

Volunteer Vernal Pool Monitoring in WV





History & Funding

Our Team

Research & Review

Year 1 - Program Development - 2022

Year 2 - Workshops & Survey Season - 2023

Year 3 - Evaluation and Second Year Workshops - 2024

Year 4 and Tutorial Videos and Survey123 - 2025

Year 5 Workshops/Virtual Training (Planned for 2026)

Lessons Learned

Next Steps LiDAR Vernal Pool Mapping & Volunteer Ground Truthing

Questions?



History & Funding

From an idea...
to a successful volunteer vernal pool monitoring
program!

- Wetland Conservation and Education, what's next in WV?
- What do we aim to do? (engage communities in wetland conservation)
- Multiple Objectives in our proposal, wetland educator workshops, wetlands of WV videos, and the development of a citizen science wetland program
- Focus Area (vernal pools)
- Identify Partners & Stakeholders
- Include proposed development of volunteer vernal pool monitoring program in EPA Wetland Program Development Grant
- Receive grant!
- Initiate regular meetings of the new WV Vernal Pool Working Group



Our Team



and more!

We have a collaborative working group with representatives from multiple agencies, including the WV Dept. of Environmental Protection, WV Division of Natural Resources, USGS Amphibian & Reptile Monitoring Initiative, National Park Service, and Fish and Wildlife Service.


Research & Review


We reviewed 10 states' vernal pool monitoring programs, including Connecticut, Maine, Massachusetts, Michigan, Ohio, Pennsylvania, Vermont, & Wisconsin. Plus, we looked at programs hosted by other entities, such as City of San Diego, Clarkson U., and right here at the Canaan Valley National Wildlife Refuge. We compared these to WV's existing Save Our Streams volunteering monitoring program.


		Other Vernal Pool Programs in Review											Volunteer Certification Levels - WV SOS Vernal Pool Protocol							
		SOS (stream survey data sheet)																		
		USGS																		
		Connecticut																		
		Maine																		
		Massachusetts																		
		Michigan																		
		Ohio																		
		Pennsylvania																		
		San Diego																		
		Virginia																		
		Vermont																		
		Mapping - L1																		
		Monitoring L2																		
		Advanced Monitoring-L3																		
Parameter/Data Point																				
General Info	VP Name	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	VP Code	X			X	X	X	X	X	X	X	X	X	X	X	X				
	VP GPS Coordinates	X		X	X	X	X	X	X	X	X	X	X	X	X	X				
	Date	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	Weather	X	X		X	X	X	X	X	X	X	X	X	X	X	X				
	Monitor's Contact Info/Associations	X	X		X	X	X	X	X	X	X	X	X	X	X	X				
	Are you the Landowner? Y/N Permission?				X		X		X		X		X							
	City/Town/County	X	X		X		X		X		X	X	X							
Number of Visits						3							1	3	3					
Chemistry	Dissolved oxygen	X						X		X						X				
	pH	X	X							X						X				
	Conductivity	X	X							X						X				
	Nitrates	X																		
	Turbidity	X	X													X				
	Alkalinity	X																		
	Iron	X																		
	Fecal/E-coli	X																		
Other	X																			
Physical Conditions	Temperature (pool)	X	X				X				X	X			X	X				
	Water clarity	X		X							X				X	X				
	Water color	X		X							X									
	Sediment/Substrate	X					X				X				X	X				
	Algae color	X		X			X								X	X				
	Algae abundance	X		X			X				X				X	X				
	Ice cover											X			X	X				
	Other			X					X			X		Visual Impairment (algae, water color, obstructions)						
Width	X	X				X				X				X	X					
Depth	X	X				X				X	X									
Circumference										X			X	X	X					
Hydroperiod		X		X		X				X				X	X					
Vegetation		X	X			X				X	X			X	X					
Habitat	Riparian Buffer	X					X		X		X				X	X				
	Percent of VP that is shaded	X	X				X				X				X	X				
	Land Use (Poolside, 1/2 mi, watershed)	X		X			X		X		X				X	X				
	Photograph/Sketch the Vernal Pool	X					X				X				X	X				
	Landscape setting (Isolated pool, floodplain pool, part of larger wetland complex)				X		X				X				X	X				
	Vernal Pool Type				X		X				X				X	X				
Biota	Wood Frogs		X	X			X	X	X		X	X	X	X	X	X				
	Salamanders		X	X			X	X	X		X	X	X	X	X	X				
	Fairy Shrimp			X			X	X	X		X	X			X	X				
	Caddisfly	X									X	X			X	X				
	Dragonfly	X							X		X				X	X				
	Damselfly	X							X		X				X	X				
	Black flies	X													X	X				
	Midges	X									X					X				
	Aquatic Worms	X														X				
	Mosquito	X									X				X	X				
	Other	X					X		X						X	X				
	Fish (to rule out VP status)						X						X	X	X	X				
	Did volunteer use polarized glasses?											X			X	X				

