



Ecosystem Services Approach Pilot on Wetlands

An Exploration of Approaches to
Understand Cultural Services and
Benefits to Ecosystem Service
Assessments

November 2011



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About This Report

The Ecosystem Services (ES) program within Alberta Environment and Sustainable Resource Development (ESRD) has been advancing the use of an ES Approach within the Department and Government of Alberta since 2007. The Ecosystem Services Approach Pilot on Wetlands (ES Pilot) is part of the Department's 10-year ES Roadmap; its completion and results are considered a progression in understanding and applying an ES Approach to support decision making.

The combined complexity of ecosystems and interactions with people, including the functions, services and benefits they provide, is a challenging new arena for science. The work of this pilot team and the results presented are a step forward in building an understanding and knowledge of ES and using an ES Approach. However we caution the reader that there is more work to be done, both in Alberta and globally, to strengthen the meaning and use of ES Approach results. Therefore, there are limitations in the information presented. The results need to be considered advancements in ES knowledge in Alberta, but considered 'pilot results' with caveats. Based upon advice and experience of international experts it is understood that the work to assess ES within a strong policy context, and using knowledge from multiple disciplines, is leading edge, and attempts were made to ensure the pilot and results presented are credible, legitimate and policy relevant. Globally, there are no international standards, methods or processes for conducting an ES assessment.

This report summarizes the socio-cultural studies completed during the ES Pilot. There are a number of complementary deliverables prepared for the ES Pilot including: an Integrated Assessment Report that summarizes the results for a technical audience, an ES Approach Report that focuses on methods and process, a Project Evaluation Report, a Summary Report for Decision makers and a Summary Report for a general audience. In addition there are a number of technical reports including: reports for various components of the biophysical assessment, and a socio-economic report. As such, a detailed overview of the methods used is not included in this report. The combined deliverables for the ES Pilot together provide all the key elements for understanding the results, the methods, project evaluation and the learning's from the Ecosystem Services Approach Pilot on Wetlands that can support future work on ES in Alberta and internationally.

The socio-cultural work completed does not necessarily capture all potential cultural services and/or benefits that may be associated with the wetland under investigation or wetlands across Alberta. While attempts were made to be comprehensive in the selection of cultural services and benefits to investigate, as well as methods selected and analysis undertaken, there may be other cultural services or benefits, or other conceptualizations of these services and benefits, relevant to the study site. As such, further inquiries are likely necessary and would likely prove beneficial to an increasing understanding about cultural services and benefits related to wetlands in Alberta.

Executive Summary

This report describes the socio-cultural tasks which contributed to the Ecosystem Services Approach Pilot on Wetlands.

Background

Ecosystem services ('ES') are the benefits that nature provides to people. Some ES benefits, such as crops, are familiar and tangible. However, other ES, such as water filtration and carbon storage, are hard to observe, not widely understood and are underestimated or unaddressed in decision making. Ecosystems provide innumerable services that are underrepresented or absent in most economic development decisions, even though these services contribute to development objectives (e.g., scenic quality of the land) and to realizing quality of life goals. Identifying and understanding many of the services from wetlands can provide more information to decision makers, which may help to prevent unintended consequences from development decisions.

Wetlands, and the regulatory approvals process for residential subdivision development in southern Alberta, were the focus for the ES Pilot. Wetlands are an integral component of Alberta's diverse landscapes and provide a wide variety of ES. For example, if managed properly, wetlands can provide water filtration and groundwater recharge, contribute to flood prevention, and provide habitat for numerous species of interest to naturalists and hunters alike. Many wetlands also have important socio-cultural value because they provide recreational, heritage and scientific/educational opportunities. As improvements are made in describing and valuing the benefits of ES, decision makers can better understand how their decisions might change (positively or negatively) the condition, quality and/or quantity of ES that could have an impact the well-being and quality of life of Albertans, and the businesses that operate in the province.

The Ecosystem Services Approach Pilot on Wetlands (the ES Pilot) is part of a program within Alberta Environment and Sustainable Resource Development to develop the practical use of the concept of ES. In earlier work, in the South Saskatchewan River Basin, an overall ES assessment approach was identified, building upon previous studies, including the Millennium Ecosystem Assessment. The ES Pilot had two specific targets: to test the ES assessment approach and to show how ES assessment can contribute to practical decision making about wetlands during the development of subdivisions in the Shepard Slough wetland area east of Calgary.

Discussions with local decision makers identified three gaps in their ability to make local wetland decisions. They asked the project to provide information to assist with those gaps, which were:

1. There is insufficient evidence to support avoidance, minimization and compensation decisions on wetlands.
2. There is insufficient consideration of cumulative effects and long-term consequences of decision making.
3. There is limited ability to communicate the 'values' of wetlands.

Most work in previous ES assessments has described the biophysical attributes and trends of the landscape and its ES, and determined economic valuations for their benefits via market prices or calculations of surrogate monetary estimates. Although socio-cultural ES are often discussed, they are often more difficult to address in detail than are scientific and economic analyses. In the ES Pilot, special attention was directed towards socio-cultural services, and specifically ways to help bring their non-monetary aspects into the ES assessment and valuation processes. Some aspects of socio-cultural services could be addressed with economic tools, such as monetary estimates of recreation benefits and the effects of near-wetland location on housing prices. They are described in the Economic Valuation Technical Report.

Main Tasks and Results

This report describes the steps and results of three socio-cultural work tasks which explore different aspects of how people assign value, otherwise referred to as importance, to different features of wetlands and the services and benefits they provide. A values survey conducted in the study site collected resident responses to questions about the importance of wetland features and their management. Survey results were interpreted to determine 'value orientations'. A thematic analysis, of written information in publicly available documents that focused on the provincial Wetland Policy, revealed themes about wetlands and their management. A benefits ranking exercise showed the relative importance that stakeholders, living and/or working in the study area, assigned to different wetland services and benefits.

These socio-cultural tasks evolved with the ES Pilot. The values survey was initiated early in the pilot. The thematic analysis and benefits ranking were begun thereafter. The results of all tasks provide insight into the three gaps and support a developing understanding of the processes of ES assessment. The three work tasks and their major results and implications are described below. Additionally, a description is provided on how the categories of socio-cultural services were identified.

Defining Socio-cultural Services and Benefits

Before socio-cultural services could be carefully considered, they needed to be defined. The existing literature is not consistent in how it describes socio-cultural services, and is less consistent in its description of the benefits people derive from them. Drawing on the literature and guided by the purpose of the project, three categories of socio-cultural ES were identified:

- Recreation and tourism services – opportunities for recreational activities, including: hiking, walking, birding, sport fishing, etc.
- Heritage services – physical artifacts and intangible attributes that an ecosystem can provide.
- Education and research services – activities that provide learning opportunities and/or permit investigations into phenomenon.

The sub team also identified eight major categories of benefits that people derive from those services: aesthetics, sense of place, sense of belonging / sense of self, mental wellness, physical wellness, spiritual and/or religious connection, inspiration and traditional use. While these terms provided a working framework for the socio-cultural tasks, the literature continues to evolve and discussions of socio-cultural services are

very active. Future projects will need to revise this vocabulary to complement the then-current state of the art.

Three challenges were encountered in approaching the socio-cultural ES; first, different services can each provide multiple benefits, and some benefits can be derived from different services. Second, these services and benefits can be derived both locally (e.g., from an individual wetland) or from a landscape more generally (e.g., on a walk or drive across a region). Third, wetlands can provide people with both tangible and intangible services and benefits (e.g., from walking to inspiration) which are usually approached differently.

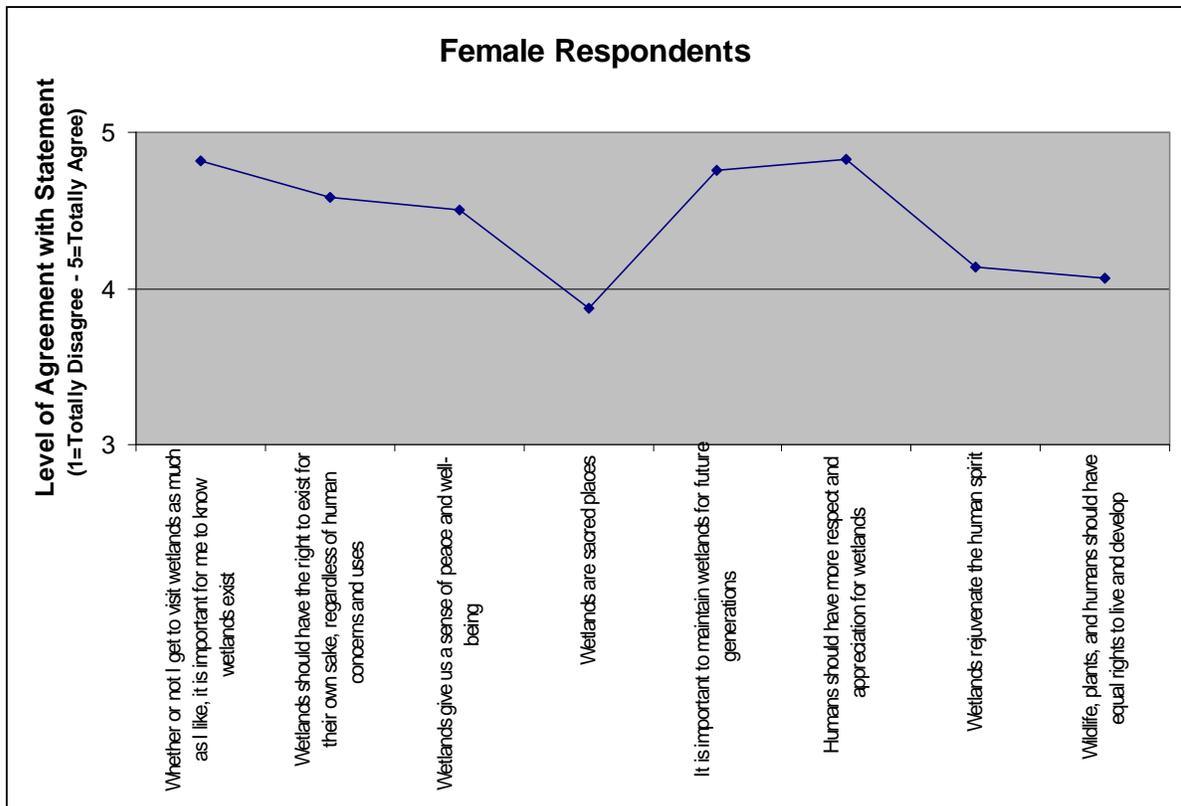
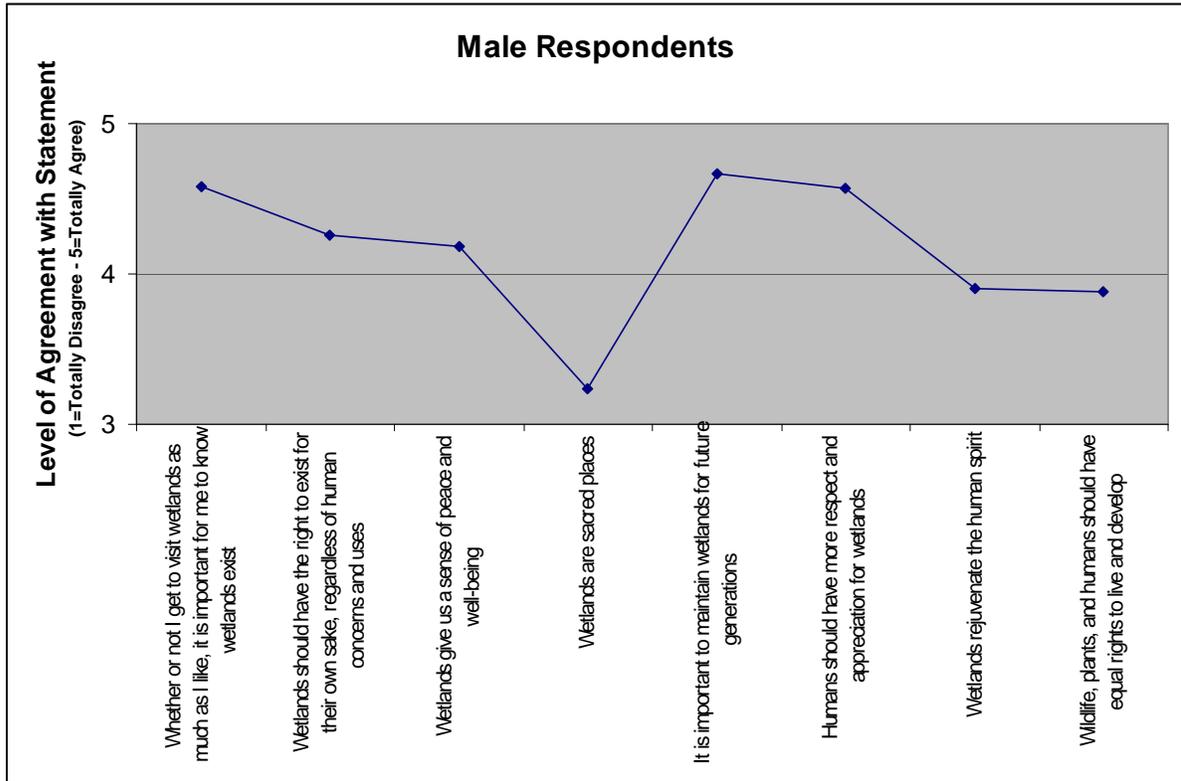
Values Survey

Previous literature suggests that people in many places have nature-oriented (biocentric) and/or human-oriented (anthropocentric) 'value orientations'; these are overall perspectives which tend to influence more particular decisions about what is important and how people should act towards nature. A central question raised in the ES Pilot, do similar orientations exist in relation to wetlands in southern Alberta, and if so, to what extent? A survey containing 73 questions was sent to a random set of residents of the study area. The questions sought some short written answers, but most questions asked respondents to respond to statements with options from 'strongly agree' to 'strongly disagree', or true/false responses. The formatting and structure of the study were based upon a previous survey of forest values, conducted by McFarlane and Boxall (2000): some of their questions were repeated with the word 'wetlands' replacing 'forest' and a variety of wetland-specific topics were added. The questions addressed:

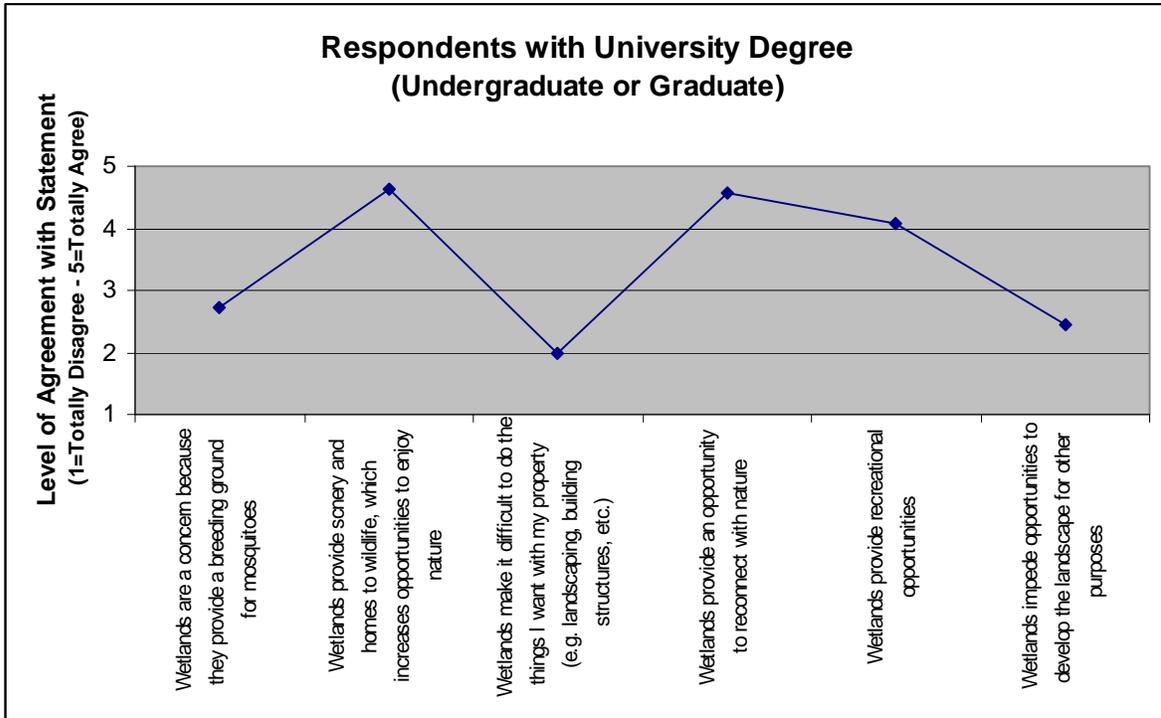
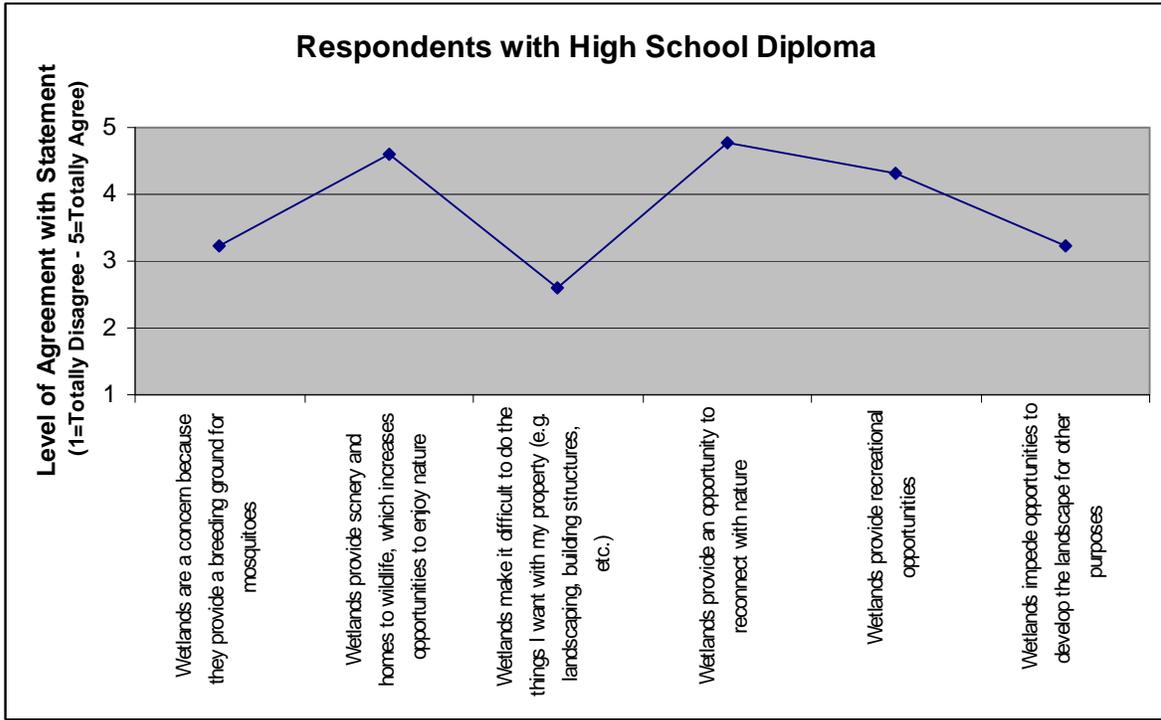
- *Socio-economic information* – respondent's age, gender, educational level, total household income, and affiliation with a specific interest group;
- *Wetland values* – a variety of questions about different categories of services and experiences with wetlands;
- *Knowledge of wetlands* – statements that measure familiarity with basic wetlands facts; and
- *Perspectives on wetlands management* – statements that measure familiarity with wetlands management as well as personal opinions on management.

The results were analyzed in two ways. First, the scores for each question were calculated and many were then compared to demographic data. These descriptive statistics showed that residents of the study area were largely positively inclined towards wetlands. The first two figures displayed below show that the scores for different questions about wetland values all ranked at the higher levels of agreement. The third and fourth figures show responses to questions about wetland management. The data also showed positive attitudes towards how wetlands were used. The results were consistent across different demographic segments of the respondents. There were no statistically significant differences in responses by age, gender, education, or occupation, although males were slightly more utilitarian in orientation than females.

Summary of responses to eight questions about feelings towards and importance of wetlands



Summary of responses to six questions about usefulness and management of wetlands



In a second analysis, the data from different questions about values and about management use, respectively, were assessed via factor analysis. This technique identifies statistically significant patterns in responses, grouping statements that tend to be answered in similar ways, and revealing likely underlying concepts that have similarly guided many respondents in the way they answer the questions.

The data about wetland values revealed three major factors. One factor was interpreted as being similar to a nature-oriented (biocentric) value orientation, where wetlands are seen as important for their own sake, independent of human uses for them. A second factor was interpreted as being similar to a human and utilitarian orientation (anthropocentric), by which respondents gave value to wetlands based upon their usefulness to people. A third factor was interpreted as being somewhat intermediate between the biocentric and anthropocentric orientations, in which people were oriented to value wetlands for what they can provide human wellbeing as well as for their own right. These factors appeared to be situated on a values continuum, where the more nature and more anthropocentric orientations were at opposite ends.

Similarly, data from questions on wetland management also revealed three factors. One factor was interpreted as representing a management viewpoint that believes current wetland management serves wetland protection and sustainability needs. Another represents a perspective that economic development should be considered a higher priority in land management than wetlands. The third factor seems to represent the idea that wetland management needs to be grounded in the local context and allow for local decision-making.

These results reveal the perspectives within the local community. Residents in the study area show a broad-based recognition that wetlands are important to them. This was not a mild response or one with wide variation within the community. Wetlands are seen to be important to almost all respondents. There is more diversity in the lines of reasoning for the valuing of wetlands. Both the absolute value of wetlands as parts of nature, the biocentric orientation, and the importance of wetlands as resources for people, the anthropocentric orientation, and the more management focused perspective in the ecocentric orientation, are reflected in people's views.

The most important feature of considering value orientations is that those orientations are likely to be very influential in the specific decisions people make about wetlands and their use. An ES approach is founded upon the recognition that anthropocentric orientations are widespread, and the ES approach provides data to help make human-centered decisions more informed. However an ES approach is not opposed to views that nature has an importance which is separate from people. ES can be quite complimentary with other perspectives on importance. The opinions of local residents seem compatible to the use of ES as a source of information to add to their tools for understanding and managing their local environment.

Thematic Analysis

The wetlands thematic analysis explored written information in publicly available documents concerning wetland policy in Alberta. These were comments made by members of the public, industry, non-government organizations and government agencies represented in public documents and newspapers describing their ideas related to wetland policy discussions. The written text was carefully reviewed and

sections of text that referred to particular ideas (themes) were extracted and compiled. Major ideas that were similar across many documents became the major themes. These public statements were about wetlands and wetland policy across all of Alberta, and are thus more general than the values survey information, which sampled residents in the study area.

The three major themes that emerged from the thematic analysis were: management of wetlands, benefits of wetlands and education relating to wetlands. Some themes revealed that Albertans felt wetlands should be managed with care, some being more concerned with protection of wetlands for their value as natural features. Other people were more concerned with conservation of wetlands for the usefulness to people. Wetlands were described as beneficial for their services to people, or simply in their own right. Comments about education described public and school education to support conservation or preservation of wetlands.

These results offered another perspective on the importance that Albertans ascribe to wetlands. They show that the ideas distinguished in the study area (through the wetlands values survey) are similar to management viewpoints held within the broader provincial context. Nature is seen as important in its own right and for its contributions to human wellbeing, and management and education were recommended to both protect nature and to conserve resources.

Benefits Ranking

Fourteen invited stakeholders, with professional experience related to wetlands in the study area, responded to two questionnaires after a workshop explaining the ES associated with wetlands. One questionnaire allowed stakeholders to rank the ES Pilot's twelve priority ES (including the socio-cultural services) compared to each other. The other ranked different socio-cultural benefits of ES. Stakeholders ranked the items based on their best estimates of how relatively important (high, medium or low) the twelve ES would be seen to be by individuals, their own stakeholder group, and society in general. Scores from all stakeholders were totaled and ranked.

The results, in the table below, showed stakeholders ranked utilitarian, water-related services of wetlands highest. Cultural services and benefits, even very intangible ones like aesthetics, were ranked quite highly, sometimes as highly as the water-related services. Aesthetics, where they were conceptualized as being both a service and a benefit in this study, as well as, recreation and tourism, and scientific and educational services, were ranked as being comparable with such tangible economically significant benefits as erosion control, crops, pollination and carbon storage. The rankings of cultural benefits gave similar results. Some tangible benefits like wildlife viewing and hiking ranked highest, but intangible benefits, such as sense of place and inspiration ranked comparably with tangible benefits including photography, hunting and fishing.

These rankings, which permit direct comparison of different services and benefits on non-monetary grounds, complement the data from the values survey and thematic analysis. They show that the stakeholders gave high ratings of importance to all the services provided by wetlands. They showed that cultural services and benefits, particularly science and education, and recreation and tourism, were just as significant to stakeholders as most other services from wetlands, although not quite as significant as water filtration, quantity and flood control. In one ranking, aesthetics was the second

highest ranked service, behind water filtration. Although traditional use did score at the bottom of the rankings, wetlands may have fewer features used for traditional features than some other aspects of land and land use. Further, the opinions of First Nations people were not directly represented and if they were, different rankings may have resulted.

Stakeholders’ perspectives on the relative importance of different ecosystem services to individuals, the groups they represented and society overall

	Individuals	Stakeholder Group	Society
Water filtration/purification	1	3	1
Aesthetic (beauty and enjoyment)	2	6	8
Water quantity regulation	3	1	1
Flood control	4	2	3
Science and Educational Value	5	8	10
Recreation and tourism	6	5	5
Erosion control	7	4	4
Pollination	8	11	5
Food Crops	9	7	10
Soil formation	10	10	7
Carbon storage	11	12	8
Traditional Use	12	9	12

Specific Information about Three Gaps

This information from the three methods can help in the planning and decision making phases of wetland approvals. Knowing that ordinary citizens recognize and give importance to many features of wetlands can help developers and regulators see wetlands in broader perspective. This information can help address the specific avoidance, mitigation and compensation decisions that must be made. The broad perspective on wetlands demonstrated here also contributes to the long-term and cumulative effects perspectives. Knowing that people are aware of wetlands as important features of the landscape can help support decisions or planning studies that show their long term merits and cumulative contributions to aquatic ecosystems, agriculture and urban society.

More broadly, these tasks contribute to understanding and communicating the value of wetlands. All three of these projects show that people think wetlands and the services they provide are important to them. These projects show that people have value orientations that recognize both the utilitarian merits of wetlands and that nature is important in its own right. They show in detail the many services and benefits that people identify from nature, and how they rank some of them relative to one another. This information directly adds to the ability of decision makers to understand and incorporate public values and preferences towards wetlands in their decisions: the public knows about wetlands and considers them important. The various tables and diagrams from these projects, or more sophisticated and detailed variants, could be used to help portray that information to others.

Limitations and Overall Conclusion

The work tasks described here have similar limitations. They were all relatively simple studies. The selection of particular services and benefits to explore was based upon current literature, which is still evolving, and could be refined in future. The two work tasks which acquired data from people (values survey and benefits ranking) had quite small samples, which could have been larger and more comprehensive; this may impact the robustness of results and warrants further inquiry. The questions for the benefits ranking were particularly simple and could be more comprehensive and better pre-tested. The thematic analysis used data from all of Alberta and thus not from the study site. In general, the results of the socio-cultural projects were all modest. They are suggestive rather than conclusive and should be taken as indications of what people think rather than firm documentation.

Nonetheless, the consistency of the results from these different projects suggests that they realistically show Albertans find wetlands important, in general. Albertans and local residents find both human-oriented, utilitarian benefits from wetlands and also broadly believe that nature has merits in its own right. Their different value orientations help lead them to support management of wetlands, to conserve resources or protect nature; or quite often, to do both. While stakeholders find tangible water-related services of wetlands to be most important, the intangible cultural services of wetlands are important too, where benefits from such services seem roughly comparable in importance to many of the more tangible or economically measurable benefits. Thus it might be important for decision makers to continue to examine these and other aspects of cultural services, in parallel with economic and scientific studies of wetland ES. If further information is desired, these and other kinds of socio-cultural studies can be expanded upon in future.

1.0 Introduction to this Report

The ES Pilot team work was premised on the understanding that ES significantly contributes to human wellbeing in a number of tangible and intangible ways. The tangible services and benefits include such things as flood control or provisioning of quality water supplies, while the intangible services and benefits includes such things as the activities or experiences within a natural setting and the sense of place and mental wellness generated from such activities and experiences (Costanza et al., 1987). In order to identify the 'value' or 'importance'¹ of ES to human wellbeing relative to the study area, a six step ES Approach, modified for Alberta Environment and Sustainable Resource Development from the World Resources Institute (WRI, 2007) was applied. During the early planning stage, the team noted that many ES assessments do not uncover the nuances in how, why and what people ascribe importance to in terms of wetlands, their services and the benefits they provide. Economic valuation provides some tools to look at the cultural values but they are not meant to assess these nuances (Gregory et al., 1993). This insight led to the addition of a socio-cultural sub team². The sub team sought to understand the ethical and non-monetized value orientations people hold for wetlands, as well as better understand what this might mean for ES and wetlands. Specific focus was given to the cultural services and benefits that are attributed with functioning wetlands.

The sub teams were to be informed by and to inform the three gaps of the ES Pilot that were identified by wetlands approvals decision makers. The goal was to provide information provided to contribute to current wetland approvals. The three gaps were:

- There is insufficient evidence to support avoidance, minimization and compensation decisions on wetlands.
- There is insufficient consideration of cumulative effects and long-term consequences of decision-making.
- There is limited ability to communicate the 'values' of wetlands.

Overall, this report:

- Documents the perspectives of the socio-cultural sub team, as well as considerations for methodology and methods selected for the ES Pilot;
- Provides an analysis of the value orientations³ and viewpoints on management that people in Alberta have, and how this relates to the ES Pilot;
- Discusses the sub team's lessons learned, limitations to the work, and recommendations for future work; and,
- Is a source document for team members and external experts to ensure a shared understanding of the socio-cultural assessment in ESRD's ES Pilot.

¹ In the socio-cultural sub team's work, values are referred to in terms of *relative importance to people*. Alternately, this sub team understood value can also be measured in terms of *relative worth to people*, which largely attempts to portray such value in monetary terms and thus is an economic conception of the word.

² The definition for socio-cultural sub team is later discussed.

³ This term is defined in the methodology section of this report, related to the conceptual framework of the socio-cultural sub team. However, for the purpose of clarity, value orientations refers to the ethics embodied by a person or group, which are constructed by people living in a particular place whom encounter various information and experiences that act to shift or enhance a person's understanding of the world around them.

This report is organized into five sections:

Section 1 introduces the Ecosystem Services Approach Pilot project and provides a brief overview of the case study area, wetland ecosystem services and why a socio-cultural assessment of wetlands services and benefits is crucial in this context. This section also explains the sub team's orientation to the work, including how cultural services and benefits are defined and what methods were used.

Section 2 discusses the wetlands value survey, including the methodological approach to the work and methods used. An analysis of survey results and discussion pertaining to the relevance of the results to the ES Pilot's three gaps is also provided.

Section 3 discusses the thematic analysis of publically available documents related to the wetlands policy in Alberta and provides an analysis and discussion of results in relation to the ES Pilot overall.

Section 4 focuses on the benefits ranking exercise completed with stakeholders, as a way to provide additional information to refine the sub team's understanding of what wetlands ecosystems services are important to people, and to some extent, why of rank-ordering the service.

Section 5 summarises overall learning and describes recommendations for future work based on what was found from the socio-cultural sub team's assessment.

1.1 Context of the Ecosystem Services Pilot and Socio-cultural Sub team

Ecosystem services ('ES') are the benefits that nature provides to people. ES provide innumerable services that are underestimated in most economic development decisions; however, these services contribute to development objectives (e.g., scenic quality of the land) and to realizing quality of life goals. For example, the flood control service of wetlands can help to protect homes, infrastructure and communities during extreme weather events.

The Ecosystem Services Approach Pilot on Wetlands ('ES Pilot') was initiated in 2010 as one of the short-term and medium-term goals of Alberta Environment and Sustainable Resource Development's Road Map for Ecosystem Services in Alberta⁴. The Road Map articulates a strategy for integrating ES into Alberta Environment and Sustainable Resource Development's governance, policy and programs: "The ES Pilot contributed to the short-term goals of enhanced appreciation and understanding of ES in policy, planning and decision making".

The ES Pilot focused on assessing the benefits that people acquire from wetlands in a qualitative, quantifiable and comparable way. Wetland ecosystems are an integral component of Alberta's diverse landscapes and provide a wide variety of ES. For example, wetlands filter and recharge freshwater, contribute to flood prevention and provide habitat for numerous species of interest to naturalists and hunters alike (Water for Life, 2008). Many wetlands are also important to people because they provide recreational, tourism, heritage and educational or research opportunities. Like other ES, these cultural services give rise to benefits, but these benefits are more often abstract, making them more difficult to identify and quantify.

