The Whitemans Creek Subwatershed Drought Contingency Project

Water Resource Adaptation and Management Initiative

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The Water Resource Adaptation and Management Initiative
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Introduction

The Whitemans Creek subwatershed in the Grand River watershed is an area with a rich variety of agricultural production. Low water conditions are a perennial issue in this subwatershed impacting both agriculture and the cold water trout fishery and wildlife that depend on Creek flows. In 2007 and 2012, the Creek fell to Ontario Low Water Response (OLWR) Level 3 conditions (less than 30% of average summer low flow and receiving less than 40% of long term average precipitation in a 30-60 day period). Through the Grand River Conservation Authority (GRCA) Low Water Response team, agencies and partners have been working with the irrigators for many years trying to help cope with low water issues. During the February 11th, 2013 Whitemans Creek Irrigators debriefing with the Brant County Federation of Agriculture (BCFA) at the Burford Fairgrounds, agencies discussed with local farmers the numerous irrigation Permits to Take Water (PTTW) from the Whitemans Creek area and how they affect Creek flows during times of drought. As a result of February's meeting, a working group was formed comprised of BCFA, GRCA, Ministry of Natural Resources, Ministry of Agriculture and Food, and Ministry of the Environment. The committee applied for funding under the Water Resource Adaptation and Management Initiative (WRAMI) at Farm and Food Care Ontario (FFCO). The Whitemans Creek Subwatershed Drought Contingency Pilot Project was one of 20 pilot projects in 2013 that received funding. The multi-agency steering committee hired Hajnal Kovacs to coordinate the project as the Drought Contingency Specialist, her findings are reported below.

Steering Committee

The group of individuals who designed this WRAMI project have different professions and backgrounds, with the common goal of helping irrigators in the Whitemans subwatershed be better prepared for drought. The committee consisted of: Larry Davis, Director, BCFA, Janet Licskai, Member Service Representative, Ontario Federation of Agriculture, James Etienne, Senior Water Resource Engineer, GRCA, Rebecca Shortt, Irrigation Engineer, Ontario Ministry of Agriculture and Food, and Ministry of Rural Affairs (OMAF/MRA), Ken Cornelisse, District Water Resources Coordinator, Ministry of Natural Resources (MNR), Hal Schraeder, PTTW Program Specialist, MOE, and John Warbick, Hydrogeologist, Ministry of the Environment (MOE).

Acknowledgements

This project would not have had successful results if it was not for the receptive farmers of the Whitemans Creek subwatershed. We thank everyone who took time out of their farm operation to meet and talk with Hajnal Kovacs throughout the growing season. We want to thank Nathan Streef from Streef Produce for hosting the demonstration farm site during the twilight meeting in August. As well, Mr. Kertez, Mr. Sroka and Ken Van Torre who all volunteered to have their soil moisture monitored throughout the season. Many aspects of this project would be impossible without your support.

Summary

This pilot project was a proactive approach to a reoccurring issue of low water in the Whitemans Creek subwatershed, a highly productive agricultural area. The project took place over eight months and every surface water Permit To Take Water (PTTW) holder was contacted. The goal of the project was to increase drought preparedness as well as increasing communication with the Conservation Authorities, Ministries and local groups, increasing education and outreach, and increasing understanding for both water users and regulators of how water is used in the Whitemans Creek subwatershed.

Increased communication was achieved through regular site visits and continual contact by Hajnal Kovacs, Drought Contingency Specialist, as she collaborated with the farmers to build a drought contingency plan. Educational flyers and one-on-one sit down meetings with the farmers increased education regarding irrigation systems, calculating watering demands, introduction to soil moisture monitoring, PTTW applications/amendments and the process involved in pond creation/renovation. Two farmers participated in the irrigation system assessments that were offered by OMAF as part of this pilot project. These assessments gave the farmers an opportunity to see the ways in which their irrigation systems, both centre pivots on potato fields, could be modified to work more efficiently. Three farmers participated in soil moisture monitoring throughout the growing season. This resulted in tracking the soil moisture of six different fields: tobacco, seedling ginseng, two-year-old ginseng, overhead irrigated tomatoes, drip tape irrigated tomatoes, and drip tape irrigated peppers. These farmers got firsthand experience in witnessing the benefits of soil moisture monitoring and how useful it can be to them to make irrigation decisions. Farm and Food Care documented the monitoring on these fields with their video, "Water Conservation and Protection in an Ontario Watershed" on their YouTube channel at: http://www.youtube.com/watch?v=aR5j0NBvYh4. Five farmers showed interest in being involved with the advertised pond renovation that offered cost-sharing to either create a contingency source or modify an existing one to have a greater storage capacity. Four of the renovations were completed in the fall of 2013 and one of them is planned to commence in September 2014, due to timing limitations of in-water works for an online pond. During the pond renovations, Farm and Food care captured some of the work and the benefits of such renovation projects in a video called, "Pond renovation creates alternative irrigation source for Ontario farms" on their YouTube channel at: http://www.youtube.com/watch?v=9CoPtrpgnCk&list=PLxl8ycqu125fcq7iHjSuc2KV60lhXAru.

The result of the knowledge gained from these farmers was used in forming a plan to help drought preparedness for all farmers, a plan which reflects years of farming expertise. Four steps have been highlighted as key components to a drought contingency plan: 1) making sure an irrigation system is in place and working accurately, 2) using Best Management Practices (BMPs) year round, 3) securing a reliable water source with a Permit To Take Water, and 4) writing down what options exist if the regular water supply is not able to provide the watering needs. With a total of nine farmers involved with the project as well as the several others who were in touch with Hajnal throughout the project our findings indicate the importance of proactive thinking and planning with the agricultural community, especially in the case of drought planning.

Drought Contingency Planning

The irrigators in the Whitemans Creek subwatershed are very responsible with their water use during irrigation events not just because it is costly to irrigate but because they understand the value of water to their farm operation. Farmers are constantly under the stress of producing quality, high yielding crops with the least amount of inputs in order to maximize their revenue. Pressures are especially high during times of drought when decisions become more serious and the fate of the crop is at stake. This is why planning ahead for a drought is beneficial so that when a drought does come farmers can be prepared and bring their plan to action without having to make decisions in the middle of the season under stress. A plan should include good preparation and a contingency plan. Preparing for a drought consists of four steps: 1) making sure an irrigation system is in place and working accurately, 2) using Best Management Practices (BMPs) year round, 3) securing a reliable water source with a Permit To Take Water before a drought, and 4) writing down what options exist if the regular water supply is not able to provide the water needed (this is the contingency plan). During a drought you can review actions 1 and 2; are your systems working effectively and are BMPs being used? During a drought monitor the main supply water levels (and how they are decreasing/recovering). You may need to act on one of the Contingency Plan options. This might include requesting to use a neighbour's pond, reducing irrigation amount or even trucking in water. For a brief summary of the plan, please refer to "Summary of Plan" attached as Appendix 1.

1.0 Irrigation Systems

Constantly upgrading, and in some cases switching, irrigation systems are needed to increase an irrigation system's land cover, reduce its fuel consumption and maximize its water application. Some land owners invest in yearly tune ups that cost about $1,800 for a travelling gun while others invest in new computer boards for centre pivots (Figure 1) that cost around $50,000. While a drip tape system needs to be purchased yearly and in order to dispose of them farmers have to pay an additional fee. Whether a farmer can spend the money to upgrade their system or are simply doing their own tune ups, the ultimate goal is the same: increase efficiency while minimizing fuel and water loss.

Figure 1: Centre pivot irrigation system assessment on a potato farm in Brant County.

Figure 2: Gathering the volume of water collected in the "IrriGauges" after the centre pivot (Image 1) passed over them.

1.1 Irrigation System Assessments

Ever notice how some sections of a field are always dryer than others? The answer might be soil variability but it could also be uneven irrigation. Irrigation system assessments are one of the greatest opportunities for

irrigation efficiency and water savings because they can help improve the spread of water across the field. They can be conducted on overhead irrigation guns, centre pivots and even drip tape systems. In Ontario OMAF/MRA and AAFC are currently working with the California approach for irrigation system assessment since they are one of the first to standardize the approaches to measuring. For more detail on the methods, please refer to "Irrigation Assessments" attached as Appendix 2.

1.2 Benefits of Irrigation Assessments

During our advertising of irrigation assessments we found that farmers were surprised that such a service was offered to them especially for free. They saw the immediate benefit to getting their irrigation systems assessed as the results could point out which aspects of their system were not functioning properly. After running the assessment on two centre pivot systems we found out that the methods used were ineffective for those centre pivots. Both systems will be reassessed next season with an alternative method that is suitable for these pivots.

Interested in getting an irrigation system assessed?

Staff at OMAF conducts these assessments, for more information and to request an Irrigation System Assessment contact: *Rebecca Shortt* (519) 426-4920 or *Patrick Handyside* (226) 217-8001.

2.0 Best Management Practices (BMPs)

BMPs are practical and affordable approaches to conserving soil and water resources without sacrificing productivity. Timing irrigation events to occur in low wind conditions and preferable at night will minimize water loss and ensure that the amount of water applied will actually make it to the soil. The Ontario Ministry of Agriculture and Food has written books on the BMPs for 25 agricultural practices. The Irrigation Management BMPs for Crop Production outlines ways of making optimal use of water resources, they are summarized in "Irrigation Management BMPs" attached as Appendix 3 and can be seen on pg. 77-80 of BMPs of Irrigation Management for full details.

Planning For A Drought	During A Drought
• Get a PTTW before a drought so that you are not scrambling to get one while the crops are wilting away. • Match crops to soil types so that they will need less irrigate, which is especially ideal when there is less water available. • Build soil organic matter throughout the years; pays off annually but especially during a drought year when any water received needs to be held in the soil for as long as possible. • Invest in and use a mobile soil moisture meter.	• When irrigation is needed, know exactly how much is needed by monitoring your soil moisture. • For produce like peppers and tomatoes, plant crop with plastic mulch to hold the soil moisture to the roots and prevent evaporation. • With plastic mulch use a drip system irrigation which requires less water per irrigation event. Irrigating a little bit all the time gives a pond the chance to recharge instead of draining all of it at once (like with an overhead gun for example).

