

Montana Department of Transportation Stream Mitigation Monitoring Report  
**ASHLEY CREEK MITIGATION SITE**

**Project Overview**

**MDT Project Number: NH-MT 5-3(59) FST / UPN # 2038010**

**Watershed:** Watershed #4 - Flathead

**Monitoring Year:** 2021

**Years Monitored:** 7<sup>th</sup> year of monitoring (2013-2015 & 2018-2021)

**Corps Permit Number:** NWO-2009-01808-MTM

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

**Monitoring Dates:** August 12, 2021

**Purpose of the approved project:**

As part of construction of the U.S. Highway 2 South Kalispell Bypass project, the Montana Department of Transportation (MDT) modified a segment of Ashley Creek at the North Bridge crossing. This project was developed to provide compensatory mitigation for stream impacts associated with the U.S. 93 Alternative widening segment of the Kalispell Bypass. Prior to construction, Ashley Creek had been channelized into a V-shaped drainage with steep side slopes (1.5:1). The purpose of this project was to restore Ashley Creek by widening the channel and recontouring the stream banks to have a more gradual slope where possible.

**Site Location:**

**Upstream Coordinates:** 48.19216, -114.337387

**Downstream Coordinates:** 48.19185, -114.335872

**County:** Flathead **Nearest Town:** Kalispell

**Map Included:** Figure 1 Site Location map on page #8.

**Mitigation Site Construction Started:** 2010 **Construction Ended:** Phase I - 2010; Phase II - 2017

**Dates of any recent corrective or maintenance activities (since previous report):**

**Activity:** Noxious weed control **Date:** September 2020

**Specific recommendations for additional corrective actions:** Adaptive Management actions have been evaluated by MDT to address streambank erosion, and loss of vegetative cover under the US Highway 93 - Kalispell Bypass bridge over Ashley Creek. MDT and their consultant are in the process of developing plans to address the eroding banks for submission to the US Army Corps of Engineers for permits and approval.

**Previous Monitoring Reports and Methods Descriptions:**

<https://www.mdt.mt.gov/publications/brochures/stream-mitigation.shtml>

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

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

**Performance Standards:**

Results from the 2021 monitoring event indicate the Ashley Creek stream mitigation site is meeting three of the six quantitative performance standards established in the monitoring plan (Table 1). Eleven years post-construction, the riparian buffer has more than 50% cover of non-noxious plant species and noxious weed cover is less than 10%. Planted woody vegetation survival met the success criteria as survivorship was greater than 50%. Combined aerial cover of riparian and streambank vegetation failed to meet the success criteria due to an abundance of bare ground under the US 93 bridge. Root stability index values failed to meet the success criteria due to high amounts of bare ground. The site failed to meet bank stability criterion because 32% (266 feet) of the banks within the project reach are eroding. Finally, the site failed the qualitative criteria for channel form success because the stream is not able to access its floodplain.

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

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Riparian Buffer Establishment	Areas within creditable riparian buffer disturbed during construction must have 50% or greater aerial cover of non-noxious weed species by the end of the monitoring period	Y	Riparian areas contain 62% cover from non-noxious species.
	Noxious weeds do not exceed 10% cover within the riparian buffer areas.	Y	Riparian buffer areas contain 3% noxious weeds cover.
Vegetation Success	Combined aerial cover of riparian and stream bank vegetation communities is at least 70%	N	Combined aerial cover of riparian and stream bank vegetation communities is 65%.
	Planted trees and shrubs must exhibit 50% survival after 5 years.	Y	Inspections indicate a 65% survival rate for woody plantings.
Vegetation along Stream Banks	Majority of the stream bank must be vegetated by plants with a root stability index of at least 6.	N	The majority (greater than 50%) of the stream bank was dominated by bare ground which has a root stability index of 1.
Stream Bank Stability	Less than 25% of bank length is unstable and classified as eroding bank.	N	Total eroding stream bank length is 266', or 32% of the total bank length within the project reach.
Channel Form (Qualitative)	Stream has stabilized, includes pools and riffles, allows for flood events to occupy the floodplain, and habitat features such as	N	Instream channel features are stable including pools and riffles, but the stream is not able to access the floodplain and riparian vegetation

	riparian plant communities have successfully established along the streambanks.		has only successfully established along a limited portion of the streambanks.
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### Summary Data

#### *Riparian Buffer Vegetation Inventory*

In 2021, the total combined aerial cover of vegetation within the riparian and stream bank belt transects at Ashley Creek was 65%, including 14% cover provided by woody species, 3% by noxious weeds, and 35% by unvegetated bare ground (Table 2). Overall, 62% of the reach exhibited non-noxious vegetation cover (65% total riparian cover minus 3% noxious weed cover). Bare ground, noxious weed, and total cover observations within the Ashley Creek riparian belt transects remained consistent from the previous year, while woody species cover increased by 1% (Table 2). Low total woody cover estimates observed within the riparian corridor reflect poor vigor among many of the planted woody shrubs, due to a lack of direct sunlight and precipitation beneath the bridge, bank sloughing, the use of herbicides, and heavy foot traffic. Bare ground was observed in areas previously sprayed with herbicide, areas where the vegetation is dead and dying, and areas that have been heavily trampled by human foot traffic. Much of the bare ground observed within the riparian corridor was concentrated under the Highway 93 Bridge, which shades the ground below. The bridge is approximately 104 feet wide and covers 50% of the right belt transect and 43% of the left belt transect. During the August 2021 monitoring event, Flathead County, MT was under a severe drought, which may have influenced vegetation vigor and growth at this site (NDMC, 2021).

**Table 2.** Vegetation cover estimates at the Ashley Creek Stream Mitigation Site in 2013, and 2019 through 2021.

Belt Transect	Length (ft)	Total % Riparian Cover				% Bare Ground				% Woody Cover				% Noxious Weed Cover			
		2013	2019	2020	2021	2013	2019	2020	2021	2013	2019	2020	2021	2013	2019	2020	2021
South bank	208	92	70	65	65	8	30	35	35	23	15	13	14	12	5	5	4
North bank	243	84	70	65	65	16	30	35	35	30	18	13	14	10	3	2	3
<b>Total</b>	<b>451</b>	<b>88</b>	<b>70</b>	<b>65</b>	<b>65</b>	<b>12</b>	<b>30</b>	<b>35</b>	<b>35</b>	<b>26</b>	<b>17</b>	<b>13</b>	<b>14</b>	<b>11</b>	<b>4</b>	<b>3</b>	<b>3</b>

Dominant species recorded along the riparian transects were combined with visual observations of vegetation in other areas to develop a vegetation community map (Figure 3, Appendix A). The same four community types documented in 2018 through 2020 were observed during the 2021 monitoring event. These include community Type 1 – *Phalaris arundinacea*, 3 – *Phalaris arundinacea/Elymus* spp., 4 – Bare Ground/*Elymus* spp., and 5 – *Cornus alba/Alnus incana*. Side slopes along the straight channel alignment are dominated by bare ground, wild rye (*Elymus* spp.), and reed canary grass (*Phalaris arundinacea*).

Since 2013, 91 plant species have been identified within the project area, and plant diversity has increased by 35 species since the initial monitoring event. Stinging nettle (*Urtica dioica*), a

native wetland species, was identified at Ashley Creek for the first time in 2021 (Table C-1, Appendix C). Forty-two of the 91 species (46%) observed in 2021 were hydrophytic based on the 2018 National Wetland Plant List (USACE, 2018).

### **Stream Bank Vegetation**

Bare ground accounted for greater than 50% cover within the 3-foot buffers along the stream-bank edge of the vegetation transects (i.e. the stream bank), which extend both upstream and downstream of the overpass (Figure 2, Appendix A). Reed canary grass comprised between 21% and 50% cover along the left stream bank and between 11 and 20% along the right (Table D-1, Appendix D). Low vegetation cover is partially due to bank erosion and limited sunlight beneath the bridge overpass, although portions of the right bank upstream of the overpass are also largely barren. Stream bank vegetation cover is higher in areas both upstream and downstream of the vegetation transects, but these areas do not contribute to the stream bank vegetation cover estimates. Given that the majority of the stream banks were bare, the dominant stream bank community type was considered “barren”, and the site was assigned the corresponding root stability index value of 1 (Winward 2000).

