TWCA® Quarterly

2020 Volume 7 Issue 2

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TURFGRASS WATER CONSERVATION ALLIANCE

TWCA

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Turfgrass Water Conservation Alliance
225 3rd Ave SW Albany OR 97321
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I feel our kinship

MISSION STATEMENT

TWCA is committed to water conservation and dedicated to preserving the ecological benefits of turfgrass in the managed environments

OFFICERS	
President	John Cochran
Vice President	Lucas Solis
Secretary	Kirsten Pick
Treasurer	Kyle Atkinson

STAFF

Program Administrator
Jack Karlin

Administrative Assistant
Evanne Gutierrez

Brand Ambassador
Dr. Michael (Mike) Kenna

-MAKE EVERY DROP COUNT-

Normally, I'd have a great quote here and a short write up about it. These aren't normal times. For any of us. We've all had to adjust to strange conditions with long term changes.

As the global pandemic continues with people falling sick and people dying I feel our kinship. Now more than ever I feel connected to the community of our industry and our need for unity. Together we can advance conversations about inclusion, diversity, and equity, while providing essential services to communities around the world.

In the coming months I hope we can continue on a path of greater compassion for one another, deeper engagement with our neighborhoods, and broader cooperation withing the industry and beyond. In these trying times it is more important than ever that we strive to be better versions of ourselves

TWCA is a members driven organization; if there is something you would like to see in the TWCA Quarterly, please contact Evanne Gutierrez at evanne@tgwca.org or Jack Karlin at jack.karlin@tgwca.org.


TURFGRASS WATER CONSERVATION ALLIANCE
TWCA

The Gutierrez Garden

COVID-19 Gutierrez Household Log
Day (since March 15th)

Today is number BLANK working from home. By now, we have adjusted to our new schedule. I still work my 4 hours in the mornings, but now I'm doing it from my kitchen table while listening to the same Disney movies playing over and over in the background. Don't get me wrong, working from home has it's perks! I don't mind the working in my pajama's or even being with my kiddos all the time. But at the same time, I'm with my kiddos ALL THE TIME! Thankfully, on sunny days we are able to take a break from the confinement of our house and enjoy or backyard.

COVID-19 has prompted many projects in the Gutierrez Household, including the Gutierrez Garden. We are quite proud of what we built, and enjoy tending to our plants, harvesting the fruits and veggies, and teaching our girls how to nurture and care for the things we have.

At this rate, who knows when I will see the inside of our office on 3rd street. But daily I am reminded of how blessed I am to be able to work from home, keep my kiddos healthy and happy, and enjoy a little bit more time with my family.

-Evanne Gutierrez

COVID-19 Update

Impacts of COVID-19 at TWCA

With COVID-19, TWCA has made adjustments to continue to provide support for our members.

After reaching out to our cooperators we have been able to be more flexible and continue to collect valuable drought trialing data from cooperators across North America.

With the uncertainty of Covid TWCA was concerned that the 2020 Tall Fescue Trial would have to be postponed. Thanks to the incredible efforts of our cooperators, we are shipping the trials out in August and preparing for another great trial with a broad range of cooperators.

An important aspect of out Covid response has been considering our fiscal position. Because odf the uncertain timeframe, TWCA has made the difficult decision to go to a fully remote model. In the coming months TWCA will be relocating from a central office to remote offices. We are fully embracing a virtual model for meetings and reducing our carbon footprint through intentionally curtailed travel in the foreseeable future.

NGBS Webinar With TWCA

Discover NGBS and the value of collaboration

TWCA is excited to offer this education opportunity to our membership. The NGBS credits are the culmination of several years of effort on behalf of TWCA and Greenscapes Alliance to incentivize the responsible use of turfgrass in landscapes and green developments.

This educational opportunity is especially useful for our Industry members who will learn more about how NGBS can create new market opportunities specifically for TWCA members.

As soon as registration details become available we will post them to the TWCA homepage at tgwca.org and email them out to out membership.

As an NGBS Green Partner we are proud to promote responsible development of sustainable communities.

2020 National Green Building Standard (NGBS) Overview

In 2008 the National Green Building Standard ICC – 700 (NGBS) earned ANSI approval as the first green rating system for residentially-used buildings. NGBS Green offered the industry a flexible, rigorous, and affordable path to third-party green certification, and within a short period of time, architects, developers, owners, agencies, and financial institutions catapulted the NGBS to be the leading national residential green certification program. Since then, over 225,000 homes and apartments have earned NGBS Green certification, and over 130,000 homes are in-process to earn certification. ANSI recently approved the 2020 NGBS, the third version to date, with an expanded scope that applies to mixed-use buildings, assisted living facilities, hotels, dormitories, lodging houses, and even monasteries. The 2020 NGBS includes a certification path for the commercial space of mixed-use buildings; greater flexibility for existing buildings being renovated or converted; a new performance path for water efficiency; and new practices designed to promote resiliency, universal design, wellness. Jon this webinar to learn more about the NGBS development and requirements and key products that contribute toward compliance.

Talk with TWCA

Mowing Heights

Mowing is the most basic practice for maintaining lawn turf. Mowing performed at the correct height and frequency is essential to the health of the lawn. When removing leaf tips, the plant is induced to form new tillers, which increases the lawns density.

Turfgrasses are adapted to be mown frequently but mowing too short reduces the vigor of the plants by reducing their ability to photosynthesize. Not only does lowering the mowing height reduce vigor, it can also reduce production of the root system. As seen in Figure 1, when the root system is reduced, the plants ability to absorb water and nutrients is restricted.

If turfgrasses are mown too short and scalped, the growing point of the plant known as the crown can be damaged, reducing the green plant tissue available for photosynthesis. Not only is the plant trying to recover from the scalping by putting all its energy to recover that damage, it also increases the pressure from weeds, insects, and disease. If crown damage is severe, it may not recover at all.

Higher cut heights allow the lawn to be stress tolerant. During summer heat, taller grass plants with higher density provide a shading effect on the soil surface. In return, this reduces germination of weed seeds, which reduces the use of herbicides. If mown too high, the shoots can lay over resulting in higher humidity which can lead to increased disease problems.

A general rule of thumb when mowing the lawn is to not remove more than one-third of the total leaf surface. During rapid growth, mowing may be required every four to five days. Higher cutting heights allow more time between mowing. As seen in Table 1, optimal mowing heights are dependent on a wide range of grass varieties. For example, bermudagrass can be mowed under $1^{1/2}$" while tall fescues should be 2-3 inches high.

Literature Cited

Day, Julie. "What Is the Proper Mowing Height for Grass in Your Yard? | Today's Homeowner." *Today's Homeowner*. Danny Lipford, 2014.

Frank, K. W., G. T. Lyman, and R. N. Calhoun. "Mowing Lawn Turf." *MSU Extension*. Michigan State University, 6 Aug. 2015.

T. Koski and V. Skinner, "Lawn Care," Colorado State University Extension, March 2012.

GRASS TYPE	RECOMMENDED MOWING HEIGHT (INCHES)	MOW WHEN GRASS REACHES THIS HEIGHT (INCHES)
KENTUCKY BLUEGRASS	2 - 2½	3 - 3¾
TALL FESCUE	2 - 3	3 - 4¾
FINE FESCUE	2 - 2½	3 - 3¾
PERENNIAL RYEGRASS	1½ - 2½	2 - 3¾
BERMUDAGRASS	1 - 1½	1½ - 2
ZOYSIA	1 - 1½	1½ - 2
ST. AUGUSTINE	2½ - 3	3¾ - 4½
CENTIPEDE	1½ - 2	2 - 3

Table 1. How tall to mow your grass type.

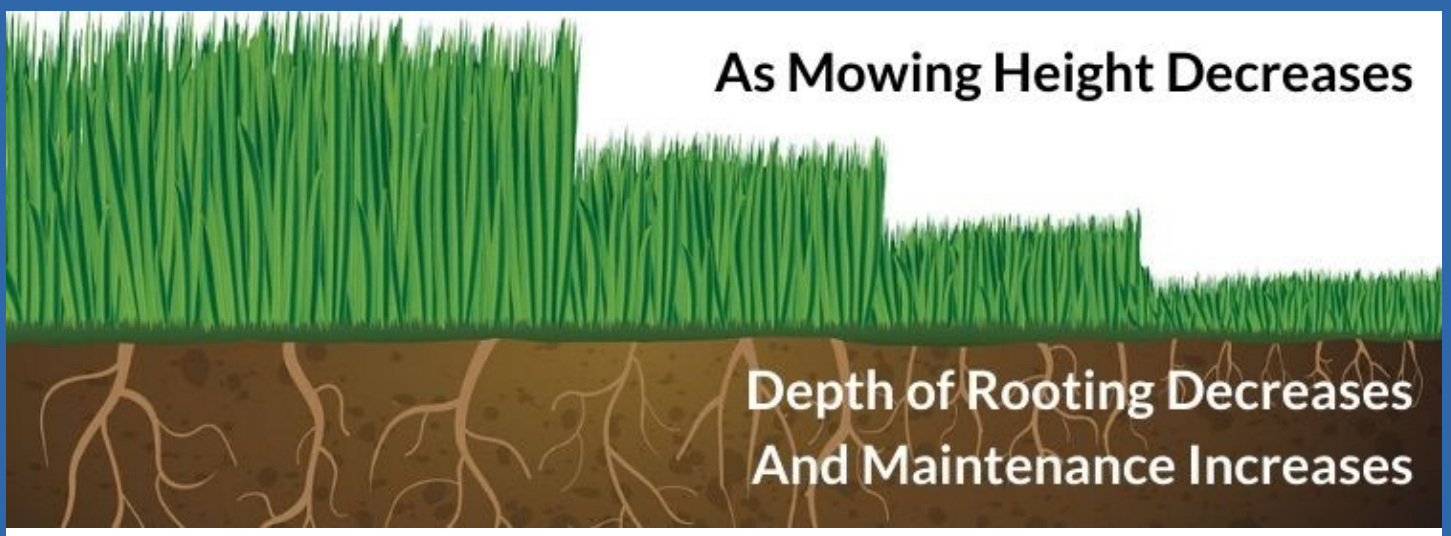

Figure 1. As mowing height is decreased the root system declines which results in shallow roots and increased

Cheryl Corson

Cheryl Corson is a landscape architect, teacher and writer, practicing independently in the Mid-Atlantic region since 2003. Her 2016, *Sustainable Landscape Maintenance Manual for the Chesapeake Bay Watershed* received an ASLA Merit Award from the Potomac Chapter and a Silver Medal from the Garden Writers of America, GWA. Through her online learning platform, Corson Learning, Cheryl helps prepare candidates across North America for the rigorous landscape architecture registration exams (LARE). She is also a national judge for America in Bloom. Cheryl enjoys travelling and learning about landscapes and gardens in North America, Central America, and in Europe.

