

Project Name | PLOC Channel & Vegetation Inspections

Date | 12/7/2022

To | Joni Giese, PLSLWD Administrator

Cc | Carl Almer

From | Mike Majeski

Regarding | Channel and Vegetation Inspections – 2022 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 invasive species growing within the PLOC easements. Following the assessment, recommendations have been provided to address specific populations of invasive species along the outlet channel to increase the density and diversity of native herbaceous vegetation and to protect the channel banks from erosion.

Methodology

The PLOC was assessed on foot from Segment 1 to Segment 7 on May 18th and October 24th, with a targeted invasive species survey conducted on August 11th. 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 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 (Joni Giese) via a shared Microsoft® OneDrive link.

Per the Minnesota Noxious Weed Law (Minnesota Statutes 18.75-18.91), invasive species were surveyed along the PLOC during the channel inspections to help guide early detection and management of satellite populations of invasive species, particularly those species known to occur along the PLOC, including garlic mustard (*Alliaria petiolata*), purple loosestrife (*Lythrum salicaria*), wild parsnip (*Pastinaca sativa*), Japanese hedge parsley (*Torilis japonica*), spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), and leafy spurge (*Euphorbia virgata*). The vegetation surveys targeted early detection invasive species such as those found in the Minnesota Department of Agriculture Noxious Weed List 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. In addition, prolific invasive species such as reed canary grass (*Phalaris arundinacea*) and smooth brome (*Bromus inermis*) were also excluded due to their wide distribution in the region. For the vegetation assessments, a GPS

was used to survey the locations of satellite populations of invasive species. Appendix A includes a summary of vegetation management conducted in 2022 by Resource Environmental Solutions (RES), Natural Shore Technologies (NST), Emmons & Olivier Resources, Inc. (EOR), and Prior Lake-Spring Lake Watershed District (PLSLWD) staff. Appendix B includes a summary of recommendations for channel and vegetation management in 2023.

Results

Segment 1 - Channel Condition

The low water levels in 2022 enabled greater establishment of riparian vegetation along the lower stream banks throughout the segment, and self-healing of previously eroded banks continue in areas where repairs were made near Jeffers Pond Elementary School (Figure 1). A small bank repair was completed during the summer of 2022 that extended boulder toe rock along the right bank just upstream of the walking path at Fountain Hills Road where erosion was previously documented (Figure 2). Downstream of Fountain Hills Road, bank erosion persists in the wooded reach where undercut banks are exposed, though the rate of bank erosion has been minimal over the last several years (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 trees and branches are currently not impeding flow but may catch debris during high flows. The beaver dams observed in this reach in 2020 appear inactive and were not holding back any water during the inspections completed in 2022.

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 2021, including the grassy area southwest of the intersection of Jeffers Pass NW and Eagle Creek Avenue, the north road slope along Fountain Hills Road, and in the grassy opening northeast of Chickadee Landing on Jeffers Pond Elementary School property. In addition, staff from NST found a new patch of wild parsnip downstream of Fountain Hills Road during their spring vegetation management trip. Japanese hedge parsley was observed again just downstream of Jeffers Pass NW. Monitoring and treatment for known invasive species, particularly wild parsnip, Japanese hedge parsley, and Queen Ann's lace should continue in 2023 to limit the spread of these species. Figure 5 and Figure 6 show the locations of target invasive species identified in this segment.



Figure 1. Self-healing bank downstream of foot bridge near Jeffers Pond Elementary School



Figure 2. Bank repair upstream of Fountain Hills Road walking trail



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. The primary bank stabilization practices implemented included placement of boulder toe along the sides of the channel and installation of rock cross vanes (Figure 7-Figure 9). Toe erosion has been minimized following the repair project, but surface erosion of the upper stream banks persists in areas with heavy shade (Figure 10). Following recent residential development in this reach, several new culverts have been installed within the channel and the culvert outfalls appeared stable (Figure 11). Tree loss has been significant as a result of the development, but the openings in the canopy have allowed herbaceous vegetation to become well established along the channel (Figure 12, Figure 13). Some leaning trees and down trees exist in this segment but are not currently impeding flow.

