

ProcellaCOR FX

Questions and Answers

Q: *What is ProcellaCOR FX and what is it used for?*

A: ProcellaCOR (herbicide active ingredient name Florpyrauxifen-benzyl) was approved for aquatic use by the United States Environmental Protection Agency (EPA) in February 2018. ProcellaCOR FX was approved by Health Canada's Pest Management Regulatory Agency (PMRA) on May 16, 2023.

SePRO, an environmental services company based in the United States initially developed the active ingredient (florpyrauxifen-benzyl) in ProcellaCOR as an herbicide for food crops such as rice; it has been used worldwide for several years. As a selective aquatic herbicide, ProcellaCOR has been documented in the United States to control various submerged, floating, and emergent aquatic plant species. It has been shown to be highly effective against Eurasian Watermilfoil, Variable Milfoil, Hybrid Milfoil, Hydrilla, Water hyacinth, and other specific invasive aquatic plants. ProcellaCOR FX is a new formulation of ProcellaCOR that has been developed by the SePRO Corporation to provide faster control of target invasive aquatic plants.

Q: *How are aquatic herbicides approved?*

A: Obtaining a pesticide label from both the EPA and PMRA is a time-consuming and expensive process. The EPA and the PMRA both require a registrant (i.e. SePRO) to submit data from over 100 tests before a product can be evaluated for possible labelling. These tests are conducted to determine the effects of the experimental pesticide on the organism targeted for control. The tests must also assess the product's impact on non-target organisms, human health, and the environment. Registrants seeking an aquatic label must submit additional data to the EPA and the PMRA including how the product affects target and non-target aquatic flora and fauna, the product's persistence in aquatic sediments and water, and the nature and impacts of its decomposition components. Furthermore, ProcellaCOR was subject to dozens of peer-reviewed scientific studies.

SePRO submitted an application to the PMRA in 2019 to have ProcellaCOR registered in Canada. ProcellaCOR underwent a thorough review by the PMRA for use in Canada. PMRA does the initial research and decides if a product is effective and safe for human and ecological uses in water. All herbicides used in aquatic environments in Canada must be tested and registered with the PMRA.

Q: *What was concluded by both the EPA and the PMRA?*

A: Human Health

Both the EPA and the PMRA determined the concentrations of ProcellaCOR and ProcellaCOR FX respectively used for treating target plants such as EWM posed a negligible risk to human health. It was also concluded that drinking water exposures to the aquatic herbicide do not pose a human health risk; no maximum allowable drinking water concentrations were established by either the EPA or the PMRA. Swimming and fishing following application are also permissible under the EPA and PMRA approvals. Dilute amounts of herbicide may be present in the water, but the EPA and the PMRA determined that there was negligible risk to adults or children swimming in treated waters. Toxicology studies found no adverse acute or chronic effects.

Fisheries and Aquatic Wildlife Risks

The EPA and the PMRA concluded ProcellaCOR had no risk concerns for fish, reptiles, amphibians, and mammals. The aquatic herbicide does not bio accumulate (becoming concentrated inside the bodies of living things) in fish or freshwater clams.

Non Targeted Aquatic Plant Risks

ProcellaCOR has been used in more than 200 United States lakes since it was approved in 2018. No harmful impacts on non-targeted plants have been observed.

Q: *Has ProcellaCOR and ProcellaCOR FX been peer reviewed?*

A: In addition to the research undertaken by the EPA and the PMRA, over 15 USA State departments of environmental protection, ecology, natural resources, health, environmental protection, fish and wildlife, and agriculture, over 6 universities, 2 aquatic plant management associations, the US Army Corp of Engineers, and the Department of Agriculture and Fisheries, Queensland, Australia undertook research of ProcellaCOR as it related to human health, fisheries and wildlife, and the aquatic ecosystems. None of the independent studies undertaken to date in the United States and in Australia have shown ProcellaCOR to have an adverse impact on human health, fish and wildlife, or non-targeted aquatic plants.

As ProcellaCOR FX is a new aquatic herbicide approved by the PMRA for use in Canada, it is expected that some Federal government agencies, Provincial ministries, and academic institutions may undertake independent reviews of ProcellaCOR FX to verify the aquatic herbicide's safety and effectiveness.

Q: *How does ProcellaCOR FX work?*

A: ProcellaCOR FX is a selective herbicide that is effective on certain plant species (e.g. EWM) but has minimal impact on native species. ProcellaCOR FX is a new systemic

herbicide that is taken up by the target plant and trans-located internally; meaning the plant absorbs the herbicide through its entire structure (e.g. leaves and stems to the root crown) to kill the EWM plant from the inside. ProcellaCOR FX has a synthetic auxin mimic mode of action. Plant specific hormones in sensitive plant species (e.g. EWM) which are typically fast growing are artificially and rapidly heightened with the new herbicide resulting in abnormal growth leading to cell and plant issue death. Essentially the plant cells self-destruct because they are growing rapidly out of control.

