AAFC-PFRA

Analysis of Agricultural Water Supply Issues - Prairie Provinces
National Water Supply Expansion Program

Prepared for

AAFC-PFRA

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Executive Summary

The purpose of this report is threefold: to assess agricultural water supply needs, to determine the nature and extent of agricultural water supply constraints and to identify priorities for agricultural water supply expansion in the Prairie Provinces.

At issue is the lack of reliable quantities of good quality water for agricultural and domestic purposes. In most years runoff is insufficient to replenish surface water dams, reservoirs and prairie potholes. Shallow surface water wells are also affected. In addition, the vulnerability of the Prairie Provinces to drought and the high costs of drought proofing further exacerbates the situation.

In terms of agricultural production/expansion, the implications of not meeting water supply needs are the disruption of livestock operations, partial or complete crop failures and hardship for farm families. In terms of rural sustainability, the impact is already visible. Drought prone areas remain static or experience a decline in population. They also continue to depend on water sources with lower supply reliability and poorer quality.

In response to water supply issues, the Government of Canada established the National Water Supply Expansion Program. An initial $10 million has been made available in 2002/03 to help relieve the water supply situation in the Prairie Provinces. The remaining $50 million will be available nationally over the next three years. The results of this report will be considered in negotiations/consultations with provincial governments and agricultural stakeholders to determine program options.

The report findings are based on several sources, including a review of existing literature, documentation and reports dealing with agricultural water supply needs; stakeholder responses to a questionnaire distributed throughout the Prairie Provinces together with selected interviews (consultations); and results obtained from workshops conducted in Alberta, Saskatchewan and Manitoba.

Based on the literature review, questionnaire responses and workshops, it is clear that many area of the Prairie Provinces do not have available water sources of sufficient quality and quantity to withstand the tests of periodic drought. In regard to project funding under The National Water Supply Expansion Program (NWSEP), the report offers the following recommendations.

Prairie Province Recommendations

- Funding is recommended for planning studies and investigations to enable priorities to be established for both short and long-term projects. Funding for data acquisition, evaluation and analysis with a particular focus on groundwater is also recommended. A portion of the NWSEP funding should be allocated to these initiatives with the remaining funds designated to infrastructure projects.
- It is also recommended that a rigorous evaluation criteria be applied when selecting projects for funding.
- The NWSEP should be part of a long-range plan to address water supply issues.

Alberta Overview/Recommendations

- Areas recommended for specific projects in Alberta include drought sensitive locations in the southeast, east, the South Saskatchewan River Basin (SSRB) and northeast.
- Southeast and east projects involve locating water of suitable quality and quantity; developing groundwater resources to serve regional needs; and the use of deeper wells combined with tank loaders feeding from pipelines. SSRB projects include funding to assess means of improving irrigation efficiency while monitoring groundwater levels and contamination, and pipelines to distribute surface water.
- Northeast projects should involve the investigation of deeper wells and regional pipelines supplemented by tank loading facilities.
- The Highway 2 corridor water supply has experienced overuse and contamination of some water supplies. A possible solution might be regional pipelines from uncontaminated, secure water sources.

- Anticipated expansion of the Agri-food sector to $20 billion in value added manufacturing by 2005 (Agriculture, Food & Rural Development, Agri-Food Fiber Facts, Trends & Opportunities Future Directions – Key Trends in World Food Markets) requires a long-term reliable water supply.
- Recommended programs are water use or diversion monitoring; more regional groundwater assessment programs; the development of educational and promotional material on water conservation and efficient use of water; transfer of existing water allocations to new users and provide a subsidy to assist with the license transfer costs; and training for rural water treatment system operators.
- Recommended projects are well testing and groundwater supply programs in low yield/poor water quality areas; assessment and analysis of water storage opportunities; conversion from high pressure to low pressure sprinkler/irrigation systems; regional water lines connecting farms and villages; groundwater and water monitoring metadata and data on the internet; community well construction; continuation of dugout programs in years with little spring runoff; rural municipal wells with truck fill (tank loader) stations; alternate watering systems; complete a groundwater inventory; and the restoration of existing water bodies.

Saskatchewan Overview/Recommendations

- In Saskatchewan, the south, southwest, northwest, west central and central areas have been heavily impacted by drought. In addition, irrigation water supply needs have been identified near the Lake Diefenbaker and Rafferty Alameda reservoirs and adjacent to the North and South Saskatchewan and Qu'Appelle Rivers.
- Recommended programs are a centre of excellence focussed on all aspects of water supply including water conservation; groundwater investigations for specific projects such as Intensive Livestock Operations (ILO); integrated water resource management; and programs related to research, monitoring, mapping and education.

- Recommended projects are regional pipelines from secure sources to augment and provide continuity of supply; investigation of potential aquifers and construction of deep wells; construction of new infrastructure within existing irrigation projects to irrigate high value crops; extension of pipelines to environmentally sustainable ILO sites; and safe reliable water to farm homes.
- Facilities should be planned to accommodate a 20-year time frame with incremental costs shared or absorbed with NWSEP.

Manitoba Overview/Recommendations

- In Manitoba, the areas impacted by drought are in south-central Manitoba, which includes Interlake and along Lake Manitoba.
- Manitoba has seen a dramatic increase in irrigated areas and types of crops receiving irrigation water in part because of market demand and the fact that only a small amount of irrigation water is required to support the production of high value crops.
- Recommended projects include irrigation infrastructure to support high value crops; safe and reliable water supply for rural domestic use; safe and reliable water supply to the agricultural industry; and off stream storage to augment summer water supplies.
- Southwest Manitoba projects include groundwater inventory, water source development (off-stream storage), and pipeline development. Projects in central Manitoba (east of Red River to Highway #10) include distribution pipeline construction, enhanced treatment of water supplies to increase livestock production, construction of irrigation works, and water sourcing (long-term).
- Southeast and Interlake Manitoba projects include source protection, infrastructure development (pipelines) and support for improvement of water quality.
- North West Manitoba projects include water source development, pipeline infrastructure, support for improvement of water quality, source protection and irrigation development.

In conclusion, the NWSEP will allocate resources to improve the capacity of agricultural producers to deal with drought and other agriculturally related water constraints. While drought issues are experienced throughout Canada, the impact of drought may be more severe on the prairies because the prairie economy is still very much an agricultural economy.

Projects such as regional supply pipelines and treatment facilities require detailed planning and significant financial resources. Other projects such as information development and monitoring are long-term initiatives. There is an immediate need to resolve water supply issues; however, the suggested approach is to balance short and long-term projects with available financial resources.

1.0 Introduction

"Year-round Prairie Droughts Worse Than Parched 1930's". This recent headline in a national newspaper simply stated what many in the prairie agricultural sector already knew. The article is based on documented climate information that compares current precipitation to that recorded in the 1930's. It is true that in the decades since, agricultural practices have improved, irrigation has become more prevalent, groundwater sources more widely used and drought-resistant crop varieties have been developed and are more commonly used. Federal and provincial financial and technical assistance to the agricultural sector have also mitigated some of the effects of drought. Nevertheless there are extreme water shortages across much of the western prairies. In quantitative terms, the nature and severity of the situation is reflected in 2002 crop insurance payments, which may exceed $2 billion-a record.

In early August 2002, Agriculture & Agri-Food Canada (AAFC) announced the release of $10 million to help fund water supply projects in drought stricken areas across Canada. The National Water Supply Expansion Program (NWSEP) also includes an additional $50 million to be made available over a three-year period.

The AAFC-PFRA require strategic approaches that can be implemented cooperatively and on a cost-shared basis with the provinces and/or local/municipal authorities and groups. The primary purpose of this report is therefore to provide direction for prioritising expenditures. Specifically, to:

- Assess agricultural water supply needs;
- Determine the nature and extent of agricultural water supply constraints; and
- Identify priorities for agricultural water supply expansion.

Findings are based on:

- A review of existing literature, documentation and reports dealing with agricultural water supply needs;
- Stakeholders' response to a questionnaire distributed throughout the Prairie Provinces together with selected interviews (consultations); and

- Results obtained from workshops conducted in Alberta, Saskatchewan and Manitoba.

The results of this report will be considered in negotiations/consultations with the provincial governments and agricultural stakeholders to determine program options.

2.0 Objectives and Methodology Used to Conduct the Consultations, Literature Review and Workshops

The objective of the consultations and literature review was to review all relevant information relating to agricultural and rural water supply in the Prairie Provinces in order to assist in the identification of issues and constraints.

The objective of the workshops was to provide an opportunity for the project team, AAFC-PFRA and selected stakeholders to exchange ideas, build consensus and work together toward the development of the National Water Supply Expansion Program for the Prairie Provinces.

2.1 CONSULTATIONS

2.1.1 Methodology

A questionnaire was distributed to a selected list of agencies/individuals across each of the three Prairie Provinces. Those receiving the questionnaire were asked to provide a written response and were contacted for a follow-up interview.

The questionnaire is shown in Appendices C, D, and E together with responses received from each province.

The questionnaire was divided into four main sections:

- Agricultural Water Supply Needs;
- Agricultural Water Supply Constraints;
- Agricultural Water Supply Infrastructure; and
- Agricultural Water Supply Development Priorities.

A series of questions were posed within each section to elicit specific details.

2.2 LITERATURE REVIEW

2.2.1 Methodology

In the literature review, primary sources of information included provincial and federal websites related to agriculture, drought and water supply as well as selected publications prepared by various levels of government, affiliated organizations or stakeholder groups. The material was consolidated into the four main questionnaire categories.

A major source of information was the Alberta government web site, www.agric-gov.ab.ca, which includes links to other sites and access to publications such as:

- "Water for Life" detailing a provincial water strategy (Equus, 2002);
- "Agriculture Drought Risk Management Plan for Alberta" (Agriculture & Agri-Food Canada, 2002); and
- "South Saskatchewan River Basin Water Management Plan" (Alberta Environment, 2001).

In Saskatchewan, the Saskatchewan Government and AAFC-PFRA web sites were available sources of information. Literature reviewed is listed in Section 6.0 and in Appendix B.

The agricultural industry in Manitoba has been increasingly focussed on a means of providing a reliable, continuous water supply for irrigation. Reports prepared by various levels of government as well as non-government organizations reflect this emphasis.

2.3 WORKSHOPS

Workshops were conducted in Alberta, Saskatchewan and Manitoba to obtain group input from selected stakeholders. The workshops not only enabled stakeholders to interact, but also to contribute to and reach a consensus on the issues, needs, constraints and priorities for each province.

2.3.1 Methodology

The workshops were led by the Project Manager, who is trained in the Building Support and Coalitions process developed by Xerox Corporation. The process enabled the collective group to get things done in a way that supports the objectives and program goals of the National Water Supply Expansion Program.

The five key aspects of the Building Support and Coalitions process are assessing, visioning, mapping, resourcing and implementing. Assessing is understanding the situation by defining the current state and the need for change. Visioning is envisioning the possibilities by defining the desired state and the benefit to the organization and all involved parties. Mapping is describing the future by defining pathways that lead to the vision. Resourcing is allocating resources to develop an agreement, which satisfies both individual and organizational objectives. Implementing is determining when the solutions will occur.

The workshop process ensures alignment of the participants and a shared vision of what the future might be. The participants included representatives from AAFC-PFRA, Environment Canada, the National Water Resources Institute, Ducks Unlimited, the Canadian Water Resources Association, Producer Groups, Livestock Associations, Rural Municipalities, Counties, Irrigation Project Associations, and Provincial Health and Agriculture and Food Departments.

3.0 Identifying Issues and Constraints through Consultations and Literature Review

This section is a summary of the information from the literature review and the initial consultations. The information is consolidated into the four questionnaire categories. A number of abstracts are in Appendix B. Alberta, Saskatchewan and Manitoba responses to the questionnaires are in Appendix C, D and E.

3.1 ALBERTA

3.1.1 Alberta Overview

In Alberta, 80% of the water supply is in the northern part of the province whereas 80% of the water demand comes from the southern half (Equus, Water for Life, 2002). Drought impacts the entire province, but is noticeably more severe in the southern half of the province. Dugout levels provide a definitive indication of the extent of moisture available for agricultural use. Figure P2 in Appendix A indicates that on October 28, 2002 dugout levels were generally either dry or one quarter of normal levels.

It is apparent that the demand for water is not consistent with where the supply exists. An obvious means of dealing with this would be to move water to where it is more urgently needed. The concept of inter-basin transfer of surface water, though technically feasible, is fraught with environmental and legal implications. There is a voluntary environmental prohibition on water basin transfers, which is intended to protect Canadian water from export. However, five provinces have refused to sign it. Alberta's Water Act prohibits the export of water and contains similar provisions about water basin transfers.

The Alberta Water Review Management Committee identified two types of interbasin transfers: the transfer of large volumes of water from one major river basin to another to supplement water supplies, and the transfer of small volumes of water between major river basins (Alberta Environment, Water Management Review Committee Report, 2003). Alberta's current policy of no new interbasin transfers; however, does not make a distinction. In consultations most Albertans expressed concerns that allowing interbasin transfers would have a negative impact on river

ecosystems and that restrictions should apply to groundwater basin transfer as well (www.agric-gov.ab.ca).

Alberta is viewed as having more groundwater than surface water resources but there is a lack of detailed data to indicate the magnitude, location and quality of these groundwater resources. It is considered that only 0.01% of this groundwater is recoverable (Alberta Environment, Water for Life, 2002). The dryland rural economies in southern Alberta have an unreliable source of surface water and a gradually declining supply of groundwater. Central Alberta is considered to have a good supply of groundwater for municipal and agricultural needs, although quantity and quality diminish as one moves to the Peace River area.

To put into perspective the consumptive use of water in Alberta, 97.5% comes from surface water sources and the remaining 2.5% from groundwater (Alberta Environment, Water for Life, 2003). The majority of surface water use is irrigation (71%) followed by commercial/industrial (15%) and municipalities (5%) (Alberta Environment, Water for Life, 2002). Miscellaneous uses account for the remaining 9% (Alberta Environment, Water for Life, 2002).

The majority of groundwater use is accounted for by commercial/industrial (53%) followed by agricultural operations (25%) municipalities (18%) and miscellaneous (4%) (Alberta Environment, Water for Life, 2002).

Domestic use of water is a relatively small percentage of consumption but approximately 20% of the population (600,000 Albertans) obtain water from private water systems which are not currently regulated (Alberta Environment, Water for Life, 2002). This is a concern from a health perspective.

Irrigation use of water is by far the largest overall water consumer with all of the province's 13 irrigation districts found within the South Saskatchewan River Basin (SSRB). Indications are that water resources are limited across the SSRB; emphasis has therefore been on strategies to maximize the use and benefits of basin water.

3.1.2 Alberta Issues and Needs

The Province of Alberta has been blessed with an abundance of both groundwater and surface water resources. Unfortunately, the vast majority of groundwater is of low quality and is not suitable for either human or livestock consumption. Surface water resources are not uniformly distributed throughout the Province. The majority of surface sources are located in the north, but unfortunately the greatest demand exists in the south. The overriding issue therefore tends to be an inadequate supply of acceptable water quality for agricultural use.

Most surface water sources, particularly in the south, are fully allocated, limiting water available for growth or expansion. However, even though the sources are fully allocated the allocations are not fully utilized. There is an increase in demand for water but a dwindling supply and rapid industrial, agricultural and municipal growth has increased the pressure on that supply.

There are drought sensitive regions in southern and eastern Alberta, which currently do not have sustainable water supplies. Agricultural activities found in these regions (livestock operations and grain farming) need a consistent supply of good quality water.

Excessive withdrawals of ground and surface water supplies, particularly during periods of drought, not only reduce groundwater and reservoir levels but can also degrade water quality.

Identified needs are numerous. Water quantity and quality research needs to be undertaken and the information base expanded, specifically for:

- understanding the relationship between surface and groundwater systems;
- determining sustainable yield of major aquifers;
- identifying water use efficiencies; and
- mapping of groundwater quality/quantity.

Regional water supply pipelines are needed to distribute water from long-term sustainable water sources.

To determine the success of water conservation practices, there must be knowledge of the antecedent conditions and monitoring to determine the changes that occur. Monitoring is an ongoing requirement and an expensive one. The amount of monitoring that is required is dependent on the magnitude of an extent of conservation practices undertaken. There are several flow monitoring stations on major Alberta rivers. These are adequate for the purpose of determining apportionment agreements with neighbouring provinces and monitoring emergency situations. Presently the stations are not tied into a water supply emergency response system, though this may happen over time with additional funds and commitment. Additional monitoring stations together with associated analytical resources would only improve the system.

Comprehensive and accurate historical and current records of water quality, quantity and associated attributes for water supplies are not always readily available for the agricultural sector to use to make informed decisions. In order for research to be effective historical and current information is required. This information needs to be readily available in a form that is user friendly. Future monitoring is also required to ensure proper management of our water resources.

In the short-term existing pipelines need to be extended to service areas adversely impacted by drought. In the long-term the construction of regional water supply systems to meet existing and future growth is required. Long-term solutions need to include consideration of future demands, yield, water quality and the cost of developing water sources.

The implications of not addressing these issues or meeting these needs will be a reduction in agricultural output, depopulation of rural and urban areas and the loss of business infrastructure. The economic impacts are felt in local communities and throughout the larger provincial community.

3.1.3 Alberta Constraints

Water supply constraints are noted in southern Alberta, particularly in the Palliser Triangle: the St. Mary, Belly and Waterton Rivers, and the Raymond and Taber Irrigation Districts (TID). Reservoirs in the Palliser triangle are highly dependent on snow pack and spring runoff to replenish their capacity. During times of little spring

runoff, the storage volumes of the St. Mary's, Chin, Milk River Ridge, 40 Mile Coulee and Waterton reservoirs are greatly reduced and the Oldman Reservoir is well below normal.

Water Supply Constraints

Water supplies are not necessarily located where the demand exists. Drought is a major risk in the southern and eastern parts of the province, and water quality, particularly groundwater, limits use. There is a lack of reliable information on water supply options and a lack of available, secure and reliable sources of surface water and groundwater.

The lack of an adequate supply of good quality water constrains the production of higher value added crops, limits growth of the agriculture sector and decreases the economic viability of what presently exists.

Rural private drinking water systems do not have the same water quality safe guards as municipal water systems. Therefore rural residents do not enjoy the same level of confidence as their urban counterparts that their water is safe to drink. This may be a consideration in encouraging people to relocate to the farm and farming communities. The contamination of surface water and groundwater could impact water quality. There is a perception that water quality degradation is a result of agricultural activities.

Water supply constraints impact most of Alberta, as supported by Figures P4 and P5 in Appendix A. These figures indicate the severity of the drought as shown by current precipitation and estimated soil moisture as a percent of water holding capacity.

There is inadequate funding for research and development, and long-term planning (e.g. overall water management plans) that relate ground and surface water supplies to existing and future water demands. There is a lack of funding for development of information that will lead to an understanding of the potential risks of an unreliable water supply.

Infrastructure Constraints

There is a shortage of funds for infrastructure projects such as regional pipelines and dams as well as transportation (roads) and/or utilities (electrical) that may be required to access/distribute a water supply.

The importance of properly maintained and operated infrastructure to store, convey and distribute water is recognized. For example, there are 500,000 water wells (Alberta Environment, Water for Life, 2002) in Alberta and many are over 20 years old and likely require remediation.

There is a lack of funding to plan for growth and to fund investments in infrastructure (e.g. pipelines to accommodate inter-basin transfer from the North Saskatchewan River to the Battle River with consideration of Alberta's obligation to meet existing water allocation and downstream requirements).

The Irrigation Rehabilitation Program began in 1969 and in the intervening years has provided funding of from $600,000 to $30,000,000 per year. This cost-shared program, between AAFRD and the irrigation districts, provides funds for approved projects related to the rehabilitation of irrigation infrastructure. There remains a lack of adequate infrastructure to produce value-added crops that have significant economic benefit. An increase of funding by 10% could generate significant economic benefit to this sector of the agricultural economy. As an example the 4% of irrigated crop land generates more than 14% of farm income and 19% of direct agricultural employment (AIPA et al, 2002 Irrigation in the 21st Century (Executive Summary), page 140). The constraint is lack of funds to enable economic growth to occur while mitigating drought impacts.

3.2 SASKATCHEWAN

Location, quantity and quality of ground and surface water in Saskatchewan pose unique challenges for domestic and agricultural use. There is a direct link between good water quality for domestic use and a healthy rural economy.

3.2.1 Saskatchewan Overview

In Saskatchewan, most of the water supply is in the northern part of the province whereas most of the water demand is in the south. River systems in the north, where there are few agricultural activities, are of high quantity and quality. There are environmental concerns, identified by the Saskatchewan Environmental Society, with diverting this supply to the south (Saskatchewan Environmental website, 2003). The North and South Saskatchewan Rivers and Diefenbaker Lake are also considered high quality sources.

Saskatchewan relies more on surface water than ground water: 40% of consumptive use is from major surface water sources; 15% from minor surface water sources (dugouts and small dams); and 45% from groundwater sources (Water Management Working Group, Water Management Issues and Challenges, 1998). Securing acceptable water quality and quantity from groundwater and minor surface water sources is a major challenge for the agricultural sector.

Surface water supplies are relatively limited and inaccessible. Surface water use is accounted for by irrigation (30%); municipalities (16%); multiple - water stored for wetland creation (23%); industrial (11%); domestic (3%); and other (17%). Groundwater use is accounted for by municipal/domestic (47%); industrial (47%); recreation/other (5%) and irrigation/multiple (1%) (Water Management Working Group, Water Management Issues and Challenges, 1998).

3.2.2 Saskatchewan Issues and Needs

The water supply issues include a lack of sufficient quantity and quality for domestic and agricultural purposes; insufficient quantities to withstand periods of drought, deteriorating quality due to low reservoir levels as a result of drought, drought vulnerability and high costs related to drought proofing. There is also a lack of information necessary for informed decisions on securing water sources. Existing irrigation projects are not used to their full potential thereby constraining the production of higher value crops.

Groundwater, though abundant, is characterized by high Total Dissolved Solids (TDS). The high TDS in most groundwater sources results in poor tasting water that smells bad. Many of these sources are unsuitable for human consumption, irrigation or livestock watering without treatment to reduce the TDS.

Agricultural development is not always located near a water supply and providing water may be uneconomical. On the other hand, where an existing water supply has been developed, sometimes agricultural development has not occurred to the extent possible. For example, Lake Diefenbaker's irrigation potential for semi-arid southern Saskatchewan remains unfulfilled.

Existing water supply infrastructure limits opportunities and a critical mass is necessary to justify spending. Infrastructure extends to roads and power as well. A lack of planning results in ad hoc programming with money spent on short-term solutions. An economic justification needs to be in place or sustainability is unlikely.

Funding is required to resolve water quality and quantity issues. For example, a group in west central Saskatchewan is currently considering a regional pipeline system to address water quantity and quality issues. This regional pipeline could lead to the distribution of a high quality water supply from the South Saskatchewan River throughout the region and replace poor quality/insecure water supplies.

Surface water access in the south is limited due to a scarcity of secure sources. It is fully allocated in the southwest leaving little room for the expansion of existing operations. There is a high dependency on surface water such as dugout use in areas impacted by drought. Several communities such as Eatonia rely on surface water supplies or shallow wells and have been water rationing in the summer for years.

Water quality needs are diverse. The agricultural sector has a number of specific water quality requirements, including domestic, livestock, irrigation, micro-irrigation, chemical mixing and industrial processing of agricultural products. Water quality problems are both a health concern for people and livestock (e.g. microbial growth) and a distribution concern (e.g. clogged spray nozzles). As water quality get worse the required treatment methods become more expensive.

High quality water is necessary for mixing with pesticides. Saskatchewan surface water is high in dissolved organic matter and groundwater is high in dissolved minerals both of which can decrease the performance of pesticides. Not enough is known about the impact of using poor quality water on pesticide efficacy.

Food and non-food processing industries also have a wide range of water quality requirements. High quality water is required for breweries, soft drinks and bottled water. These industries often utilize membrane filtration which generates a significant quantity of waste water. With poorer quality water, membrane filtration becomes more expensive and more water is wasted.

There is a major need for information related to groundwater, surface water, treatment, etc. The available information can be confusing and it's hard to know which agency to contact for specific information as there are many agencies involved in water supply issues. Education is required in the agricultural community to understand water analysis results and small-scale treatment techniques. Long-term monitoring and water research are necessary. Up-to-date information is required on water availability and management of international water agreements.

The long-term sustainability of many aquifers in Saskatchewan is poorly understood. There is also a need to determine how aquifers are affected by drought, both in the short and long-term.

3.2.3 Saskatchewan Constraints

Water Supply Constraints

Groundwater quantity and quality are a constraint. There has been a drop in water table levels and a number of issues related to nitrate and pathogen contamination in some regions of the Province. There are serious health risks from a higher level of nitrates in drinking water, and pathogens are capable of causing disease in humans and livestock. The most common source of nitrate in the environment is nitrogen fertilizer. Rural water supplies are very susceptible to high levels of nitrates.

There are water supply constraints throughout the agricultural areas of Saskatchewan; however, the constraints are most evident in the southwest and western areas removed from the South Saskatchewan River and in the northwest and

east central areas of the province. In addition, there are constraints where there are not extensive, well-known aquifers.

There is a lack of distribution infrastructure to move sufficient quantities of high quality water from the North and South Saskatchewan Rivers. Dugouts and small dams are unreliable during a drought because of insufficient runoff. Surface supplies are also variable in quality.

Highly mineralised groundwater requires more expensive treatment before it can be used for agricultural production. Wells of highly mineralised groundwater can be expected to deteriorate at a faster rate and therefore will require frequent maintenance or premature decommissioning.

The implications of not dealing with these water supply constraints are static production with no opportunity for expansion. Drought cycles disrupt agricultural production and farm income. The agricultural industry operates below capacity and value added and diversification projects are adversely impacted. Essentially the agriculture industry continues to operate from crisis to crisis.

Infrastructure Constraints

In most areas, water supply infrastructure is far from adequate. Where there is perceived to be adequate infrastructure, it may not be sufficient to meet the demand during a drought or to supply intensively produced crops and industries. Areas such as Lake Diefenbaker have the potential to be more fully utilized for irrigation purposes. There is an abundance of good quality surface water, but a lack of infrastructure to distribute water.

In some instances there are established main canals and pumping systems with the capacity and the capability to convey water to adjacent lands for irrigation, but for a variety of reasons this opportunity has not been pursued.

In addition there is farmland which could benefit from irrigation, but the necessary main canals, pumping systems and laterals do not exist to service these areas. The Lake Diefenbaker area, and other similar areas in the Province, require investment in the construction of irrigation infrastructure, such as main canals, pumphouses, laterals and/or on-farm works, in order to maximize the benefits of the existing major water storage and delivery systems.

Dams built 40 to 60 years ago need to be refurbished. For example, infrastructure on the Qu'Appelle River system is degraded and requires upgrading.

Many rural areas have fallen behind in developing infrastructure. There should be more opportunities for regional pipelines to distribute high quality surface and/or groundwater supplies.

Higher drilling and construction costs have lead to producers constructing shallow wells and small dugouts to save money. Drought has caused the failure of small surface and shallow groundwater supplies.

In some cases, there are existing water supplies that could be utilized for infrastructure expansion but are not currently being used due to lack of funding. For example, near Swift Current, there are six secure sources that could be used for pipelines, but only one is currently servicing a pipeline.

Funding is a constraint to developing a critical mass of irrigated areas to realize the full potential for irrigation in the Lake Diefenbaker area. Older irrigation projects in the southwest are failing and private and municipal dams have not been maintained. Poor quality irrigation pipelines need to be replaced.

The implication of not dealing with these infrastructure constraints is that the future of the agriculture industry is limited. There would be limited development and expansion of the livestock industry. If failing irrigation pipes are not replaced, expansion cannot continue. If dams are not maintained, they must be decommissioned and the supply is lost. Without water supply infrastructure crop variety and production levels are limited, economic opportunities are lost and uncertainty keeps people from investing.

3.3 MANITOBA

The constraint that water imposes on agricultural activities is determined by many factors. In Manitoba water demand is being driven to some degree by the changing face of Manitoba agriculture. A major factor in directing agricultural activity in Manitoba has been the elimination of the "Crow Rate" in the early 1990's combined with a reduced market for grain exports (PFRA, November 25, 2002 Agricultural

Water Supply Constraints in Manitoba – PFRA Perspective, PFRA, p2 of 5). The elimination of the Crow Subsidy has increased the cost of shipping to the point where it is uneconomical to grow grain crops for export.

3.3.1 Manitoba Overview

The agriculture industry has recently shifted from grain production to more intensive livestock and value added crops. This in turn has resulted in a need for reliable good quality water for livestock operations and irrigation. An expansion of irrigation infrastructure is also needed to service value added crops.

Groundwater is the source of potable water supply for approximately 20% of Manitobans, most of whom are rural. The quantity and quality of groundwater is extensive and excellent in some areas of the province such as the Interlake, while limited and of poor quality in other areas (Government of Manitoba, Where We are Today). Integrity of the groundwater is therefore essential to the health of a significant portion of the population.

Manitoba's climate is able to support potato growth without irrigation; however, with minimal irrigation of 3 inches to 4 inches per growing season, there are great improvements in quality and consistency. This is an important consideration to the potato processing industry. Growth of the agri-industry requires government financial support for irrigation, regional pipelines and related infrastructure.

In 1988 there were 32,000 acres irrigated with 8,600 acres or approximately 25% in potatoes (Gaia Consulting, 2001 Manitoba Survey, 2002). In 2001 irrigated acreages has grown to 68,000 with 54,000 acres or 80% in potatoes, a dramatic shift in both irrigated areas and type of crop irrigated (Gaia Consulting, 2001 Manitoba Survey, 2002).

3.3.2 Manitoba Issues and Needs

The primary issues and needs documented in the literature related to agricultural water supply are: access to reliable and safe water supply, providing safe domestic water to farm homes and northern communities and adequate funding to meet the needs of the agricultural industry and community. The cost of infrastructure projects to service rural areas with water supply constraints (not including irrigation) in the

three drought-susceptible regions - estimated at $60 million in 1989 - is significantly greater than available funding (PFRA, Manitoba Water Sourcing Study Phase II, 1989). These funds were designated for new infrastructure including treatment plants, pipelines and rural regional water distribution systems. Funding would also assist in improving the knowledge base on groundwater as a viable water supply source.

Meeting the needs of a changing farm economy involving the supply of water for the irrigation of high-value crops and for intensive livestock operations is a primary issue. Market forces favour value-added crops, which require irrigation to ensure an adequate water supply for the crop. An adequate water supply is required for the three drought-susceptible regions in Manitoba, notably the Red River Valley, west of the Red River, Plumas-MacGregor region and the southwest portion of the province.

Projects required to support irrigation infrastructure expansion involve large storage and distribution systems, which require government financial support. Potential areas of new irrigation development with large blocks of suitable land, available water and mitigable potential environmental impacts amount to 53,000 acres at a cost of $74 million for off-farm infrastructure development (Manitoba Agriculture & Food, Manitoba Sustainable Irrigation Development, 2001). Specific projects might include new irrigation development including pipelines and pumping stations. To achieve this level of irrigation expansion, government funding is required.

Steinbach, located in the southern central region of Manitoba, was mentioned as a good example of the diversification and self-sufficiency that can be achieved with a sufficient water supply. This region is ideal for hog production. The land is suitable for growing grain, can be used for waste disposal and the local grain is used for feed. This region of Manitoba is currently experiencing a large growth in pork barns that are ready to be hooked up to a water distribution system. These hog barns require constant supplies of good quality water and cannot operate for any period of time without water.

This has lead to barns being connected to treated water systems. With a larger number of hog barns, a larger percentage of the demand on the water distribution system will be inflexible, creating increased pressure on the water distribution systems that were initially intended primarily for domestic use.

3.3.3 Manitoba Constraints

Water Supply Constraints

The primary constraint to dealing with agricultural water supply issues is the lack of funding for off-farm infrastructure for irrigation development/expansion and projects to service drought-susceptible regions.

The Red River Valley has a shortage of both surface water and groundwater. The eastern area of the province has no useable groundwater, with most local streams being intermittent in nature. The western area has considerable groundwater and surface water resources but requires additional studies to determine the sustainability of groundwater sources.

As previously indicated, there is a significant percentage of Manitobans (20%) that rely on the integrity of groundwater for their potable water supply. The absence of regulations governing the treatment and monitoring of farm water quality increases the likelihood of contamination. In order to ensure safe potable water significant cost could be incurred. There is an inadequate knowledge base in regard to the potential for groundwater developments in select areas.

Infrastructure Constraints

There is a lack of funding, knowledge, assistance and education for on-farm well water testing and treatment facilities. Although the onus is on the proponent to plan and meet the requirements of well development, there is currently no technical assistance and/or education supplied for farmers to properly manage their water supplies/resources. There are currently no regulations to enforce well-water development, as no inspector for well drilling is available, however approval to employ this position has recently been given.

There is a need for additional impoundments such as storage reservoirs for use in periods of drought. Multi-use reservoirs have the conflicting demands of maximum draw down of reservoir water levels by producers in periods of drought and the desire by cottagers to have a stable water level at the reservoir full supply level. Current environmental regulations limit the ability to develop new large reservoirs resulting in the construction of smaller less effective reservoirs.

Since livestock producers, such as hog operations, require secure water supplies, a backup system in the event of drought is necessary to guarantee supplies for their inflexible needs. Regulations to ensure that livestock farms have a backup water supply could potentially require that all livestock farms, which are not supported through a pipeline from a drought proof supply, invest in a two-year water supply storage system.

Another type of storage system is the open dugout reservoir, which has been used in the past. Water supplies from this type of reservoir; however, have been found to have water quality problems such as blue-green algae.

Lack of funding has limited the opportunity to utilize off-stream storage for irrigation. For example, there is potential for off-stream storage areas along the Assiniboine River.

Another constraint is a lack of funding to adequately size distribution systems for future capacity. For example, the Stephenfield regional system was originally designed for 490 rural hook-ups, but now has 1135 (all using treated water). It has resulted in a more costly system since system expansion was not adequately allowed for. It is not yet complete, giving rise to possible expansion in the summer of 2003 (Sam Schellenberg, Pembina Valley Water Cooperative, December 2002, personal communication).

Providing water distribution and/or water supply infrastructure have associated with them certain environmental costs. In selecting a project for future investment the cost/benefit analysis must not only maximize the benefits to the stakeholders, but also the implications to the environment.

3.4 EXISTING PROGRAMMING AVAILABLE FOR WATER SUPPLY INFRASTRUCTURE AND INFORMATION DEVELOPMENT

3.4.1 PFRA - Rural Water Development Program

The purpose of the Rural Water Development Program (RWDP) is to enhance the viability of prairie agricultural areas by promoting and supporting sustainable development and protection of water resources.

Program Objectives

The RWDP is designed to:

- Alleviate water-related constraints to the viability of rural agriculture;
- Aid development, expansion and diversification of agricultural operations;
- Enhance opportunities for rural agri-business and value-added enterprises; and
- Encourage the implementation of sustainable practices in the development and protection of water resources.

This program is designed to contribute to the stability and development of Prairie rural areas by improving the security of good quality water within agricultural areas in Manitoba, Saskatchewan, Alberta and the Peace River region of British Columbia.

Projects must benefit the rural agricultural economy by maintaining or enhancing income-generating opportunities and/or encouraging the implementation of environmentally sustainable agricultural practices in the use of water resources.

Financial assistance will not exceed one-third of project costs, and application must be made and approval obtained prior to development. Projects must be constructed to specifications and standards provided by PFRA and/or various provincial government agencies.

3.4.2 Canada Alberta, Saskatchewan and Manitoba Infrastructure Programs

Over a six-year period (October 10, 2000 through March 21, 2006), the Canada Infrastructure Program (CIP) will invest in local infrastructure improvements in the provinces with equal contributions coming from the federal, provincial and municipal governments.

Program Objectives

The objectives of the CIP are to:

- Enhance the quality of Canada's environment;
- Support long-term economic growth;
- Improve community infrastructure; and
- Build 21st century infrastructure through best technologies, new approaches and best practices.

The first priority for the program is to support green (environmentally friendly) municipal infrastructure. Funding is directed towards projects that will protect and/or enhance the quality of the environment. Typical projects include potable water and wastewater systems, solid waste management and recycling, capital expenditures to improve the energy efficiency of facilities owned by local governments, and water and flood management projects. A number of secondary priorities focus on other local infrastructure.

The infrastructure program is a national initiative undertaken by the Government of Canada. The Treasury Board has overall responsibility for the program and Western Economic Diversification is responsible for implementing the program in the Prairie Provinces.

3.4.3 Green Municipal Enabling Fund

The Green Municipal Enabling Fund (GMEF) is a $50 million fund that provides grants to support feasibility studies. Operating from 2000 to 2007, GMEF expects to support a large number of studies to assess the technical, environmental and/or

economic feasibility of innovative municipal projects. Grants cover up to 50 per cent of eligible costs to a maximum grant of $100,000.

The Government of Canada created the Green Municipal Enabling and the Green Municipal Investment Fund in its 2000 federal budget with an endowment that establishes a strong partnership between the Federation of Canadian Municipalities (FCM) and the Government of Canada. FCM's network of expertise ensures that projects build on each other.

GMEF is open to Canadian municipalities and their public-sector or private-sector partners. Applications are accepted year round.

Program Objectives

Feasibility studies, supported by GMEF, must assess projects that would improve air, water or soil quality, protect the climate or promote the use of renewable resources. The projects must also show potential for significant improvements in environmental performance or energy efficiency by taking a systems approach and focusing on reducing pollution and waste at the source.

These goals must be achieved through significant improvement in the environmental performance of one of these municipal services:

- Municipal buildings;
- Energy, including community energy planning and renewable energy;
- Water supply, wastewater treatment and stormwater management;
- Solid waste management; and
- Public transportation systems and municipal fleets.

In addition, projects envisaged by a GMEF feasibility study must:

- Demonstrate an innovative approach to solving environmental problems;
- Generate measurable and verifiable results, both environmental and economic;
- Take a systems approach: assess the full life cycle of the energy, waste, water or transit service and focus on source reduction;

- Have the potential for significant improvements in performance (at least 35 per cent); and
- Be replicable in other Canadian communities.

Any Canadian municipal government, or its private-sector or public-sector partner, can submit a letter of intent to apply to GMEF. If the partner is applying, a letter from the municipal government must demonstrate its commitment to the project.

Eligible expenses are goods and services required to assess a project's technical, engineering, environmental and/or financial feasibility, including:

- Costs associated with professional, technical personnel, consultants and contractors who are directly involved in the feasibility study but are not employed by the recipient; and
- Travel to a manufacturer, dealer or supplier to select installations or material necessary for project execution.

Ineligible expenses are the recipient's general overhead costs or commitment in-kind, (including operating costs related to the general maintenance, repair and overhead cost of the project), the cost to purchase or lease real property and conference and conference travel costs.

3.4.4 Alberta Farm Water Program

The Alberta Farm Water Program (AFWP) is to provide funding and technical assistance to farmers and ranchers to develop their water supply projects. The program was intended to help farmers develop long-term, on-farm water supplies. The AFWP will pay for one-third of development costs, to a maximum of $5,000 per farm unit, for eligible water supply projects. The deadline for project completion was extended to March 31, 2003 (www.agric.gov.ab.ca/farmwater).

The program was targeted at long-term water supply solutions. Long-term projects are those that result in an adequate, sustainable, on-going water supply over many years, such as wells, pipelines, dugouts, stock dams, spring development, cisterns, remote watering systems, etc. The program was to fund new or improved water

projects, which provide access to previously unused water sources or increase the supply of water.

Any active producer with a minimum of $10,000 farm production per year, including individuals, partnerships, corporations, etc., is eligible. Alberta Agriculture, Food and Rural Development (AAFRD) will use Alberta Farm Fuel Benefit (AFFB) information to assess eligibility. Those without an AFFB number are required to complete an eligibility form and will be assessed for eligibility under the program.

Payments are based on receipts for work completed. Producers doing their own work will be compensated based on custom equipment rates. Applicant labour will not be covered. Producers must be willing to develop a long-term plan for their operation. Current projects should be part of the plan.

3.4.5 Alberta Agriculture, Food and Rural Development - Water Pumping Program

The Water Pumping Program is a service designed to assist producers obtain water for domestic and livestock use. This is an ongoing program that began 10 years ago and runs from the beginning of April to the beginning of November. Any full time Alberta producer who is experiencing water shortages for domestic and livestock use has priority for equipment use.

For a nominal fee, a producer or group of producers can rent six-inch or eight-inch aluminum pipe and pump(s) from the department to fill dugouts or other suitable catch basins from nearby water sources. Equipment is delivered to the pumping site and technical assistance is provided for proper operation.

Alberta Agriculture, Food and Rural Development dispatch locations can be contacted for further information or to apply for the use of the equipment. An Agricultural Water Specialist can also be contacted through these offices if recommendations are required on constructing or maintaining a safe/secure water supply.

3.4.6 Sask Water - Rural Water Quality Advisory Program

Sask Water's Rural Water Quality Advisory Program - which has provided assistance to more than 1000 clients since its launch in November 1997 - is aimed at small system water users coping with poor quality water and ineffective treatment systems. The service is available to farmers, ranchers, acreage owners and northern outfitters. In fact, anyone relying on a private water supply, including residents of trailer courts, villages and hamlets, is eligible under the program.

For a fee of $100, trained Sask Water technicians will complete an on-site sampling of a client's water source, ship the refrigerated samples to a certified laboratory within 24 hours for a comprehensive analysis, and then follow up by providing the client with a copy of the analysis and written advice on any health and aesthetic implications. Advice is also offered on the most suitable treatment process available to elevate the client's water quality to an acceptable standard, as well as ways for clients to improve or preserve the quality of water in their wells, dugouts and reservoirs.

The Rural Water Quality Advisory Program is available to potential clients through any of Sask Water's regional water resource offices in Swift Current, Weyburn, Yorkton and Nipawin, its rural water quality office in Saskatoon and its head office in Moose Jaw.

3.4.7 Other Saskatchewan Government Programs

Water Pumping Equipment Rental

Power take-off pumps, aluminium pipe and pipe trailers are available for rent to individuals, communities and industry for the transfer of water and wastewater. The equipment is used to fill small storage reservoirs and de-water property.

Municipal Water and Sewer Technical Assistance

Engineering and technical assistance is available to towns, villages and hamlets for the planning, design, construction, alteration and operation of water and sewage works.

Water and Wastewater Utility Development

This program is designed to evaluate, develop and operate single and multi-purpose water supply, water treatment and wastewater treatment systems to service municipal, agricultural, recreational, wildlife and industrial requirements.

Rural Water Control Assistance

Engineering, administrative and financial assistance is available to local group organizations for the investigation, design, construction, maintenance and operation of drainage, flood control, backflood irrigation and multi-purpose works that are primarily for the benefit of agricultural lands.

Under this program, engineering and financial assistance is also available to local governments and local group organizations for the design, construction, maintenance and operation of works to stabilize lake levels.

Erosion Control Assistance Program

Engineering, technical and financial assistance is available to individuals and organized groups of landowners for the design, construction and maintenance of erosion control works to correct soil erosion problems.

Assistance for Channel Obstruction Removal

Technical and financial assistance is available to rural municipalities for brush clearing and disposal, obstruction removal including beaver dams, deadfall and silt bars from creeks, rivers and other natural channels.

Urban Flood Control Assistance

Engineering and financial assistance is available to urban centres for the design, construction, maintenance and operation of flood control works to alleviate flooding problems. Under the program, the majority of the flood water must come from the rural portion of the drainage area and enter from outside the community limits and pass through the community.

Rural Water Supply/Treatment Technical Assistance

Technical and engineering assistance is available to assist individuals for the investigation, development or expansion of long-term groundwater and surface water supplies such as domestic wells, dugouts, dams and pump stations.

Technical Assistance for Private Drainage Works

Technical and engineering assistance is available to individuals proposing to construct drainage works.

3.4.8 Manitoba Agriculture and Food Soils and Crops Branch - Irrigation Development Program

The Irrigation Development Program was developed to assist provincial and regional irrigation associations with costs for planning and developing off-farm irrigation infrastructure. It provides financial and technical support for planning, designing, environmental assessments and approvals for off-farm irrigation projects. The program is co-ordinated with federal support via technical assistance from PFRA. Support is also provided for area/block development and management; investigation, demonstration and technology transfer; environmental protection; awareness; education and communications.

Applicants must be in possession of a water rights development permit and must apply for an Environment Act License. The applicant must meet the terms and conditions in the Irrigation Development Program Manual.

3.4.9 Manitoba Agricultural Area Water Pipeline Program (Joint Federal and Provincial)

The Agricultural Area Water Pipeline Program provides technical and financial assistance to local government or water co-ops supplying pipelines to rural residences. PFRA and Manitoba Water Services Board (Intergovernmental Affairs) each provides assistance of 1/3 of eligible costs with local governments or groups responsible for remaining costs, for the installation of rural water pipelines. If a local government is not involved, a group of individuals applying for assistance must become legally incorporated.

Prior approval of plans must be obtained from the Department of Conservation and a qualified professional engineer must design the system. All rights-of-way and easements must be in accordance with established standards and procedures.

3.4.10 Manitoba Community Water Source Development (Joint Federal and Provincial)

The Community Water Source Development Program provides assistance to local governments or groups to identify and develop a water supply for small community use, and/or tank loaders. The Manitoba Water Services Board (Intergovernmental Affairs) and PFRA provide technical and financial assistance in regard to the following:

- Groundwater appraisal report;
- Evaluate sources;
- Arrange, supervise test drilling and well construction;
- Advice on permits, cost estimates, tenders and contracts; and
- Engineering designs and construction supervision as staff time permits.

Local governments or legally incorporated groups of individuals can apply. Design approval is required prior to construction to ensure eligibility for financial assistance.

3.5 REGIONS OF FAILING OR INADEQUATE INFRASTRUCTURE AND WATER SUPPLY CONSTRAINTS

3.5.1 Regions of Failing or Inadequate Water Supply Infrastructure

Alberta

Nearly all dams in western Canada are earthen structures. Smaller dams are built using homogeneous materials, and require periodic maintenance and inspection to ensure that erosion and infiltration are controlled and structural integrity is maintained. Riparian outlet structures generally have a design life of 25 to 50 years, and eventually require major rehabilitation or replacement. On larger dams, dam integrity is safeguarded by the Canadian Dam Safety Guidelines, which provide strict maintenance guidelines, depending on the Hazard Classification.

The majority of small dams in Alberta are in some form of disrepair. The reservoirs formed from these dams are used mainly for stock watering on the dry prairie. Any reservoir with significant storage may be used for various forms of water supply, including municipal, recreational and industrial.

Design criteria for routing large flood events are currently being altered, following the Canadian Dam Association's Dam Safety Guidelines. Each structure is being analysed to determine whether there is enough emergency spillway capacity to protect the integrity of each dam.

The state of disrepair of canals varies by region or irrigation district. For over thirty years, southern Alberta has been aggressively rehabilitating much of its irrigation canal infrastructure. This on-going process is cost-shared by both the water users and government agencies.