### **Woody Plant Survival**

Woody plantings, including serviceberry (*Amelanchier alnifolia*), choke cherry (*Prunus virginiana*), Woods' rose (*Rosa woodsii*), common snowberry (*Symphoricarpos albus*), narrow-leaf willow (*Salix exigua*), gray willow (*Salix bebbiana*), speckled alder (*Alnus incana*), and red osier dogwood (*Cornus alba*) were observed within the project area in 2021. The Ashley Creek revegetation plan called for installation of 130 trees and shrubs. As compared to the revegetation plan, 65% of the shrubs planted (84 of 130) have survived (Table 3). While survival of planted woody shrubs is relatively high, a substantial number of these shrubs displayed poor vigor.

**Table 3.** Woody plant survival at the Ashley Creek Stream Mitigation Site in 2013 through 2015, and 2018 through 2021.

Year	Total Plants Inspected	Surviving Plants	# of Woody Plantings in Design	Plant Survival based on Planting Plan
2013	99	93	130	72%
2014	73	66		51%
2015	106	92		71%
2018	65	60		46%
2019	104	94		72%
2020	125	99		76%
2021	102	84		65%

### **Noxious Weed Inventory**

Five Montana-Listed noxious weed species were identified during the 2021 monitoring event. Nine infestations of three Priority 2B noxious weeds were mapped within the riparian corridor at the Ashley Creek site and included Canada thistle (*Cirsium arvense*), field bindweed

(*Convolvulus arvensis*), and common tansy (*Tanacetum vulgare*) (MDA 2019). A low cover class (1 to 5 percent) was assigned to for all mapped weed infestations within the project area. An estimated 3% of the project area has been colonized by noxious weeds, with common tansy (*Tanacetum vulgare*) as the most prevalent. Noxious weed occurrences are displayed on Figure 3 in Appendix A with the exception of spotted knapweed (*Centaurea stoebe*) and houndstongue (*Cynoglossum officinale*) which were observed in trace amounts (<1%), and not mapped on Figure 3.

### ***Bank Erosion Inventory***

For the purposes of this report an "eroding bank" is defined as any bank greater than two feet in length that is more than 50% bare mineral soil and has no roots, surface vegetation, or other stabilizing structure (e.g. rock, woody debris) to inhibit erosion. The use of "right" and "left" to define where erosion is occurring assumes the viewer is looking downstream. The following section provides an updated bank erosion inventory and describes where new erosion is occurring and where previous erosion has been addressed. Photos of each eroding bank are included in Appendix B of this report, while Figure 2 in Appendix A provides the locations of each eroding bank. Descriptions of bank erosion observed during previous monitoring events can be found online at: <https://www.mdt.mt.gov/publications/brochures/stream-mitigation.aspx>.

Total eroding bank length within the Ashley Creek mitigation project area decreased from 292 feet in 2020 to 266 feet in 2021. This decrease is due to improved vegetative cover on the right bank immediately upstream of the bridge. The length of erosion on the right bank is now 161 feet and occurs in two separate sections EBR1 (65 feet) and EBR2 (96 feet). The 26-foot section of bank between EBR1 and EBR2 has begun to stabilize in the last year, with increased perennial grass cover on the lower portion of the bank and woody species growth on the upper bank (Additional Photo 3, Appendix B). Slump blocks previously observed on the lower portion of the bank have begun to heal and the bank is now more than 50% vegetated. The length of erosion along the left bank (EBL 2) remained at 105 feet, which was consistent with observations in 2020. All stream banks under the footprint of the Highway 93 Bridge are considered eroding. The only eroding bank that is not under the bridge is EBR 1, which is located on a steep cut-bank that will not support extensive plant growth in its current configuration.

Although the total eroding bank length has decreased since 2019, the severity of erosion has increased on the stream banks under the bridge. Vegetative cover along EBR 2 and EBL 2 has decreased every year since monitoring began, and large sections of both banks are now completely bare. Sloughing was observed on both banks and new slump blocks were observed along EBR 2. Erosion of these banks has been accelerated by anthropogenic use (i.e. foot traffic) on both EBR 2 and EBL 2.

Despite continued erosion on the upper banks, the Ashley Creek channel does not exhibit signs of lateral migration. A clay lens, located at toe of the streambank, protects the banks from eroding laterally; however, this feature does not protect the upper portions of the streambanks. Annual cross-section surveys show slumping on the upper bank and small amounts of deposition along the toe of the bank at Transects 2-4. The upper banks under the bridge have retreated by as much as four feet since 2013 and by 0-2 feet since 2020, due to loss

of vegetation and subsequent bank erosion (Appendix E). Erosion severity along the upper banks is considered high due to the relatively steep bank angle, the bank material being fine grained, and the lack of vegetation.

Two eroding banks were previously identified downgradient of storm water culvert outlets which drain into the channel. One of these culvert outlets is located on the north bank at the upstream end of the project reach, and the other is on the south bank at the downstream end of the reach. Both outfall areas have been repaired and armored, and are no longer actively eroding.

### ***Channel Form***

Annual surveys of the Ashley Creek longitudinal profile indicate that the channel form is stable and that pool and riffle features are being maintained over time (Appendix E). The mitigation reach supports three pools, each of which are separated by a distinct riffle. Pool features occur along a sharp meander bend at the upstream extent of the project and within the straight segment of the channel. In combination, these pool-riffle sequences provide adequate slow water habitat for fish and faster-moving shallow water habitat for insect production.

Survey data collected at the four cross-section transects, indicate that the bankfull channel dimensions have been maintained over time at Transects 1 and 3. However, Transects 2 and 4 show evidence of channel narrowing, which is probably the result of upper bank sloughing. The average bankfull pool depth was 8.2 feet and average bankfull riffle depth was 2.8 feet. The average bankfull width was 24.7 feet at riffle transects and 35.3 feet at pool transects. These dimensions have remained relatively static since monitoring began in 2013 although Transects 3 and 4 have shown signs of channel narrowing in the last two years as a result of upper bank sloughing (Table 4).

**Table 4.** Maximum bankfull depths and bankfull widths at cross-section transects from 2013-2015 and 2018-2021.

Transect	Type	Maximum Depth (ft)							Bankfull Width (ft)						
		2013	2014	2015	2018	2019	2020	2021	2013	2014	2015	2018	2019	2020	2021
1	Pool	**	9.9	10.1	10.1	9.7	9.0	9.0	43.8	43.6	45.1	45.5	44.9	42.9	43.3
2	Pool	**	8.2	7.9	7.8	7.4	7.3	7.5	29.0	30.8	31.0	26.5	25.0	26.9	27.2
3	Riffle	2.6	2.8	2.8	2.7	3.0	2.9	2.9	26.3	26.3	27.0	26.3	25.3	25.0	23.6
4	Riffle	3	2.7	2.6	2.9	3.0	2.4	2.7	30.0	29.5	28.5	28.0	28.0	27.5	25.8
Average Riffles		<b>2.8</b>	<b>2.8</b>	<b>2.7</b>	<b>2.8</b>	<b>3.0</b>	<b>2.7</b>	<b>2.8</b>	<b>28.2</b>	<b>27.9</b>	<b>27.8</b>	<b>27.1</b>	<b>26.7</b>	<b>26.3</b>	<b>24.7</b>
Average Pools		N/A	<b>9.1</b>	<b>9.0</b>	<b>9.0</b>	<b>8.6</b>	<b>8.2</b>	<b>8.2</b>	<b>36.4</b>	<b>37.2</b>	<b>38.1</b>	<b>36.0</b>	<b>35.0</b>	<b>34.9</b>	<b>35.3</b>

\*\* Maximum pool depths not surveyed in 2013

The Highway 93 bypass project included construction of bike paths on both sides of Ashley Creek beneath the bridge. The bike paths were built on embankments well above the creek to ensure protection during high water events. While these embankments provide adequate elevation to protect the bike paths, they encroach against the channel and eliminate the opportunity to develop a functional floodplain along the majority of the project reach. During high water events, Ashley Creek does not have access to a floodplain throughout this confined reach and therefore exerts erosive forces directly on the streambanks. High velocity flows coming in direct contact with poorly vegetated, unstable, eroding banks will likely result in continued erosion under the bridge during high flow events.

