St. Lawrence Eastern Lake Ontario Partnership for Regional Invasive Species Management

**2015**

# Hemlock Woolly Adelgid Surveillance

SLELO-PRISM Early Detection Surveillance
August 6th - Present

*Report prepared by Caitlin Muller and Ben Hansknecht on August 28th, 2015*

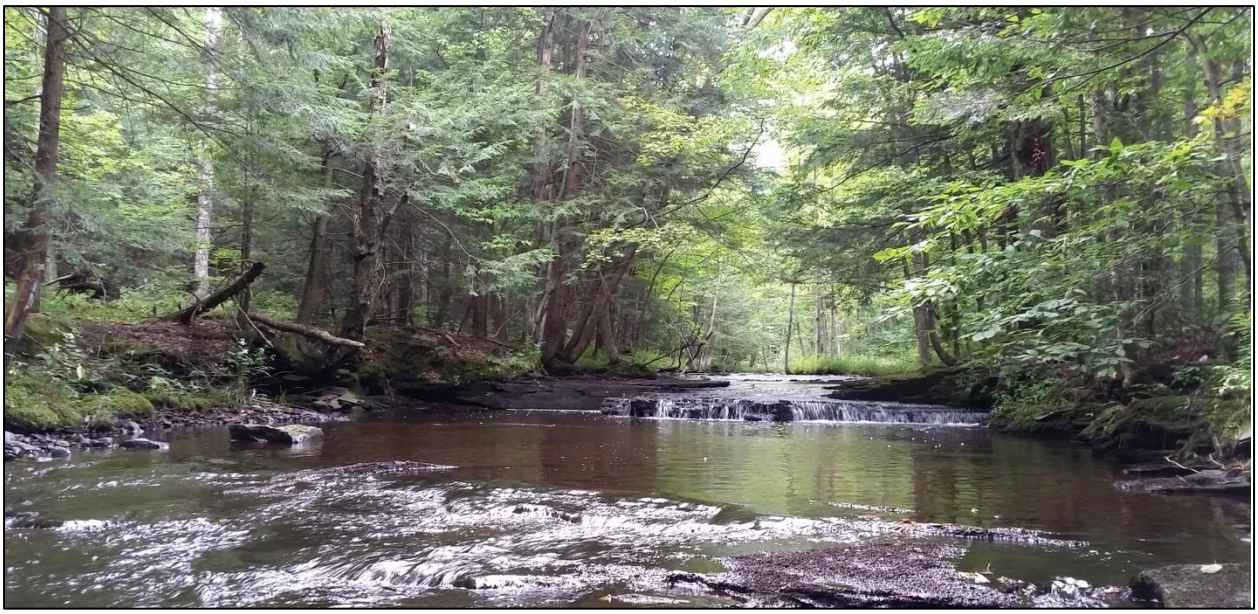

**Figure 1.** Streamside populated by eastern hemlock at Chateaugay State Forest. Photo by Caitlin Muller.

## Introduction and Background:

Hemlock woolly adelgid (*Adelges tsugae*), native to Asia, is a small, aphid-like insect that threatens the health and sustainability of eastern hemlock (*Tsuga canadensis*). Hemlock woolly adelgid (HWA) was first discovered in the United States in 1951 near Richmond Virginia, and has since spread throughout the northeastern US and into the Midwest. Decline and mortality of hemlock after an infestation typically occurs between 4 and 10 years. Hemlocks stressed by drought, poor site conditions, disease, and other insect pests will show accelerated rates of mortality (Pest Alert- Hemlock Woolly Adelgid, 2005 and Hemlock Woolly Adelgid (a)).

HWA is active in cooler months and dormant during the summer, producing two generations per year. There are six developmental stages for HWA: the egg, four nymphal instars known as crawlers, and immobile adults. The crawlers are a dark reddish-brown to purple-black in color and are typically found along the branches of hemlock. These crawlers will attach to the base of a needle, feed, and loose mobility. Adults are less than 1/16th of an inch long at maturity and produce a wool-like wax filament on the underside of branches to protect itself and its eggs.

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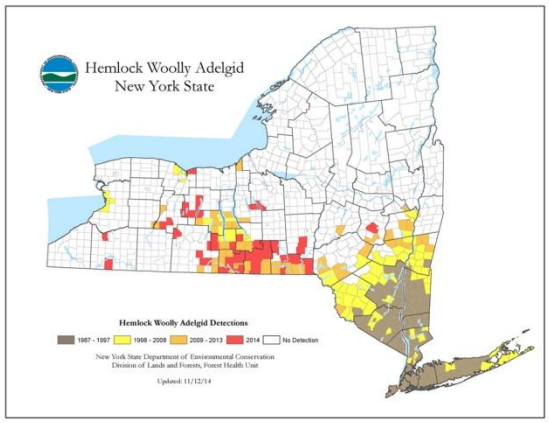


**Figure 2.** Abundance map for Hemlock woolly adelgid in New York. Click here for a larger version.

The sticky, waxy covering produced allows for the eggs to spread by attaching to deer, birds, other forest dwelling mammals, and by the wind (Pest Alert- Hemlock Woolly Adelgid, 2005 and Hemlock Woolly Adelgid (a)).