Segment 2 – Invasive Species

No new invasive species were found in this segment. In the fall of 2022, the City of Prior Lake conducted forestry mowing in Pike Lake Park to remove woody invasive species (Figure 14). Monitoring and treatment for garlic mustard, black locust, and common buckthorn should continue in 2023 to limit the spread of these species. 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. Boulder toe and cross vanes from the FEMA project



Figure 9. Boulder toe bank stabilization from the FEMA project



Figure 10. Upper bank surface erosion in areas with heavy shade



Figure 11. New culvert installed for a new road crossing (Marsh Drive NE)



Figure 12. Open canopy and dense riparian vegetation along channel banks upstream of Marsh Drive NE



Figure 13. Open canopy and dense riparian vegetation downstream of Marsh Drive NE



Figure 14. Forestry mowing of invasive species conducted along the PLOC in Pike Lake Park



Figure 15. Target invasive species along Segment 2

Segment 3 - Channel Condition

Numerous stream banks within this segment were repaired in 2019 using boulder toe stabilization (Figures 16-18). Boulder cross vanes were also installed in several locations for grade control and to concentrate flows to the center of the channel (Figure 19). The two wooden foot bridges in the Kici Yapi reach have been removed in 2022 (Figure 20). With limited flow during the growing season, riparian vegetation growth has occurred in the channel and adjacent banks (Figure 21, Figure 22).

Segment 3 - Invasive Species

No new invasive species were found in this segment. Small saplings of black locust, common buckthorn (*Rhamnus cathartica*) and bush honeysuckle (*Lonicera spp.*) were observed in areas previously managed. Coordination with the Shakopee Mdewakanton Sioux Community is recommended to manage future populations of invasive species in this segment. Figure 23 shows the locations of target invasive species identified in this segment.



Figure 16. Rock bank stabilization at the upstream end of the Kici Yapi reach



Figure 17. Bank stabilization along the gravel road in the Kici Yapi reach



Figure 18. Bank stabilization and grade control in the middle of the Kici Yapi reach



Figure 19. Rock cross vane in the Kici Yapi reach



Figure 20. Location of a former wooden bridge that was removed in 2022 in the Kici Yapi reach



