management is that which meets human needs without compromising the health of ecosystems (Callicott and Mumford, 1997) or, more generally, permits resources to be maintained indefinitely while protecting ecological, economic and societal concerns. The societal aspect of sustainable resource management is achieved only when individuals and groups from a community, who have common interests, occupations and responsibilities, are involved actively in information exchange and decision-making relevant to resource management at the local scale

(Brand, 1993; Dyson, 1996; Lee, 1992; Selman, 1996; World Commission on Environment and Development, 1987).

Accordingly, from a design and delivery perspective, the Cows and Fish Program was structured to be a community-based process, implemented in a community only when requested by interested members of that community. Participation is voluntary and direction of program activities is guided by decisions made locally by community members, community being defined by the participants themselves. Moreover, the grazing management strategies communicated by the program, such as rotational grazing systems, have been identified by cattle producers rather than program or government agency representatives, on the basis that these producers are experienced and knowledgeable, and that the strategies meet the sustainability needs of individual cattle operations and their associated landscapes (Fitch, 1999, personal communication; Fitch, 2000). This bottom-up determination of landscape management practices is fundamental to the Cows and Fish Program.

From a program operational perspective, sustainable resource management also dictates that on-going monitoring and modification is required of resource management efforts such as awareness programming, to ensure that local, regional and global needs continue to be met (Archibugi, 1989; Rees, 1990; World Commission on Environment and Development, 1987). It is here that program evaluation research has a role to play.

The sustainability paradigm, therefore, provided a backdrop for the request by Cows and Fish Program representatives for an evaluation research study examining the program's effectiveness in increasing ecological knowledge, changing attitudes and promoting the use of sustainable riparian grazing management strategies by cattle producers. In the

current era of competitive funding, the financial and technical resources that continue to be invested in programming tools provided another reason to conduct a program evaluation. Evaluation research was seen by program representatives as a necessary and practical aspect of program management, one intended to identify whether the program has had the maximum beneficial impact in those communities expressing interest in addressing their riparian zone management issues.

The Cows and Fish Program evaluation was designed to address the applied management needs of the program representatives, whose goal has been to work toward program improvement, by examining the impact of the design and delivery of the programming tools used to share information with cattle producers. This spoke to the first assumption of the process of developing ecological literacy. A qualitative approach was well suited to this aspect of the evaluation. Such an approach is closely associated with the pragmatic and interpretivist paradigms of program evaluation, described in the next section of this chapter, which arose as a response to the failure of traditional experimental research designs to explain program effectiveness (Greene, 1998; Mertens, 1998). Qualitative methodology provides descriptive, contextual meaning about a phenomenon, in this case how and why change has occurred or not occurred with exposure to the Cows and Fish programming tools: meaning is arrived at through a natural (Rog, 1994), rather than experimental (Cook and Campbell, 1979), setting in which the researcher actively interacts with program participants. Natural experiments are described more fully in the next section of this chapter.

Qualitative research methods allow for the analysis of complex data drawn from personal experience of program participants and provide a depth of nuance and interpretation necessary to arrive, through the process of induction, at a reasonable

explanation about what has occurred as a result of program participation. In this evaluation, qualitative research methods were used so that program participants could construct and communicate their perspectives about programming tool effectiveness, doing so candidly and independently of expectations imposed by program representatives (Babbie, 1995; Creswell, 1994; Firestone, 1987; Judd et al., 1991; Patton, 1987; Patton, 1997; Shadish, 1995; Strauss, 1987).

The evaluation also examined the second assumption underlying the process of developing ecological literacy, namely the relationship between attitudes, including knowledge, and action. Numerous studies have examined environmental or ecological attitudes, variously defined and promoted by different types of educational interventions, in an attempt to explain awareness or action on environmental or ecological issues (for example, Lisowski and Disinger, 1991; Marynowski and Jacobson, 1999). A common theme in this literature, however, is that while attitudes may have shifted about the issue of concern under investigation, the studies fall short of predicting or even examining related action, i.e. behaviour change (Zelezny, 1999).

Generally and within the Cows and Fish Program, action is a more meaningful indication of success of programming efforts than is attitude or attitude change alone. The apparent gap in explaining program effectiveness may, therefore, represent a fundamental flaw in the design assumptions relating to those programs. The lack of success in explaining desired ecological behaviour(s) as a result of knowledge increase and/or attitude change resulting from programming interventions poses a serious question for any program whose stated goal is behaviour change, and whose operational philosophy is grounded in sustainability.

In an attempt to address the second assumption of the process of developing ecological literacy, this evaluation investigated the attitude-behaviour relationship. For this purpose, a decision theory was borrowed from the field of social psychology, the purview of the conceptual study of attitudes and behaviour. The Theory of Planned Behaviour (Ajzen, 1991; Fishbein and Ajzen, 1975), described in Chapter 2, provided a conceptual framework for this phase of the evaluation.

The Theory of Planned Behaviour suggests that an individual's decision to undertake a particular behaviour reflects the individual's motivation, a psychological construct referred to as intention (Ajzen, 1991; Eagly and Chaiken, 1993). Behaviour is mediated fully by intention which is different from but depends on (a) distinct elements of an individual's attitude; (b) certain social influences, referred to as Subjective Norms; and (c) an individual's control over or access to skills and resources, referred to as Perceived Behavioural Control (Ajzen, 1991). Attitude itself comprises both Affect, or emotion, and Cognition, comprising knowledge, information and beliefs.

Table 1.1 illustrates the partial parallel between the elements of the Theory of Planned Behaviour and the process of developing ecological literacy in the Cows and Fish Program.

Table 1.1
Parallels in the Theory of Planned Behaviour and the Process of Developing Ecological Literacy

ELEMENTS OF THE THEORY OF PLANNED BEHAVIOUR	COWS AND FISH PROCESS OF DEVELOPING ECOLOGICAL LITERACY
Cognition	Building Ecological Knowledge
Affect, Subjective Norm, Perceived Behavioural Control	*(see below)*
Intention	Decision to Act/Change
Undertaking Behaviour	Applying Ecological Knowledge

The element of Cognition in the theory was of interest because it provided a mechanism by which to test knowledge about specific ecological concepts covered in programming tools. As indicated in column 2 of the table, the rationale of building ecological literacy in programming delivery, i.e. building and applying knowledge, was not seen at the beginning of this evaluation to have any clearly defined relationship to the theory elements of Affect, Subjective Norm and Perceived Behavioural Control. Rather, it was anticipated that using the theory as a conceptual framework for examining and articulating any role played by these theory elements as potential influences on program effectiveness and, hence, the efficacy of the rationale, would inform program improvement.

While never used to examine sustainable resource management behaviours, the Theory of Planned Behaviour has been used successfully to explain a number of behaviours, primarily in the field of human health promotion, including cancer prevention actions (Van Ryn et al., 1996) and weight loss (Schifter and Ajzen, 1985). Its use here represents one of the intended contributions of this study.

1.3 Introducing Program Evaluation Research

Program evaluation research is an appropriate methodological framework for examining program effectiveness because it explores the correspondence between actual and anticipated results. Program evaluation is defined as:

> the use of social research procedures to systematically investigate the effectiveness of social intervention programs, ... is adapted to their political and organizational environments, and designed to inform social action in ways that improve social conditions (Rossi et al., 1999: 20).

Program evaluation assesses systematically a program's worth or quality; identifies a reasonable estimation of truth about what is occurring within the program; and assists program representatives (and/or related stakeholders/policy-makers) to identify options and make decisions about improving that program (Rossi et al., 1999). Evaluation most often occurs in public settings of multiple stakeholders whose concerns and interests frame the evaluation process and where the goal is to provide practical knowledge, rather than making abstract or theoretical claims (Chelimsky, 1997; Greene, 1998). When an evaluation such as this one is undertaken with the end goal of program improvement, the evaluation is typed as formative. Central to formative evaluation is the applied use of results in moving toward that improvement. This type of evaluation is fundamentally distinct from summative evaluation, whose purpose is to arrive at a decision to continue or discontinue an established program (Scriven, 1991).

Evaluation is further characterized by assessment. Assessment requires the evaluator to use judgment to arrive at "justified value judgments about the merit or worth of [a] program" (Greene, 1998: 374). This element of assessment distinguishes evaluation from other types of research (Joint Committee on Standards for Educational Evaluation, 1994; Rossi et al., 1999; Weiss, 1972) which often claim to be entirely objective in nature (Babbie, 1995; Judd et al., 1991). Evaluation employs and relies upon a broad range of social science methodologies that govern both quantitative and qualitative research in order to appropriately address the variety of potential evaluation questions.

Evaluation research has developed and evolved through a number of methodological genres (Greene, 1998; Guba and Lincoln, 1989), described below.

(a) Post-positivist. A measurement-oriented form, focusing on theoretical, causal-model quantitative studies, where the evaluation question is: *Are outcomes attributable to the program?*

(b) Pragmatist. A management-oriented form involving description and judgment, focused on practicality and utility, in which the research design may be qualitative, quantitative, or both, and where the evaluation questions are: *Which parts of the program are working and which need improvement, in relation to program goals?*

(c) Interpretivist. A judgment-oriented form focusing on understanding program impact, using qualitative research designs, where the evaluation question is: *How is the program experienced by participants?*

(d) Constructivist. Also termed critical-normative or fourth-generation. A form extending from the interpretivist form, used in limited settings, that is devoted to ensuring emancipation for society's powerless, in which the form and the questions of the evaluation are determined by participants, arising from direct interaction with the evaluator. The evaluation question is: *How is the program serving to resolve inequities in society?*

The Cows and Fish Program evaluation incorporated elements of all the genres except the constructivist in order to address the research questions set out in later in this chapter. The research design is described more fully in the next section of this chapter.

The application of a structured program evaluation research framework to any type of broad resource-based ecological programming is recent (Penrose, 1996 and Tamblyn, 1996, as cited in Feick, 2000: 3; Grumbine, 1996 as cited in Feick, 2000: 12). Two examples of resource management programming evaluation studies are described in

this document. The first example is a theory-driven (Chen and Rossi, 1989) formative evaluation of Landcare, an Australian program that comprises over 2,200 farmer and conservation groups concerned with managing for improvement on agricultural lands that have become degraded in that country (Curtis, 1995). The second example is an exploratory, formative evaluation that used a mixed-method research design to examine decision-making in the implementation of ecosystem management in mountain regions (Feick, 2000). These studies and the methodological approaches to program evaluation research, including theory-driven and mixed-method designs, are described in Chapter 2.

As noted above, the Theory of Planned Behaviour has been used primarily in research investigating behaviours associated with the promotion of human health. In undertaking this research, no studies were found that employ the Theory of Planned Behaviour to explain links between design and delivery of programming, knowledge development, and attitudes and behaviour relating to comprehensive resource management programming such as that provided by the Cows and Fish Program.

1.4 Evaluation Research Objectives and Design

The Cows and Fish Program evaluation provided several research opportunities. The research objectives of this study were to provide:

(1) the application of a structured program evaluation research framework in the field of resource management, including the development of an evaluation research protocol, specific to the needs of the Cows and Fish Program, but one that can be potentially applied to other, similar programs;

(2) an examination of the design and delivery of programming tools to assess their effectiveness in meeting programming goals related to the process of developing ecological literacy, and to provide recommendations regarding improvement of programming tools, if and where indicated; and

(3) the use of a conceptual framework to examine the efficacy of the attitude-behaviour relationship assumed in the process of developing ecological literacy, with particular reference to the impact of programming tools on the Cognition element of attitude.

Further, it was intended that the study would assist program representatives working in the field of resource management generally:

(a) to see the process and value associated with program evaluation pertaining to sustainable resource management programs, specifically riparian grazing management programs, as an integral aspect of sustainable resource management;

(b) to gain a greater understanding of the manner in which community members are affected by and respond to community-based programming tools designed to develop ecological literacy, including building ecological knowledge and using sustainable riparian grazing management strategies; and

(c) to assess the efficacy of the attitude-behaviour relationship, examined through the elements of the Theory of Planned Behaviour, to determine whether that relationship is related to, or forms an appropriate basis for, program design and delivery.

Research questions pertaining to these objectives are set out in the next section of this chapter. With regard to objective (1), program evaluation research is described in the review of literature that forms Chapter 2. The evaluation research protocol followed to carry out objective (1), in particular the steps followed to ensure quality control in implementing the evaluation, is described throughout this document and summarized in Chapter 8.

With regard to objective (2), the Cows and Fish Program evaluation employed a qualitative research design using a focus group technique. Due to its experiential nature, a qualitative research design addresses the applied, process-oriented information requirements of formative evaluation research. It also provides the depth of detail necessary to explain how and why individual programming tools have or have not had the desired effect (Patton, 1989; Patton, 1997; Shadish, 1995; Strauss, 1987). Methods and findings are described in Chapters 4 and 5.

With regard to objective (3), a quantitative research design incorporating a structured interview instrument was used to explore linkages between the use of riparian management strategies recommended by the Cows and Fish Program and the Theory of Planned Behaviour. Methods and findings are described in Chapters 6 and 7. The quantitative phase of this evaluation involved several methodological limitations that reduced the design's contribution to evaluating program effectiveness and assisting in program improvement. These limitations arose because the program being evaluated was already underway in the public domain, precluding use of a true experimental research design that requires random selection of study participants as well as their random assignment into intervention and control groups, and which are intended to provide a good basis for making valid causal inferences about outcomes arising from an

intervention. A quasi-experimental research design was also precluded because it requires at least a post-intervention non-random comparison group (Campbell and Stanley, 1966; Cook and Campbell, 1979; Rog, 1994). Experimental and quasi-experimental research designs are described in greater detail in Chapter 6.

Accordingly, the Cows and Fish Program evaluation research adopted a natural experiment framework (Rog, 1994). Natural experiments are warranted when, as in the case of this research, the program being evaluated is already underway and the researcher does not have control over who has and who has not received the programming intervention, both before and after the intervention. The assumptions of random participation and distinct comparative groups required in experimental and quasi-experimental designs could not be met.

Natural experiments require the use of supplemental strategies to bolster the limitations arising from the nature of the program under study, keeping in mind the questions that are useful, feasible and necessary to answer in the evaluation research. The researcher must use a methodology that matches the purpose and nature of the program and evaluation (Chelimsky, 1997) and incorporate techniques that, to the extent possible, offer explanation about the phenomena observed in the research (Cordray, 1986 as cited in Rog, 1994: 121). These include attempting to identify the different patterns or levels of exposure that participants have had to programming, as well as other potential sources of influence on change (Rog, 1994). Suitable techniques appropriate for natural experiments include interviews (Miller, 1994) and focus groups (Dean, 1994).

Another reason to employ two separate research designs, implemented as two distinct phases of this research, was the inherently discrete lines of enquiry (Creswell, 1994)

which objectives (2) and (3) reflect. In examining the use and value of mixed research designs, Greene et al. (1989) reviewed 57 evaluation studies and identified several purposes and advantages of using research designs that incorporate both qualitative and quantitative methods. These include complementarity, in which overlapping or different facets of a phenomenon emerge, and expansion, in which the two methods add scope and breadth to a study. The use of separate research designs within a natural experiment framework was chosen to strengthen the Cows and Fish Program evaluation.

Based on the findings of Greene et al., Creswell (1994) examined studies employing mixed research designs and advanced three models suitable to their use, where the choice of model depends on the nature and goals of the research questions. The suggested models were:

(a) a two-phase model in which the qualitative and quantitative methods are used in distinct phases of the research to provide greater thoroughness in examining the research questions from different perspectives, as is the case in the Cows and Fish evaluation research study;

(b) a dominant-less dominant model in which one method takes precedence over the other; and

(c) a mixed-method model, a complex approach in which the two methods are mixed at all, or almost all, of the methodological stages of the research (Creswell, 1994).

Creswell recommended that the two-phase model described in (a) above, such as that used in the Cows and Fish Program evaluation, should present results following the

example of Kushman (1992, as cited in Creswell, 1994: 185). Accordingly, the Cows and Fish Program evaluation research presentation follows Kushman's four-part framework, summarized as follows:

(a) the introduction is presented in a combined manner, focusing on the background and purpose of the study;

(b) the introduction is followed by one section combining a review of literature relating to all aspects of the research;

(c) the review of literature is followed by one section containing a detailed description of the program; and

(d) the program description is followed by separate chapters describing the methods and findings for each of the qualitative and quantitative research designs.

The Cows and Fish Program evaluation research was intended to provide an understanding of how producers have responded to programming related to the landscapes they manage. This understanding is the goal of evaluation, providing a basis from which decisions can be applied by program representatives to make programming as effective as possible.

1.5 Research Questions

This evaluation research sought to answer the questions set out below for each of the qualitative and quantitative phases. Data design and collection procedures took place concurrently, with the qualitative phase occurring in the fall and winter months of 1999 and the quantitative phase occurring between July, 1999 and January, 2000.

Phase 1 - Qualitative

(1.1) What characteristics of the design and delivery of programming tools promote or impede ecological literacy, and how do they promote or impede ecological literacy?

(1.2) How do the impacts of the tools compare to the objectives identified by program representatives for those tools?

(1.3) What improvements, if any, are recommended to enhance the effectiveness of the tools?

Phase 2 - Quantitative

(2.1) Does exposure of cattle producers to programming tools contribute to ecological literacy, as evidenced by:

(a) their knowledge of key riparian ecology concepts; and

(b) their application of riparian awareness, a behaviour evidenced by:

(i) use of any of five sustainable riparian grazing systems; and

(ii) use of any of eight sustainable riparian grazing techniques, including one monitoring technique?

(2.2) Do attitudes, Subjective Norm and Perceived Behavioural Control, the antecedent elements to intention to undertake behaviour within the Theory of Planned Behaviour, explain:

(a) the application of riparian awareness by cattle producers, a behaviour evidenced by use of any of five sustainable riparian grazing systems?

1.6 Study Area

The study area for the Cows and Fish Program evaluation research is illustrated in the map shown in Figure 1.1. The study area represents that part of the province in which producers first expressed interest in developing riparian awareness: efforts that evolved into the Cows and Fish Program, and the area in which programming efforts were focussed in the years leading up to the evaluation. The study area for the quantitative research phase comprised the portion of southwestern Alberta in which the Cows and Fish Program was most active during the period 1992-1999.

The study area lies at the western boundary of the Grasslands biome of the northern Great Plains, bordering on the lower ranges of the eastern front of the Rocky Mountains. Drainage occurs to the Arctic Ocean through the Bow and Oldman Rivers via the South Saskatchewan River. The area's climate is sub-humid to semi-arid (Strong and Leggat, 1981) and encompasses a variety of landscape and productive vegetation types that have made grazing an integral feature of the area, both prehistorically by bison and in the present day by livestock (Epp, 1994). The western portion of the study area incorporates the Subalpine and Montane subregions of the Rocky Mountain natural region as well as the Lower Foothills subregion of the Foothills natural region, while the eastern portion incorporates the Foothills Fescue and Mixed Grass subregions of the Grassland natural region (Alberta Natural Heritage Information Centre, 1999).

Within the Rocky Mountain natural region, the Subalpine subregion is characterized by lodgepole pine and Engelmann spruce forests at lower elevations and spruce-fir forests at higher elevations. Elevations range from about 1,350 m to 2,000 m. Mean annual precipitation ranges from 460 mm to 1,400 mm; brunosolic and luvisolic soils are most

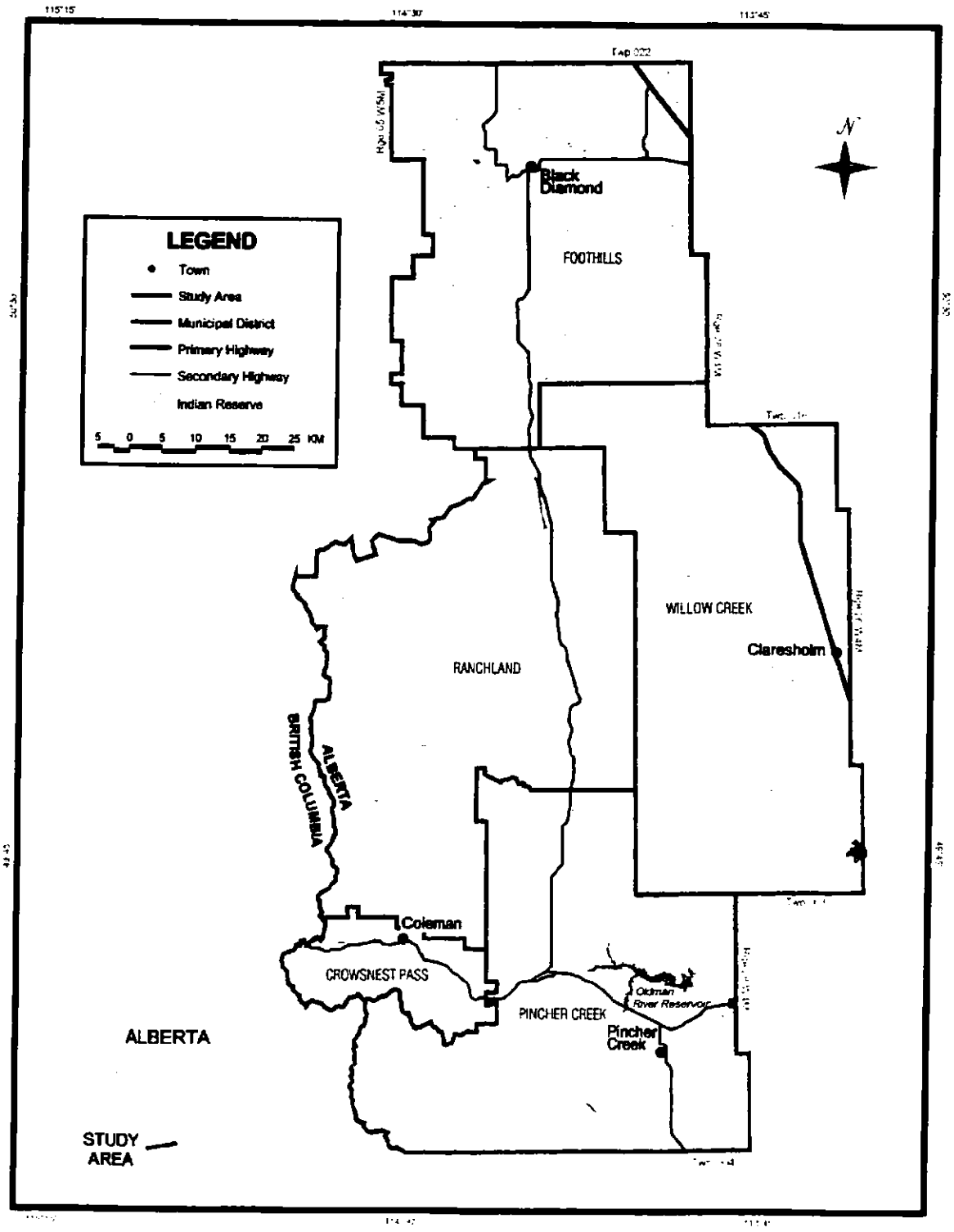


Figure 1.1
Study Area

Prepared by N. Bateman and D. Sheppard, 2001. Data source: Iunctus Geomatics Corp., Lethbridge, Alberta.

common. The Montane subregion, in which elevations range to as high as 1,600 m, is characterized by average annual precipitation of about 600 mm; soils include chernozemic, brunisolic and regosolic types. The landscape is characterized by grasslands of wheat, oat and fescue grasses, together with open forests of Douglas fir, limber pine and white spruce. Here, Chinook winds result in intermittently snow-free winters. The Lower Foothills subregion has less mean annual precipitation, about 465 mm, concentrated in the summer months. Vegetation is transitional, including white and black spruce, lodgepole pine, balsam fir and aspen; associated soils include luvisolic, brunosolic and gleyed luvisols. The subregion occurs on rolling topography of deformed bedrock and fluvial and glaciofluvial deposits. The Grassland natural region is quite distinct from the higher elevation subregions to its west. Chinook winds are frequent; winters are mild. In the Foothills Fescue subregion, found primarily on morainal, glaciolacustrine and outwash deposits, the mean annual precipitation ranges from 500 mm to 650 mm. Fescue and oat grasses, high in forage value, predominate on dark brown and black chernozem soils. The Mixedgrass subregion is characterized by ground and hummocky moraines as well as glaciolacustrine plains and lacustrine deposits. This subregion is noted for the presence of narrow-leaved cottonwood trees and the abundance of biomass production provided by species such as spear grass, porcupine grass and a variety of wheat grasses. Dark brown chernozem soils predominate (Alberta Natural Heritage Information Centre, 1999; Strong and Leggat, 1981).

The study area was bounded by Township 22 on the north; Township 4 on the south; Range 5 W5M and the Alberta-British Columbia provincial border on the west; and Range 28 W4M on the east, except between Townships 8 and 16 where it was Range 26 W4M. Within these boundaries, lands denoted as Indian Reserve were excluded

from the study because they are generally managed on a collective basis rather than by individual decision-makers. For purposes of random sampling to determine participants in the quantitative phase of the evaluation, described in Chapter 6, strict adherence to the legal land description boundaries of the study area illustrated in Figure 1.1 was maintained.

In the qualitative research phase, which incorporated distinct goals and research questions that were less dependent on the location of residence of focus group participants than the quantitative phase, the map represents the primary area from which participants were drawn. Selection procedures for participants in this research phase, and their minor variation from the boundaries indicated in this map, are explained in Chapter 4.

2. REVIEW OF LITERATURE

2.1 Introduction

Chapter 2 provides a review of literature relevant to the Cows and Fish Program evaluation research. Its purpose is to share the results of research dealing with questions and theories similar to those addressed in this study, to place this study within the discipline of program evaluation research, and to identify its contribution to resource management programming. The review of literature addresses several topics. First, while riparian ecosystem health itself is not the focus of this evaluation, the ecological factors on which the Cows and Fish Program attempts to achieve landscape management change are relevant. This evaluation asked specific questions of program participants concerning both ecological function and management responses that affect riparian health. Knowledge and action, reflecting human interaction with riparian ecosystems, are central variables in these questions. Therefore, geographical context is provided by means of a brief outline of riparian ecology, including factors contributing to riparian degradation, to illustrate the manner in which humans interact with and can damage the health of riparian ecosystems.

Second, literature pertaining to programming dealing with the development of knowledge and attitudes, in particular with regard to behaviour, is summarized. Lack of clarity in these studies in terms of the use of the concept of attitude is suggested. Third, the Theory of Planned Behaviour, which formalizes the concept of attitude in relation to behaviour, is defined, and attitude-behaviour measurement is described. Examples are provided of studies that have used the Theory of Planned Behaviour to test a variety of behaviours. As indicated in Chapter 1, no studies were found that employed this theory

to test attitudes and behaviours associated with resource management programs or their evaluation. Fourth, the chapter describes the evolution and methodological approaches of program evaluation research in order to place the Cows and Fish Program evaluation research and its goals in context. Also identified are the standards of program evaluation research, which frame the process of selecting and conducting all evaluation research studies and for analyzing their data. Last, two program evaluation studies in the field of resource management are described, providing a segue to the Cows and Fish Program evaluation research methodology described in subsequent chapters.

2.2 Factors Contributing to Riparian Ecosystem Decline

The health of a riparian ecosystem is determined by its ecological functions (Bureau of Land Management, 1993, as cited in Ohmart, 1996: 247). The proper functioning conditions of a riparian ecosystem are:

> ... adequate vegetation, landform, or large woody debris [is] present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian [wetland] areas is a result of interaction among geology, soil, water, and vegetation (Bureau of Land Management, 1993, as cited in Ohmart, 1996: 247).

Humans interact with riparian ecosystems in numerous ways, relying on them for water, food, shelter, agriculture, resource production, recreation and aesthetic purposes (Fitch, 2000). That interaction, however, has at times contributed to significant declines in

ecological function (Ohmart, 1996). Management of domestic cattle is one form of disturbance that affects the quality of function within riparian ecosystems. Before settlement occurred in western North America, wild ungulates (hoofed animals such as bison and elk) grazed compatibly within the landscape's carrying capacity (Epp, 1994). Whenever forage productivity declined at a site as a result of this disturbance, or due to climate variation, the animals migrated or adjusted their herd size through mortality. The region's grass and grass-like vegetation evolved to co-exist in a balanced, interdependent relationship with both grazing and the site characteristics (Meehan and Platts, 1978; Platts, 1991; Skovlin, 1984; Willoughby, 1992). With the onset of commercial livestock production, where herd sizes often surpassed carrying capacity and where animals were confined by fencing, the equilibrium maintained previously between grazing disturbance and ecosystem diversity was thrown out of balance. The tendency of cattle to loiter in riparian zones placed additional stress on these areas.

Under proper management, grazing is both compatible with and necessary for maintaining range and riparian zone health and diversity. Managed grazing can mimic the overall moderate grazing level of the wild ungulates of the past which placed a tolerable degree of stress on site vegetation (Ohmart, 1996; Willoughby, 1992). Stress refers to plant defoliation, which is determined by selectivity (preference for palatable species), seasonality (susceptibility during growth cycles), intensity (degree of herbage removal and amount left for next year's growth), and frequency (interval and number of times a plant is grazed) (Heady, 1975).

Grazing stress in relation to plant species diversity is illustrated in Figure 2.1. The gradient stress curve indicates that the highest degree of diversity occurs on moderately grazed sites (point B), when the number of desirable competitive species associations

dominate a site, but exist in balance with non-desirable resistant (including non-native and weed) species associations. Diversity declines on ungrazed sites (point A) as competitive species decline. The lowest degree of diversity occurs on overgrazed sites (points C and D) which are dominated by a small number of resistant species (Willoughby, 1992). These fundamentals provide the foundation on which Cows and Fish Program riparian grazing management strategies are built. These strategies are described in Chapter 3.

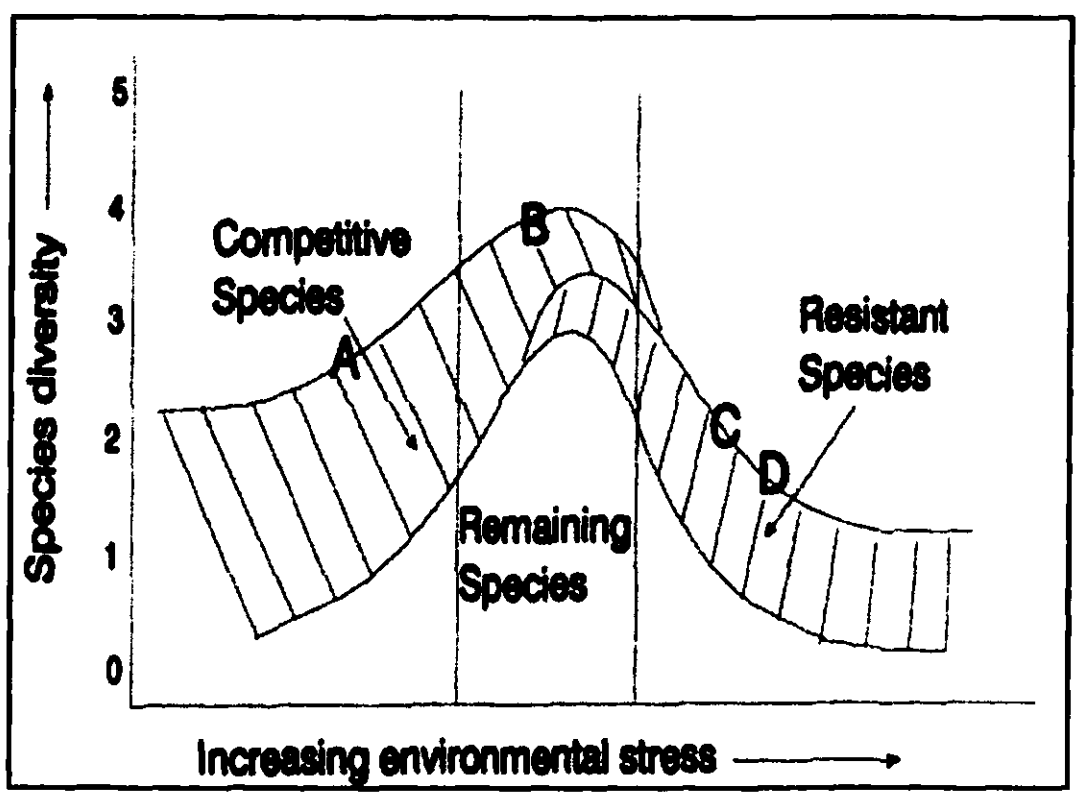


Figure 2.1
Effect of Grazing Stress on Species Diversity

Source: Michael Willoughby. 1992. Species Diversity and How It is Affected by Livestock Grazing in Alberta. Range Notes (13), Publication No. T/107. Edmonton, Alberta: Alberta Forestry, Lands and Wildlife-Public Lands Division, Figure 1.

The negative effects of intense cattle grazing on riparian ecosystems and the implications for management began to be recognized in the 1970s. Meehan and Platts (1978) identified the potential negative effects of cattle grazing, outlining several potential impacts to both the terrestrial and aquatic systems, and suggested that lack of understanding about the interconnectivity of these systems had contributed to riparian decline throughout much of the 20th century. The ecological impacts they suggested might be associated with cattle grazing were:

(a) shearing, trampling and compacting of soil, leading to a reduction or elimination of high quality forage provided by deep-rooted native plants, and their replacement by shallow-rooted, less nutritious and less vigorous plants, or weeds;

(b) declining deep water infiltration as a result of root-mass loss, leading to an increase in surface runoff volume and velocity, and a decrease in groundwater storage;

(c) accelerated water erosion, often compounded by wind, manifested by higher peak flows (the accelerated maximum flow resulting from precipitation and flood events), causing soil loss, increased bank angle, and wider, shallower, warmer streams;

(d) loss of fish and wildlife habitat provided by brush, debris and overhanging bank vegetation;

(e) greater sediment loads in water, reducing water quality generally and, more specifically, eliminating habitat, especially for fish populations; and

(f) bacterial contamination, reducing water quality for all users.

Extensive study of the relationships between grazing and riparian health followed the recognition of these problems. Results confirmed that improper grazing had, indeed, led to a series of inter-related impacts on riparian ecosystems. Kauffman and Krueger (1984) and Skovlin (1984) reviewed and summarized the research findings, confirming declines in:

(a) water quality, caused by fecal contamination and sediment loads;

(b) water temperature regimes, affecting fish and insect populations;

(c) streambank stability, leading to bank cutting due to sloughing, caused by trampling and removal of vegetation, resulting in loss of fish habitat;

(d) avian habitat and food, due to loss of nesting sites and diversity caused by removal of plant cover as cattle congregate along streambanks; and

(e) small mammal, waterfowl and ungulate habitat, due to loss of vegetation types and/or structural variability in vegetation.

A fundamental aspect of these interactions is the inverse relationship between streambank vegetation and stream velocity. Chow (1959, as cited in Ohmart, 1996: 249) determined that, when resistance against stream flow is doubled by the presence of deep-rooted vegetation, stream velocity is halved. Accordingly, floodwaters are more likely to be dissipated and stored across the floodplain. Further, the erosive force of water is proportional to the third power of velocity. Therefore, in a case where vegetated banks reduce water velocity by a factor of, say, five, the water's erosive power is reduced by a factor of 125 (Ohmart, 1996). From a grazing management perspective, an improperly grazed riparian zone has the potential to unleash significant erosive power.

Field studies conducted on rangeland in the northwestern United States in the 1980s indicated that riparian zones had reached severe levels of degradation as a result of grazing practices and that these sites required extensive remedial management (Chaney et al., 1990; United States General Accounting Office, 1988, as cited in National Research Council, 1994: 25). The small areal extent of riparian zones, the lack of management strategies to incorporate them into upland grazing management, and a lack of understanding of their ecology, are factors that contributed to riparian zones being treated as sacrifice areas -- places in which no active management was applied (Ohmart, 1996; Thompson, 2000, personal communication).

The lotic riparian health assessment is a standardized technique (described in greater detail in Chapter 3) used for measuring and monitoring a riparian zone's ecological functions, such as bank condition and vegetation structure (Riparian and Wetland Research Program, 2000b). The assessment identifies a riparian zone health score and classes the zone into one of three categories: healthy (all ecological functions are retained); healthy but with problems (ecological functions are impaired to some degree); and unhealthy (most or all ecological functions are absent or impaired). Results of lotic health assessments conducted in recent years in several regions of Alberta and Saskatchewan, as well as in the northwestern United States, are summarized in Table 2.1. These data suggest that the decline of riparian health in Alberta is not an isolated situation: the Alberta statistics bear striking resemblance to the riparian health situation in both Saskatchewan and the northern United States.

Table 2.1
Lotic Riparian Health Assessment Classification Summary

LOCATION	APPROX. LOTIC RIPARIAN AREA COVERED	% HEALTHY-	% HEALTHY BUT WITH PROBLEMS	% UNHEALTHY
Southern Alberta	500 reaches	17	44	39
Southern Saskatchewan	485 reaches	17	46	37
Idaho	1,200 km	31	42	27
Montana	4,200 km	33	45	22

Sources: Bill Bristol. 2000. Personal communication. Prairie Farm Rehabilitation Administration; Lorne Fitch. 2000. Personal communication. Alberta Riparian Habitat Management Program; Riparian and Wetland Research Program. 2000a. Bureau of Land Management Riparian and Wetland Databases, University of Montana.

The Saskatchewan Wetland Conservation Corporation delivers programming modeled on the Cows and Fish Program in that province. Although other disturbance factors are acknowledged by that organization as contributing to riparian ecosystem decline in Saskatchewan, programming focuses on grazing impacts and efforts to promote sustainable riparian grazing management strategies. Concern by cattle producers to operate in economically and ecologically suitable ways has led to strong support for the Saskatchewan programming, evidenced by over-subscriptions for attendance at workshops and related program activities (Bristol, 2000, personal communication). In Idaho and Montana, however, no community-based programming has yet been established because of long-standing polarization and mistrust among stakeholders, including cattle producers, government agencies and environmentalists (Thompson, 2000, personal communication).

Humans also affect riparian ecosystems through activities associated with resource extraction and recreation as well as by infrastructure associated with urbanization and irrigation. Only an outline of the literature is provided here, reflecting the nature of Cows and Fish programming itself, which has attempted to include similar information in its

awareness activities to a small extent in order to illustrate that no one group of people or type of activity is responsible for the health and management of Alberta's riparian zones.

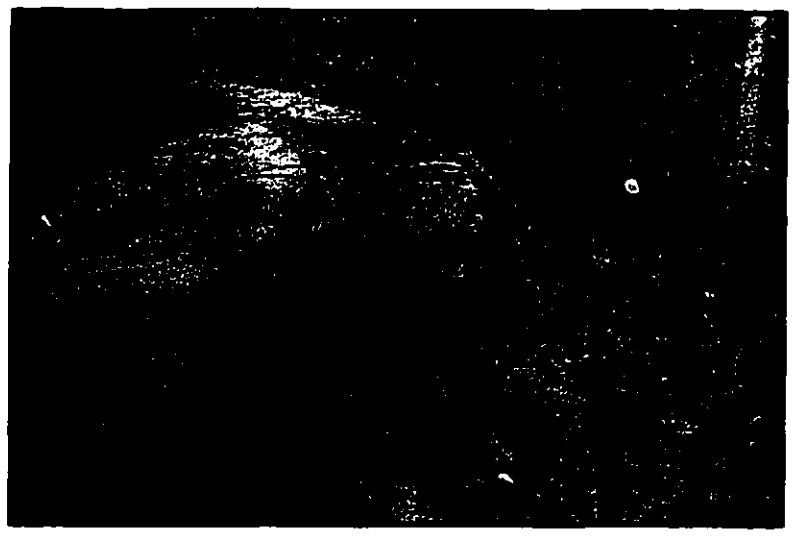
Both logging and mining activities have been found to negatively affect water quality and fish habitat, by increasing erosion potential and water contamination. An often-cited study examining stream sedimentation in logged drainages reported that intensity of road use and type of road surface increased sedimentation 130-fold due to water routing along logging roads (Reid and Dunne, 1984). Impact was greatest along unpaved, heavily used roads, and was lessened along paved, rarely used or abandoned roadways. Erosion potential has also been found to increase as a result of higher peak flows. Jones and Grant (1996) and Thomas and Megahan (1998) reported increases in peak flows ranging from 50% to 100% in small watersheds, again as a result of logging roadways that route water. Flow rate increases depended on the method of timber extraction, which varied from clear-cutting to patch-cutting, and were identifiable as long as 20 years after logging had taken place.

Mining effluent can contaminate several components of a riparian ecosystem. Metal and chemical concentrations have been found in water, vegetation, fish and stream sediment downstream from effluent source points (Moore et al., 1991). These and other types of resource extraction, such as oil and gas, have a long history in southwestern Alberta, with obvious potential riparian impacts, as indicated in Figure 2.2.

The impacts of damming and diverting rivers include alteration to fish habitat and lifecycles resulting from the creation of migratory barriers, scouring of the bed and changing of water temperature, clarity, volume and velocity (Allan, 1995). In southern Alberta and the neighbouring regions in the northern United States damming for the

24,000 log jam
on the Highwood River
1911

Photo: Glenbow Archives, Calgary, Canada NA 695.32



Towing an oil drum across
the Sheep River, Turner Valley
ca. 1930

Photo: Glenbow Archives, Calgary, Canada NA 6755

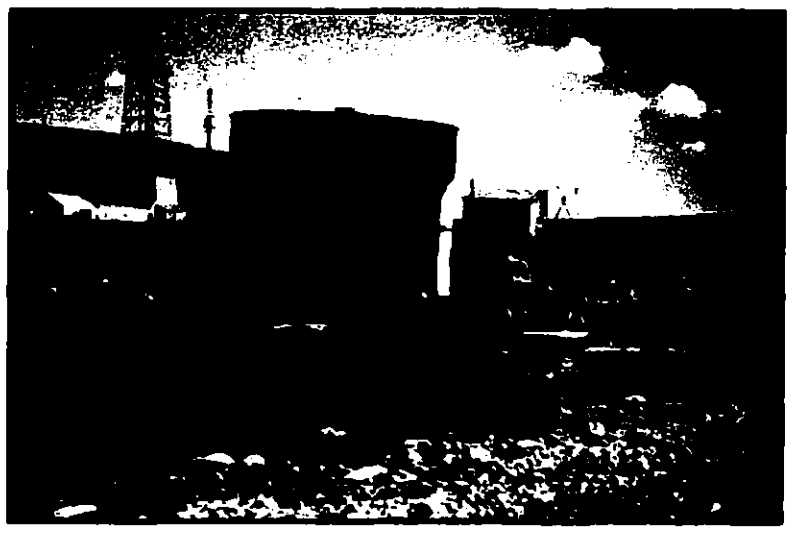


Figure 2.2
Historical Human Impacts on Riparian Zones

purpose of irrigation has led to endangerment of the area's principal riparian tree species. In this arid region, riparian poplars, particularly the prairie cottonwood species, provide shelter for livestock, and habitat for as many as 40 mammal species, six amphibian species and four reptile species (Rhodes, 1991; Rood and Mahoney, 1990). Riparian cottonwood forests also meet human needs, serving as popular sites for recreation and other activities. However, reduction in flow volume and alterations to

seasonal flow patterns caused by damming and related irrigation diversions have induced lethal drought stress on cottonwood seedlings, which require spring flood events to create barren sites and high water tables for regeneration (Rood and Mahoney, 1990; Rood and Mahoney, 1991). These hydrological alterations have resulted in degraded conditions and species loss along the Oldman River and in several other riparian systems in Alberta and the northern United States.

The process of urbanization has had profound effects on the health of riparian zones (Booth, 1991; Booth and Jackson, 1997). Modifications to the land surface, resulting from vegetation clearing, soil compaction, ditching and draining, and the covering of surfaces with impervious roofs and roads, has altered both the type and magnitude of movement and storage of runoff within drainages. With the infiltration capacity of these surfaces and surrounding compacted soils reduced to almost nil, exponentially higher velocity and peak discharge of precipitation has resulted. Existing channels have increased in size, becoming prone to flooding and rapid erosion. The consequent sedimentation and root mass loss have had severe consequences in terms of habitat disturbance and loss as well as human safety.

The physical and aesthetic qualities of riparian ecosystems have made them attractive areas for recreational pursuits, especially in the arid and semi-arid regions of southern Alberta (Bradley et al., 1991). Almost all provincial and civic parks in the province are located in riparian zones. Roads, golf courses, campgrounds, and cycling and walking trails are just a few of the features of human interaction with these zones. These interactions can impact key riparian vegetation in several ways: active removal, damage caused by trampling and mortality caused by pumping of water, leading to drought conditions throughout the floodplain. Water quality can be degraded by fertilizer and

herbicide infiltration. Other types of recreational impacts on riparian ecosystems include soil compaction and nutrient loss, habitat disturbance, animal mortality and disturbance caused by litter, noise and harassment, and contaminated water caused by sedimentation, waste disposal and other pollutants (Cole, 1993).

2.3 The Knowledge-Attitude-Behaviour Gap

There is a long-standing presumption of a positive relationship between education or similar interventions [for consistency, hereinafter called programming] aimed at increasing knowledge and/or changing attitudes on environmental matters, and the subsequent adoption of related environmental behaviours (Disinger, 1982; Newhouse, 1990; Young and Witter, 1994). [Environmental behaviours are variously referred to in the literature as ecological, conservation or sustainable behaviours. In this document, ecological behaviour(s) is the term used for consistency.] As recently as 1993, a critique of the psychological literature found that only six studies conducted since 1974 had measured the effects of ecological programming on related behaviours (Leeming et al., 1993; as cited in Zelezny, 1999: 6). Rather, the focus remained on whether knowledge was increased and/or whether attitudes were changed as a result of the programming, because of the assumption that a shift in attitude leads to behaviour change. While the number of psychological studies examining ecological behaviour changes has increased marginally in the period since 1993, Zelezny (1999) reported that most of the studies related to elementary school curricula, with only four studies involving adult, non-classroom settings. These related to type of home fuel use and the purchase of products that were marketed as environmentally-friendly. Interventions in those studies were found to increase behavioural change about half the time, if the intervention involved the active involvement of participants.

In the resource management literature, a similar gap exists that has been addressed only recently and incompletely. For example, Marynowski and Jacobson (1999) assessed the impacts of materials used in an ecosystem management program directed toward recreationalists using public forest lands in Florida. One focus of their study sought to determine if programming had any effect on knowledge of core ecological questions or on attitudes. Programming had a positive effect on knowledge about native and endangered species, forest resources and ecosystem management. The attitudes tested reflected opinions on, for example, fire ecology. Those exposed to programming had slightly more positive attitudes than those not so exposed. The researchers suggested that this may have occurred as a result of increased knowledge gained through programming. The study also reported that direct, targeted and repetitive programming was most effective in changing attitudes, but it did not examine whether participant attitudes were manifest in appropriate recreational behaviours in the forest ecosystem.

The apparent emphasis on ecological knowledge versus action was also found in a study of natural resource education materials in Missouri school curricula (Pomerantz, 1990). The materials did not provide information on specific resource management issues nor on how to participate in ecological behaviours. Knowledge of ecological concepts was also tested in field instruction settings in Illinois without reference to the application of knowledge gained (Lisowski and Disinger, 1991).

Conversely, without identifying specific programming interventions, a few studies have reported differences in ecological behaviours based on existing levels of knowledge of participants, and suggested that attempts to increase knowledge through education may be appropriate. An Illinois study on household recycling reported that recyclers had high

levels of knowledge about the benefits of recycling. Non-recyclers were more uncertain on knowledge pertaining to recycling (Vining and Ebreo, 1990). Tracy and Oskamp (1983) acknowledged that the attitude-behaviour relationship has been poorly studied and reported, in a study similar to Vining and Ebreo (1990), that correlations were found between only a small number of related behaviours, such as recycling, and an attitude defined by a statement of concern about energy conservation.

There is a growing trend, however, toward examining whether knowledge increase and/or attitudes are associated with related behaviours as an effect of programming. Richards and George (1996) found that California ranchers had improved or protected 14% of their rangeland, with a majority stating that they had implemented at least one management strategy based on information introduced in California Co-Operative Extension programming that dealt with sustainable grazing management. A long-term study of energy conservation programming in Great Britain found that program participants had significantly higher knowledge scores on energy use concepts than non-participants, and also adopted related behaviours such as using less hot water and turning off unused lights (Hanson, 1993).

Most of the studies mentioned here shared a number of characteristics with regard to attitudes. First, the term attitude was used ambiguously and was either not defined or was used generically, as in every-day use. Second, the term was used inconsistently. No one standard was employed to explain the concept of attitude by reference to attitude theory. Brush et al. (1997), for example, used the term attitude in a generic sense, without definition, assigning it simply to group concepts that were determined by a factor analysis. The purpose of that study was to examine a completely separate hypothesis in

which agricultural producers responded to agri-chemical programming based on whether they first recognized safe use of those chemicals as a problem or concern.

The importance of bridging the knowledge-attitude-behaviour gap in programming has been identified by several researchers. Because the central assumption of many ecological programs is that knowledge and/or attitudes arising from programming contribute directly or indirectly to related behaviour, a more precise definition and use of the concept of attitude is needed to explain programming effects (Francis et al., 1993; Newhouse, 1990; Weigel, 1985; Zimmermann, 1996). Newhouse further stated that a better understanding of other influences on ecological behaviours, such as an individual's perception of whether they have control over the desired change, should be incorporated into ecological program development.

With regard to behaviour arising out of knowledge and attitude factors, Francis et al. (1993) proposed a framework in which programming, to be effective, must incorporate not only underlying ecological principles of natural resources, but also information on appropriate uses of the resources. This two-part framework was intended to provide a link by which individuals incorporate their knowledge into behaviour decisions with regard to their use of the resource. Relevant knowledge was integral to the process. This framework reflected some key elements of the process of developing ecological literacy within the Cows and Fish Program, including building ecological knowledge and applying ecological awareness.

2.4 Theory of Planned Behaviour

The study of attitude and behaviour is the purview of the field of social psychology. Early views in the discipline about attitude assumed implicitly that it predicted behaviour (Eagly and Chaiken, 1993). With little evidence to support that assumption, research throughout the 1960s and 1970s found that, while such a relationship might exist, it appeared to be complex, difficult to measure, and influenced by a variety of social and experiential factors (Eagly and Chaiken, 1993; Fazio and Zanna, 1981; Fishbein and Ajzen, 1975).

2.4.1 Attitude Defined

The definition of attitude is generally accepted as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly and Chaiken, 1993: 1). In other words, an individual is predisposed toward an entity. An entity is an object of some kind, either concrete or abstract, typically referred to as an attitude object (Eagly and Chaiken, 1993). A sustainable riparian grazing management strategy is an example of an attitude object. The individual responds to the attitude object on the basis of three distinct conceptual elements:

(a) affect (feelings);

(b) cognition (factual knowledge or beliefs); and/or

(c) behaviour (overt actions) (Breckler, 1984; Zimbardo et al., 1977).

As described by Eagly and Chaiken (1993), once an attitude is developed, the individual tends to continue to respond to the attitude object in a similar manner, and so maintains

the same attitude, at least for the short-term. The process of developing an attitude by means of judging an attitude object involves the individual assigning a degree of good or bad to the object. It is in this way that attitudes express approval or disapproval, favour or disfavour, liking or disliking, and so on. The evaluative response to an attitude object is fundamental to defining attitude as a distinct concept.

2.4.2 Attitude-Behaviour Measurement

Two important developments occurred in the 1970s with regard to the study of the attitude-behaviour relationship (Eagly and Chaiken, 1993). The first was recognition that measuring *behaviours* appropriately was as important to understanding the relationship as was measuring *attitudes* appropriately. Attitude measurement itself had long been standardized, but an individual's attitude, as a function of many factors at play at different times and in different circumstances, was found to be not necessarily explained by measuring a specific, single observed act of behaviour toward the attitude object (Rushton et al., 1983). Rather, aggregating observations of multiple behaviours was believed to be a more reliable indicator of attitudes (Eagly and Chaiken, 1993; Fishbein and Ajzen, 1974). In their seminal work in the field, Fishbein and Ajzen (1974) reported that this inconsistency explained the inability of prior research to predict specific behaviours from general measures of attitude.

The second key development in examining the attitude-behaviour relationship was the creation of behaviour measurement techniques to address this inconsistency (Eagly and Chaiken, 1993; Rushton et al., 1983). In their 1974 work, Fishbein and Ajzen created a series of attitude and behaviour indices pertaining to religiosity in order to test whether attitudes toward religiosity were related to multiple behaviours of religiosity. First, they

developed a 100-item index of *behaviours* assumed to be related to religiosity, using an 11-point scale to which respondents indicated both a self-report of behaviour, and their expectation to undertake the behaviour in the future. The responses of the self-reported and expected behaviours were summed to arrive at two index scores of multiple behaviours. Then, five different indices of *attitudes* were developed, two using an 11-point numerical scale and three using other types of scales. The sum of all selections on each of the five attitude indices was taken, to arrive at an index score of attitude toward religiosity for each scale type.

The five attitude indices were then correlated to determine if the differences in scale type affected index scores. Results showed high inter-correlation between scale types. Further, the five attitude index scores were highly correlated with both of the multiple behaviour index scores, but not to single individual behaviours. As a final step, the behaviour indices for self-reported and expected behaviours were subjected to an inter-item correlation analysis designed to eliminate irrelevant index items. Items with significant negative correlation were removed from the indices, reducing the indices to about one-third their original number of items. Again, both of the behaviour indices (self-reported and expected) were correlated to the index scores of each of the five types of scale. Results showed high correlations between attitudes and the multiple-behaviour indices but not to single behaviours (Fishbein and Ajzen, 1974).

By aggregating multiple measures in this way, the use of inter-correlated attitude and behaviour indices became the foundation for examining the attitude-behaviour relationship (Eagly and Chaiken, 1993). A reliable index reflects homogeneity, or internal consistency, among the index items. The index items also reflect the construct of the index, the construct being the attribute assumed to be addressed in the index

items, providing a more stable measure of the underlying relationship (Cronbach and Meehl, 1955; Rushton et al., 1983). In the case of Fishbein and Ajzen's 1974 work, the construct of interest was religiosity. Cronbach's alpha coefficient (*a*) is the most widely used measure of internal reliability (DeVellis, 1991). It is a measure that represents the proportion of an index's total variance that is attributable to the underlying construct, i.e. it is a means by which index items reflecting the same underlying construct can be correlated to each other. Methods based on these standard procedures were followed in the quantitative phase of this evaluation, as described in Chapter 6.

2.4.3 Theory Development

Building on their 1974 work, Fishbein and Ajzen articulated their findings in their Theory of Reasoned Action (Fishbein and Ajzen, 1975) which stated that the transformation from holding an attitude to engaging in a behaviour is represented by a decision. This mental event, or psychological construct, of making a decision is distinct from attitude, instead representing a person's motivation to act. This intermediate step is referred to in the theory as intention. The stronger the intention, the greater the likelihood that the behaviour of interest will occur. The Theory of Reasoned Action was notable because it attempted to formalize the contribution of influences from an individual's social environment, on both intention and behaviour. This element of the theory, referred to as Subjective Norm, reflects an individual's perception about the preference that significant others, such as family members, friends and neighbours, hold about whether that individual should or should not perform a behaviour. Accordingly, both attitude and Subjective Norm were defined as antecedent to the formation of intention (Ajzen and Fishbein, 1980). The attitude component itself retained both the Affect and Cognition elements (Fishbein and Ajzen, 1975).

