Easter Lake & Watershed Fishery Renovation Project

Built in 1967, Easter Lake is about 178 acres and has a watershed area of around 6,500 acres. The lake lies within Easter Lake Park owned and managed by Polk County and Ewing Park owned and managed by the City of Des Moines. The lake and park offer fishing, boating, picnicking, walking trails, wildlife watching, and swimming. Park visitation has averaged 390,000 visitors each of the last five years; placing Easter Lake in the top twenty of significant publicly-owned lakes in Iowa.

Over the years, water quality has become poor in Easter Lake. The lake has shrunk from its original size in both surface area and volume. Sedimentation and nutrients have resulted in frequent algae blooms and low water clarity. Elevated bacteria levels in the lake have resulted in swimming advisories.

The Polk County Conservation Board, Iowa Department of Natural Resources, City of Des Moines, Polk Soil & Water Conservation District, Natural Resources Conservation Service, Iowa Department of Agriculture and Land Stewardship – Division of Soil Conservation, and other partners have been collaborating for nearly a decade to restore Easter Lake and its watershed. These partners have met numerous times with stakeholders, citizens, and watershed landowners during public meetings to explain the restoration project; including the eventual need for a fish renovation.

Beginning in 2008, the DNR began working with project partners to reduce nutrient and sediment loads from the watershed to Easter Lake and complete a comprehensive in-lake restoration project. To date, over 200 best management practices (BMPs) have been installed on residential properties in the watershed. Practices installed include urban storm water management practices, construction of ponds around the lake to trap nutrients and sediment, and streambank stabilization projects along Yeader Creek. In-lake work includes shoreline stabilization and deepening, fish habitat installation, removal of excess sediment, and construction of an in-lake silt pond. Additionally, a fish rearing pond was constructed near the lake, the outlet structure of the lake was updated to include a fish barrier to prevent undesirable fish from coming back into Easter Lake, and the gate-valve structure was replaced.

As the project nears completion, one of the final steps involves removing injurious and undesirable fish species (such as Common Carp and Gizzard Shad) from Easter Lake and the watershed. These species have detrimental impacts to aquatic vegetation, the fishery, and water quality. Without this very necessary step, much of the benefit to water quality and lake-based recreation will not be realized.

The Iowa DNR plans to treat the lake and watershed in the fall of 2018 with rotenone, a botanical pesticide, which is the most effective management tool to remove all of the fish from a waterbody or stream. Rotenone is used world-wide and has been since the 1930's. It is a common tool used by fisheries managers for sport fish management, improved water quality, or endangered species management. Rotenone is a naturally occurring compound that is derived from the roots of a tropical plant in the bean family. The Iowa DNR commonly uses the commercially available formulation, 5% Prenfish, which has been approved for fisheries management by the U.S. Environmental Protection Agency (EPA).

The EPA has concluded that the use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans or the environment. The EPA certifies all pesticides based on use according to label directions, which the Iowa DNR is equipped to fulfill these obligations.

Barring any major delays due to weather, the restoration project at Easter Lake is slated for completion in the spring of 2019, when construction will conclude at the lake and the lake will be re-filled. Additional streambank stabilization work along Yeader Creek will likely be completed over the next two years to help further reduce sediment inputs to the lake. Project partners estimate that $15-$18 million dollars will have been invested once all major lake and watershed improvement are completed.

FAQ's

Q. ***What is the nature of the fishery management problem?***

A. Undesirable fish species, such as Common Carp, Grass Carp, Yellow Bass, Black Bullhead, and Gizzard Shad are present in the watershed. These species pose a threat to the quality of the fishery and water quality of the newly restored Easter Lake.

Q. ***Why must the fishery management problem be corrected?***

A. It's important to eliminate undesirable and injurious fish species to ensure water quality and fishery objectives are met following the lake restoration. The watershed (ponds and streams that drain into the lake) and lake must be treated at the same time as they harbor injurious and undesirable fish that will reinfest the lake unless they are eliminated. Without the elimination of these fishes, the improvements of all lake restoration efforts cannot be fully realized.

Q. ***What are the consequences of not removing the undesirable and injurious fish species?***

A. The Easter Lake Restoration Project involves many governmental partners at the Federal, state, county, and local levels, as well as efforts on behalf of local citizens. The total estimated cost of the Easter Lake Restoration Project is in excess of $15 million, with the ultimate goal of restoring water quality, improving habitat availability, rehabilitating angling opportunities, and improving other recreation conditions of the area. Failure to remove these undesirable and injurious fish species will result in the project not meeting goals that are otherwise obtainable.