Irrigation shouldn't waste time, money, or water. Up-to-date information on scheduling strategies, the pros and cons of sprinkler, drip, and sub-irrigation systems, water-saving tips, and special applications are all available from BMP books. It even includes extensive crop-specific charts. Making sure a farm uses BMPs is the second step in drought planning, the third is establishing a secure water source.

Interested in getting a copy of your own BMPs books?

If you are an Ontario farmer, single copies of each title are available at no cost at your nearest Ontario Ministry of Agriculture and Food location. Books can also be order through an online order form from Service Ontario at http://www.gov.on.ca/OMAF/english/products/best.html

2.1 Soil Moisture Monitoring

Keeping an eye on soil moisture can help determine when irrigation is needed so that farmers do not irrigate too early or wait until the plants are already showing sign of water stress. When this happens, chances are the yield or quality has already been impacted. Soil moisture monitoring also helps remove questions of, "Should I irrigate today? Or can it wait a few more days?" Because the readings are accurate and field specific, monitoring the moisture day by day gives confidently planned irrigation events.

Figure 3: FieldScout TDR100 Soil Moisture Meter with 8" probes.

This Drought Contingency Pilot Project offered soil moisture monitoring to the surface water permit holders in the subwatershed and three farmers showed interest. Fortunately all of them had different types of crops: tobacco, peppers, tomatoes, seedling ginseng and two year old ginseng. Daily soil moisture monitoring over the months of August and September with a portable FieldScout TDR100 Soil Moisture Meter (Figure 3) took place at the same time each day. Results are described in more detail below in sections 2.1.1 through 2.1.3 and the monthly moisture graphs are in Appendix 4.

The FieldScout gives two reading measurement options: Volumetric Water Content (VWC) and Relative Water Content (RWC). The VWC is the ratio of:

$$\frac{\text{Volume of water for a Given volume of soil}}{\text{Total soil volume}} = \text{VWC \%}$$

It is expressed as a percentage and at saturation would equal the percent pore space of the soil. Using the VWC, you can determine a soil's field capacity and its permanent wilting point. The farms that were

monitored all had sandy loam soils meaning their field capacity would be 23% soil moisture and their permanent wilting point would be 11% (Figure 4).

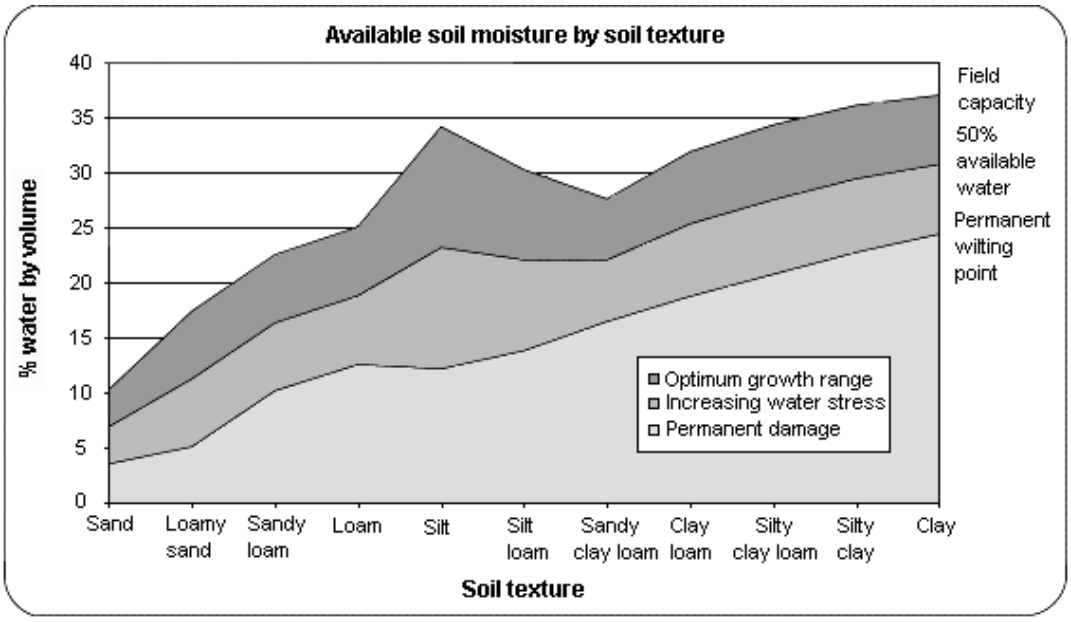


Figure 4: Available soil moisture by soil texture. Based on data from Ratliff, L.F., Ritchie, J.T., and Cassel, D.K. (1983). Soil Science Society of America Journal 47, 770(5).

RWC is index values calculated relative to the upper (wet) and lower (dry) VWC set points of a soil. If the RWC equals 100 the soil has reached the wet set point and it is at field capacity. By setting the field capacity (23% soil moisture) for the wet set point and the permanent wilting point (11% soil moisture) for the dry set point, the RWC reading became equivalent to the Plant Available Water (PAW) rather than just an index from wet to dry. The rule of thumb is to irrigate when a soil has reached 50% of the PAW. During the RWC measurement option, the meter not only displays the RWC (an index of the PAW) but it also shows the Water Deficit (WD) in inches necessary to raise the soil water content to the wet set point (field capacity). These two measurements go hand in hand: as WD increases PAW decreases.

The WD is displayed in inches, this is the same unit farmers use to set their irrigation amount so it seemed best to communicate WD with the farmers instead of PAW or VWC. Results were communicated with the farmers in conversation throughout the monitoring as well as in a final report. They easily understood and interpreted their soil moisture as a deficit of water from the field capacity rather than just telling them the soil moisture as a percentage. Irrigation events commonly apply 0.75” to 1.00” of water either on a weekly basis or whenever the farmer thinks the soil moisture is low enough that the field needs that much water again. If a 0.75” irrigation event was to take place when the WD was only 0.50”, more water would be applied than the field capacity and the extra water will go to waste. Not to mention extra running time for the irrigation systems and a waste of fuel. On the other hand, if a 0.75” irrigation event was to take place on a day when the WD was 1.00” then they would under-water and the next irrigation event would need to occur sooner so that the permanent wilting capacity is not reached. In most cases where the fields are under-watered and the soil moisture is not accurately monitored the field’s water deficit slowly adds up and the farmers are left playing catch up in

August and September. Just because it is common to apply 0.75" to 1.00" of water during irrigation does not mean that irrigating at a WD of 0.75" to 1.00" is the ideal time to start.

According to the water holding capacity of sandy loam soils, we determined that the "ideal irrigation start time" is at a WD of 0.65": approximately 50% of the water holding capacity and thus 50% of PAW. The "permanent wilting point" is at a WD of 1.3". The moisture monitoring results were graphed across times with reference lines at "ideal irrigation start time" and "permanent wilting point". When measurements were near the ideal irrigation start time it was recommended that farmers begin irrigation relatively soon. When readings approached the permanent wilting point it was recommended that farmers begin irrigation as soon as possible. If the fields often fall below the permanent wilting point the plants experience significant water stress and the crop's yield will be affected. See also the "Water Conservation and Protection in an Ontario Watershed" video on Farm and Food Care's YouTube channel at: http://www.youtube.com/watch?v=aR5j0NBvYh4

Planning for A Drought	During A Drought
Use a soil moisture meter throughout each season to get a feel for the readings and how their recommendations align with the current judgment for when and how much to irrigate. The results can be aligned with the usual schedule and once confident, all irrigation events can be planned with the meter. The graphs will show if irrigation is started too soon, too late, or if too much water or not enough is being used.	While monitoring soil moisture there might be some worries about waiting too long before the next irrigation event, it is okay to let water deficit fall to about 1.0-1.1", or a soil moisture of about 13% (in sandy loam soils). Growth will be reduced but many plants are able to adapt to some water stress.

2.1.1 Mr. Kertez – Tobacco Fields

We monitored soil moisture on Mr. Kertez's tobacco fields (Figure 5). After the first week of August the soil moisture quickly dropped in these fields (Appendix 4 Graph 1 and 2). On average, the soil moisture was kept pretty well between the ideal irrigation start and permanent wilting point lines. In the future, irrigation should take place a bit more frequently to avoid seeing low moisture values like those on August 7th, 12th, 15th, and 19th. The idea is to irrigate before the field gets this close to the wilting point. Unfortunately, Mr. Kertez did not have time to start irrigating until the last week of August and the rebound in soil moisture on the 26th reflects this. Since the moisture was already so low he was left playing catch up for the rest of the season. The rain events on September 7th, 11th, and 21st combined with his irrigation kept the soil moisture levels at a much better level in September and relatively close to the ideal irrigation start level. This was great because the tobacco plants were experiencing water deficit for almost two weeks in August and would have started showing signs of stress. Even though there were two frost events mid-September and a dry start to the seasons, there was still enough moisture to meet crop yield goals.

Figure 5: Reading the soil moisture on a tobacco plant in Oxford County.

2.1.2 Mr. Sroka – Pepper and Tomato Fields

We monitored soil moisture on Mr. Sroka's tomato (Figure 6) and pepper fields (Figure 7). After the first week of August the soil moisture quickly dropped in Mr. Sroka's tomato fields (Appendix 4 Graph 3). On average, after the 12th of August the soil moisture in the fields *with* plastic mulch was kept between the ideal irrigation start and permanent wilting points. However, the soil moisture in the fields *without* plastic mulch fell to the wilting point after August 6th and was never brought back to ideal moisture levels. Irrigating a bit earlier in August for the tomatoes in order to prevent that initial drop in soil moisture that occurred early in the season could have helped prevent the field from getting so close to the wilting point throughout August. This will eliminate the need to play catch up for the rest of the season.

Figure 6: Reading the soil moisture on tomatoes with plastic mulch (on left) and without (on right) in Brant County.