The Theory of Reasoned Action built a foundation for a more thorough examination of the attitude-behaviour relationship. However, limitations arising from its contention that the relevant behaviour is controllable by the individual, and that there is a unidirectional effect from attitude to intention to behaviour, led Ajzen to modify the theory (Eagly and Chaiken, 1993). The revised theory, called the Theory of Planned Behaviour (Ajzen, 1991), added the concept of perceived behavioural control as another antecedent requirement to the formation of intention. Perceived Behavioural Control is the perception that an individual holds about the difficulty or ease of performing a behaviour. It is based on the concept of self-efficacy, an individual's confidence in performing a behaviour (Bandura, 1982). The Theory of Planned Behaviour stated that the likelihood of a behaviour occurring increases with greater Perceived Behavioural Control (Ajzen, 1991).

As summarized by Eagly and Chaiken (1993), Ajzen (1991) reported on 16 studies of behaviours ranging from shoplifting to voting that employed the Theory of Planned Behaviour. Behaviour prediction was consistently improved by adding indices of Perceived Behavioural Control over and above indices of attitude and Subjective Norm. Multiple correlations predicting behaviour showed that Perceived Behavioural Control accounted for between 20% and 78% of the variation in the behaviour, with the average being 51%.

The elements of attitude, Subjective Norm and Perceived Behavioural Control within the Theory of Planned Behaviour are illustrated in Figure 2.3. The components of this theory run approximately parallel to the elements of the process of developing ecological literacy within the Cows and Fish Program, providing the conceptual framework for part of this evaluation, as set out in Table 1.1.

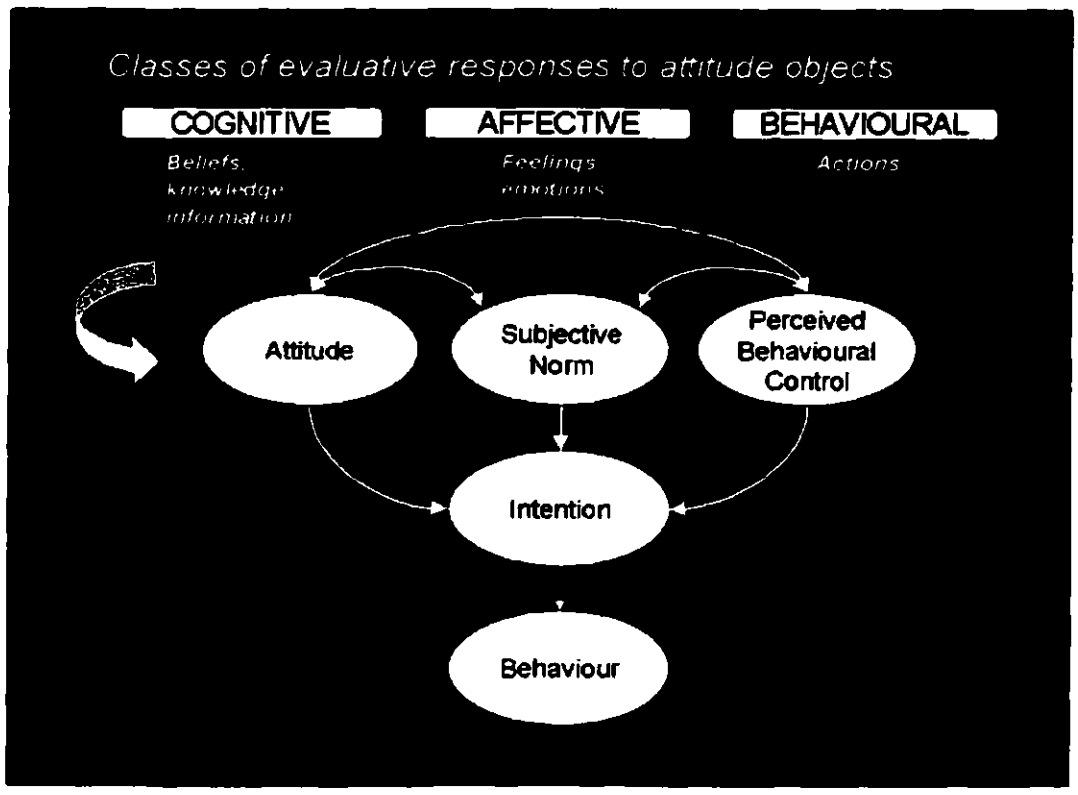


Figure 2.3
Theory of Planned Behaviour

Source: Icek Ajzen. 1991. The Theory of Planned Behaviour. Organizational Behaviour and Human Decision Processes 50(1), 182 (modified). Alice H. Eagly and Shelley Chaiken. 1993. The Psychology of Attitudes. Forth Worth, Texas: Harcourt Brace Jovanovich College Publishers, 10-11.

As indicated previously, the Theory of Planned Behaviour has been used extensively in the field of promoting human health. In a study examining participation in colorectal cancer screening, for example, the theories of Reasoned Action and Planned Behaviour were compared in terms of predicting participation. By adding an index for Perceived Behavioural Control, the Theory of Planned Behaviour increased the prediction of participation over and above the indices for the components of attitude and Subjective Norm within the Theory of Reasoned Action (DeVellis et al., 1990). In a longitudinal study of condom use, the Theory of Planned Behaviour successfully explained both

actual use and planned future use of condoms based on indices of attitudes, Subjective Norm and Perceived Behavioural Control (Reinecke et al., 1996).

Multiple or logistic regression have been the typical choices in statistical techniques examining relationships between indices of components within both the Theory of Reasoned Action (Kelly and Breinlinger, 1995; Zey and McIntosh, 1992) and the Theory of Planned Behaviour (DeVellis et al., 1990; Reinecke et al., 1996; Schifter and Ajzen, 1985).

2.5 Program Evaluation Research

2.5.1 Evolution and Standards

Program evaluation has evolved through a number of distinct phases (Greene, 1998) or generations (as summarized by Guba and Lincoln, 1989) that reflect the research paradigms described in Chapter 1, namely the post-positivist, the pragmatist, the interpretivist and the constructivist. The first generation arose in the early part of the 20th century. It was characterized by simple measurement of such things as school tests. The second generation, the descriptive form, began after World War I, focusing on actual outcomes in relation to pre-determined objectives.

Judgment characterizes the third generation of evaluation research (Stake, 1967, as cited in Guba and Lincoln, 1989: 29), a change that grew out of ineffective evaluation attempts to explain, when focusing on objectives alone, the perceived failure of the American education system that permitted the Russians to gain superiority in the space race of the late 1950s and early 1960s (Guba and Lincoln, 1989). In such unique

program situations and, increasingly, in other areas of enquiry, the methodological demand for pre-determined objectives against which to experimentally measure program success was found to be insufficient to the task. Accordingly, this third generation of the discipline, while retaining aspects of measurement and description, placed less emphasis on objectives as outcomes and more on the process within and surrounding the program. The objectives themselves fall within the evaluation process (Scriven, 1967, as cited in Guba and Lincoln, 1989: 30). The evaluator makes judgments in the evaluation, not independently of criteria, but rather against agreed-upon standards (Stake, 1967, as cited in Guba and Lincoln, 1989: 30). In this way, it is possible to identify where in the process of the program that improvement may be required, increasing the usefulness of the evaluation (Patton, 1997).

Program evaluation research began to expand in the United States during the 1960s and 1970s when expenditures for social programs fell under increasing scrutiny. Public demand for reduced government spending required accountability pertaining to the effects of public programs dealing with issues of education, poverty, housing and social welfare (Chelimsky, 1997). Today, program evaluation research has evolved into a distinct interdisciplinary and multi-method discipline. Program evaluation research is employed by both the public and private sectors in the United States (Patton, 1997). It began to be adopted by the federal government and other sectors in Canada in the 1980s and developed internationally throughout the 1980s and 1990s (Comptroller General of Canada, 1989, as cited in Patton, 1997: 15; Chelimsky, 1997). Rossi et al. (1999) reported that evaluation research is most commonly conducted in the fields of psychology, economics and political science, and organizational development. Patton (1997) has cited studies in a wide range of fields, including community development (e.g. housing, transportation, community leadership and policing), health (e.g. palliative

care, pastoral care and early childhood development) and education (e.g. school funding, curricula and administration).

Various methodological approaches have evolved within the discipline, including discrepancy evaluation (Provus, 1971, as cited in Patton, 1997: 203), goal-free evaluation (Scriven, 1972, as cited in Patton, 1997: 181), responsive evaluation (Stake, 1975, as cited in Patton, 54), utilization-focused evaluation (Patton, 1997; Patton, 1986), theory-driven evaluation (Chen, 1990), empowerment evaluation (Fetterman, 1996 et al., as cited in Patton, 1997: 101) and emancipatory evaluation (Mertens, 1998). Before the formalization of utilization-focused evaluation research (described later in this chapter) in the 1980s and 1990s, many program evaluators were derived from the academic community (Rossi et al., 1999). They tended to adopt the formal experimental research design traditionally used in pure science, where technical and methodological rigour was considered the only relevant criterion for research quality. However, by using only that criterion, and limiting evaluation research questions to those related to that formal research methodology, many evaluation results were not helpful in terms of assisting the decision-makers being held accountable for the program under evaluation. Discussion and debate occurred throughout the 1970s and 1980s about the traditionally scientific versus the pragmatic approaches to evaluation, each position advocated by major figures in the discipline. The scientific posture was advocated by statistician Donald Campbell who suggested that all research reflects society's experimenting nature (Campbell, 1969), while the pragmatic approach was advocated by Lee Cronbach whose view was that evaluation should use suitable research procedures while striving to meet the information needs of decision-makers (Cronbach and Lee, 1980).

Throughout this period, decision-makers began to require increased levels of accountability of evaluators (Greene, 1998; Patton, 1997). In 1981, research standards for program evaluation were established by The Joint Committee on Standards for Educational Evaluation Research, based at Western Michigan University (Joint Committee on Educational Evaluation, 1994). Revised in 1994, the standards established principles for evaluation research that addressed the methodological and technical concerns of scientific enquiry as well as criteria designed to ensure use of evaluation research results.

The standards for evaluation research defined its four key attributes: utility, feasibility, propriety and accuracy (Joint Committee on Educational Evaluation, 1994). These attributes are defined in Table 2.2, while the detail associated with the relevant standards is provided in Appendix A. The procedures followed to incorporate and meet these standards within the Cows and Fish Program evaluation are described throughout this document and are summarized in the evaluation protocol provided in Chapter 8.

Table 2.2
Evaluation Research Attributes

ATTRIBUTE	DESCRIPTION
Utility	Ensures that the evaluation research serves the information needs of intended users.
Feasibility	Ensures that the evaluation research is realistic, prudent, diplomatic and frugal.
Propriety	Ensures that the evaluation research is conducted legally, ethically and with due regard for the welfare of those involved and those affected by results.
Accuracy	Ensures that the evaluation research reveals and conveys technically adequate information about the features that determine worth or merit of the programming being evaluated.

2.5.2 Framework of Utilization-Focused Evaluation Research

Much of program evaluation research today falls within the pragmatist and interpretivist paradigms under the generally accepted framework of utilization-focused evaluation (Chelimsky, 1997; Patton, 1978; Patton, 1986). Regardless of research design or methods, the focus stays on intended use of the evaluation results by the intended users (Patton, 1997). Utilization-focused evaluation is:

> ... the systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve programming effectiveness, and/or to inform the decisions about future programming (Patton, 1997: 23).

It requires the evaluator to work within the applicable standards and, through an interactive process referred to as negotiation, to ensure that decision-makers (i.e. the evaluation users) are involved in the evaluation process and that the evaluation research questions are those of the users rather than the evaluator (Burnham, 1995; Posavac, 1998; Weiss and Bucuvalas, 1980). This is an important consideration when decisions arising from an evaluation are expensive and when objective evidence can help convince others, including funding agencies or policymakers, about the validity of a program (Chelimsky, 1991; Rossi et al., 1999). More specifically, utilization-focused evaluation requires the evaluator to understand and select the most appropriate type of evaluation research required by the users; to develop a mutual understanding of the evaluation research process; and to engender commitment by the users to both the evaluation research and its use (Burnham, 1995; Patton, 1997). The evaluator is obliged to achieve this through the process of negotiation, arriving at an understanding of the program's context, processes, activities, objectives and intended outcomes. This

lays the foundation that enables the evaluator to exercise judgment about what has occurred within the program so that evaluation results are useful and can be applied to program improvement decisions. In utilization-focused evaluation, truth refers not to literal or perfect unattainable truth, or even necessarily to quantifiable causal relationships between program objectives and outcomes but, rather, to "a reasonable estimate of the likelihood that particular activities have contributed in concrete ways to observed effects – emphasis on the word *reasonable*" (Patton, 1997: 23). Reasonable truth offers useful guidance in decision-making, derived as it is from the data in the evaluation that is placed within the perspectives of both the evaluator and the evaluation research users, interpreted and used based on its relevance to the program stakeholders and to program improvement (Patton, 1980; Patton, 1997). Specific steps taken to conduct a utilization-focused evaluation are described throughout this document and summarized in the evaluation protocol provided in Chapter 8.

The goal of arriving at reasonable truth and, hence, utilization of the evaluation results, acknowledges that decision-makers base their decisions first on economic, political, operational and personal factors, and that empirical information contributes only in part and not to the exclusion of these other factors in a decision (Cronbach, 1982; Feick, 2000; Leviton and Boruch, 1983; Leviton and Hughes, 1981; Weiss, 1988; Weiss and Bucuvalas, 1980).

2.5.3 Methodological Approaches to Program Evaluation Research

Program evaluation research, like other disciplines in the social sciences, has been subjected to the quantitative-qualitative dichotomy debate in which one methodology is considered superior to the other. However, this debate has declined in recent years

and, within the utilization-focused framework, choice of method is not so much dictated as determined by negotiation around the uses and users of the results (Chelimsky, 1997; Posavac, 1998; Shadish, 1995). Utilization-focused evaluation often adopts mixed-method research designs, i.e. using both quantitative and qualitative methods. This approach came with the recognition, identified as long ago as the 1970s, that the quantitative hypothesis testing of an experimental design was often inappropriate for program evaluation research, or served better as a check on subjective observations of perceptions and opinions about programming effectiveness (Greene, 1998; Rog, 1994). Relying solely on quantitative research methods has been found by many to oversimplify real-world experiences, miss factors of importance not easily quantified, or fail to capture the subtlety and sense of the program and its impact as a whole, on which judgment and decisions about the program's effectiveness and relevance are made (Bennett, 1977; Posavac, 1998; Shadish, 1995; Shaw, 1999). All of these are of concern to program stakeholders.

Thus, a variety of approaches to methodology are used in evaluation research (Mertens, 1998; Rossi et al., 1999). These range from theory-driven evaluation research (Chen and Rossi, 1989) which in its most structured variation attempts to determine both causality and explanation with a single model, to a constructivist or responsive approach (Guba and Lincoln, 1989) which extends the interpretivist approach to place program outcomes solely within participants' value-based constructions of the reality they have experienced in the program.

Theory-driven evaluation research defines and examines the hierarchy of internal logic, i.e. the program theory, surrounding the objectives, criteria and outcomes within a program. Several models are available within theory-driven evaluation research. The

user-focused model identifies and assesses what is referred to as the program's theory of action (Argyris and Schon, 1978, as cited in Patton, 1997: 221). By asking stakeholders to make their assumptions about the program explicit, by concentrating on key aspects of the program, and by clearly delineating and measuring expected outcomes, it is possible to identify where in the program's theory its desired outcomes are being met or nor met and, equally important, why or why not. In this way, evaluation research results are placed into the relevant program improvement context (Patton, 1997; Weiss, 1995).

Variations of the theory of action have been suggested for use in conducting program evaluation research in agriculture within frameworks developed by Bennett (1977) and Smith (1991). Bennett suggested that evidence of effectiveness is required in program evaluation at each stage of a multi-stage series of events within a program, including resource input, program activities, participant involvement and reactions, knowledge change, practice change and ultimate results. Smith's framework identified criteria for excellence in program evaluation research that enhance the decision-making process of programming representatives and public officials who are responsible for supporting programs designed to meet the needs of, and to benefit, community members. Smith's criteria are set out below.

(a) Relevance. The evaluation research addresses an identified need and has an identified link to public use, indicated by mandates of and funding provided by public or private sector sources.

(b) Quality Process. The evaluation research has scientific credibility with clear research objectives and methodology, and includes implications for future programming indicated by peer-reviewed and lay publications.

(c) Utility. The evaluation research provides useable results that add knowledge that solves a problem. It contributes to the improvement of expertise of programming representatives, indicated by the creation of new or improved services or enterprises, additional research efforts and increased interest in the programming (Smith, 1991).

A second model available for use within the theory-driven approach is the deductive model advocated by Chen and Rossi (1989). It requires the use of broad scientific theories of social and economic change as the only valid basis on which to measure and explain why the effects of a program have occurred or not occurred, although Chen and Rossi acknowledge that few relevant theories exist for this purpose. Further, Chen and Rossi suggest that their deductive model can be problematic because it is difficult to identify the magnitude of observed phenomena within a program while also providing contextual, in-depth explanation about why phenomena have occurred, when using only a single research design. Modeling under these circumstances can be, they explain, both cumbersome and expensive. Further, the emphasis on establishing causality is accompanied by limitations associated with generalizing results to other programs or situations. Together, these factors remove the focus of this model away from evaluation research use and users who need to make decisions in applied settings (Cordray, 1989; Patton, 1989).

The constructivist methodological approach to evaluation research, also referred to as fourth generation evaluation research, lies at the other end of the design spectrum. It departs radically from both causation and from judgment by the evaluator. The constructivist approach suggests that attempts by an evaluator to observe, make sense of and describe a program for others are invalid. Further, it suggests that program

outcomes are neither factual nor linear but, rather, are made sense of only by a process in which people create realities that are meaningful to themselves and which are agreed upon with others in similar physical and cultural contexts who have created the same reality for themselves about a program outcome. The constructivist methodology involves direct, subjective involvement of the evaluator in the dialogue of multiple stakeholders which forms the evaluation (Guba and Lincoln, 1989; Greene, 1998).

In the interpretivist approach, research methods reflect the research purpose (Chelimsky, 1997), which is to seek out and understand contextual meaning as it is experienced by program participants for the benefit of those associated with the program (Greene, 1998). Accordingly, qualitative methods such as case studies and interviews, which provide contextual meaning, are the preferred techniques used. Mertens (1998) summarizes the work of Guba and Lincoln (1989) and others to articulate the criteria for quality control in qualitative research. To illustrate that this evaluation meets the requirements of quality control in qualitative research, detailed procedures are described throughout this document and are summarized in Chapter 8. The relevant criteria summarized by Mertens (1998) are set out below.

(a) Credibility. This is the correspondence between what participants in the research communicate as their viewpoints, and the manner in which the researcher portrays those viewpoints. Credibility can be achieved by a number of steps such as prolonged and sufficient exposure to participants and peer de-briefing, to allow all relevant themes to be identified without drawing premature conclusions. Credibility equates to the concept of internal validity in quantitative research, defined by Judd et al. (1991) as the extent to which conclusions can be drawn about causal relationships within the data.

(b) Transferability. This is the correspondence between the study setting and other settings with which the users of the research may be familiar. Sufficient detail, referred to as thick description (Geertz, 1973), is a minimum requirement to enable the user to make this type of judgment. Transferability equates partially to the concept of external validity in quantitative research, defined by Judd et al. (1991) as the extent to which findings can be generalized from the participants in the research to a wider population. Qualitative data, however, is explanatory rather than prescriptive, and while it *may* reflect themes or ideas that seem reasonably applicable to other areas, it cannot be compared to those areas without additional research that verifies the specific situation(s) there. Further, the onus lies with the researchers of those areas to investigate, describe and explain their unique situations (Baxter, 2001, personal communication; Baxter and Eyles, 1999).

(c) Dependability. This refers to the quality and appropriateness of the procedures of the research, which can be tracked and publicly inspected through reporting and, if necessary, by means of an audit. Dependability equates to the concept of reliability in quantitative research, defined by Babbie (1995) as the stability or consistency of a research technique over time.

(d) Confirmability. This refers to the tracking of data and the explicit reporting of logic used in its collection and analysis, and its openness to dependability audit, if merited. Confirmability equates to the concept of objectivity, i.e. the absence of undue bias (Babbie, 1995; Judd et al., 1991) in quantitative research.

(e) Authenticity. This refers to the presentation of a fair and complete report of the research data.

Given that "the right way... [to conduct a utilization-focused evaluation research] is the way that will be meaningful and useful to the specific evaluators and intended users involved" (Patton, 1997: 217), a natural experiment approach (Rog,1994) using a two-phase mixed-method research design (Creswell, 1994) was adopted for use in the Cows and Fish Program evaluation. It was intended that this choice would:

(a) strike a necessary balance, operating within the framework of utilization-focused evaluation research and meeting evaluation research standards (Patton, 1997), helping to explain how and why programming is affecting producers;

(b) address the discrete qualitative and quantitative evaluation research objectives and questions described in Chapter 1; and

(c) strengthen the research by addressing the limitations associated with operationalizing only a quantitative design.

This research design also borrowed partially from the theory-driven evaluation approach, in two respects. First, it specifically described the program's theory of action (its rationale and desired outcomes) against which desired behaviour is examined. The program description required of the research standards is, accordingly, provided in Chapter 3. Second, this evaluation used an existing scientific theory, the Theory of Planned Behaviour, to observe behavioural influences, such as attitude, associated with programming. The choice of this conceptual framework does not represent a full theory-driven research design because the Theory of Planned Behaviour is not a broadly-encompassing theory of social change and it does not and cannot answer all of the evaluation research questions (Chen and Rossi, 1989), specifically those related to the design and delivery of programming tools which are addressed in the qualitative phase of this evaluation.

2.6 Resource Management Program Evaluation Research

Examples of rangeland or riparian resource management programs that employ a community-based approach are few in number and, of those, most have been established only recently (Agriculture and Resource Management Council of Australia and New Zealand, 1995; Huel, 1998). As indicated previously, the application of evaluation research in the field of resource management is also recent. In an era of increasing demands for accountability, Feick (2000) found only a small number of studies in North America that used a structured program evaluation research framework in the field of resource management.

Two resource management program evaluation studies are described here. The first evaluation pertains to Landcare (Curtis, 1995), an Australian program that began in the late 1980s. Landcare comprises about 65,000 farmer and rural landowner members belonging to about 2,200 community groups, whose goal is to develop and implement sustainable land use management. Like the Cows and Fish Program, it has defined itself as a community-based initiative that promotes voluntary, local management of ecosystems and watersheds. And, like the Cows and Fish Program, it is perceived anecdotally as a success, receiving broad support in local communities. It also has been embraced by governments, producer organizations and conservation organizations (Curtis, 1995).

The second evaluation described here is a formative assessment of the effectiveness of the implementation of ecosystem-based management by Parks Canada in two national parks in the interior of British Columbia (Feick, 2000). That study investigated whether the efforts of Parks Canada have influenced land use decisions relating to the agency's

mandate to maintain ecological integrity in the region's Columbia Mountains. The study examined the factors that influenced decision-making in the land use decision process, including the assumption that provision of scientific information led to decisions that promoted the maintenance of ecological integrity.

Australia's Landcare program was evaluated (Curtis, 1995) during the period 1991 to 1993 using a theory-driven evaluation research approach. Adopting the user-based model of that approach, the evaluation examined the validity of implicit assumptions within the program's logic. The program's key assumption was that local group action would facilitate, with limited government funding, sufficient community participation to produce knowledgeable, pro-active farmers who, as a result of their newly developed stewardship ethic, would use sustainable management practices.

The evaluation found that about 50% of rural landowners were Landcare members. It also determined that individual members who had higher, rather than lower, participation in local group activities undertook specific desired outcomes, such as soil testing, to a greater degree, suggesting that the participatory approach related to positive outcomes. Almost all groups (90%) reported desirable actions such as tree plantings (2.5 million in 1993), while 79% of groups had built fencing (3,000 km in 1993). Local participation in decision-making was found to positively affect outcomes in the watershed planning process, indicating the value of providing representation and power to community members. Significantly higher levels of awareness and concern about land degradation were identified among Landcare members versus non-members. These findings support the program's logic that participation had a positive influence on sustainable management actions (Curtis, 1995).

Not all elements of the program's logic were supported. First, the assumption of promoting change with limited government funding was found to be invalid because funding to groups was considered inadequate to achieve necessary land management activities once membership and awareness had been increased. Further, group members and non-group members revealed no significant difference in stewardship ethic, and so efforts directed toward increasing that ethic may be unnecessary. Lastly, the dependence of groups on government and the close working relationship between group members and government staff, while based in respect and expertise, indicated that local groups were not as autonomous as the program logic suggested (Curtis, 1995).

The evaluator summarized the effectiveness of Landcare by suggesting that the scale of community involvement in the program had moved educational programming in Australia fundamentally away from the linear tradition of agricultural agency extension programs and that collaborative relationships had become the norm. While group participation was related to significant increases in knowledge, as well as awareness and use of sustainable practices, the absence of any difference in stewardship ethic between group and non-group members suggested a flaw in the program's logic. Changing attitudes was not, therefore, key to changing resource management practices. Rather, the availability of sufficient funding resources was viewed as the necessary precursor (Curtis, 1995).

The findings of the Landcare evaluation reinforced the value of a community-based approach in promoting the use of sustainable resource management strategies. As described by Curtis, this finding represented a fundamental shift away from diffusion theory, a paradigm (Curtis, 1995; Roling, 1988) traditionally used to explain agricultural

management decisions. An assumption of diffusion theory is the linear transfer of technology from an expert source, such as agency representatives, to individuals (usually farmers). Farmers, acting in a passive role and being alike in every way except their propensity for innovation, accept or reject the technology, measured over a known period of time, based on the degree of innovativeness of the technology and the farmer. Farmers deemed to be innovative thereby gain an operational advantage over those who lag behind and only accept the technology, by means of a trickle-down effect, at a later point in time (Rogers, 1983).

As Curtis stated, the notion embedded in diffusion theory that appropriate management strategies are used only by an elite of progressive individuals is at odds with the inclusive, broad-based view of voluntary participation that is central to community-based action and to sustainability. Curtis suggested that it can be interpreted to exclude or blame some members of the community for their lack of knowledge. Curtis also stated that diffusion theory does not acknowledge that many management strategies and innovations are developed through experience and research undertaken by farmers themselves, that agency representatives learn as much from farmers as farmers from agency representatives, and that agricultural operations are uniform in neither their operational nor landscape characteristics (Curtis, 1995; Roling, 1988). In terms of programming, therefore, it has been suggested that flexible and ecologically-based approaches to education and decision-making are more effective than the more linear view of technology delivery that reflects many aspects of diffusion theory popular in past decades (Curtis, 1995; Francis et al., 1993; Roling, 1988).

Feick (2000) evaluated the effectiveness of the implementation of ecosystem management by Parks Canada in the Columbia Mountains region of the British

Columbia interior. Ecosystem management is a holistic approach to decision-making that recognizes the inter-related biological and physical components of ecosystems, where the goal is sustainability (Draper, 1998). Feick's evaluation focused on Mount Revelstoke and Glacier National Parks, as well as several neighbouring jurisdictions. Parks Canada, the federal agency that manages national parks, bears responsibility for assessing and mitigating threats to the ecological integrity of national park ecosystems and is mandated to do so through the use of ecosystem management (Parks Canada 1995, as cited in Feick, 2000: 3). Central to its role is the provision of scientific and technical information to be used in land use decision-making.

Feick's evaluation used a mixed-method approach that included case studies, policy document analysis and stakeholder analysis, including self-administered questionnaires and personal interviews. The use of a mixed-method research design was adopted as that research evolved. An initial attempt was made to apply a post-positivist research design, because it was the traditional and familiar approach for those involved in the research in both academic and government institutions. A self-administered pre-interview questionnaire was used for this purpose. In examining the evaluation needs more closely and through negotiation central to utilization-focused evaluation, Feick chose to incorporate a qualitative research design using a personal interview technique. The basis for the decision was that stakeholders would be more forthcoming in confidential, personal interviews, in terms of providing relevant, strategic and useable evidence about program performance and the complex issues involved, than they would be if asked to commit themselves on sensitive matters in a written interview. Feick (2000) reported a 94% response rate to interview requests.

The primary focus of Feick's evaluation research, therefore, took the form of 146 personal interviews with stakeholders involved in land use decisions in the Columbia Mountains region. Feick used the NUDIST[1] qualitative text analysis software to thematically analyze 283 hours of interview transcription containing 199,000 lines of text. An inductive approach to this thematic analysis was taken to discern and categorize the patterns in the data as reported in the evaluation research.

Stakeholders were drawn from Parks Canada representatives (21%), with the balance being bureaucrats within the provincial Ministry of Forests and Ministry of Environment, Lands and Parks; members of the private sector (including BC Hydro and timber companies as well as recreation and tourism interests); politicians; representatives of community groups and environmental groups; representatives of neighbouring jurisdictions; and individual community members. Feick grouped these 146 stakeholders into decision-makers (35%) and influencer-advisors (65%).

On the basis that Parks Canada was contributing to the maintenance of ecological integrity through the provision of sound scientific information, Feick explored the assumptions held by stakeholders about the use of scientific information in decision-making. This assumption is somewhat parallel to the Cows and Fish Program process of developing ecological literacy, namely that providing good information leads to better decisions, i.e. based in the tenets of sustainability. Specific research objectives in the Parks Canada evaluation included providing a clear description of the ecosystem management program; providing knowledge on stakeholder values and worldviews; explaining the bases for decision-making; examining the attitudes and knowledge level

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1. Non-Numeric Unstructured Data Indexing, Searching and Theorizing.

of stakeholders about specific aspects of ecosystem management (e.g. ecological integrity and biodiversity); as well as identifying overall program effectiveness in achieving ecosystem management (Feick, 2000).

Fifty-seven percent of stakeholders stated that Parks Canada was generally effective in its ecosystem management efforts. Reasons for effectiveness included achieving protective management; gains in research and education; influencing external stakeholders; and the skill and commitment of staff. Reasons for ineffectiveness included limited jurisdiction (in a region of diverse landscapes and multiple jurisdictions), current management practices and communication problems. Parks Canada representatives identified communication, resources, leadership and threats to ecological integrity as concerns, along with a lack of influence and the need for information to support decisions. Only 7% of stakeholders indicated Parks Canada had a great deal of influence in land use decisions, with 4% stating it had none, 38% stating it had a moderate amount, and 51% stating it had some influence. Table 2.3 summarizes Feick's findings with regard to the factors involved in decision-making by the decision-maker group. These data suggested that while decision-makers attempted to consider management goals, the environment, and information in their decisions, the reality of decision outcomes was influenced more by economic, political and personal factors, with information playing an important but smaller role in decision outcomes (44%) than the program assumption suggests (67%).

For both decision-makers and influencer-advisors, the nature and quality of information explained its role in decision outcomes. Information conveyed through trusted professional and technical personnel was most influential. Another key factor in

determining whether information was used was the manner in which the information was presented, including the qualities of the people involved, the qualities of the interaction

Table 2.3
Factors in Ecosystem Management Decision-Making Process

FACTOR FOR DECISION-MAKER	CONSIDER THE FACTOR IN DECISION (% OF DECISION-MAKERS)	FACTOR INFLUENCES THE OUTCOME (% OF DECISION-MAKERS)
Management	81	58
Environment	70	54
Information	67	44
Social-Cultural	53	53
Subjective-Personal	53	60
Economic	47	67
Political	37	58

Source: Jennifer L Feick. 2000. Evaluating Ecosystem Management in the Columbia Mountains, British Columbia. Ph.D. Dissertation. Calgary, Alberta: Department of Geography, University of Calgary, 267.

and the nature of communication pertaining to the information. The potential value of scientific information, however, was recognized. In the influencer-advisor group, 78% stated they had tried to use science in some way to influence specific land use decisions (Feick, 2000).

In summary, the findings suggested that economic factors as well as subjective factors and politics were the biggest influences on decision-making, placing scientific information in an important but secondary role in both the process and outcomes of decision-making in ecosystem management. Feick recommended that Parks Canada should, therefore, include stakeholders and their views in the implementation of ecosystem management, in educational efforts promoting it, and in establishing the criteria that measure its success, acknowledging that the use of scientific information in

ecosystem management depends on the quality of its communication and presentation (Feick, 2000).

Feick also reported that stakeholders believed Parks Canada decision-making on ecosystem management could be enhanced by broadening its research program to incorporate human impacts on all ecosystems, including aquatic ecosystems, and by receiving appropriate levels of resources from the Government of Canada so as to meet Canada's stated national and international commitments to ecological integrity (Feick, 2000).

2.7 Summary

This chapter outlined literature pertaining to basic riparian ecology and disturbance factors, key questions of knowledge to be tested in this evaluation research. The literature also described briefly the link between programming and the assumptions that knowledge and attitude are related to desired ecological behaviours arising from programming. The need to define and examine that link to evaluate programming effectiveness was suggested. The Theory of Planned Behaviour was defined as a conceptual framework suitable for that purpose, despite limitations associated with the research design that incorporated the theory into this formative evaluation. The chapter also described the evolution and methodological approaches to evaluation research and linked it to the Cows and Fish Program evaluation. The rationale for the choice of a natural, two-phase mixed-method research design has been provided. Last, two evaluation studies pertaining to resource management programs were described to place the evaluation of the Cows and Fish Program into the context of available literature.

The next chapter describes in detail the Cows and Fish Program and its programming to place its rationale of developing ecological literacy into a meaningful context for the examination of the research objectives defined in Chapter 1. The relevant research objectives are the examination of the design and delivery of programming tools and the use of the Theory of Planned Behaviour as a conceptual framework to study the attitude-behaviour relationship, whose parallels to the Cows and Fish Program were illustrated in Table 1.1.

3. COWS AND FISH PROGRAM

3.1 Introduction

Chapter 3 sets the stage for understanding the Cows and Fish Program and for carrying out the evaluation research methodologies and analyses. To place the research questions and analyses in context, and as mandated by evaluation research standards, a detailed description of the Cows and Fish Program is provided to explain its evolution, rationale, objectives and programming tools. Both the programming tools and the riparian grazing management strategies recommended in programming, against which knowledge, attitudes and behaviour are later examined, are described.

The information provided in this chapter was obtained from the sources cited, by direct observation of programming tools during the period 1997-1999 and from on-going discussions with program representatives throughout the study. Additional program and evaluation information was obtained from a formal interview conducted with program representatives in 1999 to initiate the evaluation research protocol. The roles that these and other procedures played in ensuring quality control in the evaluation are set out in Chapter 8. The initiation interview guide is provided in Appendix B. The interview consent form is provided in Appendix C.

3.2 Program Description

3.2.1 Cows and Fish Process

The 1991 environmental risk assessment report prepared for the Alberta Cattle Commission (Serecon Consulting Management, Inc., 1992) is widely viewed as the catalyst to implement action on riparian ecosystem health in Alberta. The cattle industry indicated it was prepared to be proactive and to take ownership of the riparian issue with regard to grazing management (Adams, 1997, personal communication; Glaser, 2000, personal communication). This development occurred with recognition that grazing is but one of many factors impacting riparian health. Other contributing factors were summarized in Chapter 2.

When the poor state of riparian health was identified in the 1992 environmental risk assessment report, few riparian grazing management strategies existed in southern Alberta, beyond the use of streambank fencing. Streambank fencing is an exclusion management strategy. It prevents access by cattle to riparian zones so as to facilitate streambank and/or vegetation recovery (Fitch and Adams, 1998a; Fitch, 2000). In the high-relief, flood-prone landscapes of the cattle ranching region of southwestern Alberta, construction and maintenance costs associated with fencing extensive reaches of streams and rivers almost eliminates streambank fencing as a viable management strategy for cattle producers attempting to manage riparian health. In addition to the lack of management strategies suitable to the area's landscapes, other potentially effective strategies remained elusive because no process existed at the time to identify them, particularly for privately-owned land not subject to the provincially-monitored grazing

lease system. Nor did a process exist to communicate relevant information within the producer community (Fitch, 2000).

As a result of the increased awareness about poor riparian health and its potential impact on cattle operations, however, the cattle industry sought some means to address the need to improve grazing management. Ultimately, agencies and groups with vested interests in riparian management joined in partnership, despite their traditionally diverse philosophies, to address the issue (Fitch, 2000). The partnership became known as the Alberta Riparian Habitat Management Project (now Program), commonly referred to as the Cows and Fish Program. The partners and funding associates of the program during the evaluation timeframe are set out in Table 3.1.

Table 3.1
Cows and Fish Program Partners and Funding Associates

PARTNERS	FUNDING ASSOCIATES
Alberta Cattle Commission Trout Unlimited Canada Canadian Cattlemen's Association Alberta Environment-Natural Resources Service Alberta Agriculture, Food and Rural Development-Public Lands Branch Department of Fisheries and Oceans Prairie Farm Rehabilitation Administration	Alberta Conservation Association Alberta Environmentally Sustainable Agriculture Canada Alberta Beef Development Industry Fund National Soil and Water Conservation Program

The partnership's first objective was to develop a process that would help cattle producers to better understand riparian landscapes so that they might manage both watersheds and specific riparian zones more sustainably, recognizing that cattle producers depend on these landscapes for their livelihoods. The desired outcome of the process was to achieve healthy riparian ecosystems. In developing a riparian management process, the partnership adopted a philosophy acknowledging that all

riparian zone users impact the health of those landscapes, and so all users bear some responsibility for that health. By taking a neutral approach and attempting to eliminate targeted blame from the resolution of riparian issues, the partnership hoped to establish community inclusiveness as a key feature of any new riparian management process. In addition, in contrast to the extension practices of many agricultural and environmental agency representatives typical in the past, the Cows and Fish process was intended to be characterized by personalized, respectful and frequent interaction between community members and program representatives (Adams, 1999, personal communication; Fitch, 1999, personal communication; Fitch, 2000; Hale, 1999, personal communication).

Between 1992 and 1998, when this evaluation began, a four-step riparian management process was developed and implemented by the program. Three values representing the philosophy discussed above were central to the process: it was to be community-based, it was to be producer-positive, presenting and dealing with producers and their operations in a positive manner, and it was to be based on partnership. The four-step Cows and Fish Program process is illustrated in Figure 3.1. Each of the four steps in the process is described below.

(1) Awareness-Building. Awareness is addressed through a variety of programming tools. Building of awareness, or knowledge, is viewed as the first stage in the development of ecological literacy. Awareness topics focus on the processes of riparian ecology (including the functions, evolution, biodiversity and interconnectivity of watersheds), disturbance, stream velocity, vegetation and its structure, water quality and water quantity, and forage production. Other topics

include human dependence and impact on riparian zones and the ability of riparian zones to regain function through appropriate management.

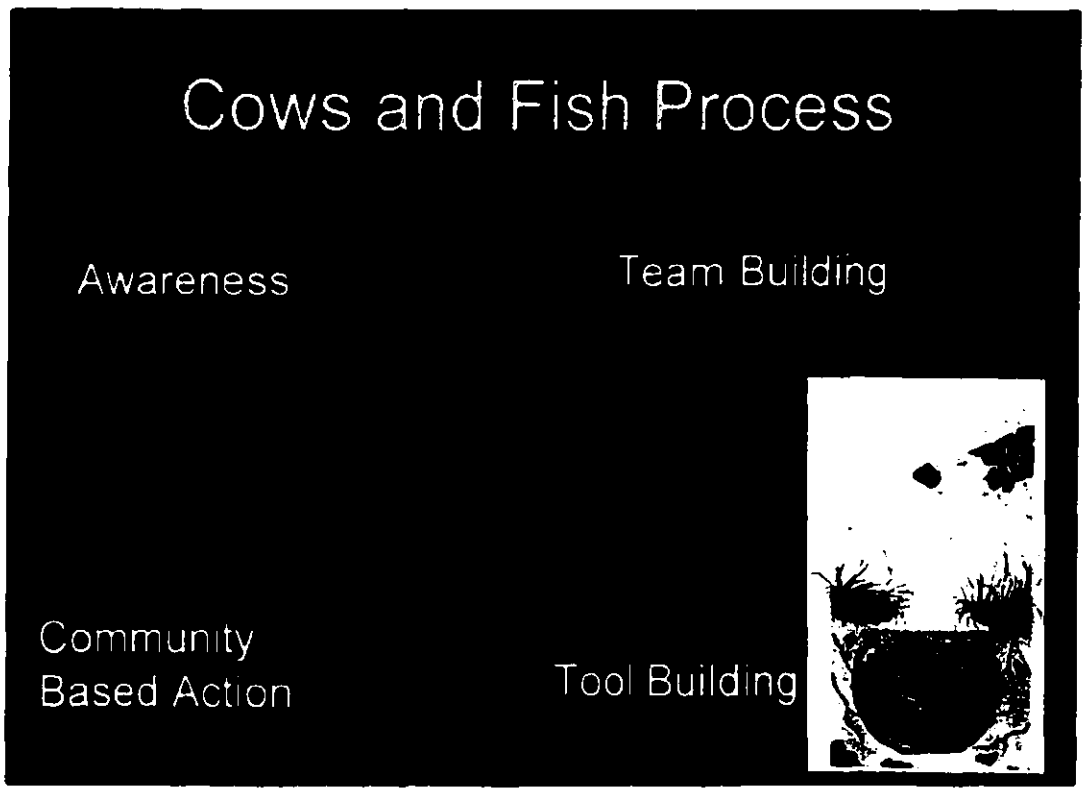

Figure 3.1
Cows and Fish Process

Source: Lorne Fitch. 2000. The Cows and Fish Process. Presentation Materials, February 29. Lethbridge, Alberta: Department of Geography, University of Lethbridge.
Note: *A fifth element relating to monitoring was formally articulated in the process subsequent to the completion of data collection in this evaluation.*

(2) Team-Building. Team-building involves implementing a multi-disciplinary, inter-disciplinary approach to riparian management. Despite traditionally opposing interests, the program includes cattle producers, scientists and agency representatives who share their particular knowledge, skill and wisdom in order to resolve landscape issues. They work within an informal structure in which awareness activities are designed and delivered.

(3) Tool-Building. Tool-building recognizes that action is required to achieve positive landscape change, and that a decision to act follows from building ecological knowledge. The Cows and Fish Program deals with two types of tools, management strategies and programming tools. Management strategies include, for example:

- five grazing systems identified and recommended by producers for their use which are suitable for riparian zones;
- a series of related general grazing techniques that may be used separately or in conjunction with the grazing systems to enhance grazing effectiveness and landscape health; and
- a monitoring technique, the lotic riparian health assessment, developed by the Riparian and Wetland Research Program of the School of Forestry at the University of Montana, and modified for use in Alberta.

The management strategies relevant in this evaluation are listed in Table 3.2. A schematic illustration of the grazing systems is provided in Appendix D. The score sheet portion of the lotic riparian health assessment is provided in Appendix E.

The function of the programming tools is to assist program representatives in awareness activities. Generally classified, programming tools are either:

- comprehensive, including both informational materials and field activities. Table 3.3 lists these tools, listed subjectively on the approximate degree of involvement required by the participant; or
- introductory, which are intended to funnel individuals to pursue information provided in the comprehensive tools. These tools are listed in Table 3.4.

Table 3.2
Cows and Fish Riparian Management Strategies

TOOL	DESCRIPTION
Grazing Systems	
Time-Controlled Grazing (also called Deferred Grazing)	Involves shortening the time period in which grazing is permitted in a pasture, allowing plants to maintain vigour and to regenerate, and restricting the impact that concentrations of cattle can cause in the riparian zone.
Rotational Grazing	Involves three or more pastures that are grazed in a different sequence each year, allowing the landscape to rest, reducing grazing intensity by dispersing cattle across the landscape, and promoting diversity of vegetation types.
Rest-Rotational Grazing	Similar to rotational grazing, but eliminates grazing from one pasture each year.
Riparian Pasturing	Involves fencing like-with-like landscapes within a riparian zone, allowing greater control over cattle distribution and promoting diversity of forage and woody vegetation.
Corridor Grazing	Involves temporarily fencing a strip along the water or wet area in a riparian zone. The strip is then grazed periodically, reducing grazing intensity and allowing the landscape to rest.
Grazing Techniques	
General	
1.	Placing salt or mineral supplies in upland areas.
2.	Using developed watering sites in upland areas.
3.	Using fences and/or hardened surfaces at watering points.
4.	Temporarily removing cattle from riparian zones during heavy rain/spring melt.
5.	Shortening the grazing period when forage plants are growing.
6.	Removing cattle from a riparian zone for one or more years.
7.	Distributing cattle across the landscape.
Monitoring	
1. Lotic Riparian Health Assessment	A non-technical standardized scoring system identifying the degree of function of 15 ecological components in the riparian zone. Objective scoring is intended to focus management action, where indicated. Ecological components include vegetative coverage, noxious weeds, disturbance-caused undesirable plants, plant health and structure, utilization of woody species, debris material, bank root mass, human-caused bare ground, human-caused structural alteration to banks, tracking and hummocking of terrain by cattle, channel incisement, bank substrate composition, intensity of animal use, erosion potential, and livestock access.

Sources: Lorne Fitch and Barry Adams. 1998a. Caring for The Green Zone: Riparian Areas and Grazing Management, 2nd ed. Lethbridge, Alberta: Alberta Riparian Habitat Management Project, 25-34; M.M. Kothmann. 1974. Grazing Management Terminology. Journal of Range Management 27(4), 326-327; Riparian and Wetland Research Program. 2000b. RWRP Lotic Health Assessment for Streams and Small Rivers. Missoula, Montana: Riparian and Wetland Research Program, School of Forestry, The University of Montana, 21-22.

Table 3.3
Cows and Fish Comprehensive Programming Tools
(informational and field activities)

TOOL	DESCRIPTION
Caring for The Green Zone: Riparian Areas and Grazing Management	A 40-page booklet describing riparian zone ecological functions, human use of riparian zones, and principles of rangeland and riparian management. The booklet also introduces riparian grazing management strategies.
Cows, Fish, Cattle Dogs and Kids	An interactive youth game show modeled on TV's Jeopardy, presented at elementary schools, agricultural fairs, park interpretive programs and community events. Themes include riparian biodiversity and the interaction between riparian zone health and cattle management.
Along the Water's Edge	A 20-minute video produced by the Department of Fisheries and Oceans that includes testimonials by cattle producers in all three prairie provinces. They talk about their experiences and decisions pertaining to managing cattle in their riparian zones.
The Green Zone	A one-hour CBC documentary produced by David Suzuki for his program, The Nature of Things. The program focuses on riparian management and ecology in various regions of Canada, including southwestern Alberta rangeland.
Wind, Grass and Sky: A Passion for Prairie	A one-hour Discovery Channel documentary produced by John and Janet Foster, showcasing grassland ecology and sustainable rangeland/riparian management, filmed on the McIntyre Ranch in southern Alberta.
General Presentations	Slide presentations of approximately one to two hours in length, describing riparian zones and some strategies for riparian zone management. Ecological function and human interaction are key themes.
Site Tours of Demonstration Ranches	Tours of cattle operations that use a variety of grazing strategies for managing riparian zones. Tours usually incorporate contrasting sites to illustrate management implications, and provide an opportunity for a question-and-answer session with the producer.
Riparian Workshops	One day meetings providing a forum for community members to identify and discuss riparian issues. Workshops begin with a slide presentation on riparian ecology, and are followed by a break-out session in which participants discuss concerns and potential solutions for riparian zone management.
Riparian Health Assessment Field Days	Starts with a workshop that includes a slide presentation addressing riparian ecological functions, followed by a field trip to teach participants how to use the lotic riparian health assessment monitoring technique. Can be combined with other tools.
Stockmen's Range Management Course	Three-day intensive field course covering many aspects of rangeland and riparian management, hosted by the Cows and Fish Program and a variety of agricultural and conservation agencies and organizations.
Community Health Assessment Process	A multi-faceted process in which a community and the program work together with the goal of identifying the riparian health of the community's watershed. This tool amounts to a framework that incorporates several programming tools, such as workshops, site tours and field days. The community ultimately permits the Cows and Fish Program field crew to carry out riparian health assessments along extensive reaches of the local watershed. Assessments are mapped and classified, then reported confidentially to community members for their use in determining management strategies.

Table 3.4
Cows and Fish Introductory (Funneling) Programming Tools
(may be used repeatedly or at any point during a producer's interaction with the program)

TOOL	DESCRIPTION
Along the Water's Edge: Enhancing Our Natural Resources (introductory pamphlet)	Introductory one-page fold-out pamphlet describing the history of the program and providing brief testimonials by producers about different riparian management strategies.
Display Booth	Shown at agricultural exhibitions, conferences, shopping malls, and various producer-related and other community events.
General Media	Articles about relevant program activities or riparian information, appearing in community newsletters and in national and local newspapers and magazines.
Website	Internet site accessible (at the time of this evaluation research) through *Ropin' the Web*, the website for Alberta Agriculture, Food and Rural Development.
Profile Producers	Producers familiar with the program who actively share information and ideas about riparian management, either through specific program activities or informally through on-going community contact.
Program Representatives (based in Lethbridge, Alberta)	Provincial Co-ordinator Assistant Provincial Co-ordinator Provincial Riparian Specialist (in-kind involvement from Alberta Environment-Natural Resources Service) Range Specialist (in-kind involvement from Alberta Agriculture, Food and Rural Development-Public Lands Division) Riparian Field Crew Chief, and crew staff

(4) Community-Based Action. Community-based action reflects the reality that cattle producers, not program or agency representatives, are the people who manage the rangeland riparian landscapes of southwestern Alberta and the area's associated natural resources. In order to identify management needs, build ecological knowledge and take advantage of relationships within a community to share information about sustainable management, deliberate and on-going interaction with cattle producers is considered fundamental to the process aimed at achieving riparian ecosystem health. Community-based action recognizes that change occurs when decisions are made *on the ground*, i.e. at the level of the individual (Fitch, 2000), suggesting that the producer is the landscape steward:

> In the end, it will be livestock producers who will make these crucial management decisions, select a variety of monitoring parameters, and choose to maintain healthy, productive environments. In all likelihood, the decisions will be made on the basis of enlightened self-interest, to maintain grazing opportunities on an exceptionally productive portion of range landscapes (Fitch and Adams, 1998b: 191).

To illustrate the differences in landscape health attributable to grazing management strategies, Figure 3.2 contains images of two reaches of a southern Alberta stream that are separated by only a fence. The first image illustrates a degraded riparian zone resulting from heavy, season-long grazing. The second image illustrates the potential ecological health of the riparian zone achieved with proper management.

Appendix F illustrates selected programming tools, including Caring for the Green Zone: Riparian Areas and Grazing Management, the Stockmen's Range Management Course, a site tour of a demonstration ranch, a riparian health assessment field day, profile producers and Cows, Fish, Cattle Dogs and Kids. The 1997-1998 Annual Report of the Cows and Fish Program reported that over 20,000 copies of Caring for The Green Zone: Riparian Areas and Grazing Management have been distributed, while close to 400 copies of the Along the Water's Edge video have been distributed. Since 1992, presentations and workshops have been delivered to over 7,000 people, about 2,600 of them in the 1997-1998 period. The majority were delivered in Alberta, with the balance delivered in other Canadian provinces and in the northwestern United States (Alberta Riparian Habitat Management Program, 1999). Approximately 30% of audience members have been non-agricultural (Fitch, 2000, personal communication).

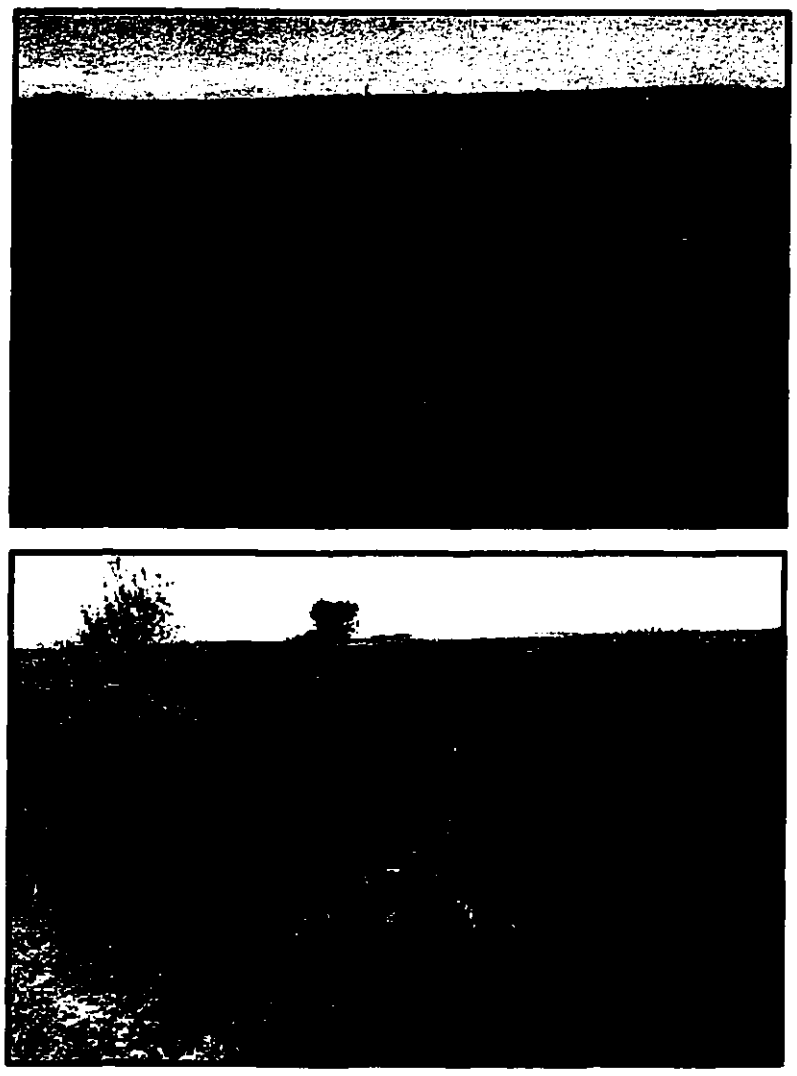

Figure 3.2
Comparative Ecological Health of a Riparian Zone

Photo: L. Fitch

3.2.2 Development of Ecological Literacy

The rationale underlying the Cows and Fish Program is that, as a result of a cattle producer being exposed to the information contained in programming tools, a desirable change occurs. Negotiative discussion with program representatives involved in this evaluation determined that such a change is defined within the program by the producer

shifting from ecological awareness to ecological action. This process is viewed as an ongoing process referred to in the program's language as the development of ecological literacy (Fitch, 1999, personal communication; Fitch, 2000). The process of developing ecological literacy is illustrated schematically in Figure 3.3.

There are two stages in the development of ecological literacy, each one associated with an underlying assumption of the process. In stage one, both introductory (funneling) and comprehensive programming tools describe key concepts relating to riparian ecology and human interaction with riparian ecosystems. The effectiveness criterion for this stage, as defined by program representatives, is that the producer *builds* ecological knowledge, indicating *intermediate* effectiveness in developing ecological literacy. Building ecological knowledge may be represented by the producer exhibiting greater insight into and understanding of riparian ecology and ecosystems, and expressing interest in or seeking information about riparian ecology and ecosystems.

