

Assessing the Potential for Policy Responses to Climate Change:
Final Research Project Report to the Prairie Adaptation Research Collaborative¹

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¹ This report has been submitted for review and will be published as a Canadian Forest Information Report

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Acknowledgements

The authors would like to acknowledge the funding from the Prairie Adaptation Research Collaborative and the Natural Resources Canada Science and Technology Internship Program. The Canadian Forest Service and the University of Alberta made considerable in-kind contributions to this undertaking. Valuable technical web based support was provided by Jon Elofson, Northern Forestry Centre Webmaster. We are particularly indebted to the efforts of our intern, Laurie Wein.



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Abstract

This report provides an overview of findings from the Prairie Adaptation Research Collaborative project, *Assessing the Potential for Policy Responses to Climate Change*. The authors use a number of social science methods to examine the policy making process in the Prairie agriculture, forestry, and water sectors. A web-based survey of 800 decision-makers examined their policy belief structure, their attitudes towards climate change issues and risk, and their network structures. The results reveal that competing policy belief structures do exist and may prove important in determining the future direction of climate change policies.

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1. Introduction

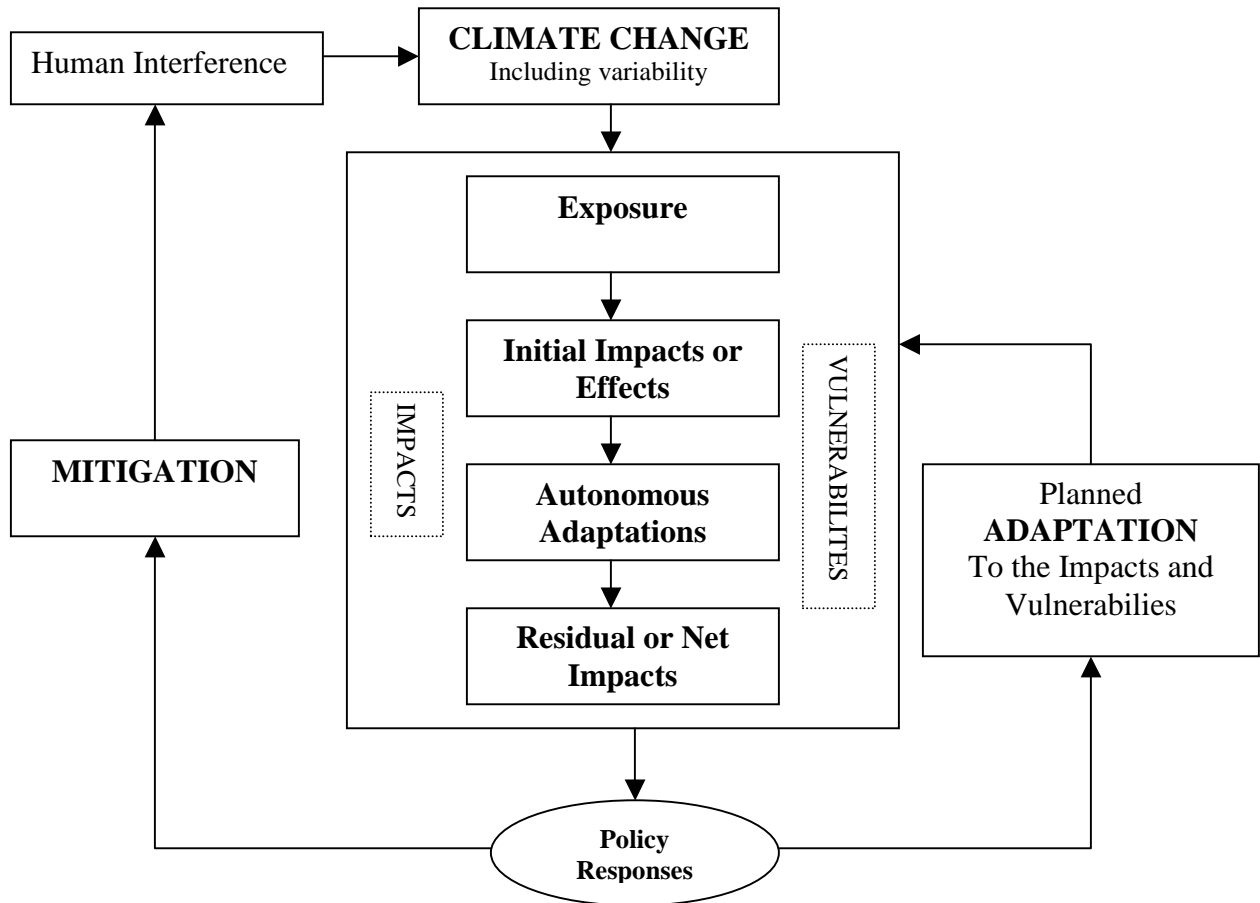
Global climate change has received no shortage of airtime in recent years among scientists, politicians, and the media. The United Nations' sponsored expert scientific panel, the Intergovernmental Panel on Climate Change (IPCC), has suggested broad scientific consensus regarding the occurrence of greenhouse gas-induced climate change. In response, there have been many prescriptions and suggestions for policies that address climate change impacts and adaptation. For example, Smit *et al* (1997) states that the Canadian agriculture sector will have to introduce a suite of policies that address climate change impacts and adaptation. These range from funding for irrigation projects to the development of new drought resistant crops. The IPCC themselves have also proposed policy developments. The diagram below (Figure 1) was derived from a recent IPCC report (IPCC 2001), which outlines the expected relationship between climate change and policy response. The figure describes the possible impact scenarios, which are expected to be particularly prevalent in vulnerable sectors such as agriculture, forestry, and coastal zones, as well as affected major global regions. It also considers adaptive capacities and possible policy solutions through mitigation or planned adaptation.

One important step that is missing from this figure, however, involves the means by which policymakers interpret, or *socially construct*, information regarding climate change. According to political scientists and political sociologists, it is in this social construction, or definitional, stage that external stimuli, such as scientific information, or environmental events, become filtered through decision-makers' own core personal beliefs, general policy attitudes that are developed through experience, and organizational cultures and relationships within a particular policy community. In short, a directed policy response to climate change will demand that policy makers have a well-developed perception of climate change as an issue that will have a significant impact on their sector, and is also seen as being within the responsibilities and capabilities of the organizations that make up the policy community. Further, many policy scientists have indicated that proactive policy communities tend to be characterized by a certain degree

of coherence in policy beliefs regarding the need for action on a particular issue, while at the same time represent a densely connected network of organizations that are sufficiently diverse in beliefs and experiences to provide for *policy learning*, to ensure the development of effective strategies.

In the current research project, the researchers empirically explored these little understood and researched aspects of the socio-political dimensions of climate change. Three different theoretical approaches were employed to develop a survey questionnaire, each of which will be described further below: the policy community/policy network and the advocacy coalition framework (ACF). We then administered this survey to over 800 members of policy communities in three sectors predicted to be vulnerable to climate change: the forest, water, and agriculture policy communities across Alberta, Saskatchewan, and Manitoba. We measure the means by which actors in these policy communities are interpreting climate change as a policy issue. We then use these results to assess the degree to which these policy-making systems have constructed global climate change in a manner that is conducive to responsiveness. A brief description of the study area is provided in the following section. The second section outlines the theoretical frameworks employed, and the third section details the study's data and methods. This will be followed by an overview of the results, and finally, we conclude with a discussion that considers the implications for both climate change policy practitioners and the policy research community.

Figure 1-IPPC Climate Change Process



2. Theoretical Underpinnings

Given the complexity of analyzing potential political responses to climate change, we found it necessary to draw from several bodies of scholarship to develop this research. In particular, we utilize policy community analysis and the advocacy coalition framework models, as well as risk perception research, each of which are explained briefly below.

A policy community (Figure 2) is a structural configuration of the policy actors who participate in the policy process within a particular sector. The “sub-government” is in the center of this community, including those senior governmental personnel who are in positions of direct responsibility for a particular policy sector, and nongovernmental organizations, such as producer groups, that have become established participants in policy formulation and implementation. Second, the policy community includes the “attentive public,” or those civil society actors in non-governmental organizations that are capable of influencing policy. In addition, this policy community is characterized by “policy networks,” which describe the types of relationships that exist between these governmental and non-governmental actors within a policy community. The policy community approach has proven to be very attractive with Canadian policy researchers because it offers a workable unit of analysis compared with the untenable prospect of understanding the entire process of governance. Moreover, it permits an understanding of policy-making that extends beyond the “iron triangle” and “stages approach” by avoiding making false assumptions about which organizations are capable of policy influence, ultimately allowing for the inclusion of a wider array of actors. In highly technical and complex sectors such as agriculture, forestry, and water, the policy community approach is able to accommodate the vast array of different organizational and individual actors. The policy community approach feeds quite well into another body of research, based on the advocacy coalition framework (ACF), because the policy communities described above are hypothesized to form the structural elements not only of the policy network but also the ACF. The ACF, developed by Sabatier and Jenkins-

Smith, examines policy change within a policy community over a long period of time (a decade or more).

There are four key elements in the ACF:

- External events influence major shifts in policy direction and constrain the actions of subsystem actors
- Policy change and policy learning require a time perspective of a decade or more
- Policy change is best understood through the examination of political subsystems as the unit of analysis
- Public policies can be conceptualized in the same manner as a belief system (Sabatier 1988).

The boundaries of the policy subsystem itself are comprised of 20-30 organizations with 2-4 key competing coalitions. There is often an organization that serves as a broker between the competing coalitions. What identifies advocacy coalitions from each other is a three-leveled hierarchical belief system. In other words, "coalitions seek to translate their beliefs into public policies and programs" (Sabatier 1988). This belief system is arranged according to three distinctive categories: a *deep normative core*, a *policy core*, and the *secondary aspects*. For this study, we examine the first two parts of the belief system (which are highlighted below).

