Agenda

Joint Meeting of the Park Board & City Council

Minnetonka Community Center - Dining Room

Wednesday, November 2, 2022 at 5:30 p.m.

1. Call to Order
2. Roll Call

Park Board

_____Isabelle Stroh
_____Korey Beyersdorf
_____James Durbin
_____David Ingraham
_____Chair Chris Gabler
_____Ben Jacobs
_____Katie Semersky
_____Chris Walick

City Council

_____Mayor Brad Wiersum
_____Deb Calvert
_____Rebecca Schack
_____Kimberly Wilburn
_____Bradley Schaeppi
_____Brian Kirk
_____Kissy Coakley

3. Special Matters
   A) Friends of Minnetonka Parks Update
4. Business Items
   A) Skate Park Feasibility Update
   B) Park Habitat Restoration & Maintenance Plans
   C) 2023 Projects Update
   D) Lone Lake Park Multi-use Mountain Bike Trail Metrics
5. Adjournment

Park Board Vision:

A city with outstanding parks and recreational opportunities within a valued natural environment.

Park Board Mission:

The mission of the Minnetonka Parks & Recreation Board is to proactively advise the city council, in ways that will:

- Protect & enhance Minnetonka's natural environment
- Promote quality recreation opportunities and facilities
- Provide a forum for citizens interested in our parks, trails, athletic fields and open space.

Joint Meeting of the Minnetonka Park Board and City Council
Item 4A - November 2, 2022

Subject:	Skate Park Feasibility Update
Park Board related goal:	To provide quality athletic and recreational facilities and programs
Park Board related objective:	Receive and provide input and guidance on the skate park feasibility study
Brief Description:	Update on the Skate Park Feasibility Study

Background
In early 2021, a group of residents approached the Minnetonka Park Board inquiring about a new or updated skate park. The city currently owns one skate park, located in Glen Lake off of Excelsior Boulevard. This 20-year-old skate park is an older style skate park and is not heavily used. In 2022, the city will complete a Skate Park Feasibility Study and identify a number of potential sites.

The results of the 2019 Community Facility & Programming Space Study indicated an increase in participation levels for skateboarding. The recent update to the Parks, Open Space and Trails (POST) Plan lists a skate park as a future priority initiative. An increased interest in non-traditional sports, such as skateboarding, have occurred recently. The Minnetonka Park Board and staff have received numerous requests for updated amenities related to skate boarding, along with estimated costs. The next step in the project would be to start design of a new or renovated skate park in 2023, with construction beginning the following year.

City staff are now working to complete the Skate Park Feasibility Study.

Summary
To identify the most appropriate spot for a new or renovated skate park in the City, staff and consultants have performed a series of site inspections and have created a detailed site analysis process. Guided by the Parks, Open Space, and Trails Plan (POST Plan), and the Natural Resources Master Plan (NRMP) two levels of site selection criteria have been created. The first level of site selection for further analysis included considerations such as ownership status, overall size available, and site conditions such as topography. This led to a “feasible” ranking for 11 sites throughout the City, with some caveats. These 11 sites then moved on to a second level of site selection criteria including elements such as accessibility, surrounding land use, supporting amenities, safety, and environmental sustainability.

Through the site selection process three sites were identified for further analysis after applying a detailed scoring rubric. The sites include Glen Lake Activity Center area, the Shady Oak Pavilion area, and the Glen Lake Elementary ice skating rink area. These three sites will have preliminary site layouts created to be included in the final feasibility study report.

Recommended Park Board Action
Receive presentation and provide feedback on the draft skate park feasibility study

Attachments

- None

Joint Meeting of the Minnetonka Park Board and City Council
Item 4B - November 2, 2022

Subject:	Park Habitat Restoration and Maintenance Plans
Park Board related goal:	To protect natural resources and open spaces
Park Board related objective:	Promote the city's efforts of protecting and enhancing the community's natural resources by creating awareness and supporting educational opportunites
Brief Description:	Review park habitat restoration and maintenance plans

Background
In 2019, city staff began developing an updated Natural Resources Master Plan (NRMP), which was adopted by the City Council in December, 2021. The plan helps fulfill a recent council strategic priority and key strategy of developing and implementing long-term plans to mitigate threats to the natural environment.

Three main goals identified in the plan are to:

1. Improve the quality of habitat in Minnetonka parks and open spaces, striving for more resilient and sustainable ecological systems while providing multiple benefits to the community.
2. Manage and improve the community forest ecosystem on both public and private lands, including natural woodlands and the altered ecosystem of the traditional managed landscape.
3. Engage the public to support ecological restoration and management on public property, and promote voluntary application of practices on private property.

The plan provides information related to the status of natural resources within the city along with strategies for addressing both challenges and opportunities. The NRMP generally includes:

- Specific goals and objectives related to natural resources management
- A natural history and current assessment of habitat and conditions of natural areas in Minnetonka parks and open spaces
- Natural resource issues and stressors
- Priorities for natural resource protection, including prioritized parks and restoration areas within parks
- Appendices, including park restoration strategies and budgets

City staff are now implementing the plan based on priorities identified in the NRMP.

Summary
A significant component of the NRMP includes the Natural Resources Stewardship Program, which focuses on an ecological systems-based approach to restoration and management of habitat in parks and other public lands. Table 4.2, Appendix A, and

Appendix B of the plan outlines prioritized parks for restoration, general restoration goals (e.g. target plant community, restoration phasing), and estimated budgets, respectively. The next phase of implementing the NRMP is to develop more specific and detailed Habitat Restoration and Maintenance Plans for the high priority parks identified in Table 4.2.

The purpose of a Park Habitat Restoration and Maintenance Plan is to take a more granular look at a park's varying ecological units, identify current conditions, develop target plant communities, and coordinate available resources to improve ecological diversity and plant community resilience. Once finalized, the plan will provide the basis for guiding seasonal field activities for city staff, volunteers, and city contractors. Information in the plan will also be used to inform future park master planning efforts identified in the recently adopted Parks, Open Space, and Trail (POST) plan.

These plans are considered "living documents" and will be updated regularly. Staff will work in close collaboration with volunteers and park stewards from Friends of Minnetonka Parks and other interested stakeholders to coordinate efforts for maximum effectiveness. The final plans will also include a GIS-based mapping and tracking tool that allows city staff and volunteers to monitor and adjust restoration efforts as needed.

Upon adoption of the proposed 2023-2027 CIP, planning efforts will begin with Purgatory Park. In anticipation of the upcoming planning for Purgatory Park, staff have worked to develop a plan template that can be used for the park, and all other high priority parks in future years.

Staff will present a sample Purgatory Park Habitat Restoration and Maintenance Plan to the Park Board and City Council for feedback and answer any questions that arise.

Recommended Park Board Action
Receive presentation and provide feedback on park habitat restoration and maintenance plans

Attachments
- None

Joint Meeting of the Minnetonka Park Board and City Council
Item 4C - November 2, 2022

Subject:	2023 Projects Update
Park Board related goal:	To provide quality athletic and recreational facilities and programs.
Park Board related objective:	Ensure that park amenities, recreational facilities and programs address future community needs and changing demographics.
Brief Description:	Provide an overview of the parks and trails projects for 2023.

Background
The 2023-2027 Capital Improvement Plan (CIP) has established parks, trails and recreational projects that address the needs of our community. Below is a brief description of each project scheduled for 2023:

Ridgedale Commons
Construction of Ridgedale Commons and the Crane Lake Preserve shelter are substantially complete. Due to supply delays, the bi-fold garage doors for the park building are not expected to arrive until late 2022. Building completion is anticipated for early 2023 and programs are scheduled in the building beginning in March. The granite for the interactive water fountain will arrive in the spring and the completion of the fountain is expected by Memorial Day. A grand opening event will be planned following the completion of the fountain. The completed areas of the park will be open to the public later this year.

Skate Park Planning/Design
The Skate Park Feasibility Study is coming to its conclusion in the coming weeks and a draft findings presentation will be made at the joint City Council/Park Board meeting on November 2nd. The presentation will outline the process for site evaluation and draft thoughts on some of the site options potentially up for final recommendation. Following the presentation on November 2nd, a final draft of the Feasibility Study will be made available to the Park Board, City Council, and the Public for a comment period. At the Park Board meeting in January, a summary of the public comments will be shared. After completion of the Feasibility Study, staff will then look to find a consultant to design the skate park in 2023 and assist with grant funding. The project is currently planned to be constructed in 2024.

Park Playground Equipment (Gro Tonka & Mini Tonka)
Staff will meet with two play equipment vendors to look at options to replace existing play equipment in November and December so the equipment can get ordered and delivered in the summer of 2023.