Membership Update

Exciting New Demographic for TWCA

TWCA is excited about emerging segments of our already diverse membership; Landscape Design professionals and Developers.

This year shows a marked increase in Landscape design professionals with the addition of Ben Young Landscape Architects (BYLA) and Cheryl Corson Design. BYLA designed the landscapes for what is planned as the first NGBS certified development in the state of Idaho. Cheryl (profiled here) is also helping TWCA develop education and outreach tools geared to educating end-users and landscape professionals in managing landscapes for water conservation.

Another key demographic is the addition of Marathon Partners. Marathon Partners is a land development firm utilizing NGBS certifications in new large scale residential developments.

We look forward to developing tools and connections to better serve a new segment of membership for TWCA.

For more information about membership contact TWCA at info@tgwca.org or visit our Membership page at tgwca.org

MEMBERSHIP APPLICATION

Complete this application form and —

Mail to: Turfgrass Water Conservation Alliance
225 3rd Ave SW, Albany, OR 97321

Online: https://www.tgwca.org/become-a-member.html

Become a Member

Select One

☐	University/Government	COMPLIMENTARY
☐	Basic	$ 100.00
☐	Beginning	$ 250.00
☐	Expanded	$ 500.00
☐	Full	$1000.00

Member Information

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Company: _____

Address: _____

City: _____ State/Province: _____ Country: _____

Zip Code: _____ Telephone: _____ Email: _____

Payment Information: Pay by Check or by Credit Card

Please check appropriate box: ☐ Check* ☐ Visa ☐ MasterCard ☐ American Express

Card Number: _____ Cardholder Name: _____

Security Code: Expiration Date:

*Make checks payable to Turfgrass Water Conservation Alliance, 225 3rd Ave SW, Albany, OR 97321

US south-west in grip of historic 'megadrought', research finds

Intensified by climate change, the current 20-year arid period is one of the worst on record, with wide-ranging effects

When Ken Pimlott began fighting US wildfires at the age of 17, they seemed to him to be a brutal but manageable natural phenomenon.

"We had periodic [fire] sieges in the 80s, but there were breaks in between," said Pimlott, the former head of the California department of forestry and fire protection. But no longer. "That doesn't really happen any more. Now you can't even blink" between fires, he said. "We're seeing the kinds of fires we have never seen before."

A recent study published in the journal Science helps explains why, revealing that the south-western US is in the grip of a 20-year megadrought – a period of severe aridity that is stoking fires, depleting reservoirs and putting a strain on water supplies to the states of the region.

"You see impacts everywhere, in snowpacks, reservoir levels, agriculture, groundwater and tree mortality," said co-author Benjamin Cook, of Columbia University's Lamont Doherty Earth Observatory. "Droughts are these amazingly disruptive events. Water sits at the foundation of everything."

Researchers compared soil moisture records from 2000-2019 to other drought events from the past 1,200 years. They found that the current period is worse than all but one of five megadroughts identified in the record.

Unlike past megadroughts – brought on by natural fluctuations in the Earth's climate – this current drought has been heavily influenced by human-induced climate change, "pushing what would have been a moderate drought in south-western North America into megadrought territory", according to the study.

Photograph: Justin Sullivan/Getty Images

"Global warming has made the drought much worse than it otherwise would have been," said Cook. "We estimate 30-50% is attributed to climate change."

According to Nasa, 19 of the 20 warmest years on record have occurred since 2001. Climate change, if unchecked, will hit the American south-west particularly hard.

A major concern is the megadrought's impact on water supplies in the region. It has experienced explosive growth – half of the nation's fastest -growing states are in the south-west – made possible by elaborate river diversion projects and massive reservoirs.

Over the past two decades, drought-depleted rivers, and population growth has led to steep declines in two of the nation's largest reservoirs, Lake Mead and Lake Powell, on which tens of millions of people depend.

Water deliveries from the Colorado River are also being rationed this year, for the first time.

For Pimlott, this drought has manifested itself in 21st-century fires unlike any he had previously witnessed. In 2018, a fire tornado destroyed part of one northern California town, and almost the entire community of Paradise, California, was wiped out by a blaze that claimed 85 victims.

"Were seeing more intense fires, with longer durations," he said.

Courtesy of Samuel Gilbert, The Guardian

WaterSense Program Specifications

News Release from Headquarters

EPA to Maintain WaterSense Program Specifications

WASHINGTON (April 7, 2020) — After a review of WaterSense specifications as directed by America's Water Infrastructure Act (AWIA) of 2018, the U.S. Environmental Protection Agency (EPA) is announcing that the agency will not make updates or changes to the program specifications.

"Today's action is yet another example of the Trump Administration following through on its promise to uphold consumer choice for the American people," said EPA Administrator Andrew Wheeler. "By maintaining the existing WaterSense specifications, EPA is ensuring responsible conservation of our Nation's water supply without adding unnecessary specifications or creating undue burdens on the economy."

Additionally, EPA is announcing next steps in the agency's ongoing process of assessing and improving its WaterSense program. EPA will be engaging with WaterSense stakeholders and the public to ensure that WaterSense products continue to help protect our nation's water supplies while saving consumers money and performing as well as or better than regular models.

EPA is issuing a federal register notice determining that, after a review of WaterSense specifications as directed by AWIA, the agency will not make updates or changes to the product specifications. Additionally, the federal register notice provides next steps in the agency's ongoing process of assessing and improving its WaterSense program.

BACKGROUND

On October 24, 2018, AWIA formally authorized the EPA's WaterSense program. The law required EPA to "consider for review and revise, if necessary, any WaterSense performance criteria adopted before January 1, 2012."

EPA initiated its specification review process in December 2018 when it released the WaterSense Notice of Specification Review, which provided the agency's initial considerations and criteria for potentially revising the relevant specifications.

June 8, 2020
Mr. Andrew Wheeler
Administrator
US Environmental Protection Agency
Washington, DC
RE: Comments on Docket ID No. EPA-HQ-OW-2020-0026 Request for Information on the WaterSense® Program

Dear Administrator Wheeler:

The Alliance for Water Efficiency (AWE) and the undersigned organizations and businesses write to express our strong support for the WaterSense program at the Environmental Protection Agency (EPA) and to share with you our submitted comments regarding WaterSense. We are filing these comments in response to the Notice of Recent Specifications Review and Request for Information on the WaterSense Program published on April 10, 2020 in the Federal Register. Our comments address the recent EPA review of the WaterSense program, the EPA's decision not to revise any of the WaterSense product specifications, and the specific questions asked within the Federal Register Notice.

Our comments focus on four specific areas of the Request for Information (ROI) in the Federal Register, the details of which are contained in the attached document. Our basic conclusions are as follows:

1. Since its inception in 2006, WaterSense has sought to base its product specifications on measured values of performance that are tested in a laboratory and certified by a thirdparty certifying organization.
2. Fixture performance has improved since the advent of WaterSense.
3. The Residential End Use Study results for toilet flushing, showering, and faucet use show that over 15 years, as fixtures themselves have become more efficient, customer use of these fixtures has not changed nor has flushing frequency increased.
4. Customer satisfaction criteria do NOT belong in WaterSense product specifications themselves, but there are reasonable uses for customer satisfaction information within WaterSense.
5. Including a vague, non-scientific concept such as customer satisfaction criteria could introduce uncertainty and bias into what has until now been a fair and scientific process for setting WaterSense specifications.
6. Product-specific customer satisfaction research is best left to the marketplace and manufacturers themselves.
7. The scope of customer satisfaction research should be limited to consideration of the WaterSense brand itself and WaterSense partnerships, like the type of customer satisfaction research ENERGY STAR has conducted in the past.
8. Proper uses of customer satisfaction survey results would inform the EPA about Americans' opinion of the WaterSense brand and their experience with WaterSense labeled products in homes and businesses. This information could help EPA guide the direction of the WaterSense brand and program.
9. While we offer no comments on the EPA's decision not to revise any specifications at this time, we nonetheless believe that it is important that specifications move forward and advance over time, based on adequate study and research. WaterSense product specifications should keep up with changing times and technology.

The WaterSense program has been a tremendous success for EPA. Public and private utilities in all 50 states tailor successful water conservation programs around consumer use of WaterSense-labeled products. And because of the nexus between water and energy use, the 3.4 trillion of gallons of water saved by WaterSense since 2006 have resulted in 462.5 billion kilowatt hours of energy that are not used to heat, pump and distribute water. These savings have resulted in a financial benefit to consumers on an average of $380 annually and $84.2 billion total in water, sewer, and energy bills since 2006. Thank you for doing your utmost to ensure this inexpensive, valuable, and effective program that continues to deliver for the American people. Sincerely, The Alliance for Water Efficiency WaterDM.

