Plan Implementation

November, 2022

Grand Haven
Coast Guard City USA

MICHIGAN FORESTRY CO.

FOREST STEWARDSHIP PLAN

200 Acres in Section 29
Grand Haven Township, Ottawa County, MI T8N, R16W
Parcel # 70-03-29-160-004
70-03-29-200-010
70-03-29-325-016

Plan Conclusions

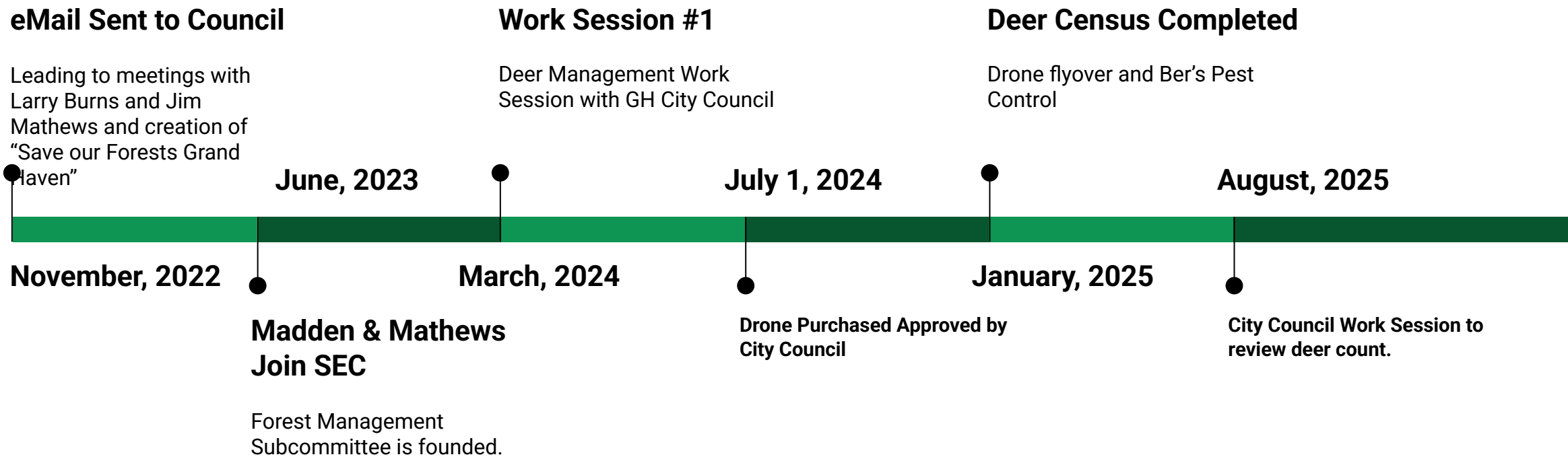
According to the 2022 City Approved Forest Management Plan, **our forests are in grave danger from invasive pathogens and deer overgrazing.** The deer have decimated the critical forest understory and inhibited tree planting efforts leading to erosion of our critical dunes.

Agenda

1. Brief History
2. Critical Need
3. Drone and Street Count Data
4. DNR Response to Questions from City (Worksession and Meeting with DNR)

Brief History

Connections, Commissions and Census




Critical Need

Shifting Baseline Syndrome

1964

1998

2025

Shifting baseline syndrome: causes, consequences, and implications, Volume 16, Issue 5, Frontiers in Ecology and the Environment pages: 263-263


Deer eat saplings before they’re able to mature, making natural forest regeneration impossible.

Fall, 2024:
Three newly planted trees died in Lake Forest Cemetery because of deer rubbing.

November 13th, 2024:
6-Point Buck spotted on Gladys Avenue driveway, in Grand Haven.

