2025 Deer Management Plan
Ross Township
Future Water Pumping
Station #37

Wellhead Protection Program

City of Kalamazoo, Department of Public Services, Water Resources Div.

Table of Contents

Figures

Appendices

Ross Township Future Water Pumping Station #37 (WPS-37) 2025 Deer Management Plan

City of Kalamazoo, Department of Public Services, Water Resources Division

As part of the City of Kalamazoo, Department of Public Services (City,) Public Water Supply System and Wellhead Protection Program Plan (WSSN: 33520), comprehensive land management goals have been established for the City's wellfield as outlined below. This document establishes the land management goal in Section 3.0 Natural Resources Protection – Water Quality Impacts for Deer Management Planning at wellfield WPS-37.

1.0 Comprehensive Land Management of City Wellfields

The City considered existing uses and practices for all the wellfields to create the five following objectives of comprehensive land management.

i. Management of Water Pumping Systems including Utilities
ii. Emergency Planning
iii. Resource Protection by Preventive Measures
iv. Passive Recreation Use for Local Communities
v. Maintaining Natural Features: water resources, forests, plains & animal and plant life

Below is a generalized outline of the land management goals established for all the City's wellfields.

1) Land Use

- Water pumping stations: tanks, boosters, bleeders and other utilities
- Farmed portions of the land with limited chemical treatment and tilling practices
- Passive recreation – hiking & biking trailways

2) City Operations

- Municipal water system/operations & maintenance: buildings, pumps, other assets
- Chemical storage and management

- Hydrogeology and aquifer management
- Emergency planning

3) Natural Resources Protection – Water Quality Impacts

- Pollution prevention
    - Wellhead Protection Ordinance & Performance Standards
    - Site Plan Review Processes
    - Stormwater Management
    - Watershed plans
- Forest Stewardship Plans: tree trimming, harvests & planting
- Habitat protection & creation
- Invasive plant and insect species controls: prevention & elimination treatments
- Animal overpopulation – deer management
- Surface water protection: proper runoff drainage, erosion control

4) Educational Outreach Collaboration

- Stakeholders
- Outreach Tactics & Strategies

2.0 WPS-37 Deer Management Planning

2.1 Background

The Ross Township future water pumping station #37 is vacant land consisting primarily of forest and wetlands. Gull Creek divides the northern parcels (167 acres) from the southern parcels (57 acres). Most of the parcels comprising the "property" were purchased in 1995. These parcels are located on the west side of Greer Drive, north of East G Avenue. An additional parcel was purchased in 2010 north of the confluence of Greer Drive and North 37th Street. The total acreage of the property is 224 acres and there is considerable relief due to the erosional processes of Gull Creek. Refer to **Figure 1** Ross Township Property – Kalamazoo County GIS Map, and **Figure 2** Ross Township Wellfield Map showing wells on the Property.

Consumers Energy has an electric power line easement on the property along the west side of N. 37th Street but only on the portions of the property south of Gull Creek. A sanitary sewer line adjoins the south portion of the property on the west side of the N. 37th Street right-of-way. Under a purchase agreement, one production well, several monitor wells and electric utilities were installed on the property for aquifer testing in the early 1990s. The wells remain on the property for potential future use. All electrical utilities have been disconnected and abandoned.

In 2022, the City initiated land management planning for its wellfield properties by contracting Michigan Registered Forester, Mark P. Janke of Michigan Consulting Forester, LLC to conduct a Forest Stewardship Plan (FSP) for the WPS-37 property. The FSP was finalized in 2022 and the property enrolled in the United States Forest Service (USFS), Forest Steward Program, established to guide landowners in forest management practices. The FSP encourages non-industrial private forest landowners to actively manage their forest in accordance with their own personal goals. The City's goals are to manage the property under the FSP with the assumption it will be developed as a wellfield eventually as outlined in the City's Wellhead Protection Program Plan (WHPPP) revised in 2024. Refer to **Appendix A** Forest Stewardship Plan, Ross Township Property.

The FSP for WPS-37 is a comprehensive report which includes detailed analyses of the forest and wetland conditions, as well as the animal and plant species. ***This document specifically focuses on the MDNR's field observations on the overpopulation of deer on the wellfield property in conjunction with the FSR, and the need for the establishment of deer population control using limited bow archery hunting.***

2.2 WPS-37 Comprehensive Land Management

The following are the existing items/factors related to WPS-37 that are pertinent to the City's land management goals:

1) Land Use

- Water pumping stations: tanks, boosters, bleeders and other utilities
    - Only production and monitor wells remain onsite
    - Wellfield development pending
    - Historical memorial marker preservation

- Farming portions of the land with limited chemical treatment and tilling practices
    - None at WPS-37

- Passive recreation
    - None at WPS-37

- Easement holders
    - Consumers Energy electric power line - routine maintenance

2) City Operations

- Municipal water system/operations & maintenance: buildings, pumps, other assets
    - Dept of Public Services, Water Resources Division
        - Asset management
    - Ross Township

- Chemical storage and management
    - None at WPS-37

- Hydrogeology and aquifer management
    - Various City pump testing reports conducted in the mid-1990s
    - Michigan Geological Survey well mapping project

- Emergency planning
    - Federal, State, and local entities
    - City of Kalamazoo
    - Ross Township

3) Natural Resources Protection – Water Quality Impacts

- Pollution prevention
    - Future Wellhead Protection Ordinance for Ross Township
    - Kalamazoo River Watershed Council
        - Watershed Management Plan 2015 – Pollution and erosion prevention
        - City creek gage

- Forest Stewardship Plans (FSP) – tree trimming, harvests & planting
    - Michigan Forester
        - FSP completed 2022

        - Tree harvest oversight 2024 and 2025
        - Ongoing forest maintenance: tree harvest every 10-15 years
    - Kalamazoo's Public Works' Tree Ordinance and Manual
    - Support from Southwest Michigan Land Conservancy

- Habitat protection as outlined in FSP

- Invasive plant and insect species controls: prevention & elimination treatments as outlined in the FSP

- Animal overpopulation – Deer Management Plan (DMP)
    - Support from MI Dept. of Natural Resources (MDNR)

- Surface water protection – proper runoff drainage, erosion control
    - Support from the Four Townships Water Resources Council
    - Support from Kalamazoo River Watershed Council
    - Support from MDNR's Forest to Michigan Faucet for source water protection (groundwater), woodland conservation & education

4) Educational Outreach Collaboration

- Stakeholders
    - Ross Township
    - Kalamazoo County Drain Commissioner
    - Local users and supporters – residents, local groups
    - Environmental groups
    - Water customers

- Outreach tactics
    - Kalamazoo's main website KalamazooCity.org, Facebook
    - EGLE Wellhead Protection Source Water Annual Grant
        - Kalamazoo's ProtectYourWater.net educational website
        - Social Media advertising, Facebook & Instagram
        - Radio advertising in collaboration with the City of Battle Creek
        - Streaming TV
        - Spotify Programmable Radio
        - Movie theater advertising
        - High school source water protection video contests

    - Kalamazoo WHP Educational Presentations
        - EGLE and MI-AWWA conferences - frequent contributors
        - Girl Scouts day camps
        - Farmers Market
        - Public Services Week
        - Township & Neighborhood meetings/events.

3.0 Forest Stewardship Plan - Deer Management Goals

White-tailed deer (Odocoileus virginianus) are one of the most recognizable and charismatic species of wildlife, but they are the cause of a growing wildlife management problem not only in the City of Kalamazoo but in the City's large properties (wellfields) outside of the City limits. Deer are generalist herbivores that exist in rural, suburban, and some urban areas throughout much of North America. White-tailed deer often shift locations according to different foods available.

During early spring, open canopy vegetation provides herbaceous forage, during summer deer may browse in wetland areas, and in autumn deer often prefer hardwood forests if a mast crop is available (McCullough, 1984). For these reasons, the white-tailed deer is a species that often thrives in the transition between forest and open canopy vegetation, or edge habitat (Alverson, 1988). White-tailed deer thrive on disturbance and fragmented habitats and their populations grow rapidly due to several factors currently existing at WPS-37:

1) Lack of natural predators,

2) Patchy habitats (scattered woodlots),

3) Abundant food resources, and

4) Increased offspring survival.

Based on the FSP, tree regeneration can be browsed heavily by white tailed deer and in some instances the successional trend of trees may be impacted by deer, and/or invasive species and therefore forest management treatments were recommended. The City's goals are largely to promote and influence the successional trend going forward.

One of the recommendation of the FSP is selective tree harvesting to improve the quality of the forest, and by doing so benefit the quality of the surface water and groundwater as Wellhead Protection measures. After a tree harvest, slash, typically the tops of the trees are left on the ground if they are too small in diameter to be useable as sawlogs, are not straight enough to saw, or are damaged in the logging process. An important beneficial outcome of tree harvesting is the resultant slash left in place which becomes an important part of the local ecosystem. Slash provides protective cover for small mammals from predators, as well as protective cover for the natural regeneration of trees from deer. Slash is also an especially important part of nutrient cycling for the forest health.

Another recommendation of the MDNR is the initiation of active deer population control measures. This is consistent with the City's 2022 *Comprehensive Deer Management Program – Report and Recommendations* (CDMPRR) conducted by the Neighborhood Association Ad Hoc Committee to address the urban deer population in the City of Kalamazoo. Refer to **Appendix B** for the report. The purpose of the CDMPRR was to provide the City of Kalamazoo's City

Commission, along with City staff, strategic guidance through the committee's fact- and research-based information, data, and recommendations:

1) Share with our city leaders the biology, ecology, and lifestyle of urban white-tailed deer, and

2) To understand how humans and deer can harmoniously and safely co-exist with each other.

Since WPS-37 is not within the City boundaries, the main recommendation that directly applies to deer management at WPS-37 is the development and implementation of a comprehensive short-, medium-, and long-term deer management program for the health and safety of the City's property ecosystem, deer, and human populations. However, the wellfield properties are protected by the City's Wellhead Protection Program Plan where land use limitations were taken into account. Once of these is the restructured use of chemicals to deter deer. For these reasons, this report relies heavily on the Michigan Department of Natural Resources (MDNR) as a major resource for discussions related to education and advice; including MDNR's regional Wildlife Biologist, Don Poppe, and MDNR research. The research conducted by MDNR included the 2009 Michigan Deer Management Plan, and the 2016 Review of Deer Management Report. For details, refer to the **Reference Section** of this document.

The MDNR identified six principal goals relating to deer that were identified through the report's public input process: (MDNR, 2016, p.1)

1) Manage Deer Populations at Levels that do not Degrade the Vegetation Upon Which Deer and Other Wildlife Depend,

2) Promote Deer Hunting to Provide Quality Recreational Opportunities, as the Primary Tool to Achieve Population Goals, and as an Important Social and Cultural Activity,

3) Manage Habitat to Provide for the Long-Term Viability of White-Tailed Deer in Michigan while Limiting Negative Impacts to the Habitats of Other Wildlife Species,

4) Reduce Conflict Between Humans and Deer,

5) Reduce the Threats and Impacts of Disease on the Wild Deer Population and on Michigan's Economy, and

6) Enhance Public Engagement in, and Awareness of, Deer Management Issues and Knowledge of Deer Ecology and Management.

According to the MDNR website, for "Kalamazoo it is preferred to stabilize the deer population to maintain recreational opportunities. Currently there are 16,000 antlerless tags available on private lands and 1,000 on public lands. It's recommended to maintain the 16,000 tags for antlerless deer on private lands and increasing to 1,200 antlerless tags on public lands. Goals are to decrease the deer population to reduce human-deer conflicts and to mitigate future disease spread probability."

Because a deer management program should outlast the tenure of the people making decisions when the program is initiated, it is valuable to have a written management plan. Such a plan provides an opportunity for the community to document their decision-making process and reasoning and establish guidance for future decisions.

3.1 Selected Deer Management Treatments

The City's Department of Public Services, Water Resources Division, has determined that two viable deer management actions are appropriate for WPS-37 at this time:

1**) Selective Tree Harvesting** followed by,

2) **Limited Archery Hunting**.

Note: There is the potential for the City to also initiate trapping and fishing programs at WPS-37. These programs are appropriate for the natural resources at the property and implementation could take place similarly and simultaneously to a deer management program.

3.1.1 Selective Tree Harvesting

Per the FSR, and after stakeholders' approval, the initial tree harvest was contracted to Northwest Hardwoods Inc. early in 2024 for the portions of WPS-37 located south of Gull Creek. This first phase of harvesting was completed under supervision of the City's contracted forester and author of the FSP, Mark P. Janke, to ensure the Wellhead Protection objectives are aligned with the City's WHPPP and properly implemented as required in the harvest contract. The first phase harvest was successful and met the FSP objectives. Therefore, the second phase of harvesting will be conducted beginning in 2025 and completed in 2026 on the parcels north of Gull Creek. A copy of the Phase 1 and Phase 2 **tree harvest contracts are available upon request**.

Note: If the implementation of the limited bow archery hunting program is successful, the possibility of organizing tree plantings to develop the understory will be considered by the City.

3.1.2 Limited Bow Archery Hunting

Controlled hunting is the application of legal, regulated deer hunting methods in combination with more stringent controls or restrictions as dictated by landowners or government officials. Regulated hunting has proven to be an ecologically sound, socially beneficial, and fiscally responsible method of managing rural deer populations. This method, when used in a safe manner, is often the most cost-effective method for managing rural, urban and suburban deer populations. The primary hunting methods used to safely harvest deer during regulated hunting timeframes typically includes archery and crossbows. The low cost of regulated hunting is one of the more attractive features of this solution to deer conflicts. After consultation with MDNR, the City has chosen to pursue bow archery hunting as an initial means of lethal deer population reduction at WPS-37.

The City will follow its 2022 *Comprehensive Deer Management Program – Report and Recommendations* as it applies to WPS-37 located outside the City's limits. The Program will

also rely heavily on MDNR resources and recommendations for implementation. Refer to the **Reference section** of this document.

Hunts are to be specifically designed to improve safety precautions and accelerate the reduction of present and future deer numbers, and includes limiting hunter numbers, while restricting days or times to hunt. To maximize the effectiveness of the deer reduction, other factors may be incorporated into the number of permits, and the type of deer to target: young vs. old, antlers vs. antlerless, doe vs. buck, etc.

There are two phases for a limited Bow Archery Hunting Program.

Initial Reduction Phase: Used to remove large numbers of deer from an overabundant herd during a short period of time to achieve desired deer densities.

Maintenance Phase: Assuming the Initial Reduction Phase is successful in meeting the City's objectives, the long-term efforts to maintain deer densities at target levels would pursue.

Because deer management is a long-term undertaking, periodic evaluation of the program is an important component. Evaluations should incorporate as much diversity of stakeholder anticipation as did the initial planning process. Progress toward the program goals should be assessed and a determination made on whether modifications to the program are needed. Such modifications may be stimulated by lessons learned during program implementation, data gathered through monitoring, technological advancements, shifts in community priorities, or other causes. In most cases, programs run more smoothly after the first year or two as surrounding residents become accustomed to the management activities and begin to see results. However, controversy can still resurface, and if periodic evaluations and modifications are not conducted, over time the program may become out of sync with the stakeholders' needs and desires.

3.1.3 Venison Donation Programs

The by-product of any deer hunting program is the availability of venison (deer meat). Venison is a lean meat that is low in fat and high in protein, comparing favorably with the nutritional qualities in chicken breasts. Such meat could be distributed to needy communities after processing. Increasingly numbers of people are looking for organically produced, free-range sources of meat, such as from free-ranging game species (including deer) as an alternative to supporting practices typically associated with existing livestock husbandry and processing.

4.0 Deer Management Program (DMP) - Hunting is a Privilege, Not a Right

4.1 PLAN FOR PUBLIC ENGAGEMENT

Step 1

In early 2024, the Public Services Director and City Engineer, James Baker P.E., presented the land management issues at WPS-37 to the Ross Township Board as part of the City's public outreach to its stakeholders. The board was in full acceptance of the proposed limited tree harvesting.

Step 2

Once the DMP is acceptable to the Public Services Director, the next step in the process would be to engage the City Attorney and City Management in this next element of land management planning. Considerations for the stakeholder's acceptance of limited bow archery hunting will be prepared and finalized such that the City can implement the plan.

Step 3

Once City Management in agreement, holding a township or neighborhood workshop and/or annual or semi-annual public meetings to update the community on the hunting progress will be considered.

Step 4

After community acceptance, the DMP budget and funding would be obtained, the DMP process organized and staffed to move it into the implementation phase..

Step 5

It is likely the City will maintain a page on our community's municipal or educational websites regarding the DMP. It will be important to keeping the public apprised of changes to the programs, progress towards the City's goals and objectives, and having a plans or monitoring to clearly identify the successfulness of the programs.

4.2 BUDGET

The following is the City's Archery Hunting Program estimated costs:

- Webpage on Protectyourwater.net – no cost
- Phone ap for onsite location mapping and registration – no cost
- Outreach / education via postings, social media, and publications – $2000
- Staff time estimated 20 hours - $_____
- If venison processing is offered by the City for 10 deer - $_____
- DMAP permits at $10/each from MDNR, estimated 5 hunters in 2025 at WPS-37, maximum deer 2/hunter - $100

4.3 TIMETABLE

The following is the anticipated timetable for the various components of our deer management plan:

- ✓ Q4 2024 - Stakeholder outreach, City approval of DMP, and established funding sources (active tree harvesting occurred on south side of creek).
- ✓ Q2 2025 - Finalize staff and responsibilities, forms, permit process, data collection, outreach, and apply for a MDNR Deer Management Assistance Permits.
- ✓ Q3 2025 - Open City's permit application process to hunters, publicize the DMP using available opportunities, add signage to the property, create webpage(s), and process permit applications.
- ✓ Q4 2025 – Active hunting allowed on the south side of Gull Creek only. The Phase II tree harvesting begins Q3 2025 to Q2 2026 on north side of creek where no hunting is allowed in 2025 or 2026.
- ✓ Q4 2025 – Deer harvest reports from the hunters is collected and analyzed.
- ✓ Q1 to Q3 2026 - Open City's permit application process to hunters, publicize the DMP using available opportunities, update webpage(s), process permit applications.
- ✓ Q4 2026 - Continue processing permit applications with active hunting on both sides of the Gull Creek if possible (routine tree harvesting occurs every 9-10 years).

4.4 RESPONSIBILITIES

For each activity included in a DMP, someone or some entity will be identified as the responsible party for carrying out the program. **DMP staff roles anticipated are:**

DMP Project Leader & MDNR Authorized designee, Public Services staff (2)

- Stakeholder Communicator for outreach/affiliations coordination
- Funding Coordination
- Permit Approver
- Media Outreach Coordination including webpage development
- Liability forms for hunters
- Program Monitor for data collection and annual City reporting
- (optional: Food Distribution for carcass butchering and meat donations)

Geographic Information System (GIS) Specialist support

- Creating mapping app
- Data collection

Property Management Support, Public Services and/or Public Works staff

- Boundary markings
- ADA accessible entrance and parking lot
- Trailway maintenance and improvements

4.5 GOALS AND METRICS

4.5.1 Permits Options

To become a MDNR **Licensed Hunter** a **base license** must first be purchased. This ranges from $6 to $151. Secondly, the hunter must purchase a **deer license** specific to how many deer they want to hunt (i.e., antlerless or antlered).

Deer can be categorized as:

> **Antlerless** - Adult Doe or Fawn Doe, or Adult Bucks that shed their antlers
> These are deer without antlers, or antlers extending less than 3 inches or more above the skull.
>
> **Antlered** – Buck or Fawn Buck
> These are deer having at least one antler that extends 3 inches or more above the skull.

The City has chosen to focus primarily on harvesting antlerless deer as a means of reducing the deer population. **The following are several permit processes considered**.

1) Universal Antlerless tags

Universal antlerless tags are available to the general public allowing hunters to harvest antlerless deer in any area open to antlerless deer hunting (public or private land). A universal antlerless deer tag, which permits hunters to kill doe, can be purchased for residents, and nonresidents of all ages for $20. Hunters are restricted to either one single or combo kill tag per season, but the MDNR allows the purchase of up to 10 universal antlerless deer tags.

2) Deer Management Assistance Permit (DMAP)

DMAP permits are specifically designed for private landowners (or groups of landowners) to manage deer populations on their properties, often to address issues like deer density or agricultural damage. The DMAP program is intended for special circumstances where significant antlerless harvest is necessary to reduce future damage by removing many deer on a property where universal antlerless tags have not been successful. *Note: DMAP licenses can be used by a "Licensed Hunter" as a supplement to the use of hunter antlerless and antler licenses available over the counter.* DMA permits are not stand-alone licenses. DMAP fosters positive relationships between landowners, hunters, and wildlife agencies by providing a framework for collaborative deer management. The daily limit and season limit shall be 1 deer per DMAP.

DMAP application are due no later than October 31 and mailed to Plainwell DNR Customer Service Center – DMA permit, 621 N 10th Street, Plainwell, MI 49080. These permits will cost $10 per tag and may not be sold, traded, or bartered for. You must purchase a minimum of 5 tags per transaction. Permittees (the City) report by January 15 to the wildlife management unit supervisor the name and address of all hunters and the number of deer harvested under the authority of DMA permits. Approvals will be mailed back with the number of eligible permits to purchase from a MDNR retail license dealer.

The first five years are expected to be "declining years" denoted by a decline in deer herds and hunter successes. Afterword's the Maintenance Phase is expected where the deer herd and hunters' successes will stabilize. Success for the City is defined as maintaining the herds at a low level to maximized other land management goals such as planting and reestablishment of quality trees, growth of a healthy forest underbrush, and reducing damaged trees.

The more hunters you cycle through in a season, the more likely you are to harvest more deer. For example, if your limit is 10 hunters for the whole season, October 1 to January 1, they may have a higher success rate, say 30%, but that is only 3 deer. If, however, 100 hunters cycle through the whole season even with a lower success rate, say 20%, you would harvest far more deer (20 deer).

As such, the City of Kalamazoo will take advantage of the DMAP program options to develop the best strategic tactic for the Deer Management Plan. If needed to increase the deer harvest rates, additional programs can be considered.

3) Hunter Access Program (HAP)

In conjunction with the DMAP program, the City could follow the HAP model with lottery drawings for hunting permits within the MDNR's seasonal hunting periods. In this case the state pays the land owner up to $25.00 per acre based on acreage enrolled, type(s) of land cover, and type(s) of hunting allowed. Up to $5/acre is available for land enrolled in USDA Conservation Reserve Program, Wetlands Reserve Easements, or actively implementing a forest management plan. The City would lease the property to the state for 2 years from September 1 to May 31. The type of hunting is determined by the landowner. Landowners are free from liability if enrolled in the HAP under Public Act 451 of 1994. The conservation district will do all of the leg work: post signs, promote the program and maintain HAP registrations stations.

There are advantages under the HAP program. For example, if both DHAs areas are available at WPS-37 (224 acres), the following hunting draws per season would be:

1. October 16-30 (draw 10 hunters)
2. November 1-14 (draw 10 hunters)
3. November 16-30 (draw 0 hunters, no hunting allowed)
4. December 1-15 (draw 10 hunters)
5. December 16-January 1 (draw 10 hunters)

An alternative HAP model for future use consideration is the "**Open All Seasons"** model which is essentially the MDNR State Game Area concept. It requires following MDNR regulations while reducing the amount of management by the City. It cycles through more hunters in a season and can result in greater harvests and hunting pressure. The drawback is that it requires using a registration box at the Property and although the MDNR administrates the harvest, the landowner would have continued property management obligations throughout the seasons.

Additionally, for large tracts of land, harvests can be restricted to "designated plats" within a DHA. This concept is utilized by Kellogg Forest and Pierce Cedar Creek.

4) Earn-Your-Buck (EYB)

The EYB program has proven to be desirable among hunters without reducing the buck population to undesirable levels. If the antlerless deer populations are significantly reduced the EYB program, it can be temporarily suspended as needed to meet the harvest goals. However, the MDNR has indicated that to initiate the DMP, the City would benefit from the unlimited antlerless hunting program until the City's DMP is well established. The EYB program will be considered by the City in the future as a strategic tactic if needed to achieve harvest goals.

4.5.2 Harvest Areas

The City's property in Ross Township is within the MDNR's Deer Management Unit referred to as DMU 312 (Branch, Kalamazoo and St. Joseph counties). The City has Designated Harvest Areas (DHA) at WPS-37 as shown on **Figure 3**. The DHAs take into account Gull Creek which naturally bisects the Ross Township property and has no bridge over the creek. The City's parcel on the south of the creek is referred to as *DHA-Ross South* and the combined parcels north of the creek are *DHA-Ross North*. These designations will be used in the City's permit process. Note: Appropriate land use/hunting signage for the property boundaries will be installed prior to the harvest.

4.5.3 Venison Donation Programs

The MDNR oversees "The Hunters Feeding Michigan" program which is a perfect way for hunters to share their harvest by donating their deer to a participating meat processor. Each deer donated will provide an estimated 160 high-protein and nutritious meals. In addition, anyone can make a monetary donation. More information is available at https://www.michigan.gov/dnr/about/get-involved/hunters-feeding-michigan.

Another option is the Michigan Sportsman Against Hunger Program (MSAH) established in 1991. It is an all-volunteer, 501c3 nonprofit organization, that coordinates participating licensed game processors throughout the state as drop off locations for whitetail deer harvested by hunters and farmers during the hunting season, and deer harvested through deer management practices. Additional information is at https://www.sportsmenagainsthunger.org/.

4.5.4 Firearm Deer Hunting

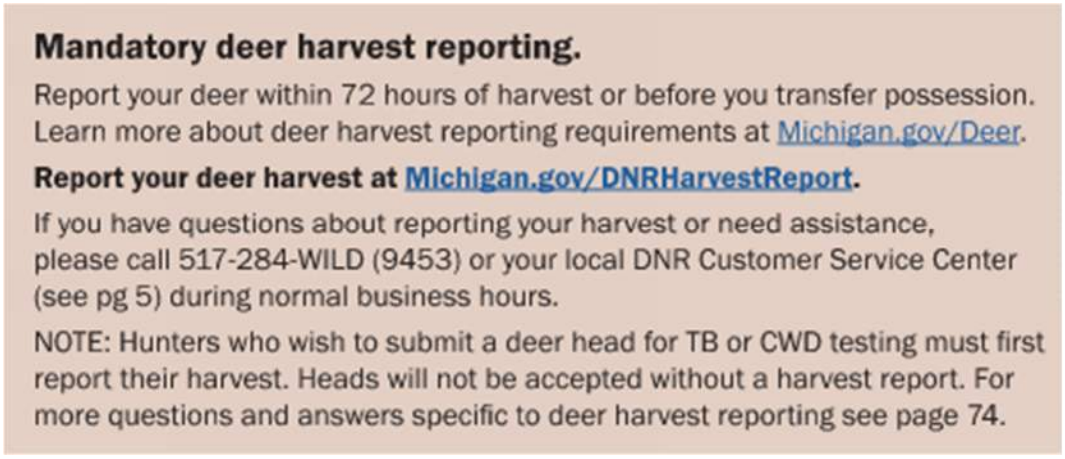
Although not a consideration at this time by the City, firearm antlerless deer hunting in the late season, December 16 to January 1, can result in higher antlerless harvest. The City's Ross Township property could be safely firearm hunted per the MDNR.

4.6 PLAN FOR HARVEST MONITORING

4.6.1 MDNR Reporting

Mandatory harvest reporting to the MDNR is required by all hunters. The most current MDNR Hunting Digest will be strictly followed for all hunters on City-owned property (refer to the **Section 7.0 References** for more details).

Hunters can report a harvest to MDNR using the following website link: https://www.michigan.gov/dnr/things-to-do/hunting/deer/harvest-reporting. The MDNR's customer service center is also available if issues are encountered during reporting. Refer to https://www.michigan.gov/dnr/about/contact/csc.



Mandatory deer harvest reporting.

Report your deer within 72 hours of harvest or before you transfer possession. Learn more about deer harvest reporting requirements at Michigan.gov/Deer.

Report your deer harvest at Michigan.gov/DNRHarvestReport.

If you have questions about reporting your harvest or need assistance, please call 517-284-WILD (9453) or your local DNR Customer Service Center (see pg 5) during normal business hours.

NOTE: Hunters who wish to submit a deer head for TB or CWD testing must first report their harvest. Heads will not be accepted without a harvest report. For more questions and answers specific to deer harvest reporting see page 74.

4.6.2 City of Kalamazoo Reporting

Additional to MDNR reporting, the City will develop a list of the indicators for monitoring to assess progress towards achieving the City's objectives. The City will collaborate with the MDNR to determine the best indicators for hunters to report back to the City. These indicators will be revised over time to determine the success in reducing the deer population at each of its DHAs.

Hunters will be required to fill in Harvest Sheets which may include data on deer removal, conditions of the deer when shot, signs of disease, etc. The City encourages hunters to take pictures of the harvest and may opt to have them posted on the City website(s) or other media.

5.0 Implementation of the Program

Archery hunting is a popular and important recreational activity. Hunters will play a significant role in deer management at WPS-37 for data collection associated with fluctuations in population size and health to mitigation of browsing damage. The Ross Township property will offer a limited bow archery hunting opportunity on the majority of the 200+ acres.

It is the goal of the City's hunting program to reduce the deer population to sustainable numbers that will results in healthier forests and improve surface water and groundwater quality. Hunters will be required to provide data on deer removal, as described in **Section 4.6**. The program will enable City Staff to keep hunters informed about upcoming management, or educational events. City Staff will monitor who accesses the property and insure the safest experience possible for them.

Step 1

The City will first apply for MDNR Deer Management Assistance Permits (DMAP) which is intended for special circumstances where significant antlerless harvest is necessary to reduce future damage by removing many deer on your property where universal antlerless tags have not been successful. Applicants may purchase up to 10 universal antlerless deer licenses, with no application required for hunting in the lower peninsula. As indicated in **Section 4.5**, DMAPs should supplement or support the use of hunter antlerless and antler licenses available over the counter.

By entering the DMAP program the City would agree to comply with the program regulations, authorized hunters-issued permits, and deer harvest report requirements including:

- The desired number of permits to control the deer population on the property.
- These permits will cost $10 per tag and may not be sold, traded, or bartered for. The applicant must purchase a minimum of 5 tags per transaction.
- Property identification numbers or property descriptions for each property where the tags will be used. Copies of property tax information or additional sheets may be provided if necessary.
- DMA permit tags issued will only be legal to use on the properties indicated on your application.
- Tracking of all authorized licensed hunters, issued permits, and deer harvest confirmation numbers.
- When active and acute horticultural damage is being cased by the antlered deer, the DMA permit may be valid for the taking of deer with antlers extending 3 inches or more above the skull with permission.
- Submittal of an application no later than October 31st, mail to Plainwell MDNR.

Upon receipt of the application, the MDNR will send it to the appropriate wildlife biologist(s). They will review and evaluate the number of tags requested. The City would be notified if

denied, or more information such as a site visit is needed to evaluate the eligibility of the application. If the application is approved, the permittee will receive the permit authorization filled in on the form with the number of eligible permits to purchase by the City from a MDNR retail license dealer or online.

Step 2

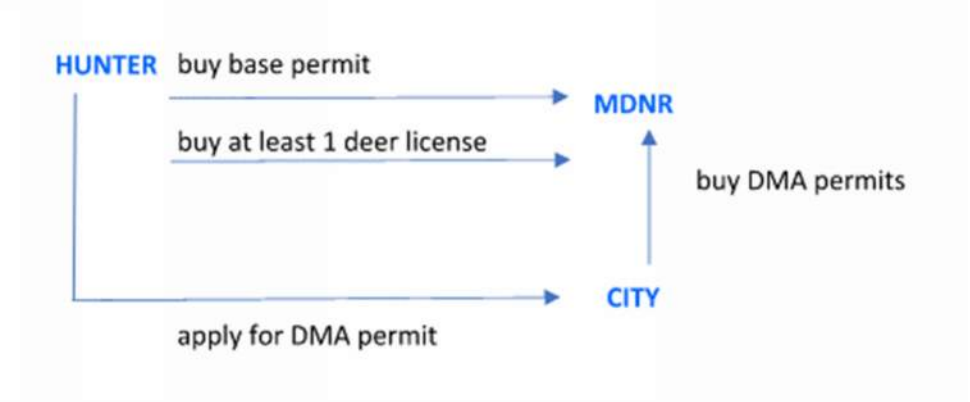
The City would offer their DMA permits to "Licensed Hunters" using a lottery selection system.

> **What is a licensed hunter?** *A licensed hunter is someone who has purchased their base hunting license and at least one deer license for the current season prior to using a DMAP permit tag.*

All Licensed Hunters shall have appropriate deer licenses from the MDNR for the season(s) in which they are hunting. The City would promote (but not require) hunters to purchase universal antlerless deer license per the current MDNR Hunting Digest requirements. (DMA permits do not count against a hunter's license purchase limit.) A universal antlerless deer license allows one kill tag valid for one antlerless deer only.

> **What is a universal antlerless deer license?** *A universal antlerless deer license entitles residents and nonresidents, to take an antlerless deer on public or private land in any deer management unit open to antlerless deer hunting in all deer seasons. No application is needed to purchase a universal antlerless deer license. Hunters of any age may purchase universal antlerless deer licenses, including youth hunters licensed under the Mentored Youth Hunting Program.*

Each season hunters can gain site access and hunt by applying for a **free City of Kalamazoo Archery Hunting Permit**. The City will utilize the most current annual MDNR Hunting Digest for guidance. Permit applications will be accepted from August 1st through 31st. Hunters may apply for the annual permit as an individual or a hunting group (up to 3 people). If applying as a group, only one application is necessary for submittal. All City-approved applicants will be selected using a lottery. Permits/Licenses through the City will be in accordance with the current MDNR Hunting Digest and be strictly followed.



Allowable licenses for WPS-37 are:

- License types including Youth age 9 and under, Youth age 10-16, Resident age 17-64 years and Resident senior age 65+ years.
- Hunters 9 years old and younger licensed through the Mentored Hunting Program and accompanied by a qualified mentor.
- Youth 10-16 years old with a bow regardless of licensed used: single deer, deer comb or antlerless deer.

The MNDR Bag Limit, Area, and Seasonal Dates for hunting will change each year. The following is the from the 2024 MDNR Hunting Digest:

SEASON	AREA	SEASON DATES
Archery - Early Season	Statewide	Oct. 1 - Nov. 14
Archery - Late Season	Statewide	Dec. 1 - Jan. 1

Step 3

Once the lottery is conducted by September 15th, the City will provide these DMA permits to the selected licensed hunters for use only on the property listed on the City's permit. Lottery winners will be notified no later than September 30th.

Hunters will be provided packets from the City which will include the annual permit, parking pass, armbands, harvest sheets, maps, and other important information as necessary. The potential for a phone ap allowing the hunter to navigate themselves on the DHAs may be available.

Hunters will be required to comply with the following per the DMAP:

- Permits may not be sold, traded, or bartered for.
- Authorized licensed hunters using your permits must review and comply with the complete list of regulations under Wildlife Conservation Order 5.80.
- Licensed hunters may take one ANTLERLESS deer per permit during OPEN deer seasons according to the regulations for that season. Please check the current MDNR Hunting Regulation Guide or online www.michigan.gov/deer for season dates and eligible hunting equipment for the permit area.
- If the authorized hunter is unsuccessful, they must return the DMA permit.
- The DMA permit may then be used by one of other eligible licensed hunters.
- Hunters are required to complete Harvest Sheets while hunting as part of the hunting program at WPS-37. The Harvest Sheets must be submitted to the City's Public Services Director at the end of the season.

- Registration is required DAILY when hunting at WPS-37 using the City's instructions provided in the packet (i.e., phone ap or phone call, etc.).
- Hunters can only hunt during times specified in the current Michigan Hunting Regulation Summary for each day of the hunting season. DMUs in Kalamazoo County are within the MDNR's Eastern Time Zone B which means hunting is allowed "½ hour before sunrise to ½ hour after sunset, plus 6 minutes".
- All hunters must wear appropriate hunter orange.
- Hunters must follow the City's hunting, tree stand and other policies.
- ABSOLUTELY NO FIREARMS are permitted on City of Kalamazoo-owned properties.