Many cultural services, and more precisely the benefits derived from these services, fall into the "difficult to define" category and often go unaddressed in decision-making. Providing ways to identify all of the services, including the many intangible but nonetheless significant benefits produced by wetlands, can provide more complete information to decision makers. This may help prevent unintended consequences from development decisions resulting in wetland loss (Ranganathan et. al., 2008).

Textbox 1 – ESRD's ES Road Map sets out the goals and path forward to support integration and adoption of the ecosystem services approach. Adopting an ecosystem services approach will support and enable ESRD's work on cumulative effects management, policy development, planning, and decision making.

Short term goal (now-1 yr): An enhanced appreciation and understanding of an ES approach to supporting policy, planning, and decision making is identified and supported by all levels of relevant management in ESRD.

Medium term goal (now-3yrs): The importance of ES is better understood and the department has increased its capacity for quantitative measurement of ES on the landscape to support policy, planning, and decision making within ESRD.

Long term goal (3-7yrs): A strong qualitative and quantitative capacity exists within the department to enable the ecosystem services approach to be common practice within ESRD's policy, planning, and decision making processes.

⁴ For information on the ESRD Ecosystem Services Roadmap, please contact ESRD at Gillian.kerr@gov.ab.ca.

The ES Pilot focused on prairie pothole wetlands in an area encompassing the east part of the City of Calgary, the Rocky View County and the Town of Chestermere (Figure 1). These wetlands are under considerable pressure from population growth and land-use development such as urban expansion, agricultural drainage, natural resource extraction and road construction.

The scope of the ES Pilot was determined in the fall of 2010 through discussions with wetland experts, regional government staff and biological/ecological/economic experts from ESRD, other ministries and other institutions. The outcome for the pilot was established as: “the development and operationalization of an ES Approach to provide a tool to enhance decision making”. In addition to the outcome noted above, the Steering Committee agreed to the following objectives:

- Test and demonstrate how an ES Approach can be used to support decision making by explicitly demonstrating the tradeoffs between development and ES benefits provided by wetlands; and
- Support wetland management in the province by providing additional information to support potential compensation decisions related to land-use development.

Additionally the ES Pilot team identified information and capacity gaps for ES assessment to support future ES work. For more information on the overall pilot please see the Integrated Results Report.

To address the first objective, it was important to understand that in the current wetlands approvals process for residential sub-division development in southern Alberta jurisdictions (e.g., City of Calgary and Rocky View County), the full array of benefits that wetlands can provide to people may not be accounted for. As well, these benefits are often unaccounted in ESRD’s current wetlands approvals decision-making process. What can result is that development approvals decisions are made without a complete understanding of individual and cumulative ES benefits that may be improved, degraded, or lost as a result of a residential development.

To address these issues, wetlands approvals decision makers involved in the ES Pilot identified several critical gaps in the wetlands approval process. The ES Pilot was designed to help address three gaps:

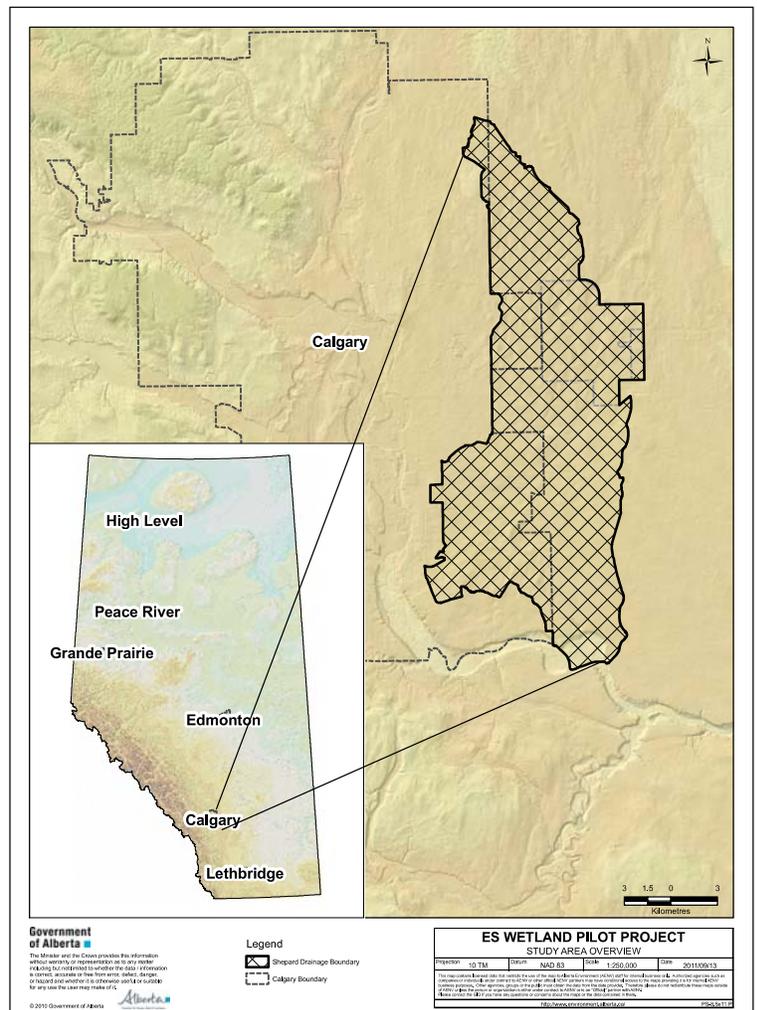


Figure 1: Case Study Area for ES Pilot

1. There is insufficient evidence to support avoidance, minimization and compensation decisions on wetlands;
2. There is insufficient consideration of cumulative effects and long-term consequences of decision-making; and
3. There is limited ability to communicate the values of wetlands.

At the outset, the socio-cultural sub team focused on determining the meaning and scope of the socio-cultural work, and exploring how people valued wetlands (gap 3). The sub team addressed the other gaps later on in the work.

To address the second objective, the ES Pilot was required to develop and operationalize an ES Approach for Alberta. Emphasis was placed on developing processes and products considered to be scientifically credible, relevant to key decision makers and legitimate in the eyes of stakeholders. The ES Approach (Figure 2) provided a framework for the ES Pilot core team to help identify and quantify the benefits provided to people by wetland ecosystems, with the goal of improving decision-making in the wetlands approvals process.

This approach was followed by the ES pilot teams for overall guidance on how to conduct an ES assessment. The socio-cultural sub team undertook several activities based on social science methods to learn how a social analysis approach might best address these questions. To ensure that the assessments were as useful as possible the socio-cultural and economic sub teams worked closely together to see what components of human wellbeing were more amenable to economic or cultural evaluations.

Socio-cultural refers to an understanding that within a particular place, there are a variety of people with a diversity of perspectives. These people participate, knowingly or not, in systems and processes of learning and decision-making that generally manifest through the actions they take within a place and with each other; thus different customs, philosophies, economies, religions, social systems and environmental factors affect the norms that both an individual and groups come to embody (Chou and Roth, 1995). In the context of the ES Pilot, given the gaps to be addressed, *socio-cultural* refers to how people value wetlands within the study site, what such value orientations⁵ give rise to, in terms of viewpoints on particular issues, and what level of importance is ascribed to cultural services and benefits from wetlands, based on value orientations.

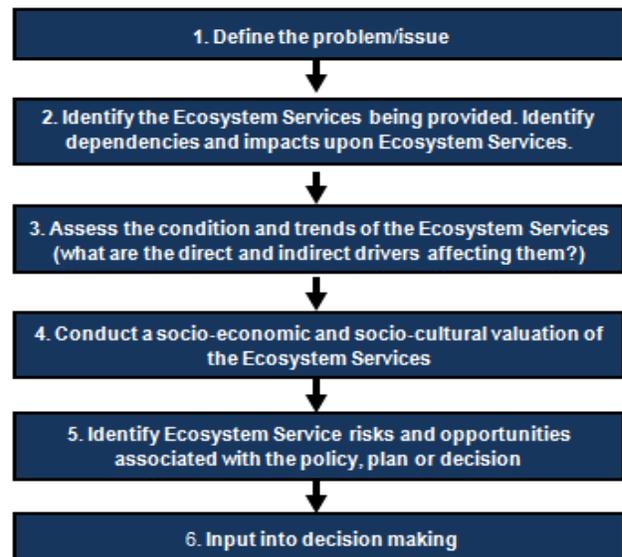


Figure 2. 6 Step ES Approach

⁵ This term is more fully discussed in Section 1.2 dealing with the sub team’s approach and is based on Stern et al.’s (1993).

As such, part of the sub team's work included understanding, broadly, how people perceived the relative importance of the cultural services and benefits provided by wetlands. This meant that methods and tools had to be identified and developed to measure and describe the value orientations people held for wetlands. Understanding value orientations would provide insight as to how certain types of importance would be ascribed to ES. All ES, including the "difficult to define", intangible benefits people derive from cultural services, are perceived to be more or less important depending on the value orientations held. From here, more specific questions related to *what level of importance* people ascribed to wetland cultural services and benefits could then be asked.

The work of the socio-cultural sub team formed part of steps 2 and 4 in the ES Approach. In step 2, the cultural services of the study area were identified and delineated. In step 4 the cultural services and benefits derived from those services, as well as the socio-cultural nature of the benefits derived from other ES (e.g., flood protection) were addressed in order to understand the social context that enables the social acceptance, or "placing of importance", on some benefits over others. For example, while many of the benefits derived from the value of flood protection can be monetized, other benefits from that service are social, including safety, convenience, sustained livelihood, and so on. Thus, examining value orientations, viewpoints on wetland management, and levels of relative importance ascribed to the benefits from wetlands can make explicit how ES are ascribed importance in a larger social context. In the following section the socio-cultural sub team's considerations and perspectives related to cultural services and benefits are discussed.

1.2 Cultural Services and Benefits Considerations

Ecosystems, and the biodiversity contained within them, provide a stream of goods and services essential for society's well-being, where the benefits provided can be "directly enjoyed, consumed, or used to yield human well being" (Boyd & Banzhaf, 2006, p. 8). ES are important to people, as they help people realize their quality of life goals, both as individuals and as members of society. For example, the flood control service functioning wetlands can provide can help protect homes and other infrastructure during extreme weather events. Flood control then, is considered to be an ES; likewise it is, for the purpose of the socio-cultural sub team, considered to produce more tangible and 'known' benefits to people; those being the costs, or lack thereof, associated with flood control. It is these types of ES and their more tangible benefits that are generally the foci of ES assessments, which have typically used economic valuation to uncover the benefits of services to people. However, the ES wetlands can provide to people can produce both tangible *and* intangible benefits; it is the latter that are often most difficult to identify or quantify, and in some cases, may not even be appropriate to do so (e.g., the perception or feelings of safety from reduced sense of risk of flood). 'Cultural services' more often tend to produce intangible benefits.

In terms of cultural services for ES Pilot context, recreational activities produced by wetland recreational services can be considered a more 'tangible' service because people can generally see or feel the activities undertaken within the wetland. People understand these tangible services exist because they manifest in activities that take place in wetlands (e.g., bird watching, fishing, photography, walking, etc). The same may be said for some educational, research or heritage services provided by a wetland. The activities are tangible to people, such as learning, recording data, or participating in festivals or ceremonies. What is interesting, however, is that these activities or experiences give rise to benefits that people receive. The benefit of recreational activities, for example, may be the physical or mental wellness one derives from participation in a particular recreational activity. These types of benefits may also be considered more tangible in that they can, for the most part, be measured in quantifiable terms and in many cases, be assigned a dollar value, a 'worth' to people. However, one can also presumably experience more 'intangible' benefits, such as feeling a sense of belonging to a place, based on one's recreational activities and experiences in the place. These benefits are not easily identified and measurement can be problematic, particularly if measurement attempts to assign dollar value. In order to address this shortcoming related to monetary valuation, alternative approaches such as value scale survey, has been proposed in the literature.

It was important for the sub team to have a space in which to wrestle with the distinction between tangible and intangible benefits produced from cultural services, and ES more broadly, given that the ES Approach did not necessarily provide a space for sociological or philosophical inquiry into 'values.' In addition to partnering⁶ with the socio-economic sub team, as well as holding numerous discussions with the core team, supporting members, and external ES experts, a series of methods were developed to guide the identification, assessment and analysis of the wetland cultural services and benefits

⁶ The socio-economic and socio-cultural sub team was partnered in the beginnings of the ES Pilot as one sub team, given that there was initially not a clear understanding on how to distinguish the pieces of work these two teams would do. However, approximately mid-way through the ES Pilot in 2011 the sub teams separated into two distinctive teams as it became evident that the socio-cultural sub team would use methods that differed from economic valuation.

provided to people, in addition to the ethical underpinnings of how people ‘value’ wetlands. The also began conceptualizing the approach that would describe and guide their work, which is more fully explained in Section 1.3.

Based on the ES Pilot's objectives and specifically seeking to address gap three, an innovative approach to determining, identifying, and assessing the values people held for wetlands, and specifically their values for wetland cultural services and benefits, was developed. After reviewing literature related to ES assessments, including the guiding document for the ES Pilot, *Ecosystems and Human Wellbeing: A Manual for Assessment Practitioners* (Ash et al 2010), it was determined that the method used to identify and assess the “value” of cultural services was inadequate. This was based on the understanding that most ES assessments have used the Total Economic Valuation (TEV) as the primary approach to valuation. Generally speaking, TEV assesses the use (e.g., flood control, crop production) and non-use (e.g., satisfaction from knowing nature exists in a given state) benefits of natural resources to human wellbeing, and these benefits are generally expressed in monetary means (Ash et al., 2010). The sub team suggested that using TEV to measure and describe the cultural services and benefits produced by such wetlands may not actually capture a “full range of values and the ways in which values extend beyond monetary dimensions” (Haluzah-DeLay et al., 2009, p.2). Thus, what needed to first be articulated was a common understanding of what cultural services and benefits meant to the ES Pilot, and then identify what cultural services and benefits would likely be found in the ES Pilot study site.

The following section describes the thinking and decisions made around cultural services and benefits as they relate to the ES Pilot and this team.

1.3 Identifying Cultural Services and Benefits

Based upon an extensive review of related literature (e.g., Ash et al 2010, TEEB, 2009, 2007 etc) and discussions with the socio-economic sub team, an understanding of the existing methods used to identify and assess cultural services and benefits was considered to frame the opportunities for this team's work. First, the sub team identified questions relevant to the exploration of cultural services and benefits, and then delved into how and why these services and benefits were important to people. The following questions are presented in order of consideration by this team:

- What are cultural services, and what are they in relation to the ES Pilot?
- What benefits do cultural services provide to people and what benefits are expected to be relevant to the ES Pilot?

To answer these questions, the team leads for socio-cultural, economic and evaluation discussed the different understanding of these terms and explored how these terms have been conceptualized in the broader ES assessment literature. Further literature reviews on ES broadly, and ES assessments specifically, as well as reviewing literature in the fields of environmental ethics, ecological economics, and natural resource management was undertaken, in tandem to discussing assumptions and ideas on cultural services and benefits with the core team and external ES experts.

In the review, it was found that some literature distinguishes between cultural services and benefits, as this work does, while other literature uses the same term for both services and benefits. Since this added confusion and masks the subtleties in understanding how cultural services and benefits are experienced and understood, the team lead settled on a current use of language that has been modified to follow contemporary patterns emerging in literature (e.g., Chan et al., 2001). These common descriptions were adopted by the ES Pilot to reflect continuity in understanding. This was significant for the ES Pilot in that exploring these perspectives expands understanding of how people benefit from wetlands, where there is some potential overlap in the activities of experiences an individual or group could receive from any particular wetland.

For the ES Pilot, cultural services were considered to be the “nonmaterial benefits obtained from ecosystems” (World Resources institute, 2005) where such services and related benefits are, for the most part, dependent on people undertaking various activities or having various experiences in a particular place. For example, in some wetlands fishing activities may occur; the quality of the water is not necessarily a ‘service’ in the case of fishing activities, because the provisioning of water quality is intermediate in providing habitat for the target fish population. However, as a cultural service, fishing activities would be the ‘service’ that can provide certain ‘benefits’ to people, as they undertake the activity. These benefits can include the physical or mental wellness one receives during the act of fishing, the sense of belonging when in a favorite fishing place, or the aesthetic satisfaction derived from immersion in a natural landscape.

Based on data availability related to the study site, as well as referring to the ES experts, the following cultural service categories were determined to be relevant to the ES Pilot:

Recreation and tourism services – opportunities for recreational activities, including: hiking, walking, birding, sport fishing, etc.

Heritage services – physical artifacts and intangible attributes an ecosystem can provide an individual or group.

Education and research services – activities that provide learning opportunities and/or investigations into phenomenon.

In many ES assessments 'aesthetics' were considered to be a cultural service (e.g., World Resources Institute, 2007). However, this 'service' is also often labeled a value in ES assessments, which point to the aforementioned confusion between services and benefits. As such, the team's lead suggested these descriptions obscured distinctions that could be made between cultural services and benefits provided to people by such services. Detailed conversations with the socio-economic team lead, in addition to literature reviews, were used to tease out the differences between aesthetics as a 'cultural service' and aesthetics as a 'benefit' from cultural services. For the purpose of this team's work, aesthetics are referred to as a benefit people derive from their activities or experiences within a wetland, through the cultural services. It is recognized, however, that aesthetics are considered a service in the socio-economic assessment for the ES Pilot and this is an area that could be further explored to understand similarities and differences in conceptualizing this category.

The next step was to identify and explain what was actually being measured, in terms of the services *and* the benefits, relative to the study site. In traditional ES assessments, 'value' measurement is often attributed to *both* the service and the benefit; the distinction between what is being measured is typically unclear (e.g., World Resources Institute, 2007). To ensure clarity in the sub team's work, considerations were explicitly given to delineating and describing the activities or experiences that generally arise from wetland cultural services, based on available information. This was done after cultural services relevant to the study site had been classified. Then, the sub team determined what benefits were most likely produced by those activities or experiences as they related to the cultural services. Both the services, in terms of activities or experiences, as well as the benefits, could then be accounted for in the study.

The benefits that were considered, as they are produced via the activities or experiences an individual or group can have within a wetland, include but are not limited to:

Aesthetics – connected to this benefit would be, for example, the joy one experiences when visually witnessing a beautiful place, hearing a soothing sound, etc in a natural space (Merriam-Webster, 2011; Parsons, 2008). Scientifically, it is the study of sensory values, or philosophically it is the study of the nature of beauty or art. It is also acknowledged that this benefit has linkages to existence value, which is commonly referred to in economic assessments using TEV, where a natural asset (e.g., wetland) may be ascribed importance or worth simply based on its existence, and where the benefits derived from its existence is the aesthetic appeal of the asset.

Sense of place – referring to the feelings and attitudes an individual or group can develop towards a particular place, based on their experiences (Jorgensen & Stedman 2001).

Sense of belonging/sense of self – an example may include the experience one derives from being part of a group in a specific place, realizing one's full potential or affirming oneself in a place; this benefit is interconnected with sense of place (Cantrill & Senecah, 2001).

Mental wellness – a dimension of health dealing with the cognitive and/or affective (emotional) that can contribute to overall wellbeing; examples can include the emotional satisfaction that one can experience from being in a place or participating in particular activities in a place (Breslow, 1972).

Physical wellness – a dimension of health dealing with the physical functioning of the body, such as cardiovascular fitness; examples can include the strength one can build or maintain from participating in outdoor recreational activities (e.g., hiking) (Breslow, 1972).

Spiritual and/or religious connection – referring to the feelings of connectedness, or feeling at peace, when in a particular place or participating in particular activities.

Inspiration – this can include the ideas, motivations or stimulation one can derive from being in a place and having various experiences; it can include artistic creativity, such as writing, drawing and other creating activities.

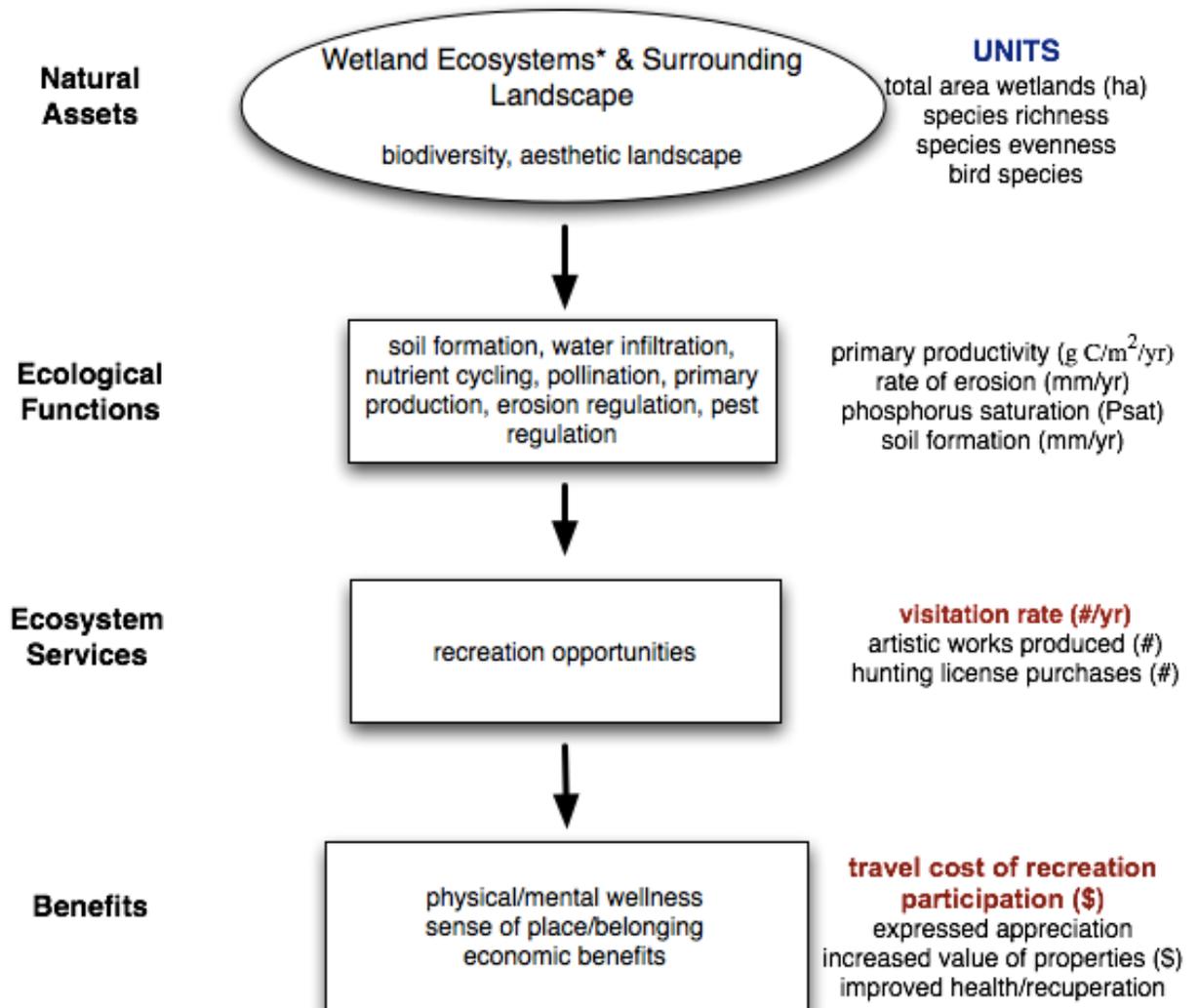
Traditional use – generally refers to land uses that are culturally significant to particular groups, such as harvesting activities, ceremonial activities, and so on (Tobias, 2000).

What became evident, after numerous discussions with the team's advisors and with the socio-economic sub team lead, was that a certain degree of interconnectivity existed between the various cultural services and the benefits they provided to people. For example, recreation and/or tourism services can also be interrelated with heritage services; recreational activities can take place in a heritage site just as tourism activities can take place in a heritage site. Similarly, the benefits of wildlife viewing or artistic activities can be provided to people through both types of services. Given this, the benefits derived from activities and experiences from one cultural service are considered to be interconnected with another cultural service, to some degree. Teasing out these specific interconnections, and what they could mean to individuals or groups, would have been very difficult and perhaps not possible; as such, this was not the focus of the work though would be very interesting and likely important to ES assessments to do so. Regardless, it was acknowledged that the significance of the variety of benefits, and the varying degrees of importance people can ascribe such benefits, relate in some way to the cultural services produced by a wetland. Attempts were made to represent and communicate this flow of benefits produced by ES Pilot's wetland of investigation through the use of cascade diagrams that represent the Recreational/Tourism Services, Educational/Research Services and Heritage Services (Figures 4, 5 and 6).

These figures are representative of some of the thinking and decisions made by the team lead, in collaboration with the socio-economic team lead, in terms of what cultural services and benefits are produced by a functioning wetland, and what and how these could be measured (e.g., what units of measurement could we look at?). This notion is similar to an idea offered by Haines-Young and Potschin (2010), where the diagrams identify the flow of wetland functions that give rise to various cultural services, which in turn, give rise to various benefits that people enjoy. These benefits are often based on

the activities or experiences people can have within the wetland and as such, can likely be measured based on relationship of benefits to activity/experience and for what units of measurement can be used for cultural services.

WETLAND ECOSYSTEMS IN ROCKY VIEW COUNTY AND EAST CALGARY: RECREATION

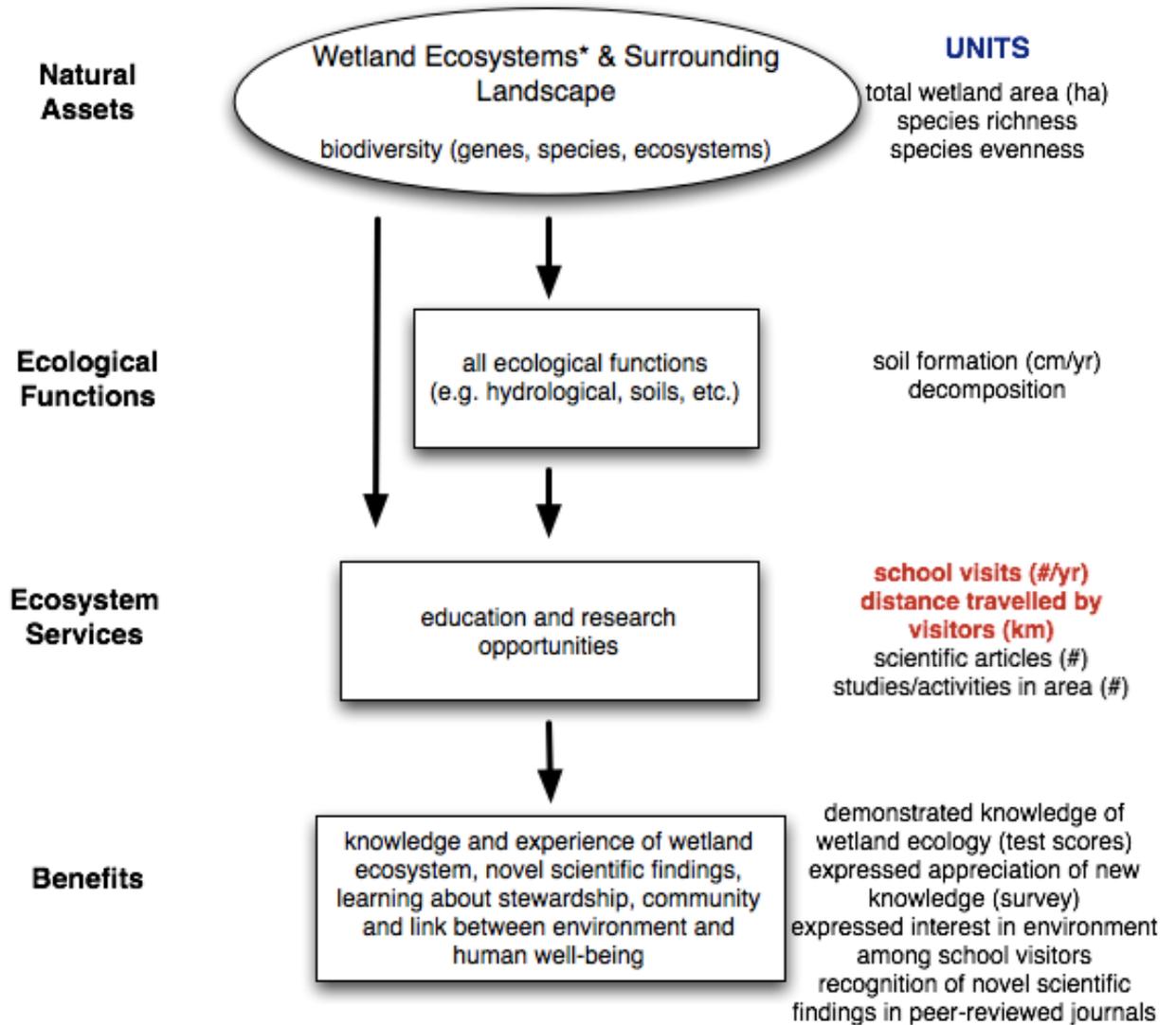


*Wetland ecosystems include biodiversity, water, soils, above and below-ground biomass, landscape features

Indicators included in the assessment are shown in **red**. The assessment is currently deciding on further indicators for inclusion

Figure 4. Recreation and Tourism cascade diagram.

WETLAND ECOSYSTEMS IN ROCKY VIEW COUNTY AND EAST CALGARY: EDUCATION OPPORTUNITIES

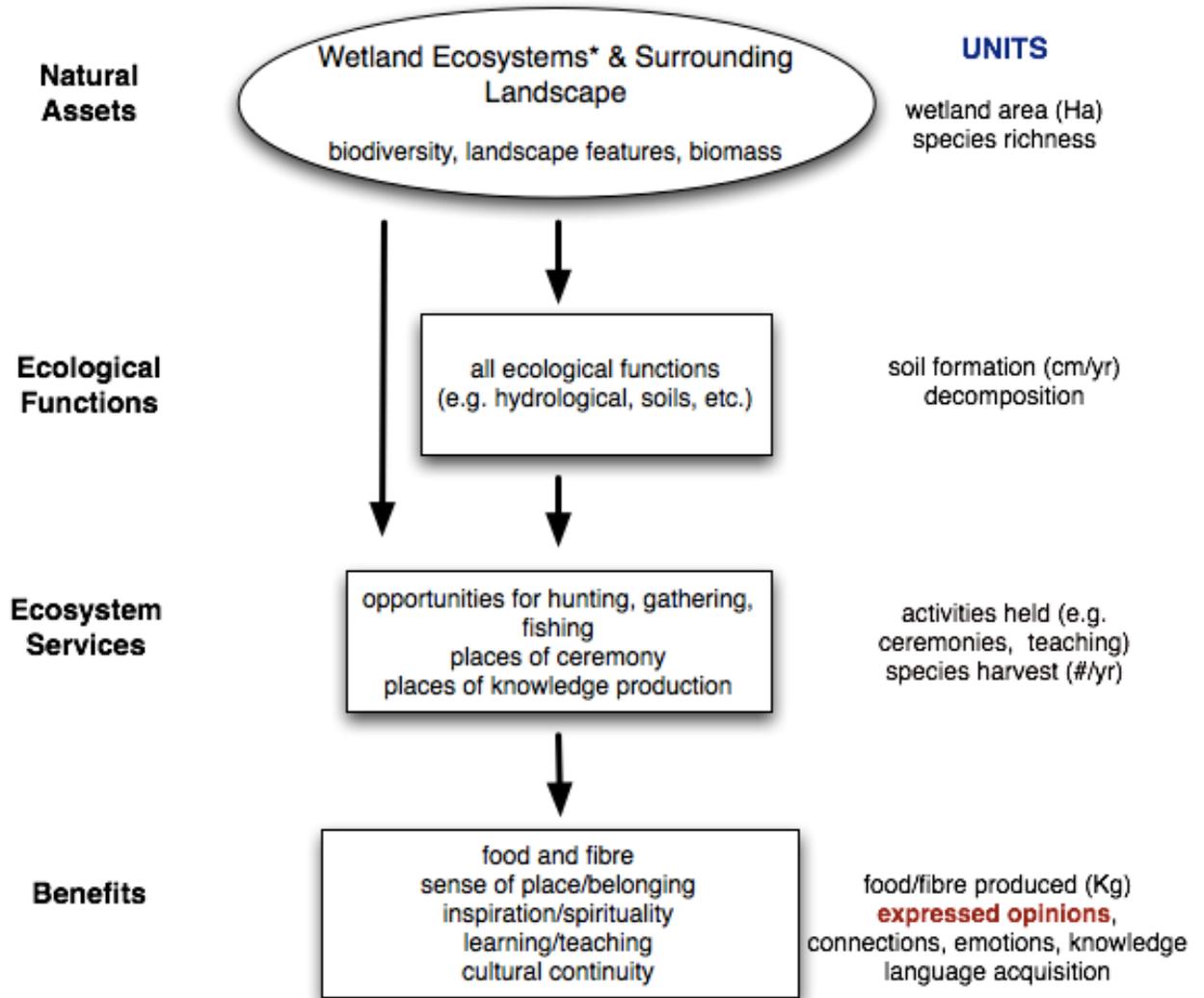


*Wetland ecosystems include biodiversity, water, soils, above and below-ground biomass, landscape features

Indicators included in the assessment are shown in red. The assessment is currently deciding on further indicators for inclusion

Figure 5. Education and research services cascade diagram.

