



# The AQUIFER

www.groundwater.org

A PUBLICATION OF THE GROUNDWATER FOUNDATION

Connecting people, businesses, and communities through local groundwater education and action, making us all part of the solution for clean, sustainable groundwater.



## Better Together

### Groundwater Foundation Merges with National Ground Water Association Foundation

by Jane Griffin, Executive Director, Groundwater Foundation

One of things that I'm most proud of at the Groundwater Foundation is the focus on the collective impact of our work - recognizing that not one person, community, or organization will solve the issues surrounding groundwater management and protection. Working together is the approach that derives meaningful outcomes.

In the true essence of the spirit of collective impact, we are thrilled about our recently announced merger of the Groundwater Foundation with the National Ground Water Association's (NGWA) Foundation for Groundwater.

The merger brings together not only the like-minded approach to addressing the issues of groundwater

management, it unites the strengths that each organization has to better serve our constituents and better fulfill our missions. As NGWA says, "Better Together."

While it is now a formal partnership, the Groundwater Foundation and NGWA have been partnering and collaborating for many years. Groundwater Foundation Founder and President Emeritus Susan Seacrest recalls utilizing the knowledge and expertise of NGWA since she founded the Groundwater Foundation over 30 years ago. In those 30 years, the Groundwater Foundation and NGWA have reciprocally served on advisory committees for programs and activities.

For those of you who have attended Groundwater Foundation National

Conferences, you may recall many excellent speakers from NGWA over the years, including Bill Alley, Director of Science and Technology; retired CEO Kevin McCray; and Cliff Treyens, former public awareness director. The conference also hosted speakers from NGWA's McElhiney Lecture Series speakers, John Jansen and Tom Christopherson.

The Groundwater Foundation has been part of promoting NGWA's National Groundwater Awareness Week and Protect Your Groundwater Day, as both have been a great opportunities to share the message of groundwater protection.

Now we are taking this partnership to a more significant level. By uniting organization, we will be able to strengthen and grow our programs

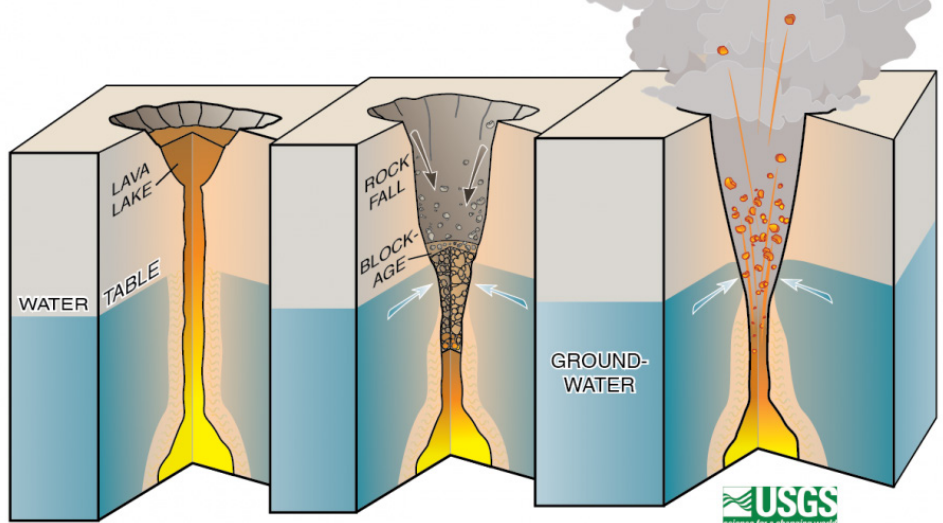
► See *TOGETHER*, p. 4

### INSIDE...

2 This and That | 4 Better Together | 6 Water Use Across the U.S. Declines to Pre-1970s Levels | 8 PFAS: An Emerging Contaminant | 9 6 Ways to Learn About Groundwater this Summer | 10 Groundwater Guardian Green Sites

Explosive eruptions can occur when

- 1) magma column drops below water table
- 2) groundwater interacts with hot rock
- 3) steam pressure builds then explodes.



## Eruptions at Kilauea: What's Groundwater Got to Do With It?

You have probably heard about the ongoing volcanic eruption of Kilauea on the Island of Hawai'i, but did you hear about how groundwater can affect the eruptions?