Figure 7: Reading soil moisture on peppers with plastic mulch in Brant County.

The soil moisture in the pepper fields with black plastic mulch (Appendix 4 Graph 4 and 5) is similar to the tomatoes with plastic mulch. The moisture in the pepper fields dropped in the first week of August and was maintained at about the same level throughout August with a few very dry readings on the 7th and 15th. However, in September the peppers were kept at optimal moisture levels; harvest was around the corner and sufficient water before harvesting peppers is critical. Compared to the month of August you can see how much higher the moisture readings were. It was exactly the kind of trend a drip-system should maintain for maximum yield. The peppers were harvested in late September, so the frequent irrigating and rain gave the very high soil moisture readings on days like August 18th and 25th when there was more moisture than the soil's water holding capacity. These are days where the pumps could have been turned off a few hours earlier, had the farmer been monitoring his own soil. Once the water holding capacity of the field is exceeded the water drains through and cannot be utilized by the crop.

2.1.3 Ken Van Torre – 1 & 2 year Ginseng

Figure 8: Monitoring soil moisture on one year old, or seedling, ginseng (on left) and two year old ginseng (on right) in Brant County.

We monitored soil moisture on Mr. Van Torre's one year old ginseng and two year old ginseng (Figure 8). Over the first week of August the soil moisture quickly dropped in both seedling and two year old ginseng fields. On average, the soil moisture in both fields was kept between the ideal irrigation start and permanent wilting points without the need for irrigation (Appendix 4 Graph 6 and 7). Seeing that ginseng does not like a lot of water, this season seemed to be just right for ginseng. This should show in the harvests of the 3 year old ginseng that took place this fall. Hopefully this will also give a nice rebound in the 2 year old ginseng that might have suffered from last year's dry year when it comes time to harvest that next fall. It was interesting to see that there was not much moisture difference between the seedling and 2 year old fields considering the difference in crop size in August. In September however, the rain events on the 7th, 11th and 21st busted the soil moisture above the wilting point. Interestingly, the 2 year old fields started showing lower soil moisture in September than the seedling ginseng. All around, it seems like the fields had a wet start but were at ideal conditions throughout the season.

2.1.4 Benefits of Soil Moisture Monitoring

During the process of monitoring soil moisture at various farms it was evident that even though farmers were using their best judgement to make irrigation decision, they often waited longer than needed to begin irrigating. If they follow the recommendations of soil moisture monitoring in the future and continuously apply the smaller amount of water the meter tells them then they would not be dancing around the wilting point of their crops throughout the season. Preventing soil moisture from getting there is a lot easier than trying to get it back up. Knowing the critical watering periods of crops helps determine when it is "critical" to apply the right amount of water. Crops that need lots of water prior to harvest, like peppers and tomatoes, were being over watered at harvest on the monitored site and the farmer could have been saving money and time irrigating if he kept track of the moisture as it approached field capacity.

Interested in monitoring soil moisture?

Find a provider who sells soil moisture probes and look for existing cost-share programs that might help cut the costs. For more information on monitoring your own soil moisture and to get help finding a provider contact *Rebecca Shortt* at OMAF (519) 426-4920. Or see fact sheet "Monitoring Soil Moisture to Improve Irrigation Decisions" www.omafra.gov.on.ca/english/engineer/facts/11-037.htm

2.2 Evapotranspiration (ET)

Figure 9: ET Gauge

Plants transpire more than 95% of the water they take up. Evapotranspiration (ET) is the amount of water that a crop transpires and the amount of water evaporated from the soil and plant surface. It can be measured by an ET gauge (Figure 9) and since the readings are influenced by climate they are different every day. Keeping track of and adding up ET values is another way to determine *when* and *how much* to irrigate. ET values equal the amount of water that needs to be given back to the field to maintain crop growth. For example, when the ET readings are around 0.65", begin setting up the next overhead irrigation gun event while a drip tape system should have already been started when ET equaled around 0.4". After irrigation, start adding up the ET values again until it reaches the starting value selected; 0.65" for overhead guns and 0.4" for drip tap. When using ET values posted online, take into account where and how far away the gauge is located to ensure the readings are valid for the farm location.

During this project, ET rates and daily temperature were tracked from August to the end of September, shown below in Figure 10 as weekly summed values. For example, in Figure 10 the week of Aug. 1 to 6th has an ET value of about 0.4". This means that if someone irrigated 0.4" on Aug. 7th they will return the exact amount of water to the field and crops lost the previous week. After the first two weeks of August, the ET values sum up to 0.9", so if they did not irrigate the 0.4" on the 7th, now they would need to irrigate 0.9" on the 14th.

Planning For A Drought	During A Drought
Just like soil moisture monitoring, practice using ET values to determine how current irrigation decisions line up with the ET recommendation.	While monitoring ET, rather than starting irrigating when ET= 0.65" to 0.75" let water deficit fall to 1.0"-1.1" (in sandy loam soils).

Interested in ET readings?

ET values are available at the Ontario potato grower's website, brought to you by the Ontario Potato Board and Weather INnovations website: http://www.onpoatoes.ca/cwd.cfm. To find another ET gauge in your local area that might not be posting readings online by contacting *Rebecca Shortt* at OMAF (519) 426-4920.

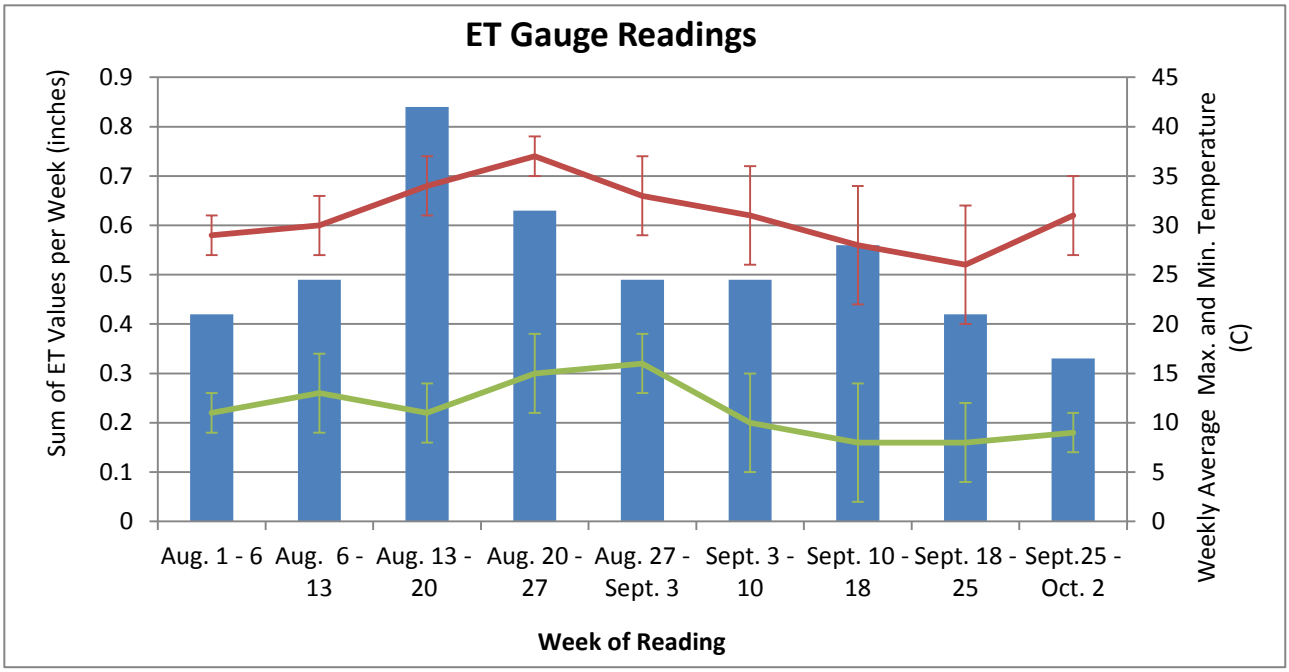


Figure 10: Sum of weekly ET values (in inches) throughout August and September. The weekly average maximum and minimum temperatures (C) at the GRCA's Burford Nursery are plotted as well, notice the temperature variability bars which show the range of temperature in each week.

3.0 Water Sources

Groundwater is the water that percolates through multiple layers of soil and makes its way in underground channels to an aquifer, which is a large body of water underground. Wells tap into these aquifers and act as major sources of water for municipal, agricultural and industrial uses. Groundwater also supplies many aquatic and wetlands systems with continual water in the form of natural springs. Groundwater is not as quickly affected by climatic events such as drought, but over a prolonged period of time, groundwater recharge of ponds and streams can slow. On the other hand, surface water sources are affected by drought more quickly since they are primarily influenced by rain and snow melt. Rivers, creeks and streams are all surface water sources and it is not hard to tell when their flows are dropping. These sources are fed by water that flows on the ground surface in a downward slope until it reached the body of water or watercourse. During a drought, temperatures are high and precipitation is scarce. Any rain that does fall is absorbed by the soil. This means all surface water sources will be under stress, imagine the irrigators who depend on surface water to irrigate their crops and how much stress they will be under as their livelihoods are at stake without enough water for their crops.

This is why it is important to establish a secure water source prior to a drought so that for those with a surface water source, from a creek let's say, are getting low flows, they can have a backup plan: a groundwater sourced pond. Wells or ground water fed ponds are called "offline" sources; taking from them doesn't decrease stream water levels with immediate impact such as with direct stream takings "online" sources. The best way to establish a secure offline water source is to locate or create a groundwater pond or well on a farm that could be used either as a primary source or as a contingency source. If a pond is not recharging very well, use a well or even a surface water source to fill the pond up *while the flows are high* in the spring. Many farm operations already depend on groundwater fed ponds as their primary water source simply because of their distance from a watercourse, even in these cases

it is still recommended to have an alternative backup pond as a contingency source. This way if the recharge time of the primary pond started to slow during the growing season, and they didn't want to draw from a well or surface water sources, they could off-set the waiting time by alternating irrigation from other ponds. For a summary of how to create a contingency groundwater source, see Appendix 5.

