

The Indiana Landscape

When we think about what defines the natural landscape of Indiana and the surrounding Midwest, many of us might first think about forests. Oak/hickory and beech/maple (and /ash before the emerald ash borer!) forests were certainly once pervasive.

For me though, it is about water. The Great Lakes most obviously, our neighbors that hold over 20% of the fresh water in the world. Smaller, but more apparent in many our lives, are the numerous lakes, large and small, that are so common, especially to the north and west. So many of us got to “the” lake for rest and relaxation. By the way, perhaps because I grew up elsewhere, this phrasing has always cracked me up - are we all going to the same “lake”?

The, in town and elsewhere, rivers and streams pervade. We are the Three Rivers city. But the jewels to me are wetlands, those small, often ethereal, aquatic habitats that often fly under the radar, tucked away back in the woods. Today I would like to bring those to the fore, celebrate them, and show you why I think they are so defining, so wonderful, so worth protecting, and what is, or is not, being done about that.

What is a Wetland?

What then is a “wetland”? Defining wetlands is an exercise in semantics, since everyone has their own notion of what wetlands are. However, amongst scientists there is broad agreement on the basic notion. The water in wetlands is still rather than moving. Otherwise you have a river. They are shallow and generally not very big. Otherwise you have like lakes, ponds and reservoirs, or the oceans. Often wetlands only hold water for part of the year, and this will turn out to be one of the more interesting things about them. But - they always hold water long enough to influence the plants that live there – and thus the animals.

There are numerous types of wetlands. “Swamp”, “marsh”, “bog”, etc. Each evokes a vision of the landscape. And emotions – mosquito factory, lost in the swamp, the creature from the bog. And these emotions are generally not positive either. Maybe I can change that a little today.

To highlight a few common around here, we can start with open water wetlands. These might be the most intuitive to Questers. They obviously have water in them – kind of like a shallow pond – and lack trees and shrubs. But most wetlands do have vegetation in them, and that is how they are classified. “Marshes” are areas dominated by species like cattails. We scientists would refer to these as emergent wetlands because cattails and such species “emerge” from the water. These don’t need to be very big, though some cover vast areas. Large forested wetlands are commonly referred to as “swamps,” though forested wetlands can also be quite dainty. They can also be dominated by shrubs rather than tree. Yet another kind of wetland important in our area is the “fen.” Fens are alkaline instead of acidic like bogs, and fed by water seeping out of

the ground instead of surface runoff. They are alkaline because the water is seeping through ancient shellfish beds. These delicate habitats have an assortment of unique plants and animals. There are many other kinds of wetlands, but there is an introduction for you to their variety.

Many Wetlands are Seasonal

A detail about many wetlands is that they do not hold water all year. They are seasonal, or ephemeral. While to some this would put into question if they are worth having at all, it turns out to be the very reason why they are so valuable for a wide variety of plants and animals – they have no fish! Fish can be voracious predators of the eggs and larvae of many species, to the point that permanent wetlands lack the variety of wildlife held in seasonal wetlands. Most endangered species of reptile and amphibian in Indiana are dependent upon seasonal wetlands for reproduction. Add fish into a wetland, and a large number of species disappear.

Our wetlands are vernal – they fill in the spring. In the winter they may look just like part of the forest floor, but by March they are full. Over the summer they take on the look you would expect of a wetland, and teem with plants and animals. Then, depending on the year and the wetland, they dry out again.

What good then is a “wetland” that is dry for half of the year? It turns out that numerous organisms have life histories that are adapted to this wet/dry cycle. We can use the Wood Frog as an example, and follow its life history over the year. In early spring, the Wood frogs converge on seasonal wetlands, mate, and lay thousands of eggs. Soon the tadpoles are swimming about, and by mid-summer they are beginning to metamorphose, and, if they are lucky, by the time the wetland dries out they are mini-frogs wondering around the woods.

Why Do We Have So Many Wetlands?

