US 2 - SWAMP CREEK MITIGATION SITE

Montana Department of Transportation Stream Mitigation Monitoring Report

Project Overview

Watershed: Watershed #1 – Kootenai River

MDT Project: Libby Creek-South; NH-F 1-1(29)45 F, CN 1027004

Monitoring Year: 2023

Years Monitored: 9th year of monitoring

Corps Permit Number: NWO-2012-00146-MTM

SPA Authorization: MDT-R1-08-2012

Monitoring Conducted By: Confluence Consulting Inc.

Monitoring Dates: July 31st-August 2nd, 2023

Purpose of the approved project:
The purpose of the Swamp Creek mitigation project was to provide onsite mitigation to compensate for unavoidable impacts to the Swamp Creek channel associated with the Libby Creek – South road reconstruction project on Highway 2. The project involved relocating 11,260 feet of Swamp Creek channel away from the roadway. The project included five reconstructed channel reaches, which are numbered from downstream to upstream (Table 1).

Table 1. Site Location Coordinates

Reach No.	Upstream Coordinates	Downstream Coordinates
1	48.220508, -115.4721273	48.221688, -115.4725672
2	48.217889, -115.4668691	48.219270, -115.4700393
3	48.199532, -115.4505371	48.209107, -115.4584196
5	48.190702, -115.4429910	48.191503, -115.4435604
7	48.181414, -115.4437213	48.188837, -115.4419659

County: Lincoln **Nearest Town:** Libby
Maps Included: Figure # 3 & Appendix A.

Mitigation Site Construction Started: 2013 **Construction Ended:** 2014

Dates of any recent corrective or maintenance activities (since previous report): NA
Activity: None **Date:** NA

Specific recommendations for additional corrective actions: Continue noxious weed treatment in 2024.

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

Requirements (from approved mitigation plan, banking instrument, or DA permit conditions)
Monitoring Period: Minimum of 5 years from construction completion or until concurrence by US Army Corps of Engineers (USACE).

Performance Standards:
Seven performance standards were established for the Swamp Creek mitigation project, which are assessed independently for each of the five monitoring reaches. Performance standards for riparian buffer, stream bank vegetation, and stream channel restoration success are summarized by monitoring reach in Table 2. All performance criteria were achieved in Reaches 3.2 and 3.3 in 2023. Monitoring data that support conclusions regarding the performance

standards and associated 2023 achievement status are provided in the following sections of this report.

Table 2. Summary of Performance Standards.

Performance Standards	Success Criteria	Criteria Achieved by Reach (Y/N)								
		1	**2**	**3.1**	**3.2**	**3.3**	**3.4**	**5**	**7.1**	**7.2**
Riparian Buffer Success	Areas within creditable riparian buffer disturbed during construction must have ≥50% cover of non-noxious plant species by the end of the monitoring period	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Combined areal cover of riparian and stream bank vegetation communities is at least 70%	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Noxious weeds do not exceed 10% cover within the riparian buffer areas	Y	Y	Y	Y	Y	N*	N*	Y	Y
	Planted trees and shrubs must exhibit 50% survival after 5 years	Y	Y	Y	Y	Y	Y	Y	Y	Y
Vegetation Along Stream Banks	The majority of the vegetation on the stream banks consists of deep-rooting riparian species with a root stability index values of 6 or greater	Y	Y	Y	Y	Y	Y	Y	Y	Y
Stream Channel Restoration Success	Bankfull width to depth ratios have value of ≤ 20	N	Y	Y	Y	Y	Y	Y	Y	N
	Maximum pool depth based on the Longitudinal Profile has not been reduced by 20% or more.	N	N	N	Y	Y	N	Y	N	Y

*These reaches are located on private property. MDT has not been given permission to treat weeds on these parcels.

Additional Reporting Requirements:

1. **Photographs** of the restored stream channel and adjacent riparian vegetation community will be taken annually from established photo points to monitor the development of the site. Photographs will also be captured at the end of each stream transect to show the stream channel and vegetation communities both upstream and downstream.
2. **Weed Control** will be based upon annual monitoring which will determine the weed species present and infestation sizes within the site. Control measures will be implemented by MDT and/or its weed contractors in cooperation with the Lincoln County Weed District to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the stream corridor.

Summary Data

Data collected at the Swamp Creek mitigation site in 2023 are summarized below. Some monitoring results are presented by individual monitoring reach, but where possible, data were summarized for brevity. The mitigation site was constructed as five separate reaches. However, reaches 3 and 7 were split into sub-reaches for monitoring purposes due to differing construction timelines and for documenting observations made during annual monitoring events. Sub-reach 3.1 was further divided into reaches 3.1a and 3.1b due to significant downcutting observed in the lower end of the reach in 2015.

