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TECHNICAL REPORT

Canadian Droughts of 2001 and 2002 Stakeholders' Consultations in Ontario: Impacts and Adaptations

Adaptation and Impacts Research Division (AIRD)

Environment Canada

Prepared by: Sepideh Khairkhahi and Samuel Wahab

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Canadian Droughts of 2001 and 2002
Stakeholders' Consultations in Ontario: Impacts and Adaptations

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Executive Summary

This report documents the various methods in which Ontario agricultural producers responded or adapted to the severe drought conditions of 2001 and 2002. Nine focus group sessions with agricultural producers were conducted in southwestern and eastern Ontario during February-April 2006. A series of 10 questions were used to guide the discussions and to gain insight in Canadian agricultural practices during severe droughts.

The majority of agricultural producers were not aware that a drought was likely to occur in 2001 or 2002. During the 2001 and 2002 droughts, crop yields generally declined, with corn followed by hay, grapes, soybeans and pasture being most severely affected. Livestock herds had to be reduced. Many producers did try to adapt strategies that would protect their crops against drought such as irrigating, no tillage and other soil conservation practices.

The top three obstacles to adaptation were lack of money, government restrictions and lack of information. Participants agreed that there was no information regarding the drought years and there is a lack of accurate forecasting. Provincial programs such as the Permit to Take Water (PTTW) were problematic due to the long and costly application and approval process. There were also conflicts to allocate water between irrigators and non-agricultural water users (i.e. industries, golf courses, municipalities) during drought conditions.

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Introduction and Methodology

The nation wide droughts of 2001 and 2002 had severe impacts on agriculture, leaving many agricultural producers with enormous losses. Agricultural production dropped an estimated \$3.6 billion for the 2001 and 2002 drought years, with the largest loss in 2002 at more than \$2 billion (Wheaton et al. 2005). Alberta and Saskatchewan were the hardest hit provinces, followed by Ontario (Wheaton et al. 2005), causing grief for farmers, food producers and water resource managers.

Periods of drought can have significant environmental, economic and social consequences. Some common consequences include wildfires and disease. Lower flows in streams and rivers can increase the risk of fish dying, algal blooms, wetlands drying up and loss of habitats for wildlife birds. Drought destroys crops or stunts the crops' growth, causing lower yields and poor crop quality.

Not only did agricultural users feel the impacts of the 2001 and 2002 droughts, but so did other non-agricultural users such as transportation, recreation, tourism, etc. Due to the Ontario Low Water Response Program, created in 2000 to improve drought preparedness, voluntary water conservation measures were taken such as not washing vehicles, lawn watering bans, etc.

A nationwide project called “Canadian Agricultural Adaptations to 21st Century Droughts: Preparing for Climate Change?” is currently underway to examine impacts of and adaptations to the 2001 and 2002 droughts that occurred in Alberta, Saskatchewan, Ontario, New Brunswick, Nova Scotia, and Prince Edward Island. Although the 2001/02 drought was nationwide, these provinces were the most affected by the hot, dry conditions.

One component of this project is to undertake stakeholder consultations to understand how agricultural producers responded and/or adapted to the severe drought conditions. The consultations were with many different stakeholders, from field crops to cow calf operations. A total of nine consultations took place during February-April 2006 (Figure 3 and Figure 4) in southwestern and eastern Ontario. These regions were most severely affected by the hot, dry conditions and input from agricultural producers was invaluable.

The consultations were run using a focus group format. Provincial farmers' associations such as the Ontario Cattlemen's Association (OCA) and the Ontario Federation of Agriculture (OFA) were contacted in each county to help identify potential stakeholder participants. The association representatives contacted stakeholders individually because AIRD staff does not have access to them. Some associations declined to participate such as the Ontario Corn Growers Association, Ontario Soybeans Association and Ontario Food and Vegetable Association.

The focus group sessions were led by AIRD staff. Focus group discussions were the preferred method of inquiry due to rich responses, group dynamics and effectiveness, not to mention time and cost efficient. A series of questions were developed by AIRD staff to facilitate the discussions. The sessions were approximately ninety minutes in length and, on average, between 5 to 12 stakeholders participated in each session. The results gathered from these consultations will improve our current knowledge of Canadian agricultural practices.

Problems such as crop failures, water supply shortages and feed problems were all documented in detail to improve our understanding on current adaptation processes and options used in Canadian agriculture during severe dry conditions. The effectiveness of certain strategies and programs, barriers and irrigation technology were all issues that agricultural producers had encountered. Many crops were severely affected, but some of the most affected were soybeans, corn and hay (Figure 1 and Figure 2).

Not all regions of Ontario were affected by drought conditions in 2001 and 2002. The consultations that took place in Tweed and Douglas received too much precipitation in 2001 and 2002, making it almost impossible to plant crops. Instead, droughts occurred in 2003 and 2005 in these locations.

The decision making process for farmers is not a simple task, and certainly not so during a drought crisis. The objective of this report is to document the impacts and adaptations used by agricultural producers, but also factors that influence certain decisions.

Focus Group Discussions

1) Were you aware that a drought was likely to occur in 2001-2002?

The majority of agricultural producers were not aware that a drought was likely to occur that year. In fact, many scoffed at this question and believed it was a ridiculous question to ask. They did not hear about any drought forecasting on the radio, television, or in newspapers. Many believe that weather forecasting is unreliable, inaccurate and inconsistent thus they do not put a great deal of faith into them. Forecasting in Southern Ontario, according to one producer, especially drought forecasting, is a weakness that must be changed (Environment Canada 2006f). Producers also claim that spatial variance exists and that weather patterns are unpredictable. For example, if there is a thunderstorm on one farm, there might not be any precipitation five miles down the road.

A) Source of Information

The majority of producers agreed that there was no information provided. However, other common responses were television, radio and the Internet. Although these sources were mentioned, producers generally treat that information with suspicion because it is inaccurate most of the time. They claim that short term forecasting is more accurate and useful compared to long term forecasting. As mentioned above, the weather is localized and it is difficult to make generalizations. Even with all the technology used in forecasting, the forecasts are still wrong, according to one producer (Environment Canada 2006). The lack of information is frustrating.

B) Availability and Usefulness of Information

It was agreed that there was no information regarding the drought years. There is a lack of accurate forecasting and many said that they predict the weather themselves. The forecasts have a fifty-fifty chance of being correct and even though there is weather information available on television, the Internet or the radio, it is not useful.

2) The most affected crops from 2001-2002 drought years

Drought affects all the crops growing, producers said, but the most affected crop was corn followed by hay, grapes, soybeans and pasture. Corn is a vulnerable crop because it requires a great deal of water, so it comes as no surprise that it suffered the

most during the drought period. For those who are able to irrigate, they irrigated only high value crops and made the decision to let other crops wither.

Decreased hay yields affected livestock due to the limited quantities and poor quality. One producer had added supplements to the hay to increase the nutrient value (Environment Canada 2006f). In addition, if there wasn't enough hay, producers would have to buy it which not only involves time and transportation but, most importantly, money.

A) Strategies adopted to protect crops from the drought

Irrigation was the most popular strategy adopted to protect crops from the drought. Many producers bought irrigation systems (sprinkler, traveler, drip) and irrigated at night in order to minimize evaporation loss. Some said that irrigation was neither cost effective nor available. This was followed by minimum to no till, mulch (plastic, straw, dust) and soil conservation (good humus level, avoid compaction). Many agreed that there was nothing they could do because they were too far into the drought – by then, it was too late to protect the crops. A few producers have been experimenting with drought tolerant crops but it was the least common strategy.

B) Obstacles that prevented the use of a strategy

Money is an enormous obstacle that prevented producers from using a particular strategy. Producers would like more financial assistance from the government and to recognize agriculture as an important industry. Money was followed by lack of water, water permits and government policies.

With respect to lack of water, it does not only include the deficiency of precipitation but the conflict with other non-agricultural water users. Producers must compete with industries, golf courses, etc for access to water which puts a strain on not only themselves, but the crops as well. Urban pressures on streams have a negative effect on agriculture. Urban centers are prioritized during low water conditions which makes it very difficult for producers to compete for water.

The process to obtain a water permit is long and expensive, which frustrates many producers. It even went as far as costing one producer \$150 000 to irrigate his farm in 2003 and obtaining eight different permits in order to irrigate from the lake (Environment

Canada 2006h). One producer believes that the water permit process has worsened because there are more restrictions and regulations on water (Environment Canada 2006).

Government policies are another obstacle that producers face which include all three levels of government (municipal, provincial and federal). For example, the Department of Fisheries and Oceans requires that a certain amount of water is in a stream for fish, their spawning needs, habitat protection, etc. They preserve streamflow during a drought crisis and often, fish come before agriculture. In areas where there is heavy irrigation, fish are considered to be more important than agriculture; thus producers are restricted in the amount of water they withdraw from a stream.

C) Water Conservation Practices

Water conservation is always part of their practices and they claim to know the value of water so it is never wasted. The most common responses were soil conservation practices, very little you can do and irrigating at night.

Soil conservation practices such as minimum to no till, avoid compaction, etc. ameliorate the quality of the soil. Some producers have planted crops deeper and earlier so that the roots will be able to pull water from the soil.

With respect to livestock, there is little producers can do because livestock need water to survive. Sometimes producers are forced to buy water from municipal sources which is costly but they do not have any other option.

Irrigating at night to minimize evaporation loss was another popular practice. Other practices include irrigating less and irrigating only high value crops so it becomes economically feasible to irrigate. Proper maintenance of the irrigation system is also very important to be certain that there are no water leaks. Some producers have mentioned that the drip irrigation is more efficient than the traveler but it is expensive, which is a barrier for most producers.

D) Factors that influence the ability to implement on-farm water conservation practices

The factors that currently constrain producers' ability to implement on-farm water conservation practices are costs, government policies and lack of water. Producers have not mentioned any factors that facilitate on-farm water conservation practices.

Everything you do during a drought costs money, according to one producer (Environment Canada 2006e), such as costs of irrigation, fuel, equipment, etc. It seems that money is the largest constraint for producers, making it difficult to implement on-farm water conservation practices. For livestock producers, economics combined with lack of water create an enormous problem because livestock absolutely require water, so producers have no other option but to buy water from municipal sources. In one case, it cost \$300 per milk truck to deliver water to livestock producers (Environment Canada 2006d). It also costs money to pump water, not to mention all the regulations that come with it.

Government policies are another constraint that producers encounter such as water permits. As mentioned before, applying for a water permit is a lengthy and costly process. There seems to be a reluctance in issuing water permits and in fact, there has been a decrease in the number of water permits issued in recent years. Irrigators have difficulty obtaining water permits due to provincial government policies.

Lack of infrastructure was also noted to be a problem. In one particular case, irrigation was not possible due to lack of infrastructure and money (Environment Canada 2006h). Although those producers had access to a lake, the infrastructure did not exist and they demanded that the government provide financial assistance to introduce the infrastructure for irrigation. Due to the fact that the costs are enormous, it is not possible for producers to pay for the infrastructure themselves. However, if the irrigation infrastructure existed, producers in that region would be less vulnerable to drought, better equipped to protect their crops and conserve water.

