Invasive Plant Research
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Kennebec Land Trust Summer Intern, 2014

Introduction:

The ecological impacts of the presence of non-native invasive plants is increasingly becoming a problem all across the United States. Many ecologists have studied the variables that influence the introduction and distribution of these species. The purpose of this research project is to explore the variables that contribute to the presence or absence of non-native invasive plants on several Kennebec Land Trust properties.

Protocol:

Beginning this research I had the bias of comparing properties where I expected invasive plants to be either present or absent. I selected two properties that were likely to have a lot of invasive plants (Webber-Rogers Conservation Area and Little Cobbossee Oatway Preserve), and two properties that were likely to have little to no invasive plants presence (Gott Pasture Preserve and Dexter Pond). I used ArcGIS to locate the center coordinate of each property parcel (when there was more than one parcel on the property, the parcel that was more likely to have or not have invasives was selected) (Appendix). Before visiting each property I referred to brochures, monitoring reports, and management plans for background information about the historic and current land uses, natural features of the parcel, and ecology of the surrounding.

When visiting each property, I took a photo and a point on a GPS to document where I took observations. At each of these points I recorded the following observations: sunlight availability (estimated percent by eye), the presence or absence of a trail, the land type (water body, agricultural system, forest, open naturalized, transport corridor, or multiple), soil moisture (xeric, dry mesic, moist mesic, saturated or inundated), and noted if any invasive plants were present. If present, I recorded which species, their reproductive state (sexual, vegetative or both), and ecological information about native vegetation present (mixed, surrounding, subdominant or absent).

Results:

Gott Pasture Preserve

Gott Pasture was donated to KLT by George, Lincoln, and Robert Ladd in 2003. The 75-acre forest parcel features mature forest stands of mixed hardwoods and conifers (with mature and understory of white oaks), three vernal pools and 1,100 feet of undeveloped shoreline on Wilson Pond. The property is located in Wayne, immediately surrounded by an undeveloped natural forest. Gott Pasture has remnants of a 19th century farmstead and geographic connections to early Native American travel routes. Currently the land is used for low-impact use and the only regular maintenance is sustaining the trail; due to a sensitive habitat, no dogs are permitted on the property. At the property entrance (N 44^{o} 18.129' W 070^{o} 03.345'), the sunlight availability was 55-65%, the soil was dry mesic and a trail is present. The entrance is a transport corridor from the road into the forest; there were no invasive plants present (Figure 1). At the property center (N 44^{o} 18.088' W 070^{o} 03.117') the sunlight availability was 10-20%, the soil was moist mesic and a trail is present. It is a forest environment and had no invasive plants present (Figure 2).

Dexter Pond Parcel, Mt. Pisgah Conservation Area

The Dexter Pond parcel was donated by Robert and Maril O'Malley in 1995 and is a part of KLT's Mt. Pisgah property in Winthrop. Dexter consists of 15 acres of sloping woodland with 600 feet of shoreline on Dexter Stream. The parcel is immediately surrounded by undeveloped lands, with a moderately developed residential area, and a popular hiking trail to a historic fire tower nearby (~0.5-1.0 mile). No exact historic land use is documented but due to rock formation it suggests that an agricultural field or homestead was present; most of the surrounding land was used for agricultural so it can be assumed that the Dexter parcel also was used for agriculture. Current land use is minimal, with no trails present or active management plans. No entrance point was taken for Dexter since there is no official trial, there are several ways that the property could be accessed. At the center of the parcel (N 44^{o} 18.775' W 070^{o} 01.863') the sunlight availability was 5-15%, the soil was mesic and no trail is present. The land type is a forest and had no invasive plants present (Figure 3).

