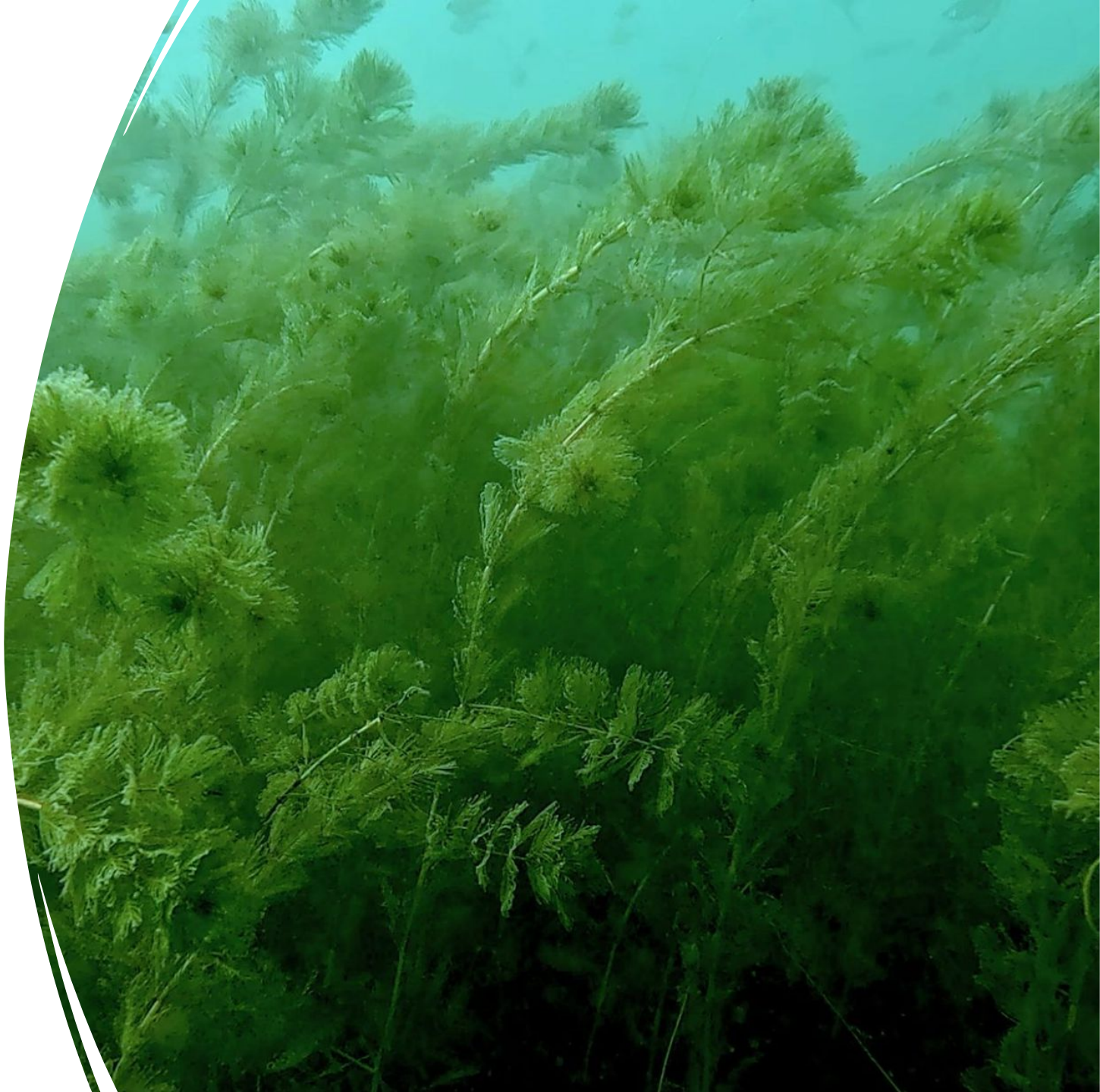
Eurasian Watermilfoil Management in Christina Lake

