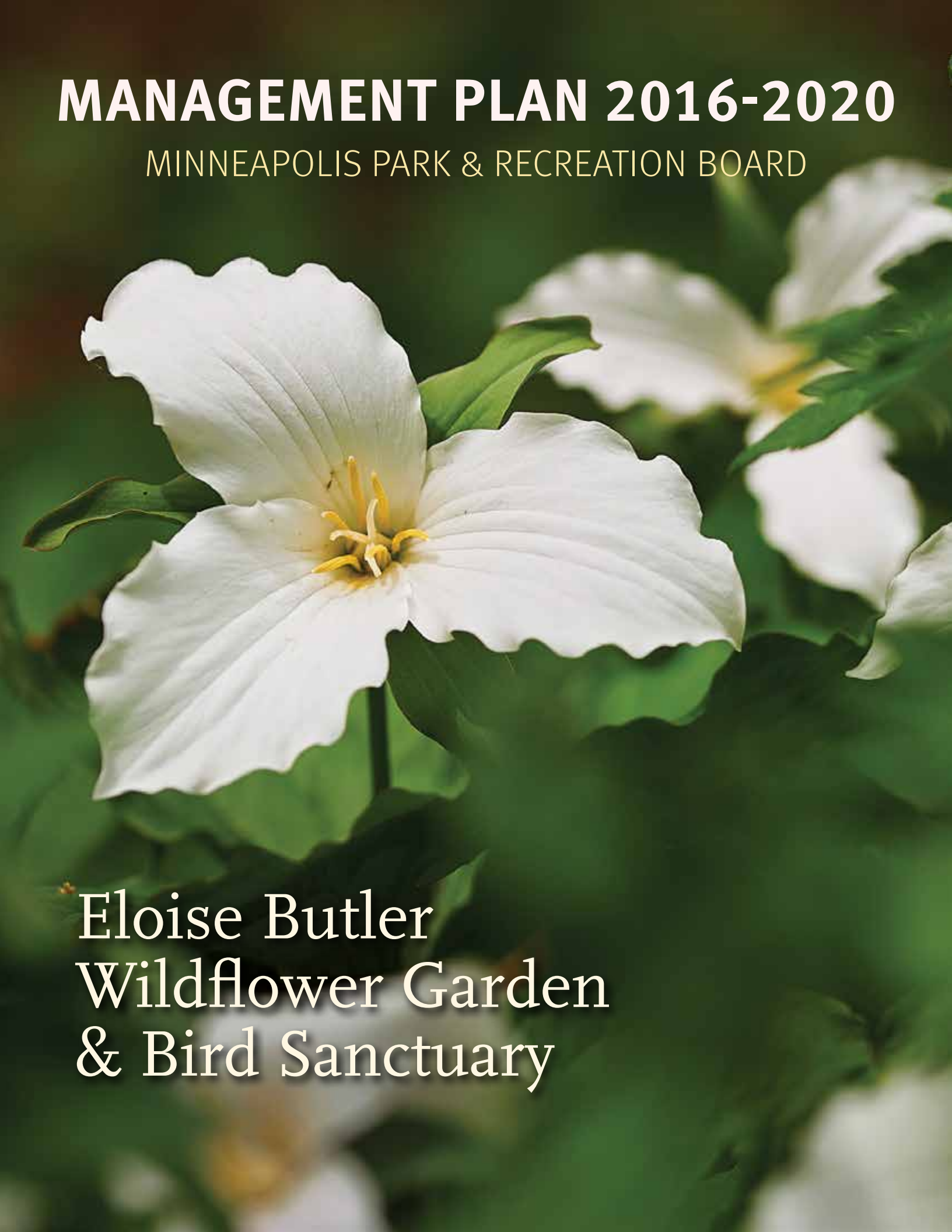
MANAGEMENT PLAN 2016-2020

MINNEAPOLIS PARK & RECREATION BOARD



Eloise Butler Wildflower Garden & Bird Sanctuary

Eloise Butler botanizing in the bog, 1911.

MANAGMENT PLAN 2016-2020

Mission

Minneapolis Park & Recreation Board

The Minneapolis Park & Recreation Board
shall permanently preserve, protect, maintain, improve and enhance
its natural resources, parkland, and recreational opportunities
for current and future generations.

The Minneapolis Park & Recreation Board
exists to provide places and recreation opportunities for all people
to gather, celebrate, contemplate, and engage in activities
that promote health, well-being, community, and the environment.

Executive Summary

The Eloise Butler Wildflower Garden and Bird Sanctuary (the Garden) is a 15-acre public native plant garden located in Minneapolis, Minnesota. Founded in 1907, it is the oldest public wildflower garden in the nation. Currently the Garden houses over 600 plant species and provides habitat for over 130 resident and migratory bird species.

This is the 2nd edition of the Garden's Management Plan. The first plan, written for 2010-2015, provides valuable information about how the Garden is managed; who the Garden serves; and foundational information about the ethos that guides the work taking place at the Garden. The first plan created awareness about Garden management strategies and goals and provided strategic information for pursuing opportunities to enhance the Garden's programming, plant collections, partnerships, and infrastructure.

The goal of the 2nd edition of the management plan is to provide updated information detailing the specific goals, both long and short term, for maintenance and improvement of the plant collections, programs and visitor experience.

Specific topics of management are covered in the plan. For each management topic, a five-year summary of past highlights is included in addition to a list of future directions and strategies. Finally, a numerical list of management priorities for the next five years, ordered by significance, is included for each topic. These priorities will serve as the core focus of management activities from 2016-2020 at the Garden.

Several strategies and priorities described in this document, such as on-going planting, will be partially funded through the current budget. However, most priorities are unfunded and will require resources from various sources both inside and outside of the Minneapolis Park & Recreation Board. Staff will continue to pursue other funding and partnership opportunities as appropriate to help accomplish unfunded strategies and priorities.

The strategies and priorities listed in the management plan compliment and advance the vision and several goals outlined in the Minneapolis Park & Recreation Board's 2007-2020 Comprehensive Plan. The Garden is a vital component in the agency's strategy to "protect natural resources recognized as significant city, regional, or national resources, due to historical, ecological, or aesthetic values."

The Garden is an important regional asset thanks to the countless people who have over the past 109+ years supported its mission, appreciated its splendor and recognized its uniqueness. The legacy of Eloise Butler is an integral part of the city's cultural and ecological heritage available for all to enjoy with every stroll through this enchanting native plant garden.

Highlights of 2016-2020 Implementation Priorities

For the Garden

✔ Increase diversity of plants and enhance wildlife habitat through dynamic canopy and understory tree plantings along with continuation of extensive pocket plantings of a diverse selection of regional native plant species.

✔ Maintain the historic character of the Garden and make the Garden more accessible to all visitors through infrastructure updates. Priorities include developing concept plans and implementing initiatives to secure funding for renovation of the Visitor Shelter, bathrooms, tool shed and entrance area.

✔ Study the hydrology and plant communities of the wetland garden. This wetland area was the original catalyst for creating the Garden.

✔ Manage invasive species and aggressive native species to ensure the health of the Garden and to continue the legacy of this dynamic collection of native plants.

For People

✔ Work to allocate additional resources to increase staffing for physical care of the Garden; education program development and delivery; and visitor services.

✔ Continue to strengthen the role of volunteers. For example, work with the Friends of the Wild Flower Garden to increase the number of participants in the Friends' Invasive Plants Action Group.

✔ Develop partnerships to enhance the depth of programming and health of the Garden.

For Education

✔ Increase efforts to reach underserved audiences by reducing barriers to participation such as lack of program awareness, language, and/or transportation.

✔ Conduct an intercept survey to better understand the needs of current and potential future Garden visitors.

✔ Provide opportunities for visitors to learn about the plants, birds and insects of the Garden in meaningful and hands-on ways.

Garden Needs 2016-2020

Garden Plant Care and Collections Improvements

Wetland Restoration Feasibility Study. ($10,000) Examine the natural history of the wetland and develop plans to enhance its health and biodiversity.

Plant Collections Database. ($10,000) Research options and purchase plant collections management database for plant collections record keeping, mapping and data management. Train appropriate staff on use of software and related data collection tools.

Mobilize Resources to Enhance Invasive and Aggressive Species Management. ($20,000) Continue intensive efforts to manage invasive and weedy species.

Tree Canopy Replacement Plantings. ($20,000) Continue efforts to increase species diversity, add selections for future climate change scenarios, and to create multi-generation forest stands.

Garden Building and Entrance Improvements

Develop plan to improve functionality of Visitor Shelter for visitors and staff. ($20,000) Plan to include updates for ADA compliance, improved visitor experience, and increased space for staff and storage.

Develop plan to improve bathroom access. ($7,500) Plan to include renovations that are ADA compliant, family friendly, and gender inclusive.

Develop plan to improve entrance. ($20,000) Develop plan to update Garden entrance to enhance accessibility to Garden and accommodation of visiting groups.

Develop plan to replace tool shed. ($10,000) Develope plan to remove existing tool shed and build new tool shed in area adjacent to Garden.

Garden Trail Improvements

Complete phase two (final phase) of wetland boardwalk. ($100,000) Install phase two of designed boardwalk and wetland education gathering space.

Trail stabilization. ($5,000) Adjust trail alignments and cross-sections to provide protection against ongoing erosion issues and foot traffic.

Garden Program and Visitor Experience Improvements

Audience intercept survey. ($10,000) Conduct survey to better understand Garden visitor demographics, interests, and trends. Conduct off-site surveys to determine if/why certain user groups do not visit the Garden.

Directional signage. ($20,000) Add permanent signage to help visitors navigate the trails from Wirth Beach parking lot to Garden's west gate.

Outreach Program. ($20,000) Develop resources to reach a broader audience.

Tools for Inclusivity. ($20,000) Develop tools, resources and programs to provide for greater inclusivity at the Garden.

Garden Staffing Improvements

Increase staffing for Garden mainenance. ($25,000 annually) Additional support for Garden maintenance and improvements is necessary to maintain a high-quality experience for visitors and for plant collection health and development.

Increase staffing for environmental education program. ($20,000-30,000 annually) Increase staffing during weekday, daytime hours to suppot programming and visitor services. Increase staffing to provide for greater outreach and programming activities.

INTRODUCTION

Getting to know the Garden

Goals and Values

Garden Background

Getting to know the Garden

That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics. That land yields a cultural harvest is a fact long known, but latterly often forgotten.

Aldo Leopold

Garden Background Information

The Eloise Butler Wildflower Garden and Bird Sanctuary (the Garden) is the oldest public wildflower garden in the United States. Founded in 1907, the Garden has served as a native plant reserve for the enjoyment and education of the public for over a century. Within the Garden's gates are found distinct garden areas, with different ecological features, each maintained to foster a wide variety of plant species typical of Minnesota's natural areas. The Garden currently houses a plant collection that contains over 600 plant species. More than 130 resident and migratory bird species travel through or reside within the boundaries of the Garden.

The Garden's Visitor Shelter serves the general public by providing access to staff, volunteers, and information. Public tours, special programs, and private group tours are scheduled regularly on a variety of natural history topics. On the trails and in the Visitor Shelter, the Garden serves the community with wide-ranging opportunities for young and old to connect directly with the natural world.

The Garden is part of a complex system with natural, cultural and social dimensions. This integrated system is one supported by interwoven components. There are four components that can be recognized as distinct, but interconnected, parts of the system. The components are the land itself; people, partners and the Minneapolis Park & Recreation Board; education; and funding. Together these resources create a rich and resilient Garden.

The Garden's Guiding Philosophy

All life is interconnected. We can nuture the health of our natural and social communities through our beneficial actions rooted in this awareness.

For millennia, people from all over the world have understood that humans are but one strand in the web of life. For centuries, indigenous people, gardeners, poets, naturalists, and philosophers have spoken to the inseparable relationship of the natural world and the human one. In more recent times, scientists from different fields have conveyed the fundamental reality of the interconnected nature of life on planet earth. This understanding is important to both how humans care for the planet as well as how humans relate to it and to each other.

This understanding also serves as the foundation for the guiding philosophy used to care for the Garden and to inspire Garden visitors. Guided by the knowledge that all life is interconnected, Garden management acknowledges and supports the notion that providing opportunities for visitors to be in direct relation with a complex biotic environment is significant and beneficial. The Garden, with its species richness and naturalistic ambiance, is a unique resource for the public and serves a vital role of awakening an ecological awareness both for individuals and the community at large.

To this end, the Garden serves as a place for many people to create and to nurture their personal relationship to the natural world. Having experiences with the natural world that invoke a sense personal connection to it provide opportunities for the individual to begin to relate to the natural world as a member of the greater web of life. As this connection is strengthened, individuals may contemplate the possibilities of being a community member of a healthier and more balanced, biologically vibrant and beautiful world. Ultimately they may become an advocate for and supporter of efforts to care for and cultivate such a world. Advocacy for and understanding of the natural world is linked to an individual's personal connection to nature and the interconnectedness of life.

The Minneapolis Park & Recreation Board's stated vision is to "...focus on preserving land...with a strong emphasis on connecting people to the land and to each other." This vision supports the concept that the parks in the system, including the Garden, serve as the foundations upon which individuals and communities can build meaningful and transformative relationships with the land.

Why the Garden is Unique

The Garden is a unique feature, not only of the Minneapolis Park & Recreation Board's parkland system, but of the nation. It functions as an aesthetically appealing public garden and native plant preserve. It is dedicated to preserving and displaying a dynamic collection of plant species native to Minnesota and to providing habitat for a wide range of bird species. There are several characteristics that contribute to its distinctive singularity:

- It is the oldest public wildflower garden in the United States.
- The plant collection focuses specifically on plants species native to Minnesota.
- Unlike traditional botanic gardens, plants are arranged to appear as though naturally occurring.
- The Garden's rustic trails and shelter, and its tucked away location in Theodore Wirth Park, provide the sensibility of being in wild nature far from the city and modern life.
- Plant collections have been developing and maturing over a period of 100+ years.
- The Garden houses the only nature-focused interpretive center staffed by the Minneapolis Park & Recreation Board.
- It was founded at the urging of teachers and scientists, most notably Eloise Butler.

Purpose of the Management Plan

This management plan has been developed to achieve five main goals and for two principal audiences: Minneapolis Park & Recreation Board staff and Commissioners and the greater community of Garden visitors and supporters.

Communication Tool

Having a concise summary of the management history and current practices serves an important role as a communication tool about how the Garden has been managed in the past and how it will be managed in the future. The information is for use within the Minneapolis Park & Recreation Board and by the greater community of Garden visitors and supporters.

Guide Future Management Philosophy and Work Plans

Managing the Garden for current and future generations is a multi-faceted responsibility for staff. Sculpting a clear picture of the management philosophy and related practices guides annual work plans and cultivates an understanding among the Minneapolis Park & Recreation Board including Garden staff and the public about the greater goals and vision for the Garden.

To Acknowledge and Learn from the Past (prescriptive management)

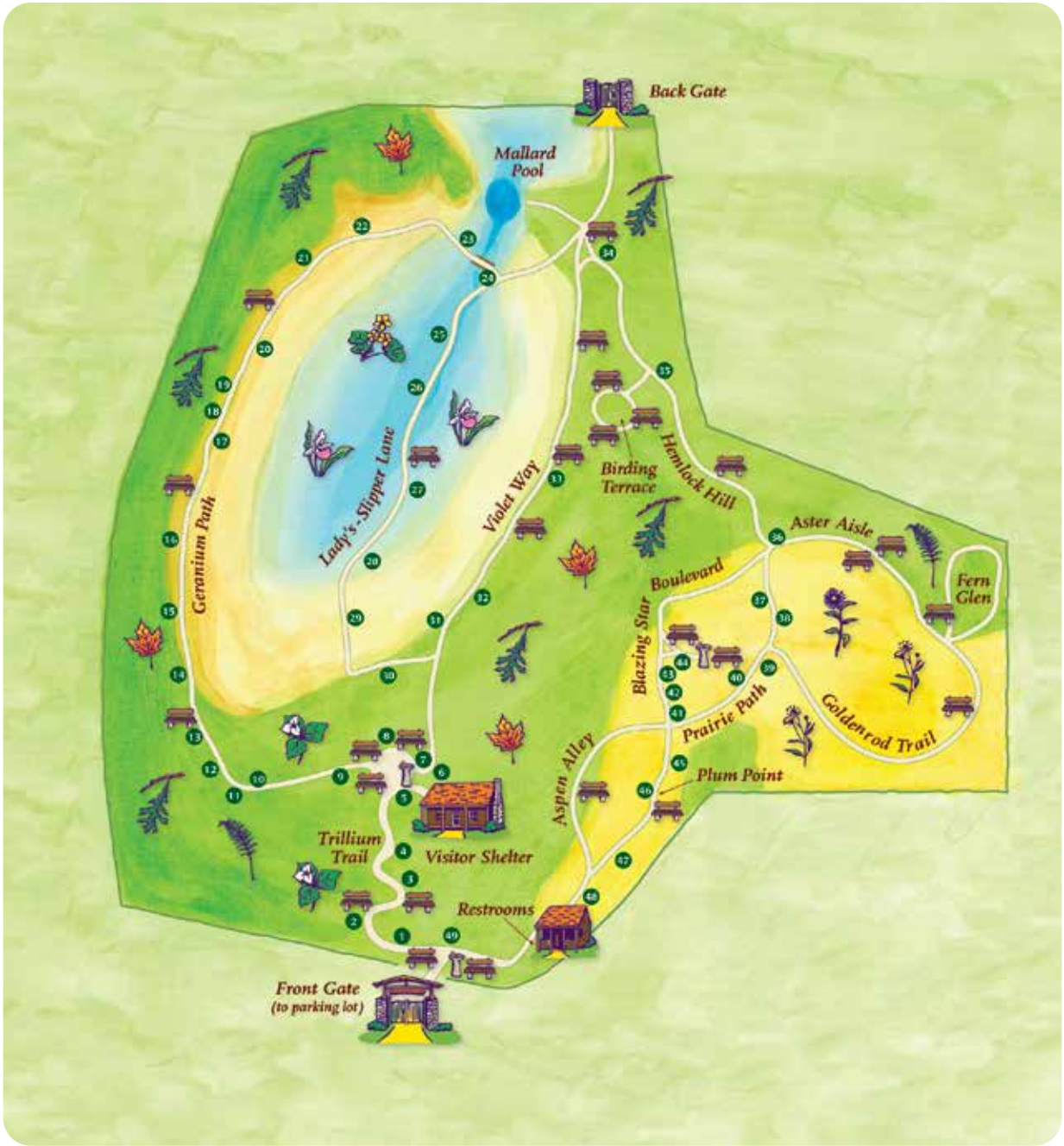
By building an understanding of how past management practices and principals have shaped the Garden, it is possible to move forward with a greater sense of purpose, unity, and clarity of vision. With this foundation of knowledge it is easier to see how the past informs and gives context to management decisions that are made today. Please see the Appendix for a detailed history.

Articulate Opportunities and Boundaries with the Greater Community

The Garden is a resource that is cherished by many different community groups and individuals. Clarifying roles and responsibilities for existing and potential relationships makes for a brighter and healthier future. Setting goals for reaching out to new community groups and individuals widens the scope of what the Garden can provide to the public.

Realize Vision Outlined in Minneapolis Park & Recreation Board 2007-2010 Comprehensive Plan

The Garden's management plan directly speaks to the broader goals of the Minneapolis Park & Recareation Board's 2007-2010 Comprehensive Plan. Work carried out at the Garden supports specific vision themes and goals outlined in the Comprehensive Plan. Just as it is recognized that the individual person is a part of a greater community, it is also true that the Garden is a single component which is part of a large dynamic park system. The Comprehensive Plan serves as a tool to unify the work of the Minneapolis Park & Recreation Board and to create clear overarching themes that guide the work of the agency. The Comprehensive Plan was developed with considerable amounts of input and feedback from the public and is a reflection of the values of the community at large.



Eloise Butler Wildflower Garden Trail Map

Goals & Values

When one tugs at a single thing in nature, he finds it is attached to the rest of the world.

John Muir

Building Understanding through the Articulation of a Common Vision

Since its founding, the Garden has been informally oriented around a system of principles used to guide its management. Throughout its history, there have been a total of five different Curators and Gardeners with different focuses for the Garden. Remarkably, there are four common overarching principles that have remained constant. These have served as a unifying organizational tool during the past century.

These unifying principles are: a vision to maintain a native plant botanic garden that sustains a wide variety of Minnesota flora in a naturalistic setting; a genuine appreciation of native plants both as individuals and as members of greater plant communities; a dedication to educating the public about Minnesota native flora and fauna; and a focus on working with the natural world and emulating the natural world's standards of complexity, flexibility, greater health and biodiversity.

It is important to understand these historic guiding principles in order to appreciate the quality, choices and tone of Garden management. They have informed the work carried out at the Garden since its inception and contribute to the Garden's guiding philosophy. The impetus to formally articulate the above principles and to translate them into the vision, mission, values, and goals of the Garden was borne from awareness that the long-term health and success of the Garden will be more easily realized with a set of clearly stated directive values and goals.

VISION

The Eloise Butler Wildflower Garden and Bird Sanctuary is a treasured, public native plant garden. The Wildflower Garden, with sensory appeal and attention to beauty, exhibits a great diversity of flora and fauna native to Minnesota in a naturalistic setting while providing dynamic and meaningful environmental education opportunities to a broad audience.

MISSION

The Eloise Butler Wildflower Garden and Bird Sanctuary showcases native plants and birds to inspire stewardship and appreciation of the natural world.

VALUES

Preservation of native plants and plant diversity

The Wildflower Garden was founded with a sincere passion for the preservation of native plants and plant diversity. This is a guiding principle for all work at the Garden.

Sanctuary for people, plants and wildlife

The Wildflower Garden serves as a place of rejuvenation and inspiration for scores of visitors from near and far. Its role as a sanctuary for people, plants and wildlife is deeply significant.

The legacy of Eloise Butler

The Wildflower Garden was founded by a visionary woman, Eloise Butler, at a time when participation by women in the endeavors of the scientific community was uncommon. Eloise Butler inspired generations of botany students through her dedication.

Connecting city residents and visitors with nature

The Wildflower Garden is situated in the heart of a major North American metropolis providing city dwellers the opportunity to connect with and find meaning in the natural world.

Sharing knowledge about the natural world

The Wildflower Garden serves as a living resource for information about plants and birds native to Minnesota. The resources found within the Garden gates provide countless opportunities for individuals to learn about and find enthusiasm for native plants and birds and their importance in our everyday lives.

Health, beauty and integrity of the greater natural world

The natural world that people are an integral part of is under severe pressure from the actions of human beings. Nurturing the Wildflower Garden in ways that contribute to the health, beauty and integrity of the greater natural world is a management priority.

GOALS

- To serve as an inspirational public Wildflower Garden devoted to the collection and preservation of Minnesota native plants and the celebration of resident and migratory birds.
- To protect, preserve, and enhance the native plant collections and historic plant collections contained within the Wildflower Garden's 15-acres of wetland, woodland, and prairie areas for present and future generations of people and wildlife.
- To maintain the legacy of Eloise Butler.
- To uphold the integrity of this historic public Wildflower Garden and the tangible and intangible resources that it provides to the community.
- To create a visually stunning display of the flora of Minnesota exhibited in a manner which is inspired by nature.
- To educate visitors on the habitats and beauty of Minnesota native plants and birds.
- To inspire preservation of and interest in native plants and birds by individuals and organizations.

Garden Background

It is fortunate, perhaps, that no matter how intently one studies the hundred little dramas of the woods and meadows, one can never learn all of the salient facts about any one of them.

Aldo Leopold

During the first years of the Garden's existence there was a concerted and pervasive effort to increase both the number of native plant species in the Garden as well as the quantity of specimens of many represented species. The Garden was viewed as a native plant garden with a purpose to sustain a great diversity of the native flora of Minnesota in a naturalistic setting. It was not managed as an intact grouping of ecosystems wanting to be restored to their former untouched nature. Rather, it was treated as a rich assembly of soil types, indigenous plant groupings, and shade and slope regimes perfect for the development of a diverse collection of native plants in a relatively small area close to an urban center. Over the past 100+ years the Eloise Butler Wildflower Garden plant collections have undergone many substantial changes due to environmental forces and the vision, tenacity and guiding management philosophy of administrative staff and the Curator or Gardener of the day.

Eloise Butler

At the time of its creation in 1907 the then three-acre Garden was viewed by Eloise Butler and the botanists who founded it as one of the more pristine pieces of unspoiled nature near the city. One reason why it had remained relatively unspoiled is due to the fact that the low lying areas that made up the bulk of the original garden were less desirable for cultivation, grazing, or residential development. Once established, the Garden quickly took on the characteristics of a true garden with the planting of hundreds of new species that would not have been part of the original plant communities found on the site. With the additions Eloise made clear her gardening style " . . . plants are to be

allowed to grow as they will and without any check except what may be necessary for healthful living. Those in excess may be removed, when others more desirable have been obtained to replace them. Each individual, when procured, is to be given an environment as similar as possible to that from which it came, and then left to take care of itself, as in the wild open, with only natural fertilizers furnished by decaying vegetation." Within a few decades over 800 plants species were added to the collections. By the time Eloise Butler died in 1933 it is estimated that the Garden encompassed more than 25 acres.

Martha Crone

During Martha Crone's time as Curator, she focused on mass plantings of native species throughout the Garden hoping to inspire home owners to abandon their marigolds and canna lilies for lupines and asters. Crone added tens of thousands of herbaceous and woody plants to the Garden during her tenure as Curator. Crone posed that "nature began this garden, and, following her master-touch, human hands impelled by a purpose have evolved its shaping, adding thousands of plants each year." Her steadfast objective of beautifying the Garden through the development and enhancement of the plant collections resulted in impressive displays of native plants.

In the 1940s a sunny hillside adjacent to the Garden was annexed because it offered the opportunity to expand the Garden's plant collections to include native prairie species. Crone also experimented with plants that grew at the same latitude as the Garden and began acquiring news species from across the United States. As Martha Crone stated, "the object is to bring together all the native plants hardy in this latitude, also to experiment with plants introduced from other areas." This resulted in several non-native species being introduced to the Garden. Over the years several species introduced by Eloise Butler died out. The 1951 official plant census of the Garden's then 14 acres identified 786 plant species.

Ken Avery

When Ken Avery took over care of the Garden in 1959, he veered away from Martha Crone's goal of introducing non-native plants from similar latitudes. He instead focused on reintroducing species that had once grown in the area of the Garden. During the 1970s Avery had to adjust to the loss of consistent seasonal labor and the removal of more than 170 mature elm trees which succumbed to Dutch elm disease. The loss of trees had a catastrophic impact on the woodland plant collections. The loss of seasonal labor reduced Avery's ability to maintain and expand plant collections. As a result the number of species represented in the Garden declined.

In 1976, **Mary Maguire Lerman** was hired as the Environmental Coordinator of Horticulture Programs. While her role was to oversee gardens and programs throughout the park system, she had a specific and major impact on the Wildflower Garden. Under Lerman's direction, a dividing fence was removed, a trail loop completed and the roadway to the Garden changed to one-way. In the mid-1980s Lerman was instrumental in extending the Garden's open hours from 7am to 3:30pm to 7am to one hour before dusk, seven days a week. With these extended hours, Lerman insisted on garden programs for the public which resulted in the hiring of Naturalist staff. She also worked with Avery, and later Cary George, to locate sources of then hard-to-find native trees and plants for the Garden.

Avery revered the natural world and readily believed (and stated) that "nature knows best." Avery's management philosophy is captured in his quote that "the more you control something, the more it upsets the balance of nature and the more you have to control something else." This viewpoint may help explain the slow creep of invasive species into the Garden during the early 1980s. At that time Avery also revealed that he weeded in such a way

that it didn't look like he had weeded, "but that the most desirable plants just happened to grow where we wanted them to [adjacent to the trail]." This may mean that the choice was made to let invasive species grow in larger sections of the Garden with the assumption that nature could bring itself back into balance without human interference.

Cary George

One of Cary George's guiding management goals was to work towards replicating a pre-settlement experience. As a guide to his management decisions George perennially posed the question "what would it be like if you walked around these areas pre-development?" His efforts to enhance the Garden plant collections were made accordingly.

George saw the silent damage to the native plant collections caused by invasive species, in particular buckthorn. He began vigorous removal of these plants upon starting his career as the Gardener in 1987. In the 1990s, despite his consistent efforts to keep invasive species at bay several species proliferated in the Garden. Invasive plant seeds were introduced by wind and wildlife from greater Wirth Park and the surrounding residential neighborhoods. The devastating impacts of invasive species were just being realized by the community at large and few resources were dedicated to removal efforts. Portions of the Garden's native plant collections were compromised by the invaders. In spite of the presence of invasive species, a few uncommon plants survived in greater Theodore Wirth Park and were found by George, including twayblades and kitten tails.

