

Project Name | PLOC Channel & Vegetation Inspections**Date** | 12/30/2021**To / Contact info** | Jaime Rockney, Water Resources Project Manager**Cc / Contact info** | Carl Almer**From / Contact info** | Mike Majeski**Regarding** | Channel and Vegetation Inspections – 2021 Summary

Background

The Prior Lake Outlet Channel (PLOC) 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 target invasive plant species and search for satellite populations of noxious weeds growing within the PLOC easements. Following the assessment, recommendations have been provided to address specific populations of noxious weeds growing along the outlet channel.

Methodology

The PLOC was assessed on foot from Segment 1 to Segment 7 on May 12 and October 8, with target invasive species surveys conducted on August 13 and September 1. Segment 8, which is under management by the United States Fish & Wildlife Service, was not assessed. Segment 5B was also not assessed due to construction of the Segment 5 Re-Meandering Project where significant site grading had occurred in 2021. For the spring and fall assessments, a series of photographs were taken in each segment to characterize the condition of the outlet channel, assess any new areas of bank erosion, and document any obstructions to flow such as down trees, debris jams, 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 shared Microsoft® OneDrive links.

Per the Minnesota Noxious Weed Law (Minnesota Statutes 18.75-18.91), noxious weeds were surveyed along the PLOC during the channel inspections to help guide early detection and management of satellite populations of noxious weeds, particularly those species known to occur along the PLOC, including garlic mustard (*Alliaria petiolata*), purple loosestrife (*Lythrum salicaria*), wild parsnip (*Pastinaca sativa*), spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), and leafy spurge (*Euphorbia virgata*). The vegetation surveys targeted only noxious and early detection invasive species such as those found in the Minnesota Department of Agriculture list of noxious weeds and the Minnesota Department of Natural Resources list of terrestrial invasive species. Common non-native species such as lamb's quarters (*Chenopodium album*), 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. For the vegetation assessments, a GPS was used to survey the locations of satellite populations of noxious weeds. Appendix A includes a summary of

vegetation management conducted in 2021 by Resource Environmental Solutions (RES, formerly Applied Ecological Services), Natural Shore Technologies, Emmons & Olivier Resources, Inc. (EOR), and Prior Lake-Spring Lake Watershed District (PLSLWD) staff. Appendix B includes recommendations for continued channel and vegetation management in 2022.

Results

Segment 1 – Channel Condition

Similar conditions exist to the 2020 channel inspection and include erosion issues associated with the placement of rock to repair failed cross vanes near Jeffers Pond Elementary School. Self-healing of a previously eroded bank was noted downstream of the walking bridge at Jeffers Pond Elementary School and can be attributed to very low flows in the outlet channel throughout the year (Figure 1). A bank repair plan is currently being developed to extend boulder toe rock along the right bank just upstream of the walking path at Fountain Hills Road where erosion was previously documented. Downstream of Fountain Hills Road, bank erosion continues in the wooded reach where undercut banks are exposed (Figure 2, Figure 3). Minor channel obstructions were observed in the same areas identified in previous surveys including several down trees lying across and within the channel in the wooded area upstream of County Road 42 (Figure 4). The beaver dams observed in this reach in 2020 appear inactive and were not holding back any water during the inspections.

Segment 1 – Target Invasive Species

Several black locust (*Robinia pseudoacacia*) saplings were found along the paved walking path west of Jeffers Pond Elementary School. In addition, patches of wild parsnip were found in the areas managed in 2020, including the grassy area southwest of the intersection of Jeffers Pass NW and Eagle Creek Avenue, the area north of Fountain Hills Road, and in the grassy opening northeast of Chickadee Landing on Jeffers Pond Elementary property. EOR and PLSLWD staff removed approximately 200 wild parsnip plants via hand shovel in between June and August. The known locations of wild parsnip and Japanese hedge parsley (*Torilis japonica*) should be closely monitored in the spring/early summer of 2022 to determine if any new plants exist in the area. Any young plants located should be dug up or treated with herbicide with follow-up inspections and treatments conducted in early July to prevent the plants from maturing and producing seed. Figure 5 and Figure 6 show the locations of target invasive species identified in this segment.