Riparian Vegetation Inventory

In 2023, total riparian cover within the 22-foot-wide riparian belt transects increased slightly and was estimated at 87%. Total riparian cover is comprised of 31% woody vegetation, 78% herbaceous vegetation, and 9% cover provided by noxious weed species. Total cover ranged from 58-92% among reaches, with Reaches 3.3 and 3.4 having the highest cover values (97%) and Reaches 1, 3.2, and 7.2 having the lowest. Several large areas of bare ground were observed over the last several years within Reach 7.2. However, between 2021 to 2023 vegetation began to reestablish within these areas and total cover has increased by 5% (Table 3).

Table 3. Areal riparian vegetation cover estimates for riparian belt transects at the Swamp Creek stream mitigation site in 2015, 2022, and 2023.

Monitoring Reach	Length (ft)	Year Built	Total % Riparian Cover			% Woody Cover			% Noxious Weed Cover			% Cover Non-noxious species		
			2015	2022	2023	2015	2022	2023	2015	2022	2023	2015	2022	2023
1	282	2013	70	73	76	5	13	40	10	2	3	60	71	73
2	556	2013	80	87	87	20	32	66	12	2	3	68	85	84
3.1a	458	2013	90	85	86	40	31	53	18	2	3	72	83	83
3.1b	796	2013	90	87	87	40	38	53	17	3	4	73	84	83
3.2	639	2014	55	73	75	3	13	57	4	7	7	51	66	66
3.3	447	2013	95	97	97	9	29	61	4	4	5	91	93	92
3.4	1,530	2013	95	97	97	35	40	59	30	15	15	65	82	82
5	338	2013	75	81	82	20	25	62	10	24	27	65	57	57
7.1	1,606	2013	98	92	94	35	37	70	18	6	7	80	86	86
7.2	1,065	2014	60	68	70	10	15	39	20	10	10	40	58	58
Total	**7,717**	**Area Weighted Cover**	**84**	**86**	**87**	**25**	**30**	**56**	**18**	**8**	**9**	**66**	**78**	**78**

Dominant species recorded along the riparian belt transects were combined with visual observations to develop a vegetation community map for each of the five restored channel segments. Twenty-two vegetation community types were identified and mapped in 2023 (Maps 9-12, Appendix A). In addition to the percent cover classes and vegetation community classifications, a comprehensive list of all vegetation species observed along each of the reconstructed channel segments is included in Appendix C.

Stream Bank Vegetation Composition

Total percent areal vegetation cover within the three-foot-wide stream bank vegetation transects was 84% or greater for all monitoring reaches (Table 4). The area-weighted total cover for the stream bank buffer portion of the riparian transect across the entire project area was 93%. A comprehensive list of species observed along the streambank transects and their associated cover classes is included in Appendix D.

Table 4. Areal vegetation cover estimates for stream bank buffers at the Swamp Creek stream mitigation site in 2015 and 2021-2023.

Monitoring Reach	Transect Length (ft)	Total % Vegetated Cover			
		2015	2021	2022	2023
1	282	95	92	92	93
2	556	95	95	95	95
3.1a	458	100	91	91	92
3.1b	796	90	85	83	84
3.2	639	50	83	83	85
3.3	447	100	97	97	98
3.4	1,530	100	97	97	97
5	338	80	91	91	92
7.1	1,606	100	95	95	95
7.2	1,065	95	92	92	93
Total	**7,717**	**93**	**93**	**92**	**93**

Vegetation community types, identified by one or more dominant species in the community, were assigned to each reach. Multiple community types were observed along the banks in Reaches 1, 3.3, and 5, while only one community type was observed along the banks of the remaining reaches (Maps 9 – 17, Appendix B). Stability ratings were determined based upon the dominant plant species for each community type to assess whether the stream bank vegetation can resist erosive forces. The stability ratings range from one to ten, with higher scores assigned to communities that are more able to resist erosion and lower scores assigned to communities that are less able to resist erosion (Winward 2000; Pick et al. 2004). All streambank vegetation communities observed in 2023 have stability ratings of 8 or higher and provide beneficial bank-stabilizing properties (Table 5).

Table 5. Dominant streambank community types and community type stability ratings, by reach, for the Swamp Creek stream mitigation site.