Photos of harvests are encouraged and may be included in the City's media outreach programs.

WPS-37 hunters will be required to comply with all MDNR rules and requirements, including obtaining and displaying a license and submitting any samples for collection. Anyone found in violation of the DMP, or other applicable law in conjunction with participation of a hunt at WPS-37, may lose their eligibility to participate in the hunt in the current and/or upcoming season(s).

All bow hunters will follow the Bowhunter's Creed provided in **Appendix C**.

Data collected may be shared with MDNR, other educational institutions and state and federal partners to help promote important wildlife management and research.

Please refer to the City's Archery Hunting Permit Application Process in **Appendix D** for additional information regarding important dates, permit fees and related terms and conditions.

6.0 Acronyms

CDMPRR - Comprehensive Deer Management Program – Report and Recommendations, 2022 (City of Kalamazoo)

City - City of Kalamazoo, Department of Public Services

DHA - Designated Harvest Areas (City of Kalamazoo)

DMA – Deer Management Assistance (MDNR)

DMAP - Deer Management Assistance Permit (MDNR)

DMP - Deer Management Program (City of Kalamazoo)

EYB - Earn-Your-Buck (City of Kalamazoo)

FSR - Forest Stewardship Plan (City of Kalamazoo)

HAP - Hunter Access Program (MDNR)

MDNR - Michigan Department of Natural Resources

WPS – Water Pumping Station (City of Kalamazoo)

WHPPP - Wellhead Protection Program Plan (City of Kalamazoo)

USFS - United States Forest Service

7.0 References – Wildlife Habitat

Kalamazoo 2022 Comprehensive Deer Management Program – Report and Recommendations - https://www.kalamazoocity.org/Community/Sustainability-Our-Environment/Urban-Deer-in-Kalamazoo

2024 (or current) Michigan Hunting Regulation Summary, Michigan Department of Natural Resources (MDNR), Wildlife Division - https://www.michigan.gov/dnr/-/media/Project/Websites/dnr/Documents/LED/digests/deer_regs_summary.pdf?rev=5ee29d84d89742be89deecdda6f1e924&hash=1EE65FAA54CD5272C870007BC3A7BB06

The MDNR Wildlife Division has an excellent publication on managing wildlife habitat at www.michigandnr.com/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/index.htm

MDNR Wildlife Conservation Regulations and Legal Descriptions - https://www.michigan.gov/dnr/managing-resources/laws

MDNR Wildlife Division – www.Michigan.gov/Wildlife

MDNR Regulation Book - https://www.mdnr-elicense.com/

MDNR Deer Website - https://www.michigan.gov/dnr/things-to-do/hunting/deer

MDNR Hunter Safety Education - https://www.michigan.gov/dnr/education/hunter-rec-edu-safety

Results of the 2023 DuLuth City Bowhunt, February 2024, Arrowhead Bowhunters Alliance.

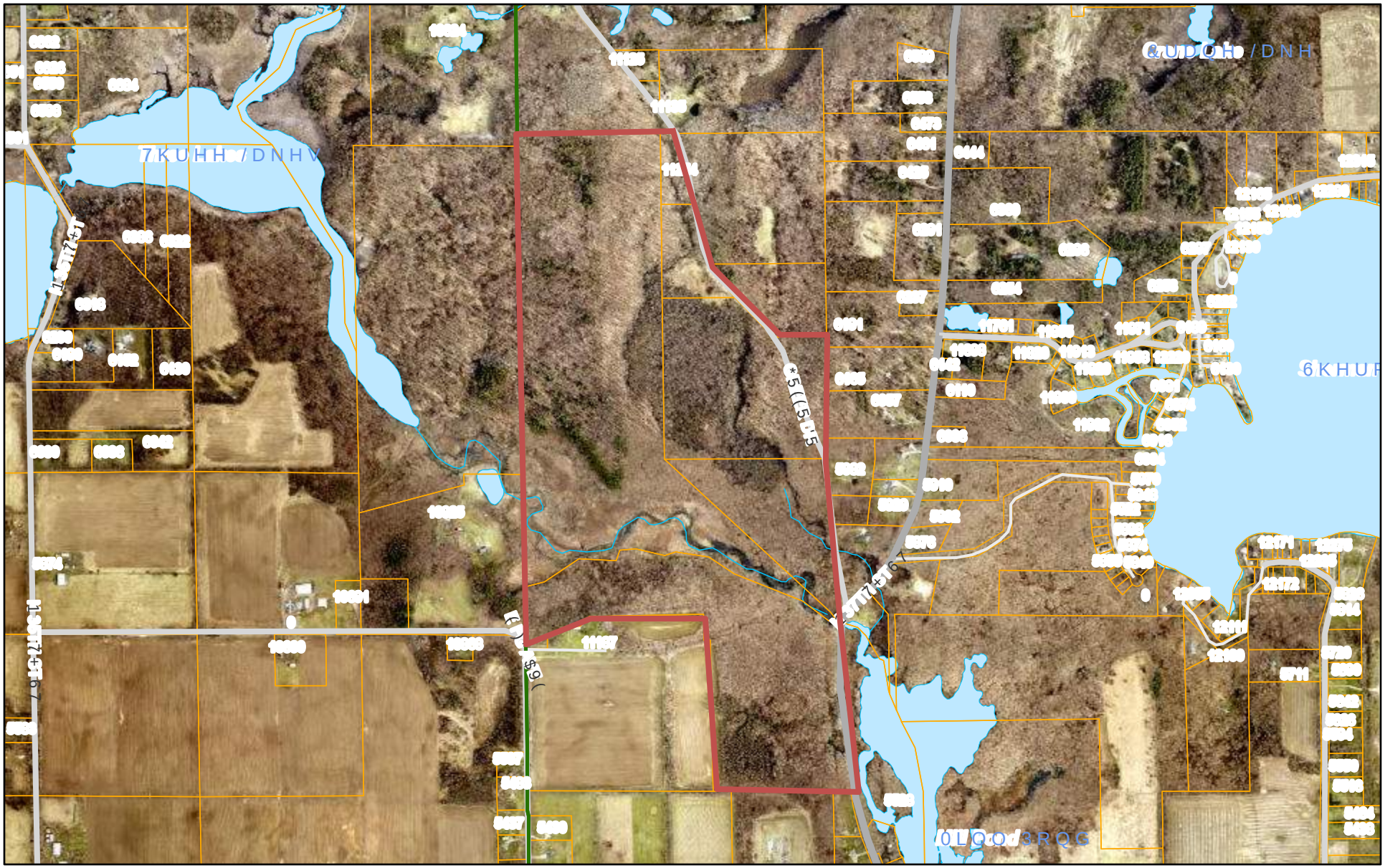
Michigan United Conservation Clubs - https://mucc.org

Quality Deer Management Association – www.qdma.com

Figures

Figure 1 - Ross Township Property – Kalamazoo County GIS Map

.DODPD]RR &RXQW\ *,6



30

$GGUHVV 3RLQWV&RXQW\ /RFDO 5RDG 3DUFHOV

*RYHUQPHQW 8QLWV&RXQW\ /RFDO 5RDG /DNHV

6WUHHW &HQWHUOLQHV 3ULYDWH 5RDG

&RXQW\ 3ULPDU\ 5RDG

PL

NP

(VUL &RPPXQLW\ 0DSV &RQWULEXWRUV (VUL 7RP7R
*HR7HFKQRORJLHV ,QF 0(7, 1$6$ 86*6 (3$ 136 86 &

.DODPD]RR &RXQW\

7KLV PDS LV IRU UHIHUHQFH SXUSRVHV RQO\ DQG GRHV QRW UHSUHVHQW D VXUYH\ RU OHJDO GRFXPHQW 'DWD OD\HUV RQ WKLV PDS DUH JHQHUDWHG IURP LQGL

Figure 2 - Ross Township Wellfield Map

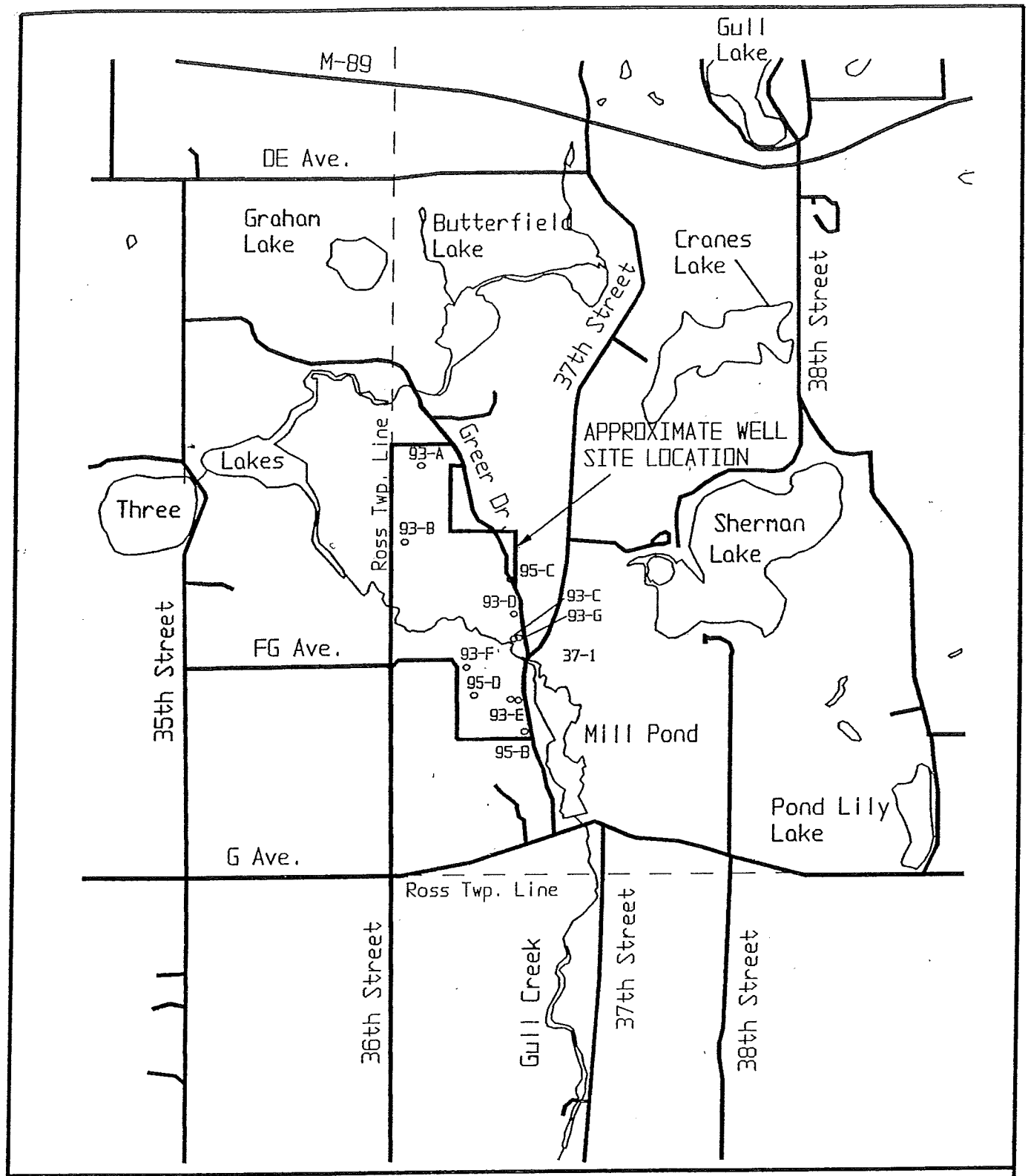


Figure 1

o = Monitoring Well

SCALE

0 1

MILE

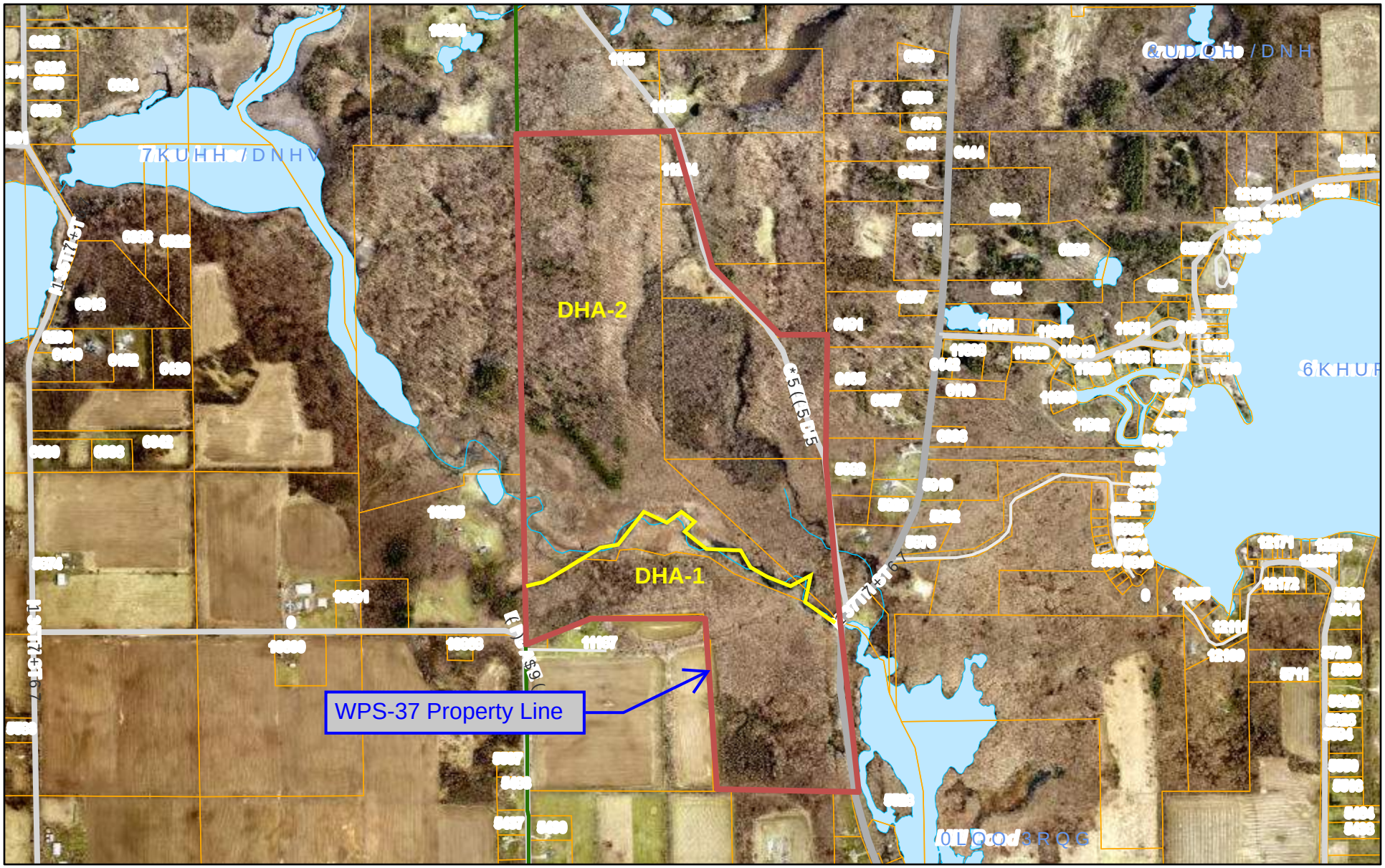
1" = Approximately 2640'

City of Kalamazoo
Ross Township Wellfield
Site Location Map

NORTH

Figure 3 - Designated Harvest Areas (DHA) at WPS-37

.DODPD]RR &RXQW\ *,6



Designated Harvest Areas (DHA)

30

$GGUHVV 3RLQW\&RXQW\ /RFDO 5RDG 3DUFHOV

*RYHUQPHQW 8QLW&RXQW\ /RFDO 5RDG /DNHV

6WUHHW &HQWHUOLQHV 3ULYDWH 1RQ &HUWLILHG 3DUFHOV

&RXQW\ 3ULPDU\ 5RDG

PL

NP

(VUL &RPPXQLW\ 0DSV &RQWULEXWRUV (VUL 7RP7R
*HR7HFKQRORJLHV ,QF 0(7, 1$6$ 86*6 (3$ 136 86 &

.DODPD]RR &RXQW\

7KLV PDS LV IRU UHIHUHQFH SXUSRVHV RQO\ DQG GRHV QRW UHSUHVHQW D VXUYH\ RU OHJDO GRFXPHQW 'DWD OD\HUV RQ WKLV PDS DUH JHQHUDWHG IURP LQGL

Appendices

Appendix A - Forest Stewardship Plan, Ross Township Property

Forest Stewardship Plan

Prepared for the City of Kalamazoo

Environmental Programs & Water Resources Division

Plan Prepared by Mark P. Janke
Mark P. Janke, Consulting Forester, LLC, Registered Forester #545

Plan Duration: 10 years (2023-2033)

The Forest Stewardship Program is funded by the United States Forest Service and administered by the Michigan Department of Natural Resources.
www.Michigan.gov/ForestStewardship

Landowner Contact Information	Plan Writer Contact Information
Name: City of Kalamazoo-Environmental Programs & Water Resources Division Ross Township Parcel	Name: Mark Janke (President) Mark P. Janke, Consulting Forester, LLC
Address: 241 W South Street, Kalamazoo, MI 49007	Address: 2676 111th Ave., Allegan, MI 49010
Phone: (269) 337-8583	Phone: (269)-673-7367
Email: talandaj@kalamazoocity.org	Email: mark@michiganforester.com

Property Information

Total Acres: 224	Forested Acres: 224	Acres in Plan: 224	Tax ID: See list below
Town: 1S	Range: 9W	Township: Ross	County: Kalamazoo

Property Legal Description (Quarter Section, Section, Town, Range, Township, County: 224 acres in the SW1/4 Section 30 and the NW1/4, Section 31, Ross Township, Kalamazoo County, Michigan.
PARCEL(S) 04-30-326-010, 04-30-326-021, 04-30-385-011

Landowner's Goals for this Forest Stewardship Plan

1) Actively manage the forest for recreation, aesthetics, forest health, sustainable timber production, soil resources, and education.
2) Prepare for sustainable commercial timber harvest in the future.
3) Protect forest from pests and diseases and protect threatened and endangered species.
4) Protect water quality and wetlands areas.
5) Enhance educational opportunities for Natural Resources at the institution.

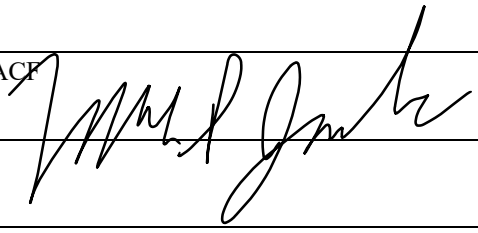
Michigan's Stewardship Ethic

Stewardship is an ethic recognizing that the land and its natural inhabitants have an inherent worth and that we have a responsibility to consider the land as we protect, manage, utilize, and enjoy the forest. Stewardship guides us to conduct our activities to the utmost of our abilities, to ensure the future health, productivity, diversity, and well-being of the land, its natural communities, and species, and to provide opportunities to our successors that are at least equal to ours to use and enjoy the land and its resources.

Signatures of Approval from Landowner, Plan Writer, and DNR Service Forester

This plan describes my goals and objectives for my forest. Participation in the Forest Stewardship Program is voluntary and only indicates my intent to practice sustainable forest management. I understand that enrolling forestland into separate property tax programs like the Commercial Forest Program or the Qualified Forest Program requires my compliance with an approved forest management plan in exchange for the reduction in property taxes.

Landowner: Date:

Plan Writer: Mark P Janke, CF, ACF  Date: 7-13-2022

DNR Service Forester: Date:

After review and approval by the Landowner, the Plan Writer will submit the entire Plan to the nearest DNR Service Forester for their review. **Electronic submission of the Plan is encouraged by emailing a Word document or pdf file to the Service Forester.** The DNR Service Forester will return a hard copy or pdf of the final signature page to the Plan Writer after approval.

Table of Contents

Introduction

Forest Stewardship Program

The purpose of the Forest Stewardship Program is to encourage nonindustrial private forest landowners to actively manage their forest to accomplish their own personal goals for their land. The voluntary Program provides landowners with professional planning from private sector foresters and wildlife biologists to develop and implement their Forest Stewardship Plan. The United States Forest Service (USFS) started the Forest Stewardship Program in 1991 because only 5% of family forest owners had a written plan to guide their forest management activities. The USFS supplies funding and partners with each state forester to provide professional planning and technical assistance to private landowners in their state. The Department of Natural Resources (DNR) administers the Forest Stewardship Program in Michigan. About 5,000 landowners in Michigan have developed a Forest Stewardship Plan to help them protect, manage, and enjoy their unique forest. See www.michigan.gov/foreststewardship for more info.

Landowner's Goals

The City of Kalamazoo owns several properties that have important water producing wells that they manage for the people of Kalamazoo. This property is referred to as the "Ross Township Property" and is a 224-acre property of primarily forest and wetlands. The property is not currently developed, has only a small strip of agricultural land and has not had any prior forest management activity that is apparent. The City's primary goals are to protect the property for potential water well development and general environmental stewardship so that a constant supply of high-quality water is available for the residents of Kalamazoo and that they are good stewards of the lands entrusted to their care. It was suggested by one of the neighbors of the Ross Township Property that active forest management would likely be compatible with the City's goals for the property as healthy forests help protect water quality while at the same time, they can produce other important outcomes such as timber, improved wildlife habitat and recreational values. In most cases, the goals for the landowner reflect their preferences, the attributes of the forest, and the desired future conditions for the land. The primary goal is to manage for long term sustainability and forest health by demonstrating active stewardship and sound management for the multiple uses of timber, wildlife, water quality, and recreation. The landowners have identified the following goals with their forester:

1. Sustainable production of high-quality water for the City of Kalamazoo.
2. Sustainable production of high-quality timber and the production of an economic return from periodic harvest activity that is consistent with maintaining high water quality and improved forest health.
3. Maintain high quality wildlife habitat through active management.
4. Protect soil and water resources.
5. Address forest health concerns such as invasive species.
6. Protect the land from non-authorized use or degradation of the resource by trespassers.
7. Create a legacy for the residence of the City Kalamazoo and Kalamazoo County to enjoy.

In many circumstances, various management strategies can be designed to achieve multiple long-term goals that can enhance the benefits that landowners find desirable from the property. By conducting appropriate forest management practices now, such as the prescribed timber harvests, it

will help future generations of the land to be part of the legacy. Wise sustainable forest management not only considers present forest condition, but also applies scientific principles of forestry management to insure sustained health and increased productivity of the forest over the long term.

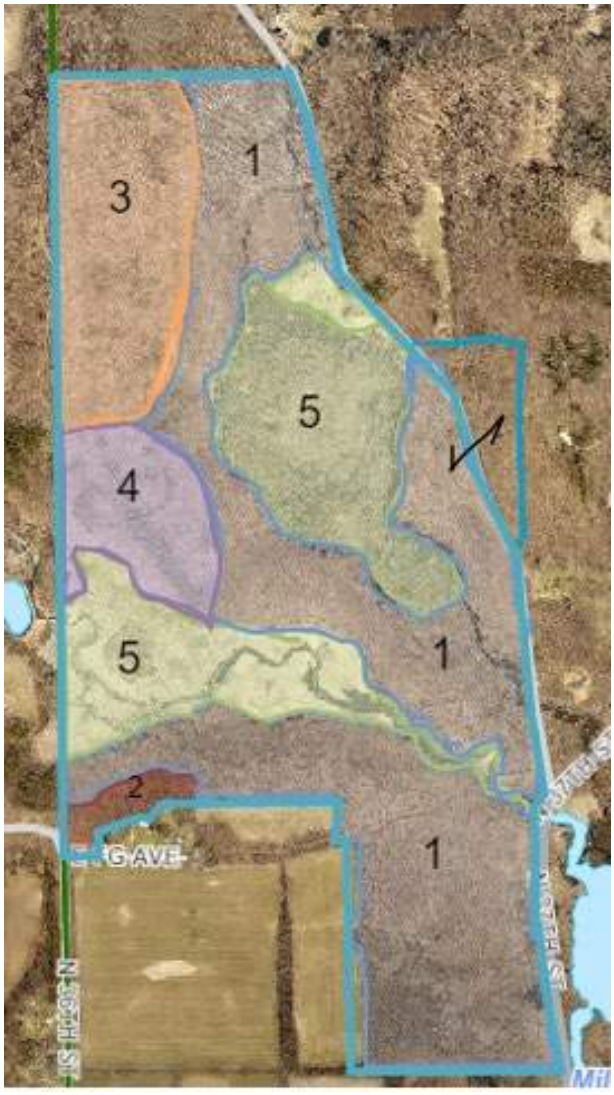
General Property Description

The Ross Township Property is situated in eastern Kalamazoo County between Richland and Augusta, Michigan. The land is just south of M-89 and is bordered by Greer Road as the eastern boundary and the southwest corner of the property is accessible from 36th Street. The property is undeveloped land that is comprised of primarily Mixed Deciduous Forest along with an important wetland complex, connecting natural drainage in the Three Lakes and Mill Pond area. This property is only a few miles south of Gull Lake. Gull Lake has reportedly some of the highest water quality of any lake in the entire State of Michigan. Throughout this plan, we have divided the property into 5 separate management units or "stands". A stand is a forestry term for an area of land containing a similar cohort of trees according to species, age class, site conditions, or management practices.

Ownership Map

Figure 1. Map of the City of Kalamazoo- General property map overview:

Figure 2. Map of the management units/ stands on the property:



Legend

Stand	Acres	Activity
Stand 1: Mixed Deciduous (MD)	121	2023: Commercial Timber Harvest 2033: Commercial Timber Harvest
Stand 2: Black Walnut (BW)	4	2023: Commercial Timber Harvest 2033: Commercial Timber Harvest
Stand 3: Upland Mixed (UM)	29	2023: Commercial Timber Harvest 2033: Commercial Timber Harvest
Stand 4: White pine/Upland Mixed	14	2023 Commercial Timber Harvest
Stand 5 Wetlands	56	Protection
TOTAL	**224**	

Table 1- STAND TABLE

ENTIRE ROSS TOWNSHIP TRACT INVENTORY 168 TOTAL ACRES

Kalamazoo (city-Ross)

TRACT SUMMARY 5-20-22

TRACT INFO 4 STANDS

ACRES 168.0 64 PTS

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	VOLUME PER ACRE MBF	CORDS
Average	133.4	215.0	10.47	20.24
Sampling Error	6.1%	14.3%	14.2%	7.2%
Probable Lower Limit	125.3	184.2	8.98	18.80
Probable Upper Limit	141.6	245.9	11.95	21.68

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	CORDS	TOTAL TRACT VOLUME MBF	CORDS
	133.4		215.0	10.7		10.47	20.24	1,758.42	3,400.14
red maple	30.9	23.2%	51.8	10.5	50.0	2.21	4.89	371.71	822.05
black cherry	27.8	20.8%	58.5	9.3	44.9	1.55	4.53	261.07	761.82
northern red oak	18.8	14.1%	19.2	13.4	63.5	2.23	2.43	374.23	407.58
black walnut	11.9	8.9%	15.5	11.9	60.0	0.66	0.97	111.59	163.00
white pine	9.7	7.3%	6.2	16.9	63.0	1.35	2.01	226.35	338.38
black oak	7.5	5.6%	8.2	12.9	56.3	0.81	1.11	136.20	185.94
pignut hickory	5.6	4.2%	7.1	12.0	58.7	0.54	0.86	90.25	144.12
silver maple	4.1	3.0%	9.4	8.9	41.2	0.16	0.66	27.21	110.54
white oak	3.8	2.8%	3.2	14.6	58.0	0.36	0.49	60.05	82.59
bigtooth aspen	3.1	2.3%	3.1	13.6	68.0	0.28	0.43	47.62	71.85
sugar maple	3.1	2.3%	11.0	7.2	35.2	0.04	0.60	6.81	101.62
American elm	1.9	1.4%	7.1	6.9	29.3		0.42		70.26
blackgum	1.6	1.2%	5.2	7.4	38.4	0.05	0.25	8.63	42.17
bitternut hickory	0.9	0.7%	2.7	8.0	45.3	0.05	0.19	7.83	31.56
sassafras	0.6	0.5%	0.8	12.0	40.0	0.02	0.11	3.23	19.17
pin oak	0.6	0.5%	0.6	13.3	44.0	0.06	0.06	9.46	9.58
northern pin oak	0.3	0.2%	0.1	22.0	80.0	0.05	0.04	8.36	6.66
black locust	0.3	0.2%	2.3	5.0	40.0		0.07		11.76
hackberry	0.3	0.2%	2.3	5.0	16.0		0.04		6.70
boxelder	0.3	0.2%	0.4	12.0	32.0		0.03		4.40
shagbark hickory	0.3	0.2%	0.2	16.0	64.0	0.05	0.05	7.83	8.41

Mark P Janke, Consulting Forester LLC

Terrain map

Figure 3. Map of the terrain on site.

Resource Descriptions

Resources Common to the Entire Property

The following natural resource elements are applicable to the entire property. Additional resources will be described in more detail for each stand.

Threatened and Endangered Species. The Michigan Natural Features Inventory (MNFI) and The Department of Natural Resources (DNR) reports that there are threatened, or endangered species present in the area.
- Speyeria Idalia, Regal fritillary, last observed 1963, Endangered (Legally protected)
- Acris blanchardi, Blanchards cricket frog, Threatened (Legally protected)
- Lithobates palustris, Pickerel frog, last observed 2005, Special Concern (Rare or Status uncertain: not legally protected)
- Scutellarial elliptica, Hairy skullcap, last observed 1947, Special Concern; not legally protected)

Archeological, Cultural, and Historic Sites. There are NO KNOWN special sites or Archeological sites located on the property. The State Historic Preservation Office database does NOT indicate the presence of historical sites in this section of the Township (www.Michigan.gov/Archaeology). Standard Seven of the American Tree Farm System is Protect Special Sites- "Special sites are managed in ways that recognize their unique historical, archeological, cultural, geological, biological, or ecological characteristics". Special sites also include unique natural communities, but there are no unique natural communities on this property (mnfi.anr.msu.edu/communities).

Forests of Recognized Importance. This property is not located within a "Forest of Recognized Importance" (FORI), which in Michigan are forests along the Great Lakes coastline, forests along Natural or Wild and Scenic Rivers, rare forest types (old growth), or forests that provide important wildlife habitat (>500 contiguous acres in the southern Lower Peninsula are required habitat for threatened or endangered species statewide). Landowners within a FORI should manage their forest to protect the ecological integrity of that larger important ecosystem.

Management Access. Access to the property for forest management activities will be from Greer Drive and North 37th St to the east or from the corner of 36th and East FG Avenue at the southwest corner of the property.

Wildlife. This diverse property provides especially important wildlife habitat for many species. The diversity provides stable food sources, shelter and nesting habitat, foraging areas, thermal cover, and nesting areas. Forest management activities will improve the wildlife habitat by creating brush piles, leaving cavity trees, and creating a mosaic of conditions across the landscape. Continuing forest management in the future will lead to a more productive forest and better quantity of wildlife species. The list below provides highlights of some of the key species that are present on the property. This list does not include every species as many more are likely present.

Bird Species:

American Robin	Northern Cardinal	Common Grackle
House Finch	American Goldfinch	Baltimore Oriole

Scarlet tanager	White Breasted Nut Hatch	Northern Flicker
Ovenbird	Northern Flicker	Black Capped Chickadee
Wild Turkey	Veery	Bald Eagle
Great Horned Owl	Pileated Woodpecker	Red Bellied Woodpecker
Downy Woodpecker	Scarlet Tanager	Crow

Mammals:

Raccoon	Opossum	Woodchuck
Squirrel	Rabbit	Coyote
Fox	White-tail deer	

Reptiles:

Eastern Gartner Snake	Painted Turtle	Green Frog
Butler's Gartner Snake	Bull Frog	Western Chorus Frog
Northern Ribbon Snake	Eastern American Toad	Eastern Massasauga Snake

Insects:

Honeybees	Butterflies	Multicolored Asian Lady Beetle
Wasps	Ants	Spiders

General Process of Commercial Timber sales

Timber Sale Process: Consulting foresters play a critical role in all areas of forest management. Forest management often involves the harvest of timber to accomplish silvicultural goals. Foresters help by streamlining the entire process including the selection of proper trees based on science, experience, and the stated landowner goals and objectives. In addition, timber sales set up by professional consulting foresters make sure poor-quality trees are included in the timber sale offering along with some better trees. Prices paid for timber sales offered to the marketplace by consulting foresters often yield higher returns than timber sold by a landowner directly to a timber buyer. There are five basic steps in the timber sale process. The timber sale process can take six to eighteen months, so start planning a year before the desired time of harvest. Spring is often a good time to start preparing for a fall or winter harvest.

Step One: A forest inventory measures the attributes of the forest to determine how to proceed with the sale. This Forest Stewardship Plan does not include this inventory, but the visual stand assessment helps determine when stands are ready for a harvest.

Step Two: The inventory data is used to decide which trees to sell by applying silvicultural methods appropriate for that forest type in accordance with the landowner's goals. The forester should determine which trees to sell, paint those trees at stump and breast height, measure approximate volume, and determine approximate current market value. It is important that the landowner knows the location of their property corners and property lines so that all trees included in the sale are within their property lines. If necessary, a professional boundary survey that locates property corners and marks a few points along property lines is a particularly good investment. This practice minimizes any conflict with neighbors and avoids unintended timber trespass. Surveyors are expensive, but they are a lot cheaper than lawyers.

Step Three: The forester should advertise your timber sale. The true market value of the trees marked for sale is determined by marketing a prospectus to multiple buyers. The forester would write a prospectus describing the trees for sale and will send it to reputable timber buyers to invite them to inspect the trees for sale prior to bidding.

Step Four: The fourth step is to negotiate a timber sale contract between the landowner and the timber buyer. You and your consulting forester should select the best buyer together based on price and other factors (reputation, timing of the harvest, equipment to be used, etc.), check references of the winning bidder, write a unique contract, collect a performance bond, verify liability and workman's compensation insurance. Full payment is collected for the landowner PRIOR to harvest for a lump sum sale of standing timber. The contract period should include two or even three winters to allow loggers enough time to perform the harvest in suitable conditions. The contract will specify that the harvest is to occur when soil conditions are suitable to minimize potential impacts.

Step Five: The forester should also supervise the timber harvest to ensure the contract is followed. Together with the forester, you and the buyer can determine the best location for skid trails and log landings to accommodate log trucks and harvesting equipment. Consider placing the landing area and skid trails in areas that can be used to service future timber harvests or provide better access for recreational pursuits. Your forester should make visits to the harvesting site during timber harvest to verify performance and help answer questions that the logger may have that arise during the logging. At the end of the harvest the forester will refund the performance bond back to the purchaser after all the conditions of the timber sale contract have been successfully met.

Timber Harvest Methods: Foresters use two categories of timber harvest methods; even-aged and uneven-aged methods. Even-aged methods create a whole new cohort of trees with a similar age throughout the entire stand while uneven-aged methods preserve a large variation in age classes in the stand. Even-aged harvest methods include "shelter-wood" and "clear-cuts" – both of which favor the regeneration of shade intolerant species, such as Aspen, Oak, Cherry or Black walnut that require lots of sunlight for reproduction and survival. Even-aged methods are also used in plantation forestry. Uneven-aged harvest methods include "single tree selection" or "group selection" – both of which favor the regeneration of shade tolerant species like Sugar maple and American beech that can reproduce and survive under full shade. Uneven-aged silvicultural methods will be used on the majority of the units to maintain the diverse age classes and species composition of the forest.

Figure 4: Demonstrates the differences between an even-aged and uneven-aged forest.

