



Introduction

Threat

The Hemlock Woolly Adelgid (*Adelges tsugae*, HWA) is an invasive insect native to East Asia which is now spreading across the Northeast affecting training areas and forests on military installations. HWA kills Eastern Hemlock (*Tsuga canadensis*) within 4-10 years, by feeding on the nutrients at the base of the needles during the winter (NYS DEC). The Eastern Hemlock is a foundational tree species in the northeast United States that plays a crucial ecological role in supporting wildlife habitats (Biological Control of Hemlock Woolly Adelgid 2024).

Impact

Eastern Hemlocks provide year-round canopy cover important to forest biodiversity. The spread of HWA alters hydrology and wildlife habitat across the region. HWA effects military installations by degrading forest cover to create realistic training and other long-term land use.

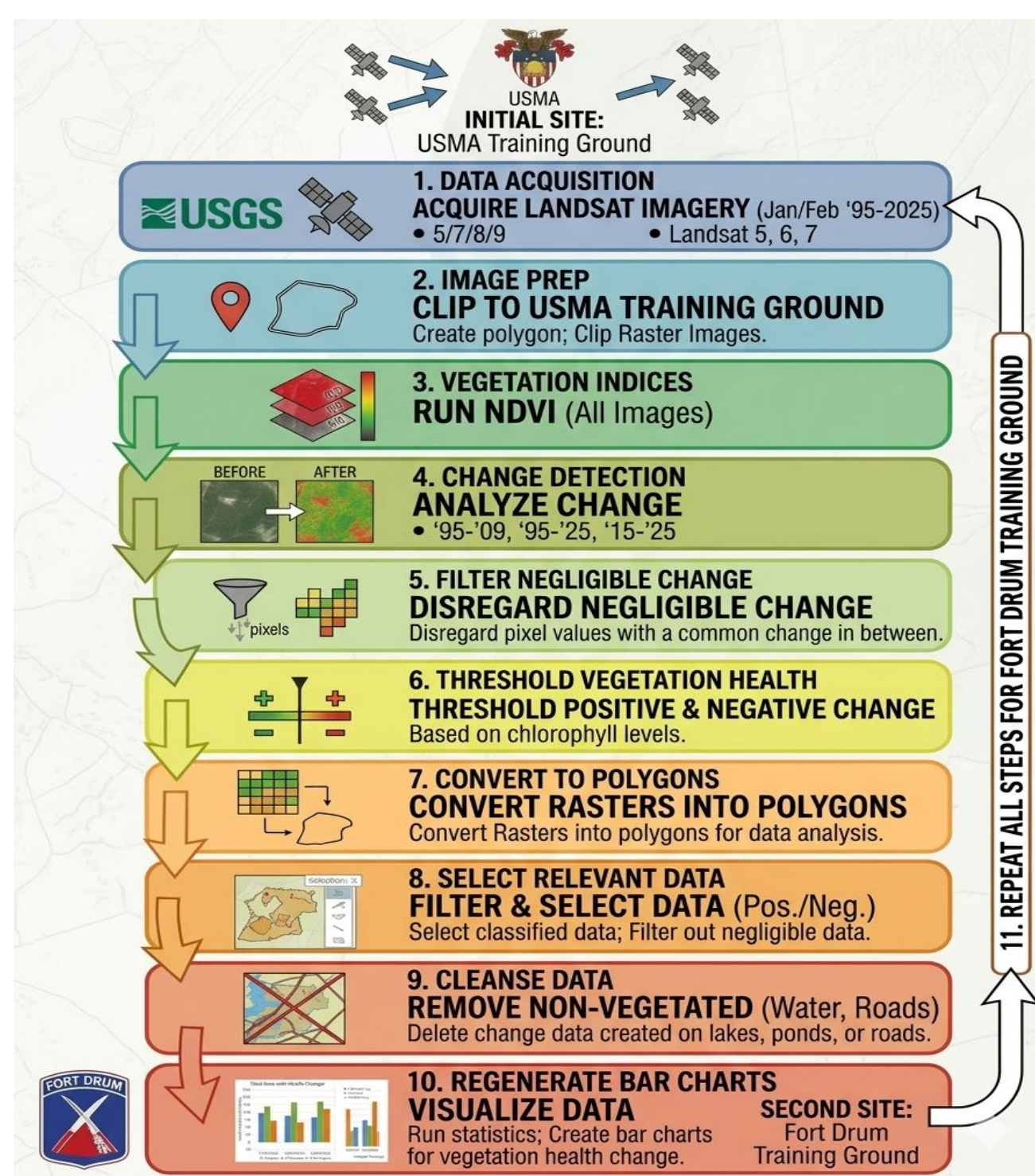
Our Study

