Montana Department of Transportation Stream Mitigation Monitoring Report

ASHLEY CREEK MITIGATION SITE

Project Overview

Watershed: Watershed #4 - Flathead

Monitoring Year: 2020

Years Monitored: 6th year of monitoring (2013-2015 & 2018-2020)

Corps Permit Number: NWO-2009-01808-MTM

Monitoring Conducted By: Confluence Consulting Inc.

Monitoring Dates: 7/30/2020

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: Yes

Mitigation Site Construction Started: 2010 **Construction Ended:** 2010 & 2017

Dates of any recent corrective or maintenance activities (since previous report):
Activity: Noxious weed control **Date:** unknown, summer 2020
Specific recommendations for additional corrective actions: Adaptive Management actions are being evaluated by MDT to address streambank erosion, loss of vegetative cover, and subsequent changes to the channel form under the US Highway 93 - Kalispell Bypass bridge over Ashley Creek. MDT is in the process of developing plans to address the eroding banks in coordination with the US Army Corps of Engineers for permits and stream crediting.

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).

Table 1. Summary of Performance Standards.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Riparian Buffer Establishment	a. 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	**YES**	Vegetation transect surveys indicate **62%** of the riparian areas have revegetated with non-noxious weed species.
	b. Noxious weeds do not exceed 10% cover within the riparian buffer areas.	**YES**	Vegetation surveys indicate **3%** cover of the project area by noxious weeds.
Vegetation Success	a. Combined aerial cover of riparian and stream bank vegetation communities is at least 70%	**NO**	Combined aerial cover of riparian and stream bank vegetation communities is **65%**.
	b. Planted trees and shrubs must exhibit 50% survival after 5 years.	**YES**	Inspections indicated **76%** survival of 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.	**NO**	Dominant vegetation along 50% of both stream banks is reed canary grass, with a root stability index of 9, while the other 50% of both stream banks is dominated by bare ground with a root stability index of 1**.**
Stream Bank Stability	Less than 25% of bank length is unstable and classified as eroding bank.	**NO**	Total eroding stream bank length is 291', or **35%** 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 riparian plant communities have successfully established along the streambanks.	**NO**	Instream channel features are stable including pools and riffles, but the stream is not able to access the floodplain and riparian vegetation has only successfully established along a limited portion of the streambanks.

Performance Standards:

Results from the 2020 monitoring event indicate the Ashley Creek stream mitigation site is meeting three of the six quantitative performance standards established in the monitoring plan. Ten years post-construction, the riparian buffer is vegetated with 50% non-noxious plant

species and noxious weed cover is less than 10%. Vegetative cover along the stream bank has not reached the desired percentage and therefore the site failed to meet the success criteria established for both combined aerial cover of riparian and stream bank vegetation and root stability index values. The site also failed to meet bank stability and channel form success criteria (details provided below) because 35% (291 feet) of the banks within the project reach are eroding. The majority (25%) of these eroding banks are located under the bridge US Highway 93 - Kalispell Bypass bridge and should be addressed with corrective actions.

Summary Data

Riparian Buffer Vegetation Inventory

Table 2 summarizes the total percent areal cover of all riparian vegetation, bare ground, woody vegetation, and noxious weeds for the riparian transects surveyed along Ashley Creek. In 2020, the total percent riparian cover decreased to 65%, with 13% cover provided by woody species, 3% by noxious weeds, and 35% by bare ground. Overall, 62% of the reach exhibited non-noxious vegetation cover (65% total riparian cover minus 3% noxious weed cover).

Table 2. Vegetation cover estimates at the Ashley Creek Stream Mitigation Site in 2013, and 2018 through 2020.

Belt Transect	Length (ft)	Total % Riparian Cover				% Bare Ground				% Woody Cover				% Noxious Weed Cover			
		2013	2018	2019	2020	2013	2018	2019	2020	2013	2018	2019	2020	2013	2018	2019	2020
Right (south bank)	208	92%	70%	70%	65%	8%	30%	30%	35%	23%	15%	15%	13%	12%	7%	5%	5%
Left (north bank)	243	84%	80%	70%	65%	16%	20%	30%	35%	30%	20%	18%	13%	10%	5%	3%	2%
Total	451	88%	75%	70%	65%	12%	25%	30%	35%	26%	18%	17%	13%	11%	6%	4%	3%

Dominant species recorded along the riparian transects were combined with visual observations in other areas to develop a vegetation community map (Figure 3, Appendix A). The same four community types documented in 2019 were observed during the 2020 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).* The right bank along the upstream extent of the project reach, which was not disturbed during construction, is dominated by reed canary grass. Community Type 3 on both the left and right stream banks has shifted since the 2015 monitoring event, to include community Types 4 and 5, due to increases in bare ground, red osier dogwood (*Cornus alba*), and speckled alder (*Alnus incana*).

Appendix C includes a comprehensive list of plant species observed during the 2013 through 2015, and 2018 through 2020 monitoring events. Since 2013, 90 plant species have been identified within the project area, representing an increase of 34 species since the initial monitoring event. Deciduous traveler's-joy (*Clematis ligusticifolia*), a native wetland species, was identified for the first time at Ashley Creek in 2020. Forty-one of the 90 species (46%) observed in 2020 were hydrophytic based on the 2018 National Wetland Plant List (USACE, 2018).

In 2020, there was an increase in bare ground observed along the steep stream banks of Ashley Creek. Increased bare ground was observed in areas previously sprayed with herbicide and in areas where the vegetation is dead and dying. 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.

The continued increase in bare ground is due to the absence of direct sunlight and precipitation under the bridge, which is causing poor plant vigor and plant mortality, thus leading to a reduction in overall vegetative cover. It is not possible to increase the amount of sunlight and precipitation under the bridge, therefore the total vegetative cover here is expected to decrease over time. A reduction in vegetation will likely contribute to increased erosion and bank instability.