Figure 2

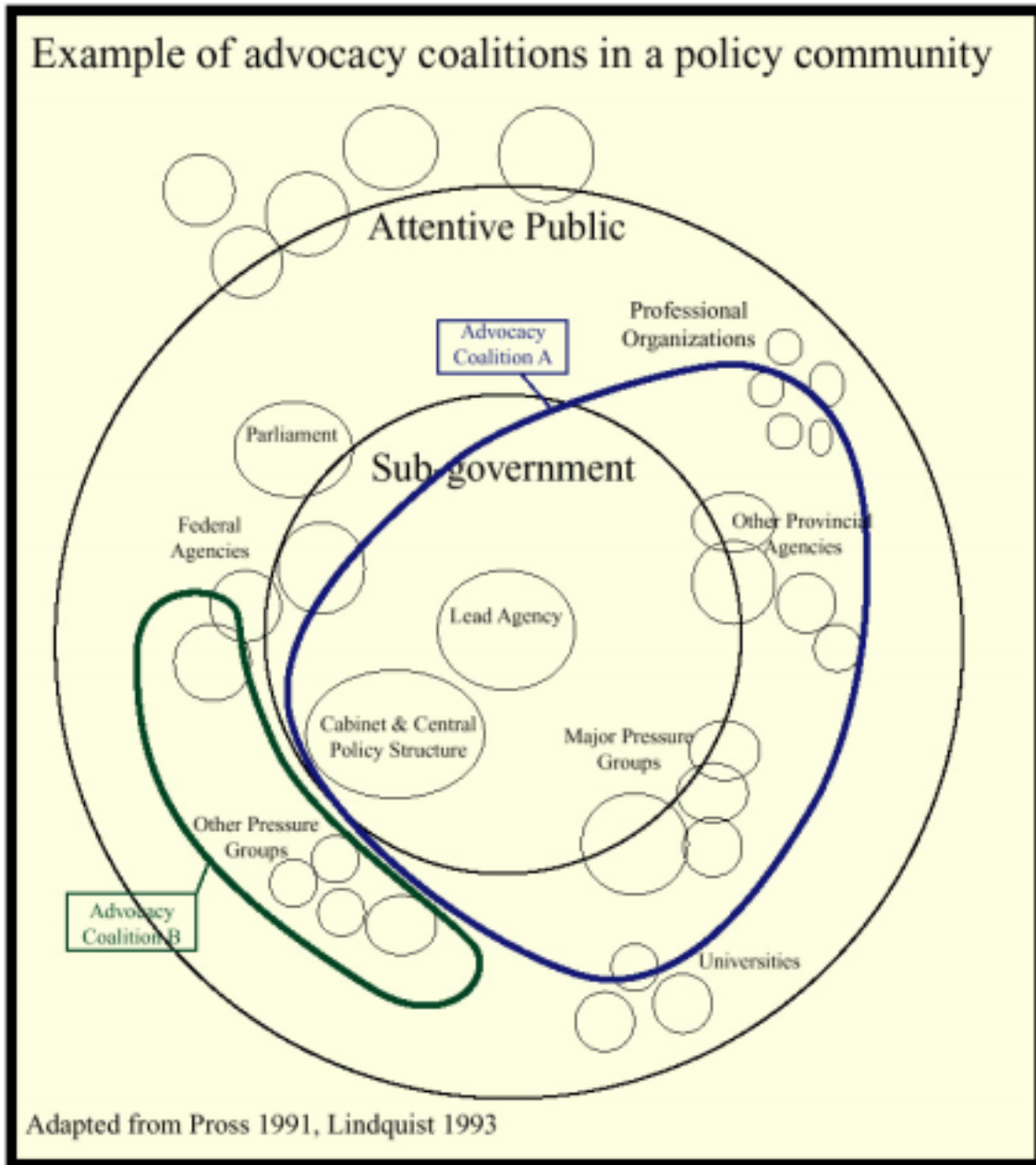
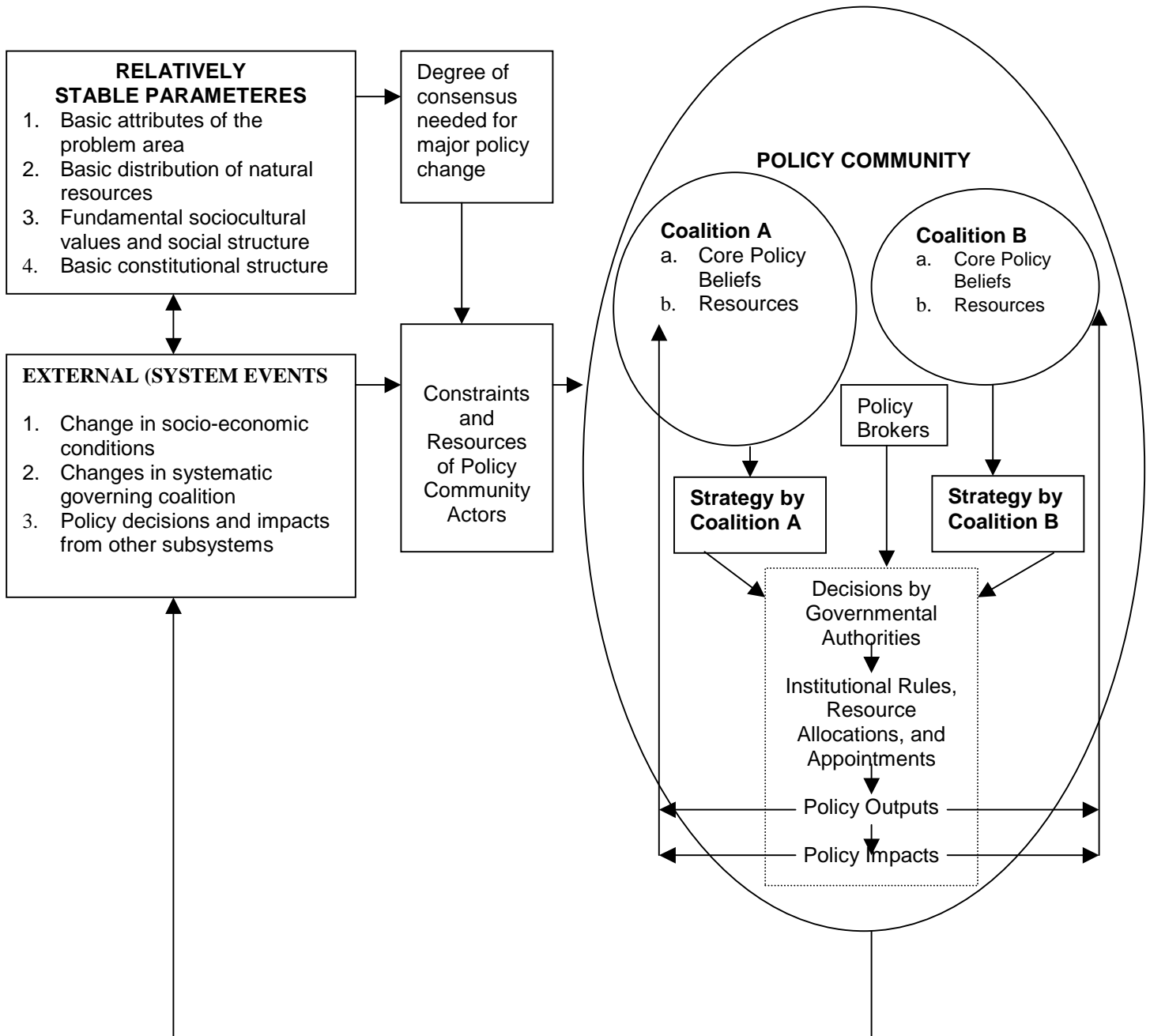


Figure 3 - The Advocacy Coalition Framework



Adapted from Sabatier and Jenkins-Smith (1999)

The secondary aspects of the policy belief system, those narrower beliefs concerning the seriousness of the problem found in specific locales, policy preferences regarding desirable

regulations or budgetary allocations, the design of specific intuitions, and the evaluations of various actors' performance could not be examined because no such climate change specific policy aspects exist. The unique contribution that this study makes to policy sciences is that we are examining what will become a long-term policy problem in its formative stages. Therefore it is critical to understand the current belief structure in order to consider the possible secondary aspects that may emerge in the future climate change policies.

Table 1 - Structure of Belief Systems of Policy Elites

	Deep Core	Policy Core
Defining Characteristics	Fundamental normative and ontological axioms	Fundamental policy positions concerning the basic strategies for achieving core values with a policy community
Scope	Across all policy communities	Policy community wide
Susceptibility to change	Very difficult	Difficult, but can occur if experience reveals serious anomalies
Illustrative components	<ol style="list-style-type: none"> 1. Human nature <ol style="list-style-type: none"> a) inherently evil vs. socially redeemable b) Part of nature vs. domination over nature c) Narrow egoist vs. contractarians 2. Relative priority of various ultimate values: freedom, security, power knowledge, health etc 3. Basic criteria of distributive justice: whose welfare counts? Relative weights of self, primary groups, all people, future generations, nonhuman beings 4. Sociocultural identity (e.g., ethnicity, religion, gender, profession) 	Fundamental normative precepts: <ol style="list-style-type: none"> 1. Orientation on basic value priorities 2. Identification of groups or other entities whose welfare is of greatest concern Precepts with a substantial empirical component: <ol style="list-style-type: none"> 3. Overall seriousness of the problem 4. Basic causes of the problem 5. Proper distribution of authority between government and the market 6. Proper distribution of authority among levels of government 7. Priority accorded to various policy instruments 8. Ability of society to solve the problem 9. Participation of public vs. experts vs elected officials 10. Policy core policy preferences

Adapted from Sabatier and Jenkins-Smith 1999

The ACF's attraction for policy scientists who wish to undertake a systematic analysis of a policy community is its emphasis upon hypothesis testing. Over the past 15 years, since Sabatier and Jenkins-Smith introduced the approach, many scholars have made significant contributions. In sum, the hypotheses we derive from this body of scholarship for this research are included in Table 2 below. The ACF has had some limited Canadian applications. Machinney (1993) examined changes to Ontario's education policy,

Lertzman *et al* (1996) examined changes to British Columbia’s forest policy, and Wellstead (1996) examined changes to Alberta and Ontario’s forest policies. Recently, Lindquist and Wellstead (2001) framed the ACF within the larger body of Canadian forest policy research. This study is the first Canadian quantitative applications of the ACF. It is also one of the few inter-sectoral and inter-jurisdictional policy studies.

Table 2 –ACF Hypotheses Examined by the Authors

ACF Hypothesis	Description
Hypothesis 1	Over a long period (greater than a decade) in which the core beliefs are in dispute, the line-up of allies and opponents tend to be stable over a decade or so.
Hypothesis 2	Actors will show substantial consensus on issues pertaining to core beliefs and less on secondary aspects.
Hypothesis 3	Secondary aspects are the instrumental decisions and information searches, which are necessary to implement the policy core. Most policy changes and policy learning occurs at this level, since it is not as threatening to the competing coalition’s core beliefs. As a result, actors are willing to give up these aspects more readily
Hypothesis 4	As long as the dominant advocacy coalition remains in power within the subsystem, the core attributes of a government program are unlikely to be revised significantly.
Hypothesis 5	Changing core beliefs requires significant perturbation external to the subsystem.

Sabatier and Jenkins-Smith (1999)

Another body of social scientific literature that will be useful to understanding political responses to climate change includes a rich body of empirical research on societal perceptions of risk. Paul Slovic, among others conducted a number of studies indicating that perceptions of risk are influenced by a number of social and cultural factors, with issues characterized by high levels of uncertainty regarding impacts and controllability being associated with particularly high levels of dread (Slovic 1987). While many of these studies focused on members of the public, this line of research was soon expanded to include assessment of risk professionals (Clarke 1988). Some of the initial conclusions indicated that individuals in positions of scientific or managerial authority tend to express significantly lower levels of risk than do their layperson counterparts. In management decision-making, this can translate into decision-makers *overestimating* their capacity to both predict and control risky situations, and a tendency toward a “failure to plan” for hazardous outcomes (Clarke, 1988). Some of the factors that have been found to

contribute to these behaviors include a closed, single-disciplinary policy community, strong production pressures, and the lack of overt indicators of the presence of risk. If these trends describe members of the climate change policy community, this may be an indicator that political and bureaucratic responses to climate change may be inadequate (Lazo *et al* 2000).

Based on previous literature on perceptions of risk among policy elites, we would expect:

- 1) those organizations with more closed networks would express the lowest levels of risk and the highest levels of expected control and/or adaptability;
- 2) those organizations with the highest production pressures to be most hesitant to recognize and respond to indicators of risk; and
- 3) those organizations that have the opportunity to observe existing impacts of climate change to be most likely to respond.

In addition to combining these three theoretical approaches, this study attempts to examine the formative aspect of the policy making process across large geographic boundaries, between different levels of government, and across sectors.

3. Data and Methods

The data for this paper comes from responses to an online web survey conducted in the winter of 2001-2002 of the policy community ‘actors’ within the agriculture, forestry, and water sectors, across the three Prairie provinces. This population included all those who are in a recognized position of influence in natural resource policy within the nine policy communities. This wide ranging population included legislators, senior Provincial and Federal government personnel, managers and directors of producer groups, Crown agencies, environmental and conservation groups, First Nations groups, consultants, and academics. Due to the small size of the study population, a census was drawn. Participants were identified using similar methods employed by Knoke (1990) and Sabatier and Zafontane (1997). Study participants were identified through an extensive search of their organization’s web-pages and/or telephone directories. In most cases, an e-mail directory of key personnel such as directors and managers was readably available. All of study participants from Federal and Provincial government agencies (Table 3) (Appendix A for the complete list) and practically all elites from organizations had unique e-mail addresses.

Table 3. Organizations Surveyed

Lead Provincial Agencies Alberta Department of Agriculture Alberta Department of Environment Manitoba Department of Agriculture Manitoba Department of Conservation Saskatchewan Department of Agriculture Saskatchewan Environment and Resource Management (SERM) Saskatchewan Water Corporation	Federal Departments Agriculture Canada and Agri-Food (including PFRA) Environment Canada Natural Resources Canada (including the Canadian Forest Service)
Professional Organizations Research Organizations Universities	Aboriginal Groups
Agriculture Producers Groups Forest Industry	Conservation and Environmental Groups

The few groups that did not have web-based directories were directly contacted. We also derived additional respondent lists from among participants noted in key Federal and Provincial sponsored policy related studies conducted in the past five years. Finally, we utilized the “snowball” technique, whereby key informants were approached and asked to

identify other organizations that should be contacted. We are confident that most, if not all of the organizations within the three policy communities were identified and contacted to participate in this study.