Northern Indiana, especially to the north of Fort Wayne, certainly has a lot of lakes and wetlands, and of many types. Why is that? To understand our landscape, we at least have to go back to the last Ice Age. As recently as 10,000 years ago, most of Indiana was covered in a massive ice sheet, often thousands of feet thick. Massive tongues of ice protruded southward from what are now Lakes Michigan and Erie, and then down from central Michigan. They covered almost everything, churned the soil, and certainly did not allow plant or animal any toehold on which to eek out an existence. As the glaciers expanded, they acted like giant bulldozers, smoothing everything in their path, and grinding soils into smaller and smaller particles. As a consequence, the ice of glaciers is actually a mix of ice and soil.

With respect to our focus on wetlands, things get interesting when glaciers recede. Receding glaciers are melting glaciers. As they melt, they drop in place whatever they are holding. This mess is called glacial till and it is a hodge-podge of whatever is in the glacier. If they temporarily expand again, they push the till forward. Otherwise they just leave it behind. Piles of glacial till are called moraines. Glaciers can also have streams flowing under them. Such streams leave

their own piles of soil, called eskers. The important wetland outcomes are that the terrain has variability that can provide basins for water to be retained, and clay soils that resist drainage. Glacial till can also hold huge chunks of ice. When they melt, the space they occupied can become lakes and a variety of other aquatic habitats, including wetlands.

This behavior also explains the landscape around Fort Wayne. The Fort Wayne Moraine holds the St. Joseph and St. Mary's Rivers to the west. They merge and flow east in now downtown Fort Wayne where the moraine blew out during the Maumee Torrent. But that is a story for another day.

In the shorter term, beaver continue to engineer their own wetlands. Their dams create ponds and wetlands. And when they fail, the aquatic habitats they started continue to evolve. In fact, all aquatic habitats change over time. Wetlands, by their nature, are doomed to disappear. Any depression is going to accumulate sediment, and dying vegetation. Lakes become open water wetlands, which become emergent wetlands, which become forested wetlands, which become very good soils for farming. And so it goes.

The Downsides of Wetlands

I would like to dwell on the positives of wetlands, but why don't we start with the negatives, or at least the perceived negatives. I figure that if we can get you away from thinking of them as stinking mud pits producing endless squadrons of mosquitoes, then maybe you will be more receptive to the positives!

So let's get mosquitoes addressed first. Yes, there are mosquitoes around wetlands, but no, wetlands are not mosquito factories. In fact, areas with healthy wetlands have fewer mosquitoes than those without them. The reasons for that relate to predators. In a healthy wetland, a wide array of predators, ranging from dragonfly nymphs, to spiders, to bats forage voraciously on different life stages of mosquitoes.

Furthermore, the species of mosquito that use wetlands tend to be species that do not carry human diseases. The primary culprits for disease transmission are what you would call "house" mosquitoes such as *Culex pipiens*. It turns out that these mosquitoes are an anthropogenic feature. That is, they flourish because of our behaviors which promote stagnant water in our own yards. Clogged gutters don't have any mosquito predators in them, and so the insects do amazingly well.

The biggest challenge from wetlands is that they are wet. If you don't want to get wet, don't go into wetlands. Pragmatically, wetlands occupy the surface of ground that we might use for something else, like agriculture. This is true. But I will also point out that the reason the ground underneath that water is so good for farming is that they were wetlands in the first place. When you go, just wear boots.

On the Value of Wetlands

One of the greatest challenges for me professionally is to encourage the valuation of nature that is not instrumental. Unfortunately, many of us only place value on things in an instrumental sense. What it can be sold for. I am frequently asked, for example, "What good is it - for us?" But *Girl with a Pearl Earring* or *The Kiss* are not only valued for sale price. Yes, a work of art can be valuable if you sell it, but it is also valuable intrinsically, is it not? To view, or, even if you never get to see it, hold it as a treasure?

That is how I feel about wildlife and landscapes, including wetlands. They do have instrumental value, but also hold the intrinsic value of a work of art. Denali National Park is a wonder to be protected even if I never go there. Wetlands are wonderful, especially when intact.

Wetlands and their residents can be exquisitely beautiful. As I described earlier, they are also amazingly diverse. And with that diversity, wetlands also provide wildlife habitat for some of our most interesting, and imperiled, plants and animals.