Aquatic Herbicide
ProcellaCOR FX

Regional District of Kootenay Boundary

Keefer Ecological Services Ltd



Outline

Introduction

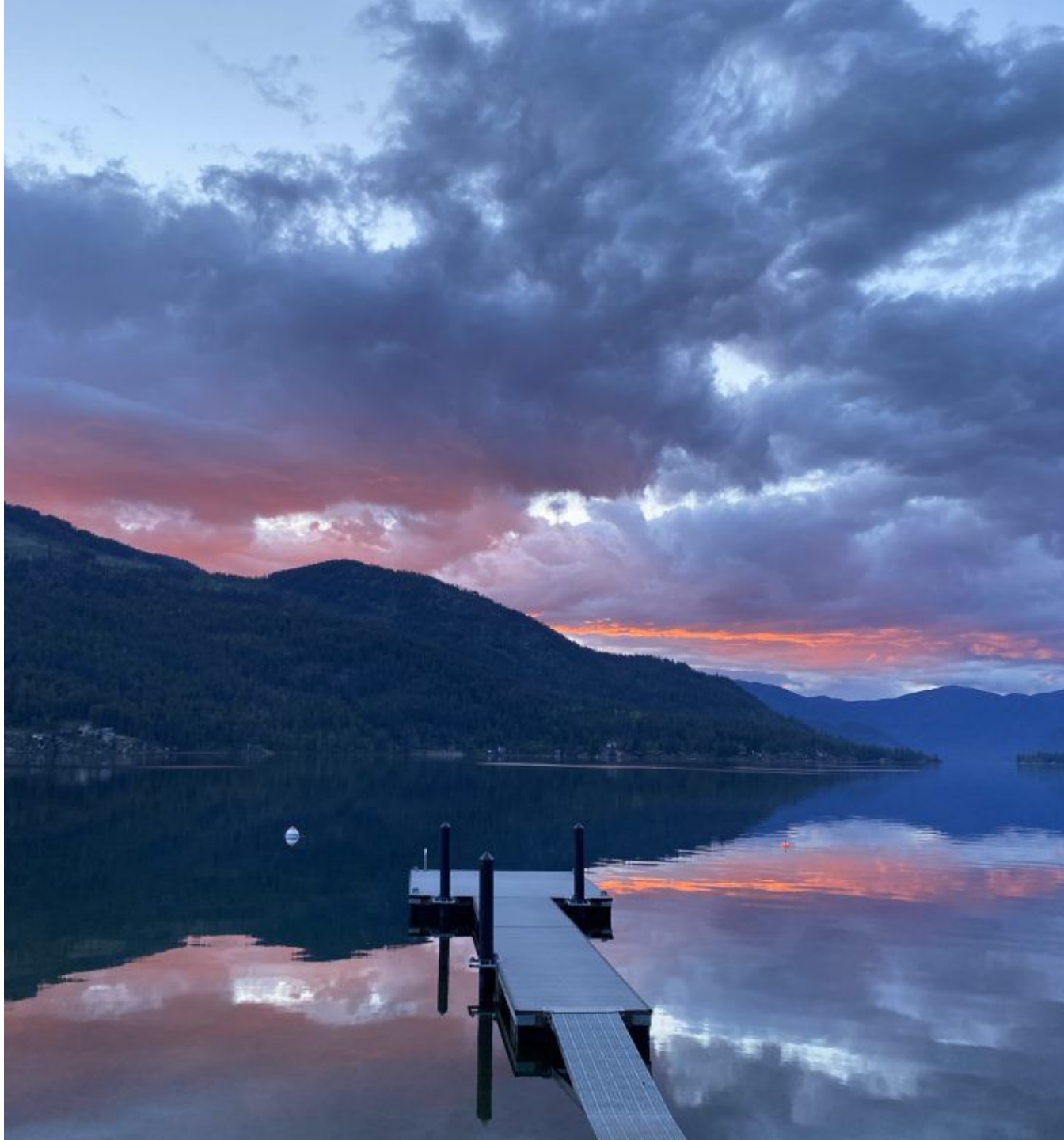
- Who are we & what is our role in the project?