Many of the early canals were single bank canals constructed on the contour. Although less expensive to construct, they intersect many watersheds, and in most cases, collect storm water. These canals require regular maintenance to guard against canal breach. Significant storm surges can overtop canals and cause significant erosion.

Canal systems were initially designed to provide flood irrigation deliveries. Over the years labor saving pressurized irrigation systems have become more popular. During severe storm events, however, power outages can shut off all the electrical pumps. As the water is already delivered but not used, it will continue down the canal system. These surges are difficult to maintain manually, and become a major safety issue for maintenance staff during very difficult storm conditions. Costs to overcome these problems can be addressed with new structures, waste ways, enlargement of some canal elements and a stable automated control system.

Saskatchewan

The Province of Saskatchewan owns and operates 42 water storage/conveyance projects ranging in age from 15 to 85 years old. Total replacement value of these works is over $1.0 billion. Over the next 5 years approximately $15 million will be required to rehabilitate/maintain these works. Within 10 years the annual

expenditure could be over $10 million per year. The rehabilitation of the Avonlea Dam is estimated to cost $1.7 million (Sask Water, Saskatchewan Water Related Infrastructure, 1997).

PFRA owns and operates 31 storage, diversion and/or conveyance works in Saskatchewan, many of which were constructed in the 1930's and 1940's (Sask Water, Saskatchewan Water Related Infrastructure, 1997). A number of the structures require improvements. The Eastend Dam is of particular concern. To protect the integrity of the dam and the community downstream, it is recommended that the earth embankment be raised 1.5 metres. The cost of this project is estimated at $500,000, with additional annual expenditures. The spillway facility at Duncairn Reservoir, south of Swift Current, has deteriorated as well. Damage from past flood events has not only eroded portions of the facility, but necessitated re-design and reconstruction based on a larger design storm event. The increased flows require larger spillways, gates, and erosion protection (Sask Water, Saskatchewan Water Related Infrastructure, 1997).

The construction of new infrastructure within existing irrigation projects (Lucky Lake and Riverhurst) to irrigate high value crops can be accomplished for $700 to $1,000 per acre (Sask Water, Saskatchewan Water Related Infrastructure, 1997). The development of new projects will require investments of over $2000 per acre. An estimated $20 million will be required over the next 10 years to construct water supply works to support this infilling (Sask Water, Saskatchewan Water Related Infrastructure, 1997). Infilling can involve constructing laterals from existing main canals to irrigate farm land or even the construction of main canal works and related infrastructure to service irrigable land adjacent to existing irrigation works. This is discussed more fully in Section 3.2.3 under Infrastructure Constraints. New irrigation projects around Lake Diefenbaker, along the Qu'Appelle River and other areas could require over $100 million over the next 10 years (Sask Water, Saskatchewan Water Related Infrastructure, 1997).

Manitoba

Manitoba's water supply infrastructure for irrigation consists of small privately owned projects. Larger water supply infrastructure for irrigation needs to be developed in order to service the many areas requesting water.

Existing regional water supply pipelines (for livestock and domestic use) are relatively new, but demand continues to increase as the changing economics of agriculture make secure water supplies a necessity.

The Red River Valley south and west of Winnipeg, including the Pembina Triangle, has undergone dramatic development of regional pipeline systems using the Red, Assiniboine, Boyne, and LaSalle Rivers as supply sources. This has led to greater demand, as the advantages of a secure supply of treated water are recognized. The majority of the irrigation development that can be accommodated using existing infrastructure has already occurred. Continued growth of the potato industry will require the further development of distribution systems to convey the water from available sources to areas with soils suitable for development.

The southwest part of the province lacks firm surface water supplies. Development of a supply pipeline using the Oak Lake Aquifer and development of dams on ephemeral streams have been suggested as possible solutions. The Westlake Area, the R.M. of Swan River and Dauphin regions have seen limited development of pipelines, but have a much greater need than available resources. Isle des Chenes, St. Adolphe and the R.M. of Rockwood have all experienced water quality problems that need to be addressed on a regional basis.

The Association of Manitoba Municipalities Task Force on Rural Water Funding (2001) estimated that Manitoba requires $180 million for rural water infrastructure (Association of Manitoba Municipalities, Task Force on Rural Water Funding 2001, pages 1-5). Of the $180 million, $90 million is designated for treatment related projects and with the remaining $90 million for other new infrastructure including pipeline expansion, shifting from surface water to groundwater sources, extending existing distribution systems and new pipelines. New sources of supply from both ground and surface water sources also need to be developed. As the most

economically viable sources have been developed, the cost of developing new sources will be incrementally greater.

3.5.2 Regions with Water Supply Constraints

Alberta

Water supply constraints are noted in southern Alberta, particularly in the Palliser Triangle: the St. Mary, Belly and Waterton Rivers, and the Raymond and Taber Irrigation Districts (TID). These areas rely on water from reservoirs, which are impacted greatly during years with low spring runoff.

The area that encompasses the region east of Red Deer/Calgary is referred to as the Special Areas. The Special Areas have experienced a lack of water and a declining population. It has been suggested that a water diversion project from Nevis to the Sounding and Berry Creeks in the Special Areas is possible and required to enable economic development to occur in this area. The Special Areas Water Supply Project is estimated to cost $168.7 million. A detailed breakdown on this project's elements and costs can be found in the Special Areas Board reference (Special Areas Board, Overview of Special Areas Project, undated.)

Saskatchewan

Water supply constraints are most evident in southwest and west central Saskatchewan, particularly in areas removed from sources like the South Saskatchewan River or Lake Diefenbaker. Many communities have experienced water restrictions during the past few years. Constraints are also noted in the northwest and east central areas.

Many communities in west central Saskatchewan use highly mineralised groundwater supplies for agricultural and domestic purposes but local treatment plants have difficulty meeting drinking water quality standards. Rural municipalities expend substantial financial resources sourcing new groundwater supplies.

Throughout the province groundwater constraints relate to location, quality and depth of sources in areas where there are not extensive, well-known aquifers.

Manitoba

Water supply constraints are experienced throughout southern Manitoba, with the southwest corner and Westlake areas being specifically identified. The southwest corner has few surface water sources and have no locally identified groundwater sources. Potential storage options must be examined and other groundwater sources identified. The Westlake area, although located near Lake Manitoba, has few reliable water sources. The most viable option appears to be a pipeline and distribution system to utilize the water in the Assiniboine Delta Aquifer, but this has been the subject of ownership and political debate.

Another region lacking in water supplies, and thus more susceptible to drought and agricultural expansion constraints, is the Pembina Triangle. This is one of the fastest growing rural areas of Manitoba in terms of both population and economic growth.

The Pembina Triangle region relies on water from the Red River as well as a few other, but not as significant, major sources in the region. The Red River is the only river in the province that does not have minimum flow agreements with the U.S. The U.S. has a number of dams on the Red River (e.g. Grand Forks) that have the potential to limit water supplies for Manitoba. Due to a flow in the Red River of only 32 L/s during the drought of 1988, and since no agreement exists for this purpose Manitoba was forced to ask the U.S. to release water to supply regional pipelines (Sam Schellenberg, Pembina Valley Water Cooperative, December 2002, Personal Communication). The U.S. complied with this request.

4.0 Building Consensus through Workshops

This section provides a summary of the workshops held in each of the Prairie Provinces. Documentation is contained in Appendices F, G, and H, Alberta, Saskatchewan and Manitoba respectively.

4.1 ALBERTA

A workshop was held on January 29 and 30, 2003 at the Valley Ridge Golf and Country Club in Calgary. The following is a summary of the issues, needs, constraints and priorities as well as programs and projects that could be considered for NWSEP funding:

Issues

- Groundwater resources and their potential are poorly understood;
- There is no long-term water supply development strategy;
- Existing water supplies are diminished due to drought;
- There is limited understanding of what the acceptable level of risk is in regard to water supply;
- Majority of water supply is in the north, but majority of demand is in the south;
- There is no clear idea as to what level of agricultural growth can be sustained with the available water supply; and
- Surface water license moratoria exist in the south.

Needs

Needs are identified as gaps between the current situation and where the workshop participants would like it to be. A significant number of needs involve programs as opposed to projects. Programs are viewed as supporting projects that will ultimately be implemented and as requiring the commitment of resources well beyond three years. The following priority needs are viewed as integral to implementing NWSEP:

- Data acquisition/monitoring; and
- Planning for long and short-term requirements.

The other needs identified were not viewed as being of the same level of importance. They include:

- Infrastructure funding to establish rural surface water supply systems to reduce reliance on poor quality groundwater supplies;
- Education on watershed health, water conservation and best management practices to develop an understanding of the water system and the implications of various practices; and
- Funding/cost-shared programs for private irrigation systems (to offset major cost projects such as river intake structures and pipelines), and for irrigation infrastructure within irrigation districts.

Constraints

Constraints that prevent or impede progress from being achieved as effectively as possible include:

- Need to move forward quickly, yet adequate planning is lacking;
- 1/3 cost share may not be adequate for "smaller" proponents;
- Lack of a water apportionment agreement with BC for the Peace River area;
- Alberta's annual share of NWSEP funding is relatively small and won't enable much to be accomplished; and
- NWSEP funding is for three years and priority programs require long-term funding.

Priorities

Projects need to be evaluated according to pre-selected criteria. Workshop participants developed a total of seven criteria and rated their relative importance, as follows:

1.	Relative need/critical areas/lack of alternatives	21%
2.	Demonstrated risk reduction	21%
3.	Safer water supply for human/livestock consumption	19%

4.	Efficient water use	13%
5.	Economic benefit to many people	13%
6.	Address a regional issue	9%
7.	Broader public acceptability	4%

It was understood that certain basic criteria needed to be met before a project was considered for further evaluation, these criteria are:

- Environmental acceptance;
- Maximum dollar limit per project or minimum number of projects;
- Meets authorized use of water and satisfies legal requirements;
- Fully fund highly rated projects when proponents are unable to pay their share;
- Project stabilizes or enhances rural development; and
- Spin-off benefits exist.

Recommended Programs/Projects

Workshop participants identified typical programs and projects that could be considered for NWSEP funding.

Programs

- Water use or diversion monitoring.
- Regional groundwater assessments.
- Educational programs to increase awareness with regard to water supply issues.
- The Irrigation Rehabilitation Program could be increased by 10% above current funding levels to more effectively enable rehabilitation to be accomplished.

Projects

- Test well/supply well programs.
- Assessment of water storage opportunities.
- Water transfer stations (tank loaders).

- Water conservation programs.
- Regional water pipelines.
- Data acquisition and monitoring.
- Community well/dugout programs.

4.2 SASKATCHEWAN

A workshop was held December 16 and 17, 2002, at the Forestry Farm Teahouse at the Forestry Farm Park in Saskatoon. The following is a summary of the issues, needs, constraints and priorities as well as programs and projects that could be considered for NWSEP funding:

Issues

- Agriculture development is not necessarily located where adequate water exists and where adequate water supply exists agriculture is not always welcome. Locations are also impacted by proximity to supporting infrastructure.
- Lack of adequate planning is resulting in short-term solutions.
- Water supply information is not readily available for decision-making.
- General public is not well informed on water supply issues.
- Comprehensive groundwater information is not readily available or easily accessible.
- Cost of accessing surface water is prohibitive to many areas of Saskatchewan.

Needs

The overriding need is to have sufficient resources to enable programs and projects to proceed. This includes resources to undertake basic planning, data acquisition and other long-term programs. Selected needs include:

- Planning for development;
- Developing a strategic plan for water supply planning and infrastructure development that includes evaluation criteria such that program money is targeted appropriately; and

- Groundwater testing, monitoring and analysis to determine suitability and sustainability.

Constraints

Constraints to addressing issues and meeting needs include:

- High cost of infrastructure to support agricultural development;
- Lack of adequate funding for both short and long-term planning;
- Economic importance of agriculture is poorly understood;
- Groundwater as a viable resource is poorly understood;
- Adequate, long-term funding not available; and
- Lack of political and public support.

Priorities

Projects need to be evaluated according to pre-selected criteria. Workshop participants developed a total of six criteria and rated their relative importance, as follows:

1.	Sustainability (economic/social/environmental)	23%
2.	Social stability/renewal (the rural community)	23%
3.	Value added (employment/spin-off economic benefits)	20%
4.	Dynamic rural community	14%
5.	Diversification benefits	11%
6.	Extent of population impacted	9%

Potential NWSEP - funded projects should also be evaluated on the following basic criteria before being pursued:

- Health (human) aspects should be a priority;
- Achievable with NWSEP funding; and
- Opportunity to partner with other available funding programs.

Recommended Programs/Projects

A total of 12 opportunity areas for priority development were selected, with the most promising as follows (in order of decreasing importance):

1. Regional water supply studies including short and long-term planning.
2. Education and public awareness of water supply issues.
3. Development of a comprehensive information system with a focus on groundwater.
4. Development of Saskatchewan "Centre of Excellence".
5. Regional water supply pipelines.
6. Financial assistance for groundwater investigation.
7. Groundwater monitoring on a long-term basis.
8. Construction of infrastructure within existing irrigation areas.

Recommendations

Several recommendations resulted from the workshop:

- Size facilities to accommodate a 10 to 20 year time frame, with extra costs picked up by NWSEP.
- Consideration of current and future water needs and demands when issuing water allocations.
- Higher cost share for the additional costs associated with developing sustainable groundwater supplies.

4.3 MANITOBA

A workshop was held on January 20, 2003 at the Holiday Inn - University in Winnipeg. The following is a summary of the issues, needs, constraints and priorities as well as programs and projects that could be considered for NWSEP funding:

Issues

- Lack of planning/assessing for regional water supply issues.
- Lack of resources and commitment for long-term groundwater investigations.
- Inadequate financial resources to implement programs/projects.
- Agricultural industry expansion needs guaranteed water supply.

Needs

The workshop participants identified 12 areas of varying degrees of importance. The six most important, in decreasing order of importance, are:

- Short and long-term water supply and watershed planning;
- Stable long-term funding for projects and staff to address water supply issues;
- Surface water resource information system;
- Groundwater resource information system;
- Education and public awareness of water supply issues; and
- To mobilize political support for water supply initiatives.

Constraints

The needs and the constraints are to some extent intertwined. The main constraints to achieving objectives are:

- Lack of public support for water supply development and a lack of understanding of water supply costs and benefits;
- Inadequate political will;
- Inadequate raw water supplies (quantity and quality);

- Inadequate information on both surface and groundwater, but especially groundwater resources;
- Lack of long-term stable funding;
- Inadequate planning to properly implement programs such as NWSEP; and
- Research and development related to agricultural water supply issues is lacking.

Priorities

Projects need to be evaluated according to pre-selected criteria. Workshop participants developed a total of eight criteria and rated their relative importance, as follows:

1.	Quality of life (health and safety)	29%
2.	Promotes rural growth	19%
3.	Economic viability of project	12%
4.	Promotes conservation of water resource	12%
5.	Public interest versus private benefit	10%
6.	Regional equity	8%
7.	Commitment in place (existing economic opportunity)	7%
8.	Financial contribution from the participant	3%

It was understood that certain basic criteria needed to be met before a project was considered for further evaluation, these criteria are:

- Require short-term project success[1];
- Project concept fits with existing strategic plan(s); and

[1] Some of the initial projects should provide immediate results, but this criteria does not apply to all projects.

- Projects should mitigate drought related risks.

Recommended Programs/Projects

Manitoba workshop participants identified the following types of projects as being priorities in different regions:

1. Southwest Manitoba
    - Water development strategies
    - Groundwater inventory
    - Water source development (off-stream storage)
    - Pipeline development
2. Central Manitoba (East of Red River to #10)
    - Pipeline/distribution construction
    - Enhanced treatment of water supplies
    - Development of water supplies for irrigation
    - Water sourcing (long-term)
3. South East and Interlake Manitoba
    - Source protection
    - Infrastructure development (pipelines)
    - Support for improvement of water quality
4. North West Manitoba
    - Water source development
    - Pipeline infrastructure
    - Support for improvement of water quality
    - Source protection
    - Development of water supplies for irrigation

It should be emphasized that these are typical projects. The evaluation and selection of a project for funding under NWSEP should follow the criteria identified under priorities.

5.0 Summary of Findings: Constraints, Priorities and Program Options

This section contains a summary of the constraints, priorities and program options based on the literature review, responses to the questionnaires and interviews, and the workshops.

5.1 ALBERTA

5.1.1 Constraints

Water supplies are not located where the demand is and water source options are neither secure nor reliable. Alberta must meet existing water allocation and downstream use obligations which limits water availability for local use during times of drought.

Poor source water quality constrains agricultural production. This constraint is further exacerbated by the impacts of agricultural activities on source water quality. Because rural private drinking water systems do not have the same water quality safe guards as municipal water systems growth in rural areas is constrained.

The expense of locating, developing and treating groundwater sources is a constraint to the development of a vibrant and prosperous agricultural economy.

A constraint is a lack of water management planning. There is a lack of knowledge and understanding of Alberta's water systems. There are policy constraints associated with inter-basin transfers to move water to where it is needed.

Infrastructure constraints include a lack of regional pipelines, dams, roads and an adequate electrical grid to support the agricultural economy. Existing infrastructure requires repairs, upgrades and maintenance. Additional water supply sources are required before additional lands can be irrigated to produce value-added crops.

There is a lack of resources to fund projects, carry out research and development and provide for adequate long-term planning.

5.1.2 Priorities

The priority areas are generally those experiencing drought related stress and shown on Figures P1, P2, P4, P5 and A1 of Appendix A. These areas are in north, east and southern Alberta.

Priorities include regional solutions that provide defined benefits to a larger number of users; irrigation for the production of value-added crops; and solutions that respond to short-term issues but plan for long-term strategies.

In the southeast and east, finding suitable quantity and quality water is an issue; it is important to identify and develop suitable groundwater sources to serve regional needs. The use of deeper wells, combined with tank loaders feeding from pipelines, is a possible solution. In the SSRB area, primary concerns are reliability of water supply and contamination. Additional effort and funds are required to improve irrigation efficiency and monitor groundwater contamination and levels.

The area northeast of Edmonton has a high density of agriculture and relies on shallow wells, which are susceptible to drought. A priority is to construct deeper wells and regional pipelines supplemented by tank loaders.

The Peace River area does not have access to good quality groundwater. A possible solution may be regional pipelines from surface water sources, but this could be an expensive alternative.

The Highway 2 corridor water supply has experienced overuse and contamination of some water supplies. A possible solution might be regional pipelines from uncontaminated, secure water sources.

In regard to information and education, specific priorities include monitoring ground and surface water supplies; development of information for proper maintenance of water supply infrastructure; research and development related to groundwater; promotion of water conservation and protection practices; identification of water supply options depending on need; and assistance in assessing water supply alternatives.

Program funding options for the development of water supplies should be targetted to include the areas most severely impacted by drought and include the assessment of short-term measures, dugouts, pipelines, additional groundwater sources, etc. Water supply initiatives servicing a larger number of users and forming part of an overall water supply strategy should receive the highest priority. Project costs should be shared equally (1/3 federal, 1/3 provincial, 1/3 proponent).

Water commissions and regional water cooperatives should be established to assist in administering projects and setting priorities. Efforts should be focussed on existing agricultural needs, particularly where joint initiatives are possible. Planning studies and investigations should be specific to those areas experiencing water supply shortages, but should also consider future growth areas. MD/Counties that have completed water studies should be identified and assigned a higher priority for funding.

Potential surface water storage sites and groundwater sources should be identified. Increased funding should be allocated to locate aquifers having the quantity and quality required for agricultural production, with a focus on drought prone areas.

Solutions identified by Alberta's water management strategy should be implemented. In certain instances it may be appropriate to implement short-term measures to alleviate the impacts of drought while long-term solutions are being developed.

In terms of economic implications associated with irrigation, the major consumer of water, there has been extensive work done on the SSRB to develop a water management policy and assess the benefits of irrigation into the 21st century. These reports emphasize the economic importance of irrigation to the agricultural sector (Alberta Environment, South Saskatchewan River Basin Water Management Plan, 2001). There are also other benefits, such as:

- Increased yields - two to three times greater than dryer and non-irrigated areas;
- Crop diversification - broader range of crops including higher value crops;
- Stability - crop yields are more stable and reliable, resulting in greater income stability; and

- Diversity - as an example, nearly 60% of Alberta beef is fattened in southern Alberta's irrigated areas.

The economic value of irrigated land is illustrated by the following (Alberta Environment, South Saskatchewan River Basin Water Management Plan, 2001):

- 4% of crop land is irrigated;
- Irrigated land generates more than 14% of farm cash income;
- Approximately 11% of the agriculture is value added; and
- Provides 19% of direct agriculture employment.

The South Saskatchewan River Basin Water Management Plan realizes that without a substantially expanded water supply system the following forecasts can not be achieved:

1. Livestock - a 50% increase in the meat processing industry in the irrigation-dependent south. This will require an increase in forage production and a shift away from cereal grain crops which is anticipated to occur by 2010 (Alberta Environment, South Saskatchewan River Basin Water Management Plan, 2001).
2. Agri-processing - expected to grow at approximately 4% per year, slightly higher in irrigation areas. Value added crops are an integral part of this growth, particularly potatoes, sugar beets, and vegetable production, all of which are highly dependent on irrigation. By 2010, the impact of value-added crops will be about $248 million or an increase of 27% from the current level (Alberta Environment, South Saskatchewan River Basin Water Management Plan, 2001).

5.1.3 Program Option Summary

In Alberta, areas recommended for specific projects are located in drought sensitive locations in the north, east and south. Projects include locating and developing surface and groundwater of suitable quality and quantity to serve regional needs.

To the south, funding is recommended to assess means of improving irrigation efficiency while monitoring groundwater levels and contamination in the SSRB. Regional pipelines to distribute water are an option throughout Alberta. In the

regions northeast of Edmonton, the investigation of the potential for deeper wells should be considered for funding, together with regional pipelines and tank loaders.

Typical programs could include: water use or diversion monitoring; more regional groundwater assessment programs; the development of educational promotion material on water conservation and efficient use of water; transfer of existing water allocations to new users and provide a subsidy to assist with the license transfer costs; and training for rural treatment system operators.

Recommended projects are well testing and groundwater supply programs in low yield/poor water quality areas; assessment and analysis of water storage opportunities; conversion from high pressure to low pressure sprinkler/irrigation systems; regional water lines connecting farms and villages; groundwater and water monitoring metadata and data on the internet; community well construction; continuation of dugout programs in years with little spring runoff; rural municipal wells with truck fill (tank loader) stations; alternate watering systems; complete a groundwater inventory; and the restoration of existing water bodies.

It should be emphasized that any project should be evaluated based on the criteria put forth by the workshop participants, as well as certain pass/fail standards that have been identified. These are discussed in the workshop documentation in Appendix F.

5.2 SASKATCHEWAN

5.2.1 Constraints

Surface supplies are variable and there is a lack of supply in the southwest area. Groundwater supplies are of poor quality and water table levels have declined in some regions.

Water quality is variable and, in some cases, contaminated. High TDS in groundwater supplies requires treatment. Nitrates and pathogens contaminate many wells and constrain production.

Constraints relate to a lack of planning, inadequate groundwater mapping, incomplete data collection and education.

Water supply infrastructure is inadequate and the expense of developing regional pipelines is a constraint. Irrigation infrastructure is inadequate for the production of high value crops in order to meet the requirements of industry. Older dams need to be refurbished and in some cases, decommissioned. Older wells have deteriorated and require maintenance. A constraint is the limited implementation of deeper wells and the associated treatment costs. Deteriorated irrigation pipelines need to be replaced.

5.2.2 Priorities

In Saskatchewan, priorities include identifying secure sources for long-term water supply solutions and identifying development options; information development for more sustainable projects and Best Management Practices (BMP) for water conservation; conservation of soil moisture and capturing spring run-off in wetlands and depressions; and integrated water resource management.

Funding priorities should be: construction of sustainable drought proof supplies; maintenance of existing large-scale facilities; development of information, and water supply infrastructure for the irrigation of higher value crops.

5.2.3 Program Option Summary

The south, southwest, northwest, west central and central areas of Saskatchewan have been heavily impacted by the drought. The areas are shown on Figures P1, P2, P4, and P5 in Appendix A.

The following projects are recommended for consideration in drought impacted areas: regional pipelines to augment and provide continuity of supply; investigation of potential aquifers and the construction of deep wells; development of regional pipelines from secure sources such as the North and South Saskatchewan Rivers; construction of infrastructure to serve high value crops; extension of pipelines to environmentally sustainable ILO sites; safe reliable water to farm homes; centre of excellence focussed on all aspects of water supply including water conservation; construction of infrastructure in existing irrigation areas; groundwater investigations for specific projects such as ILOs; and plan facilities to accommodate a 20 year time frame, with incremental costs shared or absorbed with NWSEP.

5.3 MANITOBA

5.3.1 Constraints

Local availability of good quality water constrains agricultural production and the expansion of value added crops. Livestock operations require guaranteed sources of good quality water.

The primary constraint in dealing with agricultural water supply issues is funding. Funding is required for off-farm infrastructure; for irrigation development and expansion, and for projects to service drought-susceptible regions.

There is an inadequate knowledge base on the potential for groundwater developments in select areas and an inadequate groundwater database to make informed decisions.

Infrastructure constraints include funding for: expanding existing systems such as domestic water distribution systems; water treatment plants; regional pipelines; and irrigation systems for value-added crop production.

5.3.2 Priorities

Priorities for future action do not only involve water supply for crop production but also include ensuring that domestic water supplies for rural, municipal and on-farm domestic use are safe and not a hazard to health.

Water supply developments for the irrigation of high-valued crops in selected areas are a priority. The construction of water infrastructure in the southwestern region to promote growth of the livestock industry is a priority. Projects that will provide an acceptable return on investment should receive priority funding.

Improving the knowledge base on the potential for groundwater developments in select areas is another priority.

5.3.3 Program Option Summary

Manitoba has not experienced the same severity of drought as Saskatchewan and Alberta, nevertheless water supply constraints are a continuing concern. The primary areas where water supply needs exist include the northwest, southwest, and south central regions.

Projects recommended for funding consideration include: irrigation infrastructure to support high value crops; providing safe and reliable water supply for rural domestic use; providing safe and reliable water supply to the agricultural industry; and off stream storage projects to augment summer water supplies.

5.4 PRAIRIE PROVINCES

The NWSEP should be part of a long-range plan to address water supply issues. Certain program options are common to all three Prairie Provinces, and need specific funding to support long-term initiatives. These include:

1. Planning studies and investigations to enable priorities to be established for both short and long-term projects.

2. Data acquisition, evaluation and analysis with a particular focus on groundwater.

3. Funding for water supply infrastructure.

A portion of the NWSEP funding should be allocated to these initiatives. In addition, it is recommended that application of rigorous evaluation criteria be conducted. The details of the evaluation process and the relative weight to each criteria are contained in the workshop documentation in Appendices F, G and H (for Alberta, Saskatchewan and Manitoba respectively).

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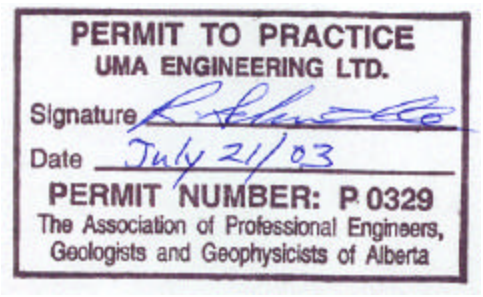
7.0 Report Submittal

This report has been prepared and submitted by UMA Engineering Ltd., as documented below:

UMA PERMIT



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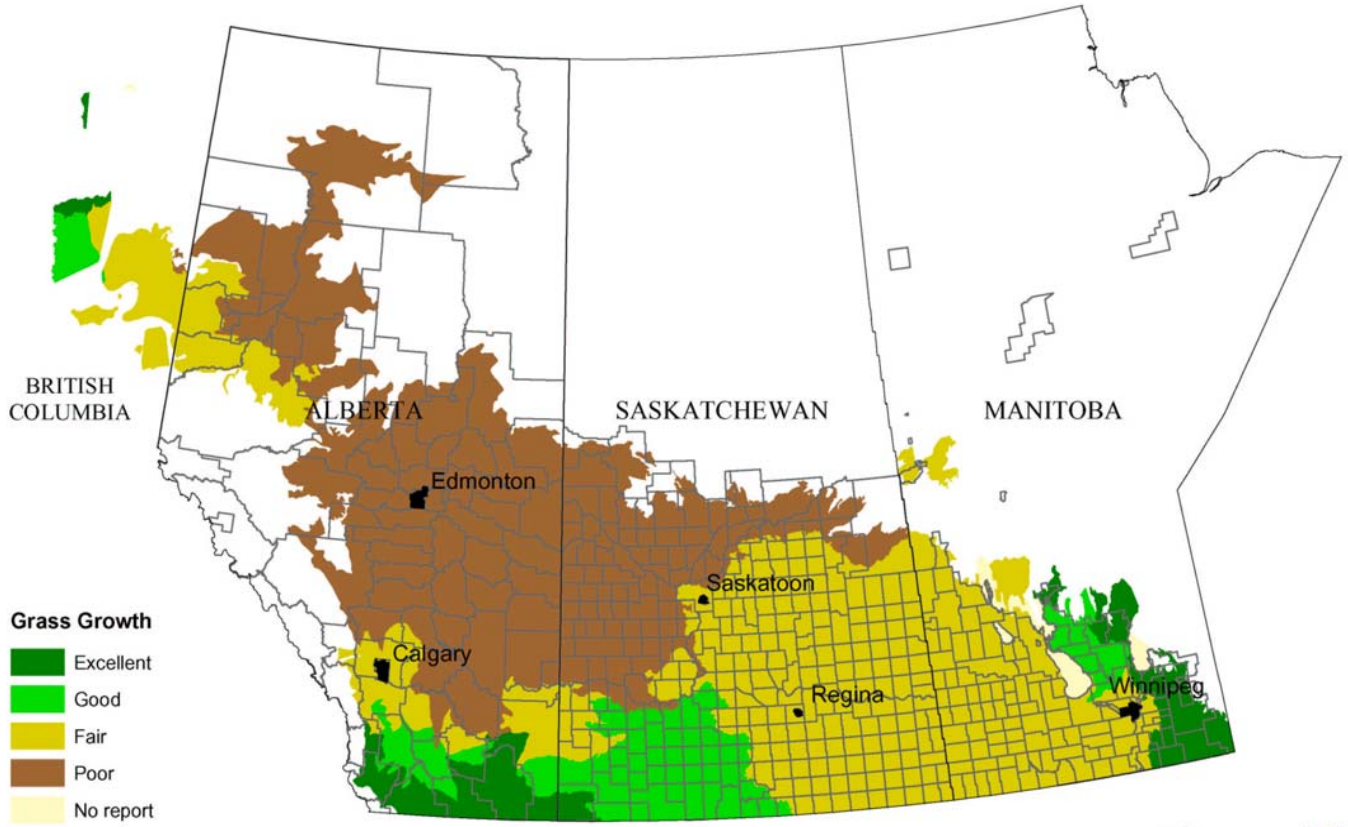
Appendix A - Figures

Prairies

P1 - Grass Growth on Pastures for 6 August 2002

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Grass Growth on Pastures for 6 August 2002



Canada

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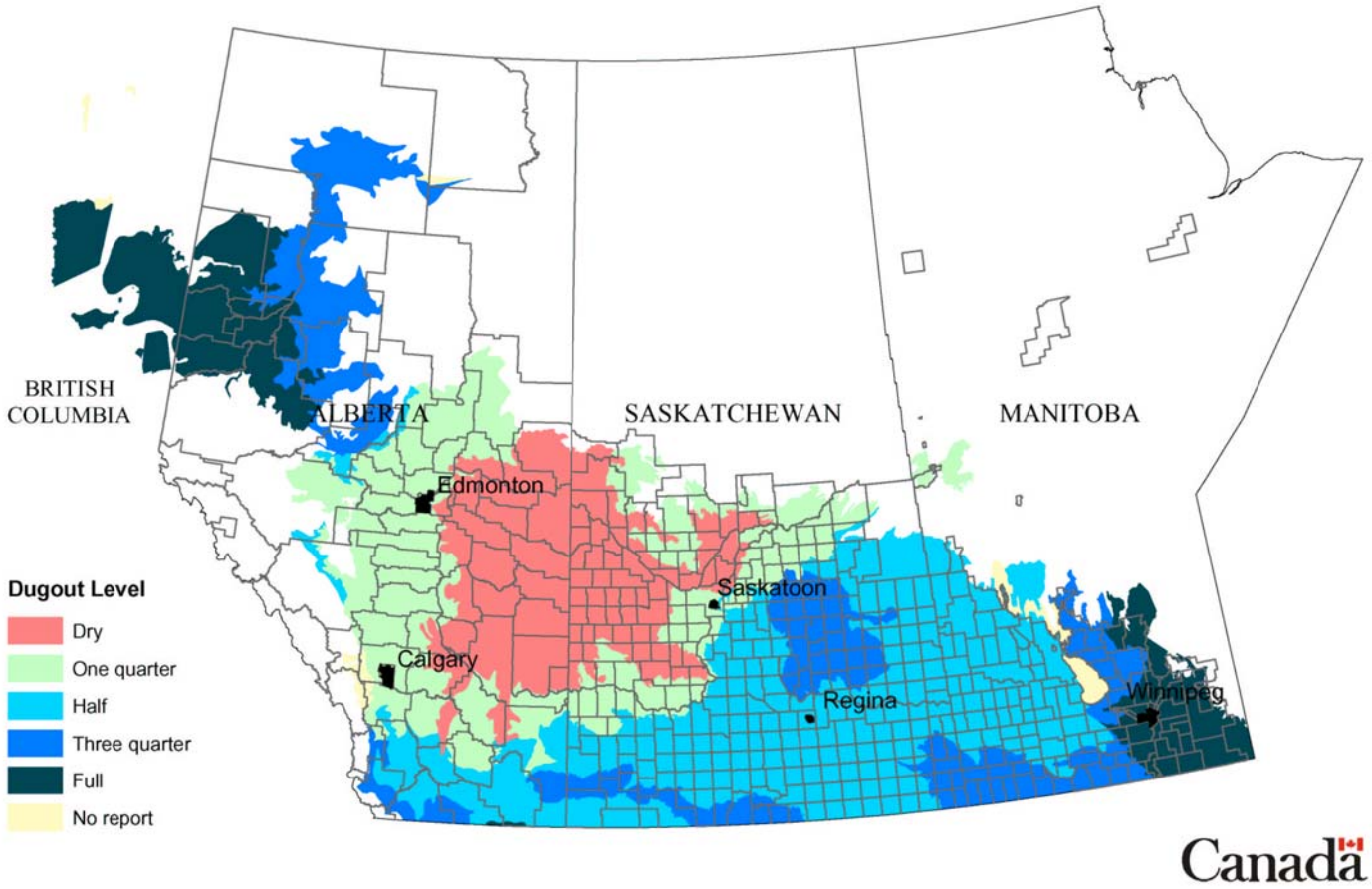
P2 - Dugout Levels of 28 October 2002

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Dugout Levels for 28 October 2002



Canada

P3 - Distribution of Wells Per Township in the Prairie Provinces

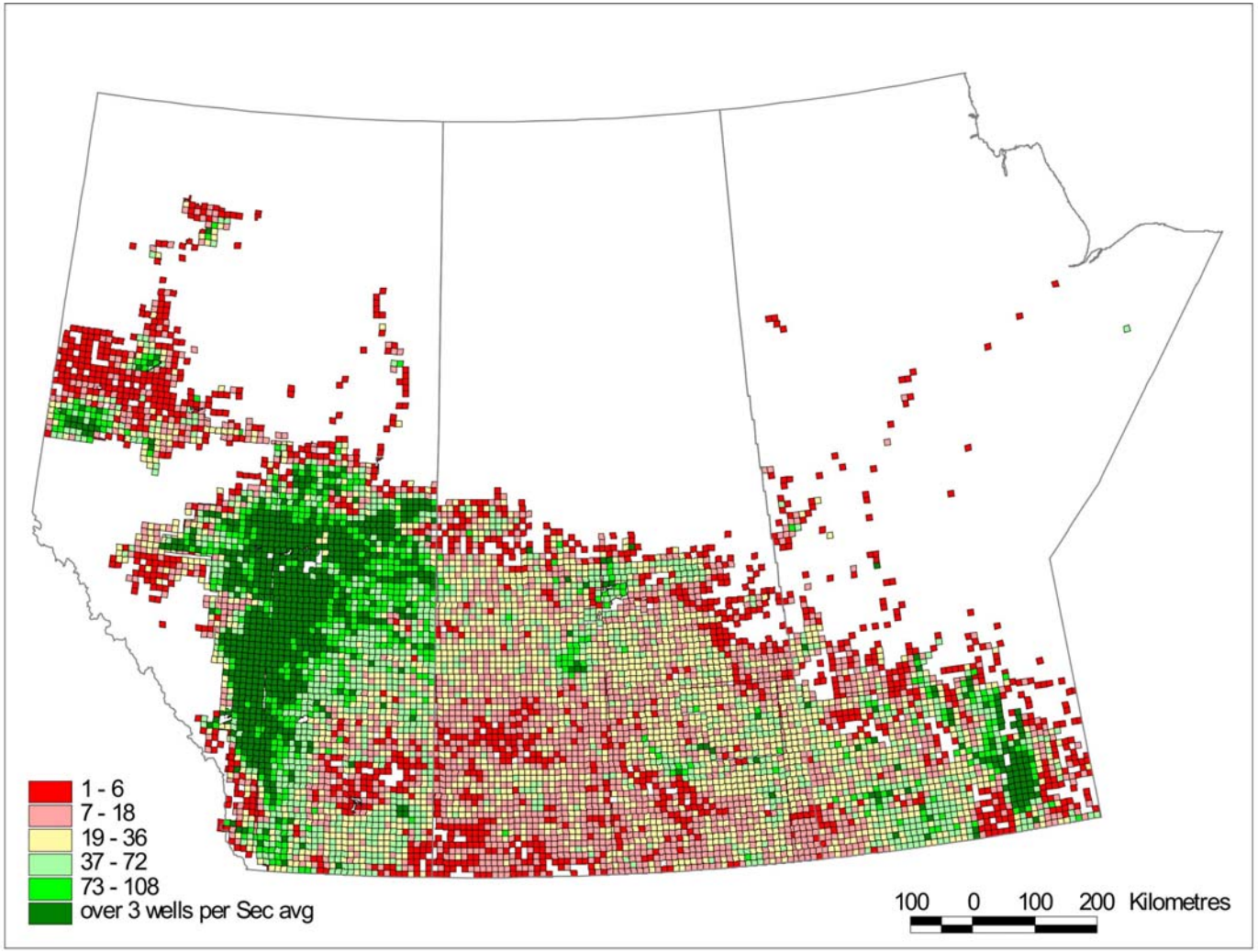


Figure 8 Distribution of wells per township in the Prairie provinces (Lebedin *et al.*, 2000)

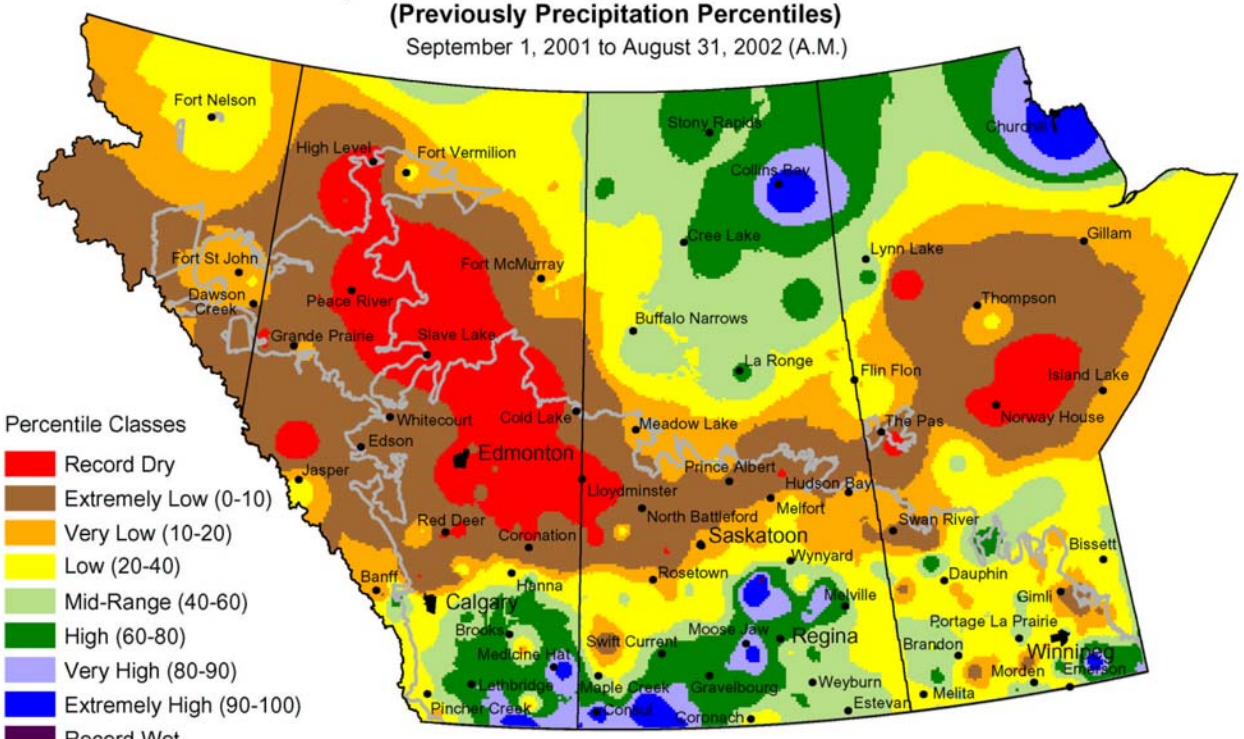
P4 – Current Precipitation Compared to Historical Distribution

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Current Precipitation Compared to Historical Distribution

(Previously Precipitation Percentiles)

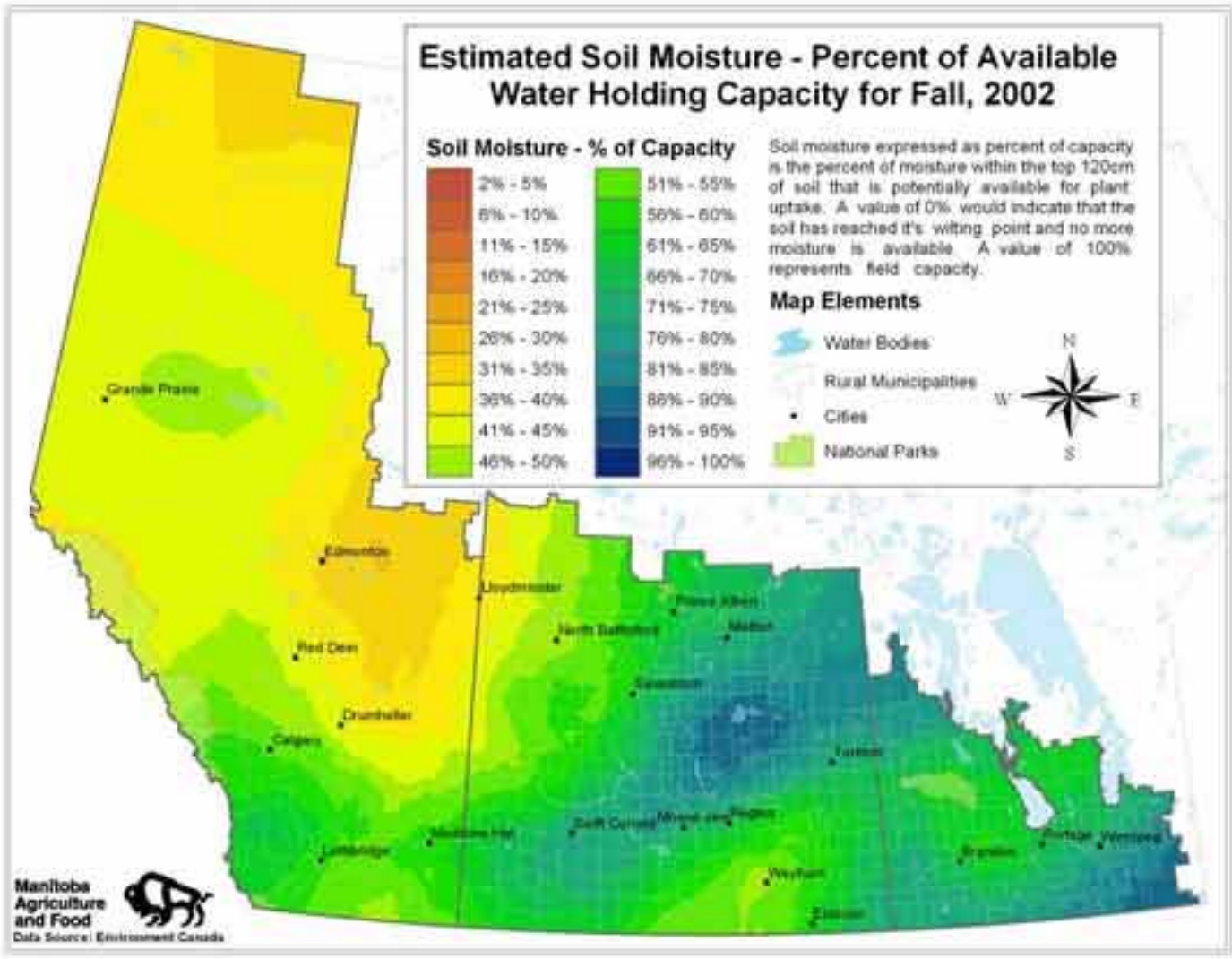
September 1, 2001 to August 31, 2002 (A.M.)



Prepared by PFRA (Prairie Farm Rehabilitation Administration) using data from the Timely Climate Monitoring Network and the many federal and provincial agencies and volunteers that support it.

