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December 4, 2018

Gerry Mirabile
Manager – Environmental Projects
Central Maine Power Company
83 Edison Drive
Augusta, ME 04336

**Subject: Invasive Plant Species Survey
Little Jimmie Pond-Harwood NECEC Compensation Tract, Manchester**

Dear Gerry,

POWER Engineers, Inc. (POWER), has conducted an invasive plant species survey of the Little Jimmie Pond-Harwood Tract (LJPT) in Manchester, Maine, to address the November 5, 2018 Maine Department of Environmental Protection's (MDEP) letter from Jim Beyer, Regional Licensing and Compliance Manager to CMP. As described in item III D. 16 of that letter, Central Maine Power (CMP) is to "evaluate the size of the population of buckthorn on the LJPT, evaluate the impact this invasive plant has on the functions and values of the parcel, and develop a plan to deal with these plants."

LJPT is one of several tracts POWER has evaluated for CMP as potential compensatory mitigation for the New England Clean Energy Connect (NECEC) (Figure 1). As described by the MDEP letter, "LJPT and some of the other adjacent conservation parcels contain a population of buckthorn (*Rhamnus cathartica* and/or *Frangula alnus*), which is an exotic, invasive species." Dependent on the species, abundance, and distribution, invasive plants can potentially diminish the ecological value of a site as compensatory mitigation or may be a factor to be considered during management and long-term stewardship.

Invasive plant species are common in Maine. Several years ago, during CMP's permitting of the Maine Power Reliability Program (MPRP), the Maine Natural Areas Program (MNAP) established a list of approximately 14 plant invasive species to be surveyed and, as necessary, controlled. In fact, on the nearly adjacent 81-acre Hutchinson Pond parcel (Figure 1), although buckthorn was initially present, subsequent successful control of this invasive plant by CMP rendered the site acceptable as MPRP compensation. That site is now managed by the Kennebec Land Trust.

METHODS

In 2003, the US Fish and Wildlife Service (USFWS) developed a survey method for invasive species (<https://www.fws.gov/invasives/staffTrainingModule/assessing/inventory.html#part3>) management at National Wildlife Refuges. Inventories or surveys linked to Geographic Information System (GIS) mapping and monitoring elements are used by the USFWS to select appropriate invasive plant management treatments. Monitoring procedures established for New England (Region 5) by the USFWS identify data to be collected in the field in terms of abundance

(estimate of number of plants) and distribution (extent over landscape) of invasive species with Global Position System (GPS) being used to document the location of occurrences. GIS is then used to analyze this field data and select an appropriate invasive plant management action (<https://www.fws.gov/invasives/staffTrainingModule/pdfs/assessing/NEregionInventoryProcedure.pdf>). The USFWS Region 5 data form developed for National Wildlife Refuges was used as a guide to identify the types of data to be collected applicable to attributes unique to CMP's transmission line corridors and substation sites and has subsequently been utilized on other CMP projects. Information collected by this vetted survey method and its application are therefore relevant to and were utilized for the invasive plant survey at LJPT. Procedures developed by the USFWS for New England are also very similar to mapping standards developed in 2002 by the North American Weed Mapping Association (https://www.naisma.org/images/Mapping_Standards.pdf).

Previous GIS mapping of wetlands by POWER at LJPT and terrain analysis were used to divide the 110-acre tract into 18 subunits. Sub-meter accuracy GPS was then used to document occurrence of invasive plants during methodical meander surveys through each predefined subunit. Invasive species information collected for each LJPT subunit includes:

Abundance (within surveyed subunit):

- NO = not observed
- T = trace (<1%)
- L = low (1.0 – 5.0 %)
- M = moderate (5.1 – 25%)
- H = high (> 25%).

Distribution:

- IO (infrequent occurrence): widely separated individuals >30 ft. apart; no pattern to distribution.
- ET (evenly throughout): individual plants occur at regular intervals separated by 25 -150 ft.; may be a pattern to the distribution.
- LP (localized patches): isolated clump of a species, often at the initial site of introduction; may/may not be surrounded by another form of distribution, may be just one patch/several; typically, widely spaced (usually no closer than 300 ft.) compared to frequent.
- FS (frequent stands): similar to localized patch but occurring with more frequency and in larger numbers; typically, large clumps of plants close together (15-30 ft. apart) but not touching; many stands usually in view at once within segment.
- DT (densely throughout): many plants growing singly or in clumps close together or touching, a monoculture, small gaps acceptable, large ones not, cannot walk through without touching plant(s) at all times.

