



**VAST's Vision:**  
*Excellence in Science Education  
Through Innovation*

ISSN 1945-7405

[VAST.Org](http://VAST.Org)

Check the web for news, conference updates, registration, and forms.

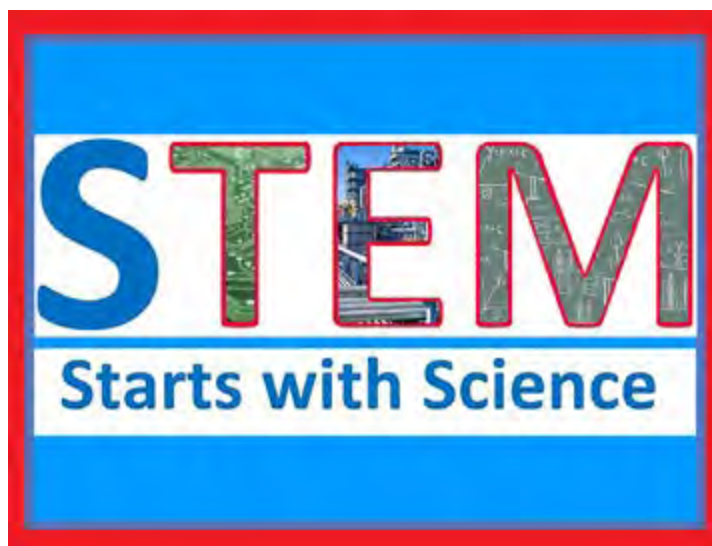
# The Science Educator

Winter 2019

A Publication of VAST, The Virginia Association of Science Teachers

Vol. 67, No. 4

## 2019 ANNUAL PROFESSIONAL DEVELOPMENT INSTITUTE



**November 14-16, 2019**

**Hotel Roanoke and Conference Center, Roanoke, VA.**

**The 2019 VAST Professional Institute will focus on the theme: STEM Starts with Science.** We will be examining the role of science in the United States and in public education and sharing ways to make your classroom science become more engaging and motivating. We will also examine the connections between science and engineering, technology, and mathematics and how to strengthen those connections in our classrooms. We will also be preparing teachers to engage with the new 2018 Science Standards of Learning and the skills in the new Profile of a Graduate that are an integral part of the new standards.

In addition to presentations related to our theme there will be concurrent session presentations in all subject areas for grades K-12.

- \* Attend the 3 general sessions featuring speakers who will challenge you with up-to-date scientific discoveries and instructional strategies.
- \* Interact with vendors in our Exhibit Hall as you collect samples of new instructional

materials and explore cutting-edge technologies.

- \* As an added bonus you can shop for cool science themed stuff.

Updated information about the PDI can be found on the PDI page at [VAST.org](http://VAST.org). Be sure to check out the [Schedule at a Glance](#).

The online Concurrent Session Presentation Proposal form is now available through May 1.

Be sure to check out the information about the

- \* Thursday [Donna Sterling Institute](#)
- \* Thursday [Afternoon 2018 SOL update](#) workshops sponsored by the VDOE.

Online registration for the PDI and the Donna Sterling Institute and the Hotel Roanoke online reservation form will open in mid-March. [2019 Online Registration Form and Fees for PDI attendees, exhibitors, and Donna Sterling Institute.](#)



## **Diversify! Be Flexible! Do this! Don't do this!** **WHAT'S NEXT?**

This is the time of the year that we are wondering what should we have done? What did we miss? What did our students miss? Oh no....why am I feeling like I am taking the test....because you are....your test is that they pass their test.

So back to **Diversify**....make your mixed abilities classroom a place where everyone shines, everyone learns and everyone succeeds.

So back to **Flexible**....work with all abilities that come to school and with all levels of interest. Work with students who come to school with no pencil and paper to others with every new piece of equipment that even a teacher would like.

After all this **Exhaustion** that occurs in May...walk into your principal's or supervisor's office and ask for their support to send you to the VAST PDI in November because you deserve to learn more to be a benefit to your students.

**Good luck and remember diversify and be flexible!**

*Susan Booth, Ed.S.*  
EXECUTIVE DIRECTOR

**November 14-16,  
2019**



**Hotel Roanoke and  
Conference Center,  
Roanoke, VA.**

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### Tom Fitzpatrick VAST President 2019



2019 promises to be a banner for science anniversaries and a great time to use these to hook our students on science. 2019 is the 150th anniversary of the creation of the Periodic Table of the Elements. Dmitrii Mendeleev put his thoughts on paper in 1869 and created the general format still used in chemistry today. One hundred years later, in July of 1969, another landmark accomplishment occurred. This summer marks the 50th anniversary of man's landing on the moon. On July 20, 1969 Neil Armstrong and Buzz Aldrin stepped off the Lunar Module into history as they walked on the surface of the moon. Talking about these events is a great way to get our students interested in science and in careers in the sciences.

2019 will also be a big year for VAST as we leap into the future of science education with our Professional Development Institute: STEM Starts with Science. Please consider submitting a presentation proposal for the fall PDI. The deadline is May 1, 2019 and the submission form is on the [www.vast.org](http://www.vast.org) website. I know that I improved my skills and content knowledge as a teacher by attending excellent presentations at VAST conferences over the years and I hope that I helped others who attended my presentations over the last few years. Now it's your turn to share some of your expertise or passions!

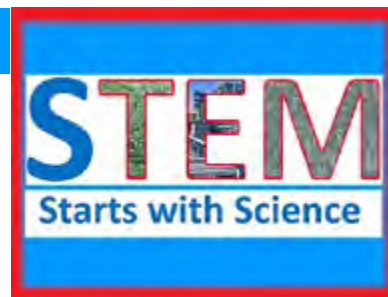
Also, please add VAST as a friend on [Facebook](https://www.facebook.com/vast.org). Our Technology team does a great job of sharing science news through our Facebook site\*. Check it out!

*Tom Fitzpatrick*

*VAST President, 2019*

*\*In Facebook search for "Virginia Association of Science Teachers" and "Like" the VAST site.*

# VAST SCHEDULE AT A GLANCE - 2019



## Wednesday, November 13, 2019

7:00 p.m. - 8:30 p.m. **VAST Board of Directors Meeting & Dinner**

## Thursday, November 14, 2019

**Ticketed Donna Sterling Institute**  
*"The Power of Problem-Based Learning for Teaching STEM"*

8:00 a.m. **Institute Continental Breakfast and Check in**

8:30 a.m. - 3:00 p.m. **Presentation and Lunch**

2:30 p.m. - 5:15 p.m. **PDI Registration Desk Open**

3:15 p.m. - 5:00 p.m. **Ticketed SOL Update Workshops Sponsored by VDOE**  
*(Separate workshops for ELEM., M.S., & H.S. teachers)*

5:30 p.m. - 6:45 p.m. **General Session I – Welcome to the PDI**

Speaker: Mike Gil Sponsored by **National Geographic**  
 Title: TBA  
*(Door prize giveaway at the end of the session), (Sponsored by TBA)*



6:45 p.m. - 7:30 p.m. **Regional Science Challenge**

7:30 p.m. - 9:00 p.m. **Night with the Exhibitors** *(Sponsored TBA)*

## Friday, November 15, 2019

7:15 a.m. - 5:00 p.m. **Registration Desk Open**

7:30 a.m. **Continental Breakfast in the Exhibit Hall**

7:30 a.m. - 10:30 a.m. **Exhibit Hall Open**

8:30 a.m. - 9:20 a.m. **Concurrent Session 1 Breakout Presentations**

9:35 a.m. - 10:25 a.m. **Concurrent Session 2 Breakout Presentations**

10:40 a.m. - noon **General Session II – Business Meeting**

Speaker: Dr. Kenneth Wesson Sponsored by **School Specialty**  
 Title: TBA  
*(Door prize giveaway at the end of the session), (Sponsored by TBA)*