This project used 30 years of Landsat satellite imagery (1995-2025) with GIS change detection to measure vegetation health trends across West Point and Fort Drum. Comparing NDVI across the two installations allowed to identify spatial patterns of recovery and decline. West Point acted as a case study for active mitigation allowing to further study managed and less-managed forests over time.

Objectives

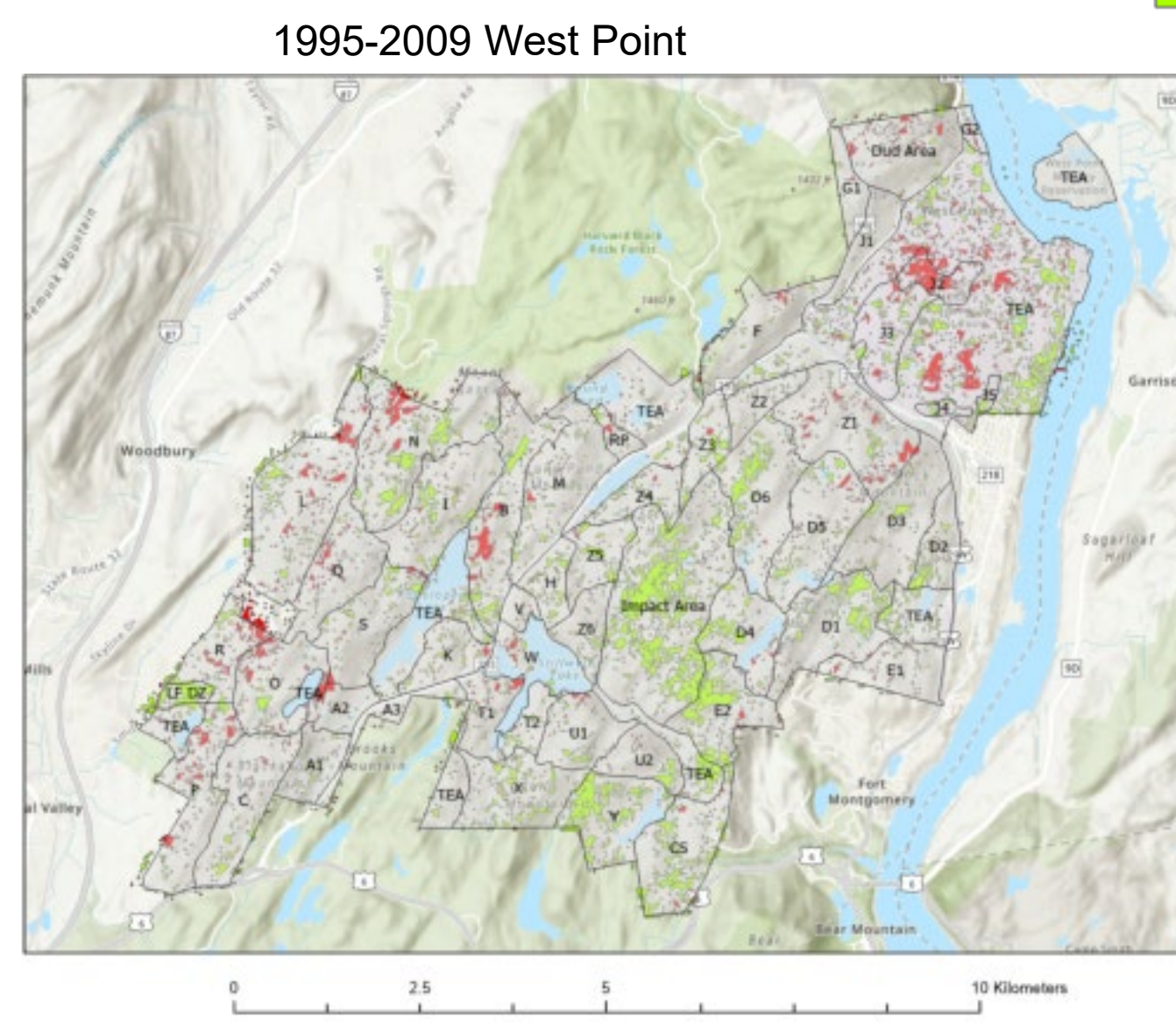
1. Compare and quantify the changes in vegetation health across West Point and Fort Drum over a 30-year period (1995-2025) by using Landsat satellite imagery and NDVI.
2. Identify spatial patterns in recovery and forest degradation by creating visual aids to show the positive and negative impacts.
3. Evaluate the active mitigation of West Point to the passive mitigation happening on a larger scale at Fort Drum.
4. Create a visual hotspots of forest decline and recovery to provide insight.