The survey process consisted of four stages. Ten days before the survey was executed, e-mail letters of introduction describing the study were e-mailed to all the respondents from the Principal Investigators. This first round of e-mails allowed the researchers to identify incorrect or non-functioning e-mail addresses (~55 returns). New e-mails were found and replacement letters sent, or adjustments to the survey population were made. The second stage involved the mail letters with the survey link being sent out to all of the respondents with the survey's web address <http://nofc.cfs.nrcan.gc.ca/parc/>. Ten days following the mail-out, all of the respondents were sent a "thank you/reminder" e-mail. After another ten days had elapsed, reminder e-mails were sent to those who had not completed the survey.

Pre-testing suggested that the average completion time was 20-25 minutes. The survey consisted of seven distinct sections. The complete survey with all of frequency scores can be found in Appendix B. Respondents were asked to identify one sector (they were most involved with), their geographic area (Alberta, Saskatchewan, Manitoba, or the Prairies), and the focus(i) of their work (local, provincial, national, and/or international).

The survey's seven sections included:

Section 1. Perceptions of policy problems: The questions in this section were posed as key policy problems from each sectors that the principal investigators found in the literature and through personal interviews. A common policy problem was an "Uncompetitive agriculture industry." Respondents were asked to subjectively assess how serious the problem was.

Section 2. Important Agricultural/Forestry/Water Issues: Depending on the sector identified, respondents were asked questions relating to key issues in their particular sector. The purpose of this sector was to measure the ACF's policy core beliefs.

Section 3. Attitudes towards climate change: In this section, respondents were asked to evaluate simple climate related data. This included historical precipitation and temperature trends as well as projected climate scenarios.

Section 4. **Perceptions of risk:** This section used similar, albeit modified, questions used by Slovic (1987) and Lazo *et al* (2000) to measure risk perception. This study concentrated on risk values pertaining to decreased precipitation, increased average temperature, increased precipitation, and increased severity of extreme weather events.

Section 5. **Network linkages:** There were three separate questions relating to the policy network structure. The first question ascertained what organizations respondents relied on for shared values/policy viewpoints, a source of valid information, and the degree of power they thought that the identified organization had. The second question asked respondents to identify those organizations that they considered as allies. This was measured by the extent that information was shared, whether the respondent's organization would develop a joint policy position and/or strategy, and if they would modify their organization's behaviour to achieve common goals. The third set of questions asked respondents to identify what organizations they considered to be their opposition.

Section 6. **General Political Beliefs:** These questions measured the broad normative policy beliefs. These questions could be generalized across all sectors. For example, the need for government to protect of property rights was asked.

Section 7. **Background information:** Key demographic variables such as age, education, employment, gender, and family status were found in this section.

A total of 851 individuals were identified (most primarily from organizations) during the first stage of the research project. 356 usable responses were received for a return rate of 41.88%.

4. Results

4.1 Background Results

There was a fairly even distribution of responses across the three sectors. However, after our initial invitation to participate, Manitoba had a significantly lower response rate than the other two Provinces in the population. The respondent pool was characterized by a very large proportion of men, and not surprisingly, a high level of education attainment. As noted in Table 4, a large but evenly distributed number of respondents came from provincial government agencies responsible for agriculture, forestry, and water. Agriculture producer groups and the forest industry made up the second largest block of organizations. This was followed by Federal organizations (Agriculture and Agri-food Canada, Environment Canada, and Natural Resources Canada). Consultants, researchers, and environmental organizations made up the other 15% of the respondents.

Table 4 - Background Characteristics of Respondents

Sector	%
Agriculture	38
Forestry	35
Water	27
Province	%
Alberta	37
Saskatchewan	33
Manitoba	17
Non-Prairie	13
Gender	%
Female	18
Male	82
Education	%
Bachelors	34
Masters	37
PhD	14

Table 5 - Organizational Affiliations of Respondents

Affiliation	%
Agriculture Canada/PFRA	6.5
Provincial Agriculture Agencies	14.6
Agriculture Producers	12.4
Provincial Environmental Agencies	22.5
Saskatchewan Water Corporation	4.2
Forest Producers	7.0
Environment Canada	6.5
Environmental Organizations	5.3
NRCan	3.1
Researchers	9.6
Consultants	4.2
Aboriginals	1.0
Other	3.7
Total	100.0

4.2 Statement of the Policy Problem

Perceptions of the “overall seriousness of the problem” is a fundamental aspect of the ACF’s policy core beliefs. In the first section of the survey, respondents were asked to consider 15 different policy issues that were identified in recent media or policy literature as being relevant to our three resource sectors. The highest ranked policy issues (on a 5 point scale) included Protectionist Trade policies (mean 3.95); increased droughts on prairie lands (3.90); water quality (3.81), with climate change coming in fourth (3.68).

In a number of cases, the degree of concern expressed regarding the policy issues identified varied significantly across sectors. For example:

- Agricultural respondents expressed the lowest levels of concern for all the issues identified, including climate change. The differences were particularly significant regarding issues that affected their own sector (declining quality of agricultural soils; increased frequency of droughts; soil erosion on agricultural lands).

- Those in the forest sector expressed the greatest level of concern for several policy issues. Their means were significantly higher for soil erosion on agricultural lands; greater frequency/severity of forest fires; and demands for nontimber values.
- Respondents from the water sector expressed the greatest level of concern for long-term climate change.
- When respondents were grouped according to Province, those respondents who were NOT from one of the three Prairie Provinces expressed significantly higher levels of concern for long-term climate change.
- We also grouped respondents according to that level of governance which was identified as the one in which the respondent was most active, finding that those in the Provincial-level expressed significantly lower levels of concern for long-term climate change, while those involved at the Federal level were the most concerned.
- Finally, respondents were grouped according to type of employment. Those employed in the forest industry expressed significantly lower levels of concern for long-term climate change, while those in environmental organizations expressed significantly higher levels.

Table 6 – Overview of differences in attitudes towards broad policy problems according to province of residence, sector, governance level, and type of employment

Perceived policy problems	Province	Sector	Governance Level	Type of employment
Uncompetitive agriculture industry	No significant differences	No significant differences	No significant differences	No significant differences
Declining quality of agriculture soils	No significant differences	Agriculture least concerned	International most concerned	No significant differences
Increased frequency of droughts on prairie agricultural land	Manitoba different from all (lower)	Agriculture least concerned	International most concerned	No significant differences
Soil erosion on prairie agricultural lands	Non-prairie different from all (higher)	No significant differences	International most concerned	No significant differences
Spread of foreign diseases	No significant differences	No significant differences	No significant differences	No significant differences
Loss of forest biodiversity	No significant differences	Agriculture least concerned Water most concerned	No significant differences	Environmentalist/ Research most concerned Provincial Government/Forest industry least interested
Protectionist trade policies	No significant differences	No significant differences	No significant differences	Environmentalist least concerned
Greater demand by non-timber users	Saskatchewan lower and Alberta higher	No significant differences	No significant differences	No significant differences
Poor forest management practices	Non-prairie different from all (higher)	Agriculture least concerned Forest most concerned	International most concerned	Environmentalist/ Research most concerned Provincial Government/ Industry least concerned
Greater frequency/severity of forest fires	No significant differences	No significant differences	No significant differences	No significant differences
Greater frequency/severity of insect damage	No significant differences	No significant differences	No significant differences	No significant differences
Poor quality of prairie water supply for urban and/or agricultural users	No significant differences	No significant differences	No significant differences	No significant differences
Increased flooding	Manitoba and Non-prairies higher than Alberta and Saskatchewan	No significant differences	Federal most concerned	No significant differences
Water restrictions/shortages	Manitoba different from all (lower)	Agriculture least concerned	Local most concerned	No significant differences
Long-term climate change	Non-prairie different from all (higher)	Agriculture least concerned Water most concerned	Provincial least concerned, Federal most concerned	Environmentalist most concerned Forest industry least concerned

4.3 The Science of Climate Change and Perceived Allocation of responsibilities

Respondents were exposed to three different types of graphic representations of scientific findings associated with climate change. In response to the graphs depicting gradual increases in historical temperature and precipitation data over the past 70 years, most respondents indicated that the graphs provided evidence of either modest or substantial climate change and thus represent an important issue for their sector. Here again, however, responses varied across the three sectors. Crosstabular results indicated that the members of the forest sector were most likely to respond that the graphs indicate substantial, rather than modest, climate change (41%), compared to 23% of respondents in the agriculture sector and 34% of the water sector. A large component of all three sectors nonetheless responded that the data are inconclusive (21% of ag, 18% of forestry, and 28% of water).

Respondents were then asked to choose among several different statements regarding the Kyoto Protocol, after considering a graph that indicated predicted differences in CO₂ levels with and without Kyoto. Most respondents (51.7%) indicated that reducing greenhouse gases under proposed Kyoto targets is only a short-term solution in a larger strategy of climate change policy options, including adaptation. Another large component (25%) stated that the reduction of greenhouse gases under proposed targets will have very little impact on climate change mitigation. A very small minority of respondents (12.5%) indicated that mitigation strategies proposed by Kyoto targets remained an important long-term policy solution, although here again the respondents in the forestry sector were more likely than respondents in either of the other two sectors to indicate that reducing greenhouse gases under proposed Kyoto targets remains an important long-term solution to mitigating climate change: 18% of the forest sector compared to 11% of the agriculture sector and 8% of the water sector.

Respondents were also asked to consider two map images of simulated future climate change scenarios. Respondents were much less comfortable with the simulation maps of

future climate change. Approximately half of respondents (47%) were hesitant to draw conclusions from the simulation maps, and instead responded that they were unsure what the maps indicated. Of those who chose one of the two map scenarios, the majority selected Map1, which indicates more substantive climate warming. 30% of the forest sector chose this map, as did 24% of water, and 19% of agriculture. Of these, the large majority responded that they felt the maps indicated that climate change will have significant impacts, and will require immediate or long term policy action.

Overall, this section indicates strong and persistent levels of concern for the impacts of climate change, although many are still hesitant to draw conclusions from existing science models. We also see very limited support for implementation of the Kyoto Protocol-based targets for GHG reduction as a viable policy option.

4.4 Responsibility for Climate Change

This sub-section examined who should be responsible for climate change related impact related policies and climate change related adaptation policies on the prairies. Interestingly, despite broad levels of concern, not everyone thought that it was the responsibility of their department or organization to implement impact and adaptation policies. Respondents were asked to identify who they felt should take responsibility for addressing climate change, with options including consumers, the private sector, other provincial or federal departments, or international government organizations (IGOs). Although none of these grouped differences were significant, the following represents a number of interesting findings. 57% of respondents in the agriculture sector, 73% of the water sector, and 64% of the forest sector indicated that they believed it to be the responsibility of their own department or organization to implement climate change impact and adaptation strategies. Overall, 72% of Government employees considered implementation of impact and adaptation policies to be the responsibility of their department. Respondents appear to be least willing to place responsibility for policy development on international governmental organizations: only 45% of respondents felt responsibility for impact policies should be placed on IGOs, and only 33% felt adaptation policies should be the responsibility of IGOs. When a comparison of mean scores using

ANOVA and tukey's B statistical tests for heterogeneity was carried, there were significances between environmentalists were more likely than forestry industry respondents to choose consumers as being responsible for impact related policies. Most agreed that the private sector should be involved in adaptation related policy making than in impact related policy making. The most noticeable difference between different groups was found in the whether the respondent's department was responsible for adaptation related polices. In this case, the government respondents were significantly higher than industry or university in assigning their own departmental responsibility.

4.5 Perceived Impacts

Differences across sectors and groups in the perceptions of the extent of climate change impacts were not significant with the exception of two cases. There Agriculture Canada/PFRA and NRCan respondents were less accepting of impacts from increased precipitation and provincial agriculture agencies, environmental groups, the Saskatchewan Water Corporation, and forest industry respondents were more accepting of controlling increased precipitation. Overall, respondents rated decreased precipitation as having the highest extent of impact for his/her sector, with an average response of 4.44 on a 1-5 scale. Decreased precipitation on the other hand was also rated as most controllable of potential impacts listed; increased precipitation was rated as least controllable. Decreased precipitation was nonetheless considered to be the least acceptable of the four impacts listed. Predictability of impacts received modest scores on all four impacts listed, again exhibiting limited levels of confidence on the science of climate modeling.