## **Conclusions**

In 2021, the Ashley Creek mitigation site met three of the six quantitative performance standards. The site met or exceeded the criteria for non-noxious vegetative cover, noxious weed cover, and planted woody vegetation survival in the riparian buffer. However, the combined aerial cover of riparian and stream bank vegetation failed to meet the 70% cover threshold, and the stream bank vegetation community failed to meet the required root stability index threshold of 6. Additionally, 32% of the stream banks are unstable and classified as eroding, which is greater than the 25% allowable by the bank stability performance criterion.

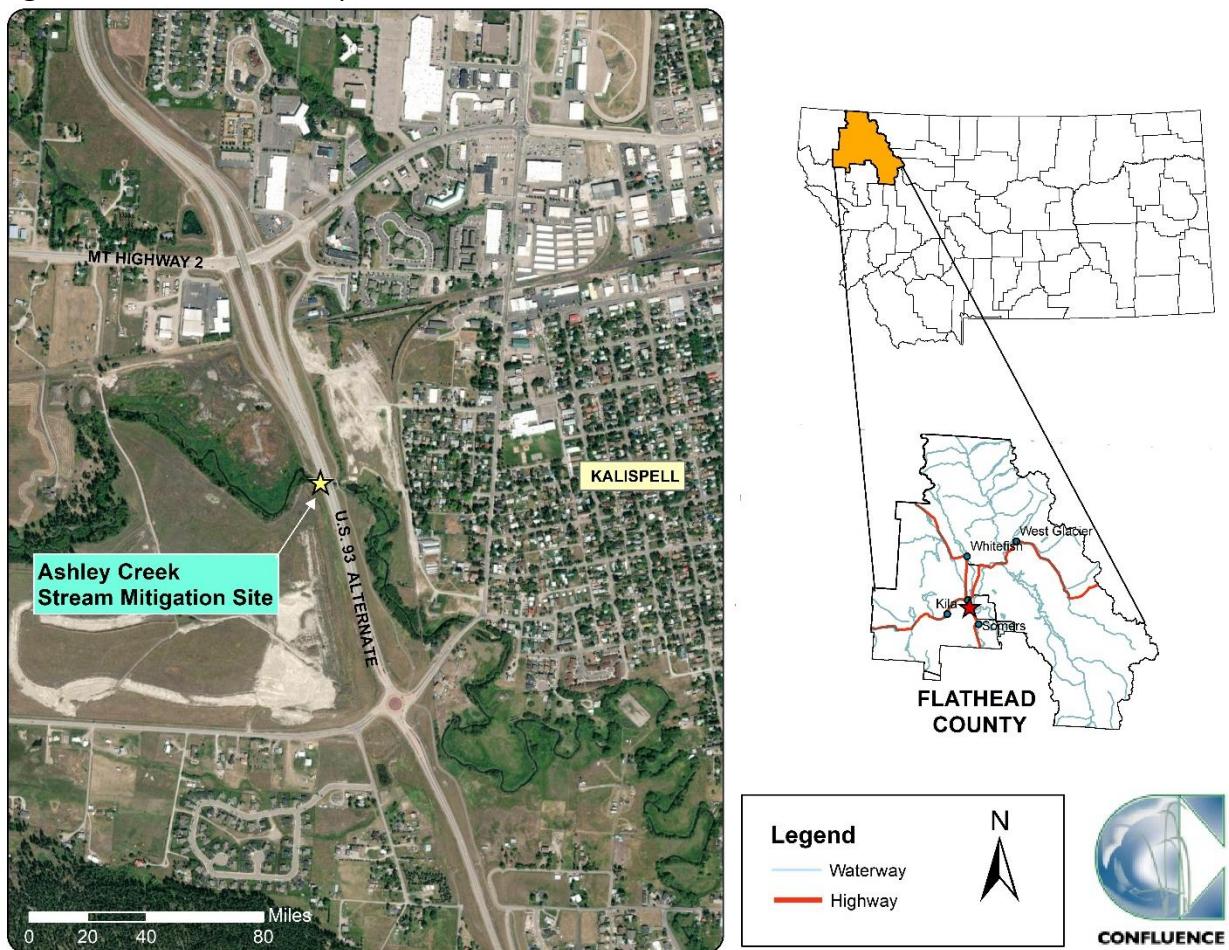
The Ashley Creek mitigation site also failed to meet the single qualitative performance criterion for channel form success. Even though the Ashley Creek channel form is being maintained below the bankfull elevation, the site does not meet the criteria for channel form success due to the lack of accessible floodplain, and a poorly established riparian plant community.

Nearly all of the performance standard failures at the Ashley Creek mitigation site are associated with the bridge that spans the creek and its adjacent riparian corridor. The 100-foot-wide bridge covers 48% (220 of 460 feet) of the riparian transects. The bridge has negatively influenced vegetation growth and establishment by intercepting direct sunlight and precipitation that would otherwise fall on the riparian zone and thereby inhibiting plant growth. Over the last several years, poor plant vigor and plant mortality has been observed, leading to a reduction in overall vegetative cover and an increase in bare ground. As it is not possible to increase the amount of sunlight or precipitation under the bridge, the total vegetative cover is expected to decrease over time which will likely contribute to increased erosion and bank instability. The loss of rooted vegetation has already resulted in destabilized banks, increased bank erosion, and increased sediment entering Ashley Creek. With such low vegetative cover and the lack of functional floodplain, the stream banks have become increasingly susceptible to erosion especially during high flow events..

Adaptive Management actions have been evaluated by MDT to address streambank erosion under the US Highway 93 - Kalispell Bypass bridge over Ashley Creek. MDT is in the process of developing plans to address the eroding banks for submission to the US Army Corps of Engineers for permits and approval.

## Maps, Plans, Photos:

**Figure 1.** Site Location Map



**Project Area Maps/Figures:** See Appendix A (Figure 2 – Monitoring Features, Figure 3 – Noxious Weeds and Vegetation Communities).

**Photos:** See Appendix B (Monitoring Photo and Survey Photo Logs).

**Comprehensive Plant List:** See Appendix C (Table C-1).

**Stream Bank Vegetation Composition:** See Appendix D (Table D-1).

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

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

<https://www.mdt.mt.gov/other/webdata/external/planning/STREAM-MITIGATION/2013%20REPORTS/2013%20ASHLEY%20CREEK%20MONITORING%20REPORT.PDF>

## **References**

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<https://agr.mt.gov/Portals/168/Documents/Weeds/2019%20Montana%20Noxious%20Weed%20List.pdf?ver=2019-07-02-095540-487>

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**U.S. Army Corps of Engineers (USACE).** 2018. *National Wetland Plant List* (Version 3.4), 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, Rocky Mountain Research Station.