This insect feeds directly from the storage cells of hemlocks, causing the needle death and progressing to twig and branch death. The needles loose color becoming yellow and grey, while drying out and falling from the tree. As the insect's feeding progresses, the terminal buds, which produce new shoot growth, will die. Within two years this dieback can be observed in major limbs. The decline in hemlock typically occurs first from the bottom limbs before continuing upward toward the top of the tree (Hemlock Woolly Adelgid (a) and Hemlock Woolly Adelgid (b)).

HWA is currently observed in Cayuga and Onondaga Counties, which border the SLELO PRISM. This species is considered a "Watch-list" species, whose arrival could be detrimental to the ecosystems found within the PRISM. One area of special concern is the southern Tug Hill Region. Eastern Hemlock is ecologically important, as it is frequently found along exposed slopes, protected gorges, and streams. Hemlock creates a cool, damp and shaded environment which supports a wide variety of organisms, including salamanders. Throughout the winter hemlock provides shelter and food for wildlife. Studies of forests damaged by HWA in the southern US have shown that a decline in hemlock populations causes a decline in other plants and animals, producing drastic changes to ecosystem processes (Hemlock Woolly Adelgid (a) and Hemlock Woolly Adelgid (b)).

## Survey Methods and Objectives:

In order to determine areas for HWA surveillance, a distribution map of Eastern Hemlock was used to discern regions of hemlock abundance within the SLELO PRISM. Therefrom, state and public parks were selected as locations for the survey. To determine the presence of HWA at these sites, the Early Detection team surveyed stands of hemlock trees for branch and stem dieback, graying and yellowing needles, and possible woolly masses.

## Observations:

Figure 3, shows areas being surveyed due to their proximity to the Tug Hill region. Since the general progression of the HWA is from the south, initial surveys focused on the southern portion of the SLELO PRISM region.