3) Primary water source for agricultural purposes

The most common primary water sources were ponds, followed by creeks, wells and precipitation. Using ponds as a primary water source was in general adequate. The same applies to creeks and wells. Precipitation, however, was not adequate.

4) Changes in farming and practices since 2001 and 2002 drought years

Soil conservation is the most popular practice adapted since the drought years followed by no changes, planting drought tolerant crops, increasing storage supplies and buying irrigation systems.

Soil conservation is a practice adapted by most producers. It is a set of strategies used for the prevention of soil being eroded or chemically altered by overuse. Some examples include spreading manure on sandy soil to avoid wind erosion, heavier mulch cover and less tillage. Other examples are less ploughing, crop rotations and using rollers to seal the ground in the spring to retain moisture. Some even switched crops (from soybeans to corn) which produced a good yield. For livestock producers in particular, they always made sure that they had extra hay and feed in case the hay yield was not enough to feed the livestock. This extra hay was either bought or borrowed, but it was essential that the livestock do not go hungry.

Some producers decided to increase their storage supply by digging deeper ponds, digging wells and irrigating from ponds. This method of storing water is an adaptation that makes those producers less vulnerable to drought and ensures that they will have some water available.

Many producers bought irrigation systems. Although this is a big investment, it is necessary, some producers argue. Several producers increased the number of pumps and set it up earlier in the year or pumped longer (instead of pumping for eight hours a day, they pumped ten hours a day). Changes were made to the irrigation systems to conserve water or some did not irrigate at all because it did not justify the return of the crops.

A growing trend in Canadian agriculture is to buy crop insurance. Several producers do more forward contracting, which is selling crops in advance, even before they have been planted. This ensures that the producer will be compensated. Others have bought crop insurance for the first time or have increased their coverage so that they are protected and will be compensated even if the crops do not grow or produce a poor yield.

5) Obstacles to adaptation that were difficult to overcome due to drought

The top three obstacles to adaptation were money, government restrictions and lack of information. Money was the major obstacle that producers encountered. Without any yield, they cannot earn money. The costs of irrigation are not justified by the crop return so some irrigators have stopped irrigation on their farms. Producers are not able to afford new equipment so their crops suffer as well as the overall efficiency and productivity of the farm.

With respect to government restrictions, producers feel that water permits in particular are difficult to apply for. The Ministry of the Environment does not issue them easily. There are many forms to be completed and it does take a while to actually obtain a water permit and by that time, the crops might have already suffered the effects of the drought. For example, irrigators in the Long Point Region Watershed have difficulty obtaining a water permit even though that watershed has more permit holders than anywhere else and is designated as high use (Environment Canada 2006a). There are also environmental restrictions that producers must comply to such as the regulations put forth by the Department of Fisheries and Oceans (DFO). For example, as mentioned before, the DFO requires a certain amount of streamflow for fish and their needs. Producers cannot withdraw any water below that streamflow threshold for their purposes due to DFO regulations.

By the time you realize you are in a drought, it is too late, according to one producer (Environment Canada 2006). Indeed, many producers share this sentiment and are frustrated, discouraged and disappointed by this lack of information. They do not find the long term forecasts useful because they are usually incorrect. They claim it is difficult to find information about the water table for irrigation purposes. Producers, particularly irrigators, would like to know the water table levels in their area in order to manage their water resources efficiently and effectively.

Another concern was that Canadian producers cannot compete against crops that are imported from elsewhere. American producers are subsidized for everything; from crops grown, water and they are compensated even though their crops did not grow. Canadian producers feel that they should be subsidized as well and treated in the same manner as their American counterparts. Consumer demand is another issue. In general, Canadian crops are smaller than American crops. So, for example, if a consumer had to choose between a small plum and a large plum, clearly they would choose the larger produce, which has negative consequences for that Canadian producer.

Not only must producers compete with foreign produce and drought, they must also battle against Bovine Spongiform Encephalopathy (BSE), otherwise known as Mad Cow Disease. Livestock producers, particularly cow calf operations, were affected negatively when the United States closed its border to live cattle and beef imports in May

2003, when the first case of BSE was discovered. The move devastated the Canadian industry. The American ban has cost the Canadian beef industry an estimated \$5 billion (CBC 2005).

6) Same or different approaches if you could do things over again?

The majority of producers stated that they would not make any changes if they were to do things over again. Others were divided between quitting farming and soil conservation methods.

There were many soil conservation changes producers would have done if they could do things over again. Soil conservation changes include changing tillage practices, conserving moisture in the soil, planting different crops (organic crops instead of crops sprayed with herbicides) and crop cover. Several producers claimed that they would not have planted anything because the costs of planting were not justified by what they received in return. Others would have collected precipitation and stored it if they were aware of a drought.

Another popular response was to quit farming altogether. Some producers claimed that they would move to another country such as the United States because they guarantee water for farmers and they appreciate farmers. There are too many restrictions in Canada and others would have changed careers. According to one producer, if he had known that a drought was approaching, he would have quit farming because it is a downhill battle (Environment Canada 2006f). For example, a box of Kellogg's cornflakes costs \$4 but the producer only receives 8 cents of it (Environment Canada 2006f). The producer is not being fairly compensated for his work.

7) Irrigation technology

The majority of producers do not irrigate, but the handful that do have different irrigation systems such as drip, traveler or sprinkler.

Many producers prefer the drip irrigation technology because it is effective and efficient. It requires less water and does not lose any of it. However, it is expensive which is why not many producers possess one, but those who do are satisfied with it. If grants were available, declared one producer, then many would acquire the drip irrigation system (Environment Canada 2006h).

Other producers have added more equipment to their irrigation systems or have changed from a small sprinkler to a larger one to cover more area. Some did not irrigate at all because the costs were not justified by the return.

Many irrigators irrigated a long time without water permits and then finally obtained one. They feel that they are unfairly targeted and penalized compared to irrigators without water permits at all. The process of obtaining a water permit also takes a long time which is another reason why many irrigators do not apply for one.

8) Programs that would increase on-farm water availability or decrease vulnerability to drought

The majority of producers are not aware of any existing programs that would increase on-farm water availability or decrease vulnerability to drought. Others were able to name a few such as the Canada Ontario Environmental Farm Plan (EFP), Canada Ontario Water Supply Expansion Program (COWSEP), Conservation Authority (CA), Alternate Land Use Services (ALUS) and last but not least, Irrigation Advisory Committee (IAC). Producers stated that most of the existing programs are targeted towards environmental conservation rather than water supplies (Environment Canada 2006f).

EFP is a federal program run by Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) in partnership with Agriculture and Agri-Food Canada (AAFC). The purpose of EFP is to improve environmental conditions on farms. Producers who are interested or concerned about environmental factors on their farms such as fuel storage, pest management, soil management, etc, complete a voluntary assessment (Ontario Ministry of Agriculture, Food and Rural Affairs, 1998). An action plan is then developed, which is completed by the producer based on their priorities with technical assistance provided by OMAFRA (Ontario Ministry of Agriculture, Food and Rural Affairs, 1998). They consider new farming methods that will decrease the risks to the natural resources. According to one producer, EFP grants some money to new wells (Environment Canada 2006c).

COWSEP is a program run under the National Water Supply Expansion Program (NWSEP). Its objective is to provide assistance to the agricultural community in Ontario to help reduce the risk of future water shortages, and to meet the daily needs of the

agricultural sector (Agricultural Adaptation Council, 2004). It is a new federal program designed to expand water supplies and, stated one producer, grants up to \$5000 to dig a new pond or well (Environment Canada 2006a). However, some producers declare that it is difficult to apply and it is a long process. One producer pointed out that one must apply before digging the pond which is not effective because it might be too late (Environment Canada 2006a).

ALUS is an ecological goods and services program proposal that is unique because it's designed by farmers, for farmers (Delta Waterfowl, 2006). It compensates farmers for preserving wild habitat that may exist on their farm, such as a wetland. There are many benefits such as improved farm income, improving soil and water quality, sustaining rural communities, etc. This program is still a proposal and does not exist yet. ALUS pilot project proposals have been written for Manitoba and Ontario and funding will be sought to initiate these projects.

9) Effective programs to determine water availability and incentives for voluntary water conservation/availability standard

The most popular response was government financial assistance, followed by information about water resources in the area and already conserving water. Producers would prefer provincial or federal financial assistance for programs or local agricultural communities. Administering local programs would be beneficial, as was the case with the Norfolk Water Supply Expansion which was a successful \$4 million program that ended three years ago (Environment Canada 2006a).

They believe that self-regulation is a much more effective method of conserving water (such as IAC). It is a farmer friendly water management technique, according to one producer, rather than the government which is similar to an enforcement vehicle (Environment Canada 2006a).

They have also expressed a desire for reasonable regulations or guidelines instead of strict laws that penalize producers. Less government interference is a desirable change and one producer angrily expressed that no one takes producers seriously anymore (Environment Canada 2006c). There are too many limitations on their agricultural operations, thus their farm incomes are suffering.

Information about water resources was the second most common response. Information on aquifers for irrigation or some type of water program to help locate water (geological information) for irrigation would both be very useful because producers would be able to manage their water resources efficiently and effectively.

Some producers stated that they already conserve water and have been doing so as long as they have been in agriculture. They value the importance of water and do not waste it. They believe water conservation should be an issue raised in cities rather than farms because, of course, cities have a much higher water consumption than necessary. As water demands increase, especially during dry, hot conditions, cities will be prioritized instead of the agricultural community. As one producer stated, water has become more precious than fuel (Environment Canada 2006f).

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies are available for all agricultural producers in a sub-watershed, particularly during drought conditions?

The majority of producers declared that they would not consider a voluntary water availability standard. Many did not understand the question and questions such as “What does voluntary water availability standard mean?” were posed. As mentioned before, producers believe they do not need this because they already conserve water and ensure that there is enough water for all other producers. For example, they take turns pumping water along the stream and make sure there is enough for the producers downstream. Participants mentioned that that was the whole purpose of an Irrigation Advisory Committee (IAC) – to coordinate, educate and mediate water distribution amongst farmers.

Producers believed that with this new water availability standard, there would be too many controls put forth by the government. They do not wish to have the government interfering anymore with their agricultural operations and feel taxed enough as it is with all the water policies.

The few that would consider this water availability standard stated that only providing producers get first priority before golf courses, people watering cars, etc. Others affirmed that it would have to be mandatory and monitored, otherwise people will compete and the voluntary system would not work. An interesting point was raised by

one producer who stated that it would be difficult to decide how much water to allocate per person. For example, are certain people going to have a higher priority when it comes to water? Are fruits more important than livestock or vice versa? (Environment Canada 2006h).

Conclusions

Many agricultural producers were unprepared for the nationwide 2001/02 droughts. Crop yields declined, and livestock herds had to be reduced. Many producers did try to adapt strategies that would protect their crops against drought such as irrigating, no tillage and reducing seeding rates.