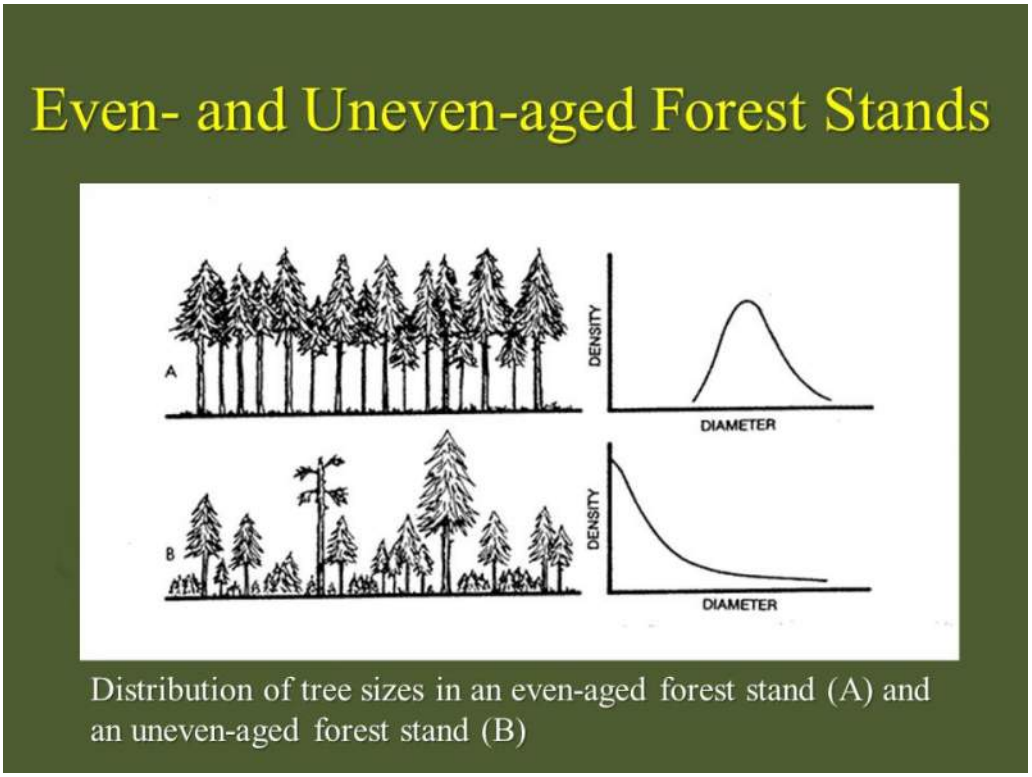


Figure 5: Diagram demonstrating single tree selection.

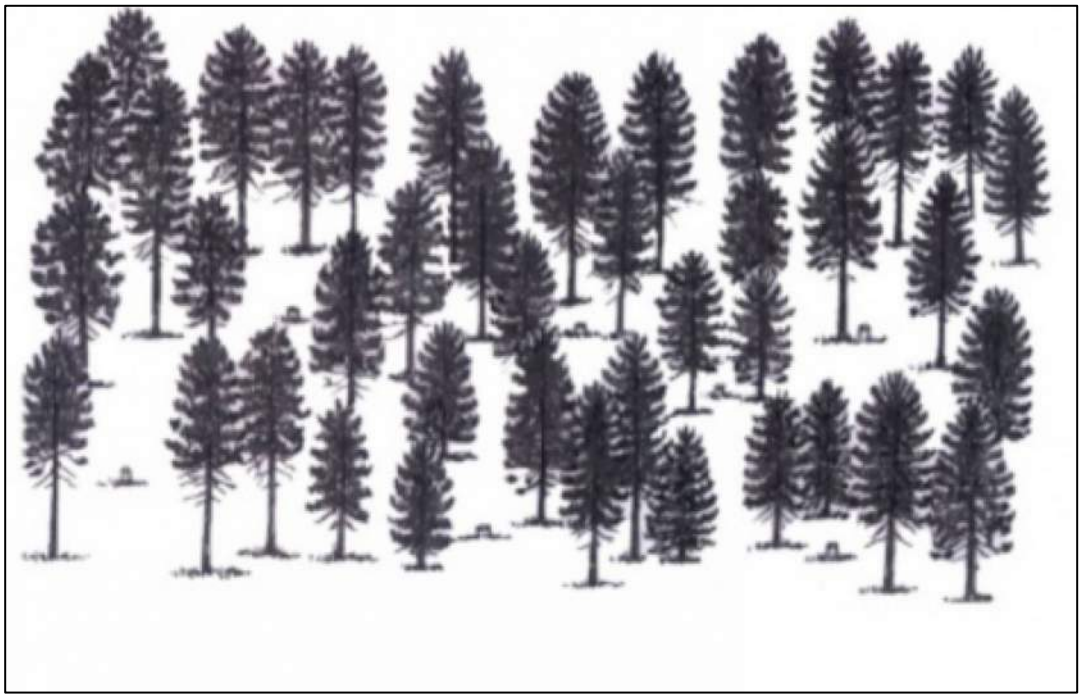
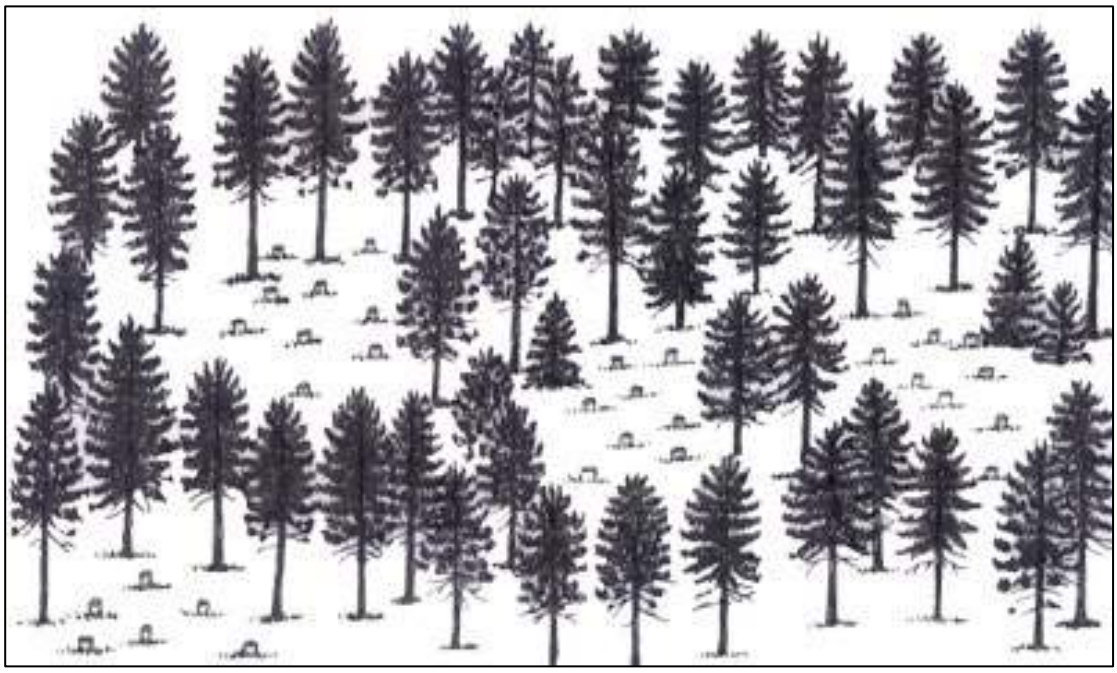


Figure 6: Diagram demonstrating group selection.



Wetlands

According to the National Wetlands Inventory Map Viewer (www.fws.gov/wetlands/data/mapper) there are wetlands present on the property. There are both freshwater emergent wetlands as well as forested wetlands, freshwater ponds, and a riverine included in this parcel.

A permit is not required for typical forest management activities, but a permit is required for filling, dredging, draining, or development. See (www.michigan.gov/deqwetlands) for more information. Any forest management activity near these wetlands should closely follow the "Sustainable Soil and Water Quality Practices on Forest Land"
(Best Management Practices www.michigan.gov/dnr).

Wetlands Map: Figure 7:
(www.fws.gov/wetlands/data/mapper)

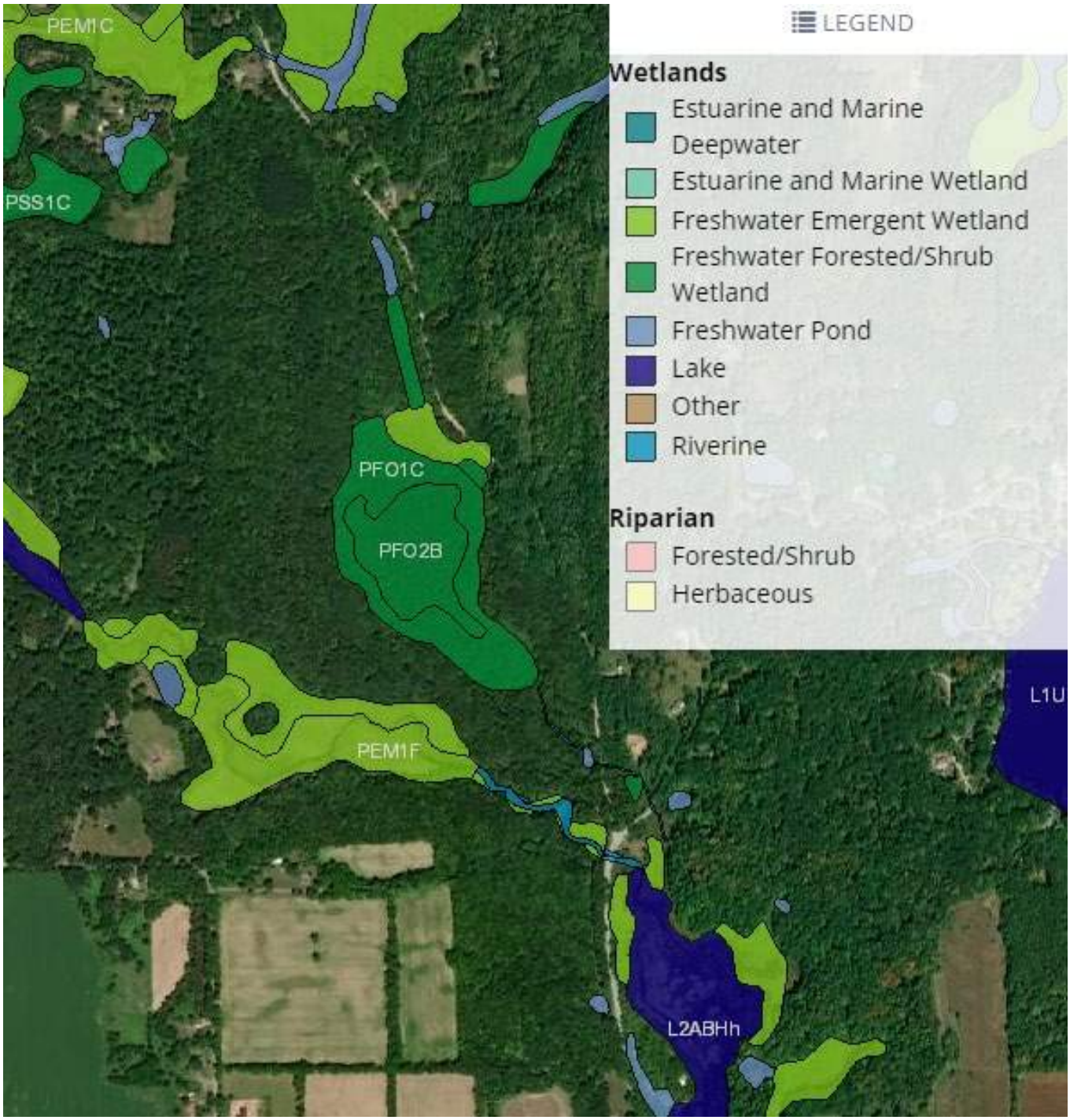


Figure 8: ***Kalamazoo County website – wetlands designation map:***

*Green areas indicate wetlands

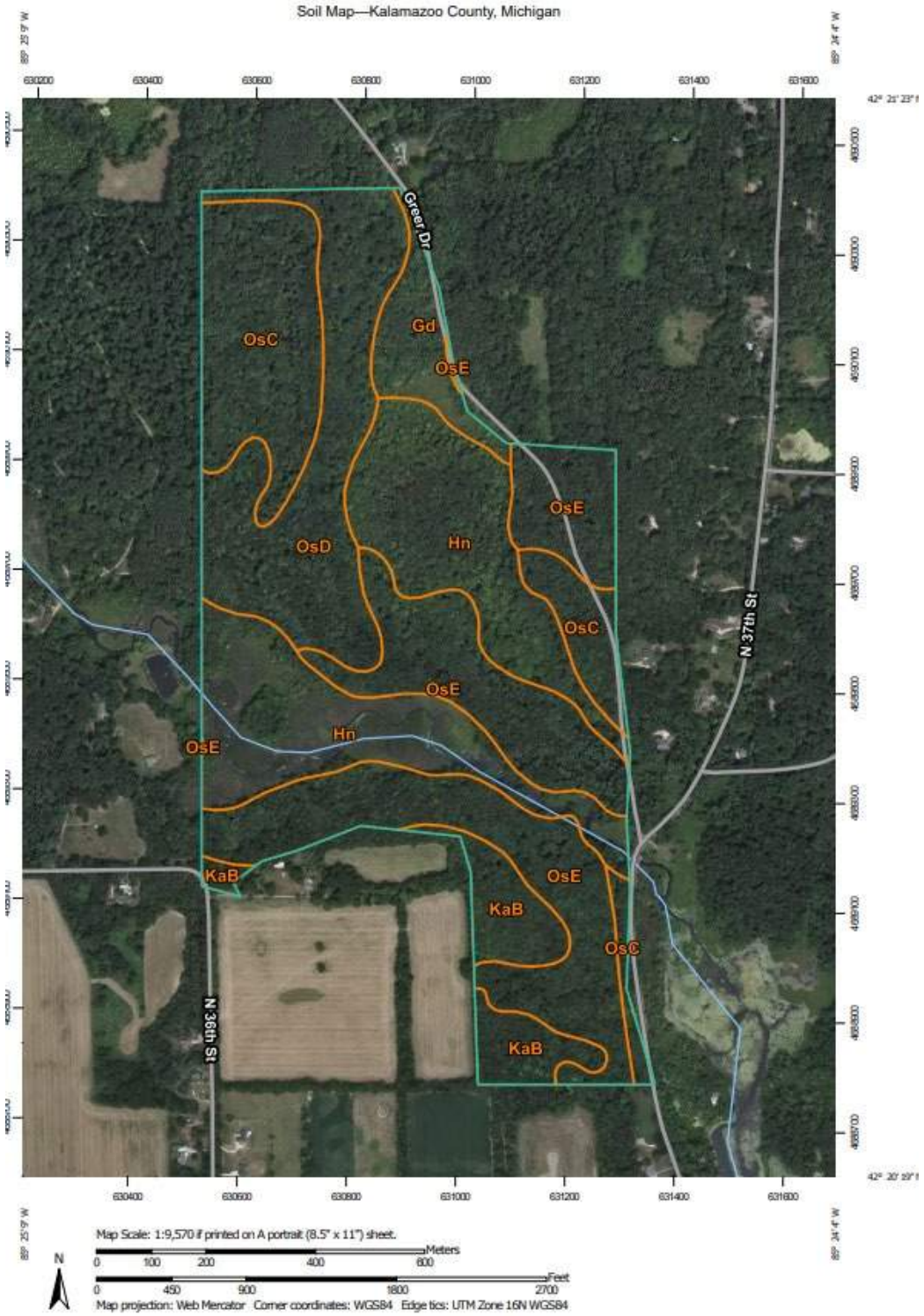
Riparian Management Zone

Riparian management zone (RMZ) is an important consideration for this ownership and should always be adhered to when conducting forest management activities. This property has a natural drain way (Gull Creek) which connects some very important lakes in Richland and Ross Township and water quality is the number one objective for the City on this ownership. Generally, a 50'-100' buffer zone of untreated or lightly treated vegetation should be maintained on both sides of the natural drainage and important wetland areas. The RMZ helps protect water quality by helping to minimize erosion and run off from heavy rain events. The RMZ is generally narrower on flat terrain and is wider with steeper terrain.

Figure 9- Picture of woodland areas and the importance of Riparian zones to protect wetlands.

Soil Map

Figure 10: Soil map:



(Image Source: USDA Web Soil Survey at www.websoilsurvey.nrcs.usda.gov)

T
Table 2 (A). Legend for Forest Soil Types:

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Gd	Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	9.4	4.2%
Hn	Houghton muck, 0 to 1 percent slopes	59.7	26.8%
KaB	Kalamazoo loam, 2 to 6 percent slopes	14.4	6.5%
OsC	Oshtemo sandy loam, 6 to 12 percent slopes	35.8	16.1%
OsD	Oshtemo sandy loam, 12 to 18 percent slopes	37.7	16.9%
OsE	Oshtemo sandy loam, 18 to 35 percent slopes	65.4	29.4%
Totals for Area of Interest		**222.5**	**100.0%**

Soil Series Description

NOTE: The various soil types on the property determine the vegetation, economic productivity, potential for wind throw, susceptibility to erosion, and suitability for heavy equipment in active forest management. All management activities should take caution to protect the soil from rutting or erosion into the creek or nearby lake. Utilize Best Management Practices described in the "Sustainable Soil and Water Quality Practices on Forest Land" to protect soil and water quality (www.michigan.gov/PrivateForestLand). The following soil information is adapted from the soil maps and reports on the USDA Web Soil Survey at (www.websoilsurvey.sc.egov.usda.gov)

Oshtemo Sandy Loam: The Oshtemo series consists of very deep, well drained soils formed in stratified loamy and sandy deposits on outwash plains, valley trains, moraines, and beach ridges. Slope ranges from 0 to 55 percent. Most areas are cultivated. Principal crops are small grains, soybeans, corn, and hay. The remainder is in forest or permanent pasture. Native vegetation is hardwood forest of oak, hickory, basswood, and sugar maple.

Houghton Muck: The Houghton series consists of very deep, very poorly drained soils formed in herbaceous organic materials more than 130 cm (51 inches) thick in depressions and drainageways on lake plains, outwash plains, ground moraines, end moraines, till plains, and floodplains. Slope ranges from 0 to 2 percent. This series consists of very little woody vegetation averaging less than 15 percent per control section

Gilford Sandy Loam: The Gilford series consists of very deep, poorly drained or very poorly

drained soils formed in loamy over sandy sediments on outwash plains, glacial drainage channels, near-shore zones (relict), and flood-plain steps. Slope ranges from 0 to 2 percent. Most of these soils are used for growing corn, soybeans, wheat, and oats. Native vegetation is dominantly herbaceous wetland in the western extent of the series and dominantly forested in the eastern extent.

Kalamazoo Loam: The Kalamazoo series consists of very deep, well drained soils formed in loess-influenced loamy outwash overlying sand, loamy sand, or sand and gravel outwash on outwash plains, terraces, valley trains, and low-lying moraines. Slope ranges from 0 to 18 percent. Saturated hydraulic conductivity is moderately low to moderately high in the loamy materials and high in the sandy materials. A large part is cropped to corn, wheat, soybeans, and hay. A small part is in pasture. Some areas adjacent to the larger cities are idle cropland. Native vegetation is forest consisting of Northern red oak, White oak, Black oak, Sugar maple, Black cherry, American basswood, Tulip tree, Red maple, Black walnut, Pignut hickory, and Shagbark hickory.

Table 2 (B: Forest Site Productivity by soil type- Site Index:

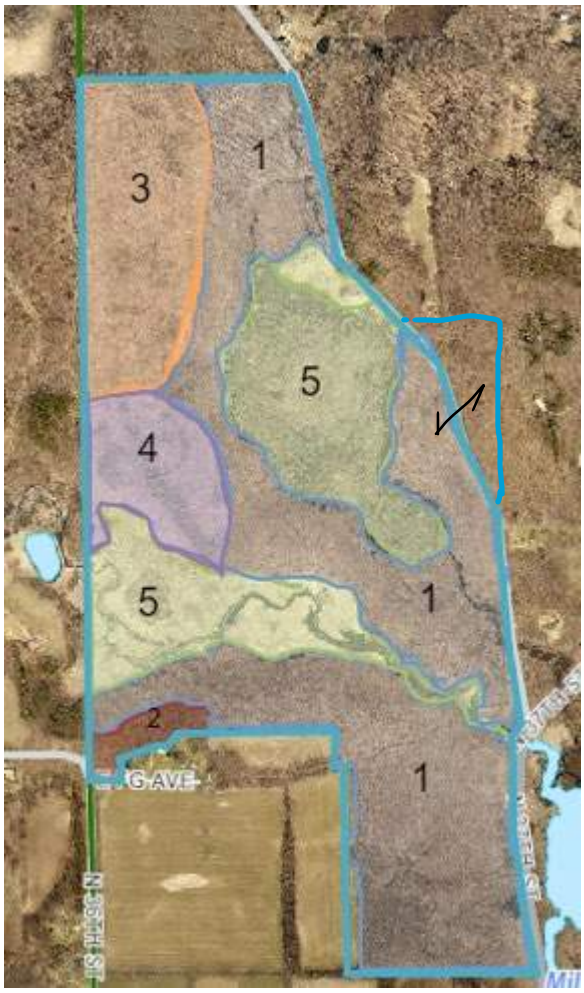
Tables — Forest Productivity (Tree Site Index): northern red oak (Schnur 1937 (820)) — Summary By Map Unit

Summary by Map Unit — Kalamazoo County, Michigan (MI077)

Summary by Map Unit — Kalamazoo County, Michigan (MI077)

Map unit symbol	Map unit name	Rating (feet)
Gd	Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	
Hn	Houghton muck, 0 to 1 percent slopes	
KaB	Kalamazoo loam, 2 to 6 percent slopes	
OsC	Oshtemo sandy loam, 6 to 12 percent slopes	
OsD	Oshtemo sandy loam, 12 to 18 percent slopes	72
OsE	Oshtemo sandy loam, 18 to 35 percent slopes	72
Totals for Area of Interest		

Stand 1- Mixed Deciduous (121 acres)



Narrative Description: Stand 1 is an uneven-aged Mixed Deciduous stand which occupies the largest stand in the Ross Township parcel at 121 total acres. Species present in this stand are Red oak, White oak, Black oak, Aspen, Black cherry, Black Gum Red maple, Black walnut, Hickory, Basswood and Sugar maple. The stand appears to be previously unmanaged and is a good quality Mixed deciduous stand with tree diameters between sapling size to 32" DBH.

Successional Trend: The successional trend of this stand is toward a greater presence of Sugar maple and Red maple over time as these species are shade tolerant. Hickory also can tolerate a good amount of shade and deer do not appear to browse the Hickory genus and it is a prolific seeder. Also, much of the Black cherry is mature and is declining in health, as is the Aspen. A great amount of Oriental bittersweet occupies most of the understory and is really beginning to take over and limit forest growth. There is a high volume of Sugar maple and Red maple in the understory. As they are more shade tolerant, they will begin to fill the gaps created by the deteriorating Black cherry and Black oak/Red oak. The site index for Red oak, the dominant species in much of this stand, is 72 indicating that the stand is a relatively high quality forest site.

Objective: Proper stewardship of this stand is for multiple values of timber, wildlife, recreation, aesthetics and water conservation.

Soil and Water: This stand is located on loamy sand which is well-drained and well suited for forestry activities. Slopes range from 6 to 35 percent. Some of this unit will need to serve as a filter strip between active forest management activities such as timber harvesting and the more fragile wetland areas that are adjacent to portions of this stand. Best Management Practices (BMP) guidelines should be adhered to when setting up any land management activity.

Timber: Stand 1 is primarily uneven-aged mixed deciduous stand with a diameter distribution of 0 to 36" DBH. The stand is presently in an overstocked condition which is limiting forest growth and overall forest health. Economics aside, a professionally marked and administered timber harvest will reduce the density back into the optimal range for improved forest growth and improved forest health.

Tree Size Class: 0-32" DBH with Oak sawtimber being dominant in the overstory.

Stand Density: The stand density (Basal Area) is 130 ft^2/acre. 70-90 ft^2/acre is optimum.

Forest Health: The overall health of this stand is very good. No Oak wilt was observed in this stand, but an abundance of invasive species was found throughout. Invasive species is the primary forest health concern on many Southwest Michigan forests and Oriental bittersweet seems to be the most pressing forest health issue to address along with Honeysuckle, Multiflora rose & Autumn olive.

Figure 11: Diameter Distribution of Stand 1 Timber:

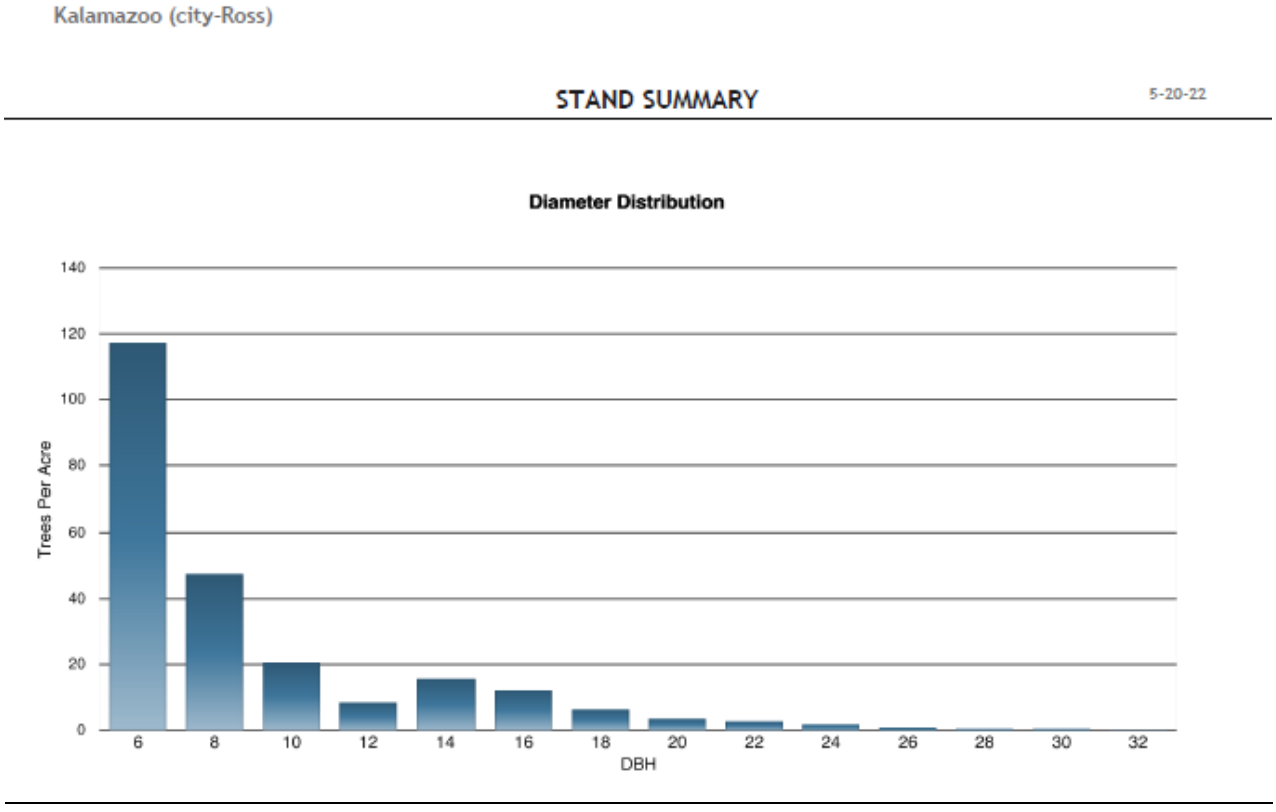
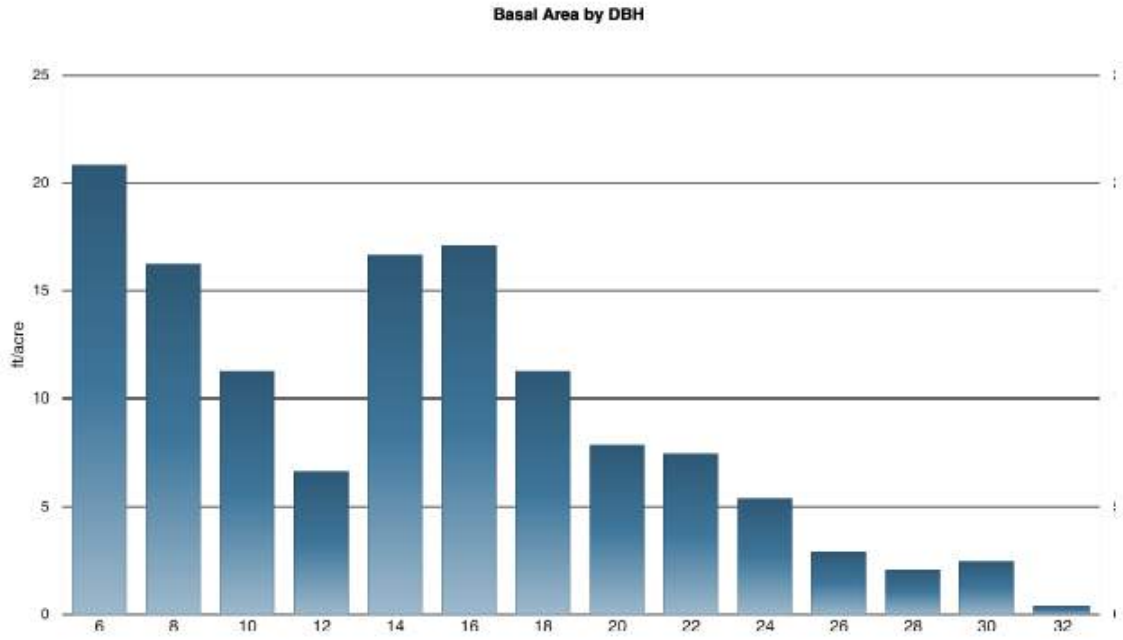


Figure 12: Summary of Stand 1 Basal Area:

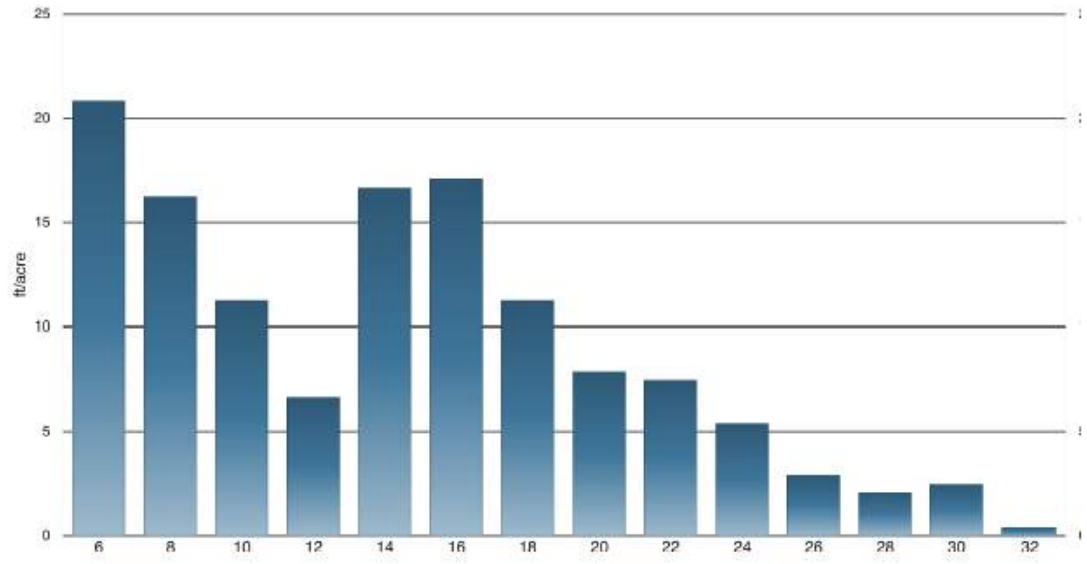
Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22



Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22



Stand #1 Forest Inventory information:

Kalamazoo (city-Ross)

STAND SUMMARY

5-20-22

STAND 1 Mixed Deciduous 9 BA 129.6 TPA 238.5

ACRES 121.0 48 PTS

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	CORDS
Average	129.6	238.5	10.0	47.0	9.55	19.19
Sampling Error	7.1%	16.0%			17.7%	8.4%
Probable Lower Limit	120.4	200.3			7.86	17.57
Probable Upper Limit	138.7	276.8			11.25	20.81

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	CORDS	TOTAL STAND VOLUME MBF	CORDS
	129.6		238.5	10.0	47.0	9.55	19.19	1,156.01	2,322.19
red maple	32.5	25.1%	59.4	10.0	49.3	2.15	4.92	259.81	594.75
black cherry	30.4	23.5%	70.0	8.9	43.1	1.50	4.67	181.83	564.76
northern red oak	22.9	17.7%	23.9	13.3	63.6	2.78	3.00	336.38	363.10
black oak	7.5	5.8%	9.2	12.2	55.1	0.78	0.92	94.76	111.78
silver maple	5.4	4.2%	12.5	8.9	41.2	0.22	0.91	27.21	110.54
pignut hickory	5.0	3.9%	5.6	12.8	60.0	0.46	0.69	55.25	84.09
black walnut	5.0	3.9%	9.4	9.9	54.7	0.46	0.73	55.30	87.81
white oak	4.6	3.5%	3.9	14.7	58.9	0.48	0.55	57.57	66.95
bigtooth aspen	4.2	3.2%	4.1	13.6	68.0	0.39	0.59	47.62	71.85
sugar maple	4.2	3.2%	14.6	7.2	35.2	0.06	0.84	6.81	101.62
blackgum	2.1	1.6%	7.0	7.4	38.4	0.07	0.35	8.63	42.17
American elm	1.7	1.3%	7.1	6.5	26.0		0.31		37.32
bitternut hickory	0.8	0.6%	3.3	6.8	36.0		0.19		23.15
sassafras	0.8	0.6%	1.1	12.0	40.0	0.03	0.16	3.23	19.17
pin oak	0.8	0.6%	0.9	13.3	44.0	0.08	0.08	9.46	9.58
white pine	0.4	0.3%	0.2	20.0	48.0	0.03	0.07	3.80	8.43
northern pin oak	0.4	0.3%	0.2	22.0	80.0	0.07	0.06	8.36	6.66
black locust	0.4	0.3%	3.1	5.0	40.0		0.10		11.76
hackberry	0.4	0.3%	3.1	5.0	16.0		0.06		6.70

Stand 1- Management Recommendations

Activity 1-1: Commercial Timber Harvest to reduce the stand density back into the optimum range of between 70-90 ft^2 per acre, removing a mix of mature, over-mature and declining trees to favor the healthiest trees for the long-term management of the forest.

Timber Harvest Objectives: The primary objective for any timber sale is to improve the forest, as defined according to the values of the landowner and the attributes of the forest. A timber sale should improve the species composition and growing conditions of remaining trees for future timber sales. One of the many benefits about managing a forest for sustainable timber production is that it is very compatible with other goals such as wildlife management, forest health, etc. In this stand and with proper forest management it is possible to conduct a timber harvest about every ten to fifteen years while keeping aesthetics, biodiversity, and wildlife habitat as equal priorities. As foresters, our priority is to keep quality trees in the forest and not just selling most of the quality trees (a practice called high grading). A timber sale can be used to improve wildlife habitat, develop trails for recreation, improve forest health, and regenerate new trees. In this instance we are wanting to focus management efforts on the growth of high-quality hardwood varieties such as Black walnut, Red oak, White oak, Sugar maple, Red maple and Hickory. Over time, shade tolerant species such as Red maple, Sugar maple and Hickory can overtake what was originally an oak dominated forest community. Forest management efforts should focus on creating openings or pockets in the canopy that will allow shade intolerant species such as Red and White oak to have an opportunity to regenerate, as Oaks are an important component of high-quality forest communities and have tremendous value to many species of wildlife. This will give less shade tolerant species such as Red oak, White oak and black cherry a better chance to regenerate.

