

The image shows a close-up of several light purple flowers with yellow centers, growing from a bed of brown, dried leaves. The flowers are the central focus, with some in sharp focus and others slightly blurred. The background is a dense layer of fallen leaves, creating a textured, natural setting. The text is overlaid on a dark, semi-transparent background that follows the shape of the flowers and leaves.

**Milwaukee County Parks
Natural Areas Strategic Plan
2024-2033**

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Blue-Spotted Salamanders

Executive Summary

**“Much that once was, is lost, for none now live
who remember it.” - JRR Tolkien**

So could begin the narrative of Milwaukee County’s natural landscape past to present, where the steely trunks of an expansive beech forest filled with the deafening dawn chorus of songbirds once guarded the shores of an inland sea; where a great estuary, teeming with waterfowl, gathered the waters of the Kinnickinnic, Menomonee, and Milwaukee rivers and slowly released them into the great lake Michi gami; where oak woodlands blending into savannas and wisps of prairie radiated into the county’s southwest corner; where tamarack bogs with their kaleidoscope of orchids maintained southern strongholds in the county’s entrancing wetlands and the siren song of the hermit thrush lured in the inquisitive soul.

Sadly, time and Manifest Destiny have not been kind to the natural world that flourished prior to European settlement in Milwaukee County. Researchers’ best estimates detail the loss of 95% of Milwaukee County’s historic natural landscape, and along with it went 37% of the native plants (including 84% of the orchids), 39% of the birds, and 44% of the reptiles and amphibians that would have called Milwaukee County home when Europeans first arrived on the western shores of Lake Michigan (Waller 2008). Most of the historic natural areas were cleared, plowed, and/or drained for agricultural land, and the few unprotected sites that remain today are rapidly being cleared for development.



Brome-Like Sedge

Devastating historical ecological losses, no doubt, but hope still remains. A fledgling Parks Department began acquiring greenspace in 1907 and over time it has gathered approximately 10,000-acres of the county's remnant natural history. These ecological lifeboats, ranging in size from 1-acre upwards to 487-acres and everything in between, crisscross the park system today. Each remaining natural area is essentially a memory of the past that has been forged by countless biological connections, glaciation, climate, and human interactions.

Though the park system is over a century old, it has only had a Natural Areas Program for the past two decades. The Program's origins lie in the public's push to make the county develop a conservation ethic that undertook management of the natural areas within the park system. Thanks to those citizens' passion for conservation, today's Natural Areas Program and its successes continue to grow exponentially.

"I have purposely presented the land ethic as a product of social evolution because nothing so important as an ethic is ever 'written'... It evolves in the minds of a thinking community."
-Aldo Leopold



Milwaukee County Parks
Forked Aster Trail

Though land management has always been the priority, essential scientific research has recently allowed Natural Areas staff to begin a conversation with each natural area. Any meaningful relationship requires taking the time to get to know each other and it is no different when getting to know a natural area's challenges and strengths. This scientific research has allowed staff to inventory and interpret a landscape of ecological resilience. At this point in the conversation, we know that 2,335 native species of plants, fungi, and wildlife still reside within the park system's natural areas, and they are accompanied by an additional 345 non-native species from other parts of the world.

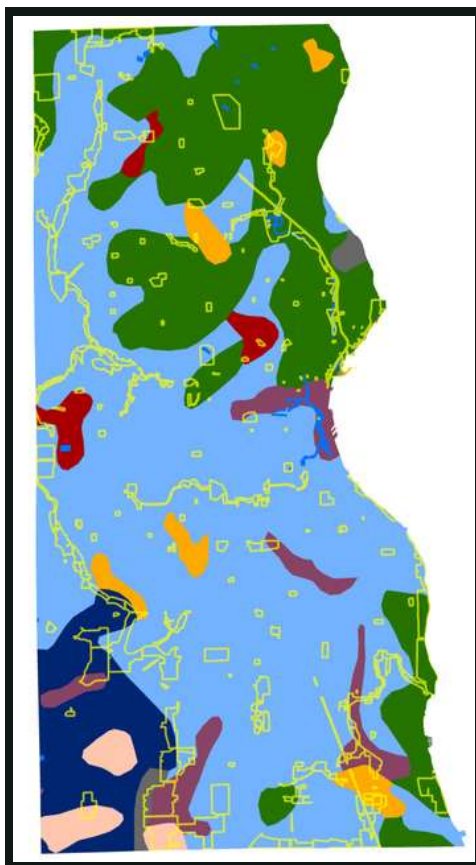
Some of these native species have hung-on, some have recolonized former habitat, and others are southern pioneers pushing north with climate change. However, the data is still incomplete, especially for fungi and invertebrates, and it is very likely that thousands more species reside within the park system's natural areas.

While Parks has numerous ecological restoration and management plans guiding scientific research and restoration, it has never had a formal overarching Natural Areas Management Strategic Plan. It is our hope that this initial plan will provide a broad-scale approach and a guiding philosophy for Parks natural areas preservation and management efforts for the next decade, but it should complement, not replace, detailed site-specific ecological restoration plans.

Land Acknowledgement Statement

We respectfully acknowledge that the land and waterways encompassed by the Milwaukee County Park System are on the ancestral homeland of Indigenous People, including the Potawatomi, Ho-Chunk, and Menominee. We recognize that they were forcefully removed from their lands along the shores of Michigami, North America's largest system of freshwater lakes, where the Milwaukee, Menomonee, and Kinnickinnic rivers meet and where the people of Wisconsin's sovereign nations remain present. In honoring the ancestral owners and stewards of these lands and waterways, we strive to be respectful stewards.

Milwaukee County Pre-European Settlement Vegetation



Natural Areas Program - Background

The current iteration of the Natural Areas Program began in 2008 when Parks decided to hit the reset button on how it was managing natural areas. Creative collaborations, significant increases in external and internal funding, creation of a robust scientific research program, and refinement of land management techniques using the latest technology have allowed the Natural Areas Program to become one of the most respected and successful programs in the region over the last 15 years. During that time, the Program has grown from one full-time employee to five full-time staff and typically five seasonal employees each field season. While the Program had three partner organizations in 2008, that number has increased to 88 partner organizations as of 2024. The Program has also grown from a handful of dedicated volunteers who would donate a few hundred hours annually into a volunteer program where over 2,000 volunteers donate over 15,000 hours annually toward land management and scientific research projects furthering the Mission and Vision of the Parks Department.

Parks Mission

Our mission is to steward a thriving park system that positively impacts every Milwaukee County Park Visitor.

Parks Vision

To foster equitable connections through our land and community, heighten the quality of life in the county, and lead as a model park system.

Natural Areas Program Activities

The Natural Areas Program undertakes many of the typical activities common throughout the ecological restoration field as well as some that are unique to our program area. Management includes: community engagement, early professional mentoring, ecological restoration and management planning, environmental impact assessments, funding acquisition and development, partnership development, policy development and enforcement, invasive species management, native seed collection and propagation, woodland restoration, prairie restoration, pollinator garden installation, reforestation, wetland restoration, science-based natural resource inventories, wildlife habitat management, nuisance wildlife management, wildlife mortality mitigation, and pond/lagoon management.



Invasives Control



Plant Mapping



Wildlife Monitoring

Overview of the Natural Areas within the Park System

Plant Diversity

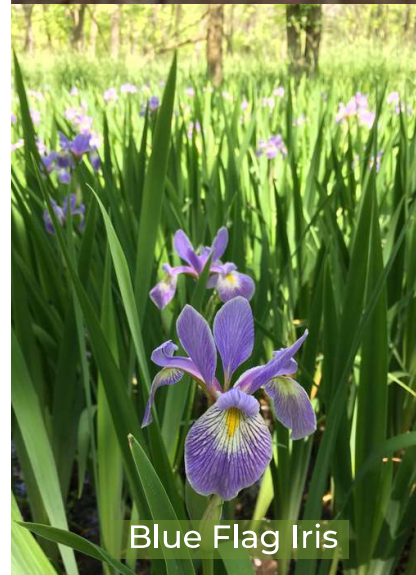
The Natural Areas Program uses the WDNR's "natural communities" descriptions to classify natural areas systemwide, and it has added an additional "novel" plant community to that list. To date, the Natural Areas Program has coarsely mapped the 15 plant communities (Appendix 1) found within the park system and updates the plant community ArcGIS-layer digital database on a finer scale when ecological restoration and management plans are developed for specific sites. Natural Areas staff have also started the ambitious task of mapping the park system's rare plant populations utilizing Arc Field Maps software to gather detailed information on population size for each locally rare native plant species. Though this is a slow process, it is also an essential one because it allows Natural Areas staff to better protect rare plant populations and collect seed to reestablish or bolster other populations during ecological restoration activities. Current vegetative surveys along with historic (dating back to 1975) and on-going SEWRPC plant surveys have documented 849 species of native plants and 345 species of non-native plants within the park system's natural areas. Of the 345 non-native species, 110 are considered by Natural Areas Program staff to be ecologically invasive and are priorities for control efforts.

Wildlife Diversity

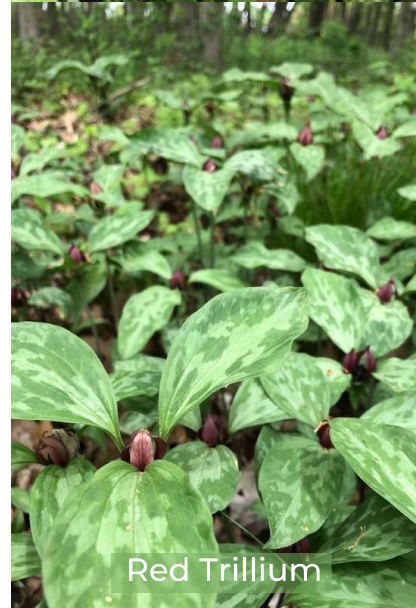
Wildlife surveys, on the other hand, are relatively new (2008-present) within the park system's natural areas. A great deal has been accomplished in a short time, but a great deal more still needs to be done in order to have a clearer picture of baseline wildlife populations. Native species currently documented include 35 species of mammals, 352 species of birds (breeding and/or migratory), 23 species of herptiles (reptiles and amphibians), 6 species of crayfish, 21 species of fish, 82 species of odonates (dragonflies and damselflies), 72 species of butterflies, 13 species of bumble bees, and 638 other species of invertebrates for a total of 1,242 native wildlife species.



Pussy Willow



Blue Flag Iris



Red Trillium



River Otter



Tiger Salamander



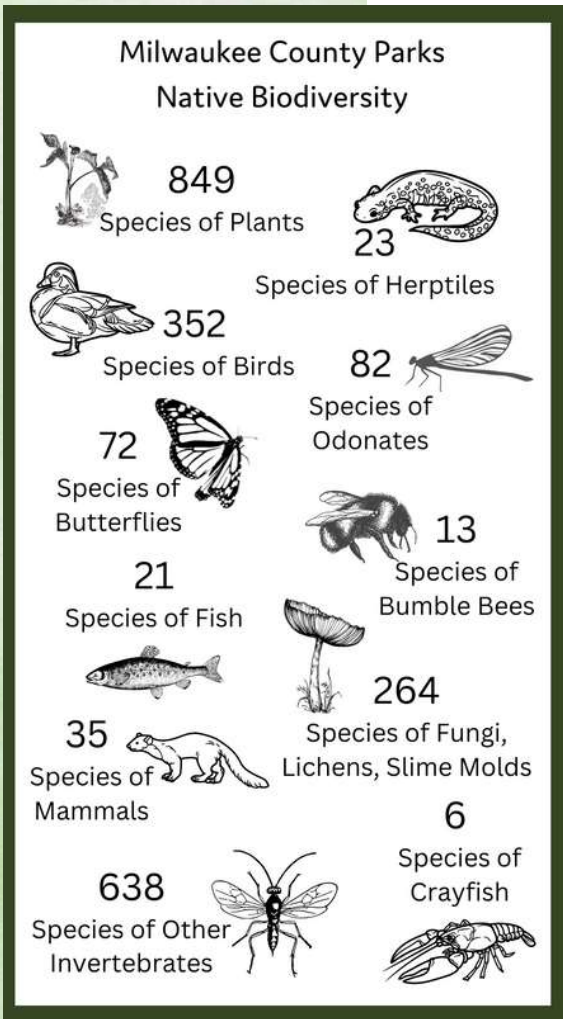
Pelecinid Wasp



Coyote

In general, wildlife species are either generalists persisting in fragmented habitats or specialists that inhabit specific plant communities. Given the historic loss of natural habitat in Milwaukee County, the majority of the remaining wildlife species would likely be considered generalist species. However, research is showing that a better term for these species may be urban adapted wildlife because many populations aren't only persisting but expanding in urban settings, and not just in Milwaukee County but also in larger urban areas across the world. Urban adaptations can include changes in physiology, feeding habits, phenology, vocalizations, daily activity times, and habitat preferences.

Natural Areas staff have documented wildlife that seem to be developing new plant associations within the park system's natural areas. One example would be the Wood Thrush, which is a songbird that is rapidly declining across its North American breeding range. Traditional thought is that wood thrushes need large blocks of unfragmented woodlands to breed successfully. Breeding bird surveys conducted by Natural Areas Program staff have recently documented wood thrushes successfully breeding in fragmented woodlands across the park system in dense woodland understories of common buckthorn (invasive species). Similar new plant/wildlife associations can be seen with the federally endangered Rusty Patched Bumble Bees using numerous invasive plant species as a nectar source. This certainly makes ecological restoration more complex when balancing invasive species removal with rare wildlife species preservation.



To keep every cog and wheel is the first precaution of intelligent tinkering.”
-Aldo Leopold

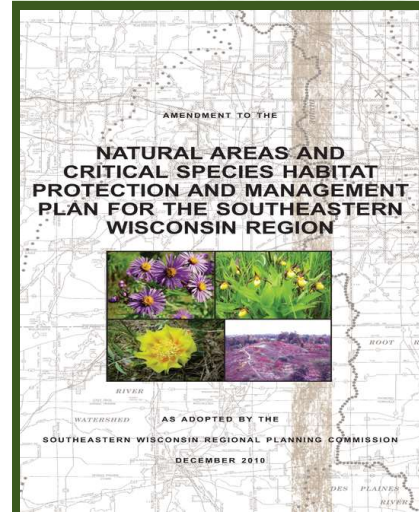
Special Designations of Natural Areas within the Park System

Given the resilience of the park system's natural areas coupled with on-going efforts by staff, partner organizations, and volunteers to actively restore the ecology of these sites, the majority of the natural areas within the park system have warranted special designations by external conservation organizations. Below is a current list of designations:

- **Important Bird Area** (WI Bird Conservation Partnership)- Defined as: “An Important Bird Area (IBA) is a site that provides critical habitat for one or more species of birds at any stage in the bird’s lifecycle (breeding, migratory, or wintering) ... Sites may vary in size, but distinguishable from the surrounding landscape in habitat, character, or ornithological important;” (Steele, 2007). All natural areas in the park system met this designation in 2019 for their essential role in providing habitat for migratory birds in the western Lake Michigan migratory bird corridor.
- **Primary and Secondary Environmental Corridors** (SE WI Regional Planning Commission) – Defined as: “Primary environmental corridors are concentrations of significant natural resources at least 400 acres in area, at least two miles in length, and at least 200 feet in width. Secondary environmental corridors are concentrations of significant natural resources at least 100 acres in area and at least one mile in length.” (SEWRPC, 1977). Currently, all major parkways (Kinnickinnic River, Little Menomonee River, Menomonee River, Root River, Dale Creek, Honey Creek, Oak Creek, and Underwood Creek) and lake front parks (Doctors Park, Big Bay Park, Back Bay Park, Lake Park, Juneau Park, Bay View Park, Sheridan Park, Warnimont Park, Grant Park, and Bender Park) and some of the larger interior parks (Falk Park, Barloga Woods, Franklin Park, Jackson Park, and Whitnall Park) have this designation.
- **Natural Area of Local or Regional Significance** (SE WI Regional Planning Commission) – Defined as: “Natural areas are defined as tracts of land or water so little modified by human activity, or which have sufficiently recovered from the effects of such activity, that they contain intact native plant and animal communities believed to be representative of the pre-European-settlement landscape.” (SEWRPC, 2010). Currently, 35 parks and sections of parkways have this designation. As ecological restoration activities are undertaken and completed, more park system natural areas could be eligible for this designation in the future.
- **Critical Species Habitat** (SE WI Regional Planning Commission) – Defined as: “Critical species habitats are defined as additional tracts of land or water which support endangered, threatened, or rare plant or animal species” (SEWRPC, 2010). Currently, 21 parks and sections of parkways have this designation. As ecological restoration activities are undertaken and completed, more park system natural areas could be eligible for this designation in the future.



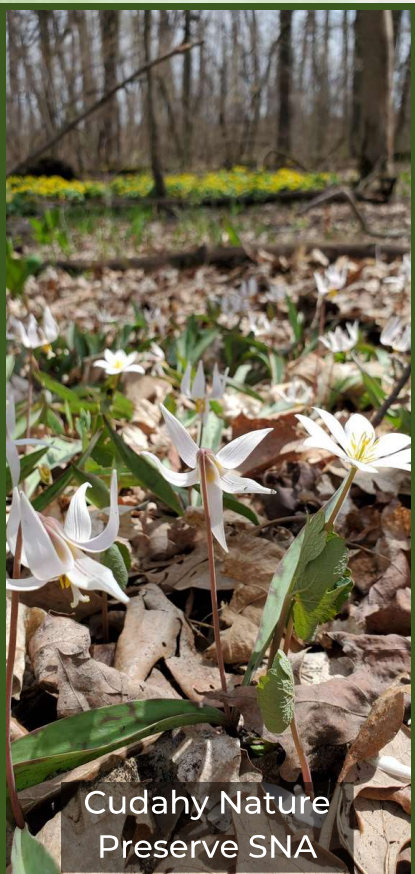
Twinleaf - WI Special Concern Species



American Bumble Bee - WI Special Concern Species



Warnimont
Fens SNA



Cudahy Nature
Preserve SNA

- **Isolated Natural Area** (SE WI Regional Planning Commission) – Defined as: “Isolated natural resource areas are those remaining significant natural resources at least five acres in area and at least 200 feet in width.” (SEWRPC, 2010). Currently, two sites (County Grounds Park and Riverton Meadows Park) have this designation. As ecological restoration activities are undertaken and completed, more park system natural areas could be eligible for this designation in the future.
- **Wetland Gems®** (WI Wetland Association) – Defined as: “Wetland Gems® are high-quality habitats that collectively represent the wetland riches—marshes, swamps, bogs, fens, and more—that historically made up nearly a quarter of Wisconsin’s landscape. These natural treasures provide critical natural benefits for our communities, including flood abatement, clean water, and wildlife habitat—and they boost our economy.” (WI Wetland Association, 2010). Currently the lower Root River Floodplain Forest (Root River Parkway south of Oakwood Road) and the Warnimont Park Fens have this designation.
- **State Natural Area** (WDNR) – Defined as: “State natural areas (SNAs) protect outstanding examples of Wisconsin’s native landscape of natural communities, significant geological formations and archeological sites...Wisconsin’s natural areas are valuable for research and educational use, the preservation of genetic and biological diversity and for providing benchmarks for determining the impact of use on managed lands. They also provide some of the last refuges for rare plants and animals.” (WDNR, 1951). Currently, Cudahy Nature Preserve, Franklin Savanna, and Warnimont Fens have this designation.

Current Threats to Ecological Resilience

The park system’s natural areas remain diverse, however historic ecological damage and emerging threats continue to impact Milwaukee County’s long-term ecological resilience. The ecological threats listed below are at the core of the existing challenges that need to be resolved, and they set the track for the management goals developed within this document.

Ecological Challenges Impacting the Vitality of the Park System's Natural Areas

- **Loss of Wildlife Habitat and Fragmentation of Remaining Natural Areas:** Since European settlement Milwaukee County has lost an estimated 95% of its natural landscape. Initially this was due to land clearance (clearcutting forest, draining wetlands, and plowing prairies) for agricultural production, but as agriculture declined in Milwaukee County land development has played a more prominent role in the continued loss and isolation of the remaining natural areas. Disconnected natural areas struggle with the natural transfer of plant and wildlife genetics, and wildlife populations with limited mobility become isolated and more vulnerable to the impacts of disease and negative environmental events. While the historical design of the park system's "Emerald Necklace" (Whitnall 1923) has preserved moderate to good connectivity along the major river and stream corridors, many smaller natural areas remain isolated from the larger corridors or are currently only connected through privately owned natural areas that could be developed in the future.
- **Altered Natural Processes:** Fire suppression, disconnecting rivers and streams from their floodplains, modifying hydrology by draining wetlands, loss of apex predators, and polluted stormwater run-off from impervious surfaces have all altered ecological functions within natural areas.
- **Introduction and Spread of Invasive Species:** Milwaukee County provides all the necessary introduction points for non-native invasive species (plants and animals) to establish and thrive due to international points of entry (Port of Milwaukee and Mitchell International Airport), a multi-state highway system that funnels southern invasives species north from Illinois through poorly timed mowing that spreads invasive grassland species, unclean construction equipment from outside the region that introduces invasive species through soil and vegetative material transfer, and a large urban and suburban population that has introduced countless invasive species through landscaping private properties with plant species from across the globe.



Common Buckthorn



Lesser Celandine



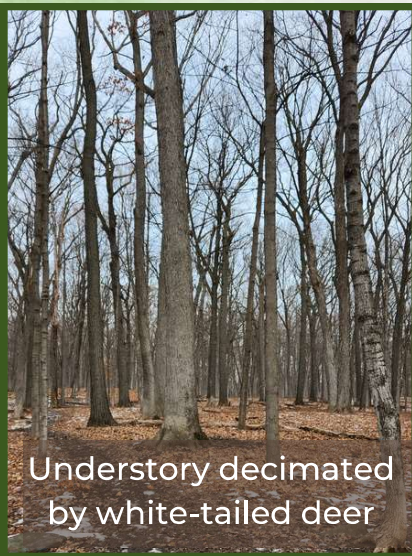
Flowering Rush



Rose-Breasted Grosbeak Nest



Large-Flowered Trillium



Understory decimated by white-tailed deer

White-tailed deer are ecosystem changers when their natural predators (wolves, cougars, bears) are absent. Unimpeded browsing rapidly eliminates habitat for native pollinators, nesting birds, and wildflowers.

- White-tailed Deer Population Exceeding the Carrying Capacity of Available Habitat:** Currently the only controls for deer on Milwaukee County parkland are predation of young deer by coyotes, vehicle strikes, disease, sharpshooters, and poaching. Research shows that to maintain robust native plant diversity, deer populations need to be at a carrying capacity of 10 deer per square mile of habitat (Anderson, 1994). The best estimate (based on browse surveys, vehicle collision reports, and deer killed through hunting on private property) for current deer populations in Milwaukee County is that there are 20-30 deer per square mile of habitat. Browse surveys conducted by Parks Natural Areas staff and the WI DNR across 5,000 acres of woodlands within the park system found “High” to “Excessive” browse levels within approximately 90% of the woodlands. Park system woodlands are no longer recruiting young trees, native plant populations have declined significantly, and wildlife that historically lived in the forest understory (shrub layer) have been virtually eliminated from the park system as breeding species. By eliminating native plant competition, deer have also opened the door to the spread of invasive species, which typically are not palatable.
- Nitrogen Deposition and Phosphorus Enrichment:** Though Milwaukee County has not undertaken research to monitor these degradations, the WI DNR states in its State Natural Areas Plan (WI DNR, 2021) that “Over the past two centuries, atmospheric deposition of reactive nitrogen in Wisconsin has increased 10 to 30 times relative to natural rates of deposition, favoring growth of nitrogen-loving plants, many considered invasive species, at the expense of native plants and natural communities. Both nitrogen and phosphorus enrichment impacts wetland and aquatic communities by increasing algae growth, which in turn impacts aquatic life.” It is a safe assumption that these processes are also occurring within the park system.



White-Tailed Deer at Grant Park

- **Climate Change:** Milwaukee County is currently the eastern terminus of Wisconsin's Ecological Tension Zone (Curtis, 1959). This is the area within Wisconsin where northern plant communities meet and integrate with southern plant communities. As the climate continues to warm, it is likely that the park system will lose many of the remaining northern plant species as the Ecological Tension Zone will likely migrate northward to Ozaukee County. Natural areas directly adjacent to Lake Michigan will be buffered somewhat by the cooler micro-climate created by the lake and have the best chance for the persistence of more northerly inclined species of plants and wildlife.
- **Significant Public Use of Natural Areas:** Currently, levels of negative impacts to the park system's natural areas exceed what is typically seen state-wide in more rural natural areas simply due to the presence of a large urban population. Negative human interactions impacting the vitality of natural areas include: unsanctioned dogs-off-leash disturbing ground nesting birds and small mammals, vandalism (construction of unsanctioned trails, damaging vegetation, litter, fires, etc.), spread of invasives species through the transport of seeds and soil on hiking shoes and bike tires, illegal foraging of edible native plants and fungi, encroachment activities, poaching of wildlife, dumping of unwanted pets within natural areas and lagoons, off-road vehicles (ORV), and unethical park users harassing rare or sensitive species of wildlife.
- **Built Infrastructure:** There are over 200 buildings in the park system, 73 of which are in or directly adjacent to natural areas elevating the potential for bird window strikes. In addition, there are miles of exterior park and parkway lights impacting bats and invertebrates, miles of concrete channelized streams, and numerous roads without safe crossing areas for wildlife.



Passing straight through Milwaukee County, the Ecological Tension Zone (green) marks the convergence of northern and southern species, resulting in heightened biodiversity.



Garden waste dumped on spring ephemerals

- **Lack of Permanent Protection:** While zoning and county ordinances allocate some protections for the park system's natural areas, the reality is that 99% of these natural areas have no permanent protection, such as a conservation easement. External interests regularly make requests to install new infrastructure (utilities, stormwater basins, recreational trails, etc.) within or adjacent to sensitive natural areas, and the lack of conservation protections makes nearly all natural areas within the park system vulnerable to this type of development.

Natural Areas Management for the Next Decade

In the face of daunting ecological challenges, it is necessary to develop an adaptive management strategy that is flexible enough to adjust conservation goals, project designs, and management techniques, based on data collected through targeted scientific research.

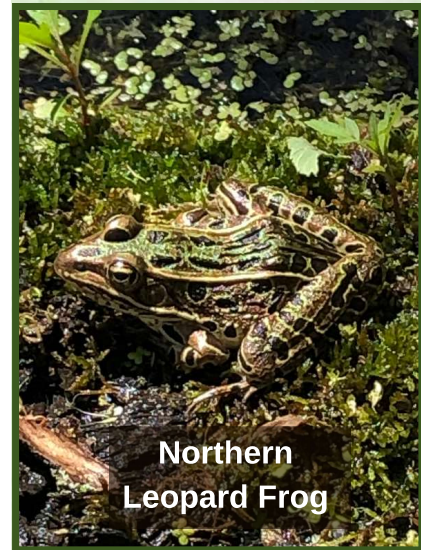
By laying out action items to address the previously mentioned challenges, this plan establishes guidelines for improving and maintaining the ecological integrity and viability of the park system's natural areas for the next decade. The broader Natural Areas Program goals listed below are the initial starting point.



Oak Woodland
Restoration at Falk Park

Goals to Advance Protection and Management of the Park System's Natural Areas

1. Protect existing populations of locally and regionally rare species by restoring habitat to create the appropriate conditions needed to stabilize declining species or reestablish, when practical, locally extinct species of flora and fauna that would have been historically present within the park system's natural areas, while at the same time working to keep common species common because they serve as the ecological backbone of each natural area.
2. Solidify conservation through the placement of permanent conservation easements on the park system's most ecologically diverse sites (SEWRPC designated Natural Areas of Significance and Critical Species Habitat sites) as well as sites that have undergone extensive ecological restoration activities.
3. Take advantage of opportunities that allow for the acquisition of additional natural areas that are adjacent to existing park system natural areas (buffers), acquire natural areas that fill in land protection gaps within ecological corridors, and acquire isolated natural areas with significant ecological value.
4. Develop and implement a comprehensive, management focused, Urban White-tailed Deer Management Plan.
5. Expand scientific research to guide and implement habitat management decisions based on the principles of conservation biology, ecological restoration, and climate change resilience.
6. Provide opportunities for compatible public use that does not degrade ecological integrity, while working to eliminate unsanctioned activities (encroachment, social trails, foraging, etc.) within the park system's natural areas.
7. Grow and nurture the Natural Areas Program's large volunteer core and creative partnership base to assist with on-the-ground restoration, scientific research, and environmental education.
8. Actively manage natural areas for invasive species control, wildlife habitat improvement, and climate change resilience.



Northern
Leopard Frog

Milwaukee County
Ordinance 47.08 Section 2
protects all native plants,
fungi, and wildlife from
collection, injury, and
harassment within the park
system.



Painted Turtles Basking

9. Create new natural areas through the conversion of leased agricultural land or underutilized turf grass into woodlands, prairies, and/or wetlands, giving priority to projects that connect or buffer existing natural areas.

10. Work to eliminate internal negative impacts to natural areas by modifying construction techniques, reduce the unintentional spread of invasive species by Parks staff, and mitigate wildlife stress and mortality caused by existing infrastructure and traditional management techniques.

11. Mitigate existing infrastructure to reduce bird window strikes, reduce light pollution from outdoor lighting, and provide safer road crossings for wildlife.

Achieving these goals provides for a more resilient and sustainable model for natural areas preservation and management within the park system for the foreseeable future. By creating a clear unifying strategy for managing the park system's natural areas, meaningful progress can be made towards preserving what is left of Milwaukee County's natural heritage and restoring a portion of what was lost. While these goals will not provide specific, site-based recommendations for the park system's natural areas, it does solidify the framework currently used to develop site-specific ecological restoration and management plans.



Planting a Wet-Mesic
Pollinator Garden

Guiding Principles for Setting Conservation Priorities

Principle 1: Managing for Ecological Resilience and not Historical Reference Conditions

One of the historic guiding principles of restoration ecology has been to manage natural areas in a way that restores them, as closely as possible, to a site's pre-European plant community. The deficiency of this mindset is that it assumes the same climatic conditions and the full slate of ecological processes can be restored to any site. However, rapidly changing climate, changes in plant wildlife associations, fragmentation of habitat, altered hydrology across landscapes, excessive nutrient and pollution inputs, and human use of natural areas are in most cases drastically different from pre-European conditions making historic plant community baselines unattainable and unrealistic.

The more logistically feasible strategy today is to focus on a site's long-term ecological resilience, which can be defined as a site's ability to retain most of its historical species of flora and fauna, integration of new native species more adapted to projected climate conditions, targeted control of wildlife (White-tailed Deer, American Beaver, etc.) and management of invasive species that have the capacity to cause the most localized ecological damage.

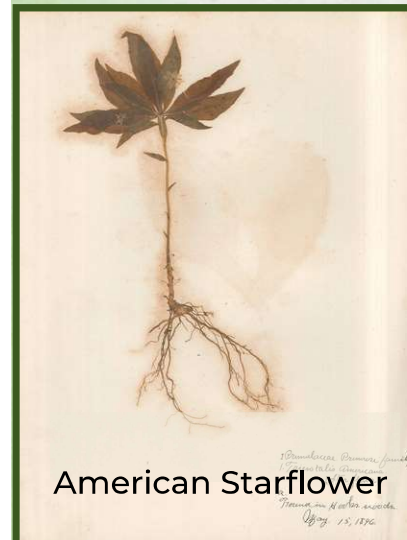
Scientific knowledge, like natural areas themselves, is constantly evolving and it is time to move beyond the historic reference conditions mindset so that park system natural areas can remain resilient into the future. Natural areas will look different than they did 200-years ago, but nature is not static, and neither is a pro-active management philosophy.

Action Item – During reforestation activities, choose a variety of native tree and shrub species to plant that include native southern species with historical natural ranges in Illinois, Indiana, southern Michigan, and Missouri (current USDA Plant Hardiness Zones 5b and 6a).

Action Item – Before commencing restoration, assess the site-specific stressors impacting a natural area to determine if they can be logistically overcome in order to determine what level of restoration is possible and what plant community would be most resilient.

Action Item - Prioritize restoration of more northerly plant species at lake-side natural areas and prioritize southern orientated plant species at interior and western natural areas.

Herbarium specimens
collected in 1896 in
Milwaukee County



Principle 2: Managing for Genetic Sustainability

Genetic flow across the landscape is essential in retaining a diversity of genetic traits that can buffer individual populations of plants or wildlife from long-term climatic changes or gradual changes in habitat conditions. In large well connected natural landscapes, wildlife can easily move between sites to supplement or expand existing populations, and plants can easily spread through seed dispersal mechanisms such as: wind, flooding, or wildlife transport. Unfortunately, due to fragmentation, genetic flow across the Milwaukee County landscape has been severely restricted by changes in land use (development, farming, roadways, etc.) to the point that many populations of rare plants and less mobile wildlife can no longer interact with other populations. Viable habitat may be restored for plants and wildlife, but the return is not likely for some species without assistance. This necessitates not only assisted migration, where staff collects seeds from numerous isolated plant populations and reintroduces them to restoration sites, but also repatriation of less mobile disjunct wildlife populations (herptiles, small mammals, select invertebrates) undertaken to reconnect populations that would have been historically connected across the landscape.



Dutchman's Breeches

Action Item – Review internal wetland data to determine site characteristics that have allowed amphibians to persist within certain park system natural areas. Also, search the data for compatible habitat areas where amphibians are not currently present and consider repatriation at those sites.

Action Item – Review internal plant presence data to determine which native species are missing at each site, based on the existing vegetative community, and replant these species during restoration activities when practical.

Action Item – Bolster small localized native plant populations by collecting seed from the same species at other nearby natural areas and planting it near existing populations.

Action Item – When purchasing seed, plant seed that has a southern Wisconsin, northern Illinois, or central Indiana genetic seed source. Only plant seed with more northerly genetic seed sources in the lake-side parks.

Action Item – Reach out to local municipalities about future development projects in their jurisdictions that will remove small isolated natural areas. Ask for the developer's contact information and inquire if Parks staff can enter the site to collect native plants and wildlife before natural areas are bulldozed for development. Place collected specimens in appropriate habitat within the park system.

Principle 3: Preserving Connectivity and Buffering Existing Natural Areas

The riparian river and stream corridors within the park system do a reasonably good job of connecting natural areas in the northern and southern portions of Milwaukee County. The majority of the Little Menomonee River, Menomonee River, Root River, and Oak Creek floodplains are currently natural areas of varying ecological quality within the boundaries of the park system. The Root River Parkway south of College Avenue down to where the Oak Leaf Trail (OLT) meets the Racine County line, is the most ecologically intact with the greatest diversity of habitat types and plant communities.

Unfortunately, all of these river/stream corridors have recently experienced significant canopy loss due to the impacts of the Emerald Ash Borer, and invasive plant species are rapidly filling in the canopy gaps. Parks has been taking a two-pronged approach to address the degradation of these essential corridors. On the north side of the county, Parks is actively participating in the US EPA's Areas of Concern Program (AOC). Through the AOC program, significant amounts of federal funds are being used to remove invasive species populations along the river corridors and replace them with native plant communities. On the south side of the county, Parks has used grant funding to aggressively convert leased agricultural land to forests, prairies, and wetlands adjacent to existing natural areas within primary and secondary environmental corridors. Both focus areas are seeing the restoration and/or recreation of natural areas that will lead to long-term ecological resilience within the park system's river and stream corridors.



An estimated 1 in 5 listed migratory species are at risk of extinction and 44% are declining. - State of the World's Migratory Species



Action Item – Convert all remaining leased agricultural land to forest, prairie, and/or wetlands.

Action Item – Acquire natural areas within environmental corridors to permanently connect and buffer protected and managed natural areas within the park system.

Action Item – Assess wildlife underpasses (areas under bridge crossings) to determine if there is adequate space to funnel wildlife under the road versus inadequate space, which pushes wildlife over the road into the “kill zone”. Undertake mitigation at existing inadequate sites and require mitigation on all new construction/rehabilitation projects.

Action Item – Focus floodplain forest management (invasive species control) around remaining native canopy species so that they can reseed into the canopy gaps created by the loss of native ash trees.

Action Item – Convert underutilized turf grass to natural areas based on site-specific ecological needs.

Action Item – Implement property restrictions (i.e. conservation easements) that permanently protect the park system’s most ecologically important natural areas.



Nursing Fox Squirrel
Killed on Road



Beaver Damage along
Floodplain Forest



Reforestation of Ag Land



Wildlife Underpass

Principle 4: Balancing Public Use with Natural Resource Protection

The challenge of managing a publicly owned resource is always balancing the diversity of expectations for public access with the public's expectation of land management to protect sensitive natural resources. This challenge is certainly heightened in a county of nearly 1,000,000 residents.

It is important for county residents to have a reasonable amount of access to natural areas because that's how our citizens build a connection with the natural world and become advocates or volunteers working to restore natural areas within the park system. Research has shown this connection, mentally, emotionally, and physically, is important to human health. That is why the majority of natural areas across the park system already possess either a section of the Forked Aster Hiking Trail System or a section of the Oak Leaf Trail System, making nature readily accessible for county residents. Placement of these trails, for the most part, took into consideration the potential ecological impacts when the routes were chosen, but not all reviews went through a thorough environmental impact assessment when the trails were historically constructed. Going forward the expansion, relocation, and maintenance of publicly accessible trails within the park system should go through an in-depth environmental assessment to determine if the proposed trail is ecologically appropriate with limited environmental impacts. New trails should not be developed within natural areas ranked by SEWRPC as Natural Areas of Significance, and should be avoided, if possible, in areas designated as Critical Species Habitat.

Action Item – Implement a moratorium on any new infrastructure projects within natural areas designated as Natural Areas of Significance or Critical Species Habitat by SEWRPC, as required by County Ordinance 47.08 (Appendix 3).

Action Item – Develop an environmental assessment form to accurately assess proposed utilities, trails, or other recreational facility impacts to natural areas.

Action Item – Continue to inventory sensitive plant and wildlife populations system-wide to better understand the full impacts of any proposed recreational amenity within the park system's natural areas.

Action Item – Unless absolutely necessary for public safety purposes, limit major trail maintenance activities to time frames that have the least amount of negative impacts to known sensitive wildlife populations.

Action Item – Install trail wayfaring and appropriate use signage to limit negative ecological impacts from park users recreating in sensitive natural areas.



Oak Leaf Trail Running Through Natural Area

Principle 5: Balancing Wildlife Habitat Management with Restoring Plant Communities

Historic wildlife habitat conservation within natural areas was the restore it and they will come philosophy, which meant that if historic plant communities were restored or recreated within a natural area then the wildlife representative of those plant communities would return and/or increase in population size. That philosophy was a coarse filter at best and didn't fully factor in extirpation and barriers to recolonization as it relates to fragmentation, as well as other external factors, influencing wildlife population movement and viability.

The historic plant communities may not be compatible with current wildlife populations utilizing a natural area, and restoring a natural area to historic conditions may actually be detrimental to sensitive species of wildlife that are currently present. Also, current restoration may include planting native plant species that did not historically exist within a natural area; however, these species will directly benefit wildlife currently utilizing the existing habitat (ex. migratory forests).

Habitat structure is also important to wildlife, and in some cases, it is more important than the plants present within a natural area. As examples, some level of woody plant growth is necessary in grasslands to have the full complement of grassland nesting birds; opening up forest canopies increases the density and diversity of vegetative growth on the forest floor benefitting pollinators; and reductions in the use of prescribed fire in oak woodlands increases downed woody debris and leaf litter which buffers the negative impacts of non-native earthworms on the myriad of species living in a woodland's duff layer.

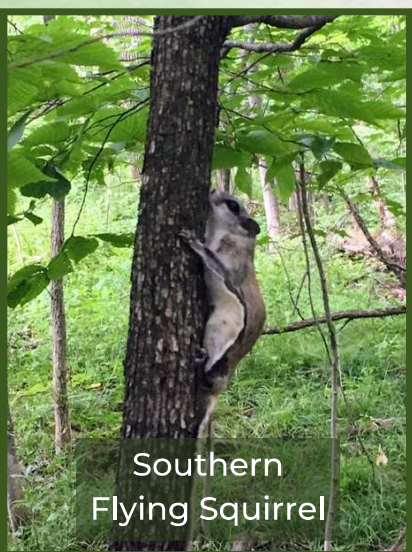
In some cases, overabundant wildlife populations such as white-tailed deer can be the greatest threat to healthy sustainable plant communities. In Milwaukee County's case, white-tailed deer populations far exceeding carrying capacity have single handedly eliminated forest habitat for hundreds of species of native plants and wildlife due to of their voracious eating habits. Deer also cause, on average, 250 vehicle collisions per year within Milwaukee County, and they are vectors for Lyme disease which they readily bring into our local communities. In this scenario, reducing a specific wildlife specie's population is essential to restoring plant communities/habitat for a much more diverse cadre of wildlife and plants, and as a side benefit it would also enhance public safety.



Monarch Butterfly



River Jewelwing



Southern
Flying Squirrel

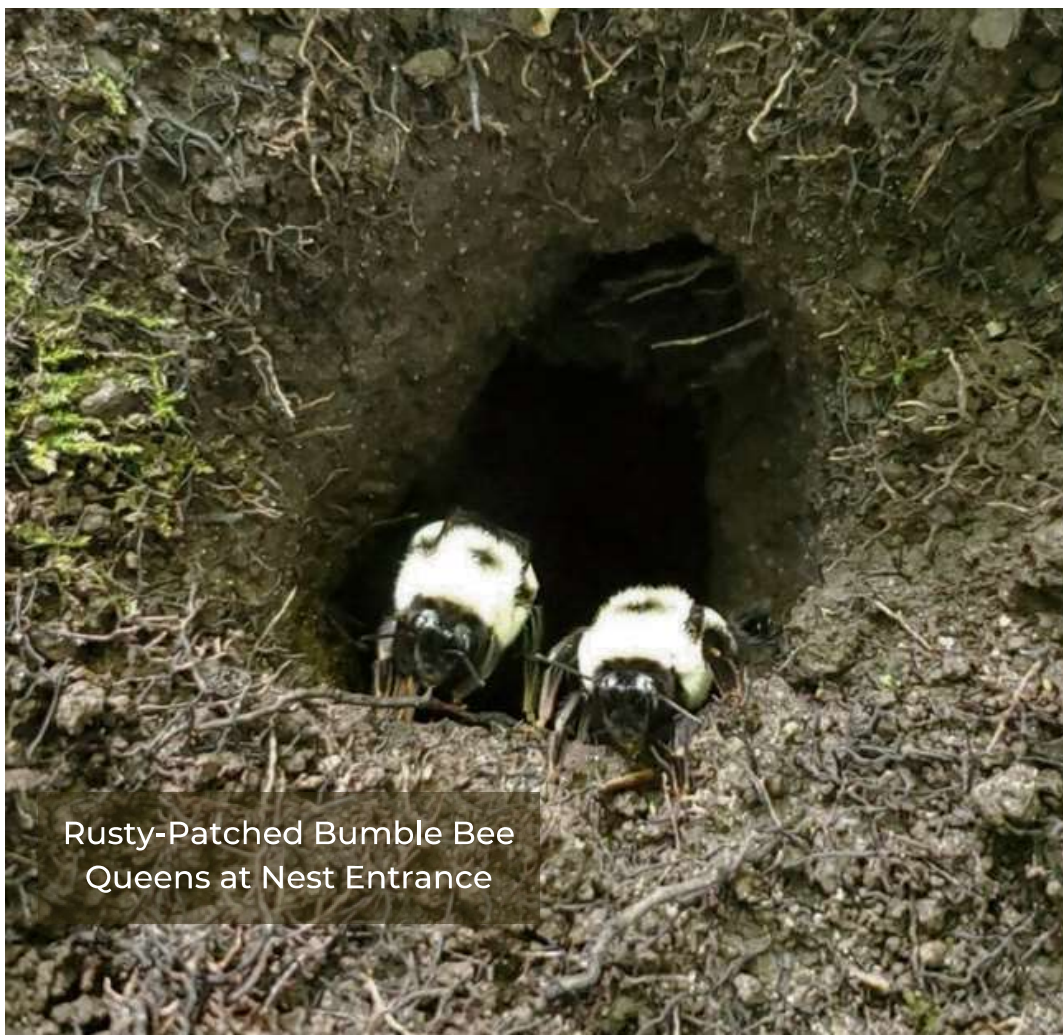
Action Item – Continue inventorying wildlife populations from multiple taxa within the park system’s natural areas to determine which specific species are using each natural area during what portion of their annual lifecycle.

Action Item – Develop an internal list of native plant species that have an oversized benefit to native wildlife and prioritize planting those species during restoration projects when conditions allow.

Action Item - Before commencing restoration, assess the site-specific stressors impacting known wildlife populations to determine if they can be logistically overcome in order to determine what level of habitat restoration is possible and what plant community would be most compatible with current and future wildlife populations.

Action Item: Develop and implement an Urban Deer Management Plan that utilizes the full gamut of management techniques such as contracted sharp shooters, a regulated antlerless bow deer season, eliminate food resources (i.e. cropland), and elimination of deer escape and bedding areas (buckthorn thickets) in or adjacent to natural areas.

Action Item: Develop and implement an American Beaver management plan in areas where their activities are threatening the integrity of the remaining floodplain forest.



Rusty-Patched Bumble Bee
Queens at Nest Entrance

Principle 6: Targeted Restoration based on Adaptive Management

Removing invasive species is important but removing all invasive species from the park system's natural areas is unrealistic. It is important to have a process in place that targets which invasives species populations should be removed from a natural area first because they have an oversized influence on the larger ecology of the site. For example, common buckthorn releases a chemical called emodin that research (Sacerdote, 2014) has shown to directly damage the livers of amphibians and prevent embryo development in amphibians when they are concentrated in breeding ponds; hence buckthorn near documented amphibian breeding ponds should be controlled first before buckthorn in the adjacent uplands. Furthermore, natural areas with documented breeding populations of salamanders, because they only occur within 18 of the park system's 163 natural areas, should be the priority for buckthorn management around ephemeral ponds.

This same scenario can be repeated around the park system by inserting different taxa of vulnerable wildlife populations, knowledge of essential habitat requirements, and knowledge of potential stressors.

Action Item – Develop a matrix where taxa sub-group habitat needs can be measured against known habitat threats to assess the level of vulnerability and prioritize restoration activities.

Action Item – Regularly reassess conservation designations listed in the “Special Designation” section of this plan to determine if natural areas should be upgraded or downgraded based on current site conditions.

Action Item – Target relatively small populations of rapid response invasive species (i.e., still uncommon in the park system) that have shown oversized negative ecological impacts in other parts of the region.



Ephemeral Pond

Principle 7: Rare Species Conservation

Seventy-five species of state and federally listed plants and wildlife (WDNR NHI Working List) have been documented within the park system since the early 1970's. The 21 listed species of wildlife have all been documented within the last 15 years, however roughly a third of the listed plant species haven't been seen in the last two decades and may no longer persist within the park system's natural areas. If these species can't be rediscovered through thorough inventories of appropriate habitat, then they will continue the post-European trend where rare plant species become just a footnote within the natural history record of Milwaukee County.

Other existing rare plant populations may have shrunk to such a small number of individuals in only one or two locations that their long-term viability is suspect. This begs the ethical question, as to which species should be the focus of ecological restoration efforts and which species should be allowed to slip into the abyss that is extinction. No one in this profession wants to lose any native species, but with limited resources and major environmental stressors such as climate change, the reality is that Parks will not be able to save every native species currently within the park system. The northern species that are near the southern edge of their range in Milwaukee County, and the species that are habitat specialists will be the most at risk of localized extinction.

Action Item – Review internal data to determine which plant and wildlife species would be considered northern species on the southern end of their range or habitat specialist species and develop a working list for the park system to assess long-term viability.

Action Item – Work with partners to conduct targeted field surveys for all listed plant species to determine if populations still persist, and to what extent, within the park system.

Action Item – Continue to conduct targeted wildlife surveys to determine the full extent of listed species within the park system.

Action Item – Reintroduce plant species that were historically present but were lost if viable habitat and projected future climatic conditions warrant reintroduction.

Action Item – Start a rare plant propagation program from seed collected within the park system's natural areas to supplement existing rare plant populations.



The world has lost two-thirds of its wildlife in the last 50 years.
– World Wildlife Fund
2020 Living Planet Report.

Principle 8: Modify or Eliminate Internal and External Practices that Damage Natural Areas

Negative impacts to natural areas and their plant and wildlife communities are varied. Urban areas in particular have a unique set of natural areas stressors that more rural natural areas, rarely if ever, have to address. Existing ecological stressors to the park system's natural areas include pressure from utilities and municipalities desiring to install or expand infrastructure in or adjacent to natural areas, maintenance and repair of existing utilities that spread invasive species and directly destroy wildlife habitat, bird window strikes from Parks facilities adjacent to natural areas, large radio towers located on parkland killing birds during migration, light pollution adjacent to or within natural areas, the inadvertent spread of invasives during land management activities, inadvertent killing of wildlife during land management activities, salt application near sensitive wetlands and waterways, and lack of communication on construction projects in or adjacent to natural areas.

Fortunately, there are ways to eliminate or mitigate these and similar ecological challenges. Parks has made some strides in recent years with the creation of a mowing moratorium in utility corridors during the bird nesting season, elimination of synthetic erosion control materials that were directly killing snakes, placement of mitigation dots on windows to reduce bird window strikes, creation of internal review matrixes that consider ecological impacts from external project requests, requiring contractors to clean equipment of soil and vegetative material as part of the right-of-entry permit process before entering a work site, and internal reviews of all planting materials in order to remove potential invasive species from proposed planting lists.



Estabrook Park
Radio Tower

The US Fish and Wildlife Service (USFWS) estimates that four to five million birds are killed annually from striking communication towers.



Birds killed after hitting radio tower in a Milwaukee County Park

Action Item – Place conservation easements on all natural areas designated by SEWRPC as Natural Areas of Significance or Critical Species Habitat to eliminate direct impacts to these sites from external infrastructure requests.

Action Item – Implement a moratorium on any new communication towers within the park system.

Action Item – Continued placement of bird window strike mitigation dots on Parks infrastructure documented to be killing birds.

Action Item – Remove unnecessary lighting within or adjacent to natural areas, and place shielding on new/upgraded lighting infrastructure that directs light downward instead of outward.

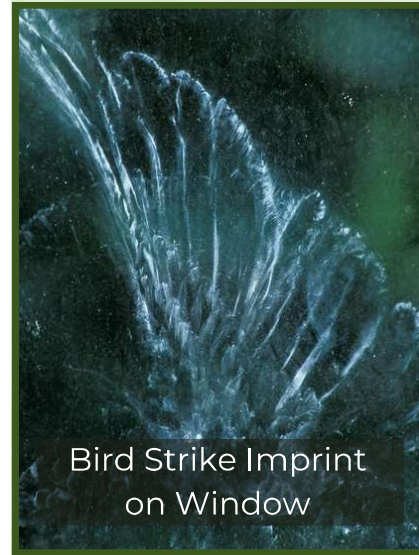
Action Item – Require all Parks internal projects adjacent to or within natural areas to submit a Cityworks request for review by Natural Areas staff prior to project initiation in the field.

Action Item – Train Parks field staff BMPs to prevent the spread of invasive species during their work activities, provide maps on areas to avoid, and provide an annual refresher.

Action Item – Limit dead tree removal in or adjacent to natural areas during the bat breeding season unless necessary for public safety (i.e. storm damage).

Action Item – Develop an internal working list of salt applications near sensitive wetlands, and then look for ways to mitigate or eliminate salt application in those areas.

Action Item – Create publicly assessable iNaturalist “project” where staff and park users can report wildlife mortality on park system roads and paved trails. Data can then be used to develop mitigation plans to reduce wildlife mortality.



Bird Strike Imprint
on Window

An estimated 365 million to 1 billion birds die annually from window collisions – 2014 Smithsonian Institute Report.



Installing Mitigation Dots to
Prevent Bird Window Strikes

Principle 9: It Takes a Community to Manage a Community Resource

The task of managing a large complex urban natural areas program with only five full-time staff can seem daunting, however meaningful partnerships coupled with well trained and engaged volunteers makes the Natural Areas Program successful. The old adage “you get back what you give” directly correlates to partners and volunteers. The Natural Areas Program has annual reviews with major partners undertaking land management on parkland, and we provide in-person and virtual training options for volunteers undertaking invasive species removal or conducting science-based research.

Action Item – Continue to provide meaningful opportunities for community science volunteers to inventory the greatest diversity of taxa as possible within the park system.

Action Item – Continue to engage in creative partnerships that align mutual goals which directly lead to the long-term resilience of the park system’s natural areas and the native plants and wildlife that reside within them.

Action Item – Keep partners abreast of restoration activities within their focus areas and look for opportunities to strengthen partnerships.

Action Item – Develop annual reports highlighting ecological restoration activities by staff, partners, and volunteers.

Action Item – Continue to highlight Natural Areas Program activities through social media, traditional media, and during external presentations.

“Unless someone like you cares a whole awful lot, Nothing is going to get better. It's not.”
– Dr. Seuss, The Lorax



Major Conservation Partners:

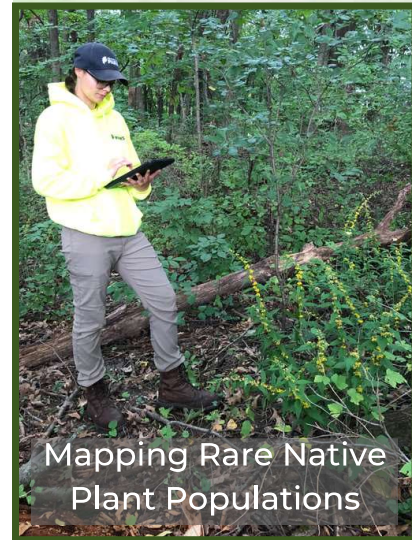


Measuring Success

Measuring success is always important, especially when managing publicly-owned natural resources under an adaptive management strategy. The most reliable way to acquire essential and meaningful information is through scientific monitoring of pre-project implementation and immediately after post project completion. For longer-term restoration projects spanning decades, monitoring should be conducted at regular short-term intervals during the life of the project to assess the impacts of project activities.

Monitoring Types

- **Monitoring to measure the effectiveness of management** – Are ecological restoration activities achieving their goals? Adaptive Management is fundamentally based on the ability to fully assess how well prescribed techniques are realized in the field and then making any necessary adjustments in real-time. Examples would be annual assessments to determine the effectiveness of invasive species control (i.e., are populations declining from direct control efforts in the field), or are focal wildlife populations increasing in number and has there been any collateral damage to other species in the process, or what percentage of the planted native seed germinated and has vigorous growth, etc.
- **Rare species monitoring** – Are ecological restoration activities increasing and/or stabilizing targeted rare species populations within the natural areas where work has been undertaken? This is best answered by utilizing standardized assessment techniques specifically targeting those species. However, this may not always be readily apparent because it may take more than one field season to see any positive or negative impacts.
- **Monitoring environmental threats** – Are restoration activities progressively addressing environmental threats, and have new threats materialized that can be mitigated through adaptive management? Regular field reviews of known and potential threats that may undermine the success of a restoration project are essential.
- **Regulatory monitoring** – Two Pronged: Are illegal activities being undertaken by third parties within the park system's natural areas? Documentation and follow-up monitoring of those activities are required so Parks staff can take the necessary steps to resolve violations of county ordinances. Also, are state and federal laws being followed to protect regulatory species of flora and fauna? Timely monitoring of listed species populations is essential for their ecological and legal protection.



Mapping Rare Native Plant Populations



Rusty- Patched
Bumble Bee Queen



White Turtlehead



Canadian Owlet
Moth Caterpillar



Bleeding Fairy Helmet



Snapping Turtle



Canoderma sessile



Belted Kingfisher

Conclusion

Anyone who is actively engaged in conservation knows that...time is running out. The next decade or two will play an oversized role in determining whether nature can be preserved and restored. We are currently living within the planet's 6th mass extinct event in which it is estimated that **150 species go extinct every day** (Convention on Biological Diversity, 2007). At the same time, North America has **3 billion fewer birds** than it did in the 1970s, which is the loss of 1 out of every 3 birds (Rosenberg, 2020). Even a species such as the Monarch Butterfly, once considered extremely common, has **declined by an estimated 85%** since the 1980s (Center for Biological Diversity, 2016) and has been listed by the International Union for Conservation of Nature as an endangered species. Unfortunately, the Monarch is but a window into the larger world of insects that are currently experiencing an estimated **40% global decline with a third of all insects** likely endangered (Milman, 2022). At the same time, climate change continues to build strength, and the natural tapestry that has remained stable since the last ice age is beginning to unravel predominantly because humans have **significantly altered 70% of the planet's land surface** (United Nations International Panel on Climate Change, 2019) at the expense of natural lands and the natural processes that sustain our own communities.

While the opportunity to completely prevent many of these formidable losses has passed, there are still opportunities to mitigate any further harm. Government agencies, organizations, and communities that have wisely protected conservation lands will have a substantial role to play. While Parks can't single-handedly overcome the regional and global challenges mentioned above, it can make meaningful change within its focus area. Collectively, similar entities across the world are doing the same, and together this provides a measure of hope.

Completion of Parks initial Natural Areas Strategic Plan provides a clear framework of the existing and evolving activities undertaken by the Natural Areas Program and its partner organizations. The overriding goal of the strategy is to provide a formal vision that diligently works towards addressing current and projected future threats to the resilience of the park system's natural areas, while leaving flexibility to make mid-course corrections when science and logistics warrant adjustments for success.

Consistent application of the principles and action items laid out in this plan should be used to address the current and projected ecological challenges of the park system. A formal strategy will also allow Parks to maximize limited internal resources, continue to acquire significant external resources, and build upon creative and meaningful partnerships that advance natural areas management within the park system.

**“How do you pick up the threads of an old life?
How do you go on, when in your heart you begin
to understand... there is no going back?”
– JRR Tolkien**

We continue the process of weaving something new and resilient that can be passed on to future generations. There is no going back, but we can move forward in a progressive and meaningful way by giving nature the respect it deserves as was evident in Milwaukee County becoming the first county in Wisconsin to pass a resolution declaring the “Rights of Nature” (Appendix 4).



Spiderwort After Prairie Burn
at Wehr Nature Center

Appendix 1 – Plant Communities

Existing park system plant communities include:

1. Clay Seepage Bluff – “Steep clay bluffs border stretches of the Great Lakes shorelines and are less commonly found inland on the lower portions of streams draining into Lakes Superior and Michigan... Vegetative cover can range from dense forests of red pine (*Pinus resinosa*), white pine (*Pinus strobus*), northern white-cedar (*Thuja occidentalis*), and paper birch (*Betula papyrifera*), to bare clay with only a few weedy herbs present. Buffalo-berry (*Shepherdia canadensis*) is a characteristic shrub, but more typically, alders (*Alnus incana* and *A. viridis*), as well as rank herbs such as Canada goldenrod (*Solidago canadensis*) and pearly everlasting (*Anaphalis margaritacea*) are dominant. Golden sedge (*Carex aurea*), gentians, orchids, and calciphilic fen species may colonize such sites, which can be local repositories of rare or otherwise noteworthy plant species.”

2. Conifer Plantation – “They encompass a variety of conifer species, primarily red pine and white pine (*Pinus resinosa* and *P. strobus*), but also may include jack pine (*Pinus banksiana*), white spruce (*Picea glauca*), and tamarack/larch (*Larix laricina*).”

3. Emergent Marsh – “Emergent marsh is dominated by robust macrophytes, in pure stands of single species or in various mixtures. Dominants include cattails (*Typha spp.*), bulrushes (particularly *Schoenoplectus acutus*, *S. tabernaemontani*, and *Bolboschoenus fluviatilis*), bur-reeds (*Sparganium spp.*), giant reed (*Phragmites australis*), pickerel-weed (*Pontederia cordata*), water-plantains (*Alisma spp.*), arrowheads (*Sagittaria spp.*), the larger species of spike-rush (such as *Eleocharis smallii*), and wild rice (*Zizania spp.*). Emergent marsh can occur in a wide variety of hydrologic settings, including inland lake, Great Lakes, riverine and estuarine complexes.”

4. Floodplain Forest – “Canopy dominants vary, but may include silver maple (*Acer saccharinum*), river birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), black ash (*Fraxinus nigra*), hackberry (*Celtis occidentalis*), swamp white oak (*Quercus bicolor* and its hybrids with bur oak), and eastern cottonwood (*Populus deltoides*). Black willow (*Salix nigra*), basswood (*Tilia americana*), red oak (*Quercus rubra*), and red maple (*Acer rubrum*) are associated species found in these forests. Historically, elms were highly significant components of the floodplain forests, but Dutch elm disease has eliminated most large elm trees that formerly provided supercanopy structure, snags and den sites, and large woody debris.”


5. Northern Mesic Forest – “Northern mesic forests form the matrix for most of the other community types found in northern Wisconsin. They are found primarily north of the climatic Tension Zone on loamy soils of glacial till plains and moraines deposited by the Wisconsin glaciation. Sugar maple (*Acer saccharum*) is dominant or co-dominant in most stands, regardless of their age or origin. Historically, eastern hemlock (*Tsuga canadensis*) was the second most important species, sometimes occurring in nearly pure stands with eastern white pine (*Pinus strobus*). Both conifer species are greatly reduced in today's forests. American beech (*Fagus grandifolia*) can be a co-dominant with sugar maple (*Acer saccharum*) in the counties near Lake Michigan. Other important tree species are yellow birch (*Betula alleghaniensis*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*), although yellow birch reproduction has become scarce in most stands.”

6. Oak Woodland – “Dominant trees included white oak (*Quercus alba*), bur oak (*Quercus macrocarpa*), and black oak (*Quercus velutina*), sometimes mixed with red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*). Under a characteristic fire regime, shrub and sapling representation in oak woodlands would be minimal. The herb layer is potentially diverse, including some members of the prairie, oak savanna, and oak forest communities, but also featuring grasses, legumes, composites, and other forbs that are best adapted to light conditions of highly filtered shade. Representative herbs may include upland boneset (*Eupatorium sessilifolium*), violet bush-clover (*Lespedeza violacea*), Virginia bush-clover (*Lespedeza virginica*), Culver's-root (*Veronicastrum virginicum*), rough-leaved sunflower (*Helianthus strumosus*), eastern shooting-star (*Primula meadia*), Short's aster (*Symphotrichum shortii*), yellow-pimpernel (*Smyrniun integerrimum*), bottlebrush grass (*Elymus hystrix*), silky wild-rye (*Elymus villosus*), and bracted tick-trefoil (*Desmodium cuspidatum*).”

7. Shrub-Carr – “Shrub-carr is a wetland community dominated by tall shrubs such as red-osier dogwood (*Cornus sericea*), silky dogwood (*Cornus amomum*), meadowsweet (*Spiraea alba*), and various willows (*Salix spp.*). Canada bluejoint grass (*Calamagrostis canadensis*) is often very common. Associates are similar to those found in alder thickets and tussock-type sedge meadows. Shrub-carrs occupy areas that are transitional between open wetlands like wet prairies, calcareous fens, and southern sedge meadows, and forested wetlands such as floodplain forests and southern hardwood swamps.”

8. Southern Dry Forest – “Oaks are the dominant species in this upland dry forest community. White oak (*Quercus alba*) and black oak (*Quercus velutina*) are dominant, often with northern red and bur oaks and black cherry. In the well-developed shrub layer, brambles (*Rubus spp.*), gray dogwood, and American hazelnut are common. Frequent herbaceous species are wild geranium, false Solomon's-seal, hog-peanut, and rough-leaved sunflower.”





9. Southern Dry-Mesic Forest – “Red oak (*Quercus rubrum*) is a dominant tree of this upland forest community type. White oak (*Quercus alba*), American basswood (*Tilia americana*), sugar and red maples (*Acer saccharum* and *A. rubrum*), white ash (*Fraxinus americana*), shagbark hickory (*Carya ovata*), and wild black cherry (*Prunus serotina*) are also important. The herbaceous understory flora is diverse and includes many species listed under southern dry forest plus jack-in-the-pulpit (*Arisaema triphyllum*), enchanter's-nightshade (*Circaea canadensis*), large-flowered bellwort (*Uvularia grandiflora*), interrupted fern (*Osmunda claytoniana*), lady fern (*Athyrium filix-femina*), tick-trefoils (*Desmodium spp.*), and hog-peanut (*Amphicarpaea bracteata*).”

10. Southern Hardwood Swamp – “Dominant tree species are silver (*Acer saccharinum*), red maple (*Acer rubrum*), hybrids of red and silver maples (e.g., *Acer X freemanii*), and green ash (*Fraxinus pennsylvanica*). Associate tree species may include swamp white oak (*Quercus bicolor*), bur oak (*Q. macrocarpa*) and their hybrids, basswood (*Tilia americana*), and American elm (*Ulmus americana*), all of which may be a significant part of the canopy or subcanopy in sites impacted by emerald ash borer. Black ash may be present in southern hardwood swamps but is usually not dominant across the site. The ground layer is often dominated by species typical of floodplain forests such as Virginia wild-rye (*Elymus virginicus*), white grass (*Leersia virginica*), common wood-reed (*Cinna arundinacea*), wood nettle (*Laportea canadensis*), false nettle (*Boehmeria cylindrica*), and Ontario aster (*Symphyotrichum ontarionis*).”

11. Southern Mesic Forest – “This upland forest community occurs on rich, well-drained loamy soils, mostly on glacial till plains or loess-capped sites south of the tension zone. The dominant tree species is sugar maple (*Acer saccharum*), but American basswood (*Tilia americana*), and near Lake Michigan, American beech (*Fagus grandifolia*) may be co-dominant. Many other trees are found in these forests, including those of the walnut family, ironwood (*Carpinus caroliniana*), northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), white ash (*Fraxinus americana*), and slippery elm (*Ulmus rubra*). The understory is typically open, or sometimes brushy with species of gooseberry (*Ribes spp.*) on sites with a history of grazing and supports fine spring ephemeral displays. Characteristic herbs are spring-beauty (*Claytonia virginica*), trout-lilies (*Erythronium spp.*), trilliums (*Trillium spp.*), violets (*Viola spp.*), bloodroot (*Sanguinaria canadensis*), blue cohosh (*Caulophyllum thalictroides*), may-apple (*Podophyllum peltatum*), and Virginia waterleaf (*Hydrophyllum virginianum*).”

12. Southern Sedge Meadow – “Widespread in southern Wisconsin, this open wetland community is most typically dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*). Common associates of relatively undisturbed sedge meadows are other sedges (e.g., *Carex diandra*, *C. sartwellii*), marsh bellflower (*Campanula aparinoides*), marsh wild-Timothy (*Muhlenbergia glomerata*), American water horehound (*Lycopus americanus*), paniced aster (*Symphyotrichum lanceolatum*), swamp aster (*Symphyotrichum puniceum*), iris (*Iris spp.*), spotted Joe-Pye weed (*Eutrochium maculatum*), marsh fern (*Thelypteris palustris*), and swamp milkweed (*Asclepias incarnata*).”

13. Surrogate Grasslands – “Surrogate grasslands now represent the vast majority of grassland habitat in the state and are similar in structure to the former prairies that occurred in Wisconsin. Surrogate grasslands include agricultural habitats such as hayfields, small grains (oats, wheat, and barley), row crops (corn, soybeans, and potatoes), fallow fields, old fields, pastures, and set-aside fields (e.g., CRP) planted to non-native cool-season grasses (such as smooth brome (*Bromus inermis*), Timothy (*Phleum pratense*), redtop (*Agrostis gigantea*), orchard-grass (*Dactylis glomerata*), bluegrass (*Poa pratensis* and *P. compressa*), and quack-grass (*Elymus repens*)) or native warm-season grasses (such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), switch grass (*Panicum virgatum*), and side-oats grama (*Bouteloua curtipendula*)).”

14. Wet-Mesic Prairie – “This herbaceous grassland community is dominated by tall grasses, including big bluestem (*Andropogon gerardii*), Canada bluejoint grass (*Calamagrostis canadensis*), cordgrass (*Spartina pectinata*), and Canada wild-rye (*Elymus canadensis*). The forb component is diverse and includes azure aster (*Symphyotrichum oolentangiense*), eastern shooting-star (*Primula meadia*), saw-tooth sunflower (*Helianthus grosseserratus*), prairie blazing-star (*Liatris pycnostachya*), prairie phlox (*Phlox pilosa*), prairie coneflower (*Ratibida pinnata*), rosinweed and prairie-dock (*Silphium integrifolium* and *S. terebinthinaceum*), late and stiff goldenrods (*Solidago gigantea* and *S. rigida*), and Culver's-root (*Veronicastrum virginicum*).”

15. Novel Plant Community – A novel ecosystem refers to a new species combination that arises spontaneously and irreversibly in response to anthropogenic land-use changes, species introductions, and climate change, without correspondence to any historic ecosystem. These plant communities whether planted intentionally or coalescing independently with time, typically consist of a combination of aggressive native plant species, colonizing non-native/non-invasive plants, and aggressive non-native invasive species. This plant community thrives in areas of historic disturbance where the original native plant community was extirpated from the site.



Appendix 2 – Natural Areas Biodiversity List

Natural Areas Name, Acreage, and Known Diversity

*See Page 40 for Natural Areas Designations

Designated Natural Areas	Designated Critical Species Habitat	Data Deficient Sites	
Park or Pkwy (Natural Area)	Site Acreage	Conservation Designations	Total Known Native Species
Barloga Woods	115.4	NA-3 & CSH & SEC & IBA	371
Brown Deer Park	102.3	NA-3 & CSH & SEC & IBA	375
Cambridge Woods	17.3	NA-3 & CSH & PEC & IBA	298
Cudahy Nature Preserve	41.8	NA-2 & CSH & IBA & SNA	367
Doctors Park	30.9	NA-3 & CSH & PEC & IBA	455
Falk Park	149.9	NA-2 & CSH & SEC & IBA	452
Grant Park	196.0	NA-2 & CSH & PEC & IBA	688
Greenfield Park	101.7	NA-2 & CSH & IBA	498
Grobschmidt Park	153.2	NA-3 & CSH & IBA	455
Jacobus Park	21.9	NA-3 & CSH & PEC & IBA	379
Kinnickinnic Parkway 2	34.6	NA-3 & CSH & SEC & IBA	225
Kletzsch Park	70.7	NA-3 & CSH & PEC & IBA	423
Mangan Woods & Adjacent Grasslands	69.6	NA-3 & CSH & PEC & IBA	322
McGovern Park	13.6	NA-3 & CSH & IBA	275
MNR NW - Pyritz & Kaiser	86.5	NA-3 & CSH & SEC & CE	169
Menomonee River 1	86.4	NA-3 & CSH & PEC & IBA	277
Menomonee River 5	126.4	NA-3 & CSH & PEC & IBA	296
Menomonee River 6	52.5	NA-3 & CSH & PEC & IBA	336
Menomonee River 7	27.3	NA-3 & PEC & IBA	170
Noyes Park	35.0	NA-3 & CSH & IBA	373
Oak Creek 1	39.4	NA-3 & CSH & PEC & IBA	280
Oak Creek 12 North	105.9	NA-3 & CSH & SEC & IBA	276
Oak Creek 12 South	111.3	NA-3 & CSH & SEC & IBA	298
Oak Creek 13	180.0	NA-3 & CSH & PEC & IBA	336
Oakwood GC (Fitzsimmons Woods)	132.5	NA-3 & CSH & IBA	239
Rawson Park	21.3	NA-2 & IBA	206
Root River 8	89.4	NA-3 & PEC & IBA	252
Root River 10	179.9	NA-3 & CSH & PEC & IBA	307
Root River 12-Rainbow Airport	487.9	NA-3 & CSH & PEC & IBA	360
Root River 13	460.9	NA-2 & CSH & PEC & WG & IBA	429
Root River 14	412.7	NA-3 & CSH & PEC & WG & IBA	381
Root River 15	155.0	NA-3 & CSH & PEC & WG & IBA	245
Root River 16	123.0	NA-2 & CSH & PEC & WG & IBA	466

Park or Pkwy (Natural Area)	Site Acreage	Conservation Designations	Total Known Native Species
Root River 17	174.3	NA-3 & CSH & PEC & WG & IBA	325
Warnimont Park	171.4	NA-2 & CSH & PEC & IBA & SNA	560
Whitnall Park	413.3	NA-3 & CSH & PEC & IBA	942
Algonquin Park	2.4	IBA	135
Baran	6.7	CSH & IBA	113
Bay View Park	12.1	CSH & PEC & IBA	248
Bender Park	281.9	CSH & PEC & IBA	564
Big Bay Park	5.6	CSH & PEC & IBA	170
Caesar's Park	1.4	CSH & PEC & IBA	144
Cannon Park	3.7	CSH & IBA	144
Chippewa Park	3.2	CSH & IBA	50
Copernicus Park	11.3	CSH & SEC & IBA	191
County Grounds	93.1	CSH & ISN & IBA	410
Cudahy Park	3.4	CSH & IBA	170
Currie Park	58.1	CSH & PEC & IBA	152
Dineen Park	7.9	CSH & IBA	137
Doyne Park	18.2	CSH & PEC & IBA	164
Dretzka Park	177.9	CSH & IBA	227
Estabrook Park	66.5	CSH & PEC & IBA	413
Franklin Oak Savanna	129.2	CSH & SEC & IBA	302
Gordon Park	12.4	CSH & PEC & IBA	259
Grantosa Creek Parkway	6.6	CSH & IBA	57
Greene Park	8.4	CSH & IBA	213
Hales Corners Park	7.8	CSH & IBA	172
Hansen Golf Course	28.1	PEC & IBA	208
Holler Park	10.2	CSH & IBA	212
Holt Park	27.7	CSH & IBA	172
Honey Creek Parkway 1	25.6	CSH & PEC & IBA	315
Honey Creek Parkway 2	9.1	CSH & PEC & IBA	139
Hoyt Park	12.2	CSH & PEC & IBA	235
Humboldt Park	5.3	CSH & IBA	256
Jackson Park	42.1	CSH & SEC & IBA	305
Johnstone Park	2.76	IBA & CSH	121
Juneau Park	7.0	CSH & PEC & IBA	147
Kern Park	7.4	CSH & PEC & IBA	225
Kohl Park	231.9	CSH & IBA	218
Lake Park	50.8	CSH & PEC & IBA	472
Lincoln Creek 1	19.0	CSH & SEC & IBA	33
Lincoln Creek 2	14.0	CSH & SEC & IBA	26

Park or Pkwy (Natural Area)	Site Acreage	Conservation Designations	Total Known Native Species
Lincoln Park	115.8	CSH & PEC & IBA	380
Little Menomonee 1	210.4	CSH & PEC & IBA	393
Little Menomonee 2	93.3	CSH & PEC & IBA	218
Little Menomonee 3	91.2	CSH & PEC & IBA	299
Little Menomonee 4	124.3	CSH & PEC & IBA	330
Little Menomonee 5	156.4	CSH & PEC & IBA	313
Little Menomonee 6	169.3	CSH & PEC & IBA	272
Maitland Park	18.8	CSH & IBA	135
McCarty Park	5.2	CSH & IBA	157
Melody View Preserve	14.0	CSH & IBA	78
Menomonee River 2	44.9	CSH & PEC & IBA	154
Menomonee River 3	37.8	CSH & PEC & IBA	147
Menomonee River 4	82.7	CSH & PEC & IBA	134
Menomonee River 9	36.6	CSH & PEC & IBA	276
Menomonee River 10	6.6	CSH & PEC & IBA	44
Milwaukee River 1	12.6	CSH & PEC & IBA	178
Milwaukee River 2	9.4	CSH & PEC & IBA	204
Milwaukee River 3	7.7	CSH & PEC & IBA	158
Milwaukee River 4	3.6	CSH & PEC & IBA	47
Milwaukee River 5	20.3	CSH & PEC & IBA	243
Mitchell	12.1	CSH & IBA	194
Mitchell Blvd Park	3.7	CSH & IBA	99
Oak Creek 2 (Mill Pond Section)	26.7	PEC & IBA & CSH	269
Oak Creek 3	35.6	CSH & PEC & IBA	211
Oak Creek 6	59.8	CSH & SEC & IBA	366
Oak Creek 7	77.7	CSH & SEC & IBA	203
Oak Creek 8	64.4	SEC & IBA & CE	218
Oak Creek 9	112.4	CSH & PEC & IBA	354
Oak Creek 10	56.4	CSH & SEC & IBA	201
Oak Creek 11	59.5	CSH & SEC & IBA	252
Oak Creek 14	79.8	CSH & PEC & IBA	192
Oak Creek 15	130.5	CSH & PEC & IBA	231
Pleasant Valley	16.4	CSH & PEC & IBA	272
Pulaski Park-Milwaukee	3.9	CSH & PEC & IBA	75
Riverside Park	22.4	CSH & PEC & IBA	722
Riverton Meadows	4.2	CSH & ISN & IBA	174
Root River East Branch	2.7	CSH & PEC & IBA	123
Root River 1	77.8	CSH & PEC & IBA	250
Root River 2	192.5	CSH & PEC & IBA	207

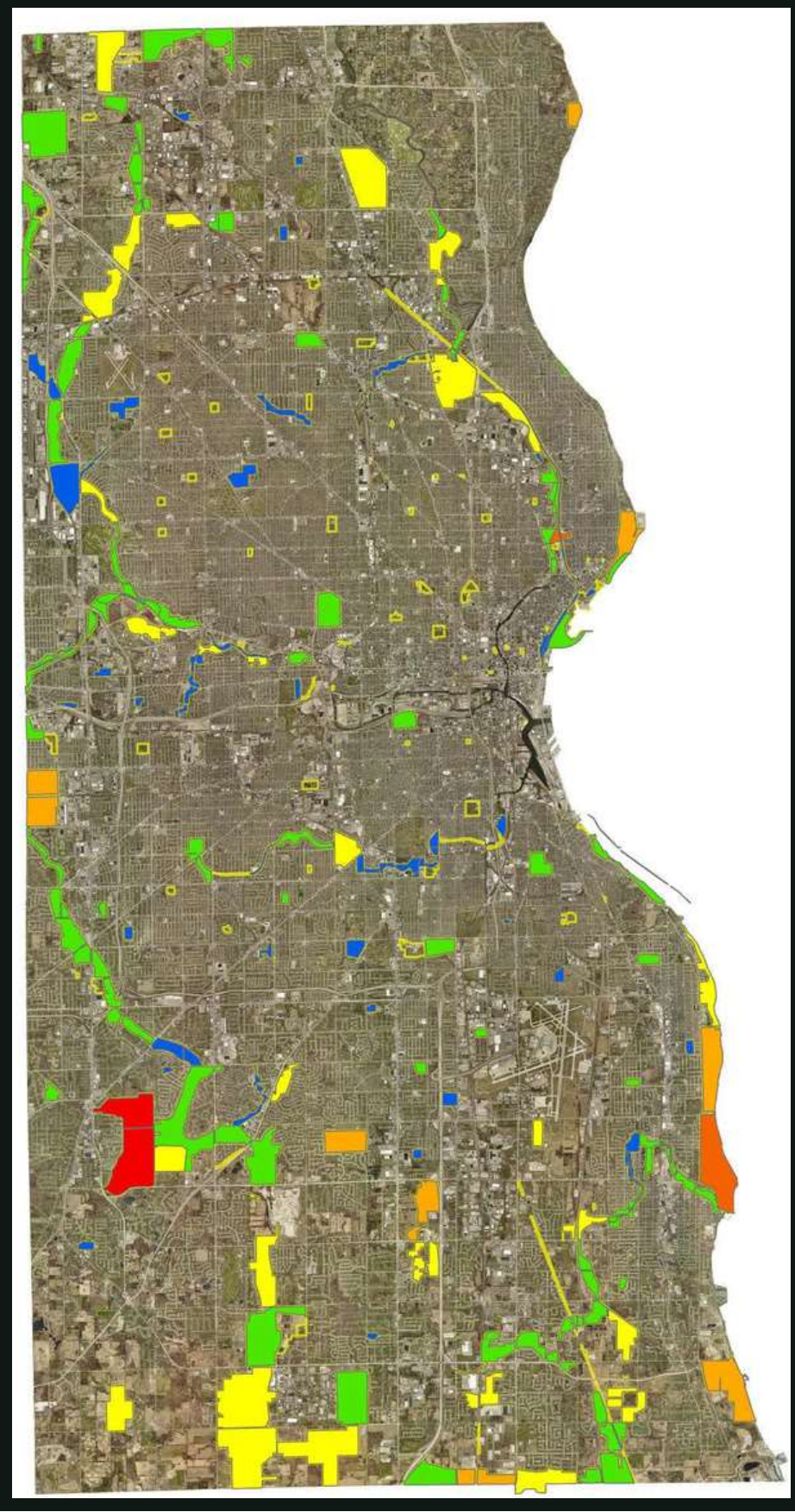
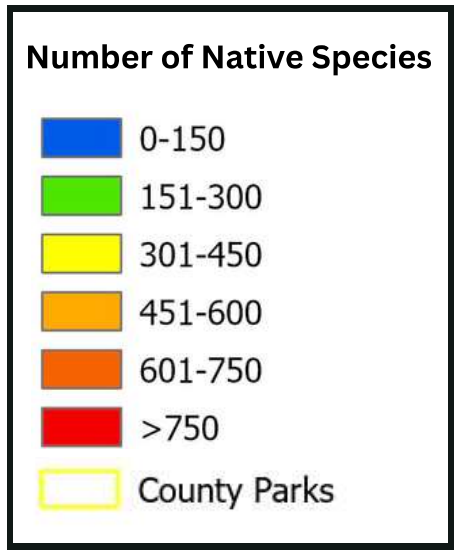
Park or Pkwy (Natural Area)	Site Acreage	Conservation Designations	Total Known Native Species
Root River 3	51.5	PEC & IBA & CSH	215
Root River 4	58.8	PEC & IBA & CSH	213
Root River 5	64.4	CSH & PEC & IBA	185
Root River 6	61.7	PEC & IBA & CSH	110
Root River 7	357.7	CSH & PEC & IBA	247
Root River 9-Anderson Lake	222.3	CSH & PEC & IBA	263
Root River 11 -Froemming & HTF	326.1	CSH & PEC & IBA	287
Root River 18	42.6	CSH & PEC & IBA	224
Scout Lake	58.6	CSH & IBA	363
Servite Park	21.3	CSH & IBA	114
Sheridan Park	33.5	CSH & PEC & IBA	412
South Shore Park	1.6	CSH & PEC & IBA	228
Southwood Glen	2.8	CSH & IBA	51
Uihlein Soccer Park	17.7	CSH & IBA	226
Underwood Creek 1 & Wil-o-Way	28.1	CSH & PEC & IBA	267
Underwood Creek 2	46.9	CSH & PEC & IBA	198
Underwood Creek 3	32.1	CSH & PEC & IBA	174
Veterans Park	21.3	CSH & PEC & IBA	297
Washington Park	19.5	CSH & IBA	252
Wilson Park	30.3	CSH & IBA	253
Zablocki Park	5.9	IBA	88
AC Hanson	6.0	IBA	174
Alcott	0.9		50
Armour Park	1.3	IBA	64
Back Bay Park	3.0	PEC & IBA	129
Barnard Park	2.3	IBA	47
Bradford Beach	1.2	PEC & IBA	241
Dale Creek Pkwy	31.6	PEC & IBA	39
Honey Creek Parkway 3	5.7	PEC & IBA	108
Honey Creek Parkway 4	14.5	PEC & IBA	124
Honey Creek Parkway 5	9.9	IBA	180
Kinnickinnic Parkway 1	1.2	IBA	0
Kinnickinnic Parkway 3	4.3	IBA	0
Kinnickinnic Parkway 4	4.7	IBA	0
Kinnickinnic Parkway 5	12.7	IBA	0
Kinnickinnic Parkway 6	4.6	IBA	0
Lincoln Creek 3	4.9	SEC & IBA	0
Lincoln Creek 4	6.7	SEC & IBA	0
LMD (East-side Bike Trail)	13.3	PEC & IBA	87

Park or Pkwy (Natural Area)	Site Acreage	Conservation Designations	Total Known Native Species
Lyons Park	8.1	IBA	166
Madison Park	8.5	IBA	105
Menomonee River 8	2.1	PEC & IBA	167
Mitchell Airport	1.0	IBA	84
Oak Creek 4	21.3	SEC & IBA	143
Oak Creek 5	30.5	SEC & IBA	162
Pulaski Park- Cudahy	1.0	IBA	48
Saveland Park	0.4	IBA	79
St. Martins Park	13.2	IBA	148
Trimborn Farm	1.2	IBA	20
Wisconsin Ave Park	2.6	IBA	118
Wyrick Park	6.4	IBA	95

Natural Areas Designations

CSH	SEWRPC designated Critical Species Habitat
IBA	Designated Important Bird Area (WI Bird Conservation Partnership)
ISN	SEWRPC designated Isolated Natural Area
NA-2	SEWRPC designated Natural Area of Regional Significance
NA-3	SEWRPC designated Natural Area of Local Significance
PEC	SEWRPC designated Primary Environmental Corridor
SEC	SEWRPC designated Secondary Environmental Corridor
SNA	Designated State Natural Area (WDNR)
WG	Designated "Wetland Gem" (WI Wetland Association)

Appendix 2 – Natural Areas Biodiversity Map



Appendix 3 – County Ordinance 47.08 “Protection of Nature”

47.08. - Injury to, destruction, or removal of public property.

(1) *Destruction of property.*

(a) No person shall remove, or in any manner damage, injure or deface, write upon, defile or ill use any flower bed, turf, fountain, play structure, statue, building, fence, equipment, bench, table, official notice, sign, bridge, structure or other property within the Park System.

(b) No person in any park or parkway shall remove any device for the protection of trees for shrubs, nor shall any such person fasten any animal or equipment next to any tree, shrub or grass plot, which may become damaged by that action.

(2) *Protection of Nature.*

(a) No person shall harvest, collect, deface, or disturb, in any manner, any portion of a native plant or native fungi within the Park System. Exceptions are made for DPRC staff, and individuals, groups, or entities authorized, through written permission from the DPRC, who are conducting land management or scientific research activities for ecological restoration, trail maintenance, or public safety.

(b) The removal of species within the Park System that the DPRC designates as invasive species can be removed or controlled by DPRC staff or individuals, groups, or entities authorized through written permission from the DPRC. Planting of any vegetative material within the Park System without the written permission of the DPRC is prohibited.

(c) The harassment, capture, injury, or killing of native wildlife within the Park System is prohibited. Exceptions are made for DPRC staff or individuals, groups, or entities authorized, through written permission from the DPRC, to disperse, remove, or reduce populations of wildlife that have become a detriment to public safety, public health, or the ecological integrity of the Park System's natural areas. Introduction or release of any animal, wild or domestic, within the Park System without the written permission of the DPRC is prohibited.

(d) Natural areas within the Park System that are designated by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) as Natural Areas of Local, Regional, or State-wide Significance or designated as Critical Species Habitat Areas, will receive a heightened level of protection. Allowable activities within these designated areas include: hiking, biking, or running on DPRC designated trails only, nature study, bird watching, or other similar passive recreation activities designated by the DPRC. The DPRC or individuals, groups, or entities authorized, through written permission from the DPRC, are allowed to maintain or repair existing built infrastructure within these designated areas, but are not allowed to increase the footprint of this infrastructure unless necessary to protect the ecological integrity of these designated sites.

(3) ***Removal or deposition of ice, stone, soil, dead woody material, or sand is prohibited within the Park System.*** Exceptions are made for DPRC staff or individuals, groups, or entities authorized, through written permission from the DPRC, to remove or deposit these materials for land management or public safety reasons.

(4) ***Penalties.*** For any individual, group, or entity violating any component of section 47.08 a minimum fee of \$100.00 will be levied for each violation and the responsible party will also be required to pay 100 percent of all ecological restoration costs associated with mitigating the damage the DPRC determines has been done to the Park System's natural resources.

Appendix 3 – Declaration of Rights of Nature

AN AMENDED RESOLUTION

Supporting the “rights of nature” movement across waterways and bodies of water in Milwaukee County for protection and ensuring human activities do not interfere with nature and its ability to be healthy, robust, and resilient

WHEREAS, Milwaukee County has developed a bold plan to achieve carbon neutrality by 2050 and improve climate resiliency across all County operations; and

WHEREAS, Milwaukee County’s vision for protection of its natural environment and inhabitants residing in the County for generations, including Native and Indigenous Communities, aligns with the County’s aim to be the healthiest County in the State of Wisconsin; and

WHEREAS, Milwaukee County recognizes the “rights of nature”, which was initially enacted by the Menominee Tribe of Wisconsin, as a sacred idea and policy to protect Southeastern Wisconsin’s waterways and bodies of water from human harm; and

WHEREAS, Milwaukee County has historically passed resolutions, including File No. 19-582, to create Climate Task Forces protecting the region’s environment and reduce greenhouse emissions thereby achieving environmental equity; and

WHEREAS, the Menominee, Potawatomi, and Ho-Chunk Tribes have called Milwaukee County home for generations, and the Menominee Tribe passed File No. 19-52 within their tribal government recognizing the inherent rights of the Menominee River to flourish and naturally exist; and

WHEREAS, major bodies of water within Milwaukee County, including the Menominee River, Milwaukee River, and Fox River as well as Lake Michigan, provide essential biodiversity and wildlife habitats; and

WHEREAS, these bodies of water require a “rights of nature” protection, which will help Milwaukee County to be the healthiest in the State of Wisconsin due to its restoration as a natural wonder; and

WHEREAS, the “rights of nature” policy, which recognizes Milwaukee County’s bodies of water as integral and essential to the environment, returns rivers and lakes to their their natural purpose; and

WHEREAS, the Committee on Community, Environment, and Economic Development, at its meeting of September 11, 2023, recommended adoption of File No. 23-785 as amended (vote 4-0); now, therefore,

BE IT RESOLVED, the Milwaukee County Board of Supervisors hereby supports the “rights of nature” movement across waterways and bodies of water in Milwaukee County for protection and ensuring human activities do not interfere with nature and its ability to be healthy, robust, and resilient.

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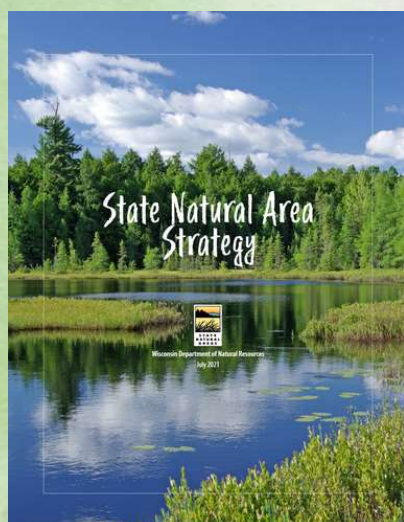
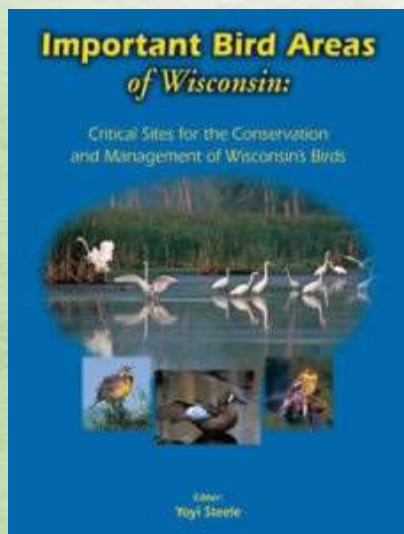
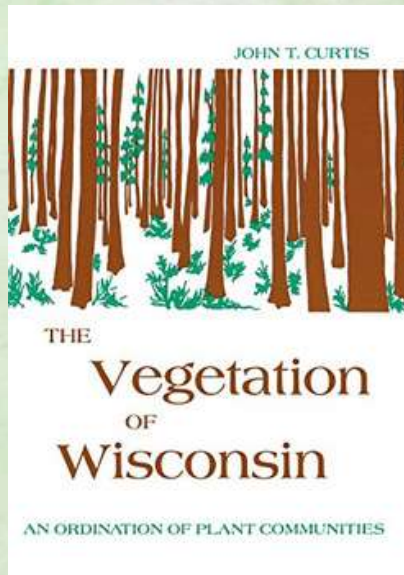
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