Miesville Ravine Park Reserve
Natural Resource Management Plan
11.22.2023 DRAFT

Dakota COUNTY
forever wild
PARKS

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EXECUTIVE SUMMARY

Purpose and Vision

The following Natural Resource Management Plan (NRMP) outlines the historical context, identifies and describes natural resources and communities, and provides a vision and recommendations for addressing issues to conserve, restore, and manage the land of Miesville Ravine Park Reserve (MRPR).

The vision for the park reserve is to be a landscape that:

- Fosters and builds resilient, mature, and high-functioning ecosystems
- Supports natural hydrology and high-quality habitat within Trout Brook
- Provides habitat for native biota, including Species in Greatest Conservation Need (SGCN)
- Allows people to experience the natural heritage of the area via low-impact activities, sensitive to the park reserve's unique resources
- Includes and engages stakeholders, such as public agencies and adjacent landowners, to achieve the best joint management of natural resources in the area
- Mitigates impacts of climate change
- Achieves regionally outstanding ecological quality

The Miesville Ravine Park Reserve NRMP aligns with the Dakota County Natural Resource Management Vision for the Park System:

The water, vegetation, and wildlife of Dakota County parks, greenways, and easements will be managed to conserve biodiversity, restore native habitats, improve public benefits, and achieve resilience and regionally outstanding quality, now and for future generations.

Background

The park reserve consists of 1,847 acres located along the southern border of Dakota County, though a small extension of MRPR protrudes into Goodhue County. The park reserve is one of six of the parklands, and one of only two reserves, that constitute the Dakota County park system. The land of MRPR is primarily publicly owned, but 332 acres represent private inholdings.

The park reserve is situated along a transition between ecological subsections that includes the level-to-rolling topography of the Rochester Plateau and the heavily dissected landscape of the Blufflands. MRPR is also on the northwestern edge of the Driftless Area, an area that was not covered with glacial drift from the last glaciation event. Trout Brook flows through the central ravine of the parker reserve until its confluence with the Cannon River which flows along the southern boundary of the park reserve. Dozens of steep tributary ravines dissect the park reserve and drain toward Trout Brook, the Cannon River, and several intermittent tributaries.

The unique surface, bedrock, and groundwater geology of MRPR influences many of the existing natural and water resources. Glacial deposits from multiple glaciations combine with a long history of erosion by wind and water create a rugged topography of bluffs and ravines with variable soil types, including areas of loess (windblown silt and fine sand), outcrops, and shallow depths to bedrock. The dissected topography creates variable slopes and aspect that dictate exert control on plant communities. The underlying carbonate bedrock is considered karst-prone and characterized by springs and groundwater discharge. This groundwater influence serves as the source water to Trout Brook and provides temperature and clarity requirements that trout depend on. Karst features also facilitate rapid surface-to-groundwater transport of pollutants and are sensitive to groundwater pollution.

Pre-European settlement was a mosaic of prairie, savanna, woodland, and hardwood forest. The park reserve likely hosted outstanding plant community diversity largely driven by topography, soils, and management by indigenous people. Following European settlement, most prairies and savannas were converted to cropland or pasture, in addition to many wooded areas. Other wooded areas were thinned or exposed to livestock grazing. Fire suppression caused overgrowth of prairies, savannas, and woodlands. Many historical wildlife populations, including keystone species such as beaver and bison, have also generally declined or been extirpated from the park reserve. Other species like white-tailed deer have greatly increased on the landscape. Land use changes also affected the water resources of the park reserve, including ravine erosion, large volumes of sediment deposition along Trout Brook, and channel incision of Trout Brook resulting in a disconnected floodplain.

Modern vegetation exhibits some remnants of the historical vegetation such as bluff prairies and forests that were too steep or rocky to cultivate and dry enough to resist woody encroachment. Twelve land cover types were identified by the NRMP. These land cover types vary in condition from near excellent ecological integrity (remnant bluff prairies) to alterations to the point they no longer resemble native plant communities. The County has restored many formerly cultivated areas and old pastures so that their condition is now on restored trajectory toward resembling a native plant community. Today, the County and partners manage and implement many activities and projects at MRPR and in the surrounding watershed.

