



Integrated Pest
Management Policy C501A

Edmonton

**Annual Report
2021**

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Executive Summary

Overview & Governance

Integrated Pest Management (IPM) Policy (C501A) commits the City to using evidence-based decision-making to protect public health and to comply with legislative obligations with respect to regulated pests and invasive species.

IPM policy governance is managed by Urban Planning and Environment (UPE), in conjunction with a cross-divisional team with representatives from UPE, Community Standards and Neighbourhoods, Parks and Roads Services, Community Recreation and Culture, and Integrated Infrastructure Services.

IPM services are supported and delivered by several business areas with input from an IPM Operational Committee and an IPM Advisory Group. The IPM Operational Committee includes internal representatives from business areas and external representatives including Alberta Health Services, Health Canada, Alberta Environment and Parks, and EPCOR, that contribute to the planning and review of IPM initiatives and sharing of relevant IPM related information. The IPM Advisory Group is a citizen-led group with members from the Edmonton Capital Region with interests from academia, industry, health and government policy who provide strategic advice to Administration.

IPM Programs & Deliverables

The City of Edmonton is committed to applying an Integrated Pest Management approach that prioritizes preventative methods of pest management and supports the long term management of pests using a combination of techniques such as mechanical and physical control, biological control, habitat manipulation and the judicious application of pesticides.

IPM action plans are evaluated and updated annually. The IPM Policy guides this work and includes a requirement to generate an annual report on the pest management activities that have been undertaken. Pesticide use is regulated both federally and provincially and the City of Edmonton employees operate under a Pesticide Service Registration.

Public Engagement

The City of Edmonton uses a variety of methods to provide transparency on decisions, education regarding its IPM programs and opportunities for citizens to engage and ask questions. This has included continued publication of the IPM newsletter, social media posts, response to inquiries through the 311 system, edmonton.ca webpage updates, information sessions and volunteer events.

The City is committed to accountability and transparency regarding the use of pesticides. Planned treatment locations by City employees for golf courses, mosquitoes, tree insects and other pests and vegetation management are posted on publicly accessible maps on edmonton.ca. Pesticide usage is reported annually through the City of Edmonton Pesticide Usage Report (Appendix A).

A public awareness and engagement approach is used to provide transparency on decisions, education on IPM programs and to allow citizens to engage and ask questions.

Contractor Engagement

External engagement sessions were held in late 2021 with current and potential contractors to discuss material changes to IPM reporting and how these might potentially impact contractors. Thirty-six stakeholders from various sized companies and different IPM services attended a series of three facilitated workshops to provide input.

Integrated Pest Management (IPM) Policy C501A: A Plan for Implementation

The Integrated Pest Management (IPM) Policy commits the City to using an evidence-based decision-making framework for integrated pest management, to protect public health and to comply with legislative obligations with respect to regulated pests and invasive species.

This approach applies to all activities undertaken by City employees or City-hired contractors, to maintain City-owned properties and public spaces. IPM prioritizes preventative methods and uses a combination of techniques, including physical treatments, biological control, habitat manipulation and the judicious application of pesticides.

The four key principles of this policy are accountability, efficacy, health and safety, and sustainability. This report describes how these principles have guided the application of the policy to pest management activities undertaken by City employees and City-hired contractors.

This report summarizes:

- the progress on policy implementation,
- the use of IPM Action Plans to describe how City employees meet the principles of the policy,
- total pesticide usage for all City pest management strategies undertaken by City employees, and
- progress on including this data from contractors.

As part of the City of Edmonton's commitment to service excellence, Administration conducted a review of policy implementation progress. The review indicated a number of areas where operations are aligned with the intent of the policy. These include:

- Development of pest-specific management plans, or IPM Action Plans for City operational groups that meet policy intent and commitments.
- Use of web-based platforms to disclose City pesticide applications.
- Work within the IPM Operational Committee with internal and external partners, including Alberta Health Services, Health Canada, Alberta Environment & Parks and EPCOR.

- Creation of an IPM Advisory Group to provide strategic advice to Administration and facilitate public perspective on IPM issues.

Several areas of improvement for implementation were also identified.

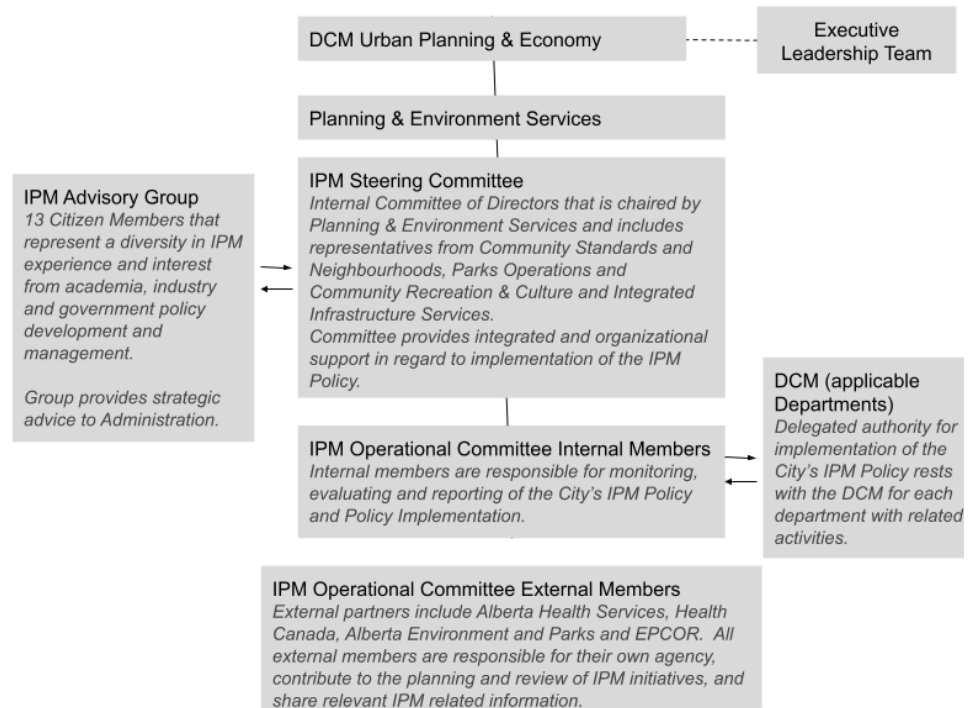
These include:

- Further engagement with contractors of City-owned properties.
- Improvements to processes related to the intake of contractor information, including identification of resources and platforms required to support the intake of decision-making frameworks, pesticide daily application plans and pesticide application data from contractors.
- Inclusion of a public health or toxicology lens in the IPM Advisory Group.

A timeline for addressing the areas for improvement was developed in 2019. As progress on the work plan items began in 2020, the COVID-19 pandemic unfolded. The work plan pivoted to focus on continuing to strengthen and support internal policy implementation and the development of the IPM Advisory Group in 2020, and advancing the contractor stakeholder engagement in the later portion of 2021.

The coordination of Integrated Pest Management activities among the relevant departments and programs is supported by the City's environmental management system, Enviso, from the design stage of new projects through to construction and maintenance activities. An Environmental Manager from the Enviso team chairs the IPM Operational Committee, supports the IPM Advisory Group and works with the Steering Committee to progress coordinated implementation.

Figure 1 IPM Policy Implementation Governance



IPM Policy Implementation Steering Committee

The update to IPM Policy C501A in 2019 prompted a requirement for the City to review the resourcing model needed for the successful delivery of Policy commitments. A steering committee was formed to champion implementation and provide integrated and organized support and decision making.

The IPM Policy Implementation Steering Committee is an internal committee of Directors that is chaired by the Environment and Climate Resilience section of the Planning and Environmental Services Branch. It includes representatives from Parks and Roads Services, Community Recreation and Culture, Community Standards and Neighbourhoods, and Integrated Infrastructure Services.

The Steering Committee is responsible for providing key updates to Council on policy implementation, liaising with the IPM Advisory Group and supporting the deliverables and programs of the departments.

IPM Operational Committee

The IPM Operational Committee consists of both members of City Administration and external partners, with clearly defined roles and responsibilities in the Terms of Reference. This long standing Committee meets monthly, up to 10 times each year.

City of Edmonton members include those that directly manage IPM issues operationally and strategically, representing pest management, urban forestry, recreational facilities, and parks and natural areas management. External partners include Alberta Health Services, Health Canada, Alberta Environment and Parks and EPCOR.

The purpose of the Operational Committee is to monitor, evaluate and report on the City's IPM Policy and Procedure C501A and policy implementation. Each member is responsible to their own agency and to the legislative and regulatory frameworks they work under. While the committee as a whole does not have a collective scope of authority, responsibility for City implementation and policy adherence lies with the business areas. Operational Committee membership and the Terms of Reference are confirmed annually.

City Administration directly approached the external partners noted in the IPM Operational Committee membership to request participation in the IPM Advisory Group. Due to the mandates of their organizations, they were not able to participate in the IPM Advisory Group in the capacity of providing strategic advice on pest management issues as defined in the Policy procedure. However, all external partners offered to attend as guests or provide subject matter information as requested by the IPM Advisory Group.

IPM Advisory Group

City Administration recruited Edmontonians to the IPM Advisory Group in the fall of 2019, and appointed these members following interviews in January 2020. All members of the IPM Advisory Group are self-declared as Citizens at Large and do not directly represent the organization or employers they are currently or historically affiliated with. This group, of up to 13 members, represents a rich diversity in IPM experience and interest from academia, industry and government policy development and management.

No health professionals, with specific experience in public health or toxicology, were among the applicants.

Administration and the Advisory Group recognized not all perspectives are represented within the group, specifically a member with direct experience to provide a public health or medical toxicology lens. While no one with this professional experience responded to the 2019 recruitment, the Advisory Group began work to ensure the collective wisdom of the community could be heard through direct recruitment or invitation to present.

Specifically, the Advisory Group invited Health Canada's Pest Management Regulatory Agency (PMRA) to provide education to the group on how pesticides are registered and what the requirements are to allow registration for use. The Advisory Group also provided a request to speak mechanism on the group website. Additionally, Administration met with the Edmonton Zone Medical Officers of Health in June 2021, to discuss options for bringing the public health perspective to the table. Timed with the biannual renewal of membership for the 2022-2023 term, in addition to the general call for interested citizens, targeted outreach for membership was conducted with academic institutions focussing on toxicology and public health. In the recruitment process for the 2022-2023 term, a member was appointed with medical experience and interest in the interaction with pesticide exposure.

Current membership and their biographies, as well as the meeting minutes are posted on the [group's website](#). To reflect the rich diversity of public perspective, all members of the public are invited to present to the group by submitting a [request to speak form](#), emailing ipmadvisorygroup@edmonton.ca, or reaching out through the IPM Advisory group's [web page](#).

In 2020, the IPM Advisory Group focused on establishing its mandate to facilitate public perspective on IPM issues and to provide a vehicle for the development and flow of strategic advice to Administration. They developed a Terms of Reference and Conflict of Interest protocol, posted member biographies on the web page and participated in a GBA+/Diversity workshop focused on the group's mandate. Recognizing the importance of understanding the legislated requirements and registration process of

pesticides, the group invited a presentation from Health Canada's Pest Management Regulatory Agency.

Over the first two years of this group's work (2020-2021), in addition to interactions with Administration to better understand the current state of IPM programs and the scope of authority at the City, the group reviewed changes to operational planning from Administration. This included a review of the impacts to weed management programs from COVID-19 budget impacts and review of IPM programs including the Pesticide Exemption Program, Parkland Petition Program and the IPM Community Engagement program. In the last half of 2021, the group focused on detailed reviews of six of the IPM Action Plans and the guiding template.