4.6 Organizational and Network Linkages

Another section of the survey was committed to gathering information that can be used to describe the policy networks that encompass the policy communities of interest. We asked respondents to identify other organizations that were relied upon for policy development, those organizations that were considered allies, and those considered opposition. We included in the survey a drop down list of several possible organizations, and also gave respondents the opportunity to fill in the names of any organizations that

were not already listed. Respondents were also asked to provide ratings in terms of the importance of sharing values/policy viewpoints, valid information, source of ideas, whether the identified organization had a lot of power, the degree that information was shared, the modification of organizational behaviour, and whether a joint policy position could be developed with the identified organization. These linkages will be explored in a forthcoming paper. In this report, the basic linkages between the respondent's organization and the identified groups are provided below. In the Tables **x,x,x** below, the columns represent the organizations that respondents belonged to. The rows represent the organizations that the respondents identified as an ally. There were over 200 possible organizations for the respondents to choose from (also respondents were able to write in other organizations). Given the variety of responses and the need to present a workable summary, the identified organizations were amalgamated in to 13 different group types.³ This also matched the 13 respondent organizational typologies. The matching number (ie a 13 x 13 matrix) is also important for future network matrix representation (Knoke and Kuklinski 1982).

4.61 Organizations Relied Heavily Upon (Policy View Point, Source of Valid Information, Source of Innovative Ideas, and has some Power)

Tables 8,9, and 10 examine those organizations that respondents relied heavily upon for a policy point of view, a source of valid information, source of innovative ideas, and a source of power. The most compelling finding is how similar organizations rely on each other. All 13 of the respondent's organizational types had the highest cell score when compared to an identified organization of a same type.

Another approach to measure the degree of network strength was to measure the ratio between total organizational responses over the total number of identified organizations. For example, of the 195 possible responses from those representing provincial environmental agencies, 100 responses were with provincial environmental agencies. In Table x below, the ratio between the total number of respondents for each organization

³ The group types included Provincial Agriculture Agencies, Environment Canada, Agricultural producer groups, AG Canada/PFRA, Research Institutions, Consultants, Provincial Environment Agencies, Environmental Groups, Forest industry, NRCan, Sask Water Corp, Aboriginal, and Other.

and the identified organizations were calculated. Therefore, in the top left hand cell, provincial agricultural agencies have a score of 0.48. In this case, there were 141 responses from individuals who belonged to provincial agricultural agencies whereas only 68 indicated that these organizations were relied upon heavily. A score of 1 or more would indicate that these organizations were more heavily relied upon than those with a ratio score of less than 1. In the case of reliance upon organizations, Federal agencies, particularly Agriculture Canada/PFRA, environmental groups, and research agencies was high.

Table 7: Strength of Organizational Support

	Rely	Ally	Oppose
Provincial Agriculture Agencies	0.48	0.51	0.09
Environment Canada	1.59	1.40	0.47
Agricultural producer groups	0.72	0.94	1.55
AG Canada/PFRA	2.30	1.52	0.67
Research Institutions	1.95	2.21	0.70
Consultant	0	0	0
Provincial Environment Agencies	0.75	0.5	0.20
Environmental Groups	1.17	2.1	6.77
Forest industry	0.70	0.94	0.62
NRCan	1.70	1.42	0.36
Sask Water Corp	0.70	0.5	0.10
Other	1.84	2.6	4.92
Aboriginal	1.0	1.6	1.67

4.62 Organizations Regarded as Allies (Sharing information, developing a joint policy position, voluntarily modifying organizations behaviour)

There was less intra-organizational identification of allies in Table 7. Only agricultural producers and forest products organizations had strong tendencies to look within their own organization types as allies. Research organizations were identified as the largest single organizational type where respondents would find an ally. This is reiterated in Table x where research organizations had the largest ratio of 2.21. Once again, respondents identified environmental groups and Federal Departments as strong allies.

4.63 Organizations Regarded as Opposition

Surprisingly, only a minority of individuals in the survey (37.8%) replied to this question. In fact, a number of respondents indicated that they had no opposition. Some were compelled to further remark about this question in the comments section. Many stated in the comment section that cooperation in policy making was necessary (see Appendix C for further insights into the written comment section). Environmental groups regarded as the main source of opposition by a large margin (36.6% of all the opposition responses). The greatest source of environmental group opposition came from Provincial environmental agencies and the forestry industry. In fact, their ratio of 6.77 indicates that opposition to environmental groups was strong throughout the entire population. Agricultural producer groups were targeted as the second main source of opposition. This came from Provincial and Federal governmental agencies and from other agricultural producer groups. The inter-producer group opposition is not surprising given the diversity and different goals amongst various Prairie farm groups.

Table 8. Organizations Relied Heavily Upon (Policy View Point, Source of Valid Information, Source of Innovative Ideas, and has some Power)

RESPONDENT'S ORGANIZATIONS																
IDENTIFIED ORGANIZATIONS		Provincial Agriculture Agencies	Env Canada	Agricultural producer groups	AG Canada/PFRA	Research Institutions	Consultant	Provincial Environment Agencies	Env Groups	Forest industry	NRCan	Sask Water Corp	Other	Aboriginal	Total	
	Provincial Agriculture Agencies	48	0	10	4	4	0	2	0	0	0	0	0	0	0	68
	Environment Canada	1	23	0	1	6	1	19	4	9	3	4	1	1	73	
	Agricultural producer groups	13	0	48	6	3	1	1	2	1	0	0	3	0	78	
	AG Canada/PFRA	43	2	30	32	11	1	1	0	0	0	2	0	0	122	
	Research Institutions	24	9	14	5	36	5	36	4	9	5	2	1	0	150	
	Consultant	0	0	0	0	0	8	0	0	0	0	0	0	0	8	
	Provincial Environment Agencies	7	5	1	1	9	2	100	4	7	1	8	2	0	147	
	Environmental Groups	1	2	2	0	2	5	4	18	1	2	1	3	0	41	
	Forest industry	0	0	0	0	0	4	8	0	25	2	0	1	0	40	
	NRCan	1	4	0	0	2	5	13	1	2	10	1	0	0	39	
	Sask Water Corp	0	1	0	0	2	0	2	0	0	0	13	0	0	18	
	Other	3	0	3	4	2	1	8	2	3	0	1	8	0	35	
	Aboriginal	0	0	0	0	0	0	1	0	0	0	0	0	2	3	
	Total	141	46	108	53	77	33	195	35	57	23	32	19	3	822	

Table 9. Organizations Regarded as Allies (Sharing information, developing a joint policy position, voluntarily modifying organizations behaviour)

	RESPONDENT'S ORGANIZATIONS														Total
	Provincial Agriculture agencies	Environment Canada	Agricultural producer groups	AG Canada/PFRA	Research Institutions	Consultants	Provincial Environment Agencies	Environmental Groups	Forest industry	NRCan	Sask Water Corp	Other	Aboriginal		
IDENTIFIED ORGANIZATIONS	Provincial Agriculture agencies	17	2	17	12	6	1	1	1	0	0	0	1	0	58
	Environment Canada	6	4	6	5	8	1	19	4	5	2	3	0	0	63
	Agricultural producer groups	15	1	40	11	6	3	6	3	0	0	0	3	0	88
	AG Canada/PFRA	37	1	14	8	10	0	1	0	0	0	2	0	0	73
	Research Institutions	27	10	16	6	19	6	36	6	17	7	3	0	0	153
	Consultants	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Provincial Environment Agencies	5	6	0	1	7	4	28	5	9	4	11	1	0	81
	Environmental Groups	2	12	0	1	4	6	21	10	2	3	6	0	2	69
	Forest industry	2	0	0	1	1	8	18	1	19	2	0	3	0	55
	NRCan	1	6	0	0	4	0	12	1	3	3	0	0	0	30
	Sask Water Corp	0	0	0	1	3	0	8	0	0	0	1	0	0	13
	Other	1	3	1	2	1	0	9	2	2	0	0	0	0	21
	Aboriginal	0	0	0	0	0	0	3	0	1	0	0	0	1	5
	Total	113	45	94	48	69	29	162	33	58	21	26	8	3	709

Table 10. Organizations Regarded as Opposition

		RESPONDENT'S ORGANIZATIONS														
IDENTIFIED ORGANIZATIONS		Provincial Agriculture Agencies	Environm ent Canada	Agricultural producer groups	AG Canada/ PFRA	Research Institutions	Consulta nts	Provincial Environment Agencies	Environmental Groups	Forest industry	NRCan	Sask Water Corp	Other	Aborigin al	Total	
		Provincial Agriculture Agencies	2	0	1	1	1	0	0	0	0	0	0	0	0	5
		Environment Canada	2	0	1	1	2	0	0	1	0	1	4	1	1	14
		Agricultural producer groups	21	0	25	10	7	2	6	4	0	0	0	1	0	76
		AG Canada/PFRA	5	0	6	1	2	0	0	0	0	0	0	0	0	14
		Research Institutions	4	3	4	1	3	2	6	1	0	1	0	1	0	26
		Consultants	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Provincial Environment Agencies	0	4	0	1	1	3	0	3	1	0	3	1	0	17
		Environmental Groups	7	7	5	2	9	15	51	1	34	11	2	5	0	149
		Forest industry	0	0	0	0	4	1	6	7	8	0	0	1	1	28
		NRCan	0	3	0	0	1	0	0	0	0	0	0	1	0	5
		Sask Water	0	0	0	0	0	0	1	0	0	0	0	0	0	1
		Other	9	13	7	4	6	2	13	5	2	0	1	1	1	64
		Aboriginal	1	0	0	0	1	0	1	0	0	1	0	1	0	5
		Total	51	30	49	21	37	25	84	22	45	14	10	13	3	404

4.7 Prairie wide policy beliefs

Finally, a brief discussion of the existence of Prairie-wide policy beliefs is examined as highlighted in the ACF literature. In Table 5, a factor analysis was conducted on the general beliefs expected to influence policy attitudes (section 6). The 12 belief statements included a variety of statements representing two belief paradigms identified in the social science literature: the New Environmentalism Paradigm (NEP), and the Human Exemptionalism, or Pro-Growth, Paradigm. Strong factor loadings were found for variables corresponding to the New Environmental Paradigm variables, confirming the presence of consistent beliefs among individual respondents who have adopted a NEP. A comparison of the means using ANOVA and tukey's B statistical tests for heterogeneity found that only those respondents belonging to environmental groups had significantly different scores than the remainder of the organizational groupings.

Table 11 – Deep Core Beliefs Across All Policy Communities

Deep Core Belief Structure New Environmental Paradigm	Mean Scores
Environment Canada	3.10
NRCan	3.20
Researchers	3.22
Forest Producers	3.26
Agriculture Canada	3.29
Provincial Agriculture Agencies	3.30
Consultants	3.30
Other	3.33
Provincial Water Agencies	3.35
Agriculture Producers	3.35
Provincial Forest Agencies	3.41
Environmental Organizations	3.89
Mean	3.34

Table 12 – Agriculture Policy Core Beliefs

Competitiveness and Viability of Agriculture Industry	Mean Scores
Environmental Organizations	2.33
Researchers	2.45
Consultants	3.00
Agriculture Canada	3.55
Provincial Agriculture Agencies	3.78
Agriculture Producers	3.79
Other	4.33
Total	3.67
Funding and Subsidies	Mean Scores
Researchers	2.25
Environmental Organizations	2.33
Agriculture Canada	2.67
Provincial Agriculture Agencies	2.84
Agriculture Producers	3.04
Consultants	3.00
Other	3.00
Total	2.85

A comparison of the means of two agriculturally based policy core variables (created from factor analysis of the policy core belief variables in section 2 of the survey) using a one way ANOVA reveals at least two distinct groupings. In the first set of mean scores that measured the long term viability of the agriculture industry (the higher the score the greater the concern) in Table 6, agriculture producers and provincial agencies have statistically different means than researchers and environmental groups. Respondents from Agriculture Canada/PFRA, a Federal agency, presented mean scores in between the two groups. A similar, albeit not as pronounced, split between groups was also found in the case of the necessity for increased government funding and subsidies.