RESULTS

POWER conducted the invasive species field survey of the 110-acre LJPT on November 14 and 15, 2018. Bark and twig characteristics, as well as remnant leaves and fruit, were used to ascertain glossy versus European buckthorn (Photos 1, 2). Occurrence as well as the relative abundance (None, Trace, Low, Moderate, High) and the distribution (infrequent, evenly throughout, localized

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patches, frequent stands, densely throughout) of invasive species during the LJPT field survey are displayed on Figure 2. In addition to the two species of buckthorn, the field survey was expanded to include the 12 additional invasive species previously identified by MNAP for CMP’s MPRP project.

SPECIES	COMMON NAME	FORM	WETLAND PLANT INDICATOR RATING ^{1, 2}
<i>Acer platanoides</i>	Norway maple	Tree	Upland
<i>Alliaria petiolata</i>	Garlic mustard	Herbaceous Perennial	FACU
<i>Berberis thunbergii</i>	Japanese barberry	Shrub	FACU
<i>Celastrus orbiculatus</i>	Asian bittersweet	Vine	Upland
<i>Cynanchum louiseae</i>	Black swallowwort	Vine	Upland
<i>Elaeagnus umbellata</i>	Autumn olive	Shrub	Upland
<i>Fallopia japonica</i>	Japanese knotweed	Herbaceous Perennial	Upland
<i>Frangula alnus</i>	Glossy buckthorn	Shrub	FAC
<i>Lonicera. Morrowii</i> ³	Morrow’s honeysuckle	Shrub	FACU
<i>Lonicera tartarica</i> ³	Tatarica honeysuckle	Shrub	FACU
<i>Lythrum salicaria</i>	Purple loosestrife	Herbaceous Perennial	OBL
<i>Phragmites australis</i>	Common reed	Herbaceous Perennial	FACW
<i>Rhamnus cathartica</i>	European buckthorn	Shrub	FAC
<i>Rosa multiflora</i>	Multiflora rose	Shrub	FACU
INDICATOR STATUS	OCCURRENCE IN WETLANDS (% per Reed, 1998*)		
Obligate (OBL)	Almost always occurs in wetlands under natural conditions (99%)		
Facultative Wetland (FACW)	Usually in wetlands, occasionally found in non-wetlands (67- 99%)		
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands. (33-67%)		
Facultative Upland (FACU)	Usually in non-wetlands, occasionally found in wetlands (1-33%)		
Upland (UPL / U)	Almost always in non-wetlands under natural conditions (1%)		

¹ Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30: 1-17. USACE National Wetland Plant List. Web [Accessed 20 June 2018].

² Lichvar, R.W., N.C. Melvin, M.L. Butterwick, and W.N. Kirchner. 2012. National Wetland Plant List Indicator Rating Definitions. ERDC/CRREL TN-12-1, USACE Research and Development Center Cold Regions Research and Engineering Laboratory, Hanover, NH. Available at <https://www.fws.gov/wetlands/documents/national-wetland-plant-list-indicator-rating-definitions.pdf> [Accessed 20 June 2018]

³ Collectively grouped as “Shrubby Honeysuckles”: University of Maine Cooperative Extension Bulletin #2507 <https://extension.umaine.edu/publications/2507e/> [Accessed 20 November 2018]

*Reed, P. B., Jr. 1988. *National List of Plant Species that Occur in Wetlands*. Washington, DC, USFWS.

Wetland plant indicator rating, initially established by USFWS, is a helpful means to focus/target vegetative surveys, such as for invasive plants. Species with an indicator rating of FAC, FACW or OBL are collectively thought of as *hydrophytes* likely to be found in wetlands; whereas plants rated as FACU or Upland (upland) are more likely to be found where associated hydrology and soils are indicative of upland.

Both species of buckthorn are rated as FAC, whereas two of the remaining listed hydrophytes are rated as FACW (common reed) and OBL (purple loosestrife). In addition to serving as an indicator rating of occurrence in wetland, the ranking also reflects hydrologic conditions, whereby OBL rated plants more commonly occur in wetter conditions than FAC rated species which are “equally likely to occur in wetlands and non-wetland.” This proved to be the case at LJPT for glossy buckthorn, which was generally restricted to a 0.25-acre patch in subunit #1 and along the upland edge of forested wetland surrounding an upland island represented by subunits #5, and #6 (Figure 2).

