Cows and Fish Report

Riparian Management Awareness Needs of Northern and Central Alberta Farmers

Action Plan

Cows and Fish
Alberta Riparian Habitat Management Program
Report No. 019

Cows and Fish

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About Cows and Fish

Riparian areas are those areas along rivers, streams, lakes, wetlands, springs, and ponds that are strongly influenced by water and are recognized by water-loving vegetation. Cows and Fish is striving to foster a better understanding of how riparian areas function and how improvements in management strategies in riparian areas can enhance landscape health and productivity for the benefit of livestock producers, their communities and others who value these landscapes.

Cows and Fish Partners: Producers and community groups, Alberta Beef Producers, Trout Unlimited Canada, Canadian Cattlemen's Association, Alberta Agriculture, Food and Rural Development, Alberta Sustainable Resource Development, Alberta Environment, Department of Fisheries and Oceans, Prairie Farm Rehabilitation Administration, Alberta Conservation Association

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Working with producers and communities on riparian awareness

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RIPARIAN MANAGEMENT AWARENESS NEEDS OF NORTHERN AND CENTRAL ALBERTA FARMERS

ACTION PLAN

Prepared for

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EXECUTIVE SUMMARY

The Cows and Fish program has been increasingly invited into northern and central Alberta agricultural communities to provide riparian awareness activities. To ensure that the content and delivery of awareness activities appropriately match the characteristics and needs of farmers in those areas, this project was undertaken to examine ecological knowledge, management practices and preferred approach to awareness. Data was collected in a series of group interviews with 24 farmers in six communities in the short-grass, aspen parkland, montane foothills and fringe boreal ecoregions of northern and central Alberta.

Knowledge on key landscape topics was found to range widely in accuracy and depth, and was generally piecemeal, with project participants able to identify only some aspects of topics discussed. Further, participants were typically unable to articulate underlying ecological processes, explain the concepts comprehensively, or identify precise ways in which existing knowledge and expertise are actively incorporated into specific management decisions. Four key landscape terms were examined. Knowledge on the terms biodiversity and carrying capacity was low; knowledge on the term riparian was low to moderate; and knowledge on the term watershed was moderate. In particular, the various types of riparian areas, the interconnectivity of lotic and lentic riparian areas with their surrounding landscapes, and the functions and scales of watersheds, were poorly understood. (However, the forested montane group located near the headwaters of a major river had the best understanding of watershed, perhaps because of their site, the many types of riparian areas they identified in their area, or because of recent riparian awareness activities in that community.)

This is not to suggest that farmers are not knowledgeable; rather that their riparian management knowledge could be deepened and broadened. Awareness activities must build on existing farmer expertise and knowledge while comprehensively defining the ecological processes involved in key riparian concepts. Moreover, awareness tools must illustrate clearly how the concepts relate to landscape, livestock and farm productivity, and how they can be incorporated into management through sustainable practices.

Overall, participants did not manage for their riparian areas specifically. While management principles such as distribution and intensity were implemented to varying degrees, principles of rest and seasonality were less well understood and infrequently applied. For example, while most participants indicated use of rotational grazing as a means of applying these principles, rotational grazing itself was defined in many different ways, ranging from intensive cell grazing to moving livestock just a few times between large pastures over the course of a season. Again, a foundation of farmer expertise exists, but clarity on varieties and implementation of sustainable management options would be beneficial.

Most participants, with the exception of the group in the dry short-grass ecoregion (who had the largest mean farm acreage of the six groups interviewed), acknowledged frankly that farmers today are beginning to feel the brunt of some past management, primarily overgrazing, that did not account for the potential limitations of present-day drought conditions. On balance, most indicated that farmers have begun to take advantage, whether proactively or reactively, of new management strategies such as alternate water systems. The rationale for use of these new strategies lies as much in increasing livestock productivity as in enhancing landscape productivity per se (greater landscape productivity achieved by proactive management was infrequently explained as a requisite precursor to greater livestock productivity). Notwithstanding, loss of moisture in all areas (again with the exception of the short-grass group) was the most common issue of concern of farmers interviewed. To some extent, these changing circumstances were viewed as an opportunity to learn about and apply new management.

The farmers interviewed did not make a direct link between overgrazing (or agricultural management, in general) and downstream impacts, for example with respect to water quality -- perhaps because of a lack of understanding of the interconnectivity of landscapes and watersheds. By extension, this may explain why a direct link is not made between management and riparian health specifically, as evidenced by the absence of riparian area management strategies. Only one group (the short-grass) stated water quality as a major concern, but this pertained to their immediate site and not to downstream users in general. Responsibility for declining landscape health, which almost all participants reported, was typically assigned to urban, recreational or industrial users. A more solid basis of knowledge about landscape health and interconnectivity may help build awareness of the relationship between management and riparian area/downstream impacts.

Riparian awareness activities were welcomed by all communities. The preferred approach was partnership-based, taking advantage of financial and technical resources by utilizing producer or community groups and agencies, including municipal agencies. A format and topic of particular interest was the on-site demonstration of specific management options such as watering systems. Cost-benefit information was considered essential whenever presenting management options, so as to enable the farmer to make an informed decision about its use. Management strategies must be presented as options, not requirements. Individuals delivering awareness, whether male or female, must be familiar with farming and farm decision-making, and take a neutral and respectful approach to farmers. For areas just beginning the awareness process, take-home handout materials were considered necessary to introduce key awareness messages and to illustrate the benefits of sustainable management options. It was generally acknowledged that there was a need for community riparian groups, working with paid staff and in partnership with groups such as Cows and Fish, to take the lead role in implementing and developing awareness initiatives. Working farmers are unable to commit the time and energy to do the job themselves. All but one group interviewed (short-grass) considered Cows and Fish welcome to work in co-ordination with local groups or agencies in presenting riparian awareness. Reasons stated by the exception group included that Cows and Fish was an outside group that focused on environmental issues (e.g. endangered species) or management issues (e.g. enforced streambank fencing) that imposed in private property rights. That group considered riparian awareness to be appropriate, but preferred to work instead only with local groups and agencies.

Other than the exceptions reported, no notable geographic distinctions were observed among the groups interviewed. This suggests that, as occurred in southern Alberta in the early 1990s, the Cows and Fish approach to awareness used elsewhere in Alberta and Canada is, in essence, appropriate and desirable in northern and central Alberta. Dealing with the principles of riparian ecology, watershed health and farm management, in a framework of positive partnerships with communities, will enhance and promote existing expertise while addressing the gaps in knowledge and application of sustainable principles identified here.

I. PROJECT BACKGROUND AND PURPOSE

Cows and Fish is a voluntary stewardship program that evolved in the early 1990s from grassroots concerns in the southern Alberta cattle producer community. At issue were the environmental impacts on riparian areas resulting from grazing, which placed the province's cattle industry under scrutiny. People interact with riparian areas in many ways, relying on them for water, food, shelter, agriculture (including forage and crop production), resource extraction, recreation and natural beauty. Because we use riparian areas intensely, they can and have been seriously impacted over the past century and more. Today, Cows and Fish continues to work on community-based riparian awareness and management in partnership with landowners, farmers, ranchers, cottagers, communities, agencies and other local groups interested in and concerned about riparian and watershed health.

Farmers and community groups in the parkland, northern foothills and fringe boreal landscapes of northern and central Alberta have increasingly begun to express interest in managing their riparian areas more sustainably. It is appreciated that these mixed (livestock and cultivation) farming communities may differ in at least two respects from those in the cattle producer community of more southern regions of the province where Cows and Fish awareness activities have been focused to date. Specifically, the ways that farmers have come to understand the ecology of their landscapes (especially riparian areas), including how they choose to manage them, as well as how they may wish to approach riparian awareness, may vary from producers operating in the fescue grasslands region and montane foothills of the southern Rockies. This project was undertaken, therefore, to obtain a greater understanding of these factors, in the context of riparian awareness needs, in northern and central Alberta. This project is not, however, intended as a comparative investigation of factors in southern Alberta.

Specifically, the project explored three types of related information about northern and central Alberta farmers:

1. the nature of their riparian ecology knowledge;
2. the management practices in use; and
3. the ways in which these individuals and communities prefer to interact and move forward on riparian management issues.

Findings are presented here in the form of an Action Plan to help guide Cows and Fish to design, refine and target meaningful awareness initiatives to assist farmers to develop the foundation of riparian awareness needed to achieve sustainable riparian management at the local level. Equally important, acting upon this Action Plan will enable Cows and Fish to interact with these community members in ways that are appropriate and relevant.

In addition to guiding Cows and Fish in how to work with these communities more effectively, it is hoped that this project's findings will assist other organizations who are committed to building knowledge and promoting sustainable riparian management at the local level through their own awareness initiatives. Others who may find the project's findings useful include local and provincial government agencies, conservation organizations and community groups.

II. PROJECT METHODS AND PARTICIPANTS

The project was carried out during Fall 2001 and Spring 2002. Farmers were interviewed in small, informal groups in six communities in northern Alberta (Lac la Biche and Marwayne) and central Alberta (Bashaw, Finnegan, Rocky Mountain House and Tofield). These communities provided coverage of several of the province's natural regions, including short-grass, aspen parkland, forested montane foothills and the fringe boreal regions, as indicated in Table 1.

Table 1
Participating Communities by Natural Region

SHORT-GRASS	ASPEN PARKLAND	MONTANE FOOTHILL (forested)	BOREAL (fringe)
Finnegan	Bashaw Tofield	Rocky Mountain House	Lac la Biche Marwayne *

* borders on Aspen-Parkland

In each of the six communities, Cows and Fish extended an invitation to one farmer who had some type of minimal prior exposure to Cows and Fish awareness activities. Cows and Fish program records were used to identify these individuals. Each of these host farmers was then asked to invite between three and five fellow farmers from their community to form an interview group, so that the group would reflect what was hoped to be reasonably typical farmers from the area.

Choosing participants purposively in this way to reflect the typical farmer, and using the group interview technique, means that the information shared by farmers in the interview sessions and as reported here is illustrative in nature. The value of this approach lies in the ability to discern from all the data collected a general sense of ideas and issues that tell the story of what is important to these people as individuals and as communities. The findings described in this Action Plan should not be interpreted as statistically representative of the communities involved.

The group interview sessions were informal, framed around a pre-prepared series of open-ended questions addressing three topics of interest: (a) knowledge of riparian landscapes; (b) relating landscape function and preferred management; and (c) preferred approach to riparian awareness. The interview guide is attached as Appendix A.

While 32 farmers confirmed attendance, last-minute attrition resulted in a total of 24 participants (21 men, 3 women). As part of the interview session, participants were given the option to voluntarily complete a four-question survey (Appendix B) asking their age category, type and number of acres of their farm operation, and types of riparian areas on their farm. Two individuals (Finnegan) refused to complete this brief survey document despite assurances of confidentiality. Both individuals, however, continued to voluntarily participate in the full interview sessions. One individual (Lac la Biche) did not complete the survey document because he was obliged to leave the session early to fulfill another commitment. One session (Lac la Biche) was cut short to about one hour in length due to lack of interest and other commitments on the part of participants. All other sessions ranged in the planned 2.25 to 2.50 hour duration.

A summary of the four questions asked of the participants is provided in Tables 2 and 3. As indicated in Table 2, of the 21 participants who completed the survey, most (n=15, 71%) were primarily livestock operators. The balance were mixed farmers (n=6, 29%), all of whom were located in the central Alberta communities. There were no participants who reported being primarily crop farmers. The mean farm acreage was 1,729 acres, ranging from an individual low value of 120 (Rocky Mountain House) to an individual high value of 8,000 (Finnegan). Both Finnegan and Marwayne reported acreages consistently above the mean for all six groups (7,250 and 2,400 acres respectively). Bashaw and Lac la Biche reported the lowest mean acreages (470 and 720 acres respectively). Acreage values for Tofield and Rocky Mountain House were disbursed through the mid ranges of the mean. A consistently broad age range was reported among the entire participant group. Age was distributed approximately equally between the four categories of 30-39, 40-49, 50-59 and 60-69 years.

Table 2
Farmer Operational Characteristics

COMMUNITY (# participants)	AGE CATEGORY FREQUENCY						TYPE OF OPERATION FREQUENCY				AVERAGE ACRES	
	20-29	30-39	40-49	50-59	60-69	N/A	Live-stock	Crops	Mixed	N/A	#	N/A
Northern												
Lac la Biche (3)			1	2			3				720	
Not completed (1)						1				1		1
Marwayne (3)	1	1	1				3				2400	
Central												
Bashaw (4)			1	1	2		1		3		470	
Finnegan (2)		1	1				2				7250	
Not completed (2)						2				2		2
Rocky Mtn House (5)		1		1	3		4		1		914	
Tofield (4)		1	1	1	1		2		2		1000	
Total (21 + 3 = 24)	1	4	5	5	6	3	15	0	6	3	1729	3

As indicated in Table 3, the most common type of natural riparian area category reported was pond/wetland/sloughs (17). An equal number of operations reported use of dugouts (17). The highest overall frequency of the pond/wetland/sloughs category occurred in the central Alberta communities, with the Bashaw and Tofield groups reporting the highest frequencies within that region (4). This is consistent with the relative amount of moisture, and the variability of terrain slope and relief, generally found within the parkland region. The greatest variety of natural riparian areas within farms was reported by the Rocky Mountain House group (rivers=3,

Table 3
Frequency of Riparian Area Type on Farms

COMMUNITY (# participants)	TYPE OF RIPARIAN AREA FREQUENCY								
	River	Stream	Lake	Pond/ Wetland/ Slough	Seep/ Spring	Natural Sub Total	Man-made Dugout	Total	Manmade as % of Total
Northern									
Lac la Biche (3)			3	2	2	**7**	**3**	**10**	**30%**
Marwayne (3)	3			2	1	**6**	**3**	**9**	**33%**
Central									
Bashaw (4)			2	4		**6**	**2**	**8**	**25%**
Finnegan (2)		1		2		**3**	**2**	**5**	**40%**
Rocky Mtn House (5)	3	3		3	2	**11**	**4**	**15**	**27%**
Tofield (4)		1		4		**5**	**3**	**8**	**38%**
Frequency Total	6	5	5	17	5	**38**	**17**	**55**	**31%**

streams=3, pond/wetland/sloughs=3 and seeps/springs=2). These frequencies also likely reflect the higher rates of precipitation and variability of landscapes generally prevalent in this higher-altitude, forested montane foothills region. The least variability of natural riparian area type within farms was reported by the Tofield group (primarily pond/wetland/sloughs=4, with streams=1).