2022 - Year 1 - Program Development - Developing the Protocol &

Survey

		WV Vernal Pool Patrol Data Sheet Level 1: Complete light blue section; Level 2: Complete light & medium blue sections; Level 3: Complete all lines. Please also visit iNaturalist and report your observations to the West Virginia Vernal Pools Project. Found at: https://www.inaturalist.org/projects/west-virginia-vernal-pools		Level # and Visit #:	
Level 1	Vernal Pool Name			Date	
	Vernal Pool Code (if known)			Time	
	Watershed/Ecoregion/County			Current Air Temp C or F	
	Vernal Pool Coordinates			Sky Code*	
	Lat:			Wind Code*	
	Long:				
	Organization & Monitor Name(s)			Org: Monitors:	
	Pool Size (estimate) in meters			Large golf umbrella Parking space 3-car garage MLB infield Walmart	
	(Estimate or measure when dry)			1m^2 10m^2 100m^2 1,000m^2 10,000m^2	
	GPS (indicate unit of measure)			Width Length Meters/Feet	
	Pool Type			Naturally Occurring Constructed Log/Gas/Tire Rut Other: Unknown	
	Egg Masses observed? PHOTO			Yes / No If yes, how many? Abundant (>10) Some (4 - 10) Few (1-3)	
	Pool has water?			Yes / No Full/Nearly Full Partial Near Dry Dry Unsure	
	Ice Cover? If yes, ext. %			Yes / No Greater than 75% 25 - 75% Less than 25% None	
Tree canopy above pool			Yes / No Greater than 75% 25 - 75% Less than 25% None		

Level 2	Tree canopy above pool		Yes / No	Greater than 75%	25 - 75%	Less than 25%	None
	Woody debris in the pool		Abundant (>50%)	Some (up to 50%)	None	Coarse*	Fine*
	Pool vegetation (circle all that are present)		Floating or Submerged	Emergent (grasses, sedges, rushes)	Shrubs	Trees	None
	Natural Forest Buffer (10m % intact)		75% or Greater	25 - 75%	Less than 25%	None	
	Forest Buffer Dominant Type		Broadleaf trees/shrubs	Conifers	Both	N/A (Inadequate buffer)	
	Forest Buffer Notes:						
	Water Clarity/Turbidity		Clear	Slightly Turbid	Turbid/Opaque		
	Algae Abundance		75% or Greater	25 - 75%	Less than 25%	None	
	Substrate		Broadleaf	Conifer Leaf	Sediment	Other:	Unknown
	Identify amphibian adult, tadpole, and egg masses (If known)		Adults		Tadpoles		Egg Masses
			Wood frog, L. sylvaticus				<input type="checkbox"/> #
			Spotted salamander, A. maculatum				<input type="checkbox"/> #
			Eastern spadefoot toad, S. holbrookii				<input type="checkbox"/> #
			Marbled salamander, A. opacum				<input type="checkbox"/> #
Jefferson salamander, A. jeffersonianum					<input type="checkbox"/> #		
Eastern Newt, Notophthalmus viridescens					<input type="checkbox"/> #		
Spring peeper, Pseudacris crucifer					<input type="checkbox"/> #		
Other:					<input type="checkbox"/> #		
Any stranded egg masses?		Yes	No	Percent of Pool Surveyed (Estimate)		%	
Fish or green/bull frogs observed?		Yes	No	(If yes, this may be indication this is not a vernal pool.)			
Other aquatic biota:		Fairy Shrimp	Caddisfly	Dragonfly	Damselfly	Mayfly	
		Aquatic Worms	Mosquito	Midges	Water Boatman	Water Strider	
		Backswimmer	Predaceous Diving Beetle	Other:			
Other terrestrial biota:		Rusty Blackbird					