In stage two, programming tools (introductory and/or comprehensive, depending on the nature and timing of the interaction of the producer with the program) deliver information about management strategies and monitoring techniques. The effectiveness criterion defined for this stage of the process is that the producer *applies* ecological awareness, representing *ultimate* effectiveness in the program's rationale of building ecological literacy. Applying ecological awareness is indicated by the producer using the desirable riparian management strategies and techniques in his or her cattle operation.

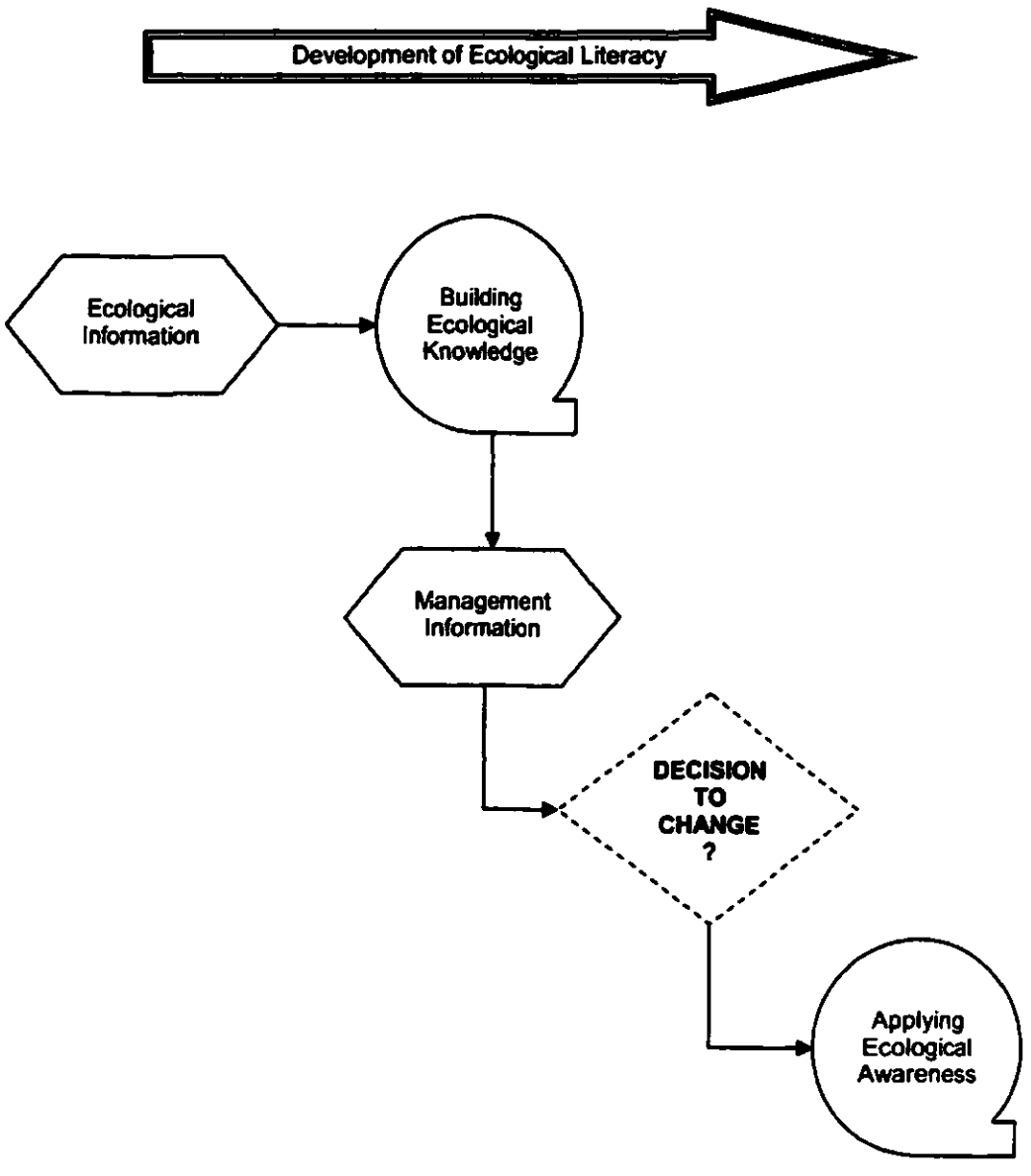

Figure 3.3
Development of Ecological Literacy in the Cows and Fish Process

Note that identifying effectiveness criteria in a formative evaluation such as this one is distinct from setting measurement standards for those criteria (Patton, 1997). It was agreed with program representatives that it would be premature during this evaluation to attempt to identify arbitrary standards as indicators of *levels* of programming success

when no benchmark yet existed for determining them (e.g. where x% of participants report meeting a given criterion which is interpreted as a particular degree of success). This evaluation was exploratory and descriptive in terms of the program rationale, rather than goal- or extensiveness-based (Patton, 1997).

In addition, and as indicated previously, it was not possible in this research to examine whether exposure to Cows and Fish programming tools caused a change in behaviour. The inability to meet the assumptions underlying an experimental research design that would have allowed valid causal relationships to be identified, either between comparison groups or over time, was precluded, as was the ability to identify change over time. To address the research questions set out in Chapter 1, however, it was possible to examine both current behavioural influences (the elements of the Theory of Planned Behaviour) and behaviours of respondents (e.g. use of grazing systems) to provide a preliminary investigation into any potential attitude-behaviour relationship influencing the development of ecological literacy.

3.3 Summary

Chapter 3 has provided a detailed description of the Cows and Fish Program, its programming tools and the program rationale of developing ecological literacy. A thorough understanding of these matters is necessary before proceeding to data collection and analysis relating to programming effectiveness. Chapter 1 defined the research objectives, namely the application of a structured evaluation framework in the field of resource management, the examination of the effectiveness of the design and delivery of programming tools, and the use of the Theory of Planned Behaviour as a conceptual framework to explore the attitude-behaviour relationship in terms of how it

may inform programming effectiveness. Chapter 2 placed these objectives into the literature of program evaluation and the study of attitudes and behaviour. Accordingly, it is now possible to move to a description of the methods and findings of the evaluation. Chapters 4 and 5 deal with the qualitative phase of the evaluation, while Chapters 6 and 7 address its quantitative phase.

4. METHODS - PHASE 1 (QUALITATIVE)

4.1 Introduction

Chapter 4 describes the research methodology used for Phase 1 of the Cows and Fish Program evaluation. The chapter first defines the focus group technique selected for use in Phase 1. The role and values of the researcher are then described insofar as these matters relate to the conduct of this phase of the research. This information is followed by an outline of the data collection and analysis procedures applied to the research questions set out in Chapter 1. Those questions are as follows.

(1.1) What characteristics of the design and delivery of programming tools promote or impede ecological literacy, and how do they promote or impede ecological literacy?

(1.2) How do the impacts of the tools compare to the objectives identified by program representatives for those tools?

(1.3) What improvements, if any, are recommended to enhance the effectiveness of the tools?

4.2 Researcher Role

As recommended by Creswell (1994) and the Joint Committee on Standards for Educational Evaluation (1994) it is appropriate to state the researcher's personal values at the outset of a qualitative research study, insofar as they pertain to the research. This requirement is related to the potential for bias arising out of the deliberate, interactive and personal involvement of the researcher in data collection and analysis, and to

address the requirement of confirmability in qualitative research. This researcher's values with regard to the Cows and Fish Program evaluation research are shaped by prior academic experience, prior professional experience, and experience with the Cows and Fish Program and the cattle producer community.

With regard to academic experience, the researcher was the sole recipient in 1997 of the highest class of bachelor degree awarded by the University of Calgary in Geography, indicating a commitment to excellence in the discipline. Professional experience of almost 20 years has demanded discretion, trust and reliability in situations of privilege. These same personal standards are applied to the Cows and Fish Program evaluation research. The researcher has limited past personal experience with cattle ranching and cattle producers. This factor presented a small disadvantage in terms of some basic knowledge gaps but was also, conversely, viewed as an advantage in terms of a lack of preconceptions that might otherwise have had the potential to influence analysis. To gain experience about the industry and to understand the Cows and Fish Program more fully, the researcher spent considerable amounts of time during 1997-2000 studying and participating in the Cows and Fish programming tools, and visited or spoke at length with a number of cattle producers in southern Alberta who were both participants and non-participants in the evaluation.

The researcher became familiar with the Cows and Fish Program in 1996 after participating as a volunteer in a jointly-sponsored riparian field event at the Bar U Ranch National Historic Site near Longview, Alberta. Interest in the program grew based on the approach to landscape management communicated at that time by the program representative. In the researcher's view, that approach applied principles of physical geography to real-life settings in which individuals take initiative to improve landscape

quality. This, again in the view of the researcher, represented the essence of both geography and sustainability: positive human interaction with the natural environment. The researcher's views in this regard underlie the interest in and regard for programming efforts, and frame this evaluation.

During the past three years, the researcher has, in negotiating and implementing this research, formed working relationships with the program representatives. Their accessibility and input enabled the researcher to better understand both the program and the evaluation research requirements and, accordingly, enhanced the ability to ensure quality control in the research, as well as to interpret and prioritize the large volume of data arising from the evaluation. At the same time, a potential for developing positive bias toward the program when interpreting data was created. Extensive efforts were made to avoid bias through:

(a) balancing openness and discretion in negotiative discussions with evaluation users pertaining to the research (Joint Committee on Educational Evaluation, 1994), including specifically discussing potential conflict-of-interest;

(b) maintaining regular contact with program personnel, with careful and complete record-keeping of discussions and procedures associated with the evaluation as the research progressed (Mertens, 1998);

(c) preparing an evaluation agreement (Patton, 1997) which specified that all phases of the research were agreed, that all records and procedures were to be maintained and are subject, if deemed necessary, to future scrutiny by an external auditor experienced in program evaluation; and

(d) paying attention to quality control, including making appropriate decisions with regard to purpose, setting, participants, focus group moderation and questions,

as well as ensuring the systematic and verifiable handling of data (Krueger, 1993) which addressed the requirement of dependability in qualitative research (Mertens,1998).

As indicated previously, negotiation and utility are essential aspects of utilization-focused evaluation. Accordingly, continual effort was made to involve program representatives in the evaluation process to encourage their commitment to the evaluation and to the use of its results. Numerous meetings and discussions took place with program representatives throughout the evaluation to gain understanding of the purpose, nature and activities of the program and its operational context, to review and agree upon evaluation methods and materials, to discuss ideas and priorities, and to agree on the fundamentals of the program's philosophy and rationale that are central to the evaluation. These actions are described throughout this document in sufficient detail to meet the quality control requirements for qualitative research design defined in Chapter 2, namely credibility, transferability, dependability, confirmability and authenticity (Mertens, 1998).

4.3 Focus Group Technique

Phase 1 employed focus groups, a form of group interviewing commonly used as a technique in qualitative research (Morgan, 1988). Focus groups are informal, small-group discussions among participants who have been expressly chosen for the task and in which conversation on topics of interest to the researcher is permitted to develop naturally under the guidance of a moderator (Dean, 1994). In this way, focus groups take advantage of "group interaction to produce data and insights that would be less accessible without the interaction found in a group" (Morgan, 1988: 12).

Focus groups are well-suited to gaining insight into the perceptions, feelings and thoughts of participants (Krueger, 1988), including the reasons why certain viewpoints are held (Dean, 1994; Morgan, 1999). Morgan and Krueger (1993) suggest several benefits of using the focus group technique, including bridging the logistical communication gap between (in the case of this research) program representatives and program participants, and investigating complex behaviours and motivations. This latter benefit occurs because a focus group can provide a non-threatening setting in which participants can express their views on a topic, listen to the views of others, and then explain their own experiences more explicitly. The strength of this process is its ability to extract valuable information not necessarily available by other means, including individual interviews (Morgan, 1988). Accordingly, the focus group technique was appropriate for Phase 1.

Focus groups are led by a moderator, who may or may not be the researcher. The moderator either passively or actively guides the discussion to points of interest in the research, using a pre-prepared interview guide of open-ended questions pertaining to the major topics to be discussed (Dean, 1994; Frey and Fontana, 1993; Morgan, 1988; Morgan, 1999). Participants are selected by the researcher in a deliberate, rather than random, manner, based on the similarity of participants to each other and on their familiarity with the topics to be discussed. This is done so that participants are comfortable having a discussion in a relatively controlled environment, and so that they can speak in an informed manner about the questions of interest. It is not necessary or even advantageous that they be acquainted with each other (Krueger, 1988; Morgan, 1988; Morgan, 1999). An appropriate number of participants in a session is somewhere between six and ten, and certainly no more than 12, the point at which the desired interaction becomes difficult to control (Morgan, 1988).

4.4 Data Collection

4.4.1 Development Stage

The development stage of Phase 1 of this evaluation research comprised three steps. These steps included:

(a) creating a focus group interview guide to encourage and direct the discussion;

(b) determining the best way to present or describe the variety of programming tools to enable discussion to occur within the structure of the focus group setting; and

(c) developing a mechanism to assign an effectiveness rating to tools to reflect participants' experiences with each tool.

The first step in the development stage involved the creation of an interview guide containing questions and verbal probes for each tool. The interview guide for this research used the funnel approach (Morgan, 1999), starting with one or two general interest questions that each participant could answer easily. The funnel approach allowed participants to establish a level of comfort in participating in the discussion, leading into discussion of more detailed topics of interest to the researcher, namely the effectiveness of the design and delivery of individual programming tools.

Two versions of the interview guide were developed. The first version was designed for *effectiveness* assessment by the majority of participants (those who had a reasonable degree of experience with the programming tools) to explore whether the tools affect knowledge and action and what, if any, modifications to the tools they considered appropriate. The second version of the interview guide was designed for *needs*

assessment, enabling the smaller proportion of participants having little or no prior exposure to the programming with an opportunity to explain the type of programming that might encourage other cattle producers to accept the Cows and Fish Program and begin the process of developing ecological literacy.

The three-part introductory dialogue in the interview guide used is set out below.

(1) *Since we're talking today about grazing management and good ways to communicate with each other about that, I wonder if each if you could think back a bit and remember a situation where you wanted to find out something about grazing management or grass management or riparian management. Can you think back a bit and give a general example of why you were looking for information about grazing management, and what your experience was?*

(2) *So, talking about new things, when you hear the word riparian, what are some things that come to mind for you?*

(3) *And putting grazing management and riparian areas together, what are some things that come to mind about the Cows and Fish program?*[2]

The interview guide then provided an opportunity for the researcher to read a general, pre-prepared description of the Cows and Fish Program, so that all participants in all sessions could begin from the same starting point before proceeding to discussion about specific programming tools. The remaining phases of the interview guide dealt with questions relating to the tools under discussion, as well as probes to encourage or re-direct discussion, if necessary. By design, the questions were very general (Morgan, 1999), such as: "*What are your impressions?*", "*In what ways has this been helpful to you?*", "*What characteristics could you comment on?*", while the probes were more

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2. The dialogue was modified slightly for the high exposure focus group session, as defined below in the Recruitment Stage section of this chapter.

specific, designed to enhance discussion on points of interest. A list of some of the probes is shown in the matrix provided in Appendix G.

The interview guide stipulated a two-step discussion about each tool. The first step permitted detailed experiences to be exchanged by participants about the design, content, delivery and outcomes of the tools, with the researcher providing general guidance on each topic. The second step allowed the participants to review the tool objectives (discussed later in this section) and to modify, rank and rate them based on the preceding discussion. This latter step was not taken in the needs assessment sessions (low exposure participants), because without prior experience of the program they could not speak in an informed manner about past programming impact.

The interview guide was reviewed and adapted in a practice session that included a program representative, a former rancher and a neutral third party experienced in focus group research. Sections of the guide devoted to each programming tool were timed to ensure all topics could be addressed in the allotted time frame for each session.

The second step in the development stage involved determining how to cover a large number of tools in a practical way, to assist focus group participants to speak about them in an informed manner. Logistic challenges were encountered due to many of the tools being field-based and not replicable in a focus group setting, and because participants may have been involved with the tools as long before the focus group sessions as two or three years. The steps shown in Table 4.1 illustrate how these challenges were dealt with. For example, portions of the display booth and the youth gameshow were set up and described; verbal descriptions were given about profile

producers, general presentations and field events; segments of the various video productions were played; and print materials and webpage contents were distributed.

Table 4.1
Method of Programming Tool Presentation

TOOL NAME	METHOD OF PRESENTATION
Display Booth	Borrowed from the Cows and Fish Program and set up in focus group session.
Cows, Fish, Cattle Dogs and Kids	Key props borrowed and illustrated. Verbal description provided based on information in Table 3.4.
Community Health Assessment Process, General Presentations, Health Assessment Field Days, General Media, Profile Producers, Program Representatives, Riparian Workshop, Stockmens' Range Management Course, Site Tours of Demonstration Sites	Verbal description provided based on information in Tables 3.3 and 3.4.
Suzuki and Foster videos Along the Water's Edge video	Relevant portions dubbed onto one video for presentation in focus group session.
Caring for the Green Zone: Grazing Management and Riparian Areas (booklet), Introductory Pamphlet	Copies provided for discussion.
Website	Webpages printed and bound in booklets for review in focus group session.

The third step in the data collection process involved the development of a procedure that would allow participants to sum up their discussion and to rate the overall success of each tool. The reason for rating the tools was to provide, in addition to the sufficient, detailed description arising from participant commentary, a summary mechanism for program representatives to compare what they believe to be delivered by each tool with what community members believe to be delivered by that tool. The rating step was operationalized by identifying general delivery objectives for each of the 17 programming tools. To ensure utility in the evaluation results, these objectives were reviewed, modified and ranked in discussions with the program representatives, prior to focus groups being held, to incorporate their experiences and assumptions about specific tools. The master list of ranked objectives used for discussion in the focus groups is

shown in Table 4.2. From this master list, a series of documents was prepared, each containing the name, brief description and objectives for those tools to be addressed in each separate focus group session, so that participants could comment on, modify, prioritize and rate the effectiveness of the objectives based on their own experience.

Table 4.2
Programming Tool Prioritized Objectives

TOOL NAME	OBJECTIVES AS RANKED BY PROGRAM REPRESENTATIVES
Introductory (Funneling) Programming Tools	
Introductory Pamphlet	1. Briefly introduces history and objectives of the Cows and Fish Program to broad audiences
Display Booth	1. Provides a general introduction about riparian zones to focus attention on role of management (using simple before/after visuals) 2. Provides opportunity to obtain copy of booklet 3. Provides forum to ask questions about program objectives (booth is not always staffed)
General Media	1. Provides general introduction to program to broad audience 2. Raises program profile 3. Provides information on how to contact the program in order to obtain riparian or range management information
Website	1. Provides program goal and how to contact program office 2. Provides introductory information on hydrological function of riparian zones
Profile Producers	1. Legitimizes program messages by presenting a producer as the messenger 2. Spreads program messages by taking advantage of alternate sources
Program Representatives	1. Provides credible source of information/believability 2. Provides alternate source of information from government agencies 3. Provides a conduit for building trust about the program 4. Puts a face on the program 5. Clarifies the program (what it is, what it isn't)
Comprehensive Programming Tools	
Caring for The Green Zone: Riparian Areas and Grazing Management (booklet)	1. Provides general riparian messages in print format addressing ecological function, management principles, grazing strategies, human role/impact, in order to raise awareness 2. Introduces management strategies, to change management behaviour
Cows, Fish, Cattle Dogs and Kids	1. Introduces basic riparian ecology concepts to young people (elementary age) 2. Introduces link between grazing management and riparian health, including fish and wildlife, to young people 3. Provides a tool that incorporates riparian messages into related school curriculum elements, using teachers as the messenger
Along the Water's Edge (video)	1. Legitimizes riparian management message by presenting prairie producers as messengers, in video format
The Green Zone (Suzuki video)	1. Introduces importance of riparian zone to a national audience 2. Builds general awareness of riparian zone function
Wind, Grass and Sky: A Passion for Prairie (Foster video)	1. Introduces concept of stewardship by producers, including co-existence of cattle and streams 2. Illustrates real-life examples of program tools (such as SC) and techniques (such as gravel bases and fencing) 3. Provides general range and riparian information

TOOL NAME	OBJECTIVES AS RANKED BY PROGRAM REPRESENTATIVES
General Presentations	1. Provides a general overview of key range and riparian ecology topics to kick-start increased awareness, introducing the idea that management can be effective in reducing grazing impacts 2. Reaches broad audiences in urban and rural areas, to raise awareness
Site Tours of Demonstration Ranches	1. Legitimizes the Cows and Fish Program messages by presenting the producer as the messenger by illustrating locally useful practices 2. Presents ground validation or evidence of concepts and practices being applied (incorporating riparian zone into range management using the foundation management principle of rest) 3. Promotes team building and community action
Riparian Workshops	1. Delivers in-depth slide talk (function, grazing principles and strategies, human role/impact) to raise awareness 2. Encourages community-based action so people start talking the same language 3. Promotes team-building with and among agency staff and community representatives
Riparian Health Assessment Field Days	1. Provides field instruction on the health assessment technique as a way to encourage individual monitoring practices 2. Delivers in-depth Cows and Fish slide talk (function, principles, human role/impact, and touching on grazing strategies) to raise awareness and encourage changed management behaviour
Stockmens' Range Management Course	1. Provides Cows and Fish Program messages (in shared agency setting) through field instruction, including health assessment, plant ID, soil typing 2. Shares expertise (e.g. historical land use, role of fire, alternate forms of winter grazing, fencing, watering) from various disciplines/perspectives, including producers 3. Legitimizes message by presenting the producer as the messenger, illustrating enlightened use
Community Health Assessment Process	1. Assists communities to assist themselves (liaise on funding, hire range consultants, provide health data for individual or shared use) 2. Encourages community-based action 3. Promotes team-building within the watershed, to include agency, municipal, producer and other interest group representatives

4.4.2 Recruitment Stage

Focus group participants were drawn from cattle producers and representatives of relevant government agencies, industry organizations and conservation organizations experienced with or active in Cows and Fish Program delivery, who were known to the researcher and/or to program representatives. The representatives involved all had several years of experience in agricultural extension and involvement with Cows and Fish programming, and so were well placed to speak in an informed manner about awareness tool effectiveness. By 1999, when the focus groups were being designed,

the Cows and Fish Program had entered a phase of expansion into areas outside the southwest portion of the province, dealing with different types of community groups and different riparian issues. To keep the evaluation current with the use of the programming tools under review and to obtain more comprehensive coverage of experiences with the program as it evolved (Patton, 1997), a small number of stakeholders from outside the study area illustrated in the map in Figure 1.1 were invited to participate in the qualitative phase of the evaluation. In addition, a small number of participants who resided outside that study area were included because they represented organizations and agencies actively involved in Cows and Fish Program delivery within the study area.

To obtain as much depth of explanation as possible about the design and delivery of programming tools, three different types of focus group sessions were employed. The type was based on the level of participant exposure to programming tools. Using available records, and based on discussion with program representatives and the participants themselves, those individuals with little or no exposure to any of the tools were grouped into a low exposure category: these sessions utilized the *needs* assessment interview guide and dialogue prompts. Being unknown to the Cows and Fish Program representatives and/or the researcher, cattle producers needed for the low exposure group could be identified, fortuitously, from the participants taking part in the (concurrent) quantitative phase of the evaluation.

Participants were grouped into the high exposure category if they had extensive experience with several tools and/or if they had been involved in some capacity with the program's development over a number of years. All other participants were grouped into a medium exposure category, which ultimately included those having either some exposure to some of the tools, or a greater amount of exposure to a smaller number of

tools. Participants in the high and medium exposure groups were invited to sessions that utilized the *effectiveness* assessment interview guide and dialogue prompts.

The choice of potential participants was a subjective process (Morgan, 1999) based on the researcher's view of how interested individuals were; how willing they might be to discuss the program in an open group setting; and, for those chosen from the quantitative phase, whether they had expressed a particular interest in any or all of the Cows and Fish Program, in riparian management generally, or in the evaluation specifically. Approximately 40 potential participants were identified by this process; 36 expressed interest when contacted by telephone. During initial telephone discussions, the purpose of the focus groups was described, assurances of confidentiality were provided, and the individual (or, in the case of some agency representatives, his/her designate) was invited to participate. Letters of invitation were sent confirming attendance, advising that participation was voluntary and confidential, and reiterating the purpose of the focus groups. Follow-up reminder telephone calls were made to participants one to two days prior to each session. Neither a fee nor reimbursement of expenses were offered that might have influenced or biased a participant's involvement. Participants were free to select the most convenient location for the exposure category into which they had been grouped.

4.4.3 Implementation Stage

Accounting for attrition and for the distance some participants needed to travel to attend the sessions, and with a goal of between six to ten participants per focus group session, it was determined that five focus group sessions would be held at three different locations across southwestern Alberta. The locations are summarized in Table 4.3.

Four or five sessions are typically considered sufficient to obtain the required data and to limit the unnecessary duplication that tends to occur as more sessions are held (Krueger, 1988).

Table 4.3
Location of Focus Group Sessions

LOCATION	EXPOSURE LEVEL FOCUS GROUPS
Pincher Creek	Low/Non (1 session)
Chain Lakes	Medium, High (1 session each)
High River	Low, Medium (1 session each)

Due to time constraints, it was not feasible to attempt to address all 17 Cows and Fish programming tools in every session. Best efforts were made, however, to obtain the highest degree of coverage as was practical for as many tools as possible. Appendix G contains the matrix of tools discussed in each of the five focus group sessions. Consistent with guidelines recommending that appropriate efforts be made to motivate participants to attend and participate in the full session (Dean, 1994; Krueger, 1988; Morgan, 1999; Patton, 1987), logistics were designed to minimize the inconvenience of participants. For example, sessions began at 10:00 am to allow participants to complete morning ranch obligations and/or to travel distances of up to 100 km to the focus group location. Lunch was provided. Participants were told in advance that sessions would finish at approximately 2:15 pm. Although a three-hour discussion period is longer than the usual 90-120 minutes for focus groups (Patton, 1987), the time-frame was stretched to incorporate as many tools as possible and to recognize that participants had committed to travel some distance in order to attend. Four of the five groups passed the expected finish time by between 20 and 60 minutes, at the choice and mutual agreement of participants, who enthusiastically pursued discussion on a variety of topics. In a few

cases, participants specifically asked if they could speak to tools not on the agenda for their session.

The researcher acted as moderator and was assisted by one individual, as recommended by Morgan (1999). Due to the complexity of the focus group administration, including the number of sessions; the amount of travel; and the use of several types of video and audio equipment as well as flipcharts, as well as the specialized nature of the management strategies around which discussion was anticipated to take place, a representative of the Cows and Fish Program was selected to act as the researcher's assistant. That individual was introduced to the group as an employee of the program and assurances were provided to participants about confidentiality. While the assistant's role was one of support, with no direct involvement in guiding the discussion, that individual's presence tended to enhance discussion in the sessions at times when questions arose about the program itself or about riparian management, to which the researcher could not fully respond. The presence of the program representative in the sessions appeared to not restrict participant commentary, although no opportunity existed to confirm this possibility outside of the sessions. Rather, the presence of the representative appeared to encourage frank commentary.

Participants were encouraged to be as forthcoming as possible in their discussion. All focus group sessions were audio-taped (Krueger, 1988) using a high quality multi-zone microphone designed to capture all sound in the room. The arrangement was explained to participants at the beginning of each session, stressing that its purpose was to help ensure that a full and complete record was made of their viewpoints, increasing the fairness and accuracy of the focus group analysis and reporting. One participant expressed nervousness about the machine, but this dissipated within approximately half

an hour. Participants were also reminded that their involvement in the focus groups was confidential and anonymous; that their comments would be held in strict confidence by the researcher and the assistant; that the transcription of the audio tapes was to be completed and held by the researcher only; and that all related records would remain in the sole possession of the researcher. Inadvertently, consent forms were not distributed to participants for signature. Participants were provided with an agenda, handouts of selected programming tools (as set out in Table 4.1) and the list of objectives (as set out in Table 4.2) for those tools included on the session agenda.

The interview guides were followed consistently, varying only depending on whether the session was oriented to effectiveness or needs, as described previously, and where participants asked about or volunteered information about programming tools not specifically listed on their agenda. At the end of the discussion about each tool, participants were asked to assign effectiveness rankings for tool objectives and overall tool effectiveness ratings. These were recorded on a flipchart using a simple tally method. Possible effectiveness rating categories were Excellent, Good, Fair and Poor. As usually occurs, some last-minute attrition and scheduling conflicts occurred, resulting in a small amount of mixing of exposure levels within sessions. Attendance at the sessions is summarized in Table 4.4. Focus group session size ranged between five and seven participants, involving a total of 31 participants.

Table 4.4
Participants by Focus Group Type and Exposure Level

	NEEDS ASSESSMENT	*EFFECTIVENESS ASSESSMENT*		
PARTICIPANT TYPE	**# LOW EXPOSURE (2 sessions)**	**# MEDIUM EXPOSURE (2 sessions)**	**# HIGH EXPOSURE (1 session)**	**TOTAL**
Producer	12	4	4	20 / 64%
Agency Representative *	1	2	5	8 / 26%
Organization Representative **	2	1	0	3 / 10%
Sub-total		7	9	
TOTAL	**15 / 48%**	**16 / 52%**		**31 / 100%**

* Alberta Agriculture, Food and Rural Development; Alberta Environment; Prairie Farm Rehabilitation Administration; Municipal District of Ranchland.
** Alberta Cattle Commission; Alberta Conservation Association; Canadian Cattlemen's Association.

4.5 Data Analysis

Qualitative data analysis is a complex, creative process of reduction and interpretation that is intended to bring order and context to data by organizing it into consistent patterns and categories (Boyatzis, 1998; Marshall and Rossman, 1989). Its purpose within the interpretivist evaluation research paradigm is to formulate meaning about a local situation through the provision of thick description (Geertz, 1973), keeping in mind the research questions and the use of evaluation results (Krueger, 1988; Patton, 1987; Tesch, 1990, as cited in Creswell, 1994: 154).

Analyzing focus groups is a multi-step process (Boyatzis, 1998; Krueger, 1988). The researcher deals first with the raw data (participant commentary). Through an interpretive process involving a series of iterative reviews of the commentary, descriptive statements (summaries of participant commentary) are developed that reflect patterns recognized in the data. Through repeated and thoughtful immersion in the data that serves to identify greater detail, accuracy and meaning, the researcher is able to

interpret and help others to understand what the participants have communicated (thematic meaning). The raw data linking the descriptive statements to the themes explaining it are identified by data codes developed by the researcher (Bogdan and Biklen, 1992, as cited in Creswell, 1994: 154; Boyatzis, 1998; Knodel, 1993; Strauss, 1987). Coding is the general term applied to the process of conceptualizing and grouping data consistently and fairly based on patterns discerned by the researcher.

The next section of this chapter identifies the procedures followed to record, code, describe and explain the focus group data in the manner suggested in the literature. Sufficient detail is provided to address the requirements of credibility, transferability, dependability and confirmability in qualitative research, permitting the researcher to provide the thick description necessary to understand and explain participant experience with the Cows and Fish programming tools.

4.5.1 Dealing with the Raw Data

The first stage in performing the data analysis was dealing with the raw data. It began with the task of transcribing the audio tapes that recorded the participant commentary during the five focus group sessions. The transcription was saved in a word processing file that contained a multi-column table identifying participant identity, exposure level and commentary. Each line in the table represented a participant dialogue string, or text unit. The transcription amounted to approximately 250 pages, or about 12,500 lines, of text. While time-consuming, the transcription task proved helpful in the subsequent analysis steps by highlighting ideas and refreshing observations made at the time the sessions were held.

With the transcription complete, the process of conceptualizing patterns of meaning in the data began. First, the transcription was printed and read through once in its entirety. Using the focus group interview guide for direction (Morgan, 1999), and keeping in mind research question 1.1 that required design and delivery factors promoting or impeding ecological literacy to be identified, a sequentially-numbered category code list was recorded, based on similar words or word sets (text sets). The transcription was read repeatedly in an iterative process aimed at developing greater understanding of the data. As categories were discerned, codes were assigned to similar text sets throughout the transcription. Within each category, related topics were also assigned a sub-code. An example of a code set is shown below.

14. Impediments to Change
14.1 Economics/Cost/Time
14.2 Skepticism/Lack of Trust

Each code set was prefaced with an identification code for the programming tool to which the text set referred, e.g. SC-14.1 (SC being the identification code used for the Stockmen's Range Management Course tool). General commentary not associated with a specific programming tool was given a dummy tool code of X. A maximum of five category codes was assigned to any text unit.

The coding structure and coding list were modified continually as the transcription was reviewed and new meanings and ideas became apparent. The transcription was also reviewed overall to ensure that code categories were applied consistently. A total of 193 code sets were identified.

4.5.2 Developing Descriptive Statements

The second stage of data analysis involved developing descriptive statements that reflected the content of the coded text sets. This involved several tasks. First, the data codes assigned manually to every text unit were entered into the master transcription word processing file. Five table columns were inserted to allow entry of the maximum number of codes assigned to any text unit. The new coded file was copied into five new files where text in four columns was deleted, leaving only one column that contained data associated with just one code. In each of the five files, that column was then sorted by the code, thereby grouping together related text sets across all 17 tools.

To facilitate a review of coded text units for each individual tool, 18 new word processing files were created, one for each of the 17 tools plus one for the general X-coded data. Coded text sets were cut and pasted from the five all-tool files into these new individualized tool files. The data were then sorted by code. This provided one file for each tool that contained all the relevant coded text for that tool, grouped in a format useful for analysis.

Through a further iterative process of text review, and working from the contents of the 18 files, descriptive statements reflecting the general content of the grouped text sets were developed. As they were created, each was entered into a new chart-style word processing file, to be called Content Analysis Summary documents. One Content Analysis Summary file was created for each tool. The inclusion of descriptive and theme statements together with extensive participant commentary reflects a pseudo-narrative style appropriate to the natural character of the research design (Miles and Huberman, 1984 as cited in Creswell, 1994: 168).

Sample descriptive statements with associated commentary are shown below, with regard to the Caring for the Green Zone: Riparian Areas and Grazing Management programming tool.

It is suitable for the foothills.	Producer (High) * "I think it's an excellent book for this area."
The content is not seen as relevant outside of the foothills.	Producer (Low) * "This looks like they're dealing with a very narrow band of the ecology in that given streambed."
	Agency (Medium) * "It's mainly dealing with issues in southwestern Alberta."

* indicates exposure type or group

4.5.3 Developing Theme Statements

As the descriptive statements were developed, broader theme statements evolved that summarized each set of descriptive statements. For example, the descriptive statements illustrated above yielded the following theme statement, one of several developed for the Caring for the Green Zone: Riparian Areas and Grazing Management tool, based on all the commentary coded for that tool.

> *The tool does not effectively address the needs of producers in areas outside the southwest of the province, because its content focuses on landscapes and management strategies relevant to the foothills region only.*

Lastly, addressing the research questions for this phase of the evaluation and in accordance with negotiated needs of the evaluation users, several types of information were added to the Content Analysis Summary documents. These included general recommendations formulated by the researcher about adjustments indicated to increase the effectiveness of each tool. These arose from an understanding of the data and the

collective theme statements. Some detailed ideas about design and content that were provided by participants were also added, as was a tally of the rankings assigned by participants to each tool objective. In the few cases where participant rankings differed from those identified by program representatives, the alternate rankings and any relevant commentary were noted. An overall effectiveness rating for each tool was assigned by the researcher according to the tally of participant responses. Tools with approximately equal tallies of Excellent and Good ratings were assigned a Very Good rating.

Two sample draft Content Analysis Summary documents, for the Display Booth and Caring for the Green Zone: Riparian Areas and Grazing Management tools, were provided to program representatives for review, discussion and clarification. Draft Content Analysis Summary documents for all tools were presented in the spring of 2000 to Cows and Fish Program representatives, partners and funding associates to assist in their strategic planning for 2000-2001.

The interpretation of focus group commentary did not include coding or quantifying text sets in terms of age, gender or other type of classifying information, although this is sometimes undertaken when undertaking content analysis of large sets of data (Krueger, 1988; Strauss, 1987). Analysis of that type did not fall within the negotiated use requirements of the program representatives and, accordingly, did not add utility to the evaluation.

4.6 Summary

Chapter 1 identified the objective of this phase of the evaluation as an examination of the effectiveness of the design and delivery of programming tools in developing ecological literacy. More specifically, the research questions required identification of factors promoting or impeding that process. This chapter has outlined the data collection and analysis procedures used to capture and analyze the viewpoints of users of the tools (i.e. focus group participants). These procedures were chosen because they were grounded in accepted qualitative research methodology and because they provided a full and accurate foundation from which to interpret and contextualize participant experiences for the benefit of the evaluation users. Having explained the procedures employed, the next step is to provide the thick description and interpretation indicated by the qualitative data as it relates to the effectiveness of the programming tools. Chapter 5 sets out these findings.

5. RESULTS AND DISCUSSION - PHASE 1 (QUALITATIVE)

5.1 Introduction

Chapter 5 provides the findings of Phase 1 of the Cows and Fish Program evaluation, discussing how the design and delivery of programming tools has, as indicated by the qualitative data, promoted or impeded ecological literacy, together with recommendations necessary to address issues indicated by the data. First, the chapter provides holistic, thick description pertaining to programming tool effectiveness. The Content Analysis Summary documents developed for this purpose for each tool, as defined in Chapter 4, are presented in this chapter. Each contains descriptive and theme statements supported by illustrative participant commentary that is grouped by exposure category. Tool objective rankings, effectiveness ratings and tool-specific recommendations are included. Due to space limitations in this thesis, it is only possible to present the entire Content Analysis Summary for one tool. The Community Health Assessment Process tool was chosen for this purpose because it represented several program values and activities, and was found to illustrate a number of themes common to other tools. The first section of this chapter, therefore, conveys the findings relating to the Community Health Assessment Process tool, presenting in the format of a complete Content Analysis Summary.

The presentation of findings about the Community Health Assessment Process tool is followed a short-form version of the Content Analysis Summary for each of the other 16 tools. These short-form versions provide only the descriptive and themes portions of their respective Content Analysis Summary documents, together with brief tool-specific recommendations suggested by participants for improving effectiveness. The complete

version of the 17 Content Analysis Summary documents is approximately 80 pages in length and is available under separate cover by contacting the researcher.

Having provided the required thick description of participant experience with the programming tools that explains, as set out in the research questions, how tool characteristics may promote or impede ecological literacy, the final section of this chapter provides an overview of the effectiveness of the Cows and Fish Program from the point of view of focus group participants. Here, tools are summarized by their rating category, key issues raised by participants about the nature, role and impact of programming are discussed, and strategic and operational recommendations indicated by the data are set out.

5.2 Findings

This section contains three parts. First, a full Content Analysis Summary for the Community Health Assessment Process tool is provided. This is followed by the short-form versions of the remaining 16 Content Analysis Summary documents which illustrate descriptive and theme statements. The short-form versions are presented first by introductory tools (Table 3.3) and then by comprehensive tools (Table 3.4).

5.2.1 Community Health Assessment Process

Table 5.1 sets out the Content Analysis Summary for the Community Health Assessment Process tool.

Table 5.1
Tool: Community Health Assessment Process

A multi-faceted process in which a community and the Cows and Fish Program work together with the goal of identifying the riparian health of the community's watershed. This tool amounts to a framework that incorporates several programming tools, such as workshops, site tours and field days. The community ultimately permits the Cows and Fish Program field crew to carry out riparian health assessments along extensive reaches of the local watershed. Assessments are mapped and classified, then reported confidentially to community members for their use in determining management strategies.

THEME 1	**In areas where the process has been active for some time, the tool has provided a framework in which local individuals can identify riparian issues, control and manage their learning process, and implement locally-determined riparian management strategies.**
Descriptive	**Commentary**
The process provides an opportunity for producers to initiate discussion of issues relevant to their community.	PRODUCER (HIGH) • "You create the questions that the rancher needs to answer." AGENCY (HIGH) • "Thinking about the Cows and Fish Program as a whole, and the key would definitely be the rancher grassroots involvement... without the rancher community, I don't think there would be a Cows and Fish Program, I think we'd be in the same place we are in the States."
The process reflects the role of producers as the decision-makers for riparian management.	PRODUCER (LOW) • "The people who you want to target, and I realize you're trying to do that, is the people that are directly involved with management of those water bodies." REPRESENTATIVE (MEDIUM) • "I think that's the only way you can actually make effective use of resources, and really get positive long-term action happening, is at the community level. You can start with the individual producers, but I think it needs to be community action." AGENCY (MEDIUM) • "It encourages community-based action. I think they're definitely doing a good job on that."
The process allows the community to control the rate and nature of their involvement.	PRODUCER (HIGH) • "It has to be a progression, if you start telling people at the start that we're going to improve for the fish and do a count and do the cows, and you just get bogged... but it's good, after a while, to have the knowledge that you could come in and ... do some other testing... but at the first I think it would overwhelm us." AGENCY (HIGH) • "I think Cows and Fish have been pretty proactive in trying to educate first, before they jumped right in." • "That's a... long-drawn process, and don't underestimate the time that it takes. Awareness and education is probably the biggest, most important, factor."
The process is assisted by the neutrality and non-threatening nature of the program's delivery.	PRODUCER (MEDIUM) • "The fact that it's not trying to push anything on any producer... it's like, we're here, and if you'd like some help, we're here to help. That concept is the concept that's so delicate to keep." AGENCY (HIGH) • "The one thing the Cows and Fish has done really well when they do their speaking engagement, is that it doesn't come across as they're blaming somebody."

The process provides an opportunity for a variety of interests to discuss issues of concern, breaking down barriers and encouraging understanding between people.	REPRESENTATIVE (MEDIUM) • "You're going to have a common base, and you know each other, and it changes things, once you've spent time with people like that." AGENCY (HIGH) • "[The] Cows and Fish approach gives a common language, they might not agree, at least they sit down and discuss certain issues perhaps. It's a starting point, it might not necessarily be the answer to the whole big screen picture, but it's a start." • "Just bringing everyone to the table, and you know, you may have different land uses or whatever but it gets everybody talking."
The process contributes to a sense of partnership and co-operation between groups.	REPRESENTATIVE (MEDIUM) • "Whenever you create that co-operative atmosphere, people look at it in a whole different way... Something is happening, people are coming together." AGENCY (HIGH) • "The partnership component, that it is not one group that needs to lead it."
The process builds on natural interaction and communication between community members, placing the community in a leadership role and encouraging local learning and action.	PRODUCER (MEDIUM) • "Anytime you mix with neighbours or people around, you're going to learn something." • "You do have good word of mouth. A lot of producers out there are telling everybody. I go to different meetings, and they all stand up and say they're right behind [the program.]... It's recognized highly... number one in my mind. Producers talk to each other so much." PRODUCER (HIGH) • "So, work with the people who are willing, and over time, [skeptics] come on stream without you having to badger them."
The process introduces credible information, establishing a knowledge base leading producers to individual action.	PRODUCER (MEDIUM) • "The basic gain that I got ... seeing what did work, and able to incorporate it into my own operation. To better my place.... I did [incorporate]... right from the grasses, right to the water quality, to the preservation of the creek bank, those are the real things that I saw, that's what I'm working on now." • "My own approach to grazing management has changed completely... you can see if you're going in the right direction or going backwards." PRODUCER (HIGH) • "You start picturing where you're at and where you're aiming." AGENCY (HIGH) • "The topic... provided a balance, and it provided an environmental message that hasn't been put forward probably in past ways or in that context...it was woven in and made sense... and I think it was a way to now take all this information and apply it to a landscape issue, and then there was more science added from the Cows and Fish."
The process requires that, as decisions-makers, community-members work together to lead implementation management.	REPRESENTATIVE (MEDIUM) • "Once the team is there, then things kind of flow out of that." AGENCY (HIGH) • "The community process, it puts the onus on [the community] to do the work."
Confidentiality has been fundamental in obtaining commitment of producers to participate in watershed level action.	AGENCY (HIGH) • "Another thing that makes this go over so well is that all this information is kept here. It's kept in the community, with the landowner, and he can utilize it if he wants to, if he doesn't. So nobody's going to get it." • "A lot of these ranchers wouldn't have touched it if they thought it was going to be public information. Or they'd be very skeptical."

THEME 2	**Where the process has been less consistently applied, the rationale and value of the process is questioned. Concerns about available resources and jurisdictional responsibilities arise in relation to partner agencies, with respect to future application of the process across the province.**
Descriptive	**Commentary**
The process is of interest, but when it is not proactively co-ordinated and maintained in a community, the process can fail, resulting in frustration and waste of the resources that were invested.	PRODUCER (MEDIUM) • "You need the leader." REPRESENTATIVE (LOW) • "Keep pushing it afterwards." AGENCY (MEDIUM) • "[Agency] plates are full, and the resources aren't there to carry on with the networking aspect and promoting the team building among agency staff... there's no one person that can do it." • "[Outside the southwest] has generally just fizzled, over the last couple of years, because we have no one person within these [government or producer] organizations who have the resources, to even arrange a general riparian presentation... we tried to do one... it just fell apart because there was no one there to drive it."
Resources are necessary, but are not sufficiently provided by partner agencies, and/or may not be fully taken advantage of.	PRODUCER (HIGH) • "Team-building within the watershed, and the municipalities and other group interests... I don't know if the management capability has been brought out enough for them to be part of the team." • "I think it's at the stage now where I think [the agency] should be putting more money in, and it should be educating more on a broader base than just agriculture, and I think that responsibility lies in [the agency]." REPRESENTATIVE (LOW) • "I think the process is there, we don't have the resources." • "The funding is so tenuous, from what I understand... there isn't any long-term guaranteed funding." AGENCY (HIGH) • "[The representatives] are obviously swamped." • "I think it's time perhaps for the partners to put their money where their mouth is."

THEME 3	**The process reflects producers' desire to act as and to be seen to act as good land stewards.**
Descriptive	**Commentary**
The process increases knowledge of producers about beneficial practices at the operational level, and can potentially lead to managing for broader-scale ecological concerns within the watershed.	PRODUCER (LOW) • "Somehow it has to come around... we as producers realizing that we're only a small part of the problem here, take responsibility for this, because we can change this kind of thing on our piece of land. Knowing that it's only one part of the whole puzzle." AGENCY (HIGH) • "To be honest, you could have knocked the fish part off, when we were dealing with it at first, because [cows] was the interest and that was what was going to get people there. The fish was something that was going to be good for everybody because it was going to happen, because we looked after our cattle and our management the right way. It wasn't focused on the fish end of it, which I think we're at the stage now, and we've talked about it before, and maybe we can kind of angle it a bit and start to learn about the other side now, too... we were looking... to see if what we've been doing is actually affecting water [quality]." • "It's getting, for us anyways, to the stage where we're wanting to go to the next level. And that would be more of an environmental issue on a whole, rather than just agriculture."

The process provides a mechanism for the industry to understand its impacts on the environment, and to communicate it constructively to other interests.	PRODUCER (LOW) • "I think we could at least gauge ourselves and know where we do stand in a wide industry. Are we only 50% effective, are we 80% effective, are we 90% effective?"

THEME 4	**The contribution and role of local governments and non-local governments, including partner agencies, is seen to vary, suggesting that there may not be, appropriately or otherwise, a template for the program. This may lead to some confusion about the function and success of team-building within the process.**
Descriptive	**Commentary**
The process reinforces the producer-based nature of the program, by producers limiting and controlling any involvement of non-local government agencies, as being undesirable.	PRODUCER (HIGH) • "I think [future government involvement] would have to be voted in, or agreed on by this community, before anybody [in government] would come in [to the process]." • "I think people definitely have to have an idea of what their creek should look like before they start asking [for outside involvement]... you've got to have that picture in your mind what they're aiming for, that's where the experts come in, the government people."
Conversely, the involvement of some (perhaps local) government is desirable, and perhaps necessary, in co-ordinating the program and providing funds to promote participation, suggesting the process is not or cannot be purely producer-driven.	PRODUCER (LOW) • "[The] affiliation with PFRA... encourage those guys to get word out that if you wanted to fence of creeks, here's some funding available. Something to encourage the rancher or producer to take some action... it's a little bit of a motivator." PRODUCER (HIGH) • "For a long-term community view, and to keep Cows and Fish going, you're going to have to have some kind of [financial] incentive available for people to create habitat." REPRESENTATIVE (MEDIUM) • "I think other areas would go to their municipalities, their Ag Fieldmen, those kind of people, for advice and help."
Sharing of information that would assist partner agencies (team members) is problematic due to the program's commitment to confidentiality.	AGENCY (LOW) • "We're supposed to be managing [habitat]... we have to see how things are changing out there, too, so we that we can do our job." AGENCY (HIGH) • "I'm mixed on that issue because we have... another agency is collecting information which we, as land managers, should be privy to... I don't know how to resolve that one." • "I have a little bit of a problem... to try to share information but not getting into this [Freedom of Information Policy] thing... is really extremely difficult."
While community-based control remains a priority, the point at which other groups contribute to the process as team members is debated.	REPRESENTATIVE (MEDIUM) • "I think the first objective is to build the team." AGENCY (HIGH) • "It should be the communities first." • "I wouldn't bring in agencies or municipalities, maybe municipalities, certainly not special interest groups, until you have that community informed, and on side, and actually being proactive."

The current process has provided a foundation that worked in specific circumstances, but ecological, operational or economic circumstances will play a role in how the process advances in other areas.	AGENCY (HIGH) • "I think we've got a ways to go in delivering this [community approach]." • "So I view the program as being very important, and the work that is being done in the foothills is certainly a good foundation for us. I wonder for it's applicability [in other ecozones], but nonetheless, I think a lot of the principles are still applicable across the board." • "If it's not broken, don't fix it. Try it this way. And then adjust accordingly." • "I know a lot of places [in the province, small parcels] would be a problem."

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)			
Objective Ranking			
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking	# Participants Agreeing
1. Assists communities to assist themselves (liaise on funding, hire range consultants, provide health data for individual or shared use)	9 / 11	2. Assists communities to assist themselves (liaise on funding, hire range consultants, provide health data for individual or shared use)	2 / 11
2. Encourages community-based action		1. Encourages community-based action	
3. Promotes team-building within the watershed, to include agency, municipal, producer and other interest group representatives		3. Promotes team-building within the watershed, to include agency, municipal, producer and other interest group representatives	

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Assists communities to assist themselves (liaise on funding, hire range consultants, provide health data for individual or shared use)	1	9	1	
2. Encourages community-based action	3	5	3	
3. Promotes team-building within the watershed, to include agency, municipal, producer and other interest group representatives		6	5	
Additional Comments				
• it's just new, in the early stages, there's a ways to go yet, what are the next steps • hard to get community-based action if non-producers and agencies are invited • time needed beforehand, otherwise lose focus, should get others on-side afterwards • process should be that producers define the community to be involved, then invite others, and proceed to action • community-based action is fine, but hard to define the community, especially in early stages • team-building should probably be part of objective 3, add the rest of the agencies later • process has by circumstance not involved or focussed on agencies outside their area so far • in other areas you're going to be met with more resistance than you're used to in the foothills				
Tool Effectiveness Rating		**Good**		

The Community Health Assessment Process tool was assigned an effectiveness rating of Good. In the southwest area of the province, where the Cows and Fish Program has been active for some time, the fundamental community-based structure of the program was validated by participants. The process was viewed as one of cumulative learning, driven by local priorities and decisions, leading to desirable management decisions on an individual and community-wide basis. The process has provided a framework in which producers have been able to act as good stewards of the landscape. Specific characteristics of the communities where the program has been active, such as size and early identification of profile producers, have played a key role in the effectiveness that participants ascribed to the program. It was acknowledged that the same set of circumstances may not occur in other areas of the province.

Some participants with experience in other parts of the province indicated that while there was interest in the Cows and Fish process, frustration has occurred among producers and agency representatives because of a perceived lack of resources needed to co-ordinate and follow through on that interest once expressed by a community. This has led to some disenchantment with the program. A lack of clarity on the role and contributions of team members was also noted. This may be due to the flexible nature of the process itself, or it may indicate that, within what is ostensibly a partnership, this feature has not been yet been addressed or clarified fully.

The involvement and co-ordination of local governments was viewed as having contributed to the effectiveness of the process in some settings, leading to watershed scale action. Conversely, participants indicated that involvement of local government was inappropriate until some local producer-driven action has occurred, at which point

access to financial or technical support is desirable from the local government. This conundrum may suggest that:

(a) there is no template for the process that can or should be applied to all communities; and/or

(b) the cumulative knowledge-awareness-action process of developing ecological literacy is not fully understood by some producers; and/or

(c) the respective roles of producers and non-producers in the process are confused.

This variability is not necessarily a negative reflection on the process, because a key foundation of the process is to permit local circumstances to drive local action.

Recommendations for improving the Community Health Assessment Process tool are set out below.

(1) Clarify the roles and responsibilities of groups or agencies that are team members within the partnership to maximize available skills and resources and to indicate that the program is a partnership in both name and action.

(2) Provide a consistent quality of delivery of the process in every community by ensuring that sufficient resources are in place at the start of the process to enable appropriate follow-through on any interest expressed.

5.2.2 Introductory Programming Tools

This section provides truncated versions of the Content Analysis Summaries for the Introductory Pamphlet, the Display Booth, General Media, the Website, Profile Producers and Program Representatives.

Table 5.2
Tool: Introductory Pamphlet

Along the Water's Edge: Enhancing Our Natural Resources	Introductory one-page fold-out pamphlet describing the history of the program and providing brief testimonials by producers about different riparian management strategies.

THEME 1	**There is a recognized need for a basic contact pamphlet, distinct from the more comprehensive Caring for The Green Zone: Riparian Areas and Grazing Management booklet, in which content serves to introduce the program, its goals, and the people involved, while continuing to emphasize the idea of partnership. The current tool does not provide sufficient information to assist producers in contacting relevant resources, particularly at the local level.**
Descriptive Statements	
1. An easily-accessible pamphlet introducing the program to new people is desirable, including how they can get more local information.	
2. The program and its objective need to be succinctly communicated to start building recognition.	
3. Use of the word *partnership* conveys an appealing, positive message, reinforcing the active role of producers in decisions and the supporting role of relevant information.	

THEME 2	**The explanation of management strategies is limited and is neither people-centered nor positive, contrary to the program's proactive philosophy. The management strategies illustrated seem to emphasize streambank fencing, and cattle are presented as problematic.**
Descriptive Statements	
1. The brochure portrays cattle in a negative light, and does not sufficiently stress the positive interaction of both producers and other riparian users, in using these systems.	
2. The link between management strategies and desired landscape objectives is not consistently clear or positive.	
3. Fencing is a sensitive topic. Careful use of language with respect to use of fences, and related management options, is required.	

THEME 3	**The format and language of the pamphlet are not appealing, although the title is suitable.**
Descriptive Statements	
1. The pamphlet's title is suitable.	
2. The pamphlet is wordy and cluttered.	
3. The language and definitions are unclear. The definition of riparian is not easily understood.	

TOOL SUCCESS	
Objective Effectiveness Rating	This tool was reviewed by low exposure (needs assessment) participants only.
Tool Effectiveness Rating	Poor

Participants consistently recognized a need and a role for a specific programming tool, such as a small pamphlet. The content of the Introductory Pamphlet tool did not, for example, introduce the program, its objective and its activities. The tool was discussed only by low exposure (needs assessment) participants who did not participate in ranking or rating the tool's delivery objectives. Based on all of the commentary about the Introductory Pamphlet, the researcher assigned an effectiveness rating of Poor.

