

# Water Conservation Education Program for the City of Victoria



## Prepared by

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## Prepared on Behalf of

Carver County Health and Human Services

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## **Introduction**

Throughout the Spring 2016 semester, Carver County has partnered with Dr. Catherine Twohig's OLPD 5204 course through the Resilient Communities Project to help solve real world issues the county is facing. Paul Rinas, Renee Bergstrom, and Ashley Alexander have been working closely with the City of Victoria to develop an adult education program for the community. This executive summary outlines recommendations for an education outreach program focused on generating awareness and motivating City of Victoria residents to change behaviors around lawn irrigation practices to conserve water and save money. The document includes recommendations for program content, platforms for delivery, marketing including social media strategy, budget, evaluation, and additional resources for further development.

## **Background**

Water usage in Minnesota has become a key issue over the last few years. Residents in the City of Victoria utilize 115–140 gallons per day per capita. The Minnesota DNR recommended usage is 75 gallons per day per capita. The City is looking for assistance in creating a water conservation and education program to reduce outdoor water use for lawn irrigation. This might include educating residents about the impacts of excessive water usage and strategies to reduce water consumption, as well as identifying incentives and disincentives that could be used to change behavior.

Additionally, the City is interested in exploring best practices for implementation of residential-scale or community-scale water reuse systems that could be used for irrigation or other non-potable water uses.

Adding to the timeliness of this project, Carver County intends to update its groundwater management plan by the end of 2016. The plan is anticipated to include a conservation education component.

As a result of the OLPD 5204 Spring 2016 course, in collaboration with Carver County and the Resilient Communities Project, students will go through the program planning process throughout the course of the semester to create and provide a recommended program framework and outline designed to educate the Victoria community about appropriate personal water usage and the water conservation efforts currently being undertaken by Carver County.

This executive summary outlines recommendations for an education Outreach program focused on generating awareness and motivating City of Victoria residents to change behaviors around lawn irrigation practices to conserve water and save money. The document includes recommendations for program content, platforms for delivery, marketing including social media strategy, budget, evaluation, and additional resources for further development.

## Program Content

The content or information recommended for educating City of Victoria residents is divided into three areas: water conservation and ecological effects, lawn care tips, and smart technologies for lawn irrigation.

*Part I - Water Conservation and Ecological Effects - The first section of content should be focused on providing residents with background of the ecological issues regarding overwatering.*

Overwatering of your lawn can have adverse negative effects on your law; on nearby lakes, rivers, and streams; and on aquatic wildlife and the surrounding habitat. Overwatered lawns can become waterlogged creating an advantageous environment for disease, moss, and fungus growth (Hartin, Geisel, & Harivandi, 2011; and Scotts, 2016). Excessive overwatering removes excess nutrients from your lawn, including excess nutrients from fertilizers, which can permeate into lakes and streams through runoff drainage (Rosen and Horgan, 2016). These excess nutrients in surrounding bodies of water also contributes to eutrophication (Oram, 2014), algae blooms, aquatic wildlife to die off, and reducing our usage of the lakes for swimming, fishing, and tourism (Minnesota Pollution Control Agency, 2008). In addition, Minnesota laws restrict the use of phosphorus fertilizers on lawns (Rosen and Horgan, 2016).

Naturally occurring replenishing of aquifers cannot keep up with the rate of overwater seen in the city of Victoria during the summer months. According to the United States Geological Survey (2016), “the volume of groundwater in storage is decreasing in many areas of the United States in response to pumping. Groundwater depletion is primarily caused by sustained groundwater pumping. Some of the negative effects of groundwater depletion:

- drying up of wells
- reduction of water in streams and lakes
- deterioration of water quality
- increased pumping costs
- land subsidence

Furthermore, pumping too much water out of the ground to overwater our lawns does not allow for groundwater to replenish itself in aquifers, and alters the flow of water, which can lower the levels of water in streams, lakes, and wetlands. This can have adverse affects on the habitat, plants, and wildlife (United States Geological Survey, 2016). According to the Freshwater Society (as cited in Huttner, 2012), as much as 25 percent of the lost water from White Bear Lake was believed to be caused by over pumping of water from aquifers to supply nearby residential areas.

*Part II - Lawn Care Tips – The second section is focused on equipping residents with the knowledge to understand and make changes to lawn watering practices.*

### Overview

Minnesota has an abundant supply of water; even so, the demand for water sometimes EXCEEDS the amount readily available. Lawn irrigation can take a large amount of water and sometimes much if it is unnecessary.