Figure 1. Self-healing of a bank where a gap in boulder toe occurs near Jeffers Pond Elementary School



Figure 2. Bank erosion downstream of Fountain Hills Road



Figure 3. Bank erosion downstream of Fountain Hills Road



Figure 4. Down trees in channel downstream of Fountain Hills Road



Figure 5. Target invasive species along Segment 1 (South half)



Figure 6. Target invasive species along Segment 1 (North half)

Segment 2 – Channel Condition

Numerous stream banks within this segment have been repaired since 2018 through the FEMA bank repair project (Figure 7). The primary bank stabilization practices implemented include placement of boulder toe along the sides of the channel and installation of rock cross vanes. Several rock cross vanes have erosion occurring around the edges of the vane wings (Figure 8). The bank repairs have reduced toe erosion throughout the segment, but bank erosion continues in areas where bank repair activities have not occurred (Figures 9-10). Following recent residential development in this reach, new culvert outfalls now occur in the channel (Figure 11). Significant tree loss has occurred because of the new development in this segment, and recent windfall adjacent to the development was observed during the October inspection (Figure 12, Figure 13). It is recommended the large sediment delta at the inlet to Pike Lake be removed now that most of the channel banks in this segment have been stabilized (Figure 14).

Segment 2 – Invasive Species

No new invasive species were found. Figure 15 shows the locations of target invasive species identified in this segment.



Figure 7. Boulder toe bank stabilization from the FEMA project



Figure 8. Erosion around the wings of installed rock cross vanes



Figure 9. Bank erosion in areas where no bank repair work was conducted



Figure 10. Bank erosion (left bank) where no bank repair work was conducted



Figure 11. New culvert outfall within the developed reach of Segment 2



Figure 12. Recent down trees within the developed reach of Segment 2



Figure 13. Recent down trees within the developed reach of Segment 2



Figure 14. Sediment delta at the inlet to Pike Lake



Figure 15. Target invasive species along Segment 2

Segment 3 – Channel Condition

Numerous stream banks within this segment were repaired in 2019, including the two road embankment slumps along the upstream end of the Kici Yapi property (Figure 16, Figure 17). The primary bank stabilization practice implemented was the placement of boulder toe along the sides of the channel (Figure 18, Figure 19). Boulder cross vanes were also installed in several locations for grade control and to concentrate flows to the center of the channel (Figure 20). No major channel obstructions were found. The private driveway culvert upstream of Pike Lake Trail was removed and the crossing has been abandoned; an open channel now occurs where the culvert existed (Figure 21). With limited flow during 2021, significant riparian vegetation growth has occurred in the channel and adjacent banks (Figure 22).

Segment 3 – Invasive Species

No new invasive species were found in this segment. Black locust, common buckthorn (*Rhamnus cathartica*) and bush honeysuckle (*Lonicera spp.*) saplings were observed in areas previously managed. Continued management will be needed to reduce the population of woody invasive species in this segment. Figure 23 shows the locations of target invasive species identified in this segment.



Figure 16. Bank stabilization along the gravel road of the Kici Yapi property



Figure 17. Bank stabilization along the gravel road of the Kici Yapi property



Figure 18. Bank stabilization within the middle reach of the Kici Yapi property



Figure 19. Bank stabilization within the middle reach of the Kici Yapi property



Figure 20. Boulder cross vane within the middle reach of the Kici Yapi property



Figure 21. Old private driveway crossing upstream of Pike Lake Trail (now open channel)



Figure 22. Channel condition downstream of the private driveway crossing upstream of Pike Lake Trail