Methods

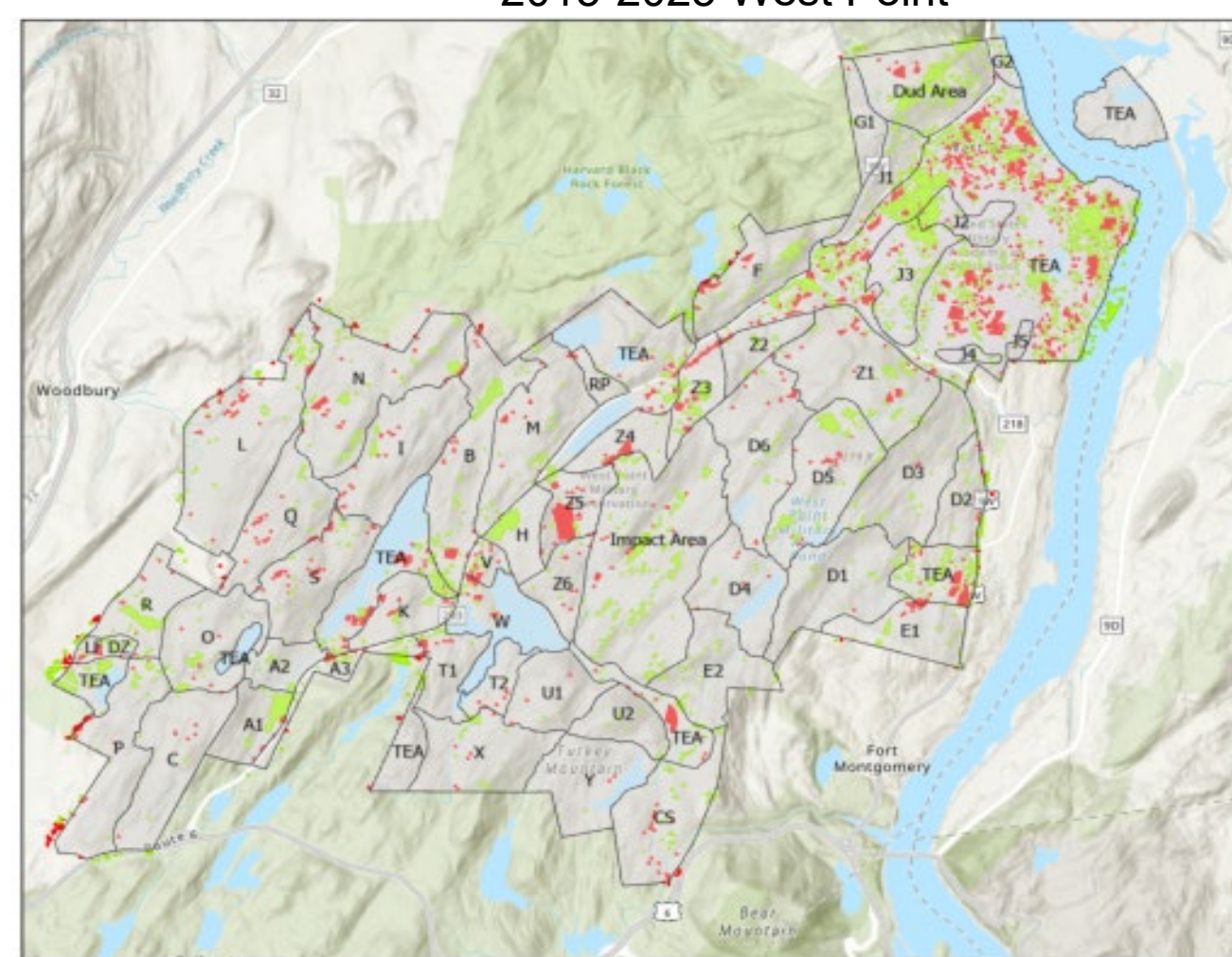


Results

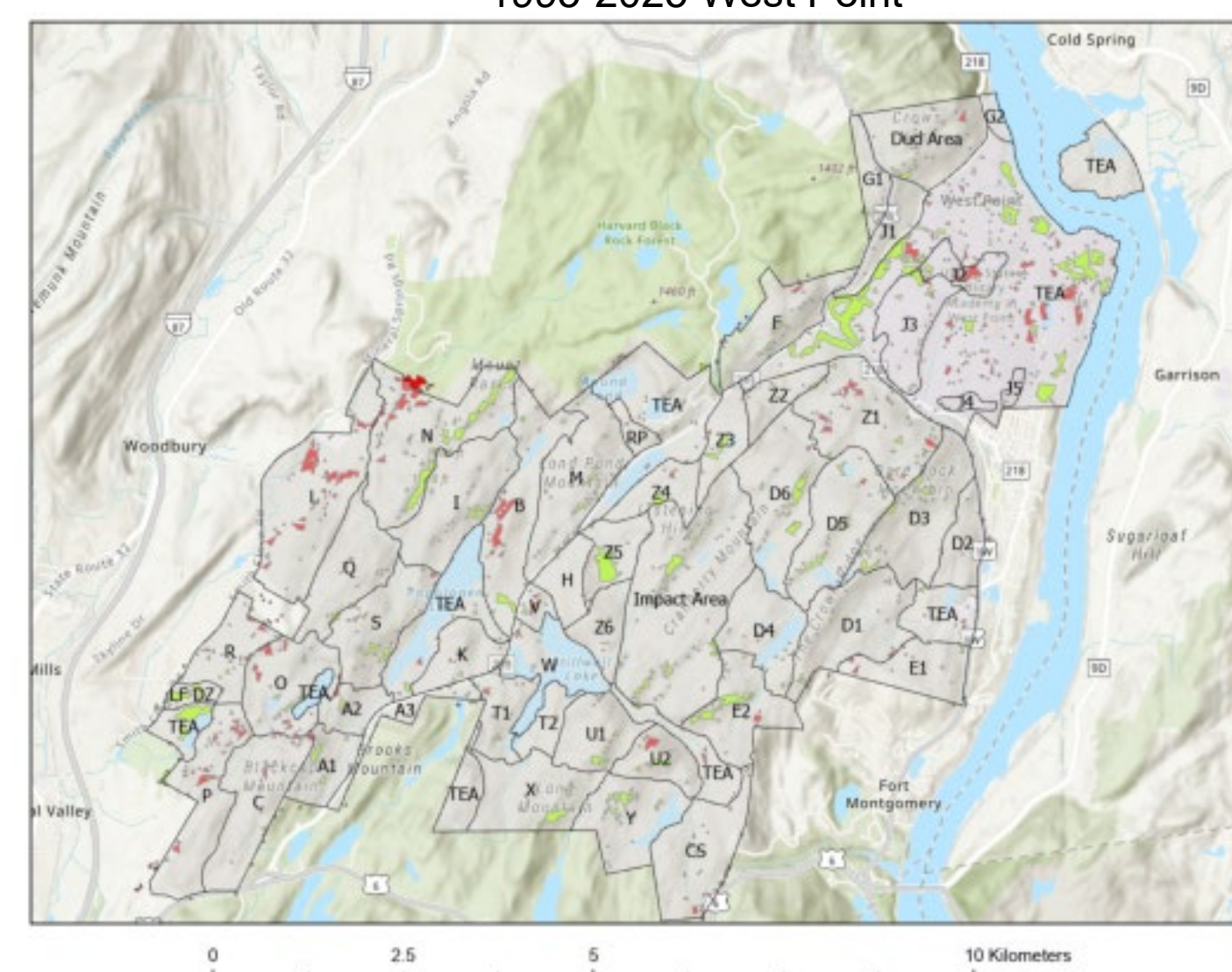
Training Area Size: 115,703,153 m²



2015-2025 West Point



1995-2025 West Point

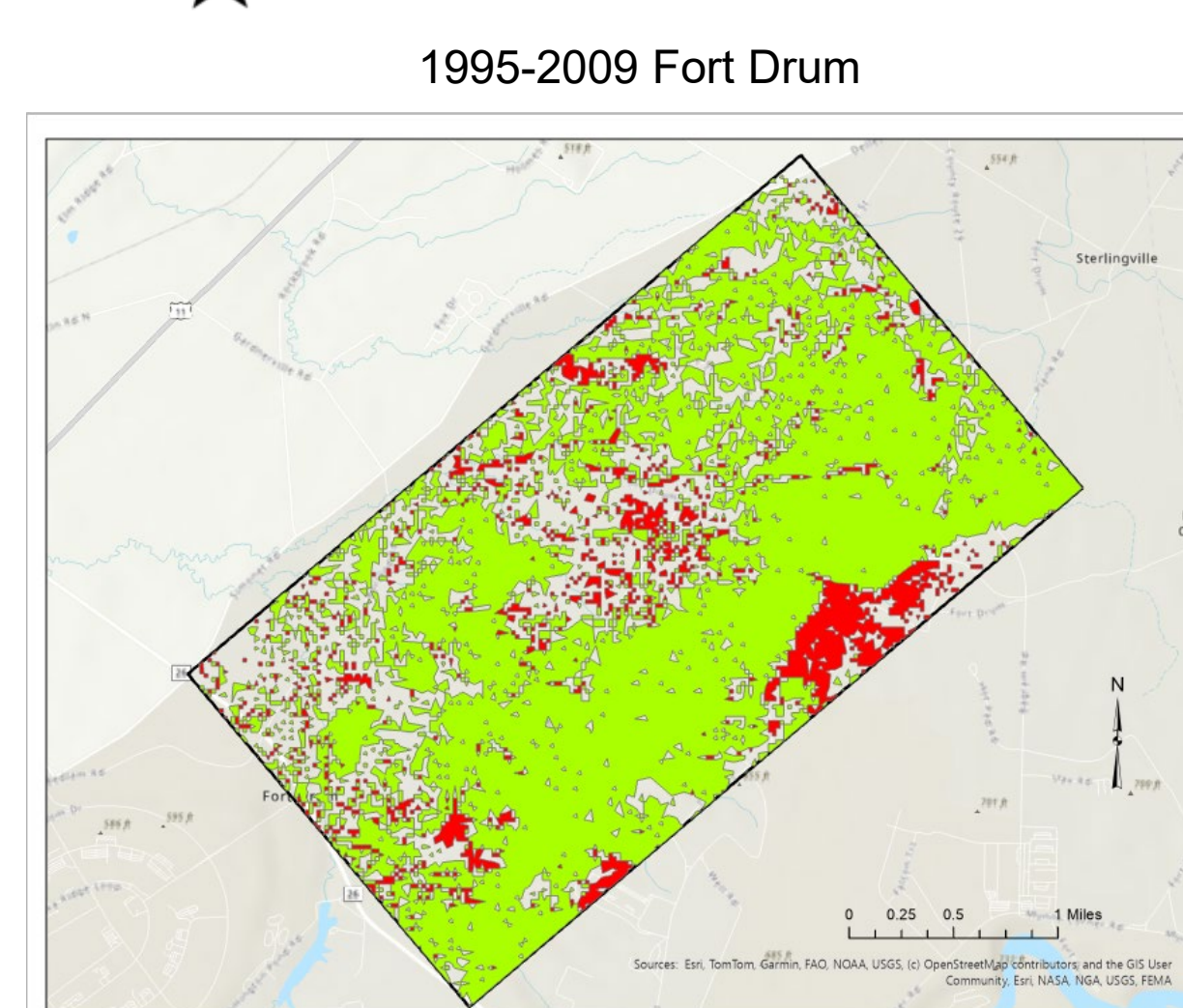


Legend

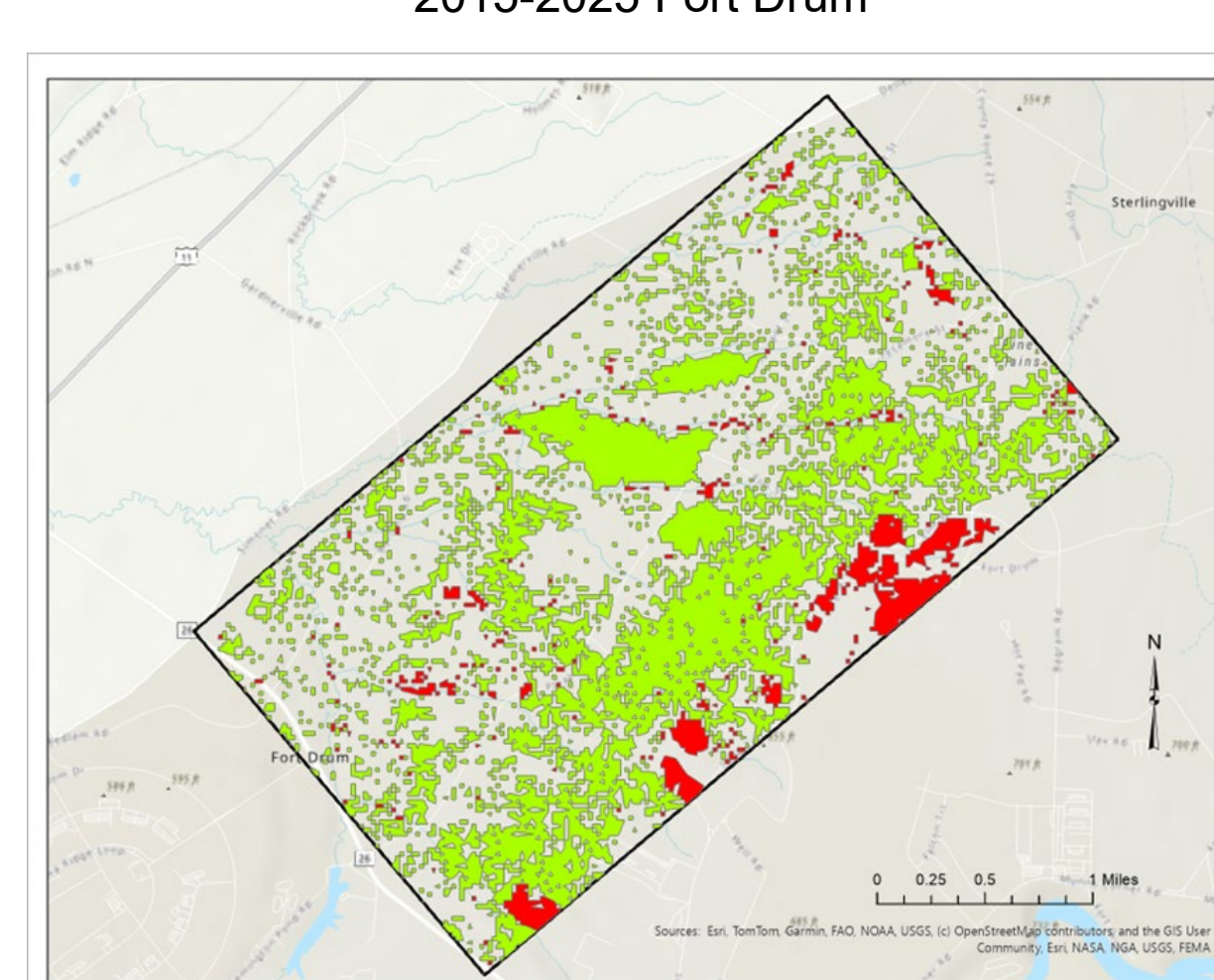
Change in Vegetation Health