Issues

Natural resource issues of MRPR are complex and intertwined. Regional and landscape level issues have impacts across the entire park. More discrete issues specific affect specific terrestrial and stream habitats. Finally, programmatic issues impact implementation efficiency and effectiveness.

Issues identified for the park reserve include:

- Legacy of post-settlement land use
- Regional landscape degradation and fragmentation
- Loss of key ecological processes
- Habitat fragmentation
- Park access
- Terrestrial habitat degradation, including:
    - Invasive vegetation
    - Invasive earthworms
    - Deer browse
    - Grazing legacy
- Riparian habitat degradation
    - Channel incision and disconnected floodplain
    - Log jams
    - Beaver dams
    - Riparian vegetation
- Erosion
    - Ravine erosion
    - Soil erosion
- Excess nutrients
- Programmatic issues
    - Funding
    - Partnerships
    - Citizen outreach, stewardship, and education
- Climate change

Management Goals and Recommendations

Park-wide goals were established to support the vision, address issues, and determine specific management goals and recommendations for priority features, attributes, and activities. Eighteen priority features, attributes, and activities were identified and assigned goals and recommended strategies for achieving goals. A summary of these goals and strategies are provided in ES Tables 1-18.

ES Table 1. Trout Brook and Tributaries Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Improve watershed hydrology and water quality within and beyond the park reserve boundary.	• Work with upstream landowners and partners to implement watershed BMPs and restoration • Restore channels at priority locations
Goal 2: Reconnect the stream with the floodplain	• Restore channels at priority locations
Goal 3: Support channel conditions that provide in-stream habitat	• Work with upstream landowners and partners to implement watershed BMPs and restoration • Restore channels at priority locations • Preserve beaver dams but consider removal of large beaver dams based on impacts • Integrate vegetation management with adjacent Altered Riparian Area
Goal 4: Restore riparian and upland vegetation	• Restore channels at priority locations • Integrate vegetation management with adjacent Altered Riparian Area

ES Table 2. Mesic Hardwood Forest Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Enhance native plant diversity and increase FQI scores	• Control garlic mustard in priority locations, via removal and revegetation • Control invasive woody vegetation in priority locations, via removal and revegetation • Native revegetation of bare soils • Map and prioritize spring ephemeral patches • Monitor plant communities
Goal 2: Reduce invasive vegetation cover to 5%, on average	• Control garlic mustard in priority locations, via removal and revegetation • Control invasive woody vegetation in priority locations, via removal and revegetation

Goal	Strategies
Goal 3: Regenerate native tree species composition and structure that follows the successional stages, natural history, and complex age structure of the target native plant community for MHs37, MHs38, and MHs39	• Native revegetation of bare soils
Goal 4: Preserve spring ephemeral areas	• Control garlic mustard in priority locations, via removal and revegetation • Map and prioritize spring ephemeral patches
Goal 5: Rebuild healthy soils by significantly increasing vegetation ground cover to 25-100%, typical of Mhs37, MHs38, and MHs39	• Control garlic mustard in priority locations, via removal and revegetation • Control invasive woody vegetation in priority locations, via removal and revegetation • Native revegetation of bare soils
Goal 6: Enhance native plant diversity and increase FQI scores	• Native revegetation of bare soils • Map and prioritize spring ephemeral patches

ES Table 3. Remnant Prairie/Savanna Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Maintain existing restored remnant prairie with less than 5% shrub/tree cover	• Continue and expand use of prescribed fire to maintain prairie and savanna • Suppress woody vegetation with alternatives to fire
Goal 2: Maintain existing restored remnant savanna with less than 50% shrub cover and 50% tree cover	• Continue and expand use of prescribed fire to maintain prairie and savanna • Suppress woody vegetation with alternatives to fire
Goal 3: Prioritize and restore unmanaged and overgrown remnant prairies and savannas to historical open condition	• Assess priority remnant sites for restoration reserve-wide • Continue removal of woody vegetation from historical prairie and savanna
Goal 4: Connect remnant prairie fragments where historical conditions support prairie, savanna, or open woodland communities	• Assess priority remnant sites for restoration reserve-wide • Continue removal of woody vegetation from historical prairie and savanna