Noon - 1:00 p.m. **Ticketed Buffet Lunch**

12:30 p.m. - 6:00 p.m. **Exhibit Hall Open**

1:10 p.m. - 2:00 p.m. **Concurrent Session 3 Breakout Presentations**

2:15 p.m. - 3:05 p.m. **Concurrent Session 4 Breakout Presentations**

3:20 p.m. - 4:10 p.m. **Concurrent Session 5 Breakout Presentations**

4:25 p.m. - 5:15 p.m. **Concurrent Session 6 Breakout Presentations**

6:15 p.m. - 7:00 p.m. **Ticketed Dinner** *(Cash Bar)*

7:00 p.m. - 8:15 p.m. **Awards Ceremony**

8:30 pm - 10:00 p.m. **DJ and Awards Ceremony** *(Sponsored by TBA)*

## Saturday, November 16, 2019

7:30 a.m. - 10:30 a.m. **Registration Desk Open**

7:30 a.m. **Continental Breakfast in the Exhibit Hall**

7:30 a.m. - 11:15 a.m. **Exhibit Hall open**

8:30 a.m. - 9:20 a.m. **Concurrent Session 7 Breakout Presentations**

9:35 a.m. - 10:25 a.m. **Concurrent Session 8 Breakout Presentations**

10:25 a.m. - 11:15 a.m. **Last Chance to Visit the Exhibit Hall - Exhibitor Door Prizes**  
*(No other events scheduled, all exhibitors will remain open until 11:15)*

11:00 a.m. - 11:25 a.m. **Pickup Ticketed /Box Lunch to eat during General Session III**

11:30 a.m. - 12:45 p.m. **General Session III - Meet your new VAST officers**

Speaker: TBA  
 Title: TBA  
*(Door prize giveaway at the end of the session), (Sponsored by TBA)*

1:00 p.m. - 1:50 p.m. **Concurrent Session 9 Breakout Presentations**

2:05 p.m. - 2:55 p.m. **Concurrent Session 10 Breakout Presentations**

*(Gift card giveaway at the end of each Presentation of concurrent session 10- sponsored by TBA)*



**CONCURRENT SESSIONS PRESENTER INFORMATION**  
**2019 Professional Development Institute**  
**ROANOKE VA**  
**November 14-16, 2019**

VAST needs you! Share your good ideas! Submit a concurrent session proposal for the 2018 PDI. Before opening the presentation proposal form you will need:

**Name, professional affiliation, email address, phone number for each presenter, if giving more than one presentation, title(s) of those other presentations**

- maximum of 4 presenters per session
- all of the above information is required for each presenter

**Presentation title:**

- maximum of 60 characters and spaces

**Presentation description for the PDI program:**

- maximum of 500 characters and spaces
- this is what attendees will see in the program

**Further information** for the PDI committee to evaluate your presentation proposal to maximum of 500 characters and spaces.

[Click HERE](#) to submit a 2019 concurrent session presentation proposal ( now open until May 1)

The online proposal submission form is open from February 15 to May 1, after May 1 contact John Kowalski ([pdi@vast.org](mailto:pdi@vast.org)) to submit a late concurrent session presentation proposal.

The PDI committee will review all proposals. Presenters will be notified by August 1 regarding their submission.

A discounted registration price is provided for up to four presenters per session who register for the PDI by September 9. It is the first presenter's responsibility to make sure all of the other presenters of their session are registered by September 9. Presenters who are not registered by September 9 will be dropped from the program unless other arrangements are made with the PDI Chair and Executive Director.

A commercial presenter must also be registered as an exhibitor and pay the \$150.00 per session fee in addition to the standard commercial exhibit fee.

A non-profit exhibitor does not pay the \$150.00 per session fee but must be registered as a non-profit exhibitor.

**Questions: Contact John Kowalski, [pdi@vast.org](mailto:pdi@vast.org)**





## **Deeper Learning and the Science Classroom: A Letter to the Science Community**

**Dr. Anne Petersen**

One of the phrases that has been a part of many discussions, both in the school divisions and at VDOE, is Deeper Learning. So what does this phrase mean and how do current initiatives fit into the picture of Deeper Learning?

We have a lot going on in the science community. The **2018 Science Standards of Learning** have been adopted, curriculum framework is being developed, performance assessment is required for 3<sup>rd</sup> grade science with an expectation that performance assessment is done at all grade levels, and teachers are expected to teach and assess the 5 C's (communication, collaboration, critical and creative thinking, and civic responsibility). How can this all be done and still meet the expectations of school and division administrators? Deeper Learning is the cohesive glue that brings these initiatives together.

The phrase Deeper Learning has been defined by different organizations and has been the topic of many publications, but what does it really mean? Although definitions exist, I think that it takes time to construct meaning of Deeper Learning; each teacher needs to conceptualize what this means in their own classroom and with their own student population. As teachers, we need to reflect on our current teaching style and determine how this can be enhanced to include a richer learning environment that fosters Deeper Learning. Practices in Deeper Learning include increasing student ownership in learning, engaging students with real world science problems, building scientific skills through performance tasks, and building workforce skills (5C's) as students master science concepts. As a science educator, this excites me as it is another reason to conduct experiments, provide opportunities for science inquiry, and bring local issues into the classroom. Students should be given opportunities to develop Science and Engineering Practices that allow them to explore and understand science content.

So, how do the new science standards factor into Deeper Learning? The science standards look different than in the past. The language of the standards focus on science concepts vs science vocabulary. Although science vocabulary is important, we wanted to emphasize the bigger ideas in science as students learn science concepts. Many times, students were too focused on the vocabulary and may have missed the concept as they memorized terms. We hope that this shift will generate a change in the way science is taught across the Commonwealth. Students should be introduced to a science concept through a common experience. As students encounter this experience and build meaning, vocabulary can be introduced. The concepts are developed and reinforced through investigations, field experiences, data analysis, computer simulations, and a variety of other learning experiences.

At VDOE, we are working with science educators across the Commonwealth to develop resources to assist in the implementation of the 2018 Science Standards of Learning and to support Deeper Learning. As we all work together to bring these initiatives to the classroom, please let us know how we can support you.

Dr. Anne Petersen, VDOE Science Coordinator and Myra Thayer, VDOE Science

# Elementary Teachers (K-6): Apply for the 2019 Donna Sterling Exemplary Science Teaching Award

Donna Sterling was a visionary science educator with a passion for working with science teachers and developing habits of inquiry-based teaching. Most recently, her leadership in the Virginia Initiative for Science Teaching and Achievement (VISTA) focused on elementary and secondary teacher professional development. This award recognizes that exemplary teachers engage in continuous improvement, and is designed to support a professional development plan for the improvement of science teaching. In 2019, the award will be given to an exemplary elementary teacher. The award alternates between elementary and middle/secondary.



The awardee will receive a total of **\$4000**. In addition, travel costs will be reimbursed to attend the 2019 VAST PDI to receive the award and to the 2020 VAST PDI to present a session on the professional development experience and outcomes. The awardee will receive \$3000 at the VAST PDI in 2019. The remainder will be awarded after the awardee presents at the next VAST PDI and also submits an article to either the newsletter *The Science Educator* or the *Journal of Virginia Science Education*.