Background

- What is Eurasian watermilfoil and how does it impact the lake?
- Management methods
- Previous removal efforts

ProcellaCOR FX

- What is it? How does it work? How is it applied?
- Effects on people and ecosystems



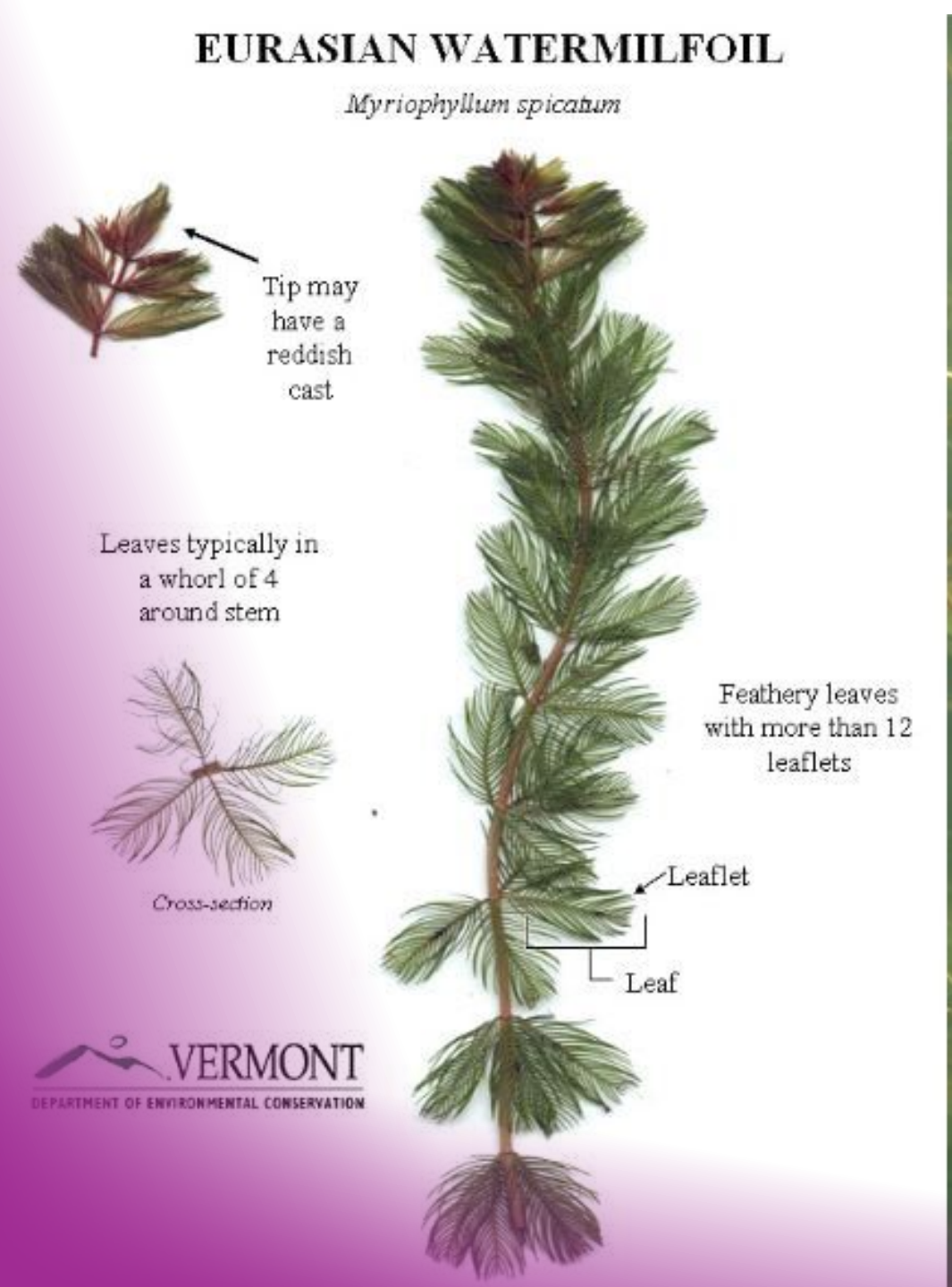
Introduction:

- Consultants with Keefer Ecological Service (KES)
  - Our job is to collect and interpret data in an open, fair, and transparent way in the interests of the public and the environment
  - Public opinion is important
    - Science doesn't detect between "right" and "wrong", people do

Our Role:

- Neutral, third party retained to share information and document community feedback
  - Gather information on ProcellaCOR FX
  - Gather community opinions, thoughts and feedback
  - Share our findings and community input with RDKB

RDKB has not yet made any decisions on this matter



What is Eurasian Watermilfoil (EWM)?

- Aquatic invasive plant
- Arrived in Christina Lake mid-1980's
- Grows in warm, nutrient-rich water
- Depths of 3-5 metres

How does EWM impact the lake?