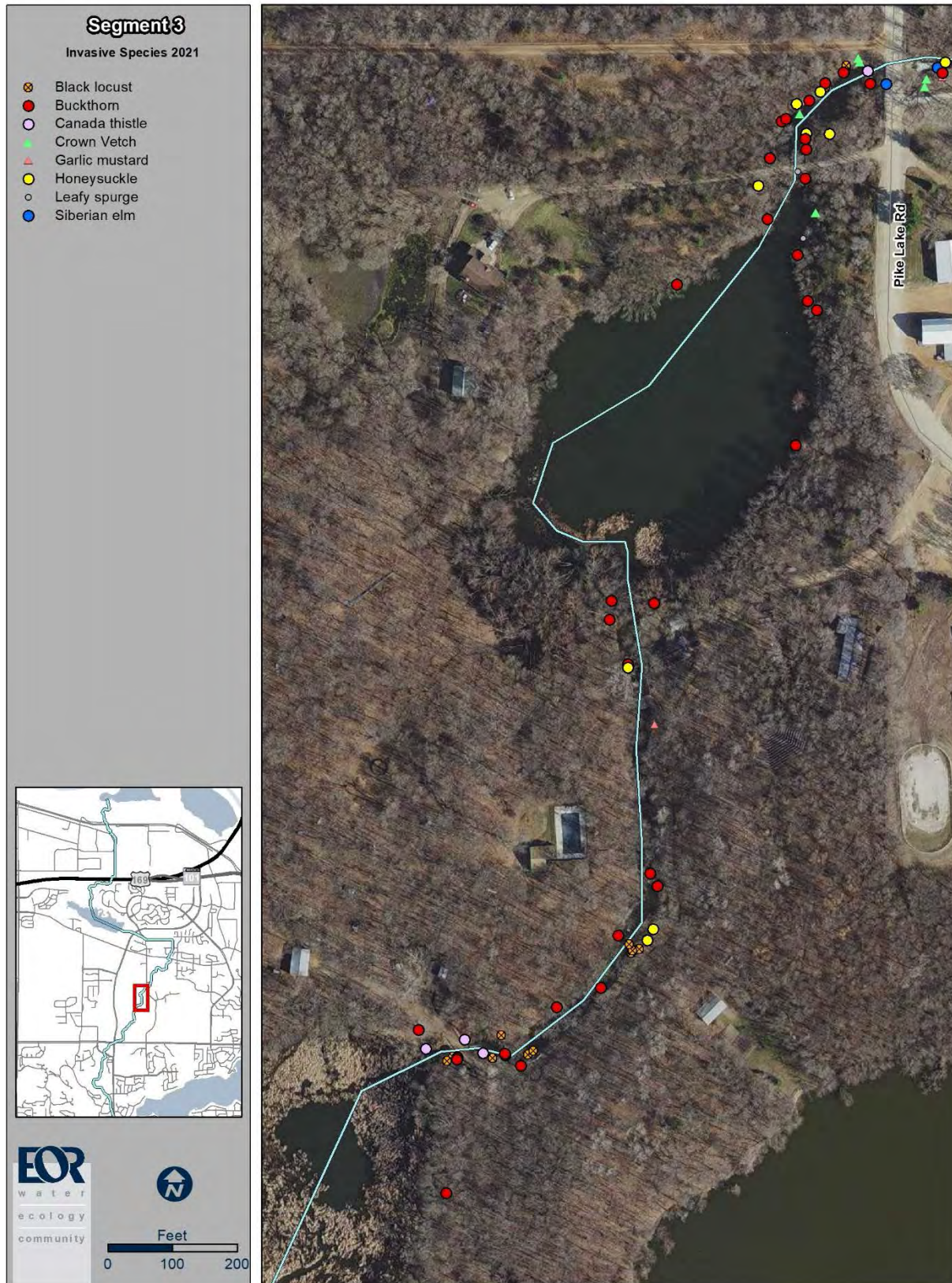


Figure 23. Target invasive species along Segment 3

Segment 4 – Channel Condition

In Segment 4A, a bank repair plan is currently being developed to stabilize eroding stream banks between Pike Lake Trail and the wooded area just north of the Gonyea culvert (Figure 24, Figure 25, Figure 26). At the Gonyea culvert crossing, sediment build-up has occurred at the upstream end of the culvert due to erosion of the active construction crossing for the new residential development (Figure 27). This sediment should be removed before spring snow melt in 2022.