Victoria currently has this problem.

#### How often should I water my lawn?

Ideally, the grass plants should dictate the watering program. The easiest way to tell is by walking on your lawn. If you see a footprint, this is an indication that irrigation is necessary. It is desirable to keep the intervals between watering as long as possible without allowing the plants to go into stress. Infrequent irrigations cause plants to develop deep, strong root systems that can extract water from a much larger volume of soil than the shallow roots associated with light, frequent irrigations.

#### When should I water my Lawn?

The best, most efficient time to water your lawn is between 4am and 8am  
Less water is lost in evaporation  
Wind velocities are usually lower  
Water demand on municipal systems is usually less at this time

#### Watering Tips

Lawn irrigation should be minimal in Spring until June  
Your Lawn only needs 1 to 1 ½ inches of water per week (minus any rainfall) during the summer months  
Only water grass...make sure water is not running off or landing on pavement  
Keep the intervals between irrigation as long as possible  
Water in early, early morning hours for greatest efficiency  
Water slowly, deeply and less frequently  
It is not necessary to water before, during or at least 1 day after a rainfall

#### Additional Lawn Care Tips

Mow your grass to 2 ½ to 3 inches. This is the single most important thing you can do to improve the health of your lawn. By keeping your grass longer, the roots grow deeper and can reach more water during dry periods.  
Use a sharp mower blade, it will make the grass plants it less susceptible to disease

*Part III Smart Irrigation Technologies – This section is focused on generating awareness of technology tools available to residents to reduce water usage and utility costs.*

#### Smart Irrigation Technologies

Smart controllers are available to consumers to help manage water more effectively. They are designed to use data about your overall climate, weather, and the specific layout of your lawn to manage water usage more efficiently. Rachio, just one of the controllers available on the market, tells you when it's raining so you can turn off the sprinklers. Using smart phone technology, these controllers can be accessed and controlled from anywhere. The controllers use WIFI, evaporation information, rain sensors, soil sensors, zone information, and most importantly, give users more control over the irrigation process.

### Conservation

Lawn irrigation makes up 59% of home water use, more than indoor use such as showers, toilets, and kitchen usage combined. Current irrigation systems waste around 50% of water through run-off or inability to absorb water consistently, causing a loss of water and patchy areas in the lawn. Using smart controllers based on weather data and evaporation could cut down on half of the waste, resulting in more money in your pocket.

### Costs savings

The City of Victoria already operates on a progressive usage rate structure to encourage water conservation. If peak usage is at 75,000 – 100,000 gallons during the summer, that is a lot of unnecessary money being wasted. Cutting down water usage by 30% over one summer by using a smart controller could effectively pay for itself in one summer.

Additionally, using a smart irrigation system like IrriGreen could save similar costs and pay for itself over the course of a 3-4 years.

Future considerations should be shared as well. If there is no change in behavior, the rate structure may become stricter. Taxes increases may have to be implemented to accommodate future infrastructure to manage chronic high water usage, such as building new water towers.

## **Platform for Information Delivery**

### *Over the phone*

Our first recommended level of outreach occurs when residents call in ask about their water bills. This call can be used as a teachable moment to share resources available to residents to reduce their water bills and water usage overall. The level of content that can be delivered in the format is low, mainly focused on tips to check water usage such as putting a can out in the lawn to measure when it's time to water again, or looking into smart controls for their sprinkler system. If follow-up is needed, set up a follow up one-on-one intervention.

### *One-on-One*

The second level of outreach is recommended for chronic high-users or residents who's phone call has required follow-up. This is an opportunity to educate residents face-to-face and tailor information to a person's specific needs. During this intervention, the educator should provide both paper and online resources, as well as recommendations for next steps to reduce water usage and solve resident's specific issue.

We recommend that, in this setting, the conversation begins with asking "why questions". For example, "Why do water your lawn when it's raining," or "Why do you think the there's so much run off into the streets?" These types of questions allow the educator to understand the base level of understanding and provide relevant information that targets the gaps in knowledge.

