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The # 8 Most Endangered River in America: The Neuse River

Imagine area streams and rivers choked by putrid-looking algal blooms. Imagine fish and other wildlife dependent on those waterways dying because the algae removed much of the oxygen from the water or because the water is choked with too much nitrogen or phosphorous. Imagine plastic bags and six-pack rings suffocating the birds who call the banks of rivers home. This is an everyday reality for the #8 Most Endangered River in America: The Neuse River. This nightmare has become a reality because there are over 400 permits given to dump waste in the Neuse River. Not only is the waste dumping a problem but run-off areas contribute largely to the pollution. Every single day, more than 100 million gallons of wastewater are dumped into the river. This is at least a 650% increase since 1950 (Bartholomew 1). In this paper, I will discuss the major concerns and factors that contributed to placing the Neuse River on America's top 10 Most Endangered Rivers list.

The Neuse River is nearly 2 million years old and it begins flowing where the Eno and Flat Rivers converge. The current of the Neuse moves fast for about 150 miles and then, once it reaches the western side of Craven County, North Carolina, it becomes a slow-moving, brackish estuary for about 40 miles before emptying into the Pamlico Sound. The Neuse is a vital part of a large and important estuary, the Albemarle-Pamlico Sounds. This estuary is reported to be the most important fish nursery in the country. Due to the pollution that is dumped into this river the fish usually never make it out of this estuary to the ocean or sounds (Dove 1). In the Neuse River fish are seen lying on the banks, belly up. These fish kills occur around mid to late summer and vary with rainfall, salinity of the water, temperature, and water circulation. Fish kills have happened amongst the river long before people littered its banks because it is part of a

normal river's life (Spivey 1). But despite the normality, the fish kill of 1991 took nearly a billion lives between Minnescott Beach and New Bern. In 1995, nearly 20 to 100 million fish were killed. In 2003, runoff took the lives of 4 million fish in the Neuse River (Dove 2). So what has caused the Neuse River to suffer more fish kills than any river in this country?

In the Neuse's most important estuary, a killer organism *Pfiesteria* commonly known as the Loch Neuse Monster, has taken the lives of many fish. *Pfiesteria piscicida* is one of the 55 dinoflagellates that are poisonous; its appearance resembles an alga but in fact it acts like an animal that paralyzes and kills fish. It can kill in ocean water or fresh water but it is deadliest in brackish water. It lives in the sediments at the bottom of the water and it undergoes at least 19 different stages. Once it senses fish and other prey, it uses its two-tails to stun fish with a neurotoxin and then eat into them (killing stage). Fish attacked by the organism usually have sores (about the size of a quarter) and a ravaged anus (a good target) when found dead. The organism reproduces sexually and dies within 24 to 36 hours. Grotesquely, it reproduces inside the host fish. While feasting on the carcasses they can camouflage themselves as colorless amoebas. They also have the ability to look like a plant feeding on chloroplasts and algae. Pfiesteria lives in temperate/subtropical regions this means that the Neuse is the perfect place for the organism (Boyle 1). This dinoflagellate has been linked to 18 fish kills in the Neuse and Pamlico Rivers. *Pfiesteria* thrives on sewage, industrial and farm pollutants, livestock wastes and urban runoff that drains into waterways. Other theories for increasing outbreaks include the ships that dump algae-filled ballasts, El Nino, and drought (Kanamine 1). People of NC are frightened because the organism is attacking one of the most important economic resources of the state.

Increased phytoplankton caused by nitrogen enrichment may be a nutrient source for *Pfiesteria*. Nitrogen loading in the Neuse has increased 30-50 percent in the last 20 years. This is due to human and industrial waste being dumped directly into the river. 75 percent of the nitrogen loading comes from runoff from fertilized lawns, farmland and emissions from car exhaust, animal waste, and the industry. A third of nitrogen in the Neuse comes from the atmosphere. This is because we are downwind of a lot of agricultural, industrial, and fossil fuel emissions. In North Carolina, a law has been passed to reduce nitrogen put into the river from humans by 30 percent (Spivey 2).