Q. ***Why is rotenone the best tool for correcting the fishery management problem?***

A. Using rotenone is the only management tool that has been proven to remove all of the fish from a lake or stream. Draining all of the water from the watershed is not feasible and mechanical removal (nets, electrofishing, etc.) is not 100% effective.

Q. ***Aren't there other alternatives than rotenone?***

A. The Iowa Department of Natural Resources utilizes alternative methods of fish removal when practical. However, in many cases, the complete removal of the fish community is a necessary component of lake restoration efforts. Without this ability; improvements in water quality, angling quality, and general user aesthetics will not be realized. Rotenone is the only tool suitable for this function.

Q. ***What is rotenone?***

A. Rotenone is a naturally occurring compound that is derived from the roots of a tropical plant of the bean family. Rotenone compounds have been used by humans for centuries for the collection of food. It has been used worldwide in fisheries management since the 1930's. We would use the commercially available rotenone formulation called *Prenfish (5% rotenone)*. It has been approved for fishery management use by the U.S. Environmental Protection Agency.

Q. ***Is rotenone harmful to people when used as a fishery management tool?***

A. Rotenone is not considered a carcinogen (capable of causing cancer), mutagen (capable of causing genetic mutation), teratogen (interferes with normal embryonic development), or reproductive toxin (affects reproductive capabilities). In order to determine if rotenone applied to Easter Lake and its watershed has any potential for adverse human health impacts, studies have been completed to determine the most likely route of exposure to rotenone and to estimate what this exposure level would be. The most likely route of exposure would be due to incidental ingestion when recreating in the lake. Scientists who have studied exposure scenarios have determined the maximum estimate of incidental ingestion of water during swimming is 40 ml of water per hour for human beings. A person swimming in a lake for 2 hours per day might ingest, at most, 80 ml of water in a day. Scientists have also determined known safe levels of exposure to chemicals based upon animal exposure studies and then applied these studies to human exposures. In the case of rotenone, the EPA has determined that a level of ingestion exposure to rotenone that would cause no adverse human health impacts is 0.004 mg/kg/day (0.004 milligrams of rotenone per kilogram body weight per day). Using the estimated ingestion rate and the concentration of rotenone that Iowa DNR will be using (a water concentration of 200 parts per billion), the highest estimated dose of rotenone a person swimming in Easter Lake would receive would be 0.0002 mg/kg/day. This is an entirely safe level of exposure.

In addition, there really is no opportunity for long-term effects since rotenone disappears within one day to four weeks (depending on multiple factors including temperature and organic content of the treated water). The total concentration within the waterbody is in a constant state of decline from the moment of treatment. No documented health effects have occurred from the use of rotenone in fisheries management. Nonetheless, and as an added measure of safety, the public are excluded from the immediate treatment zone until rotenone concentrations decline to an acceptable level. The U.S. Environmental Protection Agency has concluded that use of rotenone for fish control does not present a risk of unreasonable adverse effects to humans or the environment.

Q. What **is the link of rotenone to Parkinson's disease?**

A. There is no recognized clear evidence that rotenone is <u>casually</u> linked to Parkinson's disease (PD). Certain studies have attempted to reproduce symptoms of PD through the direct injection of rotenone into the brain or intravenously in rats (typically these studies have not attempted to link PD with rotenone use, but rather have attempted to emulate the symptomology of PD). These results are not recognized as applicable to human beings exposed to rotenone at levels used in fisheries management – no one would ever inject lake water into a human's bloodstream.

There has been an epidemiological study that has looked at self-reported PD in a prospective study including 84,740 private pesticide applicators (mostly farmers who used rotenone as an insecticide) and their spouses. This study showed an association of higher incidences of PD in pesticide applicators that used rotenone. There are substantial differences between the methods of application, formulation, and doses of rotenone used in agriculture and residential settings

compared with aquatic use as a piscicide (pesticide to remove fish), and the agricultural workers interviewed were also exposed to many other pesticides during their careers. Recently, the results of epidemiological studies linking pesticide exposure to PD have been criticized due to high variation among study results, generic categorization of pesticide exposure scenarios, questionnaire subjectivity, and the difficulty in evaluating the causal factors of PD.