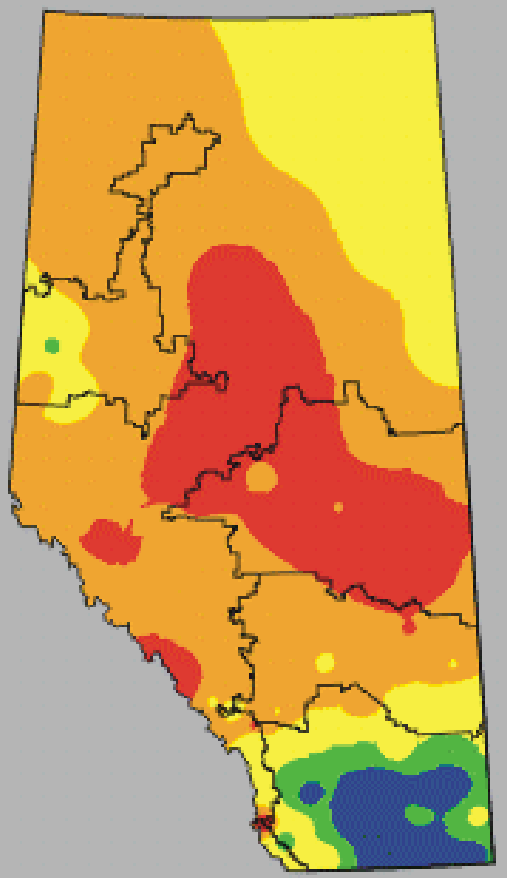
Canada

P5 - Estimated Soil Moisture


Estimated Soil Moisture - Percent of Available Water Holding Capacity for Fall, 2002
Soil Moisture - % of Capacity
2% - 5%
6% - 10%
11% - 15%
16% - 20%
21% - 25%
26% - 30%
31% - 35%
36% - 40%
41% - 45%
46% - 50%
51% - 55%
56% - 60%
61% - 65%
66% - 70%
71% - 75%
76% - 80%
81% - 85%
86% - 90%
91% - 95%
96% - 100%
Soil moisture expressed as percent of capacity is the percent of moisture within the top 120cm of soil that is potentially available for plant uptake. A value of 0% would indicate that the soil has reached it's wilting point and no more moisture is available. A value of 100% represents field capacity.
Map Elements
Water Bodies
Rural Municipalities
Cities
National Parks
N
W
E
S
Grande Prairie
Edmonton
Red Deer
Drumheller
Calgary
Lethbridge
Medicine Hat
Lloydminster
North Battleford
Melfort
Yorkton
Brandon
Portage
Westman
Manitoba Agriculture and Food
Data Source: Environment Canada

Alberta

A1 - Precipitation Departure,
April 1 to September 22, 2002



APRIL 1 - SEPTEMBER 22, 2002

Precipitation Departure

PERCENT OF 1971 - 2000 NORMAL

>150	Much Above
120–150	Above
80–120	Near
50–80	Below
<50	Much Below

Based on unverified data from Environment Canada

Alberta

AGRICULTURE FOOD AND RURAL DEVELOPMENT
Conservation and Development Branch
Resource Management and Irrigation Division

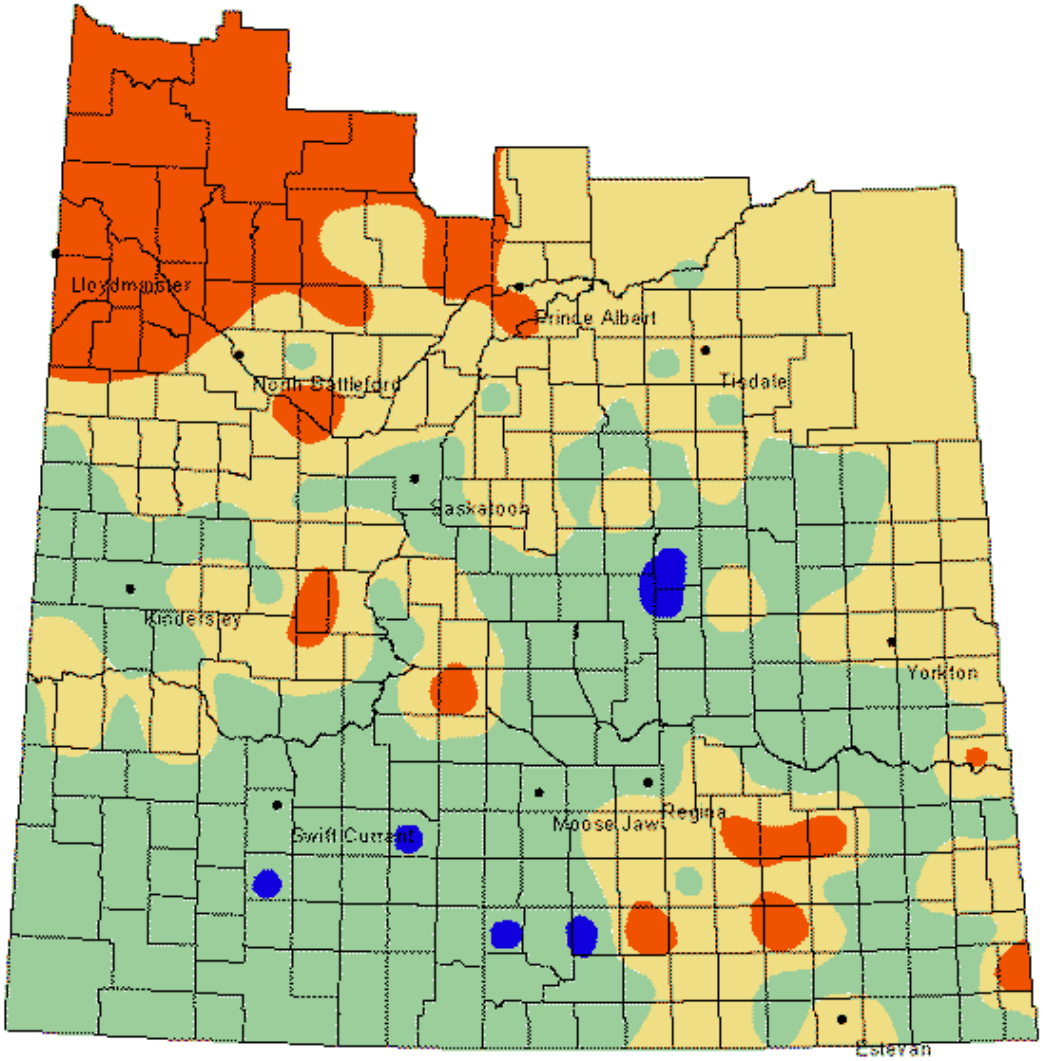
Saskatchewan

S1 - Crop Land Topsoil Moisture Conditions - November 3, 2002

Crop Land Topsoil Moisture Conditions

November 3, 2002

NOTE: Since techniques used to smooth the transition between zones can affect the values in localized areas, this map should be used for regional analysis only.



Saskatchewan Agriculture, Food and Rural Revitalization

Moisture Conditions
Excessive
Fair
Good
Poor

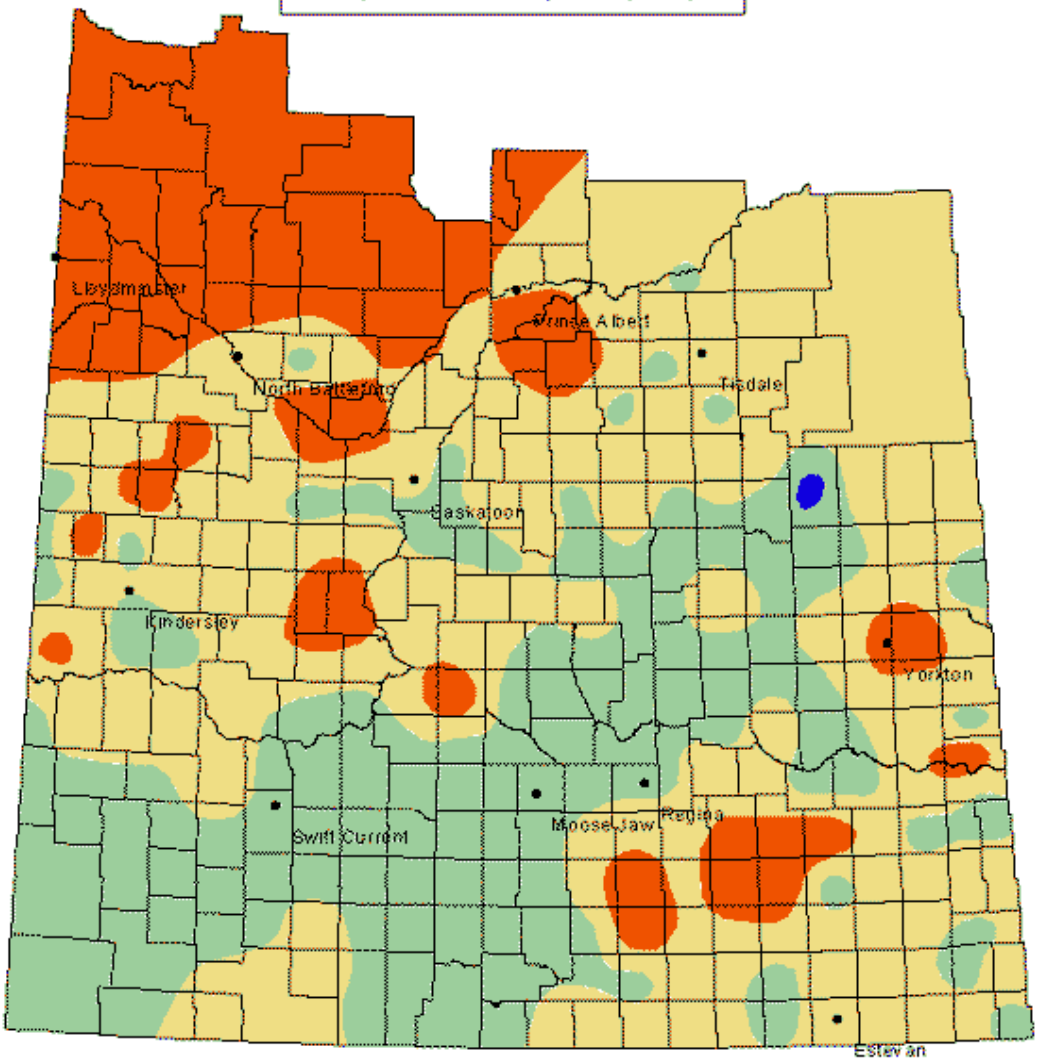
Prepared by:	Geomatics Unit, Policy Branch
Data source:	SAFRR Crop Report Database

S2 - Hay and Pasture Topsoil Moisture Conditions - November 3, 2002

Hay and Pasture Topsoil Moisture Conditions

November 3, 2002

NOTE: Since techniques used to smooth the transition between zones can affect the values in localized areas, this map should be used for regional analysis only.



Saskatchewan Agriculture, Food and Rural Revitalization	Moisture Conditions: Excessive, Good, Fair, Poor	Prepared by:	Geomatics Unit, Policy Branch
		Data source:	SAFRR Crop Report Database

Appendix B - Literature Review

A Prairie-Wide Perspective of non-point Agricultural Effects On Water Quality - A Review of Documented Evidence and Expert Opinion

- There is a public perception that water quality is worsening, and the concept of relative risk is central to the interpretation of water quality issues.
- Within the context of the Canadian Water Quality Guidelines, there is no clear evidence of wide-spread contamination of surface and groundwater from agricultural activities. Nitrate contamination of groundwater is a more common probability.
- Phosphorous contributions to surface waters are evident, although the net effect of agricultural loading is uncertain.
- Water quality risks associated with range livestock, irrigation salinity, and heavy metals are generally limited, with some local exceptions.
- Research priorities include the need to better understand the fate of agri-chemicals, to address the reduction of application losses, and take an overall watershed approach to water quality management.
- Public policy should acknowledge current safe levels and practices, while encouraging increased public involvement in evaluations and decision-making.
- There is a need for the prairie-wide coordination of water quality activities. This is required on a multi-agency basis to assure a unified approach towards effectively achieving common water quality priorities within the limited resources available.

Economic Aspects of Rural Water Quality

- It makes economic sense to protect water supplies from contamination.
- Improved water quality can provide economic benefits to producers.
- It makes economic sense to invest in the basic protection practices such as proper well location, surface contouring and proper sealing of abandoned wells.
- It is more cost effective to protect the water source from contamination rather than remedy the problem once it occurs.

- Rectification requires developing alternate sources of water such as custom hauling domestic water, drilling a new well in a different non-contaminated aquifer or developing a new dugout water supply.
- In the extreme case where the only non-contaminated alternate water source is hauled water, and if the probability of contamination in a given year is greater than 0.4%, it make sense to implement recommended management practices.
- If the probability of single events of low levels of bacterial, phosphate or turbidity contamination is greater than 2% per year, it makes economic sense to implement the recommended protection practices including controlled inlet structures, remote livestock watering, and grassed buffer strips.
- Rectification of higher levels of persistent bacterial and phosphate contamination requires developing an alternate water source. Pesticide and petroleum contamination of surface water also requires developing an alternate water source.
- Rural homeowners can expect to pay from two to seven times more for equal volumes of quality water supplies compared to their municipal counterparts.
- The least expensive rural water source is a shallow well. The most expensive rural water alternative is custom hauled water.
- It is expected that increased performance for swine and poultry because of clean water supplies will surpass the improvement in cattle performance.
- There is a benefit of utilizing clean water in herbicide mixes.
- Family health is a major economic consideration in protecting water quality because illness is very expensive from the perspective of lost employment.
- Peace of mind is another major consideration in estimating costs. When the full costs of human health are considered in the decision to protect and treat water supplies, the economic rational of implementing proper domestic water management practices becomes even more overwhelming.

Potential Impact of Climate Change on Prairie Groundwater Supplies

- With respect to groundwater, formal federal – provincial arrangements are needed to respect the jurisdiction of the Provinces and to avoid conflicts and overlap of efforts.
- Development, management and protection of groundwater cannot be separated from surface water development, management and protection. An integrated water resources management approach is required.
- An in-depth review of the long-term hydrographs from the provincial groundwater level observation well networks is needed with the objectives to:
  - classify the hydrographs according to aquifer types;
  - identify hydrographs in settings unaffected by man-induced influences;
  - develop relationships between climate and groundwater level fluctuations;
  - develop a definition of groundwater drought, applicable to the Prairie Provinces;
  - develop a prairie wide network of groundwater level observation wells for monitoring the impact of climate change;
  - develop a network of groundwater level observation wells in support of the research related to the behavior of water levels in sloughs; and
  - conduct detailed analyses of the long-term impact of man on the behavior of water levels in regional aquifers, to be able to better predict climate change-induced increased withdrawals.
- Further research is needed into the relationship between the behavior of sloughs and regional climatic conditions, thus allowing for more reliable predictions of the impact of climate change on groundwater recharge.
- If the assumption that the thickness of the oxidized zone is an indication of the water table elevation during the driest period after deglaciation is true, determination of this thickness throughout the prairies will provide invaluable information as to the impact of drought on water table levels.
- Understanding of the behavior of large-scale regional aquifers is needed to predict the impact of increased demand as a result of climate change. The Judith River aquifer is a primary example since it is a large-scale regional aquifer,

covering large portions of Saskatchewan and Alberta, and extends into the United States. It is an important source of water supply in these areas.

- To date little remains known about regional recharge to the various types of aquifers. Studies to quantify the recharge to surficial aquifers are needed in particular since these types of aquifers are the most susceptible to climate change.
- Cretaceous silts and clays form major aquitards within the Eastern Sedimentary Basin. However, to date, little is known about the hydraulic properties of these sediments, in particular from a regional perspective.
- Within each of the Prairie Provinces, various departments/organizations have groundwater quality data, but there is little to no integration of these data and/or linking of the water quality data to the water well databases.
- From a research perspective there is a need to: conduct both random and aquifer based regional groundwater quality surveys, focused on naturally occurring trace elements, establish long-term groundwater quality monitor networks, and study the hydrochemistry and hydrochemical evolution of groundwaters in large regional aquifers
- Except for Saskatchewan, correlation of the Quaternary stratigraphy on a province wide scale has not been done. Further research is needed in correlating the Quaternary stratigraphy/geology along the Manitoba-Saskatchewan and Saskatchewan-Alberta borders.
- Available database information does not provide information on functional well history on important aspects such as production (except on licensed wells), longevity or efficiency. The total investment in wells in the Prairie Provinces is estimated to be $1.8 billion. Further research is warranted to identify methods to protect this investment by measures intended to extend well life, improve reliability and extraction efficiency.

Rural Drinking Water And Waterborne Illness

- The role of water as a carrier of microbes that are disease-causing in humans is often overlooked with diseases being vastly under-reported.
- Some diseases can exhibit clinically mild symptoms with patients not seeking medical help. The frequency of reporting is also affected by awareness, interest and the availability of resources in different areas.
- The portion of a specific disease that can be attributed to water is also typically not known. The environmental occurrence of most existing and several emerging waterborne disease agents, such as enteric viruses, has not been established.
- Waterborne illnesses are not restricted to diarrheal diseases, with several severe diseases being implicated with waterborne transmissions including heart attacks, insulin dependent diabetes, Guillain-Barre syndrome and Hemolytic Uremic Syndrome.
- The official health statistics from 1990 to 1998 were examined for five reportable illnesses caused by microorganisms with a potential waterborne transmission path: giardiasis, campylobacteriosis, shigellosis, haemorrhagic colitis or hemolytic uremic syndrome, and hepatitis A. These diseases were especially prominent in the Prairie Provinces except for campylobacteriosis.
- Rural areas in the Prairie Provinces have especially challenging water quality problems due to high levels of dissolved organic material and predominantly agricultural drainage basins.
- Infants exposed to pathogenic microbes are much more likely to develop disease and the outcome of an infection is much more severe than in the general population.
- The three Prairie Provinces were among the four Provinces with highest average infant mortality rates. Rural Canada has a 40% higher infant mortality rate compared with urban Canada.
- Higher infant mortality in Canada has also been ascribed to First Nations. First Nations have frequently difficult to treat water with limited expertise.

- While the connections between waterborne microorganisms and a variety of diseases and health indicators (such as infant mortality) remain to be established, it is clear that rural areas cannot take safe drinking water for granted.
- Mechanisms to produce safe drinking water from poor sources needs to be determined. Simple, yet effective systems need to be designed, which should allow for the lack of highly skilled water treatment plant operators.

Rural Water Safety: From the Source to The On-Farm Tap

- Four million Canadians rely on private water supplies. Access to water that is safe for consumption and suitable for domestic use is a very real issue.
- Good quality water for use in the agriculture and the agri-food sector may not be readily available. Many of these private water supplies are in rural areas, where water is taken from surface or groundwater sources. These supplies may be of naturally poor quality, or may have had their quality affected by municipal, industrial or agricultural activities.
- Options to protect and enhance the quality of private water supplies include source protection Best Management Practices (BMP), source enhancement, and water treatment using innovative small-scale systems.
- AAFC has conducted applied research into effective and affordable BMPs (remote livestock watering, low-drift nozzles for farm chemicals, methods to reduce agro-chemical leaching, etc.).
- Source enhancement strategies were studied using aeration for farm ponds or preventative maintenance procedures for groundwater wells.
- A variety of water treatment technologies were adapted to the small-scale needs for farms including: coagulation, biological sand and biological carbon filtration, membrane filtration using micro-filters, nano filters or reverse osmosis processes, and disinfection systems using chlorination or ultraviolet light.
- AAFC's research project included a technology transfer component, to ensure that the knowledge gained in the research was available to those that need the information, and to help decision makers address rural water quality problems.

- AAFC's research indicated that there are practical solutions to rural water quality problems, that there is an increasing need to test protection and treatment technologies and to provide unbiased information on their effectiveness, and, that rural Canadians and the agri-food sector would like to see governments become more involved in rural water quality research and knowledge transfer.

The Health of Our Water – Toward Sustainable Agriculture in Canada

- Water is used in livestock production mainly for animal drinking, but also for cleaning facilities and equipment and for diluting manure. Nationally, agriculture withdraws a relatively small amount of water compared with thermal power generation and manufacturing but it consumes much of what it uses, returning less than 30% to sources.
- Most water quality guidelines are based on chemical concentrations or the numbers of organisms present. A more holistic approach considers all properties of water—physical, chemical, and biological, and their combined effects. National and Provincial programs to monitor water quality have been greatly reduced in recent years.
- Monitoring is now most often carried out cooperatively among several partners. Agricultural contributions to declining water quality may be significant but difficult to measure. Agriculture depends on the availability of good-quality water and may risk impaired production if this resource is threatened.
- Soil conservation practices have reduced soil erosion and the amount of soil moving into waterways. As sedimentation is reduced, so is the movement into water of substances attached to soil particles, such as phosphorus, pesticides, and bacteria.
- The amount of sediment entering surface water from farmland is lowest in the Prairies and highest in the potato-growing areas of the Atlantic Provinces. Nitrogen together with phosphorus, may cause eutrophication. Concentrations of nutrients exceed water quality guidelines where large quantities of manure and fertilizer are used.
- Pesticide concentrations are rarely measured at levels that exceed guidelines for drinking water. Guidelines for irrigation and for the protection of aquatic life are sometimes exceeded.

- Contamination by agriculturally derived bacteria is common. Bacteria numbers are elevated in runoff from manure-treated fields although their abundance in surface waters has not been directly related to livestock density.
- Heavy metal contamination of surface waters has not been linked to agricultural practices including application of sewage sludge.
- The main effect of agriculture on groundwater quality is the contamination by nitrate. Nitrate is present in nearly all groundwater underlying agricultural land but at levels below the guidelines. Concentrations are highest in areas of intensive production of crops with high nitrogen needs, intensive livestock production, permeable soils, and irrigated agriculture or heavy rainfall.
- Nitrate concentrations in wells have not changed markedly over the past 40 to 50 years. In Ontario, however, comparisons with earlier data suggest that the incidence of bacteria in well water has almost doubled due to faulty well construction.
- The effects of agriculture on aquatic ecosystems are not as well documented as its effects on the quality of surface water and groundwater. These ecological issues are best viewed in the context of the watershed.
- Agricultural practices often interface with the aquatic components of a watershed and always have positive or negative effects including altering wildlife habitat, the physical nature of waterways, and water quality. These changes in turn affect the structure and stability of biological communities, often reducing biodiversity. Irrigation development in dry regions sometimes introduces aquatic habitat.
- Farmers can improve water quality by controlling runoff and erosion, the management of agricultural inputs and wastes, and making use of buffer zones and shelterbelts. The industry is developing guidelines and codes that define acceptable agricultural practices, encourage the adoption of environmental farm plans, and, in some cases, offer peer advice on resolving nuisance or pollution complaints. Government responsibility for protecting water quality related to agriculture includes education and training, policy and programs that target areas of intensive crop and livestock production, and regulation.

- With possible climate change and increasing trends in population, urbanization, and consumptive use, the impacts of drought can only become more serious. Year-round water supplies are maintained using storage reservoirs and dugouts, particularly in the drier parts of the country.
- Artificial drainage has allowed many areas of Canada to be brought into profitable agricultural production, including areas of highly productive organic soils. Good drainage improves plant growth and yields, helps reduce soil salinity, and allows farmers a wider selection of crops and a longer growing season. Surface drainage systems result in the loss of some farmable land and may increase the risk of soil erosion and contribute to declining water quality. Subsurface systems (tile drains) contribute to water pollution through leaching of nitrate and pesticides from soil into streams. Drainage systems can alter the environment by draining wetlands, removing riparian zones, increasing runoff, and changing a region's hydrology. Proper design and maintenance of drainage systems may alleviate some of these effects, but lost riparian and wetland systems are often difficult to replace. On-farm drainage systems are not able to handle large volumes of stormwater received from developed land. Properly designed regional drainage systems may be needed to protect lowland agricultural areas. Even so, damage from major floods cannot always be prevented.
- Competition for water among users is expected to grow as water supplies fall short of increased demand, giving rise to conflict in some cases. Agriculture's chief competitors for water supplies are thermal power generation, manufacturing, and municipal water use. Wildlife habitat and fisheries are other important uses of water that must be protected.
- Droughts may become more frequent and severe as a result of global warming. The availability of water for expanding both irrigated agriculture and large-scale livestock production, especially in western Canada, may also be limited. Groundwater, where available, is not always of suitable quality for these types of farming. Expansion of intensive livestock operations may be curbed by concerns for the impact of manure on water quality. Environmental liability is an issue of growing concern to farmers. Economic and environmental policies to protect water quality may limit agricultural growth. The technologies needed to improve environmental performance are not all now available or affordable for farmers.

The Potential For Irrigation Expansion in Western Canada

- A consensus-based agriculture industry growth scenario identified a cropland productivity shortage equivalent to 2.8 million hectares, and a forage productivity shortage equivalent to 3.4 million hectares on the Prairies. AAFC-PFRA reviewed current data to determine if irrigation could provide a means to offset predicted productivity shortfalls.
- In order to offset the cropland deficit, the amount of Prairie irrigated land required would approximately be between 1.4 and 1.86 million ha, assuming that irrigated land is nearly twice as productive as dryland areas.
- Alberta Agriculture's Irrigation Branch identified an estimated 78,180 ha for additional irrigation development in Alberta. Manitoba projections are for an additional 250,000 ha. There are two estimates for irrigation expansion in Saskatchewan. Sask Water estimates an additional 50 581 ha of land. Another estimate is for an additional 1,500,000. This estimate was based on the assumption that 780,000 dam^3 of water be transferred from the North Saskatchewan to the South Saskatchewan Basin. Using the more conservative Sask Water estimate, the Alberta, Saskatchewan and Manitoba total was brought up to up to 378,180 ha, enabling close to 1/3 of the deficit to be offset. By including the transfer option estimate, the prairie-wide irrigation total was raised to 1.8 million ha, enough to offset the crop land deficit.
- Expansion will likely be hindered by environmental concerns, competing water uses, and economic constraints. Both the Provinces of Alberta and Manitoba have established action plans for future irrigation development, and are more likely to contribute more new irrigation hectares in the near future than is Saskatchewan.
- Irrigation could offset some or possibly all of the identified crop productivity shortage. At a minimum, one third of the crop productivity deficit could be offset, and at a maximum, all of the crop productivity deficit could be eliminated.
- Efforts are currently underway across the Provinces to prepare for the anticipated future growth in irrigated agriculture. Work on expansion plans continues in Alberta and Manitoba. A similar action plan needs to be completed for Saskatchewan.

- Alberta's planning involves the use of computer modeling and scenario development. Models determine how much expansion can occur while staying within specified levels of risk. Manitoba and Saskatchewan could benefit from scenario development and should look to the Alberta example for assistance and future direction.
- Producers are currently in the midst of tough economic times and even an upturn in markets will not permit them to expand their operations to the degree required to offset the deficits.
- A substantial amount of public dollars will need to be invested in irrigation infrastructure, development, maintenance and improvements in order to achieve significant growth.
- Efforts will need to be made to educate the public on the benefits of irrigation, which include: greater productivity on a decreased land base, freeing up marginal land for more sustainable uses; a consistent and quality food supply; wildlife habitat, domestic, and recreational benefits through the establishment of reservoirs; and decreased production risks resulting from increasing climatic variability trends.
- Increased irrigation production may also have the ability to aid in the reduction of greenhouse gas emissions. This may be achieved through an increased production of carbon sequestering organic matter on irrigated versus dryland soils; through a reduction in the area of land under summer fallow; and by removing marginal land from crop production.
- Further work needs to be done on the potential for irrigation expansion across the prairies including an examination of the social, environmental, and economic costs of expansion. A closer examination of the costs and returns of irrigation expansion, as well, a closer look at water availability in Saskatchewan is also required.
- Further opportunities to assist in the offset of the identified deficit could be obtained through productivity maximization on existing land. Optimizing water and fertilizer application rates, along with directing irrigation efforts to the most suitable lands will play an important role in productivity maximization across the prairies. The potential productivity gains from an increase in supplemental irrigation in the Alberta Peace River region should also be examined.

Vulnerability and Adaptation to Climate Change

- Resource managers and scientists across Canada suggest a number of adaptation measures that could reduce vulnerability. However, Canadian actions appear to be moving towards greater rather than less vulnerability.
- The nature and reliability of the new generation of climate models was examined. It is shown that the observed trends to date are consistent with model projections of the future.
- Among the most important effects of the climate scenarios on Canadian water resources are:
  - Declines in low season river flows and lake levels and higher water temperature in most of southern Canada, with potentially serious implications,
  - Groundwater levels and quality are also likely to be under greater stress with levels declining in populated southern regions,
  - Greater frequency of high intensity rainfalls that would increase soil erosion, flash floods and storm sewer overflow,
  - Average annual flood peaks are expected to be lower in most regions, but occasional very large floods are likely to occur in vulnerable river systems,
  - Sea level rise, combined with more severe winter storms, poses major flood and erosion risks in coastal areas,
  - Melting of permafrost poses difficult problems for roads and infrastructure of northern regions, and
  - Changing flow patterns and ice conditions have direct effects on wildlife distribution and survival, and in turn on subsistence communities of the north.
- A large number of specific adaptation measures were identified in each region and documented. Among those most frequently identified were:
  - water conservation measures by all users;
  - greater emphasis on planning and preparedness for droughts and severe floods;

- expanded efforts at water quality protection from agricultural, industrial and human wastes;
- renewal of federal-provincial monitoring efforts,
- improved procedures for fair allocation of water within basins, Provinces, and between jurisdictions, taking in-stream ecosystem needs into account.

- It will be immediately noted that these measures would be wise ones even if climate did not change much from the variability of the past few decades.
- With reductions in monitoring the knowledge and database has been eroding. Analyses of the present and probable future effects of climate change make constructive response urgent.
- While much needs to be done at local and provincial levels, the framework for appropriate adaptation and management must be provided at a national level (federal and federal-provincial).
- The following recommendations are directed towards the federal government:
  - create an inter-agency coordination mechanism to develop a national strategy for water resources and climate change, and to implement federal actions (e.g. transboundary issues, monitoring, science, etc.);
  - create a mechanism for federal-provincial and multi-stakeholder coordination to advise on and implement the strategy;
  - in light of water sector vulnerability and uncertainties associated with climate change, work with Provinces to prevent or limit interbasin diversions or bulk transfers of water, especially out of Canada;
  - support research and studies on regional scale climate and hydrological prediction and on adaptation measures;
  - organize a broad-based national conference involving all stakeholders on water resources and climate change to help set agenda and priorities;
  - challenge the Canadian Climate Program Board to provide guidance on research priorities for climate science, water sector vulnerability and adaptation studies, particularly for new and renewed research funds;

- as part of creating a mechanism for federal-provincial and multi-stakeholder coordination to advise on and implement the strategy, place high priority on restoring the essential monitoring of water quantity, water pollution and freshwater ecosystem health.

Water Wells - Maintaining A Valuable Prairie Resource

- Groundwater is the main water supply source in most rural areas across the Canadian Prairies. A joint study conducted by the PFRA (PFRA) and the provincial groundwater agencies indicates that since 1960, nearly 400,000 water wells have been installed across the Prairie region.
- The wide distribution implies that groundwater supplies are available in most areas. The reliance on groundwater varies in different areas due to the varying degrees of development. Due to this heavy reliance on water wells by the rural sector, proper operation and maintenance is essential in ensuring a reliable, long-term water supply. There will continue to be an increased reliance on groundwater. Ongoing monitoring and maintenance is the key in prolonging and sustaining the life of water well infrastructure across the Prairies.
- A properly designed and constructed well is the first step in ensuring a reliable and sustainable groundwater supply, since it should increase the life expectancy of the well by reducing operating and maintenance costs. A licensed water well driller with experience in a region should be contacted to provide guidance in choosing appropriate materials and construction methods.
- The well should be positioned upslope from any potential contamination sources with surface water diverted away from the well. Ponding should be prevented around the well. There should be grout seal around the well casing and the well cap should be secured on top of the casing with a screened vent. The well should be accessible for regular cleaning, testing and maintenance.
- Regular monitoring will signal any changes in water levels and water quality that may affect well performance. If left unchecked, well performance can deteriorate due to biological and/or mineral plugging of the well intake and surrounding aquifer material. This may affect both the yield and water quality obtained from the well.

- A proper well design, as well as implementing regular monitoring and well maintenance procedures, is essential ingredients in securing a safe and reliable groundwater supply.

Meridian Dam Preliminary Feasibility Study (Alberta/Saskatchewan)

- The study determined that building a dam on the South Saskatchewan River near the Saskatchewan-Alberta border would not be feasible because the estimated project costs far outweigh the potential benefits, and building such a project would necessitate an unjustifiable investment of public money.
- The project was not considered economically viable even before even considering the possible environmental impact.

Saskatchewan

Action Committee on the Rural Economy

- ACRE concluded that the fundamental change to revive the fortunes of rural Saskatchewan must come from the residents of rural Saskatchewan. There are many examples of entrepreneurs and local communities taking advantage of opportunities and creating wealth and employment.
- We cannot keep doing what we have been doing if we are truly serious about reversing the decline. The negative attitude of some Saskatchewan residents about rural Saskatchewan is a major obstacle that does not make it an attractive place for new immigrants or for new investment
- If we wish to stop the decline of population and keep young people in rural Saskatchewan we need to create jobs. The creation of jobs will come about from entrepreneurs and local communities. Through hard work and investment these ideas will translate into profitable businesses and create employment.
- The role of government is to set the proper economic and business climate and remove roadblocks so that entrepreneurs and communities can take advantage of opportunities.

- The decline in rural Saskatchewan has been an on-going process for 50 years. ACRE believes that the revitalization process will be at least a 20-year project. This time period is the only way of achieving long-term sustainable growth in rural Saskatchewan.

Effluent Irrigation: Saskatchewan Perspective

- There is considerable potential for effluent irrigation in the Prairie Provinces. Some jurisdictions view effluent irrigation as a means of wastewater disposal and others view effluent as a resource for economic development.
- A literature review conducted for the Irrigation Sustainability Component of the Canada-Saskatchewan Agriculture Green Plan Agreement (CSAGPA) indicates that a wide range of guidelines for effluent irrigation projects are used throughout the world.
- Monitoring data from two large effluent irrigation projects in Saskatchewan have shown that the soil biosystem will be altered with the application of sewage effluent. It should be sustainable, however, provided proper management practices are followed.

Groundwater Quality in Rural Saskatchewan-Emerging Issues For Drinking Water

- In Saskatchewan, a large number of rural residents obtain their domestic and drinking water from groundwater supplies.
- In 1997, Sask Water launched an advisory program to aid and encourage regular testing of private water supplies within the province.
- The program provides assistance to rural residents for the collection, analysis and interpretation of water quality information. The data collected has also formed the basis of a valuable groundwater database, which can be used in the management of local and regional water supplies.
- During a two-year study, Sask Water sampled more than 500 wells ranging in type and depth and represented a variety of aquifers. The analytical results to date have identified a number of pathogens and chemical contaminants in the water that exceed both health-related and aesthetic objectives.

- A number of emerging health-related issues need to be addressed if the groundwater is to continue to be used as a drinking water supply.
- Most Saskatchewan groundwater supplies contain high levels of total dissolved solids, iron, and manganese. In most of the samples taken, one of more of the aesthetic objectives set for drinking water was exceeded. A number of pathogens and chemical contaminants were also identified, including nitrate, coliform bacteria, arsenic, and selenium.
- While the presence of dissolved organic carbon in surface water supplies has been well documented, organics are not routinely monitored for in groundwater supplies.
- The results of this program provide the first comprehensive assessment of groundwater quality throughout rural Saskatchewan and form an important component of the provincial groundwater database.

Irrigation Sustainability - Saskatchewan Activity

- In Western Canada, irrigation has been viewed as a mechanism for stabilizing agricultural production by overcoming problems associated with drought and allowing for the diversification of crop production.
- It is critical that the long-term environmental effects of irrigation be understood if the negative impacts on soil and water are to be avoided and irrigation is to continue its contribution to the diversification of agriculture.
- The Canada-Saskatchewan Irrigation Diversification Centre (CSIDC) has developed an applied research and demonstration program designed to evaluate irrigation sustainability. Four project areas were identified: (1) pesticide and nutrient losses and groundwater contamination under irrigated conditions; (2) evaluation of the effects of irrigation on soil quality; (3) water conservation and water use efficiency; and (4) effluent irrigation management.
- It has been estimated in Alberta that 20% of the province's agricultural production comes from 4% of the arable land, which is irrigated.

- The sustainability of irrigation is questioned due to its sometimes detrimental effect on the environment. It is important that the long term environmental effects of irrigation be understood if the negative impacts on soil and water are to be avoided.
- The Canada-Saskatchewan Irrigation Diversification Centre (CSIDC), located at Outlook, Saskatchewan, has played an important role in advancing irrigation technology. It conducts, funds and facilitates many irrigated research and demonstration projects.
- The initial emphasis at CSIDC was crop diversification through varietal and agronomic evaluation; more recently emphasis has been placed on resource care issues.
- In addition to the four study areas, three additional smaller studies were initiated: i) production of a trickle irrigation manual; ii) literature review of emerging centre pivot application technology; and iii) data synthesis of a hog effluent irrigation project.

Rural Water Quality Survey-January 31, 2001

- A core objective of this research is to explore the extent to which water quality is a barrier to the expansion of agri-food processing and specialized agriculture in rural areas of Saskatchewan.
- Based on recent research documentation and water quality surveys, the primary categories of sources of water quality problems in the province include: biological and microbiological, chemical, physical and aesthetic.
- The literature offers the following on available water treatment technologies: regular testing (four times a year) filtration and biofiltration systems – utilize sand of activated carbon to remove undesirable or larger sized matter as primary treatment, reverse osmosis and membranes – removes salts and solids, ultraviolet light, distillation, and disinfection.
- The technical literature confirms that water quality can and does have an important impact on productivity and costs in agri-food processing.
- Access to water (water quantity) remains "top of mind" for those in the business.

- Saskatchewan water, from both ground and surface sources, poses unique challenges to producers and processors. Some of the water quality issues include sulphates, hardness, calcium, algae, microbiological organisms, nitrates, etc.
- The level of awareness of water quality issues on the prairies seems to be quite vulnerable.
- The most obvious solution available to processors is to locate their plant where there is a consistent supply of competitively priced water of acceptable quality.
- Rural communities would have a better chance of attracting a processor if they can offer groundwater of consistent quality, even if there are dissolved minerals which must be removed.
- Many respondents to survey had been sold systems that did not work. Further, they expect to pay about $1,500 for a water treatment system. Softeners are the most common form of treatment, followed by carbon filtration and shock chlorination.
- Experts believe that water quality issues are an important constraint to agricultural processing in rural areas. Further they noted that some important gaps in basic knowledge exist across the spectrum of agricultural processing. The review of the literature also confirmed these gaps.
- In contrast producers/processors seem to have mixed views about water quality and its importance to their operation. On the one hand most agree that water quality does affect their operations, yet few appear to think that they have a problem that requires attention. Many test their water, but it appears that the testing in infrequent which may indicate that a significant number have not tested their water in some time. There appears to be an opportunity for a test monitoring program.
- The willingness-to-pay for water treatment appears limited. Many also report paying several thousand dollars for their systems, and that they had been sold systems that did not work initially. This is another indicator that additional information and expertise may be welcomed by processors and producers. There is an opportunity to increase knowledge of the cost of water infrastructure and its associated benefits to agricultural operations.

- About 60% of the respondents to the survey indicated that they had enough information on water quality, but more than half stated they did not have enough information on alternative treatments. It is likely that some have used the same system for some time, and when asked, reflect some uncertainty about the approach they are using. This may indicate that the agricultural sector would be willing to learn more about water quality.
- A large number of processors/producers are receptive to more information, despite most saying that they have sufficient information on water quality. This, along with their confirmation that they have been sold systems that do not work, is evidence that a role exists for impartial information on treatment systems.
- Both federal (PFRA) and provincial agencies (Saskatchewan Agriculture and Food and the Saskatchewan Water Corporation) have high credibility among producers and processors. Informational fact sheets, newspaper, the internet, and in-person (extension) contact are the approaches favored by respondents.

Saskatchewan Municipal Water Supply Treatment and Distribution Systems: A Technical Assessment

- The safety of a drinking water supply can be characterized by four primary factors: water source characteristics and vulnerability, capability of treatment plant processes, operations and maintenance controls and procedures and the quality of the treated water.
- Quality management is important for the consistent production of high-quality drinking water. Essentially, quality management is a holistic approach to planning, organizing and understanding the interactions of activities impacting the quality of water.
- Quality management is central to communities to ensure delivery of quality drinking water. Basic equipment and processes that underpin quality management were found lacking in most of the 44 communities studied.
- Based on an assessment of a sample of 64 representative communities, it is estimated that over 90 percent of all communities with a population under 1,000 require upgrades to their infrastructure and quality management to meet health-related drinking water objectives.

- Over 30 percent of the cost of infrastructure upgrades applies to communities with populations less than 500 (totalling 50,000 people).
- Per capita cost for upgrades ranges from $600 to $3000 depending on the size of the community and the source of the water supply.

Saskatchewan Water Related Infrastructure

- The province owns and operates 42 water storage/conveyance projects ranging in age from 15 to 85 years old. Over the next 5 years approximately $15 million will be required to rehabilitate/maintain these works. The annual costs will continue to increase. Within 10 years the annual expenditure could be over $10 million per year. The rehabilitation of the Avonlea Dam is approximately $1.7 million.
- PFRA owns and operates 31 storage, diversion and/or conveyance works in Saskatchewan, many of which were constructed in the 1930's and 1940's. A number of the structures require improvements. Public health and safety and the ability to provide water to licensed users such as irrigators and communities and meet international apportionment commitments may be affected. The Eastend Dam is of particular concern. To protect the integrity of the dam and the community downstream it is recommended that the earth embracement be raised 1.5 metres. Cost of this project is estimated at $500,000 overall it is estimated annual expenditures in the order of $1.5 million could be required over a 10 year period. The only financial assistance available in this area in Saskatchewan is the PFRA Rural Water Development Program. This program, which has a broad range of eligible project types and a relatively limited annual budget for the province, in the order of $2.0 million, generally requires that projects of any size, if they are to be included, be staged over a number of years.
- The Canada/Saskatchewan Agricultural Service Centre and Agricultural Community Water Infrastructure Programs in the 1970's and 1980's did not have sufficient levels of funding to address all the priority needs identified by the eligible communities.

- A number of prairie communities are vital to the agricultural industry in Saskatchewan by providing essential farm services, farm inputs, marketing outlets and basic infrastructure for value-added processing and other economic development facilities. In turn they contribute to increased economic output and foreign exchange earnings.
- In addition the improvement in water quality in rural areas is becoming more important from the environmental standpoint, and in terms of providing improved living conditions in rural areas and expanded recreation opportunities. The installation of adequate sewage disposal and pollution control equipment is often essential to maintain downstream water quality.
- Currently over 80% of the provincial population receives water and sewer services from urban municipalities. Recent estimates indicate the municipal owned water and sewer infrastructure has a present day value of approximately $9.0 billion. It is further estimated municipalities will need to spend about $60 million per year over the next 10 years in order to upgrade and repair the infrastructure to ensure continuation of quality services.
- The province and their partners, farmers and agri-business, strive to maximize the economic output of large-scale irrigation projects. Irrigating potatoes, beans, canola, alfalfa and other special crops leads to value added processing opportunities, creates jobs and make effective use of the province's investment in irrigation infrastructure. Studies have shown that returns from irrigation flow 13% to the irrigator and local economy and 87% to the regional, provincial and federal economies.
- In order to sustain growth and support further agri-value processing opportunities, the development of additional irrigated acreage will become necessary. Infilling of existing projects, like Lucky Lake and Riverhurst, can be accomplished at $700 to $1,000 per acre. The development of new projects will require investments of over $2000 per acre. It is estimated $20.0 million will be required over the next 10 years to construct water supply works to support infilling. New irrigation projects, around Lake Diefenbaker, along the Qu'Appelle and other areas, could require over $100 million over the next 10 years.

Water Quality Requirements for Saskatchewan's Agri-Food Industry

- There is no consensus as to what level of microbial contamination is acceptable in livestock water supplies; nor is there conclusive information on effects of poor quality water on livestock performance.
- For micro-irrigation, water quality concerns include effects on plants as well as nozzle clogging problems. Standard irrigation is largely concerned with effects of water quality on plants. Water quality effects on plants include total soluble salt content, relative proportion of sodium cations and other cations, alkalinity effects, concentration of toxic elements, excessive nutrients, unsightly deposits, and excessive corrosion of equipment.
- When dealing with effluent irrigation, some additional criteria must be addressed. Effluent suitability depends on the concentration of compounds that may become toxic, such as sodium, boron, nickel, cadmium. There is potential for nutrients to accumulate in the soil. Most Saskatchewan surface water sources are suitable for center-pivot irrigation but many groundwater supplies are too saline for this purpose.
- The water required for micro-irrigation applications must be of a considerably higher quality than what is required for standard irrigation applications. In micro-irrigation applications, the small size of the nozzles facilitates precipitation of chemicals, trapping of particles, or growth of organisms in the orifices. Both inorganic and organic compounds can cause clogging and must be removed. Optimum nutrition is also essential in the production of most horticultural crops. Plant quality is a key selling point for Saskatchewan-made products.
- Reverse osmosis is generally recommended only as a last resort for water treatment; when such expensive treatment technologies are used, there is a great need for pre-treatment of the water. Research and development into pre-treatment of micro-irrigation water is called for. More inexpensive treatment techniques could minimize the need for reverse osmosis treatment. There is also a need to study membrane processes. Ensuring that the most suitable membranes are used for water treatment would be of benefit.

- The quality of the water used as a carrier for pesticides can affect the efficacy of the pesticides. No work has been done to systematically show the decreased effects of various pesticides when they are used with natural water sources high in inorganic and organic material. Saskatchewan surface and groundwaters commonly contain high levels of dissolved organic matter, which may also modify the efficacy of pesticides. If efficacy is increased by using water of suitable quality then crop protection will be improved possibly to the extent that less pesticide could be applied. Increased chemical optimization with reduced doses would also result in environmental benefits and a more competitive farming product.
- Food and non-food processing industries have a wide scope of acceptable water quality requirements, which range from poor water to ultra-pure water. Industries that produce water for consumption require high quality water with specific characteristics. In order to locate food and non-food processing industries in rural Saskatchewan, existing municipally treated water will likely require polishing treatment, including removal of fouling compounds, scaling compounds, and some other compounds.
- It is essential to support research and development that will provide effective and sustainable treatment solutions for poor quality ground and surface water so that is can become palatable and safe. In order to address these issues in a systematic fashion, it is necessary to evaluate different treatment techniques for their suitability to solve specific water quality issues that are of concern in Saskatchewan.
- The emerging issues for the agricultural sector include removal of particles, inorganic ions, fouling components, microbes and microbial by-products. The processes required to remove problem compounds and microorganisms must be established. Saskatchewan surface and groundwaters contain problem compounds for most water users, but linkages between water quality and impairment of process or product have often not been established. The reason for this has, in some instances, been due to the use of experimental techniques that are not sufficiently sensitive to adequately define the problems.

Saskatchewan Water Sourcing Study

- Recent droughts have pointed out a need to develop additional water sources in some areas.
- 60% of the rural municipalities had water supply problems in 1984.
- 65% of the rural municipalities indicated a need for additional or deeper wells.
- Tank loading facilities need to be strategically located.
- There is a need for continuing federal and provincial programs providing technical and financial assistance for community wells.
- Sound technical advise is required for groundwater exploration.
- Many RM's indicated that additional storage reservoirs were a high priority.
- There is a need for water development assistance programs in Saskatchewan and throughout the prairies directed at farmers and groups of farmers.
- Major developments such as costly wells, pipelines and large reservoirs require added assistance from senior levels of government.
- Water sourcing maps indicate where primary and secondary storage reservoirs are required and where there is potential for surface development or augmentation of existing supplies.
- White areas on the maps can be served by groundwater or small storage reservoirs.
- Dugout pumping is usually necessary and is not a program which promotes the development of secure water supplies.
- Financial and technical assistance should be provided to RM's in planning projects to minimize the effects of drought such as community reservoirs, community tank loading facilities and in some locations water supply pipelines.
- Programs should be designed to provide assistance only to the optimum type of farm development.