Common reed does not occur at LJPT. Purple loosestrife, better adapted to wetter conditions but relatively shade intolerant, was also not found in any of the wetlands during the meander surveys, which included scanning emergent marsh wetlands around the perimeter of Hutchinson Pond with binoculars.

The nine remaining invasive species designated by MNAP, all being FACU or UPL, are therefore more likely to be found in uplands. Of these, only three species were observed: a single multi-flora rose bush, a small, solitary Japanese barberry at the base of a tree (Photo 3), and two honeysuckle bushes (Figure 2).

In summary, only four of the 14 invasive species previously designated by MNAP and surveyed for were found to occur at LJPT, with three of these as solitary plants. European buckthorn was not observed during the two days of surveys, and glossy buckthorn occurs as solitary shrubs or at low-to-moderate abundance in small, localized patches.

FUNCTIONAL IMPACT

The sparsity of invasive species on the 110-acre LJPT is remarkable in comparison to other tracts of land of this size in southern and central Maine. Buckthorn at LJPT is essentially limited to several, solitary widely scattered (trace/infrequent occurrence) saplings and in low (1-5%) to moderate (5-25%) abundance in “localized patches” (Figure 2). Only three other invasive species of the 14 designated by MNAP were found to occur at LJPT and these too (shrubby honeysuckle, multiflora rose and Japanese barberry) were also solitary (<1%) and widely scattered (infrequent occurrence).

Based on the observed levels of abundance and forms of distribution, invasive species at LJPT are not considered to significantly impact the ecological values of this tract. More specifically, the invasive plants present on this tract are unlikely to significantly impede or displace the abundant, well-established mix of native plant species on the 110-acre Tract. The relatively low abundance and sparse distribution of invasive species therefore has not degraded wildlife habitat at LJPT.

The relative scarcity of invasive plants at LJPT is likely attributed to two factors: limited disturbance and limited dispersal/source. Invasive species commonly establish in areas where soils are disturbed by earthwork or agriculture that are not subsequently stabilized with native vegetation. Similar conditions can also be found along roadways as well as trails traveled by ATVs and other off-road vehicles. Although previously logged as evidenced by old cut stumps and traces of tote roads, no evidence of ATVs was observed at LJPT and, consequently, any previous disturbance appears to not have been extensive enough to result in the opportunistic establishment of invasive species. Additionally, on-site/in-place sources of native species (e.g., American beech, balsam fir, eastern hemlock, white pine, and maple) are so abundant and prolific that disturbed areas were reseeded with native, non-invasive seed stock. In terms of dispersal, all four of the invasive shrubs found at LJPT (buckthorn, honeysuckle, multi-flora rose and Japanese barberry) have pitted fruit, eaten by birds. Buckthorn, while still low to moderate in abundance, is most widely distributed as small patches beneath a stand of white pines trees on the west side of the entrance to the tract off Collins Road (subunit #1) and along the south and easterly side of the upland island at the north end of Hutchinson Pond (subunits #5, #6). Both locations are suggestive of roosting sites for flocks of birds.

INVASIVE SPECIES CONTROL PLAN

The MDEP letter indicates buckthorn occurs “on some of the other adjacent conservation parcels” which may refer to the adjacent 886-acre Jimmie Pond Wildlife Management Area (WMA) or the previously described nearby 81-acre Hutchinson Pond parcel (Figure 1). During the invasive survey of LJPT, the segment of the WMA located between the two parcels making up LJPT was crossed on November 15, 2018, and three mature, fruit-bearing, glossy buckthorn saplings were found on the west side of a scrub shrub wetland (Photo 4). Although no other evaluation of the WMA was conducted, as displayed on Figure 2, at this location the buckthorn would be characterized as “trace (<1%), infrequent occurrence”.

As noted above, buckthorn was previously successfully controlled at the 81-acre Hutchinson Pond compensatory mitigation parcel located off Benson Road, approximately 0.5 mile to the southwest of LJPT. At this location however, the buckthorn occurred as a 2.6-acre dense, virtually homogeneous stand or at “high abundance (>>25%), densely throughout”. Prior to implementation of the control plan, buckthorn had long since prevented establishment of native species and also functioned as a very large source for expansive dispersal.

The Hutchinson Pond parcel where a control plan had been initiated in 2011 for a dense stand of invasive buckthorn was also reviewed during the LJPT invasive species survey. The final monitoring report for this parcel, dated October 26, 2016, indicates compensation goals for buckthorn management had been met. Based on the November 15, 2018 field review, an open field of native herbaceous plants approximately 400 ft east of Benson Road now replaces what had previously been an impenetrable thicket of buckthorn.