Duncan Park

Mulligan’s Hollow

Lake Forest Cemetery

Photos Taken Between 3:30-4:00 PM July 31, 2025

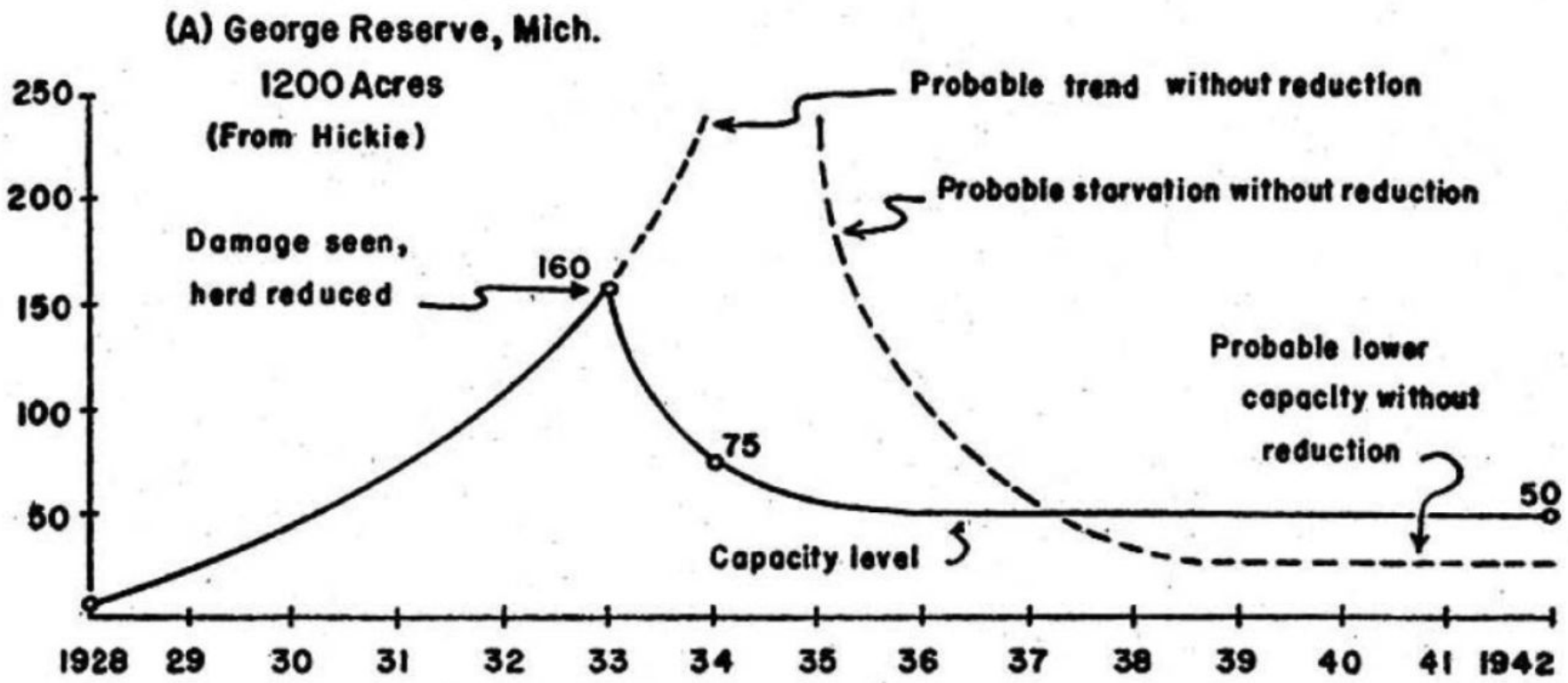
Browse Lines

"This is up there with the worst red flags you can see. You have too many deer and not enough food. You need to reduce deer numbers while increasing forage through habitat management until browse lines vanish."

National Deer Association Report, August 21, 2024

Lake Forest Cemetery July 31, 2025

1928 George Reserve Study, Ann Arbor, MI



- **Fenced preserve** managed by the UMI, 25 miles northwest of Ann Arbor.
- **The 1,200 acre study site** is **6 times larger** than our GH Urban Forest (MH, DP, LFC)
- In **1928**, researchers introduced **four does and two bucks** to initiate the study.
- By **1933**, deer population had surged to approximately **160 individuals**, demonstrating exponential growth in the absence of predators or hunting. Deer overbrowsing quickly became evident.
- The herd was reduced to 75 and then to 50 before the evidence of overbrowsing dramatically decreased.
- **The reduced herd** was then considered "**in equilibrium within its range**".

WHAT DOES A HEALTHY FOREST LOOK LIKE?

Hardy, healthy trees

A wide variety of native plants, shrubs and saplings under their canopy

A healthy ecosystem containing a broad spectrum of birds, bees, butterflies and small mammals

March 4, 2024

Council Work Session

- City requests an updated count of the deer.
- Wildlife management experts needed to answer council specific questions.
- “Save our Forests Grand Haven” begins work to address questions by Council.