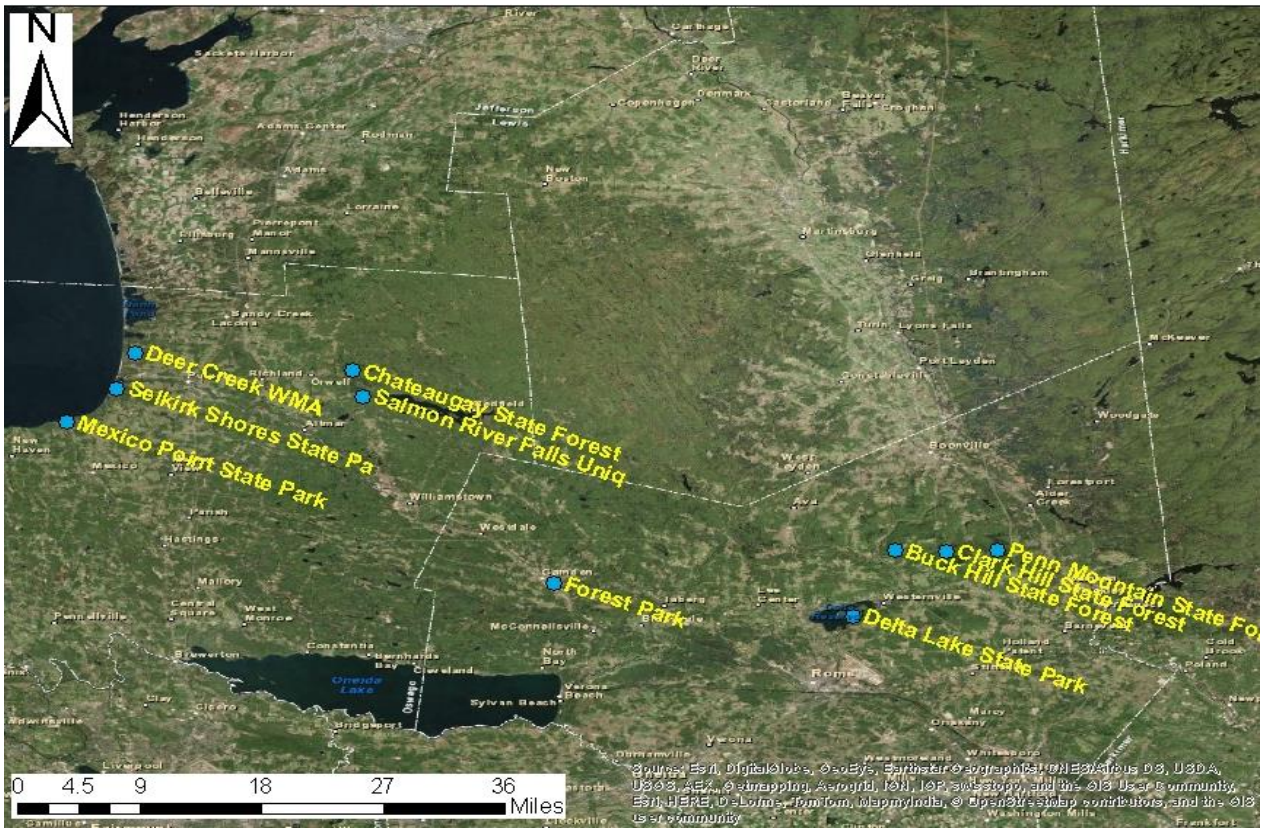


**Figure 3.** Map of parks surveyed for HWA

## **Buck Hill State Forest:** *August 6th*

Buck Hill, located in the Tug Hill region, had moderately dense populations of hemlock scattered throughout. Two populations of hemlock were surveyed within this park. Spider eggs, which are commonly confused for hemlock woolly adelgid, were observed in the upper branches of some trees.

**Table 1.** Hemlock Woolly Adelgid Survey sites at Buck Hill.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | Off Roadside | 43.38232 | -75.36503 | | 17 |
| 2 | Off Roadside | 43.38032 | -75.36469 | Spider eggs | 21 |

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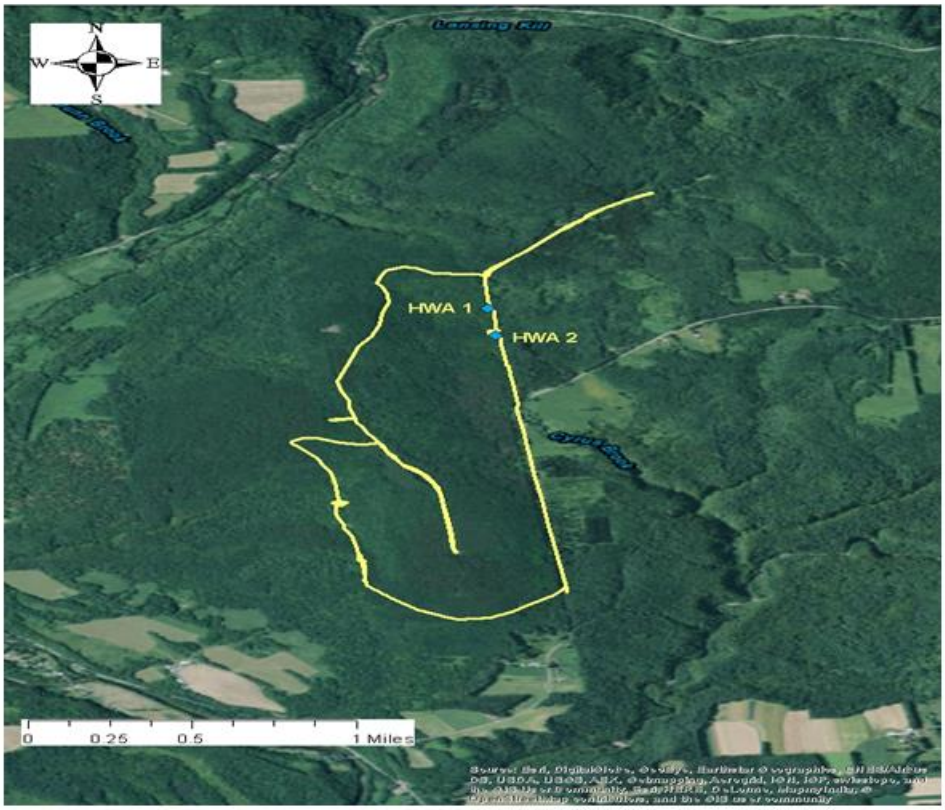
**Buck Hill HWA Survey 2015**




**Clark Hill State Forest:** *August 7th*

Clark Hill, also located in the Tug Hill Region, had one trail that contained hemlock. These hemlock stands were moderately dense in population.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | No trail names | 43.35786 | -75.310996 | | 27 |
| 2 | No trail names | 43.35902 | -75.309767 | | 45 |
| 3 | No trail names | 43.35956 | -75.310377 | Close to HWA2 | 20 |
| 4 | No trail names | 43.36398 | -75.313283 | | 26 |