Economics and government policies were the two major obstacles encountered when it came to adapting other strategies. Government policies such as water permits were always a nuisance due to the long and costly process.

In order to reduce Canada's vulnerability to drought, Canada must expand and enhance the current drought monitoring network. Armed with that knowledge, producers will be able to efficiently and effectively manage their crops and livestock in the event of another drought.

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Appendix

Focus Group Questions

- 1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?
 - A) What was the source of the information?
 - B) Was the information readily available and how useful was the information?
- 2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?
 - A) What strategy did you adapt to protect your crops from the drought?
 - B) Were there any obstacles you encountered that prevented you from using a particular strategy?
 - C) Were water conservation practices part of your adaptation practice? If yes, please specify?
 - D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?
- 3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?
- 4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?
- 5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?
- 6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches?
(methods or techniques)
- 7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?
- 8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

**Stakeholders' Consultations, Chatham, Ontario
Meeting held on March 23, 2006 7:45pm-9:00pm
Ontario Cattlemen's Association
Kent County- county level
Directed by Samuel Wahab**

**Notes taken by Sepideh Khairkhahi and Allan Truong
3 farmers attended, including the director for the Kent county Ontario Cattlemen's
Association**

**Crops include: Tomatoes, sweetcorn, soybeans, pasture, wheat, hay, processing
peas, cauliflower, black tobacco, alfalfa, oats, carrots, beans**

Other: Cattle

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- Doesn't put faith in information, can't rely on information
- Did not expect a drought, expecting something different in 2002 after the 2001 drought
- Much more cautious in 2002 because of what happened in 2001 (2001 was totally unexpected)
- No information in 2001
- No, not a lot of information
- With all the technology the forecast is still wrong
- Doesn't put faith in long term forecasts
- Lack of accurate short term and long term forecasts
- Don't depend on forecasts because investments would be made and since forecasts are inaccurate, investments would not be made

A) What was the source of the information?

- N/A
- No useful information
- Find it fairly easily on websites

B) Was the information readily available and how useful was the information?

- Radio, weather network
- DTN (Data Transmission Network)
- Environment Canada, weather reports from the United States
- Country Guide, Farmers Almanac
- They pay attention to Detroit's forecast although it's not reliable

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Corn, alfalfa, grass, hay, pasture
- Beans were more affected than corn in 2002

- However corn was severely affected in 2001
- Pasture for both years
- Tomatoes not as affected as corn

A) What strategy did you adapt to protect your crops from the drought?

- Changed tillage practice to no till to conserve moisture
- Doing tillage at night in 2002 because it didn't dry out as quick
- Packed the ground down
- Reduce cultivation during season
- Reduce stocking area
- More cover crops to conserve moisture
- Less cattle on pasture
- Spraying pesticides and fungicides on vegetable crops at night to reduce heat stress
- Plant earlier to get moisture instead of waiting for the ground to warm up
- Waited longer to plant so roots can go deeper into the soil and not be reliant on moisture
- Rotated pasture more frequently
- 2001 – irrigated vegetable crops
- Not cost effective to irrigate field crops
- They are still using these strategies

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Irrigation is neither cost effective nor available
- Livestock management vs. crop management, need to have both to have it work well
- Availability of water to irrigate
- In 2001, it was a long process to obtain a water permit and by the time he would have received it, it would have been too late for the crops. Presently, the problem regarding water permits is worse because there are more restrictions and regulations on water

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- Yes, conserved water in plants
- Less cultivation, low tillage, packing soil
- Can't conserve water for livestock
- Cover crops, reduce till
- Irrigate at night to minimize evaporation loss

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- Money- every change in irrigation equipment costs money
- Can't afford to put money into it

- Too late to change equipment once drought starts
- Lack of information

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Deep well
- Wells (not good for irrigation but drinking water)
- Drinking water for livestock but not good enough for farming
- Pond (dried up), creek (almost dried up)
- Monitoring water to make sure it's enough for livestock
- River and deep wells not adequate
- No reservoir or storage
- Bought water – expensive but adequate

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Changed to no till in 2005 – things learnt in 2001/2002 helped him through 2005 drought to some extent
- Same practices adapted in 2002 were used during 2005 drought
- Frequent pasture rotation after 2001-2002 drought
- 2005 not as dry but rain is critical at appropriate times
- More forward contracting crops (50% of crops) – selling crops in advance even before it's been planted
- Crop insurance...also used to purchase what was contracted out as futures if they can't produce enough

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- Lack of water
- Lack of information – by the time you realize you're in a drought, it's too late to do anything
- Economics
- Hard to get equipment right away (costs)
- Eliminate some red tape to irrigate more quickly
- Put more value in crops to invest in irrigation
- Too much red tape...measures would be done 6 months from now instead of right away
- Difficult to find information about water table
- Information on water table for irrigation

6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches? (methods or techniques)

- Not sure if there's any other option, no alternatives due to lack of information, technology/research but wouldn't change his methods
- Would not have planted anything – costs more to plant than what they receive in return (part time farmer)
- Happy with practices, but would have done things earlier

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Didn't irrigate in 2002 or 2005 because it costs more than what he got in return – not efficient

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- No
- Environmental Farm Plan - cleans out existing ponds to put more water in, install new ponds
- No

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Some type of water program to help him locate water (geological information) to find a water source to irrigate
- Ponds and reservoirs that hold water should be made more accessible to everyone (public access) and should be managed somehow by the government, private sector, farm organizations, stakeholders, etc.

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- Voluntary system won't work because people will compete
- When water is needed people will use it (downstream vs upstream)
- **Has to be mandatory and monitored**
- No wouldn't work
- It would be difficult to decide how much water to allocate per person (for example, who has priority livestock vs. crops)

(Environment Canada 2006)

Stakeholders' Consultations, Delhi, Ontario
Meeting held on March 9, 2006 1:30pm to 3:30pm
Big Creek Irrigation Advisory Committee (Norfolk County- county level)
Directed by Samuel Wahab
Notes taken by Sepideh Khairkhahi
8 farmers and 1 Long Point Region Conservation Authority attended
Crops Include: Ginseng, grain, tobacco, fruits, vegetables

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No, were not aware
- Informed it was a wet year (2001) by media and Environment Canada
- Ginseng farmers are aware of moisture because too much can affect the ginseng
- Two dry years (1998-1999) raised concern
- Information not reliable (i.e. weather forecasts by Environment Canada)

A) What was the source of the information?

- Nothing was available
- No information – nobody knows what the weather will be like in one year, two years
- Geographic variance
- Lack on information

B) Was the information readily available and how useful was the information?

- Weather channel, satellite maps
- Department of Fisheries and Oceans - no accurate studies for forecasting weather
- Email, Environment Canada website for Delhi and Simcoe – 5 to 7 day forecast by Environment Canada is useful and accurate, but not the long term projections
- Short term information accurate, long term information not accurate
- No farmer would have believed that a drought was going to occur in 2001 because the weather changes drastically
- Provincial government (Ministry of Natural Resources)

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Drought conditions affect everything growing (all crops that were planted)
- Tobacco
- High value crops most affected
- Corn and beans were not as affected as other crops
- Rye, corn and soybeans most affected
- Irrigate only the high value crops

- Without irrigation all crops are affected

A) What strategy did you adapt to protect your crops from the drought?

- Irrigate
- IAC organizes water use and coordination of activities – farmers cooperated during drought period and maintained water levels in Big Creek
- Chemical follow, no till helps to retain moisture
- Mulching for strawberries
- Plastic and straw mulch
- Reduce seeding rates

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Ontario Ministry of the Environment and Ministry of Natural Resources policies – if everyone were to irrigate in the evening (as per policy), then the water table would go down
- Coordinated their water activities – some irrigated at night, some in the morning
- Water supply expansion to hold more water for the summer
- Inadequate equipment, economics (money, cost restraint), inadequate water supply
- Lack of water – long time to recharge- water supply expansion
- Coordinate water activities with the environment (habitat, wildlife, etc)
- Conflict with other water users (not agricultural users)

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- Yes, irrigating at night in low wind conditions, conserving water
- Irrigated less (every ten days instead of weekly)
- Irrigated at night
- Gave up some crops and only irrigated high value crops
- Proper maintenance of irrigation system
- Switching from travellers to undershade on a larger scale – big investment

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- Money, economics
- Farmers have been selling crops for less than their actual value
- Uncertainty in water regulations
- Water permits have been cut back, government intervention on how much water can be used
- Reluctance in issuing water permits
- Cannot get water permit

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- 3 ponds
- one pond and irrigate out of creek
- pond is adequate and Big Creek (however when Level II or III are announced, there are restrictions)
- dug out ponds (some are adequate and some are not), deep wells
- ponds, Big Creek, Big Otter Creek, Horner Creek and wells
- 2 dugout ponds (one is a giant clay hole and the other is fed by spring runoff) that are both adequate
- Big Creek and its tributaries

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- No growing tobacco, but only fruits and vegetables and no irrigation in 2005
- Equipment changes, enlarging ponds
- Did not irrigate because of economics (did not justify the return of crops)
- Heavier mulch cover to maintain higher soil level for ginseng
- Highest producing crop in 2005 was ginseng
- Changed irrigation system to conserve water
- Increased equipment since 2001/02, more ponds, more pumps, more mulching for ginseng over last few years
- Crop loss in 2001, increased pond size
- Prediction: On average, there will be less irrigation in 2006 because there is no justification (dollar wise) for the cost of irrigation
- Increasing storage supply is the only way to react – dig deeper ponds, dig wells, irrigate from ponds

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- drought of 2001-2002 - government legislation, no money
- drought of 2005- economics, government legislation
- government restrictions
- Ontario Ministry of the Environment won't issue water permits
- An example of that is the sweet potato ethanol plant that could not get a water permit when it tried to use municipal water
- Delhi is under a moratorium
- Water permits are difficult to apply for, form has changed
- Ministry of the Environment reluctant about water permits – even though Long Point Watershed has more permit holders than anywhere else and is designated as high use
- Farmers draw negative attention to themselves when they apply for water permit – suspect that some people are irrigating without permit
- There should be more water permits because of the farmers compliance
- Environmental restrictions – Department of Fisheries and Ocean

6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches? (methods or techniques)

- Move to another country, such as the United States because they guarantee water for farmers, they appreciate farmers
- Too many restrictions in Canada
- No won't do things differently, hasn't influenced thinking
- Would not change anything
- Would not get water permit because people with water permits are penalized
- Expand pond

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Changed irrigation system, saves money
- No changes
- Stopped using overhead and bought a drip system for new crops but that change is not drought related, more business related
- Prior to 2001-2002, did not need a water permit but now you do
- Irrigated a long time without a water permit then applied for one
- Took a long time to get a permit so no one applied for one

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Some water supply programs but don't offer a lot of money
- Canada Ontario Water Supply Expansion Program (COWSEP) which is a new program designed to expand water supplies and grants up to 5000\$ (federal money) to dig a new pond/well, etc
- However, it is difficult to apply, and there is either slow or no response
- Don't know a lot of programs
- Alternate Land Use Services (ALUS) compensates farmers for doing good (ie. If a farmer has a piece of wetland on their property and they restore it or preserve it, he/she will be compensated). This program, however, is still a proposal, it does not exist yet
- National Water Supply set up in Saskatchewan does not meet the needs of Ontarians
- Farm Stewardship (federal money)
- COWSEP – must apply before you dig a pond which is not effective

