memo

Project Name |	PLOC Channel Inspections	**Date** |	2/15/2019
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Cc / Contact info |	Carl Almer		
From / Contact info |	Mike Majeski		
Regarding |	Channel and Vegetation Inspections – 2018 Summary		

Background

The Prior Lake Outlet Channel has been routinely inspected twice annually, typically in the spring and fall, to document the channel condition, survey debris and log jams, and inspect culverts and road crossings for obstructions of flow. Starting in the fall of 2017, a vegetation assessment was conducted concurrently with the channel inspection to assess previously managed areas for invasive plant species and document any satellite populations of invasive species growing within the channel easements. Following the assessment, recommendations have been provided to address certain populations of invasive species growing along the PLOC.

Methodology

The outlet channel was assessed on foot from Segment 1 to Segment 7 on May 16, July 3, and September 19, 2018. Segment 8, which is under management by the United States Fish & Wildlife Service, was not assessed. For the spring and fall assessments, a series of photographs were taken in each segment to characterize the condition of the outlet channel, assess new areas of bank erosion, and document any obstructions to flow such as down trees, debris piles, or culvert blockages. All images were collected working upstream to downstream in each segment to aid in channel reference. Due to the size and volume of images collected for this assessment, only the most relevant images pertaining to the channel condition were included in this memo. All other images collected for this effort were transferred to District staff (Jaime Rockney) via flash drive and were placed in an images folder titled "PLOC Channel Inspection_2018". The July survey was for targeted vegetation management for

For the vegetation assessment, a handheld Trimble GeoXH GPS unit was used to survey the locations of new satellite populations of terrestrial invasive species previously undocumented along the PLOC. A July vegetation inspection was added for the 2018 season to help guide early detection and management of satellite populations of purple loosestrife and wild parsnip to prevent any plants from producing seed. The vegetation surveys targeted only problematic and early detection invasive species such as those found in the Minnesota Department of Transportation's list of noxious weeds and those included in the Minnesota Department of Natural Resources list of terrestrial invasive species. Common non-native species such as common dandelion (*Taraxacum officinale*), common burdock (*Arctium minus*), velvetleaf (*Abutilon theophrasti*), broadleaf plantain (*Plantago major*), white clover (*Trifolium repens*), and other naturalized weeds were not assessed. Appendix A includes a summary of recommendations for continued channel and vegetation management in 2019.

Results

Segment 1 – Channel Condition

Bank erosion was observed along the left bank adjacent to the boulder cross vane located immediately downstream of Jeffers Pass NW near Jeffers Pond Elementary School (Figure 1). The erosion is the result of flow occurring between the terminus of the boulder vane and the adjacent bank. No other recent bank erosion was observed within this segment. Minor channel obstructions were located in the same areas identified in 2016 including a five-inch diameter ash tree found lying across the channel approximately 200 feet upstream of Fountain Hills Road, and several large tree trunks and branches found lying across and within the channel in the forested reach just upstream of County Road 42. The old field crossing located immediately upstream of CR 42 has mostly eroded away, but the culvert continues to function at lower flows (Figure 2). The trash rack on the upstream end of the CR 42 culvert was not obstructing flow during the channel inspections (Figure 3).

Segment 1 – Invasive Species

A few black locust (*Robinia pseudoacacia*) saplings were located along the paved walking path west of Jeffers Pond Elementary School. The saplings should be managed using either cut stump or foliar spray methods in 2019. In addition, two new small populations of wild parsnip (*Pastinaca sativa*) were located in 2018, including three plants just north of Jeffers Pass NW and eleven plants located on the east and west sides of the channel just north of Fountain Hills Drive (Figure 4). These satellite wild parsnip populations were treated by Applied Ecological Services (AES) in July 2018 and should be closely monitored in the spring of 2019 to determine if any new plants exist in the area. Any basal rosettes located should be treated with herbicide in the spring of 2019 with follow-up inspections and treatments conducted in early July to prevent the plants from maturing and producing seed.

Figure 1. Bank erosion adjacent to the boulder cross vane near Jeffers Pond Elementary School

Figure 2. Old field road crossing and culvert located immediately upstream of CR 42

Figure 3. Trash rack at upstream end of CR 42 culvert

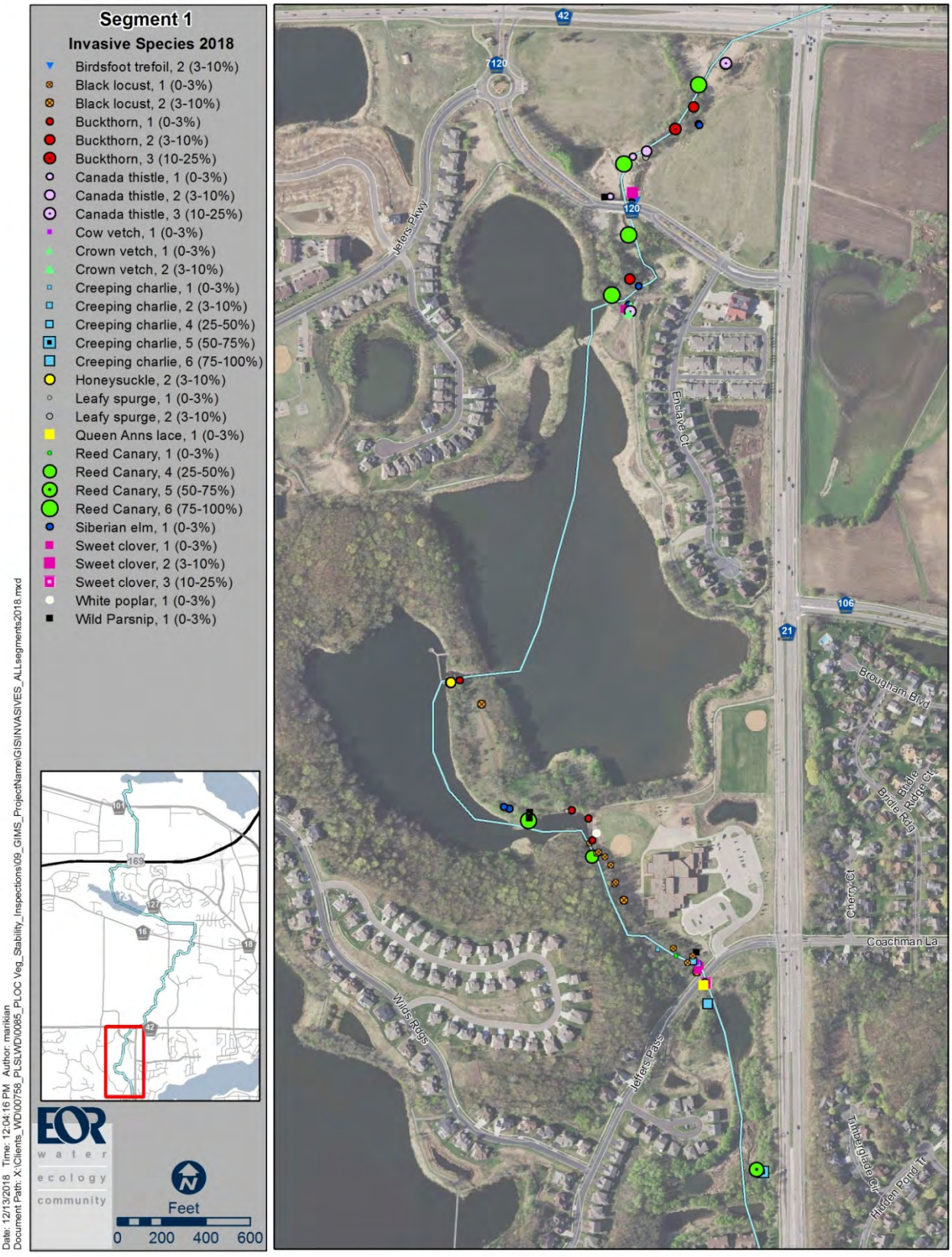

Figure 4. Invasive species and associated areal coverages (in parenthesis) along Segment 1

