# Temporary Wetland Survivor

**Adapted from**: "Life in the Fast Lane" in Project WET: Curriculum & Activity Guide. Bozeman: The Watercourse and the Council for Environmental Education, 1995.

**Grade Level**: Basic

**Duration**: 50 minutes

**Setting**: A large open area

**Summary**: Students have a scavenger hunt to illustrate the obstacles to survival in a temporary wetland.

**Objectives**: Students will recognize how organisms in temporary wetlands race against time to obtain the resources necessary for survival and be able to identify the challenges and advantages to living and reproducing in a temporary wetland.

**Related Module Resources**:

- The Pools of Spring laminated article
- Additional Module Resources:
  -"Vernal Pools" (EPA)
  -"Vernal Pools"
  -"Information About Vernal Pools"
  -"Vernal Affairs"
  -"Protecting the Rights of Wood Frogs"

**Vocabulary**: temporary wetland, vernal pool, transients, biodiversity

**Materials (Included in Module)**:

- 10 orange "predator" safety vests [Temporary Wetland Survivor Module Activity Envelope 1 of 2]
- 147 water and food game pieces (49 of each of four colors) [Temporary Wetland Survivor Module Activity Envelope 1 of 2]
- 150 blue, 100 white, & 100 red poker chips [Temporary Wetland Survivor Module Activity Envelope 2 of 2]
- 49 red pipe cleaners [Temporary Wetland Survivor Module Activity Envelope 1 of 2]
- 1 stopwatch [Temporary Wetland Survivor Module Activity Envelope 1 of 2]
- Temporary Wetland Survivor Predator (8) and Prey (32) Requirements cards for game piece and poker chip versions[Temporary Wetland Survivor Module Activity Envelope 1 of 2 and 2 of 2] and originals
- 1 whistle [Temporary Wetland Survivor Module Activity Envelope 1 of 2]
- 1 rope wrap [Box A]

**Additional Materials (NOT Included in Module)**:

- prizes (optional)
- paper clips, if needed

**ACADEMIC STANDARDS: (ENVIRONMENT & ECOLOGY)**

7th Grade

4.1.7.C. Explain the effects of water on the life of organisms in a watershed.
- Describe the life cycle of organisms that depend on water.

4.6.7.A. Explain the flows of energy and matter from organism to organism within an ecosystem.
- Demonstrate the dependency of living components in the ecosystem on the nonliving components.

4.7.7.A. Describe diversity of plants and animals in ecosystems.
- Select an ecosystem and describe different plants and animals that live there.

4.7.7.B. Explain how species of living organisms adapt to their environment.
- Explain how living things respond to changes in their environment.

10th Grade

4.1.10.C. Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.
- Explain the habitat needs of specific aquatic organisms.

4.6.10.A. Explain the biotic and abiotic components of an ecosystem and their interaction.
- Describe how the availability of resources affects organisms in an ecosystem.

12th Grade

4.1.12.B. Explain the relationships that exist within watersheds in the United States.
- Understand that various ecosystems may be contained in a watershed.
- Examine and describe the ecosystems contained within a specific watershed.

**BACKGROUND**: Wetlands come in all shapes and sizes but all share the common characteristics of the presence of water, hydric soils, and hydrophytic vegetation. As discussed in the module activity "Wetland Observations," we can distinguish different types of wetlands based on where their water comes from, the depth of that water, and the length of the saturation period. Bogs and fens retain standing water throughout the year whereas marshes and swamps sometimes dry up during the dry season. Another type of wetland, called a **temporary wetland**, is wet for even shorter periods than marshes and swamps. Temporary wetlands are only filled with water for part of the year. Temporary wetlands usually appear in low-lying areas, flatland soils, valleys, puddles, and depressions during the wet season after heavy spring rains or snow melts. Depending on the topography (elevation and physical make-up of the landscape) and the amount of precipitation, these wetlands may only be a few yards in diameter or they may cover many acres. How "temporary" a temporary wetland is also depends on the topography as well as the amount of

precipitation. Water that collects in these wetlands evaporates, percolates into the ground, or flows downstream. Temporary wetlands are only fed by rain or snowmelt (not streams or groundwater). Consequently, these temporary wetlands rarely last through the dry season. A temporary wetland may exist for one day or up to four or five months. A special name for temporary wetlands in the Northeastern United States is "**vernal pool,**" which refers to the fact that temporary wetlands in this region typically fill with water only in the spring.