The potential realistic exposure of humans to rotenone during piscicide treatments, as regulated by the EPA (application rate of rotenone used as a piscicide shall not exceed 200 ppb), is not comparable to the dose required to cause the development of PD symptoms in rodents. Piscicidal use of rotenone degrades quickly, is not expected to contaminate groundwater, and restricts public access to the treatment area during treatment, all of which make an environmental exposure to rotenone highly unlikely to cause PD or PD-like symptoms. For the applicator, the use of required PPE will significantly reduce, if not eliminate, exposure.

Q. ***How will the public and landowners be notified?***

A. The Iowa DNR will provide a press release with information about the treatment. Landowners adjacent to treated water will be sent a mailer or door hanger. Signs will be posted at public access points until concentrations have dropped below prescribed levels, determined by the EPA.

Q. ***How is rotenone applied?***

A. Applications are generally made with boats in lakes, with direct metering into moving water such as streams, and with hand-held equipment such as backpack sprayers in difficult to reach areas. Rotenone may be applied at any time of year, but most applications typically occur during warm months when the compound is more effective and degrades more rapidly.

Q. How safe is rotenone to the public and applicators??

A. Millions of dollars have been spent on research in testing laboratories and environmental monitoring studies to determine the safety of rotenone prior to registration in the U.S. by the EPA and in Canada by the Pest Management Regulatory Agency. Extensive acute (short-term) and chronic (long-term) tests on rotenone have been conducted. Rotenone is not considered a carcinogen (capable of causing cancer), mutagen (capable of causing genetic mutation), teratogen (interferes with normal embryonic development), or reproductive toxin (affects reproductive capabilities). The public will be excluded from treatment areas until rotenone residues have dissipated to safe levels, and applicators are required to wear additional safety gear to minimize rotenone exposure.

Q. ***What happens to rotenone after it is applied to the water?***

A. Rotenone is a compound that breaks down rapidly in the environment. Rotenone degrades quickly through physical (hydrolysis and photolysis) processes and biological mechanisms. An increase in temperature or sunlight increases the breakdown rate of rotenone.

Q. ***How long does rotenone persist in water and sediment?***

A. Numerous monitoring studies have shown that rotenone residues typically disappear within about two days to one month, depending on environmental conditions. The half-life (time required for ½ of material to breakdown) for rotenone varies from about 12 hours to 7.5 days, and is inversely related to temperature. Rotenone is typically applied when water temperatures are warm to optimize effect on the fish and the breakdown rate in the environment.

Q. ***How long will the proposed rotenone treatment take?***

A. The rotenone treatment will take less than 24 hours; however, the watershed may be separated into subwatersheds which would require multiple, localized treatments. In this case, rotenone may be applied over the course of several days.

Q. ***Does rotenone affect all aquatic animals the same?***

A. No. Fish are more susceptible. All animals have natural enzymes in the digestive tract that neutralize rotenone. However, fish and some forms of amphibians and aquatic invertebrates are more susceptible because they are gill-breathing animals and; thus, have a more direct path of exposure. Although some organisms, like aquatic insects are susceptible to rotenone, studies have shown that these organisms are able to quickly repopulate an area after treatment.

Q. ***Can I eat the fish that have been treated with rotenone?***

A. You should not eat fish that have been treated with rotenone because no federal or state guidelines are in place for eating fish taken after rotenone treatment. Also, salmonella and other bacteria may grow on any fish that is not properly preserved, such as fish that have been floating in a lake for some time, making them unsafe to eat.

Q. ***Will wildlife that eat dead fish and drink treated water be affected?***

A. For the reasons listed above, birds and mammals that eat dead fish and drink treated water will not be affected. A bird weighing one-quarter pound would have to consume 100 quarts of treated water or more than 40 pounds of fish and invertebrates within 24 hours to receive a lethal dose. This same bird would normally consume 0.2 ounces of water and 0.32 ounces of food daily.

Q. ***Is rotenone a groundwater contaminant?***

A. Rotenone is highly insoluble in water and strongly absorbs to soil particles in bottom sediments and to suspended particles in the water column, limiting its mobility and availability to bioaccumulate in organisms. These factors also make rotenone unlikely to leach through soils and reach groundwater, and thorough long-term (10 years post-treatment) monitoring of 80 groundwater wells in treatment areas in California, and short-term monitoring wells in California, Montana, and Washington State have never detected rotenone following rotenone treatments. If leaching does occur, rotenone will move vertically through soils typically less than one inch deep, making it unlikely to be absorbed by the roots of bank vegetation.

Q. Where can I learn more about rotenone?

A. Visit the Rotenone Stewardship Program website at https://rotenone.fisheries.org/