### *Instructor-Led Seminar*

The third level of outreach is an instructor led seminar for community members who are invested in making a change but may need more information or help creating an action plan to make changes in their irrigation habits. We recommend that this be held during the City Council Meeting and Workshop that is open to the public bi-weekly on Mondays. In this seminar, all three content areas can be discussed in detail, and resources can be shared. We recommend that the instructor or presenter be from outside the city and be presented as a subject matter expert. We also recommend that some sort of food or refreshment be made available for the attendees. This could also be an opportunity to present the grant opportunities for rebate or new sprinkler control system.

### *Access to information (Online resources)*

For easy follow up, or for residents that may not be available for one of the three levels of outreach, we recommend putting resources online to direct people to for more information. These resources can include:

- Tip sheets
- Educational guide (provided by Horticulture class)
- Lawn audit resources
- IrriGreen information for residents looking to install a new system
- Smart controller comparison sheet
- Short video of symptoms and remedies for a healthy lawn\*

\*The video should be short, no more than 5 minutes. It could be done with a theme of “lawn doctor” helping residents diagnose their lawns for an entertaining twist.

We also recommend updating the peak usage numbers on the utility cost website:

<http://www.ci.victoria.mn.us/index.aspx?nid=147>

Updating the peak usage to 75,000 or 100,000 could help drive home the cost savings of water conservation.

## **Marketing Plan**

The goal of the marketing plan is to identify outlets for communicating the water conservation initiative. The most effective method of implementing the marketing plan is to utilize these various outlets to put the outreach initiative in front of people in every way possible. The messaging should be ubiquitous and timely. If the message is everywhere, it is harder to ignore. It also creates an “in-group” by becoming a part of the local culture and community. If the City of Victoria residents start talking about the marketing campaign, they will be more inclined to learn more and hopefully make the changes the City of Victoria is hoping to see.

We recommend the main slogan of the campaign be “Are you up for the challenge?”. This is in regards to a letter that was shared by the City of Victoria mayor and may already be recognized by Victoria residents.

### *Outreach messages*

We recommend using 3 appeals to spread awareness and inspire people to consider changing habits:

Financial appeal (pragmatist) – this message is focused on the pain points residents are experiencing around the cost of water. Posters, emails, or mailers with the financial appeal may read “Are you up for the Challenge? Reduce your water bill by 20%. Visit [mn-victoria.civicplus.com](http://mn-victoria.civicplus.com) for more information”

Ecological appeal (emotion) – this message is designed to reach people on an emotional level by acknowledging the harm over-watering can do to the planet. Posters, emails, or mailers with the ecological appeal may read “Are you up for the Challenge? Make small changes now so your children won’t have to make big changes later. Visit [mn-victoria.civicplus.com](http://mn-victoria.civicplus.com) for more information”

Technological appeal (futurist/innovative) – this message will appeal to those who like to be on the cutting edge of technology and enjoy tinkering with systems for efficiency. Posters, emails, or mailers with the ecological appeal may read “Are you up for the Challenge? Make your sprinklers more effective. Visit [mn-victoria.civicplus.com](http://mn-victoria.civicplus.com) for more information”

### *Platforms for message delivery*

We recommend using multiple platforms, including printed material, social media and email, and community events to promote the “Are you up for the challenge” campaign. This will allow the City of Victoria to reach residents wherever they are and get information in front of residents to help inspire change.

Printed materials include:

- Posters – hung up at grocery stores, coffee shops, schools, and any other gathering places that will permit it.
- Mailers – sent out with water bills or other notices from the city. Can include tip sheet and should direct people to website resources.
- Job aid (printed piece that Horticulture team is working on)
- Campaign signs – These can be styled in same way as the poster, with the “Are you up for the challenge?” slogan. Residents can promote their commitment to water conservation and place sign in their yards. It will piggy back off of the national election taking place this year.

Promotional knickknacks include all of the gifts and novelties that can be printed with the “Are you up for the challenge” slogan and can be given away at community events or provided during seminars or one-on-one interventions. These knickknacks include:

- Water bottles
- Lawn measuring cups
- Mini soccer balls – some sort of toy to get children involved in the campaign
- Bumper stickers or window stickers
- Koozie coolers for cans

### *Social media*

Our recommendation is to utilize the existing Facebook online community for the City of Victoria as the main platform for social media. Post events that are coming up where the water conservation booth will be available to provide information, post about work City of Victoria is doing, post about the grant that was received and how they are using it to improve lawn irrigation in the community. Post facts of the day and using the quiz as a fun way to get people engaged. Posts should be often, a couple times a week, to keep the message in front of people.