Temporary wetlands are fascinating places because these once dry, rather dormant areas erupt with plant and animal life with the addition of water! A whole world of life appears in such a wetland, with a fast-paced lifestyle designed to win the race against time—the time when the wetland dries up. During this limited time, organisms such as mosquitoes, salamanders, frogs, toads, fairy shrimp, and microorganisms must secure shelter, find food, grow and develop and in some cases, locate a mate and reproduce.

Where do all the grasses, mosquitoes, and frogs come from? Buried in the soil, many wait for the essential ingredient that allows them to become active—water! For example, certain caddisfly and dragonfly eggs remain dormant and embedded in soil and do not hatch until the area becomes inundated with water. It's quite a survival strategy because were these eggs to hatch before the area filled with water, the newly born caddisfly larvae and dragonfly nymphs would face certain death! Other organisms bury themselves and become dormant when the water dries up (in some cases, for as long as 20 years!). Amphibian adults return to their natal vernal pools, ponds, or other temporary wetlands to deposit eggs and egg masses.

Temporary wetlands are hotbeds of insect and amphibian reproduction. You may have learned that areas of standing water are ideal breeding grounds for mosquitoes. Temporary wetlands are used by many other insects for reproduction, such as the caddisflies and dragonflies described above. Furthermore, many species of frogs and salamanders rely on temporary wetlands, particularly vernal pools for reproduction. Laying eggs or depositing egg masses in temporary wetlands is risky business but the advantage of reproducing in temporary wetlands generally outweighs the risks. One risk of the temporary wetlands is that they might dry up before young amphibians fully develop and metamorphose into juveniles or adults capable of seeking moister conditions elsewhere. Another risk is that crowding in a shrinking temporary wetland means less dissolved oxygen for more individuals. Sometimes there isn't enough oxygen to support all the biota in a temporary wetland. A third risk is that individuals living in a temporary wetland are vulnerable to predation by birds, insects and other mammals. An advantage of reproducing in temporary wetlands is that, unlike in permanent wetlands or ponds or lakes, fish (i.e., amphibian egg and larvae eaters) cannot survive in temporary wetlands.

Another advantage of living in a temporary wetland is the concentration of food sources (algae and other plant species) available. This rich supply of food makes these wetlands an attractive home and a productive nursery for many animals and plants before the wetland dries up. Other animals called **transients** (e.g., visiting during migration) live in temporary wetlands and then relocate when the temporary wetlands dry up.

In addition to being breeding grounds for insects and amphibians, other important functions of temporary wetlands include providing habitat for rich **biodiversity** (different forms of life), soaking up storm water and decreasing flooding. Water that collects in temporary wetlands is also purified and filtered as it soaks into the ground.

**OVERVIEW:** Students participate in a scavenger hunt to simulate the race against time that occurs in a temporary wetland. Students must secure shelter, find food and water, and find a mate before time runs out and the temporary wetland dries up.

**PROCEDURE**:

**Teacher Preparation:**

1. Locate the stopwatch, the orange "predator" safety vests, pipe cleaners, the water and food game pieces and the Temporary Wetland Survivor Predator and Prey Requirements cards in the module. (Note: You may use poker chips in lieu of water and food game pieces. If you do so, make sure you use the Temporary Wetland Survivor Predator and Prey Requirement cards that state the number of poker chips each player must collect instead of the number of food game pieces.)

2. Select a large open field or space as a playing field for the activity.

3. Lay out the rope in the module on the playing field to define the boundaries of the temporary wetland.

4. Spread out the pipe cleaners (shelter) and the water and food game pieces (or poker chips) within the boundaries of the temporary wetland. (You may want to alter the number of food and water game pieces/poker chips and/or pipe cleaners depending on the number of students playing the game.)

**Student Activity:**

1. Stimulate a discussion about temporary wetlands and how they are important habitats and breeding grounds for certain insects and amphibians.

2. Ask students what three major things living organisms need to survive. *Food, water and shelter!* Ask students what living organisms must do to be successful evolutionarily? *Find a mate and reproduce to pass on their genes!*

3. Explain that in temporary wetlands, organisms must find food, water, and shelter and reproduce, all before the wetland dries up.

4. Explain that students will participate in a fast-paced predator-prey scavenger hunt called Temporary Wetland Survivor to simulate the experience of organisms living in a temporary wetland.

5. Have students count off by fives. All number ones should receive an orange "predator" safety vest. They will be the predators during the game. Brainstorm some examples of predators that might be found in temporary wetlands.

6. The rest of the students will be the prey during the game. Brainstorm some examples of predators that might be found in temporary wetlands.

7. Explain that during the game, the predators and prey will have a limited amount of time to collect specific amounts of food, water, and shelter within the boundaries of the temporary wetland and that after collecting those survival requirements, they must quickly find a mate and leave the temporary wetland before time runs out and the wetland dries up.