Segment 2 – Channel Condition

Several down trees were observed across the channel in areas previously identified with bank erosion. In particular, two trees have fallen across the channel just downstream of the 2nd stream crossing due to bank erosion and undercutting of the root boles (Figure 5). Bank erosion continues to occur throughout this segment, particularly in areas damaged by previous flood events. In addition, channel widening is occurring below perched culverts, especially downstream of the 3rd crossing where the riprap in the center of the channel is directing flow into the adjacent stream banks, resulting in localized bank erosion (Figure 6). The bank that was repaired to the east of the 4th crossing at Pike Lake Park is holding up well with vegetation starting to become established (Figure 7). A large sediment delta has formed at the outlet of Segment 2 in Pike Lake (Figure 8). This sediment delta should be removed if future channel work is proposed in Segment 2.

Segment 2 – Invasive Species

No new invasive species were found. Figure 9 shows the locations and areal coverages of previously identified invasive species in this segment.

Figure 5. Down trees over the channel downstream of the 2nd crossing

Figure 6. Riprap downstream of the 3rd crossing causing channel widening

Figure 7. Stream bank stabilized with erosion control blanket east of the Pike Lake Park crossing

Figure 8. Sediment delta at the outlet of Segment 2 to Pike Lake

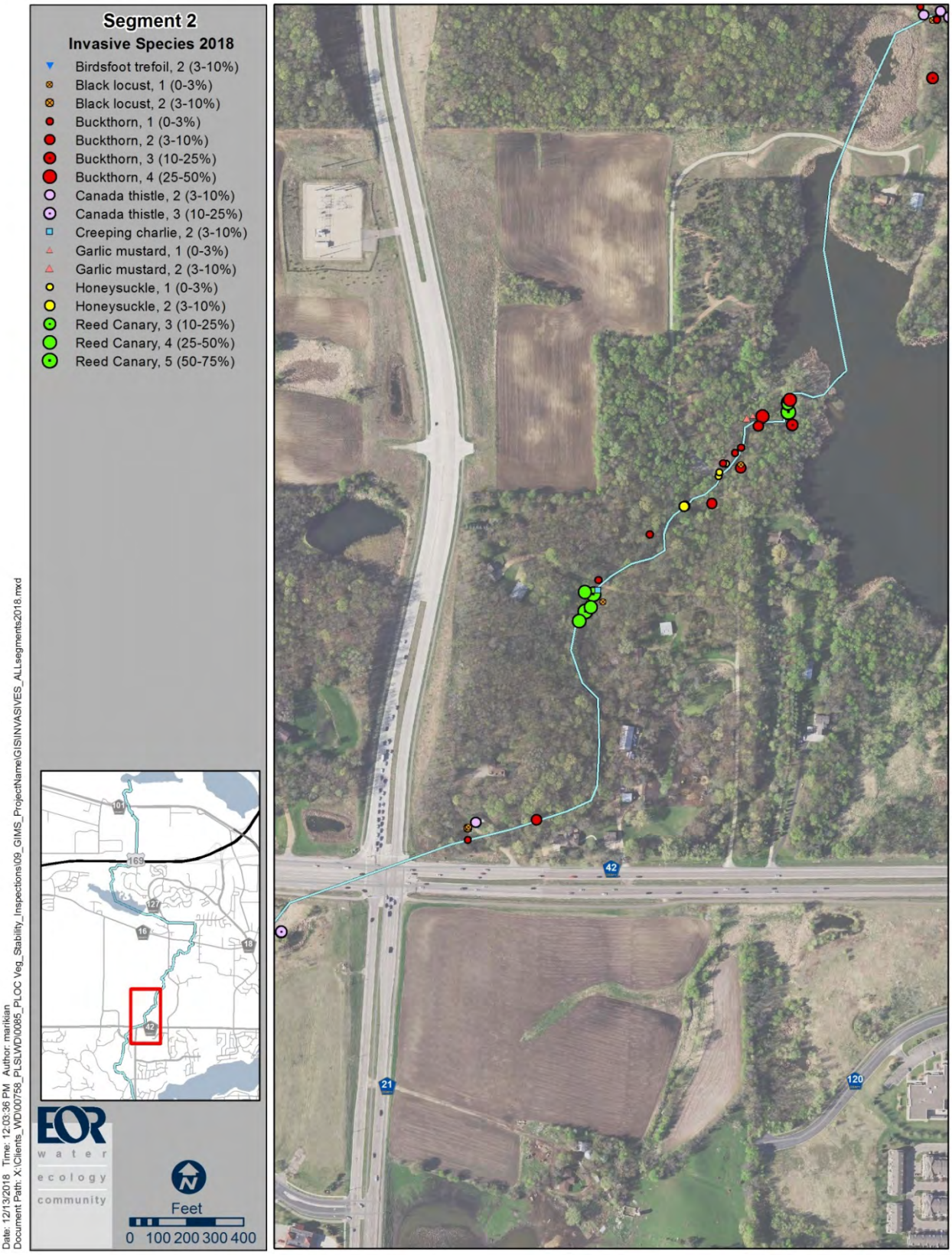

Figure 9. Invasive species and associated areal coverages (in parenthesis) along Segment 2

Segment 3 – Channel Condition

Bank erosion continues to occur in areas previously affected by large flood events, particularly along the reach at the upstream end of the Kici Yapi property (Figure 10). A few eroding banks are beginning to self-heal now that the toe of the slope has been stabilized with rock and vegetation (Figure 11). The stream bank along the left side of the channel downstream of the private driveway crossing continues to erode (Figure 12).

Segment 3 – Invasive Species

No new invasive species were found in this segment. Common buckthorn (*Rhamnus cathartica*) and bush honeysuckle (*Lonicera spp.*) saplings were located in areas previously managed and treated by AES. Continued foliar spray treatments will be needed to reduce the population of the saplings in this segment. Figure 14 shows the locations and areal coverages of previously identified invasive species in this segment.

Figure 10. Bank erosion along the right bank immediately downstream of the Kici Yapi crossing

Figure 11. Self-healing stream bank with boulder toe and vegetated slope

Figure 12. Stream bank erosion along left bank downstream of the private driveway crossing