Appendix C - Alberta

Questionnaire Response/Interviews

In Alberta, the following 14 organizations received a copy of the questionnaire. A total of 11 responses were received :

- Alberta Environment (three individuals)
- Alberta Agriculture (eight individuals)
- Energy Utilities Board (one individual)
- Western Irrigation District (one individual)
- Alberta Irrigation Projects Association (one individual)
- Eastern Irrigation District (one individual)
- Agriculture Canada (three individuals)
- Environment Canada (one individual)
- Western Economic Diversification (one individual)
- Natural Resources Canada (one individual)
- Hydrogeological Consultants Ltd. (one individual)
- Elton Environmental Ltd. (one individual)
- AAMDC (three individuals)
- PFRA (three individuals)

In terms of the four main parts of the questionnaire, the responses received were as tabulated under each heading.

Alberta Water Supply Needs

The interviews and survey response were quite varied but viewed the needs as being the following:

- focus on the drought sensitive areas;
- include irrigation, livestock watering and process operations;
- inadequate water quality (groundwater) and lack of surface water quantity;
- security, ie. long-term continuity of supply is an issue;
- implementation of best management practices is an important issue to be met;
- monitoring water quantity and quality;
- ensuring accurate and complete information on water quality/quantity, particularly for groundwater;
- need for regional water supply systems and pipelines
- drilling deeper wells;
- need to improve irrigation efficiency;
- consider deeper wells to source water that is less vulnerable to drought impacts;
- expand information data base;
- water supply options;
- yield, water quality and cost of developing water sources;
- most surface water rights, particularly in the south are fully allocated, limiting water for growth or expansion;
- assess the relationship between surface and groundwater systems and sustainable yield of major aquifers;
- provide long-term and reliable water supply to rural residents as well as agricultural and industrial operations;
- short-term needs are extension of existing pipelines to service areas adversely impacted by drought;
- long-term needs include regional water supply systems to meet existing and future growth areas;
- value added agricultural industry requires irrigated water to sustain and grow;

- continue research to identify new water efficiencies, better water quality/quantity mapping of groundwater;
- program continuity;
- need to invest in long-term solutions that reflect future demands;
- develop extensive database of water supply information;
- water supply needs exist throughout Alberta, not just to the south and east but also to the north;
- excessive withdrawals of both ground and surface water not only reduces groundwater levels but can also degrade quality; and
- water of good quality is critical to all aspects of the agriculture sector, shortages exist literally everywhere; in the long-term this will not only limit growth but reduce this part of the provincial economy.

The implications of not meeting these needs or addressing these issues will be a reduction in agricultural output, depopulation of rural and urban areas and loss of business infrastructure. The impacts are not only the local community but also the larger provincial economy.

Alberta Water Supply Constraints

To a certain extent the needs and constraints of water supply tend to overlap and are as follows:

- water supplies are not necessarily located where the demand exists, eg. 80% of supplies exist in the north but 80% of the demand exists in the south;
- drought is a major risk to the east where water supplies are not drought tolerant;
- water quality, particularly groundwater limits use;
- reliable information on water supply choices:
    - surface water
    - groundwater
    - infrastructure such as regional pipelines, dams, etc.
    - security/reliability of water source options;
- lack of financial resources to finance projects, research and development, allow adequate long-term planning;
- not understanding the potential risks to water supply:
    - increasing use and long-term implications
    - failing infrastructure

    - changing demands for water supply
- relying on emergency pumping and hauling water to mitigate drought impacts;
- poor grass growth limiting livestock operations, forcing herds to be sold;
- dugouts depleted and alternate water sources not being available;
- not having adequate good quality water constrains the production of high value added crops;
- areas that might have suitable water supply lack the transportation or electrical support network;
- high initial cost of longer term solutions such as dams, pipelines require government financial assistance;
- water quality degradation as a result of agricultural use;
- lack of an overall water management plan that relates ground and surface water supplies to existing and future water demands by use;
- adequate financing for not only short-term, but particularly for long-term solutions that are part of an overall agricultural water strategy; and
- shortage in water supplies will limit not only the growth of the agriculture sector, but also the economic viability of what presently exists.

The areas impacted by those constraints cover most of Alberta and is supported by reference to Figures P5 and P6 in Appendix A. These figures indicate the severity of the drought as shown by current precipitation and estimated soil moisture as a percent of water holding capacity.

Alberta Water Supply Infrastructure

The questionnaires and interviews recognize that infrastructure exists in the form of wells, dugouts, irrigation works, canals, pipelines, dams, etc., but there was not a lot of discussion related to this aspect. The primary comments were as follows:

- wells that are over 20 years old likely require remediation and there are an enormous number in Alberta, 400,000 water well logs;
- infrastructure exists throughout the Province, predominant in the south and east;
- deteriorating infrastructure will impact production and the farm economy;
- should consider inter-basin transfers to move water to where it is needed;
- should consider expanding regional pipelines and water retaining dams;
- infrastructure needs should plan for growth and expansion;

- require more infrastructure to irrigate lands to produce value-added crops that have significant economic benefit;
- major infrastructure works requires government financial support;
- increase the Irrigation Rehabilitation Program by 10% in order to complete the rehabilitation program;
- should consider major infrastructure investments to move water to where it is needed, e.g. North Saskatchewan into the Battle River; and
- infrastructure investments that can mitigate drought impacts such as investments in pipelines and water retaining dams.

The primary focus was on the need and importance of regional solutions requiring major infrastructure, such as pipelines and dams to service areas during periods of drought, but also to permit expansion and growth of the agricultural sector to continue.

Alberta Water Supply Priorities

The interviews, questionnaires and a workshop provided an indication of the priority areas that need to be addressed in Alberta.

Water supply priorities for Alberta might include the following:

1. Information and education

- monitor water supplies, ground and surface;
- proper maintenance of water supply infrastructure;
- research and development related to groundwater
- promote water conservation practices and water protection;
- identify water supply options depending on need;
- assist in assessing water supply alternatives.

2. Program funding for development of water supplies

- begin with the areas most severely impacted by the drought:
    - assess needed short-term measures, dugouts, pipelines, additional groundwater sources, etc.
    - provide shared funding, possibly 1/3, 1/3, 1/3
    - highest priority to those measures servicing a larger number of users
    - measures should form part of an overall water supply strategy, where possible;

- establish water commissions, regional water cooperatives to assist in administering projects and setting priorities;
- focus efforts on existing agricultural needs, particularly where joint initiatives are possible;
- identify potential storage sites and groundwater sources;
- identify MD/Counties that have completed water studies and give them a higher priority for funding;
- consider short-term measures when necessary, including tank loaders and well drilling where justified by drought severity;
- increase funding to locate aquifers having the quantity and quality required for agricultural production – focus on drought areas;
- continue with Alberta's water management strategy and consider specific water supply solutions for drought impacted areas; and
- planning studies and investigations should be specific to those areas experiencing water supply shortages, but also considering future growth areas.

The priority areas are generally those areas experiencing drought related stress and shown on Figures P1, P2, P5, P6 and A1 of Appendix A. These areas are in north, east and southern Alberta. The priorities vary with the geographic location.

In the southeast and east, finding a suitable quantity and quality is an issue; the need exists to identify and develop suitable groundwater sources that could serve regional needs. The use of deeper wells combined with tank loading from pipelines is a possible solution.

In the south, the South Saskatchewan River Basin area is where irrigation systems service the needs of the agricultural sector. Primary concerns are reliability of water supply and contamination. Additional effort and funds are required to improve irrigation efficiency and monitor groundwater contamination and levels.

The Highway 2 corridor water supply has experienced overuse and contamination with falling aquifer levels. A possible solution is to obtain surface water by a regional pipeline.

Northeast of Edmonton has a high density of agriculture with reliance on shallow wells that are directly impacted by droughts. A priority is to construct deeper wells and regional pipelines supplemented by tank loaders.

The Peace River area does not have access to good quality groundwater. A possible solution may be regional pipelines from surface water sources, but this could be an expensive alternative.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 8, 2002

Location:

Person Interviewed: Council/County of Paintearth

*Phone No.:*403-882-3211

Role:

E-mail: info@countypaintearth.ca

Organization: County of Paintearth No. 18

Interviewer:

Phone:403-882-3211

Fax:403-882-3560

E-mail: info@aountypaintearth.ca

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue:

Reliable water supply is lacking. There is not enough water to sustain current operations, thus no chance to increase value adding possibilities. Surface water is gone due to drought conditions

Location:

Rural and urban areas extending from east central Alberta and western Saskatchewan

Importance:

HIGH - # 1 Priority

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Documentation contained in: hydrogeological ground water studies (PFRA), dugout water pumping records (PFRA/Alberta Agriculture), crop insurance records, drought declared municipalities (Province), Environment Canada records, Weather Station records, Statistics Canada census confirms declining population, farms, etc. in rural areas.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, the current trend indicates that water issues are the foremost concern to sustain agricultural and industrial opportunities. Expansion is impossible despite the availability of space. There is no possibility of irrigation in many areas. There is no chance to counter population losses without the availability of water.

2. Where might these needs be located?

Eastern Alberta- East of Hiway 21 into Saskatchewan and Hiway 1 north to the forest area. Current immediate needs within this municipality extend beyond agricultural concerns and include industry (cooling for Battle River Power Plant) and the lack of a water supply for urban areas!

3. What are the specifics of these needs?

A reliable long term supply of water is required to maintain viability of current operations. - treated water is required for towns, villages, hamlets, rural residents, hog and beef operations, greenhouses, etc.

- raw water is required for industry, limited irrigation, aquaculture and riparian areas.
A pipeline/canal from the North Saskatchewan River to fill the Battle River would provide a supply of water for many municipalities, thus securing a long term source.

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

The implications have already become a reality; - many producers were forced to sell their herds due to the lack of water.
Reduction in agricultural output, depopulation of rural and urban areas, loss of businesses, infrastructure and services will be the result of not meeting the needs. The economic viability of this region is in severe stress.

5. *What are some possible solutions?*

Short term - extension of water pipeline to serve areas in need. This process must be fast tracked in order to meet immediate needs. The provision of a source to water will assist producers.
Long term - provision of a source to raw water. A pipeline/canal to divert water from the North Saskatchewan River into the Battle River system would ensure a water supply to sustain economic viability of East Central Alberta

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

North Saskatchewan Watershed Alliance shows an unused capacity in the N. Saskatchewan River. Atco Electric have data on water quality and quantity at the Battle River Generating Station. Level is now critical! Alberta Environment has data on the allocation of water from the Red Deer River documenting the need for water to rural areas. Data pertinent to Drought Declared Areas should be reviewed. Attention is drawn to production statistics (both commodity and value added) pertinent to areas served by irrigation (eg Lethbridge area) with comparison to those that do not (eg. Flagstaff, Provost with similiar equalized assessment) This information should be available from Statistics Canada.
Ducks Unlimited also have data.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Both. Many producers were forced to haul or pump water to meet livestock needs. Urban areas imposed water restrictions limiting available water to both their residents and rural users. In majority the dugouts are dry, the Battle River is dry in many areas. Most deep well groundwater is very high in TDS and does not meet drinking water guidelines. Current conditions have put many areas in a "crisis" situation.

2. *Where are these water supply constraints most evident?*

In this entire municipality and beyond. The contraints extend beyond agricultural needs to those of urban and industry. In many areas well water is unavailable.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Reduced production, lack of expansion, no value adding opportunities, depopulation of rural areas as producers are unable to sustain a living.

4. *What are some possible solutions?*

There must be some fast tracking to secure viable access to water sources. A long term solution is required to prevent crisis situations. Many areas require access to long term high volume water supply. Depending upon the area possible solutions will include dams and reserviours, pipelines, dugouts, wells, loading stations. Oilfield injection of fresh water from wells has to stop.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Most of the documentation available has been referenced in forenoted questions. Oilfield injection well sites databank should be listed with Alberta Energy Board.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

No. There is no large scale infrastructure in our area to meet agricultural water supply needs. There are many empty dugouts, sloughs, creeks, lakes, etc. Many wells deliver less than 2 gpm. Urban infrastructure is incapable of meeting agricultural needs, and in many cases cannot meet their own needs. There are no dams, reserviors, pipelines or canals to access more reliable sources.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

The lack of infrastructure in the rural setting is a great concern. There are areas that have no wells of volume and no surface water sources for pumping.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Very large loss of production if the drought continues. Contraction, not expansion will contribute to the shutdown of the economy in the region. The area will experience further loss in population. Some municipalities may revert to a Special Areas status, as the ability of farms and other businesses to pay taxes erode.

4. *What are some possible solutions?*

- Diversion of water into river system (i.e. North Saskatchewan into Battle River) with eventual expansion to meet residents' needs (rural, urban and industrial)
- A comprehensive rural water supply pipeline network

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Referencing to provincial data.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Water diversion through river systems would ensure an adequate long term supply and provide the greatest benefit to the largest number of people. We need a Gas Co-op or REA type program to distribute water to agricultural and industrial producers in rural areas.

2. *What type of organizations should receive priority funding?*

Water Commissions (ie. establishment of Battle River Water Commission comprised of municipalities along its flow and extending into Province of Saskatchewan); Regional Water Co-operatives; Municipalities (rural and urban) should be funded to provide infrastructure to secure water.

3. *What type of projects should be eligible for funding?*

- Projects to secure water necessary to meet and maintain current demands (ie. pipelines, canals, reseviors, well drilling, etc.);
- Projects to encourage rural growth

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Areas which have been recognized as severe drought areas require special attention to address the emergent need for water. Water needs are apparent upon a review of documentation for increased water licensing. Many communities have tapped into the Red Deer River basin for supply. Regional water issues are underway in Stettler. Attention should directed towards projects providing solutions through joint iniatitives.

F. OTHER COMMENTS

Rural areas affected by water shortages are facing economic recession and will become more dependent upon government support, placing pressure on social programs. Statistics Canada data will justify the trend. Long term water deficits have continually been experienced in this area. Refer to the writings of Dr. Roger Epp and Jack and Rose Stabler for current socio-economic trends in rural Western Canada. An adequate and secure supply of water for the rural areas is probably the only hope we have of reversing these trends.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: January 7, 2003 *Location*: Edmonton

Person(s) Interviewed: Robert Harrison, Ernie Hui, Dave Trew, Ian Rudland

Phone No.:

R*ole:* *E-mail:*

Organization: Alberta Enviroment

Interviewer: Bob Buie *Phone:* (780) 486-7025

Fax: (780) 486-7070 *E-mail:* bbuie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes - SSRB - security of water supply and central areas reliance on groundwater supply.
- do not have good database of inforamtion on groundwater
- groundwater inforamtion is sketchy - lack of central database of information
- groundwater information must be submitted
- problems that exist relate to people

Province into four pieces:
- South - availability of water a concern
- East - is a desert/people want to live there
- Central - lot of growth - more pressure on water
- North/Peace - lots of water in rivers

Nature of Issue:

Location:

Importance: difficult to say; based on economic viability
ICAP e.g. favour regional solutions

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

long term may be an overall water strategy > 3 years
reorg going towards proper planning

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

South – SSRB – transfers within basin can improve water supply/a tool to allow water to be used where it is needed

transfer may be useful to allow development to occur

Water for Agic AB (3 oat)
1. domestic
2. livestock/animals
3. irrigation
    a. individual/small
    b. conglomerate

drought related issues are not (1) or (2) but (3)

cost of irrigation can be extreme cost

(4th category)

Priority – 1. domestic use and cattle #1
concern over water quality/quantity for livestock

water supply for small communities
concern over poor water quality

contaminated water, i.e. an issue with regards to return flow from agriculture
may be a concern with regards to other uses

$ allocation

2. *Where might these needs be located?*

3. *What are the specifics of these needs?*

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

5. *What are some possible solutions?*

not a possible solution – dugouts / short term solution
look for coops/pipelines/large reservoir constr
try to prevent degradation of water quality
restoration of contaminated water bodies
env application of expanding agri operations

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

current act may constrain inter-basin water transfer
proper management should enable proper water use to occur

2. *Where are these water supply constraints most evident?*

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

AB has infrastructure program in place
currently not seeking $ in this area
this is not necessarily a high priority

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

what type of organization should apply
- individual/org

- leave it open, present a case of $

formula for $ dictated
guiding principle – proponent should have a stake in project AFRD is provincial rep
overlap of programs will need to be dealt with on an adhoc basis

2. *What type of organizations should receive priority funding?*

3. *What type of projects should be eligible for funding?*

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

F. OTHER COMMENTS

specific eg of water supply

- watershed management using "on-farm program"
- e.g. alternative water supply program using solar energy to run pumps
- move cattle to higher grade and pump

Robert P. Harrison, P.Eng.
Manager, Water Policy
Basin Evaluation and Policy Branch
Alberta Environment

Ian Rudland
Water Policy Coordinator
Basin Evaluation and Policy Branch
Alberta Environment

Ernie Hui, P.Eng.
Director
Drinking Water Branch
Alberta Environment

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 18, 2002 *Location: J. G. O'Donoghue Bldg.*

Person Interviewed: Tony Cowen, P.Geol. *Phone No.*:780-495-4911

Role: Hydrogeologist *E-mail: cowent@agr.gc.ca*

Organization: Agriculture and Agri-Food Canada, PFRA – Prairie Farm Rehabilitation

Interviewer: Bob Buie *Phone: 780-486-7000*

Fax: 780-486-7070 *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue:
- issue – cattle – 188 acres
- surface water source deteriorated – quantity/quality
- rely on wells, but even these are impacted by water quality issues.

Location:
- St. Paul County to east – lots of wells/shallow, more acceptable to drought
- Peace District has very little good quality groundwater
- cost to supply from surface water is very high
- ultimate source would be a pipeline
- Areas of responsibility - Beaver County water shortage: Viking shortage of Water; also west of Edmonton.

Importance:

Required Groundwater assessments – available www.agr.gc.ca/PFRA/water/groundwater.htm shows where reports have been done and information on wells/yields/quality, etc.

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

May not be reports available on local issues.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, groundwater not really a source for large seed operations throughout province.

2. Where might these needs be located?

Could be almost everywhere – potable water needs also.

3. What are the specifics of these needs?

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

- inconvenient/expensive – eg. Potable water
- cattle side - very expensive.

5. *What are some possible solutions?*

Groundwater side – spending money to expand dugouts; available remote/labour/same; regional/local water supply source – eg. tank fill.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Previously discussed.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes, especially to the north with regard to wells/quantity and quality.

2. *Where are these water supply constraints most evident?*

To the west the water has reasonable quality.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Selling cattle/closing farm/economic spin off and loss of family farm/increase farm size.

4. *What are some possible solutions?*

Planning, proper documentation of information, monitor w/c information, hydrogeological investigations regarding long term impacts – monitoring.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Previously referenced.
- licensed groundwater users are required to monitor report – not necessarily done.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Not too much experience with infrastructure.
- Well infrastructure likely an issue, nor organized program to deal with.
- Flowing to surface.
- Rusty.
- No specific program.
- Subsidized opportunity to assist well owners.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Probably go by age, say prior to 1950/60 etc. might be of concern.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Contamination.

4. *What are some possible solutions?*

- enormous number of wells
- educate public on proper practices for maturing and abandoning - more practical

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Documentation on age is OK, but not necessarily condition.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

- Proper operated dugouts, rely on groundwater as a supplemental water source.
- Proper well maintenance.

2. *What type of organizations should receive priority funding?*

Groups of agricultural providers or people who service them.

3. *What type of projects should be eligible for funding?*

Tank loaders on wells and large surface water supplies, pasture pipelines.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Those having special constraints.

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 26, 2002 | *Location:*

Person Interviewed: Steve Grasby, Ph.D. | *Phone No.* 403-292-7111

Role: Research Scientist | *E-mail: sgrasby@nrcan.gc.ca*

Organization: Natural Resources Canada

Interviewer: Bob Buie | *Phone: 780-486-7000*

Fax: 780-486-7070 | *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

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- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

Reading over your questions I felt I couldn't provide much detail other than the obvious general overview of the impact of drought in southern and central Alberta over the last few years. Most surface water rights in Alberta are fully allocated, meaning there is very limited surface water supply available for growth or expansion of the industry. The drought of the last few years has seen supply fall below allocations, meaning that users had to share shortfalls. A provincial response to the drought was to provide funding for groundwater wells. The inherent assumption here is that groundwater is an alternative resource that is somehow disconnected from surface water. Most hydrogeologists will tell you that this is not true, but they will also tell you that they are not certain how and to what degree the ground and surface water systems are connected. Thus, as groundwater is commonly seen as an alternative supply for future growth, I think it is critical to study the relationship between the surface/groundwater systems and to examine sustainable yield of major aquifers in the province.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 18, 2002 *Location: J. G. O'Donoghue Bldg.*

Person Interviewed: Allan Howard *Phone No.*:780-427-3594

Role: Soil Moisture Specialist, Farm Water, Mgmt Section *E-mail: allan.howard@gov.ab.ca*

Organization: Alberta Agriculture, Food and Rural Development

Interviewer: Bob Buie *Phone: 780-486-7000*

Fax: 780-486-7070 *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

demand for opening up more areas for irrigation, but water not very available.

Nature of Issue: primarily irrigation/now; higher value added crops require more water; east of Hwy 36 has a problem; Peace Region is a concern - grain/cattle production

Location:

Importance:

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

water strategy for Alberta */David Neilson as initial contact; also sub-committee members

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, critical issue, even without a drought; concern will only become worse.

2. Where might these needs be located?

- surplus water does not exist in Alberta
- eg. even Peace has lots of water, but cost to supply is considerable and what might be the costs to transport to market?

3. What are the specifics of these needs?

- irrigation resulting use has a return flow component - solarity issue; pesticide contaminant
- livestock does not have same return flow - focus on treatment

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

1. consumption of water - demand degrades water supply
2. also degraded water quality becomes an issue; have a long-term plan that reflects usage, consider available water and treatment

5. What are some possible solutions?

- understand what we have and sustainable supply/quality/quantity
- shortages come with inadequate supply/inventory
- likelihood of maintaining what we have, monitor what we have/behaviour

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

1. "Water Strategy for Alberta"
2. "Agriculture Drought Risk Management Plan" - strategic document, how drought will be addressed
3. Web available products - "how to" deal with situations; links through (www.agric.gov.ab.ca)

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes - water quality degradation as a result of agriculture is a concern; concern eg. "ILO *air, water contaminant; there are some naturally degraded waters

2. *Where are these water supply constraints most evident?*

- they are everywhere/we live in a province where we consume more than replenish
- all agricultural areas
- require assessment of inventory

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

- cost of maintaining industry incrases all aspects of global competition, subsidizing
- selling of land, losing control of agriculture producing land
- aging farming population; move off the land

4. *What are some possible solutions?*

- information data base
- look at what is desirable growth
- value water/incentive for not degrading water, ie. recognize value

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Previously referenced

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Is an issue in "weather monitoring", optimize use of water; also need good info to understand long-term implications.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

- eg. dugouts based on climatic response and withdrawls
- built bigger dugouts in south; north has not done this
- need to recognize the situation and respond accordingly
- balance cost vs. risk

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

- cost of sustaining industry goes up

4. *What are some possible solutions?*

- proper planning together with resources
- planning - do we plan for growth? / statistics *?

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

refer to previous / possibly Alberta Environment as a source

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

planning - integrated plan that considers the other uses of water

2. *What type of organizations should receive priority funding?*

identify needs; ideal world - plan for the future, not just short-term programs

3. *What type of projects should be eligible for funding?*

Plan - needs (plan discuss where resources are spent)

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

refer to previous

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 29, 2002

Location: Calgary

Person Interviewed: John Elton

Phone No.:403-286-8195

Role: Hydrogeologist

E-mail:elton-environmental@shaw.ca

Organization: Elton Environmental Ltd.

Interviewer:

Phone:

Fax:

E-mail:

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

reports of farmers culling herds of cattle or moving them to greener pastures. Also reports of dugouts and shallow wells going dry afecting livestock watering. Reservoir levels down affecting irrigation

Nature of Issue: reduced precipitation leading to less runoff and declining shallow groundwater levels

Location: east and south parts of the province mainly, but extending up to Lloydminster

Importance: serious

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Numerous newspaper articles plus record number of farmers applying for susbsidies under the Farm water program

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

yes

2. Where might these needs be located?

all parts, particularly south and east of province

3. What are the specifics of these needs?

need for deeper wells for livestock watering /farm use and increased water for irrigation

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

decreasing production

5. What are some possible solutions?

identification of yield and quality of water in deeper aquifers. Also, improved treatment of poorer quality groundwater and collection of rainwater from farm buildings plus more efficient irrigation techniques

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

PFRA probably has good documentation of needs

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes. Few aquifers have the capability (yield and quality) for irrigation purposes. Some areas have poor yield/poor quality groundwater for other agricultural purposes

2. *Where are these water supply constraints most evident?*

south and east of province-however, this is a generalization as certain places in the south have high capacity aquifers yielding good quality water. In most cases aquifer yields are not sufficient for crop irrigation

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

reduced production and no expansion

4. *What are some possible solutions?*

Aquifer mapping programs

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

PFRA, SRC/GSC studies

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Not sure about larger infrastructure: canals and reservoirs, except reservoirs have had low water levels in recent years-therefore inadequate. Use of sloughs, dugouts and shallow wells has proved to be inadequate recently due to insufficient runoff and declining watertable

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

same geaneral area; south and east parts

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

impact on livestock operations

4. *What are some possible solutions?*

drill deep(er) wells

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Try surveying which areas grants have been given to for deeper wells. The water well drillers organizations may be able to advise on driller activity

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

aquifer yield and quality definition

2. *What type of organizations should receive priority funding?*

PFRA, private consultants and national bodies involved with groundwater eg GSC, CGWA

3. *What type of projects should be eligible for funding?*

Research into downhole logging techniques for groundwater test drilling

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

S & E

F. OTHER COMMENTS

Water conservation measures should be encourged/manadated, plus collection of rainwater/snowmelt from farm buildings should be encouraged (the Australians do it all the time!)

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 17, 2002 | *Location: Lethbridge*

Person Interviewed: S.C. (Stan) Klassen | *Phone No.*:403-328-3063

Role: Executive Director | *E-mail: aipa@telusplanet.net*

Organization: Alberta Irrigation Projects Association

Interviewer: Bob Buie | *Phone: 780-486-7000*

Fax: 780-486-7070 | *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes. There is land available within the irrigation region that could be converted to irrigation if water were not the limiting factor. More off stream storage would allow this to happen.

Nature of Issue: see above

Location: Southern Alberta

Importance: High

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

A small study has been done in the Oldman River Basin that identifies some storage opportunities. It was conducted by UMA Engineering.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes.

2. Where might these needs be located?

Alberta.

3. What are the specifics of these needs?

Alberta has essentially reached its capacity for growth, in many areas, because of water resource deficiencies.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

With oil and gas supplies nearing depletion we will be more dependent on agriculture than we have been before. Strengthening the irrigated agricultural sector provides large opportunity for value added industry and job creation for Albertans.

5. What are some possible solutions?

Continued research, supporting the efforts of WISE at the University of Lethbridge, to find new water efficiencies, better water quality and better mapping of groundwater supply/quality. Determine how to deal with non-point source contamination of the resource.

Government should undertake a detailed study of potential off stream storage sites from Edmonton south, then begin to act on it.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

See question #2.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

See above.

2. *Where are these water supply constraints most evident?*

Below the City of Edmonton, from the Saskatchewan to British Columbia border.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Consider that at present we irrigation about 5% of the total arable land in the province and produce about 20% of the gross agricultural production. If we were to make a small gain in irrigated acres, the returns are enormous. Further, the crops that it produces are of a value added nature; creates food and jobs.

4. *What are some possible solutions?*

Higher investment by government and industry in research. Support agricultural conversion from low conservation to higher conservation water application i.e. flood irrigation to low pressure pivots. Making more water available by capturing spring run off into new and expanded storage facilities.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

See above.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

I believe that essentially the infrastructure is in place to serve more acres, within the irrigation districts.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Increased government support (federal dollars) could increase the infrastructure rehabilitation process thus reducing/eliminating a present day bottleneck.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Alberta is not benefiting from its investment in irrigation rehabilitation to its optimum.

4. *What are some possible solutions?*

Increase the current Irrigation Rehabilitation Program by about 10% (perhaps the federal government contribution) in order to complete the rehabilitation program that has been ongoing for at least 20 years, and thus free up the water savings that can then be reallocated to more acres.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

See AIPA IRRIGATING in the 21st Century study. Also the 1993 AIPA Irrigation Impact Study.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

1. Enhance/speed up the rehabilitation process through increased cost shared funding.
2. Mapping of potential new storage sites.

2. *What type of organizations should receive priority funding?*

Irrigation Districts and other potential irrigation projects.

3. *What type of projects should be eligible for funding?*

See E1.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Every area from Edmonton south needs a strong assessment.

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 9, 2002 | *Location:*

Person Interviewed: Iris Larson | *Phone No.*: 780-753-2434

Role: | *E-mail:*

Organization: Municipal District of Provost No. 52

Interviewer: Bob Buie | *Phone: 780-486-7000*

Fax: 780-486-7070 | *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

We have an area of our M.D. which has adequate H_2O for existing use but expansion is limited due to low water well output. Southeast corner of our M.D.

Nature of Issue:

Location:

Importance:

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, our surface water is gone and we have to go to alternative methods of getting water to the surface. Drilling wells, pipelining.

2. Where might these needs be located?

All over a big part of western Canada.

3. What are the specifics of these needs?

We need to move surface water farther to better utilize our land base.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Vast areas will be ungrazeable by cattle.

5. What are some possible solutions?

Major pipelines into areas with no water. An affordable way of pipelining in areas where there is still deep water available. Making the movement of power affordable.

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

PFRA has done almost or maybe all of Alberta for groundwater mapping.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   Yes, in parts of our Municipal District as well, I'm sure, as in the province for both quantity and quality.

2. *Where are these water supply constraints most evident?*

   I feel this is a M.D. to M.D. issue and if you contact the agriculture Fieldman he should know.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   In time expansion will be over and there will be a major water concern.

4. *What are some possible solutions?*

   Look into what our groundwater sources are like. Is the present supply unending. Is the reduced snow pack in the recharge areas going to have an effect.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   Unsure.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   Need major water lines to address surface water needs.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Production has to decrease.

4. *What are some possible solutions?*

   Major consultation with Municipal Districts and Counties to address all provincial problems.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

PFRA

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Consultation.

2. *What type of organizations should receive priority funding?*

It should be based on need not organization.

3. *What type of projects should be eligible for funding?*

All major water development projects e.g. pipelining, moving power, water well drilling, community water development.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

No, wherever there is a water shortage.

F. OTHER COMMENTS

A review of major water uses should be looked at to see if it is the best use of our water. I'm not in the industry so can't give you an example but in Agriculture an example would be our hog barns which use the flush clean method as their alternatives.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 19, 2002 *Location:*

Person Interviewed: R. David Neilson, P.Eng., P.Ag. *Phone No.*:780-427-3906

Role: *E-mail: david.neilson@gov.ab.ca*

Organization: Alberta Agriculture, Food and Rural Development, Farm Water Management Section Conservation and Development Branch

Interviewer: Bob Buie *Phone: 780-486-7000*

Fax: 780-486-7070 *E-mail: bbuie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

- Livestock size is going down as a result of drought (whether sold or transferred to another province).
- Lack of feed and water.
- Market price for feed is large enough to justify moving herds to another province/short term.
- Could be long term implications.

Location:
- Northeast area has been a growth area, but adversely impacted (not used to drought).
- Also Peace River area – floods/droughts.

Documentation: Spring and Fall moisture maps (Fall 2002).
90% of agriculture area is low/very low soil moisture depletion.
www.agric

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, water is critical to all aspects of agriculture.
January 2002, Provincial Permit requested to proceed with Agriculture development . . . water is a part of decision process.

2. Where might these needs be located?

As above, plus define surface/groundwater. If surface water then clearly a concern look to groundwater for making a difference. If groundwater not necessarily as great a concern.

3. What are the specifics of these needs?

May make sense to look at volumes. Livestock needs are relatively small in relation to irrigation needs.

High value crops require access to good quality water.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

- Transfer out of livestock
- Downsizing of rural industry – this will impact rural economy

- Impact on peripheral business activities
- Multiplier effect.

5. *What are some possible solutions?*
   - Alberta Environment website – "Water for Life" link. Involves all provinces – "Water Strategy".
   - Information published in water strategies on Province websites.
   - Series of consultations/Ministers Forum.
   - Minister will lead approval process – actions to follow.
   - Alberta response will follow out of these forums.
   - Need to understand data available/important in coming up with solutions.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   Yes, quality aspects of groundwater:
   - Not really well understood
   - PFRA has done a good job
   - May require additional data gathering
   - Sustainable yield.

2. *Where are these water supply constraints most evident?*

   Shortages exist literally everywhere.
   - May need to consider limits to growth. Water supply may limit growth.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   - Government is being proactive – this is not an opinion.

4. *What are some possible solutions?*

   - Watershed planning, groundwater analysis will show up in strategy, strategic planning that will involve local level – all is in place to address constraint issues. Becomes a H.R. issue to address.
   - Expect close working relationship between all levels of users/government.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Refer to Water Strategy – Alberta Government web site.
- 3 parts of process - each builds on the other.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Infrastructure needs exist with regard to:
- Rural water supply pipelines.
- Could guarantee a supply to farming public.
- Regional type systems.
- Require locating suitable supply.
- e.g. EPCOR supplying water to Vegreville area. Supported by strong water treatment capability.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Infrastructure condition not known, Brent could probably cover.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

We don't know yet. Rural economy will be drastically impacted. True picture will not be known for some time.

4. *What are some possible solutions?*

Water strategy
- Planning for the future.
- Coordinated response.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Refer to website.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Priority is water strategy – involve local people in process.
- Work into regulatory aspects will happen.

- Address short-term issues, but plan for the future.

2. *What type of organizations should receive priority funding?*

3. *What type of projects should be eligible for funding?*

Process is as important as projects.
- Already good initiatives underway/need to take this into account.
- Involve the right people in the decision making.
- Framework is already in place - make sure they are connected with priority areas

Needs to be flexible in approach.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

- "Special Areas" are east/NE. N.R. Saskatchewan border. Key issues are water supply for livestock/domestic needs.
- People refer to "dust bowl – lack of water" took over from Government.
- City of Calgary in terms of water supply/long term.
- East/NE of Edmonton/agriculture area has need to adapt over past 10 years.
- Peace River.
- Process will focus attention on where priorities should be spent.
- May be better spent on studies/investigation.

F. OTHER COMMENTS

Climate Change
- Don't know full impact/uncertainty. What are best projections for water supply under different climate change predictions.
- "Alberta Ingenuity Fund":
    - $500 m to look at research related to various situations.
    - Information on climate impact (50 year time horizon).

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: January 2, 2003 | *Location: Lethbridge*

Person Interviewed: Brent Paterson | *Phone No.*:403-381-5143

Role: | *E-mail:brent.paterson@gov.ab.ca*

Organization: Alberta Agriculture, Food and Rural Development

Interviewer: | *Phone:*

Fax: | *E-mail:*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Water supply constraints currently exist within the South Saskatchewan River Basin (SSRB) and Milk River Basins of southern Alberta

Nature of Issue: Parts of the basin are closed to further development because they are fully allocated for water.

Location:

Importance: Very important

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Alberta Environment and AAFRD have a number of reports and documents that identify the current status of water supply and allocation in the SSRB.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

I can only speak for Alberta. See answer to question A.

2. Where might these needs be located?

SSRB

3. What are the specifics of these needs?

Irrigation expansion cannot take place in parts of the basin because of water supply shortages. In addition, domestic/livestock water supplies are critically short in many parts of the basin because of sustained drought conditions.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Livestock management and expansion cannot take place without adequate water supplies. The demand is there (for expansion), but the water supplies are not there.

5. What are some possible solutions?

Construct water supply pipelines for domestic/livestock needs from existing water sources. These are often irrigation reservoirs or rivers/streams.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

A number of project proposals for pipelines already exist. AAFRD and AENV have reports/documents which identify the potential irrigation expansion constraints due to a lack of water.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Wate quality is generally not an issue. Water supply shortages are a concern in the SSRB.

2. *Where are these water supply constraints most evident?*

SSRB

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Value-added agriculture will not reach its full potential in Alberta. Reduction in cattle herds have taken place in the Basin (as well as other parts of the province). Further reductions may be required if sufficient water is not available. Irrigation expansion cannot take place, in spite of continued interest by farmers.

4. *What are some possible solutions?*

1. Constructed water supply pipelines. 2. On-stream and off-stream reservoirs. 3. Improved water use and management efficiencies.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Current irrigation infrastructure is sufficient to meet current irrigation demands. AAFRD provides $19 Million per year to assist districts with rehabilitation of infrastructure.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Dryland areas in the SSRB (outside of the existing irrigation areas). The Special Areas should receive priority for domestic/livestock water supplies, as should the South East Water Supply Initiative.

2. *What type of organizations should receive priority funding?*

   Domestic and livestock water supply organizations.

3. *What type of projects should be eligible for funding?*

   1st Priority - Domestic and water supply projects. 2nd Priority - onstream and off-stream reservoirs that supply water for irrigation, municipal, domestic and recreation uses.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

   SSRB

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 23, 2002

Location:

Person Interviewed: Alan Pentney

Phone No. 403-381-5512

Role:

E-mail: alan.pentney@gov.ab.ca

Organization: Alberta Environment

Interviewer: Bob Buie

Phone: 780-486-7000

Fax: 780-486-7070

E-mail: bbuie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

Dave and I as regulators are going to have difficulty answering many of these questions due to the large scope we cover as well as the conflict in giving opinions on some of the questions. I anticipate they were written for an agency like an irrigation district to respond. For the most part the information that is on our website for the SSRB water management plan will give you advice on where water management is going - http://www3.gov.ab.ca/env/water/regions/ssrb/ . We would be pleased to meet with you and discuss the questionnaire etc. but I would prefer not to respond (have not discussed with Dave as to his preference).

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 9, 2002 *Location:*

Person Interviewed: *Phone No.*:
Murray Tenove, P.Eng., Water Quality Engineer 780-427-4182
Marshall Eliason, P.Eng., Project Engineer 780-427-8764
Don Martz, Water Technologist 780-415-2358
Bob Buchanan, Agricultural Water Specialist 780-427-2963
Role: *E-mail: murray.tenove@gov.ab.ca*
E-mail: meliason@telusplanet.net
E-mail: don.martz@gov.ab.ca
E-mail: bob.buchanan@gov.ab.ca

Organization:
Alberta Agriculture, Food and Rural Development, Agricultural Engineering Branch
Alberta Agriculture, Food and Rural Development, Processing Development Division
Alberta Agriculture, Food and Rural Development, Agricultural Engineering Branch
Alberta Agriculture, Food and Rural Development, Agricultural Engineering Branch

Interviewer: Bob Buie *Phone: 780-486-7000*

Fax: 780-486-7070 *E-mail: bbuie@umagroup.com*

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Is it a response program:

- Can it be build upon.
- Consistent overtime/5 year.
- So users can work.

2. Rural water programs – come and go - no continuity (e.g. groundwater exploration in 90's).

- Short-term programs.
- Parts of other programs/targeted.
- PRFA tended target particular areas.
- e.g. Alberta farm grant program – rural pipelines/expansion of water lines.
- Programs were 1/3 1/3 1/3
- Larger scale projects tend not to go far unless 2/3 funding.

3. Constraints – does dictate how many head of cattle.

- Funding test drilling for groundwater sources.
- Where no surface water water exists.

Groundwater Program

- Source groundwater
- Long term opportunities
- Pastor pipe lines.
  Government pays up to 1/3 ($5000 maximum)
- Either improve or build new facilities.
- Larger projects required coordination with e.g. PFRA.
- Need to identify appropriate quality/quantity.
- Alberta has generally good ground water information.
- Alberta Environment has monitored w/c information/observation wells. Typically problem has been "drain and develop" (in the 80's).
- Revisit surface water considerations.
- Channel storage vs. getting rid of water.
- Q_2O test for ILOT.
- Surface water for grazing.
- Homestead – surface water.
- Western diversification study – Neil McAlpine – AgieAB.
- Expansion of beef and hog industry.
- Operation may be smaller than present size.
- AB Geological Survey – hydrogeology data. Stefan Bachu – information pertinent to groundwater.
- Is intent to develop database of information – value to all. Long term management plan.

- GIS available but data deficient or in a number of databases that may not be as available from certain sources.
- Sometime information is not shared.
- Sometimes form is not useable/utilization difficult.
- Boundaries may be difficult to define.
- National.
- Problem areas – Eastern half – Vegreville east, Smoke Lake, groundwater mapping – any areas with deficient groundwater.
- Water is one of a number of issues (e.g. labour, transportation distance, power).
- Agriculture Consultation.
- Smaller Communities – solve an existing problem.
- Look at bigger picture options.
- Criteria – pipeline from high yield aquifer to many farms.
- Water Quality Issues.
- Information sources
    - Provide sources of information.
    - Water supply/reuse/treatment.
- Drought risk management
    - Sense of how government would respond to drought.
    - Soil monitoring/rain network.
    - Working with municipalities.
    - Allan Howard – AFRD – information on line.

Priorities:

- Counties/Municipal Districts that have done a water study – have immediate priority.
- Those Counties/MDs that have not done water studies should be lower priority.
- PFRA would have records of MD/Counties that have done water studies.
- Priority Areas:
    - Look O/S irrigation districts, already covered.
    - Look at Eastern Alberta.
    - Decide to spend majority of funds in this area.
    - Go where the problems area.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 4, 2002	*Location: Calgary*
Person Interviewed: Terry Dash	*Phone No.*:403-292-5719
Role: Regional Earth Science Engineer	*E-mail:dasht@agr.gc.ca*
Organization: AAFC-PFRA	
Interviewer:	*Phone:*
Fax:	*E-mail:*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes.
The main uses of water in agriculture are:

- crops - irrigation - good quality
- crop spraying
- watering livestock
- cleaning barns etc
- domestic water use - farms, ranches
- ag industry - processing (e.g. ethanol, potatoes)

Water supply is essential to all types of agricultural operations - particularly livestock type operations. Grain operations generally require good quality water for spraying whereas livestock operations need secure supplies that are strategically located (or strategically delivered) to allow them to manage their pastures in a sustainable fashion and to take optimum advantage of the grass available for grazing. This can require the delivery of water to many locations within an operation and explain why shallow pasture pipelines have become so popular in recent years. Limited water supplies (for reason of quantity, quality or both) can result in the over-grazing of some parcels (where water is available) and under-grazing in other areas where water supplies are not as ideally located. This constrains production and can prevent expansion.

Agricultural businesses (like confined feeding operations) also need secure, good quality water supplies as they involve large investments and require water for consumption, plus for some operations, cleaning of barns etc. Water can be a constraint thay prevents expansion.

Poor water quality can affect the efficacy of pesticides (http://www.agr.gc.ca/pfra/water/farmchem.pdf). Water quality is also an important factor in weight gain in animals (affecting production), especially in confined feeding operations.

Irrigation is big in southern Alberta. The volume of water depends on runoff from the mountains and in drought years, restrictions are sometimes in place that reduces the amount of water available to all irrigators. A large infrastructure network is in place to store and deliver this water to irrigated fields and this requires ongoing maintenance to ensure it is meeting, as best as possible, the needs (quantity and timing of water application) of the irrigators. Efforts are ongoing to try and increase irrigation efficiency to increase agricultural production (e.g. irrigate more land) with the same amount of water (less evaporation losses)

Nature of Issue:

Location:

Importance:

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

Yes, many of them are documented on AAFC or AAFRD websites in Alberta with much emphasis on planning to ensure that water supply is considered up front when expanding operations. Lots of information is also out there on maintaining and monitoring water supplies:
http://www.agr.gc.ca/pfra/water/farmdug.htm
http://www.agric.gov.ab.ca/water/wells/index.html
http://www.agr.gc.ca/pfra/water/wqualite.htm
http://www.agr.gc.ca/pfra/water/supplye.htm
http://www.agr.gc.ca/pfra/water/conserve.htm
http://www.agr.gc.ca/pfra/water/irrigate.htm

There are also downloadable reports on water availability in the South Sask River Basin at http://www3.gov.ab.ca/env/water/regions/ssrb/index.html. There is one report on the home page, one on Irrigation in the 21st Century, the other on Non-Irrigation Water Use Forecasts.

The AAFC publication entitled "The Health of Our Water" also has some sections on water resoures and water use, in addition to lots of information on water quality.

NRCan has recentlypublished reports on the the impacts of climate change on water resources and agriculture - http://www.adaptation.nrcan.gc.ca/pdf/perspective_chap3.pdf
http://www.adaptation.nrcan.gc.ca/pdf/agriculture_en.pdf

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

Yes, there are agricultural water supply needs in Alberta. Key needs are for irrigation, livestock watering (animals of all types) in both pasture and confined feeding operation settings. Processing operations for agricultural operations (like potatoes) also require water.

Water supply needs and issues can occur due to water quality and/or water quantity issues or both, and the issues can be different for agricultural operations with existing supplies and for those needing new supplies (to expand, new operation entireley - new CFO, new processing facility, new winter watering site etc, new municipal tank loader etc.).

Issues for agricultural water users with existing supplies can include:

- security of supply (how secure is there existing supply, and if they don't know, how can they evaluate it and with what degree of certainty?)

- what should they do in terms of monitoring and maintenance to ensure their existing supply lasts

- how should they go about protecting their current supply - what practices or BMP's should they and their neighbours be practicing to ensure that water supplies are protected, are they practicing appropriate conservation to ensure water is not wasted.

- what is the current status of their water supply (yield, quality) and what are the current or potential risks to water supplies that these owners may face (overuse, contamination, potential reduction in supply due to decreased recharge due to changing land use practices, climate change, drought etc.

One issue is: Is current water quantity/quality monitoring by the Province (the owner of the water) and/or by individual water users (they also have a monitoring role as they use the water) sufficent to ensure that the current status and future development potential of water supplies is known.

Agricultural water users looking for new supplies want to know what quantity and quality is possible from the various potential water supply options for a specific agricultural operation or location. Issues to consider include:

- how accurate and reliable is this information? (what is the probability or risk that the information may be wrong? what is the information based on? have things changed since this information was prepared? are there any future opportunities (e.g. regional pipeline) that should form part of the decision matrix?

- how complete is this information?

- how secure are the various water supply options under consideration? e.g. under drought? what are the risks to each supply option due to changing land use, changing supply due to climate change, drought etc.;

- are the optoins affected differently by water licensing issues (e.g. could the apparent amount available be reduced if future licensed volume amounts are clawed back in the future to meet currently short-changed riparian needs?

- cost? - what will the maintenance costs be; how long will the infrastructure last; what monitoring should be done etc.

2. *Where might these needs be located?*

In general in the Province, water supply needs and issues can vary with location:

- southeast and east (Special Areas, Cypress, Paintearth, Flagstaff etc), finding a supply with suitable quantity and quality is an issue. AAFC has supported the completion of municipality-scale groundwater assessments to try and give people in these areas information on what the potential aquifer supply options might be. Go to: http://www.agr.gc.ca/pfra/water/groundw.htm for more information. In some areas, regional studies have confirmed that groundwater and surface water supply options are very limited and regional pipelines have been completed (or are currently being promoted) to supply water to agricultural water users and communities, and ag-industries (CFO's). Eg.