Q: *How will ProcellaCOR FX compare to Reward in managing Eurasian Watermilfoil?*

A: Herbicides are typically classified as contact or systemic herbicides based on the action mode of the active ingredient in the herbicide. Reward (common name Diquat dibromide) is a contact herbicide that has been used by the FLCA for years to manage EWM in Farlain Lake; until May 2023 it was the only aquatic herbicide approved for use in Canada. When Reward comes in contact with the leaves and stems of an aquatic plant, the herbicide dehydrates the plant tissue causing damage to the plant's cells thereby disrupting the photosynthesis process. Only the parts of the plant that come into contact with Reward are affected. Diquat is not selective; the herbicide will impact all aquatic plant species. Diquat does not usually kill the whole plant; it only reduces the height and size of the aquatic vegetation by temporarily suppressing the growth of the aquatic plants. It acts like an underwater chemical lawnmower.

When selecting an aquatic herbicide the most important criteria is the efficacy of the product on the target aquatic plant. While ProcellaCOR FX is more expensive than Reward, ProcellaCOR FX will be more effective and cost efficient. The FLCA reviewed published scientific papers and reports from a number of United States government organizations and lake management groups who tested ProcellaCOR and assessed its effectiveness. The results of the treatments of EWM with ProcellaCOR in the United States were deemed to be very successful, achieving nearly complete control of the invasive aquatic plant with little or no impact to non-target plants.

Q: *How will ProcellaCOR FX compare to Reward in managing EWM.*

A: ProcellaCOR FX will remove problematic plants (i.e. EWM) while leaving native plants to survive and repopulate the void created by destroyed EWM. Healthy aquatic plants are an important part of the lake's ecosystem as they provide sediment stabilization, oxygenating the water, and providing habit for invertebrates, fish, and animals.

Research has shown that sport fish populations are greatest when submerged plants inhibit 30 – 40% or less of the water column. ProcellaCOR FX will remove EWM enabling native plant species to thrive. Many people fail to appreciate that the unchecked growth characteristic of EWM necessitates management efforts that focus on eliminating as much vegetation as possible.

SePRO's three-year guaranteed control program with ProcellaCOR FX of Farlain Lake's EWM will be aligned with detailed surveys of the aquatic plant community. Year one involves treating all known 17 scattered EWM infestations with ProcellaCOR FX. As there will be fewer identified EWM infestations in year two, the treatment with ProcellaCOR FX will be scaled back. In year three, any residual EWM infestations of sufficient density will be treated with ProcellaCOR FX.

As a comparison, the treatment...up to a maximum of two treatments each year with a two week separation between treatments...with Reward will not reduce the volume of EWM in Farlain Lake as Reward does not kill EWM. Year after year, Reward would have to be applied to EWM infestations as a measure to hamper the spread of EWM in the lake.

A key factor in a successful EWM management strategy is ongoing vigilance of monitoring and mapping of EWM locations in Farlain Lake.

Q: *How is ProcellaCOR FX applied?*

A: ProcellaCOR FX is licensed to a limited number of certified applicators who have been trained specifically trained by SePRO in the aquatic herbicide's use. Herbicide applications to open waters require specialized equipment and tools in order to effectively reach the target aquatic plants. Liquid formulations are packaged as concentrates and are applied in dilute form. ProcellaCOR FX is applied at a dosage rate of 7 parts per billion (ppb). A concentrate of ProcellaCOR FX will be diluted with lake water and prepared in a mixing tank onboard the treatment boat. The ProcellaCOR FX solution will be evenly injected throughout the treatment sites using a calibrated pumping system to apply the herbicide by a handgun to treat target emergent and floating plants, a boom for treating dense vegetation on the surface, or by trailing weighted hoses behind the boat to treat submerged plant species like EWM. ProcellaCOR FX will be injected below the surface onto Farlain Lake's EWM plants with weighted hoses for maximum effectiveness.

Q: *What happens to ProcellaCOR FX after it is applied?*

A: Aquatic herbicides used to treat submerged aquatic plants must travel through the water column to reach the target plant; the herbicide will undergo substantial dilution before coming into contact with the target plant. Flow and water currents result in the movement of the herbicide out of the treatment area, which reduces contact exposure time (the period of time in which the aquatic herbicide maintains contact with the aquatic plant) and further limits the efficacy of the treatment.

