

Identifying Challenges and Improvements for the Water My Yard Program

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Abstract. *The WaterMyYard Program is an innovative new program launched in collaboration with the North Texas Municipal Water District (NTMWD) in May 2013. The program aims to help homeowners conserve water by providing them a weekly email with a recommended irrigation runtime rather than the amount of inches to apply. Homeowners create a profile by selecting on a district map the location of their residence and entering their sprinkler precipitation rate. However many homeowners do not know the precipitation rate of their sprinklers so an intuitive tool is used to allow them to pick their sprinkler type based on the sprinkler image, spacing and the manufacturer, thereby enabling manufacturers data be used to estimate precipitation rate. The program also incorporates local water restrictions such as days per week available for irrigation. Lessons from its pilot year have been incorporated into the WaterMyYard V2.0 program. This paper discusses the upgrades and challenges of the program as it evolves and becomes adopted by other. In 2014 we initiated a research project to investigate the spatial variability of ET drivers in an urban environment in order to determine the minimum number of weather stations needed. This paper will also provide an update on this project.*

Keywords. *Landscape Irrigation, Irrigation Scheduling, Homeowners, Evapotranspiration*

Introduction

The Water My Yard program and website (<http://WaterMyYard.org>) was developed using simple, intuitive images and information prompts for homeowners to receive recommendations on how long (in minutes) to run their irrigation systems. The program was launched in May 2013 as a joint effort of the Irrigation Technology Program of the Texas A&M Agrilife Extension Service (Extension) and the North Texas Municipal Water District.

The North Texas Municipal Water District (NTMWD) covers 1,600 square miles and provides to water services to 1.6 million residents of North Texas through 13 member cities. NTMWD provides the majority of water from Lake Lavon. With persistent drought over the last few years, lake levels have dropped resulting in mandatory outdoor water restrictions. Most restrictions have limited outdoor watering to two (2) days a week irrigation with recent restrictions allowing only one (1) day a week watering.

In the summer of 2014, WaterMyYard Program V2.0 was released. Stakeholder input was also incorporated into the new version to improve the homeowner experience with the program.

Water My Yard Program

Working with Extension, NTMWD purchased and installed seven (7) ET Weather Stations. Locations were chosen based on elevation, microclimates, district property, and variations in typical rainfall patterns. Weather station data is collected daily as a part of the TexasET Network (<http://TexasET.tamu.edu>) to calculate daily ETo. A customized interactive map was created (Figure 1.) for identifying homeowner location within the district in order to link the appropriate weather station.

Once the location is selected, confirmed or located, the homeowner is prompted to enter their precipitation rate (Figure 2.). If the precipitation rate is not known, they are given instructions on how to conduct a catch can test. Alternatively they can select their sprinkler type. Working with state and local irrigation associations and sprinkler manufacturer representatives, a list of irrigation systems was developed which describe the common irrigation systems used in the area (Figure 3.). These include spray heads, rotors, multi-stream rotors and drip irrigation (required in some landscapes as per Texas Rules and Regulations). After the sprinkler type is selected, the spacing between sprinklers (or emitters) and the manufacturer is selected in order to fine tune the precipitation rate for calculating runtime (Figure 4.). Once the precipitation rate is set, a runtime can be calculated.

In order to calculate the runtime, assumptions were made to keep this simple for homeowners. The first assumption is that the homeowner is watering a warm season turf grass with a $k_c = 0.6$. Adjustment factor of "Normal Quality" or 60% of turf ETc was used. For NTMWD, a shift from Stage 2 water restrictions (2 days a week watering) to Stage 3 water restrictions (1 day a week watering) required a 10% reduction in water use as a part of the districts drought management plan. For this period the adjustment factor was reduced to a "Low Quality" or 50% of turfgrass ETc. This will keep the turfgrass alive but may result in some mild visual signs of turf stress during peak ET in the summer. Taking the adjustment factors into account along with user defined precipitation rate and localized weather station rainfall, the Water My Yard Program calculates weekly irrigation runtimes (Figure 5.). Once a runtime recommendation has been calculated, the homeowner can then sign up for weekly irrigation runtime emails to be received every Monday (Figure 6).