- Creates large monoculture mats
- Outcompetes native plants by blocking sunlight, reducing biodiversity
- Creates low-oxygen zones through decomposition
- Alters native habitat for fish and aquatic life
- Interferes with swimming, boating, and fishing

How can EWM be managed?

- **Hand harvesting**
  - Pros: simple, selective for EWM
  - Cons: labour intensive, can fragment plant, not feasible for large patches
- **Benthic mats**
  - Pros: cost efficient, can reduce EWM growth
  - Cons: only controls the area immediately below the mat, challenging logistics
- **Machine harvesting**
  - Pros: immediate results, removes EWM root, can target large areas
  - Cons: non-selective, causes EWM fragmentation, disruptive to lake ecosystem

EWM management strategies, continued

- **Diver Assisted Suction Harvesting (DASH)**
  - Pros: can remove plant well, can be longer term solution
  - Cons: fragments plant, requires lots of time, disruptive to ecosystem, can release nutrients into the water
- **Biocontrol**
  - Pros: selective to EWM
  - Cons: requires high insect populations to control EWM, not always effective
- **Chemical control**
  - Pros: can be selective, can target both roots and leaves
  - Cons: not all herbicides are selective, not all herbicides impact the roots

Previous EWM Control Efforts in Christina Lake

- **Hand Pulling:** Since 1987 by SCUBA Divers
- **Benthic Mats:** Mats are installed over EWM growth, blocking sunlight and preventing the plant from photosynthesizing
- **Biocontrol:** Conducted preliminary studies for the use of weevils for biocontrol

Eurasian Milfoil Control Program Trends Over Time

Annual Plant Count Summary Table:

2024 Plant Count	2023 Plant Count	2022 Plant Count	2021 Plant Count	2020 Plant Count	2019 Plant Count	2018 Plant Count	2017 Plant Count	2016 Plant Count	2015 Plant Count
866,926	673,371	646,398	703,847	453,181	535,135	590,612	529,343	321,385	400,030

Next Steps?

- Research ProcellaCOR FX
- Engage Community
- Potentially adapt the Christina Lake Eurasian Watermilfoil Control Program

South-end of Christina Lake, areas of maximum milfoil growth

What is ProcellaCOR FX?

Chemical Control Agent:
Selectively targets invasive aquatic plants

Active Ingredient:
Florpyrauxifen-benzyl (FPB), a novel compound approved in for use in the United States in 2018 and in Canada in 2023

One of two approved aquatic herbicides in Canada
Other is Diquat, also known as Reward

How does ProcellaCOR FX work?

Synthetic auxin mimic:

- Targets plant growth hormone pathway.
  - Auxin mimic targets a receptor specific to plants. Humans do not have this receptor
- Stimulates rapid and unregulated growth that the plant cannot sustain
- Impacts entire plant (systemic), including roots
- After exposure, plant dies within 2-4 weeks

How is it selective?

- Only targets dicot plants
- Many native species are monocots
  - But not all!
  - May impact nearby native dicots
- Milfoils are particularly susceptible to its control mechanism
  - Allows for very low application rates

Some native dicot plants in Christina Lake:

- Common bladderwort
- Water marigold
- Northern milfoil and whorled milfoil
- Common mare's tail
- White water buttercup and yellow water buttercup
- Water starwort
- Watershield
- Coontail

How is ProcellaCOR FX applied?

Very low rate: 1 to 7 parts per billion (ppb)

- Approximately one ounce in a typical-sized swimming pool
- Dosage is around 100 – 1000x lower than other aquatic herbicides