Goal	Strategies
Goal 5: Maintain or reduce invasive vegetation cover to less than 5% cover on average	• Assess priority remnant sites for restoration reserve-wide • Continue removal of woody vegetation from historical prairie and savanna • Continue and expand use of prescribed fire to maintain prairie and savanna • Suppress woody vegetation with alternatives to fire • Continue vegetation management and establishment in restored areas
Goal 6: Enhance native plant diversity and increase FQI scores.	• Assess priority remnant sites for restoration reserve-wide • Continue removal of woody vegetation from historical prairie and savanna • Continue and expand use of prescribed fire to maintain prairie and savanna • Suppress woody vegetation with alternatives to fire • Continue vegetation management and establishment in restored areas
Goal 7: Conserve dry prairie wildlife specialists	• Assess priority remnant sites for restoration reserve-wide • Continue removal of woody vegetation from historical prairie and savanna • Continue and expand use of prescribed fire to maintain prairie and savanna • Suppress woody vegetation with alternatives to fire • Continue vegetation management and establishment in restored areas

ES Table 4. Reconstructed Prairie Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Maintain reconstructed prairie with less than 5% shrub/tree cover	• Continue vegetation management using prescribed fire, mowing, and spot-invasive treatment • Establish burn units with a diversity of management regimes • Consider consistent diversity of management • Introduce/continue grazing, mowing, and haying • Introduce and establish additional native plant species
Goal 2: Maintain or reduce invasive vegetation cover to less than 5% cover on average	• Continue vegetation management using prescribed fire, mowing, and spot-invasive treatment • Establish burn units with a diversity of management regimes • Consider consistent diversity of management • Introduce/continue grazing, mowing, and haying • Introduce and establish additional native plant species

Goal	Strategies
Goal 3: Enhance native plant diversity and increase FQI scores toward a reference condition	• Establish burn units with a diversity of management regimes • Consider consistent diversity of management • Introduce/continue grazing, mowing, and haying • Introduce and establish additional native plant species
Goal 4: Maximize structural heterogeneity	• Establish burn units with a diversity of management regimes • Consider consistent diversity of management • Introduce/continue grazing, mowing, and haying • Introduce and establish additional native plant species
Goal 5: Conserve prairie wildlife specialists	• Establish burn units with a diversity of management regimes • Consider consistent diversity of management • Introduce/continue grazing, mowing, and haying • Introduce and establish additional native plant species

ES Table 5. Overgrown Oak Woodland Savanna Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Increase native plant diversity and abundance (significantly increase FQI scores)	• Thin and remove non-oak tree and shrub species • Control common buckthorn and Tartarian honeysuckle, following initial woody removal • Native revegetation
Goal 2: Reduce invasive vegetation cover to 5% cover or less, on average	• Thin and remove non-oak tree and shrub species • Control common buckthorn and Tartarian honeysuckle, following initial woody removal • Native revegetation
Goal 3: Regenerate native tree species composition and structure that follows the successional stages and natural history of the target native plant community (see DNR NPC Field Guide, 2005, for detailed plant community descriptions)	• Thin and remove non-oak tree and shrub species • Native revegetation
Goal 4: Rebuild healthy soils by significantly increasing vegetation cover	• Thin and remove non-oak tree and shrub species • Control common buckthorn and Tartarian honeysuckle, following initial woody removal • Native revegetation

Goal	Strategies
Goal 5: Reduce deer population below 10 deer per square mile	• Thin and remove non-oak tree and shrub species • Native revegetation

ES Table 6. Seepage Meadow Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Better understand existing and historical conditions	• Conduct floristic inventory and geomorphic assessment
Goal 2: Increase native plant diversity and abundance to resemble reference remnants and DNR native plant community descriptions	• Control reed canary grass in seepage meadows • Monitor and plan for beaver activity
Goal 3: Reduce invasive vegetation cover to 5% cover on average	• Control reed canary grass in seepage meadows • Monitor and plan for beaver activity