Stream Bank Vegetation Composition

Reed canary grass comprised between 21 and 50% cover along the left stream bank and between 11 and 20% along the right. Bare ground, due to bank erosion and limited sunlight beneath the bridge overpass, accounted for greater than 50% of both stream banks. Therefore, reed canary grass, with a root stability index of 9, dominated less than half of the stream bank vegetation, while more than half the banks was dominated by bare ground (Appendix D). Based on the high amount of bare ground present within the project reach, the stream bank vegetation does not meet the success criterion that requires at least 50% cover (i.e. the majority) from plants with a root stability index of at least 6.

Noxious Weed Inventory

Eight infestations of three Montana Listed Priority 2B noxious weeds were mapped within the riparian corridor at the Ashley Creek stream mitigation site and included Canadian thistle (*Cirsium arvense)*, field bindweed (*Convolvulus arvensis)*, and common tansy (*Tanacetum vulgare)* (MDA 2019). Noxious weed occurrences are displayed on Figure 3 in Appendix A with the exception of those observed in trace amounts, which were not mapped. Spotted knapweed (*Centaurea stoebe*) and houndstongue (*Cynoglossum officinale*) were observed in isolated trace amounts but were not mapped. A low cover class (1 to 5 percent) was identified for all mapped weed occurrences within the project area. An estimated 3% of the project area has been colonized by noxious weeds, with common tansy (*Tanacetum vulgare*) identified as the most prevalent. Based on these results, the riparian buffer meets the noxious weed success criterion which requires less than 10% noxious weed cover in the riparian buffer.

Woody Plant Survival

Woody plantings, including serviceberry (*Amelancier 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 2020. Table 3 indicates the total number of woody plantings inspected and the number of surviving plants. The Ashley Creek revegetation plan called for installation of 130 trees and shrubs. As compared to the revegetation plan, 76% (99 of 125 plants) have survived ten years following construction. While survival of planted woody shrubs is relatively high, a substantial number of these shrubs displayed poor vigor. This observation is reflected by the decrease in total woody cover that was observed within the riparian corridor. Poor vigor for many of the planted woody shrubs is

due to a lack of direct sunlight and precipitation beneath the bridge and the use of herbicides. The poor vigor of shrubs planted along the lower banks (particularly along the south bank) is also influenced by bank sloughing. Additionally, over the past few years, it has been challenging to locate shrubs that may have died several years ago, which can skew the results toward a higher survival rate if the number of live shrubs is compared to the number of dead shrubs observed.

Table 3. Woody plant survival at the Ashley Creek Stream Mitigation Site in 2013 through 2015, and 2018 through 2020.

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%

Bank Erosion Inventory

Previous monitoring reports documented bank erosion beneath the Highway 93 Bridge. 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 following section provides an updated bank erosion inventory 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.

Total eroding bank length within the Ashley Creek mitigation project area decreased from 312 feet in 2019 to 292 feet in 2020. The length of erosion on the right bank (EBR 1-2) is 187 feet, which decreased by 41 feet since 2019, as the downstream end of this bank has been stabilized by woody vegetation, including chokecherry and snowberry, perennial grasses, and a patch of common tansy (*Tanacetum vulgare*) along this bank. Left bank erosion increased by 21 feet in 2020, and now is 105 feet long, owing to reduced vegetative cover on the upstream end of this bank segment. All stream banks under the footprint of the Highway 93 Bridge are now considered eroding. The only length of eroding bank that is not under the bridge is the upstream end of EBL 1-2, which is 75 feet long. This bank segment is a steep cut-bank that will not support vegetative growth or otherwise become stabilized 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 1-2 and EBL 2 has decreased every year since monitoring began. This trend has continued over the last year and there are now large sections of both banks that are completely bare. Sloughing was observed on both banks and new slump blocks were observed along EBR 1-2. Erosion of these banks is also being accelerated by anthropogenic use (i.e. foot traffic) on both EBR 1-2 and EBL 2. Reduced vegetative cover and increased bare soil stem from a lack of direct sunlight and precipitation beneath the bridge, which are required elements for plant growth.

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. This conclusion is supported by annual cross-sectional transect surveys (Appendix E) which show little lateral movement at the edge of the bankfull channel and slumping on the upper bank at Transects 2-4. The upper banks have retreated by as much as four feet since 2013 (Appendix E), due to loss of vegetation and subsequent bank erosion. 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. Without corrective action, erosion is likely to continue along both banks under the Highway 93 Bridge.

Two eroding banks were previously identified downgradient of storm water culvert outlets which drain into the channel. One of these culvert outlets is located the left bank on the upstream end of the project reach, and the other is on the right bank on the downstream end of the reach. Both outfall areas have been repaired and armored, and are no longer actively eroding (see photos in Appendix B).

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.

Four annually surveyed cross-sectional transects also indicate that the bankfull channel dimensions are being maintained over time. During the 2020 monitoring event, bankfull pool and riffle depths and widths were very similar to those observed in previous years. The average bankfull pool depth was 8.2 feet and average bankfull riffle depth was 2.7 feet. The average bankfull width was 26.3 feet at riffle transects and 34.9 at pool transects. These dimensions have remained relatively static since monitoring began in 2013 (Table 4).

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 increase erosion under the bridge during high flow events.

Table 4. Maximum bankfull depths and bankfull widths at cross-sectional transects 2013-2015 and 2018-2020.