WETLAND ECOSYSTEMS IN ROCKY VIEW COUNTY AND EAST CALGARY: HERITAGE



*Wetland ecosystems include biodiversity, water, soils, above and below-ground biomass, landscape features

Indicators included in the assessment are shown in **red**. The assessment is currently deciding on further indicators for inclusion

Figure 6. Heritage services cascade diagram.

These diagrams represent a similar understanding of flow as the team’s conceptual approach to the value orientations the people hold for wetlands. Here value orientations are understood to give rise to particular viewpoints on an issue related to wetlands, where relative importance is likely to be ascribed to services and benefits based on people’s corresponding viewpoints and value orientations. The steps in the cascade diagrams are interconnected and reliant on each other in terms of the construction of one giving rise to another. With this understanding, it became ever more important to

not only consider *what* the cultural services and benefits were in relation to the ES Pilot and specific to the study site, but to also identify *how* people construct their values for wetlands. Furthermore, it was anticipated that the level of relative importance people ascribe to wetland cultural services and related benefits could be determined.

The next section describes the conceptual framing, which in itself was largely exploratory, of how these questions were explored by the socio-cultural sub team.

1.4 Methodological and Conceptual Approach.

Methodologically, work related to uncovering, understanding and articulating the values people held in relation to wetlands, as well as their values for wetland cultural services and benefits, was approached in an exploratory manner and evolved through iterative discussions with core team members, sub team advisors, and extensively reviewing literature. Environmental ethics and environmental sociology largely informed the sub team's understanding of how meaning produced within social groups is constructed, as well as how this construction of meaning gives rise to how people 'value' wetlands, as well as 'value' wetland features (Mayerfield Bell, 2004).

Through an opportunistic approach, the sub team employed three methods to guide the tasks. The initial exploratory methods used were a values scale survey; a thematic document analysis; and, a benefits ranking exercise. Generally, a values typology framework informed by Kellert (2004), McFarlane and Boxall (2000), and to some extent, Rokeach⁷ (1973) was referred to in the development of the conceptual approach to this work (Figure 3); this approach largely evolved through the literature reviews and discussions with members of the ES Pilot.

First, the sub team sought to uncover the value orientations that people in the study area held, with considerations for how these orientations were produced as a result of the cultural and societal context of the study site. Value orientations are understood to represent the ethics, principles, morals or beliefs embodied by a person or a group, which are constructed by people in a particular place through their encounters with information and experiences⁸. Value orientations are thus understood to play a role in influencing how a person comes to appreciate the world around them (Rokeach, 1976). This relates to the three gaps referenced earlier in the report.

Related to the ES Pilot and specific to wetlands, value orientations are considered to give rise to people's viewpoints on particular issues. The issue under consideration here is the management of wetlands, related to the three gaps, where management viewpoints can include the opinions people hold for management based on the activities or experiences they can have within wetlands. The opportunities for these activities/experiences are thought to guide how people think about wetlands management based on how important wetlands, and the activities/experiences, are to people. Management viewpoints then are suggested to give rise to the levels of relative

⁷ Rokeach (1976), among others, have identified 36 basic values that all people have, which overarch and give rise to how value orientations are constructed. These basic values are considered to be primary to all people, in varying degrees; however, they are not the focus of this study.

⁸ Information and experiences are referred to by McFarlane and Boxall (2000) as the antecedent and knowledge factors, the external variables found in the lifeworld that inevitably influence the construction of value orientations; these include the environmental, economic, political, or cultural factors that play a role in what people know and come to value.

importance people ascribe to the cultural services and benefits that wetlands provide to human wellbeing.

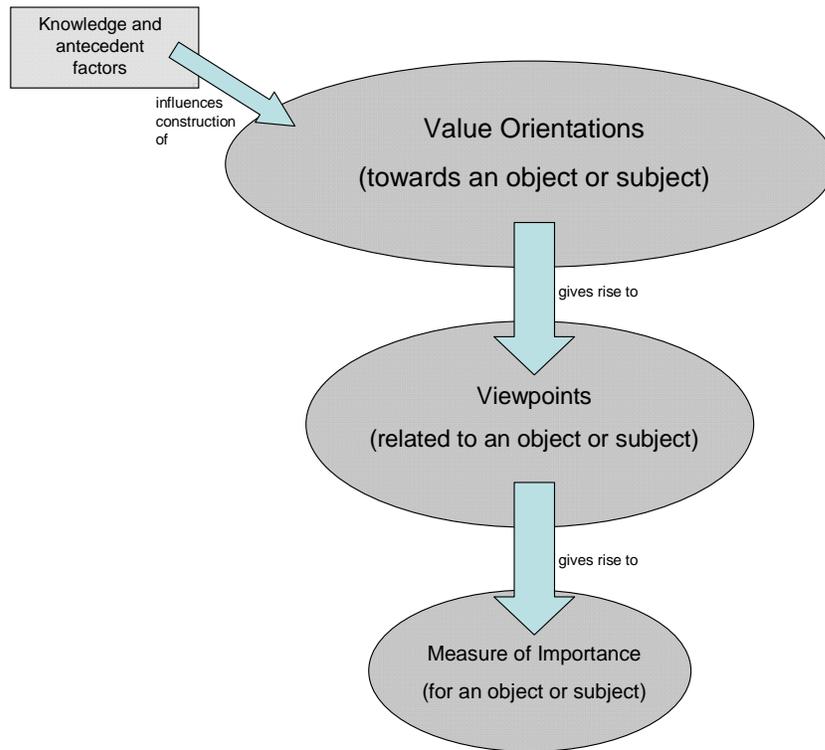


Figure 3. Conceptual approach guiding the team’s work.

Based on the concept of value orientations and other studies (e.g., McFarlane and Boxall, 2000; Kellert, 2004; Stern et al., 1994), the sub team framed that people in the study site would likely be nature-oriented (biocentric) or human-oriented (anthropocentric) in their value orientations towards wetlands, and that these orientations would likely be located on opposite ends of a continuum. This continuum reflects the range of value orientations people may construct based on their experiences, held knowledge, and influences of other factors (e.g., employment type) within a particular socio-cultural context.

A biocentric value orientation can be understood to represent the measure of importance of wetlands in and of themselves; this would mean wetlands would be ‘valued’ for their biotic components, independent of human use (Kellert, 2004). This orientation can be found in Taylor’s⁹ (1986) work on environmental ethics, the deep ecology¹⁰ movement (Naess, 1973), and the concept of biophilia¹¹ (Wilson, 1984). Other characteristics of a biocentric value orientation may include an aesthetic¹², humanistic¹³, moralistic¹⁴, or

⁹ Refers to the rights of nature, and the moral obligations and relationships humans have towards and with the natural world, both biotic and abiotic as well as processes.

¹⁰ Recognizes the inherent worth of non-human nature aside from its utility to humans, and seeks to communicate a more holistic understanding of how humans live within the natural world, as part of total ecosystem functions.

¹¹ Biophilia refers to the deep connection between humans and the nature world, both biotic and abiotic.

¹² “Nature and other creatures...constitute an essential source of beauty and physical attraction.

Few experiences in life exert as powerful an impact on people as the aesthetic appeal of certain features of nature” (Kellert, 2004, p.12).

symbolic¹⁵ rationale for ascribing importance to an object of subject, as suggested by Kellert (2004). This value orientation would likely be found at one end of the continuum, and would likely hold that wetlands management should be protection-based (McFarlane and Boxall, 2000). Levels of importance to cultural services and benefits from this orientation may situate around the value of wildlife in and of itself, independent of human use.

At the other end of the continuum would be the anthropocentric value orientation, which can be understood to represent a utilitarian¹⁶ and potentially dominionistic¹⁷ rationale for ascribing worth, rather than importance, to wetlands. This would mean that wetlands, and the services and benefits provided to people, are for use by people in order to meet human needs (Kellert, 2004). Viewpoints on wetlands management from this orientation would likely hold that wetlands should be managed to meet people's needs, and might represent using nature as a "source of material sustenance and physical security" (Kellert, 2004, p. 12). Levels of importance would not likely be represented through this orientation, though worth of services and benefits to people likely would; however, assessing worth was in the realm of the socio-economic sub team (e.g., tourism revenue).

The description of an anthropocentric value orientation can also be considered from a different perspective in that biotic and abiotic components, and the processes and functions within any given ecosystem, can be managed for people's use *as well as* to maintain or enhance ecosystem integrity (Norton, 1984 in Kalof & Satterfield, 2005). This value orientation might be better described as ecocentrism, where humans are seen as a part of the ecosystem and where management results in actions that can benefit both ecosystems and people. This orientation is suggested to likely fall somewhere in the 'middle' of the continuum, and may 'balance' the biocentric and anthropocentric orientations.

This description is essential to articulate because a richer understanding of the possible value orientations that might be found in the study site would help inform how people would ascribe importance to wetlands and their management, and perhaps shed light on how to uncover levels of importance people ascribe to wetland cultural services and benefits. What also becomes evident is that by teasing out the nuances in different value orientations, be those the ones articulated here or other that may emerge, decision makers will have a better understanding of the social agenda and can make decisions about wetlands conservation and human development projects accordingly.

¹³ "The natural world constitutes a subject of deep affection for people. These feelings of affection provide people with opportunities for experiencing intimacy, for expressing trust, and for achieving feelings of relationship and kinship" (Kellert, 2004, p. 13).

¹⁴ "Nature is...deeply significant to people as a source of moral and spiritual inspiration" (Kellert, 2004, p. 13).

¹⁵ "The natural world constitutes an indispensable source for developing our unique human capacity for communication and thought. People employ natural diversity as a raw material for expediting the exchange of information and understanding among and between [humankind]" (Kellert, 2004, p. 14).

¹⁶ "The 'sense of material and commodity advantage derived from exploiting nature. In this regard, people have...used the natural world as an indispensable source of material sustenance and physical security...modern society often prides itself on having domesticated the wild and, in the process, achieved large food surpluses, material affluences, and physical health largely by eliminating wild competitors and converting natural into cultivated and artificial landscapes" (Kellert, 2004, p. 12).

¹⁷ "People seek opportunities to 'hone their physical and mental fitness through subduing and mastering nature" (Kellert, 2004, p. 11). Nature provides a usable context for humans to challenge themselves.

The sub team posited that understanding value orientations and viewpoints on wetlands management would provide decision makers with information on how, what and why people 'value' wetlands, and would primarily address gap three, as well as be useful to address gaps one and two. The following section outlines the specific research questions posed by the sub team to address gap three of the ES Pilot, and the methods that were chosen to complete this work.

1.5 Specific Research Questions and Methods Selection

Based on the articulation of cultural services and benefits relative to wetlands in the ES Pilot, the central research questions include:

- How do people construct their values for wetlands?
- What importance do people ascribe to cultural services and benefits?

These questions would specifically address gap three, however, it was also assumed that findings would support decision-making in both a wetlands approvals and cumulative effects context and as such support gaps one and two.

The methods selected to address these questions were first identified in an exploratory and opportunistic manner, where opportunities presented themselves to 'try out' these methods through the ES Pilot's journey. As well, methods were chosen based on the advice of external experts in social research and informed through literature reviews on values elicitation (e.g., Dunlap et al., 2000; Satterfield, 2001). Methods used were reviewed by the Steering Committee, Review Panel members, and Wetlands Policy team as they emerged, and include:

- a wetlands values survey within the ES Pilot study site, to understand value orientations and viewpoints on wetlands management;
- a thematic analysis of publicly available documents related to wetlands policy in Alberta, to support an understanding of viewpoints on management; and
- a benefits ranking exercise that enabled the ranking of the relative levels of importance people ascribed to the cultural services and benefits produced by the wetland in the ES Pilot.

The results generated from the methods helped provide insight as to what value orientations people hold related to wetlands, what viewpoints people have for wetlands management, and what level of importance people ascribe to the cultural services and benefits wetlands provide, relative to the study site. Taken together, this information was used to help address the project's three gaps.

The following section begins with the wetlands values survey and moves to the subsequent methods used as part of this study.

2.0 Socio-cultural Wetlands Values Survey

2.1 Introduction

A wetlands values survey was the primary method identified early in the ES Pilot, based on discussions with sub team advisors and literature reviews. Subsequent methods were selected opportunistically, after the three gaps by decision-makers were posed.

The survey was developed between the months of February to April 2011 and was ready for mailing in early May. Springtime was selected as a mail out date given that wetlands would be emerging from under snow cover, birds would begin returning to the province, and people would generally begin to have wetlands at front of mind. However, due to a breakdown in the internal approvals process, as well as a Canada Post mail strike, the survey was mailed in July 2011. This may have resulted in a lower response rate than first anticipated, yet the response rate still provided adequate data for analysis.

The survey was modeled after Boxall and McFarlane's (2000) forest values survey, which attempted to uncover public value orientations (e.g., general residents, government, environmental non-profit, and forest management groups) related to forests, including biocentric and anthropocentric orientations. As such, expectations we held for the results of the wetlands values survey were similar, including the assumption that a more biocentric and anthropocentric value orientation would likely arise from the study.

As noted in McFarlane and Boxall (2000), biocentric or anthropocentric value orientations can reflect an individual or group's understanding and beliefs about natural resources; these orientations, which are constructed from social and cultural, as well as environmental interactions, give rise to people's viewpoints on particular issues, including those related to environmental management. Value orientations then, can be understood to inform a person or group's preferences for particular management actions, where human intervention of actions within a particular place, in relation to a particular subject or object, is considered in light of the level of importance (or worth) a person or group ascribes to such place, activities, or experiences. Biocentric orientations in Boxall and McFarlane's (2000) study recognized nature as having inherent worth and a right to exist for its own sake (e.g., forests are valuable to people regardless of their usefulness, such as fiber production). When natural resources are managed for biocentric orientations the naturally occurring qualities of the resource are emphasized, and human intervention is often minimal; in contrast, anthropocentric orientations are strongly influenced by managing natural resources for human utility, where actions reflect meeting human needs and desires (Boxall and McFarlane, 2000). The wetland values survey examined if similar value orientations relative to wetlands existed in the study site, and what this might mean for wetlands management.

The typical biocentric–anthropocentric dichotomy, which is illustrated as a values continuum by this team, has been used in the fields of environmental/natural resource management, where the dichotomy indicates what management philosophy stakeholders in a particular area might hold (or accept) for a specific subject or object (Boxall and McFarlane, 2000). In addition to the forest values survey, a review of "*How Canadians Value Nature: A Strategic and Conceptual Review of Literature and Research*" (Haluza-DeLay, Kowalsky & Parkins, 2009) also reinforced the sub team's

conceptual framework, understandings of 'value', and notions behind the values continuum. By identifying and articulating the dichotomy between these value orientations, and doing the same for the viewpoints that stakeholders may construct and hold in relation to management actions, a better understanding of why or what (subjects/objects) people ascribe importance to can be developed; this understanding can, in turn, be used in decision-making.

In the case of the ES Pilot, understanding a person or groups' value orientations for wetlands, including their viewpoints towards wetlands management, would enable an understanding of how people ascribe importance to a wetland, as well as provide insight into what aspects of wetlands (services or benefits) people ascribe importance to. It was thought that this information would better equip decision makers to determine what management actions might be socially acceptable¹⁸ based on the expressed values of stakeholders. Furthermore, an understanding of 'value' in the broadest sense (from value orientations to importance of certain wetlands features) may enable decision makers to seek opportunities to improve their decision-making process to reflect all possible conceptions of 'value'¹⁹.

The following section outlines the method used for the survey, as well as analysis of results and discussion.

2.2 Method

Boxall and McFarlane's (2000) forest values survey used a scale based on the New Ecological Paradigm (NEP) scale from Dunlap et al (2000) to measure the public's perspectives on human-forest interactions, based on a statements related to opinions, ideas, or beliefs the public held about forests (Boxall and McFarlane, 2000). The NEP is a widely used measure of an environmental, or ecological, worldview as well as a measure of concern for environmental issues and human impacts on those issues (Dunlap et al., 2000). The NEP also recognizes that varying social contexts play a role in what, and to some extent, how peoples' values are constructed, where held values can influence the attitudes, beliefs, and behavioral actions of people (Stern et al., 1995). This understanding was adopted by the team in the development of the wetlands values survey.

The values survey was selected to develop an understanding of public values for wetlands because the opportunity existed to test a new tool and because surveys can be used to sample across broad areas and provide good results. Survey research, however, must have a clearly defined outcome and well-articulated steps in order to achieve the defined outcome. Additionally, survey research must include well-planned sampling at appropriate scales with appropriate audiences; further, analysis and reporting on results must resonate with the defined outcome as well as needs of end-users (SPSS, 2011).

¹⁸ In this context, 'socially acceptable' refers to the level of acceptance and/or tolerance an individual or group will hold for any particular decision made by government, as such decisions relate to wetlands approvals, wetlands conservation, or development applications.

¹⁹ Including economic and ecological 'value' of a natural asset.

Other considerations made in using this method included:

- The survey must be easy for respondents to understand and complete – the organization and flow of statements should be logical, and there should be enough space for comments;
- Data entry²⁰ needed to occur smoothly and be clearly organized for analysis purposes;
- Data needed to be analyzed in a way that was appropriate for the survey so that useful, reliable results could be produced (e.g., factor analysis in SPSS); and
- Analysis must relate to identifying factors based on responses and correlations to perspectives related to wetlands values and wetlands management.

Every attempt was made to attend to these details, where formatting and statements used were derived and adapted from the forest values survey. For example, in any place the word forest was found it was replaced with wetland. Questions and statements in the wetlands values survey were also dichotomous, Likert-based and short answer formats, which followed the forest values survey format. The survey was reviewed by advisors to the sub team, to ensure clarity in questions, statements, and overall formatting. The following information was solicited from respondents:

- *Socio-economic information* – information related to respondent's age, gender, educational level, total household income, and affiliation with a specific interest group.
- *Wetland values* – respondents' perceptions of wetland values examined by ranking three broad categories of wetland benefits (environmental, economic, and social) from most to least important, in addition to other 'value' related questions.
- *Knowledge of wetlands* – statements that measure familiarity with basic wetlands facts.
- *Perspectives on wetlands management* – statements that measure familiarity with wetlands management as well as personal opinions on management.

This information will hereafter be referred to as 'knowledge' and 'antecedent information' in the following analysis section, similar to Boxall and McFarlane (2000). A copy of the survey can be found in the appendices.

In tandem to developing the survey, the sample for both the pretest and full survey was defined; considerations were given to the sample size, timing for the mail out and returning the survey. The steps generally used to identify the survey sample included:

- *Defining the population.* For the ES wetlands survey experts from the University of Alberta and Review Panel were solicited to help identify the survey sample. Randomized sampling within representative groups was used, where participants included: residents of Rocky View County (single family dwellings, urban and rural); environmental non-profit organizations (e.g., Ducks Unlimited Canada, Nature Conservancy Canada), watershed stewardship groups (Ghost Watershed Alliance, etc), government (e.g., Government of Alberta, Rocky View County) and First Nations tribes (e.g., Blood Tribe, etc). Participants were made aware they were not

²⁰ An excel template was provided to Sagewood Communications' Kristina Dembinski, the consultant assisting with data entry for the sub team. Ms. Dembinski provided the team with the original excel spreadsheets so that they could be imported into the Statistical Package for Social Sciences (SPSS).

representing the views of their organization; rather, their personal views within the organization to which they belonged. This was necessary to articulate, especially for First Nation participation.

- *Estimating the required sample size.* If a sample size is too small, there is a risk of insignificant results; on the other hand, if a sample size is too big, there may be too much time spent on compiling and analyzing data and money may be wasted. Sub team advisors, as well as Review Panel members, helped determine the sample size for the values survey pretest (approximately 30 people from representative audiences) as well as the full survey (approximately 3000 people from representative audiences).
- *Selecting a method of sampling data collection.* All residents and specific stakeholder groups were selected on the basis of: a) living within the County, or b) working with wetlands. Assistance from Rocky View County staff was solicited to provide a randomized address listing for residents of the County for the pretest survey. Canada Post provided an *Admail Acquisition* for the full 3000 sample for resident addresses (also a randomized sampling within the study site). For environmental non-profits (ENGOS), government, watershed groups and First Nations, those that were located in the County or had the closest possible proximity to the County and worked within the County were solicited for participation.

After the audience was identified, bound by the study area and limitations of Canada Post (e.g., electoral divisions with mailing addresses), a pre-test was disseminated to 30 participants. Participants from specific stakeholder groups (e.g., DUC, ESRD and other government staff, etc) were solicited to pre-test the survey; however, some members of the general public (e.g., resident of RVC) could not be reached²¹. Regardless the pre-test survey was sent out.

A pre-test is a formal review of the survey and data collected; information gathered is used to identify potential problems in the survey that can be rectified prior to disseminating to the full sample (SPSS, 2011). The wetlands values pre-test was sent out in late June 2011, to test the validity of the questions and ensure no other small errors were present. However, due to strong recommendations from the Steering Committee based on the ES Pilot's time constraints²², the survey was sent out to the full sample in July 2011 prior to receiving pre-test results. Despite a few minor errors in numbering, there were no significant problems with the survey since the wetlands values survey was closely modeled after Boxall and McFarlane's (2000) forest values survey (e.g., question and statement types, formatting, etc).

The Statistical Package for the Social Sciences (SPSS) software, and specifically factor analysis, was used to analyze the wetlands values survey results. Factor analysis is understood to be the examination of "the pattern of correlations (or co-variances) between the observed measures. Measures that are highly correlated (either positively

²¹ It is important to note that contacting survey participants is not necessarily a required protocol; however, it is a courtesy that can be offered to potential participants.

²² The briefing note to ESRD senior management that provided information on the nature and intent of the wetlands values survey was delayed; as a result, the survey was delayed. Additionally, Canada Post went on strike and there was greater risk in sending out surveys via Purolator, based on an experience from the pre-test. As such, the sub team had to wait until Canada Post resumed work to send out the survey via regular mail.

or negatively) are likely influenced by the same factors, while those that are relatively uncorrelated are likely influenced by different factors” (DeCoster, 1998, p.1). More specifically, exploratory factor analysis (EFA) was used to discover what variables were influencing a set of responses; identifying this would uncover the underlying structure of the variables (e.g., what statements on the scale were answered in a similar way by a significant portion of the sample?) (DeCoster, 1998; MacCallum, 2011). The number of variables from the data set could then be reduced so that the structure in the relationships between variables could be detected; these variables could then be classified or described based on their properties; in this case, the variables were the responses to questions or statements that were agreed or disagreed upon by participants (Statsoft, 2011). Overall, these features would ‘hang together’ (cluster), based on how participants responded to the questions or statements. For a description of the EFA process, refer to the appendices.

In the following section, the analysis of the survey results is presented.

2.3 Analysis and Results

In relation to the primary objectives of the ES wetlands values survey, analysis of the survey attempted to:

- identify the value orientations that people in the ES Pilot study site held; and,
- identify the wetlands management viewpoints people held, in the ES Pilot study site.

Using descriptive methods, the survey results are presented below. Inferential analysis was used to infer conclusions based on findings from the factor analysis²³. While conclusions can be made using both analytic techniques, it should be noted that these results are specific to the ES Pilot study site and should not be considered representative of all Albertans.

It was anticipated that results from the wetlands values survey would be similar to results from Boxall and McFarlane’s (2000) forest values survey, where at least two factors similar to biocentrism and anthropocentrism, would emerge across the sample. It was also expected that males and females would cluster together on certain features, that education may play a role in how features cluster together, and, that the clustering of features may be influenced by participants’ organizational affiliation. Again, these assumptions were based on results from the forest values survey as well as results from the NEP and other studies (Dunlap et al. 2000).

Of the pre-test, 22 of 30 surveys were completed by:

- General residents (7);
- Ducks Unlimited Canada staff (1);
- Alberta Environment and Sustainable Resource Development staff (8);
- Rocky View County Municipal office staff (2), and
- Agriculture and Agri-Food Canada staff (4).

²³ To be clear, descriptive analysis enabled a description of what the data showed, while inferential analysis enabled conclusions to be suggested beyond the immediate results (Trochim, 2006).

Seven surveys were returned incomplete, and one respondent chose not to participate.

Of the full survey (mailed to general residents living in single family dwellings and stakeholders in the study area) there was a 5.3% response rate (160 surveys completed out of 3000 mailed). Poor response rates were likely due to the time of year the surveys were mailed out (e.g., summer holidays), as well as due to other constraints²⁴ (e.g., time, approvals, Canada Post strike).

Using factor analysis in SPSS, three factors, which are understood to represent the underlying ideas that account for patterns in participant responses, were identified based on correlations of responses to the following survey questions:

- Question 3, perspectives related to wetlands values; and,
- Question 6, perspectives related to wetlands management.

Across the sample three factors emerged from survey statements about the value of wetlands. These factors, hereafter referred to as value orientations, reveal *how* people determine wetlands to be important.

Respondents within **Factor A** tended to respond favorably to all biocentric statements, which Boxall and McFarlane (2000) refer to as representative of people's expression of existence value, inherent value, and spiritual value towards the natural resource under investigation (in this case, wetlands). Statements that represent utilitarian values did not factor on this viewpoint; thus, this factor is similar to what Boxall and McFarlane (2000) call biocentrism. Specific to the ES Pilot, this value orientation has been characterized as one that ascribes wetlands importance in terms of their **natural value and benefits beyond direct human use**. Statements that characterized Factor A include:

- *“Wetlands give us a sense of peace and well-being.”*
- *“It is important to maintain wetlands for future generations.”*
- *“Wetlands should have the right to exist for their own sake, regardless of human concerns and uses.”*

Factor B was representative of what Boxall and McFarlane (2000) considered to include utilitarian values (including economic values) as well as spiritual and existence values of wetlands and thus, is a value orientation that ascribes wetlands importance in terms of **sustainable use and beneficial management**. However, Factor B shares similarities in preferring statements that are both anthropocentric and biocentric. As such, Factor B has been characterized as being a value orientation that ascribes importance to both the services that wetlands can provide to people as well as the importance of human management of wetlands. Statements that characterize Factor B include:

²⁴ For future reference, it was highly suggested the pre-test be completed in early spring and the full survey be completed in mid- to late spring, given lack of commitment to complete surveys in the summer months. This will be important to consider for future survey research by ESRD, particularly related to wetlands (e.g., people may not be thinking 'wetlands' in the late summer, but may in spring after snow melt, waterfowl migration, etc).

- *“If wetlands are not threatened by human activities, we should use them to add to the quality of human life.”*
- *“Wetlands can be improved through management actions by humans.”*
- *“Wetlands rejuvenate the human spirit”*

While this factor appears to represent the importance of the various services wetlands can provide to people, it also places importance on human management of wetlands; specifically, the idea that human management can improve wetlands. This may represent ideas or beliefs that people can manage and control the environment, particularly since this factor had an inverse relationship with the statement “wetlands should be left to function naturally, through wet and dry conditions, without being managed by humans”. This factor then may represent people’s beliefs that they have the ability to use human innovations (e.g., technology) to effect and control the environment and fix environmental problems (O’Riordan, 1981).

Finally, all statements clustering on **Factor C** were considered to be similar to a more traditional anthropocentric value orientation, as described by Boxall and McFarlane (2000). Based on the human-centered character of Factor C, represented by statements that appear to emphasize the importance of wetlands for their products or services for human use, this orientation is described in terms of the **extraction of utilitarian services and benefits**. Statements that characterize Factor C include:

- *“Wetlands should exist mainly to serve human needs.”*
- *“The primary function of wetlands should be to provide products and services that are useful to humans.”*
- *“Wetlands that are not useful are a waste of our natural resources.”*

Supporting the analysis and description of this factor, C also has an inverse relationship with some of the statements representing spiritual or inherent values, which characterize Factor A. In fact, Factor A and Factor C have orientations that are not necessarily compatible, suggesting that they are perhaps representative of opposite positions on a wetlands values continuum.

Figure 9 represents the factor depictions for survey question 3, related to soliciting information on individuals’ wetland values. **Factor A: Natural Value and Benefits Beyond Direct Human Use, Factor B: Sustainable Use and Beneficial Management, and Factor C: Extraction of Utilitarian Human Services and Benefits** are arranged in the following manner given that they represent positions on a values continuum, as noted above. The numbers (standard deviations) in the boxes are arranged to reflect the factor they associate with (A, B, C). Any number nearing 1.00 is considered significant as it correlates to that factor.

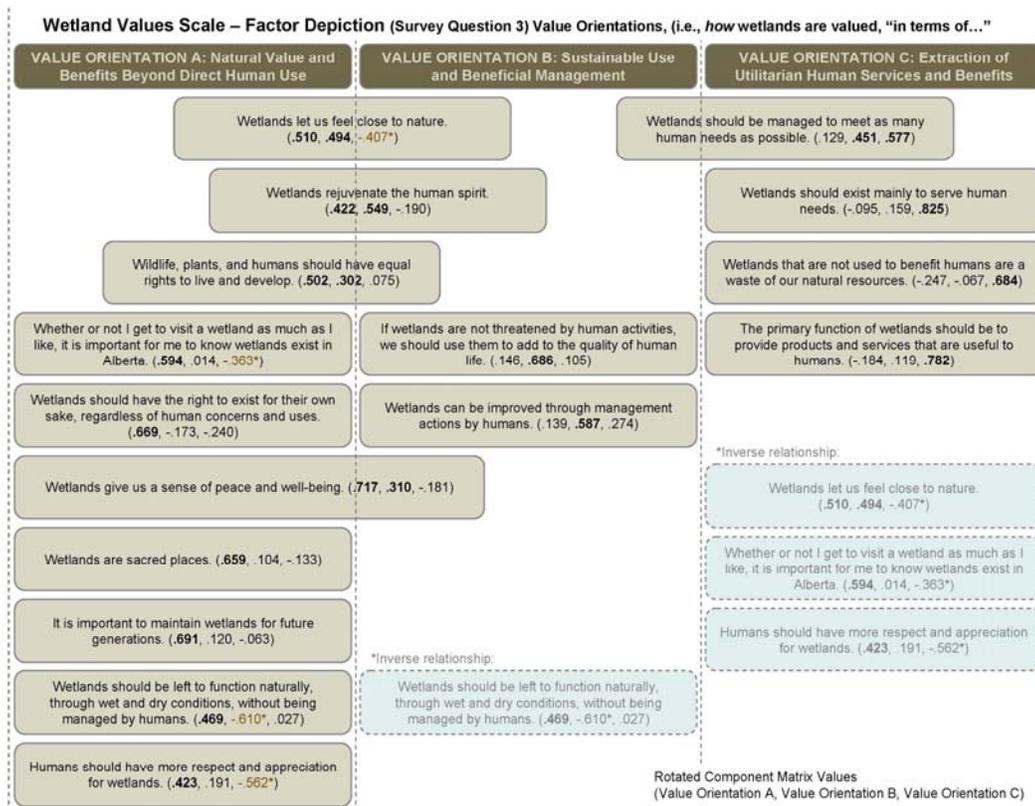


Figure 9. Value orientations from the wetlands survey factor analysis.

Of the socio-economic variables from the survey, only gender was related to factoring, where males appeared to be more strongly correlated with the Factor C and females appeared to be more strongly correlated to the Factor A (Figure 10). Statements reflecting this include:

Males (81 respondents):

- “Wetlands should exist mainly to serve human needs.”

Females (79):

- “Wetlands are sacred places.”