Detailed Comments

1. Should the EPA include customer satisfaction criteria in the WaterSense product specifications and guidelines?

We believe that customer satisfaction criteria do not belong in WaterSense product specifications themselves, but there are reasonable uses for customer satisfaction information within WaterSense. Proper uses of customer satisfaction survey results would inform the EPA about Americans' opinions of the WaterSense brand and their experience with WaterSense-labeled products in homes and businesses. This information could help EPA guide the direction of the WaterSense brand and program. However, it would not be reasonable or correct for EPA to include customer satisfaction requirements within individual product specifications.

ENERGY STAR hired JD Power and Associates and others to conduct customer satisfaction surveys about products that receive the ENERGY STAR label.[1] All of these surveys were focused on satisfaction with partnerships, utility programs, and the ENERGY STAR brand. These surveys did not cover topics like the wattage of light bulbs, the duration of dishwasher cycles, or any product-specific information. Recent JD Power research answered the question, "Does Energy Star Partnership Increase Customer Satisfaction?"

Similarly, WaterSense could use customer satisfaction surveys conducted by independent organizations to evaluate utility partnerships, brand recognition, and overall satisfaction with WaterSense-labeled products. This information could help guide EPA to improve the WaterSense program and could even provide insight and general direction for product categories like toilets, urinals and smart irrigation controllers.

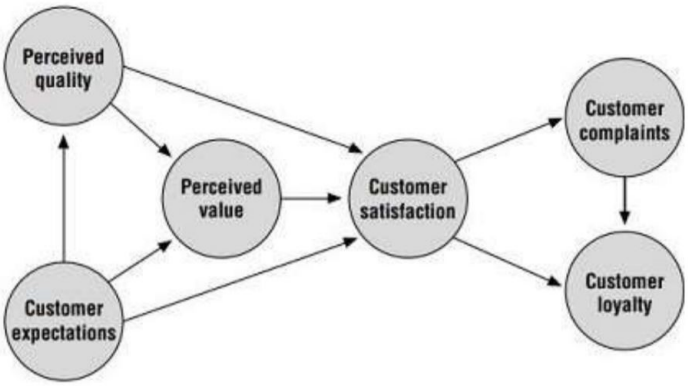

Figure 1: Customer satisfaction research nexus. Source: https://asq.org/quality-resources/customer-satisfaction

Customer satisfaction is a comparatively vague concept that cannot be measured in a laboratory in the same way as flush volumes and flow rates can. As shown in Figure 1, customer satisfaction research examines the nexus between customer expectations, perceived quality, and perceived value. Customer satisfaction with a plumbing fixture depends greatly on the quality of manufacturing, the cost of the product, the customers' own expectations, the actual installation of the fixture, the water pressure in the building, and the appearance of the fixture, among other factors. These are all difficult to measure. Including customer satisfaction criteria could introduce uncertainty and bias into what has until now been a fair and scientific process.

Since its inception in 2006, WaterSense has sought to base its product specifications on measured values of performance that are tested in a laboratory and certified by an authorized certification body. These measured values include the volume of water used to flush a toilet, or the maximum flow rate of a showerhead or faucet aerator under specific pressure conditions. These measured test values ensure that products that receive the WaterSense label are tested and are thus capable of meeting established, measurable performance criteria under laboratory conditions. This fundamental adherence to measured performance has provided a level playing field for manufacturers who have produced WaterSense products since 2006. The playing field is level because the measured requirement of each specification is understood by product manufacturers.

Customer satisfaction research is best left to the marketplace and manufacturers themselves. Product manufacturers conduct customer satisfaction research frequently and keep the results to themselves so they can use it strategically to develop their products and brand to competitive advantage. This is truly the proper use of and location for product-specific customer satisfaction research, not with the EPA, but with product manufacturers.

The WaterSense approach of basing specifications on measured values of performance that are tested and certified has had tremendous positive impact on the American economy. Americans can choose from more than 16,000 available models of WaterSense-labeled products for bathrooms, commercial kitchens and irrigation systems. The EPA has estimated that WaterSense-labeled products have saved more than $84.2 billion on American families' water, sewer, and energy bills. To date more than 1,700 manufacturers, retailers and distributors, water and energy utilities, state and local government, non-profit and trade organizations, irrigation training organiza-

Detailed Comments

2. How should EPA design studies to inform future reviews that might incorporate customer satisfaction considerations?

Measuring customer satisfaction is a complex task that requires statistical surveying and careful research. It becomes particularly challenging when trying to understand customer satisfaction with a product and to distinguish that from the brand and style and manufacturing of the fixture, the installation of the fixture, the local water pressure, and other factors. The task of measuring customer awareness of and satisfaction with the WaterSense brand as a whole would be quite different than measuring customer satisfaction with specific WaterSenselabeled plumbing fixtures such as toilets or showerheads.

This is not the type of research that can or should be conducted by the EPA itself. To protect WaterSense partners and the integrity of the WaterSense brand, the EPA should rely on the services of professional independent researchers (like JD Power, Edmunds, or KBB) or who specialize in this type of work.

Our recommendation is to limit the scope of customer satisfaction research to consideration of the WaterSense brand itself and WaterSense partnerships, like the type of research ENERGY STAR has conducted. This is much more likely to yield useful information to the EPA. If EPA chooses to conduct customer satisfaction research into specific labeled product categories, it must be designed and conducted by experts with knowledge of both customer satisfaction survey methods and plumbing fixtures.

Superior products will gain market share and it is industry that knows best how to conduct customer satisfaction research. Product category research has been conducted in the marketplace by industry and product manufacturers and distributors who all want this information to make popular products that customers want, to thus gain competitive advantage and market share. Product-specific customer satisfaction research does not need to be and should not be conducted with public funds. Industry may not wish to share the results of the research they have privately conducted, but that is their prerogative. During the WaterSense product specification and review process, information that industry deems relevant can be introduced.

3. What information, data, surveys, and studies are available that to help assess customer satisfaction with WaterSense-labeled products which could help inform future product specification?

In 2002, four years before WaterSense was created, all toilets sold in the US were required to comply with ASME Standard A112.19.2, which required testing with media comprised of plastic "granules", nylon balls, sponges and kraft paper. In 2003, in response to water utilities' concerns over the performance of toilets they rebated, engineers John Koeller and Bill Gauley created Maximum Performance Testing (MaP Testing) and began bench-testing toilets using far more realistic test media comprised of dense bean paste. MaP also began publishing testing results on a regular basis so that water utilities could provide toilet fixture performance information to their customers. Manufacturers voluntarily submitted their toilets for MaP Testing so that they could be part of large rebate programs in California, Texas, Georgia, and elsewhere.

By June 2006, when the WaterSense program was introduced, there were already about 500 different tank-type toilet models submitted for MaP Testing, the results of which were released to the public. These toilets could remove an average of 420 grams each (see Figure 2 below). As the WaterSense toilet specification for tank-type toilets was developed, many parties recommended that MaP Testing (or similar testing using realistic test media) be incorporated into the specification and, ultimately, the WaterSense tank-toilet minimum performance specification was set at 350 grams of waste removal using the MaP approach.

The WaterSense tank-type toilet specification was released in 2007, and since that time the number of MaP-tested fixture models has gone from 500 to 3,390, and the average flushing performance has improved from 500 grams of waste removed in a single flush to almost 900 grams. To be perfectly clear, 900 grams is nearly two (2) pounds of waste in a single flush, which is over 7 times the median wet weight for daily fecal output by healthy individuals in high income populations (128 grams) and 3.6 times the median wet weight for daily fecal output by healthy individuals in low income populations (250 grams).[2]

The impact of MaP Testing in improving toilet performance has been so significant that it was incorporated into the national product standard (ASME A112.19.2-2013/CSA B45.1-13) in 2013. Figure 2 shows the progression of fixtures tested and the improvement in average flushing performance since the advent of MaP Testing and WaterSense.

Detailed Comments

American consumers have expressed a high level of satisfaction with WaterSense-labeled products that have been tested through this and other processes. Customers of the Home Depot were so satisfied with WaterSense products that the company chose to sell WaterSenselabeled products exclusively in all of their stores. At competitor Lowe's, the overwhelming majority of eligible product offered for sale carry the WaterSense label. If there were a problem with customer satisfaction, these retail giants would know it and would offer something different. Home Depot and Lowe's both know that the products carrying the WaterSense label perform better than the competition that is not subject to rigorous performance testing.

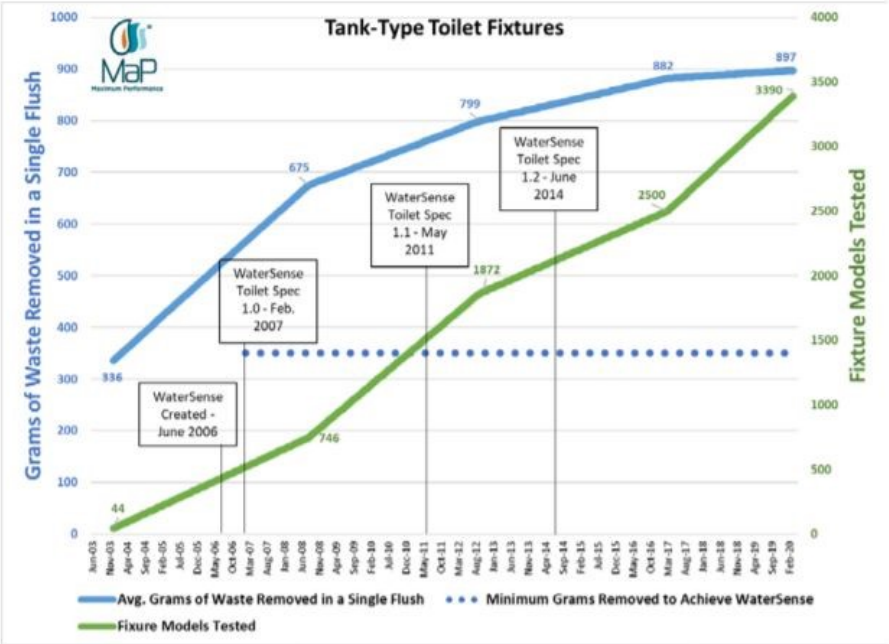

Figure 2: Fixture models tested and average grams of waste removed by tank-type toilets, 2003 – 2020 (Source: MaP Testing)

WaterSense has operated on a very modest budget since 2006, but nonetheless has become remarkably successful and popular. WaterSense manufacturer partners have produced over 4,200 different WaterSense-labeled tank-type toilet models; 9,300 models of WaterSenselabeled showerheads; and 18,000 WaterSense -labeled lavatory faucet and accessory models[3]. American consumers have voiced their satisfaction with their purchases. Industry agrees, and more than 1,700 manufacturers, retailers and distributors, water and energy utilities, state and local government, nonprofit and trade organizations, irrigation training organizations, and home builders strengthen their businesses through partnerships with WaterSense.

