STORY COUNTY CONSERVATION

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Memorandum

To: Story County Conservation Board

Through: Michael D. Cox, Director

From: Ryan Wiemold, Parks Superintendent

Date: July 2, 2020

Re: Consideration of Support For Rotenone Application at Hickory Grove Lake by the Iowa Department of Natural Resources.

Renovating the fishery at Hickory Grove Lake is an imperative and final step in the restoration process. In 2019, Story County Conservation (SCC) and the Iowa Department of Natural Resources (DNR) attempted to remove the remaining carp population by draining as much of the lake as possible. Unfortunately, carp were observed this spring as the lake was refilling. At this point, the best option to eliminate the remaining carp is to apply rotenone to the lake basin and tributaries. Rotenone is a natural pesticide derived from the roots of certain members of the bean family from South America and is a common tool that fisheries managers use to manage sport fish, improve water quality, and manage endangered species.

The DNR is investigating treating Hickory Grove Lake and watershed tributaries in late summer/early fall with rotenone. Two joint (SCC & DNR) press releases would be sent out this summer to notify and educate the public about the process. SCC and DNR staff will collaborate with landowners adjacent to treated water as well. Please see the attached FAQ for more specific information in regards to rotenone application.

Staff urges your support.

_____	_____
Approval	Disapproval
_____	_____
Date	Date

Hickory Grove Lake Fishery Renovation - Rotenone FAQ

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

A. Several injurious fish species (Common Carp, Grass Carp, and Black Bullhead) are present in the lake and watershed. These species pose a threat to the fishery and water quality of the newly restored Hickory Grove Lake.

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

A. It's important to eliminate the remaining fish population, including the 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 simultaneously as they harbor injurious fish that will reinfest the lake. Without the elimination of the remaining fish population, the impact of the lake restoration efforts cannot be fully realized.

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

A. The Hickory Grove Lake Restoration Project required collaboration from multiple partners at the Federal, state, county, and local levels. The multi-million dollar project began with the ultimate goal of restoring water quality, improving habitat availability, rehabilitating angling opportunities, and improving water-based recreation conditions. Failure to remove these 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.

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

A. The Iowa Department of Natural Resources utilizes alternative methods of fish removal when practical. For example, an attempt was made to completely drain the lake in 2019. Unfortunately, injurious fish survived this management strategy. 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, habitat, angling quality, and general user aesthetics will not be realized. Rotenone is the best remaining 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. This piscicide (chemical substance poisonous to fish) 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 Hickory Grove 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 the Iowa DNR will be using (a water concentration of 200 parts per billion), the highest estimated dose of rotenone a person swimming in Hickory Grove 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 casually 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 used 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 and Story County Conservation will provide two press releases to notify and inform the public about the treatment. Story County Conservation will also provide information about the treatment, including FAQ's on their website. Landowners adjacent to treated water will be notified and signage 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 or semi-closed pump systems in lakes/pools, 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 one day to complete.

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. According to the label, treated fish should not be used for food or feed. 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 through 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/