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Less interference and more financial assistance
- Self-regulation (such as the IAC)- farmer friendly water management

- MNR and MOE is like an enforcement vehicle – they enforce policies whereas local enforcement is better (with a ****nudge nudge wink wink**** things can be solved)
- IAC manages permanent funding for farmers which works well
- Financial assistance – long term funding for local communities
- Administer **local** programs such as the Norfolk Water Supply Expansion which was a successful, \$4 million program that ended 3 years ago
- Provincial funding, no federal government funding
- Free engineering and hydrologist specialists came to farms and assisted farmers in British Columbia and Alberta. They made a water budget, assisted with water planning and proper water management

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- **There was a lot of confusion regarding this question**
- **Who is setting the standard? Narrow the question down – what does “voluntary water availability standard” mean?**
- IAC motto is coordinate, educate, mediate – they come up with the best ways to handle water because farmers sit in on the IAC
- IAC, self regulation to avoid intervention by government

Other Business

Discussion about the letter sent explaining the purpose of the project, the need for consultations, etc. Regarding the pilot watershed in the Grand River Basin, some members of the IAC were a bit upset that Big Creek was not chosen. They claim that the Grand River has a larger supply of water but doesn't have as much usage as Big Creek. Crops demand irrigation in the Big Creek watershed and there is a larger agricultural diversification in Big Creek. They would want the program to be farmer friendly and not intimidate farmers. Some did not want Big Creek chosen as the pilot project because of the high water usage, there might be additional restrictions imposed. Somebody else claimed the government was wasting a lot of resources – 4 members of the Big Creek IAC went through a similar meeting in Guelph for Agriculture and Agri Food Canada but nothing is being accomplished.

(Environment Canada 2006a)

**Stakeholders' Consultations, Douglas, Ontario
Meeting held on April 24, 2006 7:30pm-9:00pm
Ontario Cattleman's Association
Renfrew County- county level
Directed by Samuel Wahab
Notes taken by Sepideh Khairkhahi
4 farmers attended, including the Renfrew County director of the Ontario
Cattleman's Association
Crops include: hay, pasture, alfalfa
Other: cow calf**

**1997 and 2005 were severe dry years for them but they were also affected by the
2001-2002 drought**

**1) 2001 and 2002 were the most severe drought years across Canada and impacted
the agricultural sector negatively. Were you aware that a drought was likely to
occur that year?**

- 1997 and 2005 were severe dry years for them but they were also affected by the 2001-2002 drought
- No, didn't know ahead of time and didn't know it can be predicted – information not available
- Drought forecasting unpredictable, doesn't put a lot of faith in it
- 2001-2002 were somewhat dry conditions but 1997 was a severe drought and 2005 was pretty close
- no
- 2001 was dry but didn't impact pasture too much – 1st cut was ok

A) What was the source of the information?

- Treat information with suspicion since it's inaccurate
- No information
- Forecast weather yourself
- Canadian Military base runs models for the weather although it is unreliable
- For this summer, hasn't heard if it's extra wet/dry in farm newspapers
- Short term information more accurate, more useful

B) Was the information readily available and how useful was the information?

- Internet, Canadian Military base, looks at forecasts for other communities that are 5-6 hours away
- Internet, local weather stations
- Internet (2x) for short term weather

**2) From your experience of 2001 and 2002 drought years, which crop(s) was/were
the most affected by the hot, dry conditions?**

- Strong 1st cut of alfalfa but 2nd cut was poor in 2001

- 2002 had a 2nd cut of alfalfa
- 2nd cut pasture was poor
- Grass, alfalfa, hayfields, pasture

A) What strategy did you adapt to protect your crops from the drought?

- Supplement cattle with hay harvested for winter. Fed it in August but you're not suppose to until November
- Sold a large part of his herd because he couldn't support them
- Fed cattle earlier in the year
- Spread fertilizer earlier before 2nd cut

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- No
- Hay prices increase- cost of replacement feed
- Irrigation is impossible – too many acres and limited water
- no

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- Has reservoirs and pumps it with solar energy for cattle
- Put on farm ponds and reserves for cattle but it's hard to conserve water for cattle
- No
- 2 wells – 1 for the cattle and 1 for the house

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- Healthy animals come first – they can have all the water they need
- None
- Sometimes he knocks down beaver dams for his cattle to get some more water but that didn't work in 2001
- Economics
- Some government regulations about cattle in streams which is one reason why they retire cattle from streams

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Cattle have a well which is adequate
- Two creeks that flow through the farm and he pumps it – adequate
- Streams and wells are adequate
- Drill well, watering system (stream fed), beaver dams
- Stream and storage reservoir are both adequate

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Since 1997, he has bought crop insurance to insure hay and pasture fields. He has increased his level of coverage so he's protected and can afford to buy feed.
- Increased fertilizer application to promote initial growth. It is water soluble and he puts it on earlier in the year (early June) so that it will dissolve into the ground
- Purchased more feed and crop insurance
- Cut earlier (June 15) and 2nd week of August. He cuts earlier, cutting season is up two weeks and he applies fertilizer

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- One side of the county was drier than here (approx. 25%)
- Farms differ geographically
- Predicting weather

**6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches?
(methods or techniques)**

- If he knew back then what he knew now, he wouldn't have started farming
- Put pile drain in for proper drainage instead of buying a new tractor
- Change very little
- Wouldn't get into farming (Mad Cow Disease)
- "Red sky at night, sailors delight" these old sayings were very good for predicting weather
- if you just look outside yourself, you can predict the weather more accurately than professionals
- Extra cattle on hand to send to market earlier so he's not short on feed and increase crop insurance if he knew there was a drought coming
- In 1997, he sold cattle to the market and downsized the herd rather than buy a lot of expensive feed

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- N/A

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Ducks Unlimited which is a program that conserves water and creates wetlands for animals.
- Wildlife Habitat Canada – wetland habitat fund that creates and protects wetlands
- Environmental Farm Plan
- Bonnechere Watershed Project- water quality and conservation

- Renfrew County Stewardship Council (there is one in every county)
- Conservation Authority
- There is another program that covers 50% of the cost of trees that you can plant near streams to allow the water to go slowly seep into the ground. It is run on provincial and federal funding

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- More funding available for programs (2x)
- Difficult to afford some programs especially because of Mad Cow Disease
- There is a quarry on French Hill that has undergone an environmental review and if it turns into a dead lake it could affect water levels

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- Wrong county to ask this question
- No, wrong direction, too many controls. They don't want the government meddling anymore, definitely against it
- Careful enough as it is – farmers are very careful with water and know the value of it
- Cows drink a lot of water but it's all recycled. Cattle excrete on the pasture which helps fertilize crops and they are not using as much water as we think.
- Do not want meters on wells, dead set against that
- Do not meter water!

Other Business

- Net drought condition since 1997 – rainfall is not adequate and groundwater levels are receding
- Lake Superior low mark has receded 4" and the Hoover Dam in Nevada is down 8 feet of water
- Could alter farming practices if they knew drought was coming
- Crop insurance is controversial, only 50% of farmers have insurance. If the program was better than more farmers would buy it
- They have a permanent cover on the ground (like a mulch) to conserve water
- Conserving soil as well and having a permanent cover crop helps

(Environment Canada 2006b)

**Stakeholders' Consultations, Paris, Ontario
Meeting held on February 15, 2006 7:00pm-8:30pm
Brant County - county level
Ontario Cattlemen's Association
Directed by Samuel Wahab
Notes taken by Sepideh Khairkhahi
9 farmers attended, including the Brant county president for the Ontario
Cattlemen's Association**

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No, were not aware
- Not a lot of information was given out (ie newspapers)
- Do not believe warnings; they claim they are unreliable, inconsistent
- Weather forecasts do not relate to their county
- Maybe later on (few months after drought commenced) dry conditions were announced

A) What was the source of the information?

- No source of information since no information was provided
- Most problems are localized, making it difficult to generalize (for example, there might be 10mm of precipitation in one region, but no precipitation in another)
- Thunderstorms, etc are localized so cannot make broad assumptions

B) Was the information readily available and how useful was the information?

- No information was provided
- All information was short term, no long term information

A question that was asked was "Can we predict a drought?"

They were skeptical that a drought can be predicted

- **We moved off topic as they discussed the 2005 drought. Some comments were:
wasn't accurate information and the French weather forecasts (issued by Environment Canada) are useless because they do not understand French. Ever time the weather forecasts came on in French (on radio), radio was switched off. They claimed there is a language barrier and requested that French weather forecasts be stopped. Although it was pointed out that bilingualism is an important aspect of Canada, he said he did not care and wished to hear the weather forecasts in English.**

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Drought conditions affect everything growing (all crops that were planted)
- Corn went down 25 bushels/acre
- All droughts are different
- Pasture was dry and hay crop was affected
- Decreased hay yield (2nd cut yield) because there was no rain. This decreased hay yield affects the hay for the animals. However, hay must be bought to feed animals so this is another hassle involving transportation, extra time and most importantly, money
- There was cattle heat, so more open cows

A) What strategy did you adapt to protect your crops from the drought?

- No irrigation
- Watered cows
- Change in herbicide
- Drought tolerant corn was planted
- Nothing you can do
- Corn was dying (June 14, 2001) but then it rained and there was good corn
- Some figures were given for precipitation in that region in 2001 (see table below)

Months (2001)	Normal amount of precipitation (mm)	Precipitation received in Brant County in 2001 (mm)
May	78	104
June	82	51
July	85	6
August	80	82

- Depends when you receive rain relative to the crop planted
- Stream was bone dry- hauled water from dugouts (has never seen stream dry in his entire life)
- Necessary to do something- pasture was dry
- Planted oats in wheat field- good pasture
- Drew water, dug pond near stream
- Bought irrigation system (first time he has ever irrigated)
- Pumped water into well to recharge aquifer

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Permit to take water for irrigation
- Cost (money issue)
- Fields are irregular shapes- barrier
- Value of crop (is it worth it?)