In Segment 4B, the stream banks stabilized by the FEMA-funded project were repaired in 2020/2021 and appeared to be in good condition with vegetation becoming established (Figure 28, Figure 29, Figure 30). In addition, a large box elder tree that had fallen across the channel at the upstream end of the segment is still present as of October 2021 (Figure 31). It is recommended this tree be removed to prevent the formation of a debris jam that could cause bank erosion during high flow events.

Segment 4 – Invasive Species

During the May and August vegetation inspections, several wild parsnip basal rosettes were found at the upstream end of Segment 4A. In addition, several patches of garlic mustard continue to persist in areas where it was previously managed. Reconnaissance for purple loosestrife was conducted in August and no plants were found. Monitoring and treatment for wild parsnip, garlic mustard, Japanese hedge parsley, and purple loosestrife should continue in 2022 to limit the spread of these species. Any new plants found should be dug up or treated with herbicide with follow-up inspections and treatments conducted in early July to prevent the plants from maturing and producing seed. Woody invasive species including Siberian elm (*Ulmus pumila*), common buckthorn, and bush honeysuckles should be scouted and treated in the fall of 2022. With the new residential development currently under construction between the Gonyea culvert and County Road 16, scouting for satellite populations of invasives is recommended to prevent establishment of new invasives along the outlet channel. Figure 32 and Figure 33 show the locations of target invasive species identified in this segment.



Figure 24. Toe erosion along the north bank downstream of Pike Lake Trail (to be repaired in 2022)



Figure 25. Channel banks to be stabilized in 2022 (upstream of Jackson Trail).



Figure 26. Channel banks to be stabilized in 2022 (downstream of Gonyea culvert).



Figure 27. Sediment build-up at the upstream end of the Gonyea culvert



Figure 28. Repaired bank at the downstream end of Segment 4A



Figure 29. Repaired bank at the upstream end of Segment 4B



Figure 30. Repaired bank at the downstream end of Segment 4B



Figure 31. Fallen box elder tree over the channel at the upstream end of Segment 4B



Figure 32. Target invasive species along Segment 4A



Figure 33. Target invasive species along Segment 4B

Segment 5 – Channel Condition

As documented during previous inspections, muskrat tunnels exist between the stormwater ponds and the PLOC between County Road 16 and Oak Ridge Trail. The tunnels occur under the earthen berm that divides the PLOC from the stormwater ponds and are functioning like culverts which have largely drained the east pond (Figure 34). Due to the degraded nature of the earthen berm and banks between the stormwater ponds, a channel modification plan is currently being developed to increase wetland storage and flood capacity of the wetland system between County Road 16 and Oak Ridge Trail.

In Segment 5B, a new outlet channel has been constructed through the existing floodplain and will be the primary flow path of the PLOC through the segment (Figure 35). The old channel is still in place and serves as a stormwater conveyance for existing residential developments to the east. With the new channel in operation, the degraded culverts along the old channel have been replaced (Figure 36), and the down trees and beaver dams found in 2020 have been removed (Figure 37, Figure 38). Downstream of Pike Lake Road in Segment 5C, the sediment delta continues to accumulate sediment (Figure 39). A dredging project is currently under development to remove the accumulated sediment from the pond.