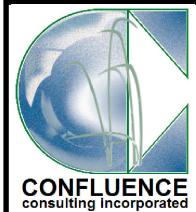
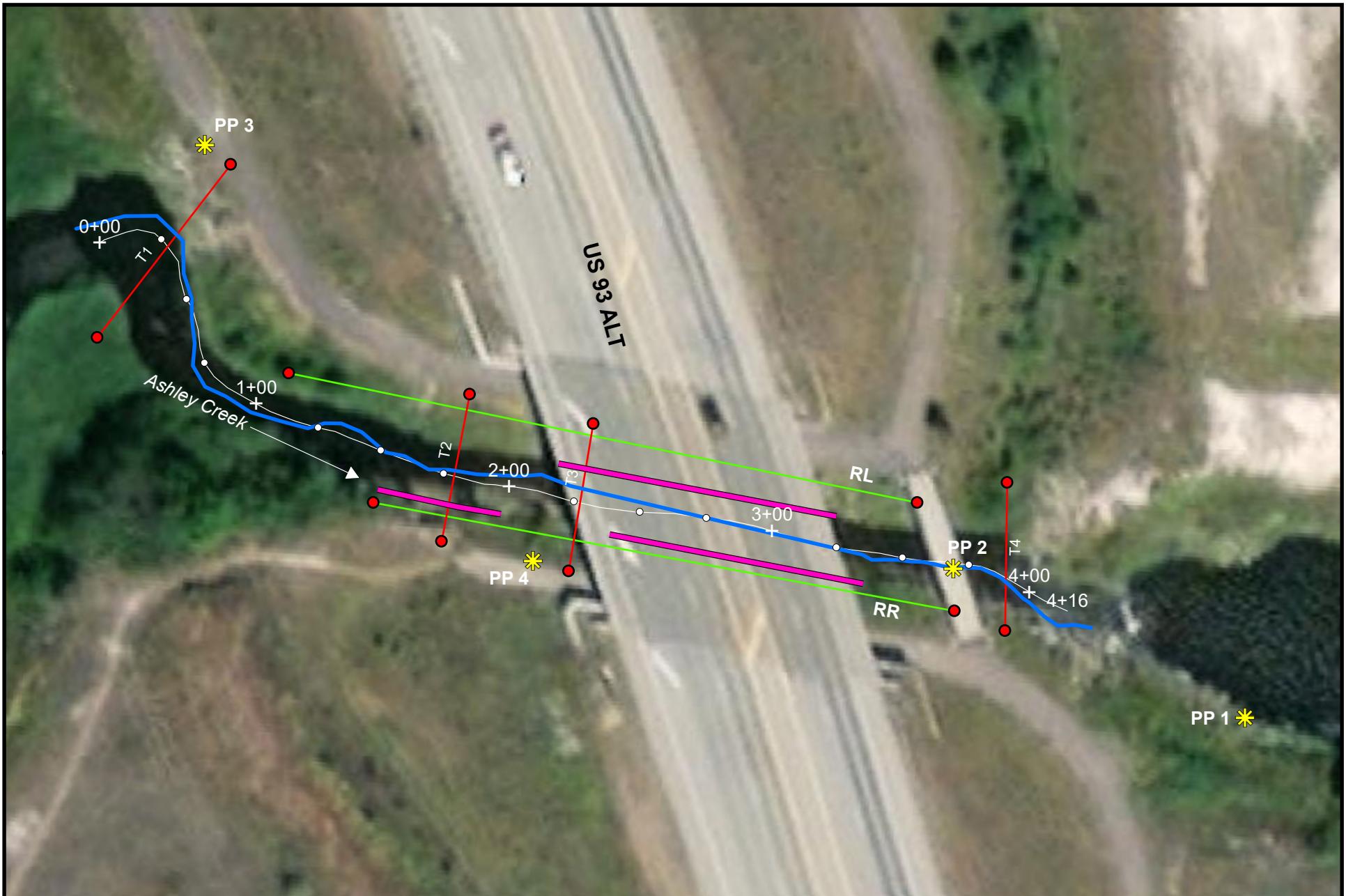
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## **APPENDIX A**

### **PROJECT AREA MAPS**

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MDT Streams Mitigation Monitoring  
Ashley Creek  
Flathead County, Montana



### Legend

- ★ Photo Points
- 2021 Thalweg
- + Design Channel Center
- Eroding Banks
- + Major Station (100')
- Minor Station (25')
- Pool and Ripple Transects
- Riparian Transects

0 25 50  
Feet

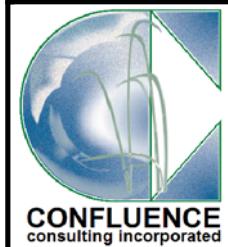
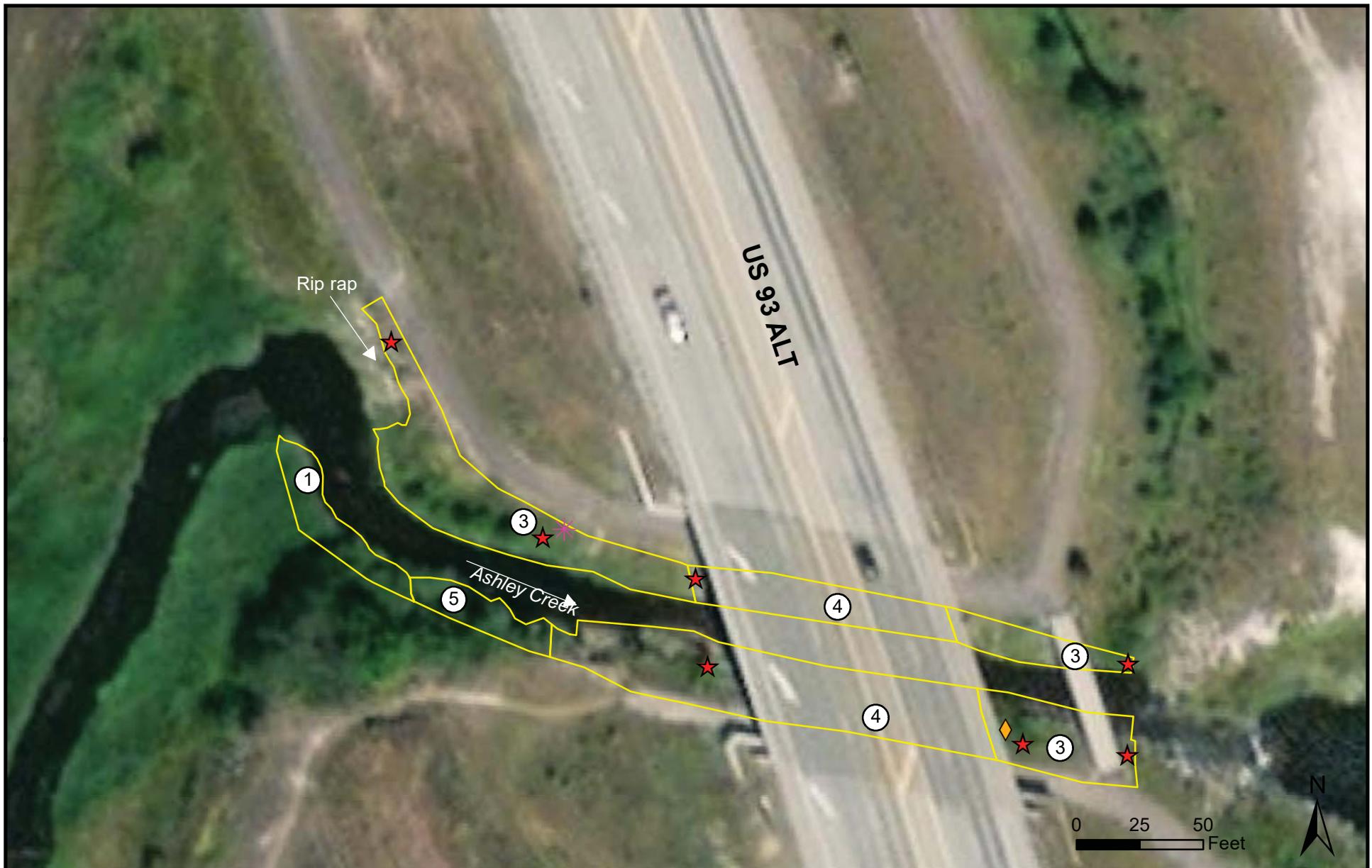


### Ashley Creek - 2021 Monitoring Features

Figure 2

Date: 9/20/2021

Ashley\_features2021.mxd



### Legend

Vegetation Community Boundary

◇ Cirsium arvense

\* Convolvulus arvensis

★ Tanacetum vulgare

1 Phalaris Community

3 Phalaris/Elymus Community

4 Bare Ground/Elymus Community

5 Cornus/Alnus Community

**Ashley Creek - 2021  
Noxious Weeds and  
Vegetation Communities**

Figure 3

Date: 9/24/2021

Ashley\_monitor2021.mxd

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## **APPENDIX B**

### **PROJECT AREA PHOTOGRAPHS**

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MDT Streams Mitigation Monitoring  
Ashley Creek  
Flathead County, Montana