Public presentations made to the group included concerns with IPM operational choices related to golf courses. After the citizen presentation, the group reviewed the operational planning with Administration prior to responding to the citizen.

City of Edmonton IPM Programs

City of Edmonton programs that involve the direct management of IPM issues by City employees currently fall under three branches: Parks and Roads Services, Community and Recreation Facilities and Community Standards and Neighbourhoods.

These programs include the management of pests that directly or indirectly affect City assets. A **pest**, for the purpose of the IPM Policy C501A and the City management programs, is defined as any living organism that has an undesired effect.

At the City of Edmonton, we manage pests for a variety of reasons. Actions to manage pests are triggered by thresholds described in the operational programs and relevant IPM Action Plans. These include:

- Regulated Pests that the City has an obligation to monitor, control and/or eliminate as per federal or provincial legislation and regulations. These include weeds or invasive plants and insects.

- Pests that have the ability to damage infrastructure or assets, such as rodents, insects and some birds.
- Pests that can affect turf health and quality, found in places such as golf courses and premier sports fields.
- Pests that can affect the health and safety of people, such as microorganisms in water bodies used for triathlon events, bedbugs and coyotes when they become pests.
- Pests such as geese that affect the quality of experience of City assets.

Pests that City employees directly manage include:

- Turf, tree and vegetation diseases and their vectors, such as Elm Bark Beetles, Dutch Elm Disease and snow mould.
- Prohibited, noxious and regulated species. These can include regulated weeds, animals, insects and diseases named under municipal, provincial or federal legislation.
- Invasive species, which can include plants, animals, insects and nursery stock of concern, which can jeopardize natural area health.
- Undesired aquatic organisms, which can affect public health or aesthetics, such as pathogenic bacteria management for triathlon events and in fountains.
- Undesired insects, such as mosquitoes and other biting flies, some of which have the potential to act as vectors of disease.
- Insect and rodent pests that can affect structural assets and buildings.
- Rodents, other mammals and birds, such as geese and coyotes when they become pests or problem wildlife.

It is important to note that some organisms can exist in their environment and not be considered pests. Thresholds determine when that organism becomes a pest and requires direct management.

Within the City of Edmonton, pests are treated in a variety of areas, which can include but are not limited to:

- City buildings, field facilities, golf courses, cemeteries, recreation centres
- City attractions such as the Muttart Conservatory, Edmonton Valley Zoo, Fort Edmonton Park and Churchill Square

- Natural and naturalized areas, boulevard trees, parks, shrub beds, sports fields
- Rehabilitation projects for trails and infrastructure in natural areas
- Construction sites, development areas that require sterilants, or any other capital project where weed management is required
- Temporary and semi-permanent pools and ditches where mosquito larvae can develop
- Hard surface areas like sidewalks and parking lots
- Water treatment for safety of public interaction (triathlons, fountains)

Other branches within the City directly hire contractors, or have work within the IPM Policy scope that are components of larger infrastructure work and capital projects. This work is discussed in the Contractor section of this report.

Legislated Requirements

Legislation from the Federal, Provincial and Municipal levels governs which pests we have to manage and, if pesticides or biocontrol organisms are selected as the most effective tool, how they are used. These requirements are included within the City's ISO 14001 certified environmental management system, Enviso, and are audited regularly to verify that effective controls are in place.

Legislation which guides the requirements to control pests within the City of Edmonton includes, but is not limited to:

- Federal legislation such as the *Aquatic Invasive Species Regulations*, *Plant Protection Act*.
- Provincial legislation such as the *Weed Control Act*, *Agricultural Pest Act*, *Fisheries (Alberta) Act* and their applicable regulations. These regulations contain lists of prohibited and noxious species that the City has a requirement to manage.
- Municipal bylaws such as the *Community Standards Bylaw*, or the *Animal Licensing and Control Bylaw* which describes the standards for private property for weeds and care of pest species that if released,

could become invasive. These can include pets such as snakes and disease vectors that can cause Dutch Elm Disease.

- In 2021, the City conducted 3,054 weed investigations, issued 2,191 notices to remedy noxious/prohibited weeds, and conducted 607 remedial actions (weed control/cutting).
- Municipal programs that help control potential pests associated with backyard hens and food sources.

In addition to these legislated requirements, the City implemented a herbicide restriction in 2015, which further restricts the application of herbicides to control noxious weeds, with clearly defined exemptions.

Integrated Pest Management is a decision making framework that uses an evidence based approach to make decisions for managing pests. These tools can include mechanical, biological, cultural and when necessary, chemical. Some of these management tools, such as the application of pesticides, the use of biocontrol agents and the management choices for wildlife are regulated by Federal and Provincial legislation.

Pesticide use is regulated both federally and provincially. Pesticides are commonly used to refer to many types of pest control products made from active ingredients that are synthetic, naturally occurring or biochemical. These can include herbicides to control weeds, insecticides to control bugs, fungicides to control plant diseases, and rodenticides to control rats and mice.

Health Canada regulates all pesticides under the *Pest Control Products Act*, and registers products approved for use with specific directions on the issued pesticide label. Registered products authorized by Health Canada have a Pest Control Products (PCP) number on the label. Health Canada's Pest Management Regulatory Agency monitors pesticide incidents and publishes an annual report of incident reports received.

The Province regulates who can apply pesticides, and how they are safely distributed, stored, used and disposed. Pesticide management falls under the *Environmental Protection and Enhancement Act*, and the regulations *Pesticide (Ministerial) Regulation, Pesticide Sales, Handling, Use and Application Regulation* and the Environmental Code of Practice for Pesticides. All

applications must be performed by an certified applicator or directly supervised by one. Businesses must:

- be registered when applying pesticides on all municipal lands,
- employ certified pesticide applicators, and
- comply with all the legislation regarding pesticide storage, insurance, use and disposal.

City of Edmonton employees operate under a Pesticide Service Registration, and all applications are either supervised or performed by Certified applicators and assistants. The City's environmental management system, Enviso, helps ensure controls are in place for training, storage, use, disposal and incidents to meet legislated requirements. If pesticide services are contracted to a third party, the City must ensure the contractor holds a valid and proper service registration with certified applicators who hold the appropriate class of certificate.

Biocontrol agents, such as insects, mites, nematodes and other organisms are used to control weeds and insects. The import and release of biological control agents is regulated by the Canadian Food Inspection Agency, through the *Plant Protection Act* and its relevant directives.

When wildlife become pests, their management is either governed federally, such as the guidelines associated with Canada Geese management, or provincially, such as the management requirements for beavers and coyotes under the *Wildlife Act* or the *Agricultural Pest Act*.

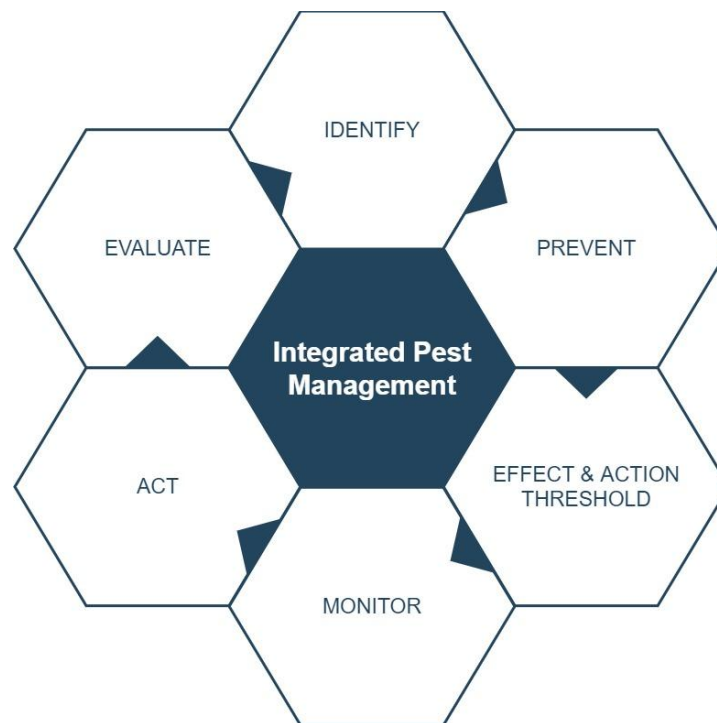
IPM Action Plans

The City of Edmonton is committed to applying an Integrated Pest Management approach that prioritizes preventative methods of pest management and supports the long term management of pests using a combination of techniques such as mechanical and physical control, biological control, habitat manipulation and the judicious application of pesticides.

This approach incorporates the six key elements of IPM: Identify, Prevent, Set Effect and Action thresholds, Monitor, Act and Evaluate, as shown in Figure 1.

Evidence based decision making guides the application of the IPM approach for the City's operational programs. In 2020, the IPM Operational Committee adopted the use of management plans, called IPM Action Plans, to standardize the approach for documenting policy commitments. The IPM Action Plans integrate the existing components of each program into a single document that reflects both the policy commitments and documents the six key elements of IPM. The IPM Operational Committee identified the timeline for the development of IPM Action Plans, and considered the impacts of COVID-19 on resource and capacity when identifying priorities in the work plan.

Figure 2 Elements of IPM



IPM Action Plans are updated annually, in the first quarter of each year, and include the evaluation of the preceding year. It is important to note the alignment of management of these programs may shift to reflect operational

efficiency, and that while cost efficiency is a consideration of all operational decisions, it is not currently named as a driver for decision making in the IPM Policy.

IPM Action plans prioritized in 2020 and 2021 included:

- Weeds (Open Spaces, Sports Fields, Naturalized and Natural Areas)
- Turf (Golf Courses) , 2022 expansion: Cemetery Operations, Field Facilities
- Mosquitoes
- Tree Pests and Tree Health (General)
- Emerald Ash Borer
- Dutch Elm Disease
- Regulated Woody Species
- Problem Wildlife (Coyotes), 2022 expansion for geese, raccoons

IPM plans prioritized for 2022 include:

- Muttart/Horticulture
- European Elm Scale
- Biological Control (Weeds and Diseases)
- Stinging Insects
- Black Flies
- Vertebrate Pests (that affect infrastructure)
- Structural Pests (inside structures, building, community facilities)

Accountability, Pesticide Application Disclosure, Exemption Programs

The City of Edmonton is committed to accountability and transparency regarding the use of pesticides. IPM strategies focus on minimizing the use of pesticides, but some pesticide use is required to ensure program effectiveness and meet legislated requirements.

Treatment applications are disclosed as required by pesticide label and Pesticide Service Registration requirements. This can involve published annual notification of intent to apply for mosquito and weed control programs, and signage at location of application.

Above these regulated requirements, the City is committed to sharing the accurate, current treatment locations with citizens. Treatment locations by City employees for golf courses, mosquitoes, tree insects and other pests and vegetation management are posted on publicly accessible maps on edmonton.ca in the [Public Notice of Pesticide Programs](#) section.

The City offers the [Pesticide Exemption Program](#) where citizens may apply for increased restrictions on pesticide use, to prevent City employees and contractors from applying pesticides within 30m of their residence unless there is a pertinent need to do so. Pertinent need is defined within the program information, and if this need arises, the citizen will be contacted 48 hours prior to the application. Residents can also petition to designate a neighbourhood green space as herbicide free through the [Park Petition Program](#).

Pesticide usage is reported annually, through the City of Edmonton Pesticide Usage Report. As part of the commitment to accountability, this report details trends, products used, and categories of usage for pesticides in the 2018-2021 seasons. This includes all uses of pesticide by City employees, as well as City contractors applying mosquito larvicides. At this time it does not include pesticides applied by other City contractors. Work is underway to include this data in future reports.