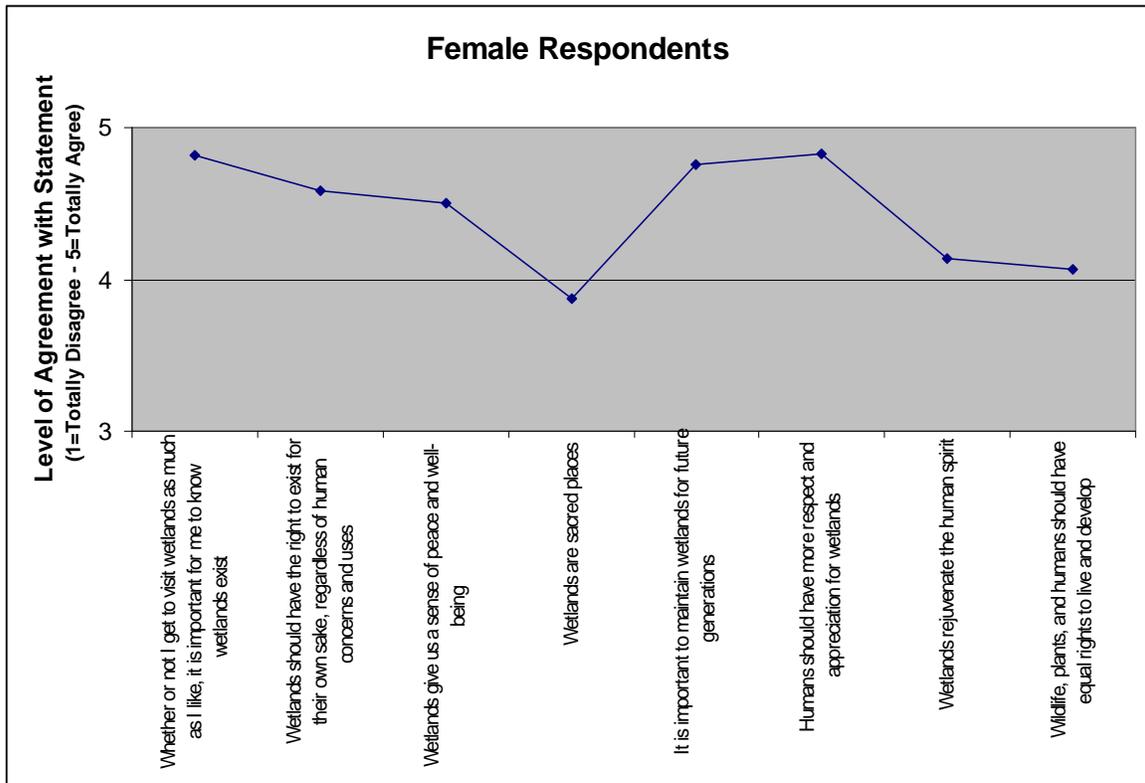
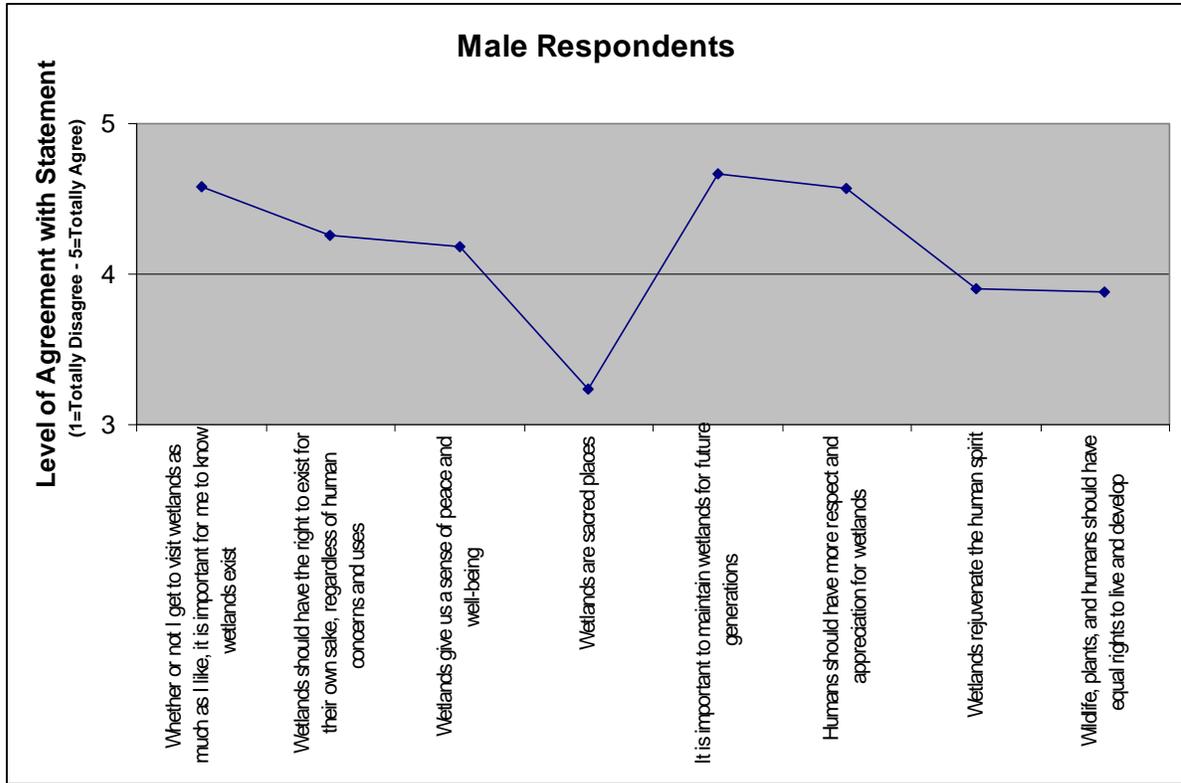


Figure 10. Descriptive graphics for Q#3, agreement with value statements by gender.

It was also found that perceived versus actual knowledge was low; respondents perceived themselves to have higher knowledge about wetlands and their management, and considered themselves to be somewhat to very well informed. However, the mean (3.61) for responses to knowledge questions reflects an average knowledge of wetlands and wetland management.

Though nothing was found to be statistically significant between the factors and age, income, or education, knowledge scores appeared to be higher when respondents were affiliated with an environmental group, though were only slightly higher when affiliated with a government agency, in some cases. Affiliation with environmental organizations in the area, such as bird watching clubs or watershed stewardship groups, was moderate (38 respondents or 23.7%) given the sample size. Nonetheless, affiliation with groups helped confirm the assumption that knowledge scores would likely be higher given affiliation due to the type of activities affiliation might produce (e.g., ENGO’s providing information on wetlands to members, provincial ministry staff who work with wetlands, etc). Additionally, there appeared to be higher responses on written sections (survey questions 4 and 18) when respondents indicated they were affiliated with a group, indicating that they have opinions to share. It would be interesting to explore if those whom shared personal perspectives were correlated to any particular factor.

All responses from participants that were affiliated with various groups had relatively high agreement with the statements related to the value of wetlands (Figures 11, 12 and 13).

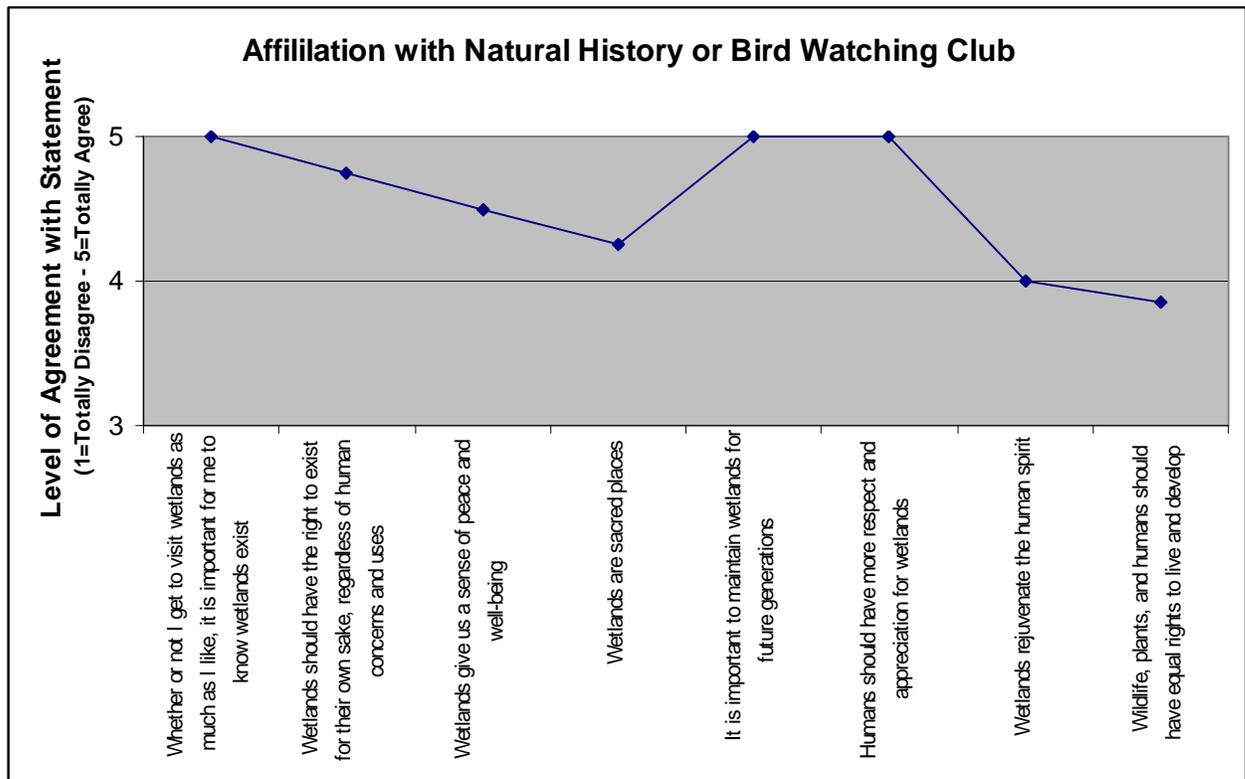


Figure 11. Descriptive graphic of respondents affiliated with a Natural History or Bird Watching Club and their agreement with the value of wetlands statements.

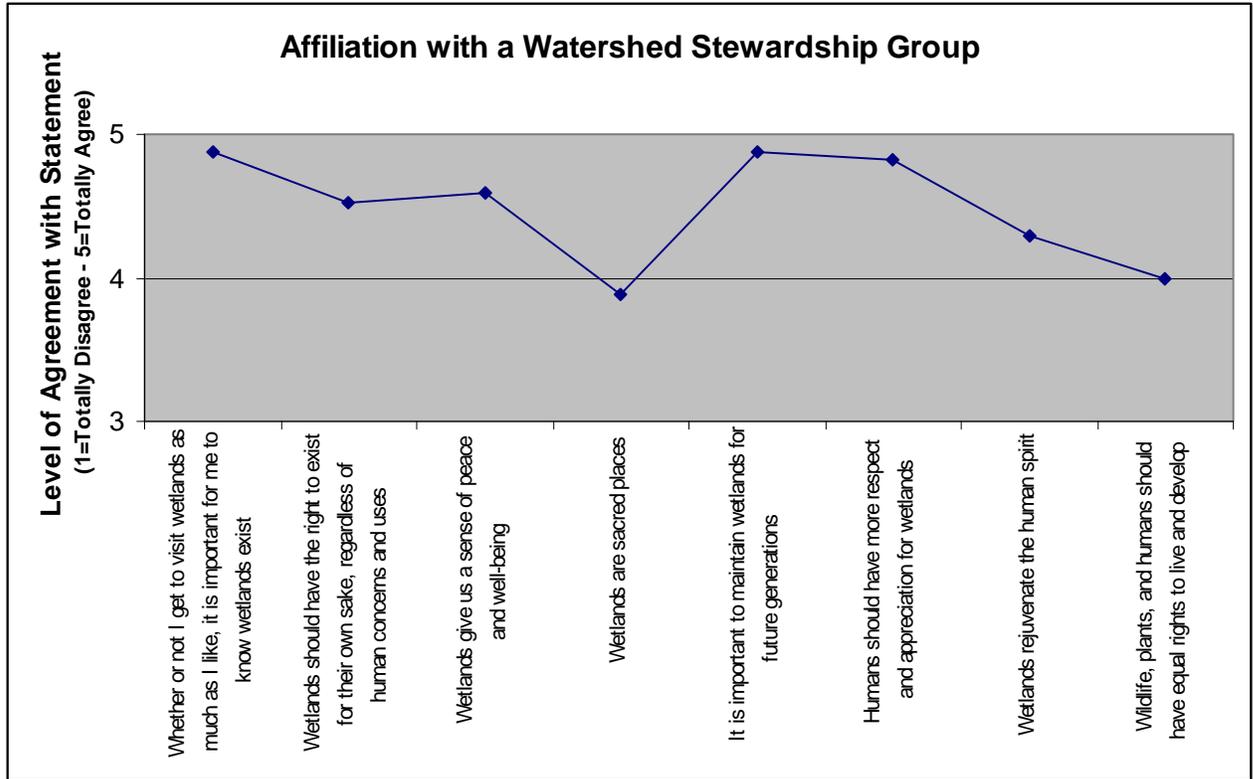


Figure 12. Descriptive graphic of respondents affiliated with a Watershed Stewardship Group and their agreement with the value of wetlands statements.

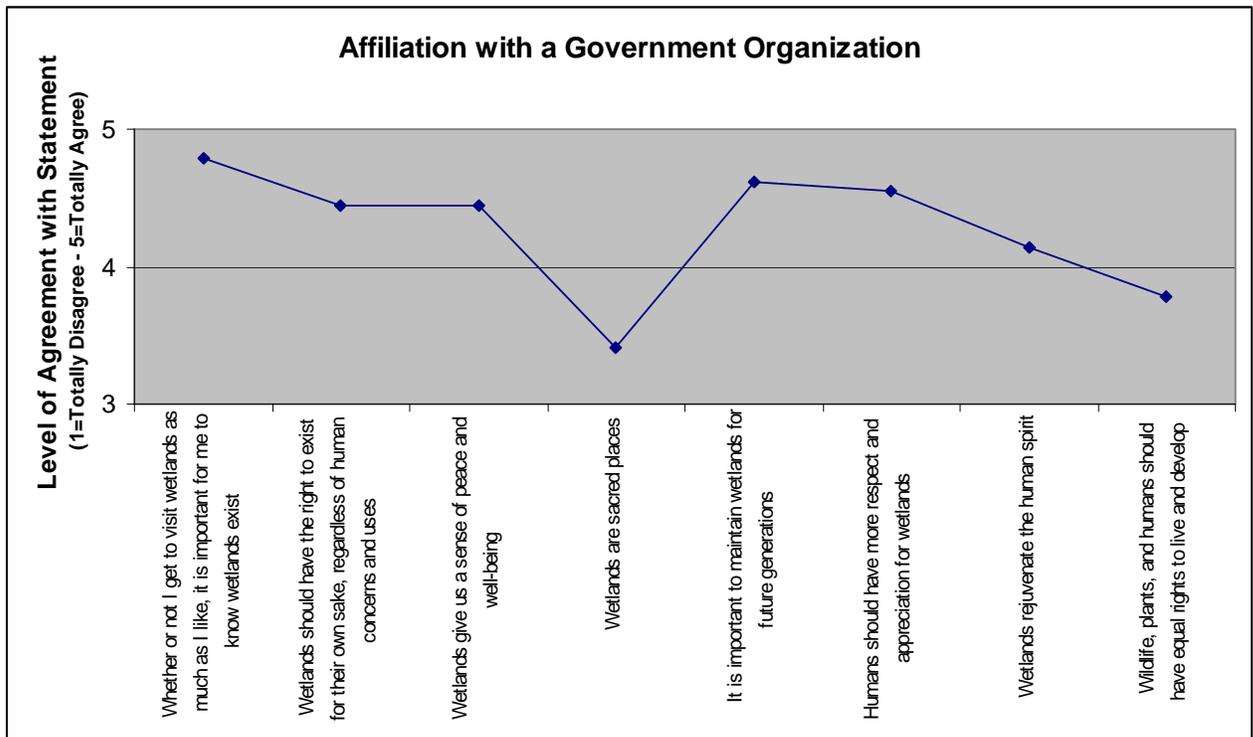


Figure 13. Descriptive graphic of respondents affiliated with a Government Organization and their agreement with the value of wetlands statements.

Additional descriptive graphics can be found in the appendices as they relate to questions three and nine.

Three factors also emerged in relation to participants rating their level of agreement with statements associated with wetlands management. These factors represent the perspectives people have on wetlands management, and are suggested to arise from the value orientations people hold for wetlands. They were important to identify, given the relationship that value orientations share with influencing management perspectives, and given the assumption held that there is a relationship between the management perspectives people hold for wetlands and the activities or experiences (services and benefits) people can have within wetlands. These factors are referred to as Factors D, E and F. There was no relation found between these factors to the values orientation continuum, nor was there any relationship between Factors A, B and C, and D, E and F.

Factor D is characterized as a management viewpoint that believes **current wetland management serves wetland protection and sustainability needs**. Factor D suggests that people appear to hold perspectives indicating they are satisfied with how wetlands are being managed in the province, for both economic benefits as well as benefits for future generations. Statements that characterize Factor D include:

- *“Wetland managers do a good job at balancing local economic interests with wetland conservation.”*
- *“Wetlands are being managed successfully for the benefit of future generations.”*
- *“The citizens of Alberta have enough to say in wetland management.”*

Factor E is characterized as a management viewpoint that believes **economic development should be considered a higher priority in land management than wetlands**. This factor suggests that people think wetlands loss in Alberta is not an issue of concern, particularly in light of community and economic development. Factor E also appears to suggest that there are few long-term negative effects from losing a few wetlands across the province. Statements that characterize Factor E include:

- *“Economic stability of communities is more important than protecting wetlands from development.”*
- *“Losing a few scattered wetlands across the landscape generally produces few long-term negative effects on the environment.”*
- *“The economic benefits from development that impacts wetlands usually outweighs any negative consequences.”*

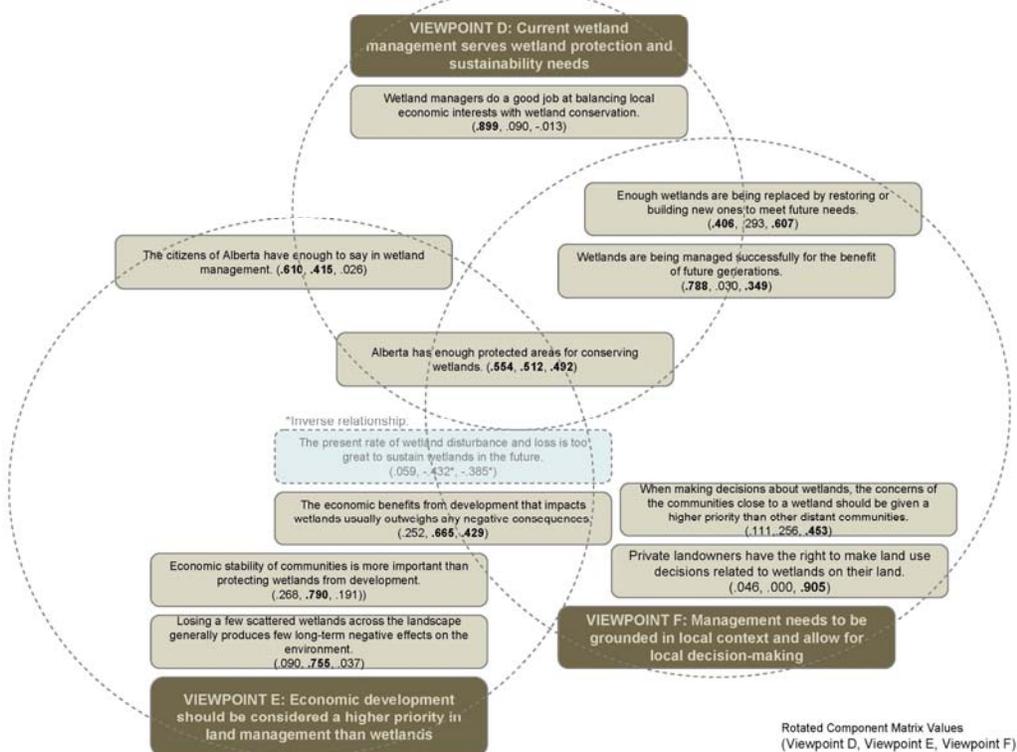
Factor F is characterized as a management viewpoint that believes **wetland management needs to be grounded in the local context and allow for local decision-making**. This factor is interesting in that it appears to emphasize the local context, particularly individual or community decision-making abilities, in wetlands management. Statements that characterize Factor F include:

- *“Private landowners have the right to make land use decisions related to wetlands on their land.”*

- “Enough wetlands are being replaced by restoring or building new ones to meet future needs.”
- “When making decisions about wetlands, the concerns of the communities close to a wetland should be given a higher priority than other distant communities.”

Figure 12 represents the factor depictions for survey question 6, related to wetlands management. Viewpoints D, E and F are arranged in a manner that represents the relationship among these viewpoints. Numbers in boxes nearing 1.00 are significant as they relate to the factor they are associated with (D, E, F).

Viewpoints on Wetland Management – Factor Depiction (Survey Question 6)



While Factor D and E share some

similarities to a more nature-centered and human/utilitarian-centered perspective based on the clustering of statements, Factor F is not as easily distinguished. The significance of Factor F then, can be illustrated by Coke and Brown (1976) who conducted a study (using a different methodology) to assess viewpoints towards land development in seven U.S. states. While two dominant factors were emerged in different jurisdictions, they did not find the traditional continuum they assumed they would. Instead, they found an orthogonal²⁵ relationship between the dominant factors called environmentalist and localist. The localist factor revealed that there was more concern given to local interests and having local voices represented in decision-making, versus concerns specific to

²⁵ Referring to the characteristic of being independent in relation to something else (Merriam-Webster, 2011).

rampant development (Coke and Brown, 1976). This relates to Factor F in that perhaps the survey participants are demonstrating their concern with having their voice and interests represented in wetlands management decisions, as well as the actual management actions when such actions are on private land.

Also of interest between the differing management viewpoints was that the statement *“Alberta has enough protected areas for conserving wetlands”* factored on all three management viewpoints. In contrast, there was an inverse relationship for Factors E and F with the statement *“the present rate of wetland disturbance and loss is too great to sustain wetlands in the future”*. At first glance, these two statements and their factoring seem contradictory; however, this may signal that these viewpoints held importance for the management option indicated in the statements, rather than the amount of wetland loss indicated in the statements. Participants’ agreement with these statements may indicate they believe there are sufficient wetlands protected within Alberta’s protected areas, and that wetland management might be better enacted if locally held and conducted for the purpose of economic development. Again, this would be interesting to further explore.

While the **Factors A, B and C** (value orientations) appeared to fall along a continuum, the management viewpoints did not indicate a linear relationship, nor did they indicate a strong relationship to any particular value orientations. Instead, these viewpoints appeared to illustrate a large degree of overlap between each other; therefore, they are not considered to be entirely exclusive or opposing viewpoints. Rather, these viewpoints appear to emphasize different aspects of wetlands management that share some degree of similarity in opinion on what should be done in Alberta. That said, people may have pluralistic perspectives when it comes to how they value wetlands and how they want to see wetlands managed (Barrett and Grizzle, 1998). This would be interesting to further explore, to better understand if or how differing value orientations relate to wetlands management viewpoints.

Perceived knowledge about wetlands was generally higher than actual knowledge about wetlands, and while this is not entirely new information, a good basis of understanding about wetlands was demonstrated by respondents. Here, an opportunity may exist to provide additional information and educational programs to Albertans, in order to increase their awareness about wetlands and their management.

What was interesting and not entirely expected was that the statement specific to perspectives on ecosystem services did not generate positive responses; this may be due to a lack of understanding of what ecosystem services are, or may be due to a value orientation (e.g., biocentrism) that supersedes a utility value for wetlands. For example, 70% agreed that *“wetlands can be improved through management actions by humans”*, which may suggest that the statement itself is confusing for respondents, or that responses were based on the balanced perspective embedded within the statement. This would be interesting to further explore, particularly as it relates to the future of ES in ESRD.

2.4 Discussion and Conclusion

2.4.1 Discussion

The wetlands values survey found that by understanding what value orientations people construct in relation to wetlands, as well as which wetlands management viewpoints arise from such value orientations, can provide insight as to how people ascribe importance, relatively speaking, to wetland cultural services and benefits, among other ES and benefits. This information contributes not only to better articulating how and to what level people deem wetlands to be important to them (gap 3), but also contributes to a decision-making context, where considerations can be given to the full range of cultural services and benefits that people associate with wetlands, as well as how highly people regard these services or benefits. Immediate decisions can then be made in regards to this understanding, as well as decisions that consider the cumulative and long-term effects of (e.g., sub-division) development on wetlands and how this, in turn, can effect human wellbeing (gap 2). In both cases, decisions can be made that explicitly considers people's ability to use and appreciate wetlands, both locally and regionally, in parallel to the importance of wetlands for their biophysical functions on the landscape.

Overall, providing additional information about how people's value orientations give rise to their management viewpoints, as well as how people ascribe importance to the cultural services and benefits of wetlands, adds to the evidence to support avoidance, mitigation and compensation decisions at the planning and approvals stages (gap 1). This information provides local decision makers additional perspectives, on a directly comparable basis, that demonstrate the levels of importance a range of cultural services and benefits can be provided to people from wetland ecosystems. Such perspectives provide additional breadth and depth to the planning and approvals processes, and specifically help address the three gaps in the wetland planning and approvals process.

Determining how people ascribe importance to wetlands and what management viewpoints they hold provides insight as to what level of importance people ascribe to wetlands cultural services and related benefits. This information is significant for wetlands approvals decision makers when faced with sub-division development decisions in the context of wetlands conservation, so that decisions can better reflect the needs and wants of society as a whole, including specific stakeholder groups' interests. For example, decisions made regarding approvals of development opportunities that may impact an ecosystem, can have significant ramifications on people, and not only in a tangible "ES" way; the implications of loss of natural spaces as well as the wildlife produced there, can impact the connections people construct and nurture with the natural world. In turn, the loss of opportunity to develop spiritual connections with a place or species, or loss of opportunity to learn about natural process within a place, can result in such things as "nature deficit disorder" where there is not only a misunderstanding, or total lack of understanding, about ecosystem functions, but also a range of behavioral and psychological issues from lack of connection to the natural world (Louv, 2005).

Understanding the value orientations and management viewpoints held by people of a particular area, can be used in the wetlands approvals decision making process, as well as in cumulative effects management decisions. If value orientations and management viewpoints are known, and possible management options that are or have been proposed in an area conflict with the values of people, then decisions can be made to

better address the social agenda for wetlands in that area. As well, an understanding of value orientations and management viewpoints can provide insight as to the relative level of importance certain features of wetlands have for people. While this requires a deeper examination into the specific statements that align with value orientations and management viewpoints (e.g., how and why are ES important to people?), it nevertheless provides important information for decision makers to better understand what wetland features can or might be managed.

2.4.2 Limitations

Despite the general success of the piloting of the survey as a new tool, some limitations to this work remain. These included: time constraints, software purchases and sub team membership which will be described briefly below.

Projects are often subject to a variety of constraints (e.g., time, resources); this project is no exception. A significant constraint for the wetland values survey was time. For example, obtaining approval to conduct the pre-test and full sample took much longer than anticipated, due to a breakdown in internal communications, in addition to an unexpected Canada Post strike. The impact was a delay in the survey mail-out, and the response rate was lower than first anticipated. This may have impacted the results in that other value orientations, or stronger correlations to existing orientations, may have arose from the analysis if we had more data. When a complete analysis was conducted, only the direct output from SPSS was provided to the team lead for interpretation, rather than a more complete descriptive analysis. This was problematic in that the team lead could only interpret data based on existing knowledge of factor analysis, and further capacity in this area had to be developed. This led to delays in the writing of results. However, the issue was rectified as best as possible by working with advisors to complete the analysis in a descriptive way. Lastly, more time overall was required to reflect on literature reviewed at the front end of this work, so as to formally develop a conceptual framework. Additionally, more time was required to fully explore the data once it was all submitted and analyzed. More time was needed to take a step back and ask “what do we want to know of the data”, which might have enabled the sub team to uncover insights that may have been overlooked in this analysis.

There were also delays in acquiring the appropriate software (SPSS) to conduct the survey factor analysis. The process to request and acquire software in ESRD includes involvement of finance and information technology (IT) business units. The delays impacted the ability of the team lead to learn factor analysis in a timely manner, and resulted in some of the aforementioned issues. In future, the existing process for acquiring software must be outlined to and implemented by the project team. This includes involving IT personnel in discussions related to software needs, given the operating systems used by ESRD.

The team required members solely committed to undertaking and completing this work. For most of the project, the team lead was the sole member responsible for organizing and coordinating work, as well as completing analytic and other tasks. In the beginning, it made sense to have one person (socio-cultural lead) do the majority of the work, especially with the early work with the economics team to look at the values survey and the economic valuation opportunities. The learning is that committed members should have been brought on board early (e.g., meetings were held and commitments were

made but they were not kept, for the most part). This imposed undue stress and increased susceptibility of time constraints to project deliverables.

2.4.3 Conclusions

Despite limitations, knowledge generated from this study provides insight as to how people living or working in the area of the ES Pilot study site ascribe importance to wetlands and their management. This is important information for decision makers to use in the wetlands approvals process, as well as in cumulative effects management, which helps address the ES Pilot's three gaps. By better understanding how people deem wetlands to be important it is useful for making more informed decisions that reflect the social agenda for wetlands in Alberta. Additionally, an understanding of the management viewpoints people hold for wetlands, and how such viewpoints relate to people's value orientations, will have important implications for decision making within a cumulative effects management context. That said, further investigation of people's value orientations, and viewpoints on wetlands management, would be interesting to pursue in order to refine ESRD's understanding of the social agenda for wetlands in the province.

3.0 Wetlands Thematic Analysis

3.1 Introduction

Within Alberta, the development of a provincial wetlands policy has been ongoing for the past several years, with input from the provincial government, the Alberta Water Council (AWC), industry representatives, (E)NGOs, and the public. In this period of transition and political process, recommendations for what should be contained within a new wetland policy have been actively and publicly debated. In light of this, a number of resources on how various members of government and the public view wetland management are available for analysis within the public domain. A selection of publicly available documents and news clippings were thematically analyzed to provide insight into the importance of cultural services within the broader provincial society. The analysis was completed late in the project, when the opportunity was realized, to provide additional insight into the importance people ascribe to wetland cultural services and benefits.

This work centered on several newspaper articles published between 2006 and 2010, capturing the debate that took place when the AWC released their recommendations for a provincial wetland policy. At this time, there were two letters of non-consensus submitted to the AWC from stakeholders involved in the recommendation development process. The AWC also published letters they authored, and letters from other stakeholders, in response to these non-consensus issues. These letters were also included in the analysis. The official wetland policy documents from the 1993 interim policy, and the most recent policy intent authored by Alberta Environment and Sustainable Resource Development, were used in this analysis as well.

Limitations to this work are largely based on the documents available for analysis, and the type of analysis used, grouping content topics into themes. The opportunity was there to capitalize on a rich debate that had taken place in the public domain, regarding wetlands. Of course, this debate was spurred by specific issues raised during and after the release of the AWC recommendations for a provincial wetland policy. This provided an obvious and somewhat bounded suite of information available publicly for analysis. On the other hand, the data sources were focused specifically on particular issues surrounding the development of wetland policy, not necessarily revealing diverse information about how people view cultural services and benefits in particular. Additionally, this analysis represents perspectives from across the province, therefore a broader scale than the ES Pilot study site; this means that some issues contained within the documents (e.g., pothole wetlands) are not necessarily in scope for the analysis. It would be preferable to have perspectives from within the study site included in the analysis, if available for future studies.

The following section outlines the approach used to analyze the documents.

3.2 Methodology and Method

Thematic analysis is a commonly used method of qualitative analysis where the aim is to identify a limited number of themes that adequately reflect their textual data (the documents being analyzed). However, this can be difficult to accomplish, since the identification of several superficial themes may not reflect the required level of analysis needed; as such, several analytic steps may need to be repeated in order to identify all possible themes to represent the data (Howitt and Cramer, 2008). In this case, the initial coding of themes focused on how each of the “authors” stated the problem, i.e., what the different perspectives expected the wetland policy to solve. This first layer of coding revealed statements about preferences for wetlands, particularly surrounding wetland management throughout history and the present.

This analysis was based on an emergent design, where categories and themes emerged from the data through the analytic process; there was no external, prior thematic system (e.g., researcher bias) applied to the data (Wright, 2009). This design then, involved a process, as Wright describes, “that is ongoing, changeable and iterative in nature but implies that choices will be purposeful and carefully considered” (2009, p. 62). To further ensure that the themes were indeed emergent and not based on researcher bias more than one researcher performed and reviewed the analysis.

Documents used in the analysis were organized according to the primary author to ensure a variety of perspectives were captured from the debate. These include:

- Government – Alberta Environment and Sustainable Resource Development;
- Parastatal – defined as being composed of a public entity, industry and general citizens. This group included the Alberta Water Resources Commission (AWRC) and Alberta Water Council (AWC); and
- External – including industry and general citizens.

The analytic approach to coding statements was informed by Hilding-Rydevik et al (2011), following part of their coding scheme based on “problem identification” as noted above. Each statement representing a problem the wetland policy was expected to solve was individually coded using the text from the statement itself. This initial coding revealed the swath of problems or expectations articulated about wetlands and their management. The first layer of coding was then aggregated to form larger categories, still focusing on the problem, or more specifically the expectation for the wetland policy, that was revealed. These larger categories based on patterns in the initial codes were given names, or headings, that for the most part also came directly from the text or a combination of statements in the text. As described by Howitt and Cramer, though this can be a trial-and-error process, where changes to headings as well as aggregating data can occur, clear, concise and consistent themes began to emerge (2008).