Based on this success, the popularity of WaterSense is expected to grow. Research from Plumbing Manufacturers International found that within the next 15 years, most bathroom sink faucets and showerheads installed in the United States will be WaterSense-certified or meet the requirements of the WaterSense program. Within the next 30 years, most residential tanktype toilets will also be WaterSense-certified or meet the requirements of the WaterSense program. Within the next 40 years, most flushometer-valve toilets and flushing urinals will be WaterSense-certified or meet the requirements of the WaterSense program.[4]

While not addressing customer satisfaction or WaterSense products directly, the 1999 and 2016 Residential End Uses of Water Studies[5] measured how people use water at home in their daily lives. The studies reveal how frequently people use toilets, faucets, and clothes washers, and to what extent those behaviors have changed over time. This information can be a strong indicator of customer satisfaction. These paired residential end use studies offer the best available measurements of key metrics such as the frequency of toilet flushing, the duration of shower and faucet usage, and the flow rate of these fixtures. This information provides valuable insight about water use patterns and indicates if people are using fixtures the same or more frequently as the flow rates and flush volumes of the fixtures have changed.

The results for toilet flushing, showering, and faucet use show that over 15 years, fixtures themselves have become more efficient, but the use of these fixtures has not changed. The average volume of water used to flush a toilet has decreased, but the average number of flushes per person per day has stayed the same. The average number of minutes spent in the shower has likewise stayed the same. The average faucet use per person per day has also stayed the same. Subsequent analysis on shower patterns using the same Residential End Uses of Water data sets found "on average, people do not compensate for lower flow rates by increasing the duration of their shower

Detailed Comments

and that lower flow rate showerheads do, on average, result in a lower overall shower volume".[6]

WaterSense has also driven performance improvement for showerheads. ASME industry standards for showerheads have been made more rigorous directly as a result of WaterSense with the addition of spray force and spray coverage test requirements taken directly from the WaterSense specifications.

Under section "V. Request for Information on Consumer Satisfaction" of the April 10 Federal Register Notice it states the following (emphasis added): "Understanding consumer satisfaction is important to the EPA as the Agency seeks to ensure that our performance criteria review is in fact ensuring that labeled products are meeting the same standards as products on the market before the WaterSense label was adopted."

This statement is problematic for several reasons. First, the statement correctly states that products that achieve the WaterSense label are meeting different standards than products that do not receive the label. Both then and now, all plumbing products and fixtures must meet the same set of basic national product standards established by ASME/CSA A112.19.2-2013/CSA B45.1-13 for fixtures and ASME A112.18.1 -2018/ CSA B125.1-18 for fittings. Since 2013, however, the requirements contained within the WaterSense specifications for plumbing products have been incorporated into the relevant ASME/CSA standards. As a result, certification to the national product standard can also result in certification to the WaterSense specification if the manufacturer so desires.

Appendix A shows the current standards that all tank-type toilets must meet in 2020 along with a history of these specifications since 2003.

Second, the statement wrongly implies that customer satisfaction for plumbing fixtures was higher before 2006 when the WaterSense label was adopted and that products met a different standard back then. The tremendous success and popularity of WaterSense-labeled products (described above) is due in large part because WaterSense specifications include measurable performance requirements that result in products that work better for consumers than the products they had before. Achieving the WaterSense label requires that products be tested to a higher standard, and this statement wrongly implies that these don't meet the same minimum basic standards as other fixtures. The confusion evident in this statement in the Federal Register should be corrected.

4. Comments on EPA's recent review of the WaterSense program.

The April 10 Federal Register Notice also included a summary of the review of WaterSense product performance criteria, conducted as required under the authorizing legislation under the America's Water Infrastructure Act (AWIA) of 2018. Based on this review, the EPA made the decision not to revise any specifications.

While we offer no comments on the EPA's decision not to revise any specifications at this time, we nonetheless believe that it is important that specifications move forward and advance over time, based on adequate study and research. WaterSense product specifications should keep up with changing times and technology.

Resources

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[2]The Characterization of Feces and Urine: A Review of the Literature to Inform Advanced Treatment Technology, C. Rose, a A. Parker, a , * B. Jefferson, a and E. Cartmell a – 2015 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4500995/
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Keeping Your Lawn Green

Putting Water Retention Products to the Test

By DJ McCauley

- A team at Texas Tech University tested two types of commercially available water retention products in a two-year study.
- Even with no irrigation beyond rainfall, water retention products improved visual quality of turfgrass.
- The researchers offer tips for homeowners to best manage their turfgrass from avoiding overwatering to changing watering schedules and testing out turfgrass products.

More than 40 million acres of turfgrass dot the landscape of the United States. From satellite's perspective, lawns are like maps of population density: where people live, turfgrass grows.

The USEPA estimates that homeowners use 9 billion gallons of water per day just for landscape irrigation (https://bit.ly?332rhYE). Overwatering and poor irrigation systems waste about half that amount.

As drought stress increases across the United States and local ordinances limit landscape water use, amendments may be a great supplemental option to help homeowners keep their grass green. Commercially available water retention products are one such option.

Consumers, however, may not be savvy in the ways of lawncare products. Advertisements tout the amount g water a homeowner can save using these amendments, but their efficacy had not been tested. This was the question that two researchers from Texas Tech University sought to answer.

"I saw tis story in the news, and it was like, "Put this in your yard, water it, and your yard will green up!" says Joey Young, a professor of turfgrass science." That's the normal process for how grass grows, so at what point did this product reduce the amount of water I'd need for m yard?"

To test common water retention products, Young collaborated with his Ph.D. student, Vikram Baliga, and Mario Carrillo of Smartfield, Inc. (now defunct). The study, recently published in *Crop, Forage & Turfgrass Management*, is a component of corresponding author Baliga's dissertation (httpd://doi.org/10.2134/cftm2019.07.0052). For the study, the team took to the field. But what exactly are the products they tested?

Water Retention Products

Water retention products come in two primary types: surfactants and hydrophilic sands.

Surfactants increase the ability of water to reach root zones. They make it easier to dry, drought-stricken soils to be re-wetted. As anyone who tends to forget about their houseplants knows, totally dried-out soil repels water.

For the curious: hydrophobicity is a product of the peculiar physical properties of organic component in the soil. As organic matter breaks down, hydrocar-

bons create waxy coatings on soil particles, and sometimes aggregate, preventing polar water from passing through the soil surface. Sandy soils are especially susceptible to hydrophobicity when dried and can even cause surface runoff so severe that is prevents water from getting to the root zones entirely.

Hydrophilic sands, on the other hand, are sand particles coated in super-absorbent polymers that soak up many times their weight in water. The polymers, when applied to sand, are easy to distribute over the grass surface. The theory is that normal watering will also hydrate the super-absorbent polymers on the sand and extend the time it takes for the soil to dry out as water is slowly released into the soil from the polymers,.

For this study, the team used four commercially available water retention products: AquaSmart Pro (a super-absorbent polymer), MaXand (a hydrophilic sand with clay), Revive Granular (a granular surfactant), and Revive Liquid (a liquid surfactant).

The Study

For the summers of 2015 and 2016, the Texas Tech team managed plots of a hybrid bermudagrass, 'TifSport' [*Cynodon dactylon* (L.) Pers. X *Cynodon transvaalensis* Burtt-Davey]. Prevalent throughout Texas, TifSport is drought tolerant, recovers well from heavy traffic, and tolerates close mowing (https://bit.ly/2xlOK5L).

The team set up four treatment groups with four replicates each. They used a spoon aerifier to aerify each plot to simulate what a typical homeowner might use. Aerification is a strategy for decreasing soil compaction, increasing oxygenation, and allowing more water to get crop root zones. Aerification involves removing cores from the soil, creating small holes that allow water and potentially allows deeper penetration of water retention products.

Each month, the team applied test products and irrigated the plots with a quarter inch of water. The two hydrophilic sand treatments were mixed with additional top-dressing sand to ensure uniform application, applied according to the manufacturer's directions, and then brushed into the grass canopy.

The team took measurements of volumetric water content, visual turfgrass quality, percentage of green cover, and canopy temperature.

After calculating the evapotranspiration rates to determine turfgrass water loss, there were only two weeks in 2015 when plots received more water form rainfall than they lost through evapotranspiration. In 2016, there was not a single week during the study in which rainfall exceeded water loss.

Even under these severe drought conditions, the team noted that three of the four products improved turfgrass quality and percentage of green cover compare with control plots. AquaSmart Pro, MaXand, and Revive Granular showed the best responses when higher amounts of rainfall occurred shortly after application.

The team speculates that the benefits to turfgrass from the hydrophilic sand products do not come from extra water retention, but from the protection the sand provides to the crown of the plant. The crown, right at the soil surface, is the point of all growth for turfgrass. If the crown stays intact, the plant can survive adverse conditions. Likely, the sand applied at the crown provided protection from damage, especially from wind stress. When the crown is healthy, grass is more likely to show quick growth when better conditions arise.