Figure 21. Vegetation establishment within the channel in the Kici Yapi reach



Figure 22. Dense vegetation within the channel upstream of Pike Lake Trail

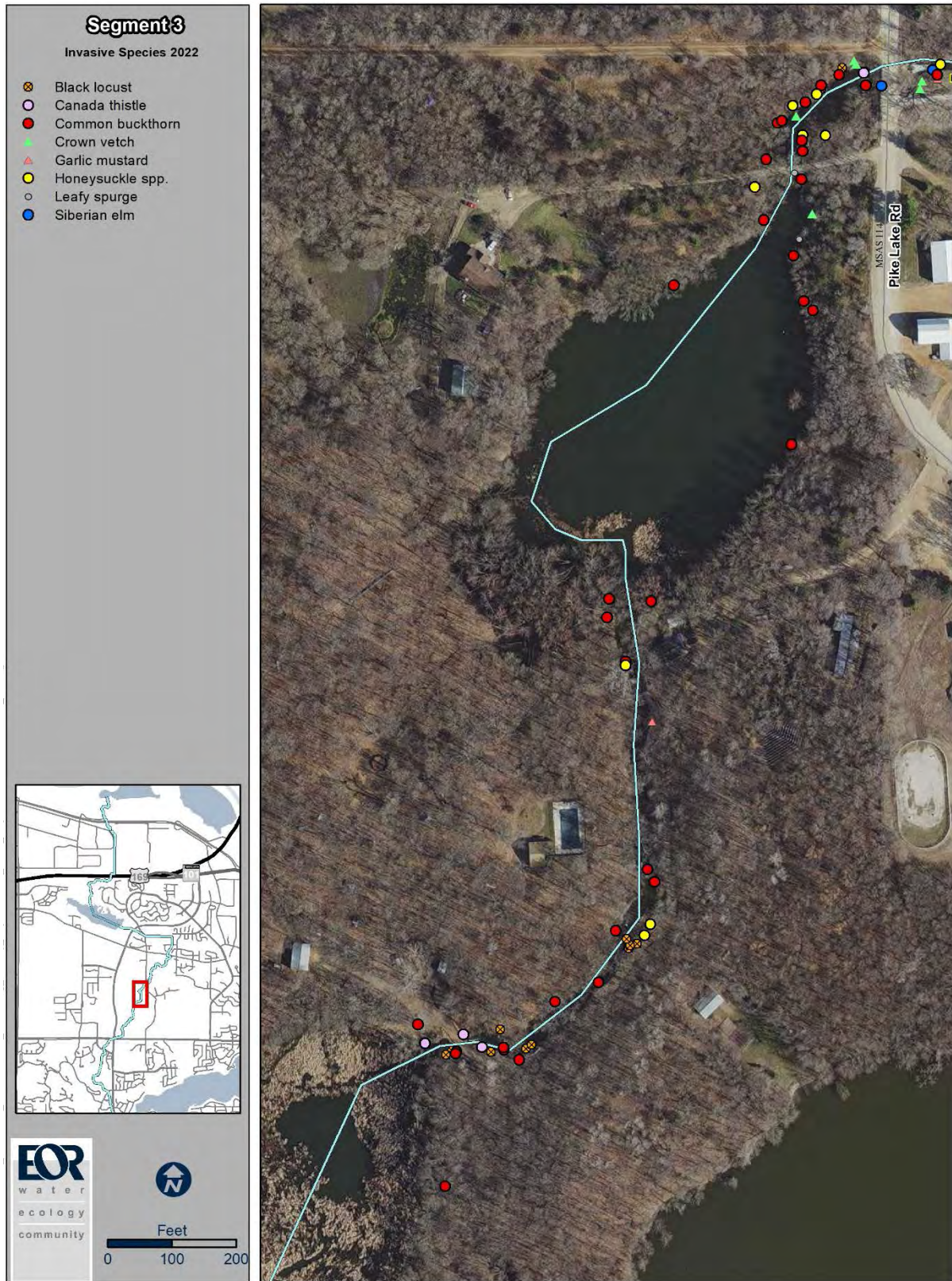


Figure 23. Target invasive species along Segment 3

Segment 4 - Channel Condition

In Segment 4A, the stream banks were repaired in the summer of 2022 using boulder toe rock and grade control structures (Figure 24). Floodplain benches were also excavated to dissipate flood energy within the channel (Figure 25, Figure 26). The repairs included tree harvest to remove invasive species and allow access for bank grading to create floodplain benches. With limited flow during 2022, vegetation has become well established within the channel (Figure 27, Figure 28).

The stream banks stabilized by the FEMA-funded project that were repaired in 2021 were in good condition with dense riparian vegetation along the stream banks (Figure 29, Figure 30). A new box culvert was installed in the developed reach of Segment 4B, and the fallen trees documented in 2021 were removed for placement of the culvert (Figure 31).

Segment 4 - Invasive Species

During the August vegetation inspection, one purple loosestrife plant was found at the upstream end of Segment 4A, and five purple loosestrife plants were found at the far downstream end of Segment 4B near County Road 16. Monitoring and treatment for known invasive species, particularly wild parsnip, garlic mustard, Japanese hedge parsley, and purple loosestrife should continue in 2023 to limit the spread of these species. Figure 32 and Figure 33 show the locations of target invasive species identified in this segment.