In tandem with Facebook, Periscope allows for live streaming and could be used to let people know it’s going to rain and to turn off their sprinklers. Periscope could also be used to keep message out in front of people. Live streaming allows people to interact and ask questions. The broadcaster can see the questions and can respond back to the questions.

Using Twitter can be beneficial for sharing articles, posting videos, and “retweeting” prominent figures within the community. For example, coordinating messages with the mayor to be tweeted/retweeted might allow the message to reach more community members. It is recommended to tweet a couple times a day to keep the message in front of people

### *Facebook quiz*

Facebook has some free tools for creating quizzes that can be a fun way to get City of Victoria residents engaged with the content. These quizzes can be shared by Facebook users who take the quiz and can be no cost teachable tools.

Recommended application: Quiz Maker is a free Facebook application that lets you control the inputs and content of your quizzes.

Quiz Title: How well do you know your lawn?

Description: Take this quiz and find out if you are the best on the block at giving your lawn what it needs to be healthy and green!

Questions:

- What is one major contributing factor that promotes fungus (mushroom) growth? (abundance of water)
- Do you know what are the two main active elements in fertilizer? (phosphorus/phosphate and/or nitrogen/nitrate)

- What do you think is the main nutrient contributor to causing algae and moss blooms? (phosphorus/phosphate and/or nitrogen/nitrate)
- When is the best time to water your lawn? 4am to 8am
- Do you want your grass roots to be shallow or deep? Deep
- It is best to water your lawn on a consistent basis, no matter the weather situation? No, inconsistent is best
- During the summer months your grass only needs 1-2 inches of water per week. Yes, this is correct
- Do you need to water your lawn when it is raining? No
- Your soil should be wet down to the depth of 5 inches. Yes
- You should be frequently watering your lawn in the spring? No

### *Community engagement – Events*

As alluded to, attending community events and setting up a booth is important for outreach. We recommend coordinating with the organizers for the following events to set up a booth where you can hand out printed materials, campaign signs, promotional knickknacks, and collect information from residents who want more information and help assessing their lawns.

- May 18<sup>th</sup> – Community Grandstand Opening All Day Event
- City Council Workshop – Bi-weekly on Mondays
- June 8<sup>th</sup>, 22<sup>nd</sup>, July 6<sup>th</sup>, 20<sup>th</sup> – Classic Car Night (opportunity to reach kids as well with promotional toys and quizzes at booth)
- June 18<sup>th</sup> – Bike Ride and After Ride Bash
- June 22<sup>nd</sup> Classic Car Night and Band Stand Concert
- July 22<sup>nd</sup> – Movie in the Park
- July 27<sup>th</sup> – Concert in the Park
- Ongoing: Business Community Coffee Hours – Potential opportunity to share information or literature to have available in case people want to grab flyers or get contacts.

We also recommend branding a Water Conservation Week. This could piggy back off of other events already schedule, but would spotlight the water conservation efforts undertaken by the City of Victoria. To promote this, we recommend including updates on the city website, putting notices on community calendar, and working with local businesses and organizations to get them involved in the event. One example would be to do a special movie in the park or book reading at the local library around the topic of water.

## **Evaluation**

The initial steps for evaluation of recommendations decided by the City of Victoria is a focus group of Victoria residents. We recommend considering asking the following questions of the focus group to identify gaps in knowledge and identify barriers to action.

1. Do you think you over water your lawn?
2. Did you think you over watered your lawn before reviewing this information?
3. What best practices can you take away from the information and implement right away?

4. Is there any information that you would have like to see presented about lawn watering that was not?
5. Was this information useful to you?
6. Where you aware that the City of Victoria had an issue with the citizens consistently over watering their lawns in the summer months?
7. Is this information going to change the way you water your lawn? Why? Or Why not?
8. What are the barriers for making changes in your watering habits? Time? Information? Money?
9. Which message appeals to you the most: financial, ecological, or technological? Why?
10. Do you think your lawn needs more water than the Amazon rain forest? Because that's how much everyone is watering their lawns in the summer.
11. Do you think the city should drill another well and construct an additional water holding tank for emergency services to accommodate the spike in summer water usage, solely for overwatering lawns?