- Red: Negative Change
- Green: Positive Change

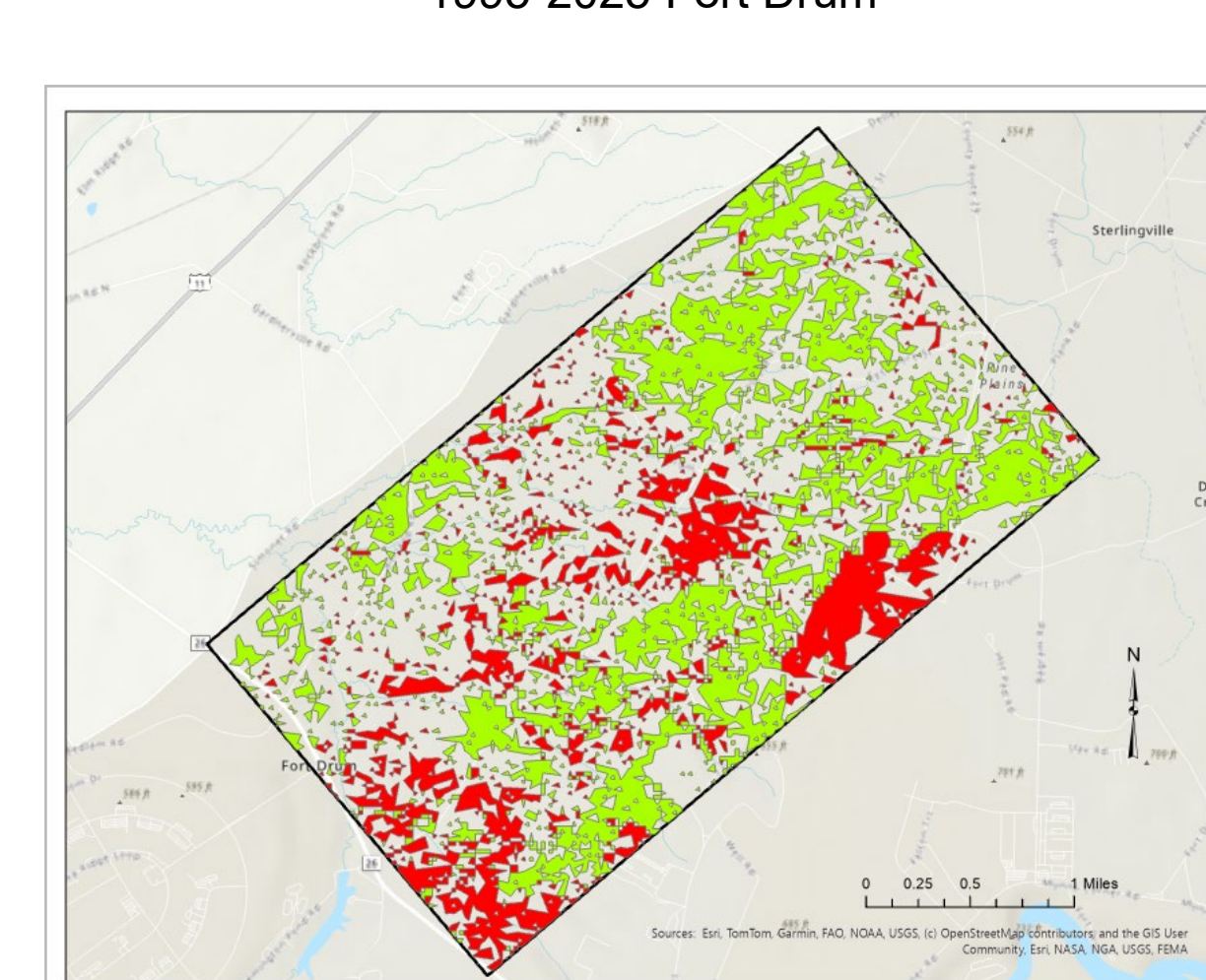
Training Area Size: 207,886,39 m²



2015-2025 Fort Drum



1995-2025 Fort Drum



Results

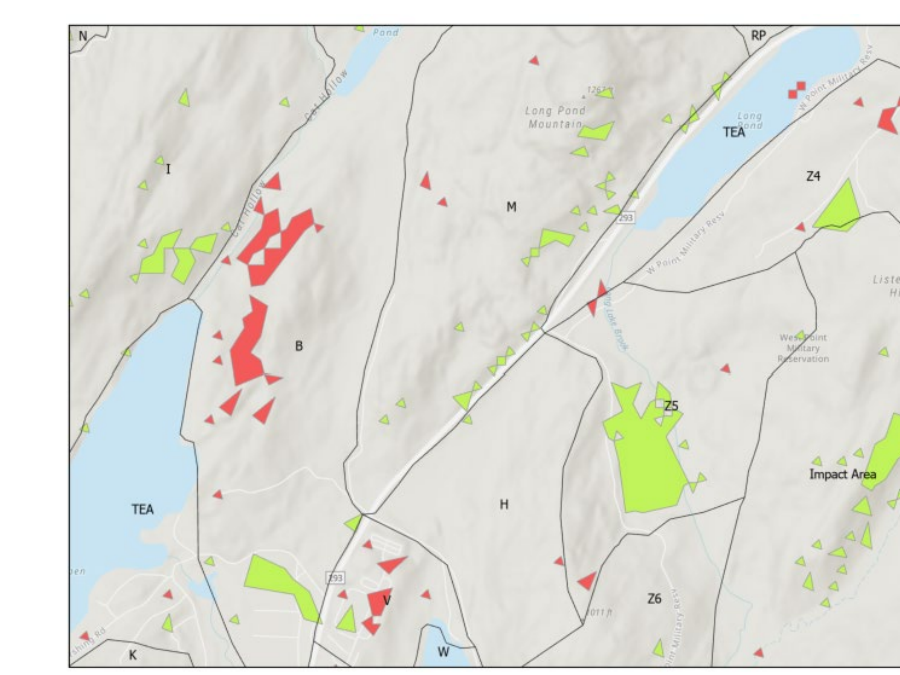
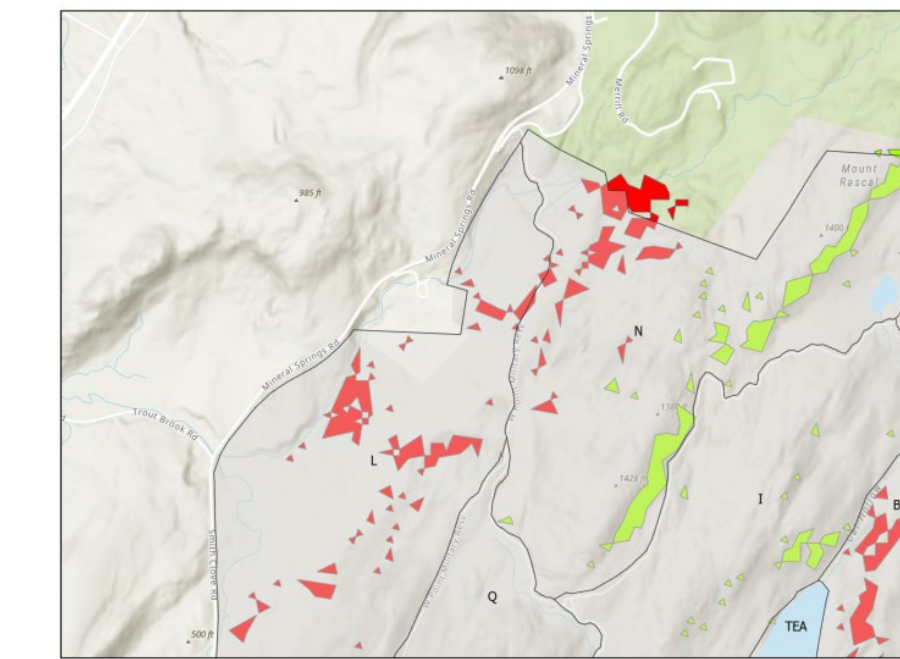
Changes in Vegetation Health (Square Meters)

West Point