Segment 5 – Invasive Species

New locations of purple loosestrife were discovered in Segment 5A downstream of the County Road 16 box culverts. In addition, several purple loosestrife plants were found within the wetland adjacent to the sediment pond in Segment 5C and in the stormwater pond to the northeast of Pike Lake Road. The stormwater pond is outside the easement of the PLOC; therefore, coordination with the City of Shakopee is recommended to manage this population since the pond occurs in close proximity to the PLOC. The small patch of invasive common reed (*Phragmites australis*) documented in 2020 in the west stormwater pond of Segment 5A did not have any new growth in 2021. RES treated this patch in the summer of 2020 and it appears the treatment was effective. The wetland areas within Segment 5A should be monitored closely again in the summer of 2022 and any new plants should be promptly treated or removed before seeds develop. Purple loosestrife and phragmites management in this segment is particularly important since the site is located just upstream of Deans Lake which contains a large wetland complex vulnerable to loosestrife and phragmites invasion. Figure 40 and Figure 41 show the locations of target invasive species identified in this segment.



Figure 34. Drained stormwater pond due to muskrat tunnels under the berm along the PLOC



Figure 35. Inlet to the new outlet channel in Segment 5B



Figure 36. New box culvert installed within the old channel in Segment 5B



Figure 37. Tree and beaver dam removal from the old channel in Segment 5B



Figure 38. Tree removal along the old channel in Segment 5B



Figure 39. Sediment delta located downstream of Pike Lake Road in Segment 5C

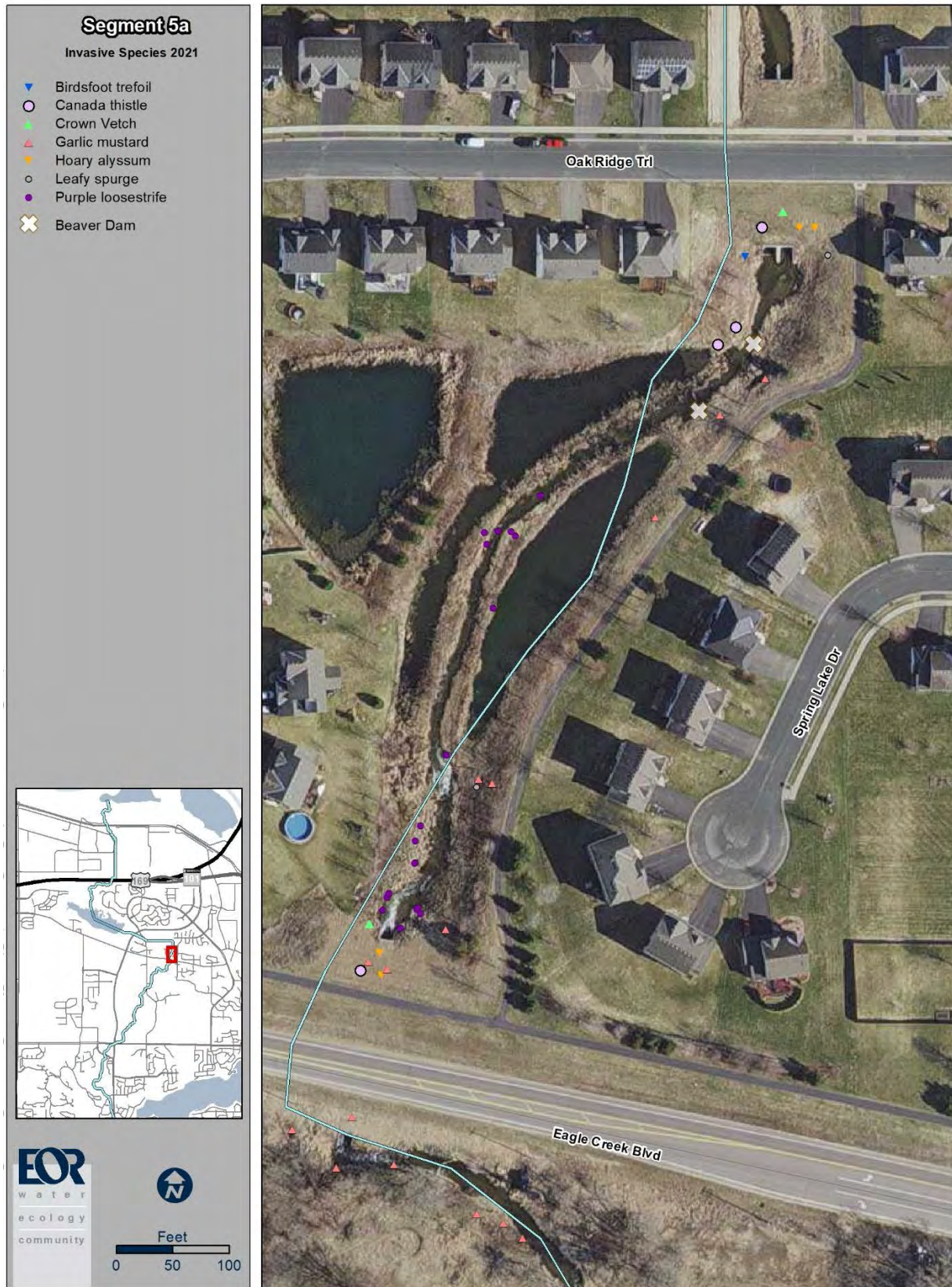




Figure 41. Target invasive species along Segment 5C

Segment 6 – Channel Condition

The sediment delta at the inlet to the Deans Lake bypass channel documented in 2018 has now become vegetated with wetland plants. The sediment delta bridges the entire mouth of the bypass channel and directs low flows into Deans Lake (Figure 42). Although the bypass channel still functions during high flow events through the PLOC, it is recommended the sediment delta be removed to increase flows through the bypass channel and reduce nutrient loading to Deans Lake. 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 surveys. The channel banks throughout this segment are well vegetated and show little evidence of bank erosion (Figure 43, Figure 44).

Segment 6 – Invasive Species

One purple loosestrife plant was found downstream of the Deans Lake weir where management was conducted in 2017. RES treated the plant in late July/ early August. It is recommended this area continue to be monitored due to the existence of purple loosestrife just upstream in Segment 5C. Figure 45 shows the locations of target invasive species identified in this segment.