Henry Krueger pipeline from Red Deer River to Hanna, MD of Acadia pipeline from Red Deer River, pipeline from Elkwater Lake to serve farms and ranches on the north slope of the Cypress Hills.and many more. A major pipeline is currently proposed (South East Alberta pipeline) to move water from Ridge Reservoir, west to many individual farms, Hutterite Colonies, agricultural businesses, and small communities as far west as the slopes of the Cypress Hills. There is also a regional pipeline proposed for the MD of Kneehill.

- Many of these areas also have a very high risk to drought and existing dugout supplies are unreliable in these years. The move is mainly away from insecure dugout supplies (and shallow wells), towards water wells of sufficient depth to provide secure supplies even after several drought years (quality may be marginal but is usually acceptable for stock watering). There has also been a move towards the construction of appropriately spaced tank loaders within a muncipality to meet emergency needs (these tank loaders are sourced from pipelines or usually deeper more reliable groundwater supplies).

- South irrigation areas - Lethbridge, Taber, Newell, Wheatland - Water is typically available from the irrigation systems. Main issues are: the reliability of this supply in drought years, and potential water quality issues due to contamination (this water is also used for some communities and by individuals). Work is underway to improve irrigation efficiency and to transfer water to the most valuable uses (using the transfer provision in the Water Act) to ensure this water is used properly. In some areas, there is concern with current aquifer contamination or overuse (e.g. local falling water levels in Milk River Aquifer).

- Hwy 2 corridor - Main issues here incude both overuse and contamination. In recent years, many small communities along the corridor have expressed a concern about falling aquifer water levels: Ponoka, Lacombe, Acme, Beiseker, Irricana etc. This concern has resulted in the current interest in many of these areas to obtain surface water via a proposed regional pipeline(s).

- Northeast of Edmonton area - relatively high density of agriculture in this area - similar to Hwy 2 in some areas. Historically has had lots of shallower bored wells that we have since found are not reliable (both quality and quantity) in drought years. Move to more secure supplies in recent years: deeper wells, regional or rural-scale pipelines from Edmonton or other communities, more tank loaders.

- Peace River Area - not as involved in this area but do know about local concerns regarding potential contamination of the important Grimshaw Aquifer, and the difficulty in many other areas to develop any supply of water due to the presence of deeply incised surface water streams (high pumping costs to move water to upland level) and the general absence of aquifers of suitable quantity, quality or both. Several pipelines and the construction of large dugouts have addressed water supply concerns in some areas.

3. *What are the specifics of these needs?*

Much of this is discussed above.
- Obvious shortcoming in some areas are the lack of information on water supply options, for example the groundwater development potential of underlying aquifers. People need sound information that is understandable and that they can use to make decisions. The ARC

maps of the 1970's attempted to address this need for aquifer information (general estimate of yield and water quality) and more recently, AAFC-PFRA has supported the development of updated maps that utilize the extensive water well drilling and testing data that has become available since the publishing of these earlier ARC maps. Information should include possible yield available, water quality, cost to develop and maintain, design life etc.

- People need to better understand the security of the supply that they propose to use and the risks associated with that supply (potential depletion, contamination, infrastructure requires maintenance and doesn't last forever, monitoring is essential to identify problems as they occur and take action).

- People also want to be confident that the provincial government is taking care of the resource and safe guarding the water supply for their operation (i.e. protecting their interests). They should also understand that they can't delegate all this reponsibility to the Province and that they also have a role to take care of their own resource - conserve water, protect water from contamination by their land use or other activities etc.

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

Not meeting these needs ultimately means money. It can take the form of lost agricultural production and other issues like increased costs (e.g. poor water quality makes pesticides less effective and may require more pesticide to be purchased and applied) or the investment in a water supply project that is not sustainable, or that is not sufficient to supply water when it is needed most (e.g. in drought years). This can result in selling off herds for example, that have taken years to develop and increase.

5. *What are some possible solutions?*

There are many tools to address these issues/needs:
- Information - much is available on AAFC or AAFRD websites in Alberta with much emphasis on planning to ensure that water supply is considered up front when expanding operations. Information on the groundwater development potential of aquifers underlying many of the municipalities in Alberta is available in AAFC supported reports that are on line at http://www.agr.gc.ca/pfra/water/groundw.htm, and are also available for sale through the Alberta Geological Survey. Lots of information is also out there on maintaining and monitoring water supplies (see web sites given in answer to earlier question).

- Continued support of information development on water supply is desirable and should be focussed on: identifying to the agricultural producers/businesses etc. potential water supply options (e.g. aquifer yield and water quality) across the agricultural area of Alberta; identifying procedures and approaches to monitor and confirm the security/reliability of water sources (and performance of infrastructure) and changes in water quality over time, changes in the quantity of water available change over time; information on management and maintenance practices - to maintain infrastructure; information on risks and how to manage them (e.g. via environmental farm plans).

- program money to help producers develop supplies that are sustainable and secure, and that provide for future monitoring and maintenance. This is especially important where supplies are very tough to find and develop (e.g. areas where surface water or dugouts are unreliable in drought, aquifers are low yielding or poor quality). Drilling test holes to find water cost money and the success rate may be low in some areas. The solutions to problems may vary depending on the area: pipelines may be the best solution in some of these areas; lots of poor quality water may be available and water treatment may be the answer in some areas. Program money can also be used to support research and development to develop and inform agricultural water users of the best practices to use to: monitor the water supply itself and the performance of the infrastructure (e.g. the well); to maintain the infrastructure; to protect the water supply; to develop new water treatment technologies to treat poorer quality water or to ensure the water quality of existing sources is safe for intended uses.

- Program funds should lead to the best water supply solution for an individual agricultural producer and should not bias the potential water supply options under consideration (e.g. the program will help fund a pipeline but not individual deep wells), nor should program funds be used to fund "stop gap" supplies that will soon fail or that will be unreliable when foreseeable stresses occur (e.g. drought). Program funds should be used to fund a secure, long term solution. The type of solution may vary across the Province.

- legislative solutions to better manage and protect water and possibly ensure that the water that is available is allowed to go towards supporting the highest value agricultural (or may be other) use. Enforcement is also required to ensure that legislation is followed.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Needs are likely best reflected in i) recent surveys of agricultural operators/respondents, ii) reports as contained in the websites documented in earlier responses to questions. The recent Alberta Water for Life consultations may be one of the better sources for this type of information as it documents what the the Alberta public (urban and rural; north and south) see as being key water supply needs and issues.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes, and this varies throughout Alberta as discussed earlier under needs. In general, water supplies are more available on the west side of the province: streams originate here, water quality is better, aquifers are generally more permeable, receive more recharge, and can easier supply agricultural needs. On the east side of the Province, lands and water supplies are generally at higher risk of drought: surface water is not reliable in many areas, groundwater is also tough to find and often of poor quality. Refer to earlier discussion on needs for more on this topic. Lower population density in many of these drought-prone areas also makes certain types of solutions (e.g. regional or rural pipelines).

In more general terms, the basic constraint to water supply development is: Are any of the local or available water supply/water quality options sufficient for the intended agricultural use? or can they be made to work if other measures such as water conservation or water treatment are employed to make the option work? Governments usually address these types of constraints by providing information, money (via programs), or legislation.

In terms of information for water supply development, constraints can include:
- reliable information on water supply choices - surface water, groundwater, existing infrastructure (e.g. regional pipeline sourced from either surface water or groundwater). Surface water availability is generally reasonably well known or can be reliably estimated. Groundwater supply options are less well known. Estimates or guesstimates of possible groundwater supplies are based on professional of the available data, how this data might apply to nearby areas of similar geology (but with less or no actual test hole data), and predictions (often based on probabilities) of likely yield and water quality.

- information on security/reliability of water source options (water quality and quantity)? Is it possible that water quality or the quantity of water available may change over time? due to less recharge etc.

In terms of money, for producers, money can be a constraint as:
- water development cost money whether it be for new water supply development or to replace failing infrastructure. In some area, the cost of potential new supplies is relatively easy to estimate (potential supply options well known, infrastructure costs well known). In other areas, cost is much less well known as risky drilling operations may be required to locate a suitable supply.

- there is an ongoing need for money for ongoing monitoring and maintenance

- there may be ongoing costs for water treatment, expensive water pumping (e.g. from a stream valley to upland level)

For governments, money is needed to develop information to lead to more sound decisions on water supply options, to answer questions above etc. Money is also required for research and development, for example to develop technologies to deal with emerging water quality issues or new water quality MAC's (e.g. new standards for arsenic etc in the US), or to identify better ways to deal with monitoring/maintenance considerations in the design of water supply infrastructure.

Licensing of water supplies can also be a constraint as water may be locally available to expand an agricultural operation but the water is already fully allocated to other users.

Another way to look at constraints is to also look at potential risks to water supplies. Possible risks may include:

-Yield available from water source will decrease due to climate change, drought, overuse, or re-allocation of available water to competing needs like riparian uses, fish etc.

- increasing use or demand can impact the quantity of water available

- failing infrastructure (e.g. plugging of intake zone in wells)

- water quality will deteriorate due to: contamination from land use; drilling-type activities like oil and gas, seismic etc; aquifer depletion (e.g. inflow of poorer quality water from other aquifer units with higher head); infrastructure deterioration (e.g. failing well seals, corroded well casing allowing water from different aquifer to mix; broken pipelines or seals allowing contaminated water to enter); biological/chemical infrastructure issues (e.g. biofouling in wells, biofouling in pipelines etc; drought and/or climate change; failure or incapacity of treatment system to meet water quality needs

2. *Where are these water supply constraints most evident?*

This has been covered earlier. The local availability of water is not uniform throughout the province. Geology and the presence of aquifers is also not uniform: some areas are blessed with multiple water supply options (e.g. surface water and groundwater), others much less so (e.g. east side of the province (surface flow is less reliable, less rainfall and recharge, geology is such that bedrock contains more shales - lower yields and generally poorer quality). Constraints in other areas occur due to competing uses for the same water (e.g. high demand along highway #2; in irrigation areas where more water is desired for irrigation in drought years). So issues are different depending on the areas in the province. Alberta Environment officers responsible for approving or providing technical input to approval for water licenses (e.g. Claude Eckert, Steve Wallace, Ian Franks etc.), and/or local municipalities are likely the best source of information on local constraints. The 1970's ARC maps and more recent regional groundwater studies can also identify where groundwater supplies may be less available or are poor quality. For example: PFRA is starting to assess regional groundwater study maps to identify regions where groundwater supplies are limited by either quanity or water quality.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

Improved information and/or program money to direct (and may be financially assist) agricultural operators to develop the "best" (secure, reliable, most cost effective) water supply solution for them. Money via program funds is the tougher part of the equation as there is an insatiable demand for program funds for water supply projects (infrastructure doesn't last forever and needs to be replaced; water supplies thought to be secure are found to provide less than in the past due to less supply or more demand, or they've been compromised by contamination). So a big issue is: Assuming funding is limited, what should programs fund in terms of water supply infrastructure?
- are there areas or locations in the Province that should receive funding priority - highly productive areas? areas where water supplies are more difficult to obtain and where solutions may involve riskier investments (e.g. test drilling) or higher costs (e.g. piping in water from a secure source located far away). Should limited funds be used to fund projects

where water supplies are easy to obtain and these projects would have proceeded even without government assistance?

- what types of projects should be eligible (e.g. should we be funding dugouts or may be even shallow wells in areas where we know they are not reliable in drought? should we fund replacement wells, even though it's possible that lack of maintenance may have caused the previous infrastructure to fail?

- Should program money also be used to: develop information to better understand the distribution of groundwater supplies; to monitor/protect the supplies we know about to ensure they are secure and not being over-exploited or contaminated; to carry out R&D to come up with better tools to address constraints (e.g. water quality treatement technologies).

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Covered above - AGS has groundwater maps for the entire province. AAFC-PFRA and others are trying to update and improve our level of knowledge re: groundwater. For monitoring data, contact Alberta Environment.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

No not everywhere. In some areas, secure water supplies must be imported by pipeline as surface and groundwater sources are unreliable or unacceptable (yield or quality). This can cost substantial sums of money, especially in areas on the east side of the Province where operations can be located relatively remote to one another and long pipeline lengths may be required to address the needs of relatively few agricultural operators. In other areas, overuse has resulted in aquifer or surface water sources being unavailable (there is too much demand for the local supply of available water) and again, water may be imported to meet local needs (again, usually via pipeline).

Irrigation infrastructure is another issue and other experts should be consulted as to whether or not more storage would be desirable (and where) to meet irrigation needs in drought years. In some areas (e.g. along the Milk River) no storage is available on the Canadian side of the border and storage is desirable to meet local needs in times of drought.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Water wells fail all the time - typical life has been estimated by some as being 10 to 20 years (AAFC-PFRA study for Kneehill County - http://www.agr.gc.ca/pfra/water/knee.htm and for the Prairies as a whole - http://www.agr.gc.ca/pfra/water/iah217.pdf
http://www.agr.gc.ca/pfra/water/iah2000t.pdf
http://www.agr.gc.ca/pfra/water/ruralwat.pdf

Other types of infrastructure - pipelines, dams, dugouts etc also have design lifes and require maintenance to perform for extended periods of time.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Cost and potentially lost agricultural production. For example, water must be delivered to strategic locations in pastures to allow for good grazing management of all areas of the pasture.

4. *What are some possible solutions?*

Information promoting the importance of maintenance and monitoring. Maintenance to extend infrastructure life and monitoring to confirm that the water supply is operating the way it should (Note: need to monitor to confirm the water supply itself, and also the infrastructure: e.g. monitor non-pumping water levels to confirm that the aquifer is ok, and monitor pumping water levels to ensure the well screen/intake , pump etc are ok)

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Lots is available - In addition to those mentioned earlier -
http://www.agric.gov.ab.ca/water/wells/index.html
http://www.agr.gc.ca/pfra/water/farmdug.htm
and many more on the PFRA and AAFRD websites - e.g. maintenance and BMP's to protect water quality etc.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Existing water users:
- the main tool for these users is information and self-assessment tools.
- emphasis on encouraging users to monitor their water supplies (water levels, water quality) and maintain their own water supply infrastructure (this is done usually by workshops and information products). Some municipalities encourage monitoring by providing tax incentives for owners to observe and report on water levels in their own wells.
- these users also need to be able to assess the security of their supply and be aware of current or possible future risks that may affect that supply. This could be done again by information delivery - workshops, workbooks, fact sheets.
- the Province also has a role to monitor and observe water supplies (water levels in aquifers, water quality in streams and aquifers, water levels/flow in streams) to identify problems as they develop (or to confirm that they are not occurring) and to assure the public that water supplies are secure, reliable and that their water quality is not being affected by land use changes, by aquifer depletion, by poor practices (unsealed abandoned wells). The Province must ensure that sufficient stream monitoring stations, observation wells and water quality

sampling points (streams and aquifers) are in place to confirm the status of the resource. The Province is also responsible that water use is monitored by high water users to ensure they are meeting licensing requirements, and that their observations are confirming that the water supply is ok. and that it is not being unduly impacted by development. As a first step, the Province is currently considering carrying out a study to review the current Q20 system of determinging sustainable well yield, and to determine if another approach is warranted. Frequent "State of the water supply" type reports may be one approach to ensuring that the collected data is being analysed and passed on to the public.
- The Province may also want to enforce already stringent monitoring and reporting requirments to confirm what is occurring in high use (licensed) water wells.
- In areas where existing supplies are inadequate, program funding may be required to help agricultural operators/businesses find new supplies. Government funds are also sometimes requested to maintain existing water supply infrastructure that benefits many water users (e.g. dams, irrigation canals and infrastructure).
- continued research and development to encourage conservation, improve monitoring and maintenance practices, improve irrigation efficiency, improved water quality treatment, improved water quality testing technologies to identify water quality concerns as they occur (e.g. ecoli, nitrates etc).
- information, program funds, and legislation to promote water conservation and water protection and get water users more actively involved in protecting "their" water supplies (e.g. fund demonstration projects to get cattle out of the creek; promote watershed protection groups and aquifer management and protection groups; promote municipal planning to protect water supplies). One aspect of water protection could be government funding for pilot projects to: i) raise awareness about the risk of contamination and mixing of water between aquifers posed by unused wells, ii) use program funds to assist in the proper decommissioning of unused or abandoned water wells

New water users:
- need information to identify what their water supply options are (e.g. the development potential of underlying aquifers) - e.g. current regional groundwater assessment studies being carried out throughout the province - http://www.agr.gc.ca/pfra/water/groundw.htm. Provinces routinely handle this role, although in Alberta AAFC is partnering with municipalities to develop these updated maps.
- continue to prepare and distribute client-friendly information ion how to assess water supply alternatives, and how to plan and develop a water supply (including what to consider: costs, risks, maintenance costs over time etc.
- Program funding may also be advantageous to help new agricultural users (bona fide farmers, not acreage owners) develop water supplies. If this is done, funding should only be for secure, reliable water supply sources and should require design provisions to ensure the supply/infrastructure can be readily monitored and maintained, and protected. Larger scale water supply projects like dams, reservoirs, regional pipelines generally require government funds to proceed.

2. *What type of organizations should receive priority funding?*

No real criteria with regards to client type or organization. Funding could mainly take two forms as discussed below: infrastructure, or strategic studies (includes information development for current or emerging issues, monitoring activities to confirm the status of the water resource, research and development to benefit water supply or protection activities).

3. *What type of projects should be eligible for funding?*

Funding should address the needs of both types of users (current agricultural water users and future users - new ag operations, new ag-businesses, expansion requiring more water than is being supplied by their current water source).

Two types of projects should receive funding:
i) infrastructure water supply projects - criteria for funding should consider the security of the supply and risks to the supply (why would you fund a dugout in an area where dugouts are unreliable in drought or when they are needed most). The funding should not introduce a bias to develop certain types of projects (e.g. pipelines) over other types of potential projects (e.g. water wells). Maximum funding assistance from the federal and provincial government should be 2/3 (say 1/3 federal, 1/3 provincial). Funding should also consider the "risk of obtaining a suitable supply" (should we help fund a farmer where a shallow drilled well will provide an assured supply, or should we save that money and help the farmer with no easy choices and whatever is done, e.g. drilling, is risky and costs lots of money).

ii) strategic water supply studies or activities such as:
- studies to identify the yield and quality available from underlying aquifers. The intent being to identify potential drilling targets and allow farmers to estimate likely yield, quality, and possible well development costs. This allows the ag water user to compare water well costs to other water supply options that may be more firmly known or that can be more reliably estimated (e.g. pipeline, may be development of a local spring, pipe water from a nearby stream)
- studies or maps to identify risks to potential water supply options or projects (e.g. maps showing the vulnerability of shallow aquifers to contamination)
- information/booklet/fact sheet development to help agricultural water users monitor and maintain water supply infrastructure (e.g. water wells that last for generations booklet)
- assessment tools to allow agricultural water users to determine the security of their supply (e.g. to show how to monitor to assess the current aquifer status, how to compare to the initial status, and forecast whether or not there may be a problem
- studies to review current observation wells or other data gathering activities to confirm the status of water supplies, identify areas where emerging problems may be occurring, and to identify where targeted future monitoring may be desirable.
- regional aquifer system analyses - similar to those done by the US Geological Survey in the US. Computer modelling is carried out of major aquifer systems to identify pre-development, current development, and future aquifer development potential (and potential develop impacts and issues) - see USGS Circular 1099 by Ren Jen Sun and Richard H. Johnston.

- monitoring systems or programs to observe changes in water supply or quality
- research and development projects to benefit water supply development and protection (e.g. new water treatment technologies).
- water protection projects - raise awareness of and financially help plug unused wells, help form watershed or aquifer protection and/or management groups

You could check current agricultural water programs to see what they allow in terms of projects (e.g. AAFC Rural Water Development Program, the provincial Alberta Farm Water Program, and may be programs elsewhere with similar general climate or issues - e.g. Montana?). Projects funded this past year by AAFC-PFRA RWDP program are on the internet at:
http://www.agr.gc.ca/pfra/alberta/rwdprojects_e.htm. You'll note that the RWDP program funds water supply development (mostly pasture pipelines), water protection projects, and studies or R&D to improve information. This year's version of the NWSEP is funding mostly rural municipal tank loading facilities (test drilling, well completion, tank loader infrastructure construction), rural pipelines, pasture pipelines, and some studies (geophysics, test drilling) to improve our knowledge about water supplies in areas with known problems with water supply shortages.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Yes:

1. Drought sensitive areas, mainly on east side of province, to identify secure water supply development.
2. Highly developed areas along Hwy 2 to identify areas of current concern with regards to overuse or contamination and to identify actions to take to protect water supply sources. This is likely the area where depletion may occur first as water use is heavy in many areas, and still increasing.
3. Areas of high water use as these may be areas with the highest potential for depletion (particular attention to aquifers with possible longer time for recharge to reach the aquifer - confined aquifers, buried valley aquifers. Macfarlane (1998) has argued whether or not one can even sustainably manage some confined aquifers. vanderKamp and Maathuis (19XX) have identified the need to carefully manage the development of buried valley aquifers to avoid depletion.
4. Areas of high contamination risk throughout the province, to identify areas where education and may be land use measures may be warranted to protect water resources. Special attention should be paid to areas where shallow aquifers are being used, or for aquifers with lots of unused or abandoned wells, or for aquifers where wells are flowing uncontrolled and wasting water.
5. Riparian needs assessment. The province is starting these and this needs to continue particularly in those basins where licensed water is "fully allocated". We need to know the quantity of water that must be allowed to pass through the system (via runoff to streams or groundwater discharge to streams) to supply the essential needs of the streams and riparian areas. This can affect the quantity of water available for other uses.
6. Areas where developing or finding water is costly and relatively high risk in that test drilling is expensive and may require several to many holes to find a suitable water supply, or alternatively these could be areas where more costly water supply pipelines

are required. Costs to individual agricultural operators can be higher in these cases and there is more risk they may be unsuccessful. This is somewhat of a philosophical area: does one target government funds to those that need the money to try and offset the higher cost and/or higher risk, or is blanket universal funding more appropriate (in which case funding may be insufficient for these water supply projects - whether they be test hole drilling programs, regional pipeline schemes may not go ahead.

F. OTHER COMMENTS

I don't like the NWSEP acronym. Water supply involves protection as well as development or "water supply enhancement". The program could better be called the National Agricultural Water Program (NWAP) or something similar.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 10, 2002

Location: Wainwright

Person Interviewed: Bob Barss

Phone No.:780-842-4454

Role: Reeve

E-mail:

Organization: M.D. of Wainwright

Interviewer:

Phone:

Fax:

E-mail:

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   Yes

   Nature of Issue: Due to severe drought there is a major shortage of water

   Location: M.D. of Wainwright

   Importance: Extremely High

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

   Some issues have been documents through meetings and media stories

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   Yes

2. *Where might these needs be located?*

   All areas across drought stricken Alberta and Saskatchewan

3. *What are the specifics of these needs?*

   Water for livestock and crops

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

   Loss of income and availability of feed. This would have a high impact on local community Social Services

5. *What are some possible solutions?*

   Grants for water well drilling that have a renewable clause. Possibly look at interbasin transfers through pipelines from rivers

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   Yes, aquifers are drying up as well as sloughs and dugouts.

2. *Where are these water supply constraints most evident?*

   In all drought areas of the province

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   Poor land use and loss of prime agricultural land

4. *What are some possible solutions?*

   Stop water being used to push oil up from underground. Pipeline from major rivers

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   The water level in aquifers is dropping. There is no surface water left and the worst area in the province is in the North East.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Loss of agricultural land, loss of the family farm, high use and cost of social services.

4. *What are some possible solutions?*

   Interbasin transers, water wells, pipelines

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Again interbasin transfres, pipelines, well drilling and tank loaders

2. *What type of organizations should receive priority funding?*

   Landowners, municipalities, Province and Federal Government

3. *What type of projects should be eligible for funding?*

   Water well drilling, dugouts, tank loaders, and interbasin transfer studies

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

   Drought area - North East part of Alberta

F. OTHER COMMENTS

Appendix D - Saskatchewan
Questionnaire Response/Interviews

In Saskatchewan, the following 10 organizations received a copy of the questionnaire and a total of 15 responses were received:

- Sask Water (three individuals)
- Sask Watershed Authority (four individuals)
- Sask Agriculture Food and Rural Revitalization (two individuals)
- PFRA (three individuals)
- Irrigation Diversification Centre (one individual)
- Saskatchewan Association of Rural Municipalities (one individual)
- Saskatchewan Research Council (two individuals)
- National Water Resources Institute (one individual)
- Dairy farmers of Saskatchewan (one individual)
- Saskatchewan Irrigation Projects Association (one individual)

A. General Questions

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain?

   All responses indicated that water supply issues exist and that these issues constrain agricultural expansion and production.

   Nature of Issue:

   Issues that constrain agricultural production and expansion are: the lack of good quantity and quality for domestic and agricultural purposes; sourcing large volumes of good water quantity and quality that are often difficult to locate and develop for Intensive Livestock Operations (ILO); insufficient run-off; drought vulnerability; high costs related to drought proofing; lack of information required to make informed decisions; completion of infrastructure for existing projects (Lake Diefenbaker); and the lack of irrigation acres constrains the production of higher value crops. There is an insufficient availability of water sources having sufficient quantity and quality that can withstand the tests of periodic drought.

   Location:

   The location of water supply issues that constrain agricultural production and expansion are: generally across the prairies, throughout the agricultural areas of Saskatchewan and particularly in the south, southwest, northwest (Lloydminster area) west central and central areas of the province.

   Importance:

   The importance of resolving water supply issues that constrain agricultural production and expansion in Saskatchewan is critical to the survival of individual farms, municipalities and the province and are a limitation to economic growth in all agricultural areas.

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Information is available from: the Sask Watershed Authority library in Moose Jaw; a series of Basin Overview reports completed by Sask Water in the mid-90's; AAFC-PFRA drought monitoring and water supply reports as well as water supply and water sourcing studies; the Saskatchewan River/Nelson River Basin Study; a study associated with the Canada Saskatchewan Partnership Agreement on Water Based Economic Development Agreement (PAWBED); Sask Research Council, the Safe Drinking Water Foundation; intuitive information from PFRA, SWA and SAFRR staff; Sask Watershed Authority supply/precipitation data; and SIPA. Specific reports identified are: The Health of Our Water - Toward Sustainable Agriculture in Canada, AAFC, Ottawa, Canada, 2000; Saskatchewan Water Sourcing Study - Phase 1, PFRA, Regina, Sask., August 1986; Water Management: Issues and Challenges, Saskatchewan Government, November, 1997; and the Drought Primer.

B. Agricultural Water Supply Needs

1. Are there agricultural water supply needs within the Prairie Provinces?

The following agricultural water supply needs were identified: reliable water supply of good quality; information related to groundwater supply; soil moisture; water for ILOs'; irrigation infrastructure; and good water quality for crop spraying, ethnol production and agriculutral expansion. More use could be made of the rivers.

2. Where might these needs be located?

Water supply needs are located primarily in the south, southwest, northwest, west central and central areas of the province. There are extensive areas where ground and surface water are poor. Water supply needs were identified in the Lake Diefenbaker and Rafferty Alameda reservoirs and adjacent to North and South Saskatchewan and Qu'Appelle Rivers as well as the areas outside of secure sources. The Ribstone Creek aquifer was also identified.

3. What are the specifics of these needs?

The specifics of agricultural water supply needs within the Prairie Provinces are: higher water volumes are needed to maintain and increase agricultural production; assistance for groundwater exploration; high cost of construction related to water supply options; soil moisture limitations; poor groundwater quality for livestock; sustainable water supplies; more access to existing sources; preservation of wildlife;

recreation; financial and technical expertise; irrigation infill; and large quantities on a reliable basis.

4. What are the implications of not meeting these needs in terms of agricultural production/ expansion?

   The implications of not meeting these needs in terms of agricultural production/expansion are: the limitations will impact the economics of an operation; prevent the development of new operations; growth in areas with a good supply while other areas remain stagnant; diversification of the agricultural sector will be stalled; continued dependence on sources with lower reliability; continued disruption of livestock operations; continued reliance on governments for farm aid; partial or complete crop failure; expense of alternate drinking water supplies; lack of new projects moving in; the affect on rural development; fewer opportunities for value added crops and related industries; severe hardships and stress; livestock herd sell-offs'; lack of critical mass needed for value-added production; and no potential to increase earning potential of non-irrigated land.

5. What are some possible solutions?

   Some of the possible solutions to meeting agricultural supply needs are: construct/improve wells, dams, dugouts, pipeline systems, treatment systems to upgrade quality, conservation, pasture pipelines, deep wells, trickle irrigation, and irrigation; determine the best alternatives locally to secure sources for agricultural development; strengthen groundwater information to producers; provide technical and financial assistance to promising projects; more analysis into water issues as projects are proposed; conservation tillage and other improved agricultural practices; more efficient crops in respect to water use; revert cropland to pasture; bottled water; regional pipelines; dams are not a solution; be proactive in regard to availability, sustainability, protection; complete and expand planned irrigation projects; fund long term infrastructure consistently, and reverse osmosis and EDR membrane treatment to improve water quality.

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

   Documentation in regard to the possible solutions to meeting agricultural supply needs is available from: local producers; drilling companies; Rural Municipalities; economic development agencies; Sask Research Council groundwater maps; Watershed Authority groundwater data base; Ribstone Creek Aquifer Report; Sask River Basin issues/water supply studies; PFRA rural water mapping; PFRA intuitive

knowledge; Sask Agriculture, Food and Rural Revitalization; Sask Environment; and pipeline inventories and maps from Sask Water, PFRA and the Rural Pipeline Association.

C. Agricultural Water Supply Constraints

1. Are there agricultural water supply constraints in terms of insufficient quantity or quality?

   The agricultural water supply constraints in terms of insufficient quantity or quality are: poor groundwater supplies; lack of distribution infrastructure; unreliable surface water supplies; not enough research; highly mineralised groundwater requiring treatment; drop in water table levels; lack of supply in the southwest area; lack of infrastructure to move good quality water; variable surface supplies and variable quality; contamination; and high TDS in groundwater supplies. There are areas with natural springs that could be explored.

2. Where are these water supply constraints most evident?

   Water supply constraints are most evident in southwest and western Saskatchewan in areas removed from the South Saskatchewan River; northwest and east central areas; when a small livestock operation is looking to expand and when an ILO is looking for a site; groundwater constraints throughout the province that relate to location, quality and depth; areas where there are not extensive, well known aquifers; the under utilization of Lake Diefenbaker; and throughout the agricultural areas of Saskatchewan.

3. What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?

   The implications of not dealing with these water supply constraints in terms of agricultural production and expansion are: no new developments that requires significant quantities of reasonable water quality; no increase in production or expansion; projects go ahead and are affected by drought cycles; agriculture production and farm income are disrupted; no business development such as irrigation and other spin-offs; impacts value added and diversification projects; operations operating under capacity; retarded economic development; no expansion in the southwest because of variable water supplies; and the agriculture industry operates from crisis to crisis.

4. What are some possible solutions?

Some of the possible solutions of dealing with water supply constraints in terms of agricultural production and expansion are: engineered solutions; conservation technologies; re-allocation of existing water resources; determine locally the best alternatives for water resources considering current and future use; consistent approach; better groundwater information; technological and financial assistance to improve existing surface sources; target funding to promote long term, drought proof supplies like regional pipelines, deep wells, and shallow buried pasture pipelines; planned development to address small urban water quality issues and rural water needs with one solution; address areas where there are no extensive well-known aquifers; treated water regional pipelines; document the relationship between poor water quality and poor production; integrated water management; expand canals and pipelines to deliver water to starved areas, funding and expertise; and develop regional pipelines from secure sources like the North and South Saskatchewan Rivers and small dams like the Weyburn Dam.

5. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

The following is a list of documentation and where it can be found in regard to agricultural water supply constraints in terms of insufficient quantity and quality, local knowledge; studies generated by local economic agencies, Sask Industry and Resources and Sask Water; groundwater maps available at Sask Research Council; water well driller's logs from Sask Watershed Authority; information from SIPA; hydrology maps from Sask Water; and small dam and pipeline inventories. There is a lack of integrated information.

D. Agricultural Water Supply Infrastructure

1. Is existing water supply infrastructure adequate to meet agricultural water supply needs?

In some areas, such as Lake Diefenbaker and the South Saskatchewan River Watershed, the existing water supply infrastructure is adequate to meet agricultural water supply needs. In most areas, water supply infrastructure is far from adequate. There should be more opportunities for regional pipelines. Where there is adequate infrastructure, it may not be adequate to meet the demand during a drought. Nitrates and pathogens contaminate many wells. The infrastructure is inadequate for intensively produced crops and industries as well.

2. If infrastructure is inadequate or failing, what are the specifics and the location?

Summary: The specifics and the location of infrastructure that is inadequate or failing are: dams built 40 to 60 years ago need to be refurbished; more infrastructure is required in the southwest; older wells have deteriorated; the Qu'Appelle River is degraded and its capacity needs to be re-established; many rural areas have fallen behind in developing infrastructure; inadequacy also relates to drought prone shallow wells and surface supply and the limited implementation of deeper wells; regional pipelines due to cost; higher drilling costs lead to shallower drilling; there are at least 6 secure source reservoirs in Swift Current District that could be used for pipelines but only one pipeline is servicing operations; many wells have poor quality due to contamination by nitrate and pathogens; poor quality irrigation pipelines need to be replaced; some of Sask Water's 44 dams need to be upgraded or decommissioned; a critical mass of irrigated areas has not been reached at Lake Diefenbaker and Lucky Lake; older irrigation projects in the southwest are failing; private and municipal dams have not been maintained; and drought has caused the failure of small surface and shallow groundwater supplies.

3. What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?

The implications of not dealing with these infrastructure issues in terms of agricultural production and expansion are: if infrastructure is not maintained and expanded, the future of the agriculture industry is questionable; there are liability issues related to the underutilized capacity at Lake Diefenbaker; limited development and expansion of the livestock industry; if failing irrigation pipes are not replaced with pvc, expansion cannot continue; if dams aren't maintained, they must be decommissioned and the supply is lost; rural development is limited; varieties and production levels are limited; opportunities are limited; economic opportunities are lost; and uncertainty keeps people from investing.

4. What are some possible solutions?

Some of the possible solutions to infrastructure issues in terms of agricultural production and expansion are: improve large scale infrastructure using the best sources for each region; funding; better groundwater availability information; funding for the development of drought proof projects; higher funding levels for the development of regional pipelines; increased investment in groundwater mapping, evaluation, well drilling, and water treatment; replace deteriorating pipelines with better quality material; long term funding programs made available for projects; international/inter-provincial programs; diligent management to manage allocations;

increased support for mapping, education on well maintenance, and water quality improvement technologies; make water, three phase power, natural gas and highways more accessible and cost friendly; consistent policy environment and long term funding; and plan and implement investments in new infrastructure.

5. What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?

   The following is a list of documentation and where it can be found in regard to existing water supply infrastructure: local information; groundwater information from SRC; PFRA sourcing studies; maps showing existing rural pipelines; RWDP database; Sask Watershed Authority; and SIPA.

E. Agricultural Water Supply Development Priorities

1. From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?

   The priority areas that need to be pursued in addressing agricultural water supply issues are: tie new infrastructure to high value production and BMP for water conservation; consider large scale infrastructure issues; fund ILO development; maintenance of existing infrastructure; infrastructure research; information development to develop more sustainable projects; funding to encourage construction of more sustainable and drought proof supplies with a priority of higher cost regional solutions; improve water wells to ensure better quality; conserve soil moisture; manage spring run-off and store water in wetlands and depressions; integrated water resource management; start with the South Saskatchewan River Basin and project and extend water use outwards; develop pipelines and irrigation and infill existing projects; determine environmentally sustainable ILO sites and extend pipelines to them; provide assistance to small farms in the Lumsden area; identify secure sources for long term solutions; examine optional development; direct strategic investments towards information and infrastructure needs; give priority to long-term solutions; and give priority to the needs of the livestock industry.

2. What type of organizations should receive priority funding?

   The following organizations should receive priority funding: user/producer co-ops that share in the capital costs and accept 100% of the operating costs; prioritize funding as can be demonstrated and sustainable to the environment and diversifies the rural economy; target funding towards sustainable projects; the Province; livestock developers; partnerships; government cooperative projects; universities;

SRC; consultants; focus on regional solutions but should not rule out individual developments; Rural Municipalities; pipeline groups; REDA; government agencies that do research, monitoring, mapping, education and provide financial assistance to farmers; wildlife and habitat agencies; organizations that are responsible for irrigation infrastructure and pipelines; Sask Water to repair dams; agencies involved in groundwater mapping and groundwater resource inventories; rural water pipeline associations; funding for PFRA to provide engineering services and funding for rural water pipelines; irrigation districts; ILOs'; small farms; value added processes; regional approaches; and projects with a strong agricultural component.

3 What type of projects should be eligible for funding?

The following types of projects should be eligible for funding: sustainable projects that diversify the local economy; sustainable water resource development and expansion projects; source protection projects; information based projects (e.g. groundwater, technical information, riparian protection); regional pipelines, deep wells, pasture pipelines and source protection technologies; well head protection; aquifer mapping; soil conservation, watershed projects and public education; aquifer mapping and characterization; ILO impact on water quality; testhole drilling; projects from a small market garden and to a Large ILO; irrigation potential studies; on-farm development; pipelines to areas where groundwater quality is suspect; regional surface or groundwater assessments; and secure source development projects.

4. Are there certain provincial areas that should be targeted for special attention in terms of overall needs?

Provincial areas that should be targeted for special attention in terms of overall needs are: research and studies to determine the priority areas and identify areas to be targeted; severely affected producers; hydrology in the southwest; ILOs'; information and research; west central Saskatchewan and the southwest; east central, the Yorktown/Melville aquifer (more population base); spread development around because growing conditions vary from year to year; target areas in the province where wells are not an option; Lake Diefenbaker; expand from areas that have an assured supply; conduct more analysis to set priorities; and look at the areas with the greatest constraints.

F. Other Comments

Other comments relate to the real and/or perceived impression of agricultural pollution and water quality degradation; a funding program could be implemented to raise producer levels of stewardship; riparian health needs to be looked at in rural

and urban areas from the standpoint of raising awareness and changing behaviour; demonstration projects and possibly the restoration of riparian areas could be funded; climate change is a large factor that should be considered in water resource planning and the environmental impact of water management should be taken into consideration; manure management is another important issue; the economics of a project are a key priority; if the economics are viable, producers can stay with it and continue to farm; Lake Diefenbaker is not fully utilized for irrigation; money to assist infill projects would create a critical mass that would encourage high value crop production and attract value added spin-offs and young people would stay on the farm; planning is the key; base decisions on availability, consistancy, supply, quantity, and quality, and then decide where the ILO, processing plant or agri-park should go.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 26, 2002

Location: Moose Jaw

Person Interviewed: Bart Oegema

Phone No.:(306) 694-3957

Role: Acting Director - Basin Operations

E-mail:bart.oegema@swa.ca

Organization: Saskatchewan Watershed Authority

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Surface Water Quantity issues primarily in western and southwestern portions of the province, although can extend to east and NE in some years.

Location:

Importance: Critical at the individual farm scale, some municipal supplies, and irrigation, no new allocations available for ILO's.

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

- Authority Library in Moose Jaw
- Series of "Basin Overview" reports completed by Sask Water in mid-90's documented water availability and water supply issues.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes

2. Where might these needs be located?

3. What are the specifics of these needs?

Water "need" or more usually referred to as "demand" has several difference types:

1. Household or Domestic
2. Livestock
3. Irrigation
4. ILO

Each has its own quantity, quality and reliability characteristics.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Limitations in quantity and for quality will impact economics of an operation, or prevent the development of a new operation.

5. *What are some possible solutions?*

Wells, dams, dugouts, pipeline systems, treatment systems to upgrade quality, conservation, trickle irrigation, LEPA irrigation.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

As above.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes

2. *Where are these water supply constraints most evident?*

Southwest and Western Saskatchewan, away from the South Saskatchewan River.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

No new development requiring significant quantities of reasonable water quality.

4. *What are some possible solutions?*

- Engineered Water Supply solutions
- Conservation technologies
- Re-Allocation of existing water rights - may require legislative changes.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

As Above

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

In some areas, yes such as the Lake Diefenbaker area and South Saskatchewan River Water Shed; other areas, no

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Many dams built 40 - 60 years ago need to be refurbished.
Need for more infrastructure in Southwest and West.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Tie new infrastructure to high valve production and BMP for water conservation.

2. *What type of organizations should receive priority funding?*

   User/Producer Co-ops that share in capital costs and that accept 100% operating, maintenance and depreciation. Prioritize as can be demonstrated and sustainable to environment, and diversifies rural economy.

3. *What type of projects should be eligible for funding?*

   As above.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

   As above.

F. OTHER COMMENTS

Opinions expressed are my own and not necessarily those of the Saskatchewan Watershed Authority.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 18, 2002

Location: Rosetown, SK

Person Interviewed: Brian Champion

Phone No.: 306-882-4272

Role: District Manager

E-mail: championb@agr.gc.ca

Organization: AAFC - PFRA

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes, water supply issues do exist.

Nature of Issue: Many areas lack good quality and/or quantity of water to use for domestic, agricultural and industrial purposes. These issues effect both large and small scale operations.

Location: Various locations across province.

Importance: Very important to those directly effected and also very important to the entire province.

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

PFRA Drought Monitoring and water supply reports: contact Darrell Corkal, PFRA Water Quality Coordinator @ 975-6413

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes.

2. Where might these needs be located?

Throughout West Cental Saskatchewan (speaking for our District only)

3. What are the specifics of these needs?

Increased agricultural productions requires higher water volumes to maintain production. Adequate quantities of good quality water is difficult to find and develop. Spraying requires high volumes of good quality water. Livestock productions improves with better quality water.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

If the needs are not met, agricultural production will remain stagnant and expansion will be limited to areas with higher quantities or quality of water. Diversification of the agricultural sector will also be stalled.

5. *What are some possible solutions?*

Determining on a local area base, the best alternative for water sources considering current and possible future use. This would lead to development of secure sources which in turn leads to agricultural development.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Most information is limited to local discussion. There may be some economic development agencies who have completed studies reflecting this issue such as Rural Economic Development Agencies, Sask Industry and Resources, Sask Water, etc.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes, poor groundwater supplies, lack of distribution infrastructure, and un-reliable surface water supplies.

2. *Where are these water supply constraints most evident?*

In many parts of West Central Saskatchewan and North West Saskatchewan (speaking for our district only).

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Production will not increase and expansion will not be possible.

4. *What are some possible solutions?*

As in B5.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

As in B6

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Water supply infrastructure is far from adequate. In some areas where infrastructure has been development, the immediate needs have mostly been met. In many cases the infrastructure was inadequate to meet future needs due to funding limitations.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Many rural areas located away from larger towns and cities have not developed any infrastructure for many years. The deterioration of the older infrastructure, mostly wells, have reduced the available water sources to many users who live too far from major centres to efficiently haul water longer distances.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Production and expansion require long term, sustainable water sources. If the infrastructure is not maintained, expanded or considered, the future of the agriculture industry is in question.

4. *What are some possible solutions?*

Improving large scale infrastructure using the best sources for each region will solve many of the current and future problems. This may include pipelines, reservoirs, wells, lakes, rivers, etc.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Most of the information is local. Contacts shown in other answers may be of assistance.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Large scale infrastructure issues must be considered.

2. *What type of organizations should receive priority funding?*

Regional or large groups dealing with solutions to many problems. Funding should be targeted toward sustainable projects regardless of who the applicant is. This should include both large and small scale operations, cities, towns, villages, rural municipalities, federal and provincial agencies.

3. *What type of projects should be eligible for funding?*

Sustainable water source development and expansion.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Research and studies to determine the priority areas will identify the areas to be targeted and the level of needs.

F. OTHER COMMENTS

The above answers reflect the comments made by 4 PFRA Rosetown District Office staff who work on water related issues in west central Saskatchewan on a daily basis.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 27, 2002 *Location: Moose Jaw*

Person Interviewed: Bryan Ireland, Nolan Shaheen, Bart Oegema *Phone No.*:306-694-3973

Role: Director-Regional Operations; Director-Groundwater Management; Acting Director-Basin Operations

E-mail:; bryan.ireland@swa.ca; nolan.shaheen@swa.ca; boegema@saskwater.com

Organization: Saskatchewan Watershed Authority

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   Yes.

   Nature of Issue: Production of existing irrigated agriculture, especially in SW Saskatchewan can be reduced when insufficient runoff. Intensive livestock operations require large volumes of reliable, good quality water which often be difficult to locate and develop

   Location: Each area of the province is susceptible to water supply shortages

   Importance: very important if to maintain and grow primary and secondary agriculture

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

   There are a large array of reports on water supply infrastructure possibilities including Sask Nelson River Basin Study. We discussed a number of them during our November 19 teleconference. Saskatchewan Watershed Authority Regional Offices were asked to submit comments on issues and possible solutions for their areas. The attached paper provides their thoughts. In addtion, when the Canada Saskatchewan Partnership Agreement on Water Based Economic Development Agreeement (PAWBED) was winding down, Gerry Wetterstrand (and perhaps others), PFRA and me prepared the attached paper as a possible stepping stone to a new agreement. Time constraints prevents me from filling out the remainder of the survey.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   Yes for ILOs'. Lack of a reliable water supply limits growth.

2. *Where might these needs be located?*

   In the SW more than in the north.

3. *What are the specifics of these needs?*

   Undertake groundwater exploration programs-verify supply. There is a need for funding-site specific assistance

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

5. *What are some possible solutions?*

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Saskatchewan Research Council groundwater maps; Watershed Authority groundwater data base; hydrology reports; Sask River Basin issues/water supply studies; PFRA-rural water mapping-run off overlay with water use(GIS)-broad trends-see Gord Bell

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

The surface water allocations are used in a number of water sheds in the SW. There is no more water. Further research is required. These are low run-off years Groundwater quality is a constraint-high in sodium.

2. *Where are these water supply constraints most evident?*

Throughout Saskatchewanal-east central and the northeast-not just in the SW

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

Limits growth, growth is constricted-more coordination

4. *What are some possible solutions?*

sistant approach

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

No. There should be more opportunities for regional pipelines

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

The Qua-Appelle River is degraded-re-establish capacity.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Liability isues-underutilized capacity around Lake Diefenbaker

4. *What are some possible solutions?*

   Money. There is no shortage of creative thinking

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Funding for ILO development; existing maintenance ;research ; hydrology.

2. *What type of organizations should receive priority funding?*

   province; livestock developers

3. *What type of projects should be eligible for funding?*

   projects that are economically and environmentally sustainable; source water protection

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

   hydrology in the SW, ILOs'; information; research

F. OTHER COMMENTS

November 18, 2002

National Water Supply Expansion Program

Issues and Project Ideas

Southeast Region - Weyburn

- Avonlea Reservoir
  - insufficient firm draft to support economic development in the area.
  - potential solution would be to raise reservoir FSL to increase the available firm draft. The increase in FSL would ensure a water supply for Avonlea and provide water for economic development.