Upon implementation of the educational outreach program, we recommend following up with participants of the phone calls, one-on-one meetings, and seminar attendees. Questions to ask include:

1. What changes have you made since the phone call/meeting/seminar?
2. Which message (financial/ecological/technological) appealed to you most?
3. How do you feel about the water conservation project as a whole?
4. How do you feel about your participation in the water conservation?
5. What information do you still feel like you are missing?
6. What barriers were most challenging to overcome in changing your lawn watering habits?

We also recommend follow-up on rebate earners or smart control winners. Questions for these residents include the following:

1. Have you noticed a difference in your lawn health and appearance?
2. Have you told others about the smart controller tool?
3. Did you have challenges setting it up?
4. Would you recommend the smart controller system to others?

The most effective method for collecting information would be a phone interview. It is best to schedule a time to follow up with the participant and explain that it will only take 15 or so minutes.

## Budget and Resources

(Based on preliminary pricing research)

<b>Printed Materials</b>		
Item	Quantity	Cost
Posters, 16x20"		
- High gloss	50	\$500
- Semigloss		\$800
Mailers, 8x11" printed in color, single-sided	500	\$245
Campaign signs, 2x2'	500	\$1500
<b>Promotional knickknacks</b>		
Water bottles with printed logo	50	\$161 (3.22 ea)
Orbit 26250 sprinkler catcher cups	20	\$500 (25 ea)
Mini soccer balls with printed logo	50	\$259 (5.18 ea)
Bumper stickers or window stickers with printed logo	125	\$131 (1.05 ea)
Koozie coolers for cans with printed logo	250	\$298 (1.19 ea)

### *Additional costs*

Smart Controllers for grant prize/rebate ~ \$150 per, depending on model chosen

Other budgetary considerations should be analyzed before implementing the program delivery. These include items like staff time for one-on-one meetings, costs for booth set up at community events, graphic design work for logos, and presenter and food costs for in-person seminars. These costs are highly variable based on City of Victoria resources available, salary and fringe benefits of city employees, and quantities of materials for printing. Our recommendation is to investigate costs and preferred vendors before implementation.

### *Evaluation costs*

It is important to factor in the costs for evaluation and follow up. The costs associated with the phone interview and focus groups include staff time to carry out evaluation and analyze the information. We recommend spending 15 minutes gathering feedback for each participant.

## Contact Information

For further questions about the recommendations provided for the City of Victoria, please feel free to contact the program design team:

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## Appendix

### Suggestions for Water Conservation Partners:

- Contact IrriGreen to get orientation on a real water saving irrigation system
- Maybe strongly suggest to contract companies and new home builders to use consider the IrriGreen irrigation system (possibly offering them incentives if they are resistant because of upfront costs)
- Offer residents grant money or rebates for switching to a proven efficient irrigation system like IrriGreen's (it requires installing new pipe and access to their wifi system).
- Offer rebates or credits for water audits (reduced rate on the audit, city paid for or credited to the water bill, or using some of the grant money)
- Visit [Irrigreen.com](http://Irrigreen.com) for more information

### Additional Resources

Hartin, J., Geisel, P., & Harivandi, M. A. (2011). Lawn Diseases: Prevention and Management in Pests in Garden and Landscapes. University of California Agriculture & Natural Resources. <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7497.html>

The Scotts Company LLC. (2016). Why Do I Have Mushrooms in My Lawn? <http://www.scotts.com/smg/goART3/Howto/why-do-i-have-mushrooms-in-my-lawn%3F---lawn-care---scotts/40400012>

Rosen, C. J., Horgan, B. P. (2016). Preventing pollution problems from lawn and garden fertilizers. University of Minnesota Extension. <http://www.extension.umn.edu/garden/yard-garden/lawns/preventing-pollution-problems/>

Oram, B. (2014). Total Phosphorus and Phosphate Impact on Surface Waters in Phosphate in Water. Water Research Center. <http://www.water-research.net/index.php/phosphate-in-water>

Minnesota Pollution Control Agency. (2014). Nutrients: Phosphorus, Nitrogen Sources, Impact on Water Quality. <https://www.pca.state.mn.us/sites/default/files/wq-iw3-22.pdf>

United States Geological Survey. (2016). Groundwater depletion in The USGS Water Science School. <http://water.usgs.gov/edu/gwdepletion.html>

Huttner, P. (2012). Land of 9,999 “shrinking” lakes? Is White Bear Lake MN’s “climate change canary in coal mine?” Minnesota Public Radio. [http://blogs.mprnews.org/updraft/2012/10/minnesota\\_land\\_of\\_9999\\_shrinki/](http://blogs.mprnews.org/updraft/2012/10/minnesota_land_of_9999_shrinki/)  
(image graphic of White Bear Lake water recession)