Pfiesteria can also affect humans, causing loss of memory and grotesque sores on the body before the organism goes into hiding. Humans that are exposed to the organism can have "respiratory distress with asthma-like symptoms, severe stomach cramping, nausea, eye irritation and blurred vision (lasting for days), irregular heart beat (weeks), reversible short-term memory loss (weeks) and, reversible cognitive impairment (weeks)" (3). Divers, fishermen, and marine contractors are known to have developed sores similar to the fish (Boyle 3). It is important to study the health of fishermen and others who work in North Carolina's estuaries, which are prone to fish kills. As fish kills occur the health of the workers should be monitored.

Another factor that contributes to fish kills is the lack of oxygen in the Neuse River. It is likely that many fish kills happen due to low levels of oxygen in important parts of the Neuse. The fish kills that happened between 1994 and 1997 all occurred at times when oxygen was depleted in these areas. Algae buildup is the main cause of oxygen deficit. Blue-green algae sinks to the river bottom and dies, where the bacteria decomposes it. Oxygen, which is vital to fish survival, is used up in the decomposition. Hypoxia is water with oxygen levels below 5;

where anoxia is water with no oxygen at all. These types of water can severely stress fish, which make them more vulnerable to disease and infections. The more serious type of water (anoxia) can kill fish in just a few hours. Neuse River Estuary Modeling and Monitoring project team collects data about the water and sediment in the estuary. It is only a year and a half old program and it is beginning to show patterns between fish and other animals and oxygen levels. Weather can also affect the river by sloshing the low oxygen water from the bottom, up against the bank. When scientist arrive at a kill site, water low in oxygen may be gone (Spivey 1-4).

North Carolina's hog industry is the second largest in the country (17^{th}-5 years ago), this factor also contributes to Neuse River pollution. Our state ranks 43^{rd} or 47^{th} for spending on environmental programs when it is the worst state for polluting its rivers with toxic discharges (Mulvaney 2). Waste from hog farms and other animals are being dumped into our river. A typical type of disposal system is being widely used; these hog lagoons are similar to outhouses. These waste pits are filled with urine and feces from swine operations. This waste runs off directly into our rivers because when the waste pits fill they are sprayed onto fields for "crop growth". Nutrient pollution is the main cause of fish kills in the Neuse River. The hog industry creates the nutrients that provide a home for the killer organism *Pfiesteria*. Gases from this industry are having a huge impact on public health especially those living near the hog facilities. A moratorium was passed to stop the further production of lagoons. But despite the efforts, 100 new lagoons have appeared. However, there have been some new technologies developed to attempt to replace the lagoons, but they are not as cheap as lagoons and people refuse to use them. Lagoons could be completely disposed of but NC's industry does not have the financial resources. It is now being considered if our tax dollars could help delete the "hog lagoon" problem (Baldwin 3-4).

North Carolina is taking action. Many companies are starting to be fined for dumping their hog waste into the Neuse. In Snow Hill, N.C., a processing and hog slaughtering company pleaded guilty to violating the Clean Water Act and faces a $500,000 fine. In this instance, a former owner of Lake View Packing Company Inc. bypassed their permitted septic system and installed a series of underground pipes that discharged hog slaughter and processing waste from the kill floor and human waste from their bathrooms into a creek close by. Not only do they get a $500,000 fine but they also face a maximum sentence of five years probation and a $400 special assessment. Contentnea Creek, a tributary of the Neuse River, is where the processing and human wastes were dumped from a drainage pipe into the marsh. According to the EPA, "the waste ultimately reached the Neuse River, and the bypass system was designed so it could be hidden form detection inspectors" (9). This dumping of animal and human wastes can contribute to the growth of harmful micro-organisms and can make surface waters unsafe for drinking and recreation (Johnson 9).