Emergent themes were looked at holistically, to form a comprehensive picture of the data. Identifying the following features in the statements developed themes specific to the ES pilot:

- Repetition of ideas, beliefs, concerns and/or issues related to wetlands management and the importance of wetlands in Alberta.

- Explanations, descriptions and/or interpretations across statements, referring to the past and/or explaining present thoughts related to wetlands management, and their importance, in Alberta.

A selection of these categories and codes were then extracted based on their relevance to the concepts of ecosystem services, wetlands management and the ‘value’ of wetlands to people.

It was hypothesized that statements made by the various authors would likely provide insight into specific perspectives on wetlands management in Alberta, as well as indicate how and potentially why, wetlands are ascribed importance by said authors. Anticipated results would be used to provide supporting evidence to the management viewpoints found from the wetlands values survey, and more specifically, results would be used to help address gaps one and two for the ES Pilot.

3.3 Analysis and Results

Though the documents were analyzed based on their “authorship”, the characterization of each theme was not contingent on differentiating between the authors. It was the ideas and preferences about wetlands and their management that were the subject of analysis. As such, the interpretation offered below reflects *the key themes* (that often spread across authors) and not the authors to whom the themes might ‘belong’.

It was hypothesized that ‘management’ concerns would be strongly represented in the data, given that the document’s content was situated around wetland policy in Alberta; this proved to be true in the analysis. However, it was unexpected that the benefits of wetlands would be represented in the data nearly as strongly as ideas on management. Another unexpected theme emerged, those statements related to education about wetlands, and the importance of more information on wetland benefits.

Table 1 illustrates the three major themes that emerged from the data, as well as describes the characteristics of these themes. While every attempt was made to use words or phrases from the data to name the themes, the word benefit is used rather than value despite value being used by authors of the documents. This choice was made to reduce the ambiguity that is found in the term value, and because the benefit better reflects the actual content of the statements, in terms of how we have used the language for this pilot project.

Table 1. Characterization of the three major themes.

Three Major Themes		
<p>Management of Wetlands: includes ideas and opinions related to the importance of the protection and conservation of wetlands, as well as concerns related to development pressures on wetlands and loss of/or degradation to wetlands.</p>	<p>Benefits of Wetlands: includes ideas, opinions and assumptions on why, and to some extent how, wetlands are important (or worthwhile) to people; includes notions of ecosystem services as well.</p>	<p>Education related to Wetlands: includes ideas and opinions on informational needs, as well as particular thoughts on certain wetland functions or components, so as to raise awareness and understanding about wetlands and their importance in Alberta.</p>

It was found that, under the theme of **Management of Wetlands** statements represented relatively strong views on how wetlands should be managed in Alberta. Perspectives ranged from concepts of protection, i.e. that wetlands should be managed to prevent harm, destruction or loss, as well as conservation, i.e. to balance human land uses and needs with managing natural features sustainably. Statements that characterize management, generally, include:

“All wetlands serve important ecological and hydrological functions and should be protected equally to some basic standard by and under the law.”

“Representative, rare, and unique wetlands should be afforded some level of protection from development.”

“The challenge for Albertans is to balance growth and economic development while safeguarding the environment, including wetlands.”

“Wetlands, like other natural resources, are sustained for future generations with initiatives”

In addition to these statements, a desire was expressed to manage wetlands as ecosystems. Statements that characterize this include:

“Wetlands should be managed as ecosystems. They are an integral and important part of our environment.”

“The new wetland policy should be guided by the concept of ecosystem services that wetlands provide.”

In relation to wetland management, some statements were about the benefits wetlands can provide people; however, it was recognized that there was difficulty in measuring the benefits (values) wetlands provide:

“Many wetland uses can be measured in economic terms, while other significant values do not lend themselves to economic evaluation.”

The difficulty stated here may indicate a need for the use of methods that can identify a more holistic view of the benefits that wetlands provide people, where methods used are alternative, or complimentary, to economic valuation methods. Regardless of this difficulty, some authors did nevertheless recognize the need to consider these benefits in management decisions:

“Different types of wetlands have different social, economic, and environmental functions and values. This variety of values should be reflected in our decision-making processes.”

Several statements appeared to reflect a cumulative effects management perspective, where authors stated that management actions must be cognizant of the impacts, now and into the future, of development in Alberta:

“This does not mean development that impacts wetlands would stop, but that future development must strive to avoid or minimize their impacts to wetlands.”

Under the **Benefits of Wetlands** theme, authors expressed ideas about why wetlands are important people. These were characterized by:

“Recognition that wetlands provide diverse benefits, and that all these benefits must be considered in any management decision.”

“The ecological value of wetlands is significant.”

“Water resource (hydrological) benefits - Wetlands are important for the control and storage of surface water and the recharge and discharge of groundwater.”

“A wide range of consumptive and non-consumptive recreational and tourism opportunities are dependent on wetlands.”

“Wildlife and fisheries benefits - Wetlands, wetland margins and surrounding uplands provide important habitat for a large variety of plant and animal species.”

“Permanent wetlands are a valuable source of water for domestic, livestock and industrial use.”

“We recognize that wetlands have different values and we think it’s important to incorporate that into a provincial wetland policy.”

Finally, within the theme of **Education Related to Wetlands**, authors stated a desire to see educational activities initiated or increased, so that Albertans could increase their awareness and understanding of wetland functions and their importance on the landscape. These include:

“Albertans are aware of, and value, the functions and benefits that wetlands and wetland riparian areas provide”

“Information base about peatlands and slough/marsh wetlands in the non-settled area is limited and many functions and roles of non-settled area wetlands and peatlands aren’t well understood.”

“Develop a better understanding of wetland function and benefits; the relationship between wetland area and function; the costs and benefits of maintaining or increasing wetlands on the landscape; and their value in comparison to other land uses and values.”

3.4 Discussion and Conclusion

3.4.1 Discussion

This analysis was completed on publicly available documents related to wetlands policy in Alberta. As such, the analysis is not specific to the ES Pilot study site. However, the findings nonetheless support the results of the wetlands values survey, specifically the viewpoints on wetlands management. This analysis suggests that the viewpoints found in the study site are drawn from similar perspectives within a larger repertoire of viewpoints in the broader society. In this way, this analysis provides information that can be used to address gaps one and two for the ES Pilot.

While some authors revealed specific perspectives for managing wetlands, which included expressions of why wetlands are important in Alberta, the overall analysis regardless of particular authors suggests that there is a strong desire to manage wetlands for and against human land use activities. This includes, for example, sub-division or other development projects, as well as agriculture, so that wetlands can be protected and conserved for both human use and benefit, and simply for their existence.

Also interesting, was the desire to manage the protection and conservation of wetlands that were considered to be significant, which included rare and representative wetlands and peatlands. This was relatively strongly represented in the extracted statements, even when these wetlands were proclaimed to be ill-understood and inadequately defined. Supporting this was that some statements also reflected a desire to provide education about these types of wetlands, along with all other wetlands, so that awareness about wetlands protection and conservation from degradation and loss could be increased among Albertans. For example, some statements reflected the desire to have more specific educational activities providing information on how to identify and classify wetlands, so that various types could be known and understood related to function and value on the landscape. Further, it was also suggested that development of educational activities would increase understanding of how and why wetlands were important to people's lives, which connects the ecological services and benefits provided by wetlands for human wellbeing, was also suggested.

Benefit statements about the importance of wetlands, for such things as the recreational and wildlife opportunities they provide, are important to note. While these statements did not specify exactly why these services were important, they do relate to cultural services and benefits (and other ES), identifying a higher level description of why certain features of wetlands were ascribed importance. What would be interesting to further explore, and is done to some extent in the benefits ranking exercise, is to determine how that stated importance of wetlands cultural services is connected to human wellbeing.

A desire was also expressed to manage wetlands from a cumulative effects and future-outlook perspective, so that management reflects social, economic and environmental needs and uses, where benefits are provided to people from functioning wetlands. While there were some statements that reflected a lack of importance for certain wetlands, that is, some authors reported that wetlands could not be considered of greater value than an entire landscape complex in management decisions; this is not entirely detrimental to wetlands protection. In fact, a landscape view that seeks to manage human activities in order to ensure ecosystems or entire regions can be better conserved and protected, appears to resonate not only with an ecosystem-service based

management approach, but also a cumulative effects management approach: determining the cumulative impacts on the entire landscape, based on human activities now and into the future.

While the information acquired to this point in time of the ES Pilot was useful, the sub team still had not addressed the second research question: what level of relative importance do people ascribe to the cultural services and benefits found in the ES Pilot study site? As such, the following section describes the benefits ranking exercise, which was another opportunistic method used to address this question.

Relating the survey results to the thematic analysis, and specific to viewpoints on the management of wetlands, the thematic analysis demonstrated that people have strong preferences for managing wetlands in Alberta, albeit for a variety of reasons. However, what was most salient from this analysis was that people wanted wetlands to be managed *for* human use as well as *for* their intrinsic right to exist. The findings then, indicate a strong desire to see wetlands managed on the landscape, based on the services and benefits provided to people as well as for their existence. What was also interesting was that there appeared to be a relatively strong desire to see education about wetlands and their importance undertaken, so as to increase public awareness of, and understanding about, wetlands in Albertans.

Insights gained from the thematic analysis of public data provide insight into what has been said by public entities regarding wetlands management and the value of wetlands. The results that emerged illustrated the key messages, ideas and issues specific to the development of wetland policy in Alberta; however, this is relevant to the Pilot Project given the link between the policy's management approach to ecosystems and balancing social, economic and environmental needs. This approach resonates with the Pilot Project's ecosystems services approach to decision-making and wetlands management, were we are fulfilling requests to provide information for the three gaps. In addition to these connections, quotes also illustrated the need for more or better information and education related to wetlands; this can be connected back to the gaps in that better understanding wetlands and their relationships with humans can enable a better understanding of values for wetlands. In turn, this will enable better management decisions on the landscape.

This work reinforced the notion to further explore the use of thematic analysis in analyzing existing, publically available information related to wetlands management (among other topics) in Alberta. However, in future studies it may be useful to refer to Thompson's (1966) suggestion, where four principal characteristics for evaluating the opinions of people in engagement settings may be useful:

- Explore the diffusion and persistence of opinion.
- Explore the intensity and reasonableness of opinion, which can serve to distinguish opinions held in earnest and on rational grounds, from those that reflect a vague preference of one option over another.

This framework may help better identify the degree to which an individual or group's opinion(s) reflect (Coke and Brown, 1976):

- a personal general preference for an interpretation of fact(s);
- a personal desire for specific action to occur: or,

- a personal belief related to the best ways to achieve outcomes.

Nonetheless, the design used for this analysis does demonstrate a relatively strong desire to manage wetlands against human land use pressures, and for the benefits they provide. Overall the thematic analysis supported the findings of the wetlands survey, specific to the viewpoints that people hold on managing wetlands. This is significant in that understanding how, where and why people place importance on wetlands management, *as it relates to people's use of wetlands and the existence value of wetlands*, can be used in approvals decision-making so that decisions resonate not only with sound natural science (e.g., functioning of wetlands) but also with an understanding of the social context: the ways in which people ascribe importance (or worth) to wetlands, their services and benefits based on management viewpoints.

3.4.2 Limitations

There were a couple of key limitations for this work including time constraints, trying to link general wetland analysis to the case area and trying to merge another analysis project to work for the ES Pilot. The length of time required to collect and catalogue the available documents for analysis was not anticipated, including; locating documents, organizing them into themes and building an understanding of the themes took more time than expected. Furthermore, only extracted statements were provided to the sub team lead, with little attention to a preliminary coding scheme. Lastly, the sub team lead was the only member available to complete the full analysis of extracted statements at the time. Little can be done about collecting and cataloging documents, aside from allowing more time for collection and cataloging. As noted in other sections, full sub team membership is required to reduce workloads on a single member.

This analysis was conducted on all publicly available documents related to wetlands policy in Alberta, and not just documents specific to the ES Pilot study site. This analysis was undertaken as an emergent opportunity that could provide more detail on the viewpoints people held related to wetlands management, in order to support findings from the survey. An analysis of this nature specific to the study site should be considered in future. Finally the ES pilot was opportunistic in using this method as there was other thematic analysis work underway within ESRD. There was a limitation in that the two projects had different deliverables but relied on the same person to do the work which lead to sub-optimal results and too much for one person to complete.

3.4.3 Conclusions

Overall, the thematic analysis indicated a certain amount of social desire to manage wetlands to prevent degradation and loss, particularly in relation to human land use activities such as development, now and into the future. This may be influenced by historical experience, where the authors share a perspective; they have seen firsthand the loss and disturbance of wetlands due to increasing human land uses over time. Additionally, there appears to be a strong desire to manage wetlands for the many benefits they provide people. There was also a desire to see educational activities on wetlands that would increase awareness and understanding about the vital role wetlands play in Alberta, and how they are important to human wellbeing.

These themes then, have similarities to the viewpoints of wetlands management that came out of the wetlands values survey. This is significant for the ES Pilot in that decision makers can use this information to take a more balanced perspective on wetlands management, where management decisions can reflect the biophysical, socio-economic, and socio-cultural significance of wetlands, in and of themselves and for the services and benefits they provide to people. This information then, helps address gap one and two, where decision makers can use an understanding of public viewpoints on wetlands management to choose the most appropriate approvals decisions in relation to the social agenda for wetlands and development, as well as consider how management decisions play a role in cumulative effects of developing wetlands. Furthermore, this information supports gap three in that an understanding of what the public indicates is important to them, related to the benefits wetlands provide humans, can help ensure decisions are made that resonate with the public's needs and desires.

4.0 Wetlands Ecosystem Services and Benefits Ranking

4.1 Introduction

The ES Pilot was interested in finding out more about socio-cultural aspects of ES and non-monetary values of ES, as described earlier in this report. People have used ranking approaches to compare very different ES, including those that do not have easily calculated monetary values, are ranking approaches. In such methods, participants place different services in a rank order based upon some chosen criteria of importance (Ko 2007). Sometimes those tools are used as part of a larger ES assessment process that can involve simultaneously identifying ES and drivers of change, as well as ranking the most important services (e.g., Lopez-Marrero & Hermansen-Biaz 2011, Shelton 2001) and sometimes the ranking is a step in its own right (e.g., Ko 2007). A ranking of ES in southern Alberta was done by the professional staff involved in the South Saskatchewan River Basin study (Hughes-Field 2010).

A meeting with stakeholders in the ES Pilot study area was planned, to discuss ES of wetlands for other purposes, so the sub team took the opportunity to conduct a simple services and benefits ranking study at the same time. This opportunity would permit the ES Pilot to get data that was specific to wetlands, specific to the study site, from resident stakeholders, and which could be detailed enough to specifically address socio-cultural services and benefits as well as the other ES being investigating. This Section provides a summary of the key points. More details of the workshop day are in the report by Clare (2011), and details about the questionnaires, data, analysis and interpretation are found in the report by Brown (2011, in the Appendix).

4.2 Methods and Methodology

On August 24, 2011 a one day workshop was held in the ESRD office in Calgary with seventeen people representing stakeholder groups interested in and knowledgeable about the Shepard Slough study area. At the end of the day stakeholders filled out two questionnaires. They used a ranking approach to address the relative importance that stakeholders assigned to different ecosystem services and benefits. The first questionnaire provided the list of the 12 ES being investigated, which included four cultural services. Stakeholders were asked to rank the perceived importance of those 12 into categories of high (H), medium/middle (M), low (L) or not relevant (NR) importance. They were asked to do that ranking three times, each time from a different point of view: those of three potential 'beneficiaries' – individuals, stakeholder group and society as a whole. The second questionnaire provided a list of 14 cultural benefits that people might derive from wetlands. Stakeholders were asked to rank the relative importance of each benefit using the same categories (H, M, L, NR) as in the previous question.

4.3 Analysis and Results

To analyze the data, scores of 3, 2, 1 and 0 were assigned to each service assigned H,M, L or NR, and the scores added for each service and benefit. The services and benefits were then arranged in the order of total assigned scores. Because the total scores were rather complex to work with, they were converted to the simple rank order of the services and benefits. The rank order results are displayed in Tables 2 and 3.

Table 2. Rank order of ecosystem services by perceived importance to individuals, their stakeholder groups, and to society

	Individuals	Stakeholder Group	Society
Wildlife Viewing	1	1	1
Hiking/Walking	2	1	3
Place providing Knowledge and Study	3	1	3
Place for Research	4	7	3
Aesthetic Appreciation	5	5	2
Photography	6	6	9
Artistic Activities	6	8	10
Inspiration	8	12	6
Sense of Place	9	1	6
Sense of Belonging	10	8	10
Sense of Self/Identity	10	10	13
Hunting/Fishing	12	10	8
Traditional Harvest or Use	13	13	13
Religious or Spiritual Use	14	14	12

Table 3. Rank order of socio-cultural benefits by perceived importance to individuals, their stakeholder groups and to society

	Individuals	Stakeholder Group	Society
Water filtration/purification	1	3	1
Aesthetic (beauty and enjoyment)	2	6	8
Water quantity regulation	3	1	1
Flood control	4	2	3
Science and Educational Value	5	8	10
Recreation and tourism	6	5	5
Erosion control	7	4	4
Pollination	8	11	5
Food Crops	9	7	10
Soil formation	10	10	7
Carbon storage	11	12	8
Traditional Use	12	9	12

Most broadly, the stakeholders completing the survey perceived differences in the importance of different ES. They also believed that the three beneficiary groups rank the services differently.

All services rated rather highly. The average rating per category is above two (the average possible score) for all beneficiary groups. Further, the services were seen to be important somewhat more by society and by individuals than for the stakeholder groups. The average scores being 2.9 for society, 2.7 for individuals and 2.5 for their stakeholder groups. On the whole, the participants gave substantial importance to all of the services provided by wetlands.

Because the scores were quite close in some cases, the rank orders are often distinguished by only small differences. Such small differences should not be given too much importance. Therefore it is most realistic to compare broad trends in the data rather than slight differences between individual services. The discussion below addresses broad patterns, which do show quite clearly.

The three water-related services (water quantity, water filtration and flood control) were consistently the most highly rated services. These three services collectively comprised three of the top four services for all beneficiary groups, although the exact order varied slightly among beneficiary groups. The practical importance of the services related to quantity and quality of water and flood control was the reason those services were included in the ES Pilot. That such merits were recognized by stakeholders was soundly confirmed.

There is also a strong clustering among lower ranked services. Traditional use, carbon storage, soil formation and food crops ranked in the bottom half and mostly in the bottom third for the three beneficiaries. Comparatively, they were broadly considered less important than the other categories, for all beneficiary sectors.

The other five categories scored more towards the middle, and were also ranked somewhat more variably among the different beneficiary sectors. They are described here in order of roughly higher to lower rated importance. Aesthetic services ranked as high as the second ranked services within the individual beneficiaries sector; and above the middle point for the stakeholder group, and slightly below average score for society. This result shows that one of the more intangible cultural categories, which would perhaps have been thought to be assigned less importance than more tangible or practical services, is rated very highly by these individuals, and is still considered a mid ranked priority for the other beneficiaries.

Two other cultural services recreation and tourism and science and educational values ranked in the middle of the lists, also showing that cultural considerations were given substantial weight compared to more conspicuously tangible and economically significant services. Erosion control was consistently above average, and clustered in the middle of the rankings close to science and educational value and recreation and tourism. Although closer to the mid point than the bottom, the category pollination was below the average score for all beneficiary groups and was on average only slightly higher than food crops. Therefore they ranked lower than the cultural services. The cultural service traditional use although overall the lowest rated service still had an average score of 1.8 for the stakeholder group, 1.6 for individuals, and 1.9 for society, where 2.0 represents M (medium/middle) ranked benefit. Thus even though it was the

lowest ranked benefit, it was still considered of medium importance. Overall then, **perhaps the most significant result from this work is that the cultural services were broadly considered to be comparable in importance to many other ecosystem services.**

Workshop participants distinguished differences among the benefits that could be produced from cultural services. Overall, the average score per benefit – 2.1 for individuals and society and 1.8 for stakeholder group – was very close to a medium rank of two. Nonetheless, that is still a substantial importance score, considering the intangible nature of some of these benefits, which could have been hypothesized to receive very low ratings. The participants chose to rate cultural benefits, overall, as being of substantial importance.

Similar to the pattern revealed previously for all services, the highest ranked cultural benefits were the more tangible ones: wildlife viewing and hiking/walking. Also similar, the intangible benefits were nonetheless still rated highly. The educational benefit 'place providing knowledge and study' ranked from second to fourth among the beneficiary groups. Also 'place for research' and aesthetic benefits were also broadly in the top third of the results. The middle ranked cultural benefits were also a mixture of more tangible benefits (photography and artistic activities) as well as some more intangible ones (inspiration and sense of place).

Traditional harvest or use and religious or spiritual use scored lowest overall, and their weighted scores were comparatively low. Sense of self/identify, hunting/fishing and sense of belonging were only scored slightly higher. Although they had slightly different rankings among the beneficiary sectors, those five benefits collectively made up the bottom third of the rankings. Thus some quite tangible benefits (traditional harvest or use and hunting/fishing) were again ranked similarly with some of the more intangible benefits: in this case, comparatively low. Thus a possible assumption that beneficiaries are inclined to mostly materialist orientations is not strongly supported by this data.

4.4 Discussion and Conclusion

This study showed how stakeholders ranked the importance of different services and benefits that wetlands provide and this information directly contributes to addressing gap three. The benefits ranking showed that people ranked all of the services from wetlands quite highly, although some were more important than others. The study identified the major importance given to the water supply, water quality and flood controlling. However, stakeholders also ranked three cultural services (aesthetic, educational and recreational services) as between Medium to High importance, which was equivalent to more tangible and potentially economically prominent services such as erosion control and pollination.

The stakeholders considered 14 different socio-cultural benefits from ecosystem services and ranked them quite highly as well. The highest ranked benefits were wildlife viewing and hiking/walking with other tangible and more intangible benefits (place for education, photography, inspiration and sense of place ranking similarly). Thus the study showed that wetland ecosystem services are understood and felt to be important by people in the region. It also showed the high levels of importance given to the sometimes intangible socio-cultural services and benefits. These perspectives offer decision makers tangible information about the values of wetlands to communicate with

the public, local political representatives and developers and to include in their development planning and approvals processes.

This information also contributes to the other two gaps. People derive a full range of cultural services and benefits regard them highly. People often derive multiple cultural benefits simultaneously from their experiences with wetlands, adding to the overall merit from a wetland. The cultural services of wetlands and the experiences they provide come sometimes from single wetlands, but also from the whole wetland landscape. These cultural perspectives thus help one consider the cumulative and long term effects of impacts on wetlands: they impact people's ability to use and appreciate wetlands and wetland landscapes locally and regionally for the long term. Understanding more about cultural services also adds to the evidence to support avoidance, mitigation and compensation decisions.

4.4.1 Comparison to Other Studies

In an earlier study of ES in southern Alberta, professional staff from government agencies ranked the relative importance of 20 ecosystem services. Information in these paragraphs is derived from Integrated Environments (2006) Ltd & O2 Planning and Design Inc. (2007), pp 73-87 and 98). They ranked the 20 services, separately, "in relation to the following four variables" (p. 73):

- Importance of the service to the production of goods.
- Importance of the service to the maintenance of assets.
- Relative importance at the margin (the impact of a small change in status of a service on the production of a good or maintenance of an asset).
- Manageability (the ability to manage the asset to ensure the delivery of the service) (p. 73).

"The results of this [combined] assessment conclude that the top six ES of greatest importance to southern Alberta are biological control, erosion control and sediment retention, water supply, water regulation, nutrient cycling and disturbance regulation." (p. 98). The four services in the earlier study that are similar to topics in this survey were ranked, out of 20: 11-science and education, 13-recreation, 16-aesthetic and 16 (tie)-spiritual and traditional use.

Note that the first two variables of 'importance' relate to the physical production of benefits, the third is a rating of sensitivity to change and the fourth is a rating of the service's amenability to management. Although these are all criteria of significance to the physical production and management of benefits from ecosystem services, the assessment of importance done for southern Alberta is quite different from that done here. This study generated assessments of the perceived importance of benefits to different beneficiary groups, and not to the production or manageability of the service itself. Inevitably, that approach results in much less importance being assigned to socio-cultural services with their usual benefits being 'experiences' and other less tangible results.

The literature on natural resource management (e.g., Stirling 1999) frequently recommends the use of different kinds of rankings, scorings and weightings (often under the title of multiple criteria analysis) to replace or complement use of financial equivalents alone in different kinds of decision making. Within many Millennium

Assessment regional studies, only the South African regional assessment is documented showing how local people directly ranked 11 ecosystem services (Periera H. et al 2005 p 176). Ecosystem assessment studies seem to more commonly involve ranking several priority ES for further study (e.g., Lopez- Marrero & Hermansen-Biaz), while ranking a full range of local services (e.g., Sheldon et al. 2001, Ko 2011) is less common. Lamarque et al. (2011) considered the relative values of 21 ecosystem services of agricultural mountain grasslands, including a range of cultural benefits similar to the ones ranked in questionnaire two. They also note the relative rarity of comparative studies. However some studies involve a careful and sophisticated range of ranking and other comparative studies (e.g., Periera E. et al. 2005). Similarly, relative ranking can also involve public participation, as it did in this study. Such participatory approaches are commonly recommended for natural resource management (Meffe et al. 2002) and Farber, Costanza and Wilson (2002) have recommended small group deliberation and data gathering approaches specifically in the context of ecosystem services. Similarly, although Chan et al. (2011) provide a variety of calculation and mapping and valuing tools, they end by considering that the modeling efforts to assign values to ecosystem services are not the whole picture. "For many stakeholders, an equally important consideration will be people's preferences regarding the processes by which decisions are made (p. 225)". They identify the possible merits of citizen juries and multi-criteria decision making as possible alternatives "or addenda to valuation of ecosystem services". (p. 225).

The relative importance rankings identified in this study were intended to stand alone, as information for local decision makers. Such information is often used as part of more complex and formal decision making processes, or as input to various kinds of tools, the more organized of which are often collectively referred to as decision support tools. (The most complex, involving computer software, are called 'decision support systems') Goosen et al (2007) discuss a continuum of decision support tools (Figure 1 p 188) from the more interactive to the more analytical: this workshop and survey would be close to the interactive end of the continuum. The importance (and difficulty) of considering different stakeholders' interests at different scales has been thoughtfully considered by Hein et al (2006), who also consider the challenges of different measures of value appropriate for different services from wetlands.

The place of social information in general, and a more comprehensive approach to ecosystem services data gathering and decision making, is provided in Chapter 2 of Turner, Georgiou and Fisher (2006). Ultimately, it would seem likely that relative importance rankings are not sufficient tools in themselves but would be included within broader and more comprehensive decision making.

4.4.2 Limitations

Two particular cautions are relevant to interpreting the results. First is that respondents only had four categories (H,M,L and NR) to choose from. Respondents did not have any way to differentiate among the different benefits that they gave the same rating class to. That is, if a stakeholder assigned a rating of H to 6 services, M to 4 and L to 2, there is no way to show the relative ranking within the six Hs, the four Ms or the 2 Ls.

Second, there was no formal definition to the key term 'importance' and thus it could be interpreted independently by each respondent. Although the group had discussed what benefits were during the earlier part of the day, and had a good overall understanding of

a wide range of benefits and their importance, more specificity of this key term could be helpful.

4.4.3 Conclusions

The participants invited to the full-day workshop were carefully chosen stakeholders with a professional involvement in resource management and conservation in the study area. They had a good understanding of the different kinds of services and benefits people get from wetlands. As a result, the data provided are well founded, based on a deeper understanding of the categories and context than is often the case for questionnaire surveys. The results thus deserve serious recognition and consideration, despite the small sample size and simple questions. Therefore, while the results must be considered somewhat tentative and suggestive, they are nonetheless based on thoughtful and informed participants and provide a sound preliminary source of information on relative importance of different wetland services to local beneficiaries. These results should not be the basis of strong conclusions, but they are very suggestive of the significance of the approach. Further study of relative importance and more use of participatory inquiry related to ecosystem services could be warranted to better include cultural services in decision making.

There are several points relevant for future, similar, studies:

- The information workshop followed by the questionnaire was an interesting format that led to very informed responses. It does not represent uninformed opinion and the best tool depends on what you are trying to find out and both sources might have a role.
- Consider stakeholders with single mandates and not multiple mandates.
- Consider direct information from local residents instead of representative stakeholders.
- Do a more thorough questionnaire design with pretesting.

Consider more detailed approaches to non-monetary analysis tools, such as those addressed by E. Periera et al. (2005), Turner, Georgiou and Fisher (2006), Hein (2006), Stirling (1999) and Chan et al. (2011).

5.0 Overall Conclusions and Recommendations

5.1 Conclusions

The work of the socio-cultural sub team, and results presented, are a step forward in building an understanding about the social and cultural perspectives for wetlands. One of the main goals of the ES Pilot was to contribute information to address the three gaps identified by decision makers for the ES Pilot; these gaps include:

- There is insufficient evidence to support avoidance, mitigation and compensation decisions on wetlands;
- There is insufficient consideration of cumulative effects and long-term consequences of decision making; and
- There is limited ability to communicate the 'values' of wetlands.

Overall, the results from the three analyses undertaken by the socio-cultural sub team are primarily consistent in meeting the needs of gap three, which:

- Provides decision makers with information related to people's value orientations to wetlands, in terms of how important wetlands are to people;
- Provides decision makers with information on people's viewpoints on wetlands management, which relates to what activities they may value in wetlands and what they want wetlands managed for; and
- Provides decision makers with information on the level of relative importance people ascribe to the cultural services and benefits that wetlands provide.

This study communicates the importance, or value, of a wetland and its cultural services and benefits, to decision-making, which directly addresses gap three. The wetlands values survey determined that people construct particular value orientations for wetlands, which can be based on their knowledge about wetlands, as well as other antecedent factors (e.g., cultural context, group affiliation, place of work, etc). The survey also found that people, based on their particular value orientations, construct specific viewpoints on wetlands management, which relates to the level of importance they appear to ascribe wetlands, and may provide insight to certain features of wetlands people deem as being important (e.g., the cultural services and benefits). Results on wetlands management viewpoints are supported by the results from the thematic analysis, in that Albertans overall, and conceivably people in the ES Pilot study site, generally hold strong viewpoints on how wetlands should be managed in Alberta – ranging from managing wetlands for human use, as well as for the sake of wetlands to exist on the landscape, independent of human utility. Similarly, the benefits ranking exercise demonstrated the level of relative importance stakeholders specific to the study site ascribed to the different cultural services and benefits provided by wetlands to individuals, groups and society as a whole.

These results also contribute knowledge that can support gap one and two, in relation to using information in wetlands approvals and cumulative effects decision-making, in terms of providing insight on the social agenda at play in the study area as it relates to wetlands and their management. This information can help decision makers weigh

decisions in light of knowledge on the environmental, economic and socio-cultural context. The sub team demonstrated that some social research methods might be appropriate to use in ES assessments, in terms of determining the nuances in how, what and why people value wetlands, or conceivably, other natural resources. However cautioned is advised that further investigation is required, in Albertan context as well as more broadly, on conceptualizing and understanding how people come to value a particular object or subject within the natural world, as well as what cultural services and benefits mean to people, and how and why they are valued.

5.2 Overall Sub Team Limitations

The novel work on the ES pilot and this sub team specifically provided a number of lessons and limitations to expose to inform future work. This section provides a brief overview of some general limitations.

The socio-cultural sub team encountered some resistance and difficulties in that this work was 'new'; it was an explicit sub team in ES assessments and there was confusion about how the sub team was different than the socio-economic sub team. As well, there was discomfort from internal and external members of the ES Pilot, around the notion this sub team posed: that cultural services, and the benefits they provide, have generally been ill-defined in ES literature. Given this, the work of this sub team appeared to be pitted against economic valuations in ES assessments; however, this was not the case in the actually working relationship between the socio-economic and socio-cultural sub teams. The resistance also stemmed from not having a clear definition for the term 'socio-cultural'. A combination of literature, expert opinion, and professional judgment informed the development of a definition.

Also, given that the sub team represented a blend between humanities and social sciences, drawing primarily from literature, research and thought on environmental ethics and environmental sociology, there were growing pains as to how to reconcile the differences between different disciplines. Despite the explicit interdisciplinary approach this sub team adopted, there was scrutiny on what results would actually come from this work, and how it would be relevant to the ES Pilot, as well as ES assessments overall. What became evident in this work is that there is limited space for these types of reflective considerations in ESRD, just as there is discomfort with interdisciplinary work in wider professional research organizations. To mitigate this issue, the sub team lead was at first partnered with, and then worked closely with, the socio-economic sub team lead to ensure integration and mutual understanding of different theories, methods, and tools at every step possible. As a result, capacity was built between both sub team leads and horizons were broadened.

Finally, another limitation was the exploratory nature of this work. For the most part, the methods were new to the sub team, the ES Pilot and ES work overall. As a result, there was hesitancy in many different instances in making decisions to move forward with methods used; this inevitably resulted in some delays in completing work. This also resulted in a learning curve for the sub team members, which is a positive outcome but nonetheless contributed in delays. However, based on building staff capacity in a new area (e.g., factor analysis), this method can be carried on and tested again in future work in ESRD. Further, new considerations for those undertaking ES assessments can be posed, based on what lessons this sub team and ES Pilot overall learned from methods used.