Figure 24. Repaired boulder toe downstream of Pike Lake Trail



Figure 25. Repaired channel and floodplain bench upstream of Jackson Trail



Figure 26. Repaired channel and floodplain benches downstream of the Gonyea culvert



Figure 27. Dense vegetation within the PLOC channel in Segment 4A



Figure 28. Dense vegetation within the PLOC channel in Segment 4A



Figure 29. FEMA bank repair area in Segment 4B with established vegetation



Figure 30. FEMA bank repair area in Segment 4B with established vegetation



Figure 31. New box culvert and road crossing in Segment 4B



Figure 32. Target invasive species along Segment 4A



Figure 33. Target invasive species along Segment 4B

Segment 5 - Channel Condition

In the summer of 2022, boulder weirs were installed at the downstream end of Segment 5A to increase water storage and flood capacity of the wetland system between County Road 16 and Oak Ridge Trail (Figure 34). With the addition of the boulder weirs, the east and west stormwater ponds in Segment 5A are now equalized with the water level in the outlet channel (Figure 35).

In Segment 5B, construction of the new outlet channel has been completed and new culverts have been installed along the new channel alignment (Figure 36). The new channel is stable and contains grade control structures (rock cross vanes), rootwads, and graded streambanks (Figure 37, Figure 38).

The sediment delta in Segment 5C downstream of Pike Lake Road was removed in early 2022 (Figure 39).

Segment 5 - Invasive Species

Small pockets of purple loosestrife were documented in Segment 5A downstream of the County Road 16 box culverts and one plant was found downstream of Oak Ridge Trail. In addition, several purple loosestrife plants were found within the abandoned ditch (old PLOC alignment) in Segment 5B. Since the ditch is no longer part of the PLOC, EOR coordinated with the City of Shakopee to treat the plants in the ditch, and their staff removed the plants in August 2022. Only one purple loosestrife plant was observed in Segment 5C in 2022. RES treated purple loosestrife in this area in 2021, and it appears the treatment was effective. Monitoring and treatment for known invasive species, particularly garlic mustard and purple loosestrife, should continue in 2023 to limit the spread of these species. Figure 40, Figure 41, and Figure 42 show the locations of target invasive species identified in this segment.



Figure 34. Boulder weirs installed upstream of Oak Ridge Trail in Segment 5A



Figure 35. Equalized water levels in the west stormwater pond in Segment 5A



Figure 36. New box culvert installed at the upstream end of the new channel alignment in Segment 5B



Figure 37. Boulder cross vane grade control installed in the new channel alignment in Segment 5B



