Docket No. _____
Exh. TDI-GGM-7

Non-Native Invasive Species
Inventory Report
New England Clean Power Link Project
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Introduction

Arrowwood Environmental (AE) conducted an inventory of Non-Native Invasive Species (NNIS) in connection with the terrestrial component of the NECPL Project. This inventory was conducted concurrently with a rare, threatened and endangered (RTE) plant species inventory. The report for the RTE inventory is being submitted under separate cover.

Study Area

The route of the study area is as follows:

1. Canadian Border down Bay Road to 55 Bay Road, Alburg
2. Exit Lake at 113 Stoney Point Road, Benson
3. Lake Road to Route 22A
4. Route 22 A to Route 4
5. Route 4 to Route 7
6. Route 7 to Route 103
7. Route 103 to Route 100
8. Route 100 to Town Roads in Ludlow
9. Town Roads in Ludlow

The width of the study area corridor is as follows:

1. Alburg: 50 foot total width, including existing roadway surface (Town ROW) and private parcel owned by project developer.
2. Town Roads in Benson: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs and private parcel owned by project developer.
3. VT Route 22A: Entire width of VTrans or Town of Fair Haven ROWs, ~ 66 feet.

4. US Route 4: Entire width of VTrans ROW on either side of paved roadway/shoulder (~125'), not including the median (North of westbound lands and South of eastbound lanes).
5. US Route 7: Entire width of VTrans ROW
6. VT Route 103: Entire width of VTrans ROW
7. VT Route 100: Entire width of VTrans ROW
8. Town Roads in Ludlow: 50 foot total width, including existing roadway surfaces, entirely within Town ROWs.

Methodology

The NNIS general survey methodology is outlined in Section 6.1 of the *Rare, Threatened, and Endangered Species, Necessary Wildlife Habitat, and Natural Community Survey Pro*gram (TRC Companies, Inc, April 2014).

Non-Native Invasive Species (NNIS) are plant species that are not native to Vermont and can become aggressive invaders of native plant communities. The list of species that are considered NNIS is based on the Class A and B Noxious Weeds in the Vermont Noxious Weed Quarantine Rule (2002).

There are 4 different species of invasive honeysuckles (*Lonicera spp*.) on this list. During the field inventory, it was not always possible to distinguish between the species (especially on vegetative specimens). For this reason, all of the honeysuckles were mapped as *Lonicera sp*..

The NNIS surveys were conducted by three botanists: Michael Lew-Smith, Matt Peters and Art Gilman. The surveys commenced on July 17, 2014 and concluded on August 19, 2014. Meander surveys were conducted throughout the Project

survey area. Project survey area boundaries were imported into field GPS units to identify the limits of the study area during the field surveys.

Locations of NNIS species were recorded using GPS point locations. Two different types of points were employed based on the nature of the NNIS population, "Local" points and "Continuous" points. "Local" points recorded NNIS species that occurred either at that point location or in a local area. If the plants occurred in a local area, the dimensions of that area were recorded in square feet. In either case, either the number of plants or the percent cover of the NNIS was also recorded.

"Continuous" points were developed after the first week of field survey based on the widespread and abundant nature of NNIS along Route 4. This wide ROW corridor has many species of NNIS that are often scattered over long distances. It was impractical to record each individual occurrence under these circumstances. Instead, the "Continuous" points record the beginning and end of infestations for each NNIS species present. In post-processing, the continuous points were converted into linear features showing the extent of each infestation. Linear representations of these continuous occurrences were developed through manual and automated processing in a GIS environment parallel to the survey area at a fixed offset distance varied by species. In general, the lines begin parallel to points flagged as infestation start points and terminate parallel to points flagged as end points. The lines are not intended to represent the actual location of the infestation within the study area, rather are suggestive of the length and general position of each extensive infestation area along the study area. Attempts were made to determine the appropriate side of the road for each set of start/end points and lines are positioned to convey road-side. Lines are offset at predetermined fixed distances based on species to facilitate visual distinction of overlapping species occurrences. Due to the variability of the

source data, errors or omissions may exist. Both start/end points and linear representations of continuous occurrences are included in the spatial data deliverables.

For both the local and continuous points, data on the phenology of the plants was taken. One of the three categories, Flowering, Fruiting, or Vegetative was selected for each population. If plants exhibited more than one phenology, the dominant phenology type was chosen.

The data accompanying this report includes three GIS spatial data files. First, the local point data ("Invasive_LocalPts") which provides information on NNIS species, phenology, size of infestation and abundance. Second, the continuous point data ("Invasive_LinearPts") which provides the "start and end" point data that the linear infestations data was derived from and also includes information on species, phenology and abundance. Third, the linear infestation data ("Invasive_LinearLines") which provides a line file that is meant to represent the area occupied by continuous populations in between the start and end points.

Results

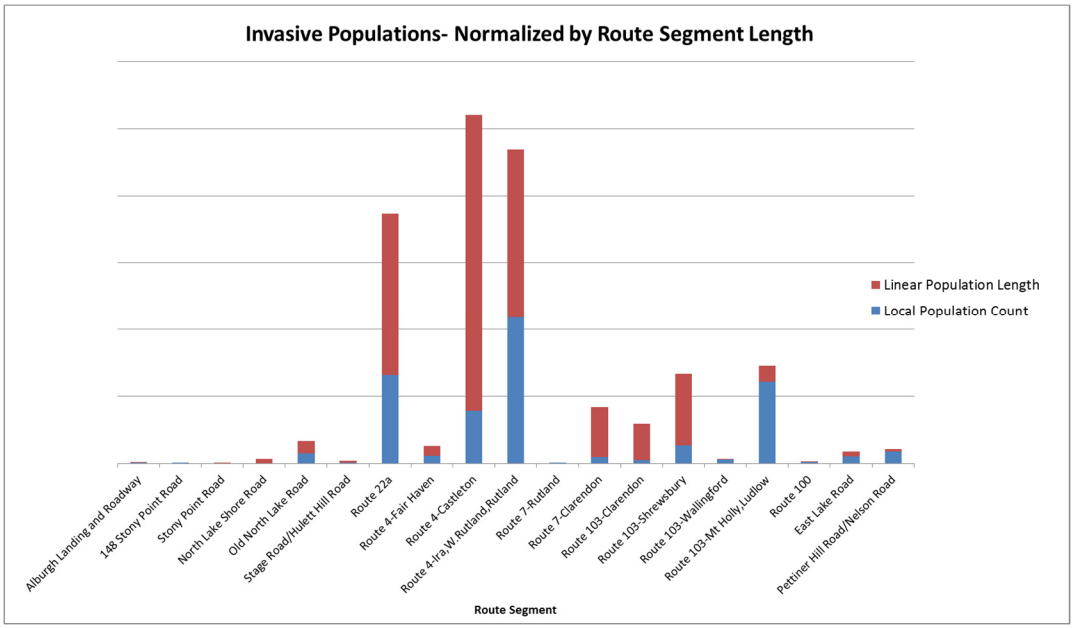
A total of 10 different NNIS species were documented throughout the study area. Table 1 shows the total number of localized infestations as well as the linear miles of infestation for each species. The data for the localized infestations was taken from the "Local" point dataset, while the linear infestation data was derived from the "Continuous" dataset. Summary data for the NNIS infestations is provided in the table below.

Table 1. Summary Data for NNIS Infestations

Latin Name	Common Name	# Localized Infestations	Miles of Linear Infestation
Aegopodium podagraria	Goutweed	27	0.3
Alliaria petiolata	Garlic Mustard	46	3.7
Butomus umbellatus	Flowering Rush	1	0
Celastrus orbiculatus	Oriental Bittersweet	17	0
Lonicera sp.	Honeysuckle	154	42.3
Lythrum salicaria	Purple Loosestrife	151	35.1
Phragmites australis	Phragmites	93	3.6
Polygonum cuspidatum	Japanese Knotweed	49	0.4
Rhamnus cathartica	Common Buckthorn	54	38.4
Rhamnus frangula	European Buckthorn	31	12.0
Vincetoxicum nigrum	Black Swallowwort	12	1.0

As can be seen from this table, the three most common NNIS species are the honeysuckle, purple loosestrife and common buckthorn. These species are present throughout the study area, though most abundant along Route 4. Black swallowwort appears to be most abundant in the towns of Benson and Fair Haven and absent east of Rutland. Japanese knotweed is most common along

Rte 103 in Shrewsbury and Wallingford where it appears to colonize the roadsides from infestations along the Mill River. The only location for flowering rush was on the shores of Lake Champlain at the far western end of the study area. For the flowering rush and Oriental bittersweet, no continuous populations were recorded so the miles of linear infestation is listed as zero.



Note: Y axis represents population length and count, graph displays relative population distributions only.

Figure 1. NNIS Distribution Graph

Figure 1 shows the relative distribution of NNIS populations by route segment, normalized by length. The Y axis represents both length of population (inclusive of both sides of the roadway) and population count. This figure illustrates that, even normalized by route segment length, NNIS species are most abundant along Route 4. The wide disturbance created and maintained by the road has provided abundant habitat for NNIS species. Town roads such as those in Benson and Ludlow had the least amount of NNIS due to their small size and relatively less disturbed ROWs.