Although the proportion of total water supply accessed from all types of riparian areas within farms was not identified, those groups reporting highest frequency of use of man-made water storage (i.e. dugouts) were Finnegan (40%) and Tofield (38%), both east-central Alberta communities. Note that Finnegan lies in the dry, short-grass natural region. Also in central Alberta, Bashaw (25%) and Rocky Mountain House (27%) had the lowest use of dugouts in relation to all riparian area types they reported. About one-third of farms (31%) reported use of dugouts but, overall, every farmer involved in this project had direct farm access to, and was responsible for managing, natural riparian areas.

Further, it was noted during the interview sessions that no participants were certified organic farmers. Rather, use was consistent with traditional forms of farming.

III. KNOWLEDGE OF RIPARIAN LANDSCAPES

Five topics were addressed in the group interviews to obtain an understanding of the ways in which the farmers involved understood some basic riparian ecology concepts. The five topics included:

- defining the term riparian;
- explaining the values and functions of riparian areas, including the role of vegetation;
- identifying riparian health;
- recognizing change on the landscape (generally) over time, and identifying concerns and causes relating to any change; and
- understanding the values/roles/function of cultivated land in relation to riparian areas.

Table 4 details participant comments for each topic (by natural region), describes the implications of those comments in terms of awareness activities, and suggests actions for Cows and Fish to address the findings when designing and delivering awareness activities.

Table 4
Riparian Knowledge Findings and Actions

Topic (i): Defining Riparian Question series: 1a, 1b		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ It's the water's edge ▪ Water source *(note: limited ability to define clearly, but could describe – see Table 4(ii))* *Tofield* ▪ Natural water body that hasn't been disturbed (1) ▪ Slough <u>Short-Grass</u> *Finnegan* ▪ Where the creek bed meets the vegetation <u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Lake, river, stream area immediately adjacent to the water's edge (3) ▪ Where all the wildlife and waterfowl are ▪ The water table close to the stream or above ground ▪ Small percentage of landscape, important part of the landscape (1) <u>Boreal</u> *Lac la Biche* ▪ Clear, clean water, lakeshore *Marwayne* ▪ The area near or around a river, also marshes and sloughs, any water area	In terms of *defining* what a riparian area is, the majority of participants identified it quite simply, namely as "the place beside the stream". However, only two individuals (Rocky Mountain House and Marwayne) were able, without probing, to identify them as a particularly important landscape type, or to comprehensively articulate several or all riparian functions (see more under Table 4(ii) below). Notwithstanding, all participants could *describe* at least one to two characteristics of what is found in a riparian area, noting that the differences between riparian areas and uplands relate mostly to the greater presence/variety of vegetation and animal species. There was good knowledge about riparian areas being the source or provider of the water supply, i.e. it's where the moisture is. Due to this rather piecemeal understanding of riparian, the pre-prepared definition of riparian was read to all groups before proceeding so that participants had a fuller idea of the definition, making subsequent discussion more meaningful. Individual participants generally described the types of riparian areas as those within their immediate vicinity (e.g. Lac La Biche - "it's the lakeshore"; Finnegan – "where the creek is"; vs. Rocky Mountain House and Marwayne - where lakes, rivers, streams, marshes and sloughs were all mentioned); overall, however, there was relatively low knowledge about different types of riparian areas generally.	Knowing what riparian areas are is a fundamental knowledge item. The participants overall were only moderately able to define riparian, although the majority knew that it had "something" to do with the area near water. For the most part, participants did not describe the many different types of riparian areas. The foundation of riparian definition needs to be supplemented and expanded. For example: ▪ reinforce through ongoing coverage the importance, uniqueness, characteristics and varieties of riparian areas; and ▪ present this information in relation to the watershed topic (see below) so that community members (especially in natural regions with less variability in landscape features) can grasp the concept of inter-connectivity, and setting the stage for more accurately relating their impacts from management actions to the large scale of riparian systems.

Topic (ii): Values and Functions of Riparian Areas, Including Vegetation Question series: 2a, 2b, 2c, 2d, 2e, 2f		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ See different kinds of grasses ▪ Wet areas are different than dry and connected by blending between the two (1) ▪ More frogs, ducks, insects; more breeding, only found here vs. dry areas ▪ Cows can make a real mess; concentration is a problem ▪ Count on grass there for forage in dry years (4) ▪ *On landscape generally*, trees draw rain (4) and provide lots of benefits for shelter, and protecting from wind/soil erosion ▪ Trees have aesthetic value (1) ▪ Evergreens use less water and have smaller roots than poplars (3) *Tofield* ▪ Riparian areas include low land where moisture is involved (1) ▪ There are beaver and nesting birds in riparian areas (2) ▪ There is coarser vegetation than in uplands e.g. slough grass for forage; also trees (1) ▪ Riparian areas act as filter (3) and protect against erosion (2) ▪ Wetlands can be utilized by cattle for grazing and water sources (2) <u>Short-Grass</u> *Finnegan* ▪ Hilly ▪ Lots of growth and lots of trees ▪ The whole world revolves around water; a healthy riparian area is a sign of good management (1) ▪ Plants keep erosion down (2) and are home to little birds ▪ Plants provide shelter and food (4) ▪ Plants clean the water a bit	Most participants *described what is found* in riparian areas visually, in particular by two or three characteristics relating to vegetation (presence, variety and, to a lesser extent, different vegetation than is found in uplands). Generally speaking, the vegetation could not be specifically identified by type, and there was limited understanding of the process of plant succession (i.e. "why do certain plants appear there and what are they?"). In terms of ecological function, there was good knowledge that root binding provided by vegetation is related directly to erosion control, and moderate knowledge that riparian areas act as sponges and filters (but only one or two references were made in this context specifically to "water quality" itself). There was also good high knowledge about the relationship of riparian areas to wildlife, bird and insect habitat (the most common function identified for riparian areas). It was clear that almost all participants were actively aware of the presence of wildlife, birds (and to a lesser extent, insects) in their riparian areas. With respect to moisture retention, there was moderate awareness that trees and vegetation (on the landscape generally) draw and hold moisture, but only two individuals (Lac la Biche and Marwayne)	Knowledge of riparian function ranged from low to moderate to good with participants able to partially articulate only some aspects of the role and vulnerability of riparian areas (e.g. erosion). Explanations of the full range of riparian functions, especially vegetation, and how they are affected by humans, are needed. For example: ▪ use the existing kernels of knowledge about, e.g., the role of vegetation, to build and lead into more comprehensive explanations of vegetation structure, buffering, filtering, etc. Relate this information to examples of how riparian areas can be impacted by cattle (e.g. bank destabilization and compaction), in particular with respect to water quality and water quantity; ▪ continue to provide descriptions of types of plants, including the concepts of disturbance of succession; and

Topic (ii): Values and Functions of Riparian Areas, Including Vegetation Question series: 2a, 2b, 2c, 2d, 2e, 2f		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Riparian areas are important for bird and wildlife nesting requirements and winter habitat and for livestock forage (3) ▪ There is sensitive vegetation in riparian areas (1) ▪ Very important because act as sponge (3) ▪ Cleans the water, nitrates and phosphates are filtered out (1) ▪ Vegetation holds the land where it is supposed to be (1) ▪ 75% of animals, birds, insects frequent riparian areas (1) <u>Boreal</u> *Lac la Biche* ▪ Riparian areas have fish and birds (4) ▪ Cattails, birch, reeds, willow, Russian thistle (2) ▪ Not a lot of food down by the lake ▪ Riparian areas have the presence of water (4) ▪ Creeks are riparian areas too (in addition to the lake) ▪ Trees stop the banks from falling in; if you remove them the water rushes in and there is more erosion (1) ▪ When you cut down the trees, there is less moisture and less shade so it dries up; then the days get hotter and the nights get colder (1) (*general comment about moisture availability not just riparian areas)* ▪ Riparian areas cleanse the water (1) ▪ Put a lot of beauty value on the lakeshore ("it's nice to hear a bird when you're walking around the lake") ▪ Nice to be there (butterflies there) *Marwayne* ▪ Changes in size and species of riparian area will occur with change in water [amount] ▪ Riparian areas have lots of vegetation (sedge, cattail, willow) (3) ▪ Riparian areas act like sponges for the water table, keeps rejuvenating the water table (1)	described this as something essential to the productivity, health or function of riparian areas specifically. However, the literal connection to an understanding of biodiversity was not made in relation to these views. Further, there was little or no mention of fish; which were mostly considered irrelevant, a thing of the past, or simply not important. No participant made a direct connection to landscape or riparian health and the presence of fish species. There was moderate recognition that low areas provide good pasture and that "animals need water"; however, this was mostly the case for those on lotic and wetland systems - lake areas were not themselves used for forage. Frequent mention was made of the aesthetics or beauty of riparian areas, allowing people to enjoy them as natural and/or recreational areas. Groups from the driest area (Finnegan) and the large lake area (Lac la Biche), who were also the most remotely located, made the least association between livestock and water quality, indicating that it was someone or something else that causes damage to water quality and to riparian vegetation. In both cases, direct	▪ continue plant identification. To initiate interest in the topic, link to people's existing appreciation of the productivity, usefulness and beauty of riparian areas, as well as their obvious awareness about the presence of many plant and animal species. For example: ▪ reinforce ecological relationships by relating them to what people frequently or easily experience as individuals (e.g. viewing and enjoying wildlife, recognizing erosion, needing shelter or forage). Arm farmers with confidence to discuss their riparian area functions in an accurate, informed manner with others who are involved with or concerned about those areas. For example: ▪ relate actual terminology (e.g. "biodiversity") both to existing knowledge and to additional illustrative examples of riparian function: to help people

Topic (ii): Values and Functions of Riparian Areas, Including Vegetation Question series: 2a, 2b, 2c, 2d, 2e, 2f		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Trees and plants keep the banks stable (1) ▪ Riparian areas are very pretty (3); like to ride there – visitors also appreciate and value them	interaction between cattle and the water's edge was rejected as a possible contamination source.	become familiar with the word and to understand/ use it in a confident manner when dealing with riparian issues; or to assess criticism or riparian information from other sources in an informed way.

Topic (iii): Identifying Riparian/Pasture Health Question series: 3a		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ Height/amount of forage (2) ▪ Green is a good sign (2) *Tofield* ▪ Green is good (4) ▪ Lots of black dirt showing is bad (2) (*but not clear on variations/role/causes of different types of exposed ground)* ▪ If lots of wildlife, a good sign its healthy (2) <u>Short-Grass</u> *Finnegan* ▪ The healthier a creek, the more deer ▪ Concentration of species in riparian areas <u>Montane Forested Foothills</u> *Rocky Mountain House* N/A	Participants consistently assessed riparian health visually and related it to easily identifiable characteristics of the landscape. The most common observations were that green/lush is good, and that bare ground (black/brown) or wilted/low vegetation is not good and indicates abuse. To a moderate degree, the type and variety of vegetation was also a health indicator. Participants gave frequent indications that they are fairly tuned in to observing plants/animals in a general way on the landscape, but had a low to moderate level of knowledge about linking this to a concrete understanding of	Illustrate riparian health (including function) by examples that reflect the ways that people recognize and appreciate health: by visualizing colour and being aware of the presence of plants/animals. This can be achieved through visual and language techniques. For example: ▪ match awareness format to the way people assess the landscape, i.e. build in on-site (i.e. visual) components to awareness experiences that illustrate comparative health situations on the landscape; and ▪ consider use of simple repetitive phrases like "green is good" (like "good mud/bad mud"). Illustrate the link between riparian function/health and people's stated appreciation of the presence of birds and wildlife, relating to the concept of

Topic (iii): Identifying Riparian/Pasture Health Question series: 3a		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Boreal</u> *Lac la Biche* ▪ When you see lush and green, the riparian area is healthy (4) ▪ If it's wilted or brown, the riparian area is unhealthy indicating lack of water or that it's being abused; the vegetation changes (4) ▪ There's not a lot of forage there (1) *Marwayne* ▪ Healthy riparian areas look pretty, with lots of sedge, cattails, grass, willow hang over and shading the water (3) ▪ Green plants are good (3)	biodiversity, i.e. how the presence/absence/changes in wildlife might be an indicator of riparian health or function.	biodiversity, and their choice of management practices. For example: ▪ use a cycle of messages to build on their appreciation of the presence of birds/wildlife--their presence suggests biodiversity--biodiversity is a circle leading back to healthy function--health and biodiversity is something humans can manage in positive ways; and ▪ introduce techniques for measuring components of health, illustrating how to understand the pieces by understanding and monitoring them individually.