When the lava column at Kilauea drops below the water table, groundwater can come into contact with magma or hot rocks. This rapidly heats the groundwater, causing violent steam explosions.

The role of groundwater in Kilauea eruptions is part of ongoing USGS research and has been observed before. For example, in 1924, lava drained from Halema'uma'u Crater and dropped below the water table. Collapse of the crater walls, and influx of groundwater into the conduit to Halema'uma'u, caused repeated explosions between May 11 and 27, 1924. These explosions threw rocks more than 10 inches in diameter for more than 0.6 miles from the vent. Ash from the explosions fell from North Hilo to beyond Pāhala, pea-size rocks were reported to have fallen at the Volcano House, and gravel-size rocks were deposited 2 miles southwest of Halema'uma'u.

Kilauea is a shield volcano (or a broad shield-shaped volcano that is built up by successive, mostly effusive, eruptions of low-silica lava) located on the eastern slope of Mauna Loa Volcano

▲ At Kilauea, when the lava column drops below the water table, groundwater may come into contact with magma or hot rocks, causing violent steam explosions.

on the Island of Hawai'i. The volcano is considered to be in the shield-building stage of Hawaiian volcanism.

There is a lack of old exposed rock at Kilauea, which makes it difficult for geologists to piece together its complete eruption history. Only about 10 percent of Kilauea's surface consists of rock older than 1,000 years. The other 90 percent of the volcano's surface is covered by lava flows younger than 1,000 years, and about 20 percent of those flows are less than 200 years old. The Hilina Basalt formation, exposed in Hilina fault scarps on Kilauea's central south flank, includes the oldest lava flows found above sea level, which erupted around 50,000 to 70,000 years ago.

Older rocks have been recovered from Kilauea's submarine slopes and drill cores, providing some clues to the volcano's origin. Estimates for the age of Kilauea's first-erupted lavas continue to evolve as more samples are collected and various dating methods are used. Current research indicates the first alkali-basalt lava flows erupted onto the ocean floor between 210,000 and 280,000 years ago, and the volcano transitioned from its pre-shield to shield-building stage about 155,000 years ago.

Want to learn more about Kilauea, its history, and its explosions? Visit <https://volcanoes.usgs.gov/volcanoes/kilauea>.

## Free Educator Toolkit Packed with Tools and Resources

The Groundwater Foundation has compiled a variety of educational tools and resources into a convenient downloadable Educator Toolkit, available for free on the Foundation's website at [www.groundwater.org/kids/classroom](http://www.groundwater.org/kids/classroom).

The Toolkit is organized by age level, making it easy for elementary, middle, and high school educators to find the tools to best suit their classrooms or extracurricular setting. There are also a series of tools appropriate for all age groups.

The featured tool for both elementary and middle school ages is the Awesome Aquifer Kit. The additional resources can be used to supplement the curriculum.

Elementary resources include fun hands-on activities like the story of Frannie the Fish, Growing with Groundwater, word searches and crossword puzzles, Upcycled Conservation Flowers, Clean Water Challenge, and many more.

For middle school educators, find lesson plans and student worksheets, plus instructions for activities like You Be the Judge, Contamination on the Move, Water Quality Survey, and other free tools.

For high school educators, the featured tool is the Hydrogeology Challenge, a learning tool that introduces students to basic groundwater modeling concepts. Find a guide to Hydrogeology and links to other advanced activities.

There are additional free tools and resources appropriate for all ages - a demonstration of the Awesome Aquifer Kit, the Water1der and 30by30 free mobile apps, and the Groundwater Guardian and Groundwater Guardian Green Site programs.

Find the free educator toolkit, along with other great resources educators can use in the classroom and beyond to help students understand groundwater and how they can take action to protect it, visit [www.groundwater.org/kids/classroom](http://www.groundwater.org/kids/classroom).





## Next Drug Take Back Day Set for October 27

Americans nationwide did their part to drop off a record number of unused, unwanted or expired prescription medications during the DEA's 15th National Prescription Drug Take Back Day, at close to 6,000 sites across the country. Together with a record-setting amount of local, state and federal partners, DEA collected and destroyed close to one million pounds—nearly 475 tons—of potentially dangerous expired, unused, and unwanted prescription drugs, making it the most successful event in DEA history.