Figure 38. Rootwads installed along the new channel alignment in Segment 5B



Figure 39. Open water pond downstream of Pike Lake Road in Segment 5C



Figure 40. Target invasive species along Segment 5A

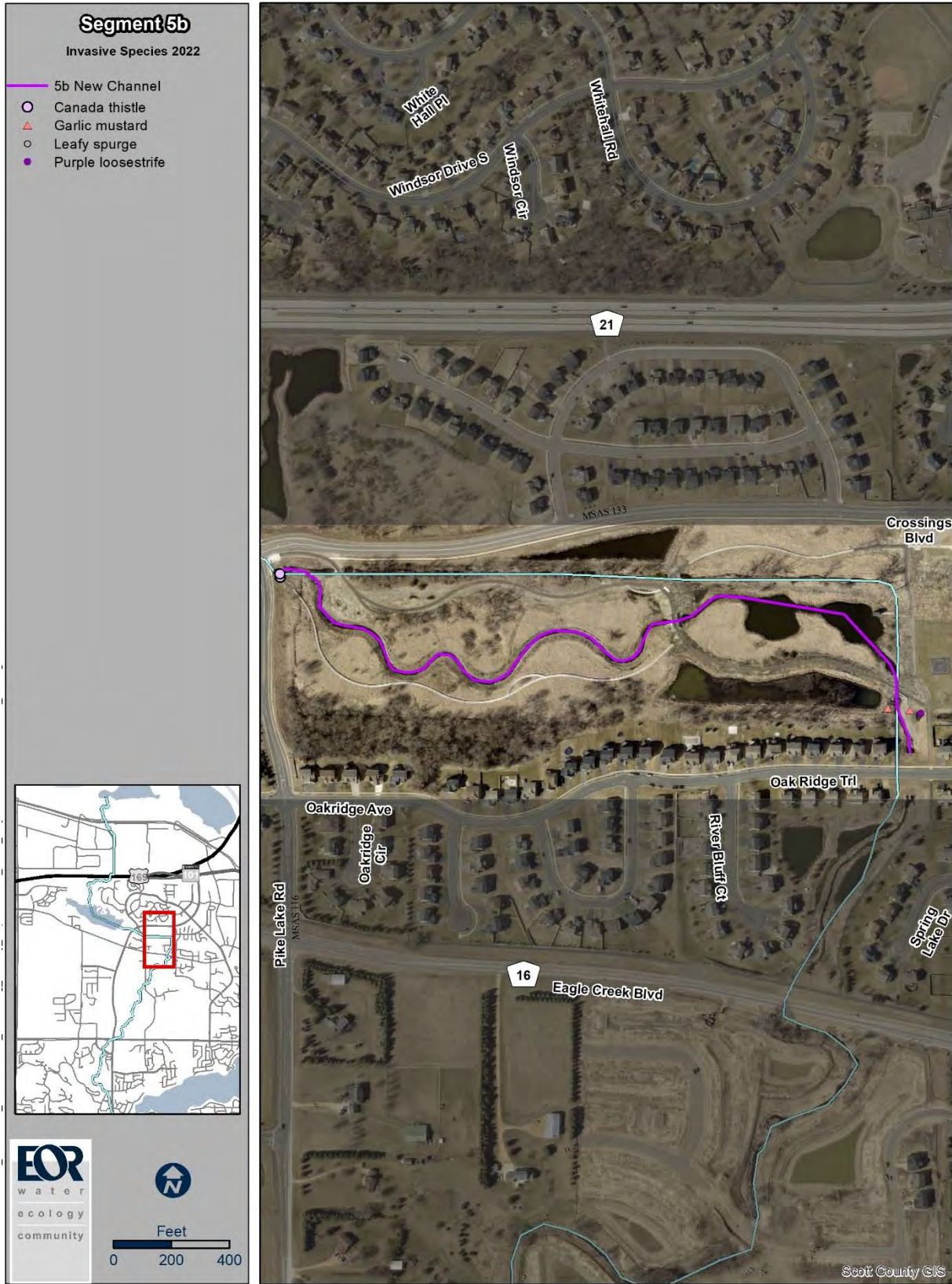


Figure 41. Target invasive species along Segment 5B



Figure 42. Target invasive species along Segment 5C

Segment 6 - Channel Condition

The Deans Lake bypass channel was dry during the fall survey and no water was present upstream of the Deans Lake weir (Figure 43, Figure 44). The Deans Lake weir appears to be in good condition and no debris was found at the weir outlet. The channel banks throughout this segment are well vegetated and show little evidence of bank erosion (Figure 45).

Segment 6 - Invasive Species

Several purple loosestrife plants were found downstream of the Deans Lake weir and were managed by NST staff in August 2022. Monitoring and treatment for known invasive species, particularly purple loosestrife, should continue in 2023 to limit the spread of these species. Figure 46 shows the locations of target invasive species identified in this segment.



Figure 43. Channel downstream of County Road 21 & bypass channel



Figure 44. Stable, vegetated stream banks downstream of the Deans Lake weir



Figure 45. Stable, vegetated stream banks upstream of Highway 169



Figure 46. Target invasive species along Segment 6

Segment 7 - Channel Condition

The channel banks in Segment 7A are well vegetated and show little evidence of bank erosion (Figure 47). The sheet pile weirs within the reach are very rusted but are still functional (Figure 48). Low flows and persistent drought conditions throughout 2021 and 2022 have resulted in vegetation establishment along the channel bottom and possible abandonment of the beaver dams documented in 2020.

