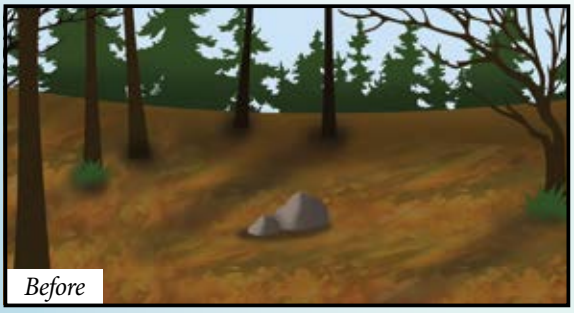
PLAY
Winter 2021
Pennsylvania • League • of • Angling • Youth

Vernal Pools

Have you explored a woodlot, forest, or field in the spring and noticed a low-lying area filled with water? There may have been water ripples as critters scurried about it. Or, maybe you heard calling amphibians. Later, the water disappeared, leaving a muddy bottom with decomposing leaves and debris. You probably came across a **vernal pool**.

Vernal pools are also called seasonal pools. These wetlands are temporary, and usually dry up and return again the next year. Vernal pools are home to unique animal species.

In this *PLAY* issue, you will learn more about vernal pools, the animals that live in vernal pools, threats, and how to lend a helping hand.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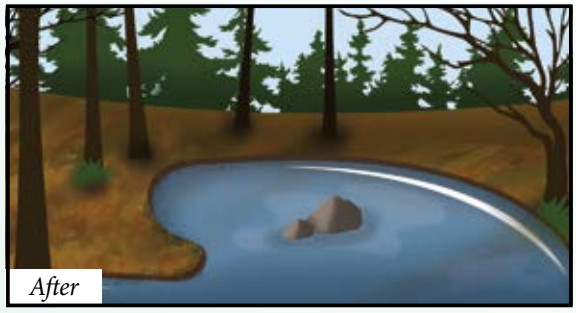
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Vocabulary *(Watch for these words!)*

- **Autumnal** - fall
- **Facultative species** - take advantage of vernal pools but do not require vernal pools for survival
- **Habitat fragmentation** - large areas of habitat transformed into smaller patches
- **Hardpan Layer** - an impervious layer like clay below the soil that impairs water drainage
- **Herps** - amphibians and reptiles
- **Hydric soils** - soil that is saturated with water for long periods and has anaerobic conditions (lacks oxygen)
- **Hydrology** - study of water and its movement on Earth and underground
- **Impermeable** - not allowing fluid to pass through
- **Indicator species** - requires vernal pools at some stage of the life cycle
- **Oxbows** - standing bodies of water that form when a stream meander is cut off
- **Pingos** - dome-shaped hills formed in permafrost areas when the pressure of freezing groundwater pushes up a layer of frozen ground
- **Runoff** - water draining from the surface of a land area
- **Vernal pool** - seasonal pool of water

All About Vernal Pools

Geology

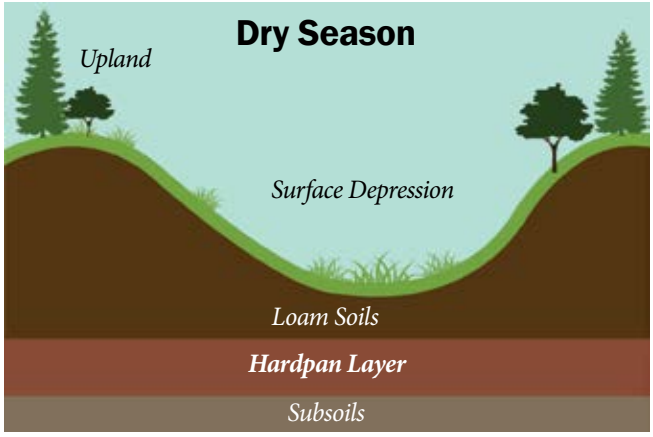
Here are some ways vernal pools form:

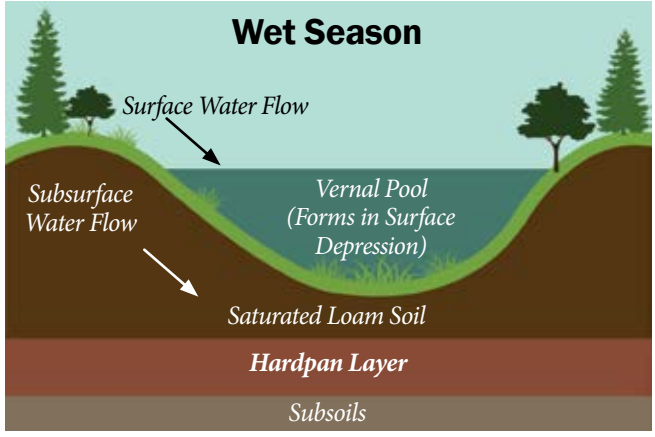
- Ice age glaciers that create depressions
- Streams and rivers that flood and create scour pockets in a floodplain
- Streams that meander across a floodplain and create **oxbows**
- Groundwater that dissolves limestone bedrock under impermeable surface soil layers, creating sag ponds
- Crescent-shaped wetlands that form on **pingos**

All these low-lying areas fill with water, becoming vernal pools.