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

** Maximum pool depths not surveyed in 2013

Conclusions

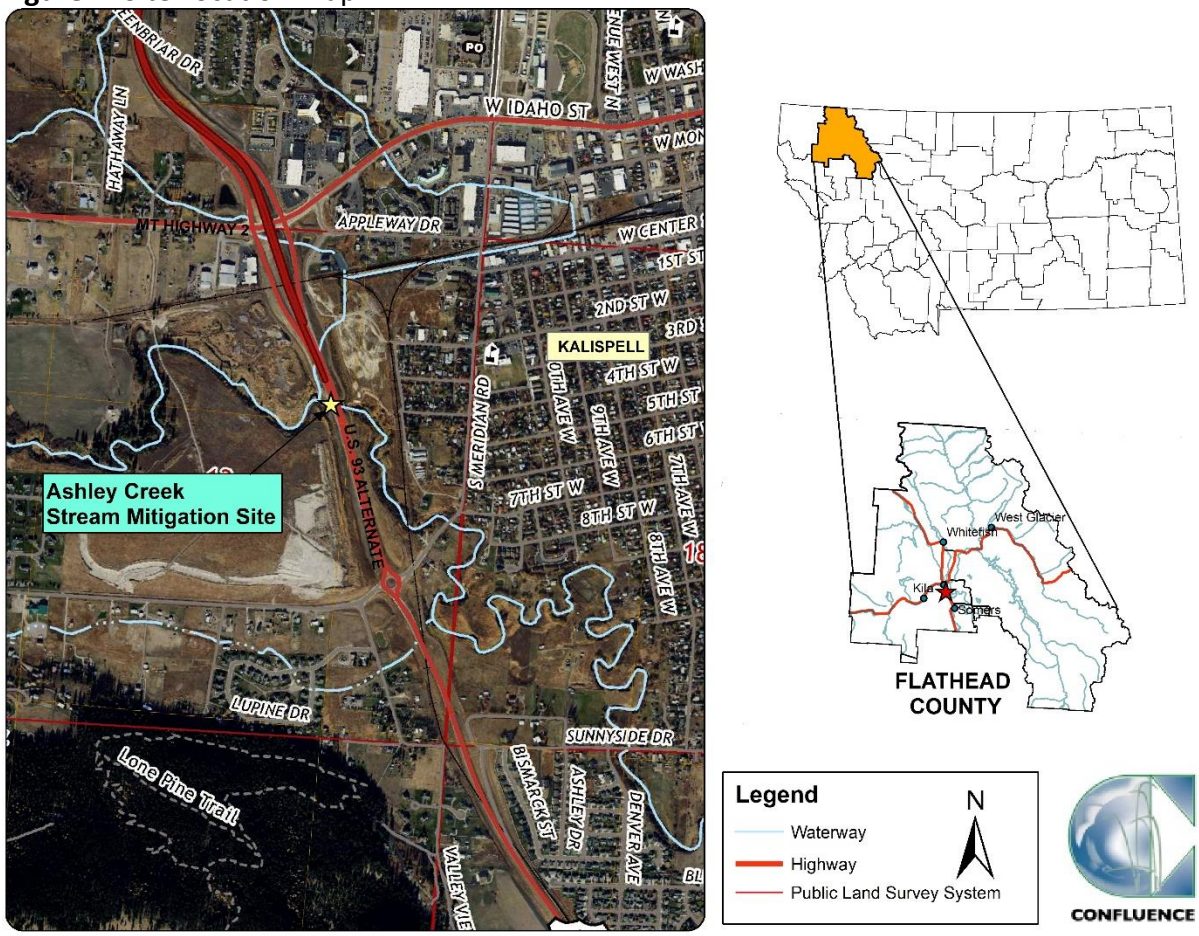
In 2020, the Ashley Creek mitigation site failed to meet three of the six quantitative performance standards, and one qualitative standards was also not met. The success criteria for total areal vegetative cover and noxious weed cover in the riparian buffer are being met, as is the criterion for planted woody vegetation survival. However, the combined aerial cover for riparian and stream bank vegetation communities was observed at 65%, which fails to meet the goal of at least 70% cover, and the majority of the stream bank vegetation does not have a stability rating of greater than 6. Additionally, 35% of the stream banks are unstable and classified as eroding, which is greater than the 25% allowable by the bank stability performance criterion. 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. Management actions will need to be taken for Ashley creek to meet the channel form success criteria.

Nearly all of the performance standard failures are associated with the bridge that spans Ashley Creek and its adjacent riparian corridor. The 100-foot wide bridge now covers 48% (220 of 460 feet) of the riparian transects. The expansion of the bridge from 2 to 5 lanes has negatively influenced vegetation growth and establishment by intercepting direct sunlight and precipitation that would otherwise fall the riparian zone. Vegetation has become sparser and bare ground has increased each year of monitoring; a trend which is expected to continue over time. Since the expansion of the bridge, the loss of rooted vegetation to hold the soil has resulted in destabilized banks, increased bank erosion, and an increase of sediment entering Ashley Creek at this location. With such low vegetative cover under the bridge, and the lack of functional floodplain, the stream banks have become increasingly susceptible to erosion especially during high flow events. On average, erosion rates are not overly rapid (<1 foot/year); however, given the high severity of erosion and length of eroding banks under the bridge, efforts should be taken to stabilize these banks.

Adaptive Management actions are being evaluated by MDT to address streambank erosion and subsequent changes to the channel form under the US Highway 93 - Kalispell Bypass bridge over Ashley Creek. MDT is in the process of developing construction plans with a stream restoration firm to address the eroding banks along Ashley Creek within this mitigation area in coordination with the US Army Corps of Engineers for permits and stream crediting.