Topic (iv): (a) Recognizing Change on the Landscape Over Time **(b) Issues of Concern about Landscape Change** Question series: 4a, 4b, 5a		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ Current condition of land is worse now (3) ▪ Unsure about change in condition (1) ▪ Less wildlife (4) including ducks ▪ Fewer birds due to less trees, also fewer woodchucks, bush rabbits and snowshoe hare ▪ More moose, ravens, deer – probably due to less hunting ▪ More hawks, owls and foxes (4) ▪ Trees are less healthy, cattle are hard on them by rubbing (3) ▪ Helps that there is less summer fallow now and don't put feedlots on riverbank	Reduced moisture was the most common change noted across all groups. This was recognized by generally dryer conditions, and recent consistently low water levels in streams, lakes, wells and dugouts. This trend of reduced moisture was observed to a somewhat lesser degree, and was more recent, among the Bashaw and Rocky Mountain House groups, where there is generally more moisture available and where	Increased drought/decreased availability of moisture was stated as the issue of most concern among almost all groups (except the group in the most arid area). Almost all participants (again with the exception of the Finnegan group) acknowledged the stress that the impacts of drought were placing on farm operations as the realities that farmers are now

Topic (iv):	**(a) Recognizing Change on the Landscape Over Time** **(b) Issues of Concern about Landscape Change** Question series: 4a, 4b, 5a	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Much dryer (4) ▪ Tree removal is biggest concern ▪ Soil erosion a concern (4); but is improving due to summer fallow and less burning (keeps more organics in place) *Tofield* ▪ All dugouts are low so dangerous for animals to go there ▪ Concern about pressure from the public, so there is a need to show that the land is being taken care of ▪ See moose and deer regularly now but never did as a child (1); likely due to natural cycles over time ▪ Most of the potholes have dried up so there is no beaver ▪ Have lots of weeds that didn't used to have (e.g. scentless camomile, probably coming from hay and/or from other counties) ▪ Lack of moisture is biggest concern (4); in last few years all lakes to north have gone down (4) but there is evidence that this had also occurred historically (e.g. Buffalo Lake) ▪ This is due to a climatic dry cycle <u>Short-Grass</u> *Finnegan* ▪ Riparian areas haven't changed (2), same plants; it looks the same ▪ Poplars have died off in some areas due to change in moisture (1) ▪ Never was any fish in these creeks; they run dry in the summer (2) ▪ There are more deer now, linked to cow management/available feed – when got into more cattle, the deer followed (1) ▪ People are using more off-site watering and using better rotations ▪ Can remember flooding bank to bank ▪ Concern is about water quality because water is usually lying dormant, haven't had good runoff in last few years (there is no	recent drought conditions have not been as prevalent. A major cause of reduced moisture was stated as a general shift in the climate pattern; there was a feeling that there was not a lot of control over this. There was a moderate degree of acknowledgement that producers are generally more pressured on their operations now and were not able to "get away" with management they used before; they're feeling the pinch due to less moisture/less forage. This was the case in Marwayne, Tofield, Rocky Mountain House and, to a lesser extent, Bashaw. Water quantity was not a concern in Finnegan, the only group that expressed water quality to be the biggest concern. While landscape condition generally was felt to have deteriorated, there was also moderate acknowledgement that, when applied, landscape management had improved *somewhat* because of a greater emphasis in recent years on sustainable management. Access to new information, e.g. conservation tillage, rotation plans, alternate watering systems and so on, have helped them	facing. These realities were mentioned by participants as triggers for moving people toward seeking information and/or making changes to management. This type of concern may provide a practical buy-in opportunity for awareness messages from Cows and Fish. For example: ▪ use the concern about drought and its immediate impacts on operations to illustrate the importance of more careful attention to management (e.g. stressing various management options to address carrying capacity, biodiversity, riparian function etc. over the long-term); and ▪ illustrate water (its availability, reliability and quality) as a management concern of the first order -- relate specific management actions (season-long or over-grazing, cropping to the edge of sloughs, removal of vegetation) to specific

Topic (iv): (a) Recognizing Change on the Landscape Over Time
(b) Issues of Concern about Landscape Change
Question series: 4a, 4b, 5a

FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
manure runoff); this country depends on run-off for "flush" ▪ Water is black by mid-summer ▪ Other main concern is seeing a gradual erosion of property rights (4) <u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Changes to land occur gradually over time; current generation doesn't know what it used to look like ▪ Wells used to be 3m deep, now need to be 20m deep; water has been taken for granted (2) ▪ There are less coarse grasses, more fescues, because it is drier ▪ Less fish ▪ More deer – agricultural creates more "edge"; deer are a nuisance now ▪ Sloughs are disappearing ▪ Land is changing (5); sloughs are drying up and disappearing ▪ Landscape health has improved (2) ▪ A lot of clearing of bush/forest removal is going on small parcels but also by big companies, being driven by $$ (4); this change affects flooding (spring melt is quicker, higher flood peaks, more erosion) ▪ Also concerned about water injection in the oil patch affecting underground water levels/supply <u>Boreal</u> *Lac la Biche* ▪ Riparian areas have really deteriorated; there will be no trees left soon (will look like Saskatchewan); timber companies causing a lot of soil erosion (2) ▪ Oil and timber companies sing the tune of being environmentally friendly but they are not (4) ▪ Recreational users (quads) doing a lot of damage to the lake (4); they have no respect for the landscape	to ameliorate past impacts from farm operations. The Finnegan group, the farmers in the driest area but those also having the largest land base, felt strongly that both their past and existing management was consistent and appropriate and had maintained landscape health accordingly (i.e. requiring neither major change nor improvement). The larger land holdings may provide them greater flexibility in response to variable climate conditions, or perhaps the tenure system in place already reflects the typically harsh, dry conditions. This group did not express a large number of concerns about landscape change, generally, but were concerned about water quality. Issues surrounding multiple use/users of riparian landscapes (e.g. in Tofield and Lac la Biche) were reported as creating confusion and frustration about expectations and responsibility for maintaining riparian health (e.g. recreational use). Further, the Finnegan group expressed serious concern about "outside" users or priorities being *forced* on them regarding management control of local	effects on water quantity and changes in landscape health. While water quality was mentioned as a concern surprisingly infrequently, when it was mentioned it was typically indicated that depleted water quality was caused by someone else. In general, it was not seen as being caused by cattle using riparian areas. For example: ▪ make sure that the impacts on water quality by a variety of users are explained, making it easier for farmers to accept responsibility for their actions while accepting that others may also cause damage; and ▪ illustrate examples of how specific management actions can improve or degrade water quality (e.g. off-stream watering, hard crossings). Act as a conduit of correct factual and factual information about rights and obligations, to

Topic (iv):	**(a) Recognizing Change on the Landscape Over Time** **(b) Issues of Concern about Landscape Change** Question series: 4a, 4b, 5a	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Town and city people are polluting the water through sewage (4), not caused by agricultural so much (2) ▪ Water table on the lake is down; there is less moisture generally (2) ▪ Feel a lack of control over issues like water quality (especially re Alpac removal of so much timber) – David and Goliath ▪ Feel frustrated and unsure about who is responsible for their lake front; regulations unclear and public uneducated – why should a producer work for ten years to protect his land when a quadder can wreck it in a summer's weekend ▪ See poor management everywhere, e.g. towns and cities *Marwayne* ▪ Landscape is much drier now due to global warming (3) ▪ In last 15-20 years, health has improved though, due to zero till and more thought being put into cattle management (1) ▪ Haven't seen much change in wildlife, but there is more moose, wolf and hawks ▪ Other concerns relate to trees being brushed out and sloughs being drained; herbicide use affecting water quality; and agriculture becoming big business	riparian landscapes. Most participants had noticed fluctuations in the type and number of wildlife species in recent decades, but could not really explain why this was happening, except one individual who suggested that increasing cultivation provided more edge effect, and increasing livestock numbers attracted ungulates to readily available feed sources. Increased industrial activity (oil/gas and timber extraction) was also mentioned as a serious concern in the parkland and foothills regions. Again, the concern was also related to moisture loss, with the relationship between loss of vegetation and reduced moisture retention being moderately to well-articulated by the Lac la Biche and Rocky Mountain House groups (both in forested areas). Concern related to removal of trees for both timber and crop cultivation purposes.	alleviate disenchantment while encouraging producers to manage pro-actively. For example: ▪ be prepared with information that clarifies for producers their rights and obligations in areas where permitted multiple use of e.g. shorelines, has given rise to confusion and frustration; and ▪ continue to share this information with non-producer users as an educational tool to reduce damage to riparian areas and promote respect among different types of users.

Topic (v): Values/Roles/Functions of Cultivated Land in Relation to Riparian Areas Question series: 7a, 7b, 7c		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ Wetlands are a nuisance to cropping ▪ Wetlands/sloughs are hayed (2) ▪ Crop as close as possible (2) ▪ Don't break up area immediately next to wetlands if it's alkali because results in foxtail (4) *Tofield* ▪ Zero till starting to catch on; crops will do better should dry conditions occur *(comment related to moisture conditions generally, not riparian areas specifically)* ▪ Wetlands get to be a nuisance for local grain farmers to get around with their tractors; like to get every acre ▪ Have noticed gradual drying of potholes; after a few years they aren't viewed as habitat any more and so then they get cropped in ▪ Don't drain wetlands here; too difficult because of hills <u>Short-Grass</u> *Finnegan* ▪ Don't manage sloughs differently; sloughs are pastured and hayed in the same way ▪ They're just low spots where water lays; when dry just grow foxtails and when wet slough grass comes back ▪ Rule of thumb is you can abuse them because the next wet year will come along and they'll "come back" <u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Important to leave willow ring around sloughs, creeks ▪ Wetlands are there for a reason – filtration ▪ Can be a pain in the area is larger, creates access problems, but generally it is so wet in this area they are just accepted (some get drained, some do not) ▪ Can also cause flooding and road washouts; rivers are more	Due to the relatively small proportion of participants who were involved in cropping, this topic was not dealt with in depth. The topic was addressed primarily with a discussion around the role and value of wetlands/sloughs in cultivated areas. Participants indicated that crop farmers and livestock farmers view the value of wetlands/sloughs differently. That difference was either stated specifically, or stated by the livestock farmers on behalf of cropping operations they were familiar with. Generally, crop farmers were seen, in their focus on monoculture, to crop as closely as possible to maximize production. Elimination of wetlands was seen to occur either by incremental drying/disappearance or active tree removal, particularly in the parkland and boreal areas. Farmers of livestock, on the other hand, indicated that because they need to address animal concerns, they see different, additional values in retaining wetland/slough areas (moisture, shelter, forage). However, most agreed that wetlands had a nuisance factor. Curiously, the group from the driest area (Finnegan) indicated that sloughs were expendable because it was assumed that when moisture returns, forage value returns.	Continue to build on existing moderate knowledge about the value and role of wetlands/sloughs. For example: ▪ communicate clearly the value of wetlands to those who crop, reinforcing the functions of retaining and filtering moisture in an area, and in habitat protection, rather than just as areas that interfere with maximum production; ▪ emphasize the connectivity of all water sources above and below ground, to both livestock and crop farmers, but to a greater extent with crop farmers; and ▪ relate the concept of maintaining moisture through

Topic (v): Values/Roles/Functions of Cultivated Land in Relation to Riparian Areas Question series: 7a, 7b, 7c		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
stable and are "very nice" ▪ Nice to have wild vegetation and wildlife ▪ Crop farmers don't value them as much as cattle farmers who see the benefits they provide for forage <u>Boreal</u> *Lac la Biche* N/A *Marwayne* ▪ Cattle farmers like to keep bush for cattle; crop farmers tend to drain and brush out slough areas that leads to dryness and less productivity: "the more people who brush, the less rain we get" – trees hold the water (2)	The alteration to landscapes due to available moisture may loom larger in the immediate experiences of farmers in areas that are not traditionally dry (aspen parkland, forested foothills and fringe boreal areas), thereby posing a greater concern than it does in areas that are almost always consistently dry (short-grass).	natural processes to landscape productivity.

IV. RELATING LANDSCAPE FUNCTION AND MANAGEMENT PRACTICES

Three topics were addressed in the group interviews to determine how farmers applied their riparian knowledge and assess how they understood its impacts on the landscape. Table 5 details participant comments for each topic (by natural region), describes the implications of those comments in terms of awareness activities, and suggests actions for Cows and Fish to address the findings when designing and delivering awareness activities.

The three topics included:

- riparian/pasture management principles (distribution, rest, seasonality, intensity), and grazing options;
- carrying capacity; and
- relationship between management action and water quality/quantity/biodiversity/ downstream impacts, including understanding watersheds.

Table 5
Management Practices Findings and Actions

Topic (i):	**(a) Riparian/Pasture Management Principles (Distribution, Rest, Seasonality, Intensity)** **(b) Grazing Options** Question series: 8a, 8b, 10a, 10b	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ Don't manage riparian areas differently than non-riparian areas (4), but try to stay away so animals and vehicles don't get stuck ▪ If spring is dry or slow, hold off putting cows out; feed more i.e. amount/condition of forage (3) ▪ Start based on spring temperature and moisture (4) ▪ Determine use by past experience, if less moisture or older pasture, it is less productive ▪ Utilize all you can (4) ▪ Use trees and shrubs as shelterbelts (4) for shade, snow trapping and insect protection ▪ Use buffer strips (1) ▪ Use planned rotational grazing (2) based on size and using what's there *(but not riparian-specific)* ▪ Use alternate watering systems (2) ▪ Don't do anything special (1) ▪ Use fencing (1) to make it convenient for cows to drink ▪ Use electric fencing to allow you to carry a few extra head since they utilize all areas (no areas left with grass they don't like); more productivity this way (1) ▪ Don't put manure close to edge or on ice (2) *Tofield* ▪ Acknowledged that on "home place" operations (vs. community pasture) don't move cattle "as often as they should"; just move them "when the grass is gone" ▪ Move the home cows by comparing (visually) grass between different pastures (2) ▪ Home riparian areas are managed just as part of the pasture (4)	Generally speaking, participants were not managing specifically for their riparian areas or riparian health. There was also a wide discrepancy in understanding some of the underlying pasture management principles of distribution, rest, seasonality and intensity. The almost total absence of special riparian area planning may be partly due to: ▪ riparian health being already good on those operations (there was no way to assess that in this project); or ▪ not recognizing the special characteristics or functions that healthy riparian areas perform through linkages with uplands areas that may require particular attention in management. On farms generally, almost all participants indicated that they used what they called "rotational grazing", but this clearly meant different things to different farmers. Rotation ranged from planned short-term (e.g. 3-7 day) and/or intensive cell grazing using easy-to-move electric fencing (Bashaw), to reasonably frequent movement of animals between cross-fenced fields (Lac la Biche, Finnegan, Tofield); to shifting herds between two or three large fields a couple of times over the course of the season (Lac la Biche and Rocky Mountain	Develop a deeper understanding of the connection between riparian and non-riparian landscapes. For example: ▪ explain riparian area functions (as described above) and their value to overall landscape health. Reinforce the relationship between riparian function/health and management practices: For example: ▪ illustrate vegetative response to grazing/browsing disturbance and relate to principles of rest, seasonality, etc. (adjust accordingly for tame species used); ▪ carefully define and give examples of strategies/systems that manipulate grazing for greatest benefit to ecological and forage productivity in riparian areas

