

Integrated Pest Management Policy and Operations Manual

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Minneapolis Park & Recreation Board

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Section 1: Integrated Pest Management Policy

The Minneapolis Park and Recreation Board's (MPRB), mission includes the charge to "permanently preserve, protect, maintain, improve, and enhance natural resources, parkland, and recreational opportunities for current and future generations." In furtherance of this mission, the MPRB has an Integrated Pest Management (IPM) Policy which is described in this document. The MPRB's staff uses these strategies, practices, and procedures to manage pests. In addition, the MPRB has websites and other agency documents (some of which are referenced herein) which provide more detail and support to the MPRB staff's pest management activities.

What is a Pest?

This document begins with defining what is a pest. Organisms are usually considered pests because they can cause damage to the natural or built landscape or the health of those that inhabit those spaces. For example, codling moths damage apples, spongy moths damage many species of native forest trees, and reed canary grass displaces a wide diversity of native plants in wetland habitats.

Pest: An organism possessing characteristics humans consider injurious or unwanted.

Pests that negatively impact human health include ticks, which harbor Lyme Disease, mosquitoes, which are transmitters for West Nile Virus, and rats, which can carry the plague.

Pests can be...

- rodents
- insects
- plants
- fungi
- viruses
- bacteria

It is possible for a species to be a pest in one setting but beneficial or domesticated in another. For example, some plants that are used in home landscapes are highly desirable in a residential garden. However, this same species may be an invasive plant in nearby natural areas, and therefore is considered a pest. Similarly, many stinging insects (e.g., bees and wasps) perform many beneficial ecological functions, including pollinating crops, landscape plants, and native plants. However, a population of a stinging insect next to a playground may be considered a pest.

Pest plants are frequently referred to as "weeds." A weed is a plant growing in an undesired place and is considered by the user of the term to be a nuisance. The term weed can be applied to plants growing in many different settings, including gardens, lawns, agricultural areas, developed parks, and natural areas.

Weeds may be unwanted for several reasons: they might be unsightly, degrade water quality, negatively affect ecosystem functionality, crowd out or restrict light to more desirable plants, or use limited nutrients from the soil. They can harbor and spread plant pathogens that infect and degrade the quality of crop or horticultural plants. Some weeds are a nuisance because they have thorns or prickles, while others contain skin-irritating chemicals (e.g., poison ivy) or are hazardous if eaten, or have parts that come off and attach to fur or clothes.

In some settings even native plants can be considered undesirable, such as prairie restoration projects where woody shrubs and trees would conflict with the desired site characteristics. Poison ivy, in some locations where the likelihood of public exposure is high, MPRB may elect to control it in the interest of public safety.

IPM Objectives

MPRB's objective is to provide long-term prevention or suppression of pest problems with minimum impact on human health, the environment, and non-target organisms. The MPRB, with experts on staff, has a systematic program to inventory and survey pests, their damage, and/or other evidence of their presence and to manage these pests appropriately in various environments; this program is described in this policy and management plan.

The MPRB's program is based on a thorough understanding of pests, their life cycle, environmental requirements, natural enemies, and impact on their surroundings. The program will evolve as both pests and understanding of various treatments evolve. It is a gradual, logical process to effectively implement and improve pest management. In addition, the MPRB is required by the Minnesota Department of Agriculture to remove certain plants.

IPM programs use a combination of approaches; including judicious application of ecological principles, management techniques, cultural and biological controls, and pesticide methods to keep pests below levels where they can cause economic damage. Established programs consider public usage of the areas in which the pests are located. When treatments are necessary, the least toxic and most target-specific plant protectants are chosen.

Each identified natural or built infrastructure supports public use and requires the need for pest management. Within a site or park property, the varying types of natural or built environments, programmed or spontaneous public uses, requires evaluation for pest management.

MPRB activities relating to pest control are based on the following core tenants:

Environment: MPRB works to "permanently preserve, protect, maintain, improve, and enhance natural resources, parkland, and recreational opportunities for current and future generations."

Economic: Management and operation of the park system is rooted in maintaining short-term and long-term financial stability, as well as providing career opportunities.

Equity: Building equity in MPRB's workforce and park system ensures that everyone has access to parks and recreation amenities and the opportunities they provide for improved health, well-being, and quality of life.

Pest Management Decision Making / Philosophies

MPRB pest management decision making is framed around using techniques to suppress pests, such as proactively:

- monitoring, planning, and managing the natural and managed ecosystems to prevent organisms from becoming pests
- monitoring populations of pests, pest damage, and environmental conditions
- reducing pest populations to acceptable levels, utilizing approved and authorized biological, physical, cultural, mechanical, behavioral, and pesticide controls
- measuring results, monitoring, and reporting as required for water quality practices

MPRB staff shall provide pest management actions and treatments based on the policies set forth below as well as the mandates provided by the Minnesota Department of Agriculture (e.g., the noxious weed list for non-water areas). When these overlap or conflict, the MRPB will be required to balance these policies and select methods and products that are appropriate for the circumstances; the MPRB selections may not be consistent with all these factors. For example, the least toxic treatment may not be effective at controlling the targeted pest. In addition, currently available organic treatments often require multiple applications, with each application creating more risk of exposure and issues to humans. Factors considered include:

- Least damaging to human health
- Least damaging to the natural and built environment
- Effective at eradicating the targeted pest (if caught sufficiently early)
- Effective at controlling the targeted pest
- Minimal and with negative impacts to non-targeted organisms
- Prioritizing organics when feasible while minimizing risk of exposure to humans
- Within available MPRB resources and financial revenues

The MPRB team will focus their actions based on:

- Promoting naturally occurring biological control
- Adopting cultural practices that include cultivating, pruning, providing nutrition (including fertilization), maintenance, and irrigation practices that reduce pest problems
- Optimizing the habitat to make it incompatible with pest development
- Using alternate plant species or varieties that resist pests
- Limiting monoculture plantings where possible
- Selecting plant protectants with a lower toxicity to humans or non-target organisms

At times, MPRB works with partners who provide grants and other funding for projects which are consistent with the MPRB objectives (e.g., creating a native plant restoration project or a best management practice (BMP) and which may be located in part or entirely on MPRB land. In these “Partner Projects,” the partner’s goals may be to create an ecological uplift to an area through a BMP or a project like a native plant restoration area. These partners may have expectations and goals associated with the project and the site which are more specific and may allow for/require actions and treatments at thresholds different than those laid out herein.

IPM Requirements

If a plant protectant application is utilized to support pest management, MPRB will comply with the City of Minneapolis ordinance regarding pesticide application posting.

Full ordinances can be found within the Appendix. The following are overviews of pertinent ordinances.

Pesticide Control (87-Or-078, § 1, 5-8-87): All employees conducting pesticide application shall be trained, qualified, and licensed in Minnesota in the methods of handling and applying pesticides. All pesticides shall be applied pursuant to the applicable requirements of Minnesota Statute Chapter 18A and rules promulgated thereunder by the commissioner of agriculture. Everyone who apply pesticides outdoors are required to post or affix warning flags on the street

frontage and entrances of the property so treated.

Control of Invasive Species Tree Pests (Pk. Bd. Ord. No. 77-102, § 1, 7-6-77; Pk. Bd. Ord. No. 2009-103, § 1, 11-18-09): “All premises and places within the city shall be inspected by employees or agents of the Park and Recreation Board as often as practicable” to determine whether any living or dead tree or part thereof is infected to any degree or infested with any invasive species pest. All reported incidents of an infection or infestation by an invasive species tree pest shall be investigated. Upon finding indications of an invasive species tree pest infection and/or infestation, appropriate specimens or samples shall be taken and sent to the Minnesota Commissioner of Agriculture (bureau of plant industry) for analysis, or such other steps shall be taken for diagnosis as may be recommended by the commissioner of agriculture. If the tree or wood tests positive for infection/infestation, the tree or wood shall be removed and burned or otherwise effectively treated to destroy and prevent as fully as possible the spread of the invasive species tree pest. Such abatement procedures shall be carried out in accordance with the current technical and expert methods and plans as may be designated by the commissioner of agriculture of the State of Minnesota or by the commissioner of natural resources of the State of Minnesota.

Environmental Protection – Shoreland and Floodplain Preservation (Pk. Bd. Ord. No. 2001-102, § 1, 9-19-01): MPRB may take the following actions on a floodplain or protected shoreland: building or maintaining any structure; removing vegetation (not including routine mowing of grass and trimming of trees, shrubs, bushes, or similar vegetation); or grading or filling. However, when taking these actions, the MPRB shall comply with all applicable state and federal laws and regulations and, to the extent reasonably feasible as determined by the MPRB, shall minimize stormwater runoff into protected waters, maximize overland flow and flow distances over surfaces covered with vegetation, employ on-site filtration techniques, replicate predevelopment hydrologic conditions, minimize off-site discharge of pollutants to ground and surface waters, and encourage natural filtration functions.

IPM Record Keeping & Documentation

MPRB staff will produce and maintain the necessary records of all pest management activities as required by the Minnesota Department of Agriculture. The data and documentation will be kept within the specialized areas of the MPRB. These records are saved in a centrally accessible location. Duplicate records may be held by department team and/or work groups.

Future Pest Control Concerns

The MPRB recognizes that with changes in climate and the intentional and unintentional human movement of new pests (e.g., firewood being transported, aquariums being flushed into waterways), the environment will be subject to many changes, including the arrival of additional pests within the park system. Following IPM principles, the MPRB experts and trained staff will determine the best management of new pests.

The Minneapolis Park and Recreation Board will provide the necessary updated training to staff to keep them informed of ongoing pest issues and best IPM practices. Tolerance levels for each pest will be dealt with on a

case-by-case basis. MPRB will work with the appropriate local, state, or national agencies to determine the best control approach for these new pests.

Section 2: Invasive Species Control

Invasive Species

The natural resources of Minneapolis parks are threatened by several invasive species. Invasive species are species that are not native to Minnesota and cause economic or environmental harm or harm to human health.

The National Invasive Species Information Center defines an invasive species as a species that is:

1. non-native (or non-indigenous) to the ecosystem under consideration and
2. whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112)

Goal: to prevent spreading of invasive species into the MPRB park system. Remove & control invasive species already present in the park system.

State Government Listings

Minnesota Department of Agriculture Regulations

Noxious Weed Listings

The Minnesota Department of Agriculture (MDA) has two regulatory listings for noxious weeds: eradicate and control. This state department maintains lists of noxious weeds that mandate the MPRB to act.

- **Eradicate list** is composed of plants that are either not currently known to be in Minnesota, or not widely established and which must be destroyed completely if seen (e.g., Japanese honeysuckle and poison hemlock). Transportation, propagation, or sale of these is prohibited except as allowed by Minnesota Statutes. Measures must also be taken to prevent and exclude these species from being introduced into Minnesota.
- **Control list** is comprised of plants that have been established; meaningful efforts must be made to prevent the spread, maturation, and dispersal to reduce established populations, prevent reproduction, and stop spread of these noxious weeds (e.g., Canada thistle and wild parsnip). Transportation, propagation, or sale of these is prohibited except as allowed by Minnesota Statutes.

In addition, the MDA has non-regulatory listings of noxious weeds.

- **Restricted Noxious Weeds** are widely distributed in Minnesota, but the only feasible means of control is to prevent their spread by prohibition of importation, sale, and transportation (e.g., buckthorn and garlic mustard).
- **Specifically Regulated Plants** may be native or have a demonstrated economic value, but also have the potential to cause harm in non-controlled environments (e.g., poison ivy and amur maple).
- Counties can also specify certain plants as noxious weeds. Furthermore, federal terrestrial and parasitic listed noxious weeds are prohibited in Minnesota.

Plant Pest Quarantines

Invasive insects and diseases can also have major detrimental impacts on the native environment. The MDA works to prevent the introduction and spread of destructive invasive species in Minnesota. For some organisms,

regulating the movement of certain products or materials can help to prevent introductions and spread.

Quarantines have been used for centuries to contain harmful pests and deadly pathogens. Plant pest quarantines are imposed to prevent artificial introduction or to limit the spread of agricultural plant pests. Such quarantines may restrict the production, movement or existence of plants, plant products, animals, animal products, or any other material or human activity which could result in the artificial introduction or spread of the specified pests. For example, MDA prohibits pine wood with bark from the western US from entering Minnesota due to the invasive mountain pine beetle.

Minnesota Department of Natural Resources Regulations

The Minnesota Department of Natural Resources (DNR) also has laws regarding invasive species which are intended to minimize the introduction of terrestrial vertebrates, aquatic animals, and aquatic plants within Minnesota. They use a four-tiered system for regulation.

- **Prohibited Invasive Species** are invasive species that can threaten natural resources. This list includes mammals, invertebrates, fish, and aquatic plants (e.g., European rabbit, zebra mussel, Eurasian minnow, and water chestnut). It is unlawful to possess, import, purchase, transport, or introduce these species except under a permit for disposal, control, research, or education. Prohibited invasive species include hybrids, cultivars, or varieties of each listed species.
- **Regulated Invasive Species** can legally be possessed, sold, bought, and transported; however, they may not be introduced into the environment, including being released or planted in public waters. These invasive species include birds, reptiles, invertebrates, fish, and aquatic plants (e.g., Egyptian goose, red-eared slider, rusty crayfish, koi, and water hyacinth).
- **Unregulated Nonnative Species** are not subject to regulation under Minnesota Invasive Species Status. Refer to fishing and hunting regulations when fishing, hunting, or transporting these species. These species include mammals, birds, invertebrates, and fish (e.g., rat, helmeted guinea fowl, and rainbow trout).
- **Unlisted Nonnative Species** are not those species not prohibited, regulated, or unregulated. Several steps must occur before an unlisted nonnative species may be legally released into a free-living state.

The DNR lists specific invasive species on their website as well as referencing the federal listing of invasive species. See appendix for websites.

Transportation Prohibitions

Minnesota state law prohibits transportation of all aquatic plants (with a few exceptions). This law is intended to help prevent the spread of invasive species such as starry stonewort, spiny water flea and zebra mussels. Additionally, it will reduce the inadvertent transportation of other harmful plants into and within Minnesota. Water must also be drained from all water-related equipment for boaters and sailors, and for shoreline anglers (who may use equipment such as live bait coolers).

Establishment

Invasive species can be plants, animals, and other organisms (e.g., microbes), and may be located on land or in the water. Human actions are the primary means of invasive species introduction and spread.

Many invasive plants were introduced from Europe and Asia either accidentally or intentionally, often for food, medicinal, or horticultural values. Purple loosestrife, an invasive wetland plant, was planted in the 1920s to

beautify wetlands. Non-native insect species like the emerald ash borer were first found in Michigan in 2002 and it is thought they were accidentally introduced in wood shipping crates coming from Asia.

Invasive plants can become established in many types of habitats but, in general, they are more likely to invade ecosystems that have been disturbed by human activity. Invasive plants are problems in both urban and rural areas worldwide. Some invasive plants also produce allelopathic substances, “chemicals” released through roots, fruits, or leaves that inhibit or prevent the growth and establishment of native plants.