8. Point out the playing area and explain that the area inside the rope boundary represents the temporary wetland.

9. Explain that there are pipe cleaners (that represent shelter) and blue water and yellow, pink, orange, and red food game pieces (or blue water poker chips and white and red food poker chips) spread out within the boundaries of the temporary wetland.

10. Distribute the Temporary Wetlands Survivor Predator and Prey Requirements Cards to the predators and prey respectively. Go over the requirements with the students and make sure they understand what is expected of them. Prey must search for their survival requirements without being captured by predators. Predators capture prey by tapping them gently. Upon being captured by predators, prey must stop searching for their own survival requirements and travel around with the predator. Once students have obtained the necessary food, shelter, and water requirements for survival, they should start snapping their fingers. This will let other students know that they are looking for a mate. Prey must find prey mates and predators must find predator mates.

11. Once students have found their mate they can leave the boundary of the temporary wetland. They have survived the risks of living and reproducing in a temporary wetland. Make sure that they did in fact collect all the necessary Survivor Requirements.

12. Using the stopwatch, begin round one with a time limit of approximately 2 minutes—this will vary depending on how many students play the game and the size of the playing area.

13. Predators and prey still in the temporary wetland when time expires perish. The wetland has dried up and they die.

14. Play subsequent rounds. It is up to you whether or not students who died in early rounds can play in later rounds. Feel free to mix things up by decreasing the length of the round or reducing the size of the temporary wetland.

15. Prizes can be awarded to students who survive Temporary Wetland Survivor.

## DISCUSSION:

What might be the fate of organisms that do not obtain what they need before the wetlands dry up? *They might die.*

Do all organisms in temporary wetlands die when the wetland dries up? *No, some are able to survive by remaining dormant until the area fills with water again.*

What are the challenges of living in temporary wetlands? What are the advantages? *See the Background section.*

What are the main functions of temporary wetlands? *See Background section.*

## EVALUATION:

- Discussion questions above.
- Describe how organisms in temporary wetlands must behave to win the race against time.
- Define "vernal pool".

## EXTENSIONS AND MODIFICATIONS:

- During the course of the game, students might step outside the wetland boundary rope. When they do, they could be disqualified from the game for venturing beyond the relatively secure confines of the temporary wetland.
- Assign students different temporary wetland species. Have them research what their temporary wetland species eats. Use this information to make different food game pieces and have "predators" and "prey" collect only those food items that their organism actually eats (e.g., plants, detritus, etc.).
- Assign different temporary wetland species to the predators/prey and make them find another individual of their own species to mate with instead of just any other prey/predator.
- Monitor a temporary wetland by sampling the macroinvertebrates or testing other water quality parameters. Record temperature, diameter and average depth as well over a period of days, weeks, or months.
- Research the types of organisms that live and reproduce in temporary wetlands.
- Research vernal pools and other specific types of temporary wetlands.

## NOTES (PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE):

# HANDOUT: TEMPORARY WETLAND SURVIVOR

| Temporary Wetland Survivor Prey Requirements | |
|---|---|
| Requirement | Number and Description |
| *Water* | 3 blue water game pieces |
| *Shelter* | 1 pipe cleaner |
| *Food* | 4 food game pieces (1 pink, 1 yellow, 1 orange, and 1 red) |
| *Mate* | The first prey (student not wearing an orange vest) you see who has found water, shelter and food (they should be snapping their fingers) |


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**GAME PIECES VERSION**

## Temporary Wetland Survivor Predator Requirements

| Requirement | Number and Description |
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| *Water* | 3 blue water game pieces |
| *Shelter* | 1 pipe cleaner |
| *Food* | 8 food units<br>[1 food game piece (any color) = 1 food unit<br>1 prey item (other student) = 2 food units] |
| *Mate* | The first predator you see who has found water, shelter and food (they should be snapping their fingers and wearing an orange vest) |


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**GAME PIECES VERSION**

## Temporary Wetland Survivor Prey Requirements

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| *Water* | 3 blue water poker chips |
| *Shelter* | 1 pipe cleaner |
| *Food* | 4 food game pieces (any combination of red and/or white poker chips) |
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**POKER CHIPS VERSION**

## Temporary Wetland Survivor Predator Requirements

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| *Water* | 3 blue water poker chips |
| *Shelter* | 1 pipe cleaner |
| *Food* | 8 food units<br>[1 red or white poker chip = 1 food unit<br>1 prey item (other student) = 2 food units] |
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**POKER CHIPS VERSION**