The stream banks repaired in 2019 along Segment 7A and 7B appear stable with vegetation fully established in areas where the tree canopy was thinned (Figure 49). Similar to Segment 7A, the low flows in Segment 7B have allowed vegetation to establish within the outlet channel (Figure 50). Down trees occur in the channel upstream of the railroad box culvert and recent windfall was also found in the wooded reach downstream of the railroad crossing, but the wood is not currently impeding flow (Figure 51, Figure 52).

Segment 7 - Invasive Species

No purple loosestrife plants were found in the areas where the species was managed in 2021, and the spread of seeds from known populations was likely inhibited by drought conditions throughout the year. However, long term management of this species will be problematic until the source of seed from the western MNDOT stormwater pond can be controlled where numerous plants were observed in 2021 (see east-west linear pond at the bottom of Figure 53).

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 further establishment of herbaceous vegetation and promote self-healing of the upper stream banks. Figure 53 and Figure 54 show the locations of target invasive species identified in this segment.



Figure 47. Vegetated channel in Segment 7A



Figure 48. Corroded sheet pile weir in Segment 7A



Figure 49. Former bank repair area and vegetation establishment in Segment 7B



Figure 50. Vegetated channel in Segment 7B



Figure 51. Recent windfall in Segment 7B



Figure 52. Down willow tree just upstream of Highway 101 in Segment 7B



Figure 53. Target invasive species along Segment 7A

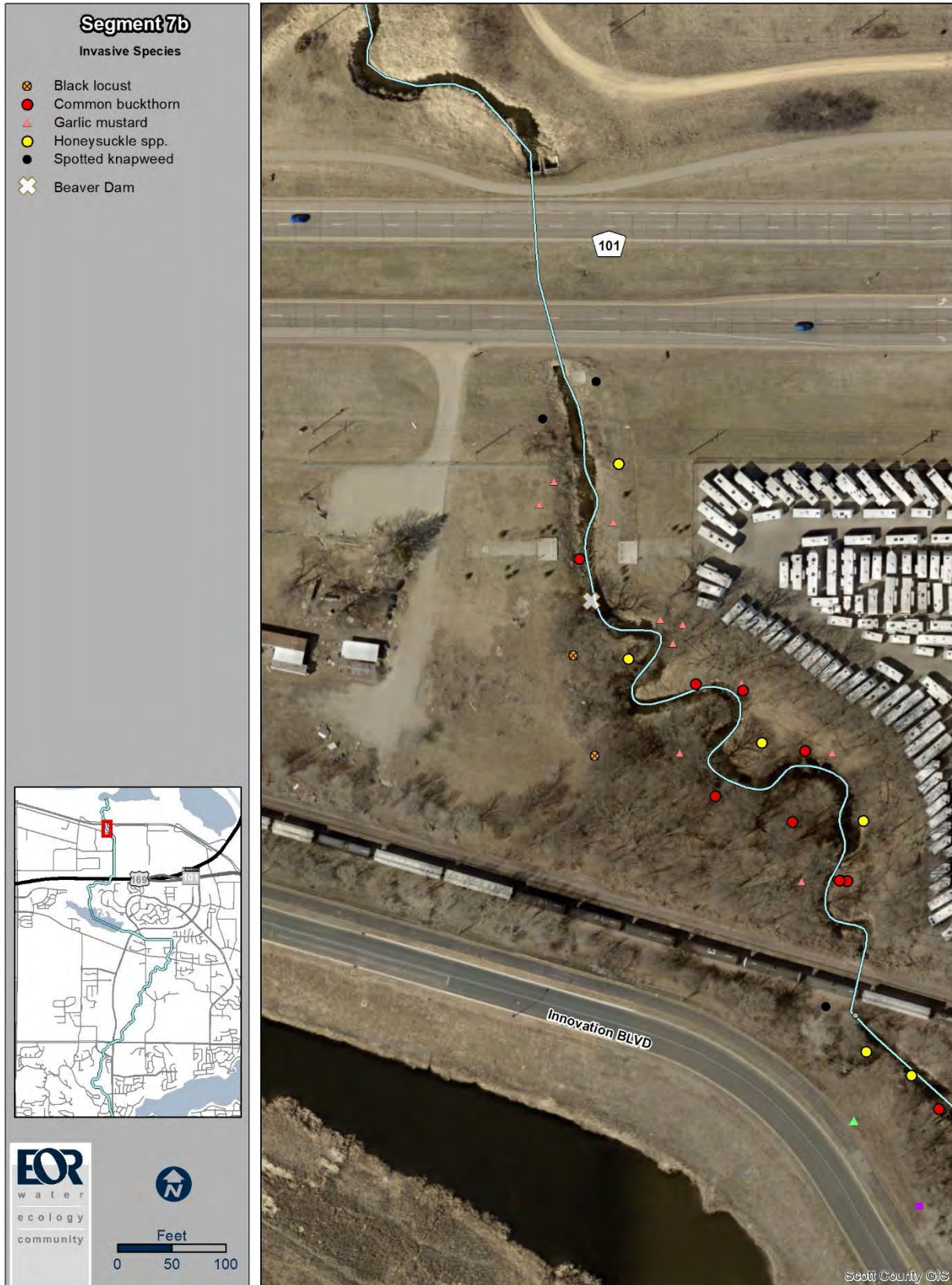


Figure 54. Target invasive species along Segment 7B

Appendix A

Vegetation Management Conducted in 2022

Segment 1

- Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to County Road 42. NST also cut down the large Siberian elm near Chickadee Landing and placed the tree in the pond for a loafing log.
- June 6: 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 and disposed of onsite.