The United States Department of Agriculture estimates that invasive species (both plant and animal) cause \$130 billion dollars annually in losses to agriculture, forestry, fisheries, and the maintenance of waterways in the United States. With the global trade economy, new invasive species introduction is an ongoing problem that scientists, land managers, and policy makers must address.

Environment Impact

The presence of invasive plants can alter many functions of a native ecosystem. They can alter nutrient cycling, soil composition, hydrology, and other ecological processes. They cause native plant communities to decline and decrease biodiversity.

When introduced to a new ecosystem, invasive plants have an advantage over native plants. They are free from the diseases, insects, and other ecological influences that slow their growth in their native ecosystem, and they beat native plants for limited resources. As a result, a previously diverse ecosystem may become a plant community of just a few species with the non-native species dominant.

Invasive plants may create safety problems in park areas. Dense areas of buckthorn, for example, reduce visibility along pathways and at intersections which reduces your enjoyment and sense of safety.

The Minnesota Department of Agriculture and Minnesota Department of Natural Resources are the lead agencies for invasive species research, prevention, and control strategies.

MPRB is concerned about invasive species in the park system and incorporate recommendations provided by these agencies to manage invasive species into our practices, taking into consideration the policies described herein, available budget, and staffing levels.

Management

Nationwide management efforts are aimed at invasive species prevention, early detection, and control. In addition to MPRB and similar entities actions, education about the harmful effects of invasive plants on our native ecosystems is essential for management efforts to be successful. Community engagement (volunteering, knowledge, & action) is also an important tool in invasive species management.

The Minneapolis Park and Recreation Board has identified priority areas for invasive plant management. The Environmental Management Department is concerned with managing invasive species in natural areas that still have ecological significance and semblance of a native plant community structure.

Invasive species are comprised of:

- Terrestrial (Land-Based) Invasive Species

- Aquatic (Water-Based) Invasive Species

Terrestrial Invasive Species

MPRB is working to control various terrestrial invasive species in our parks. While there are many invasive species being addressed, some prominent invasive species are listed below, including those mandated by state and federal agencies.

Buckthorn

Buckthorn is a shrub brought into Minnesota from Europe in the 1800s. Buckthorn was frequently planted as an ornamental hedge and can still be found today in many Minneapolis neighborhoods. The fruits of buckthorn are spread by birds, moving buckthorn seeds from residential properties into park lands. As a restricted noxious weed, buckthorn can no longer be planted or sold in Minnesota nurseries.

Canada Thistle

Canada thistle is native to Europe. It was introduced to North America in the 1600s, probably in agricultural seed shipments, and is now widespread throughout the United States and Canada. This plant is highly invasive; it invades new areas and outcompeting other vegetation types. Canada Thistle degrades wildlife habitat and can hinder reforestation and landscape restoration efforts. Once a population gets established, it begins to quickly displace native vegetation, including desirable pollinator habitat, creating large stands with little biological diversity and low habitat value.

Dutch Elm Disease

Dutch Elm Disease (DED) is caused by a fungus and is fatal to elm trees. While the European-based Dutch Elm Disease was spreading through the U.S., many were under the false assumption that Minnesota was considered too far north for DED to be a problem. However, the primary vector in the eastern U.S., the European elm bark beetle, did manage to survive the harsh Minnesota winters thus introducing DED into the state. First identified in Minnesota in 1961, DED has now spread throughout the state. Because it is widespread, there are not state or federal regulations related to Dutch elm disease in Minnesota. Some municipalities require control of elm trees infected with Dutch elm disease to prevent its spread to other elm trees in the municipality. When the MPRB Forestry Department determines that a publicly owned elm tree has DED, it must be removed.

Emerald Ash Borer

Native to eastern Russia, northern China, Japan, and Korea, emerald ash borer (EAB) probably arrived in the U.S. on solid wood packing material carried in cargo ships or airplanes. EAB is an invasive beetle that was discovered in Minnesota in 2009. All ash species native to North America are vulnerable to attack; the insect infests and kills both weak and healthy ash trees. Emerald ash borer has already killed millions of ash trees throughout the Midwest, eastern U.S., and Canada. Minnesota has the highest volume of ash trees in the U.S. with nearly 1 billion forestland and urban ash trees combined. The spread of emerald ash borer will have serious environmental and economic impacts on our forests and communities.

Within Minnesota, the MDA has enacted a quarantine to limit the movement of firewood and ash material

(woodchips, mulch, tree waste) into Minnesota and out of infested counties. Furthermore, all ash material and hardwood firewood are prohibited from entering Minnesota from other states.

Garlic Mustard

Garlic mustard is a European plant brought to North America for use as a culinary herb. Its name comes from the strong garlic odor released when its leaves are crushed. Garlic mustard is a member of the mustard family. This plant family is known for its massive seed production and seed dispersal. Garlic mustard thrives in woodlands. In areas where garlic mustard is prevalent you can see a decline in native plants within ten years.

Honeysuckle

There are various types of honeysuckle, with varying legal statuses. Honeysuckle vines and shrubs are being removed from woodlands because of their prolific fruiting. They are also transported by birds. Capable of overtaking sites, honeysuckle can crowd out native species and alter habitats by depleting soil moisture and nutrients. Japanese Honeysuckle is on the eradicate list. They have environmental impact: rapid growth – they are capable of engulfing small trees and shrubs causing their collapse. It can shade other plants in the understory choking out native species.

Leafy Spurge

Native to Eurasia, leafy spurge was introduced to Minnesota as seed in a barrel of oats from Russia in 1890. Once a stand of leafy spurge becomes established, it reduces pasture or grassland productivity. If leafy spurge is present in a hayfield, the hay cannot be cut and moved, resulting in economic loss. Infestations can displace native plants and reduce wildlife habitat. By 1992, it was estimated that there were 800,000 infested acres in Minnesota, including the Twin Cities area. In response, approximately 9 million leafy spurge beetles (*Aphthona lacertosa*) were released at over 2,000 sites in Minnesota from 1994 to the present as a biological control. Biological control with the beetles has been overwhelmingly cost-effective and successful at greatly reducing infestations at most sites.

Roundleaf Bittersweet

Roundleaf bittersweet is a woody vine that is native to China, Korea, and Japan. It was introduced to North America in the mid-1860s as an ornamental. Roundleaf bittersweet vines twine around trees and other supports resulting in girdled and smothered trees and shrubs.

Poison Ivy

Poison ivy is a native species and beneficial to the landscape. Its berries serve as a food source for many wildlife species. However, exposure to the toxic compound urushiol in the plant can cause severe blisters, rashes, and swelling on human skin and occasionally livestock. It is a perennial plant that grows as either an erect shrub or as a climbing/creeping vine. Poison Ivy is considered a noxious weed and must be eradicated or controlled for public safety along rights-of-ways, trails, public accesses, and business properties open to the public.

White Mulberry

Originally from China, white mulberry was introduced in an attempt to establish a silk industry in the US. It is a fast-growing tree that tolerates a variety of soil and moisture conditions, crowding out natives. While not as invasive as buckthorn, mulberry trees are being removed from woodlands because of their prolific fruiting. They are also transported by birds.

Wild Parsnip

Wild parsnip is native to Europe and Asia. It was brought to North America by European settlers and grown as a root vegetable. Over time, it escaped from cultivation, and is now common throughout the US. Wild parsnip is highly invasive and if ignored can spread rapidly, developing into large monocultures that replace native animal and plant habitat. The plant sap contains toxic chemicals that are activated by sunlight and can cause serious burns and blisters to human skin after contact.

Aquatic Invasive Species

MPRB is working to control several aquatic invasive species (AIS) in our parks. While there are many invasive species being addressed, some prominent invasive species are listed below, including those mandated by state and federal agencies. MPRB staff stay up to date on new species that may be found in our system, and work with the Minnesota DNR and experts at the Minnesota Aquatic Invasive Species Research Center to determine whether or not a response is needed (do nothing), how to manage a new AIS, or whether an attempt at eradication is feasible.

Chinese Mystery Snails / Banded Mystery Snails

Chinese Mystery Snails and Banded Mystery Snails are commonly imported and sold by the aquarium trade, leading to the potential for illegal release into the wild. They graze on lake and river bottom material. They are called “mystery” snails because females give birth to young, fully developed snails that suddenly and “mysteriously” appear. Their lifespan is about four years. They can die-off in large numbers, fouling beaches and shoreland. Furthermore, Banded Mystery Snails cause mortality of largemouth bass embryos by invading bass nests. Both species of mystery snail are regulated invasive species in Minnesota, which means it is legal to possess, sell, buy, and transport, but it may not be introduced into a free-living state, such as being released or planted in public waters.

Curly-Leaf Pondweed

Curly-leaf pondweed is native to Eurasia, Africa, and Australia. It was likely introduced when common carp were intentionally introduced into Midwest waters as a game fish in the 1880s. People spread curly-leaf pondweed primarily through the movement of water-related equipment. Curly-leaf pondweed overtakes habitat and outcompetes native aquatic plants, potentially lowering diversity. Dense mats at the water’s surface inhibit water recreationists. Midsummer die-offs can litter the shoreline with dead plants.

Eurasian Watermilfoil

Eurasian watermilfoil is native to Europe, Asia, and north Africa. Deceptively delicate and fragile in appearance,

the Eurasian watermilfoil is a highly invasive species. The plant forms thick mats in shallow areas of a lake, quickly growing and spreading to block sunlight, killing off native aquatic plants that fish and other species rely on for food and shelter. In North America, the plant threatens the diversity and abundance of native plants as well as the ecological balance of lakes/ponds, which in turn adversely affects recreational opportunities. If left unchecked, invasive watermilfoil will spread through a lake to other lakes by transmission.

European/Common Carp

Native to Europe and Asia, this carp was intentionally introduced into Midwest waters as a game fish in the 1880s. The fish, known as both the European and common carp, is a large omnivorous fish. They have large scales, a long dorsal fin base, and two pairs of long barbels (whiskers) in its upper jaw (be aware of a native look-a-like: the native fish bigmouth buffalo looks like a carp without barbels). Common carp are one of the most damaging aquatic invasive species due to its severe impacts in shallow lakes and wetlands. They release phosphorus that increases algae abundance. Carp-induced declines in water quality causes declines of aquatic plants needed by waterfowl and fish.

Goldfish

When released into the wild, goldfish are an invasive species in North America. Their feeding preferences consist of fish eggs, fish larvae, and aquatic plants. This wide array of subsistence magnifies their impact on ecosystem health and biodiversity.

Non-Native Phragmites

A semi-aquatic/aquatic grass species, there are two varieties of *Phragmites australis* in Minnesota: the native variety and an introduced subspecies dubbed “invasive common reed.” While both varieties look similar, the invasive subspecies is very aggressive and responsible for displacing populations of native common reed throughout the US. It outcompetes native plant species, creating large, dense areas with low biodiversity. It invades wetlands, lakeshores, streambanks, and marshy areas.

Purple Loosestrife

Purple loosestrife a semi-aquatic species that is native to Europe and Asia. It was introduced to North America in the early 1800s as a medicinal herb and within ship ballasts; it was also valued for its aesthetics in wetlands. Purple loosestrife aggressively invades lakes, rivers, and wetlands, creates large monocultures, and significantly decreases the biological diversity of native plant and wildlife populations. Purple loosestrife reproduces both by seed dispersal and vegetative propagation which allows it to quickly invade and overtake new landscapes. It prefers wet soil or standing water; purple loosestrife can be found in poorly drained soil near roads and trails, drainage ditches, culverts, lake shores, steam banks, and wetland habitats.

Zebra Mussels

Zebra mussels probably arrived in the Great Lakes in the 1980s via ballast water that was discharged by large ships from Europe. People spread zebra mussels primarily through the movement of water-related equipment. Zebra mussels are an invasive, fingernail-sized mollusks that are native to fresh waters in Eurasia. Their name

comes from the dark, zig-zagged stripes on each shell.

The zebra mussels outcompete the native species for food and space, and because of their fast reproduction, can quickly overwhelm a water system. The feeding habits of zebra mussels can also have a drastic impact on an infested lake. Zebra mussels are filter feeders that siphon particles of plankton from the water. They are highly efficient at this, and a large population of mussels can quickly clear the water of almost all floating particles. This change can cause shifts in local food webs, both by robbing food from native species that feed on plankton and also by increasing water clarity and thus making it easier for visual predators to hunt.

Section 3: Pest Management Guidance

This section provides general management plans for physical sites within MPRB parks and properties. Each management plan illustrates thresholds or criteria for actions for pest management. MPRB's actions are dependent upon MPRB resources, including staffing and budget.

When pests are present, MPRB staff and vendors MPRB may hire use cultural, manual, mechanical, and biological solutions prior to utilizing pesticides. When pesticide solutions are deemed necessary, organics are first considered for product options, then synthetic. The main difference is whether the pesticides are naturally derived, as in organics, or synthetically produced. As noted above, the MPRB's approach balances various priorities, including the risk to humans of the multiple applications of organics that can be required when using organic treatment methods. Pesticides include herbicides, insecticides, rodenticides, and fungicides. In addition, certain adjuncts and plant health promoters can be used to stimulate immune responses without pesticides. The thresholds listed in this IPM refer to the percentage at which pesticides may be used; other non-pesticide methods can be used prior to the threshold.

Proper plant nutrition is an important aspect in keeping not only us as humans healthy, but also our landscapes. MPRB is gathering data on nutrition; thus far, the organic trials on parkland have yielded some interesting aspects regarding nutrient ratios in the plant and its effect on disease/weed/insect pressures. The understanding and use of nutrients can be complicated, as each site has unique attributes (e.g., species, soil, microclimates) and the nutrients can coincide with each other.

Additionally, emerging pests may require staff to intervene before the threshold is reached. This is particularly true in in "pay to play" type of facilities (e.g., golf courses, premiere athletic fields, wedding venue locations, rental sites like refectories) or if dealing with a new aquatic invasive species (AIS) which has the potential to change an ecosystem.

Aggressive Stinging Insects

Description: Wasps, hornets, yellow jackets, bumble bees, and honeybees may quickly establish nests above and below ground or in cavities in public spaces. European honeybees typically nest in cavities above the ground and may also form swarms when seeking new nest sites. Not every wasp or bee nest creates a problem for park users or staff. Public threat is dependent on insect species, nest location, time of year and other factors. Yellow jackets, bald-faced hornets, and certain hornet species can be particularly aggressive towards people, especially near their nests. Other wasps, such as paper wasps are less aggressive and are more benign depending on location of their nest. Honeybees are generally protective of their nest sites and can sting, but swarms of honeybees generally do not create a large stinging potential as bee behavior is altered when swarming (as their primary mission at this stage is to locate a new nest site). The nest location of stinging insects is also important when determining threat. Nests located near walkways, crosswalks, buildings, playgrounds, or similar sites are more problematic than those located in remote areas. Nests in areas where vegetation management or restoration planting is being carried out can also create problems. The behavior of some stinging insects may also vary with the time of year. Yellow jackets, for example, will exhibit increased defensive behavior as the season progresses. Normally, yellow jacket and paper wasp colonies only live one season. Honeybee nests usually persist from year to year.