5.3 Recommendations

There are some overall sub team recommendations to consider when undertaking socio-cultural assessment work in the future. These include:

- Ensuring adequate time to build understanding of and conduct assessments;
- Considering the limitations of this work in doing further studies;
- Continuing to build knowledge and capacity in socio-cultural assessments; and
- Carefully and purposefully select methods.

There were a number of limitations highlighted in the report, both specific and general. It is recommended that future studies review and consider these limitations and specifically spend time creatively thinking of potential project specific limitations. One of the key limitations was that more time was required in the entire process of the socio-cultural sub team, specifically related to time for critical reflection, analysis of results and exploration of findings, and report writing. As well, a great deal of time was spent in meetings with core team, Steering Committee, Review Panel, Wetlands Policy team, and other supporting members of the ES Pilot overall and socio-cultural sub team specifically. While these discussions were crucial, so as to fully flesh out ideas, solidify understandings, and ensure the best path forward was taken, enough time for these discussions is critical to consider in future work. As well, more time needs to be given to this sub team to develop their conceptual framework through which to undertake research, given that methodology and methods used require a great deal of critical reflection.

Based on the results from the wetlands values survey, it is recommended that a comparison between the value of wetlands and, for example, the value of subdivision development is undertaken to understand how value is conceptualized in light of the two subjects. More specifically, questions that could be explored include: how important is development to people living in a particular area²⁶? Does the type of development project make a difference to the measure of importance? Or, does the future potential to restore wetlands impact the importance level? This research project did not set out, nor was able, to answer these questions, however, they may be significant to approvals decision makers for current and future management of wetlands.

The methods used in this study can be considered generally readily available for use in other contexts. However, these methods can be considered relevant to any particular context in which the value of natural resources broadly, or cultural services and their benefits specifically, are being investigated. A values survey can conceivably be used in any setting, where the question of 'environmental or ecological' worldview is under investigation (Dunlap et al. 2000). However, ensuring the content of the questions or statements (e.g., forest versus wetlands) reflects the actual research is a must.

²⁶ For the most part, the research of this sub team answered the question how important are wetlands to people living in (or working in) a particular area (e.g., survey results, benefits ranking results, and supporting evidence from the thematic analysis).

Similarly, a thematic analysis of publicly available documents can also conceivably be completed in any given location, pending that documents are available for such analysis. The same can be said for the benefits ranking exercise. Overall, the differences will simply be in what the results actually are, which are expected, even in Alberta, to differ based on social, cultural, political, economic or environmental factors. An important recommendation connected to the methods, however, is that capacity should exist, or at least be supported in terms of developing capacity, in using these methods (or others) in this type of research project. Time must be allotted for learning, testing and refining knowledge, skills and abilities in using these methods. That said, when capacity is built, it is to the benefit and advantage of the department. Overall, this report does provide specific details on what was done in each method to obtain results, as well as how analysis was undertaken. Further, in the appendices the actual tools used in each method are provided for review. This will help ensure that consistency can be ensured if these methods are used in another research project similar to the ES Pilot. The methods were also feasible; in the sub team's research was, generally speaking, small in budget.

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7.0 Appendices

Appendix A - General description of the seven basic steps to the EFA process used in the wetlands values survey analysis

Collect measurements. Measure variables on the same (or matched) experimental units.

Obtain the correlation matrix. Obtain the correlations (or covariances) between each of the variables.

Select the number of factors for inclusion. Sometimes a specific hypothesis will determine the number factors included; in contrast, the model may be desired so as to account for as much covariance in the data with as few factors as possible. For example, if you have k measures, then you can extract only k factors. A number of methods can be used to determine the "optimal" number of factors, including the Kaiser criterion. This states that the number of factors used should be equal to the number of the eigenvalues of the correlation matrix that are greater than one. Alternately, the "Scree test" states the eigenvalues of the correlation matrix should be plotted in descending order, and then use a number of factors equal to the number of eigenvalues occurring prior to the last major drop in eigenvalue magnitude.

Extract the initial set of factors. The correlations or covariances must be imported into a computer program to extract the factors, where a number of different extraction methods, including maximum likelihood, principal component, and principal axis extraction, could be used. The best method is oftentimes maximum likelihood extraction, unless multivariate normality is seriously lacking in the measures.

Rotate your factors to a final solution. For any given set of correlations and number of factors, there are oftentimes an infinite number of ways the factors can be defined and still account for the same amount of covariance in the measures. By rotating the factors one attempts to find a factor solution equal to the one obtained in the initial extraction but that has the simplest interpretation. Many different types of rotation exist, though all try to make the factors highly responsive to a small subset of the items, opposed to being moderately responsive to a broader set. Generally, there are two categories of rotations, *orthogonal rotations* producing uncorrelated factors, and *oblique rotations* producing correlated factors. Varimax is suggested to be the best orthogonal rotation, while the three most commonly used oblique rotations, despite being less distinguishable, are Direct Quartimin, Promax, and Harris-Kaiser Orthoblique.

Interpret your factor structure. Each of the measures produced will be linearly related to each of the factors. The strength of this relationship is contained in the respective factor loading, produced by rotation. This loading can be interpreted as a *standardized regression coefficient*, regressing the factor on the measures. A factor will be defined by considering the possible theoretical constructs that could be responsible for the observed pattern of positive and negative loadings. To ease interpretation the option exists to multiply all of the loadings for a given factor by -1 ; this reverses the scale of the factor, allowing a, for example, "unfriendliness" factor to be turned into a "friendliness" factor.

Construct factor scores for further analysis. If additional analyses are sought, using the factors as variables, factor scores will need to be constructed. The score for a given factor is a linear combination of all of the measures, weighted by the corresponding factor loading. Factor scores can sometimes be idealized, where a value of 1.00 is assigned to strongly positive loadings, a value of -1.00 is assigned to strongly negative loadings, and a value of 0.00 is assigned to intermediate loadings. These factor scores can be used in analyses just like another variable, however, they will be strongly collinear with the measures used to generate them.

A coding scheme was developed and embedded into the questions on the actual survey, to make data entry and analysis easier²⁷. 'Value label formatting' was used where numbers on the actual survey were assigned to each question and statement; this means that questions are statements that request respondents to answer 'yes' or 'no' were labeled as '1' (yes) and '0' (no) (see survey in appendices).

In analyzing the survey results, descriptive statistical techniques were used; the mean then, is regarded as an *informative measure of the central tendency of the variable*, where the mean enables the researcher to generate an inference about the data, in relation to the population sampled (Statsoft, 2011). However, this is only significant if and when the mean is reported with the *confidence intervals*, which provide information on the expected value (the mean) of the dependent variable; this is where the 'true' mean is expected to be located, with a given level of certainty (Statsoft, 2011). For example, "if the mean in a sample is 23, and the lower and upper limits of the $p=0.05$ confidence interval are 19 and 27 respectively [then it can be concluded that there is] a 95% probability the population mean is greater than 19 and lower than 27. If you set the p -level to a smaller value, the interval would become wider thereby increasing the "certainty" of the estimate, and vice versa" (Statsoft, 2011). This is likened to forecasting weather, where the more "vague" the prediction (e.g., the wider the confidence interval), the more likely the prediction will occur; however, "the width of the confidence interval depends on the sample size and on the variation of the data values...the larger the sample size, the more reliable its mean, [whereas] the larger the variation, the less reliable the mean" (Statsoft, 2011). Calculating confidence intervals then, is based on the assumption that variable(s) are normally distributed within a population.

In terms of describing a variable, the shape of its distribution, for example in a graph, is important; this shape illustrates "the frequency of values from different ranges of the variable" (Figure 7 and 8) (Statsoft, 2011). What is important, is how well the distribution can be approximated by the expected (normal) distribution. Descriptive statistics can provide some information relevant to this issue; for example, "if the *skewness*, which measures the deviation of the distribution from symmetry, is clearly different from 0, then that distribution is asymmetrical while normal distributions are perfectly symmetrical...[similarly] if the *kurtosis*, which measures "peakedness" of the distribution is clearly different from 0, then the distribution is either flatter or more peaked than normal; the kurtosis of the normal distribution then, is 0" (Statsoft, 2011).

²⁷ Kristina Dembinski (Sagewood Communications, consultant for the socio-cultural sub team) completed data entry of the pre-test and full survey results using an excel template provided to her to ensure consistency and ease of completing analysis in SPSS. Additionally, she provided a summary results report to Courtney Hughes (ESRD) based on her observations of aggregated responses to questions/statements, response rates, knowledge questions, etc from the pre-test and full survey.

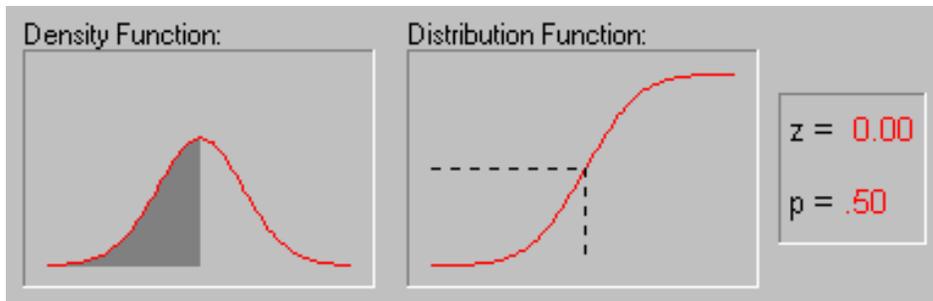


Figure 7. Example of density and distribution of a variable (Statsoft, 2011).

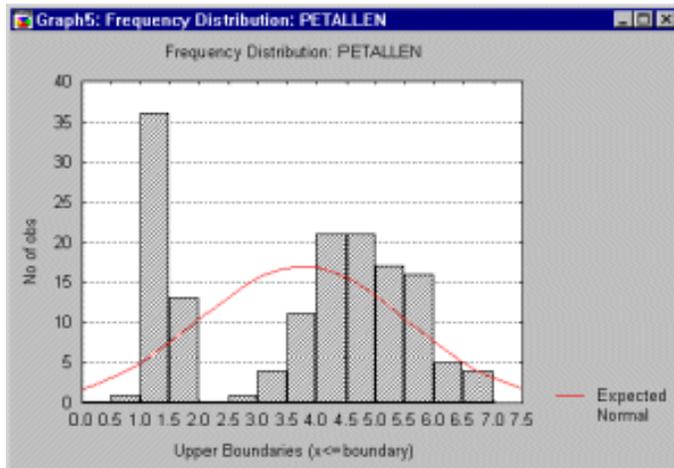


Figure 8. Example of a frequency distribution to evaluate normality of empirical distribution (Statsoft, 2011).

Correlation between the variables was also explored, where “correlation is a measure of the relation between two or more variables” (Statsoft, 2011). The scales used for measurement should typically be at ‘least interval scales’, and correlation coefficients that range from -1.00 to +1.00, where:

- a value of -1.00 represents a perfect negative correlation;
- a value of +1.00 represents a perfect positive correlation; and
- a value of 0.00 represents a lack of correlation.

The type of correlation coefficient used was *Pearson r*, also called *linear* or *product-moment* correlation, which is a simple linear correlation. “Pearson correlation (hereafter called *correlation*), assumes that the two variables are measured on at least interval scales and it determines the extent to which values of the two variables are ‘proportional’ to each other...the value of correlation (e.g., correlation coefficient) does not depend on the specific measurement units used” (Statsoft, 2011). In this case, ‘proportional’ refers to linearly related, meaning that correlation is high if it can be summarized by a straight line (regression line) that is either sloped upwards or downwards; this is hereafter referred to as the regression line because “the sum of the *squared* distances of all the data points from the line is the lowest possible” (Statsoft, 2011). In this analysis, “the correlation coefficient (*r*) represents the linear relationship between two variables...if the correlation coefficient is squared the resulting value (r^2 , known as the coefficient of determination) will represent the proportion of common variation in the two variables (e.g., the ‘strength’ or ‘magnitude’ of the relationship)” (Statsoft, 2011). To evaluate

correlation between variables, the magnitude (or strength), as well as the significance²⁸ of the correlation, must be known.

²⁸ The significance of each correlation is primary information about the reliability of correlation; “the significance of a correlation coefficient of a particular magnitude will change depending on the size of the sample from which it was computed [where] the test of significance is based on the assumption that the distribution of the residual values (e.g., the deviations from the regression line) for the dependent variable y follows the normal distribution, and that the variability of the residual values is the same for all values of the independent variable x (Statsoft, 2011). Meeting these assumptions may not be crucial if the sample size is relatively large and when departure from normality is relatively small; a general rule is thus followed, which states that if the sample size is 50 or greater then serious bias is unlikely, and if the sample size is greater than 100 normality assumptions should not be of concern (Statsoft, 2011).

Appendix B - Documents used for thematic analysis

From Alberta Environment and Sustainable Resource Development

1. Wetlands Policy Intent—Draft (new policy)
2. Province of Alberta—27th Legislature 2nd Session—Alberta Hansard, March 10, 2009 (new policy)
3. Province of Alberta—27th Legislature 2nd Session—Alberta Hansard, November 1, 2010 (new policy)
4. Tobin, C. (2010, March 11). *When Swamped is a good thing to be*. ESRD News Release

From Alberta Water Council (AWC)

1. Talking with Albertans About a New Wetland Policy and Implementation Plan: What We Heard Summary.
2. AWC Letter to Hon. Renner—Recommendations Transmittal
3. AWC Letter to the public—Recommendations Transmittal
4. AWC News Release—AWC Finalizes Recommendations for a New Wetlands Policy and Implementation Plan
5. AWC Recommendations for an Alberta Wetland Policy Implementation Plan—September 16, 2008
6. AWC Recommendations for a New Alberta Wetland Policy—September 16, 2008
7. AWC Wetland Consultation Workbook—Talking with Albertans About a New Wetland Policy and Implementation Plan.

From the Public ("External"):

(a) Industry (i.e., external industry)

1. Letter of Non-Consensus from Canadian Association of Petroleum Producers (CAPP) to AWC.
2. Letter of Non-Consensus from Alberta Chamber of Resources to AWC.

(b) General public (i.e. external other)

Non-media sources:

1. Letter of the Non-Government Organization Caucus of the AWC to AWC.
2. North Saskatchewan Watershed Alliance Letter (Response) to the AWC Wetland Consultation Workbook.
3. Cryderman, K. (2008, Sept 13). *Tar sands firm balk at wetlands policy*. Calgary Herald.

Media Sources:

1. Dyer, S. (2008, Sept 16). *Oilsands Industry Blocks New Wetland Protection Rules*. The Pembina Institute. Accessed August 31, 2011 from <http://www.pembina.org/media-release/1697>
2. Christian, C. (2009) CAPP denies withdrawing from watershed council. Today staff. Accessed August 31, 2011 from <http://www.fortmcmurraytoday.com/ArticleDisplay.aspx?archive=true&e=1205243>
3. Water Matters (2009, Dec 9). Another delay for the wetlands policy. Accessed August 31, 2011 from <http://www.water-matters.org/story/342>
4. tarsandswatch.org. (2010, March 15). Alberta Chamber of Resources says Alberta to change wetlands plan. Accessed August 31, 2011 from <http://www.tarsandswatch.org/alberta-chamber-resources-says-alberta-change-wetlandsplan>
5. WaterMatters.org (2010, April 21). *Albertans, not industry, will pay for lost wetlands—leaked policy document*. Accessed August 31, 2011 from <http://www.water-matters.org/story/365>
6. Bowman, L. (2010, April 27). Alberta Auditor General looks at managing Alberta's water supply—compliance, wetland policy under scrutiny. Accessed August 31, 2011 from <http://environmentallawcentre.wordpress.com/2010/04/27/alberta-auditor-general-looks-at-managing-alberta%E2%80%99s-water-supply-compliance-wetland-policy-under-scrutiny/>

7. WaterMatters (2010, June 8). Looking for Alberta's Wetland Policy. Accessed August 31, 2011 from <http://www.water-matters.org/blog/381>
8. Howell, T.S. (2010, June 17). Wetlands policy under water. Accessed August 31, 2011 from <http://www.sierraclub.ca/en/in-the-news/wetlands-policy-under-water>
9. (2008, September 26) Alberta needs wetland policy that holds water. Calgary Herald. Accessed August 31, 2011 from http://www.albertawater.com/index.php?option=com_content&view=article&id=362:kehoe-alberta-needs-wetland-policy-that-holds-water&catid=61:water-news-2010&Itemid=82
10. Simieritsch, T. (2010, Nov 29). Weakened policy risks destroying thousands of hectares of Alberta wetlands. Alberta Wilderness Association news release. Accessed August 31, 2011 from <http://www.pembina.org/media-release/2110>
11. WaterMatters.org. (2010, October 20). Weakened policy puts Alberta wetlands at risk. Accessed August 31, 2011 from <http://www.water-matters.org/story/409>
12. Cryderan, K. (2010, November 1). Alberta dilutes wetland defence. Calgary Herald, <http://www.water-matters.org/story/409>
13. Sierra Club Canada (2010 November 1). Updated action alert: don't let big oil water down Alberta's wetlands policy! Accessed August 31, 2011 from <http://www.sierraclub.ca/node/3307>
14. Simieritch, T. (2010, Nov 4). Alberta caves to oilsands interests, dilutes wetland policy. Pembina Institute. Accessed August 31, 2011 from <http://www.pembina.org/blog/427>
15. Howell, T.S. (2010, Nov 4). Alberta's wetlands policy falls flat: Province caves to industry interests, say conservationists. Accessed August 31, 2011 from <http://www.ffwdweekly.com/article/news-views/news/albertas-wetlands-policy-falls-flat-6554/>
16. Obad, J. (2010, November 10). New wetlands policy fails: Government endangers a valuable ecological resource in rush to ditch 'no net loss' approach. Accessed August 31, 2011 from <http://www2.canada.com/edmontonjournal/news/ideas/story.html?id=37a39f2b-244d-40b8-8ff4-c018142cc239>
17. Audette, T. (2010, April 21). Green groups attack province's 'weak' wetland policy: Liberal critic wants government to stop stalling, tell industry to 'step up'. Edmonton Journal. Accessed August 31, 2011 from <http://www.sierraclub.ca/node/2360>
18. Howell, T. S. (2010, November 4). Howell, T. S. Alberta's wetland policy falls flat. Accessed August 31, 2011 from <http://www.ffwdweekly.com/article/news-views/news/albertas-wetlands-policy-falls-flat-6554/>

Appendix C - General overview of process used to conduct thematic analysis

The process used by the team lead to code, categorize and determine the themes is characterized by the following steps (Boyatzis, 1998; Love, 1994):

- Make copies of the extracted quotes with space for writing notes (e.g., making connections between themes).
- Use open coding procedures, where data is coded data it is read, and notes are made based on what statements appeared to group together. Salient words or phrases were highlighted/underlined when they reappeared throughout the data set. Note that the codes should represent all descriptions relevant to the topic under investigation.
- From the highlighted work, identify and mark each piece of data that represents a distinct unit of meaning. Meaning units are separated by a break or change in meaning, and there can be numerous meaning units in data available. These will be the codes. Code each meaning unit, by, for example, statement number as it correlates to the old or new wetlands policy.
- Take a break (a day or two between reading the data). Then read through the coding scheme developed to ensure the codes resonate with the descriptive criteria in order to answer the research question(s). Identify if there are statements that could be regrouped, etc.
- Using the codes already developed, begin to sort through the codes and group similar codes together. Name a cluster (or aggregate) of codes using words or phrases from the data (e.g., "preservation"); these will be initial categories and will likely give rise to a theme(s).
- Again, take a break and then re-read through the entire data set, ensuring that the categories identified and used resonate with the data itself. Re-label categories as needed and/or collapse or subdivide categories as appropriate.
- Next, examine the set of categories identified, as a whole. Consider whether or not they are truly representative of the data.
- Take a break again. Re-read the total set of categories and, using words or phrases from the data, group the categories into major themes. These themes should pull together the categories of data, based on similarities or differences, and be representative of major elements in the data.

Appendix D - Wetlands Values Survey

Wetlands are natural areas that can take on many forms, where water and land meet and where aquatic plants are usually found in or around the edges. Wetlands are part of much larger systems known as watersheds that move water across the land. Wetlands can be found in natural and developed areas throughout the province.

This survey is part of Alberta Environment and Sustainable Resource Development's Ecosystem Services Approach pilot project. An Ecosystem Services approach is an assessment method that can be used to provide an understanding of the services that ecosystems provide to people, and how this might inform decision-making. One step to building this understanding is to identify public perspectives on ecosystems.

You have been selected to participate in this survey for Rocky View County. Your response will make an important contribution to understanding the public's perspective on wetland ecosystems. The more participant responses we collect, the more accurate the survey results will be. Please take the time to complete this survey. The survey will take a maximum of 15 to 20 minutes to complete.

A few important points that you should know:

- This survey should be filled out by any adult in the household.
- The responses are confidential, meaning that you will not be personally identified in any way. All information will be kept confidential, and only a summary of the results will be made public through published reports and presentations. We will collect information regarding the organization you are affiliated with; however, this is for analysis purposes and again, you will not be personally identified.
- The survey is entirely voluntary; if you choose not to participate please let us know why via email. We appreciate all feedback.

We value your participation and are happy to respond to any questions or comments you may have about the survey. Thank you very much for taking the time to participate.

Please try to answer **all** of the questions. They can be answered **checking (v)** the box, **circling** the number that best describes your answer, or **writing** in the space provided. If there are questions you do not wish to answer, please leave them blank and move to the next question.

If you have any questions or comments regarding this survey please contact:
Kristina Dembinski, Sagewood Communications, on behalf of Alberta
Environment and Sustainable Resource Development
kdembinski@sagewoodcommunications.ca
(780) 718-5023



SECTION 1. YOUR OPINION ON WETLANDS MANAGEMENT IN ALBERTA

1. Wetlands provide many things for the people of Alberta. Please rank how important you think the following three are by placing a “1” next to what you think is most important, a “2” next to the second most important, and a “3” next to the least important. Please do not use a number more than once.

- a. Environmental benefits, such as wildlife species and habitat
- b. Economic benefits, such as tourism and flood control
- c. Social benefits, such as recreation and relaxation

2. Do you live directly near a wetland? Yes No

3. One aspect of our study is understanding how people feel about wetlands. Please indicate how you feel about the following statements by circling the number that best describes your agreement or disagreement.

	Totally disagree	Partly disagree	Neither agree or disagree	Partly agree	Totally agree	Not sure
a. Whether or not I get to visit wetlands as much as I like, it is important for me to know wetlands exist in Alberta.	1	2	3	4	5	6
b. Wetlands should be managed to meet as many human needs as possible.	1	2	3	4	5	6
c. Wetlands should have the right to exist for their own sake, regardless of human concerns and uses.	1	2	3	4	5	6
d. Wetlands give us a sense of peace and well-being.	1	2	3	4	5	6
e. Wetlands should exist mainly to serve human needs.	1	2	3	4	5	6
f. Wetlands are sacred places.	1	2	3	4	5	6
g. It is important to maintain wetlands for future generations.	1	2	3	4	5	6
h. Wetlands should be left to function naturally, through wet and dry conditions, without being managed by humans.	1	2	3	4	5	6
i. Wetlands that are not used to benefit humans are a waste of our natural resources.	1	2	3	4	5	6

j.	Humans should have more respect and appreciation for wetlands.	1	2	3	4	5	6
k.	Wetlands let us feel close to nature.	1	2	3	4	5	6
l.	If wetlands are not threatened by human activities, we should use them to add to the quality of human life.	1	2	3	4	5	6
m.	Wetlands rejuvenate the human spirit.	1	2	3	4	5	6
n.	Wetlands can be improved through management actions by humans.	1	2	3	4	5	6
o.	Wildlife, plants, and humans should have equal rights to live and develop.	1	2	3	4	5	6
p.	The primary function of wetlands should be to provide products and services that are useful to humans.	1	2	3	4	5	6

4. We are also trying to understand people's familiarity with wetlands. Please use the following space to describe your understanding of a wetland.

5. The following questions ask about your knowledge of wetlands in Alberta. (Please check (✓) the answer that you feel best answers the question.)

a.	Wetlands are one of the most fertile, complex and productive ecosystems on earth.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
b.	Authorization from Government of Alberta is required to disturb, drain or fill in a wetland, whether on private or public land.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
c.	Wetlands that are lost to any type of development can be restored elsewhere on the landscape.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
d.	Alberta has numerous wetlands, so although a large number have been lost, wetland loss in Alberta is not critical.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
e.	An area has to have standing water at some point each year in order to be considered a wetland.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
f.	Peat extraction in Northern Alberta represents the main economic value provided by wetlands.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
g.	All water in Alberta is owned by the province, regardless if it is located on public or private land.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
h.	Wetlands act as nature's water filter, removing contaminants and trapping sediments.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
i.	The decline in North American waterfowl populations are related to loss of wetlands in Alberta.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
j.	Wetlands play a role in regulating climate change.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
k.	Wetlands play an important role in maintaining biodiversity.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
l.	Wetlands play a role in water regulation.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE
m.	Wetlands should be filled in so that the land can be used more productively.	1 <input type="checkbox"/> TRUE	2 <input type="checkbox"/> FALSE	3 <input type="checkbox"/> NOT SURE

6. The following asks your opinion about wetland management in Alberta. Please indicate your agreement or disagreement by circling the number that best reflects what you think.

	Totally disagree	Partly disagree	Neither agree or disagree	Partly agree	Totally agree	Not sure
--	------------------	-----------------	---------------------------	--------------	---------------	----------

a.	Wetland managers do a good job at balancing local economic interests with wetland conservation.	1	2	3	4	5	6
b.	Alberta has enough protected areas for conserving wetlands.	1	2	3	4	5	6
c.	When making decisions about wetlands, the concerns of the communities close to a wetland should be given a higher priority than other distant communities.	1	2	3	4	5	6
d.	The present rate of wetland disturbance and loss is too great to sustain wetlands in the future.	1	2	3	4	5	6
e.	Wetlands are being managed successfully for the benefit of future generations.	1	2	3	4	5	6
f.	Enough wetlands are being replaced by restoring or building new ones to meet future needs.	1	2	3	4	5	6
g.	The economic benefits from development that impact wetlands usually outweigh any negative consequences.	1	2	3	4	5	6
h.	Economic stability of communities is more important than protecting wetlands from development.	1	2	3	4	5	6
i.	Losing a few scattered wetlands across the landscape generally produces few long-term negative effects on the environment.	1	2	3	4	5	6
j.	The citizens of Alberta have enough to say in wetland management.	1	2	3	4	5	6
k.	Private landowners have the right to make land use decisions related to wetlands on their land.	1	2	3	4	5	6

7. How well informed would you say you are concerning wetlands management issues in Alberta?

NOT AT ALL
INFORMED

SOMEWHAT NOT
INFORMED

SOMEWHAT
INFORMED

VERY WELL
INFORMED

NOT
SURE

1

2

3

4

5

8. In the past year, have you participated in any of the following to express your views and opinions on wetland management, or to gain information about wetland management in Alberta?

	YES	NO
a. Watching films or TV shows related to wetlands or wetland issues.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
b. Reading books or magazines related to wetlands or wetland issues.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
c. Attending a lecture or seminar related to wetlands or wetlands issues.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
d. Calling or writing a politician.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
e. Calling or writing an environment department official.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
f. Attending a public meeting on wetlands issues.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
g. Serving on a committee dealing with wetland management issues.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
h. Attending a public rally or protest about an environmental management issue.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
i. Joining an environmental or conservation organization.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
j. Writing to a newspaper or magazine.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
k. Donating money to a conservation or environmental organization.	1 <input type="checkbox"/>	0 <input type="checkbox"/>
l. Other (please specify): _____	1 <input type="checkbox"/>	0 <input type="checkbox"/>

9. We are also interested in understanding how people interact with wetlands, if at all, in their day-to-day lives. Please complete the following to tell us about your personal experience(s) with wetlands.

	Totally disagree	Partly disagree	Neither agree or disagree	Partly agree	Totally agree	Not sure
a. Wetlands are a concern because they provide a breeding ground for mosquitoes.	1	2	3	4	5	6
b. Wetlands provide scenery and homes to wildlife, which increases opportunities to enjoy nature.	1	2	3	4	5	6
c. Wetlands make it difficult to do the things I want with my property (e.g., landscaping, building structures, etc.).	1	2	3	4	5	6
d. Wetlands provide an opportunity to reconnect with nature.	1	2	3	4	5	6

e.	Wetlands provide recreational opportunities.	1	2	3	4	5	6
f.	Wetlands impede opportunities to develop the landscape for other purposes.	1	2	3	4	5	6

SECTION 2: ABOUT YOU.

We would like to ask a few questions about you, to help determine if there are connections between peoples' backgrounds and their opinions. Your name never appears with your answers, and if there is a question you do not want to answer, just leave it blank and move to the next question.

10. You are: ₀ MALE ₁ FEMALE

11. What was your age on your last birthday? _____ YEARS.

12. Do you belong to any of the following organizations?

	YES	NO
a. A natural history or bird watching club.	₁ <input type="checkbox"/>	₀ <input type="checkbox"/>
b. A hunting or fishing organization.	₁ <input type="checkbox"/>	₀ <input type="checkbox"/>
c. A watershed stewardship group.	₁ <input type="checkbox"/>	₀ <input type="checkbox"/>
d. Other special interest group e.g., environmental or conservation organizations).	₁ <input type="checkbox"/>	₀ <input type="checkbox"/>
e. Government organization (e.g., federal, provincial, municipal).	₁ <input type="checkbox"/>	₀ <input type="checkbox"/>

13. Are you a private landowner? ₁ Yes ₀ No

14. What is the highest level of education that you have completed

- | | |
|--|--|
| ₁ <input type="checkbox"/> Never attended school. | ₆ <input type="checkbox"/> Some university. |
| ₂ <input type="checkbox"/> Grade school (grades 1 to 9). | ₇ <input type="checkbox"/> University degree (bachelors). |
| ₃ <input type="checkbox"/> Some high school. | ₈ <input type="checkbox"/> Some graduate study. |
| ₄ <input type="checkbox"/> High school graduate. | ₉ <input type="checkbox"/> Graduate university degree. |
| ₅ <input type="checkbox"/> Technical school or community college. | |

15. Which category best describes your **total household income** (before taxes) in 2010?

- | | |
|---|---|
| ₁ <input type="checkbox"/> less than \$10,000 | ₇ <input type="checkbox"/> \$60,000 - \$69,999 |
| ₂ <input type="checkbox"/> \$10,000 - \$19,999 | ₈ <input type="checkbox"/> \$70,000 - \$79,999 |

₃ \$20,000 - \$29,999

₉ \$80,000 - \$89,999

₄ \$30,000 - \$39,999

₁₀ \$90,000 - \$99,999

₅ \$40,000 - \$49,999

₁₁ \$100,000 or more

₆ \$50,000 - \$59,999

16. Occasionally Alberta Environment conducts surveys of peoples' opinions on various natural resources issues. Would you be willing to participate in future studies on natural resource management similar to this one?

₁ YES

₀ NO

17. Would you be willing to participate in a follow-up interview related to this survey?

₁ YES

₀ NO

18. Do you have any additional comments about wetlands in Alberta?

THANK YOU

Ecosystem Services Approach Pilot on Wetlands Key Stakeholder Feedback Form

Thank you for participating in today’s workshop. Your feedback and opinions on wetlands and ecosystem services are very important to us, and we would ask that you please fill out the following feedback form.

Your responses to these questions will be anonymous and confidential. This information will be used to help us understand how various stakeholders perceive wetland benefits in the pilot study area, and will inform the Ecosystem Service Team as it moves forward.

What ‘stakeholder’ group do you represent (fill in first box below)?

In the first list on the next page, please rank the benefits received from wetlands in the Shepard Slough area, by writing the letter that best indicates those you think are of highest (H), medium/middle (M), or lowest (L) importance your stakeholder group (or NR Not Relevant). If there are benefits that your group benefits from that are not on the list please add them in the spaces at the bottom. In addition, we would like to know how these benefits rank in importance for you personally, as well as how you think they rank in importance to society.

We have less information available about the benefits that are often called ‘cultural’ category. On the second list, please rank the cultural benefits according to the importance you think they have for your stakeholders, for you personally and for society as a whole.

If you have any general comments about the day, please add them in the spaces at end of the form.