Revive Granular had a different advantage. Made primarily from dehydrated poulty waste, the product added more supplemental nitrogen and iron compared with the other three tested products, Sandy Texas soils are often low in iron: Young speculates that the iron in the product aided grass in "greening up" faster.

Aerification had no effect on the plots. The team thinks that the cores were both too far apart and too shallow to provide benefits to the turfgrass un-

der the dry, hot conditions of the Lubbock County, Texas study site.

Finally, the team highlights the fact that *no* supplemental water was added during the study.

"We really wanted to push the limits of the products we tested." Baliga says. "We really tried to see how they would do with no extra water from us. Ideally, I'd like to add two or three irrigation levels to see when we're getting optimal results. For future studies, I'd like to see where some of those break points are and where we can maintain acceptable quality with minimal water."

Tips for Homeowners

Under drought conditions, the Texas Tech team demonstrated that amendments for water retention can help homeowners keep their lawns green. Baliga and Young offered some tips for anyone seeking better ways to keep their grass green while minimizing their water use.

"People could apply a product and water their lawn half as much as the would have, and it would be enough to keep the grass growing whether the product was there or not," Young says.

Overwatering increases disease pressure and discourages grass from developing strong, deep root systems. In constantly damp soil conditions, fibrous grass roots only grow shallowly. When drought sets in, the lack of deep roots and their minimized surface area means that the turfgrass will struggle to find adequate water.

Decreasing the frequency of watering can also encourage turfgrass to grow deeper, stronger root systems. Avoid daily watering. Instead, it may be prudent to combine your watering sessions for only one or two long drinks a week.

"If you're trying to put down an inch of water every week, instead of watering a fifth of an inch every day, split it into two irrigations and put down half an inch of water, twice" Baliga says. "That really pushes water down into the soil better, and your turfgrass will be much healthier."

Young emphasizes that choosing landscape plants that are suited to your yard's particular environment means you, ad the caretaker, will have much less difficulty keeping them healthy and aesthetically pleasing. Using a state extension website to check temperature adaptability, drought tolerance, and shade preferences, you can choose plants that will thrive.

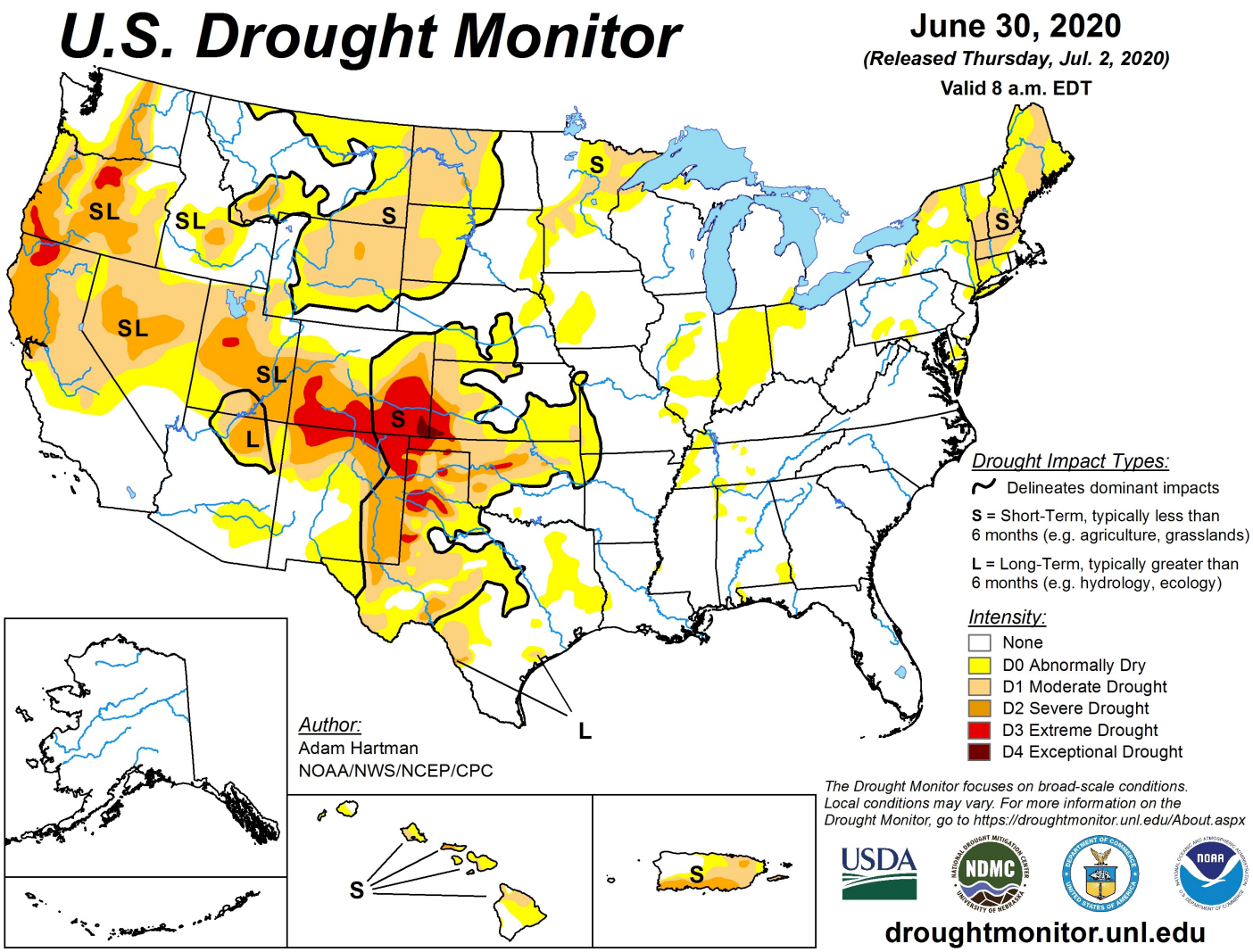
"Whether we're talking about a tree, or a shrub, or turfgrass, or a perennial flower, we have to put the right plant in the right place,: Young says.

Finally, a simple tip: before you spend our hard-earned money on a pile of water-retention products, try out the product in a small area of your yard to see if it really does make a difference.

"Gold course superintendents do this all the time," Young says. "They put down a sheet of plywood when they're making their applications, leaving one little part untreated to see if all the activities they're doing are making a difference or not. That would be a really cool thing for people to consider trying."

To sum up, Baliga mentions that experimenting with less water or more infrequent watering is not something to be afraid of.

"Your grass is way more resilient than you think," Baliga says. "Even in exceptional drought, with just a little bit of help from a product or a little bit of irrigation, you can really maintain what you want without over-applying water."



National Drought Summary

Author: Adam Hartman, NOAA/NWS/NCEP/CPC

Precipitation was hit-or-miss this week for many locations east of the Great Plains. Much of the Midwest, South, and Southeast saw combinations of D0 additions and removals based on 7-day rainfall accumulations. Most areas with D0 removal observed at least 2-3 inches of rainfall. Some short-term dryness crept into southern Georgia (isolated 2-4 inch 30-day deficits) and the Florida Gulf Coast (widespread 2-4 inch deficits over the last 14 days). The Mid-Atlantic coast saw some D0 expansion near the Delmarva Peninsula. Portions of New England saw more than 3 inches of rainfall, drastically reducing 30- and 60-day deficits and warranting some D1 removal. However, USGS 7-day average stream flows remain below normal for much of the Northeast. The High Plains and northern Rockies also received some beneficial rainfall. Many locations in Idaho saw 1-category improvements (D1 to D0 and D0 removal), but much of the northern High Plains Region did not receive enough rainfall for much improvement. Some degradation from D3 to D4 occurred in southeastern Colorado and southwestern Kansas in areas where little or no precipitation fell and temperatures averaged above normal for the week. The wildfire risk remains high for many locations that remain in drought, particularly in the West.

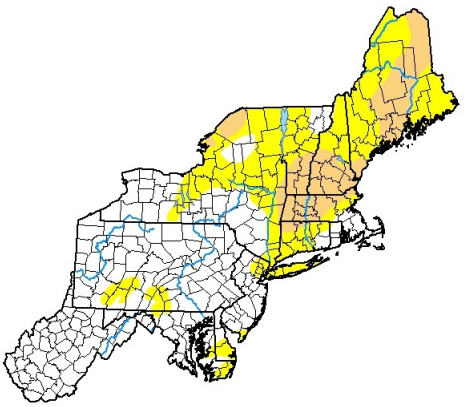
Northeast

Parts of New England received more than 3 inches of rainfall this week. Some locations in western Maine, eastern New Hampshire, and eastern Massachusetts had 30-day deficits reduced to around an inch, warranting an upgrade from D1 to D0 over western Maine. Precipitation deficits were totally removed near Norfolk, MA (7-day precipitation totals greater than 3 inches), leading to D0 removal. However, greater than 1.5 inch 60-day precipitation deficits remained for much of eastern Maine and USGS 7-day average stream flows remain below to much below normal (below the 24th percentile). In eastern Maine, despite light rainfall, D1 was expanded over Penobscot, Hancock, and Piscataquis Counties, in favor of D3-D4 SPIs at 30 and 60 days. D1 was also added near Jefferson County, NY, in support of a D3 60-day SPI nearby and 3-4 inch 60-day rainfall deficits. D0 was expanded across northern and southern New Jersey and the Delmarva Peninsula as 30-60 day precipitation deficits continue to mount. Many of the new D0 areas have seen 25-50 percent of normal precipitation over the last 60 days, diminishing to 10-25 percent of normal for several locations in the last 30 days. In addition, USGS 7-day average stream flows are below normal (10th -24th percentile) for D0 areas on the Delmarva and much below normal (less than the 10th percentile) for southern and northern New Jersey.