Timber Sale Timing: We recommend this stand is harvested within the next year or two as the stand is overstocked, growth rates have declined, and overall forest health is being sacrificed. A harvest should be done consistent with this plan and should be marked, set up and administered by a consulting forester that can best represent the interests of the City of Kalamazoo.

Activity 1-2: A selective timber sale will be recommended again in approximately 10-15 years after the initial sale (2032). The purpose again is to remove excess growth as by that time stand densities will have again increased to a level that would be restricting stand growth.

Stand 2 – Black Walnut

Narrative Description: Stand 2 is a 4-acre Stand dominated by Black Walnut. The diameter distribution of this stand ranges from 6" to 32". This stand has high wildlife value for whitetail deer, as the grassy undergrowth along with dead limbs provide an excellent habitat for whitetails to give birth. The Black Walnut in this stand is of significant economic value for harvesting soon. Black Walnut is by far the most sought-after species in the economic landscape in Michigan. The site index is 72 for Red oak.

Successional Trend: The successional trend for this stand is gradually toward a much younger walnut stand as many of the older trees are overmature and are slowly beginning to deteriorate, creating openings and gaps for the pole sized walnuts to develop into and openings for walnuts to regenerate themselves. There is a presence of Boxelder and Red maple which are much lower value species which can compete for space with the Black walnut, so efforts should be made to discriminate against these lower value species types. Walnut does a pretty good job of keeping other species at bay since they exude a natural Jugulone, which repels many other plant species. That said, Walnut will likely be the dominate species in this stand for the foreseeable future.

Objective: The primary objective for this stand is to manage for a healthy and sustainable stand of high-quality Black walnut trees. The best way to accomplish this is by periodic harvest of the mature and overmature trees. The creates a condition whereby the site will recruit new walnut seedlings where gaps in the canopy are created from a timber harvest. The recommendation is to maintain these stands in the 70-90 sq. ft. per acre basal area range and to do selective harvests at about 10-15-year intervals.

Soil and Water: The primary soil type for this stand is Oshtemo sandy loam with slopes ranging from 18 to 35 percent. This soil composition is well suited for timber harvesting activities during much of the year, however caution should always be exercised to avoid harvest operations during unseasonably wet periods such as late winter thaw or during periods when heavy spring rains are common, especially since this stand has some rather steep terrain.

Timber: Stand 2 is a previously unmanaged stand which consists primarily of Black Walnut along with an assortment of other hardwood species such as Black cherry, Boxelder, Hickory, and Red maple. The stand is an uneven-aged stand with diameters ranging from 6 to over 32 DBH. The current basal area of this stand is about 135 feet^2/acre which illustrates that the stand is presently in an overstocked condition. Generally, once trees reach 20-22" DBH, they are at their peak for productivity and then trees begin a slowdown in growth rates. The Optimum density for maximum productivity for an uneven-aged timber stand, and to maintain overall forest health, is between 70-90 feet^2/acre This site will continue to produce high quality Black walnut as long as it is sustainably managed on a periodic basis and the treatment is set up, marked and administered by a Registered Forester, who has the best interest of the City of Kalamazoo's objectives in mind.

Tree Size Class: 6"-32" DBH with many trees presently considered overmature.

Stand Density: 135 feet^2/acre

Figure 13: Diameter Distribution of Stand 2 Timber:

Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22

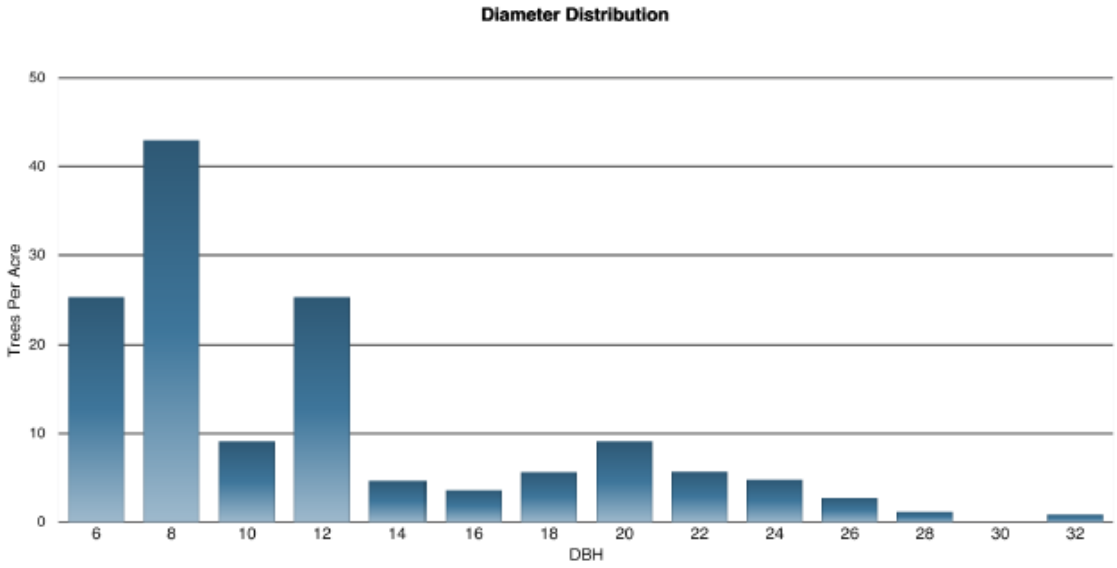
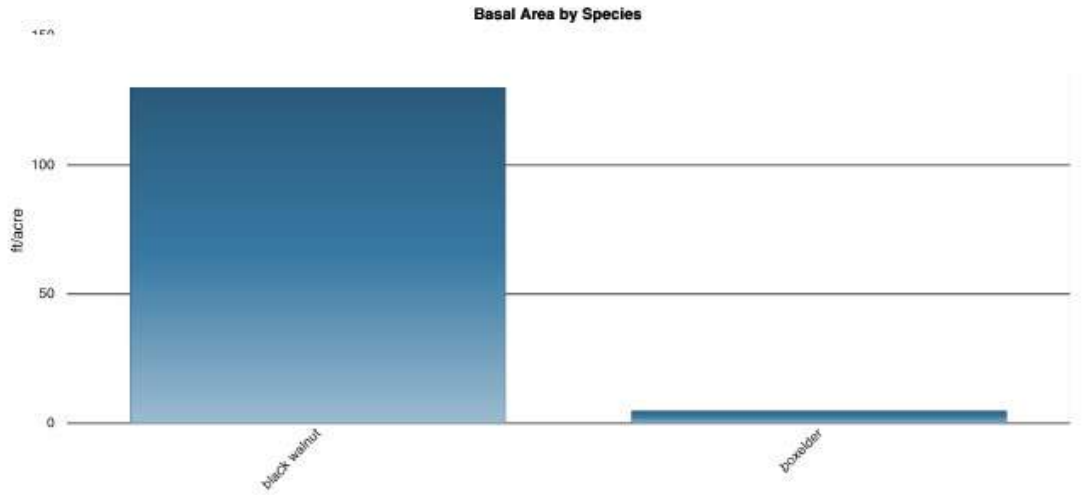
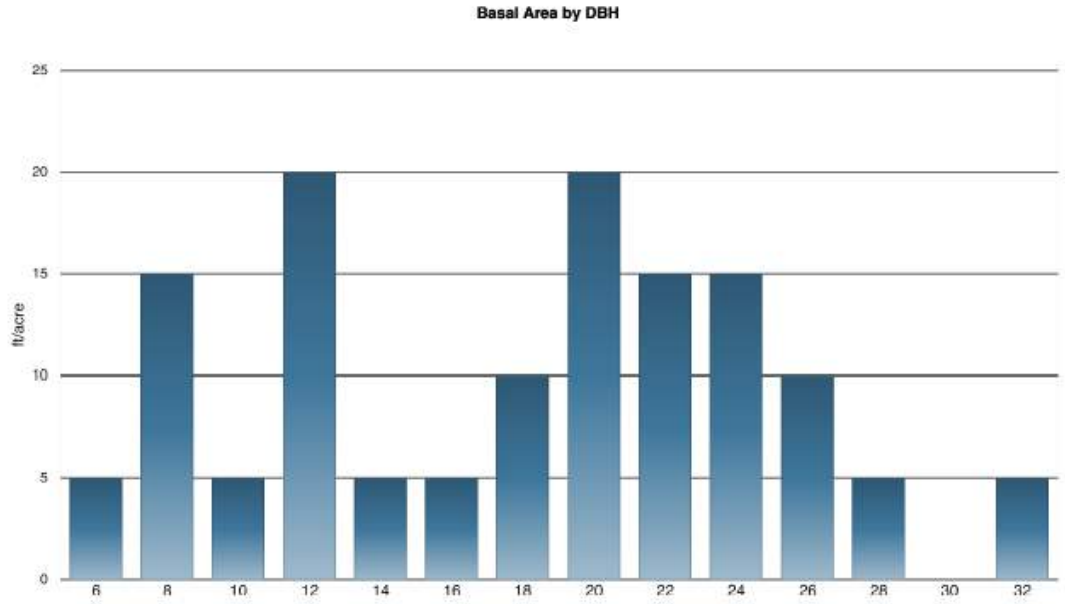


Figure 14: Summary of Stand 2 Basal Area:



Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22



Stand 2- Management Recommendations

Activity 2-1: Selective Timber Harvest

Timber Harvest Objectives: A selective harvest is recommended for this stand which would remove some of the largest diameter, more open grown trees that are considered overmature. These are taking up valuable growing space from intermediate sized trees that can are healthier and are able to grow higher quality timber at a faster rate. Most of these trees originated in an open setting years ago and many are very limby and are not high-quality specimens. A sustainable harvest now, leaving the most desirable growing stock of primarily 6-22" DBH trees at a proper density will improve the forest for timber, wildlife, recreation, aesthetics, and long-term ecological sustainability.

Activity 2-2: Selective Timber harvest

<u>Stand #2 Forest Inventory Information</u>

Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22

STAND 2 Walnut BA 135.0 TPA 141.4

ACRES 4.0 4 PTS

STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE CORDS
Average	135.0	141.4	13.2	61.1	14.07	19.90
Sampling Error	26.1%	119.9%			71.4%	52.2%
Probable Lower Limit	99.7				4.02	9.50
Probable Upper Limit	170.3	310.9			24.12	30.29

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE CORDS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME CORDS
	135.0		141.4	13.2	61.1	14.07	19.90	56.29	79.58
black walnut	130.0	96.3%	135.0	13.3	62.5	14.07	18.80	56.29	75.19
boxelder	5.0	3.7%	6.4	12.0	32.0		1.10		4.40

Stand 3- Upland Mixed 29 acres

Narrative Description: Stand 3 is 29 acres of primarily an upland mixed stand consisting of primarily Black cherry, Red maple along with some scattered White pine, Red oak, Black Oak, White oak, Hickory and Elm. The stand appears to be primarily a successional forest that originated after the area was used for pasture or farming purposes many years ago. The topography of this stand is 6-12% slopes which has some of the gentlest terrain on the property as compared to surrounding Stands 1 and 4. The quality of the trees in this stand is lower than stand #1 as they have many lateral limbs from their originating in more open conditions. The stand is now overstocked with the Basal area at over 137ft^2 per acre and an improvement harvest is recommended. The Site index is 72 for Red oak in this stand.

Successional Trend: This stand is in an advanced stage of development of a successional forest that originated likely in old pasturelands. Species that invaded this site were predominantly Black cherry, a very sun living variety, along with Red maple, Red oak, Black oak, White oak and Hickory. Most of the younger White pine likely seeded in from the pine planting that happened likely about 50-70 years ago and some of the larger pines in Stand 3 were planted at the same time the Stand 4 planting was done.

Objective: The primary objective for this stand is to manage for a healthy and sustainable stand of high-quality mixed hardwoods and to maintain the White pine component for diversity. The best way to accomplish this is by periodic harvest of the mature and overmature trees. This creates a condition whereby the site will recruit more oak seedlings where gaps in the canopy are created from a timber harvest. The recommendation is to maintain these stands in the 60-70 sq. ft. per acre basal area range and to do selective harvests at about 10-15-year intervals. In addition, the group selection technique is appropriate to purposefully create more open conditions in pockets where oaks are present. The Oak Genus requires a great amount of sunlight. Invasive species control should be a component of any management treatment as additional sunlight will also stimulate these unwanted species.

Soil and Water: The soils of this stand are entirely made up of Oshtemo soils with a "C" slope of between 6-12 %. These soils have favorable characteristics for forest management activities and the use of heavy mechanical equipment during much of the year, however caution should always be exercised to avoid harvest operations during unseasonably wet periods such as late winter thaw or during periods when heavy spring rains are common, especially since this stand has some rather steep terrain.

Timber: Densely wooded area comprised of predominantly Red maple and Black cherry along with an assortment of Oaks and mixed Hickory along with some White pine. The oak species should be favored in this stand as much as possible. Timber quality is medium due to the high percentage of more open grown Cherry and Red maple, Black Oak, White oak and large White oak or Red oak in nearly every plot taken. The diameter distribution ranges from about 12 inches in diameter to about 32. However, there is a significant gap in the distribution with no trees sampled from 20 – 24 inches in diameter. The stand is dominated by white oak and red oak with smaller super maple and red maples in the understory. There is also a significant presence of intermediate sized white pine in the area.

Tree Size Class: Diameter distribution ranges from 6" to 26"

Stand Density: Basal area is estimated at about 137 ft^2/acre.

Forest Health: The overall health of this stand is very good. No Oak wilt was observed in this stand, but an abundance of invasive species was found throughout. Invasive species is the primary forest health concern on many Southwest Michigan forests and Oriental bittersweet seems to be the most pressing forest health issue to address along with Honeysuckle, Multiflora rose & Autumn olive.

Figure 15 Oriental Bittersweet in understory and winding up into the canopy

Figure 16: Diameter Distribution of Stand 3 Timber:

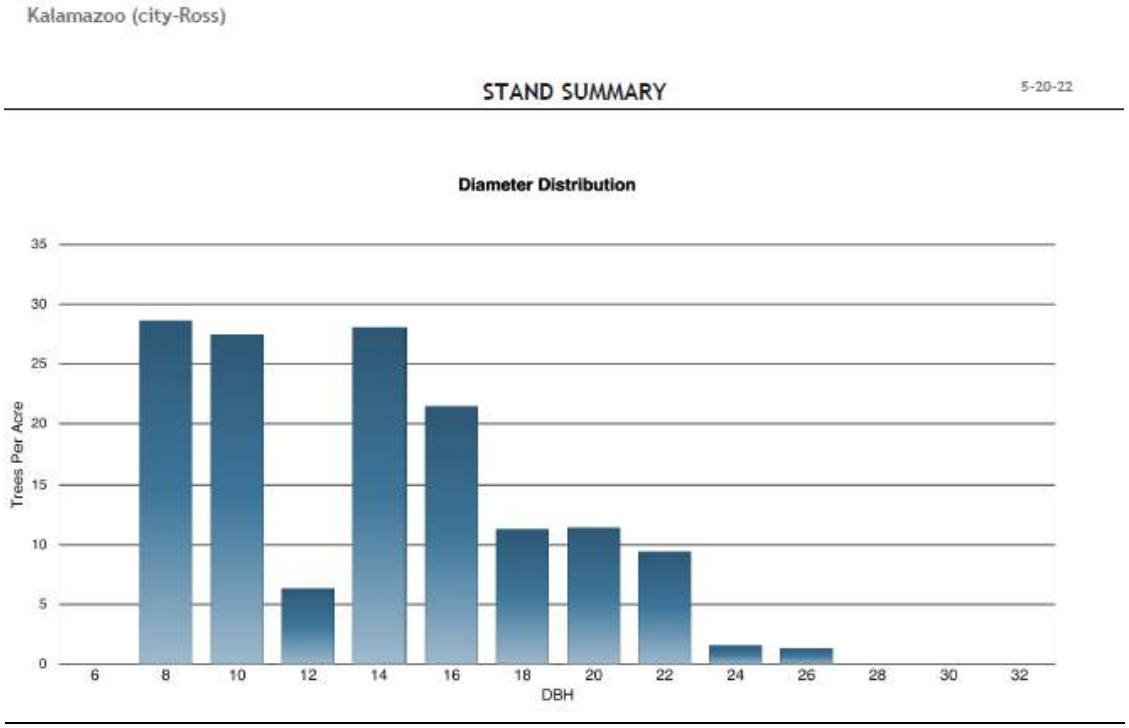
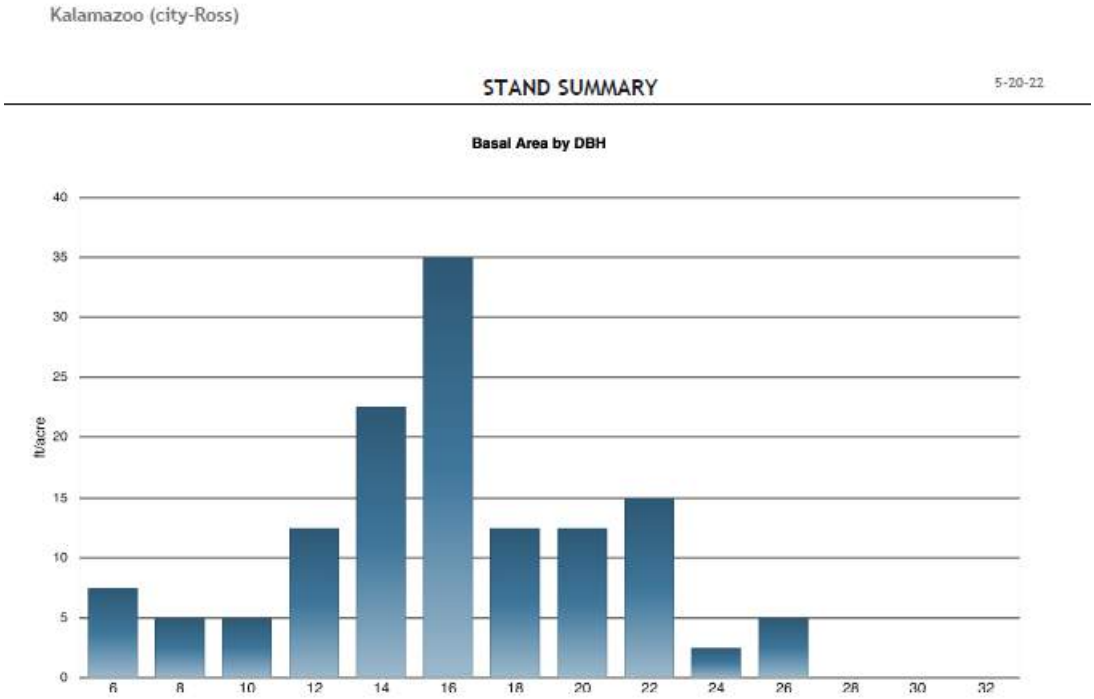
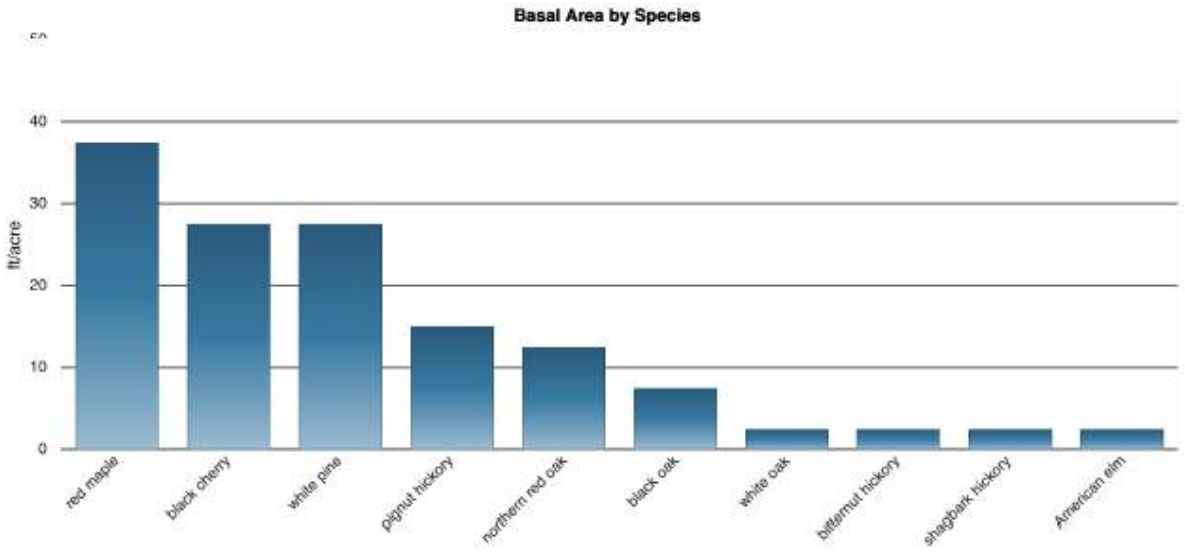


Figure 17: Summary of Stand 3 Basal Area:





Stand 3- Management Recommendations

Activity 3-1: Commercial Selection and Group Selection Timber Harvest to reduce the stand density back into the optimum range of between 60-80 ft^2 per acre, removing a mix of mature, overmature and declining trees to favor the healthiest trees for the long-term management of the forest.

Timber Harvest Objectives: The primary objective for any timber sale is to improve the forest, as defined according to the values of the landowner and the attributes of the forest. A timber sale should improve the species composition and growing conditions of remaining trees for future timber sales. In this instance we are wanting to focus management efforts on the growth and regeneration of all oak species along with Hickory, Red maple, Back Cherry and White pine. Over time, shade tolerant species such as the Red maple, Hickory and White pine can overtake the important oaks that are the most important species in this forest community. Forest management efforts should focus on creating openings or pockets in the canopy that will allow shade intolerant species such as Red and White oak to have an opportunity to prosper and regenerate. Timber harvests also improve the area for many species of wildlife and provide food, cover and a more diverse vegetative condition.

Timber Sale Timing: We recommend this stand is harvested within the next year or two in conjunction with Stands 1, 2 and 3 as these stands are all substantially overstocked and overall forest health is being sacrificed. A harvest should be done consistent with this plan and should be marked, set up and administered by a consulting forester that can best represent the interests of the City of Kalamazoo.

Activity 3-2: A selective timber sale will be recommended again in approximately 10-15 years after the initial sale (2032). The purpose again is to remove excess growth as by that time stand densities will have again increased to a level that would be restricting stand growth.

Stand #3 – Forest Inventory Information

Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22

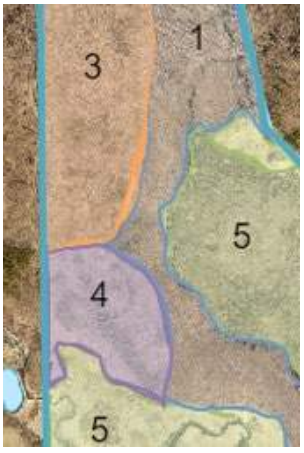
STAND 3 Upland Mixed BA 137.5 TPA 144.7

ACRES 29.0 8 PTS

STATISTICAL ANALYSIS Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	CORDS
Average	137.5	144.7	13.2	53.2	10.86	21.72
Sampling Error	19.8%	32.8%			28.4%	21.1%
Probable Lower Limit	110.3	97.2			7.78	17.13
Probable Upper Limit	164.7	192.2			13.94	26.31

SPECIES COMPOSITION	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	CORDS	TOTAL STAND VOLUME MBF	CORDS
	137.5		144.7	13.2	53.2	10.86	21.72	314.99	629.93
red maple	37.5	27.3%	46.9	12.1	50.1	2.49	5.93	72.29	172.01
black cherry	27.5	20.0%	29.9	13.0	54.5	2.10	4.52	60.95	131.13
white pine	27.5	20.0%	15.6	18.0	54.5	2.39	4.54	69.26	131.71
pignut hickory	15.0	10.9%	23.2	10.9	56.0	1.21	2.07	35.00	60.03
northern red oak	12.5	9.1%	9.9	15.2	62.4	1.31	1.53	37.85	44.48
black oak	7.5	5.5%	6.1	15.0	61.3	0.74	1.46	21.51	42.46
white oak	2.5	1.8%	2.3	14.0	48.0	0.09	0.54	2.48	15.63
bitternut hickory	2.5	1.8%	1.8	16.0	64.0	0.27	0.29	7.83	8.41
shagbark hickory	2.5	1.8%	1.8	16.0	64.0	0.27	0.29	7.83	8.41
American elm	2.5	1.8%	7.2	8.0	32.0		0.54		15.65

Stand 4- White pine/ Upland Mixed)



Narrative Description: This Stand is a mixture of older planted White pine and an Upland mixed forest condition like Stand #3, but with steeper topography descending to the wetland's component (Stand 5). The White pine component is the dominant volume in this stand with volunteer natural hardwoods consisting of Black cherry, Black oak and Red maple which is common in pine plantation areas. The Stand density is very high at 170 ft^2 per acre. Conifer plantations typically have about double the density and volume grown on a per acre basis. That said, White pine stands should be maintained at about 100-120 ft^2 per acre so the stand density is too high for optimum growth and the forest is quite stagnant. The Site index is 72 for Red oak for this management unit.

Successional Trend: This is primarily a planted stand of White pine. Most of this area was planted at an 8 foot by 8 foot spacing and was likely planted by hand as a conservation practice to protect water quality and minimize soil erosion. White pine is a native species in Michigan and is the State Tree. White pine is also shade tolerant so it will regenerate itself well and adds a component of species diversity in this otherwise almost entirely deciduous forest region of the State. White pine regeneration can be browsed heavily by white tailed deer in some instances so the successional trend may be impacted by deer, invasive species and the forest management treatments that are implemented. Landowner goals will largely influence the successional trend going forward.

Objective: The primary objective for this stand is to manage for a healthy and sustainable stand of high-quality mixed hardwoods and to maintain the White pine component for diversity. The best way to accomplish this is by periodic harvest of the mature and overmature trees. This creates a condition whereby the site will recruit more Oak seedlings where gaps in the canopy are created from a timber harvest. The recommendation is to maintain these White pine pockets in the 80-120 ft^2 / acre range, while maintaining a 60-70 ft^2 per acre basal area range in the hardwood dominated areas. Selective harvests at about 10–15-year intervals will help to accomplish these targets and the group selection technique can be used to favor oaks within this stand to purposefully create more open conditions in pockets where oaks are present. The Oak Genus requires a great amount of sunlight. Invasive species control should be a component of any management treatment as additional sunlight will also stimulate these unwanted species.

Soil and Water: The soils of this stand are entirely made up of Oshtemo soils with a "D" slope of between 12-18 %. These soils have favorable characteristics for forest management activities due to the soil texture being heavy to sand, but extra caution should be exercised due to the steeper slopes. Forest management treatments (Harvests) should be done during dry or frozen periods of the year. The use of any type of equipment during unseasonably wet periods such as late winter thaw or during periods when heavy spring rains are common should be avoided.

Timber: Markets for white pine timber are scarce in southern Michigan, but white pine can make excellent lumber for hobby markets and most buyers can move some white pine trees if they are larger diameter and pine is a small component of a larger hardwood timber sale. The high density of the stand and the need to improve forest health point to a managed timber harvest to be performed in conjunction with the other stands on this Ross Township property.

Tree Size Class: The diameter distribution is from 8" to 26" DBH.

Stand Density: The Stand density is estimated at 170 ft^2/ Acre.

Forest Health: The overall health of this stand is very good. No Oak wilt was observed in this stand, but an abundance of invasive species was found throughout. Invasive species is the primary forest health concern on many Southwest Michigan forests and Oriental bittersweet seems to be the most pressing forest health issue to address along with Honeysuckle, Multiflora rose & Autumn olive.

Figure 18: Diameter Distribution of Stand 4 Timber:

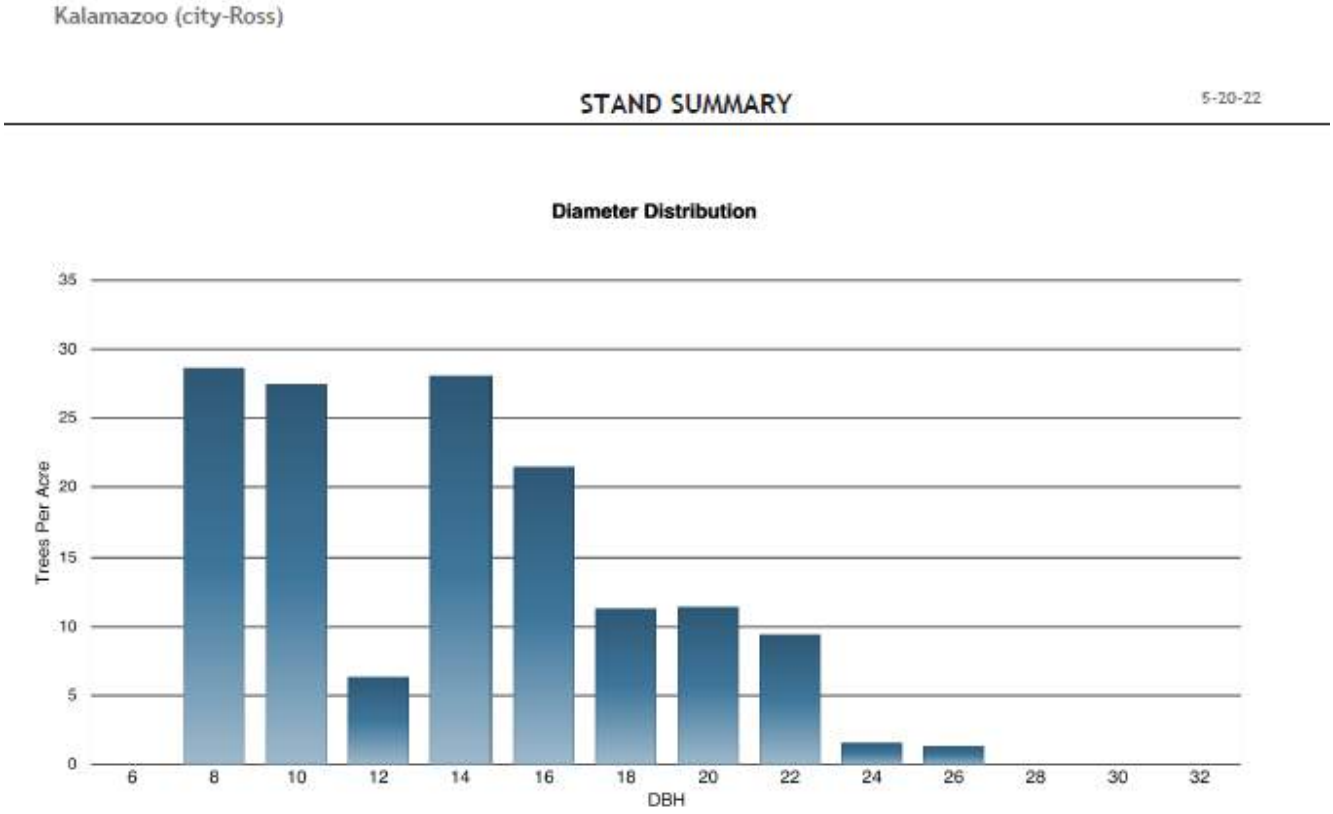
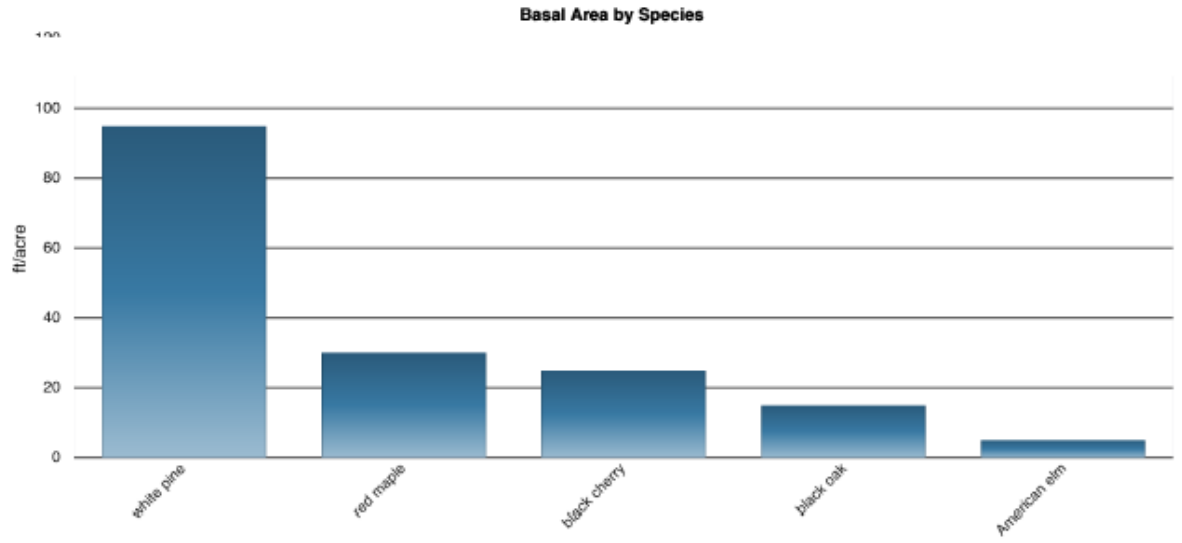
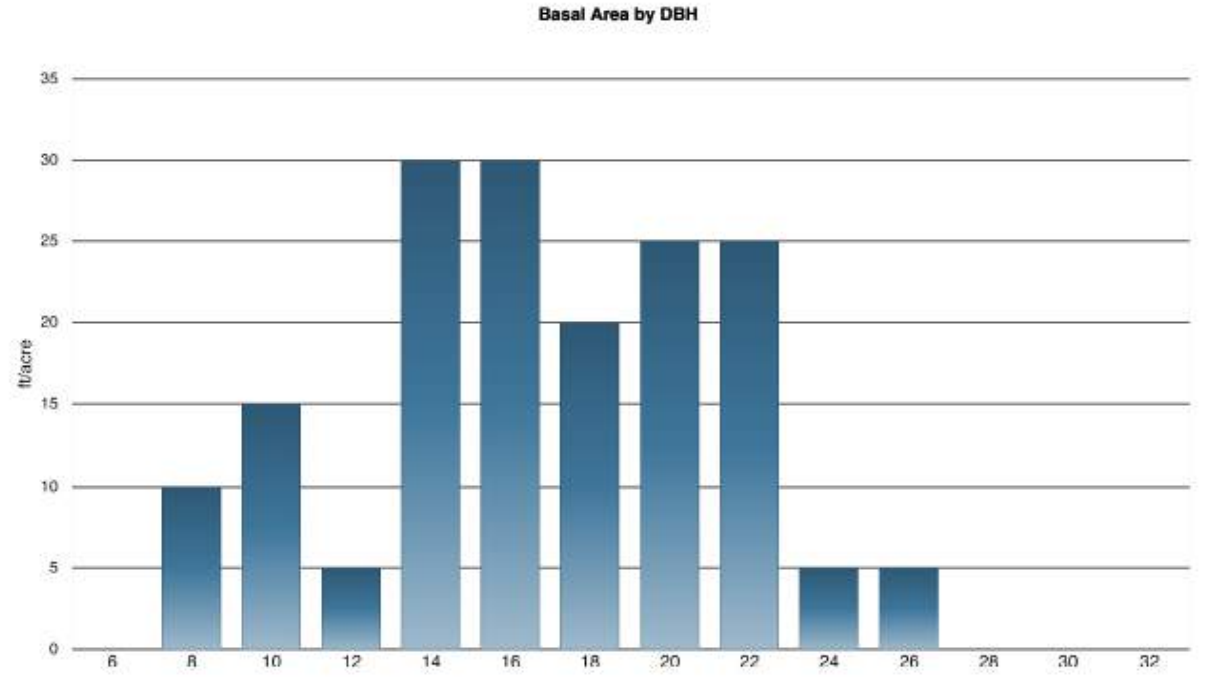


Figure 19: Summary of Stand 4 Basal Area:



Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22



Stand 4- Management Recommendations

Activity 4-1: Timber harvest (2023)

Timber Harvest Objectives: The primary objective for any timber sale is to improve the forest, as defined according to the values of the landowner and the attributes of the forest. A timber sale in this stand should reduce the density back into the optimal range for forest health and improve timber growth. In addition, the White pine is an old plantation which should be thinned to increase the Oak and hardwood component while leaving good quality White pine trees on a much wider spacing to improve the visual appearance into a more natural one, while encouraging natural hardwood and White pine regeneration. Forest management efforts should focus on creating openings or pockets in the canopy that will allow shade intolerant species such as Red and White oak to have an opportunity to prosper and regenerate. Timber harvests also improve the area for many species of wildlife and provide food, cover, and a more diverse vegetative condition.