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/other/webdata/external/planning/STREAM-MITIGATION/2013_REPORTS/2013_ASHLEY_CREEK_MONITORING_REPORT.PDF

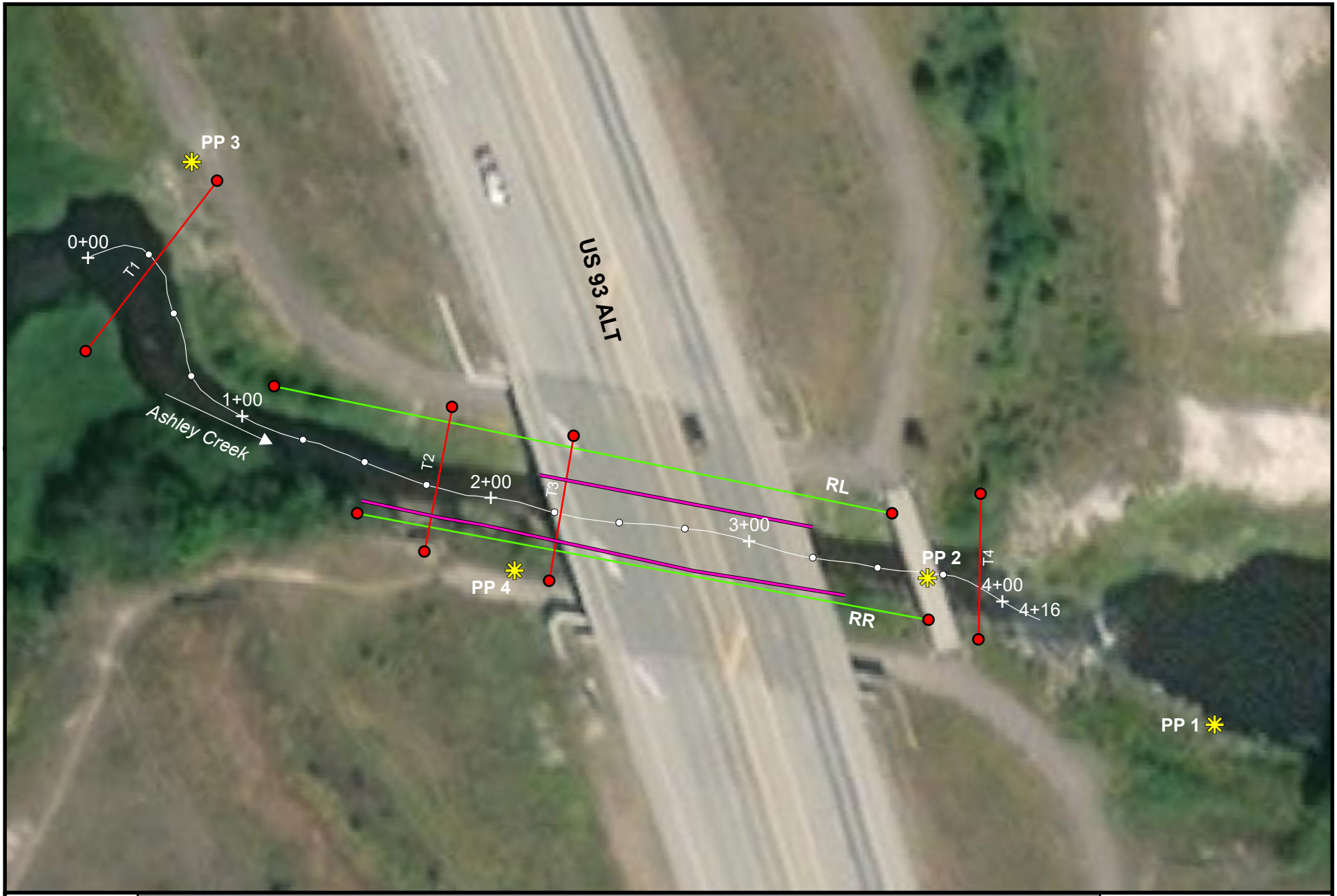
References

Montana Department of Agriculture (MDA). June 2019. *Montana Noxious Weed List*. Accessed October 2020 at: https://agr.mt.gov/Portals/168/Documents/Weeds/2019%20Montana%20Noxious%20Weed%20List.pdf?ver=2019-07-02-095540-487

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

APPENDIX A
PROJECT AREA MAPS

MDT Streams Mitigation Monitoring
Ashley Creek
Flathead County, Montana



CONFLUENCE
consulting incorporated

Legend

- Photo Points
- Channel Thalweg
- Major Station (100')
- Minor Station (25')
- Eroding Banks
- Pool and Riffle Transects
- Riparian Transects