Soils

Vernal pools have an **impermeable** soil layer that results in water ponding. **Hydric soils** may form if saturated for long periods. Nutrient rich soils will layer over top of the impermeable soil.





Hydrology

Hydrology is the study of water and its movement on Earth and underground. Vernal pools receive most water from rain or snowmelt **runoff** and fill in the fall **(autumnal)**, winter, or early spring (vernal). Some pools are close to the water table and have groundwater sources. Pools may also fill when nearby waterways overflow from heavy rains. Most pools dry up during summer.

Vegetation

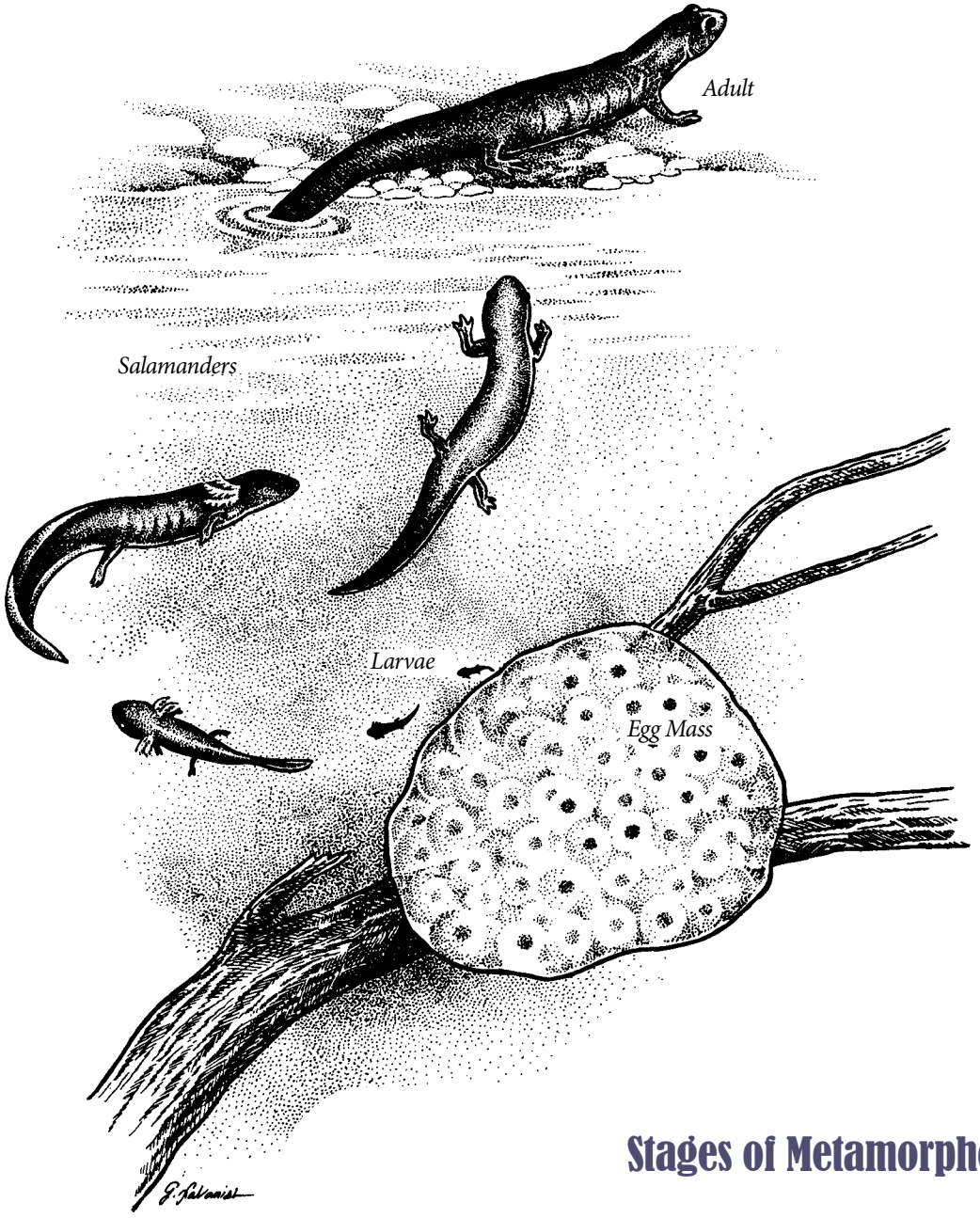
Grasses, rushes, and pondweeds provide egg-laying sites and cover from predators. Shrubs and trees provide shade that regulates water temperature. Leaves and woody debris also supports the food web.