Topic (i):	**(a) Riparian/Pasture Management Principles (Distribution, Rest, Seasonality, Intensity)** **(b) Grazing Options** Question series: 8a, 8b, 10a, 10b	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Do not use fencing systems to manage cattle access to water (too much bush restricts cross-fencing) ▪ Decisions come down to economics, how much $ you can make, but in recent years there has been more awareness that overgrazing is occurring and how damaging it is ▪ Cost factor "pretty important" (4) ▪ Some instances locally of farmers now forced to react to new i.e. dry/overgrazed circumstances (i.e. turning hay land into pasture) ▪ Have to balance moisture and temperature with economics and with what's best for grass (2); wait til grass starts before putting cows in ▪ On local community pasture (7000 acres) planned rotation is used (switch fields by season; intensify grazing pressure with larger numbers in shorter period; modify start date) ▪ Rotation on community pasture results in better grazing, healthier pastures, force them to eat less palatable plants <u>Short-Grass</u> *Finnegan* ▪ Saw a graph (1) showing that overgrazing means you'll have more species in a pasture than in an untouched pasture (gophers, raptors, burrowing owls); might be different in riparian area – if highly disturbed, biodiversity will likely decrease *(note: this was a reference to, and misinterpretation of, Michael Willoughy's 1992 gradient stress curve indicating highest biodiversity under <u>moderate</u> grazing)* ▪ No fencing in this area ▪ Use some form of rotation and/or rest-rotation (4) *but not clearly defined as separate riparian management*	House) (this latter example was considered by the farmer to be rotational). Members of the Tofield group were familiar with more structured rotation through their involvement with the community pasture (run by a separate manager). They were aware that community pasture grazing start-up as well as the grazing period were carefully monitored and adjusted for moisture and vegetative growth. They acknowledged, however, that this type of detailed management was not applied as stringently on their home operations. Yet other participants indicated that they had no formal grazing plan in place (Lac la Biche and Bashaw), and followed what they had always done in prior years (Lac la Biche, Rocky Mountain House and Tofield). The typical reasons for using rotation (regardless of its specificity as defined by the participant) were to distribute grazing pressure (including reducing selective grazing of palatable species across different areas) and to manage intensity. As expected from the variety of definitions of rotation, there was a similar range of application of principles of distribution, rest, seasonality and intensity. The reported use of some form of rotation, as well as the low to moderate level of understanding about carrying capacity (see Table 5(ii) below),	(e.g. rotational grazing is abc, rotational grazing is not xyz; e.g. deferred grazing works well to meet the following farm goals…), and so on. Provide practical actions for farmers to adopt to apply their knowledge. For example: ▪ supplement the introduction of information about management options with details of how to apply specific riparian management techniques, e.g. provide learning opportunities by access to demonstrations; ▪ encourage the use of monitoring techniques to support and clarify farmers' views of the health of their riparian areas; ▪ encourage the development of farm plans that include measurable goals pertaining to riparian health; ▪ work co-operatively with local groups and agencies that have already working

Topic (i):	**(a) Riparian/Pasture Management Principles (Distribution, Rest, Seasonality, Intensity)** **(b) Grazing Options** Question series: 8a, 8b, 10a, 10b	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Usually use riparian areas for calving and wintering ▪ Follow some timing every year (e.g. when finish calving, they go in pasture X for six weeks) ▪ Use pipelines from creek due to distances/size of pasture ▪ Use "off-stream" watering (1) in both summer and winter *but on further probing it was determined that this stored water was 10 feet from the creek* ▪ Generally know when to move them based on experience – more grass, graze later in the fall <u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Don't manage specifically for riparian areas (4); *indicated use of "rotational" grazing but probing indicated that "the cows just move around the same way every year in the big pasture" or "I move them when I happen to be at home" i.e. basically continuously graze* <u>Boreal</u> *Lac la Biche* ▪ Generally in summer, cows have free access to lake; this is "OK"; en route to lake they stick to trails and don't do much damage ▪ It's not OK in the winter because they go out on the water (i.e. ice) rather than stay next to it; this is a water quality problem and a safety problem (lose animals to drowning especially in spring) – animal safety is big issue ▪ Use watering bowls (2) ▪ Use solar panel with pump (1) ▪ Use fencing systems for specific rotation (1) ▪ Manage specifically for riparian area with fencing and saw a lot of vegetation coming in that built the beach (1); others generally just "one big pasture"	suggests a moderate familiarity with the underlying principle of distributing the grazing load across an area, while concurrently providing rest (remembering that most discussion was about operations as a whole since riparian areas were not specifically managed, as indicated above). The main goal was to protect against complete loss of productivity in the future. Moisture/weather and grass volume/height were stated as the most common factors in determining when/where to start the season's operation. Spring start-times for grazing were consistently determined by available moisture/forage/growth levels. No participants specifically reported familiarity with or use of a formal deferred grazing plan. However, at least one participant (Marwayne) discussed knowledge of specific stages of vegetative growth, plant sensitivity during early growing periods, and certain plants doing better than others, as a way of understanding how these seasonality factors may affect forage productivity or use. (These observations should all be considered in light of most of the operations using at least some tame rather than native forage.) In addition, a number of participants (Tofield, Finnegan, Rocky Mountain House, Bashaw)	relationships, awareness tools and resources being accessed by farmers. Introduce the implementation and benefits of management options adaptable to farm and on-site characteristics. For example: ▪ provide on-site learning examples of a variety of grazing plans (e.g. demonstration tours etc.); ▪ include real producer stories to communicate challenges and successes of different options, e.g. use local producers who already use these strategies as contact points for farmers expressing interest; and ▪ incorporate costs and benefits information to illustrate the feasibility of adopting suggested practices.

Topic (i):	**(a) Riparian/Pasture Management Principles (Distribution, Rest, Seasonality, Intensity)** **(b) Grazing Options** Question series: 8a, 8b, 10a, 10b	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Weather (moisture) and plant height determines when they start grazing (4); go with what they've got ▪ Move cows before "it gets bare"; need to give plants a chance to grow and not chewed to the ground and use fencing to do this (2) ▪ Best time to graze lower pasture (i.e. near lake) was early in season (higher forage value) *Marwayne* ▪ Use HRM principles/philosophy (2): high number of cows for high intensity grazing over short number of days ▪ Graze each pasture at different time each year (1) ▪ Riparian areas need some disturbance; cattle can be a tool for this but depends on how people use them (1); you can "make the grass last" through selective grazing ▪ Don't necessary manage riparian areas differently, the goal is to maintain and increase willow, "keep something green" ▪ If growth is fast, means you move between pastures fast; if no rain and slower growth, you can move them slower; usually rest 30-90 days depending on weather and soils (1) ▪ Important to have a good <u>plan</u> for management, to set goals for the operation and the environment, just like setting goals for the family (2); goal setting must include clean water, trees, green grass, birds, animals ▪ Economics is the key ▪ Aware that some neighbours are now fencing riparian areas, especially wetlands, using electric fence (2), but many continue to do "the same thing they always have"	indicated they have recently begun to use a variety of management strategies to protect areas around water, mostly commonly alternate water systems and fencing. A common and more traditional strategy for livestock farmers was to maintain vegetation (mostly shrubs or trees) as buffer zones. The primary reason for doing so was to take advantage of the shelter and forage for the animals' benefit; a secondary benefit was to help draw or retain moisture (Marwayne and Rocky Mountain House). Aesthetics played a small role here also. There was a moderate level of agreement that there has been increasing use of alternate watering systems and soil conservation techniques in recent years; these changes were considered a good thing. However, participants also stressed that many farmers continue management practices based on habit or family tradition (Lac la Biche, Rocky Mountain House, Tofield). Sources of information relating to these newer strategies were usually PFRA, the MD/county or agriculture service industry companies. Large-scale factors such as market conditions played virtually no role in practices used.	

Topic (ii): Carrying Capacity Question series: 9a, 9b		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
Aspen Parkland *Bashaw* ▪ Utilize all you can (4) ▪ Most pastures in area are overgrazed but people don't realize it will be worse/they'll get less next year (4) ▪ Move cows when there's too little left (grass height) ▪ Half of grass growth is underground so if all chewed off, no roots for next year (2) *Tofield* ▪ Carrying capacity is what the land can handle; how many you should put out to keep the land healthy (2) ▪ Stocking rate is how many you actually put out there (3) ▪ There should be a difference between stocking rate and carrying capacity (1); they should be the same if everything is perfect: carrying capacity is what you should do, stocking rate is what you actually do – around here stocking rate is generally too high ▪ We are not overgrazing (2) Short-Grass *Finnegan* ▪ Start with basic stocking rate allowed by Special Areas, figure out how many months they "need" to be there, then work out number of cows ▪ *Confusion between stocking rate (3) until clear definition provided before discussion proceeded* ▪ Carrying capacity can change (4) ▪ Market factors do not come into decision; look at the grass, carryover, moisture ▪ You can overgraze some years but if you do it all the time it will damage the range for future	Participants provided a wide variety of fairly indistinct definitions of carrying capacity; however, most participants at least mentioned in some way or form that it meant leaving some grass/forage for the next year. No-one mentioned any aspects of carrying capacity relating to health of landscape components generally (i.e. non-forage vegetation, wildlife). Just two participants (Marwayne, Rocky Mountain House) gave it an accurate description conceptually, namely as the ability of a landscape to be sustained under balanced use and stress. However, as indicated by the difficulties almost all participants had in responding to this question, it was evident that there was, overall, low recognition of the term "carrying capacity" among most participants. Only two individuals (Tofield, Marwayne) specifically mentioned the longer-term view that use (stocking rate) must ideally and deliberately be applied in balance with what the land can sustain. The Tofield group overall gave the most accurate description. Consequently, the full definition of carrying capacity was read to all group interview sessions to provide participants with information on the concept. Carrying capacity was typically confused with a calculated (or habitual) stocking rate. In other words, it was viewed more as a management technique than an ecological concept to be considered when making management decisions. While general statements were made about the correctness or need to maintain *carry-over* to protect forage for the future, few specific techniques were	Overall, define and broaden the context in which carrying capacity can be understood and applied. For example: ▪ introduce the term carrying capacity and its broad meaning so that on-the-ground assessments of carry-over, which farmers already understand to varying degrees, are placed in the specific context of broader landscape health; and ▪ include an explanation of how carrying capacity relates to maintaining biodiversity generally and not just livestock use, and relate carrying capacity to long-term economic viability of operations. Place discussions of carrying capacity and carry-over in the context of vegetative response. For example: ▪ provide detailed information about how

Topic (ii): Carrying Capacity
Question series: 9a, 9b

FARMER COMMENTS (tally of responses where recorded)	DISCUSSION	ACTION
Montane Forested Foothills *Rocky Mountain House* ▪ Carrying capacity is the number of cows you can carry on a section times the number of months ▪ You look at what's left in the fall; it looks like a table if its overgrazed; if there's lots of vegetation left you are closer to carrying capacity ▪ Condition of cow (overfed/underfed) will tell you what your carrying capacity is ▪ Economics are forcing us to learn more; need to be more efficient at management options in order to make a living (2); you are forced to learn more because of economics ▪ Bottom line is economics (3) ▪ Generally other farmers follow history/tradition; it's been done this way for generations so that's how management continues (4) ▪ Most people will adjust to market conditions to make changes year to year (1) ▪ Decide what to do by visually looking at the grass, see how its working to determine if do more or less next year (try not to eat it down to the table) (1) Boreal *Lac la Biche* ▪ Pasture is only good for so many head (1) ▪ Hay fields give you your food storage limit (1) ▪ Need to leave some behind (4) *Marwayne* ▪ Moisture and grass levels determine when cattle get moved (2); change the grazing start date depending on weather ▪ Finances also play a lesser role (1) ▪ Work hard at maintaining a "biological bank account"; some years you get hit harder	mentioned about how this was understood, measured or adjusted. Assessing carry-over (in their context, meaning simply forage volume/availability) was primarily done visually based on grass height and moisture conditions. Only one group (Bashaw) specifically related root mass condition to vegetative growth and stability, as a way of measuring or identifying carry-over. While visually looking at grass height and "trying" to keep it the same each year – efforts that should not be discounted -- an in-depth understanding of the broader concept of carrying capacity was low across the groups of participants. Perhaps due to this, the approach to assessing *carry-over* within management could be described primarily as reactive rather than proactive – e.g. "if it gets to look like a table, it's overgrazed" or "I move the cows when there's too little left". In cases where operations were larger than the mean across all six groups interviewed, e.g. in the Marwayne and Finnegan groups, maintaining carrying capacity was not seen as a concern, while (generally speaking) the other groups struggled more with balancing financial return, controlling costs and maintaining land/herd/farm viability. Generally, participants reported that many other producers in their communities overgraze (but few, if any, admitted to doing so themselves). As indicated	different plant types and varieties respond to grazing and other variable stress factors such as moisture levels, by encouraging plant identification training. Emphasize that management must be consistently pro-active rather than tolerant of some over-grazing in the hope that it can be reacted to later. For example: ▪ emphasize that carrying capacity and stocking rate are two distinct ideas, one somewhat abstract and the other a concrete strategy, but which work in tandem with each other; ▪ build planning for carrying capacity into the descriptions of how various management options are designed and implemented; ▪ illustrate the economic benefits of different management options, and how they increase forage

Topic (ii): Carrying Capacity Question series: 9a, 9b		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ "Buy time for what grass is ahead of you and what grass is left behind" ▪ Stocking rate gets changed with the weather (e.g. in drought, have reduced stocking rate to give plants to regrow (2) ▪ Carrying capacity means the amount the land will sustain with grazing but still leaving healthy grass; it can change (1) ▪ Need to leave enough grass to leave good groundcover throughout year (1) ▪ People don't understand that production is decreasing	in Table 4(iv), there was moderate acknowledgment that the envelope is now sometimes being pushed toward overgrazing, especially due to dry times, because people have to make a living: "most are trying to produce as much as they can". The Finnegan group did not share this view, and at least one individual in that group indicated that it was acceptable to overgraze some of the time. Overall, however, there was a moderate level of concern expressed about producers in their communities (if not themselves personally) beginning to feel caught by over-use of their landscapes (riparian or otherwise) by either cropping or livestock activities, now that we have entered a drought period.	productivity, to alleviate some of the concerns about inadvertently or habitually placing undue stress on landscapes; and ▪ build on farmers' current awareness that they need to *leave some* by providing specific monitoring techniques to assist in on-site visual assessment (height markers, browse ID, etc.) to help them identify *how much* to leave.