Activity 4-2: Timber Harvest (2033)

Stand 4 – Forest Inventory Information:

Kalamazoo (city-Ross)

STAND SUMMARY 5-20-22

STAND 4 White pine/Upland mixed BA 170.0 TPA 147.3

ACRES 14.0 4 PTS

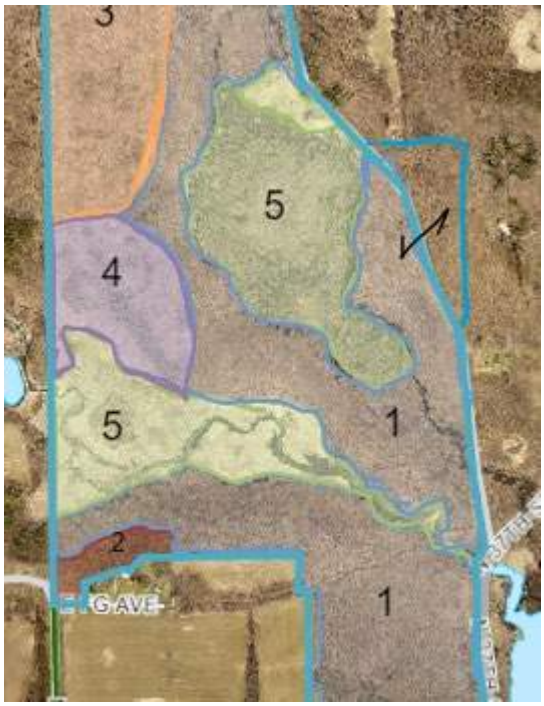
STATISTICAL ANALYSIS

Confidence Interval 90%	BA	TPA	DBH	MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE CORDS
Average	170.0	147.3	14.5	59.5	16.51	26.32
Sampling Error	36.6%	18.9%			71.5%	27.3%
Probable Lower Limit	107.7	119.4			4.71	19.14
Probable Upper Limit	232.3	175.1			28.31	33.49

SPECIES COMPOSITION

	BA		TPA	AVG DBH	AVG MHT	VOLUME PER ACRE MBF	VOLUME PER ACRE CORDS	TOTAL STAND VOLUME MBF	TOTAL STAND VOLUME CORDS
	170.0		147.3	14.5	59.5	16.51	26.32	231.13	368.44
white pine	95.0	55.9%	66.0	16.2	68.6	10.95	14.16	153.29	198.23
red maple	30.0	17.6%	21.5	16.0	58.7	2.83	3.95	39.61	55.29
black cherry	25.0	14.7%	36.4	11.2	51.2	1.31	4.71	18.30	65.93
black oak	15.0	8.8%	9.1	17.4	58.7	1.42	2.26	19.93	31.69
American elm	5.0	2.9%	14.3	8.0	40.0		1.24		17.29

Stand 5- Wetland(s)



Narrative Description: This 59-acre Management Unit is considered Wetlands, which is the most important feature of this unique property. In fact, writing a forest management plan to address the importance of forests in the protection of water quality cannot be understated. Forest lands described in this plan completely border all potions of this diverse unit. This unit includes important drainages between Three Lakes and Mill Pond which are a regional feature, not to mention its proximity to the City of Kalamazoo, the City of Battle Creek and Gull Lake. Forest management prescriptions and treatments should prioritize the protection of water quality and limiting soil erosion by employing the Michigan Department of Natural Resources - Best Management Practices for water quality. Wetlands provide several other benefits including incredible wildlife habitat and enriching the diversity of the adjacent forest lands covered in this plan. This is a forestry plan so, as foresters, our specialty and expertise is not in managing the wetlands themselves, but in prescribing management practices that help protect and sustain these most important and most fragile parts of the ecosystem.

Objective: Due to the fragile nature of this unit, no forest management treatments are appropriate, and "PROTECTION" of this valuable resource is our objective as foresters and indeed that of the City of Kalamazoo.

Soil and Water: The soils in this management unit are exclusively Houghton series soils which are flat and mostly inundated by water the year around.

Timber: N/A

Stand 5- Management Recommendations: N/A

Desired Future Conditions

Forestry management activities are meant to accomplish the landowner's goals for that stand and to bring about desired future conditions for the forest. The goals for the entire property include recreation, maintaining aesthetics, conducting sustainable timber harvests, maintaining excellent wildlife habitat, and protecting soil and water quality.

General Activities for the Entire Property

Activity 0-1: Consider joining American Tree Farm System and Michigan Forest Association.

The Tree Farm System (www.treefarmsystem.org) provides forest "certification" to verify that forests are sustainably managed. Certified forest products sometimes have a higher retail price, but do not often generate higher prices for the forest owner. The minimum requirements are ten acres of forest, a current written management plan, compliance with the eight principles of the American Tree Farm System (listed in the Appendix), and a free inspection by a certified Tree Farm Inspector. There is no additional cost for you after this Forest Stewardship Plan is written.
You may also want to consider joining other forest landowner groups. According to USFS research, only 4% of non-industrial, private forest owners have a written forest management plan (Butler, 2008). Your investment in this management plan puts you into an elite group of forest owners! I believe that you may enjoy spending time with other active and involved forest owners. The Michigan Forest Association (MFA) is an organization of private forest owners in Michigan and costs around $40 in annual dues (www.michiganforests.com). MFA provides useful forest management information (magazines, newsletters, emails) and opportunities for networking with other landowners (annual conferences, workshops, and field days).

Activity 0-2: Monitor Forest Health Annually
Forest health is an issue of moderate concern with Emerald ash borer already present and a potential for Oak wilt. I recommend monitoring the forest regularly (each year and during different seasons) for changes that may indicate additional insect or disease problems. The "Forest Health Highlights" publication about forest insects and diseases is a great resource updated annually and available at www.michigan.gov/foresthealth. There are several new insects and diseases that are not yet present in Michigan but are in nearby states, so landowners should monitor their forest and report any unusual problems to the DNR for an early response (Asian longhorn beetle for maple, Thousand cankers of walnut, etc.). To report an unusual insect or disease in your forest, please contact Roger Mech, the DNR Forest Health Monitoring Specialist, at MechR@michigan.gov, or 517-243-0300.

Integrated Pest Management (IPM) should be practiced protecting soil and water. IPM requires correctly identifying pests, setting an economic or action threshold, and then implementing the best method to control the pest. IPM actions may include cultural, mechanical, biological, and chemical controls. Chemical pesticides are a useful tool but should not be the first or only choice to control pests. For example, the best way to prevent Oak wilt is the cultural practice of not wounding oaks between April and July. If Oak wilt does become established, the primary action is a mechanical control of severing roots to prevent the spread of the fungus through root grafts.

Asian longhorn beetle on maple trees: This disease in not in Michigan yet but because Sugar maple and red maple populations are present on the ownership it is a good idea to be aware of this potential forest health issue.

Emerald ash borer: The Emerald ash borer (EAB) is an exotic pest that is attracted to both healthy and dying ash trees. All living ash trees ≥16" DBH should be included in the next timber sale. Harvest smaller diameter ash trees for firewood. This County is within the Level One Quarantine Area so logs or firewood cannot legally leave the Lower Peninsula. Girdled trees could be left standing to provide tall snags for wildlife, but ash crowns quickly become brittle and fall apart. See www.emeraldashborer.info for more information about EAB.

Oak wilt: Oak wilt is caused by a fungus that can be transported by bark beetles, but more commonly is spread by root grafts. The Red oak group of oaks (Red oak, Black oak, Pin oak) is more susceptible to oak wilt than the White oak group of oaks (White oak, Bur oak, Swamp white oak, Chinkapin oak). It is a better option to work toward preventing Oak wilt in the first place than it is to treat a stand after infection. One preventative measure that the Michigan DNR recommends is to avoid harvest activity during the three-month period when the beetles are most active. The beetles that can spread the disease are typically most active from April to July when the trees are most actively growing. Ideally, Timber sales that are conducted in the fall or winter months are best, but this is not always possible due to wet soils, timber markets or other competing uses of the forest. Oak wilt incidences vary across the State of Michigan. There are many oak areas in Michigan where Oak wilt has not been confirmed and Oak wilt transmission risk would be extremely low. However, treating oak stands near where there are confirmed Oak wilt incidences, it would be particularly important to avoid pruning or wounding to oak trees during the three-month window previously stated. http://na.fs.fed.us/fhp/ow/. (See appendix for a map of Oak wilt distribution in the state)

Beech bark disease: Beech bark disease (BBD) is initiated by a scale insect that attaches to the tree and feeds on its sap. The tiny scale (~1 mm) secretes a white, wooly, waxy covering and the trunks look like they are covered in white powder. The scale feeding damage allows a fungus to invade the tree, which inhibits the flow of sap, which causes a general decline in tree health and eventually kills the tree. Controlling the natural spread of BBD is not feasible because both the scale and fungus are moved by the wind. If the scale is not in your forest, consider reducing the amount of beech in your forest so that beech is <20% of the stand basal area. If beech scale is already present, harvest the infected trees. Do not move infested firewood as this will spread the scale and fungus that causes beech bark disease. See http://na.fs.fed.us/fhp/bbd/. (See appendix for a map of BBD distribution in the state)

Forest Health: Invasive species such as autumn olive oriental bittersweet, honeysuckle and multiflora rose can quickly overtake this stand limiting growth and regeneration of native species. More information on invasive species can be found at: https://mnfi.anr.msu.edu/publications/best-control-practice-guides.

Summary Table

The previously recommended activities are summarized in Table 1. This table includes space for you to make notes about your management decisions over the next twenty years. See the descriptions above for the proper season to conduct management activities. The timing of timber sales should be based primarily upon biological considerations like stand age, density, and forest health issues, but timing can be modified by several years according to other factors including economics (timber prices, income needs, and taxes) or landowner preferences.

Table 2. Summary of Recommended Management Activities for the Next Twenty Years

Stand	#	Acres	Activity Description	Dates		Silvicultural System
				Planned	Complete	
Entire Forest	0-1		Join Tree Farm	2022		
Entire Forest	0-2		Monitor Forest Health	Annual		
Entire Forest		168	Invasive species Control	ASAP		
1	1-1	121	Timber harvest	2023		Selective/ group selection
2	2-1	4	Timber harvest	2023		Selective/ group selection
3	3-1	29	Timber harvest	2023		Selective/ group selection
4	4-1	14	Timber harvest	2023		Selective/ group selection
5	5	59	PROTECTION			

After the Harvest

After a commercial timber harvest has occurred there will be slash left behind on the ground. [Slash is typically the tops of trees that are too small in diameter to be usable as sawlogs, are not straight enough to saw or are damaged in the logging process- this is region/mill/logger specific]. To some people this slash could look unappealing, but to natural resource professionals slash is an important part of the local ecosystem. The slash will provide protective cover for small mammals from predators as well as protective cover for natural regeneration from deer. Slash is also an especially important part of nutrient cycling for the forest.

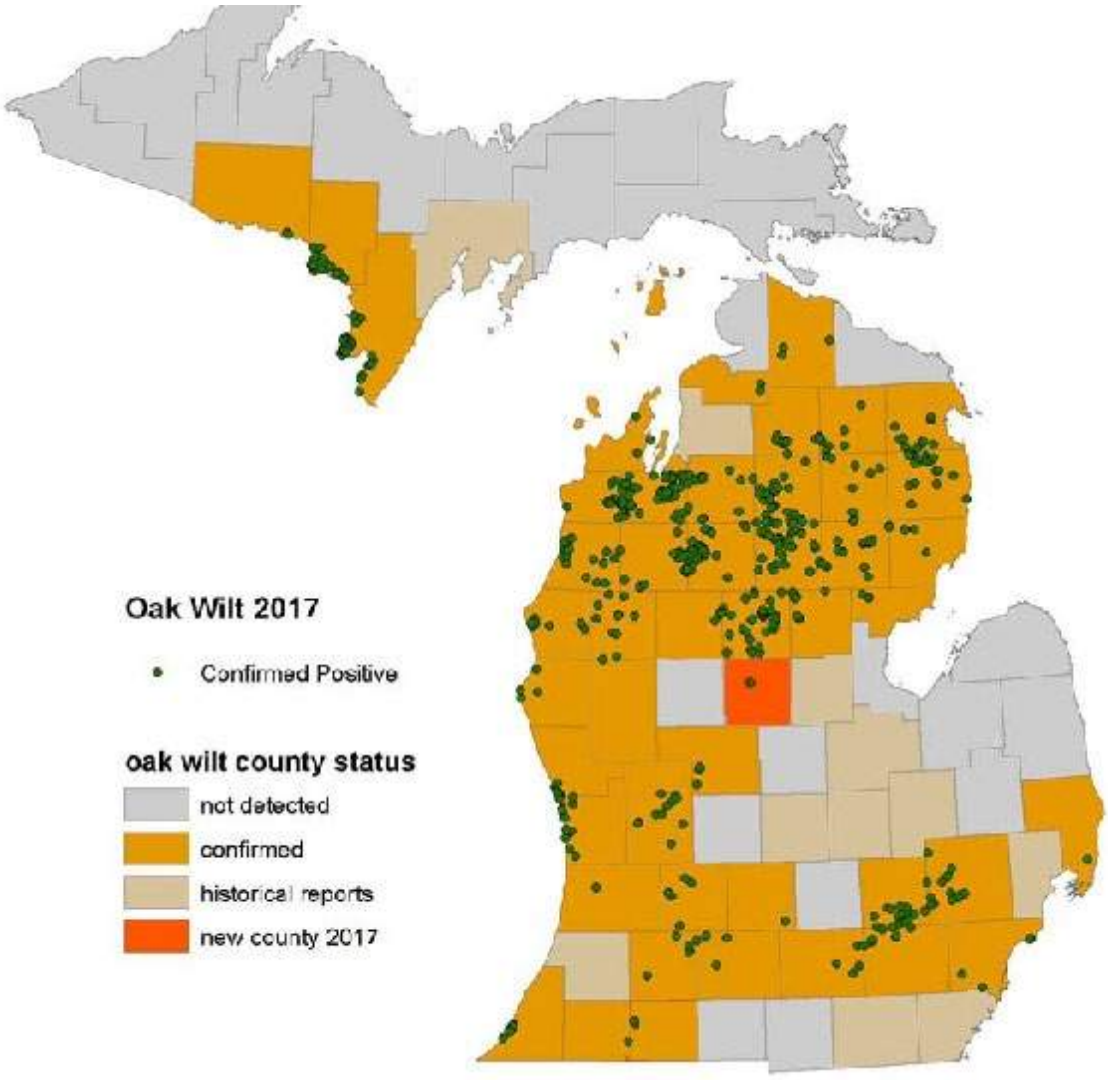
Monitoring

The successful implementation of this Forest Stewardship Plan is dependent upon frequent monitoring by the landowner. The landowner or their agent (consulting forester) should walk the entire forest at least annually to inspect the forest for changes and to evaluate the success of earlier management activities. Monitoring for forest health issues should occur more frequently, at least two or three times a year, to look for signs and symptoms of insects or disease during different seasons. All Forest Stewardship Plans should also be adaptable and flexible enough to accommodate changes in landowner goals or forest resources over the ten to twenty-year planning period. Plans for the Commercial Forest Program must allow for record keeping of silvicultural practices and amendments due to unexpected events or natural disasters. Please use the table at the end of this plan to record notes and make modifications to this plan as needed.

Appendix – General Forestry Information

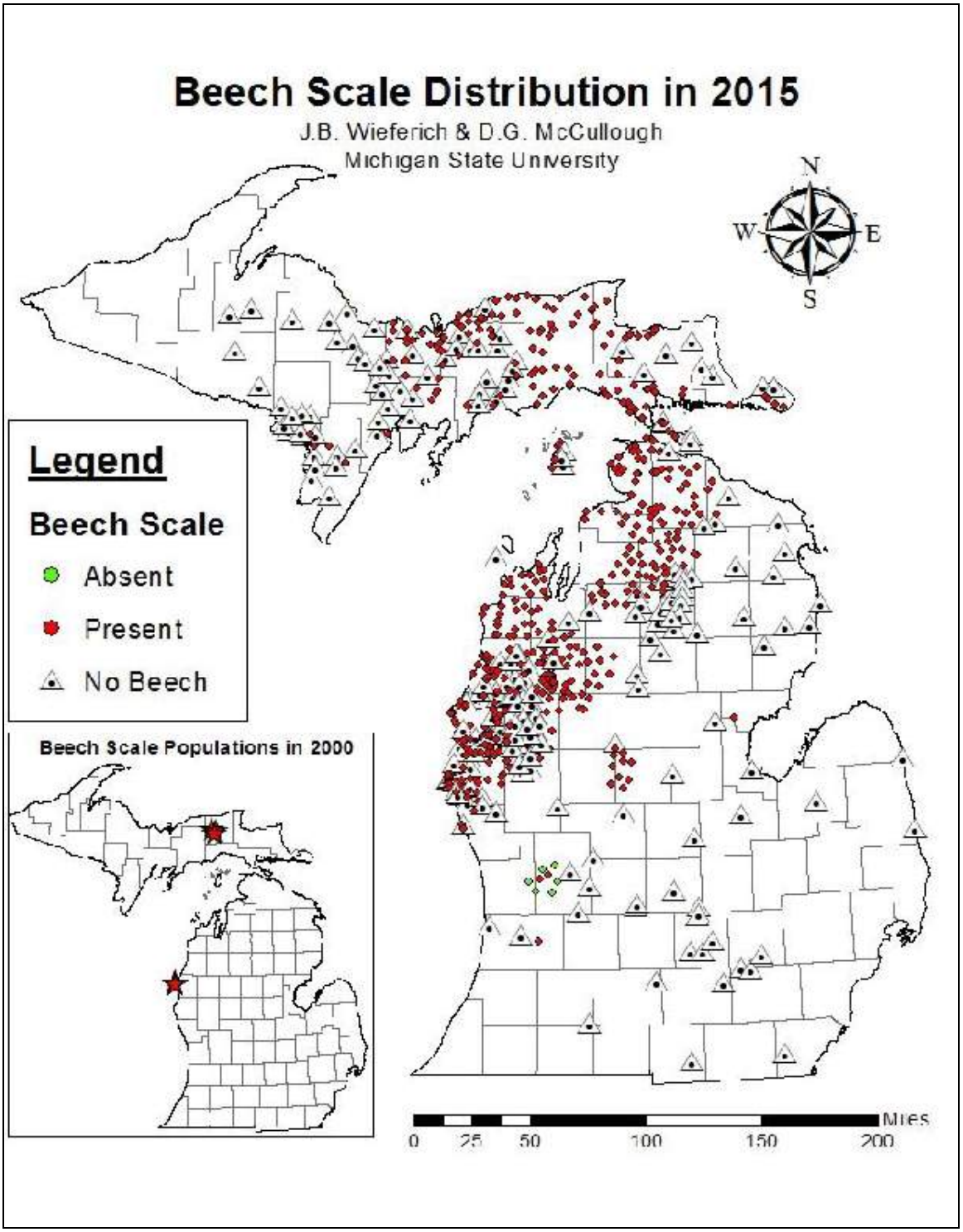
*Map of Oak Wilt Distribution **

This map shows the distribution of Oak wilt by county in 2017. For more information of Oak wilt go to www.michiganoakwilt.org. An interactive map (Oak wilt viewer) is at the bottom of the web page. There are no confirmed cases of Oak wilt in Van Buren County at this time, but annual monitoring is encouraged.



*Oak wilt has been confirmed in the Richland Area of Kalamazoo County

Map of ***Beech*** *Bark Disease Distribution*



Glossary of Common Forestry Terms

The following glossary is adapted from www.dnr.state.md.us/forests/gloss.html.

Agroforestry: a land-use system that combines both agriculture and forestry in one location. Alley **Cropping**: widely spaced rows of trees with annual crops growing in between the rows.
Basal Area (of a Tree): the cross-sectional area of a tree trunk at 4.5 feet off the ground and expressed in units of square feet (ft2).
Basal Area (of a Forest): the basal area of all trees on an acre of land is summed up for the basal area of a forest and expressed in ft2/acre; used as a measure of forest density.
Biomass: harvesting and using whole trees or parts of trees for energy production
Board Foot: a measure of volume 1 foot by 1 foot by 1 inch or 144 cubic inches of wood.
Bolt: 8-foot-long log
Browse: parts of woody plants, including twigs, shoots, and leaves, eaten by forest animals.
Carbon Cycle: the bio-geochemical cycle to exchange carbon between the biosphere and atmosphere by means of photosynthesis, respiration, and combustion.
Clear-cut: the harvest of all the trees in an area to reproduce trees that require full sunlight.
Co-dominant Tree: a tree that extends its crown into the canopy and receives direct sunlight from above but limited sunlight from the sides.
Commercial Forestland: forest capable of producing 20ft3 of timber per acre per year.
Commercial Treatments: timber stand improvements that generate income from sale of trees.
Cord: a unit of wood cut for fuel that is equal to a stack 4 x 4 by 8 feet or 128 cubic feet
Cordwood: small diameter or low-quality wood suitable for firewood, pulp, or chips.
Crop Tree: a young tree of a desirable species with certain desired characteristics.
Crown: the uppermost branches and foliage of a tree.
Crown Classes: see dominant, co-dominant, intermediate, and suppressed.
Crown Cover or Crown Closure: the percentage of a given area covered by tree crowns.
Crown Ratio: the ratio of the leaved portion of a tree's height to its total height.
Cruise: a forest survey used to obtain inventory information and develop a management plan.
Cull: a sawtimber size tree that has no timber value because of poor shape or damage. Diameter at
Diameter Breast Height (DBH): measurement of the tree trunk diameter taken at 4 1/2 feet.
Diameter-Limit Sale: a timber sale in which all trees over a specified DBH may be cut. A Diameter-limit sale often results in high grading the woodlot and is a poor forestry practice.
Dominant Trees: trees that extend their crown above surrounding individuals.
Even-Aged Stand: a stand in which the age difference between the oldest and youngest trees is minimal, usually no greater than ten to twenty years.
Forest Farming: cultivating high value specialty crops in the shade of natural forests.
Forest Stand Improvement (FSI): any practice that increases the health, composition, value, or rate of growth in a stand. Also called Timber Stand Improvement when focused on timber.
Forest Types: associations of tree species that have similar ecological requirements.
Group Selection: a process of harvesting patches of trees to open the forest canopy and encourage the reproduction of uneven aged stands.
Habitat: the ecosystem in which a plant or animal lives and obtains food and water.
Hardwoods: a general term encompassing broadleaf, deciduous trees.
High Grading: to remove all good quality trees from a stand and leave only inferior trees.

Intermediate Tolerance: a characteristic of certain tree species that allows them to survive, though

not necessarily thrive, in relatively low light conditions.
Intolerance: a characteristic of certain tree species that does not permit them to survive in the shade of other trees.
Landing: a cleared area within a timber harvest where harvested logs are processed, piled, and loaded for transport to a sawmill or other facility.
Log Rule: a method for calculating wood volume in a tree or log by using its diameter and length. Scribner, Doyle and the International 1/4-inch rule are common log rules.
Lump-Sum Sale: a timber sale in which an agreed-on price for marked standing trees is set before the wood is removed (as opposed to a mill tally or unit sale).
Mast: nuts and seeds such as acorns, beechnuts, and chestnuts that serve as food for wildlife.
Merchantable Height: the point on a tree stem to which the stem is salable.
Over-mature: trees that have declined in growth rate because of old age and loss of vigor.
Overstocked: the situation in which trees are so closely spaced that they compete for resources and do not reach full growth potential.
Over-story: forest canopy that includes dominant, co-dominant, and intermediate trees.
Overtopped: a tree cannot sufficiently reach the over-story and receive direct sunlight.
Pole Timber: trees 4 to 10 inches DBH.
Pre-Commercial Operations: cutting to remove wood too small to be sold.
Prescribed Fire: an intentional and controlled fire used as a management tool used to reduce hazardous fuels or unwanted understory plants (invasive, undesirable species, etc.).
Pulpwood: wood suitable for use in paper manufacturing.
Range: cattle grazing in natural landscapes.
Regeneration: the process by which a forest is reseeded and renewed.
Regeneration Cut: a timber harvest designed to promote natural establishment of trees.
Release: to remove overtopping trees that competes with understory or suppressed trees.
Residual Stand: the trees remaining intact following any cutting operation.
Riparian Forest Buffers: strips of land along stream banks where trees, shrubs and other vegetation are planted and managed to capture erosion from agricultural fields.
Salvage Cut: the removal of dead, damaged, or diseased trees to recover value. Sapling - a tree at least 4 1/2 feet tall and between 1 inch and 4 inches in diameter.
Saw-bolt: an 8-foot-long sawlog.
Saw-log: log large enough to be sawed economically, usually >10” diameter and 16’ long.
Saw-timber stand: a stand of trees who’s average DBH is greater than 11 inches.
Sealed-Bid Sale: a timber sale in which buyers submit secret bids.
Seed Tree: a mature tree left uncut to provide seed for regeneration of a harvested stand.
Seed Tree Harvest: the felling of all the trees in an area except for a few desirable individuals that provide seed for the next forest.
Selection Harvest: the harvest of individual trees or small groups at regular intervals to maintain an uneven-aged forest.
Shelter-wood Harvest: the harvest of all mature trees in an area in a series of two or more cuts, leaving enough trees of other sizes to provide shade and protection for forest seedlings.
Silvo-pastures: trees and improved forages to provide suitable pasture for grazing livestock.
Silviculture: the art and science of growing forest trees.
Site: the combination of biotic, climatic, topographic, and soil conditions of an area.

Site Index: a measure of the quality of a site based on the height of dominate trees at a specified

age (usually fifty years), depending on the species.
Site Preparation: treatment of an area prior to reestablishment of a forest stand.
Skidder: a rubber-tired machine with a cable winch or grapple to drag logs out of the forest.
Skidding: the act of moving trees from the site of felling to a leading area or landing.
Slash: branches and other woody material left on a site after logging.
Snag: a dead tree that is still standing. Snags provide important food and cover for a wide variety of wildlife species.
Softwood: any gymnosperm tree including pines, hemlocks, larches, spruces, firs, and junipers.
Stand: a group of forest trees of sufficiently uniform species composition, age, and condition to be considered a homogeneous unit for management purposes.
Stand Density: the quantity of trees per unit area, usually evaluated in terms of basal area, crown cover and stocking.
Stocking: the number and density of trees in a forest stand. Stands are often classified as under-stocked, well-stocked or overstocked.
Stumpage Price: the price paid for standing forest trees.
Succession: the natural replacement of one plant (or animal) community by another over time in the absence of disturbance.
Suppressed: a tree condition characterized by low growth rate and low vigor as a result of competition with overtopping trees. See overtopped.
Sustained Yield: an ideal forest management objective in which the volume of wood removed equals growth within the total forest.
Thinning: a partial cut in an immature, overstocked stand of trees used to increase the stand's value growth by concentrating on individuals with the best potential.
Threatened Species: a species or subspecies whose population is so small or is declining so rapidly that it may become endangered in all or a significant portion of its range.
Tolerance: the capacity of a tree species to grow in shade
Under-stocked: a stand of trees so widely spaced, that even with full growth potential realized, crown closure will not occur.
Understory: the level of forest vegetation beneath the canopy.
Uneven-Aged Stand: Three or more age classes of trees represented.
Unit Sale: a timber sale in which the buyer makes regular payments based on mill receipts.
Veneer Log: a high-quality log of a desirable species suitable for conversion to veneer.
Well-Stocked: the situation in which a forest stand contains trees spaced widely enough to prevent competition yet closely enough to utilize the entire site.
Wildlife Habitat: native environment of an animal that includes food, water, cover and space.
Windbreaks: rows of trees to provide shelter for crops, animals, or farm buildings

Federal and State Laws Related to Forest Management

- USA - Federal Insecticide, Fungicide, and Rodenticide Act, 1947
- USA - National Historic Preservation Act, 1966
- USA - Clean Water Act, 1948 and 1972
- USA - Endangered Species Act, 1973
- MI - Michigan Pesticide Control Act, Public Act 171 of 1976
- MI - Natural Resources and Environmental Protection Act, Public Act 451 of 1994
- MI - Right to Forest Act, Public Act 676 of 2002

Best Management Practices

Best Management Practices (BMPs) are guidelines published by the State of Michigan to protect Michigan's water resources from non-point source pollution and erosion while working on forest land. BMPs are now called "Sustainable Soil and Water Quality Practices on Forest Land" and the document is online at www.Michigan.gov/PrivateForestLand. BMPs include proper location and construction of logging roads, the use of riparian management zones, installation of culverts and other stream crossings, proper use of pesticides and other chemicals, and site preparation for planting. BMPs also include the proper seasonal timing of activities to minimize the spread of insects or disease. Any forest management activities should minimize soil erosion near wetlands and surface water. Tree Farm certification requires compliance with best management practices.

Forest Health

The DNR publishes the annual "Forest Health Highlights" that has information about the forest insect and disease problems in Michigan. See www.Michigan.gov/ForestHealth for a pdf of the most recent edition. To report an unusual insect or disease in your forest, please email several photos to DNR-FRD-Forest-Health@Michigan.gov.

DNR Forest Health - www.Michigan.gov/ForestHealth
DNR Invasive Species Info - www.Michigan.gov/InvasiveSpecies
MDARD Exotic Forest Pests – www.Michigan.gov/ExoticPests
USFS Forest Health - http://fhm.fs.fed.us/

Wildlife Habitat

The DNR Wildlife Division has an excellent publication on managing wildlife habitat at www.michigandnr.com/publications/pdfs/huntingwildlifehabitat/Landowners_Guide/index.htm.

DNR Wildlife Division – www.Michigan.gov/Wildlife
Michigan United Conservation Clubs - https://mucc.org
Quality Deer Management Association – www.qdma.com
Audubon Society - www.MichiganAudubon.org
Foresters for the Birds – http://vt.audubon.org/foresters-birds
Ruffed Grouse Society - www.RuffedGrouseSociety.org
National Wild Turkey Federation - www.nwtf.org
Michigan Trout Unlimited – www.MichiganTU.org
US Fish and Wildlife Service - www.fws.gov/partners

Forest Economics

Capital Gains Tax Information. Profits from timber sales are taxed as capital gains, rather than ordinary income, if you own the timber for more than twelve months. Expenses, including the cost of a management plan or a consulting forester's fees for a timber sale, can be deducted from profits. There are many great tax related resources available on www.TimberTax.org, including the most recent edition of the annual "Tax Tips for Forest Landowners."

American Tree Farm System- Standards of Sustainability

I recommend that you join the American Tree Farm System to certify your exemplary and sustainable forest management. A free inspection from one of the 145 Tree Farm Inspecting Foresters is required to enroll. This Forest Stewardship Plan complies with the Farm System's eight Standards of Sustainability listed below. See www.TreeFarmSystem.org for information about the Tree Farm program, forest certification, and the full Standards of Sustainability.

1. **Commitment to Practicing Sustainable Forestry.** Forest owner demonstrates commitment to forest vitality by developing and implementing a sustainable forest management plan.
2. **Compliance with Laws.** Forest management activities comply with all relevant federal, state, and local laws, regulations, and ordinances.
3. **Reforestation and Afforestation.** Forest owner completes timely restocking of desired species of trees on harvested sites and non-stocked areas where tree growing is consistent with land use practices and the forest owner's management objectives.
4. **Air, Water, and Soil Protection.** Forest management practices maintain or enhance the environment and ecosystems, including air, water, soil, and site quality.
5. **Fish, Wildlife and Biodiversity.** Forest management activities contribute to the conservation of biodiversity.
6. **Forest Aesthetics.** Forest management plans and management activities recognize the value of forest aesthetics.
7. **Protect Special Sites.** Special sites are managed in ways that recognize their unique historical, archeological, cultural, geological, biological, or ecological characteristics.
8. **Forest Product Harvests and Other Activities.** Forest product harvests and other management activities are conducted in accordance with the management plan and consider other forest values.

Qualified Forest Program

The Qualified Forest Program (Public Acts 42 and 45 of 2013, as amended) exempts forest owners from paying local millage taxes up to 18 mills in each tax jurisdiction (township). Landowners must have between 20 and 640 acres, a forest management plan, and agree to comply with their forest management plan. Landowners must report harvests to the Michigan Department of Agriculture and Rural Development after they occur. A Forest Stewardship Plan is accepted by the Qualified Forest program. See www.Michigan.gov/QFP for information and enrollment forms. The application deadline is September 1 for tax benefits in the following year.

Commercial Forest Program

The Commercial Forest Program offers a specific property tax of $1.25 per acre (Parts 511 & 512 of Public Act 451, 1994, as amended). Landowners must have at least 40 acres of forest, a forest management plan, conduct commercial harvests as prescribed in the plan, and allow public foot access for hunting and fishing. Landowners must notify the DNR before they harvest forest products. A Forest Stewardship Plan is accepted by the Commercial Forest program. For more information and enrollment forms, see www.Michigan.gov/CommercialForest. The application deadline is April 1 for tax benefits in the following year.

Financial Assistance Programs

The Natural Resources Conservation Service (NRCS) administers several programs such as the Environmental Quality Incentives Program (EQIP) or Conservation Stewardship Program (CSP) that may provide financial assistance to forest owners to implement "conservation practices" to address "resource concerns" on their land. Landowners must have an approved forest management plan prior to enrolling. Forest Stewardship Plans are accepted by the NRCS when applying for EQIP funding, although they do not require the same level of detail as NRCS conservation activity plans. Work with your NRCS District Conservationist and forester to fill out supplemental "Job Sheets." See www.mi.nrcs.usda.gov/technical/forestry.html for info.

Some of the recommended activities in this plan have potential for financial assistance. NRCS forestry "conservation practices" include forest trails and landings, stream crossings, riparian forest buffers, stream habitat improvement, forest stand improvement, tree and shrub establishment, brush management, early succession habitat, wetland wildlife habitat, and upland wildlife habitat. NRCS conservation practices address "resource concerns" (environmental problems) like soil erosion, soil quality, water quality degradation, plant productivity, habitat fragmentation, invasive plants, forest health, etc. Contact your local NRCS Service Center to apply for financial assistance (see www.nrcs.usda.gov/wps/portal/nrcs/main/mi/contact/local).

Notes and Modifications.

Appendix B - 2022 *Comprehensive Deer Management Program – Report and Recommendations* (CDMPRR)

ADDRESSING THE URBAN DEER POPULATION IN KALAMAZOO

Neighborhood Association Ad Hoc Committee:
Comprehensive Deer Management Program - Report and Recommendations

February 1, 2022

Urban Deer Management Plan – Table of Contents

- Non-Lethal
- Lethal
- Experimental
- No Action

EXECUTIVE SUMMARY

Our committee, and this report, was initiated and developed in response to over three years of resident feedback and complaints to our many Neighborhood Associations (and the City) regarding an increase in quality of life, health, and safety challenges to both humans and deer. Our committee is solely made up of board members or officially designated representatives of our respective Neighborhood Associations.

We note that three Neighborhood Plans within "Imagine Kalamazoo 2025" include action items to pursue an approach to maintaining the deer population at a safe level for both the deer and residents.