Tennis Court Reconstruction (Linner & Junction)
City crews will repave the courts as early as possible in the spring (planned for May/June). Once paving is complete the courts cure for 30 days before the new color coatings are applied. Staff will conduct a neighborhood meeting with the residents surrounding each park to get feedback on whether to add pickleball to one or both parks. Each park has two tennis courts. Options for pickleball would include converting one tennis court to a dedicated pickleball court, stripe both courts with pickleball lines but use the tennis net, or stripe the courts so people can bring their own nets.

Trail Improvement Plan – Smetana Rd. (Westbrook Way to Sanibel Dr. - .9 miles)
The Smetana Road Trail Project proposes a .9 mile trail along the south side of Smetana Road from Sanibel Drive to Westbrooke Way. The proposed trail improvements include the addition of an eight-foot-wide bituminous trail along the south side of Smetana Road from Sanibel Drive to Westbrooke Way. Trail construction includes concrete curb and gutter installation, American Disabilities Act (ADA) improvements, retaining wall construction, pavement and drainage improvements, overhead power burial and other private utility relocation. Design will occur over the next several months with bidding in early 2023. Construction is scheduled to begin in the spring of 2023.

Park Master Planning – Purgatory Park
The first in a series of Community Park Master Planning efforts is set to begin at Purgatory Park in 2023. Early in the New Year, staff will release a RFP to identify a consultant to assist in the master planning of Purgatory Park. This effort will include analysis of all human-use elements such as but not limited to parking, shelters, trails, signage, and benches. This master planning process will follow-up on the Restoration Management Plan for the park that will continue its development concurrently.

Recommendation Action:
Receive an update on the scheduled projects for 2023

Attachments
- None

Joint Meeting of the Minnetonka Park Board and City Council
Item 4D - November 2, 2022

Subject:	Lone Lake Park Multi-Use Mountain Bike Trail Metrics
Park Board related goal:	To renew and maintain parks and trails
Park Board related objective:	Review annual rules and metrics report of Lone Lake Park multi-use mountain bike trail and make recommendations to staff and city council
Brief Description:	Review the annual trail metrics document

Background
On June 6, 2018, the Lone Lake Park multi-use mountain bike trail plan and study was presented to the Minnetonka Park Board. At that meeting, the park board recommended approval of the project to the city council. On August 26, 2019, the city council voted to approve the concept plan for the multi-use mountain biking trail in Lone Lake Park.

Metrics
An annual trail update to the park board and city council was requested as part of the city council approval of the project at their August 26, 2019 meeting. Annual reporting metrics were established with the assistance of local stakeholders. Staff presented the initial metrics report at the joint park board and city council meeting in November of 2021. At that meeting, it was requested that the future metrics report be more concise. Staff has compiled the attached 2021-2022 metrics report and will give the board and council a brief presentation.

Trail Updates
The trail continues to be well-used, but not overly crowded. There is a nice mix of bikers, hikers, and snowshoers throughout the year. The local Minnesota Off-Road Cyclists (MORC) volunteers have been a very dedicated volunteer group completing weekly trail maintenance and monthly restoration. MORC and staff strive to provide a safe and fun year-round amenity for all users while balancing competing interests. One suggested improvement from MORC since the opening of the trail is the addition of a small snow groomer to provide improved trail conditions for winter users. MORC now has access to such a groomer and would like to use it this winter. This addition was anticipated and discussed during the creation and approval of the agreement with MORC. The agreement states “winter trail grooming will be performed only with the prior approval of the City of Minnetonka Program Manager (Land Manager) or Recreation Director.”

Recommended Action
Review the Lone Lake Park Multi-Use Mountain Bike Trail Metrics annual report and provide comments and feedback.

Attachment
1. Lone Lake Park Multi-Use Mountain Bike Trail Annual Metrics Report 2021-2022

LONE LAKE PARK MULTI-USE MOUNTAIN BIKE TRAIL
ANNUAL METRICS REPORT - DRAFT
2021-2022
(Reporting period: September 1, 2021 – August 31, 2022)

Trail Use

Number of days trail is open and closed:

- Open: 251
- Closed: 114

Number and size of programs/events:

- Sept. 11, 2021 – Grand Opening/Ribbon Cutting – 75 attendees

Number of team practices scheduled:

- 9 team practices scheduled (2022 Season)
- 7/21 (Edina); 7/23, 7/28, 8/11 (Shakopee); 7/27, 8/24 (Bloomington); 8/11 (Mounds View/Irondale/Totino Grace combined team; 9/28, 9/29 (Chaska Chanhassen, Eden Prairie combined team)
- Teams had between 14-40 riders per practice
- All team riding groups must be 8 or less with a maximum of 40 coaches and student-athletes at a time. There is no time trial or race activities, this includes simulated starts, passing drills, etc.

Periodic Trail counts to estimate average annual use:

- Bikers: 17,389
- Hikers/Runners: 907
- Snowshoers: 246

See Seasonal Trail Count attachment.

Trail Impacts

Periodic parking lot counts:

- Reports of congestion on a couple Saturdays in the fall at both Rowland Rd. and Shady Oak Lots

See Parking Lot Counts attachment.

Number and type of complaints and resolutions:

- See Trail Complaints and Resolutions attachment

Number and type of reported incidents and resolutions:

- See Trail Incidents and Resolutions attachment

Qualitative input from residents (annual community survey question):

- 27% surveyed had used the trail
- 38% for mountain biking, 49% for walking/hiking, 6% for running, 7% for multiple uses
- 97% rated their trail experience as good or excellent

See Community Survey questions attached.

Trail erosion tracking and maintenance:

- See Trail Erosion Tracking and Maintenance attachment

Number and size of risk/diseased trees within the trail corridor:

- No trees were removed from the trail corridor since the last annual update. However, inspections for risk assessments will be conducted along the trail corridor this fall.

Advocacy & Engagement

Number of MORC:

- Volunteers: 229 (66 unique individuals)
- Volunteer events: 26
- Volunteer hours for trail maintenance: 458
- Volunteer hours for park restoration: 197.5

Number of other volunteers/hours related to the trail: 0

Description of restoration work completed (area size, locations, type of restoration):

- Buckthorn, garlic mustard and other common invasive species removed in various areas of the corridor.
  See MORC Restoration Volunteer Project and Hours attachment.

Total cost benefit of volunteers:

- Current estimated national value of each volunteer hour is $29.95
- $29.95 x 655.5 volunteer hours = $19,632 value

Meet with local stakeholders to review and contribute qualitative information:

- Draft report reviewed by a MORC and FLLP representative in October 2022.

General Lone Lake Park Monitoring

Conduct Rusty Patched Bumble Bee survey annually for three years:

- 2020: 1 Rusty-patched bumble bee documented
- 2021: 6 Rusty-patched bumble bees documented
- 2022: 2 Rusty-patched bumble bees documented

See Lone Lake Park Bumblebee Survey Final Report attachment.

Document invasive species presence and abundance:

- Garlic mustard abundance throughout the park has been relatively low in recent years due to annual maintenance activities.
- Poison ivy near and along trails was significantly reduced by NR staff sprays
- Thistle has been reduced through ongoing management.
- Crown vetch and leafy spurge remain between the far south east mountain bike trails away from other park amenities
- Stickseed abundance was up. Extensively pulled by MORC and staff.
- Newer invasive species in the corridor: narrowleaf bittercress – north end of topo ridge west of deer exclosure. Extensively pulled by MORC and staff.

Lake water quality monitoring every three years:

- Lone Lake was monitored for water quality in 2021. The lake is sampled every three years, thus the next year monitoring will occur is in 2024.

Seasonal Trail Counts
Fall 2021 - Summer 2022

Season Totals

	Walkers/Runners	Snowshoers	Mountain Bikers
Fall Totals	**546**		**7,320**
Winter Totals		**246**	**933**
Spring & Summer Totals	**361**		**9,136**
Four Season Total	**907**	**246**	**17,389**

Average Daily Use

	Walkers/Runners	Snowshoers	Mountain Bikers
Fall Daily Average - weekday	7		88
Fall Daily Average - weekend	7		107
Winter Daily Average - weekday		1.7	11.7
Winter Daily Average - weekend		7	13.7
Spring & Summer Daily Average - weekday	4		85
Spring & Summer Daily Average - weekend	3		118

Days Open

	Weekday	Weekend	total
Fall *09/01/21-12/08/21*	**54 of 71**	**24 of 28**	**78 of 99**
Winter *(snow on ground)* *12/09/21 - 03/13/22*	**54 of 67**	**22 of 28**	**76 of 95**
Spring Thaw - TRAIL CLOSED *03/14/22-05/05/22*	**0 of 53**	**0 of 53**	**0 of 53**
Spring & Summer *05/06/22 - 08/31/22*	**70 of 84**	**27 of 34**	**97 of 118**
Total Days Open	**178**	**73**	**251 of 365**