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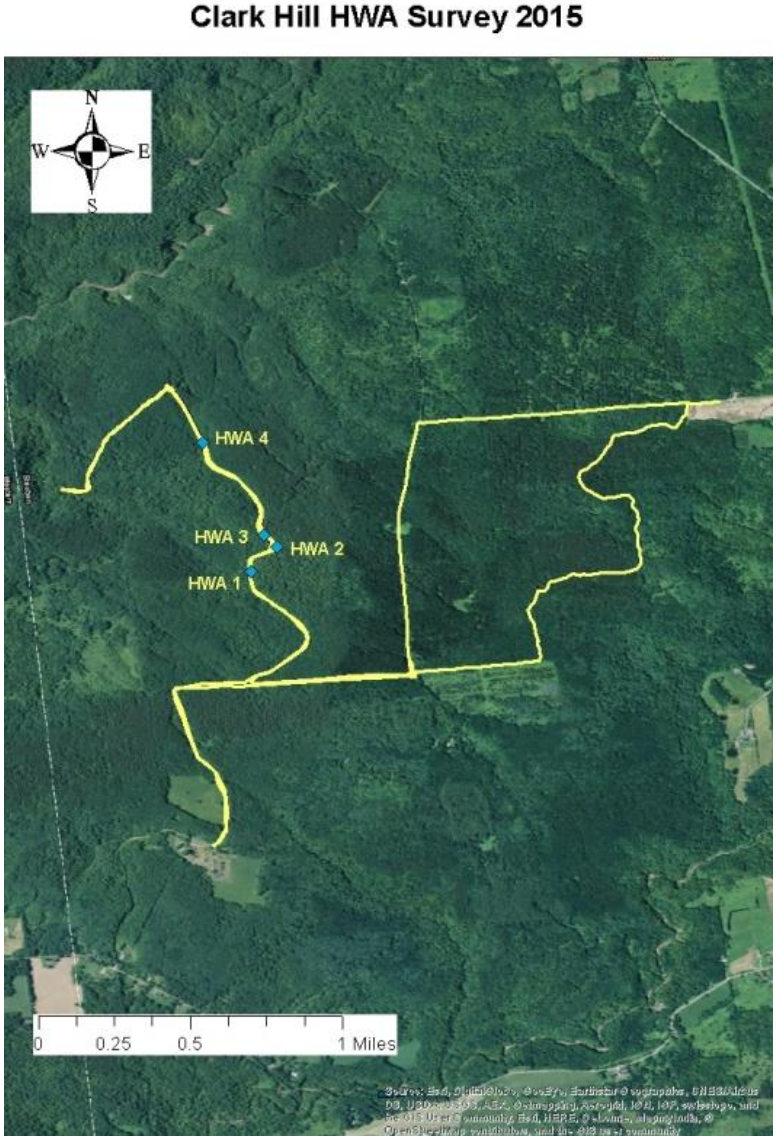
**Table 2.** Hemlock Woolly Adelgid Survey sites at Clark Hill.

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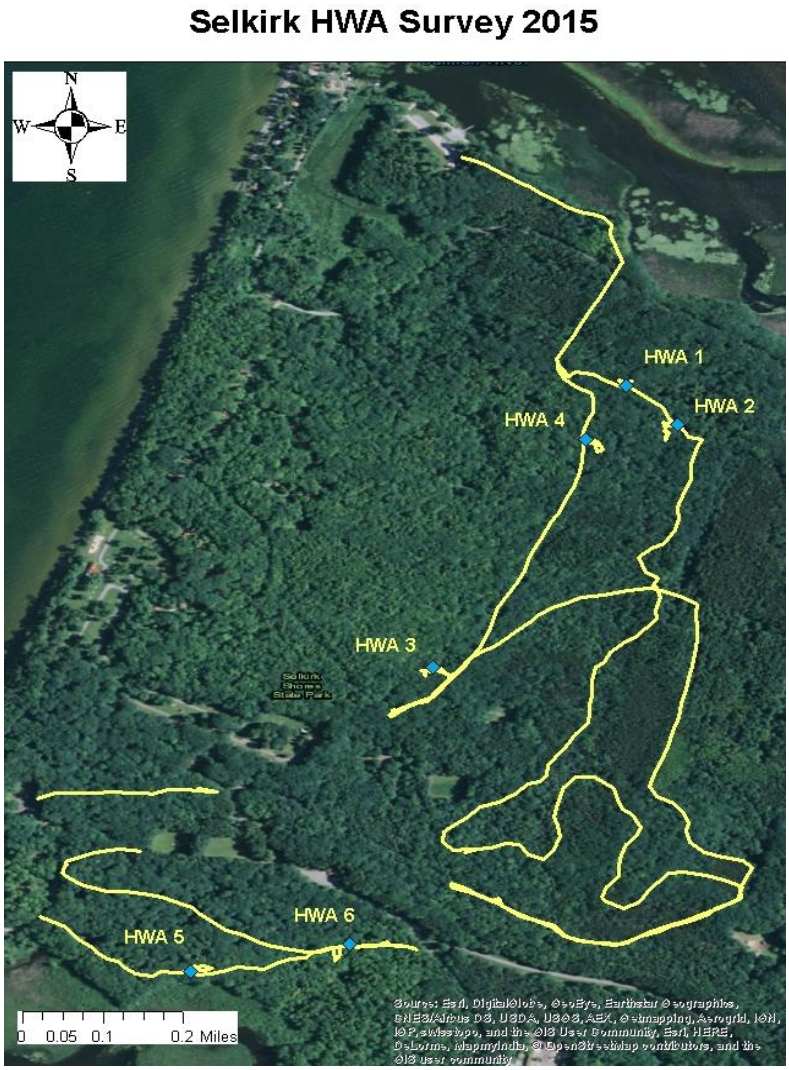
**Selkirk Shores State Park:** *August 13th*