Stakeholder Feedback Form

1 What stakeholder group do you represent?:			
2 Benefits received from wetlands Please rank the benefits that the Pilot Project studied, listed below. If there are benefits that your group receives that are not on this list of please add them in the spaces at the bottom)	Importance to your Stakeholder Group (H, M, L or NR)	Importance to You (H, M, L or NR)	Importance to Society (H, M, L or NR)
Water quantity regulation (supply and storage)			
Carbon storage			
Flood control			
Erosion control			
Water filtration/ purification			
Pollination			
Soil Formation			
Recreation and Tourism			

Traditional Use			
Science and Educational Value			
Food crops			
Aesthetic (beauty and enjoyment)			
3 Cultural Benefits Please rank the different kinds of possible 'cultural benefits' of wetlands that have been identified within the Pilot Project.	<i>Importance to your Stakeholder Group (H, M, L or NR)</i>	Importance to You (H, M, L or NR)	Importance to Society (H, M, L or NR)
Recreation/Tourism Benefits			
Hiking/Walking			
Hunting/Fishing			
Wildlife Viewing			
Photography			
Artistic Activities			
Educational/Scientific Benefits			
Place providing Knowledge and Study			
Place for Research			
Spiritual/Religious/ Inspirational/Heritage Benefits			
Sense of Place			
Sense of Belonging			
Sense of Self/Identity			
Inspiration			
Aesthetic Appreciation			
Traditional Harvest or Use			
Religious or Spiritual Use			

4 Please provide any general comments in the spaces below.
What did you learn today that you found interesting or useful?

Do you have any additional thoughts or comments about today's workshop, or possible follow up from the workshop?

Appendix E - Table illustrating the organization of data into major themes and categories, with quotes aggregated in each

Theme	Category - ESRD
<p>Management of Wetlands - includes protection and conservation concepts; includes concerns related to development pressures on wetlands; wetland loss and degradation also included.</p>	<p><u>Need for cumulative effects approach</u> 1. Wetlands are susceptible to damage from a wide range of activities.</p> <p><u>Need for clear management direction</u> 1. Wetlands should be managed as ecosystems. They are an integral and important part of our environment.</p> <p><u>Need to manage incentives to drain or disturb wetlands and disincentives to protection</u> The agricultural value of wetlands varies with the type of wetland and farm operation.</p> <p><u>Need to manage land use impacts on wetlands</u> 1. The effects on wetlands of residential, recreational, agricultural, industrial, and transportation land uses were identified as problems.</p> <p><u>Need to protect rare and irreplaceable wetlands</u> 1. Representative, rare, and unique wetlands should be afforded some level of protection from development.</p> <p><u>Need to allow for development/ recognize inevitability of (wetland) loss</u> 1. Many public participants asked for an immediate halt to drainage of all slough/marsh wetlands. Landowners and representatives of the urban, energy, transportation, utility and tourism development sectors felt flexibility was required to allow some drainage of wetlands when it is in the public interest. 2. Landowners in northwestern Alberta asked to be allowed to drain sheetwater in the spring and after heavy rains.</p> <p><u>There is an undesirable cost to maintaining wetlands</u> 1. Municipalities asked the provincial government to pay for wetland management programs and were concerned about potential effects on property tax revenues.</p>
<p>Education related to Wetlands – includes need for information</p>	<p><u>Lack of information about wetlands</u> 2. Information base about peatlands and slough/marsh</p>

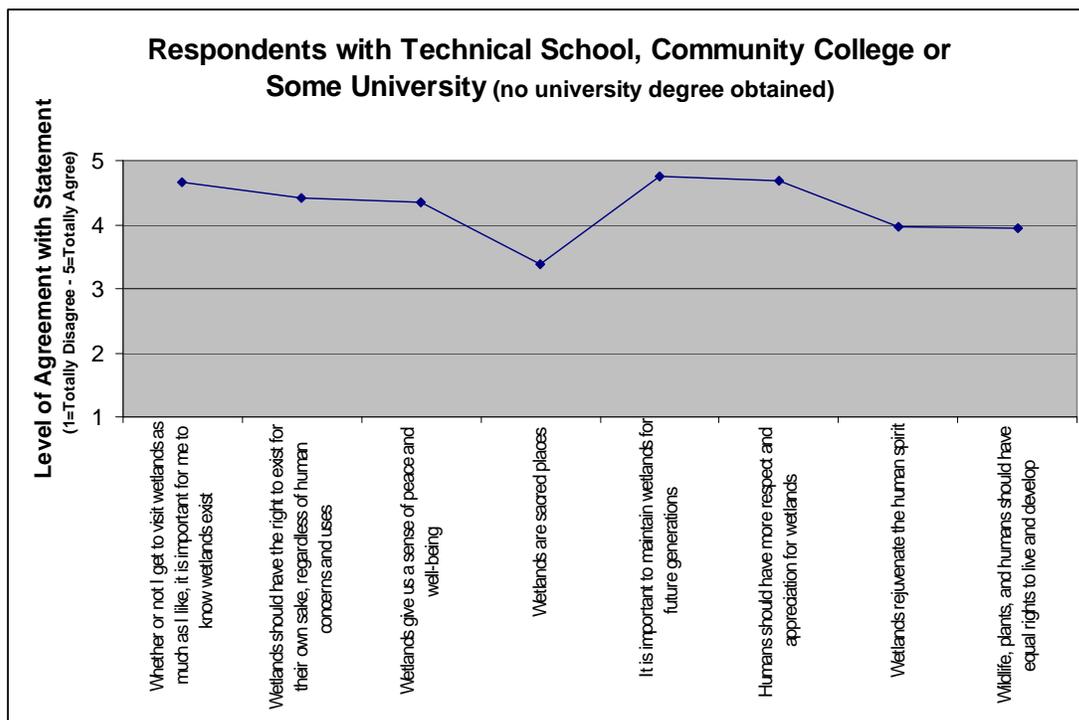
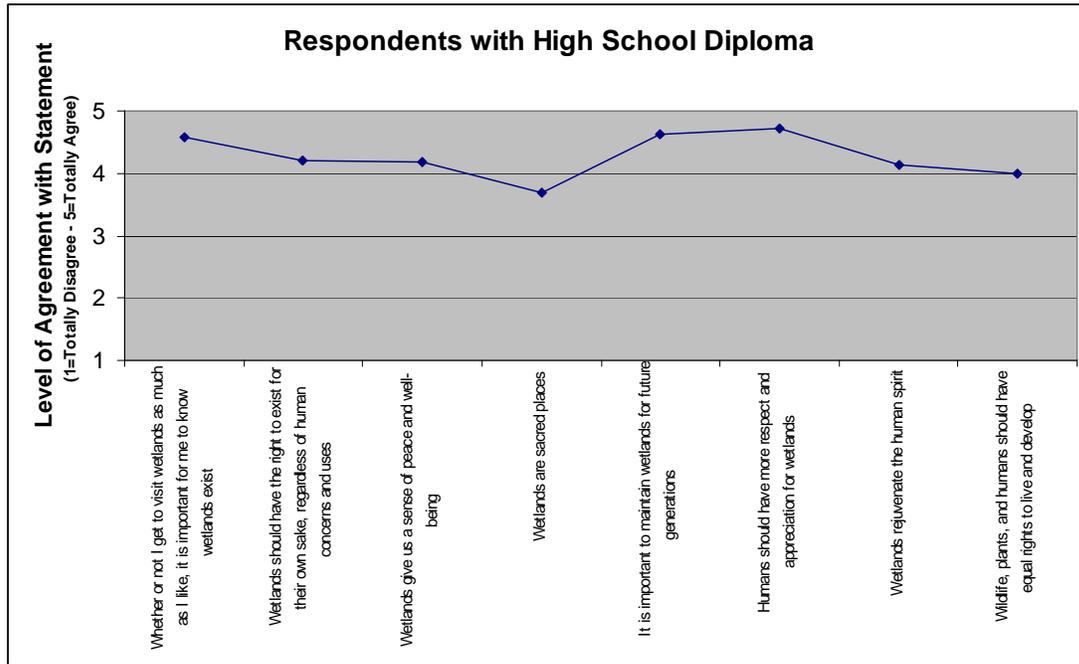
	<p>wetlands in the non-settled area is limited and many functions and roles of non-settled area wetlands and peatlands aren't well understood.</p>
<p>Benefits of Wetlands – includes the value statements</p>	<p><u>Need to differentiate types of wetlands</u> 1. Different types of wetlands have different social, economic, and environmental functions and values. This variety of values should be reflected in our decision-making processes.</p> <p><u>Need to protect ecological services for development</u> 1. Permanent wetlands are a valuable source of water for domestic, livestock and industrial use.</p> <p><u>Need to protect wetland values and benefits</u> 1. Recognition that wetlands provide diverse benefits, and that all these benefits must be considered in any management decision. 2. The ecological value of wetlands is significant. 3. Water resource (hydrological) benefits - Wetlands are important for the control and storage of surface water and the recharge and discharge of groundwater. 4. A wide range of consumptive and non-consumptive recreational and tourism opportunities are dependent on wetlands. 5. Wildlife and fisheries benefits - Wetlands, wetland margins and surrounding uplands provide important habitat for a large variety of plant and animal species. 6. Wetlands can be used as a tool in water management. They can actually be created or altered to improve their usefulness as a water management tool. 7. Wetlands make a substantial contribution to the Alberta economy and the economic costs of wetland loss are significant.</p> <p><u>Valuation of wetlands is difficult</u> 1. Many wetland uses can be measured in economic terms, while other significant values do not lend themselves to economic evaluation.</p>

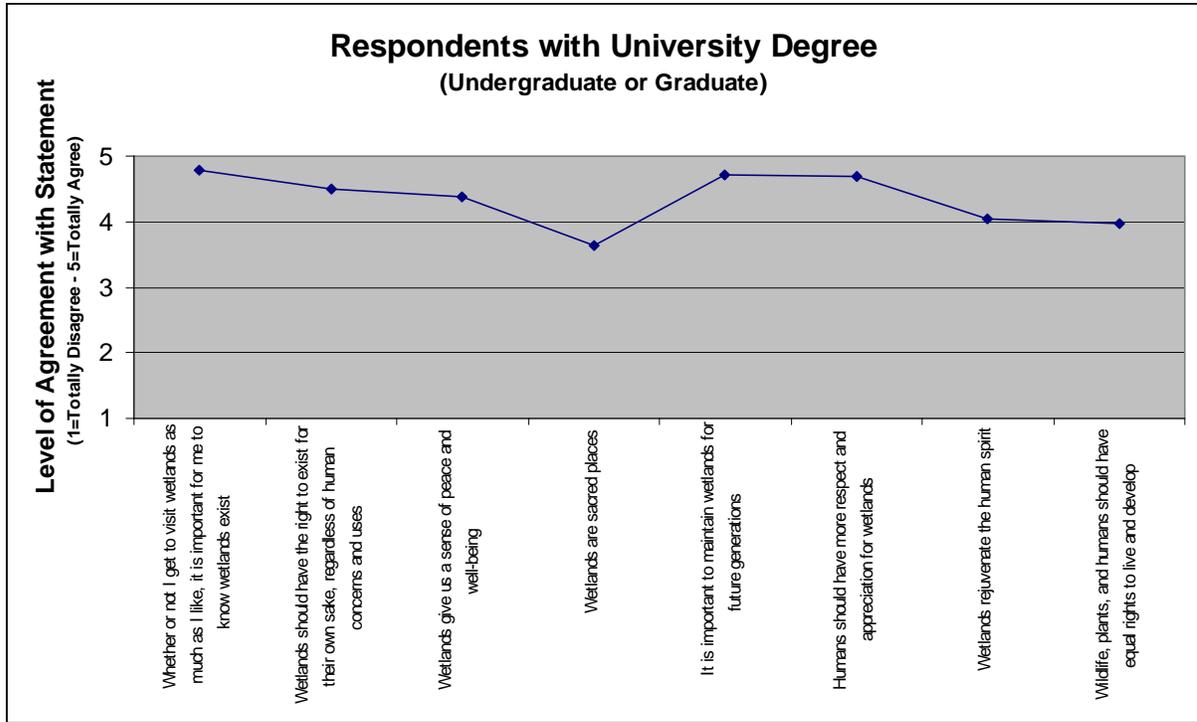
New Wetlands Policy.

Theme	Category - ESRD	Category - AWC	Category – External Other
<p>Management of Wetlands - includes protection and conservation concepts; includes concerns related to development pressures on wetlands; wetland loss and degradation also included.</p>	<p><u>Need to address [wetland] degradation and loss</u></p> <ol style="list-style-type: none"> 1. Alberta has lost two thirds of its wetlands in the White Area (settled area) of the province and wetlands are still being lost today. 2. Thousands of hectares of wetlands continue to be destroyed in the absence of any policy. <p><u>Need to focus wetland conservation on areas of high loss first</u></p> <ol style="list-style-type: none"> 1. Wetlands and their benefits are conserved and restored in areas where losses have been high. 	<p><u>Ephemeral wetlands are too difficult to manage</u></p> <ol style="list-style-type: none"> 1. Ephemeral wetlands are too difficult to manage <p><u>Need to balance social, economic and environment</u></p> <ol style="list-style-type: none"> 1. The challenge for Albertans is to balance growth and economic development while safeguarding the environment, including wetlands. 2. While acknowledging the importance of protecting, conserving, and restoring wetlands for the benefits they provide to Albertans, it is also important to find a workable balance between preserving the ecological integrity of Alberta’s wetlands and sustaining healthy communities and healthy economies. <p><u>Need to manage as ecosystems</u></p> <ol style="list-style-type: none"> 1. . . . recognizing that wetlands are an important component of Alberta's watersheds. <p><u>Need to manage for sustainable resource and for future generations</u></p> <ol style="list-style-type: none"> 1. . . . wetlands, like other natural resources, are sustained for future generations with initiatives. <p><u>Need to recognize inevitability of some wetland loss</u></p> <ol style="list-style-type: none"> 1. It is important to acknowledge that the loss of some individual wetlands is unavoidable. 2. We cannot always avoid the loss of wetlands. <p><u>Wetland managers need to be aware of incentives for protecting wetlands</u></p> <p>It is necessary to develop and</p>	<p><u>All wetlands should be treated equal</u></p> <ol style="list-style-type: none"> 1 All wetlands serve important ecological and hydrological functions and should be protected equally to some basic standard by and under the law. 2. Include a process to address and alleviate impacts to wetlands regardless of severity. 3. The identification of “exceptional” or important wetlands is notoriously difficult and inevitably a narrow exercise. At best, it should only be done using independent scientific assessments and applied to enhance baseline protections in place for all wetlands. 4. The policy proposes to grade wetlands from irreplaceable to expendable, opening the door to countless battles over each affected wetland and where it sits on the scale. 5. The policy would only require substantial compensation for the functions of “exceptional” wetlands, leaving others exposed to destruction without adequate compensation. 6. The province sided with those two groups, favoring replacing wetlands based on their value. <p><u>Ephemeral waterbodies need NOT to be recognized as wetlands.</u></p> <p>Ephemeral wetlands are too difficult to manage.</p> <p><u>Need for clear wetland management direction</u></p> <ol style="list-style-type: none"> 1. Rules to protect the province's disappearing wetlands. 2. There needs to be a clear policy that says that there are consequences that have to be acknowledged and have to be dealt with when wetlands are destroyed.

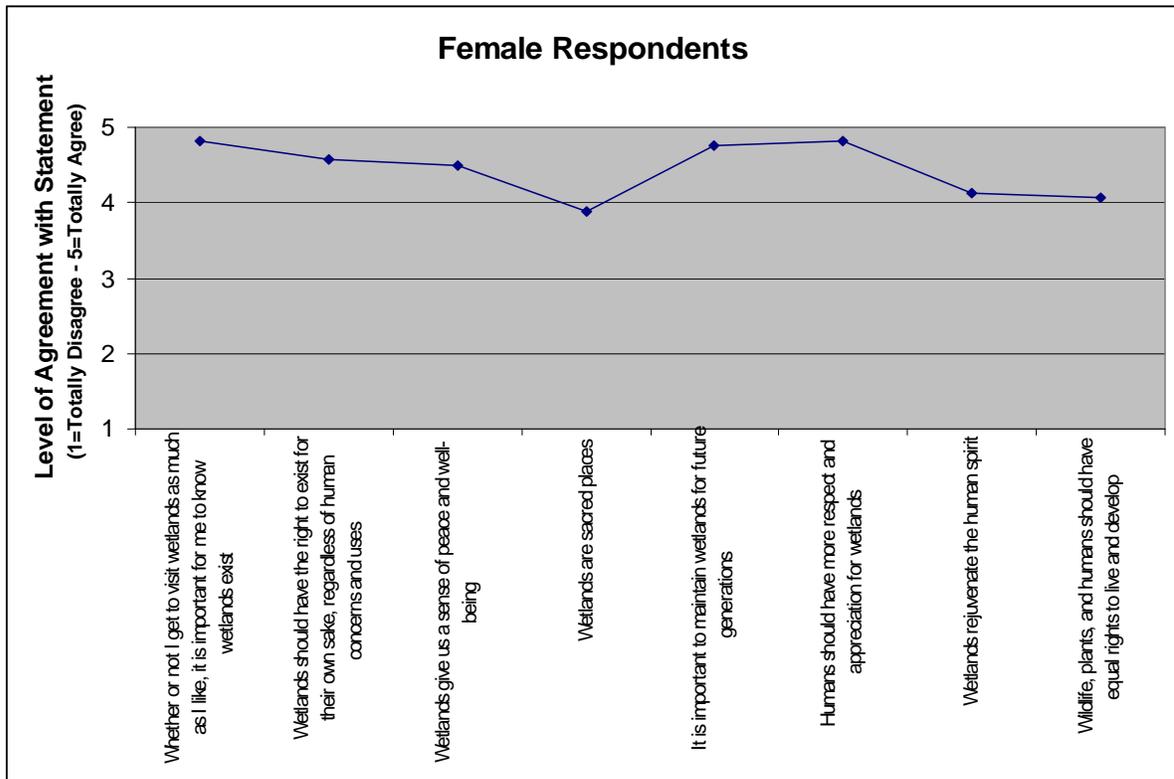
Appendix F - Graphic depictions from survey of correlations to questions 3 and 6

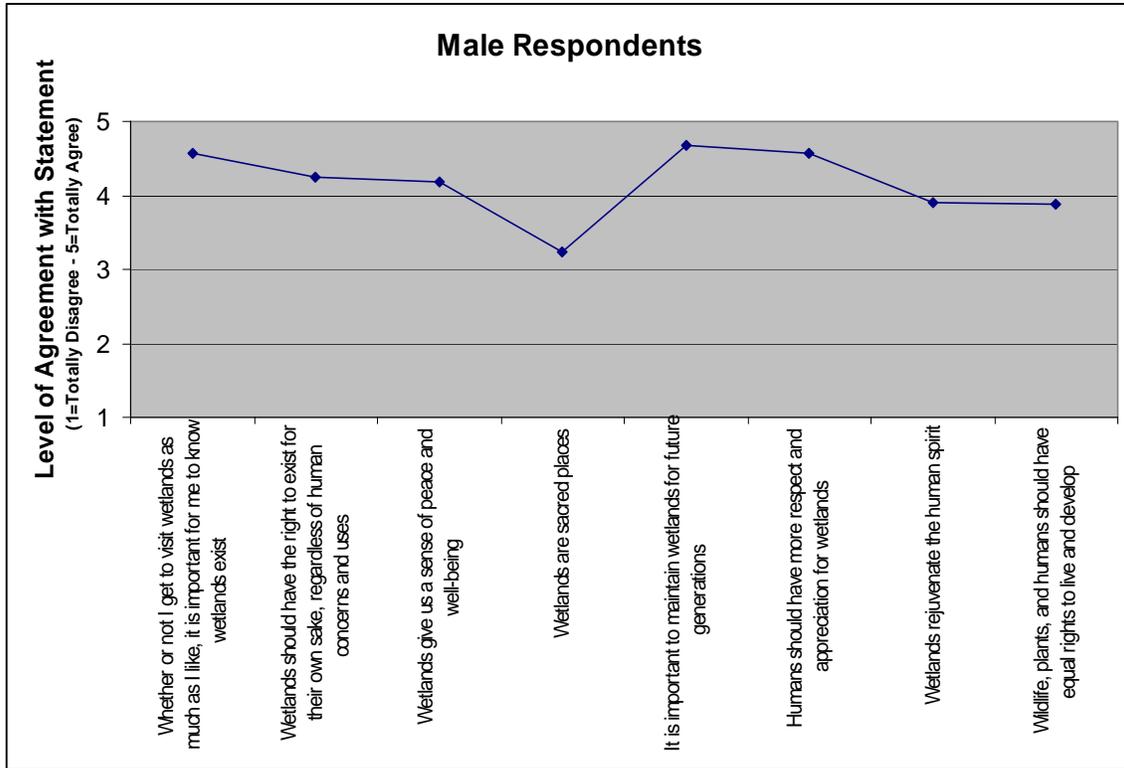
Q3. Agreement with Value Statements by Different Education Level



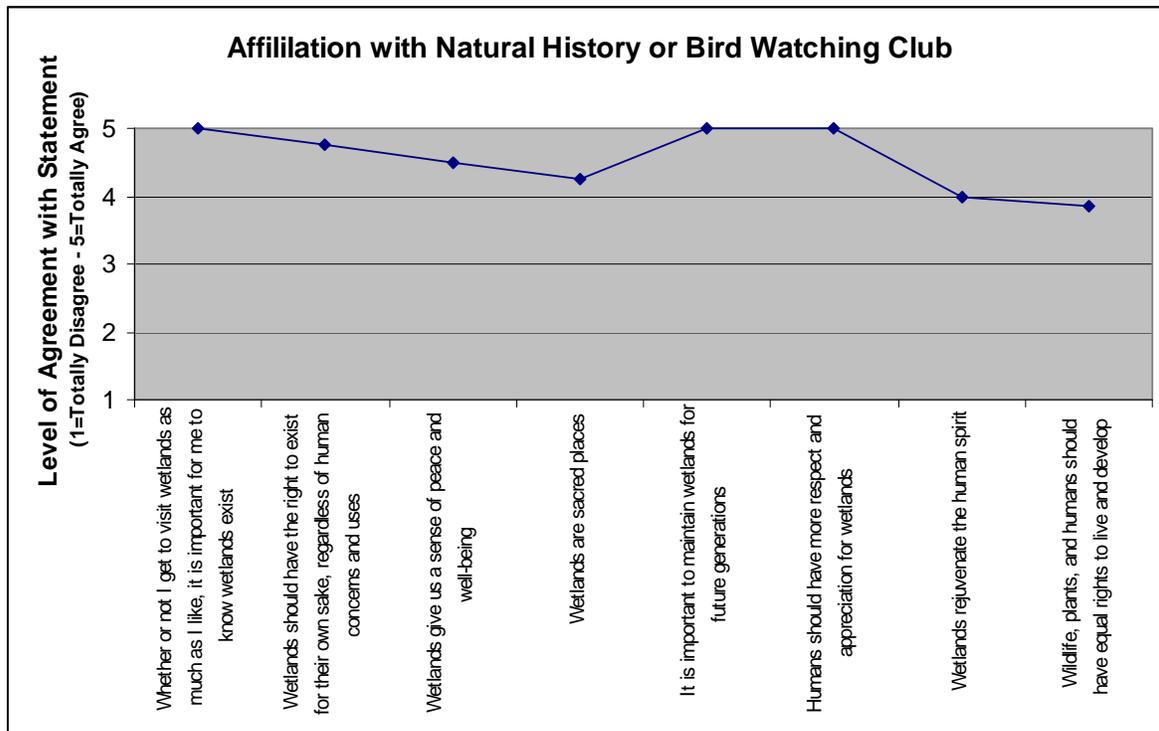


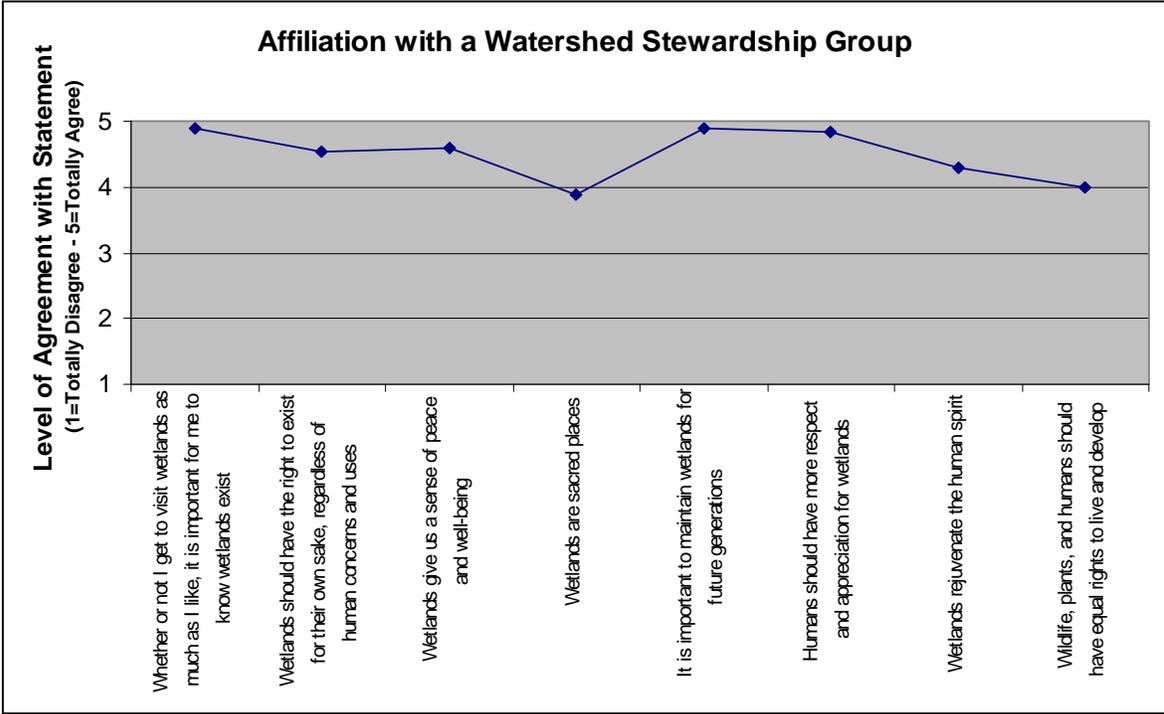
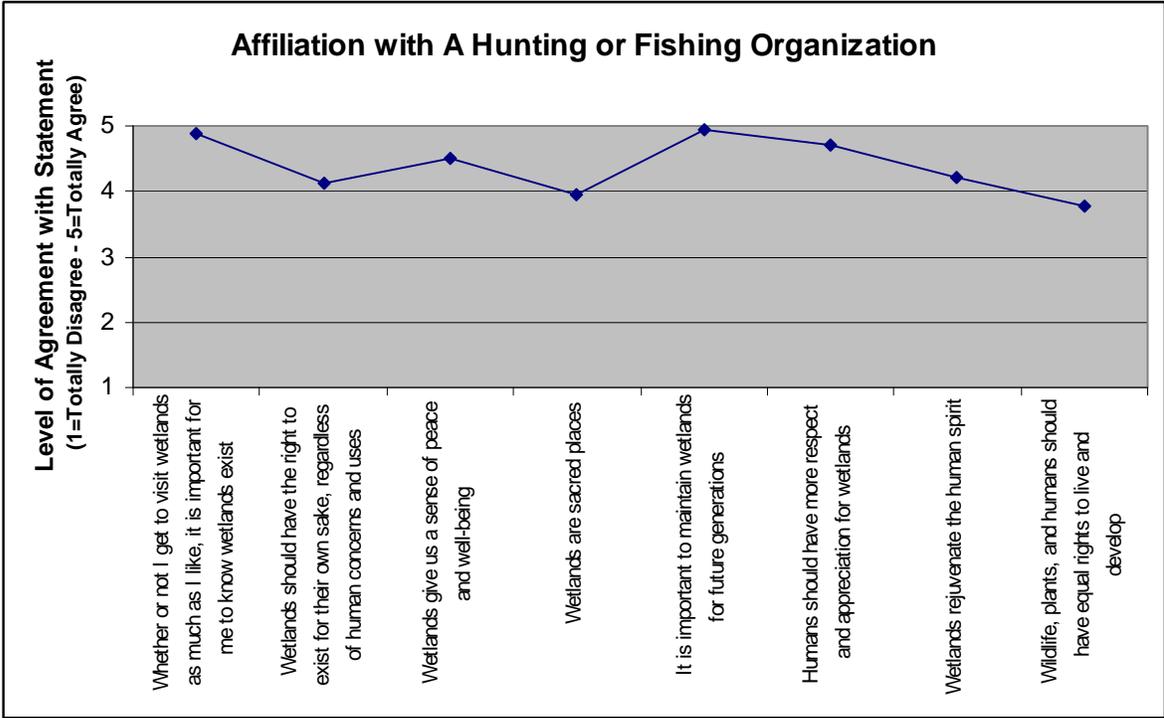
Q3. Agreement with Value Statements by Gender

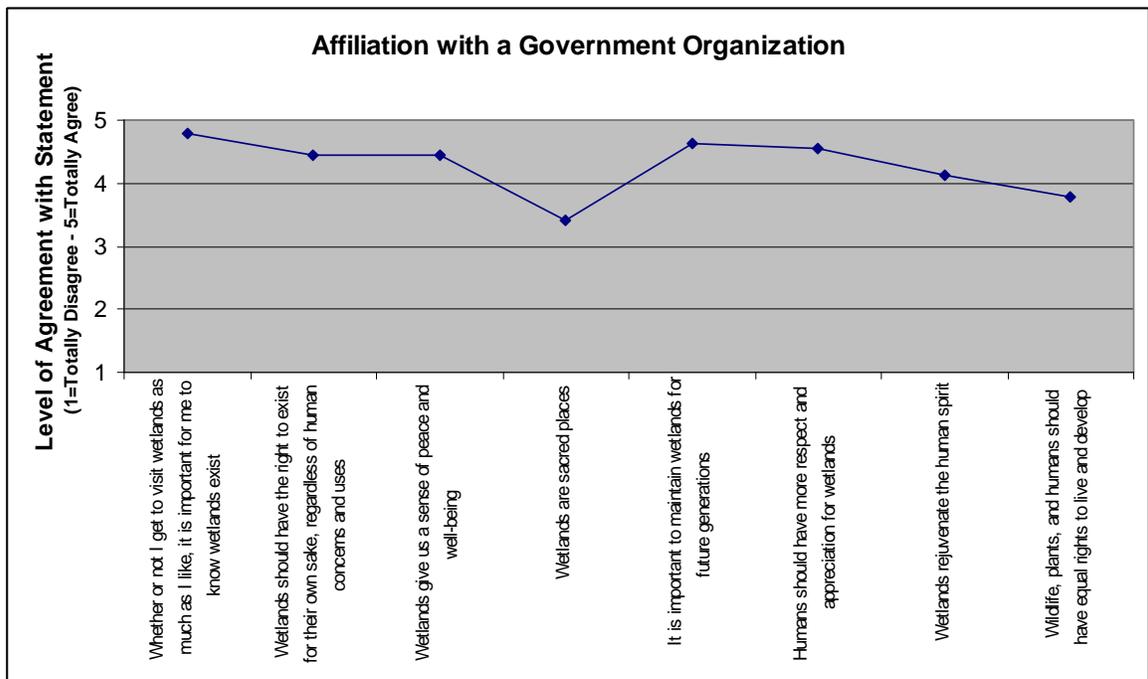
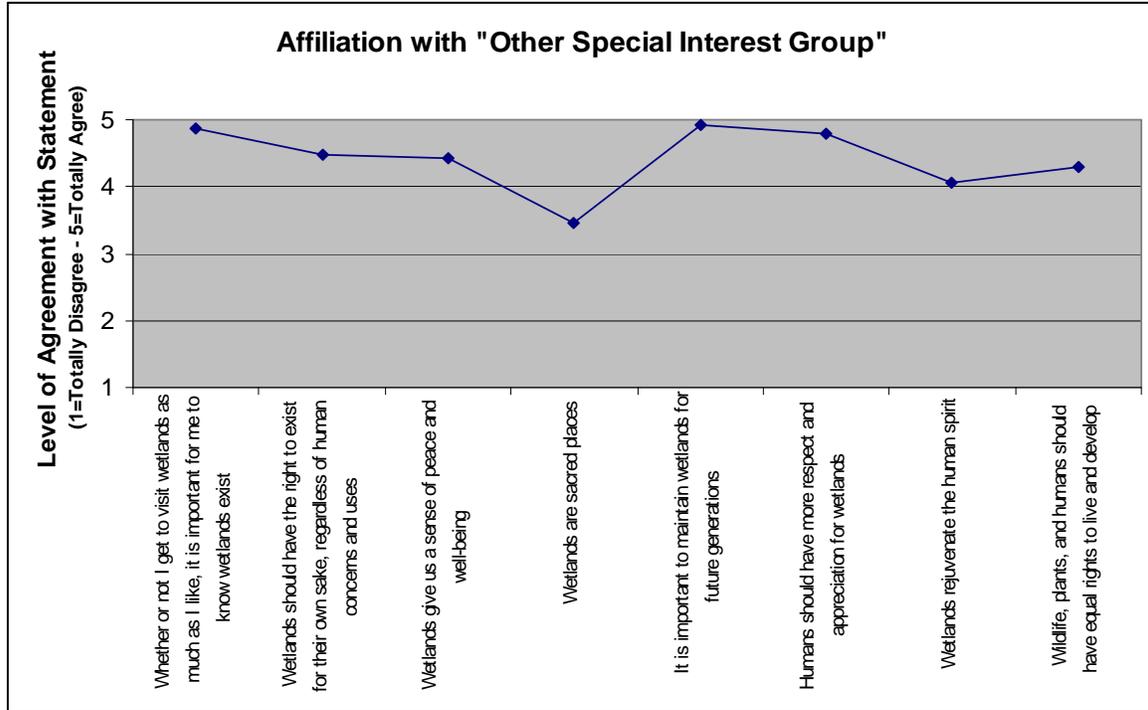