For smart controller technology comparison <http://socialcompare.com/en/comparison/smart-networked-sprinkler-irrigation-controllers>

For information regarding Irrigreen for consumers <http://irrigreen.com/Consumers/>

For technical analysis, see:

Characterizing Groundwater/Surface

Water Interactions in Lakes: White Bear Lake Study:

<http://mn.water.usgs.gov/projects/pdf/WBLCDmeeting2212012.pdf>

For summary of findings, see:

Report on Groundwater and Surface-Water Interactions near White Bear Now Available Online

[http://mn.water.usgs.gov/about/newsletter/2013\\_Spring/](http://mn.water.usgs.gov/about/newsletter/2013_Spring/)

### **Water Resource Subject Matter Experts**

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**Lesson Plans for In-Person seminar:**

*Part I - Water Conservation and Ecological Effects*

Lesson Outline	Lecture topics	Resources and expansion on topic	Time
Introduction	<ul style="list-style-type: none"> <li>• <b>Question</b> <b>How does over watering your lawn negatively impact the environment around you?</b></li> </ul>	Think about how it can affect wildlife, the landscape, and aquatic features.	2 min.
Presentation 1	<p><b>What happens to your lawn</b></p> <ul style="list-style-type: none"> <li>• <b>Lawn becomes waterlogged</b></li> <li>• <b>Mushroom growth</b></li> </ul>	<ul style="list-style-type: none"> <li>• Waterlogged soils restricts root growth, promotes some diseases, and allows algae and moss to thrive (Hartin, Geisel, &amp; Harivandi, 2011).</li> <li>• Also enables other types of fungus that can be more serious problems for your lawn (The Scotts Company LLC, 2016).</li> </ul>	2 min.
Presentation 2	<p><b>What happens to the nearby lakes and rivers from runoff</b></p> <ul style="list-style-type: none"> <li>• <b>Fertilizers leached from soil draining into lakes and streams</b></li> </ul>	<ul style="list-style-type: none"> <li>• Excessive over watering removes excess nutrients from your lawn, especially if your lawn is on top of sandy, coarse textured soils including clay (Rosen and Horgan, 2016 )</li> <li>• Over usage of fertilizers can also infiltrate into lakes and streams through runoff and drainage from over watering (Rosen and Horgan, 2016 ).</li> <li>• Proper application and soil testing can reduce the possibility of pollution (Rosen and Horgan, 2016 ).</li> <li>• Excess nutrients, especially phosphorus and nitrogen, in drinking water can cause an infant’s body to loose their ability to use oxygen (Rosen and Horgan, 2016 ).</li> <li>• Too much nitrogen can create an ideal environment for fungal growth (The Scotts Company LLC, 2016 ).</li> </ul>	5 min.

Lesson Outline	Lecture topics	Resources and expansion on topic	Time
Presentation 2 (cont.)	<b>This can cause adverse affects to aquatic wildlife and the overall health of the body of water</b>	<ul style="list-style-type: none"> <li>• “Excessive nutrient inputs, usually nitrogen and phosphate, have been shown to be the main cause of eutrophication over the past 30 years” (Oram, 2014).</li> <li>• This process causes algae blooms, unpleasant odors, water discoloration, aquatic life to suffocate and die, and some types of algae to produce toxins that can be harmful if ingested (Minnesota Pollution Control Agency).</li> <li>• See resources 4 and 5 for an in-depth explanation on this process and the effects on the lakes, wildlife, and potential humans.</li> <li>• “This may result in declines in fishing and swimming and hurt tourism” (Minnesota Pollution Control Agency). (see page 2 for details on this process).</li> </ul>	8 min.
Presentation 3	<b>MN laws restricting the use of phosphorus fertilizers on lawns</b>	<ul style="list-style-type: none"> <li>• “In an effort to reduce phosphorus runoff to surface waters, the Minnesota state legislature passed laws in 2002 and 2004 that restrict phosphorus fertilizer use on lawns” (Rosen and Horgan, 2016).</li> <li>• “Because most lawns in Minnesota already test very high in phosphorus, the Minnesota legislature passed a statewide law that restricts the application of phosphorus fertilizer to established turf. Note, this law does not pertain to phosphorus use in gardens” Rosen and Horgan, 2016).</li> <li>• “Current law allows application of phosphorus fertilizer to turf during the establishment year”(Rosen and Horgan, 2016)</li> </ul> <p><b>Question: How many people know what elements are in their fertilizer?</b></p>	3 min.