**Deadline for applications: July 15, 2019**

## To apply:

1. In your cover letter, include information on yourself, including your preferred name, your home and school addresses, and phone numbers and email address(es) where you can be reached. Tell us how many years you have taught, where, and what grade levels.
2. In no more than two pages, single-spaced, **describe an inquiry-based science unit** that you taught. Describe how your unit is student-centered and includes community engagement. Give evidence that the unit was effective. Evidence documents such as student work can be submitted separately, and will not count toward the two-page limit.
3. In no more than two pages, single-spaced, **describe your plan for professional development**, using the funds received through the Sterling

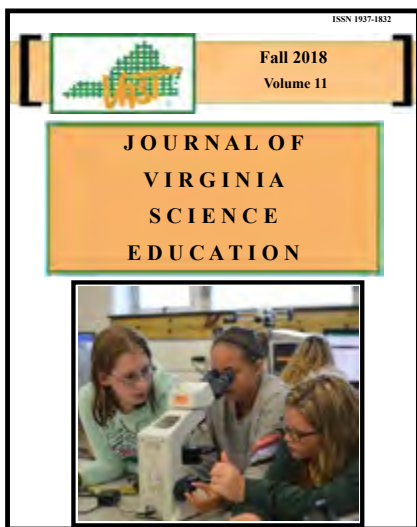
award. These plans may include summer courses, attendance at workshops, study abroad opportunities, instructional materials development under the guidance of experts on-site, etc. Feel free to be creative in your plan. Submit the professional development description with anticipated outcomes, including plans for a presentation at the 2020 VAST PDI. Tell how this award will help you become a better teacher of science and will support the development of leadership skills. Tell about your plans for writing an article for publication about your experiences.

4. Submit **three letters of recommendation** based on direct observations of teaching. One letter must be from the science supervisor or someone serving in that capacity, a second letter must be from the principal, assistant principal, or instructional leader, and a third letter must be from a fellow teacher or a parent. Letters should address the following: Why is this teacher a good candidate for this award? What qualities do they exhibit as teachers that make the recommender think they will use the funds from the award to improve their practice as teachers of science?

**All materials must be submitted by 5 pm on July 15, 2019.**

**Submit applications and letters of recommendation to Dr. Juanita Jo Matkins, [jjmatk@wm.edu](mailto:jjmatk@wm.edu)**

## JVSE Corner News



## VAST Awards at the PDI



November seems a long time in the future, but now is the time to begin your plan to nominate someone for the **RISE Award**, the **TACT mini-grant** in Chemistry, or the **VAST mini-grants**.

The forms for these nominations are on the VAST web site. The deadline for submission is August 20, 2019.

Award Page: <https://vast.wildapricot.org/Awards>

Grants Page: <https://vast.wildapricot.org/Grants>

## Outstanding Biology Teacher Award: Virginia

Since 1961, the National Association of Biology Teachers each year attempts to identify an Outstanding Biology Teacher in all 50 states, Puerto Rico, Washington D.C. and overseas territories. The program continues strong, sponsored by Carolina Biological and Ken-A-Vision. Award winners receive certificates as well as public recognition and professional gratification, in addition to several gift certificates and a year's membership in NABT. Each year NABT also honors recipients at a special luncheon held in conjunction with NABT's National Convention. This is an excellent way to reward outstanding biology teachers for their valuable contributions to the profession and to their students.

All biology teachers in grades 7-12 in public or private schools, who teach primarily life sciences. Membership in NABT is not required. Candidates may be nominated again in subsequent years. Teaching ability and experience, cooperativeness in the school and the community, inventiveness, initiative and inherent strengths.

Send nominations to the Virginia OBTA Director:  
Kathy Frame Email: [chuckframe@aol.com](mailto:chuckframe@aol.com)

**APPLICATION DEADLINE**  
**May 1, 2019**

Do you use computer simulations to help students learn science, math, or engineering concepts or to engage students in science process skills? Or perhaps you want to share research you are conducting about using simulations in STEM instruction? Or maybe you have found computer simulations help you to address one or more challenges in STEM education? If so we would love to have your article submission by April 1st for potential publication in our winter **JVSE issue** *Computer Simulation Use for STEM Education*.

Please submit your manuscript following the procedures described on the [journal website](#). While we are excited to have submission related to computer simulations in our winter issue, we also welcome all submissions that are aligned with one of the three JVSE focus areas (i.e., lesson activities, research, and sharing solutions).

We still need more article reviewers! If you are willing to review 1-2 articles per year please email Dr. Goncz at [journal@vast.org](mailto:journal@vast.org).

Be on the lookout for our summer journal issue coming in July!



# Aquatic Survey Says...

This is Part 2 of a 4 Part Series on this Expedition

Donna Sterling Awardee 2017

Becky Schnekser, Cape Henry Collegiate, Virginia Beach, VA

## Background

In July 2017, I was a member of Field Season 10 Expedition Team to the Boiling River with Andres Ruzo, Geothermal Scientist and National Geographic Explorer. Among the team members was Dr. Prosanta Chakrabarty, Ichthyologist and Evolutionary Biologist from LSU. He was the lead on completing an aquatic survey of Shanay-Timpishka, the Boiling River of the Amazon. We were interested in finding what lives in Shanay-Timpishka. Interestingly enough, there are parts of the river that maintain cooler temperatures. How might the biodiversity of those portions differ from the hotter portions? How are they similar? Does rainfall affect the biodiversity of the river? So many more questions are out there to be answered, and this was our first crack at it! This is a pretty lofty task, which is why it required many of us to complete over the course of the field season. To collect an aquatic survey, we used cast and dip nets initially. These were used to collect samples and record where we found fish and equally as important, where we did not. When a sample was collected, the GPS coordinates and anecdotal notes of the area were then recorded. Tagging and identification would happen at the base camp which meant samples collected were then placed in plastic bags with water and into large buckets which were carried by team members. You can imagine that the weight increased with each sample and we would often rotate who was carrying the bucket throughout the day. When the active collection part of the day was finished, the aquatic survey was not. This was when the samples would then be tagged and identified to species level if possible. They would then be transferred to a formaldehyde bath for transport back to the states.



Becky Schnekser, Dr. Prosanta Chakrabarty, and Roger Palmer use dip and cast nets to complete an aquatic survey at the Boiling River in the Peruvian Amazon. Photo Credit: Wesley Della Volla

## Classroom Connection-students in the field

Anecdotal note taking was commonplace in the field as well as the practice of delegating tasks among field team members. The data you collected, GPS coordinates, or anecdotal notes you composed oftentimes were used by someone else later in the day. Your ability to take organized, accurate, and detailed notes was imperative to the work of other team members. The importance of teamwork and personal responsibility for completing your tasks accurately was paramount. In my class, I often require students to exchange notes in the middle of field work to simulate and demonstrate this important component of field work. You must pull your own weight or risk letting someone on your



Two fourth graders take water chemistry readings of the classroom trout tank. Photo Credit: Becky Schnekser



team down. Effective written and oral communication is key in the field not only for research's sake but for the safety of all team members. I believe this also helps students recognize how important organization of notes are in general, not just in the world of field science.

Completing an aquatic survey with your students can be as involved as you want it to be. It is a great addition to an existing or budding Meaningful Watershed Experience or even a simulation in the classroom. Aquatic surveys as well as water quality monitoring are great independent studies or integrated student investigations for courses such as AP Environmental Science, Biology, Oceanography, or Marine Biology.

**Equipment options typically used in the field for aquatic surveys are:**

**Dip Nets:** These are nets attached to poles that can be as short as a .33 meter (about 1 foot) sometimes even 30 centimeters, or as long as 3 meters (approximately 9 feet or more). These are generally held in the hand and dipped into water sources, hence the name “dip net”. In running water or larger pools of water, they are often dipped and dragged about a meter length or dipped underneath floating leaf litter, gently shook, then taken out of the water for inspection.