George oversaw the addition of one acre to the upland garden and managed the resulting transformation by adding diversity to the plant collections in the prairie. The physical boundaries of the Garden had expanded and contracted throughout the years and with this final 1-acre addition, the Garden reached its current size of 15 acres. A 1986 plant census identified 489 species.

Susan Wilkins

Upon Cary George's retirement in 2004 the gardener position was revised. The goal was to have the new Garden Curator oversee all aspects of the Garden including gardening, environmental education programming, staff, outreach, volunteer programs, planning, and plant collection development.

Susan Wilkins was hired as the Garden Curator in 2004. In the last eleven years, emphasis has been placed on eradication of invasive species from the Garden and development of plant collections. Large sections of the woodland and wetland garden areas have been cleared of buckthorn and garlic mustard. This has dramatically improved both the visual appeal and the health of these garden areas.

The number of native plants added annually to the Garden's plant collections has increased dramatically. Large quantities of native plants have been planted over the past five years including more than 11,000 wildflowers, grasses, sedges, trees and shrubs.

Several new initiatives have been undertaken since 2004 including: the building of new partnerships, the inclusion of the public in hands-on volunteer work, the development of specialized art-nature focused programming, the installation of new signage, the development and installation of the wetland boardwalk, the inclusion of flora and fauna inventories, including the first bee census taken in the Garden's 115 year history, and the development of regularly updated management plans.

GARDEN MANAGEMENT

Garden Management Background
Garden Design Foundations: Principles & Practices
Woodland Garden Collections
Wetland Garden Collections
Upland Prairie Garden Collections
Invasive Species Management
Hardscape Elements & Infrastructure
Garden Fauna
Beyond the Garden Gates

Garden Management Background

Our ability to perceive quality in nature begins, as in art, with the pretty. On expands through successive stages of the beautiful to values as yet uncaptured by language.

Aldo Leopold

The Wildflower Garden: Natural Area or Garden?

It's a garden! Since the Garden's founding, staff and the public have played into the romantic ideal of the Garden being a piece of untouched wilderness, however, it clearly is not. In today's hectic world many people find refuge in not only the place but the idea that there is an intact piece of wilderness that is easy to access in the city. The Minneapolis Park & Recreation Board provides the opportunity for visitors to revel in their own ideas about wild nature at the Garden and this should not be discouraged.

However, it is important, especially from a management perspective, to be realistic about what the Garden is and what it is not. It is essential for staff to recognize that the Garden is not made up of intact, remnant native plant communities. Rather, the Minneapolis Park & Recreation Board is managing a highly-altered native plant garden. To manage the Garden without this core understanding would likely result in a decrease in the health, vitality and diversity of the Garden's plant collections.

A significant number of people who visit or are involved with the Garden still view it as a natural area. Research and study of Garden planting records and logs reveal that immediately upon its founding, there was an inordinate amount of work related to the manipulation of the Garden's indigenous plant collections. During the past 109+ years more than 800 new species and tens of thousands of plant specimens were added to the Garden. This movement and addition of plants has affected the plant assemblies that are often thought of as intact plant communities in the Garden. The end result is a much more diverse display of the native flora of Minnesota than what the indigenous (to the site) flora would have provided. Garden diversity was also impacted by the addition of plant species from other parts of the United States.

The survival of particular plant species and their distribution in the Garden speaks more to the fortitude of individual plant species to survive and the will and whims of the Curator or Gardener of the day than to an idealized notion of the Garden being an untouched natural area of remnant plant communities. Adding to the complexity are the natural and greater human-induced forces at work.

These forces include the introduction of invasive species which have altered soil dynamics and also the non-native species that have temporarily filled niches that were previously available to native species. Some indigenous and introduced species are actively reproducing while others are not. The invasion of exotic earthworms has changed soil dynamics in the woodland. The loss of 170 mature canopy trees due to Dutch elm disease decades ago altered the composition of the woodland garden plant collections. The change of ground water dynamics has affected both the wetland and woodland gardens due to freeway construction and urbanization. While the Garden Curator may be able to impact some of these adverse forces many are beyond the Curator's control.

The Garden is an expression of the decisions and actions carried out over the past 100+ years coupled with the natural processes constantly at play. The Garden is sculpted by both human and environmental forces. This understanding is taken into account as management decisions are made for the Garden. Of critical importance is the knowledge that the Garden is managed as a true garden and not as a natural area. This is done to ensure that the health and vitality of the plant collections are maintained and enhanced for current and future generations to enjoy.

Gardening for Health and Vitality

The Garden is composed of a rich assembly of soil types, shade and slope regimes, plant species, animals, fungi, mosses, bacteria and other organisms. The result is a dynamic and ever evolving manifestation of myriad combinations of these different existing elements. New plant species and organisms are introduced to the Garden through enhancements to the plant collections and through introduction via numerous natural pathways and forces. These additions become part of the web of life found at the Garden.

Managing the Garden to ensure its health and vitality now and in the future involves developing an appreciation for and working with this complexity. The rich assembly of life and landscape features at the Garden creates countless opportunities for a wide array of interactions and dynamics to emerge between these elements. Management practices are utilized that encourage this complexity and diversity. For plant collection care and development, it is helpful to have tools for organizing this multi-faceted assembly of Garden elements into workable layers of life. A general description of one way to look at the collections follows.

The Garden essentially has three distinct garden areas: woodland, wetland, and prairie. Within each garden area are pockets of various plant assemblies. Currently few of the plant assemblies accurately mimic a native plant community. However often they do convey the general look of particular plant communities. The goal is to develop these plant assemblies to both increase diversity and to enhance them so that they visually resemble their authentic counterparts. These native plant assemblies will then serve as the canvas or backdrop for pockets of plantings and mass plantings that contain unique taxa not necessarily specific to the composition of plant assemblies cultivated in the Garden. In addition, collections of historic plantings that are either taxonomically unique or in some other way distinct from the plant assembly structure may be featured.

Increasing the health and diversity of these core native plant assemblies is essential. In turn, this layer serves as the structure that allows for the development of special collections and the restoration of historic plant collections within the Garden.

Garden Design Foundations– Principles & Practices

The laws of artistry are well known to lovers of the beautiful.

Eloise Butler

The foundation for the development of the Garden plant collections is guided by knowledge garnered from direct observation and study of native plant communities and the enduring principles of naturalistic landscape design. As a public garden whose mission it is, in part, to inspire visitors to appreciate the beauty, greatness, and complexity of the natural world, great care will be taken to improve both the ecological health of the Garden and the splendor of the plant collections.

Four Guiding Garden Design Principles

Rhythm

Creating rhythm with the plantings adds to the sense of flow and continuity from garden space to garden space. This is done by appropriately spacing out focal points, seasonal features, and pocket plantings. This spacing allows for moments of focus on one area or feature to be interspersed with moments of general connection to the greater landscape.

Vistas

The creation of special surprise views in appropriate garden spaces affords visitors an unexpected reconnection to the larger landscape. Vistas provide visitors the opportunity to pause and reflect on the sense of opening and or intrigue afforded to them by this visual experience. Reconnecting with the greater landscape creates breadth in one's experience and provides an opportunity to re-focus once reconnected with finer, closer-at-hand details.

Unique Focal Points

Encountering an unexpected unique natural feature such as a large mossy boulder or a standing, hollowed-out dead tree can be a remarkable and memorable experience for visitors. These features may be ephemeral in nature but that does not diminish their importance. These features serve as focal points which draw visitors into a moment of concentration on a singular object or scene.

Tempo

The pace at which visitors travel though the Garden is a function both of personal demeanor and also the way facilitation of movement has been designed. The arrangement of plantings, benches, trail openings, vista and focal points can either foster or hinder a person's ability to connect with the landscape and also develop a personal relationship with it. Creating a harmonious tempo provides opportunities for reflection, connection to the landscape, and the development of personal intimacy with the Garden.

Six Guiding Garden Design Practices

Development of plant assemblies

The plant assemblies that are contained within the Garden are an interesting mix of primarily Minnesota native and some non-native flora. Particular site conditions determine what will grow and what will not. Plant species are added in such a way as to create dynamic assemblies of plants that are visually stunning and that look natural. Many of the plant species grouped together in assemblies do not grow together in plant communities found in wild nature.

> ***Example:*** The prairie garden area is a good example of a plant assembly. The majority of the prairie garden area was added to the Garden proper in the 1940s. Much work was done to remove woody plants and herbaceous weeds before planting occurred. What is called the prairie garden today is not a remnant prairie, but rather a planted prairie garden that mimics, in many ways, a native prairie.

Development of pocket plantings

Pocket plantings will be planted throughout the Garden as part of the development of the Garden's plant collections. Pocket plantings consist of groupings of plants that will grow well together in a particular habitat and that will provide a visually stunning display of native flora in a small area. The effect of multiple pocket plantings growing throughout the Garden will enhance the quality of the visual experience for visitors. Pocket plantings will generally consist of perennial wildflowers, ferns, and mosses. Groupings will be planted in a highly naturalistic manner.

Pocket plantings are not to be confused with traditional garden beds. To the contrary these plantings will be akin to natural mass groupings or drifts of plants found growing naturally in healthy native plant communities throughout the region. The pockets will all "shine" for a particular time period when the majority of the plant species contained within them will be at their peak. The plant groupings will be appropriate to the Garden setting. They will not attempt to mimic native plant groupings in frequency of distribution, percent cover or other species distribution dynamics.

Example: The new pocket planting in the wet hardwood forest area features more than 500 specimens of Virginia bluebell, foam flower, and miterwort. The long term goal is to plant an additional 2500 specimens (of the species noted above) which will result in an eye-catching mass planting for visitors to enjoy in mid-spring.

Increase diversity of plant species represented

As a garden whose purpose it is, in part, to house a significant amount of the flora native to Minnesota, increasing the number of species represented in the plant collections is integral to success. Increasing the diversity of plant species found in the Garden will encourage a greater diversity of birds, insects, fungi, and other organisms to migrate through or to reside within the Garden.

Example: The addition of new or formerly represented plant species in the prairie area has taken place over the last five years. New and reintroduced species include Canada Milk Vetch, Silky Prairie Clover, and Butterfly Milkweed. These plants will benefit monarch butterflies, bumble bees, and other pollinators and will provide nourishment for hummingbirds and other songbirds.

Single species mass plantings

In certain instances mass plantings of individual species may be carried out. In general, plantings in the Garden are to be dynamic groupings of multiple plant species. However adding a small number of single species plant groupings to the collection will remain an option.

Example: Existing single species mass groupings already exist in the Garden including Interrupted Fern Hill (indigenous grouping) and Hepatica Hill (planted grouping).

Increase beauty and visual/sensory appeal

It is important to plant large quantities of specific plant species en mass as appropriate to the planting site. This is to ensure three things:

- a viable, self-sustaining population is introduced to a given garden area;
- a given planting can impact the visual experience of garden visitors; and
- the scale of the planting is appropriate to the scale of the Garden and the local planting setting.

Example: Extensive planting of woodland wildflowers has taken place over the past several years along the trail from the front gate to the Visitor Shelter. These planting efforts have added thousands of specimens to this area, slowly increasing the showiness of this collection and increasing the likelihood that self-sustaining populations of particular plant species will develop.

Value of historic vegetation components within plant collections

Of great importance are the species which were introduced by Eloise Butler and Martha Crone from 1907 through 1959. Plant species added to the indigenous flora of the Garden during this time period are included as species in the Historic Plant collection. A small percentage of these species are not native to Minnesota and an even smaller percentage of these are known to be aggressive or invasive. Those species of the Historic Plant collection which are invasive will be removed as needed to maintain the health of the overall collection. Those species which are not native to Minnesota, but that are not invasive, will be maintained as part of the Historic Plant collection indefinitely.

Example: Eloise Butler started planting purple trillium plants in the woodland garden collections as early as 1910 and continued to add this species to the Garden throughout her tenure. The purple trillium, although not native to Minnesota, are an important part of the Historic Plant collection and are valued as an integral part of the woodland plant collection.

Woodland Garden Collection

The woodland plant collections represent a dynamic array of plants native to the woodlands of the Midwest generally. The woodland area does not represent a distinctive woodland type, but rather is a collection gathered for the purpose of displaying an aesthetically pleasing assembly of native plants that can thrive in Garden conditions. It is an essential part of the Garden experience, providing mature tree canopy cover and a distinguished collection of understory plants, most notably wildflower species representing the iconic maple basswood forests, or big woods, of Minnesota.

In the last five years (2010-2015)

Large landscape-scale planting projects of both woody and herbaceous plants continue to take place throughout the woodland garden areas. Several thousand plants have been added to woodland garden areas. For example, the beautification of the Garden's entries has involved planting large quantities of woody and herbaceous plants and the select pruning of shrubs.

Invasive species eradication efforts for buckthorn and garlic mustard continued in full force with large-scale removal of both species throughout the woodland areas. All areas of the Garden were traversed systematically to locate and remove these species.

Removal changed the character of the understory of the woodland areas. The most noticeable visual changes included the opening up of the woodland ground layer and shrub understory layers, and the increase of dappled sunlight to the woodland floor. Both changes, along with other factors, allowed for greater regeneration of native plant species although the presence of non-native earthworms prevents the successful regeneration of many native plant species.

Other species of note that have been managed include dame's rocket, wintercreeper, periwinkle and oriental bittersweet.

Improvements in the aesthetic appeal of the woodland area occurred through the removal of excess woody debris, including select downed trees and extensive piles of buckthorn brush scattered throughout the woodland areas.

On April 29, 2011 a tornado moved through Wirth Park and skirted the Garden's western edge. Several trees were damaged along the fence line and were later trimmed or cut down depending on the severity of the damage. The damage to areas outside of the garden was extensive.

Also in 2011, the MPRB partnered with the Minnesota Landscape Arboretum and the Minnesota DNR to move a select number of an endangered plant species represented in the Garden to facilitate the installation of the future boardwalk and to assist with critical research taking place at the Arboretum.

In 2011, a professional botanist, Barb Delaney, was hired to create a complete key to the aster species of the Garden.

In 2012, a tree survey was completed that included species and size information for all of the trees in the Garden with a diameter at breast height (dbh) at or greater that 4 inches.

In 2013, as part of the MPRB's efforts to proactively remove ash trees from regional park areas that would become hazards once infested with Emerald Ash Borer (EAB), staff began evaluating, identifying and removing ash trees adjacent to trails in the woodland and wetland garden areas. This work is scheduled to occur annually in the winter, as needed, through 2021. Ash logs and branches that are not left as course woody debris are burned on site by trained staff in the winter months.

In 2014, botanist Barb Delaney completed a census of the Garden plants (see page 70).

On-going oak wilt monitoring (annual) and management (as needed) continues throughout Garden areas where oaks are present in the collection. The monitoring and management extends beyond the Garden boundaries into South Wirth to protect the oak canopy from potentially significant impacts from this disease.

Invasive earthworms greatly impact the work of restoration and enhancement in all forested areas of Wirth Park, with no known control methods available. Starting in 2015, staff and volunteers began experimenting with planting native sedges in groupings as suggested by several professional ecologists. Sedges have shown resilience to root damage caused by earthworms and can provide a ground layer in disturbed forest ecosystems, thus aiding with erosion control and habitat enhancement.

Future strategies and priorities

- Maximize natural regeneration of native plant species and allow for successive generations of plants to take hold on their own accord so that repopulation, both of woody and herbaceous plants, occurs as part of the cycle of development of the plant collections.
- Add large quantities of woody and herbaceous native plants to the woodland garden areas to increase the number of species represented and to increase the general abundance of plants.
- Maximize diversity and general health of the plant collections.
- Emphasize planting the next generation of canopy and understory trees. These trees will supplement natural regeneration and will ensure that the woodland canopy remains intact for generations to come.
- Pro-actively manage the invasive and aggressive native and non-native plant species found in the woodland garden areas to minimize damage to the native plant collections.
- Monitor for new and manage existing diseases and pests.
- See also Garden Design Foundations: Principles and Practices (page 17).
- Continue to use Integrated Pest Management (IPM) practices to manage diseases and pests.
- Continue to research and find solutions related to forest ecology issues, such as invasive earthworms.

Priorities for next five years (2016-2020)

1. Create pocket plantings in highly visible areas along the trails of the woodland areas. These will mainly consist of showy herbaceous plants in groupings large enough to create an eye-catching display. There are three areas where large-scale, generalized herbaceous plantings will occur, including the front entryway area (from the front gate down to the Visitor Shelter), the hillside adjacent to Violet Way Trail, and the hillside that encompasses Hepatica Hill. The plantings will contain a diversity of native woodland wildflowers, grasses and sedges.

2. Continue experimentation with mitigating the impact of non-native earthworms on the forest community.

3. Continue to plant native canopy and understory trees.

4. Continue to monitor and manage existing tree diseases and pests including, but not limited to: oak wilt, Dutch elm disease, anthracnose, golden canker, Japanese beetle and two-lined chestnut borer. Continue monitoring for new diseases and pests including: emerald ash borer, hemlock wooly adelgid, and gypsy moth.

5. Continue control of invasive and aggressive native and non-native species (see pages 27-29).

6. Research options and secure funding for the development of a plant collections database that includes a mapping function for the Garden.

Wetland Garden Collection

The wetland area of the Garden has changed dramatically over the past century. Originally a tamarack bog, the wetland area underwent several dramatic changes over the past 100 years, including a tornado in 1925 that leveled all the tamaracks, which changed its visual and ecological character. Notably, the soil has changed significantly as decomposing peat has mixed with other organic and mineral materials. The current soil and moisture conditions of the wetland allow for a wide variety of native plants adapted to moist, moderately acidic to neutral soil conditions to thrive.

In the past five years (2010-2015)

A wetland delineation evaluation and report was completed for the Garden in 2012 by Kjolhaug Environmental Services Company, Inc. This report was a first step in better understanding the general health of the wetland garden area as well as general ecological dynamics occurring in the wetland garden area. It remains apparent that a better understanding of the ecological history of the wetland garden and its present state is needed. This area is a complex biotic community that is greatly impacted by the hydrologic features of the site. Over the years the wetland has changed considerably through natural events and ecological processes as well as from human-induced ones. A feasibility study is required to create a sustainable vision and related management practices for this Garden area.

The visual appeal of the wetland was improved by planting showy and colorful native wildflowers along the path. Habitat improvements have been made by planting native woody shrubs and trees which are fruit bearing and/or provide nesting and perching areas.

Select pruning of shrubs and small trees has been an on-going maintenance task during this time period. This is done to maintain open views through the wetland area.

Large-scale removal of invasive species took place including buckthorn, garlic mustard, and dame's rocket.

In 2011, a professional botanist, Barb Delaney, was hired to create a complete key to the aster species of the Garden.

In 2012, Garden staff participated in a showy lady slipper and ram's head orchid rescue trip in Beltrami County, MN. The rescue saved native orchid plants that would have been destroyed by a road construction project along the Lady-Slipper Byway. This activity was permitted by the MN DNR and carried out in tandem with staff from the Minnesota Landscape Arboretum.

In 2012, a tree survey was completed that included species and size information for all of the trees in the Garden with a diameter at breast height (dbh) at or greater that 4 inches.

In 2013, as part of the MPRB's efforts to proactively remove ash trees from regional park areas that would become hazard trees once infested with Emerald Ash Borer (EAB), staff began evaluating, identifying and removing ash trees adjacent to trails in the woodland and wetland garden areas. This work is scheduled to occur annually in the winter, as needed, through 2021. Ash logs and branches that are not left as course woody debris are burned on site by trained staff in the winter months, requiring winter road access to the Garden.

In 2014, botanist Barb Delaney completed a census of the Garden plants (see page 70).

In 2015, the Friends of the Wild Flower Garden provided funding for a contractor to work under the direction of the Curator to supplement the efforts of staff with woody and invasive plant control in primarily the upland and wetland garden areas. This funding is available through 2018.

In 2015, several professional ecologists and landscape architects visited the Garden at the request of Garden staff to discuss ecological and plant collections dynamics in the prairie and wetland garden areas. Ideas were shared regarding future planting selections and invasive plant management strategies for staff to evaluate and implement as deemed appropriate for this setting.

Future strategies and priorities

- Maximize natural regeneration of native plant species and allow for successive generations of plants to take hold on their own accord so that repopulation, both of woody and herbaceous plants, occurs as part of the cycle of development of the plant collections.
- Manage the wetland to enable native species present to flourish and for natural processes to continue to unfold.
- Maximize general health of the plant collection.
- Pro-actively manage the invasive and aggressive native and non-native plant species found in the wetland garden area to minimize damage to the native plant collection.
- Monitor and manage existing diseases and pests.

- Balance the distribution and quantities of woody plants and herbaceous plants to ensure that the diversity of wetland trees and shrubs is high, a general sense of openness is maintained, open areas for desirable sun-loving wetland natives are maintained, and long-distance views from the wetland trail are maintained.
- See also Garden Design Foundations: Principles and Practices (page 17).
- Continue to use Integrated Pest Management (IPM) practices to manage diseases and pests.

Priorities for next five years (2016-2020)

1. Complete a feasibility study to better understand the hydrology and plant communities of the wetland and the small human-created basin known as Mallard Pool.

2. Expand pocket plantings. Until the feasibility study is complete, only small-scale pocket plantings will take place in areas that are stable and close to the trails.

3. Reestablish stream and Mallard Pool maintenance. Each season the stream and open water areas partially fill with plant debris and soil. Historically it has been necessary every few years to remove the excess debris to allow for flowage and open water conditions. Excess soil is distributed to interior wetland garden areas.

4. Continue to monitor and manage existing tree diseases and pests including, but not limited to Dutch elm disease and golden canker. Continue monitoring for new diseases and pests including: emerald ash borer, gypsy moth, and Japanese beetle.

5. Continue to control invasive species and aggressive non-native and native species (see page 27).

Upland Prairie Garden Collection

The upland prairie garden area of the Garden is a created prairie garden dominated by wildflowers and grasses with scattered oak trees. This garden area is reminiscent of an oak savanna ecosystem in its structure but not in its plant composition.

In the past five years (2010-2015)

The upland prairie garden area has been managed to maximize diversity and visual appeal as well as to minimize the spread and invasion of non-native, invasive plants. Several thousand showy native prairie plants have been planted in scattered locations in the upland garden area during this time period.

Every two to four years the upland prairie garden is managed through prescribed burns carried out by professional contractors who are trained in prescribed fire management techniques and safety. Woody plants that are not killed by prescribed burns are removed, typically in the autumn months.

From 2010-2015, large areas of woody plants including native sumac, raspberry, blackberry and buckthorn were removed which resulted in a more open understory. The work to manage aggressive woody plants in the upland garden is exacerbated by the fact that this area has rich mesic soils. In seasons with above average rainfall the growth of woody plants is only amplified. This will be an on-going issue as long as rainfall amounts continue to be average or above average.

Extensive removal of annual, biennial and perennial invasive herbaceous plants has occurred annually. This includes the drastic reduction in size of reed canary grass stands in several prairie garden areas.

Significant plantings have taken place in select garden areas to fill in spaces where invasive and aggressive plants have been removed and to enhance the plant collection to improve the showiness and diversity of the upland garden display of seasonal wildflowers.

In 2011, a professional botanist, Barb Delaney, was hired to create a complete key to the aster species of the Garden.

In 2014, Barb Delaney completed a census of the Garden plants (see page 70).

In 2015, the Friends of the Wild Flower Garden provided funding for a contractor to work under the direction of the Curator to supplement the efforts of staff with woody and invasive plant control in primarily the upland and wetland garden areas. This funding will be available through 2018.

In 2015, several professional ecologist and landscape architects visited the Garden at the request of Garden staff to discuss ecological and plant collections dynamics in the prairie and wetland garden areas. Ideas were shared regarding future planting selections and invasive plant management strategies for staff to evaluate and implement as deemed appropriate for this setting.

Future strategies and priorities

- Maximize diversity and general health of the plant collection.
- Increase the seasonal interest and pollinator foraging benefits of the prairie by adding large numbers of early and late blooming flowering plants.
- Pro-actively manage the invasive and aggressive native and non-native plant species found in the prairie garden area to minimize damage to the native plant collections.
- Continue to maintain health of specimen oak trees through preventive care.
- Monitor and manage existing diseases and pests.
- See also Garden Design Foundations: Principles and Practices (page 17).
- Continue to use Integrated Pest Management (IPM) practices to manage diseases and pests.

Priorities for next five years (2016-2020)

1. Continue to develop and maintain high-diversity wet meadow/prairie in low-lying, moist prairie bowl. This area was once dominated by a stand of reed canary grass and has undergone extensive removals of sumac as well.

2. Add diversity to upland garden plant collection through plantings and seedings in pockets plantings.

3. Remove tree and shrub seedlings and saplings from prairie areas annually.

4. Continue control of invasive species and aggressive native and non-native species (see page 27).

5. Continue to monitor and manage existing tree diseases and pests including, but not limited to: oak wilt, two-lined chestnut borer, and anthracnose. Continue monitoring for new diseases and pests including gypsy moth.

6. Maintain distinction between prairie and woodland edge through regular brush sawing of woody plants growing in from woodland edge to upland garden areas.

Garden Hardscape Elements and Infrastructure

The human-made structures are intended to serve as a backdrop to the Garden's plant collections. Features such as the Visitor Shelter, restrooms, benches, water fountains and trails all provide visitor comfort. Other features such as the fence surrounding the Garden and the tool shed, serve either directly or indirectly to secure and maintain the Garden.

In the past five years (2010-2015)

Discussions leading to plans to replace the wetland bridge and small wooden stream mini-bridges along the wood chipped wetland trail began in 2011. These bridges were replaced with an award-winning boardwalk in 2015. The decking for the boardwalk utilized reclaimed ash wood from the Minneapolis Park System that was thermally modified by a MN company to ensure its structural integrity and to make it suitable for outdoor use. This was phase one of the boardwalk project. The Friends of the Wild Flower donated $75,000 towards this significant project. The new bridge portion of the project was dedicated to Cary George, the Gardener at the Garden from 1987-2003, at the request of the Friends with the approval of the MPRB Board of Commissioners.

In 2012 a topographic survey was completed that included all of the Wildflower Garden and the entrance area to the Garden.

In 2012 a new security system was installed and staff were trained in its proper use.

The bathroom structure's roof had new cedar shakes installed in 2012. The Visitor Shelter roof was replaced with new cedar shakes in 2013.

Parking lot improvements were made in 2013 and included the installation of a new paybox and payment system along with the addition of new spaces along the entrance and exit drives to increase parking capacity.

The Garden fence was evaluated annually by staff, and necessary repair and maintenance work was carried out as needed to maintain the integrity of the fence. The front gate to the Garden was in need of repair and re-finishing. In 2014, the gate was repaired so that it closed properly and was stripped and powder-coated.

The fireplace in the Garden received necessary improvements to improve functionality and safety. The fireplace door was replaced in 2011. The chimney was evaluated, and necessary improvements were made including the installation of a new lining which was installed in 2012.

Plant identification labels were purchased over a period of time in the last five years and are in use. Each label includes the common name, scientific name and plant family for a given species. All species represented in the plant collection have a plant identification label as of 2015.

Bench slats have all been replaced with untreated cedar slats as of 2015. The bench slats were formerly painted wood.

The tool shed was evaluated in 2015 and it has been determined that no additional improvements will be made to it given its current conditions. The MPRB intends to replace the building when planning and funding opportunities arise.

A strategy for erosion control in Garden areas where the trail is adjacent to a slope was developed and implemented. Trails have been graded to effectively shed water and prevent erosion and puddles.

Future strategies and priorities

- Maximize diversity and general health of the plant collection.
- Maintain integrity of the rustic, natural character and design of buildings, trails and all hardscape elements. Use of natural material will take preference for repair and restoration of hardscape elements.
- Develop and implement an improvement plan and maintenance schedule for all of the building structures. As part of the work, prioritize design improvements to increase accessibility to Visitor Shelter and bathrooms.
- Improve directional signage to help visitors locate the Garden entrances and other natural features in Wirth Park.
- Continue to build on successes with trail stabilization efforts, with a focus on prairie trails.

Priorities for next five years (2016-2020)

1. Complete phase two of the boardwalk project that includes a gathering space for visitors to use for study, enjoyment and contemplation.

2. Building improvements:

- Develop plan to replace tool shed.
- Develop plan to increase functionality of Visitor Shelter for the public and staff. Update existing structure for ADA compliance and improved visitor experience. Increase and optimize space for staff and storage.
- Develop plan to improve bathroom accessibility.