Lesson Outline	Lecture topics	Resources and expansion on topic	Time
Presentation 4	<b>Overwatering can lead to drying up the local water table and aquifer.</b>	<b>The city of Victoria is in the process of identifying a site to drill a fourth well to accommodate the over use of water in the summer months</b>	10 min.
	<b>Excessive pumping can overdraw the groundwater</b>	<ul style="list-style-type: none"> <li>The volume of groundwater in storage is decreasing in many areas of the United States in response to pumping. Groundwater depletion is primarily caused by sustained groundwater pumping. Some of the negative effects of groundwater depletion: <ul style="list-style-type: none"> <li>drying up of wells</li> <li>reduction of water in streams and lakes</li> <li>deterioration of water quality</li> <li>increased pumping costs</li> <li>land subsidence (United States Geological Survey)</li> </ul> </li> </ul>	
	<b>Reduction of water in streams and lakes</b>	<ul style="list-style-type: none"> <li>By using excess water, we are taking away groundwater that contributes to the flow of streams.</li> <li>Pumping too much water because of over use does not allow for groundwater to replenish itself in aquifers, and alters the flow of water and can lower the levels of water in streams, lakes, and wetlands. This can have adverse affects on the habitat, plants, and wildlife (United States Geological Survey).</li> </ul>	

Lesson Outline	Lecture topics	Resources and expansion on topic	Time
Case study	<b>White Bear Lake findings from 2012</b>	<ul style="list-style-type: none"> <li>“White Bear drains a very small watershed and has always had big decreases in area and volume during extended dry periods when rainfall and melting snow do not keep up with evaporation.</li> <li>Chemical testing of water from wells around the lakes confirms that lake water is flowing out the bottom of the lake into groundwater aquifers that feed those wells.</li> <li>Pumping from high-capacity wells in suburban communities that mostly draw their water from those aquifers more than doubled over the last 30 years.” There are varying scientific opinions, but some believe</li> </ul>	5 min.

as much as 25% of White Bear’s water volume may have been lost from below due to increased groundwater pumping in the aquifer below the lake.” (Huttner, 2012)



Google Earth image of White Bear Lake approx. 2012

*Part II - Lawn Care Tips*

Lesson Outline	Instructor Activity	Participant Activity	Time
Introduction	<ul style="list-style-type: none"> <li>• Question</li> <li>- What are best practices for lawn irrigation?</li> </ul>	Think about experiences you’ve had with your irrigation system, or watering your lawn. How often do you water? How much do you water?	5 min.
Presentation	<ul style="list-style-type: none"> <li>• Lecture</li> <li>- Proper lawn irrigation</li> <li>- How much water is needed?</li> <li>- When to water your lawn</li> <li>- Best way to water your lawn</li> </ul>	Watch lecture and PowerPoint Respond to questions.	15 min..

Participant Activities	Provide scenarios for different weather conditions	Group Break out-discussing best way to care for lawn regarding their scenario	10 min.
Review	<ul style="list-style-type: none"> <li>• Summary</li> <li>• Questions</li> </ul> - Revisit elements of best lawn irrigation practices	Respond, comments, questions.	5 min.
			35 min.

*Part III – Smart Technologies*

Lesson Outline	Instructor Activity	Participant Activity	Time
Introduction	<ul style="list-style-type: none"> <li>➤ Lecture</li> <li>- Features of smart irrigation systems</li> <li>- How it works to save water and money</li> <li>- What to look for if purchasing own</li> </ul>	Share some examples of smart irrigation or smart control systems. Ask if anyone has used them, or is aware of these options.	10 min.
Cost Comparison Examples	<ul style="list-style-type: none"> <li>➤ Lecture</li> <li>- cost of water</li> <li>- how much water is wasted by not setting up irrigation system properly</li> <li>- what cost could be if rate structure changes</li> </ul> Video: <a href="https://www.youtube.com/watch?v=bNVqRIrRb-0">https://www.youtube.com/watch?v=bNVqRIrRb-0</a> <a href="http://irrigreen.com/Consumers/">http://irrigreen.com/Consumers/</a>	Watch lecture and video Respond to questions. Discussion - anyone willing to share their water bills? What would they rather spend that money on?	10 min..