Topic (iii): (a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f		
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
<u>Aspen Parkland</u> *Bashaw* ▪ Watersheds are drainage areas (3) into lakes, rivers ▪ Sloughs aren't involved with a watershed; they are small watersheds themselves ▪ Biodiversity means different species (1) ▪ Cows are attracted to sloughs and cause trampling; fence them for animal health reasons	In terms of understanding watersheds, there was, overall, a moderate level of knowledge on this term, with quite a divergence of descriptions provided by participants. Usually a third to one-half of each group described a watershed as being an area with some kind of boundaries, that captures water, but these views were expressed in a general way and without high confidence.	The concept of a watershed and, in particular, connectivity between areas, was weakly to moderately understood by almost all participants, and needs to be explained and reinforced in awareness tools.

Topic (iii):	**(a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts** **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
(dirty bags) ▪ Got rid of trees in past and wished hadn't (3); have lost benefits of shelter and erosion protection; they'll never come back ▪ Due to cattle and cropping, young trees don't survive ▪ Negative impact from producers is caused by creating more runoff and reducing cover (trees) ▪ Use wetlands/sloughs for grazing and watering (4) *Tofield* ▪ Watershed is the area from which any water body gets its water (2); spots that catch water ▪ Biodiversity means lots of species (1) ▪ Riparian and biodiversity are related to water, which goes down and makes flowers grow, and the next year it takes care of itself ▪ Wetlands don't affect downstream people, not as noticeable (1) ▪ Use shelterbelts of wooded and fenced off areas (1) ▪ To get cattle out of dugouts, using off-site watering (2) to get better water quality – cattle do better ▪ Start to see vegetation and different grasses growing in with off-site watering ▪ Off-water systems a very new idea, info came from PFRA and then people started talking about it; Alberta farm water program helped give a push with cost assistance ▪ Remote watering systems a good way for producers to control health; this would benefit downstream people due to cleaner water because	Views between groups differed. For example, the Rocky Mountain House group, located in the foothills near the headwaters of their main water source and who were familiar with many different types of riparian systems, were most able to express the scale and interconnectivity of a watershed. This included understanding their place within their watershed ("not too much upstream from us") and that their water ends up somewhere else ("in Hudson's Bay"). Note that Rocky Mountain House also has a fairly active local riparian group, and some of this project's participants had participated in the riparian group's awareness activities. It is not possible to confirm whether their greater clarity of knowledge on this topic was a result of their involvement in those awareness activities. Most other groups related to a more localized scale, not describing themselves within a larger system. Participants indicated a lot of uncertainty, for example about relating wetlands and sloughs to the idea of a watershed. These were sometimes not considered part of a watershed or were thought to be their own watershed (partially accurate depending on scale, but the concept of interconnectivity between systems, and the role of groundwater, was not clear overall), e.g. "all watersheds are independent of each other". This low awareness of connectivity between upstream and downstream, and the role of groundwater, was more acute with respect to describing lentic systems (running water was easier to visualize as running downstream somewhere and as being part of a	Help the individual to more readily place themselves within their larger landscape, one fundamentally defined by water. For example: ▪ reiterate the different types of riparian areas, illustrate their inter-connectivity and ecological functions within watersheds, and emphasize the incremental scales of watersheds; ▪ along with presenting this bigger picture, provide locally-specific illustrations and descriptions of local watersheds to help local individuals relate to their own unique site; ▪ use visual techniques such as maps, illustrations and models which are well suited to dealing with this type of topic (e.g. a graphic showing incrementally-sized circles illustrating

Topic (iii):	**(a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts** **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
riparian area acts as a filter ▪ Wouldn't call wetlands a watershed (4) <u>Short-Grass</u> *Finnegan* ▪ Biodiversity means variety of species (1) including trees, frogs, shrubs, grass ▪ It's noisy down there (1) ▪ Don't understand biodiversity (1); how diverse do you have to be, what does it include? ▪ Biodiversity important because if it's missing the landscape is not working properly (1) ▪ Watersheds are drainage areas for a given area (2) ▪ Watersheds are related to erosion; if lots of grass, no erosion (1) ▪ Watershed is a scary term because it involves things like DFO where there was a negative experience because DFO delayed digging into bank during spring to put in pump <u>Montane Forested Foothills</u> *Rocky Mountain House* ▪ Don't know what biodiversity is (4) ▪ Biodiversity is the amount of different species you have (plants, insects, birds etc.) (1) ▪ There are different extremes, e.g. a 160 acre grain field just has wheat vs. a native prairie vs. a riparian area that would have the highest biodiversity (1) ▪ Following the same practices every year discourages biodiversity; sustainable practices encourage it (2); also too many livestock discourages biodiversity	watershed). One group (Finnegan) felt the term watershed was "scary" because it was associated with actions of a federal agency working in their area to protect species diversity in "watersheds". The agency's involvement was viewed as unnecessary, inappropriate, and interfering with local jurisdictions and private property rights. These linkages between disparate activities on the basis of like terms suggests there may be significant sensitivity about what is perceived to be interference by government attempting to deal with large-scale watershed/landscape issues -- this may be a barrier in presenting awareness in some communities when dealing with topics of watershed function and how they can be managed, particularly if the awareness activity attempts to explain the values of biodiversity. The localized-scale of understanding watersheds may explain comments made about downstream impacts of management practices. Overall, participants did not mention concern about downstream impacts as factors considered in their decisions, nor was agriculture generally mentioned as a contributor to changes in water quality. Specifically, when some participants who had indicated they permitted frequent grazing directly at the water's edge were asked: "Does the manure affect the water quality?", answers were vague ("I suppose that having the cows right there might affect somebody downstream") (Lac la Biche), or phrased in the negative	a farm/home linked to a creek/slough, a river, a region, a larger watershed and so on). Therefore, any information presented about management strategies needs to be illustrated along with its ecological value. For example: ▪ ensure that management strategy awareness is consistently complemented with information about how the strategy benefits and/or impacts site-specific riparian health and watershed health; and ▪ use visual tools illustrating how contaminants move through or across land and into water (e.g. showing how water behaves underground could be useful in explaining the

Topic (iii):	**(a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts** **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Can't have biodiversity without good riparian areas (1) ▪ Watersheds contain rivers, creeks, mountains, hills (1) ▪ Watershed is the area that drains into a particular river, can be big or small (2) ▪ Watershed starts in the mountains and eventually goes to Hudson's Bay (2); the snowpack recharges the groundwater and fills the sloughs (1); we get first pass at the water because there's not too much upstream from us ▪ What the river runs through (fields, rocks) can affect the watershed (1) ▪ All watersheds are independent of each other (2) ▪ Sloughs are microenvironments; they are settling ponds, capture and release water, slow down water movement (2) ▪ Sloughs may or may not be connected to rivers/creeks (some go through intermittent streams to alkali likes that don't flow to anything) (1) ▪ Specifically fenced off intermittent stream (1) ▪ Alternate water systems now being used more and more (3) ▪ Have to use creek because it's the only water source and it is the centre of the grazing plan; thinking about alternate water development (1) ▪ It's OK to spread manure in winter but concerned that legislation will prohibit this even on upland pastures; spreading should be OK because I have a buffer (1) (*but when probed could not explain the process of runoff or why it would be different*	("No.") (Finnegan). Indeed, when asked whether there were actually any downstream impacts from their practices, this question often drew blanks from participants. Only one participant (Lac la Biche) specifically stated that producers can affect water quality downstream by the way they feed. Two other producers (Bashaw) acknowledged that they had begun to use alternate watering systems to improve water quality, but this related only to dugouts, not natural riparian areas, and the goal was to improve animal condition (i.e. not used specifically to address riparian or watershed health concerns). This observation about farmers not affecting downstream users by management practices is distinct from their acknowledgement by some that over-grazing is known to occur. The key observation here may be that these farmers do not make a logical link between improper management (i.e. overgrazing) on operations generally, and *downstream impacts*, i.e. their area of concern is quite localized. If farmers do not make such a link, they may similarly fail to make a logical link between that same management and their *riparian health*. This observation is supported by statements by almost all participants that they do not manage their riparian areas in specifically different ways than the rest of their operations (see Table 5(i) below). Participants consistently referred to "some people" and to "industry" affecting downstream water quality	relationships between what appear to be stagnant water bodies (lentic) and the surrounding landscapes; or, illustrating the concept of surface run-off, and how seasonality and intensity can impact water quality, may help explain why manure-spreading *near* riparian areas can be as damaging as permitting cattle to loiter directly on ice; relate all to animal health and productivity.) Particularly in forested areas, messages incorporating a simple tree image can be maximized to illustrate how the presence of vegetation is related to water quality and quantity (and by extension, improvements in productivity). For example: ▪ use colloquialisms that people are already

Topic (iii):	**(a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts** **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
between the two areas) ▪ Use/specifically retain bush (3) for shelter and bank protection <u>Boreal</u> *Lac la Biche* ▪ Biodiversity is a variety of uses (1), different users in the same area (producers, wildlife); cattle and wildlife getting along ▪ Biodiversity something to do with "biological" and "use" (1) ▪ Biodiversity is more than one species (including humans) living there (1) ▪ Biodiversity is nature; so it's important (*comment provided only after definition given; somewhat obvious this was a desirable question response)* ▪ Biodiversity is linked to riparian areas by wildlife and fish/bird habitat (4) and variety in species (1) ▪ Agree that there is a connection between the health of a watershed and what we do to it (1) ▪ There is a direct relationship between timber removal by Alpac and loss of filtration performed by trees; even muskeg is drying out – leads to a lot of erosion/cutting and more sediment is flowing away; really affects water quality: "if you can see soil erosion, it's already too much" (1) ▪ Producers affect water quality by way they feed, and should use alternate water sources/tools *Marwayne* ▪ Biodiversity is lots of different organisms (3) like bugs and plants ▪ Biodiversity starts with organisms in the soil ▪ The more biodiversity, the more stable the	(especially by changes in vegetation and urban use). (See also the discussion in Table 4(iv) above.) Having said that, almost all groups indicated that they have recently started to use alternate watering systems, or had started to investigate obtaining them. Typically, reasons offered for their actual or planned use included improving animal health, safety and productivity. There was a high level of agreement that having access to information about these different management strategies was important. Although not discussed specifically with respect to riparian areas, at least three of the groups (Bashaw, Marwayne, Lac la Biche) reiterated the damage done by removal of trees (either for timber or to ease cropping). The lost values mentioned were primarily shelter and forage and, to a lesser extent, moisture. No one specifically mentioned that farm management strategies affect water quantity, except indirectly as loss of long-term moisture when shelterbelts, wetlands and forests are removed (usually by someone else). In terms of defining biodiversity, this question could not be answered by most participants. As such, it was not possible to ask most of them to speak about how important they thought biodiversity might be. Accordingly, it was necessary to read a pre-prepared definition of biodiversity to participants at each session. Notwithstanding this low level of knowledge about the	familiar with and can remember easily (e.g. "trees draw rain") as a starting point to explain the important underlying ecological functions, and to increase the likelihood of retaining/appreciating vegetation. There is a high level of need to clarify what biodiversity means, expanding out to a more comprehensive description from the components farmers already grasp to some degree, but are not yet entirely comfortable in articulating (e.g. number of species). For example: ▪ as with the topic of carrying capacity discussed above, continually emphasize the specific term biodiversity whenever defining it or describing/relating to its components.

Topic (iii):	**(a) Relationship Between Management Action and Water Quality/Quantity/Biodiversity/Downstream Impacts** **(b) Understanding Watersheds** Question series: 6a, 6b, 6c, 6d, 6e, 6f	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
environment; everything interacts to make a stable community so disturbance will not completely alter it (1) ▪ Water is the link between riparian areas and biodiversity; all animals need water (1) ▪ A watershed is a hill whose north side flows to this slough and whose south side flows to that slough (1) ▪ A well-vegetated watershed keeps its water ▪ Farmers have helped to reduce topsoil loss through low till practices (1) ▪ Wetland areas provide shelter from wind for cows, catch the snow and water, reduce evaporation ▪ Removing wetland vegetation causes all the water to run away; would rather pay farmer to keep wetland than brush it out	term itself, and also about what it means, one or two aspects of biodiversity were tentatively mentioned. These items indicated a key element of biodiversity, namely different species or numbers of species, but generally participants were unable to expand on what this meant (and these comments referred only to plants/animals, not genetic or ecosystem diversity). There were two exceptions to the generally low level of knowledge on the biodiversity item. The Rocky Mountain House group had one individual whose employment background appeared to include some kind of professional land management or assessment, and the Marwayne group had one individual who seemed to have been particularly proactive in seeking out this type of information through HRM. Both individuals were able to articulate biodiversity more fully and accurately than other participants.	

V. PREFERENCES FOR RIPARIAN AWARENESS APPROACH

The final topic addressed in the group interviews was an understanding of the interest in, and desired approach to, riparian awareness activities in each area.

The following topics were discussed:

- ways that communities/neighbours prefer to work together/interact; and
- ways people prefer to exchange information and knowledge.

Table 6 details participant comments for each topic (by natural region), describes the implications of those comments in terms of awareness activities, and suggests actions for Cows and Fish to address the findings when designing and delivering awareness activities.