3. Add new water lines to the woodland garden area and upland garden area to improve access to water for new plantings.

4. Add directional signs to help visitors navigate the trails from the Wirth Beach parking lot to the Garden's west gate and from the Garden to the Quaking Bog.

5. Continue to manage and stabilize difficult areas for erosion control in Garden areas where the trail is adjacent to a slope. Maintain graded trails to effectively shed water and prevent erosion and puddles. Continue to replace missing timber edges lining trails as needed.

6. Upgrade the on-trail self-guided interpretive system.

Invasive Species Management

Invasive species have been present in the Garden for decades. Invasive species enter the Garden through a variety of means, some of which can be controlled and some that cannot. The most common ways new invasive species are introduced and existing invasive species reintroduced to the Garden are:

- wind dispersion of seeds from adjacent park land and neighboring yards;
- introduction of seeds and root fragments by animals (mammals and birds);
- past intentional introduction by humans before plant was known to be invasive or was mislabeled; and
- unintentional introduction by humans.

Humans, both staff and the public, can unintentionally introduce seeds and root fragments of invasive plants to the Garden in a variety of ways. These include:

- dispersion of seed inadvertently collected off-site (from clothing and shoes);
- introduction of soil contaminated with seeds and/or root fragments (associated with new plantings);
- wood chips for trails contaminated with seeds and/or root fragments; and
- contaminated seed source for seeding-based plantings.

To minimize the opportunity for the introduction of new invasive species and the reintroduction of species currently found in the Garden staff will do the following:

Only purchase plants rooted in soil from professional distributors of native plants.

When planting specimens that have been harvested from natural areas, home gardens, or other non-nursery sites, great care will be taken to assess whether or not exotic invasive species exist in the harvesting location. If no invasive species are present, soil can be gathered and used to amend the soil at the planting location in the Garden. It is much more likely that a plant gathered from the wild will survive if the native soil and soil organisms are transplanted with the plant itself. If there are invasive species in the area of harvest, native soil may not be taken back with the plant itself and the plant roots must be washed thoroughly to remove any remaining soil. The plant will be planted as a bare root plant.

Many modes of dispersion are unfortunately beyond human control and thus removal/treatment must be used as another tool for dealing with existing invasive species.

How invasive species are recognized

There are several invasive species that are found growing in the Garden that are both well-known and easily recognizable. In today's world the expectation is that many more species, both known and currently unknown, will make their way to the Garden's gates through one of the modes of introduction noted previously. It is the role of the Garden Curator to use the many resources available on the topic to keep track of invasive plant species that may be moving into the vicinity of the Garden. In addition, the Garden Curator and staff annually update the following lists of species currently found in the Garden:

1. **Non-native invasive species** are species that are not native to Minnesota and that will quickly and relentlessly spread throughout a given Garden area causing damage to the native plant collections contained within. The long-term management goal for all of these species is to eradicate them from the Garden. Examples include common buckthorn, garlic mustard, and reed canary grass.

2. **Non-native aggressive species** are species that are not native to Minnesota and that will uncompromisingly spread and eventually negatively impact the Garden's plant collections. The management goal with these species is to limit their spread in the Garden while maintaining a manageable population of the plants from a given species. Many of these non-native plant species are maintained as part of the historic plant collection and help reveal the Garden's unique history. If a species in this category becomes invasive the management goal will shift to eradication. Examples include periwinkle vine, forget-me-not, and Ohio buckeye.

3. Non-native garden weed species are species that are common garden weeds. They prefer disturbed habitats, typically along trail edges and disturbed soil, such as areas where tilling or extensive weeding and invasive species removal has occurred. In general, non-native garden weed species won't compete well in established Garden areas. The management goal with these species is to limit their spread in the Garden while maintaining a manageable population of the plants from a given species near trails for display and educational purposes. Examples include ground ivy, dandelion, and chicory.

4. Aggressive native plants are plant species that, although native to Minnesota, have a tendency to be problematic by virtue of being vigorous growers. They typically spread by rhizome or seed and over time can proliferate in their given location in the Garden and out-compete other species in that Garden area. The management goal with these species is to maintain balanced populations of each species. Examples include early goldenrod, spotted jewelweed and prairie cordgrass.

How invasive species are managed

All invasive species are managed on a case by case basis as no two are exactly alike. Each species requires its own control method and schedule. Timing is an important factor when controlling invasive species. For instance, a plant species that cannot be controlled effectively through the use of manual removal or other non-chemical treatments will be treated with an herbicide chosen for its efficacy and low-toxicity.

In most situations there is an appropriate time during the life stages of a particular species when herbicide treatment is most effective. If the herbicide is applied during this time period, the greatest level of success is expected. If it is applied at a different time, less success is expected, which will result in a greater use of herbicide over time and a lack of efficiency. Many species uptake of herbicides is highest in the late summer and autumn months. If this is the case for a particular species, the plant will remain in the collections for a given season until the appropriate time for actively controlling the species arrives.

Listed below is a summary of different control methods that are used to manage invasive species at the Garden. For each invasive species, Garden staff assess what methods are effective with this species based on current research and studies, empirical data from peers, and past experience. If multiple control/removal methods exist for a given species, staff will choose the least harmful and most effective approach. This may require the use of more than one method of control for a given species over time.

- Manual removal
- Use of heat and fire with weed torch and/or controlled burns in upland prairie garden
- Bio-control
- Herbicides

In the last five years (2010-2015)

Intensive efforts continued to remove glossy and common buckthorn. These two woody invasive species have been intensively managed for over 10 years with significant progress being made. Historically they covered several acres within the Garden including the core wetland area, the wooded hillside slopes and along the prairie edges.

Most mature buckthorn trees and shrubs have been removed and/or are under management through cutting and treating. Maintenance of re-sprouts and seedlings is now the focus for buckthorn control. Treatment of re-sprouts and removal of buckthorn seedlings are both time intensive maintenance tasks. In certain Garden areas, primarily the wetland, some stands have been particularly difficult to eradicate, but progress is being made. This removal and treatment work typically takes place in the late summer and autumn months.

Concerted efforts to remove garlic mustard over the past decade have been highly successful. This invasive herbaceous plant had gained significant ground in the woodland and wetland and prairie edges of the Garden.

For several years, a noticeable decline in annual garlic mustard populations has been observed. The Garden is methodically traversed each spring 1-3 times to remove garlic mustard plants. Thousands of

plants must still be removed annually. Each year a reduction in the population is noted. Garlic mustard removal and prevention of re-establishment will be an on-going labor-intensive annual maintenance activity indefinitely.

Several other invasive plant species, including dame's rocket, shrub honeysuckles, Japanese knotweed, oriental bittersweet, leafy spurge, Grecian foxglove, wintercreeper, and reed canary grass have been managed, with the end goal of eradication of existing specimens of these species from the Garden. Each season staff continue to work towards annual eradication of the species noted above. Removal of and prevention of re-establishment of these species will be an on-going labor-intensive annual maintenance activity indefinitely.

Efforts to manage aggressive non-native plants, such as periwinkle have been on-going since 2010. Staff have created a designated boundary for this plant, originally introduced by Eloise Butler, and have removed all plants that grow outside of this boundary annually.

Significant work, in particular within the upland garden, is underway to manage aggressive native plants such as sumac, raspberry, blackberry, Canada goldenrod, and prairie dogbane to limit their negative impacts in the plant collections where they are found.

Future directions and strategies

- Stay current with invasive species management issues including the encroachment of new invasive species in our region and new techniques for controlling current and future invasive plant species.
- Continue pro-active management of existing invasive plant species.
- Continue to utilize volunteers and build capacity to accommodate additional volunteers to assist with invasive species removal efforts in the area surrounding the Garden.

Priorities for next five years (2016-2020)

1. Continue efforts to eradicate target invasive species from the Garden. The target species for the next five years include: common buckthorn, glossy buckthorn, oriental bittersweet, leafy spurge, Grecian foxglove, Japanese knotweed, shrub honeysuckles, garlic mustard, dame's rocket, reed canary grass, wintercreeper, ground ivy and moneywort.

2. Continue to work with the Friends of the Wild Flower Garden to increase the number of participants in the Friends' Invasive Plant Action Group program featuring volunteers working in the area surrounding the Garden.

3. Increase efforts to control aggressive non-native plants such as false blue indigo in order to maintain representatives of these species but not large populations.

4. Increase efforts to control aggressive native plants such as Canada goldenrod, sumac, raspberries and blackberries in order to maintain representatives of these species but not large populations.

5. Continue research to improve methods for removal and treatment of current and new invasive and weedy plants.

Garden Fauna

Birds and Other Beneficial Wildlife of the Garden

The Garden is an important refuge for resident urban and migratory wildlife. Within the Garden gates are found a variety of habitats that provide food, shelter, and protection for birds, insects, reptiles, amphibians, and mammals.

The Garden was designated a bird sanctuary in 1969 to emphasize the importance of the Garden's native plant collections to resident and migratory birds. The diversity of plants found growing in the Garden provides a unique opportunity in an urban area for rest and

re-fueling by migratory songbirds and for breeding, feeding, and habitation by resident birds.

A great diversity of insect species are present in the Garden. Of notable interest are the pollinators including butterflies such as monarchs and bees like native bumblebees. Other wildlife found in the Garden ranges from mammals like the red fox and groundhog to herps such as the gray tree frog and common garter snake.

Wildlife (most notably birds) indirectly act as native plant ambassadors spreading seeds from native plants found growing in the Garden. These seeds are dispersed in the Garden and beyond the Garden fence into greater Wirth Park and surrounding areas.

In the last five years (2010-2015)

Starting in 2010, staff have observed snapping and painted turtles laying eggs in grassy patches adjacent to the Garden parking lot in the spring months. Seasonal signs are posted so that the nests are not inad-

vertently damaged in these high traffic areas. Hatching events have been observed by staff and visitors. In most instances it has been necessary to assist baby turtles as they cross the entrance drive and attempt to climb the curb.

The six-year partnership with Bird x Bird was a wonderful opportunity to build awareness about the Garden and its importance for birds. The organization had its final auction in 2010 and is no longer active.

Visitors and birds continue to benefit from improvements to the bird feeding station just outside of the Martha Crone Visitor Shelter. The addition of a greater diversity of seeds and feeder types increased the diversity of species found feeding at the station. Visitors have benefited from the improvements as close-up viewing opportunities from the Shelter window have increased.

Staff have observed the continued presence of the great-horned owl and pileated woodpecker populations with nesting sites observed in south Wirth Park near the Garden.

The Garden has been part of the annual Urban Birding Festival since 2012 offering enhanced birding programs during this Twin Cities metro-wide event.

Wild Turkeys have become a nearly constant presence in the Garden within the last few years. Visitors appear to enjoy seeing these large wild birds, often seen on the trails and/or congregating near the bird feeders in front of the Visitor Shelter. In 2014, the MPRB started to evaluate the damage caused by wild turkeys in the Garden.

Honeybee hives in the Garden were actively managed by a local company, The Beez Kneez, in the Garden from 2012-2014. The company also offered honeybee rearing education classes at the Garden while the hives

were present. In 2015, The Beez Kneez moved the hives to a different location and the MPRB decided to focus on wild bee habitat improvements and education at the Garden moving forward.

A bee survey of the Garden was carried out by entomologist Elaine Evans and her assistant, graduate student Joel Gardener, in 2013- 2014. Over the course of two seasons Elaine and her team identified 104 species of bees in the garden, with 101 of the species being native to the region. A rare oil-collecting bee species was found foraging on a native loosestrife plants during the survey. The collection of bees is now housed in Visitor Shelter. The survey findings have enhanced opportunities to educate visitors about bees and to guide habitat enhancements for native bees. MPRB funding for the survey was matched by the Friends of the Wild Flower Garden.

Mink sightings have occurred periodically in the wetland garden area. Infrequent sightings of opossum, coyote, and groundhog have occurred as well.

Red fox kit rearing and den establishment in the woodland and upland garden areas has occurred regularly over the past three years.

An increase in sightings of the common garter snake has occurred in the last two years.

Future directions and strategies

- Continue to maintain a diversity of habitats for wildlife.
- Continue to provide sanctuary for wildlife. Provide an environment where wildlife will be respected.
- Develop new and enhance existing relationships with organizations dedicated to wildlife education and preservation.
- Develop relationships with higher education institutions to create opportunities for research that will benefit wildlife.

Priorities for next five years (2016-2020)

1. Establish and enhance relationships with bird-focused organizations and researchers. Participate in the Twin Cities based Urban Birding festival to increase awareness about birding opportunities at the Garden.

2. Enhance wildlife habitat by adding a diversity of plant species for food sources as well as breeding, nesting and year-round use

3. Provide educational opportunities for visitors to learn about the bees of the Garden and plants that they commonly forage on. Build connections between plant health and pollinator health.

4. Provide resources to visitors about creating habitat and providing food sources for pollinators (including bees) and wild birds.

5. Create permanent signage to alert drivers on the Garden drive to the possibility of a turtle crossing. Research options for creating a safer and easier passage from the grassy patches to Birch Pond for recently hatched baby turtles.

Nuisance Wildlife Managment

Nuisance wildlife management in the Garden is typically limited in scope and frequency to occasional events that are handled by Minneapolis Animal Care and Control or wildlife removal contractors.

In the last five years (2010-2015)

The Minneapolis Park & Recreation Board has historically worked with the Minnesota DNR and Three Rivers Park District to monitor deer populations of Theodore Wirth Park and the surrounding suburban communities. Currently deer are not causing significant or ongoing grazing problems in the Garden. The fence continues to be maintained and repaired as needed to prevent deer from entering the Garden.

Common buckthorn provides good cover for deer. As a result of removing buckthorn from the area surrounding the Garden, deer have been on the move looking for cover in the adjacent neighborhoods or other areas of the park where the understory is denser.

On occasion, unwanted domestic animals are released in the Garden. Dogs, rabbits, and gerbils have been released in the past. When this occurs, Minneapolis Animal Care and Control is notified so that the animal can be removed from the Garden and taken into custody by professional animal handlers.

Feral and non-feral cats also frequent the Garden. This has become a perennial issue. The presence of cats in the Garden is a direct threat to songbirds and small mammals that find refuge within the Garden gates.

Wild turkeys, although native to the region, have been making more of an impact on the Garden plant collections in recent years. In 2014, staff began evaluating the damage caused and initiated the development of a management plan with the assistance of the Minnesota DNR.

Future directions and strategies

- Continue to keep the Garden a deer-free area of the park system.
- Intercept releases of unwanted domestic animals when possible.
- Develop partnerships with neighborhood organizations and appropriate agencies to create and distribute information about keeping cats indoors for bird population health.
- Research long-term management solutions for wild turkey populations in Garden that will benefit wildlife.

Priorities for next five years (2016-2020)

1. Maintain Garden fence to ensure deer are not able to walk into or jump over the fence to enter the Garden.

2. Develop and implement a plan for managing populations of wild turkeys in the Garden when it has been determined that the Garden is at or beyond capacity for sustaining a population without causing undue harm to the Garden plant collections.

Beyond the Garden Gates

The Wildflower Garden is nestled within the 182 acres that are informally known as South Wirth Woods. Historically this area of Theodore Wirth Park was a mixture of mesic oak forest, oak savanna, wetlands, and prairies prior to European settlement.

At present the plant community outside of the Garden's gates would be considered a disturbed mesic oak forest. Over the years many varieties of trees were planted into this forest area including: white pine, white cedar, and Norway spruce. These trees were mainly planted along Theodore With Parkway, to improve the aesthetic appeal of the scenic park drive. The sub-canopy consists almost entirely of common buckthorn, a non-native invasive shrub species.

In the past five years (2010-2015)

Following the 2006-2010 invasive species removal project in the South Wirth Park that had an annual commitment of $50,000 of funding through the Minneapolis Park & Recreation Board, a Lessard-Sams Outdoor Heritage grant in the amount of $600,000 was obtained through the Minnesota State Legislature for habitat enhancements in Wirth Park for 5-years, 2015-2019.

The main goal of these projects is to restore the oak forest to a level where invasive species can be managed annually as part of a regular maintenance activity. Treatments will involve using a combination of management techniques including herbicide treatments, hand-pulling, brush mowing and possibly prescribed burns to achieve a level of control.

Garlic mustard (another invasive species) flourishes after the buckthorn understory is removed. It was thought that the Minnesota Department of Agriculture would release a biological control agent to aide in the control of this invasive herbaceous species in 2010. The promising biological control agent was deemed unfit for release as it was found to cause harm to native mustard species in the Western US.

The Friends of the Wild Flower Garden coordinate a group called the Friends Invasive Plant Action Group (FIPAG). FIPAG volunteers, in addition to Garden Legacy Volunteers, have become a critical component to maintaining this portion of South Wirth adjacent to the Gardenknown as the Eloise Butler Wildflower Garden Volunteer Stewardship Area (VSA). Their volunteer work consists of hand-pulling invasive plants like buckthorn and garlic mustard multiple times a season.

On April 29, 2011 a tornado moved through Wirth Park and skirted the Garden's western edge. Several trees were damaged along the fence line and were later trimmed or cut down depending on the severity of the damage. The damage to areas outside of the Garden was extensive, including forested areas immediately adjacent to the Garden and along the entrance drive. Forested areas adjacent to Glenwood Avenue and Theodore Wirth Parkway were in the direct path of the tornado and as a result of the loss of the majority of the mature trees in those areas, the character of the Park at this location was dramatically altered. The kiosk like structure over the springs was also damaged and later removed.

In 2011, the ski trail running adjacent to the Garden fence line on the east side of the Garden was moved due to concerns related to negative impacts on nesting and over-wintering wildlife in and around the Garden. Many species of birds and other wildlife use the Garden as winter habitat and winter/early spring nesting grounds including great-horned owls, barred owls, red fox, and mink.

On-going oak wilt monitoring (annual) and management (as needed) continues throughout areas in South Wirth adjacent to the Garden to protect the oak canopy from potentially significant impacts from this disease.

Invasive earthworms greatly impact the work of restoration/enhancement in all forested areas of Wirth Park. With no known control methods available, staff and volunteers started experimenting in 2015 with planting native sedges in groupings as suggested by several professional ecologists. Sedges have shown resilience to root damage caused by earthworms and can provide a ground layer in disturbed forest ecosystems, thus aiding with erosion control and habitat enhancement.

Future strategies and priorities

- Work with volunteers to maintain the health of the forests within the VSA.
- Develop plan to research wildlife behavior and nesting/habitat needs in this area.
- Monitor and manage oak wilt in areas of South Wirth Park.
- Continue to research and find solutions related to forest ecology issues, such as invasive earthworms.

Priorities for next five years (2016-2020)

1. Remove buckthorn seedlings that have germinated after the initial clearing of parent buckthorn trees. Experiment with various management techniques in select locations including foliar spraying, mowing and prescribed burning.

2. Control the garlic mustard that has come up after initial large-sized buckthorn removal. Current garlic mustard control methods include hand pulling by volunteers. Work with Minnesota Department of Natural Resources and Minnesota Department of Agriculture on biological control methods when available for release.

2. Continue experimentation to mitigate the impacts of non-native earthworms on the forest community.

GARDEN PROGRAMS, PARTNERS & PEOPLE

Garden Volunteers
Garden Education
Garden Partnerships
Garden Supporters

Garden Volunteers

The only gift is a portion of thyself

Ralph Waldo Emerson

The Garden has a long history of volunteerism beginning with Eloise Butler and the Minneapolis public school botany teachers in 1907. These teachers volunteered their time to transplant native species and to care for the fledgling Garden. Later Martha Crone volunteered her time alongside Eloise Butler for approximately 15 years. With Crone working as the paid Garden Curator beginning in 1933, still other volunteers accompanied her to rescue native plants from highway construction sites.

In 1970, the Martha Crone Visitor Shelter was opened and the Garden's longest running volunteer program was born. Visitor Shelter volunteers welcome visitors and help answer questions about the Garden. Scheduling these volunteers is also the work of a volunteer from the Friends of the Wild Flower Garden. See page 43 to read more about the Friends.

Interest in volunteerism continues to grow at the Garden and as it does so do the types of volunteer opportunities.

In the last five years (2010-2015)

The on-going Shelter volunteer program has continued to provide volunteers to greet and assist visitors to the Visitor Shelter during daytime hours. Efforts have been made to increase Shelter volunteer Garden knowledge through enhanced training opportunities Including: Curator and Naturalist led walks, annual in-person trainings, and up-to-date Garden education related materials.

Two field-based programs that were developed in the last ten years continue to provide meaningful opportunities for people of all ages and abilities to contribute to the health of the Volunteer Stewardship Area (VSA) surrounding the Garden.

Legacy Volunteers assist in the eradication of invasive plants. After training from the Garden Curator, each volunteer takes responsibility for a designated section of the VSA and commits to removing the invasive species in their chosen section for the season.

Friends' Invasive Plants Action Group Volunteers Leads work with the support of the Garden Curator so they can lead volunteer crews in the VSA. These volunteer crew leaders volunteer on weekends to facilitate opportunities for other volunteers with removing invasive plants from the natural areas surrounding the Garden.

The Garden has benefited from working with organizations and corporations that feature a volunteer component to their business ethos. These volunteer groups have provided labor for invasive species removal, chipping trails and large planting events. Volunteer groups are often referred to the Garden by the Minneapolis Park & Recreation Board's Environmental Stewardship Volunteer Coordinator.

Each year from 2010-2015 volunteers have contributed approximately 1,500 hours annually.

Future directions and strategies

- Continue to utilize volunteers to achieve vegetation management goals in specific areas of the Volunteer Stewardship Area (VSA), and in specific instances, within the Garden.
- Work with volunteers to increase their knowledge, deepen commitment, and build an enduring relationship with the Garden and the surrounding natural environment.

- As the health of the Garden continues to improve, it is in the best interest of the Garden to limit the number of volunteers who work off trail in order to prevent soil compaction and plant damage. Volunteer labor within the Garden will focus on on-trail work, such as chipping tails. Smaller groups may assist with weeding and planting events at a suitable time of year to minimize damage. Opportunities will be provided for groups to work within the VSA, the health of which impacts the vitality of the Garden.
- Strengthen volunteer labor force to increase the impact of the Minneapolis Park & Recreation Board's efforts to restore the surrounding natural areas and increase the activity of Legacy Volunteers in this area.

Priorities for next five years (2016-2020)

1. Support existing volunteer programs such as the Visitor Shelter Program, Legacy Volunteer Program, and Friends' Invasive Plants Action Group.

2. Continue to work with the Friends on outreach efforts to ensure the Visitor Shelter program provides volunteers for 95% (or more) of available shifts. Develop an increasingly knowledgeable volunteer corps that is visitor-centric, professional, and representative of the community in age, languages spoken, and cultural background.

3. Provide annual training to Visitor Shelter volunteers to ensure that volunteers are well-trained and customer service-oriented and able to meet the needs and expectations of visitors.

4. Direct large-scale volunteer efforts by youth and adults to the surrounding natural area which can absorb intensive efforts by many people at once and strive for consistent efforts for best results.

5. Utilize individual volunteers in supplemental ways such as helping monitor trails on high-traffic weekends and for special programs.

6. Identify additional opportunities for volunteers to contribute their skills and knowledge for the betterment of the Garden as site and staff capacity permits.

Garden Education

Look deep into nature, and then you will understand everything better.

Albert Einstein

The Garden provides an array of high-quality opportunities for people of all ages and backgrounds to connect with nature. The Garden serves as a place of inspired informal and formal learning about nature, native plants, and wild birds in a natural setting. As one of few immersive nature-focused spaces in Minneapolis, visitors are afforded an opportunity to take a break from the busyness and sensory load of urban life in a setting tucked away from roads, buildings, bright lights, loud sounds and the infrastructure of urban environments.

Guided Learning Opportunities

The guided environmental education programs, both free and fee-based, at the Garden serve the community in a variety of ways. Guided tours and classes provide a means for people to step through a door into a new world of learning. Few field-based opportunities for learning specific information about nature exist in Minneapolis and the Garden serves an important role in this regard.

Formal programs at the Garden are offered both as public programs as well as special tours and programs for requesting groups. Public program offerings are scheduled regularly throughout each week, and people can sign up for or, if rooms allows, simply show up for these guided programs led by Garden naturalists. Most of these programs are free and some, like the moon hikes, have a small fee to cover additional staff time allocated for them. Special classes led by contracted instructors are also offered as fee-based public programs.

Special "private" tours and programs for specific groups (such as youth organizations, school groups, childcare centers, garden clubs, religious organizations and more) can be scheduled ahead of time and have a small fee associated with them to cover the cost of staffing.

In the last five years (2010-2015)

A teen horticulture internship program was developed and launched in 2010 with support and funding directed to the program from the MPRB. The program has focused on building ecological gardening skills along with environmental education delivery in a team environment with the support of Garden staff.

An artist residency was developed and piloted with watercolor artist Joel Pieper in 2010. Joel painted in the Garden during public hours and shared with visitors his experiences as a plein air painter working in a setting like the Garden. He had a small exhibition in the Visitor Shelter displaying works created at the Garden.

The number of people attending public tours has trended upwards over the past five years. The largest recorded number of participants occurred in 2015 with 994 people participating in naturalist led public programs. This is an increase from an average of 800 participants each Garden season from 2006-2009.

Starting in 2010, public homeschool programs were added to the public program offerings. In 2013, a homeschool phenology club program was offered that provided an opportunity for homeschool youth to visit the Garden 15 times over 6.5 months and learn, in depth, with a staff naturalist about ecology and phenology. This program was also offered in 2014.

Weekly public birding programs continue to be offered each season. These programs have been well attended and continue to draw an enthusiastic audience of new and experienced birders. The rich array of plant life in the Garden provides ideal habitat for a wide range of bird species making this one of the premier birding locations in Minneapolis.

During the 2010-2015 time period, special public fee-based classes were coordinated by Garden staff and led by contracted instructors with specialized knowledge. Many of these classes foster learning experiences that integrate art or wellness and nature. Special classes topics include landscape painting, nature photography, gardening with wildflowers, medicinal plant studies, honeybee keeping, and outdoor yoga. These fee-based programs were successful for many years. Despite on-going marketing efforts, interest and registrations decreased over 2010-2015 and the special classes program with outside instructors has been reduced to offer only the most popular topics.

The volume of people participating in special "private" group tours and programs has increased and may be near maximum numbers for the site in large part due to staff capacity. Finding and respecting the balance between demand for programming and the capacity of the site to provide an immersive nature experience for all visitors is critical to maintain the spirit and benefit of the Garden experience.

For comparison, in 2004, 17 groups visited and participated in special group tours serving a total of 422 individuals. In 2009, 68 groups visited resulting in 1,510 individuals being served as special group tour participants. In 2015, 2,207 people participated in over 110 group tours and special paid classes at the Garden.

Of special note, the Garden has partnered with the Minneapolis Public School (MPS) system to provide high-quality nature immersion-based learning in the summer months to 4th graders enrolled in the MPS summer school program. From 2010-2015, approximately 400-500+ students have participated in this program each summer. Students are engaged for a full school day with Garden naturalists to learn about animal and plant adaptations at the Garden and Quaking Bog.

A robust offering of special "private" classes has also been developed at the Garden for the Osher Lifelong Learning Institute (OLLI) and offered each season during the 2010-2015 timeframe. In 2015, course offerings included Autumn Tree ID, Mushroom ID, Natural History of Minneapolis Parklands, Showy Lady Slipper Tour, Blooming Prairie Tour, Wildflower Botany, Quaking Bog Tour, Intro to Slime Molds, and MN Ecology.

In the spring of 2012, teens working as part of a youth employment and mentorship program through the Minnesota Conservation Corp volunteered at the Wildflower Garden several times, removing invasive plants and planting native species to replace what was removed. This crew was hired by the Minneapolis

Park & Recreation Board and worked in a variety of Minneapolis Park & Recreation Board locations from March-November.

In the summer of 2012, a group of international women climate leaders visited the Garden to learn about this historic site and to volunteer their time weeding invasive plants. The group was visiting the U.S as part of the State Department's International Visitor Leadership Program to examine climate entrepreneurship, green initiatives, and empowering women climate leaders in the U.S. Community-based volunteering was an important part of the exchange as well.

In November of 2012, the Garden was awarded a $1,000 donation as a thank you for participating in the Museum Adventure Pass (MAP) program for the past four years. The MAP program, offered through the Metropolitan Library Service Agency (MELSA) and sponsored by the Macy's Foundation, wrapped up its sixth and final season this September.