N

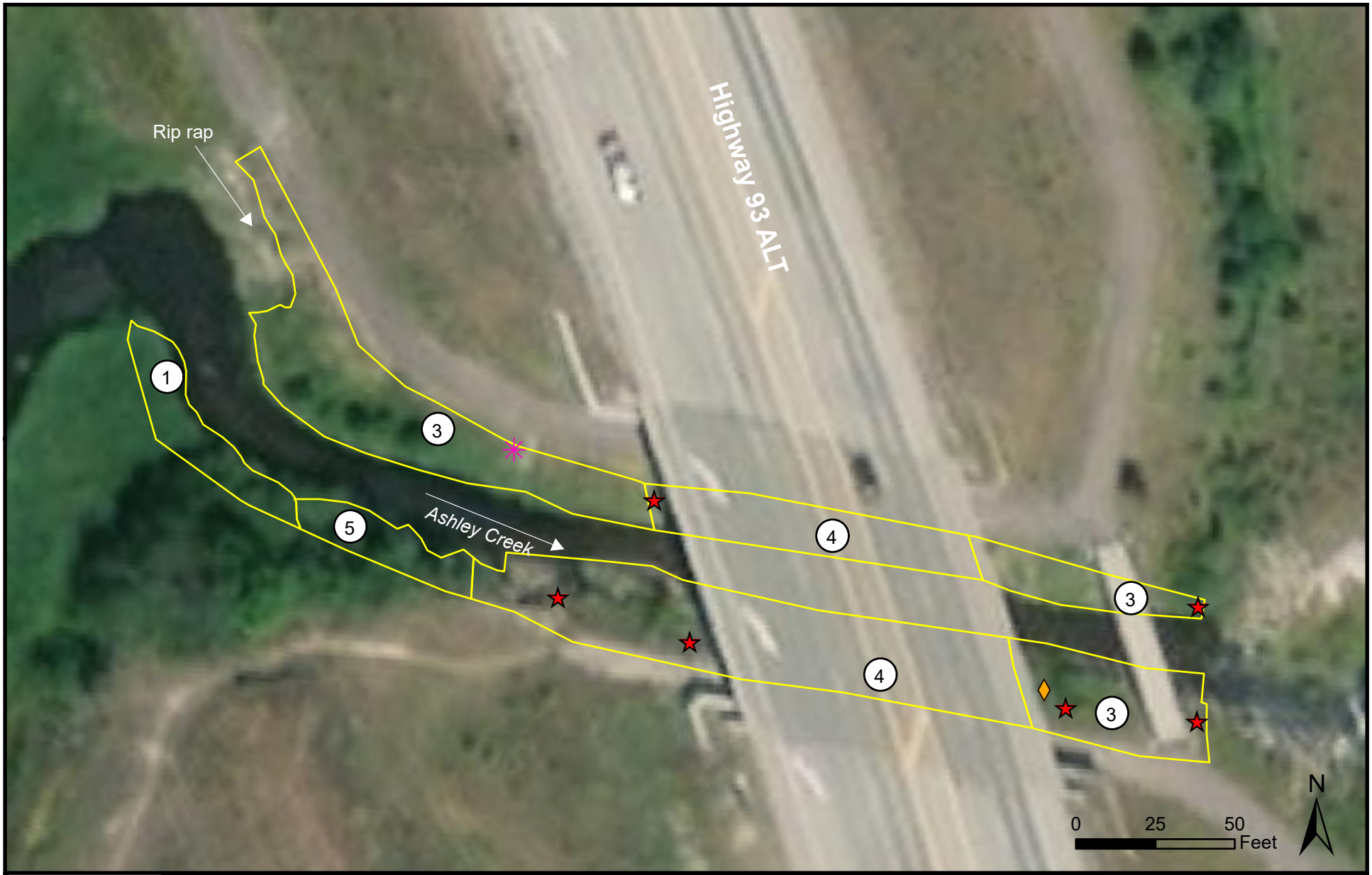
0 25 50 100 Feet

Ashley Creek - 2020 Monitoring Features

Figure 2

Date: 10/22/2020

Ashley_features2020.mxd



CONFLUENCE
consulting incorporated

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 - 2020 Noxious Weeds and Vegetation Communities

Figure 3

Date: 10/15/2020

Ashley_monitor2020.mxd

APPENDIX B
PROJECT AREA PHOTOGRAPHS

MDT Streams Mitigation Monitoring
Ashley Creek
Flathead County, Montana

MONITORING PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEARS: 2013 and 2020

2013

2020

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

2013

2020

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

2013

2020

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 2020

2013

2020

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

2013

2020

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

2013

2020

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

MONITORING PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEARS: 2013 and 2020

2013

2020

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

2013

2020

Additional Photo 2: Upper end of Eroding Bank EBR1 –2.

2013

2020

Additional Photo 3: Middle of Eroding Bank EBR1-2.

MONITORING PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEARS: 2013 and 2020

2018

2020

Additional Photo 4: Middle of Eroding Bank EBR1-2.

2013

2020

Additional Photo 5: Downstream end of eroding Bank EBR 1-2.

2014

2020

Additional Photo 6: Stabilized culvert outlet.

MONITORING PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEARS: 2013 and 2020

2013

2020

Additional Photo 7: Eroding Bank EBL2

2020

Additional Photo 8: Toe of eroding bank EBR1-2 showing bank sloughing and loss of woody vegetation.

SURVEY PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEAR: 2020

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: 2020

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.

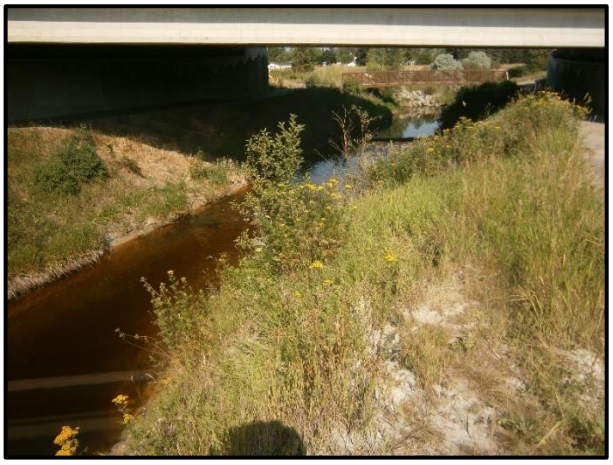
Survey Photo 11: T2: Looking West from creek.

Survey Photo 12: T2: Looking East from creek.

SURVEY PHOTO LOG

SITE NAME: Ashley Creek
MONITORING YEAR: 2020

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

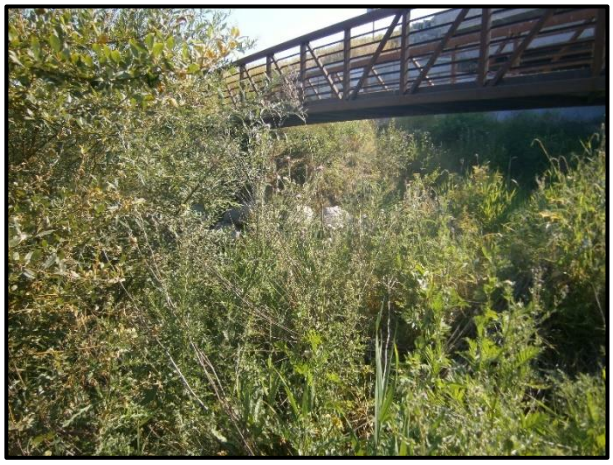
SITE NAME: Ashley Creek
MONITORING YEAR: 2020

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: 2020

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.

APPENDIX C
2013 – 2020 COMPREHENSIVE PLANT SPECIES LIST

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 2020.

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

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

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

* 2018 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (WMVC) (USACE 2018)
New species identified in 2020 are **bolded**
Species identified to genus level have been assigned an indicator status of N/A

APPENDIX D
2020 STREAM BANK VEGETATION COMPOSITION

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 2020.