DEFINITIONS & CODES																												
Coarse Woody Debris (CWD) Dead pieces of wood including downed, dead tree and shrub boles, large limbs, and other woody pieces that are severed from their original source of growth or are leaning more than 45 degrees from vertical. CWD transect diameter must be > 3.0 inches (7.6cm).	Fine Woody Debris (FWD) Dead branches, twigs, wood splinters 0.1 to 2.9 inches (0.3 - 7.4 cm) in diameter.																											
USGS-ARMI SKY CODE: Do not conduct surveys if sky codes are 8 or above.																												
<table><tr><th>Code</th><th>Sky Condition</th></tr><tr><td>0</td><td>Clear or few clouds (<20% of sky)</td></tr><tr><td>1</td><td>Partly cloudy or variable (20-50% of sky)</td></tr><tr><td>2</td><td>Cloudy or overcast (>50% of sky)</td></tr><tr><td>3</td><td>Fog</td></tr><tr><td>4</td><td>Mist</td></tr><tr><td>5</td><td>Showers or light rain</td></tr><tr><td>6</td><td>Heavy rain</td></tr><tr><td>7</td><td>Sleet/hail</td></tr><tr><td>8</td><td>Snow</td></tr></table>		Code	Sky Condition	0	Clear or few clouds (<20% of sky)	1	Partly cloudy or variable (20-50% of sky)	2	Cloudy or overcast (>50% of sky)	3	Fog	4	Mist	5	Showers or light rain	6	Heavy rain	7	Sleet/hail	8	Snow							
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Vernal Pool Sampling Windows																												
																												
Sketch your vernal pool here, noting important features.																												
Email completed survey data sheets to: saveourstreams@wv.gov or mail to: WV DEP - Save Our Streams Coordinator, 47 School Street, Suite 301, Philippi, WV 26416																												

Three ways to get involved, to allow a variety of audiences to participate.

Location Data Only - intended for people who work in the field

Level 1 Survey - Location Data + Some observations

Level 2 Survey - More detailed observations

All observations are taken poolside to reduce impact.

Where possible, we aligned parameters with the USGS Amphibian Research & Monitoring Initiative (ARMI) and Canaan NWR protocol.

2023 - Year 2 - Workshops & Survey

Season

- Workshops consist of presentations on protocol, vernal pool biota, amphibian disease prevention/decon, VP research, plus field practice/ conducting a vernal pool survey
- 4 Workshops -
 - Cacapon State Park,
 - Fox Forest WMA,
 - Kanawha State Forest,
 - Cranberry Mountain Nature Center
- 100+ vernal pool monitors trained
- 15+ vernal pools surveyed using the data sheet to add to our database
- WV iNaturalist Project: 233 observations, 95 observers



2024 - Year 3 - Evaluation and Second Year Workshops



2024 Workshops

- WV Botanic Garden (in the snowstorm!)
- Fort Mill Ridge WMA/Romney DNR Office
- New River Gorge National Park, Glen Jean
- Kanawha State Forest/Charleston area
- Cranberry Nature Center - Monongahela National Forest - Greenbrier River

Over 100 vernal pool monitoring surveys
returned!




2025 Year 4 and Tutorial Videos and Survey123


And, DEP and DNR GIS professionals developed a Survey123 vernal pool monitoring tool. Volunteers may use the app or the paper survey starting in 2026.



In 2025, our DEP videographer helped us film tutorial videos for participants who could not attend a workshop in person.

Vernal Pools

dep  WEST VIRGINIA DNR



This is a survey to enter your vernal pool observations. Please take a moment to review this form and what data is being requested prior to filling out the vernal pools survey. We strongly advise monitors to limit their observations to vernal pools located on public lands and be in communication with park staff. If observation is on private land, please ensure you have received landowner permission prior to monitoring. If you would like to learn how to successfully complete a vernal pool observation, please refer to The [West Virginia Vernal Pool Volunteer Monitoring Manual](#). Additional information can be found at the [WVDEP Vernal Pools webpage](#).

Vernal Pool - a type of wetland; a depression in the terrain that holds water in winter and spring, but does not hold substantial water year round due to seasonal evaporation and groundwater fluctuations associated with reduced precipitation. Pools can be naturally occurring, or formed by human activity. Vernal pools are disconnected from other bodies of water, except in larger wetland pool complexes.

[Vernal Pool Monitoring with Survey123](#)

Next Steps

What's next for the program?

Using LiDAR to develop a list of potential pool sites for volunteers to ground truth and monitor.

Creating a pocket egg mass ID guide.

Hosting additional training workshops and recruiting more vernal pool monitors and motivating current volunteers to continue to monitor.

Analyzing pool survey data to better understand vernal pool ecology, watershed health, and forest ecosystems.



What have we learned?

It's much easier to attract workshop participants than it is to recruit dedicated volunteer monitors.

Be sure to have vernal pools in need of a monitor to assign to volunteers who do not know where to monitor.

Provide multiple ways to submit surveys, paper, online survey¹²³, iNaturalist.

Questions?



WV Vernal Pool Monitoring
Page



Volunteer monitors in
Monongalia Co. WV



Wood frog



Spotted Salamander egg masses in a vernal pool in the New River Gorge National Park