This brings the total amount of prescription drugs collected by DEA since the fall of 2010 to 9,964,714 pounds, or 4,982 tons.

"Today we are facing the worst drug crisis in American history, with one American dying of a drug overdose every nine minutes," said Attorney General Jeff Sessions.

"An unprecedented crisis like this one demands an unprecedented response – and that's why President Trump has made this issue a priority for this administration. DEA's National Drug Take Back Days are important opportunities for people to turn in unwanted and potentially addictive drugs with no questions asked. These Take Back Days continue to break records, with the latest taking nearly 1 million pounds of prescription drugs off of our streets. And so I want to thank DEA and especially every American who participated in this event. I have no doubt it will help keep drugs out of the wrong hands and stop the spread of addiction."

"National Prescription Drug Take Back Day is a day for every American, in every community across the country, to come together and do his or her part to fight the opioid crisis – simply by disposing of unwanted prescription medications from their medicine cabinets," said DEA Acting Administrator Robert W. Patterson. "This event – our 15<sup>th</sup> – brings us together with local, state and federal partners to fight the abuse of prescription drugs that is fueling the nation's opioid epidemic."

Now in its 9<sup>th</sup> year, National Prescription Drug Take Back Day events continue to remove ever-higher amounts of opioids and other medicines



from the nation's homes, where they could be stolen and abused by family members and visitors, including children and teens.

This initiative addresses a vital public safety and public health issue. Medicines that languish in home cabinets are highly susceptible to diversion, misuse and abuse. Rates of prescription drug abuse in the U.S. are alarmingly high, as are the number of accidental poisonings and overdoses due to these drugs. Studies show that a majority of abused prescription drugs are obtained from family and friends, including from the home medicine cabinet.

DEA launched its prescription drug take back program when both the Environmental Protection Agency and the Food and Drug Administration advised the public that their usual methods for disposing of unused medicines – flushing them down the toilet or throwing them in the trash – posed potential safety and health hazards.

Helping people to dispose of potentially harmful prescription drugs is just one way DEA is working to reduce the addiction and overdose deaths plaguing this country due to opioid medications.

Complete results for DEA's spring Take Back Day are available at DEA's next Prescription Drug Take Back Day is October 27, 2018.



▲ The next National Prescription Drug Take-back Day, sponsored by the Drug Enforcement Agency (DEA) is planned for October 27, 2018. Find more information as well as a list of drop off sites at <https://takebackday.dea.gov>.

In Nebraska, every day is take back day! Over 320 pharmacies participate in the Nebraska MEDS Initiative and will take back unused and expired medications for free, no questions asked. There's no need to wait for a take-back day to clean out your medicine cabinet - find a participating pharmacy in Nebraska near you at [www.leftovermeds.com](http://www.leftovermeds.com).

Since the MEDS Initiative went statewide in 2016, over 50,000 pounds of medications have been returned to pharmacies across the state.

The Nebraska Medication Education on Disposal Strategies (MEDS) Coalition educates Nebraskans about drug disposal and provide safe ways to dispose of them to better safeguard the environment and protect public health. The Nebraska MEDS initiative is funded by the Nebraska Environmental Trust and the Nebraska Legislature. ♦

**JOIN OR RENEW! [WWW.GROUNDWATER.ORG/MEMBER](http://WWW.GROUNDWATER.ORG/MEMBER)**

through joint networks, provide new tools and resources for our constituents, and deliver proven programs to better fulfill our mission and have an even bigger collective impact on groundwater. We have an exciting future ahead of us.

I wanted to share a glimpse of how we truly will be Better Together, in delivering programs that connect people, businesses and communities through groundwater education and action.

#### **GROUNDWATER GUARDIAN PROGRAM: EXPAND REACH AND IMPACT**

Groundwater Guardians have accomplished a lot over the past 24 years, from implementing public awareness campaigns to water festivals to wellhead protection programs and much more. We will build on those accomplishments and position the program for additional decades of impact. 2019 marks the 25<sup>th</sup> year of the program. In recognition of that milestone, we have a goal of recruiting 25 new Groundwater Guardian teams across the country.

We'll be introducing some exciting new tools and resources for Groundwater Guardian teams. This includes tools to better manage and engage team members, recruit volunteers, and share information with the general public. We're also working on new resources for Groundwater Guardians to use in their community to help educate community members about groundwater.