- July 22: Herbaceous invasive treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 1A South. Note from NST: "All Japanese Hedge Parsley going to seed was bagged and taken off site. Visible rosettes were also pulled and left on site to decay. Identified Wild Parsnip segments were scouted, and plants were sprayed with Aquaneat. The Wild Parsnip rosettes were fairly small, 10-20 plants were treated with herbicide."
- Early to mid-October: Woody invasive foliar treatments by RES.

Segment 2

- Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Pike Lake.
- Early to mid-October: Woody invasive foliar treatments by RES.

Segment 3

- Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Pike Lake Trail.
- Early to mid-October: Woody invasive foliar treatments by RES.

Segment 4

- Late May: NST treated wild parsnip, garlic mustard, and other broadleaf weeds within the channel easements downstream to County Road 16.
- July 22: Herbaceous invasive treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 4A & 4B. Note from NST: "Segment 4A: 1 purple loosestrife was cut and treated with Aquaneat and bagged and taken off site. 2 wild parsnip rosettes that survived the last herbicide treatment were sprayed with Aquaneat. Segment 4B-5A: purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. Plants that were not blooming were placed on top of other vegetation to decay. 30+ plants were found and treated with herbicide."
- Early to mid-October: Woody invasive foliar treatments by RES.

Segment 5

- July 22: purple loosestrife treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 5A. Note from NST: “Segment 4B-5A: purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. Plants that were not blooming were placed on top of other vegetation to decay. 30+ plants were found and treated with herbicide.”
- August 11: During the summer vegetation survey, EOR staff hand-pulled 1 purple loosestrife plant at the edge of the sediment pond in Segment 5C.

Segment 6

- Late May: NST treated broadleaf weeds within the channel easements downstream of Deans Lake weir.
- July 22: Herbaceous invasive treatments by NST.
- August 22: Follow-up herbaceous treatments by NST in Segment 6. Note from NST: “Purple loosestrife was cut and treated with Aquaneat, bagged, and taken off site. 5 plants were found and treated with herbicide.”