The City of Edmonton Pesticide Usage Report, 2018-2021, is included in Appendix A.

All spills and releases of pesticides, or potential pesticide incidents are reported to the provincial or federal agencies as required. In the event of a spill, release or incident, City staff work with the regulators to ensure the correct mitigations are developed and any damage is remediated. These mitigations are verified through the City's environmental management system, Enviso.

Public Education and Engagement

The City of Edmonton uses a variety of methods to provide transparency on decisions, education regarding its IPM programs and opportunities for citizens to engage and ask questions. Publication of the monthly IPM

newsletter started in May 2019 and continued in 2021. The newsletter currently has 399 subscribers.

Social media is used to promote awareness of these programs, and citizens regularly submit specific questions related to IPM through 311 and other mechanisms, including but not limited to, email inquiries and specimens submitted for identification.

Website education and awareness provides information on the programs, and is mainly organized by the service delivery. Web pages provide related links to other service programs and to related documents.

- [Integrated Pest Management](#) focuses on the City's IPM approach, [Public Pesticide Notifications](#), Weed Biocontrol and Aquatic Invasives
- [Insects, Weeds and Pests](#) focuses on Mosquitoes, Weeds and Insect Identification and Advice
 - [Insect Identification and Advice](#)
 - [Weed Identification](#) and [Control Programs](#)
- [Wildlife](#) focuses on coyote, geese and rat, prevention and management
- [Tree and Plant Complaints](#) and [Weeds Enforcement](#) focus on information related to the Community Standards Bylaw requirements on weeds and diseased wood

Additionally, many of the programs host information sessions and community events to provide education to citizens and opportunities to engage and ask questions. For example, in 2021, IPM related engagements for coyotes reflected COVID-19 restrictions and included webinars focusing on educating citizens on encounters and prevention to decrease conflicts.

Volunteer events and programs, related to IPM while impacted by Public Health restrictions, included:

- Community weed pull events (five), focused on leafy spurge, garlic mustard, Himalayan Balsam and Canada thistle.
- "Spot it Report it Remove it" branded gardening gloves to educate residents on invasive species.

Engagement with Contractors

The Integrated Pest Management Policy applies to all activities undertaken by City staff or City hired contractors, to maintain City-owned properties and public spaces.

Contractors can be involved in IPM activities within the scope of the Policy that include but are not limited to:

- The design and planning stage or construction phase of infrastructure or rehabilitation projects.
- Managing weeds and invasive species associated with earthworks construction phase of infrastructure or rehabilitation projects.
- Managing rodents associated with temporary construction trailers.
- Clearing sewerage infrastructure for sewerage pipeline inspections or preparing land for new building infrastructure.
- Managing structural pests associated with buildings and their associated infrastructure.
- Managing pests in public infrastructure that can impact health and safety, such as bed bugs associated with public transit.

Currently, all contractors who intend to apply pesticides as a component of their work are required to acknowledge and mitigate this risk as specified in the City's *Contractor's Environmental Responsibility Package* and potentially the associated ECO Plan developed by the Contractor, if conditions for requiring an Eco Plan are met. Prior to application, contractors are required to confirm their work scope does not overlap with resident's preferences in the City's Pesticide Exemption Program, using the Pesticide Application disclosure program.

The new Policy and the recommendations from the City Auditor's 2017 Report on pesticide use brought three material changes for contractors, who are required to:

- document their decision making framework for the IPM activities,
- submit their pesticide application data in the City's annual pesticide usage report, and
- share accurate, current treatment locations with citizens.

During the initial stakeholder engagement for Policy development in 2018-2019, we identified concerns from industry participants related to

these changes and we committed to further engagement on these requirements.

It is important to note that contractors who apply pesticides on behalf of the City are responsible for following provincial and federal regulations on the safe and effective use of herbicides in their worksite, and for notifying the public in accordance with product labels. Federal pest control product label regulations depict how to mitigate exposure to wildlife, water systems and bystanders. It is the contractor's responsibility to adhere to these guidelines, including but not limited to using only certified applicators to apply products.

A timeline for engaging internal staff who manage these contracts and associated projects, and for engaging current and potential contractors was developed in 2019. As progress on work plan items began in 2020, the COVID-19 pandemic unfolded. The work plan pivoted to focussing on the internal engagement in 2020 and progressing contractor stakeholder engagement in the later portion of 2021.

The required date for City-hired contractors to implement this Policy is January 1, 2023, with the expectation for participation in submitting pesticide application data and planned application disclosure from June 1, 2022 onward.

Internal Engagement with our Contract Managers and Operational Staff

IPM operational staff and contract and project managers who hire contractors to conduct IPM activities were invited to participate in internal engagement sessions to review the material changes for contractors, identify potential issues including the internal resources and capacity to implement these changes. Five workshops were held in December 2020 and January 2021. Participants identified opportunities to build on existing system controls and interfaces to support contractors in meeting the policy commitments. The participants identified pinch points, potential resource capacity constraints and potential paths forward that included:

- Providing clear instructions to contract managers on the requirements.
- Clarifying expectations for contractors in the City's *Contractor's Environmental Responsibility Package*.

- Providing a simple interface for the intake of contractor pesticide application data.
- Developing a public pesticide notification system for contractors to share accurate and current application plans that reflect the technological capabilities of all contractors.
- Additional resources were noted as needed to support this data in the initial data intake year, including addressing contractor concerns in the pilot year, and ensuring compliance with expectations and data submissions.

External Engagement with Existing and Potential Future Contractors

External engagement in November and December 2021 focused on existing contractors and potential future contractors, with the goal of discussing the material changes and understanding how these changes would potentially impact contractors. The facilitated discussions were designed by a third party to better understand concerns with the requirements, opportunities to support our contractors and to identify design features of the information intake platforms. A *What We Heard Report* will be finalized in April 2022.

Stakeholders with existing contracts were identified through the most current list of open contracts and in consultation with contract and project managers. In consultation with Legal Services, these stakeholders were contacted directly with a letter providing notice regarding the deliverables, an invitation to join the engagement sessions, and contact information for additional follow up and questions. Stakeholders interested in potential work with the City were contacted directly through affiliated associations and publicly available business listings.

In November and December of 2021, the City hosted three workshops in the REFINE area of the Public Engagement Spectrum, with 36 stakeholders from various sized companies and different IPM services. General topics raised by the stakeholders included:

- Clarification on any associated decision making, on intended application plan and flexibility to adjust decisions in the field according to conditions.

- Designing the intake systems for submitted data with simplicity, mirroring the required pesticide application record as closely as possible.
- Clarification on the assignment of reporting responsibilities in relevant City documents, such as contracts, the *Contractor's Environmental Responsibility Package* and Design Standards.
- Providing clear instruction on the data submissions interface and support for issue resolution.

Next Steps for Increasing Contractor Accountability and Transparency

The next steps for increasing contractor accountability and transparency focus on providing clear expectations and support to contractors and contract managers. Timelines on deliverables reflect the start of the pilot data intake and disclosure date of June 1, 2022, with the exception of support for issue resolution which will be ongoing. Next steps include:

- Clarification of requirements in supporting City documents, including the contract risk assessment process, contracts and *Contractor's Environmental Responsibility Package*.
- An integrated rollout of these requirements to all applicable contract managers.
- Development of the data intake form for pesticide application data.
- Development of a web-based interface for disclosure of pesticide application plans.
- Continued support and issue resolution for contractors and contract managers. Dedicated internal resources for this support are identified.

Key deliverables for 2022

Key deliverables for the successful implementation of the Integrated Pest Management Policy reflect the policy commitments and key principles and are supported by the IPM Policy Implementation Steering Committee. These include:

- Continued support for the IPM Advisory Group and the IPM Operational Committee.
- Continual improvement opportunities for the Policy Annual Report, such as inclusion of metrics in the public education section.

- Completion of the remaining IPM Action Plans and evaluations of 2021 programs.
- Development of the contractor data intake mechanisms, supporting instructions and an integrated and comprehensive implementation across all departments.
- Contractor management accountability improvements in the contract risk assessment process, contract requirements and *Contractor Environmental Responsibilities Package*.
- Evaluation of policy application to existing and future property leases and partner agreements.
- Health check on compliance with the data intake systems, development of audit protocol to verify use and effectiveness.
- Assignment of internal resources to support the contractor data intake and continued support for issues related to implementation.

Timeline for the Next Policy Update

A formal review of the Policy is currently planned for every five years, or as required. The next update is scheduled for 2024, and while opportunities to improve the policy are identified, the Steering Committee does not recommend an earlier revision.

Revision will follow the Corporate Policy Framework, led by the Parks and Roads Services Branch and supported by their Department Strategy Section and the Service Innovation Branch, with a dedicated team beginning in 2023. The policy revision will include engagement with all departments as scope applies to most business areas, and clear alignment with the Corporate Policy Framework tools to activate strategy and direct the activities of City of Edmonton staff.

City of Edmonton

Edmonton

**Pesticide Usage Report
2018 / 2019 / 2020 / 2021**

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Executive Summary

Pesticides, though important, are only one of a number of Integrated Pest Management (IPM) tools used to manage growing numbers of urban pest species and issues. Pests cause issues including public health, sanitation and general nuisance issues; impairment of public utility functions; facility and building pest infestations; pest impacts on the urban forest, other green infrastructure such as sports fields and golf courses, and damage to the City's natural biodiversity and ecosystems.

The City's use of pesticides is framed by a comprehensive federal system regulating product registration and safety in Canada, a provincial system regulating sales and application restrictions in Alberta, and the City's Integrated Pest Management Policy (501A), approved by Council in July, 2019. The common thread throughout all these levels of government policy on pesticides is their planned use under an Integrated Pest Management, or IPM, approach.

IPM is about effective, knowledge-based, responsible pest management options with minimal risk to human health and the environment. Traditional, conventional pesticides tend to be quite potent at low doses, which makes them extremely effective when measured on a per-kilogram basis. Newer, biorational pesticides are more targeted, and are less toxic to non-target organisms, but often require much larger application rates to be effective.

City of Edmonton: Pesticide Usage

Pesticides are products used directly or indirectly to control, destroy, attract or repel a pest to mitigate or prevent injurious, noxious or troublesome effects.

Herbicides target unwanted plants, such as noxious and prohibited noxious weeds regulated under provincial legislation.

Insecticides target insects such as biting flies, yellowjackets, or pests that threaten the urban forest such as bark beetles or scale insects.

Fungicides target fungus that grow in moist conditions, and threaten turf or trees.

Rodenticides target vertebrate pests like pocket gophers, ground squirrels or mice that do damage to city infrastructure.

All pesticides used by City of Edmonton are registered with Health Canada, and applied under supervision of licensed applicators.

Pesticides, though important, are only one of a number of Integrated Pest Management (IPM) tools used to manage growing numbers of urban pest species and issues. Pests cause issues that include public health, sanitation issues and general nuisances; impairment of public utility functions; facility and building pest infestations; pest impacts on the urban forest, other green infrastructure such as sports fields and golf courses, and damage to the City's natural biodiversity and ecosystems.

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IPM is about effective, knowledge-based and responsible pest management options with minimal risk to human health and the environment. The City's IPM Policy is built on the four pillars of Accountability, Efficacy, Health & Safety, and Sustainability.

As part of the commitment to Accountability, this report details some of the trends, products used, and categories of usage for pesticides in the 2018-2021 seasons. This includes all uses of pesticide by City employees, as well as Contractors applying mosquito larvicides. It does not include pesticides applied by other Contractors, even when applied to City property.

There are four main areas in the City of Edmonton that utilize pesticides as part of their day-to-day IPM operations.