Reach	Dominant Stream Bank Community Type(s)	Community Type Stability Rating
1	*Phalaris arundinacea / Alnus incana*	9
	Phalaris arundinacea / Equisetum arvense	9
	Phalaris arundinacea / Agrostis stolonifera	9
2	*Phalaris arundinacea / Alnus incana*	9
3.1	*Phalaris arundinacea / Alnus incana*	9
3.2	*Phalaris arundinacea / Alnus incana*	9
3.3	*Phalaris arundinacea / Alnus incana*	9
	Alnus incana / Equisetum arvense	9
3.4	*Phalaris arundinacea / Alnus incana*	9
5	*Phalaris arundinacea*	9
	Phalaris arundinacea / Alnus incana	9
7.1	*Phalaris arundinacea / Alnus incana*	9
7.2	*Phalaris arundinacea / Alnus incana*	9

Combined Cover
Combined areal cover for both the riparian and streambank transects (area weighted) ranged from 72.8% to 97.1%. All monitoring transects met the combined areal cover performance criterion in 2023 (Table 6).

Table 6. Combined total cover for riparian and stream bank transects (25 feet wide).

Monitoring Reach	Combined Riparian and Streambank Cover (%)
1	78.0
2	88.0
3.1a	86.7
3.1b	86.6
3.2	76.2
3.3	97.1
3.4	97.0
5	83.2
7.1	94.1
7.2	72.8

Noxious Weed Inventory
Six State-listed noxious weed species were identified within the Swamp Creek mitigation site in 2023, including one Priority 2A and five Priority 2B weed species (Appendix E). Total percent noxious weed cover within each reach ranged from 3% to 27%, with a site-wide estimate of 9% total cover (Table 3). In 2023, minimal changes in noxious weed cover (i.e., plus or minus 1-2%) were observed along most reaches, with a 3% increase observed in Reach 5. However, all reaches except Reaches 3.4 and 5 exhibited noxious weed cover below the performance success threshold of ≤10% noxious weed cover. Reach 7.2 is narrowly meeting this threshold with noxious weed cover at 10%. Reach 5, which is on private property, exhibited the highest noxious weed cover at 27%.

Locations of all weed infestations that encompassed at least 1% of the transect area are shown on Maps 9 – 17 in Appendix B with the cover class of each infestation noted. Noxious weed infestations identified in trace amounts (<1% of inventory area) were noted and used to calculate total percent noxious weed cover but were not mapped. This includes all observations of orange hawkweed (*Hieracium aurantiacum*) and St. Johnswort (*Hypericum perforatum*), which were only observed in isolated, trace occurrences. MDT's weed spraying program is limited to treatments within MDT's Right-of-Way, but some stream reaches (i.e. 3.4 & 5) extend outside MDT's Right-of-Way.

Woody Plant Survival
Due to the length of time since construction and the inability to distinguish planted versus volunteer vegetation, a quantitative assessment of woody planting survival rates was not performed in 2023. Instead, the percent cover provided by woody vegetation was estimated along each stream bank transect from aerial images of each monitoring reach. Aerial images of Swamp Creek were taken by the MDT airplane on June 30, 2023.

Estimates of woody cover along the streambank transects ranged from 40-94%. Reach 3.1 demonstrates the least cover provided by woody vegetation, while Reach 2 and 7.2

demonstrate the most (Table 7). Estimates of woody cover along the streambank transects are higher than those along the riparian transect, as many of the shrub plantings were placed immediately along the streambanks during site construction in 2013. Consistent with the stream bank community types mapped at each reach, speckled alder (*Alnus incana*) was the dominant woody species observed. The speckled alder plants have established particularly well along the reconstructed channel segment, and many have grown over 15 feet tall over the last nine years.

Channel reconstruction disturbed a relatively narrow corridor and many of the adjacent shrubs and trees remained undisturbed, which allowed the seed source for woody vegetation recruitment to remain relatively intact. As a result, many volunteer woody species have established in the disturbance corridor, including Woods' rose (*Rosa woodsii*), Douglas-fir (*Pseudotsuga menziesii*), common snowberry (*Symphoricarpos albus*), narrow-leaf cottonwood (*Populus angustifolia*), balsam poplar (*Populus balsamifera*), and multiple willow species (*Salix* spp.). During site construction in 2013, a total of 18,800 trees and shrubs were outlined for installation in the revegetation plan.

Table 7. Aerial estimates of woody cover in 2023.