**WaterViewers:** These are easy to purchase, or even create with students using empty and cleaned milk cartons, jugs, or PVC pipe. One end is covered in clear cellophane wrap then submerged into a water source. The other end is used to look through in an attempt to view any living or nonliving matter in the water source. This is a great option for classes or young students that require more one-on-one interaction. This is also a very inexpensive option with a lot of room for student creation of viewers using a variety of materials. Creating a water viewer would be a great STEM activity or even design challenge.

**Kick Net:** These are usually about 1-2 meters in length and made of canvas, heavy plastic material, or sometimes netting between two sturdy poles, usually made of wood. They are great for running water sources such as rivers or streams. You place the poles on the river or water source bed, holding them perpendicular to the bottom of the water source. In other words, the poles make a 90 degree angle with the river or water source bed. Oftentimes, rocks just in front of the kick net are lifted off of the ground, but still submerged in the water and gently shook. This causes macroinvertebrates to be loosened and caught in the kick net for viewing. It is helpful to have clear containers in which to place small amounts of water and the specimen collected for



Fourth graders use a kick net to examine macroinvertebrates of the South River. Photo Credit: Becky Schnekser



Second graders collect rain water runoff samples for testing. Photo Credit: Becky Schnekser

viewing.

**Seine net:** These can be anywhere from a meter to 4 meters in length and made of different varieties of netting. These are best for water that does not have a strong current or is relatively still. You can find them with different sized net openings based on what you are expecting to collect as specimen. I reserve this type of tool for older students while it tends to be a bit more tricky to use and control in the field.

We raise trout in the classroom each year, and each spring we release our fingerlings into the South River in Waynesboro, Virginia. As a part of this project, we collect water samples and take water chemistry readings on site as well as use a kick net in the river itself to investigate macro-invertebrates. Prior to the trip itself, we spend a substantial amount of time in the classroom learning about macroinvertebrate species, what they mean when found in a water sample and how they, along with trout species, indicate the water's quality. We practice water chemistry testing in our classroom tank and any time it rains, we test the water collected in drains and pools around campus. This is also a great time to put samples under compound microscopes to see if there are any diatoms or single celled organisms present. Students also bring in samples from ponds, drainage ditches, rivers, streams, and even tidal pools near their own residences. This is a great opportunity to test water quality, chemistry, and compare samples from around the city. Before completing our aquatic survey in the South River while releasing our trout, I create simulations in the classroom and we complete small trips to local waterways. In the classroom, I fill several containers with water, insert different numbers of fish and macroinvertebrate models in each water source. I then set teams of students to task in sampling their assigned water source, recording number and species of living things found in the water as well as water chemistry and temperature readings. Each team of scientists then compare their samples to rank each water source based on quality. These rankings are based on the water chemistry readings and species found in their samples. They must create a formal report with quantitative and qualitative data as well. We complete these simulations several times throughout the year in order to have longitudinal data for comparison. They track any changes that happened to their water source and within their reports, attempt to explain any changes they observed. As much as possible, this would be best completed in person with real water sources however many variables affect the ability of classrooms to complete such tasks. When it is not possible to complete authentic field work, simulations like this are a great way to supplement. Understanding the constraints that many schools have in creating such simulations, creating data samples for students would also be a way to have them experience organization of data and



A first grade student inspects rainwater samples.  
Photo Credit: Becky Schnekser



Fourth-grade students inspect rainwater samples for micro-life. Photo Credit: Becky Schnekser



practice analyzing and drawing conclusions. This lends itself to math integration through the creation, reading, and analyzing data tables.

If you are interested in more information about any of these activities, lesson plans, sample data sets, or how to make field expeditions with aquatic surveys a reality for your classroom, please reach out to me via email [expedition-schnekser@gmail.com](mailto:expedition-schnekser@gmail.com) or Twitter [@schnekser](https://twitter.com/schnekser)



Mrs. Schnekser demonstrates for first graders how to collect water samples for inspection. Photo Credit: Brooke Hummel



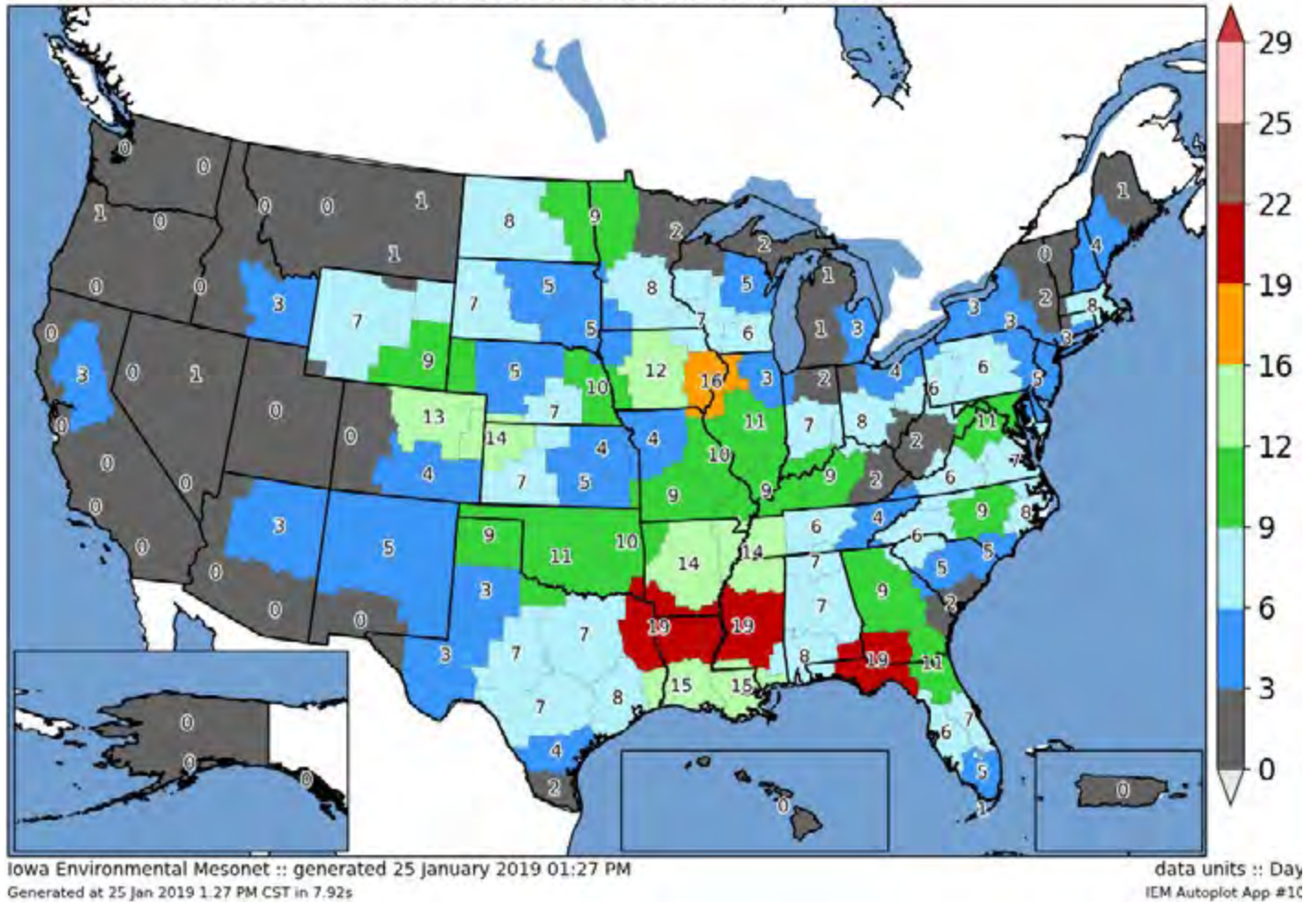
Mrs. Schnekser works with first graders to set up an outdoor field station for water sample inspection. Photo Credit: Brooke Hummel