Integrated Pest Management (Parks & Roads Services Branch; City Operations Department)



Flowering rush

Flowering rush is a prohibited noxious weed, listed under the Alberta Weed Control Act and the Fisheries Act. It was introduced as an aquatic ornamental planted in and around water features.

Integrated Pest Management (IPM) manages turf and green spaces throughout the city, including the management of noxious and prohibited noxious weeds on city property, as well as maintenance of sports fields, high profile public areas and parks.

Pest Management Lab & Operations (Community Standards & Neighbourhoods Branch: Citizens Services Department (1918-2020) / Parks & Roads Services Branch; City Operations Department (2021))

Pest Management Lab & Operations performs monitoring and surveillance for invasive insects and diseases that threaten the urban forest, manages native and introduced insect and vertebrate pests on city property, and controls mosquito populations developing in temporary aquatic habitats on public and private property within Edmonton and in surrounding areas within the regional program boundaries.

Golf Courses & Cemeteries (Community Recreation Facilities: Citizen Services Department)



Asian longhorned beetle

The Asian longhorned beetle is listed in the federal Plant Protection Act. Infestations have killed maples and other trees in many communities in North America. In 2019 one Asian longhorned beetle was detected in Edmonton in wooden pallets shipped from China.

Golf Courses & Cemeteries control insect pests, fungal diseases and weeds to maintain high quality turf standards on city golf courses and in city cemeteries.



Muttart Conservatory (Community Recreation Facilities: Citizen Services Department)

The Muttart Conservatory utilizes a variety of integrated pest management techniques to maintain and grow a wide variety of exotic and demanding

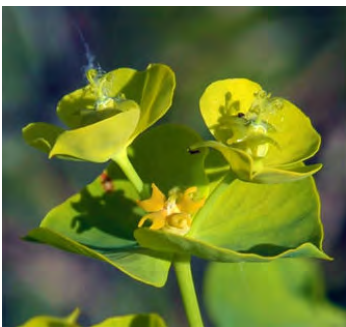
plant specimens in the specialized greenhouse interior environment of the facility. The primary approach at the facility is the use of biologicals for insect management.

2018/2019/2020/2021 Pesticide Usage

In 2019 City Council approved the updated Integrated Pest Management Policy (501A) which spells out the city's commitment to the principles of IPM and obligations for notification and reporting of pesticide usage on city property or by city employees or contractors.

The goal of Integrated Pest Management is to balance the most effective, and most sustainable pest management practice while minimizing risk to health, safety and the environment. Ideally, this involves employing a proactive solution that prevents pest problems from occurring before an outbreak develops, but that is not always possible. When direct intervention is required, it involves choosing the right tool to manage a pest in the right place and time, in the most vulnerable life stage, with the most effective tool. Sometimes this requires the judicious application of pesticides. In many cases, this results in a decrease in overall pesticide usage. This is an overall goal of the IPM program, but is not a metric of its success, as there are many factors that can affect seasonal rates of pesticide use.

Traditional, conventional pesticides tend to be quite potent at low doses. This makes them extremely effective when measured on a per-kilogram basis, but they can have deleterious effects on non-target organisms as well. Newer, biorational pesticides are more targeted, and are less toxic to non-target organisms, but often require much larger application rates to be effective. Many also lack residuality, or need to be applied several times at different stages of the target's growth cycle, again increasing the total amount that must be applied. As the City shifts away from conventional pesticides to the newer reduced-risk and biorational products, the comparative quantities of active ingredients by kilogram will likely increase.



Leafy spurge

Listed in Alberta Weed Control Act as a noxious weed, leafy spurge thrives in disturbed areas and inhibits the growth of nearby plant species.

Seasonal variations can also make a big difference. Mosquito populations in particular, are highly driven by spring and summer precipitation. Years in which there is higher than average rainfall and warmer temperatures will trigger more mosquito activity, and subsequently require more larvicide application to manage their populations.

Outbreaks of cyclical pest species, or introductions of invasive species, especially regulated species such as noxious or prohibited noxious weeds

require swift action before such pests can get established, and often require pesticide application.

Pesticide usage is reported in kilograms of active ingredient.

The active ingredient is the component of a pesticide formulation responsible for its ability to control the target pest.

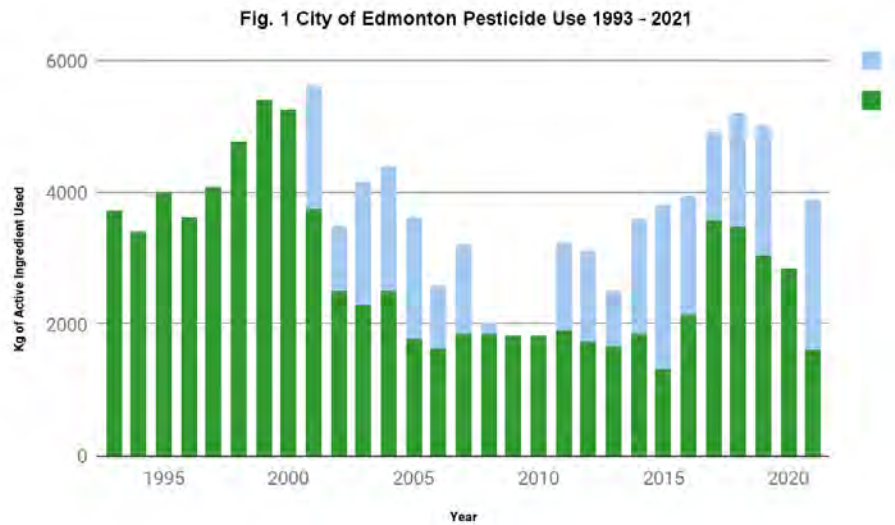
Some products have more than one active ingredient.

Full page versions of all Figures are available in Appendix 3.



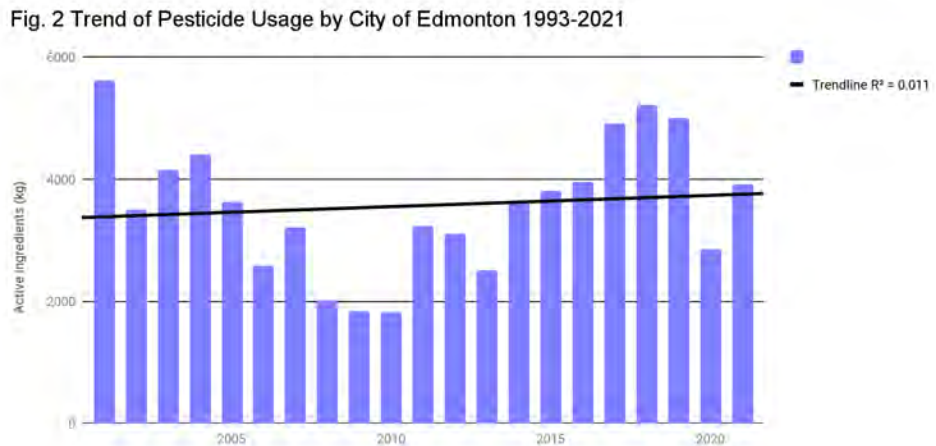
Emerald ash borer

Named in the federal Plant Protection Act, emerald ash borer has devastated native and planted ash trees in eastern North America since its first detection in 2002. Since then it has been detected in five provinces, including Winnipeg, Manitoba in 2018. Green ash trees are the most abundant boulevard tree in Edmonton's urban forest.



Blue represents sodium hypochlorite used in conjunction with water contact events
Green represents all other pesticides used, including insecticides & herbicides

The general trend for the last several years has been for increasing pesticide use, primarily driven by the two biggest users; Pest Management Operations and Integrated Pest Management. Pest Management Operations use is largely antimicrobials for management of water quality in conjunction with water contact events in Hawrelak Park, followed by mosquito larvicides. Integrated Pest Management usage is primarily herbicides used to maintain turf and control regulated weed species.



Measured in terms of kilograms of active ingredients used, 2018 saw more pesticides used than any year since 2001 (Fig. 1). The amount in 2019 saw a slight reduction. These high amounts were largely driven by increased use of a herbicide called Fiesta, which requires large quantities of product several times over the growing season to be effective. Further increases were driven by mosquito larvicide use, as Pest Management Operations completes the transition from broad-spectrum organophosphate pesticides to more targeted biorational products, which also require large quantities to be effective. These increases in the amount of pesticide used when shifting to non-conventional chemistries demonstrate why simple targets of decreasing amount of pesticide used are not necessarily good metrics for responsible pesticide use.



Japanese knotweed

Prohibited noxious weed under Alberta Weed Control Act. Japanese knotweed forms thick, dense colonies that completely crowd out other herbaceous species. Roots can extend 7 m horizontally and 3 m deep.

For most years, a considerable proportion or even majority of pesticide usage for City of Edmonton operations is anti-microbials (sodium hypochlorite) used to reduce populations of pathogenic bacteria in conjunction with water contact events in Hawrelak Lake. This generally involves application of such anti-microbials in the week leading up to and during events such as the International Triathlon Union (ITU) World Triathlon Series. This is done to meet Alberta Health Services guidelines and ITU regulations in regards to acceptable levels of bacterial activity, and necessary owing to the remarkably shallow depth (~1.5 m) of the man-made 5 hectare pond, and high levels of added organics due to artificially supported populations of Canada geese and ring-billed gulls around the lake.



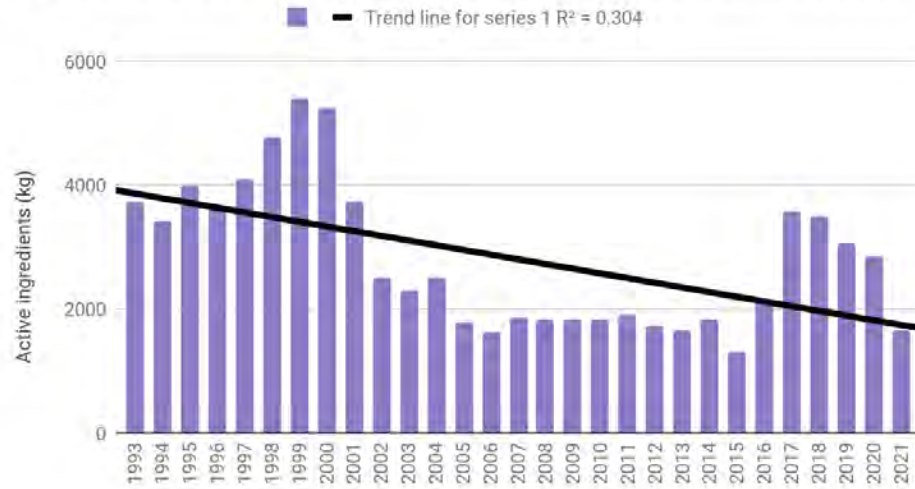
Smaller European elm bark beetle

The primary vector of Dutch elm disease, the smaller European elm bark beetle is named under federal, provincial and municipal regulations. Edmonton has the largest population of Dutch elm disease free elms in the world.

Across Canada, nearly one-third of all pesticide sales are for anti-microbials, and they made up 97.7% of non-agricultural pesticide sales in 2019 (PMRA, 2019) where they are used for water treatment, including pools and spas, and wood preservation.

Comparing only the use of insecticides and herbicides, and not antimicrobials, the trend overall has been for a decrease in pesticide usage by the City of Edmonton.

