



Cows and Fish Report

The Magic and Mystery of Fish Survey:
A Survey of Albertans

Cows and Fish

Alberta Riparian Habitat Management Society

Report No. 037

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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 Supporters and Members: Producers and community groups, Alberta Beef Producers, Trout Unlimited Canada, Alberta Agriculture and Food, Alberta Sustainable Resource Development, Alberta Environment, Department of Fisheries and Oceans, Prairie Farm Rehabilitation Administration- Agriculture and Agri-Food Canada, Alberta Conservation Association

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Working with producers and communities on riparian awareness

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**THE MAGIC AND MYSTERY OF FISH SURVEY
A SURVEY OF ALBERTANS**



Prepared for:

**Alberta Riparian Habitat Management Society - Cows and Fish
in partnership with
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- Alberta Beef Producers
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- Alberta Sustainable Resource Development
- Alberta Agriculture and Food
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- Agricultural and Agri-Food Canada – Prairie Farm Rehabilitation Administration
- Alberta Conservation Association



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Pêches et Océans
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1.0 BACKGROUND

The Cows and Fish program works with Alberta communities to develop a greater understanding about how the natural environments in and around water bodies function, and how best these important areas can be managed.

To build awareness of fish and fish habitat in Alberta, Cows and Fish will be creating a new education presentation for the Alberta public. The new presentation will be called the ‘The Magic and Mystery of Fish.’ Before building such a presentation, Cows and Fish require direct input from a diversity of Albertans in order that the presentation is meaningful in raising awareness. The fish survey was designed to find out the level of involvement by Albertans in the fisheries, what the concerns and opinions are of Albertans about fish and fish habitat and their general knowledge of fish and fish habitat in Alberta.

2.0 METHODS

An eleven page fish survey was designed by NGB Evaluation Solutions Inc. (Edmonton). The survey contained three pages of background and instructions and eight pages of the survey. The eight page survey was divided into four parts:

Part 1: Alberta’s Fish – And You!

The five questions in Part 1 were designed to learn about the involvement of the respondent in fishing and/or fish conservation.

Part 2: Thoughts on Managing Alberta’s Fish

The 15 questions in Part 2 were designed to learn the opinion of the respondent with regards to fish management, environmental health, approaches to conservation and threats to fisheries resources. This was the opinion-based portion of the fish survey and there was not necessarily a correct answer.

Part 3: Fishy Facts

The six questions in Part 3 were designed to test the knowledge of the respondent with regards to fish ecology and fish habitat. Each question in Part 3 had a correct answer.

Part 4: For Comparison Purposes – A Little More About You!

The seven questions in Part 4 were designed to learn about the primary residence (location), level of education and primary occupation of the respondent.

The fish survey was provided online at the Cows and Fish website (www.cowsandfish.org). However, the primary method of disseminating the fish survey was as a hardcopy at meetings, workshops and schools. Attendees were made aware of the fish survey and asked to take a few minutes and fill out a survey. The major events where hardcopies of the fish survey were made available are summarized in Table 28.

For comparative purposes, the respondents data was first analysed with all the responses combined, which included respondents from urban, rural or unknown areas. The second part of the analysis was completed to determine if responses differed between urban and rural groups. For this analysis only responses from urban or rural individuals were included and did not include responses from individuals who did not identify where they lived. In addition, analysis was completed to determine if responses differed among levels of involvement with fish in Alberta (i.e., recreation, government and volunteers). Responses were not included in the analysis among these sectors if more than one box was checked (refer to Question 2 where respondents identified their involvement).

3.0 RESULTS AND DISCUSSION

In all, 230 fish surveys were completed from February 15th, 2007 to January 12th, 2008. Sixteen of the fish surveys were filled out by email or online with the remainder completed as hardcopies at the various meetings, workshops and schools. Of the respondents, 70% were classified as living in urban areas and 30% classified as rural. The percent of urban versus rural responses is quite close to the actual percent of people in Alberta classified as living in urban or rural areas. In 2001, Statistics Canada classified 81% of the Alberta population as urban and 19% as rural (Statistics Canada website). This suggests the fish survey provides a reasonably accurate cross-section of the Alberta population.

The results and interpretation of the completed fish surveys are summarized in the following four parts, in the order of the original survey. Appendix B summarizes the number of respondents to each question by the various groups (i.e., total, urban/rural and recreation/government/volunteer).

Part 1 Alberta’s Fish – And You!

Question 1a: Do you fish in Alberta at this time, or have you fished in Alberta at any time in the last 10 years?

In total, nearly half (51%) of the people who completed the survey fish had fished in Alberta within the last 10 years. When comparing between the urban and rural groups, whether a person was from an urban centre or rural area (within groups) made little difference in the angling participation rate, with roughly half from each group participating in fishing (Table 1).

Table 1 - Summary of Results from Question 1a.

Answer	Number	Percent of Respondents	Comparison Between Urban and Rural	
			% Urban	% Rural
Yes	116	51	54	49
No	111	48	46	51
No Answer	3	1	-	-

Question 1b: Are you involved in some aspect of fish conservation at this time, or have you been in the last 10 years?

Thirty-seven percent of those completing the survey have been involved in some aspect of fish conservation in the previous 10 years.

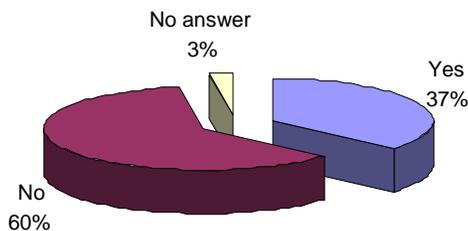


Figure 1 - Summary of Results from Question 1b.

Question 2: Please select the one category that best describes your involvement in fishing and / or fish conservation in Alberta.

A total of 45% of the respondents described themselves as involved as a sport angler while 27% described themselves as being member (paid or unpaid) of a non-government group involved in conserving water and/or land resources (Table 2).

When examining responses between the urban and rural groups, the trends are similar. Approximately half the respondents from each group identify themselves as sport anglers and approximately a third of each group identify themselves as a member (paid or unpaid) of a non-government group involved in conserving water and/or land resources. People involved in managing water and/or land resources (government or non-government) are three times as likely to live in urban areas compared to rural areas.

Table 2 - Summary of Results from Question 2.

Category	Number	Percent of Respondents	Comparison Between Urban and Rural	
			% Urban	% Rural
You are mostly involved as a recreational or sport angler	67	45	44	52
You are mostly involved as a commercial fisher	0	0	0	0
You are mostly involved because you fish as part of the First Nations / Metis fishery	1	1	0	2
You are a government employee involved in managing water and / or land resources	19	13	16	5
You are a member, volunteer or employee of a non-government group or organization involved in conserving water and / or land resources	40	27	30	25
Other	21	14	10	16
No Answer	82	-	-	-

Question 3: For the one category you selected in Question 2, how many years have you been involved in that way?

The majority of respondents (40%) indicated they had been involved fishing or fish conservation for more than 10 years, with fewer people involved for < 2 years (29%) or 3 to 10 years (31%) (Table 3). The data suggests that fewer younger people are becoming involved in fishing or conservation activities, if it is assumed that the respondents who answered > 10 years are older than those who answered < 2 years and that all age groups were equally represented.

Examining trends between urban and rural participation indicated similar trends within both groups and was similar to the results with all groups combined. For the > 10 years participation, the data suggests that a lower percentage of rural respondents (36%) are taking part in long-term fishing or conservation activities compared to urban respondents (43%), whereas a higher percentage of rural respondents have participated over the medium term (3 to 10 years). When comparing the levels of fisheries involvement within recreation and government group, the highest percentage of respondents had been involved for > 10 years, whereas a larger percentage of volunteer had been involved in the medium-term (3 to 10 years).