Table 6
Awareness Preferences Findings and Actions

Topic (i):	**(a) Ways the Community/Neighbours Work Together or Interact to Make Management Decisions** **(b) Ways People Prefer to Exchange Information and Knowledge** Question series: 11a, 11b, 11c, 12a, 12b, 12c, 12d	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
Aspen Parkland *Bashaw* ▪ No previous awareness activities in immediate area (4) ▪ People wouldn't likely attend because not concerned about watersheds or haven't thought about it before (3); have to build interest first ▪ Awareness is a long-term thing ▪ Need before-and-after format showing effectiveness (4) ▪ Use papers and Cattlemen's magazine (if backed by ACC, gets people thinking) ▪ Hard to say if a group would form and work together (4), partly because there are "no streams or rivers" ▪ Neighbours do influence one another (4); you learn from your neighbours ▪ Awareness best coming from retired farmers who've "been there"; older experienced individual preferred (if young, female preferred to male) ▪ Person has to have respect – not pushy and not a windbag; has to be the right approach *Tofield* ▪ Helps to see demonstrations of what works (e.g. watering systems) ▪ Important to show that farmers are doing good things ▪ Seeing is believing; important to explain benefits of ideas and that there are easy ways to make improvements with little cost (2), e.g. tours are popular but do tend to get the same people each year ▪ Want to see healthy vs. unhealthy and little things	Participants in four groups indicated that they were aware of and had participated in some prior riparian awareness activities in their area (Tofield, Finnegan, Rocky Mountain House and Marwayne). Those groups with prior awareness activities indicated that the local municipality had taken the lead in arranging activities, working in partnership with the Agricultural Service Board/municipality (Marwayne and Finnegan), community pasture board (Tofield), or local riparian group (Rocky Mountain House). Past activities consisted primarily of site tours to demonstrate watering systems. None of these groups mentioned that specific management or grazing planning was discussed on the tours (although this may have occurred and was just not mentioned). Some members of at least three groups recalled Cows and Fish participation in these events (Tofield, Rocky Mountain House and Marwayne). All awareness activities had been well received and informative in the view of participants, although all	For five of the six groups (all but Lac la Biche), the most appropriate characteristics of a process for developing future awareness activities were that it be initiated locally and that it be partnership-based. Cows and Fish efforts need to be focused, therefore, on meeting those requirements whenever community representatives express interest in starting or continuing an awareness process. For example: ▪ allow local individuals, groups or agency representatives (e.g. municipal or county agricultural fieldmen) who act on behalf of their community, to initiate and identify riparian issues and needs that are relevant to them; ▪ take a neutral approach in dealing with community members, but work positively in partnership with local agencies and groups to develop relationships and initiatives to access and of share resources; ▪ facilitate procedures and administration relating to accessing joint access to funds and technical resources; and ▪ incorporate learning formats that include opportunities for neighbours to exchange information and learn about

Topic (i):	**(a) Ways the Community/Neighbours Work Together or Interact to Make Management Decisions** **(b) Ways People Prefer to Exchange Information and Knowledge** Question series: 11a, 11b, 11c, 12a, 12b, 12c, 12d	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
that can be done to improve, want to see pictures, want to learn why riparian areas are important ▪ Joint partnership idea is very good e.g. Cows and Fish, DUC, PFRA to lead activity (farmers don't realistically have time to lead/organize but will participate) ▪ Need to include ASB and MD in activities (2) ▪ Piggyback with community pasture board meetings, beef group meetings (in winter) ▪ "if I can learn one new thing, it was worth my time" <u>Short-Grass</u> *Finnegan* ▪ Cows and Fish and similar programs seen as invasion within political climate involving endangered species, changes to leases and DFO – don't want to get involved because don't know what's coming at them next ▪ Concern about Cows and Fish goes back to early rumours about making people fence off creeks ▪ Don't see need for Cows and Fish type activities (2); its an invasion of privacy and don't want people looking over shoulder saying you're doing something wrong ▪ Producers get ideas e.g. about off-site watering from UFA, HRM, conservation tillage groups, community pasture involvement, local feeder group ▪ Like to see successes and learning from neighbour's success, e.g. tradeshows, ASB demonstrations ▪ Best to piggyback with other agencies, e.g. ASB ▪ Good relationship already in place between producers and local ASB; that's a good place to start	expressed frustration at only reaching the same audiences with each event, and being unable to identify ways to reach new people. Those groups who had experienced prior awareness activities indicated that they felt riparian awareness (indeed, any information) was always beneficial. Participants also indicated that a practical and positive feature of awareness activities they had experienced was that farmers learn from each other by talking and visiting among themselves to discuss the pros and cons of their management. One group (Lac la Biche) was unclear what was meant by awareness activities, could not identify any such activities in their area, and was unfamiliar with some resources available locally for this purpose (e.g. they did not know that their county had "an ag fieldman" who could help in this regard). One group (Finnegan) felt quite strongly against involvement by Cows and Fish in local awareness activities because of a perception that the program has interests not relevant to	management options from each others' experiences. Continue to work at alleviating perceptions that Cows and Fish is focused on addressing only contentious environmental issues that are not in balance with concerns of local residents. Be prepared to illustrate the value received by other communities already participating in Cows For example: ▪ provide a consistent and neutral message about the priorities and objectives of Cows and Fish regardless of the audience; and ▪ use producers from other areas that have worked with Cows and Fish to deliver messages that illustrate the benefits to these communities (e.g. through community story document mail-outs; in-person presentations at producer/forage/community meetings; or at cross-watershed site tours). Community members will not be receptive to awareness activities delivered in a way, or by an individual, that they do not consider legitimate. They must respect and be able to learn from the individual delivering awareness messages. The approach to specific awareness delivery must reflect these needs.

Topic (i):	**(a) Ways the Community/Neighbours Work Together or Interact to Make Management Decisions** **(b) Ways People Prefer to Exchange Information and Knowledge** Question series: 11a, 11b, 11c, 12a, 12b, 12c, 12d	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
Montane Forested Foothills *Rocky Mountain House* ▪ Have shared tours of watering demos with Rocky Riparian group (Cows and Creeks); some confusion over similarity in names about who it is and who's involved ▪ Tours are great but get the same people a lot of the time; still important to do; working together between organizations good ▪ Need to have a paid employee or organization to run awareness – not realistic for farmers to do it on a volunteer basis ▪ Interested in information on riparian areas, solar pumps, and the economics of practices (this always seems to be missing) ▪ Delivery can be done by male or female, young or old; needs to be someone who knows what they're talking about to share experiences (don't talk from a screen) ▪ Must suggest, not enforce, ideas; don't like pushy people Boreal *Lac la Biche* ▪ Awareness is important, I'll take any chance I get to feel enlightened (1) ▪ Could not describe or suggest what an "awareness activity" was (4) ▪ Not aware of any prior activities in area ▪ Did not know the county had something called an Ag Fieldman ▪ Any activities need to come from within community ▪ Any activities would need to show how to do it, and how to make a profit	that community (e.g. there is no need to focus on anything except cattle, such as watershed or fish and wildlife topics). In terms of preferred approach, all groups except Lac la Biche expressed the value of working together with (primarily) agencies to initiate awareness activities (examples include demonstration site tours, equipment demonstrations and so on). There was an acknowledgement that not only did this bring together expertise and financial assistance, but that it was not practically feasible for working farmers to be completely responsible for co-ordinating activities of this nature. Only one group (Finnegan) expressed reservations about "outside" groups coming to their communities for awareness activities. Notwithstanding, participants indicated that they were interested in and saw the value of riparian awareness in their communities, both to help themselves and to illustrate to others who may influence potential regulation that producers are working proactively in addressing environmental concerns. Concern about pre-empting external influences by positive local action was articulated particularly in Rocky	For example: ▪ the deliverer must take a neutral, constructive approach; must respect the producers' knowledge; and must be familiar with the realities and variability of farming and farm decisions; and ▪ management strategies must be presented as options and not as demands. The introduction of management strategies must illustrate in practical ways how and why they can be implemented. For example: ▪ maximize opportunities for learning through hands-on site demonstrations (e.g. solar pumps, rotational grazing, sustainable uses of wetlands); ▪ include information about the financial costs of the management strategy in relation to its benefits to the farm operation as a whole; For communities unsure or at the very early stages of coming to grips with riparian issues, provide an introduction to a process that may be beneficial to them. For example: ▪ since awareness is a long process, start small by utilizing local

Topic (i):	**(a) Ways the Community/Neighbours Work Together or Interact to Make Management Decisions** **(b) Ways People Prefer to Exchange Information and Knowledge** Question series: 11a, 11b, 11c, 12a, 12b, 12c, 12d	
FARMER COMMENTS (tally of responses where recorded)	**DISCUSSION**	**ACTION**
▪ Need to be clear on regulation situation (e.g. shoreline access) ▪ Need to learn more about water quality ▪ Learn by doing; but also listen to TV and radio ▪ Brochures are good – "bathroom reading" *Marwayne* ▪ People should manage properly because they understand the reasons it is important not because they are paid to do so (3); it should come from the heart ▪ Past experience with riparian health inventory done by 5 counties with consultants was scary because the reason the assessment was done on the river was unclear; needed to have a presentation of the results with a focus on some of the good stories they found ▪ Cattle farmers would be interested in awareness but not grain farmers (2); they just do monoculture to make money ▪ Awareness should show photos and simple data about good news and success stories, with local stories and local information ▪ Start small, with one project in the community, in time others will get curious to see the results, and will follow up – show good/poor management comparisons ▪ Newspaper articles also help ▪ Emphasize the reality that good management (information) is what makes money now, not just hard work like in the old days (2) ▪ Awareness delivery needs to be independent, with no pressure	Mountain House and Tofield. Their views contrasted strongly with the views expressed in the Finnegan group, the majority of whose members seemed to retreat from taking advantage of all available potential partnerships/information sources to address similar fears (i.e. the underlying concerns seemed to be the same, but the process of how and who might be involved in its resolution was different). The Lac la Biche group was not familiar with what an awareness process meant, and so was not able to articulate how such a process might work in their community. On balance, there was general consensus that working in partnerships with local agencies was a beneficial route toward learning about riparian issues and management, and could play a constructive role in initiating and organizing activities on behalf of producers. Desirable characteristics of the individual(s) delivering awareness are that they be neutral, practical, approachable, and familiar with the realities of farming.	newspapers or distributing hand-out materials introducing and explaining the process, goals and benefits of addressing riparian issues locally; ▪ ensure staff resources are in place to begin building one-on-one relationships both within the community (e.g. between farmers and their agency staff) and between the community and Cows and Fish; and ▪ always clearly define who and what Cows and Fish is and how it works in conjunction with other groups and agencies involved in riparian awareness. Build aptitude among farming communities to address riparian issues. For example: ▪ always include and promote a role for local individuals to initiate, develop and deliver awareness activities.

VI. SUMMARY

This project examined three factors about northern and central Alberta farmers, namely their knowledge about riparian area ecology, the management practices they understood and applied, and their preferred approach to riparian awareness. The project results suggest that accurate knowledge was incomplete about key terms and concepts, typically ranging from low to moderate with regard to riparian ecology and the complexities of riparian health/function. Similarly, use of sustainable management practices and principles was inconsistent, with some farmers applying into their management a sound understanding of the concepts, while others were somewhat less able to articulate how they match their choice of management to sustainable land use. The preferred style of awareness delivery was generally consistent across all groups, with one exception. The preferred style was characterized by partnered activities demonstrating practical management options and their costs in a neutral manner. Each of these three topic areas is summarized below.

Knowledge of Riparian Landscapes

Defining Riparian

The majority of participants defined a riparian area as the area beside a stream and/or as the source of water. More telling, however, was that the ability to comprehensively describe the uniqueness or importance of riparian areas or their functions was low to moderate. Knowledge of different types of riparian areas was also limited, generally limited to the type seen most commonly at the immediate local site. An exception to this was the Rocky Mountain House group who were able to identify several different types of riparian areas (most of which were also readily found in their forested montane foothill terrain).

Key Term: Riparian – Low to Moderate Knowledge

Key Actions

- The foundation of a riparian definition needs to be articulated and expanded from the components already understood.

Explaining Values and Functions of Riparian Areas, including Vegetation

Knowledge of riparian function ranged broadly but was moderate overall. Many participants were able to describe riparian areas by what they can visually see there (usually by the presence and variety of vegetation), rather than articulate an understanding of them by defining them by their functions. However, generally speaking vegetative species could not be identified or classified in-depth. Riparian areas were also recognized by the presence of some bird and wildlife species, but fish were rarely mentioned as a component in riparian areas, and indeed seem to have fallen off the radar of most participants. In terms of specific functions, the important role of protecting against erosion played by vegetation root binding was mentioned by some participants, although detailed descriptions of how different plant species (and the impacts of agricultural practices on their health) achieve this was not directly linked to that function. Several participants spoke about the potential for vegetated (riparian or upland) areas to retain moisture, as well as the ability of riparian areas, most particularly wetlands/sloughs, to act as filters. Again, however, the detailed mechanics of how a number of these processes work were not clearly articulated, and the disparate pieces of practical farmer knowledge experience were rarely explained in the context of concepts of riparian health, landscape health or biodiversity. The aesthetic value of riparian areas was mentioned by some members of all groups interviewed, and the provision of water and forage by riparian areas was mentioned by at least some, but not a majority, of all groups.

Key Actions

- Link riparian functions to the appreciation already recognized and expressed about the productivity, beauty and usefulness of riparian areas, in particular to the presence of plant and animal species.
- Provide more in-depth explanations of the full suite of riparian function, building on existing knowledge or information that farmers now visualize on the landscape, but can't yet quite fully articulate.
- Explain and reinforce appropriate terminology such as biodiversity to arm farmers with confidence to discuss and plan for enhanced riparian function and to deal constructively with others engaging in riparian issues.

Identifying Riparian Health

Assessing riparian health was mentioned consistently as a visual process related to easily identifiable characteristics, such as the colour, amount and variety of vegetation. The second common feature of riparian health was the presence of many animal, bird and insect species.

Key Actions

- Match awareness formats to the way farmers already assess the landscape (using colour recognition to relate to vegetation).
- Build messages around existing values, in particular the presence of wildlife, relating to concepts of biodiversity, healthy function, and management practices.
- Introduce monitoring techniques for measuring individual functional components of riparian health.

Recognizing Change on the Landscape/Identifying Concerns and Causes

The most consistent factor noticed by the farmers interviewed about change on the landscape was the reduced amount of moisture (sometimes referred to specifically as drought), although this was a somewhat less immediate concern among the Bashaw and Rocky Mountain House groups where lower water levels and dryer landscapes had been noticed only relatively recently. The primary cause of the dryer conditions was stated as climate change. Curiously, the driest area (Finnegan group) was the least concerned about dry conditions, perhaps because aridity is commonplace in that area, while the other groups interviewed may have been less accustomed to dealing with the effects of limited moisture. Similarly, most groups acknowledged that as a result of dryer conditions, a number of farmers have begun to realize that more careful attention to farm management is now required to deal with stressed landscapes, after the fact. The Finnegan group, however, did not express particular concern about any relationship between adapting management and dry conditions; their main concern was water quality (Finnegan being the only group to state water quality as their main issue of concern). Generally across all groups, landscape condition was felt to have deteriorated in the past two decades, but on balance management was believed to be gradually improving as a result of access to new information available to farmers about sustainable management practices.

Another type of concern identified by participants, particularly in Lac la Biche, was growing confusion and frustration surrounding the responsibility for maintaining the health of riparian areas where multiple use is a factor (e.g. lakeshore recreational users conflicting with pasture management). The Finnegan group stressed a related concern but one with a slightly different focus: their fear related to outside groups imposing management controls on them, in their view detracting from their personal property rights.