From 2012-2014 honeybee hives were kept at the Garden by a local company called Beez Kneez. This group also provided honeybee keeping educational programs at the Garden for those three seasons. In 2015, the Beez Kneez decided to focus on other sites and the hives were removed from the Garden. At that point, the MPRB made a commitment to focus on wild bee education at the Garden based on emerging research showing the potential negative impact of honeybees on wild bee populations in high-diversity natural spaces in urban areas like the Garden.

In 2014, a buckthorn spoon carving event was held at the Garden in collaboration with staff from the University of Minnesota's Art Department, the U of MN Carving Club and Summit View Spoon Carvers. Visitors learned how to carve simples spoons from buckthorn wood that had been harvested from woodland areas in Theodore Wirth Park by a Conservation Corp of MN crew.

In 2015, after completion of the bee survey that took place in 2013 and 2014 (see page 94), citizen science bumble bee surveys were offered and led by PhD candidate Entomologist Elaine Evans at the Garden multiple times a season.

Future directions and strategies

- When developing annual program offerings, work within the identified limitations of the Garden such as: its seasonal nature, keeping people on trail to preserve the plant collections, the intimate scale of the Visitor Shelter, and the number of naturalist staff available to lead tours at a given time.
- Continue to maintain the sanctuary ambiance of the Garden for wildlife and visitors by limiting the number and size of groups that may use the Garden at any given time.

- Continue outreach activities to draw in new groups and sustain relationships with groups who have visited previously in an effort to create a diverse and broad audience for the Garden.
- Continue to offer natural history tours for the general public with an emphasis on topics that are in high demand including wildflower identification and bird watching.
- Staff will continue to initiate new programs based on both the goals and strategies of the Minneapolis Park & Recreation Board's Comprehensive Plan and on accommodating various learning styles.
- Continue to offer special programs led by outside instructors based on participant registration numbers. Evaluate the amount of staff time to support these programs and create parameters to ensure that the cost does not outweigh the benefit.
- Begin work to build and strengthen relationships with neighborhood schools and neighborhood organizations, with a focus on underserved audiences, enabling students to regularly visit the Garden.

Education program priorities for next five years (2016-2020)

1. Increase accessibility of programs in terms of language, access, special needs and fee structure.

2. Continue to offer a horticulture internship program for teenagers.

3. Conduct a visitor intercept survey to determine demographics, program interests, and other pertinent items.

4. Conduct an on-line survey to find out more about visitors' sentiments on communication methods, program topics, etc.

5. Increase the number of special fee-based class offerings led by staff naturalists with respect to spatial limitations of site and appropriateness of the program. Introduce new subjects for classes in response to the interests of the community, current events, and trends.

6. Continue to provide natural history tours that are high-quality outdoor learning experiences for youth and adults and develop additional communication tools to promote natural history tours.

7. Continue to be responsive to community interests and needs when developing programs.

8. In addition to annual bumble bee citizen science surveys, research and offer additional citizen science programs appropriate to the Garden.

9. Focus service-learning projects and programs in the surrounding natural areas.

10. Develop an outreach program that connects with local audiences and groups in the surrounding community, particularly in neighborhoods near to the Garden in North Minneapolis.

Self-directed learning opportunities

The Garden provides myriad opportunities for visitors to enjoy and study nature independently. For many, being able to wander the trails and learn about nature in their own way and at their own pace is key to a rich experience. Several self-directed learning opportunities have been developed over the years to assist visitors in their pursuit of an informal educational experience.

The Visitor Shelter serves as a great starting and ending point for many visitors' trips to the Garden. Within the Shelter a variety of resources are available:

- Staff and volunteers can answer questions about the Garden, its plant collections, and wildlife.
- Interpretive displays include seasonal information and a 'touch and see' table.
- Visitors can acquire copies of Garden guidebooks, maps, plant keys, field guides, and bird and plant checklists.
- Binoculars are available for use for free.
- Garden scavenger hunts help direct exploration of the Garden.

On the Garden's trails are several resources for self-guided educational opportunities:

- Numbered station posts correspond to the Garden's guidebook.
- Identification labels help visitors learn plant names.

- Interpretive signs welcome visitors at the front and west gates.
- Naturalists walk the trails and readily interact with visitors.

In the last five years (2010-2015)

High-quality botanic garden style plant identification labels for each species represented in the garden were purchased and are in use as an educational tool for visitors. Each label lists the common name, scientific name and plant family for the highlighted species.

A new nature backpack program was developed by the Friends with the guidance of Garden staff in 2013. Two backpacks with nature discovery tools and activities are available for families to check out and use on the trails.

Several plant identification-related tools were developed, including additional plant keys. A new program schedule format was created to highlight Garden programs seasonally with a full-color pamphlet that could also be posted for access on the Garden's webpage as a PDF.

Full-color Garden scavenger hunt cards were developed for use by families and groups. This allows for families to participate in self-directed learning about the natural world without a formal guide.

Future directions and strategies

- Continue to provide means to help people directly connect with nature on their own.
- Support a "slow garden" environment that centers on direct sensory connection to the natural world.
- Provide unobtrusive means of providing self-directed learning and limit use of screen-based technology in the Garden.
- Stay current with trends in self-guided and field-based education.
- Improve accessibility of information, especially with printed materials.

Priorities for next five years (2016-2020)

1. Install a four-sided information kiosk near the parking lot. The kiosk will provide space for Garden information, maps, and brochures.

2. Research and explore opportunities to update Garden guidebook and associated way-finding signs to provide greater enrichment for visitors using this set of tools.

3. Continue to increase staff and visitor interactions on trails in a manner that is sensitive and attuned to the visitor experience (not all visitors are seeking out interactions with staff).

4. Conduct a visitor intercept survey to determine demographics, program interests, and other pertinent items to help shape program direction.

5. Conduct an on-line survey to find out more about visitors' sentiments on communication methods, program topics, etc.

Garden Partnerships

Synergy is the bonus that is achieved when things work together harmoniously.

Mark Twain

The Minneapolis Park & Recreation Board regularly develops partnerships with a wide array of agencies and groups to provide a richer experience for park visitors. Partnerships are a valuable means to leverage each group's resources and expertise to accomplish a shared vision.

Successful partnerships revolve around an equitable investment by each partner organization to achieve a common goal. Contributions shared by each partner can vary greatly but an equitable contribution will result in a better outcome. Partnerships must balance contributions of staff, skills, knowledge, volunteers, funding and in-kind donations, as well as access to land, training and tools. Joint efforts result in a shared sense of success and the development of trust. They also enrich the creative process which can lead to new projects and programs to achieve additional common goals.

Minneapolis Park & Recreation Board staff strive to proactively identify project and program goals of the Garden. Staff then look to existing partnerships for help and also work to develop new partnerships. Common goals include eliminating invasive species in the Garden and surrounding natural areas, reaching underserved youth audiences, and enriching the birding habitat and programs of Garden.

The Garden's sponsorship policy can be found in the policy section of this plan. See page 50.

In the last five years (2010-2015)

Significant progress has been made to eradicate invasive species in the area surrounding the Garden. Working with long time Garden supporters, the Friends of the Wild Flower Garden, Minneapolis Park & Recreation Board staff and Friends' volunteer crew leaders train in volunteers and then work with them in the field to remove invasive species. Additional programs done in partnership with the Friends of the Wild Flower Garden are described on page 43.

In 2010, the MN School of Botanical Art and the Minneapolis Park & Recreation Board embarked on an exciting new partnership to establish the Eloise Butler Wildflower Garden Florilegium. This 10 year legacy project aims to document 130 plant species represented in the Garden through artful and scientifically accurate botanical illustration carried out by botanical illustrators affiliated with the School. The art works are donated to the Minneapolis Park & Recreation Board once accepted into the collection and staff work to have them on exhibit each season to educate and inspire the community.

In 2014, forty-five botanical watercolor illustrations from the Florilegium were on exhibit in Cargill Hall at Central Library. An opening with presentations by Marilyn Garber, President of the MN School of Botanical Art, Superintendent Jayne Miller, and Garden Curator Susan Wilkins were given.

From 2010 through 2015 forty-six illustrations have been completed and donated to the Minneapolis Park & Recreation Board with twenty-six artists contributing works to the collection.

The Minneapolis Park & Recreation Board partnership with Bird x Bird created a meaningful dialogue between artists and naturalists that built awareness and compassion for the plight of birds. Its mission to stimulate a creative interface between artists, scientists and the public in an effort to enhance the stewardship of wild birds and improve the eco-literacy of human beings made a positive impact. The Garden benefited from this unique program partnership, and proceeds from each annual auction from 2004-2010 were used for projects and programs specific to birds including improved habitat, binoculars for public programs, and a pilot project focused on graphic design, technology and art. Bird x Bird ceased operations in 2010.

Future direction and strategies

- Strengthen existing partnerships that help meet the goals of the Garden - working towards sustain ability, succession planning for volunteer programs, diversity of volunteers (age, language, nearby neighborhood community representation, etc.).
- Continue to work with organizations and corporations that have their own volunteer corps that can be directed to work in support of the Garden (examples: Aveda, Best Buy, etc.).
- Create cross-pollination opportunities for current program and project partnerships such as linking the Friends' Invasive Plants Action Group volunteers with student programs.
- Evaluate potential partnership projects and programs based on their ability to help meet the following criteria:

  1. Support MPRB's work to enhance or expand depth of educational programming;
  2. Support MPRB's work to connect new and underserved audiences to the Garden;
  3. Support MPRB's work to improve native plant collections;
  4. Provide volunteers for Garden activities and special projects under the direction of the Curator; and
  5. Promote the Garden and its programs using MPRB protocol and promotional materials.

Priorities for next five years (2016-2020)

1. Seek out partners who can provide groups of volunteers for invasive species removal events in the surrounding natural area.

2. Create new partnerships with organizations to collaborate in the development of innovative, dynamic youth programming focused on creative ways to connect youth from underserved communities with the natural world.

3. Maintain partnership with MN School of Botanical Art and seek opportunities to regularly display the growing Florilegium collection in relevant and appropriate exhibition spaces within the Twin Cities.

Garden Supporters

The Friends of the Wild Flower Garden, Inc

Garden Supporters are defined as groups that have a long term on-going relationship with the Garden. As of 2015 only one group fit this definition, the Friends of the Wild Flower Garden, Inc (the Friends). The Friends are a 501(c)(3) non-profit founded in 1952 by a group of private citizens including Clinton Odell, and then Minneapolis Park & Recreation Board employee and Wildflower Garden Curator, Martha Crone.

The Friends' stated purpose is to protect, preserve, and promote the interests of the Eloise Butler Wildflower Garden and Bird Sanctuary for its unique beauty and as a sanctuary for native flora and fauna of Minnesota, and to educate and inspire people of all ages in relating to the natural world.

According to the Friends' Mission Statement, the Friends believe that:

* *The Eloise Butler Wildflower Garden and Bird Sanctuary should be preserved for its historical significance and its value as an environmental resource for the study and appreciation of native plants and birds.*
* *It is necessary to maintain a natural buffer zone around the Garden to protect its ecological integrity and to preserve its value as a retreat for quiet contemplation and observation of nature.*
* *It is our role to support and encourage the Minneapolis Park & Recreation Board in maintaining and preserving the Garden.*
* *Promotion and utilization of the Garden should be compatible with protecting it as a sanctuary for flora and fauna and preserving the features of a natural environment.*
* *As nature depends on a balance of diverse species, our success as an organization is supported by working with a variety of individuals and organizations with common interests.*

The Friends group is a long-standing supporter of the Garden. The group has a rich history of partnering with the Minneapolis Park & Recreation Board on a variety of projects both large and small over the past 63 years. This includes everything from the funding of the construction of the Martha Crone Visitor Shelter to coordinating the Shelter volunteer program and the Friends' Invasive Plants Action Group volunteer program at the Garden. In recent years the Friends have contributed significant financial support to the development of Phase One of the boardwalk project. Additional information about the Friends can be found in their quarterly publication *The Fringed Gentian* and at www.friendsofeloisebutler.org.

In the last five years (2010-2015)

The Friends have increased their annual investment in the Garden's plant collections and restoration efforts. Over the last five years, intensive plantings of species selected by the Curator and planted by Garden staff have focused on the restoration of woodland, wetland and upland garden areas where extensive invasive species removal has occurred. In 2010, the Friends funded a planting project featuring the addition of 145 trees in the lowland hardwood forest area of the Garden.

In 2011 and 2012, the hillside east of Violet Way Trail benefited from large herbaceous plant plantings of woodland wildflowers and ferns. Woodland plantings also occurred in 2012 of 152 encompassing trees and shrubs. In 2013, herbaceous plants were added to the entrance area thanks to funding from the Friends. In 2015 100 trees and shrubs were funded by the Friends and planted in woodland garden areas by staff adjacent to Geranium Path.

In 2013, the Friends committed $3,750 to match MPRB contributions for a first ever survey of the bee species found in the Garden conducted by entomologist Dr. Elaine Evans. More Information about the survey can be found on pages 94-96.

In 2014, the Friends donated $75,000K towards the boardwalk project to be used towards design fees and construction expenses for phase one of the project. At the request of the Friends, the bridge portion of the boardwalk overlooking Mallard Pool was dedicated to the Garden's former Gardener Cary George in the autumn of 2015.

In 2015, the Friends committed to provide funds for the MPRB to hire a contractor, Prairie Restorations Inc., to assist staff with woody and invasive plant management in the upland and wetland garden areas. The Friends commitment of $16,375 was offered to span a four-year period from 2015-2018.

The Friends have worked to grow the Friends' Invasive Plants Action Group (FIPAG) program with the support of the MPRB. The volunteers in this program help eradicate invasive plant species, in particular, garlic mustard, dame's rocket, common buckthorn, and glossy buckthorn. This group started as a small assembly of dedicated volunteers and now has grown to include dozens of committed weeders led in the field by an MPRB approved and trained volunteer lead. Originally working in the Garden proper, the group now is solely focused on invasive plant removal in the surrounding natural area. In 2009, limited planting of native woodland wildflower seeds was included as an activity of the group. In the future, more planting projects in the surrounding natural area are possible based on funding and interest of the group.

The Friends Transportation Grant Program, initiated in 2009, provides a stipend to qualifying school groups to rent a bus or van to visit the Garden. The program continues to successfully support students who are participating in MPRB staff led programming at the Garden, serving 2,945 youth through 2015.

Future directions and strategies

- Continue to coordinate the volunteer schedule for the Shelter Volunteer Program.
- Expand efforts to recruit new Garden volunteers.
- Support efforts to introduce new and underserved people—especially children—to the Garden.
- Continue to support improving the health of the vegetation and ecosystems surrounding the Garden, especially through volunteer recruitment and invasive species removal activities.
- Support MPRB projects and initiatives that contribute to the Garden's plant collections, hardscape and infrastructure needs.

Priorities for next five years (2016-2020)

1. Encourage the Friends to continue to provide funding for projects that enhance the health of the vegetation and ecosystems within and surrounding the Garden.

2. Continue to provide funding support of the Transportation Grant Program enabling students in economically challenged communities to visit the Garden.

3. Help volunteers develop a long-term relationship with the Garden through the Visitor Shelter and Friends' Invasive Plants Action Group volunteer programs.

4. With the support of the MPRB, fundraise for future capital improvement projects at the Garden, such as phase two of the boardwalk project.

MINNEAPOLIS PARK & RECREATION BOARD

Garden Staff

You do your needed work
out of love, the love that dares not speak
its name, the love of spareness, beauty,
open space, clear skies,
and flowing streams...

Edward Abbey

The Garden is owned, operated and maintained by the Minneapolis Park & Recreation Board. The Minneapolis Park & Recreation Board's sustained management of the Garden for more than 100 years provides a high-quality experience for visitors and a healthy, ecologically vital landscape. The consistent professional care provided by the Minneapolis Park & Recreation Board for this unique asset allows the Garden to endure through time and to sustain its role as a sanctuary for future generations.

In the last five years (2010-2015)

The Garden Curator oversees management and development of: Garden plant collections and infrastructure; environmental education programs and outreach; volunteer programs; and partnerships. This position is also responsible for supervising and training all Garden staff.

The Seasonal Garden Program Coordinator manages public and private program scheduling and promotion. This position also supports naturalists with curriculum enhancements and programming support.

Garden Seasonal Naturalists provide environmental education formally and informally to the public daily through informal interactions in the visitor shelter and on the trails as well as through formal programs and special tours. Naturalists staff the Garden and visitor shelter on weekday afternoons and evenings and weekends to provide expertise, enhanced learning opportunities and support to visitors.

Seasonal Garden interns provide Garden care under the direction of the Curator to manage and enhance the diverse plant collections within the Garden.

Interns are selected based on their educational pursuits and interests in fields related to restoration ecology and horticulture.

Garden staff continue to receive high quality training and support each season to develop and enhance the skills needed to serve the public and care for the Garden.

The teen internship program was developed in 2010-2011 to provide valuable, hands-on education in the fields of horticulture and natural resources management and environmental education to youth interested in learning more about these green career fields. Several youth have participated in the program, working alongside Garden staff to assist with programs and field work.

Future directions and strategies

- Develop the full potential of the Garden's native plant collections through an increase in professional field staff.
- Increase daytime program offerings, outreach, and visitor support through an increase in professional naturalist staff during daytime hours.
- Engage a widely diverse audience for free and fee-based programming.
- Enhance visitor appreciation of native plants through high quality naturalist-led programs.
- Broaden opportunities for cross-cultural exchanges of ideas and botanic garden management philosophies and practices.

Priorities for next five years (2016-2020)

1. Work to allocate additional staff resources to Garden activities including: Garden care, daytime program, outreach and volunteer support; and outreach activities to underserved audiences.

2. Recruit and hire bilingual naturalist staff to better serve community.

3. Increase the number of naturalist staff with specialized knowledge in botany, orinthology, mycology and geology.

4. Develop a framework for professional, cross-cultural exchanges with other botanic garden staff.

Behind the Scenes

In addition to the visible Garden staff there are many Minneapolis Park & Recreation Board staff and work divisions whose behind the scenes work support the Garden.

The **Board of Commissioners** works to create and uphold policies that support and enhance the current and future health of the Garden and the programs that occur at the Garden.

Natural Resources staff support the Garden by providing natural resources-based information to enhance the work of Garden staff.

Forestry works with the Garden Curator to identify hazardous and diseased trees and to develop an associated management and removal strategy each year. Forestry supports an annual tree health survey, with a more intensive survey specific to specific oak wilt. Forestry also serves as first responders for storm damage and contributes plant material for special tree plantings

Asset Management (Maintenance) staff consisting of park keepers and mobile equipment operators, mow turf grass areas around the perimeter of the Garden, provide trash removal and recycling from the parking lot, and also perform sweeping and snow removal as needed.

Information and Technology Service is responsible for maintaining the computers, printers and related technologies and program support such as on-line registration.

Customer Service staff provide customers with helpful phone and online support for registering for programs and supporting patrons with Garden related information when Garden staff are not available.

Communications staff provides website updates, news releases, and facilitates the effective use of social media to promote the Garden and its programs.

Administrative staff from payroll, human resources, and finance provide a variety of services.

Park Police provide regular patrols and emergency response to Theodore Wirth Park and the Garden.

Special Services coordinates parking passes and permits as needed.

Skilled Trades and Equipment Services provide carpenters, plumbers, masons, painters and mechanics to help care for the Garden's infrastructure including buildings, footbridges, waterlines, fences and gates, equipment and more.

Environmental Management Volunteer Programs staff assist with volunteer group referrals and preliminary event coordination for referred group visits.

Garden Funding

Not only must we be good, but we must also be good for something.

Henry David Thoreau

There are several different ways that the Garden receives financial support. General funding of operations is provided through the Minneapolis Park & Recreation Board. Staff from Environmental Services and the Garden also pursue and receive supplemental funding for specific projects and programs through donations and grants, and as a beneficiary of special events.

The Garden requires constant care and maintenance to maintain the plant collections, infrastructure, and programming. The need to invest in this 100+ year old resource is on-going and requires the continued commitment of the Minneapolis Park & Recreation Board to fully fund operational expenditures at and for the Garden. It is important to note that infrastructure elements at the Garden constitute a significant portion of the items requiring regular maintenance at the Garden including the Visitor Shelter building, restrooms, tool shed, benches, paths, fencing, tools, and equipment.

Another significant investment that the Minneapolis Park & Recreation Board has made since 1911 is staffing the Garden with qualified professional employees. This investment has ensured the health of the Garden, and more recently, with the addition of part-time interpretive staff in 1984, allowed for greater outreach to and educational opportunities for the public.

In the last five years (2010-2015)

The Minneapolis Park & Recreation Board funded several physical infrastructure related projects at the Wildflower Garden over the past five years including:

- Reroofed Visitor Shelter and bathroom building with cedar shakes in keeping with original design of both buildings
- Visitor Shelter chimney was repaired and re-lined to ensure safety of staff, visitors and building
- With significant financial support from the Friends of the Wildflower Garden, completed phase one of boardwalk project
- Completed wetland delineation report and topographical survey to support future habitat and infrastructure improvements
- Completed a tree inventory
- Completied a comprehensive plant survey
- Completed the first-ever bee survey (this project was funded with a matching donation by the Friends of the Wild Flower Garden)
- Purchased plant id signs for all Garden plants
- Significant investment in plant collections development

Donations, large and small, have been given by individuals and organizations over the past five years to the MPRB on behalf of the Wildflower Garden. This includes donations given in small amounts at the Visitor Shelter by visitors.

The partnership with Bird x Bird ended at the end of the season in 2010 when the non-profit closed its doors. The final auction took place in 2010 with funds being donated to the Garden for use on bird education and habitat enhancement related expenses.

Additional funding for Garden projects was provided by the Friends of the Wild Flower Garden (the Friends). There were a number of significant projects funded by the Friends over the past five years. Please see page 41 for details.

Future directions and strategies

- Effectively utilize various funding means to achieve management plan goals, including to research and secure grants to investigate the possibility of a Garden endowment and to work with organizations such as the Minneapolis Parks Foundation.
- The Garden Curator will continue to work directly with individuals and organizational and agency donors to determine how to best meet complimentary goals.

- Address deferred maintenance needs. Incorporate Garden infrastructure needs into Minneapolis Park & Recreation Board maintenance and planning schedules for future upgrades and replacements.
- Continue to raise Garden standards by improving the aesthetic quality of hardscape components (fencing, signs, railings, etc.) and improving accessibility through strategic and graceful earthwork.
- Work to leverage existing resources, including regional park funding from Metropolitan Parks and Open Space Commission.

Priorities for next five years (2016-2020)

1. Continue to seek appropriate grants and to develop partnerships to reach goals described in this management plan.

2. Continue to provide opportunities for individuals and groups to donate directly to the Garden. Make it easier to donate by making such opportunities more obvious and accessible.

Garden Performance

Monitoring the Health of the Garden

Plant Survey

One of the most straightforward ways to monitor the health of the Garden is to conduct a thorough plant survey every five-ten years. The survey results reveal the diversity of plant species in general categories including forbs, grasses, sedges, shrubs, trees, and vines. In addition, plants found can also be sorted by native to Garden, native to Minnesota, historic collection, non-native invasive, etc. The survey will be used to shape management goals for specific areas of the Garden.

The number of plant species found in the Garden has varied considerably over the past 109 years. When the Garden was a mere three acres in 1907, an incomplete plant survey revealed 130+ species. Later, as Eloise Butler expanded the boundaries of the Garden to approximately 25 acres, several hundred additional plant species were identified as native to the area/Garden. During Eloise Butler's 22-year tenure as Curator she added more than 800 species.

A plant census taken by Martha Crone in 1951 revealed that 786 plant species grew in the Garden. By the time the next plant census was completed in 1986, only 489 plant species were present. In 2009, the Garden curator and Garden staff completed a plant census that identified 547 distinct species. in 2014, a plant census completed identified 648 distinct species. Current and historic plant censuses are available in the appendices.

Measurement

- Variety of desirable species present in Garden (number of distinct species present).

Monitoring Garden Visitor Satisfaction

Visitor Survey

The first step is to establish baseline data for the Garden by conducting a visitor intercept survey. The intercept survey would focus on acquiring visitor demographics, activity profiles, frequency of visits, visitors' assessment of the Garden's attributes, suggestions for improvements (physical site), major areas of interest for programs, and also how visitors prefer to receive information about the Garden and its programs. Ideally a visitor intercept survey would be conducted every five years to coincide with the timeline established for updating this management plan.

Measurement (qualitative and quantitative)

- Increased number of repeat visitors
- Increased participation in programs
- Increased number of new visitors from under-represented Garden user groups
- Increased number of volunteer hours
- Positive program evaluations

Garden Policies

Accessioning Policy

To maintain accurate and enduring records of the plants in the Garden's plant collections, an accessioning procedure has been adopted and is to be followed. All plants that are to become part of the Garden's permanent collection will be accessioned. The records will be updated whenever there is an accession.

Accessioning procedures

Each accession will be registered in the database with the following information:

- scientific name as received;
- corrected name if other than as received (as listed in currently accepted horticultural references);
- family name;
- date acquired;
- original collection information (if provided);
- source;
- type of plant received (existing plant, division, rooted cutting, etc.);
- size received;
- number received and number planted;
- type of container received (bare root, balled and burlapped, potted, etc.);
- date planted; and
- general location where planted or housed.

No tagging/permanent labeling of plants will occur within the Garden.

Acquisitions Policy

To ensure the integrity, health and vitality of the plant collections contained within the Garden, an acquisitions policy has been adopted and is to be followed. All plants that are to become part of the Garden's permanent collection must meet the goals and fall within the parameters of the acquisitions policy.

Goals and Parameters

- All acquisitions will be approved of or made by the Garden Curator with the assistance of the Natural Resources Coordinator as needed.
- Plants species that are added are to be:

  native to Minnesota and/or;

  part of the historical collection and/or;

  consistent with the collection goals as noted in the plant logs of Eloise Butler and Martha Crone.

The USDA plant database and the Minnesota Department of Natural Resources are two resources used when determining a given plant species' status as a Minnesota native plant.

- Plants will be acquired that are relevant to the purposes and priorities of the Garden.
- Taxa will be chosen that are appropriate to the Garden's growing conditions and that can be grown without extreme measures.
- Taxa will be acquired that have no associated problems (in the judgment of the Garden Curator).
- The Garden Curator will avoid introducing aggressive species that may become rampant or take the place of native species in their natural habitat.
- Taxa will be chosen for which the agency can provide money and staff time for maintenance.
- Only plants whose sources are known will be acquired.
- If a plant is donated it must have no restrictions on the plant's use by the donor.
- Plants will not be acquired that have been illegally collected or imported unless in accordance with the policies of state, federal, or international plant rescue programs.
- Species will be verified according to the source (where acquired). Plants with questionable identity will be checked and verified. When purchased, the plant must have a bill of sale with the vendor's information. When donated, the plant must have documentation as to its origin.
- Species that are appropriate for sustaining and shaping plant collections within a changing environment will be selected.

Plant Collection Policy

No part of any plant may be collected at the Garden pursuant to Minneapolis Park & Recreation Board Ordinance PB2-2. Molesting vegetation. This includes the seeds, flowers, fruit, leaves, stalks and roots of any given plant.

PB2-2. Molesting vegetation. No person not an employee of the board shall pick or cut any wild or cultivated flower, or cut, break or in any way injure or deface any tree, shrub, or plant within the limits of any park or parkway; nor carry within or out of any park or parkway any wild flower, tree, shrub, plant or any newly plucked branch or portion thereof, or any soil material of any kind.

Photography Policy

Permits are required for commercial photography and videography in the Garden and in the Minneapolis Park & Recreation Board's parkland system generally.

All photographers, amateur and professional, must stay on the trails at all times **without exception.** Photographers are not allowed to touch or manipulate the plants or wildlife in any way, but must photograph the plants and wildlife in their natural state as found.

Photographers who break these rules will be asked to leave the Garden and, if appropriate, fined pursuant to Minneapolis Park & Recreation Board Ordinance PB2-2. Molesting vegetation.

Certain types of commercial photography are not permitted in the Garden. This includes, but is not limited to: individual portraits by professional photographers (senior portraits, etc.) and portraits of groups by professional photographers (wedding photos, etc.).

Commercial photographers and videographers are to obtain permits for taking photographs and videos (film or digital) of Garden flora and fauna. To do so they must contact the Minneapolis Park & Recreation Board's Special Services department in advance of their planned shoot date. The Minneapolis Park & Recreation Board reserves the right to not grant a commercial photography permit to a given applicant if the Garden Curator concludes that the associated activities of the permit holder would cause disruption to the normal activities of wildlife and visitors and/or would cause damage to the Garden's plant collections. If a permit is granted, the permit must be made available for staff upon request. If no permit is presented the activity must cease.

Sales Policy

Sales at the Garden are extremely limited. This is to protect the quality of visitors' experiences and to maintain the rustic nature of the Garden.

Merchandise that is currently sold in the Visitor Shelter includes Garden guidebooks and parking passes for the Minneapolis Park & Recreation Board's pay lot parking system. The two items sold at the Visitor Shelter enhance the immediate experience of the visitor. The Minneapolis Park & Recreation Board does not intend to expand the type or amount of merchandise available for purchase in the Visitor Shelter.

Sponsorship Policy

A sponsorship is a relationship that allows for one organization to contribute resources to another while being specially recognized for this contribution. Sponsorships at the Garden are not intended to be on-going but rather limited to specific projects or programs. On-going sponsorships will be rare in nature.

Sponsorships that would be appropriate for the Garden include organizations that have a similar interest, goal, and/or purpose. A conflict of interest with Garden's core values is not appropriate. Organizations must positively promote the Garden and the relationship must be complimentary to the Garden.

Examples of what would work: a Garden newsletter, transportation costs for groups from under-served audiences, special programs that meet Minneapolis Park & Recreation Board parameters and that have the full support of Environmental Services staff.

Exclusive Use Policy for Weddings and other Events

Exclusive use permits are not granted to the public for any use of any part of the Garden including the Visitor Shelter, trails and trail openings. Weddings and other special events are not allowed in the Garden and permits will not be given for such activities. This is to ensure that public access to the Garden is not limited and to safeguard the plant collections, the naturalistic ambiance of the Garden and the quality of visitors' experiences.

Definitions & Descriptions

Abiotic is defined as not being associated with or derived from living organisms. Abiotic factors in an environment include such items as sunlight, temperature, wind patterns, and precipitation.

Accessioning is a process whereby information about plants added to the Garden is recorded in a systematic method and data is stored for future reference.

Aggressive native plants are plant species that, although native to Minnesota, have a tendency to spread and proliferate in their given location in the Garden.

Biotic is defined as consisting of living organisms. An ecosystem is made up of a biotic community (all of the naturally occurring organisms within the system) together with the physical environment. The biotic factors in an environment include the organisms themselves as well as such items as predation, competition for food resources, and symbiotic relationships.

Bird x Bird is a unique nonprofit organization that enlisted painters, printmakers, photographers, sculptors and multi-media artists to create works of art in response to data collected about avian species at Eloise Butler Wildflower Garden and Bird Sanctuary, and also the Audubon Center of the North Woods. Its mission was to stimulate a creative interface between artists, scientists and the public in an effort to enhance the stewardship of wild species and the eco-literacy of human beings. Each year the artworks created were exhibited and auctioned through 2010. The proceeds were donated to the Garden and the Audubon Center.

Fauna refers to the animals of a given region or period considered as a whole.

Flora refers to the plants of a particular region or period considered as a whole.

The Friends of the Wild Flower Garden, Inc is an organization of private citizens whose purpose is to protect, preserve, and promote the interests of the Garden for its unique beauty and as a sanctuary for native flora and fauna of Minnesota, and to educate and inspire people of all ages in relating to the natural world. www.friendsofeloisebutler.org

Garden Supporters are groups that have a long term (10+ years), on-going relationship with the Garden. Support may take the form of volunteers, donations, funding specific projects, in-kind services, or some combination of the above. An on-going relationship refers to relationships that include regular involvement with the Garden beyond an annual event or individual project.

Guided learning is a process by which people gain knowledge through the use of a guide or teacher. At the Garden many guided learning opportunities exist including: formal public natural history tours, interaction with staff on trails and in the Visitor Shelter, and special classes.

Herps encompass families of animals such as turtles, toads, frogs, and snakes.

Historic Plant Collection is a collection of plants representing plant species that:

- Are indigenous to the Garden and/or
- Were added to the Garden between the years 1907 and 1959.

The historic plant collection is both an ecological legacy of the indigenous flora of the Garden and a horticultural legacy of the efforts of Eloise Butler and Martha Crone to more fully develop the Garden's plant collections. The historic plant collection includes species which are not native to Minnesota. These species, if not invasive, are managed as part of the Garden's living history as a botanic Garden. Their presence speaks to the story of this ever-evolving native plant botanic garden and serves as an interpretive tool for Garden visitors.

Indigenous (plant) groupings are groups of non-planted native plants found in the Garden.

Legacy Volunteers assist in the eradication of invasive plants. After training from the Garden Curator each volunteer takes responsibility for a designated section of the Garden and commits to removing all of the invasive species in their chosen section for the season. For more info contact Garden Curator at swilkins@minneapolisparks.org

Minnesota Recreation and Park Foundation is a non-profit organization dedicated to enhancing the quality of life in Minnesota communities by supporting recreation and parks through education, grants, and assistance to the Minnesota Recreation and Park Association. The Foundation's efforts are encouraged and supported by the Minnesota Recreation and Park Association and its members. The Foundation was established in 1972 and incorporated as a tax-exempt, non-profit corporation in 1973. www.mnrpa.org

Minnesota School of Botanical Art is a for-profit botanical illustration art school established in 2001 by founder Marilyn Garber. The School is dedicated to furthering the tradition of the art of botanical illustration by teaching courses that combine the scientific with the aesthetic in drawing and painting. The School is a partner with the Minneapolis Park & Recreation Board in the development of the Eloise Butler Wildflower Garden Florilegium.

Monarch Watch is an educational outreach program based at the University of Kansas that engages citizen scientists in large-scale research projects. www.monarchwatch.org

Non-native aggressive plant is a plant species which is not native to Minnesota that will uncompromisingly spread and eventually negatively impact the Garden's plant collections.

Non-native invasive plant is a plant species which is not native to Minnesota and will quickly and relentlessly spread throughout a given Garden area causing damaging to the native plant collections contained within.

Non-native garden weed species are species that are common garden weeds. They prefer disturbed habitats, typically along trail edges and disturbed soil, such as areas where tilling or extensive weeding and invasive species removal has occurred.

Plant assemblies are groupings of plants in the Garden assembled to be similar in aesthetic to their natural plant community counterpart.

Plant community refers to the associated plant species that form a recognizable, distinct and complex assemblage of vegetation. Plant community appearance and species composition can vary over time and place.

Planted (plant) groupings are groups of planted plants found in the Garden.

Self-directed learning is learning that occurs through educating oneself using tools and direct observation. Many opportunities exist for self-directed learning at the Garden.

Shelter Volunteers are trained by Garden staff so that they can greet and provide information to visitors in the Martha Crone Visitor Shelter. In addition, Shelter volunteers answer the phone, register participants for programs, and assist with maintaining the tidiness of the Visitor Shelter.

Taxon (plural taxa) describes the rank-based grouping of one or more organisms into a unit. More specific to this plan, it represents a group of plants organized within a particular taxonomic rank such as a family or genus. A taxon encompasses all included taxa of lower rank.

Friends' Invasive Plants Action Group (FIPAG) Volunteers are trained by Garden staff so they can lead volunteer crews. These volunteer crew leaders volunteer on evenings or weekends to assist other volunteers with removing invasive plants from the natural areas surrounding the Garden.

Plan Amendment Process

As management of the Garden has adapted to new challenges and issues in the past, this management plan is not intended to be a static document. This plan should evolve based on experience and with regard to new opportunities and issues facing the Garden. This plan is envisioned as incorporating three methods of revision as outlined below.

Term of the Management Plan

Every five years commencing from the date of the adoption of this plan, the plan will be updated and revised to reflect any new conditions or issues the Garden faces. This regular update will be developed by Minneapolis Park & Recreation Board staff. It will be brought to the Minneapolis Park & Recreation Board Commissioners for adoption only if there are changes proposed to the mission, goals, or policies outlined herein. Changes in the implementation tasks, methods, or background information may be completed by staff and updated without Minneapolis Park & Recreation Board Commissioner approval.

Mid-term changes in *Mission, Goals, or Policies*

Substantive changes needed in the mission, goals, or policies contained in the plan within the five year term specified above may be developed by Minneapolis Park & Recreation Board staff and brought before the Minneapolis Park & Recreation Board Commissioners for adoption and incorporation into the plan.

Mid-term changes in *Implementation Tasks, Methods, or Background*

Changes needed or desired by Minneapolis Park & Recreation Board staff that deal with implementation tasks, methods, or background and do not substantively change the mission, goals, or policies of the plan may be made and incorporated by Minneapolis Park & Recreation Board staff without approval of Minneapolis Park & Recreation Board Commissioners. These changes should be done in consultation with the full spectrum of affected staff considering best practices and available resources. These changes may be made only with the approval of the Garden Curator.

APPENDICES

History of the Eloise Butler Wildflower Garden

2014 Vascular Plant Census

2012-2014 Wildflower Garden Bee Census

2015 Bird Sightings at the Wildflower Garden

Integrated Pest Management Procedures

Selected Sources

Appendix I

History of the Eloise Butler Wildflower Garden

The 103 year history of the Garden is exceedingly rich. The story of its creation, development and care fills many files with letters, reports, newspaper articles and more. This appendix is a greatly condensed version of the Garden's history. In the future, more details, stories, and anecdotes about the Garden will be added to this document.

Pre-settlement era to purchase of land for Glenwood Park in 1889

As part of the Treaties of Traverse des Sioux and Mendota in 1851, the Dakota Nation ceded most of southern Minnesota to the United States government. In 1853 public land surveyor Jesses Jarrett noted that the area now known as Theodore Wirth Park had numerous streams, marshes, ponds, swamps and tamarack bogs – which he declared "unfit for cultivation". He also noted that near these waterbodies there was abundant "heavy timber" including elm, linden, ironwood, ash, aspen and oak, and that farther away from the water, there were only sparse oak trees — most likely indicating oak savanna or prairie ecosystems.

The area surrounding Birch Pond and the tamarack bog were purchased by land speculator Samuel Gale in 1883. Two years later Gale sold the parcel to Thomas W. Wilson who made plans to drain the bogs and swamps and platted the area with streets and house lots.

In 1889 the adjacent neighbors petitioned the Board of Park Commissioners to buy the land and prevent development. Residents sweetened the petition by offering to bear the cost of the land acquisition. When writing the history of the Minneapolis Park System, Superintendent Theodore Wirth described this 64 acre parcel of land as having "topographical contour and many natural attractions of those beautiful wooded hills and open country along the western city limits, as well as the possibilities for a charming water landscape through the Bassett's Creek Valley," which, he said, "impressed me as affording splendid opportunity for the development of an extensive natural park."

The Commissioners sided with the petitioners and proceeded to secure the park's initial 64 acres known as Saratoga Springs for $100,000. The next year the park's name was changed to Glenwood Park. For the next 20 or so years, the Board continued to acquire land until Glenwood Park reached 681 acres.

Wildflower Garden Beginnings 1907-1910

> *"On account of the rapid growth of the city—spreading out like a spider's web for miles in all directions —and the consequent disappearance of the wild lands and their indigenous vegetation—making it necessary for students to go farther and farther afield for specimens, it occurred to the writer, some years ago, that means should be taken to establish a plant preserve, within which to maintain representatives of the flora of our state; to serve also as a depot of supplies for the schools; as a resort for the lovers of wild nature; and to afford an opportunity to study botanical problems at first hand."*
>
> —Eloise Butler

For years high school botany teachers from across Minneapolis utilized Glenwood Park for fieldwork with their students. Riding the streetcar to the end of the line in the Bryn Mawr neighborhood, botany classes walked the rest of the way to the park to begin collection of plant specimens. Eloise Butler in particular was well-known for taking her Central and South high school students tromping through the bogs of Glenwood Park.

Even though the land had been secured as a public park it did not guarantee that wild spaces within would be left untouched. Dredging, draining and filling swamps, shoreline shaping, and extensive earthwork were common in this era of creating new

parks. It was paramount to local botany teachers that Glenwood Park's wildest spaces be protected, especially the treasured tamarack swamp abundant with orchids, pitcher plants, and sundew.

In 1907, Eloise Butler and three other Minneapolis high school botany teachers (Clara Leavitt, Elizabeth Foss, and Julia Clifford) organized a petition to persuade the Board of Park Commissioners to set aside land within Glenwood Park for a natural botanic garden. The petition was signed by 32 people including all the principals of Minneapolis high schools, University of Minnesota president Cyrus Northrup, several University professors, and local botanists C.W. Hall and Josephine E. Tilden. The petition requested that a "certain portion of the park grounds of Minneapolis [be] permanently set aside for a natural Botanical Garden for the instruction of students of botany and for the enjoyment of all lovers of nature."

The petitioners' desired Garden location was the eastern section of Glenwood Park because it consisted of "an undrained tamarack swamp with adjacent meadow land and wooded slopes. An undrained tamarack swamp is essential for the proposed garden because, on account of city improvements, such land is fast disappearing, together with certain lilies, arums, heaths, dogwoods, mosses and fungi and the rare and curious insectivorous plants which are never found elsewhere."

The petition also stated that the "aims of this garden would be to show plants as living things and their adaptation to their environment, to display in miniature the rich and varied flora of Minnesota, and to teach the principles of forestry."

The Board was persuaded as to the value of preserving this wild habitat and approved the request. The Board allocated $200 to the Garden for paths and fencing. Three acres of bog, meadow and hillside were quickly fenced and the "Natural Botanical Garden" opened on April 27, 1907.

The botany teachers spent the first gardening season documenting the species found within the Natural Botanical Garden's original three acres. In May of 1907 their plant census listed sixteen species of trees, twenty-seven shrub species, ten fern species, eight mosses, two liverworts, and seventy-six species of wildflowers and many grasses. By the end of the season more than 130 species had been documented in the Garden. See the Indigenous Plants of the Wildflower Garden/1907-1916 appendix for a complete inventory.

Working as volunteers, the teachers visited their favorite botanizing locations to acquire more plants for the Garden. Favorite sites included Minnehaha Falls, Minnehaha Creek, the Mississippi River near the Lake Street Bridge, and also the small towns of Mahtomedi and Mound. These sites were sources for pitcher plant, yellow lady's slipper, wild calla, pasque flower, and many kinds of ferns which were transplanted into the Garden. And although the stated aim was to focus on Minnesota flora, plants from Maine (Butler's home state) also found a home in the Garden.

The Garden doubled in size in 1908 when the Board of Park Commissioners purchased more land for Glenwood Park. The Garden's new addition featured a wet meadow and a spring-fed stream meandering through a marsh. The stream also connected in the open north meadow to a bubbling spring along the Garden's east boundary. The stream was dammed near the spring to form a small pool within the Garden providing habitat for carnivorous sundew plants. A pinetum was established in 1909, just outside the Garden's fence and included Norway pine, white pine, junipers, and yews.

In a 1910 publication Butler provided this description: "About seven acres have been given up to the Wild Garden, which has for its core a tamarack swamp, surrounded by untimbered bog land, merging into meadows and wooded slopes. The meadow is threaded by a tiny, tortuous brook, falling through several levels in little, musical cascades. When it leaves the Wildflower Garden, the brook has been widened by means of a dam into a small pond for the harborage of the water lily . . . and other choice aquatics." In this publication Butler also enthused that the "tamarack swamp is an abiding joy, being the only one within the city limits that has been saved from drainage and devastation for fence posts."

During these early years, the Garden was cared for solely by the botany teachers. Plant hunting, transplanting, weeding, watering and mulching were the teachers' regular chores.

Eloise Butler
Curator 1911-1933

"A paramount idea is to perpetuate in the Wildflower Garden its primeval wilderness. All artificial appearances are avoided and plants are to be allowed to grow as they will and without any check except what may be necessary for healthful living. Those in excess may be removed, when others more desirable have been obtained to replace them. Each individual, when procured, is to be given an environment as similar as possible to that from which it came, and then left to take care of itself, as in the wild open, with only natural fertilizers furnished by decaying vegetation."

—Eloise Butler

Upon her retirement as a Minneapolis high school teacher in 1911 Eloise Butler was hired by the Board of Park Commissioners to serve as the Curator for the Garden. In Butler's first year as Curator half of her salary was paid by the Minneapolis Women's Club.

The first mention of the Wild Botanic Garden in the annual reports of the Board of Park Commissioners is 1911. Butler's letter to the Superintendent and Board reiterates that the most valuable and important plants are those "indigenous to the place" meaning the Garden. However in contradiction to her statement, Butler records that she planted 157 species, 40 of which were new to the Garden. In addition, the "primeval wilderness" of the Garden was not entirely pristine and Butler spent her time "discouraging noxious weeds, especially the Canada thistle, which has come in the Garden from an adjacent part of the park where it is the chief vegetation." During this first season as Curator she planted a grove of eastern hemlock, which was also not indigenous to the Garden.

In 1912, a small building was constructed in the Garden to serve as a combination tool shed and Curator's office (see photo). Butler's letter in 1912 describing the status of the Garden exalts that a "cause for congratulation is the generous extension of the garden limits by the addition of an adjacent hillside and meadow. This greatly increases the

Curator's office/garden shed, 1935.

value of the place by contributing a number of choice plants not indigenous within the former boundaries." She also makes clear that much of her time is spent "exterminating pestilent weeds like poison ivy, Canada thistle, burdock, Lappula; grubbing out the excess of prickly ash and sumach [*sic*], clearing the ground from fallen branches; and protecting the property from marauders."

During Butler's tenure as Curator, thousands of plants were added to the Garden each year. Working toward her goal of acquiring representative flora from across Minnesota, hundreds of species not indigenous to the Garden were added and so were some of her favorite species from Maine and Canada. During this era of gardening, native plant nurseries were exceedingly rare. It was no small undertaking to increase the Garden's plant collections. Plants were dug up in the wild and most likely transported to the Garden by rail and streetcar. From the streetcar stop on Glenwood Ave, the plants were carried or rolled to the Garden's gate before transplanting. The Garden log kept by Butler identifies many of the original locations for the transplants.

While common weeds were regularly eradicated, at least one species considered an invasive weed today was purposely planted in the Garden. Butler's annual letter of 1912 reveals that "the pretty purple loosestrife (lythrum alatum) is a desirable adjunct" for the Garden. In fact, during the early 1920's more than 700 plants of purple loosestrife were installed on the shoreline of Birch Pond located adjacent to the Garden. *NOTE: In the late 1990s purple loosestrife beetles were released at Birch Pond and successfully controlled the invasive plants.

At least one invasive species in the Garden was the result of a shipping error. In 1913 a South Carolina nursery sent the wrong plant glossy buckthorn, *Rhamnus frangula* (now *Frangula alnus*) instead of *Rhamnus alnifolia*. By 1922 Butler noted the plant's invasive qualities as it ran rampant over previously open hillsides and shaded out some native species.

Butler saw that one of the roles of the Garden was as a teaching tool, "Visitors find the garden helpful in suggestions, being there enabled to note, in a natural environment, the habitat, size, and form of our native plants; the color, succession, and other characters of flowers and fruits; and thus to decide for themselves what is appropriate for the ornamentation of their homes; and in gratifying their individual tastes, to raise the standard of public taste, and to break down the wearying monotony too often seen in cultivated grounds."

Butler's plant records of 1914 show that the "garden contains, excluding liverworts, mosses, fungi, and algae; 774 species of plants, 326 of which are indigenous, distributed among 66 trees, 101 shrubs, and 607 herbs."

1925

A tornado uprooted most of the Wildflower Garden's mature tamaracks. This drastically altered the bog's habitat by opening up the canopy and allowing more sunlight to penetrate to the ground plane.

Throughout the years the Garden boundaries were somewhat fluid; even unfenced portions of Glenwood Park were considered part of Garden. No maps survived that may have recorded the Garden's boundaries as they grew and shrunk.

As the Garden's first Curator and one of its principal founders, Butler saw a need for a place in the city where native plants could be protected, cared for, amassed and studied. She wrote that she envisioned a wild botanic garden that would serve "as a depot of supplies for the schools; as a resort for the lovers of wild nature; and to afford an opportunity to study botanical problems at first hand." One of her main goals was to transplant specimens of each native plant species from across the state of Minnesota to the Garden so that visitors and students could see "representatives of the flora of our state" in a single location.

SAMPLING OF PLANT COLLECTION SITES AS LISTED IN ELOISE BUTLER'S GARDEN LOG

Minneapolis Parks

Minnehaha Park, Twin Lakes, Bassett's Creek, meadow on golf links, and Quaking Bog

In town collection

Brownie's Pond, cow pasture near Quaking Bog, meadow off of 6th Ave S, woods off of Superior Blvd., a field off of Xerxes Ave, east river bank near Franklin Ave Bridge, meadow off of Luce Line RR, Fort Snelling, and Battle Creek in St. Paul

Throughout Minnesota

West Concord, Sullivan Lake near Hillman, vicinity of Eden Prairie, Girl Scouts' camp off Dan Patch Line, Medicine Lake, Echo Lake, White Bear, Minnesota River bottom, Riverview Heights, Northome, Cambridge, Lake of the Woods, Bryan, vicinity of St. Francis, Lake Kabekona, Grand Marais, Coon Lake, vicinity of Anoka, Bemidji, Minnetonka, big bog near Clear Springs, Jefferson Highway, Fridley, and Lake Independence

And nearby states

North Dakota: Grand Forks
Iowa: Maquokata, Denison, and Graettinger
Wisconsin: Taylor's Falls, Lake Geneva, and Solon Springs

Unlike other botanical gardens, which tended to create formal collections of plants in unnatural groupings, Butler felt it essential to maintain and foster the natural characteristics of the land that became the Garden. "A paramount idea" Butler noted, "is to perpetuate in the Wildflower Garden its primeval wilderness."

While working in the Garden on April 10, 1933 Butler suffered an apparent heart attack. It's not clear if the "boys" helped her get home, but Butler passed away at her lodgings on Xerxes Ave. She was 81.

NOTE: an extensive history of Eloise Butler can be found in Martha Hellander's book, *The Wild Gardener: The Life and Selected Writings of Eloise Butler*.

April 19, 1933

Excerpts from a letter to the Board of Park Commissioners from Theodore Wirth upon the death of Eloise Butler on April 10, 1933

"Miss Butler had faithfully, efficiently, and lovingly devoted her labor and knowledge of plants to the preserve, in the preservation and enlargement of the native plant life, ever since the garden was first established in 1907 . . .

" . . . and ever since that time until the ripe age of 81 years, Miss Butler has most devotedly and kindly rendered valuable service to the garden and information to large numbers of botany students and friends of nature in general. For a full quarter of a century, her useful life has been spent in a labor of love – not only in the preservation and protection of our native trees and flora, but in the introduction of plants native to other parts of our state and country.

"Every plant in her garden, large and small, was her living child, upon whom she bestowed her devotion and care – and her love went to the birds and all other members of the Animal Kingdom who were inhabitants of and attracted to the peaceful, beautifully wooded glen in which she studiously and untiringly labored for her beloved beings of Dame Nature. I say "beloved" advisedly, for she did not shrink from manual labor in order to protect her treasures from inexperienced or unthinking hands or feet of visitors or willing helpers. Hers was a life of happiness in a kingdom all of her own, and her spirit has not departed from those grounds which have been so fittingly named for her, and which should for all time in the future be devoted to the purpose for which they were dedicated at her wish and that of her co-workers in nature study."

Martha Crone
Curator 1933-1958

"Wild flowers are my life work and they are important. Everything was wild once."

—Martha Crone

While accounts vary, Martha Crone began visiting the Garden and Eloise Butler somewhere between 1918 and 1920. Crone was in her early 20s and eager to learn about native plants. Butler was taken in by Crone's uneducated enthusiasm for wild plants and came to rely on her help transplanting, plant hunting in greater Minnesota, and heeling in the many plants shipped from Butler's vacation trips home to Maine. Crone also accompanied Butler on the many Garden tours she provided to students and the public. She literally served as Butler's guard, following the tour stragglers to make sure they did not pick the flowers. Besides becoming great friends, Crone worked [volunteered] alongside her until Butler's death in 1933.

Within a week of Butler's death, Superintendent Wirth noted that the Garden needed "proper care and attention, if the labors of its late Curator, Miss Eloise Butler, are not to be lost. The work can only be performed by some person with the necessary knowledge of plants and the essential training in their preservation." Wirth recommend Martha Crone for the Curator position, stating that "Mrs. Crone seems best qualified to carry on Miss Butler's work." In his letter to the Board, Wirth also stated that "Mrs. Crone is also recommended by close friends of Eloise Butler, who are aware of the professional and scientific relations and friendship that existed between the two plant lovers." The Board endorsed these recommendations and Martha was hired to work thru October with a monthly salary of $60.

The first few years that Crone served as Curator, the Garden endured an extended multi-year drought. The Board of Park Commissioners 1934 Annual Report states that as a result of the drought, the "entire supply of Showy Orchids, Shooting Star, and some varieties of ferns were wiped out."

Clinton Odell, a former botany student of Eloise Butler's, developed a keen interest in the Garden after Crone became Curator. At that time Odell served as president of the Burma-Vita Company (the makers of Burma-Shave with their ubiquitous signs) which was located in the Bryn Mawr neighborhood and just blocks from the Garden. Odell preferred wildflowers to golf and spent many of his lunch hours walking through the Garden as well as helping Crone remove weeds and repair trails. Odell was especially passionate about eliminating the rampant jewelweed which he felt was destroying Butler's plantings.

Succumbing to the relentless march of weeds that were smothering Butler's plantings, portions of the Garden were abandoned in 1938 including Lady's Slipper Path and the area that at the time was known as Mallard Pool (this is not the pool of water within the Garden's fence today). By reducing the boundaries of the Garden, the remaining portions could receive more intensive maintenance.

Odell was supportive of Butler's goal to have every species of Minnesota flora represented within the Garden. To help Crone achieve that goal, in 1944 Odell offered the Park Board $3000 to expand the Garden to include two acres of upland hills [the prairie today]. The funds were used to clear sumac, underbrush and tress, and to fence the area for "open field and hilltop flowers." At the same time, a northern swampy section of the Garden was abandoned.

For many years Odell annually contributed funds to the Park Board to hire two men to work full time for Crone during the gardening season. The addition of two workers made a huge difference. Suddenly, the number of plants added to the Garden dramatically increased from several hundred a year to several thousand per year.

Crone also had a stated goal of trying to grow flora from across the United States from the same latitude as the Garden. And as a gardener she was fervently committed to creating the most beautiful Garden possible. Taken together, this led Crone to experiment with flowering species from warmer latitudes such as azaleas, rhododendrons, Oconee bells, and redbuds. She also experimented with tree species from various climates to test their cold hardiness. This service to home gardeners was ended in 1958, when the University of Minnesota took over that role with the opening of the Minnesota Landscape Arboretum in Chanhassen.

In 1946 "a new item of interest added to the garden is a series of pools wherein are planted water lilies, pickerel week, lotus lily and water crowfoot. These pools are situated along the swamp trail where an intimate view of them may be had when in bloom. The undertaking in establishing the garden was a real challenge, inspiring a great determination to succeed, for in the cultivation of wild plants, many problems are met, some of which respond satisfactorily, while others require considerable patience and intelligent care in handling. To offset the years of drought, a steady supply of water is most essential. This was realized and a water system installed in 1947 connecting with the main on Chestnut and Xerxes Avenue North."

MONARCH

In 1940 the Garden lost one its landmarks; the magnificent 700+ year old white oak known as Monarch. Eloise had earlier tried to save the tree by having its' hollow core filled with concrete, a common forestry practice in the early 1900's. By 1940 Monarch apparently threatened the safety of Garden visitors so was removed.

Ken Avery began working with Crone in 1954. In 1958 it was noted in the Fringed Gentian newsletter that the city skyline and the Kenwood water tower were visible from the prairie's hill top. A bench was placed there for Garden visitors to enjoy the scenery. In 1958 a new partnership developed for the improvement of the Garden. The Minnetonka Garden Club and the Little Minnetonka Garden Club sponsored the planting of Fern Hill, now known as the Fern Glen.

Crone retired as the Garden's Curator in 1958. Her last annual report to Superintendent Doell and the Board of Park Commissioners notes that during the previous 12 years, 40,999 plants were added to the Garden. She also acknowledges the contributions of the Minnetonka Garden Club, the Friends, and Clinton Odell. Crone closed her letter with a wish, "May this beautifully situated garden always be sponsored and protected for future generations to enjoy."

Above all, Crone viewed the Garden as precisely that, a garden for wild flowers and other native plants. She did not attempt to restore the ecosystems of the garden to what they once were. Instead she enhanced the garden by creating diverse and dynamic displays of native plants in a naturalistic setting.

She wrote in her 1951 *History of the Eloise Butler Wildflower Garden*, "Here is offered an opportunity to see and enjoy within a short time plants grouped together from all parts of Minnesota, as well as from distant states. Their cultural requirements vary; the conditions under which the given species thrive naturally in the wilds must be carefully imitated... Even if a plant lives and thrives, it must be remembered that the life of each individual plant in limited. The span of life for some is very short, others many years. It is therefore quite understandable why a constant replanting must be carried on year after year to maintain a sufficient supply of native plants for educational purposes, to preserve the indigenous flora, and to introduce flora from other regions for the benefit of students of botany and lovers of wild life... The garden is intended to stimulate an interest in, and an appreciation of, our wild flowers, which is a natural resource second to non in value and in beauty—a priceless heritage which should be handed down for enjoyment."

NOTE: More detailed information about Martha Crone and her work in the Garden as well as with the Friends of the Wild Flower Garden can be found at www.friendsofeloisebutler.org

Ken Avery
Head Gardener 1959-1987

"We have [plant] beds, of course, but they don't look like beds. And we can't go moving around plants just so they look nice. Wild plants have an integrity that we must respect."

–Ken Avery

When Martha Crone retired as Curator in 1958 so did the title and Ken Avery was hired as the Gardener at the Garden. In 1980, when Avery was looking back on his career, he wrote that he made a couple major decisions when he took over primary care of the Garden in 1959. The first decision was the result of the University of Minnesota's opening the new Arboretum in Chanhassen. This meant there was no longer a need to invest time and energy "testing the hardiness of exotic plants" at the Garden. The second decision was to "concentrate on reintroducing the plants that had once grown in the area and to a lesser extent to attempt to grow all the plants native to Minnesota." His last decision was to try and "institutionalize the Garden — that is to remove the Curator's personality as an important element in its makeup."

Avery had worked for Crone since 1954 so he knew the Garden extremely well. He also understood Martha's vision for the Garden as well as how to care for the plant collections. As for the Garden itself, in the late 1950's the plantings by Crone were still in good shape. The wetland area of the Garden still had three separate pools which were refilled with water each season by moving around a garden hose. Avery and garden laborer Edward Bruckelmeyer dug channels between the pools so they didn't have to drag around the garden hose. The pools regularly silted in so every few years Bruckelmeyer and Avery would dredge them out to about two feet deep and put the "spoils" back on the adjacent pool edges to once again seep back in.

Maintaining the Garden was still predicated on the concept that "In our Wild Garden the ideal is that it appear that the present viewer is the first person to see the area. That is, we try to weed in such a way that it doesn't appear that we did so but that the most desirable plants just happened to grow where we wanted them to".

During the 1960s the dirt paths were first wood chipped with chips from the Forestry division. Garden care practices that one would not normally associate with a natural area were still commonly used in the Garden. Avery was actively using "leaf coverings" to keep down weeds and reduce erosion on slopes. Hay was even placed over prairie plantings because "exposure to the winter sun is disastrous." Plant species lost to severe winters like trilliums were readily replaced. Within various issues of The Fringed Gentian, Avery makes frequent mention of propagating plants through seed and division but no descriptions could be found on the species or volume of plants produced.

Pit toilets were replaced with chemical toilets in 1961 which was a boon to ground water quality and general sanitation. The Garden's water lines were extended in 1963. This may have facilitated the decision in 1965 to stop mowing the prairie each spring and to instead use fire. Avery decided to try burning because he had read that is was "an effective method of preventing the encroachment of trees and shrubs and if it does this for us it would be preferable to the use of chemicals or physically removing these weeds".

Also in the 1960s, it was repeatedly noted in the Fringed Gentian that "experiments with Rhododendrons and Azaleas" had proved successful. And that in general, "plants native elsewhere will prosper here," including dwarf and yellow trillium. Advice was provided to home gardeners on how to protect non-native plants from winter damage in their yards.

During the 1960s the Friends of the Wild Flower Garden provided an annual $500 donation to the Board

of Park Commissioners for Garden maintenance. This was most likely a continuation of the tradition Clinton Odell started in the 1950s by donating funds to cover costs for additional garden labor. Neither Park Board Annual Reports nor Fringed Gentians newsletters record specifically how the funds were spent.

It should be noted that Martha Crone remained active with the Garden by continuing her role as the editor of the Fringed Gentian. Her passion for rescuing plants can be seen by the frequent publication of pleas to salvage native plants from construction sites, "as urban development envelopes these bits of land, the last stand of some of the local flora will be destroyed. If you know of such a location, an attempt should be made to salvage desirable plants. Those hard to propagate – such as orchids, perennial gentian, and some ferns should be salvaged if all possible . . . if you know of a location with desirable plants, about to be "worked" and wish to salvage the plants, please call Mrs. Martha Crone, Ja-9-4719 and assistance will be arranged whenever possible." Based on the fact Avery does not mention plant salvage in his notes or articles, it seems he was less inclined to pursue this path of plant acquisition. However, orchids and similar native plants were donated to the Garden by local residents.

BIRCH POND

Letter from Avery to Superintendent Robert Ruhe

March 4, 1966

"I suggest serious thought be given to poisoning little Birch Pond to remove the rough fish living there. Mrs. Crone . . . told me that 10 or so years ago the little lake was crystal clear and many water lilies grew there. She was of the opinion that the goldfish and carp that were introduced into the lake grubbed all the vegetation from the bottom and stirred it into the mud hole it has been for as long as I can remember."

No records show such action was taken. And today the pond does have water lilies.

In 1964, Avery developed a proposal to declare the 40 acres surrounding the Garden as under the care of Garden staff. His goal was to manage the entire area to benefit the Garden. The Friends brought Avery's proposal to the Board of Park Commissioners and in August 1964 the Board declared the area surrounding the Garden a native conservatory. Avery noted in his correspondence to Superintendent Moore that he was excited about managing the area as a single integrated unit and felt that the "chief value of this area was for the study and appreciation of nature." Avery's expectation was that the existing maintenance and forestry staff would take direction from him to manage the area's natural resources.

While the Board of Park Commissioners did affirm Avery's proposal, no shift in supervisory duties or reassignment of staff occurred. He continued to hope that this proposal would come to fruition. Years later when David Fisher was Director of Operations, Avery again submitted a proposal requesting that "the Curator be given complete authority over the area." This did not happen.

In 1969, the Garden was renamed The Eloise Butler Wildflower Garden and Bird Sanctuary. The name change served as acknowledgement of the many resident and migratory birds found within the Garden and greater Theodore Wirth Park.

A major addition to the Garden began in 1969 with the construction of the Martha Crone Visitor Shelter which was funded through donations from the Friends of the Wild Flower Garden and built by Minneapolis Park & Recreation Board trades. The main purpose of the Visitor Shelter was to provide visitors with additional educational opportunities and protection from the weather. The building replaced the Curator's decrepit shack which lacked running water, heat or insulation, and had been built in 1912 when Eloise Butler was Curator. The new building was designed by H.H. Livingston and opened in 1970.

Loss of Garden Labor

Up until 1970, Avery was assigned two full time workers each season to help care for the Garden and keep the gates open on weekends. Workers included Sam Baker, Edward Bruckelmyer, and Richard Wick. Written records could not be found that explained why there was reduction in labor. Potential explanations include the recession of the 1970s, reassignment of workers to other parks, retirements, or maybe donations were dedicated to infrastructure needs.

GROW YOUR OWN BOG

When Avery first started working in the Garden in the 1950s, he experimented with growing a "little sphagnum bog" in the wetland area. His first attempts failed but he later hit upon a new idea, "I made a raft upon which I could grow an artificial bog. I did this by taking throw-away beer bottles which were found in the park and pushing their tops through chicken wire. I then placed sphagnum moss on it [and] waited to see if it would grow under these circumstances. In a couple years, I had a little island with quite a luxuriant growth of moss on it."

With this success, Avery was ready to build a bigger bog raft. However, the brewery had stopped making the bottles he had first used. In 1978 he found an alternate base – wine bottles. This required a different strategy, "instead of thrusting the tops through the chicken wire, I tie them beneath it like logs . . . Richard Wick and I went over to the dying bog in the park for sphagnum and put in on the raft and set it in the pool. . . The next time you go through the GARDEN you may notice the two little islands in our pool. The one in front looks awful, but don't look on it as an eyesore. In a few years it will look as luxuriant as that smaller island behind it."

Fringed Gentian, Summer Issue, 1978

Whatever the cause, the loss of these laborers had an impact on the maintenance of the Garden's plant collections. Several mass plantings gradually died out. Other collections nurtured by Martha Crone, such as lupines and hepaticas diminished as well.

The loss of consistent labor may have been the catalyst for Avery to adopt the philosophy of "nature knows best" — which freed him from trying to maintain a 13 acre garden with only a third of the previous manpower. Avery writes of the Garden's prime as being prior to 1970 when he had laborers and before Dutch elm disease wiped out the tree canopy.

Dutch elm disease had a devastating effect on the Garden. In less than ten years during the 1970s almost the entire woodland canopy - 175 mature elms — succumbed to the disease. The loss of these trees meant the Garden was sunnier, drier and hotter. Collections of spring ephemerals suffered, and some woodland species even disappeared.

In an interview with the Minneapolis Tribune in the mid-1970s, Avery lamented that the Garden "used to be just beautiful. It does not compare with what it was. It has to go back to what it used to be; [now] it's a highly disturbed area. It's a tragedy in many ways. I go into mourning over it. The flowers are not as nice as they used to be. But by the same token, if a person is interested in nature, he has to be interested in what is happening. It's an experiment [removal of the tree canopy] I wouldn't have the nerve to conduct." The elms were replaced with plantings of swamp oak, butternut, balsam fir and black ash.

The newspaper article when on to describe how bittersweet nightshade, boxelder and groundnut had moved into the woodlands of the Garden. Blackberries and raspberries were problematic. And welted thistles, common in disturbed sites such as abandoned fields, were also starting to appear. According to Avery, "We didn't have one [welted thistle], five years ago. They're one of the things that are coming in since the trees are gone."

Avery's management philosophy is captured in his quote that "the more you control something, the more it upsets the balance of nature and the more you have to control something else." This viewpoint may help explain the slow creep of invasive species into the Garden during the early 1980s.

When Avery retired in 1986, botanist Barbara Delaney conducted a plant survey of the Garden. She identified 492 species.

NOTE: More detailed information about Ken Avery can be found at www.friendsofeloisebutler.org

Mary Maguire Lerman

Although she was not the gardener or the curator assigned to the Garden, Mary Maguire Lerman had a major impact on the site. Hired as the Environmental Coordinator of Horticulture Programs in 1976, her first day of work included a tour of the Garden led by Gordon Morrison, the Minneapolis Park & Recreation Board's first Environmentalist. Morrison encouraged Lerman to make suggestions to improve the site and to work with the Friends of the Wild Flower Garden to create an educational guidebook. Lerman took this encouragement to heart, and over the next 33 years, she worked to improve the Garden.

Lerman worked with Avery to locate and order tamaracks and other wetland native bareroot woody plants for installation. At that time, neither Out Back Nursery nor Landscape Alternatives had opened, so native plants had to be obtained from small in and out of state nurseries.

The 1977 Spring issue of the Fringed Gentian notes that Lerman supported the aim to "acquire every possible herbaceous, if not woody, material native to Minnesota so people can go to the Garden and see an actual collection of Minnesota materials." She was also interested in developing the Garden's prairie area and expanding its collection of cacti, which are native to southwestern Minnesota.

Providing people with opportunities to learn about the Garden was a priority for Lerman. She gave regular lecture slide shows (including one on poisonous plants) and led hikes of the Garden and the Quaking Bog. Together, Lerman and the Friends of the Wild Flower Garden created an educational guidebook for the Garden. Several versions of the guidebook were published for visitors' education. The Prudential Insurance Company, whose offices were located on the west side of Brownie Lake, donated the printing.

Lerman's commitment to increasing the public's access to the Garden led to a change in hours as well as staffing. Prior to 1984, the Garden was only open from 7am to 3:30pm, standard working hours for the Minneapolis Park & Recreation gardeners. Lerman convinced administration that the Garden should be open longer hours in order to better serve the public. The new garden hours would be 7am to dusk, or one-half hour before sunset. These extended hours allowed for the average working citizen to come to the garden on weekday and weekend evenings.

To staff the Garden, Lerman interviewed and hired a number of individuals, all having educational background with an environmental focus. She required that they provide program activities for garden visitors — and thus began the naturalist programs. Family and youth programs were part of the focus.

Lerman was also responsible for changing the Garden's main roadway access to a one way. Prior to the change, speeding on this roadway occurred during rush hours as drivers tried to avoid the backup of traffic at Glenwood Avenue. The roadway change eliminated speeding hazards and accidents for visitors to the Garden.

Cary George
Gardener 1987-2004

"So, I think, the true 'State of the Garden' should be examined not by plant surveys, programming, and architectural adornments, but by asking the question, 'Is the primary purpose of the Garden— to comprehend the grace of nature— still valid?'"

—Cary George

Cary George inherited a garden that was in recovery mode, and at the same time, under attack by invasive species. George had worked with Ken Avery for two seasons, part-time, before he took on the role of Head Gardener upon Ken Avery's retirement. The Garden had suffered big losses with the removal of 175 diseased, mature elm trees in the 1970s. A plan to replant the lost canopy was not created or implemented, and so trees that naturally regenerated in the area were the ones that were allowed to grow into the next generation of canopy trees. Black walnut, boxelder and green ash became prevalent.

George saw the damage to the native plant collections caused by invasive species, in particular buckthorn. Buckthorn was an issue in all areas of the Garden when George started. He waged a continuous battle to keep the populations of both glossy buckthorn and European buckthorn in check. In the upland garden area both leafy spurge and Grecian foxglove were problematic non-native plant species. Garlic mustard started to become a problem in the early 1990s. As a reproducing population of this invasive became established in greater Theodore Wirth Park, it quickly moved throughout the Garden. In the 1990s despite his consistent efforts to keep invasive species at bay, several species proliferated in the Garden. Invasive plant seeds were introduced by wind and wildlife from greater Theodore Wirth Park and the surrounding residential neighborhoods. The devastating impacts of invasive species were just being realized by the community at large and few resources were dedicated to removal efforts. Portions of the Garden's native plant collections were compromised by the invaders. In spite of the presence of invasive species, a few uncommon plants survived in greater Theodore Wirth Park and were found by George including twayblades and kitten tails.

George's focus on keeping the simplicity and natural beauty of the Garden intact was paramount to his management style. As he stated, "Much like the Japanese philosophy of Wabi-Sabi, the beauty of the Wildflower Garden is found in the imperfect, incomplete, and impermanent. Indeed, it is just this discovery of truth in the inconspicuous that comforts us with the calculus of nature that surpasses mathematics and man. At a time when 'Open Space' means tot lots, paved bike trails, crushed aggregate softball fields and beach parking lots, when wetland restoration is a filtering system for urban runoff, let us begin again at the Garden."

Over the years he made many subtle, but significant, changes to fence and trail locations in an effort to give the Garden more depth of field and to remove visual barriers from the view shed of visitors. George contributed to the development and installation of the self-guided tour program, which included the installation of 49 station posts throughout the Garden and the development of an associated guidebook highlighting plants found near each post.

George felt that one of the guiding management goals was to work towards replicating a pre-settlement experience. As he stated "what would it be like if you walked around these areas pre-development?" To this end he thought that it was important to bring in as many indigenous (to the site) native plant species as possible because many had been lost throughout the years.

He was also consistently concerned that the simple and yet very particular aesthetic of the Garden could be impacted by management practices and decisions not in keeping with this look and approach. He spoke to trying to keep out any sort of "Disneyland falseness" but rather to keep the experience intimate and natural for visitors. As head gardener he was very aware of the fact that it was essential to "maintain what you have; don't go backwards" and he worked to that end during his 17 years at the Wildflower Garden. Although, for several seasons early in his career, he had the assistance of a fellow gardener to aid him, part-time, in the care of the Garden's plant collections in the early spring and fall months, George eventually was left to do all maintenance work on his own.

George oversaw the addition of 1-acre to the upland garden and managed the resulting transformation while adding diversity to the plants collections in that section of the Garden. The physical boundaries of the Garden had expanded and contracted throughout the years and with this final 1-acre addition, the Garden reached 15-acres. Large swaths of underbrush were removed to make way for the prairie plantings in this new section of the Garden under George's direction.

George was quite philosophical when it came to matters regarding the Garden's importance and care. As he stated in an article that he wrote for the Fringed Gentian publication, "My contention is that more so than ever, a sanctuary that protects all life, both human and non-human, should be a touchstone for living our daily lives, not just a quaint natural history lesson."

Ecologically, George felt that the Garden had a unique standing in the community. "The Garden is more than a remnant of what Wirth Park used to be. It is different geographically. It also has a transcendental spirit. Has Wirth Park been lost to invasive plants and a labyrinth of eroded trails . . . ? Maybe, but I trust the Garden. Yes, it's being squeezed by a consumer-oriented world, but in the end there will always be the Garden. The Garden is non-materialistic. It's a humble, modest place, unaffected by affluence."

There were several major obstacles that were notable during his tenure. The non-native species invasions, previously mentioned, and the resulting decline in plant community health was a significant one. Also impacting the Garden's plant collections were the boom and bust rainfall cycles that occurred throughout the years that he was gardener. George was also the first gardener who dealt with a disease which was making its presence known in Theodore Wirth Park, Oak Wilt.

Upon Cary George's retirement in 2004, the gardener position was revised. The goal was to have the new Garden Curator oversee all aspects of the Garden including gardening, environmental education programming, staff, outreach, volunteer programs, planning and plant collection development.

NOTE: More detailed information about Cary George can be found at www.friendsofeloisebutler.org

Appendix II

Vascular Plant Census/2014

(648 species listed)

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
FERNS AND FERN ALLIES			
DENNSTAEDTIACEAE Bracken Family	Bracken Fern	*Pteridium*	*aquilinum var. latisuculum*
DRYOPTERIDACEAE Dryopteris Family	Lady Fern	*Athyrium*	*felix-femina*
	Bulblet Fern	*Cystopteris*	*bulbifera*
	Brittle Bladderfern	*Cystopteris*	*fragilis*
	Silver False Spleenwort	*Deparia*	*acrostichoides*
	Spinulose Woodfern	*Dryopteris*	*carthusiana*
	Crested Woodfern	*Dryopteris*	*cristata*
	Spreading Woodfern	*Dryopteris*	*expansa*
	Goldie's Woodfern	*Dryopteris*	*goldiana*
	Intermediate Woodfern	*Dryopteris*	*intermedia*
	Marginal Woodfern	*Dryopteris*	*marginalis*
	Ostrich Fern	*Matteuccia*	*struthiopteris var. pensylvanica*
	Sensitive Fern	*Onoclea*	*sensibilis*
	Christmas Fern	*Polystichum*	*acrostichoides*
EQUISETACEAE Horsetail Family	Field Horsetail	*Equisetum*	*arvense*
	Water Horsetail	*Equisetum*	*fluviatile*
OPHIOGLOSSACEAE Adder's Tongue Family	Grapefern	*Botrychium*	*sp.*
OSMUNDACEAE Royal Fern Family	Cinnamon Fern	*Osmunda*	*cinnamomea*
	Interrupted Fern	*Osmunda*	*claytoniana*
	Royal Fern	*Osmunda*	*regalis var. spectabilis*
PTERIDACEAE Maidenhair Fern Family	Maidenhair Fern	*Adiantum*	*pedatum*
THELYPTERIDACEAE Marsh Fern Family	Long Beechfern	*Phegopteris*	*connectilis*
	Northern Marsh Fern	*Thelypteris*	*palustris var. pubescens*
GYMNOSPERMS			
CUPRESSACEAE Cypress Family	Eastern Red Cedar	*Juniperus*	*virginiana*
	Northern White Cedar	*Thuja*	*occidentalis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
PINACEAE Pine Family	Balsam Fir	*Abies*	*balsamea*
	Japanese Larch	*Larix*	*kaempferi*
	Tamarack	*Larix*	*laricina*
	Norway Spruce	*Picea*	*abies*
	White Spruce	*Picea*	*glauca*
	Black Spruce	*Picea*	*mariana*
	Mugo Pine	*Pinus*	*mugo*
	Red Pine	*Pinus*	*resinosa*
	Eastern White Pine	*Pinus*	*strobus*
	Scotch Pine	*Pinus*	*sylvestris*
	Hemlock	*Tsuga*	*canadensis*
TAXACEAE Yew Family	American Yew	*Taxus*	*canadensis*
ANGIOSPERMS			
ACERACEAE Maple Family	Amur Maple	*Acer*	*ginnala*
	Box Elder	*Acer*	*negundo*
	Black Maple	*Acer*	*nigrum*
	Striped Maple	*Acer*	*pensylvanicum*
	Norway Maple	*Acer*	*platanoides*
	Red Maple	*Acer*	*rubrum*
	Silver Maple	*Acer*	*saccharinum*
	Sugar Maple	*Acer*	*saccharum*
	Mountain Maple	*Acer*	*spicatum*
ACORACEAE Sweetflag Family	Sweetflag	*Acorus*	*sp.*
ALISMATACEAE Water Plantain Family	Water Plantain	*Alisma*	*sp.(possibly subcordatum)*
	Northern Water Plantain	*Alisma*	*triviale*
	Broadleaf Arrowhead	*Sagittaria*	*latifolia*
ANACARDIACEAE Cashew Family	Fragrant Sumac	*Rhus*	*aromatica*
	Smooth Sumac	*Rhus*	*glabra*
	Common Poison Ivy	*Rhus*	*radicans var. negundo*
	Staghorn Sumac	*Rhus*	*typhina*
	Western Poison Ivy	*Toxicodendron*	*rydbergii*
APIACEAE Parsley Family	Rattlesnake-master	*Eryngium*	*yuccifolium*
	Cow Parsnip	*Heracleum*	*maximum*
	Anise Root	*Osmorhiza*	*longistylis*
	Golden Alexanders	*Zizia*	*aurea*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
APOCYNACEAE Dogbane Family	Eastern Bluestar	*Amsonia*	*tabernaemontana*
	Spreading Dogbane	*Apocynum*	*androsaemifolium*
	Prairie Dogbane	*Apocynum*	*cannabinum*
	Common Periwinkle	*Vinca*	*minor*
	Common Periwinkle, white form	*Vinca minor*	*f. alba*
AQUIFOLIACEAE Holly Family	Common Winterberry	*Ilex*	*verticillata*
ARACEAE Arum Family	Jack-in-the-pulpit	*Arisaema*	*triphyllum*
	Wild Calla	*Calla*	*palustris*
	Skunk Cabbage	*Symplocarpus*	*foetidus*
ARALIACEAE Ginseng Family	Wild Sarsaparilla	*Aralia*	*nudicaulis*
ARISTOLOCHIACEAE Birthwort Family	Wild Ginger	*Asarum*	*canadense*
ASCLEPIADACEAE Milkweed Family	Poke Milkweed	*Asclepias*	*exaltata*
	Swamp Milkweed	*Asclepias*	*incarnata var. incarnata*
	Common Milkweed	*Asclepias*	*syriaca*
	Butterfly Milkweed	*Asclepias*	*tuberosa*
	Whorled Milkweed	*Asclepias*	*verticillata*
ASTERACEAE Composite Family	Common Yarrow	*Achillea*	*millefolium*
	White Snakeroot	*Ageratina*	*altissima*
	Common Ragweed	*Ambrosia*	*artemisiifolia*
	Western Ragweed	*Ambrosia*	*psilostachya*
	Field Pussytoes	*Antennaria*	*neglecta*
	Lesser Burdock	*Arctium*	*minus*
	Pale Indian Plantain	*Arnoglossum*	*atriplicifolium*
	White Sagebrush	*Artemisia*	*ludoviciana*
	Leafy Mugwort	*Artemisia*	*serrata*
	Bur Marigold	*Bidens*	*cernua*
	Swamp Beggartick	*Bidens*	*connata*
	Leafy Beggartick	*Bidens*	*frondosa*
	Threelobe Beggartick	*Bidens*	*tripartita*
	Spotted Knapweed	*Centaurea*	*stoebe*
	Chicory	*Cichorium*	*intybus*
	Canada Thistle	*Cirsium*	*arvense*
	Field Thistle	*Cirsium*	*discolor*
	Swamp Thistle	*Cirsium*	*muticum*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Canadian Horseweed	*Conyza*	*canadensis*
	Bird's foot Coreopsis	*Coreopsis*	*palmata*
	Yellow Hawksbeard	*Crepis*	*tectorum*
	Whitetop Aster	*Doellingeria*	*infirma*
	Flat Top Aster	*Doellingeria*	*umbellata*
	Flat Top Aster	*Doellingeria*	*umbellata var. pubens*
	Narrow-leaved Purple Coneflower	*Echinacea*	*angustifolia*
	Pale Purple Coneflower	*Echinacea*	*pallida*
	Purple Coneflower	*Echinacea*	*purpurea*
	Pilewort	*Erechtites*	*hieracifolia*
	Daisy Fleabane	*Erigeron*	*annuus*
	Philadelphia Fleabane	*Erigeron*	*philadelphicus*
	Philadelphia Fleabane	*Erigeron*	*philadelphicus var. philadelphicus*
	Lesser Daisy Fleabane	*Erigeron*	*strigosus*
	Boneset	*Eupatorium*	*perfoliatum*
	White Wood Aster	*Eurybia*	*divaricata*
	Bigleaf Aster	*Eurybia*	*macrophylla*
	Grassleaf Goldenrod	*Euthamia*	*graminifolia*
	Grassleaf Goldenrod	*Euthamia graminifolia*	*graminifolia var.*
	Great Plains Goldenrod	*Euthamia*	*gymnospermoides*
	Spotted Joe Pye Weed	*Eutrochium*	*maculatum*
	Sweet Joe Pye Weed	*Eutrochium*	*purpureum*
	Giant Sunflower	*Helianthus*	*giganteus*
	Hairy Sunflower	*Helianthus*	*hirsutus*
	Showy Sunflower	*Helianthus*	*pauciflorus*
	Showy Sunflower	*Helianthus*	*pauciflorus subsp. pauciflorus*
	Woodland Sunflower	*Helianthus*	*strumosus*
	Jerusalem Artichoke	*Helianthus*	*tuberosus*
	Bright Sunflower	*Helianthus*	*x laetiflorus*
	Smooth Oxeye	*Heliopsis*	*helianthoides*
	Smooth Oxeye	*Heliopsis*	*helianthoides var. scabra*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Orange Hawkweed	*Hieracium*	*aurantiacum*
	Canada Hawkweed	*Hieracium*	*canadense*
	Narrowleaf Hawkweed	*Hieracium*	*umbellatum*
	Wild Lettuce	*Lactuca*	*canadensis*
	Prickly Lettuce	*Lactuca*	*serriola*
	Oxeye Daisy	*Leucanthemum*	*vulgare*
	Rough Blazing Star	*Liatris*	*aspera*
	Cylindric Blazing Star	*Liatris*	*cylindracea*
	No. Plains Blazing Star	*Liatris*	*ligulistylis*
	Shaggy Blazing Star	*Liatris*	*pilosa*
	Dotted Blazing Star	*Liatris*	*punctata*
	Prairie Blazing Star	*Liatris*	*pycnostachya*
	Great Blazing Star	*Liatris*	*pycnostachya* *var. pycnostachya*
	Northern Blazing Star	*Liatris*	*scariosa* *var. novae-angliae*
	Dense Blazing Star	*Liatris*	*spicata*
	Stiff Goldenrod	*Oligoneuron*	*rigidum*
	Golden Ragwort	*Packera*	*aurea*
	Wild Quinine	*Parthenium*	*integrifolium*
	White Rattlesnake Root	*Prenanthes*	*alba*
	Prairie Coneflower	*Ratibida*	*columnifera*
	Gray-headed Coneflower	*Ratibida*	*pinnata*
	Black-eyed Susan	*Rudbeckia*	*hirta*
	Green-headed Coneflower	*Rudbeckia*	*laciniata*
	Three-leaved Coneflower	*Rudbeckia*	*triloba*
	Rosinweed	*Silphium*	*integrifolium* *var. integrifolium*
	Compass Plant	*Silphium*	*laciniatum*
	Cup Plant	*Silphium*	*perfoliatum*
	Prairie Dock	*Silphium*	*terebinthinaceum*
	Tall Goldenrod	*Solidago*	*altissima*
	Canada Goldenrod	*Solidago*	*canadensis*
	Zigzag Goldenrod	*Solidago*	*flexicaulis*
	Giant Goldenrod	*Solidago*	*gigantea*
	Gray Goldenrod	*Solidago*	*nemoralis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Stiff Goldenrod	*Solidago*	*rigida*
	Stiff Goldenrod	*Solidago*	*rigida var. rigida*
	Spiny Sow-thistle	*Sonchus*	*asper*
	Heart-leaved Aster	*Symphyotrichum*	*cordifolium*
	Drummond's Aster	*Symphyotrichum*	*drummondii*
	White Heath Aster	*Symphyotrichum*	*ericoides*
	Glossy-leaved Aster	*Symphyotrichum*	*firmum*
	Smooth Aster	*Symphyotrichum*	*laeve*
	Geyer's Aster	*Symphyotrichum*	*laeve var. geyeri*
	Smooth Blue Aster	*Symphyotrichum*	*laeve var. laeve*
	Panicle Aster	*Symphyotrichum*	*lanceolatum*
	Side-flowering Aster	*Symphyotrichum*	*lateriflorum*
	New England Aster	*Symphyotrichum*	*novae-angliae*
	Ontario Aster	*Symphyotrichum*	*ontarionis var. ontarionis*
	Sky Blue Aster	*Symphyotrichum*	*oolentangiense*
	Redstem Aster	*Symphyotrichum*	*puniceum*
	Purplestem Aster	*Symphyotrichum*	*puniceum ssp. firmum*
	Silky Aster	*Symphyotrichum*	*sericeum*
	White Arrowleaf Aster	*Symphyotrichum*	*urophyllum*
	Tansy	*Tanacetum*	*vulgare*
	Red-seeded Dandelion	*Taraxacum*	*erythrospermum*
	Common Dandelion	*Taraxacum*	*officinale*
	Meadow Goatsbeard	*Tragopogon*	*dubius*
	Yellow Goatsbeard	*Tragopogon*	*pratensis*
BALSAMINACEAE Touch-me-not Family	Spotted Touch-me-not	*Impatiens*	*capensis*
	Pale Touch-me-not	*Impatiens*	*pallida*
BERBERIDACEAE Barberry Family	Japanese Barberry	*Berberis*	*thunbergii*
	Blue cohosh	*Caulophyllum*	*thalictroides*
	Twinleaf	*Jeffersonia*	*diphylla*
	Mayapple	*Podophyllum*	*peltatum*
BETULACEAE Birch Family	Speckled Alder	*Alnus*	*incana ssp. rugosa*
	Yellow Birch	*Betula*	*alleghaniensis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	River Birch	*Betula*	*nigra*
	Paper Birch	*Betula*	*papyrifera*
	Bog Birch	*Betula*	*pumila*
	Musclewood	*Carpinus virginiana*	*caroliniana ssp.*
	American Hazelnut	*Corylus*	*americana*
	Beaked Hazelnut	*Corylus*	*cornuta ssp. cornuta*
	Ironwood	*Ostrya*	*virginiana*
BORAGINACEAE Borage Family	Virginia Stickseed	*Hackelia*	*virginiana*
	Hoary Puccoon	*Lithospermum*	*canescens*
	Virginia Bluebells	*Mertensia*	*virginica*
	True Forget-me-not	*Myosotis*	*scorpioides*
BRASSICACEAE Mustard Family	Garlic Mustard	*Alliaria*	*petiolata*
	Smooth Rock-cress	*Arabis*	*laevigata*
	Smooth Rock-cress	*Arabis*	*laevigata var. laevigata*
	Yellow Rocket	*Barbarea*	*vulgaris*
	Hoary Alyssum	*Berteroa*	*incana*
	Cut-leaved Toothwort	*Cardamine*	*concatenata*
	Two-leaved Toothwort	*Cardamine*	*diphylla*
	Pennsylvania Bittercress	*Cardamine*	*pensylvanica*
	Dame's Rocket	*Hesperis*	*matronalis*
	Pepper Grass	*Lepidium*	*densiflorum*
CAMPANULACEAE Bellflower Family	Bristly Bellflower	*Campanula*	*cervicaria*
	Clustered Bellflower	*Campanula*	*glomerata*
	European Bellflower	*Campanula*	*rapunculoides*
	Harebell	*Campanula*	*rotundifolia*
	American Bellflower	*Campanulastrum*	*americanum*
	Cardinal Flower	*Lobelia*	*cardinalis*
	Great Blue Lobelia	*Lobelia*	*siphilitica*
CAPRIFOLIACEAE Honeysuckle Family	Bush Honeysuckle	*Diervilla*	*lonicera*
	Climbing Honeysuckle	*Lonicera*	*dioica*
	Hairy Honeysuckle	*Lonicera*	*hirsuta*
	Morrow's Honeysuckle	*Lonicera*	*morrowii*
	Tartarian Honeysuckle	*Lonicera*	*tatarica*
	Canada Elderberry	*Sambucus*	*nigra ssp. canadensis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Red Elderberry	*Sambucus*	*racemosa var. pubens*
	Snowberry	*Symphoricarpos*	*albus*
	Wolfberry	*Symphoricarpos*	*occidentalis*
	Coralberry	*Symphoricarpos*	*orbiculatus*
	Horse Gentian	*Triosteum*	*perfoliatum*
	Southern Arrowwood	*Viburnum*	*dentatum*
	Nannyberry	*Viburnum*	*lentago*
	Highbush Cranberry	*Viburnum*	*opulus var. americanum*
	European Highbush Cranberry	*Viburnum*	*opulus var. opulus*
CARYOPHYLLACEAE Pink Family	Mouse-ear Chickweed	*Cerastium*	*fontana ssp. vulgare*
	Blunt-leaved Sandwort	*Moehringia*	*lateriflora*
	Bouncing Bet	*Saponaria*	*officinalis*
	Water Chickweed	*Stellaria*	*longifolia*
	Star Chickweed	*Stellaria*	*pubera*
CELASTRACEAE Bittersweet Family	Oriental Bittersweet	*Celastrus*	*orbiculatus*
	Climbing Bittersweet	*Celastrus*	*scandens*
	Winged Burning Bush	*Euonymus*	*alatus*
	Eastern Wahoo	*Euonymus*	*atropurpureus*
	Running Strawberry Bush	*Euonymus*	*obovatus*
CHENOPODIACEAE Goosefoot Family	White Lamb's Quarters	*Chenopodium*	*album*
	Arid-land Lamb's Quarters	*Chenopodium*	*leptophyllum*
	Desert Goosefoot	*Chenopodium*	*pratericola*
	Maple-leaved Goosefoot	*Chenopodium*	*simplex*
CISTACEAE Rockrose Family	Hairy Frostweed	*Helianthemum*	*bicknellii*
CLUSIACEAE Mangosteen Family	Great St. John's Wort	*Hypericum*	*ascyron*
	Common St. John's Wort	*Hypericum*	*perforatum*
COMMELINACEAE Spiderwort Family	Bracted Spiderwort	*Tradescantia*	*bracteata*
	Bluejacket Spiderwort	*Tradescantia*	*ohiensis*
CONVOLVULACEAE Morning Glory Family	Hedge Bindweed	*Calystegia*	*sepium*
CORNACEAE Dogwood Family	Pagoda Dogwood	*Cornus*	alternifolia
	Silky Dogwood	*Cornus*	*amomum var. schuetzeana*
	Bunchberry	*Cornus*	*canadensis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Silky Dogwood	*Cornus*	*obliqua*
	Gray Dogwood	*Cornus*	*racemosa*
	Red-osier Dogwood	*Cornus*	*sericea*
	"Red-osier" Dogwood	*Cornus*	*sericea cv. baileyi*
CRASSULACEAE Orpine Family	Live Forever	*Hylotelephium*	*telephium*
CUSCUTACEAE Dodder Family	Hazel Dodder	*Cuscuta*	*coryli*
	Aster Dodder	*Cuscuta*	*glomerata*
	Common Dodder	*Cuscuta*	*gronovii*
	Bur Clover Dodder	*Cuscuta*	*pentagona*
CYPERACEAE Sedge Family	Foxtail Sedge	*Carex*	*alopecoidea*
	Turgid Sedge	*Carex*	*amphibola var. turgida*
	Common Wood Sedge	*Carex*	*blanda*
	Plains Oval Sedge	*Carex*	*brevior*
	Oval-headed Sedge	*Carex*	*cephalophora*
	Bottlebrush Sedge	*Carex*	*comosa*
	Soft Fox Sedge	*Carex*	*conjuncta*
	Curly-styled Sedge	*Carex*	*convoluta*
	Crested Sedge	*Carex*	*cristatella*
	Dewey's Sedge	*Carex*	*deweyana*
	Graceful Sedge	*Carex*	*gracillima*
	Turgid Sedge	*Carex*	*grisea*
	Hairy Sedge	*Carex*	*hirtifolia*
	Porcupine Sedge	*Carex*	*hystericina*
	Lake Sedge	*Carex*	*lacustris*
	Mead's Sedge	*Carex*	*meadii*
	Troublesome Sedge	*Carex*	*molesta*
	Long-stalked Sedge	*Carex*	*pedunculata*
	Woolly Sedge	*Carex*	*pellita*
	Pennsylvania Sedge	*Carex*	*pensylvanica*
	Necklace Sedge	*Carex*	*projecta*
	Eastern Star Sedge	*Carex*	*radiata*
	Curly-styled Wood Sedge	*Carex*	*rosea*
	Straight-styled Wood Sedge	*Carex*	*rosea var. radiate*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Bur-reed Sedge	*Carex*	*sparganioides*
	Sprengel's Sedge	*Carex*	*sprengelii*
	Awl-fruited Sedge	*Carex*	*stipata*
	Tussock Sedge	*Carex*	*stricta*
	Swan's Sedge	*Carex*	*swanii*
	Marsh Straw Sedge	*Carex*	*tenera*
	Cattail Sedge	*Carex*	*typhina*
	A species of Sedge	*Carex*	*viridula*
	Slender (hybrid) Nut-sedge	*Cyperus*	*(lupulinus, schweinitzii, or hybrid)*
	Hardstem Bulrush	*Schoenoplectus*	*acutus var. acutus*
	Dark Green Bulrush	*Scirpus*	*atrovirens*
DIAPENSIACEAE Diapensia Family	Galax	*Galax*	*urceolata*
DIOSCOREACEAE Yam Family	Wild Yam	*Dioscorea*	*villosa*
ELAEAGNACEAE Oleaster Family	Russian-olive	*Elaeagnus*	*angustifolia*
ERICACEAE Heath Family	Wintergreen	*Gaultheria*	*procumbens*
	Mountain Laurel	*Kalmia*	*latifolia*
	Flame Azalea	*Rhododendron*	*calendulaceum*
	Pinkshell Azalea	*Rhododendron*	*vaseyi*
EUPHORBIACEAE Spurge Family	Flowering Spurge	*Euphorbia*	*corollata*
	Wild Poinsettia	*Euphorbia*	*cyathophora*
	Leafy Spurge	*Euphorbia*	*esula*
FABACEAE Bean Family	Leadplant	*Amorpha*	*canescens*
	Hog Peanut	*Amphicarpaea*	*bracteata*
	Groundnut	*Apios*	*americana*
	Canada Milk Vetch	*Astragalus*	*canadensis*
	White False Wild Indigo	*Baptisia*	*alba*
	False Blue Wild Indigo	*Baptisia*	*australis*
	Plains Wild Indigo	Baptisia	bracteata
	White Wild indigo	*Baptisia*	*lactea*
	Redbud	*Cercis*	*canadensis*
	Partridge Pea	*Chamaecrista*	*fasciculata*
	Yellowwood	*Cladrastis*	*kentukea*
	White Prairie Clover	*Dalea*	*candida*
	Purple Prairie Clover	*Dalea*	*purpurea*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Canada Tick Trefoil	*Desmodium*	*canadense*
	Pointed-leaved Tick Trefoil	*Desmodium*	*glutinosum*
	Kentucky Coffeetree	*Gymnocladus*	*dioica*
	Veiny Pea	*Lathyrus*	*venosus var. intonsus*
	Round-headed Bush Clover	*Lespedeza*	*capitata*
	Wild Lupine	*Lupinus*	*perennis*
	Black Medic	*Medicago*	*lupulina*
	White Sweet Clover	*Melilotus*	*alba*
	Yellow Sweet Clover	*Melilotus*	*officinalis*
	Silvery Scurf Pea	*Pediomelum*	*argophyllum*
	Black Locust	*Robinia*	*pseudo-acacia*
	Trailing Wild Bean	*Strophostyles*	*helvola*
	Red Clover	*Trifolium*	*pratense*
	White Clover	*Trifolium*	*repens*
	American Vetch	*Vicia*	*americana*
FAGACEAE Beech Family	American Beech	*Fagus*	*grandiflora*
	White Oak	*Quercus*	*alba*
	Swamp White Oak	*Quercus*	*bicolor*
	Northern Pin Oak	*Quercus*	*ellipsoidalis*
	Bur Oak	*Quercus*	*macrocarpa*
	Northern Red Oak	*Quercus*	*rubra*
FUMARIACEAE Fumitory Family	Fumewort, Corydalis	*Corydalis*	*solida*
	Dutchman's Breeches	*Dicentra*	*cucullaria*
GENTIANACEAE Gentian Family	Yellowish Gentian	*Gentiana*	*alba*
	Closed Bottle Gentian	*Gentiana*	*andrewsii*
	Bottle Gentian	*Gentiana*	*clausa*
	Cream Gentian	*Gentiana*	*flavida*
	Downy Gentian	*Gentiana*	*puberulenta*
GERANIACEAE Geranium Family	Wild Geranium	*Geranium*	*maculatum*
GROSSULARIACEAE Saxifrage Family	Wild Black Currant	*Ribes*	*americanum*
	Prickly Gooseberry	*Ribes*	*cynosbati*
	Missouri Gooseberry	*Ribes*	*missouriense*
	Red (cultivated) Currant	*Ribes*	*rubrum*
HAMAMELIDACEAE Witch Hazel Family	Witch.Hazel	*Hamamelis*	*virginiana*
HYDRANGEACEAE Hydrangea Family	Mock Orange	*Philadelphus*	*sp.*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
HYDROPHYLLACEAE Waterleaf Family	Virginia Waterleaf	*Hydrophyllum*	*virginianum*
IRIDACEAE Iris Family	Blackberry Lily	*Belamcanda*	*chinensis*
	Yellow Flag Iris	*Iris*	*pseudacorus*
	Blue Flag Iris	*Iris*	*versicolor*
	Blue-eyed Grass	*Sisyrinchium*	*campestre*
JUGLANDACEAE Walnut Family	Bitternut Hickory	*Carya*	*cordiformis*
	Pignut Hickory	*Carya*	*glabra*
	Shagbark Hickory	*Carya*	*ovata*
	Butternut	*Juglans*	*cinerea*
	Black Walnut	*Juglans*	*nigra*
JUNCACEAE Rush Family	Path Rush	*Juncus*	*tenuis*
JUNCAGINACEAE Arrowgrass Family	Marsh Arrowgrass	*Triglochin*	*palustris*
LAMIACEAE Mint Family	Giant Hyssop	*Agastache*	*foeniculum*
	Purple Giant Hyssop	*Agastache*	*scrophulariaefolia*
	Downy Wood Mint	*Blephilia*	*ciliata*
	Hoary Wood Mint	*Blephilia*	*hirsuta*
	Creeping Charlie	*Glechoma*	*hederacea*
	Motherwort	*Leonurus*	*cardiaca*
	Water Horehound	*Lycopus*	*americanus*
	Northern Bugleweed	*Lycopus*	*uniflorus*
	Wild Mint	*Mentha*	*arvensis* *var. canadensis*
	Bee Balm	*Monarda*	*didyma*
	Wild Bergamot	*Monarda*	*fistulosa*
	Purple Bergamot	*Monarda*	*media*
	Obedient Plant	*Physostegia*	*virginiana*
	Heal All	*Prunella*	*vulgaris*
	Mountain Mint	*Pycnanthemum*	*virginianum*
	Marsh Skullcap	*Scutellaria*	*galericulata*
	Mad-dog Skullcap	*Scutellaria*	*lateriflora*
	Marsh Hedgenettle	*Stachys*	*palustris*
	Germander	*Teucrium*	*canadense*
LEMNACEAE Duckweed Family	Lesser Duckweed	*Lemna*	*minor*
LILIACEAE Lily Family	Wild Garlic	*Allium*	*canadense* *var. canadense*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Nodding Wild Onion	*Allium*	*cernuum*
	Prairie Wild Onion	*Allium*	*stellatum*
	Wild Leek	*Allium*	*tricoccum*
	Asparagus	*Asparagus*	*officinalis*
	Lily-of-the-Valley	*Convallaria*	*majalis*
	White Trout Lily	*Erythronium*	*albidum*
	Yellow Trout Lily	*Erythronium*	*americanum*
	Dwarf Trout Lily	*Erythronium*	*propullans*
	Orange Day Lily	*Hemerocallis*	*fulva*
	Yellow Day Lily	*Hemerocallis*	*lilio-asphodelus*
	Canada Lily	*Lilium*	*canadense*
	Michigan Lily	*Lilium*	*michiganense*
	Wood Lily	*Lilium*	*philadelphicum var. andinum*
	Turk's Cap Lily	*Lilium*	*superbum*
	False Solomon's Seal	*Maianthemum*	*racemosum*
	Starry False, Solomon's Seal	*Maianthemum*	*stellatum*
	Solomon's Seal	*Polygonatum*	*biflorum var. biflorum*
	Giant Solomon's Seal	*Polygonatum*	*biflorum var. commutatum*
	Blue Squill	*Scilla*	*siberica*
	Nodding Trillium	*Trillium*	*cernuum*
	Sweet Betsy Trillium	*Trillium*	*cuneatum*
	Purple Trillium	*Trillium*	*erectum*
	Drooping Trillium	*Trillium*	*flexipes*
	Large-flowered Trillium	*Trillium*	*grandiflorum*
	Yellow Trillium	*Trillium*	*luteum*
	Snow Trillium	*Trillium*	*nivale*
	Prairie Trillium	*Trillium*	*recurvatum*
	Toadshade Trillium	*Trillium*	*sessile*
	Red Trillium	*Trillium*	*sulcatum*
	Large-flowered Bellwort	*Uvularia*	*grandiflora*
	Pale Bellwort	*Uvularia*	*sessilifolia*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
LYTHRACEAE Loosestrife Family	Purple Loosestrife	*Lythrum*	*salicaria var. tomentosum*
MENISPERMACEAE Moonseed Family	Canada Moonseed	*Menispermum*	*canadense*
MORACEAE Mulberry Family	White Mulberry	*Morus*	*alba*
MYRICACEAE Wax Myrtle Family	Sweet Fern	*Comptonia*	*peregrina*
NYCTAGINACEAE Four O'Clock Family	Heart-leaved Four O'Clock	*Mirabilis*	*nyctaginea*
NYMPHAEACEAE Water Lily Family	Large Yellow Pond Lily	*Nuphar*	*lutea subsp. variegata*
OLEACEAE Olive Family	Fringe Tree	*Chionanthus*	*virginicus*
	White Ash	*Fraxinus*	*americana*
	Black Ash	*Fraxinus*	*nigra*
	Green Ash	*Fraxinus*	*pennsylvanica*
ONAGRACEAE Evening Primrose Family	Fireweed	*Chamerion*	*angustifolium*
	Enchanter's Nightshade	*Circaea*	*lutetiana ssp. canadensis*
	Northern Willowherb	*Epilobium*	*ciliatum ssp. glandulosum*
	Purple-leaved Willowherb	*Epilobium*	*coloratum*
	Evening Primrose	*Oenothera*	*biennis*
	Northern Evening Primrose	*Oenothera*	*parviflora*
	Prairie Sundrops	*Oenothera*	*pilosella*
ORCHIDACEAE Orchid Family	Yellow Lady's Slipper	*Cypripedium*	*parviflorum var. pubescens*
	Showy Lady's Slipper	*Cypripedium*	*reginae*
	Helleborine	*Epipactis*	*helleborine*
OXALIDACEAE Wood Sorrel Family	Yellow Wood Sorrel	*Oxalis*	*dillenii*
	Yellow Wood Sorrel	*Oxalis*	*stricta*
PAPAVERACEAE Poppy Family	Bloodroot	*Sanguinaria*	*canadensis*
	Wood Poppy, Celandine	*Stylophorum*	*diphyllum*
PHRYMACEAE Lopseed Family	Lopseed	*Phryma*	*leptostachya*
PLANTAGINACEAE Plantain Family	Common Plantain	*Plantago*	*major*
	Rugel's Plantain	*Plantago*	*rugelii*
POACEAE Grass Family	Quack Grass	*Agropyron*	*repens*
	Red-Top	*Agrostis*	*gigantea*
	Big Bluestem	*Andropogon*	*gerardii*
	Sideoats Grama	*Bouteloua*	*curtipendula*
	Blue Grama	*Bouteloua*	*gracilis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Smooth Brome	*Bromus*	*inermis*
	Earlyleaf Brome	*Bromus*	*latiglumis*
	Hairy Woodland Brome	*Bromus*	*pubescens*
	Bluejoint Grass	*Calamagrostis*	*canadensis*
	Orchard Grass	*Dactylis*	*glomerata*
	Western Panicgrass	*Dichanthelium*	*acuminatum*
	Scribner's Panicgrass	*Dichanthelium*	*oligosanthes ssp. scribnerianum*
	Smooth Crabgrass	*Digitaria*	*ischaemum*
	Hairy Crabgrass	*Digitaria*	*sanguinalis*
	Nodding Wild Rye	*Elymus*	*canadensis*
	Bottlebrush Grass	*Elymus*	*hystrix*
	Quackgrass	*Elymus*	*repens*
	Streambank Wild Rye	*Elymus*	*riparius*
	Hairy Cup Grass	*Eriochloa*	*villosa*
	Nodding Fescue	*Festuca*	*subverticillata*
	Tall Mannagrass	*Glyceria*	*grandis*
	Fowl Mannagrass	*Glyceria*	*striata*
	Porcupine Grass	*Hesperostipa*	*spartea*
	Rice Cutgrass	*Leersia*	*oryzoides*
	Cutgrass	*Leersia*	*virginica*
	Mexican Satin Grass	*Muhlenbergia*	*mexicana*
	Marsh Muhly Grass	*Muhlenbergia*	*racemosa*
	Switchgrass	*Panicum*	*virgatum*
	Paspalum	*Paspalum*	*setaceum*
	Reed Canary Grass	*Phalaris*	*arundinacea*
	Timothy	*Phleum*	*pratens*e
	Canada Bluegrass	*Poa*	*compressa*
	Kentucky Bluegrass	*Poa*	*pratensis*
	Little Bluestem	*Schizachyrium*	*scoparium*
	Little Bluestem	*Schizachyrium*	*scoparium var. scoparium*
	Yellow Foxtail	*Setaria*	*pumila ssp. pumila*
	Green Foxtail	*Setaria*	*viridis*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Indiangrass	*Sorghastrum*	*nutans*
	Prairie Cordgrass	*Spartina*	*pectinata*
	Porcupine grass	*Stipa*	*spartea*
POLEMONIACEAE Phlox Family	Wild Blue Phlox	*Phlox*	*divaricata ssp. laphamii*
	Garden Phlox	*Phlox*	*paniculata*
	Prairie Phlox	*Phlox*	*pilosa ssp. fulgida*
	Jacob's Ladder	*Polemonium*	*reptans*
POLYGONACEAE Smartweed Family	Fringed Black Bindweed	*Fallopia*	*cilinodis*
	Japanese Knotweed	*Fallopia*	*japonica var. japonica*
	Dotted Smartweed	*Persicaria*	*punctata*
	Arrow-leaf Tear-thumb	*Persicaria*	*sagittata*
	Curly Dock	*Rumex*	*crispus*
PORTULACACEAE Purslane Family	Virginia Spring Beauty	*Claytonia*	*virginica*
PRIMULACEAE Primrose Family	Jeweled Shooting Star	*Dodecatheon*	*amethystinum*
	Prairie Shooting Star	*Dodecatheon*	*meadia*
	Darkthroat Shooting Star	*Dodecatheon*	*pulchellum*
	Fringed Loosestrife	*Lysimachia*	*ciliata*
	Moneywort	*Lysimachia*	*nummularia*
	Whorled Loosestrife	*Lysimachia*	*quadrifolia*
	Tufted Loosestrife	*Lysimachia*	*thyrsiflora*
	Garden Loosestrife	*Lysimachia*	*vulgaris*
	Starflower	*Trientalis*	*borealis*
RANUNCULACEAE Buttercup Family	White Baneberry	*Actaea*	*pachypoda*
	Black Cohosh	*Actaea*	*podocarpa*
	Black Bugbane	*Actaea*	*racemosa*
	Red Baneberry	*Actaea*	*rubra*
	Sharp-lobed Hepatica	*Anemone*	*acutiloba*
	Round-lobed Hepatica	*Anemone*	*americana*
	Canada Anemone	*Anemone*	*canadensis*
	Thimbleweed	*Anemone*	*cylindrica*
	Wood Anemone	*Anemone*	*quinquefolia*
	Tall Thimbleweed	*Anemone*	*virginiana*
	Columbine	*Aquilegia*	*canadensis*
	Marsh Marigold	*Caltha*	*palustris*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Virgin's Bower	*Clematis*	*virginiana*
	Prairie Larkspur	*Delphinium*	*carolinianum ssp. virescens*
	False Rue Anemone	*Enemion*	*biternatum*
	Kidneyleaf Buttercup	*Ranunculus*	*abortivus*
	Tall Buttercup	*Ranunculus*	*acris*
	Hispid Buttercup	*Ranunculus*	*hispidus*
	Swamp Buttercup	*Ranunculus*	*hispidus var. nitidus*
	Hooked Crowfoot	*Ranunculus*	*recurvatus*
	Tall Meadow Rue	*Thalictrum*	*dasycarpum*
	Early Meadow Rue	*Thalictrum*	*dioicum*
	Rue Anemone	*Thalictrum*	*thalictroides*
	Veiny Meadow Rue	*Thalictrum*	*venulosum*
RHAMNACEAE Buckthorn Family	New Jersey Tea	*Ceanothus*	*americanus*
	Glossy Buckthorn	*Frangula*	*alnus*
	Common Buckthorn	*Rhamnus*	*cathartica*
ROSACEAE Rose Family	Agrimony	*Agrimonia*	*pubescens*
	Saskatoon Serviceberry	*Amelanchie*	*alnifolia*
	Downy Juneberry	*Amelanchie*	*arborea*
	Inland Juneberry	*Amelanchier*	*interior*
	Black Chokeberry	*Aronia*	*melanocarpa*
	Hawthorn	*Crataegus*	*sp.*
	Fireberry Hawthorn	*Crataegus*	*chrysocarpa*
	Dotted Hawthorn	*Crataegus*	*punctata*
	Queen-of-the-prairie	*Filipendula*	*rubra*
	Queen-of-the-meadow	*Filipendula*	*ulmaria*
	Wood Strawberry	*Fragaria*	*vesca ssp. americana*
	Common Strawberry	*Fragaria*	*virginiana*
	White Avens	*Geum*	*canadense*
	Prairie Smoke	*Geum*	*triflorum*
	Prairie Crabapple	*Malus*	*ioensis*
	Crabapple hybrid	*Malus*	*prunifolia x baccata*
	Ninebark	*Physocarpus*	*opulifolius*
	Silvery Cinquefoil	*Potentilla*	*argentea*
	Rough Cinquefoil	*Potentilla*	*norvegica*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
	Rough-fruited Cinquefoil	*Potentilla*	*recta*
	Common Cinquefoil	*Potentilla*	*simplex*
	Wild Plum	*Prunus*	*americana*
	Pin Cherry	*Prunus*	*pensylvanica*
	Black Cherry	*Prunus*	*serotina*
	Chokecherry	*Prunus*	*virginiana*
	Prickly Rose	*Rosa*	*acicularis ssp. sayi*
	Prairie Rose	*Rosa*	*arkansana*
	Smooth Wild Rose	*Rosa*	*blanda*
	Carolina Rose	*Rosa*	*carolina*
	Climbing Rose	*Rosa*	*setigera*
	Wood's Rose	*Rosa*	*woodsii var. woodsii*
	Blackberry – complex	*Rubus*	*sp.*
	Common Blackberry	*Rubus*	*allegheniensis*
	Red Raspberry	*Rubus*	*idaeus var. strigosus*
	Black Raspberry	*Rubus*	*occidentalis*
	Thimbleberry	Rubus	parviflorus
	Dwarf Blackberry	Rubus	pubescens
	Swamp Blackberry	Rubus	semisetosus
	Red Raspberry	Rubus	strigosus
	American Mountain Ash	*Sorbus*	*americana*
	European Mountain Ash	*Sorbus*	*aucuparia*
	Showy Mountain Ash	*Sorbus*	*decora*
	Meadowsweet	*Spiraea*	*alba*
RUBIACEAE Madder Family	Buttonbush	*Cephalanthus*	*occidentalis*
	Cleavers	*Galium*	*aparine*
	Rough Bedstraw	*Galium*	*asprellum*
	Northern Bedstraw	*Galium*	*boreale ssp. septentrionale*
	Shining Bedstraw	*Galium*	*concinnum*
	Small Bedstraw	*Galium*	*tinctorium var. tinctorium*
	Threepetal Bedstraw	*Galium*	*trifidum var. trifidum*
	Fragrant Bedstraw	*Galium*	*triflorum var. triflorum*
	Partridgeberry	*Mitchella*	*repens*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
RUTACEAE Rue Family	Hop Tree	*Ptelea*	*trifoliata*
	Prickly Ash	*Zanthoxylum*	*americanum*
SALICACEAE Willow Family	White Poplar	*Populus*	*alba*
	Balsam Poplar	*Populus*	*balsamifera*
	Cottonwood	*Populus*	*deltoides ssp. monilifera*
	Bigtooth Aspen	*Populus*	*grandidentata*
	Quaking Aspen	*Populus*	*tremuloides*
SALICACEAE Willow Family	Bebb Willow	*Salix*	*bebbiana*
	Pussy Willow	*Salix*	*discolor*
	Prairie Willow	*Salix*	*humilis*
SANTALACEAE Sandalwood Family	Bastard Toadflax	*Comandra*	*umbellata*
SAPINDACEAE Soapberry Family	Ohio Buckeye	*Aesculus*	*glabra var. glabra*
SAXIFRAGACEAE Saxifrage Family	False Goat's Beard	*Astilbe*	*biternata*
	Snow Plume	*Astilbe*	*japonica*
	American Alumroot	*Heuchera*	*americana*
	Foamybells	*Heucherella*	*tiarelloides*
	Swamp Saxifrage	*Micranthes*	*pensylvanica*
	Twoleaf Miterwort	*Mitella*	*diphylla*
	Grass of Parnassus	*Parnassia*	*glauca*
	Foamflower	*Tiarella*	*cordifolia*
SCROPHULARIACEAE Figwort Family	White Turtlehead	*Chelone*	*glabra*
	Red Turtlehead	*Chelone*	*obliqua ssp. speciosa*
	Grecian Foxglove	*Digitalis*	*lanata*
	Butter-and-eggs	*Linaria*	*vulgaris*
	Foxglove Beardtongue	*Penstemon*	*digitalis*
	Large Flowered Beardtongue	*Penstemon*	*grandiflorus*
	Lanceleaf Figwort	*Scrophularia*	*lanceolata*
	Common Mullein	*Verbascum*	*thapsus*
	Culver's Root	*Veronicastrum*	*virginicum*
SMILACACEAE Catbrier Family	Carrion Flower	*Smilax*	*ecirrhata*
	Smooth Carrion Flower	*Smilax*	*herbacea*
	Greenbrier	*Smilax*	*hispida*
	Common Carrion Flower	*Smilax*	*lasioneura*
	Catbrier	*Smilax*	*tamnoides*

Scientific Family Name	Common Family Name	Scientific Name	
		Genus	Species
SOLANACEAE Nightshade Family	Clammy Groundcherry	*Physalis*	*heterophylla*
	Bittersweet Nightshade	*Solanum*	*dulcamara*
	Black Nightshade	*Solanum*	*nigrum*
SPARGANIACEAE Bur-reed Family	Broadfruit Bur-Reed	*Sparganium*	*eurycarpum*
STAPHYLEACEAE Bladdernut Family	Bladdernut	*Staphylea*	*trifolia*
THYMELAEACEAE Mezereum Family	Leatherwood	*Dirca*	*palustris*
TILIACEAE Basswood Family	Basswood	*Tilia*	*americana*
TYPHACEAE Cattail Family	Narrowleaf Cattail	*Typha*	*angustifolia*
	Broadleaf Cattail	*Typha*	*latifolia*
	Hybrid Cattail	*Typha X*	*glauca*
ULMACEAE Elm Famil	Hackberry	*Celtis*	*occidentalis*
	American Elm	*Ulmus*	*americana*
	Red Elm	*Ulmus*	*rubra*
URTICACEAE Nettle Family	Wood Nettle	*Laportea*	*canadensis*
	Black-fruited Clearweed	*Pilea*	*fontana*
	Clearweed	*Pilea*	*pumila*
	Stinging Nettle	*Urtica*	*dioica ssp. gracilis*
VERBENACEAE Vervain Family	Blue Vervain	*Verbena*	*hastate*
	Hoary Vervain	*Verbena*	*stricta*
	White Vervain	*Verbena*	*urticifolia*
VIOLACEAE Violet Family	Canada Violet	*Viola*	*canadensis var. rugulosa*
	Prairie Birdfoot Violet	*Viola*	*pedatifida*
	Birdfoot Violet Hybrid	*Viola*	*pedatifida x sagittata*
	Downy Yellow Violet	*Viola*	*pubescens*
	Common Blue Violet	*Viola*	*sororia*
	Confederate Violet	*Viola*	*sororia var. priceana*
VITACEAE Grape Family	Virginia Creeper	*Parthenocissus*	*quinquefolia*
	Woodbine	*Parthenocissus*	*vitacea*
	Riverbank Grape	*Vitis*	*riparia*

Appendix III

2015 Bird Sightings at the Wildflower Garden

Sightings sorted by date first observed or, for fall migrants, date first seen during fall migration season; ranges determined by *Peterson Field Guides: Eastern Birds*. * signifies sighting in greater Theodore Wirth Park.

Y —Year-round Resident **M**—Migrant **S**—Summer (breeding) **W**—Winter (non-breeding) **R**—Rare

Date First Seen	Common Name	Scientific Name	
3/30/2015	American Robin	Turdus migratorius	Y
3/30/2015	Black-capped Chickadee	Poecile atricapillus	Y
3/30/2015	Wilson's Snipe	Gallinago delicata	M
3/30/2015	Downey Woodpecker	Dryobates pubescens	Y
3/30/2015	Golden-crowned Kinglet	Regulus satrapa	M
3/30/2015	Hooded Merganser*	Lophodytes cucullatus	S
3/30/2015	Mallard	Anas platyrhynchos	Y
3/30/2015	Northern Cardinal	Cardinalis cardinalis	Y
3/30/2015	Pileated Woodpecker	Dryocopus pileatus	Y
3/30/2015	Red-tailed Hawk	Buteo jamaicensis	Y
3/30/2015	Red-winged Blackbird	Agelaius phoeniceus	Y
3/30/2015	Wood Duck*	Aix sponsa	S
4/1/2015	Sandhill Crane*	Antigone canadensis	M
4/1/2015	White-throated Sparrow	Zonotrichia albicollis	M
4/1/2015	Wild Turkey	Meleagris gallopavo	Y
4/1/2015	Yellow-rumped Warbler	Setophaga coronata	M
4/3/2015	American Woodcock	Scolopax minor	S
4/3/2015	Great Horned Owl	Bubo virginianus	Y
4/4/2015	American Crow	Corvus brachyrhynchos	Y
4/4/2015	American Goldfinch	Spinus tristis	Y
4/4/2015	Bald Eagle	Haliaeetus leucocephalus	Y
4/4/2015	Brown Creeper	Certhia americana	W
4/4/2015	Bufflehead*	Bucephala albeola	M
4/4/2015	Canada Goose	Branta canadensis	Y
4/4/2015	Common Grackle	Quiscalus quiscula	Y
4/4/2015	Cooper's Hawk	Accipiter cooperii	Y

Y —Year-round Resident **M**—Migrant **S**—Summer (breeding) **W**—Winter (non-breeding) **R**—Rare

Date First Seen	Common Name	Scientific Name	
4/4/2015	Great Blue Heron*	Ardea herodias	S
4/4/2015	Hairy Woodpecker	Dryobates villosus	Y
4/4/2015	Northern Harrier	Circus hudsonius	S
4/4/2015	Red-bellied Woodpecker	Melanerpes carolinus	Y
4/4/2015	Ring-billed Gull*	Larus delawarensis	S
4/4/2015	Ruby-crowned Kinglet	Regulus calendula	M
4/4/2015	Song Sparrow	Melospiza melodia	S
4/4/2015	White-breasted Nuthatch	Sitta carolinensis	Y
4/8/2015	Eastern Phoebe	Sayornis phoebe	S
4/10/2015	Great Egret*	Ardea alba	S
4/11/2015	Dark-eyed Junco	Junco hyemalis	W
4/11/2015	Fox Sparrow	Passerella iliaca	M
4/11/2015	Hermit Thrush	Catharus guttatus	M
4/11/2015	Killdeer	Charadrius vociferus	S
4/11/2015	Northern Shoveler*	Spatula clypeata	S
4/11/2015	Pied-billed Grebe*	Podilymbus podiceps	S
4/11/2015	Pine Siskin	Spinus pinus	W
4/11/2015	Sharp-shinned Hawk	Accipiter striatus	Y
4/14/2015	Scarlet Tanager	Piranga olivacea	S
4/14/2015	Yellow-bellied Sapsucker	Sphyrapicus varius	S
4/16/2015	Northern Flicker	Colaptes auratus	Y
4/18/2015	Blue Jay	Cyanocitta cristata	Y
4/18/2015	House Sparrow	Passer domesticus	Y
4/18/2015	Lesser Scaup*	Aythya affinis	M
4/18/2015	Tree Swallow	Tachycineta bicolor	S
4/24/2015	Barred Owl	Strix varia	Y
4/25/2015	Belted Kingfisher*	Megaceryle alcyon	S
4/25/2015	Blue-winged Teal*	Spatula discors	S
4/25/2015	Broad-winged Hawk	Buteo platypterus	S
4/25/2015	Brown-headed Cowbird	Molothrus ater	S
4/26/2015	Swamp Sparrow	Melospiza georgiana	S

Y —Year-round Resident **M**—Migrant **S**—Summer (breeding) **W**—Winter (non-breeding) **R**—Rare

Date First Seen	Common Name	Scientific Name	
5/2/2015	Barn Swallow	Hirundo rustica	S
5/2/2015	Blue-grey Gnatcatcher	Polioptila caerulea	S
5/2/2015	Chipping Sparrow	Spizella passerina	S
5/2/2015	Nashville Warbler	Leiothlypis ruficapilla	M
5/2/2015	Northern Waterthrush	Parkesia noveboracensis	M
5/2/2015	Savannah Sparrow	Passerculus sandwichensis	S
5/2/2015	Virginia Rail*	Rallus limicola	S
5/8/2015	Baltimore Oriole	Icterus galbula	S
5/8/2015	Indigo Bunting	Passerina cyanea	S
5/9/2015	American Redstart	Setophaga ruticilla	S
5/9/2015	Blank-and-white Warbler	Mniotilta varia	M
5/9/2015	Canada Warbler	Cardellina canadensis	M
5/9/2015	Chestnut-sided Warbler	Setophaga pensylvanica	M
5/9/2015	Common Yellowthroat	Geothlypis trichas	S
5/9/2015	Eastern Kingbird	Tyrannus tyrannus	S
5/9/2015	Golden-winged Warbler	Vermivora chrysoptera	M
5/9/2015	Great Crested Flycatcher	Myiarchus crinitus	S
5/9/2015	Green Heron*	Butorides virescens	S
5/9/2015	Gray Catbird	Dumetella carolinensis	S
5/9/2015	House Wren	Troglodytes aedon	S
5/9/2015	Lincoln's Sparrow	Melospiza lincolnii	M
5/9/2015	Marsh Wren	Cistothorus palustris	S
5/9/2015	Northern Parula	Setophaga americana	M
5/9/2015	Palm Warbler	Setophaga palmarum	M
5/9/2015	Red-eyed Vireo	Vireo olivaceus	S
5/9/2015	Rose-breasted Grosbeak	Pheucticus ludovicianus	S
5/9/2015	Tennessee Warbler	Leiothlypis peregrina	M
5/9/2015	Winter Wren	Troglodytes hiemalis	M
5/9/2015	Yellow Warbler	Setophaga petechia	S

Y —Year-round Resident **M**—Migrant **S**—Summer (breeding) **W**—Winter (non-breeding) **R**—Rare

Date First Seen	Common Name	Scientific Name	
5/9/2015	Yellow-throated Vireo	Vireo flavifrons	S
5/16/2015	Blackpoll Warbler	Setophaga striata	M
5/16/2015	Least Flycatcher	Empidonax minimus	S
5/16/2015	Magnolia Warbler	Setophaga magnolia	M
5/16/2015	Olive-sided Flycatcher	Contopus cooperi	M
5/16/2015	Ovenbird	Seiurus aurocapilla	S
5/16/2015	Ruby-throated Hummingbird	Archilochus colubris	S
5/16/2015	Tern (undiferentiated)	Sterna sp.	M
5/23/2015	Cedar Waxwing	Bombycilla cedrorum	Y
5/23/2015	Eastern Wood Peewee	Contopus virens	S
5/30/2015	Warbling Vireo	Vireo gilvus	S
6/6/2015	European Starling	Sturnus vulgaris	Y
6/6/2015	Mourning Dove	Zenaida macroura	S
6/10/2015	Wood Thrush	Hylocichla mustelina	S
6/13/2015	Veery	Catharus fuscescens	M
6/27/2015	House Finch	Haemorhous mexicanus	Y
7/11/2015	Turkey Vulture	Cathartes aura	S
7/25/2015	Chimney Swift	Chaetura pelagica	S
7/27/2015	Purple Finch	Haemorhous purpureus	W
8/1/2015	Brown Thrasher	Toxostoma rufum	S
8/29/2015	Eastern Bluebird	Sialia sialis	S
8/29/2015	Wilson's Warbler	Cardellina pusilla	M
9/12/2015	Double-crested Cormorant*	Phalacrocorax auritus	S
9/12/2015	Osprey	Pandion haliaetus	S
9/12/2015	Red-shoulered Hawk	Buteo lineatus	S
9/19/2015	American Coot*	Fulica americana	S
9/19/2015	Clay-colored Sparrow	Spizella pallida	S
9/19/2015	Orange-crowned Warbler	Leiothlypis celata	M
10/24/2015	Peregrine Falcoln	Falco peregrinus	Y

Appendix IV

2012-2014 Wildflower Garden Bee Census

The associated plant for a given bee species is the plant that bee was most frequently collected on, if any. Bees not collected on one plant genus at least 50% of the time are marked "various". Bees that were only collected in bowl traps or trap nests or otherwise lack floral associations are marked "N/A".

Bee census taken by University of Minnesota Entomologists Elaine Evans and Joel Gardner

Species	Number Collected	Associated Plant (Genus or species)
Agapostemon virescens (Fabricius)	8	various
Andrena aliciae Robertson	6	*Helianthus*
Andrena carlini Cockerell	20	various
Andrena chromotricha Cockerell	7	*Solidago*
Andrena crataegi Robertson	2	various
Andrena distans Provancher	2	*Geranium maculatum*
Andrena dunningi Cockerell	4	N/A
Andrena fragilis Smith	1	*Cornus*
Andrena geranii Robertson	2	*Hydrophyllum virginianum*
Andrena helianthi Robertson	6	*Helianthus*
Andrena hippotes Robertson	1	*Cornus racemosa*
Andrena hirticincta Provancher	6	*Solidago*
Andrena integra Smith	1	*Cornus*
Andrena milwaukeensis Graenicher	1	*Ribes missouriense*
Andrena nasonii Robertson	1	N/A
Andrena nubecula Smith	1	*Solidago rigida*
Andrena peckhami Cockerell	8	various
Andrena rugosa Robertson	2	various
Andrena vicina Smith	11	various
Andrena virginiana Mitchell	3	*Ceanothus americanus*
Andrena wilkella Kirby	9	various
Andrena ziziae Robertson	6	*Zizia aurea*
Anthidium manicatum (Linnaeus)	1	N/A
Anthidium oblongatum (Illiger)	1	*Strophostyles helvola*
Anthophora terminalis Cresson	4	various
Augochlora pura (Say)	16	various
Augochlorella aurata (Smith)	33	various
Augochloropsis metallica (Fabricius)	8	various
Bombus affinis Cresson	2	various
Bombus auricomus (Robertson)	165	various

Species	Number Collected	Associated Plant (Genus or species)
Bombus bimaculatus Cresson	95	various
Bombus citrinus (Smith)	30	various
Bombus fervidus (Fabricius)	15	various
Bombus griseocollis (De Geer)	98	various
Bombus impatiens Cresson	233	various
Bombus pensylvanicus (De Geer)	13	various
Bombus rufocinctus Cresson	3	various
Bombus vagans Smith	34	various
Calliopsis andreniformis Smith	15	*Amorpha canescens*
Ceratina calcarata Robertson	35	various
Ceratina dupla Say	6	various
Ceratina mikmaqi Rehan and Sheffield	22	various
Dufourea monardae (Viereck)	21	*Monarda fistulosa*
Halictus confusus Smith	3	*Taraxacum officinale*
Halictus ligatus Say	10	various
Halictus rubicundus (Christ)	5	various
Heriades carinatus Cresson	18	*Monarda fistulosa*
Holcopasites calliopsidis (Linsley)	1	*Rudbeckia hirta*
Hylaeus mesillae (Cockerell)	1	*Ceanothus americanus*
Hylaeus sp. (affinis group)	50	various
Hylaeus sp. (annulatus/affinis group)	1	*Ceanothus americanus*
Lasioglossum anomalum (Robertson)	7	various
Lasioglossum cattellae (Ellis)	15	various
Lasioglossum cf. abanci	2	N/A
Lasioglossum coeruleum (Robertson)	1	*Solidago flexicaulis*
Lasioglossum coriaceum (Smith)	3	*Thalictrum dasycarpum*
Lasioglossum cressonii (Robertson)	6	*Thalictrum dasycarpum*
Lasioglossum foxii (Robertson)	2	various
Lasioglossum heterognathum (Mitchell)	23	*Filipendula ulmaria*
Lasioglossum hitchensi Gibbs	2	*Trifolium pratense*
Lasioglossum illinoense (Robertson)	2	various
Lasioglossum imitatum (Walker)	3	various
Lasioglossum laevissimum (Smith)	1	*Solidago flexicaulis*
Lasioglossum lineatulum (Crawford)	5	*Filipendula ulmaria*
Lasioglossum macoupinense (Robertson)	23	various
Lasioglossum nigroviride (Graenicher)	2	various
Lasioglossum paradmirandum (Knerer & Atwood)	4	*Amorpha canescens*
Lasioglossum sp.	1	*Campanula rapunculoides*
Lasioglossum sp. (atwoodi?)	1	*Enemion biternatum*

Species	Number Collected	Associated Plant (Genus or species)
Lasioglossum sp. (viridatum group)	2	*Campanula rotundifolia*
Lasioglossum subviridatum (Cockerell)	1	N/A
Lasioglossum versans (Lovell)	4	various
Lasioglossum viridatum (Lovell)	1	*Symphyotrichum ericoides*
Lasioglossum weemsi (Mitchell)	1	*Enemion biternatum*
Lasioglossum zephyrum (Smith)	10	various
Macropis nuda (Provancher)	2	*Lysimachia ciliata*
Megachile campanulae (Robertson)	12	*Campanula*
Megachile frigida Smith	6	*Campanula*
Megachile gemula Cresson	6	various
Megachile inermis Provancher	4	various
Megachile latimanus Say	10	various
Megachile pugnata Say	2	*Cirsium*
Megachile relativa Cresson	5	various
Megachile rotundata (Fabricius)	1	*Helianthus*
Megachile texana Cresson	2	*Apios americana*
Melissodes agilis Cresson	1	*Helianthus*
Melissodes desponsa Smith	21	*Cirsium*
Melissodes druriella (Kirby)	3	various
Melissodes subillata LaBerge	2	various
Melissodes trinodis Robertson	17	various
Nomada cressonii Robertson	1	N/A
Nomada lehighensis Cockerell	1	*Prunus americana*
Nomada luteoloides Robertson	1	*Direa palustris*
Nomada sp. (bidentate)	12	various
Nomada sp. (illinoensis/sayi group)	3	various
Osmia atriventris Cresson	1	*Penstemon digitalis*
Osmia lignaria Say	1	*Erythronium albidum*
Osmia pumila Cresson	5	N/A
Pseudopanurgus andrenoides (Smith)	5	various
Pseudopanurgus labrosus (Robertson)	8	various
Pseudopanurgus rudbeckiae (Robertson)	1	*Rudbeckia*
Sphecodes sp.	2	*Solidago rigida*
Svastra obliqua (Say)	1	N/A

Appendix V

Integrated Pest Management Procedures

Policy IX-B-9
Revised: July 24, 2008

Integrated Pest Management (IPM) is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment and non-target organisms. In most cases, IPM is directed at controlling pests that have an economic impact on commercial crops; however, in the instance of mosquito control, IPM is used to control nuisance and potentially dangerous mosquito populations. The guiding principles, management techniques and desired outcomes are similar in all cases.

A number of concepts are vital to the development of a specific IPM policy goal:

1. Integrated pest management is not a predetermined set of practices but a gradual stepwise process for improving pest management.

2. Integrated pest management programs use a combination of approaches, incorporating the judicious application of ecological principles, management techniques, cultural and biological controls and chemical methods to keep pests below levels where they cause economic damage. (Laws of MN, 1989)

3. Implementing an integrated pest management program requires a thorough understanding of pests, their life histories, their environmental requirements and natural enemies as well as establishment of a regular, systematic program for surveying pests, their damage and/or other evidence of their presence. When treatments are necessary, the least toxic and most target-specific plant protectants are chosen.

The four basic principles of IPM used in designing a specific program are:

1. Know your key pests
2. Plan ahead
3. Scout regularly
4. Implement management practices

Selection of Management Strategies

Selection of Management Strategies pest management techniques include:

- 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 possible, selecting plant protectants with a lower toxicity to humans or non-target organisms

The criteria used for selecting management options include:

- Minimization of health risk to employees and users
- Minimization of environmental impacts (e.g. water quality, non-target organisms)
- Risk reduction (losses to pests, or nuisance/ threshold level)
- Ease with which the technique can be incorporated into existing management approaches
- Cost-effectiveness of the management technique

Posting of Plant Protectant Applications

The Minneapolis Park and Recreation Board complies with the city of Minneapolis ordinance regarding pesticide application posting.

At MPRB Golf Courses, posting of applications occurs at the clubhouse check-in so that golfers can make the decision to proceed with their round of golf. Additional posting will be done on the course at the first area treated.

Record Keeping

MPRB staff will produce and maintain the necessary records of all pest management activities as required by the Minnesota Department of Agriculture. Yearly paper records will be kept by the District or Golf Course office. Electronic records of all applications will begin in the calendar year 2008.

Natural Areas/Wildlife Habitat, Out of Play/ Perimeter Play

On all out of play/perimeter areas, the Minneapolis Park and Recreation Board has set a threshold level of 100% for turf disease pressure, 100% for broadleaf and grassy weeds, and 100% for insect pressure. 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.

Natural Lakes and Ponds, Artificial Ponds, and Creeks

On all natural/artificial lakes, ponds and creeks, the Minneapolis Park and Recreation Board has set a threshold of 100% for aquatic weeds. No chemical applications will be made to these aquatic areas. The exception to this rule will be the case of exotic species whose control is required by state law. In these instances, control measures used will be determined and directed by the Environmental Operations Section.

Garden Integrated Pest Management

Goal: *To develop and implement environmentally sound, integrated pest management for the Minneapolis Park and Recreation Board display gardens and neighborhood park and parkway gardens.*

The Minneapolis Park and Recreation Board and staff members recognize the need to develop and use strategies that effectively manage pests in gardens and to manage those pests in an environmentally sound manner. Therefore, plant selection and design plays a major role in Integrated Pest Management by putting the right plant in the right place. Careful selection of plant species or cultivars that show resistance to pests will eliminate the need for plant protectant applications.

Within the Minneapolis Park system, both large display gardens and smaller landscape gardens can be enjoyed by the public. Climate bears 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. Staff gardeners monitor the gardens for pests and response to these pests is based on the time of the season, existing weather conditions and the presence or absence of natural predators.

Plant Selection for Environmental Design

Garden plants are selected and/or replaced in order to provide the most disease and insect resistant plantings, thereby reducing plant protectant applications.

Disease Control in Gardens

During wet, humid seasons, diseases can be problematic. However, the incidence of disease issues will vary at the gardens depending on the air flow. Regular monitoring of the gardens is critical in order to locate and handle disease issues promptly. Pruning to increase air flow and adjusting mulch levels are the first control methods. Then, if necessary, biocontrols or low toxicity plant protectants will be applied only a spot spray basis. It is critical to keep updated about disease pests and be ready to respond with the current recommendations from the University of Minnesota and the Minnesota Department of Agriculture.

Insect Control in Gardens

Insect problems can vary from season to season. Gardeners will regularly monitor their gardens for insect pests. Release of predatory insects into an outdoor garden is rarely successful as they naturally disperse from the site. All attempts will be made to control insect pests using biocontrols and lower toxicity plant protectants. Global climate change is causing the introduction of more insect problems into our state that were previously found further south. It is critical that our 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.

Weed Control in Gardens, Shrub Beds and Around Trees

In all gardens, trees and shrub beds, the Minneapolis Park and Recreation Board has set a threshold of 100% control of weeds. Weed Control in gardens and shrub beds is primarily handled through mechanical or manual means. However, due to global climate change, increasing populations of tap-rooted and other perennial weeds are being transported into our gardens by birds and other means. Pulling or digging of these weeds is usually not successful. Spot spraying of these tap-rooted weeds with a low toxicity herbicide will help prevent flowering, seeding and further dispersal of these pest weeds. Currently the most critical tap-rooted invasive weeds are Canada Thistle and Mulberry. Appropriate mulching of gardens, trees and shrub beds will help decrease the number of pest weeds. If control of annual weeds in pathway or mulched areas is required, the proper pre or post emergent low toxicity herbicide will be applied on a spot spray basis. Posting of any plant protectant applications occurs at all garden or shrub bed sites prior to the application.

Display Gardens Turf Areas

The Minneapolis Park and Recreation Board has set a threshold of 20% for broadleaf and/or grassy weeds in turf areas adjoining display gardens. 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. A threshold of 20% for insect and diseases will apply to these turf areas. When that threshold has been reached, spot spray applications with the appropriate plant protectant will be applied.

General Parks and Parkways Integrated Pest Management

Goal: *To develop and implement environmentally sound, integrated pest management for the Minneapolis Park and Recreation Board's general park and parkway areas.*

The Minneapolis Park and Recreation Board 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.

The Minneapolis Park and Recreation Board has set a threshold of 50% for broadleaf and/or grassy weeds in turf areas. 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. 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. 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. Posting of the park site (according to City of Minneapolis posting regulations) to be treated must occur just prior to application and if this park includes a recreation center or building, posting of a sign must occur at the entrance doors.

Natural Lakes and Ponds, Artificial Ponds, and Creeks

On all natural/artificial lakes, ponds and creeks, the Minneapolis Park and Recreation Board has set a threshold of 100% for aquatic weeds. No chemical applications will be made to these aquatic areas. The exception to this rule will be the case of exotic species whose control is required by state law. In these instances, control measures used will be determined and directed by the Environmental Operations Section.

Future Pest Control Issues

The Minneapolis Park and Recreation Board recognizes that with changes in climate, the environment will be subject to many changes, including the arrival of additional pests within our park system. Following IPM principles, the MPRB trained staff will determine the best management of new pests.

The Minneapolis Park and Recreation Board will provide the necessary update 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.

Pesticide use

1. Practices and procedures

In keeping with the IPM procedures stated above, great care will be taken when making decisions regarding the use of pesticides in the Wildflower Garden.

Weed species—When effective and feasible, manual control methods will be used to control herbaceous and woody plants without the use of chemical pesticides. When control and/pr eradication of a given pest plant is not possible through the use of manual methods alone, pesticides will be considered as another tool to use. When pesticides are used to control weed plants staff will post this information according to Minneapolis Park and Recreation Board procedure.

Pest insect species— Insects have not been directly treated with insecticides at the Wildflower Garden in known history. If an outbreak occurs that is severe enough to warrant the use of a chemical insecticide and all other options, including biological control, have been exhausted, Garden staff will refer to recommendations given be the University of Minnesota and the Minnesota Department of Agriculture.

2. MSDS booklet

An up-to-date Materials and Safety Data Sheet booklet is kept in the Garden's Shed. An additional copy is stored in the Visitor's Shelter for reference. The MSDS booklet contains information related to the chemical nature and safety hazards of each individual pesticide used in the Wildflower Garden.

3. Record keeping (PF Manager)

All pesticide applications are recorded electronically. This information is kept up-to-date by Garden staff.

Appendix VI

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"A sympathetic interest in nature is a never failing source of delight."

Eloise Butler

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