Reach	% Woody Cover
1	45
2	94
3.1	40
3.2	58
3.3	80
3.4	83
5	64
7.1	86
7.2	94

Bank Erosion Inventory

Approximately 2.6% of the total stream bank length within the Swamp Creek mitigation area was considered eroding in 2023, which is a decrease of almost 1.8% since 2022 and 4.8% since 2021. Locations of all eroding banks are shown on Maps 1-8 (Appendix A). Bank erosion was noted in five of the nine monitoring reaches. No eroding banks were observed in Reaches 1, 2, 3.3, or 7.2. All remaining reaches contained eroding banks, the majority of which had been observed and documented during previous monitoring events. All observed bank erosion is considered natural, and no corrective action is recommended (Table 8).

The length of eroding streambank within Reach 1 was 0 feet in 2023 (Table 8), which represents a 6.9% decrease since 2022. The two eroding banks that were mapped within Reach 1 in 2022 healed between the 2022 and 2023 monitoring events. The previously eroding bank mapped on the left near cross-sectional Transect 4 is still only partially vegetated but has become sufficiently revegetated to be removed from the eroding bank inventory.

The only eroding bank mapped within Reach 2 in 2022 had stabilized in 2023, and the total eroding bank length observed in 2023 was also 0 feet (Table 8). The bank which stabilized is steep and is largely comprised of unconsolidated colluvium, and while this bank had developed enough vegetation to be removed from the eroding bank inventory in 2023, this bank is unlikely to become completely vegetated.

Approximately 5.0% of the banks in Reach 3 were considered eroding in 2023, which is an overall reduction of 2.2% since 2022 (Table 8). Most of the eroding banks are located within

sub-reach 3.1, where extensive downcutting was observed in 2014. However, the eroding banks within Reach 3.1 have exhibited increased stability over the last few years and between the 2022 and 2023 monitoring events several eroding banks had partially stabilized, thus decreasing the total eroding bank length for the reach by 1%. Reach 3.2 contained four eroding banks in 2023, three of which have been present since 2019 and one that recently developed on the right bank just upstream of T21.5. One of the three previously mapped eroding banks partially stabilized between 2022 and 2023 and the total eroding bank length within the reach decreased by 0.5% between the two monitoring years. No eroding banks were observed in Reach 3.3, which has remained stable for several years. Bank erosion decreased by 4.8% within Reach 3.4 since 2023. Two of the eroding banks previously mapped within the reach had completely stabilized while one, located along the left bank below the headcut stabilized in 2019, increased in length. Erosion has consistently been observed along the banks downstream of the headcut since it developed.

Approximately 3.5% of the stream banks within Reach 5 were eroding in 2023, a percentage that has remained consistent for the last three years as the channel form continues to stabilize.

Table 8. Eroding banks (both left and right) observed throughout the Swamp Creek stream mitigation project area in 2023.

Reach	Eroding Bank Length (ft)	Total Bank Length (ft)	% Eroding Banks	Suspected Causes of Erosion
1	0	950	0	All previously mapped eroding banks were stable during the 2023 monitoring event.
2	0	1,970	0	All previously mapped eroding banks were stable during the 2023 monitoring event. One very steep hillslope stabilized enough to be removed from the eroding bank inventory but may still be subject to erosion.
3.1	249	3,850	6.5	Erosion within Reach 3.1 is a result of significant grade adjustments in 2014. Channel and banks have been moving toward a higher degree of stability for the past few years. Inset floodplains have developed in some of the locations where the worst erosion occurred.
3.2	86	1,400	6.1	Bank erosion was observed in the vicinity of a failing rock weir and has not changed in the last year. One additional eroding bank was mapped in 2023.
3.3	0	900	0	No erosion observed in Reach 3.3
3.4	138	3,250	4.2	Increased erosion is occurring along the downstream extent of Reach 3.4 where headcut developed in 2019 and in two other locations. Erosion appears to be natural adjustment of channel and no corrective actions are warranted. Two previously mapped eroding banks stabilized between 2022 and 2023.
5	26	750	3.5	Bank erosion observed along the outside of one meander bend. Bank stability has increased within the reach over the last year. Observed erosion is considered natural.
7.1	31	5,300	0.6	Lateral erosion was observed along outside of two meander bends but to a lesser extent than in previous years. Erosion is considered natural.
7.2	0	2,400	0	No erosion observed in Reach 7.2
Total	**530**	**20,770**	**2.6**	

Reach 7 followed the same trend as Reaches 1 through 3 by displaying a reduction of in eroding bank length between the 2022 and 2023 monitoring events. Only two eroding banks were mapped within Reach 7.1 and no bank erosion was observed within Reach 7.2. One of the two eroding banks mapped partially stabilized between 2022 and 2023 and the total eroding bank length within Reach 7 is now less than 0.05%.