Farm operations that depend primarily on surface water sources are most at risk during times of drought. This is because of the reduced amount of rainfall and thus reduced amount of water in the creeks and tributaries. It may seem pointless to create a pond if there is a healthy creek flowing near the property but with reduced rainfall and increased temperatures during a drought, water levels will keep getting lower. When flows decline to a point where a Low Water Level is announced by the Water Response Team (administered by GRCA), water takings need to be reduced by 10%, 20% or even more than 20% to ensure continued flow in the stream. This applies to both ground and surface water takers. The tricky thing about surface water source is that MOE requires them to take no more than 10% of the flow at the permit's taking location at any given time of year. You can imagine how quick takings will equal 10% of the flow when the water levels are dropping. There will be a point where an irrigation pump requires 30% or even 50% of the water flowing and the farmer will have to find another source. The general terms and conditions imposed on a water taker by a Permit To Take Water (PTTW) require that when water taking occurs it must not stop of reduce stream flow to a rate that diminishes the availability of water for other users or to sustain the natural function of the stream. The MOE routinely inspects water takers and also responds to complaints reported by other users of the stream. When the MOE encounters unauthorized water taking or water taking that is not complying with the terms and conditions of a PTTW, it will immediately enforce measures to restore compliance with the PTTW and to protect the water supply for all other uses. If contingency source of a groundwater pond is established ahead of time, the only regulations they will need to follow is the appropriate percentage reduction in takings at the particular Low Water level Response.

Planning For a Drought	**During A Drought**
Whether a new pond can be dug or an existing pond can be renovated, take action to establish a groundwater source. Then apply for a PTTW or an amendment to your existing PTTW *before* a drought event.	During a drought if there is no established contingency groundwater pond, contact neighbors if they have an existing unused irrigation pond with a PTTW. A holder of a PTTW can authorize another person to take water under the terms and conditions of the PTTW. The permit holder cannot however, 'lend' the permit to someone else to take water from another source for any purposes. If circumstance arise that might require you to take water under someone else's PTTW, it would be best to involve the MOE in those discussions. Cash crop growers, for example, may have an active PTTW for a pond on their farm in case future renters want to grow a water demanding crop.

The future direction of alternative water sources for drought contingency planning includes the identification and establishment of community irrigation ponds. Draft documents have been made during this WRAMI pilot project for such a scenario where a land owner with an irrigation pond and PTTW can accept requests from his neighbouring irrigators to pump from his pond. These ponds would

have a short term agreement with the land owner, or the community pond "host", and the irrigator(s) who are granted permission by the host. Ways in which we can identify candidates for these ponds is by locating cash crops farms with permitted irrigation ponds using 2013 AgRI Ground Truth Observations map created by OMAF. Since cash crops do not require irrigation and they may be in rotation on a field with an irrigation pond, that pond could be used by neighbouring irrigators during the year(s) the cash crops are grown. Specifically during times when the water levels drop during a drought and negative effects are seen on farmers' primary water source. Appendix 6 has the draft "Community Pond Permission Request Procedure" which can apply to any drought sensitive areas.

3.1 Pond Renovations

The WRAMI project funded pond creation or renovation for surface water permit holders who wanted to create contingency sources or simply increase their water storage capacity. Two farmers showed interest in renovating existing old irrigation ponds to have an alternative source that can supplement their surface water source yearly, but especially during a drought when their surface water sources reaches low flows. Three additional farmers showed interest in increasing the storage capacity of their existing irrigation ponds so they could have more storage in case their recharge slowed during a drought. These five case studies are described below. See also the "Pond renovation creates alternative irrigation source for Ontario farms" video on Farm and Food Care's YouTube channel at: http://www.youtube.com/watch?v=9CoPtrpgnCk&list=PLxl8ycqu125fcq7iHjSuc2KV60lhXAru_.

3.1.1 Case Study 1: Mr. Kertez

There was an old 1950's dugout pond on Mr. Kertez's property and over time the springs naturally started clogging up with silt and the surrounding trees began to mature. Mr. Kertez had an active surface water PTTW from Horners Creek on his property and he wanted us to help him renovate the old pond so that he could partially divert his takings to an alternative source (shallow groundwater fed pond). The pond proposed for renovation was determined not to be in a wetland by Robert Messier at GRCA. This removed the need for any permitting that would have been required for this job since the pond was not a wetland and it is farther than 120m from any watercourse. The pond was cleaned to a maximum depth of 10ft with a 50ft extension on the North side (See Figure 11 through 14). The excavator and farmer were made aware of the importance of using the most environmentally friendly approach to the job to minimize the loss of trees around the pond. The excavator approached the site from the West side and trees were removed only from the North and West sides of the pond in order to access the pond and to create the 50ft extension. We were able to preserve the habitat on the East side of the pond and maintain a healthy tree cover. The removed fill and trees were placed in the shrubs West of the pond. The result was a cleaned, deepened and extended pond that Mr. Kertez is now adding to his existing PTTW so that he may irrigate from this pond in the following growing season.

Figure 11: Mr. Kertez's pond before, Entire pond.

Figure 12: Mr. Kertez's pond after, Entire pond, 50ft expansion of the North side (near the top of photo).

Figure 13: Mr. Kertez's pond before, South side of pond.

Figure 14: Mr. Kertez's pond after, South side of pond.

3.1.2 Case Study 2: Mr. Wigand

Just like his neighbour Mr. Kertez, Mr. Wigand had two old 1950's dugout ponds and over time the springs naturally started clogging up and the surrounding trees began to mature. Mr. Wigand had an active surface water PTTW from Horners Creek on his property and he wanted us to help him renovate the old ponds so that he could partially divert his takings to an alternative source (shallow groundwater fed pond). Both ponds were determined not to be a wetland by Robert Messier at GRCA. However both ponds still needed to get GRCA work permits as they fell into the GRCA regulatory areas. The excavator approached the first pond from the East and West sides and cleaned the whole pond area as well as the boarders so only shrubs were growing in with a few large trees (Figures 15 and 18). The second pond had a wall of mature trees all around it so in this case the excavator accessed the pond from the North and South sides to minimize tree removal while still cleaning the entire pond. Both ponds were cleaned out to a maximum of 10ft depth. Prior to beginning the work, the excavator removed the top soil from a large area beside the pond so that the fill from the pond could be spread in that area and then leveled back with the topsoil. This way Mr. Wigand lost no land and had two ponds cleaned and deepened for irrigation which he is now adding to his PTTW.

Figure 15: Mr. Wigand's pond before from South Side.

Figure 16: Mr. Wigand's pond after from South Side.

Figure 17: Mr. Wigand's 2nd pond before from South Side.

Figure 18: Mr. Wigand's 2nd pond after from South Side.

3.1.3 Case Study 3: Mrs. Rudy

This was an existing irrigation pond that Mrs. Rudy wanted to clean up and deepen. Although the pond backs onto a wetland, the Southwest extension of the pond was determined not to be a wetland by Robert Messier at GRCA while the North side of the pond remained as a wetland. The pond needed a GRCA work permit as it is partially in a wetland and therefore the GRCA regulatory area. The excavator accessed the pond from the South side and cleaned the South and West extending arm to a maximum of 10ft (See Figures 19 to 22). The majority of the North extension was left alone to prevent damages to the wetland North of the pond. We promoted to further protect the wetland habitat by placing logs in the North end and installing a wood duck nesting box as well. The fill was placed South of the pond and once it dewaters, Mrs. Rudy had the excavator move the soil around the farm.

Figure 19: Mrs. Rudy's pond, before on the West arm.

Figure 20: Mrs. Rudy's pond, after on the West arm.

Figure 21: Mrs. Rudy's pond, before East side.

Figure 22: Mrs. Rudy's pond, after East side.

3.1.4 Case Study 4: Phil DeMunck (Triple View Farms)

Triple View Farms already took the initiative to creating a contingency source aside from their existing source at Whitemans Creek. They dug the small pond four years ago and although it sustained their ginseng operation the land owner recognized that when he rents his land out in the future it would not have enough storage for water demanding crops. He preferred the renters have a secure water sources in the pond than having to resort to Whitemans Creek. This project needed a GRCA work permit because it partially fell into regulatory lines. The excavator approached the pond from the East side closest to the road. It was cleaned out to a total depth of 12ft and there was a 3m extension on either side of the pond (Figures 23 and 24). The spill was primarily gravel and went on the South side of the pond where it will be crushed and spread across the farm laneways by the land owner.

Figure 23: Triple View's pond before from the West.

Figure 24: Triple View's pond after from the West.

3.1.5 Case Study 5: Mr. Vamos

Mr. Vamos has a large irrigation pond with two culverts acting as outlets. There was a GRCA work permit required for this project and that has been approved. However, this project was postponed to next season as it is connected to a cold-water system which means the work cannot begin until July 1st of 2014 and should be completed by Oct. 1st 2014. Robert Messier, an ecologist at GRCA, has identified trout spawning in the channel created by the pond's outlet that acts as a tributary to Rest Acres Creek, a tributary to Whitemans Creek. Robert says there is no mitigation plan that we can develop to get approval to begin the project this year. There are opportunities to extend the in-water works *later* into October next year if required (which it will be) so Robert will work with the Specialist to figure out how late we can work past October 1st of 2014. The work will begin with the installation of an AgriDrain control structure that will be installed in the West arm of this pond (Figure 25) with an inlet pipe from the centre of the pond and an outlet pipe leading 200 feet into the wetland North of the pond. Rather than having his current East culvert be the predominate outlet (Figure 26). The control structure will reduce the temperature of the water leaving, stop beavers from clogging the outlet, and control the exact level of the water in the pond. This will help prevent Mr. Vamos' pump houses from eroding into the banks, as well in times of pond clean up the water level can be lowered to reduce the difficulty of cleaning this large pond. The length and design of the outlet pipe will stop erosion issues that have been taking place from the water channel erosion with the current outlet design (Figure 27 and 28). The pond

will be cleaned to a depth of 12ft (Figure 29 and 30) and the spill will be used to fill in the East and West arms of the pond (Figures 25 and 26). The excavator will use the main farm lane, South of pond, and will work from the edges where there are no tree line buffers.

