Montana Department of Transportation Stream Mitigation Monitoring Report

# BOWSER CREEK MITIGATION SITE

## Project Overview

**MDT Project Number: NH-MT5-3(50)109F UPN #: 2038013**

**Watershed:** Watershed #4 - Flathead

**Monitoring Year**: 2024

**Years Monitored**: 12th year of monitoring

**Corps Permit Number**: NWO-2009-018098-MTM

**Monitoring Conducted By**: Confluence Consulting Inc.

**Monitoring Dates:** August 13, 2024

**Purpose of the approved project:**

The purpose of this project was to provide on-site compensatory mitigation for impacts to Bowser Creek from a highway interchange project at the junction of U.S. Highway 2 and the US 93 Kalispell Bypass. As a part of the project, Montana Department of Transportation (MDT) impacted a 709-foot segment of Bowser Creek to move it farther from the roadway and right-of way. The project was constructed in 2010 and involved relocating 430 linear feet of channel slightly to the north of its previous location, laying back floodplain slopes adjacent to the channel from 1.5:1 to a 4:1 slope (or flatter) and implementing an aggressive revegetation plan to re-establish native riparian and upland vegetation.

**Site Location:**

**Upstream Coordinates:** 48.1971988607, -114.341118964
**Downstream Coordinates:** 48.1972550009, -114.342793899
**County:** Flathead **Nearest Town:** Kalispell
**Map Included:** Figure 1

**Mitigation Site Construction Started:** 2010 **Construction Ended:** 2010

**Dates of any recent corrective or maintenance activities (since previous report):**
**Activity:** Management actions for noxious weeds **Date:** April 25, 2024

**Specific recommendations for additional corrective actions:** One recommendation is for MDT Maintenance to clean the trash rack at the culvert under US 2 periodically of debris to allow the movement of sediments within the restored Bowser Creek channel upstream of that location. Discuss with the US Army Corps of Engineers and staff botanists on whether planting additional woody vegetation along the stream banks is beneficial, or should we allow the volunteer woody vegetation community to expand as is occurring to meet this vegetative establishment goal.

**Previous Monitoring Reports and Methods Descriptions:**
https://www.mdt.mt.gov/publications/brochures/stream-mitigation.aspx

**Monitoring Period:** 5 years from construction completion or until concurrence by US Army Corps of Engineers (USACE).

**Requirements** (from approved mitigation plan, banking instrument, or DA permit conditions)

**Performance Standards:**

Results from the 2024 monitoring event indicate the Bowser Creek stream mitigation site is meeting five of the six quantitative performance standards established in the monitoring plan (Table 1). Thirteen years post-construction, the site exhibits 79% non-noxious vegetative cover, and noxious weeds comprise 6% of the vegetative cover within the riparian buffer. Planted tree and shrub survival was the only vegetation-based performance standard that did not meet the success criteria of ≥50% survival. Combined areal cover of riparian and stream bank vegetation is 88% and reed canary grass (*Phalaris arundinacea*) was the dominant vegetation community, with an associated Winward stability rating of 9. The stream banks are stable and water is able to access a floodplain during larger events; however, pool features have filled in with fine sediment over time due to lack of scour and incoming sediment loads from upstream sources.

**Table 1.** Summary of Performance Standards.

| Performance Standards | Success Criteria | Criteria Achieved Y/N | Discussion |
|---|---|---|---|
| **Riparian Buffer Success** | a. Areas within creditable riparian buffer disturbed during construction must have 50% or greater areal cover of non-weed species by the end of the monitoring period | Y | Riparian vegetation transects contained 79% cover from non-noxious species. |
| | b. Noxious weeds do not exceed 10% cover within the riparian buffer areas. | Y | Riparian vegetation transects contained 6% noxious weed cover. |
| **Vegetation Success** | a. Combined areal cover of riparian and stream bank vegetation communities is at least 70% | Y | Combined areal cover of riparian and stream bank vegetation is 88%. |
| | b. Planted trees and shrubs must exhibit 50% survival after 5 years. | N | This criterion has not been met. |
| **Vegetation along Stream Banks** | Majority of the stream bank must be vegetated by plants with a root stability index of at least 6. | Y | The dominant streambank community along both stream banks is community Type 2-*Phalaris arundinacea*, which has a root stability index of 9. |
| **Stream Bank Stability** | Less than 25% of bank length is unstable and classified as eroding bank. | Y | A single eroding bank was observed (7 linear feet) located immediately downstream of the detention area culvert. Less than 25% of total bank length. |
| **Channel Form (Qualitative)** | Stream has stabilized, includes pools and riffles, is able to occupy the floodplain during flood events, and riparian plant communities have successfully established along the streambanks. | N | Channel planform is stable, but pool depths have shallowed due to sediment deposition and lack of scour. Riffle elevations generally remain consistent. The stream is able to access the floodplain, and riparian plant communities are well established along the streambanks. |

**Additional Reporting Requirements:**

1. **Photo Document** success of restored stream channel and stream bank vegetation community development showing distinct positive changes from pre-construction to final monitoring year in comparison with the establishment reference reach.

**Summary Data**

***Riparian and Stream Bank Vegetation Inventory***

In 2024, average areal cover values for riparian and stream bank vegetation transects were 88% total vegetation cover, 6% woody species cover, and 5% noxious weed cover (Table 2). Total cover values are calculated using an area-weighted average of the riparian and streambank transects (i.e. the average accounts for the transects being of different lengths and widths). The total percent cover within riparian transects was 85%, which included 7% cover by woody species and 6% by noxious weeds. Stream bank transects exhibited 95% total cover which includes 4% woody species cover and 4% noxious weed cover.

**Table 2.** Vegetation cover estimates at the Bowser Creek Stream Mitigation Site in 2013, and 2022-2024. Average values are area weighted to account for differences in belt transect area.

| Belt Transect | Length (ft) | Total % Vegetation Cover | | | | % Woody Cover | | | | % Noxious Weed Cover | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2013 | 2022 | 2023 | 2024 | 2013 | 2022 | 2023 | 2024 | 2013 | 2022 | 2023 | 2024 |
| Right (South) Riparian[a] | 204 | 100 | 79 | 82 | 83 | 2 | 6 | 7 | 7 | 2 | 2 | 4 | 5 |
| Left (North) Riparian[a] | 167 | 100 | 85 | 88 | 88 | 14 | 6 | 6 | 6 | 5 | 3 | 6 | 7 |
| **Riparian Average** | | 100 | 82 | 85 | 85 | 8 | 6 | 7 | 7 | 4 | 3 | 5 | 6 |
| Right (South) Stream Bank[b] | 465 | 100 | 94 | 95 | 95 | 17 | 3 | 4 | 4 | 4 | 3 | 3 | 4 |
| Left (North) Stream Bank[b] | 465 | 100 | 95 | 95 | 95 | 12 | 4 | 4 | 4 | 4 | 2 | 2 | 3 |
| **Stream Bank Average** | | 100 | 95 | 95 | 95 | 15 | 4 | 4 | 4 | 4 | 3 | 3 | 4 |
| **Riparian and Stream Area Weighted Average** | | **100** | **85** | **87** | **88** | **9** | **5** | **6** | **6** | **3** | **3** | **4** | **5** |

[a] Riparian belt transects are 25’ wide.
[b] Stream bank transects are 3’ wide.

Since 2013, 112 plant species have been identified within the project area (Appendix C). Additionally, 49 plant species were identified during the stream bank vegetation inventory along Bowser Creek (Appendix D). Reed canarygrass (*Phalaris arundinacea*) dominated the stream bank community and comprised 21-50% of the total cover in 2024. Winward stability ratings are typically assigned based on the stability ratings of multiple dominant species within a vegetation community rather than individual species. Reed canarygrass, which has a stability rating of 9 (Winward 2000), was the only dominant species within the streambank transects. Therefore, the Winward stability rating was based solely on this species.

Dominant species recorded along the riparian and stream bank transects were combined with visual observations throughout the site to develop a vegetation

community map (Figure 3, Appendix A). The four vegetation community types observed in 2024 are described below (Table 3).

**Table 3**. Vegetation community types observed at Bowser Creek in 2024.

| Community Type | Dominant Species |
|---|---|
| 2 | *Phalaris arundinacea* |
| 3 | *Nasturtium officinale* |
| 5 | *Elymus* spp./ *Festuca ovina* |
| 6 | *Elymus* spp./ *Bromus inermis* |

Vegetation community Type 2 – *Phalaris arundinacea* was identified along both stream banks and riparian zones adjacent to the channel. Reed canary grass dominated this community, with lesser cover provided by field horsetail (*Equisetum arvense*), creeping meadow-foxtail (*Alopecurus arundinaceous*), Northwest Territory sedge (*Carex utriculata*), creeping wild rye (*Elymus repens*), Nebraska sedge (*Carex nebrascensis*), watercress (*Nasturtium officinale*), and other species. Community Type 2 was the dominant community type observed along the stream banks.

Vegetation community Type 3 – *Nasturtium officinale* (watercress) was observed within the stream channel. Watercress dominated this community type with more than 50% cover growing in the channel bed and 6 to 10% cover along both stream banks. This community has been consistently observed in dense stands along the stream bed and edges of stream banks since the 2015 monitoring event. This community also includes common duckweed (*Lemna minor)*, climbing nightshade (*Solanum dulcamara*), and true forget-me-not (*Myosotis scorpioides*), although in much lesser amounts than watercress.

Vegetation community Type 5 – *Elymus* spp./*Festuca ovina* was identified along the upper slopes of the southern and eastern portions of the project area. Sheep fescue (*Festuca ovina*), nodding wild rye (*Elymus canadensis*), slender wild rye (*Elymus trachycaulus*), and western-wheat grass (*Pascopyrum smithii*) were the most common species within this vegetation community.

Vegetation community Type 6 – *Elymus* spp./*Bromus inermis* was observed for the first time in 2019 due to a shift in dominance from the noxious Canada thistle (*Cirsium arvense)* and nonnative bull thistle (*Cirsium vulgare*) to patchily distributed bare ground and an increase in the nonnative smooth brome (*Bromus inermis*).

***Noxious Weed Inventory***

Five Priority 2B noxious weeds were identified within the Bowser Creek stream mitigation site and included Canada thistle (*Cirsium arvense)*, gypsy flower (*Cynoglossum officinale)*, ox-eye daisy (*Leucanthemum vulgare),* butter-and-eggs *(Linaria vulgaris),* and common tansy (*Tanacetum vulgare*) (MT Department of Agriculture, 2019). Across the entire Bowser Creek mitigation site, the average noxious

weed coverage is estimated at 5% . A low cover class (1 to 5 percent) was assigned to all mapped weed occurrences within the project area in 2024. Canada thistle was the most prevalent noxious weed with many infestations located on the eastern half of the project area. Locations of noxious weed infestations are provided on Figure 3 in Appendix A, except for gypsy flower and butter-and-eggs, which were observed as isolated occurrences in trace amounts.

***Woody Plant Survival***

Planted woody species observed included: willows (*Salix* spp.), speckled alder (*Alnus incana*), red osier dogwood (*Cornus alba*), common snowberry (*Symphoricarpos albus*), chokecherry (*Prunus virginiana*), bog birch (*Betula pumila*), and Woods' rose (*Rosa woodsii*). It is unknown how many plants were installed during construction of the project; however, the revegetation plan called for planting 505 trees and shrubs to be installed between the Bowser Creek and Spring Creek stream restoration efforts. In 2024, the total woody plants observed was 42. While a few of the surviving shrubs have grown up to five feet tall, most shrubs remain small, with several exhibiting poor vigor. Volunteer willows are gradually expanding along the streambanks and riparian corridor, particularly along the downstream right bank of Bowser Creek.

***Bank Erosion Inventory***

A single eroding bank was observed immediately downstream of the stormwater detention pond outlet at STA 3+25 on the north bank. The eroding bank less than 7' in length and does not appear to be problematic. All previously noted bank erosion has healed.

***Channel Form***

The cross-sections (i.e. transects) of Bowser Creek surveyed in 2024 indicate minimal lateral channel migration since 2013 and no significant signs of lateral migration were observed during the 2024 monitoring event (Table 5). Riffle transect #4 was the only location to show any lateral movement with the channel expanding 2' to the north bank. Cross section data indicates channel depths overall have decreased slightly since 2023. Additionally, the 2024 longitudinal profile indicates all three pools have filled in since the initial monitoring event in 2013. The decreased pool depths are likely the result of a relatively low gradient, straight channel alignment that lacks scour-inducing features capable of maintaining deeper pool habitat. No sediment sources are evident within the project reach; therefore, sediment supply is originating from upstream inputs. The longitudinal profile does indicate bed elevations are being maintained at riffles, signifying the whole reach is not aggrading (Table 5; Appendix E).

**Table 4.** Maximum depths at four channel cross-section transects from 2013 and 2020-2024

| Transect | Type | Max Depth (ft) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2013 | 2020 | 2021 | 2022 | 2023 | 2024 |
| 1 | Pool | 1.9 | 1.8 | 1.6 | 1.4 | 1.3 | 1.3 |
| 2 | Riffle | 2.2 | 2.0 | 2.0 | 2.1 | 2.1 | 1.7 |
| 3 | Pool | 3.6 | 2.5 | 2.5 | 2.1 | 1.9 | 1.7 |
| 4 | Riffle | 1.9 | 1.8 | 2.1 | 1.9 | 1.9 | 1.8 |
| Average Riffles | | 2.1 | 1.9 | 2.1 | 2.0 | 2.0 | 1.8 |
| Average Pools | | 2.8 | 2.3 | 2.2 | 1.8 | 1.6 | 1.5 |
| Average All | | 2.4 | 2.1 | 2.1 | 1.9 | 1.8 | 1.7 |

**Table 5.** Bankfull widths at four channel cross-section transects from 2013 and 2020-2024.

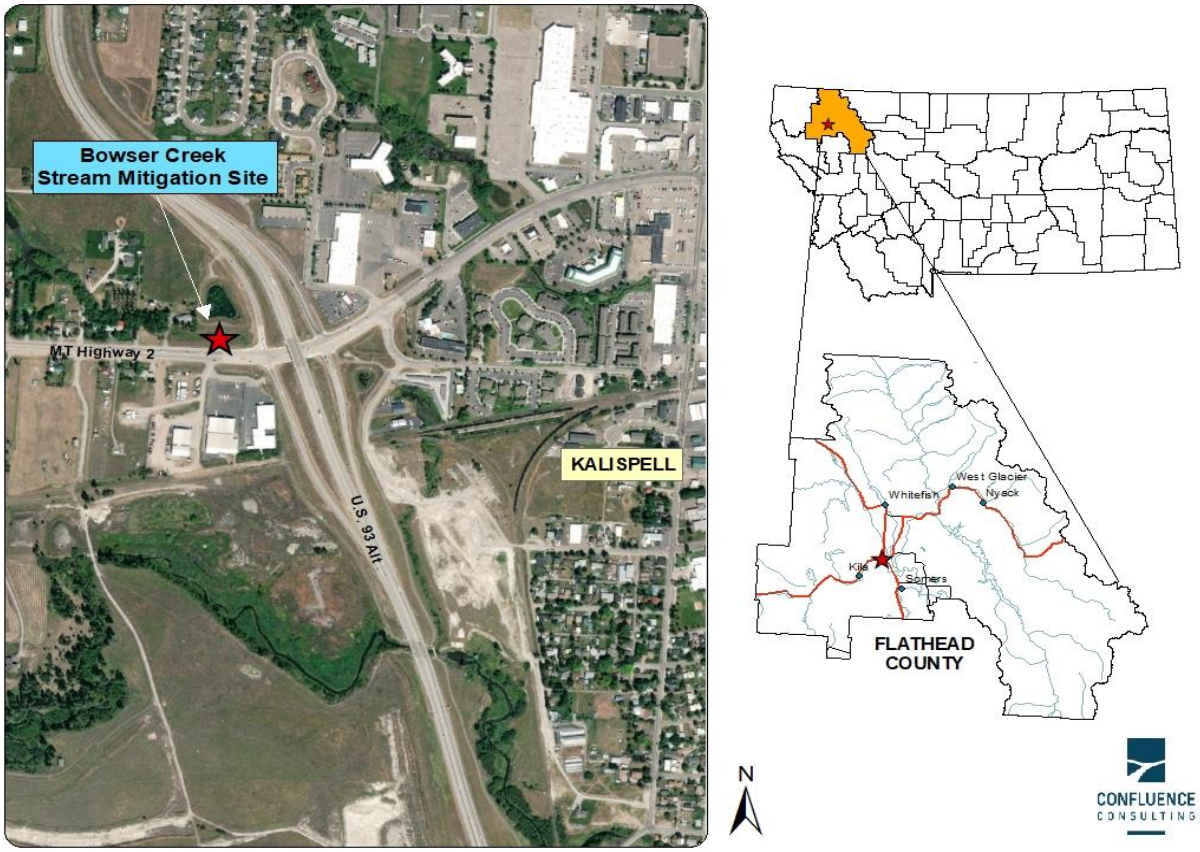
| Transect | Type | Bankfull Width (ft) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2013 | 2020 | 2021 | 2022 | 2023 | 2024 |
| 1 | Pool | 6.0 | 6.0 | 6.5 | 6.2 | 6.2 | 5.9 |
| 2 | Riffle | 12.7 | 12.4 | 12.9 | 12.2 | 12.1 | 12.3 |
| 3 | Pool | 14.8 | 14.5 | 15.2 | 15.1 | 14.9 | 14.1 |
| 4 | Riffle | 7.8 | 7.6 | 7.6 | 7.9 | 7.9 | 7.6 |
| Average Riffles | | 10.3 | 10.0 | 10.3 | 10.0 | 10.0 | 9.9 |
| Average Pools | | 10.4 | 10.2 | 10.9 | 10.7 | 10.6 | 10.0 |
| Average All | | 10.3 | 10.1 | 10.6 | 10.4 | 10.3 | 10.0 |

## Conclusions

The Bowser Creek stream mitigation site is meeting all performance standards except for the percent survival of planted trees and shrubs, and the qualitative channel form stability criteria. Besides less-than-desirable cover from woody vegetation, the site is well vegetated and has limited noxious weed cover. Gradual loss of pool habitat limits the ability of the creek to provide habitat complexity; however, riffle elevations are being maintained, signifying the reach as a whole is not aggrading.

**Maps, Plans, Photos:**

**Figure 1.** Site Location Map




**Project Area Maps/Figures:** See Appendix A.

**Photos:** See Appendix B.

**Comprehensive Plant List:** See Appendix C.

**Stream Bank Vegetation Composition:** See Appendix D.

**Perpendicular Transect and Longitudinal Profile Plots:** See Appendix E.

**Plans:** See Appendix E of 2013 Monitoring Report.

**https://www.mdt.mt.gov/publications/brochures/stream-mitigation.aspx**

## References

**Montana Department of Agriculture (MDA)**. June 2019. *Montana Noxious Weed List*. Accessed December 2024 at: https://agr.mt.gov/_docs/weeds-docs/2019-Montana-Noxious-Weed-List.pdf

**U.S. Army Corps of Engineers (USACE).** 2020. *National Wetland Plant List* (Version 3.5), prepared by U.S. Army Corps of Engineers, U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH

**Winward, Alma H.** 2000. *Monitoring the Vegetation Resources in Riparian Areas.* Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

# APPENDIX A
# PROJECT AREA MAPS

MDT Streams Mitigation Monitoring
Bowser Creek
Flathead County, Montana


CONFLUENCE CONSULTING

## Legend

- Photo Points
- 2014 Channel Center
- Major Station (100')
- Minor Station (25')
- 2024 Channel Thalweg
- Pool and Riffle Transects
- Riparian Transects

N

0 25 50 100 Feet

**Bowser Creek - 2024 Monitoring Features**

Figure 2

Map Date: 12/03/2024

*MDT Bowser Creek.aprx*


CONFLUENCE CONSULTING

## Legend

- Project Boundary
- Vegetation Community Boundary
- *Cirsium arvense*
- *Leucanthemum vulgare*
- *Tanacetum vulgare*
- (2) Phalaris Community
- (3) Nasturtium Community
- (5) Elymus/Festuca Community
- (6) Elymus/Bromus Community

N

**Bowser Creek - 2024 Noxious Weeds and Vegetation Community**

Figure 3

Map Date: 12/03/2024

*MDT Bowser Creek.aprx*

# APPENDIX B
# PROJECT AREA PHOTOGRAPHS

MDT Streams Mitigation Monitoring
Bowser Creek
Flathead County, Montana

**MONITORING PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEARS: 2013 and 2024

CONFLUENCE CONSULTING

**2013**

**2024**

**Photo 1**: View looking west (upstream) of Bowser Creek.

**2013**


**2024**

**Photo 2.1:** View looking northwest at Bowser Creek.

**2013**

**2024**

**Photo 2.2**: View across Bowser Creek looking north from photo point 2.

**MONITORING PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEAR: 2024

**2013**

**2024**

**Photo 2.3**: View looking east (downstream) of Bowser Creek from photo point 2.

**2013**

**2024**

**Photo 2.4:** View looking east across Bowser Creek from photo point 2.

**2013**

**2024**

**Photo 3:** View looking east (downstream) of Bowser Creek from photo point 3.

**MONITORING PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEAR: 2024

**2013**

**2024**

**Additional Photo 1**: Eroding bank observed in 2013 which has healed.

**2013**

**2024**

**Additional Photo 2:** Middle of Bowser Creek looking downstream.

**2013**

**2024**

**Additional Photo 3:** Stormwater pond culvert and outflow confluence with Bowser Creek.

**MONITORING PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEAR: 2024

**2023**

**Additional Photo 5:** Debris on the southern bank of the mitigation site.

**2023**

**Additional Photo 6:** Upper reach of Bowser Creek is largely grown in with watercress (*Nasturtium officinale*).

**Additional Photo 7:** The downstream trash rack is clear of debris, however, is well vegetated at the invert of the culvert.

**SURVEY PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEAR: 2024

**Survey Photo 1:** T1 looking west upstream.

**Survey Photo 2:** T1 looking south downstream.

**Survey Photo 3:** T2 looking west downstream from middle of creek.

**Survey Photo 4:** T2 looking east upstream from middle of creek.

**Survey Photo 7:** T3 looking east downstream.

**Survey Photo 8:** T3 looking upstream.

**SURVEY PHOTO LOG**

SITE NAME: Bowser Creek
MONITORING YEAR: 2024

**Survey Photo 9:** T4 looking upstream.

**Survey Photo 10:** T4 looking downstream.

# APPENDIX C
# 2013 – 2024 COMPREHENSIVE PLANT SPECIES LIST

MDT Streams Mitigation Monitoring
Bowser Creek
Flathead County, Montana

**Table C-1**: Comprehensive list of plant species observed at the Bowser Creek Stream Mitigation Site from 2013 through 2024.

| Scientific Name | Common Name | WMVC Indicator Status* |
|---|---|---|
| *Acer negundo* | Ash-Leaf Maple | FAC |
| *Achillea millefolium* | Common Yarrow | FACU |
| *Agastache urticifolia* | Nettle-Leaf Giant-Hyssop | FACU |
| *Agropyron cristatum* | Crested Wheatgrass | UPL |
| *Agrostis gigantea* | Black Bent | FAC |
| *Agrostis stolonifera* | Spreading Bent | FAC |
| *Alisma triviale* | Northern Water-Plaintain | OBL |
| *Alnus incana* | Speckled Alder | FACW |
| *Alopecurus arundinaceus* | Creeping Meadow-Foxtail | FAC |
| *Amelanchier alnifolia* | Saskatoon Service-Berry | FACU |
| *Artemisia absinthium* | Absinthium | UPL |
| *Artemisia biennis* | Biennial Wormwood | FACW |
| *Atriplex patula* | Halberd-Leaf Orache | FACW |
| *Beckmannia syzigachne* | American Slough Grass | OBL |
| *Betula pumila* | Bog Birch | OBL |
| *Bromus inermis* | Smooth Brome | UPL |
| *Calamagrostis canadensis* | Bluejoint | FACW |
| *Carduus acanthoides* | Spiny Plumeless Thistle | NL |
| *Carduus nutans* | Nodding Plumeless-Thistle | UPL |
| *Carex bebbii* | Bebb's Sedge | OBL |
| *Carex nebrascensis* | Nebraska Sedge | OBL |
| *Carex pellita* | Woolly Sedge | OBL |
| *Carex* sp. | Sedge | N/A |
| *Carex stipata* | Stalk-Grain Sedge | OBL |
| *Carex utriculata* | Northwest Territory Sedge | OBL |
| *Centaurea cyanus* | Garden Cornflower | FACU |
| *Centaurea stoebe* | Spotted Knapweed | UPL |
| *Chamaenerion angustifolium* | Narrow-Leaf Fireweed | FACU |
| *Chenopodium album* | Lamb's-Quarters | FACU |
| *Chorispora tenella* | Common Blue-Mustard | UPL |
| *Cicuta douglasii* | Western Water-Hemlock | OBL |
| *Cirsium arvense* | Canadian Thistle | FAC |
| *Cirsium vulgare* | Bull Thistle | FACU |
| *Cornus alba* | Red Osier | FACW |
| *Cynoglossum officinale* | Gypsy-Flower | FACU |
| *Descurainia sophia* | Herb Sophia | UPL |
| *Elymus canadensis* | Nodding Wild Rye | FAC |
| *Elymus repens* | Creeping Wild Rye | FAC |

| Scientific Name | Common Name | WMVC Indicator Status* |
|---|---|---|
| *Elymus trachycaulus* | Slender Wild Rye | FAC |
| *Epilobium ciliatum* | Fringed Willowherb | FACW |
| *Equisetum arvense* | Field Horsetail | FAC |
| *Festuca ovina* | Sheep Fescue | UPL |
| *Galium aparine* | Sticky-Willy | FACU |
| *Geum macrophyllum* | Large-Leaf Avens | FAC |
| *Geum* sp. | Avens | N/A |
| *Geum triflorum* | Old-Man's-Whiskers | FACU |
| *Glyceria grandis* | American Manna Grass | OBL |
| *Glyceria striata* | Fowl Manna Grass | OBL |
| *Helianthus maximiliani* | Maximilian Sunflower | UPL |
| *Helianthus nuttallii* | Nuttall's Sunflower | FACW |
| *Hesperis matronalis* | Mother-of-the-Evening | FACU |
| *Hordeum jubatum* | Fox-Tail Barley | FAC |
| *Hypericum perforatum* | Common St. John's-Wort | FACU |
| *Juncus balticus* | Baltic Rush | FACW |
| *Juncus* sp. | Rush | N/A |
| *Lactuca serriola* | Prickly Lettuce | FACU |
| *Lathyrus sylvestris* | Flat Pea | UPL |
| *Lemna minor* | Common Duckweed | OBL |
| *Leucanthemum vulgare* | Ox-Eye Daisy | FACU |
| *Leymus cinereus* | Great Basin Lyme Grass | FAC |
| *Linaria vulgaris* | Butter-and-Eggs | UPL |
| *Lysichiton americanus* | Yellow-Skunk-Cabbage | OBL |
| *Medicago lupulina* | Black Medick | FACU |
| *Medicago sativa* | Alfalfa | UPL |
| *Melilotus albus* | White Sweetclover | UPL |
| *Melilotus officinalis* | Yellow Sweet-Clover | FACU |
| *Mentha arvensis* | American Wild Mint | FACW |
| *Myosotis scorpioides* | True Forget-Me-Not | FACW |
| *Nasturtium officinale* | Watercress | OBL |
| *Nepeta cataria* | Catnip | FACU |
| *Onopordum acanthium* | Scotch Thistle | UPL |
| *Pascopyrum smithii* | Western-Wheat Grass | FACU |
| *Peritoma serrulata* | Rocky Mountain Beeplant | FACU |
| *Persicaria amphibia* | Water Smartweed | OBL |
| *Persicaria lapathifolia* | Dock-Leaf Smartweed | FACW |
| *Phalaris arundinacea* | Reed Canary Grass | FACW |
| *Phleum pratense* | Common Timothy | FAC |
| *Plantago lanceolata* | English Plantain | FACU |
| *Plantago major* | Great Plantain | FAC |

| Scientific Name | Common Name | WMVC Indicator Status* |
|---|---|---|
| *Poa palustris* | Fowl Blue Grass | FAC |
| *Poa pratensis* | Kentucky Blue Grass | FAC |
| *Prunus virginiana* | Choke Cherry | FACU |
| *Ranunculus* sp. | Buttercup | N/A |
| *Rosa woodsii* | Woods' Rose | FACU |
| *Rudbeckia hirta* | Black-Eyed-Susan | FACU |
| *Rumex crispus* | Curly Dock | FAC |
| *Salix bebbiana* | Gray Willow | FACW |
| *Salix drummondiana* | Drummond's Willow | FACW |
| *Salix exigua* | Narrow-Leaf Willow | FACW |
| *Salix* sp. | Willow | N/A |
| *Scirpus microcarpus* | Red-Tinge Bulrush | OBL |
| *Silene vulgaris* | Maiden's-tears | UPL |
| *Solanum dulcamara* | Climbing Nightshade | FAC |
| *Solidago canadensis* | Canadian Goldenrod | FACU |
| *Sonchus arvensis* | Field Sow-Thistle | FACU |
| *Stachys byzantina* | Woolly Hedgenettle | UPL |
| *Stuckenia pectinata* | Sago False Pondweed | OBL |
| *Symphoricarpos albus* | Common Snowberry | FACU |
| *Tanacetum vulgare* | Common Tansy | FACU |
| *Taraxacum officinale* | Common Dandelion | FACU |
| *Thlaspi arvense* | Field Pennycress | UPL |
| *Tragopogon dubius* | Meadow Goat's-beard | UPL |
| *Trifolium pratense* | Red Clover | FACU |
| *Trifolium repens* | White Clover | FAC |
| *Triglochin maritima* | Seaside Arrow-Grass | OBL |
| *Typha angustifolia* | Narrow-Leaf Cat-Tail | OBL |
| *Typha latifolia* | Broad-Leaf Cat-Tail | OBL |
| *Urtica dioica* | Stinging Nettle | FAC |
| *Verbascum thapsus* | Great Mullein | FACU |
| *Veronica americana* | American Brooklime | OBL |
| *Vicia americana* | American Purple Vetch | FAC |
| *Viola sp.* | Violet | N/A |

* 2020 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (USACE 2020). New species identified in 2024 are **bolded.** Species identified to genus level have been assigned an indicator status of N/A.

# APPENDIX D
# 2024 STREAM BANK VEGETATION COMPOSITION

MDT Streams Mitigation Monitoring
Bowser Creek
Flathead County, Montana

**Table D-1.** Plant species and their associated cover classes along the stream banks of the Bowser Creek stream mitigation site in 2024. Percent Cover Classes: 0 = <1%, 1 = 1-5%, 2 = 6-10%, 3 = 11-20%, 4 = 21-50%, 5 = >50%

| Streambank Species | North bank | North Bank Cover Class | South bank | South Bank Cover Class | WMVC Indicator Status* |
|---|---|---|---|---|---|
| *Agrostis stolonifera* | X | 1 | X | 1 | FAC |
| *Alnus incana* | X | 0 | X | 1 | FACW |
| *Alopecurus arundinaceus* | X | 1 | X | 1 | FAC |
| *Artemisia absinthium* | | 1 | X | 2 | UPL |
| *Bromus inermis* | X | 2 | X | 3 | UPL |
| *Carduus acanthoides* | X | 0 | X | 1 | UPL |
| *Carex nebrascensis* | X | 1 | X | 0 | OBL |
| *Carex pellita* | X | 3 | | 1 | OBL |
| *Carex utriculata* | X | 1 | X | 2 | OBL |
| *Chamaenerion angustifolium* | | | X | 0 | FACU |
| *Cirsium arvense* | X | 2 | X | 2 | FAC |
| *Cirsium vulgare* | X | 1 | X | 1 | FACU |
| *Cornus alba* | X | 0 | X | 1 | FACW |
| *Cynoglossum officinale* | X | 0 | X | 0 | FACU |
| *Elymus repens* | X | 2 | X | 2 | FAC |
| *Epilobium ciliatum* | X | 1 | X | 1 | FACW |
| *Equisetum arvense* | X | 1 | X | 0 | FAC |
| *Geum macrophyllum* | X | 0 | X | 1 | FAC |
| *Helianthus nuttallii* | X | 0 | X | 0 | FACW |
| *Juncus balticus* | X | 1 | X | 1 | FACW |
| *Lactuca serriola* | | | X | 0 | FACU |
| *Lemna minor* | X | 0 | X | 0 | OBL |
| *Leucanthemum vulgare* | X | 0 | X | 1 | FACU |
| *Linaria vulgaris* | X | 0 | X | 0 | UPL |
| *Medicago lupulina* | | | X | 1 | FACU |
| *Meliotus albus* | X | 1 | | | UPL |
| *Mentha arvensis* | X | 1 | X | 1 | FACW |
| *Myosotis scorpioides* | X | 1 | X | 1 | FACW |
| *Nasturtium officinale*** | X | 2 | X | 2 | OBL |
| *Nepeta cataria* | | | X | 0 | FACU |
| *Persicaria lapathifolia* | X | 0 | X | 0 | FACW |

| Streambank Species | North bank | North Bank Cover Class | South bank | South Bank Cover Class | WMVC Indicator Status* |
|---|---|---|---|---|---|
| *Phalaris arundinacea*** | X | 4 | X | 4 | FACW |
| *Poa palustris* | X | 1 | X | 1 | FAC |
| *Poa pratensis* | X | 0 | X | 0 | FAC |
| *Rosa woodsii* | X | 1 | | | FACU |
| *Rumex crispus* | X | 1 | X | 1 | FAC |
| *Salix bebbiana* | X | 0 | X | 1 | FACW |
| *Salix drummondiana* | X | 0 | X | 1 | FACW |
| *Salix exigua* | | | X | 2 | FACW |
| *Solanum dulcamara* | X | 0 | X | 0 | FAC |
| *Sonchus arvensis* | X | 1 | X | 1 | FACU |
| *Symphoricarpos albus* | X | 1 | X | 1 | FACU |
| *Tanacetum vulgare* | | | X | 1 | FACU |
| *Taraxacum officinale* | X | 1 | X | 0 | FACU |
| *Thlaspi arvense* | | | X | 0 | UPL |
| *Typha latifolia* | X | 1 | X | 1 | OBL |
| *Verbascum thapsus* | X | 0 | X | 1 | FACU |
| *Veronica americana* | X | 0 | X | 0 | OBL |
| *Viola sp.* | X | 0 | | | N/A |

* 2020 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (USACE 2020)

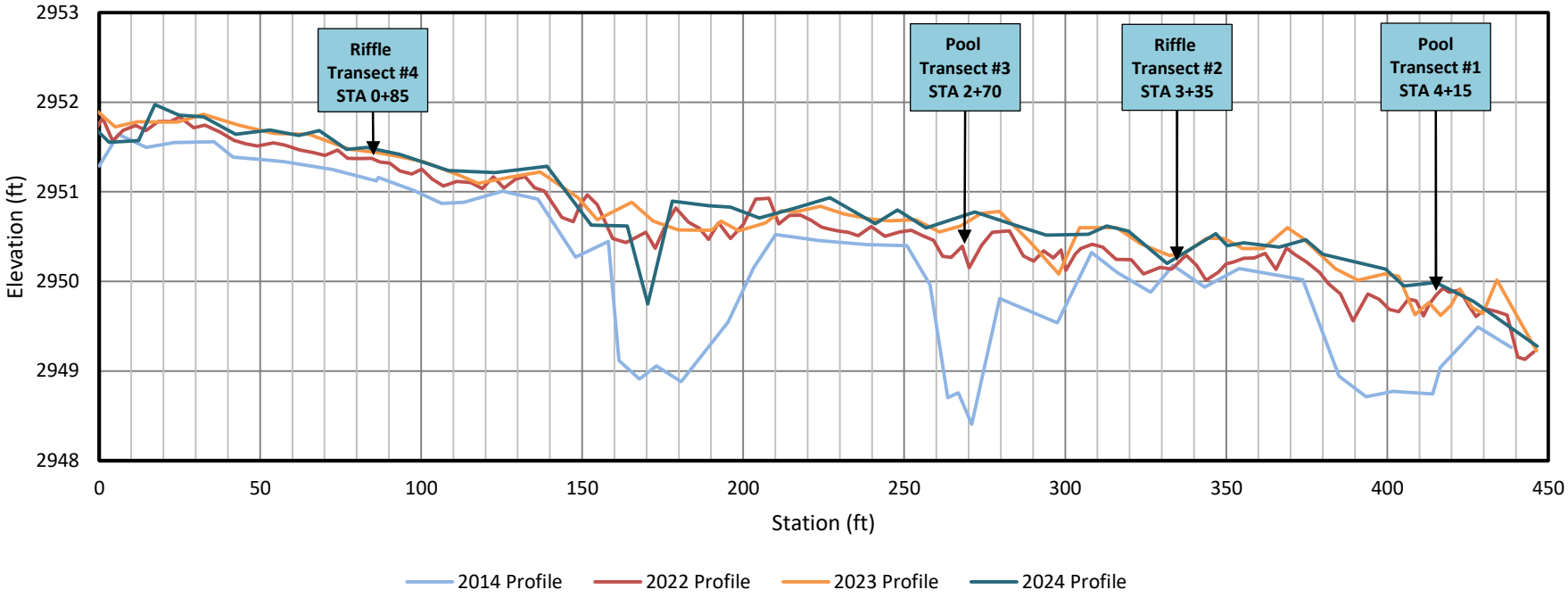
*** Dominant species observed along Bowser Creek stream banks*

**** Dominant species observed along Bowser Creek stream bed*

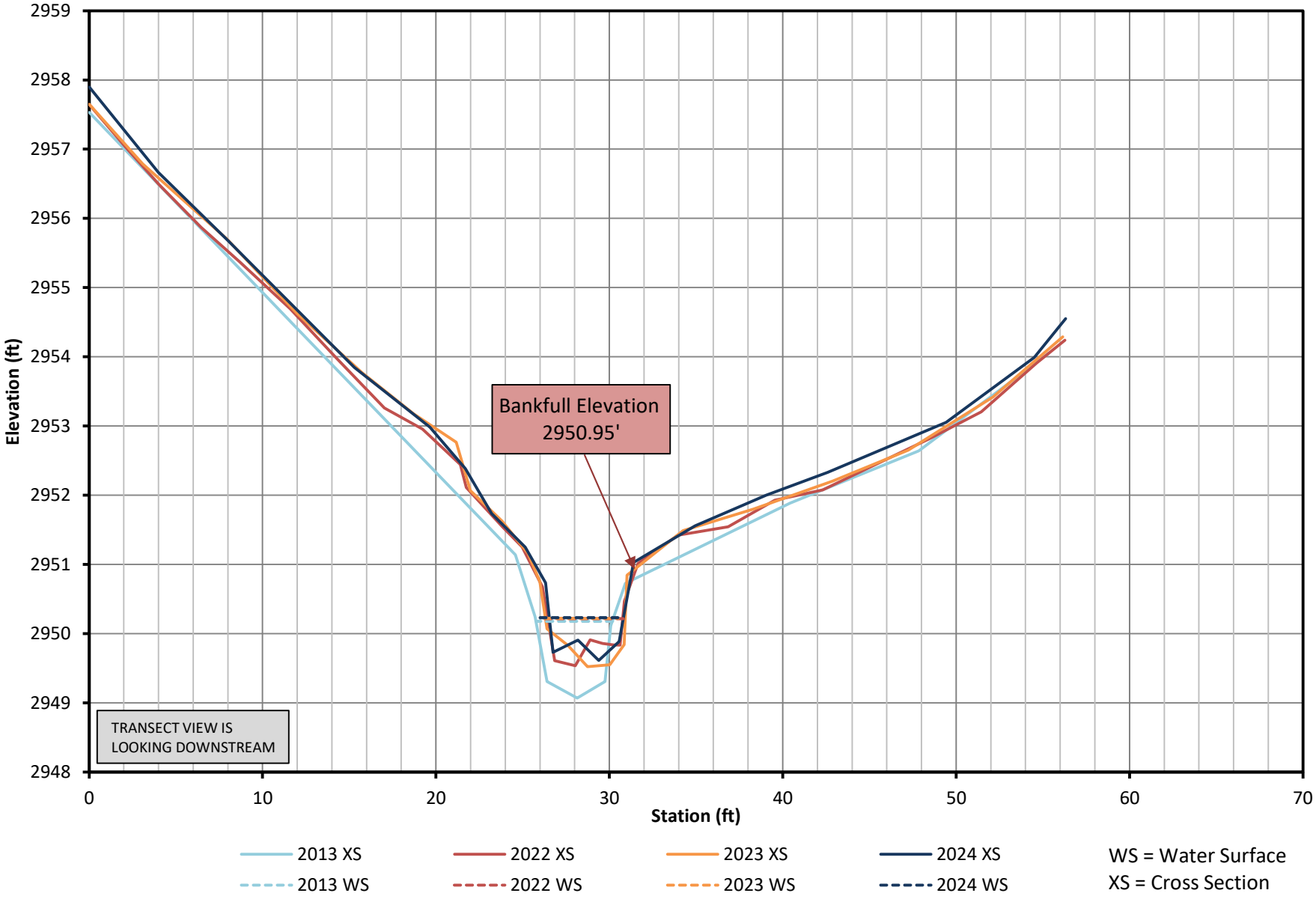
# APPENDIX E
# PERPENDICULAR TRANSECT PLOTS and LONGITUDINAL PROFILE

MDT Streams Mitigation Monitoring
Bowser Creek
Flathead County, Montana

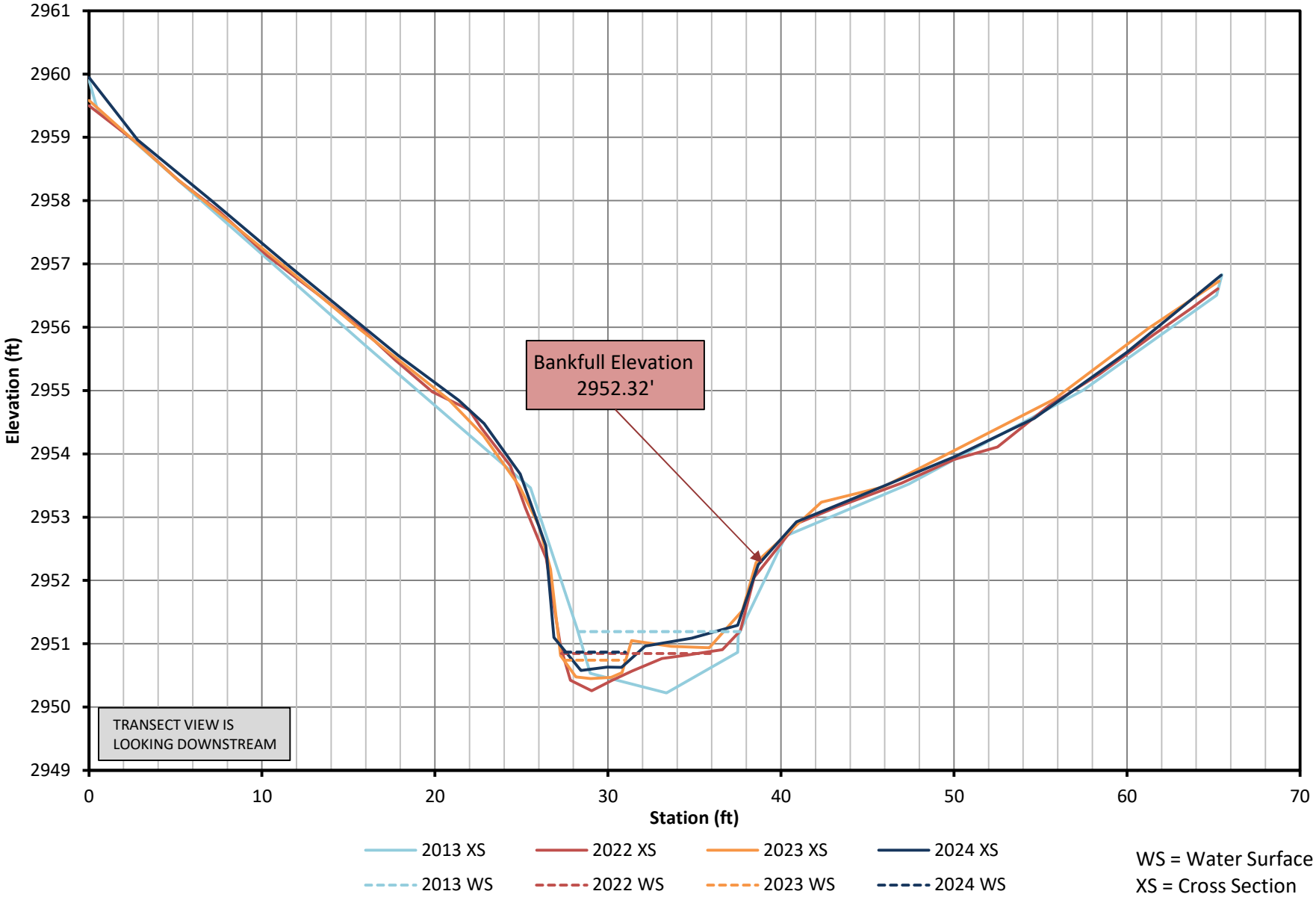
# Bowser Creek Longitudinal Profiles



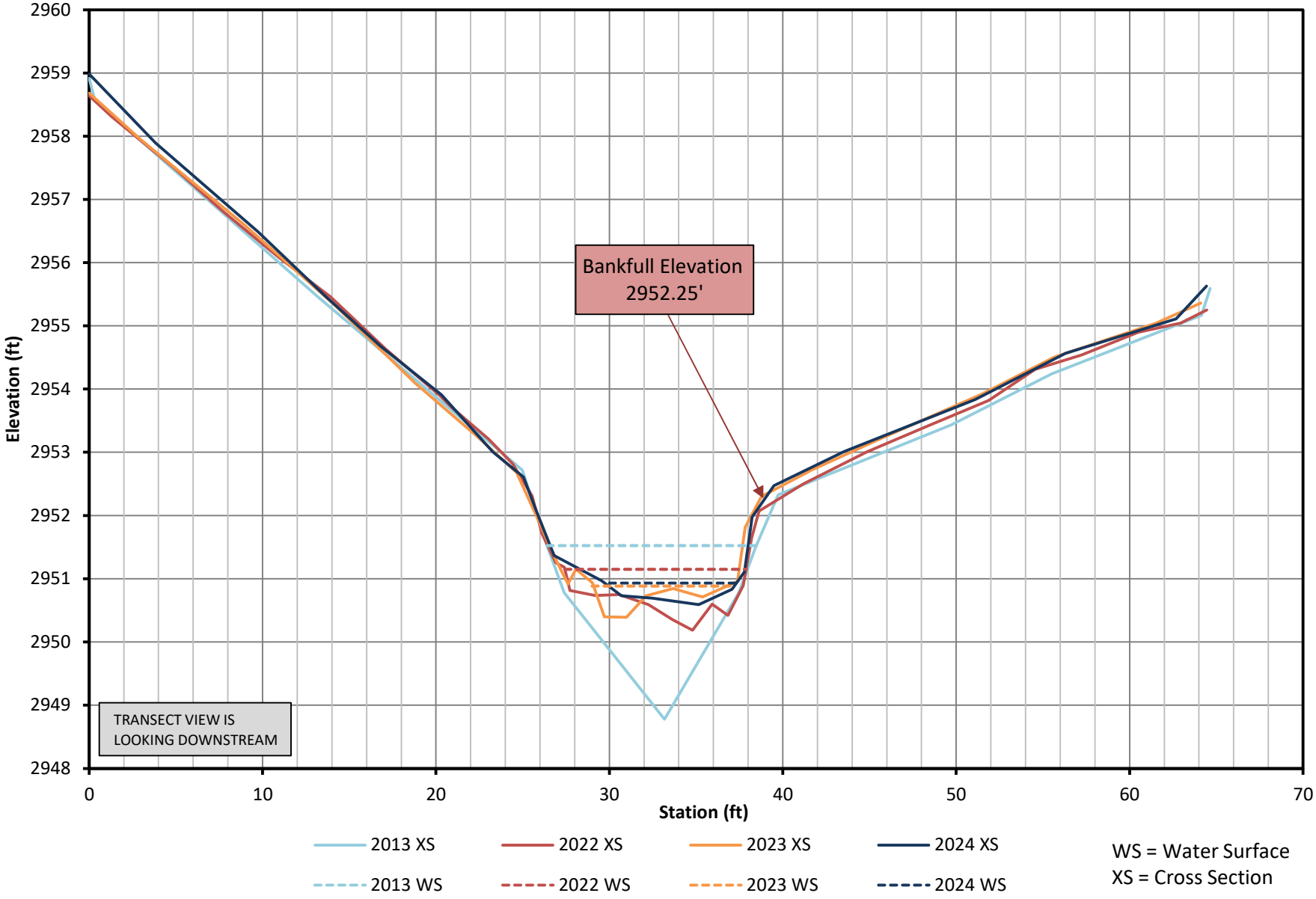
# Bowser Transect #1 - Pool



# Bowser Transect #2 - Riffle



# Bowser Transect #3 - Pool



# Bowser Transect #4 - Riffle