2021-2022 Lone Lake Park
Parking Lot Counts

Parking Lot	Capacity		09/10/21 @ 4:15pm	10/05/21 at 3:30 pm	10/14/21 @ 9:00 am	12/13/21 @ 5:00 pm	12/30/21 @ 10:00 am	02/18/22 @2:30 pm	03/3/22 @ 2:00pm	05/10/21 @5:00 pm	06/14/22 @ 5:00 pm	06/28/22 @ 1:45 pm	07/26/22 @ 5:30 pm	08/09/22 @ 5:30 pm	09/13/22 @ 4:30 pm
A	55		23	3	1	2	4	3	2	13	32	4	12	6	22
B	10		5	0	0	7	6	4	2	2	5	2	2	3	5
C	18		12	8	4	14	16	5	5	12	14	5	9	14	11
D	84		53	23	8					28	32	52	24	42	34
E	9		6	5	3	6	7	3	2	4	9	2	9	8	6

Trail Complaints and Resolutions		
Date	**Complaint**	**Resolution**
9/28/2021	Voicemail regarding congested parking lot on Rowland Rd. on a Saturday morning. Individual suggested MTBers should not be able to park at Rowland Lot.	Parking lots were monitored throughout the season and there are a few weekend days where the Rowland lot is congested, but no changes are recommended at this time.
9/28/2021	Resident complaint about the trail rule not allowing ebikes.	On 6/10/2022 the Park Board approved a change to the trail rules to allow for ebikes
11/6/2021	Resident complaint about trail construction practices and damage to trees within the corridor.	The city forester met on-site with members of the Friends of Lone Lake Park in the spring to walk the trail and discuss tree health assessments due to construction activity. The residents will continue to monitor the corridor and email the city forester when a concern arises so additional assessments can be completed.
6/20/2022	Resident complaint about safety for trail walkers regarding direction of walkers and blind intersections.	Intersection signage to be installed at specified locations.
7/14/2022	Complaint of some obstructed sightlines for riders.	MORC volunteers contacted resident to determine location and removal of brush if needed
7/27/2022	Resident complaint about new mounds/bumps on the trail and one section where new trail appeared to be cut for future use.	Activity log of MORC volunteer activities shared with the resident. The alternative route was abandon and will not be constructed.

Trail Incidents and Resolutions		
Date	**Incident**	**Resolution**
2/14/2022	Report by resident about off-leash dogs on the trail.	Additional signs were added at the entrance to remind users that dogs must be on leash while using the trail.
3/25/2022	Report of two trees being tapped for maple syrup near the trail.	Taps were removed by city staff.
7/7/2022	Report of people skateboarding on the trail.	Reported to staff and volunteers for monitoring. Appears to be an isolated incident.
8/3/2022	Report by resident of a biker with an off-leash dog on the trail approaching their dog which was on leash.	Resident informed biker of the leash rule on the trail.

IF RESPONDENT USES ICE ARENA, ASK: (N=72)

135. Do you primarily use the ice arena for figure skating and lessons, public skating and open hockey or youth hockey?

ICE SKATING/LESSONS...10%
PUBLIC SKATING/OPEN...68%
YOUTH HOCKEY.....22%
OTHER (VOL.).....0%
DON'T KNOW/REFUSED.....0%

	NOT	EXC	GOO	FAI	POO	DKR
136. Trails?	18%	39%	41%	2%	0%	0%

IF RESPONDENT USES TRAILS, ASK: (N=327)

137. Do you use trails primarily for recreational purposes, commuting, or to go to a specific destination?

RECREATIONAL.....79%
COMMUTING.....3%
SPECIFIC DESTINATION...5%
ALL (VOL.).....13%
DON'T KNOW/REFUSED.....0%

138. Do you use trails daily, multiple times a week, weekly, multiple times a month, monthly or less often?

DAILY.....12%
MULTIPLE/WEEK.....38%
WEEKLY.....15%
MULTIPLE/MONTH.....21%
MONTHLY.....8%
LESS OFTEN.....6%
DON'T KNOW/REFUSED.....1%

139. Have you used the multi-use mountain biking trail at Lone Lake Park?

YES.....27%
NO.....73%
DON'T KNOW/REFUSED.....1%

IF "YES," ASK: (N=87)

140. Did you primarily use the trail to - mountain bike, walk or hike, run or snowshoe?

MOUNTAIN BIKE.....38%
WALK/HIKE.....49%
RUN.....6%
SNOWSHOE.....0%
MULTIPLE (VOL.).....7%
DON'T KNOW/REFUSED.....0%

141. How would you rate your experience on the trail -- excellent, good, only fair, or poor?

EXCELLENT.....45%
GOOD.....52%
ONLY FAIR.....2%
POOR.....0%
DON'T KNOW/REFUSED.....1%

Trail Erosion Tracking and Maintenance

Type of Work	Loop	Specific Location	Work Details	Date Completed
Drainage	Water Tower Ridge	Ravine where seasonal water runs	Armor (2) drains with stones to prevent erosion and allow bikers to ride when water is flowing. Create berm on upper one.	9/1/2021
Dirt Work	Water Tower Ridge	Around mile marker (MM) #6	2 tight turns that people are running off trail. Look to move drain further down trail (2') and build up first berm to further direct riders to stay on trail.	9/1/2021
Trail Inspection	Nursery	Shady Oak trailhead to East Lone Lake Ridge and back to trailhead.	Inspected trail after overnight rain. Removed small branches from trail tread, dropped one dead leaning tree, minor erosion management (slight grading to improve drainage).	9/14/2021
Trees	Nursery	Shady Oak trailhead to mile marker (MM) 4	Inspected trail for report of a downed tree. None found and assume a rider moved it	9/14/2021
Drainage	Entire Trail	Entire trail	Inspected entire trail to look for wet areas and downed trees after rain/wind storm	9/17/2021
Trees	Nursery	Mile marker 3 and East Lone Lake Ridge	Cut/pulled down two trees that were identified 9/16 as hanging next to or over the trail from the windstorm overnight 9/15	9/18/2021
Trees	Nursery	between MM #2 and MM #3	Report from community of tree down over/on trail between MM #2 and MM #3. Aspen tree identified, snapped off and laying on a spruce. Also another aspen fallen next to trail, partially blocking. Hanging tree brought down, and both trees removed from trail. Gates closed for safety (tree on trail) and impending rain.	9/20/2021
Trail Inspection	Nine Mile	Western 2/3 of trails, Shady Oak trailhead west.	removed downed branches, identified hanging branch for City removal list	9/27/2021
Dirt Work	Water Tower Ridge	Berm after MM #6	People are running off this berm at the end. Look to build it back up, plant additional seed and add visual objects to help visually direct riders.	9/28/2021
Dirt Work	Water Tower Ridge	MM #19	People are running off trail and wiping out side of trail. Build rock support. Rework dirt into down slope.	9/28/2021
Dirt Work	Lone Lake Ridge East		Picked up rocks at public works for retaining walls along trail. Transported rocks to trail and hauled to work sites at Rowland Trailhead.	10/11/2021
Safety	Nursery	Pickleball courts east	Blew leaves off trail	10/12/2021
Safety	Water Tower Ridge	Eastbound trail just before pickleball courts, MM #18	Drop the dead and leaning tree trunk.	10/21/2021
Safety	Entire Trail	Entire trail	Cleared trail of leaves	10/29/2021
Dirt Work	Nursery	East half of trail from Trailhead to top of East Lone Lake Ridge and back	Leaves cleared and small branches removed	11/6/2021