Fig. 3 Trend of Pesticide Usage (no anti-microbials) 1993-2021

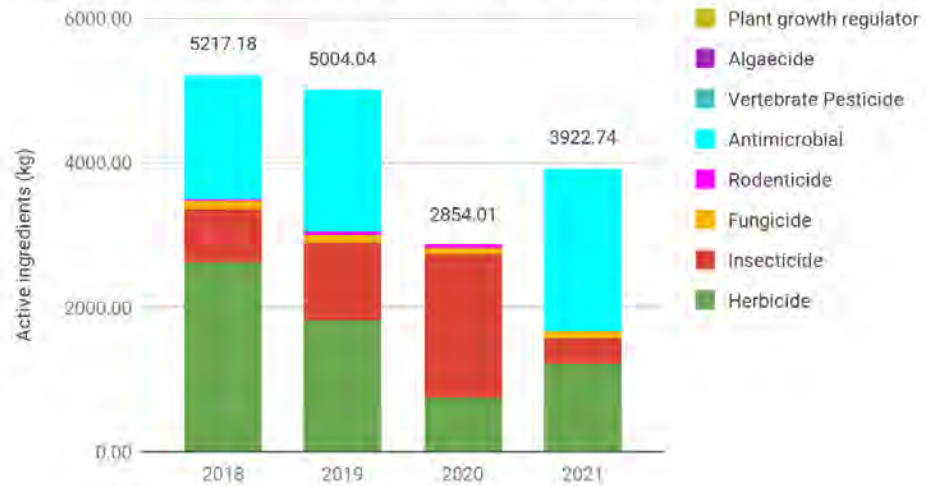


Field scabious

Introduced as an ornamental garden plant, field scabious is considered a noxious weed under the Alberta Weed Control Act. It can invade disturbed range and outcompete grasses in open fields. The mature plant is unpalatable and lacking in nutrition for livestock.

Pesticide Use by Category

Fig. 4 Pesticide Usage by Category 2018-2021



Banded elm bark beetle

Banded elm bark beetle was first detected in Alberta in 2008, and has since spread to Edmonton as far north as Grande Prairie. Potentially capable of killing elm trees on its own, it also infests willow and caragana. It is not currently regulated under any level of legislation.

In general, most of the City's pesticide use comes from anti-microbials used for water quality, insecticides used for control of larval mosquitoes, and herbicides used to maintain turf, protect infrastructure and manage regulated weed species. The uses of other products, such as fungicides and rodenticides make up a very small fraction of the overall total.

Fluctuations from year to year depend largely on environmental conditions and somewhat on the needs of events. Mosquito development in particular closely mirrors precipitation, and years with large snow melts, or high rainfall see subsequent increases in mosquito control products.



Common buckthorn

An ornamental shrub, widely planted for fencerows and windbreaks in agricultural fields, buckthorn forms dense stands under which few other plants can grow. Birds eating the fruit can carry the seeds long distances. Listed as Prohibited Noxious in the Alberta Weed Control Act.

In 2020 most of the pesticides used by the City of Edmonton were insecticides, in particular larvicides used for managing mosquito populations. The use of Fiesta (iron chelate) as a herbicide was curtailed in 2020 greatly reducing the quantity of herbicides used, and due to COVID-19 restrictions there was no triathlon held in 2020, so no antimicrobials were used for that purpose. 2020 was also an unusually rainy year, leading to widespread and regular mosquito hatching throughout the program area. More larvicides would have been used, but COVID-19 related issues created supply chain difficulties that made the product unavailable for much of June.

With the return of the triathlon, 2021 had an increase in overall pesticide use, but an extremely hot and dry summer saw significant decreases in insecticide use.

Pesticide Use by Section

Integrated Pest Management

More than 4200 hectares are maintained within the City of Edmonton as sports field turf and open grassland.

Greater naturalization of more passive areas of mowed turf in the City will eventually reduce habitat for many of the more common weed species, but also help meet larger goals of healthier, more sustainable and resilient landscapes that secure greater long term environmental benefits. However, as naturalization occurs there is a transitional period in which management of non-native vegetation such as weeds must be increased to ensure that sustainable ecosystems are able to establish and develop.

Since the implementation of the Council-directed cosmetic herbicide restriction in 2015, the overall trend has been an increase in the use of herbicides in City of Edmonton operations. However, a measure of just amounts of active ingredients does not tell the whole story.

Every pesticide registered for use in Canada has a label registered under the Pest Control Products Act (PCP), which details how it is to be used and against which pests.

The label also contains a guarantee regarding the product's concentration and composition of active ingredients.

Some products have more than one active ingredient, but share a single PCP number.

Products that are altered or improved, changing their active ingredients may retain the same trade name but will be given a new label and new PCP number.

While the raw quantity of herbicide usage has increased, this is largely due to the trial usage of products such as Fiesta (iron chelate) for control of noxious and prohibited noxious weeds, which require larger quantities per application for effectiveness than standard herbicides.

Usage of standard herbicides, such as glyphosate (eg. Roundup) (Fig. 6) and products using 2,4-D amines (Fig. 7) do show a trend towards reduction.

Table 1 - Integrated Pest Management Pesticide Usage 2018-2021 (Weeds - Turf Program)

Product Name	Active Ingredient	PCP Number	2018 Active Ingredient (kg)	2019 Active Ingredient (kg)	2020 Active Ingredient (kg)	2021 Active Ingredient (kg)
2,4-D Amine 500 Herbicide	2,4-D Amine	9528	0	0	0	510.8
Arsenal Powerline Herbicide	Imazapyr	30203	6.8	11.76	23.04	0
Casoron G-4 Granular Herbicide	Dichlobenil	12533	0	35.7	12.0	44.2
Clearview Herbicide	Aminopyralid	29752	0.94	3.75	0	0
	Metsulfuron	29752	0.17	0.68		
	Metsulfuron Methyl	23005	0.02	77.61	1.94	0.87
Fiesta Lawn Weed Killer	Iron (FeHDTA)	29535	2163.76	1234.36	0	244.98
Garlon RTU Herbicide	Triclopyr	29334	1.16	0.75	2.45	8.4
Lontrel 360 Herbicide	Clopyralid	23545	0	23.62	5.69	9.4
Milestone Herbicide	Aminopyralid	28517	3.24	0.63	0.85	2.6
Munger Horticultural Vinegar	Acetic Acid	29405	0	6.0	0	0
Nufarm 2,4-D	2,4-D Amine	14726	164	112.82	201.8	0

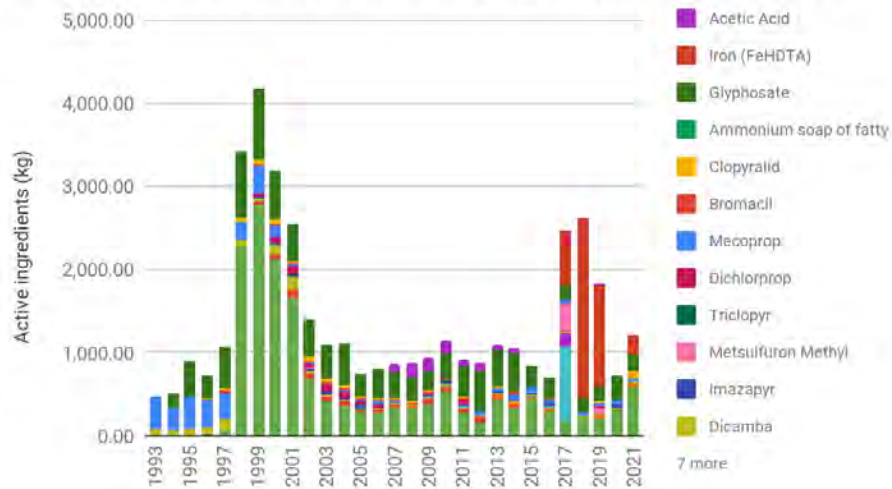


Himalayan balsam

An aggressive invader of wetlands, streams and moist woodlands, Himalayan balsam was widely planted as an ornamental garden plant. The seeds are readily transported by water. Volunteer efforts to remove this Prohibited Noxious weed from City ravines help to keep it from displacing native vegetation.

Amine 600 Liquid Herbicide (2-4-D amine 600)						
Nufarm Estaprop XT Liquid Herbicide	2,4-D Ester	29660	0	3.61	0	0.009
	Dichlorprop	29660		3.84		0.009
Nufarm Trillion Turf Herbicide	Dicamba	24972	3.35	5.94	9.06	5.25
	2,4-D Amine	24972	35.37	62.67	95.66	55.45
	Mecoprop	24972	18.61	32.98	50.35	29.18
Roundup Transorb HC Liquid Herbicide	Glyphosate	28198	174.96	158.14	266.69	55.6
Roundup Weathermax with Transorb 2 Technology Liquid Herbicide	Glyphosate	27487			30.64	132.32
Vanquish Herbicide	Dicamba	26980	0.75	0.22	9.12	0

Fig. 5 Herbicide Use in Parks and Open Spaces 1993-2021



In the years 2017-2019 overall herbicide usage increased from a general trend of decreasing use, largely due to the trial use of iron chelates for weed management as allowed under the exemptions to the Council-directed herbicide restrictions. These products require large quantities of application for effectiveness. In 2020 and 2021 there were increases in the amounts of herbicide used in concordance with an increase in the number and size of

Glyphosate is a herbicide that affects broad-leaf plants. It is found in a number of products, such as Roundup. It is the number 1 active ingredient of all pesticides sold in Canada, mainly used in agriculture.

areas managed by IPM as newly developed areas were added to the inventory. In 2021 the naturalization group began converting turf area around Stormwater Management Facilities to naturalized grass. Over 80 hectares have been converted, with a total target of up to 150 hectares. These naturalized areas require additional maintenance, including management of invasive weeds before they are established. In addition, the majority of 2,4-D and glyphosate use in 2021 was to manage an extensive outbreak of regulated weeds, including the regulated scentless chamomile at the (private access) Old Man Creek nursery outside the city.

Comparative Use

In 2013 (the last date for which sales data are available) the following amounts of pesticide were sold in Alberta:

Domestic Glyphosate: 12,768.3 kg ai

Domestic 2,4-D: 7,989.9 kg ai

Commercial/Industrial

Glyphosate: 46,176.9 kg ai

Commercial/Industrial 2,4-D:

67,455.4 kg ai

Total Pesticides Sold in

Edmonton: 106,912.8 kg ai

[Overview of 2013 Pesticide Sales in Alberta](#)