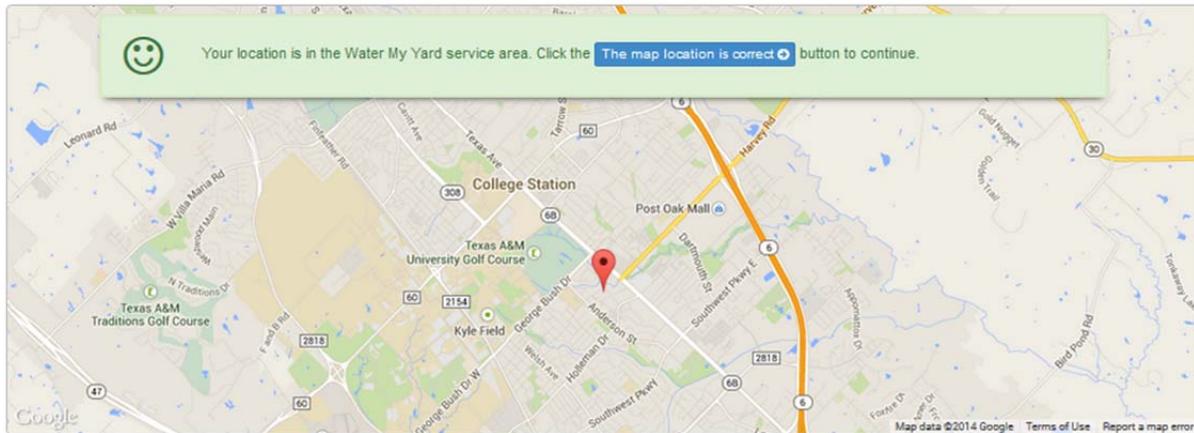
A HEALTHY LANDSCAPE ACTUALLY REQUIRES LESS WATER THAN YOU MAY THINK. The "Water My Yard" program has been established as a tool to assist you in determining an adequate amount of supplemental water that is needed to maintain healthy grass.

It only takes three short steps to begin receiving a weekly email to know how much water your landscape actually requires based on local weather conditions - effective rainfall, solar radiation, relative humidity and wind.

Let's get started!

Step 1.) We need to know where you will be irrigating

Based on your IP address
Note: this is not very accurate
YOU ARE HERE



The map location is correct Pinpoint your location Search for a different location

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Figure 1. Water My Yard Homepage-Map

TEXAS A&M
AGRI LIFE
EXTENSION

Water My Yard

Login to your account 

[Forgot your password?](#)

Just one more step ...

Step 2.) We need to determine the precipitation rate of your irrigation system 

Select from the options below ↓

You know your precipitation rate ✓ 

You do NOT know your precipitation rate

Please enter your precipitation rate below. ↓

Your Precipitation Rate:  inches per hour

Use this precipitation rate 

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Figure 2. Water My Yard Step 2- Enter Precipitation Rate

Step 2.) We need to determine the precipitation rate of your irrigation system [?](#)

Select from the options below ↓

[You know your precipitation rate](#) [?](#)

[You do NOT know your precipitation rate](#) ✓

Please select the sprinkler that most resembles the sprinklers that your system uses. ↓



Multi-Stream
 Applies water in multiple moving streams across the lawn, typically in either a circle, half circle, or quarter circle pattern.

[You have this type of sprinkler](#)



Rotor
 Applies a single stream of water that rotates in a circular pattern over the lawn.

[You have this type of sprinkler](#)



Spray
 Applies a solid continuous fan of water across the lawn, typically in either a circle, half circle, or quarter circle pattern.

[You have this type of sprinkler](#)



Drip
 Applies water through dripping emitters in a buried hose in the lawn's root zone. Sub-surface drip of turf only.

[You have this type of sprinkler](#)

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Figure 3. Water My Yard Step 2- Selecting Sprinkler Type

Step 2.) We need to determine the precipitation rate of your irrigation system ⓘ

Select from the options below ↓

You know your precipitation rate ⓘ

You do NOT know your precipitation rate ✓

Please select the sprinkler that most resembles the sprinklers that your system uses. ↓



Rotor
Applies a single stream of water that rotates in a circular pattern over the lawn.

You have this type of sprinkler ✓

Please select from the options below ↓

Irrigation spacing:
→ 20 Feet

Manufacturer:
→ Hunter

Use this sprinkler ⓘ Choose a different sprinkler ⌂

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Figure 4. Water My Yard Step 2 – Selecting Sprinkler Installation Information

You're done!

Step 3.) Based on your location and precipitation rate we calculate your watering recommendation to be ... 

Watering recommendation sponsored by: **Texas A&M AgriLife Extension**

Stage 1 watering restrictions - irrigation limited to once every 7 days

Watering recommendation for the time period: 🏠 Thursday, October 16, 2014 to Wednesday, October 22, 2014

💧 0 inches of water needed
 No watering required!

Important Notes:

1. Always consult your city or local water provider for watering restrictions which may be in place.
2. To receive a runtime email, or text-message, every Monday morning, click [Create an account](#) below and create your account.
3. Runtimes greater than 25 minutes may require multiple irrigations per day to avoid having runoff.
4. For assistance in programming your irrigation controller, please refer to your irrigation controller owners manual or contact a Licensed Irrigator.