Another concern, also related to water, was industrial activity such as oil/gas and timber extraction. The main focus of this concern was the removal of trees and shrubs (not necessarily in riparian areas but on the landscape generally), leading to loss of moisture, protection against erosion and filtering of water contaminants. Loss of forests for both timber and cropping purposes was a particular issue in Lac la Biche and Rocky Mountain House.

Other types of changes noticed about the landscape in recent years included fluctuations in numbers of many types of bird and wildlife species, some increasing and some decreasing. Few explanations could be provided to account for these changes, although one individual indicated that more intensive cropping and livestock farming attracted ungulates because of increased edge effect and easily accessible feed sources.

Key Actions

- Use the concern about drought to stress the importance of more careful, pro-active attention to management (e.g. when addressing topics of carrying capacity and riparian health over the long-term).
- Illustrate the availability, reliability and quality of water in relation to specific management options (e.g. how various strategies can improve or degrade).
- Encourage ownership by providing accurate information to clarify rights and obligations of producers and other users with respect to managing and protecting riparian areas.

<u>Understanding Values of Riparian Areas on Cultivated Land</u>

Views about riparian areas on cultivated land were not dealt with in depth due to the relatively small proportion of participants involved to any extent in crop farming. Generally, however, a distinction was drawn between views held about, for example, wetlands on land managed by

crop farmers and that managed by livestock producers. Livestock producers stated that they assign a multitude of values to wetlands within cropped areas, recognizing them for moisture, shelter and forage productivity, and therefore retain these areas for those purposes. Crop farmers, on the other hand, tend to focus more on maximizing cropping yield and will gradually encroach on wetland areas until they dry completely.

Key Actions

- Communicate clearly the habitat, buffering, filtering and forage productivity values of wetlands.
- Emphasize the connectivity of all water sources above and below ground.

Relating Landscape Function and Management Practices

Management Principles and Grazing Options

It was clear from the participants interviewed that almost without exception they were not managing specifically for their riparian areas. Within farms generally, most indicated they used some form of rotational grazing incorporating both riparian and upland areas, but rotation was explained by a very wide range of definitions (ranging from planned short-term cell grazing to what in essence could be described as season-long grazing across a couple of large fields). The reasons provided for using rotation (however defined) included distributing grazing pressure and managing intensity. Grass volume/height and moisture conditions were the main determining factors for starting a grazing season, although no formal deferred grazing plans were described. Only one individual spoke in detail about variable response of different plants to grazing in different seasons. While an absence of formal grazing plans was evident, participants indicated that they had begun to use a variety of technical strategies to protect areas around water bodies, mostly commonly alternate water systems and fencing. Another frequently reported, more traditional, strategy was the use of buffer zones of trees and shrubs. In both cases, the rationale for choice of the strategy was not specifically riparian area health, but provision of shelter and forage for animals.

Key Actions

- Develop a deeper understanding of the connection between riparian and non-riparian landscapes, including how riparian areas contribute to overall landscape health.
- Reinforce the relationships between riparian function/health and management practices (e.g. vegetative response to grazing/browsing in different seasons).
- Define and illustrate examples of strategies/systems that manipulate grazing to maximize ecological health and forage productivity in riparian areas.
- Incorporate producer stories to communicate challenges and successes of using different management options.
- Incorporate costs-benefit information to illustrate feasibility of adopting suggested practices.
- Encourage the use of monitoring techniques to support and clarify farmers' views of the health of their riparian areas.
- Encourage the development of farm plans that include measurable goals pertaining to riparian health.

Carrying Capacity

Carrying capacity was poorly understood, although a number of participants related it in some way to leaving some grass as carry-over for the next or future years. No-one articulated the concept in relation to landscape components unrelated to forage for livestock, although two individuals (Marwayne and Rocky Mountain House) described it on a fairly conceptual level as the ability of a landscape to be sustained under balanced use and stress. Carrying capacity was often confused with a farmer's calculated or habitual stocking rate (i.e. it was seen as a management technique rather than an ecological concept to be built into management decisions). Assessing carry-over (i.e. simply forage volume/availability) was a visual task based on grass height and moisture conditions. No formal techniques were identified as being used to measure or identify carry-over. Efforts were made to try to keep forage the same each year, but an in-depth understanding of the broader concept of carrying capacity, and how to plan for it in a concrete way, was low across all groups. Further, the approach to assessing carry-over was really a reactive rather than a proactive one. The groups with the largest mean acreage per farm (Marwayne and Finnegan) were least concerned about loss of carry-over. There was a general acknowledgement that overgrazing was occurring (except in Finnegan) and again that certain

farmers were now finding themselves having to push the envelope on overgrazing because of the priority remained to make a living. The Finnegan group did not share this view, and at least one individual in that group indicated that it was acceptable to overgraze sometimes.

Key Term: Carrying Capacity – Low Knowledge

Key Actions

- Broaden the context in which carrying capacity is understood by defining its meaning and relating it to overall landscape and/or riparian health.
- Provide detailed information about how different plant types and varieties respond to grazing and other variable stress factors such as depleted moisture (e.g. promote plant identification skills).
- Emphasize a pro-active approach to management, including distinguishing between the abstract concept of carrying capacity and the concrete strategy of a stocking rate. Use catch-phrases like "build a biological bank account".
- Illustrate the economic benefits of different management options to alleviate existing concerns about inadvertently or habitually placing undue stress on landscapes.
- Build on farmers' current practice/knowledge of "leave some" by providing specific monitoring techniques to assist in on-site visual assessment (e.g. browse identification).

<u>Management and Water Quality/Quantity/Biodiversity/Downstream Impacts; Watersheds</u>

The concept of watershed was moderately well understood, but again a wide divergence of explanations and definitions were provided by participants. They were generally able to describe a watershed as an area within boundaries that collects water. The Rocky Mountain House group had the best grasp overall of watershed, including being able to locate themselves within their river basin and explain that their water flows through a system all the way to Hudson's Bay. In contrast, all other groups described their watershed as a very localized area identified usually only by the type of riparian area to which they were most closely located. Further, participants generally were uncertain about how wetlands and sloughs fit into a watershed (some stating that they were their own watersheds or that they were not part of a watershed). This low awareness of the connectivity within and between watersheds of various types and scales was most acute with respect to lentic systems. When asked to define the term watershed, a participant in one

group (Finnegan) defined it as a “scary” word because of its association with watershed-scale activities undertaken by a federal agency in that community. These activities, dealing with species diversity and protection/restoration of riparian areas, was considered irrelevant, interfering and not in the interests of the local community. Linkages made between disparate activities on the basis of the use of like terms may present a barrier to acceptance of awareness activities by Cows and Fish whenever dealing with similar topics.

Key Term: Watershed: - Moderate Knowledge

Key Actions

- Help individuals to place themselves within their larger landscape, defined by water, by reiterating different types of riparian areas, illustrating the inter-connectivity and ecological functions between watersheds, emphasizing incremental scales of watershed, illustrating local watersheds to help individuals relate to their unique site, and using visual techniques such as maps and illustrations.

Downstream impacts were rarely mentioned, perhaps because of the localized view of the watershed concept. Participants did not consider downstream impacts in any of their decisions, nor was agriculture stated as a contributor to changes in downstream water quality (manure from animals loitering at the water’s edge was stated specifically by two farmers as not affecting water quality). Use of off-stream watering, for example, was indicated as being more popular in recent years, most often used with dugouts rather than natural riparian areas, with a goal of improving or protecting animal health/condition rather than riparian or watershed health. If farmers are not making a logical link between certain management practices and downstream impacts, they may similarly fail to make a logical link between their management and the health of their own riparian zones (as indicated above, no producers indicated that they had specific riparian area management in mind as part of their overall farm management). Farmers were not unaware of the issue of water quality; however, causes of degraded water quality were frequently attributed to “some people”, “towns” or “industry”. Only one to two participants mentioned that agricultural practices could directly affect water quantity; other references made suggested indirectly-caused loss of long-term moisture when shelterbelts, wetlands and forests are removed (by someone else). Presumably, it is only through an understanding of watersheds and riparian ecological function that the concept of downstream impacts in relation to management becomes relevant

and meaningful to an individual. An added benefit of people understanding and hopefully applying this knowledge is that they can respond confidently and appropriately to rumours or issues about potentially enforced management practices (e.g. fencing, manure-spreading and so on).

Key Actions

- Ensure that management strategy awareness incorporates information about how the strategy benefits and/or impacts site-specific riparian health and watershed (i.e. downstream) health, as well as livestock health.
- Use visual tools to illustrate how contaminants move through or across land and into water, especially lentic systems, and in relation to intensity, frequency and seasonality of use.
- Use familiar images and colloquialisms (e.g. “trees drawn rain”) to illustrate how the presence of vegetation is related to water quality and quantity.

The term biodiversity could not be defined or described in-depth by most participants. The elements that were tentatively mentioned by a few participants referred to different species or numbers of species (plants/animals only, not genetic or ecosystem diversity). Arming people with the appropriate label of biodiversity, supported by an accurate foundation of its meaning, should serve to increase their confidence in dealing with related (even controversial) landscape/ riparian issues and/or other people/agencies in their area. This familiarity with shared language/terminology/meaning should also alleviate some of the misinformation or gaps in knowledge that have been indicated here, and increase the likelihood that the knowledge will be incorporated into management decisions.

Key Term: Biodiversity – Low Knowledge

Key Actions

- As with carrying capacity, clearly define this term by expanding on the components farmers have been able to grasp but are not yet entirely comfortable in articulating (e.g. number of species), but incorporating various scales and inter-relationships of biodiversity.

- Illustrate what biodiversity looks like on the ground and explain its benefits to farm and landscape productivity.

Preferences for Riparian Awareness Approach

As expected, most communities were in the early stages of becoming involved in or developing riparian awareness. The majority of participants indicated that any awareness process would be best handled, and should be initiated, by working in tandem with local agencies or groups (agricultural service boards, producer groups, Public Lands and so on). These groups must be active players in order to identify locally relevant issues and needs. Five of the six groups interviewed indicated that they would respond very positively if Cows and Fish was invited to be involved as a partner in riparian awareness in their communities. This requirement for a locally-driven process was a common theme among all groups, with the exception of Lac la Biche who were least able to describe their awareness needs and preferences because of limited familiarity with the term *awareness*. The advantages of working in partnership within a community were stated as the ability to identify and build on existing relationships in the community (e.g. with existing producer groups); familiarity with local issues and needs; and maximizing access to technical and financial resources. While holding the view that riparian awareness has an important role in their community, the Finnegan group rejected the participation of Cows and Fish in their area, instead preferring to work only with local agencies and producer groups. Reasons for this view were based on concerns about perceived demands for enforced fencing, a focus on species at risk, and imposing on individual choice and property rights. Practical on-site demonstrations of management strategies (in particular, watering systems) were stated as highly valuable formats for exchanging information in all communities (again, except Lac la Biche who, being at the very beginning stages of awareness, stated that they would find media and brochure materials to be most helpful). Due to the realities of the farming business and the requirement to make a living from it, it was considered essential to include cost/benefit information whenever introducing management options, in order that the farmer be able to make an informed decision about whether the practice is appropriate for his or her operation. Further, awareness needs to be delivered by an individual who is knowledgeable about farming, and respectful of farmers and their priorities.

Key Actions

- Continue to use a locally-initiated and partnership-based approach in dealing with any community representatives who express interest in awareness.
- Develop relationships locally to help facilitate joint access to funds and technical resources. Ensure that staff resources are in place to permit follow up on partnered activities.
- Use learning formats (e.g. demo site tours) that include opportunities for partners and neighbours to exchange information about different management options and how to implement them, including cost-benefit information
- Include and promote a role for local individuals to initiate, develop and deliver awareness activities.
- Provide a consistent and neutral message about the priorities and objectives of Cows and Fish, to alleviate misperceptions about its role or mandate, and take advantage of farmers from other areas to act as messengers about successful Cows and Fish initiatives in their home communities.
- Ensure that the staff who are delivering awareness activities take a neutral, constructive approach that respects farmers' knowledge and that they bring practical farming experience to the interactions.
- Present management strategies as options not demands.

Conclusion

The preferences and needs identified by representatives of the six communities interviewed reflect, for the most part, the content of existing awareness messages and tools already commonly used by Cows and Fish elsewhere in Alberta and across Canada. The broad range of accuracy and ability to comprehensively define or describe ecological concepts, functions and impacts, as well as management strategies covered in this project, was not unexpected and is likely reasonably typical of most communities involved in agricultural production. Indeed, similar gaps in knowledge drove the content and design of Cows and Fish awareness tools developed originally for cattle producers in southern Alberta during the 1990s.

Whenever opportunities for delivering awareness arise, therefore, it will be necessary to build greater depth and comprehensiveness in the knowledge of northern and central Alberta farmers

while acknowledging and building on their existing expertise, to enable them to more effectively manage their landscapes at the local level. The articulation of awareness themes expressed by those interviewed in this project suggests that the program's rationale and philosophy, as well as its specific awareness initiatives, are generally universal in their applicability within the province. No strikingly unique geographic differences in knowledge, understanding of management practices, or desired approach to awareness were noted here, with minor exceptions as indicated above. Therefore, the design and delivery of awareness tools for northern and central Alberta should match in essence those successfully provided by Cows and Fish in other communities to date. Building on a foundation of farmer experience and expertise, ongoing awareness of this type in northern and central Alberta should continue to enhance and expand the aptitude and self-reliance of farmers to manage sustainably.