Participants felt that an Introductory Pamphlet of this type had the potential to build recognition of the program, if it were readily accessible at agency offices, through the partnership, at producer meetings or at special events. Many producers had not yet heard of the program, despite characterizing themselves as being well-informed about activities and developments within the industry. Incorporating phone numbers, and the name and/or logo, in a more prominent manner would assist in raising the program's profile. Participants responded positively to the reference to partnership, but this was not maximized because no means to contact the partnership for more information was provided in the pamphlet.

Participants also required a greater variety of management options to be illustrated, however briefly, to assist in making the link between desirable landscapes and their own actions. Descriptions in the tool of the interactions between cattle and the landscape seemed to focus on the negative aspects of cattle, rather than the positive role of producers as proactive managers.

The format was considered to be generally unappealing. A more balanced, uncluttered visual and text presentation was stated as being desirable, as was greater clarity on basic definitions of key terminology.

Recommendations for improving the Introductory Pamphlet tool are set out below.

(1) The Introductory Pamphlet should be revised to reflect a balance of content. First, it should promote greater identity of, and access to, the program. This content should include a statement of the program's objective, a clear definition of the term riparian, and contact information for profile producers and partners. Second, illustrations, however brief, of a broader variety of management strategies were required to de-emphasize fencing and to create interest with regard to the decision-making required to achieve the desirable landscapes depicted in the visual aspects of the tool.

(2) Producers and cattle must be presented in a consistently positive, proactive manner.

(3) The presentation format of the pamphlet should be adjusted to make it more visually pleasing and easier to read.

Table 5.3
Tool: Display Booth

Shown at agricultural exhibitions, conferences, shopping malls, and various producer-related and other community events.

THEME 1	**The tool targets cattle activity exclusively and negatively, without reference to the responsibility or positive actions of various groups of people who use riparian zones.**
Descriptive Statements	
1. The cow is targeted as a negative, literally as "the problem". Other types of users and impacts are not addressed.	
2. The cow is targeted as "the solution", without explaining how the solution can be achieved.	
3. The message is perceived as both imposed by external interests and as misinformed.	
4. People, especially producers, are not recognized as part of the solution.	

THEME 2	**The tool's ecological content is simplistic and distrusted.**
Descriptive Statements	
1. The title terminology "The Green Zone" is not meaningful. Riparian is not highlighted or defined.	
2. The management choices intended to be illustrated by the before-and-after photographs are discounted because the photograph content is seen as misleading.	
3. Cattle are not presented as legitimate in a broader ecosystem or ecological sense.	
4. The inclusion of fish is not clear.	

THEME 3	**The tool's relationship to the Cows and Fish Program and process is unclear.**
Descriptive Statements	
1. The tool does not take advantage of the Cows and Fish name to link the tool's message with the program.	
2. The tool is static/non-interactive.	

TOOL SUCCESS	
Objective Effectiveness Ranking	The tool was reviewed by low exposure (needs assessment) participants only.
Tool Effectiveness Rating	Poor

The Display Booth tool was discussed only by low-exposure participants, who did not participate in ranking or rating the tool's objectives. Based on all of the commentary about the Display Booth, which indicated that participants considered it to be very ineffective, the researcher assigned an effectiveness rating of Poor.

Participants agreed with a strong consensus on the following points. The Display Booth was unlikely to attract and retain either agricultural or non-agricultural viewers and, therefore, achieve message delivery, in a competitive exhibition setting where this tool is usually employed. Due to participants' experience working with landscapes, the tool's images and text were seen as biased and, accordingly, failed to engender interest in or acceptance of the program. Conversely, the Display Booth may be sending a too-narrow message about riparian management to non-agricultural audiences, which was seen to be inconsistent with the program's stated intent. Reaching non-agricultural audiences was viewed as important. The Display Booth was not seen to be synchronized with more finely-tuned tools within the program, particularly the inter-active General Presentation tool, which more effectively communicate the responsibility of all people in riparian management. Participants felt the booth did little to promote further enquiry or awareness, because it was not identified clearly as part of the Cows and Fish Program or process, and no mechanism for future contact was apparent.

Recommendations for improving the Display Booth tool are set out below.

(1) Align this tool with other tools by emphasizing all of the following: the positive role of people, including producers, in achieving change; the impacts of a variety of riparian zone users; broad ecological function; specific management techniques; and the Cows and Fish Program and process.

(2) Increase interaction by upgrading and using visual techniques, and provide a program representative to answer questions.

(3) Increase content impact by reducing the amount of text, and by emphasizing and defining key terminology.

Table 5.4
Tool: General Media

Articles about relevant program activities or riparian information, appearing in community newsletters and in national and local newspapers and magazines.

THEME 1	**A positive, informed message about the program's objectives and activities is considered appropriate, through various media or communication forums, but there is a lack of consistency in content that can lead to potential misconceptions in the public. The program is not known by some producers, suggesting a need to communicate the existence of the program more comprehensively.**
Descriptive Statements	
1. Use of media is an acceptable means of drawing positive attention to, and support for, the program.	
2. Although not always possible in a practical sense, it is desirable to try to manage content to prevent misuse or misconceptions.	
3. A number of producers, even in the southwest, remain unfamiliar with the program.	

THEME 2	**The role of the partnership in communicating with producers is seen as important, but is insufficient and not consistently positive, reducing the level of desired awareness within the staff of program partner organizations and the producer community.**
Descriptive Statements	
1. Partner agencies are not proactively promoting the program internally, or with producers, to a satisfactory degree.	
2. Producer groups, in particular, within the partnership are not sufficiently informed, proactive or positive in communicating their program.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)			
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking	# Participants Agreeing
1. Provides general introduction to program to broad audience	7 / 11	**2.** Provides general introduction to program to broad audience	4 / 11
2. Raises program profile		**1.** Raises program profile	
3. Provides information on how to contact the program in order to obtain riparian or range management information		**3.** Provides information on how to contact the program in order to obtain riparian or range management information	

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides general introduction to program to broad audience		1	7	3
2. Raises program profile		3	8	
3. Provides information on how to contact the program in order to obtain riparian or range management information		1	4	6
Tool Effectiveness Rating	**Fair**			

Due to limited use of General Media in the history of the Cows and Fish Program, focus group commentary reflected on its desirable future use as much as on views about its past use as a programming tool. Participants considered that use of media (such as newspapers) was an appropriate tool in terms of its ability to create a positive profile about the program in the general public, but only so long as the message can be managed for accuracy to the extent possible. The media message should also present a consistently positive view of the program and its activities, and provide contact information. There was concern that the program was not well enough known, or accurately understood, within the producer community and within the partnership.

Recommendations for improving General Media as an awareness tool are set out below.

(1) Develop a communications plan that addresses control and consistency of information, and maximizes partner resources.

(2) Develop a standard introductory tool that introduces the Cows and Fish Program to agency representatives and to the public, setting out the program's objectives and providing contact information to make it easier for producers to follow through on their interest in the program.

Table 5.5
Tool: Website

Internet site accessible (at the time of this evaluation) through *Ropin' the Web*, the website for Alberta Agriculture, Food and Rural Development.

THEME 1	**The tool provides basic information about program content and contact, which is available elsewhere, but does not optimize the flexibility and interactive nature of the internet.**
Descriptive Statements	
1. The internet is seen as suitable for providing basic content and contact information about the program, but the website in its current format does not efficiently maximize access to relevant information, people and resources.	
2. The tool does not, but could, act as a central source of information about current activities of the program, rather than duplicating information available in other tools.	
3. The tool does not, but could be used to, keep in touch with its partners and key producers, and to communicate information to help them promote the program.	
4. The tool does not, but could, maximize ways to obtain community feedback about needs and expectations of the program and its partners, who are seen as removed from program activity.	
5. The tool does not, but could be used to, maximize the distribution of information and tools to new audiences or to supplement tools directed to existing audiences.	
6. While the tool has the ability to provide downloaded documentation, it may not be appropriate to do so due to (a) lack of exposure to other awareness tools and (b) inefficiency.	

THEME 2	**The tool may not reach all audiences due to its technological nature and practicalities of access.**
Descriptive Statements	
1. Practicalities of access to computers and other time commitments, as well as producer age and unfamiliarity with the tool, may limit its use.	

THEME 3	**The tool does not communicate the grassroots nature of the program, and the use of financial resources for non-producer audiences may not be appropriate.**
Descriptive Statements	
1. The program appears to be government-based, to the exclusion of producers.	
2. The tool may be addressing targets that lie outside the program's main objective and, if so, consideration of appropriate funding resources should be made.	

THEME 4	**The tool is difficult to use and is not synchronized with other program tools.**
Descriptive Statements	
1. The website location is neither well-known nor intuitively easy to find, and its association with government websites is confusing.	
2. The tool is out of date.	
3. The tool is not easy to navigate.	
4. The website is not consistent in appearance to other program tools.	
5. The name of the website should reflect the program and match the intended target.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Provides program goal and how to contact program office	11 / 11	
2. Provides introductory information on hydrological function of riparian zones		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides program goal and how to contact program office			11	
2. Provides introductory information on hydrological function of riparian zones			11	
Tool Effectiveness Rating	**Fair**			

Much of the discussion about the Website tool centred around its potential future use, because it was recognized that the current state of the tool was under-utilized and poorly designed. Participants assigned an effectiveness rating of Fair. The potential value of a Website for use in the Cows and Fish Program was, however, recognized by participants because of its ability to:

(a) supplement and provide efficient access to basic contact information to the program, its partners, tools and resources;

(b) supplement and provide efficient access to relevant ecological information to start the awareness process; and

(c) report on current activities that are not or cannot be communicated by other means or through other tools.

Participants stated that improving these aspects of the Website would widen the sphere of influence of the program and its messages, perhaps resulting in less demand on staff resources in dealing with repetitive or generic requests from the public.

The Website did not describe impacts of non-producer users on riparian areas. As described more fully later in this chapter in the review of Caring for The Green Zone: Riparian Areas and Grazing Management, this tends to offend some producers and could result in missed opportunities to reach non-producer audiences. While the current format of the website does provide basic contact information, it did not include a list of producers involved or how to contact them. Participants stated that the internet location of the Website, and its contact list, gave the (erroneous) impression of a government program. This association created a negative response among producers that may create an unnecessary barrier to awareness-building. The Website was believed to be difficult to find on the internet, and was seen as unsophisticated in terms of navigation and access to related sites or information. Its awareness content was seen as being limited while primarily duplicating, but with less effect, some of the content of the Caring for The Green Zone: Riparian Areas and Grazing Management tool. While basic ecological awareness content was viewed as desirable, simply duplicating portions of content available in other tools was not seen as the best use of this resource. Accordingly, both the content and format of the Website were perceived to be outdated.

The Website did not take advantage of the technology's ability to describe, display, print or order program tools, or to communicate electronically with people associated with or interested in the program. This may reduce the number of people potentially reached, and under-utilizes potential features unique to the internet that are not available with other program tools. These features could be maximized to include communications about current activities, scientific developments, funding sources, etc., to the general public, to key members of the producer community, and to program partners who need or want to be kept informed about program activities.

The limitations of a Website in reaching all audiences was recognized. It was felt that older or less affluent producers may not have access. Alternately, it was felt that new audiences may be reached, including young people or others interested in or researching environmental issues.

Recommendations for improving the Website tool are set out below.

(1) Identify key audiences and prioritize financial resources devoted to the Website accordingly. Specify that the Cows and Fish Program is a community or producer-based program. Balance content to reflect use of riparian zones by a variety of users.

(2) Take advantage of the inter-active nature of a Website, not available with other tools, to communicate regularly with partners and producers; to provide current information on program activities; and to increase the public's access to the program's objectives or to other program tools. Improve navigation to increase access to awareness content, using a question-and-answer format and direct links to related sites.

(3) Present the Website in a format consistent with other program tools in terms of formatting, graphic presentations and so on.

Table 5.6
Tool: Profile Producers

Producers familiar with the program who actively share information and ideas about riparian management, either through specific program activities or informally through ongoing community contact.

THEME 1	**The program provides a forum for profile producers to act as communicators of expert, highly credible management information, which is viewed as valid, relevant and accessible by other producers.**
Descriptive Statements	
1. Information delivered by experienced producers is practical and reflects the complexity of management decisions. Generally, producers are more receptive to this than if information is delivered to them by non-producers.	
2. Profile producers provide an informed, local source for other producers to contact for further information.	

THEME 2	**In representing themselves and other producers as good land stewards, profile producers can initiate informed dialogue with non-producer interests, developing common ground and reducing conflict. This potential interest by non-producer interests enhances and expands the communications role filled by profile producers.**
Descriptive Statements	
1. Profile producers illustrate that producers are agents of landscape change.	
2. Profile producers build trust by bridging the gap between producer and non-producer interests; this role is enhanced when coupled with non-producer interests in, e.g., presentations or courses.	

THEME 3	**Involvement of profile producers as communicators of the program is fundamental, and should be safeguarded.**
Descriptive Statements	
1. Profile producers can take advantage of local community interaction, which builds enthusiasm and promotes a sense of local ownership of riparian management.	
2. There is some concern about a shift away from being producer-delivered toward being government-delivered.	

THEME 4	**Support provided by the program to profile producers is limited or insufficient.**
Descriptive Statements	
1. The efforts of profile producers are not appropriately acknowledged, resulting in a feeling of alienation.	
2. Insufficient effort has been made to communicate program activities and progress to profile producers, in return for their contributions.	
3. There is no standardized procedure to assist profile producers in preparing their programming presentations.	

THEME 5	**Profile producers must be seen as viable, accessible to others, and representative of the average producer.**
Descriptive Statements	
1. Profile producers carry more weight if seen to be non-biased and economically viable.	
2. The role of the profile producer would be strengthened if their operations are more representative of the typical producer.	
3. While respected, not all profile producers are viewed as skilled communicators for the program.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Legitimizes program messages by presenting a producer as the messenger	11 / 11	
2. Spreads program messages by taking advantage of alternate sources		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Legitimizes program messages by presenting a producer as the messenger	5	6		
2. Spreads program messages by taking advantage of alternate sources	5	6		
Tool Effectiveness Rating	**Very Good**			

Profile producers were assigned an effectiveness rating of Very Good. Participants indicated that these producers were fundamental to the positive impact of the Cows and Fish Program and, further, that their role should be protected and maintained. Profile producers are valued because they reflect and communicate appropriate management. Their expertise was viewed as providing a local, credible source of information to both producers and non-producers. With regard to local producers, familiarity with the profile producers increased the likelihood of constructive interaction. In their communications role, profile producers were to seen to build trust and new partnerships. There was some concern expressed that individuals may not be included in or be in receipt of regular, timely communications from the program, but rather are seemingly only contacted when something is required of them.

Recommendations for improving the Profile Producer tool are set out below.

(1) Individuals selected as profile producers should be comfortable acting in the role, and be accessible to interested parties. In selecting individuals, it should be remembered that their impact may be more widespread if that individual's operation is typical or average in size, in relation to the majority of the province's producers. Selecting large-scale producers was not seen as inappropriate, but producers from average-sized operations may relate less well to them.

(2) Continue to provide opportunities for profile producers to interact with interested parties as credible messengers of good riparian management. This is particularly important with regard to non-producers, because it reduces the possibility of conflict and the ultimate loss of control by local communities over riparian issues.

(3) Recognize the time limitations that profile producers are subject to. As with other professionals, their contribution should be recognized by, for example, providing a per diem to cover time and expenses.

(4) Develop some mechanism to communicate regularly with individuals acting in the role of profile producers, to reinforce their commitment to the program, and to provide them with relevant information to help them fulfil their role in the community.

(5) Investigate with current profile producers whether some form of standardized assistance could be provided to them to assist them in preparing presentations and, if so, what form it should take.

Table 5.7
Tool: Program Representatives

Based in Lethbridge, Alberta: Provincial Co-ordinator Assistant Provincial Co-ordinator Provincial Riparian Specialist (in-kind involvement from Alberta Environment-Natural Resources Service) Range Specialist (in-kind involvement from Alberta Agriculture, Food and Rural Development-Public Lands Division) Riparian Field Co-ordinator, and crew staff

THEME 1	**The representatives are viewed as competent and effective.**
Descriptive Statements	
1. The representatives are seen as excellent, non-threatening communicators for the Cows and Fish Program.	
2. In areas where involvement has been long-term, the representatives have established relationships of trust and familiarity, helping producers to accept the program.	
3. The representatives are viewed as knowledgeable, appropriately trained, flexible and committed.	
4. The role of some field staff in building awareness may be under-utilized.	

THEME 2	**It is recognized that non-producer representatives are the appropriate primary deliverers of the program, but concern is expressed about ensuring that delivery and future direction of the program continues to reflect that it is fundamentally producer-driven.**
Descriptive Statements	
1. The representatives successfully fill a qualified, full-time communications role in delivering the program, one that cannot be met practically by producers.	
2. Communicating the program as producer-driven is seen to be fundamental to its existence and future viability.	
3. The representatives do not maintain sufficient, proactive communication with profile producers and agency staff, leading to potential disenchantment and to concern that the program's emphasis is shifting away from being producer-driven.	

THEME 3	**The relationship of the representatives to government is unclear, resulting in confusion and establishing a potential barrier to program acceptance.**
Descriptive Statements	
1. The representatives are introduced as or are identified in some tools as being associated with government agencies, instead of acting on behalf of a producer-based initiative.	
2. The wide range of viewpoints about the relationship to government suggests that both the relationship, and hence its significance, are not well understood.	

THEME 4	**The demands on the representatives are perceived to outrun their available resources, reducing their effectiveness and threatening the program's reputation.**
Descriptive Statements	
1. Accessibility to representatives is insufficient, affecting the program's positive reputation.	
2. Demands on representatives are recognized as being too great.	
3. Lack of resources is perceived to be a threat to the program's future continuity.	

4.	The reputation of the program is tied to the reputation of its representatives, and concern is expressed about how to maintain that continuity of standard over time and during periods of expansion.
5.	Resources from within the partnership are not being fully utilized.

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Provides credible source of information/believability	12 / 12	
2. Provides alternate source of information from government agencies		
3. Provides a conduit for building trust about the program		
4. Puts a face on the program		
5. Clarifies the program (what is it, what it isn't)		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides credible source of information/believability	8	4		
2. Provides alternate source of information from government agencies		11	1	
3. Provides a conduit for building trust about the program	5	7		
4. Puts a face on the program		12		
5. Clarifies the program (what is it, what it isn't)		12		
Tool Effectiveness Rating	**Very Good**			

Based on commentary provided by those who have worked with the Program Representatives over a length of time, and in areas where the Cows and Fish Program is in intermediate or advanced stages of delivery, the representatives were seen to have contributed significantly to program effectiveness. They were viewed by participants as being highly credible, approachable and trustworthy; able to establish and build rapport within the producer community upon initial contact; and to build relationships of respect and trust over time. These characteristics were seen to be fundamentally necessary precursors to producers accepting the validity of the Cows and Fish Program. Accordingly, the Program Representatives were assigned an effectiveness rating of Very Good.

The role of the Program Representatives as deliverers of the program was validated: participants acknowledged that producers themselves are not available to deliver it and

that the expertise and resources available to the Program Representatives are essential in order to communicate a consistent riparian message to the public. It was also acknowledged that the personalities of the key individuals represent a particular strength of the program's activities to date. Concern was expressed about how the program might maintain or duplicate these strengths in a time or place where the existing Program Representatives are not available.

Some confusion existed about the relationship of individual Program Representatives with government agencies because they have sometimes been identified with those agencies, both verbally and in print. Such a relationship, perceived or otherwise, may create an unnecessary barrier to program acceptance. Further, it was felt that identifying the representatives in this way, without reference to producers, tends to misrepresent the producer-focused philosophy of the program, and excludes producers who have played a role in delivering and maintaining the program.

Some potential disenchantment with the program was expressed because the representatives were perceived to be sometimes unavailable, both for initial contact and necessary follow-up. It was acknowledged that this has likely been a result of limited resources to support the high demand placed on individual Program Representatives. It was suggested that support from program partners has been under-utilized. Further concern was expressed that lack of communication from Program Representatives to Profile Producers raised the possibility that the program may lose its producer focus.

Recommendations for improving on the role of Profile Producers as a programming tool are set out below.

(1) While no recommendations are provided with respect to the Program Representatives, because they were all rated very highly, there may be a potential role for field staff to become more actively involved in communicating the results of their field work with relevant producers.

(2) The relationship of individual Program Representatives with government should be articulated, and all verbal and print references to them must reflect that relationship accurately.

(3) Technical and financial resources are required to permit Program Representatives to provide a consistently high quality of program delivery, both on a continuing basis where the program is already established, and as the program expands into other areas of the province. In particular, resources available from within the program partnership should be identified, utilized, and communicated to the public, to reflect the philosophy of partnership that the program promotes.

(4) A mechanism to communicate with Profile Producers is required so that the Cows and Fish program, through the Program Representatives, continues to acknowledge the contribution of those producers and to reflect the needs and goals of producers generally, on whose behalf the Program Representatives act.

5.2.3 Comprehensive Programming Tools

This section provides truncated versions of the Content Analysis Summaries for Caring for the Green Zone: Riparian Areas and Grazing Management booklet; the Cows, Fish, Cattle Dogs and Kids gameshow; three video productions relating to aspects of the Cows and Fish Program; Site Tours of Demonstration Ranches; Riparian Workshops;

Riparian Health Assessment Field Days; and the Stockmen's Range Management Course.

Table 5.8
Tool: Caring for The Green Zone: Riparian Areas and Grazing Management

A 40-page booklet describing riparian zone ecological functions, human use of riparian zones, and principles of rangeland and riparian management. The booklet also introduces riparian grazing management strategies.

THEME 1	**The ecological and management content of the tool is appealing because it is presented as positive, relevant and flexible.**
Descriptive Statements	
1. Management options and ecological content are accessible, relevant and practical.	
2. Management options are seen as individualized and positive.	
3. The format is appropriately easy for an introductory awareness tool.	

THEME 2	**The tool is seen as an early step in a cumulative process of awareness building, when used in context. It raises interest in obtaining further information (in some format).**
Descriptive Statements	
1. The tool triggers initial interest.	
2. The tool triggers interest in obtaining more information, both technical and economic.	
3. The tool's effectiveness may be reduced if not accompanied by contextual information.	

THEME 3	**The tool does not effectively address the needs of producers in areas outside the southwest of the province because its content focuses on landscapes and management strategies relevant in the foothills region only.**
Descriptive Statements	
1. It is suitable for the foothills.	
2. The tool's content is not seen as relevant outside of the foothills.	
3. The tool does not appear to present management techniques suitable for small operations.	

THEME 4	**The tool reflects the importance that producers place on their role as stewards of riparian zones, but the role of other watershed users is not emphasized enough. Non-agricultural issues need to be addressed in this tool or in supplementary tools, with content determined locally by the community.**
Descriptive Statements	
1. Producers are seen in a stewardship role, which reduces potential conflict.	
2. It is important to address the role of other users and impacts, but this is done only minimally.	
3. Clarification of the target and reformatting of the tool may be required.	
4. Content should be determined by and for local producers in any new area.	

THEME 6	**The tool is not clearly associated with the Cows and Fish Program and its partners.**
Descriptive Statements	
1. The tool does not explain the role of the Cows and Fish program or partnership, and is not readily identifiable as a Cows and Fish Program tool.	
2. It is somewhat difficult to determine contact information to pursue further queries.	
3. The tool is not actively promoted or available through those organizations identified as its partners throughout the province. Some sensitivity around the use of logos and partner names is noted.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Provides general riparian messages in print format addressing ecological function, management principles, grazing strategies, human role/impact [to raise awareness]	17 / 17	
2. Introduces management strategies [to change management behaviour]		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides general riparian messages in print format addressing ecological function, management principles, grazing strategies, human role/impact [to raise awareness]	6	11		
2. Introduces management strategies [to change management behaviour]	6	11		
Tool Effectiveness Rating	**Very Good**			

The Caring for The Green Zone: Riparian Areas and Grazing Management booklet assigned an effectiveness rating of Very Good. Participants indicated that content was accessible and relevant, providing a solid starting point in the process of building awareness and engaging further interest. The tool has been well received in the southwest area of the province but, based on the expertise and familiarity of participants with the industry across the province, the booklet's content was seen as being less relevant for producers in other areas of the province, thereby reducing its potential use and impact. The core design of the booklet was stated to be effective but in need of adjustment to provide ecological information and management practices suitable for those areas, based on community input about local conditions and practices.

Participants expressed the need for a *how to* print-format tool, providing technical information, as a follow-up to Caring for The Green Zone: Riparian Areas and Grazing Management. Given that it is a heavily-used awareness tool, it was considered appropriate by most participants to identify it more clearly as a Cows and Fish Program document, and to include the program's objective.

Recommendations for improving the booklet are set out below.

(1) Consider redesigning the booklet to meet the needs of interested new target audiences. Any revision should retain ecological and management fundamentals in a core document but include locally relevant management strategies/issues, as well as the Cows and Fish Program objective.

(2) Develop supplemental tools for non-foothill landscape issues.

(3) Consider supplementary print-format tools that provide more technical information relating to specific management techniques, including the cost benefits associated with use of the management strategies.

(4) Develop strategies to enhance the role of Cows and Fish Program partners in promoting the tool and its information.

(5) A number of small design adjustments, such as adding a table of contents and specific contact names to obtain further technical information, will increase the booklet's ease of use and impact.

Table 5.9
Tool: Cows, Fish, Cattle Dogs and Kids

An interactive youth game show modeled on TV's *Jeopardy*, presented at elementary schools, agricultural fairs, park interpretive programs and community events. Content themes include riparian biodiversity and the interaction between riparian zone health and cattle management.

THEME 1	**The availability of the tool reflects the fundamental importance of educating all young people about riparian systems. A more general riparian health message may be sufficient and appropriate for a younger age group, without incorporating management strategies.**
Descriptive Statements	
1. The tool is one way of reaching what is considered to be a very important audience.	
2. It is important to use the tool in urban audiences.	
3. A broad riparian health message may be sufficient and appropriate for this age group.	
4. The tool currently reflects the ecology of the foothills, and so does not target other areas.	

THEME 2	**It is acknowledged that it is difficult to break into the elementary school curriculum structure, so the tool may be most effective when communicated through existing programs only.**
Descriptive Statements	
1. Curriculum restrictions limit where and when the tool can be used.	
2. The tool is most useful when directed through existing programming avenues.	

THEME 3	**Non-school settings may require supplemental tools to reach bigger audience numbers.**
Descriptive Statements	
1. At large events, the small audience size does not maximize coverage and impact of the tool.	
2. The tool does not address the teen-aged group who, as recreationalists, may impact riparian areas.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)

Objective Ranking

Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking	# Participants Agreeing
1. Introduces basic riparian ecology concepts to young people (elementary age)	1 / 6	1. Introduces basic riparian ecology concepts to young people (elementary age)	5 / 6
2. Introduces link between grazing management and riparian health, including fish and wildlife, to young people		3. Introduces link between grazing management and riparian health, including fish and wildlife, to young people	
3. Provides a tool that incorporates riparian messages into related school curriculum elements, using teachers as the messenger		2. Provides a tool that incorporates riparian messages into related school curriculum elements, using teachers as the messenger	

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Introduces basic riparian ecology concepts to young people (elementary age) 2. Introduces link between grazing management and riparian health, including fish and wildlife, to young people 3. Provides a tool that incorporates riparian message into related school curriculum elements, using teachers as the messenger	4	2		
Tool Effectiveness Rating	**Very Good**			

The importance of reaching a youth audience was raised consistently by participants, both with regard to the Cows, Fish, Cattle Dogs and Kids tool and to the Cows and Fish Program generally. Reaching non-agricultural and recreational youth audiences was also identified as a priority. For elementary age groups, the tool was seen to be very successful in terms of effectiveness, with no major concerns raised about its current format or content. Accordingly, an effectiveness rating of Very Good was assigned to the tool. However, the modification to the ranking of this tool's objectives indicated that reduced emphasis on management strategies was considered appropriate insofar as youth audiences are concerned and, in particular, in reaching urban audiences. Difficulties outside the control of those delivering the tool were acknowledged to limit its access to some school settings, but it was considered to be important to continue working within existing school programs.

Recommendations for improving this tool are set out below.

(1) Continue focusing efforts on the gameshow to reach youth through schools, particularly urban schools, taking advantage of existing accessible avenues of contact such as FINS [Fish in Schools] and CAP [Classroom Agriculture Program]. The tool could be modified slightly to provide a more generalized

riparian message incorporating non-agricultural impacts. This may ease entry into curriculum structures not now accessible. In doing so, determine the extent to which ecozone-specific messages may be required.

(2) A similar tool directed to teenage youth may be called for, to address the impacts they can make as recreationalists now active in riparian zones, for presentation to relevant recreational groups.

Table 5.10
Tool: Videos

Along the Water's Edge	A 20-minute video produced by the Department of Fisheries and Oceans that includes testimonials by cattle producers in all three prairie provinces. They talk about their experiences and decisions pertaining to managing cattle in their riparian zones.
The Green Zone	A one-hour CBC documentary produced by David Suzuki for his program, *The Nature of Things*. The video focuses on riparian management and ecology in various regions of Canada, including southwestern Alberta rangeland.
Wind, Grass and Sky: A Passion for Prairie	A one-hour Discovery Channel documentary produced by John and Janet Foster, showcasing grassland ecology and sustainable rangeland/riparian management, filmed on the McIntyre Ranch in southern Alberta.

THEME 1	**Generally, these tools successfully introduce concepts of landscape processes and benefits of change. Two of the three videos successfully link management strategies to landscape goals. The videos do not illustrate the needed variety of management options required by producers.**
Descriptive Statements	
1. Foster and Suzuki videos help producers recognize landscape processes and landscape goals.	
2. Foster and Suzuki videos seem to emphasize fencing, rather than illustrating a variety of management options, and raise questions with producers about risks associated with fencing.	
3. Along the Water's Edge video communicates a necessary relationship between commercial benefits and good management of riparian areas.	
4. Along the Water's Edge video does not create a management link between ecological information and end management goals.	

THEME 2	**A sense of stewardship is communicated by the videos.**
Descriptive Statements	
1. A sense of stewardship is promoted by providing real-life examples that other producers can relate to.	

THEME 3	**Videos are seen as appropriate tools to reach broader, non-agricultural audiences, but producers are sensitive to their content when it illustrates only those impacts caused by cattle, when those videos are likely to be viewed by non-agricultural audiences.**
Descriptive Statements	
1. It is important to represent good cattle management to broader audiences, and videos can achieve this.	
2. The emphasis on cattle impacts may communicate an undesirable message to non-agricultural audiences.	
3. Non-agricultural audiences may be more receptive if broader ecological topics are addressed.	
4. It is important to communicate that cattle are an appropriate part of the environment.	
5. In video production, control over content should be maintained.	

THEME 4	**The videos are most effective when a producer acts as the messenger, and will reach a higher proportion of producers if the messenger is similar in operational attributes to the typical producer.**
Descriptive Statements	
1. The video content is well received when delivered by producers, but may be resisted if the video messenger is distrusted.	
2. Interest is established when the producer delivering the message has similar operational attributes as the intended target producer.	
3. The videos focus on deeded land; needs of producers with leased land were not perceived to be addressed.	

THEME 5	**Along the Water's Edge is most appropriate for use in non-personal, multi-viewer, public situations rather than individual at-home use.**
Descriptive Statements	
1. Brief videos like Along the Water's Edge, with its current type of content, are suitable for quick sound-bites, in public settings.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
Along the Water's Edge 1. Legitimizes riparian management message by presenting producers as messengers, in video format	7 / 7	
Suzuki 1. Introduces importance of riparian zone to a national audience 2. Builds general awareness of riparian zone function	7 / 7	
Foster (This video was not reviewed by medium-high exposure participants, only low exposure participants.) 1. Introduces concept of stewardship by producers, including co-existence of cows and streams 2. Introduces program tools (such as the Stockmen's Course and techniques (such as gravel bases and fencing) 3. Provides general range and riparian management		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
Along the Water's Edge 1. Legitimizes riparian management message by presenting prairie producers as messengers, in video format		7		
Suzuki 1. Introduces importance of riparian zone to a national audience 2. Builds general awareness of riparian zone function		7		
Foster (This video was not reviewed by medium-high exposure participants, only low exposure participants.) 1. Introduces concept of stewardship by producers, including co-existence of cows and streams 2. Introduces program tools (such as the Stockmen's Course) and techniques (such as gravel bases and fencing) 3. Provides general range and riparian management				
Tool Effectiveness Rating	**Good**			

Together, the video tools were assigned an effectiveness rating of Good. They provided an introduction to ecological information perceived to be of interest to producers. Participants stated that the Suzuki and Foster videos provided a more comprehensive approach to landscape processes, and that specific messages could be identified within the videos (e.g. role of deep, binding rootmass). The Suzuki and Foster videos also illustrated how landscape goals can be achieved with specific management strategies, although concern was raised about the apparent emphasis on fencing-related options and the absence of other management strategies.

Placing the producer in the role of messenger was felt to be very appropriate, because it created a personalized link to the viewer, illustrating that a producer, even on a small operation, can take specific actions to achieve landscape goals that meet both cattle and habitat requirements. Along the Water's Edge, while communicating a similar stewardship message and showing producers in the role of landscape decision-makers, did not illustrate the management actions viewers needed to know about to meet the end goal of healthy riparian zones.

The producer shown in the videos who had the greatest impact on viewers was the small operator, because he was seen to be most like the majority of producers in the province in terms of operational attributes. Participants indicated that, generally, producers are more likely to relate to him as a messenger of management information. Due to limitations of space and money, producers with average-sized operations have difficulty relating their operations to the larger-scale operations exhibited in the videos.

Because the Suzuki and Foster videos were available to a national audience, concern was expressed that non-cattle related impacts were not addressed. The tools sent a misleading message to non-agricultural audiences, namely that cattle represent an inappropriate use of the landscape, and are the only cause of riparian zone damage. This was a particular concern with the Suzuki video, due in part to perceptions about David Suzuki's reputation as an extreme environmentalist.

Recommendations for improving the effectiveness of video tools are set out below.

(1) Video content needs to be controlled and targeted carefully to send consistent producer-positive messages. Messengers should be carefully chosen in order to create a common bond with the majority of producers. Non-agricultural impacts need to be included, even minimally, to reduce producer anxiety about being targeted, and to illustrate that cattle are an appropriate part of the landscape.

(2) Even in sound-bite format, some mention of management strategy is needed to link the ecological information to desired ecological and operational goals.

Table 5.11
Tool: General Presentations

Slide presentations of approximately one to two hours in length, describing riparian zones and some strategies for riparian zone management. Ecological function and human interaction are key themes.

THEME 1	**Producers are interested in learning about broad landscape issues and impacts such as those addressed in the tool. The tool is presented in a simple, flexible and neutral format, allowing participants to weigh the validity and applicability of the information given, establishing a starting point in raising awareness and building knowledge about management options to help in future decisions. The tool may not address landscape processes outside of the producer's control to the desired extent, nor does it consistently incorporate materials that can be taken home for review or to share newly learned information with skeptical family members.**
Descriptive Statements	
1. Producers who have not participated in the tool value the opportunity to learn new information that might assist them in decision-making, but tool content must be neutral and comprehensive to reduce skepticism.	
2. The tool is neutral, comprehensive and easy to understand. It promotes learning and dialogue between different groups, but may not be as well known as is desirable.	
3. The tool develops relevant knowledge by introducing management options that assist in future decisions.	
4. The tool does not provide supplemental materials for participants to build on enthusiasm and knowledge, subsequent to the presentation.	

THEME 2	**The tool has broad value and utility, within and outside of the producer community. In particular, the tool addresses the concern of producers of the need to raise awareness in wider audiences about producer stewardship and riparian issues generally. Urban, youth and recreational audiences are viewed as targets that should be actively pursued, but concern about maintaining a producer focus arises.**
Descriptive Statements	
1. The tool illustrates producers as proactive stewards of riparian landscapes.	
2. It is important to producers that the impacts of non-agricultural riparian users be understood and communicated.	
3. The tool is suitable for reaching a variety of audiences, including agricultural, recreational and urban audiences.	
4. Producers are interested in the tool and want it to be proactively delivered, including use at program partner venues.	
5. A high priority is placed on using the tool to reach young people, especially in agriculture.	
6. Viewpoints vary on the priority of target audiences for which the tool should be utilized, with concern about maintaining a focus on the producer.	

THEME 3	**The tool and sufficient follow-up to it has led to success in building upon initial interest and creating community involvement. In cases where there had been less co-ordination of follow-up by an identifiable party with a clear mandate, interest has waned and frustration set in.**
Descriptive Statements	
1. In some locales, the tool has initiated interest in the program, established the basis for future working relationships, and ultimately led to high levels of community involvement.	

2.	Lack of co-ordinated follow-up in other locales has led to disenchantment with the process, and opportunities for commitment from the community have been lost.
3.	Lack of resources in some locales has led to frustration with the tool, and an undervaluing of its contribution in the awareness process.

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Provides general overview of key range and riparian ecology topics to kick-start increased awareness, introducing the idea that management can be effective in reducing grazing impacts	11 / 11	
2. Reaches broad audiences in urban and rural areas, to raise awareness		
Notes		
Number of participants: 13 Number of votes: 11 (two individuals not familiar with tool did not vote)		

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides general overview of key range and riparian ecology topics to kick-start increased awareness, introducing the idea that management can be effective in reducing grazing impacts	2	8	1	
2. Reaches broad audiences in urban and rural areas, to raise awareness	2	8	1	
Tool Effectiveness Rating	**Good**			

In cases where sufficient program resources have been delivered, the General Presentation tool was seen as an effective and important step in communicating landscape knowledge and related management options to a wide variety of audiences. The tool was also viewed as a way to break down skepticism and establish initial working relationships, building necessary trust and credibility. General Presentations have the added advantage of presenting producers to the general public in a positive light and illustrating their proactive involvement in sustainable riparian management. Participants indicated that the tool addresses the desire of the producer community to communicate a more comprehensive understanding of riparian impacts than just those caused by cattle. The General Presentation was seen as neutral, flexible and adaptable, easily targeted to a variety of audiences and, accordingly, it was considered to have high potential for raising awareness. It was assigned an effectiveness rating of Good.

In areas where program resources have not been available, however, participants indicated that the process of initiating General Presentations had broken down. The role of an identifiable individual to initiate and co-ordinate events, and build upon local interest, was viewed as an aspect essential to successful delivery of the tool. Without it, the reputation of the Cows and Fish Program and its community-based process was seen to be weakened. The success of the General Presentation has placed it in high demand. This factor raised the matter of prioritizing target audiences and determining the most appropriate use of resources available to deliver the tool. Further, it was noted that some of the impact and enthusiasm arising out of exposure to the tool may be lost due to the absence of take-home materials to accompany it.

Recommendations for improving the General Presentation tool are set out below.

(1) Clarify the appropriate scope of the tool and how best to meet demand for it.

(2) Resources should be consistently applied to ensure continuity of service and maintenance of the program's community process.

(3) Determine appropriate hand-out materials to accompany the tool.

Table 5.12
Tool: Site Tours of Demonstration Ranches

Tours of cattle operations that use a variety of grazing strategies for managing riparian zones. Tours usually incorporate contrasting sites to illustrate management implications and provide an opportunity for a question-and-answer session with the producer.

THEME 1	**The tool illustrates landscape interactions, providing a setting in which producers begin to relate that ecological information to sustainable management. Producers can distinguish management options relevant for their operations, but acknowledge that operational factors may limit their ability to achieve sustainability.**
Descriptive Statements	
1. The tour leads producers to begin to bring landscape characteristics into the context of their long-term goals.	
2. Producers relate the tour information to their fundamental concern about carrying capacity, but acknowledge that there are some barriers to them achieving appropriate carrying capacity levels.	
3. The tour illustrates a variety of management options, allowing producers the flexibility to consider practices that match their individual needs.	

THEME 2	**The visual nature of the tour is a particular strength, providing credible evidence to producers of comparative results achieved by different management options. The involvement of producers as managers of the demonstration sites adds significant credibility, both during the tour, and subsequently within the community, where interest and learning is promoted by local word-of-mouth.**
Descriptive Statements	
1. By visually illustrating the practical aspects of different management strategies, on comparative sites, the tour reduces producer skepticism, thereby increasing the credibility of new management options.	
2. Producers who are the managers of the sites are credible messengers.	
3. Once established, sites become the subject of local dialogue, promoting interest and awareness within the community, reinforcing the learning and decision processes as local ones.	

THEME 3	**While focused primarily on producers, both the tour and the general availability of the site communicate to non-producers that producers are acting responsibly as land managers and are addressing past problems.**
Descriptive Statements	
1. The tool addresses the concern producers have about the importance of communicating their good management to the public.	
2. The tool illustrates that problems arising from past management can be and are being addressed by producers.	

THEME 4	**The delivery of the tour by Program Representatives provides needed up-front expertise. The task is seen as a labour-intensive commitment, with necessary resources being unavailable outside the southwest, reducing use of the tour. While intended to achieve team-building, there is some confusion over the timing and nature of involvement by Program Representatives and on-site producers in presenting the sites as an awareness tool.**
Descriptive Statements	
1. The Program Representative expertise is a valuable and necessary element of the site tour.	
2. Resources are limited outside the southwest to arrange tours.	
3. The on-site producer may be viewed as being separate from the Cows and Fish Program team-building process.	

THEME 5	**The positioning of the tour among other program tools is appropriate. It is seen as a preliminary field component, necessarily occurring after introductory ecological information sessions, but prior to a producer determining and implementing any monitoring or management strategies.**
Descriptive Statements	
1. The site tour is placed appropriately in the process of building knowledge, following the introductory presentations of ecological processes but preceding management action.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)			
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking	# Participants Agreeing
1. Legitimizes the Cows and Fish Program messages by presenting the producer as the messenger by illustrating locally useful tools	0 / 6	**2.** Legitimize Cows and Fish Program message by presenting the producer as the messenger by illustrating locally useful tools	6 / 6
2. Presents ground validation or evidence of concepts and practices being applied (incorporating riparian zone into range management using the foundation management principle of rest)		**1.** Presents ground validation or evidence of concepts and practices being applied (incorporating riparian zone into range management using the foundation management principle of rest)	
3. Promotes team building and community action		**3.** Promotes team building and community action	

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Legitimizes Cows and Fish Program message by presenting the producer as the messenger by illustrating locally useful tools	6			
2. Presents ground validation or evidence of concepts and practices being applied (incorporating riparian zone into range management using the foundation management principle of rest)	6			
3. Promotes team building and community action			6	
Tool Effectiveness Rating	**Good**			

The Site Tour tool was assigned an effectiveness rating of Good. Participants suggested that it offers a clear link between real landscape impacts and management options. The explanation of this link was offered in the context of meeting long-term goals, which are of immediate concern to producers. Concrete, practical examples of management systems and techniques provided the credibility necessary to reduce producer skepticism. The availability of the site and the on-site producer were seen to promote ongoing dialogue and interest at the local level. The hands-on and visual aspects were considered fundamental to this process. The tool was seen to promote good resource management to the public, reducing the sense that many producers have of being targeted for improper practices.

Participants suggested that Site Tours provide an appropriate programming transition for producers, allowing them to visualize and learn about landscape processes addressed in General Presentations, and setting the stage for them to develop further skills in evaluating landscape health. Access to Site Tours in areas outside the southwest was, however, stated as a concern due to perceived lack of resources to develop and implement them.

A recommendation for improvement of this tool is to ensure that sufficient resources are available so that Site Tours can be provided for any interested producers outside the southwest of the province.

Table 5.13
Tool: Riparian Workshops

One day meetings providing a forum for community members to identify and discuss riparian issues. Workshops begin with a slide presentation on riparian ecology, and are followed by a break-out session in which participants discuss concerns and potential solutions for riparian zone management.

THEME 1	**The tool is a starting point in the process of creating awareness and action, building on initial interest from within the community. It provides a forum to develop a common language about riparian issues between a variety of interest groups.**
Descriptive Statements	
1. It is important to provide a forum of this type to break down barriers between groups.	
2. The tool is a logical starting point for discussion of issues, fitting appropriately in the process of awareness building.	
3. The tool provides a forum for different interests to share their knowledge and to discuss issues.	

THEME 2	**Due to limited co-ordination resulting from lack of mandate or resources, the tool has failed to become established in some areas outside the southwest.**
Descriptive Statements	
1. There is a recognized need for an identifiable, co-ordinated effort to build on any local producer interest, both for the tool itself, and the anticipated developments arising from it.	
2. Agencies do not have the jurisdictional mandate to perform the necessary co-ordination and follow-up, a niche that may best be filled by the Cows and Fish Program.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Priority of Objectives (Manager Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Delivers in-depth slide talk (function, grazing principles and strategies, human role/impact) to raise awareness	13 / 13	
2. Encourages community-based action so people start talking the same language		
3. Promotes team-building with and among agency staff and community representatives		

Objective Effectiveness Ranking	# EXC	# GOOD	# FAIR	# POOR
1. Delivers in-depth slide talk (function, grazing principles and strategies, human role/impact) to raise awareness	2	10	1	
2. Encourages community-based action so people start talking the same language	2	10	1	
3. Promotes team-building with and among agency staff and community representatives	2	10	1	
Tool Effectiveness Rating	**Good**			

The Riparian Workshop tool was considered to be an appropriate stepping stone in starting the awareness process at the local level, because it provides local interests with the opportunity to identify and discuss issues of concern. The Riparian Workshop was assigned an effectiveness rating of Good.

It was recognized that central co-ordination of the Riparian Workshop was essential to its effectiveness. The tool had worked well in areas where central co-ordination by the program had been available but had failed where the task of co-ordination had fallen to partner agencies whose mandates did not include this type of activity. It was suggested that the co-ordination role was best met by a neutral party, such as the Cows and Fish Program, given sufficient resources.

Recommendations for improvement include providing personnel and financial resources to capture and co-ordinate interest at the local level, in order to create a forum in which producers can begin to discuss issues of concern. While it is important to include other interest groups in the tool, the focus should remain producer-based.

Table 5.14
Tool: Riparian Health Assessment Field Days

Starts with a workshop that includes a slide presentation addressing riparian ecological functions, followed by a field trip to teach participants how to use the lotic riparian health assessment monitoring technique.

THEME 1	**The tool provides a method, not available elsewhere, that enables producers to view landscape processes and change both consistently and critically, as part of a cumulative process leading to them choosing appropriate management actions.**
Descriptive Statements	
1. The tool communicates to producers how to identify, measure and comparatively assess elements of riparian landscapes.	
2. The tool supports producers' need and ability to act independently as the decision-maker in managing their own riparian sites, helping them to monitor health, set goals and identify management options appropriate for their specific sites.	

3. There is no other similar tool available to producers to help them to understand the elements and interactions of riparian landscapes.

THEME 2	**Field instruction is essential to the effectiveness of the tool because management by producers is inherently field-based, but the print document is slightly cumbersome in size and language.**
Descriptive Statements	
1. The hands-on nature of the tool reflects the working style of producers.	
2. The printed handout is cumbersome for at-home use.	
3. The form's language may be too technical for some, and the form does not provide an opportunity to record comparative site history.	

THEME 3	**The tool reflects producers' traditional sharing of expertise through interaction, allowing them to arrive at a common understanding of the landscape without assigning blame for its condition to the producer managing it. The tool may have its greatest impact in settings where opportunities for producer interaction are maximized.**
Descriptive Statements	
1. The process of learning and applying the health assessment at home encourages interaction and dialogue between producers, creating a neutral forum to understand the condition of their landscapes.	
2. Presenting the tool in one-day events may not maximize efficient use of resources or provide the greatest opportunity for the necessary interaction between participants.	
3. Return on investment of program resources, and producer interest in the tool, may be diluted without proactive, targeted follow-up from the program.	

THEME 4	**The tool is of interest to producers, and they are seeking alternate ways to obtain an introduction or explanation of its potential, prior to participating in or conducting full assessments.**
Descriptive Statements	
1. The tool is not well known outside its current field day setting; other methods of communications are not maximized.	

THEME 5	**The tool may not address non-agricultural impacts sufficiently, representing a desire on the part of producers to ensure non-agricultural riparian zone users are reached.**
Descriptive Statements	
1. The tool appears to focus on cattle impacts without communicating impacts by other types of users.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)		
Objective Ranking		
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking
1. Provides field instruction on the health assessment technique as a way to encourage individual monitoring practices	11 / 11	
2. Delivers in-depth talk (function, principles, human role/impact, and touching on grazing strategies), to raise awareness and encourage changed management behaviour		

Notes
Number of participants: 12 Number of votes: 11 (one individual not familiar with tool did not vote)

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides field instruction on the health assessment technique as a way to encourage individual monitoring practices	9	2		
2. Delivers in-depth talk (function, principles, human role/impact, and touching on grazing strategies), to raise awareness and encourage changed management behaviour)	9	2		
Tool Effectiveness Rating	**Excellent**			

The Riparian Health Assessment Field Day was assigned an effectiveness rating of Excellent. The field setting was considered by participants to be both helpful and appropriate because it provides the necessary hands-on opportunity to visualize and interpret the landscape. Development of these skills provides producers with the means, once at home, to independently evaluate their landscapes, creating a knowledge from which to make appropriate management decisions. This tool was considered by producers to keep management decisions at the producer level. However, accounting for non-cattle impacts was again raised by participants as a concern, highlighting their sense of being targeted and the need to involve and communicate with others who use and impact riparian zones.

The field setting for instruction, and the potential use of the riparian health assessment monitoring technique at home, were viewed by participants as being delivered in a suitably neutral manner, providing producers with the opportunity to learn through discussion and interaction among themselves. This reflected the established practice of social information-gathering within the producer community and created a positive environment for management change based on newly acquired skills and information. Access to the tool by those previously involved continued to be of interest.

Recommendations for improving the Riparian Health Assessment Field Day tool are set out below.

(1) Maximize access to the Riparian Health Assessment Field Day by communicating its availability and potential and by continuing to present it in learning situations that allow interaction between participants.

(2) Use resources efficiently by targeting follow-up to only participants expressing high interest.

(3) Modify the lengthy printed materials used in the field instruction setting for ease of use.

(4) Consider mechanisms to communicate the tool and the results to non-agricultural audiences.

Table 5.15
Tool: Stockmens' Range Management Course

Three-day intensive field course covering many aspects of rangeland and riparian management, hosted by the Cows and Fish Program and a variety of agricultural and conservation agencies and organizations.

THEME 1	**The tool is an appropriate setting for promoting riparian awareness as part of range management generally, and provides a positive, flexible and open forum in which producers can share their knowledge and learn about new management information.**
Descriptive Statements	
1. The tool places learning about riparian management within the larger ecology of range management, and is an appropriate forum for Cows and Fish Program involvement.	
2. The tool provides a forum for constructively sharing both practical and science-based information, breaking barriers and establishing new working relationships.	
3. The less formal aspects of the course are highly valued because they provide opportunities for further discussion on course material.	
4. The flexibility of the course material options and direct access to Program Representatives are valued components of the course.	

THEME 2	**The course provides a hands-on field experience that is key to increasing ecological awareness and changes in management practices.**
Descriptive Statements	
1. The course material promotes ecological knowledge.	
2. The course creates interest in changing to new management strategies, and promotes implementation of those strategies, through hands-on learning and shared experiences.	

THEME 3	**The length of the course is appropriate given the volume of material covered, but the season of the course, while necessary for plant identification, is not conducive to some producers or operations field staff who cannot attend in June. Concern is also expressed about finding new ways to reach other potential participants.**
Descriptive Statements	
1. The three-day timetable is considered appropriate and necessary to ensure acceptance of the depth and breadth of information covered.	
2. It is acknowledged that, for practical purposes, the course must be held in June, but this timing prevents attendance by certain key operational staff, or producers from areas outside of the southwest, who would benefit from instruction.	
3. The course may only be reaching those most interested in improving management strategies, and not those who most need to change their management strategies.	

TOOL SUCCESS (Effectiveness Assessment - medium-high exposure participants)			
Priority of Objectives (Program Ranking)	# Participants Agreeing	Alternate Participant Ranking	# Participants Agreeing
1. Provides Cows and Fish message (in shared agency setting) through field instruction, including health assessment, plant ID, soil typing	9 / 10	1. Provides Cows and Fish message (in shared agency setting) through field instruction, including health assessment, plant ID, soil typing	1 / 10
2. Shares expertise (e.g. historical land use, role of fire, alternate forms of winter grazing, fencing, watering) from various disciplines/perspectives, including producers		3. Shares expertise (e.g. historical land use, role of fire, alternate forms of winter grazing, fencing, watering) from various disciplines/perspectives, including producers	
3. Legitimizes message by presenting the producer as the messenger, illustrating enlightened use		2. Legitimizes message by presenting the producer as the messenger, illustrating enlightened use	

Objective Effectiveness Rating	# EXC	# GOOD	# FAIR	# POOR
1. Provides Cows and Fish message (in shared agency setting) through field instruction, including health assessment, plant ID, soil typing	9	1		
2. Shares expertise (e.g. historical land use, role of fire, alternate forms of winter grazing, fencing, watering) from various disciplines/perspectives, including producers	9	1		
3. Legitimizes message by presenting the producer as the messenger, illustrating enlightened use	8	2		
Tool Effectiveness Rating	**Excellent**			

The Stockmens' Range Management Course tool was rated consistently high by participants, and was assigned an effectiveness rating of Excellent. Participants indicated that both the format and content of the tool provided a constructive, comfortable learning forum for producers. Benefits of the tool include increased awareness, incorporation of management practices into operations, and opportunities to share information and build relationships, both within the producer community and with others interested in riparian management. Plant identification was identified as one of the most valuable course topics, as was placing riparian management into a broader ecological context of range and watershed management. The role of the Cows and Fish Program in working with other agencies in this learning setting was considered to be appropriate.

The three-day commitment to attend the course was raised but it was acknowledged generally that the nature and volume of the course material merits a three day format. The June date of the course was also acknowledged as necessary for plant identification, but it can prevent attendance by many producers and their field staff due to operational factors such as releasing cow-calf pairs into new pastures, or onto grazing co-operatives, which must occur at this time of year.

No major recommendations are made with respect to this tool, although some consideration could be made to providing a portion or variation of the course during some period other than mid-June to reduce the time commitment of participants and to permit operational staff to participate who cannot do so in June.

5.3 Discussion

This section presents the key findings of the qualitative evaluation of the effectiveness of the Cows and Fish Program in developing ecological literacy. The key findings relate to the program generally, addressing the delivery process and program values; partner resources and management options; and program identity. Overall, the discussion reflects the views, issues and concerns underlying the thick description already provided about how specific programming tools promote or impede ecological literacy, and provides further explanation about whether the program's rationale is supported by experience in southwestern Alberta. Strategic and operational recommendations relating to the key findings are also provided to assist the evaluation users in addressing the matters raised. To preface the discussion about programming effectiveness, the effectiveness ratings assigned by focus group participants to each tool are summarized in Table 5.16.