# Severe Weather...in Virginia?? Chris White, Roanoke



## Tornado Warning Days with 1+ Events by NWS Office

Valid 01 Jan 2018 00:00 - 31 Dec 2018 00:00 UTC, based on VTEC: TO.W



Many folks are surprised to learn that severe weather is relatively common in Virginia during spring and summer months. The annual average number of tornadoes in the Old Dominion stands at 16 with 2018 tornado reports numbering more than twice that amount. Even more prevalent – and potentially just as dangerous – is the occurrence of severe thunderstorms across the state. As defined by the National Weather Service (NWS) a thunderstorm is categorized as severe if it produces hail one inch or larger in diameter or if it produces wind gusts of at least 58 mph (50 knots). Either of those phenomena can produce personal injury or property damage without the occurrence of a tornado.

There is a specific division of labor as to which NWS entity issues Watches (severe weather is possible) and which issues Warnings (severe weather is occurring). The Storm Prediction Center in Norman Oklahoma issues all tornado and severe thunderstorm watches for the U.S. based upon their forecast of the potential for severe weather. Warnings, however, are issued by the specific NWS Forecast Office

being affected by the severe weather. For example the NWS Wakefield office issued the tornado warnings for the Richmond area during the September 2018 tornado outbreak caused by the remnants of Hurricane Florence.

The graphic (from the Iowa Environmental Mesonet data generator) summarize the number of days during 2018 with tornado warnings and severe thunderstorm warnings per NWS office:

Note that the three NWS offices covering most of Virginia recorded 24 days with tornado warnings and 150 days with severe thunderstorm warnings during 2018. That's a much more frequent occurrence of severe weather in this area of the country than is generally realized!

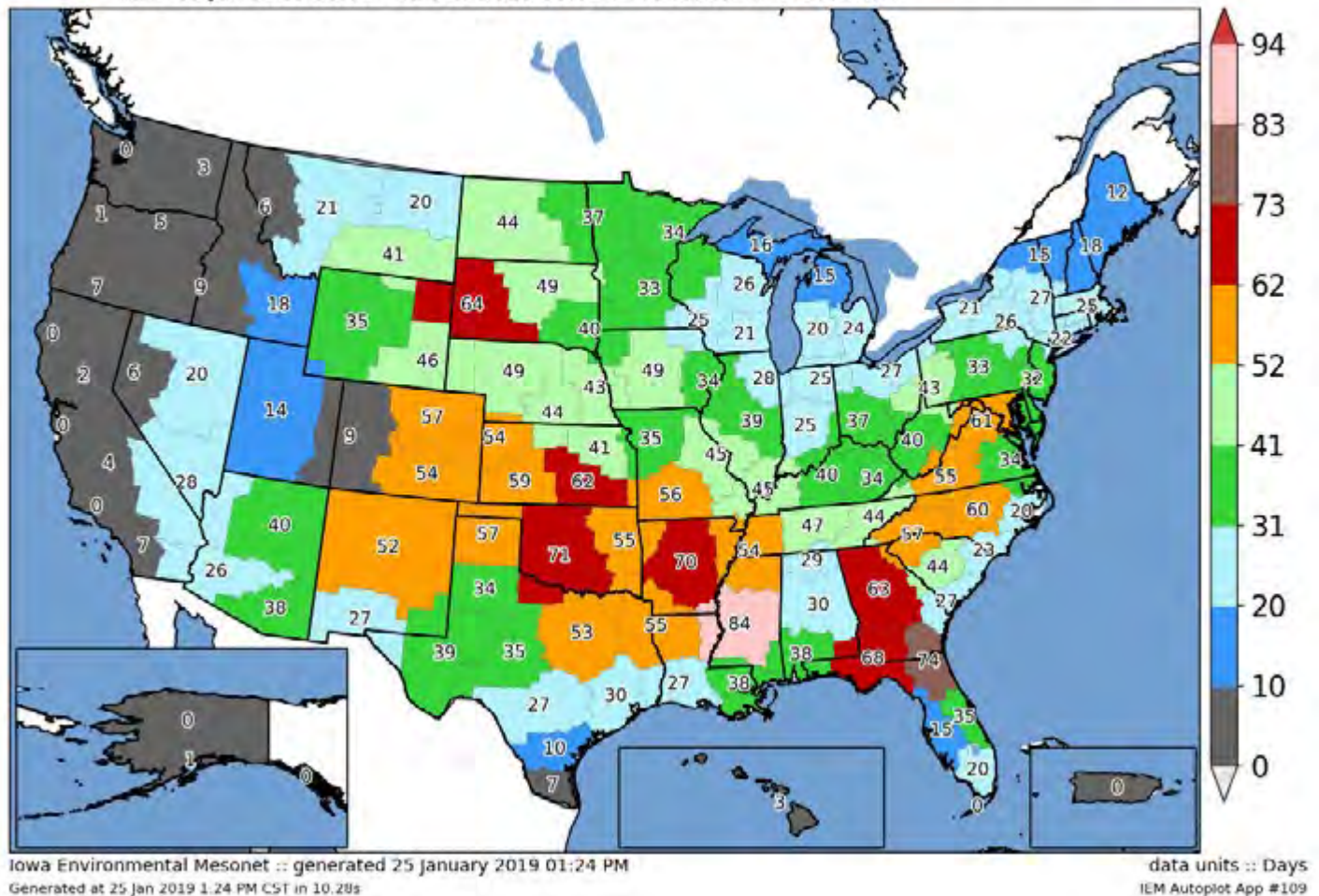
Although severe storms can occur any month of the year the peak season for Virginia is May through early August. A secondary peak in September is associated with the remnants of tropical systems that swirl through the region during that time period. Having chased storms in the Old





## Severe Thunderstorm Warning Days with 1+ Events by NWS Office

Valid 01 Jan 2018 00:00 - 31 Dec 2018 00:00 UTC, based on VTEC: SV.W



Dominion since 2002 I can attest personally to the number of severe events that occur every year. Despite the fact that a segment of the general population seems to be surprised when severe storms affect their area I can also verify that the NWS warning process is both accurate and effective.

When severe weather watches are in effect everyone in the affected area should have multiple methods of receiving any warnings that may be issued. Such methods include tuning to local TV/radio stations, using effective smartphone apps, and – especially - having a NOAA weather radio that will sound an alarm when a warning is issued. A non-weather related ability that everyone should also have is how to find their location on a map in order to determine if they are in the warned area.

Should a severe thunderstorm warning be issued for your location the National Weather Service recommends sheltering inside a sturdy building away from windows and avoiding electrical equipment and plumbing. If a tornado warning is issued the above recommendations apply with the addition of moving to the lowest level (basement

if available) of that sturdy building. Put as many walls between yourself and the outdoors as possible, with interior closets on the lowest level of the building being one spot to consider. Remain sheltered until the warning expires or until the all-clear is sounded. Another recommendation would be to take a radio, smartphone, and a flashlight into the shelter. Wearing hard-soled shoes (in case of debris caused by storm damage) and even wearing head protection such as a helmet are also considerations.