Goal: Maintain the safety of the public while maintaining the integrity of bee populations.

Monitoring: Staff will keep an eye out for nests and areas of high concentrations of aggressive stinging insects seasonally within the parks system as a part of normal duties. When they become aware of an issue involving aggressive stinging insects, staff's first goal will be to safely locate the nest and assess the threat to the public.

Threshold: The action threshold for stinging insects depends on a variety of factors: species, location, insect activity, and time of year. When wasp or bee nests are discovered on MPRB managed lands, staff should evaluate the safety threat they pose. If a nest is in an area where people are not expected to be and the nest is not interfering with management activities or the expected use of the site, the nest may be tolerated.

If a nest creates a safety hazard for park users or staff, demarcation and control measures should take place. Nests that create an immediate hazard, such as those near playgrounds, crosswalks, community centers, walkways, trails, and work sites, should be addressed as soon as possible. Other criteria that may constitute a hazard are nests that have been disturbed and nests sites with aggressive individuals. Control of these nests will either be handled internally or immediately referred to a qualified contractor. Nests occurring within inhabited structures such as community centers create an immediate safety hazard and control of these should be immediately addressed. While these insects will not always cause problems, their presence in some locations can create immediate and serious public and staff safety issues. Most importantly, individuals with bee and wasp venom allergies may be presented with life threatening situations if they are stung.

Action:

Demarcating nests or swarms:

Where possible, nests or swarms that present an immediate public hazard should be demarcated by signage, cones, taping, flagging, or by other means so that the area of danger can be avoided by park users. This demarcation should stay in place until the nest is eliminated or the swarm leaves on its own or is removed.

When honeybees pose a risk factor, MPRB may utilize a bee relocation service which involves a professional service coming out to determine if the bees can be relocated or if the hive should be treated with insecticide for public safety. Honeybees are generally manually relocated while other species including wasps and hornets are sprayed with insecticide. If the nest is considered to create a safety hazard for park users or staff, there is no tolerance for the nests of wasps and hornets. To properly address these safety concerns, park employees may be faced with the need to apply insecticides within a short time frame. Accordingly, unlicensed MPRB staff are treating aggressive stinging insect nest sites, including sites in and around structures. Although currently not done, all insecticide treatments are anticipated to be recorded as a pesticide application.

Gardens and Formal Landscaping

Description: MPRB parkland showcases a variety of gardens for visitors to enjoy. Ranging from more traditional formal gardens of Lyndale Park to the naturalistic Eloise Butler Wildflower Garden. Within the MPRB system, both large display gardens and smaller landscape gardens can be enjoyed by the public. Park board gardeners maintain the gardens with the help of volunteers, while residents can grow their own food and flowers at community gardens. These gardens include specialty gardens. While not an exhaustive list, some specialty gardens are included below:

The Commons Park Landscape Plantings	Loring Park Garden of the Seasons
Eloise Butler Wildlife Garden & Bird Sanctuary	Lyndale Park Formal Gardens
Gateway Park Garden	Minneapolis Sculpture Garden
JD Rivers' Children's Garden	Minnehaha Falls Regional Park Gardens
Longfellow Gardens	Nokomis Naturescape Garden

Goal: To develop and implement environmentally sound, integrated pest management for the MPRB's formal and landscape gardens.

Management Practices

MPRB recognizes the need to develop and use strategies that effectively manage pests in garden settings and to manage those pests in an environmentally sound manner. Therefore, plant selection and design play a major role in the IPM by putting the right plant in the right place. Careful selection of plant species and how they are combined aid in the resistance to pests and help eliminate the need for plant protectant applications. Environmental conditions also bear a strong influence on the presence of pests. For example, during drought seasons, foliar diseases are rarely a problem, but insect populations may be severe. Horticulture staff monitor the gardens for pests and response to these pests is based on the time of the year, recent weather conditions, and the presence or absence of natural predators.

Weed Control in Gardens and Landscape Beds

In all formal landscaping, the Minneapolis Park and Recreation Board has set a threshold of 100% control of weeds. Weed control in gardens and landscape beds is primarily handled through mechanical or manual means. However, there are times when mechanical or manual options cannot successfully manage the weeds present. When infestations of tap-rooted and other perennial weeds are found to be well established, pulling or digging of these weeds is usually not successful. Spot spraying of these weeds with a low toxicity herbicide allow the root structure to be targeted when applied at the correct time of the growing season. Currently the most critical tap-rooted invasive weeds are Canada thistle, burdock, and mulberry. Appropriate mulching of gardens and landscape beds may help decrease the competition from pest weeds while also limiting water lost to evapotranspiration. Control of annual weeds is typically successful through manual or mechanical efforts. Only when cultural, mechanical, manual, and biological controls are exhausted or deemed not feasible will pesticide control be considered. Posting of any plant protectant applications occurs at all garden or shrub bed sites prior to the start of the application.

Volunteers and Park Stewards can be an effective resource in the mechanical removal of invasive weeds; the Park

Stewardship Program is further outlined in the Natural Areas section.

Insect and Disease Control in Gardens

Insect and disease pressures can vary from season to season. Horticulture staff routinely monitor the formal gardens and landscape beds for insect pests and symptoms of disease. When damage from insect pests or disease reaches a level beyond the tolerance of the specific garden space, control is deemed necessary. Each garden or landscape will have its own tolerance level for insect and disease depending on location, plant collection present, and the scale and impact of the threat.

Most often insect and disease pressures can be lowered through cultural practices. These cultural practices may include changes to the plant selections, timing of maintenance practices such as cutbacks, pruning to increase air flow, and monitoring irrigation to ensure adequate water is provided at the right timing to the plants. The goal is to promote plant health because strong, healthy plants are better able to withstand pressure from insects and disease. When cultural practices aren't enough to control insect concerns, manual or mechanical controls are implemented next. This includes hand picking insects such as Japanese beetles.

Biological controls such as the release of predatory insects may be an option but releasing them in an outdoor garden is rarely successful in the short term as they naturally disperse from the site. All attempts to use biological controls need to be carefully considered as the release of new insect species may turn out to cause more harm than possible benefits. In formal gardens and landscaping, the best approach to implementing biological controls is through the promotion and attraction of beneficial insects. Beneficial insects are insects that positively affect the health of the plant collections. Most often these insects are predatory, feeding on many of the insects the gardeners aim to control. Some examples include ladybugs that feed on aphid populations, the winsome fly that parasitizes Japanese beetles, and predatory wasp species.

When cultural, manual, mechanical, and biological control efforts are deemed ineffective or not feasible, plant protectants may be utilized. MPRB staff reserves the right to delay management actions for weeds that are above the action threshold due to resource or financial constraints.

Climate change is causing the introduction of more insect problems into Minnesota that were previously found further south. It is critical that MPRB staff keep updated about these insect pests and be ready to respond with the current recommendations from the University of Minnesota and the Minnesota Department of Agriculture.

Small Mammal Control in Gardens

Small mammals can cause significant damage in garden and turf settings particularly in the areas where plants are being grown in the ground or in raised beds. Moles, gophers, and voles may use underground tunnels to access the areas where plants are being grown, sometimes because of the moist soil conditions (in the case of moles) and other times to eat the plant material itself (as with gophers and voles). Squirrels can also cause significant damage from aboveground through their caching activities; squirrels seem particularly attracted to beds and pots of garden plants. Since any one of these small mammals can decimate a bed of native plants within a matter of days, the number of small mammals that can be tolerated is moderate.

Preventative measures, such as the installation of physical barriers (chicken wire, plastic bird or deer netting, in-ground sonic emitters), use of pelletized or spray-on repellents, and the reduction of desirable habitat (e.g., trimming of nearby tree branches to limit aerial access to the site for tree squirrels) will be used as a first line of defense.

Action thresholds for small mammals will be established on a case-by-case basis. In general, action thresholds will be set to minimize negative small mammal impacts to native plant material. For example, the presence of a single mole can cause significant damage to both raised and in-ground beds in a very short period and may result in action at the first sign of damage. On the other hand, it may take the presence of a large number of tree squirrels on a regular basis to cause enough damage to trigger the action threshold.

When preventive measures are unsuccessful or damage has reached action thresholds, trapping will be employed to limit further impacts to native plant materials. All control actions used for small mammals will be in accordance with state and local laws.

Landscape Beds

Description: Landscape beds, such as shrub and flower beds, include all non-turf plantings in developed parks and around community centers, pools, and other public facilities.

Threshold: Weed management is performed in landscapes to preserve the landscape's aesthetic qualities, functionality, and maintenance of safe public spaces. This includes providing accessible facilities, eliminating tripping hazards, and preserving the function of pathways and driveways. Landscape management is also performed to prevent the spread of invasive species to other parts of the park system.

The action threshold level for each landscape area is directly correlated to the service level set for each landscape bed in a park based on the MPRB maintenance standards. The service level is determined by the design, location of the landscape beds, and the visibility/complexity of the plant communities. Management and control of grass and broadleaf weeds are the primary activities associated with these sites. The thresholds triggering control actions are based on the percent cover of weeds present in the landscape beds. If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken.

Action: Weed management is critical to the success of our designed landscapes. Prioritization is on non-pesticide-based methods of control, focusing on cultural, manual, and mechanical controls. Hand pulling or hoeing is the primary method of weed removal in landscape beds. If weeds cannot be managed manually, cultural and mechanical control methods are utilized. When weeds cannot be feasibly controlled by non-pesticide methods, pesticides may be utilized to maintain and recover landscape beds. Pesticide use is focused on the following: its status as a noxious weed (e.g. Roundleaf bittersweet), the threat it poses to being able to maintain the planting to its design intent (e.g. weed trees), and/or the threat it poses to human health (e.g. poison ivy). Generally, pesticides are used when it is the only viable option and active management of the pest and/or disease is necessary to protect the planting.

Description: The Rose Garden is the second oldest public rose garden in the United States and showcases 3,000 plants in 200 different varieties. It sits on 1.5 acres located near the Northeast corner of Lake Harriet, at 4124 Roseway Road, Minneapolis, MN 55409. When large gardens feature a monoculture of plants, such as the Rose Garden, there will be

larger populations of pests to control. Timing of bio-controls and low toxicity plant protectants are scheduled to prevent intense damage to the roses caused by insects and/or diseases. Currently major insect pests dealt with yearly include the Japanese Beetle, Rose Midge, Rose Rosette Disease, and Thrips. If these are not controlled, the insects will effectively destroy the rose blooms. Black Spot is the major disease that if not controlled, can defoliate, and severely weaken the plants. The use of biocontrol agents and lower toxicity insecticides and fungicides is based on weekly monitoring of the garden. The choice of plant protectants to be used will be based on the method of alternating products to avoid pest resistance. At times, MPRB use preventative measures depending on conditions.

Requirement: The Rose Garden is posted and roped off from public access during any plant protectant applications.

Threshold: There is a 0% tolerance for any pests. As a monoculture, it is particularly susceptible to disease and pest damage. Additionally, the main focus of this garden is aesthetics, so the quality of the display is a top priority.

Action: MPRB staff and volunteers work to maintain a formal rose collection. Manual control techniques such as hand-picking Japanese beetles and hand pulling weeds are highly favored at this site. Additionally, the horticulture staff are actively working to promote an increase to the predatory insect population in the garden. This includes wasps and ladybugs which both feed on insects such as aphids that damage rose plants. This is categorized as a biocontrol. When pest issues cannot be managed by manual, mechanical, or biological control options, pesticide controls are utilized.

Eloise Butler Wildflower Garden and Bird Sanctuary

Description: Situated in the rolling hills of Theodore Wirth Regional Park, the Eloise Butler Wildflower Garden and Bird Sanctuary (the Garden) houses a spectacular display of over 600 plant species of Minnesota and regionally native wildflowers, grasses, sedges, ferns, trees, and shrubs. This curated plant collection is displayed in a naturalistic style in keeping with the original design intent thoughtfully planned by the Garden's principal founder, Eloise Butler, at the Garden's inception in 1907. A majority of the current native species present were introduced to the site from 1907-1959 with the addition of tens of thousands of plants during that time frame.

Extensive plant collection development continues to this day in the 15-acres of woodland, wetland, and upland meadow garden areas of the Garden. In the past twenty years over 36,000 native plants have been planted here, adding to the diversity and abundance of the plant collection. Extensive invasive species removal has occurred over the last 20 years including the removal of significant populations of common buckthorn, glossy buckthorn, garlic mustard, reed canary grass, hybrid cattail, and oriental bittersweet. Several native plants that create monocultures are also managed including raspberry, blackberry, and Canada goldenrod species.

Despite the extensive shaping of the living landscapes within the 15-acre historic Garden over the past 116 years, as a result of careful planning and management of the plant collection, the Garden continues to have the feeling of a "primeval wilderness", something Eloise Butler considered paramount while she set out to build this diverse plant collection of Minnesota native plants. This quality of wildness, and the experience it provides, is a cherished feature of the Garden for the 40,000+ annual visitors.

In addition to the diverse plant collection, a great diversity of wildlife flourishes at the Garden as well. Over 130 resident and migratory bird species and 100 bee species can be found in the Garden in addition to a wide variety of mammals including red fox, raccoon, mink, coyote, groundhog, red squirrel, and opossum.

A robust garden and nature education program exists at the Garden. Seasonal naturalist staff provide informal and formal educational opportunities for visitors each day. The Martha Crone Visitor Shelter, built in 1970 with funding from the Friends of the Wildflower Garden, serves as the primary indoor space for visitor services at the Garden.

Goal: To maintain, through horticultural care and plantings, the existing plant collection of over 600 plant species in perpetuity while enhancing the plant collection to include a greater diversity of regionally appropriate native plant species that are sympathetic to the current aesthetic of the Garden.

To manage invasive and weed plant species as well as pests and plant diseases effectively for population reduction or elimination using current management practices that minimize negative impacts to the surrounding plants, wildlife, soil, and water resources.

Plants Threshold: Invasive and weed plant species are managed on a species-by-species basis. The threshold for some species, for instance Roundleaf Bittersweet, is 0%. The threshold for other species, for instance red raspberry, is relative to how it is impacting a given area where it is growing. In some cases, it will be removed from a garden area completely and in other instances it will be reduced significantly but not eliminated.

Insects, Diseases and Other Pests' Threshold: Insect pests as well as fungal, bacterial, and viral plant diseases are addressed on a case-by-case basis. Some pests and diseases are allowed to run their course without intervention taken if significant damage is not occurring or if the damage will most likely be temporary in nature.

Other pests and diseases are actively managed due to the threat posed to the plant species in question and/or the impact on the greater landscape. Research, planning, and consultation with experts will occur to develop best practices for management of the pest or disease. Thresholds for treatment will be developed on a case-by-case basis.

Action: Removal and control of invasive and weed plant species is critical to the health of the Garden's plant collection. Prioritization of non-pesticide-based methods of control will occur for each target pest and/or disease. Accordingly, in most cases at this site, control of invasive and weed species is carried out by manual removal without the use of pesticides. Pesticides may be used when other methods of removal and/or control are exhausted or prove to be ineffective and it is deemed necessary to control the invasive or weed species due one of the following reasons: its status as a noxious weed (e.g., Oriental bittersweet), the threat it poses to maintaining plant diversity within a given area of the Garden (e.g., hybrid cattail), and/or the threat it poses to human health (e.g., poison ivy). Generally, pesticides are used when it is the only viable option and active management of the pest and/or disease is necessary to protect a plant species population in the Garden.