- Cookson Reservoir
  - ground and surface water is fully allocated in the area around Cookson Reservoir (Coronach). In the past SaskPower experienced low water levels on Cookson, requiring an extensive groundwater pumping program to supplement the Reservoir (on-going). Recently, groups in the area have endeavored to develop economic projects, but do to lack of water have been unsuccessful.
  - At one time, schemes to import water from Lake Diefenbaker or Buffalo Pound Lake were studied.

- Kenosee Lake/White Bear Lake/Town of Carlyle
  - these lakes at Moose Mountain are experiencing ongoing low water levels. The reason why these lakes are not recharging is not fully understood. There are large recreational areas, cottage developments and golf courses that draw water directly or indirectly from these lakes.
  - Again, at one tine a scheme was devised to pipe water from Alameda Reservoir to the Lakes and the Town of Carlyle.

- Communities
  - Those communities that experienced drought related water supply problems - Assiniboia, Bienfait, Spring Valley
  - Communities that expected to have problems if drought conditions persisted - Oungre, Arcola, Benson, Caron, Congress, Corning, Fleming, Gainsborough, Khedive, Lampman, Manor, Spring Valley
  - Reading the preliminary program outline, it is noticed that water quality was also to be addressed. There would be many more communities that could be added to the list that have water quality problems that may or may not be drought induced.

Southwest Region - Swift Current

- (Re)Confirmation of Availability of Supply - The majority of watersheds in the SW are subject to development moratoriums. In some cases the moratoriums are and continue to be real, i.e. Frenchman River, Battle Creek.

  In some instances the moratoriums were conservatively put into place to avoid the potential of reducing availability to existing users to an unacceptable level. Unfortunately, the basis for establishing the moratoriums were not always done on sound technical findings but rather the pressures of the day, i.e. Old Wives Lake Watershed.

  Knowing what water is available, or unavailable, is crucial to any being able to determine any water supply expansion opportunities. A need exists to (re)confirm the extent of allocations in some watersheds. The results of these findings could be used to confirm the need for continuing the moratorium, modifying it to provide opportunity for specific development, or removing it to provide opportunity for a wide range of development. Water supply studies have been initiated in some watersheds but remain uncompleted, i.e. Big Stick Lake, Swift Current Creek. In others such studies remain to be initiated; i.e. Old Wives Lake. Typically we have not had the human resources (hydrology staff, field staff) to begin and complete this work. Having the program dedicate resources toward even the completion of initiated work would be of significant benefit.

- Alternative Livestock Water Supplies - A significant number of SW reservoirs provide opportunity for a spring, and/or fall release of water for purposes of replenishing naturally occurring water holes. In some instances a constant flow is maintained during the winter and/or year to maintain a stream flow during period in which it would not naturally occur. The water is then used as livestock watering points. The amount of water that is actually used as a result of the release is probably less than 10% of the volume released. Nonetheless because individuals have become accustomed to this method operation there is significant pressure to continue with the practice. A constant winter release is normally maintained below Newton Reservoir. The "cost" of such a release is equivalent to an irrigation on one of the projects; projects which are historically subject to water shortages.

  A program which would encourage the development of offstream storage reservoirs that could be filled during surplus flow periods and then subsequently used to supply livestock needs till the next surplus period could create opportunity to enhance the reliability of supply to existing projects or provide opportunity for new developments. Streams on which this idea could be applied include:
  - Wiwa Creek downstream of Braddock Reservoir
  - Russell Creek downstream of Russel Reservoir
  - Notekeu Creek downstream of Admiral and Gouvernor Reservoir
  - Wood River downstream of Thomson Res.
  - Frenchman River downstream of Newton Res.
  - Gap Creek below Downie

  - Maple Creek below McDougald and Junction

- Rural Water Supply Pipelines - with similar background to the above rural pipelines may provide an alternative solution to offstream storage reservoirs where firm draft demands can be supported from reservoirs.

East Central Region - Yorkton

Water Supply Issues:

- Dugouts:
  - Typically poor water quality - economically feasible treatment alternatives required to produce the standard of quality required for the purpose intended.
  - poor watershed management practices - best management practices in a watershed need to be implemented to reduce erosion and contamination of inflow water.
  - since dependant on surface runoff, dugouts are extremely susceptible to impacts from drought -technical and financial assistance for proper dugout sizing and location to reduce impact from drought - develop a sustainable source and build pipelines
  - ineffective dugout management /maintenance - technical and financial assistance on how to effectively deal with sediment, plant and algae growth.

- Groundwater
  - susceptibility of shallow wells to be affected by drought - producers dependant on shallow wells need to develop alternative sustainable water sources.
  - develop a sustainable source and build pipelines
  - lack of knowledge of groundwater supplies - develop groundwater mapping
  - high cost of exploration - technical and financial assistance for drilling
  - lack of maintenance of wells - provide education; provide technical and financial assistance

- Qu'Appelle System
  - lack of capacity in the upper end of the Qu'Appelle River does not allow for sufficient water to be delivered to meet the downstream demand during extreme drought conditions - improve the conveyance capacity of the Qu'Appelle River from the Qu'Appelle Dam to Buffalo Pound.

Northeast Region - Nipawin

- Water supply is a problem for many producers while water quality is also a problem. Some producers have abundant supplies of poor quality water, which is unfit for consumption. This still is a water supply issue for them.

  On this note, more money and resources have to be dedicated to developing and improving on farm water treatment equipment. This type of equipment has to be readily available at reasonable prices. To do this, governments have to work with academics and private industry to develop this equipment. Research money has to be set aside specifically for these studies. There also has to be demonstration and pilot projects, which the producers can see the benefits of improved water quality. The research and pilot projects for the prairies have to be coordinated with the three provinces, the federal government, universities and colleges and private industry. We in Saskatchewan should have knowledge of and access to research projects which are taking place in Alberta and Manitoba. Our work should also be shared.

- Another aspect of the water quality treatment may be a registry and an association to protect the agricultural producers. This may already be in place. The aim of the association would be to inventory the products that are out in the market place and to clearly identify what each of the products is capable of doing. This would help eliminate the potential for poor advice and poor matching of treatment requirements to product installations.

- Part of the problem of water supply for agricultural producers could be addressed by more rural water distribution systems (rural pipelines). This would be a straight infusion of cash from the federal government, provincial government and the local groups. For example, the domestic water supplies in the Tisdale area would be greatly enhanced by rural pipelines from the proposed main to Tisdale from the Melfort treatment plant.

Northwest Region - North Battleford

The following potential projects are located in drought prone areas within the NW region. They all require alternative water supplies.

- Turtleford - Edam - Vawn Area
  - Issue - chronic water supply problems with no known ground water supply for agricultural producers
  - Solution -Undertaking more ground water studies for aquifer identification or constructing a pipeline from the North Sask River. At least one meeting was held this past summer with producers to identify the magnitude of the problem.

- Maidstone - Waseca Area
  - Issue - chronic water supply problems for both landowners and communities Many calls have been received over the last few years. Most individuals and the communities are using wells and have been rationing for the last few years
  - Solution - carry out additional groundwater investigations to locate an adequate aquifer. Some work has been carried out this year but a suitable resource has not been found that can supply all the region's needs.

- Greenstreet Area
  - Issue - producers having to haul water, community looking for alternative to surface water supplies
  - Solution - develop source and pipe water from the Rex Valley aquifer to meet both needs

- Ruddell - Denholm Area
  - Issue - chronic water shortages with no known ground water supplies. Most producers were hauling or using water pumping equipment to pump from N. Sask River to supply their needs.
  - Solution - undertake groundwater investigation adjacent to N. Sask River or use N. Sask River for a supply pipeline to the problem areas.

- Dodsland - Kerrobert - Luseland Area
  - Issue - chronic supply of usable water. The only water available is from the Judith River aquifer which is very highly mineralized.
  - Solution - look into feasibility of extending pipeline from Kindersley.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date:02/11/22

Location: Swift Current

Person Interviewed: Dan Runcie

Phone No.:778-5000

Role: District Manager

E-mail:runcied@em.agr.ca

Organization: PFRA

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes. There are issues which exist that constrain the development of both small and large scale operations. They relate to both water quantity and quality and to a great extent relate to drought vulnerability. Generally the producer has adequate water for the "good years", but drought years tend to be the downfall. Quality issues are more general and ongoing. High costs of drought proof supplies are also an issue. In many cases, the level of information available in order to make informed development decisisons is also lacking.

Nature of Issue: see above.

Location: Generally across the prairies

Importance: high

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

There is documentation related to all these issues, likely not all encompassing however. PFRA has done water supply studies, water sourcing studies, the Water Quality Unit has some quality information. The SRC and Safe Drinking Water Foundation may have some water quality information as well. Much of the information is intuitive and held at local levels by PFRA, SWA, SAFRR staff.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

There remains need for adequate water supplies of good quality in many areas of the prairies. There also remains a need for good information, especially related to groundwater availability, quality and depths/costs generally across the prairies.

2. Where might these needs be located?

The need for better groundwater information exists everywhere. Parts of every area of the prairies also have need for better, more reliable sources of supply and there are extensive areas of the prairies where water quality (both surface and ground) is poor.

3. What are the specifics of these needs?

They relate to lack of extensive information related to groundwater, some areas being burdened with limited supply options and the high cost of construction of a sustainable or drought prood supply. The latter is also linked to the struggling farm economy and a "get by for now" attitude of many producers.

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

Continued dependance on sources with lower reliability, continued disruption of the livestock operation by drought, continued calls to government for assistance with a recurring problem.

5. *What are some possible solutions?*

Strengthen the groundwater information available to producers. Provide technical and financial assistance to projects with long term sustainability. Look deeper to the development of quality water or improvement of water quality as projects are proposed.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

PFRA has extensive intuitive info about the water quantity needs across the praries and a growing knowledge of the water quality shortfalls in many areas. Whether there is comprehensive documentation or mapping of this information is less likely. Other agencies like SWA have good information as well regarding surficial water availability including licenced allocations as well as a good understanding of the groundwater opportunities and limitations.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes

2. *Where are these water supply constraints most evident?*

WHEN they are most evident is when a small livestock operation looks to expand, when an ILO looks for a site or when a drought hits. WHERE they are most evident is harder as they exist everywhere across the prairies to some degree. Surficial runoff sources are always a problem related to quality and quantity when a drought hits. Groundwater constraints also exist in most areas of the prairies - these constraints being location, quality and depth (which relates to cost)

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

If these constraints are not adequately addressed, projects will continue to be built which do not completely serve the users need and drought cycles will continue to disrupt agriculture production and farm income (especially livestock) regularly.

4. *What are some possible solutions?*

Better general groundwater information, tech and financial assitance to aid improvement of existing surface sources, funding targetted to promote development of long term, drought proof supplies like regional pipelines, deep wells, & shallow buried pasture pipelines (discouraging dugouts). Consideration needs to be given to planned development that could address the emerging small urban water quality issues and the rural water needs with one solution. In many cases, joint projects could be a solution.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

Groundwater maps exist in Sask that show availability - the constraints could be pulled from there. There maps need updateing as many more wells have been drilled in the intervening years and the data needs incorporating. Sask Watershed Authority also has the water well drillers log data base which can be utilized to add to the groundwater information. PFRA has a RWDP program database which can give some clues as to development trends and issues prairiewide.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

It generally meets the existing needs, recognizing the aging/replacement factor which is an issue for all capital works. The reason for this is that most farm sites have been there for nearly a century and have either developed unlimited supplies (less common) or have limited their operational development to the water supply capability (more common). When livestock expansions or larger operations search for a supply, or drought occurs, we find the infrastructure often isn't adequate.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

Aging wells are an issue as many are at the end of lifespans although this is more a depreciation issue. The inadequacy of infrastructure relates more to drought prone shallow wells and surficial reservoirs being commonly used and the limited implementation of deeper wells & regional pipelines due to cost. The locations are harder to nail down. In the Swift Current area the south half of the district has a deep aquifer at 1100 feet, but the $50 to 70K development costs tend to lead to shallower drilling occuring. Excess capacity exists in the City of Swift Current water system available for regional pipelines (and many were done in the early 90's), but after higher funding levels dried up in the mid 90's, no further development occurred, even though many new proposals are on the books. Numerous (12)PFRA reservoirs exist in the district of which at least 6 would be reliable sources for pipelines, yet only one pipeline exists directly from a reservoir serving a single hog operation. Cost is the issue.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

Potential development/expansion of the livestock industry is limited, drought severly disrupts to production cycle and it is one more reason (among many) to leave the farm.

4. *What are some possible solutions?*

Better groundwater availability information, more funding to aid the building of drought proof projects and higher funding levels for the more expensive (but reliable) regional pipelines.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

PFRA sourcing studies have identified good surface supplies adequate for regional systems. Groundwater information in may areas is adequate to develop some high production wells for regional systems. Maps exist showing existing pipeline systems. RWDP database can be used to plot project type and age which can be analyzed to show trends in development in areas and aging supplies.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Development of information which will allow development of more sustainable with better quality water supply. Funding to allow the construction of more sustainable, drought proof supplies with priority given (including higher funding levels) to higher cost regional solutions.

2. *What type of organizations should receive priority funding?*

Patnerships that allow the items in 1 above to occur. Information development may include senior & and municipal government co-operative projects, universities, SRC, consultants. Infrastructure development should also focus on regional solutions as priority, but should not rule out individual developments. This include RMs, pipeline groups, possibly REDAs.

3. *What type of projects should be eligible for funding?*

Information based - like groundwater development info, water quality technical info, riparian protection info. Infrastructure like group & regional pipelines, deep wells, pasture pipelines & source protection technologies.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Some analysis needs to be done to answer that, however, I would lean more to an approach that targets the severely affected producer (ie: livestock) and focusses on the sustainable supply for these operations. In a regional system, however, the criteria would need to be looser as all users are needed to make a project viable - including urbans, non-livestock and rural residents.

F. OTHER COMMENTS

One area which does not emerge readily when talking supply and infrastructure, but which is an area impacted by agriculture and livestock in particular, is riparian areas. Poorly located ILO's and winter feeding sites on streams lead to either a real or perceived impression of ag pollution and water quality degradation. Some consideration should be given to fund education and awareness initiatives aimed at producers in order to raise their stewardship levels where needed. As all users affect and are affected by riparian health, this type of initiative shouldn't be limited to agriculture only, recreational and urbans must be part of the solution - both from the standpoint of changing habits and understanding the other users issues and impacts. Funding for demonstrations may also be a consideration, funding for the actual cleanup or relocation of sites, while usually needed to get voluntary action, is very expensive and may be beyond the scope of this program.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: Nov 13, 2002 *Location: Saskatoon*

Person Interviewed: Garth van der Kamp *Phone No.*: 306-975-5721

Role: Research Scientist *E-mail: garth.vanderkamp@ec.gc.ca*

Organization: National Water Resources Institute

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: livestock water, soil moisture limits, drinking water supplies limited by quality

Location: Central Prairies

Importance: high

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Soil moisture is obviously the main need, met by irrigation in south Alberta only. Water for livestock, including ILO's, is also a concern.

2. Where might these needs be located?

Throughout the prairie region.

3. What are the specifics of these needs?

Soil moisture shortage limits crop production in many years. Groundwater supplies are often the only real possibility for livestock. Drinking water is commonly of poor quality

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Limitations on livestock operations, partial or complete crop failure in many years (e.g. 2002). Expense of alternate drinking water supply.

5. What are some possible solutions?

Moisture conservation by conservation tillage etc., more efficient crops w.r.t. to water use, reverting cropland to pasture, improved knowledge of groundwater resources, piped water supplies over long distances, bottled water.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   yes

2. *Where are these water supply constraints most evident?*

   Dry parts of the prairies, areas where there are no extensive well-known aquifers

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   as above

4. *What are some possible solutions?*

   as above

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No, many wells have poor quality including contamination by nitrate and pathogens. Alternate supply for livestock may not be available

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   as above

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

   Increased investment in groundwater mapping, evaluation, well drilling, water treatment

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Water wells need to be improved to ensure better quality. Soil moisture should be conserved by conservation tillage, reducing spring runoff to streams, storage of water in wetlands and depressions.

2. *What type of organizations should receive priority funding?*

   Government agencies that do research, monitoring, mapping, agencies that provide education and financial assistance to farmers, wildlife and habitat agencies.

3. *What type of projects should be eligible for funding?*

   Well-head protection, aquifer mapping, outreach on soil moisture conservation,

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

F. OTHER COMMENTS

Climate change is a large factor that must be considered in all water resource planning (shorter, warmer winters, earlier and reduced spring runoff, longer growing season. Environmental impacts of water management of all kinds should be taken into consideration (e.g. wetland drainage and waterfowl, impacts of ILO's on water quality, maintaining healthy streams, etc.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 22, 2002 *Location: Moose Jaw*

Person Interviewed: Glen Morine, Jeff Mander, Mart Cram *Phone No.*:306-694-3106

Role: Program Manager, Policy and Planning; Senior Project Manager, Design and Construction Services; Director, Water Supply anad Tream,ent *E-mail: ;gmorine@saskwater.comjeff.mander@saskwater.com; mcram@saskwater.com*

Organization: Sask Water

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   yes

   Nature of Issue: lack on an assured water supply in some areas

   Location: west central-highly dependant on natural conditions

   Importance: on a scale of 1-5, 4.5-agriculural enterprises need water

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

   Not at Sask Water but at the Water Shed Authority-supply, precipitation-several years of data-at least 10 years-track record

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   yes

2. *Where might these needs be located?*

   Sask Water's view-all in the western part of the province; south, central and north; central, east central more of a snap shot

3. *What are the specifics of these needs?*

   cattle, hogs, irrigation,municipal supply, lots of communities. Where's the water coming from?

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

   Don't meet the need-new projects won't be moving into these areas-producers don't always consider assured supply of water.

5. *What are some possible solutions?*

   Regional supply pipelines. The last two major dam projects will likely be the last two ever built unless well thought out. Dams are becoming uneconomic.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   none

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   Yes to both. Particularly quality. Groundwater supplies in some areas of Saskatchewan are highly mineralized and not compatible for irrigation and may not be good for a cattle operation-same for hogs-locate near better sources. If aquifers are not re-supplied, the water table will continue to drop, water quality tends to suffer as wells are drilled deeper.

2. *Where are these water supply constraints most evident?*

   Quantity-western side of the province. Where you have good quality-often lack quantity.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   no business development such as irrigation and other agricultural operation spin-offs.

4. *What are some possible solutions?*

   regional water supply pipeline-raw or treated water. Trade-off between poor water quality and poor production although documentation needs to confirm.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   Check with PFRA and Sask Ag and Foonot SaskWater

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   not likely-no

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   inadaquate-decisions were made in the development of irrigation pipelines-used poor quality pipe material that now needs to be replaced. Pipeline at Lucky Lake and Riverhurst were replaced. Sask Water operates 44 major, minor dams. Some are very old and need to be upgraded or decommissioned. Dams are failing. Canals are maintained annually.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   If the irrigation pipes are not replaced with PVC, irrigation epansion cannot continue. If dams aren't maintained, they must be decommissioned. There would be no supply.

4. *What are some possible solutions?*

Replace the pipelines with better quality material; long term funds, grants generated from a federal/provicial program, possibly international and interprovincial programs. Diligent management-manage allocations as best we can.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Sask Watershed Authority

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

West Central-Alberta border east of Rosetown, north to Kerrobert-south to the South Saskatchewan River.

2. *What type of organizations should receive priority funding?*

Organizations that are resonsible for irrigation infrastructure, pipelines. Sask Water- to repair dams.

3. *What type of projects should be eligible for funding?*

Infrastructure, regional pipelines.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

west central Saskatchewan, the southwest, however, there is a lower poplation in the SW; East Central-the Yorktown/Melville aquifer.

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 28, 2002 *Location: Saskatoon*

Person Interviewed: Harm Maathuis *Phone No.*:306-933-5496

Role: Principle Hydrogeologist *E-mail:maathuis@src.sk.ca*

Organization: Saskatchewan Research Council

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   yes

   Nature of Issue: drinking water supply, water quality, animal water supply

   Location: prairies, in particular southern part

   Importance: high

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   yes

2. *Where might these needs be located?*

   Throughout the Prairie Region

3. *What are the specifics of these needs?*

   Sustainable water supplies: irrigation, domestic rural water supply, livestock water supply

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

   Affects rural development. In particular has an impact on livestock operations

5. *What are some possible solutions?*

   Improved argicultural practices; be proactive in terms of water availability,sustainability and protection, in particular with respect to groundwater

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   yes, with respect to both quantity and quality

2. *Where are these water supply constraints most evident?*

   Southern Prairies

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   Limits agricultural development

4. *What are some possible solutions?*

   Integrated water management : "central" withdrawals and pipelines ??

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No, aging wells, numerous water quality issues (contamination, poor natural water quality)

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   Aging wells

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Severe limitation to rural development in general because of unreliable supplies

4. *What are some possible solutions?*

   Increased support for mapping, testhole drilling, education/outreach on well maintenance, water quality improvement technologies

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   Intergrated water resource management

2. *What type of organizations should receive priority funding?*

   Provincial governmental agencies involved in groundwater mapping, groundwater resources inventories: agencies that provide outreach and finanicial assistance programs

3. *What type of projects should be eligible for funding?*

   Aquifer mapping and characterization (quantity, quality), impact of ILO's on water quality: support for testhole drilling (i.e. data collection .. E-logs, wate rquality): projects related to soil conservation, watershed management, outreach programs, public education

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

F. OTHER COMMENTS

In rural area groundwater often is the only source of water supply. Climate variability is an issue. Integrated water resource management is imperative. Manure management.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 17, 2002

Location: Saskatoon

Person Interviewed: Helen van der Loop

Phone No.:306-826-5776

Role:

E-mail: hefra@sk.sympatico.ca

Organization: Dairy Farmers of Saskatchewan

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

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- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   Yes, dugouts are empty, lakes disappearing

   Nature of Issue: drought

   Location: NW Saskatchewan (Lloydminster area)

   Importance: high

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

   newspapers, websites, drought severity maps of the herd retention program, RMs', etc.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   Yes, more use of the rivers, eg pipelines and more well drilling

2. *Where might these needs be located?*

   We're right above the Ribstone Creek aquifer so it should be possible to drill more wells, maybe use solar panels to fill up dugouts

3. *What are the specifics of these needs?*

   Livestock industries, preservation of wildlife, shelters, tourism (lakes disappearing)

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

   Production costs getting too high, culling cowheards, no expansion, devaluation of properties, high stress

5. *What are some possible solutions?*

   Longterm subsidies to develop more wells, help with pipelines from the Battle River to dugouts. What about the North Saskatchewan River? Its almost untapped!

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   Report about the Ribstone Creek aquifer and drilling companies. RMs'.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   Quantity is definately a problem but there are areas with natural springs. Maybe that should be further explored.

2. *Where are these water supply constraints most evident?*

   NW of the province. SW, CW,CE you could say.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   No sustainibility for livestock, economic hardship, no expansion, crop failure.

4. *What are some possible solutions?*

   Water supply systems, increase database and groundwater mapping. Put money towards longterm projects.

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   There's a lack of information and infrastructure and no integration of all information available.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No, too much is still personnel investment.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   We need: long term financial programs, pumping data, groundwater level information. We need money, resources and qualified people.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Crop failure, no soil moisture, selling livestock, high production costs, degrading land/water resources, health hazards.

4. *What are some possible solutions?*

Inventory of existing infrastructure and ownership models. Expanding existing water testing and assistance in information and costs about water treatments. Ground and surfacewater investigations, regional and rural pipelines.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Reports from Sask Watershed Authority. Help from Provincial Pipelines. Maps from Saskatchewan Groundwater Association.

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

RM's and drilling companies. that's where you go first for permits, etc.

2. *What type of organizations should receive priority funding?*

Provincial and rural pipelines. Existing water projects (Diefenbaker). Study groups of agricultural ground/surface water supplies. Funding for water transportation.

3. *What type of projects should be eligible for funding?*

Drilling new wells, subsidies for building cisterns, pipeline projects, cost sharing in treatment, subsides on pumps, promoting irrigation next to rivers

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Especially the severe drought areas. Furthermore to boost agriculture in Saskatchewan big, existing water projects should be finished and expanded.

F. OTHER COMMENTS

There's no integration of information. Its all available but hard to find. 45% of the population relies on groundwater resources. Not only for livestock but also for humans! That might be a health problem for the future! Water is not preceived as a priority, therefore not to be found adaquate. This is on a government level and local people (good water is seen as a right). Therefore there is a lack of political support.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 17, 2002 *Location: Saskatoon, Sk*

Person Interviewed: James Harvey *Phone No.*:306-934-3047

Role: Chairman *E-mail:*

Organization: Saskatchewan Irrigation Project Association

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Completion of infrastructure of existing projects plus new development

Location: Province wide

Importance: Huge importance towards provincial and national economy

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Yes. Information is available from S.I.P.A. and also copies have been forwrded to to Provincial Government

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes

2. Where might these needs be located?

Province wide but especially in the southwest, central and northwest regions

3. What are the specifics of these needs?

More access to existing water sources (i.e. lakes, rivers, pipelines)

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

By not meeting these needs, there are fewer opportunities for value added crops and related industries. ALso there are severe hardships during periods of drought.

5. What are some possible solutions?

Finish and expand irrigation network within the Provice

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

see No. 2 above

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   In the southwest water supply is a factor but with Lake Diefenbaker centrally located, a large area has access to an unlimited water supply

2. *Where are these water supply constraints most evident?*

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   Producers are restricted to the amounts of production they can acheive

4. *What are some possible solutions?*

   Expand canal and pipelines to deliver water in wtaer starved areas

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   refer to A2

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   Not if you want to produce intensively produced crops and industries

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   refer to A2

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Again as producers we are limited to varieties and production levels we can acheive

4. *What are some possible solutions?*

   Make water, three phase power, natural gas and highways more accessible and cost friendly

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

Refer to A2

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Start with the South Saskatchewan River basin and work out in several directions; west east and south.

2. *What type of organizations should receive priority funding?*

I personally don't think organizations need funding

3. *What type of projects should be eligible for funding?*

This is where funding should go. A project could be anything from a 5 acres market garden to a 500 acre I.L.O.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

I don't think so. Spread development around because growing conditions vary in the province.

F. OTHER COMMENTS

I have the luxury of commenting after the workshop. I still feel the outcome is skewed but democracy. As a producer I still feel that direct economic benefits are important and come before sustainable communities. If I'm not making a resonable living I quit and sell out or move away. Domestic water health issues are just that, a health issue to be handled by the Department of Health. Agriculture should look after agricultural needs, i.e. water transportation and development, three phase power and natural gas availability. These are my biasis. However, as a producer I have to promote them. I thankyou very much for inviting myself and my organization to the workshop and hope we can work together again in the future. Merry Christmas, James Harvey

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 28, 2002 *Location: Regina*

Person Interviewed: Ken Engel and Arita McPherson *Phone No.*:306-757-3577

Role: Executive Director and Director of Agriculture Policy *E-mail:kengel@sarm.ca*

Organization: SARM

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Water quality and quantity problems exist . We are a semi-arid province.

Location: across the province

Importance: High

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Yes, check with PFRA.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes.

2. Where might these needs be located?

The needs vary across the province--some areas can easily find wells, others have great difficulty finding wells. There needs to be assistance in establishing low-volume pipelines to farms and small rural communities.

3. What are the specifics of these needs?

Financial and technical expertise

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Livestock herds are being sold-off due to lack of water supply. Diversification opportunities are limited

5. What are some possible solutions?

Pipelines, irrigation, and water pumping and all types of water development programs are needed.

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

Sask Agriculture, Food , and Rural Revitalization, Sask Environment and PFRA would have this type of information.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   yes

2. *Where are these water supply constraints most evident?*

   In rural areas

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   It limits production and expansion. In some cases it eliminates production. Value-added enterprises and diversification projects, including higher value crops (ie. horticulture) need water

4. *What are some possible solutions?*

   Money and expertise

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   See above

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No. More pipelines, dugouts,l and irrigation are needed.

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   Rural areas

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Limits opportunities. See above.

4. *What are some possible solutions?*

   See above

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

See above

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Pipelines and irrigation

2. *What type of organizations should receive priority funding?*

Rural water pipeline associations. At one time PFRA provided the engineering services and some funding for rural water pipelines and to a great extent that has completely dried up.

3. *What type of projects should be eligible for funding?*

Studies for irrigation potential, pipeline implementation, on-farm water development.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Areas of Saskatchewan where wells are not an option should be targetted first.

F. OTHER COMMENTS

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 21, 2002

Location: Outlook

Person Interviewed: L. Tollefson

Phone No.:306-867-5404

Role: Manager

E-mail:tollefson@agr.gc.ca

Organization: Irrigation Diversification Centre

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Lack of irrigation acres constrains production of higher value crops and subsequent value added.

Location: Lake Diefenbaker and other irrigation areas in Saskatchewan

Importance: Highly Important

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Yes, SaskWater, PFRA, Irrigation Development Branch of SaskAg and Food.

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, many irrigation infrastructure

2. Where might these needs be located?

Lake Diefenbaker area
Raffets/Alameda

3. What are the specifics of these needs?

Major infill required in irrigation projects to get the areage to a minimal crictial mass

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Will not have critical mass and will not be able to attach value added ie. french fry processor, bean processing, livestock feedlot

5. What are some possible solutions?

Fund insrastructure

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

Same as before

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   There is lots of good quality water but there in lack of infrastructure to move it. This is the constraint.

2. *Where are these water supply constraints most evident?*

   Lake Diefenbaker

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   Operate at less than capacity, it will retard the economic development of the area.

4. *What are some possible solutions?*

   Fund Infrastructure

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   Same as 6

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   No

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   Not adequate, not a critical mass of irrigated areas, Lake Diefenbaker.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Loss of economic opportunities and rural development

4. *What are some possible solutions?*

   fund infrastructure

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

same as before

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Infill of existing projects. The cost of Lake Diefenbaker Dam has already been paid. This simply adds value to it.

2. *What type of organizations should receive priority funding?*

Irrigation Districts.

3. *What type of projects should be eligible for funding?*

Those that makes the most positive economic impact.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Lake Diefenbaker

F. OTHER COMMENTS

Lake Diefenbaker is constructed but not being fully utilized for irrigation. Money to assist in infill would help create a critical mass which would encourage higher valued crop production, attract value added and keep young people in the country on the farm.

It has tremendous development potential.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: Nov 22, 2002 *Location: Outlook*

Person Interviewed: Len Erickson *Phone No.*:306-867-5505

Role: Irrigation Engineering Services *E-mail:lerickson@agr.gov.sk.ca*

Organization: Sask Agriculture, Food and Rural Revitalization

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Require infrastructure in the Lake Diefenbaker area to move the water to the land and increase the potential for higher value production

Location: Any provincial water source, Lake Diefenbaker has the gratest potential

Importance: high

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

Talk to the experts-lots of sources

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes, more irrigated acres is a need. There is an ILO distribution issue. Put ILO's where they make sense.

2. Where might these needs be located?

Throughout the province such as Rafferty Alameda and other surface water sites. The main potential is with the North and South Saskatchewan river systems and the Qu'Appelle River

3. What are the specifics of these needs?

Infill 30,000 acres in the Lake Diefenbaker area.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

A 2001 economic study by Russel states that irrigated acreage near Lethbridge generates $300 acre in earning potential as compared to only $50 per acre dry-losing $250 acre-hinders livestock production

5. What are some possible solutions?

long term infrastruture funding based on a consistant policy

6. What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?

economic study, CEPA

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   no -irrigation consumes only 3.5% of the mean annual flow-97% goes down the river so why build another dam. There are issues outside of the major basins-a problem in the SW. Supply is not the problem within or near existing sources.

2. *Where are these water supply constraints most evident?*

   West central area is short of water-must be more efficient. Can water be practically be delivered to Kindersley? No.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   No economic expansion in the SW. The supply is too variable.

4. *What are some possible solutions?*

   In the SW-increase efficiency

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   the same-SW hydrolgy studies-Sask Water

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

   no-infrastructure is totally a limiting factor

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

   Older irrigation projects in the SW are failing. The infrastructure in the Lucky Lake area is in good shape but has not reached critical mass to be viable.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

   Fall backwards if not dealt with, a serious liability if there is a failure in the middle of the crop season, high value crops in paticular, keeps people from investing. Need a long term plan beyond the 10 year window. The Gardner Dam was constructed in 1967. In 1973, the Province shut down irrigation development limiting it to 90,000 acres when it should have been 300,000.

4. *What are some possible solutions?*

Consistent policy environment-longer term funding

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

same-pulished policies

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

Infill remaining 30%. Make use of existing investment. For ILO determine environmentally sustainable site and extend pipeline to the site. Provide assistance to small farmers at Lumsden.

2. *What type of organizations should receive priority funding?*

Irrigation Districts, ILO's, small farms, policies accessible to all, focus infrastructure, value added process.

3. *What type of projects should be eligible for funding?*

Irrigation infrastructure. Pipelines to ILOs (in the most sound location and then construct pipelines to that location), and pipelines to where groundwater quality is suspect (Old Wives Lake)

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

Those areas that have an assured, high quality water supplies. Extend to ensure quality, quantity and reliability.

F. OTHER COMMENTS

Planning! Base on availability, consistancy, supply, quantity, and quality, then decide where ILO's should go as well processing plants and agri-parks

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: November 21, 2002

Location: Regina

Person Interviewed: Mark Geremia

Phone No.:(306) 780-5653

Role: water resource specialist

E-mail:geremiam@agr.gc.ca

Organization: AAFC-PFRA

Interviewer: Hugh MacKenzie

Phone: 306-955-3300

Fax: 306-955-0044

E-mail:hmackenzie@umagroup.com

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In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain.

Yes

Nature of Issue: Insufficient availability of water sources having sufficient quantity and suitable quality for agriculture needs, which can withstand the tests of periodic drought.

Location: Generally throughout the agriculture area of Saskatchewan.

Importance: This is a significant limitation for livestock producers, processors, irrigation, and domestic farm needs

2. Have these issues been documented and if so where can information, data, reports, etc. be found?

"The Health of Our Water - Toward sustainable agriculture in Canada", AAFC, Ottawa, Canada, 2000.
"Saskatchewan Water Sourcing Study - Phase 1", PFRA, Regina, Sask. , August 1986.
"Water Management: Issues and Challenges" Saskatchewan Government, November, 1997.
"Drought Primer"

B. AGRICULTURAL WATER SUPPLY NEEDS

1. Are there agricultural water supply needs within the Prairie Provinces?

Yes. For the expanding livestock industry, processors, crop spraying, domestic farm use and irrigation, ethanol.

2. Where might these needs be located?

In areas not already serviced by a secure sources. (Examples are the areas outside of the secure sources of the Lake Diefenbaker area, the South and North Saskatchewan River system, the Qu'Appelle River system etc.) Also, areas not already served by regional or rural pipeline systems. And finally, areas not overlying or near to know reliable aquifers.

3. What are the specifics of these needs?

Livestock (including all types and poultry and dairy) - quantity and quality for pasture water systems, feedlots (intensive operations), wintering sites;
Procesors - High quality and very reliable sources;
Domestic and crop spraying - high quality and small quantities;
Irrigation - large quantities on a reliable basis.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

- constraints to production and expansion

- high risk to developments and continuing operations.

5. *What are some possible solutions?*

- pasture pipeline systems from the best water sources.
- deep wells where possible.
- rural and regional pipeline systems.
- treatment of poor quality supplies eg. RO membrane treatment, EDR membrane treatment.

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

- Pipeline inventories and maps from Sask Water, PFRA, Sask Association of Rural Water Pipelines.
- Ground Water Assessment Reports - from various studies, SRC, Other Agencies etc.
- Water Well Data Base in Saskatchewan - from Saskatchewan Watershed Authority.
- Rural Water Mapping Initiative - Surface Water Component - from PFRA and others provincial agencies.

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

Yes, both. Many surface supplies are variable. That is, they are dependent on spring snow melt runoff and recharge. Quality also varies and there are issues of deterioration of quality in sources and/or possible contamination issues. Ground water aquifers can have very high TDS etc.

2. *Where are these water supply constraints most evident?*

Throughout the agriculture area of Saskatchewan. We have seen drought ravage all this area; not just confined to the "Paliser Triangle" area.

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

The agriculture industry is left at risk to a "crisis to crisis" type of management and response rather than dealing with the root of the problem.

4. *What are some possible solutions?*

Rural and regional pipelone systems from the secure sources like SSR and NSR systems, deep wells, small dams like say the Weyburn Dam. #1 secures ources-#2 distribute

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

(overlap with some earlier reference suggestions)
- SRC ground water map series
- inventory of small dams and pipelines.

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

Only in some areas - where investments have been mande in secure source development and further distribution to the users. (an example of past investments would be the Ag Service Centre water and wastewater infrastructure programming of the 80's).

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

There is aging and inadequate infrastructure. (an example is the private and municipal held small dams where there has been inadequate investment and upkeep).
Drought is also a cause of failure of small surface and shallow ground water supplies.

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

- Impact assessments and evaluations of past programs (Ag service Centre, ACWI, PAWBED, etc).
(overlap with some earlier reference suggestions)

4. *What are some possible solutions?*

- Refurbish infrastructure where appropriate;
- Investments in new infrastructure planned and implemented.

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

(overlap with some earlier reference suggestions)

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

- Analysis of the needs, information gaps, etc.;
- Identification of secure sources for long term solutions;
- Examine the optional developments for solutions (feasibility considerations);
- Direct strategic investments toward information and infrastructure needs.

- Priority given to long term solutions.
- Priority given to the needs of the Livestock industry (all types).

2. *What type of organizations should receive priority funding?*

- Priority given to those that "Regional" in scope (the idea of addressing the needs of many rather than few).
- Priority given to those having a strong agriculture component.

3. *What type of projects should be eligible for funding?*

- Regional surface or ground water assessments;
- Secure source development;
- Regional and rural water pipeline systems.

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

More analysis may be needed to set priorities. Generally, look at areas with greatest constraint, areas not near to secure water supplies.

F. OTHER COMMENTS

In time, I may be able to identify more references and make some additional comments.

PFRA – Analysis of Agricultural Water Supply Issues – Prairie Provinces
Interview Questionnaire

Date: December 2002 *Location: Saskatoon*

Person Interviewed: Russ Johnson *Phone No.*:306-933-5357

Role: Provincial Environmental Engineert *E-mail:russjohnson@agr.gov.sk.ca*

Organization: Sask Agriculture Food and Rural Revitalization

Interviewer: Hugh MacKenzie *Phone: 306-955-3300*

Fax: 306-955-0044 *E-mail:hmackenzie@umagroup.com*

Agriculture and Agri-Food Canada (AAFC) recently announced $50 million to be made available nationally over 3 years under the National Water Supply Expansion Program. AAFC will require strategic approaches that can be implemented in co-operation and on a cost-shared basis with the Province or local/municipal authorities to address agricultural water supply constraints.

In order to implement the 3-year $50 million national component, AAFC requires some analyses to scope the agricultural water supply needs; to determine the nature and extent of water supply constraints on agriculture; and to identify priorities for agricultural water supply expansion in agricultural regions of Canada. The results of these studies will be incorporated into negotiations/consultations with the provincial government and agricultural stakeholders in order to determine program options.

This interview questionnaire is an integral component of this program, the intent being to:

- identify· existing or readily available documentation on agricultural and rural water supply needs and problems across each province/region; and
- consult, both individually and through a small advisory group, with pertinent provincial and federal agencies and key stakeholder groups.

In addition to this survey there will be a separate workshop with selected stakeholders to exchange ideas, build consensus and cooperatively work together towards implementation of the National Water Supply Expansion Program.

A. GENERAL QUESTIONS

1. *Do water supply issues exist that constrain agricultural production/expansion and if so please explain.*

   Yes

   Nature of Issue: Quantity and quality of available water at preferred development sites

   Location: Province wide

   Importance: High

2. *Have these issues been documented and if so where can information, data, reports, etc. be found?*

B. AGRICULTURAL WATER SUPPLY NEEDS

1. *Are there agricultural water supply needs within the Prairie Provinces?*

   Definitely

2. *Where might these needs be located?*

   Regions with little surface water and limited groundwater, primarily central and west

3. *What are the specifics of these needs?*

   -the need for good quality water to supply intensive livestock developments of larger size
   -good quality potable water for communities/people servicing the agricultural communities

4. *What are the implications of not meeting these needs in terms of agricultural production/expansion?*

   Constraints on growth and sustainability

5. *What are some possible solutions?*

6. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

C. AGRICULTURAL WATER SUPPLY CONSTRAINTS

1. *Are there agricultural water supply constraints in terms of insufficient quantity or quality?*

   There are emerging constraints on development and those difficulties will increase as development progresses

2. *Where are these water supply constraints most evident?*

   Province wide - most evident where larger ILO initiatives originate

3. *What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?*

   Development and sustainability are linked to water

4. *What are some possible solutions?*

   Regional water management palanning

5. *What documentation exists, e.g. mapping, reports, literature, monitoring and other data and where can they be found?*

   Saskatchewan has an extensive technical database housed in various locations (research and government agencies, consultants etc)

D. AGRICULTURAL WATER SUPPLY INFRASTRUCTURE

1. *Is existing water supply infrastructure adequate to meet agricultural water supply needs?*

2. *If infrastructure is inadequate or failing, what are the specifics and the location?*

3. *What are the implications of not dealing with these infrastructure issues in terms of agricultural production and expansion?*

4. *What are some possible solutions?*

5. *What documentation exists, e.g. mapping, reports, monitoring, literature, and other data and where can they be found?*

E. AGRICULTURAL WATER SUPPLY DEVELOPMENT PRIORITIES

1. *From your perspective, what should be the priority areas that need to be pursued in addressing these agricultural water supply issues?*

   (1) Regional studies, education, information transfer

2. *What type of organizations should receive priority funding?*

   Organizations engaged in "applied" research such as the SRC and PFRA.

3. *What type of projects should be eligible for funding?*

   - mapping
   - regional studies
   - definition of supply/sustainability options

4. *Are there certain provincial areas that should be targeted for special attention in terms of overall needs?*

F. OTHER COMMENTS

Appendix E - Manitoba
Questionnaire Response/Interviews

In Manitoba, the following 15 organizations received a copy of the questionnaire:

- PFRA (eight individuals)
- Canada Manitoba Infrastructure Secretariat (one individual)
- MWSB (one individual)
- Manitoba Agriculture & Food (one individual)
- Manitoba Conservation (10 individuals)
- Association of Manitoba Municipalities (one individual)
- Keystone Agricultural Producers (one individual)
- Manitoba Conservation Districts Association (one individual)
- Association of Irrigators of Manitoba (one individual)
- Manitoba Cattle Producers Association (one individual)
- Manitoba Pork Council (one individual)
- Pembina Valley Water Cooperative (one individual)
- Threshold Technologies Company (one individual)
- AAFC (one individual)
- Manitoba Community Planning Services (one individual)

Summary of Stakeholder Questionnaires/Interviews - Manitoba

The constraint that water imposes on agricultural activities is determined by many factors. In Manitoba demand is being driven to some degree by the changing face of Manitoba agriculture. With the elimination of the Crow Subsidy for shipping grain, the cost has increased to the point where it is uneconomical to grow grain crops in Manitoba.

Agriculture Canada has indicated that with the elimination of shipping raw grain out of Manitoba will return a zero profit in the long term. In the Dauphin region, the long-term profit is projected to be negative.

Manitoba farmers have recognized this and have started to diversify agricultural production into higher value products or those with local secondary processing. This includes activities such as intensive livestock production (which adds value to locally grown grain) and/or higher valued specialty crops such as potatoes that can also be processed locally.

The local availability of sufficient quantities of good quality water is viewed as primary constraint to agricultural expansion. In many cases, the areas where conditions are most suitable or most in need for diversified agricultural activities are also the areas short of water to sustain them.

A. General Questions

1. Do water supply issues exist that constrain agricultural production/expansion and if so please explain?

   The combination of the elimination of the Crow Rate and the commodity price for grain crops has put pressure on farmers to change to produce products that have a higher value and can be processed locally (potatoes, legumes, and intensive livestock). These are to a large degree dependant on having a sufficient water supply of good quality.

   Location: There are issues in SW Manitoba, Pembina Valley, Westlake Area, and Almassippi Wetsands.

   Importance: Resolving thee issues is critical for the continued existence of the farm economy.

   Ultimately, many see the solution as developing a better understanding of water availability, developing new sources of water through is constrained by the lack or poor distribution of quality water sources, the lack of funding to develop the required infrastructure, the inadequacy of the data base used to make decisions and the lack of political will to ensure sufficient funding.

Although some development of the required infrastructure has taken place, the slow pace of progress limits diversification efforts and makes dwelling in many rural areas unattractive. The Province needs to develop a single vision with the Manitoba Natural Resources Board, Department of Conservation, Environmental Branch and Water Resource Branch to accomplish water supplies in support of agricultural communities.

Water supply development is currently being driven by industry such as hog and potato production. Thus the problem of bringing water to needed areas is economically driven.

In spite of this many feel that the primary need for rural water supplies in Manitoba is domestic rather than industrial. Without a domestic water supply of high quality water the rural population will continue to decrease, which will doom the rural economy.

2. Have these issues been documented and documents and, if so, where can information, data, etc. be found?

There is no single source that compiles all the data.

B. Agricultural Water Supply Needs

1. Are there water supply needs within the Prairie Provinces?

For Manitoba's economy to thrive, water is required for both domestic and valued-added applications (hog farms). Although the Province of Manitoba's mandate is to have water sources developed for domestic rather than industrial use, water can be provided if industry is willing to pay the infrastructure cost and is near a pipeline being built for domestic utilization.

2. Where might these needs be located?

There are currently requests for water distribution in Dauphin, Swan River and Kelsey (south of The Pas) for both domestic and livestock uses. To assist with water distribution for agricultural growth, the water supply expansion program will develop potable water supplies for livestock, irrigation and use of water from ponds (not licensable, but a development opportunity).

3. What are the specifics of these needs?

Steinbach located in the southern central region of Manitoba, was mentioned as a good example of the diversification and self-sufficiency that can be achieved with a

sufficient water supply. This region is ideal for hog production as the land is suitable for growing grain, can be used for waste disposal and the local grain is used for feed. This region of Manitoba is currently experiencing a large growth in pork barns that are ready to be hooked up to a water distribution system. These hog barns require constant supplies of good quality water and cannot operate for any period of time without water.

This has lead to barns being connected to treated water systems. With increased numbers of hog barns, a larger percentage of the demand on the water distribution system will be inflexible, creating limitations on the water distribution systems primarily intended for domestic use.

4. What are the implications of not meeting these needs in terms of agricultural production/expansion?

Production would be crippled as the cost of grain production exceeded the required inputs.

Due to recent droughts the south-western region is seen as having the potential for livestock production only and not grain production. This area is lacking in water supplies would need a water distribution for livestock supply, similar to the Pembina Valley region. Due to a low population density the cost of the distribution system is extremely high and might prove too expensive without significant government funding. There is also a concern that it might stress existing water supplies, which highlights the need for further exploration of potential sources.

A major concern for industrial water use in the future is that once industries are allowed access to the water distribution system, they become too dependent on the supply making it very difficult to regulate consumption.