Webber-Rogers Conservation Area

The Webber-Rogers Conservation Area is an easement donated by George and Judy Rogers, Jr. that KLT began protecting in 2005. The property is divide into four land uses. The largest land use area, 92-acres, consists of fields and woodlands with 2,200 feet of shoreline. The surrounding areas consist of a homestead and a vineyard. The property is located in a moderately developed area that is popular for boating, fishing and swimming. In the late 1790's and early 1800's the Webber-Rogers land was cleared and farmed by early Litchfield settlers. Over time many of the cleared areas reverted to forest, but some fields still remain. Current land uses consists of low impact hiking (for public use no dogs are permitted on the property due to a sensitive habitat), annual wood cutting by the land owner, and haying and grape production by neighboring farmers. A field at the property entrance (N 44^{o} 08.779' W 069^{o} 53.556) the sunlight availability was 75-85%, the soil was dry mesic and a trail is present. This area a transport corridor with a field connecting to the forest. Invasive Japanese honeysuckle (*Lonicera japonica*) was present, in the reproductive state and was surrounded by native plants (Figure 4). At the property center (N 44^{o} 08.600' W 069^{o} 53.454) the sunlight availability was 10-20%, the soil was moist mesic and no trail was present. This area was forested and no invasive plants were present, although approximately 100 yards away many invasives were present in a field.

Little Cobbossee Oatway Preserve

The Little Cobbossee Oatway Preserve was donated by Mary Oatway in 2012. The property consists of two parcels, a total of 90 acres and 4,000 feet of shoreline on Little Cobbossee Pond, consisting of wetlands and woodland areas. The property is located in the middle of a heavily developed area, consisting of a residential area and a large golf course. Stone walls, some in the forest and some underwater, suggest an agricultural use of the land in the 18th and 19th centuries; the pond increased in size when a dam was placed in Cobbossee Stream in the mid-1700's. Currently, there are no hiking trails on the property but a snowmobile trail provides access across the pond and through the Oatway property. No entrance point was taken for this property since there is no official trial, there are several ways that the property could be accessed. The exact property center was not accessible at the time of observations as it is

located in the water but observations were taken at a point as close to the center as possible (N 44^{o} 19.919' W 069^{o} 52.885'). The sunlight availability was 35-34%, the soil was very moist mesic (borderline saturated) and no trial was present. The area was on the border of the forest and water body; invasive Japanese barberry (*Berberis thunbergii*) was present in a vegetative reproductive state, surrounded by native plants.

Discussion:

Gott Pasture Preserve and Webber-Rogers Conservation Area

Gott Pasture Preserve and Webber-Rogers Conservation Area were compared since they had several common ecological features. Both properties have a shoreline, a trail where dogs are not allowed, and have a history of agricultural land use. The two properties have different adjacent land uses. The Gott Pasture upland is immediately surrounded by an undeveloped area and the bordering shoreline has minimal development, while Webber-Rogers is located in a moderately developed area and borders a moderately developed body of water which could increase the likeliness of non-native plants introduction and distribution. While both properties have been used for agriculture, farming is still taking place on several properties near Webber-Rogers. Gott Pasture is completely forested, while Webber-Rogers has an even amount of field and forested areas which gives invasive plant seedlings more space, sunlight, and ability to establish. In conclusion, it makes sense that non-native invasive plants are present at Webber-Rogers Conservation Area, and not present at Gott Pasture Preserve.

Dexter Pond Parcel and Little Cobbossee Oatway Preserve

The Dexter Pond parcel and Little Cobbossee Oatway Preserve vary greatly in size and location but they share the similarity of not having a hiking trail. It would be assumed that since there is no trail, invasive plants are less likely to be present because there isn't any direct transport corridor. However Oatway has a snowmobile trail with a wide cleared path that is maintained annually. The snowmobile trail is exposed to a higher degree of sunlight than a hiking path, which gives the invasive plant seedlings a greater chance of establishing and resprouting after trail pruning. The most significant difference between Dexter and Oatway is the surrounding land uses. Dexter is surrounded by undeveloped forest with a closed canopy therefore, invasive seedlings would need to compete in an undisturbed area with very little sunlight. Oatway is surrounded by homes and a large golf course that has decorative plants, and a busy roadway that goes along the pond and provides easy access for water run off to transport invasive seeds. In conclusion, it makes sense that non-native invasive plants are present at the Little Cobbossee Oatway Preserve, and not present at the Dexter Pond parcel.