As a comparison, Reward was surface applied with a fire hose. A ten metre buffer zone around each infestation was created to compensate for any migration caused by wind and wave action. The term 'drift' is typically used when aerial spraying is involved.

Migration of an aquatic herbicide in the water column is not an issue with ProcellaCOR FX unless there is a strong current in the water body being treated such as a boating channel connecting two lakes.

Q: *What happens to ProcellaCOR FX after it is applied?* (Continued)

A: ProcellaCOR FX breaks down quickly in water by sunlight (i.e. photolysis). It has a half-life (the time it takes for half of the active ingredient to degrade) ranging from 1 – 6 days. Water tests conducted on ProcellaCOR in United States lakes almost exclusively have shown no detection less than 48 hours after application when used for EWM management. Aquatic field studies have documented minimal detection of ProcellaCOR in bottom sediments.

Post treatment, EWM plants will die-back over a 4 - 5 week period.

1 – 2 weeks after treatment:

EWM plants should still be standing but may look brown and wilted. The plant's leaflets, which comprise the leaf, will fall off leaving a stem on branch. Branch stems curl and drop off.

2- 3 weeks after treatment:

Most of the plants (but not all) will have fallen to the bottom of the lake. EWM biomass will appear blackened.

4- 5 weeks after treatment:

It will be difficult to detect any evidence of EWM plants.

Q: *Will the treatment of EWM with ProcellaCOR FX lead to oxygen depletion and fish mortality?*

A: Fish mortality could occur after any aquatic herbicide treatment due a reduction in dissolved oxygen (DO) in the water column if label instructions are not followed or the treatment exceeds the parameters set out in the Ontario Ministry of the Environment, Conservation, and Parks (MECP) pesticide permit . Vegetative matter that has been killed by an herbicide is broken down by aerobic organisms. This decomposition could deplete DO during the process. The photosynthesis process by plants that have been killed by an aquatic herbicide is eliminated; the dissolved oxygen the plants previously contributed to the water column is no longer produced. To reduce the likelihood of fish mortality caused by DO imbalance, most aquatic herbicide labels specify the herbicide can only be applied to a portion of a weed-infested water body at a time. In the United States, a State Department of Natural Resources office may stipulate only a portion (e.g. 40%) of a water body can be treated during one treatment. In Ontario, the Federal Government's

Department of Fisheries and Oceans Canada (DFO) and the Provincial Ministry of Natural Resources and Forestry (MNR) stipulate that aquatic herbicide applications can only occur after the closure of the fisheries timing window. The MECP stipulates that Reward can be applied twice during the summer season providing there is a two week gap between applications.

Farlain Lake has a surface area of approximately 1.10 km² (1,100,000 m²); the seventeen (17) known EWM sites in 2023 total approximately 4,124 m² in area. This figure included an added 10 metre buffer zone around each site to compensate for migration if Reward was surface sprayed. The total area (4,124 m²) represents 0.9% of the lake's total surface area. If ProcellaCOR FX was used, a smaller percentage of the lake's surface area containing EWM would be involved as a 10 metre buffer zone around each infestation would not be required. ProcellaCOR FX, unlike Reward, will not impact non-target (e.g. EWM) aquatic plants.

It is unlikely that an oxygen depletion and fish mortality event will occur as a result of the treatment of EWM with ProcellaCOR.

Q: *Will a single treatment of ProcellaCOR FX remove all EWM from Farlain Lake?*

A: Once EWM has become established in a water body, it is almost impossible to eradicate it. No two water bodies are identical. Each may have differences in the overall size, water depths, water retention time, water clarity, littoral zone (where plants grow) size, bottom substrate (e.g. muck, clay, rock, etc.), macrophyte (aquatic vegetation) diversity, recreational use, trophic state, and other factors.

As an example, Minerva Lake, in New York State is different than Farlain Lake, in the Province of Ontario. Minerva Lake is a small 91 acre artificial lake that was created in 1932 when a dam was installed on the lake's outlet stream. Farlain Lake is a natural 271 acre lake that was formed 11,500 years ago when the retreating ice cap's glacial spillway was blocked by rock and shifting sands; there is no lake outlet. Minerva Lake's shoreline development is limited to a small campground whereas Farlain Lake's shoreline involves both shoreline and inland residential development. Powered watercraft on Minerva Lake is limited to a maximum of 3 horsepower. There is no horsepower limit on powered watercraft (e.g. PWCs, pontoon boats, fishing boats, waterskiing boats, wake boats, etc.) on Farlain Lake. Research has shown that propulsion systems from powerful boats can scour the bottom of lakes disturbing fish habitat, releasing phosphorous and nutrients from the sediment, and uprooting aquatic plants.