Figure 42. Channel downstream of County Road 21 & sediment delta in bypass channel



Figure 43. Stable, vegetated stream banks downstream of the Deans Lake weir



Figure 44. Stable, vegetated stream banks upstream of Highway 169



Figure 45. Target invasive species along Segment 6

Segment 7 – Channel Condition

The channel banks downstream of Highway 169 are well vegetated and show little evidence of bank erosion (Figure 46). The sheet pile weirs within the reach were mostly free of debris during the inspections but are showing considerable rust and corrosion. Due to low flows in the channel throughout 2021, significant vegetation growth has occurred along the channel bottom (Figure 47). The beaver dams found in 2020 were no longer active.

The stream banks repaired in Segment 7A and 7B in 2019 appeared stable with vegetation developing in areas where the tree canopy was thinned. With toe stabilization in place, the eroded banks are beginning to self-heal, though the vertical banks will continue to erode until a stable bank slope becomes established (Figure 48, Figure 49, Figure 50). A few large trees have fallen into the channel immediately upstream of the railroad crossing and should be removed to prevent potential blockage of the railroad culvert (Figure 51).

Segment 7 – Invasive Species

Several purple loosestrife plants were found in the areas where the species was documented in 2017 as well as in new locations immediately downstream of Hwy 169. Management of this species will be problematic until the source of seed from the western stormwater pond can be controlled where numerous plants were observed in 2021 (see east-west linear pond at the bottom of Figure 52). The wetland complex west of Segment 7A was managed with both biological control (purple loosestrife beetles and weevils) and herbicide treatments since 2018 and will need to continue until the source zone of purple loosestrife can be managed. Any loosestrife plants should be treated with herbicide prior to seed development, and follow-up inspections should be conducted in July/August to determine treatment effectiveness. Seed-producing plants should be cut or treated, and the seed heads bagged and removed from site.

On July 1, EOR staff collected several hundred leafy spurge flea beetles from a population discovered west of the intersection of Valley Park Drive and Innovation Blvd. Most of the flea beetles collected were *Aphthona lacertosa*, but some *Aphthona nigriscutis* beetles were also collected. The beetles were released at two separate locations to support previous beetle release efforts in the area (Figure 52).