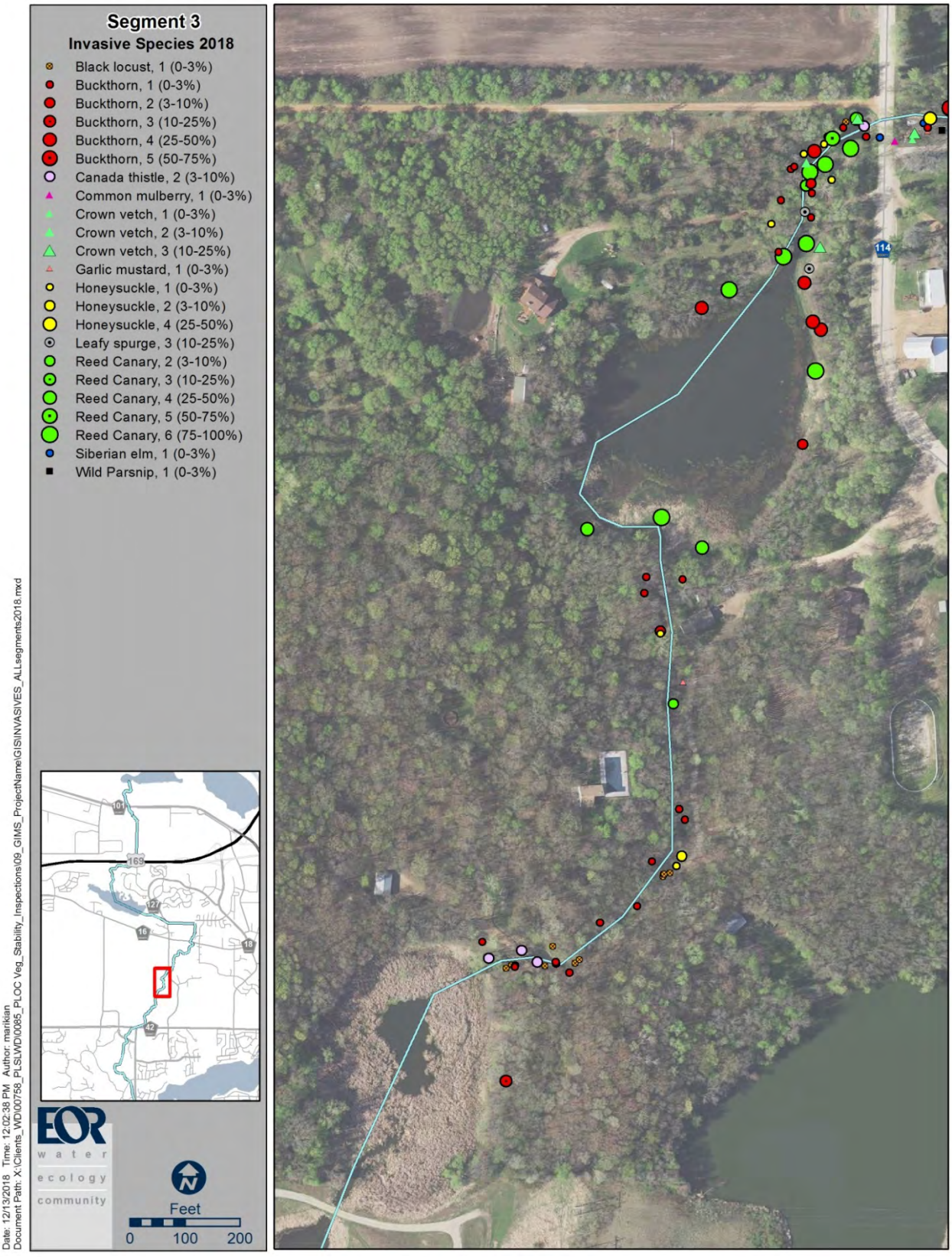

Figure 13. Invasive species and associated areal coverages (in parenthesis) along Segment 3

Segment 4 – Channel Condition

The restored channel in Segment 4A would benefit from re-positioning of the existing riprap. There appears to be a sufficient volume of riprap along the right side of the channel to address the erosion that is occurring along the toe of the left bank (Figure 14). The riprap located above the baseflow elevation could be removed and placed along the left bank to stabilize the toe. Immediately downstream of the Jackson Trail culvert, the riprap in the center of the channel continues to cause localized bank erosion and channel widening near the culvert (Figure 15). Bank erosion continues to advance within this segment, particularly at sites damaged by previous flood events (Figure 16). In Segment 4B, the large box elder tree that had fallen over the channel near the upstream end of the segment is obstructing flows within the channel (Figure 17). Poor riparian vegetation exists within the old pastured reach, with several species of invasive thistle (*Cirsium* spp.) occurring throughout Segment 4B.

Segment 4 – Invasive Species

In July 2018, five purple loosestrife (*Lythrum salicaria*) plants and eleven wild parsnip plants were found in the restored reach in Segment 4A. PLSLWD and AES staff were notified immediately after the completion of the survey and the plants were treated with herbicide by AES in mid-July. Reconnaissance for purple loosestrife and wild parsnip basal rosettes should be conducted in early summer of 2019, and any new plants found should be immediately treated with herbicide. A follow-up inspection should occur in late summer of 2019 to search for any plants that were missed during the reconnaissance effort. Common buckthorn and bush honeysuckle saplings were located in areas previously managed and treated by AES. Continued foliar spray treatments will be needed to reduce the population of the saplings in this segment. Figure 18 and Figure 19 show the locations and areal coverages of previously identified invasive species in this segment.

Figure 14. Minor bank erosion along the left bank of Segment 4A

Figure 15. Riprap downstream of the Jackson Trail culvert causing bank erosion along the right bank

Figure 16. Continued bank erosion downstream of the Gonyea culvert in Segment 4A

Figure 17. Down box elder tree over the channel at the upstream end of Segment 4B/ cattle pasture