- 1995 – 2009:
 Negative (-): 2,633,779.89 m²
 Positive (+): 6,776,181.65 m²
 2015 – 2025:
 Negative (-): 1,524,426.25 m²
 Positive (+): 3,172,442.30 m²
 1995 – 2025:
 Negative (-): 1,094,502.75 m²
 Positive (+): 2,057,657.33 m²

Fort Drum, NY

- 1995 – 2009:
 Negative (-): 3,4400,763.75 m²
 Positive (+): 21,090,087.86 m²
 2015 – 2025:
 Negative (-): 1,932,355.11 m²
 Positive (+): 9,848,212.77 m²
 1995 – 2025:
 Negative (-): 3,011,395.88 m²
 Positive (+): 5,962,853.95 m²



Discussion

Comparison :

The Fort Drum training area is roughly twice the size of the USMA training area, which brings several important takeaways.

1. Proportionally: Fort Drum has considerably less decay in forest health due to HWA
2. The vegetation health at Fort Drum is much more erratic compared to the USMA training area
3. In recent years, the amount of negatively impacted Vegetation at Fort Drum has increased and spread to areas where it was healthy before, USMA has stayed the same, with consistent hotspots

Key Findings:

1. Training Areas needing the most assistance: N, L TEA, P, and J2
2. Growth/Loss: Negative loss is stabilizing but not recovering. Additionally, repair efforts are needed.
3. NDVI in the winter is effective for monitoring HWA impacts