## MONITORING PHOTO LOG

**SITE NAME:** Ashley Creek

**MONITORING YEARS:** 2013 and 2021



**2013**



**2021**

**Photo Point 1:** View of grade control structure downstream of project area. **Compass:** 315° (Northwest)

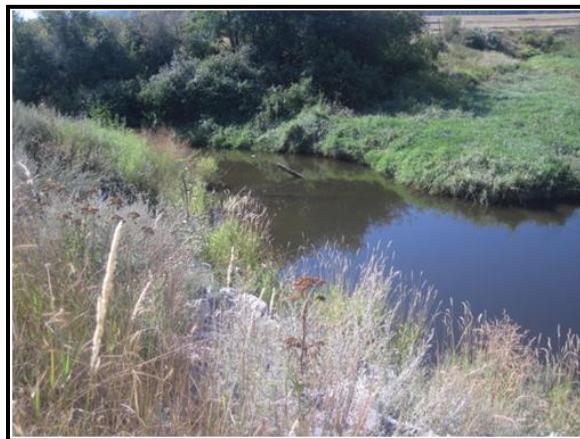


**2013**

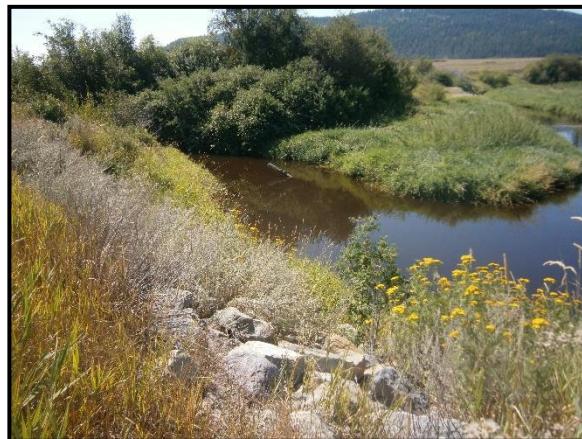


**2021**

**Photo Point 2:** View looking upstream from pedestrian bridge. **Compass:** 315° (Northwest)



**2013**



**2021**

**Photo 3.1:** View looking south at upstream end of project site. **Compass:** 180° (South)

## MONITORING PHOTO LOG

SITE NAME: Ashley Creek

MONITORING YEARS: 2013 and 2021



**2013**

**Photo 3.2:** View looking at upstream end of project site. **Compass:** 225° (Southwest)



**2021**



**2013**

**Photo 4.1:** View looking downstream from south bank. **Compass:** 90° (East)



**2021**



**2013**

**Photo 4.2:** View of channel looking upstream from south bank. **Compass:** 315° (Northwest)



**2021**

## MONITORING PHOTO LOG

SITE NAME: Ashley Creek

MONITORING YEARS: 2013 and 2021



2013



2021

**Additional Photo 1:** View of Ashley/Spring Creek confluence.



2013



2021

**Additional Photo 2:** Eroding Bank EBR1.



2013



2021

**Additional Photo 3:** Section of stabilized bank (previously considered eroding) between EBL 1 and EBL 2.

## MONITORING PHOTO LOG

SITE NAME: Ashley Creek

MONITORING YEARS: 2013, 2014, 2018 and 2021



2018



2021

**Additional Photo 4:** Eroding Bank EBR 2.



2013



2021

**Additional Photo 5:** Downstream end of eroding Bank EBR 2.



2014



2021

**Additional Photo 6:** Stabilized culvert outlet on the upstream end of the project area.

## MONITORING PHOTO LOG

**SITE NAME:** Ashley Creek

**MONITORING YEARS:** 2013 and 2021



2013



2021

**Additional Photo 7:** Eroding Bank EBL2



2021

**Additional Photo 8:** Looking upstream at eroding bank EBR 2 showing bank sloughing and loss of woody vegetation.



2021

**Additional Photo 9:** Looking upstream at eroding bank EBL 2 showing bank sloughing and loss of vegetation.

## SURVEY PHOTO LOG

**SITE NAME:** Ashley Creek  
**MONITORING YEAR:** 2021



**Survey Photo 1:** T1 Left: Looking Southwest to T1 Right.



**Survey Photo 2:** T1 Right: Looking Northeast to T1 Left.



**Survey Photo 3:** T1 Left: Looking Southwest upstream.



**Survey Photo 4:** T1 Left: Looking Southeast downstream.



**Survey Photo 5:** T1 Right: Looking North upstream.



**Survey Photo 6:** T1 Right: Looking East downstream.

## SURVEY PHOTO LOG

SITE NAME: Ashley Creek  
MONITORING YEAR: 2021



**Survey Photo 7:** T2 Left: Looking South to T2 Right.



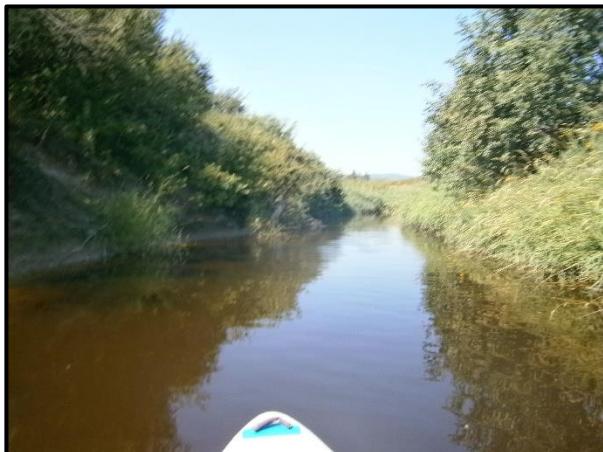
**Survey Photo 8:** T2 Right: Looking North to T2 Left.



**Survey Photo 9:** T2 Left: Looking West upstream.



**Survey Photo 10:** T2 Left: Looking East downstream.



**Survey Photo 11:** T2: Looking West from creek.



**Survey Photo 12:** T2: Looking East from creek.

## SURVEY PHOTO LOG

SITE NAME: Ashley Creek  
MONITORING YEAR: 2021



**Survey Photo 13:** T2 Right: Looking North upstream.



**Survey Photo 14:** T2 Right: Looking East downstream.



**Survey Photo 15:** T3 Left: Looking Southwest to T3 Right.



**Survey Photo 16:** T3 Right: Looking Northeast to T3 Left.



**Survey Photo 17:** T3 Left: Looking West upstream.



**Survey Photo 18:** T3 Left: Looking East downstream.

## SURVEY PHOTO LOG

SITE NAME: Ashley Creek  
MONITORING YEAR: 2021



**Survey Photo 19:** T3: Looking West from creek.



**Survey Photo 20:** T3: Looking East from creek.



**Survey Photo 21:** T3 Right: Looking West upstream.



**Survey Photo 22:** T3 Right: Looking East downstream.



**Survey Photo 23:** T4 Left: Looking South to T4 Right.



**Survey Photo 24:** T4 Right: Looking North to T4 Left.

## SURVEY PHOTO LOG

SITE NAME: Ashley Creek  
MONITORING YEAR: 2021



Survey Photo 25: T4 Left: Looking West upstream.



Survey Photo 26: T4 Left: Looking East downstream.



Survey Photo 27: T4: Looking West from creek.



Survey Photo 28: T4: Looking East from creek.



Survey Photo 29: T4 Right: Looking West upstream.



Survey Photo 30: T4 Right: Looking East downstream.

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## APPENDIX C

### 2013 – 2021 COMPREHENSIVE PLANT SPECIES LIST

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MDT Streams Mitigation Monitoring  
Ashley Creek  
Flathead County, Montana

**Table C-1.** Comprehensive list of plant species observed at the Ashley Creek Stream Mitigation Site from 2013 through 2015, and 2018 through 2021.