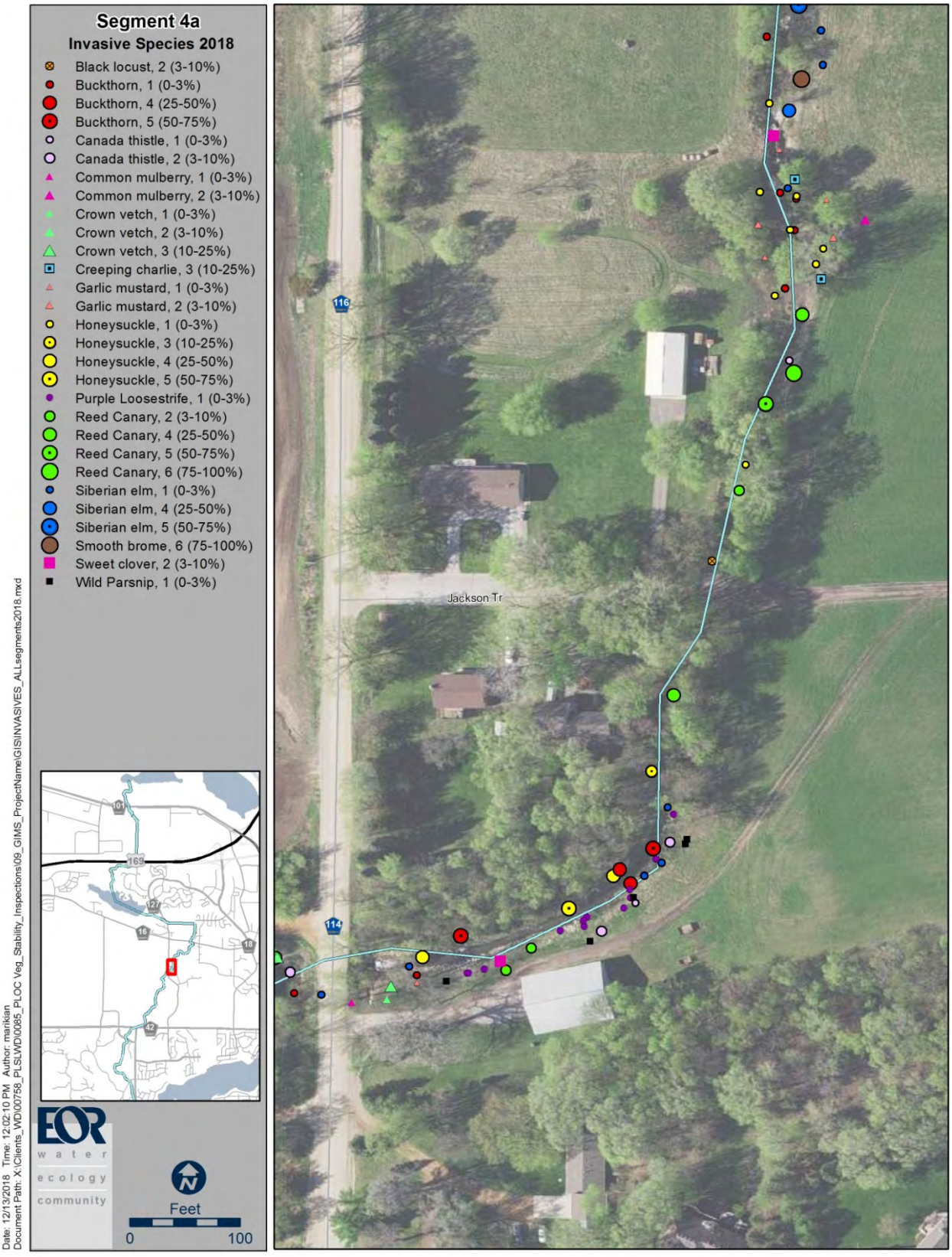

Figure 18. Invasive species and associated areal coverages (in parenthesis) along Segment 4A

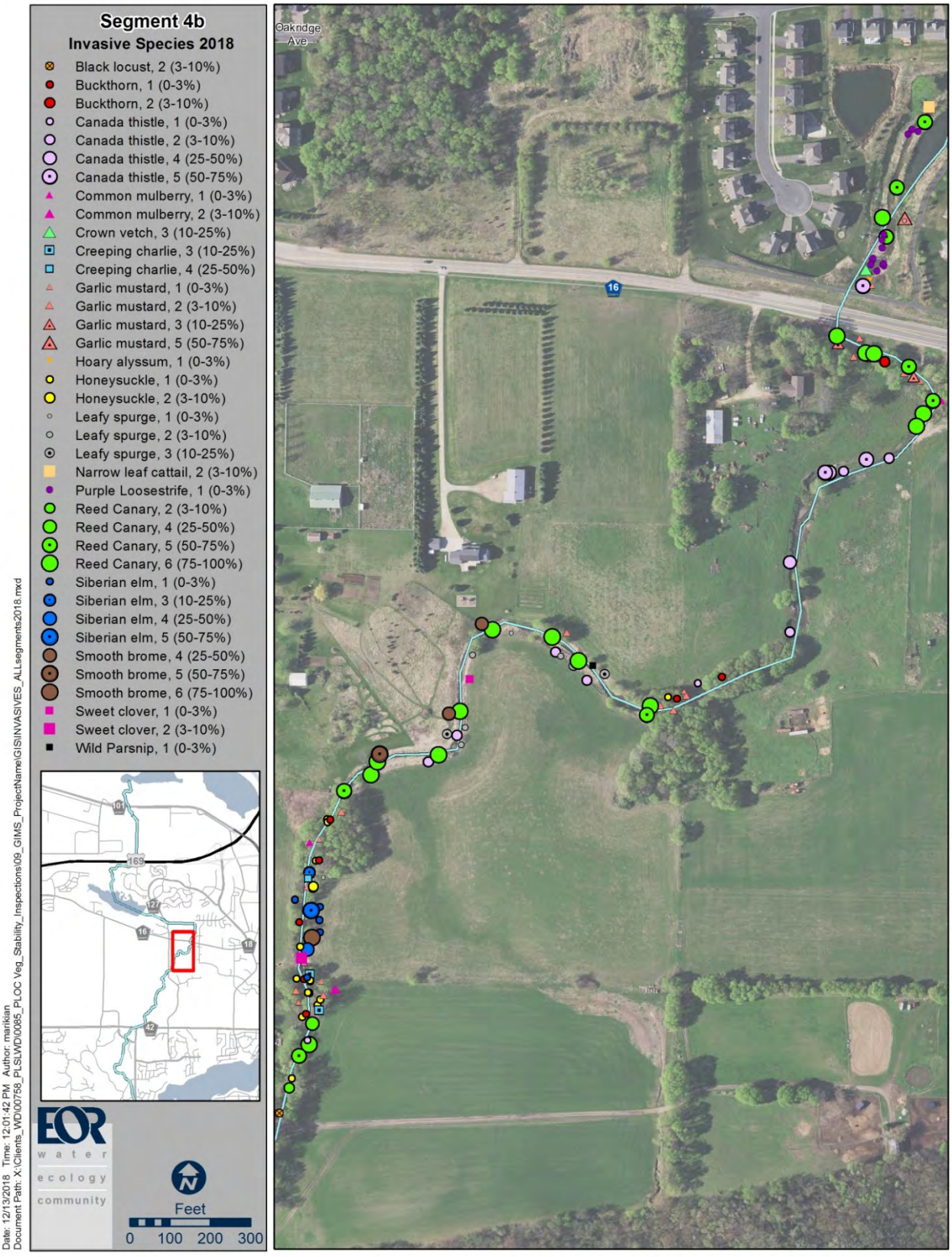

Figure 19. Invasive species and associated areal coverages (in parenthesis) along Segment 4B

Segment 5 – Channel Condition

There were no significant channel obstructions found in this segment. A few tree trunks and branches occur within the channel just west of the 90 degree ditch bend in Segment 5B, but do not appear to be obstructing flow at this time (Figure 20). The channel banks throughout this segment are in fairly good condition with reed canary grass (*Phalaris arundinacea*) and tree roots providing ample surface protection (Figure 21). However, stream banks that were damaged by previous flood events continue to slowly erode. Despite recent dredging efforts in the sediment pond downstream of Pike Lake Road, a new sediment delta has already formed at the upstream end of the pond (Figure 22).

Segment 5 – Invasive Species

It appears the management efforts to treat purple loosestrife located immediately downstream of the CR 16 box culverts in Segment 5A were successful. Only six plants were found during the July inspection, and all six plants appeared to be in poor health. AES treated these six plants with herbicide in July. This area should be monitored closely again in the summer of 2019 and any new plants should be promptly treated or removed before flowers develop. Purple loosestrife management in this area is particularly important since this site is located adjacent to three large wetland/pond areas and connects to other downstream wetlands, as well as Dean's Lake. Figures 23-25 show the locations and areal coverages of previously identified invasive species in this segment.

Figure 20. Down tree trunks and branches located west of the 90 degree ditch bend

Figure 21. Stream bank protection from tree roots and grasses

Figure 22. Sediment delta located downstream of Pike Lake Trail (Segment 5C)