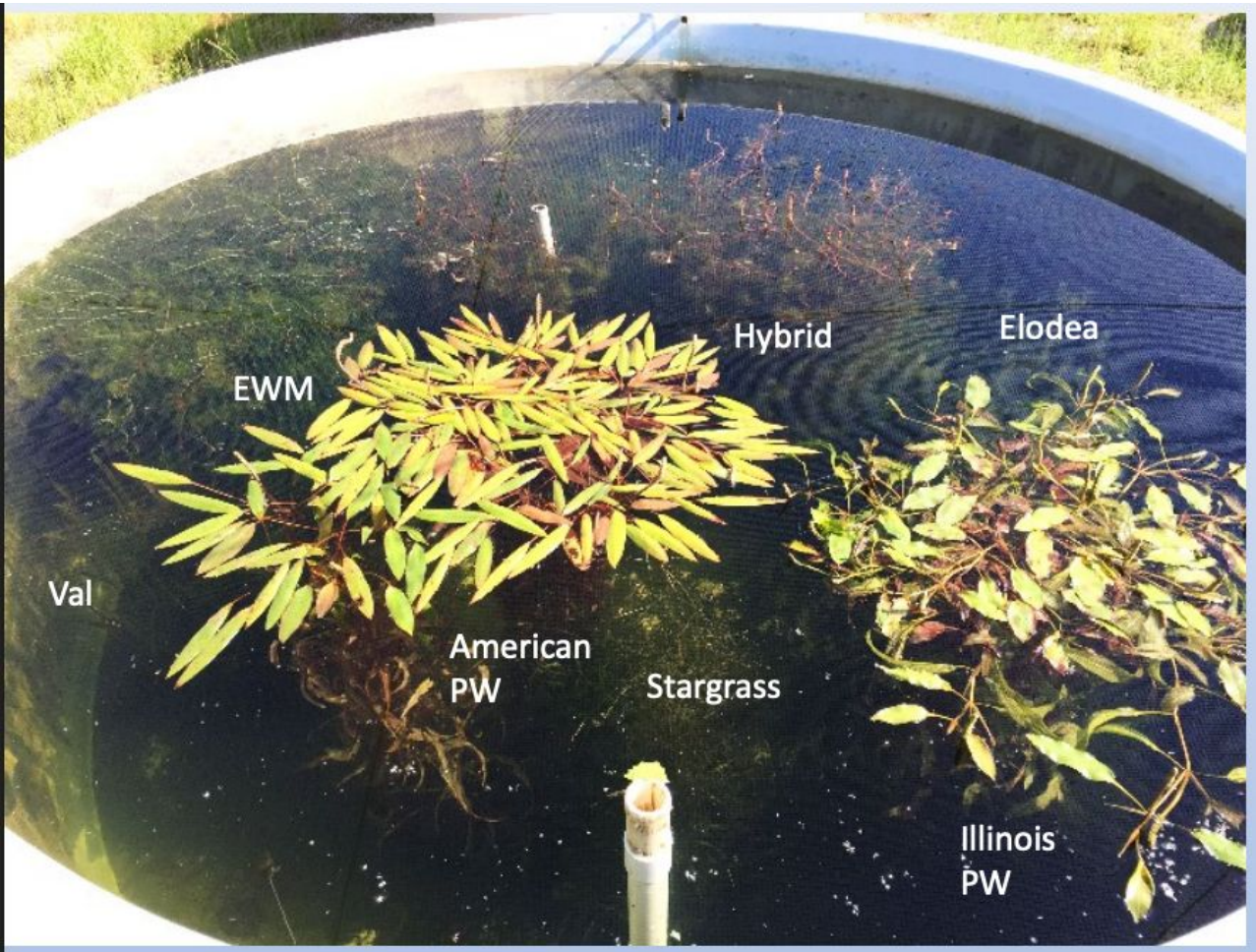
Applied by a licensed applicator

- Targeted spot treatment using subsurface injection
- Application rates can be specifically tailored for each treatment location

Timing: Most effective when applied to actively growing plants (spring and early summer)

- Can be successful in a range of plant growth stages and environmental conditions

Image credit: Dr. Mark Heilman, from *ProcellaCOR Overview for Farlain Lake Community Association*



Untreated

4 weeks after short exposure (6h) of ProcellaCOR

JAPM Publication: Beets, Heilman, and Netherland 2019

Image credit: Dr. Mark Heilman, from *ProcellaCOR Overview for Farlain Lake Community Association*

Does ProcellaCOR FX Pose a Human Health Risk?

- Not in the water column for long
  - Half life of 1 to 6 days
  - Studies have found it is undetectable after 48 hours

- Health Canada determined its presence in food or drinking water does not pose a health risk.
- Vermont Department of Health established a drinking water standard of a maximum of 3 mg/kg/day.
  - 400 times higher than the average EWM treatment concentrations.

- In a two year study, rats were given ProcellaCOR FX every day and no harmful effects were observed.
- To reach equivalent dosage levels, an adult would need to drink over 70,000 L of water treated with ProcellaCOR FX everyday.

Will ProcellaCOR FX negatively impact the lake's native fauna and flora?