Figure 25: Mr. Vamos' pond before, West arm.

Figure 26: Mr. Vamos' pond before, East arm.

Figure 27: Mr. Vamos' pond outlet downstream of East arm.

Figure 28: Mr. Vamos' pond outlet downstream of East arm.

Figure 29: Mr. Vamos' pond before, West side of pond.

Figure 30: Mr. Vamos' pond before, East side of pond.

4.0 Recommendations

A lot of lessons were learned from the proactive approach taken for this project and the community involvement that resulted. Five of the major recommendations and guide lines are described below.

1. It is very important to outline and establish all goals of your project when working with a committee of multiple members with different interests. Advertise, send letters and make the target community aware of the project before meeting with individuals. As the project begins keep in touch with everyone interested whether they are involved in the project, just want occasional updates or have a few minutes to chat so that you can learn from their experiences. These conversations are priceless.

> *It took longer than expected to get the initial introduction letter out to the public and this delayed the start time for meetings with farmers, field work and setting up a demonstration site. If we would have sent out the letter in our first week we would have almost a month more of data. Perhaps the better solution would have been to hire the Specialist earlier.*

2. If workshops are planned, schedule them between December and April. After April there will always be a group of farms who are planting, irrigating, pruning, harvesting, combining or cultivating and they will not be free until about December. Advertise workshops through newspaper and bulletin boards but especially through personal letters to target your group of interest.

> *The field demonstration site during this project had a workshop at the end of August to show the benefits the soil moisture meters had on the crops. However, many irrigators could not attend because they were out irrigating their own fields or harvesting crops. Even if you are demonstrating equipment on a field that needs to have crops on, schedule the workshop either right after planting when the seedlings are just establishing or at the end of the season in late November.*

3. If the project involves cost-share initiatives, such as this one, create your funding criteria and distribute it to everyone applicable so all details, requirements and pricing is discussed as soon as possible. This will help prevent confusion and arguments later when the farmer says, "Well you never told me this before…"

> *One of the farmers was under the impression the pond renovation would be 100% paid for by the WRAMI project as "cost-share" was never officially discussed during the time the renovation was being planned. Once the excavator estimate was received, the farmer was informed of his share of the cost of the project. He was surprised he had to pay anything. Thankfully, the project still went head, but that confusion could have been avoided if cost-sharing was brought up earlier.*

4. If any equipment will be used, learn how to use them and work out the bugs *before* the growing season so that you do not waste any time trying to get them working when you should be collecting data.

> *One of the soil moisture meters used in the project was not setting up properly and the data logger would not log the data. There was trouble shooting throughout the season but no valid data was collected from that data logger. This was supposed to be the reference moisture to see how efficient the irrigator was on that site. Although occasional one time soil moisture readings were taking with another meter, there was no continual data as anticipated.*

5. If any renovation or construction related work is planned, figure out *all of the possible* permits, work timing-windows and other funding programs that exist *before* asking people whether they are interested in getting "x" renovation or project done.

> *Farmers were not aware that work permits were needed from the GRCA to renovate their existing irrigation ponds. These permits could have been received earlier if the farmers were aware of them. All works were still completed on time but there was a few weeks delay waiting for the permit approvals. However, one of the projects needed not only a work permit but it also had to be done in the cold-water timing window since the pond had two outlets to a tributary of Whitemans Creek. Had the project Specialist or farmer known about this timing-window earlier, they could have pushed to get the plans, estimates and work permits done faster so that the work would not have had to get bumped to the next timing window.*

6. This type of a program should be established as a sustainable long term program so that a proactive approach to drought planning can continue in all watersheds. It is essential to have someone coordinating the project and working with the individuals involved to build a trustworthy relationship with the agricultural community. Having a multi-agency steering committee gives ample amount of support and guidance for the coordinator and leaves a positive impression on the community.

> *The uptake from the irrigators in the Whitemans Creek subwatershed was excellent and irrigators were already asking about what next year will bring as they are interested in participating again. This type of feedback alone suggests the need to continue having an individual working in the field as much more progress and success was accomplished than otherwise. The farmers were happy to see things getting resolved quickly because the agencies were working together on one timeline so that progress could actually be made.*

7. Other funding sources such as those from the Ministry of Natural Resources and from Ducks Unlimited Canada (DUC) should be brought into the equation as many benefits arise from renovation projects that promote the goals of multiple funding sources.

> *DUC was especially interested in helping pond renovation where the land owner is interested in signing a conservation agreement and received a wood duck nesting box kit to promote water fowl habitat. Supplies, tools, instructional booklets, species identification books are just some of the things interested land owner would get, all for the low price of agreeing to take care of the box by cleaning it every winter.*

5.0 From the Farmers

During discussion on countless meetings with farmers in Brant and Oxford County, there were two interesting things brought to light where farmers would like to see change:

Problem 1: Irrigators are encouraged to use drip tape irrigation due to its frequent but low water application requirements. This means less immediate stress on their water source and better crop yield from frequent watering. When investing in drip tape, these irrigators also need to invest in plastic mulch to minimize soil moisture loss. Unfortunately both plastic mulch and drip tape need to be replaced annually to ensure a quality distribution of water and minimal moisture loss. Buying them to set up a new system yearly is one thing, but unfortunately these irrigators also have to pay to dispose of their plastic waste.

Solution: Establish a grant or funding program from the County or OMAF that would pay for farmers to dispose of their drip tape and plastic mulch. Irrigators understand the benefits of investing in a drip tape system but they do not agree with being penalized for its disposal.

Problem 2: Irrigators are expected to apply for a PTTW for *all water sources* from which they take more than 50,000L/day. They are to apply for amendments if they want to change anything about their permit and they need to apply for a renewal every "X" number of years. Unfortunately, these steps all require paper work and a lot of it, especially if your water source is a surface water source like a creek or river. Irrigators are becoming more informed about the PTTW requirements but not everyone understands the rules and processes involved. Doing research online is not a viable option for everyone.

Solution: Create and schedule PTTW workshops year round, preferably *three times* throughout winter: first week of December, last week of January and last week of February. These workshops need to be advertised in the newspaper, on local bulletin boards and online as the growing season wraps up so people can plan to attend one if not all of the workshops. The workshop must cover: when a PTTW is needed (ponds need permits too!), the three categories of PTTW, what forms you need, where you find the forms (especially for those people who don't use computers), how you apply/fill out those forms, when do you need to apply for amendment, how to renew your PTTW, and how and when to submit your PTTW annual water usage.

Problem 3: The Water Response Team mails letters to irrigators if a Low Water Levels is reached in their subwatershed. This is a way to communicate to irrigators that flows are low and we may be getting a dry spell so conservation actions need to be implemented. During Level 1 , irrigators are asked to voluntarily reduce their consumption by 10%, in Level 2 by 20%, and in Level 3 the Water Response Team may ask the province to impose mandatory restrictions on the PTTW holders. The ultimate goal of this Response team is to declare low water conditions for each part of the Grand River watershed. However, there is no contact between this team and irrigators when flows are normal or high, which is the case in wet years.

Solution: Farmers should get letters from the Response team when the water flows are normal, high, or are beginning to approach low instead of only getting news when the flows reach a Low Level. A monthly letter throughout the growing season for example would keep irrigators in the loop and (if a graph is included) show them how the water level has changed over the month. Some irrigators will not care either way and may not even read letters from the Response team. But others, would like to have good news mailed to them not just the bad news of, "you need to reduce taking water."

Conclusion

With the results of the field monitoring and the feedback from the irrigators who were involved, there is no doubt that this program would benefit the Whitemans Creek subwatershed year after year. The best part about this type of proactive community involvement based project is that it could be done in other sensitive irrigation areas too. The objectives of the committee can apply to any watershed that wants to help irrigators plan for times of low water. There is nothing but gained knowledge and increased water security to the agricultural community from our results. The findings were achieved in just months of working with the Whitemans Creek subwatershed community, imagine what can be done if this type of program continues or even became permanent.

Appendix 1: Summary of Plan

Summary of a Drought Contingency Plan

1) Make sure your irrigation system is in place and working accurately,

I. Choose your irrigation system based on your crop type & get your irrigation system assessed annually.
   a. Plastic mulch and drip for produce, overhead for larger crops, pivots for potatoes etc.
   b. Irrigation system assessments can highlight the areas that need to be adjusted.

2) Use Best Management Practices (BMPs) year round,

II. Build your soil organic matter throughout the years
   a. Pays off annually but especially during a drought year when any water received can be held in the soil for a longer time.

III. Invest in and use a mobile soil moisture meter
   a. Use it as often as you can to see how the meter's recommendations align with your current judgment for *when* and *how* much to irrigate.

IV. Use Evapotranspiration (ET) values
   a. Determine how your current judgment lines up with the ET recommendation.

3) Secure a reliable water source with a Permit To Take Water.

V. Establish a groundwater pond as a primary or contingency source
   a. Either dig a pond or renovate and existing one and apply for a PTTW *before* a drought.
   b. Assess how frequently you are affected by drought and how severe you're planning needs to be. For example, how many years in 10 does the supply get stressed?
   c. Consider contacting your neighbours to see if they have irrigation ponds that you can use as an alternative source.

Appendix 2: Irrigation Assessments

Irrigation Assessments

The Assessment: Involves running the irrigation system for a minimum of 4 hours, during which time e technicians will measure the pressure, flow rate and depth of water applied in several sections of the field or zone (Figure 2).

The Results: Tell you the Distribution Uniformity (DU) (how much the water depth will vary across the field). If the DU does not meet the standard, then the raw data collected during the assessments can highlight which sections of your irrigation were under or over watered.