Amphibians and reptiles reach some of their greatest diversity in wetlands. Most imperiled reptiles and amphibians in Indiana are dependent upon them. Salamanders like the Eastern Newt, with the handsome Red Eft stage. An array of frogs, including weirdos like the Eastern Spadefoot Toad. The Eastern Massasauga, our little rattlesnake and the only venomous snake in northern Indiana, is fond of fens. The copperbelly watersnake haunts emergent and shrub/scrub wetlands. Turtles like Blanding's Turtles and Spotted Turtles are also dependent upon wetlands.

Less obvious, but more diverse, are the wetland invertebrates. Dragonfly larvae, caddisflies, snails and spiders are all in great abundance for those who stop to look.

Birds of all stripes are not only abundant, but also often obvious. Many are small, like the Prothonotary Warbler or Common Yellowthroat. Others are quite large, like Sandhill Cranes and herons.

Wetlands also provide a variety of ecological services. Some of these are for wildlife, and some of them are very helpful to us directly. A lot of our avian summer residents spend the winters as far south as South America. When they return, both neotropical migrants like warblers, and waterfowl like ducks, geese and shorebirds rely on regional wetlands as stopovers, if not summer habitat, as they head north into Canada and even the Arctic. Wetlands in our area are critical for the Mississippi Flyway, one of the principal aerial highways in North America.

Wetlands provide ecosystems services because of what they capture in their basin. Most obviously, they capture water. Surface runoff has to go somewhere, and wetlands can have an impressive capacity to store it. Removal of wetlands means that water more rapidly travels downstream. Wetlands slow the flow of water and protect places like downtown Fort Wayne from flooding.

Of course, anywhere the water goes, so goes whatever is in it. Sediment from surface runoff settles in wetlands, and pollutants is held in vegetation and the soils before the water continues further. When wetlands are removed or otherwise compromised, they cannot provide these functions, and pollutants travel directly into streams.

Wetland Threats and Protection

It should be clear now that wetlands have both intrinsic and instrumental value. However, wetlands continue to be degraded and disappearing. Over 90% of our historic wetlands are gone. Our large regional wetland systems like the Black Swamp and the Grand Kankakee were successfully drained long ago. Allen County was once approximately 20% wetlands, and area about the size of Fort Wayne. That percentage is now about 3%. Consequently, it is important to save and restore what we can.

It turns out that wetlands are not very well protected, and what protections they have had are being eroded. Ultimately, the lack of protection for wetlands is a classic example in the ebb and flow of conservation policy.

Wetlands are protected federally under the Clean Water Act of 1977. The Clean Water Act came to us on the same wave as the Endangered Species Act, the Clean Air Act and others as the nation grappled with environmental degradation and other challenges like the Vietnam War.

To better understand wetland protection, we need to better understand the Clean Water Act. The intent of the Act was to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and nonpoint pollution sources, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. It has been very successful at helping clean our waters, and at least initially slowed wetland loss.

Federal jurisdiction for the Clean Water Act is the Commerce Clause (Article 1, Section 8) of the Constitution, which allows for laws to protect rivers as a common good. The protection focuses on navigable waters, the "Waters of the United States," given their historic utility as transport corridors.

Protecting wetlands from pollution makes sense, given that what goes into a wetland will eventually get into a tributary, which will eventually get into rivers. However, many of the most wonderful wetlands are "isolated," without obvious surface connection to rivers, and as such, are not "navigable."

Anybody who cares to look will understand the underground connectivity of isolated wetlands to other aquatic features, including, by the way, the subterranean aquifers many rely on for drinking water. But if you do not want to protect wetlands, you can conveniently ignore that. And that is exactly what has happened. Argument over the Waters of the United States has

gone back and forth for years, and presently they only include navigable waters and immediately adjacent wetlands. Isolated wetlands are no longer included.

When federal law does not address an issue, or leaves verbiage up to interpretation, it is up to the states to decide what to do. So wetland protection therefore falls to the states. In a state like Indiana, there is little appetite for impeding development, and so wetlands are not a high priority. Presently, only the most pristine wetlands are conferred protection, and our legislators are actively trying to degrade the protection of those.

I do hope I have convinced you that wetlands and the wildlife that live in them are wonderful. And if we don't care about that, then we should at least value the ecosystem services they provide. They deserve our protection, and I hope that the ones that remain can be protected, and that we can restore as many as possible.

Let's not "Drain the Swamp" when it comes to our wetlands.