Monitoring and treatment of garlic mustard, common buckthorn, bush honeysuckle, and other invasives should continue within the wooded areas now that the streambank stabilization project has been completed. Managing for an open canopy along the channel will allow for greater establishment of herbaceous vegetation and promote further self-healing of the stream banks. Figure 52 and Figure 53 show the locations of target invasive species identified in this segment.



Figure 46. Vegetated stream banks in the upper reach of Segment 7A



Figure 47. Vegetation growth along the bottom of the outlet channel in Segment 7A



Figure 48. Self-healing stream banks in Segment 7A



Figure 49. Self-healing stream banks in Segment 7A



Figure 50. Self-healing stream banks in Segment 7B



Figure 51. Down trees in the channel just upstream of the railroad culvert in Segment 7A



Figure 52. Target invasive species along Segment 7A



Figure 53. Target invasive species along Segment 7B

Appendix A

Vegetation Management Conducted in 2021

Segment 1

- May 21: Natural Shore Technologies cut garlic mustard along the walking path south of Fountain Hills Road
- June 22 & August 20: Three wild parsnip populations were managed by EOR and PLSLWD staff, including the area just north of Jeffers Pass NW, the area east of Chickadee Landing on Jeffers Pond Elementary School property, the east and west sides of the channel just north of Fountain Hills Road, and the city-owned parcel at the southwest quadrant of Jeffers Pass NW and Eagle Creek Avenue. All plants were dug up with a shovel, bagged, and removed from the site
- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Woody invasive foliar treatments by RES

Segment 2

- May 21: Natural Shore Technologies attempted to cut garlic mustard in this segment but could not access the park due to construction. EOR staff hand-pulled several dozen plants on May 15 downstream of the last culvert crossing at Pike Lake Park
- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Buckthorn foliar treatments by RES

Segment 3

- May 15: During the channel inspection, EOR scouted for garlic mustard in the Kici Yapi area previously managed by hand-pulling efforts. Several garlic mustard plants were found and hand-pulled
- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Woody invasive foliar treatments by RES

Segment 4

- May 21: Natural Shore Technologies cut garlic mustard at known locations between Pike Lake Trail and County Road 16
- June 22 & August 20: EOR staff dug up wild parsnip from the known location downstream of Pike Lake Trail. The plants were bagged and removed from the site
- Late July/early August: Herbaceous invasive treatments by RES
- Mid-September: Buckthorn foliar treatments by RES

Segment 5

- May 21: Natural Shore Technologies cut garlic mustard at Segment 5A
- Late July/early August: Herbaceous invasive treatments by RES including the purple loosestrife near the sediment pond in Segment 5C
- August 13: EOR staff hand-pulled purple loosestrife plants along the flow channel in Segment 5A and the adjacent eastern stormwater pond where new plants were discovered in 2021

Segment 6

- Late July/early August: Herbaceous invasive treatments by RES

Segment 7

- May 21: Natural Shore Technologies cut garlic mustard at Segment 7A & 7B
- Late July/early August: Herbaceous invasive treatments by RES including purple loosestrife along the channel at previous known locations
- July 1: Several hundred leafy spurge flea beetles were collected by EOR staff from a population discovered west of the intersection of Valley Park Drive and Innovation Blvd (Figure 54). The beetles were released at two separate locations where dense patches of leafy spurge were found
- August 13: EOR staff hand-pulled purple loosestrife plants immediately downstream of Highway 169 where new plants were discovered in 2021. These plants are likely the result of seed dispersal from the stormwater pond located immediately west of the PLOC. The stormwater pond discharges directly to the PLOC immediately downstream of Highway 169
- Mid-September: Buckthorn foliar treatments by RES