Selkirk shores had moderately dense and densely populated areas of hemlock throughout the park. These populations occurred at various locations throughout the park.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | Red fox trail | 43.56243 | -76.2003 | Younger trees | 17 |
| 2 | Red fox trail | 43.56168 | -76.1994 | Continuation of HWA1 | 11 |
| 3 | Yellow Forest | 43.55703 | -76.2037 | | 20 |
| 4 | Yellow Forest | 43.56139 | -76.201 | | 20 |
| 5 | White Fox | 43.55117 | -76.2081 | Large stand | 20 |
| 6 | Green Frog | 43.5517 | -76.2052 | Near pond, large stand | 20 |

**Table 3.** Hemlock Woolly Adelgid Survey sites at Selkirk Shores.

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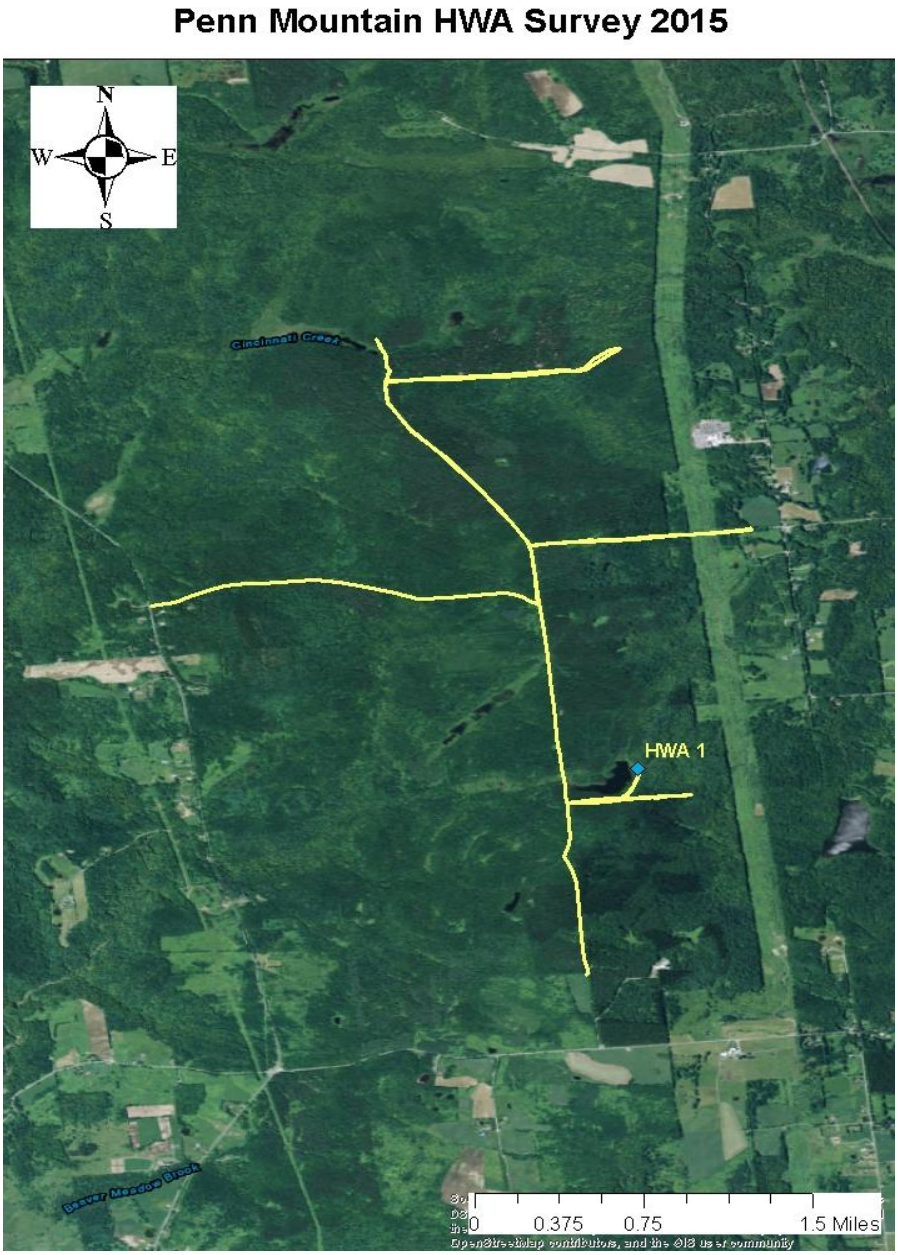
**Penn Mountain:** *August 18th*

Penn Mountain is adjacent to Clark Hill within the Tug Hill Region. This survey contained only one population of hemlock that was sparse.

| Survey Site | Description | | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|---|
| 1 | Duck pond trail | 43.35899 | -75.2509 | Sparsely populated by hemlock | | 5 |