This year's Groundwater Week, December 3-6, 2018 in Las Vegas, will showcase the work Groundwater Guardians are doing and is when we'll unveil the new tools and resources.

#### **GREEN SITE PROGRAM: EXPAND REACH AND IMPACT**

We are excited about introducing NGWA members to the Green Site program, which educates and recognizes businesses that are using groundwater-friendly practices in managing their turf. Green Sites range from corporate and educational campuses to golf courses, parks, and nature trails.

Working with NGWA members will help grow the program over the next year. It's a win-win prospect for groundwater protection - NGWA members can reach out to different sectors in their communities while Green Sites maintain their sites with groundwater-friendly practices.

We're also focusing on offering new tools to Green Sites to assist them in



▲ Groundwater Foundation Executive Director Jane Griffin and National Ground Water Association CEO Terry Morse at the NGWA offices in June.

generating and measuring the positive environmental gains they are making through proper management practices, as well as providing outreach to their communities.

#### **YOUTH EDUCATION: UTILIZE RESOURCES AND EXPERTISE TO PROVIDE MORE EDUCATIONAL OPPORTUNITIES FOR YOUTH**

Recently an Assistant Professor at the South Dakota School of Mines told us that our Hydrogeology Challenge "is a great tool to introduce students to groundwater modeling." This is just one of the many enthusiastic reactions we've had to the program. We are excited about the opportunity to work with NGWA Scientists and Engineers to refine this educational tool and train more educators to use this in their classrooms.

We also look forward to building on the success we have had with our LEAP into Groundwater patch program for Girl Scouts. After working with thousands of Girl Scouts in Nebraska, we are ready to share the fun and educational program across the U.S. and help more girls discover ways they can protect groundwater.

Our Awesome Aquifer groundwater modeling kits continue to have great success in classrooms, science clubs, afterschool programs, and many other settings. Through the extended network of members and constituents, we anticipate integrating the educational tool into even more educational settings across the U.S.

#### **WELLOWNER PROGRAM: PROMOTE THE RESOURCES AND TOOLS AVAILABLE AT WELLOWNER.ORG**

Public and private wells supply water for drinking, agriculture, industry, and more for millions of people across the U.S. For over a decade, the Groundwater Foundation has partnered with the Nebraska Department of Environmental Quality to advance wellhead protection efforts in the State of Nebraska. We look forward to finding ways to expand those efforts in other states.

In addition, we are excited to share the fantastic resources that NGWA's Wellowner program offers with our constituents. By working together we will offer a wide range of comprehensive resources to all involved in managing private and public wells.

#### **GROUNDWATER WEEK IN LAS VEGAS: DECEMBER 3-6, 2018**

We invite all of you to attend this action-packed week in Las Vegas. In addition to the excellent program and insightful exhibits, you will learn firsthand how this merger will help us better fulfill our mission of connecting people, businesses, and communities through local groundwater education and action. We all are a part of the solution to clean, sustainable groundwater - join us in Las Vegas to get inspired!

Visit [groundwater.org](http://groundwater.org) and [ngwa.org](http://ngwa.org) to find out more about how we're "Better Together." ♡





## What people are saying:



**Terry Morse**  
**NGWA CEO**

"Since 1994, the NGWA Foundation has established numerous programs to assist those working with, and those that need groundwater. This merger aligns our Foundation with an organization that shares our passion, extends our combined vision, and bolsters our grassroots efforts to educate, inspire action, and to create a community of Groundwater Guardians to protect this critical resource."

"One of our key messages to our diverse membership is that we truly are 'better together' in our collective efforts to advance the groundwater industry. We're excited to merge with a fantastic organization that allows us to expand this message to its members, to individuals, and to local communities alike."



**Jane Griffin**  
**Groundwater Foundation Executive Director**

"NGWA and the Groundwater Foundation have been partners for several years and we have complementary strengths, experiences, and industry knowledge. While the Groundwater Foundation has a national presence, our mission is to boost groundwater awareness at the local level, and merging with NGWA's Foundation allows us to extend this mission, address issues, and educate at every level."