Classification Values and Percent Cover Classes: 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*
Agrostis stolonifera	X	1	X	1	FAC
Alnus incana	X	0	X	0	FACW
Artemisia absinthium	X	0			UPL
Beckmannia syzigachne	X	0			OBL
Bromus inermis	X	1	X	1	UPL
Carex stipata	X	0			OBL
Cornus alba			X	1	FACW
Cynoglossum officinale	X	0			FACU
Elymus repens	X	1	X	2	FAC
Epilobium brachycarpum			X	0	UPL
Equisetum arvense	X	0	X	1	FAC
Galium aparine	X	0			FACU
Glyceria grandis	X	0	X	0	OBL
Lactuca serriola	X	0			FACU
Medicago lupulina	X	0			FACU
Melilotus officinalis	X	0	X	0	FACU
Mentha arvensis	X	0			FACW
*Phalaris arundinacea***	X	4	X	3	FACW
Poa pratensis	X	0	X	0	FAC
Salix bebbiana	X	0			FACW
Salix drummondiana	X	0			FACW
Sonchus arvensis	X	1			FACU
Symphoricarpos albus	X	0			FACU
Tanacetum vulgare	X	0	X	0	FACU
Thlaspi arvense	X	0	X	0	UPL

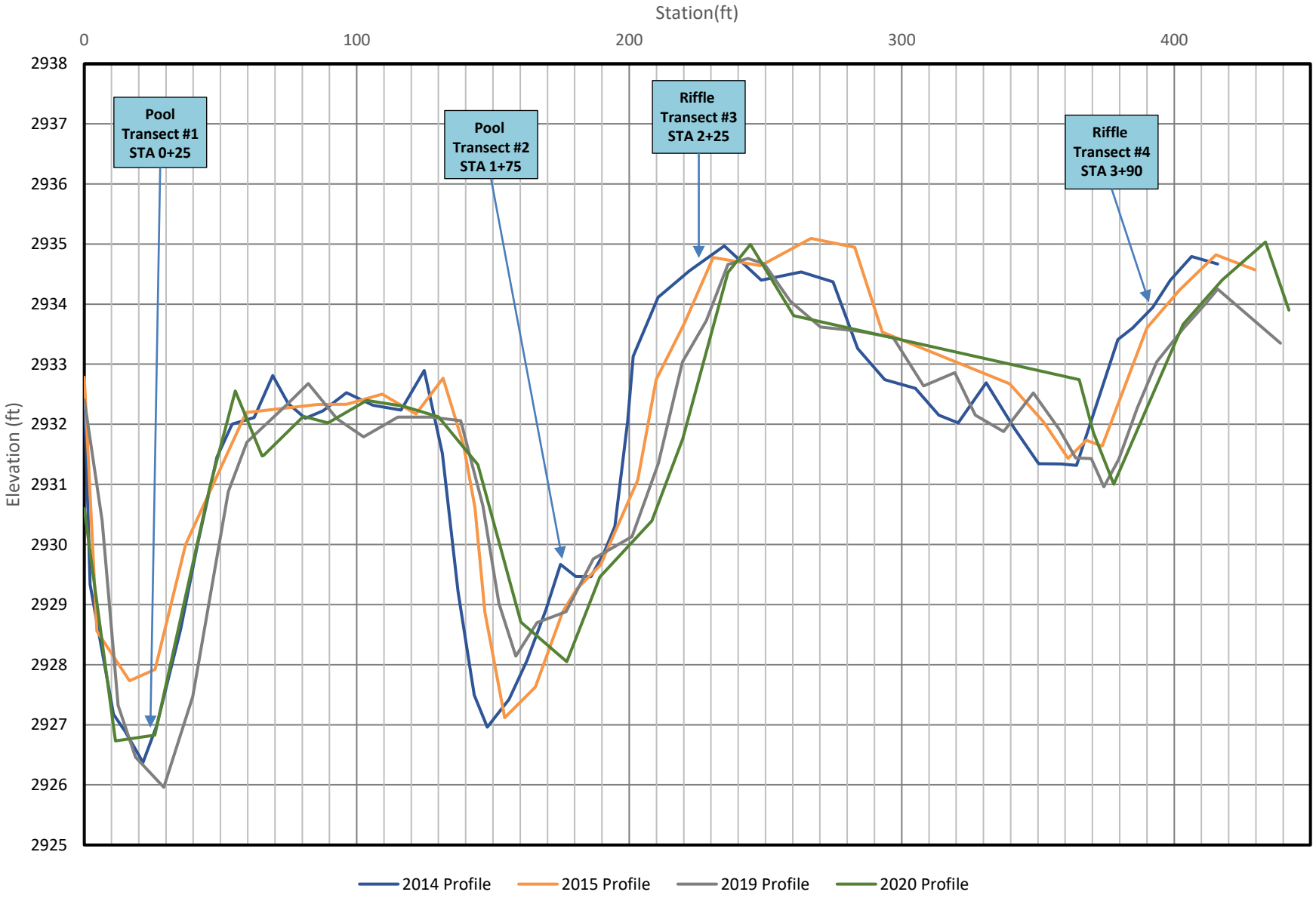
* 2018 National Wetland Plant List; Western Mountains, Valleys, and Coast Region (WMVC) (USACE 2018)