Dirt Work	Nine Mile	West half of trail from middle gate to bottom of East Lone Lake Ridge and back plus 9 Mile Ridge	Leaves cleared and small branches removed	11/8/2021
Safety	Nursery	Big oak downhill	attempted to fill in ruts on downhill	1/10/2022
Inspection	Entire Trail	Entire trail	Rode trail to assess snow conditions. Filled grooves, smoothed bumpy spots	01/22/2022
Safety	Entire Trail	Trailheads	Mud Season. Place snow fencing up at access points.	3/15/2022
Trees	Nine Mile		Removed two trees that fell across the trail	4/17/2022
Erosion	Water Tower Ridge	Area above pickle ball courts	Tamped down erosion ruts that were forming to prevent from getting worse.	4/21/2022
Drainage	Lone Lake Ridge West	Big climb and decent on the return	Raked leaves that had collected on the trail to aid in drying.	4/22/2022
Trail Inspection	Entire Trail	Entire Trail	Swept the entire trail to check conditions. Raked up some leaf piles and removed sticks and 2 trees that had fallen across the trail	4/27/2022
Trail Maintenance	Lone Lake Ridge West	Before MM #14. Beginning of loop. In front of kiosk.	Water is flowing along fall line and creating a significant rut. Add stone for armoring. Rework trail tread to slope out. Add rollers to divert water.	05/10/2022
Trail Inspection	Entire Trail	Entire trail	Walked the entire trail to clear trees, sticks and to check dirt conditions after a severe storm	5/12/2022
Revegetation	Lone Lake Ridge East	Upper LLR East & West	Some back slopes were not seeded and strawed at the end of the season. Look for areas that could use some seeding	05/24/2022
Dirt Work	Entire Trail	Entire trail	Identify areas holding water and CANT be fixed Need armoring	05/24/2022
Drainage	Nursery	Between MM #1 & #2. Clay area with berms.	Water is still holding in low spots. Water appears to be moving down trail. Look to reslope and trench. Add roller(s) to help move water off trail and break up water running down trail. Act as water bar.	05/24/2022
Erosion	Water Tower Ridge	Ravine closest to tennis courts. Adams Return trail	A few of the downslopes on the large grade reversals need erosion blankets to prevent erosion	05/24/2022
Trail Inspection	Entire Trail	Entire trail	Walked the entire trail to clear trees, sticks and to check dirt conditions after a severe storm. Tires collecting dirt and pools of water in about a dozen locations. Decided not to open trail.	5/31/2022
Drainage	Nursery	Between MM #2 & #3. After little rock garden. Winding trail in trees.	Water is not shedding and draining properly in spots. Couple puddles holding after rain. Water flowing down trail in spots. Look at building up dirt when possible, adding rollers in spots to act as water bars. Create out slope when able. Rework berms to flow better.	06/14/2022
Dirt Work	Nursery	Right after MM #4. prior to crossing informal trail.	This area continue to be bumpy and rough. Keep an eye on it. If it dosen't smooth out with time, take action.	06/14/2022
Erosion	Entire Trail	TBD	Identify areas holding water and look to fix	Ongoing Summer 2022
Dirt Work	Lone Lake Ridge West	Berm after MM #10	Rework sandy area by armoring with stone and boulders. Create visual and plant additional seed to help visually direct riders.	06/14/2022

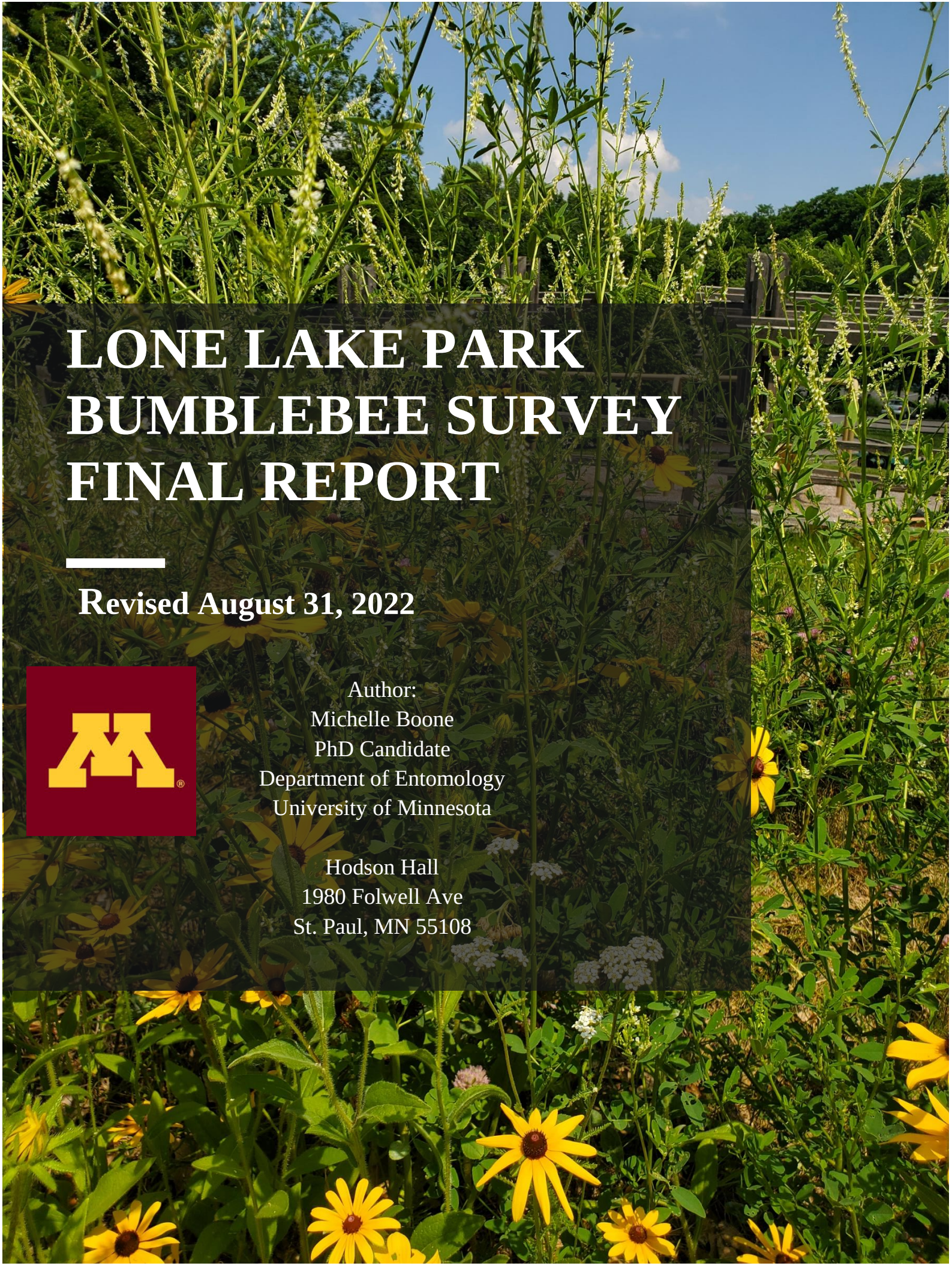
Trail Maintenance	Nursery	Between MM#3 and #4. Bren Road.	Out slope trail tread to drain proper. Create rollers to help drainage at mid-point of climbs (3).	06/14/2022
Trail Maintenance	Nursery	Between MM#3 and #4. Bren Road.	Break up construction debris along Bren road. Use soil on trail tread. Disperse brush in neat windrows to help slow runoff.	06/14/2022
Dirt Work	Nine Mile	After MM #13. Right before exit of Topo Ridge	Area where people continue to ride off trail. Build rock support. Add more dirt. Build up. Or other solutions.	06/14/2022
Trail Maintenance	Entire Trail	Entire trail	Walked the entire trail, removed three large branches and lots of small branches dropped by high winds. inspected for standing water spots. highlighted on for repair on Nine Mile Creek section.	06/24/2022
Drainage Erosion	Lone Lake Ridge East	Between MM #16 & #17	Couple areas holding water after rain. Dane marked with flags.	06/28/2022
Dirt Work	Entire Trail	Rowland Trailhead	Picked up rocks at public works for retaining walls along trail. Transported rocks to trail and hauled to work sites at Rowland Trailhead.	7/2/2022
Trail Maintenance	Lone Lake Ridge West	Between mm#8 &#9.	Deep tire rut that is catching riders. Break up trail tread slightly, fill and compact.	07/14/2022
Dirt Work		Dump	Worked on "rock garden", to shore up and harden trail.	7/28/2022
Dirt Work	Water Tower Ridge		Removed down tree across trail, from storm the night before.	08/04/2022
Trail Maintenance	Lone Lake Ridge West	Right at MM#15	Riders are taking low line. Rework trail to pinch riders in and narrow trail tread. Revegetate and straw trail.	08/09/2022
Trail Maintenance	Lone Lake Ridge West	Just up from MM#15. Random rocks in the middle of the trail.	Rework this section to narrow trail. Remove rocks or move to the side. Revegetate.	08/10/2022
Trail Maintenance	Lone Lake Ridge East	After mm #17	Small rut forming and pushing riders off trail left. On final descent of Pickball Plunge. Rework trail tread.	08/23/2022
Trail Maintenance	Lone Lake Ridge East	Before mm #17	Area where some riders are going off trail on left. Build up rocks to hold dirt in. Create slight in-slope/berm if possible.	08/23/2022
Trail Maintenance	Nine Mile	Right at MM#12. Berm.	Finish and add to this berm at the end of it. Difficult to trust the berm and hold the rider in. Add boulder and pack with dirt.	08/23/2022
Trail Maintenance	Nine Mile	Right before MM#13	Add stones to area with significant break bumps. Keep an eye on for future additions.	08/23/2022
Trail Maintenance	Nine Mile	Right before MM#13	Riders are biking off of the end of this berm. Look at add boulders and pack dirt to hold riders and dirt in.	08/23/2022
Trail Maintenance	Nine Mile	Well after MM#13. Near exit of Topo.	Last small berm and roller is pushing some riders and dirt of the trail. Reinforce berm with boulders to better direct riders. Build retaining wall on roller to hold soil in.	08/23/2022
Safety	Entire Trail	TBD	Need to add signage at turn around spots with mileage to specific destination, "Return to Rowland TH .5 miles"	08/28/2022
Trail Maintenance	Nine Mile	Before MM#12. First Berm	This Berm is being washed out and/or used as a deer trail at its apex. Look to reinforce the back of the berm with boulders and repack with soil. Potentially add a roller shortly after berm to help with drainage and enhance rider experience.	09/14/2022
Trail Maintenance	Lone Lake Ridge West	Just after MM#10. Sandy area that is washing out.	Build structural support with boulders to hold soil in and push riders up to the left. Avoiding widening the trail.	09/23/2022