Fig. 6 Glyphosate Use 1993-2021

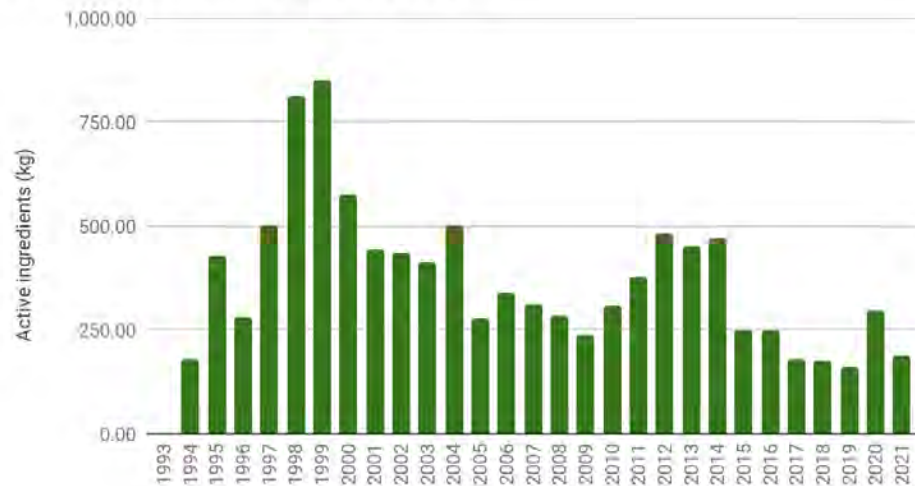
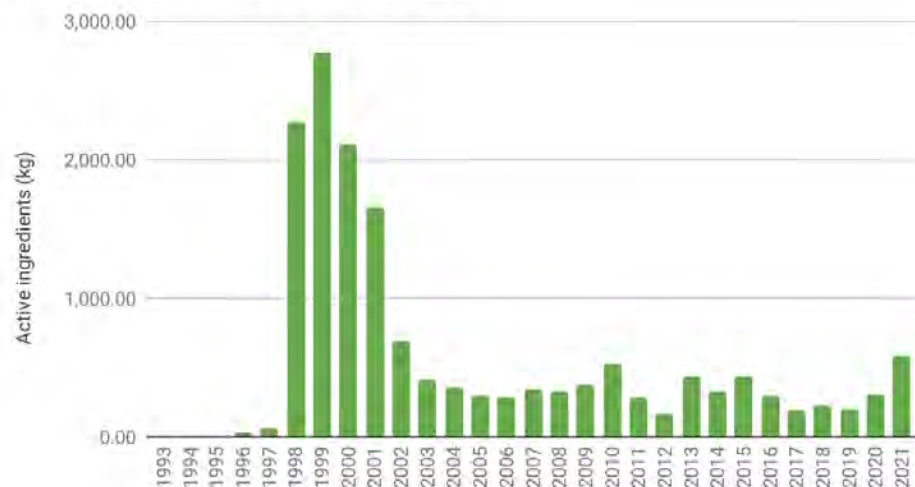


Fig. 7 2,4-D Amine Use 1993-2021



Pest Management Lab & Operations



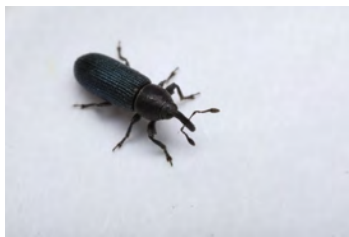
Yellow toadflax

Native to Europe and Asia, yellow toadflax was brought to North America as an ornamental plant. It can crowd out native plants and form large colonies. Listed as noxious under Alberta Weed Control Act.

The largest uses of pesticides by the Pest Management Operations area are in the mosquito control program, targeting the aquatic larval stage of mosquitoes developing in temporary bodies of water on public and private property in and around the City of Edmonton and also in relation to pathogenic bacteria mitigation prior to water contact events in artificial facilities such as in Hawrelak Lake for the ITU Triathlon.

The mosquito control program covers over 1400 km² of territory on public and private property within the City of Edmonton and extending into the surrounding counties of Sturgeon, Strathcona, Leduc, and Parkland as well as the Enoch Cree Nation and Town of Beaumont. Treatments target temporary bodies of water that develop in open fields in agricultural and industrial areas, as well as roadside ditch habitat to reduce the numbers of nuisance biting flies that enter the city and reduce quality of life for citizens.

The use of chlorpyrifos, a broad-spectrum organophosphate insecticide was discontinued in the aerial program in 2016, and from ditch & roadside use in 2018. In its place, the biorational larvicide *Bacillus thuringiensis israelensis* (Bti) has been used extensively. Larvicides using Bti are much less toxic to most other organisms, but require larger quantities of product to be applied for effective control, and without residual effects must be applied more often. This has resulted in an overall increase in amounts of pesticides used, measured purely in kilograms of active ingredients used (Fig 8).



Mecinus janthinus

The larvae of Mecinus janthinus mine in the stems of toadflax plants. This damage does not kill the plants, but does reduce flowering and seed production. Mecinus was approved for release for biological control of toadflax in 1995. Since then, it has been released and established in several sites in Edmonton.

Seasonal variations have also had an impact on the program. July of 2019 was the rainiest on record in more than 40 years, and resulted in widespread and continuous hatching of mosquitoes throughout the month, requiring considerably more application of larvicides than the 2018 season. In 2020, heavy rainfall in late May and into June triggered considerable hatching, and more treatment of developing mosquitoes than in the previous two decades. Supply chain issues actually prevented even more treatment, as product for the aerial program was not available for much of June. 2021 was one of the hottest and driest summers on record. It was only the second time since the



Cottony psyllid

An introduced pest, cottony psyllid was first detected in the Edmonton area in 2000. By 2003, the city had lost over 10,000 black and Manchurian ash trees. Systemic injections of insecticides seem to be the best way of managing the insect. Cottony psyllid is not a regulated pest under any level of legislation.

Although not considered a pesticide by Health Canada, the use of oils for managing Canada goose populations (egg oiling) in parks as part of a damage control permit from Environment Canada is included in Pest Management's Pesticide Usage report.

program began that there was no spring campaign, and only one campaign in May (compared with an average of 3-4 campaigns per year).

The Pest Operations area also applies pesticides required to maintain and protect the urban forest canopy from insects and disease. Orthene (acephate) and Treeazin (azadirachtin) were used extensively as systemic trunk injections in 2020 to combat ongoing infestations of European elm scale across the city.

Table 2 - Pest Management Lab & Operations Pesticide Usage 2018-2021

Product Name	Active Ingredient	PCP Number	Program	2018 Active Ingredient (kg)	2019 Active Ingredient (kg)	2020 Active Ingredient (kg)	2021 Active Ingredient (kg)
Aquabac 200 G Biological Larvicide Granules	<i>Bacillus thuringiensis israelensis</i> (Bti)	26863	Insects - Mosquito	20.53	47.28	28.81	0.022
Aquabac XT Biological Larvicide	<i>Bacillus thuringiensis israelensis</i> (Bti)	26860	Insects - Mosquito	0.81	0	3.1	1.38
Contra Blox Kills Rats & Mice	Bromadiolone	22239	Rodents - Structural	0.003	0.006	0.008	0.005
Contra Super Size Blox Kills Rats & Mice	Bromadiolone	23870	Rodents - Structural	0.0001	0.0003	0.001	0.002
Daconil 2787 Flowable Fungicide	Chlorothalonil	15724	Fungi - Turf	3.45	0.873	0	0
Dragnet FT Emulsifiable Concentrate Insecticide	Permethrin	24175	Insects - Wasps	0.29	0.22	1.36	0.96
Drione Insecticide Dust	Pyrethrins	15255	Insects - Wasps	0.002	0.0002	0.002	0.007
	Piperonyl Butoxide	15255	Insects - Wasps	0.023	0.002	0.02	0.07
	Amorphous Silica Gel	15255	Insects - Wasps	0.09	0.008	0.09	0.27
Giant Destroyer (Super Gasser)	Gaseous oxides Sulphur	12269	Rodents	24.21	43.72	28.6	0.1
Green Earth	Mineral Oil	21348	Insects - Tree	0.097	0	4.95	5.45

Comparative Use

Amount of DEET sold in Alberta
by year (kg ai)

1998: 3,972.2

2003: 3,413.3

2008: 1,201.7

2013: 5,711.9

[Overview of 2013 Pesticide Sales
in Alberta](#)



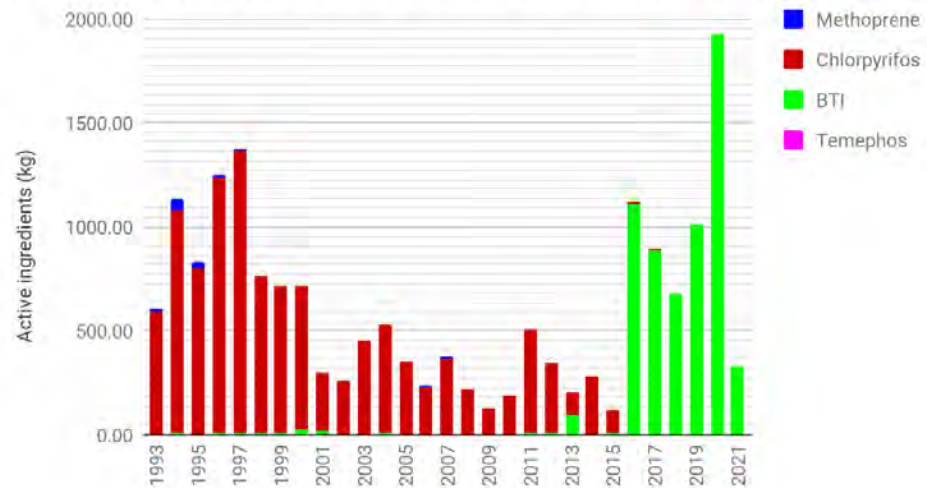
Floodwater mosquito

The floodwater mosquito (Aedes vexans) thrives in open habitat and is the primary summer mosquito in the Edmonton area. It is not a major disease vector, and is not a regulated pest under any legislation.

Horticultural Oil Insect Spray							
Groundforce ™ GS Pocket Gopher Bait	Chlorophacinone	28142	Rodents	0.008	0	0	0
Ground Force Paraffinized Pellets Rodenticide	Chlorophacinone	20239	Rodents	0	0.0019	0.0019	0.00004
Hypochlor-12	Sodium Hypochlorite	30754	Bacteria - Coliforms	1727.8	1986.9	0	2268.6
Instrata Fungicide	Chlorothalonil	28861	Fungi - Turf	1.96	1.96	1.96	1.95
	Propiconazole	28861	Fungi - Turf	0.31	0.31	0.31	0.3
	Fludioxonil	28861	Fungi - Turf	0.08	0.08	0.08	0.08
Interface Stressgard	Iprodione	31906	Fungi - Turf	0.74	0.74	0	0
	Trifloxystrobin	31906	Fungi - Turf	0.05	0.05		
Maxforce Roach Killer Gel	Hydramethylnon	24240	Insects - Structural	0.003	0.000027	0.004	0.005
Maxforce Quantum Ant Bait	Imidacloprid	30513	Insects - Structural	0.00005	0.00007	0.000003	0.00001
Orthene 75% Soluble Powder Systemic Insecticide	Acephate	14225	Insects - Tree	9.88	0.9	64.04	0.11
Ortho Home Defense Max No-Pest Insecticide Strip	Dichlorvos	22027	Insects - Trapping	0.037	0.037	0.037	0.037
	related active ingredients	22027	Insects - Trapping	0.0016	0.0016	0.0016	0.0016
Pounce 384 EC Insecticide	Permethrin	16688	Insects - Tree	0.031	0.024	0.1	0.14
Pro Attack Hornet & Wasp Killer	Pyrethrins	24838	Insects - Wasps	0.000075	0	0	0
	Piperonyl Butoxide	24838	Insects - Wasps	0.00015			
	N-octyl bicycloheptene dicarboximide	24838	Insects - Wasps	0.0002			

Rozol RTU Field Rodent Bait	Chlorophacinone	29545	Rodents	0.002	0.005	0.003	0.01
Treeazin Systemic Insecticide	Azadirachtin	30559	Insects - Tree	1.94	2.93	2.37	7.34
Vectobac 1200L Biological Larvicide	<i>Bacillus thuringiensis israelensis</i> (Bti)	21062	Insects - Mosquito	20.37	65.47	107.7	1.2
Vectobac 200G Biological Larvicide	<i>Bacillus thuringiensis israelensis</i> (Bti)	18158	Insects - Mosquito	635.22	899.98	1785.1	327.9
Daedol 50	White Mineral Oil	n/a	Vertebrate - Birds	1.45	3	0	0.75

Fig. 8 Mosquito Larvicide by Active Ingredient 1993-2021



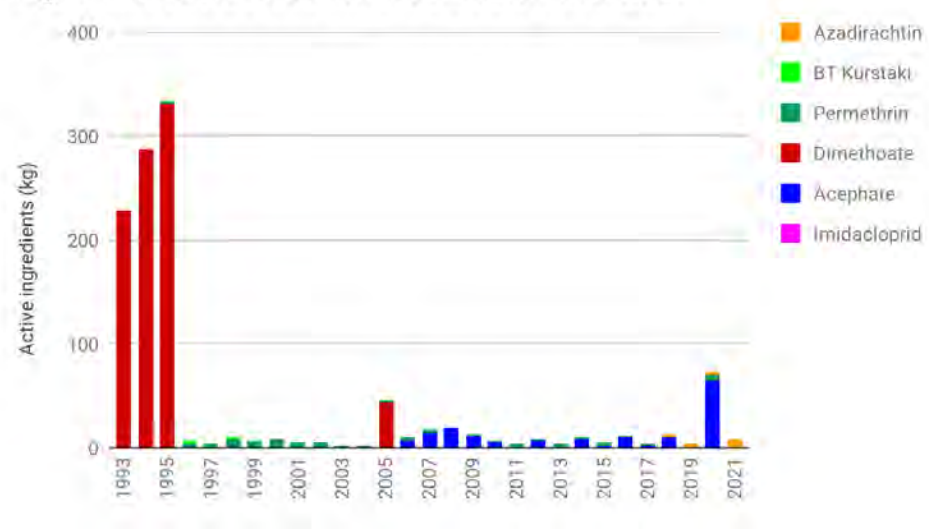
The majority of mosquito larvicides are applied by helicopter as part of the aerial program. Use of the broad-spectrum organophosphate chlorpyrifos was discontinued from the aerial program in 2016, and from the ditch program in 2018. Overall quantity of larvicides used has increased due to switching to biorational BTI products, which require more applications more often to manage mosquito development.