Development along the river has spiked an increase in pollution amongst the Neuse. The population in the Neuse sub basin area has grown a shocking 74 percent in the last 30 years (Boyle 3). Atlantic Beach is overpopulated with homes and buildings and we are now beginning to see a shift to development on the river. This development is contributing to runoff and a larger population will lead to more pollution from lawn fertilizers, car exhaust, and human waste. This will be tragic because the Neuse is used for drinking water by Raleigh residents, provides a nursery for fish, and is a place for kayaking and sailing. Two million people live amongst the basin and sharks, dolphins, alligators, manatees, and the endangered loggerhead sea turtle live in the Neuse River. The new development switching from coastal to inland around the Neuse is

going to make runoff and human sewage a problem more serious than the hog operations (America 2).

North Carolina is also taking steps to defend the Neuse by fining companies who dump their materials and sedimentation into the river. As seen in Oriental, North Carolina, a construction company faces being fined by the state for allowing dirt and rocks to slide into the Neuse River. Prescott Brothers Marine Construction dumped dirt onto land out on Sandy Point Road. The construction company tore down a seawall to build a new one and all the rock went into the River. Roughly 25 to 30 dump truck loads of dirt and rocks were let able to fall into the Neuse River. The Neuse Riverkeeper is concerned about the water quality and he believes that this action is a complete disregard to that. The sediment and debris can cause huge complications with the river and can choke aquatic and vegetative life. The Prescott construction company claims that they will do whatever they can do to reverse the damages they have made. The property is going to be reevaluated to see how much of the rock and dirt is sinking into the river. The construction company is facing the probability of being fined for violating water-quality-compliance standards. If it rained after all this rock and dirt is dumped in the River it could turn into a big mud pile and make an even bigger mess (Tessnear 1-2).

In some areas, like the Triangle area, pollution is already widely affecting human and aquatic life. Here, residents are being warned to limit their consumption of certain fish found amongst the Neuse. Contamination has spread to catfish and carp. Fish from these waterways are showing high levels of PCB's. PCB's can cause health problems in people who consume these fish often. They can increase a risk of developing cancer, infections, and skin problems. Pregnant or nursing women who eat the fish carry the risk of having children with learning deficiencies. PCB's were once used for coolants and lubricants in electrical transformers.

Although, PCB's have been disused since 1977 they can still be found in old transformers, or former transformer sites. Some fish are now even being reported with high levels of mercury. Some of the fish on the state's high mercury list can be found in the Neuse River including catfish. Eating fish contaminated with Mercury can cause huge health problems. Mercury affects nerve cells in the brain and spinal cord (especially in babies and children). It can effect the way children think, learn and problem solve when developing later in life (Tainted 1-2).

Locals of the Neuse River are striving to end pollution on their home front. There are plans to recruit hundreds of new volunteers for the recently started programs "Riverwatch" and "Muddy Water Watch Citizen Patrol." The volunteers for the Riverwatch Program will be held responsible for analyzing violations against the Clean Water Act, examine complaints of fish kills, and observe the water conditions of the Neuse River Basin. The volunteers of the Muddy Water Watch Program will report on violations of erosion-control and sedimentation from construction sites located amongst the Basin. The Riverkeeper responsible for monitoring the Neuse from Goldsboro to Raleigh is Larry Baldwin. He notices that stormwater runoff and hog waste is the main concerns for the river. Around the Neuse River Watershed two million hogs are producing twice the fecal waste of every resident in North Carolina. In the Triangle area and the Pamlico and Craven waterways, growth is creating sediment and stormwater runoff from the construction sites. The Neuse River Foundation, government, and developers are getting together to minimize this problem. They are also focusing on eliminating hog lagoons and spray fields from the state. (Neuse 1-2).

Many farmers and contractors do not understand that every day they go to work near the Neuse they are endangering many lives. As a resident of the Neuse River area for 17 years, I have seen the health hazards and the fish kills that result from the tremendous amounts of

pollution dumped into our river. I believe that it is important for locals to know that every time they fish in the Neuse they could consume deadly fish infested with *Pfiesteria*. I would like them to know that their children are swimming where over 400 companies and persons dump their waste (Bartholomew 1). Hog farms run waste off into the water that we drink; sedimentation seeps into the river from housing development and contributes to suffocating our fish. Despite this reality, I feel that with much action, we could create a healthy community above and below the water and get the Neuse River of North Carolina off the list of the 10 Most Endangered Rivers in America.

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