Ecology and Life Cycles

One advantage of a temporary pool is avoiding predators. Predators like fish cannot survive, because the pool eventually dries up. It is a safe place for eggs and larvae. The tradeoff is that vernal pool animals must adapt to dry conditions or leave the pool before it dries up.

Some invertebrates like fairy shrimp and clam shrimp leave eggs at the bottom of the pool. The eggs can withstand drying out in summer and freezing in winter.

Amphibians like salamanders and frogs can survive in aquatic and terrestrial habitats at different life stages. Adults spend the summer, fall, and winter in nearby uplands. There the adults find food, shelter, and overwintering sites. Amphibians migrate to vernal pools after spring rains and lay eggs. Larvae or tadpoles have gills and must grow quickly after hatching. Tadpoles metamorphose into adults and leave the pool before it dries up.



Stages of Metamorphosis

Vernal Pool Indicator Species

Certain species need vernal pools for a part of the life cycle. These animals are called **indicator species**.

Most amphibians return to the same vernal pool where born and travel past other pools and cross obstacles like roads on the migration journey.

Vernal pool indicator species include:

- Blue-spotted Salamander *(Endangered Species)*
- Clam Shrimp *(not pictured)*
- Eastern Spadefoot *(Threatened Species)*
- Fairy Shrimp *(not pictured)*
- Jefferson Salamander
- Marbled Salamander
- Spotted Salamander
- Wood Frog

Jefferson Salamander

Marbled Salamander

Blue-spotted Salamander, Endangered Species

Spotted Salamander

Eastern Spadefoot, Threatened Species

Wood Frog

Vernal Pool Facultative Species

Many other animals take advantage of vernal pools, but vernal pools are not required for survival. Vernal pools provide a source of food or shelter for these species, and species may breed in vernal pools but are also adapted for reproduction in other wetland habitats. These animals are referred to as **facultative species**.

Vernal pool facultative species include:

- American Bullfrog
- Eastern American Toad
- Northern Green Frog
- Spring Peeper
- Red-spotted Newt
- Spotted Turtle
- Wood Turtle
- Woodland Box Turtle *(not pictured)*

American Bullfrog

Red-spotted Newt

Eastern American Toad

Spotted Turtle

Northern Green Frog

Wood Turtle

Spring Peeper

For more information on these animals, visit **www.fishandboat.com**.

Functions and Values

Vernal pools have benefits to society and the environment.

- Flood control
- Water purification
- Habitat for animals
- Beautiful to explore

Threats

Vernal pools are sensitive to human harm.

Habitat Loss

Agriculture, construction, logging, and quarries cause a loss of habitat.

Changing Hydrology

Developments may decrease the water table. Pools may be dug deeper for a permanent fish pond.

Water Quality

Runoff contains sediment, salt, oil, and chemicals that harm pool life.

Climate Change

Temperature changes and rainfall amounts may affect animal life cycles.

Habitat Fragmentation

Construction and agriculture breaking up the landscape, animals killed crossing roads, and invasive species outcompeting native species in open areas are examples of **habitat fragmentation**.

Vegetation Changes

Logging reduces shade, increasing water temperature. Vegetation removal eliminates egg sites and cover.

Helping Hand

Here are steps to protect vernal pools.

- Allow a buffer; avoid mowing too close
- Avoid cutting trees around the pool
- Limit pesticides and herbicides
- Do not dig a temporary pool deeper
- Conserve water

Pennsylvania Vernal Pool Registry

This registry allows volunteers to submit information on vernal pools.

www.naturalheritage.state.pa.us/VernalPool_Register.aspx

Pennsylvania Amphibian and Reptiles Survey (PARS)

This statewide atlas helps us understand where **herps** live. Citizens can report observations or join as a volunteer.

https://paherpsurvey.org

Become a Superhero

Check out the *Pennsylvania Angler & Boater* July/August 2020 *PLAY* "Superheroes of Summer" to learn how to help and become a Citizen Scientist.

Vernal Pool Word Search

Find these vernal pool words in the following word search.

S P P H Y G O L O R D Y H R Z
N I Q R S G Y F P Y Y Q Y M I
W Y R U N O F F Z M S D D O O
Y O G A U M S R C A S A R O N
V H B W U A M E G N P V I T H
N R D X J T R E A T D X C Y E
E O R N O A U L Y S N J I W R
B F I O G J W M A Q O G R E P
T T J T S P J X N N P N L B S
A A R C A K D R R A R B A H W
I I M P E R M E A B L E K L K
M P M W X O G I A K O K V F H
K D C A U T R I L F N J W N Z
P D U U Q X W U M C C O N V E
F A Z S A G P O N D Z B O N A

Word List

- HYDRIC
- HYDROLOGY
- MIGRATION
- OXBOW
- SAG POND
- SEASONAL
- VERNAL
- AUTUMNAL
- RUNOFF
- IMPERMEABLE
- HERPS

(***Hint:*** *Some words may appear backwards.*)

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