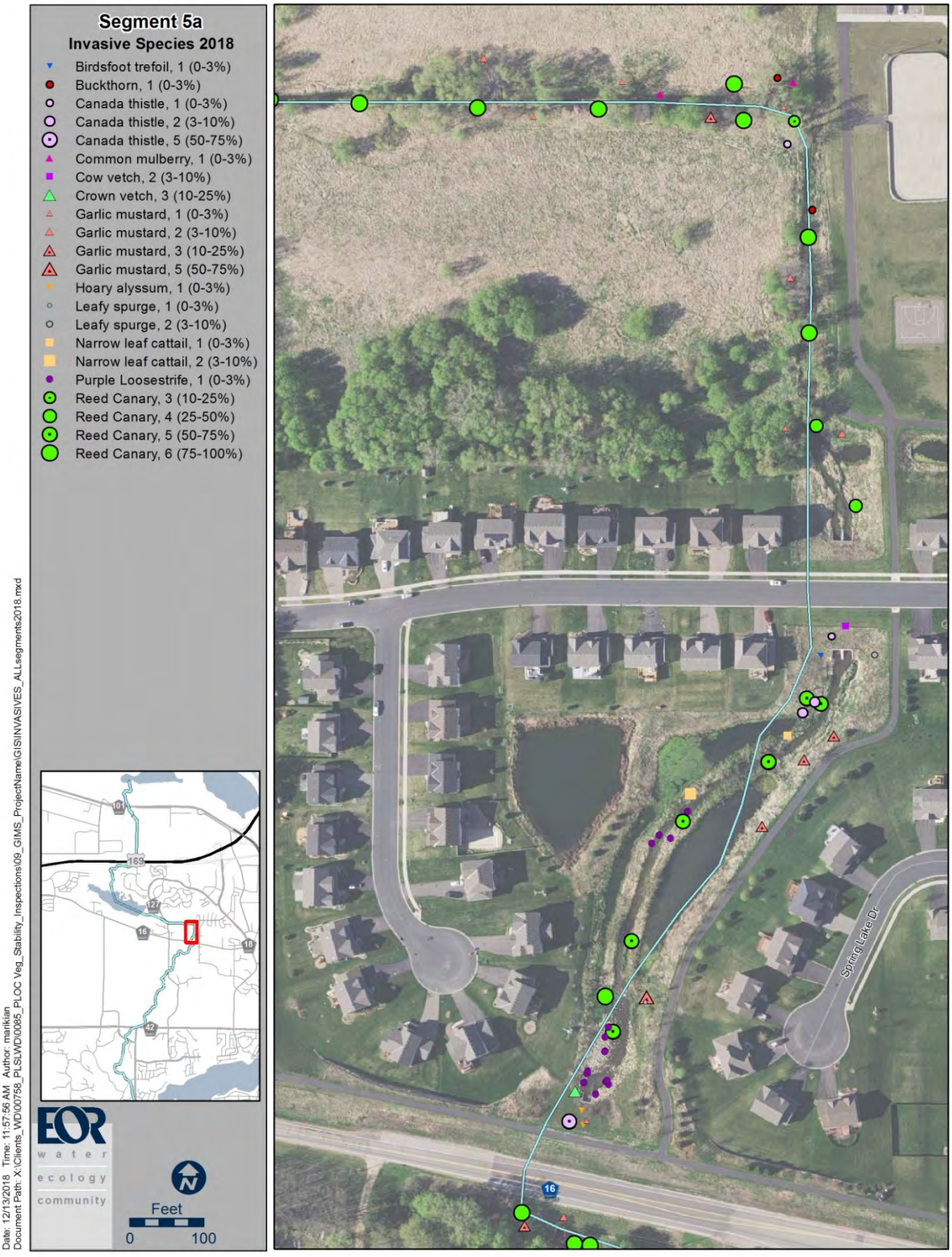

Figure 23. Invasive species and associated areal coverages (in parenthesis) along Segment 5A

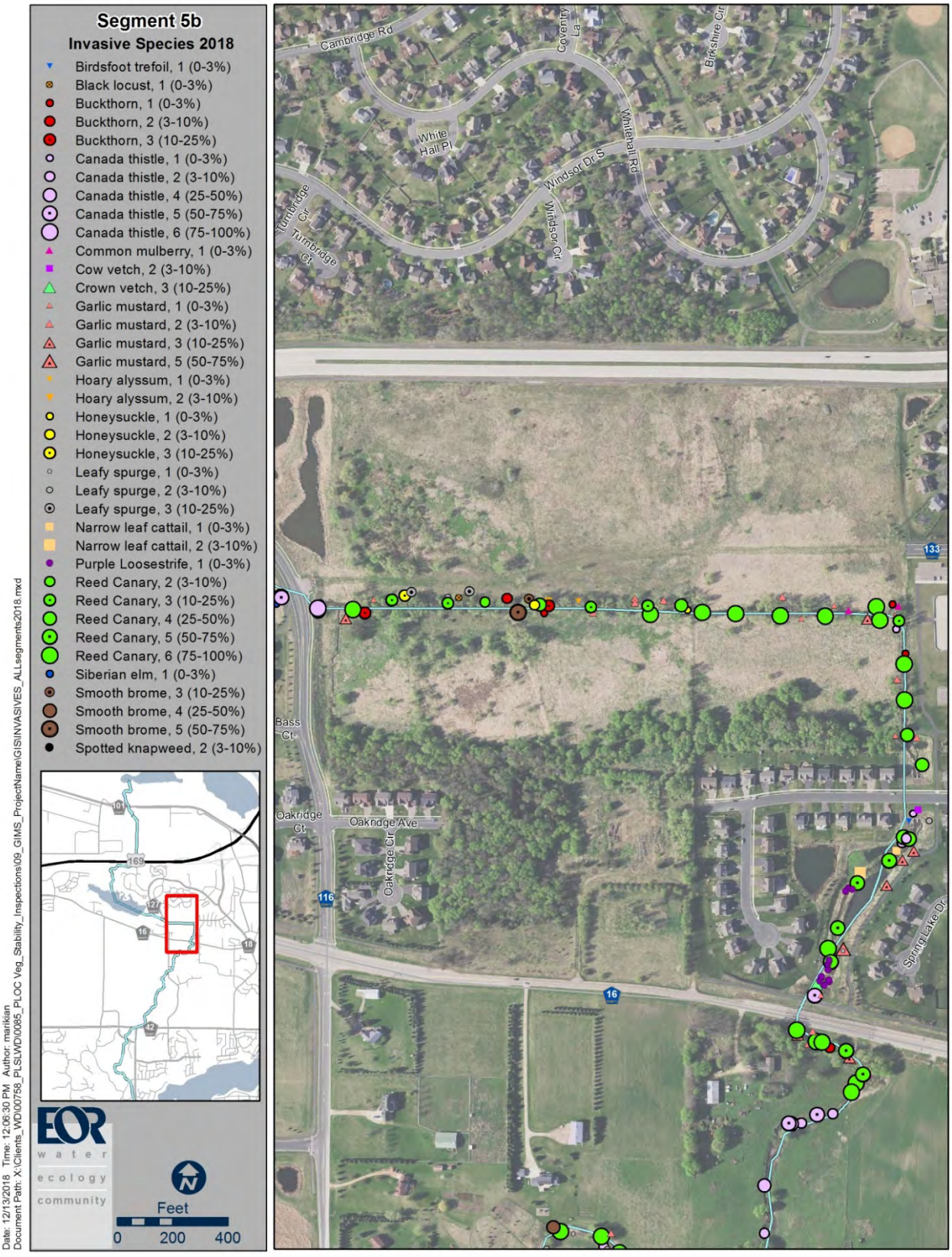

Figure 24. Invasive species and associated areal coverages (in parenthesis) along Segment 5B