**Susan Seacrest**  
**Groundwater Foundation President Emeritus**

"This merger is an important forward-thinking milestone of collaboration with a long-standing Groundwater Foundation partner. The perspective, knowledge, and programs of the National Ground Water Association will have a tremendously positive impact on the Groundwater Foundation's educational and community outreach, and in turn, on groundwater."

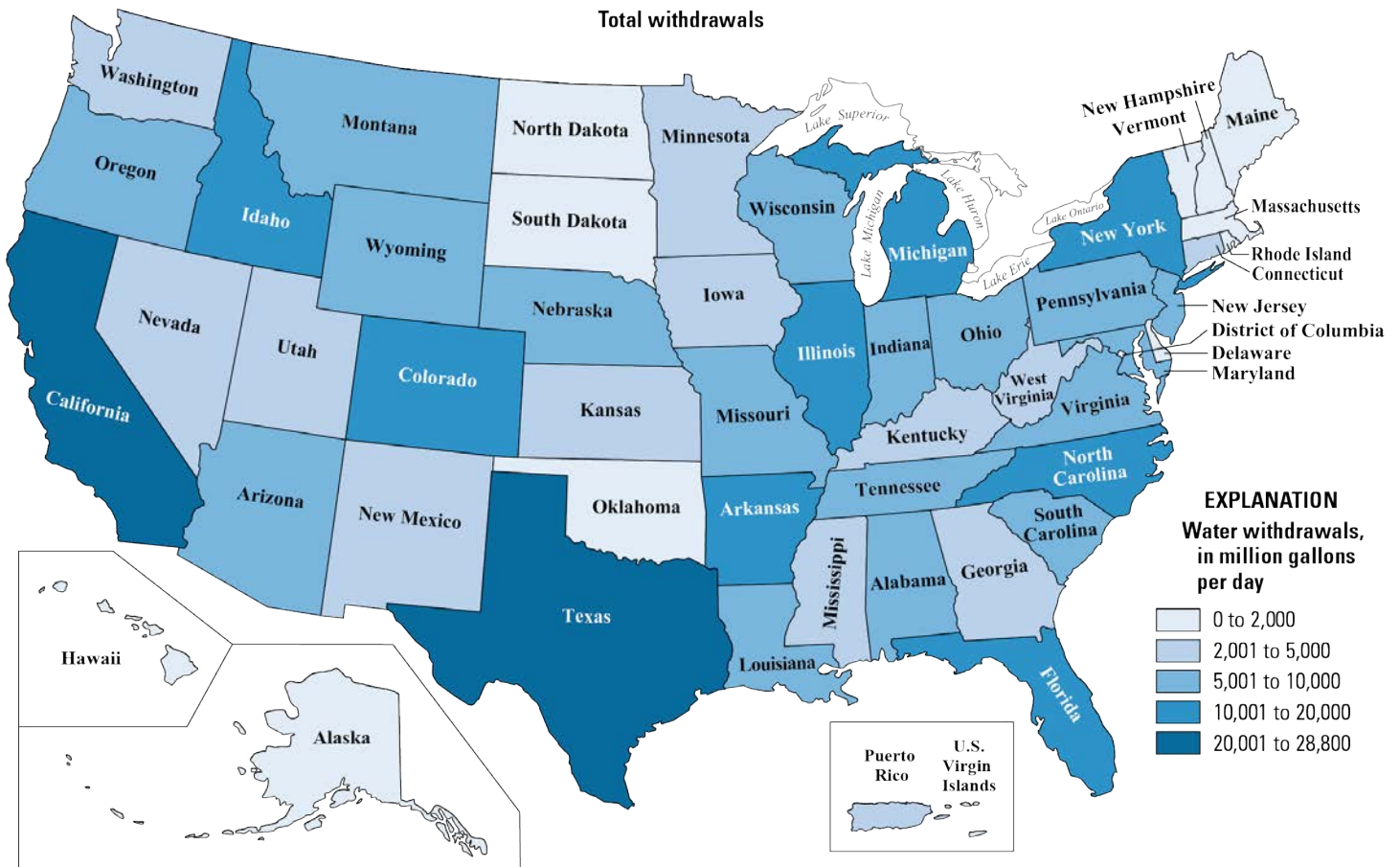
I have been impressed by NGWA's people and professional expertise since my first contact with them almost 35 years ago. There is no doubt in my mind that it will strengthen and heighten the scope and impact of both organizations."



**Andy Belanger**  
**Southern Nevada Water Authority, Groundwater Foundation Board Chair**

"Our merger with the National Ground Water Association will amplify the reach of the Groundwater Guardian program. We are excited to see what the future brings as we work in unison together to advance the cause of community-based groundwater protection."





# Water Use Across the United States Declines to Pre-1970s Levels

Reductions in water use first observed in 2010 continue, show ongoing effort towards efficient use of critical water resources

**R**eductions in water use first observed in 2010 continue, show ongoing effort towards “efficient use of critical water resources.”

Water use across the country reached its lowest recorded level in 45 years. According to a new USGS report, 322 billion gallons of water per day (Bgal/d) were withdrawn for use in the United States during 2015.

This represents a 9 percent reduction of water use from 2010 when about 354 Bgal/d were withdrawn and the lowest level since before 1970 (370 Bgal/d).

“The downward trend in water use shows a continued effort towards efficient use of critical water resources, which is encouraging,” said Tim Petty, assistant secretary for Water and

Science at the Department of the Interior. “Water is the one resource we cannot live without, and when it is used wisely, it helps to ensure there will be enough to sustain human needs, as well as ecological and environmental needs.”

In 2015, more than 50 percent of the total withdrawals in the United States were accounted for by 12 states (in order of withdrawal amounts): California, Texas, Idaho, Florida, Arkansas, New York, Illinois, Colorado, North Carolina, Michigan, Montana, and Nebraska.

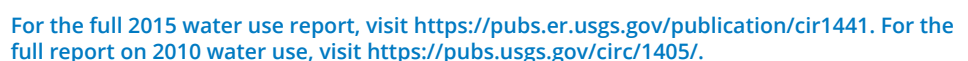
California accounted for almost 9 percent of the total withdrawals for all categories and 9 percent of total freshwater withdrawals. Texas accounted for about 7 percent of total withdrawals for all categories, predominantly for thermoelectric power generation, irrigation, and public supply.

Florida had the largest share of saline withdrawals, accounting for 23 percent of the total in the country, mostly saline surface-water withdrawals for thermoelectric power generation. Texas and California accounted for 59 percent of the total saline groundwater withdrawals in the United States, mostly for mining.

“The USGS is committed to providing comprehensive reports of water use in the country to ensure that resource managers and decision makers have the information they need to manage it well,” said USGS director Jim Reilly. “These data are vital for understanding water budgets in the different climatic settings across the country.”

For the first time since 1995, the USGS estimated consumptive use for two categories — thermoelectric power

The USGS is the world's largest provider of water data and the premier water research agency in the federal government. Visit [water.usgs.gov](https://water.usgs.gov) to find out more. 💧





# PFAS: An Emerging Contaminant

## National Ground Water Association Develops Industry Guidance

**E**arlier this year, the National Ground Water Association (NGWA) released Groundwater and PFAS: State of Knowledge and Practice. A 12-month effort by 36 volunteers spending 1100 hours, this comprehensive eight-part guidance document explores these potentially hazardous, and widely discussed, compounds in groundwater and soil.

NGWA published this document to identify the known science and knowledge related to per- and polyfluoroalkyl (PFAS) compounds. It summarizes the fate, transport, remediation, and treatment of PFAS, as well as current technologies, methods, and field procedures used to characterize sites and test remediation and treatment technologies.

According to the U.S. Environmental Protection Agency (EPA), PFAS are a class of manmade chemicals that are persistent in the environment and the human body. Widely used to make products more stain-resistant, waterproof, and/or nonstick, PFAS are sometimes used to make products that:

- Keep food from sticking to cookware
- Make upholstered furniture, carpets, and clothing resistant to soil, stains, and water
- Make shoes, clothes, and mattresses more waterproof
- Keep food packaging from sticking to food
- Help fight fires at airfields and other places where petroleum-product-based fires are a risk.

PFAS contamination may be present at some landfills receiving waste since the 1950s and facilities using aqueous film foaming foams (AFFF) such as fire-training facilities, civilian and military airports, petroleum terminals, and refineries. Moreover, any raw materials and commercial products might contain PFAS, and facilities using these products or raw materials might not realize PFAS are present because of unclear packaging or labeling.