Purpose of our Report

To provide the City of Kalamazoo's City Commission, along with city staff, strategic guidance through our committee's fact- and research-based information, data, and recommendations to:

1) Share with our city leaders the biology, ecology, and lifestyle of urban white-tailed deer, and
2) To understand how humans and deer can harmoniously and safely co-exist with each other

Goals of our Report

1) **Demonstrate there is a growing deer population in Kalamazoo** creating multiple issues that affect the health and safety of both residents and deer in many neighborhoods, not one or two
2) **Show that deer live within Kalamazoo in multiple herds** of varying sizes that impact each neighborhood differently; therefore they can and should be managed as such
3) **Identify and detail the many health and safety issues** brought forth by our neighborhoods that indicate the city's growing deer population is impacting both residents and the deer themselves
4) **Provide the initial, fundamental considerations** required to develop, implement, monitor, and maintain an effective short-, medium-, and long-term Deer Management Program for the City by:
    - Providing the initial data that illustrates many city residents have been impacted by deer, have concerns, and want action taken to ad dress the issue of our urban deer
    - Detailing ways to further evaluate community issues with white-tailed deer, and
    - Recommending "next steps" for city government to take that will address conflicts with deer by developing a comprehensive, practical, effective, science-based, humane, and community-supported deer management plan.

Our committee believes we have accomplished these goals – *and believes that the result of creating and implementing a deer management plan will create a community that is more knowledgeable and better equipped to co-exist with deer and other wildlife within our full urban ecosystem..*

Method of Data Gathering and Analysis

Our committee utilized *fact-based research and guidance* from known and trusted resources who have proven knowledge and experience in deer management techniques and planning. Sources included:

1) Michigan Department of Natural Resources (MDNR)
2) Over 20 State and city-based deer management plans
3) Seven Michigan city-based deer management/deer culling plans
4) Local research resources:
    - Kalamazoo Nature Center
    - Kalamazoo College
    - Kalamazoo Christian High School
5) Citywide resident survey (***1,616 responses received****;* see **Appendix D** for full survey results)
    - Developed via referencing surveys from seven professional deer management plans, a review by our full committee and senior city staff, and professional marketing help
    - One survey question stands out: *Generally, what are your thoughts about deer in Kalamazoo?*
        1. **"I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause" - 48.4%**
        2. **"I do not enjoy the presence of deer and regard them as a nuisance" - 22.7%**

(Note: All survey data throughout this report is represented in bold and in brown)

Overview of Findings

A. Our committee examined all areas of multiple objective, fact-based, professional, and comprehensive urban deer management programs:

1) Understanding *urban* white-tailed deer (behaviors, range, diet, reproduction, etc.)
2) Examining the MNDR's mission, goals, and philosophy of managing urban deer:
   - The MDNR *"advises community leaders, assists in the development of deer management plans, participates on local task forces, speaks at public meetings, conducts disease testing, and provides permits for lethal harvest, but lacks a defined process that can be implemented consistently across the State...*
     - ***…Successful resolution of urban/suburban deer issues requires that community leaders and DNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflicts".*** (MDNR, 2016, p.26)
3) Understanding the root causes of conflicts between deer and people in Kalamazoo:
   - We have identified nine safety issues that go well beyond "my hostas are being eaten", including increasing cases of deer/vehicle collisions (DVCs), Lyme Disease, and Chronic Wasting Disease (CWD)
4) Reasons for, and how to create and implement, a successful deer management program
5) Investigating many urban deer management options, tools, and techniques; both non-lethal and lethal

B. There are three types of deer "carrying capacity" (biological, ecological, and social) to consider when evaluating the management of an urban deer population. ***"An effective and appropriate management of deer populations must consider [all] carrying capacities".*** (MDNR, 2009, p.7)

C. *Deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions.* (MDNR, 2009, pp.9-12)

Recommendations

(Note: All committee notes and recommendations throughout this report are represented in red)

Based on our findings and research our committee is **recommending a two-phase approach** to managing Kalamazoo's urban deer population:

Phase 1

Develop and implement:

1) Ongoing public education program and resource website for residents regarding urban deer
2) Deer carcass removal program
3) Review and modify (if necessary) the fence ordinance to allow higher residential fencing
4) Effective way(s) the city can help support and report violations of the state's "no feeding" law

Phase 2

Work with the MDNR and other wildlife experts to:

1) Lead the research and budgeting (of funding and personnel) to gather deer population data
2) Develop and implement a comprehensive short-, medium-, and long-term deer management program for the health and safety of our city's ecosystem, deer, and human populations

NOTE: *Our research and recommendations reflect our desire to identify an appropriate balance among the biological needs of the species, the benefits deer provide to some segments of society, the costs they impose on others, and the acceptability and feasibility of the differing management methods.*

Our committee is not advocating for deer eradication or the elimination of wildlife watching opportunities, but rather to manage our urban deer safely and effectively for both residents and the deer themselves..

INTRODUCTION

Committee History, Formation, and Makeup

Our committee, and this report, was initiated and developed in response to over three years of resident feedback and complaints to our many Neighborhood Associations, as well as City staff, along with frequent neighborhood Facebook posts filled with concerns regarding an increase in safety, health, and quality of life challenges to both humans and deer. These included:

1) Deer damage to private property
2) Concerns regarding the increase and spreading of Lyme Disease among humans and Chronic Wasting Disease (CWD) among deer
3) Increase in deer/vehicle collisions
4) Lack of a governmental response (and taking responsibility for) helping residents safely and efficiently remove deer carcasses from their property
5) Damage to the natural ecosystems within Kalamazoo's parks and land preserves
6) Concern about the health and safety of Kalamazoo's deer population
7) Increase in dangerous deer/human and pet interactions

In response, **city staff encouraged a group of Neighborhood Association leaders along with other relevant association leaders** to form a citizen ad hoc committee to collaborate with them to research this issue and develop a roadmap to an acceptable and effective deer management plan to address these challenges.

NOTE: *ALL Kalamazoo Neighborhood Associations were contacted and invited to designate a representative to serve on this committee. One of our main goals was always to be as inclusive as possible, and to gather as many perspectives from as many viewpoints as possible. We also invited and included representatives from neighborhoods without formal Associations, such as Westnedge Hill, Hillcrest, Parkwyn Village, and Stewards of Kleinstuck*. (A list of participating neighborhoods can be found in **Appendix A).**

Some neighborhoods informed us that they did not want to participate, while others did not respond to our repeated attempts to contact and include them. Nevertheless, we continued to communicate and inform those neighborhoods of our progress, as well as invited them to reach out and keep their residents informed, and to join in on all feedback methods we employed, including our citizen survey.

NOTE: *Three Neighborhood Plans within the "Imagine Kalamazoo 2025" Master Plan include action items to pursue an approach to maintaining the deer population at a safe level for both deer and residents.*

A critical component of our recommendations was the solicitation and incorporation of as many Neighborhood Associations and citizen points of view as was possible, given our time, personnel, and budget constraints.

Committee Deer Research: Methodology

Our committee utilized *fact-based* research and guidance from known and trusted resources who have proven knowledge and experience in deer management techniques and planning; more than we could hope to amass as a citizen ad hoc committee. Sources included:

NOTE: *All applicable research sources are cited at the beginning of each section.*

1) **Michigan Department of Natural Resources (MDNR)**
   MDNR was a major resource which we relied on for discussions relating to education and advice; including our regional Wildlife Biologist, Don Poppe, and MDNR research; specifically, their 2009

Michigan Deer Management Plan, and their 2016 Review of Deer Management Report.

2) **Other Deer Management Plans - National**
Urban deer management is not a new issue in the United States. There are many cities across the US which have already completed their own research to develop their own comprehensive plan, of which much of their background information and research is universal to urban/suburban deer.
   - Our committee studied over 20 of these plans and have included relevant information and research from them in this report

3) **Other Deer Management Plans – Michigan Cities**
   - Our committee also researched deer management plans from seven Michigan cities that chose to institute a culling program. (A summary of their deer management programs, *along with their issues and concerns*, can be found in **Appendix B)**

4) **Supplemental Local Research**
Although not peer-reviewed scientific papers, two local school science classes provided us research that proved very helpful to our committee, in that they both presented strong anecdotal evidence that Kalamazoo has an over-abundance of deer in some areas
   - Kalamazoo Christian High School
     Their environmental science class, led by their Life Sciences teacher Steve Dyk, produced both a 2017 and 2020 Winchell/Asylum Lake Deer Survey

   - Kalamazoo College
     A 2020 Senior Individualized Research paper focused on Monitoring of White-tailed Deer Population using Citizen Scientists (by employing the "iNaturalist" citizen reporting app) in many Kalamazoo neighborhoods. A second, 2021 study by different Kalamazoo College students, is currently in progress

5) **Resident Survey** (1,616 responses; See **Appendix D** for full results)
   - During March and April 2021, our committee developed a citizen deer survey to supplement our other research with local data
   - We used as our guide surveys from seven professional deer management plans, professional marketing help, and a review by our full committee and senior city staff
   - With the help of Community Planning and Development, we distributed our survey online in mid-May via the city's website, as well as to all Neighborhood Associations, who promoted it and made it available through each of their own communication channels
   - We **closed the survey in mid-June 2021 and received 1,616 responses** from residents in 24 neighborhoods (as well as 70 non-residents who identified themselves as working in Kalamazoo). Selected survey results will be found throughout this report

NOTE: *Our committee fully understands that although our response rate was high, this survey was never intended to justify final deer management decisions. Rather, our goal for the survey was to* ***begin*** *to understand the observations, experiences, and attitudes of residents about our deer population to guide the "next steps" of developing a comprehensive deer management program for Kalamazoo.*

PURPOSE AND GOALS OF THIS REPORT

The purpose of this report is to provide the City of Kalamazoo's City Commission, along with city staff, strategic guidance through our committee's fact- and research-based information, data, and recommendations to:
1) Educate our city leaders on the biology, ecology, and lifestyle of urban white-tailed deer, and
2) To learn how we can harmoniously and safely co-exist with each other

The goals of this report are to:

1) **Demonstrate that there is a growing deer population in Kalamazoo**, creating multiple issues that affect many neighborhoods, not just one or two
2) **Identify and detail the health and safety issues** brought forth by our neighborhoods that indicate the growing city's deer population is impacting both residents and the deer themselves
3) **Show that deer within the city live within multiple herds** of varying sizes that impact each neighborhood differently; therefore can and should be managed as such
4) **Provide the initial, fundamental considerations** required to develop, implement, monitor, and maintain an effective short-, medium-, and long-term deer management program for the City of Kalamazoo by:
   - Providing initial data from our survey that illustrates that many of our city residents have concerns and have been impacted by deer and want action taken to address the issue of our urban deer population
   - Detailing ways to further evaluate community issues with white-tailed deer, and
   - Recommending "next steps" for city government to take that will address conflicts with deer by developing a comprehensive, practical, effective, science-based, humane, and community-supported Deer Management Plan.

NOTE:* *Our committee believes we have accomplished these goals* *– and believes the result of putting a deer management plan in place will create a community that is more knowledgeable and better equipped to co-exist with deer and other wildlife.

MICHIGAN DEPARTMENT OF NATURAL RESOURCES (MDNR): DEER MANAGEMENT

(Michigan Deer Management Plan, MDNR, 2016, pp.1, 11-33)

This report has closely followed the MDNR's mission, goals, and philosophy for deer management in guiding our committee's research and recommendations.

1) MDNR Deer Management - MISSION

The mission of the MDNR regarding deer throughout Michigan is to *maintain a healthy white-tailed deer population*: (MDNR, 2016, p.1)

- Using sound scientific management
- Maximizing recreational opportunities
- Minimizing negative impacts on ecosystems and other wildlife species
- Without creating undue hardship to private interests

2) MDNR Deer Management - GOALS

The MDNR has identified six principal goals relating to deer identified through their public input process: (MDNR, 2016, p.1)

***NOTE:** Based on the results of our citizen deer survey, we have discovered numerous trends that indicate further action is needed for Kalamazoo to work with the MDNR (and other experts) to have our city fulfill all six goals of the MDNR, which reflect the public's desires to create the best and most appropriate management effort for deer herds and for the people of Michigan (and Kalamazoo).*

1. **Manage Deer Populations at Levels that do not Degrade the Vegetation Upon Which Deer and Other Wildlife Depend**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Deer preventing the natural regrowth of native plants" - 65.7%**
   - **"Disruption of our city's ecosystem" – 64.2%**
   - **"Over-browsing of natural habitats (on public and/or private lands)" - 63.4%**

2. **Promote Deer Hunting to Provide Quality Recreational Opportunities, *as the Primary Tool to Achieve Population Goals*, and as an Important Social and Cultural Activity**

NOTE: *Although our survey showed that 81.9% are personally "not interested" in hunting deer as a sport* ***the MDNR considers hunting (i.e. – the killing of deer by humans) their primary tool to achieve deer population goals.*** *The MDNR states that the natural predators of deer in Michigan are effectively absent from the ecosystem, so humans must take over that role in some capacity to successfully manage deer population levels.*

3. **Manage Habitat to Provide for the Long-Term Viability of White-Tailed Deer in Michigan while Limiting Negative Impacts to the Habitats of Other Wildlife Species**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Loss of deer habitat, leading to their increased population" – 73.1%**
   - **"Loss of plant or animal diversity in your neighborhood/city" – 64.2%**
   - **"Decreased bird populations due to deer-related habitat loss" – 60.3%**

4. **Reduce Conflict Between Humans and Deer**
   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Injury to you or family members from a deer-vehicle collision" – 64.5%**
   - **"Deer threatening or harming people or pets" – 29.8%**

NOTE: *Many resident comments included accounts of their pets have been attacked or charged at by deer, mainly during "rutting" season (October – November).*

5. **Reduce the Threats and Impacts of Disease on the Wild Deer Population and on Michigan's Economy**

   The percentage of survey respondents who were "concerned to very concerned" about the following issues include:
   - **"Chronic Wasting Disease (CWD) spreading among local deer" – 71.0%**
   - **"You or those close to you getting a tick-borne disease (such as Lyme Disease)" – 70.0%**

6. **Enhance Public Engagement in, and Awareness of, Deer Management Issues and Knowledge of Deer Ecology and Management**

   The percentage of survey respondents who were:
   - **Not interested in feeding deer, or "concerned to very concerned about fellow neighbors feeding deer" – 82.8%**
   - **"Learning more about deer management actions" – 73.9%**

NOTE*: In addition to citizen responses that directly correlate to the MDNR's six primary goals, the following survey results and local data are also relevant to understanding the need to manage Kalamazoo's deer population in relation to the MDNR's Deer Management Philosophy:*

3) **MDNR Deer Management Philosophy**
The MDNR supports deer management in urban/suburban areas to help address the following five issues:

1. **Damage to Ecosystems**
   As stated above, 64.2% of survey respondents are "concerned or very concerned" about this issue, *a Strategic Vision Goal (Environmental Responsibility) of our Master Plan.*

2. **High Deer-Vehicle Crash (DVC) Incidence Rate**
   As the following data indicates, deer/vehicle crashes within Kalamazoo have been trending up since 2014 (data from Kalamazoo City Engineer and Michigan Traffic Crash Facts (MTCF)):

Year	# DVCs
2014	42
2015	53
2016	57
2017	58
2018	87
2019	72

Average # DVCs from 2014-19 = 61/year

In addition, 2019 deer-vehicle crash data from the Office of Highway Safety Planning (OHSP) shows that out of the 84 Michigan Counties, Kalamazoo ranked:

- 3rd in persons injured
- 7th in local street crashes
- 12th in total crashes

3. **Damage to Residential Landscaping and Gardens**

   The percentage of survey respondents who were "concerned to very concerned" about "Deer damage to trees, shrubs, plantings & gardens around [their] home"– 66.6%

   NOTE: *This was the second-highest concern among respondents, and generated the most comments among those who left comments*

4. **Public Act 451 of 1994**
   The Wildlife and their habitats of the state are valuable public natural resources held in trust by the state, and the state has a duty as trustee to *manage its wildlife and their habitats effectively for the use and enjoyment of present and future residents and for the protection of the environment*.

   Survey respondents indicate residents who:
   - **Have "seen an increase in deer" in the last three years:**
     - **At their home: 60.7%**
     - **In their neighborhood: 62.9%**
     - **In the city at-large: 49.1%**

   - **"Enjoy the presence of deer, but worry about problems (damage, disease, etc.) they may cause" – 48.4%**
     - **Believe the deer population should "decrease/decrease a lot"- 63.7%**
     - **Believe it is "important or very important" that the size of the deer population change – 56.7%**

NOTE: *As pointed out from survey data results, a vast majority of respondents are looking to Kalamazoo government to protect our city's ecosystem and manage the rising deer population*

5. **Natural Resources Commission Policy #2007**
   The Department's goal is to manage the deer herd using management practices based on scientific research to:

   - Maintain healthy animals and keep the deer population within limits dictated by the carrying capacity of the range

- Limit effects on native plant communities, agricultural, horticultural, and silvicultural crops, and public safety

Our resident survey also indicated that 63.4% respondents have "personally been affected" by problems #1 - 5 listed above.

Currently, the MDNR *"advises community leaders, assists in the development of deer management plans, participates on local task forces, speaks at public meetings, conducts disease testing, and provides permits for lethal harvest, but lacks a defined process that can be implemented consistently across the State.* ***Successful resolution of urban/suburban deer issues requires that community leaders and DNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflict****".* (MDNR, 2016, p.26)

NOTE: *It is precisely for this reason that our committee recommends the City of Kalamazoo takes the initiative and lead in researching, developing, and implementing a comprehensive short-, medium-, and long-term deer management plan for the health and safety of its ecosystem and deer & human populations.*

To develop a deer management program based on scientific research, ***further study will need to be taken by Kalamazoo government*** *by means of engaging with the MDNR and other experts, and dedicating resources to the effort.*

UNDERSTANDING WHITE-TAILED DEER

(A Review of Deer Management in Michigan, MDNR, 2009, p.1,2 - 29,30)

NOTE: Our survey indicated that deer are important to the people of Kalamazoo*. The expectations, concerns, and values associated with deer by Kalamazoo residents are diverse and complex and will make successful management of this natural resource challenging, but necessary.*

Background

White-tailed deer (*Odocoileus virginianus*) are one of the most recognizable and charismatic species of wildlife, but they are the cause of a growing urban wildlife management problem not only in Kalamazoo but many metropolitan areas throughout the United States. Deer are generalist herbivores that exist in rural, suburban, and some urban areas throughout much of North America. White-tailed deer often shift from open canopy vegetation to forested cover seasonally and according to different food availability.

During early spring, open canopy vegetation provides herbaceous forage, during summer deer may browse in wetland areas, and in autumn deer often prefer hardwood forests if a mast crop is available (McCullough, 1984). ***For these reasons, the white-tailed deer is a species that often thrives in the transition between forest and open canopy vegetation, or edge habitat.*** (Alverson, 1988).

The forest/open canopy edge also occurs at the forest transition to ***areas such as landscaped suburban yards, parks, or playing fields*** where low intensity residential development is spreading into once rural farmed or forested areas. ***As land use shifts*** from forest, agricultural fields, and pasture to single family dwellings and recreational areas such as golf courses and playing fields, ***so too must our perception and management of deer habitat.***

Marked increases in forest fragmentation with only slight increases in human population density have had large effects on edge habitat This creates a suite of conditions that supports deer and ***often protects them from sources of mortality such as predation and hunting*** (Vogelman J., Assessment of forest fragmentation in southern New England using remote sensing and geographic information systems technology. 1995, p. 439-449).

As urban development increases, the natural habitat required by many wildlife species disappears, but white-tailed deer adapt to urban environments and human activity. ***White-tailed deer populations grow rapidly in urban areas due to:***

1) Lack of natural predators
2) Patchy habitats (scattered woodlots)
3) Abundant food resources
4) Increased offspring survival

*"**White-tailed deer thrive on disturbance and fragmented habitat**. It is possible to get very large deer populations in suburban areas, especially where there are tracts of trees between houses for cover".* (The Truth About Deer and Urbanization, Realtree.com, Dr. Joe Caudell, deer biologist, Indiana Department of Natural Resources, 2019).

Reproduction

(A Review of Deer Management in Michigan, MDNR, 2009, p.29, 30)

Deer productivity rates (fawns produced per doe) are generally highest in regions with an abundance of nutritious food. Deer living in areas with low annual snow accumulation tend to be more productive than those living in regions where snow covers available food for months at a time and inhibits deer movement to food sources. In southern Michigan, where winter conditions are relatively mild, a high percentage of fawns and almost all yearling and adult does breed each year.

Deer are highly adaptable; they adjust easily and quickly to changing environmental conditions. In lean years, deer tend to have just one fawn or none, reabsorbing their embryos when their nutritional status is poor. When their food supply is good, twins or triplets may be born.

In Michigan, the deer mating season typically occurs during late October through December. Peak mating activity is in November. Gestation is about 200 days, and the peak of fawn drop is mid-May to mid-June. For the first couple of weeks, does leave their fawns in a hiding place for several hours at a time, returning briefly to nurse them. This strategy reduces the likelihood of predators locating the newborn fawn. Fawns begin to follow their mother on her foraging trips at about 4 weeks of age. White-tailed deer fawns are nursed for 8 to 10 weeks before they are weaned.

In southern lower Michigan, where habitat for deer is excellent and winters are relatively mild, about 30 to 50 percent of females breed as fawns and produce a fawn themselves when 1-year old. **Pregnancy rates for does two years and older typically are very high, ranging from 80 to 95 percent.** Pregnant one-year old does usually produce a single fawn, whereas older does usually produce twins, with singles or triplets possible depending upon their age and nutritional status.

Food Habits

The diet of white-tailed deer changes with the seasons. Succulent herbaceous plants, such as hostas, sedums asters, and chard are preferred by deer during the summer months. *Favorite winter "browse" species in Michigan are white cedar, maple, birch, aspen, dogwood, and sumac, as well as many shrubs.*

Causes of Mortality

A deer's life expectancy in Michigan is influenced greatly by **hunting pressure and hunting regulations**. This obviously has an impact in rural areas but <u>not</u> in urban settings.

Deer-vehicle collisions (DVC's) are another major source of deer mortality in the state. According to State Farm Insurance research, Michigan ranks **5th in the nation** for DVC's; drivers have a 1-in-54 chance of a collision. (State Farm, 2020)

- On an annual basis, DVCs cost Michiganders upwards of $130 million in damage, a AAA news release said. In 2018, 14 people died in deer crashes in Michigan; nine of those were motorcycle-deer crashes, the release said. There was a total of 53,464 vehicle-deer crashes in the state that year, which was up from 50,949 in 2017. (MLive.com, October 31, 2019)

- **Crashes occurred most often in Michigan's southern, heavily populated counties**
  (Note – Kalamazoo County population ranks 8th of 84 counties)
  Vehicle-deer crashes occur during all months of the year, but they are especially prevalent during autumn (October-December) when roadways offer the last green forage of the season, corn fields are being harvested, the deer mating season ("rut") is in progress, and daily commute occurs around dawn and dusk, when deer are most active.

Behavior

Deer ***leap as high as 10 feet*** in a single bound. Although they are great jumpers, ***fences that are 8 feet or higher typically deter them***. (Solving Problems with Deer, Humane Society of the United States (HSUS), p.3)

Current Population Status and Range in Michigan

(Michigan Deer Management Plan, MDNR, 2016, p.10)

In our southwestern lower peninsula, deer populations are highly productive, with many factors working together to produce a challenging management scenario. *The **abundance of food** in the form of available agricultural crops combined with the more than **adequate cover** of scattered woodlots and idle fields provide near perfect white-tailed deer habitat.*

In addition, relatively mild winter conditions, ***the near elimination of natural predators**, and **limited hunting access** on private land (including numerous parcels where no deer hunting occurs at all) contribute to the growth of these populations.*

Urban Deer Range

The size and shape of a deer's home range varies with deer density, sex, landscape conditions, habitat quality, and seasons. **Non-migratory deer in the southern lower peninsula have an estimated annual home range size of 0.2–2.9 square miles**. Males generally have larger home ranges than females. Research has shown yearling bucks in southern Michigan travel about 6 miles on average (Pusateri 2003). **Female resident deer have a home range of .48 to .83 square miles.**

Influential landscape variables included distance to forest, roads, and urban development. *Deer occupying better habitats can fulfill all their necessary requirements (suitable food and cover) in smaller areas.* (Emerging Issues in White-tailed Deer Management and Conservation, Purdue University, 2009, p.20)

The relatively small annual home ranges of deer may be attributed to:

- Land ownership patterns (scattered woodlots)
- Quality of the habitat provided by stakeholders
- The positive values stakeholders have for deer

Following are three Kalamazoo studies that indicate the prevalence of deer throughout the city:

1) A **WMU-led study** map of deer travel corridors demonstrates this perfectly within the **Oakwood-Parkview Hills/Parkwyn Village/Oakland Drive-Winchell area**. Situated between two nature preserves, and home to wooded areas, streams, natural wildlife corridors, and abundant "transition" areas, this area is an ideal deer habitat and *the home to most Kalamazoo deer:*

2) A **2017 and 2020 Winchell-Asylum Lake Deer Survey** conducted by Kalamazoo Christian High School's 2017 and 2020 Environmental Science Classes. In both studies they observed the same Oakland Drive/Winchell Neighborhood boundary, a 1.34 mi^2 area, which as noted above, is an average range size for multiple, separate deer herds.

   Their results found:

   - In 2017 they observed **547 deer tracks which they interpreted to correlate to 266 deer - 199 deer/mi^2**
   - In 2020 they observed **1677 deer tracks which they interpreted to correlate to 108 deer - 81 deer/mi^2** (p.18)
   - One of their main conclusions in both studies was*, "The one piece of indisputable information is that the raw data illustrated pockets of high densities of deer among neighborhoods and in pockets of wooded areas".* (p.15)

Below is a map of the KCHS 2020 deer/deer track sightings:

NOTE: *Our committee understands the disparity between the 2017 and 2020 numbers and realizes that these students have done the best research they can with limited resources. But even accounting for their lowest estimates, it is clear this neighborhood has an abundance of deer that live and travel amongst it.*

3) **Monitoring of White-Tailed Deer Population using Citizen Scientists in Kalamazoo Neighborhoods**, a 2021 Senior Individualized Research paper by Kalamazoo College students (their research was supervised by the Kalamazoo Nature Center and the Kalamazoo College Department of Biology)
    - The group used "citizen science" via the free iNaturalist app to collect their data. iNaturalist uses a tracking system linked with Google Earth, and anyone who has a phone with a camera was eligible to submit photos and help with the deer's tracking. The application automatically detects what type of animal or plant is in the photo taken and pins the photo's location to a map of Kalamazoo using Google Earth, which tracks the photo's location and time studied (p.6)
    - The location of this project was in the City of Kalamazoo and recorded observations were made in 12 of the city's 21 named neighborhoods: Arcadia, Burke Acres, Colony Farm, Edison, Hill N' Brook, Oakland-Winchell, Oakwood, Parkview Hills, South Westnedge, Westnedge Hill, West Main Hill, and Westwood (p.6)
    - Their results indicated: (p.18)
        - There was **a total of 14 different herds** throughout Kalamazoo's neighborhoods
        - **The majority of the sightings came from the Oakland-Winchell neighborhood**, with 40 different sightings

        - This neighborhood was one of the largest sustainable living areas for deer in Kalamazoo (p.25)
    - Of the 14 herds, four came from the Oakland-Winchell neighborhood
    - A direct correlation between the abundance of deer to plentiful water sources and forest/woodlands areas. Again, Oakland-Winchell has more of these types of natural areas than any other neighborhood

NOTE: *Again, our committee understands the inexact science here, and the limitations imposed by voluntary data collectors, the need to use the iNaturalist application on a smart phone, and the incomplete public awareness of the study.* ***But direct observation and data shows us that deer are prevalent within the city and specifically, their counts vary drastically depending on the neighborhood***.

These cited studies within the city, along with our resident survey, indicate that residents also observe many deer on a regular basis in these other neighborhoods:

- **Arcadia** - has the most readily available parks (Kalamazoo College Study, 2021, p.24)
- **Bronson/Parker-Duke** - Woods Lake to Whites Lake through the Kalamazoo Country Club
- **Burke Acres** - has one of the most extended stretches of woodland area and water sources of all the neighborhoods (Kalamazoo College Study, 2021, p.24)
- **Parkview Hills** – Adjacent to Asylum Lake Preserve and includes numerous streams, mill ponds, and Lake Hill-n-Brook
- **Westnedge Hill** - Crane Park to Bryant Pond/Portage Creek areas

NOTE: *This researched data and the student-led studies premised our committee to work from the basic assumption that* ***Kalamazoo has multiple herds*** *of does and fawns, so* ***some neighborhoods will be more severely affected by our deer population than others****, depending on which neighborhoods have an environment that are more ecologically likely (those that transition between forest and open canopy vegetation, or edge habitat) to support deer.* ***A Kalamazoo deer management program needs to take this into account.***

DEER MANAGEMENT WITHIN URBAN AREAS

(Michigan Deer Management Plan, MDNR, 2016, p.1), (HSUS, p.4)
(Deer Management Within Suburban Areas, Creacy, 2006, pp.1,2)

Root Causes of Conflict Between Deer and People

NOTE: *Our committee agrees with and supports the premise that the goal of deer control measures is* ***not*** *deer eradication or the elimination of wildlife watching opportunities, but rather to manage our urban deer safely and effectively for the health and safety of both our residents and the deer.*

Eight root causes of conflicts between deer and people in urban and suburban areas have been identified, which create obstacles for effectively managing their population levels:

1) **Conflicting Social Attitudes and Perceptions: Human Values Placed on Deer**
   The public may view high deer numbers differently depending on a variety of factors. Some considerations include:
   - Health and safety risks
   - Fear of disease transmissions
   - Concerns about animal health
   - Economic costs

   "Controlling deer populations within residential areas involves numerous stakeholders. These stakeholders often present disparate views and opinions regarding control measures". (HSUS, p.4)

2) **Suburban Development**
Conversion of farmland and forest to suburbs brings people and deer together in an environment where both species thrive, inviting conflict. Golf courses, parks, grassy lawns and tree-lined or hedge borders, and the flowers, ornamentals, bird feeders and vegetable gardens in suburban backyards *provide more food for deer in suburbia* than mature woods, where most vegetation is out of reach in the forest canopy.

For the deer, this leads to good nutrition, which means excellent physical condition and a high reproductive rate. ***This highly fragmented landscape is the preferred habitat structure of white-tailed deer.***

Residential developments also possess a variety of planted trees and shrubs, creating a large quantity of food. *This enhanced landscape* ***provides year-around stable living conditions for deer****, as opposed to fluctuations in forage availability on natural ranges.*

3) **Aesthetics**
Many people enjoy wildlife watching within their neighborhoods. Although white-tailed deer are often viewed as an aesthetically pleasing addition to many homeowners in urban communities, ***they can cause ecological, social, and economic problems when they become overabundant and unmanaged.***

4) **Wildlife feeding**
Safe from harassment and hunting, suburban and urban deer can quickly lose their fear of people and pets and make themselves at home in backyards and on playing fields. ***Intentional backyard feeding emboldens them even more, concentrating deer and worsening conflicts.***

NOTE: *The State of Michigan has banned feeding or baiting deer anywhere in the lower peninsula.*

5) **Lack of Natural Predators**
Another factor leading to suburban deer overabundance is *the scarcity of predators within these habitats*. Modern deer populations on natural ranges are maintained at suitable levels largely by fawn predation. The reduction of predators within less natural, suburban habitats contributes to unusually high fawn survival rates.

Additionally, recreational hunting is not allowed within most residential areas. In rural areas across the United States where deer predators have been eliminated, recreational hunting has served to create a balance between deer populations and their available habitats.

6) **Safety and Liability Concerns**
Harvesting or capturing animals within populated areas may create safety concerns for residents. While many safety concerns are only perceived, rather than real, special safety precautions must be addressed before deer control measures are initiated.

7) **Hunting and/or Firearm Restrictions**
Local ordinances and/or policies regarding hunting and the discharge of firearms may be obstacles to implementing deer control measures.

NOTE: **Kalamazoo Ordinance § 7-9; Hunting and trapping** states: *"No person shall hunt or trap wildlife at any time within the City limits, except with the approval of the City Manager or Chief of Public Safety, nor shall any person carrying a firearm or hunting weapon trespass upon the land of another in the City without the landowner's consent".*

8) **Public Relations Concerns**
Appointed decision makers within city governments, community associations, or development organizations are often hesitant to make controversial or divisive decisions.

Suburban deer overabundance presents unique challenges and circumstances. While the biological constraints of deer herds are commonly considered when managing rural deer populations, ***suburban deer overabundance is usually solely a reflection of human values. When deer numbers approach or exceed human tolerance levels, they may be considered overabundant.*** (Creacy, 2006, p.1)

The percentage of survey respondents who have "seen more deer now than 3 years ago" – 58.0%

Carrying Capacity: Biological, Cultural/Social, Ecological

(A Review of Deer Management in Michigan, MDNR, 2009, pp.9-12)
(Deer Management, Whitetails Unlimited, 2018, pp.5-6)

There are three types of deer population "carrying capacities" to take into account when considering management of a wildlife population. ***"An effective and appropriate management of deer populations must consider ALL carrying capacities".*** (MDNR, 2009)

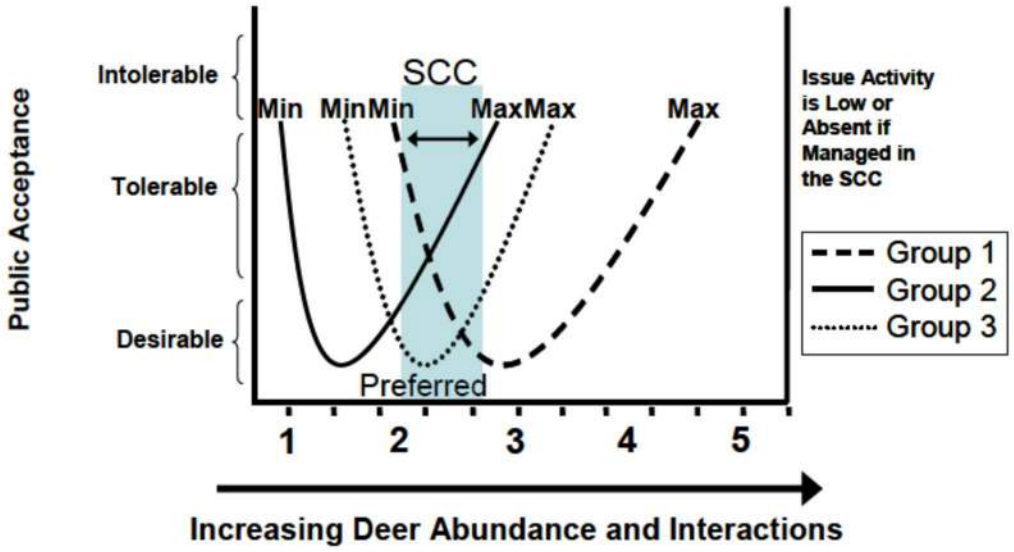
1) **Biological Carrying Capacity (BCC)**
This is referred to as the number of animals that a given area can support in good condition over an extended period. *BCC is determined by the quality and quantity of food, water, and cover in an area. When the environment cannot meet the needs of the herd, mortality from starvation, disease, parasites, or reproductive failure is imminent or is occurring* and there is a dramatic population decline, and surviving animals are in poor health. ***Biological carrying capacity for deer is a moving target in that it changes yearly and seasonally****. Zones containing a large percentage of public land and minimal human conflict are generally managed based on BCC, not the typical definition of an urban area.* ***Therefore, BCC is often not relevant in an urban setting.***

2) **Cultural/Social Carrying Capacity (CCC or SCC)**
This is the maximum number of deer that *can coexist compatibly* with local human populations (Ellingwood and Spignesi, 1986). This level is dependent on human tolerance, land use, availability of natural foods, local values, and other factors, and can vary from area to area. The SCC/CCC is the point where conflicts between deer and human populations become a problem. **The cultural carrying capacity can be exceeded without exceeding the biological carrying capacity over a geographic area**, because different communities have different tolerance levels of deer numbers, and it and is not easily correlated with specific deer densities.

