Wisconsin Brook Trout:

Facing A Changing Climate

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Climate Change Effects on Brook Trout

Industrialization that began in the early 1800's was a huge technological leap for man, but the beginning of a harsh punishment for nature. As industrialization became popular, so did deforestation, land development, and mass pollution. When arising problems in nature became evident, conservation groups were formed and regulations were set in place, but even today, factories haze the skies with gaseous bi-products, automobiles smog the oxygen we breathe with exhaust, and the land on Earth that was once dominated by forests is now home to man and his enterprises. Because of the neglect that the environment has experienced, animals' homes and nature have been destroyed and global warming is occurring as a result of climate change. Based on studies performed by NASA, "Ninety-seven percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities," while 100% of national science professional societies agree that humans have contributed to what is now referred to as "global warming," which is becoming a worldwide problem. One of the animals experiencing the wrath of climate change is species *Salvelinus fontinalis*, or more commonly known as, the brook trout.

According to studies performed by Terrance Dehring and Charles Krueger of Madison, Wisconsin's Department of Natural Resources, the brook trout are freshwater fish native to northeastern North America. They range from Minnesota to the Hudson Bay and along the Lake Michigan shoreline of northern Sheboygan, WI. Although many species of stream trout exist in

Wisconsin, the brook trout are the only native ones. Besides living in streams, they are also found in lakes that have clean and highly oxygenated water with temperatures of 53-57°F (12-14°C). Their diet consists mainly of insects, crayfish, leeches, and other small fish while their predators consist of sea lamprey and other fish larger than themselves.

The biggest threat the brook trout are facing in Wisconsin today is a warming climate. The Wisconsin Initiative on Climate Change Impacts (WICCI), based in Madison, WI, was created in 2007 by the Wisconsin Department of Natural Resources. Daniel Vimont is one of the Science Council members and also the Co-Chairman of the WICCI who has provided an overview of current, and likely future climate changes across the state. According to research, "Our state has become warmer and wetter over the past 60 years" (Vimont). From 1950-2006, Madison scientists found that statewide, Wisconsin's average temperature rose by about 1°F, with the northwest part of the state warming the most. "Although 1°F may not seem like much," as described by Vimont, "it coincides with a number of effects." These effects include shorter time periods for ice cover on lakes, shorter migration seasons for birds, longer blooming seasons for plants, and a 2.5-4.5°F average temperature increase during the winter season.

By 2055, the statewide average temperature is expected to increase anywhere from 4-9°F, leading to warmer winters and many more summer days exceeding 90°F (Vimont). This is where the problem for brook trout begins.

As mentioned earlier, brook trout thrive in water temperatures ranging from 53-75°F. If temperatures rise and stay above 90°F by 2055, the bodies of water that house the brook trout will warm up as well. John Magnuson, a college professor who teaches ecology and limnology

at UW-Madison, explains that brook trout require “specific thermal requirements…in which the mean summer daily water temperature does not exceed 72°F…High temperatures limit reproduction.” Even though the trout themselves may not be in immediate harm, their offspring will be. If temperatures rise above 72°F, then the successful reproductive rate will fall for every increase of a degree. Magnuson’s study shows that an increase of 1.4°F will result in a 43.6% decrease in the current brook troutpopulation, a 4.3°F increase will result in a 94.4% decrease, and a 7.2°F increase will result in a 100% decrease.

Although climate change is proving to be a major threat to brook trout, humans are trying to restore their numbers. According to Dehring & Krueger, a stocking program, started in 1967 stocks 200,000 brook trout into Lake Michigan every year. These brook trout are all spawned in October in a carefully executed spawning program at the St. Croix State Fish Hatchery. The fertilized eggs are then shipped to other hatcheries for incubation in which the eggs hatch after about 75 days in 48°F waters. The young are raised in the hatcheries and then released into Lake Michigan as fingerlings or yearlings.

Another step that scientist have taken to help the brook trout involves the hybridizing them. “Male brook trout are crossed with female lake trout form the Apostle Islands to produce a fertile hybrid known as a splake” (Dehring & Krueger). Likewise, “Brook trout can also be crossed with brown trout to produce what is called a “tiger trout” (Dehring & Krueger). The hopes in crossing the brook trout with the other two types of trout are that they will become more tolerant of higher water temperatures thus improving their successful reproduction rates and adapting to a warming climate to avoid extinction.

In conclusion, the future of brook trout in Wisconsin does not shine brightly. Unless they can undergo successful reproduction through hybridization, the warming climate will likely wipe the brook trout out of Wisconsin waters. Unfortunately, brook trout are not the only animal facing this issue. Many other animals are dying due to a changing global climate caused by humans. If we cannot find a quicker solution to the problem that we have created, then we should prepare to experience a large loss in precious life on Earth.

Works Cited

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