July 1st, 2024

- City Council approves drone purchase
- Purchase made possible by a GHACF Mixer Grant and donations to “Save our Forests Grand Haven”.
- The city owns the $5,460.60 drone and may use it for multiple purposes
- Drone flights are limited to city owned property.

24-148 Council Member **McLaughlin** moved, seconded by Mayor Pro-tem **Cummins** to approve the purchase of a DJI Mavic 3 Thermal Drone in the amount of $5,460.60 for the purpose of completing ecological studies, with funds to be reimbursed by the Save the Forest Fund at the Grand Haven Community Foundation.

January, 2025

Deer survey conducted, with a drone forest flyover,

and Berg's Pest Control using infrared cameras to count deer on city streets.

Drone Survey Data

Lake Forest Cemetery, Mulligan's Hollow, Duncan Park

The count recorded 68 highly likely (verifiable) sightings, with an additional 44 possible sightings. Thus, the total deer population within the 200-acre urban forest is estimated to range between 68 and 112.

Location	Likely Sightings	Additional Possible Sightings	Estimated Population
Mulligan's Hollow Area 1	8	6	14
Mulligan's Hollow Area 2	18	13	31
Mulligan's Hollow Area 3	7	5	12
Lake Forest Cemetery	16	9	25
Duncan Woods	19	11	30
Total:	**68**	**44**	**112**

*Full survey results attached at the end.

2025 Deer Count

Park Location	Likely	Additional Possible	Estimated Maximum
MH 1	8	6	*14*
MH2	18	13	*31*
MH3	7	5	*12*
LFC	16	9	*25*
DW	19	11	*30*
	68	44	***112***
Deer counted outside the park	**55**		
GH Census Range	**123**		***167***

Questions

What are your recommendations for communities struggling with ecological damage associated with deer overbrowsing?

Questions

Do you believe the number of deer counted in Grand Haven exceeds a healthy carrying capacity?

Questions

Is it worth trying to manage the deer? Won't that just create a vacuum and deer in the surrounding area will flood in to fill that vacuum?

Questions

When is the best time of year to manage the deer?

Questions

Does the DNR reimburse cities for deer removal as the deer are "owned" by the state?

Budget

$495 Per Deer Includes

- All required permits
- Harvesting
- Field dressing and clean-up
- Processing in preparation for donation:
  - Muskegon Rescue Mission
  - Doe Patrol
  - Others as needed

Thank You!

Grand Haven Thermal Deer Count Estimate
January 2025

Prepared for
The City of Grand Haven
By
Alpha 616 Drone Services, LLC

Report Contents

Summary

This deer count includes two levels of confidence based on the January 2025 thermal imagery:

1. **Likely sightings**; with clear visual verification of deer.
2. **Possible sightings**; with thermal signatures suggesting deer, though visual confirmation was inconclusive.

The count recorded 68 highly likely (verifiable) sightings, with an additional 44 possible sightings. Thus, the total deer population within the 200-acre urban forest is estimated to range between 68 and 112.

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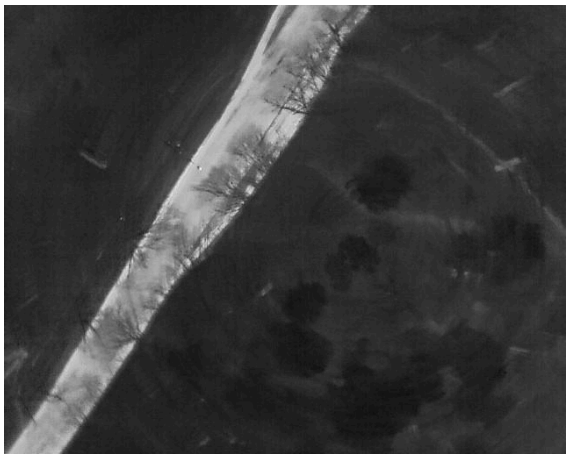
Background & Methods