Table 5.16
Tool Effectiveness Rating Summary

RATING CATEGORY / # OF TOOLS	TOOL
Excellent (2)	Riparian Health Assessment Field Days, Stockmen's Range Management Course
Very Good (4)	Program Representatives, Profile Producers, *Cows, Fish, Cattle Dogs and Kids*, Caring for the Green Zone: Riparian Areas and Grazing Management
Good (7)	Videos (3), General Presentations, Riparian Workshops, Site Tours of Demonstration Ranches, Community Health Assessment Process
Fair (2)	Website, General Media
Poor (2)	Display Booth, Introductory Pamphlet

5.3.1 Delivery Process and Program Values

The first key finding in Phase 1 was that both the delivery process and program values assumed in program design were, for the most part, validated by the qualitative data. The delivery process was perceived by participants to be generally effective: the program was additive in nature, starting with introductory tools that built awareness through a series of more comprehensive tools, in a process leading to sustainable riparian management practices. The following statement by one producer mirrors views expressed by several focus group participants: "it becomes a learning thing over time... my own approach to grazing management has changed completely".

In southwestern Alberta, therefore, the program rationale of developing ecological literacy was supported. The values on which the program was designed, however, were viewed as having been implemented with varying degrees of effectiveness. The first program value (community-based management) was seen as being achieved in a very effective manner. A second value (reflecting producers in a positive light) was found to be primarily, but not entirely, effective, while a third value, primarily operational in nature (acting as a team-based partnership) was found to be ineffective in some circumstances. It is suggested, therefore, that that the Cows and Fish Program was reasonably sound in its design and delivery of programming tools but that some modifications, as outlined in this chapter, could be undertaken to increase effectiveness by addressing the impediments to ecological literacy identified by participants.

Focus group participants identified the strength of delivery of the community-based value as fundamental to the program's effectiveness. This was achieved by the Cows and Fish Program providing a framework in which local individuals identified community-

specific needs, controlled and managed local information, and determined future direction on landscape issues. The program was structured at a manageable, locally-driven pace, building knowledge and promoting action over time. It provided an initial contact and information source, while encouraging increasing levels of local leadership and providing a forum to initiate dialogue between different interests. The program offered a focal point for community action, filling a niche that could not be met by other organizations due to jurisdictional limitations. It helped individual producers learn to recognize and understand landscape change, thereby promoting bottom-up, not top-down, decision-making, and gave individuals the flexibility of science-based choices that were communicated in a neutral manner. The Cows and Fish Program also shared relevant management solutions with individual producers, where traditional sources of information had not, and encouraged learning through personal and local interaction. It reflected producers' desire to act as stewards and illustrated that desire and its results to others. Finally, the program reflected producers' expertise and reputation within their communities, providing them with an opportunity to act as communicators in those communities.

These observations suggest that the fundamental philosophy of the community-based approach, as applied by the Cows and Fish Program, reflects the tenets of sustainable resource management. They also mirror some of the Landcare evaluation findings in which Curtis (1995) stated that collaborative interaction on decision-making is becoming the standard for land use management and, in particular, that it appropriately and proactively incorporates local knowledge and expertise into the process. Similarly, an evaluation of ecosystem management decision-making by Feick (2000) stressed that information, to be useful and useable, must be relevant, accessible and presented in an inclusive setting. This suggests that the Cows and Fish Program has understood and

applied the principle that community members, whether called stakeholders or program participants, play a more significant role in land use management decisions than has occurred under past, traditional leadership by government agencies.

As Roling (1988) has suggested, the process is about developing people rather than about developing agricultural operations. The effect is more informed individuals, better able to make appropriate decisions and to organize themselves to deal with circumstances unique to their situation. It is a type of social learning, in which numbers of people are able to work together effectively because they share problems, ideas, encouragement and solutions, which together promote better land management (Campbell, 1989; Edgar and Patterson, 1992, as cited in Curtis, 1995: 13; Woodhill, 1990).

5.3.2 Partner Resources and Management Options

The second key finding in Phase 1 is that the intended impact of programming tools can be reduced when staff and/or technical resources were perceived to be unavailable from, or not applied consistently by, the program and/or the program partners. This impediment to promoting awareness was due, first, to lack of clarity in developing and maintaining the role and contribution of program partners/team members and, to a lesser extent, Profile Producers. Focus group participants stated that this impediment was most likely caused by a lack of financial resources. Second, effectiveness of some of the existing programming tools was reduced because of a perceived lack of management solutions for non-foothill ecozones, and for various sizes and types of cattle operations -- information which, if available, might motivate interest in the program by producers.

With regard to the first reason for reduced impact, producers expressed consistently that they want reliable and easy access to relevant management information. Follow-up on enquiries and on riparian management projects was viewed as an important program feature, one that has sometimes not been achieved. This drawback was evidenced by telephone calls from producers remaining unanswered by Program Representatives, the inability of producers to access information through program partners (e.g. the Alberta Cattle Commission and Alberta Agriculture, Food and Rural Development), as well as the inability of existing program partners to initiate or follow through on ranch visits, community programming activities (e.g. Riparian Workshops and General Presentations) and development of new programming tools (e.g. Site Tours). Representatives of some program partners who participated in the focus groups expressed frustration at being unable to move forward due to the limitations of their agency mandates, while others suggested that a certain lack of co-ordination within the program had hindered progress on joint projects. This situation had been caused by heavy demands on existing staff (both Program Representatives and program partners) with a consequent reduction in communication.

Focus group participants were close to unanimous in stating that financial and technical support from program partners, including industry organizations and government agencies, is both necessary and appropriate if riparian management is to be applied successfully. This support is required so that the program can maintain its activities, its reputation and its ability to help producers address riparian management issues. As one participant observed succinctly, "it's time to put their money where their mouth is."

This finding is similar to evaluation observations made about Landcare by Curtis (1995). Its program rationale, namely that significant levels of activity and landscape

management change occurs by some organic process driven by individuals or groups with local, occasional financial and technical support, was found to be faulty. Once a certain level of program participation and awareness has been achieved at the community level, more permanent resources were found to be needed to manage the growth of the process. This idea was also reiterated by Cows and Fish Program evaluation focus group participants, who suggested that dependable financial resources to support future programming were "really important, because if we lose it at this stage, we've lost a lot of work". Without these resources, it was suggested, the program "will die soon".

Curtis (1995) also mentioned the conundrum of dependence on government by groups claiming to be community-based. Similarly, participants in the Cows and Fish Program focus groups spoke about the complex relationship between community-based initiatives and government agencies. On the one hand, the idea of the community driving action on riparian issues was paramount, yet the funding and technical resources necessary to continue the process were available primarily from government agencies. The point at which communities act independently was, therefore, difficult to pinpoint.

In order for programming to be considered legitimate, producers want their industry and, in particular, riparian grazing management, to be presented in a positive light and to be explained in the context of other human impacts on riparian zones. The integration of cattle with healthy riparian ecosystems was treated inconsistently in the programming tools. The Stockmens' Range Management Course and Site Tours, for example, were considered to be very effective at engendering positive attitudes and actions by producers: "...I found watching the people leave ... that everyone felt proud of being a rancher... I can say [to myself], oh, I'm doing that OK." However, programming tools

such as the Display Booth and the Suzuki video appeared to single out cattle as the primary culprit in riparian ecosystem decline. "It says the problem... here's a cow... the problem is the cow, is what I see right away... as a cattleman, it gets your hackles up right away ... approach [it] from the point of view, this is what cattlemen are doing to combat some of the problems". It was important that producers not feel targeted by programming, if the program goal was to achieve their commitment to sustainable riparian management. Many producers, for example, regularly experience damage to their property by recreationalists and believe that it is essential to include urban and recreational audiences in Cows and Fish programming. To encourage greater understanding of riparian issues among different groups it is important to highlight current and potential actions taken by producers to manage their riparian zones properly. Communicating this in every tool in the positive, balanced manner achieved in, e.g., the Stockmens' Range Management Course and Site Tours, will promote the program's producer-positive value more effectively. As Feick (2000) suggests, use of information in decision-making depends on the nature and quality of its delivery. This appears to hold true for the Cows and Fish Program.

The concept of partnership communicated by some tools was a very positive feature of the program, establishing immediate interest. "I saw right off the bat that there was partnership... [it means] it's not being forced down your throat." As explained above, the collaboration between program representatives and producers was highly valued. When this program value was not consistently illustrated in all tools, however, a barrier of skepticism was created. For example, the Caring for the Green Zone: Riparian Areas and Grazing Management booklet lists its program partners, but more are government agencies. Producers are not included in the list. Further, information about the program, including the Caring for the Green Zone: Riparian Areas and Grazing

Management booklet, could not in some cases be obtained from those so-called partner agencies. As one participant indicated, the partner agency staff he dealt with had "never heard of" the Cows and Fish Program. The assumption in the program rationale is that good information leads to good decisions, so producers must first be able to access that information. Producers become distrustful quickly if they perceive a mixed message in the program's delivery, especially as it relates to government involvement. Any tools that do not clarify the identity and nature of the partnership, and its producer focus, reduce the potential of producers to become interested in the substantive content the program intends to deliver.

Producers also need information that is relevant to their operational situation. For example, the Caring for the Green Zone: Riparian Areas and Grazing Management booklet was rated Very Good for use in southwestern Alberta. It was suggested that, as the program expands, the lack of similar tools that describe management options suitable for landscapes outside of the foothills ecozone may impede interest from producers operating in those areas. In particular, information tools dealing with management options for small-size operations, and flat-land operations, appeared to be absent from the currently available programming tools. Further, producers in the focus groups perceived an emphasis on streambank fencing in some tools (e.g. the Introductory Pamphlet and Foster video), a factor that may discourage producers from pursuing further involvement with the program. Fencing is an unpopular management option because of its material and labour costs, the limitations it places on appropriate grazing and its tendency to create a fire hazard in corridors of ungrazed vegetation.

5.3.3 Program Identity

The third key finding in Phase 1 is that the program's identity and purpose was not clearly stated across the suite of programming tools. Participants observed that the tools do not contain a concise description of the program's objective or goal. This lack of clarity has led to misconceptions about the program, including confusion about whether it is a government program. For example, the list of program partners found in the Website tool suggested that the program consists almost entirely of government agencies, when it is intended to be oriented to and driven by producers. The association with government, particularly in introductory programming tools, presents a barrier to some individuals in and of itself. It can create confusion and potential distrust which may only be resolved if an individual is subsequently exposed to more comprehensive tools (e.g. General Presentations) that more successfully explain that the Cows and Fish Program is intended to be a community-based, producer-oriented program. Clarification and appropriate involvement of government agencies within the Cows and Fish process is merited. Curtis (1995) also noted the conundrum of needing government involvement to ensure the long-term effectiveness of a community-based program.

Some producers in the focus groups who believed themselves to be well-informed producers had not yet heard about the Cows and Fish Program, even though it had been operating in their area for some time. This suggests that if name recognition was maximized, producers may be more likely to identify with, and pursue additional information from, the program. "Is this a book [Caring for the Green Zone: Riparian Areas and Grazing Management] that's put out by Cows and Fish, that's what you're saying?"... "You're more likely to pick this stuff up [Introductory Pamphlet] if you've had previous exposure [heard of the name]."

In discussing several tools, participants expressed strongly that it is important to reach non-agricultural audiences with Cows and Fish programming, including urban, recreational and youth groups, so that these people increase their knowledge about the role of grazing and the variety of other impacts on riparian zones. However, this raises the question about who the program's primary target is or should be, given that it is, ostensibly, intended to assist cattle producers in achieving healthy riparian ecosystems through sustainable grazing management. Resources devoted to non-agricultural audiences may place greater demand on the program, but may also promote broad-based interest in riparian issues by sharing information in a co-operative and inclusive manner. Given the complexity of land use decisions, and the potential for conflict over riparian resources as expressed by participants, a well-informed and involved public was stated as desirable. As Feick (2000) suggested, raising awareness about ecosystems and providing practical mechanisms by which information exchange occurs will enhance, rather than inhibit, the process and outcomes of decisions pertaining to use of important landscapes.

Accordingly, while focus group participants explained that the tools are generally effective in terms of being producer-positive and partnership-based, the implementation of these values was not consistently evident across all tools.

5.3.4 General Observations

As described in Chapter 4, the qualitative data coding procedures identified some participant commentary not associated with specific tools. That commentary reflects more general ways in which producers respond to management information and to the Cows and Fish Program generally. Participants identified the best features of the

program as its grassroots involvement, building trust with community groups, the credibility of science-based knowledge combined with community wisdom, and flexibility in management practices. Personalized interaction was stressed as an essential component in initiating awareness and education, communicated by both expert producers and specific Program Representatives.

The elements of the program name were raised repeatedly by focus group participants. As the program's trademark, as it were, it was acknowledged that the two elements in the name are easy to remember and have become established. The name does, however, present some potential drawbacks in terms of attracting people to pursue program information. First, it was suggested that the name does not contain a third element representing people, one that would reflect the essential role people play in riparian management, as suggested by programming content. Second, not all cattle producers have fish, and so may fail to make the link between the literal use of the term fish, and the analogy that the term fish is intended to represent water or riparian ecosystems. Third, urbanites may simply disregard or misunderstand the program and/or its programming tools because their personal experience does not relate to either the fish or the cows elements within the program name.

Participants candidly expressed what they believe to be their own barriers to changing management practices. Reluctance to move away from familiar, traditional practices, and to admit that riparian zones require more active management, were identified as self-imposed barriers to change. Participants also stated that they found it easy to blame others for management problems and agreed that they were not as open to working with urban and recreational interests as may be merited. They emphasized that, if the Cows and Fish Program represents one way to achieve change, producers

first need to know more about what the program involves (options for management) and does not involve (streambank fencing). Economic factors were identified as playing a large role in the acceptance of new management. Ecologically sustainable management strategies must, therefore, be illustrated to producers in ways that tie into their requirement to produce a return on their investment in cattle.

5.4 Recommendations

As set out in the program evaluation agreement governing this research, an agreement based on standards of the Joint Committee for Educational Evaluation (1994), recommendations aimed at improving programming effectiveness are provided in the evaluation to help achieve use of the evaluation results. The recommendations reflect a distillation of the perceptions and suggestions of focus group participants speaking in an informed manner about the Cows and Fish Program. The first recommendation is strategic, designed to address long-term program planning. The second and third recommendations are operational in nature, indicating practical short-term actions for improving program effectiveness.

(1) Clarify the Program's Future Direction. This includes determining and prioritizing target audiences, incorporating additional site-relevant management strategies, and ensuring appropriate resources are in place to maintain current program quality and to support new initiatives.

The Cows and Fish Program is at a crossroads. Concern was expressed, particularly by producers, that the program should fulfill a broad awareness function directed to many audiences, including urban, recreational and youth groups, while also maintaining a

producer focus. It is necessary, therefore, for the program to examine in greater detail where program efforts and resources should be directed and used most effectively, and to identify how a broader awareness function fits with a producer-oriented program. It is important to work with producers to continue to identify and learn about a wider spectrum of management options suitable for different operational types and sizes. The program design and delivery is essentially sound and should remain so in other areas of the province if a similar process is continued. However, financial and technical resources are required to support the program and to support producers in managing riparian ecosystems. Appropriate resource levels will prevent alienation and misunderstanding by ensuring that follow-through occurs at the current level of quality.

(2) Clarify Working Relationships Within the Program Partnership. Team-building is neither fully developed nor maintained. It is necessary, therefore, to identify, educate and maximize available staff resources drawn from the program's partners.

People relate well to the idea of partnership: this program value was implemented reasonably well in southwestern Alberta. However, tools were not consistently promoted by program partners, nor were all potential technical resources maximized from partners that would help implement and support program activities. Specifically, strategies are needed to utilize agencies at appropriate times to distribute information; to advise the public about the program; to co-ordinate riparian project referrals; to provide technical support; and to provide funding. With regard to Profile Producers who have volunteered their time to program activities, it is necessary to communicate regularly with them and to ensure that they are treated like other professionals within the partnership, for example by offering per diem reimbursements to cover their contributions of time and

expertise. It is also appropriate to develop for producers some form of standardized guideline that they can take advantage of prior to involvement with public activities, so that they are more comfortable and effective when acting in their roles as communicators.

(3) Develop a Plan to Ensure Accurate and Positive Presentation Of Content Across All Programming Tools. It is recognized that the current programming tools have been developed over several years and that some have received more attention in terms of modification, based on demand for the tools and resources available to update them.

It is recommended that a communications plan be created that focuses on strengthening the program's identity by explaining more clearly its objectives, activities, team members, resources and contact information. Program identity needs to be articulated clearly. A communications plan should also involve a review of all tools for visual and thematic consistency, paying attention to the three key program values of community-based action, producer-positive focus and partnership. Revisions to tools must include management strategies relevant to producers operating in a variety of circumstances and address non-agricultural impacts on riparian zones, if only to soften the sense that producers often feel that they are, intentionally or otherwise, blamed for causing all the damage to these areas. Finally, a communications plan should address the nature and extent to which non-agricultural audiences are to be targeted by programming tools and, accordingly, incorporate tools and message content relevant to those audiences.

5.5 Summary

This chapter provided the thick description required to address objective 2 of the evaluation, namely to examine the effectiveness of the design and delivery of programming tools in the process of developing ecological literacy, as experienced by the focus group participants. Descriptive and thematic statements describing the ways in which the tools have promoted or impeded that process were provided. Three key findings relating to core program values, resources and program identity were discussed. The community-based approach that is central to the Cows and Fish Program philosophy was, in the experience of the participants, to be very effectively delivered, while the producer-positive program value was considered to have been inconsistently addressed in programming tools. A third program value of acting as a team-based partnership was found to be ineffective in a number of situations described by participants. To address aspects of program delivery that were not believed to be delivered effectively and to increase the usefulness of this utilization-focused evaluation, tool-specific, strategic and operational recommendations to enhance programming impact were presented for consideration by the Cows and Fish Program managers. These included clarifying the future direction of the program, including identifying relevant target audiences; clarifying working relationships within the partnership, including those with government agencies; and developing an overall communications plan to standardize tool design and focus content to specific audiences.

This discussion completes the qualitative phase of the evaluation. The next chapters deal with the Phase 2 (quantitative) research design. Phase 2 addresses the third objective of the study in which a conceptual framework relating to the attitude-behaviour relationship is used to explore the development of ecological literacy. Phase 2 is distinct

in design from Phase 1, as defined by the two-phase mixed-method model (Creswell, 1994) used in this evaluation, but provides an opportunity for examining and understanding ecological literacy from a different perspective.

6. METHODS - PHASE 2 (QUANTITATIVE)

6.1 Introduction

Chapter 6 describes the quantitative methods used to address the Phase 2 research questions. The research questions are repeated below for ease of reference.

(2.1) Does exposure of cattle producers to programming tools contribute to ecological literacy, as evidenced by:

- (a) their knowledge of key riparian ecology concepts; and
- (b) their application of riparian awareness, a behaviour evidenced by:
  - (i) use of any of five sustainable riparian grazing systems; and
  - (ii) use of any of eight sustainable riparian grazing techniques, including one monitoring technique?

(2.2) Do attitudes, Subjective Norms and Perceived Behavioural Control, the antecedent elements to intention to undertake behaviour within the Theory of Planned Behaviour, explain:

- (a) the application of riparian awareness by cattle producers, a behaviour evidenced by use of any of five sustainable riparian grazing systems?

The methods were designed to, first, examine the relationship between respondent exposure to programming tools and (a) building ecological awareness (knowledge) and (b) applying awareness, namely, the use of selected sustainable riparian grazing management strategies. Second, the methods examined the relationship between respondent attitudes and desired behaviours (i.e. use of selected management strategies). The chapter begins with an outline of data collection procedures, including

sampling, and describes the data collection instruments. The chapter then outlines the statistical procedures undertaken to analyze the relationships of interest, i.e. between programming, attitudes and behaviour. Specifically, the methods used to calculate knowledge scores, develop indices for the elements of the Theory of Planned Behaviour, and run regression models are detailed. Limitations associated with the research design are described in Chapter 8.

6.2 Data Collection

This section describes the data collection procedures. Modifications to the methods are outlined where appropriate to illustrate how some aspects of the research design evolved during the early stages of the study. In 1998, at the beginning of this research, it was assumed that the common technique of using a questionnaire, framed around the Theory of Planned Behaviour to analyze comparison groups of cattle producers, would provide a meaningful basis from which to explain whether exposure to Cows and Fish programming was related to behaviour and whether attitudes (including knowledge) were related to behaviour -- in other words, to help examine the rationale of ecological literacy. Further, it was assumed that randomly selecting potential respondents for inclusion in those comparison groups would permit cause-and-effect conclusions to be made about any observed associations. Accordingly, procedures were undertaken to:

(a) design and implement a questionnaire, described in greater detail later in this chapter, in which variables were structured around items identifying respondent exposure to programming (level of involvement); the indices of the Theory of Planned Behaviour (Affect, Cognition/knowledge, Perceived Behavioural Control

and Subjective Norm); and respondent behaviours (use of riparian management strategies); and

(b) conduct a randomized selection of potential respondents drawn from the cattle producer community in southwestern Alberta.

After these tasks had been completed, limitations associated with this type of operationalization became apparent. In brief, they related to the inability to eliminate selection bias in what was otherwise intended to be an experimental research design (Cook and Campbell, 1979; Rossi et al., 1999). The implication of the research design as operationalized was that it would not be possible to determine whether the Cows and Fish Program, rather than some other influencing factor, was the cause of any behaviour observed. This occurred because the program had been active in southern Alberta for several years, had received a degree of media exposure and was presumed to be a relatively well-known initiative by the public. A standard randomization technique used in experimental research designs to reduce bias in the selection and comparison of respondents (Judd et al., 1991; McGrew and Monroe, 1993; Rog, 1994; Rowntree, 1981) could not, when used in this study, eliminate the potential that a given respondent may have been exposed to some unknown influence, not identified and accounted for, that may have caused the observed behaviour. Chapter 8 includes a brief discussion of the nature of experimental research designs (Campbell and Stanley, 1966; Cook and Campbell, 1979) which can reliably illustrate causation and permit observations to be generalized to a broader population.

Inferential statistics typically used to analyze, explain and generalize about causal relationships were, therefore, eliminated as potential analytical tools in this research. It was both possible and practical, however, to continue utilizing the questionnaire

instrument and the randomly selected sampling frame already prepared. The questionnaire reflected the elements of the Theory of Planned Behaviour, and the randomization provided the required coverage (Rossi et al., 1999) of the area of Alberta targeted by the Cows and Fish Program. Together, they offered a new starting point from which to adapt the research design and to begin analysis. The procedures carried out to identify and select potential respondents and to develop and implement data collection are described next.

6.2.1 Sampling and Random Selection

The cattle producers of southwestern Alberta have been the primary target audience for the Cows and Fish Program over the past several years. The relevant area is illustrated in the study area map shown in Figure 1.1. Accordingly, this group represented the group of interest in assessing attitudes and behaviours in the evaluation. Initial attempts were made to identify cattle producers by accessing records from various municipal districts and from Alberta Agriculture, Food and Rural Development. Constraints relating to time delays and issues of confidentiality, in particular with regard to Freedom of Information Policy restrictions, effectively eliminated these organizations as feasible options to help identify potential study respondents.

The only other organization in the province that maintains records of cattle producers is the Alberta Cattle Commission. The commission was approached and, on the basis of its partnership in the Cows and Fish Program, was requested to release confidential records for members based in southwestern Alberta. Permission was granted, and a formal agreement was signed pertaining to confidential use of any records released by the commission to the researcher. Canada Post postal codes provided the only

mechanism by which the records database of the commission and the evaluation study area could be matched. The commission produced a database listing of 1,638 members with those postal codes (identified by the researcher), associated with the study area. As indicated earlier in this chapter, the original objective of the randomization procedure was to create a sampling frame (McGrew and Monroe, 1993) that gave every producer the equivalent opportunity to be selected for participation. However, membership boundaries and study area boundaries were different, so the listing provided only a starting point for the randomization procedure. Two problems arose: first, postal codes are associated with the town where the post office building is located, but a producer will generally reside and/or operate away from the town in which the relevant post office is located. Accordingly, the postal code listing provided by the commission did not directly match either the operating locations of any member listed, or the evaluation study area boundaries. Second, because membership in the commission is based on the name of the seller of each head of cattle in the province, the same cattle operation had the potential to be listed more than once on the membership postal code listing. Cattle are often sold under a variety of company names, the ranch name, or the names of children and spouses, all representing the same family and/or land unit. It was necessary, therefore, to modify the commission's list to eliminate, as much as was reasonably possible, any duplicate names and/or names for producers residing/operating outside of the study area boundary. This task was achieved by manually checking each name on the commission's postal code listing against the titleholders and leaseholders named for every legal land subdivision shown on cadastral maps for all municipal districts located entirely and partially within the study area. The process involved over 5,000 land units.

Table 6.1 lists the cadastral maps used in this procedure.

Table 6.1
Cadastral Maps Used in Randomization Procedure

JURISDICTION	DATE AND NAME OF MAP
Municipal District of Foothills No. 31	April 30, 1998 - Municipal Map
Municipal District of Pincher Creek No. 9	1995
Municipal District of Ranchland No. 66	June 1, 1997 - Land Ownership
Municipal District of Willow Creek No. 26	April 1, 1998 - Land Ownership
Municipal District of Crowsnest Pass	N/A *

* Previously incorporated in the Municipal District of Ranchland. No cadastral map of the new Crowsnest Pass jurisdiction was available at the time of data collection for the evaluation. Due to small areal extent of that jurisdiction, all names on the Alberta Cattle Commission listing with postal codes used in that jurisdiction were included in the sampling frame.

The selection process described above resulted in a sampling frame of 1,323 producers, which represented the maximum eligible population of cattle producers across the entire study area. The sampling frame records were exported into a spreadsheet file where formatting inconsistencies were corrected to maximize accuracy, visual appearance and ease of use of the materials to be provided to potential respondents (Dillman, 1978).

Purposive sampling (Rossi et al., 1999) aimed at targeting specific respondents (e.g. producers located near rivers and streams identified on cadastral maps) was considered too narrow a technique in meeting the requirements of this evaluation. Such a procedure would have excluded land that contained a variety of riparian zone types targeted for awareness activities but not identified on the maps, such as seeps, springs, dugouts and ephemerally wet draws and coulees. Further, the intent of this formative evaluation was to assess programming impact throughout the area in which the Cows and Fish Program had been active to determine the effectiveness of the tools generally.

Several factors of a practical nature had to be taken into consideration in determining the number of telephone interviews to be conducted and, hence, the number of potential

respondents to be invited to participate. These factors were that, first, only one interviewer was available to conduct all interviews and, in order to maintain interest and commitment, it was necessary that interviews be conducted promptly once agreement was received from a respondent. Second, time requirements had to be considered, because interviews were expected to be approximately one half-hour in length, and all interviews needed to be completed within a period of a few months. In addition, as explained above, it had been originally anticipated that an experimental research design would be used in Phase 2, requiring that respondents be classed into intervention and comparison groups that each required a minimum of 30 respondents to reliably conduct statistical analyses (McGrew and Monroe, 1993). Together with a limited postage budget that restricted the number of both initial and follow-up mailings, these factors indicated that the number of interviews ultimately conducted had to fall within a manageable range. Taking all the factors together, a target of between 80 to 100 interviews was considered both necessary and manageable.

The number of mailings necessary to ultimately obtain 80 to 100 interviews was estimated by intuitively exploring a variety of scenarios based on potential (i.e. as yet unknown) response rates, as well as the need to address the practical factors (e.g. staggering the timing of interviews) defined in the previous paragraph. The process used to explore the number of mailings required is illustrated by the following example. A 10% random draw from the sampling frame of 1,323 would result in 132 letters of invitation, to be sent as the first mailing. Assuming, say 70% (92) of recipients expressed interest, of whom, say 10% (9) failed to meet pre-screening criteria, 83 interviews would result. No further mailings would be required because the minimum number of required interviews had been obtained. However, if only 40% (53) from the first mailing expressed interest, of whom 10% (5) were disqualified, only 48 interviews

would result. Therefore, a second 10% random draw from the sampling frame, and a second mailing, would be required. Assuming a similar pattern of 40% interest and 10% disqualification from this second mailing, another 48 interviews would result. In this latter scenario, the two 10% random draws and two mailings would together result in 96 interviews, providing the required number of interviews.

Numerous permutations of potential response rates, number of mailings and their costs, timing of mailings, and disqualification rates were explored to determine what percentage value would most likely result in 80 to 100 interviews. Reviewing the permutations and weighing the practical implications of the data collection process, a rate of 7% was found to best meet the stated requirements. The sampling frame of 1,323 producers was exported from the spreadsheet file to a statistics software file. There, 7% random filter selections were performed. A total of eight random filters were drawn. Results are shown in Table 6.2. As each draw (filter) was completed, its records were exported into a word processing file where they were merged with letters and labels, and into a database file that was used to manage all mailings, telephone follow-up, interview scheduling and status of each record. A total of 637 requests for participation in the study were mailed at four points in time between June and October, 1999, representing about 48% of the sampling frame.

A slight decrease (7.63 - 8.16 = -0.53%) occurred in the percentage drawn between the first and last filters because the second and all subsequent draws were taken from records remaining after the prior draw (sampling without replacement) rather than drawing from the entire sampling frame in each case. Using the same percentage throughout (7.63%, as rounded by the statistics software) would have ensured exactly the same probability of any given name being selected for participation, regardless of the

Table 6.2
Selection Draws on Sampling Frame

DRAW #	# NAMES	FILTER % (ROUNDED)	# RECORDS SELECTED	# RECORDS REMAINING	CUMULATIVE TOTAL
1	1323	7.63	101	1222	101
2	1222	7.77	95	1127	196
3	1127	7.89	89	1038	285
4	1038	7.89	82	956	367
5	956	7.84	75	881	442
6	881	7.83	69	812	511
7	812	8.00	65	747	576
8	747	8.16	61	686	637

draw. Due to the evolution of the research design away from an experimental design in this phase of the study, however, this small variation in probability did not present serious implications for analysis.

6.2.2 Pre-Screening and Telephone Interview Instruments

Data collection instruments were devised using Dillman's Total Design Method (TDM) (Dillman, 1978). TDM was found in common usage during literature searches conducted for this study. While other basic guidelines for social sciences survey design are available (Dixon and Leach, 1978; Henerson et. al., 1987) that share some aspects of TDM, TDM was chosen because it represented a comprehensive, empirically-tested approach to survey design (Dillman, 1978). TDM was developed by testing, within a framework of social exchange theory, over 200 published methodological suggestions for different aspects of mail and telephone surveys. Dillman combined effective elements into a whole approach on the theoretical basis that the decision to respond is an overall, subjective assessment of all study elements apparent to a prospective respondent, rather than a response to any single element. In a review of 50 studies relying in part or wholly on TDM (Dillman, 1978) the average response rate was 74% for

those instruments using all aspects of the method. The rate dropped to as low as 50% as various aspects of the method were eliminated from a study, for example when the number of follow-up contact attempts was reduced. Dillman suggested that participant response is encouraged through TDM by rewarding the respondent (by showing positive regard, giving verbal appreciation and supporting the respondent's values), reducing cost to the respondent (by making the task appear manageable and eliminating any implication for subordination) and establishing trust (by identifying with a known organization). Numerous techniques are recommended to address key aspects of instrument design, including ways to develop well-organized, easy-to-use survey instruments, order questions strategically, promote participant motivation, pre-test the instrument and promote completion by participants by personalized follow-up. To the extent that it was practical and cost-effective, for example with regard to financial and time resources available to design and prepare materials and to conduct follow-up to respondents, the Cows and Fish Program evaluation research employed TDM.

A telephone interview was chosen as the appropriate method of quantitative data collection because it was not practical to visit all respondents in person. However, the volume of information required to explore the elements of the Theory of Planned Behaviour, to record certain demographic and operational information, and to identify respondents' exposure to 17 different programming tools suggested that data collection should be a two-step process.

The first step was handled by a pre-screening booklet, illustrated in Appendix H. The pre-screening booklet was designed with several TDM techniques in mind, including introductory page layout (style, placement and content of text and visuals) and question and answer structure (alignment, size, formatting and so on). It was mailed to potential

respondents with an accompanying letter of invitation on University of Lethbridge Department of Geography letterhead, provided in Appendix I. The letter explained the value of the research and, as Dillman (1978) suggested, placed particular emphasis on its application to potential respondents, in this case cattle producers. Potential respondents were asked to complete and mail their booklet in the return stamped envelope provided, together with a consent form, shown in Appendix C. The letter asked producers to agree to participate, at their convenience, in step two of the research, a telephone interview about their grazing management. The pre-screening booklet content required that respondents confirm their active involvement in cattle production, their location within the study area boundaries, the number of head in their operation and the type of operation. In addition, respondents were asked to identify an area of their choice within their operation that contained a riparian zone, the management of which they were comfortable speaking about in the telephone interview. Lastly, in order to identify exposure to the Cows and Fish Program, respondents were asked to report whether they had ever heard about or participated in any of the 17 programming tools and, if so, whether that involvement occurred either once or on two or more occasions. The pre-screening booklet specified that Indian reserves and communal operations were excluded from the study.

A series of several timed mail and telephone follow-ups to respondents, conducted at regular intervals in the weeks and months following initial contact, are recommended by TDM as one way of increasing response rate. With limited resources, the follow-up possible in this research included only two elements. The first was a coloured reminder card mailed approximately one week after the letter of invitation. The second was a follow-up telephone call made approximately three to four weeks subsequent to the first

mailing. A minimum of two telephone attempts were made to contact each respondent who:

(a) had not yet mailed back the pre-screening booklet; and

(b) was identified by Alberta Cattle Commission zone representatives as being active in cattle production in the relevant area. This determination was made by reviewing mailing lists with the representatives prior to placing calls, a practice undertaken for the sake of efficiency in devoting resources to the task.

The second step of the data collection procedure involved the telephone interview using the questionnaire instrument. The full questionnaire instrument is provided in Appendix J. As pre-screening booklets were returned by mail, respondents were rejected from participation in the telephone interview:

(a) if they indicated that they were no longer active in the cattle business;

(b) if they were located outside the study area shown in Figure 1.1;

(c) if they had 20 head or less in their operation (because these operations were not the focus of Cows and Fish programming);

(d) if they operated a hobby acreage or a feedlot (because only commercial cow-calf or yearling operations were the focus of Cows and Fish programming at the time of this evaluation); or

(e) if they could not identify an area in their operation containing some type of riparian zone that they wished to discuss in the telephone interview.

Respondents rejected from step two were mailed a note of acknowledgement indicating that they would receive a summary of the final study results. Respondents who qualified

for step two were contacted by telephone and, in continuing the effort to minimize inconvenience to them and express regard for their involvement, were asked to identify a suitable future date and time at which they felt the telephone interview could be conducted. Interviews ranged from 25 to 55 minutes. At the completion of each telephone interview the respondent was mailed a note of thanks.

Both the pre-screening booklet and the telephone interview questionnaire instrument were pre-tested with 11 individuals, either by mail or in person. The pre-test group included cattle producers familiar with the program, cattle producers not familiar with the program, municipal agency representatives, University of Lethbridge students familiar with the cattle industry and Cows and Fish Program managers. Their observations and recommendations were incorporated into the instruments prior to mailing.

6.3 Data Analysis

This section outlines the steps taken to identify patterns of self-reported exposure to programming tools, to calculate knowledge scores and to develop indices for the elements of the Theory of Planned Behaviour. These data variables were needed in order to conduct the logistic regression, also described here, that explored the rationale of ecological literacy, more specifically the association between:

- programming exposure and (a) knowledge of riparian ecology and (b) use of riparian grazing management strategies (research question 2.1); and
- theory elements and use of riparian grazing management strategies (research question 2.2).

6.3.1 Exposure Patterns

Before examining any role that Cows and Fish programming might have played in developing ecological literacy, it was necessary to develop a mechanism by which to relate respondent programming exposure to knowledge, attitudes and behaviour. The quantitative data obtained from the pre-screening booklet and telephone interview involved 91 respondents, 17 programming tools and four levels of self-reported exposure to the programming tools. The complexity of this data matrix suggested the use of exploratory principal components analysis (Foster, 1998; Garson, 2000a; Kim and Mueller, 1978; Tabachnick and Fidell, 1996). Principal components analysis is a data reduction technique well-suited to uncovering the underlying structure of associations in complex data sets. It combines all variables, in this case level of exposure to each of the Cows and Fish programming tools, into fewer composite variables referred to as components (also called domains, factors or dimensions) that account for the major sources of variance in the data. Each component extracted in principal components analysis reflects an independent, uncorrelated pattern of variance in the data set, helping to identify unique patterns in the data. A component is defined by those variables, in this case individual programming tools, that are most correlated with each other. The extracted components are ordered, where the first component accounts for most of the variance. Subsequent components are formed from the residual variance. The last component extracted from the original data accounts for the least variance.

In the case of this study, the principal components analysis allowed the complex variations of self-reported exposure to all the tools to be reduced into meaningful, more easily-described dimensions of tool exposure, namely sets of tools. Specifically, the analysis:

(1) identified sets of tools (components) to which the respondents were exposed in similar ways, each component defined by an eigenvalue measuring the amount of variance in all the data accounted for by each component;

(2) defined the relative importance of each tool within a component (the component loading); and

(3) measured each respondent's exposure to the sets of tools (a component score) on a common standardized scale, useful as the independent variable in regression models examining relationships between exposure and use of management strategies. On the standardized component score curve, mean equals zero and standard deviation is one.

In this study, exposure level was a self-reported ordinal scale measure (never heard of/heard of but never participated/participated once/participated more than once). The Spearman's rank correlation co-efficient is an appropriate similarity measure for ordinal data and has been found to be suitable for use in exploratory principal components analysis (Davies, 1984). The principal components analysis conducted in this evaluation employed a Spearman's rank correlation co-efficient matrix, a technique used by Townshend and Davies (1999). Results were almost identical to those obtained when using a Pearson's product moment correlation co-efficient.

Varimax rotation was applied to the components extracted in the principal components analysis. The technique is useful in maintaining orthogonality, independence among the components, while increasing the interpretability of the dimensions (Kim and Mueller, 1978; Tabachnick and Fidell, 1996). Although "there are no hard and fast rules" (Dunteman, 1989: 40) for determining the number of components to retain, the reasonable choice is usually based on:

(a) the general rule of thumb of retaining eigenvalues of 1.00 or greater, providing a way of excluding components that do not account for at least the total variance of one variable, although it is a common practice to also extract dimensions with eigenvalues less than, but close to, 1.00 in order to enhance the explanation of the components;

(b) a scree test plot illustrating the eigenvalues for the components, in which a major change in line slope indicates reduced utility of any additional components;

(c) the ability to account for a reasonably large proportion of the variation against all variables; and

(d) ease of interpretation of the components (Dunteman, 1989; Tabachnick and Fidell, 1996).

Results of the principal component analysis are interpreted in Chapter 7. Discussion addresses the components extracted based on component loadings and the scree test plot; the naming of the components (hereinafter referred to as exposure domains); Pearson's product moment correlation co-efficient matrix; and the Nagelkerke's R^2 statistics reported in the calculation of the logistic regression models used to examine any associations between exposure and ecological literacy.

6.3.2 Riparian Ecology Knowledge Scores

Research question 2.1(a) asks whether exposure to Cows and Fish programming is associated with building knowledge on key riparian ecology concepts such as the relationship between water quality and riparian function, and the value of vegetation structure in a riparian zone. The key riparian ecology concepts, as listed in Table 6.3,

were revealed through a review of programming tools and were agreed with program managers prior to data collection.

Table 6.3
Key Riparian Ecology Concepts

#	CONCEPT
1.	Riparian zones are a functional part of rangeland.
2.	Diversity is best.
3a.	Vegetation is key in dealing with stream energy.
3b.	The vegetation component of riparian zones performs an ecological function.
4.	Rest must follow grazing disturbance.
5.	Structure has value.
6.	Water quality increases with riparian function.
7.	The soil component of riparian zones performs an ecological function.
8.	Water quantity increases with riparian function.
9.	The hydrology component of riparian zones performs an ecological function.

Concepts (3a) and (3b) had been designed to reflect different concepts relating to the role played by vegetation in riparian health. Although not apparent during the questionnaire pre-testing, it became clear during the first stages of telephone interviewing that the item wording used for concept (3b) was unclear and that it overlapped the concept more clearly addressed in (3a). Hence, the questionnaire item for concept (3b) was dropped from subsequent analysis, leaving nine concepts to be analyzed.

Each riparian ecology knowledge concept was presented in the questionnaire as a statement of belief, using a zero-to-ten response scale, where zero indicated the respondent believed the statement to be completely inaccurate and ten indicated that the respondent believed it to be completely accurate. This type of language was chosen because responses to the ecology knowledge items were to serve a second function in the quantitative analysis, namely the development of an index for Cognition in

operationalizing the Theory of Planned Behaviour (discussed in the next section of this chapter). Cognition represents *belief* pertaining to an attitude object (Eagly and Chaiken, 1993). For example, concept (6), water quality increases with riparian function, was queried by the belief statement: *Water quality in a stream or river is improved when there is a lot of bank vegetation.*

Mean knowledge scores (n=91) were calculated for all nine riparian ecology concept items. To examine any association between exposure to programming and knowledge, as set out in research question 2.1(a), the nine mean scores were correlated with the component scores of the five exposure domains identified in the principal components analysis. Pearson's correlations are reported in Chapter 7.

6.3.3 Indices for Theory Elements

As defined in Chapter 2, attitudes are measured best by responses to multiple items. The telephone interview questionnaire instrument was, therefore, structured around multiple items (Judd et al. 1991) that reflected the elements of the Theory of Planned Behaviour, providing the structure for the indices needed to examine any relationship between attitudes and behaviour. A description of the indices is presented below.

(a) Attitudes. This theory element was based on two sub-indices, a nine-item Cognition index and a seven-item Affect index. The Cognition index was based on the same nine items described in the previous section dealing with knowledge. The Affect questions dealt with concern about declines in habitat and forage, landscape productivity and potential legislative regulation.

(b) Perceived Behavioural Control. This element was represented by a ten-item index pertaining to respondent confidence in identifying range and riparian vegetation, and in implementing and controlling outcomes of management choices.

(c) Subjective Norm. This element was represented by a nine-item index of questions pertaining to significant others, including spouse, business partner, and neighbour, from whom the respondent might seek advice about riparian grazing management.

The theory indices employed a zero-to-ten scale following Fishbein and Ajzen (1974), Tracy and Oskamp (1983), Barla et al. (2000) and others, allowing for variation in responses. Scales ranging from five to 11 values are typical in the social sciences (Judd et al., 1991). Responses were coded as one through 11; reverse value coding was used where needed to reflect question wording. The indices were subjected to the common practice of eliminating poor index items, i.e. those with weak inter-item correlations, to arrive at the highest possible internal consistency, measured by Cronbach's alpha value (Cronbach and Meehl, 1955; DeVellis, 1991; Judd et al., 1991). The purpose was to ensure that the resultant index items consistently reflected one underlying concept intended to be represented by the index. Index development is described in greater detail in Chapter 7.

6.3.4 Regression Models

Research questions 2.1(b) and 2.2(a) ask about use of sustainable riparian management strategies as indicators of applying ecological literacy. Use of management strategies was reported in the telephone interview in a binary (Yes-No) format. Regression is the

method of choice to analyze relationships between independent (predictor) variables such as exposure pattern or attitude element, and dependent variables such as the use of selected management strategies (Hosmer and Lemeshow, 1989). In cases such as this where the dependent variable is binary, it is not possible to use linear regression to explain its relationship to the independent variable because variance is restricted to that of only two values. Binary data are neither linear nor normally distributed. When using binary dependent variables, logistic regression is the method of choice because it does not require that the data be either linear or normally distributed (Garson, 2000b; Hosmer and Lemeshow, 1989; Wright, 1995). Logistic regression reports a Nagelkerke's R^2 value, ranging in value from 0.0 to 1.0. It is conceptually similar to the R^2 statistic reported in linear multiple regression to index the proportion of variance in the dependent variable that is explained by the independent variables (Garson, 2000b; Nagelkerke, 1991).

Two sets of logistic regression models were performed. The first set, involving 13 individual models, addressed research question 2.1(b). It regressed the use of five grazing systems and eight grazing techniques against the five exposure domains. The second set, involving five individual models, addressed research question 2.2(a). It regressed use of five grazing systems against index scores for each element of the Theory of Planned Behaviour. The results of the logistic regression models are presented in Chapter 7.

6.3.5 Alternate Sources of Management Information

Rog (1994) recommends that, when implementing descriptive, exploratory natural experiments such as this evaluation, interpretation is strengthened by identifying

possible alternate sources of influence on the outcomes examined. Accordingly, respondents were asked to name management information sources they considered to be the most helpful and the second most helpful in making decisions about four aspects of grazing management covered by Cows and Fish programming tools: identifying range vegetation; identifying riparian vegetation; recognizing overgrazing; and classifying riparian health. Information source categories included family; producer; producer group; conservation group; federal/provincial agency; municipal district; private range consultant; Society for Range Management; the Stockmen's Range Management Course (delivered by multiple organizations/agencies); the Cows and Fish Program; post-secondary education; and self-teaching. Frequency tabulations are reported and discussed in Chapter 7.

6.4 Summary

Chapter 6 outlined the quantitative data collection and analysis procedures required to examine relationships between exposure to programming and (a) knowledge on riparian ecology concepts (building ecological awareness) and (b) use of sustainable riparian grazing management strategies (applying ecological awareness). Also described were procedures required to investigate whether use of sustainable management strategies (applying ecological awareness) were influenced by the Affect, Cognition, Perceived Behavioural Control and Subjective Norm elements of the Theory of Planned Behaviour. Chapter 7 presents the results of these procedures and discusses whether the findings support the Cows and Fish Program rationale of developing ecological literacy.

7. RESULTS AND DISCUSSION - PHASE 2 (QUANTITATIVE)

7.1 Introduction

Chapter 7 presents the findings of Phase 2 of the Cows and Fish Program evaluation and discusses their implications in terms of programming effectiveness, with particular reference to the program rationale of developing ecological literacy. The response rate and respondent attributes are presented first to summarize the quantitative data and to provide an overview of the respondents who participated in this phase of the evaluation. This information is followed by the principal components analysis results that identified five distinct sets of programming tools based on self-reported level of exposure.

Pearson's correlations are then reported to describe the relationship between exposure to programming tools and the first stage of developing ecological literacy, building ecological awareness (mean knowledge scores). The results of the first of two sets of logistic regression models are then presented, providing the basis for a discussion about the second stage of developing ecological literacy, applying ecological awareness. Associations between use of management strategies (Yes-No binary variables) and exposure to programming (component scores of the exposure domains) are reported. The second set of regression models also dealt with the application of ecological awareness, but were set within a conceptual framework based on the Theory of Planned Behaviour. Indices for attitudes and the related elements of the theory are discussed, followed by regression models dealing with use of management strategies (Yes-No binary variables) and the elements of the theory (index scores). These results provide the basis for discussing whether the assumption that attitudes play a role in determining behaviour (applying ecological literacy as indicated by decisions to use sustainable

riparian grazing management strategies) is supported by the data collected in this phase of the evaluation. Lastly, alternate management information sources reported by producers as helpful to them in decision-making are tabulated and discussed so as to place the relatively recent Cows and Fish programming into the context of how producers, operating in a long-established industry, traditionally seek guidance in managing it.

7.2 Findings

This section describes the response rate; respondent attributes; exposure to programming tools; knowledge of riparian ecology (building ecological awareness); and regression models examining the use of management strategies (application of riparian awareness).

7.2.1 Response Rate

The response rate in this phase of the study, as tabulated in Table 7.1, was 52.1%. This rate fell in the 50% range reported by Dillman (1978) for studies that employed most aspects of the recommended data collection design but where the number of follow-up attempts was limited to only one or two. Several factors outside of the data collection design influenced the response rate. The primary factor was major inaccuracies in the Alberta Cattle Commission membership listing used to develop the sampling frame (as noted also in Table 7.1). The inaccuracies, consisting of names of children and deceased or retired producers, names of individuals not involved in the cattle business, and incorrect contact information, became apparent only after the first and second

Table 7.1
Phase 2 Response Rate

DESCRIPTION	#	#	AS % OF 637 MAILINGS	AS % OF USEABLE SAMPLING FRAME OF 328
Requests mailed		637		
Not useable due to incorrect contact information				
Wrong contact information	-42			
Retired or deceased	-64			
Unknown or not involved in industry per Alberta Cattle Commission zone delegate	-203			
Total mailings not useable		-309	48.5	
Useable sampling frame		**328**	**52.5**	
Could not reach during telephone follow-up or chose not to participate	-157			
Available for participation/Response rate		**171**		**52.1**
Respondents disqualified from interview (determined by returned pre-screening booklet or specified during telephone follow-up: too few # of head, non-cow/calf operation, out of study area, no riparian zone)	-79			24.1
Respondents qualified for interview		92		
Non-useable interviews (determined to be Indian reserve)	-1			
n = Useable interviews (including 24 resulting from telephone follow-up)		91		

random filters had been prepared and mailed. As the nature and degree of listing errors became clear, additional random filters were drawn on the sampling frame in continuing efforts to obtain an acceptable overall response rate. In total, eight random draws were made, totaling 637 mailings. The useable number of the mailings totaled 328 (52.5% of mailings). After subtracting 157 individuals who indicated in telephone follow-ups that they preferred not to participate, or who could not be reached, 171 of these 328 individuals remained as potential respondents, representing a response rate of 52.1% (Raedeke et al., 2001). Ninety-one telephone interviews were conducted after accounting for 79 (24.1%) respondents disqualified based on information provided in the pre-screening booklet and one respondent disqualified due to operating on Indian reserve lands. Twenty-four (26.4%) of the 91 interviews were confirmed through either

mail or telephone follow-up reminders, suggesting that these types of efforts, as recommended by Dillman (1978), are worthwhile.

In post-data collection discussions with the Alberta Cattle Commission, it acknowledged that its management of the membership list has focused on adding members representing current year's cattle sales, rather than deleting those that occurred in prior years. Despite its impact on the response rate, the commission's list represented the best opportunity to contact cattle producers in the province.

A number of other factors may have influenced the response rate and the number of interviews conducted. Apart from implementing only two follow-up contacts, as already mentioned, respondents were required to have specific operational and landscape characteristics, such as a certain type and size of operation and the presence of a riparian zone. These requirements could not be determined during the selection process; pre-screening disqualifications accounted for 24.1% of the useable sampling frame. Other factors that may have influenced the response rate of 52.1% included, first, the two steps involved in the data collection, which may have appeared complex to potential respondents and presented a barrier to their commitment to participate. Second, during much of the period in question, both haying of forage crops and harvesting of grain crops was taking place. Both are sun-up to sun-down activities that restrict producers from other activities. Third, as the autumn proceeded, it became apparent that many people in the industry take vacation during this period and so were not available to participate. Lastly, illness or family commitments were mentioned by respondents as reasons for non-participation. There was no opportunity to undertake a specific follow-up procedure to quantify reasons for non-participation.

7.2.2 Respondent Attributes

Of the 91 telephone interviews conducted, 80 respondents (88%) were male and 11 (12%) were female. Almost all (87) respondents (96%) represented family-run cattle operations. One respondent (1%) spoke on behalf of a corporate entity, while three (3%) represented specialty types of operations. Sixty-five respondents (72%) reported that they owned the land area discussed in the interview, while 14 (15%) leased the area; four (4%) were managers or foremen; one (1%) represented a community pasture/grazing co-operative; and seven (8%) reported that they acted in a combination of roles. Locations of respondents were generalized based on self-reported nearest stream or river. Responses were combined into five watersheds to provide the Cows and Fish Program managers with the location information requested in the evaluation. Forty-seven respondents (52%) were located in the Oldman River watershed, 32 (35%) were located in the Highwood River-Bow River watershed, six (7%) were located in the Crowsnest River watershed; 4 (4%) were located in the Waterton River watershed; and two (2%) were located in the Castle River watershed.

Age, education, number of head in the operation and percentage of income from cattle production were reported by category, as set out in Table 7.2. Frequency of use of management strategies is presented in Table 7.3. Chi-square cross tabulations using the Gamma option for ordinal data (Table 7.4) showed no significant associations between demographic attributes and use of management strategies. The respondents were a mature group, almost all aged 40 or older, while over half had some type of post-secondary education. The respondents were active participants in the industry, with about two-thirds reporting 100 head of cattle or more, and about half reporting at least 50% of total income derived from cattle production. This degree of involvement meant

that the respondent group was an appropriate one to use when investigating grazing management.

Table 7.2
Demographic Attribute Descriptive Tabulations

CATEGORY	FREQUENCY	%
Age n = 91		
20 - 29 years	1	1
30 -39 years	15	17
40 - 49 years	29	32
50 - 59 years	29	32
60 - 69 years	12	13
70+ years	5	5
Total	91	100
Education n = 91		
Some / All High School	26	29
Some Post-Secondary	12	13
Diploma / Certificate	34	37
Bachelor Degree	14	16
Post-Graduate Degree	3	3
Other	2	2
Total	91	100
Number of Head in Operation n = 91		
21 - 50 head	10	11
51 - 100 head	22	24
101 - 200 head	25	27
201 - 500 head	18	20
501+ head	16	18
Total	91	100
% Income from Cattle Production (family operations only) n = 87		
25% or less	16	18
26-50%	13	15
51-75%	22	26
76-100%	36	41
Total	87	100

Table 7.3
Management Strategy Frequencies

STRATEGY	FREQUENCY	%
Grazing Systems n = 91		
Time-Controlled Grazing (also called Deferred Grazing)	78	86
Rotational Grazing	59	65
Rest-Rotational Grazing	24	26
Riparian Pasturing	50	55
Corridor Grazing	5	6
Grazing Techniques n = 91		
Placing salt or mineral supplies in upland areas.	87	96
Using developed watering sites in upland areas.	53	58
Using fences and/or hardened surfaces at watering points.	39	43
Temporarily removing cattle from riparian zones during heavy rain/spring melt.	33	36
Shortening the grazing period when forage plants are growing.	62	68
Removing cattle for long periods of time (more than one year)	21	23
Distributing cattle across the landscape.	67	74
Monitoring Technique n = 91		
Lotic Riparian Health Assessment	9	10

7.2.3 Exposure to Programming Tools

7.2.3.1 *Exposure Level*

In order to examine any relationship between Cows and Fish programming and ecological literacy, it was first necessary to understand the way in which respondents in this study had been exposed to the programming tools. Self-reported level of exposure to each of the 17 programming tools is presented in Table 7.5. For ease of interpretation, the table combines the four exposure categories reported into two categories. First, frequency and percentage are listed for respondents who (1) had never read/heard of the tool and (2) had heard of it but never read or participated in it (listed in ascending order of frequency). Frequencies and percentages are then listed

Table 7.4
Management Strategy / Demographic Attribute Cross Tabulations

STRATEGY	DEMOGRAPHIC ATTRIBUTE CHI SQUARE VALUE							
	Age Category		*Education Level*		*# of Head*		*% Income from Cattle*	
	χ^2	sig.	χ^2	sig.	χ^2	sig.	χ^2	sig.
Grazing Systems n = 91								
Time-Controlled Grazing (also called Deferred Grazing)	5.316	.379	2.123	.832	5.647	.227	1.563	.815
Rotational Grazing	7.444	.190	6.611	.251	8.121	.087	.701	.951
Rest-Rotational Grazing	6.557	.256	4.387	.495	3.484	.480	3.379	.496
Riparian Pasturing	2.121	.832	4.113	.533	.452	.978	3.091	.543
Corridor Grazing	5.069	.408	2.776	.735	3.916	.482	4.472	.346
Grazing Techniques n = 91								
Placing salt or mineral supplies in upland areas.	2.668	.751	4.236	.517	3.474	.482	3.460	.484
Using developed watering sites in upland are	4.626	.463	2.117	.833	2.014	.733	2.864	.581
Using fences and/or hardened surfaces at watering points.	2.342	.800	4.949	.422	1.024	.076	4.865	.301
Temporarily removing cattle from riparian zones during heavy rain/spring melt.	6.252	.282	3.165	.674	5.463	.243	4.407	.354
Shortening the grazing period when forage plants are growing.	6.966	.223	12.016	.055	5.478	.242	1.683	.794
Removing cattle for long periods of time (more than one year)	6.057	.301	6.217	.286	1.855	.762	3.308	.508
Distributing cattle across the landscape.	1.940	.857	6.158	.291	6.828	.145	7.866	.097
Monitoring Technique n = 91								
Lotic Riparian Health Assessment	4.977	.419	5.654	.341	3.466	.483	.819	.936

* sig. =< .05

for respondents who reported that they (3) had read or participated in the tool once and (4) had done so more than once.