The very limited occurrences of buckthorn and other invasive plants at LJPT have negligible impacts on the tract’s ecological values. As well, no recent or ongoing activities that expose soils and thereby increase the opportunity for establishment of additional invasive species, or the increased abundance or distribution of existing invasive species, occur on the LJPT. Bird dispersal of fruit pits is a chief vector for establishment of certain invasive plants and therefore complete eradication of invasives on this tract is considered to be impossible. Based on this, CMP is proposing a one-time round of buckthorn control, which will be effective in eliminating invasive plant seed sources now in place at LJPT.

A wetland scientist familiar with the location of invasive plant species at LJPT, as well as this control plan and any related permitting requirements, will coordinate implementation of the control plan in the field with an appropriately licensed herbicide application contractor. Subsequent to appearance of leaves and prior to development of fruit, mechanical, hand-operated equipment (chain saws, brush saws, loppers, and/or hand clippers) will be used to flush-cut (no higher than six inches above ground surface) invasive buckthorn, multi-fora rose and honeysuckle shrubs in locations at LJPT displayed on the November 2018 invasive species survey (Figure 2). Slash of cut shrubs will be scattered to lay as close to the ground as practical but will not exceed 18 inches in height. Approved herbicide shall be applied directly to freshly cut stumps by hand by the contractor in accordance with regulatory requirements. This herbicide-cut-stump treatment will not take place during adverse weather conditions such as rain or winds greater than 15 miles per hour, nor will it take place within, or immediately adjacent to, areas of standing or flowing water.

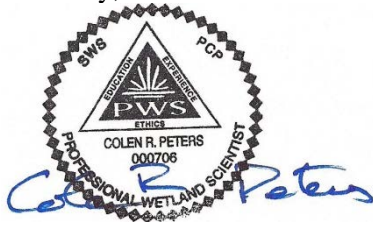
A follow-up assessment documenting the presence, distribution and condition of invasive shrubs at LJPT that may remain in areas addressed by this invasive species survey and control plan will be conducted during leaf-on conditions prior to the end of the growing season. A summary

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monitoring report will be prepared and submitted to the Maine Department of Environmental Protection. Submittal of this monitoring report will complete CMP's obligations with respect to the control of invasive plant species at LJPT.

Should you have any questions about information presented herein please call me at 207.869.1432 or 207.671.6781 (cell) at your earliest convenience.

Sincerely,



Cole Peters
Professional Wetland Scientist

cc: PEI Project File



Photograph 1 A mature fruit bearing (arrow) glossy buckthorn located along the upland - wetland boundary in LJPT subunit #5.