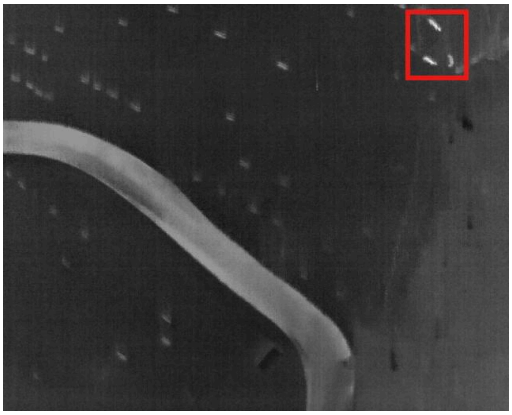
Unlike traditional cameras, which assign a specific color to each pixel to construct a visible image, thermal cameras operate by assigning a relative temperature value to each pixel. Therefore, warmer temperatures in a thermal image appear bright while cooler temperatures appear dark. The drone used in this deer count – owned by the City of Grand Haven – is equipped with both a traditional color camera (with a resolution of 1440x1080 pixels) and a thermal camera (with a resolution of 640x512 pixels). Color and thermal images are captured near-simultaneously. In these images, an individual pixel corresponds to a roughly 7 square centimeter area based on an average flight altitude of 175 feet relative to the takeoff point. Due to differing focal lengths and resolutions, color and thermal images do not align exactly, but each thermal image has a roughly corresponding color image (see images below):



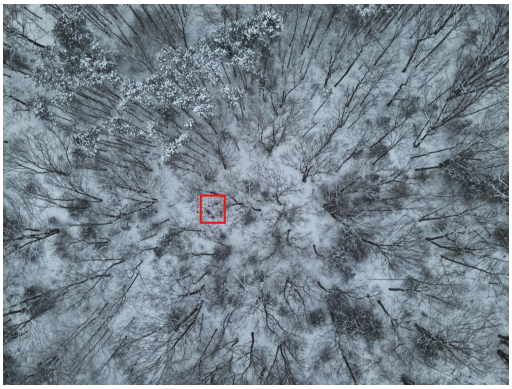
Flights were conducted over Mulligan's Hollow, Lake Forest Cemetery, and Duncan Woods according to pre-planned routes and flown semi-autonomously. Due to its size and geometric complexity, Mulligan's Hollow was subdivided into three separate flights. A total of five different flights encompassing all 200 acres took place across three subsequent days – January 9, 10, and 11 – with start times between 8:30AM and 9:30AM. ***It is important to note that these deer count estimates represent single points-in-time on three subsequent days; while every effort is made to provide accurate estimates, exact counts cannot be guaranteed.***

Thermal images are manually reviewed for deer sightings and, wherever possible, potential thermal deer sightings are augmented by review of the accompanying color image. Potential sightings are grouped into three categories:

1. **Likely deer sighting**; where an object appears to be a deer, and confirmation based on color imagery supports positive identification (in the images below, what appears to be a group of three deer in the thermal image is visible as a group of three deer in the color image):




2. **Potential deer sighting**; where an object appears to be a deer in the thermal imagery, but confirmation based on color imagery is not possible (in the images below, what appears to be a cluster of deer in the thermal image is inconclusive in the color image):

3. **Erroneous sighting**; where an object resembles a deer in the thermal imagery, but upon further review is not a deer (in the images below, what appears to be a potential deer sighting in the thermal image is visible as a street lamp in the color image):


Mulligan’s Hollow Area 1 Estimate

January 9, 2025; 8:30AM

The composite image below represents the boundary of **Mulligan’s Hollow Area 1** and was captured on a prior date:

Deer Estimates:

- Likely deer spotted: **8**
- Possible deer spotted: **6**

Mulligan’s Hollow Area 2 Estimate

January 9, 2025; 9:10AM

The composite image below represents the boundary of **Mulligan’s Hollow Area 2** and was captured on a prior date:

Deer Estimates:

- Likely deer spotted: **18**
- Possible deer spotted: **13**

Mulligan’s Hollow Area 3 Estimate

January 9, 2025; 10:00AM

The composite image below represents the boundary of **Mulligan’s Hollow Area 3** and was captured on a prior date:

Deer Estimates:

- Likely deer spotted: **7**
- Possible deer spotted: **5**

Lake Forest Cemetery Estimate

January 10, 2025; 8:30AM

The composite image below represents the boundary of **Lake Forest Cemetery** and was captured on a prior date:

Deer Estimates:

- Likely deer spotted: **16**
- Possible deer spotted: **9**

Duncan Woods Estimate

January 11, 2025; 9:30AM

The composite image below represents the boundary of **Duncan Woods** and was captured on a prior date:

Deer Estimates:

- Likely deer spotted: **19**
- Possible deer spotted: **11**