

2020

Natural Resource Monitoring Progression of Forest Park's Forested Natural Areas in St. Louis, Missouri

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Recommended Citation

Witt, Amy L.; Faber, Shawnell C.; and Jankowski, Alan R. (2020) "Natural Resource Monitoring Progression of Forest Park's Forested Natural Areas in St. Louis, Missouri," *Cities and the Environment (CATE)*: Vol. 13: Iss. 1, Article 14.

DOI: 10.15365/cate.2020.130114

Available at: <https://digitalcommons.lmu.edu/cate/vol13/iss1/14>

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Natural Resource Monitoring Progression of Forest Park's Forested Natural Areas in St. Louis, Missouri

St. Louis City, MO had 121 acres managed as woodland or forested natural areas: 98 acres in Forest Park and 13 acres in O'Fallon Park. In Forest Park, standardized Missouri forest vegetation monitoring plots were started in 1993 to develop and guide habitat management such as thinning, species richness development, etc. In 2018 and 2019, a holistic Natural Resources Management Plan (NRMP) for Forest Park provided additional recommended metrics and monitoring, some of which have already begun implementation.

Keywords

urban forest monitoring, GIS, adaptive management

INTRODUCTION

St. Louis City, MO had 121 acres managed as woodland or forested natural areas: 98 acres in Forest Park and 13 acres in O'Fallon Park. In Forest Park, standardized Missouri forest vegetation monitoring plots were started in 1993 to develop and guide habitat management such as thinning, species richness development, etc. In 2018 and 2019, a holistic Natural Resources Management Plan (NRMP) for Forest Park provided additional recommended metrics and monitoring, some of which have already begun implementation.

CONTEXT

The Missouri Department of Conservation supplied baseline forest analysis and funds to start the professional management of forested natural areas in both Forest Park and O'Fallon Park. Budget constraints and concerns once limited what natural resource management was able to be performed. Forest Park Forever (FPF) assumed and progressed efforts in Forest Park through the staffing and establishment of the Nature Reserve in 2006. As FPF's organizational strength and public acceptance of Forest Park's natural areas management increased, there was an ability to reintroduce natural disturbances and perform thorough restorations to enhance visitor awareness and enjoyment. Over time, monitoring, which was originally implemented as an important tool for management decisions, also became a useful tool for education, communication, and monitoring impacts of the newly instated best management practices. Continued restoration efforts brought a greater need for a holistic park-wide understanding of ecological conditions, management success, green asset development, detailed staff metrics, and funding estimates. Thus, a broader NRMP was developed incorporating adaptability and urban standards.

GOAL

- Complete woodland and forest condition baseline for use in plan development, partner growth, and public communications.
- Develop and collect metrics in which urban management and habitat health can be reviewed.
- Assess restoration and management technique efficiency, resource requirements, chemical usage.
- Choose monitoring techniques and methodologies to allow a diversification of required skillsets, such as guided opportunities for partner and public inclusion for the creation of stewards.

APPROACH USED

Long-term Vegetation Monitoring

Field data collection began in Forest Park's forests in 1993 (see Shifley & Brookshire 2000 for forest monitoring protocols.) Ground layer measurements including species composition and

ground cover composition were collected every 2-3 years. Overstory, understory, and shrub layer measurements, including tree diameter, canopy dominance value, den availability, snag presence, and snag decay, were collected every 3-6 years, depending on management of the site. By using the standard nested-vegetation sampling methodology developed for the current, century-long Missouri Ozark Forest Ecosystem Project (MOFEP), comparisons may extend across broad research completed across the state, and include research on fauna.



Image 1. Forest Park Forever Employees, Catherine Hu and Theodore Smith, perform MOFEP forest vegetation monitoring. Ground story monitoring plots radiate at 45, 135, 225, & 315 degrees from the understory sub-plot center. Data is collected on all flora within a 1 m² quadrat that is less than 1m tall.