Channel Form

Longitudinal Profiles

In 2023, Reaches 1, 2, and 3.1 of the Swamp Creek stream mitigation site had longitudinal profiles that closely mirrored those surveyed in 2022, indicating that the thalweg depth profiles for these reaches have largely remained the same over the last year.

Reaches 3.2, 3.3, 3.4, 5, and 7.2 displayed longitudinal profiles that were similar to those surveyed in 2022, but all these profiles also displayed a few locations where the bed elevation appears to have increased by 0.5-2.5 feet. Increased bed elevations were most commonly observed at riffle crest locations and generally occurred without a corresponding increase in pool depth (Appendix G). One large pool within Reach 3.3 also appears to have filled in by 3.5 feet over the last year. These observations indicate that gravel and cobble are being transported through Swamp Creek and that some of that substrate was retained within the project reaches in 2023. The longitudinal profile through Reach 3.4 indicates the headcut that was stabilized in this reach has not continued to advance upstream. Although the bed elevation has remained consistent in the vicinity of the armored headcut, the rock weir installed to prevent further headcutting is beginning to show signs of deterioration. The channel has not responded and no immediate action is warranted; however, continued deterioration may result in additional maintenance needs.

The longitudinal profile for Reach 7.1 did not exhibit the evidence of aggradation that has been observed in previous years. The profile indicated changes in the location of riffles and pools; evidence the channel is becoming more dynamic as maturing woody debris is recruited from adjacent banks (Appendix G).

Perpendicular Transects – Channel Geometry and Pool Depths

Results of the cross-sectional transect surveys within each monitoring reach are summarized in Table 9 and the following narrative. Plots depicting the channel dimensions at each transect (T) in 2015 and 2022, and bankfull elevation in 2022 are included in Appendix G. The exception is for transects 21.5, 21.7, 22.3, 22.5, and 22.7 in Reaches 3.2 and 3.3, which were established in 2018 and therefore only depict survey results from 2018 and 2023. Transect plots illustrate whether the channel has adjusted vertically or laterally between the two years of data that are shown.

All transects surveyed in Reach 1 displayed shallower bankfull depths in 2023 than in 2015 (Appendix G, page G-11). The average bankfull width was 17.8 feet, the average depth was 1.7 feet, and resulting average width to depth ratio was 20.5. Therefore, Reach 1 did not meet the performance criterion for width to depth ratio in 2023 (Table 9). Also, the pool depths at both Transects 1 and 3 (T1 & T3) have decreased to the extent where they no longer meet the pool depth success criterion (Table 10).

The cross sectional transects within Reach 2 indicate that sediment redistribution and channel migration has occurred within the middle and upstream end of the reach, but channel geometry has been maintained across half of the transects. Transects 9, 10, and 13 have changed very little since 2015, but Transects 11 and 12 indicate that the channel has become a few feet wider on the south bank. Channel migration is corroborated by the aerial view of the thalweg surveyed in 2023 (Map 2, Appendix A). At Transect 14 the channel has gotten deeper (Appendix G, page G-12). All but one of the transects (T9) met the performance standard criteria for width to depth ratio, with an average ratio of 16.3 (Table 9). Only one of the three surveyed pools met the

criterion for pool depth (T14), and all three pools decreased in depth between the 2022 and 2023 monitoring events (Table 9).

Cross-sectional transects within Reach 3.1 illustrate the changes that have occurred in this reach since 2015 (Please see Appendix G, page G-13). Three transects within Reach 3.1a (T15, T16 & T19) indicate that the channel has aggraded and become shallower and narrower in these locations. Transects 17, 18, and 20 indicate that the channel has become wider by 6-17 feet since 2015, and in 2023 were shallower, though in previous years these same transects were deeper than in 2015. Transects 17, 20, and 21 illustrate the thalweg has shifted several feet toward the west bank (Appendix G, page G-13; Appendix A, Map 3).

The width to depth ratio performance criterion was met for Reach 3.1 on average, with all but two transects (T15 and T18 – both located in riffles) having a width to depth ratio under 20. The width to depth ratio for T15 did not exceed the criterion enormously and is only failing the performance criterion due to the aggradation that has occurred in this portion of Reach 3.1. However, T18 had a width to depth ratio that was more than double that specified by the performance criteria (Table 8). This transect is located in the center of the area that downcut in 2015, where the channel exhibited significant lateral migration (Map 3; Appendix A). Sediment has been deposited in the vicinity of T18, making the channel shallower than the design specified. This transect is unlikely to ever meet the performance criterion unless it downcuts through some of the deposited sediment and forms a new channel within the inset floodplain. The two pools contained within Reach 3.1b met the pool depth criterion, but the single pool in Reach 3.1a, located at Transect 16, has become too shallow to meet the criterion due to aggradation (Table 9). Although this particular pool has filled over time, other pools exist in the vicinity of Transect 16, as shown on the longitudinal profile through Reach 3.1b (Appendix G).