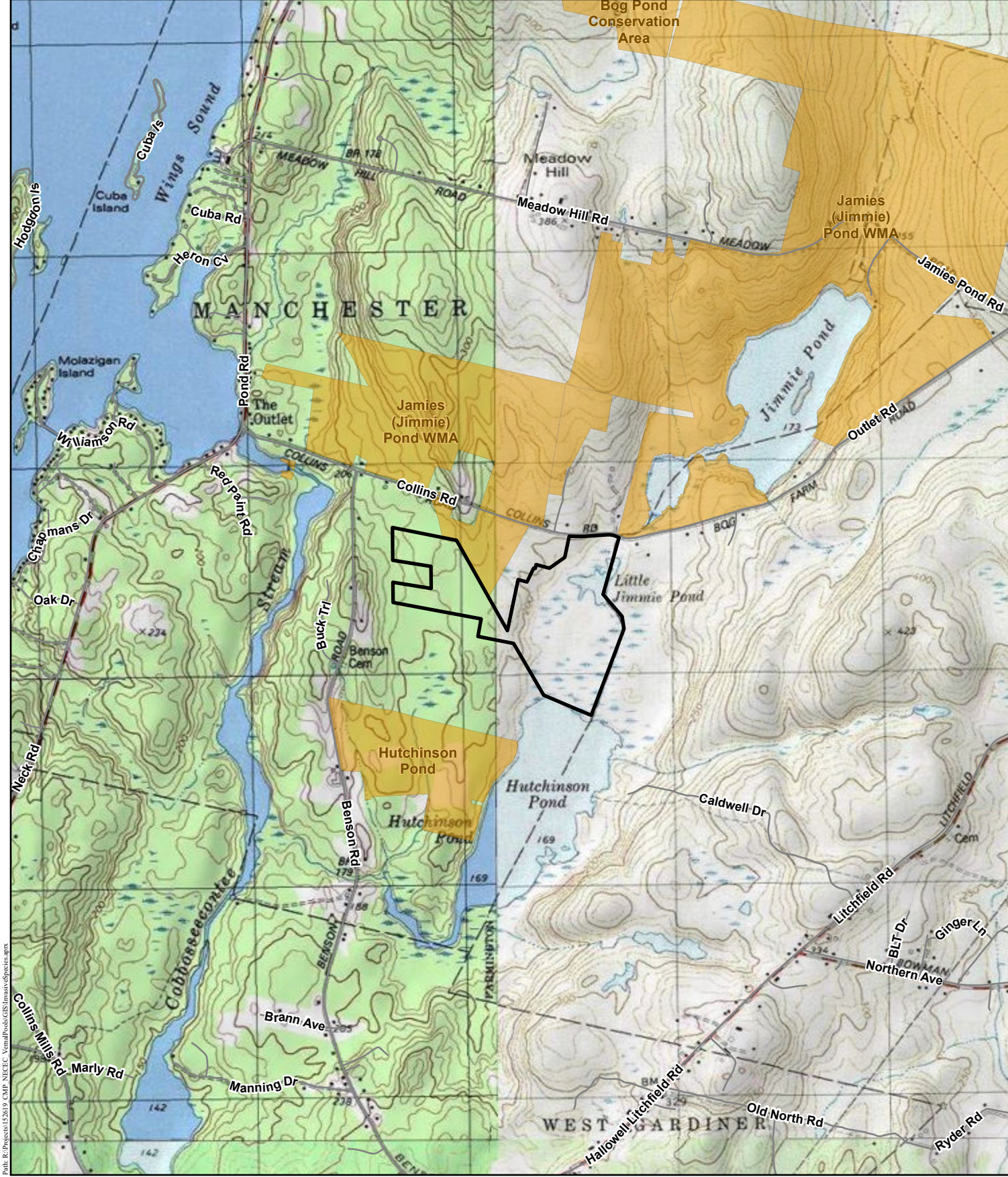
Photograph 2 Twig and bark characteristics, as well as remnant leaves and fruit, were used to identify presence of buckthorn at LJPT.



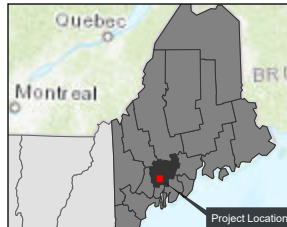
Photograph 3 A small Japanese barberry shrub (base of tree by GPS) was observed along the upland bordering the west side of a vernal pool at LJPT subunit #5.



Photograph 4 Glossy buckthorn was found at the west side of the shrub swamp (PSS) on the segment of the Jamie Pond Wildlife Management Area located near the center of LJPT.



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- Road
- Conserved Lands
- Survey Boundary

SCALE: 1" = 2,000'