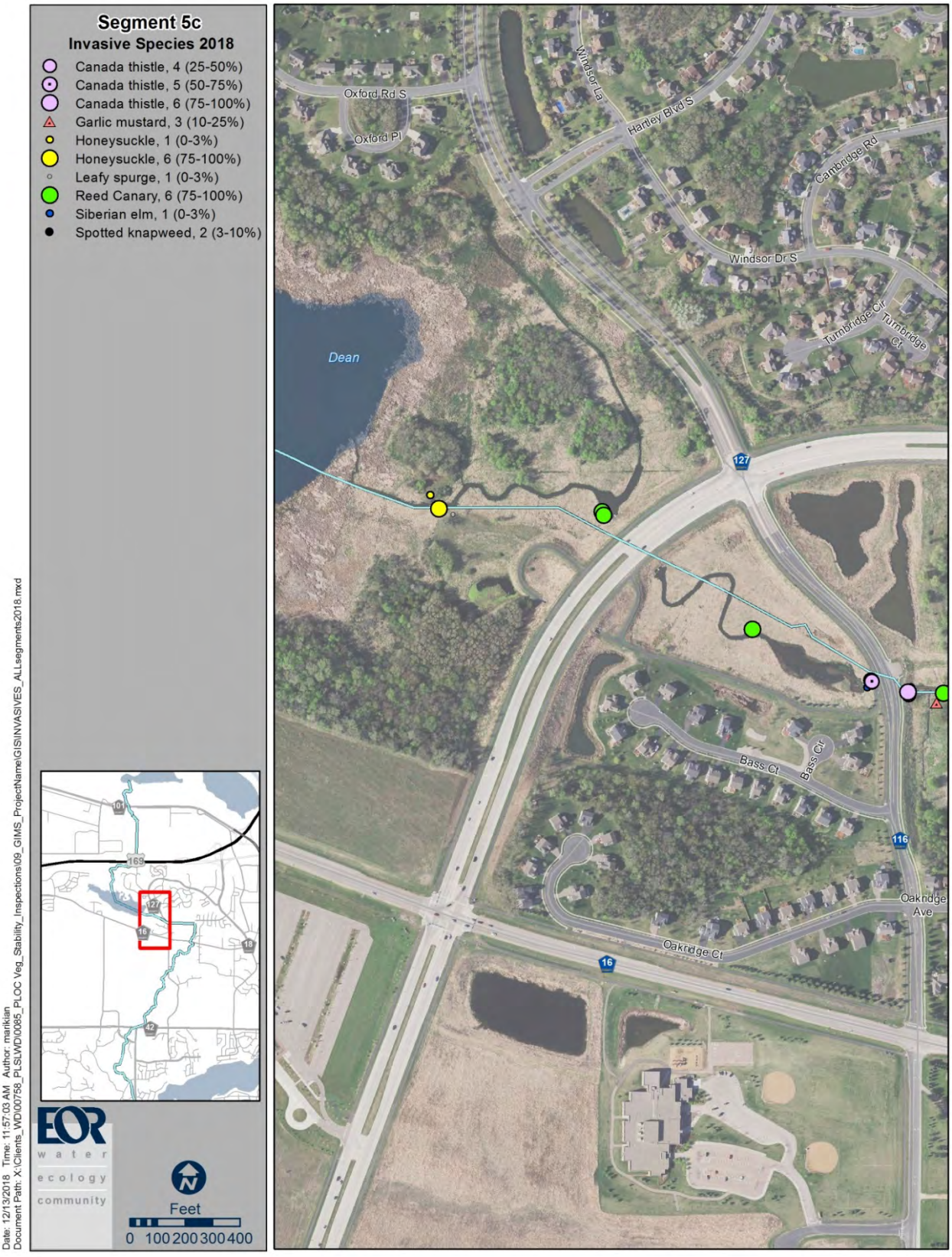

Figure 25. Invasive species and associated areal coverages (in parenthesis) along Segment 5C and Segment 6

Segment 6 – Channel Condition

A small sediment delta has formed immediately downstream of the County Road 21 box culverts and is affecting flow through the bypass channel, particularly during low flows (Figure 26). No other channel obstructions were found in this segment. The Deans Lake weir appears to be in good condition and was free of debris at the time of the inspection. The channel banks throughout this segment are well vegetated and show little evidence of bank erosion (Figure 27, Figure 28).

Segment 6 – Invasive Species

No purple loosestrife plants were found downstream of the Dean's Lake weir where management was conducted in 2017. Although no plants were found in 2018, it is recommended this area be monitored closely in the summer of 2019 and any new plants should be promptly removed before flowers develop. Treatment and/or removal in this area are particularly important since the site is located near Deans Lake and connects to other downstream wetlands. Figure 29 shows the locations and areal coverages of previously identified invasive species in this segment.

Figure 26. Sediment delta downstream of County Road 21 affecting low flows through the bypass channel (located on the right side of the image)

Figure 27. Vegetated stream banks downstream of Deans Lake weir

Figure 28. Vegetated stream banks upstream of Highway 169

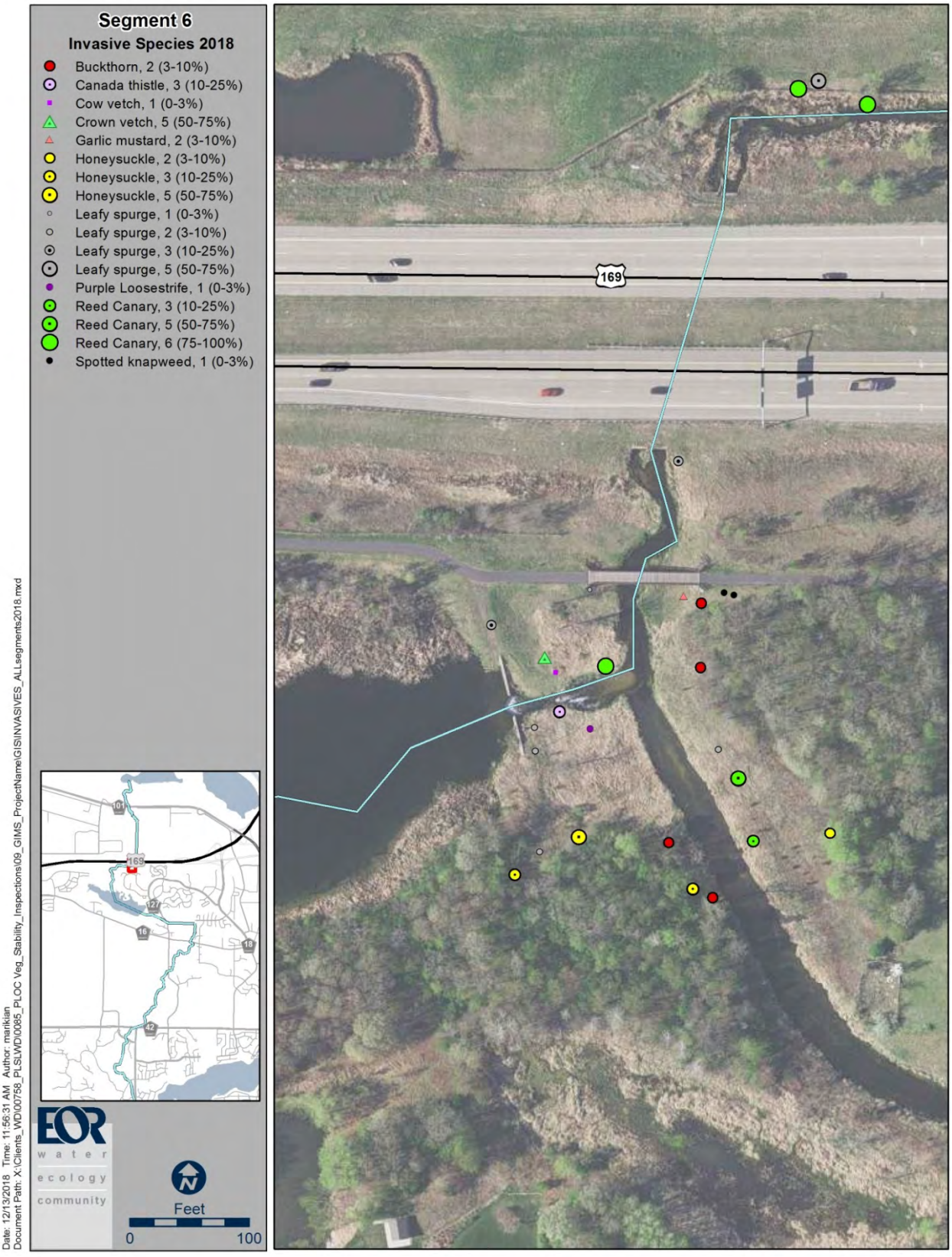

Figure 29. Invasive species and associated areal coverages (in parenthesis) along Segment 6