Citizen Science

Partnered or collaborated with citizen science initiatives to develop biological inventory and enhance stewardship, e.g., Bioblitz, Frog Watch, BeeBlitz, City Nature Challenge. Urban indicator species that citizen scientists and regional programs can focus their efforts on have been selected. Through current participation of the Urban Biodiversity Inventory Framework, St. Louis City was able to further enhance iNaturalist data with urban indicator species Presence/Absence programming.

Management Techniques Monitoring

Habitats in which much human disturbance and modification have occurred throughout time often had many small-scale variations in which management success varied greatly. Monitoring restoration and management techniques such as seeding success, herbicide success, prescribed burns, and forest stand improvements increased site knowledge, allowed for more tailored management and resources, improved our efficiency, reduced herbicide use, and continued to improve our habitats.

Natural Resources Management Plan

A one-year planning process conducted by Forest Park Forever, St. Louis City, partners, and regional experts has outlined additional metrics to include in forest monitoring, i.e. soil analysis recurring every 3-5 years, light level analysis, and ant diversity and distribution (Forest Park Natural Resources Management Plan 2019).

RESOURCES

- A close partnership between Forest Park Forever and the St. Louis City Parks Department, which owns the park, supports increased efforts and work-quality
- *Funding*: FPF (private, non-for-profit) & private foundation grants
- *Partners*: Missouri Department of Conservation, St. Louis Zoo, Academy of Science St. Louis, City of St. Louis, Missouri Botanical Gardens, and Webster University
- *Contractors*: Biohabitats, Conservation Research Institute, and Institute of Botanical Training
- *Existing Tools*: Universal FQA website

KEY RESULTS

- Stocking rate and groundstory light levels were primary limiting factors of flora diversity, particularly oak and hickory sapling success (Forest Park Natural Resources Management Plan 2019). Progressively oaks and hickories were declining in Forest Park's oak-hickory forests, and shade-tolerant mesic tree species were dominating all vegetation layers other than the upper canopy.
- Thinning or removal of non-native species and overly-abundant mesic tree species was pertinent to the continued existence of Forest Park's native hardwood, oak-hickory forests. Management such as thinning and prescribed burns started in 2015; sites with MOFEP plots were prioritized so the impact of efforts could be monitored. Thinning in combination with plant material supplementation increased flora species found in the ground layer over 300% in the first two years. Flora diversity then minorly decreased. However, an overall increase in both species richness and quality persisted after restoration efforts and continued stewardship.
- Over 1,838 unique species are recorded in the park's biological inventory (2007 – 2019), including some state listed species. Species-specific considerations can be taken into consideration, particularly for listed species.

ADDITIONAL RESOURCES

BeeBlitz information can be found at: <https://beespotter.org/stlbeebrigade>

Bioblitz information can be found at:

<https://www.academyofsciencestl.org/academy-programs/academy-of-science-st-louis-bioblitz/>.

Brookshire, B.L. & Shifley, S.R., eds. (1997). Proceedings of the Missouri Ozark Forest Ecosystem Project Symposium: an experimental approach to landscape research. 1997 June 3-5; St. Louis, MO. General Technical Report NC-193. St. Paul, MN: U.S. Dept. of Agriculture, Forest Service, North Central Forest Experiment Station.

CityNature Challenge information can be found at:

<https://www.stlouis-mo.gov/government/departments/planning/sustainability/urban-vitality-ecology/stl-city-nature-challenge.cfm>

<http://citynaturechallenge.org/>

Dey, D. C., & Kabrick, J. M. (2015). Restoration of Midwestern Oak Woodlands and Savannas. In *Restoration of boreal and temperate forests* (pp. 401–428). CRC Press Inc.

FrogWatch information can be found at:

<https://www.stlzoo.org/education/frogwatchusa>

Urban Biodiversity Inventory Framework information can be found at:

<http://ubif.us/>

<https://www.inaturalist.org/trips>

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