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

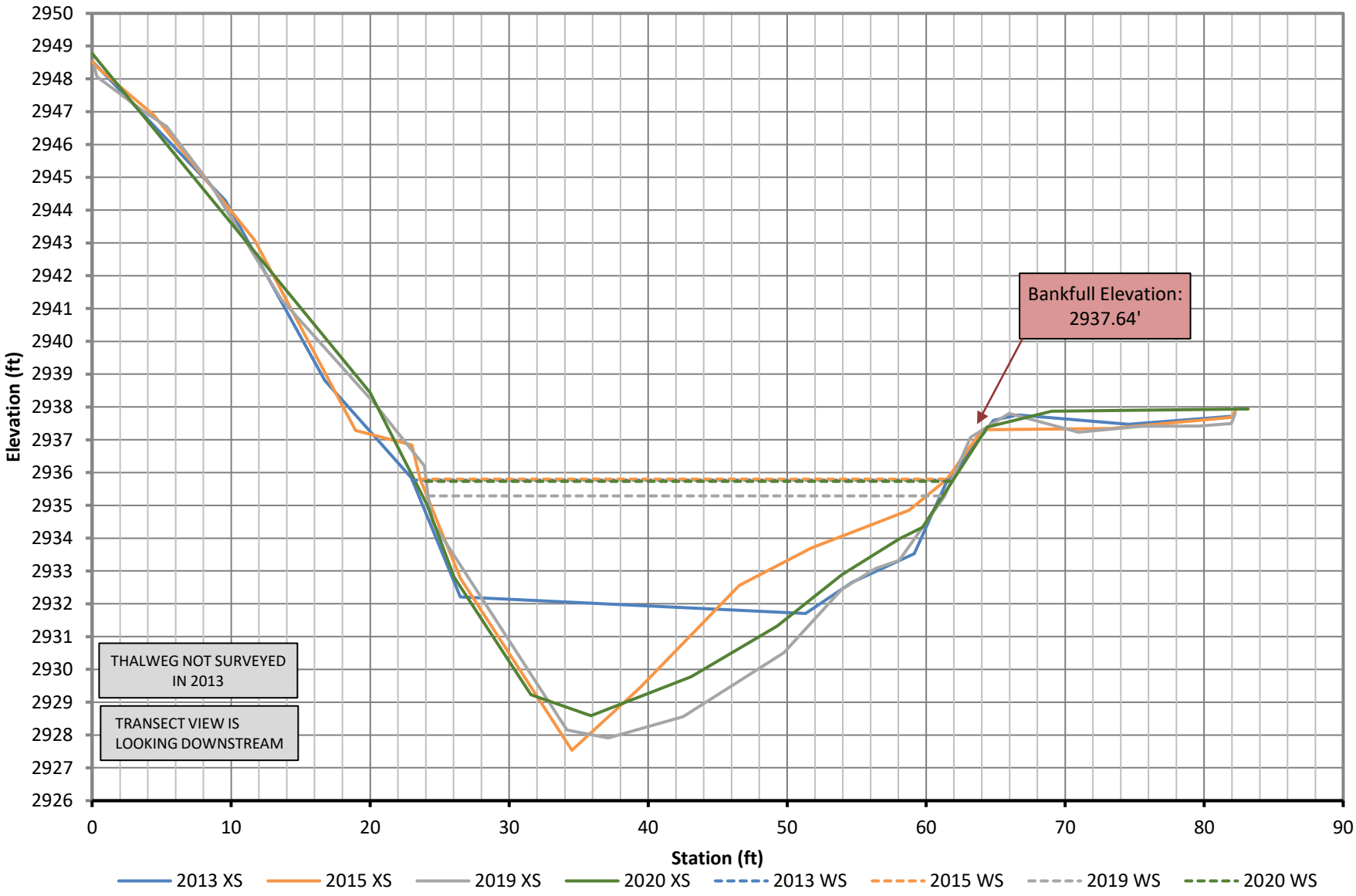
APPENDIX E
LONGITUDINAL PROFILE AND PERPENDICULAR TRANSECT PLOTS

MDT Streams Mitigation Monitoring
Ashley Creek
Flathead County, Montana

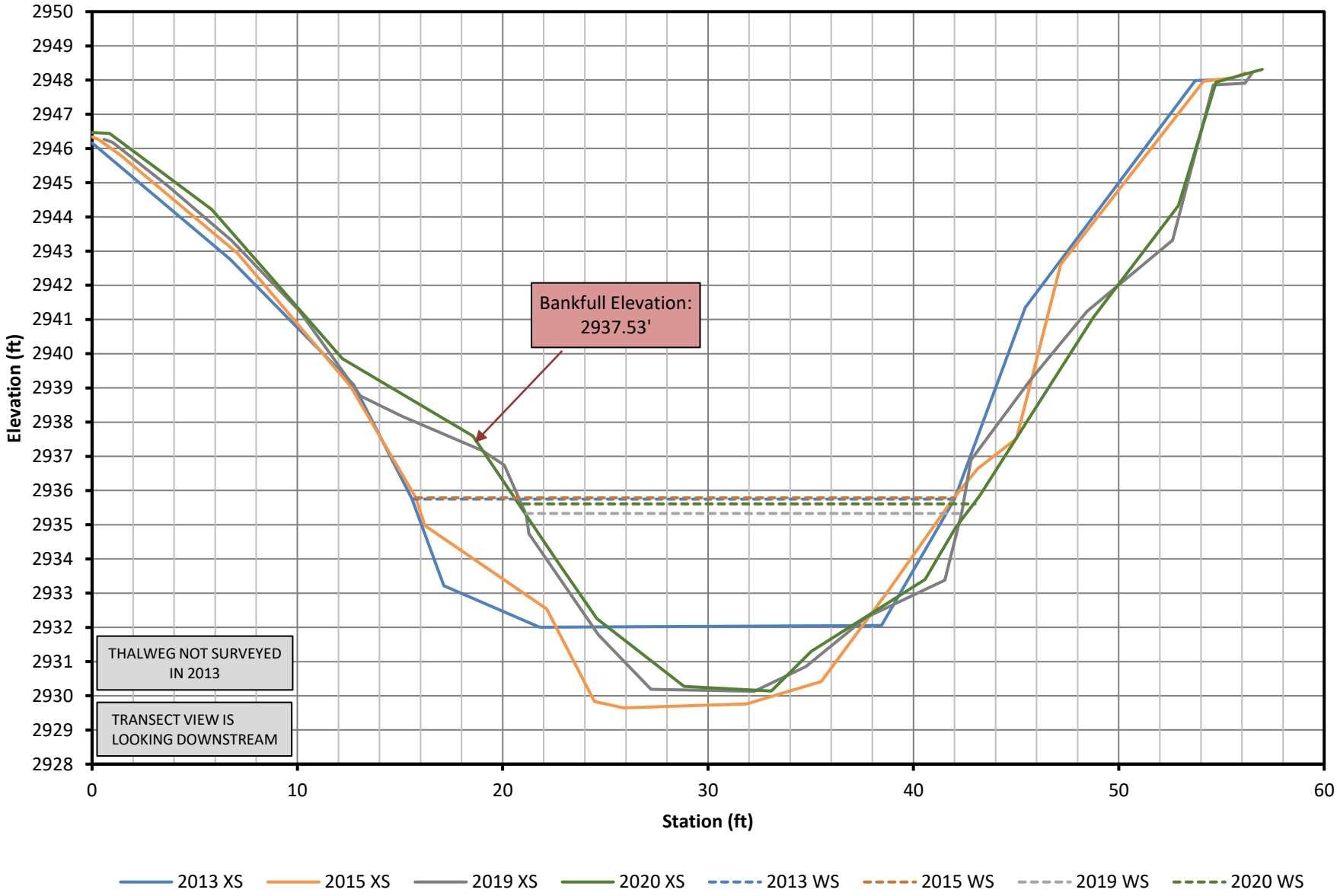
Ashley Creek Longitudinal Profiles

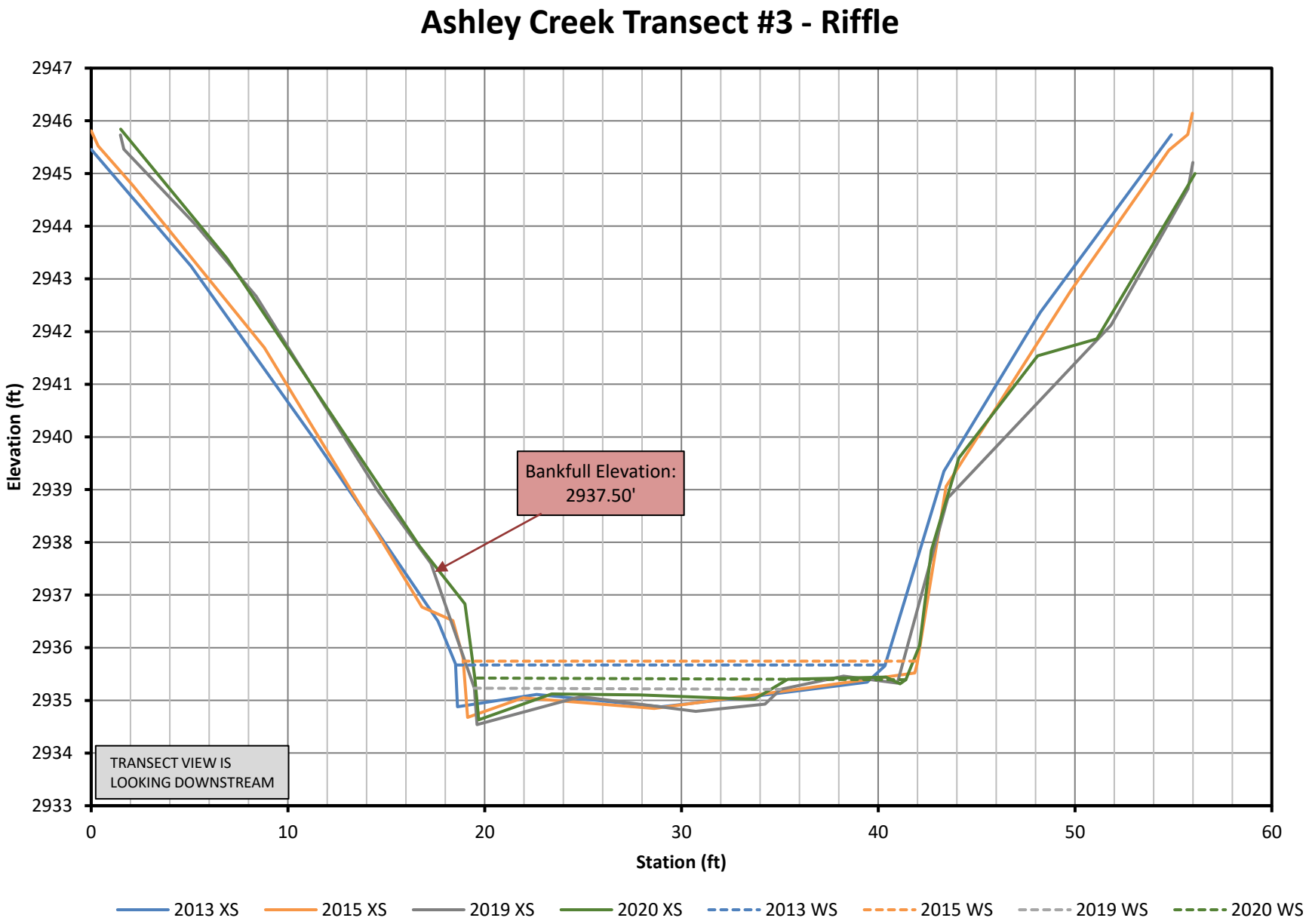


Ashley Creek Transect #1 - Pool



Ashley Creek Transect #2 - Pool




Ashley Creek Transect #3 - Riffle
Elevation (ft)
2947
2946
2945
2944
2943
2942
2941
2940
2939
2938
2937
2936
2935
2934
2933
0
10
20
30
40
50
60
Station (ft)
Bankfull Elevation:
2937.50'
TRANSECT VIEW IS
LOOKING DOWNSTREAM
2013 XS
2015 XS
2019 XS
2020 XS
2013 WS
2015 WS
2019 WS
2020 WS

Ashley Creek Transect #4 - Riffle