Scientific Name	Common Name	WMVC Indicator Status*
<i>Agropyron</i> sp.	Wheatgrass	N/A
<i>Agrostis gigantea</i>	Black Bent	FAC
<i>Agrostis stolonifera</i>	Spreading Bent	FAC
<i>Alnus incana</i>	Speckled Alder	FACW
<i>Alopecurus pratensis</i>	Field Meadow-Foxtail	FAC
<i>Amelanchier alnifolia</i>	Saskatoon Service-Berry	FACU
<i>Artemisia absinthium</i>	Absinthium	UPL
<i>Artemisia biennis</i>	Biennial Wormwood	FACW
<i>Asperugo procumbens</i>	German-Madwort	UPL
<i>Avena fatua</i>	Wild Oats	UPL
<i>Bassia scoparia</i>	Mexican-Fireweed	FAC
<i>Beckmannia syzigachne</i>	American Slough Grass	OBL
<i>Betula pumila</i>	Bog Birch	OBL
<i>Bromus carinatus</i>	California Brome	UPL
<i>Bromus inermis</i>	Smooth Brome	UPL
<i>Bromus tectorum</i>	Cheatgrass	UPL
<i>Carex stipata</i>	Stalk-Grain Sedge	OBL
<i>Centaurea stoebe</i>	Spotted Knapweed	UPL
<i>Chenopodium album</i>	Lamb's-Quarters	FACU
<i>Cirsium arvense</i>	Canadian Thistle	FAC
<i>Cirsium vulgare</i>	Bull Thistle	FACU
<i>Clematis ligusticifolia</i>	Deciduous Traveler's Joy	FAC
<i>Convolvulus arvensis</i>	Field Bindweed	UPL
<i>Cornus alba</i>	Red Osier	FACW
<i>Cynoglossum officinale</i>	Gypsy-Flower	FACU
<i>Descurainia sophia</i>	Herb Sophia	UPL
<i>Elodea canadensis</i>	Canadian Waterweed	OBL
<i>Elymus canadensis</i>	Nodding Wild Rye	FAC
<i>Elymus hispoides</i>	Intermediate Wheatgrass	UPL
<i>Elymus repens</i>	Creeping Wild Rye	FAC
<i>Elymus trachycaulus</i>	Slender Wild Rye	FAC
<i>Epilobium brachycarpum</i>	Panicled Willowherb	UPL
<i>Epilobium ciliatum</i>	Fringed Willowherb	FACW
<i>Equisetum arvense</i>	Field Horsetail	FAC
<i>Equisetum hyemale</i>	Tall Scouring-Rush	FACW
<i>Festuca idahoensis</i>	Bluebunch Fescue	FACU
<i>Galium aparine</i>	Sticky-Willy	FACU
<i>Glyceria grandis</i>	American Manna Grass	OBL
<i>Helianthus maximiliani</i>	Maximilian Sunflower	UPL
<i>Helianthus nuttallii</i>	Nuttall's Sunflower	FACW
<i>Lactuca serriola</i>	Prickly Lettuce	FACU

Scientific Name	Common Name	WMVC Indicator Status*
<i>Lepidium perfoliatum</i>	Clasping Pepperwort	FACU
<i>Lupinus argenteus</i>	Silvery Lupine	UPL
<i>Lupinus lepidus</i>	Stemless-dwarf Lupine	UPL
<i>Lupinus</i> sp.	Lupine	N/A
<i>Malva neglecta</i>	Dwarf Cheeseweed	UPL
<i>Medicago lupulina</i>	Black Medick	FACU
<i>Medicago sativa</i>	Alfalfa	UPL
<i>Melilotus albus</i>	White Sweetclover	UPL
<i>Melilotus officinalis</i>	Yellow Sweet-Clover	FACU
<i>Mentha arvensis</i>	American Wild Mint	FACW
<i>Onopordum acanthium</i>	Scotch Thistle	UPL
<i>Pascopyrum smithii</i>	Western-Wheat Grass	FACU
<i>Peritoma serrulata</i>	Rocky Mountain Beepplant	FACU
<i>Phalaris arundinacea</i>	Reed Canary Grass	FACW
<i>Plantago major</i>	Great Plantain	FAC
<i>Poa palustris</i>	Fowl Blue Grass	FAC
<i>Poa pratensis</i>	Kentucky Blue Grass	FAC
<i>Populus angustifolia</i>	Narrow-Leaf Cottonwood	FACW
<i>Populus balsamifera</i>	Balsam Poplar	FAC
<i>Potamogeton richardsonii</i>	Red-Head Pondweed	OBL
<i>Potentilla anserina</i>	Silverweed	OBL
<i>Prunus virginiana</i>	Choke Cherry	FACU
<i>Rosa woodsii</i>	Woods' Rose	FACU
<i>Rumex acetosa</i>	Garden Sorrel	FAC
<i>Rumex crispus</i>	Curly Dock	FAC
<i>Salix bebbiana</i>	Gray Willow	FACW
<i>Salix drummondiana</i>	Drummond's Willow	FACW
<i>Salix exigua</i>	Narrow-Leaf Willow	FACW
<i>Salix lasiandra</i>	Pacific Willow	FACW
<i>Scirpus microcarpus</i>	Red-Tinge Bulrush	OBL
<i>Silene latifolia</i>	Bladder Campion	UPL
<i>Silene repens</i>	Creeping Catchfly	UPL
<i>Silene vulgaris</i>	Maiden's-tears	UPL
<i>Sinapis arvensis</i>	Corn Mustard	UPL
<i>Sisymbrium altissimum</i>	Tall Hedge-Mustard	FACU
<i>Solanum dulcamara</i>	Climbing Nightshade	FAC
<i>Solidago canadensis</i>	Canadian Goldenrod	FACU
<i>Sonchus arvensis</i>	Field Sow-Thistle	FACU
<i>Symporicarpos albus</i>	Common Snowberry	FACU
<i>Symporicarpos occidentalis</i>	Western Snowberry	FAC
<i>Sympyotrichum ascendens</i>	Western American-Aster	FACU
<i>Sympyotrichum laeve</i>	Smooth Blue American-Aster	FACU

Scientific Name	Common Name	WMVC Indicator Status*
<i>Tanacetum vulgare</i>	Common Tansy	FACU
<i>Taraxacum officinale</i>	Common Dandelion	FACU
<i>Thlaspi arvense</i>	Field Pennycress	UPL
<i>Tragopogon dubius</i>	Meadow Goat's-Beard	UPL
<i>Trifolium repens</i>	White Clover	FAC
<b><i>Urtica dioica</i></b>	<b>Stinging Nettle</b>	<b>FAC</b>
<i>Verbascum thapsus</i>	Great Mullein	FACU
<i>Vicia americana</i>	American Purple Vetch	FAC

\* 2018 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (WMVC) (USACE 2018)

New species identified in 2021 are **bolded**

Species identified to genus level have been assigned an indicator status of N/A

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## **APPENDIX D**

### **2021 STREAM BANK VEGETATION COMPOSITION**

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MDT Streams Mitigation Monitoring  
Ashley Creek  
Flathead County, Montana

**Table D-1.** Plant species and their associated cover classes along the stream banks of the Ashley Creek stream mitigation site in 2021.\*\*\*

Cover Class Percentages: 0 = <1%, 1 = 1-5%, 2 = 6-10%, 3 = 11-20%, 4 = 21-50%, 5 = >50%

Streambank Species	Left Bank	Left Bank Cover Class	Right Bank	Right Bank Cover Class	WMVC Indicator Status*
<i>Agrostis stolonifera</i>	X	1	X	1	FAC
<i>Alnus incana</i>	X	0	X	0	FACW
<i>Artemisia absinthium</i>	X	0	X	0	UPL
<i>Bromus inermis</i>	X	1	X	1	UPL
<i>Carex stipata</i>	X	0			OBL
<i>Clematis ligusticifolia</i>			X	0	FAC
<i>Cornus alba</i>			X	1	FACW
<i>Cynoglossum officinale</i>	X	0			FACU
<i>Elymus repens</i>	X	1	X	2	FAC
<i>Epilobium brachycarpum</i>			X	0	UPL
<i>Equisetum arvense</i>	X	0	X	1	FAC
<i>Galium aparine</i>	X	0			FACU
<i>Glyceria grandis</i>	X	0	X	0	OBL
<i>Lactuca serriola</i>	X	0	X	0	FACU
<i>Medicago lupulina</i>	X	0			FACU
<i>Melilotus officinalis</i>	X	0	X	0	FACU
<i>Mentha arvensis</i>	X	0			FACW
<i>Phalaris arundinacea</i> **	X	4	X	3	FACW
<i>Poa pratensis</i>	X	0	X	0	FAC
<i>Salix bebbiana</i>	X	0			FACW
<i>Salix drummondiana</i>	X	0			FACW
<i>Sonchus arvensis</i>	X	1			FACU
<i>Symporicarpos albus</i>	X	0	X	0	FACU
<i>Tanacetum vulgare</i>	X	0	X	0	FACU
<i>Thlaspi arvense</i>	X	0	X	0	UPL