Conclusion:

A property surrounded by a developed, residential area has an increased chance of invasive plants being introduced while a property surrounded by a wooded, undeveloped area has a lower chance of invasive plants being introduced to the environment. If current land use consisted of only low-impact hiking then there is a decreased chance of invasive plants being introduced in the environment, while if the land is currently used for agriculture, snowmobile use or other high-impact activities then the chance of introducing invasive plants is increased. In

addition, if the property has clear areas from historic use and if the fields are maintained for current use then there is an increased risk of invasive plant seedling establishment. In conclusion, the two most influential variables that influence the presence or absence of non-native invasive plants are the land uses of the surrounding areas and the current land uses on the property being evaluated (e.g. agriculture versus managed as a forest preserve).

Figure 1. Entrance at Gott Pasture Preserve.

Figure 2. Center point at Gott Pasture Preserve.

Figure 3. Center point at Dexter Pond parcel.

Figure 4. Entrance at Webber-Rogers Conservation Area.

Figure 5. Center point at Little Cobbossee Oatway Preserve.

References:

Gott Pasture 2012 Annual Monitoring Report, Charlie Jacobs.

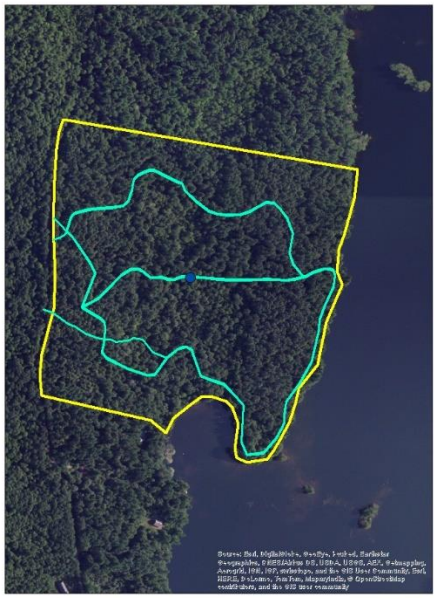
Oatway Dedication Brochure

Webber-Rogers Annual Easement Monitoring Report, Steve Musica. 2012 Nov 13.

Webber-Rogers History

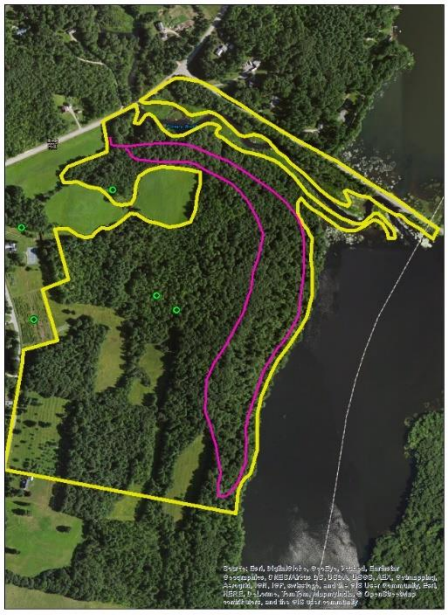
*A special thank you to Nicole Rhodes and Theresa Kerchner for your guidance and patience throughout my research. Also thank you to Jim Connors and George Rogers Jr. for your wise words as I visited properties.

APPENDIX.

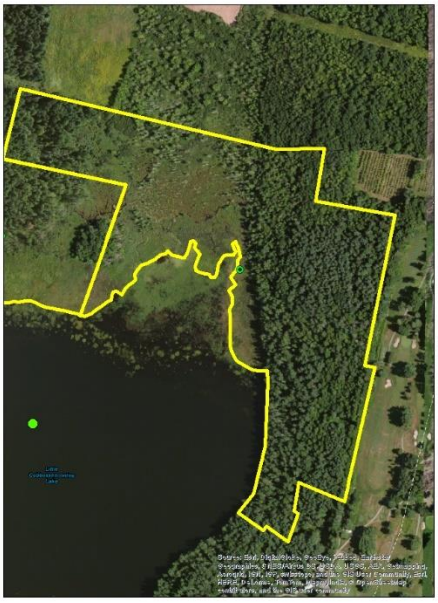


Gott Pasture Preserve

Dexter Pond Parcel, Mt. Pisgah Conservation Area



Webber-Rogers Conservation Area



Little Cobbossee Oatway Preserve