MORC Restoration Volunteer Projects and Hours

Lone Lake Park Sept. 1, 2021 - Aug.31, 2022

BT-buckthorn; GM-garlic mustard; NLB-narrow leaf bittercress
HQ-high quality; CST-cut and stump treat with herbicide; WE-windrows for erosion reduction;
Trail-mountain bike trail

Date	# Vols	Vol Hours	Management area	Invasive species removed and/or Activity	Control method
2021					
Sept. 14	9	18	Rowland entrance prairies	foxtail, motherwort, crown vetch, lady's thumb, asiatic day-flower	Pulled, bagged seeds
Oct. 19	6	9	Rowland entrance prairies	Goldenrod thinning	Pull and bag
				Prairie seed collection and dispersal	NA
Nov. 27	13	25.75	Aspen woods (SE trails)	Buckthorn	CST and stack WE
2022					
May 2	Cancelled due to inclement weather				
May 3	15	32.25	Aspen woods (SE trails)	Buckthorn	CST and stack WE
May 31	10	20	Topo/9-mile ridge	Garlic mustard	Pull whole plants
June 7	16	30	Topo/9-mile ridge	Garlic mustardn, NLB	Pull whole plants
July 5	13	26	Trails west and far SE	Garlic mustard	Cut and bag seed pods
Aug 2	10	19.5	Trail SE-east of W entrance	Asian honeysuckle	CST
			Formal trail	Motherwort	Dead-head and bag seed tops
			Along trails	Stickseed	Pull and bag
Sept 6	10	17	S-east hilltop, HQ sedge area	Buckthorn	CST and stack WE
Total hours		**197.5**			



LONE LAKE PARK BUMBLEBEE SURVEY FINAL REPORT

Revised August 31, 2022

Author:
Michelle Boone
PhD Candidate
Department of Entomology
University of Minnesota

Hodson Hall
1980 Folwell Ave
St. Paul, MN 55108

Table of Contents

List of Figures

List of Tables

All activities included in this report were conducted under the authority of Scientific Recovery Permit TE30472C-1 (Principal Investigator: E. Evans).

The cover photograph, taken in 2020, shows a prairie restoration in progress near the pickleball court in Lone Lake Park, Minnetonka, MN. Credit: M. Boone.

Executive Summary

This report summarizes the findings of bumble bee surveys conducted in Lone Lake Park, Minnetonka, during the summers of 2020-2022. Non-lethal surveys were conducted at two sites within the park. The objective was to document the bumble bee community within the park, including the federally endangered rusty-patched bumble bee, *Bombus affinis*. Each site was surveyed six times each year between June-August. Ten bumble bee species were documented foraging from 39 plant species over the three-year survey period. In 2020 and 2021, there were 1,033 and 1,137 bumble bees documented, respectively. There were 713 bumble bees documented in 2022. The number of species present remained constant across all three years of surveys. Male and worker rusty-patched bumble bees were detected in Lone Lake Park, representing less than 1% of the observed bumble bees throughout the surveys. There is not enough data on the rusty-patched bumble bee population in Minnesota to assess the proportion of the population present in Lone Lake Park. While the presence of rusty-patched bumble bees foraging in the park has been confirmed, more evidence is needed to determine whether this species uses the park for nesting or overwintering habitat.

Introduction

The rusty-patched bumble bee (*Bombus affinis*) is a federally endangered species found in the Eastern United States, ranging from eastern North Dakota to the Atlantic coast, and south to Tennessee and Georgia (Figure 1). Once a relatively common species, the rusty-patched bumble bee has experienced a drastic decline and has been extirpated from much of its previous range since the 1990's[1]. The species was listed as endangered under the Endangered Species Act[2] in 2017, becoming the first listed bee in the continental U.S. Bumble bees are important pollinators of crops and wild flowering plants.

The U.S. Fish and Wildlife Service (USFWS) delineates areas where rusty-patched bumble bees are likely to be present in suitable habitat (high potential zones), primary dispersal zones (low potential zones), and uncertain zones (low potential zones)[3] (Figure 1). The high potential zones are based on recent (2007-current) sightings of rusty-patched bumble bees, while primary dispersal zones are areas surrounding the high potential zones. Uncertain zones represent slightly older records (2000-2006). Lone Lake Park is located within the high potential zone for rusty-patched bumble bees.

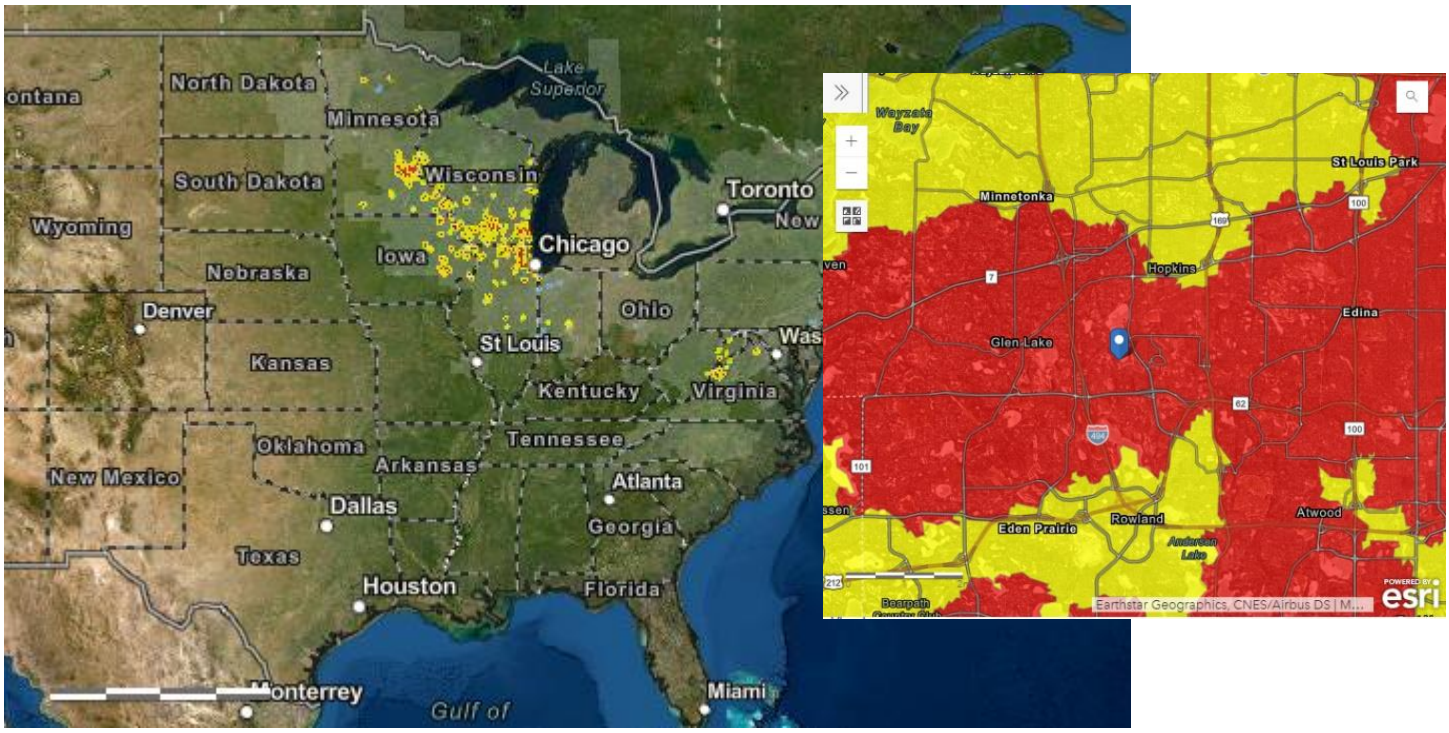


Figure 1. Rusty-patched bumble bee range map. High potential zones are red, primary dispersal zones are yellow, uncertain zones are blue, and the historic range is light green. The map on the right shows Lone Lake Park, represented by the blue arrow. Map courtesy of USFWS[3].

[1] Colla, S.R. and L. Packer (2008) Evidence for decline in eastern North American bumblebees (Hymenoptera: Apidae), with special focus on *Bombus affinis* Cresson. Biodivers Conserv, 17:1379-1391. DOI 10.1007/s10531 008-9340-5
[2] United States. (1983) The Endangered Species Act as amended by Public Law 97-304 (the Endangered Species Act amendments of 1982). Washington: U.S G.P. O).
[3] Range map can be found online at https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html Last updated Feb. 19, 2020.