The self-reported exposure levels should be considered in terms of the nature of the Cows and Fish Program community-based approach. As described previously, the process begins in a community once that community has expressed interest in pursuing resolution of local riparian issues. Accordingly, subsequent programming resources were purposively directed to those communities at their direction. On the other hand, for reasons discussed in Chapter 6 relating to participant selection in the research design,

Table 7.5
Self-Reported Level of Exposure to Programming Tools

	NEVER READ / HEARD OF or HEARD OF BUT NEVER READ / PARTICIPATED		READ / PARTICIPATED ONCE or MORE		TOTAL
	#	%	#	%	#
General Media	41	45	50	55	91
Profile Producers	52	57	39	43	91
Caring for the Green Zone: Riparian Areas and Grazing Management	52	57	39	43	91
Program Representatives	59	65	32	35	91
Stockmen's Range Management Course	62	68	29	32	91
Site Tours of Demonstration Ranches	68	75	23	25	91
Display Booth	71	78	20	22	91
Introductory Pamphlet	73	80	18	20	91
General Presentations	74	81	17	19	91
Riparian Health Assessment Field Days	75	82	16	18	91
Riparian Workshops	81	89	10	11	91
Community Health Assessment Process	81	89	10	11	91
Along the Water's Edge	84	92	7	8	91
Suzuki (video)	85	93	6	7	91
Foster (video)	85	93	6	7	91
Cows, Fish, Cattle Dogs and Kids	89	98	2	2	91
Website	90	99	1	1	91

the respondents were chosen from the general population of producers in southwestern Alberta. Therefore, the self-reported exposure levels reported in Table 7.5 reflect the experience of the respondents in the study, not necessarily the level of interest or involvement by those to whom programming efforts were targeted in any given area.

Notwithstanding, the data suggested that the respondent group of producers represented four general groupings of exposure to programming tools, based on the two combined exposure categories illustrated in Table 7.5. Approximately one-half of the respondents reported exposure to General Media, Profile Producers and Caring for the Green Zone: Riparian Areas and Grazing Management. Approximately one-third

reported exposure to Program Representatives and the Stockmen's Range Management Course, while approximately one-fifth reported exposure to Site Tours, the Display Booth, the Introductory Pamphlet, General Presentations and Riparian Health Assessment Field Days. One-tenth or less reported exposure to each of the Community Health Assessment Process, the three videos, the youth gameshow and the Website.

These four general groupings of exposure level suggest that, first, the Cows and Fish Program had received a moderate degree of exposure in the media, that respondents were moderately aware of the association between programming and Profile Producers, and that the Caring for the Green Zone: Riparian Areas and Grazing Management booklet was moderately well known, a not unexpected observation due to the number of copies in distribution. The second general grouping of exposure level, somewhat lower, should be viewed in terms of the nature of the tools associated with it. For example, there were only two or three Program Representatives working in southwestern Alberta prior to this evaluation, and it is unlikely that most or all respondents would be personally familiar with them. The Stockmen's Range Management Course is co-ordinated and promoted by the Public Lands Branch, a partner in the Cows and Fish Program and, accordingly, it is targeted primarily to grazing leaseholders rather than deeded landowners. A relatively low exposure level for this tool was not surprising because the respondents included both leaseholders and deeded landowners. In the third general grouping of exposure level, low levels were not unusual. Site Tours and Riparian Health Assessment Field Days were relatively new tools at the time of the evaluation and so large numbers of respondents would be unlikely to be familiar with them yet, while the Display Booth and the Introductory Pamphlet were both in declining use. The fourth general grouping of exposure level included tools delivered on only a few occasions, such as the Riparian Workshop, and/or that were available by limited types of access,

such as the Website, videos shown on television or purchased at special events, and the youth gameshow delivered at a special events.

Overall, respondents may have had some difficulty in relating what they recall having read/participated in with the programming tool name and description identified in the data collection. This factor would relate, in particular, to the General Presentation, which has taken various forms in several types of settings, and the Community Health Assessment Process, a term which community members may not have recognized despite the description provided in the pre-screening booklet, and which might have been more effectively labeled or described during data collection.

7.2.3.2 *Exposure Pattern*

Following the procedures described in Chapter 6 to determine the number of components to retain from the principal components analysis, a five component solution (described below) was found to be the most suitable for explaining the data. The components empirically confirmed five distinct ways in which the respondents reported exposure level for all tools. Every respondent was represented in each component, grouped on the basis of like patterns of reported exposure, and measured by a calculated component score representing their exposure to the sets of tools. Names were assigned to characterize the five components and to reflect the combination and nature of tools (variables) that defined the key properties of each component. The components are subsequently referred to in this document as exposure domains. Table 7.6 lists the exposure domain names and tools associated with the five components.

Table 7.6
Exposure Domain Names

DOMAIN NAME ASSIGNED TO COMPONENT	PROGRAMMING TOOLS ASSOCIATED WITH COMPONENT (in order of contribution of variance - see Table 7.7)
1. Personal Contact / Field Tools	Program Representatives Site Tours Profile Producers Stockmen's Range Management Course Display Booth Caring for the Green Zone: Riparian Areas and Grazing Management
2. Community-Based Tools	Health Assessment Field Days Riparian Workshops General Presentations Community Health Assessment Process
3. Special Target Tools	Website Cows, Fish, Cattle Dogs and Kids Along the Water's Edge
4. Introductory Communications Tools	Introductory Pamphlet General Media
5. National Media Tools	Foster (video) Suzuki (video)

The component loadings defining the five component solution of the principal components analysis are presented in Table 7.7. The five components accounted for 70.9% of the overall variance. All but one variable, the Display Booth, indicated at least 50% communality, a recommended percent of variance in a given variable explained across all of the components, that indicates the reliability of the variable in the analysis (Garson, 2000a; Tabachnick and Fidell, 1996). The result of the scree test used to confirm the number of components to retain (Tabachnick and Fidell, 1996) is illustrated in the plot presented in Figure 7.1. The change in shape of the plot line near the fifth component extracted supported the retention of five components in the analysis.

Table 7.7
Exposure Domain / Component Loadings

COMPONENT #	1	2	3	4	5	
EXPOSURE DOMAIN NAME	Personal Contact/Field-Based Tools	Community-Based Tools	Special Target Tools	Introductory Communica-tion Tools	National Media Tools	
EIGENVALUE *	7.216	1.651	1.249	1.000	.943	
% VARIANCE	42.4	9.7	7.3	5.9	5.5	
CUMULATIVE % VARIANCE	42.4	52.2	59.5	65.4	70.9	
TOOL/VARIABLE	*VARIMAX COMPONENT LOADING I (VARIANCE)*					*COMMUN-ALITY ***
Program Representatives	**.761 (58%)**	.310				78%
Site Tours	**.758 (57%)**	.379				77%
Profile Producers	**.746 (56%)**					68%
Stockmens' Range Management Course	**.714 (51%)**					63%
Display Booth	**.600 (36%)**					44%
Caring for the Green Zone: Riparian Areas and Grazing Management	**.568 (32%)**			.388		61%
Health Assessment Field Days		**.833 (69%)**				84%
Riparian Workshops		**.788 (62%)**				79%
General Presentations		**.752 (57%)**		.428		84%
Community Health Assessment Process		**.700 (49%)**				78%
Website			**.841 (71%)**			76%
Cows, Fish, Cattle Dogs and Kids			**.738 (54%)**		.314	66%
Along the Water's Edge (video)			**.696 (48%)**			66%
Introductory Pamphlet			.325	**.758 (58%)**		75%
General Media		.377		**.663 (44%)**		
Foster (video)					**.820 (67%)**	74%
Suzuki (video)			.339		**.748 (56%)**	72%

* Eigenvalues for components 6 through 17 ranged from .828 to .119. They did not represent distinct exposure domains because their variables explained less variance together than any one variable within the component explained on its own.

** Loading values < |0.3| were suppressed. When squared, the loading indicates the percentage of variance (as illustrated) in that variable explained by the component. The communality percentage is the variance in the variable explained across all of the components.

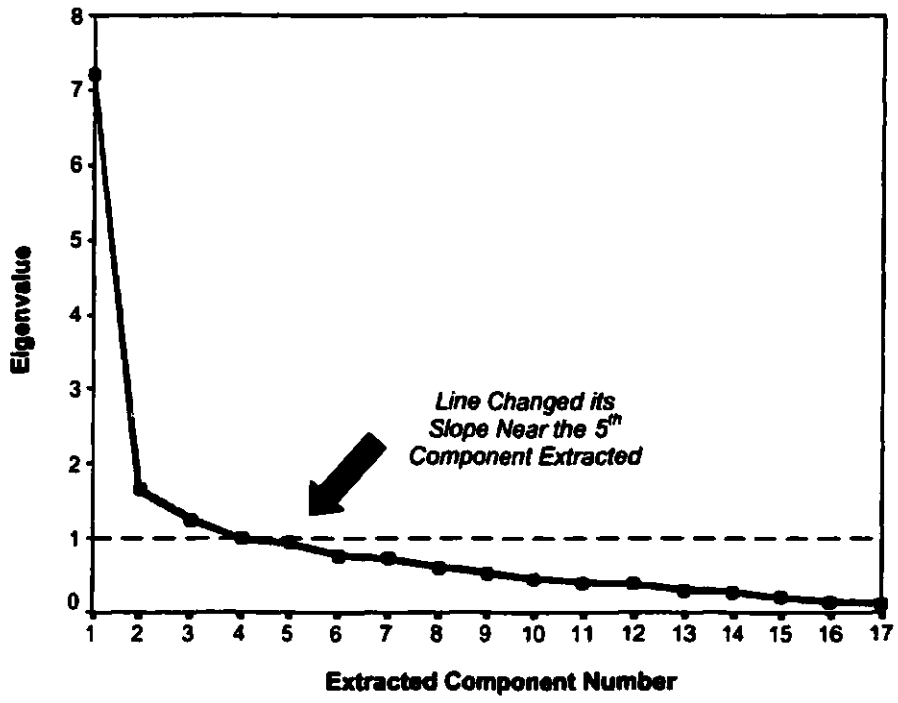

Figure 7.1
Extracted Component Scree Test Plot

The five exposure domains are described below.

(1) Personal Contact/Field-Based Tools. This exposure domain, the first of five, explained the highest percentage of variance (42.4%) in the data. Within the domain, four of the six tools (Program Representatives; Site Tours; Profile Producers; and the Stockmens' Range Management Course) each made relatively important contributions to the structure of the domain as indicated by their component loadings of >.714 (>50% of variance). This domain's combination of tools seems reasonable because Program Representatives and Profile Producers actively participate in and are accessible to producers who attend Site Tours and the Stockmen's Range Management Course. Exposure to the Display Booth and the Caring for the Green Zone: Riparian Areas and

Grazing Management booklet also contributed to the definition of the first domain, although only 36% and 32% of their variance respectively was captured by the domain. The Caring for the Green Zone: Riparian Areas and Grazing Management booklet is not specifically field-based, but is often associated withcontact with both Program Representatives and a number of field-based tools. A number of these tools fell into the higher general categories of exposure level, as indicated in Table 7.5.

(2) Community-Based Tools. The second exposure domain accounted for 9.7% of the variance in the data. It indexed four tools that are generally delivered sequentially or repeatedly in a variety of forms, as interest in the program grows in a community, and so grouping in this domain seems appropriate. The tools included in this domain are the General Presentations and Riparian Workshops, as well as the Health Assessment Field Days, which together are intended to lead to a watershed-level or Community Health Assessment Process. It was not surprising that respondents taking part in any one of these tools also participated in the other tools, based on the functional relationship among the tools. The Health Assessment Field Day was the most important contributor to the domain, with a component loading of .833 (69% of variance). It is reasonable that the Community Health Assessment Process also loaded on this component due to its relatively recent introduction and its dependence on the other tools occurring in a community first. Each tool in this domain involves some personal contact with Program Representatives and Profile Producers, already indexed in the first exposure domain. Exposure to the four tools indexed in the second domain, therefore, represents a form of personal contact that is distinct from that accounted for by the first (Personal Contact/Field-Based) exposure domain.

(3) Special Target Tools. This exposure domain represented the third most important grouping of variance in the data set, accounting for a 7.3% increment of variance in the data. The domain was defined by exposure to three tools (Website, youth gameshow and *Along the Water's Edge* video), each having a component loading of .696 or higher. These three tools were delivered to fairly small and specific, yet relatively distinct, audiences.

(4) Introductory Communications Tools. The fourth exposure domain explained an additional 5.9% of the variance in the data. This domain was defined by two tools, the Introductory Pamphlet and General Media, having relatively high component loadings of .759 and .663 respectively. The Introductory Pamphlet was no longer in common circulation at the time of data collection and, therefore, fewer opportunities may have existed for respondents to be exposed to it in a manner similar to their exposure to other tools as indexed in the other exposure domains.

(5) National Media Tools. This exposure domain accounted for the remaining 5.5% of the variance across the domains, indexing the Foster and Suzuki videos with component loadings of .820 and .748 respectively. Use of the videos is determined primarily by national television networks, and so lies outside the direct control of the Cows and Fish Program. Hence, it is not unusual that these two tools would reflect a distinct pattern of exposure. Both fell within the particularly low levels of exposure indicated in Table 7.5.

The principal components analysis reduced the complexity of dealing with several levels of exposure to 17 separate programming tools by identifying five distinct sets of tools (exposure domains). The exposure domains were defined by correlated variables that exhibited relatively high loadings within the component. Because the five domains

represented independent patterns of exposure, they permitted reasonable insight into the underlying structure of respondent exposure to the programming tools. As described in Chapter 6, each respondent's exposure to the tools within a domain was identified by a standardized (interval data) component score. The component score provided the means by which to examine any association between the exposure domain and the elements of the development of ecological literacy, using their index scores). The exploration of these associations is discussed in the following sections of this chapter. For ease of reference, the research question pertaining to each area of analysis is repeated prior to the discussion.

7.2.4 Building Ecological Awareness

Research Question 2.1(a) — *Does exposure of cattle producers to programming tools contribute to ecological literacy as evidenced by their knowledge of key riparian ecology concepts?*

Table 7.8 sets out the mean, minimum and maximum knowledge scores on the nine riparian ecology concepts operationalized in this phase of the evaluation. The mean knowledge score was 8.37 on an 11-point scale, suggesting a reasonably high level of knowledge among the respondents. The highest scoring concepts were those addressing the role of vegetation in dealing with stream energy (9.85), rest must follow grazing disturbance (9.60) and water quality increases with riparian function (9.66). The lowest score (4.89) related to the function of soil in riparian function. Numerous respondents had difficulty with this questionnaire item, either because of poor item wording, or incomplete or ineffective coverage of this concept in programming tools. No opportunity existed subsequent to data collection to examine the underlying explanation for this low score.

Table 7.8
Riparian Ecology Concept Knowledge Scores

#	CONCEPT	MEAN *(n=91)*	STANDARD DEVIATION	MINIMUM SCORE	MAXIMUM SCORE
1.	Riparian zones are a functional part of rangeland.	7.19	2.60	1	11
2.	Diversity is best.	8.70	1.82	3	11
3a.	Vegetation is key in dealing with stream energy.	9.85	1.86	3	11
3b.	The vegetation component of riparian zones performs an ecological function.	-	-	-	-
4.	Rest must follow grazing disturbance.	9.60	2.02	1	11
5.	Structure has value.	8.87	2.35	2	11
6.	Water quality increases with riparian function.	9.66	1.56	3	11
7.	The soil component of riparian zones performs an ecological function.	4.89	3.36	1	11
8.	Water quantity increases with riparian function.	8.18	2.58	2	11
9.	The hydrology component of riparian zones performs an ecological function.	8.43	2.40	1	11
Overall Mean		8.37	1.05		

Under the assumptions of the process of developing ecological literacy, and as confirmed in discussions with the program managers, a criterion evidencing intermediate Cows and Fish Program success would be a positive relationship between exposure to the Cows and Fish Program and knowledge of key riparian ecology concepts (building ecological knowledge). Note that, due to the formative, exploratory nature of this evaluation and its focus on establishing baseline information, no standards against which to judge the criterion were required or established (Patton, 1997). A correlation matrix of the component scores of the five exposure domains (sets of tools) and the nine riparian ecology concept mean knowledge scores was calculated to explore any relationship between exposure and knowledge. Results are presented in Table 7.9.

Table 7.9
Exposure Domain / Knowledge Pearson's Correlation Matrix

#	RIPARIAN ECOLOGY CONCEPT	EXPOSURE DOMAIN PEARSON'S CORRELATIONS									
		Personal Contact/Field-Based Tools		*Community-Based Tools*		*Special Target Tools*		*Introductory Comm's Tools*		*National Media Tools*	
			sig.		sig.		sig.		sig.		sig.
1.	Riparian zones are a functional part of rangeland.	-.006	.957	.048	.651	.188	.074	-.033	.757	-.037	.727
2.	Diversity is best.	-.070	.512	.058	.588	.138	.191	.077	.469	.085	.421
3.	Vegetation is key in dealing with stream energy.	.075	.480	.202	.055	-.015	.885	.046	.667	-.008	.942
4.	Rest must follow grazing disturbance.	.013	.901	.73	.489	.148	.160	-.042	.695	.012	.908
5.	Structure has value.	-.064	.545	.119	.261	.044	.677	.127	.232	.034	.747
6.	Water quality increases with riparian function.	.003	.974	**.284	.006	.108	.310	.063	.552	-.098	.356
7.	The soil component of riparian zones performs an ecological function.	-.015	.886	.091	.389	-.173	.101	-.055	.601	.052	.626
8.	Water quantity increases with riparian function.	.064	.547	*.263	.012	.074	.486	-.026	.808	-.110	.301
9.	The hydrology component of riparian zones performs an ecological function.	.004	.968	.109	.303	.119	.262	-.089	.401	.146	.167
	Overall Knowledge Score	.000	.997	**.289	.005	.125	.238	-.002	.988	.025	.813

sig. ** =<.01
* =<.05

Notwithstanding the research design limitations outlined previously regarding the restrictions on determining causality in this phase of the evaluation, the matrix shows that only the tools in the Community-Based exposure domain are significantly correlated with knowledge. That exposure domain is significantly correlated with overall mean scores (.289, p<.005), and with knowledge scores on two riparian ecology concepts, namely those relating to riparian function and water quality (.284, p<.006), and riparian

function and water quantity (.263, p<.012). The personalized, structured, repetitive, visual and experiential nature of the tools in this domain may explain these significant results. These are characteristics that may be more conducive to learning than tools that are more impersonal, an observation that parallels the findings in Phase 1 of this evaluation which indicated that the opportunity for community-based information exchange plays an important role in engendering commitment to sustainable activities. Notwithstanding, the correlations of <0.3 suggest that the contribution of these tools was minimal, explaining only about 8% of the variance in knowledge in each case. The negative correlations shown for the role of soil structure in riparian function may be consistent with difficulties that participants encountered with this item during the telephone interview, or it may indicate that programming content needs to be adjusted to address this concept more thoroughly.

The low correlation results, and the lack of a positive correlation between any of the other four exposure domains and knowledge scores, must be considered in light of the nature of the exposure domains and of the tools themselves. For example, different tools are designed to achieve different objectives, ranging from introducing the program, touching on basic riparian ecological function, to teaching hands-on ecological monitoring techniques: all tools do not (and are not intended to) give equal treatment to all concepts. Rather, they are assumed to be cumulative in nature. Therefore, while there is a general expectation that knowledge should increase, highly significant correlations with all riparian ecology concepts should not be expected to result from exposure to the tools in, say, the Special Target, Introductory Communications or National Media exposure domains. The inclusion of all tools in this analysis was intended to explore whether, in a general sense, they play any role, and are needed in, building knowledge.

On the other hand, a significant positive correlation between the Personal Contact/Field-Based exposure domain and knowledge may have been expected. Specifically, the Caring for the Green Zone: Riparian Areas and Grazing Management booklet and the Stockmen's Range Management Course are knowledge-oriented tools that did not contribute independently to knowledge among these respondents. However, because these tools had relatively low component loadings in the Personal Contact/Field-Based exposure domain, any correlation between these specific tools and overall knowledge may have been reduced when the correlation was calculated on the entire domain. The absence of any positive correlation between the Personal Contact/Field-Based exposure domain as a whole, and knowledge, may be a function of the nature of the other tools within the domain (exposure to Program Representatives and to Profile Producers does not assume an independent, direct knowledge link), or it may suggest that the tools within the domain are simply not individually effective at delivering the concepts addressed in this study.

In summary, four of the five Cows and Fish programming tool exposure domains were not significantly correlated with overall knowledge scores or with individual concepts. Only the Community-Based exposure domain was positively correlated with knowledge, specifically with the overall knowledge score and scores on only two of nine individual riparian ecology concepts. Each explained only about 8% of the variance in knowledge, and so could be interpreted to be fairly insignificant contributors to knowledge. However, the significant correlations were found to be with those tools where building knowledge was most expected based on designs that feature repetitive and in-depth coverage of riparian ecological concepts, namely the Community-Based tools. This suggests that these programming tools have played an important role in building knowledge.

Interpretation of the correlations should be tempered by acknowledging the research design limitations addressed elsewhere in this document; the structure of the exposure domains; the additive nature and varying content of the tools themselves; and the fact that Cows and Fish programming is neither the first nor only source of management information available to the cattle producer community. For example, many respondents indicated that they have long experience in the industry, that they read widely and that they pursue courses and workshops provided by municipal and provincial agencies as well as producer organizations. Alternate sources of helpful management information reported by respondents are discussed later in this chapter.

7.2.5 Applying Ecological Awareness

Under the assumptions of the process of developing ecological literacy and as confirmed in discussions with Cows and Fish Program managers, a criterion evidencing ultimate program effectiveness would be a positive relationship between exposure to the Cows and Fish Program and use of sustainable riparian management strategies (applying ecological awareness). Due to the formative, exploratory nature of this evaluation and its focus on establishing baseline information, no standards against which to judge the criterion were required or established (Patton, 1997). This section presents the results of a series of logistic regression models that explored whether use of selected management strategies was explained by the exposure domains.

7.2.5.1 *Exposure Domains and Use of Grazing Systems*

Research Question 2.1(b)(i)	*Does exposure of cattle producers to programming tools contribute to ecological literacy as evidenced by their use of any of five sustainable riparian grazing systems?*

Five logistic regression models were run to examine any relationships in the data between the component scores of the five exposure domains and the binary (Yes-No) responses reporting use of five grazing systems addressed in Cows and Fish programming. The five systems were Time-Controlled Grazing; Rotational Grazing; Rest-Rotational Grazing; Riparian Pasturing; and Corridor Grazing. When using a binary Yes-No format, in this case to report use of grazing systems, very limited variation in the data results, which can be exacerbated by small numbers of respondents choosing one or the other value. This occurred with regard to the use of Corridor Grazing (6% use). Accordingly, this grazing system was excluded from further analysis and discussion. Table 7.10 sets out the results of the logistic regression models examining use of the remaining four grazing systems. The table includes standardized correlation co-efficients (B), significance values and Nagelkerke's R^2, the statistic used in logistic regression that represents the percentage of variance of the binary dependent variables that is explained across all the data (Garson, 2000b), in this case, across all exposure domains. Also reported are Chi-square values representing goodness-of-fit and probability values reporting the overall significance for each model.

Two of the four regression models (Rotational Grazing and Rest-Rotational Grazing) were not significant and, therefore, are not useful in interpreting or understanding relationships between any exposure domains and use of those grazing systems. Two of the four regression models (Time-Controlled Grazing and Riparian Pasturing) were

significant overall (p<.001 and p<.005 respectively), suggesting that exposure to Cows and Fish programming is a significant predictor of use of these two systems.

Table 7.10
Exposure Domain / Use of Grazing Systems Regression Models

	TIME-CONTROLLED GRAZING		ROTATIONAL GRAZING		REST-ROTATIONAL GRAZING		RIPARIAN PASTURING	
	n = 91 Yes = 86% No = 14%		*n = 91* Yes = 65% No =35%		*n = 91* Yes = 26% No = 74%		*n = 91* Yes = 55% No = 45%	
	β	sig.	β	sig.	β	sig.	β	sig.
Personal Contact-Field Tools	0.856	0.054	0.287	0.219	0.041	0.867	0.206	0.373
Community-Based Tools	*1.097	0.038	-0.061	0.787	0.199	0.406	*0.924	0.001
Special Target Tools	-0.120	0.766	0.234	0.372	0.194	0.386	0.430	0.285
Introductory Comm's Tools	*-0.788	0.023	-0.212	0.343	-0.086	0.728	0.026	0.912
National Media Tools	1.617	0.064	-0.151	0.506	-0.238	0.364	0.099	0.699
Nagelkerke's R^2	0.346		0.058		0.038		0.223	
χ^2 / p	19.594	.001	3.915	.562	2.406	.791	16.612	.005

* sig. =< .05

Within the Time-Controlled Grazing model, the Community-Based (β =1.097, p<.038) and Introductory Communications (β = -0.788, p<.023) exposure domains were significant predictors, indicating that the tools within those two exposure domains are the key individual contributors to use of Time-Controlled Grazing. The Community-Based (β =0.924, p<.001) exposure domain was also a significant predictor within the Riparian Pasturing regression model. The contributing role of the Community-Based exposure domain seems reasonable due to the interactive and structured nature of its tools as described previously in this chapter. The association with Riparian Pasturing also seems reasonable because it is a relatively new grazing system introduced specifically

by the tools within the Community-Based exposure domain, including the Health Assessment Field Day.

Overall, 34.6% of the variance in use of Time-Controlled Grazing, and 22.3% of the variance in use of Riparian Pasturing was explained by exposure to programming tools. Whether this represents a direct causative relationship between exposure and use of the grazing systems is unknown, since respondents choosing to participate in programming may already have been familiar with the grazing systems or might have been predisposed to sustainable management.

It should be noted that Rotational Grazing and Rest-Rotational Grazing are somewhat similar to Time-Controlled Grazing in that each is designed to apply similar grazing management principles, such as reduction of grazing intensity and provision of rest. It is unlikely that a respondent already reporting use of Time-Controlled Grazing would report use of another, similar system in the area of their operation discussed in the telephone interview, when landscape or operational objectives were already being met. Indeed, the systems could be considered mutually exclusive insofar as asking a producer to identify and label the management applied to a given area. This may or may not account for the absence of significant relationships in the Rotational and Rest-Rotational Grazing models. Nonetheless, it is important to recognize, from the popularity of use of what producers identified as Time-Controlled Grazing (86%), that the respondents appear to understand and apply the importance of the underlying management principles.

In examining the regression models for the five exposure domains collectively, any discussion about relationships between exposure and use of grazing systems is

meaningful primarily when referring to those tools specifically designed to promote use and when use is considered in light of alternate sources of management information that may influence decision-making. For example, the Special Target and National Media exposure domains include tools that form part of the larger suite of programming tools expected to cumulatively develop ecological literacy; they are not individually expected to alone promote use. Significant positive associations between these tools and grazing systems use were not, therefore, anticipated, but were included in this analysis in order to better understand their impact, if any, within the program generally. Alternate management information sources are discussed later in this chapter.

In summary, two regression models (Time-Controlled Grazing and Riparian Pasturing) were significant overall. In both models, the Community-Based exposure domain contributed significantly to use of the systems. These results are similar to those reported in the correlation matrix in Table 7.9 in which the Community-Based exposure domain made a small but statistically significant contribution to knowledge on some key riparian ecology concepts. Further, the role of Community-Based tools identified in this set of regression models parallels findings reported in Phase 1 of this evaluation in which local, community-driven initiatives were considered by producers to be integral to achieving sustainable riparian grazing management.

7.2.5.2 *Exposure Domains and Use of Grazing Techniques*

Research Question 2.1(b)(ii)	*Does exposure of cattle producers to programming tools contribute to ecological literacy as evidenced by their use of any of eight sustainable riparian grazing techniques?*

Eight logistic regression models were run to examine any association in the data between the component scores of the five exposure domains and eight grazing

techniques addressed in Cows and Fish programming. The eight techniques were Upland Use of Salt/Minerals; Upland Use of Water Developments; Use of Hard Surfaces/Fences at Crossings; Removal of Cattle When Vegetation is Vulnerable; Long-Term Removal of Cattle; Shortening the Grazing Period in the Growing Season; Distributing the Grazing Load; and Assessing Riparian Health. As occurred in the regression models that explored use of grazing systems very limited variation in the data was found for two techniques, Upland Use of Salt/Minerals (96% use) and Assessing Riparian Health (10% use). Accordingly, these two techniques were excluded from further analysis and discussion. Table 7.11 sets out the results of the logistic regression models pertaining to use of the remaining six grazing techniques. The table reports standardized correlation co-efficients, significance values, Nagelkerke's R^2 values, Chi-square values and probability values.

Five of the six regression models examining grazing techniques were not significant and, therefore, are not useful in interpreting or understanding relationships between any exposure domains and use of those techniques. Only one model (Distributing the Grazing Load) was significant overall ($p<.003$) indicating that Cows and Fish programming is a significant predictor of use of that technique.

Within the Distributing the Grazing Load model, the Personal Contact/Field-Based (β =.812, $p<.027$) and Introductory Communications (β =1.083, $p<.009$) exposure domains were significant predictors, indicating that the tools within those two exposure domains are the key individual contributors to use of Distributing the Grazing load. The contributing role of the Personal Contact/Field-Based exposure domain seems reasonable due to the inter-active, experiential nature of the tools in this domain: the

Table 7.11
Exposure Domain / Use of Grazing Techniques Regression Models

	UPLAND WATER DEVELOPMENT		HARD SURFACING / FENCES		REMOVE WHEN VULNERABLE	
	n = 91 Yes = 58% No = 42%		*n* = 91 Yes = 43% No = 57%		*n* = 91 Yes = 36% No = 64%	
	B	sig.	B	sig.	B	sig.
Personal Contact/Field Tools	0.004	0.987	-0.001	0.997	-0.101	0.652
Community-Based Tools	-0.064	0.764	-0.128	0.561	0.091	0.682
Special Target Tools	-0.075	0.724	0.343	0.157	0.051	0.812
Introductory Comm's Tools	-0.046	0.830	0.000	1.000	-0.015	0.948
National Media Tools	0.165	0.455	-0.248	0.281	0.264	0.224
Nagelkerke's R^2	0.012		0.054		0.028	
χ^2 / p	.831	.975	3.755	.585	1.891	.864

	LONG-TERM REMOVAL		SHORTEN WHEN GROWING		DISTRIBUTE GRAZING LOAD	
	n = 91 Yes = 23% No = 77%		*n* = 91 Yes = 68% No = 32%		*n* =91 Yes = 74% No = 26%	
	B	sig.	B	sig.	B	sig.
Personal Contact/Field Tools	0.002	0.994	0.439	0.075	*0.812	0.027
Community-Based Tools	0.008	0.976	0.212	0.386	0.351	0.355
Special Target Tools	0.192	0.393	0.064	0.800	2.107	0.122
Introductory Comm's Tools	-0.084	0.745	-0.184	0.422	*1.083	0.009
National Media Tools	0.056	0.822	0.048	0.846	0.874	0.070
Nagelkerke's R^2	0.014		0.072		0.267	
χ^2 / p	.853	.974	4.799	.441	18.341	.003

* sig. =< .05

principles are easily illustrated on the landscape for learning purposes, and are incorporated into verbal and visual aspects of the design and delivery of many tools, including Program Representatives, Profile Producers, Site Tours and so on. The reason for the contribution of the Introductory Tools exposure domain is unclear.

Overall, 26.7% of the variance in use of the Distributing the Grazing Load technique was explained by exposure to programming tools. Again, due to some of the limitations of the research design, it cannot be stated whether this represents a direct causative

relationship because of potential alternate influences and/or a predisposition by respondents to manage sustainably.

Distributing the Grazing Load incorporates the same two management principles (reducing grazing intensity and providing rest) involved in Time-Controlled Grazing found to be significantly associated with the Community-Based exposure domain in the regression models discussed earlier in this chapter. This pattern of associations suggests that the respondents understand and apply these principles and, further, that there may be (notwithstanding design limitations) a relationship between use of the Distributing the Grazing Load technique and the participants' exposure to the program's personalized, interactive approach associated with the Community-Based programming tools.

In examining the regression models for all six grazing techniques, the relative absence of significant associations could be interpreted as failure of the Cows and Fish Program to be effective in promoting their use. However, as indicated previously, the nature and intent of the tools in, e.g. the Special Target and National Media exposure domains, must be considered: it is reasonable to anticipate action on the ground occurring as a result of exposure to tools that are more personalized and/or field-oriented in nature. On the other hand, a completely different set of influences may drive use of any or all techniques. These influences may include, for example, operational or landscape factors such as time and labour costs; dependence on limited water sources; landscape structure; breed requirements; land tenure arrangements; and/or use of other management strategies that achieve the same operational and/or landscape goals. The Cows and Fish Program should examine these potential alternate influences to

determine their impact and, if appropriate, identify management strategies that address them and include those strategies in future programming.

In summary, only one regression model in this set (Distributing the Grazing Load) was significant. Within that model, the Personal Contact/Field-Based and Introductory Communications exposure domains were the key predictors, suggesting that tools characterized by personalized, interactive participation with producers (as in the case of Personal Contact/Field-Based tools) appear to influence the application of ecological awareness. Again, the absence of significant predictors with regard to the techniques in the other models may be related to operation-specific factors that merit further examination.

7.2.5.3 *Theory Elements and Use of Grazing Systems*

Research Question 2.2(a)	*Do attitudes, Subjective Norm and Perceived Behavioural Control, the antecedent elements to intention to undertake behaviour within the Theory of Planned Behaviour, explain the application of riparian awareness by cattle producers, a behaviour evidenced by use of any of five sustainable riparian grazing systems?*

This section presents the results of the regression models that explored the attitude-behaviour relationship in respect of use of sustainable grazing systems. In exploring this relationship, any positive associations found between use of sustainable grazing systems and the elements of the Theory of Planned Behaviour would suggest that the theory provides a useful conceptual framework in considering riparian grazing management decisions.

Prior to running the regression models, indices for each of the theory elements were developed by the researcher. Table 7.12 sets out the indices used in the regression,

after eliminating items with weak inter-item correlations (listed for reference purposes in Table 7.13). The Cronbach's *a* values of .57 to .68 for the finalized indices fell within moderately acceptable ranges: acceptable low values of Cronbach's *a* range from .70 to

Table 7.12
Theory Indices and Reliability Values

INDEX / ITEM	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	CRONBACH'S *a*
Affect			.68
1. Want to Maintain Landscape Productivity	.52	.27	
2. Afraid of Regulation	.49	.25	
3. Feel Responsible for Watershed	.49	.24	
Cognition			.57
1. Vegetation Deals with Energy	.56	.33	
2. Structure has Value	.42	.20	
3. Water Quality Increases	.50	.26	
4. Water Quantity Increases	.36	.18	
5. Hydrology Performs Ecological Function	.39	.19	
Perceived Behavioural Control			.63
1. Confident in Identifying Riparian Vegetation	.41	.35	
2. Confident in Identifying Range Vegetation	.56	.41	
3. Confident in Assessing Health	.32	.21	
4. Confident in Recognizing Overgrazing	.38	.22	
Subjective Norm			.58
1. Seek Advice from Neighbouring Producer	.32	.17	
2. Seek Advice from Producer Elsewhere	.54	.29	
3. Seek Advice from Friend	.32	.17	

Table 7.13
Items Removed from Theory Element Indices

INDEX	ITEM REMOVED
Affect	Worried about Forage Decline
	Worried about Fish and Wildlife Decline
	Want to Increase Profit
	Don't Trust Information Source
Cognition	Riparian is Part of Range
	Diversity is Best
	Rest Follows Disturbance
	Soil Performs Ecological Function
Perceived Behavioural Control	Prefers Past Management
	Too Difficult to Implement
	Too Expensive to Implement
	Cannot Improve no Matter What
	Cannot Protect Against Dry Years
	Dependent on Luck
Subjective Norm	Seek Advice from Spouse
	Seek Advice from Parent
	Seek Advice from Sibling
	Seek Advice from Children
	Seek Advice from Banker

.60 (Nunnally, 1978, as cited in DeVellis, 1991: 85) although lower values are found in published studies (DeVellis, 1991). Values between .70 and .80 are termed acceptable, while values between .65 and .70 are minimally acceptable, and values between .60 and .65 are acceptable but not ideal. The moderate range of values found for the indices used here may reflect the difficulty in developing indices from scratch, which involved an attempt to identify those ideas that were relevant and that truly reflected the underlying concepts to be operationalized. (While established indices have been developed and tested for repeated use in a number of fields such as education and health, no pre-existing and/or proven indices were known to the researcher that dealt with the concepts being examined here, e.g. an Affect index relating to sustainable management strategies).

Five logistic regression models were run to examine any relationships in the data between the index scores of the operationalized elements of the conceptual framework and the binary (Yes-No) responses reporting use of five grazing systems, namely Time-Controlled Grazing; Rotational Grazing; Rest-Rotational Grazing; Riparian Pasturing and Corridor Grazing. As described earlier in this chapter in the discussion about use of grazing systems and exposure domains, almost no variation was reported in the binary data associated with use of Corridor Grazing (6% use). This grazing system was, therefore, excluded from further analysis.

Table 7.14 presents the results of the logistic regression models pertaining to the use of the four remaining grazing systems. The table reports standardized correlation co-efficients, significance values, Nagelkerke's R^2 values, Chi-square values and probability values.

Table 7.14
Theory of Planned Behaviour / Use of Grazing Systems Regression Models

	TIME-CONTROLLED GRAZING		ROTATIONAL GRAZING		REST-ROTATIONAL GRAZING		RIPARIAN PASTURING	
	n = 91 Yes = 86% No =14%		*n = 91* Yes = 65% No = 35%		*n = 91* Yes = 26% No = 74%		*n = 91* Yes = 55% No = 45%	
	[illegible]	sig.	[illegible]	sig.	[illegible]	sig.	[illegible]	sig.
Affect	0.139	0.453	0.091	0.581	0.085	0.658	0.141	0.369
Cognition	0.254	0.231	-0.080	0.633	0.090	0.613	-0.007	0.962
Perceived Behavioural Control	0.263	0.311	0.225	0.265	0.078	0.712	0.049	0.791
Subjective Norm	0.304	0.170	*0.457	0.007	0.259	0.127	0.170	0.247
Nagelkerke's R^2	0.121		0.153		0.055		0.038	
χ^2 / p	6.384	.172	10.734	.030	3.483	.481	2.638	.620

*sig. = < .05

Three of the four regression models (Time-Controlled Grazing, Rest-Rotational Grazing and Riparian Pasturing) were not significant, and so are not useful in interpreting or understanding relationships between any elements of the Theory of Planned Behaviour and use of those grazing systems.

One regression model (Rotational Grazing) was significant ($p<.030$). Overall, 15.3% of the variance in the use of Rotational Grazing was explained by the Theory of Planned Behaviour. Within that model, the Subjective Norm element (β =0.457, $p<.007$) was the one individually significant predictor of use of Rotational Grazing. Items on the Subjective Norm index included (a) consultation with other producers, both locally and elsewhere in the province, and (b) consultation with friends. The significance of the Subjective Norm element in this model appears to reflect the influence of those community members in management decisions made by producers, an observation also identified in Phase 1 of this research as contributing to programming effectiveness. Notwithstanding the importance of Subjective Norm in the program's philosophy of providing opportunities for learning through locally-shared information, the other elements of the conceptual framework, as operationalized here, did not appear to explain behaviours of interest. Neither Perceived Behavioural Control nor the two elements that comprise attitudes, Affect and Cognition, showed significant relationships to any of the grazing systems examined in the regression models.

These results provide only weak evidence that the application of ecological literacy (use of sustainable management strategies addressed in Cows and Fish programming) is related to Affect, Cognition, Perceived Behavioural Control and Subjective Norm, as operationalized here. Further, the role of Subjective Norm can be only cautiously assumed to have a relationship to management behaviour due to the moderate inter-

item correlation Cronbach's *a* value for that index, i.e., a relatively small proportion of the variance was explained by its index items.

There may be several reasons for low or absent significant associations within the regression models. First, the concepts measured may be unrelated to the behaviours measured (e.g. Affect and Cognition may not be considered by producers in decisions pertaining to use of grazing systems, because the decision instead involves factors beyond the personal), suggesting that the conceptual framework used here may simply be an inappropriate one for the types of behaviours being examined. Further, the framework did not account for certain types of operational and/or landscape factors, as suggested in the previous section of this chapter, that may have influenced respondent decisions to apply ecological literacy.

Second, the operationalization of the framework involved some limitations including: the use of the binary Yes-No dependent variable which reduced variation in that data; the moderate Cronbach's *a* scores associated with each of the indices within the framework; and the measurement of behaviours as single items rather than as multiple-item indices. As defined in Chapter 2, behaviours are most reliably predicted by measuring multiple related behaviours. Accordingly, in the Theory of Planned Behaviour, multiple related behaviours are usually required to be measured to predict motivation (intention) to undertake actions of interest. However, the behaviours examined in all of these regression models (use of management strategies) were viewed as single, mutually exclusive behaviours: the grazing systems are generally distinct from each other rather than being actions that are undertaken collectively or additively. Even though the attitude elements of the framework were indexed with multiple items (albeit weakly), the operationalization of behaviours could not, for practical purposes, be indexed.

In summary, the complexity of both attitudes and of cattle operations requires further investigation. Caution dictates that until more relevant study is possible, the Cows and Fish Program should not reject the idea that attitudes and other behavioural influences play a role in determining decisions about sustainable behaviours. Future studies using the Theory of Planned Behaviour as a conceptual framework may find it to be an appropriate choice for application in the field of resource management. However, changes to research design are required: addressing causality by using control and intervention groups and/or pre-post measurement; improving index reliability and measurement especially pertaining to behaviours; and using a larger sample to achieve greater variation for programming interventions.

7.2.6 Alternate Sources of Management Information

As defined in Chapter 6, the natural experiment research design used in this evaluation is strengthened by identifying alternate sources of management information, in addition to Cows and Fish programming, that can potentially influence use of sustainable riparian management strategies. The management items contained in the index used to measure Perceived Behavioural Control provided useful factors to investigate alternate information sources. When interviewing respondents on questions relating to that index, respondents were also asked to identify the two most helpful learning sources associated with the indexed management items, namely Identifying Range Vegetation; Identifying Riparian Vegetation; Recognizing Overgrazing; and Classifying Riparian Health. The extent to which these sources were reported as helpful by respondents provides some insight into where the respondents have traditionally sought assistance and, accordingly, helps explain influences on the development of ecological literacy not accounted for by exposure to the Cows and Fish Program. Further, this information can

be used in a practical sense by incorporating it into programming, to the extent possible, to maximize its effectiveness.

Figure 7.2 confirms that the Cows and Fish Program is not the only, or even the primary, source of management information relied upon by respondents. This result is entirely expected in the context of a long-established industry and a relatively new program. In particular, Figure 7.2 illustrates that for all four management items, sources such as personal on-the-job experience, family, self-teaching (i.e. reading of books and other reference sources), and other producers were the most important primary and secondary sources of information (when taken together) relied upon by respondents. In common with findings elsewhere in this evaluation, this observation reflects, first, the social nature of information exchange and learning in the cattle producer community. It is similar to findings in other evaluations (e.g. Feick, 2000) that reported that people look to verbal information transfer from their trusted personal sources when making management decisions. Second, it suggests that the respondents tended to actively pursue knowledge through personalized learning in order to improve management of their operations.

The Stockmen's Range Management Course also played a large role for all four items, suggesting that respondents considered its field-based, experiential design and content to be relevant and useful. Post-secondary education played a role in Identifying Range Vegetation, Identifying Riparian Vegetation and Recognizing Overgrazing, likely because these subjects are specifically covered in course material and can be directly applied in management activities. It played a lesser role in assessing riparian health. For that management item, the Cows and Fish Program played the larger role, a reasonable finding since the program has actively promoted this monitoring technique in recent

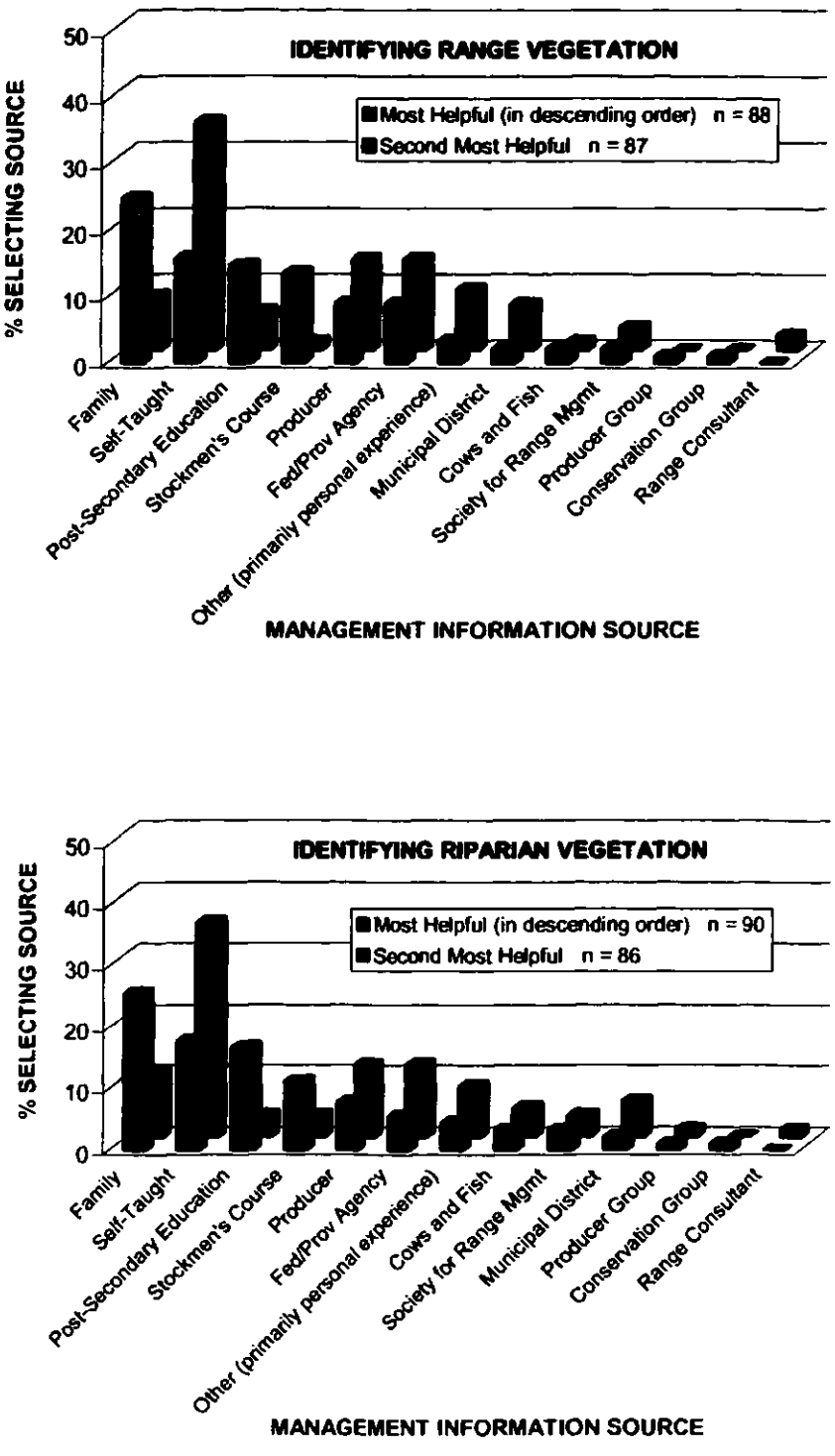

Figure 7.2
Alternate Management Information Sources

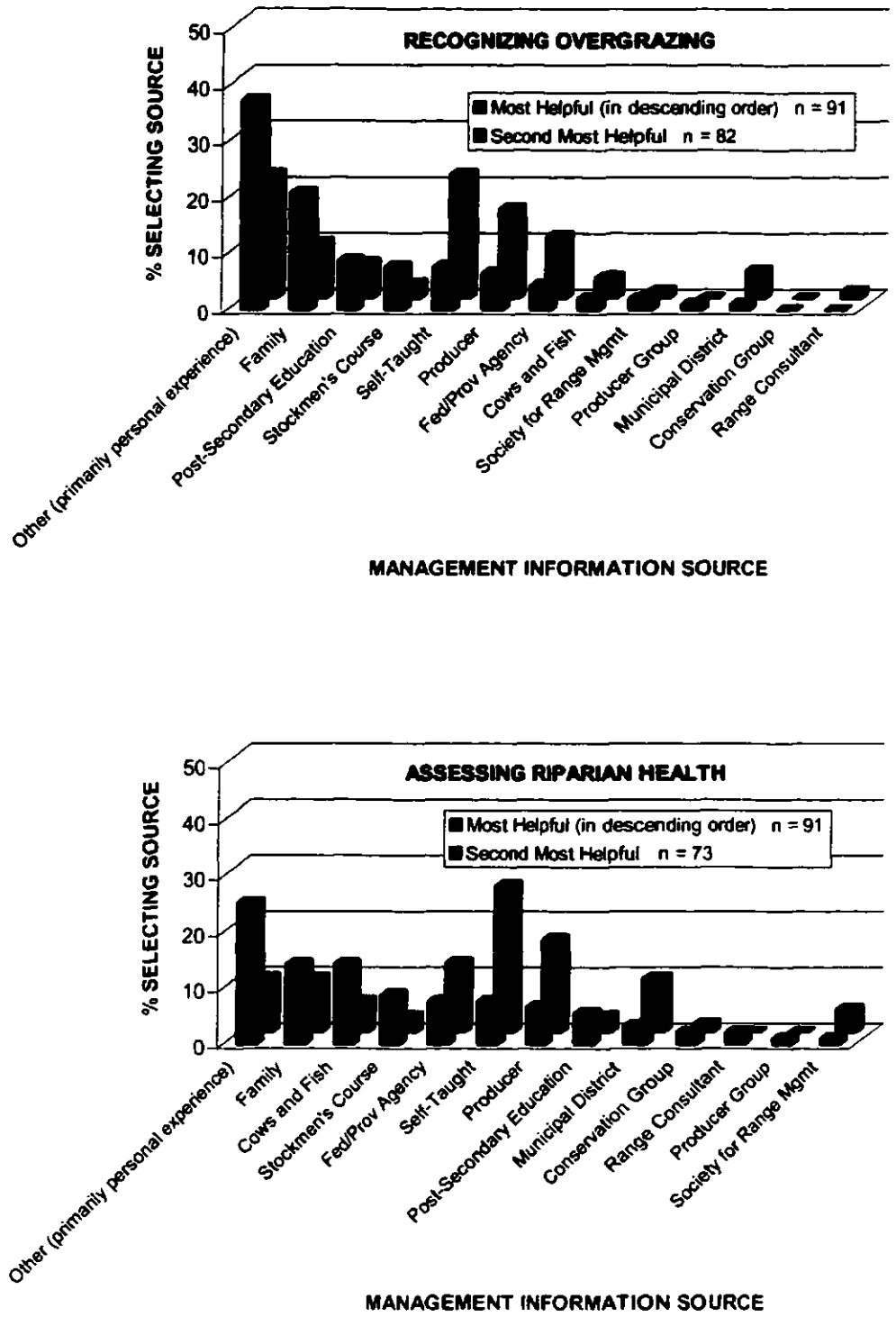

Figure 7.2 (continued)
Alternate Management Information Sources

years. For this management item, many respondents indicated that they learned the skill from personal on-the-job experience, family and self-teaching. Notes taken by the researcher when covering this interview item with respondents suggest that those who reported these sources for this management item were actually assessing riparian health in an informal, visual manner, rather than using the structured monitoring technique of the lotic riparian health assessment technique. In other words, they were interpreting the management item/skill as something quite different than the formal monitoring technique that measures specific health parameters, and in many cases seemed unfamiliar with that option. In terms of learning to conduct a structured assessment, the Cows and Fish Program was the most important source of information reported by respondents.

Sources that played little or no role in decision-making were those associated with organizations, such as producer and conservation advocacy groups, and individual government agencies (with the exception of the role played by the Stockmen's Range Management Course). This again suggests that the respondents, when seeking management information, tended to prefer more personalized and individualized interactions with sources they are comfortable with, and have not sought out/been aware of programming provided by these organizations.

Overall, the sources of management information considered by respondents to be most helpful were primarily those characterized by local, personal interaction, field training and self-learning. This finding supports the general nature of the Cows and Fish Program philosophy and should, accordingly, continue to be emphasized in programming design and delivery. Specifically, maximizing opportunities for family members and neighbours to share management information in a variety of interactive

and/or field settings is recommended. Reading of reference materials in personalized learning was a popular choice for information sources. Additional print and/or take-home materials associated with existing programming tools may, therefore, prove worthwhile to reinforce information addressed in those settings. A similar finding was made in Phase 1 of this research.

The reliance on the Stockmen's Range Management Course suggests that working in conjunction with other agencies can be effective, and reinforces the suggestion made in Phase 1 of this evaluation that the Cows and Fish Program should build on these joint educational opportunities and continue to expand working relationships with the relevant agency personnel in order to further the goals of developing ecological literacy.

7.3 Summary

This chapter outlined the findings of Phase 2 of the evaluation that explored the development of ecological literacy from two perspectives. First, on the assumption that Cows and Fish programming promotes ecological literacy, logistic regression models were utilized to examine potential associations between exposure to the distinct sets of programming tools defined by the principal components analysis and (a) knowledge (building ecological awareness); and (b) use of sustainable grazing systems and grazing techniques (applying ecological awareness). Second, in order to develop a greater understanding of whether attitudes predict sustainable behaviours, an assumption inherent in the Cows and Fish Program design, logistic regression models were utilized to examine potential associations between the use of sustainable grazing systems and indexed elements of the Theory of Planned Behaviour (including attitudes and related influences on behaviour).