Figure 54. Leafy spurge flea beetles collected and released in Segment 7A in 2021. Most of the beetles were *Aphthona lacertosa* (black beetles) but some *Aphthona nigriscutis* (brown beetles) were also collected

Appendix B

Channel and Vegetation Management Recommendations for 2022

Segment 1

Channel

- Continue inspections in 2022 and monitor stability of bank repair areas
- Remove fallen trees within the channel upstream of CR 42 (unless tree removal is part of future bank repair work)
- Remove blown-out culvert located upstream of CR 42 (old field crossing culvert) to reduce potential for channel obstruction during high flows

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank from Jeffers Pass NW to Jeffers Pond
- Remove large Siberian elm tree near Chickadee Landing and place in pond for a loafing log
- Scout and treat target herbaceous invasive species from Jeffers Pass NW to CR 42 (excluding open water areas around upper and lower Jeffers Pond). Conduct the work between May and early July to prevent plants from maturing and producing seed

Segment 2

Channel

- Continue inspections in 2022 and monitor stability of bank repair areas
- Remove the sediment delta at the outlet of Segment 2 in Pike Lake

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank throughout project reach (CR 42 to Pike Lake)
- Scout and treat target herbaceous invasive species from CR 42 to Pike Lake. Conduct the work between May and early July to prevent plants from maturing and producing seed

Segment 3

Channel

- Continue inspections in 2022 and monitor stability of bank repair areas

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank throughout the segment (outlet of Pike Lake to Pike Lake Trail, excluding the open water zone around the large wetland)
- Scout and treat target herbaceous invasive species from outlet of Pike Lake to Pike Lake Trail, excluding the open water zone around the large wetland. Conduct the work between May and early July to prevent plants from maturing and producing seed

Segment 4

Channel

- Continue inspections in 2022 and monitor stability of bank repair areas
- Remove fallen trees within the channel at upstream end of Segment 4B

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank within the remaining wooded areas downstream of Jackson Trail
- Scout and treat target herbaceous invasive species from Pike Lake Trail to CR 16. Conduct the work between May and early July to prevent plants from maturing and producing seed

Segment 5

Channel

- Continue inspections in 2022 including new outlet channel

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank along the old outlet channel ditch in Segment 5B
- Scout and treat for target herbaceous invasive species between CR 16 to Pike Lake Road, including the new outlet channel in Segment 5B and along the old ditch channel. Conduct the work between May and early July to prevent plants from maturing and producing seed
- Coordinate with the City of Shakopee to manage purple loosestrife in the ponds located east of Pike Lake Road and south of CR 21. These ponds are outside the PLOC easement but occur near the outlet channel are a likely seed source to downstream wetlands along the PLOC

Segment 6

Channel

- Remove the sediment delta at the upstream end of the Deans Lake bypass channel located immediately downstream of CR 21. Continue inspections in 2022

Vegetation

- Scout and treat for target herbaceous invasive species around the Deans Lake outlet. Conduct the work between May and early July to prevent plants from maturing and producing seed

Segment 7

Channel

- Continue inspections in 2022 and monitor stability of bank repair areas

Vegetation

- Perform cut stump and foliar spray of all woody invasive species located within 30 feet from the top of the bank within the wooded areas of Segment 7A and Segment 7B
- Scout and treat target herbaceous invasive species from Highway 169 to Highway 101. Also scout for and treat for purple loosestrife along the eastern edge of the large wetland complex in Segment 7A. Conduct the work between May and early July to prevent plants from maturing and producing seed
- Coordinate with MNDOT to manage purple loosestrife in the long east/west pond immediately north of Highway 169. The pond is located in the MNDOT right-of-way and discharges to the PLOC. The purple loosestrife in the pond is a seed source to downstream wetlands along the PLOC
- Monitor for establishment of leafy spurge flea beetles in areas where beetle releases have occurred. Change or modify biological management techniques if warranted.
- Continue hand-removal of invasive species (primarily spotted knapweed, hoary alyssum, vetch species, and sweet clover) in the remnant strip of sand prairie that contains rare species