



# **More Than Just Puddles of Water**

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Europeans first started settling North America in the early 1600s. At that time, there were over 221 million acres of wetlands. By the 1980s, only 103 million acres remained. Most people think about the stereotypical wetland as a swamp or ocean side marsh, but there are several types of wetlands. Some wetlands are ephemeral which refers to the seasonal filling and drying of these wetlands. To the public eye, they just look like puddles of water because they aren't permanent like other typical of wetlands. For that reason, conservation attention is very minimal for these pools even though they harbor many types of organisms and act as breeding pools for those organisms. One conservation method is to recreate this wetlands in another location. But



Picture A represents ephemeral pool during wet period and picture B represents the same ephemeral pool a few months later.

wouldn't it be a good idea to understand what affects these wetlands first? Different human and natural affect these wetlands, but are they positive or negative affect? All these questions and more are examined throughout this article.

### *Affects of a Growing World*

As a society, we have affected many different ecosystems through the world, and ephemeral wetlands are no exception. With the growing demand for food and crop, agriculture

has become wider spread and more destructive to the environment. Agricultural fields have had to become bigger to compensate for our growing appetites. With that, forests maybe leveled to make room for these fields, but ephemeral wetlands often remain.

Researcher Brian O’Neill at the University of Wisconsin along with colleagues became very interested in agriculture on ephemeral wetland performance. So, between the years of 2011 and 2013, his team sampled 73 ephemeral wetlands in the states of Colorado, Nebraska, South Dakota, Wyoming, and Montana. Row crop tilling and cattle grazing effects on invertebrates was the main focus of there 3 years of research. Not surprisingly, row crop tilling had a negative affect on invertebrate communities but surprisingly cattle grazing had positive effects. Run off from the tilling tends to pill up in the wetlands causing them to dry up quicker than normal while the cattle grazing mimics a time when bison would graze alongside ephemeral wetlands before their populations decreased.

Another type of ephemeral wetland that many people may not think about are roadside ditches. These ditches fill with rainwater and run off from the road. As the population expands, the number of roads is also sure to follow, increasing the number of roadside ditches. Sarah Turtle at the University compared the survival of spotted salamanders in roadside pools to natural woodland pools. She set out to try and understand how pollution affects embryonic survival of spotted salamanders. To no one’s surprise, the survival of embryos was lower in roadside pools than in woodland pools. A majority of the roadside pools



Spotted Salamander

had higher concentrations of deicing salts and metals like sodium and chlorine. This would explain the results since amphibians have such a low tolerance to salinity.

### *Mother Nature at Work*

Natural processes, like precipitation, could arguably have the greatest overall affect on ephemeral wetland productivity. But wetland dynamics like pool clustering and distance from permanent bodies of water have just as much of an affect as weather does.

The amount of precipitation that an ephemeral wetland could really determine how long it will stay filled. Robert Brooks at the U.S. Department of Agriculture researched precipitation on the reproductive rate and amphibian species and found that lower precipitation rates negatively affected the amphibians. Less amounts of rain would lead to pools drying earlier in the year which affected the reproductive season of some amphibians.

Wetland clustering refers to how close together or how isolated the wetlands. Fred Van Dyke, professor at Au Sable Institute in Michigan, set out to discover how wetland clustering affects amphibian diversity. Through amphibian surveys in multiple different clustered and isolated ephemeral pools, it was discovered that clustered pools were more diverse than isolated pools. The reasoning for this was because if one pool dried up earlier than another surrounding pool, then the amphibians were able to move to the next neighboring pool. In a situation where the pool is isolated, the amphibians wouldn't have another pool to move to in the event that it dried up.

At Wupatki National Monument, Arizona, researcher Tim Graham studied the various factors that affect species richness in ephemeral pools. Most notably was the distance from permanent bodies of water. One would think that it shouldn't really matter how close the

ephemeral pool is to permanent water, but surprisingly, it does matter. Pools that were closer to permanent bodies of water were found to have higher amounts species than pools farther away. This is due partially to the permanent bodies of water resisting to immigration, so ephemeral pool communities tend to be more diverse.

### ***Recreation as Conservation Method***

Since more than half of the United States wetlands have been lost since the 1600s, conservation practices need to be implemented. Creating wetlands is often a good choice to mitigate or make up for wetland lose but is extremely hard. Due to ephemeral wetlands impermanent duration of water and them filling and drying seasonally, it makes them one of the hardest wetland systems to recreate. But with a better understanding of how various factors affect the ephemeral wetlands, they can be designed to benefit the organisms that live and use them.

Another conservation strategy that could benefit ephemeral wetlands would be citizen science. Citizen science is the use of nonscientists to collect scientific data while also learning about science. In this case, citizens would go out to the wetlands and could survey for amphibians while also learning about wetlands. When the community is aware of how important these ephemeral wetlands are, the less likely they need to be recreated.



Citizen science in action; surveying and learning about amphibians in local ephemeral pools.

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