ES Table 7. Altered Riparian Area Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Increase native plant diversity and abundance (significantly increase FQI scores)	• Integrate riparian restoration with stream restoration • Prioritize restoration of upstream areas and tributaries • Thin canopy to stage community restoration toward mature forest • Remove dense patches of reed canary grass
Goal 2: Regenerate native tree species composition and structure that follows the successional stages and natural history of the target native plant community (see DNR NPC Field Guide, 2005, for detailed plant community descriptions)	• Integrate riparian restoration with stream restoration • Prioritize restoration of upstream areas and tributaries • Thin canopy to stage community restoration toward mature forest
Goal 3: Reduce invasive vegetation cover to less than 5% cover on average	• Integrate riparian restoration with stream restoration • Prioritize restoration of upstream areas and tributaries • Thin canopy to stage community restoration toward mature forest • Remove dense patches of reed canary grass

Goal	Strategies
Goal 4: Target approximately 75% forest NPC cover	• Integrate riparian restoration with stream restoration • Thin canopy to stage community restoration toward mature forest
Goal 5: Manage and promote beaver to help maintain and benefit the riparian communities	• Integrate riparian restoration with stream restoration

ES Table 8. Altered Upland Forest Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Improve native understory diversity and composition toward that described in applicable DNR NPC descriptions	• Thin or clear trees and shrubs to blend with adjacent prairie, savanna, or woodland habitat • Restore target NPCs using strategies described for prairie, savanna, woodland, and mesic hardwood forest priority features
Goal 2: Reduce invasive vegetation cover to less than 5% cover on average	• Thin or clear trees and shrubs to blend with adjacent prairie, savanna, or woodland habitat • Restore target NPCs using strategies described for prairie, savanna, woodland, and mesic hardwood forest priority features
Goal 3: Maintain or reduce shrub and tree cover to less than 5% on average for target prairie NPCs and no more than 50% for target savanna NPCs	• Restore target NPCs using strategies described for prairie, savanna, woodland, and mesic hardwood forest priority features
Goal 4: Maintain or increase oaks and white pine within target woodland NPCs with target canopy cover of at least 50%	• Restore target NPCs using strategies described for prairie, savanna, woodland, and mesic hardwood forest priority features
Goal 5: Maintain or increase oaks and basswood within target mesic hardwood forest NPCs with target canopy cover of at least 50%	• Restore target NPCs using strategies described for prairie, savanna, woodland, and mesic hardwood forest priority features

ES Table 9. Altered Grasslands Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Increase native plant diversity and abundance toward target NPC descriptions as described in DNR field guide	• Thin or clear trees and shrubs to restore prairie and savanna habitat • Plant trees suited to target NPCs
Goal 2: Reduce invasive vegetation cover to less than 5% cover on average	• Thin or clear trees and shrubs to restore prairie and savanna habitat
Goal 3: Maintain or reduce shrub and tree cover to less than 5% on average for target prairie NPCs and no more than 50% for target savanna NPCs	• Thin or clear trees and shrubs to restore prairie and savanna habitat • Plant trees suited to target NPCs
Goal 4: Maintain or increase oaks and white pine within target woodland NPCs with target canopy cover of at least 50%	• Thin or clear trees and shrubs to restore prairie and savanna habitat • Plant trees suited to target NPCs
Goal 5: Maintain or increase oaks and basswood within target mesic hardwood forest NPCs with target canopy cover of at least 50%	• Thin or clear trees and shrubs to restore prairie and savanna habitat • Plant trees suited to target NPCs

ES Table 10. Cliff and Rock Outcrops Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Understand distribution, extent, and condition of cliff and outcrop communities within the park reserve	• Map distribution, extent, and condition of cliff and rock outcrop communities
Goal 2: Reduce woody vegetation within ROs12c communities to 0-5%	• Remove woody vegetation encroaching on ROs12 communities • Restore and maintain adjacent communities and ecological processes