The channel dimensions in Reach 3.2 have changed somewhat over the years, but to a lesser extent than Reach 3.1. The original monitoring plan only established one transect within Reach 3.2 (T22), and following the changes observed in Reach 3.1, two transects were added within the reach in 2018 (T21.5 and T21.7). Since 2018 and 2015 respectively, the bankfull channel has become approximately 2-4 wider at T21.5, T21.7, T22. A failed rock weir exists between Transects T21.5 and T22, and the channel widening observed at these three transects may be a consequence of the structure's failure (Appendix A, Map 4). The bankfull depth has remained consistent at all three transects within Reach 3.2 except T 22, which has become 1-1.5 feet deeper in the last year (Appendix G, page G-14). All three transects in Reach 3.2 and the reach-wide average ratio met the width to depth ratio performance criterion (Table 8). The single pool within the reach met the pool depth performance criterion (Table 9).

The original monitoring plan did not establish any transects in Reach 3.3, but due to channel geometry changes observed during early monitoring events, three transects were added to the reach in 2018 following consultation with resource agencies. The channel dimensions have remained relatively static at T22.7 since 2015, but in 2023 the channel at T22.5 appeared to have shifted approximately 3 feet toward the east bank and became slightly deeper (0.5'). Conversely, T22.3 appeared to have narrowed by approximately 5 feet and showed evidence of mid-channel bar development. All three transects in Reach 3.3 met the performance criterion for width to depth ratio (Table 8), and both pools surveyed met the pool depth criterion (Table 9).

As with several other reaches, the changes observed within the Reach 3.4 transects were variable. Transects 23 and 25 currently have a similar geometry to that observed in 2015, though T25 has become several feet wider. The bankfull widths at two of the cross-sections surveyed in Reach 3.4 have increased since 2015; T24 increased in width by approximately 3 feet, and T26 increased by approximately 8 feet since 2015. The maximum depth at transects 24 and 27 have increased in depth by 1-2 feet, and the pool depth at T27 has increased by approximately 2 feet. All but one of the transects (T25) in Reach 3.4 met the performance

criterion for width to depth ratio, and two of the three pools met the pool depth criterion (Table 8; Table 9).

Three of the four surveyed transects (T28, T29, T30) in Reach 5 appeared to become narrower in 2023 and deeper, indicating that sediment has been deposited along the banks of the reach within the last year. The riffle at Transect 28 previously appeared to have aggraded and has not met the criterion for the width to depth ratio performance standard since 2016 (Appendix G, page G-17). Yet in 2023, the depth had decreased by approximately one foot and the bankfull channel width had narrowed slightly, indicating that this transect has downcut from within the last year. Transects 29, 30, and 31 all displayed a similar pattern, narrowing between 1 and 10 feet and becoming deeper by up to 1 foot since 2015. The average width to depth ratio for Reach 5 was 18.0, which passes the performance criterion for this standard, even though the shallow riffle depth at Transect 28 (T28) did not meet the performance standard criterion. The channel has become significantly wider and a foot deeper at Transect 31 resulting in a very low width to depth ratio of 9.6, which helps to average out the high ratio at Transect 28 (Table 9). Both surveyed pools met the pool depth criterion and therefore this reach now satisfies this performance standard (Table 10).

Three of the nine transects surveyed in Reach 7.1 (T32, T35, & T38) exhibit little change in channel geometry since 2015. The bankfull width at Transects 36 and 39 has increased by 3-5 feet throughout the monitoring period and has decreased by approximately 4 feet at transect 34. Bankfull depths have increased by approximately 1 foot at T36 and T40 and decreased by approximately 1 foot at transect 33 (Appendix G, pages G-18 & G-19). These changes in channel geometry accompanied with different types of changes that have been observed in other monitoring years indicate that the channel form in Reach 7.1 is still evolving. Despite the observed cross-sectional changes, all but one of the nine Transects in Reach 7.1 met the performance criterion for width to depth ratio in 2023, and the reach-wide average width to depth ratio was 15.8 (Table 9). All but one surveyed pool within Reach 7.1 met the performance criterion for the pool depth standard (Table 10).