The Goal: To adjust the pressure, nozzles or whichever aspect of the system to get an even application to will ensure that the system will actually apply the set amount of water to the soil. Results will either leave you feeling assured that your system is working correctly or will highlight the areas in which your system needs to be adjusted.

Appendix 3: Irrigation Management BMPs

Irrigation Management BMPs

1. **Get the required Permits to Take water (PTTW)**
    - Apply for PTTW for *all* water sources *creek, well or pond.*
    - Keep track of your daily usage and submit annually to MOE.

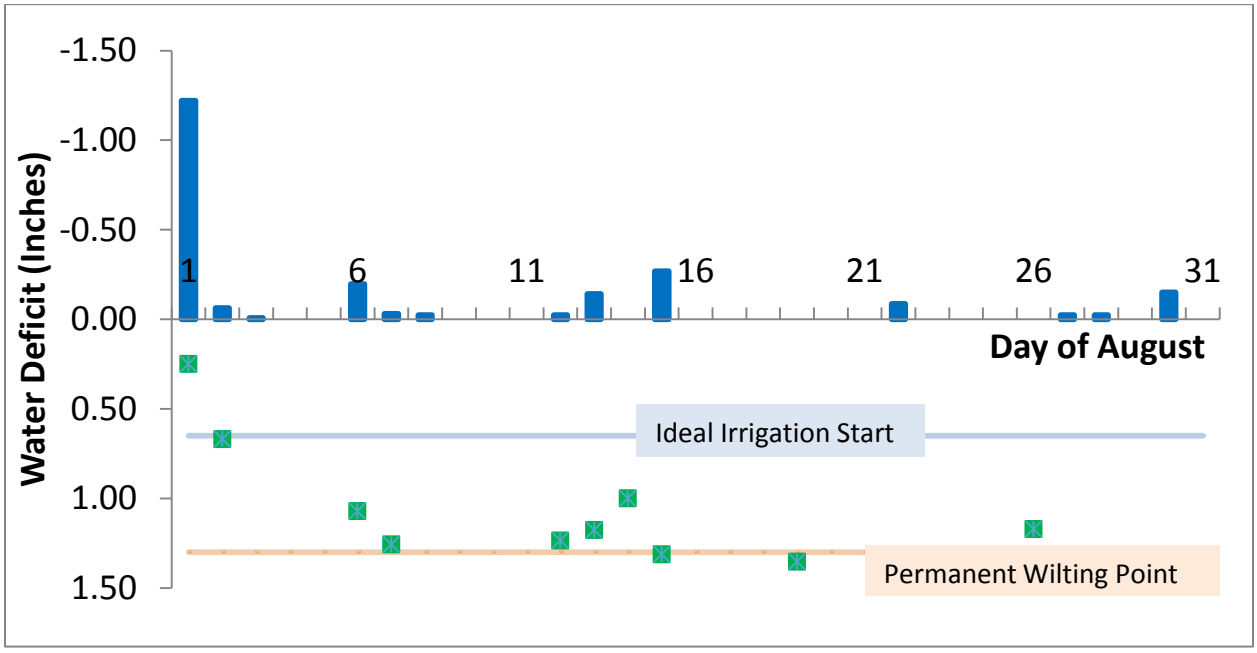
2. **Build healthy soils**
    - Build soil organic matter: 0.5% increase in soil organic matter results in 12% increase in water-holing capacity of sandy loams.
    - Reduce tillage.
    - Use conservation tillage, keep residue on surface, encourages infiltration (See also BMPs for Soil Management).

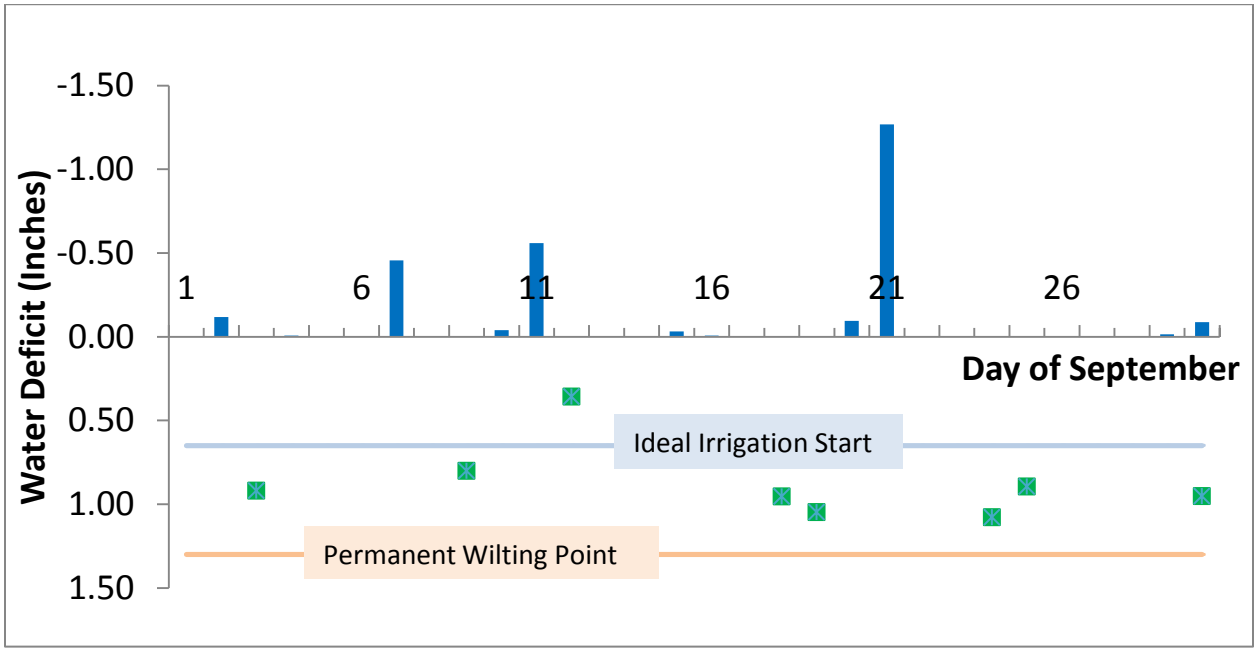
3. **Irrigate efficiently**
    - Harvest and store water from watercourses during peak flows.
    - Apply the *right* amount of water- measure soil moisture.
    - Try to upgrade to drip irrigation next time if it suits your crop.
    - Schedule irrigation to take into account forecast information.
    - Irrigate at night and in low winds.
    - Maintain your irrigation equipment.

4. **Reduce water loss from crops and soil**
    - Plant windbreaks to slow drying.
    - Use plastic or organic mulch.
    - Schedule short season crops for spring or fall.

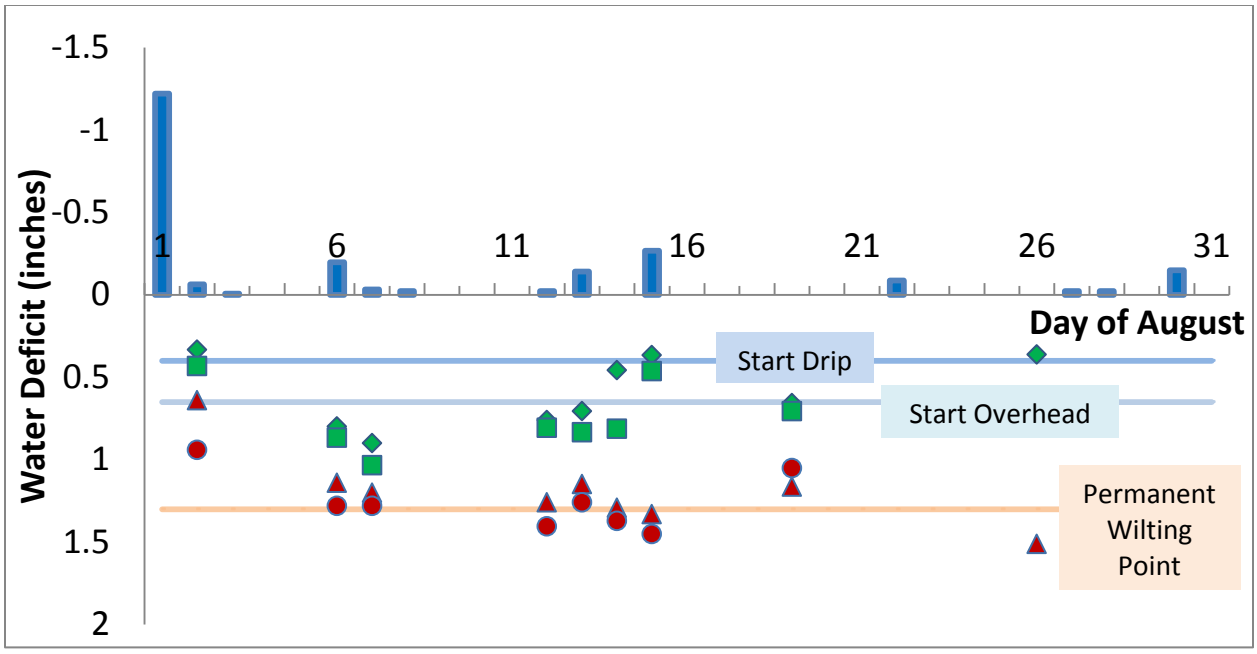
5. **When considering to irrigate, weigh the increased costs and potential benefits**
    - Calculate the cost/benefit of an irrigation system for your operation.