Southeast

Despite precipitation surpluses beyond 90 days, short-term dryness (30-60 days) remains the concern for many locations across the Southeast. This region again experienced a combination of D0 addition and removal, depending on where the heaviest precipitation fell. Parts of southeastern Alabama and southern Georgia have also experienced below normal precipitation over the last 30-60 day periods,

U.S. Drought Monitor
Northeast



June 30, 2020
(Released Thursday, Jul. 2, 2020)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	54.45	45.55	14.23	0.00	0.00	0.00
Last Week 06-23-2020	57.80	42.20	16.15	0.00	0.00	0.00
3 Months Ago 03-31-2020	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 12-31-2019	99.61	0.39	0.00	0.00	0.00	0.00
Start of Water Year 10-01-2019	48.74	51.26	8.49	2.23	0.00	0.00
One Year Ago 07-02-2019	100.00	0.00	0.00	0.00	0.00	0.00

Intensity:
None · D0 Abnormally Dry · D1 Moderate Drought · D2 Severe Drought · D3 Extreme Drought · D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Adam Hartman
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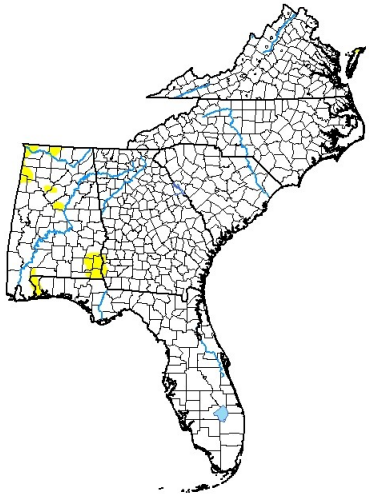
droughtmonitor.unl.edu

U.S. Drought Monitor
Southeast



June 30, 2020
(Released Thursday, Jul. 2, 2020)
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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	97.84	2.16	0.00	0.00	0.00	0.00
Last Week 06-23-2020	97.72	2.28	0.00	0.00	0.00	0.00
3 Months Ago 03-31-2020	75.37	24.63	13.75	0.21	0.00	0.00
Start of Calendar Year 12-31-2019	93.12	6.88	1.69	0.00	0.00	0.00
Start of Water Year 10-01-2019	20.54	79.46	44.26	13.71	1.87	0.00
One Year Ago 07-02-2019	74.11	25.89	7.01	0.43	0.00	0.00

Intensity:
None · D0 Abnormally Dry · D1 Moderate Drought · D2 Severe Drought · D3 Extreme Drought · D4 Exceptional Drought

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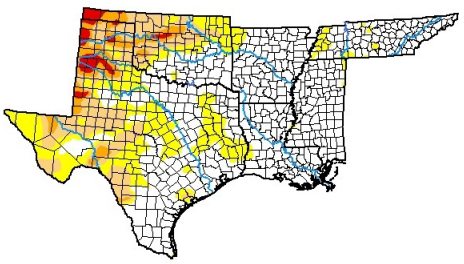
U.S. Drought Monitor
South



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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	60.33	39.67	19.86	6.90	2.04	0.01
Last Week 06-23-2020	64.52	35.48	17.16	6.49	1.27	0.00
3 Months Ago 03-31-2020	81.33	18.67	11.98	7.49	2.76	0.18
Start of Calendar Year 12-31-2019	63.30	36.70	20.62	5.16	0.37	0.00
Start of Water Year 10-01-2019	36.49	63.51	33.94	13.74	3.20	0.00
One Year Ago 07-02-2019	95.74	4.26	0.68	0.03	0.00	0.00

Intensity:
None · D0 Abnormally Dry · D1 Moderate Drought · D2 Severe Drought · D3 Extreme Drought · D4 Exceptional Drought

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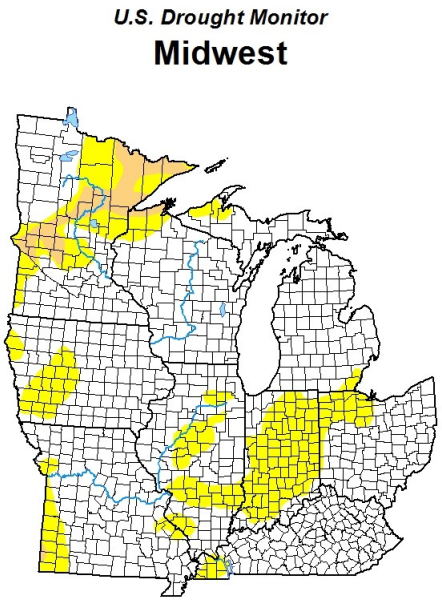

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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	76.78	23.22	3.54	0.00	0.00	0.00
Last Week 06-23-2020	75.83	24.17	2.90	0.00	0.00	0.00
3 Months Ago 03-31-2020	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 12-31-2019	99.74	0.26	0.00	0.00	0.00	0.00
Start of Water Year 10-01-2019	74.06	25.94	11.99	5.07	0.32	0.00
One Year Ago 07-02-2019	96.09	3.91	0.00	0.00	0.00	0.00

Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

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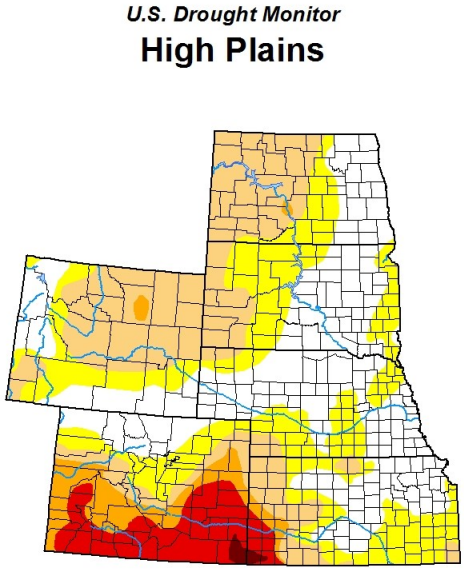

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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	34.41	65.59	39.70	13.29	7.90	0.43
Last Week 06-23-2020	37.79	62.21	40.10	13.49	7.57	0.00
3 Months Ago 03-31-2020	82.13	17.87	10.65	0.99	0.00	0.00
Start of Calendar Year 12-31-2019	75.57	24.43	12.06	4.79	0.00	0.00
Start of Water Year 10-01-2019	78.65	21.35	6.42	0.00	0.00	0.00
One Year Ago 07-02-2019	94.40	5.60	1.48	0.33	0.00	0.00

Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

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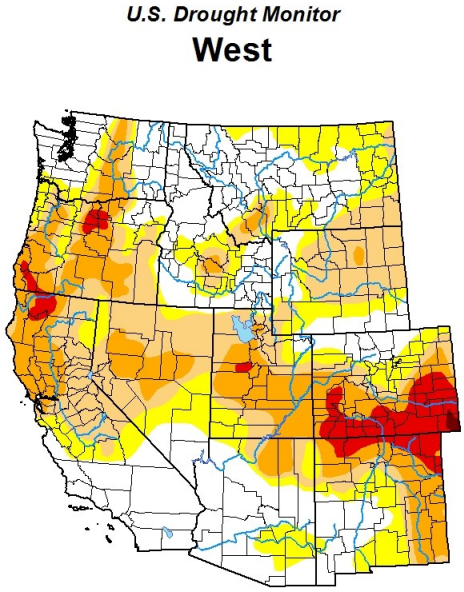

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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	35.15	64.85	45.24	22.93	5.00	0.12
Last Week 06-23-2020	33.43	66.57	46.04	21.34	4.86	0.00
3 Months Ago 03-31-2020	51.87	48.13	27.82	4.20	0.00	0.00
Start of Calendar Year 12-31-2019	59.17	40.83	18.17	7.12	0.00	0.00
Start of Water Year 10-01-2019	68.40	31.60	16.32	3.16	0.00	0.00
One Year Ago 07-02-2019	86.89	13.11	5.53	1.24	0.00	0.00

Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought

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as some stations are reporting D0, D1, and D2 SPIs for those periods. USGS 7-day average stream flows remain near and above normal for all of Georgia, so this week is status quo for much of the state. The exception being southwestern Georgia, where an area of D0 was introduced in southeastern Alabama and along the AL/GA border, where the area has received 25-50 percent of normal precipitation in the last 30 days, stream flows have fallen below normal (10th to 24th percentile), and soil moisture continues to decline. Many locations along Florida's Gulf Coast saw a very dry last two weeks in June, with much of the coast experiencing 2-4 inch 14-day deficits. Scattered showers this week did little to help and USGS stream flows are mostly near normal, with the exception of the Tampa Bay area. 30-day SPIs are generally positive also, so no D0 introduction this week. However, the Florida Gulf Coast will need to be monitored closely in the coming weeks if the short-term dryness continues.

South

In the Southern Region, the story remains the short-term (30-60 day) dryness. Western Tennessee has missed out in recent weeks on the heaviest precipitation, warranting some D0 expansion (2-3 inch deficits going back 90 days). Northwestern Arkansas and northeastern Oklahoma saw D0 and D1 expansion, as little to no rain fell and most of these areas have received only 10-25 percent of normal precipitation in the last 30 days. 7 inch rainfall deficits in the last 60 days have been observed near Tulsa and Creek Counties in Oklahoma, warranting the addition of a small area of D2. USGS 7-day stream flows are also below normal (10th - 24th percentile) for areas around Tulsa County, OK. In western areas of Texas and Oklahoma, heat, low humidity, and lack of rainfall continue to exacerbate existing drought conditions, leading to some D1, D2 and D3 expansion. Widespread D2-D4 SPIs over several time periods for many of these locations.