Please see the for more detailed information.

Community Gardens

Description: MPRB is establishing community gardens in parks throughout Minneapolis. There are currently eight community gardens being managed by MPRB with additional space dedicated in other parks' master plans for future gardens. Applications for gardening plots are open to residents for a spot within a designated community garden,

which are managed by community members in coordination with MPRB staff. Within each garden, individual community members have access to a plot of MPRB-owned land for a period of one year. Preference is given to local Minneapolis residents who use their plot for edible plants and who don't otherwise have access to gardening land.

Community gardeners generally maintain their plots April-October, weather permitting. Community Garden Program rules require that gardeners maintain vegetation within their garden plot to program standards and manage the weeds and other pests in their individual garden plots. Within these gardens, a weed is any non-desirable plant that competes for space or other resources that can otherwise be used by desirable crops.

The primary reason for weed control in individual plots is to reduce competition with desirable crops. The expectation is that gardeners will make a reasonable effort to prevent weeds from going to seed to minimize the spread of weeds into adjacent plots. Additional information may be found in the urban agriculture policy.

Goal: The purpose of community gardens is to provide education, access to healthy food, and support for the local food system. In addition to fostering urban agriculture, MPRB helps address racial equity throughout the park system through use of a racial equity lens in implementing this policy.

Plant Threshold: Percent cover for weeds will vary in any given garden plot, but gardeners are required to maintain their plots at a frequency and intensity that limits the spread of any weed from their plot into any other plot in the Community Garden. MPRB staff oversee the management of weeds and other vegetation in common areas with the goals of limiting the spread of weeds and providing the use and access of common areas.

Diseases and Animal Thresholds: Thresholds for non-plant pests in the community garden setting are the point at which action (i.e., implementation of pest control strategies) is necessary to minimize plant damage and the loss of desired crops. Action may not always be triggered every time a potential pest is identified. Sighting a single pest, for example, does not always mean action is required.

With plant diseases (fungal, bacterial, or viral), action thresholds may occur soon after first occurrence of disease symptoms or the occurrence of climatic conditions (usually temperature and humidity levels) that favor development of the disease.

With insects or other animal pests (e.g., aphids, slugs, or snails), the action threshold is usually linked to the presence of some critical population level or the appearance of feeding damage on a critical number of the plants within the area being protected.

Action for Plants, Diseases and Animal Pests: Community gardeners are required to garden organically and maintain consistency with MPRB's Community Garden Integrated Pest Management Policy which emphasizes:

- Encouraging naturally occurring biological control
- Adoption of cultural practices that include cultivating, pruning, fertilizing, maintenance, and irrigation practices that reduce pest problems
- Changing the habitat to make it incompatible with pest development
- Using alternate plant species or varieties that resist pests

- Limiting monoculture plantings where practicable

Best management practices for weeds should occur in individual plots to reduce competition for resources and to maximize crop health and production. Control action is required to prevent weeds from going to seed and to prevent weeds from encroaching into adjacent plots.

Individual gardeners take organic measures to control other pests (non-desirable plants, fungal, viral, bacterial, and animal pests) within plots for a variety of reasons, and the expectation placed upon gardeners is that the plots remain in an active, managed state or in a winterized state. No pesticides, herbicides, or fertilizers may be used unless the specific use is approved by the Board of Park Commissioners.

Gardeners are responsible for maintaining the areas around garden plots including pathways, common areas, and exterior borders of the garden. Each gardener will be responsible for maintaining the immediate edge of their plot to ensure plants do not grow onto pathways. MPRB performs limited weed control work in common areas.

General Parks and Parkways

Description: MPRB has many parks, both regional and neighborhood, within its jurisdiction. Regional parks include Above the Falls, Minneapolis Chain of Lakes, Minnehaha Park, Mississippi Gorge, Nokomis Hiawatha, Central Mississippi Riverfront, North Mississippi, and Theodore Wirth. MPRB also hosts a network of 160 neighborhood parks

MPRB parkways include Dean Parkway, East River Parkway, Kenwood Parkway, Minnehaha Parkway, Saint Anthony Parkway, Stinson Parkway, Theodore Wirth Parkway, West River Parkway, William Berry Parkway, Victory Memorial Parkway, and parkways circling the Chain of Lakes.

Goal: To develop and implement environmentally sound IPM for the MPRB's general park and parkway areas. The MPRB and staff members recognize the need to develop and use strategies that effectively manage pests in our general park areas and to manage those pests in an environmentally sound manner.

Plants:

Threshold: The MPRB has set a threshold of 100% for broadleaf and/or grassy weeds in turf areas. However, noxious weeds will be removed in a timely manner as mandated per state statute. Exceptions arise when newly introduced invasive species occur. MPRB reserves the right to manage the pests based on available data and recommendations from experts at the time of infestation.

Action: Staff is required to use turf cultural practices other than herbicide applications if weeds and/or other vegetation must be controlled or removed from areas within 100 feet of wading pools or playgrounds. Turf cultural practices include aeration, topdressing, overseeding, fertilization, and irrigation.

Insects

Threshold: The MPRB has set a threshold level of 100% for turf insects unless the continuance of turf becomes an issue. If establishment/retention of turf becomes problematic, staff may intervene if more than 20% of the area is bare soil. Furthermore, exceptions arise when newly introduced invasive species occur. MPRB reserves the right to manage the pests based on available data and recommendations from experts at the time of infestation.

Action: When it is determined that this level has been reached or exceeded, a curative insecticide treatment will be applied on a spot spray by location basis, as needed. In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Victory Memorial Parkway

Description: This parkway was designed as a memorial drive for the Hennepin County soldiers who lost their lives in service to this country during World War I.

Goal: Maintain a formal memorial site while providing space for recreation.

Threshold: Victory Memorial Parkway is maintained at a different threshold for pest control than other parkways. The MPRB has set a threshold of 20% for broadleaf and/or grassy weeds.

Action:

Formal Turf: Maintenance of the formal turf in this park is focused on manual and mechanical control techniques. These include routine aeration, topdressing, overseeding, and fertilization practices. MPRB staff may also utilize turf resting practices to allow specific sections of lawn time to recover before and after major park events. Resting turf involves limiting foot traffic to areas of the park using rope and pole as well as signage.

To the extent that it is determined that a post emergent or pre-emergent herbicide should be applied, preferably on a spot spray basis, posting of the parkway will occur just prior to the application and neighbors will be notified by postcard a week prior to the scheduled treatment.

Insect and disease infestations are currently managed on a spot spray basis, as they are usually a rare occurrence. Further application of any plant protectant within parks must be timed to minimize contact with park users.

Turf Areas

MPRB hosts a variety of turf types in the parks system. These include no-mow areas, bee lawns, and traditional lawns.

Goal: The goal of turf management operations for developed parks and MPRB maintained right-of- ways is to establish and maintain safe turf grass surfaces that are appropriate for the areas intended use or aesthetic goals. Managed turf grass areas include sports fields, general service parks, and around community centers.

Plants:

Threshold: Weeds are controlled in turf areas for a variety of reasons. Action thresholds for weeds are set at specific service levels that maintain the aesthetic appearance of the original park design, protect public health and safety (e.g., uneven sports field surfacing, weeds with thorns), ensure the overall health and quality of turf areas, and prevent the spread of invasive species. If weeds of any class are discovered and occupy a small area, a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises to the 100% action threshold, a control action may be taken. MPRB Environmental Stewardship staff reserves the right to delay management. However, noxious weeds will be removed in a timely manner as

mandated per state statute.

Actions: Maintenance of our general parkland turf is primarily done through mowing routines. Routine mowing prevents weed pressure from building by removing flower and seed heads from weed plants. The uniform height also keeps areas tidy in appearance which prevents visual quality issues. In addition, maintenance and cleaning of mowing equipment reduce movement of undesirable plant material in spreading weed material to other areas.

Control methods for weeds in turf areas vary by weed class, weed species, and service level. All weeds, regardless of class, will be controlled using the most effective and least toxic method available. When necessary, pesticide control methods will utilize the least toxic and most effective herbicides and adjuvants available. Reduce mowing frequency within erosion prone areas to reduce the spread of invasive and problematic plant species.

Insects

Threshold: The MPRB has set a threshold level of 50% for turf insects. Exceptions arise when newly introduced invasive species occur. MPRB reserves the right to manage the pests based on available data and recommendations from experts at the time of infestation.

Action: When it is determined that this level has been reached or exceeded, a curative insecticide treatment will be applied on a spot spray by location basis, as needed. In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Bee Lawns

Threshold: MPRB has set a threshold of 100% for broadleaf and/or grassy weeds in bee lawn areas. No noxious weeds will be allowed to persist within these areas.

Action: When it has been determined that this percentage has been reached, the appropriate post emergent or pre-emergent herbicide may be applied, preferably on a spot spray basis. Selection of the appropriate herbicide of choice will be determined by trained staff after evaluating the site, the hazard rating of the product and the specific location. Noxious weeds will be controlled with either herbicide applications or biological control if available. Weeds listed on the State of Minnesota's Noxious Weed List must be controlled as per state statute.

Reduced Mow Areas

Reduced-mow areas are locations that aren't in highly useable areas (steep slopes for example). These areas are mowed one to three times per year.

Goal: These areas are mowed to control woody and invasive plants from establishing themselves.

Threshold: MPRB has set a threshold of 100% for broadleaf and/or grassy weeds in turf areas designated for reduced mow maintenance routines. No noxious weeds will be allowed to persist within these areas.

Action: Reduced mow areas are mowed one-three times per growing season. Timing of these mowing routines is dependent on staff and equipment availability, environmental conditions, and weed pressure.

Formal Turf and Landscaping

Display Gardens Turf Areas

No-Mow Lawns

Plants

Threshold: MPRB has set a threshold of 20% for broadleaf and/or grassy weeds in turf areas adjoining display gardens.

Action: When it has been determined that this percentage has been reached or exceeded, the appropriate post emergent or pre-emergent herbicide may be applied, preferably on a spot spray basis. Selection of the appropriate herbicide of choice will be determined by trained staff after evaluating the site, the hazard rating of the product and the specific location.

Insects

Threshold: A threshold of 20% for insect and diseases will apply to these turf areas. Exceptions arise when newly introduced invasive species occur. MPRB reserves the right to manage the pests based on available data and recommendations from experts at the time of infestation.

Action: When that threshold has been reached, applications with the appropriate plant protectant will be applied. When pesticides are considered, organic products will be considered before synthetic pesticides. While spot spraying may be applied on a case-by-case basis, generally this isn't an effective treatment as the insects are mobile pests or the insects are located below the soil line. For example, grubs are the most common insect pest concern and they are not visible as they feed on turf roots below the soil line. In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Traditional Lawns

Threshold: MPRB has set a threshold of 50% for broadleaf and/or grassy weeds in turf areas adjoining display gardens.

Action: When it has been determined that this percentage has been reached or exceeded, the appropriate post emergent or pre-emergent herbicide may be applied, preferably on a spot spray basis. Selection of the appropriate herbicide of choice will be determined by trained staff after evaluating the site, the hazard rating of the product and the specific location.

Minneapolis Sculpture Garden

Description: The Minneapolis Sculpture Garden site has a long history in the city of Minneapolis. In 1913, the site was home to the floral display gardens known as the Armory Garden. In 1934, the Armory building was demolished, and the land was turned over to the MPRB. In 1988, the Minneapolis Sculpture Garden (Garden) was opened as a partnership between the MPRB and the Walker Art Center.

Today over 40 artworks are showcased in this 11-acre park. In 2017, the remodeled park reopened to the public. The updated design features a meadow planting focused on native plants, formal lawns, hedged "rooms", perennial plantings, as well as a no mow fescue hillside. The Garden also contains a water reuse system. This Garden attracts high volumes of foot traffic.

Formal Lawns

Goal: To maintain the formal event lawns including the great lawn, where the iconic Spoonbridge and Cherry artwork is located, ongoing maintenance routines must be performed to meet the design intent of the park. This includes ensuring lawn areas do not have exposed areas of soil, standing water, or other issues that would hinder the recreational and aesthetic value of the space.

Threshold: Minneapolis Sculpture Garden formal lawns are maintained with a 50% threshold for grassy/broadleaf weeds.

Action: Maintenance of the formal turf in this park is focused on cultural, manual, and mechanical control techniques. Cultural practices include routine aeration, topdressing, overseeding, irrigation, and fertilization practices. MPRB staff may also utilize turf resting practices to allow specific sections of lawn time to recover before and after major park events. Resting turf involves limiting foot traffic to areas of the park using rope and pole as well as signage.

No Mow Fescue Hillside

Goal: To maintain the no mow fescue hillside to meet the design intent and function of the park.

Threshold: The no mow fescue plantings are maintained with a 20% threshold for grassy/broadleaf weeds.

Action: Maintenance of no mow fescue in this park is focused on cultural, manual, and mechanical control techniques. These include mowing and hand weeding. If feasible cultural, manual, and mechanical control techniques are exhausted, pesticide controls may be utilized.

Meadow

Goal: To maintain a native plant community with an aesthetic value. This includes the management of invasive and weed plant species as well as pests and plant diseases effectively for population reduction or elimination using current management practices that minimize negative impacts to the surrounding plants, wildlife, soil, and water resources

The maintenance of this landscape feature is similar to the managed natural areas described below but with several limitations. One major limitation is the inability to perform controlled burns (which is a technique used on prairie planting to control woody plants and to remove excess material to prevent them from building up). Even some native plants can become problematic in this type of planting. Canada Goldenrod is an example of a native plant that if not controlled, can dominate a planting area, choking out other desirable plantings and negatively impacting diversity.

Threshold: The meadow has a 0% tolerance for any noxious weed species, 20% threshold for grassy weeds, 50% threshold for broadleaf weeds. There is 50% tolerance for insects and disease. Presence of noxious weeds may result in actions under the established threshold.

Action: The meadow is managed with a full toolbox of control methods. Due to the restrictions in burning, a combination of manual, mechanical, biological controls are used, including cutting and mowing. Pesticide controls may also be used to manage noxious weeds and other invasive or aggressive plant material. When small infestations of noxious weeds are found, MPRB will balance being proactive versus reactive to limit the impact and spread of the weeds. Weeds listed on the State of Minnesota's Noxious Weed List must be controlled as per state statute.

The management of the meadow at the Minneapolis Sculpture Garden differs from managed natural areas as the form matters as much as the function of the plant community. A higher emphasis is placed on aesthetic qualities and that requires a slightly higher level of care.

Perennial and Shrub Beds

Goal: To maintain plantings to meet the design intent and function of the park.

Threshold: There is a 0% tolerance of grassy or broadleaf weeds in the perennial and shrub beds. There is a 20% tolerance of insect and disease pests.