The three transects surveyed in Reach 7.2 have also exhibited very little change in channel dimensions since 2015 (Appendix G, page G-20). Despite the lack of change in channel dimensions, all three transects had a width-to-depth ratio of greater than 20 and the average width to depth ratio for Reach 7.2 was 23.4. Therefore, Reach 7.2 failed to meet the criterion for this performance standard in 2023 (Table 9). Given that the channel width at the Reach 7.2 transects has not changed appreciably since 2015, it appears as though the channel may have been built wider than was specified by the design, and therefore these transects may not be able to achieve the width to depth criterion (Appendix G, page G-20). Only one pool was surveyed within Reach 7.2, and it met the performance criterion for the pool depth standard (Table 10).

Table 9. Surveyed bankfull widths, depths, and cross-sectional areas at all monitoring transects, with calculated width to depth ratios, in 2023.

Monitoring Reach	Transect	Type	Surveyed Bankfull Width (ft)	Surveyed Maximum Depth (ft)	Area (ft2)	Mean Depth (ft)	W/D Ratio
1	1	Pool	9.9	2.3	10.6	1.1	9.0
	2	Riffle	14.7	1.3	11.2	0.8	18.4
	3	Pool	25.6	1.6	23.8	0.9	28.4
	4	Riffle	21.0	1.5	16.0	0.8	26.2
Average Pools			**17.8**	**2.0**	**17.2**	**1.0**	**18.7**
Average Riffles			**17.8**	**1.4**	**13.6**	**0.8**	**22.3**
Average Transects			**17.8**	**1.7**	**15.4**	**0.9**	**20.5**
2	9	Pool	23.9	1.2	19.8	0.8	29.8
	10	Riffle	20.1	1.7	25.2	1.3	15.5
	11	Riffle	28.1	2.4	44.4	1.6	17.6
	12	Pool	16.9	2.3	22.9	1.4	12.1
	13	Riffle	17.0	1.2	16.4	1.0	17.0
	14	Pool	13.2	3.1	28.7	2.2	6.0
Average Pools			**16.7**	**2.4**	**25.6**	**1.6**	**11.2**
Average Riffles			**21.7**	**1.7**	**28.6**	**1.3**	**16.7**
Average All Transects			**19.9**	**2.0**	**26.2**	**1.4**	**16.3**
3.1	15	Riffle	8.5	0.7	3.5	0.4	21.2
	16	Pool	8.1	1.0	5.1	0.6	13.5
	17	Pool	28.9	2.9	47.7	1.7	17.0
	18	Riffle	20.1	1.0	8.6	0.4	50.2
	19	Riffle	26.8	4.1	61.4	2.3	11.6
	20	Pool	18.1	3.8	44.7	2.5	7.2
	21	Riffle	13.1	2.2	19.5	1.5	8.7
Average Pools			**18.3**	**2.6**	**32.5**	**1.6**	**12.6**
Average Riffles			**17.1**	**2.0**	**23.2**	**1.2**	**22.9**
Average All Transects			**17.6**	**2.3**	**27.2**	**1.3**	**18.5**
3.2	21.5	Riffle	11.5	1.6	11.4	1.0	11.5
	21.7	Pool	25.0	3.1	41.1	1.6	15.6
	22	Riffle	16.1	2.4	27.3	1.7	9.4
Average Pools			**25.0**	**3.1**	**41.1**	**1.6**	**15.6**
Average Riffles			**13.8**	**2.0**	**19.4**	**1.4**	**10.5**
Average All Transects			**17.5**	**2.4**	**26.6**	**1.4**	**12.2**
3.3	22.3	Pool	19.9	3.0	26.5	1.3	15.3
	22.5	Riffle	11.8	1.6	10.1	0.9	13.1
	22.7	Pool	14.6	2.9	25.0	1.7	8.6
Average Pools			**27.2**	**4.5**	**39.0**	**2.2**	**12.0**
Average Riffles			**11.8**	**1.6**	**10.1**	**0.9**	**13.1**
Average All Transects			**15.4**	**2.5**	**20.5**	**1.3**	**12.3**
3.4	23	Riffle	14.1	2.4	22.7	1.6	8.8
	24	Pool	16.6	3.8	36.9	2.2	7.5
	25	Riffle	26.5	2.0	32.9	1.2	22.0
	26	Pool	19.9	3.1	43.5	2.2	9.1
	27	Pool	11.3	2.1	13.9	1.2	9.4
Average Pools			**34.5**	**3.0**	**31.4**	**1.9**	**8.7**
Average Riffles			**27.3**	**2.2**	**27.8**	**1.4**	**15.4**
Average All Transects			**17.7**	**2.7**	**30.0**	**1.7**	**11.4**
5	28	Riffle	17.4	2.3	10.9	0.6	29.1
	29	Pool	15.0	2.3	15.0	1.0	15.0
	30	Riffle	20.1	1.5	21.2	1.1	18.3
	31	Pool	16.9	2.5	29.7	1.8	9.4
Average Pools			**23.4**	**3.5**	**29.9**	**1.9**	**12.2**
Average Riffles			**27.5**	**3.1**	**21.5**	**1.2**	**23.7**
Average All Transects			**17.4**	**2.2**	**19.2**	**1.1**	**18.0**
7.1	32	Riffle	14.9	1.1	11.7	0.8	18.7
	33	Pool	13.2	1.4	13.5	1.0	13.2
	34	Riffle	13.5	1.0	8.9	0.7	19.3
	35	Pool	9.2	1.6	10.4	1.1	8.4
	36	Riffle	13.7	1.8	14.2	1.0	13.7
	37	Pool	18.2	2.1	20.8	1.1	16.5
	38	Pool	13.4	0.9	9.5	0.7	19.2
	39	Riffle	14.3	1.1	8.4	0.6	23.8
	40	Riffle	9.6	1.7	9.7	1.0	9.6
Average Pools			**13.5**	**1.5**	**13.5**	**1.0**	**14.3**
Average Riffles			**13.2**	**1.3**	**10.6**	**0.8**	**17.0**
Average All Transects			**13.3**	**1.4**	**11.9**	**0.9**	**15.8**
7.2	41	Riffle	19.2	1.5	16.4	0.9	21.4
	42	Pool	21.7	2.0	22.6	1.0	21.7
	43	Riffle	13.6	0.8	7.4	0.5	27.2
Average Pools			**21.7**	**2.0**	**22.6**	**1.0**	**21.7**
Average Riffles			**26.0**	**1.9**	**20.1**	**1.2**	**24.3**
Average All Transects			**18.2**	**1.4**	**15.5**	**0.8**	**23.4**