Enhancing public awareness of severe weather is one of several themes of the second annual Mid-Atlantic ChaserCon to be held at the Science Museum of Virginia in Richmond on Saturday, October 26th 2019. Talks by broadcast and NWS meteorologists, storm chasers, and others from the weather enterprise will cover severe local storm events and the associated impacts on the Mid-Atlantic region which (of course!) includes Virginia. Tickets will be available beginning this summer on the event website. All science teachers are invited to attend so be sure to circle the date on the calendar.

## Author Chris White of the Severe Weather Article Roanoke, VA

Chris has been fascinated by weather - especially severe storms - all his life. Growing up in a military family he experienced many types of weather in various parts of the world. That early exposure to different weather phenomena motivated Chris to consider meteorology as a college major, but when he graduated from high school no institution in his home state of Virginia offered a meteorology undergraduate degree. Instead he earned a science education degree from Virginia Tech.

After a year of teaching earth science in public school Chris accepted a position as a scientist with the U.S. Defense Department. He was always the office weather geek, the go-to person for weather information. He did briefly sample the graduate meteorology program at the University of Maryland but other factors led to him keeping weather as a hobby rather than a vocation. In 2009 that hobby translated into starting a local weather blog that was eventually picked up by the local newspaper in Fredericksburg VA.

Chris's pursuit of storms resulted from his son's decision to pursue a meteorology degree at the University of Oklahoma. While there his son began chasing storms and continued to do so in Virginia, thus introducing Chris to this fascinating avocation. May 2002 marked Chris's initial storm chasing trip to the Great Plains during which he saw his first tornado. After returning home he continued chasing storms in northern Virginia as his work and family schedule permitted. He has chased in the Old Dominion every year since then interspersed with several more personal chase trips to the Plains.

After retiring from federal service Chris joined the Virginia Tech Severe Weather Field Course (aka the "Hokie Stormchasers") as a volunteer driver / mentor, chasing with the Hokies for eight total trips from 2011 to 2018. Meanwhile his Virginia storm chase territory shifted southward following a relocation to the Roanoke valley. Currently he chases for WDBJ7, the CBS affiliate in Roanoke, and continues to write the Fredericksburg Weather Blog.

Links to Chris's weather related activities can be found at: [regardingweather.com](http://regardingweather.com).

### Russ Wayland Mini Grant for Teachers- 2019 Sponsored by the Virginia Section of the American Institute of Professional Geologists (AIPG)

Applications due August 20, 2019

In 1993, the Virginia section of AIPG established a mini-grant program to improve the teaching of Geology in K-12 public and private schools. The section has allocated \$1000 to fund approved proposals for 2019.

Applicants must be currently employed as classroom teachers and must be a member of VAST or WVSTA. Applicants must agree to share the outcomes of their project with other teachers through in-services and/or a presentation at the VAST PDI or the WVSTA conference.

Recipients are also expected to share the outcomes of the project with members of the Virginias Section of the AIPG at one of their yearly meetings.

The review committee is looking for proposals that will result in more hands-on activities, and a better understanding of the importance of geologic resources, and/or geological processes. The grant may be awarded to one applicant or split among several applicants (to be determined by the AIPG selection committee). Grant monies are not intended as remuneration and should not be considered as such. The AIPG selection committee may elect not to make an award if it feels that none of the proposals meet the goals of AIPG.

Download the application form as a pdf. <https://vast.wildapricot.org/resources/Documents/AIPG%20Grant%20form.pdf>



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and trees and ferns and orchids and more: the **Flora of Virginia App**. For classroom or field. Plant names, identification, habitats. Use in data gathering, presentations, and just learning plants. All 3,163 species described in botanical terms—glossary included! With photos and county-by-county range maps. Seven pounds of Virginia flora in a weightless app. For all levels. Android or iOS, \$19.99.



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## Engaging Secondary Students in Authentic Research – Year 2

**Register by March 31, 2019**

**<https://www.surveymonkey.com/r/AuthRes2>**

**When: May 22-23, 2019**

**Where: Old Dominion University, Norfolk VA**

**Time: May 22: 7:45 am – 8:30 pm**  
**May 23: 8:00 am – 2:30 pm**

**Description:** Twenty teachers – who do not currently participate in VJAS – will be supported to attend the Virginia Junior Academy of Science (VJAS) and Virginia Academy of Science (VAS).

- **May 22, 2019:** Orientation breakfast; Observation of VJAS student presentations (over 600); Lunch with judges; College/Career Fair and laboratory tours; Group dinner and discussion; VJAS General Session & George W. Jeffers Memorial Lecture (Time: 7:45 am – 8:30 pm)
- **May 23, 2019:** VJAS Awards Ceremony (part); VAS Education Section – concurrent presentations; Presentations by VJAS first place winners; VAS Poster Session & President-Provost Reception; Closing events (Time: 8 am – 2:30 pm)

In 2019, priority will be given to participants from Tidewater, Northern Neck, and Southside. Others will be accepted on a space-available basis, and given priority when VJAS is in their area. For information about VJAS, go to **[www.vjas.org](http://www.vjas.org)**. For information about VAS, go to **<http://vacadsci.org>**. In April and May, these sites will post detailed information about events.

**Meals:** Breakfast, lunch, and dinner are provided on May 22.  
Breakfast and lunch are provided on May 23.

**Lodging:** We are not able to provide reimbursement for lodging.

**Information:** You will receive notification of acceptance from Barbara Scott (**[Barbara@ittip.org](mailto:Barbara@ittip.org)**) at Longwood University's ITTIP. Closer to the date you will receive logistical information regarding final program, campus locations of events, parking, etc.

**Registration deadline is March 31, 2019. Registration is required to attend.**





## Virginia Association of Science Teachers

### STUDENT ART POSTER CONTEST 2019



VAST invites all K -12 artists/young scientists to showcase their talents by creating original artwork that reflects our 2019 *Professional Development Institute* theme, “**STEM Starts with Science.**” Posters will be judged in the following four categories: **Kindergarten - 2nd Grade, 3rd - 5th Grade, 6th - 8th Grade, and 9th - 12th Grade**- by a panel of artists, scientists, and educators.

#### Judging

- The poster will be judged on: its clear message of the theme, “**STEM Starts with Science**”; the clarity of the entry’s text and art with correct spelling and grammar; size requirement; and creativity.
- Posters may be submitted on plain paper or poster paper that is an 8 x 8 inch square. Leave a white border. Do not frame or mat.
- Any medium may be used by the student to create a completely original, two-dimensional entry, with the exception of glitter. Copyrighted characters, such as Superman, or copyrighted clip art, or copyright-free clip art will not be accepted. Artwork must be submitted in original media format, not as a pdf, jpeg, or color print.
- On the back of the artwork, the entrant must include all of the following information, printed legibly:

**Artist’s Full Name, Grade, Age**  
**Parent’s/Guardian’s name, email address, and phone number**  
**Science Educator’s Full Name and email, School name and address**

#### Submitting the Poster

All submissions must be postmarked by: Wednesday, April 10th to be received by April 15th. We expect to complete judging before the end of the school year. Decision of the judges is FINAL. All posters will become the property of the Virginia Association of Science Teachers.

**Mail submissions to:**  
**Kathy Frame, VAST**  
**13112 Nestlewood Court, Oak Hill, VA 20171-3904**

#### Winners

First, second, and third places will be awarded in each category and displayed at the VAST PDI in Roanoke in November. The winners will also be featured in a VAST newsletter and on the VAST website **www.vast.org**. The grand prize winner’s work may become the PDI program front cover. Also, the winner, parents/guardians (up to two), and Science educator will be invited as VAST’s guests at the PDI Awards Dinner and Ceremony, in Roanoke, on Friday evening, November 15th. The Science educators of the first place winners in each category will receive a free one-year membership in VAST.