Table 13 –Forestry Policy Core Beliefs

Efficiency of Forest Regulations	Mean Score
Environmental Organizations	1.78
Researchers	2.83
NRCan	2.89
Other	3.11
Provincial Forest Agencies	3.53
Consultants	3.58
Forest Producers	3.80
Total	3.37
Level of Forest Protection	Mean Score
NRCan	3.17
Forest Producers	3.48
Other	3.58
Consultants	3.63
Provincial Forest Agencies	3.63
Researchers	3.78
Environmental Organizations	4.22
Total	3.73

A comparison of the means of two forestry based policy core variables (created from factor analysis of the policy core belief variables in section 2) using a one way ANOVA reveals at least two distinct groupings. In the factored variable examining the “efficiency of forest regulations and legislation,” there was a clear distinction between environmental groups on one hand, and forestry producers, on the other. The federal and provincial agencies had scores at the mid-point, consistent with Sabatier and Jenkins-Smith’s (1999) hypothesis that government agencies will not have as strong a policy core belief system as other interest groups within a policy community. The second factored score measuring beliefs concerning the level of forestry protection required from fire and insect infestations did not present any statistically significant differences between the groups.

Table 14 – Risk Perception (I) – Extent of climate change impacts

Extent of Impacts*	Mean Scores
Provincial Forest Agencies	3.71
Forest Producers	3.72
Provincial Agriculture Agencies	3.80
Consultants	3.83
Agriculture Canada	3.86
Environmental Organizations	3.92
Other	3.94
Provincial Water Agencies	3.95
NRCan	4.00
Environment Canada	4.04
Agriculture Producers	4.08
Researchers	4.37
Total	3.92

*decreased precipitation, increased average temperatures, increased precipitation, and increased severity of extreme weather events

Table 15– Risk Perception (II) – Control and Acceptance of Climate Change Related Impacts

Control and Acceptance of Impacts*	Mean Scores
Consultants	3.23
Agriculture Canada	3.25
Provincial Forest Agencies	3.38
Forest Producers	3.41
Provincial Water Agencies	3.47
Provincial Agriculture Agencies	3.52
Agriculture Producers	3.56
NRCan	3.56
Researchers	3.63
Environmental Organizations	3.66
Environment Canada	3.67
Other	3.69
Total	3.49

*decreased precipitation, increased average temperatures, increased precipitation, and increased severity of extreme weather events

Table 16 - Risk Perception (III) – Predictability of Climate Change Impacts

Predictability of Impacts*	Mean Scores
Agriculture Producers	2.86
Provincial Agriculture Agencies	2.90
Environment Canada	2.96
NRCan	3.04
Provincial Water Agencies	3.05
Forest Producers	3.06
Environmental Organizations	3.07
Consultants	3.08
Provincial Forest Agencies	3.17
Agriculture Canada	3.30
Researchers	3.33
Other	3.67
Total	3.08

*decreased precipitation, increased average temperatures, increased precipitation, and increased severity of extreme weather events

None of the three factored risk perception scores in tables were statistically different between groups. As a collective, the respondents think that climate change related impact would be great, respondents' willingness to accept such impacts is modest, and most lack confidence in our ability to predict such impacts.

5. Discussion and Conclusion

This analysis should be considered preliminary, a first step into research on the responsiveness of different policy communities to climate change. We were a bit disappointed with the response rates of certain groups. The low response rate may in part be due to concerns about anonymity in a web-based survey; we will attempt to address this concern in future surveys. . In addition, it must be emphasized that assessment of institutional cultural characteristics, such as was done here, is only one step in any comprehensive assessment of political responsiveness. This work must ultimately be complemented with research that focuses on organizational autonomy and capacity across each of these policy sectors.

Most respondents are uncomfortable with forecasting science, and are not confident in our ability to predict climate change impacts, and are therefore likely to be hesitant to base policy strategies on climate modeling, the predominant form of cc science today.

Members of Other provinces appear to express higher levels of concern than those in the Prairie provinces. Given that respondents from Other Provinces make up only a small proportion of our respondent pool, some caution is warranted regarding this finding, however, this is certainly something that should be pursued in further study.

There appear to be consistent gaps in the belief systems of environmental groups and research scientists on the one hand, and government and producer groups on the other, with the former expressing greater levels of concern and propensity for action overall. Considering that environmental groups and research scientists represent a small minority of the policy communities overall, and furthermore that environmental groups are seen to be an oppositional force among several members of the policy communities, there is the potential for these voices of concern to remain marginalized, limiting the potential for policy learning.

There were clear delineations in terms of policy network structures. There is high degree of trust towards Federal and research based organizations throughout the prairies. There

is in these initial findings a degree of reliance upon like-minded organizations. Provincial agencies are seen neither as an ally or opposition. Environmental organizations were seen to be the main source of opposition. Interestingly, aboriginal groups, although a very small number in the study, were neither seen as an ally or a foe.

The initial findings regarding the belief structures is somewhat mixed. 2 broad coalitions were identified in the case of core policy beliefs in the agriculture and forestry sectors. However, the factored deep core beliefs did not reveal any differences. However, it is not surprising that a simple ANOVA tests did not provide a clear indication of complex belief structures. Ongoing research using LISREL and structural equation modeling will provide more robust results.

We began this research with the premise that in addition to the scientific efforts being undertaken to forecast the potential impacts of global warming on climatological and biophysical processes, we also need to turn our attention to "political climate modeling." Given that socio-political context represents an additional layer of complexity that warrants consideration in our efforts to develop adaptation and response mechanisms, political climate modeling will allow us to forecast which political units, whether they are policy communities, towns, cities, provinces, or regions, are by their socio-political nature more vulnerable to the risks associated with climate change, due to their lack of capacity for reflexive response. In short, scientific information regarding global warming is inevitably sifted through a number of social filters that help to determine the extent to which a group of people define climate change as a risk worthy of consideration, and whether that same social group has the capacity to adapt and/or respond to change. These social filters, furthermore, are far from uniform across the social landscape; different social groups will be defined by differing social filters.

Climate change issues will become more common place on government agendas, as policy actors are forced to contend with the development of climate change impacts and adaptation strategies. We sought to outline how policy researchers can provide input into understanding the policy capacity of socio-political systems in addressing this issue. Such information will be as important and as relevant as the long range projections made by climatologists.

6. Future Research Directions

The research project described in this report represents a first step in the right direction toward political climate modeling. With this work, we now have some information regarding three policy sectors, across the three Prairie Provinces of Canada. As expected, we found significant differences across the sectors, and hope these characteristics prove useful to climate change policy-makers. This work comes with a strong caution, however: a one-time quantitative survey provides just a snapshot in time of some characteristics of very dynamic social systems, and further research will be required. The following are some suggestions that could be used to guide additional work in this area:

1. Expansion of survey research

Clearly we need to move beyond the three sectors considered here to include, in particular: the energy and mining sectors, as well as metropolitan regions and consumers more broadly. In addition, given that university researchers and environmental organizations appear to be minor players in the policy communities we identified, these groups may need to be a particular focus of further survey work. Extending the survey across the remaining Canadian Provinces, and cross-national comparative work will ultimately prove invaluable, as it will enable us to associate survey findings with variations in actual political responses at the provincial and national levels. Finally, such surveys ideally ought to be administered at regular intervals to trace patterns of change in each of the variables analyzed.

2. In-depth case studies of political units

Survey research is critical to political climate modeling, allowing quantitative assessment of a large number of variables, among a large number of recipients. This research method is only one of a handful of necessary methods, however, and must be considered in combination with more in-depth case studies of political units, which would include qualitative interviewing of key informants, historical analysis of policy and media discourses, social network analysis, and demographic and economic assessments. Political units can be defined by a policy community, as we have done in this research,

and/or they can be defined geographically. The size of geographic political units can (and should) vary, from metropolitan units to nation-states, however some detail is clearly lost the larger the unit becomes. What we will likely find in such a study is that certain political units are far better equipped to both recognize climate change as an immediate risk issue, and plan for expected changes. Others may be more vulnerable due to, for example, the degree of dependence on vulnerable industries, "narrow" social networks that do not support the extensive information exchange necessary to develop an informed level of awareness about climate change, and the viability of political systems themselves. Political sociologists, political scientists, and community scholars have all developed effective methodologies to perform such tasks effectively.

3. Interdisciplinary integration of findings

Ultimately, the framework we have described is designed to allow for integration with research findings from other disciplines, to be represented as a set of "informational layers," much of which will be representable in a Geographic Information Systems format. The biophysical layers of which many of us are familiar, we will be able to identify regions that are vulnerable to rise in sea level, drought, pest infestations, and so on. The socio-political layers, on the other hand, can identify which social units across space may face additional vulnerabilities to the risks associated with climate change based on social characteristics. This information can in turn be used to direct resources to areas of vulnerability, as well as develop policy responses that are specifically suited to the needs of a given unit. In turn, we may find units across the landscape that share many features in common, that may benefit from informational networking or pooled resourcing. One of the principal investigators and a number of her colleagues have recently secured a Canadian Foundation for Innovation grant to develop a spatial analysis laboratory facility to work on just such initiatives, and climate change will be one of our primary research priorities.

4. Understanding the Potential for Policy Oriented Learning and the Role of Policy Brokers

This study has presented a snap shot of important elements of the Prairie agricultural, forestry, water policymaking process. Next steps will need to examine a key driver of policy change, namely understanding policy learning potential. Policy-oriented learning is defined “relatively enduring alternations of thought or behavioural intentions that result form experience an/or new information and that are concerned with the attainment or revision of policy objectives. This will require a more detailed examination of secondary policy aspects (i.e., specific policies and programs) that will have a future climate change component and determine the extent that these aspects can indeed be changed through a learning process.

5. Role of Municipal and Local Governments in climate change oriented policies

Although this study was primarily concerned with provincial and federal level policy-making processes, an understanding of municipal level governance needs to be examined within the framework that we have introduced. Recently, Wittrock *et al* (2001) examined key climate change impacts and adaptation issues such as water resources, infrastructure, parks, transportation, and human health that are important in Prairie cities. The survey format, population identification and data collection methods, and theoretical framework would remain the similar in nature as what was undertaken here. In addition to cities, rural resource dependent communities could also be examined.

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APPENDIX A

ORGANIZATIONS WITHIN THE PRAIRIE AGRICULTURE, FORESTRY, AND WATER POLICY COMMUNITIES

AGRICULTURE

1. Agriculture and Agri-Food Canada
2. Prairie Farm Rehabilitation Administration
3. Canada Grains Council
4. Canadian Meat Council
5. Canadian Cattlemen's Association
6. Canadian Federation of Agriculture
7. Canadian Pork Council
8. Canadian Seed Growers' Association
9. Canadian Special Crops Association
10. Canadian Canola Growers Association
11. Canola Council of Canada
12. Con Agra Grain
13. Crop Protection Institute
14. Farm Credit Corporation
15. United Grain Growers
16. Western Barley Growers
17. Western Canadian Wheat Growers
18. Canadian Society for Soil Science
19. Alberta Agriculture Alberta Grain Commission
20. Agricore
21. Agriculture and Food Council of Alberta
22. Alberta Barley Commission
23. Alberta Canola Producers Commission
24. Alberta Cattle Commission
25. Alberta Cattle Feeders Association
26. Alberta Irrigation Projects Association
27. Alberta Pulse Growers Commission
28. Alberta Winter Wheat Producers Commission
29. Wild Rose Agricultural Producers
30. Alberta Institute of Agrologists
31. Alberta Applied Research Association
32. University of Alberta
33. University of Calgary
34. University of Lethbridge
35. Alberta Conservation Tillage Association
36. Saskatchewan Agriculture and Food
37. Saskatchewan Crop Insurance Corporation
38. Saskatchewan Canola Growers Association
39. Saskatchewan Cattle Feeders Association
40. Saskatchewan Pulse Growers Association
41. Saskatchewan Wheat Pool

42. Saskatchewan Winter Cereal Growers
43. Saskatchewan Institute of Agrologists
44. University of Regina
45. University of Saskatchewan
46. Saskatchewan Soil Conservation Association
47. Manitoba Agriculture
48. Manitoba Crop Insurance Corporation
49. Keystone Agricultural Producers
50. Manitoba Canola Growers Association
51. Manitoba Cattle Producers Association
52. Manitoba Chicken Producers
53. Manitoba Forage Council
54. Manitoba Seed Growers Association
55. Manitoba Institute of Agrologists
56. University of Manitoba
57. University of Winnipeg