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- Always part of their practices, never waste water
- Most water consumption is for cattle, not much room for changes because you have to give water to animals
- Work the ground, conserve water
- Very cautious about letting cultivated land dry out

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- **** Water costs money to pump it ****
- **** Regulations** (government policies)**
- not allowed to do dugouts
- creek is available
- store water (from precipitation)
- collect water in tanks from roof

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Drill well for cattle, rain for crops
- Draw water, pond for cattle
- River (city)
- Wells
- Cistern, ponds
- Creek, rain collection
- Dugout ponds
- Water supply sources were adequate but well levels do change and it costs money for water

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Equipment already prepared from the 2001/02 drought
- Make sure you have feed in case hay runs out
- Kept same practices
- Spread manure to save soil from blowing away (i.e sandy soil is easily blown away – wind erosion)
- More acres of hay for animals
- **Conflict with provincial regulations and current tillage regulations**

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- **Fishery and Oceans fish regulation**
- Fish come before agriculture

- Areas where irrigation is heavy, fish are considered to be more important so water is conserved for them

**6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches?
(methods or techniques)**

- Do the same things (can't predict a drought)
- If you could predict a drought, grow different crops
- Cut hay at different times if you could predict precipitation
- Change tillage practices, conserve moisture if you knew drought was coming
- Reduce livestock
- Buy a generator

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- N/A
- Do not irrigate
- Used sprinkler irrigation system for the droughts of 2001/02 but not 2005

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Conservation Authority – supported by federal gov't to ensure adequate water supply
- Preserve streamflow for fish
- **** Farmers aren't taken seriously, too many limitations ****
- Tobacco farms are given more focus, more privileges, wells are given to them to irrigate, but not for cattle farmers
- Environmental Farm Plan (federal program) has some money for wells, 33% grant for new wells

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Information on aquifers (irrigation)
- Drill wells in one spot
- No hassle for water (flexibility) in severe conditions
- Reasonable regulations
- Guidelines, instead of strict laws
- Cannot conserve water, cattle need it and so do people
- Water conservation in cities, not on farms
- Raise hydro prices in cities so people become aware and conserve water

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- Committee divides water resources (creek)
- Control amount of water to ensure no arguments break out between farmers
- Groundwater is regulated
- Same regulations should be applicable to everyone (industries, etc)

(Environment Canada 2006c)

Stakeholders' Consultations, Schomberg, Ontario

Meeting held on March 20, 2006 7:30pm-8:45pm

York Region - county level

Directed by Samuel Wahab

Notes taken by Sepideh Khairkhahi and Allan Truong

**5 farmers and one Ontario Federation of Agriculture regional representative
attended**

Crops include: carrots, onions, tomatoes

Others: dairy, sod and trees

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No wasn't aware but expects to have a drought every year
- No, not at all
- No, no warning
- Weather forecasts are not accurate – doesn't believe in drought forecasts

A) What was the source of the information?

- Information is always out there – TV can be useful depending on where you are located (geographic variability)
- Radio, TV, weather forecasts but again there is spatial variability
- We don't have climate, have weather
- Radio
- Weather network but only for short term forecasts not long term
- Do not rely on information from Environment Canada
- Able to only plan a few days ahead
- Don't really rely on weather from Environment Canada, look at weather network (short term focus for weather)

B) Was the information readily available and how useful was the information?

- Weather network (TV), radio
- For long term weather, they use 'The Ontario Farmer' newspaper
- Mostly radio, some TV
- Mostly radio, weather network, but checks the internet if there is a chance of precipitation
- News
- Subscribed network DTN (Data Transmission Network), newspaper, radio

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Soybeans, barley
- Trees- Mature hardwood bush (70-80 years old). The effects of drought show up on the leaves, they color much earlier than they should and experience crown die

back. This is a long term effect and his trees are not nearly as healthy as they should be.

- Effect of drought shows at end of the year, colours mature quicker and therefore affects value and future health.
- Sod
- Carrots

A) What strategy did you adapt to protect your crops from the drought?

- Irrigate in the evening to minimize evaporation loss
- Cut back on fertilizer
- Grow crop varieties that are drought resistant
- Turn off radio – stop listening to politicians
- Rollers to seal ground to retain moisture
- Harvesting mature trees at the wrong time would be devastating therefore other methods to maintain value would be to trim bushes and harvest at a later date

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Demands on water, adjust farming practices
- Limits on water
- Cut back on fertilizers
- Would not spread manure because too much will burn crops

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- No, doesn't irrigate
- N/A
- Digging ponds to store water for low water conditions
- Water less often but deeper – saturate roots because they are deep, depends on crop

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- Nothing except costs of irrigation
- Urban pressures – pressures on streams
- Urban centres are prioritized during low water conditions – there is competition
- Golf courses are using a lot of water so milk trucks are filled with water and distributed to livestock farmers (300\$ per truck)
- Proposed landfill site (artesian site) that involves upward gradient. If the proposal goes through, all farmers in those areas MUST prove that their irrigation practices would not affect the upward gradient pressure ie: must spend money on studies

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Groundwater is very adequate

- Artesian flows very adequate
- Rivers and storage ponds (4 ponds)
- Innisville (3 locations), Nottawasaga, 5 pivots, Schomberg River West Branch
- Schomberg River West Branch adequate in 2001-2002 but 2005 was not adequate

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- More careful of what crop varieties to grow
- Rollers used to seal ground during spring to retain moisture
- No changes
- Cover crops such as onions to retain moisture, use a variety of crops (diversify)
- Economic pressures, tries to minimize irrigation, tries to pick crop varieties that are drought tolerant
- Be more pro active, bought more irrigation equipment (pipes) and set them up earlier
- Drought tolerant crops

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- Concern about government policies – competition with other farmers
- Pulling contaminants onto property with irrigation
- Costs of irrigation are not justified by crop return
- Availability of water – on going crisis which will only get worse
- Will adapt to crisis – whatever needs to be done
- Tighter margins (high demand but low availability due to lack of water)

**6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches?
(methods or techniques)**

- No changes – building ponds was expensive but worth it during drought
- No, you learn from every mistake
- Crop cover, rollers
- No till

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Same pumps and tractors but has changed the small sprinkler system to larger one to cover more area
- Irrigate late afternoon instead in the morning to minimize evaporation loss
- Owned pivots and travelers before the drought but added more equipment after drought
- N/A

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Yes but doesn't know offhand
- Canada-Ontario Environmental Farm Plan
- Hasn't looked into programs
- Conservation Authority
- Doesn't believe it's there, not easy to locate
- Up to government to do some smart planning in communities with a strong agricultural background
- Not a priority
- Should be doing smart planning...instead of thinking how farmers affect growth, should be thinking on how growth affects farmers

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Economics
- Doesn't need a program – stands by the pump and takes 10% of the stream for use on his farm
- Due to government cutbacks, Ministry of Natural Resources can't monitor streams so it's up to the farmers to monitor streams
- Streamflow variable – need monitors to monitor streamflow
- Doesn't want government interference to his productions and operations

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- They are doing that now – farmers along the stream take turns pumping water
- Yes, but providing farmers get first priority before golf courses, people watering cars, etc.
- Water is the lifeblood of a farmer

(Environment Canada 2006d)

**Stakeholders' Consultations, Simcoe, Ontario
Meeting held on March 16, 2006 8:00pm-9:20pm
Horticulture Research International, Horticultural Research Institute of Ontario
(HRIO), Simcoe Research Station/University of Guelph, Ontario Agricultural
College
Norfolk County- county level
Directed by Samuel Wahab
Notes taken by Sepideh Khairkhahi
7 farmers attended
Crops include: Corn, soybeans, wheat, hay, vegetable (tomatoes, cauliflower,
cabbage)**

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No, were not aware
- 2000 was a wet year
- No warning
- Not aware
- No, wouldn't bother him because he irrigates out of ponds and streams

A) What was the source of the information?

- No forecasts
- No local forecasts – weather changes spatially
- No accurate forecasts, no local forecasts
- No information (presently, he scans the internet for forecasts – it's a 50/50 chance of a correct forecast depending where you are located)

B) Was the information readily available and how useful was the information?

- Radio, TV
- Country Guide Magazine, although it's not dependable
- Farm papers (long term forecasts)
- DTN (Data Transmission Network) although unsure whether it's still available
- Internet forecasts (storm development)
- TV, weather station

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Beans, hay, alfalfa, shallow rooted crops
- Corn is a vulnerable crop – needs a lot of water
- Soybeans, hay, corn
- Hay (some hay wasn't worth cutting in 2005)
- Cauliflower

- Most crops were alright except cauliflower (even with irrigation it was too hot)

A) What strategy did you adapt to protect your crops from the drought?

- Can't do much, crops depend on rain
- Irrigate with a sprinkler
- Irrigate with travelers
- Look after soil, keep good humus level in it to feed plants
- Less cultivation, cultivate corn but did not that year (2001)
- Minimum to no tillage, avoid compaction which gives the soil better water holding capacity
- Dust mulch will hold moisture in

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Adjust to situation, can't plan too far ahead, management decision (such as cultivate lightly or not at all)
- Lack of water for those who irrigate
- Minimum to no tillage, avoid compaction which is beneficial in dry years
- Money
- Some chemicals will not work during certain times of the day

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- Conserve water
- Depends on rain, does not have any practices
- Grow a crop of clover, then plough it down
- No conservation practices
- Taking care of soil, minimum to no till, avoid compaction, create an environment on the farm that will survive drought
- Some practices depend on soil type (sandy, clay, etc)
- Soil conservation practices, irrigation not an option, tillage practices
- Depends on weather (hot, cold, etc)

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- Fuel and equipment costs
- Everything you do during a drought costs money
- You will always lose crops
- Costs you more to irrigate than what you get in return
- Cost – money
- Irrigators have difficulty getting water permits (provincial government policies)

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Precipitation

- Rain, spring runoff
- Creek
- Dam, pond, creek
- Creek, small pond
- Drill well
- Sometimes rain is adequate but variable
- Variability depending on season

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- In 2001-2002, less trucking to do (yield wasn't there)
- Less money because of lower yield
- No changes for 2005
- Don't plough, less tillage (2001-2002)
- No adaptations, no changes
- Buy irrigation system which is a big expense
- Put up dam to take less water from stream to get runoff of winter
- Minimum tillage
- Crop rotations

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- **Paying the bills (money)**
- If there's no yield, cannot pay the bills
- Can't afford to buy new equipment
- Money- farming is a business, not a way of life
- Stop the cheap food policy (his father got more money for wheat in the 1930's then he does now)
- Money- less crop to sell, less money is earned, politics and trade
- Quebec treats farmers better than Ontario – the government supports farmers better than the Ontario government and those farmers get as good a deal as the American farmers
- US farmers get subsidized for everything – crops, crops that are not grown, water
- US farmers get paid even though their crops did not grow

6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches? (methods or techniques)

- Personal management abilities will take you through a drought (ex. Switch crops)
- The expense that crops require is not justified by their return
- Grow organic corn vs. corn with herbicides
- Can't do a lot more re: water supplies
- Think outside the box – add value to crop
- It is worth extra management for premium or not?