 [Previous 7 Days Weather Summary](#) [\[View\]](#)

[Create an account](#) 

[Start over](#) 

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Figure 5. Water My Yard Step 3 - Select a Water Recommendation

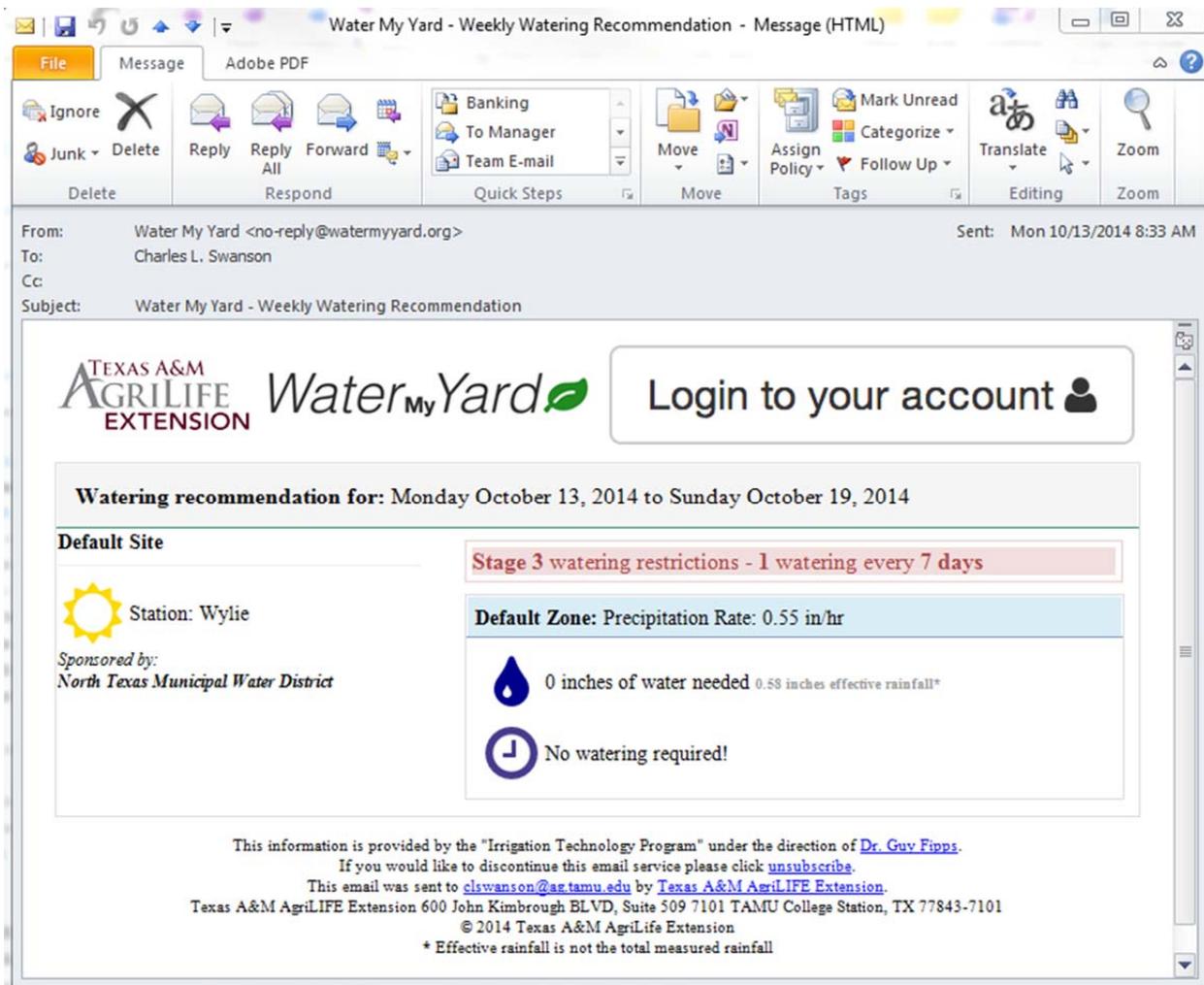


Figure 6. Water My Yard- Email Water Recommendation

Challenges and Improvements

During its first year of operation, challenges were identified by homeowners trying to use the program as well stakeholders recommendations. The first challenge was that some homeowners did not know where they live. This may seem strange, but some users found it difficult to click on the location of their home on the service area map. To address this issue, the service area map was replaced with an interactive google map which automatically pinpoints their location based on their IP address. Alternatively, users may enter their address. The homeowner would then verify their home location.

In V1.0, users were only allowed to set up one landscape zone at a time. This meant, for example if a home had spray heads in the front yard and rotor sprinklers in the backyard, they would have to create a profile for the first zone, then start over and create a profile for the second zone. Version 2.0 allows users to add multiple controllers and stations with different precipitation rates to a single account.