- Most native aquatic plants unharmed, possible damage to dicots
- No identified toxicological impacts on fish or aquatic invertebrates
- Third-party research has concluded that it does not harm reptiles, amphibians, or fish
- Has not been found to bioaccumulate

Water use restrictions following ProcellaCOR FX application

- No drinking water restrictions
- No swimming restrictions
- No fishing restrictions
- No restriction on turf irrigation

Do not use treated water for:

- Irrigation of greenhouse vegetables and fruit
- Hydroponic irrigation
  - Unless it has been filtered using activated charcoal or a similar filtration system prior to use
- Irrigation of gardens, landscape vegetation, or other non-food irrigation for 5 days after application
- Irrigation of commercial field crops until concentrations are below 2 parts per billion

Previous uses of ProcellaCOR

- Approved for use in Canada in 2023
    - Used in 5 Canadian lakes, so far
    - Farlain Lake (ON)
- Approved for use in USA by EPA in 2018
    - Used in over 200 lakes in the USA
- Applications have been successful, with dramatic reductions in watermilfoil and limited impact on native species
    - However – lack of long-term data

- **Case study: Farlain Lake**
    - First Canadian lake to use ProcellaCOR FX
    - Applied ProcellaCOR FX in September, 2023
    - Follow-up surveys in October, 2023
        - Determined watermilfoil was dying or dead, while native plants were still living
    - Surveys conducted in July, 2024 of treated areas did not find any watermilfoil
    - Native vegetation was found at 13 out of 15 sites
    - Future management will likely include hand harvesting and periodic applications of ProcellaCOR FX to control any new, dense milfoil sites

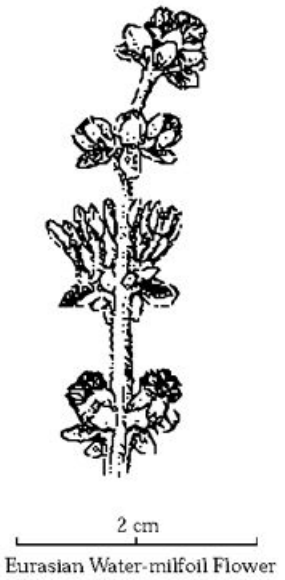
ProcellaCOR FX peer-reviewed research

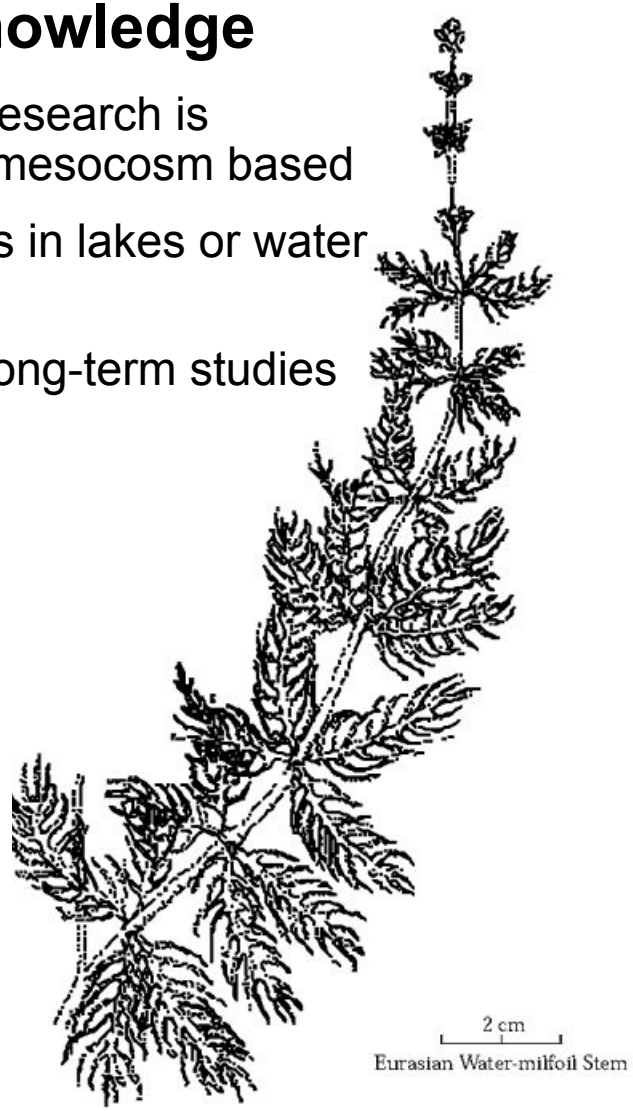
Findings:

- Effective in partial-lake treatments of EWM with limited non-target impacts to native species **(Davidson, 2023).**
- Significant control of EWM. Native species showed lower sensitivity **(Beets & Netherland, 2019).**
- Minimal declines in native aquatic plant species presence and increased species richness following treatments. EWM decreased from 72 to 1% and 58 to 8% after treatment and remained low 1 year after treatment **(Cattoor et al., 2022).**
- Herbicide formulations with ProcellaCOR's active ingredient were not toxic to juvenile freshwater mussels in tested concentrations. LC50 level (concentration with 50% mortality rate) could not be determined, due to the lack of mortality at the highest tested concentration **(Buczek et al., 2020).**

Gaps in the knowledge

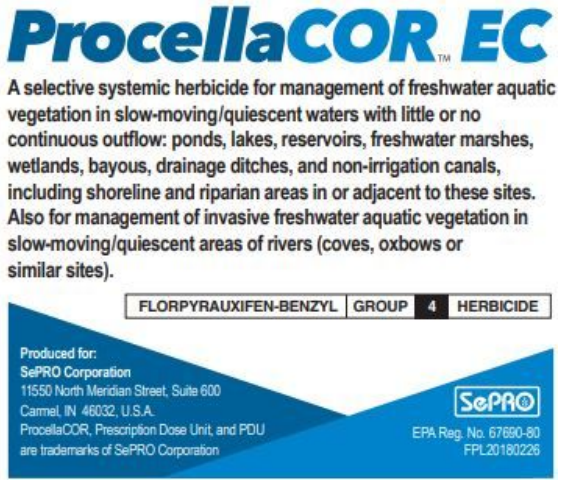
- Peer reviewed research is primarily lab or mesocosm based
  - Few studies in lakes or water bodies
- No 5-10+ year long-term studies