Goal	Strategies
Goal 3: Maintain or increase FQI scores based on initial condition with composition and structure representative of target native plant communities (see DNR NPC Field Guide, 2005, for detailed plant community descriptions)	• Remove woody vegetation encroaching on ROs12 communities • Restore and maintain adjacent communities and ecological processes

ES Table 11. Cannon River Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Support water quality of the Cannon River	• Implement watershed and stream restoration practices within the Trout Brook subwatershed • Assess the recreational tubing launch at Orlando Trail
Goal 2: Support wildlife using the Cannon River	• Implement watershed and stream restoration practices within the Trout Brook subwatershed • Assess the recreational tubing launch at Orlando Trail
Goal 3: Minimize erosion and disturbance along the banks of the Cannon River	• Assess the recreational tubing launch at Orlando Trail

ES Table 12. Ravines Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Minimize erosion from ravines to limit the impacts on adjacent and downstream resources	• Inventory and monitor ravines • Develop plans to address concerns, garner funding, and quantify returns
Promote native cover and reduce exotic cover	• Control garlic mustard • Plant a diversity of native understory plants

ES Table 13. Rare Species and Wildlife Priority Feature: Goals and Strategies

Goal	Strategies
Goal 1: Protect and provide habitat for rare species known or likely to occur in the park reserve	• Continue and expand native plant community restoration • Assess rare plant species prior to management actions and park-development activities • Assess Blanding's turtle presence and habitat • Consider reintroductions of dry prairie specialist wildlife • Coordinate with DNR to review fisheries data and if necessary, conduct a fisheries survey and habitat assessment
Goal 2: Provide habitat for a diversity of indigenous wildlife species and SGCN known or likely to occur within the park reserve	• Consider bison reintroduction to reconstructed prairie • Coordinate with DNR to review fisheries data and if necessary, conduct a fisheries survey and habitat assessment
Goal 3: Reduce deer population below 10 deer per square mile	• Manage deer to reduce impact on native plant communities

ES Table 14. Connectivity Goals and Strategies

Goal	Strategies
Goal 1: Reduce edge effects	• Continue native plant community restoration, especially removal in overgrown woody areas • Continue to purchase inholdings, as feasible, to connect and to buffer habitat
Goal 2: Build connectivity and core habitat within and surrounding the park reserve	• Continue native plant community restoration, especially removal in overgrown woody areas • Continue to purchase inholdings, as feasible, to connect and to buffer habitat
Goal 3: Increase core habitat and connectivity	• Continue native plant community restoration, especially removal in overgrown woody areas • Continue to purchase inholdings, as feasible, to connect and to buffer habitat

ES Table 15. Climate Change Resiliency Goals and Strategies

Goal	Strategies
Goal 1: Mitigate harmful changes to natural resources	• Continue native plant community restoration with emphasis on plant and habitat diversity • Monitor for shifts in plant and wildlife populations to inform and adapt management • Manage overgrown woodlands and second growth forest to restore more open woodland and savanna conditions • Selectively and carefully apply assisted migration of plant species or ecotypes that may be climate adaptive • Consider a "regional admixture" approach to seed sourcing • Prioritize surface water and groundwater projects throughout the watershed
Goal 2: Manage for resilient native plant communities	• Continue native plant community restoration with emphasis on plant and habitat diversity • Manage overgrown woodlands and second growth forest to restore more open woodland and savanna conditions • Selectively and carefully apply assisted migration of plant species or ecotypes that may be climate adaptive • Consider a "regional admixture" approach to seed sourcing • Prioritize surface water and groundwater projects throughout the watershed

ES Table 16. Citizen Outreach, Stewardship, and Education Goals and Strategies

Goal	Strategies
Goal 1: Increase public interest, natural resource literacy, and support for parks and open space	• Continue to organize volunteer efforts consistent with current County efforts • Develop volunteer opportunities that combine education, outreach, and stewardship • Continue restoration and management of the native plant communities within the park reserve and educating visitors about its ecology and value
Goal 2: Reduce labor costs and leverage in-kind volunteer match for grants	• Continue to organize volunteer efforts consistent with current County efforts • Develop volunteer opportunities that combine education, outreach, and stewardship • Pilot a site stewardship program and recruit 1-2 volunteer site stewards • Identify MRPR-specific volunteer tasks