Managing Irrigation during water restrictions has been a major challenge of the

program. When the program was first released, water restrictions allowed two irrigation days per week. However, as the drought progressed, restrictions increased only allowing one day per week for irrigation, then to one day every two weeks. The change in restrictions produced the needs for limits on the amount of irrigation water applied and the time frame upon which the irrigation recommendation is based. For weekly or biweekly water balance calculations, a limit is placed on irrigation which corresponds to the maximum amount of water that can be held in the soil. The maximum amount of water available for the plant was set at 0.67 inches of water which is the equivalent of a four inch effective root zone in clay soil, the most common landscape scenario in the areas.

The second challenge was producing an irrigation recommendation for the one irrigation every two week scenario. The initial solution was to use the previous two weeks evapotranspiration and rainfall. This methodology was found ineffective as rainfall is inconsistent and confusing to users. The decision was made to produce a “floating” two week irrigation recommendation every week. This allowed for the most recent rainfall to be included in the irrigation recommendation and address uncertainty over which week the homeowner chose or was allowed to irrigate.

Besides addressing these challenges, other improvements were made to the software to simplify ease of use and implementation of the program. These included a redesign of the program website to allow for a more clean and modern view with a smart device. Users are also able to input their cellular provider information during the account set up to allow for weekly text messaging of irrigation runtimes in addition to weekly emails.

Variability of ETo in Urban Environments

As the drought continues for much of Texas, the Water My Yard program is gaining attention from water stressed utilities around the state. As these utilities begin their inquiry into joining the program, one of the first questions is how many ET Weather Station or Rain Gages are needed. In 2014, a study began to address that question. Mobile weather readings are taken across urban areas to determine the variability of ET drivers: temperature, solar radiation, relative humidity, and wind speed. Data is also collected from permanent ET weather stations in each urban area as baseline measurements. Preliminary results show that temperature, solar radiation and relative humidity have very low variability across the tested urban areas. However wind speed values have shown some variability based on the varying fetch in urban areas, leading to higher calculated evapotranspiration in those areas. Rainfall continues to be a highly variable factor across areas. While predominate rainfall patterns may be used for siting of rain gages, intensity of rainfall amounts can vary quite significantly even in small urban areas.

Summary

Currently the Water My Yard Program provides runtime recommendations for three areas: the North Texas Municipal Water District, the City of Irving, and the Brazos Valley-Bryan/College Station area. Two addition utilities are interested in joining the

program and are currently either procuring the necessary equipment or in the early planning stage. The Water My Yard program as of October 15, 2014 has over 1300 user accounts after its first year of operation. Preliminary analysis shows great potential for water savings. For example, the Wylie area only had an irrigation recommendation for 19 weeks of the year. When followed by homeowners in that service area, they would have applied zero irrigation for 34 weeks, or 64% of the year (See Figure 7). Currently volunteers are being sought in Water My Yard service areas to help document and verify the water savings potential of the program.

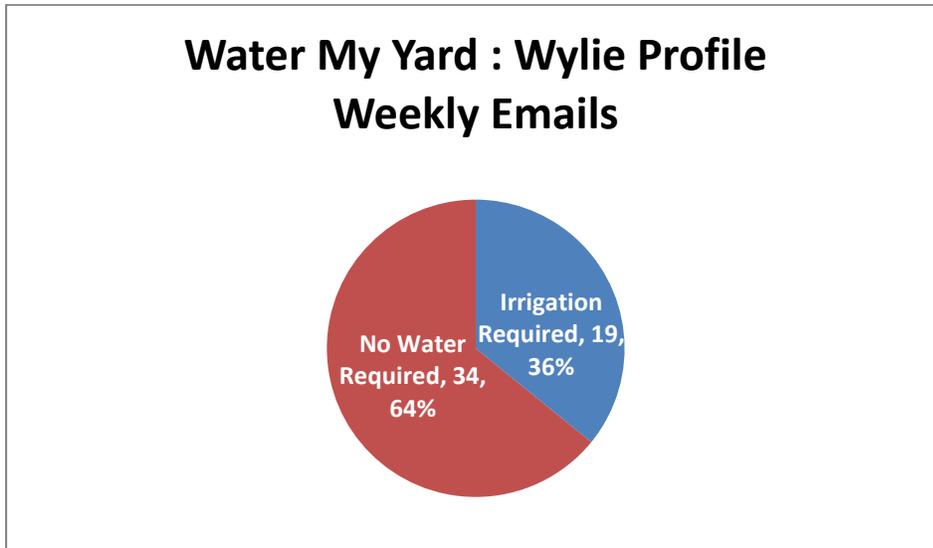


Figure 7. Water My Yard- Recommendation Summary for Wylie

References

North Texas Municipal Water District. <http://NTMWD.com>. June 2013.

Texas A&M Agrilife Extension Service. Water My Yard Program. <http://WaterMyYard.org>. July 2014.