The first step in developing ecological literacy as defined by the program rationale is to build ecological awareness, evidenced by knowledge of riparian ecology concepts. The Community-Based exposure domain was significantly correlated with mean knowledge scores on two riparian ecology concepts (the Increase of Water Quality and the Increase of Water Quantity associated with riparian function) and with the overall knowledge scores across all nine riparian ecology concepts. This finding would appear to support the emphasis and value placed on the community-based approach inherent in the Cows and Fish Program, and suggests that the tools associated with this domain (Health Assessment Field Days; General Presentations; Riparian Workshops; and the Community Health Assessment Process) are effective in developing knowledge generally and on the two specific concepts mentioned. Accordingly, continuation of delivery of those tools as-is would be appropriate. On the other hand, the remaining ecological concepts were uncorrelated with programming tools, and so may require further refinement. All of these findings must be viewed in the context of the relatively low number of respondents (n=91), the relatively low levels of exposure to programming across the data set, the relatively low significance levels and the nature of some of the tools which were not specifically designed to alone develop in-depth knowledge on riparian ecology.

With regard to the application of ecological awareness, the second step in developing ecological literacy, three regression models (Time-Controlled Grazing, Riparian Pasturing, and Distributing the Grazing Load) were significant overall. The Community-Based exposure domain was a significant predictor of both Time-Controlled Grazing and Riparian Pasturing, while the Personal Contact/Field Based exposure domain was a significant predictor of Distributing the Grazing Load. The interactive and local nature of the tools in the Community-Based exposure domain suggests that the approach taken

by the program in using these tools is an appropriate one for encouraging use of these two important grazing systems. As with Time-Controlled Grazing, the Distributing the Grazing Load technique incorporates the fundamental management principles of reducing grazing intensity and providing rest. The significance reported in this model suggests that respondents had a good grasp of how to apply this information on the landscape. Accordingly, the tools in the Personal Contact/Field Based exposure domain (Program Representatives; Site Tours; Profile Producers and so on) appear to play a valuable role in promoting the application of this sustainable grazing technique.

Only the Subjective Norm element of the Theory of Planned Behaviour was significantly associated with use of sustainable grazing systems, specifically the Rest-Rotational Grazing model. Affect, Cognition and Perceived Behavioural Control, the other concepts in the conceptual framework, were not significantly associated with any of the other grazing systems examined in the regression models. Further study incorporating the Theory of Planned Behaviour may prove more conclusive if a stronger operationalization is applied than was possible in the case of this evaluation.

Finally, helpful sources of management information were presented and discussed. Consistent with observations made throughout this evaluation, personal and individualized learning provided in family and local social settings was preferred by producers as the most desirable method to communicate management information. Accordingly, opportunities that incorporate this type of learning should be continued and reinforced within the Cows and Fish Program.

The findings of this phase of the evaluation highlight a general theme in terms of the respondents' development of ecological literacy, namely that programming tools

characterized by interactive, personalized and local learning are most often associated with the development of ecological literacy. Further, while the overall regression models did not show significant correlations, the individual models that did show significant correlations included those tools that were most likely to engender knowledge and action among respondents (i.e. field and community-based tools). These observations suggest that the Cows and Fish Program has an appropriate understanding of the ways in which producers tend to respond to programming and that the tools designed and delivered by the program mirror that understanding in order to develop ecological literacy.

8. CONCLUSION

8.1 Introduction

This research had a number of objectives. The first objective was to determine the effectiveness of Cows and Fish programming tools in the process of developing ecological literacy by qualitatively examining the design and delivery of those tools and by quantitatively exploring outcomes in relation to exposure to programming. This was to be achieved by means of a second objective, applying a structured program evaluation research framework that, while used commonly in many fields, has to date been used only rarely in the field of resource management. This part of the research included the development of an evaluation protocol (summarized later in this chapter) outlining the steps involved in applying the utilization-focussed evaluation approach. A third objective was to examine whether the attitude-behaviour relationship, known to explain many types of human activity, and which was assumed to underlie the process of developing ecological literacy, was supported in the case of the Cows and Fish Program evaluation with regard to building ecological literacy.

A literature summary was provided to set the context for the research. It covered riparian ecology; a description of the Cows and Fish Program under evaluation; the evolution and methodological approaches of program evaluation; the rationale for use of a natural experiment research design; program evaluation in the field of resource management; the attitude-behaviour relationship (including the limited research devoted to examining it in the context of resource management); and the role of attitudes and related personal influences on behaviour decisions, specifically as they are articulated in the Theory of Planned Behaviour.

This chapter provides a summary of findings arising from the two phases of the evaluation; presents the evaluation protocol; discusses quality control with respect to the qualitative phase of the evaluation; and addresses both limitations and implications of the research with regard to program evaluation in general and the Cows and Fish Program specifically.

8.2. Summary of Findings and Program Implications

Phase 1 of the evaluation used the focus group qualitative research technique to explore the effectiveness of the design and delivery of programming tools in developing ecological literacy. Participants indicated that they considered most of the key programming tools to be effective, while some (mostly supplementary) tools were not. They indicated that some core values had been implemented with greater success than were others, and that certain aspects of program delivery required improvement before producers would consider them to be effective.

The programming tools rated as Excellent and Very Good included the Riparian Health Assessment Field Days, the Stockmen's Range Management Course, Program Representatives, Profile Producers and the Caring for the Green Zone: Riparian Areas and Grazing Management booklet, while tools rated as Good included General Presentations, Riparian Workshops, Site Tours of Demonstration Ranches and the Community Health Assessment Process. Contributing in a fundamental way to the effectiveness of these tools was the perception by producers that programming was delivered in a process viewed as locally-driven, neutral, additive and appropriately paced, and that provided flexibility for producers in management options. This reflects the community-based core value intended to frame the Cows and Fish Program. More

specifically, these tools were considered effective because they provided producers with appropriate and relevant information that assisted them in building knowledge about riparian ecological function and making changes in their riparian grazing management.

Characteristics of the above-noted tools, as well as those tools rated by participants as Fair and Poor (Website, General Media, Display Booth and the Introductory Pamphlet), that reduced effectiveness were those that were perceived to promote a narrow selection of management options required to address unique operational or landscape factors (specifically, streambank fencing or small amount of acreage); stall due to lack of resources to ensure follow-up; identify the Cows and Fish Program as a government initiative; target producers as being solely responsible for declining riparian health; and fail to provide sufficient or accurate information about how to manage riparian areas and/or to contact the program for additional information. These viewpoints suggested that the core program values of being producer-positive and partnership-oriented were implemented with less impact than the community-based philosophy of the program.

The qualitative data suggest that the design and delivery of the Cows and Fish Program is generally sound. It has, with some exceptions, provided an awareness process that producers believe has promoted local action on sustainable riparian management issues. Continuation of programming of the same nature is, therefore, appropriate. To address factors identified by producers that they believe reduce programming effectiveness, it is recommended that the program work toward clarifying its future direction in terms of potential target audiences who express interest in riparian management, and to broaden the public's understanding of grazing impacts on watersheds generally; clarify its working relationships within the partnership to promote team-building and ensure consistent access to and quality of programming; and develop

a plan to ensure consistency and continuity across the entire suite of programming tools in terms of presentation of program values, program identity and message content. Failure to address the factors suggested by participants as impediments to acquiring information from the program that is intended to encourage action on the ground will, presumably, limit the impact of programming as it is delivered to the producer community.

Phase 2 of the evaluation employed quantitative methods to explore the program rationale of developing ecological literacy. The analysis was conducted in several stages using as an independent variable the five exposure domains identified by principal components analysis, representing unique patterns of self-reported exposure to the tools. The first stage of ecological literacy (building awareness) was examined by calculating correlations between exposure domains and knowledge scores on riparian ecology concepts. The second stage of ecological literacy (applying awareness) was examined by regressing the five exposure domains on use of both sustainable grazing systems and grazing techniques. Finally, the attitude-behaviour relationship was examined by regressing elements of attitude derived from the Theory of Planned Behaviour on use of grazing systems.

Only the Community-Based exposure domain showed a significant positive correlation with knowledge on riparian ecology concepts, both in terms of the overall mean score of nine concepts, and on two concepts relating to riparian function and water quality/water quantity. These tools (Health Assessment Field Days; Riparian Workshops; General Presentations; and the Community Health Assessment Process) provide opportunities for locally-based information exchange, and so mirror the intent and philosophy of the Cows and Fish Program. The correlations suggest that the community-based approach

as implemented with these tools is an effective one for the program. However, the relatively low correlations (<.03) and the absence of correlations with any of the other four exposure domains are reminders that all tools were not designed to promote specific knowledge equally, and that the Cows and Fish Program is neither the first nor only source of management information available to producers. Notwithstanding, the criterion for intermediate program success of building knowledge as established within the evaluation was partially met.

With regard to use of sustainable riparian grazing systems, both the Time-Controlled Grazing and Riparian Pasturing regression models were significant overall, with the Community-Based exposure domain acting as the key predictor. The important role played by these tools, in conjunction with their relationship to knowledge development and the role of social learning as reported in Phase 1, suggests that the community-based awareness approach is consistently and fundamentally important to effective programming.

With regard to grazing techniques, the Distributing the Grazing Load regression model was significant overall, with the Personal Contact/Field-Based exposure domain acting as the key predictor. The interactive and experiential nature of the tools in this exposure domain (Program Representatives; Site Tours; Profile Producers; the Stockmen's Range Management Course; the Display Booth; and Caring for the Green Zone: Riparian Areas and Grazing Management), suggests that a field-based approach that incorporates opportunities for local producers to act as expert communicators is also central to programming effectiveness.

The absence of significant associations for the other regression models may indicate that programming has not been effective and so requires modification, or that the program needs to examine other potential management determinants, such as landscape or operational factors, that should be incorporated into future efforts. However, keeping in mind the differing content of the existing programming tools, the mutually exclusive nature of the grazing strategies examined (i.e. a producer would likely identify just one type of system being used in the area discussed in the study), and the fact that the Cows and Fish Program is not the only or even the primary source of learning for producers, the models that were significant suggest that the criterion for ultimate program success (applying ecological awareness) was partially met.

The natural experiment research design required that sources of management information other than Cows and Fish be identified to supplement conclusions arising from the qualitative and quantitative phases. Local, social influences of producers and family members appeared to be the primary influences in four key areas of management, including Identifying Range Vegetation, Identifying Riparian Vegetation, Recognizing Overgrazing and Assessing Riparian Health. Again, findings indicated that community-based programming like that employed by the Cows and Fish Program which takes advantage of established learning paths is likely to promote ecological literacy within the producer community and should be continued in order to achieve sustainable riparian management.

To examine the attitude-behaviour relationship with regard to the development of ecological literacy, elements of attitude derived from the Theory of Planned Behaviour were operationalized to provide a conceptual framework for this aspect of the evaluation. Use of grazing systems was regressed onto indices for each element. Only the

Rotational Grazing regression model was significant overall, with the Subjective Norm (the influence of significant social relationships such as those with neighbouring producers) element acting as the key predictor. This finding reinforces the social nature of management information exchange identified in Phase 1 of the evaluation. Providing learning settings in which producers have the opportunity to exchange information among themselves or to act as sources of expert experience (e.g. producer management testimonials as part of Riparian Workshops, Health Assessment Field Days and the Stockmen's Range Management Course) should be continued because they appear to promote interest and action on sustainable management.

On the assumption that changing attitudes is fundamental to changing riparian management behaviour, this research offered the opportunity to explore the attitude-behaviour relationship. Despite research design limitations beyond the control of the researcher, the conceptual framework provided by the Theory of Planned Behaviour helped to illustrate that knowledge and action were partially associated with exposure to programming at one point in time. A future study incorporating an experimental design, not possible in this research evaluation, may shed more light on the role that attitudes and other behavioural influences play in ecological behaviours. Given that this program is based, like many others, on some type of attitude change concept, greater understanding of the role of attitudes in behaviour change is required in order to help explain potential programming impacts and lead to better programming. It would also be useful to conduct more detailed knowledge testing of specific ecological concepts to identify factors that could be addressed through programming. In addition, the influence of the many publicly debated issues concerning land and water use in southern Alberta could be explored to identify how they affect community and individual land use decisions.

In summary, the Cows and Fish Program has been reasonably successful in designing and delivering awareness programming that reflects the tenets of sustainable resource management. Programming tools identified in this research as being most effective in building ecological literacy are those which incorporate opportunities for community members to contribute to and learn from locally-driven and locally-paced awareness and management initiatives. When examined in the context of a relatively new program operating in a long-established and somewhat conservative industry (but keeping in mind that other factors may have influenced the reported associations), programming appears to have made some contribution to both knowledge (building ecological awareness) and use of sustainable management strategies (applying ecological awareness). However, some aspects of the implementation of the Cows and Fish Program require improvement to ensure that programming messages remain consistent yet flexible. In particular, to promote interest and commitment by producers, the producer community must be presented in programming in a consistently positive light in terms of their management actions, and the unique requirements of operations and landscapes must be addressed in management options.

8.3 Reflections on Program Evaluation

As one of only a few studies that has applied established evaluation methodology to the field of resource management, this evaluation of the Cows and Fish Program may prove useful in designing future studies that evaluate the impact and/or effectiveness of resource management programming. As water-related and riparian management issues gain greater public profile in Alberta and across Canada, it is important to be able to add scientifically-based methodologies and information to the sometimes contentious debates. Future evaluations of other resource-based programming efforts will add to the

body of knowledge on program design and effectiveness, and assist resource managers in the development and implementation of programming that more reliably meets desired landscape outcomes.

The sustainability paradigm requires on-going monitoring of efforts to ensure that social, cultural and economic requirements of communities are met. This research has illustrated that utilization-focused program evaluation can provide a framework for use in the monitoring efforts that are fundamental to sustainable resource management. The Cows and Fish Program evaluation appears to have provided the program managers with the required reasonable, contextualized estimation (Patton, 1997) about the ways that programming has and has not contributed to ecological literacy: based on these research findings, changes are now being made within the Cows and Fish Program to address producer needs in southwestern Alberta and to ensure that appropriate evaluation steps are taken to ensure that new programming used in other areas is appropriately grounded in community needs. This litmus test of use suggests that the conduct of the Cows and Fish Program evaluation was appropriately placed within the perspectives of the users and that it was interpreted based on relevance to program improvement (Cronbach, 1982; Leviton and Boruch,1983; Patton, 1997; Weiss, 1988; Weiss and Bucuvalas, 1980).

When conducting future program evaluations, every effort should be made to ensure that the full research design mirrors the nature of the initiative being evaluated; that the research design is relevant; and that the research design is manageable (Chelimsky, 1997; Feick, 2000), particularly in academic settings where supporting resources may be limited. In particular, consideration should be given in formative evaluations to

qualitative approaches that are able to derive the type of detailed information required for decision-making.

The choice of the natural experiment design using a mixed-method approach was both necessary and helpful in this evaluation: only when combined with the thick description provided in Phase 1 do the broader findings of Phase 2 begin to provide a degree of relevant, useful information about programming impact and improvement. The value of this combined information is that it can be judged in context and extrapolated for application by decision-makers (Cronbach, 1982; Patton, 1997; Rog, 1994; Rossi et al., 1999; Weiss and Bucuvalas, 1980).

Alternate approaches to examining programming effectiveness could be employed in further studies, including marketing and communications theory, education theory, social learning theory and social ecology. However, in the context of utilization-focussed evaluation, it may be most appropriate to build on the recommendations of existing literature by examining, for example, social settings in which learning occurs (Roling, 1988); control over decision-making (Newhouse, 1990); the importance of economic factors over attitude in decision-making (Curtis, 1995; Feick, 2000); and the role of peers, politics, and quality and relevance of information in decision-making (Feick, 2000).

8.4 Evaluation Protocol

Table 8.1 presents the Cows and Fish Program evaluation protocol. It documents key actions taken by the researcher to design and administer this evaluation using the utilization-focused evaluation approach and following the Joint Committee on

Educational Evaluation (1994) standards. Reference in the protocol to coding of standards refers to the full statement of principle underlying each of the standards, which are detailed in Appendix A. Code prefixes refer to the four key attributes of the standards defined in Table 2.1: utility (U); feasibility (F); propriety (P) and accuracy (A).

While distinct from the process of carrying out the research methodologies described in Chapters 4 and 6, the protocol provides a mechanism by which the methodological and analytical quality of this evaluation can be judged by others, and illustrates a potential guideline for use in evaluations of other resource management programs. While the protocol is a secondary aspect of this academic document, it forms an integral part of the applied study.

As indicated by the protocol, all Joint Committee on Educational Evaluation (1994) standards were addressed in this research, with the exception of the requirement for assessment of the evaluation process itself by program managers (A12). This step falls outside the purview of this academic document. One error is reported with regard to standard P3. Inadvertently, the researcher failed to obtain signed consent forms from focus group participants, although the nature of the research and the issue of confidentiality were addressed verbally with participants on at least two occasions.

Table 8.1
Cows and Fish Program Evaluation Protocol

EVALUATOR ACTION	STANDARD #
Evaluation research conducted independently in academic setting	U2, P5, P7, A3, A4, A5, A6, A7, A8, A9, A10, A11
Evaluator attended several programming events to develop familiarization with programming tools	U4, P1, A1, A2
Formal evaluation research agreement signed by key parties, specifying evaluation research goals and procedures, and terms of access to results	P1, P2, P6, P7
Initiation interview conducted with program representatives to identify program rationale, evaluation research goals, criteria and outcomes, as well as potential other stakeholders	U1, U3, U4, F2, P3, A1, A2
Literature review conducted and research design developed that is relevant to program context, evaluation research goals and research standards	U3, A2, A4
Interim meetings and reports provided to users throughout evaluation research to delineate program rationale, discuss planning, confirm next steps and report findings (included strategic meetings of program partnership); issue of potential conflict of interest discussed openly	U3, U6, U7, F1, F2, F3, P7, A1, A3, A11
Initial detailed research design, including questions, variables and procedures, drafted as a matrix and negotiated with users before proceeding to data collection; regular personalized contact maintained with program representatives	U4, U7
Key content for interview instrument and focus groups negotiated with users; drafts reviewed for accuracy and relevance; descriptions and objectives of programming tools agreed upon; relevant focus group participants identified and discussed for suitability	U3, F1
Detailed interim reports and thesis (and anticipated user reporting and publications) provided description of all or part of this protocol, the program rationale and process, the evaluation research methods; specific reporting requirements of users were negotiated	U5, U6, P5, A1, A3, A4
Interview instrument pre-screened with members of cattle producer community	U3, P1
Meetings, interviews and focus groups scheduled at participant convenience and occurred on a voluntary basis; release forms signed by interviewees; human subjects research approval obtained from university	P3, P4
Study participation request communicated in writing and verbally as voluntary and confidential; findings shared pro-actively with and are accessible by participants, program representatives and the public; thesis is a public document	P3, P6
Used established research procedures of identify participants, and to collect and analyze data in both the qualitative and quantitative phases; qualitative quality control actions were documented	A3, A5, A6, A7, A8, A9, A10
Thesis, interim and final reports disclose positive, neutral and negative findings and included recommendations accordingly; all required documentation has been retained on a long-term basis and is accessible to the public	P5, P6
Financial summaries and forecasting shared at regular intervals between evaluator and funding agencies requested them	P8

However, "in the end, the worth of evaluations must be judged by their utility" (Rossi et al., 1999: 431), and it has been noted that the Cows and Fish Program has begun to utilize a number of the findings and recommendations arising from this research with the goal of improving programming effectiveness.

8.5 Quality Control in Qualitative Research

This section addresses the requirement for integrity and quality in qualitative research, as defined in Chapter 2, that provides a direct link between the viewpoints expressed by focus group participants and the findings reported by the researcher, and so ensures that the research is credible, transferable, dependable, confirmable and authentic (Guba and Lincoln, 1989). The steps followed to ensure quality in the qualitative phase of this evaluation are illustrated schematically in Figure 8.1. Criteria summarized by Mertens (1998) to judge that quality are detailed in Table 8.2. All of the strategies identified by Mertens required to meet the criteria for quality have been addressed either fully or partially in this evaluation, indicating that the study meets the quality requirements for qualitative research.

Table 8.2
Criteria for Judging Quality in Phase 1

QUALITY CONTROL CRITERION	STRATEGY	DEFINITION	USED IN THIS STUDY
Credibility - *ensuring correspondence between respondent perceptions and how the researcher portrays them*	Prolonged substantial engagement	Researcher is confident that themes and examples are repeating rather than extending understanding	Yes - recommended number of focus groups/participates involved; several iterations of commentary review and theme development conducted during coding process
	Persistent observation	Researcher observes long enough to identify salient issues and avoids premature closure	Yes - recommended number of focus groups/participates involved; several iterations of commentary review and theme development conducted during coding process; researcher involved in/exposed to all programming tools; researcher involved in detailed discussions/interviews with program managers/ evaluation users
	Peer debriefing	Researcher engages in extended discussion with	Indirectly - instead, constructs are reviewed within academic

QUALITY CONTROL CRITERION	STRATEGY	DEFINITION	USED IN THIS STUDY
		disinterested peer	setting
	Progressive subjectivity	Researcher monitors and documents personal development of constructs for review by de-briefer	Indirectly - instead, constructs are reviewed within academic setting
	Member checks	Researcher formally or informally checks developing constructs with respondents	Partial - participants given opportunity to confirm tool objectives, program managers given opportunity to review draft theme documents
	Triangulation	Researcher uses multiple methods and seeks information from multiple sources	Partial - focus group was primary technique; but included three types of user groups (producers, agencies, producer/conservation organizations)
Transferability - *providing sufficient detail to enable the reader to make a judgment, whose burden it is to determine similarity between site/group examined and broader context*	Thick description	Researcher extensively and carefully describes context and commentary	Yes - detailed Content Analysis Summary documents prepared which include relevant commentary, theme statements, tool ratings and recommendations suggested by participants
	Multiple cases	Used for case studies only	N/A
Dependability - *recording the change/development of interpretation typical in qualitative data analysis*	Dependability audit	Researcher documents iterations and/or development of analysis in such a way that it can be audited for appropriateness	Yes - records pertaining to iterations of code and theme development prepared in such a way that they can be duplicated; retained long-term
Confirmability - *minimizing the influence of the researcher's judgment*	Confirmability audit	Ensuring data can be tracked to its source and that the process of synthesizing data to reach conclusions can be confirmed	Yes - field notes, transcriptions, data analysis documentation prepared and retained long-term in manual and electronic format
Authenticity - *presenting a balanced view*	Fairness	Different constructs are solicited and honored (reported); explanation of data collection process provided in detail; potential conflicts articulated	Yes - for and against constructs/themes presented; potential conflict of interest dealt with openly; recommendations negotiated with participants
	Ontological authenticity	Participants experience becomes more informed	Yes - applied primarily to program managers in evaluation (as defined by the utilization-focused approach) rather than study participants
	Catalytic authenticity	Action is stimulated by the inquiry process	Yes - applied primarily to program managers in evaluation (as defined by the utilization-focused approach) rather than study participants

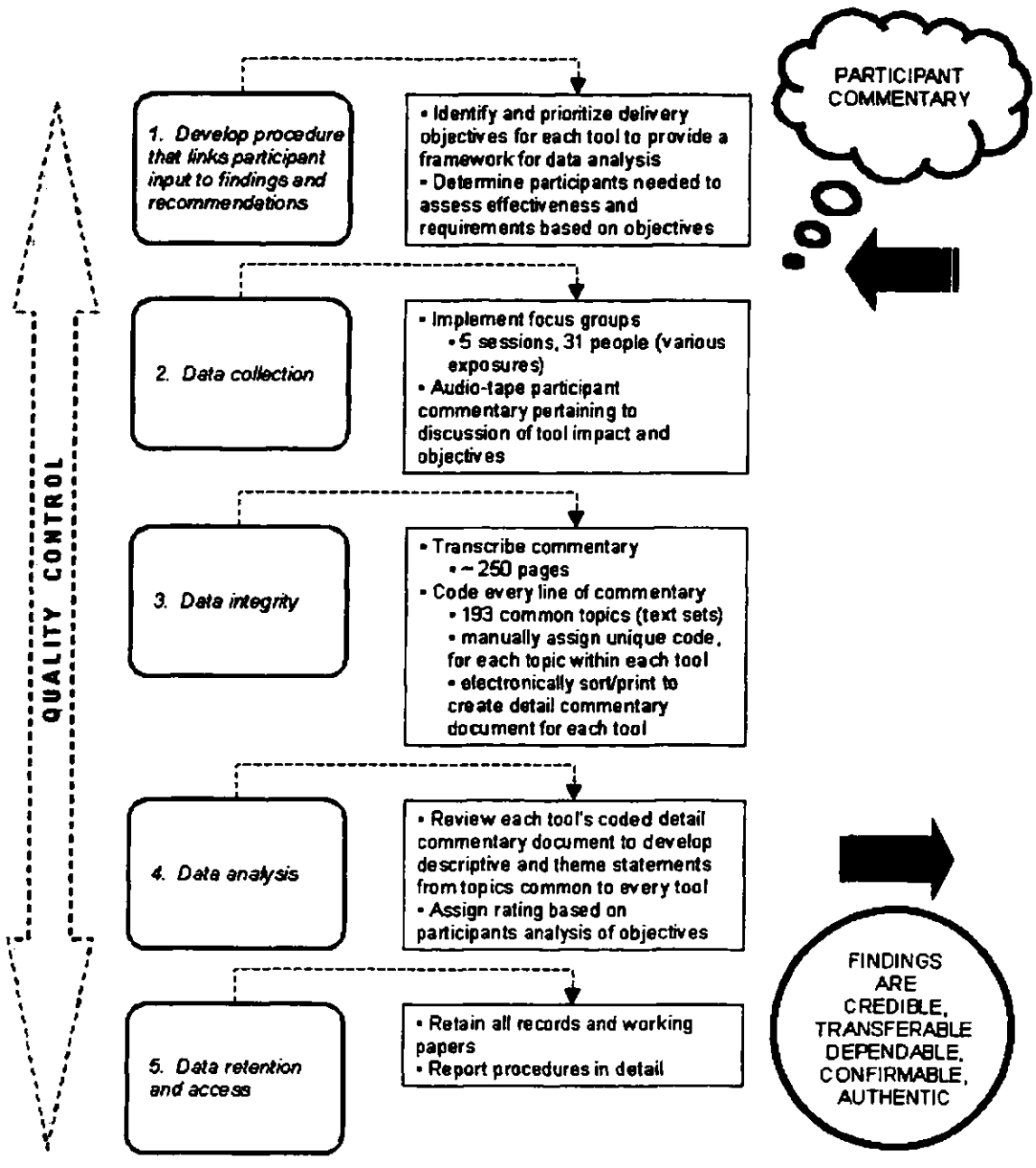

Figure 8.1
Quality Control in Qualitative Data Analysis

8.6 Limitations

This section discusses the limitations associated with this research, which include issues pertaining to research design; timing of the research; and the nature of behaviours (management actions by producers) examined in the evaluation. The limitations, as well as the distinct nature of the research questions asked, led to the requirement to use a natural experiment research design as defined in Chapter 2. Natural experiments are appropriate when the researcher has no control over who has received an intervention (e.g. programming) and who has not, and require the use of supplemental strategies, such as focus groups and identification of alternate influences, in order to strengthen conclusions.

The first limitation of this study related to implications arising from the type of research design used. The use of a natural experiment research design arose as the study evolved and as some of the requirements and assumptions associated with more traditional designs became apparent. Specifically, it had been assumed that a typical experimental research design (Campbell and Stanley, 1966; Cook and Campbell, 1979) would be employed. Generally speaking, the experimental research design is the best choice when applying a theory and attempting to reliably illustrate causation. Potential alternate sources of influence on outcomes (bias) other than those associated with the intervention can be almost entirely eliminated. In doing so, any conclusions drawn about cause and effect are strengthened.

Randomization is the standard technique employed to eliminate bias (McGrew and Monroe, 1993; Rowntree, 1981). It gives each potential participant an equivalent probability of being selected from an eligible population (e.g. all cattle producers in

southwestern Alberta) for participation in an experiment and again when assigning participants to intervention and controls group in that experiment (Judd et al., 1991; Rog, 1994). In this way, participants in the two groups are assumed to be the same on all factors relevant to the research except the intervention. The intervention group receives the experimental intervention (e.g. programming) while the control group does not. Conclusions drawn about any observed differences between the groups, therefore, can be considered both valid and attributable to the intervention.

As is often the case with program evaluations (Cronbach, 1982; Marcantonio and Cook, 1994; Patton, 1997; Rog, 1994), however, situational factors prevent the use of an experimental research design and its ability to support statistically-based conclusions about any cause-and-effect relationships occurring as a result of an intervention. It became evident as this study proceeded that this would be the case with the Cows and Fish Program evaluation. The program had been active in a number of Alberta communities for several years and had received a degree of media exposure. It was, generally speaking, an entity known to the public. Any potential participant selected from the general population of cattle producers, using a randomization technique, may already have had some unknown degree of exposure to the program. It was not possible, therefore, to eliminate potential bias either when selecting the sampling frame participants from the general cattle producer population for participation in the study, or when subsequently attempting to assign those individuals to potential intervention and control groups.

The decision to move away from attempting to use an experimental research design was based, therefore, on the consistent threat of selection bias. This meant that the opportunity to draw conclusions about causality arising from observed relationships

between the programming intervention and outcomes was lost. Further, the inability to meet the requirements of an experimental research design meant that it was not possible in Phase 2 of the evaluation to generalize any observations to the broader population of cattle producers based on the cattle producers in the sampling frame (McGrew and Monroe, 1993; Rowntree, 1981). The random selection procedure used in Phase 2 of this study, therefore, acted merely as a convenient and thorough method to identify suitable participants for the study, but was unable to act as a mechanism to help determine causality. With regard to the qualitative phase (Phase 1) of this study, it remains the reader's/user's responsibility to judge the extent to which findings may be applied to a broader group of people (Mertens, 1998).

The quasi-experimental research design presented an option to an experimental design because, while it requires both an intervention and control group (or condition), it relaxes the requirement for randomization in participant selection (Cook and Campbell, 1979, Creswell, 1994). Accordingly, this type of design has somewhat less predictive ability than the experimental design. The requirement for intervention and control/comparison groups remains, however, even when using the weakest of quasi-experimental designs, the post-test design. The post-test design applies when, as was the situation with the Cows and Fish Program, observations can be made only after the intervention has occurred (Cook and Campbell, 1979). However, in the Cows and Fish Program evaluation, there were 17 programming tools against which 13 potential outcomes were being measured. Those 17 tools were not equivalent in terms of either content and objectives. To appropriately measure the relationship between four levels of self-reported participant exposure to each tool and its associated attitudes and behaviours, a post-test quasi-experimental research design would have required 17 distinct sets of intervention and control/comparison groups. Such a requirement was clearly impractical

and would have required a very large number of study participants. Further, the quasi-experimental research design is considered to be most effective in those situations in which observations can be made at different points in time, over an extended period of time (interrupted time series design) or when a specific point on a time continuum can be chosen and the desired outcome measured both prior and subsequent to that point in time (regression-discontinuity design) (Marcantonio and Cook, 1994). Again, the Cows and Fish Program evaluation was unable to meet these requirements, and so the quasi-experimental research design was also rejected as appropriate for use in this study. Accordingly, the evaluation proceeded using the natural experiment research design described previously.

A second limitation of the study was that data were collected at only one point in time (all during 1999). Practicalities prevented a repeat data collection procedure to measure change in Affect, Cognition, Perceived Behavioural Control, Subjective Norm and behaviours across two points in time. The evaluation did not, therefore, parallel the assumption of change in attitude that underlies the process of developing ecological literacy in the Cows and Fish Program, and so was unable to reflect completely the nature of the program being evaluated.

A third limitation of the study related to the use of the Theory of Planned Behaviour itself and the nature of the behaviours being measured. The goal of the Cows and Fish Program is that cattle producers use certain grazing systems, monitoring techniques and various management techniques that characterize sustainable riparian management. As described in Chapter 6, these strategies are mostly single, mutually exclusive behaviours. For example, the technique of installing a hardened surface to reduce erosion at a riparian crossing is not associated with the use of, say, Rotational Grazing,

and so use of that technique by a cattle producer cannot be assumed to be an action that predicts the behaviour of using Rotational Grazing. Similarly, due to landscape or operational factors, it is unlikely that a cattle producer would use more than one type of grazing system in the riparian area of an operation. The types of behaviours examined in this study, therefore, could not be combined into an index of related behaviours to be correlated with indices of Affect, Cognition, Perceived Behavioural Control and Subjective Norm in order to predict a particular action – this being the usual procedure when using the Theory of Planned Behaviour. As described in Chapter 2, multiple behaviours are more strongly associated with attitudes than single behaviours. The measurement of single, mutually exclusive behaviours in this study was appropriate because of the nature of the behaviours being investigated. However, it reduced the utility of the methodology traditionally associated with studies involving the elements of the Theory of Planned Behaviour in explaining whether the attitude-behaviour relationship applied to sustainable riparian grazing management.

8.7 Contributions of the Research

This research had made a number of contributions to developing understanding of resource management, program evaluation and social psychology. It has:

- applied a formal program evaluation framework in the field of resource management to assist the Cows and Fish Program to understand its programming effectiveness; to provide guidance as to its improvement; to increase general understanding of how cattle producers respond to programming; and to illustrate to other resource managers the utility and procedures of program evaluation;

- applied a mixed-method approach, addressing limits and drawing on the strengths of both qualitative and quantitative methods, in order to provide a description of programming based on participant feedback that is of strategic value to decision-makers responsible for future program development and implementation;
- built on previous work on the human dimension of natural resource management and added a western Canada study to the resource management literature;
- attempted to bridge the gap in the resource management literature with regard to the role of attitudes and how they affect individual decisions pertaining to sustainable actions; and
- drawn together literature from a variety of disciplines, including physical and human geography, social psychology, education and program evaluation. The breadth of this literature reflects the complexity of factors that contribute both to land use decisions by individuals, and to the implementation of successful resource management programming. It also suggests that program impact cannot be easily or quickly explained.

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ATTRIBUTE/ STANDARD	PRINCIPLE
Attribute: *Utility*	*Definition:* *Ensures an evaluation serves the information needs of intended users.*
Standards: U1. Stakeholder identification	Persons involved in or affected by the evaluation are identified so that their needs can be addressed.
U2. Evaluator credibility	Persons conducting the evaluation are trustworthy and competent so that the findings achieve maximum credibility and acceptance.
U3. Information scope and selection	Information collected is broadly selected to address pertinent questions about the program.
U4. Values identification	The perspectives, procedures and rationale used to interpret the findings are carefully described so that the bases for judgments are clear.
U5. Report clarity	Reports clearly describe the program, including context, purposes, procedures and findings, so that essential information is provided and easily understood.
U6. Report timeliness and dissemination	Significant interim findings and reports are disseminated to intended users for use in a timely fashion.
U7. Evaluation impact	Evaluations are planned, conducted and reported to encourage follow-through by stakeholders so that the likelihood of evaluation use is increased.
Attribute: *Feasibility*	*Definition:* *Ensures that an evaluation is realistic, prudent, diplomatic and frugal.*
F1. Practical procedures	Procedures are practical to keep disruption to a minimum while needed information is obtained.
F2. Political viability	The evaluation is planned and conducted with anticipation of the different positions of various stakeholders, so that their co-operation is obtained in order to curtail bias or misapplication of evaluation results.
F3. Cost effectiveness	The evaluation is efficient and produces information of sufficient value so that the resources expended are justified.
Attribute: *Propriety*	*Definition:* *Ensures that an evaluation is conducted legally, ethically and with due regard for the welfare of those involved and those affected by results.*
P1. Service orientation	The evaluation is designed to assist organizations to be effectively serve the needs of targeted participants.
P2. Formal agreements	Obligations of the parties to an evaluation are agreed to in writing so that these parties are obligated to adhere to the conditions of the agreement or formally to renegotiate it.
P3. Rights of human subjects	The evaluation is designed and conducted to respect and protect the rights and welfare of human subjects.
P4. Human interactions	The evaluator respects the human dignity and worth of other persons associated with the evaluation so that participants are not threatened or harmed.
P5. Complete and fair assessment	The evaluation is complete and fair in its examination and recording of the strengths and witnesses of the program being evaluated.
P6. Disclosure of findings	Parties to the evaluation should ensure that full evaluation findings, along with pertinent limitations, are accessible to the persons affected by the evaluation and any others with legal rights to receive the results.
P7. Conflict of interest	Should be dealt with openly and honestly so that it does not compromise the evaluation processes and results.
P8. Fiscal responsibility	The evaluator's expenditure of resources reflects sound accountability and is prudent and ethically responsible.
Attribute *Accuracy*	*Definition:* *Ensures that an evaluation reveals and conveys technically adequate information about the features that determine worth or merit of the programming being evaluated.*
A1. Program documentation	The program being evaluated is described and documented clearly and accurately so that the program is clearly identified.

ATTRIBUTE/ STANDARD	PRINCIPLE
A2. Context analysis	The context in which the program exists is examined in enough detail so that its likely influences on the program are identified.
A3. Described purposes and procedures	Purposes and procedures are described in sufficient detail so that they can be assessed and identified.
A4. Defensible information sources	Sources of information are described in enough detail so that the adequacy of the information can be assessed.
A5. Valid information	Information gathering procedures are chosen or developed and then implemented to assure that the interpretation arrived at is valid for its intended use.
A6. Reliable information	Information gathering procedures are chosen or developed and then implemented to assure that the information obtained is sufficiently reliable for its intended use.
A7. Systematic information	Information collected, processed and reported is systematically reviewed and errors corrected.
A8. Analysis of quantitative information	Quantitative information is appropriately and systematically analyzed so that the evaluation questions are answered effectively.
A9. Analysis of qualitative information	Qualitative information is appropriately and systematically analyzed so that the evaluation questions are answered effectively.
A10. Justified conclusions	Conclusions are explicitly justified so that the stakeholders can assess them.
A11. Impartial reporting	Reporting procedures guard against distortion caused by a bias of any party to the evaluation, so that evaluation reports reflect the evaluation findings fairly.
A12. Meta-evaluation	The evaluation itself should be formatively and summatively evaluated against these standards, so that its conduct is appropriate and, on completion, stakeholders can examine its strengths and weaknesses.

Source: Joint Committee on Educational Evaluation. 1994. The Program Evaluation Standards: How to Assess Evaluations of Educational Programs, 2nd ed., The Joint Committee on Standards for Educational Evaluation. Thousand Oaks, California: Sage Publications, Inc., pp. not specified.

COWS & FISH EVALUATION
PROGRAM MANAGER - INITIAL INTERVIEW
QUESTION GUIDE
April 30, 1999

PREAMBLE

1. Thank you.
2. I'm interested in your personal experience and views about the Cows and Fish Program, and in particular regarding the evaluation process, so please speak freely.
3. The evaluation is yours, not mine, so while it's being done in an academic setting, it is essential to have your input in order to maximize its usefulness - indeed, usefulness is one of the current standards of practice for evaluation research.
4. To provide assurance to you that your responses will be used only in an appropriate way within the research, I'll ask you to sign a consent form, basically indicating I will contact you for consent prior to any use of your quotes.

#	QUESTION
1.	Perhaps I could begin by asking you to fill in some gaps for me about your role in the Cows & Fish program. Could you please describe how you see your current role and also how and when your involvement in the program began?
2.	From your viewpoint, and speaking in a broad sense, what is the central premise underlying the design of the Cows and Fish Program -- what is the program really all about?
3.	How was what you've just told me about, first identified, and has it changed over time? *Prompt if necessary:* back up to broad level if gets too detailed.
4.	Turning to the evaluation itself, what is your view as to why it is being done?
5.	What do you see as the end use of the evaluation? What is the information going to be used for?
6.	What's the one thing you would most care to know about from the evaluation, that would be most helpful to you?
7	In previous discussions, we've touched on the idea of program success.

#	QUESTION
	I'm interested to know how you would define success for the Cows and Fish Program. *Prompt if necessary:* how would you know it was successful, what would a successful program look like to you?
8.	Turning to the individual programming tools, I've brought a list of them for reference. First, can you tell me if this a complete and accurate list? Second, thinking about just one or two (any) examples from the list, could you describe what you've seen as their strengths, concrete things that in your experience have been particularly successful? Why have they been successful?
9.	And, conversely, would there be parts of any of these tools that, now with some experience behind you, perhaps haven't worked the way you intended or that you would do differently, and, if so, why?
10a.	One of the purposes of this interview is to gather information so that we can prepare an evaluation agreement setting out expectations and responsibilities. This is something we can negotiate together over the next few weeks, but I have a brought a rough outline with me. HAND OUT It takes care of a number of housekeeping items that can be determined in later discussion, but I'd like to focus on a few of the more substantive points at this time. One of the things that I'm particularly interested in, is this:
10b.	The central approach of the evaluation will be an overall assessment of the impact of the collective suite of tools, by comparing two groups of ranchers in terms of the effect of programming in influencing rancher decisions to adopt the recommended riparian management practices. However, with regard to looking in detail at each of the individual components, can you describe what, if any, information you're looking for from the evaluation? *Prompt if necessary:* What, if anything, are you looking for in terms of the individual tools rather than the whole programming suite?

#	QUESTION
	Prompt if necessary: For example, are you trying to identify in a general way which tool more successfully communicates the key messages than other tools, OR do you want an assessment of each tool individually, one that includes an evaluation of appearance, content, structure, presentation, etc., something more like a marketing evaluation? Note for future: needs to be negotiated - may have to trim list due to limitations of resources/time.
11.	Another key point that I'd like your view on, is the nature and type of reporting on evaluation results. First, a lot of evaluations include recommendations by the evaluator arising from the program analysis, although making recommendations can be quite a distinct process from evaluation. What is your view on this -- would you consider it appropriate or necessary for me to provide recommendations as part of the evaluation?
12.	Second, there are a variety of ways that reporting the results of the evaluation can be done. Obviously, you'll receive a copy of my thesis, but I'd like to ask you to give some thought to the nature and type of reporting that is going to be of greatest assistance to you as a manager, to help you assess and act upon the evaluation results. This aspect can, of course, be renegotiated at any time, but: To that end, rather than trying to define this level of detail now, I'm going to leave a sheet with you listing some reporting options, if you could please think about your requirements, and I'll follow up with you later next week.
13	One last item that we need to give some thought to and ultimately include in the evaluation agreement -- and that is the matter of the use of results. For example, I'm interested in your views in terms of ultimate "ownership" of the evaluation results, for example, who owns the reports, the data, who disseminates results and so forth.
14.	As you know, [xxxxx] are being interviewed. Are there any other people involved in the Cows and Fish Program with whom I should have a similar discussion, whose advice would enhance the design or planning of the evaluation?
15.	At [xxxxx]'s suggestion, I'll be approaching [xxxxx] to request their involvement in furthering a request to the Alberta Cattle Commission for

3

#	QUESTION
	access to their records. This is so I can develop the sampling list of potential participants in the evaluation. [xxxxx] has volunteered to provide an opportunity to meet with [xxxxx] next week, and [xxxxx] is working with me to develop an appropriately phrased request as part of that strategy. Some of the parameters for the list I want to get from them are: • name of producer • name of operation • mailing address and telephone number • producers of 20 cows or more • operation situated south of Highway 1, west of Highway 2, north of Highway 3, east of the Alberta/BC border (perhaps by LSD) (operations on streams will have to be addressed in the pre-screen checklist) Given the importance of acquiring this list, do you have any comments or suggestions about : (a) this process; and (b) the parameters identified?
16.	And, finally, keeping in mind the research requirement of respondent confidentiality, which means that I will not be able to report results by location that may inadvertently identify an individual respondent, do you wish the evaluation results to be reported or analyzed based on the ranch site being in a particular ecozone, e.g. grassland, foothills, etc.? *- If done, but if only low # in a given area, can't do it for that area since it will ID person*
17.	That completes my questions, thank you. Are there any questions that you have, or comments that you would like to make?

4

COWS & FISH EVALUATION
INITIAL PROGRAM MANAGER INTERVIEW

CONSENT TO BE INTERVIEWED

I, _____, agree to be interviewed by Nancy Bateman for the purposes of the Cows & Fish evaluation research project, under the terms set out in email from her to me dated April 28, 1999. I understand that I will not be identifiably quoted as a result of this interview in any of the academic or program reporting arising from the evaluation, without my prior written consent.

_____

_____
Date

THE COWS & FISH PROGRAM
EVALUATION STUDY

INFORMED CONSENT

I, _____, hereby state that I have volunteered for a study evaluating the effectiveness of the Cows & Fish program.

I understand that participation in this study involves completing a written checklist, which will take between 2 and 12 minutes (depending on your circumstances), and participating in a telephone questionnaire, which will take about 25 minutes to complete.

I hereby authorize the use of all records, tests and personal data derived from this study for research purposes, providing that there is no disclosure of the identity of the undersigned.

By signing below, I indicate that I understand the nature of this study, and consent to participate voluntarily as a subject. I understand that I am free to discontinue participation in the study at any time, and that I am in no way obliged to participate.

Please print your name: _____

Your signature: _____

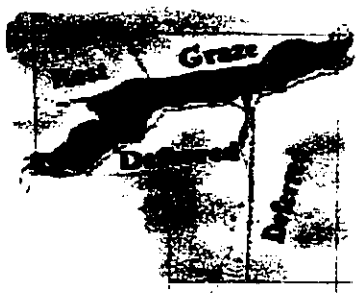
Dated: _____

THIS STUDY HAS BEEN APPROVED BY THE HUMAN SUBJECT RESEARCH COMMITTEE OF THE UNIVERSITY OF LETHBRIDGE, WHOSE PURPOSE IS TO REVIEW RESEARCH CONDUCTED AT THE UNIVERSITY.

PLEASE RETURN THIS FORM WITH YOUR CHECKLIST IN THE ENCLOSED STAMPED ENVELOPE.

Time-Controlled Grazing

Rotational Grazing



Rest-Rotational Grazing

Riparian Pasturing

Corridor Grazing

Source Lorne Fitch and Barry Adams. 1998a. Caring for the Green Zone: Riparian Area Grazing Management, 2nd.ed. Lethbridge, Alberta: Alberta Riparian Habitat Management Project, 25-31.

LOTIC HEALTH ASSESSMENT
FIELD DATA SHEET

1. Vegetative Cover of Floodplain and Streambanks. Score:_____
6 = More than 95% of the reach soil surface is covered by plant growth.
4 = 85% to 95% of the reach soil surface is covered by plant growth.
2 = 75% to 85% of the reach soil surface is covered by plant growth.
0 = Less than 75% of the reach soil surface is covered by plant growth.

2. Invasive Plant Species. Score:_____
6 = No invasive species on the site.
4 = Less than 1% of site infested by invasive species.
2 = 1% to 15% of site infested by invasive species.
0 = More than 15% of site infested by invasive species.

3. Disturbance-Increaser Undesirable Herbaceous Species. Score:_____
3 = Less than 5% of the site covered by disturbance-increaser undesirable herbaceous species.
2 = 5% to 25% of the site covered by disturbance-increaser undesirable herbaceous species.
1 = 25% to 45% of the site covered by disturbance-increaser undesirable herbaceous species.
0 = More than 45% of the site covered by disturbance-increaser undesirable herbaceous species.

4. Preferred Tree and Shrub Establishment and Regeneration. Score:_____
6 = More than 15% of the total canopy cover of preferred trees/shrubs is seedlings and saplings.
4 = 5% to 15% of the total canopy cover of preferred trees/shrubs is seedlings and saplings.
2 = Less than 5% of the total canopy cover of preferred trees/shrubs is seedlings and saplings.
0 = Preferred trees/shrub seedlings or saplings absent.

5. Utilization of Preferred Trees and Shrubs. Score:_____
3 = None (0% to 5% of available second year and older leaders of preferred species are browsed).
2 = Light (5% to 25% of available second year and older leaders of preferred species are browsed).
1 = Moderate (25% to 50% of available second year and older leaders of preferred species are browsed)
0 = Heavy (More than 50% of available second year and older leaders of preferred species are browsed).

6. Standing Dead and Dead Woody Material. Score:_____
3 = Less than 5% of the total canopy cover of woody species is decadent or dead.
2 = 5% to 25% of the total canopy cover of woody species is decadent or dead.
1 = 25% to 45% of the total canopy cover of woody species is decadent or dead.
0 = More than 45% of the total canopy cover of woody species is decadent or dead.

7. Streambank Root Mass Protection. Score:_____
6 = More than 85% of the streambank has a deep, binding root mass.
4 = 65% to 85% of the streambank has a deep, binding root mass.
2 = 35% to 65% of the streambank has a deep, binding root mass.
0 = Less than 35% of the streambank has a deep, binding root mass.

8. Human-Caused Bare Ground. Score:_____
6 = Less than 1% of the site is human-caused bare ground.
4 = 1% to 5% of the site is human-caused bare ground.
2 = 5% to 15% of the site is human-caused bare ground.
0 = More than 15% of the site is human-caused bare ground.

9. Streambank Structurally Altered by Human Activity. Score:_____
6 = Less than 5% of the bank is structurally altered by human activity.
4 = 5% to 15% of the bank is structurally altered by human activity.
2 = 15% to 35% of the bank is structurally altered by human activity.
0 = More than 35% of the bank is structurally altered by human activity.

10. Pugging and/or Hummocking. Score:_____
3 = Less than 5% of the polygon is affected by pugging and/or hummocking.
2 = 5% to 15% of the polygon is affected by pugging and/or hummocking.
1 = 15% to 25% of the polygon is affected by pugging and/or hummocking.
0 = More than 25% of the polygon is affected by pugging and/or hummocking.

11. Stream Channel Inclisement (vertical stability). Score:_____
9= Channel vertically stable and not incised; 1-2 year high flows access a floodplain appropriate to the stream type. Active downcutting is not evident. Any old inclisement is characterized by a broad floodplain inside which perennial riparian plant communities are well established. (Stages A-1, A-2, or A-3 of Figure 3.)
6 = Either of two inclisement phases: (a) an early phase where the channel is just beginning to downcut. May be small headcuts, but bankfull flows still access the floodplain. (Look for cutting in channel bottoms) or (b) an old inclisement in which the channel may still show limited active downcutting. A new floodplain is well formed at the lower level, although much narrower than it may become. Lateral bank cutting is likely still widening the incised system on outside curves. Perennial riparian plants are becoming well established. (Stage B of Figure 3.)
3 = Two phases of inclisement also fit this rating. (a) an intermediate phase with downcutting and headcuts probable. Channel is not yet so deeply incised that medium (5-10 year) high flows cannot escape the banks or (b) a deep inclisement that is starting to heal. In this phase new floodplain development, though very limited, is key. (Look for widening of the incised system and for early establishment of pioneer perennial plants on the new depositional surfaces.) (Stage C of Figure 3.)
0 = The channel is deeply incised to resemble a ditch or a gully. Downcutting is likely ongoing. Only extreme floods overtop the banks. No floodplain development has begun. (Stages B-1 or B-2 of Figure 3.)

12. Streambank Rock Volume and Size
12a. Streambank Rock Volume. Rate the streambank rock volume as the highest appropriate one of the following four categories: Score:_____
Scoring
3 = More than 40% of streambank volume is rocks at least 2.5 inches
2 = 20% to 40% of streambank volume is rocks at least 2.5 inches.
1 = 10% to 20% of streambank volume is rocks at least 2.5 inches.
0 = Less than 10% of streambank volume is rocks at least 2.5 inches.

12b. Streambank Rock Size. Rate the streambank rock size for the polygon as the highest appropriate one of the following four categories: Score:_____
Scoring
3 = At least 50% of rocks present are boulders and large cobbles (>5 inch)
2 = 50% of rocks present are small cobbles and larger (>2.5 inches).
1 = At least 50% of rocks present are coarse gravels and larger (>0.6 inches).
0 = Less than 50% of rocks present are coarse gravels and larger (>0.6 inches).

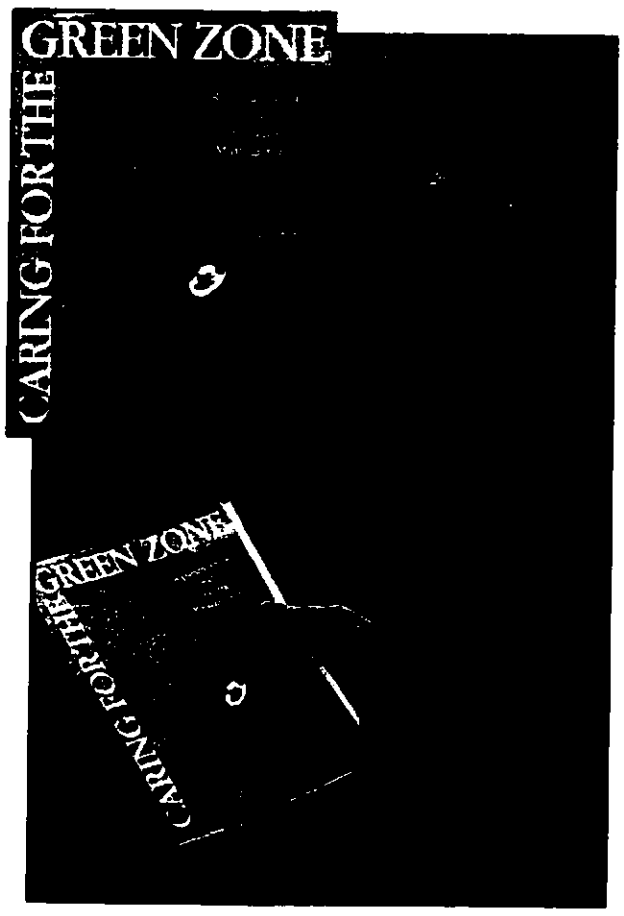
13. Vegetative Use by Animals. Score:_____
0 to 20% 21 to 50% 51 to 75% 76 to 100%

14. Susceptibility of Parent Material to Erosion. Score:_____
3 = Not susceptible to erosion (well armored).
2 = Slightly susceptible to erosion (moderately armored).
1 = Moderately susceptible to erosion.
0 = Extremely susceptible to erosion.