**Table 4.** Hemlock Woolly Adelgid Survey sites at Penn Mountain.

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**Delta Lake State Park:** *August 19th*

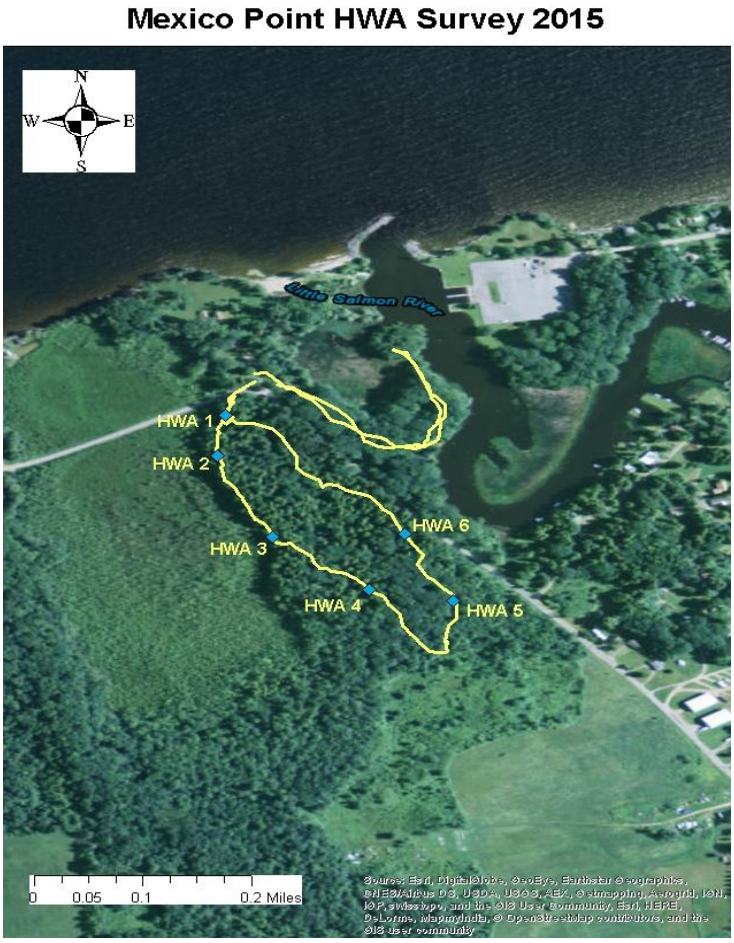
No hemlock were found at Delta Lake State Park

**Mexico Point State Park:** *August 20th*

Roops loop at Mexico State Park contained a dense stand of hemlock. A vast majority of the trail was dominated by hemlock.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | Roops loop | 43.52245 | -76.2592 | | 20 |
| 2 | Roops loop | 43.52183 | -76.2593 | | 20 |
| 3 | Roops loop | 43.5206 | -76.2586 | | 20 |
| 4 | Roops loop | 43.5198 | -76.2573 | | 20 |
| 5 | Roops loop | 43.51964 | -76.2562 | | 20 |
| 6 | Roops loop | 43.52064 | -76.2568 | | 20 |

**Table 5.** Hemlock Woolly Adelgid Survey sites at Mexico Point.

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**Deer Creek Wildlife Management Area:** *August 20th*