Water distribution issues are also important to the development of increased potato production as well as other high value crops that require supplemental irrigation located in the southern central region of Manitoba. Potatoes represent a higher value crop (a specialty crop) and are in considerably high demand in North America (every 2 years, a new potato processing plant is required for chips and fries). As traditional potato resources (Idaho & P.E.I.) reach their limit of production, Manitoba will become the next large exporter as it has a suitable climate and soils for potato crops. Manitoba's climate is able to support potato growth without irrigation however with minimal irrigation (3-4"), great improvements in quality and consistency of potatoes would be seen. Although excess irrigation can lead to

environmental degradation as in Alberta and Saskatchewan, crops in Manitoba would require minimal irrigation and would therefore not be susceptible.

5. What are some possible solutions?

The opinion was expressed that improvements need to be made in the monitoring of water sources. Data currently available for Manitoba's consumption and use of water supplies needs to be analyzed from a different perspective (as compared to in the 1980s) with respect to current priorities between drought and flood issues.

This data also needs to be made into a user-friendly format for easy access and query development. All stakeholders need to be involved in considering water sources and distribution systems to effectively apply resources to prioritized applications.

There is currently no water licensing enforcement and no feasible method of ensuring that reported water consumption reflects actual. To remedy this problem, all water source users needed to be treated fairly by metering all water consumption and application.

C. Agricultural Water Supply Constraints

1. Are there water supply constraints in terms of insufficient quantity or quality?

The primary reason water distribution systems have been developed is for drought proofing, not agricultural growth and expansion. During the drought in the 1980s, dugouts dried up while groundwater sources were sparse, sporadic and bad in quality. Due to these extreme conditions, the drought-proofing program was initiated.

2. Where are these water supply constraints most evident?

Rural water distribution infrastructure needs to be evaluated; as it is currently inadequate to meet the domestic and industrial water supply needs, particularly in the south-western and Westlake areas of Manitoba.

3. What are the implications of not dealing with these water supply constraints in terms of agricultural production and expansion?

There will be no expansion and the pressure on the existing economy will increase.

4. What are some possible solutions?

Funding should be available for all water use projects-from small individual projects to large multi-user storage projects that supply water for many users including irrigation, livestock, municipal, industry and recreation. Eligible infrastructure projects for funding should also include the development of pipelines to distribute water from a reliable, good quality source (natural or treated) to minimize the risk of contamination from sewage, such as happened in recent years.

Hooking up to a water distribution system costs farmers at least $9,000 up front and every gallon of water is metered (too expensive for irrigation). Rural consumers pay $6.25-$6.50 per 1000 gallons of water for maintenance and capital repayment which does not include the hook-up fee. Pipeline distribution connection fees are more expensive in some areas. It would cost approximately $15,000 for someone to connect in the south-western corner of Manitoba where water supplies are not only lacking but area also relatively a large distance away. Finding difficulties paying this fee, local citizens would be forced to decline the services of distributed water supplies, leaving the drought problem to remain.

Eligible infrastructure projects for funding should also include onsite well-water testing and treatment facilities (including treatment of nitrates prior to entering well). Although the onus is on the proponent to plan and meet the requirements of well development, there is currently no technical assistance and/or education supplied for farmers to properly manage their water supplies/resources. Therefore, funding should also be used to educate farmers to treat a well as a piece of equipment (records of efficiency and quality monitored data) and how to properly seal an abandoned well. There are currently no regulations to enforce well-water development, as no inspector for well drilling is available, however approval to employ this position has recently been given.

Funding also needs to be eligible for potential additional impoundments such as storage reservoirs for use in periods of drought. Multi-use reservoirs used for storage in the past however, have caused varying water level problems with cottagers. A new generation approach to this problem is to have all cottagers agree to water level changes or complete drainage agreement prior to purchasing land around a reservoir. Large reservoir development however will be limited in the future due to environmental regulations and potential smaller-scale storage solutions will be the responsibility of individuals.

As livestock producers such as hog barns, consistently require water supplies, a backup system in the event of drought is necessary to guarantee supplies for their inflexible needs of water.

Another type of storage system is open dugout reservoirs, which have been used in the past. Water supplies from this type of reservoir however have been found to have water quality problems such as blue algae.

Conversely, rather than relying on a water distribution system altogether, off-stream storage developments should be considered primarily with pipeline supplies used as back up only. Potential off-stream storage areas exist along the Assiniboine River within its tributaries such as in Stephenville where they are used for irrigation. Stephenville was actually the last region to have developed water distribution systems (1998/1999). The distribution system was originally designed for 490 rural hook-ups but now has 1135 (all using treated water) and is not yet complete giving rise to possible expansion in the summer of 2003.

Also for consideration of infrastructure funding is developing one large regional treatment plant rather than several smaller ones as it is more cost effective to operate, more consistent and easier to properly manage.

No options of water distribution and/or supply security infrastructure are free of environmental cost, however each option should be evaluated for a cost/benefit analysis to determine which project maximizes the benefits of not only stakeholder requirements but also environmental protection.

Water Quality

Water supply issues that constrain agricultural production and expansion exist in both terms of quantity and quality. Poor water quality not only affects human health but also prevents resource sustainability and curtails agricultural diversification. Issues of water quality exist in both surface water (especially the Assiniboine River and Sioux River) and groundwater.

Particular agricultural operations such as livestock industries require higher water quality. The first dairy hooked up to treated water pipelines had an increase of 152 L of milk/day as a result of better water supply quality. Hog barn producers are also willing to pay for water as better water quality supplies reflect decreased veterinarian bills and hog fatalities.

Public health is of primary concern and funding should be available for the necessary level of treatment. Geographic areas of water quality concern include St. Claude where the water supplies taken from wells are inadequate and the Westlake area where the water is very hard (iron and manganese). Treatment to soften the water in the Westlake area could be very

expensive and unnecessary as hardness is not a health hazard and some people are willing to use the water without treatment

Groundwater quality is often overlooked and protection is not emphasized. In particular, the protection of groundwater resources is required in the Interlake area. Poor groundwater quality is not only the result of human-induced conditions but also natural processes. Natural water quality problems such as arsenic and selenium concentrations are not well understood and require further research. Human induced conditions such as waste disposal have detrimental effects on the quality of water supply due to resulting bacteria and nitrates. With increased potato and hog production with resulting waste disposal, environmental farm plans need to be instituted to protect groundwater supplies (Tyndull and Garson). One possible remedy to groundwater pollution through hog industries and associated waste disposal is to utilize waste-streams through wetland treatment.

Following flooding in the southeast region of Manitoba, 180 wells were tested and found to be highly contaminated and wells were not successfully disinfected. To protect groundwater from contamination resulting from floods, wells need to be designed prevent direct infiltration from the wells to the underlying aquifer.

The effects of irrigation on water quality are not well known, however, the Manitoba Crop Diversification Centre (MCDC) has affiliates providing research in determining possible impacts that irrigation can have on groundwater resources.

Available Water Quantity

Water supplies issues that constrain agricultural production and expansion include both water quantity and water quality. To effectively apply water distribution and supply systems, the Province of Manitoba needs to determine the areas in need of water supplies versus the areas that have available supplies. Distances between areas in need of water and areas with supplies of water may be great, reflecting a high financial burden for redistribution.

Data exists on the resources limits of major aquifers such as groundwater availability. However, information for the many smaller streams and unknown aquifers is only determined on a case-by-case basis with much unidentified data remaining. Funding needs to be directed to identifying all possible stable water sources for potential distribution systems. In particular, groundwater inventory needs to be explored in the south-western region of Manitoba, which has a potential for unidentified groundwater resources.

To ensure that water is diverted to appropriate regions for suitable purposes based on physical attributes of the soil, funding needs to be provided for data acquisition of hydrogeological characteristics, more specifically, the capabilities for irrigation potential.

Research performed by Manitoba Agriculture found that the land in Manitoba is limited in irrigation potential and only possible in Almassippi Wetsands, Pembina Valley, Assiniboine Delta, Southwest Manitoba and Alma regions. Overall, a water supply and hydrogeological inventory is required to ensure best management practices (BMPs).

Lacking in water supplies and more susceptible to drought and/or experiencing agricultural growth and expansion constraints include the Pembina triangle, south-western corner (Hartney), Westlake (Glenella, Franklin and McCreary) and Interlake regions, Thompson, the R.M.'s of Swan River and Dauphin. Isle des Chenes, St. Adolphe and R.M. of Rockwood, have problems that need to be addressed on a regional basis.

The Pembina triangle region relies on water supplies from the Red River, which is the only river in the Province of Manitoba that does not have minimum flow agreements with the U.S. The U.S. has a number of dams on the Red River (e.g. Grand Forks) that have the potential to leave minimal water supplies in the Red River. During the drought of 1988, due to a flow of only 32L/s, Manitoba asked forced to ask the U.S. for release of water to supply regional pipelines. Therefore, as the U.S. is able to over utilize the Red River and Manitoba needs to develop a second source on the Assiniboine River.

Manitoba needs to build a working relationship with the U.S. and, as Winnipeg does not depend on the Red River as a water supply source, it may take an extreme drought to get the public to notice and react. The City of Winnipeg has a sufficient quantity and quality of water and therefore the issue is not on the political radar.

To secure water supplies put a dam on Red River in the event of drought (same problem on Boyne), and draw from both the Red River and Assiniboine (alternately dry/wet) as backup. When the Red River is dry, the low volume easily freezes leaving no reliable source of water. The Assiniboine River is the lifeline of Manitoba.

There is a Potential to divert water to the Assiniboine River from the South Saskatchewan River which is fed by Lake Diefenbaker in Saskatchewan, however Manitoba will need to compensate energy lost ($) to Saskatchewan.

In the south-western corner of Manitoba water supply sources are a large distance away and population densities are low making water supply distribution development very expensive. This region could potential acquire water from the Oak Lake aquifer however due to political constraints and claimed ownership of individuals living above the aquifer, the south-western region remains susceptible to drought and lacks water supplies for agricultural sustainability, growth and expansion. For example, the Hartney region located in the south-western corner of Manitoba has the potential for potato development however due to these political constraints is unable to develop water supplies for irrigation from the Pak Lake Aquifer.

Within the R.M. of Franklin there is no reliable groundwater supply due to high salinity and therefore depends on the region east of Dominion City for reliable water supplies.

A sourcing study used to identify the most susceptible areas to drought in Manitoba were:

- Gilbert Plains – groundwater - $5 million
- Dauphin – treatment plant - $6 to 8 million
- Swan River – groundwater and treatment plant - $8 to 9 million
- McCreary – groundwater and town treatment plant - $3 million

Manitoba has an abundance of water flowing through at certain times of the year, however the needs are greatest during the summer after the spring flows are past. Therefore, Manitoba needs to develop, through technical work, storage and delivery systems to capture and store spring flows. Funding needs to be applied to computer data modeling and aquifer management, practice, and education with respect to physical responses, to efficiently determine potential rerouting options to maximize spring flow redirection and storage.

The lack of guaranteed water supply constrains agricultural production and expansion, particularly in the south-western corner and southern central regions (such as the Pembina triangle) of Manitoba. This has been documented by the Provincial Department Conservation Library, PFRA, and the Manitoba Water Services Board. Because water resources are lacking, agricultural growth and diversification through the irrigation of special crops is limited. This curtails the sustainability and efficiency of Manitoba's agricultural industry, potentially resulting in lost independence for food production.

Implications of not meeting the water needs in terms of agricultural production/expansion are significant. There are lots of hog barns that are totally dependent on water supplies and have no flexibility in requirements. For irrigators in the potato industry, an unreliable source of water can lead to a curtailed agricultural growth industry, lack of growth, depopulation and unemployment in rural regions and the lose of a large tax base. Other implications are:

- The depopulation of rural areas (due to poor water quality and quantity).
- By not dealing with the water constraints, agricultural expansion and growth is stalled. The faster the constraints are dealt with, the faster future development can occur.
- Acreages with water are more attractive.
- Development only in areas identified with guaranteed water supply.
- Livestock introduced into areas only with guaranteed water supply and quality.
- Farmers/livestock producers won't buy acreages unless guaranteed water supply/quality (not interested in cisterns).

- Areas lacking in water sources will lose potential industries therefore losing potential economic/agricultural growth. However, current systems design does not take into account industrial expansion and consequent increases in water demand. Therefore, need backup systems.
- Need to balance the needs and priorities of water sources to fairly and efficiently distribute.
- Need a way to provide water supply planning as currently there is no focused plan (used to be, but not anymore).
- Need to look at water supply issues in the future.
- Long-term planning is necessary for water source development.
- In south-western Manitoba, a water development team is being developed (officially formed in January 2003).
- Need to look at water resource development holistically (including riparian zone protection for example).
- Lake Winnipeg as a water source is not known, as there is currently no information to determine how much water is available for licensing.
- Problems of allocating more water from a source than is sustainable (licensed too much). Also, not licensing fast enough is a problem. When licensing water, Manitoba takes a risk analysis into account.
- We do not understand the Assiniboine Delta Aquifer well enough to determine a sustainable yield for the demand on the aquifer. In determining a sustainable yield, human and environmental allocation is 50/50.
- Winkler Aquifer is in danger of being overused causing saline intrusion.
- Consider artificial aquifer recharge [does not necessarily give acceptable water quality as from surface water].
- Total dissolved solids (TDS) very high in Lake Manitoba, therefore, not a good water supply for distribution.
- Clear water from Lake Winnipeg (with little treatment is good supply).
- Currently, there is no leadership of the capital city [Winnipeg] to supply water to surrounding areas (where as Edmonton supplies to areas up to 100 miles outside the city). [Very expensive.]
- Rural areas that do not have water supplies need to truck it in.
- There is a larger issue of water disposal than supply in Selkirk.

- Funding should be received by the Manitoba Water Services Board (Intergovernmental Affairs) and area municipalities to assist in infrastructure development to deliver good supply of good quality water.

Other Water Quality/Quantity Issues

- Manitoba has been working together as a Province towards drought-proofing, therefore has a good idea where the issues are.
- Funding system is inadequate to meet all needs.
- Need to look at real economics (the risks due to water supply) in order to justify major projects.
- Sourcing of water, increased treatment capacity, increased reservoir balancing all seen as paying a return. The rest of Manitoba is not as well developed (Pembina has no groundwater).
- Need to look at short and long term solutions (study impacts of economic influences), and determine/justify the best solutions up front.
- Should invest in agricultural economic benefits, otherwise will lose rural service centers. Rural water supply is essential to maintaining rural populations.
- Need for a water task force to recognize economic development limitations.
- Province needs to work together politically and have a regional water management strategy.
- Need to develop a strategy from the entire Province's perspective for water development.
- Need to work with a mind set.
- Need to work as an entire region.
- The majority of the Province of Manitoba does not recognize water supply constraints.
- Education and awareness to the issues of water distribution and need are very important.
- All levels of government need to cooperate together for a possible drought-proofing plan. Need to consider when there will be another drought, not if.
- There are many legislative roadblocks (regulatory and financial). More departments and agencies are hindering development (i.e. Historic and Archaeological Resources").

- Need to consider the issue of whether or not people should pay more money in order to save for financial reserves for the future or get people to pay in the future (invest or not).
- Organizations that should receive priority are the PFRA, Manitoba Water Services Board of Intergovernmental Affairs and municipalities.
- Overall, need more money from the federal government (have always lacked money). Manitoba has paid the last 15-20 years on it's own. The federal government needs to support the development with more than the proposed three year length (10 to 20 years more appropriate). The amount of money [$50 million] is only a 'drop in the bucket'.
- Development potential should be spread across the Province.
- Funding should go towards analysis and assessments.
- Need to be reactive as difficult to be pro-active (i.e. Hog-farming not existent 10 to 15 years ago).
- Overall, there are more problems with management rather than with supply.
- Understaffed and cannot provide the services therefore need to hire consultants. Need for extension services for environmental and water rights.
- Innovation has to invest the funds for the future rather than short-term developments.
- Government grants are not enough to cover the development of water distribution systems, however, out-of-pocket expenses are more acceptable as viewed as a business investment.
- Need education and awareness for monitoring water quality, beneficial management practices (BMP) information distribution.
- Political constraints for water distribution and development are political and not physical (thus artificial). (Have to remove the impediments to development, basic information required.)
- Currently, there is no fish inventory on the Red River from the Department of Fisheries (DFO), (need to know in the event of water distribution system development and letting the costs fall on the developer is unacceptable).
- Biological resources not the PFRA's mandate, therefore need the DFO.
- Need inventory and analysis of biosystems to determine what is at stake (fish species and migration patterns).
- Need to regulate the same water rate withdrawal on large region to eliminate competition.

- Water supply issues such as water quality (especially on the Assiniboine River), groundwater protection, establishment of in stream flows (need the technical assessment to evaluate), environmental uses of water, Sioux River water quality problems.
- Need for environmental protection, new in-stream flow requirements, water budgets and limits.
- Manitoba alone requires $100 million for water distribution pipelines (therefore funds for $50 million are substantially much too small to distribute across the Prairie Provinces). When distributing funds across the Province, must do it fairly which spreads the money thin leaving less ability to install distribution pipelines in each area. Therefore, need to prioritize distribution of funds for development. Can determine priorities with public meeting opinions and considering future growth potential in value added crops, economic development and livestock production.
- Water distribution systems are designed based on the lowest flow available; water licenses are also based on the lowest flow available (therefore low-flow Red River is not an issue). Dams can be installed in order to maintain the minimum flow.
- With increased water supplies, increased dependency results therefore the drought in the future will be even worse.
- Municipalities (local taxing) and possibly charge a levee on the individual town getting the water services.
- The majority of the Province of Manitoba does not recognize water supply constraints.
- Establishment of in stream flows (need the technical assessment to evaluate), environmental uses of water.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Meeting with Dick Menon, Wednesday, December 4, 2002 (9:00am – 10:00am)

- Manitoba has been working together as a province towards drought-proofing, therefore has a good idea where the issues are.
- Lack of water restrains agricultural growth and expansion.
- First reason to develop water distribution systems is primarily for drought-proofing, not growth and expansion (due to extreme conditions resulting from the drought in the 1980s). Drought-proofing program started in 1980s.
- During the drought in the 1980s, dugouts were used and dried up while groundwater sources were sparse, sporadic and bad in quality.
- Primary need for water supplies in Manitoba is always domestic and not for irrigation.
- People not willing to pay $5/1000l to irrigate crops.
- Province of Manitoba's mandate is for domestic water use (water sources not developed for hog-barn, however can provide if willing to pay/along the way of the pipeline being built for domestic uses).
- Used sourcing study to ensure against drought issues and identified the following rural areas in need of water (as they are susceptible and prone to drought):
    1. Red River/Pembina (Pembina Valley area)
    2. Westlake (west of Lake Manitoba) (Gladstone)
    3. Southwest corner of Manitoba (R.M. of Arthur) critical

    (no money has been put towards these areas yet)
- There are water sources in the R.M. of McDonald and R.M. of Cartier that have been developed (7-8000 miles of pipeline).
- Water needed for domestic and value-added uses (i.e. Hog farms).
- Need to provide water in rural communities for domestic and livestock uses.
- In the last 15-20 years, 7-8 thousand miles of pipeline have been developed.
- Requests for water distribution in Dauphin, Swan River and Kelsey (south of Le Pas) to apply to domestic and livestock uses.
- Primary need is for domestic (livestock = value added).
- Manitoba alone requires $100mil for water distribution pipelines (therefore funds for $50mil are substantially much too small to distribute across the prairie provinces). When distributing funds across the province, must do it fairly which spreads the money thin leaving less ability to install distribution pipelines in each area. Therefore, need to prioritize distribution of funds for development. Can determine priorities with public meeting opinions and considering future growth potential in value added crops, economic development and livestock production.
- An implication of not meeting the agricultural water sourcing needs includes the depopulation of rural areas (due to poor water quality and quantity). Funding system is inadequate to meet all needs.
- Need good quality water for sustainability.
- Pipeline distribution connection fees are more expensive in some areas. For example, it would cost approximately $15,000 for someone to connect in the southwestern corner of Manitoba. The local citizens of this area would not want to pay this fee, therefore, the drought problem would remain. There are different limitations for different areas.
- There are no problems with supply except in southwestern Manitoba as the people living on the Oaklake aquifer are taking ownership and do not want 'their' water supply removed.
- It is more cost effective to operate 1 large regional treatment plant rather than several smaller ones (also more consistent and easier to manage properly).
- The Westlake area has very hard water (iron and manganese) where hardness is 150. Treatment of this water could be very expensive (to soften) however some people are willing to use the water without treatment, as hardness is not a health hazard. Public health is of primary concern and should pay for the necessary level of treatment (and if willing to pay for softening).

- Need to consider the issue of whether or not people should pay more money in order to save for financial reserves for the future or get people to pay in the future (invest or not).
- By not dealing with the water constraints, agricultural expansion and growth is stalled. The faster the constraints are dealt with, the faster future development can occur.
- Winkler is the fastest growing area.
- Areas lacking in water sources will lose potential industries therefore losing potential economic/agricultural growth. However, current systems design does not take into account industrial expansion and consequent increases in water demand. Therefore, need backup systems.
- Need to balance the needs and priorities of water sources to fairly and efficiently distribute.
- Most rural agricultural water distribution systems are fairly new in Manitoba. The current needs far outweigh the demands.
- Areas predicted correctly in 1980s & 1990s for value added crops.
- Water distribution systems are designed based on the lowest flow available; water licenses are also based on the lowest flow available (therefore low-flow Red River is not an issue). Dams can be installed in order to maintain the minimum flow.
- Once someone is on the pipe distribution network, it is difficult to cut-off or regulate consumption.
- Hog barn producers need to have back-up systems in case of drought (water distribution systems are not fool-proof).
- Water supply development priorities lay in the southwest corner, Westlake area, upper Cartier (R.M. of Portage Grey), south-central (Pembina Valley), Morris, Thompson, R.M. of Swan River and Dauphin.
- Organizations that should receive priority are the PFRA, Manitoba Water Services Board of Intergovernmental Affairs and municipalities.
- Municipalities (local taxing) and possibly charge a levee on the individual town getting the water services.
- Rural pipelines should be primarily eligible for funding.
- Overall, need more money from the federal government (have always lacked money). Manitoba has paid the last 15-20 years on it's own. The federal government needs to support the development with more than the proposed 3 year length (10 to 20 years more appropriate). The amount of money [$50mil] is only a 'drop in the bucket'.
- Development potential should be spread across the province.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Questionnaire Notes from Doug Smallwood

- Water supply issues do exist that constrain agricultural production and expansion. These issues are documented in the following publications through the AIM: *Irrigation Strategy (1995, 1998), Manitoba Irrigation Survey (1997, 1999)* and discussion paper of 2001.
- Issues are important to the development of increased potato production as well as other high value crops that require supplemental irrigation.
- Manitoba has an abundance of water flowing through at certain times of the year, however the needs are greatest during the summer after the spring flows are past. Also the need for water can be at a great distance from the sources.
- There is a need to develop storage and delivery systems to capture the spring flows and deliver at the appropriate time.
- The three potato processing plants in Manitoba require a guaranteed quality of product for processing and export. The implications and impact of irrigation on the Manitoba economy are well documented in the report "Irrigation: The economic Impact on Manitoba" prepared by and for the Association of Irrigators in Manitoba in 2000.
- There needs to be some work done to reassess the work done by PFRA on major storage facilities in the province to take advantage of the excess spring flows for use at high need times. The technical expertise of the PFRA group needs to be used to overcome some of the issues indicated
- The province of Manitoba produced a discussion paper in the fall of 2001 that clearly shows where and why expansion of irrigation in Manitoba can and should take place.
- Existing water supply infrastructure is not adequate to meet water supply needs.
- Need more technical work completed on how and where to capture spring flows and how to deliver to the crops when needed.
- We need larger water storage projects to insure the sustainability and future of the agriculture industry. If we cannot become more efficient in production we will lose our independence for food supplies
- At this point, there needs to be some vision, planning and technical work established to move us forward to greater irrigation of high value crops. PFRA has been a leader in this field for many years and we need to call on their experience and expertise to move forward.
- Funding should be eligible for all water use projects from small individual projects to large multi user storage projects that supply water for many users including irrigation, livestock, municipal, industry and recreation.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Meeting with Manitoba Conservation – Water Branch, Thursday, December 5, 2002 (9:00am – 11:00pm)

Manitoba Conservation – Water Branch staff in attendance:
Ray Bodnaruk
Darwin Donachuk
Laurie Frost
Graham Phipps
Steve Topping
John Towle
Rick Bowering

- PFRA is agriculturally focused (need for development in southwestern Manitoba and Westlake).
- Need to consider rural versus agricultural use.
- Need to address future plans for proper use, administration and allocation.
- Data of water use and consumption available but lengthy to analyze and needs to be analyzed in a different light compared to in the 1980s-different priorities (drought/flood).
- Need to involve all stakeholders.
- Education and awareness to the issues of water distribution and need are very important.
- Province needs to work together politically and have a regional water management strategy.
- Funding should go towards analysis and assessments.
- Need to develop a strategy from the entire province's perspective for water development.
- There is lots of data on limits of resources (some information doesn't exist though as there are lots of smaller streams and unknown aquifers which are usually resolved on a case-by-case basis). There is more information on major aquifers such as groundwater availability (well documented).
- Distribution problems in Sioux, Pembina Valley, surplus water irrigation problem, (PFRA just signed permission to put gates on Shellmouth).
- Water needs in southwestern Manitoba (domestic and urban), Glenella and Gladstone.
- Need to develop water supplies (domestic use) in Ille des Chenes, St. Adolphe and R.M. of Rockwood.
- Water supply issues such as water quality (especially on the Assiniboine River), groundwater protection, establishment of instream flows (need the technical assessment to evaluate), environmental uses of water, Sioux River water quality problems.
- Limiting factor for development is technical capacity and development management plans with stakeholders.

- Laurie Frost to provide list?

- Water supply development is being driven by industry (hog and potato). Problem of bringing water to needed areas is economically driven. The demand issue is industry driven and water is not located where the demand occurs.
- Need to consider waste disposal.
- Poor groundwater quality due to bacteria and nitrates, along with poor groundwater protection (which is very important). Groundwater protection is not emphasized.
- Environmental farm plans need to be instituted (protected well heads-Tyndull, Garson). There are supply and protection problems if the potato and hog industry is pushed.
- We don't totally understand groundwater and/or well pollution.
- Currently, no one is supplying technical assistance and/or education for farmers to properly manage their water supplies/resources.
- Proponent has onus to do planning and needs help to meet the requirements.
- PFRA needs to modernize their view.

- Need communication process to get people up to speed on water requirements (i.e. Environmental licensing needed).
- Need a way to provide water supply planning as currently there is no focused plan (used to be but not anymore).
- Need to be reactive as difficult to be pro-active (i.e. Hog-farming not existent 10-15 years ago).
- Need to understand different client perspectives.
- Need a water supply inventory (done by Manitoba Agriculture in which Wetsands, Pembina River, Elma have soils with irrigation potential, limited amount of land that have an irrigation potential).
- Long-term planning is necessary for water source development.
- In southwestern Manitoba, a water development team is being developed (officially formed in January 2003).
- Need to look at water resource development holistically (including riparian zone protection for example).
- DFO has standards that are not hydro logically correct, therefore making them difficult to meet.
- Will not see large storage reservoirs in the future (due to DFO regulations).
- People become too reliable on water distribution systems (i.e. Hog barns).
- Drought-proofing via storage (2-year water storage supply). Perhaps enforce that if a farmer does not invest in a 2-year water supply, they will not be supported through a water distribution system.
- Allocate water based on available water, perhaps based on a 2-year supply (at least).
- Elimination of Crow?
- Steinbach example of diversification as hogs are ideal, land is good for wastes, local grain used for feed, self-sufficient (hog wastes on the land growing grain locally, local grain is fed to the hogs).
- Lake Winnipeg as a water source is not known, as there is currently no information to determine how much water is available for licensing.
- Problems of allocating more water from a source than is sustainable (licensed too much). Also, not licensing fast enough is a problem. When licensing water, Manitoba takes a risk analysis into account.
- We do not understand the Assiniboine Delta Aquifer well enough to determine a sustainable yield for the demand on the aquifer. In determining a sustainable yield, human and environmental allocation is 50/50.
- Winkler Aquifer has 2000 acre-ft/year but actually only 350 acre-ft/year that is already licensed.
- Assessment is sight specific 10-40 acre-ft/year for hog barns where irrigation is 100-300 acre-ft/year.
- Water Well Act-no regulations to enforce (no inspector for well drilling, but now have the approval to refill the position).
- Need well-sealing programs for closed wells.
- Need to protect wells in the event of a flood and infiltrating directly from the wells to the underlying aquifer.
- Currently do not have a good handle on natural water quality problems (i.e. arsenic, selenium) or on water quality problems related to irrigation.
- MCDC (Manitoba Crop Diversification Centre) has affiliates to research towards impacts of irrigation on water quality.
- Overall, there are more problems with management rather than with supply.
- Understaffed and cannot provide the services therefore need to hire consultants. Need for extension services for environmental and water rights.
- Agricultural water supply – Almassipi sands
- Need for environmental protection, new in-stream flow requirements, water budgets and limits.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Meeting with PFRA, Friday, November 19, 2002 (9:00am – 12:00pm)

PFRA staff in attendance: Erminio Caligiuri
Alain Vermette
Stella Fedeniuk
Ron Gares
John Zyla
John Osterveen

Erminio Caligiuri

- Need rural water supplies in order to support agricultural communities.
- Develop a single vision with the Manitoba Natural Resources Board, Department of Conservation, Environmental Branch and Water Resource Branch to accomplish water supplies in support of agricultural communities.
- Most expensive to ship agricultural products from Manitoba therefore, need to diversify agricultural industry. Currently, shipping raw grain out of Manitoba returns a zero profit in the long term, where in Dauphin the long term profit is actually negative.
- To turn a net positive profit, Manitoba needs to diversify its agricultural exports such as developing livestock industries and/or higher valued crops (barley). By developing livestock industries, value is added to Manitoba's grain industry.
- Potatoes represent a higher value crop (example of specialty crops) and are considerably in high demand in North America (every 2 years, a new potato processing plant is required for chips and fries). Traditional potato resources (Idaho & PEI) have reached their limit. The prairies also have suitable climate and soil for potato crops (best in Manitoba). Potatoes will be the next exportation for economic growth in Manitoba. Manitoba's climate is able to support potato growth without irrigation however it would be beneficial to quality and consistency of potatoes. As excess irrigation can lead to environmental degradation, Manitoba, which would require minimal irrigation, would not be susceptible to environmental degradation as compared to Alberta and Saskatchewan.
- The water supply expansion program will develop potable water supplies for livestock (rural domestic water), irrigation and use of water from ponds (not licensable but is a development opportunity).
- Open dugouts for water supply has blue algae and other quality problems.
- Innovation has to invest the funds for the future rather than short-term developments.
- Off channel storage in Surplus Water Initiative.
- Three key issues:1) Continue with pipeline network; start with reliable, safe source and branch-off.
  2) Exploration for groundwater as no inventory currently exists and supplies are unknown.
  3) Correct development important for long term focus and success.
- Federal money matched by other levels of government.

Eric Blais

- Manitoba doesn't need elaborate channels and pipelines as in Alberta and Saskatchewan (doesn't need as much water).

Alain Vermette

- In the 1980's, focused on areas needing water supplies (Pembina Valley)
- 1980's expansion (Red River Valley Expansion).
- Reliable areas include Westlake Area (catch out of Assiniboine aquifer which never proceeded as people on top of Assiniboine aquifer felt the water was 'theirs' and did not want it removed.
- Pipeline expansion will continue.
- Hartney area has potential for potato development (SW water supply shortage).

- Western Manitoba most vulnerable to drought (population density low).
- Hogbarn over carbonate aquifer should be in west.
- Protection of groundwater resources required in Interlake area.

Erminio Caligiuri

- Draw from both the Red River and Assiniboine (alternately dry/wet) as backup.
- Develop southwestern part of Manitoba if warmer temperatures (most important).
- Need to explore for groundwater inventory (SW of MB believed to have large ground water supply)

Stella Fedeniuk

- Southwestern part of Manitoba has more land base but less population density.
- Southwestern part of Manitoba good for livestock only, not grain production.
- Development only in areas identified with guaranteed water supply.
- Offstream storage and use pipeline as backup supply only.
- Need to recognize stability of supply.
- Some operations need higher water quality.
- Issues of ownership of water in aquifer.
- Water quality monitoring.

Erminio Caligiuri

- Potato market to have 'Northern Vigor'; require smaller acreages, give higher value, need to have farms far apart.
- Need for continued diversification (hogs in the west) and therefore need to keep water supplies clean.
- Need to invest water into the economic engine.

Alain Vermette

- Target western half of Manitoba for developing water supplies.
- Development not happening due to cost and demand.
- Need for diversification (hog development in the west).

Erminio Caligiuri

- Eastern side of Manitoba has lots of water that needs to be protected.
- Livestock barns getting larger in the east but should really be growing in the west.
- Need to look at water supply issues in the future.

Eric Blais

- Need to develop separate water supplies (risk due to contamination).

Alain Vermette

- Primary concern for agricultural rather than contamination risk.
- Higher service connection cost in western Manitoba.

- Look at soil and water GIS layers.
- Determine areas of need versus areas of supply.

Stella Fedeniuk

- Southwestern Manitoba, Oaklake aquifer susceptible to drought.
- Southwestern Manitoba has very sparse populations.
- More expensive to develop water in southwestern Manitoba
- Need to move to livestock production.
- Look to develop off-stream rather than off-line water distribution systems.

Erminio Caligiuri

- Need to work with a mind set.
- Government grants are not enough to cover the development of water distribution systems, however, out-of-pocket expenses are more acceptable as viewed as a business investment.

Stella Fedeniuk

- Need to consider the social perspective as to whom 'owns' the water.
- Need education and awareness for monitoring water quality, beneficial management practices (BMP) information distribution.

John Zyla

- 10gpm for 600 cattle (10gal/day for each cattle).
- To be able to meet pipe-sizing requirements to be able to provide enough water for the cattle, will cost lots of money (pipeline costs and sizing).
- Need for protection of water supplies (contamination) in Interlake area.
- Whitemouth (Canadian Shield), hit and miss with water supplies, therefore area gets water from the Seven Sisters Dam (private) in the Winnipeg River. Water treatment needs to be upgraded.
- Possible vision of pipeline development in Haddishville.
- Southeastern Manitoba flooding = contaminated wells (180 wells tested), found to be shallow, old and dirty and not successful for disinfection.
- Armour Franklin has no groundwater supply of water (salty), therefore uses water from east of Dominion City for reliable water supplies.

Regional Municipality of Alexander: "Rural Municipality of Alexander Water and Sewer Infrastructure Study Final Report", Prepared for The Rural Municipalities of Alexander and Manitoba Water Services Board" (Project # 68811/99029 (March 2000), Cochrane Engineering Ltd.).

Ron Gares

- Need to diversify from grains to grains and mixed and/or from grains to livestock (only manage cattle).
- More livestock = more water requirements.
- Introduce more higher value crops such as potatoes (have not used irrigation yet).
- Past summers yielded quality potatoes, however much more improvement would be seen with only 3-4" of irrigation (therefore, some desire for irrigation).
- Need to investigate groundwater sources.
- Livestock introduced into areas only with guaranteed water supply and quality.
- Farmers/livestock producers won't buy acreages unless guaranteed water supply/quality (not interested in cisterns).
- Lawrence-not a good supply and would like to resolve.
- Need to address smaller areas too.
- Gilbert Plains – groundwater - $5mil
- Dauphin – off treatment plant - $6-8mil
- Swan River – groundwater and off treatment plant - $8-9mil
- McCreery – groundwater and town treatment plant - $3mil
- Need to devise priorities.

Erminio Caligiuri

- Gaps in rural municipalities of Portage le Prairie and Thompson.
- Central needs irrigation (for potatoes).
- Block irrigation – "Manitoba Sustainable Irrigation Development", Treherne = serious development.
- Assiniboine River is lifeline of Manitoba.
- Need to develop Assiniboine River tributaries (storage areas).

- Potential to diver water to Assiniboine River from Le Pas (which is fed by Diefenbaker Lake in Saskatchewan), however will need to compensate energy lost ($) to Saskatchewan, which is 'peanuts'.
- Political constraints for water distribution and development are political and not physical (thus artificial). (Have to remove the impediments to development, basic information required.)

- Hydrogeology: -Best available information needs to be put into database.
  -More research needs to be done defining sources.
  -Redundancy of sources.
  -Groundwater recharge.
  -Beneficial Management Practices (BMP).
  -In-house treatment of marginal quality water.

John Osterveen

- Many shallow water supplies in western Manitoba, which are cheap but not sustainable.
- Need for education of aquifer management practices and physical responses as there is a lack of data knowledge of inventory constraints to groundwater development.
- Consider artificial aquifer recharge [does not necessarily give acceptable water quality as from surface water].
- Consider BMP
- Need to treat wells as piece of equipment (records, efficiency, quality, monitored)
- Need to properly seal abandoned well.
- Consider in-situ treatment as part of infrastructure (also treatment of nitrates prior to entry into well).
- Consider waste-streams through wetland treatment (with right bacteria in wetland).

Stella Fedeniuk

- Need to divide groundwater sub-basins (there are 13 in the Assiniboine basin).

Reluctance on Red River water supply.

Erminio Caligiuri

- Faced drought in 1960's.
- Consider flow augmentation of Assiniboine River.
- Huge water dam leaves no water supply at leader of Red River (in Grand Forks). U.S. is able to dry up the Red River therefore, need to rely on the Assiniboine River (Environment Canada monitors quality of Red River).
- Morris needs water infrastructure due to the current supply of water from the Red River is unreliable.
- When the Red River is dry, low volume easily freeze leaving no reliable source of water.
- Currently, there is no fish inventory on the Red River from the Department of Fisheries (DFO), (need to know in the event of water distribution system development and letting the costs fall on the developer is unacceptable).

Alain Vermette

- There is a lack of knowledge in groundwater development.
- Need for more user friendly data format to make information easily accessible.
- Biological resources no the PFRA's mandate, therefore need the DFO.
- Need inventory and analysis of biosystems to determine what is at stake (fish species and migration patterns).

Erminio Caligiuri

- Consider getting water from the Assiniboine River rather than Oak Lake for the Pembina Valley.
- Total dissolved solids (TDS) very high in Lake Manitoba, therefore, not a good water supply for distribution.

- Currently, there is no leadership of the capital city [Winnipeg] to supply water to surrounding areas (where as Edmonton supplies to areas up to 100 miles outside the city). [Very expensive.]
- Rural areas that do not have water supplies need to truck it in.
- Need to deal with the mentality of ownership of water and pipelines.
- Clear water from Lake Winnipeg (with little treatment is good supply).

- There is a larger issue of water disposal than supply in Selkirk.

Alain Vermette

- Green-Plan Program to digitize well data.

Erminio Caligiuri

- Need to work as an entire region.
- Need to regulate the same water rate withdrawal on large region to eliminate competition.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Meeting with Sam Schellenberg, Tuesday, December 3, 2002 (2:00pm – 3:00pm)

- Two main issues that constrain agricultural production/expansion are; 1) Lack of supply & 2) Security of supply.
- Since 1997, there has been rapid growth in the agricultural sector that has become difficult to manage.
- Stephenville was the last region to have developed water distribution systems (1998/1999). Originally designed for 490 rural hook-ups, now has 1135 and not done yet (all using treated water), possible expansion in summer 2003.$1mil to R.M. of Morris as a grant to put towards infrastructure. Supplies are not secure, funds used to increase security (computer data to efficiently determine rerouting options etc.). Stephenville on Assiniboine River use offshoots for irrigation.
- Agricultural water supply needs located in the Pembina triangle.
- First dairy hooked up to treated water pipelines had an increase of 152 L of milk/day (due to better quality water supply).
- Pork barns in Manitoba ready for hook-up (huge growth in southern Manitoba). Therefore, a huge percentage of demand is inflexible (hog barns always need water and cannot go without for a period). Hog barn producers are willing to pay for water as better water quality supplies reflect decreased veterinarian bills and hog fatalities.
- Implications of not meeting the water needs in terms of agricultural production/expansion are huge. There are lots of hog barns that are totally dependent on water supplies and have no flexibility in requirements. For irrigators in the potato industry, an unreliable source of water can lead to a curtailed agricultural growth industry, shrink growth, depopulate and unemploy rural regions, thus losing a very large tax base.
- Red River is the only river in the province of Manitoba that does not have minimum flow requirements. In drought of 1988, due to only 32L/s, Manitoba asked U.S. for release of water to function. Winnipeg depends on the Red River and it may take an extreme drought to get the public to notice and react. City of Winnipeg does not have insufficient quantity or quality of water and is therefore not on the political radar.
- To secure water supplies, put dam on Red River in event of drought (same problem on Boine)
- No options of water distribution and/or supply security are free of environmental cost.
- Holland Dam, Treherne Reservoir
- Manitoba vs. U.S.; legal action against diversion prior to border and into Manitoba. Public perception very different from actual fact at times. Manitoba really needs to build a working relationship with the U.S..
- St. Claude wells not adequate (groundwater and precipitation decrease, therefore decrease in quality).
- People lie about their water consumption and there is no enforcement of licensing. Key is to treat everyone the same by metering all water consumptions.
- Need to look at real economics (the risks due to water supply) in order to justify major projects.
- The majority of the province of Manitoba does not recognize water supply constraints.
- Need to look at rural infrastructure (1000s of miles of rural waterlines).
- Hookup for farmers cost at least $9,000 up front and every gallon of water is metered (therefore not used for irrigation). Rural people pay $625-$650 per 1000 gallon of water for maintenance and capital repayment (not including hook-up fee).
- Need to look at short and long term solutions (study impacts of economic influences), and determine/justify the best solutions up front.
- There are 18 municipal governments, each demanding for agricultural development and diversification.
- Sourcing of water, increased treatment capacity, increased reservoir balancing all seen as paying a return. The rest of Manitoba is not as well developed (Pembina has no groundwater).

- Concern of contamination (Haywood) from sewage (shallow wells and no proper measures to handle sewage). Therefore, existing water supply infrastructure in not adequate to meet agricultural water supply needs.
- All levels of government need to cooperate together for a possible drought-proofing plan. Need to consider when there will be another drought, not if.
- With increased water supplies, increased dependency results therefore the drought in the future will be even worse.
- There are many legislative roadblocks (regulatory and financial). More departments and agencies are hindering development (i.e. Historic and Archeological Resources").
- Should invest in agricultural economic benefits, otherwise will lose rural service centers. Rural water supply is essential to maintaining rural populations.
- Funding needs to be eligible for rural water infrastructure and potential additional impoundments (reservoirs).
- Stanley is the fastest and youngest rural growing community.
- One large water treatment plant is more effective, efficient and has better regulation controls (trained and consistent).
- Acreages with water are more attractive.
- Multi-Use Reservoirs are a problem for uses for cottagers and as a supply. New generation approach is to have the cottagers agree to water level changes or complete drainage (sign an agreement) prior to purchasing land around a reservoir.
- Need for a water task force to recognize economic development limitations.

ANALYSIS OF AGRICULTURAL WATER SUPPLIES AND ISSUES IN MANITOBA

RE: Questionnaire Notes from Wayne Hildebrand

- Lack of guaranteed water supplies constrain agricultural production/expansion, in southwestern corner of Manitoba, south central Manitoba. Highly important for agricultural/rural diversification (livestock and domestic). The Provincial Department Conservation Library, PFRA and Manitoba Water Services Board have documented data for these issues.
- Lacking in water resources supplies limits agricultural growth and diversification in rural Manitoba.
- Lacking in water resources quality affects human health.
- Lacking in water resources also limits expansion of irrigation potential and special crop production.
- Possible solution is to develop pipelines to distribute water from a reliable, good quality source (groundwater), or to distribute treated surface water.
- Another possible solution is the storage of surface water via dam construction.
- Data exists for the Westlake water supply (PFRA & Manitoba Conservation) and for the southwestern corner of Manitoba water supply (Manitoba Water Services Board & PFRA).
- There are water supply constraints in both terms of quantity and quality.
- Potential for assistance with well water quality and treatment through an incentive and educational program.
- Existing water supply infrastructure in not adequate to meet water supply needs in both the southwestern Manitoba corner and Westlake (west Lake Manitoba) areas.
- Priority area in need of water supplies is the southwestern corner of Manitoba.
- Funding should be received by the Manitoba Water Services Board (Intergovernmental Affairs) and area municipalities to assist in infrastructure development to deliver good supply of good quality water. Projects should also include infrastructure for rural water supplies along with well water testing and treatment (shock chlorinate).

Appendix F - Alberta
Workshop Documentation

NWSEP WORKSHOP
CALGARY, ALBERTA
JANUARY 29/30, 2003

NWSEP Workshop Agenda

The workshop will follow the outline described below and be conducted on January 29/30, 2003, at:

Valley Ridge Golf and Country Club*
11618 Valley Ridge Park NW
Calgary, Alberta T8B 5L4

** Note: The Valley Ridge Golf and Country Club is located west on the Trans Canada Highway, 2 km past Canada Olympic Park, exit North on Valley Ridge Boulevard and down the hill to the clubhouse.*

Wednesday, January 29, 2003

8:00 am – 8:30 am **Continental Breakfast**

8:30 am – 9:00 am **NWSEP/UMA Presentations**

8:30 am – 8:35 am **Introductions - UMA**

8:35 am – 8:50 am **NWSEP Presentation/Q & A**

8:50 am – 9:00 am **Questionnaire Response Summary - UMA**

9:00 am – 9:45 am **Assessing**

- What is the current state of the situation?
- Brainstorm ideas
    - Consolidate ideas

9:45 am – 10:15 am **Visioning**

- What is the desired outcome?
- What are implications of not achieving?

10:15 am – 10:30 am **Coffee/Stretch Break**

10:30 am – 12:00 pm **Mapping**

- Functional Analysis
- What are the gaps?
- What are the needs?
- What are the constraints?

12:00 pm – 1:00 pm **Lunch**

1:00 pm – 3:00 pm **Mapping (continued)**

- What are the opportunities?
- Implementation opportunities.
- Brainstorm ideas
  - Consolidate ideas

3:00 pm – 3:15 pm **Coffee/Stretch Break**

3:15 pm – 4:30 pm **Resources**

- What resources are required?
  - low, medium, high cost
- Brainstorm Ideas

5:00 pm - **Adjourn**

Thursday, January 30, 2003

7:30 am – 8:00 am **Continental Breakfast**

8:00 am – 9:30 am **Priorities/Evaluation**

- What are the priorities for proceeding?
- Evaluation Criteria

9:30 am – 10:00 am **Opportunity Evaluation**

- Prioritize Opportunities

10:00 am – 10:15 am **Coffee/Stretch Break**

10:15 am – 10:30 am **Presentation Phase/Closure**

- Review Workshop
- Summarize results
- Where do we go from here?