15. Percent of Streambank Accessible to Livestock. Percent:_____

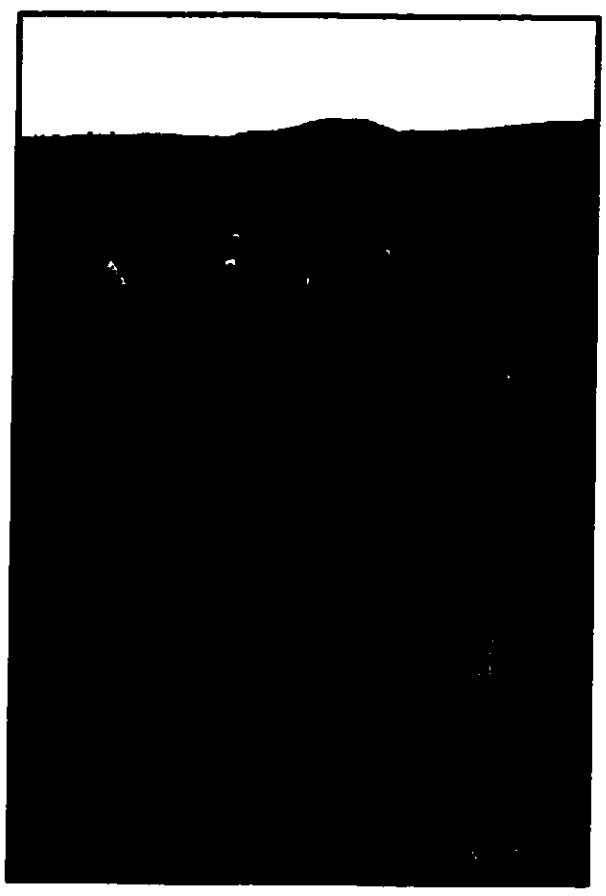
16. Trend. Select one: Improving, Degrading, Static, or Status Unknown

17. Comments and Observations.



Caring for the Green Zone: Riparian Areas and Grazing Management

Photo: L. Fitch



Site Tour of Demonstration Ranch

Photo: L. Fitch

Stockmen's Range Management Course - Plant Identification

Photo: N. Bateman

Stockmen's Range Management Course -Soil Identification

Photo: N. Bateman

Riparian Health Assessment Field Day
- Riparian Specialist Explaining the Lotic Riparian Health Assessment Monitoring Technique

Photo: N. Bateman

Riparian Health Assessment Field Day
- Cattle Producers Scoring Health Components of a Lotic Riparian Zone

Photo: N. Bateman

Profile Producers
- Planning a Grazing Management Strategy

Photo: L. Fitch

Cows, Fish, Cattle Dogs and Kids

Photo: N. Bateman

TOOL	LOW-SOUTH	LOW-NORTH	MED-SOUTH	MED-SOUTH	HIGH-NORTH	PROBES / QUESTIONS
Introductory						
Introductory Pamphlet	X	X		X		What are your impressions of this? If you were to pick something like this up, what does it tell you? What doesn't it tell you, what are you looking for? What would lead you to hold on to this vs. throwing it away when you get home?
Display Booth	X	X	X			What are your impressions? What does this tell you? Does this catch your attention? Does it need a person here? What would a good display booth provide you with, that you could take away with you? What are downsides of this?
General Media	X	X		X	X	Should Cows and Fish use the media to promote itself? Is it important to increase the profile? How should Cows and Fish use the media? Where should the focus be? What should the audience targets be in order of importance (producers, urban communities)? What should the message be? What should the primary outlets be? Where did you see see/hear about Cows and Fish in the media? In what ways was this memorable?
Website	X	X	X	X	X	What kind of information would you be looking for if you were to use a website? How would you start to look for that information? What do you want to see on the website? Do you want to download information? What should the website be called? Should it be stand-alone or attached to website of its partners? How should the existence of the website be communicated to the public?
Profile Producers	X	X		X	X	Is there a role for community leadership? Would you consciously contact such a person? How would you know they existed? What would you look to them for? How could they help you the most? How should people be made aware of these producers?
Program Representatives		X	X	X	X	What do you see as their role? What about perceptions with associations with their partners - ACC, Public Lands, Alberta Environment? Are there enough of them to go around? What are their strengths and weaknesses?

Comprehensive						
Caring for the Green Zone: Riparian Areas and Grazing Management	X	X	X	X	X	Let's look at content Is this the kind of information that's helpful? What's helpful about it? What problems do you see with this? Is something missing? Is it practical? What's the best section or part of it? Can anything be left out? Is there too much information? What did you learn most/what stuck with you the most when you used this? Do you know who publishes this Is it important that the Cows and Fish name/logo be on the cover?
Cows, Fish, Cattle Dogs and Kids			X	X	X	How important is it to reach a youth audience? How important is it to develop partnerships with school/curriculum programs? How important is it to reach an urban audience or a non-producer audience? How do you feel about resources being used for this kind of activity?
Along the Water's Edge	X	X	X			Is there useful information here? Would you pay for this (3 minutes on Alberta)? What are some good things about using the video format? What kind of information would you like to see?
Suzuki (video)	X	X	X			Observations? Is it important to get a riparian message out to a national audience? Is it important to introduce the role of cattle producers in land management to a national audience? What kind of value does this type of profile add to Cows and Fish?
Foster (video)	X	X			X	As for Suzuki
General Presentations	X	X	X	X		Would you attend something like this? If so, what would you expect to see and learn and come away with? What are your impressions of this outline? What's useful to you about these presentations? What kind of information do you like to see in presentations about grazing management? How important is it to reach audiences other than cattle producers?
Site Tours of Demonstration Ranches		X		X		What's the value of these? What makes it valuable/helpful to producers? How important is it to show other groups these on-the-ground examples?
Riparian Workshops			X	X		What are your comments about this forum? Is this something that's of value? What kinds of things are achieved by these workshops?
Riparian Health Assessment Field Days		X	X		X	How was this helpful? What didn't you like about this? How does the field element contribute to learning? Or does it? What can you say here about building trust,

						partnership? Are these things important? What about the workshop led to that happening?
Stockmens' Range Management Course	X			X	X	What's the value of this course? Why? Was there something key that happened here that led to a shift or change in what you thought or did in terms of your management? What did you learn? What was it about the design that was positive or negative? Is the time commitment required a concern? How do you feel about Cows and Fish working with and presenting courses like this in conjunction with government agencies such as Public Lands? What format/what content is helpful – planning sessions, introduction of new technologies, field component, slide talks, lectures?
Community Health Assessment Process			X	X	X	What are the important features of this? What results do you see coming from this? What didn't work well? What would you do differently?

Your Personal Study Identification # ☐

The Cows & Fish Program:

Evaluating Riparian Management Programming for Use on Alberta Rangelands

The purpose of this study is to evaluate the effectiveness of activities and extension materials available to Alberta cattle producers through the Cows & Fish program. The study results will be used by the Cows & Fish program to provide the best possible information to producers, to help producers themselves make better decisions about landscape health and productivity.

Department of Geography
University of Lethbridge
Lethbridge, Alberta T1J 4B7

THANK YOU FOR CONTRIBUTING YOUR TIME TO ASSIST ME IN THIS STUDY.

If you have any questions, please call me at (403) 394-6494.

Nancy Bateman

HOW TO COMPLETE THIS CHECKLIST

This checklist forms the first of two stages in the evaluation study. The second stage is a more detailed telephone questionnaire.

The person most responsible for making decisions about grazing management in your cattle operation should complete this checklist. The same person will be contacted shortly to complete the telephone questionnaire.

This checklist has four parts. Part 1 asks you a little about yourself and your cattle operation. Part 2 asks you to identify an area (of your choice) within your operation that we can talk about during the study. Part 3 asks about your familiarity with the Cows & Fish program. Part 4 asks you simply to confirm your name and telephone number so that I can contact you to set up a convenient time for the telephone questionnaire.

Information gathered in the study will be treated confidentially by me. Results will be provided to the Cows & Fish program, and shared with you in summary form. Your name and location will never be known to anyone but myself, and will never appear in any study results.

Please answer each question by checking the box for the answer you feel is most appropriate to your situation.

Please answer all questions. When complete, I would appreciate you returning this checklist, and the signed consent form, in the enclosed stamped envelope.

PART 1

Please tell me a little about yourself and your cattle operation.

		YES	NO
#1.	Were you involved in beef cattle production in either 1997 or 1998?	☐	☐
#2.	Does all or part of your cattle operation lie within the boundaries shown by the dashed line on the map on page 2 (opposite)?	☐	☐

If you answered NO to either question #1 or question #2, you may stop now. Please accept my thanks for your participation, and return this checklist in the enclosed stamped envelope.

If you answered YES to both question #1 and question #2, please proceed to question #3.

#3. In your most recent full year of operation, what was the total number of head in your entire operation, not including calves?

CHOOSE ONE

- ☐ 20 HEAD OR LESS
- ☐ 21 - 50 HEAD
- ☐ 51 - 100 HEAD
- ☐ 101 - 200 HEAD
- ☐ 201 - 500 HEAD
- ☐ 501 HEAD OR MORE

PLEASE USE THIS MAP TO ANSWER

QUESTION #2 (on page 1) AND SECTION A (on page 4).

REFER TO THE AREA LOCATED WITHIN THE DASHED LINE.

#1. Which of the following categories best describes your cattle operation?

CHOOSE ONE

- ☐ HOBBY ACREAGE
- ☐ COMMERCIAL COW-CALF / YEARLING (including Backgrounding and Breeding)
- ☐ FEEDLOT

PART 2

I understand that within your whole cattle operation, you may have grazing land located in several different areas. Therefore, I would like you to pick one area, of your choice, from within your entire operation, that we can focus on. This will simplify answering questions from now on.

For ease, I'll call this area your "study area". It may be all of your operation or only part of it (for example, it could be just one, or several, fields or pastures).

The study area you select is your choice, but I do ask that the area you choose include the characteristics mentioned in Section A and Section B, starting on the next page. This is necessary only so that the study areas for everyone involved in this research are as similar as possible.

SECTION A In choosing your own study area, please choose an area that includes all of the characteristics listed below. Please check off each box to indicate that your study area is:

- ☐ LAND THAT IS LOCATED ENTIRELY WITHIN THE BOUNDARIES SHOWN BY THE DASHED LINE ON THE MAP ON PAGE 2 *(but the land should not be cotton or reserve lands)*

AND –

- ☐ LAND THAT IS EITHER ALL OR ALMOST ALL RANGELAND (trees, shrubs, grasses, or grass-like plants, as either conifer or forest foliage) ... OR ... IT HAS SOME RANGELAND AND SOME CULTIVATED CROPS *(the land should not consist entirely of cultivated crops)*

AND –

- ☐ LAND THAT IS AT LEAST 40 ACRES IN SIZE

AND –

- ☐ LAND THAT IS USED FOR CATTLE GRAZING AT LEAST PART OF THE YEAR IN MOST YEARS

AND –

- ☐ LAND WHERE YOU ARE THE PERSON WITHIN THE OPERATION WHO HAS THE GREATEST AMOUNT OF INFLUENCE OR CONTROL IN MAKING DECISIONS ABOUT MANAGING THE CATTLE THAT GRAZE THERE (OR YOU SHARE THAT RESPONSIBILITY EQUALLY WITH SOMEONE ELSE IN YOUR OPERATION)

SECTION B Please also choose your study area so that it contains at least one of the following types of riparian zones. Check off any of the boxes that apply, to indicate that your study area has one or more:

CHOOSE ANY OF THESE THAT APPLY

- ☐ STREAM OR RIVER THAT CONTAINS WATER FOR THE ENTIRE YEAR, IN ALL OR MOST YEARS
- ☐ STREAM OR RIVER THAT CONTAINS WATER FOR ONLY PART OF THE YEAR, IN ALL OR MOST YEARS
- ☐ DRAW OR COULEE THAT HAS WATER, EITHER ALL OR PART OF THE YEAR, IN ALL OR MOST YEARS
- ☐ DRAW, COULEE OR STREAMBED THAT YOU BELIEVE CONTAINED WATER IN THE PAST, EITHER ALL OR PART OF THE YEAR, BUT WHICH IS NOW PERMANENTLY DRY
- ☐ NATURAL SPRING

Please proceed to question #6 -- even if you were unable to select any of the items listed above in Section B because they don't apply to your operation.

	YES	NO
#6. Have you been able to identify a study area that has: • all of the characteristics listed in Section A, AND • at least one of the characteristics listed in Section B?	☐	☐

If you answered YES to question 65, please proceed to question 66. If you answered NO to question 65, stop now. Please accept my thanks for your participation, and return this checklist in the enclosed stamped envelope.

66. What is the nearest river or major stream that the water in your study area flows into?
_____
If it is also known by one or more different names, please include them here.
_____

67. How would you describe the landcover in your study area?

CHOOSE ONE
- ☐ IT CONTAINS ONLY RANGELAND (trees, shrubs, grasses or grass-like plants, as either native or tame forage)
- ☐ IT CONTAINS SOME RANGELAND AND SOME CULTIVATED CROPS

68. Which category best describes your role in most of your study area?

CHOOSE ONE
- ☐ YOU OWN THE LAND
- ☐ YOU LEASE THE LAND
- ☐ YOU ACT AS A MANAGER OR FOREMAN FOR THE LANDOWNER(s) OR LEASEHOLDER(s)
- ☐ YOU SHARE THE LAND AS PART OF A FORESTRY GRAZING ALLOTMENT
- ☐ YOU SHARE THE LAND AS PART OF A COMMUNITY PASTURE OR GRAZING CO-OPERATIVE
- ☐ OTHER (please specify): _____

PART 2

Now, please indicate whether or not you have HEARD ABOUT any of the following activities or extension materials provided by the Cows & Fish program. *(I'll ask about your participation in each of these in a later section of this checklist.)*

	YES	NO
The Stockmen's Range Management Courses? *(These are 3-5 day field courses covering many aspects of range management, hosted by a variety of organizations including the Cows & Fish program.)*	☐	☐
The Cows & Fish Riparian Health Assessment Field Workshops? *(These Cows & Fish workshops involve a slide presentation on how riparian zones function, followed by a field trip to determine the condition of the riparian zone using a scoring system that examines vegetation, soil, etc.)*	☐	☐
The Cows & Fish Riparian Workshops? *(These are one day meetings involving a slide presentation, followed by a session where participants break into working groups to talk about policy and working around riparian zones.)*	☐	☐
The Cows & Fish Riparian Presentations? *(These presentations are about an hour in length, and describe riparian zones and managing livestock in these areas. One or more of these presentations may have been hosted by your municipality, a conservation group, a producer group or your neighbours.)*	☐	☐
The Cows & Fish Riparian Health Assessment community process? *(This involves the community inviting Cows & Fish representatives to work with local producers along a stream or river, or within a watershed, to assess the general condition of the riparian zone.)*	☐	☐

Continued... have you HEARD ABOUT?

	YES	NO
The brochure called "Caring for the Green Zone: Riparian Areas and Grazing Management"? *(This is a large glossy booklet describing riparian zones, principles of range management and techniques for grazing cattle in these areas.)*	☐	☐
The pamphlet called "Along the Water's Edge: Safeguarding our Natural Resources"? *(This small yellow pamphlet describes the history and purpose of the Cows & Fish program.)*	☐	☐
The video called "Along the Water's Edge"? *(This video includes interviews with producers in Alberta, Saskatchewan and Manitoba, who talk about managing cattle in riparian zones.)*	☐	☐
The youth game show called "Cows, Fish, Cattle Dogs and Kids"? *(This is an interactive game show for young people, presented in park interpretive programs, agricultural fairs and special events like EnviroDays, AgDays and WETHing.)*	☐	☐
The Cows & Fish display booth? *(This booth is shown at agricultural exhibitions, in shopping malls and at various producer and other special events.)*	☐	☐
Site tours of demonstration ranches? *(These are tours, coordinated by the Cows & Fish program, of ranches that demonstrate a variety of strategies for grazing in riparian zones. Some of the ranches are the Waldron Ranch, the V.V.V. Ranch, the Eldorin Ranch and the Mt. Sweeny Ranch.)*	☐	☐
The Cows & Fish website on the Internet?	☐	☐

Other than hearing about the Cows & Fish program items listed above, please indicate whether you have HEARD ABOUT any of the following sources that provide information about the Cows & Fish program.

	YES	NO
Cattle producers who you know to be very familiar with the Cows & Fish programs, and who actively share the program's information or ideas with other producers? *(These cattle producers may be neighbours you've talked with, or other people you've met at producer meetings or similar events.)*	☐	☐
Representatives of the Cows & Fish program? *(These include Greg Hale, Lorne Fitch and Barry Adams.)*	☐	☐
The television documentary covering Cows & Fish, called "Wood, Grass and Sky: A Passion for Prairie", a one-hour Discovery Channel program hosted by John and Joost Foster?	☐	☐
The television documentary covering Cows & Fish, called "The Green Zone", presented by David Suzuki on his program "The Nature of Things"?	☐	☐

Please indicate how often you have ATTENDED OR PARTICIPATED IN the following.

	NEVER	ONCE	TWICE OR MORE
The Stockmen's Range Management Course?	☐	☐	☐
The Riparian Health Assessment Field Workshops?	☐	☐	☐
The Riparian Workshops?	☐	☐	☐
The Riparian Presentations?	☐	☐	☐
Community Riparian Health Assessments?	☐	☐	☐
Bits tours of demonstration ranches?	☐	☐	☐

Please indicate how often you have READ ALL OR PART OF the following.

	NEVER	ONCE	TWICE OR MORE
The brochure called "Caring for the Green Zone: Riparian Areas and Grazing Management"?	☐	☐	☐
The pamphlet called "Along the Water's Edge: Enhancing our Natural Resources"?	☐	☐	☐
Articles or other information about the Cows & Fish program contained in newspapers, newsletters or magazines?	☐	☐	☐

If you answered YES to the last item, please list some examples of the newsletters, newspapers and/or magazines in which you read about the Cows & Fish program. _____ _____ _____

Please indicate how often you have SEEN ALL OR PART OF the following.

	NEVER	ONCE	TWICE OR MORE
The video called "Along the Water's Edge"?	☐	☐	☐
The game show called "Cows, Fish, Cattle Dogs and Kids"?	☐	☐	☐
The TV documentary called "Wind, Grass and Sky: A Passion for Prairie"?	☐	☐	☐
The TV documentary called "The Green Zone"?	☐	☐	☐
The Cows & Fish display booth?	☐	☐	☐
The Cows & Fish website?	☐	☐	☐

And, finally, please indicate how often you have DISCUSSED the Cows & Fish program with the following.

	NEVER	ONCE	TWICE OR MORE
Cattle producers who you know to be very familiar with the Cows & Fish program, and who actively share the program's information or ideas with other producers?	☐	☐	☐
Representatives of the Cows & Fish program?	☐	☐	☐

PART 4

So that I can contact you to set up a convenient time to complete stage 2 of the study (the telephone questionnaire), please provide your name, telephone number, and the best time to reach you. THANK YOU.

Your Name (please print) _____

Your Telephone Number _____

Best Time to Reach You to Set Up Appointment for Telephone Questionnaire

- ☐ WEEKDAY
- ☐ WEEKEND
- ☐ DAYTIME
- ☐ EVENING

Is there anything else that you would like to add about the Cows & Fish program, this evaluation study, or managing cattle around riparian zones? If so, please provide your comments here.

Also, I would appreciate any comments you have that might help improve future Cows & Fish programming and assist Alberta cattle producers. You can use this space, or send a separate letter. If you wish, we can expand on these comments when we speak on the telephone.

••••••••••

Your contribution to this effort is greatly appreciated.

The University of Lethbridge

4401 University Drive
Lethbridge, Alberta, Canada
T1K 3M4
TEL: (403) 329-2225
FAX: (403) 329-2016

DEPARTMENT OF GEOGRAPHY

Your Personal Study Identification # [ ]

October 25, 1999

«FIRSNAME» «LASTNAME»
«ADD1»
«ADD2»
«TOWN», «PROV» «PCODE»

Dear «SALU»:

COWS & FISH PROGRAM - EVALUATION STUDY

The Cows & Fish program[1] has been working with Alberta cattle producers in recent years to foster better understanding of how improvements in grazing management can enhance landscape health and productivity, for the benefit of producers *and* others who value Alberta rangelands. The Cows & Fish program has focussed on grazing management for areas near streams, rivers, springs and postormlands. These areas are often referred to as "green zones" or "riparian zones". The health *and* productivity of these areas can play an important role in the success of any cattle operation.

At this time, however, it is not known how effective the Cows & Fish program really is, or if it is helping producers in their decisions, or what other factors might influence producers when they make grazing management decisions -- especially for riparian zones. Therefore, the Cows & Fish program has asked me to conduct an independent evaluation study, as part of my Master of Arts degree in Geography, to determine how effective the program's activities and extension materials are.

A major goal of the evaluation is to help the Cows & Fish program provide the best possible information to producers, so that producers themselves can make better decisions when it comes to managing their riparian zones.

I'm writing to ask for your involvement in this evaluation because of your experience as a producer, and to ensure that the study results truly reflect the views of producers in this province. I hope that, in particular, you can provide me with good insight into what producers think is important when grazing management decisions are made.

Your operation is one of a small number drawn in a random sample of cattle operations in southern Alberta. **It is important that the study participant be the person in your cattle operation who is most involved or responsible for making decisions about grazing strategies, planning or management.** This may be you, or another member of your household or operation (in which case I would appreciate you providing this letter to them instead).

---

1 Its formal name is the Alberta Riparian Habitat Management Program

If you make grazing management decisions on an **equal** basis with another person, then **either one of you, but not both**, should participate.

There are two stages in this study. The first stage involves completing the enclosed checklist, which should take between 2 and 10 minutes, depending on your circumstances. The second stage of the study consists of a telephone questionnaire, to be done by the same person who completes the enclosed checklist. As soon as you return the completed checklist, using the enclosed stamped envelope, I will call you to set up a convenient appointment for us to complete the telephone questionnaire. I realize that many people appreciate being advised of this kind of call in advance. Altogether, the telephone questionnaire should take about 25 minutes. If, when I call, it turns out to be an inconvenient time, please tell me and I will be happy to call at a later time.

You are assured of complete confidentiality. You'll notice that this letter and the enclosed checklist contain a personal study ID number for you, shown in the upper right corner. Your number will be used throughout the study to record and report any information you provide. No individual person, name or location will ever be identified. I do need your name, however, to contact you for the telephone questionnaire, but any papers or records showing your name or location, as needed to administer the study, will be destroyed at the completion of the study.

As a study participant, you are free to withdraw at any time. To assure you of the ethical administration of this study, I would appreciate you filling out and signing the enclosed Informed Consent form, and returning it with your checklist in the enclosed stamped envelope. *Your signature indicates that you understand that your participation is voluntary and that your identity will not be disclosed.* A signed form is required from each participant, under University of Lethbridge policy.

You will automatically receive a summary of the study results. The results will also be provided to the Cows & Fish program, and to any interested cattle producers or members of the public.

I would be happy to answer any questions you might have. Please write to me at the above-noted address or call me at ( ). Or, you may email me at *nancy.bateman@uleth.ca*.

I appreciate you taking the time to participate in stage 1 of the study. I look forward to receiving your checklist and consent form, and to talking with you on the telephone to complete stage 2 of the study.

Thank you for your assistance.

Sincerely,

Nancy Bateman
Master of Arts (Geography) Degree Candidate

COWS & FISH PROGRAMMING EVALUATION
TELEPHONE QUESTIONNAIRE

Personal Study Identification # [ ]

Read: May I please speak with _____?

This is Nancy Bateman, calling as arranged from the University of Lethbridge to complete the telephone questionnaire we discussed for the Cows & Fish program research study.

Read: We had arranged this time to do the questionnaire -- is this a convenient time to talk?

[IF YES, PROCEED. IF NO, RE-ARRANGE CALL TIME.]

Read: I appreciate you giving me your time. Before beginning the questionnaire today/tonight, I'd like to remind you that any information you give me will be treated completely confidentially by me, and that you'll receive a copy of the summarized results at the end of the study.

We should be able to complete the questionnaire in about 25 minutes. Please feel free to ask for clarification at any time. If you wish to stop the questionnaire at any point, you are free to do so, just let me know. OK?

I will occasionally be using the term "riparian zone". For clarification, this term refers to areas on our landscape that are near to rivers, streams, springs and wetlands, that are wet now, for all or part of the year, or were wet at sometime in the recent past.

I'll also be talking about your study area, the area within your operation that you chose when completing the recent checklist. Before getting started, would you like to go over the characteristics that need to be included in your study area, or do you have it in mind now?

[IF NEED TO REVIEW:

- must lie within the map area shown on the checklist you completed, but cannot be property held in common on reserve or colony lands (refer to townships on map if necessary)
- it must have a riparian zone
- it must contain all or some rangeland, but cannot be entirely cultivated crops
- it must be at least 40 acres in size
- it must be land that is grazed for part of most years
- and it must be an area where you personally have the greatest amount of influence in decision-making about grazing management (or you share that decision-making equally with someone else)

IF YES, PROCEED]

Do you have any questions before we begin?

OK, to get started, there are 8 sets of questions for us to go through. Some questions can be answered simply with yes, or no, or from a list of choices I'll give to you. For some questions, I'll ask you to answer by choosing the best number on a scale of 0 through 10. When using that scale, 0 will always mean a very low value and 10 will always mean a very high value. For example, if I asked you to rate how much you agree with the statement "The weather this summer has been pleasant", a response of 0 means that you completely disagree, and a response of 10 means that you completely agree. Choosing 5 on the scale would mean that you feel neutral about the statement.

As we go through each set of questions, I'll describe how the scale works in that case, for example I might be asking you how much you agree with something, or how comfortable you are with an idea, or how much something influences you. If it's not clear, just ask me at any time, OK?

Please feel that you can answer frankly, based on your personal experience, because I am interested in learning about what you think is important. No one response is more right or wrong than another. OK?

Theoretical Construct	Q.#	Prompt	Question
Attitude-Feelings. Worry about "cows".	1.1	This first set of statements deals with some ideas that cattle producers might consider in making decisions about grazing management. Please indicate how much each of the following ideas influences you, when deciding on grazing management for your study area. Use the 0-10 scale, where *0 INDICATES THAT THE IDEA DOES NOT INFLUENCE YOU AT ALL, AND 10 INDICATES THE IDEA IS EXTREMELY INFLUENTIAL.* So, on the 0-10 scale, how influential is each of the following in your decisions?	You are concerned that cattle forage is declining.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Attitude-Feelings. Worry about "fish".	1.2		You are concerned that fish and wildlife habitat is declining.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Attitude-Feelings. Desire to succeed.	1.3		You want to increase the profits of your cattle operation.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Attitude-Feelings. Ecological Concern.	1.4		Excluding financial considerations, you want the landscape to be productive for many years in the future.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Attitude-Feelings. Fear.	1.5		You are worried that future government regulations might require you to change the way you manage your grazing.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Subjective Norms. Neighbours.	1.6		You want to operate in a similar way to neighbouring cattle producers.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			

Theoretical Construct	Q.#	Prompt	Question
Subjective Norms. *Other producers.*	1.7		You want to operate in a similar way to cattle producers in other parts of the province.

0	1	2	3	4	5	6	7	8	9	10		
01	02	03	04	05	06	07	08	09	10	11		99

Theoretical Construct	Q.#	Prompt	Question
Feelings. *Ecological concern*	1.8		You feel a responsibility for the whole stream or watershed in which you operate.

0	1	2	3	4	5	6	7	8	9	10		
01	02	03	04	05	06	07	08	09	10	11		99

Theoretical Construct	Q.#	Prompt	Question
Subjective Norms. *Operating partners generally.*	1.9	This is the last idea in the list. You may answer not applicable if that is appropriate to your situation.	You want to operate in a way that is important to other people involved in your operation.

0	1	2	3	4	5	6	7	8	9	10	n/a		
01	02	03	04	05	06	07	08	09	10	11	98		99

Theoretical Construct	Q.#	Prompt	Question
Subjective Norms.	2.1	For the second set of questions, please indicate how likely you are to consult or seek advice from the following sources, when you make a decision about grazing management for your study area. In answering, please think about these decisions you've made either this year or during the past two years. For these questions, use the 0-10 scale, where a response of *0 INDICATES YOU NEVER CONSULT OR SEEK ADVICE FROM THE SOURCE, WHILE 10 INDICATES YOU ALWAYS DO SO.* If the source mentioned is not applicable to your situation, please just indicate that. Otherwise, using the 0-10 scale, how likely are you to consult or seek advice from each of the following when making a grazing management decision for your study area?	A neighbouring cattle producer.

0	1	2	3	4	5	6	7	8	9	10	n/a		
01	02	03	04	05	06	07	08	09	10	11	98		99

Theoretical Construct	Q.#	Prompt	Question
Subjective Norms	2.2		Cattle producers in other areas of the province.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.3		A spouse or significant other.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.4	Remember, you can answer with "not applicable" if that applies.	A parent.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.5		A brother or sister.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.6		A son or daughter.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.7	Just a reminder that we're still using the 0-10 scale, where 0 indicates that you never consult or seek advice, and 10 indicates you always do. The next item is:	A business partner in your cattle operation, other than a family member.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.8		A neighbour or friend who is not in the cattle business.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Subjective Norms	2.9		Your banker, accountant, financial or legal advisor.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			
Other Influences Alternate info source.	2.10	*There are just a few more items in this section about consulting or seeking advice.* **(PROMPT ONLY IF NECESSARY)** These might include the Alberta Cattle Commission, the Canadian Cattlemen's Association and the Western Stock Growers' Association.	A representative of a producer group.
0 1 2 3 4 5 6 7 8 9 10 n/a			
01 02 03 04 05 06 07 08 09 10 11 98 99			

Theoretical Construct	Q.#	Prompt	Question
Other Influences *Alternate info source.*	2.11	[PROMPT IF NECESSARY]: These might include the Fish and Game Association, Trout Unlimited, Ducks Unlimited, the Alberta Conservation Association, the Nature Conservancy, or the Southern Alberta Land Trust Society.	A representative of a conservation group.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			
Other Influences *Alternate info source.*	2.12	[PROMPT ONLY IF NECESSARY]: These might include Alberta Agriculture (Public Lands Branch), Alberta Environment (Fish and Wildlife, or Forestry, Branches), PFRA or Agriculture Canada.	A representative of a provincial or federal agriculture agency.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			
Other Influences *Alternate info source.*	2.13		Your local MD Agriculture Service Board members or service representative.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			
Other Influences *Alternate info source.*	2.14		A private hired range consultant.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			
Other Influences *Alternate info source.*	2.15		A representative of the Cows & Fish program.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			
Other Influences *Alternate info source.*	2.16		Extension materials and/or activities provided by the Cows & Fish program.
0 01 | 1 02 | 2 03 | 3 04 | 4 05 | 5 06 | 6 07 | 7 08 | 8 09 | 9 10 | 10 11 | n/a 98 | 99			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Past* • *Intended*	3.	OK, thanks. The third set of questions refers to five types of grazing management plans or systems. Again, there are no right or wrong answers here, so please answer frankly because I am interested in learning what you personally think is important. Please respond to the next question with either yes or no. A time-controlled grazing plan involves shortening the period of grazing in an area to allow plants to regrow.	1. Have you ever used time-controlled grazing in your study area?	☐ *01*	☐ *00*	☐ *99*
			2. [ONLY IF (1) IS YES] Are you using time-controlled grazing in your study area in 1999?	☐ *01*	☐ *00*	☐ *96* ☐ *99*
			3. [ONLY IF (1) IS YES] Not including this year, how many years in the previous 5 years have you used time-controlled grazing in your study area?	☐ *01* ☐ *02* ☐ *03* ☐ *04* ☐ *05*		☐ *96* ☐ *99*
			4. For this question, there are four possible responses. You may answer yes, OR no, OR you're not sure, OR it doesn't apply, OK? Do you think you will use time-controlled grazing in your study area either next year or the year after?	☐ *01* ☐ *00* ☐ *02* ☐ *98*	*Yes* *No* *Unsure* *N/A*	☐ *99*
			5. [(a) If explanation already provided]: You've mentioned some reasons for your answers. To make sure I understand correctly, you answered this way because ... : OR *[(b) If no explanation already provided]:* Just very briefly in a sentence or two, can you give me a reason or some background why you answered this way?			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Past* • *Intended*	3.	A rotational grazing plan involves 3 or more pastures, which are grazed in a different sequence each year.	6. Have you ever used rotational grazing in your study area?	☐ 01	☐ 00	☐ 99
			7. [ONLY IF (6) IS YES] Are you using rotational grazing in your study area this year?	☐ 01	☐ 00	☐ 96 ☐ 99
			8. [ONLY IF (6) IS YES] Not including this year, how many years in the previous 5 years have you used rotational grazing in your study area?	☐ 01 ☐ 02 ☐ 03 ☐ 04 ☐ 05		☐ 96 ☐ 99
			9. For this question, you may answer yes, OR no, OR you're not sure, OR it doesn't apply. Do you think you will use rotational grazing in your study area either next year or the year after?	☐ 01 ☐ 00 ☐ 02 ☐ 98	Yes No Unsure N/A	☐ 99
			10. *[(a) If explanation already provided]:* So, you've mentioned some reasons for your answers. So that I understand correctly, you answered this way because ... : OR *[(b) If no explanation already provided]:* And can you describe briefly why you've answered this way about this grazing system?			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action. • *Past* • *Attitude - Current* • *Past* • *Intended*	3.	**A rest-rotational grazing plan is similar to rotational grazing, but involves eliminating the grazing from one of the pastures each year.**	11. Have you ever used rest-rotational grazing in your study area?	☐ *01*	☐ *00*	☐ *99*
			12. **[ONLY IF (11) IS YES]** Are you using rest-rotational grazing in your study area this year?	☐ *01*	☐ *00*	☐ *96* ☐ *99*
			13. **[ONLY IF (11) IS YES]** Not including 1999, how many years in the previous 5 years have you used rest-rotational grazing in your study area?	☐ *01* ☐ *02* ☐ *03* ☐ *04* ☐ *05*		☐ *96* ☐ *99*
			14. Again here, your options are yes, OR no, OR you're not sure, OR it doesn't apply. Do you think you will use rest-rotational grazing in your study area either next year or the year after?	☐ *01* ☐ *00* ☐ *02* ☐ *98*	*Yes* *No* *Unsure* *N/A*	☐ *99*
			15. ***[(a) If explanation already provided]:*** **You've described some background as to why you use/do not use rest-rotational grazing. To make sure I understand correctly, it's because ... :** **OR** ***[(b) If no explanation already provided]:*** **Just very briefly, can you give me a reason or some background why you use/do not use rest-rotational grazing in your study area?**			

Theoretical Construct	Q #	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Past* • *Intended*	3.	Riparian pastures contain an area that is all similar in landscape, and all lying within the riparian zone. These pastures are fairly large in size and are grazed on a periodic basis.	16. Have you ever used riparian pastures in your study area?	☐ *01*	☐ *00*	☐ *99*
			17. [ONLY IF (16) IS YES] Are you using riparian pastures in your study area this year?	☐ *01*	☐ *00*	☐ *96* ☐ *99*
			18. [ONLY IF (16) IS YES] Not including 1999, how many years in the previous 5 years have you used riparian pastures in your study area?	☐ *01* ☐ *02* ☐ *03* ☐ *04* ☐ *05*		☐ *96* ☐ *99*
			19. Once again, you may answer yes, no, you're not sure, OR it doesn't apply. Do you think you will use riparian pastures in your study area either next year or the year after?	☐ *01* ☐ *00* ☐ *02* ☐ *98*	Yes *No* *Unsure* *N/A*	☐ *99*
			20. *[(a) If explanation already provided]:* And the reason for your answers here is that..: OR *[(b) If no explanation already provided]:* And the reason for your answers here is that:			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • Past • Attitude - Current • Past • Intended	3.	Lastly, corridor grazing involves temporarily fencing a strip along the water or wet area in a riparian zone. These strips, which are quite narrow, are grazed periodically.	21. Have you ever used corridor grazing in your study area?	☐ 01	☐ 00	☐ 99
			22. [ONLY IF (21) IS YES] Are you using corridor grazing in your study area this year?	☐ 01	☐ 00	☐ 96 ☐ 99
			23. [ONLY IF (21) IS YES] Not including 1999, how many years in the previous 5 years have you used corridor grazing in your study area?	☐ 01 ☐ 02 ☐ 03 ☐ 04 ☐ 05		☐ 96 ☐ 99
			24. Again, using yes, no, OR you're not sure, OR it doesn't apply... Do you think you will use fenced corridor grazing in your study area either next year or the year after?	☐ 01 ☐ 00 ☐ 02 ☐ 98	Yes No Unsure N/A	☐ 99
			25. *[(a) If explanation already provided]:* **And the reason is because:** **OR** *[(b) If no explanation already provided]:* **And the reason is because:**			

Theoretical Construct	Q.#	Prompt	Question			
Perceived Control. Skills.	4.1	Great, for the next few statements, please go back to using the 0-10 scale. This time, use the scale to indicate how confident you feel about the idea mentioned. 0 *INDICATES THAT YOU DO NOT FEEL AT ALL CONFIDENT ABOUT THE IDEA, AND 10 INDICATES THAT YOU FEEL EXTREMELY CONFIDENT ABOUT IT.* Remember, 5 is the neutral point on the scale. So, using the 0-10 scale, how confident do you feel that...	You can identify many of the grasses or grass-like plants found in the riparian zone in your study area?			
0 ☐ 01	1 ☐ 02	2 ☐ 03	3 ☐ 04	4 ☐ 05	5 ☐ 06	6 ☐ 07	7 ☐ 08	8 ☐ 09	9 ☐ 10	10 ☐ 11
Other Influences. Alternate Information Source.	4.2	[IF RESPONSE IS ZERO, SKIP TO NEXT QUESTION, OTHERWISE...]: Because you know something about identifying grasses and grass-like plants in riparian zones, I'd like to know how you learned that skill. From the following list, which I'll read, please choose two items. First, choose the source of information that was MOST helpful to you in learning to identify these plants, and then choose the SECOND MOST helpful source. OK? The list is rather long, so I'll read through it completely once so you know all your choices before selecting two. This is the list ... you learned to identify riparian grasses and grass-like plants from...	• A family member? • A fellow cattle producer? • A producer group? • A conservation group? • A federal or provincial agriculture agency or rep? • A municipal agriculture agency or rep? • A private hired range consultant? • The Cows & Fish program? • The Society for Range Management? • The Stockmen's Range Management Course? • Your post-secondary education? • You taught yourself using books and similar reference materials? • Or some other method I haven't mentioned? Specify:	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	*#1 -01* *#2 - 02* *All others not selected - 03* *97/95* *99/99*

Theoretical Construct	Q.#	Prompt	Question											
Perceived Control, Skills.	4.3	And, how confident do you feel that...	You can identify many of the grasses and grass-like plants found on the rangeland in your study area?											
0 ☐ 01	1 ☐ 02	2 ☐ 03	3 ☐ 04	4 ☐ 05	5 ☐ 06	6 ☐ 07	7 ☐ 08	8 ☐ 09	9 ☐ 10	10 ☐ 11				
Other Influences, Alternate Information Source.	4.4	[IF RESPONSE IS ZERO, SKIP TO NEXT QUESTION, OTHERWISE...]: Again, because you know something about identifying grasses and grass-like plants on your rangeland, I'd like to know how you learned that skill. Please select the sources of information that were the MOST helpful to you in learning to identify these plants, and then choose the SECOND MOST helpful source. Would you like me to read the list again, or would you prefer to just go ahead and make your selections?	• A family member? • A fellow cattle producer? • A producer group? • A conservation group? • A federal or provincial agriculture agency or rep? • A municipal agriculture agency or rep? • A private hired range consultant? • The Cows & Fish program? • The Society for Range Management? • The Stockmen's Range Management Course? • Your post-secondary education? • You taught yourself using books and similar reference materials? • Or some other method I haven't mentioned? Specify:	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	#1 -01 #2 - 02 *All others not selected - 03* *97/95* *99/99*								
Perceived Control, Skills.	4.5	Again using the 0-10 scale, how confident are you that...	You can classify the overall ecological condition or health of your riparian zone?											
0 ☐ 01	1 ☐ 02	2 ☐ 03	3 ☐ 04	4 ☐ 05	5 ☐ 06	6 ☐ 07	7 ☐ 08	8 ☐ 09	9 ☐ 10	10 ☐ 11				

Theoretical Construct	Q.#	Prompt	Question			
Other Influences. Alternate Information Source.	4.6	[IF RESPONSE IS ZERO, SKIP TO NEXT QUESTION, OTHERWISE...]: And what were the most helpful and the second most helpful sources in helping you learn to do this? I can read the list for you again if you wish.	• A family member? • A fellow cattle producer? • A producer group? • A conservation group? • A federal or provincial agriculture agency or rep? • A municipal agriculture agency or rep? • A private hired range consultant? • The Cows & Fish program? • The Society for Range Management? • The Stockmen's Range Management Course? • Your post-secondary education? • You taught yourself using books and similar reference materials? • Or some other method I haven't mentioned? Specify:	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	*#1 -01* *#2 - 02* *All others not selected - 03* 97/05 99/99
Perceived Control. Skills.	4.7	And lastly, using the 0-10 scale, how confident are you that ...	You can recognize the signs of over-grazing in your study area?			

0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐	10 ☐
01	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*10*	*11*

Theoretical Construct	Q.#	Prompt	Question			
Other Influences. Alternate Information Source.	4.8	[IF RESPONSE IS ZERO, SKIP TO NEXT QUESTION, OTHERWISE...]: And, the most helpful and second most helpful sources in learning this were...?	• A family member?	☐	☐	*#1 -01 #2 - 02*
			• A fellow cattle producer?	☐	☐	
			• A producer group?	☐	☐	
			• A conservation group?	☐	☐	*All others not selected - 03*
			• A federal or provincial agriculture agency or rep?	☐	☐	
			• A municipal agriculture agency or rep?	☐	☐	
			• A private hired range consultant?	☐	☐	
			• The Cows & Fish program?	☐	☐	
			• The Society for Range Management?	☐	☐	
			• The Stockmen's Range Management Course?	☐	☐	
			• Your post-secondary education?	☐	☐	
			• You taught yourself using books and similar reference materials?	☐	☐	
			• Or some other method I haven't mentioned?	☐	☐	*97/05*
			Specify:			
				☐	☐	*99/99*

Theoretical Construct	Q.#	Prompt	Question
Belief 1. Riparian is part of range.	5.1	The following statements are intended to get an understanding of your own experience with riparian areas found on rangelands. For these statements, please use the 0-10 scale to indicate how accurate you believe the statement is. Choosing *0 MEANS YOU BELIEVE THE STATEMENT IS COMPLETELY INACCURATE, AND 10 MEANS YOU BELIEVE THE STATEMENT IS COMPLETELY ACCURATE.* Choosing 5, being the neutral point, would mean you are not sure whether it is inaccurate or accurate. OK?	Riparian zones represent about 2% of the total area of rangeland in southern Alberta. Accordingly, they contribute to rangeland productivity to only a small degree.

0 ☐	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐	10 ☐	11 ☐
11	*10*	*09*	*08*	*07*	*06*	*05*	*04*	*03*	*02*	*01*	*99*

Theoretical Construct	Q.#	Prompt	Question
Belief 5. Diversity is best.	5.2		All things being equal, a riparian zone that contains good fish and wildlife habitat is likely to increase the profitability of a cattle operation.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Belief 4. Vegetation is key in dealing with stream energy. Belief 8a. Riparian components (veg) perform ecological functions.	5.3	(Again, just a reminder that for these statements, *0 MEANS YOU BELIEVE THE STATEMENT IS COMPLETELY INACCURATE AND 10 MEANS YOU BELIEVE IT IS COMPLETELY ACCURATE.*	Stream or riverbanks with open areas, free of vegetation, offer good protection against the impacts of flooding.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
11 10 09 08 07 06 05 04 03 02 01 99			
Belief 2. Rest must follow grazing disturbance.	5.4		Forage productivity is likely to decline if the rangeland is grazed continuously on a season-long basis.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Belief 3. Structure has value.	5.5		Rangeland is most productive when all its vegetation, for example trees and shrubs, are the same age.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
11 10 09 08 07 06 05 04 03 02 01 99			
Belief 7. Water quality increases with riparian function.	5.6		Water quality in a stream or river is improved when there is a lot of bank vegetation.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Belief 8b: Riparian components (soil) perform ecological functions.	5.7		As the texture of the soil in a riparian zone gets finer and finer, it will hold more moisture.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Belief 6. Water quantity increases with riparian function.	5.8	There are just two more statements in this section.	When a riparian zone contains a lot of thick vegetation, the water table is likely to drop.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ 11☐			
11 10 09 08 07 06 05 04 03 02 01 99			

Theoretical Construct	Q.#	Prompt	Question
Belief &: *Riparian components (hydrology) perform ecological functions.*	5.9	And,	Riparian zones are likely to become increasingly dry when the stream or riverbank gets more down-cut each year.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Past Behaviour	6.1	OK. I appreciate you using the 0-10 scale one last time for the following few statements. This time, *0 INDICATES THAT YOU COMPLETELY DISAGREE WITH THE STATEMENT, AND 10 INDICATES THAT YOU COMPLETELY AGREE* with it. When you hear about new ideas for grazing management, you usually do not like to try them because...	You prefer to continue using the grazing management that you have always used in the past.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Feelings Confidence	6.2		Because it is too difficult to implement a new idea.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Perceived Control, Financial Resources	6.3		Because it is too expensive to implement a new idea.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Feelings, Trust	6.4		Because you do not know the person or source of information well enough to trust them.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ ☐			
01 02 03 04 05 06 07 08 09 10 11 99			
Perceived Control, Skills	6.5	There are just three more statements in this section, where *0 INDICATES YOU COMPLETELY DISAGREE AND 10 INDICATES YOU COMPLETELY AGREE* with the statement.	No matter what grazing management plan you try, the condition of your study area does not seem to improve.
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ ☐			
11 10 09 08 07 06 05 04 03 02 01 99			

Theoretical Construct	Q.#	Prompt	Question
Perceived Control, Skills	6.6		No matter what grazing management plan you try, you cannot protect yourself against future dry years.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
11 10 09 08 07 06 05 04 03 02 01 99			
Perceived Control, Skills	6.7	And,	Luck plays a big part in maintaining your study area in a productive condition.
0☐ 1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐ ☐			
11 10 09 08 07 06 05 04 03 02 01 99			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.	OK, this is the second last set of questions. The following items describe techniques that cattle producers have found useful in certain situations. Again, I am interested in finding out what you have found useful in your own situation, and of course there are no right or wrong responses. Please answer yes or no.	The first technique involves placing salt or mineral supplies in upland areas. 1. Have you ever used this technique in your study area? 2. [ONLY IF (1) IS YES] Are you using this technique in your study area in 1999? 3. For this next part, please answer in one of five ways. You may answer yes, OR no, OR you're not sure, OR you believe the technique is not helpful, OR it doesn't apply. Do you think you will use this technique in your study area either next year or the year after?	☐ *01* ☐ *01* ☐ *01* ☐ *00* ☐ *02* ☐ *04* ☐ *98*	☐ *00* ☐ *00* *Yes* *No* *Not Sure* *No Help* *N/A*	☐ *99* ☐ *96* ☐ *99* ☐ *99*

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
			4. [(a) If explanation already provided]: You've described some background as to why you used/do not use this technique. To make sure I understand correctly, it's because ... : OR *[(b) If no explanation already provided]:* Just very briefly, can you give me a reason or some background why you used/do not use this technique in your study area?			
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		The second technique involves using developed watering sites in upland areas. 5. Have you ever used this technique in your study area? 6. [ONLY IF (5) IS YES] Are you using this technique in your study area this year? 7. Again, please answer yes, no, you're not sure, you believe the technique is not helpful, OR it doesn't apply. Do you think you will use this technique in your study area either next year or the year after?	☐ 01 ☐ 01 ☐ 01 ☐ 00 ☐ 02 ☐ 04 ☐ 98	☐ 00 ☐ 00 Yes No Not Sure No Help N/A	☐ 99 ☐ 96 ☐ 99 ☐ 99
			8. [(a) If explanation already provided]: And the reason or background to your answers is/you are using what kind of watering sites? OR *[(b) If no explanation already provided]:* And the reason for answering as you have is..?			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		The third technique involves using either fences or hardened surfaces to control cattle impact at watering points in riparian zones. 9. Have you ever used this technique in your study area? 10. [ONLY IF (9) IS YES] Are you using this technique in your study area this year? 11. Again, using yes, no, you're not sure, you believe the technique is not helpful, OR it doesn't apply... Do you think you will use this technique in your study area either next year or the year after?	☐ 01 ☐ 01 ☐ 01 ☐ 00 ☐ 02 ☐ 04 ☐ 98	☐ 00 ☐ 00 Yes No Not Sure No Help N/A	☐ 99 ☐ 96 ☐ 99 ☐ 99
			12. *[(a) If explanation already provided]:* Are you using both fences and hardened surfaces or just one of them? And your decision to use them is to...? OR *[(b) If no explanation already provided]:* Are you using both fences and hardened surfaces or just one of them? And why do you use them??			

Theoretical Construct	Q #:	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		The next technique is to temporarily remove cattle from riparian zones after heavy rains or during spring melt. 13. Have you ever used this technique in your study area?	☐ 01	☐ 00	☐ 99
			14. [ONLY IF (13) IS YES] Are you using this technique in your study area this year?	☐ 01	☐ 00	☐ 96 ☐ 99
			15. Again, please answer yes, no, you're not sure, you believe it's not helpful, OR it doesn't apply. Do you think you will use this technique in your study area either next year or the year after?	☐ 01 Yes ☐ 00 No ☐ 02 Not Sure ☐ 04 No Help ☐ 96 N/A		☐ 99
			16. *[(a) If explanation already provided]:* And the background to your answers is...: OR *[(b) If no explanation already provided]:* And the background to your answers is...:			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		**Another technique is to shorten the grazing period in riparian zones when forage plants are growing.** 17. Have you ever used this technique in your study area? 18. [ONLY IF (17) IS YES] Are you using this technique in your study area this year? 19. Here again, please answer yes, no, you're not sure, you believe the technique is not helpful, OR it doesn't apply. Do you think you will use this technique in your study area either next year or the year after?	☐ *01* ☐ *01* ☐ *01* ☐ *00* ☐ *02* ☐ *04* ☐ *98*	☐ *00* ☐ *00* *Yes* *No* *Not Sure* *No Help* *N/A*	☐ *99* ☐ *96* ☐ *99* ☐ *99*
			20. [(a) If explanation already provided]: **And the background to your answers is...:** **OR** ***[(b) If no explanation already provided]:*** **And the background to your answers is...:**			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		**The third last technique is to remove cattle from a riparian zone for a long time, say one or more years, so that vegetation can re-establish.** 21. Have you ever used this technique in your study area?	☐ *01*	☐ *00*	☐ *99*
			22. [ONLY IF (22) IS YES] Are you using this technique in your study area this year?	☐ *01*	☐ *00*	☐ *96* ☐ *99*
			23. Answering yes, no, you're not sure, you believe the technique is not helpful, it doesn't apply... Do you think you will use this technique in your study area either next year or the year after?	☐ *01* ☐ *00* ☐ *02* ☐ *04* ☐ *98*	*Yes* *No* *Not Sure* *No Help* *N/A*	☐ *99*
			24. *[(a) If explanation already provided]:* **And the background or reasons for your answers is...:** **OR** *[(b) If no explanation already provided]:* **And the background or reasons for your answers is...:**			

Theoretical Construct	Q #:	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		The second last technique is to calculate a classification for the ecological condition or health of the riparian zone. 25. Have you ever used this technique in your study area? 26. [ONLY IF (25) IS YES] Are you using this technique in your study area in 1999? 27. Answering yes, no, OR you're not sure, you believe the technique is not helpful, OR it doesn't apply... Do you think you will use this technique in your study area either next year or the year after?	☐ 01 ☐ 01 ☐ 01 ☐ 00 ☐ 02 ☐ 04 ☐ 98	☐ 00 ☐ 00 Yes No Not Sure No Help N/A	☐ 99 ☐ 98 ☐ 99 ☐ 99
			28. *[(a) If explanation already provided]:* And the background to your answers is....: OR *[(b) If no explanation already provided]:* And the background to your answers is....:			

Theoretical Construct	Q.#	Prompt	Question	Yes	No	
Action • *Past* • *Attitude - Current* • *Intended* *Belief* • *Knowledge*	7.		And the last technique is to distribute cattle throughout the landscape to spread the grazing load. 29. Have you ever used this technique in your study area?	☐ 01	☐ 00	☐ 99
			30. [ONLY IF (29) IS YES] Are you using this technique in your study area in 1999?	☐ 01	☐ 00	☐ 96 ☐ 99
			31. Once again, answering yes, OR no, OR you're not sure, OR you believe the technique is not helpful, OR it doesn't apply. Do you think you will use this technique in your study area either next year or the year after?	☐ 01 ☐ 00 ☐ 02 ☐ 04 ☐ 98	Yes No Not Sure No Help N/A	☐ 99
			32. *[(a) If explanation already provided]:* And the reasons or background behind your answers was...? OR *[(b) If no explanation already provided]:* And the reasons or background behind your answers is...?			

Read: Thanks. The questionnaire is almost complete except for a few details about you personally, just to finish off. So...

	Q.#	Prompt	Question		
Other Influences. Age.	8.1	Which of the following categories includes your age?	• 25-29 years • 30-39 • 40-49 • 50-59 • 60-69 • 70 years or older	☐ ☐ ☐ ☐ ☐ ☐ ☐	02 03 04 05 06 07 99
Other Influences. Education.	9.1	Which of the following categories describes the highest level of education you have?	• Some or all of high school • Some post-secondary • A college, trade or technical diploma or certificate • A university bachelor degree • A post-graduate degree • Or, some other type that I haven't mentioned Specify:	☐ ☐ ☐ ☐ ☐ ☐ ☐	01 02 03 04 05 97 99
			ASK ONLY IF > HIGH SCHOOL		
Other Influences. Education.	9.2	Is your degree or diploma in the field of Agriculture?	• Yes • No	☐ ☐ ☐	01 02 99
Other Influences. Business Structure.	10.1	Is your cattle operation?	• Primarily a family-run or family corporate operation, or • Strictly a corporate business operation	☐ ☐ ☐	01 02 99
			ASK ONLY IF FAMILY OPERATION		
Other Influences. Family Structure.	11.1	How many generations has this cattle operation now been in the family?	• One, being yourself • Two • Three • Four • Five	☐ ☐ ☐ ☐ ☐ ☐	01 02 03 04 05 99

	Q #:	Prompt	Question		
		ASK ONLY IF FAMILY OPERATION			
Other Influences. Family Structure.	11.2	And, how many generations actively take part in making decisions about grazing management for your study area?	• One, being yourself • Two • Three • Four	☐ ☐ ☐ ☐	01 02 03 04 99
Other Influences. # of Years	12.1	And could you estimate approximately how many years you have personally had the greatest amount of influence for making the kinds of grazing management decisions we've talked about today/tonight, for your study area?	[Don't read categories, just assign number of years as stated]: • Less than 5 years • 5 - 9 years • 10 -19 years • 20 - 29 years • 30 - 39 years • 40 - 49 years • 50 years or more	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	01 02 03 04 05 06 07 99

	Q.#	Prompt	Question			
Other Influences, Goals	12.2	*[IF CORPORATE]:* And, this is the very last question: *[IF FAMILY, JUST CONTINUE WITH]:* This is the second last question.] I realize you may have several goals for the future of your operation. I'm going to read a short list of possible goals and then ask you to choose two. Not all of them will necessarily apply to you. That's OK, in responding, just consider the ones that do apply. So, in managing your operation, which goal from the following list do you consider your highest priority, and which goal do you consider your second highest priority? The list is:	• To maintain the operation as a working ranch • To conserve and protect natural resources • To provide the primary source of income or revenue • To provide your children with a healthy rural environment and experience • To maintain ownership for inheritance by your children • Or, some other goal I haven't mentioned Specify:	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐	#1 -01 #2 - 02 *All others not selected - 03* ☐ 97 99

	Q.#	Prompt	Question		
ASK ONLY IF FAMILY OPERATION					
Other influences. *Operational income.*	13.1	The very last question is, which of the following categories indicates approximately the percentage of the family's total income that is derived from cattle production in this operation?	• 25% or less • 26 - 50% • 51 - 75% • 76 - 100%	☐ ☐ ☐ ☐ ☐	01 02 03 04 99
Other influences. Sex.	14.1	Enter sex.	• Male • Female	☐ ☐ ☐	01 02 99

Read: _____, thank you very much. We've completed the questionnaire. I really appreciate your time and help. Do you have any questions or other comments now that we're done? [If no, thanks and sign off.]

INDICATE HERE IF THIS INDIVIDUAL SOUNDS LIKE A GOOD FOCUS GROUP CANDIDATE: ☐