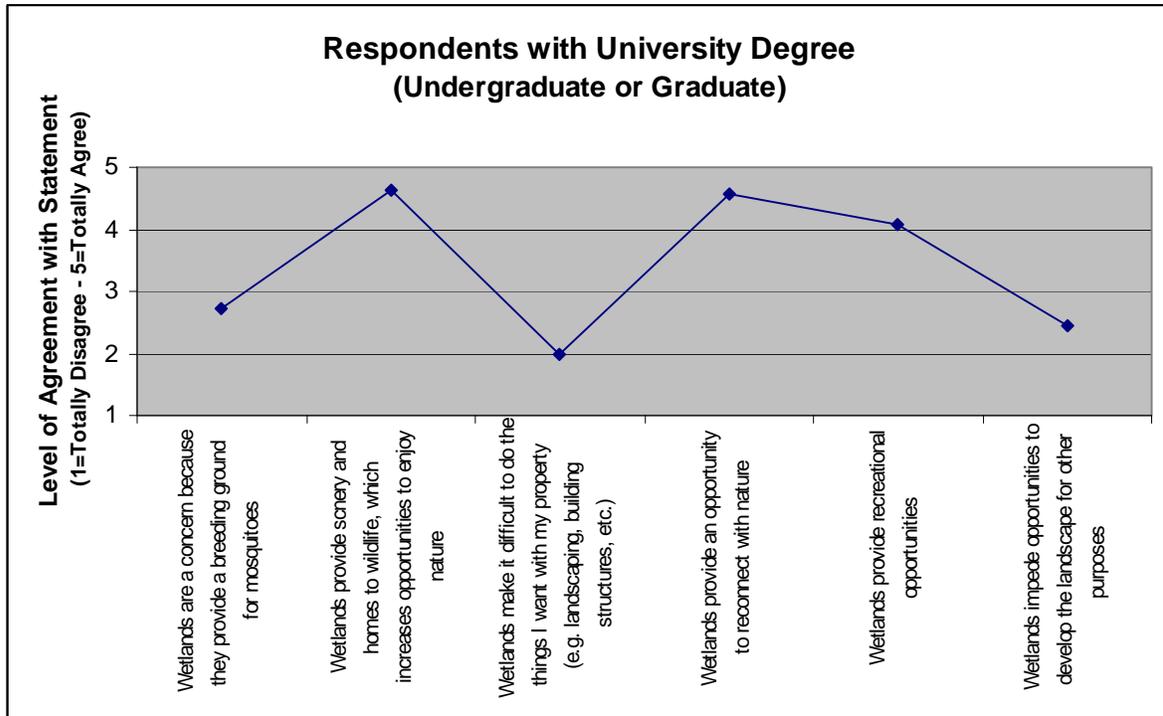
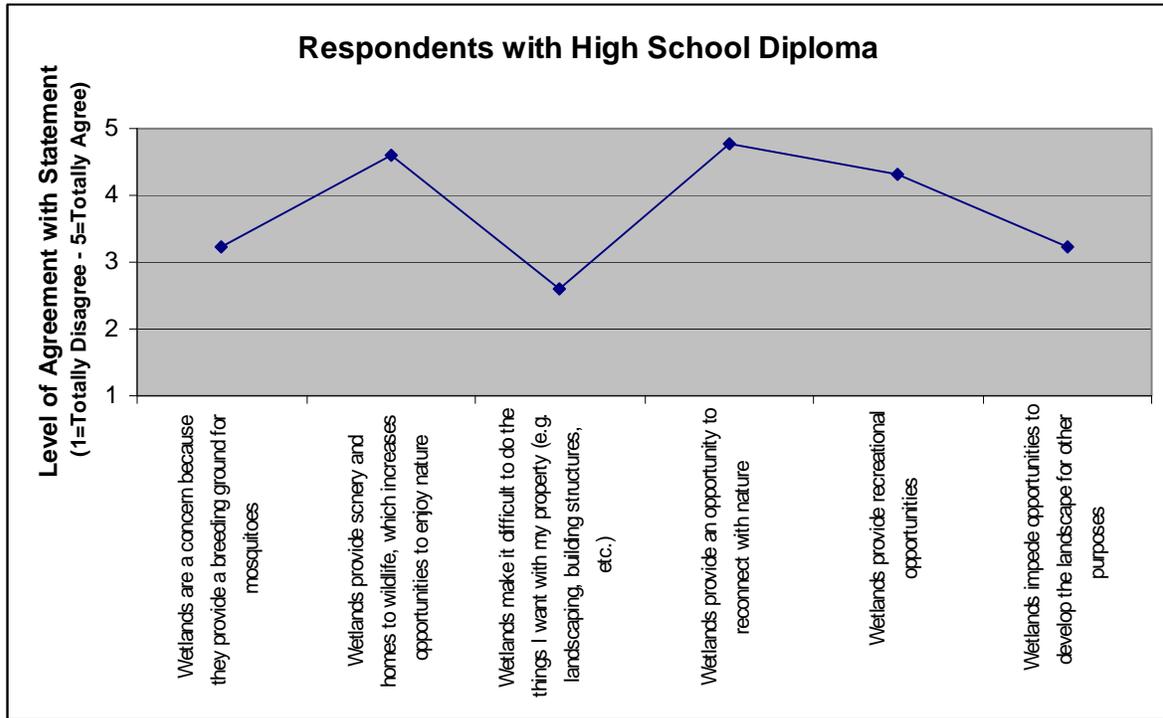
Q3. Agreement with Value Statements by Organizational Affiliation



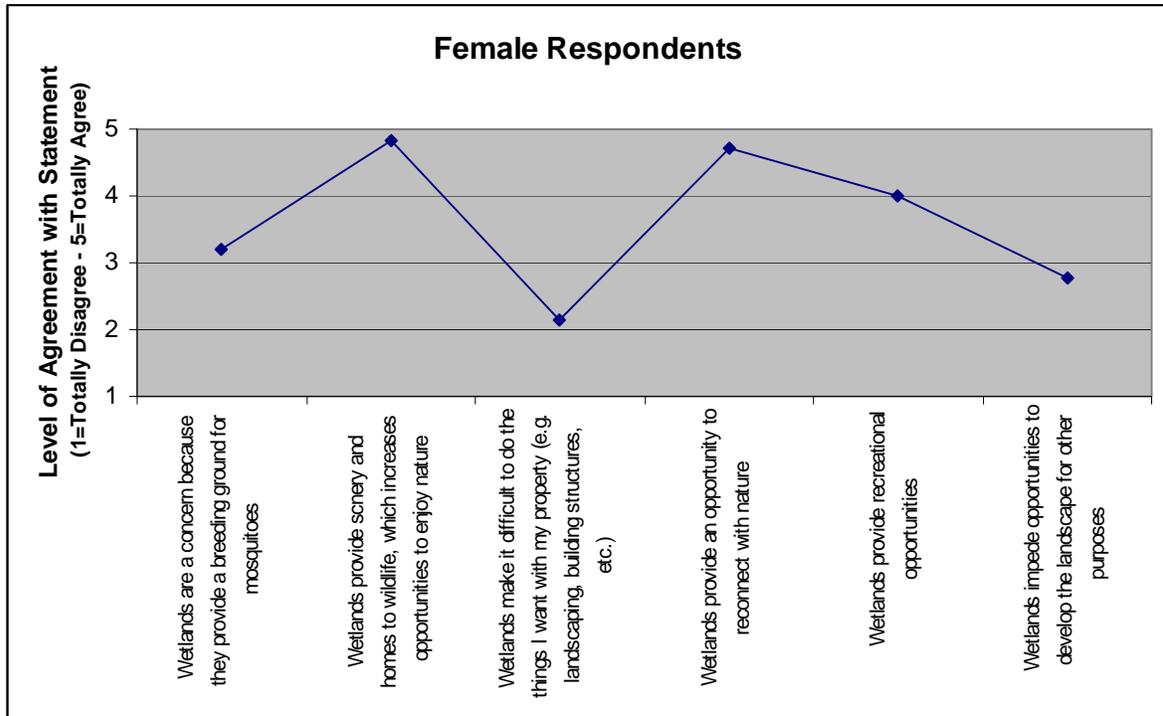
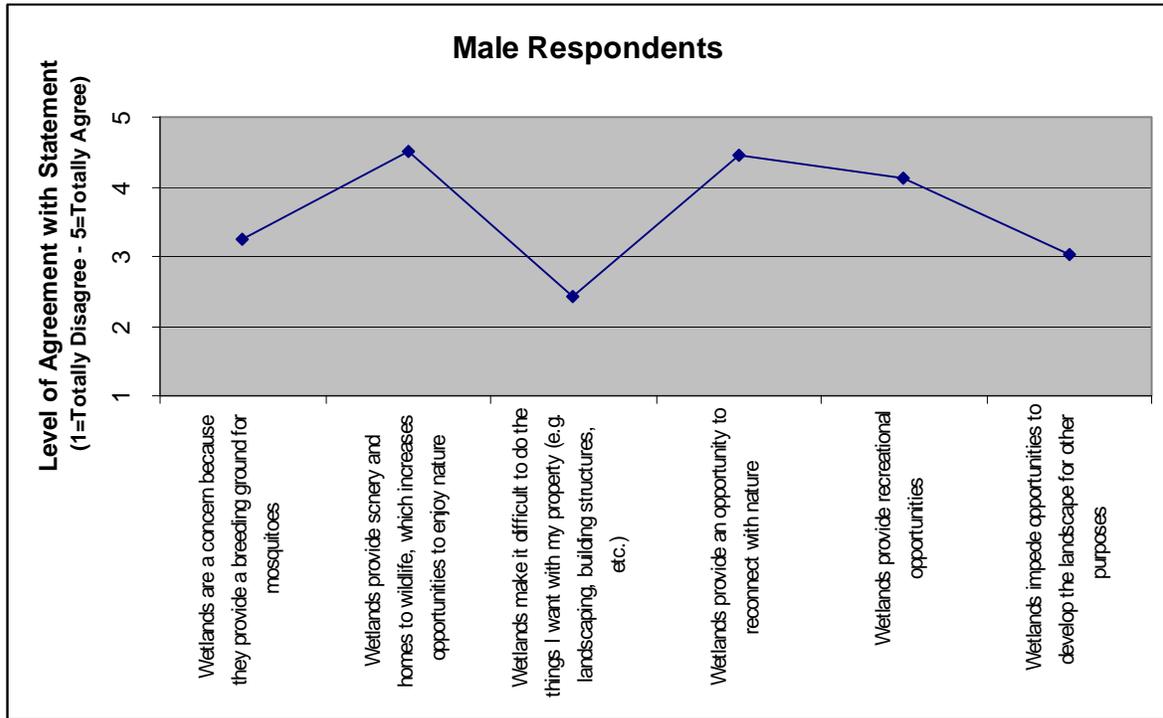




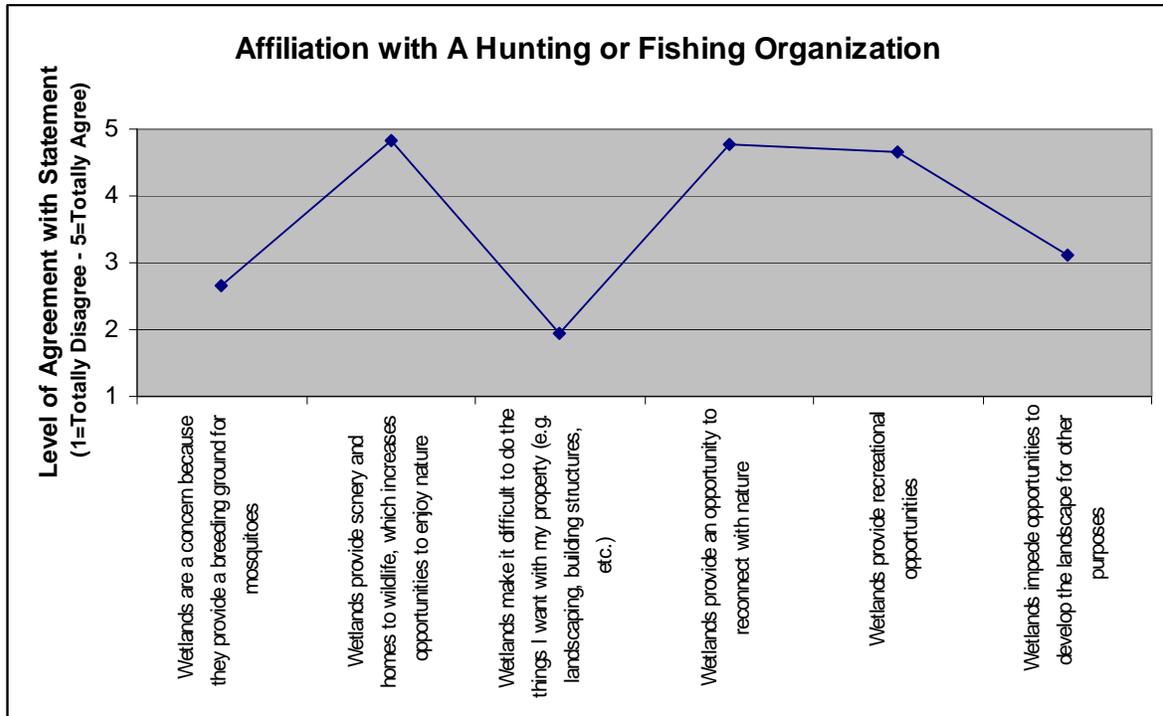
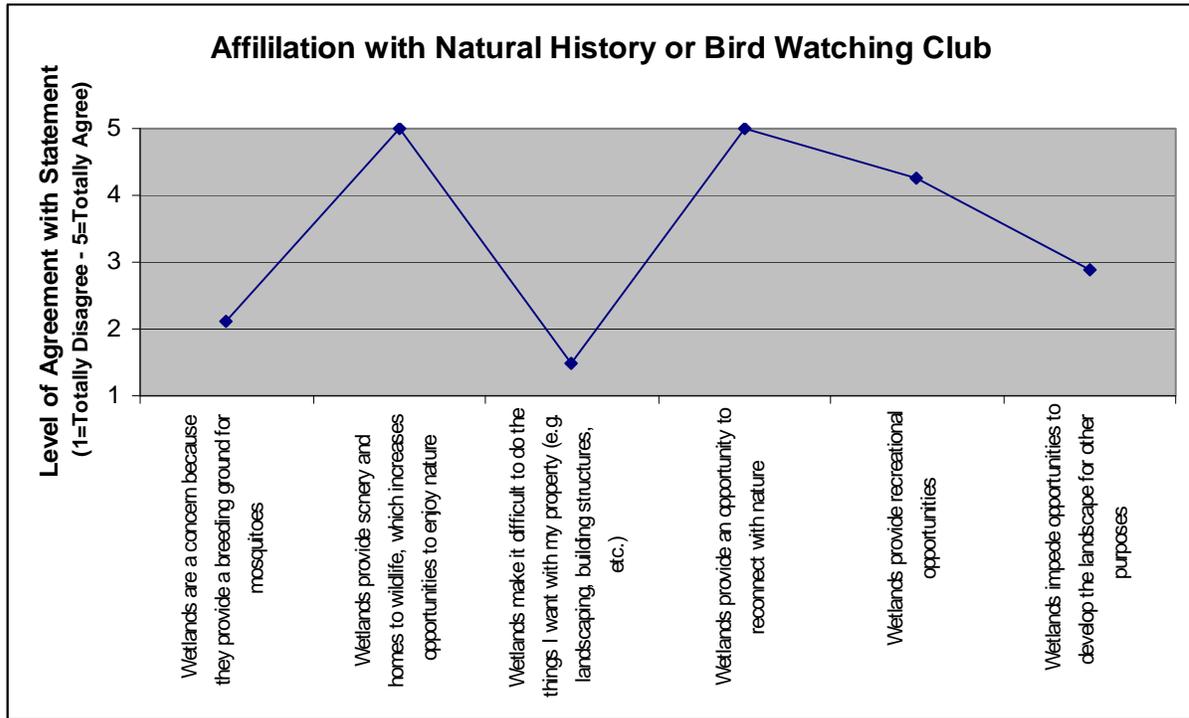
Q9. Agreement with “Use” Statements by Different Education Level

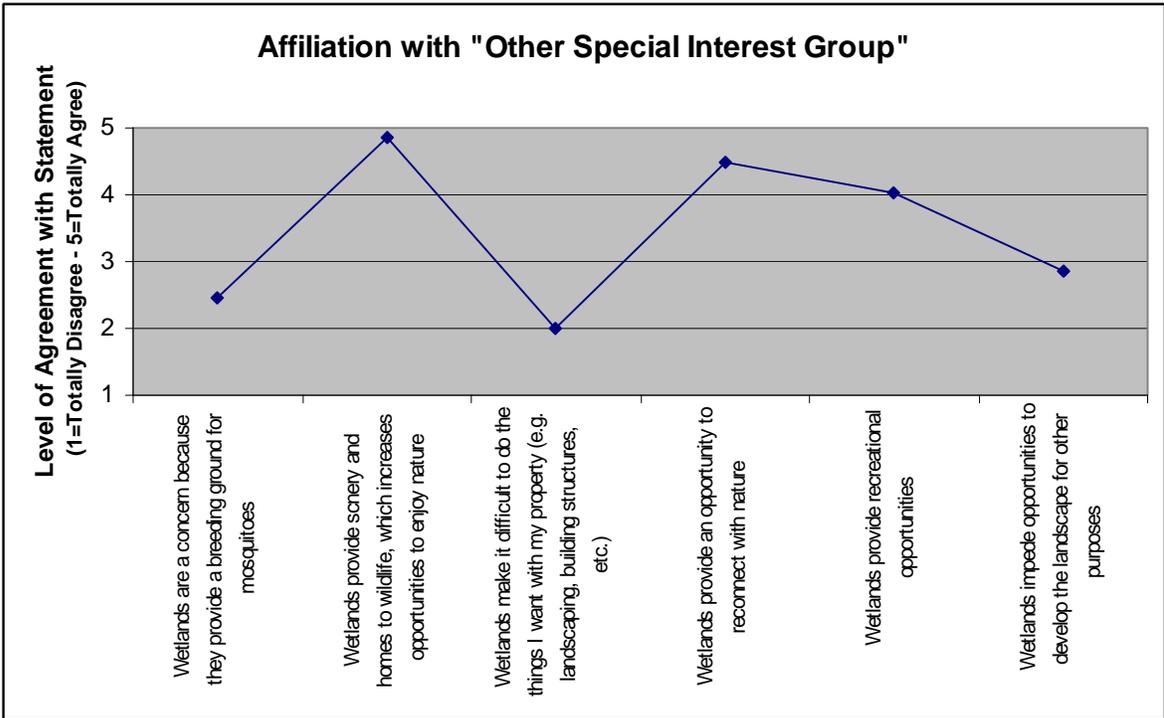
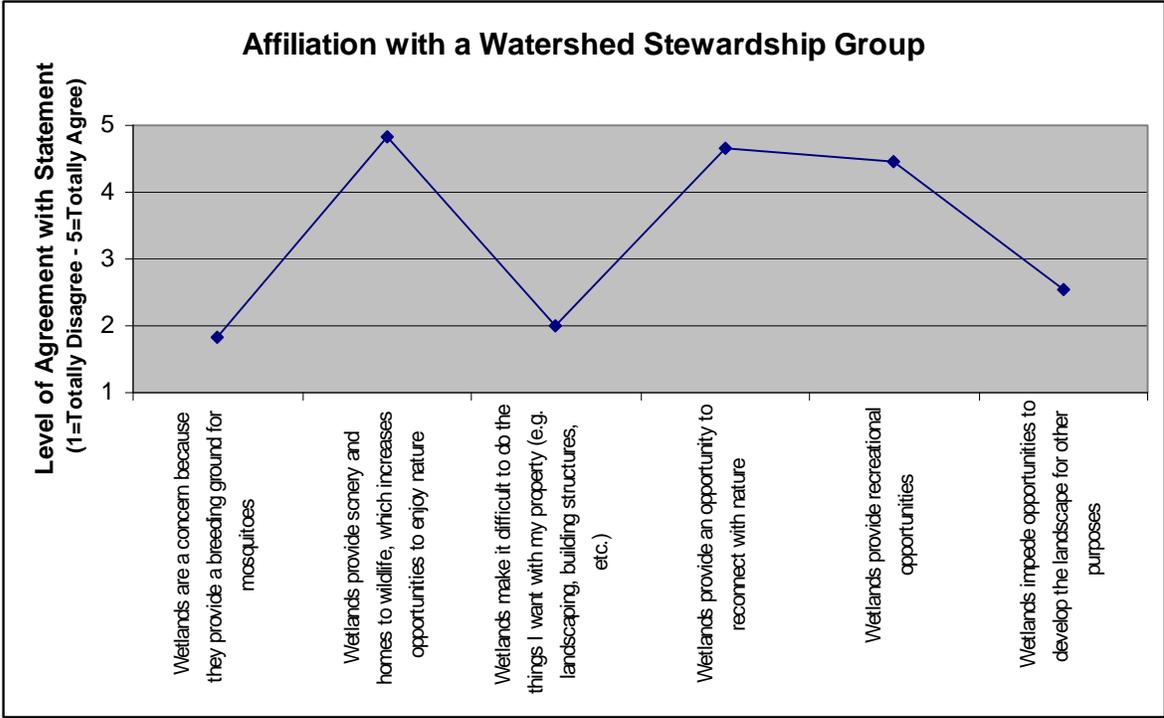


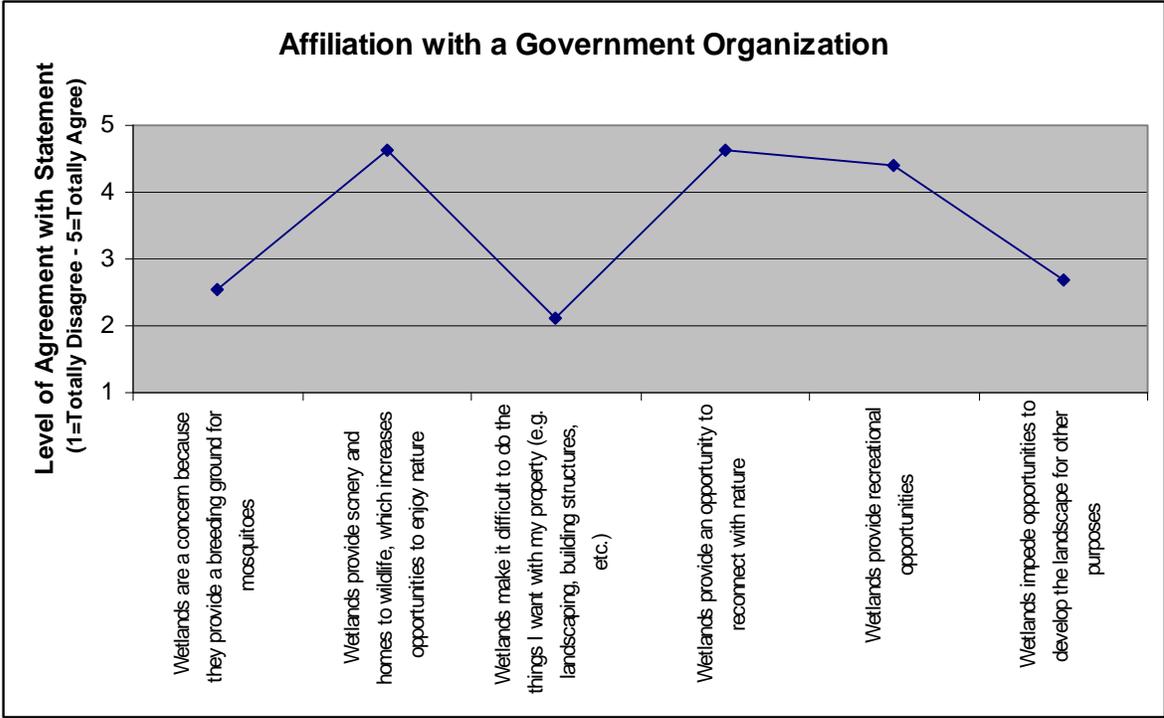
Q9. Agreement with “Use” Statements by Gender



Q9. Agreement with “Use” Statements by Organizational Affiliation







Appendix F - ES Pilot Glossary of Key Terms

Term	Description
Altruism Value	The value individuals attach to the availability of ecosystem resource for others in the current generation. An example of <i>Non-use Value</i> .
Beneficiary (of Ecosystem Services)	Persons, groups or projects that benefit from ecosystem services in tangible or intangible ways.
Benefit	Positive change in human wellbeing from the delivery of ecosystem services.
Bequest Value	The value individuals hold regarding the availability of resources for future generations. An example of <i>Non-use Value</i> .
Biodiversity	The variability among living organisms and the ecological complexes of which they are a part. This includes the diversity found within and between species and between ecosystems. Biodiversity serves as the foundation for all <i>Ecosystem Services</i> , which are dependent to some degree on the diversity of genes, species, populations, communities, landscapes and information, or on key components of biodiversity include food, genetic resources, timber, biomass fuel, and ecotourism.
Consumptive Use	The reduction in the quantity or quality of a good available for other users due to consumption.
Cultural Services	The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values.
Cumulative Effects	The combined effects on the environment arising from the combined impacts of all past, present, and reasonably foreseeable future human activities.
Direct Use Value	The value derived from the services provided by an ecosystem that are used directly by an economic agent. These include <i>Consumptive Uses</i> (e.g., harvesting goods) and <i>Non-consumptive Uses</i> (e.g., enjoyment of scenic beauty). An example of <i>Use Values</i> .
Driver (Direct, Indirect)	Any natural or human-induced factor that directly or indirectly causes a change in an ecosystem.
Ecological Functions	Natural processes that are necessary for the self-maintenance of an ecosystem and its integrity, such as primary production, nutrient cycling, decomposition, etc.
Economic Valuation	The attempt to elicit public preferences for changes in the state of the environment through analytical techniques where these preferences are quantified into monetary equivalents or other appropriate units.
Economic Value	The measure of the wellbeing associated with the change in the provision of an ecosystem service quantified in monetary or other appropriate units. It is not synonymous with monetary value.
Ecosystem	An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit.
Ecosystem Goods and Services	It is synonymous with ' <i>Ecosystem Services</i> '.
Ecosystem Services	Outputs (goods and services) derived from ecosystems that benefit people. These include provisioning services, regulating services, supporting services, and cultural services. Ecosystems, and the biodiversity contained within them, provide a stream of goods and services essential for society's well-being.
Ecosystem Services Approach	An Ecosystem Services approach provides a framework by which ecosystem services are integrated into public and private decision

	making. The approach included the following components: identification of problem or issue, identification of ecosystem services being provided, dependency and impact assessment, condition and trend assessment, economic valuation of services, identification of risks and opportunities, input into decision making.
Ecosystem service impact	A project, plan or policy <i>impacts</i> an ecosystem service if actions associated with the project, plan or policy alter the quantity or quality of a service.
Existence Value	The value individuals derive from the knowledge that an ecosystem resource exists, even though they will never see it or use it. An example of <i>Non-use Values</i> .
Indirect Use Value	The value derived from the goods and services provided by an ecosystem that are used indirectly by an economic agent. For example, drinking water that has been purified as it passed through the ecosystems. An example of <i>Use Values</i> .
Intrinsic Value	The worth of a good or service for its own sake, independent of the benefits they may yield to humans.
Marginal Value	The change in economic value associated with a unit change in output, consumption or some other economic choice variable.
Market Value	The value of a good or service determined in a market and expressed in monetary terms (prices).
Natural Asset	The stock of natural resources from which many ecosystem services are produced.
Non-consumptive Use	Using a resource in a way that does not reduce its supply in quantity or quality, such as hiking, bird watching and other recreation activities.
Non-market Value	The value of a good or service recognized by people but not transacted in a market place.
Non-use Value	The value that is derived from the knowledge that the natural environment is maintained. This comprises <i>Bequest Value</i> , <i>Altruistic Value</i> and <i>Existence Value</i> .
Option Value	The value that people place on having the option to use a resource in the future. An example of <i>Use Values</i> .
Opportunity Cost	The benefits forgone by undertaking one activity instead of another.
Passive Use Value	The values that are enjoyed vicariously, without having to directly or indirectly use a good or visit a site. This comprises <i>Option Value</i> , <i>Bequest Value</i> , <i>Altruistic Value</i> and <i>Existence Value</i> .
Project Stakeholder	A person, group or organization with a common interest in a project and its outcomes, where stakeholders may or may not be involved in the delivery of a project, and may or may not be an ecosystem services beneficiary.
Provisioning Services	The products obtained from ecosystems, including, for example, genetic resources, food and fiber, and fresh water.
Public Good	A good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted.
Quasi-option Value	The welfare gain associated with delaying a decision when there is uncertainty about the payoffs of alternative choices, and when at least one of the choices involves an irreversible commitment of resources. Stems from the value of information gained by delaying an irreversible decision to develop a natural environment. (See also <i>Option Value</i>)
Regulating Services	The benefits obtained from the regulation of ecosystem processes, including, for example, the regulation of climate, water, and some human diseases.
Scenario	A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions

	about key driving forces (e.g., rate of technology change, prices) and relationships. Scenarios are neither predictions nor projections and sometimes may be based on a “narrative storyline.” Scenarios may include projections but are often based on additional information from other sources.
Supporting Services	Ecosystem services that are necessary for the production of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Threshold	The value of an indicator that reflects a problem condition in an ecological, economic, or other system. Thresholds at which irreversible changes occur are especially of concern to decision makers.
Total Economic Value (TEV)	The total gain in wellbeing from a natural resource. It comprises <i>Use Value</i> (including <i>Direct Use Value</i> , <i>Indirect Use Value</i> , <i>Option Value</i>), and <i>Non-use Value</i> (including <i>Existence Value</i> , <i>Altruistic Value</i> , <i>Bequest Value</i>).
Trade-offs	Management choices that intentionally or otherwise change the type, magnitude, and relative mix of services provided by ecosystems.
Use Value	The value that is derived from using or having the potential to use a resource. This comprises <i>Direct Use Value</i> , <i>Indirect Use Value</i> and <i>Option Value</i> .
Utilitarian	An approach that focuses on the satisfaction of human preferences.
Utility	In economics, the measure of the degree of satisfaction or happiness of an individual.
Valuation	The process of expressing a value for a particular good or service in a certain context (e.g., of decision-making) usually in terms of something that can be counted, often money; can also be described in qualitative terms, using methods and measures from other disciplines (sociology, ecology and so on).
Value	Generally, the worth, merit or desirability of an ecosystem service to human. In economics, it is the measure of the wellbeing associated with the change in the provision of an ecosystem service. In social context, it is the appreciation or emotional value attached to a given ecosystem service. It can be expressed quantitatively or qualitatively (either in economic terms or ethically).
Well-being	A context- and situation-dependent state, comprising basic material for a good life, freedom and choice, health, wealth, good social relations, and security.
Wetland	Land saturated with water long enough to promote wetland or aquatic processes as indicated by the poorly drained soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to a wet environment.
Wetland Compensation	Payment into a fund for wetland restoration work.
Wetland Loss	Includes infilling, altering, or physically draining a wetland, any impact to the riparian area or buffer strips, and any type of interference with the hydrology to and from a wetland.
Wetland Mitigation	A process to reduce the loss of wetlands, focusing on avoiding loss, minimizing impact, and compensating for unavoidable wetland loss.
Wetland Restoration	The re-establishment of a naturally occurring wetland with a functioning natural ecosystem whose characteristics are as close as possible to conditions prior to its drainage or alteration.

Appendix G - Benefits Ranking Exercise Materials

Information about Participants in Stakeholder Benefits Workshop Day	
Organization	“Sector” *
City of Calgary-Ralph Klein Park	Water Management
Rocky View County	Agriculture
Sustainable Resource Development	Land Development
Rocky View County	Land Development
Rocky View County	Land Development
Alberta Environment	Water Management
Cattlemen	Agriculture
U of Calgary	Conservation
Duck Unlimited Canada	Conservation
ARD (RD)	Land Development
ARD (AG)	Water Management
Agriculture Canada	Agriculture
Alberta Beef	Agriculture
Urban Design	Land Development
Remington	Land Development
Alberta Native Plant Council	Conservation
Alberta Agriculture	Agriculture

*Distinguished, approximately, as “Land Development”, ‘Agriculture’, ‘Water Management’ and ‘Conservation’