10:30 am – 12:00 pm **NWSEP Questionnaire**

12:00 pm – 1:00 pm **Lunch/Adjourn**

PFRA – NWSEP WORKSHOP
JANUARY 29 & 30, 2003
CALGARY, ALBERTA

In Attendance:

Attendee	Organization
John Elton	Elton Environmental
Dennis McKerracher	Alberta Pork
Fred Zaal	Environment Canada
Mark Bennett	Bow River Basin Council
David Pochylko	PFRA
Dave Seitz	PFRA/Hanna
Ian Rudland	Alberta Environment
Jamie Wuite	AAFRD
Jack Hayden	AAMDIC
Jason Beres	County of Newell No. 4
Wally Chinn	AAFRD – Irrigation Branch
Bob Buie	UMA Engineering Ltd.
Rod MacLean	UMA Engineering Ltd.

The workshop generally followed the agenda attached to this documentation of the workshop. The primary purpose of the workshop was to evaluate priorities and provide direction for the expenditure of NWSEP designated funds. In addition the participants identified criteria that should be used in evaluating eligible, competing projects.

OVERALL OBSERVATIONS

The workshop participants provided some overall comments/observations that should be documented in the following paragraphs.

Funding needs to provide support not only for a three year term, but also to extend well beyond the 3 year term.

For example, the workshop team identified programs that are extremely important and should be funded on a long term basis, these are:

1. Data acquisition, monitoring, data base creation, data availability, etc.
2. Planning – both long term and short term.
   Planning should include:
   - recognition that some areas are not suitable for further development
   - provide watershed basin councils with not only responsibilities, but authority
   - require watershed planning
   - assume expectations for water are realistic
   - integrate the management of water resource data
   - elevate the priority in public policy of water management

3. Infrastructure rehabilitation, including upgrading existing water treatment plants.

The workshop also differentiated between programs and projects.

Programs may be considered as not necessarily having a defined end date, i.e. they provide an ongoing function and are essential to properly plan for future projects.

The two primary programs that are essential if projects are to be evaluated and selected on a defensible basis are:

1) Planning
2) Data acquisition, monitoring costs, etc.

These two programs are fundamental to the success of implementing a program such as the NWSEP. At the present time this is an area that needs immediate and long term attention.

It was also observed that funding needs to be more significant and not constrained to three years. This is particularly important where long term continuity is required, such as the two programs previously identified.

1.0 CURRENT SITUATION

The participants discussed the current situation as it applies to Alberta with each point representing an individual's assessment of where we are in 2003.

- increased competition for groundwater – need to get a better handle on our groundwater resources
- shallow groundwater – levels declining
- is there evidence that declining groundwater levels result in poorer water quality
- need to have a groundwater monitoring network in place to get a benchmark level on the status of the resource
- concern on the quantity of good quality water being used in injection wells
- general poor understanding of how groundwater is recharged and moves through the ground
- surface water supplies in southern Alberta are limited
- many basins over allocated already
- groundwater knowledge is limited
- abandoned wells an issue regarding contamination
- surface water supplies for livestock use are critically low
- dugouts and sloughs going dry
- need to think about restoring previously drained water bodies
- insufficient knowledge base on water storage potentials
- storage – how do we insure that a unit of H2O stored to reduce existing risk is not used to fuel further growth?
- surface water knowledge is detailed

- groundwater knowledge is negligible
- watershed planning in the "infancy" stage
- growth has to have limits – 20, 30, 100 years hence for land contamination water
- to what extent is H2O availability seen as a limit to growth
- extreme variability in water supply
- lack of long-term water supply development strategy
- growth in Alberta outstrips the rate of change with water use rates
- as supply increases demand increases more
- water use change (conservation) has to be accelerated – it is beyond the individual to afford required rate
- linear approach vs. integrated
- population growth? are there expectations of growth in rural Alberta
- need to protect water bodies from livestock by providing alternative water supply systems
- existing water supplies – diminishing from extended periods of drought and/or dry periods. Also expanding livestock herds (ILOs) taking more supply/demand
- should farmers be encouraged to collect roof runoff in cisterns (as in Australia)
- agricultural supply in dry land areas has no/few "options" during times of shortage
- rural domestic supply in "outlying" areas is drought sensitive (dependence on private systems)
- is there a difference, and should we be aware of the difference between supply and availability?
- do we have agreement on what is an acceptable level of risk on water supply?
- water licenses for rural water lines are difficult to obtain
- surface water licenses moratoria are now a reality in the south
- allocation of water in the Red Deer River – are we close to the limit?
- constraints within existing legislation
- insufficient capacity to "optimize" apportionment agreement(s)
- is this part of a normal cycle?
- uncertainty of impacts of potential climate change

2.0 VISIONING…WHERE DO WE WANT TO BE?

- to have a common database that is believable – not one that is "convenient"
- research into drought tolerant crops
- need to look at conservation and efficiencies in irrigation systems
- development of farm water risk plans
- everyone has access to good quality water
- interbasin transfers?
- decrease dependence on single source of water (existence of alternative supplies)
- when constructing water supply projects (i.e. pipelines) – important to look at regional needs and design accordingly
- primary agricultural activities remain an important "cog" in the Alberta economy

- water conservation an integral part of all agricultural operations
- recognition that water has a high value
- stabilization and enhancement of rural development
- H2O has a cost – must make urban link
- economic growth supported by stable water supply
- increased flexibility in the economy (risk management)
- separate guidelines for Oil and Gas, Agriculture, Urban? defined changes and education
- water management – best use of water – need education and awareness to all users
- watershed groups need to take a holistic approach to water
- increased conservation and demand management
- existing supply is used as efficiently as possible (conservation in all sectors)
- need less "now speak" and to know whether we got there, i.e. how do you measure it?
- the Bow Basin as the best managed basin (watershed) in the world
- to have provincial vision that's credible and supported by all
- no legal feuds in the courts as in the USA
- agricultural industry a leader in water efficient irrigation practices
- widespread recognition that sometimes in certain circumstances the best use of H2O is to leave it alone
- recognize the fallacy and limits of conservation

2.1 VISION

We see Alberta as having an economically viable, dynamic and growing agricultural sector where:

- *development is based with existing resources*
- *reasonable access to good quality water is the norm*
- *the agricultural sector is a leader in effective water management practices*
- *the agricultural sector leads in stewardship of the environment within watersheds*

3.0 GAPS

The general approach was to consolidate ideas into categories, where possible. Each point within a category represents an idea put forth by a participant.

<u>Education/Knowledge</u>

- better education needed
- governance by public relations – not planning
- overcome concept that water is cheap and abundantly available (i.e. public education issue)
- public perception of bias in information
- definitional difficulties
- lack of definition or understanding of what is "most beneficial use"
- assess experience/knowledge of others with regards to sound agricultural water use

- (w)holistic thinking

Benchmark

- establish performance measures
- Alberta is in need of a water audit – to account for all water use as it passes through the province
- meta data management

Political Support

- is there a political will to fulfil this vision from all stakeholders

Existing Agreements

- conflicting allocating strategies: "first in time" vs. "most beneficial use"

Water Treatment $

- funding for water treatment systems

Resources

- funding $$$$$
- priorities
- manpower resources
- lack of resources $
- agriculture operating on survival mode
- inability to delay income – short term needs must be met first
- need to move from short term to longer term focus

Information/Data

- lack of information
- lack of baseline information within watersheds
- water supply inventory
- surface water bodies have been drained which results in less aquifer recharge
- insufficient analysis/data on potential water management strategies
- insufficient understanding or knowledge on acceptable levels of water supply risk
- monitoring stations – weather, precipitation, etc.
- facilitate flow of water data from its collection to its use (e.g. promote data access via internet)
- how to use water more efficiently

- lack of awareness where groundwater could replace stock-support from canals. Huge efficiency gain possible for irrigation use

Infrastructure

- lack of water/storage
- are dugouts the best way to go?
- is present water infrastructure adequate/efficient to meet current water supply needs?

4.0 WHAT ARE THE NEEDS

It was the consensus of the workshop participants that proceeding with projects without adequate planning and access to readily available and complete data is not a recipe for long term success. There was also agreement that this should not impede moving ahead on implementing projects, but rather resources need to be set aside to fund these program requirements for the long term, not just for three years and they should be viewed as a high priority.

These priority areas are identified as:

Program – Data
Program - Planning

Program - Data

- water use/diversion/return flow monitoring systems
- generate/collect/disseminate information
- need to pool data in one place and make it accessible to the public
- reasonable, scientific-based projections on potential effects of climate change on Alberta's hydrology
- deep groundwater monitoring needs to continue
- resources (manpower) to reduce "turnaround" time on collected data
- create a (vetted) central database – combine resources for more information access
- improve access/sharing of information between stakeholders

Program - Planning

- long-term (horizon) integrated planning
- need to concede that some areas are too dry for further agricultural development
- plan for short term requirements $
- to get the money to where the water can be saved (money and water – 2 different mediums)
- re: basin councils authority must accompany responsibility
- watershed group planning
- assure expectations (e.g. water supply) are realistic

- integrated management of water resource data
- elevate the priority (in public policy) of H2O management

Program - Infrastructure

- new/rehabilitated structures i.e. dams, pipelines
- $ required to upgrade existing treatment plants

Program/Projects

- need to explore interbasin water transfers
- more off-stream storage (irrigation districts made more efficient)
- rural water distribution systems
- need to assess drainage projects for possible water body restoration
- rigorous and objective cost/benefit analysis with real cost accounting

Program - Education

- extended public sector awareness and private sector
- better understanding of the true value of water (through more public education/awareness programs)
- we need to educate people
- awareness of shelterbelt program

Program - Funding

- need to have an ongoing federal/provincial cost shared water infrastructure program
- incentives – i.e. tax credit
- we need action
- better definition of where we want to be (end-in-mind)
- get cities to invest in conservation practices – but does not need to be same place – water transfers now assist

Program – Critical Areas

- need to know the critical water supply areas of agriculture (hot spots)

5.0 CONSTRAINTS…WHAT PREVENTS US FROM ACHIEVING OUR VISION?

- immediate needs (action) vs. time necessary to do the job right
- 30% proponent share will likely be too much for smaller players. users will be mostly urban
- irrigation license is worst case. Alarm signals on climate change will not encourage growth of irrigation acres. Irrigation caps will not change.

- proof of supply does not guarantee obtaining a water license (right)
- lack of treaty with BC
- the program dollars are small relative to program required. It's set up money, but it won't build much
- knowledge management
- political will to make "tough" decisions
- many bureaucratic hurdles
- water can be saved – but does who paid for the change get the water? Who gets return of investment (user – environment – province)

6.0 CRITERIA

The workshop participants were then asked to select those criteria that should be used as a basis for evaluating competing alternatives. The group initially chose nine criteria, but subsequently reduced this to eight.

A. economic benefit to many people

C. local public acceptability; broader public acceptability

D. reasonable return on dollars invested

E. project will address a regional issue
relative need (critical areas – lack of alternative

G. efficient water use

H. does the project lead to a safer and more secure water supply for human and livestock consumption?

I. demonstrated long term risk reduction

The following criteria are required for the projects to be considered for funding. **The intent was that these criteria would be applied to each project, before a decision was made to evaluate according to the criteria shown on Table 1. If the project did not satisfy these criteria then it would not move to the next step for evaluation.**

- environmental acceptance
- maximum $ limit applied for (minimum number of projects per year); not exceed 50% of annual funding for any one project
- authorized use of water and satisfy legal requirements
- consideration will be given to fully fund highly rated projects when proponents can demonstrate an inability to pay their share
- does it stabilize or enhance rural development?
- spin off benefits

6.1 EVALUATION CRITERIA

A. Economic benefit to many people
B. "Removed and considered to be an essential criteria for funding
C. Broader public acceptability
D. Reasonable return on the $ invested
E. Project will address a regional issue
F. Relative need/critical areas/lack of alternatives
G. Efficient water use
H. Safer water supply – human/livestock consumption
I. Demonstrated long-term risk reduction

6.2 TYPICAL PROJECTS

Program	Project
• water use or diversion monitoring • more regional groundwater assessment programs • educational promotion material on water conservation and efficient use of water • license transfer subsidy? • training for rural water treatment system operators	• test well/supply well programs in low yield/poor water areas • assessment and analysis of water storage opportunities • construction of water transfer stations • conservation – conservation from high pressure to low pressure sprinkler systems • regional water line connecting farms and villages providing e.g. serv sector • web access to groundwater metadata • put water monitoring data on internet • community well construction • creation/continuation of dugout pumping/filling programs in years with little spring runoff • rural municipal wells with truck fill stations • alternate watering systems (use of solar power) • spring enhancement (well) • completed groundwater inventory: where, how much, quality, recharge • restoration of existing waterbodies (use of ditch plugs)

The relative ranking of each criteria was determined by consensus and PAIRS analysis. Each criteria was compared to one another and the one taking precedence was selected and the relative degree of important was then determined, as shown on Table 1.

Table 1

EVALUATION CRITERIA

	B	C	D	E	F	G	H	I	Evaluation Criteria	Score	Weighting Factor
A		A2	A2	A1	F2	A2	H2	I2	Economic Benefit to Many People	7	13%
	B										
		C	C2	E2	F2	G3	H2	I2	Broader Public Acceptability	2	4%
			D	E2	F2	G2	H3	I2	Reasonable Return on $ Invested	0	0%
				E	E1	G2	H1	I1	Address a Regional Issue	5	9%
					F	F1	F2	F2	Relative need/critical areas/lack of alternatives	11	21%
						G	H2	I2	Efficient water use	7	13%
							H	I2	Safer water supply for human/livestock consumption	10	19%
								I	Demonstrated risk reduction	11	21%
										53	100%

KEY

"Evaluation Criteria" are the project elements or alternatives that need to be compared.
"Score" is the total number of points for each attribute.
"Weighting Factor" is the relative numerical value of each attribute.

RANKING

1 Slightly more significant
2 More significant
3 Much more significant

The evaluation criteria priorities and relative weighting, beginning with the most important, are as follows:

Rank	Description	Weight
1	Relative need/critical areas/lack of alternatives	21%
2	Demonstrated risk reduction	21%
3	Safer water supply for human/livestock consumption	19%
4	Efficient water use	13%
5	Economic benefit to many people	13%
6	Address a regional issue	9%
7	Broader public acceptability	4%
8	Reasonable return on dollars invested	0%

The fact that reasonable return on dollars invested did not receive any votes should not be interpreted as meaning that this is unimportant. The workshop recognizes that if other criteria were met then it could be expected that the economics would be a product of the project.

It was also intended that the weighted evaluation criteria would form an integral party of the evaluation and decision making process in selecting projects for funding under the NWSEP.

Appendix G - Saskatchewan Workshop Documentation

NWSEP WORKSHOP
SASKATOON, SASKATCHEWAN
December 16/17, 2002

NWSEP Workshop Agenda

The study will follow the outline described below and be conducted on December 16 and 17, 2002, at:

Forestry Farms
Saskatoon, Saskatchewan

Monday, December 16, 2002

8:30 am - 9:30 am **NWSEP/UMA Presentations**

8:30 am – 8:40 am **Introductions - UMA**

8:40 am – 9:15 am **NWSEP Presentation/Q & A**

9:15 am – 9:30 am **Questionnaire Response Summary - UMA**

9:30 am - 11:00 am **Assessing**

- What is the current state of the situation?

10:00 am – 10:15 am **Coffee/Stretch Break**

11:00 am - 12:00 pm **Visioning**

- What is the desired outcome?
- What are implications of not achieving?

12:00 pm – 1:00 pm **Lunch**

1:00 pm – 3:15 pm **Mapping**

- What are the gaps?
- What are the needs?
- What are the constraints?
- *Brainstorm Ideas*

3:15 pm – 3:30 pm **Coffee/Stretch Break**

3:30 pm – 4:30 pm **Resources**

- What resources are required?
- *Brainstorm Ideas*

4:30 pm **Adjourn**

Tuesday, December 17, 2002

8:30 am – 9:00 am **Resources**

- What resources are required?
- *Brainstorm Ideas*

9:00 am – 10:00 am **Priorities**

- What are the priorities for proceeding?
- Evaluation Criteria

10:00 am – 10:15 am **Coffee/Stretch Break**

10:15 am – 11:00 am **Priorities**

- Evaluation Criteria/ Pairs Analysis.

11:00 am – 12:00 pm **Presentation Phase**

- Review Workshop
- Summarize results
- Where do we go from here?

12:00 pm – 1:00 pm **Lunch**

1:00 pm - 2:30 pm **NWSEP Questionnaire**

2:30 pm **Adjourn**

PFRA-NWSEP WORKSHOP
DECEMBER 16/17, 2002
SASKATOON, SASKATCHEWAN

A workshop generally followed the agenda attached to this documentation of the workshop. The primary purpose of the workshop was to evaluate priorities and provide direction for the expenditure of NWSEP designated funds. In addition the participants identified criteria that should be used in evaluating eligible, competing projects.

The workshop was attended by the following:

- Helen Vander Loop, Dairy Farmers of Saskatchewan;
- Lowell Johnson and John Soloninko, Saskatchewan Groundwater Association;
- Terry Haggart, Saskatchewan Urban Municipalities Association;
- Keith Carlton, Saskatchewan Association of Rural Municipalities;
- Suren Kulshreshtma, University of Saskatchewan;
- Russ Johnson, Sask Agriculture, Food and Rural Revitalization;
- Jonathon Warnock, Sask Agrivision;
- John Linsly, Sask Agriculture Food and Rural Revitalization;
- Harold Steppuhn, Agriculture and Agri-Food Canada;
- David Pochylko, Agriculture and Agri-Food Canada;
- Terry Gibson, Saskatoon Health Region;
- Tom Gehlen, Sask Water Corporation;
- Darrel Corkal, Agriculture and Agri-Food Canada;
- Harm Maathuis, Saskatchewan Research Council;
- Nolan Shaheen, Sask Watershed Authority;
- Martin Bohrson and Allen Patkau, Sask Stockgrowers Association;
- James Harvey, Irrigation Producers Association;
- Mark Geremia, Agriculture and Agri-Food Canada;
- Rob Weibe, Sask Water Shed Authority;
- Gratton O'Grady, Sask Pipeline Association;
- Len Erickson, Sask Agriculture and Food; and
- Neil Ketilson, Sask Pork.

UMA Engineering: Bob Buie
Hugh MacKenzie
Garry Mak (part-time)

1.0 ASSESSING…WHERE ARE WE?

- Water shortage for livestock operation.
- Public perception of I.L.O. contamination.
- Does agriculture community understand analysis results? Education
- Is water research necessary? Yes - long term monitoring.

- Infrastructure limits opportunity to use available resources. Definition of "critical mass" to justify infrastructure spending. High cost of infrastructure. Infrastructure also includes roads/power.
- Agriculture development not located in best spots. Water is not always where demand is. Imbalance between availability and demand. Maybe water is a limiting factor to Saskatchewan. Is agriculture development tapped out? In some areas this may be true, but overall no. High dependency on surface water, e.g. dugouts in some areas.
- Define water use objectives. Lack of planning at landscape level. Ad hoc programming. Money spent on short-term solutions. Agriculture sectors needs a better understanding of water development.
- Lack of large-scale water resource planning. Too much effort on short-term programs as opposed to long term. Must be mindful of short term programs that benefit 15% of the population are not popular or may not be.
- Links to agricultural development.
- Information confusing. Many agencies involved. Limited information on water treatment (small-scale) techniques. Need for up-to-date information on water allocation availability. Management of agreements of international waters
- Economic justification must be in place or sustainability of not likely. Water seen as a free good. Water costs more than people realize. Who's responsibility for infrastructure funding? Public? Private? Combination? What %? Technical issues are minimal but the larger issues of financing and long-term operation are the difficult issues. Big economic impact on agriculture.
- Ground water quality increase T.D.S. in water? Ground water high in iron content. Shallow wells unreliable "in some cases". Ground water investigation costly. Are aquifers affected by drought? Seems deeper digging is necessary to find water. Sustainable management of aquifers. There are plenty of sources.
- Water quality and quantity problems due to natural conditions–climate, minerals.
- Access to surface water very limited. Lots of surface water. Abundance of surface water in much of province. Insufficient use of rivers. Surface water in SW is heavily (totally) allocated. Surface water exists but not necessarily in the location required.
- Dugout shallow wells. Surface supplies - many are impacted by drought. Unreliable sources (dry up)

2.0 VISIONING…WHERE DO WE WANT TO BE?

- Attracting young farmers in Saskatchewan.
- Safe, secure water supplies for agriculture industry (and other sectors as well).
- Best management practices to enhance water quality.
- Balance between economic development and environmental degradation.
- Allow people to stay on the land that they now farm.
- A limited number of "full service" rural communities.
- Safe drinking water in rural areas and on farms.
- Increased agriculture diversification.
- Long-term availability of safe water.
- Realize the social and economic potential of the agricultural community.
- Increased public awareness and knowledge of water.

- The agricultural industry partnering with others to enhance Agricultural industry.
- Cooperation in finding solutions.
- Water not taken for granted. Everyone is a watershed steward - urban and rural.
- Product certification, relation to water supplies.
- Reduce health related problems associated with water.
- Balance of use of surface water between the agricultural community and potable water for communities.
- Weather variables can be managed.
- Cost effective treatment for poor quality water.
- Regional water strategies.
- Delineation of major groundwater resources.
- Secure water for agricultural towns, villages with water wells or pipelines if no groundwater is available.
- Have water meters installed in all towns, villages, etc. to prevent wasting of water.

2.1 THE VISION – "A CHICKEN IN EVERY POT"

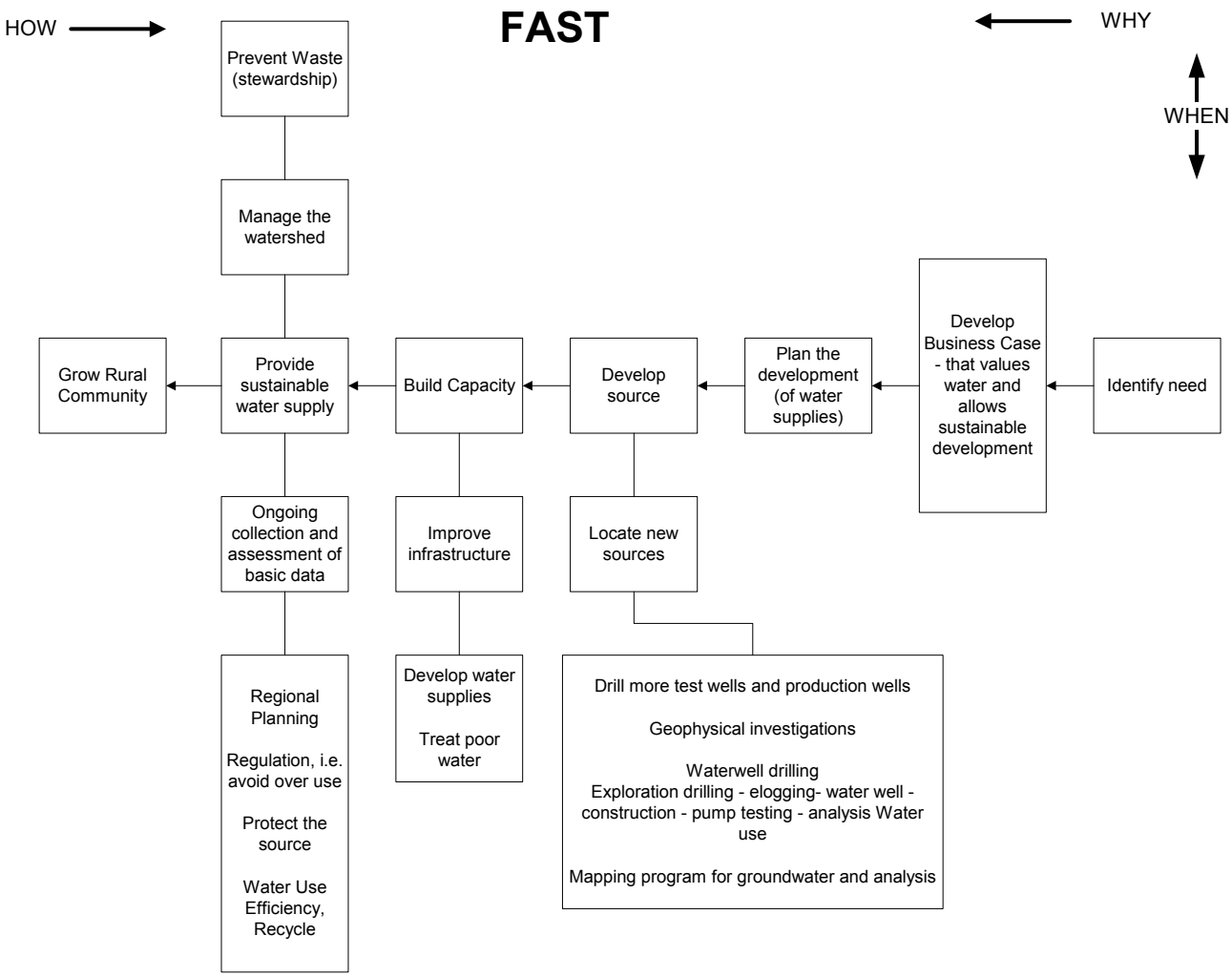
> *We see Saskatchewan having a vibrant, prosperous, diverse & growing young agricultural community, where sustainable development exists and good stewardship of land and water is the norm: an agricultural economy that is an integral part of the provincial economy and is expanding globally.*

3.0 MAPPING (HOW DO WE GET THERE?)

The workshop attendees participated in a Functional Analysis exercise intended to assist in understanding what is the purpose of the program, what is the function of the various elements, what are the opportunity areas.

The process was relatively simple and begins by identifying on the left hand side what is the highest order function, refer to Table 1. This information is then linked to a lower order function (to the right) by asking the question "how do we…grow the rural community". One answer might be "provide sustainable water supply". We continue asking the questions as we move to the right to establish a critical path. The logic is checked by asking a question to the left "why do we … provide sustainable water supply"…the reason "to grow rural community". :Linkages are also checked vertically by asking the question "when we provide a sustainable water supply" we also "manage the watershed" and we do "regional planning" etc.

The purpose of Functional Analysis Systems Technique (FAST) is to assist the participants in understanding what they are trying to do and as such improves understanding when you subsequently move forward to develop solutions.


HOW
FAST
WHY
WHEN
Prevent Waste (stewardship)
Manage the watershed
Grow Rural Community
Provide sustainable water supply
Build Capacity
Develop source
Plan the development (of water supplies)
Develop Business Case - that values water and allows sustainable development
Identify need
Ongoing collection and assessment of basic data
Improve infrastructure
Locate new sources
Regional Planning
Regulation, i.e. avoid over use
Protect the source
Water Use Efficiency, Recycle
Develop water supplies
Treat poor water
Drill more test wells and production wells
Geophysical investigations
Waterwell drilling
Exploration drilling - elogging- water well - construction - pump testing - analysis Water use
Mapping program for groundwater and analysis

4.0 GAPS

What gaps exist between where we are now and where we want to be? This section identifies those gaps.

- Require water supply and testing before issuing agricultural development permits
- Developing criteria for infrastructure planning
- Long term-coordinated infrastructure
- Information on development /treatment costs
- Define region for regional planning
- Water treatment technology development. Awareness
- Make RWDP consistent rather than a year by year program (look at certainty that program will continue funding year by year)
- Complete driller's report sent into SWA within a certain time
- All rotary drilled exploration holes must be e-logged and submitted to SWA
- For infrastructure support needs, i.e. data (groundwater, quantity, surface quality)
- Network liaise between agencies
- Streamline government bureaucracy

5.0 OPPORTUNITIES

Each participant was given seven votes to select those areas that in their opinion were the greatest priority; the only caveat was you could not place more than one vote on a particular choice. The maximum number of votes possible was 21 and the minimum was zero. There were seven areas that received more than 50% of the possible number of votes. The general approach was to consolidate ideas into categories, where possible, so that voting might be more meaningful. Each point within a category represents an idea put forth by a participant.

The resource requirements were separated into three categories:

Low cost .....less than $100,000
Medium cost....more than $100,000 less than $1,000,000
High cost .....more than $1,000,000

The expected resource requirements are identified for each opportunity area.

<u>(20 votes) (High Cost)</u>

- Regional Water Supply Study.
- Complete watershed water supply studies (surface).
- Look at resource planning in staged developments. Different levels of information.
- Long-term studies of impact on agricultural practices on groundwater and surface water.
- Regional groundwater resource evaluations.
- Opportunity/constraint mapping (groundwater).

(17 votes) (High cost)

- Development of water treatment or transmission center of excellence in Saskatchewan.
- Adapting water treatment technology to agricultural scale. Needs appropriate technology/money.

(14 votes) (High cost)

- Regional Pipelines.
- Rural Water Pipelines.
- Funding for pipelines (river water) to dugouts.

(9 votes) (High cost)

- Finish infill on developed projects. Example SSRD/Gardner Dam.
- Promote macro scale (project) water use efficiency.
- Updating existing water projects.

(3 votes) (High cost)

- Treatment for existing supply.
- Cost sharing in water treatment.
- Money available for projects based on user contribution.

(20 votes) (Medium cost)

- Share information publicly.
- Education and awareness
- Create awareness of information available.
- Creation of public awareness.
- Fund a water education extension group (reactive and pro-active).
- Begin province-wide discussions with communities (look to expand services to rural locations).

(19 votes) (Medium cost)

- Information Database
- GIS based regional ground water resource evaluations.
- Integrated groundwater database
- Integrate databases.

(13 votes) (Medium cost)

- Groundwater investigation assistance for specific projects (could also be surface water) e.g. small ILOs'.

(12 votes) (Medium cost)

- Long-term groundwater monitoring of water level and water quality.
- Expand groundwater level observations. Network.
- Long term commitment to acquire groundwater data.

(9 votes) (Medium cost)

- Expand the water testing programs.

(2 votes) (Medium cost)

Greater availability to rent pumps and pipes (Sask Water)

(9 votes) (Low cost)

- Inventory of existing infrastructure and ownership models. Provide information on cost of obtaining water at locations throughout province.

6.0 CONSTRAINTS

The constraints that prevent us from achieving the vision are as follows:

- Resources-money/people (qualified)
- Long-term commitment.
- Perception-not perceived as a priority, therefore not funded ADEQ.
- Lack of political support (money) and individual support.
- Federal/Provincial relationships (ownership of resources).
- Public & sector lack of knowledge w.r.t. impact of water on health/animals.

7.0 IMPLICATIONS

The implications of not implementing measures to achieve the vision identified are:

- No farmers (ageing)
- High production costs.
- Degrading land and water resources.
- Failure to compete globally.
- No markets.
- Too much burden of taxes.
- Reduced Saskatchewan population & fewer children.
- Less income in Saskatchewan.
- Becoming a social and economic wasteland.
- It will be even harder to catch up to the change that is taking place elsewhere.
- Higher taxes per person in the province.

- Large population decline.
- There is no such thing as remaining as is. We will need to change to have any influence.

8.0 CRITERIA

The workshop participants were then asked to select those criteria that should be used as a basis for evaluating competing alternatives. The group initially chose ten criteria which were subsequently reduced to seven and they determined a relative weighting that should be applied, as indicated in Table 2.

A. Direct economic benefit

~~B. Human Health~~

C. Sustainability (economic, social, and environmental)

D. Social stability/renewal (future-stay on the farm)

E. Extent of population impacted

F. Diversification benefits

G. Value added (employment, spin-off of economic benefits)

~~H. Is it achievable with NWSEP~~

~~I. Overlap with programs from other agencies~~

J. Dynamic rural community

The relative ranking of each criteria was determined by consensus and PAIRS analysis. Each criteria was compared to another and the one taking precedence was selected and the relative degree of importance was then determined, as shown on Table 2.

Table 2 – Evaluation Criteria

A	B	C	D	E	F	G	H	I	J	No.	%
A		C_3	D_3	E_3	F_2	G_3			J_3	0	0%
	B										
		C	C_1	C_1	C_1	C_1			C_1	8	23%
			D	D_2	D_1	D_1			D_1	8	23%
				E	F_2	G_2			J_1	3	9%
					F	G_1			J_1	4	11%
						G			G_1	7	20%
							H				
								I			
									J	5	14%
										35	100%

Legend

1 Marginally More Important
2 More Important
3 Much More Important

Required criteria before projects should be considered for funding:

B. "Health" (Human) aspects are viewed as a "Given" in any project.

H. "Achievable with NWSEP" is a "Given".

I. Overlap with programs from other agencies is a "Given".

8.1 EVALUATION CRITERIA

The evaluation criteria priorities and relative weighting, beginning with the most important, are as follows:

Ranking	Priorities Description	Weight
1	Sustainability (Economic/Social/Environmental	23%
1	Social Stability/Renewal (Future/Staying on Farm)	23%
2	Value Added (Employment, Spin-off Economic Benefits	20%
3	Dynamic Rural Community	14%
4	Diversification Benefits	11%
5	Extent of Population Impacted	9%
6	Direct Economic Benefit	0%

The fact that "direct economic benefit" did not receive any votes should not be interpreted as meaning that this is unimportant. The workshop recognized that if other criteria were met then it could be expected that the economics would be a product of the project.

9.0 RECOMMENDATIONS

1. Recommend:

    - Oversize facility to accommodate 10-20 year time frame with a cost over normal picked up by NWSEP. Initial costs shared.
    - Upsize cost should be shared by Community. Percent may be difference than shared cost for initial size.
    - Expanded water allocation ties up a resource.
    - Additional costs of developing wells must be shared?

2. Cost Share

    - Federal/Provincial/User for projects.
    - Exception: Federal/Provincial….Information/Background Infrastructure.

It was intended that the weighted evaluation criteria would form an integral part of the evaluation and decision making process in selecting projects for funding under NWSEP.

Appendix H - Manitoba
Workshop Documentation

NWSEP WORKSHOP
WINNIPEG, MANITOBA
JANUARY 20, 2003

NWSEP Workshop Agenda

The workshop will follow the outline described below and be conducted on January 20, 2003, at:

Holiday Inn - University
Winnipeg, Manitoba

Monday, January 20, 2003

7:30 am – 8:00 am	**Continental Breakfast**
8:00 am – 8:30 am	**NWSEP/UMA Presentations**
8:00 am – 8:05 am	**Introductions - UMA**
8:05 am – 8:20 am	**NWSEP Presentation/Q & A**
8:20 am – 8:30 am	**Questionnaire Response Summary - UMA**
8:30 am – 9:15 am	**Assessing**

- What is the current state of the situation?

9:15 am – 9:45 am **Visioning**

- What is the desired outcome?
- What are implications of not achieving?

9:45 am – 10:0 am **Coffee/Stretch Break**

10:00 am – 11:30 am **Mapping**

- What are the gaps?
- What are the needs?
- What are the constraints?
- What are the opportunities?
- *Brainstorm Ideas*
    - *consolidate ideas*

11:30 am – 12:00 pm	**Resources**

- What resources are required?
  - low, medium, high cost
- *Brainstorm Ideas*

12:00 pm – 1:00 pm	**Lunch**
1:00 pm – 2:30 pm	**Priorities/Evaluation**

- What are the priorities for proceeding?
- Evaluation Criteria

2:30 pm – 3:00 pm	**Opportunity Evaluation**

- Prioritize Opportunities

3:00 pm – 3:15 pm	**Presentation Phase/Closure**

- Review Workshop
- Summarize results
- Where do we go from here?

3:15 pm – 3:30 pm	**Coffee/Stretch Break**
3:30 pm - 5:00 pm	**NWSEP Questionnaire**
5:00 pm	**Adjourn/Dinner**

PFRA-NWSEP WORKSHOP
January 20, 2002 – Winnipeg, Manitoba

In Attendance

Erminio Caligiuri	(PFRA)	Peter Mah	(MB Pork Council)
Alain Vermette	(PFRA)	Kerry Church	(Puratone Corp.)
Bruce Shewfelt	(PFRA)	Sam Schellenberg	(PVWC)
Stella Fedeniuk	(PFRA)	Tam McEwen	(Threshold Tech.)
John Zyla	(PFRA)	Glenn Lelyk	(AAFC)
John Osterveen	(PFRA)	Steve Topping	(MC-Water Branch)
Walter Saciuk	(PFRA)	Jim Smithson	(MC-Water Branch)
Barb Harrison	(CMIP)	Ray Bodnaruk	(MC-Water Branch)
Dave Shwaluk	(MB Intergov. Affairs)	Laurie Frost	(MC-Water Branch)
Don Rocan	(MB Conserv.)	Bob Betcher	(MC-Water Branch)
Joe Masi	(AMM)	John Towle	(MC-Water Branch)
Stuart Briese	(AMM)	Ken McGill	(MB Agri. & Food)
David Rolfer	(KAP)	Suren Kulshreshtha	(U of Sask.)
Doug Smallwood	(AIM)	Leo Prince	(MB Intergov. Affairs)

UMA Engineering: Eric Blais
Bob Buie
Janelle Weppler

The workshop generally followed the agenda attached to this documentation of the workshop. The primary purpose of the workshop was to evaluate priorities and provide direction for the expenditure of NWSEP designated funds. In addition, the participants identified criteria that should be used in evaluating eligible, competing projects.

1.0 ASSESSING…WHAT IS THE CURRENT SITUATION?

- Water source developments inadequate
- Protection of existing and future water supplies
- More resources for rural water distribution systems
- Need for more water conservation projects to retain water not only to rely on aquifer supply
- Nutrient loading from all sources must be dealt with equally (municipal/industrial/agricultural/natural sources)
- Water quality and quantity varies for different water sources. Further data/information required (i.e. water metering, water quality testing)
- Need for regional water infrastructure to meet regional/local needs
- Variable situations (some areas too little water/some too much – flooding)
- Ensuring industry expansion (processing industry, irrigation, livestock) is sustainable (environmental resource base)
- Climate change – Kyoto accord
- Large surface water supplies such as Lake Manitoba need to and will be used in the next century
- Watershed management plans, well head protection plans to ensure sustainability and quality of water supplies over long term.
- Expanding potato processing industry will require at least 50,000 acres of annually irrigated land within 10 years.

- Shortage and insecurity of water supply – where is raw water to come from?
- Don't overlook water requirements for new crops not currently grown on the prairies
- Sustainable water management funding is required specifically for drainage and water distribution infrastructure
- How much water is required to maintain ecosystem integrity
- Coordination and cooperation… Government departments involved in agricultural water programs

Groundwater

- More groundwater exploration needed
- More extensive/comprehensive mapping of groundwater resources in select areas

Planning/Assessing

Two parts:
1) Research and development
2) Planning

- Sealing abandoned wells to protect aquifers
- Need for longer term planning (i.e. 10 years)
- Rural water demands seriously underestimated, we need to know real demand
- Science-based factual examination of water issues is essential (research and analysis)
- Regional water strategies that take into account in-stream needs
- Research into technology to use less potable water sources

Cooperation

- Need more cooperation between R.M.'s to share water resources

Financial

- Lack of adequate financial help for producers to assist with pumping – construction of water conservation projects
- High demand by municipalities for cost sharing on rural pipeline system
- Funding of regulation licensing aspects of projects

Domestic water supply/livestock

- Boil water orders, safe water supplies

Agricultural Industry Expansion

- Environmental impact of agricultural expansion – deforestation, drainage of wet lands
- Livestock production requires constant guaranteed water supply
- Agriculture must be given high priority when allocating water resources
- Reassessment of options to bring in water into water-short areas such as S.W. Manitoba

2.0 VISION (HIGH LEVEL)…WHERE DO WE WANT TO BE?

- A prosperous rural Manitoba with a stable and growing rural population base supported by a growing diversified agricultural industry
- Wise stewardship of rural water to meet all rural needs – agriculture/recreation and tourism/municipal/manage peak drought and flooding
- Water supply is not a limiting factor in agricultural diversification opportunities throughout the province

"A prosperous rural Manitoba with a stable and growing rural population base supported by a growing environmentally sustainable diversified agricultural industry."

2.1 VISION (MORE ACHIEVABLE)

- Opportunities in drought and population growth
  "To ensure a sustainable supply of high quality water to support a stable and prosperous agricultural industry."

3.0 MAPPING…HOW DO WE GET THERE?

Each participant was given five votes to select those areas that in their opinion were of the greatest priority; the only caveat was you could not place more than one vote on a particular choice. The maximum number of votes possible was 25 and the minimum was zero. There were five areas that received more than 50% of the possible number of votes. Votes were cast on areas that included "mapping" as well as "constraints".

The general approach was to consolidate ideas into categories, where possible, so that voting might be more meaningful. Each point within a category represents an idea put forth by a participant.

Planning (24/25 votes)

- Need cost-benefit analysis of options (cost to do versus cost to not do)
- Need more flexibility and planning in design
- Lack of methodologies to develop business case
- Long term water supply planning
- We need watershed basin planning to bring the grassroots knowledge and wisdom together with the scientific data, through education and awareness
- Leadership, i.e. lack of organizational structure and process for long term water planning and strategy implementation (responsibility currently fragmented, roles uncoordinated, crisis management mode)

Resources (21/25 votes)

- Constraints are money and environment
- Adequate resources (staffing and tools) to fill in the required 'gaps'
- Longer term stable government funding and technical assistance
- Constraints are costs for engineering and environment (for current opportunities)

Database – Water (16/25 votes)

- Water resource inventory before any development
- Data needed for detailed soil information as a basis for planning sustainable irrigation development
- Water management knowledge, technology, experience
- Need effective monitoring and inspection to maintain water quantity/quality
- Need to convert paper data to electronic form
- Opportunity to make maps accessible via internet

Database – Map Data (16/25 votes)

- Hydrogeologic interpretation of groundwater data
- Need groundwater exploration to better define unknown resources

- Need comprehensive groundwater reports to compliment and explain maps

4. CONSTRAINTS…WHAT CONSTRAINS US FROM ACHIEVING OUR VISION?

- Environmental concerns
- Lack of public support

Education (14/25 votes)
- Need education and understanding (i.e. media, classroom, general public)
- Enhanced water conservation initiatives
- Public awareness increase with respect to value of water to society

Political Will (11/25 votes)

Water (6/25 votes)
- We don't have sufficient water supplies to provide water on tap to every farm – even if we had limitless funds
- Assessment of potential agricultural water use if supplies were adequate
- Analysis for in-stream flow needs definition (Assiniboine River)

Planning (5/25 votes)
- Lack of integrated planning process including not only water resources but land use planning and development
- Watershed management plans – well head protection plans as part of inventory

Research and Development/Analysis (5/25 votes)
- Need to consider new/innovative water technology (treatment, recycling, distribution)
- Need more science-based discussion/analysis (less emotion)

(4/25 votes)
- Need capacity to develop 5,000 annually irrigated acres per year for the next 10 years (at least)

(2/25 votes)
- Planned, coordinated approach to water development to meet range of needs on area basis

(0/25 votes)
- Need more storage large and small dams
- Opportunity and need (need to "build on" existing water programs and initiatives Manitoba water survey – conservation district, regional water strategies)
- Put the 3 year program funding over 10 years for planning and education for both the public and politicians
- Need public-private sector consensus and action on issues and solutions

5.0 EVALUATION CRITERIA…WHAT CRITERIA SHOULD BE USED TO EVALUATE PROJECT OPPORTUNITIES?

The participants identified possible criteria that should be considered when evaluating projects competing for NWSEP funding.

- Immediacy of the economic opportunity – capture it or lose it
- Focus on realistic achievable projects
- Put the money where you will get the best economic return in the shortest time. We need to address pressing issues and opportunities now
- Good business plan for project
- Most efficient use of the presently available financial resources
- Rural areas must have as good a quality of life as their urban counterparts
- It has to address the rural "human" element – we need to retain our rural human capital in the process and water to the farm helps do this
- Project must have long-term economic return/benefit without compromising environment and quality of life
- Readiness to proceed
- Immediacy and extent of impact from money invested
- Sustainability of environment and resource base (given)
- Value of economic opportunity to enhance rural sustainability (given)
- Regional equity
- Public good versus private benefit
- Protection of resource (i.e. good siting)
- Diversification which promotes economic growth in area (criteria)
- Number of funding partners
- Owner "buy-in" (i.e. financial contribution)
- Project visibility (public awareness and understanding)
- Need to balance short-term cost/benefit with long-term cost/benefit
- Commitment to long-term funding
- Employment generation
- Realized existing economic opportunity
- Cost-effective "grass roots" initiatives – promoting things consumers/citizens can do (pollution prevention, cap abandoned wells)
- Improve/capture drainage – prevent flooding and retain for local use (small and medium scale projects)
- Where development can take place including/excluding mapping

The workshop participants were then asked to select those criteria that should be used as a basis for evaluating competing alternatives. The group chose nine criteria and determined a relative weighting that should be applied, as indicated in Table 1.

EVALUATION CRITERIA

Table 1

CRITERIA	%	PRIORITY RANK
A. Economics	12	#3
B. Promotes Rural Growth	19	#2
C. Commitment in Place (existing economic opportunity, money in place for long term O & M)	7	#6
D. Cost Sharing	3	#7
E. Project Visibility	0	#8
F. Regional Equity	8	#5
G. Quality of Life (health and safety)	29	#1
H. Public Interest Versus Private Benefit	10	#4
I. Promote Conservation of Resource	12	#3

The evaluation criteria priorities and relative weighting, beginning with the most important, are as follows:

Rank	Criteria	Weight
1	Quality of Life (health and safety)	29%
2	Promotes Rural Growth	19%
3	Economics	12%
3	Promote Conservation of Resources	12%
4	Public Interest Versus Private Benefit	10%
5	Regional Equity	8%
6	Commitment in Place (existing economic opportunity, money in place for long term O & M)	7%
7	Cost Sharing	3%
8	Project Visibility	0%

6.0 REQUIRED TO BE CONSIDERED FOR FUNDING

The participants agreed that prior to project being put forward for evaluation that certain aspects should be considered; as follows:

1. Require short-term project success
2. Criteria/planning becomes means to develop successful projects
3. Manage risks (regional drought risk analysis = priority)
4. Revisit in-stream flow needs/opportunities – Assiniboine River

It was also intended that the weighted evaluation criteria would form an integral part of the evaluation and decision making process in selecting projects for funding under the NWSEP.

In addition, there were certain desirable "wants" that should be sought after, such as:

- Access to good quality and cost – effective water supply
- Need for a stable, good quality water supply

- Water on tap for every farm in the province

7.0 PRIORITY PROJECTS – TYPICAL EXAMPLES

The participants also identified examples of what might be considered priority projects:

1. Southwest Manitoba
   - -Water development strategies
   - -Groundwater inventory
   - -Water source development (off-stream storage)
   - -Pipeline development

2. Central Manitoba (East of Red River to #10)
   - -Pipeline/distribution const.
   - -Enhanced treatment
   - -Irrigation
   - -Water sourcing (long-term)

3. South East and Interlake Manitoba
   - -Source protection
   - -Infrastructure development (pipelines)
   - -Water treatment

4. North West Manitoba
   - -Water source development
   - -Pipeline infrastructure
   - -Water treatment
   - -Source Protection
   - -Irrigation Development
   - -Water deficit/potable water (along Lake Manitoba)

It should be emphasized that there are typical projects. The evaluation and selection of a project for funding under the NWSEP should follow the considerations identified in Section 6.0 and be evaluated in accordance with the criteria documented in Section 5.0.

Certain programs, identified in Section 3.0, are essential to the long term success of this and other funding programs. The participants thought that funding needs to be allocated to the top ranked programs identified in Sections 3.0 and 4.0 and this should be concurrent with actual project funding.