FORESTRY

1. Environment Canada
2. Environmental Protection Service
3. Meteorological Service of Canada
4. Natural Resources Canada
5. Canadian Forest Service
6. Climate Change Secretariat
7. Geological Survey of Canada
8. Canadian Pulp and Paper Association
9. Canadian Sustainable Forestry Certification Association
10. Council of Forest Industries
11. Pulp and Paper Research Institute of Canada
12. Forest Engineering Research Institute
13. Canadian Lumberman's Association
14. Canadian Institute of Forestry
15. International Institute for Sustainable Development
16. Pembina Institute
17. Canadian Forestry Association
18. Canadian Nature Federation
19. Canadian Parks and Wilderness Association
20. David Suzuki Foundation
21. Environment Probe
22. Forest Stewardship Council
23. Friends of the Earth
24. Greenpeace
25. Sierra Club
26. Western Canada Wilderness Committee
27. World Wildlife Fund
28. Alberta Environment
29. Land and Forest Service
30. Climate Change Central
31. Alberta Forest Products Association
32. Sundance Forest Industries
33. Alberta Newsprint Company
34. Alberta Pacific Ltd
35. Canfor Ltd
36. Daiashowa-Marubeni International Ltd
37. Manning Diversified Forest Products
38. Millar Western
39. Tolko Industries Ltd
40. Weldwood of Canada Ltd
41. Weyerhaeuser Ltd
42. Alberta Registered Professional Foresters
43. Alberta Society of Professional Biologists
44. Canadian Institute of Forestry
45. Foothills Model Forest
46. National Centre of Excellence
47. University of Calgary
48. University of Lethbridge
49. Alberta Environmental Network
50. Alberta Wilderness Association
51. Federation of Alberta Naturalists
52. Friends of the Athabasca
53. Saskatchewan Environment and Resource Management

54. Council of Saskatchewan Forest Industries
55. Saskatchewan Council of Independent Forest Industries
56. Central Forest Products Association
57. Clearwater Forest Products
58. Millar Western Ltd
59. Mistik Management
60. NorSask Forest Products Partnership
61. Suntec Forest Products
62. Saskatchewan Environmental Managers Association
63. Prince Albert Model Forest
64. University of Regina
65. University of Saskatchewan
66. Saskatchewan Forest Conservation Network
67. Native Plant Society of Saskatchewan
68. Nature Saskatchewan
69. Saskatchewan Environmental Society
70. Saskatchewan Forestry Association
71. Saskatchewan Action Foundation for the Environment
72. Saskatchewan Eco-Network
73. Manitoba Conservation
74. Tolko Industries
75. Manitoba Model Forest
76. University of Manitoba
77. University of Winnipeg
78. Manitoba EcoNetwork
79. Manitoba Forestry Association
80. Manitoba Future Forest Alliance
81. Assembly of First Nations
82. Metis National Council
83. Canadian Aboriginal Science and Technology Society
84. Treaty 7 Tribal Council
85. Metis Nation of Alberta
86. Federation of Saskatchewan Indian Nations
87. Manitoba Keewatinowi Okimakanak
88. Centre for Indigenous Environmental Resources
89. Assembly of Manitoba Chiefs

WATER

1. Environment Canada
2. Environmental Conservation Service
3. Environmental Protection Service
4. Meteorological Service
5. Natural Resources Canada
6. Climate Change Secretariat
7. Geological Survey of Canada
8. Canadian Aquaculture Industry Alliance
9. Canadian Water Resources Association
10. Canadian Water and Wastewater Association
11. Western Canada Water and Wastewater Association
12. Western Canada Water Environment Association
13. Alberta Water and Wastewater Operators
14. Association of Professional Engineers, Geologists
15. Canadian Nature Federation
16. David Suzuki Foundation
17. Environment Probe
18. Friends of the Earth
19. Greenpeace
20. Sierra Club
21. Western Canadian Wilderness Committee
22. World Wildlife Fund
23. Alberta Environment
24. Climate Change Central
25. Alberta Environmental Network
26. Alberta Fish and Game Association
27. Alberta Fish Farmers Association
28. Alberta Soil and Water Conservation Society
29. Pembina Institute
30. Friends of the Athabasca
31. Ducks Unlimited
32. Trout Unlimited
33. Prairie Association for Water Management
34. Saskatchewan Environment and Resource Management
35. Saskatchewan Water and Wastewater Association
36. Saskatchewan Water Corporation
37. Saskatchewan Wetland Conservation Corporation
38. Meewasin Valley Authority
39. Saskatchewan Ground Water Association
40. Soil and Water Conservation Society
41. Saskatchewan Environmental Society
42. Manitoba Conservation
43. Delta Waterfowl Foundation
44. Waterwatch
45. Manitoba Eco-Network
46. University of Alberta
47. University of Calgary
48. University of Lethbridge
49. University of Saskatchewan

50. University of Regina
51. University of Manitoba
52. University of Winnipeg
53. Assembly of First Nations
54. Metis National Council
55. Canadian Aboriginal Science and Technology Society
56. Treaty 7 Tribal Council
57. Metis Nation of Alberta
58. Federation of Saskatchewan Indian Nations
59. Manitoba Keewatinowi Okimakanak
60. Centre for Indigenous Environmental Resources
61. Assembly of Manitoba Chiefs

Appendix B

Results From Resource Management Policy and Climate Change Survey

Your Province

1. Alberta	36.7%
2. Saskatchewan	35.1%
3. Manitoba	16.0%
4. Outside the prairies	11.2%

Please indicate the focus of your work: (check all that apply)

Your Work Focus

1. Local	31.2%
2. Provincial	73.3
3. Federal	30.1
4. International	16.9

Please indicate what Sector your work is MOST actively involved with:

Your Sector

1. Agriculture	40.7%
2. Forestry	33.4
3. Water	25.8

Part One - Important Issues

Below is a list of issues related to provincial policy making within the agricultural, forestry, and water sectors. These issues have been identified in the literature as problems. Please indicate your assessment of the seriousness of each problem below. A score of 1 indicates not a problem for policymakers, while a score of 3 indicates somewhat of a problem, and a score of 5 indicates a very serious problem for policymakers. DK (9) indicates a response of don't know.

	Mean Scores
1. Uncompetitive agriculture industry	3.31
2. Declining quality of agricultural soils	3.40
3. Increased frequency of droughts on prairie agricultural lands	3.91
4. Soil erosion on prairie agricultural lands	3.44
5. Spread of foreign agricultural diseases	3.27
6. Loss of forest biodiversity	3.32
7. Protectionist trade policies	3.92
8. Greater demands by non-timber users (e.g., recreation, hunting, environmentalists)	3.18
9. Poor forest management practices	3.20
10. Greater frequency/severity of forest fires	3.33
11. Greater frequency/severity of insect damage in forested areas	3.31
12. Poor quality of prairie water supply for urban and/or agricultural users	3.82
13. Increased flooding	2.77
14. Water restrictions/shortages	3.64
15. Long-term climate change due to greenhouse gas emissions	3.65

Part Two. Important Agricultural Issues

The following items express perceptions about Prairie agricultural issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

1. The prairie agriculture industry can compete in global markets	3.88
2. Greater diversification into specialty crops and into intensive livestock operations is needed improve the viability of the prairie agriculture industry	3.88
3. The federal government should increase funding for farm subsidy programs	2.64
4. The provincial government in my province should increase funding for farm subsidy programs	2.45
5. An increase in irrigation systems is a feasible alternative to countering damage caused by droughts	2.57
6. Provincial crop insurance programs adequately protect prairie farmers from damage caused by droughts, flooding, and insects	2.73
7. The elimination of the CROW rate had a serious long-term negative effect on the competitiveness of the prairie agriculture industry	2.75
8. Downstream water supplies are adequately protected from agricultural operations	2.69
9. The decline of the family farm is a serious economic and social problem in my province	3.61
10. The best strategies for resolving most issues in my sector involve:	
a) Consensus-based negotiations among stakeholders	3.72
b) Reliance on existing regulations	2.61
c) Reliance on experts and professionals	3.25

d) Reliance on market-based instruments (e.g., carbon credit trading)	2.92
11. Communities and municipal governments should have more power in making decisions in my sector	2.88
12. Drainage of wetlands due to agricultural and other purposes is a critical issue	3.35

Part Two. Important Forestry Issues

The following items express perceptions about prairie forestry issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

1. Current provincial forest legislation and policies promote sustainable forest management in my province	3.39
2. Species biodiversity is being threatened by current forest management practices	3.05
3. Forest practices that mimic natural disturbances are the best form of forest management strategy	3.67
4. The expansion of the forest industry will improve my province's economy	3.39
5. Forest fire suppression is adequate enough to prevent most major forest fires	3.05
6. Insect infestation suppression is inadequate (especially in the case of a large outbreak)	3.12
7. Environmental groups and the media tend to exaggerate the environmental damage caused by forest management practices	3.55
8. Forest companies should be given a wider range of private property rights on Crown lands	1.92
9. Fish and wildlife stocks in forested areas are in good health	3.03
10. The best strategies for resolving most issues in my sector involve:	
a) Consensus-based negotiations among stakeholders	3.79
b) Reliance on existing regulations	2.71
c) Reliance on experts and professionals	3.58
d) Reliance on market-based instruments (e.g., carbon credit trading)	2.87

11. Communities and municipal governments should have more power in making decisions in my sector	2.93
12. Aboriginal concerns are adequately represented in forest related decisions	3.08
13. Forests are managed successfully for a wide range of uses and values, not just timber	3.32
14. My province has enough protected areas such as provincial and national parks or wilderness areas	2.97
15. Intensive forest management is a realistic forest management supplement to current practices	3.36
16. Forest regeneration practices are adequate	2.84
17. There will be sufficient forest growing stock in my province to meet future economic needs	2.92

Part Two. Important Water Issues

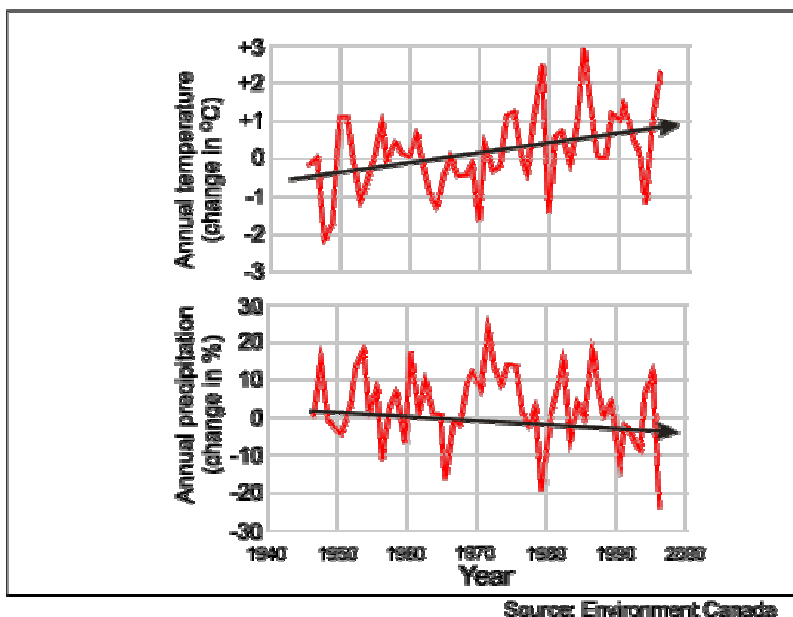
The following items express perceptions about Prairie water issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

- | | |
|---|------|
| 1. There is an adequate supply of water available for all prairie resource users | 2.22 |
| 2. Watersheds are adequately protected from forest operations | 2.39 |
| 3. Water contamination from farm-related activity is a serious water problem | 3.72 |
| 4. Water quality regulations are being adequately enforced | 2.77 |
| 5. The Canada-U.S. Air Quality Agreement Act has been successful in addressing acid rain | 2.92 |
| 6. Aboriginal people should be accorded more control over water resources | 2.54 |
| 7. Canadian drinking water guidelines/standards should be strengthened | 3.48 |
| 8. Drainage of wetlands due to agricultural and other purposes is a critical issue | 3.91 |
| 9. Water management should be based on demand management in order to promote water efficiency | 3.52 |
| 10. The best strategies for resolving most issues in my sector involve: | |
| a) Consensus-based negotiations among stakeholders | 3.80 |
| b) Reliance on existing regulations | 3.14 |
| c) Reliance on experts and professionals | 3.58 |
| d) Reliance on market-based instruments (e.g., carbon-credit trading) | 2.81 |
| 11. Communities and municipal governments should | |

have more power in making decisions in my sector	3.07
12. The Federal government should allow bulk water exports	2.14

Part Three. The Science of Climate Change

Below are published graphs depicting average annual temperatures and precipitation for the Prairie Provinces over the past 60 years. The graph shows that the average temperature has increased by 1.6°C whereas precipitation may have declined. Please indicate how you interpret this data in the question below.