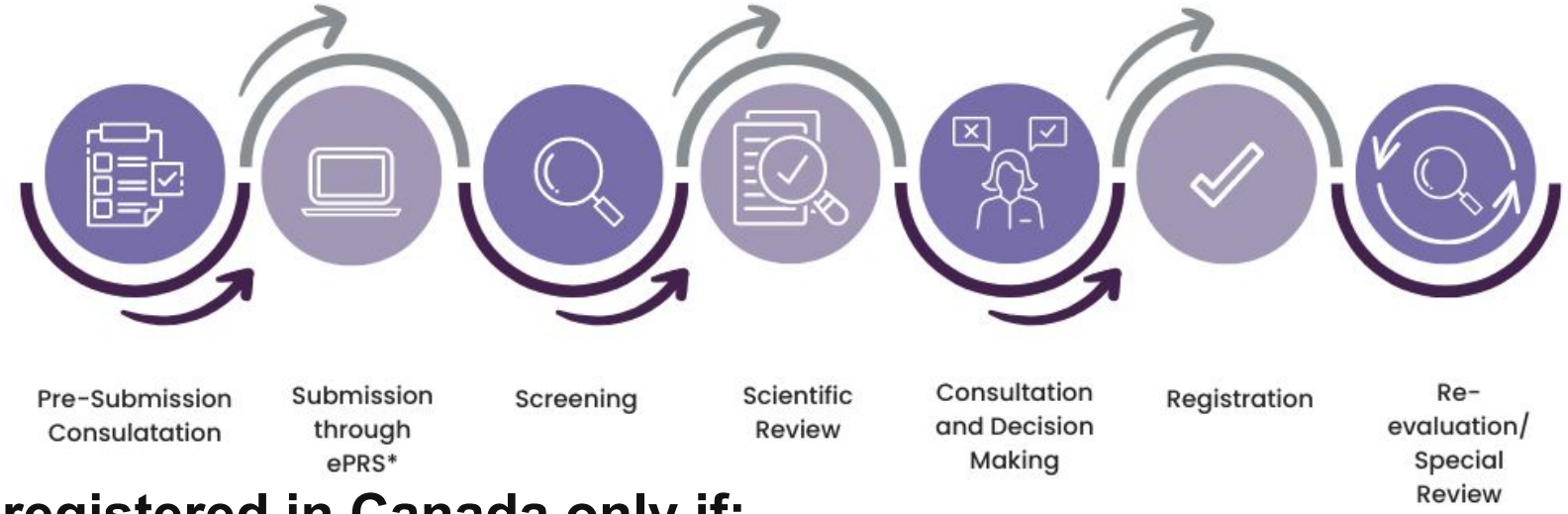


Pest Management Regulatory Agency (PMRA) Herbicide Approval Process

1. **Applicant prepares a submission that documents:**
   a. The potential risks to human and animal health;
   b. The way the product degrades in the environment; and
   c. The residues that could be left on foods
2. **PMRA assesses the application, specifically:**
   a. Where, how, and by whom will the pest control product be used?
   b. What is its toxicity?
   c. Are there any potential health hazards to users or bystanders?
   d. Will food or drinking water be affected?
   e. What is the impact on the environment?



PMRA registration, continued



A herbicide is registered in Canada only if:

1. Sufficient data has been provided to assess the safety and value of the product;
2. A scientific review of health and environmental risks associated with its proposed use are acceptable; and
3. A value assessment determines that the product does what it claims to do and sets the lowest effective application rate

Approved pesticides and herbicides go through a re-evaluation process every 15 years to ensure they continue to meet current health and environmental standards

Current debate over active ingredient status

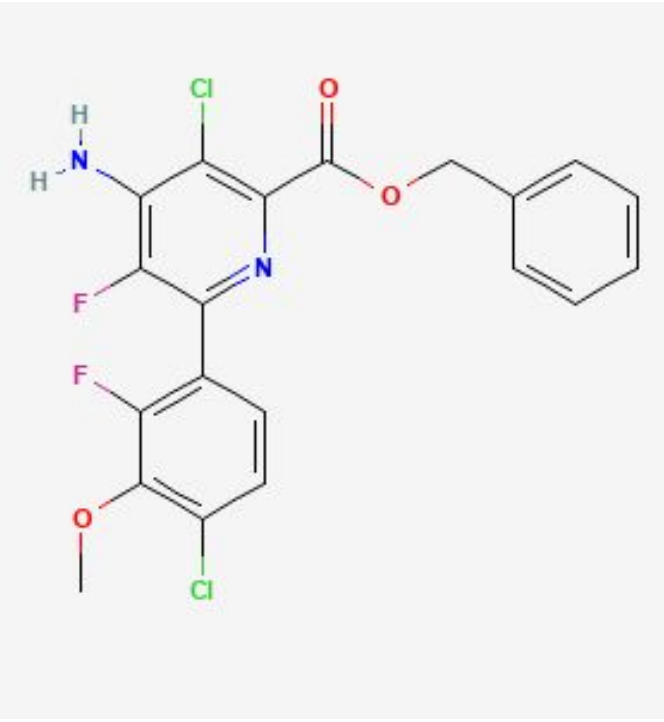
Disagreement over whether Florpyrauxifen-benzyl (FPB) should be classified as a "forever chemical," also known as a PFAS (per- and polyfluoroalkyl substance)

Currently

- US EPA does NOT classify it as a PFAS
- Minnesota Department of Agriculture (MDA) recently published a report that DOES include FPB on a list of PFAS

Why the difference?

- MDA defines any active ingredient that contains at least one fully fluorinated carbon atom as a PFAS
    - This is the broadest definition in regulatory use.
        - Broader than EPA, the European Chemicals Agency, and the Organization for Economic Co-operation and Development
    - Under this, 95 active ingredients are considered PFAS. Under EPA, it would be 6
    - Other regulatory bodies use narrower definitions with more restrictions on the compound's chemical structure



Next Steps:

1. Document feedback, including survey responses and concerns raised in this information session
2. Compile feedback into a report for the RDKB

Your feedback matters!

- If you have not already, please fill out the survey to share your opinion on the use of ProcellaCOR FX in Christina Lake
  - Can be found on the RDKB Join the Conversation page
  - Fill-out a physical copy today
  - Or scan the QR code on the next slide
- Deadline for survey responses is October 1, 2025

Thank you for your time!

Questions?

Relevant contact info:

- SePRO: Travis Fuller – **travisf@sepro.com**
- Farlain Lake Association: **inquiries@farlainlake.ca**
- RDKB: Stephen Gaim – **sgaim@rdkb.com,**
  Janine Dougall – **esmanager@rdkb.com**

Please fill out the survey by scanning the code below: