Survey of Terrestrial Invasive Plants along Finch Creek

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GRASS RIVER NATURAL AREA

Supported by the Dole Family Foundation

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1. Target terrestrial invasive species and Michigan priority levels. Watchlist species are priority species that have been identified as posing an immediate and significant threat to Michigan's natural resources. These species have either never been confirmed in Michigan, have very limited distribution, or are localized. Early detection and timely reporting of occurrences of these species is crucial for increasing the likelihood of stopping an invasion and limiting negative ecological and economic impacts. High priority species are included for at least one of the following reasons: numerous land managers in Michigan report them as a significant problem on their lands; they are included in federal, regional or state listings of invasive species; there is research literature documenting their adverse impacts on native plant and animal communities. Prohibited or restricted species are unlawful to possess, introduce, import, sell or offer for sale as a live organism, except under certain circumstances. The term "prohibited" is used for species that are not widely distributed in the state. Often, management or control techniques for prohibited species are not available. The term "restricted" is applied to species that are established in the state …….. 6

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Introduction

Grass River Natural Area harbors many ecological features that contribute to rich biodiversity and a healthy wetland habitat. Stream side inventories and assessments are an essential function in the management and conservation of these ecological features. Invasive plant species have become detrimental to these critical wetland habitats, using the waterways as a means of spreading more rapidly than their initial gravity dispersed pattern and becoming problematic across large sections of land (Mack 2003). Riparian systems often contain more non-native species than the surrounding landscape due to increased seed dispersal from moving water and physical disturbances from water movement and flooding (Thomas et al 2006).

Invasive plant species are a growing concern with land management and conservation organizations due to threats of competition of resources with native plants, hybridization with native flora, the alteration in structure and function of ecosystems, and the potential of degradation of fish and wildlife habitat (Charles et al. 2007). Many of these plants produce large numbers of seeds that stay viable in the soil for years, tolerate many soil types, spread easily and efficiently, and grow rapidly, often displacing slower growing plants (Brock 1998). Invasive plant species also create a negative economic impact on natural areas and preserves, such as a decrease in recreation due to the degradation of habitat quality and the cost of reducing, controlling or eradicating the infestation (Olsen 2006).

Although the most effective way to prevent the establishment of invasive species is to prevent their introduction, Early Detection and Rapid Response (EDRR) increases the chances of successful removal while populations are localized and densities are low (Leung et al. 2002). Once populations are well-established removal becomes more difficult and the financial and ecological cost of long-term management increases (Lodge et al. 2006).

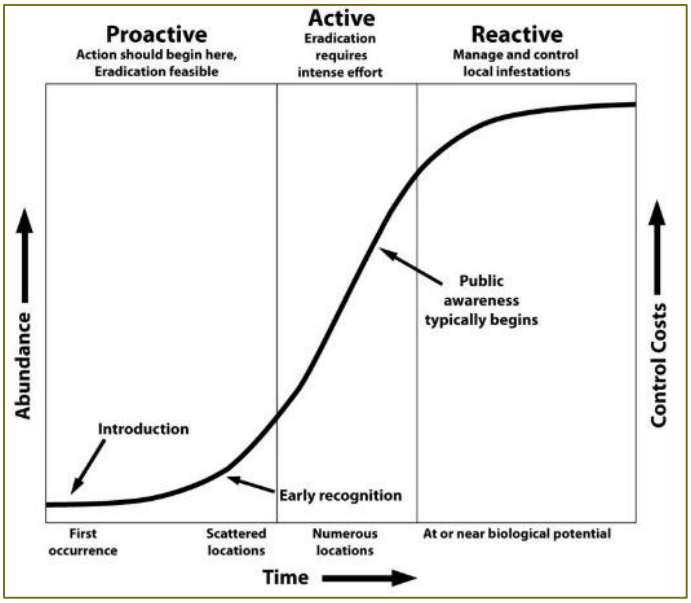

Figure 1. Phases of Invasive Species Invasion and Control. As the abundance of an invasive species increases so does the associated cost of control and the risk of unsuccessful control.

An example of the effective approach of EDRR is “killer algae” (*Caulerpa taxiflolia*), an algae native to Europe that produces a chemical that is toxic to fish and other organisms. This algae presents a global threat to marine ecosystems and was identified in a lagoon in San Diego County, California, in 2000, covering almost 12,000 square feet. Multiple agencies at the local, state and federal level immediately recognized the potential damage it could inflict on fishing and recreation and coordinated a response. Control tactics were implemented to eradicate the species and recreational divers were educated on early detection practices. The last new infestation of only 4.3 square feet was documented in 2002 and immediately controlled. After years of monitoring with no new occurrences, the eradication of this “killer algae” was deemed a success in 2006. Early detection and rapid response were critical to the success of eradication efforts (“Killer Algae,” 2003).

Three cold water creeks, Finch, Cold and Shanty, flow through Grass River Natural Area into Grass River, continuing through the Elk River Chain of Lakes and eventually reaching the Grand Traverse Bay. The first stream being surveyed is Finch Creek with a length of approximately 4.5 miles (Figure 2).

By conducting this survey GRNA hopes to get a clear picture what species are threatening the stream side habitat on GRNA property as well as what potential threats are upstream. This baseline survey is the first source data that will be used to determine long-term monitoring and management plans for terrestrial invasive wetland plant species for GRNA.

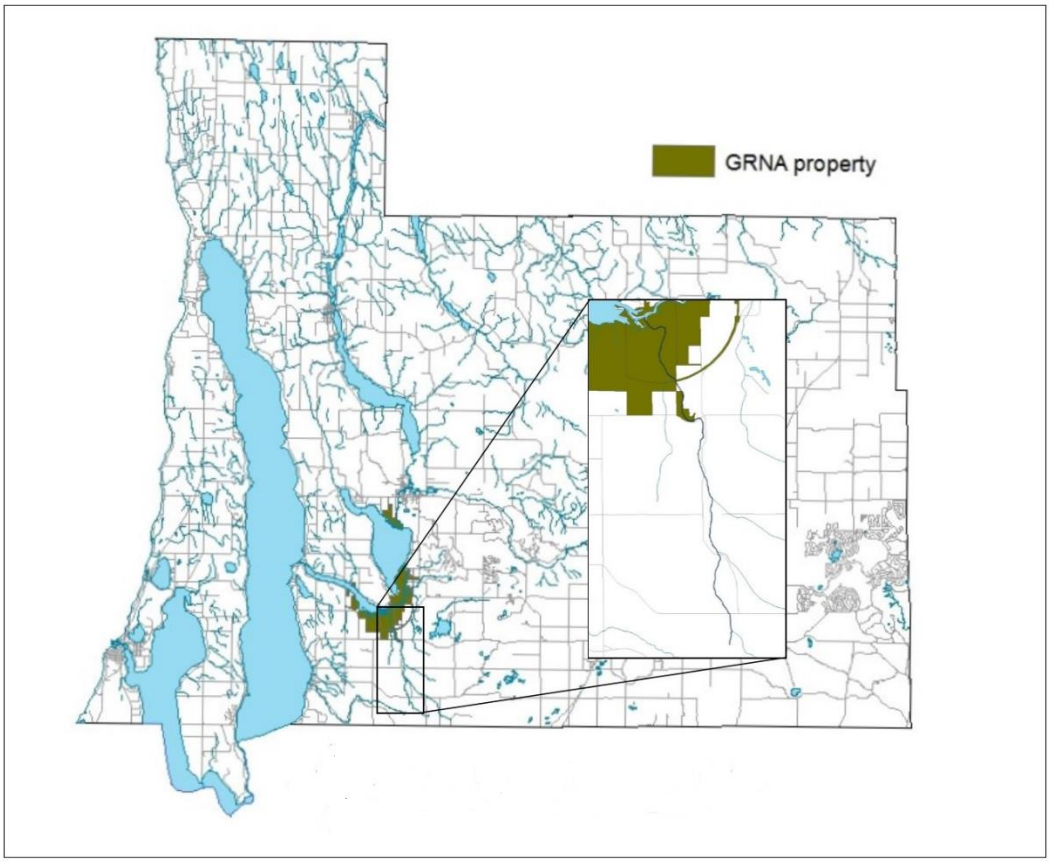

Figure 2. Map of Finch Creek survey area inset to Antrim County

Target Species

Target species were compiled from a list of invasive species determined by Michigan Natural Features Inventory (MNFI) and the Michigan Terrestrial Invasive Species State Management Plan to be the most threatening to Michigan's biodiversity. The list was narrowed and prioritized based on the ecological terrain that would be covered i.e. stream banks, wetlands and cedar swamp. Table 1 lists all of the target species for this survey.

Table 1. Target terrestrial invasive species and MI priority level

Common Name	Scientific Name	Priority Level
Dame's Rocket	*Hesperis matronalis*	High
Eurasian Phragmites	*Phragmites australis*	Restricted
Garlic Mustard*	*Alliaria petiolate*	High
Glossy Buckthorn	*Frangula alnus*	High
Japanese Barberry	*Berberis thunbergii*	High
Japanese Stiltgrass	*Microstegium vimineum*	Watchlist
Knotweed, Giant	*Polygonum schalinense*	High
Knotweed, Japanese	*Polygonum cuspidatum*	Prohibited
Mile-a-Minute	*Polygonum perfoliatum*	Watchlist
Multiflora Rose	*Rosa multiflora*	High
Narrow-leaf Bittercress	*Cardamine impatiens*	High
Narrow-leaf Cattail**	*Typha angustifolia*	-------
Purple Loosestrife	*Lythrum salicaria*	Restricted
Reed Canarygrass	*Phalaris arundinacea*	High
Thistle, Bull	*Cirsium vulgare*	Prohibited
Thistle, Canada	*Cirsium arvense*	High
Thistle, European Swamp	*Cirsuim palustre*	High

*was not surveyed when flowering

**does not have a priority level due to hybridization with native cattails

Field Surveys

The invasive plant survey methods used in this inventory were established by the Midwest Invasive Species Information Network (MISIN). All information about the invasive species that were found was documented using the categories established by MISIN. The survey took place over the course of four months in 2016 and 2017 (August and September 2016 and July and August 2017). The survey started at the headwaters of Finch Creek and proceeded to the mouth of Finch Creek where it flows into Grass River. The creek runs through 15 private properties in addition to GRNA property. All private landowners were contacted before conducting the survey.

Two surveyors walked in the creek as well as along the edges, surveying approximately 20 feet on either side of the stream bank. Occurrences of invasive plants were documented by marking data points with a GPS; area and density were quantified using protocols established by MISIN, found in Table 2.

Table 2. Area and density codes for invasive species infestations determined by MISIN

Area Code	Area Description	Density Code	Density Description
1	Individual/several	1	Sparse
2	Less than 1,000 ft^2	2	Patchy
3	1,000 ft^2 to 0.5 acr	3	Dense (greater than 40% of area)
4	0.5 acres to 1 acre	4	Monoculture (nearly 100% of area)
5	More than 1 acre		

Data Processing

The data points of the invasive species observed were taken with a Garmin GPS and downloaded into a GIS project file using ArcGIS 10.5. Distribution maps were generated based on species, area and density. The species are indicated by the color of the icon. Area of the distributions are identified by increasing icon sizes, and the density is distinguished by the color shade of the icon; the darker the shade, the more dense the infestation.

Results

Six of the seventeen target species were identified along Finch Creek with a total of 167 separate occurrences (Figure 3). Bull thistle made up 40%, Canada thistle made up 26%, European swamp thistle made up 10% and autumn olive comprised 23% of the total occurrences. Giant knotweed and multiflora rose each made 0.01% of the total occurrences (Figure 4).

At least one of the six identified invasive species were found along the entire length of Finch Creek with the exception of the mouth, the headwaters and a few 500 to 1,000 foot sections of the upper reaches (Figure 5). Bull thistle, Canada thistle and autumn olive were all found along the entire length of Finch Creek with varying degrees of density and area covered. The density and area of bull thistle and Canada thistle occurred in varying degrees of area and density along the entire length of Finch Creek. European swamp thistle was not found on the upper reaches of the creek, first appearing approximately 500 feet south of the rail trail and continuing downstream into GRNA property to the mouth of the creek.

Autumn olive was only found in single occurrences but was found along the entire length of the creek. One dense stand of giant knotweed was found at a private residence encompassing a large area estimated at 0.5 acres and one occurrence of a single plant of multiflora rose was identified.

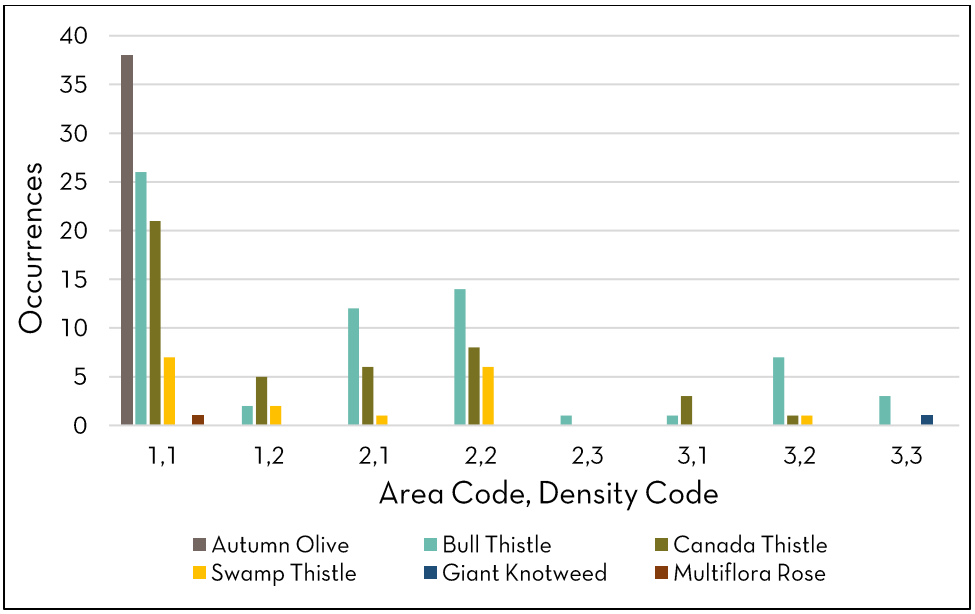

Figure 3. Distribution chart of identified invasive species of Finch Creek based on area and density.

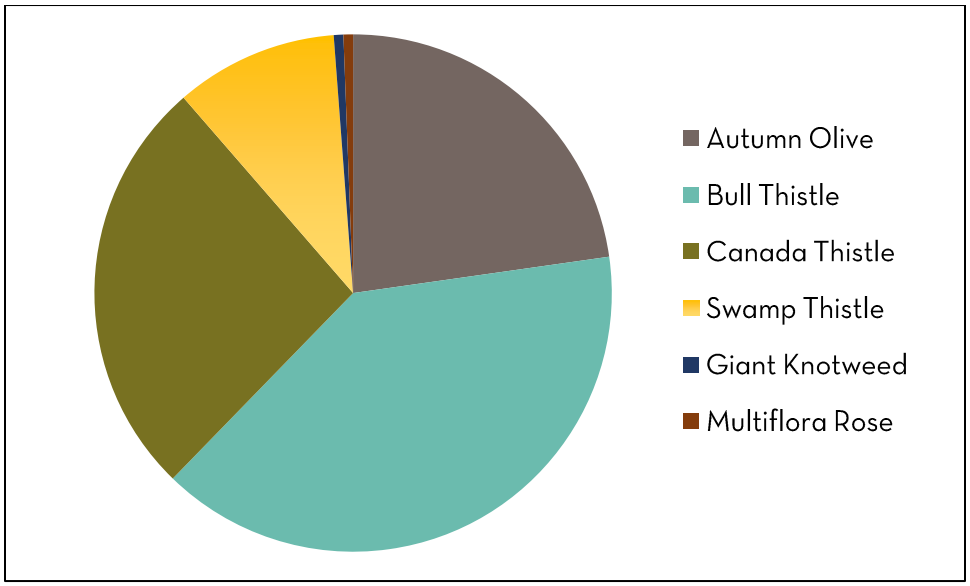

Figure 4. Distribution of individual invasive species occurrences identified along Finch Creek.

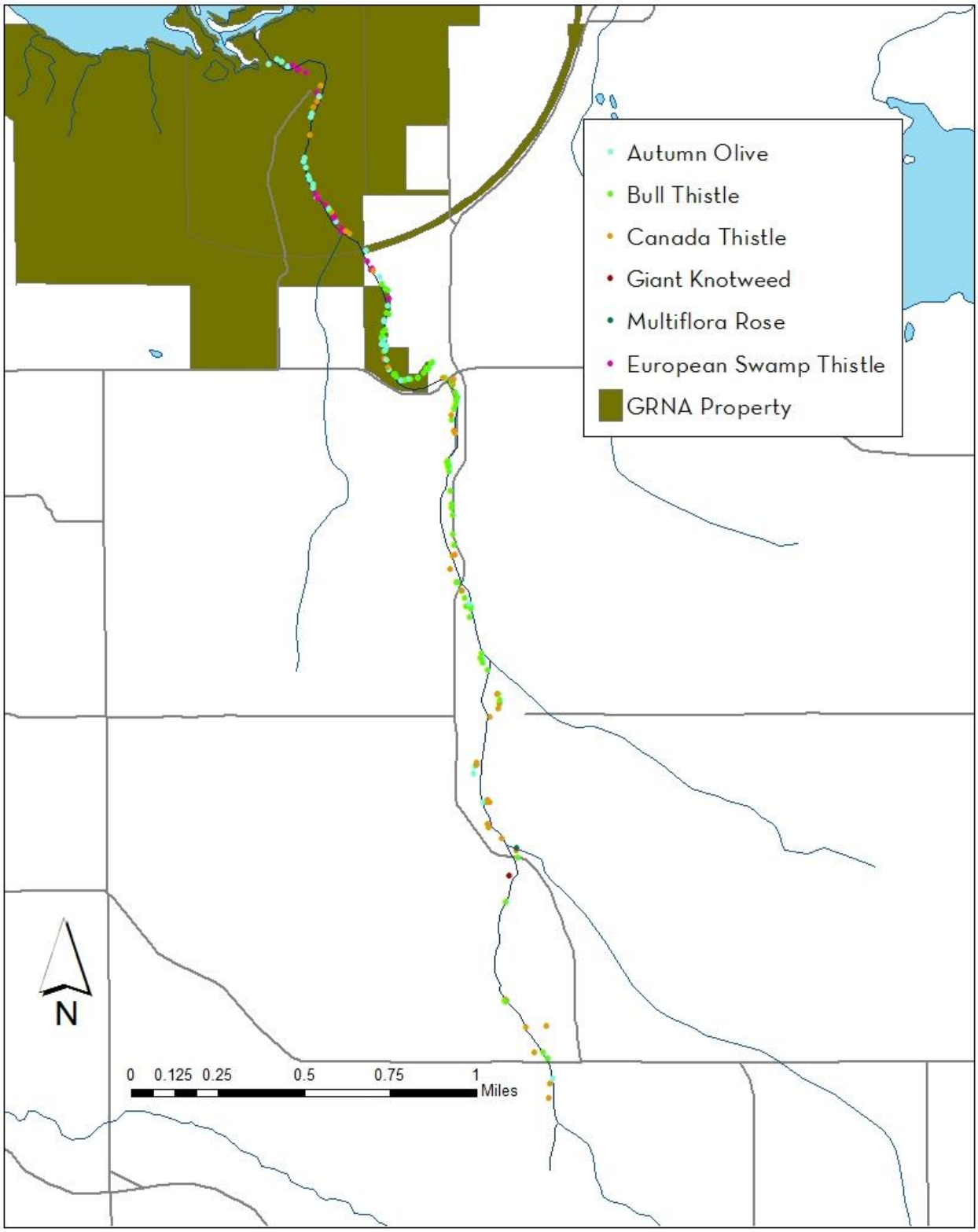

Figure 5. Terrestrial invasive species infestations along Finch Creek. Area and density are not denoted on this figure only the species locations of the infestation.

Conclusions

Finch Creek is experiencing invasive infestations along the entire length in varying degrees of area and density. The highest density of infestation occurrences were mainly located in areas of high anthropogenic disturbance, within 500 feet of roadways, road crossings, trails or development. Areas of no or low infestations were in areas further than 500 feet from this disturbance. The high occurrence of bull thistle and Canada thistle (66 and 44, respectively) would suggest that neither of these are early detection species, although bull thistle has higher control success rates at this scale (Figure 6).

Bull thistle is a biennial plant, flowering and spreading seed in its second year. Seeds remaining on the surface of the soil are short-lived but can remain viable in the soil for years if buried from disturbance. They do not reproduce vegetatively and do have rhizomes. Manual control of bull thistle is effective, cutting and bagging flowers and digging out rosettes. Canada thistle, in addition to being widespread along the streambank, is also extremely difficult to control. It is a perennial that spreads by seed and an underground system of vertical and horizontal roots. Successful control involves repeatedly injuring and exhausting its root system requiring multiple treatments within a season over multiple seasons.

European swamp thistle was identified in 17 separate occurrences and, like bull thistle, is a biennial plant and has similar reproductive characteristics (Figure 7). European swamp thistle can be effectively controlled manually by digging up rosettes and cutting and bagging flowers or applying a foliar herbicide.

Although autumn olive was identified along the entire length of Finch Creek, it only occurred as a few individual plants scattered over low densities (Figure 8). Autumn olive is easily controlled in small populations by hand pulling saplings or cutting larger specimens at ground level and applying herbicide to the entire cambium layer of the cut stump. A single multiflora rose plant was found in one location and can be easily controlled by digging up and removing all roots of small plants or cutting the stems at the ground and applying herbicide to the cut stems.

A dense stand of giant knotweed was identified, estimating to cover approximately 0.5 acres. This infestation is surrounding a private homeowner, along a 100 foot section of Finch Creek, and along Finch Creek Road (Figure 9). Giant knotweed is a perennial shrub which grows extensively through rhizomes or fragments. It is very difficult to control and resprouts aggressively when cut, mowed or dug up. Multiple applications of herbicide within a season can offer an effective control although follow up is required for multiple seasons.

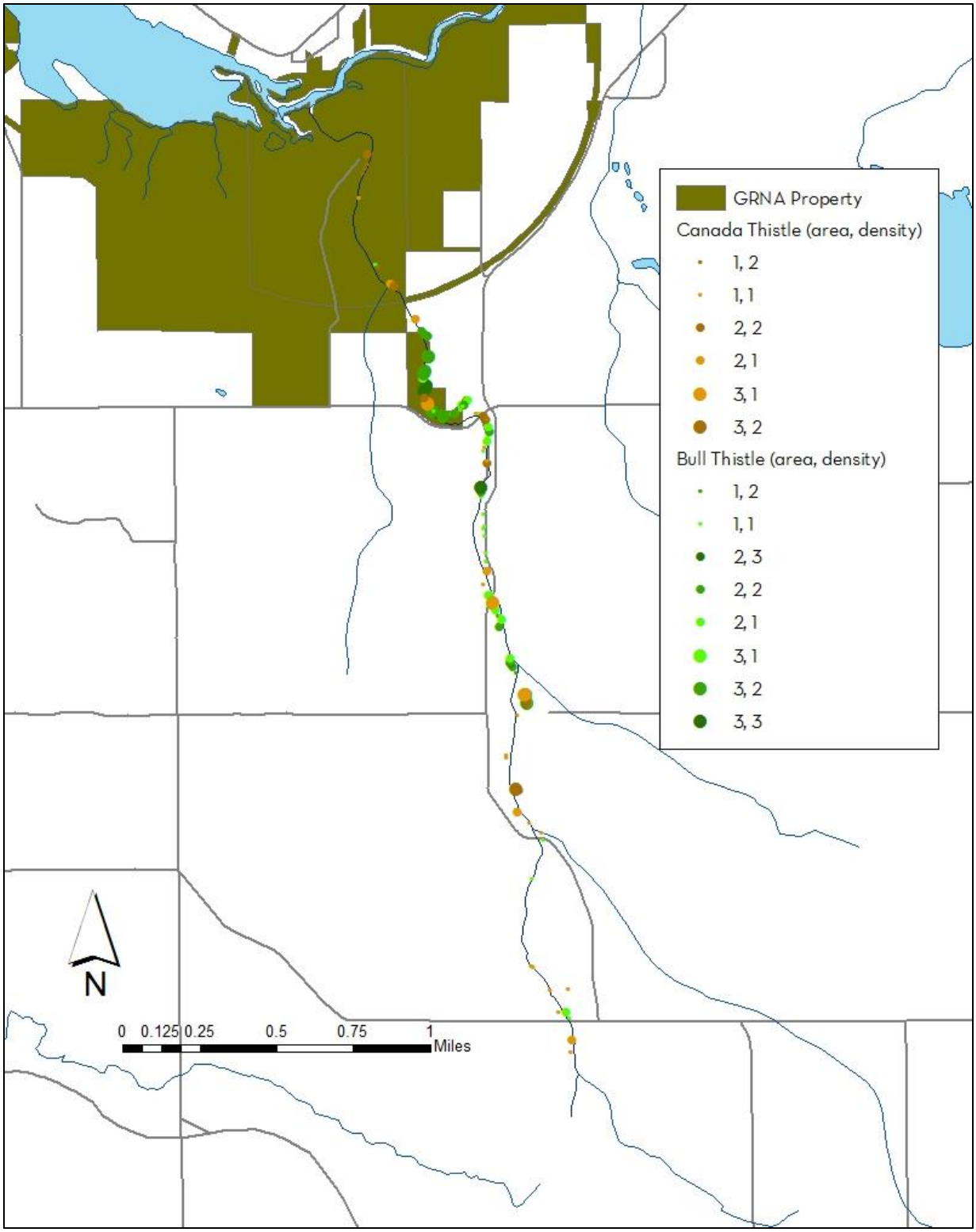

Figure 6. Occurrences of bull thistle and Canada thistle along Finch Creek. The larger the dot, the larger the area of infestation. The darker the shade of the dot, the more dense the infestation.

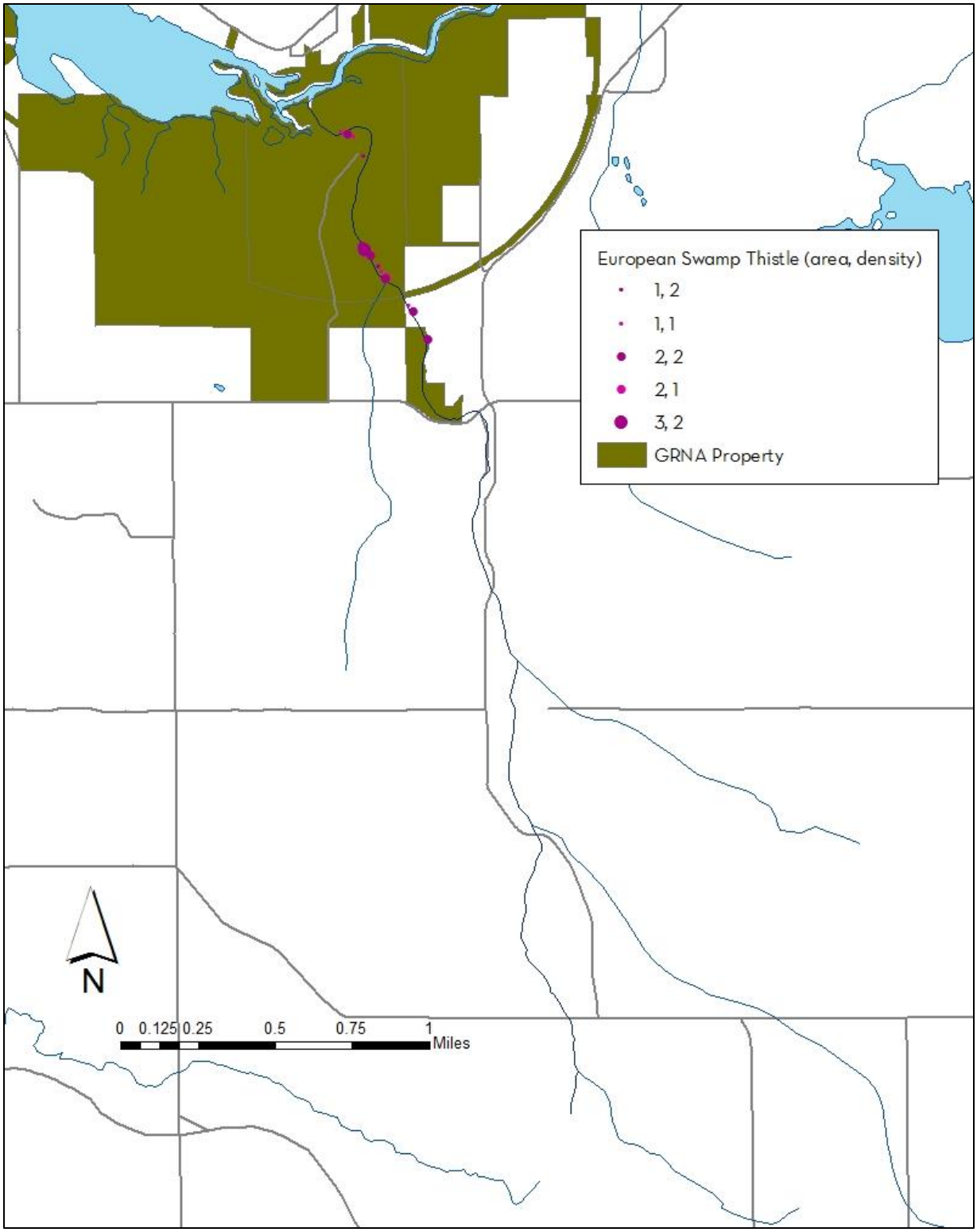

Figure 7. Occurrences of European swamp thistle along Finch Creek. The larger the dot, the larger the infestation. The darker the shade of the dot, the more dense the infestation.

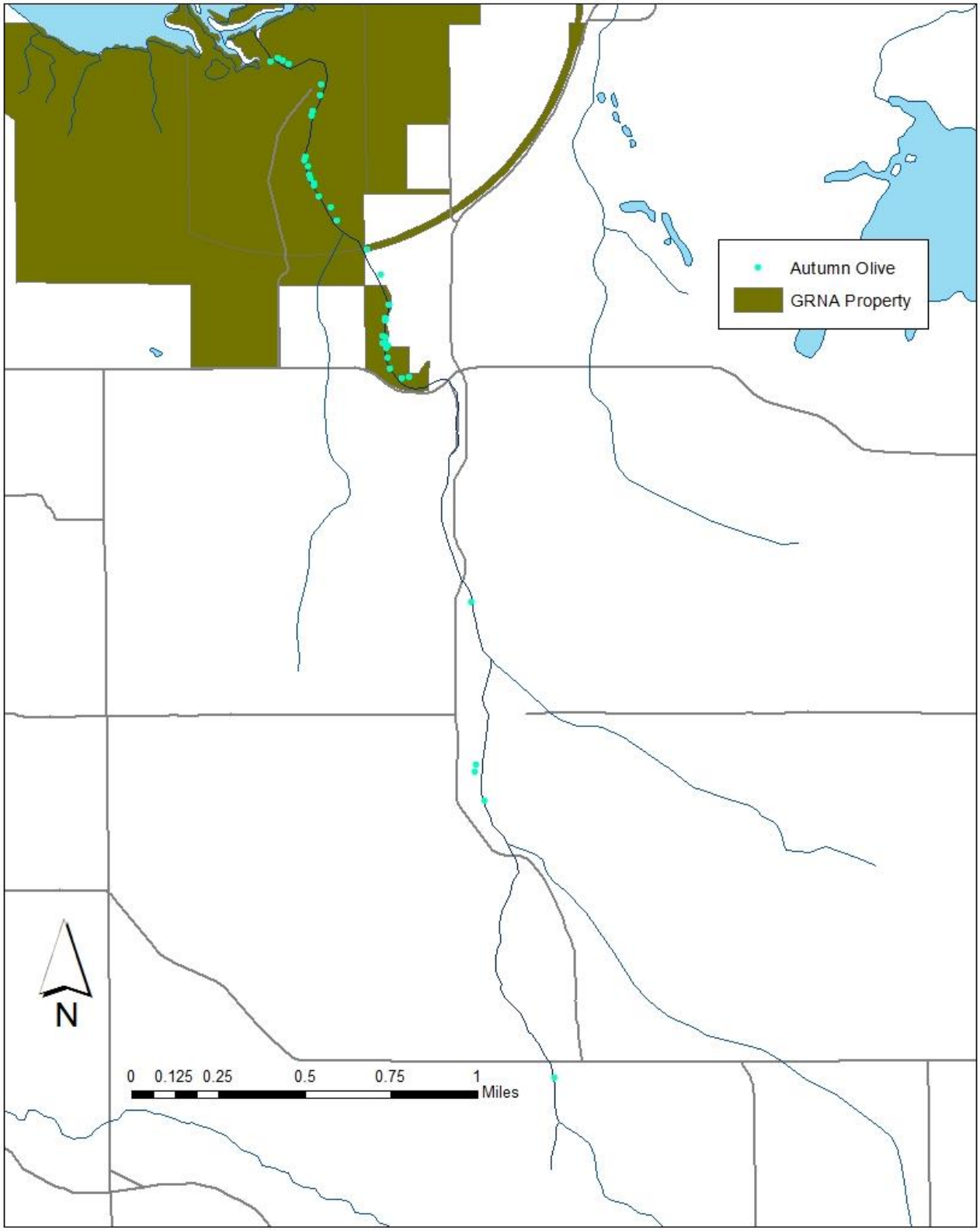

Figure 8. Occurrences of autumn olive along Finch Creek. Only infestations of single plants or a few scattered plants were identified.

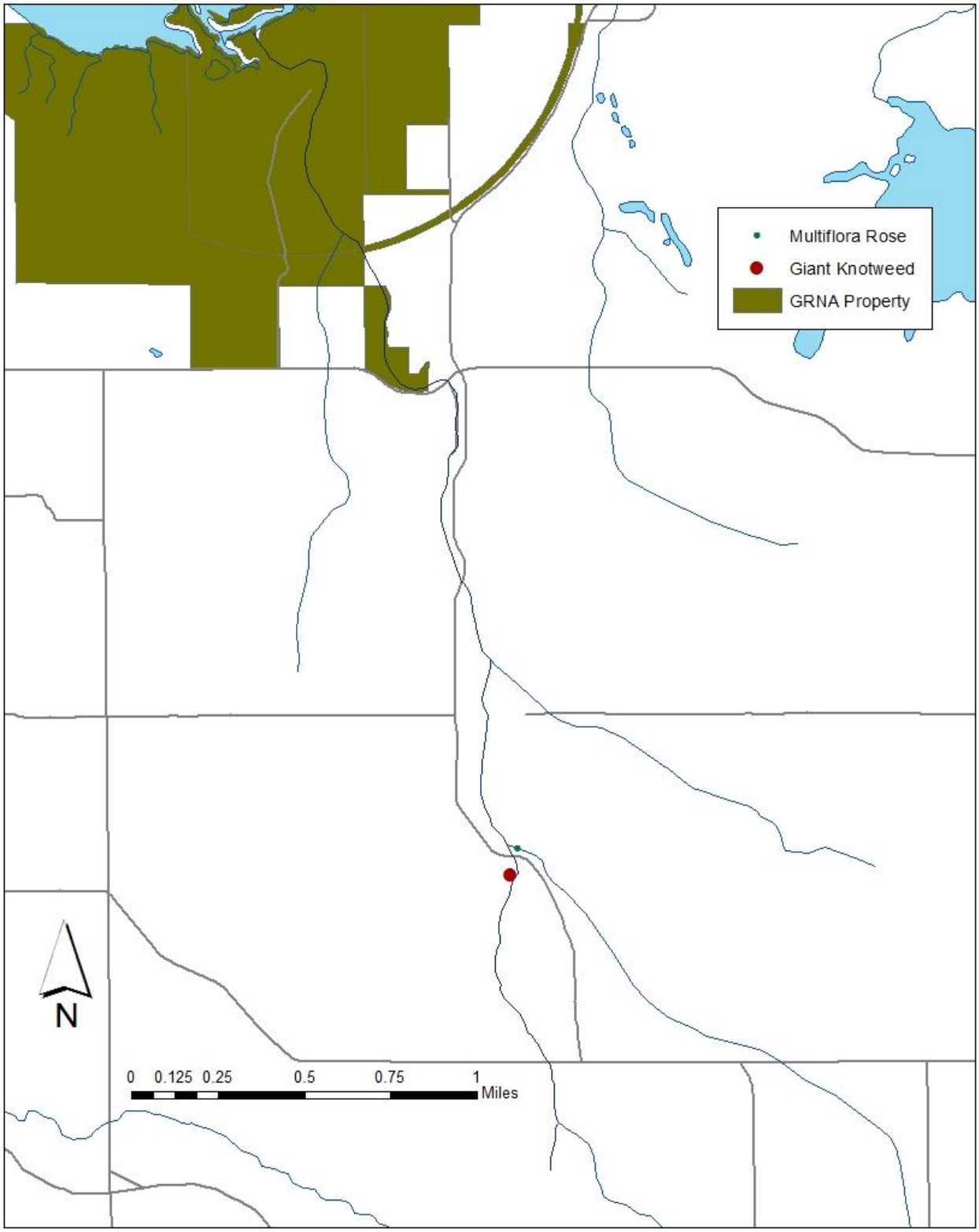

Figure 9. Occurrences of giant knotweed and multiflora rose along Finch. One large infestation of giant knotweed and a single plant of multiflora rose were identified.

Recommendations

It is recommended to begin control efforts on the early detection species, autumn olive and multiflora rose (Figure 10). Because many of the identified infestations occur on privately owned property I recommend updating all landowners by providing a copy of this report and providing resources for them if they choose to pursue control efforts. Focusing on control efforts on GRNA owned lands, I recommend immediate control of autumn olive and recurring monitoring. Development of an invasive plant management plan is recommended and should include future projects that include recurring monitoring plans.

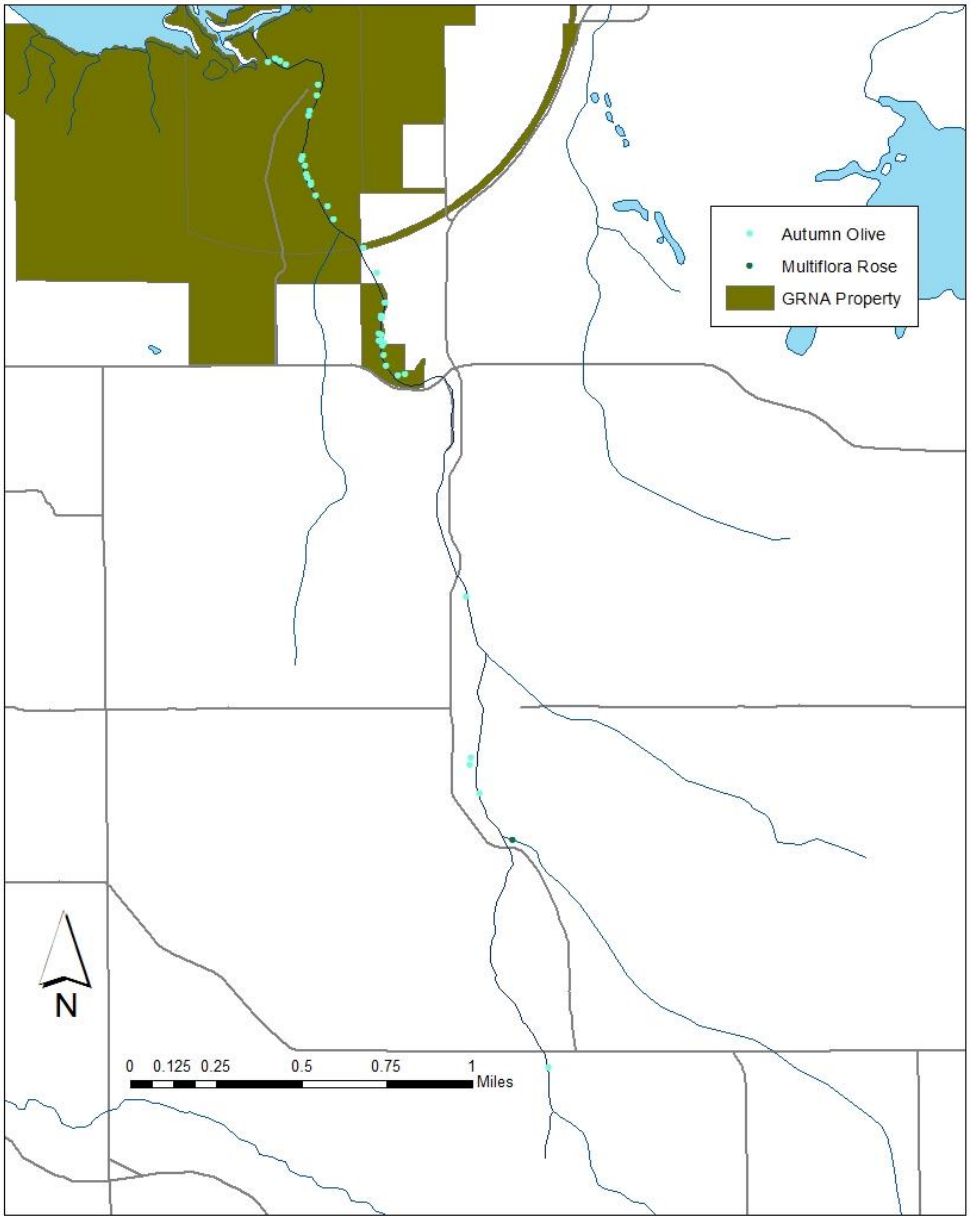

Figure 10. Early detection species identified along Finch Creek; species only occurring where area and density codes=1.

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