Appendix 4: Soil Moisture Graphs

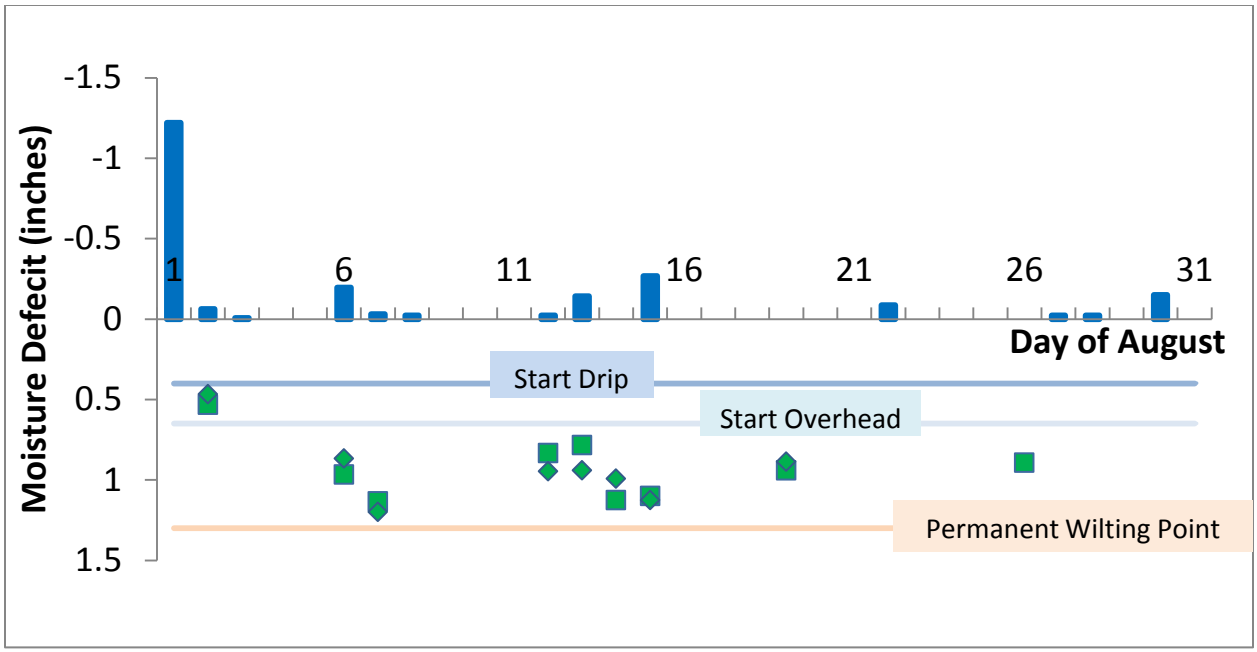


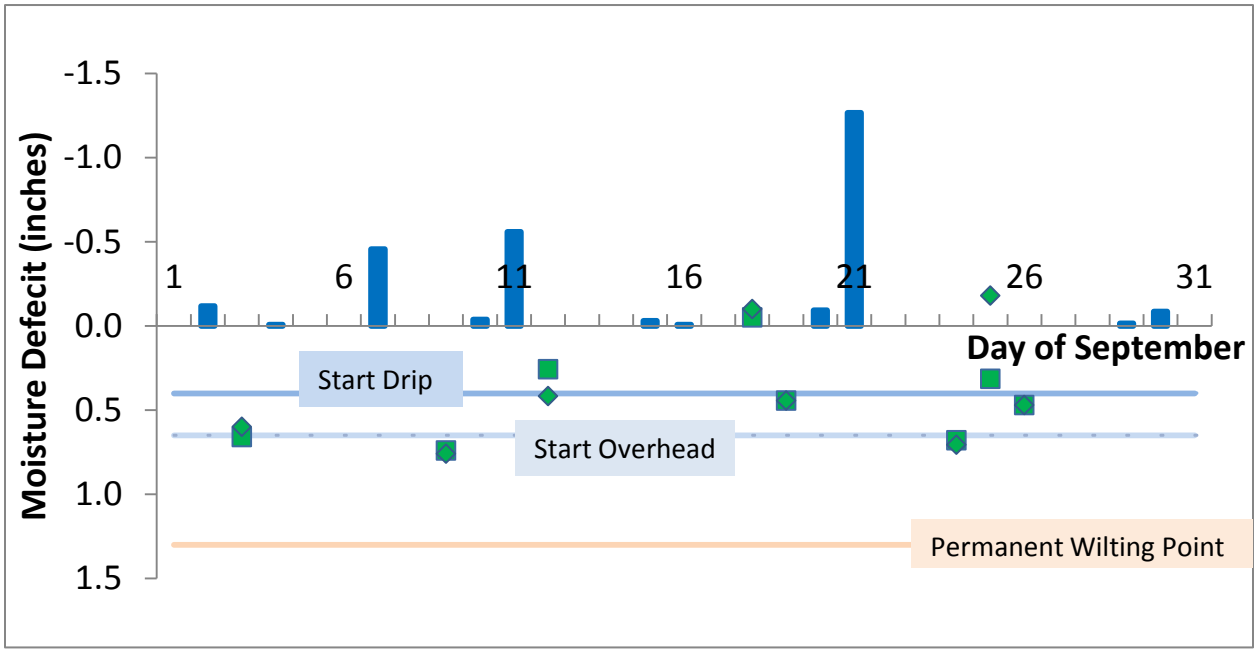


Graph 1 and 2: Soil moisture monitoring for Mr. Kertez's Tobacco in August and September. Points represent the average of measurements taken across all of the fields. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked.

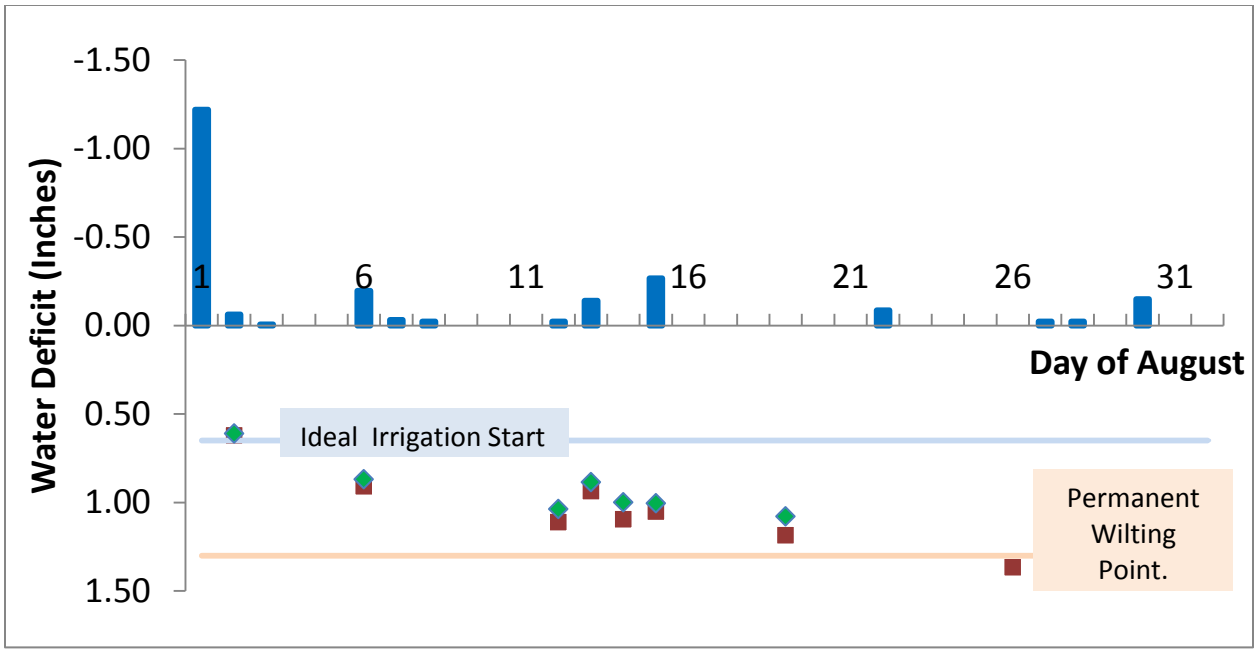


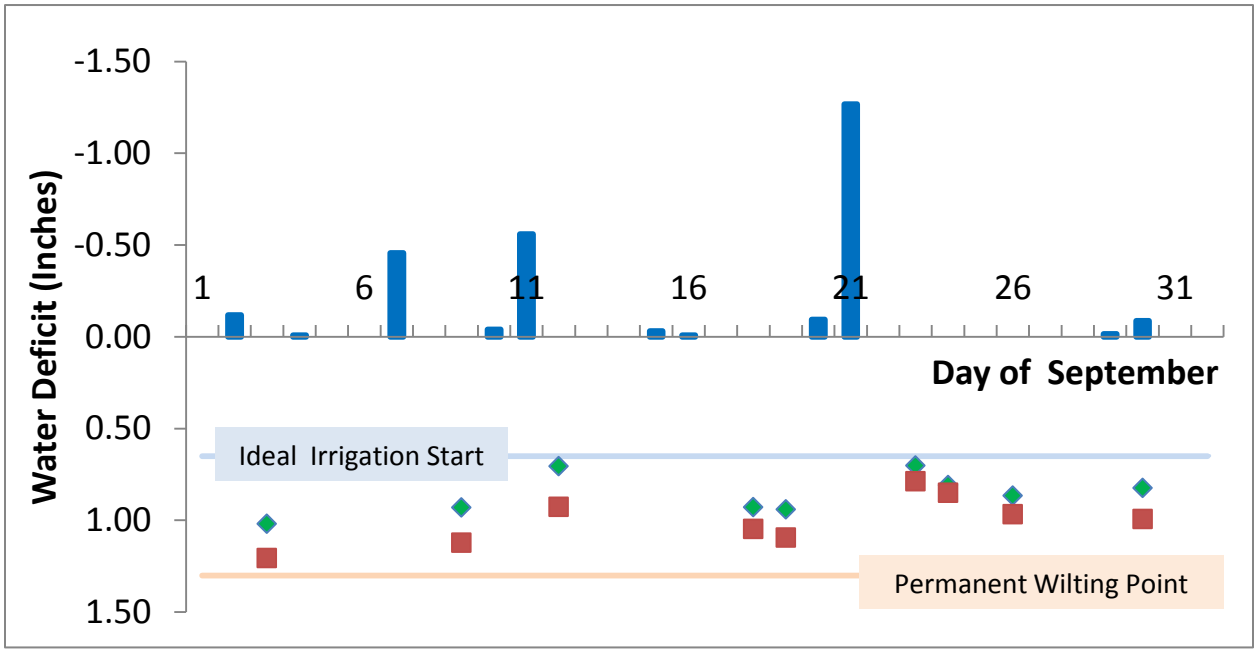
Graph 3: Soil moisture monitoring for Mr. Sroka tomatoes in August. Points represent the average of measurements taken across all of the fields at two different points: the beginning of the row and after the 1st sand knoll. All green points are for tomatoes with mulch and all red points are for tomatoes without mulch. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.