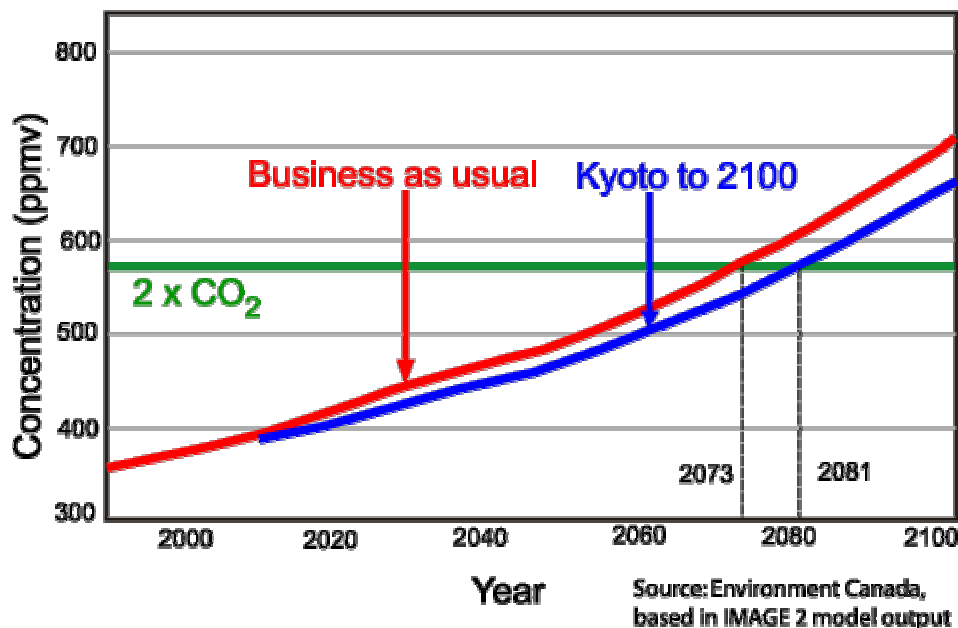


In my opinion, the above graphs are evidence of (choose one):

- | | |
|--|-------|
| 1. Substantial climate change and represent an important issue for my sector | 32.8% |
| 2. Substantial climate change but are not a critical issue for my sector | 1.4 |
| 3. Modest climate change and represent an important issue for my sector | 35.9 |
| 4. Modest climate change and are not a critical issue for my sector | 5.5 |
| 5. No climate change and are not a critical issue for my sector | 0 |
| 6. The data are inconclusive | 21.3 |
| 7. Unsure | 3.2 |

Part Three. The Science of Climate Change (continued)

In this graph, the added blue line indicates what would happen to the CO₂ concentrations if the full Kyoto provisions for greenhouse gas reductions were adopted.



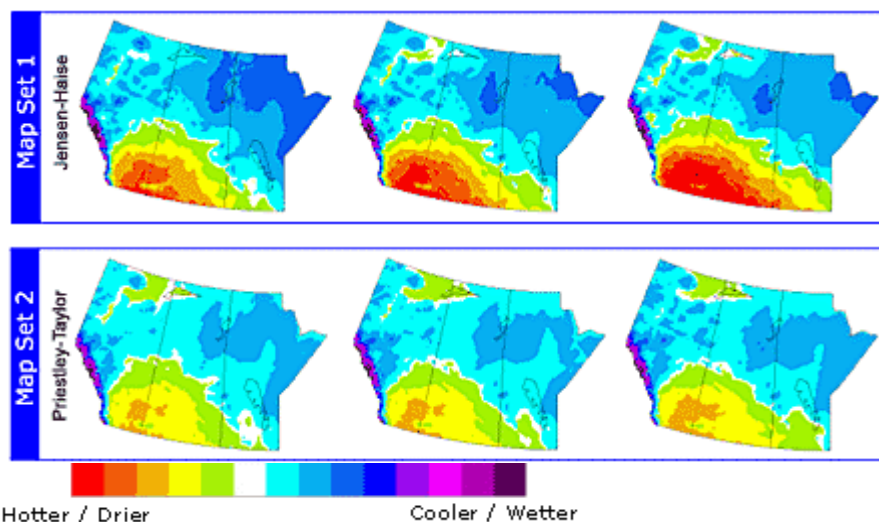
Based upon the evidence presented in the above graph: (choose 1)

- | | |
|---|-------|
| 1. In light of this evidence, reducing greenhouse gases under proposed Kyoto targets still remains an important long-term solution to mitigating climate change | 13.7% |
| 2. Reducing greenhouse gases under proposed targets is only a short-term solution in a larger strategy of climate change policy options, including adaptation | 51.6 |
| 3. Reducing greenhouse gases under proposed targets will have very little impact on climate change mitigation | 25.7 |
| 4. 2 x CO ₂ will not have a great impact on the prairie provinces | 1.5 |
| 5. Unsure | 7.6 |

Part Three. The Science of Climate Change (continued)

Scientists have developed complex computer simulations of future climates. Below are two common examples of these simulations that produce different possible future scenarios of projected climate conditions in the prairies over the next 70 years. Both Map Set 1 and 2 illustrate different Climatic Moisture Index (CMI) that take into account the drying power of the local climate. For more information about the CMI, Jensen-Haise, and Priestley-Taylor models click [here](#).

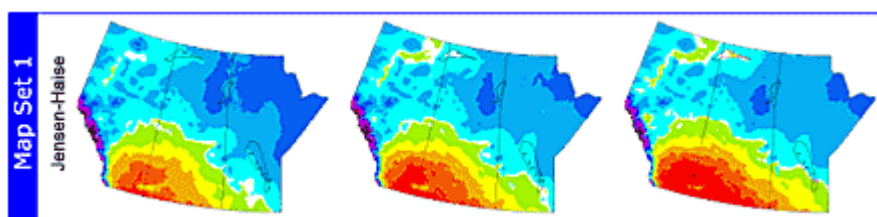
In the legend below, the temperature and dryness is greatest where the colors in the maps are red, whereas purple indicates the cooler temperatures and wetter conditions.



From the maps above (please select one of the following):

- | | |
|--|-------|
| 1. Map Set 1 represents the most realistic outcome for future climate change | 25.3% |
| 2. Map Set 2 represents the most realistic outcome for future climate change | 14.6 |
| 3. Neither Map Set is indicative of future climate change | 12.6 |
| 4. Unsure | 47.5 |

Part Three. The Science of Climate Change (continued)

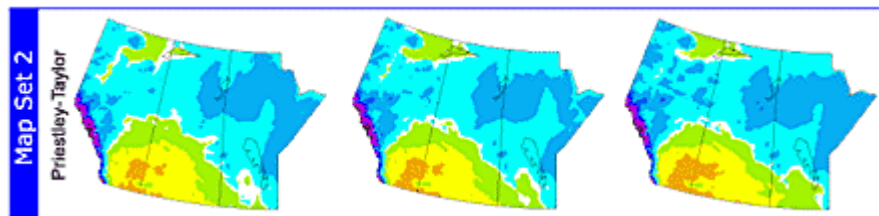


By choosing Map Set 1, then you think that changes to the prairie climate will occur in the... (please select one of the following)

- | | |
|---|-------|
| 1. Short-term future (<10 years) and will have significant impacts requiring immediate policy action | 27.0% |
| 2. Short-term future (<10 years) and will have modest impacts requiring long term policy action | 6.7 |
| 3. Long-term future (>10 years) and will have significant impacts requiring immediate policy action | 47.2 |
| 4. Long-term future (>10 years) and will have significant impacts requiring long-term policy action | 16.1 |
| 5. Long-term future (>10 years) and will have negligible impacts requiring little to no policy action | 1.1 |
| 6. Unsure | 1.1 |

n=89

Part Three. The Science of Climate Change (continued)



By choosing Map Set 2, then you think that changes to the Prairie climate will occur in the... (please select one of the following)

- | | |
|---|------|
| 1. short-term future (<10 years) and will have significant impacts requiring immediate policy action | 0% |
| 2. Short-term future (<10 years) and will have modest impacts requiring long-term policy action | 11.5 |
| 3. Long-term future (>10 years) and will have significant impacts requiring immediate policy action | 17.3 |
| 4. Long-term future (>10 years) and will have significant impacts requiring long term policy action | 48.1 |
| 5. Long-term future (>10 years) and will have negligible impacts requiring little to no policy action | 19.2 |
| 6. Unsure | 3.8 |

n=52

Part Three - The Science of Climate Change (continued)

By choosing neither map set, then you think... (please select one of the following)

- | | |
|---|------|
| 1. Both maps underestimate potential climate change impacts | 6.7% |
| 2. Both maps overestimate potential climate change impacts | 4.4 |
| 3. The data presented in both map sets is too inconclusive | 37.8 |
| 4. All future scenarios developed by climate change science is too inconclusive to make policy decisions on | 44.7 |
| 5. Unsure | 6.7 |

n=45

Part Three. Responsibility for Climate Change

Below we examine who you perceive to be responsible for climate change related impacts and adaptation on the prairies.

Who should be responsible for implementing climate change related IMPACT policies on the prairies? (check all that apply)

1. Individual consumers	61.8%
2. My department/organization	60.1
3. Private sector	69.4
4. Other provincial government departments	79.2
5. Other federal government departments	77.8
6. International government organizations	43.8
7. Nobody, it isn't an issue	1.7
8. Unsure	5.3

Who should be responsible for implementing climate change related ADAPTATION policies on the prairies? (check all that apply)

1. Individual consumers	59.6%
2. My department/organization	58.4
3. Private sector	79.8
4. Other provincial government departments	79.5
5. Other federal government departments	75.6
6. International government organizations	33.7
7. Nobody, it isn't an issue	1.4
8. Unsure	3.9

Part Four. Risk and Resource Management

Below are four risk related issues associated with a number of potential impacts of climate change.

For each risk related issue, please indicate the severity of the impact.

Extent of Impacts

For each impact, please rate the extent of this impact in your resource sector. Where a score of 1 indicates a very small scope and 5 indicates a very large scope. NOp (9) indicates no opinion.

1. Decreased precipitation	4.43
2. Increased average temperatures	3.87
3. Increased precipitation	3.30
4. Increased severity of extreme weather events	4.00

Control of Impacts

For each impact, please rate how controllable each impact is in your resource sector. Where 1 indicates easy to adapt and 5 indicates difficult to adapt. NOp (9) indicates no opinion.

1. Decreased precipitation (droughts)	4.14
2. Increased average temperatures	3.32
3. Increased precipitation	2.78
4. Increased severity of extreme weather events	3.83

Acceptance of Impacts

For each impact, please rate how acceptable each impact is in your resource sector. Where 1 indicates easy to accept and 5 indicates difficult to accept. NOp (9) indicates no opinion.

1. Decreased precipitation (droughts)	4.27
2. Increased average temperatures	3.20
3. Increased precipitation	2.62
4. Increased severity of extreme weather events	3.75

Predictability of Impacts

For each risk, please rate the predictability of each potential impact upon your resource sector. Where 1 indicates very little predicability and 5 indicates a great deal of predicability. NOp indicates no opinion.

1. Decreased precipitation (droughts)	3.16
2. Increased average temperatures	3.18
3. Increased precipitation	2.88
4. Increased severity of extreme weather events	2.55

Part Five. Organizational Issues

In developing your strategies for dealing with prairie resource issues, please indicate from the list below up to three (3) organizations on which you rely most heavily. Then indicate why you rely on them in determining your strategies. For each organization, please rank each of the four reasons listed below on a scale from 1 indicates not at all important 5 indicates extremely important.

- Shared Values/Policy Viewpoints
- Source of Valid Information
- Source of Innovative Ideas
- Organization has a lot of power

Choose from:

- Agriculture and Agri-Food Canada
- Prairie Farm Rehabilitation Administration
- Canada Grains Council
- Canadian Meat Council
- Canadian Cattlemen's Association
- Canadian Federation of Agriculture
- Canadian Pork Council
- Canadian Seed Growers' Association
- Canadian Special Crops Association
- Canadian Canola Growers Association
- Canola Council of Canada
- Con Agra Grain
- Crop Protection Institute
- Farm Credit Corporation
- United Grain Growers
- Western Barley Growers
- Western Canadian Wheat Growers
- Canadian Society for Soil Science
- Alberta Agriculture Alberta Grain Commission
- Agricore
- Agriculture and Food Council of Alberta
- Alberta Barley Commission
- Alberta Canola Producers Commission
- Alberta Cattle Commission
- Alberta Cattle Feeders Association
- Alberta Irrigation Projects Association
- Alberta Pulse Growers Commission
- Alberta Winter Wheat Producers Commission
- Wild Rose Agricultural Producers
- Alberta Institute of Agrologists
- Alberta Applied Research Association
- University of Alberta
- University of Calgary

- University of Lethbridge
- Alberta Conservation Tillage Association
- Saskatchewan Agriculture and Food
- Saskatchewan Crop Insurance Corporation
- Saskatchewan Canola Growers Association
- Saskatchewan Cattle Feeders Association
- Saskatchewan Pulse Growers Association
- Saskatchewan Wheat Pool
- Saskatchewan Winter Cereal Growers
- Saskatchewan Institute of Agrologists
- University of Regina
- University of Saskatchewan
- Saskatchewan Soil Conservation Association
- Manitoba Agriculture
- Manitoba Crop Insurance Corporation
- Keystone Agricultural Producers
- Manitoba Canola Growers Association
- Manitoba Cattle Producers Association
- Manitoba Chicken Producers
- Manitoba Forage Council
- Manitoba Seed Growers Association
- Manitoba Institute of Agrologists
- University of Manitoba
- University of Winnipeg
- Environment Canada
- Environmental Conservation Service
- Environmental Protection Service
- Meteorological Service
- Natural Resources Canada
- Climate Change Secretariat
- Geological Survey of Canada
- Canadian Aquaculture Industry Alliance
- Canadian Water Resources Association
- Canadian Water and Wastewater Association
- Western Canada Water and Wastewater Association
- Western Canada Water Environment Association
- Alberta Water and Wastewater Operators
- Association of Professional Engineers, Geologists
- Canadian Nature Federation
- David Suzuki Foundation
- Environment Probe
- Friends of the Earth
- Greenpeace
- Sierra Club
- Western Canadian Wilderness Committee
- World Wildlife Fund
- Alberta Environment
- Climate Change Central
- Alberta Environmental Network
- Alberta Fish and Game Association
- Alberta Fish Farmers Association
- Alberta Soil and Water Conservation Society
- Pembina Institute

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- Friends of the Athabasca
- Ducks Unlimited
- Trout Unlimited
- Prairie Association for Water Management
- Saskatchewan Environment and Resource Management
- Saskatchewan Water and Wastewater Association
- Saskatchewan Water Corporation
- Saskatchewan Wetland Conservation Corporation
- Meewasin Valley Authority
- Saskatchewan Ground Water Association
- Soil and Water Conservation Society
- Saskatchewan Environmental Society
- Manitoba Conservation
- Delta Waterfowl Foundation
- Waterwatch
- Manitoba Eco-Network
- University of Alberta
- University of Calgary
- University of Lethbridge
- University of Saskatchewan
- University of Regina
- University of Manitoba
- University of Winnipeg
- Assembly of First Nations
- Metis National Council
- Canadian Aboriginal Science and Technology Society
- Treaty 7 Tribal Council
- Metis Nation of Alberta
- Federation of Saskatchewan Indian Nations
- Manitoba Keewatinowi Okimakanak
- Centre for Indigenous Environmental Resources
- Assembly of Manitoba Chiefs

- Environmental Conservation Service
- Environmental Protection Service
- Meteorological Service of Canada
- Natural Resources Canada
- Canadian Forest Service
- Climate Change Secretariat
- Geological Survey of Canada
- Canadian Pulp and Paper Association
- Canadian Sustainable Forestry Certification Association
- Council of Forest Industries
- Pulp and Paper Research Institute of Canada
- Forest Engineering Research Institute
- Canadian Lumberman's Association
- Canadian Institute of Forestry
- International Institute for Sustainable Development
- Pembina Institute
- Canadian Forestry Association
- Canadian Nature Federation
- Canadian Parks and Wilderness Association
- David Suzuki Foundation
- Environment Probe
- Forest Stewardship Council
- Friends of the Earth
- Greenpeace
- Sierra Club
- Western Canada Wilderness Committee
- World Wildlife Fund
- Alberta Environment
- Land and Forest Service
- Climate Change Central
- Alberta Forest Products Association
- Sundance Forest Industries
- Alberta Newsprint Company
- Alberta Pacific Ltd
- Canfor Ltd
- Daiashowa-Marubeni International Ltd
- Manning Diversified Forest Products
- Millar Western
- Tolko Industries Ltd
- Weldwood of Canada Ltd
- Weyerhaeuser Ltd
- Alberta Registered Professional Foresters
- Alberta Society of Professional Biologists
- Canadian Institute of Forestry
- Foothills Model Forest
- National Centre of Excellence
- University of Calgary
- University of Lethbridge
- Alberta Environmental Network
- Alberta Wilderness Association
- Federation of Alberta Naturalists
- Friends of the Athabasca

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- Saskatchewan Environment and Resource Management
- Council of Saskatchewan Forest Industries
- Saskatchewan Council of Independent Forest Industries
- Central Forest Products Association
- Clearwater Forest Products
- Millar Western Ltd
- Mistik Management
- NorSask Forest Products Partnership
- Suntec Forest Products
- Saskatchewan Environmental Managers Association
- Prince Albert Model Forest
- University of Regina
- University of Saskatchewan
- Saskatchewan Forest Conservation Network
- Native Plant Society of Saskatchewan
- Nature Saskatchewan
- Saskatchewan Environmental Society
- Saskatchewan Forestry Association
- Saskatchewan Action Foundation for the Environment
- Saskatchewan Eco-Network
- Manitoba Conservation
- Tolko Industries
- Manitoba Model Forest
- University of Manitoba
- University of Winnipeg
- Manitoba EcoNetwork
- Manitoba Forestry Association
- Manitoba Future Forest Alliance
- Assembly of First Nations
- Metis National Council
- Canadian Aboriginal Science and Technology Society
- Treaty 7 Tribal Council
- Metis Nation of Alberta
- Federation of Saskatchewan Indian Nations
- Manitoba Keewatinowi Okimakanak
- Centre for Indigenous Environmental Resources
- Assembly of Manitoba Chiefs
-

From the same list, please identify up to three (3) organizations you regard as allies. For each group, please indicate how often you engage in the following four activities with that group. Indicate according to the scale below from 1 indicates never 5 indicates very often.

- Share information
- Voluntarily modify my organization's behaviour to achieve common goals
- Develop a joint policy position and/or strategy

Please indicate up to three (3) organizations you regard as your principal opposition.

Part Six. General Policy Attitudes

The following statements express general opinions about government, institutions, public policies, and the environment. Please circle the number that comes closest to expressing your opinion on a scale from 1 indicates strongly disagree to 5 indicates strongly agree. NOp (9) indicates no opinion.

	Mean
1. A first consideration of any good political system is the protection of property rights	3.26
2. The balance of nature is very delicate and easily upset by human activities	3.59
3. The best government is the one that governs the least	2.77
4. Ecological rather than economic factors must guide our use of natural resources	3.30
5. Decisions about development are best left to the economic market	2.33
6. We attach too much importance to economic measures on the well-being of our society	3.40
7. We are approaching the limit of the number of people the earth can support	3.33
8. When humans interfere with nature it often produces disastrous consequences	3.25
9. Humans must live in harmony with nature in order to survive	4.14
10. Most environmental problems can be solved by applying more and better technology	2.76
11. Plants and animals exist primarily to be used by humans	2.28
12. There are limits to growth beyond which our industrialized society cannot expand	3.93

Part Seven. About You

In the final section are background socio-demographic questions relating to your age, gender, occupation, and education.

1. What is your principal occupation / profession?

- Business person 1.8
- Attorney 0.3
- Consultant 4.8
- Planner/Architect 2.1
- Engineer Scientist 14.0
- Manager 22.3
- Journalist 0.3
- Farmer 3.3
- Professional Forester 6.7
- Agrologist 10.4
- Civil Servant 25.6
- Elected official 1.8

2. How many years have you been in your present organization?

- less than 1 year 6.2%
- 1-5 years 21.5
- 6-9 years 15.3
- 10-14 years 13.6
- 15-20 years 13.0
- greater than 20 years 30.4

3. Which of the following best describes your principal employer(s)?

- Agricultural producer organization 9.5
- Forest industry organization 5.7
- University 6.3
- Government agency 61.0
- Environmental organization 5.7
- Fishing or sport club 0.3
- Consulting firm 3.3
- Self-employed 6.8
- Corporation 1.5

4. What is your age?

- Under 21 0.3
- 21-30 7.3
- 31-40 17.7
- 41-50 39.1
- 51-60 30.3
- Over 60 5.2

5. What is the highest level of education you have attained?

- Not a high school graduate 0.6
- High school graduate 1.7
- Some college 10.4
- Bachelor's degree 33.1
- Law Degree (LL.B.) 0.6
- Master's or professional degree 33.7
- Ph.D. or MD 14.3

6. If you have a university degree, in which of the following fields is it?

- Agriculture 22.0
- Physics 2.4
- Chemistry 2.1
- Forestry 11.0
- Engineering 12.4
- Earth/resource sciences 12.4
- Biology or ecology 15.8
- Economics 6.9
- Law 0.7
- Planning 4.1
- Other social sciences 5.5
- Education 2.1
- Humanities or fine arts

7. What is your gender?

- Male 82.2%
- Female 17.8

8. What is your family status?

- Single Married or Common law without children 11.9
- Married or Common law with children 73.3

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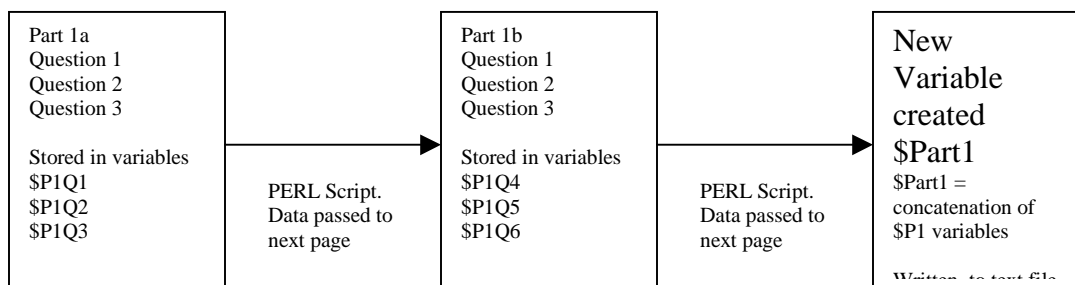
- Separated or Divorced without children 1.5
- Separated or Divorced with children 3.0
- Widowed 0.9

Appendix C – Technical Method for PARC Web-based survey

The web-based survey uses HTML form markup on the client (browser) interpreted by PERL CGI (Common Gateway Interface) scripting on the server.

After a page is submitted, the data from that page is stored in variables and passed to successive pages. When the survey is completed and submitted, all the data for each part is written to text files in a delimited format. This makes importing into a spreadsheet or data base application simple.

Figure 1.



Data is stored in individual variables and passed to successive pages. Upon completion of a given part, a new variable is created which is a concatenation of all individual variables for that part. This new variable is passed to successive pages until the survey is completed, where it is written to a text file in delimited format.