Action: Manual and mechanical control options are the primary method for eliminating weeds within plantings beds. Volunteers support manual and mechanical techniques such as hand pulling, cutting, and hoeing. For insects and disease, cultural controls are the primary focus. This includes ensuring the right plant is selected for the site and altering the growing conditions to support plant health. This further includes monitoring and adjusting irrigation schedules, pruning for air flow, and removing old plant material to prevent diseases from overwintering or spreading within the site.

The Commons Park

Description: Located next to the Vikings' Stadium in downtown Minneapolis, The Commons is a modern park space focused on multiple design elements. The park includes extensive perennial gardens, formal hedges, and sand-based, fiber-infused turf with berms. The park hosts large, high traffic events including Minnesota Vikings' tailgating.

Formal Turf

Goal: To maintain event lawns for recreational use including events. With very high traffic at this site, staff work to maintain continuous lawn coverage while providing space for recreation.

Threshold: The MPRB has set a threshold of 50% for broadleaf and/or grassy weeds, insect, and disease within the formal lawn areas.

Action: The care of the formal lawns is focused on cultural practices. Turf areas are routinely aerated, topdressed, overseeded, irrigated, and fertilized. Sand-based turf does not hold moisture and nutrients at the same levels as native soils. For this reason, higher and more frequent inputs are required in order to maintain their health; with this higher input, sand-based turf can yield higher quality turf. The fiber-infusion also helps hold up the turf to high traffic from park users, events, and general park use. When cultural, manual, and mechanical control methods are exhausted, then pesticide options may be considered. Organic options would be considered prior to synthetic products.

No Mow Fescue Lawns

Goal: To maintain the no mow fescue lawn sections to meet the design intent of the park.

Threshold: The no mow fescue plantings are maintained with a 20% threshold for turf weeds, insects, or disease.

Action: Maintenance of no mow fescue in this park is focused on cultural, manual, and mechanical control techniques. These include mowing and hand weeding. If feasible cultural, manual, and mechanical control techniques are exhausted, pesticide controls may be utilized.

Perennial and Shrub Beds

Goal: To maintain plantings to meet the design intent and function of the park.

Threshold: There is a 0% tolerance of grassy or broadleaf weeds in the perennial and shrub beds. There is a 20% tolerance of insect and disease pests.

Action: Manual and mechanical control options are the primary method for eliminating weeds within plantings beds. Volunteers support manual and mechanical techniques such as hand pulling, cutting, and hoeing. For insects and disease, cultural controls are the primary focus. This includes ensuring the right plant is selected for the site and altering the growing conditions to support plant health. This further includes monitoring and adjusting irrigation schedules, pruning for air flow, and removing old plant material to prevent diseases from overwintering or spreading within the site.

Dog Parks

Description: The MPRB has seven off-leash dog parks: Franklin Terrace, Lake of the Isles, Loring Park, Lyndale Farmstead, Minnehaha, St. Anthony Parkway, and Victory Prairie. These areas are clearly posted as dog off-leash areas, and they are separated from the rest of the park by a perimeter fence. Dog parks surfaces are primarily covered with wood chips or granite chips in addition to turf and plants cover.

All dog parks are heavily used throughout the year and providing adequate turf coverage throughout the year is a maintenance challenge. For dog parks adjacent to water bodies, the sites must be managed to reduce onsite erosion and water runoff from the site.

Goal: To keep the dog park environments environmentally safe for all.

Threshold: The MPRB has set a threshold range of 100% for plants. Only Class 1 weeds and invasive exotic weeds will be actively managed in dog parks. All other weeds listed in the appendices will be allowed and will be accepted as a component of a viable ground cover. Native pest plants, such as poison ivy, may be removed at MPRB's discretion.

Action: Non-noxious pest plants may be manually removed when found. Once the action threshold has been reached, appropriate spot or field wide applications of plant protectants will be made as determined by the manager. Pesticide control methods will utilize the least toxic and most effective herbicides and adjuvants available. If pesticide applications are deemed necessary, the dog park may be required to be closed for a suitable amount of time during

and after the application until the pesticide is absorbed.

Playgrounds

Description: MPRB has playgrounds throughout its parks.

Goal: Protect the safety of playground users. The primary reasons for vegetation management within the soft fall surface areas of playgrounds are to preserve the surface's overall safety characteristics, to comply with ADA and National Playground Safety standards, to eliminate trip hazards, and to preserve the integrity of the fall surface.

Threshold: Threshold is set to 100%. No noxious weeds will be allowed to persist on any playground fall surface.

Action: Weeds will be manually removed. No registered pesticide will be used within a playground (see Appendix B). All controls will be focused on prevention practices, mechanical removal, or rarely, biological control. An exception will be made for aggressive stinging insects; due to safety concerns, pesticides may be used.

Community Athletic Fields

Description: MPRB hosts a wide variety of athletic fields with field types suitable for multiple sports.

Goal: To develop and implement environmentally sound, integrated pest management for the MPRB athletic fields. The Minneapolis Park and Recreation Board and staff members recognize the need to develop and use strategies that effectively manage turf pests on park athletic fields and to manage those pests in an environmentally sound manner. The MPRB wants to maintain its athletic fields so that park users have a safe and stable site for athletic activities. However, multi-use of these fields and the intensity of their use and lack of turf recovery time will affect the quality of turf. Currently, due to compaction from overuse, many of our general park athletic fields have a high population of knotweed, dandelions, and annual grassy weeds.

Athletic Outfields

Threshold: Each athletic field area will have a turf quality threshold level set for diseases, weeds, insects, and other pests. The threshold level will be a percentage figure of turf loss for each defined area on an individual basis. The percentage figure for each defined area is a minimum amount of turf loss that the MPRB has agreed to tolerate before plant protectants (i.e., fungicides, herbicides, insecticides) are applied to these defined areas. The threshold at our athletic fields is 70%. However, noxious weeds will be removed in a timely manner as mandated per state statute.

Action: Control methods for weeds in athletic fields vary by weed class and weed species. All weeds, regardless of class, will be controlled using the most effective and least toxic method available. Pesticide control methods will utilize the least toxic and most effective herbicides and adjuvants available.

Baseball and Softball Infields

Goal: Safety and playability are main concerns. Vegetation management is performed for a variety of reasons, focused on preserving the surface's overall integrity, maintaining ADA compliance and aesthetic value, and eliminating potential tripping hazards. Control action may be taken when any weeds are observed growing on infield ag-lime

surfaces.

Infield Turf

Description: MPRB staff actively manages baseball and softball infields throughout the park system. During play season, skinned infields will be maintained with a smooth surface and low weed threshold levels.

Threshold: Weed tolerance is maintained at 100% as long as the cover is green and full. However, noxious weeds will be removed in a timely manner as mandated per state statute.

Action: Control methods for weeds in athletic fields vary by weed class and weed species. All weeds, regardless of class, will be controlled using the most effective and least toxic method available. Chemical control methods will utilize the least toxic and most effective herbicides and adjuvants available.

Agricultural Lime Play Surfaces

Description: Infields are skinned (bare dirt) play surfaces; this surface is composed of agricultural lime (ag-lime), the crushed limestone used within ballfields. During play season, skinned infields will be maintained with a smooth surface and low weed threshold levels.

Threshold: MPRB has set the threshold for ag-lime to 0%. Weeds that are actively growing during times of softball play create unsafe conditions for the users, while also decreasing the playability of the field. MPRB Environmental Stewardship staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. However, noxious weeds will be removed in a timely manner as mandated per state statute.

Action: Mechanical and manual controls are the primary methods for plant removal. These include weed whip, weed burner, and hand removal. If it is deemed necessary to use an herbicide, then the least toxic and most effective herbicide will be used.

Specialty Sports Turf Complexes (Premier and Semi-Premier Fields)

Description: Specialty sports turf complexes are the highest-level permitted fields. Sports leagues often play in these complexes. They often have a cost associated to play on these fields.

Threshold: The MPRB has set a threshold range of 20% for turf insects, plants, or diseases.

Action: Once this threshold has been reached, appropriate spot or field wide applications of plant protectants will be made as determined by the manager. The security of the fields (gated and locked or open) may impact maintenance routines, including turf resting and treatment timing.

Hard Surface Areas

Description: Hard surface areas include all paved surfaces within developed parkland or natural areas, and any surfaces in the rights-of-way for which MPRB staff has maintenance responsibility, including pathways, ball courts, picnic areas, skate parks, and street medians. Hard surfaces are typically constructed of cement, brick, or asphalt.

Goal: Safety and playability are main concerns. Vegetation management is performed on hard surfaces for a variety of reasons, with a focus on preserving the surface's overall integrity, maintaining ADA compliance and aesthetic value, and eliminating potential tripping hazards. Control action may be taken when any weeds are observed growing on any hard surface.

Threshold: MPRB has set the threshold for hard surfaces to 10%. When plants are identified, MPRB will take or plan to take mechanical, manual, or chemical action.

Action: Mechanical and manual controls are the primary methods for plant removal. These include weed whip, weed burner, and hand removal. If it is deemed necessary to use an herbicide, then the least toxic and most effective herbicide will be used.

Building Facility Pest Control

Description: Interior Building Pest Control. This is managed externally by a contractor.

Goal: Preserve public assets and protect public health and safety.

Threshold: For food service and childcare areas, the threshold is set to 0% to protect public health and safety. There is 0% tolerance for pests that have entered structures.

Action: Make changes to environmental conditions to discourage specific animals from inhabiting interior areas of a building, including installing barriers. When preventative measures are unsuccessful or damage has reached action thresholds, mechanical and chemical methods will be employed to limit further impacts to park resources. The specific action depends on the pest involved. For instance, ants are dealt with in a different manner than raccoons. The contractor selects methods and products that are appropriate for the circumstances; the least toxic treatment may not be effective at controlling the targeted pest. Due to public safety, (Minnesota Administrative Rule 4665.2300) pests must be dealt with if they have entered building facilities.

In dealing with rodents, MPRB's contractor uses anticoagulant rodenticide, the active ingredient of which is less than 0.0005%. When pesticides are used, there is a concern for secondary poisoning – where non-target animals are affected when consuming a poisoned animal. According to the pesticide manufacturer, secondary poisoning is unlikely; non-target animals would need to consume multiple rodents to have any effect, which is dependent upon percentage of body weight of bait consumed. Appendix D contains a table indicating the number of rodents which must be consumed for pets of different body weights.

Trees & Urban Forest

Description: Our urban forest is important to the health and well-being of Minneapolis and provides many benefits:

- Improves quality of life
- Increases property values
- Lowers heating and air conditioning costs
- Reduces stormwater runoff and prevents erosion
- Provides wildlife habitats

Accordingly, MPRB plants, prunes, and strategically removes all trees on public property, including nearly 200,000 boulevard trees on 1,100 miles of streets, 400,000 park trees on more than 6,000 acres of MPRB land, and trees on other city properties, such as police and fire stations, stormwater retention ponds, and Public Works facilities.

Goal: Maintain the health of the urban forests.

Street Trees, Parkland, Woodland trees, and Trees on Other City Property

Threshold: There is a 0% threshold for invasive pests on trees. The preferred approach for managing trees under MPRB responsibility has been a combination of proactive planning including diverse and site appropriate tree planting, timely mechanical maintenance practices (watering, pruning, root zone improvements), and tree removal.

Action: Private interests may treat public trees to prevent Dutch Elm Disease, Oak Wilt, and Emerald Ash Borer. Treatments are at the expense of the private interest and must be completed by a contractor that has been approved by MPRB Forestry. Chemical or biological control applications may be considered if future invasive tree pests emerge or as required by state statute.

Tree Pests/Fungi

The first major tree pest was Dutch Elm Disease. This fungus killed tens of thousands of elm trees beginning in the 1970s and continues at reduced levels today.

Another major tree pest, Emerald Ash Borer, is responsible for the ongoing loss of tens of thousands of ash trees. It was discovered in Minneapolis in 2010.

Tree Removal

Action: Reduce Dutch Elm Disease, Oak Wilt, and Emerald Ash Borer occurrence with tree pruning, removal and the proper disposal of the resulting infected debris.

Tree Protection

Description: Barked or mulched tree wells are managed in developed parks and medians primarily to protect the tree's health and the public's safety.

Goal: To keep trees healthy by protecting them from damage from grass trimming, mowing, and wildlife.

Threshold: Grasses and weeds that have been allowed to grow up and around the tree trunks increase the likelihood of the tree being damaged by mechanical maintenance operations (e.g., mowing, string trimming). This damage to trees can weaken the tree, compromising its health and longevity. Foreign objects left behind by park users have a way of ending up at the base of trees, covered by grass, where they can pose a hazard to both maintenance workers and park patrons. If weeds of any class are discovered and occupy a small area, a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. The service level of tree wells is dictated by the service level of the surrounding area.

Action: Tree protection actions include mulched rings around the trunks and trunk guards. Tree trunk guards will be

placed around the bases of vulnerable or damaged trees. Weeds will be removed as deemed necessary by MPRB staff.

Community Orchards

Description: MPRB continues to establish community orchards as well as planting fruit and nut trees in parks throughout the city

Goal: The purpose of these plantings is to provide education and access to healthy food in addition to supporting urban agriculture.

Threshold: Currently a 100% threshold is accepted for orchard tree pests.

Action: Current management relies on planting pest and disease resistant fruit and nut tree varieties and implementing cultural practices to prevent and limit pest outbreaks. It is accepted that this may affect the overall quality and quantity of useable fruit and nuts.

Natural Areas

Description: Park natural areas are made up of native plant communities and areas planted with native plants. Since the 1980s, MPRB has worked to restore native plant communities and has increased the use of native plants throughout the park system. Approximately 400 acres of MPRB's natural areas are higher in ecological quality and include forests, savanna, and prairie plant communities. Greenway corridors are the connectors between the natural areas and the City's neighborhoods. Many natural areas are generally left to grow naturally without human involvement; MPRB also has a subset of natural areas that they manage.

Threshold: On all natural areas, the MPRB has set a threshold level of 100% for turf disease pressure, 100% for broadleaf and grassy weeds, and 100% for insect pressure. However, plants listed on the Minnesota Department of Agriculture's noxious weed list will be removed in a timely manner as mandated per state statute.

Action: Natural areas are managed with a variety of tools including prescribed burning and mowing. Generally, no chemical applications will be made in these areas. When small infestations of noxious weeds are found, MPRB will balance being proactive versus reactive to limit the impact and spread of the weeds. However, noxious weeds will be controlled with either herbicide applications or biological control if available.

Natural Areas Assessment

The MPRB Natural Areas Plan guides restoration and preservation efforts by prioritizing areas of higher ecological quality, identifying problematic weeds, and outlining the best management practices for their control.

Managed Natural Areas

Goal: Keep currently high-quality natural areas in a high-quality state. MPRB has less tolerance for weed species in natural areas that have relatively intact, diverse native plant communities. Management of natural areas primarily focuses on control of invasive and weedy plants to enhance native plant regeneration.

Action: Natural areas are managed with a variety of tools including mechanical controls, native planting, native

seeding, prescribed burning and mowing, and targeted herbicide application to noxious weeds.