Table 3 - Summary of Results from Question 3.

Category	Number	Percent of Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
2 years or less	43	29	28	28	27	32	15
3 years to 10 years	47	31	29	36	23	26	48
More than 10 years	59	40	43	36	50	42	37
No Answer	81	-	-	-	-	-	-

Question 4: How often do you fish in Alberta?

The majority of respondents surveyed indicated they fished 1 or 2 times per year with 25% stating they never fish. Only a small portion of the respondents (11%) identified themselves as fishing more than 10 times a year (Table 4).

Examining trends between the urban and rural groups indicated that both groups prefer to fish 1 to 2 times a year with only a small portion of both groups fishing more than 10 times a year. However, a slightly greater percentage of urban anglers fish more than 10 times a year compared to rural anglers. Predictably, when comparing the levels of fisheries involvement, the recreation group had the highest percent (19%) that fished more than 10 times a year. Surprisingly, amongst the volunteer group, 53% indicated they never fish suggesting their involvement is primarily conservation-based and non-consumptive. The government group also had a high rate (42%) of non-participation in angling.

Table 4 - Summary of Results from Question 4.

Category	Number	Percent of Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Never	38	25	25	24	0	42	53
Usually 1 or 2 times a year	61	40	38	45	54	37	27
Usually 3 to 10 times a year	36	24	24	26	27	10	20
More than 10 times a year	17	11	13	5	19	10	0
No Answer	78	-	-	-	-	-	-

Question 5: Where do you usually fish?

Lakes, wetlands and ponds (i.e., water bodies) were the preferred locations for anglers to fish with 58% of respondents choosing these areas as their usual fishing area (Table 5). Eighteen percent of the respondents identified rivers and streams (i.e., watercourses) as their usual fishing area and 12% indicated they fished equally between the two. The results of a provincial wide survey of angling in 2005 indicated that based on days fished, 73.3% of angling occurred at lakes and reservoirs and 26.8% at rivers and streams (Park 2007). These percentages are similar to the results of this survey if the 24% attributed to both lakes and streams in this survey is divided equally and assigned to each lake and stream category (i.e., 70% of angling at lakes and 30% at watercourses).

Examining trends between the urban and rural groups indicated that both groups prefer to fish at water bodies as opposed to watercourses, although there is a slightly stronger preference for urban anglers to fish at water bodies. Rural anglers had a slightly stronger preference to fish at both watercourses and water bodies when compared to urban anglers. When comparing the level of fisheries involvement, the three groups all had a stronger preference (50 to 56%) to fish on water bodies.

Table 5 - Summary of Results from Question 5.

Category	Number	Percent of Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Mostly on water bodies (lakes, wetlands and/or ponds)	67	58	61	53	56	55	50
Mostly on watercourses (rivers and/or streams)	21	18	19	16	15	36	30
About equally on water bodies and watercourses	28	24	20	31	29	9	20
No Answer	114	-			-	-	-

Part 2: Thoughts on Managing Alberta’s Fish

Question 6: Is it important to you that Alberta's fish populations be maintained and / or restored?

Ninety percent of respondents indicated that it is important that Alberta’s fish population is maintained or restored (Table 6).

Urban dwellers tended to value fish slightly more than rural inhabitants (92% compared to 86%). One hundred percent of government and volunteer respondents agreed that Alberta’s fish populations should be maintained or restored, compared to 91% of those who enjoy fishing strictly for recreation.

Table 6 - Summary of Results from Question 6.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Yes	199	90	92	86	91	100	100
No	1	0	0	2	0	-	-
Neutral	11	5	5	5	3	-	-
Not sure/Don't know	10	5	3	7	6	-	-
No Answer	9	-	-	-	-	-	-

Question 7: How familiar would you say you are with all the different native and non-native fish species in Alberta (including their habitat needs)?

Most people responding to the survey felt they were, at the least, a little bit familiar with different native and non-native fish species in the province. Less than 10% of the general population felt they were extremely familiar with Alberta’s fish (Table 7).

Comparing the urban and rural responses, 11% of urban dwellers felt that they were extremely familiar with fish and their habitat needs, while no rural residents believed they were this familiar. A total of 17% of rural residents reported that they are just ‘fairly familiar’ with the topic of fish compared with 29% for urban residents. Conversely, 36% of rural respondents indicated they were ‘not at all familiar’ with Alberta fish compared to 19% for urban residents.

Twenty-one percent of government representatives indicated that they were ‘extremely familiar’ with fish and fish habitat in Alberta. This was more than twice that of the general population. A total of 52% of the volunteer community indicated that they were ‘fairly familiar’ with native and non-native fish in Alberta.

Table 7 - Summary of Results from Question 7.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Extremely familiar	18	8	11	0	14	21	5
Fairly familiar	55	25	29	17	32	32	52
Just a little bit familiar	97	44	41	47	31	21	38
Not at all familiar	51	23	19	36	23	26	5
No Answer	9	-	-	-	-	-	-

Question 8: Which one of the following categories best illustrates how you would describe the overall fish population in Alberta at this time?

The majority of people indicated that Alberta's water bodies could hold some more fish (56% of all respondents), although many indicated that they did not know for sure (34%) (Table 8).

A similar understanding was held by the urban and rural residents, although almost half (49%) of rural residents indicated that they were uncertain.

Government representatives were the most likely to report that Alberta's water bodies can hold more fish as indicated by 84% of those surveyed. Nearly 70% of volunteers responded with a similar answer to government representatives whereas 57% of recreational respondents indicated that Alberta's water bodies could hold some more fish. Across all groups, the percentage of respondents that believed there were hardly any fish in Alberta's water bodies was quite low (0 to 11%).

Table 8 - Summary of Results from Question 8.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Alberta's water bodies have as many fish as they can hold	9	4	6	0	6	0	3
Alberta's water bodies could hold more fish	123	56	60	44	57	84	69
There are hardly any fish in Alberta's waterbodies	12	6	5	7	5	0	11
Not sure / don't know	75	34	29	49	32	16	17
No Answer	11	-	-	-	-	-	-

Question 9: To what extent do you agree that fish can be an indicator of the health of our environment?

A total of 63% of all respondents strongly agreed and 27% moderately agreed that fish can be an indicator of the health of our environment (Table 9). No person surveyed disagreed with this statement.

Urban and rural responses were similar to those of the general population. However, a higher percentage of rural residents indicated a neutral response to this question (17%) compared to urban residents (6%).

Eighty-four percent of volunteers who were surveyed indicated that they strongly agreed with this statement. That is about 20% more than the general population and 30% more than those who were involved in the fisheries through recreation.

Table 9 - Summary of Results from Question 9.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Strongly agree	140	63	67	57	51	74	84
Moderately agree	59	27	27	26	35	26	13
Neutral	23	10	6	17	14	0	3
Moderately disagree	0	0	0	0	0	0	0
Strongly disagree	0	0	0	0	0	0	0
No Answer	8	-	-	-	-	-	-

Question 10: In your opinion, what is the one best method to measure the environmental health of a waterbody (e.g. a lake, wetland, river or stream)?

Overall, the majority of the general population surveyed (31%) indicated that the best method to measure environmental health of a water body was to count the number and type of other creatures who live in and near the water (e.g., insects, amphibians, birds and small mammals) (Table 10). This response was followed closely by the taking water samples and testing them for pollutants (25%).

Urban and rural resident responses, and those provided by the various sectors involved with fish (e.g., recreation, government and volunteers) indicated a similar answer to the general population; although, government representatives had the highest response (52%) for counting the number and type of other creatures who live in and near the water (this was almost twice the percentage of the response provided by the general population). Government also had the lowest response (11%) of all groups for taking water samples and testing them for pollutants.