- No till (it would be nice if they got paid to do it, carbon sequestration)
- If he knew what he knew now 70 years ago, he wouldn't have become a farmer
- Would have gotten a chicken quota
- Organic crops (take into consideration a lot of factors, long process)

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Drip irrigation is the only way to go, don't lose water, requires less water and is efficient
- The technology has changed from nozzles to travelers to drip
- Travelers with booms (with drip irrigation, it doesn't matter if there are windy conditions)
- Not changed because of costs (his current technology works well)
- Not changes because he is not a large enough grower

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Environmental Farm Plan – money available to increase water supply on farms
- Water Management Program – with the cooperation of local authorities, they monitor stream flows and advise growers on conditions
- Different things are being done in Norfolk County
- Water Supply Enhancement Program – not active
- IAC (Irrigation Advisory Committee)
- Four counties and 3 CA's are on a water management steering committee to manage water better
- Water conservation needed on sandplains

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Provincial or federal programs help offset costs
- Not everybody can afford to conserve water
- Irrigators know when they do or do not have water (bog, creek, stream)

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- Doesn't always work
- Grants from government – grants for ponds, dams
- Can't dig a pond without a spring underneath
- A voluntary system is in place in the Big Creek watershed to ensure adequate water supplies, but to keep it working, farmers need to get more money
- Solution a lot bigger than this question
- Farmers are struggling with crops not bringing in enough money

- Plant more trees (but this won't happen, land is too expensive and there will be less agricultural production)
- Encourage planting of trees but with compensation
- Close the border, support local markets
- ALUS (Alternate Land Use Services) landowners can save environment but with the financial support of the government

(Environment Canada 2006e)

Stakeholders' Consultations, Six Nations, Ontario

Meeting held on March 28, 2006 7:30pm-9:00pm

Ontario Federation of Agriculture

Brant County- county level

Directed by Samuel Wahab

Notes taken by Sepideh Khairkhahi

5 farmers attended

Crops include: Sweetcorn, hay, soybeans, field crops (corn, soybeans, wheat, hay, conventional and organic crops)

Other: Cow calf operation and trees

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No, didn't know in advance
- Unpredictable weather patterns in that area because they are surrounded by lakes (geographic variance)
- No, but also wasn't looking for information
- Were not aware that drought was imminent (weakness in Southern Ontario forecasting especially drought forecasting)
- Forecasts unreliable, incorrect

A) What was the source of the information?

- Information is available on his computer at home but not dependable
- DTN (Data Transmission Network), website named "farmzone" which gets its information from Environment Canada
- Internet and TV but not reliable (you would have more success in flipping a coin)
- Weather Channel, Canadian weather channels, DTN on an American site (drought monitor)
- Weather information needed for different things at different times
- Satellite pictures gives you a feeling of what's happening but are useless in general
- Weather map (from Environment Canada) in daily newspaper

B) Was the information readily available and how useful was the information?

- Radio, TV, Internet
- Newspaper
- DTN (subscribed service – weather information from the United States)
- Step out in the morning and predict the weather yourself
- From experience

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Soybeans, hay

- Sweetcorn
 - Corn more affected than soybeans
 - Soybeans, corn, hay yield was limited and bad quality as well (added supplements) but the nutrient value of hay decreased for livestock
- A) What strategy did you adapt to protect your crops from the drought?**
- Stopped growing soybeans (yield and dollar value decreased) and planted corn earlier
 - Nothing you can do, plant when soil conditions are appropriate
 - Bought a zone tillage system either in 1995 or 1996, works well for his purposes and didn't change anything after 2001/02
 - No changes
 - No till with soybeans and wheat but not corn because the equipment is expensive to plant in untilled ground. This method retains soil moisture and saves money on tillage
- B) Were there any obstacles you encountered that prevented you from using a particular strategy?**
- Five people agreed to one obstacle: costs
 - Water permits costs money, time and restricts the amount of water
 - New provincial policy which restricts water taking (referred to as Bottle Water Law). It's suppose to prevent people from taking water and selling it- not suppose to affect agriculture but it does
- C) Were water conservation practices part of your adaptation practice? If yes, please specify?**
- Yes, soil water and soil air were reasons for no tillage strategy
 - Irrigate at night to minimize evaporation loss
 - Hasn't ploughed land for 20 years but has experimented with different tillage practices but for more cultural reasons- soil conservation (benefits from no till)
 - Very little you can do – checks water bowls for leaks
 - Forced to buy water for livestock from municipal sources
- D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?**
- Cost is the biggest factor
 - Constraint – crops need a certain amount of water
 - This question assumes there's extra water around to save
 - Gathering runoff from rain to use later on
 - Drip irrigation is efficient but expensive and labor costs as well
 - Farmers today cannot leave the land for a year (also know as a “foul year”) because it's not practical but farmers in the past used to do a foul year
 - Put a plastic mulch over the sweetcorn to gain maturity (matures 10 days earlier) and soil moisture is retained
 - Mulch on crops to conserve soil moisture

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Drill well (volume is adequate but quality is not – it is high in iron and sulfur, natural ground minerals), dug a pond for drinking
- Rain
- Grand River adequate
- Drill well and pond adequate for livestock purposes but not crop purposes

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Stopped growing soybeans and switched to corn, worked the ground up conventionally in 2005 which gave him a good yield
- Some corn seeds are adapted to dry conditions
- Different maturity times for corn and soybeans to reduce the risk of losing crops
- No change with field crops but looked after sweetcorn properly
- No changes at all
- No changes – always planted drought tolerant tree species

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- Finding enough hay of decent quality
- Once drought occurs, it's too late
- Crop insurance (2 poor yield years will decrease your insurance)
- Farm supplies are closing up around that area so now they must get their machinery supplies further north

6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches? (methods or techniques)

- Do it the same, no regrets
- Having known what was happening with droughts, would have gotten out of the farming business because it's a downhill battle. For example, a box of Kellogg's cornflakes costs 4\$ but the farmer only gets 8 cents of it. The farmer is not being fairly compensated for his work.
- Not much you can do, don't want to over forward contract your crops in case the yield is poor
- Cannot decide not to plant- you must plant and take what you get
- A farmer is retiring but the man is broken
- Fear of early frost and fear of a late spring
- If there's an early frost the crops won't mature properly (soybeans, corn) and there won't be anything to harvest. Frost is more damaging to corn than beans

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Bought a traveler either in 1984 or 1985 and happy with it
- Irrigates at night and cultivates the land before he irrigates so water can soak in

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Environmental Farm Plan will help pay for a cistern and during high water demand periods, you can draw water from the cistern instead of the well
- COWSEP (Canada Ontario Water Supply Expansion Program)
- Soil and Crop Improvement Association does a farm environmental study which is a self evaluation of your farm and then you match your problems to sources of funding (they will pay 25-30%, even up to 50%)
- Ducks Unlimited – funds ponds to conserve the environment
- Rural Quality Water Program
- ALUS (Alternate Land Use Services) federal program
- Most of the existing programs are targeted towards environmental conservation rather than water supplies

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Make sure there is an adequate source of good quality water
- Habitat protection is a higher priority than agriculture
- Reforestation on marginal lands
- Forestation is essential especially in this county (Brant)
- Don't even try to save trees just bulldoze them over
- Policy development for food production (crop value worth irrigation? For example, soybeans not worth irrigating but corn is)
- Federal government should think of a program to compensate farmers for costs such as water and fuel. Water is a more precious resource than fuel.

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- They believe that is already installed as the Ontario Low Water Response Program with its 3 stages
- Might be a useful tool
- With regards to water permits, you must log your water use but they're cracking down on it – its not voluntary
- Farmers should have water at their disposal first

(Environment Canada 2006f)

**Stakeholders' Consultations, Tweed, Ontario
Meeting held on April 20, 2006 8:00pm-9:30pm
Ontario Cattleman's Association
Hastings County- county level
Directed by Samuel Wahab
Notes taken by Sepideh Khairkhahi and Erin Stratton
20 farmers attended, including the Hastings County president of the Ontario
Cattleman's Association
Crops include: barley, hay, corn, soybeans
Other: beef, cow calf operation, dairy, pork**

This particular consultation is an exception to the 2001-2002 drought years because they did not experience drought conditions – in fact, they experienced very wet conditions in 2001/2002. In their case, 2003 and 2005 were drought years for them so the responses are for those two years.

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No (everyone agrees)

A) What was the source of the information?

- Might have been information but doesn't know where to find it
- Farmers Almanac
- Don't know where to find information, it's all just guesses
- The radio just predicts short term forecast, not a drought

B) Was the information readily available and how useful was the information?

- Radio, internet, CFB Trenton air force base for the short term forecast, but still unpredictable
- Weather network on TV
- Geographic variance (there might be a storm here but not five miles down the road)
- Internet (3-4 day forecast)
- Radio
- Farmers Almanac
- 2001-2002 were not drought years, instead he received too much rain

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- None
- Since it was very wet, couldn't plant crops
- Farm was flooded and it was too cold so the harvest was poor
- Since 1998, there were two dry years 2003 and 2005

- Hay field was damaged very badly, not just the drought you worry about but every year
- Used up surplus of hay, disposed of cattle because of lack of feed
- Hayfields were damaged so badly last year (2005) that they wondered if it would grow back again and be useful next year
- If you don't get hay it is a disaster
- Driving around the fields looking for one spear of hay
- Hay is very expensive to buy
- Hay (3x)
- Hay, corn, pasture
- You only know it's a drought **after** it happens, if rain comes at a critical time then the yield will increase; farmers have a tough time believing a drought is coming

A) What strategy did you adapt to protect your crops from the drought?

- Nothing, they were too far into the drought to do anything
- Cannot irrigate
- Bought crop insurance (\$7000-\$8000) for hay in 2005
- Crop insurance
- Don't know many strategies, no information
- Without any money, how can he deal with a drought?
- No information and the crop insurance didn't pay him because of a late rain they received at the end of August
- Options are limited, cattle not worth it
- Corn silage
- Hope the neighbors have a little extra hay
- Nothing you can do
- Inputs are so high and the costs skyrocket. The Assistant Deputy Minister Jim Wheeler told farmers to quit the farming business
- Consumers choose the cheapest product American produce vs. Canadian produce
- Just pray for rain, too expensive to switch crops

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Lack of funding (government, crop insurance, current market)
- Sell mature cows for 39 cents per pound. They are being robbed of their income; they only get 1/3 of their income and a lot of them are going to give up
- Government cannot protect them
- Western Canada has feedlots and therefore have adequate hay supplies. But Eastern Canada (this region) does not have adequate supplies during the drought. They cannot compete with US produce
- Costs of production stops you from changing a lot of things

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- No (6x)

- Livestock need water (2x)
- Less tillage or no tillage conserves soil moisture
- Plant crops deeper and earlier (this is the first year they are doing it)
- No irrigation in this area

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- N/A
- Cannot conserve water for cattle

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Rain for crops not adequate, creek for livestock adequate, springs, wells
- Well running dry
- River at Chisms have dams that hold back water from June-August, so someone else has control over their water supply and they can tell when their wells will run dry
- Can't allow cattle to drink from the Clair River unless he pumps it
- Drill well, dug well, dug pond are all adequate but rain for crops is not adequate
- Springs are adequate
- Springs are adequate, ponds are not
- Dug well adequate

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Buy more insurance so he can get some money back
- Can't adapt to dry conditions if you don't know it's coming
- Need money
- Grew extra corn but it didn't grow and he lost money
- No

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- Money to buy hay and provide food for cattle
- Lack of information, no reason to change
- None (2x)
- **Money ; don't have a fixed income to fight a drought**
- They shipped hay out West 2001-2002 at no charge but they did not consider shipping hay East (to this region) when they had the drought crisis. 1500 bales of hay were never picked up in Saskatchewan.
- It's not only the drought they are fighting but Mad Cow Disease as well. They weren't able to ship heifers to the US the last three years. Their husbands lost their health when they had heart attacks and they feel they are fighting a losing battle.