Segment 7 – Channel Condition

The channel banks between Highway 169 and the Quarry Lake Park crossing are well vegetated and show little evidence of bank erosion (Figure 30). The sheet pile weirs located in this segment are still operational and mostly free of debris. No channel obstructions were found within this segment; however, bank erosion continues to occur in areas damaged by previous flood events, particularly at the far downstream end of Segment 7A (Figure 31). Woody debris still occurs within the channel in Segment 7B, and the large oak tree that had fallen into the channel in 2016 is still partially obstructing flow (Figure 32). Bank erosion in Segment 7B continues to occur in areas previously damaged by flood events. Several trees growing on the channel banks have undercut root boles and will likely fall into the channel if the banks are not restored (Figure 33). In particular, a large bur oak tree located on an outside meander is being threatened by an active bank undercut. Bank toe restoration and a flow deflector would help protect this tree from falling into the channel. At the far downstream end of Segment 7B where the Metropolitan Council Environmental Services interceptor work was completed in the summer of 2017, the channel banks appear to be stable and vegetation has become established (Figure 34).

Segment 7 – Invasive Species

No purple loosestrife plants were found in the areas where management was conducted in 2017; however, 4 new plants were found just upstream of Highway 101 in the area where the MCES interceptor work was completed. The 4 plants were promptly treated with herbicide by AES staff on July 23. It is recommended that all previously treated areas be monitored closely in the summer of 2019 and any new plants should be promptly removed before flowers develop. In addition, a fringe of purple loosestrife was identified along the edge of the wetland complex located immediately west of Segment 7A (Figure 35). Based on the extent of the loosestrife population, it was decided that purple loosestrife beetles should be released in this wetland as a means of biological control. EOR and PLSLWD staff collected several hundred beetles (*Galerucella* spp.) and weevils (*Hylobius transversovittatus* & *Nanophyes marmoratus*) from the known White Bear Parkway population off County Road 96 (Ramsey County) on July 16. PLSLWD staff promptly released the beetles and weevils on the afternoon of July 16 along the Segment 7A wetland fringe (Figure 35). EOR staff also collected approximately 40 leafy spurge beetles from the sites where the beetle release occurred in 2016. The beetles were re-distributed to nearby patches of leafy spurge in Segment 7A.

The proliferation of the invasive species crown vetch (*Coronilla varia*) that was documented in 2016 is continuing to spread along the segment. Extensive populations occur along Innovation Road and the Quarry Lake Park crossing. Common buckthorn and bush honeysuckle saplings were located in areas previously managed and treated by AES. Continued foliar spray treatments will be needed to reduce the population of the saplings in this segment. Figure 35 and Figure 36 show the locations and areal coverages of previously identified invasive species in this segment.

Figure 30. Vegetated stream banks in the upper reach of Segment 7A

Figure 31. Bank erosion and down tree in the forested reach of Segment 7A

Figure 32. Fallen oak tree partially obstructing flow in Segment 7B

Figure 33. An active undercut bank threatening several trees in Segment 7B

Figure 34. Vegetated stream banks at the downstream end of Segment 7B where MCES interceptor work was completed in 2017

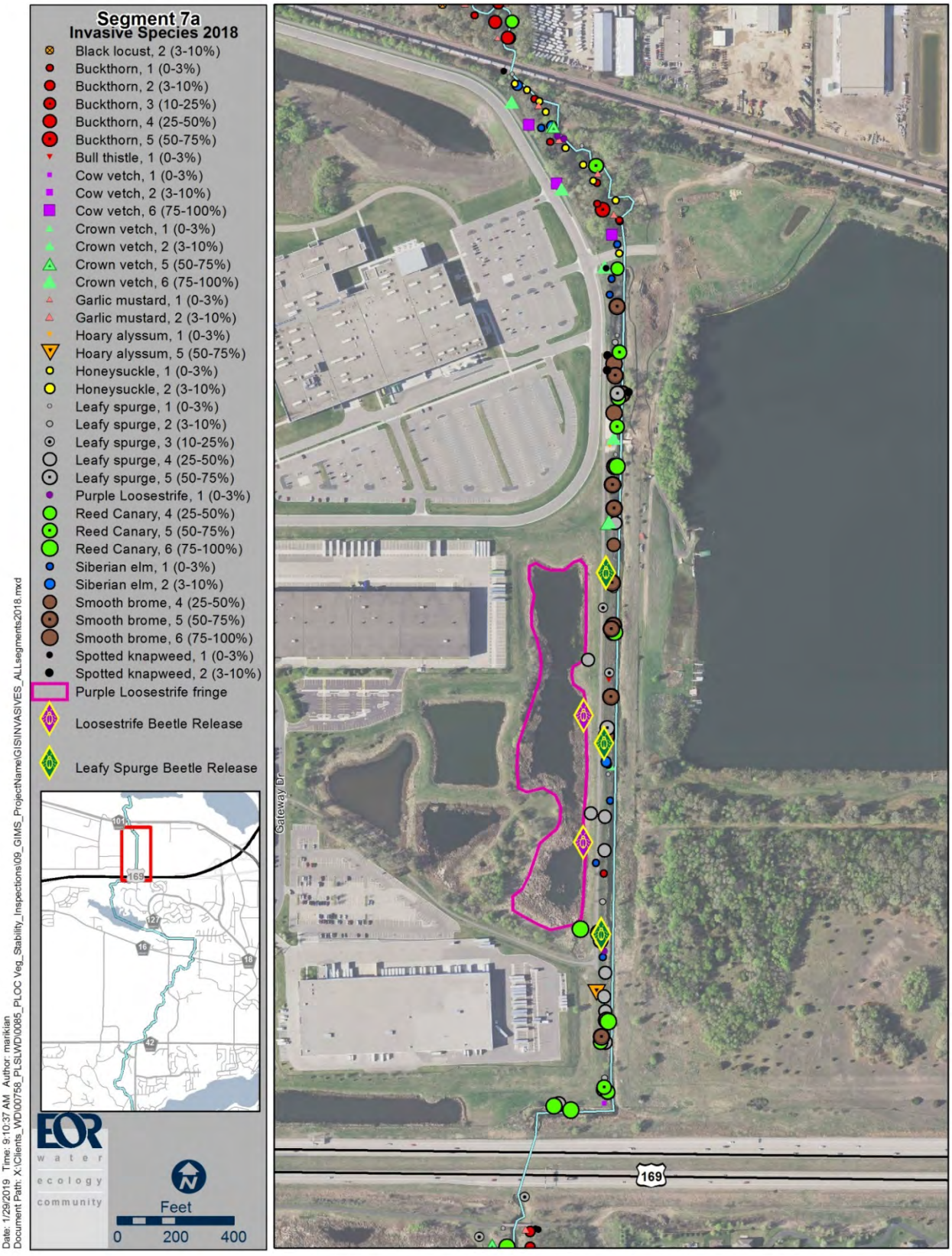

Figure 35. Invasive species and associated areal coverages (in parenthesis) along Segment 7A