Bumble bees require foraging habitat (i.e. blooming flowers), nesting habitat, and overwintering habitat. Rusty-patched bumble bees have been documented foraging on a wide variety of flowers, including both native and non-native species[4]. Foraging areas must be located within the maximum foraging range of the nest site. The maximum documented foraging distance of bumble bees is 9.8 km[5], but they typically forage within 1 km of the nest[6,7,8]. The nesting requirements of *Bombus affinis* are not fully understood, but they have been documented nesting primarily underground, typically in abandoned rodent nests located from six to eighteen inches below the surface[9,10]. Occasionally nests will be constructed on the surface in areas such as clumps of grass on the ground[11]. In recent years, *B. affinis* nests have been documented in urban and natural habitats, including the exterior wall of a private home and underground in a garden, a woody park[17], and the side of a wooded bluff (Boone, unpublished). Due to the variability in their nesting habits and the difficulty in locating nests, it is challenging to predict where nesting will occur. Overwintering habitat requirements are not known for rusty-patched bumble bees but are assumed to be similar to those of other bumble bees, burrowing underground or in rotting logs[12]. The objective of the Lone Lake Park Bumble Bee Survey was to document the bumble bee community present in the park, including verifying the presence of rusty-patched bumble bees.

Survey Methods

The methods used in the Lone Lake Park Bumble Bee Survey can be found in the U.S. Fish and Wildlife Survey Protocols for the Rusty Patched Bumble Bee. The "Project Review" protocol for High Potential Zones was followed. The protocol recommends 1 person-hour per 3 acres of habitat and four equally spaced sampling periods from mid-June to mid-August[13]. Six surveys, rather than four, were conducted at Lone Lake Park to increase the probability of detecting rusty-patched bumble bees in the park if they are present[14]. Surveys were only conducted when temperatures were above 60° F and there was no precipitation. Survey dates are listed in Table 1.

Two areas of suitable habitat were surveyed within Lone Lake Park (Figure 2). These areas are referred to as the east site (or rain garden site), located between the pickleball and tennis courts, and the west site (or nine-mile creek site), located north of Rowland Road. Each site was surveyed for one hour on each date. A timer was started at the beginning of each survey. During each survey at both sites, one

[4] Simanonook, M.P., Otto, C.R., Cornman, R.S., Iwanowicz, D.D., Strange, J.P., & Smith, T.A. (2021). A century of pollen foraging by the endangered rusty patched bumble bee (*Bombus affinis*): Inferences from molecular sequencing of museum specimens. *Biodiversity and Conservation*, *30*(1), 123-137.
[5] Goulson, D., & Stout, J. C. (2001). Homing ability of the bumblebee *Bombus terrestris* (Hymenoptera: Apidae). *Apidologie*, 32(1): 105–111. https://doi.org/10.1051/apido:200111
[6] Dramstad, W.E. (1996) Do bumble bees (Hymenoptera: Apidae) really forage close to their nests? *Journal of Insect Behavior*, 9:163-182.
[7] Osborne, J.L., S.J. Clark, R.J. Morris, I.H. Williams, J.R. Riley, A.D. Smith, D.R. Reynolds, and A.S. Edwards. 1999. A landscape-scale study of bumble bee foraging range and constancy, using harmonic radar. *Journal of Applied Ecology*, 36:519-533.
[7] Rao, S., & Strange, J. P. (2012). Bumble bee (Hymenoptera: Apidae) foraging distance and colony density associated with a late-season mass flowering crop. *Environmental Entomology*, *41*(4), 905–915. https://doi.org/10.1603/EN11316
[9] Plath, O.E. 1922. Notes on the nesting habits of several North American bumble bees. *Psyche*, 29(5-6):189-202.
[10] Plath, O. E. 1927. Notes on the nesting habits of some of the less common New England bumblebees. *Psyche*, 34: 122-128.
[11] Macfarlane, R. P., K. D. Patten, L. A. Royce, B. K. W. Wyatt, and D. F. Mayer. 1994. Management potential of sixteen North American bumble bee species. *Melanderia*, 50: 1-12
[12] Macfarlane, R.P. 1974. Ecology of *Bombinae* (Hymenoptera: Apidae) of Southern Ontario, with emphasis on their natural enemies and relationships with flowers. PhD, thesis, University of Guelph, Guelph, ON, Canada.
[13] USFWS (2019) Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*). Version 2.2.
[14] Evans, E., Boone, M., & Cariveau, D. (2019). Monitoring and Habitat Assessment of Declining Bumble Bees in Roadsides in the Twin Cities Metro Area of Minnesota.

individual of each bumble bee species observed was netted, chilled on ice, photographed, and released for identification verification. All rusty-patched bumble bees were netted and photographed for documentation. The timer was paused during these activities so that one hour of active surveying occurred. Surveys were conducted along a meandering path in which the observer searched for bees on blooming flowers. The species and sex of all bumble bees observed during the surveys were recorded (Appendix A). Two species, the black and gold bumble bee (*B. auricomus*) and the American bumble bee (*B. pensylvanicus*), appear similar and are challenging to differentiate in the field, so these two species were grouped together during the surveys. The floral species on which bumble bees were observed foraging was also recorded (Appendix B).

Table 1. Bumble bee survey dates in 2020-2022.

	2020	**2021**	**2022**
Survey 1	June 15	June 14	June 14
Survey 2	July 2	June 28	June 27
Survey 3	July 17	July 12	July 12
Survey 4	July 31	July 26	July 26 and July 27*
Survey 5	August 11	August 9	August 9
Survey 6	August 25	August 23	August 25

*For survey 4 in 2022, sites were surveyed across two days due to rain.

Survey Locations

Two locations were surveyed within the park (Figure 2). Locations were selected based on the availability of suitable foraging habitat. Each location was surveyed 6 times per year during the summer. The east site (or rain garden site) has an area of approximately 3.09 acres and includes suitable foraging habitat near the basketball court, parking lot, pickleball court, and the field leading to the tennis court (Figure 2). The west site (or nine-mile creek site) is located north of Rowan Road. It has an area of approximately 2.28 acres and includes suitable habitat near the parking lot, along the trail, and within the prairie restoration running parallel to the south fork of Nine-Mile Creek (Figure 2).

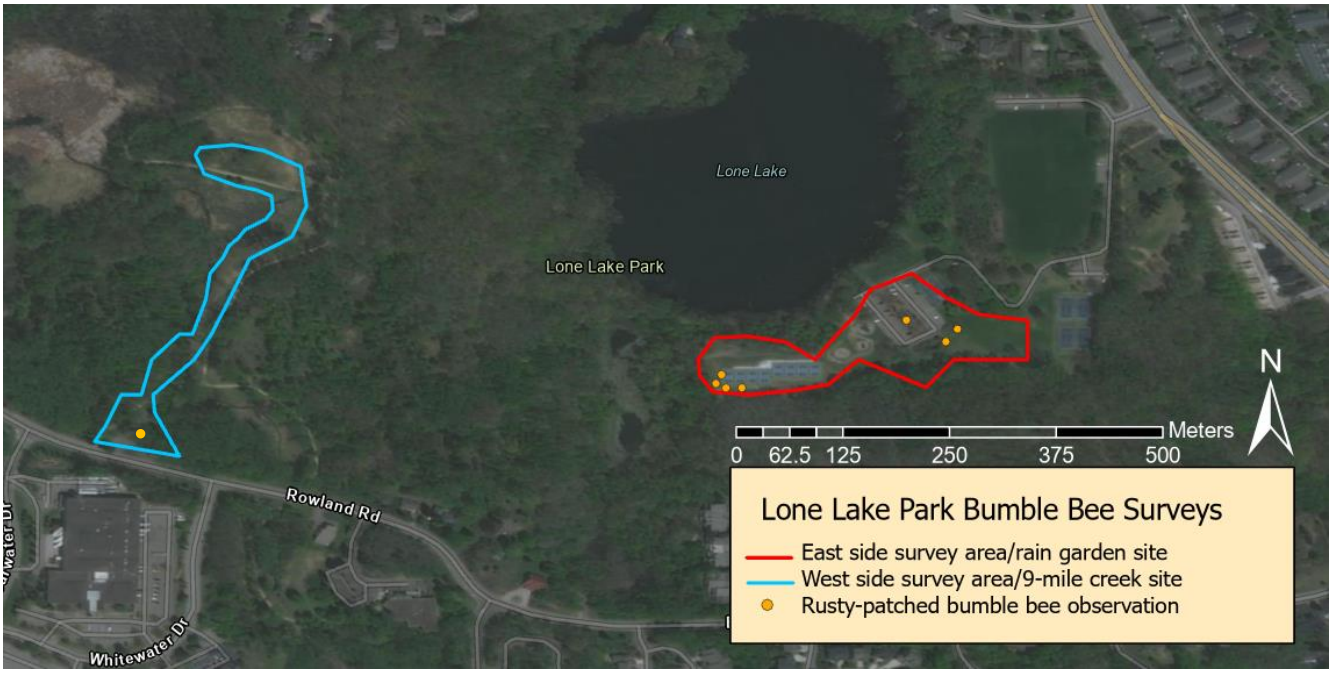


Figure 2. Sites surveyed in Lone Lake Park. The blue outline shows the survey site on the west side of the park (nine-mile creek), while the red outline shows the site on the east side of the park (rain garden). The locations of the rusty-patched bumble bee observations are represented by orange circles. Map created using Esri ArcGIS Pro.

Results

Ten bumble bee species were documented in Lone Lake Park (Table 2; Figure 3) foraging on 39 plant species, including 24 native species and 15 non-native species (Appendix B). A total of 1,033 bumble bees were observed in 2020 and 1,137 bumble bees were observed in 2021 (Table 2). In 2022, there were 713 bumble bees observed. The black and gold bumble bee and American bumble bee are difficult to distinguish in the field, so these two species were grouped together during the surveys for efficiency. Both species were present, as verified by photographs from individuals that were captured and observed up close (Figure 3). Rusty-patched bumble bees were documented at both sites in the park (Figure 2). On July 17, 2020, one male rusty-patched bumble bee was observed foraging on beebalm (*Monarda fistulosa*) in the parking lot rain garden. In 2021, six rusty-patched bumble bees were observed. On July 12, two workers were observed foraging on bee balm (*M. fistulosa*) and bird's-foot trefoil (*Lotus corniculatus*). On July 26, four males were detected foraging on Joe Pye weed (*Eutrochium maculatum*) and fragrant hyssop (*Agastache foeniculum*). In 2022, one rusty-patched worker was observed foraging on bee balm along the edge of the turf grass field on the east side of the park on July 26, while another was seen near the parking lot at the west side of the park on July 27. A few bumble bee nests were observed in the park in abandoned rodent holes and clumps of dead grass, but the species were not identified.

Table 2. Bumble bee species observed foraging in Lone Lake Park. Unidentified species represent individuals which the observer was unable to identify because they flew away too quickly or were missing most of their abdominal hair.

***Bombus* Species**	**Common Name**	**2020 count**	**2020 proportion of total**	**2021 count**	**2021 proportion of total**	**2022 count**	**2022 proportion of total**
B. affinis	Rusty-patched bumble bee	1	<0.001	6	0.005	2	0.003
B. auricomus*/*pensylvanicus	Black and gold/American bumble bee	179	0.173	181	0.159	130	0.182
B. bimaculatus	Two-spotted bumble bee	294	0.285	390	0.343	252	0.353
B. citrinus	Lemon cuckoo bumble bee	76	0.073	115	0.101	73	0.102
B. fervidus	Yellow bumble bee	1	<0.001	16	0.014	1	0.001
B. griseocollis	Brown-belted bumble bee	122	0.118	55	0.048	58	0.081
B. impatiens	Common Eastern bumble bee	279	0.270	282	0.248	117	0.164
B. rufocinctus	Red-belted bumble bee	15	0.015	52	0.046	25	0.035
B. vagans	Half-black bumble bee	60	0.058	38	0.033	55	0.077
unidentified	-	6	0.006	2	0.002	0	0
Total	-	1,033	1.0	1,137	1.0	713	1.0

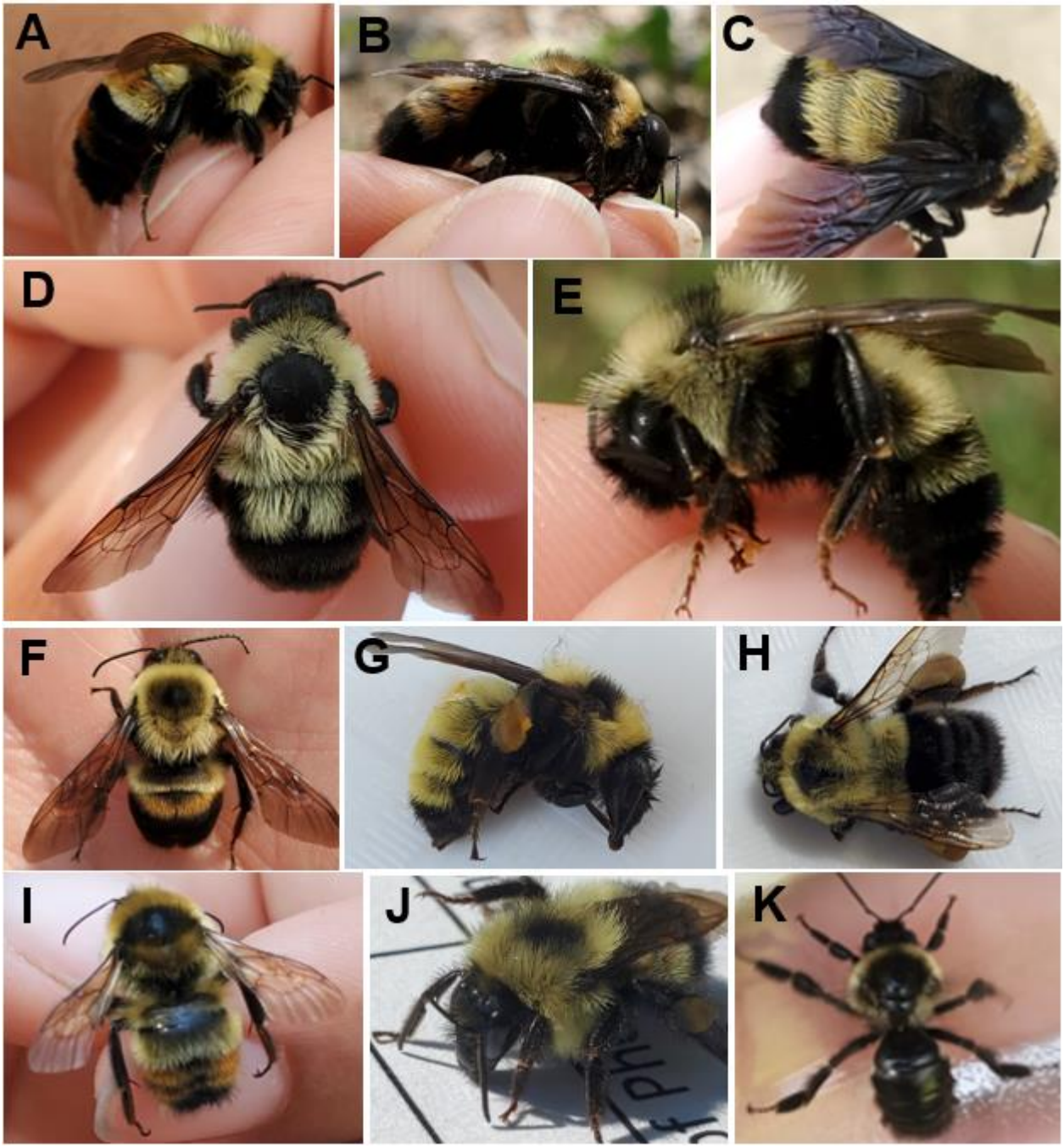


Figure 3. Bumble bee species documented in Lone Lake Park. A) Rusty-patched bumble bee (*B. affinis*); B) black and gold bumble bee (*B. auricomus*); C) American bumble bee (*B. pensylvanicus*); D) two-spotted bumble bee (*B. bimaculatus*); E) lemon cuckoo bumble bee (*B. citrinus*); F) brown-belted bumble bee (*B. griseocollis*); G) yellow bumble bee (*B. fervidus*); H) common eastern bumble bee (*B. impatiens*); I) red-belted bumble bee (*B. rufocinctus*); J) half-black bumble bee (*B. vagans*); and an K) unidentified bumble bee.

Conclusion

This bumble bee survey, along with previous observations[15], have confirmed the presence of rusty-patched bumble bees in Lone Lake Park. The rusty-patched bumble bee represented less than 1% of the total bumble bees documented in Lone Lake Park. For comparison, rusty-patched bumble bees comprised less than 1% of the observed bumble bees in the Minnesota Bumble Bee Survey[16] in parks in the Twin Cities from 2007-2019 overall. The proportion of rusty-patched bumble bees at individual parks ranged from 0-6% of observations (Evans, personal communication). A roadside survey conducted by the University of Minnesota[14] in 2018 found that rusty-patched bumble bees comprised less than 1% of all bumble bee observations. Although there are current bee survey efforts in Minnesota through the University of Minnesota and Minnesota Department of Natural Resources, as well as sightings documented through community science programs such as Bumble Bee Watch and iNaturalist, there are not enough systematic studies to assess the proportion of the statewide rusty-patched bumble bee population represented in Lone Lake Park, as the total population size is unknown at this time. There is, however, evidence that rusty-patched bumble bees forage in the park. Given typical foraging ranges of bumble bees of 1 km, it is possible that rusty-patched bumble bees may also nest within the park. The USFWS compiles data on rusty-patched bumble bees and should be contacted for inquiries regarding current known distribution.

Acknowledgements

Leslie Yetka, City of Minnetonka, coordinated the bumble bee surveys. Dr. Elaine Evans, University of Minnesota, provided data from the Minnesota Bumble Bee Survey.

Appendix A: Bumble bee observations

Survey	*Bombus* species	Female count	Male count	Queen count	Total
6/15/20	*bimaculatus*	47	0	3	50
	auricomus_pensylvanicus	11	0	0	11
	impatiens	4	0	0	4
	griseocollis	2	0	0	2
	vagans	0	0	2	2
	unknown	1	0	0	1
7/2/20	*bimaculatus*	3	0	0	3
	vagans	2	0	0	2
	auricomus_pensylvanicus	4	0	0	4
7/17/20	*impatiens*	44	0	1	45
	auricomus_pensylvanicus	15	0	0	15

[15] There have been 11 verified sightings of rusty-patched bumble bees in Lone Lake Park reported to the citizen science project Bumble Bee Watch since 2015. https://www.bumblebeewatch.org/ Accessed August 8, 2020.
[16] Evans, E. (2019) Minnesota Bumble Bee Survey. http://www.befriendingbumblebees.com/survey.html
[17]Boone, M.L., Evans, E., Wolf, A., Minser, H., Watson, J., & Smith, T.A. (2022) Notes from rusty patched bumble bee (Bombus affinis Cresson) nest observations. Insect Conservation and Diversity, 15(3): 380-384. https://doi.org/10.1111/icad.12564

	bimaculatus	93	112	2	207
	griseocollis	20	12	0	32
	vagans	26	1	0	27
	fervidus	0	1	0	1
	unknown	3	0	0	3
	citrinus	0	8	2	10
	affinis	0	1	0	1
	rufocinctus	7	0	0	7
7/31/20	*impatiens*	119	5	1	125
	bimaculatus	21	8	1	30
	griseocollis	23	48	0	71
	vagans	13	0	0	13
	auricomus_pensylvanicus	89	0	0	89
	citrinus	0	58	0	58
	rufocinctus	1	1	0	2
	unknown	2	0	0	2
8/11/20	*impatiens*	37	16	0	53
	bimaculatus	1	3	0	4
	griseocollis	1	14	0	15
	vagans	4	0	0	4
	auricomus_pensylvanicus	47	1	0	48
	citrinus	0	6	0	6
	rufocinctus	4	0	0	4
8/25/20	*impatiens*	9	43	0	52
	auricomus_pensylvanicus	11	1	0	12
	griseocollis	0	2	0	2
	citrinus	0	1	1	2
	rufocinctus	0	0	2	2
	vagans	7	5	0	12
6/14/21	*fervidus*	1	0	0	1
	bimaculatus	10	0	1	11
	impatiens	1	0	0	1
	griseocollis	1	0	0	1
	auricomus_pensylvanicus	5	0	0	5
6/28/21	*auricomus_pensylvanicus*	6	0	0	6
	rufocinctus	5	0	0	5
	fervidus	4	0	0	4
	impatiens	1	0	0	1
	vagans	2	0	0	2
7/12/21	*bimaculatus*	8	274	2	284
	griseocollis	0	3	0	3
	impatiens	5	1	0	6
	vagans	9	7	0	16
	fervidus	4	0	0	4

	auricomus_pensylvanicus	33	0	0	33
	affinis	2	0	0	2
	rufocinctus	2	0	0	2
7/26/21	*bimaculatus*	40	39	0	79
	impatiens	57	20	1	78
	griseocollis	4	26	1	31
	fervidus	2	2	0	4
	auricomus_pensylvanicus	77	1	1	79
	citrinus	0	53	0	53
	vagans	3	1	0	3
	rufocinctus	2	1	0	3
	affinis	0	4	0	4
8/9/21	*bimaculatus*	15	1	0	16
	impatiens	40	38	1	79
	auricomus_pensylvanicus	54	2	0	56
	fervidus	3	0	0	3
	citrinus	0	31	0	31
	rufocinctus	7	17	0	24
	griseocollis	0	9	0	9
	vagans	5	1	0	6
8/23/21	*impatiens*	39	78	0	117
	rufocinctus	0	18	0	18
	vagans	5	5	0	10
	citrinus	0	27	4	31
	auricomus_pensylvanicus	2	0	0	2
	unidentified	0	1	1	2
	griseocollis	0	11	0	11
6/14/22	*impatiens*	2	0	3	5
	bimaculatus	5	0	0	5
	vagans	0	0	3	3
	auricomus_pensylvanicus	1	0	0	1
	griseocollis	1	0	0	1
	impatiens	1	0	0	1
6/27/22	*vagans*	1	0	0	1
	bimaculatus	3	0	0	3
	auricomus_pensylvanicus	2	0	0	2
7/12/22	*vagans*	13	0	0	13
	rufocinctus	9	1	0	10
	auricomus_pensylvanicus	13	0	0	13
	bimaculatus	5	45	1	51
	impatiens	1	0	0	1
	griseocollis	0	7	1	8
	citrinus	0	2	0	2
7/26/22	*vagans*	11	0	0	11

7/26/22	*bimaculatus*	4	130	1	135
	griseocollis	0	21	2	23
	impatiens	11	1	0	12
	citrinus	0	56	0	56
	auricomus_pensylvanicus	10	0	0	10
	rufocinctus	1	3	0	4
	affinis	1	0	0	1
7/27/22	*impatiens*	41	4	3	48
	bimaculatus	16	32	0	48
	vagans	17	0	1	18
	auricomus_pensylvanicus	54	0	1	55
	griseocollis	0	13	0	13
	rufocinctus	5	1	0	6
	citrinus	0	9	0	9
	affinis	1	0	0	1
8/9/22	*griseocollis*	2	10	0	12
	impatiens	11	4	0	15
	vagans	4	1	0	5
	auricomus_pensylvanicus	35	7	0	42
	bimaculatus	0	4	1	5
	rufocinctus	1	1	0	2
	citrinus	0	4	1	5
8/25/22	*impatiens*	22	12	1	35
	auricomus_pensylvanicus	11	0	1	12
	rufocinctus	1	2	0	3
	vagans	4	0	0	4
	griseocollis	1	0	0	1
	fervidus	0	1	0	0
	citrinus	0	1	0	0

Appendix B: Floral species on which bumble bees were observed foraging

Scientific name	Common name	Status in MN
Agastache foeniculum	Blue giant hyssop	Native
Asclepias incarnata	Swamp milkweed	Native
Baptisia australis	Blue false indigo	Non-native
Chelone lyonii	Pink turtlehead	Non-native
Cirsium altissimum	Tall thistle	Native
Cirsium discolor	Field thistle	Native
Cirsium vulgare	Bull thistle	Non-native
Cornus racemosa	Gray dogwood	Native
Erigeron sp.	Fleabane	Native
Eupatorium perfoliatum	Common boneset	Native

Eutrochium maculatum	Joe-pye weed	Native
Glechoma hederacea	Ground ivy	Non-native
Helenium autumnale	Common sneezeweed	Native
Helianthus occidentalis	Fewleaf sunflower	Native
Helianthus sp.	Sunflower species	Native
Heliopsis helianthoides	Smooth oxeye	Native
Hypericum perforatum	St. Johnswort	Non-native
Leonurus cardiaca	Motherwort	Non-native
Lotus corniculatus	Birds-foot trefoil	Non-native
Lythrum salicaria	Purple loosestrife	Non-native
Melilotus officinalis	Yellow sweet clover	Non-native
Monarda fistulosa	Beebalm	Native
Nepeta cataria	Catnip	Non-native
Penstemon digitalis	Foxglove beardtongue	Native
Persicaria pensylvanica	Pennsylvania smartweed	Native
Physostegia virginiana	Obedient plant	Native
Ratibida pinnata	Gray-headed coneflower	Native
Rosa blanda	Smooth wild rose	Native
Rubus sp.	Raspberry	Native
Rudbeckia hirta	Black-eyed Susan	Native
Securigera varia	Crown vetch	Non-native
Solanum dulcamara	Bittersweet nightshade	Non-native
Solidago canadensis	Canada goldenrod	Native
Thalictrum dasycarpum	Tall meadow rue	Native
Trifolium pretense	Red clover	Non-native
Trifolium repens	White clover	Non-native
Verbena hastata	Blue vervain	Native
Veronicastrum virginicum	Culver’s root	Native
Vicia cracca	Tufted vetch	Non-native