Deer in urban and suburban areas do not exhibit the typical flight behavior seen in rural areas. Urban deer accustomed to human presence essentially have lost fear of humans and no longer view them as a threat, which *increases the probability that a negative human-deer interaction will occur.*

Deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions. *"A SCC for deer is defined by the level of abundance and interactions acceptable to enough stakeholders such that there is a low level of deer-related issues".* (MDNR, 2009, pp.9-12)

There is no question that there is a tremendous amount of variation in determining the "right" SCC. *It is a subjective figure which can vary widely depending on which interest group(s) are surveyed.* The overlap of the example of the three interest groups on the next page defines a CCC; that is, it suggests a level of deer abundance and interactions that would be acceptable to most members of the three hypothetical stakeholder groups. (MDNR, 2009, p.12



3) **Ecological Carrying Capacity (ECC)**
This is when the ecosystem starts to become damaged because the herd is eating faster than the plants can regenerate. **Deer remain healthy, but as the habitat degrades, the deer may move on.** Reducing the number of deer can restore overall ecological health.

As the MDNR states, ***"Rather than a discussion regarding overall deer numbers or densities, a focus on impacts related to the local deer population should be emphasized and monitored****. This can include constituent surveys sent out every couple of years to measure changing attitudes regarding deer numbers, monitoring deer-vehicle collisions, or conducting simple regeneration surveys in natural areas".* (MDNR, 2016, p.1)

The choices all depend on the overall goals of a deer management program. Focusing on a set number of deer for a management plan may not resolve some of the concerns that were intended to be reversed or stabilized by initiating deer management.

For example: ~20 deer/square mile has generally been cited as an appropriate level to ensure healthy regeneration/bird communities, etc. pertaining to forest management. However, if a forest has been severely over-browsed for years, yielding little to no regeneration, a population under 20 deer/sq mile could still hypothetically have an impact on regeneration as their numbers are still high enough to suppress a vegetative response in a denuded landscape. (East Lansing, City Council Questions re: Deer Management, 2015)

NOTE: *Our committee believes that the various Carrying Capacities make up a complex and variable concept; they are very specific to each area within the city where deer live.* ***Further study is warranted*** *to:*

1. ***Determine accurate deer counts*** *(and number of herds) within Kalamazoo at-large, beginning the focus of study on the individual neighborhoods that report more deer sightings and issues than others*
2. ***Measure and track*** *citizen conflicts and impacts, deer-vehicle crashes, and vegetation regeneration (or lack of) by each affected area*
3. ***Survey*** *citizen tolerance and attitudes*

REASONS TO DEVELOP A KALAMAZOO DEER MANAGEMENT PROGRAM

Introduction

(A Review of Deer Management in Michigan, MDNR, 2009, p.29-30)

As white-tailed deer have expanded in number and adjusted to living in and around urban areas, they have taken up permanent or semi-permanent residence in many Michigan communities. ***With adequate cover and food available*** deer successfully navigate sidewalks, traffic, and backyard fences, and ***appear quite comfortable with daily interactions involving humans, barking dogs and vehicles***. Management of urban/suburban deer populations can be difficult. As deer populations increase and conflicts with deer arise, different expectations, concerns, and values make addressing these conflicts problematic.

Similarly, as deer populations increase and conflicts with deer arise, different expectations, concerns, and values make addressing these conflicts problematic. As stated previously, ***deer management can be less about management of deer than about managing the issues created by deer–human interactions and differences in stakeholder tolerances regarding those interactions.***

NOTE: *Our committee understands that many stakeholder groups and individuals often have differing views and needs regarding deer management.* ***A deer management plan should take all views into consideration but still "follow the science"*** *to insure the best course of action for the health, safety, and quality of life of both the deer herds and residents.*

Our research and recommendations reflect efforts to ***identify an appropriate balance*** *among the biological needs of the species, the benefits deer provide to some segments of society, the costs they impose on others, and the acceptability and feasibility of the differing management methods.*

Identified Issues in Kalamazoo

Based on public statistics and data, our citizen survey, and multiple neighborhood's resident feedback over the last several years, **the main, identified issues associated with Kalamazoo's urban deer population include:**

The percentage of our survey respondents "personally affected by the problems [below]" – 63.4%

1) **Deer-Vehicle Collisions (DVCs)**
   - The data indicates that DVCs within Kalamazoo have been trending up since 2014 (*data from City Engineer and MTCF*):

Year	# DVCs
2014	42
2015	53
2016	57
2017	58
2018	87
2019	72

Average # DVCs from 2014-19 = 61/year

   - **Michigan DVC Statistics:**
     (A Review of Deer Management in Michigan, MDNR, 2009, p.34)
     - As deer populations increase and development encroaches upon rural environments, **DVCs have become more prevalent**. As many as half of all DVCs go unreported (Marchoux, 2005). During 2008, there were 61,010 reported DVCs in Michigan (MTCF, 2008).

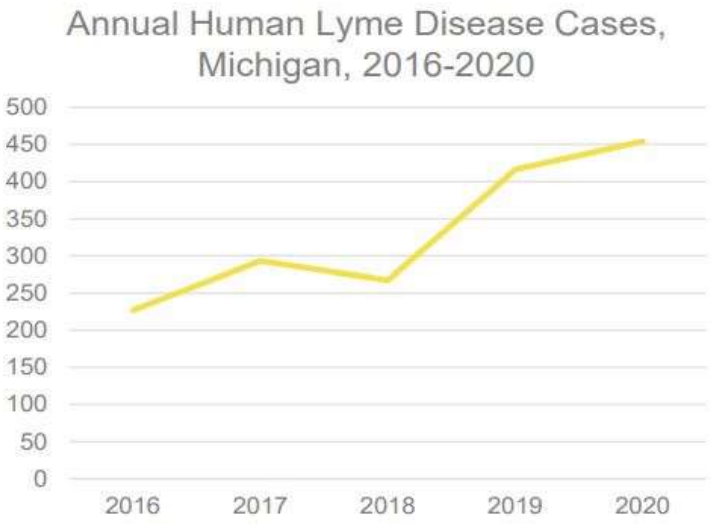
- While Michigan's two million deer are most active in spring and fall, vehicle-deer crashes are a year-round problem. Each year, there are nearly 50,000 reported vehicle-deer crashes in Michigan. (Michigan.gov/MSP [Michigan State Police], 2021)
- The average repair bill when a person hits a deer is about $2,100 (MSU Extension, 2012)
- On an annual basis, deer crashes cost Michiganders upwards of $130 million in damage, per a AAA news release
- In 2018, 14 people died in deer crashes in Michigan; nine of those were motorcycle-deer crashes, the release said. *There was a total of 53,464 vehicle-deer crashes in the state that year, which was up from 50,949 in 2017.* (MLive.com, 2019)

2) **Lyme Disease**
(Ticks and Your Health, MDHSS, MDNR, MSU, 2019)

Lyme disease is an illness caused by the spirochete bacterium *Borrelia burgdorferi.* In the midwestern and eastern US, this disease is transmitted to people and animals by the bite of an infected blacklegged tick (*Ixodes)*.

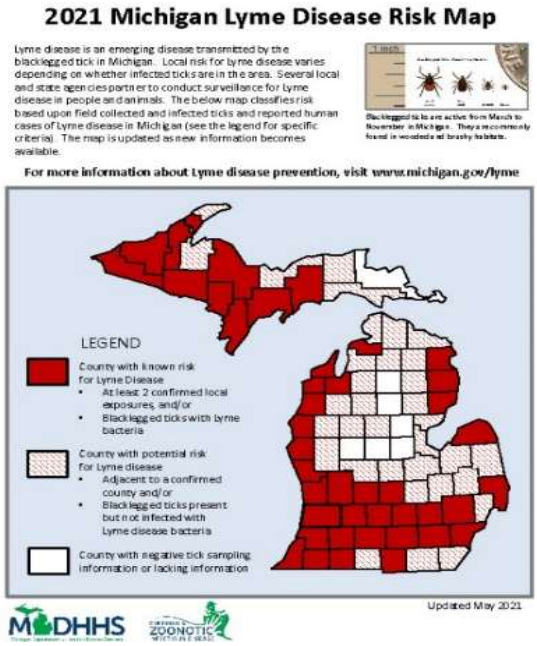
The percentage of our survey respondents who were "concerned to very concerned" about "You or those close to you getting a tick-borne disease (such as Lyme Disease)" – 70.0%; *the #1 concern among respondents*

- *Lyme disease is the most common vector-borne disease in Michigan*
- In Michigan, the first official reported human case of Lyme disease was in 1985
  Cases have now been reported in both the upper and lower peninsula and in most of Michigan's 83 counties and is rapidly trending up
- *It is anticipated that the number of cases reported will continue to increase:*



Source: MI Dept. Health & Human Services, 2020

White-tailed deer are the primary hosts for adult black-legged ticks, or deer ticks (Ixodes). These ticks are responsible for transmitting the causative agent of Lyme disease to humans. *Research has shown increased tick abundance and more human disease occurrences in areas with high deer densities, and that **tick populations decline by controlling the deer population*** (Deer Reduction Is a Cornerstone of Integrated Deer Tick Management, Sam R Telford, III, Journal of Integrated Pest Management, Volume 8, Issue 1, January 2017, p. 25)



NOTE: *In a July 30, 2020 news release the Kalamazoo County Health & Community Services Department made residents and healthcare providers aware of an increasing number of confirmed and probable Lyme disease cases in Kalamazoo County. They also noted that* ***Lyme disease cases were five times higher than they were in 2015.***

3) **Other Tick-borne Diseases Spread in Michigan**
(*Ticks and Your Health*, MDHSS, MDNR, MSU, 2019)

Ticks may transmit numerous other diseases to people and pets and although they are less common than Lyme disease, it is just as important to protect yourself from:

- Powassan Encephalitis (Deer Tick virus)
- Rocky Mountain spotted fever
- Anaplasmosis
- Ehrlichoisis
- Babesiosis
- Tularemia

4) **Landscape and Garden Damage**
The percentage of our survey respondents who were "concerned to very concerned" about "Deer damage to trees, shrubs, plantings & gardens around [their] home" – 66.6%

NOTE: *This was the second-highest concern among respondents*

Many trees, shrubs, vines, and herbs planted within residential landscapes are highly preferred by white-tailed deer. Of course, severity of landscape damage is directly proportional to deer population density. It has been estimated that residential landscape damage in the US may exceed $250 million per year (Conover 2002).

5) **Ecosystem Damage - Private and Public Lands; Over-Browsing & Habitat Degradation**
(A Review of Deer Management in Michigan, MDNR, 2009)

The percentage of our survey respondents who were "concerned to very concerned" about the following issues include:

- **"Deer preventing the natural regrowth of native plants" - 65.7%**
- **"Disruption of our city's ecosystem" – 64.2%**
- **"Loss of plant or animal diversity in your neighborhood/city" – 64.2%**
- **"Over-browsing of natural habitats (on public and/or private lands)" - 63.4%**
- **"Decreased bird populations due to deer-related habitat loss" – 60.3%**

Excessive deer densities are known to cause long-term damage to wildlife habitats. Parks and land preserves must serve as protected areas for all plant and animal species. Impacts on native plant communities have cascading effects on associated wildlife species.

Overabundant deer herds can:

- Eradicate preferred and native plant species
- Alter or eliminate habitat ecosystems of other animals
- Disrupt the natural succession of plant communities

Deer may also facilitate the introduction and spread of invasive species through preferential foraging on certain plant species and serving as dispersal conduits along the trails they use.

There is already evidence of damage to Kalamazoo's parks and land preserves ecosystems by deer over-browsing, as noted by local biologists and naturalists:

- Our parks and land preserves support ecosystem services, protect water quality, and provide wildlife habitats
- Preferred native forage plants (oak, cedar, trillium, bloodroot, and trout lily) can require *up to 10 years to regenerate*

6) **Declining Deer Herd Health: Chronic Wasting Disease (CWD) and Other Diseases**
(Michigan.gov/DNR [Deer Management], 2021)

The percentage of our survey respondents who were "concerned to very concerned" about "Chronic Wasting Disease (CWD) spreading among local deer" – 71.0%

- ***CWD is a highly contagious and lethal neurological disease*** that affects deer, elk, and moose. It causes a degeneration of the brain resulting in emaciation, abnormal behavior, loss of bodily functions and death. **CWD is fatal; once an animal is infected there is no recovery or cure.** To date, there is no evidence that CWD can be naturally transmitted to humans or to other animals.

  It is caused by a normal protein, called a prion, that folds incorrectly and can infect other deer. It is transmitted through direct animal to animal contact or by contact with saliva, urine, feces, blood, carcass parts of an infected animal or infected soil. Prions are extremely resistant in the environment and can stay infectious for years.

  Since May 2015 when the first CWD deer was found in Michigan, CWD has been confirmed in several Lower Peninsula counties. CWD was found in October 2018 in Dickinson County, in August 2018 at a Kent County deer farm facility, and in January 2017 in two captive deer from a deer farm facility in Mecosta County. (Michigan.gov/DNR [Deer Management], 2021)

- **Other diseases deer can contract:**
  (East Lansing, City Council Questions re: Deer Management, 2015)
  - Epizootic hemorrhage disease (EHD)
    - The SLP has had sporadic outbreaks of EHD at varying intensities *that have impacted deer populations for several years.* EHD is an acute, infectious, often fatal viral disease of some wild ruminants. (MDNR, 2016, p.5)
  - Bovine tuberculosis
  - Blue tongue virus – lethal among deer
  - Deer warts - can be lethal to deer; affected areas should not be consumed
  - Parasitic worms & Arterial worms & Nasal bots
  - Brain abscess – meat not edible
  - Mange – contagious to other deer

7) **Loss of Deer Habitat Leads to an Unhealthy and Unsafe Ecosystem for Deer**
As deer populations overutilize available resources, herd health inevitably declines. Increased parasite loads and declines in body weight, antler production, and fawn recruitment are **often followed by large-scale deer "die-offs".**

The percentage of our survey respondents who were "concerned to very concerned" about the loss of deer habitat leading to an increased deer population" – 58.8%

8) **Other Public Health Concerns (not including Lyme's Disease)**
(MDNR, September 2020; Michigan Emerging Disease Issues, 2021)

- **SARS-Co-2 (COVID-19)**
(aphis.usda.gov/aphis/, July 28, 2021;
https://www.nytimes.com/2022/02/07/health/coronavirus-deer-animals.html)

  In July 2021, the US Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) released the news that a survey of wild deer populations has found that large numbers of the animals seem to have been exposed to SARS-CoV-2, the virus that causes COVID-19. ***67% of the deer tested in Michigan have been exposed to it.***

  APHIS is working closely with federal and state partners, including the Department of the Interior, the CDC, and the Association of Fish and Wildlife Agencies, to determine next steps. Results from this surveillance effort are currently being prepared for publication in a peer-review journal.

- **Deer Droppings (scat)**
(Nicholas Martin, entomologist; Entomology and Nematology Department, University of Florida, Institute of Food and Agricultural Sciences, Feb. 2021)
  - Zoonotic diseases associated with deer feces, urine, or other biological fluids include E. coli, Leptospirosis, Listeria, Cryptosporidium, Q fever (Coxiella burnetti), and tuberculosis
  - E. coli can be easily transmitted between species through fecal to oral contact. In 2011, 15 people in Oregon became ill and one died from E. coli 0157:H7 contaminated strawberries grown on a field with deer scat. E. coli poses a threat to dogs as well as people. Dogs with E. coli can then transmit it to their owners
  - Scientists have not ruled out fecal to oral transmission of CWD from deer to humans, although no cases of this type of transmission have been reported
  - There is no evidence at this time that the CWD pathogen is transmissible to people from consuming deer or elk meat, but both the CDC and the Game Commission state that if a harvested animal tests positive for CWD, you should not eat it

The percentage of our survey respondents who have "seen deer pellets (poop)" – 66.3%

NOTE: *Many of our survey respondents commented on the nuisance, sanitary concerns, and health hazards of regularly finding abundant amounts of deer scat in their yards, in parks, and in school playgrounds.*

9) **Public Safety**
The percentage of our survey respondents who were "concerned to very concerned" about the following issues include:
- **"Injury to you or family members from a deer-vehicle collision" – 64.5%**
- **"Loss of [natural] deer habitats, leading to their increased population [within suburban areas]" – 58.8%**
- **"Deer threatening or harming people or pets" – 29.8%**

NOTE: *Many resident comments included accounts of their pets being attacked or charged at by deer (and themselves being threatened), mainly during mating/"rutting" season (October – November)*

Many suburban communities, including Kalamazoo, are experiencing overabundant deer populations, urban sprawl, and limited natural resources. These scenarios lead to an unhealthy environment for humans and deer to coexist in. ***Consequently, some form of deer management becomes a requirement, not an option****.*

DEVELOPING AND CREATING A SUCCESSFUL DEER MANAGEMENT PROGRAM

Planning Considerations

NOTE: *Our committee recognizes that many other cities throughout the US, as well as cities in Michigan, have faced, and will continue to face, this complex issue. The good news, however, is that many cities who have addressed this issue head on have developed and created strategies and tools (and successes) to lead the way for Kalamazoo's efforts.*

1) **MDNR Publications**
   - Managing Deer Within Suburban Communities – First Steps, 2020
   - Urban Deer Management: First Steps and Options for Communities, 2020

2) **Local Resources**
   - Kalamazoo Nature Center: Deer culling program; 2001-present (phone conversation with Ryan Koziatek, KNC Stewardship Director, February 2020)
   - Summary of other Michigan cities deer management/culling programs (2015-20) (Can be found in **Appendix B**)

3) **Other Resources**
   - Community-based deer management (CBDM): Cornell University
     - https://deeradvisor.dnr.cornell.edu/cbdm-process
   - Solving Problems with Deer, HSUS, 2018

Comprehensive Deer Management Strategy

(A Review of Deer Management in Michigan, MDNR, 2009, p.33)

1) ***Choosing which actions to implement*** is the most difficult and time-consuming part of the planning process for many communities.
   - MDNR staff can help by providing information on deer biology and management options

2) ***Bringing in a trained facilitator*** *to guide discussions* may also be useful and even necessary.
   - Deer management can become a contentious and controversial issue, as community members may have widely varying perspectives on deer and be passionate about their opinions and priorities

3) It's important to ***thoroughly publicize planning*** efforts to ensure that all members of the community have an opportunity to participate and voice their perspectives.
   - Insufficient outreach increases the likelihood of negative backlash from groups or individuals who disagree with a plan that was formulated without their participation

4) ***An inclusive process*** provides valuable information to community leaders on deer impacts and stakeholder opinions, allows stakeholders to increase mutual understanding by educating each other on their differing perspectives, and establishes a strong foundation for defending deer management decisions and actions in the event of a subsequent challenge.
   - *A high level of communication and transparency should be maintained throughout program implementation to keep community members informed and engaged*

5) **Because deer management is a long-term undertaking, periodic evaluation of the program is an important component.**
    - Evaluations should incorporate as much diversity of stakeholder participation as did the initial planning process
    - Progress toward the program goals should be assessed and a determination made on whether modifications to the program are needed. Such modifications may be stimulated by lessons learned during program implementation, data gathered through monitoring, technological advancements, shifts in community priorities, or other causes
    - In most cases, programs run more smoothly after the first year or two as residents become accustomed to the management activities and begin to see results. However, controversy can still resurface, and ***if periodic evaluations and modifications are not conducted, over time the program may become out of sync with the community's needs and desires***

6) Because a deer management program should outlast the tenure of the people making decisions when the program is initiated, ***it is valuable to have a written management plan***. Such a plan provides an opportunity for the community to document their decision-making process and reasoning and establish guidance for future decisions

URBAN DEER MANAGEMENT OPTIONS, TECHNIQUES, AND TOOLS

(Solving Problems with Deer, HSUS, 2018)

Deer Management Options

(Deer Management Handbook for Communities in New York, 2018, p.12)

Options communities have to reduce deer-related impacts fall into ***two broad approaches***:

1) Reduce resident's vulnerability to the negative effects of deer
2) Reduce deer populations

NOTE: *Our committee believes full consideration of both of the above approaches will maximize the likelihood of success and will engage all residents in the impact reduction effort.*

Deer Management Techniques

(Deer Management Within Suburban Areas, Creacy, 2006, p.3)

1) When addressing suburban deer problems, the advantages and disadvantages of **all available deer management tools must be evaluated**. Differing circumstances among suburban communities will result in varied approaches to solving the problem
2) Furthermore, it is likely that a **combination of management tools** will be necessary to achieve desired results
3) Deer control measures require **community input**, as well as considerable long-term planning and commitment
4) The costs of suburban deer management should always be compared to potential benefits such as reduced deer/vehicle accidents, improved human safety, and decreased landscape/garden damage.
5) It is important for communities to **develop measurable long-term goals and objectives** as part of a comprehensive deer management plan before implementing deer control measures:
    - Objectives based on deer abundance can be evaluated with standard deer survey techniques such as:
        - Survey transects or time/area counts
        - Indicators such as frequency of deer/vehicle collisions
        - Number of reported deer complaints
        - Predetermined reductions in landscape damage

Stakeholders should understand that the total elimination of the problem (or the deer herd) is neither practical nor achievable. Rather, ***the goal should be related to the reduction of deer-human conflicts to an acceptable level.***

Deer Management Tools

NOTE: *Our committee has carefully researched and listed every option we could identify and reviewed each and every one for the City's evaluation and consideration.*

1) **Education Programs for Citizens**
(A Review of Deer Management in Michigan, MDNR, 2009;
Howard County, MD Dept. of Recreation and Parks, Deer Management Plan, 2002, p.6-7)

Public information is an important part of the management of deer-human conflicts. A lack of understanding of deer biology and ecology can be compounded by a lack of knowledge, misinformation, and misconception regarding available management options.

Educational activities can range from formal presentations for large groups to ad hoc, one-on-one conversations. Content includes educating the public, deer committee members, and city officials about the aspects of urban deer management.

NOTE: *Our committee recommends that the following specific educational tools be developed and implemented by the City as soon as possible:*

- Deer management educational and informational-based website, to**:**
  - Disseminate deer-related (biology, habits, etc.) information
  - **Inform** about:
    - The latest management activities and policies
    - Other resources and information regarding deer-related issues
  - Be a **resource** for:
    - Deer resistant plants
    - Non-lethal deterrents
    - Hazing and scare tools
  - Comments and inquiries from residents should also be received
  - *Create effective tools to report and manage:*
    - *Deer-feeding violations*
    - *Deer carcasses for city removal*
- Educational programs and informational brochures covering deer biology, carrying capacities, diseases, etc.
- Media plan to provide timely and relevant information to residents
- Informational brochures
- Hold regular informational meetings
- Annual update on deer management activities
- Partner with public health agencies to increase awareness about Lyme Disease, CWD, and other public health safety issues

2) **Non-Lethal Deer Management Techniques**
(A Review of Deer Management in Michigan, MDNR, 2009, p.30-33; Deer Management Within Suburban Areas, Creacy, 2006, p.3; Deer Management Handbook for Communities in New York, 2018, p.20; Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.11-14)

Non-lethal management techniques are generally well accepted by the public. However, ***limited effectiveness and high cost*** may prevent success when used exclusively to resolve human-deer conflicts; they are best used to ***supplement, not replace***, deer population management.

NOTE: *Our committee has identified the following non-lethal methods of urban deer management for the City's research, review, and consideration. We recommend the City also be an educational resource for this information.*

1. **Ban on Deer Feeding**
   Many people enjoy feeding deer in urban/suburban areas to increase viewing opportunities. This may attract deer to unwanted areas, especially during winter months. *Feeding deer can also lead to crowding and increased potential for disease transmission*, and also induce deer to cross roadways, increasing the potential of vehicle accidents**. *Strong, consistent enforcement is a must for this to be effective.***

NOTE: *The State of Michigan has banned the feeding of deer in the lower peninsula, therefore, our committee strongly recommends the following measures:*

1) *The City establishes an anonymous method for residents to report deer feeding*
2) *The City works with MDNR to establish an effective way of enforcing the deer-feeding ban*

2. **Unpalatable Landscape Plants**
   While deer feed readily on a variety of plants, some varieties are less palatable than others, and a wide variety of native and cultivated plants are available. Careful plant selection for home and business landscapes, combined with the selective use of repellents may minimize damage due to deer browsing and make areas less attractive to deer. However, as deer densities increase, preferred foods become less available, resulting in less desirable plants also being browsed to a greater extent.

3. **Repellants**
   Repellants are commonly used to reduce a plant's attractiveness and palatability to browsing deer.
   - Use of repellants is often expensive, labor intensive, and its effects temporary due to being diluted or washed off by rain and acclimation by deer
   - Repellants work best in small orchards, gardens and on ornamental plants when an alternative food source is readily available
   - Repellents are more effective on less palatable plant species than for those that are highly preferred

   Repellents also work by reducing the attractiveness and palatability of treated plants to a level lower than that for other available forage. ***Repellents don't reduce or control deer numbers but do have the potential to increase human tolerance to deer.***

4. **Fencing**
   "Deer-proof" fencing (8 to 10-foot-high woven wire) is effective at excluding deer from specific locations to prevent or reduce deer access. (Solving Problems with Deer, HSUS, 2018, p.3)

   - Fencing does not directly reduce deer numbers. Rather, it can prevent damage, which in turn has the potential to some extent to increase tolerance to deer by those directly impacted.
   - Locations where landscape or horticultural damage is an issue are good candidates for fencing as are airports and along roads where deer-vehicle collisions are common
   - The initial cost for fencing materials and installation can be substantial but will provide years of protection if properly maintained

The percentage of our survey respondents who found it "acceptable to very acceptable" for the City to "allow "deer" fences to keep them away from yards, gardens, etc." – 66.2%

NOTE: *Our committee recommends that the City review and modify, if needed, its current fencing ordinance (§ 6.3 Screening and Fences) to allow for approved "deer-proof" fencing* ***up to 10 feet high*** *to allow residents to keep deer out of their yards. § 6.3 currently limits fence height to 4 feet in front yards and 7 feet for side and rear yards. We also recommend the City consider allowing the use of electric fencing / tape in certain locations as an option to control deer damage.*

5. **Deterrents**
   - Hazing and frightening techniques
     - Hazing or frightening deer using ***motion-activated devices*** that use sound, light or spraying water can be an effective method for keeping deer out of specific areas. *However, deer can quickly become accustomed to these repetitive sounds or sights over time unless a variety of methods are used and changed often.*
   - Approaches for minimizing DVCs include:
     - Roadside reflectors
     - Warning (Deer Crossing) signs
     - Wildlife warning whistles
     - Vegetation management
     - Reduced speed limits
     - Efforts to raise public awareness
     - Construction of barrier fencing, or wildlife overpasses/underpasses may be effective for addressing specific problem areas but can be expensive to construct. *This is not a practical option in Kalamazoo.*

     These have all been used to attempt to decrease the incidence of deer-vehicle collisions without much documented success.

6. **Dogs**
   Use of dogs, located within invisible fencing systems has been *used effectively to deter deer from damaging crops*. Success varies with the size of the area and the number and aggressiveness of the dogs. Dogs with restricted movement, such as on a chain, are not effective.

7. **Trap (live capture) and Relocate**
   (A Review of Deer Management in Michigan, MDNR, 2009, pp.31-32)

   Capturing and moving deer from one area to another is often requested by people opposed to lethal techniques. However, ***it is not a reasonable option, and has been demonstrated to be:***
   - Impractical (there are few places available to release excess deer)
   - The procedure of capture and release is very expensive
   - Relocating deer results in significant levels of stress, injury, and mortality to them
   - *Presents risk of spreading diseases*

NOTE: *Due to these disease concerns, MDNR will not issue a permit to translocate deer.*

3) **Lethal Deer Management Techniques**
   (Deer Management Within Suburban Areas, Creacy, 2006, p.3) & (Anthony J. DeNicola, *Managing white-tailed deer in suburban environments*. A technical guide, January 2000)

NOTE: *Based on our resident survey results, our committee fully understands and appreciates that employing lethal methods as part of a Kalamazoo urban deer management program is a controversial approach, as many residents have very strong feelings both for and against the culling of deer.*

However, to dismiss any/all lethal methods without fully researching the local situation *to see if lethal methods are warranted and necessary as one part of a comprehensive approach to managing the*

deer population in Kalamazoo is not looking at the full picture to support the long-term health and safety of both our residents and our deer.

*Therefore, **our committee strongly recommends that the City "follow the science"** and wildlife experts to determine the most effective methods (both non-lethal and lethal) to manage our urban deer population, and to employ methods recommended by the professional deer managers.*

Lethal tools are more effective than others but may be unacceptable if social or safety concerns are an issue. ***Applying a combination of several techniques specifically tailored for each situation should prove to be more successful than utilizing a single tool.***

Lethal techniques face several challenges in many urban/suburban areas, including:

- Real or perceived safety concerns
- Conflicting social attitudes and perceptions about wildlife
- Hunting and firearm discharge restrictions
- Liability or public relations concerns

Lethal deer population management techniques are not always well accepted by some portions of the public. However, *when successfully implemented*, they can be safe, relatively inexpensive, and highly effective at reducing deer populations.

As the MDNR states in their 2016 Michigan Deer Management Plan (p.26):
"Perhaps the most challenging aspect in all of white-tailed deer management is the issue of how to best manage deer in these urban/suburban areas where use of lethal control as a management tool is frequently unavailable and community members often have highly polarized views and values regarding deer management.

***Successful resolution of urban/suburban deer issues requires** that community leaders and MDNR staff work together with stakeholders to gain acceptance of proven methods and utilize them to successfully reduce human-deer conflicts".*

"Currently, the DNR:

- *advises community leaders*
- *assists in the development of deer management plans*
- *participates on local task forces*
- *speaks at public meetings*
- *conducts disease testing, and*
- *provides permits for lethal harvest but*
- ***lacks a defined process that can be implemented consistently across the State".***

***NOTE:** Our committee recommends that if it is determined by professional deer managers and experts that lethal method(s) should be employed to manage a demonstrated overabundant deer population in Kalamazoo, it should be accomplished in two phases:*

- **Initial Reduction Phase**
  Used to remove large numbers of deer from an overabundant herd during a short period of time to achieve desired deer densities.

- **Maintenance Phase**
  This includes long-term efforts to maintain deer densities at target levels.

***NOTE:** Most importantly, our committee believes and recommends that Kalamazoo have a long-term deer management plan in place before initiating any deer herd reduction operations.*

See **Appendix B** for a table identifying other Michigan cities that, after careful research and consideration, have employed lethal methods as a part of their deer management programs.

NOTE: *The Kalamazoo Nature Center, although rural in nature, has held numerous deer culls since 2001. Their research and shared experiences to our committee have been invaluable in understanding this method first-hand. Our committee recommends, if a cull is warranted, that the City works with them to gain further insight.*

(A Review of Deer Management in Michigan, MDNR, 2009 p.30-33);
(Deer Management Handbook for Communities in New York, 2018, p.20);
(Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.9-14)

1. **Regulated Hunting**
   Controlled hunting is the application of legal, regulated deer hunting methods in combination with more stringent controls or restrictions as dictated by landowners or government officials. Regulated hunting has proven to be an ecologically sound, socially beneficial, and fiscally responsible method of managing *rural* deer populations. However, hunting has limited application in some urban/suburban areas because of safety considerations, competing land-use priorities, legal constraints, or social values.

   This method, when used in a safe manner, is often the most cost-effective method for managing urban-suburban deer populations. The primary hunting methods used to safely harvest deer during regulated hunting in urban environments typically includes archery and crossbows. The low cost of regulated hunting is one of the more attractive features of this solution to deer conflicts.

NOTE: *Due to the lack of strict management control over licensed hunters at-large, especially in our urban setting, our committee does not recommend this method be employed by the City.*

2. **Controlled/Managed Hunting**
   These are *specialized hunts that incorporate the benefits of regulated hunting but add restrictions* designed to meet the needs and objectives of landowners experiencing conflicts with deer.

   Restrictions typically are imposed by the municipality during controlled hunts and specifically are *designed to improve safety precautions* or accelerate the reduction of present and future deer numbers, and include limiting hunter numbers, restricting days or times to hunt, requiring shooting proficiency tests, strategically disbursing hunters on property experiencing deer conflicts, etc.

NOTE: *Again, due to the lack of strict management control over licensed hunters at-large, even with additional regulations placed on them, especially in our urban setting, our committee does not recommend this method be employed by the City.*

3. **Sharpshooting (either with firearms and/or archery)**
   Lethal harvest of deer by sharpshooting through the employment of highly trained, experienced professional sharpshooters, ***generally employed by municipalities through the U.S. Department of Agriculture's Wildlife Services (USDA)***, ***can be a very effective technique***. A variety of techniques (shooters using night vision goggles, suppressed weapons, limited locations and times, etc.) can be used in sharpshooting programs to maximize safety, humaneness, discretion, and efficiency.

   This technique, while effective in reducing deer population, is *generally more expensive than controlled hunting* based upon several factors (size and scope of the project, approachability

of deer, seasonal or timing restrictions, level of involvement of professionals in processing of culled deer, etc.) as well as requiring the service of trained professionals (through the USDA), which increases the cost significantly over regular hunting options. *However, costs are much lower ($600-700/deer) than methods such as capture and* sterilize; see 4) 1.below. Further, like virtually all forms of deer management options, sharpshooting **requires year-to-year repetition to be successful**. (Deer cull by sharpshooters approved in Muskegon despite some citizen opposition - mlive.com, January 14, 2020)

NOTE: *If a lethal method is determined by experts to be an effective piece of successfully managing the deer population (for the benefit of humans and overall deer herd health and safety), our committee recommends that only this lethal method be employed by the City.*

- **Venison Donation Programs**
  An obvious by-product of any deer reduction program is the availability of venison (deer meat). Venison is a lean meat that is low in fat and high in protein, comparing favorably with the nutritional qualities in chicken breasts. Such meat is in desperate need by many. Additionally, an increasing number of people are looking to organically produced, free-range sources of meat, such as from free-ranging game species (including deer) as an alternative to supporting practices typically associated with existing livestock husbandry and processing.

NOTE: *Our committee further recommends that any deer reduction effort by the City encourages, promotes, and employs a* ***Venison Donation Program*** *as a valuable public service. Our committee has identified local and regional processors who have previously offered their services for processing and venison donation distribution at no, or reduced, cost to those in need.* ***Local food banks identified include Loaves & Fishes, Gospel Mission, Ministry with Community, as well as several Neighborhood Association food banks.***

4. **Trap and Euthanasia**
   This method is seldom used but is an option in areas where lethal techniques have been approved but hunting or sharpshooting are not possible due to safety concerns. *It is a labor-intensive, inefficient, and expensive method* as it is difficult to trap deer. The deer are euthanized by gunshot, penetrative captive bolt, or by pharmacological agent. The effects of capture stress are key in assessing the humaneness of this option. The longer a deer is trapped, the greater its stress level and the less humane the management option. This also poses danger to the people involved with the process.

NOTE: *Due to the understood costs, difficulties, and unnecessary trauma inflicted on deer using this process our committee does not recommend this method be employed by the City, unless recommended by experts as being both humane for the deer and cost-effective for the City.*

4) Experimental Deer Management Techniques

(A Review of Deer Management in Michigan, MDNR, 2009 p.30-33),
(HSUS, 2018, p.17, Appendix H),
(Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp.11-14)

1. **Deer Fertility Control**
   There has been a significant amount of research focusing on alternative, non-lethal population control techniques. Specifically, researchers have sought an effective, affordable immune-contraceptive that would be useful in areas where traditional hunting methods are not a safe or socially acceptable option.