Graph 4 and 5: Soil moisture monitoring Mr. Sroka's peppers in August and September. Both figures represent the average of measurements taken across all of the fields at two different points: the beginning of the row and after the 1st sand knoll. All green points are for peppers with plastic mulch. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.





Graph 6 and 7: Soil moisture monitoring for Mr. Van Torre's ginseng in the months of August and September. Points represent the average of 3 measurements taken in 5 different rows that were 5 rows apart. The ideal irrigations start time, permanent wilting point, and amount of rainfall collected at the Burford Nursery Weather Station have been marked for the ease of comprehension.

Appendix 5: Creating a Contingency Groundwater Source

Interested in creating a contingency groundwater source?

These are the steps you will take to renovate or create a new irrigation pond (not connected to a stream or creek):

Step 1: Plan

1) Design your plan to create a pond or renovate an existing one. Try using online mapping tools if you can or contact a hydro-geologist or a contractor to help you design the perfect pond. To create a plan, you can go to http://www.grandriver.ca/, scroll down to "Online Services", click on "GRIN: Maps,…", then click on "Create a map" and you're on your way.
2) To determine what size of pond your irrigation system needs to cover "x" amount of acres, read through the Irrigation BMPs book or contact *Rebecca Shortt* at OMAF (519) 426-4920.

Step 2: Permits

3) Contact your local Conservation Authority (CA). Based on the project location, whether you are proposing a new pond or renovating an existing one they will tell you if the pond falls into a regulated area. If so, you need to apply for a work permit from your CA.
    - If you *do not* fall into a regulated area, then there are no other work permits required.
    - If you *do need* to get a work permit, the CA can send you the paper work. You need to fill out the one page application, attached your project plan, and pay the required permit fees.
4) Timing windows: your CA will tell if your pond is connected to a cold water system. If so, your project must be completed within the cold-water works timing window: Jul 1 – Oct 1.
5) If the pond project will involve tree removal, contact your county to see what tree bylaws exist.

Step 3: Contractor

6) Contact your local excavators to arrange site visits and get accurate estimates.
    - Do not assume the lowest hourly rate will be the cheapest; ask the contractor about their equipment's reach, years of experiences and get other people's reviews.
7) Once you chose an excavator, walk them through your plan and schedule your start date.

Step 4: Permit to Take Water

8) When the pond is finished, contact the MOE or go to their website: http://www.ene.gov.on.ca/ to get all of the forms needed to apply for a PTTW. On the website's home page, click on "Water" (left side of page), scroll down to "Water Taking", and click on "Permits to Take Water". All of the forms will be listed there. If you need extra help, call the MOE toll-free: 1-800-565-4923 and ask to speak to someone about Permits to Take Water.

Appendix 6: Draft Community Pond Permission Request Procedure

If someone is aware of the community pond and wants to use it during times of drought, they would initialize the process by sending the Requesting Permission letter (on page 1) to the owner.

Once the community pond owner (herein referred to as "host") receives the Requesting Permission letter, they would respond to with a Letter of Consent granting permission for the irrigator to use to pond under "x, y, and z" conditions. Potential conditions in which they will use the pond are listed but can be modified.

As the host receives Requesting Permission letters from irrigators, and responds to them with the Letter of Consent, he will reach a point where he has "enough" irrigators signed up for the next "x" years. The amount of irrigators that is "enough" for the pond will depend on the owner's preference and the size of the pond he has. The host then sends a Letter of consent for irrigators to use my community pond to the MOE and BCFA to notify them of the individuals that will be using his pond and PTTW in the next "x" years.

The host of the community pond will sign a Letter of Agreement to Host a Community Irrigation Pond with the BCFA for "x" duration, let's say 5 years. This agreement is for all hosts, whether they used grant money (ex. Brant County Rural Water Quality Program) to *create* a community pond or they just *turned their unused* ponds into community ponds. During the agreed upon duration time the host will receive letters Requesting Permission from the interested irrigators, send them back a Letter of Consent. The irrigator's letter Requesting Permission to use the pond will be kept by the host as an agreement for the terms, unless the host wants to modify the terms in which another document would be created

If someone is aware of the community pond and wants to use it during times of drought, they would initialize the process by sending this letter of request to the owner.

_____(*Name*)_____, _____(*Date*)_____
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

Subject: **Requesting Permission**

To (*Community pond land owner's name*):

I, ___(*Neighbouring irrigator's name*)___, a neighbouring farm at ___(*Neighbouring farm's address*)___ am writing to you to request permission to access the water taking location of the community pond on your property at ____(*Address of community pond*)___ in _____(*City*)_____, ON with UTM coordinates__(*Easting*)__, __(*Northing*)__ for the next __*(Insert Years)*__. I am asking for permission to access this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. I propose to use the community pond until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. I acknowledge that you hold an active Permit to Take Water (PTTW), ___(*Permit Number*)___, at this location and I will follow the regulations set out by the Ministry of the Environment associated with that PTTW. I agree to these terms and will oblige by them to respect the community pond on your property. If you grant me permission please send me a letter of consent. Thank you.

If you have any further questions, you can contact me at ___(*Land owners Phone number*)___.

Sincerely,

___(*Neighbouring irrigator's First and Last name*)___

___(*Signature*)___

Once the owner receives the request letter, they would respond with letter granting permission for the irrigator to use to pond. The conditions in which they will use the pond are listed and can be modified.

_____(*Name*)_____, _____(*Date*)_____
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

Subject: **Letter of Consent**

To___(*Neighbouring irrigator's name*)__:

I am writing to let you know that I, ___(*Land owner's name*)___, the land owner at ____(*Address of water taking location*)___ in _____(*City*)_____, ON am granting you, _____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____ permission to access the community pond on my property at UTM coordinates__(*Easting*)__, __(*Northing*)__ for the next __*(Insert Years)*__ for which I hold an active Permit To Take Water, ____(*Permit Number*)____. You may have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. You may continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. If you disrespect my property or fail to follow these terms of use I will remove you from my approved list of irrigators and you will no longer be allowed to use the community pond. If you fail to cooperate I will call the police for trespassing without consent.

If you have any further questions, please contact me at ___(*Land owners Phone number*)___.

Sincerely,

___(*Land owner's First and Last name*)___

___(*Signature*)___

Once the host has "enough" irrigators signed up for the next "x" years. He sends this letter to the MOE and BCFA to notify them of the individuals that will be using his pond and PTTW in the next "x" years.

_____(*Name*)_____, _____(*Date*)_____
_____(*Address*)_____,
_____(*Postal Code*)_____,
____(*Phone Number*)____

Subject: **Letter of consent for irrigators to use my community pond**

To the Ministry of the Environment and the Brant County Federation of Agriculture:

I am writing to let you know that I, ___(*Land owner's name*)___, the land owner at ____(*Address of water taking location*)___ in _____(*City*)_____, ON am granting permission for the following neighbouring irrigators to access my community pond for the next __*(Insert Years)__:*

_____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____
_____(*Neighbouring irrigator's name*)_____, at _____(*Address*)_____

to access the community pond on my property at UTM coordinates__(*Easting*)__, __(*Northing*)__ for which I hold an active Permit To Take Water, ____(*Permit Number*)____. The listed irrigators may have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual. They may continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season, whichever comes first. If any of the irrigators disrespect my property or fail to follow these terms of use I will remove them from my approved list of irrigators and they will no longer be allowed to use the community pond. If they fail to cooperate I will call the police for trespassing without consent.

If you have any further questions, please contact me at ____(*Land owners Phone number*)___.

Sincerely,

____(*Land owner's First and Last name*)___

____(*Signature*)____

The person who agrees to host a community pond will sign this agreement with the BCFA for "x" duration, let's say 5 years. The irrigator's letter requesting permission to use the pond will be kept by the host as an agreement for the terms, unless the host wants to modify the terms in which another document would be created.

Letter of Agreement to Host a Community Irrigation Pond

To the Ministry of the Environment and the Brant County Federation of Agriculture:

AGREEMENT: I the undersigned landowner, in recognition of the Brant County Federation of Agriculture investment in this pond renovation project (if applicable), agree to the following for a 5 year-period starting when the pond renovation is completed and the PTTW has been accepted and approved by the Ministry of the Environment.

1. To take reasonable measures to protect and maintain the irrigation pond from filling in by cleaning it when needed and trimming the shrubs and trees around it to prevent them from growing in and reducing water storage.
2. To allow the Brant County Federation of Agriculture staff and their agents to act as a liaison between interested irrigators and the Owner.
3. To grant permission to interested irrigators to have access to this water sources only in times of drought when the Grand River Conservation Authority has declared a Level 2 low water flow in the Whitemans Creek subwatershed or if a creek source has a low enough flow that taking the permitted 10% of the flow does not meet irrigation requirements of the individual.
4. To allow irrigators to continue using the water source until the Level 2 status drops back to a Level 1 or until the end of the growing season or whichever comes first.
5. If any of the irrigators disrespect the Owners property or fail to follow the terms of use (listed in the Letter of consent for irrigators to use the community pond) the Owner will remove them from the approved list of irrigators and they will no longer be allowed to use the community pond. If they fail to cooperate the police will be contacted for trespassing without consent.
6. In the event the Owner sells the property, all obligation of the Owner under this agreement will cease.

___(*Land owner's First and Last name)*___	____(*BCFA Representative Agent*)_____
___(*Signature*)_____	___(*Signature*)_____
___(*Date*)_____	___(*Date*)_____