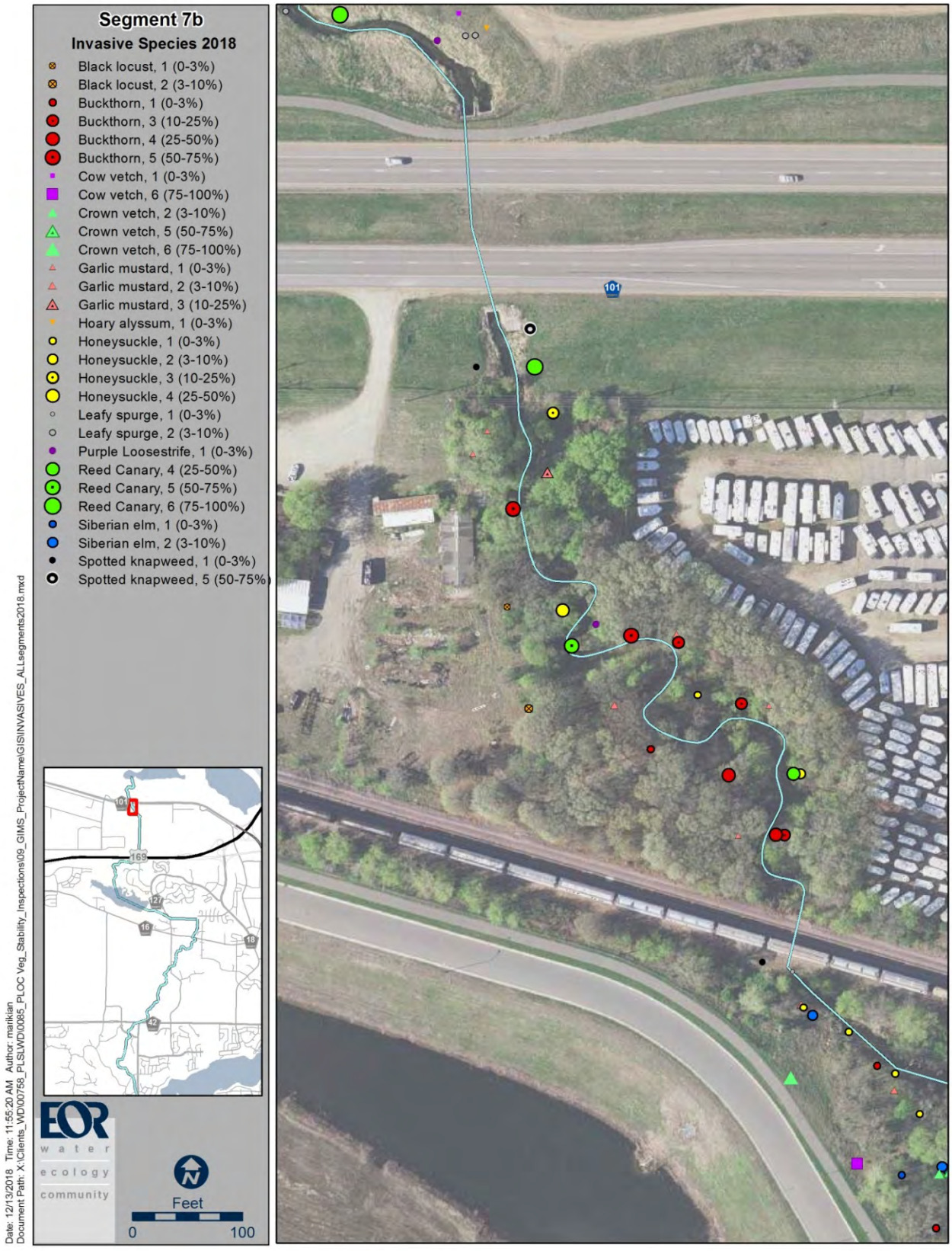

Figure 36. Invasive species and associated areal coverages (in parenthesis) along Segment 7B

Appendix A

Vegetation Management Conducted in 2018

Segment 1

- The two small populations of wild parsnip including the area just north of Jeffers Pass NW and at the east and west sides of the channel just north of Fountain Hills Drive were treated by AES in July 2018

Segment 2

- No management conducted in 2018

Segment 3

- EOR scouted for garlic mustard in the Kici Yapi area previously managed with hand-pulling efforts. No plants were found in 2018. AES did not conduct any management in 2018

Segment 4

- Five purple loosestrife and 11 wild parsnip plants were treated by AES in July 2018

Segment 5

- Six purple loosestrife plants were treated by AES in July 2018

Segment 6

- No management conducted in 2018

Segment 7

- No management conducted in 2018

Appendix B

Channel and Vegetation Management Recommendations for 2019

Segment 1

Channel

- No significant channel obstructions were found. Continue inspections in 2019 and re-evaluate bank restoration sites following FEMA stabilization project (for all 8 segments)

Vegetation

- Foliar spray or cut stump treatment of black locust saplings that are located along the paved walking path west of Jeffers Pond Elementary School
- Scout and treat (as needed) the two small populations of wild parsnip located in the area just north of Jeffers Pass NW and at the east and west sides of the channel just north of Fountain Hills Drive. Conduct the work in early July to prevent plants from maturing and producing seed

Segment 2

Channel

- Repair overly-wide channels downstream of perched culverts if not being addressed by the proposed bank repair work
- Remove the sediment delta at the outlet of Segment 2 in Pike Lake

Vegetation

- Scout and treat buckthorn saplings in previously managed areas

Segment 3

Channel

- No significant channel obstructions were found, continue inspections in 2019

Vegetation

- Scout and treat buckthorn and honeysuckle saplings in areas not addressed by the proposed bank repair work

Segment 4

Channel

- Re-position existing riprap along restored channel in Segment 4A
- Remove riprap in center of channel immediately downstream of Jackson Trail
- Remove fallen box elder tree at upstream end of the Muhlenhardt property

Vegetation

- Scout and treat buckthorn and honeysuckle saplings in areas not addressed by the proposed bank repair work

- Monitor and treat (as needed) the purple loosestrife and wild parsnip areas that were managed in the restored reach of Segment 4A. Conduct the work in early July to prevent plants from maturing and producing seed

Segment 5

Channel

- No significant channel obstructions were found, continue inspections in 2019

Vegetation

- Scout and treat (as needed) the purple loosestrife areas that were managed immediately downstream of County Road 16 in Segment 5A. Conduct the work in early July to prevent plants from maturing and producing seed

Segment 6

Channel

- Remove the sediment delta located immediately downstream of County Road 21 adjacent to the Deans Lake bypass channel

Vegetation

- Scout and treat (as needed) for purple loosestrife immediately downstream of Deans Lake weir. Conduct the work in early July to prevent plants from maturing and producing seed

Segment 7

Channel

- Continue inspections in 2019 and re-evaluate bank restoration sites following FEMA stabilization project

Vegetation

- Monitor and treat (as needed) the purple loosestrife areas that were managed downstream of Quarry Lake Park in Segment 7A and in the small area immediately upstream of Highway 101 in Segment 7B. Conduct the work in early July to prevent plants from maturing and producing seed
- Scout and treat buckthorn and honeysuckle saplings in areas not addressed by the proposed bank repair work

- Collect and distribute additional leafy spurge and purple loosestrife beetles and weevils in areas containing dense populations of leafy spurge and purple loosestrife
- Hand-pull invasive herbaceous species (primarily spotted knapweed) in areas containing uncommon and rare plant species, especially where four-point evening primrose has been found