

*Amphibian population estimates and ecosystem assessment on the Durango Nature
Studies property.*

Durango Nature Studies is a nonprofit organization dedicated to preserving local plant and wildlife in Southwestern Colorado. It is located half an hour from downtown Durango, near Ignacio, Colorado. It is used not only as a preserved habitat, but also as a learning environment for kids in any grade, from preschool to college. It was obtained and created into Durango Nature Studies Nature Center in 1996. A small pavilion was built on the small property along with several bridges and many hiking trails. The property is 142 acres and is located on the Florida River. The dirt trails lead the way to an iron bridge, which takes you to across to a stem of smaller trails. The pond where the frogs inhabit is a couple hundred feet from the edge of the bridge, and is roughly 200 feet long. Native flora surrounds the pond letting the animals living on it be in a more native habitat. But there lies one problem in the boundaries of DNS. Invasive species, bullfrog.

Bullfrogs (*Rana catesbeiana*) are taking over many other plant and wildlife habitats quickly due to their reputation for being an invasive species. Invasive species are certain living things that are not native to a particular area, and take over the land from the former natives habitat. This is an issue in the world due to these invasive species. Many rare animals and plants are being forced out of their habitats to make room for the ever growing invasive aliens, such as the bullfrog /leopard frog problem in Colorado. Which in turn makes them become extinct in their local habitat. And a chain of events will happen where the habitat will eventually give way to the invasive species.

A native Colorado species found near Durango, and in the boundaries of Durango Nature Studies, is the Northern Leopard Frog (*Rana pipiens*). The bullfrog is pushing this Coloradan native out of its home quite literally. By the bullfrog moving into the northern leopard frogs habitat, it is taking the leopards frogs home away. Since the bullfrog is a naturally aggressive animal, it will use its strength and power over the weaker animal (i.e.: the leopard frog) to get a more comfortable home. The bullfrogs tadpoles are even as aggressive as the adults pushing the leopard frogs offspring out of the safer areas and into the open, where they are open game. The bluegill fish (*Lepomis macrochirus*) is a natural predator of the leopard frog, and will eat them when given the chance. So in a cause in events, when the bullfrog pushes the leopard frog out of its nesting hole, it forces it to live out in the open, where the bluegill will hunt and prey on the helpless leopard frog. This causes the leopard frog population to decrease faster than it should be. The status on the northern leopard frog in Colorado is currently in *State Special Concern*.

In order to gather information about the habitat at Durango Nature Studies, several steps had to be conducted. First, four pitfall traps, a trap designed to enclose an animal in a five gallon pit dug into the ground, had to be set up. Two were placed near the river, and the other two near the pond. This causes the animals to fall into the pit so they can be identified and marked. The frogs were also captured by hand and by net directly in the pond. This was conducted with four classes during the four day session. Pink elastomer, a harmless bright pink latex solution, was injected into the right hind leg of each frog to help identify how many frogs were caught in one hour of the 4 day session. Three frogs were captured and marked during this session. A recapture session was issued the next day to capture the already marked frogs, and one was caught that was actually marked, while 4 without a mark were captured. This shows that the population of the

Leopard frog is at 15 total.

Water chemistry was important to include, to see how the Durango Nature Studies habitat was holding up. several tests were run to check the nitrate levels, how many phosphates were in the water, to check the acidity levels (pH levels), to check for choloform levels, and to check temperature to compare to previous years. Oxygen was dissolved into water samples to check for the amount of oxygen in the water. One square meter vegetation plots (Veg Plots) were taken on the land to check for the diversity of flora. Four random veg plots surveys were conducted each day of the session.

Macroinvertebrates were collected in the pond and the river to see the diversity of insects in the area. Macroinvertebrates are incredibly small insect larvae that settle in the mud and sediment that are found at the bottom of ponds, lakes, and rivers. They were collected in the pond by the 'kick method', which is where one person kicks up the settled mud at the bottom of the pond and another shoves a net down into the water to pick up the floating macroinvertebrates. In the river, the method used was the 'dip method' where a large net shaped like a pyramid (called a dip net) is thrust into the bottom of the river. The macroinvertebrates were then preserved in an alcohol and water solution to be counted later.

Dangerous nitrate levels rise up to 40 ppm, while the normal levels are at 4 ppm, the levels found in the pond were at 6 ppm and the river was at 10 ppm, ranging them at a relatively normal levels. The phosphate levels found in the pond *and* the river were at a significantly high level, both reaching levels of 4, which is a 133% rise in phosphate levels from their normal levels. Dissolved oxygen tests were taken and it was found that the oxygen levels in the river were perfectly normal, however the oxygen levels in the pond were relatively low, reaching a

maximum of one, which is two-thirds the normal levels.

Phosphates are nutrients that occur naturally in food, plantlife, and water. And the reason to test for phosphates is to see if there is human, or other animal, waste ending up in the water. If there are too many phosphates in the water then it makes algae grow rapidly which takes other nutrients and precious oxygen that the animals and insects need to survive. Nitrates are tested in the water to make sure the living organisms are not swimming in *their* own waste. Nitrites have a similar effect on the ecosystem, by depleting the oxygen and creating more algal growth in the water, due to the waste that is not being broken down. The pH levels in the pond were fairly high, reaching a level of ten, which is the basicity of the Great Salt Lake. The levels in the river were at a level of 8, which is at a relatively normal level. Dissolved Oxygen is the run off oxygen that goes into water from plant matter and roots. This settles throughout ponds, lakes, and rivers, allowing living organisms, such as frogs and macroinvertebrates, to survive under the water for a longer period of time.

This information shows that the amphibian populations are slightly higher this year than past years. The leopard frog populations are at 15 this year, which is 3 more frogs than last year. There has been a decrease in bullfrog population this year too. Last year two bullfrogs were caught, and this year only one was found. This shows that the leopard frog will have a better chance at surviving this year than previous years. The water quality in the pond where most of the frogs live is at a more dangerous level than it should be in certain areas.

Trace amounts of fecal matter were found in the pond *and* in the river, which brings about the matter of how it got into the water sources. In the Florida river, there is a possibility of farms upstream that could have their livestock excrementing into or near the water source. Another

possibility is that factory waste and runoff have found their way into the water sources which went downstream. A possibility for the pond testing positive for coliform is that the nitrates (i.e: waste) that are released by the amphibians and fish in the water are not being broken down quickly or efficiently enough. This could result in algal blooms in the pond, and would ultimately result in the dissolved oxygen levels to start going down, which would cause the ponds habitat to die off. Currently the pond is at a risk of an algal bloom, as the phosphate levels are incredibly high. If this happens then the Durango Nature Studies pond will not be able to sustain very much life, if any at all. Adding heavy duty biological filters (i.e nitrifying bacteria) will help clean the waste matter out of the pond and will help the growth of nitrifying bacteria. The river, however, is at a more healthy level than the pond. The pH levels are relatively normal, the nitrate levels are little higher (ranging at 10 ppm), and the dissolved oxygen levels are at a perfectly normal level. The only worry there should be for them to add biological filters to the pond, which will help the growth of the nitrifying bacteria that grow on the bottom of the pond. The river is a different story, it has fairly natural levels of everything, except its phosphate levels. There is a high chance of algal blooms in the river also, if this happened the river's oxygen levels will go down, and there will be less organisms that will be able to sustain themselves in the river.