Bio-controls have been used in managed natural areas. On a regular basis, research with University of Minnesota staff and/or Minnesota Department of Agriculture staff has explored the release of natural predators for these pests. For example, insects that target the invasive purple loosestrife and leafy spurge have been released by Minnesota in the past.

Volunteers and Park Stewards can be another effective resource in the mechanical removal of invasive weeds.

Park Stewardship Program

The Park Stewardship Program allows volunteer groups or individuals to restore, maintain and beautify gardens and natural areas within Minneapolis Parks. This program consists of agreements with volunteer groups doing a variety of activities including plant care and removal, community engagement, and trash clean-up. Of particular importance to this IPM, volunteers help MPRB staff to remove invasive species – including garlic mustard and buckthorn, seeding, planting, tend garden beds, and more. Park stewardship groups are not permitted to use pesticides. Therefore, they are an effective asset for non-pesticide use within natural areas, gardens, and other habitats.

MPRB staff, contracted services and volunteer partnerships support the quality of natural areas within MPRB properties.

MPRB Managed Natural Areas include but are not limited to:

North Mississippi Prairie	17 th Avenue Prairie	Mike's Island
36th Street Savanna	Nokomis Prairie	Raspberry Island
44th Street Forest	Tamarack Bog	William Berry Forest
Edmund Boulevard Savanna	JD Rivers Prairie	Roberts Bird Sanctuary
Black Ash Seepage Swamp	Shingle Creek Prairie	Kenwood Prairie
Morley's Prairie	Brownie Lake Prairie	
Longfellow Gardens Prairie	Cedar Lake Regional Trail Prairie	

Golf Courses

Description: MPRB maintains seven golf courses and three driving ranges. The golf courses are Columbia, Francis A. Gross National, Theodore Wirth, Theodore Wirth Par 3, Hiawatha, Meadowbrook, and Fort Snelling. The driving ranges are located at Columbia, Francis A Gross, and Hiawatha. MPRB staff recognize the need to develop and use strategies that effectively manage turf pests within MPRB golf courses in an environmentally sound manner.

Goal: To develop and implement environmentally sound, integrated pest management for the MPRB managed golf courses.

Threshold: The MPRB has set a routine maintenance threshold for every golf course area. Special maintenance events may require the MPRB to act before the routine maintenance threshold has been reached.

In addition, MPRB has preventatively treated for certain diseases because it is more effective than treating after the

pests have taken hold. MPRB can forecast diseases much better than in the past and knocking back the pathogen before an outbreak is a very viable strategy. MPRB also reserves the right to manage the pests based on available data and recommendations from experts at the time of infestation.

Golf Course Greens

Threshold: On all regulation putting greens, practice putting greens, practice target greens, and nursery greens, a turf quality threshold level is established for disease, weeds, insects, and other pests. The threshold level will be a percentage based on turf loss for each defined area on an individual basis. The percentage figure for each defined area is a minimum amount of turf loss that the MPRB has agreed to tolerate before plant protectants (i.e. fungicides, herbicides, insecticides, and algaecides) are applied to these defined areas. However, noxious weeds will be removed in a timely manner as mandated per state statute.

Plants

Threshold: The MPRB has set a threshold of 0% for broadleaf and grassy weeds. Since annual blue grass (*Poa annua*) is a high percentage of MPRB putting surfaces, the MPRB staff continues to maintain annual blue grass with the same cultural practices as bentgrass.

Action: Weeds on putting surfaces are spot sprayed as necessary. When it is determined that the threshold percentage for a putting surface has been reached or exceeded, a curative herbicide treatment will be applied.

Fungi

Threshold: On all regulation putting greens, practice putting greens, practice target greens, and nursery greens, the MPRB has set a threshold range of 0% to 2% percent for turf disease pressure.

Action: When it is determined that this threshold percentage has been reached or exceeded, a curative fungicide treatment will be applied. In the case of Pythium (a very rapidly evolving turf disease that is triggered by high temperature, high humidity, and high soil moisture), a preventative fungicide treatment will be applied on a 14-to-21 day schedule or until weather conditions change.

Insects

Threshold: The MPRB has established a threshold range of 0% to 5% for turf insect pressure.

Action: In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Requirements: Reentry interval labels on organic and synthetic chemicals must be followed, with special attention to Junior Golf Programs. Plant protectants shall not be applied to golf courses less than 3 hours prior to or during Junior Golf Programs, as in accordance with the standards set by chemical producers. These programs include Junior Golf Leagues, Junior Golf Camps, First Tee Programs, and other Board approved golf programs geared towards participants 17 years of age and younger. In the rare case of fast-spreading turf diseases such as Pythium that develop prior to or during scheduled Junior Golf Programs and require immediate attention may necessitate the cancellation of the scheduled Junior Golf Program or moving the program to an alternative play area that will not be treated.

Golf Course Tees and Fairways

Plants

Threshold: In a 40'x40' area, the MPRB has set a threshold level of 25% for broadleaf and grassy weeds.

Action: When it is determined that this percentage has been reached or exceeded, a post-emergent herbicide will be applied on a spot spray by location basis as needed. A better option for annual weeds will be to apply a pre-emergent herbicide in early spring to prevent the weeds seeds from successfully sprouting.

Fungi

Threshold: On all regulation tee, practice tee areas, and all regulation fairways and practice fairway areas, the MPRB has set a threshold level of 25% for turf disease pressure.

Action: When it is determined that this percentage has been reached or exceeded, a curative fungicide treatment will be applied on a spot spray by location basis as needed. In the case of Pythium (a very rapidly evolving turf disease that is triggered by high temperature, high humidity, and high soil moisture), a preventative fungicide treatment will be applied on a 14-to-21day schedule or until weather conditions change.

Insects

Threshold: The MPRB has set a threshold level of 25% for turf insect pressure.

Action: When it is determined that this threshold percentage has been reached or exceeded, a curative insecticide treatment will be applied on a spot spray by location basis as needed. In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Golf Course Roughs and Clubhouses

Plants

Threshold: The MPRB has set a threshold level of 50% for broadleaf and grassy weeds.

Action: When it is determined that this percentage has been reached or exceeded, a post-emergent or pre-emergent herbicide will be applied on a spot spray by location basis, as needed. Noxious weeds will be controlled with either herbicide applications or biological control if available. Weeds listed on the State of Minnesota's Noxious Weed List must be controlled as per state statute.

Fungi

Threshold: The MPRB has established a threshold level of 50% for turf disease pressure on all rough areas.

Action: When it is determined that this level has been reached or exceeded, a curative fungicide treatment will be applied on a spot spray by location basis as needed.

Insects

Threshold: The MPRB has set a threshold level of 50% for turf insects. Exceptions arise when newly introduced invasive species occur.

Action: When it is determined that this level has been reached or exceeded, a curative insecticide treatment will be applied on a spot spray by location basis, as needed. In the case of insects such as grubs that develop over a cycle of several years, treatment will be applied when the insect is most receptive to control.

Golf Course Natural Areas

Threshold: On all out of play/perimeter areas, the Minneapolis Park and Recreation Board has set a threshold level of 80% for turf disease pressure, 80% for broadleaf and grassy weeds, and 80% for insect pressure.

Action: No chemical applications will be made in these areas. However, noxious weeds will be controlled with either herbicide applications or biological control if available. Weeds listed on the State of Minnesota's Noxious Weed List must be controlled as per state statute. For wetland areas, see Wetlands below.

Golf Course Water Features

Description: While water features on golf courses are generally subject to lower thresholds, the treatments and actions are generally as described in the Lakes, Ponds, and Waterbodies section below. The MPRB may also take action to improve the aesthetics of water features and surrounding areas. For example, the non-native *Phragmites Australis* creates a visual wall, impeding views of water features and impairing viewer experience. Water feature buffer planting may occur regardless of threshold.

Threshold: On all natural/artificial lakes, ponds, and creeks located on golf courses, MPRB has set a threshold of 80% for aquatic weeds. As described below, actions may be taken at lower threshold levels. This includes when animals or plants are released into these waters by people unassociated with MPRB; this can and has historically caused major detrimental impact. Golf water features are often connected to larger water systems within the region, including Minnehaha Creek, Mississippi, and Basset Creek. If MPRB staff find any nonnative animals or plants, they have the right to take immediate action.

Action: Except as described below, no chemical applications will be made to these aquatic areas on golf courses. Mechanical applications may also vary from those described in that section. For example, in some cases, mowing on a golf course may be done to the shoreline while mowing in a different area may leave a buffer.

Lakes, Ponds, and Other Waterbodies

Description: As the City of Lakes, Minneapolis is known for its ample and beautiful lakes and waterbodies. Without a dedicated effort to preserve and protect these urban waters, our lakes and other aquatic systems would not be the valuable resources that they are today. MPRB's lake water quality monitoring program was implemented in 1991 as part of a diagnostic study for the Chain of Lakes Clean Water Partnership. MPRB currently monitors the following lakes within the City of Minneapolis:

Bde Mka Ska	Lake Harriet	Powderhorn Lake
Brownie Lake	Lake Hiawatha	Spring Lake
Cedar Lake	Lake Nokomis	Wirth Lake
Diamond Lake	Lake of the Isles	

Grass Lake	Loring Pond	
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In addition, MPRB properties having rivers, creeks, ponds, water conveyance, and ephemeral drainages, including the adjacent land area affected by their presence needs to be managed to support the sensitive nature of the habitats and infrastructure. The habitats include plant, animal communities, and their direct link with the protected waters.

Other waterbodies within or adjacent to MPRB property include:

Bassett Creek	Ryan Lake
Birch Pond	Shingle Creek
Minnehaha Creek	Sweeney Lake
Mississippi River	Twin Lake

Goal: To preserve the ecological integrity, recreational viability of our water bodies and to protect drainage infrastructure.

The treatment of invasive plants in these aquatic systems is not uniform; the treatment varies depending on the type of system (in-lake, shoreline, wetland, stormwater pond, etc.) and on the type of invasive species. For example, the treatments and thresholds are different for natural lakes and ponds, artificial ponds, and creeks. Treatments also vary based on whether the area is shoreline or underwater vegetation, if the area is high traffic or recreational, if the area is or impacts a conveyance, and if the area is under threat by an ecosystem-changing AIS. In addition, treatments associated with Partner Projects may be more aggressive than those described herein, and allow for earlier intervention and, on a case-by-case basis, limited chemical treatments. Treatment approaches can also change over time as options are developed, MPRB utilizes the research and information provided by the Minnesota AIS Research Center on various and evolving treatment methods to inform the MPRB's approach. Finally, permit requirements may also differ by environment.

Invasive species found in the Minneapolis aquatic systems can be plants, animals, and pathogens. The treatment of these different types of invasive species varies, not only by its location, but also by the type of species, whether it is species is "legacy" or "new," and whether the species is potentially eco-system changing. In addition, there are also native species that are considered pests. For purposes of this IPM, legacy aquatic invasive species are aquatic invasive species (AIS) with a nearly ubiquitous presence. Eradication is unlikely, with long-term management and control being the only feasible strategy.

Current management practice for legacy aquatic invasive species is to manage primarily through the harvesting program to preserve recreational access to the lake (e.g., swimming, boating, fishing) and keep conveyances open. Other approaches may be reviewed, for example, utilizing a combination of harvesting and chemical treatment focusing on preserving recreational access. A more aggressive approach would be a multiyear plan of whole-lake

treatments to increase aquatic habitat; these might occur in defined areas that have a high ecological value or if the species impedes recreation. A treatment program would need to be ongoing to have a continued effect. Examples of legacy are curly leaf pondweed and Eurasian watermilfoil.

A new AIS is one that has the possibility of being detected early and being eradicated with proper targeted management; these new AIS may have the ability to be ecosystem changing. A new aquatic invasive species (AIS) would likely require a more aggressive management strategy wherever it is found in a lake or other waterbody to prevent the new species from impacting the resource. New AIS can arrive in Minnesota and become threats rapidly. Examples of new AIS are hydrilla, Zebra mussels; Phragmites also likely fits into this category. Egeria Densa is another example; this new invasive feature was new to the state and potentially ecosystem changing. It was chemically treated in Powderhorn and has not returned. This eradication protected not only Powderhorn but the Mississippi River, as the two are connected.

Some AIS may not fall neatly into an “ecosystem changing” category. For example, Chinese/Banded Mystery snails can grow to nuisance levels but have not been clearly demonstrated to be ecosystem changing. There is also no eradication type treatment for them (manual removal is the only method of control).

While invasive diseases also exist in aquatic habitats, there are not treatments currently. An example of this is carp herpes virus (Viral Hemorrhagic Septicemia - VHS). MPRB generally monitors potential treatments as they are developed; if a treatment is found that fits the parameters of this IPM, it may be utilized.

For AIS in Minnesota’s aquatic systems:

Threshold: For these invasive species which are found in various aquatic systems, the actions and thresholds will vary. Shoreline plant species will likely be treated differently than in-lake species. For all natural/artificial lakes, ponds, and creeks, the MPRB has set a threshold of 100% for aquatic plants which are not upland species; this threshold is dependent on recreational usage. In addition, MPRB can intervene much earlier to (a) eradicate new and/or ecosystem changing species at low threshold levels to prevent these from becoming pervasive and requiring regular management treatments or (b) keep conveyances open (for, among other reasons, flood control). In addition, ponds, wetlands, and conveyances on golf courses may have thresholds considerably less than those not located on golf courses.

Action: Aquatic invasive plants in high-traffic recreational areas of water bodies are mechanically removed by MPRB staff or contractors once their growth affects recreational use; this includes Milfoil and Curly Pond Leaf, two non-native AIS. Nuisance native plants may be harvested from high-traffic recreational areas when they are found among invasive plants. On a case-by-case basis, native plants may also be skimmed from surface areas (e.g., Duckweed). No chemical applications will be made to plants in these aquatic areas (except for small spray applications on a case-by-case base in conjunction with a project with a partner. In addition, new and particularly ecosystem-changing AIS may require early intervention to eradicate. Contractors are required to have an AIS prevention plan.

Specific invasive species have action plans associated with them which go beyond the scope of this work, for example, the Zebra Mussel Action Plan and certain work associated with carp prevention and removal. The Zebra Mussel Action Plan includes an extensive early detection program and chemical treatments if the treatment can be very targeted, and eradication focused. If the infestation is too large for eradication, then the MPRB utilizes management practices.

While MPRB's management methods currently focus on mechanical means, at times and in some locations, that alone may not be sufficient. For example, underwater manifolds at outlets may eventually need to be treated with divers and possibly chemicals.

On occasion, people unassociated with MPRB have released animals or plants into these waters; this can and historically has caused a major detrimental impact. If MPRB staff find any nonnative animals or plants, they can take immediate action.

Contractors are required to have an AIS prevention plan.

See the various aquatic systems below for more information on specific treatments of legacy and new AIS and of native species.