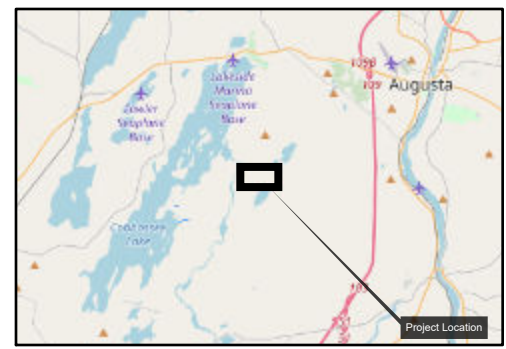
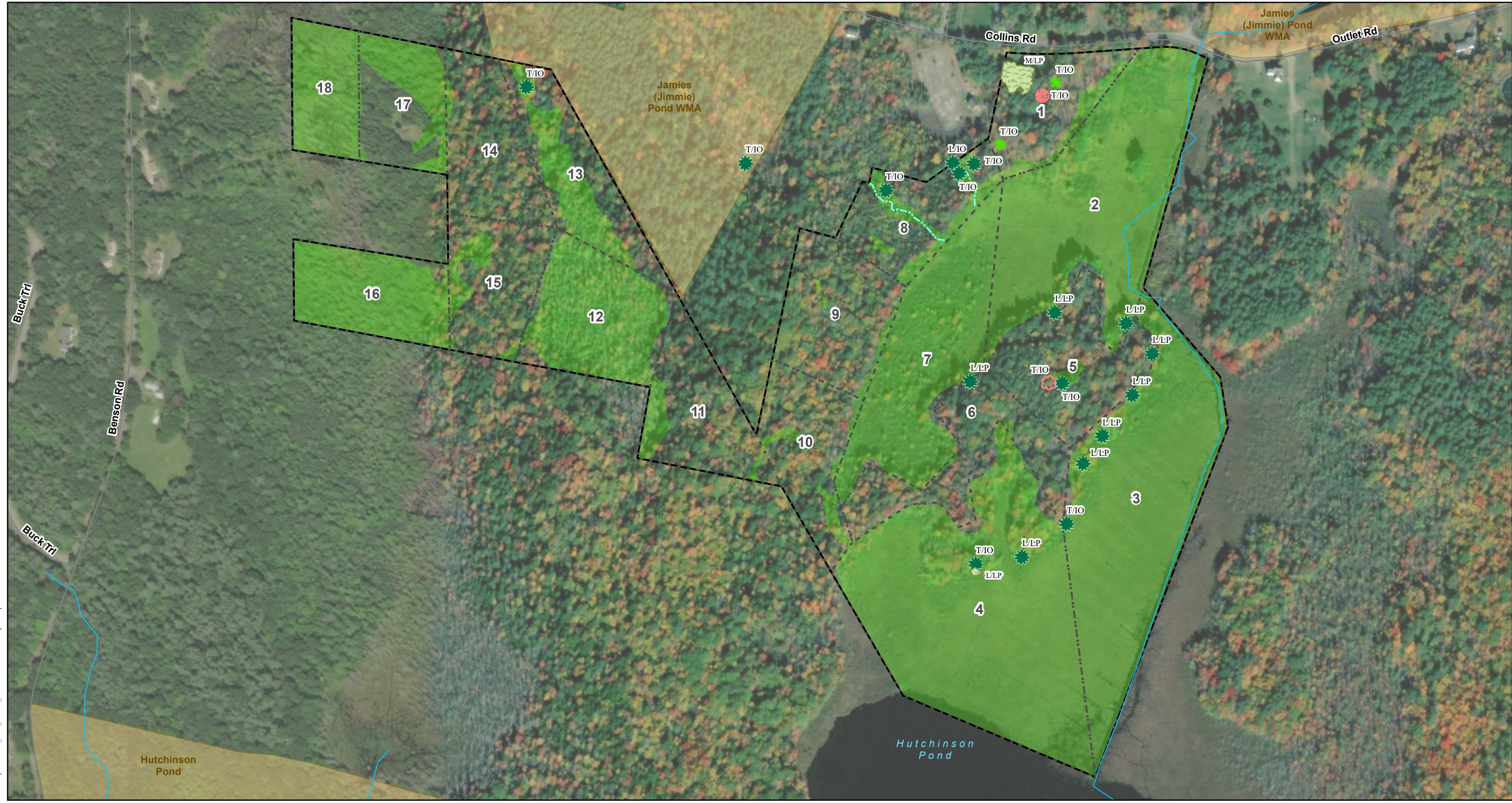
0 1,000 2,000
Feet

Figure 1: Locus
Little Jimmie Pond
Harwood Tract

Kennebec County
Maine

Date: 11/21/2018
Author: KK
Project: 155165

Central Maine Power
NECEC Compensation Parcels



	Survey Area	18	Invasive Survey Subunit
	Delineated Ephemeral Stream		Glossy Buckthorn <i>Frangula alnus</i>
	Delineated Wetland		Glossy Buckthorn <i>Frangula alnus</i>
	Conservation Land		Japanese Barberry <i>Berberis thunbergii</i>
	Stream (NHD)		Multiflora Rose <i>Rosa multiflora</i>
	Road		Shrubby Honeysuckle <i>Lonicera</i> species

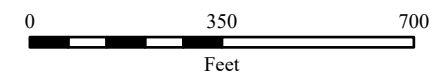
Abundance
 T < 1%
 L 1-5%
 M 5-25%

Distribution
 IO Infrequent Occurrence
 LP Localized Patches



Figure 2: Invasive Species Survey
 Little Jimmie Pond - Harwood Tract

Manchester Township, Kennebec County, Maine



1" = 350'

Central Maine Power
 NECEC Compensation Parcels



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