NOTE: *Most of these tools are still in experimental phases, and thus are not currently available for general use.*

- **Immunocontraception** (a vaccine to block reproduction)
  Most immunocontraception options have had limited use due to the substantial costs, labor, and special requirements needed to successfully implement such programs:
  - Most must be administered via a hand injection, project costs are typically high due to the need for traps, restraint equipment, specialized personnel, and possibly immobilization drugs.
  - It is believed that 70 to 90 percent of the females in a specific area need to be treated to effectively limit the population growth
  - A 2021 New York study conducted on suburban, free-ranging deer estimated that the minimal annual time commitment per deer for reproductive control was approximately **20 person-hours and a cost of $700 to $1,550 per deer**
  - In general (depending on the specific vaccine used) this method can be 80-100% effective for 2-5 years, then re-treatment is necessary

- **Surgical Sterilization**
  Involves surgically removing female reproductive organs or interrupting the fertilization pathway. (DeerFriendly.com, 2018)

  - Spaying can be expensive; $1,200 per deer because of high labor costs. Sterilization is typically 97 to 100 percent effective and only needs to be done once, but *may result in the death or injury of some deer*
    - This field surgery requires more supplies and equipment than contraception so easier access to deer also becomes an issue
  - **In 2018 Ann Arbor attempted this with much controversy and concern**: (https://www.bridgemi.com/michigan-environment-watch/no-joke-ann-arbor-removing-deer-ovaries-lawmakers-arent-laughing)
  - This technology *does not overcome the intensive effort involved with treating a substantial proportion of deer to prevent population growth* and assessing deer movements in and out of the area in which management is being applied

Unfortunately, the lack of public education regarding the availability and practicality of fertility control has caused unnecessary delays in the implementation of effective management programs because fertility control has been perceived as the ideal solution.

NOTE:

1) ***MI Public Act 390 of 2018 currently prohibits until April 1, 2022, the MDNR from issuing any permits to authorize the sterilizing of deer***
2) *A December 20, 2020 MDNR Preliminary Report on Sterilization of Game in Michigan found that the MDNR is **not yet able to evaluate** how much of deer decline may be attributable to the combined sharpshooting and sterilization efforts, or attributable to other factors. The final MDNR report is due March 31, 2022*

Due to the described concerns with these methods (effectiveness, cost, stress/injury/death to deer), as well as their status as experimental (and sterilization currently prohibited under Michigan law), our committee does not recommend any of these fertility methods be employed by the City.

2. **Reintroduction of Predators**
   (Deer Management Handbook for Communities in New York, 2018, p.20)
   This is not ecologically or socially feasible in areas with high human density and no large blocks of natural habitat.

NOTE: *Due to the highly urban nature of Kalamazoo, and for the safety of our citizens (and pets), our committee does not recommend this method be employed by the City.*

3. **NO ACTION**
   Per the MDNR's Review of Deer Management in Michigan, 2009, pp.32-33:
   "Implementing urban/suburban deer management is a difficult, costly, and time-consuming undertaking. Communities may be tempted to ignore human-deer conflicts until the problem has escalated and become severe in nature. ***The eventual cost for taking no action will likely be much greater than if the problem had been addressed when conflicts first surfaced****. Deer populations, as well as frustration levels of residents, will likely grow to the point where finding a successful solution becomes very difficult".*

The percentage of our survey respondents who found it "not acceptable to not acceptable at all" for the City to "let nature take its course without human interference" – 92.1%

When asked their "general thoughts about deer in Kalamazoo"

- **"I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause" - 48.4%**
- **"I do not enjoy the presence of deer and regard them as a nuisance" – 22.7%**
- **"I enjoy the presence of deer, and I do not worry about problems they may cause" – 26.8%**

NOTE: *Based on our resident survey results, as well as the many comments, complaints, and concerns voiced to many of our Neighborhood Associations over the years (especially in the last 2-4 years), as well as our report's demonstrated deer population issues our committee is* ***strongly against the City taking a "no action" approach to our urban deer population****.*

CONCLUSIONS AND RECOMMENDATIONS

Our committee's deer management recommendations are based on the best biological science available to us; however, all decisions must also be considered within a social context where stakeholder values and priorities must be addressed. *The integration of social considerations into scientific examination is necessary* to move wildlife management recommendations and actions forward.

NOTE: *Our committee understands that proper research and implementing effective and acceptable solutions will take time. Due to the complexity of the issue, as well as the additional research needed to make scientifically based decisions, our committee recommends this issue be addressed in TWO PHASES, employing the following tools:*

A) PHASE 1 - *Develop and Implement*:

1) Public Education Program and Resident Resource Website

- Public information is an important part of the management of deer-human conflicts. A lack of understanding of deer biology and ecology can be compounded by a lack of knowledge, misinformation, and misconception regarding available management options.

Our committee recommends the City develops and maintains an up-to-date, comprehensive deer education program to include educational programs, literature, dedicated website, in-person educational events, public informational displays, ***and hold regularly scheduled meetings with residents and neighborhoods to keep them informed and educated on responsible deer management techniques***

2) Deer Carcass Removal Program

- Although not asked in our survey, ***many neighborhood associations and residents have indicated over the years their frustration and disappointment that no local***

governmental body will take responsibility for removing deer carcasses. The only "solutions" offered to-date include either "drag it into the woods" or "dump it in a trash bin". Both are completely unacceptable

Our committee strongly recommends the city develops an efficient and safe program for residents to have deer carcasses removed from their property, as well as from parks and roadways.

3) Modified Fence Ordinance and/or Allow Higher Fencing

- It has been demonstrated that "deer-proof" fencing (8-10-foot-high woven wire) is effective at excluding deer from specific locations to prevent or reduce deer access. Additionally, electric tape in some locations should be considered
- Although fencing does not directly reduce deer numbers it can prevent damage, which in turn has the potential to some extent to increase the tolerance to deer by those directly impacted.

4) Support Enforcement of Michigan's "No Feeding" Law

- Address illegal deer feeding by:
  - Educating residents of the state's current "no feeding" law
  - Creating an effective and efficient process for residents to report illegal feeding
  - **Implementing an effective way to enforce this ban via education and/or penalties to violators**

B) PHASE 2 - *Develop and Implement:*

1) Further City-led Research

As stated earlier, the MDNR **advises** community leaders, **assists** in the development of deer management plans, **participates** on local task forces, speaks at public meetings, **conducts** disease testing, and **provides** permits for lethal harvest*, but lacks a defined process that can be implemented consistently across the State*. (MDNR, 2009, p.26)

It is precisely for this reason our committee recommends the City of Kalamazoo takes the initiative and lead in researching, developing, and implementing a comprehensive short-, medium-, and long-term deer management program for Kalamazoo for the health and safety of its ecosystem and the deer and human populations.

- Our data and resident survey indicate that Kalamazoo has multiple herds of does and fawns, the deer population seems to be increasing, and some neighborhoods are more severely affected by our deer population than others
  - Our committee *strongly recommends* that the deer management program takes this into account, and looks at this issue from each affected neighborhood, based on their geography and topography

- Carrying Capacity is a complex and variable concept; very specific to each area/range/herd where deer live. Our committee *recommends* further study to:
  - Determine accurate deer counts within Kalamazoo
  - Begin the focus of study on those individual neighborhoods that have reported more deer sightings and issues than others
  - Measure citizen tolerance, deer-vehicle crashes, and vegetation regeneration by each affected area

2) City-led Deer Management Plan

*Our committee recommends the City **develop and authorize a budget now**, as well as **adequate staff resources now**, to:*

1) Comprehensively research the issues brought forth in this report, working with experts from MDNR, as well as regional and local environmental, biological, and health experts

2) Include Western Michigan University (WMU) in the discussions and research process. As the landowner of two of the largest natural open spaces in Kalamazoo that house our urban deer (Asylum Lake Preserve and Kleinstuck Preserve) WMU's input and cooperation will be crucial in successfully planning and implementing any deer management plan
3) Utilize that research to develop a comprehensive short-, medium-, and long-term deer management program for Kalamazoo that is ongoing in nature

4) Let the research, science, and evidence dictate the best course of action(s) that works to protect the health and safety of both our residents and the deer herd

C)

Suggested Implementation Timeline

APPENDIX A: COMMITTEE ROSTER

Neighborhood Association Ad Hoc Deer Management Committee

Association	Name	Title
Arcadia NA	Jeff Carroll	Past President
Bronson Neighborhood	Mary Balkema	Representative
Edison NA	Tammy Taylor	Executive Director
Hillcrest Neighborhood	Vicky Kettner	FB Administrator
Milwood NA	John Hillard	President
Oakland Dr./Winchell NA	Peter Kushner (Chair)	President
Oakwood NA	David Nesius	Board Representative
Parker/Duke NA	Bill Hughes	President
Parkview Hills NA	Rick Schmitt	Board Representative
Parkwyn Village	Les Tung	President
Vine NA	Steve Walsh	Executive Director
Westnedge Hill	Natalie Patchell	Representative
Stewards of Kleinstuck	Heather Ratliff	Treasurer
Environmental Concerns Committee	Jim Melluish	Member
Environmental Concerns Committee	Gail Walter	Member
Advisors		
Kalamazoo Nature Center	Jen Meilinger	Community Science Director
MDNR	Don Poppe	Wildlife Biologist
City of Kalamazoo	Rebekah Kik	Director, CPED

APPENDIX B: MICHIGAN CITIES THAT HAVE IMPLEMENTED DEER CULLING PROGRAMS

1) **Summary: Deer Cull/Management Programs – Issues and Concerns**

MI Cities Holding Culls:

Ann Arbor	2015-2020
East Lansing	2020
Lansing	2017
Jackson	2008-2017
Muskegon	2019
Tecumseh	2018-2019
Manistee	2019
Meridian Twp.	2010-present
Kal. Nature Center	2001-present

2) **Reasons Municipalities Decided to Control their Deer Population**

Ann Arbor:

Began its deer cull program in 2016 for three primary reasons:

1) Residents stated herds of deer were eating virtually all landscaping as soon as it was planted.
2) Multiple nature areas and parks in the city were being depleted of flowers and tree seedlings, resulting in reduced biodiversity, and depriving wooded areas of young trees.
3) Car collisions with deer were increasing.

East Lansing:

1) *"This [isn't] about whether gardens are being destroyed. It [is] about proper wildlife management".*
3) Survey of under 200 residents: about 60% of residents supported a professional deer cull; 39% opposed it
4) Another survey indicated that about 54% of respondents "strongly supported" a lethal deer cull:
   - *"We're not here to eliminate deer in East Lansing. This is about managing the population*"
   - *"Overpopulation is an issue and, at least from what I've been hearing, residents want something to be done".*

Lansing:

1) Over-population
   - A MDNR-funded culling effort removed 113 deer over seven nights in 2017. As a result, more than 3,300 lbs. of venison was donated to Volunteers of America

Meridian Township:

1) Have been culling since 2010. A 2020 survey indicated 81% of residents approved
2) 2020: 350 deer culled, and 7,000 pounds of venison was donated to a five-county area.

Jackson:

1) MDNR study said the deer population in the area was very high
2) A high number of car crashes due to deer

Muskegon:

1) Nuisance
2) Worried about the spread of deer ticks and tick-borne illnesses, such as Lyme disease. (There were no signs that Lyme disease was spreading in Muskegon County at that time (2019))

Tecumseh:

1) Destruction to their gardens from browsing deer
2) Car-deer collisions
3) Spread of diseases such as Lyme Disease in the city

Manistee:

1) "Overrun with deer"

Kalamazoo Nature Center (rural environment):

1) Malnutrition / chronic wasting / tick-borne illnesses

APPENDIX C: TECHNICAL CONSULTANTS AND OTHER EXPERT SUPPORT

1) Michigan Department of Natural Resources (MDNR): Don Poppe; Wildlife Biologist
2) Kalamazoo Nature Center: Jen Meilinger, Community Science Director and Ryan Koziatek, Stewardship Director
3) Kalamazoo Christian High School: Life Sciences Class
4) Kalamazoo College: Department of Biology

APPENDIX D: AD HOC COMMITTEE CITIZEN SURVEY RESULTS

Neighborhood Association Ad Hoc Committee:
Citizen Survey - May 2021

Total number of responses: 1616

What evidence have you seen of deer in the city the past 3 years? (Check all that apply.)	
Saw deer	97.2%
Saw deer pellets (poop)	66.3%
Saw deer feeding	74.5%
Saw evidence of where deer had been feeding	66.8%

In your opinion over the past 3 years, what trend have you seen in the number of deer around your house/neighborhood/city?	
More deer now than 3 years ago	58.0%
Fewer deer now than 3 years ago	4.1%
About the same number of deer now as 3 years ago	29.1%
No deer seen at all	1.3%
Don't Know	7.2%

The following is a list of interests that people may have regarding deer. Please indicate how interested you are in doing each of the following.	
Watching or photographing deer near your home? - Not interested-1	35.3%
Watching or photographing deer near your home? - 2	10.2%
Watching or photographing deer near your home? - 3	18.4%
Watching or photographing deer near your home? - 4	12.0%
Watching or photographing deer near your home? - Very interested - 5	23.0%
Feeding deer near your home? - Not interested - 1	78.9%
Feeding deer near your home? - 2	3.9%
Feeding deer near your home? - 3	6.9%
Feeding deer near your home? - 4	2.8%
Feeding deer near your home? - Very interested - 5	5.6%
Learning more about deer management actions? - Not interested - 1	17.3%
Learning more about deer management actions? - 2	7.5%
Learning more about deer management actions? - 3	19.7%
Learning more about deer management actions? - 4	17.2%
Learning more about deer management actions? - Very interested - 5	37.1%
Hunting deer? - Not interested - 1	79.0%
Hunting deer? - 2	3.0%
Hunting deer? - 3	5.3%
Hunting deer? - 4	2.4%
Hunting deer? - Very interested -5	8.5%

The following is a list of possible problems that people may have regarding deer. Please indicate how concerned you are about each in Kalamazoo

Injury to you or family members from a deer-vehicle collision - Not concerned -1	20.3%
Injury to you or family members from a deer-vehicle collision - 2	14.0%
Injury to you or family members from a deer-vehicle collision - 3	17.2%
Injury to you or family members from a deer-vehicle collision - 4	16.8%
Injury to you or family members from a deer-vehicle collision - Very concerned - 5	30.4%
Deer threatening or harming people or pets - Not concerned -1	57.4%
Deer threatening or harming people or pets - 2	7.3%
Deer threatening or harming people or pets - 3	10.6%
Deer threatening or harming people or pets - 4	7.3%
Deer threatening or harming people or pets - Very concerned -5	11.9%
Deer damage to trees, shrubs, plantings & gardens around your home - Not concerned - 1	21.6%
Deer damage to trees, shrubs, plantings & gardens around your home - 2	9.7%
Deer damage to trees, shrubs, plantings & gardens around your home - 3	10.4%
Deer damage to trees, shrubs, plantings & gardens around your home - 4	12.3%
Deer damage to trees, shrubs, plantings & gardens around your home - Very concerned -5	43.9%
Over-browsing of natural habitats (on public and/or private lands) - Not concerned - 1	22.6%
Over-browsing of natural habitats (on public and/or private lands) - 2	7.8%
Over-browsing of natural habitats (on public and/or private lands) - 3	12.4%
Over-browsing of natural habitats (on public and/or private lands) - 4	14.3%
Over-browsing of natural habitats (on public and/or private lands) - Very concerned -5	36.8%
Deer preventing the natural regrowth of native plants - Not concerned - 1	19.9%
Deer preventing the natural regrowth of native plants - 2	9.8%
Deer preventing the natural regrowth of native plants - 3	13.1%
Deer preventing the natural regrowth of native plants - 4	16.0%
Deer preventing the natural regrowth of native plants - Very concerned -5	36.6%
Loss of plant or animal diversity in neighborhood/city - Not concerned - 1	21.5%
Loss of plant or animal diversity in neighborhood/city - 2	8.3%
Loss of plant or animal diversity in neighborhood/city - 3	16.5%
Loss of plant or animal diversity in neighborhood/city - 4	15.0%
Loss of plant or animal diversity in neighborhood/city - Very concerned - 5	32.7%
You or those close to you getting a tick-borne disease (such as Lyme) - Not concerned -1	18.5%

You or those close to you getting a tick-borne disease (such as Lyme) - 2	8.5%
You or those close to you getting a tick-borne disease (such as Lyme) - 3	11.8%
You or those close to you getting a tick-borne disease (such as Lyme) - 4	15.7%
You or those close to you getting a tick-borne disease (such as Lyme) - Very concerned - 5	42.5%
Disruption of our city's ecosystem - Not concerned -1	20.5%
Disruption of our city's ecosystem - 2	9.4%
Disruption of our city's ecosystem - 3	17.7%
Disruption of our city's ecosystem - 4	15.8%
Disruption of our city's ecosystem - Very concerned -5	30.6%
Decreased bird populations due to deer-related habitat loss - Not concerned -1	20.5%
Decreased bird populations due to deer-related habitat loss - 2	10.3%
Decreased bird populations due to deer-related habitat loss - 3	17.2%
Decreased bird populations due to deer-related habitat loss - 4	15.9%
Decreased bird populations due to deer-related habitat loss - Very concerned - 5	27.2%
Chronic Wasting Disease (CWD) spreading among local deer - Not concerned - 1	14.5%
Chronic Wasting Disease (CWD) spreading among local deer - 2	7.4%
Chronic Wasting Disease (CWD) spreading among local deer - 3	14.3%
Chronic Wasting Disease (CWD) spreading among local deer - 4	18.1%
Chronic Wasting Disease (CWD) spreading among local deer - Very concerned - 5	36.8%
Loss of deer habitat, leading to their increased population - Not concerned -1	11.0%
Loss of deer habitat, leading to their increased population - 2	6.1%
Loss of deer habitat, leading to their increased population - 3	14.4%
Loss of deer habitat, leading to their increased population - 4	18.6%
Loss of deer habitat, leading to their increased population - Very concerned - 5	40.2%

Have you personally been affected by any of the problems listed previously?

Yes	63.4%
No	36.0%

Generally, what are your thoughts about deer in Kalamazoo?

I enjoy the presence of deer, and I do not worry about problems they may cause.	26.8%
I enjoy the presence of deer, but I worry about problems (damage, disease, etc.) they may cause.	48.4%
I do not enjoy the presence of deer and regard them as a nuisance.	22.7%
I have no specific feelings about deer in Kalamazoo	1.4%

Please indicate the extent to which you believe the following events have increased, decreased, or stayed the same in your local area over the last 3 years.

Number of deer you see around your home - Decreased a lot -1	2.5%
Number of deer you see around your home - 2	2.3%
Number of deer you see around your home - No change -3	29.8%
Number of deer you see around your home - 4	19.6%
Number of deer you see around your home - Increased a lot -5	41.2%
Number of deer you see in your neighborhood - Decreased a lot- 1	2.3%
Number of deer you see in your neighborhood - 2	2.4%
Number of deer you see in your neighborhood - No change - 3	27.8%
Number of deer you see in your neighborhood - 4	20.2%
Number of deer you see in your neighborhood - Increased a lot - 5	42.6%
Number of deer you see city-wide - Decreased a lot- 1	2.0%
Number of deer you see city-wide - 2	1.7%
Number of deer you see city-wide - No change - 3	29.8%
Number of deer you see city-wide - 4	23.3%
Number of deer you see city-wide - Increased a lot- 5	25.9%
Amount of deer damage to plants around your home - Decreased a lot - 1	2.9%
Amount of deer damage to plants around your home - 2	1.7%
Amount of deer damage to plants around your home - No change-3	32.2%
Amount of deer damage to plants around your home - 4	17.1%
Amount of deer damage to plants around your home - Increased a lot- 5	39.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - Decreased a lot - 1	2.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - 2	1.4%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - No change - 3	28.5%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - 4	12.9%
Amount of deer damage to natural plants and forests in parks, undeveloped land, etc. - Increased a lot- 5	19.6%
Number of deer-vehicle collisions (roadside carcasses) - Decreased a lot - 1	2.7%
Number of deer-vehicle collisions (roadside carcasses) - 2	1.9%
Number of deer-vehicle collisions (roadside carcasses) - No change - 3	29.2%
Number of deer-vehicle collisions (roadside carcasses) - 4	20.7%
Number of deer-vehicle collisions (roadside carcasses) - Increased a lot- 5	18.7%

How do you believe the size of the deer population should change?

Decrease a lot - 1	36.2%
2	27.5%
Stay the same - 3	23.6%
4	1.9%
Increase a lot - 5	2.2%

Based on your previous answer, How important is it to you that the size of the deer population change?

Not important - 1	15.8%
2	6.1%
3	14.4%
4	18.4%
Very important - 5	38.2%

Listed below are actions that have been used for managing deer in other communities. Some are actions individuals might take on their own property; others require collective community action. How acceptable to you personally is each action for managing deer in Kalamazoo?

Ongoing deer surveying (drone, trail cameras, etc.) - Not acceptable at all - 1	6.6%
Ongoing deer surveying (drone, trail cameras, etc.) - 2	4.3%
Ongoing deer surveying (drone, trail cameras, etc.) - 3	10.5%
Ongoing deer surveying (drone, trail cameras, etc.) - 4	14.3%
Ongoing deer surveying (drone, trail cameras, etc.) - Very acceptable - 5	58.0%
Allow "deer" fences to keep them away from yards, gardens, etc. - Not acceptable at all - 1	8.0%
Allow "deer" fences to keep them away from yards, gardens, etc. - 2	6.9%
Allow "deer" fences to keep them away from yards, gardens, etc. - 3	11.9%
Allow "deer" fences to keep them away from yards, gardens, etc. - 4	15.5%
Allow "deer" fences to keep them away from yards, gardens, etc. - Very acceptable - 5	50.7%
Sterilization (live trap, sterilize, release) - Not acceptable at all - 1	17.6%
Sterilization (live trap, sterilize, release) - 2	7.8%
Sterilization (live trap, sterilize, release) - 3	10.8%
Sterilization (live trap, sterilize, release) - 4	12.6%
Sterilization (live trap, sterilize, release) - Very acceptable - 5	43.2%
Contraception (birth control) – effective for up to 3 years - Not acceptable at all - 1	15.3%
Contraception (birth control) – effective for up to 3 years - 2	6.6%
Contraception (birth control) – effective for up to 3 years - 3	10.5%
Contraception (birth control) – effective for up to 3 years - 4	12.8%
Contraception (birth control) – effective for up to 3 years - Very acceptable - 5	47.1%

Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - Not acceptable at all - 1	35.7%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 2	8.3%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 3	10.3%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - 4	9.7%
Use firearms - regulated sharpshooters to kill deer and donate the deer meat to food banks. - Very acceptable - 5	9.7%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - Not acceptable at all - 1	31.6%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 2	30.8%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 3	7.7%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - 4	10.0%
Use archery - regulated sharpshooters to kill deer and donate the deer meat to food banks - Very acceptable - 5	9.8%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Not acceptable at all - 1	37.6%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 2	44.0%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 3	10.5%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 4	8.0%
Allow licensed archery hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Very acceptable - 5	7.0%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Not acceptable at all - 1	25.6%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 2	54.3%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 3	11.4%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - 4	6.4%
Allow licensed firearms hunting by licensed hunters (vs. sharpshooters) to control the deer population. - Very acceptable - 5	4.8%
Stricter enforcement of current "no deer feeding" ordinance - Not acceptable at all - 1	18.1%
Stricter enforcement of current "no deer feeding" ordinance - 2	8.4%
Stricter enforcement of current "no deer feeding" ordinance - 3	6.7%
Stricter enforcement of current "no deer feeding" ordinance - 4	11.5%
Stricter enforcement of current "no deer feeding" ordinance - Very acceptable - 5	10.9%
Educate people about how to co-exist with deer - Not acceptable at all - 1	55.4%
Educate people about how to co-exist with deer - 2	8.2%
Educate people about how to co-exist with deer - 3	6.2%
Educate people about how to co-exist with deer - 4	12.3%
Educate people about how to co-exist with deer - Very acceptable - 5	11.4%

Let nature take its course without human interference - Not acceptable at all - 1	57.0%
Let nature take its course without human interference - 2	35.1%
Let nature take its course without human interference - 3	15.5%
Let nature take its course without human interference - 4	15.8%
Let nature take its course without human interference - Very acceptable - 5	7.7%
Use chemical repellents to keep deer away from plants. - Not acceptable at all - 1	19.4%
Use chemical repellents to keep deer away from plants. - 2	30.6%
Use chemical repellents to keep deer away from plants. - 3	15.5%
Use chemical repellents to keep deer away from plants. - 4	15.3%
Use chemical repellents to keep deer away from plants. - Very acceptable - 5	10.5%
Capture and kill deer by lethal injection. - Not acceptable at all - 1	54.6%
Capture and kill deer by lethal injection. - 2	9.3%
Capture and kill deer by lethal injection. - 3	7.0%
Capture and kill deer by lethal injection. - 4	4.0%
Capture and kill deer by lethal injection. - Very acceptable - 5	16.2%
A combination of any of the above approaches - Not acceptable at all - 1	17.0%
A combination of any of the above approaches - 2	7.0%
A combination of any of the above approaches - 3	17.2%
A combination of any of the above approaches - 4	12.4%
A combination of any of the above approaches - Very acceptable - 5	27.5%

Generally, when you think about all aspects of living with deer, how would you weigh the benefits and disadvantages of having deer in your area?

The benefits of deer in my local area exceed the disadvantages	28.3%
The disadvantages of deer in my local area exceed the benefits	43.6%
The disadvantages and benefits of deer in my local area are about an even tradeoff	26.4%

REFERENCES

Michigan Deer Management Plan, MDNR, 2016, pp. 1, 10-33

A Review of Deer Management in Michigan, MDNR, 2009, pp. 1, 2, 5, 9-12, 29-34

Solving Problems with Deer; *A template conflict management and coexistence plan for white-tailed deer*, The Humane Society of the United States (HSUS), 2018, pp. 1, 3, 4-14, 17, Appendix H

Emerging Issues in White-tailed Deer Management and Conservation, Purdue University, 2009, p.20

Deer Management Within Suburban Areas, Greg Creacy, Texas Parks and Wildlife Department, 2006, pp. 1-3, 8-9

Community-based deer management (CBDM), Cornell University, https://deeradvisor.dnr.cornell.edu/cbdm-process

Anthony J. DeNicola, *Managing white-tailed deer in suburban environments.* A technical guide, Jan. 2000

Deer Management, Jeff Davis, Whitetails Unlimited, 2018, pp.5-6

Michigan Department of Natural Resources (MDNR), www.Michigan.gov/DNR

Community Deer Management Guide, New York Division of Fish and Wildlife, 2018, pp.9-12, 20

Managing Overabundant White-Tailed Deer, Texas A&M University, Texas AgriLife Extension Service and Research, Texas Parks and Wildlife Department, 2019, pp.9-13

Urban Deer Technical Guide, Indiana Division of Fish & Wildlife, 2013, pp. 9-13, 17

Don't Veer for Deer, State Farm Insurance, October 21, 2020

canr.msu.edu/news/deer_wars_in_garden_landscapes, June 5, 2012

mlive.com/news/2019/10/deer-vehicle-crashes-cost-michiganders-130m-annually, October 31, 2019

Howard County (MD) Department of Recreation and Parks Comprehensive Deer Management Plan, 2002, p.6-7

Deer Reduction Is a Cornerstone of Integrated Deer Tick Management, Sam R Telford, III, Journal of Integrated Pest Management, Volume 8, Issue 1, January 2017, p. 25

Kalamazoo County Health & Community Services Department, News Release, *"Increased Risk of Lyme Disease in Kalamazoo County",* July 30, 2020

Ticks and Your Health, MDHHS, MDNR, MSU, 2019

https://www.michigan.gov/emergingdiseases/ (2021)

mlive.com/news/muskegon/2020/01/deer-cull-by-sharpshooters-approved-in-muskegon-despite-some-citizen-opposition, January 14, 2020

https://www.bridgemi.com/michigan-environment-watch/no-joke-ann-arbor-removing-deer-ovaries-lawmakers-arent-laughing, March 14, 2018

Michigan Act No. 390, Public Acts of 2018; MCL 324.40114 (Effective Date: March 19, 2019)

MDNR, *Preliminary Report on Sterilization of Game in Michigan*, 2018 Public Act 390, Section 40114(9)

Deer Management Handbook for Communities in New York, 2018

michigan.gov/DNR [Deer Management], 2021

aphis.usda.gov/aphis/, July 28, 2021

https://www.nytimes.com/2022/02/07/health/coronavirus-deer-animals.html

Nicholas Martin, entomologist; Entomology and Nematology Department, University of Florida, Institute of Food and Agricultural Sciences, February 2021

https://deeradvisor.dnr.cornell.edu/cbdm-process

DeerFriendly.com, 2018

extension.psu.edu/reducing-risks-from-animals=-and-manure, May 4, 2015

Appendix C - Bowhunter's Creed

APPENDIX C

Bowhunters Creed

I firmly resolve, without reservations or equivocation, to uphold the following bowhunting principles.

- That I will support national, state and provincial regulatory agencies and conservation organizations in the propagation and management of all game.
- That I will at all times actively support and promote hunting with a bow.
- That I will abide by current game regulations and at all times conduct myself as a sportsman so as not to bring discredit to the bowhunting fraternity.
- That I will respect landowner's rights.
- That I will assist all bowhunters in locating places to hunt, but i will not impose myself knowingly on another bowhunter.
- That I will enjoy the challenge of the hunt and will study the habits of the game I hunt.
- That I will use legal archery equipment and will search long and diligently to track down and recover any wounded game.

Appendix D - City's Archery Hunting Permit Application Process

APPENDIX D

City of Kalamazoo, Ross Township Property "WPS-37" @ Greer Drive & N. 37th Street

Archery Hunting Overview – Hunting is privilege, not a right.

Archery hunting is a popular and important recreational activity. Hunters play a significant role in deer management at WPS-37 by collecting data on the fluctuations in population size and health, and mitigating browsing damage. Bow Hunting is allowed at WPS-37 in select areas.

It is the goal of the City's hunting program to reducing the deer population to sustainable numbers that will results in healthier forests. Hunters will be required to provide data after deer removal, such as the conditions of the deer when shot, etc. The program will enable City Staff to keep hunters informed about upcoming management, or educational events. City Staff will monitor who accesses the property and insuring the safest experience possible for them.

Hunters will be required to comply with all MDNR rules and requirements, including obtaining and displaying a base license and submitting any samples for collection.

The City's Department of Public Services ("City") purchases MDNR Deer Management Assistance Permits (DMAPs) that allow limited bow archery on select properties. An Archery Hunting Program requiring hunters to apply to the City for a DMAP license is done using a lottery process. Depending on the antlerless population, the number of licenses may vary year to year.

Hunters must apply for a City's Archery Hunting Permit each season from **May 1st - July 31st**. Hunters may apply for the annual City permit as an individual or a hunting group (up to 3 people per application). Base Licenses must be purchased separately through the current MDNR permit application process (https://www.michigan.gov/dnr/things-to-do/hunting/deer) and the MDNR Hunting Digest must be followed.

Allowable licenses for WPS-37 are for Youth age 9 and under, Youth age 10-16, Resident age 17-64 years and Resident senior age 65+ years.

Hunters will be provided packets which will include the DMAP license, parking pass, armbands, harvest sheets, maps, location and other important information.

***** Hunters are required to complete harvest sheets while hunting at WPS-37 ***.**

The harvest sheets must be submitted at the end of the season, no later than January 15th. Photos of your harvest are encouraged and will be included in the City's media outreach. Data collected may be shared with MDNR, other educational institutions and state and federal partners to help promote important wildlife management and research.

Please refer to the City's **Archery Hunting Permit Application Process** for additional information. It can be access at *ProtectYourWater.net/Resources/Hunting* regarding important dates, permit fees and related terms and conditions.

APPENDIX D

City of Kalamazoo, Ross Township Property "WPS-37" @ Greer Drive & N. 37th Street

Archery Hunting Permit Application Process

Applications are taken each season from **May 1st - July 31st** and are available online at *ProtectYourWater.net/Resources/Hunting*.

Regular Season Hunting dates: **October 1st – January 1st**.

***** Applications accepted May 1st through July 31st. *****

Archery Hunting Permit Application Requirements

1. Initialed copy of Hunting and Tree Stand Policy (attached, 1 page)
2. Signed copy of Hunting Permit Application

***** Hunting Permit are no cost to applicants *****

Submit the Application via mail to *Hunting Program, 1415 N. Harrison St., Kalamazoo, MI 49007* or by email _____@kalamazoocity.org.

Questions? Call 311 (from inside the City) or (269) 337-8000 (if outside the City) or email: _____@kalamazoocity.org.

Hunting Packet

Applications will be processed after July 31st and awarded by August 15th. Hunters will receive materials digitally via email or mail as requested in the application.

Hunting Packet: Includes a City hunting permit; DMAP(s); parking passes, armbands, and tree stand markers with hunter or group IDs; harvest/data sheets; maps; and other information.

***** Only hunters who submit harvest sheets will be eligible to hunt the next season.*****

Use and Restrictions

1) The parking pass must be prominently displayed in vehicle dashboard while hunting.

2) The unused City Hunting Permit must be carried by the hunter while hunting on City-owned property. Copies of Permits are NOT permitted.

3) The Permit is for the sole use of the hunter(s) named. The hunter shall exhibit the City permit photo ID, and base hunting license upon the request of a law enforcement officer or designated City Staff to verify they are the hunter(s) named on the permit.

APPENDIX D

City of Kalamazoo, Ross Township Property "WPS-37" @ Greer Drive & N. 37th Street

Hunting & Tree Stand Policy

Hunting Policy

Initials _____ **Date _____**

***** ABSOLUTELY NO FIREARMS are permitted on City of Kalamazoo-owned properties. *****

- Registration is required DAILY when hunting using the City's phone application/calling.
- ALL INFORMATION IS REQUIRED TO REGISTER including the City's DMAP license #.
- One hunter or hunting group is allowed per the Permit assigned hunting section only.
- When parking, DO NOT block gates, roadways, or access drives. Vehicles found to be in violation may be TOWED at owner's expense.
- NO HUNTING in Safety Zones, within 300 ft of any building on off-site properties or 100 ft from the off-site property boundary.
- NO BAITING allowed.
- Please review the TREE STAND POLICY before using a tree stand.
- Observation Sheets and any Harvests must be recorded and submitted by the end of hunting season and no later than January 15th using 1) the City's phone application, by mail to *Hunting Program, 1415 N. Harrison St., Kalamazoo, MI 49007* or 3) by email to _____@kalamazoocity.org.
- All other State Regulations apply.
- Report suspicious activity to the Kalamazoo County Sheriff's Office at (269) 488-8911.
- Deer kills are to be registered with the MDNR.
- No guts can be left at the WPS-37 property.
- Only a minimum of branches may be removed, using hand pruners, to improve shooting lanes. Branches cannot be cut with saws or loppers or torn by hand.
- Only temporary blinds may be used.

Tree Stand Policy

- AS REQUIRED BY STATE LAW, only temporary portable stands or platforms can be used at WPS-37. Stands cannot be affixed or attached to any tree by nails, screws, or bolts. Stands and blinds cannot be placed on City-owned properties any earlier than **Sept. 1st and must be removed by March 1st**. Stands and blinds left on City-owned properties outside of these dates will be deemed abandoned and may be disposed of by the City per its discretion.
- Hunter or Group ID must be prominently displayed on the stand or platform.
- Stands / tree steps cannot cause excessive damage to trees. No screw-in steps allowed.

APPENDIX D

- Stands cannot be placed in black cherry, oak, or walnut trees; it is the responsibility of the hunter to identify tree species.
- Stands must not be visible from the main roads including Greer Drive and N. 37th Street, and cannot be located within 300 feet of any building on off-site properties.

***** Any hunter harassment by other hunters, visitors or dogs on- or off a leash should be promptly reported to management. *****

Other Policies

Although WPS-37 consists of forested vacant parcels, the City maintains several test wells on the property for future use. The wells are spray painted and flagged in bold colors and marked on the maps provided. City Management will do its best to inform hunters of operational activities at WPS-37 during business hours. However, you may be inadvertently interrupted by research, management or educational activities.

ADOPTION AND APPROVAL OF THE 2025 DEER MANAGEMENT PLAN, ROSS TOWNSHIP

Approved:

CITY OF KALAMAZOO, MICHIGAN

By: _____ Date: 6/30/25

Name: James K. Ritsema, ICMA-C

Its: City Manager

FORM APPROVED
6/27/25
CRB
CITY ATTORNEY