While research on the possible health effects of exposure to PFAS is ongoing, NGWA outlines the current information on human exposure in this document. Key findings include:

- Studies have estimated more than 95 percent of the U.S. population

has been exposed to PFAS and have measurable concentrations in their blood

- Human exposure to PFAS can occur through ingestion, direct contact, inhalation, and occupational contact
- In humans, the highest PFAS concentrations are detected in the serum and liver, and to a lesser extent the kidneys and other organs
- PFOA and PFOS are linked to a multiplicity of adverse effects, including hepatic toxicity, reproductive and developmental toxicity, suppression of the immune system, and some types of cancer

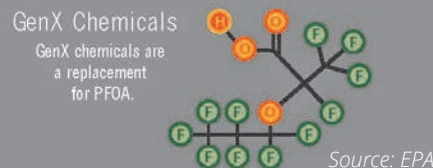
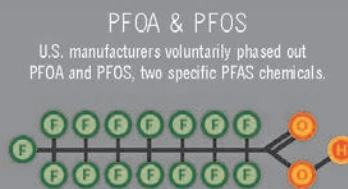
regulations ranging from non-existent to more stringent than the USEPA health advisory.

"Without a federal regulatory standard, clean-up of PFAS is inconsistent and the various state standards create both legal and public confusion over the risks of the contaminants. It was critical for NGWA to provide the groundwater community with the best available science for evaluating the impacts of PFAS," said Kellogg.

She continued: "NGWA felt this particular group of compounds were so unique, persistent, and pervasive we spent 12 months with 36 volunteers, 14 of whom have Ph.D.'s, to research, then develop, this document. As the

### WHAT ARE PFAS CHEMICALS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS and GenX chemicals. Since the 1940s, PFAS have been manufactured and used in a variety of industries around the globe, including in the United States. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both are very persistent in the environment and in the human body. Exposure to certain PFAS can lead to adverse human health effects.



Source: EPA

- A wide range of regulatory screening levels exist throughout the United States but currently there is no consensus on safe levels for PFAS in soil and water.

In 2016 the EPA set drinking water health advisories for PFOA and PFOS at 0.07 micrograms per liter, or 70 parts per trillion, equivalent to one grain of salt in 1000 gallons of water. Based on EPA sampling of water supply systems, up to 15 million people live in areas where PFAS concentrations are above the EPA health advisory. Before this document, the groundwater industry did not have consistent and reliable approaches to characterizing and remediating emerging contaminants.

According to Seth Kellogg, PG, and NGWA Science and Engineers Board member who served as an author of the document, the challenge was amplified by the patchwork of state

Association dedicated to the responsible development of groundwater we felt it was necessary to explore this emerging contaminant so our members and the public have the tools necessary to protect the resource of groundwater and to minimize health threats."

NGWA's technical PFAS guidance document includes eight sections: Section 1 - Introduction, Section 2 - Glossary, Section 3 - Human and Ecological Impact, Section 4 - Fate and Transport, Section 5 - Field Sampling and Analysis, Section 6 - Legal and Regulatory Issues, Section 7 - Risk Communication, and Section 8 - Remediation and Treatment.

An overview of the document is available for free on NGWA's website at [goo.gl/kTtZ2H](http://goo.gl/kTtZ2H) and the comprehensive document is currently available for free to all Association members, while others may purchase it through the NGWA online bookstore.💧



# 6 Ways to Learn About Groundwater This Summer

Keep the Learning and Fun Going When They're Not In School

by Jennifer Wemhoff, The Groundwater Foundation

**A**re you looking for some fun and different things to do with your kids this summer? Here are six ways to have fun learning about groundwater:

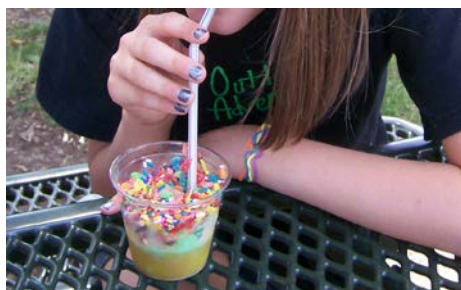
## 1. DIG IN THE DIRT.