European elm scale

An invasive pest introduced on new plantings, European elm scale is now widespread across Edmonton. Honeydew secreted by the scale insects promotes the growth of black sooty mould, and coats cars and sidewalks beneath elm trees. It is not a regulated pest, but threatens the health of many trees.

Fig. 9 Insecticide Use for Tree Pests 1993-2021



Use of pesticides for protection of the urban forest is generally low, but important. Primary uses include trunk injections of acephate for control of invasive cottony psyllids on black and Manchurian ash, and injections of azadirachtin for control of European elm scale on American elms. The targeted nature of these applications means that volumes are low, and also greatly reduces the risk of exposure to the public or non-target species such as pollinators.



Birch leaf miner

The larvae of birch leaf miner develop between layers of the leaves of birch trees, protecting them from many predators and pesticides. In 1993 490 kg of dimethoate was sold domestically in the Edmonton area, mostly for control of birch leaf miner. By 1998, that dropped to 220 kg. (Source: Alberta Environment)

In the 1980's and into the 1990's a considerable quantity of dimethoate was used in Edmonton, largely for control of birch leafminer (Fig 9). That program was discontinued as biological control of the pest by the parasitic wasp *Lathrolestes lutiolator* caused populations of the pest to crash. This was a great success for integrated pest management techniques, and the City of Edmonton no longer has stores of dimethoate in its inventory.

Most other insect pest issues on trees, when they require pesticide intervention are handled with judicious applications of permethrin to treat outbreaks of pests such as yellow-headed spruce sawfly, ash borer moth, or woolly elm aphid.

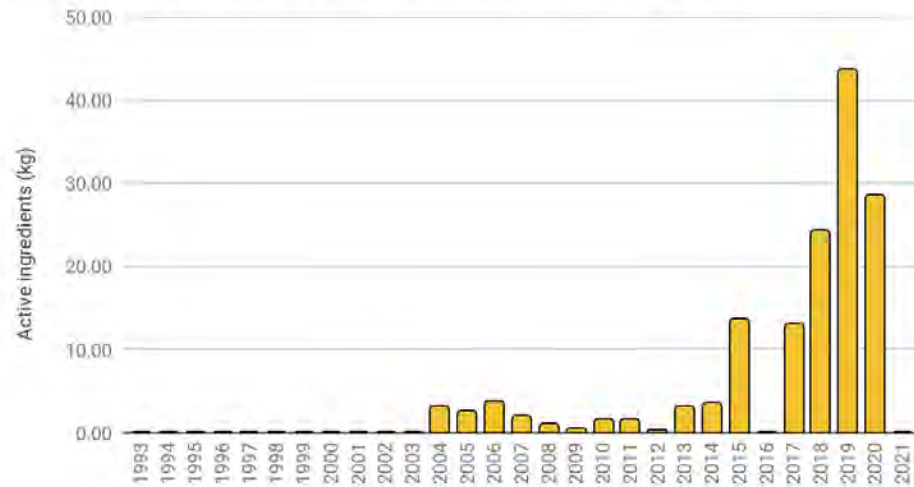


Northern pocket gopher

Often mistaken for a mole or ground squirrel, northern pocket gophers are solitary underground dwellers who feed on plant roots and are active year-round.

Declared a nuisance under Alberta Agricultural Pest Act, their burrows are important overwintering habitat for many species such as tiger salamanders.

Fig. 10 Rodenticides for Pocket Gopher 1993-2021



Naturalization and the increase in vegetation in many green areas, and particularly the increase in many weed species with substantial root systems has had an impact on rodent populations in these green spaces. Voles, ground squirrels, and especially northern pocket gopher populations have increased tremendously, increasing the amount of damage these rodents do to city infrastructure, and also their incursions into the yards and gardens of nearby citizens. As a result, the requirements for mechanical, cultural and chemical controls for these rodents has greatly increased as well. In particular, the use of rodenticides (mostly gaseous oxides of sulfur) for control of northern pocket gopher increased significantly in 2018-2020. This has led to the development of more mechanical controls, and Pest Management now uses traps as the primary method of dealing with northern pocket gopher when they do become pests. Following the implementation of this strategy the use of rodenticides for northern pocket gopher decreased dramatically in 2021(Fig 10).



Canada thistle

Despite the common name, Canada thistle is native to Europe. It is highly competitive and invades crop fields and grasslands. One plant can produce over 5000 seeds, and it can regenerate from pieces of its creeping rhizome as small as 3 mm in size, making mechanical removal largely ineffective. They are well known for their thorny leaves. Considered a noxious weed under the Alberta Weed Control Act, Canada thistle is the only species listed in the act that was included in Alberta's first weed regulation in 1907.



Meadow hawkweed

Native to Europe, introduced to North America for ornamental and medicinal purposes in the late 1800s. Meadow hawkweed invades grasslands and forms dense mats of rosettes that prevent other plants from growing. Considered prohibited noxious under Alberta Weed Control Act.

Golf Courses and Cemeteries

The City of Edmonton operates golf courses at Victoria, Riverside and Rundle Park. These greens have a high standard to meet in terms of turf quality. Maintenance of these greens requires a year-round commitment of care, including a wide variety of mechanical and cultural practices including mowing, irrigation and fertilization, but often also requires timely implementation of pesticides to prevent the establishment of weeds or fungal turf diseases.

The City's seven municipal cemeteries also must maintain a high standard of aesthetic care in respect to those interred, attending services, or visiting to honour loved ones.

Table 3 - Golf Courses & Cemeteries Pesticide Usage 2018-2021

Product Name	Active Ingredient	PCP Number	Program	2018 Active Ingredient (kg)	2019 Active Ingredient (kg)	2020 Active Ingredient (kg)	2021 Active Ingredient (kg)
Banner Maxx Fungicide	Propiconazole	27003	Fungi - Turf	1.08	1.95	0	1.08
Chipco Aliette Signature Fungicide	Fosetyl AL	28299	Fungi - Turf	10.8	0	0	0
Demand CS Insecticide	Lambda-cyhalothrin	27428	Insects - Turf	0.06	0	0	0
Disarm Turf Fungicide	Fluoxastrobin	31857	Fungi - Turf	0.77	0	0	0
Heritage Maxx Fungicide	Azoxystrobin	28393	Fungi - Turf	3.83	3.71	2.81	2.81
Instrata II A Fungicide	Fludioxonil	32712	Fungi - Turf	1.8	2.7	1.8	1.8
Instrata II B Fungicide	Benzovindiflupyr	32711	Fungi - Turf	0.18	0.27	0.18	0.18
Instrata Fungicide	Chlorothalonil	28861	Fungi - Turf	44.97	68.96	62.37	68.82
	Propiconazole	28861	Fungi - Turf	7.08	10.86	9.82	10.84
	Fludioxonil	28861	Fungi - Turf	1.80	2.76	2.5	2.76
Medallion	Fludioxonil	31528	Fungi	1.42	0	0	0



Common tansy

Traditionally used as an insect repellent and in cooking, common tansy was introduced in the 1600s from Europe. It invades disturbed areas, roadsides and grasslands, and contains alkaloids that can be toxic to humans and livestock if consumed in large quantities. Listed as noxious under Alberta Weed Control Act.

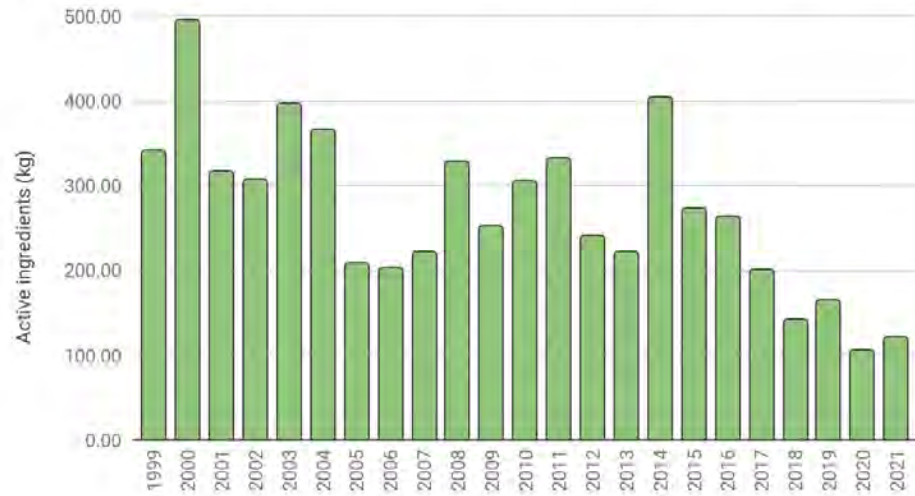
Fungicide			-Turf				
Nufarm Trillion Turf Herbicide	Dicamba	27972	Weeds - Turf	2.61	2.56	1.44	1.8
	2,4-D Amine	27972	Weeds - Turf	27.55	26.98	15.2	19
	Mecoprop	27972	Weeds - Turf	14.5	14.2	8	10
Roundup Weathermax with Transorb 2 Technology	Glyphosate	27487	Weeds - Turf	0	0	0	0.70
Posterity Fungicide	Pydiflumetofen	33019	Fungi - Turf	0	0	0.34	0.34
Quali-Pro Intaglio Fungicide	Chlorothalonil	32765	Fungi - Turf	0	15.48	0	0
	Iprodione	32765	Fungi - Turf		2.365		
	Fludioxonil	32765	Fungi - Turf		0.75		
Quali-Pro Iprodione 240 SE	Iprodione	29410	Fungi - Turf	0	7.1	0	0
Secure Fungicide	Fluazinam	32991	Fungi - Turf	0	0	0	0.11
StartUp Herbicide	Glyphosate	29498	Weeds - Turf	0	2.1	0.29	0.27
Touchdown Total Herbicide	Glyphosate	28072	Weeds - Turf	0.63	0.35	0	0
Trilogy Stressgard	Iprodione	29870	Fungi - Turf	19.7	0	0	0
	Triticonazole	29780	Fungi - Turf	2.1			
	Trifloxystrobin	29780	Fungi - Turf	0.98			
Vantage Plus Max Herbicide Solution	Glyphosate	27615	Weeds - Turf	0	1.01	0.32	0



Whitefly

Whiteflies feed on the sap of numerous species of plants. In addition to their toxic saliva and copious production of honeydew, they can also vector a variety of important plant pathogens. They can be major pests in greenhouses, and are noted for quickly developing resistance to pesticides.