Table 10 - Summary of Results from Question 10.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Take water samples and test them for pollutants	56	25	25	22	27	11	24
Determine whether fish populations are present or absent	17	7	6	10	10	5	0
Count the number and type of fish species that are present	44	19	19	20	19	16	24
Count the number and type of other creatures who live in and near the water (such as insects, amphibians, birds and small mammals)	70	31	34	24	32	52	35
Measure the flow and level of the water	2	1	1	0	1	0	3
Monitor the clarity, colour and transparency of the water	3	1	1	2	1	0	0
Not sure / don't know	27	12	9	19	7	5	3
Other (please specify)	10	4	5	3	3	11	11
No Answer	8	-	-	-	-	-	-

Other (Please Specify)	Number
All of the above. (i.e., All are large factors; I don't think you can boil it down to one; I think all are important; All of the above; Must do all)	5
Select sensitive species - sentinels - that live in and near water including fish and count them.	1
Index of Biological Integrity (IBI, site specific) incorporating a gauge of conditions compared to a reference of 'normal' or absent from disturbance.	1
No one best method, number may be needed - water quality, biodiversity, fish communities, aquatic invertebrates.	1
Assess the physical, biological and chemical characteristics of water through water sampling.	1

Question 11: We would like your opinion about the best approaches for conservation of Alberta’s fish and their habitat. Please rank two choices as #1 and #2 from the following list of possible approaches to conservation.

The best approach for conservation of Alberta’s fish and their habitat, as expressed by the general population, was to conduct regular ecological monitoring and adjust fishing regulations accordingly (106 score - Rank 1) and use land management practices that are sustainable (86 score - Rank 2) (Table 11).

Other approaches that were deemed valuable, although ranking lower, were planning at the watershed scale, providing education about fish and fish habitat and restoring any habitat that may have been lost. Continuing to use the approaches being used now and stopping all fishing in the province were ranked low and not considered viable approaches for fish conservation by respondents.

Table 11 - Summary of the Number of Respondents Results from Question 11.

Category	Total Score	Rank 1	Rank 2
Conduct regular ecological monitoring and adjust fishing regulations accordingly	106	66	40
Continue with the approaches being used now	8	3	5
Ensure appropriate water flow and water levels	33	18	15
Plan at the watershed scale	62	42	20
Provide education about fish and fish habitat	60	22	38
Restore any habitat that may have been lost	41	16	25
Stop all fishing	3	1	2
Strictly enforce related laws and regulations	33	9	24
Use land management practices that are sustainable	86	40	46
Not sure / don’t know	8	8	0
Other (please specify)	2	2	0
No Answer	6	6	0

Other

- Fish hatcheries - #1 a must in Alberta.
- Stop commercial fishing.

Question 12: Please think about Alberta landowners who live in settled areas such as subdivisions, cottage communities, or villages, towns or cities. How much negative impact, if any, do you think the land use choices made by those landowners have on fish?

Considering negative impacts of land choices made by Alberta landowners who live in settled areas, the majority of general respondents indicated that these landowners have a moderate (41%) to high (39%) impact on fish (Table 12).

A similar response was provided by urban and rural residents, although urban residents tended to indicate a slightly higher response for ‘moderate impact’ (45%) compared to rural residents (31%). Both urban and rural residents indicated a similar response rate for ‘major impact’ at 40% and 41%, respectively.

Comparing among the levels of fisheries involvement, 18% of those involved through recreation indicated that urban landowners have a minor impact on fish (the highest response rate among all groups). The response rate for ‘moderate impact’ and ‘major impact’ amongst the three groups was similar to the overall and urban/rural response rates. No group indicated ‘no negative impact’ on fish.

Table 12 - Summary of Results from Question 12.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
No negative impact on fish	3	1	0	5	0	0	0
A minor negative impact on fish	23	10	9	13	18	0	12
A moderate negative impact on fish	95	41	45	31	40	50	40
A major negative impact on fish	90	39	40	41	37	44	45
Not sure / don't know	18	8	6	11	5	6	3
No Answer	1	-	-	-	-	-	-

Question 13: *Now, please think instead about Alberta landowners who live away from settled areas (i.e. they do not live in subdivisions, cottage communities, or villages, towns or cities). How much negative impact, if any, do you think the land use choices made by those landowners have on fish?*

Considering negative impacts of land choices made by Alberta landowners who live away from settled areas, 43% of the general population indicated a ‘moderate negative impact’ which was quite similar to the percentage of respondents in Question 12 (41%). A lower percentage of the population indicated that rural landowners have a major negative impact on fish (26%) (Table 13) compared to the same question posed about urban landowners where the response was 39% (Table 12).

Forty-five percent of those living in urban areas believe that rural landowners have moderate negative impact on fish compared to 39% of those living in rural areas. Ten percent of rural people surveyed believe rural landowners have no negative impacts on fish and 15% did not know how to respond or were unsure.

Of the responses provided by the various sectors, 9% of those involved with fish through recreation indicated that rural landowners have no negative impact on fish. Government representatives indicated an equal percentage of responses (35%) that rural landowners have a moderate or major impact on fish. Twenty-four percent of government representatives indicated a minor impact on fish was caused by rural landowners, compared to the 0% for the same question regarding urban impacts (Table 13). The volunteer

community indicated that rural landowners have a moderate (45%) to major impact (43%) on fish. This was similar to the response rate provided for Question 12 regarding urban landowners. Based on the responses from Questions 12 and 13, urban landowners are identified as having a slightly larger impact on fish compared to rural landowners across all groups.

Table 13 - Summary of Results from Question 13.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
No negative impact on fish	11	5	3	10	9	0	0
A minor negative impact on fish	42	18	20	14	20	24	12
A moderate negative impact on fish	98	43	45	39	47	35	45
A major negative impact on fish	58	26	27	22	20	35	43
Not sure / don't know	18	8	5	15	4	6	0
No Answer	3	-	-	-	-	-	-

Question 14: Now, think about just your own actions and how they may or may not impact fish. Regardless of how close you live to a waterbody, how much negative impact, if any, do you think your personal actions have on fish?

Considering negative impacts of land choices made by their own actions, the majority of the general population indicated their personal actions had none to a minor negative impact on fish (60%). Only 3% of the general population believed their own actions have a major impact on fish (Table 14).

A similar response was provided by the urban and rural residents. Fifty-seven percent of urban residents and 69% of rural residents indicated that their own actions have no or a minor impact on fish. About 10% of those involved in recreation, government or volunteering indicated that they have no impact on fish. Of the three sectors, 67% of those involved through recreation indicated that they have no to a minor impact on fish, compared to government representatives and volunteers (53 and 54%, respectively). Only 22% of those involved through recreation indicated a moderate impact on fish, compared to government representatives (42%) and volunteers (36%).

Table 14 - Summary of Results from Question 14.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
No negative impact on fish	30	13	8	23	12	11	13
A minor negative impact on fish	107	47	49	46	55	42	41
A moderate negative impact on fish	66	29	33	18	22	42	36
A major negative impact on fish	8	3	4	2	3	5	5
Not sure / don't know	18	8	6	11	8	0	5
No Answer	1	-	-	-	-	-	-

Question 15: *In general, how would you describe the amount of habitat available now that is needed to support Alberta's fish populations over the long-term?*

The majority of the general population indicated that there is not enough habitat available to support Alberta's fish populations over the long-term (59%) (Table 15). Twenty percent of the same population surveyed did not know or were not sure whether enough habitat was available.

Similarly, those living in urban or rural areas suggested that there was not enough habitat available for fish in the long-term (63% and 52%, respectively). Twenty-five percent of rural people surveyed did not know or were unsure. Volunteers and government representatives indicated most strongly that there was not enough habitat available for fish (77% and 74%, respectively).

Table 15 - Summary of Results from Question 15.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
There is more than enough habitat	8	3	3	5	3	0	5
There is about the right amount of habitat	40	17	16	18	22	21	15
There is not enough habitat	136	59	63	52	58	74	77
Not sure / don't know	45	20	18	25	17	5	3
No Answer	1	-	-	-	-	-	-

Question 16 : Please select up to three factors from the following list that you feel pose the greatest threats (if any) to fish and fish habitat in Alberta.

Overall, a lack of awareness or knowledge among the public was identified as the greatest threat to fish and fish habitat in Alberta. This was followed closely by domestic, municipal and/or industrial sewage effluent discharge and agricultural activities (Table 16).

Table 16 - Summary of Results from Question 16.

Factors	Number	Rank
Climate change	52	5
Poor management of the Alberta fishery	34	10
Lack of awareness or knowledge among the public	80	1
Not enough science to understand and appropriately manage Alberta's fish	20	14
Logging / timber activities	23	13
Carbon fuel / resource extraction activities (e.g. coal, oil, gas)	41	7
Agricultural activities	61	3
Domestic, municipal and / or industrial sewage, effluent and / or discharge	79	2
Residential developments	35	9
Recreational activities	24	12
Over-fishing (sport angling and / or commercial fishing)	44	6
Roads and / or bridges near waterbodies	9	18
Dam-building and / or water withdrawals	40	8
Fish diseases	15	15
Introduction of non-native fish species	28	11
Removal of plants that grow in waterbodies, or that grow at or near the shore / bank	57	4
None of the above	0	20
Not sure / don't know	9	17
Other (please specify)	11	16
No Answer	1	19

Other

- Over use of lakes and watershed for any recreation and development.
- Winter kill from snow pack.
- Lack of water run off in streams to allow fish run from lake to lake.
- Lack of landuse planning.
- Insufficient knowledge of environmental conditions to provide sufficient oxygen to sustain fish populations over winter period i.e. decay of excessive vegetation in water consumes oxygen needed by fish.
- All of the above.
- Native over harvesting.
- Provincial government not listening to their own scientists concerning the condition of bodies of water, i.e., Mike Cardinal allowing fishing on a lake (in his riding) that provincial scientists had closed due to collapsed fishing conditions.
- Absence of watershed advisory planning.
- Nuclear war.

Question 17: In your opinion, how many fish should a person licensed to fish in Alberta be allowed to keep each year?

In general, most people surveyed, regardless of where they lived or what sector they represented indicated that each person licensed to fish in Alberta “should be allowed to keep a share of any of the extra fish population that is available for harvest’ or ‘enough to eat a meal of fish once in a while’. Very few people indicated that ‘no fish should be kept’ or ‘as many fish as they want or feel they need’ was acceptable (Table 17).

Question 18: The quality of water in a waterbody is generally most dependent on:

Regardless of residence or sector, most people indicated that the quality of water in a waterbody is most dependent on the ‘condition of the surrounding watershed’, followed closely by the response ‘water that runs off from surrounding surfaces such as fields, forests, parking lots and roads’ (Table 18).

Question 19: Please indicate whether you think each of the following statements is True or False.

In general, correct responses provided by the general population ranged from 30% to 92% (Table 19). Very few of those who were surveyed knew that fixing fish habitat is not always successful in re-establishing fish populations over the long-term. Forty-two percent of people either were not sure or believe that native fish have been successful to adapting quickly to changes people have made to their habitat. A further 38% of the general population either did not know or don’t believe that Alberta’s non-sport fish are important to the survival of sport fish.

Comparing urban and rural residents who were surveyed, urban residents were more likely to provide the correct answer. Among the three sectors, volunteers and government representatives were more apt to be correct in their answers, compared to those involved in fisheries through recreation.

Table 17 - Summary of Results from Question 17.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
None	8	3	5	2	2	5	5
A share of any of the extra fish population that is available for harvest	81	35	35	30	37	37	49
Enough to eat a meal of fish once in a while	78	33	35	33	36	37	32
As many as they want or feel they need	3	1	1	2	2	0	2
Not sure / don't know	50	22	19	28	19	16	5
Other (please specify)	9	4	5	5	4	5	7
No Answer	1	-			-	-	-

Other

- Depends on the population of lake and age of the fish.
- Depends on types and location of fishing.
- As many as we can use.
- It's too late to think we can eat what's now left to catch.
- Depends on the lake population.
- This should depend on fish species and population in lakes/rivers. But should not be gluttonous.
- Enough to eat fish regularly. Angling by licensed people should have 1st priority to the fish over native netting and commercial netting.
- 3 species/person/day
- 50

Table 18 - Summary of Results from Question 18.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
The stability of the waterbody's shore or bank	14	6	5	5	6	9	2
Water that runs off from surrounding surfaces such as fields, forests, parking lots and roads	60	25	23	27	22	17	25
Sewage and treated discharges carried directly into the waterbody via outlet pipes	23	9	8	13	13	9	2
The number and type of creatures living in and near the waterbody (such as fish, insects, amphibians, birds and small mammals)	11	4	3	7	4	5	2
Changes in water levels due to climatic conditions (such as drought or flood)	10	4	3	7	3	5	9
The condition of the surrounding watershed	100	41	49	28	40	50	58
Not sure / don't know	22	9	6	13	12	0	0
Other (please specify)	5	2	3	0	0	5	2
No Answer	2	-	-	-	-	-	-

Other

- Multi-factorial.
- No single dependency.
- Area (soil stability, vegetative cover, slope, soil, substrate) bordering the waterbody.
- All of the above.
- Riparian habitat

Table 19 - Summary of Results from Question 19.
Percentage refers to the number of responses that were correct.

Statement	Number Correct	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
When a fish population declines, it can be a reflection of what is happening in the surrounding watershed (T)	210	92	96	84	87	100	100
In order to benefit fish populations, draining wetlands is a good way to get more water into lakes, rivers and streams (F)	193	85	89	81	83	100	98
As long as there is enough water available at the time when fish are reproducing, they can maintain their populations (F)	166	73	78	67	73	79	88
Fixing fish habitat is almost always successful in re-establishing fish populations over the long-term (F)	68	30	35	20	33	42	38
A fish population that has mostly big individuals in it means that the population is being maintained (F)	172	75	80	69	73	95	98
As long as there is enough food available for fish, they can maintain their populations (F)	169	75	80	66	69	84	95
Alberta's native fish have been quite successful at adapting quickly to changes people have made to their habitat (F)	131	58	61	52	61	74	82
Alberta's non-sport fish are important to the survival of Alberta's sport fish (T)	141	62	65	55	60	68	79

Question 20: Can you describe one action that you could take (as an individual) to maintain or restore Alberta fish populations and /or fish habitat?

A total of 206 people responded to Question 20 with 132 (64%) providing at least one action to maintain or restore fish populations and/or fish habitat. Seventy-four of the respondents (36%) provided a No answer indicating that they could not provide at least one action.

A total of 163 actions were provided by the 132 respondents, with some providing more than one action. The 163 actions were summarized into nine broad categories (Table 20). Actions under the category of 'Pollution Prevention' were most commonly provided, accounting for 24% of the actions (Table 20) under the general theme of preventing pollutants from entering surface waters. Fertilizers, chemicals and detergents were the most common pollutants identified by respondents.

The three categories of 'Riparian Management', 'Education' and 'Fisheries Regulations and Management' each provided 15% of the actions that could be taken to maintain or restore fish populations and/or fish habitat. Under Riparian Management, respondents commonly identified the management and preservation of riparian areas as important as well as the restoration of riparian areas. Respondents identified self-education, talking to others, public awareness and educating children as important under the Education category. Under the category of Fisheries Management and Regulation, respondents commonly identified catch and release, decreasing possession limits, not fishing and obeying fishing regulations as actions that could be taken to maintain/restore fish populations and/or fish habitat in Alberta.

The remaining five categories of 'Government (Enforcement, Monitoring, Policy)', 'Fish Habitat Restoration', 'Community Activism', 'Land Use and Agricultural Practices' and 'Water Conservation and Protection' contributed 4 to 7% of the actions that could be taken to maintain/restore fish populations and/or fish habitat in Alberta. Respondents provided a variety of actions that could be implemented (Table 20)

Table 20 - Summary of Results from Question 20.

Category	Percentage of Responses	Summary of Actions
Pollution Prevention	24%	use less fertilizer/chemicals; avoid polluting water; proper disposal of chemicals; avoid detergents with phosphorus; runoff management; use eco-friendly household products; do not spray/fertilize near watercourses; ban 2-stroke outboard motors
Riparian Management	15%	encourage landowners to manage/preserve riparian areas; restore riparian areas; plant trees/shrubs along riparian areas; increase setback distances; develop riparian policy
Education	15%	public awareness; teach children; self-education; talk to others; educate those who live near water
Fisheries Regulation & Management	15%	decrease possession limits; obey fishing regulations; catch and release; do not fish; proper fish handling techniques; reduce personal fishing effort; use barbless hooks, more fish hatcheries
Government (Enforcement, Monitoring, Policy)	7%	better enforcement of regulations; improved standards/practices; influence government policy; monitor fish habitat and water quality; lobby government for increased funding for fisheries; influence urban planners/policy
Fish Habitat Restoration	7%	improve fish habitat conditions; maintain healthy aquatic ecosystems; restore stream banks and streambeds; restore lost wetlands
Community Activism	7%	join local watershed/conservation or fish & game groups; donate money to Trout Unlimited Canada; contribute to watershed stewardship activities
Land Use and Agricultural Practices	6%	improve land use management; restrict use of off-road vehicles; off-stream watering sites for cattle; exclusion fencing; improve farming practices
Water Conservation and Protection	4%	limit water use at home; collect rainwater to reduce use; protect water resources on personal property; practice on-site storm water management

Part 3: Fishy Facts

Question 21: Trout generally prefer:

Only 40% of the general population correctly identified trout as preferring cold water (Table 21). Forty-nine percent of urban respondents correctly answered, compared to 23% of rural respondents. The majority of rural residents (42%) believed trout prefer cool water. Approximately 50% of those involved in recreation and government responded correctly, and 44% of volunteers correctly provided the answer; however, 44% of volunteers also incorrectly responded that trout prefer cool water. The low percentages of people responding ‘not sure/don’t know’ (7 to 32%) suggests respondents had a higher level of confidence in answering this question.

Table 21 - Summary of Results from Question 21.

Answer	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Warm water	5	2	1	3	0	0	5
Cool water	72	32	27	42	32	26	44
Cold water (✓)	91	40	49	23	49	53	44
Not sure / don't know	58	26	23	32	19	21	7
No Answer	5	-	-	-	-	-	-

Question 22: Walleye, pike and perch will die when the water temperature exceeds:

Only 19% of the general population knew the upper temperature threshold for walleye, pike and perch was 29°C. When providing an incorrect answer, most respondents chose 19°C as a lethal temperature for walleye, pike and perch. Those involved with fish as part of recreation group had the highest correct response rate (33%) for this question. The high percentages of people responding 'not sure/don't know' (42 to 70%) suggests respondents had a lower level of confidence in answering this question (Table 22).

Table 22 - Summary of Results from Question 22.

Answer	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
9° C (or 48° F)	12	5	7	3	8	11	5
19° C (or 66° F)	41	18	21	13	15	21	37
29° C (or 84° F) (✓)	43	19	23	14	33	26	16
Not sure / don't know	127	57	49	70	44	42	42
No Answer	7	-	-	-	-	-	-

Question 23: Please indicate whether each of the following fish species is native or non-native in Alberta.

In general, approximately 42 to 56% of the people who responded to this question were able to correctly identify a fish species as either native or non-native. Brook trout and fathead minnow were two exceptions and fewer people (26 to 35%) were able to correctly identify if these fish species were native or non-native. Comparing urban and rural groups, 30 to 67% of urban residents provided the correct answer; however, only 17 to 34% of rural residents provided the correct answer. Government and volunteers were able to provide a higher percentage of correct answer (38 to 74%) compared to the recreation group (30 to 63%). Across all groups, lake sturgeon was correctly identified as native by the highest percentage of respondents (33 to 74%). Conversely, brook trout was correctly identified as a non-native species by the lowest percentage (17 to 47%) of respondents across all groups (Table 23).

Table 23 - Summary of Results from Question 23.
Percentage refers to the number of responses that were correct.

Fish Species	Correct Answer	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
				% Urban	% Rural	% Recreation	% Government	% Volunteer
Arctic grayling	Native	96	43	49	33	55	58	61
Brook trout	Non-native	57	26	30	17	30	47	38
Fathead minnow	Native	77	35	43	17	40	47	55
Goldeye	Native	94	42	49	30	53	58	47
Lake sturgeon	Native	123	56	67	33	63	74	71
Trout-perch	Native	102	46	52	34	47	58	55

Question 24: A variety of different types of living and dead vegetation along the shore or bank of a waterbody indicates good habitat for:

Of the respondents surveyed, 37 to 58% correctly indicated that a variety of different types of living and dead vegetation along the shore or bank of a waterbody indicates good habitat for both fish and people (Table 24). A high percentage (27 to 37%) responded that the vegetation is a good indicator for fish habitat, and 0 to 15% indicated that vegetation along the shore is an indicator for neither fish nor people. Not a single respondent indicated that vegetation along the shore is a good indicator of habitat for people alone.

Table 24 - Summary of Results from Question 24.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
Fish	62	27	28	30	35	37	32
People	0	0	0	0	0	0	0
Both fish and people (✓)	107	48	53	37	39	58	55
Neither fish nor people	24	11	7	14	15	0	5
Not sure / don't know	32	14	12	19	11	5	8
No Answer	5	-	-	-	-	-	-

Question 25: Which one of the following descriptions do you feel is the best definition of a riparian area?

Eighty percent of the general population surveyed correctly defined riparian areas as an area with water-loving vegetation that borders a lake, wetland, stream or river. Ten percent more of the urban population surveyed correctly defined riparian areas, compared to rural residents. Government and volunteers most often correctly identified the definition of riparian area (95% and 93%, respectively). In contrast, only 71% of the recreation responses correctly identified the riparian area definition. Twenty-one percent of recreational users did not know or were unsure (Table 25).

Table 25 - Summary of Results from Question 25.

Category	Number	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
A waterbody such as a lake, wetland, stream or river	10	4	3	6	3	0	2
An area with water-loving vegetation that borders a lake, wetland, stream or river (✓)	181	80	84	74	71	95	93
An upland area located away from the water	7	3	2	5	5	5	5
Not sure / don't know	29	13	11	15	21	0	0
No Answer	4	-	-	-	-	-	-

Question 26: Please indicate whether you feel each of the following statements about Alberta fish is True or False. (If you're just not sure, please feel free to check the appropriate box!)

Generally, most people knew that fish do not get oxygen from the air and that fish do not lay eggs anywhere in the water at any time throughout the year (Table 26). There were a lower percentage of correct answers to the other questions. Only 40% of the general population surveyed understood that sand or silt on the bottom of a waterbody can damage fish eggs so they cannot hatch successfully. Similarly, only 43% of respondents understood that most of Alberta's lakes and rivers do not rely on stocked fish from hatcheries.

More of those surveyed who live in urban areas answered the questions correctly compared to rural residents. Only 20% of rural residents who responded to the question regarding fish eggs and sand and silt were able to answer correctly compared to 50% of urban residents.

Volunteers (59 to 100% correct answers) and government representatives (58 to 100% correct answers) tended to be more informed about fish habitat requirements compared to those involved with fish through recreation (39 to 86% correct answers).

Table 26 - Summary of Results from Question 26.
Percentage refers to the number of responses that were correct.

Question	Number Correct	Percent of All Respondents	Comparison Between Urban and Rural		Comparison Among Levels of Fisheries Involvement		
			% Urban	% Rural	% Recreation	% Government	% Volunteer
All fish tend to migrate to warmer water as the weather turns cold in the fall (F)	123	55	60	44	58	58	77
Fish can lay their eggs anywhere in the water at any time throughout the year (F)	180	80	87	68	86	84	95
Sand or silt on the bottom of a waterbody protects fish eggs so they can hatch successfully (F)	90	40	50	20	39	58	62
Fish mostly breathe by surfacing to get oxygen from the air (F)	189	84	88	82	85	100	100
To conserve their energy, fish position themselves near fallen trees, rocks and vegetation in the water (T)	126	56	65	38	62	63	63
All fish need about the same amount of oxygen (F)	134	59	62	54	65	68	69
Fish never stop swimming (F)	121	54	58	48	56	68	64
Fish eat more food in the winter months as added protection against the cold conditions (F)	105	47	55	28	58	63	59
Most of Alberta's lakes, rivers and streams rely on stocked fish from fish hatcheries (F)	96	43	45	38	41	58	68

Part 4: For Comparison Purposes – A Little More About You!

Question 27: In what Alberta municipality is your primary residence located? (e.g., City of Edmonton, MD of Willow Creek, Red Deer County)

Of the 211 Alberta respondents, 52% were from the six municipalities of Vulcan County, Medicine Hat, Edmonton, Calgary, Red Deer County and Lac St. Anne County. In total, 58 Alberta municipalities were identified in Question 27 (Table 27). Of the 211 Alberta respondents, 83% were located in the southern half of the province, from the greater Edmonton area, south to the Alberta/Montana border.

Table 27 - Location of Primary Residence for Respondents of Question 27.

Municipality	No.	Municipality	No.	Municipality	No.
Vulcan County	30	County of Leduc	2	MD of Pincher Creek/Willow Creek	1
Medicine Hat	28	Lacombe	2	MD of Wainwright	1
City of Edmonton	16	Lacombe County	2	Minburn County	1
Calgary	15	Sherwood Park	2	Okotoks	1
Red Deer County	11	Athabasca County	1	Parkland County	1
Lac St. Anne County	9	Brooks	1	Peace River	1
County of Flagstaff	6	Canmore	1	Ponoka	1
Strathcona County	6	Clear Hills County	1	Spruce Grove	1
Barrhead County	6	Clearwater County	1	St. Paul	1
St. Albert	6	Cochrane	1	Village of Crystal Springs	1
MD of Foothills	5	County of Camrose	1	Three Hills	1
Lethbridge	5	County of Newell	1	Two Hills	1
Barrhead	5	County of Smokey Lake	1	Vermilion	1
Red Deer	4	County of Two Hills	1	City of Airdrie	1
Saskatchewan	4	County of Wetaskiwin	1	County of Warner	1
Vermillion River County	4	Grande Prairie	1	Westlock	1
Paintearth County	3	Hanna	1	Yellowhead County	1
MD of Rocky View	3	Leduc	1	Non-resident	1
Sturgeon County	3	McKenzie County	1	<i>No Answer</i>	14
Rural Municipality of Wood Buffalo	2	MD of Bighorn	1		
Alberta Beach	2	MD of Bonnyville	1		

Question 28: What type of area is your primary residence located in?

Of the 218 respondents, 70% identified their primary residence as being in a settled area (e.g. in a subdivision, cottage community, village, town or city) and in this survey were classified as urban. The remaining 30% identified their primary residence as being away from any settled area (i.e. not in a subdivision, cottage community, village, town or city) and for the purpose of this survey were classified as rural. Twelve individuals did not answer.

Question 29: Is your primary residence immediately adjacent to a waterbody?

Of the 224 respondents, 74% identified their primary residence as not being adjacent to a waterbody and 26% identified their primary residence as being adjacent to a waterbody. Six individuals did not answer. The results of this question are similar to Question 28 and suggest that most urban residents do not live adjacent to a waterbody and most rural residents do live adjacent to a waterbody.

Question 30: Do you have a secondary residence (such as a recreational property) that is immediately adjacent to a waterbody?

Of the 224 respondents, 14% identified themselves as having a secondary residence that is immediately adjacent to a waterbody and 86% identified that they did not have a secondary residence adjacent to a waterbody. Six individuals did not answer.

Question 31: And a little about your education ...

(A) Have you completed some or all of a post-secondary certificate, diploma or degree in the natural or physical sciences?

Of the 216 respondents, 62% had completed a post-secondary certificate, diploma or degree in the natural or physical sciences and 38% had not. A total of 14 individuals did not answer.

(B) Are you a middle, junior or high school student (in Grades 7 to 12)?

Of the 145 respondents, 23% were a middle, junior or high school student and 77% indicated they were not. A total of 85 individuals did not answer.

Question 32: Which one of the following categories best describes your primary occupation?

The primary occupation identified by the 221 respondents:

- None of the above: 50%
- Agriculture: 30%
- Fish and/or wildlife conservation, protection, education, enforcement or management: 11%
- Engineering or construction of roads, bridges, dams or other water crossings: 5%
- Resource extraction (e.g. timber, oil, gas, coal, etc.): 4%
- Eleven individuals did not answer.

Question 33: And finally, about this survey!

(A) At what event were you given this survey?

Table 28 summarizes the major events where fish surveys were completed.

Table 28 - Summary of Events where Fish Surveys (Hardcopy) were made Available.

Event	Date	Community
Grazing School for Women	June 2007	Vermillion
ASN Annual General Meeting	June 2007	Nisku
Riparian Health Assessment Workshop	October 2007	Calgary
Watershed Planning & Advisory Council (WPAC) Summit	October 2007	Leduc
Grasslands Naturalist Meeting	October 2007	Medicine Hat
Society for Range Management - Climate Change Seminar	November 2007	Red Deer
County Central High School - Science Class	January 2008	Vulcan

(B) In what community did you get this survey?

Refer to the above table for a summary of the communities in which the majority of respondents received the fish survey.

(C) On what date did you complete this survey?

All of the fish surveys were completed between February 15, 2007 and January 12, 2008.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Two hundred and thirty surveys were completed by a diverse group of people across the province, including urban and rural landowners, government and non-government representatives, volunteers and students. The responses received are considered to provide an accurate understanding of Alberta's population with regards to fish and fish habitat.

Part 1 of the survey was designed to find out about Albertan's involvement in fishing and/or fish conservation. The survey revealed that nearly half of respondents had not fished in the previous 10 years (Question 1), and of those that fished, 40% fish one or two times per year (Question 4). The survey suggests that fewer, younger people are becoming involved in fishing and/or conservation activities (Question 3). Since a peak in 1985, the number of active anglers in Alberta has decreased by nearly 40% (Park 2007). While there may be many reasons for declining angling participation, increasing angler age and low recruitment of young anglers are basic factors. The 2005 age-class distribution of licensed resident anglers indicates an increasing proportion of anglers >45 years old, and a decreasing proportion of anglers <35 years of age, in comparison to a similar 2000 survey (Park 2007).

Therefore, a focus group for the 'Magic and Mystery of Fish' presentation should be younger Albertans. Schools are obvious candidates as larger groups of young people (> 20 students) would be available in classrooms. The presentation may encourage younger Albertans to pursue fishing activities, join a conservation group or consider a diploma/degree in biology or environmental science as a career option. Students should be made aware of water-focused conservation groups such as Cows and Fish, Trout Unlimited Canada or Ducks Unlimited Canada and any internship or volunteer opportunities that might be available. Programs such as the Yellow Fish Road Program sponsored by Trout Unlimited Canada could be encouraged in urban environments. In Alberta, two weekends are designated Free Fishing Weekends. During the Alberta Family Day long weekend and for two days in early July (coincident with Canada's National Fishing Week), any person is permitted to fish without an Alberta Sportfishing

Licence. The purpose of these special events is to encourage non-anglers to try fishing, and thereby increase participation. Almost half of Alberta anglers are unaware of the Free Fishing Weekends (Park 2007) so it stands to reason that even fewer non-anglers would be aware of this special event. The ‘Magic and Mystery of Fish’ presentation should emphasize the Free Fishing Weekends to encourage greater participation in angling activities.

Part 2 of the survey was designed to learn the opinion and concerns of the respondents with regards to fish management, conservation and threats to fisheries resources. Nearly 60% of respondents stated there is not enough habitat to provide long-term support to Alberta fish populations (Question 15) and nearly the same percentage believed Alberta waters could hold more fish (Question 8). Most respondents agreed that fish can be an indicator of environmental health (Question 9) and that water sampling and monitoring/counting of fish and other species dependent on water were effective methods of monitoring environmental health (Question 10). The threats to fish that were ranked by respondents indicated that a lack of awareness was the largest threat, followed by municipal/industrial effluent and agricultural practices (Question 16). Although these were ranked as concerns, few people recognized the impact of their own actions on fish and fish habitat (Question 14).

It was made clear by the responses that although people understand the concept of land use management and its link with the aquatic environment, there is a limited understanding of how land use management relates to fish and their habitat requirements (Question 20). Respondents chose pollution prevention (particularly fertilizers/detergents) more often as an action to restore fish and/or habitat over more effective strategies such as riparian management and improved land use management and agricultural practices. While stewardship activities and projects, such as habitat enhancement projects, help people to understand the life strategies of fish, they may provide a false sense of security as 70% of respondents incorrectly believed that fixing fish habitat is almost always successful in re-establishing fish populations over the long-term (Question 19).

A component of the ‘Magic and Mystery of Fish’ presentation should focus on “cause and effect” relationships between land use management and the health of fish and fish habitat. Identifying the benefits of watershed planning and healthy riparian areas and how it links to improved fish habitat and water quality will be important to understanding the human impacts to fish and fish habitat. Identifying ‘best management practices’, such as streamside fencing, catch and release, bridges for off-road vehicles, will provide further insight into links between land use management and fish habitat. The presentation should also show how fish populations are monitored (as well as water quality) and identify how habitat restoration and fish stocking are components of fisheries management.

Part 3 of the survey was designed to test the knowledge of respondents with regards to fish ecology and habitat. The percent correct answers for ecology questions (e.g., temperature and habitat preferences of fish) ranged from 19 to 84% and averaged 49%. Without exception, the rural groups scored the lowest correct response rate for every ecology and habitat question when compared to urban, recreation, government or volunteer groups. To the credit of the respondents, only 33% felt they were fairly or extremely familiar with Alberta fish (Question 7), with most (44%) indicating they were only a little bit familiar. This suggests self-awareness that their knowledge of fish and habitat is limited. An encouraging sign was that 80% of all respondents were able to correctly identify the definition of a riparian area.

A component of the ‘Magic and Mystery of Fish’ presentation should focus on the ecology and habitat of Alberta fish given there was only an average correct response rate of 49% and respondents admitted to being less familiar with fish and habitat. An additional focus group might include rural areas given the lower rate of correct responses amongst this group. The key to success will be to present fisheries information in an informative and appealing format that captures the interest of the audience.

5.0 REFERENCES

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Appendix A – Summary of comments from Question 20.

- Be aware that everyone is in a watershed and know that your actions within the environment will reflect upon the water quality in the watershed area.
- Guide on a river
- Apply less fertilizer - weed & feed to lawns (or make sure applying appropriate amounts). Ensure pollutants are not getting into storm drains in my neighborhood.
- Shore line clean-up. Public awareness.
- Avoid polluting water.
- Do whatever I can to keep gross things out of water, dispose of oil properly, not litter on highways.
- Make sure the lake is healthy, and have control on how many you catch.
- Limit water use in my home, this leaves more water in the natural system for fish to use. Also limit P detergents, pharmaceuticals sent down drain. Education - talk to others about how to conserve water.
- Use biodegradable laundry detergents, ensure water from my lawn stays on my lawn and doesn't run into the street (ending up un-treated into the rivers), obey fishing regulations, join a local fish and game chapter, assist with local initiatives to restore riparian areas, collect rainwater to reduce water usage in my home, avoid using off-road vehicles in sensitive areas (riparian), teach my children about fish and fish habitat.
- Encourage land owners to practice management of their riparian areas to improve fish habitat.
- Low phosphorus detergents, good runoff management.
- Maintain existing riparian region on my lake shore and increase the variety of vegetation (and amount of) on my property.
- Release fish, pick up and keep lakes litter free.
- Riparian restoration, bigger setbacks!
- Recycle, throw less away.
- Better manage land use.
- Contribute to watershed stewardship activities.
- Vote to ban all 2-stroke boat engines.
- Catch and release is a good a good maintenance idea in some lakes.
- Protecting water resources on personal property.
- Make sure the water they are living in is clean and healthy.
- Water cows out of troughs instead of directly out of water body or river.
- Good watershed management large and small.
- We can do more to protect the few riparian areas on our ranch, through exclusion fencing and / or limited, controlled grazing management.
- As a farmer limit the amount of chemicals and fertilizer contamination to water of any type.
- Care for riparian areas on our farm.
- Clean up the lakes.
- Be involved with a local watershed stewardship group.
- Ensure that I do not pollute - land use - areas along creeks, rivers, lakes, swamps, etc.
- Maintain a large, healthy riparian area.
- Spread knowledge and information to those who live and recreate in/near water bodies.
- Being conscience of litter in our environment. Cleaning up ditches around our property and in or around our local creeks and rivers to minimize contamination into our bodies of water.
- Determine appropriate regulations for land use and provide monitoring and evaluation of choices.
- Leave your shoreline (riparian) area natural and encourage your neighbors to do the same.
- I've thought for the past year to contact my MLS regarding fishing in the foothills. Fishing on the McLeod River is now done by 4 X 4, RV's and quads with the damage being done by quads

driving from gravel bay to gravel bay up the fall line of the river. No boats are used, but the result is that fish populations are too accessible and very depleted. It's too late for catch limits and size regulations - the horses are no longer in the barn; the fish have left the building. Quads should not have unlimited access to the full length of foothill streams and rivers.

- Leave shoreline habitat natural at lakeside cottage and encourage neighbors to do the same.
- Planting trees and shrubs along riparian zones.
- Help to improve habitat conditions and to continue not to fish.
- Maintain/improve riparian areas along lake front property.
- Use environmentally friendly, non-chemical household products.
- Plant a tree.
- Take the opportunity to let people know how important it is to look after your watershed.
- Learn more and share info. Look at our farming practices. Keep watch and learn more about oil and gas activities. Where I can, assist influencing standards/practices.
- Ensure that runoff is contained and runs through a buffer strip before entering a river.
- Maintain healthy aquatic ecosystems.
- Stream bank restoration. Development of offstream watering sites.
- Public awareness.
- Protect lakes and watersheds.
- Talk to the government and fisheries people and offer ideas and observations.
- Become informed.
- I could try and educate as many people as I could, as I am fishing. I would also like to take kids out and teach them how best to fish.
- Education.
- When spraying or fertilizing along water areas keep away so there is no residue going into water body.
- Increase awareness within my community.
- Stop fishing so much, watch what kind of chemicals I use on my crops, that could potentially go into a water source with fish.
- If the waterbody/wetland is losing riparian, try to plant more shrubs/trees/vegetation and encourage vegetation to grow. As you know, fish like roots and vegetated riparian most likely.
- Reducing my water consumption.
- Donate money to TUC.
- Protect riparian habitat.
- Volunteer for planting event.
- Only take what you need. Stay out of sensitive riparian environments with ATV's and other.
- Don't overfish. Don't litter shorelines or degrade while fishing.
- Institute a riparian policy, much like the wetlands policy, to protect riparian areas.
- Encourage the town planners to reduce the size of homes - i.e. reduce impervious surface
- Become more aware and educated on the fisheries current state to make more informed decisions on my actions.
- Have fenced the cattle off the creek.
- Ensure no garbage/pollutants enter water systems.
- Ensure that chemicals used in washing vehicle do not get into storm water system.
- Minimize personal negative impacts on watershed pollution, conservation, catch and release.
- Catch and release.
- The support, maintenance of the wetland habitat of riparian or/and the watershed as a whole. The watershed must be healthy to maintain healthy ecosystem, and biodiversity.
- Become involved in conservation/user groups to help inform others, become involved in decisions, make recommendations to management agencies, guide direction of research, river clean-ups, etc.

- Lobby the government to put more money toward the fishery resource in Alberta. Habitat improvement, population inventory and stocking programs all require more money.
- TU fish rescue programs irrigation canals, catch and release carefully and exclusively.
- Support local watershed stewardship groups.
- Avoid allowing contaminants from my yard reaching a water body - chemical fertilizers, pesticides, car washing, etc.
- Work for or volunteer a conservation organization that works on fish habitat protections/enhancement.
- Get involved in water management and land use management near water.
- Practice on-site storm water management (rain barrels, infiltration garden) and/or promote these practices.
- Work as a volunteer to assure a healthy watershed.
- Maintain riparian vegetation in ephemeral streams to assist with water quality maintenance in the watershed.
- Volunteer/organize restoration of wetland and riparian habitat.
- Maintain a healthy distance from creek when planning septic fields.
- No keep any more than you need.
- Reduce amount of commercial chemical and fertilizer use on lawns, etc.
- Restoration of stream beds combined in the fencing off and improvement of riparian areas.
- Help repair vegetation along bankshores.
- Do not introduce non-native species, respect angling rules and regulations, protect riparian habitat, etc.
- Try to improve riparian areas quality.
- Do not use ornamental lawn and garden products for enhancing growth or reducing weeds.
- Keep fertilizers and pesticides away from water bodies. Maintain riparian areas around lakes and rivers. Cordon off cattle from entering lakes and rivers - have dug outs. Follow the fishing regs for each area.
- As there is a natural pond at the bottom of my subdivision I can ensure that fertilizers and chemicals are not used in my neighborhood to eliminate runoff into this pond.
- I believe practicing proper fish handling techniques along with self educating of fish habitat can maintain a fishery.
- This province has lack the direction by our politicians in maintaining our fish resources, lack of fish hatcheries.
- Use barbless hooks, handle fish carefully and don't keep them out of water for long if releasing them.
- Make more bodies of water follow similar regulations as those used in Bullshead Reservoir in SE Alberta. You have great fishing, excellent population and only occasionally are fish harvested. This action to change regulations at Bullshead was a complete success.
- Become aware and involved in the health and stability of your watersheds.
- What I put into my effluent water.
- Tell the different levels of government to make our environment a priority and give all the different agencies involved enough resources to do their job effectively. . . Without political interference.
- Become more knowledgeable about Alberta's fish populations and the impacts my personal choices have on them.
- Prevent the destruction of fish habitat around lakes. There are too many instances where subdivisions have been built along the edge of a lake and people promptly remove the natural habitat and try to replace it with a city or town landscape. No one should be allowed to own property right up against a lake front. Invariably they will claim the crown land and start modifying lake frontage. We need to have a strong education and awareness program developed. Also we need better enforcement of existing regulations.

- Join or support organization aimed at promoting the protection/retention of natural shoreline habitat diversity. Better management of storm water from own property.
- Do not dump pollutants down the drain that can be disposed of safely.
- Participate in riparian restoration projects.
- Ensure the growth of our community has no adverse impact on the Sheep River.
- Use less water for household and gardening purposes, use the 'catch and release' policy when fishing, avoid sending water and pollutants down the storm sewer drains.
- Provide education in grazing management of pastures in watersheds and riparian areas.
- Besides practicing catch and release practices I can encourage off-highway vehicle users (quads) to be responsible in how they practice their sport.
- Help with a fish restoration program such as FINS.
- I could recycle more and try to make my ecological footprint smaller.
- Stop putting waste into the water that fish are swimming in.
- Increase the harvest of non-native fish species that are competing with natives. Introduce vegetation (appropriate) along streams with rip-rap/slumping banks, etc.
- I could not fish as many fish, or if when I do don't keep as many, put some back.
- I could stop littering or dumping in rivers or lakes.
- I can try to make my economical footstep.
- Banning fishing in some seasons, make sure they have habitats, food that is clean.
- Help restore habitats at my dugout.
- Don't put waste into lakes.
- Be very careful with disposing of chemicals/fertilizers/paints.
- Educate our children.
- Don't use pesticides on my lawn, take water quality samples in creeks in Medicine Hat for studies.
- Take water quality samples in lakes and rivers.
- Encourage Ab. Env. To monitor fish habitat for sufficient quantity of water to maintain good quality of water for the fish. Convince people that healthy riparian areas are necessary, that not all water needs to be used up.
- Reduce the amount of water use and the amount of cleaners/detergents I put/use in the water.
- Stop polluting, tell others.
- Don't fish
- Don't fish
- Maintain our wetlands. Restoration of lost wetlands.
- Be careful of waste which could get to waterways.
- Use no known harmful chemicals that go into sewage.
- Catch and release

Appendix B – Number of Respondents by Group to Each Question

Question No.	Number of Respondents					
	Total (n=230)	Urban (n=153)	Rural (n=65)	Recreation (n=67)	Government (n=19)	Volunteer (n=40)
<i>PART 1: Alberta's Fish – And You!</i>						
1a	227	151	65	n/a	n/a	n/a
1b	224	n/a	n/a	n/a	n/a	n/a
2	148	108	44	n/a	n/a	n/a
3	149	101	65	66	19	40
4	152	104	42	67	19	40
5	116	79	32	67	11	20
<i>PART 2: Thoughts on Managing Alberta's Fish</i>						
6	221	152	58	65	19	36
7	221	152	58	65	19	37
8	219	152	57	65	19	39
9	222	153	58	65	19	37
10	229	153	59	67	19	37
11	230	n/a	n/a	n/a	n/a	n/a
12	229	153	64	67	18	40
13	227	153	62	66	17	40
14	229	152	65	67	19	39
15	229	153	65	67	19	40
16	230	n/a	n/a	n/a	n/a	n/a
17	230	153	64	67	19	40
18	230	153	65	67	19	40
19	230	153	64	67	19	40
20	206	n/a	n/a	n/a	n/a	n/a
<i>PART 3: Fishy Facts</i>						
21	206	151	65	65	19	39
22	223	150	64	64	19	38
23	230	149	64	64	19	38
24	225	152	64	66	19	38
25	227	152	65	65	19	40
26	230	153	65	66	19	39
<i>PART 4: For Comparison Purposes – A Little More About You!</i>						
27	230	n/a	n/a	n/a	n/a	n/a
28	218	n/a	n/a	n/a	n/a	n/a
29	224	n/a	n/a	n/a	n/a	n/a
30	224	n/a	n/a	n/a	n/a	n/a
31a	216	n/a	n/a	n/a	n/a	n/a
31b	145	n/a	n/a	n/a	n/a	n/a
32	221	n/a	n/a	n/a	n/a	n/a