Midwest

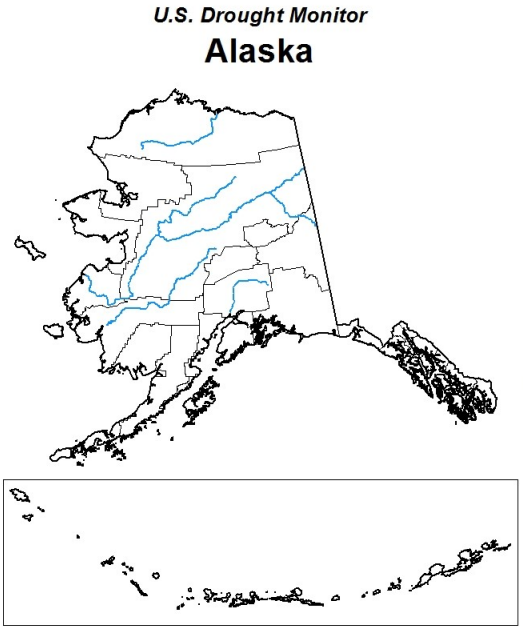
The Midwest saw widespread precipitation where some locations received 3-6 inches of rain. D0 removal from much of the lower Ohio River Valley. The Corn Belt saw both expansion and reduction of D0, depending on where 7-day totals were below and above normal, respectively, adding to 1.5-3 inch 30-day deficits. The Arrowhead of Minnesota and northern Wisconsin saw D0 and D1 expansion, in favor of 3-5 inch 60-day departures, D3-D4 SPIs over several time periods, and much below normal (below the 10th percentile) USGS average 7-day stream flows.

High Plains

Above normal temperatures, low humidity, high winds, and below normal precipitation in recent weeks has led to continued degradation in southeastern Colorado and southwestern Kansas. Although some isolated convection occurred in southeastern Colorado, in areas that did not see precipitation and that continued to see above normal temperatures this week, D4 was introduced, which expanded into southwestern Kansas. However, some D0 and D2 reduction was warranted in western Kansas, as 7-day rainfall accumulations of more than 1.5 inches eliminated 30-day departures for several locations. Some areas of Nebraska saw expansion of existing D0 coverage, where 30-day dryness continues. There are concerns of potential flash drought in eastern Nebraska, where 30-day SPIs of D2 or greater are being reported. The northern High Plains saw enough rainfall this week (1.5-3 inches) to warrant D1 reduction in northwestern South Dakota and southwestern North Dakota. The remainder of the region was generally status quo.

West

The Western Region is mainly status quo, except for the northern Rockies and Pacific Northwest, where an active storm track. Idaho benefitted the most, with several lo-



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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 06-23-2020	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 03-31-2020	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 12-31-2019	93.18	6.82	0.83	0.00	0.00	0.00
Start of Water Year 10-01-2019	88.64	11.36	5.03	2.00	0.88	0.00
One Year Ago 07-02-2019	87.64	12.36	2.78	1.65	0.88	0.00

Intensity:
None | D0 Abnormally Dry | D1 Moderate Drought | D2 Severe Drought | D3 Extreme Drought | D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
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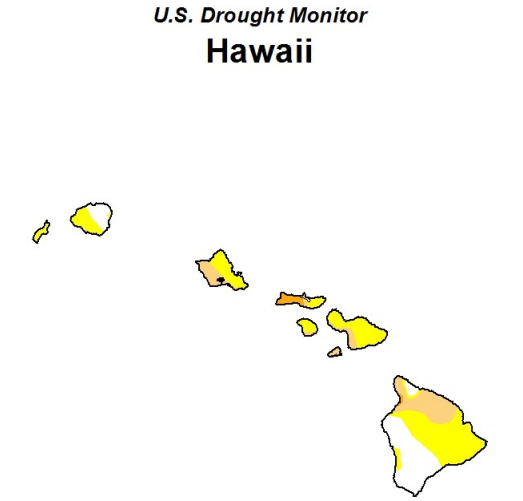

June 30, 2020
(Released Thursday, Jul. 2, 2020)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	26.34	73.66	23.07	2.82	0.00	0.00
Last Week 06-23-2020	33.75	66.25	19.97	2.82	0.00	0.00
3 Months Ago 03-31-2020	89.54	10.46	3.06	0.56	0.00	0.00
Start of Calendar Year 12-31-2019	36.78	63.22	17.58	6.66	0.99	0.22
Start of Water Year 10-01-2019	62.03	37.97	17.85	6.15	1.55	0.00
One Year Ago 07-02-2019	32.82	67.18	43.30	3.76	0.94	0.00

Intensity:
None | D0 Abnormally Dry | D1 Moderate Drought | D2 Severe Drought | D3 Extreme Drought | D4 Exceptional Drought

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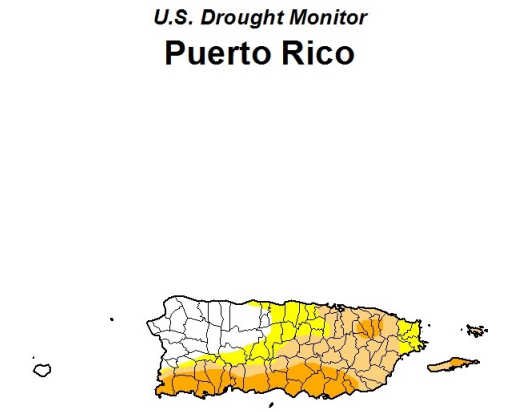

June 30, 2020
(Released Thursday, Jul. 2, 2020)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	26.80	73.20	54.69	22.44	0.00	0.00
Last Week 06-23-2020	22.52	77.48	59.84	26.11	0.00	0.00
3 Months Ago 03-31-2020	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year 12-31-2019	63.82	36.18	10.86	0.00	0.00	0.00
Start of Water Year 10-01-2019	82.06	17.94	7.93	0.00	0.00	0.00
One Year Ago 07-02-2019	40.08	59.92	31.84	5.80	0.00	0.00

Intensity:
None | D0 Abnormally Dry | D1 Moderate Drought | D2 Severe Drought | D3 Extreme Drought | D4 Exceptional Drought

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cations seeing 1-category improvements, particularly western Idaho, which received 0.5-1.5 inches of rainfall. Light showers in eastern Washington and northeastern Oregon led to slight reduction of D0 and D1 coverages. Soil moisture is below the 10th percentile in many areas across the Great Basin and northern California. USGS 7-day average stream flows also continue to be below to much below normal this week for much of the Four Corners Region, the Great Basin, and northern California.

Alaska, Hawaii and Puerto Rico

In Alaska, rainfall has been near and above normal for many locations across the state going back 7-14 days, warranting status quo this week. Hawaii remained dry again this week, with most locations seeing below normal precipitation for the 7-day period. Several stations in Oahu reported negative precipitation departures of more than 0.5 inches while northern portions of Maui also saw slight negative precipitation anomalies. As such, D1 was expanded eastward in Oahu to encompass locations seeing the greatest negative departures, and D0 was expanded to cover the remainder of the island. D0 was also expanded in Maui, in favor of slightly negative 30-day SPIs, below normal precipitation, and above normal temperatures this week. D0-D2 reductions were made in western Puerto Rico, with several locations receiving 2-5 inches of rainfall this week. Many D2 locations along the southern coast of the have seen YTD deficits of 2-5 inches, with pockets of 5-10 inch deficits. Much of the eastern third of the island is seeing 25-50 percent of normal precipitation going back 90 days and USGS 7-day average stream flows are below the 10th percentile for much of the region. It was reported that the San Juan metro area will be implementing water rationing measures to cope with moderate and severe drought conditions in surrounding areas.

Looking Forward

During the next 5 days (July 2-6), WPC's QPF showed increased probabilities for precipitation across many of the northern tier states, much of the Mississippi Valley, and Southeast, where many areas are favored to receive up to and exceeding 1 inch of precipitation. The Northern High Plains and the Middle Mississippi Valley are expected to see some of the heaviest rainfall (2-4 inches in some cases). Probabilities drop off quite a bit for many locations just east of the Rockies, where below normal precipitation, high winds, low relative humidity, and above normal temperatures continue to be the driving factors for maintenance and exacerbation of drought conditions. Luckily, temperature anomalies are favored to be near to slightly above normal for much of the next week over the western Plains. Much of the Great Lakes is also favored to miss out on some beneficial rainfall in the upcoming week, in addition to positive temperature anomalies of 8-10 °F.

The Climate Prediction Center's 6-10 day outlook (July 7-11) shows an amplified pattern with a mean ridge over the central CONUS, and troughing over the West Coast and over the eastern CONUS. Enhanced probabilities of below normal temperatures are favored along the West Coast and interior Pacific Northwest, in association with a mean mid-level trough over the West. Above normal temperatures and below normal precipitation are favored in much of the central CONUS, with probabilities for above normal temperatures extending to the Great Lakes and Northeast, underneath a mean ridge. The active storm track is favored to continue for the northern tier states, with elevated odds for above normal precipitation centered over the Upper Midwest and Great Plains.

