

an amphibian's eye view of wetlands

You say it's a wetland?

Picture this...you are on a tour of wetlands. Let's make it a southeastern wetland tour, since the ecology lab where I work and conduct my research on salamanders is in the Southeast. It is July—98°F, 85% humidity—and you are doing your best to ignore the deer flies and mosquitoes. First, you visit a cypress-tupelo swamp. At a tributary to the swamp you trek through a beaver pond. Then, just a few miles away, you cool off in a blackwater stream. Finally, at the last stop on your tour, you hear “Go on ahead. Let's meet at the edge of the wetland.” You plunge ahead, under the pine canopy, beyond the band of sweetgums. You wade through greenbrier and cut-grass, looking for water. You dive between clumps of buttonbush, and emerge back in forest. Your feet remain dry. You curse the tour leader. What wetland?

Timing is everything. Were you to make the same hike in February, for example, in most years your feet would not stay dry. In some years you would literally swim through cold water teeming with aquatic life. Again, you would curse the tour leader.

Seasonal wetlands—

full-time wetland, part-time water

A “wetlands tour,” similar to the one described above, could include tramping through seasonal wetlands in almost any region of the United States. The names of such wetlands may differ depending on where you are—prairie potholes, vernal pools, Carolina bays, rock pools, desert depressions, pocosins, swale ponds, snow melt pools, sandstone potholes. The geology and origin of the wetland may differ from one

place to the next, but the ecology is strikingly similar. They are all seasonal wetlands.

To some folks, “wetland” means only the sort of habitat where a duck can wet its feet all year round. But a glance at the U.S. Fish and Wildlife Service's *Classification of Wetlands and Deepwater Habitats of the United States* or numerous other wetland manuals will illustrate that wetlands come in many forms, shapes, and sizes. And although our appreciation of the value of wetlands has increased in

recent years, the importance of the general category of “seasonal wetlands” is still largely

unrecognized. In fact, in many cases, seasonal wetlands are still under siege.



Summer wetland



Winter wetland



It helps to look at the big picture. It is easy to envision a landscape that has lakes, farm ponds, and marshes—permanent waters. Similarly, most of us can picture short-term flooding in roadside ditches and old-field puddles. These conditions, however, are but the two ends, the extremes, of a continuum of “wetness.”

Different types and sizes of wetlands hold water for differing amounts of time; that is, the *hydroperiods* of the wetlands differ. Across a landscape of moderate size, perhaps only a few square miles, one is apt to find wetlands that fall all along this hydroperiod continuum. Biologists have long recognized that hydroperiod variation is directly linked to species biodiversity.

Because different species have different habitat preferences, wetlands that differ in hydroperiod are likely to support diverse sets of species.

What many amphibians need

Of all the vertebrate animals, amphibians demonstrate the importance of wetland habitat diversity better than any other group.

As most of us learned in elementary school, frogs and toads and salamanders are amphibians because (in general) they lay eggs in water that hatch into babies (larvae) that live in the water for part of their lives. At some point larvae switch physiological gears, change from aquatic infants to terrestrial juveniles, and move out onto land. Under this scenario water is the key, both as a breeding site and as an environment for young to grow and mature. Water is water, right? So pretty much any water will do, eh? Ah, but not so fast, salamander boy.

Believe it or not (you knew this was coming)—“NO, not all aquatic habitats are created equal.” Wetlands that are “good” for bullfrogs are not suitable for spadefoot toads, and a marbled salamander would only be caught dead (literally) in a pond that is great for sirens. The bottom line is that within the category of “seasonal wetlands” there are subcategories based largely on the wetland’s average hydroperiod, and different

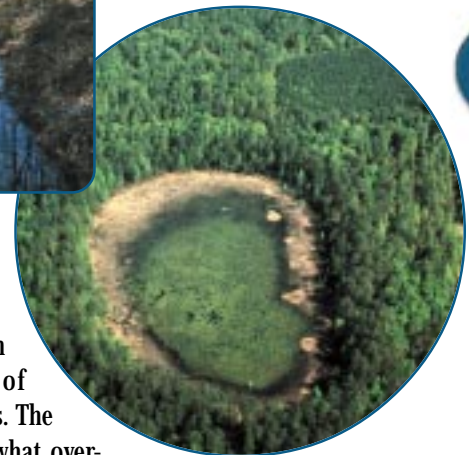
suites of amphibian species prefer different subcategories of wetlands.

The presence of fish

Aside from hydroperiod, the other key component affecting amphibian well-being is the type of predators in the



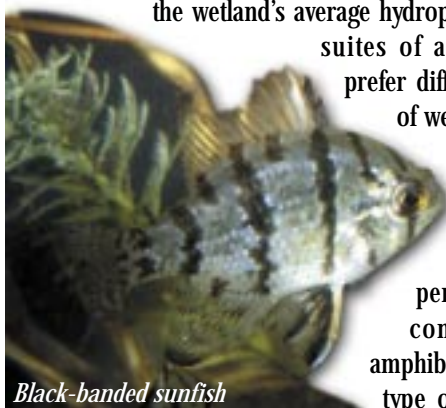
Wetlands range from permanent ponds (above), to short-lived roadside ditches, to seasonal wetlands like Carolina bays (below) that may hold water for many months in some years and remain relatively dry in others.



wetland. With only a few exceptions, fish are the bane of most amphibians. The equation, somewhat oversimplified, is straightforward: POND + FISH = NO AMPHIBIANS. It is puzzling that so many backyard wildlife guides suggest building a small wetland to enhance the diversity of backyard critters, and then suggest stocking those wetlands with fish that would chow down on that very same diversity. The evolutionary reason that so many amphibian species prefer seasonal wetlands is because wetlands that dry frequently usually do not contain fish. Yes, there are exceptions, such as bullfrogs and newts, which can survive with fish. And yes, fish occasionally even inhabit seasonal wetlands, if they are of the more permanent variety. But again, let’s look at the big picture. For example, on the Coastal Plain of South Carolina, an area of high diversity of pond-breeding amphibians, more than half of the 40 or so amphibian species that require “pond” habitats show a strong preference for fish-free waters. There is absolutely no doubt that the maintenance of amphibian diversity hinges on the

A diversity of wetlands on a landscape promotes a diversity of amphibians.

Seasonal wetlands are especially important for many amphibian species.



Black-banded sunfish

preservation of remaining seasonal wetlands.

Protected wetlands?

Unfortunately for the amphibians and other species that need seasonal wetlands, these wetlands are not well protected. Scarcely a congressional session goes by when there is not a proposal to reduce what little protection already exists, usually by redefining what a wetland is. So would it matter? If we were to destroy all small, seasonal wetlands—the final blow to those remaining wetlands beyond the 50-90% already destroyed in many states—who would notice? Well, the amphibians would, both directly and indirectly. When small wetlands are destroyed, the local populations of plants and animals are eliminated. And with the passing of every tiny wetland and its associated fauna, other nearby amphibian populations become increasingly separated from one another, making it more difficult for populations to recover from disturbances of all kinds, including natural events such as droughts.

So why not just make more wetlands? If we must, for whatever progressive reason, eliminate a few seasonal wetlands here and there, why not just dig a big one elsewhere? Or build additional small wetlands in places more in line with our aesthetics and economics? The answer to the first question should be obvious at this point. One 10-acre wetland and ten 1-acre wetlands do not sum to the same amphibian community. On the question of construction of

small, artificial seasonal wetlands, the future may hold promise. The problem is that it is no easy task to make a truly “natural” artificial wetland from scratch—it may be impossible. Yes, in many cases it is easy enough to *restore* what once was a wetland back to its original wetland state. But to *create* a wetland where there never was one...well, it is more likely you'll end up with a fast-drying puddle or a permanent pond, rather than a functional seasonal wetland. Perhaps we could attempt to construct new wetlands to supplement those now existing, but we certainly shouldn't consider replacing natural wetlands with our feeble attempts. Brain surgery and rocket science are far more simplistic than ecology, for we are not even close to understanding the complexities of Mother Nature.

And another thing...

The ecology of amphibians presents an additional layer of complexity when it comes to understanding wetlands and habitat needs. Many amphibians exhibit what is known as a “complex” life cycle, similar to many invertebrates, in that the young undergo a dramatic transition (a metamorphosis) into subsequent life stages. In amphibians this means going from aquatic tadpoles or larvae to terrestrial frogs or salamanders. So what about the terrestrial needs of pond-breeding amphibians? Even though we may call them “pond-breeding amphibians,” a more apt name might be “woodland-for-9/10-of-their-lives-except-for-a-brief-period-when-they-are-pond-breeding amphibians.” After metamorphosis many pond-breeding

One 10-acre wetland and ten 1-acre wetlands do not sum to the same amphibian community.

Many amphibian species can reproduce successfully only in fish-free, seasonal wetlands.



Spadefoot toads



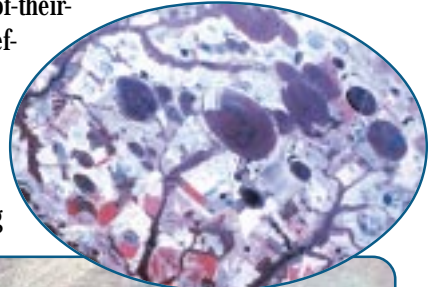
Tiger salamander



Ornate chorus frog



Marbled salamander



Remaining seasonal wetlands are often isolated from one another (as shown in the upper aerial photo), increasing the chances that populations using these wetlands will be unable to recover from natural or human-induced disturbances.

amphibians return to water for only a month or less out of the entire year. A corollary of this biology is that these “wetland” species need habitat adjacent to the wetland. At present, very few state regulations stipulate that the boundary of a jurisdictional wetland extend beyond the high water mark. Without simultaneous protection of the upland habitat, sometimes several hundreds of meters beyond the high water mark, many amphibian species could not persist even if the seasonal wetland itself is left intact. Using ecological fact rather than politics as a decision-making tool would lead one to revise the definition of a wetland to include much more, rather than less, acreage, and not just the water itself.

Terrestrial habitat surrounding wetlands is critical to many amphibian species.

If it holds water, keep it

It is unfortunate that wetland policy and legislation are often politically driven rather than biologically based. If decisions were based on the best ecological knowledge, then it would be a no-brainer that small, isolated wetland depressions, no matter what the name or size or how long they hold water, would remain undisturbed because of their value as critical breeding sites for many amphibians. In this fantasy world of rational decision making, small wetlands of only a few acres or less (which in some regions may collectively total 50% of a landscape’s total wetland acreage) would not be filled or drained or separated from one another by unsuitable habitat. Seasonal wetlands, in conjunction with all other wetlands across a landscape, provide a varied habitat through space and time that enhances biodiversity. Without seasonal wetlands the amphibian diversity and our natural heritage in every region of the country will suffer.

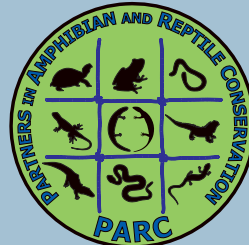
Many amphibian species depend not only on seasonal wetlands, but also on the surrounding terrestrial habitat.



Seasonal wetlands in a South Carolina woodland habitat (top) and in the mountains of Wyoming.

For an answer to the question “Why protect small seasonal wetlands?” we should just ask the frogs. The answer would come in a resounding chorus (in five-species harmony) of “Listen to me when I talk to you—ribbit—’cause you’ll miss me when I’m gone.”

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