**Questions or Additional Information?**  
**Susan Bardenhagen, Art Contest Coordinator**      **region4@vast.org**



## “Animals at Risk from Climate Change”

### Free Resources

The definition and fundamental causes of climate change, both man made and natural, are presented simply and clearly through stunning illustrations, symbols, charts and brief explanatory text. By using the risks to animals as the context, the complex interaction of biological traits and environmental conditions that cause a species to be susceptible to climate change are made understandable and relatable.

*“Wonderful project. ...the earlier we convey this information to students the better it is for the planet.”*

~ Dr. Alexander More, Historian and Climate Scientist,  
Harvard

Thoroughly documented to studies from reliable sources, including the IUCN Climate Change Specialist Group, NASA, NOAA, the US EPA, and the IPCC, the resource features 25 animals that highlight the fundamental impacts of greenhouse gases—causes, effects and risk of extinction—on all forms of life on the planet.

*“...an easy, responsible, engaging resource for explanation of a very complicated process and very critical condition.”*

~Peter N., World Ocean Observatory

Available as a full color wall poster, a 70 page downloadable PDF presentation, and online on our free educational website at:

<http://theglobaleducationproject.org/climate-change>



## FREE ENGINEERING Professional Development For Gr. 6-12 TEACHERS

Old University, Norfolk, VA  
July 15-19, 2019

### AN ASM MATERIALS EXPERIENCE

Engage with science and engineering practices of NGSS through real-world applications of engineering and hands-on activities you can incorporate in your classroom.

Excellent opportunity to meet volunteers from industry and build connections to benefit your students.

### WHO SHOULD ATTEND?

Middle school and high school teachers with an interest in science, engineering, and industrial/career and technical education.

Pre-service science teachers.

### WHY ATTEND?

Engage in hands-on, low-cost activities that you can integrate into your classroom immediately. Help your students discover career opportunities in science and engineering, and meet practicing engineers.

Strong connection to NGSS.

### WHAT'S INCLUDED?

4 CEUs (40 hours), demonstration materials, and meals.

### GRADUATE CREDITS AVAILABLE!

Two (2) graduate credits available (at participant's expense) through the University of Missouri-Kansas City at \$250. (This is optional.)

### REGISTER NOW!

[SURVEYMONKEY.COM/R/JMM9GKH](http://SURVEYMONKEY.COM/R/JMM9GKH)

Jeane Deatherage, Administrator of Foundation Programs [jeane.deatherage@asminternational.org](mailto:jeane.deatherage@asminternational.org)  
800 336 5152, ext. 5433.



Introducing  
**Donta the Dragonfly Explores the Dominion**



**Donta the Dragonfly** – *Odonata infraorder*

**Cindy Duncan**

**The dragonfly symbolizes change, transformation, adaptability, and self-realization.**

**The change that is often referred to has its source in mental and emotional maturity and understanding the deeper meaning of life.**

**The dragonfly symbolizes Spiritual renewal. The Native American legend is that the dragonfly is a symbol of resurrection and renewal after hardship.**

It is because of increasing hardships facing our environment that Donta has decided to explore and share with teachers of the Commonwealth information on environmental education resources. She hopes for change, transformation, adaptability, and self-realization within our classrooms so that each student in the Commonwealth can become an environmentally literate student who will protect and uphold the Virginia Constitution.

Section 1 of the Virginia Constitution states, “To the end that the people have clean air, pure water, and the use and enjoyment for recreation of adequate public lands, waters and other natural resources, it shall be the policy of the Commonwealth to conserve, develop, and utilize its natural resources, its public lands, and its historical sites and buildings. Further, it shall be the Commonwealth’s policy to protect its atmosphere, lands, and waters from pollution, impairment, or destruction, for the benefit, enjoyment and general welfare of the people Commonwealth.”

It is of great importance that students should be provided the skills to protect the Commonwealth. As

educators of future generations, we need to instruct and facilitate experiences that will prepare this generation with the skills to tackle the environmental challenges we have yet to imagine.

Each edition of VAST’s *The Science Educator* will now contain an “Environmental Literacy” section with information about Donta’s adventures throughout the Dominion. She will share information on topics such as her favorite species, flora, fauna, *Homo sapiens*, man-made structures, and environmental advancements to aid teachers in developing the skills and the desire to protect and resurrect the environment of the Commonwealth.

Donta has decided for her debut that she would share about an amazing place she discovered hidden in downtown Charlottesville.

### **The Lewis and Clark Exploratory Center**

The Lewis & Clark Exploratory Center is located on the banks of the Rivanna River in Charlottesville, and the river is closely connected to all we do. Though we

are near to the city, our part of the river is the home of many species of wildlife and of plants, and buildings are rarely visible. Like Lewis and Clark, we write and make art in journals, focusing on the birds, the mammals, the leaves, and the way the river snakes through the sycamores and the cliffs. We teach children to spot heron, osprey,

and eagles. We visit an 18<sup>th</sup> Century rock quarry and discuss the geology of the Southwest Mountains; we kayak and stop to sketch animal tracks and to do water testing. We exist in Charlottesville as a remembrance of the Lewis and Clark families who had their roots in Albemarle County. Meriwether Lewis was born in Ivy, not far away, and William Clark's parents lived just over the hill from the Center. The Center was built on land previously owned by William Clark's grandfather Jonathan, who received it as a tract in 1734. Thomas Jefferson also modified the Rivanna River for commerce, building wing dams, and his interest in rivers continued with his efforts to find a transcontinental waterway through Lewis and Clark. The Missouri River has also become a large part of the story we tell: we grow a Native American heritage garden with seeds from the Mandan and Hidatsa, who fed the Expedition in the winter of 1804, and we have three full-scale boat replicas of the wooden crafts the Expedition took from St. Louis to the Mandan village. We also have a Mandan bullboat replica, and artwork that shows how it was used by the women of the Mandan as a river craft but also as a storage container for vegetables.

We teach about how rivers have changed in appearance since the days of Lewis and Clark because of dams, and we bring into the story the history of North America when it was bisected by a waterway, and when the Missouri began in the Hudson Bay. Megafauna also enter in: Jefferson was fascinated by mammoths and giant ground sloths, and we have a component on both.

Though Lewis and Clark used pen and ink exclusively, we also teach modern forms of making journals and notes, emphasizing forms such as underwater



**Cindy Duncan**

photography, spray paint silhouettes of plants, and computer imagery. The underwater photography does not involve swimming; instead we dip our hands and cameras into the water either from shore or from our kayaks. We find whirligig beetles, crayfish, bass, and damselflies hitching a ride on a leaf. We will be traveling ambassadors

for underwater photography in this year's River Renaissance events here in Albemarle County.

Children learn that we are part of the Chesapeake Bay watershed, and about watershed health and challenges. We do stream walking, taking a walk in boots through water, matching photographs with what we see, photos that include watershed words and photos of various parts of Trevillians Creek, which runs into the Rivanna. ESOL students also do this stream walking scavenger hunt, learning English watershed words as they go.

Other activities include map-making, compass challenges, history puzzles, weather station activities, and model boat building and full-size boat building. Model boat building is all through the year; full-size boat building is once a year.

We take reservations for tours Monday through Thursday, and are open to the public Friday and Saturday, 10 to 4. The cost is \$7 per person.