APPENDIX A

	Concept as set out in Project Proposal cross-referenced by number to chart below	Chart question #s
1.	Defining the meaning of riparian	1a, 1b
2.	Values and functions of riparian areas, especially vegetation	2a, 2b, 2c, 2d,2e, 2f
3.	Identifying riparian/pasture health	3a
4.	Issues of concern re riparian management on their landscape	4a, 4b
5.	Recognition of change on the landscape over time	5a
6.	Relationship between management action and water quality/quantity/biodiversity/downstream impacts	6a, 6b, 6c, 6d, 6e, 6f
7.	Values/roles/functions of cultivated land in relation to riparian areas	7a, 7b, 7c
8.	Riparian/pasture management principles - distribution, rest, seasonality	8a, 8b
9.	Carrying capacity	9a, 9b
10.	Grazing options	10a, 10b
11.	Ways the community/neighbours work together or interact to make management decisions	11a, 11b, 11c
12.	Identifying ways people prefer to exchange information/knowledge	12a, 12b, 12c, 12d

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
THERE WILL BE GENERAL INTRODUCTORY COMMENTS HERE ABOUT CONSENT/PURPOSE/ FORMAT/ TIMING/THANKS ETC.			REVIEW AND COMPLETE CONSENT FORM AND MINI-QUESTIONNAIRE Things to ask as warm-ups (for general info): Do you farm OR ranch? Do you have cattle OR crops -- What kind of water sources do you have on your place? This will help use of language on subsequent questions. Also, as I ask different people the knowledge-type questions, they will be asked in different order in case one person(s) knows too much and might influence others, and I will stress that I won't comment on the accuracy of their answers at any point, ie each person will be encouraged to give their own version.	
			Since we're going to be talking a fair amount today about your experience and knowledge of management on your farms or ranches, as well as about what you know, or would like to know, about how management and land are connected, I thought we'd begin by getting some ideas on the table about some basic concepts... so I'm just going to throw out some initial topics (or terms) to get us talking about your land, and we can go from there... The idea is not to test anybody, but just to share information between ourselves, with the aim being that any future education or awareness activities done by Cows and Fish in this part of Alberta are really based on what people's knowledge is and what your needs are.	

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
1a	Defining the meaning of riparian	Define	We are starting to hear the word "riparian" a lot? What does that word mean to you, if anything?	
2c	Values and functions of riparian areas, especially vegetation	Visualize, recognize functions	What kinds of things would you see in a riparian area?	Quantity ♦ Lots of water Quality ♦ Clean water Biodiversity/Stability ♦ Wildlife/fish/bird/duck habitat ♦ Varieties of vegetation ♦ Varying vegetation structure People ♦ Human impacts
1b	Defining the meaning of riparian	Lotic/lentic	Are there different kinds of riparian areas?	
			DEFINE RIPARIAN Riparian areas are small portions of the landscape along rivers, streams, lakes, springs, ponds and seeps, and they are recognizable by the presence of water-loving vegetation. They are the "green zones" that we can see easily on the landscape. They play a really important role in sustaining fish and wildlife species, providing good water quality and supply, providing forage and shelter for livestock, and supporting people in the work and recreation.	
2a	Values and functions of riparian areas, especially vegetation	Define	We hear a lot of talk about biodiversity. It can mean different things to different people. Now, this can be a bit of a hot topic sometimes, so let's just right in. Can you tell me (frankly) what you feel is meant by biodiversity?	♦ Different/variety of species ♦ Variety of landscape types/ecosystems ♦ Variety of genes ♦ Stability (contains all the necessary pieces) ♦ Rare species
2b	Values and functions of riparian areas, especially vegetation	Understand biodiversity	Do you feel that biodiversity important at all? Why? Who to?	
			DEFINE BIODIVERSITY Biodiversity is the strength and variety of life on Earth, referring to all its inter-related biological (plant and animal) life. Usually we look at biodiversity on 3 scales, from genes to species to ecosystems. An ecosystem is an area on the landscape that has similar, inter-dependent life and landscapes, such as grasslands, foothills, wetlands, boreal forest and so on. One way to measure biodiversity is the total number of plant or animal species found in an area. The greater the variety of life, the greater the stability of ecosystems or landscapes to protect themselves against stress, such as flood or drought. As species decline or are lost, or when there is only one species e.g. of a crop or grass, the greater the risk that stresses like diseases or pests will spread rapidly. Guarding against loss of diversity	

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
			protects us from these threats and provides flexibility in how we can respond to them when they do occur.	
2f	Values and functions of riparian areas, especially vegetation	Relate biodiversity and riparian	Are there any ways that you think biodiversity and riparian areas are somehow linked or connected, and what, if any, would those links be, in your experience? (e.g. if a landowner uses continuous grazing or grassed buffer strips around wetlands, how could it affect biodiversity in a riparian area?)	♦ Wildlife habitat ♦ Bird/fish habitat ♦ Species variety
6a	Relationship between management action and water quality/quantity/biodiversity/downstream impacts	Understand watershed	And one last term to talk about, if I was to ask you to think about the idea of a *watershed*, what ideas come to mind?'	♦ Drainage area ♦ Connects areas of the landscape ♦ Water management ♦ Downstream impacts by users
			DEFINE WATERSHED A watershed is a defined geographical area that captures all the surface water and groundwater draining from a high point of land (e.g. the headwaters of a stream or river) sloping to a lower area (e.g. into a lake or pond). Watersheds, sometimes called drainage areas or basins, can be looked at on different size scales, from the very small (Bullpound Creek) to the very large (the Saskatchewan River or the Mississippi River). All watersheds from smallest to biggest are connected, and capture all the water flowing across an area from the smallest watersheds (sometimes called subbasins) into larger and larger basins, until all the water has flowed downhill to reach our oceans.	
6c 7b	Values/roles/functions of (cultivated) land in relation to riparian areas Values/roles/functions of cultivated land in relation to riparian areas	Management strategies now used	Let's talk more now about the management practices you prefer. I'd like to get just a general idea of what kind of management practices you yourself use. How would you describe your management practices or management plan that you use on your place for around riparian areas, where sloughs or streams or lakes are located? PROMPT: For example, if you **were** to use something like a shelterbelt or a buffer strip or some planned rotation of livestock, what kind of changes, if any, would you expect to see on the landscape there?	**Either** ♦ Delay cultivation/grazing ♦ Snow trapping ♦ Shelterbelts / retain bush or native land **Cropping** ♦ Extended crop rotation ♦ Grassed waterways (eg buffer strips) ♦ Minimum or zero tillage ♦ Cropping bars *Livestock* ♦ Fencing systems to manage access to water ♦ Eliminate grazing ♦ PLANNED rotational grazing (where riparian needs are considered - make sure they DEFINE this e.g. "How do you go about doing the rotation?)

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
				♦ Alternate watering systems (eg pumps or off-water systems) NOTE: these should be systems that take pressure off SURFACE water
10a	Grazing options	Options used	Talking just about livestock now, what are some of the different grazing options or grazing plans that you're familiar with?	♦ Rotation (planned) ♦ Rest-rotation ♦ Deferred ♦ Fencing of any type
10b	Grazing options	Reasons for use	Do you use these and why/why not?	
6d 7c	Values/roles/functions of (cultivated) land in relation to riparian areas Values/roles/functions of cultivated land in relation to riparian areas	Unique management requirements	Do you manage your other land that is near a riparian area DIFFERENTLY than land that is not? Why?	
6b 7a	Values/roles/functions of (cultivated) land in relation to riparian areas Values/roles/functions of cultivated land in relation to riparian areas	Importance, relevance	How necessary or important is it to even consider riparian areas at all when planning for grazing or cultivating land? Why or why not?	
8a	Riparian/pasture management principles - distribution, rest, seasonality	Define/ understand principles	What kind of things do you consider when you are deciding when you start seeding or haying or grazing or placing livestock in or near riparian areas?	*Management Principles* ♦ Distribution ♦ Intensity of grazing ♦ Frequency ♦ Seasonality *General* ♦ Weather ♦ Habit - same practice as always, each year ♦ Space limits ♦ # of head ♦ Access to water ♦ Calving ♦ Shelter *Landscape* ♦ Amount/condition of forage/grass ♦ Wildlife/fish/bird habitat ♦ Biodiversity ♦ Water quality ♦ Allow nesting periods to finish

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
				♦ Finish winter feeding period
3a	Identifying riparian/pasture health	Recognition	In your experience, talking again about just riparian areas, how do you know whether a riparian area might be healthy or unhealthy or somewhere in between?	♦ Visualize (what are you seeing - vegetation, types of plants, physical features e.g. alteration to banks?) ♦ Height/amount of forage ♦ Mix of vegetation types/amount of vegetation ♦ Government or range consultant - formal assessment or farm plan ♦ Production is good ♦ Green is good
8b	Riparian/pasture management principles - distribution, rest, seasonality	Relative importance of principles	How much do you consider factors such as? ♦ Highest yield or livestock production ♦ Most money to be made ♦ Availability of labour ♦ Production costs Current market conditions	
9a	Carrying capacity	Carrying capacity	What's your thinking behind figuring out how many head, or how many acres of land to crop, each year?	♦ Depends on market ♦ Actively determine allowable AUMs ♦ Monitor changes to land/water over time ♦ Produce as much as possible ♦ Stays the same
9b	Carrying capacity	Define	You sometimes hear the term carrying capacity. What can you tell me about what you know about this idea of carrying capacity?	♦ Balancing use with landscape's ability to deal with disturbance ♦ Using without accumulating incremental decline in ecological function ♦ Equilibrium ♦ Forage supply equals stock needs ♦ Leaving some carry-over ♦ "Take some, leave some"
5a	Recognition of change on the landscape over time	Recognizing change	Have you found that the health or condition of the land on your farm/ranch has improved, or stayed the same, or deteriorated, over say, the last 10 or 20 years? If so, what's caused these changes and how would you describe the changes?	*Reasons* ♦ Climate ♦ Industrial activities/pollution ♦ Urban expansion ♦ Farming practices ♦ Recreation *Impacts* ♦ Less water/drier ♦ Less wildlife/fish ♦ Less productivity (need more fertilizer to maintain crop yields)
4a	Issues of concern re riparian management on their landscape	Issues of concern	Talking more generally now, what kinds of things worry you when you think about the condition or health of your land?	♦ Loss of soil fertility ♦ Soil erosion (what causes that?) ♦ Water contamination (which is caused by what?) ♦ Loss of wildlife habitat or fish habitat

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
4b	Issues of concern re riparian management on their landscape	Most important	Of the concerns you've mentioned, what is your biggest concern?	
6e	Relationship between management action and water quality/ quantity/biodiversity/ downstream impacts	Control of impact	In what ways do you think that you, or producers in general, can affect or control the health of the land by different types of management practices? In what ways do you think that the management practices that you use on your place might be important to others in your watershed or how might they be affected? Or are they?	♦ low or no till cultivation ♦ buffer stripes, grassed waterways ♦ hay rather than crop in stream/wetland areas ♦ grazing rather than cropping in stream or wetland areas
6f	Relationship between management action and water quality/ quantity/biodiversity/ downstream impacts	Actions, recognize value	An example might be: What can you say about wetlands? What do you do with them? Are they a nuisance or a hindrance or a good thing or what? And what, if any, changes do you notice after any management action?	♦ Drain them ♦ Maintain buffer ♦ Use them for grazing/watering ♦ Crop as close as possible ♦ Use to promote habitat ♦ Hay them ♦ Don't put manure at edge or on ice to protect water quality ♦ Use off-surface watering to pull impact back ♦ Supplemental feed ♦ Move livestock a lot ♦ Use minerals to move livestock ♦ Swath grazing ♦ Soil testing to determine fertilizer rates ♦ Equipment stuck more often ♦ Higher/lower crop yields ♦ More weeds ♦ Greater erosion from cropping run-off or summer rainstorms ♦ water wells - water dries up ♦ less/more wildlife ♦ less/more soil erosion
2d	Values and functions of riparian areas, especially vegetation	Functions	Just going back briefly to riparian areas again, what would be some ways you might describe the role or function of a riparian area (whether a wetland, slough, stream, lake or otherwise) in the landscape generally? In other words, do riparian areas do anything particular in relation to the rest of the landscape?	♦ Primary water source ♦ Nutrient storage/trap sediments/contaminants ♦ Wildlife habitat ♦ Bird/fish habitat ♦ Cleansing water ♦ Water temperature control ♦ Role of vegetation/roots (reduce erosion)
2e	Values and functions of riparian areas, especially vegetation	Plants	What are some ideas about the role of plants in a riparian area? What do they do?	♦ Rootmass, binding power ♦ Stream velocity control ♦ Bank building

	Concept as set out in Project Proposal	Topic or Sub-topic	Lead Question	Checklist of Potential Responses
12a	Identifying ways people prefer to exchange information/knowledge		Switching focus now, going to talk about your views on awareness activities or learning opportunities relating to land management, especially regarding riparian areas.	
11a	Ways the community/neighbours work together or interact to make management decisions	Any interest?	How important is it for there to be riparian education or riparian awareness activities in your community?	
12b	Identifying ways people prefer to exchange information/knowledge	Who did it before? What didn't work?	Were there management or land use awareness activities, if any, in your communities in the past? Who got that going (a person, the county or MD?) What did you like about the activities? In what ways were they helpful? Or weren't they? Why?	
11b	Ways the community/neighbours work together or interact to make management decisions			
12c	Identifying ways people prefer to exchange information/knowledge	Opportunity to state needs and working style	Where do you think new ideas or solutions should come from about some of the concerns about land management that we've talked about?	In what ways do you talk to your neighbours about management stuff? How do you share info?
11c	Ways the community/neighbours work together or interact to make management decisions		Do you think working as individuals alone, or working together as a group of neighbours, would be the best way to improve land management and riparian management practices in your area? And how would you see this getting started in your community?	
12d	Identifying ways people prefer to exchange information/knowledge	What do they need?	If there were going to be riparian awareness activities in your community, what would you want them to cover? Are there particular items you think need to be addressed?	

APPENDIX B

COWS AND FISH
NORTHERN / CENTRAL ALBERTA PROJECT

FIRST AND LAST NAME _____

WHAT M.D. OR COUNTY DO YOU LIVE IN? _____

CONTACT INFORMATION (optional)

Mailing Address _____

_____

Postal Code _____

YOUR AGE CATEGORY

(select one)

- ☐ 20-29 years
- ☐ 30-39
- ☐ 40-49
- ☐ 50-59
- ☐ 60-69
- ☐ 70 years or older

TYPE OF OPERATION

(select one)

- ☐ Mostly livestock
- ☐ Mostly cropping (grains/cereals/forage)
- ☐ Mixed

Other (specify) _____

SIZE OF FARM OR RANCH

Approx. # of acres, including leased/rented land _____

ON YOUR FARM OR RANCH, DO YOU HAVE ANY OF THE FOLLOWING?

(select all that apply)

- ☐ River
- ☐ Stream
- ☐ Lake
- ☐ Pond, Wetland or Slough
- ☐ Dugout
- ☐ Seep or Spring