Shoreline:

Description: Shorelines are comprised of both non developed and developed areas, with the latter including beaches and natural swimming areas (Webber Pool) which are supported by nature. The vegetation in these locations is managed differently; for example, the developed shoreline of Lake of the Isles is maintained differently than that shoreline plantings at Cedar Lake. The priority for beach management is for public health and safety. In particular, beaches are impacted by Swimmer's Itch in the adjoining water and possibly various other organisms that may become a nuisance or a public health concern. See "Underwater Vegetation" for Swimmers' Itch information.

Goal: Keep shorelines protected from AIS and safe for human use; eradicate or manage AIS which are potentially ecosystem changing, keep conveyances open.

Legacy AIS

Examples of legacy AIS: Purple loosestrife, yellow iris, reed-canary grass, flowering rush

Threshold: Variable, depending on the state at which the legacy AIS is caught and its potential impact to public usage and the environment.

Action: These species will generally not be managed unless they interfere with recreational access to the water bodies. Various nonchemical controls are typically used. For example, purple loosestrife is managed through biocontrol; a program using beetles was developed in conjunction with the DNR. The flowering heads can also be cut. Flowering rush is not currently managed with chemicals, but depending on its location and threat, it may eventually require chemical controls. Yellow iris can be mechanically controlled by digging out the root system.

New AIS

Examples of new AIS: *Phragmites australis*

Threshold: Variable, state at which the legacy AIS is caught and its potential impact to public usage and the environment. In the case of *Phragmites Australis*, activities began early after detection.

Action: MPRB may manage new shoreline AIS via mechanical or chemical methods to prevent their spread. The only

new AIS targeted to date by MPRB is *Phragmites Australis*, since it is potentially ecosystem changing, grows as a monoculture, and early attempts to replant native species were ineffective. Chemical treatments were utilized before this invasive monoculture could take root; this early intervention was supported by the University of Minnesota Aquatic Invasive Species Research Center.

Native Species that create nuisance conditions

Examples: Blue-Green Algae, E Coli, Swimmer's Itch

Threshold: These species, while considered pests, are native to Minnesota. MPRB's current policy varies depending on the species. For some native species, the tolerance is 100%. For example, it has been the policy in the past to not treat beaches for Swimmer's Itch because the treatment is toxic to non-target species and can build up in the sediment. The guidance is behavior change for people – towel off after swimming – and the “do not feed the waterfowl” programs. However, E. Coli does not have this tolerance; it is managed through the goose management program. Blue Green Algae has also been treated as described in underwater vegetation - native species below.

Action: To be determined by MPRB based on the organism species and level of nuisance of public health concern. Nuisance native plants in high-traffic recreational areas of water bodies may be mechanically harvested when they grow among invasive plant species. This is because the harvesting equipment is not selective for invasive species and instead cuts all plants in the treatment area, regardless of their species.

Submersed Vegetation:

Legacy AIS:

Examples of Legacy AIS: Eurasian watermilfoil, curly-leaf pondweed

Threshold: Determined by MPRB on a case-by-case basis.

Actions:

Legacy AIS is generally managed with mechanical methods, as other methods are beyond the scope of this IPM. Harvesting is currently the best management option that the MPRB must control underwater aquatic plants, including Eurasian watermilfoil, an aquatic invasive species that is prevalent in many Minneapolis lakes. Harvesting is done primarily in high recreational use areas such as the beaches, sailboat buoy fields, and boat launches. Harvesting temporarily provides for trouble-free boating and swimming and allows sunlight to penetrate to native plants below. Milfoil and Curly-Leaf Pondweed are not currently chemically treated.

Harvesting of these underwater aquatic plants can only occur in the areas identified in the Minnesota DNR issued permit. The littoral zone is the near shore area where sunlight penetrates all the way to the bottom and aquatic plants grow. The MPRB uses two forms of harvesting as part of its aquatic plant management program – mechanical harvesting and hand pulling by SCUBA divers. Harvesting activities occur from roughly Memorial Day to August 31st each year.

Mechanical Harvesting is performed on Cedar Lake, Lake of the Isles, Bde Maka Ska, and Lake Harriet. A machine called a mechanical harvester, operated by MPRB certified equipment operators, removes plants that are in the top four to six feet of water. The harvested plant material is removed from the water and stored until the end of summer when

it is brought to the Minnesota Landscape Arboretum to be used as organic fill for their operations. The mechanical harvesters can only harvest within the Minnesota DNR permitted areas.

SCUBA diver hand pulling of aquatic plants is performed in areas that are inaccessible or hard to reach with a mechanical harvester. SCUBA diver removal is utilized at Wirth Lake and Lake Nokomis.

Newly written masterplans call for reduction of legacy AIS and promotion of native vegetation in lakes; however, current policy does not allow for use of aquatic herbicides, which would be necessary for successful restoration.

New AIS

Examples: Hydrilla, Rusty Crayfish, Zebra Mussels, Water Lettuce, Water Hyacinth

Threshold: For these ecosystem-changing AIS, MPRB works to have an action plan that allows for control at a detection level threshold. For a non-ecosystem changer, MPRB may opt for management instead of an eradication attempt.

Action: The action would be different for different species. For example, water lettuce and water hyacinth can be hand removed in small infestations. Zebra Mussels or Hydrilla would require a chemical treatment, as other methods are not effective.

Native Species

Examples: Blue-green Algae, E Coli, Swimmer's Itch, Duckweed, Coontail

Threshold: These species are native to Minnesota but may be a nuisance to recreation and water body aesthetics under certain conditions. MPRB's current policy is generally 100% tolerance for these native species depending on location. It has been the policy in the past to not treat beaches for Swimmer's Itch because the treatment is toxic to non-target species and can build up in the sediment.

Action: To be determined by MPRB based on the organism species, level of nuisance of public health concern and findings from past treatments. For example, Blue-Green Algae is treated indirectly with alum treatments, barley straw treatments and, for the 2022 season, an iron-ceramic treatment. Duckweed has been skimmed, but not chemically treated.

Nuisance native plants in high-traffic recreational areas of water bodies may be mechanically harvested when they grow among invasive plant species. This is because the harvesting equipment is not selective for invasive species and instead cuts all plants in the treatment area, regardless of their species. For example, Coontail is removed from swim and buoy areas with the harvester.

Creeks/Conveyances

Creeks and other conveyances have unique issues. If a species that grew to a level that affected flow, the species may need to be managed, including with chemical treatments. If flow is restricted in these areas by heavy plant growth or other barriers, parkland could be damaged. In some cases, damage could extend beyond park boundaries.

Examples of conveyances include Nokomis Solomon channel, William Berry channel, Harriet Channel, and Ryan Creek. Waterbodies connected to these conveyances may also need a higher level of management to prevent the migration of the species in question into a conveyance.

Legacy AIS

Examples: Zebra Mussels, Eurasian watermilfoil

Threshold: Variable. Management plan may be needed for each new species to prevent damage to natural and built infrastructure.

Actions: The treatment varies on the species, location, and impact to the flow. For example, Zebra Mussels can clog underwater manifolds that effect lake drainage. This would require physical removal, in some cases possibly chemical treatment. Eurasian milfoil is occasionally detected in the creeks, but no treatment generally done.

New AIS

Examples of new AIS: Water Chestnut, Dydimio, Flowering Rush, Water Chestnut, Water Soldier

Threshold: Action may be needed upon early detection if eradication is possible.

Action: The treatment varies on the species, location, and impact to the flow. For example, hand removal of Water Chestnut may be effective; if not, it may need to be treated chemically. In certain circumstances, eradication may be desirable if non action could result in spread to areas that would cause infrastructure damage or prevent recreational use. Other species like Dydimio would change the ecosystem but would not change flow. In these situations, prevention techniques are typically used; no chemical treatments or mechanical removals occur. MPRB's AIS education and requirements for AIS prevention plans for research and projects are the primary prevention methods used.

Wetlands

Description: Wetlands are environments where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Wetlands can also be disturbed and undisturbed, some of which have legal requirements; treatments may vary depending on the situation. For the purposes of this IMP, wetlands vary from the pond areas on golf courses as wetlands do not generally have open water. Wetlands are saturated and can be shorelines or buffers. In contrast, pond areas have open water and submerged species.

Certain areas on golf courses are also wetlands (i.e., areas which do not generally contain open water). These include Grass, Diamond, and parts of Ryan and the storm water BMPs.

Thresholds, Actions: The thresholds and treatments vary by the type of wetland and species. For example, shorelands, wetlands, and saturated wetlands may have a quality goal, or a goal related to a restoration project or partnership project. For submerged or emergent species, a more aggressive management of new ecosystem changers or species that could have effects on conveyance may be necessary.

Vegetated Stormwater Facilities

Description: MPRB regularly monitors stormwater flowing through storm sewer pipes and best management practices (stormwater BMPs) treatment devices such as wetlands, ponds, grit-chambers, and other structures. MPRB uses state of the art equipment and automatic flow-paced samplers, and samples are analyzed by an independent laboratory. Monitoring sites are chosen by MPRB and the City of Minneapolis and vary according to the organizational needs.

Vegetated stormwater facilities are water treatment systems designed to remove pollutants from storm water flows in or near roadways, parking lots, buildings, and other hard/soft surface areas that may generate storm runoff. They are predominately planted with wetland species and are tolerant of standing water. These stormwater facilities are vegetated to slow the flow of water and to sequester pollution through plant uptake and sedimentation. Some facilities contain a gradient of species and could contain or be predominantly planted with mesic to upland species, depending on the system design and estimated length of inundation.

Some vegetated stormwater facilities were created by MPRB. Some facilities were built in partnership with other organizations or grant funds and ownership can be complex.

Requirements: All MPRB's watershed partners have the goal to promote native landscapes (and reduce invasives) so MPRB's goals and management may take these goals into account in determining thresholds and actions. Vegetated stormwater facilities have the same riparian buffer zones as waterways.

Threshold: Weed management is performed in vegetated stormwater facilities at various thresholds appropriate to preserve the filter's ability to remove pollutants and meet other storm water goals. Landscaped stormwater facilities may also be managed for aesthetic values. All stormwater facilities should be kept free of high-threat invasive weeds. The service required for each vegetated stormwater facility is determined by location, the planting scheme, and the visibility/quality of the surrounding plant communities. If the weed population rises above the appropriate action threshold, a control action may be taken. MPRB Environmental Stewardship staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. If weeds are discovered and occupy a small area (< 2% cover), a control action (which may include the application of chemicals) may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. A control action may also be taken if vegetation of any type is found to impede the intended operational design of a stormwater facility.

Action: Management and control of plants are the primary activities associated with these sites. Some plants will be controlled because they are invasive; other plants, including native, will be controlled based on location. For example, cattails or trees growing on a pipe that impedes infrastructure. Maples, boxelders, and ash are also frequent invaders in stormwater basins. The thresholds triggering control actions are based on the threat posed by the weed species combined with the percent weed cover present in the vegetated stormwater facility.

The appropriate control action depends on the species being controlled and its life cycle as well as the threat to the location. MPRB staff use cultural, manual, and mechanical means prior to utilizing chemicals. Many herbaceous invasives respond well to hand pulling. In the case of biennial invasives like Canada Thistle and Burdock, their first-year rosettes can be effectively controlled with mechanical means but are much more difficult to do so in their second year when they are flowering and seeding. Early herbicide control of second year plants, before they have a chance

to go to seed and spread, can be a very effective means of control.

The Minnehaha Creek Watershed District (MCWD) also performs maintenance on certain vegetated facilities, and the Mississippi Watershed Management Organization (MWMO) has also funded some vegetation work.

Stormwater Ponds and Wetlands

Urbanization has led to drastic changes in the historical patterns of water movement. The use of storm sewers has caused an increase in the amount of water, pollutants and sediment that enter Minneapolis lakes and creeks. Stormwater BMPs, such as treatment wetlands and ponds, are being used throughout the park system to improve water quality in the lakes and creeks. These structures help counteract the effects of urbanization by allowing for pollutants and sediment to settle out before they reach a water body. MPRB has been closely involved in the construction of several stormwater treatment ponds and wetlands, including but not limited to:

Cedar Meadows Constructed Wetland	Southwest Bde Maka Ska Constructed Wetlands
Standish-Ericsson Neighborhood Association (SENA) Constructed Wetland	Lake Nokomis Constructed Wetlands
Lake Harriet Subsurface Flow Constructed Wetland	Creekview Stormwater Ponds

Waterways

Requirements: Special management areas along waterways, called *riparian buffer zones*, are defined as a corridor of land on the sides of a stream or other body of water. Anticipated seasonal or weather-related changes affecting water level will be included in the decision-making process when dealing with buffer zones. The ordinary *high-water line (OHW)* as defined in this policy refers to the highest possible water level that would be expected in a given body of water during a 5-year period. This elevation is critical to know when management is being planned since permitting jurisdiction can change above and below this elevation.

Application Equipment Used

Click here to enter text. Pesticide delivery for all waterway buffer areas will generally be carried out by hand with directed, low volume, single wand sprayers, wiping, daubing, and painting equipment, injections systems, or drop spreaders. Typically, this is done by backpack sprayers, but may also include sprayers with larger fill tanks as long as the same kind of hand application methods are used. These methods of delivery result in low volume applications and low-pressure spraying. This minimizes the formation of fine mists that might be carried off target. These practices ensure that applied materials will reach targeted plants or targeted soil surfaces.

Pesticide Drift

When applications of pesticides are being made within the riparian buffer zone, great care will be exercised in the process. Managing drift is of particular importance when surface waters are nearby. Equipment used in the application shall employ all necessary methods to limit drift. Nozzle size, pressure regulation, droplet size, and height of spray wand, are all techniques that can be modified to reduce unwanted drift of pesticides. Spray applications will not be allowed in the riparian buffer zone when: Wind speed is above 5 mph. Wind direction or activity would carry pesticides toward, or deposit them upon open water.

Threshold: Thresholds are based on site specific conditions.

Action: Choice of pesticides utilized consider any possible effects on aquatic life as well as tendencies to move in the environment. Only approved pesticides for the aquatic environment would be used or a variance with the proper permitting authority would be applied for if dealing with a new chemical or new invasive species (and the technique is not yet approved for general use).

Vacant Lands Intended for Future Park Development

Description: Vacant lands intended for future park development are defined as undeveloped park lands that were purchased with the intent of developing them for a mixture of active and passive recreational uses. These uses include future park development or maintenance of a natural resource value/function. In addition, vacant lands can include existing parklands that are being converted from turf to naturalized areas. MPRB's approach to managing pests on vacant land varies by the vegetation (and its threat), the current development on the land, and its intended use.

Vacant lands which were purchased to provide a future park may eventually contain developed features such as irrigated turf, playgrounds, sports fields, and other active recreational features. Because of this intention for future development, few management activities other than vegetation management, debris and trash pickup, and hazard abatement occur at the sites. The thresholds for weeds in these sites are substantially higher than in other management areas. The inventories of these sites will likely change as current sites are developed and new sites are purchased.