6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches? (methods or techniques)

- N/A

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- N/A

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- No, not aware
- No
- There might have been some programs but the provincial government eliminated them. There used to be a representative that kept farmers up to date but they cut back yet another farm service. The farmers were told to get information from private sources. But, of course, information about fertilizer from a fertilizer salesman is different from the fertilizer information you would receive from an expert
- Major companies are doing an assessment rather than the government, they only want to sell their own products
- Many programs to restrict farm access to farm water sources, no compensation for those restrictions

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Government is surveying farms to install meters on wells to make them pay for water but they definitely don't want to do that
- Animals need water
- Since they don't irrigate, they don't waste water

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- N/A
- Bottled water companies are draining town wells
- Shouldn't be considered – water is the only available commodity and they don't want to be taxed for it
- No
- Might be applicable to the South Saskatchewan River Basin but not here
- Ontario Clean Water Act is in the 3rd reading which may restrict access to water, but they are not sure what it's exactly about.

*Canadian Droughts of 2001 and 2002
Stakeholders' Consultations in Ontario: Impacts and Adaptations*

(Environment Canada 2006g)

**Stakeholders' Consultations, Vineland, Ontario
Meeting held on April 12, 2006 9:00pm-10:30pm
Ontario Federation of Agriculture (OFA)
Niagara County- county level
Directed by Samuel Wahab**

Notes taken by Sepideh Khairkhahi and Sonia Dhir

13 farmers attended, including 1 member of the Irrigation Advisory Committee for Niagara region, the director of OFA for Niagara North, the director of OFA from Niagara northeast and the director of OFA Niagara northwest

Crops include: grapes, cash crops, hay, corn, apples, pears

Other: poultry boiler farm, dairy farm, deer, beef cattle, greenhouse, pigs

1) 2001 and 2002 were the most severe drought years across Canada and impacted the agricultural sector negatively. Were you aware that a drought was likely to occur that year?

- No were not aware
- Most years there was barely enough rainfall in this area, never extra rain in the Niagara Peninsula
- When a storm approaches, it misses the area
- Nicknamed "Sahara of Niagara"
- Looks at 30 day forecast by Environment Canada
- Was not aware
- Cannot rely on Environment Canada forecasts, get more accurate forecasting for the Niagara Peninsula
- Less than adequate rainfall in the Niagara Peninsula
- Doesn't draw water but buys it instead for his poultry farm so this doesn't apply to him

A) What was the source of the information?

- No information beforehand, not available
- Environment Canada forecasts not reliable
- The Niagara Region is working on this project to provide water for the Niagara region. It has received funding (\$300 000) from the Canadian Agricultural Adaptations Council to protect and make a long term investment in trees, fruits and crops by providing a source of water for agriculture. The second phase proposal has gone out.

B) Was the information readily available and how useful was the information?

- CFTO 5 day forecast which is not accurate
- No information

2) From your experience of 2001 and 2002 drought years, which crop(s) was/were the most affected by the hot, dry conditions?

- Grapes

- Everything was affected
- Different crops were affected
- Nursery stock
- Tender fruit, apples, grapes
- Hay, corn
- Soybeans, oats, barley, hay, corn, wheat
- Hay, corn, soybeans, wheat
- Western Canada had a drought and Eastern Canada had to send hay out west
- One of the two years, it was very wet and he couldn't plant

A) What strategy did you adapt to protect your crops from the drought?

- Started and Irrigation Advisory Committee to get water from the canal or lakes to irrigate tender fruit
- **Irrigation is very important!**
- **Irrigation system is desperately needed!**
- Irrigation system is almost in place with some funding provided by the provincial government (\$2 million) and the federal government – the cost is enormous and farmers cannot afford to pay for it themselves
- Cost him \$150 000 to irrigate his farm in 2003
- Irrigation and put in ponds
- Turn city tap on more, but still has to pay for it
- Put water in drainage ditches
- Hay mulch
- Try to conserve soil moisture
- Moved to drip irrigation
- Can't irrigate, no till operation to conserve soil moisture, choose drought tolerant crops
- Can't afford irrigation, not economical, no till
- Irrigation system and pulls out weeds so there is less competition between crops
- No till practice to plant soybeans

B) Were there any obstacles you encountered that prevented you from using a particular strategy?

- Money, more help from the government
- Liked to get money from crops, not government
- Lack of water
- Water permits take a long time to get and he had to get 8 different permits in order to irrigate from lake. For example, he had to get a permit to go underneath the highway, a permit to use public property, a permit for landing lake. He went through all three levels of government (for example, Ontario Ministry of the Environment, Department of Fisheries and Oceans, Ontario Ministry of Transportation) and found that the provincial and federal government were the slowest but the municipal was fastest.
- Also need a permit to irrigate from the Welland Canal, must go through Ministry of the Environment and Department of Fisheries and Oceans. They group sixty

farmers together under one permit but if they did it individually then they would change the water standard. They don't recognize agriculture as an important industry.

C) Were water conservation practices part of your adaptation practice? If yes, please specify?

- No till
- Can't conserve water for livestock
- Trickle irrigation will save water but it's costly
- Some Niagara farms have spray irrigation – placed dams in drainage ditches and farmers alternated water use
- Trickle irrigation
- Drip irrigation, recycle water, store it in tanks
- Overhead irrigation, can't afford drip system
- No

D) What factors currently facilitate or constrain your ability to implement on-farm water conservation practices?

- *Money is an enormous factor*
- Lack of infrastructure
- They sit in between two huge lakes and irrigation should be in place by the government – they should provide money and infrastructure
- No subsidy for Canadian crops; however, their American counterparts receive subsidy for their crops
- **Government needs to help introduce infrastructure for irrigation**

3) What is your primary water source for your agricultural operations (e.g., river name, storage reservoir)? Were on-farm or other water supply sources adequate?

- Lake, municipal water, landfill site controls his groundwater but it's not adequate and the quality is poor, pond and buys water for his livestock
- Lake Ontario
- Welland Canal, not adequate
- Municipal water, rain, buys water which is not adequate and expensive
- Rainfall not adequate
- Rainfall and groundwater not adequate
- Well adequate for animals, rain for crops
- Rain, on farm pond, Lake Ontario not adequate
- Welland Canal not adequate

4) In what ways or to what extent have your farming and practices changed since the 2001 and 2002 droughts years if so in what ways? For example, how did you adapt to the dry conditions in 2005?

- Irrigated in 2005
- Water weekly – moisture meters monitor how much water he sprays on his crops

- Pumped longer – instead of seven to eight hours a day he pumped nine to ten hours a day
- Crops started to burn
- Irrigated pears but not grapes in 2005 until the rains came in early fall
- Some tender fruit growers irrigated but with a long term crop there is very little that you can do
- Sell small fruit
- Lost money
- Peaches, apples, pears have disappeared off the farm over the last 41 years but grapes managed to survive the drought

5) Is there any particular obstacle to adaptation that was difficult to overcome as a result of the drought crisis?

- Money and infrastructure
- Costs money to put in more fields, buy equipment
- Competition with crops that are being imported from elsewhere
- Money
- Consumer demand – Canadian crops are smaller compared to US crops – the consumer sees the bigger plum and would rather buy that than the smaller one
- Costs that Niagara farmers incur. The irrigation system costs \$1.3 million to install pumps, pipes
- Strict regulations for quantity and quality of water – water testing for fruit and milk

**6) If you were to do things over again, would you make the same decisions and use the same adaptations or would you use different approaches?
(methods or techniques)**

- Get water from rain
- Quit farming and work for the federal government
- No choice
- Do the same thing for water but if grants were available, he would put in drip irrigation
- Change careers
- Do the same thing

7) What type of irrigation technology have you adapted since the droughts of 2001 and 2002 how effective and efficient is the technology?

- Drip irrigation is the most efficient if grants were available
- Most of the Niagara region doesn't have the ability to put in irrigation
- Drip irrigation more efficient
- Doesn't have money or water to adapt any irrigation system
- Drip irrigation is very efficient and effective but costly
- Irrigated before 2001-2002 because she could see a continual dryness trend during the summers; however, 1988 was the trigger point to start irrigating – the Private Members Bill

8) Are you aware of any existing programs that would help support strategies to increase on-farm water availability or decrease vulnerability to drought (e.g., water conservation, water storage options etc)?

- Environmental Farm Plan which shares the costs with farmers
- Canada Adaptations Council
- This is not an existing program but a Stantec Consultant is working on a raw water feasibility project and filling in information gaps in the Niagara region

9) What would be effective programs to help you determine water availability in your area, what incentives would assist you in voluntary water conservation/availability standard?

- Money- invest in Niagara's agriculture
- By providing farmers with water natural systems would not be disturbed
- Money for trickle irrigation
- Conservation Authority doesn't want to put in a pipeline the farmers want to protect the fish

10) Would you consider a voluntary water availability standard a beneficial tool to ensure adequate water supplies were available for all agricultural producers in a sub-watershed, particularly during drought conditions?

- Already a guideline – 1" of water per week per acre
- Not a good tool for them
- Livestock need water
- With this standard, are certain people going to have a higher priority when it comes to water? Are the fruits more important than meat or vegetables?
- If they had unlimited water, they would change their crops to lettuce or tomatoes, for example, which would change the water demand and then economics would take control
- A small number of people irrigate – the lakes wouldn't look as big as they are if irrigation was available to everyone
- Water table needs to get up
- People who irrigate need to use water more efficiently
- Would sell bottled water if irrigation available, wouldn't sell crops

Side Notes

The following were comments that arose after the consultation was over

- **Questions 1-3 are an insult to farmers – get rid of them**
- **Road salt is contaminating groundwater and contaminating water quality**
- **There are 1600 to 1700 farmers and only 40 are able to irrigate. There are a handful that pump off the lake; however, those who live on the escarpment have no water access but would if infrastructure existed.**

(Environment Canada 2006h)