Participant Activities	Demonstrate technology. Walk through process of researching, where to purchase, how to install & set-up, and how to monitor throughout summer.	Group - Discuss any barriers to installing one for themselves. How to remove those barriers. What can you do next? Immediate action!	10 min.
Immediate Action!	Explain benefit of grant, who is eligible, how the drawing works.	Have people sign up for drawing or provide information if interested in getting new smart system.	5 min.
Review	<ul style="list-style-type: none"> <li>➤ Summary</li> <li>➤ Questions</li> </ul> - Revisit cost comparison	Respond, comments, questions.	5 min.
			40 min.

## Best Lawn Watering Practices-Talking Points

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*Audience: Residents of Victoria, MN*

*Objective: Provide lawn watering tips*

### **Overview**

Minnesota has an abundant supply of water; even so, the demand for water sometimes exceeds the amount readily available (“Watering Lawns and other turf,” 2016). This is a current problem that Victoria is experiencing. Lawn irrigation can take a large amount of water and sometimes much of it is unnecessary.

### **The typical amount of water needed to irrigate lawns**

- The amount of water to apply depends on the soil type and the wetness of the soil. The preferable method is to thoroughly wet the soil down to a depth of 5 inches. If the soil is initially very dry, it may take 1/2 inch of water to wet a sandy soil down to a depth of 5 inches. Any additional water will drain below the root system and is wasted. An easy method to check how far the water has penetrated your lawn is to sink a shovel into the soil and spread the hole so you can see how far the water has penetrated. Then remove the shovel and press the soil into place with your foot (“Watering Lawns and other turf,” 2016)
- One inch or less of water per week is generally sufficient in cool or warm weather, with 1-2 inches per week needed during hot or windy weather (minus any rainfall). Most lawn sprinklers apply about one-fourth to three-eighths inch of water per hour. You can easily check your sprinkler output by placing a straight sided can on the lawn and measuring the depth of water after one hour (“Watering Lawns and other turf,” 2016)
- If you see that the water is running off onto the cement or any other hard surface and/or forming puddles, your lawn is saturated and does not need any more water. Sometimes the rate at which you water your lawn is faster than the time your lawn can soak it up. If this is the case, turn off your sprinkler for 15 minutes and then turn it back on again

### **Lawn irrigation frequency**

- Lawn irrigation should be minimal in Spring until June
- Water slowly, deeply and less frequently
- It is desirable to keep the interval between waterings as long as possible without allowing the plants to go into water stress

- Deep, infrequent irrigations cause plants to develop deep, strong root systems that can extract water from a much larger volume of soil than the shallow roots associated with light, frequent irrigations.
- If you do not have a smart irrigation system to indicate that the lawn needs to be watered, an easy way to determine this is to place a tuna can on your lawn when you are sprinkling your grass. When the tuna can fills up, stop watering. Leave the tuna can on your lawn and when the water evaporates out of the can, it is time to water your lawn again
- It is not considered best lawn watering practices to water your lawn 1 day before, during, or at least 1 to 2 days after a rainfall
- If you notice that your lawn has mushrooms growing in it, this typically means that your lawn has been over watered. This can occur naturally when there has been a significant amount of rainfall, but most often in Victoria, it is due to over watering your lawn. The best way to combat this is to reduce the watering time and watering frequency of your lawn.
- The best time to water your lawn is between 4am and 8am. Less water is lost to evaporation at this time and the wind velocity is generally lower at this time (“Watering Lawns and other turf,” 2016)

### Other helpful lawn care tips

- Mow your grass 2 1/3 inches to 3 inches. This is the single most important thing you can do to improve the health of your lawn. By keeping your grass a little longer, the roots grow deeper and can reach more water during dry periods (“Mowing Practices,” 2016)
- Use a sharp blade: it will make your grass plants less susceptible to disease
- It is important to mow often enough so that no more than one-third of the vertical grass height is removed with each cutting. (Mowing Practices,” 2016)

#### References

Watering Lawns and other turf. (2016, March 1). Retrieved from <http://www.extension.umn.edu/garden/yard-garden/lawns/watering-lawns/>

Mowing Practices. (2016, March 1). Retrieved from <http://www.extension.umn.edu/garden/landscaping/maint/mowing.htm>