EWM was introduced to Minerva Lake around the year 2007. Hand harvesting by SCUBA divers with collection bags was the primary control method in Minerva Lake until 2015. Hand harvesting EWM by contracted SCUBA divers using a DASH (diver assisted suction harvesting) system began in 2015. DASH hand harvesting involved approximately 400 –

500 hours each year at a typical cost of \$70,000 annually. In 2020, forty one acres (66% of littoral zone) of EWM in Minerva Lake was treated with 8.73 gallons of ProcellaCOR; the treatment was focussed on the lake's densest milfoil beds. ProcellaCOR (1 part per billion) dissipated in the water column 24 hours post treatment. Two months following treatment, EWM was not observed in Minerva Lake. Minerva Town officials stated that EWM did not return to the lake for at least two seasons. The use of ProcellaCOR enabled Adirondack Park and the Town of Minerva officials to utilize a more efficient integrated strategy (i.e. ProcellaCOR, DASH) to manage EWM in Minerva Lake.

ProcellaCOR FX is expected to be used as one-time application each year in northern climates. It is anticipated that treatment areas will experience multiple years of control following the initial treatment effort.

Q: *What will it cost to treat EWM with ProcellaCOR FX in Farlain Lake?*

A: A three year contract with SOLitude Lake Management specifies that \$1000 will be for assisting with obtaining necessary permits for year one and the following two years, \$8,020 for the liquid herbicide ProcellaCOR FX to treat two (2) hectares of EWM, \$3,325.00 for the application of the herbicide to 17 EWM infestation sites, and \$1,200 for EWM monitoring post treatment and report writing for year one. The total cost \$16,020 US (\$21,735.94 CA) also includes \$1,225.00 in year 2024 and \$1,250.00 in year 2025 for EWM monitoring post treatment and report writing. The costs of the aquatic herbicide and the application of ProcellaCOR FX in years 2024 and 2025 will be determined following the determination of the amount of EWM in the lake each year following treatments.

A key factor in a successful EWM management strategy is ongoing vigilance of monitoring and mapping of EWM locations. A key factor in a successful EWM management strategy is ongoing vigilance of monitoring and mapping of EWM locations. A key factor in a successful EWM management strategy is ongoing vigilance of monitoring and mapping of EWM locations.

Q *Will ProcellaCOR FX be used instead of other EWM control methods?*

A: The FLCA will continue to use an integrated management approach to reduce EWM. As part of the management strategy, ProcellaCOR FX will be used to manage target areas of the most abundant growth. ProcellaCOR FX will be utilized in conjunction with other integrated management control methods (e.g. DASH hand harvesting, etc.) on smaller clusters, scattered EWM plants, or plants in challenging locations such as rocks or submerged tree trunks and branches.

Q: *What is Eurasian Watermilfoil (EWM)?*

A: EWM is an aggressive invasive aquatic plant. EWM reproduces in three ways; seed dispersal, lateral roots (Stolon) extending outwards horizontally from the root ball that produce new roots and shoots, and stem fragmentation. Fragmentation, auto and physical,

is the plant's predominant means of reproduction. Plant fragments are created when a EWM plant is physically damaged by watercraft, fishing, swimming, wave action, large fish, animals, and diving waterfowl. Auto fragmentation occurs at the end of EWM's growth cycle when the plant dislodges stems as a natural reproductive method. The small plant pieces can be transported on the lake's surface by wind and wave action. A two inch stem fragment from a broken stem can grow into a new plant which could colonize into a dense infestation replacing native plant species. EWM forms dense canopies below the surface or floating dense mats on the water surface. Left unmanaged, EWM will alter the ecosystem of a water body threatening lake users (e.g. swimming), animals, and native plant species. The invasive aquatic plant will also reduce water quality. Excessive EWM also reduces spawning habitat for many fish species in the lake.

Q: *What has the FLCA been doing to manage EWM?*

A: EWM was first discovered in Farlain Lake in 2012. The FLCA has been researching and implementing control methods to manage EWM. An integrated management approach has been adopted to use three different control methods (aquatic herbicide treatment, DASH (diver assisted suction harvesting) hand removal of EWM plants, and benthic mat installation to manage EWM populations and curtail the spread of the invasive aquatic plant in the lake. Invasive aquatic plants are difficult to manage because they spread underwater. While the EWM population in the lake is not growing rapidly due to the efforts of the FLCA and its volunteers, it is slowly expanding. While we are not seeing the types of dense floating mats that are seen in other water bodies inundated with EWM, we have not been able to significantly reduce the population of EWM in Farlain Lake. However, our efforts to date have slowed the rate of spread throughout the lake.