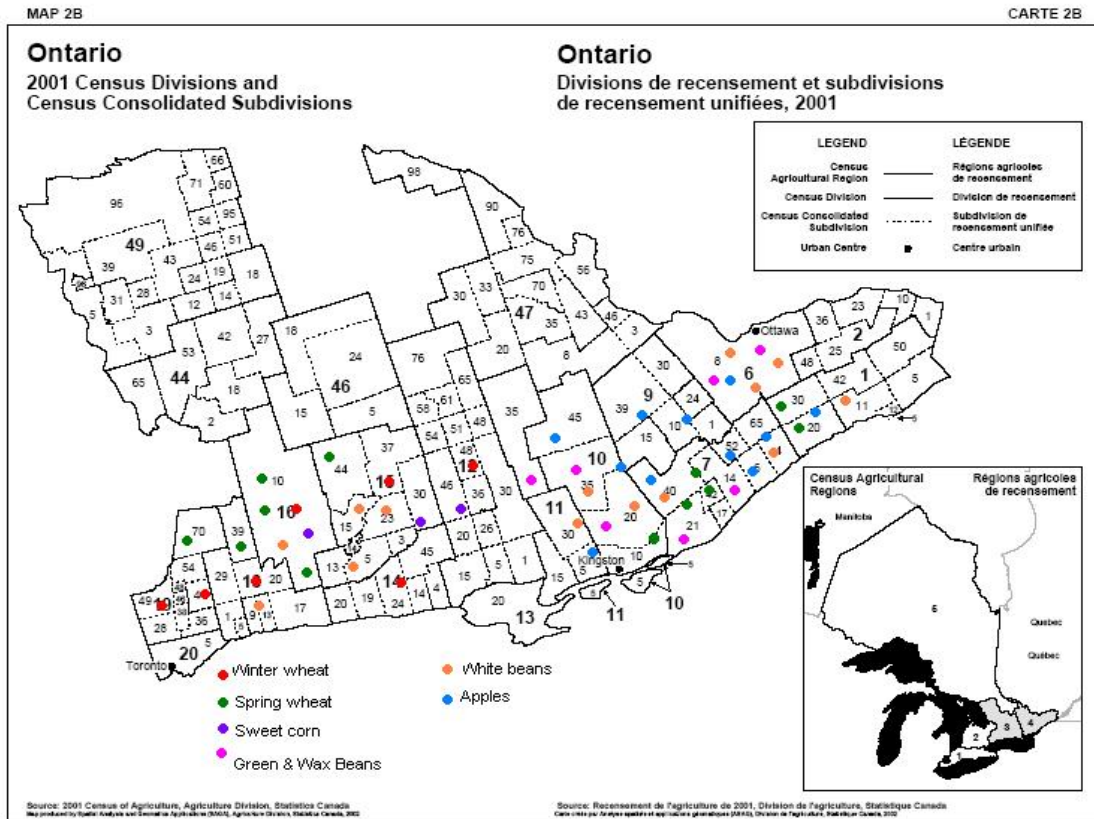


Figure 1 Crop Impacts in Eastern Ontario (Environment Canada, 2006i)

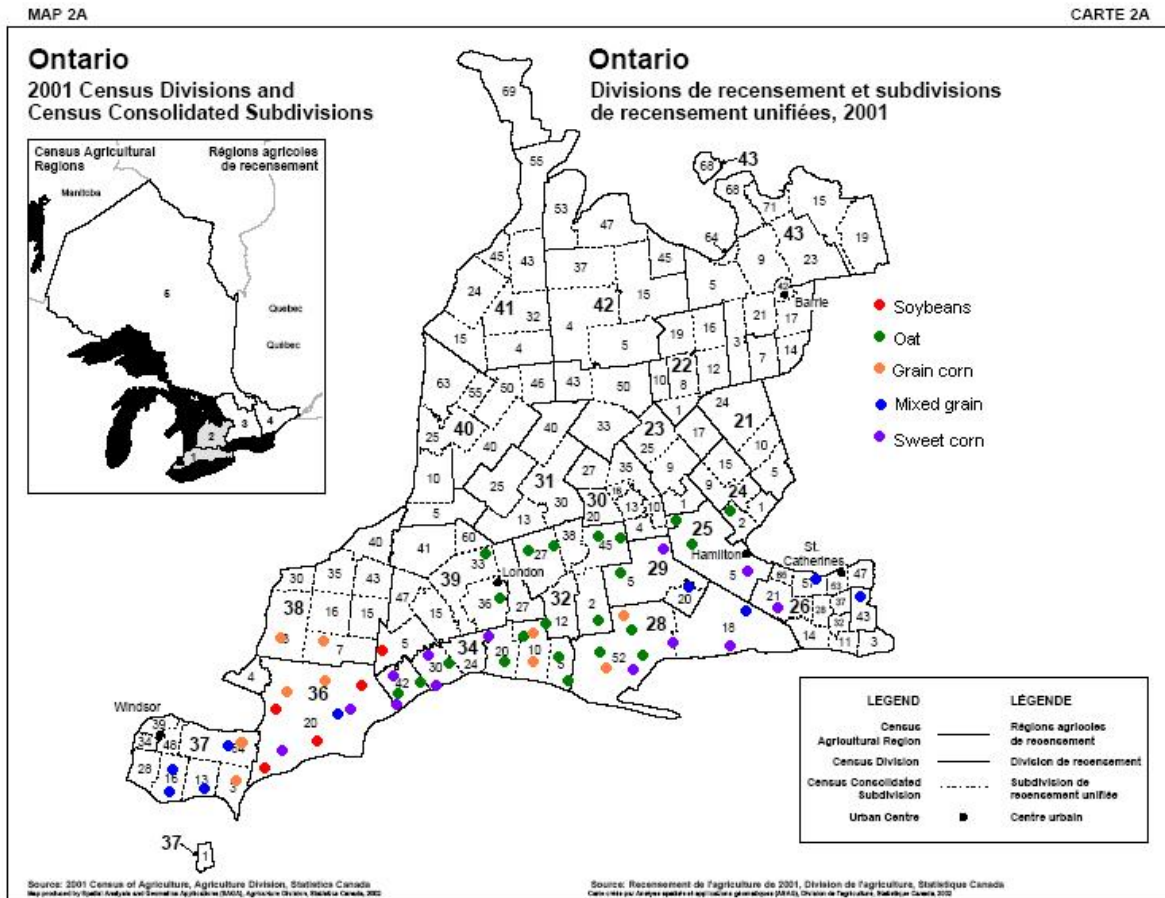


Figure 2 Crop Impacts in Southwestern Ontario (Environment Canada, 2006j)

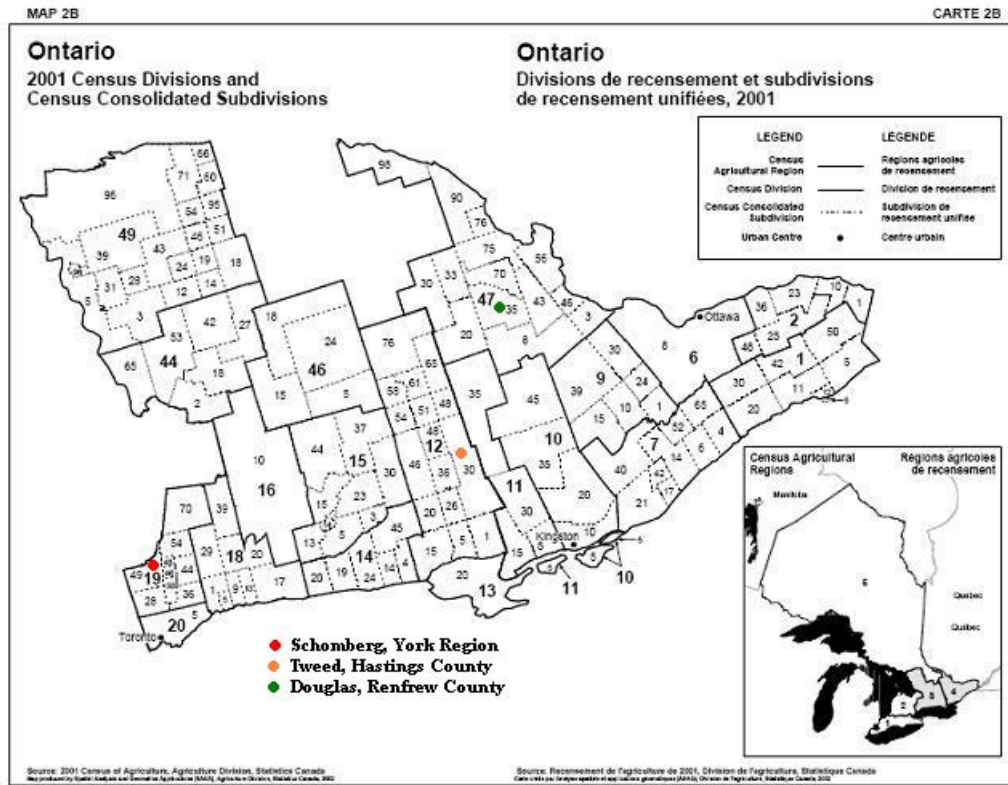


Figure 3 Counties visited in Eastern Ontario (Environment Canada, 2006k)

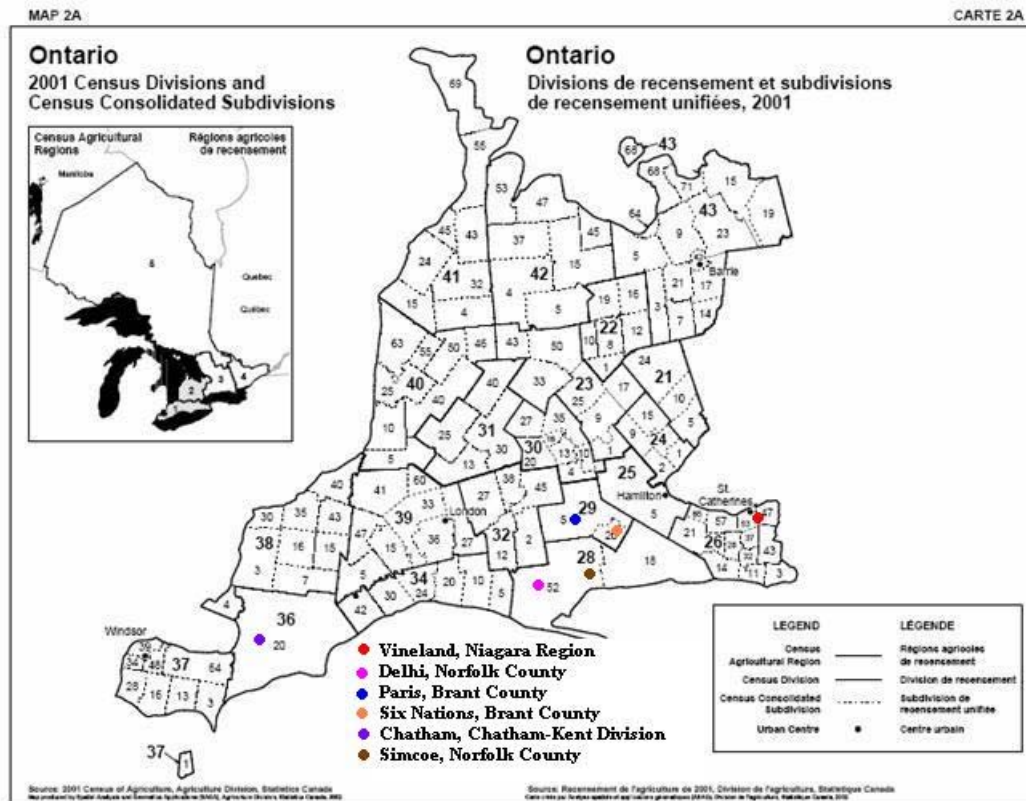


Figure 4 Counties visited in Southwestern Ontario (Environment Canada, 2006)