Segment 7

- Late May: NST treated garlic mustard and other broadleaf weeds within the channel easements downstream to Highway 101.
- July 22: Herbaceous invasive treatments by NST.
- August 11: During the summer vegetation survey, EOR staff hand-pulled 1 purple loosestrife plant in Segment 7A.
- Early to mid-October: Woody invasive foliar treatments by RES.

Appendix B

Channel and Vegetation Management Recommendations for 2023

Segment 1

Channel

- Continue inspections in 2023 and monitor stability of bank repair areas.
- Stabilize eroding banks and remove fallen trees within the channel upstream of County Road 42.
- Remove blown-out field culvert upstream of County Road 42 (old field crossing culvert) if future bank stability work is planned in this area.

Vegetation

- Perform cut stump treatments / foliar spray of all woody invasive trees, shrubs, and saplings located within 30 feet from the top of the bank from Jeffers Pass NW to upper Jeffers Pond and from the outlet of Jeffers Pond to Fountain Hills Road.
- Scout and treat target herbaceous invasive species from Jeffers Pass NW to County Road 42 (excluding open water areas around upper and lower Jeffers Pond). Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.

Segment 2

Channel

- Continue inspections in 2023 and monitor stability of bank repair areas and channel modifications in the new development area.

Vegetation

- Perform cut stump treatments / foliar spray of all woody invasive trees, shrubs, and saplings located within 30 feet from the top of the bank from County Road 42 to Pike Lake.
- Scout and treat target herbaceous invasive species from County Road 42 to Pike Lake. Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.

Segment 3

Channel

- Continue inspections in 2023 and monitor stability of bank repair areas.

Vegetation

- Perform cut stump treatments / foliar spray of all woody invasive trees, shrubs, and saplings located within 30 feet from the top of the bank from the outlet of Pike Lake to Pike Lake Trail, excluding the open water zone around the large wetland and the Kici Yapi reach.

- Coordinate with the Shakopee Mdewakanton Sioux Community to manage invasive species along the Kici Yapi reach.
- 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 and the Kici Yapi reach. Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.

Segment 4

Channel

- Continue inspections in 2023 and monitor stability of bank repair areas.

Vegetation

- Perform cut stump treatments / foliar spray of all woody invasive trees, shrubs, and saplings located within 30 feet from the top of the bank within the remaining wooded areas downstream of Jackson Trail to County Road 16.
- Scout and treat target herbaceous invasive species from Pike Lake Trail to County Road 16. Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.

Segment 5

Channel

- Continue inspections in 2023 and monitor the stability of channel improvements and the new alignment in Segment 5B.

Vegetation

- Scout and treat for target herbaceous invasive species between County Road 16 to County Road 21, including the area around the sediment pond in Segment 5C. Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.
- Coordinate with the City of Shakopee to scout and treat purple loosestrife in the abandoned ditch in Segment 5B.

Segment 6

Vegetation

- Scout and treat for target herbaceous invasive species around the Deans Lake outlet. Conduct one trip in mid-late May and a second trip in early July to prevent target invasive species from maturing and producing seed.

Segment 7

Channel

- Continue inspections in 2023 and monitor stability of bank repair areas.
- Remove fallen trees within the channel upstream of the railroad crossing in Segment 7A and upstream of Highway 101 in Segment 7B.

Vegetation

- Perform cut stump treatments / foliar spray of all woody invasive trees, shrubs, and saplings 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 one trip in mid-late May and a second trip in early July to prevent target invasive species 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 in the MNDOT right-of-way and discharges directly to the PLOC. The purple loosestrife in the pond is a seed source to downstream wetlands along the PLOC.
- Monitor effectiveness of leafy spurge flea beetles in areas where beetle releases have occurred. Change or modify biological management approach 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 (EOR and PLSLWD staff).