\* 2018 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (USACE 2018)

\*\* Dominant species observed along Ashley Creek stream banks

\*\*\* Bare ground was observed along both stream banks as a cover class of 5 (greater than 50%)

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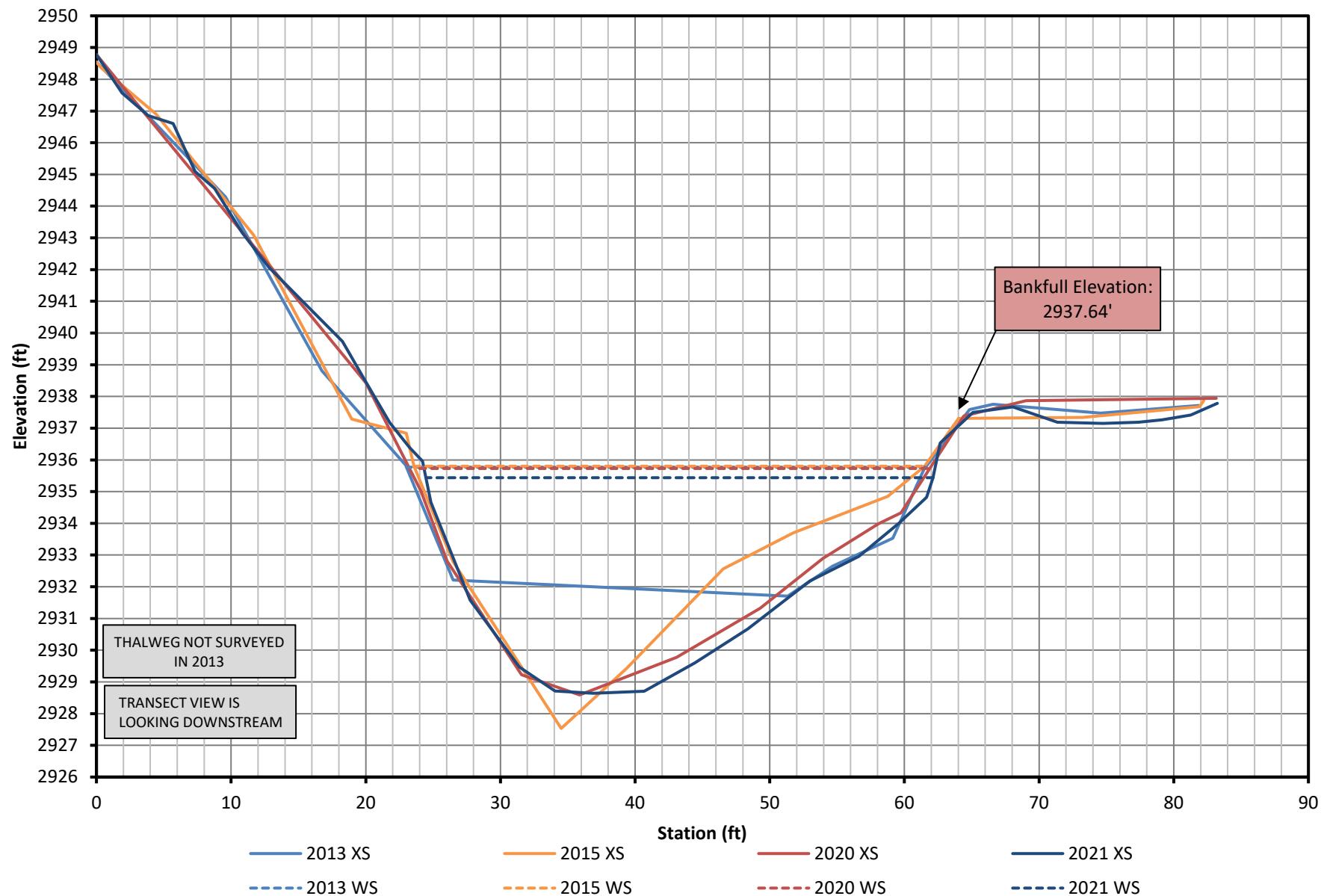
## **APPENDIX E**

### **LONGITUDINAL PROFILE AND PERPENDICULAR TRANSECT PLOTS**

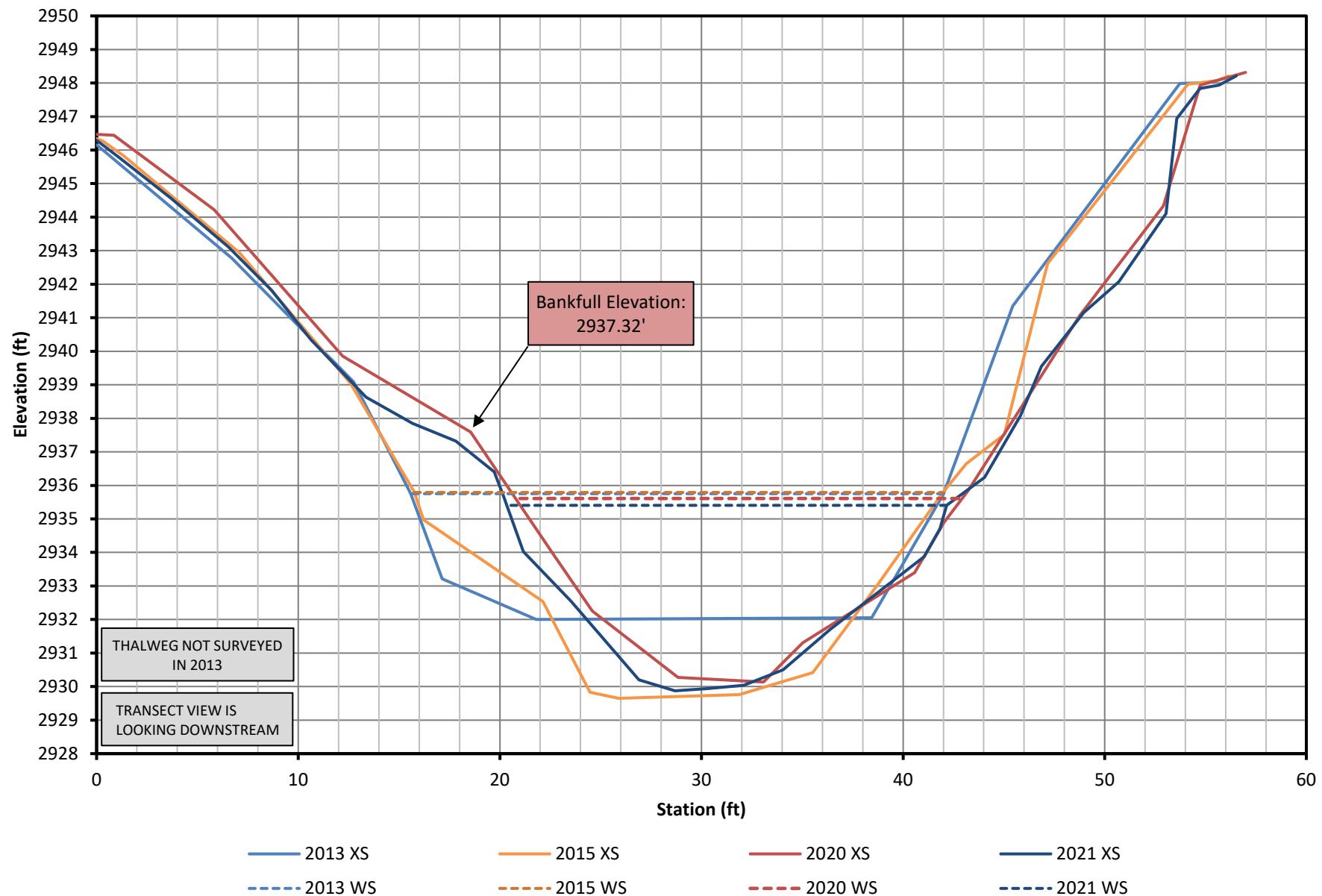
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MDT Streams Mitigation Monitoring  
Ashley Creek  
Flathead County, Montana