Fig. 11 Golf Courses & Cemeteries Total Pesticide Use 1999-2021



Muttart Conservatory



Orange tortrix

The caterpillars of orange tortrix feed on a variety of plants, and can be a major pest of citrus and grape growers, as well as greenhouse operations. Biological control through parasitic wasps can be highly effective, especially in enclosed areas where host and parasitoid are kept in close proximity.

Nestled in the river valley, the City's premier horticultural attraction features more than 700 species of plants in three climate-regulated biomes, and grows a variety of horticultural species in its greenhouses. These controlled environments provide unique challenges for pest management, with exotic insects being introduced, and the controlled environment allowing pests that could not survive outdoors in Edmonton to thrive.

Table 4 - Muttart Conservatory Pesticide Usage 2018-2021

Product Name	Active Ingredient	PCP Number	Program	2018 Active Ingredient (kg)	2019 Active Ingredient (kg)	2020 Active Ingredient (kg)	2021 Active Ingredient (kg)
Altus Insecticide	Flupyradifurone	33176	Insects - Interior Landscape	0	0.035	0.254	0.167
Avid 1.9% EC Miticide Insecticide	Abamectin	24485	Insects - Interior Landscape	0	0	0	0.002
Bio-Ceres G WP	<i>Beauveria</i>	31231	Insects -	0.39	0	0	0



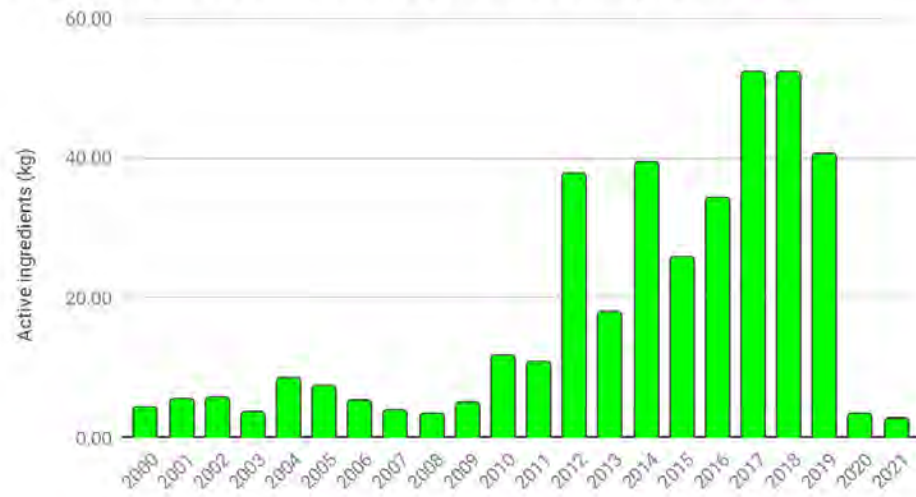
Titan Corpse Flower

Able to reach nearly 3 meters in height, the bloom of the giant corpse flower is nature's tallest. The flower only appears every 2 to 3 years, and emits a putrid smell to attract pollinators such as carrion beetles. Since this flower, dubbed "Putrella", arrived at the Muttart Conservatory in 2012 it has bloomed three times.

	<i>bassiana</i> Strain ANT-03		Interior Landscape				
Bonzi Plant Growth Regulator	Paclobutrazol	25453	Weeds - Interior Landscape	0.0013	0.00112	0.0015	0
Botanigard 22WP	<i>Beauveria bassiana</i> Strain GHA	29321	Insects - Interior Landscape	0.066	0	0	0
Chipco Aliette Ornamental Fungicide	Fosetyl AL	27557	Fungi - Interior Landscape	0.24	0	0	0
Cycocel Extra	Chlormequat Chloride	17001	Weeds - Interior Landscape	0.56	0.0046	0.005	0
Daconil 2787	Chlorothalonil	15724	Fungi - Interior Landscape	0.17	0.28684	0.07	0.15
Distance	Pyriproxyfen	28414	Fungi - Interior Landscape	4.66	0.04326	0.076	0.05
Endeavour 50 WG	Pymetrozine	27273	Insects - Interior Landscape	0.48	0.1	0	0
Enstar EW	S-Kinoprene	29661	Insects - Interior Landscape	0.04	0	0	0
Floramite SC Miticide	Bifenazate	27924	Insects - Interior Landscape	0.12	0.014	0.036	0.014
Florel Plant Growth Regulator	Ethephon	29593	Weeds - Interior Landscape	0.09	0.048	0.048	0.14
Fujimite Miticide/Insecticide	Penpyroximate	32302	Insects - Interior Landscape	0.0001	0	0	0.04
Nova Fungicide	Myclobutanil	22399	Fungi - Interior Landscape	0	0	0	0.03
Phyton 27 Bactericide and Fungicide	Copper sulphate	21699	Fungi - Interior Landscape	0.03	0.008	0.008	0.028
Rhapsody ASO	<i>Bacillus subtilis</i> (Strain QST 713)	28627	Fungi - Interior Landscape	0.08	0.08	0.083	0
Safer's End-All II Miticide Insecticide Acaricide Concentrate	Potassium salts of fatty acids	22299	Insects - Interior Landscape	7.6	21.85	0	0
	Pyrethrins	22299	Insects - Interior Landscape	0.076	0.2185		

Safer's Insecticide Soap Concentrate	Potassium salts	14669	Insects - Interior Landscape	27.3	11.86	2.02	1.52
Senator 50 SC Fungicide	Thiophanate-methyl	32096	Fungi - Interior Landscape	0	0	0	0.5
Signature Xtra Stressguard	Fosetyl AL	32800	Fungi - Interior Landscape	0	1.5	1.5	0
Superior 70 Oil	Mineral Oil	14981	Insects - Interior Landscape	10.3	4.5	4.5	0
Touchdown Total Herbicide	Glyphosate	28072	Weeds - Interior Landscape	0	0.01	0.01	0
Ventigra Insecticide	Afidopyrofen	33309	Insects - Interior Landscape	0	0	0	0.017

Fig. 12 Muttart Conservatory Pesticide Usage 2000-2021



The trend for pesticide usage at the Muttart Conservatory shows an upward trend in terms of kilograms of active ingredient over recent years. This is largely due to a shift towards biorational products such as bacterial strains used for fungal control, and greater use of non-conventional pesticides such as insecticidal soap which require larger dosage for efficacy over the use of broad-spectrum insecticides such as imidacloprid. Total quantities used remain quite low. Usage in 2020 and 2021 was notably low, in part due to construction and rehabilitation of the facility itself.

Neonicotinoid Use (All Branches)



European honeybee

Domesticated in the Neolithic, honeybees have been kept in hives to produce honey and wax for humans for thousands of years. Often prized for their pollination services as well, European honeybees actually prefer European plant species over North American natives, and contribute to the spread of many noxious and prohibited weeds. Neonicotinoid pesticides have been implicated in the decline of agricultural honeybees in North America and Europe.

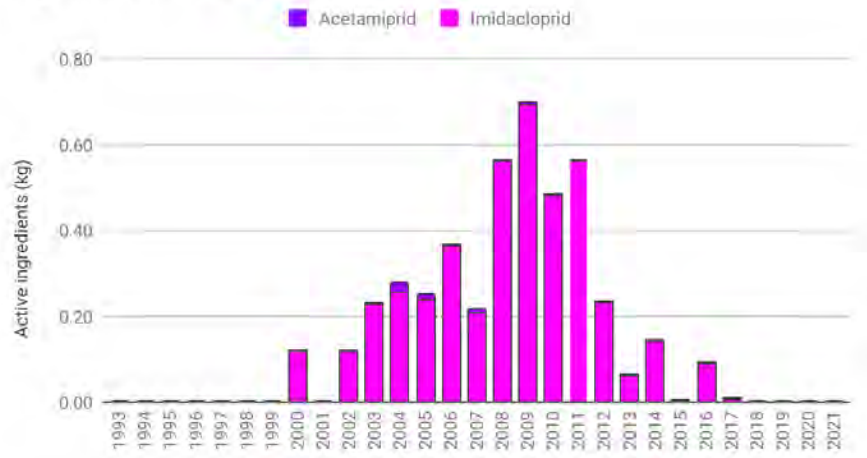
Neonicotinoids have been implicated in reductions of pollinator populations across North America and Europe, including honeybees. Because of the potential impact on pollinators and other non-target organisms, the City of Edmonton has deliberately limited usage of neonicotinoids since the early 1990s.

When used, neonicotinoids such as imidacloprid have only been used indoors (such as within Muttart Conservatory, or in sealed ant and cockroach baits), or as trunk injections as a systemic insecticide targeted at specific insect pests such as European elm scale or cottony psyllid. The quantities used in such applications have been quite small (maximum of 0.7 kg active ingredient in 2009).

Neonicotinoids continue to be used in targeted applications. Currently it is used in small amounts within ant bait stations placed in the interior of buildings, where there is little chance of exposure for pollinators. In 2018 this amount came to 51 mg, 70 mg in 2019, 27 mg in 2020, and just 11 mg in 2021.

Imidacloprid remains a potential useful tool as a trunk injected systemic for protecting trees should emerald ash borer arrive in Edmonton, and with proper precautions in place to avoid affecting non-target organisms still has a place in an integrated pest management plan.

Fig. 13 Neonicotinoid Use 1993-2021



Appendix 1

Photo Credits

- Flowering rush: edmonton.ca
- Asian longhorned beetle: Pudding4brains (wikimedia commons)
- Leafy spurge: Daniel Laubhann (edmonton.ca)
- Emerald ash borer: nrcan.gc.ca
- Japanese knotweed: Leslie Mehrhoff, University of Connecticut, Retrieved from Bugwood.org (Image Number: 2308046), used under CC BY 3.0 US, modified from the original
- Smaller European elm bark beetle: Joseph Benzel, Screening Aids, USDA APHIS PPQ, Bugwood.org
- Field scabious: edmonton.ca
- Banded elm bark beetle: Pest and Diseases Image Library, Bugwood.org
- Common buckthorn: edmonton.ca
- Himalayan balsam: edmonton.ca
- Yellow toadflax: edmonton.ca
- Mecinus janthinus: City of Edmonton Pest Management Lab
- Cottony psyllid: City of Edmonton Pest Management Lab
- Floodwater mosquito: City of Edmonton Pest Management Lab
- European elm scale: City of Edmonton Pest Management Lab
- Birch leaf miner: City of Edmonton Pest Management Lab
- Northern pocket gopher: flickr.com
- Canada thistle: edmonton.ca
- Meadow hawkweed: Nicole Kimmel; Alberta Agriculture & Forestry
- Common tansy: Nicole Kimmel; Alberta Agriculture & Forestry
- Whitefly: Whitney Cranshaw, Colorado State University; bugwood.org
- Orange tortrix: Mark Dreiling; bugwood.org
- European honeybee: Adam Siegel; phys.org

Appendix 2 References

Overview of 2013 Pesticide Sales in Alberta

<https://open.alberta.ca/publications/9781460124109>

PMRA Pest Control Products Sale Report for 2019

<https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/corporate-plans-reports/pest-control-products-sales-report.html>

Appendix 3 Selected Figures (Full Page)

All Figures show usage in kilograms (kg) of active ingredient