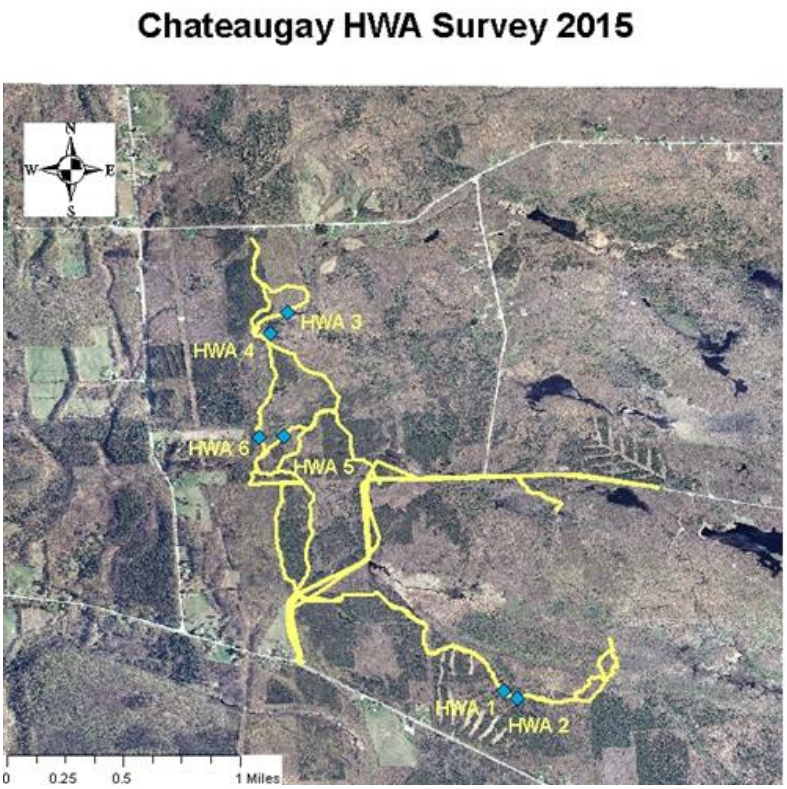
No hemlock were found at Deer Creek WMA

**Chateaugay State Forest:** *August 21st and 25th*

Chateaugay State Forest contained sparsely to densely populated areas throughout the entirety of the park. Areas surveyed contained moderate to dense populations of hemlock. One area was not surveyed due to the presence of a large bog where it was unsuitable habitat for hemlock and the trail was unmarked and unmaintained.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | Trail 1 | 43.57239 | -75.94892 | Few hemlock | 10 |
| 2 | Trail 1 | 43.57198 | -75.94806 | | 17 |
| 3 | Trail 6 | 43.59586 | -75.96239 | Few hemlock | 7 |
| 4 | Uphill of trails 1/2 junction | 43.59459 | -75.96341 | | 20 |
| 5 | Trail 7 | 43.58818 | -75.96255 | | 20 |
| 6 | trail 1 | 43.58815 | -75.96411 | | 20 |

**Table 6.** Hemlock Woolly Adelgid Survey sites at Chateaugay State Forest.

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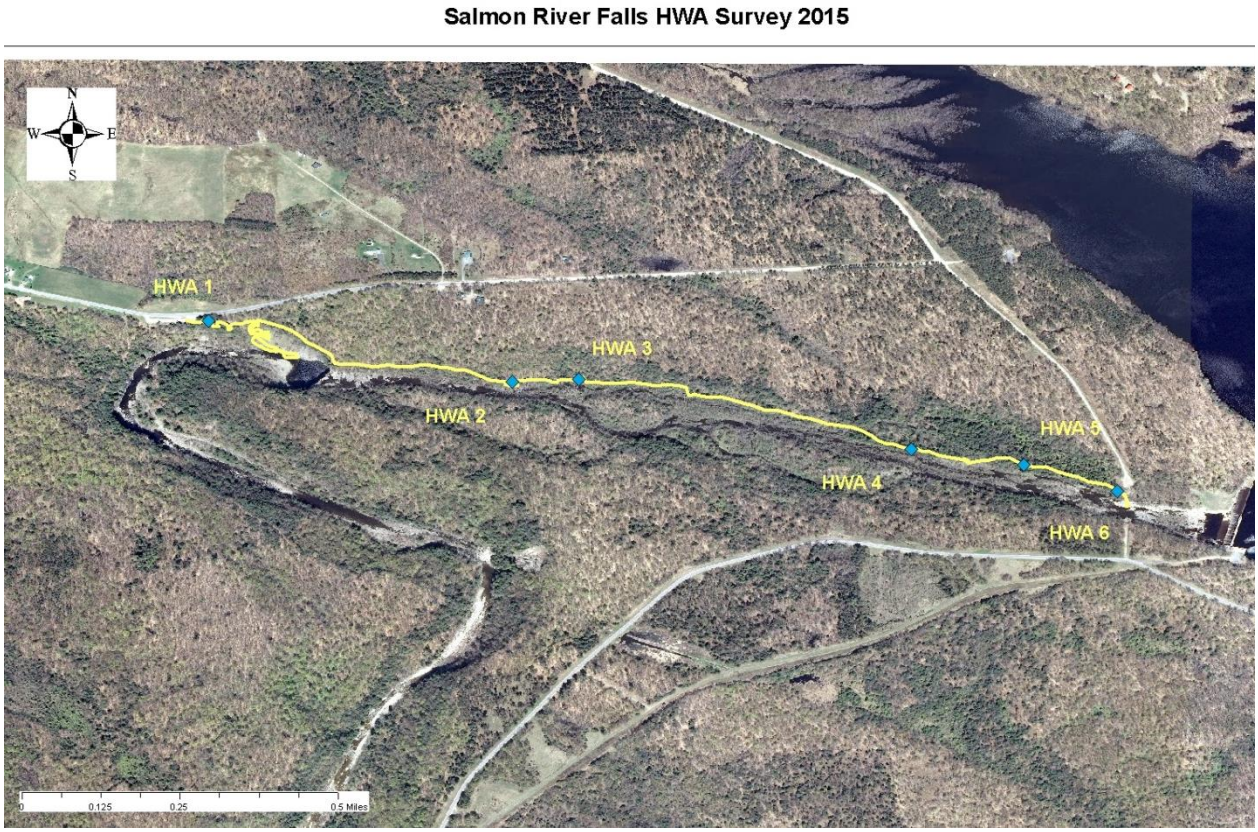
**Salmon River Falls:** *August 25th*

The entirety of the Salmon River Falls trail from the beginning of the falls to the Lighthouse Hill Reservoir dam contained moderate to dense populations of hemlock. Randomly selected populations were chosen for survey.