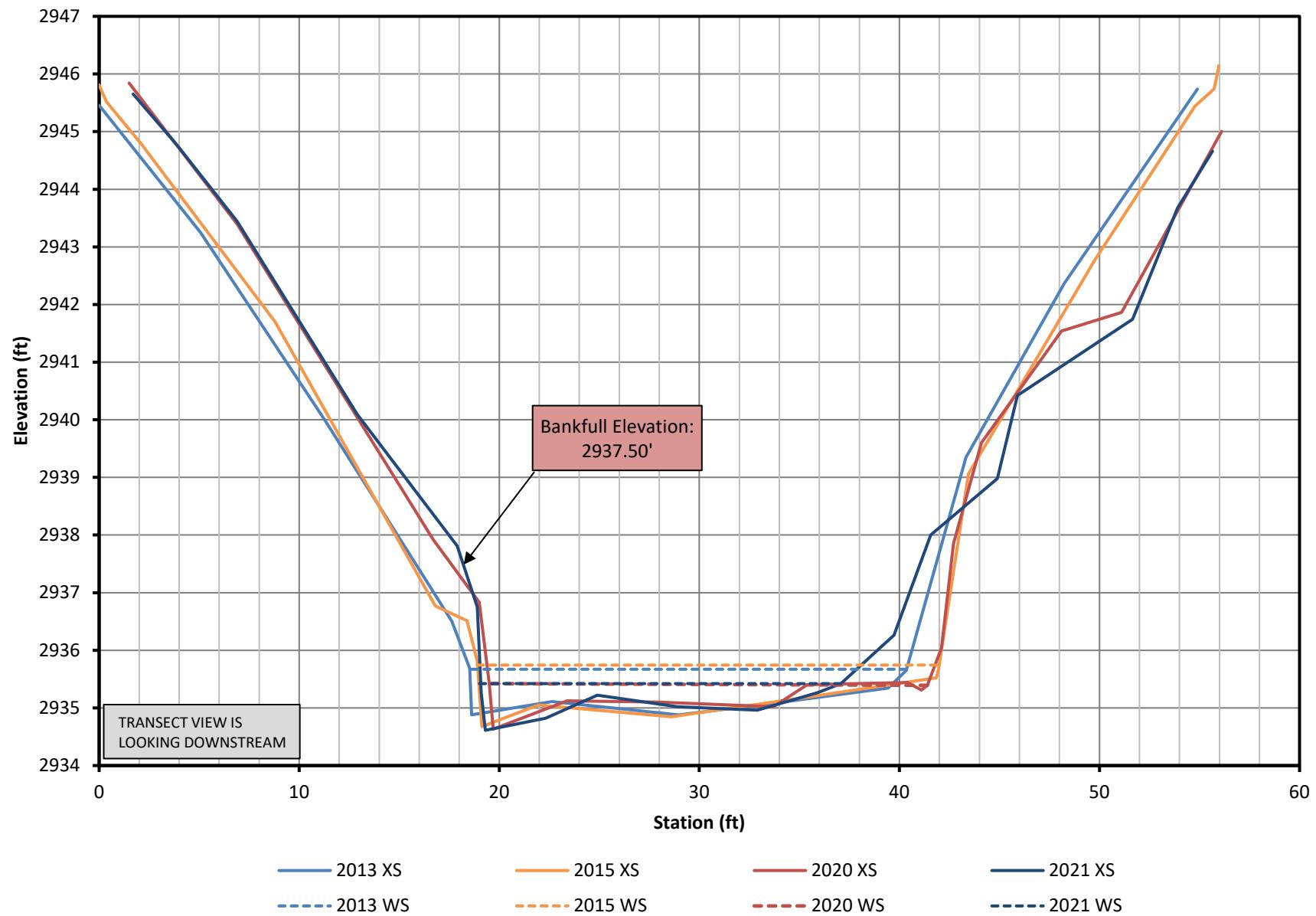
## Ashley Creek Transect #1 - Pool



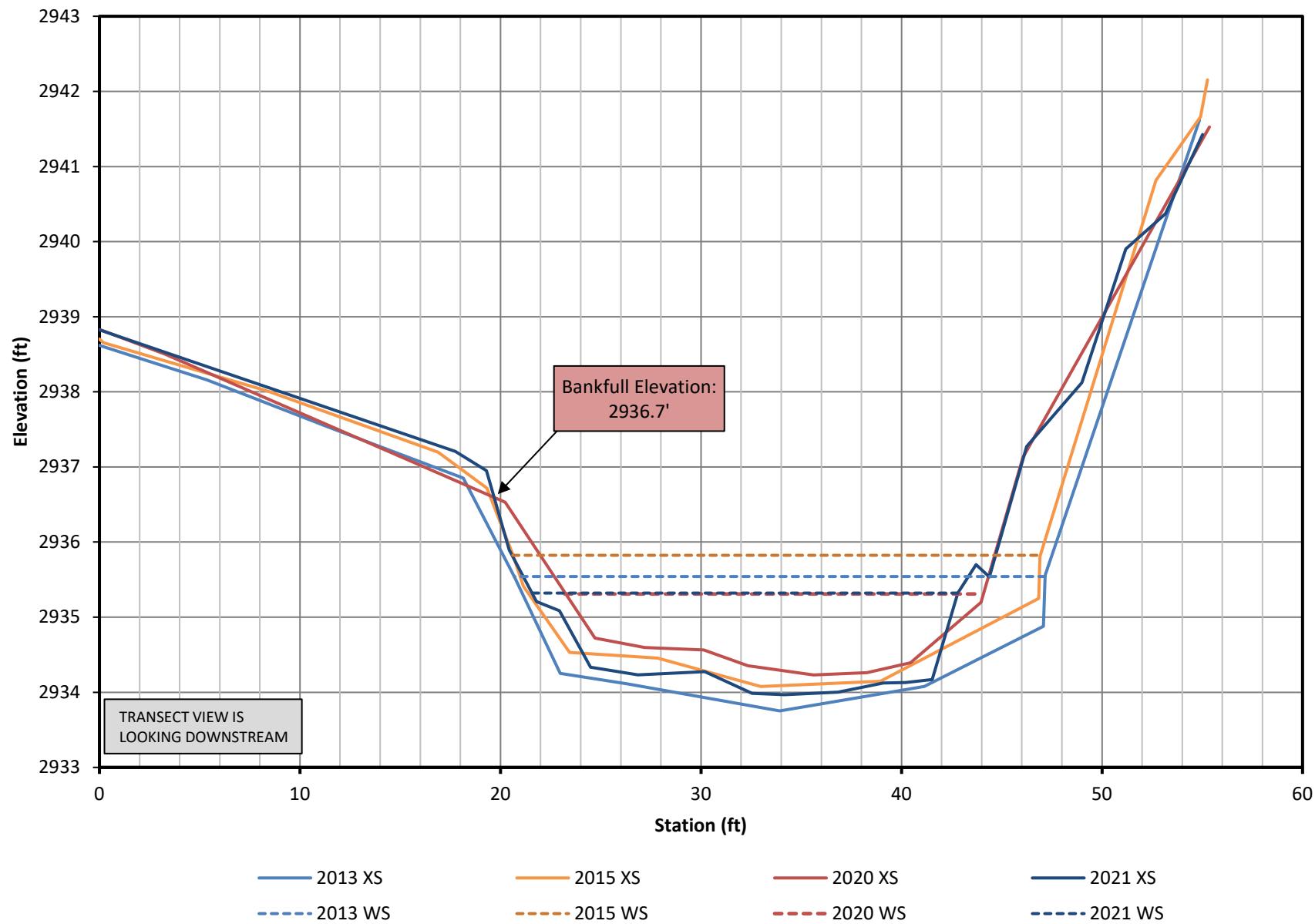
## Ashley Creek Transect #2 - Pool



## Ashley Creek Transect #3 - Riffle



## Ashley Creek Transect #4 - Riffle



## Ashley Creek Longitudinal Profiles