We can be reached at [lewisandclark@lewisand-clarkvirginia.org](mailto:lewisandclark@lewisand-clarkvirginia.org), or 434-996-7282 Website: [lewisandclarkvirginia.org](http://lewisandclarkvirginia.org) Facebook: **Lewis & Clark Exploratory Center**

**Written for Donta by Alexandria Searls, Executive Director of Lewis and Clark Exploratory Center.**

If you know of a great resource for improving environmental education in the Commonwealth and would like Donta to visit and highlight, contact Cindy Duncan at [cduncan@cbf.org](mailto:cduncan@cbf.org).

## Night Sky Network



## Springtime Planet Party

David Prosper



*The morning planets on March 31. Image created with assistance from Stellarium*

March brings longer days for Northern Hemisphere observers, especially by the time of the equinox. Early risers are treated to the majority of the bright planets dancing in the morning skies, with the Moon passing between them at the beginning and end of the month.

The **vernal equinox** occurs on **March 20**, marking the official beginning of spring for the Northern Hemisphere. Our Sun shines equally on the Northern and Southern Hemispheres during the moment of equinox, which is why the March and September equinoxes are the only times of the year when the Earth's north and south poles are simultaneously lit by sunlight. Exacting astronomers will note that the length of day and night on the equinox are not precisely equal; the date when they are closest to equal depends on your latitude, and may occur a few days earlier or later than the equinox itself. One complicating factor is that the Sun isn't a point light source, but a disc. Its edge is refracted by our atmosphere as it rises and sets, which adds several minutes of light to every day. The Sun doesn't neatly wink on and off at sunrise and sunset like a light bulb, and so there isn't a perfect split of day and night on the equinox - but it's very close!

Ruddy **Mars** still shines in the west after sunset. Mars scoots across the early evening skies from Aries towards Taurus and meets the sparkling Pleiades star cluster by month's end.

March opens with the morning planets of **Jupiter**, **Saturn**, and **Venus** spread out over the southeastern horizon before sunrise. A crescent **Moon** comes very close to Saturn on the 1st and occults the ringed planet during the daytime. Lucky observers may be able to spot **Mercury** by the end of the month. March 31 opens with a beautiful set of planets and a crescent Moon strung diagonally across the early morning sky. Start with bright Jupiter, almost due south shortly before dawn. Then slide down and east towards Saturn, prominent but not nearly as bright as Jupiter. Continue east

to the Moon, and then towards the beacon that is Venus, its gleam piercing through the early morning light. End with a challenge: can you find elusive Mercury above the eastern horizon? Binoculars may be needed to spot the closest planet to the Sun as it will be low and obscured by dawn's encroaching glow. What a way to close out March!

Discover all of NASA's current and future missions at [nasa.gov](http://nasa.gov)



*Earth from orbit on the March equinox, as viewed by EUMETSAT. Notice how the terminator – the line between day and night – touches both the north and south poles. Additional information can be found at <http://bit.ly/earthequinox> Image credit: NASA/Robert Simmon*

This article is distributed by **NASA Night Sky Network**. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.org](http://nightsky.jpl.nasa.org) to find local clubs, events, and more!



## Food Science Opportunity

### FDA Summer Professional Development Program in Food Science

The following is information about a wonderful professional development opportunity for teachers fully funded by the FDA.

Foodborne disease outbreaks and food recalls frequent the news. What organisms cause these diseases? What can an individual do to protect themselves from these diseases? What measures are being taken by the federal government to prevent transmission of these diseases?

Science, health, agriculture, and family and consumer science teachers have an opportunity to provide inquiry-based lessons related to these outbreaks, recalls, and nutrition. Lessons can be found in the curriculum Science and Our Food Supply developed jointly by FDA and NSTA. And, in order to prepare teachers to use these lessons, FDA provides a free multidimensional professional development program that will take place July 21 – 27, 2019 in Washington, DC. Included in the program are transportation to and from Washington and all housing and meal expenses. During the program, selected teachers will participate in activities such as the following - meet with FDA and USDA scientists to learn about their current research on foodborne diseases and nutrition; work with instructors to learn proper techniques to use in doing all the labs with their own students; and, tour USDA's farm in Beltsville, MD.

Selected teachers are asked to implement the supplemental curricu-

ulum in their classrooms during the 2019- 2020 school year and to do a hands-on workshop on the curriculum for other teachers.

To apply on line – deadline April 24, 2019- go to:  
<http://www.teachfoodscience.org/apply.asp>

The Science and Our Food Supply curriculum guides on which the summer program is based are available from this website <http://www.fda.gov/Food/FoodScienceResearch/ToolsMaterials/ScienceandTheFoodSupply/default.htm>. We strongly suggest you review these guides before applying for the summer workshop.

For more information, contact Mimi Cooper at:  
[mimicooper@verizon.net](mailto:mimicooper@verizon.net)



**Twenty Teachers - who do not currently participate in VJAS - will be supported to attend the Virginia Junior Academy of Science (VJAS) and Virginia Academy of Science (VAS) at Old Dominion University on May 22-23, 2019. Go to <https://www.surveymonkey.com/r/AuthRes2> for additional information. Registrations must be received by March 31, 2019.**

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### **Science Museum of Virginia**

2500 West Broad Street  
Richmond, VA 23220

[www.smv.org](http://www.smv.org)



### **Delta Education**

80 Northwest Boulevard  
Nashua, NH 03063

[www.delta-education.com](http://www.delta-education.com)

### **Science Matters Community Idea Stations**

23 Sesame Street  
Richmond, Virginia 23235

[www.ideastations.org/sciencematters](http://www.ideastations.org/sciencematters)  
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20 Channel Center Street  
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757-903-4586  
[secretary@vast.org](mailto:secretary@vast.org)

**Treasurer**  
Matt Scott  
(703) 577-6482  
[treasurer@vast.org](mailto:treasurer@vast.org)

**Editor Science Educator**  
Jean Foss  
434-973-3709  
[newsletter@vast.org](mailto:newsletter@vast.org)

**Executive Director**  
Susan Booth  
757-897-3104  
[executive.director@vast.org](mailto:executive.director@vast.org)

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**Regional Director Coordinator – Eric Pyle - [pyleej@jmu.edu](mailto:pyleej@jmu.edu)**

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Carolyn Elliott  
[region1@vast.org](mailto:region1@vast.org)

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Becky Schnekser  
[Rebeccaschnekser@capehenry.org](mailto:Rebeccaschnekser@capehenry.org)  
Camilla Walck  
[Camilla.Walck@VBSchools.com](mailto:Camilla.Walck@VBSchools.com)

**Director, Region 3,**  
Dr. Dianne Clowes  
[dclowes@spotsylvania.k12.va.us](mailto:dclowes@spotsylvania.k12.va.us)

**Director, Region 4,**  
Susan Bardenhagen  
[region4@vast.org](mailto:region4@vast.org)

**Director, Region 5,**  
Tammy Stone  
[tstone@rockingham.k12.va.us](mailto:tstone@rockingham.k12.va.us)

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Jill Collins,  
[jill.collins@pcs.k12.va.us](mailto:jill.collins@pcs.k12.va.us)  
Dr. Patricia Gaudreau  
[pgaudreau@mcps.org](mailto:pgaudreau@mcps.org)

**Director, Region 7,**  
Donna Rowlett  
[region7@vast.org](mailto:region7@vast.org)

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Katherine Bowen  
[bowen.katherine@nottowayschools.org](mailto:bowen.katherine@nottowayschools.org)  
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**Mission: The Virginia Association of Science Teachers (VAST) is a community of Science educators whose mission is to:**

- inspire students,
- provide professional learning opportunities,
- build partnerships,
- advocate for excellence at the school, local, state and national level.



**Please send articles, letters to the [editor](#), or labs by the submission deadline, MAY 1, 2019, for inclusion in the next digital PDI VAST Newsletter.**



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