

# Rotenone

## Invasive fish control in Alberta storm water management ponds

### Rotenone use in Alberta waterbodies

Rotenone is a compound derived from the roots of a tropical plant from the bean family. Currently, it is commercially available as Noxfish Fish Toxicant (PCP Reg. No. 14558), Noxfish Fish Toxicant II (PCP Reg. No. 33247) or Prentox Nusyn-Noxfish Fish Toxicant (PCP Reg. No. 19985). All pesticides for use in Canada are registered by Health Canada's Pest Management Regulatory Agency (PMRA). They conduct human health, environment and value assessments to ensure risks are mitigated and do not exceed acceptable levels.

Rotenone provides the highest likelihood of eradication success in terms of removing invasive fish from isolated waterbodies and minimizes the potential movement of unwanted fish to other waterbodies. It is best suited for storm water management pond responses, as these areas can usually be isolated during application (to prevent flowing water) and do not contain other fish species.

Releasing live fish into Alberta waterbodies is **illegal**. *Fisheries (Alberta) Act* - Section 11.01(1) states:

*A person shall not place or keep an invasive organism in, or allow an invasive organism to enter, water of any kind.*

There are 25 prohibited fish species under the *Fisheries (Alberta) Act*, all of which are **mandatory** to report within 14 days of finding them for the best chance of response success.

Alberta Environment and Parks (AEP) take the threat posed by aquatic invasive species (AIS) seriously and have programs in place to address the spread of AIS, such as goldfish and koi, which have the potential to affect the environment, economy and human health.

In this fact sheet, we address a general overview of rotenone use in Alberta and answer questions on its use to eradicate unauthorized fish in storm water management ponds within the province.

### Unauthorized fish release

#### What is the problem posed by released fish?

The release of aquarium or domestic pond water, plants or animals, dead or alive, into Alberta's waterbodies is a serious issue. These species, can become invasive when released into the wild with the potential of causing both ecological and economic harm to our aquatic ecosystems.



Various goldfish netted from a storm water pond.

For example, goldfish are able to tolerate large fluctuations in water temperature and can exist in water with low oxygen levels. They can prey upon native fish eggs, snails, and plants and increase turbidity by stirring up sediment when feeding. Goldfish are prolific and populations can grow rapidly under multiple spawning events in a summer. In addition to outcompeting native species, aquarium pets can also carry diseases and parasites.

For more information or to report invasive species, call 1-855-336-BOAT (2628).

## What actions have been considered to correct the released fish problem?

Methods for eradication and control of invasive organisms can be divided into three categories:

- Biological
- Physical/mechanical
- Chemical

Biological control is not an eradication tool, as it can encourage predatory fish presence and there is no guarantee that the predator will eliminate the target species and all of its life stages. There is also a risk of further movement of the target species to other waterbodies in the time that it would take for the predator to reduce the target population.

The use of rotenone in Alberta requires special authorizations. If you would like a complete list of requirements on rotenone use, have additional questions or suspect an aquatic invasive species, please email [aep.ais@gov.ab.ca](mailto:aep.ais@gov.ab.ca).

A wide array of physical or mechanical methods have been used to control invasive fish populations but have limited potential in eradication. This includes removal of fish by use of nets, traps, electrofishing, and management of water levels and/or flows. All methods have been implemented in Alberta with minimal success. Other than complete and prolonged dewatering, which is costly and time-consuming, chemical control (such as rotenone) is the best method to completely eliminate undesirable fish in a body of water.

## Rotenone safety

### Is rotenone harmful to people when used as a fisheries management tool?

No. A 132 pound person would have to consume more than 150,000 litres (approx. 40,000 gallons) of rotenone-treated water within a 24 hour period to receive a lethal dose.

There is no opportunity for long-term effects since rotenone biodegrades within two to four weeks. The use of rotenone for fish control/eradication does not

present a risk of adverse effects to humans, animals or the environment.



*Certified applicators applying a rotenone treatment.*

### If rotenone is not considered harmful when used as a fisheries management tool, why are applicators wearing a large amount of personal protective equipment, including coveralls, gloves, goggles and a respirator?

Certified applicators are handling concentrated product, which increase risk and exposure. When applied, the product is diluted and generally applied below the surface of the water, reducing the risk to the surrounding area and individuals.

### How long will a rotenone treatment take?

After a rotenone treatment, the public should not enter the waterbody for three to four days. It is not recommended that you drink rotenone-treated waters, however, if this does occur, rotenone is not readily absorbed by mammals.

### Does rotenone affect all aquatic animals the same?

No. Fish or species with gills, such as some stages of amphibians and some aquatic insects, are the most susceptible. All animals have natural enzymes in the digestive tract that neutralize rotenone, whereas gill breathing species do not possess these enzymes and therefore cannot neutralize rotenone. Studies have shown that gill breathing species are

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able to quickly repopulate an area after a rotenone treatment.

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

Birds and mammals that eat dead fish and drink treated water will not be affected, for reasons mentioned above. A bird weighing approximately 113 grams would have to consume 95 litres of treated water or more than 18 kilograms of fish and invertebrates within a 24 hour period to receive a lethal dose. This same bird would normally consume 6 millilitres of water and 9 grams of food daily.

### **Will wildlife species be affected by the loss of their food supply following a rotenone treatment?**

During treatments, fish-eating birds and mammals can be found foraging on dying and recently dead fish for several days following a treatment. Following this abundance of dead fish, a temporary reduction in food supplies for these wildlife may result until native fish and invertebrates are restored. However, most of the affected species are mobile and will seek alternate food sources or forage in other areas.

### **What are some of the impacts of the proposed rotenone treatment?**

Some impacts are:

- chemical odours for several days,
- temporary change in water quality,
- temporary loss of fish, and
- loss of recreation for up to one month.

### **Is rotenone a groundwater contaminant?**

Wells and groundwater will not be affected by the rotenone treatment. Monitoring studies show that groundwater in adjacent areas have not been affected.

## **Neutralization of rotenone**

### **What is used to neutralize rotenone?**

A solution of potassium permanganate ( $\text{KMnO}_4$ ) can be used to accelerate the natural breakdown of

rotenone in water. Neutralization of rotenone is not immediate, however, water will turn a purple colour during the neutralization process.



*A purple-coloured stream from the use of potassium permanganate when neutralizing rotenone.*

### **Is potassium permanganate toxic?**

Potassium permanganate is toxic to gill-breathing organisms at use rates for neutralization. As a strong oxidizing agent, permanganate is reduced when it oxidizes other substances (such as rotenone). Thus, in the process of oxidizing rotenone, potassium permanganate is in turn reduced in the environment.

*This document has been adapted from the American Fisheries Society.*

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