| Survey Site | Description | GPS Waypoint | | Observations | Number of trees inspected |
|---|---|---|---|---|---|
| 1 | By parking lot | 43.549022 | -75.942753 | | 20 |
| 2 | | 43.547636 | -75.935794 | | 20 |
| 3 | | 43.547695 | -75.934268 | Spread along trail | 20 |
| 4 | | 43.546101 | -75.926658 | Spread along trail | 20 |
| 5 | | 43.545738 | -75.924079 | | 20 |
| 6 | End of trail | 43.545129 | -75.921933 | | 20 |

**Table 7.** Hemlock Woolly Adelgid Survey sites at Salmon River Falls

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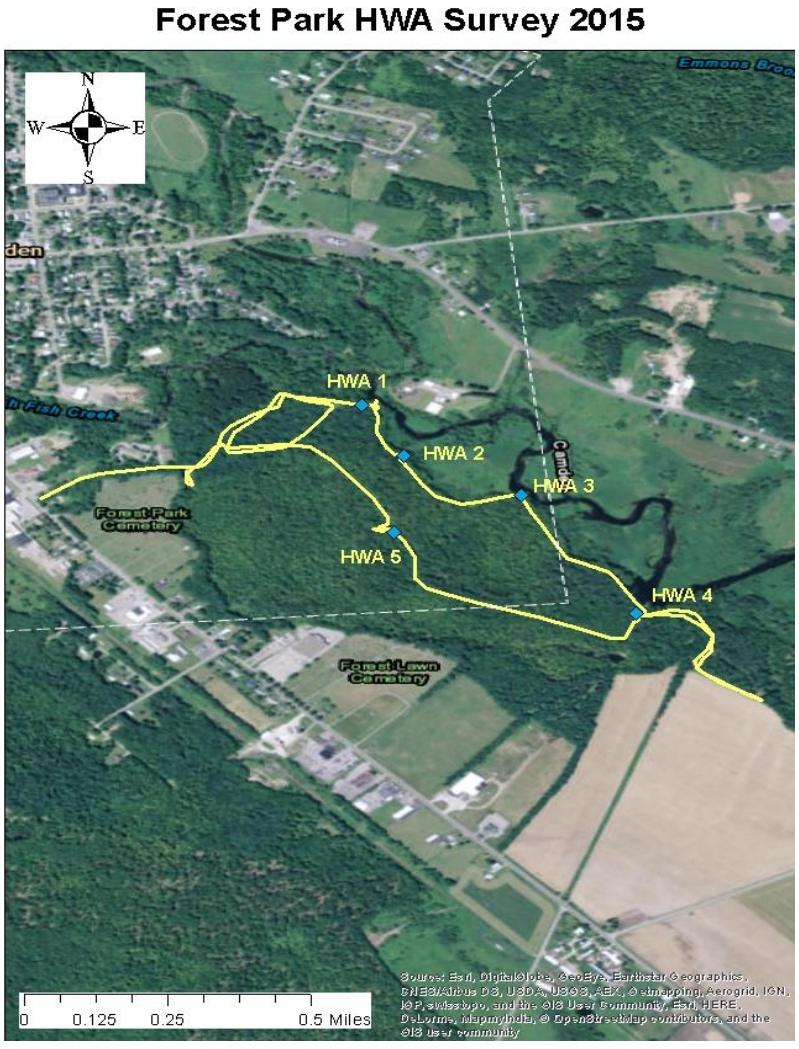
**Forest Park:** *August 28th*

One large stand was observed throughout forest park. Random areas within this stand were surveyed. Some areas were densely covered with hemlock while others had sparse populations.

| Survey Site | Description | Observations | Number of trees inspected |
|---|---|---|---|
| 1 | Along Woodland Avenue | Sparse stand | 11 |
| 2 | Along Woodland Avenue | Dense stand | 20 |
| 3 | Along Woodland Avenue | Dense stand | 20 |
| 4 | Along Costello Road | Sparse | 10 |
| 5 | Along Costello Road | Dense stand | 22 |

**Table 8.** Hemlock Woolly Adelgid Survey sites at Forest Park.

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**Suggestions:**

Future Early Detection teams may consider surveying in the beginning of the field season, as the winter production of woolly masses are typically present until June.

## References:


*Hemlock Woolly Adelgid*. (n.d. A). Retrieved August 26, 2015, from St. Lawrence Eastern Lake Ontario Partnership for Regional Invasive Species Management SLELO PRISM: http://www.sleloinvasives.org/about-invasives/prevention-watch-list-species-in-slelo-region/hemlock-woolly-adelgid/

*Hemlock Woolly Adelgid*. (n.d. B). Retrieved August 26, 2015, from http://www.nyis.info/index.php?action=invasive_detail&id=24

Pest Alert - Hemlock Woolly Adelgid. (2005, August). *Pest Alert - Hemlock Woolly Adelgid*. United States Department of Agricutlure Forest Service.



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