Threshold: Threshold levels for vacant lands are set forth in the naturalized landscapes and naturalized turf categories of developed parks, as appropriate. MPRB maintains specifications which it targets for native seed areas; actions may be taken to achieve these thresholds. Action thresholds for pest management in MPRB-owned vacant lands are derived from the percent cover of the weed, threat the weed poses to the area, and current/intended use of the land. The thresholds triggering control actions are based on the percent cover of weeds present at the park site. Generally, there is a 100% tolerance for weeds while the area is designated as vacant land – when the designation changes (to park, for example) the tolerance will also be adjusted. If noxious weeds are discovered, a control action will be taken according to regulations and possibly at lower thresholds in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. MPRB reserves the right to delay management actions for weeds due to resource constraints.

Action: Management and control of exotic invasive species, mowing for vegetation control, fence line vegetation control, and basic stewardship activities such as regular site inspections are the primary management activities associated with these assets. The specific type of action taken to treat weeds and other pests on vacant land depends on the pest, its threat, and the current and intended usage of the land on which the pest resides. The general approach is mechanical controls, such as mowing. Chemical controls are used for noxious weeds and possibly when the site reaches the construction/development phase. Seeding of native grasses also may occur.

Native Seeding

MPRB hires contractors to clear land and seed designated areas with native grasses and wildflowers; the specification is edited to suit each project that requires a natural area. Contractors first examine and prepare the ground for seeding; they are permitted to use pesticides that are approved by the Environmental Protection Agency (EPA),

comply with MPRB policy and City of Minneapolis Ordinances – Chapter 230 Pesticide Control, and do not contain Glyphosate. If an herbicide is used, seeding will not occur until the presence of herbicide is no longer present in the soil. After the ground is cleaned of vegetation, soil tested, graded, and the topsoil is tilled, fertilizer will be applied, followed by seeding the area with grasses and wildflowers native to Minnesota. The seeded area is then watered and mulched and/or covered with an erosion control blanket for protection. MPRB requires a total percentage cover of seeded areas; therefore, the contractor is required to maintain and establish native seeded areas by removing weeds, mowing, replanting, and performing other operations as required to establish healthy, viable vegetation.

New Park Construction

Description: When new parks are developed, the MPRB usually hires contractors for park construction. MPRB Environmental Stewardship Division or Planning Division staff may require contractors to modify or control vegetation to achieve the specifications in the contract.

Thresholds: In the development or construction of parks, action thresholds depend on the scale of the project as well as on the vegetation, location, usage, and contractor/consultant used in developing the project. Typically, chemical controls are used to prep sites as construction timelines aren't usually conducive to solarization or other non-chemical techniques. Weed threshold levels and specifications for modifications to vegetation are identified prior to start of construction and are defined in the project contract and implemented within the context of this policy. Once a park has been established, the thresholds and actions defined earlier in this document are applicable.

Action: The type of action taken to treat weeds on this land depends on the weed and other pests, its threat to the land and its intended usage of the land on which the pest resides. The general approach is mechanical controls, such as mowing. Chemical controls are used for noxious weeds and possibly when the site reaches the construction/development phase. Seeding of native grasses also may occur. If weed tolerances exceed the contract specifications for any weed classes, the contractor is responsible for meeting specified outcomes. Native seeding may also be done by landscape architects.

Appendix A: Definitions

Aesthetic Value

Value of a property based on its capacity to elicit pleasure or displeasure when appreciated or experienced.

Aquatic Invasive Species (AIS)

Non-native plants, animals, and other organisms that have evolved to live primarily in water (aquatic habitats) rather than on land (terrestrial habitats). Aquatic habitats are habitats that are covered with water all or part of every year.

Best Management Practice (BMP)

Methods or techniques found to be the most effective and practical means in achieving an objective while making optimum use of resources.

Bluff

A steep outcropping, hill, cliff, or embankment adjacent to a protected water, with an average slope of eighteen percent (18%) or greater measured over a horizontal distance of fifty (50) feet or more, and that rises at least twenty-five (25) feet above the ordinary high-water mark of the protected water.

Disease

Either an infection or an infestation.

Environment

The surroundings (natural or built) in which a plant or animal lives, which tend to influence its development or behavior.

Floodplain

An area delineated as a floodplain by the Federal Emergency Management Agency.

Fungicide

A substance primarily intended to kill fungi.

Glyphosate

An active ingredient in a non-selective herbicide applied to the leaves of plants to kill both broadleaf plants and grasses.

Herbicide

A substance that is primarily intended to destroy unwanted vegetation.

Infection (Tree)

A tree that is: (1) contaminated with pathogenic microorganisms; (2) being parasitized; (3) a host or carrier of an infectious, transmissible, or contagious pest; or (4) so exposed to a tree listed in clause (1), (2), or (3) that

one of those conditions can reasonably be expected to exist and the tree may pose a risk of contamination to other trees or the environment.

Infestation (Tree)

A tree that has been overrun by pests.

Insecticide

A substance primarily intended to kill insects.

Integrated Pest Management Program

A pest management technique that gives preference to the safest pest control methods and uses conventional chemical pesticides only when no other feasible, reasonable alternative exists. It addresses the underlying causes of pest problems and seeks to find effective long-term solutions that emphasize prevention.

Invasive Species

Any invertebrate animal, plant pathogen, parasitic plant, or similar or allied organism which can cause a native organism to be diseased. This title is given to a pest causing economic or environmental harm and disease to native organisms in Minnesota. This designation is determined by orders of the superintendent based on information from internal MPRB experts, the commissioner of agriculture of the State of Minnesota, or the commissioner of the department of natural resources of the State of Minnesota.

Legacy Aquatic Invasive Species

Legacy aquatic invasive species are aquatic invasive species (AIS) with a nearly ubiquitous presence. Eradication is unlikely, with management and control being the only feasible strategy. Management options include managing solely through the harvesting program to preserve recreational access. Another option would be to manage with a combination of harvesting and chemical treatment focusing on preserving recreational access. A more aggressive approach would be a multiyear plan of whole-lake treatments to increase aquatic habitat. A treatment program would need to be ongoing to have a continued effect.

New Aquatic Invasive Species (AIS)

A new AIS is one that has the possibility of being detected early and being eradicated with proper targeted management; these new AIS may have the ability to be ecosystem changing. A new AIS would likely require a more aggressive management strategy wherever it is found in a lake or other waterbody to prevent the new species from impacting the resource. New AIS can arrive in Minnesota and become threats rapidly.

Some AIS may not fall neatly into an “ecosystem changing” category. For example, Chinese/Banded Mystery snails can grow to nuisance levels but have not been clearly demonstrated to be ecosystem changing. There is also no eradication type treatment for them (Manual removal is the only method and it is not effective).

Noxious Weed / Restricted Weed

A noxious weed is an invasive species of a plant which is designated as harmful to agricultural crops, ecosystems, or humans or livestock. In accordance with the Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.), the U.S. government has designated certain plants as noxious weeds. These plants cannot be planted

or sold in Minnesota Nurseries. The Minnesota Department of Agriculture determines the noxious weed listings.

Ordinary High-Water Mark

The point of the highest water level, which has existed for a sufficient period to leave evidence upon the landscape. The ordinary high-water mark is commonly that point where natural vegetation change from predominantly aquatic to predominantly terrestrial. Determined by the Department of Natural Resources.

Pest

An organism possessing characteristics humans consider injurious or unwanted. Pests can include both native and invasive species.

Pesticide

Any substance primarily intended to control, destroy, repel, or mitigate a pest. Pesticides include, but are not limited to, herbicides, fungicides, insecticides, rodenticides and any other compounds and organisms, naturally occurring or otherwise.

Plant Protectant

Pesticides classified as fungicides, herbicides, insecticides, and algaecides, which are utilized to preserve targeted plants.

Plant Pest

Any non-vertebrate organism, in any developmental stage, which is injurious to any plant or plant product.

Prairie

Herbaceous-dominated habitats identified primarily by the presence and number of trees in a grassland setting.

Shoreland Zone

Land owned by or under the control of the MPRB that is (a) within one thousand (1,000) feet of the ordinary high-water mark of a protected water; (b) within one thousand (1,000) feet of the top of a steep slope; or (c) on a bluff.

Rodenticide

A substance primarily intended to kill or deter rodents.

Steep Slope

Land having an average slope of eighteen percent (18%) or greater measured over a horizontal distance of fifty (50) feet or more having a drop from the high point to the low point of at least ten (10) feet that is adjacent to a protected water.

Stormwater Best Management Practices (stormwater BMP)

Structural, vegetative, or managerial practices used to treat, prevent, or reduce water pollution.

Structure

Any building, road, path, walkway, stairs, retaining wall, pier, dock, or other permanent fixture or improvement.

Tree

Includes both deciduous and coniferous trees.

Weed / (Common Weed)

A weed is a plant growing in an undesired place and is considered by the user of the term to be a nuisance. The term weed can be applied to plants growing in many different settings, including gardens, lawns, agricultural areas, developed parks, and natural areas. In some settings even native plants can be considered undesirable, such as prairie restoration projects where woody shrubs and trees would conflict with the desired site characteristics. Poison ivy is a native plant, but in some locations where the likelihood of public exposure is high, staff may elect to control it in the interest of public safety. Weeds may be unwanted for several reasons: they might be unsightly, degrade water quality, negatively affect ecosystem functionality, crowd out or restrict light to more desirable plants, or use limited nutrients from the soil. They can harbor and spread plant pathogens that infect and degrade the quality of crop or horticultural plants. Some weeds are a nuisance because they have thorns or prickles, some have chemicals that cause skin irritation (e.g., poison ivy) or are hazardous if eaten, or have parts that come off and attach to fur or clothes.

Appendix B: No Pesticide Zones

Due to the nature of their use and/or their users, some parkland areas have been designated “No Pesticide” zones. The following setbacks for pesticide applications will apply to all MPRB parklands*

- **Playgrounds and Exercise Stations:** No pesticides will be applied within 25 feet of playgrounds.
- **Dog Parks:** No pesticides will be applied within 25 feet of the outside perimeter of the Dog Park.
- **Picnic Areas:** No pesticides will be applied within 25 feet of picnic facilities.
- **Community Gardens:** No pesticides will be applied inside the gardens or within 25 feet of the outside perimeter of Community Garden sites.
- **Outdoor Swimming Pools, Wading Pools, and Water Parks:** No pesticides will be applied within 100 feet of these types of water features during the season when it is open to the public. Exception: applications made to control invasive species in natural areas within the 100-foot buffer at Webber Pool. Necessary applications shall be made with low-drift methods during off-peak pool use hours.
- **Stormwater Catch Basins and Inlets:** No pesticides will be applied within 5 feet of any catch basin or inlet that leads to the piped Stormwater system.

*Park supervisors may authorize the application of a pesticide in a No Pesticide Zone when there is a threat to public health or safety (e.g., a population of hornets, wasps, yellow jackets, mosquitoes, poison oak, etc.) or in cases where a pest poses a substantial risk to the intended function of the park or an asset, after reasonable non-pesticide approaches have been considered.

Appendix C: Website Links

MPRB Pest Management

https://www.minneapolisarks.org/park_care_improvements/maintenance/pest_management/

MPRB and IPM Applicable Policies

The MPRB Board of Commissioners have adopted various resolutions supporting the advancement and utilization of best practices for an IPM. These include but are not limited to: [Sustainable Parks – Sustainability](#).

The following City of Minneapolis Code/Ordinances are also applicable for supportive management for this IPM:

[Chapter 2 - GENERAL REGULATIONS GOVERNING CONDUCT | Code of Ordinances | Minneapolis, MN |](#)

[Chapter 10 - TREES AND VEGETATION | Code of Ordinances | Minneapolis, MN | Municode Library](#)

[Chapter 12 - ENVIRONMENTAL PROTECTION | Code of Ordinances | Minneapolis, MN | Municode Library](#)

Invasive Species

The [Minnesota Department of Natural Resources](#) is an additional reference for information on invasive species found in the state of Minnesota and their impact on land and water resources.

[Department of Agriculture Noxious Weed List](#)

[DNR Link to Invasive Species in Minnesota](#)

[Department of Interior Nonindigenous Aquatic Species](#)

[Midwest Invasive Plant Network](#)

[University of Minnesota – Aquatic Invasive Species](#)

[University of Minnesota – Minnesota Aquatic Invasive Species Research Center](#)

[University of Minnesota – Aquatic Invasive Species Campaigns](#)

[U.S. Geological Survey Aquatic Nuisance Species Task Force](#)

MPRB has additional information about their treatment of invasive species

- [Terrestrial \(Land-Based\) Invasive Species](#)
- [Aquatic \(Water-Based\) Invasive Species](#)

Natural Areas Assessment

[MPRB Natural Areas Plan Phase II – Condensed Version \[PDF\]](#)

Community Gardens

[IPM Plan for Community Gardens](#)

Water Resources

https://www.minneapolisarks.org/park_care_improvements/water_resources/

Appendix D: Secondary Non-Target Exposures to Anticoagulant Rodenticide Baits



3699 KINSMAN BLVD. MADISON,
WISCONSIN 53704 USA
P. (608) 241-0202 / F. (608) 241-9631

www.belllabs.com

A secondary poisoning is described as an exposure to an active ingredient via consumption of another organism that has already consumed the bait. As shown below, the probability of a secondary poisoning from one of the anticoagulant rodenticides is extremely unlikely.

While a rat need eat only a few grams and a mouse about one gram of these baits to reach a toxic dose, they often eat far in excess of lethal dose. A rat can consume 20 - 25 grams of bait in a day, a mouse, 5 - 10 grams. The rat or mouse will die in approximately 3 to 5 days, during which time it will have excreted up to 50% of the active ingredient. If we consider the worst-case scenario, that the rat or mouse has just eaten the bait and the pet then consumes the entire rat/mouse, thereby essentially eating the bait via the rat/mouse, we get the consumption quantities shown in Table 1 (rat/mouse totals are rounded up).

Table 1 -

% of Body Weight of Bait Consumed	<1%	1-5%	5-10%	>10%
10 lb. pet	2 rats 5 mice	2 - 9 rats 5 - 22 mice	9-18rats 22 - 44 mice	More than 18 rats More than 44 mice
25 lb. pet	4 rats 11 mice	4 - 22 rats 11 - 56 mice	22 - 45 rats 56-112mice	More than 45 rats More than 112 mice
40 lb. pet	7 rats 18 mice	7 - 36rats 18 - 91 mice	36 - 73 rats 91 - 182 mice	More than 73 rats More than 182 mice
100 lb. pet	18 rats 46 mice	18-91rats 46 - 227 mice	91- 182rats 227 - 454 mice	More than 182 rats More than 454 mice
Suggested Response	Treatment optional but probably not necessary. Observe for overt symptoms.	Treatment optional but pet should be observed for overt symptoms. Consider Prothrombin Time (Pro-Time) test 24 hours after ingestion.	Treatment advisable, consult your veterinarian. Consider Prothrombin Time (Pro-Time) test 24 hours after ingestion.	Seek immediate treatment. Bring product packaging with you

As can be seen from this table, while possible, unless the rats or mice are the primary food source for the pet, consumption of a sufficient quantity of poisoned animals is not likely. Dead rodents should be picked up and disposed of, preferably daily. The probability of getting a disease from the dead or dying rodents probably exceeds the likelihood of getting sick from any residual active ingredient in the baits. If you have questions or require any additional information, please see our website, or give us a call at 608-241-0202.