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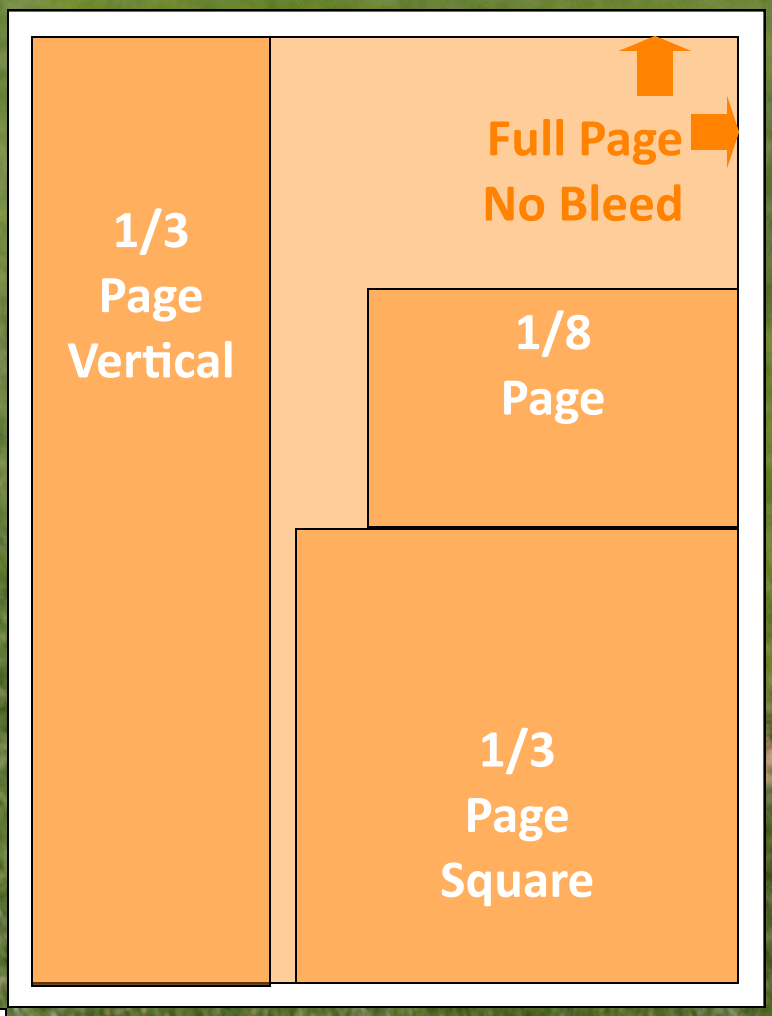

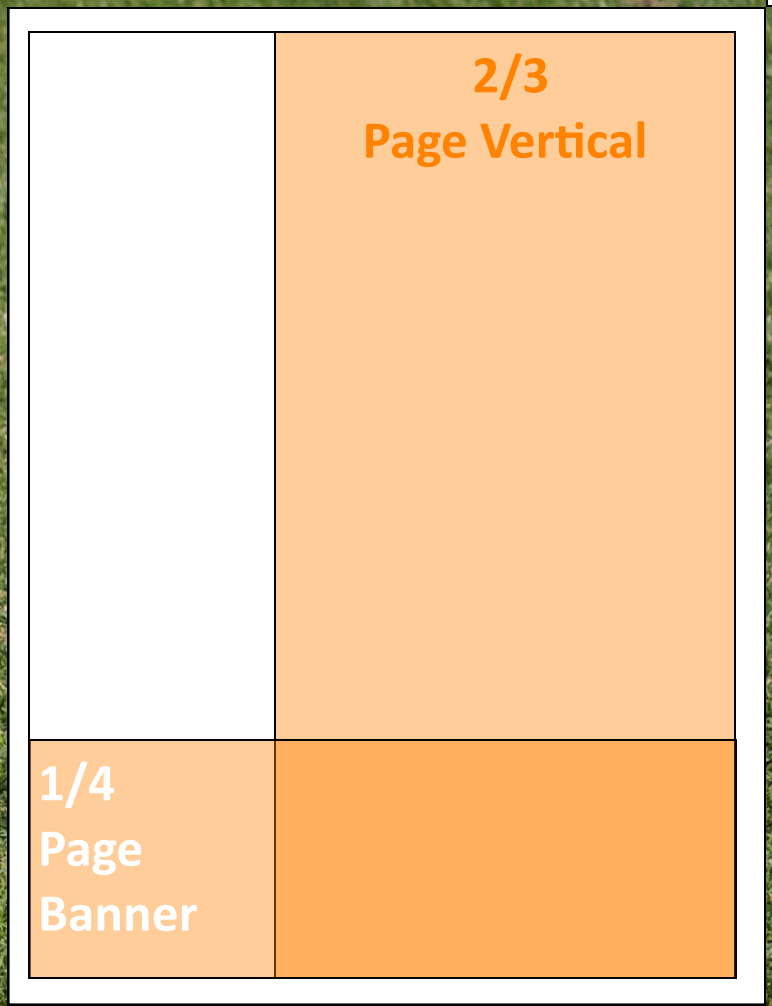

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TURFGRASS WATER CONSERVATION ALLIANCE
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TWCA CALENDAR

upcoming events

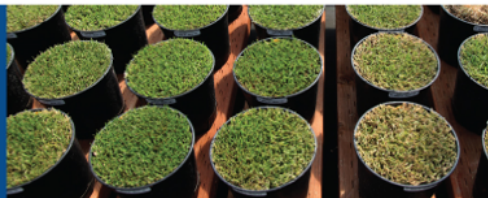
THIS EVENT HAS BEEN

POSTPONED

BECAUSE OF THE COVID-19 SITUATION,

THE TURFGRASS RESEARCH FIELD DAY WILL BE RE-SCHEDULED FOR 2021.

Turfgrass Water Conservation Alliance
225 3rd Ave SW Albany OR 97321
info@tgwca.org



5 Tips for Beautiful Sustainable Landscapes

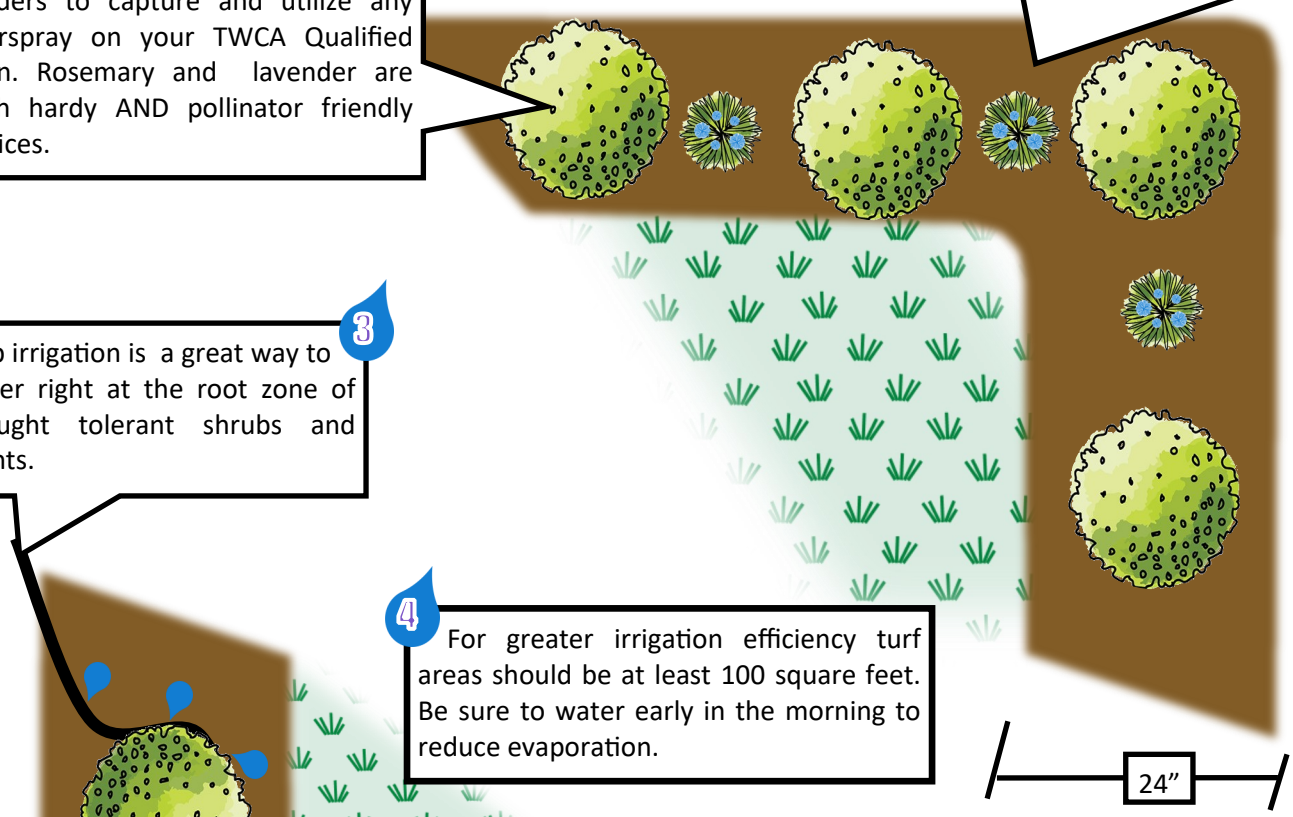
Sustainable Landscaping doesn't always mean getting rid of grass. With TWCA Qualified Drought tolerant turf your yard can reduce it's water need by 30%! These 5 simple tips help you have an easy, affordable, and beautiful sustainable landscape! Learn more about drought tolerant turf at tgwca.org

1. TWCA Qualified Drought tolerant turf is only one way your landscape saves water. Installing mulch or gravel strips 18-24" wide reduces turf area and eliminates overspray from irrigation. Make you landscape more unique by using local alternatives like hazelnut shells or pine straw instead of gravel.

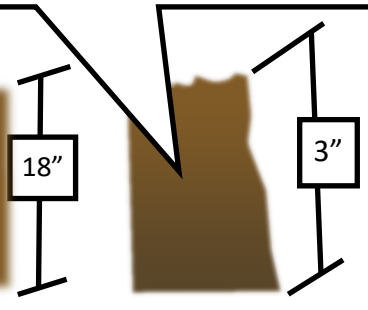
2. Plant drought tolerant, climate appropriate ornamentals in your borders to capture and utilize any overspray on your TWCA Qualified lawn. Rosemary and lavender are both hardy AND pollinator friendly choices.

3. Drip irrigation is a great way to water right at the root zone of drought tolerant shrubs and plants.

4. For greater irrigation efficiency turf areas should be at least 100 square feet. Be sure to water early in the morning to reduce evaporation.



5. Make sure your mulch is at least 3" deep to maximize moisture retention and weed suppression.



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