Kids love dirt and getting dirty! Find a good spot for them to go nuts and dig a hole. Have them notice how the soil gets wetter the deeper they dig, and talk about the water table, saturated and unsaturated zones. After they're good and dirty, hose them off and talk about how groundwater is recharged.



## 2. MAKE AN EDIBLE AQUIFER.

There's not much better than a cold treat on a hot summer day! Build an edible aquifer out of ice cream or sherbet, ice cubes, sprinkles, and clear soda and learn about groundwater while eating your yummy creation.



## 3. GO ON A WATER DROP HIKE.

Explore a park, recreation area, nature center, or other outdoor space and visualize the path a water drop can take when it falls from the sky. Where does a water drop move to after falling on a tree? Or a slide? A roof? The ground? A blade of grass? Think about whether or not the water soaks into the ground, runs down a hill, or ends up in a stream. Draw a picture of your drop's journey.



## 4. TRY OUT AN AWESOME AQUIFER KIT.

The Kit comes with instructions and materials to do six cool experiments that teach about groundwater terminology, groundwater's role in the hydrologic cycle, the makeup of an aquifer, groundwater contamination, and clean up. The Kit is reusable so you can have fun with it again and again!

## 5. VISIT A RIVER OR STREAM.

Talk about the connections between groundwater and surface water and gaining and losing streams while enjoying the river view or safely wading in and splashing around.



## 6. PICK AN ACTIVITY FROM OUR ONLINE ACTIVITY LIBRARY.

We have a library with a ton of fun hands-on, brains-on activities to get kids excited about water. Search the library by age group, key topic, and category to find the perfect fun and educational activity. Find it at [www.groundwater.org/resources-for-educators](http://www.groundwater.org/resources-for-educators).

SELECT AS MANY OF THE FILTERS THAT APPLY, OR CLICK "SEARCH" FOR A COMPLETE LIST OF ACTIVITIES AND RESOURCES. IF YOU KNOW THE NAME (OR PARTIAL NAME) OF THE ACTIVITY YOU ARE LOOKING FOR, TYPE IT INTO THE SEARCH BOX.

Activity Name

Age

Key Topics

Well

Wildlife

Duration

Category

☐ Grades K-1  
☐ Grades 2-3  
☐ Grades 4-5  
☐ Grades 6-8  
☐ Grades 9-10  
☐ Grades 11-12  
☐ Adults

☐ Climate and weather  
☐ Contamination/pollution prevention  
☐ Earth science/geology  
☐ Groundwater  
☐ Human health  
☐ Irrigation  
☐ Recharge  
☐ Recycle  
☐ Runoff  
☐ Scientific method  
☐ Surface water  
☐ Water availability/water use  
☐ Water conservation  
☐ Water cycle  
☐ Water management  
☐ Water quality

☐ Wells  
☐ Wildlife  

☐ s 30 minutes  
☐ s 1 hour  
☐ Multiple sessions

☐ Arts and crafts  
☐ Critical thinking/problem solving  
☐ Educational apps  
☐ Festival materials  
☐ Girl scouts  
☐ Guides & Curriculum  
☐ Hands-on  
☐ Indoor  
☐ Investigation  
☐ Make and take  
☐ Messy  
☐ Outdoor  
☐ Physical activity  
☐ Science olympiad  
☐ Virtual resources  
☐ Webinar  
☐ Worksheets

Find more activity ideas, fun ways to take action, and more online at  
**WWW.GROUNDWATER.ORG**

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Founded in 1985, the Groundwater Foundation is a 501(c)(3) nonprofit organization operated by the National Ground Water Association that connects people, businesses, and communities through local groundwater education and action, making us all part of the solution for clean, sustainable groundwater.



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**GROUNDWATER  
GUARDIAN**



**GROUNDWATER GUARDIAN  
GREEN SITE**



## GROUNDWATER GUARDIAN GREEN SITE

Green spaces can protect groundwater through site maintenance. Sites like golf courses, ball fields, education and office campuses, and parks can be recognized as a Green Site for implementing groundwater-friendly practices. These sites implement, measure, and document their groundwater-friendly practices related to chemical use, water use, pollution prevention, water quality, and environmental stewardship. Are you a green space manager or know one who should get involved? Find out more at [www.groundwater.org/greensites](http://www.groundwater.org/greensites) or email [guardian@groundwater.org](mailto:guardian@groundwater.org).