Goal	Strategies
Goal 3: Expand site monitoring and data collection capabilities	• Develop volunteer opportunities that combine education, outreach, and stewardship • Pilot a site stewardship program and recruit 1-2 volunteer site stewards • Identify MRPR-specific volunteer tasks
Goal 4: Provide public benefits of natural resources education and stewardship such as knowledge, exercise, and building community	• Continue to organize volunteer efforts consistent with current County efforts • Develop volunteer opportunities that combine education, outreach, and stewardship • Pilot a site stewardship program and recruit 1-2 volunteer site stewards • Continue restoration and management of the native plant communities within the park reserve and educating visitors about its ecology and value

ES Table 17. Partnership Goals and Strategies

Goal	Strategies
Goal 1: Partner with organizations to share resources, leverage funds, and collaborate on funding opportunities	• Continue and expand conservation and restoration project partnership
Goal 2: Partner with organizations to coordinate and implement projects, including education and volunteerism	• Continue and expand conservation and restoration project partnership
Goal 3: Partner with private landowners to implement water quality and habitat management projects	• Continue and expand conservation and restoration project partnership • Pursue partnerships to secure management access to park reserve lands

Implementation

The implementation plan outlines cost and timelines for implementing recommended strategies for priority features. Implementation of native plant community management is based on 46 management units. Implementation is described for native plant community (ES Table 18), water resources (ES Table 19), wildlife management (ES Table 20), and inventory/assessment tasks (ES Table 21-23).

ES Table 18. Cost summary for native plant community management in all units. Baseline management is captured within Maintenance 1 (intensive follow-up management) and Maintenance 2 (long-term, routine management).

Priority Category	Acres	Cost Summary YR 1-5	Cost Summary YR 6-20	Total 20 YR Cost Summary
Maintenance 1	245	$563,143	$112,629	$675,771
Maintenance 2	434	$273,990	$54,798	$328,788
Restoration 1	383	$2,299,751	$459,950	$2,759,701
Restoration 2	783	$3,683,671	$368,367	$4,052,038
Grand Totals	**1846**	**$6,780,025**	**$991,691**	**$7,771,716**

ES Table 19. Estimated costs for remaining Trout Brook stream restorations.

Reach Description	Stream Length (linear feet)	Construction Cost
Tributary (perennial flow north of CR91)	1,100	$49,500
Trout Brook (upstream of CR91 to spring)	2,300	$195,500
Trout Brook (management unit 23)	5,000	$425,000
Trout Brook (management unit 27 downstream to Orlando)	3,650	$310,250
Total Construction Cost		**$980,250**
Engineering Fees (lumped into single project)		**$275,000**
Total	**12,050 linear feet**	**$1,255,250**

ES Table 20. Cost estimates for ongoing wildlife management projects.

Task	Cost YR 1-5	Cost YR 6-20	Total 20 YR Cost
Continued deer management	$25,000	$110,000	$135,000
Beaver conservation	$5,000	$5,000	$10,000
Totals	**$30,000**	**$115,000**	**$145,000**

ES Table 21. Native plant community assessment and inventory tasks identified in the NRMP.

Task	Cost

Map garlic mustard park-reserve wide	$5,000
Map spring ephemerals	$5,000
Assess and map priority prairie remnants	$5,000
Seepage meadow floristic inventories and geomorphic assessments	$6,500
Map cliff and rock outcrop plant communities	$5,000
Manage the state-endangered plant species, *Silene nivea*, according to the DNR permit issued September 2023.	TBD
Total	**$26,500**

ES Table 22. Water resources assessment and inventory tasks identified in the NRMP.

Task	Cost
Ravine assessment and catchment delineation	$8,000
Total	**$8,000**

ES Table 23. Wildlife assessment and inventory tasks identified in the NRMP.

Task	Cost
Blanding's turtle habitat assessment	$5,000
Rare species reintroduction assessments	$20,000
Fish habitat assessment	$8,000
Total	**$33,000**