Table 10. Pool depths surveyed at monitoring transects within the Swamp Creek mitigation project area in 2023.

Monitoring Reach	Transect	Type	Pool Design Depth (ft)	Minimum Depth to Meet Success Criterion (ft)	Surveyed Maximum Depth (ft)	Meeting Criterion?
1	1	Pool	3.3	2.6	2.3	NO
	3	Pool	3.3	2.6	1.6	NO
2	9	Pool	3.9	3.1	1.2	NO
	12	Pool	3.9	3.1	2.3	NO
	14	Pool	3.9	3.1	3.1	YES
3.1	16	Pool	3.9	3.1	1.0	NO
	17	Pool	2.1	1.7	2.9	YES
	20	Pool	2.1	1.7	3.8	YES
3.2	21.7	Pool	3.0	2.4	3.1	YES
3.3	22.3	Pool	3.0	2.4	3.0	YES
	22.7	Pool	3.0	2.4	2.9	YES
3.4	24	Pool	3.9	3.1	3.8	YES
	26	Pool	3.9	3.1	3.1	YES
	27	Pool	3.9	3.1	2.1	NO
5	29	Pool	3.0	2.4	2.3	YES
	31	Pool	3.0	2.4	2.5	YES
7.1	33	Pool	1.6	1.3	1.4	YES
	35	Pool	1.6	1.3	1.6	YES
	37	Pool	1.6	1.3	2.1	YES
	38	Pool	1.6	1.3	0.9	NO
7.2	42	Pool	1.8	1.4	2.0	YES

Stream Bed Substrate Composition

Continued monitoring of bed material composition indicates the average substrate size (D50) found in both pools and riffles is coarse gravel, ranging from 14-25 mm. The range of D50 values observed across all monitoring reaches was several mm smaller than in 2022. Bed substrate fining has become a trend over the last three years (Figures 1 and 2

Despite the observed substate fining, the Swamp Creek stream bed substrates are still supportive of fish spawning. Spawning sized gravels occur within each of the monitoring reaches, and fine-grained particles which would limit spawning success (less than 2 mm) were limited. Monitored pools did not contain excessive fine sediment, which is an indication that sediment transport through pool habitats continues to be adequate and that the reconstructed channel is functioning as designed. Wolman pebble count data collected in Swamp Creek in 2023 are presented in the cumulative distribution curves in Appendix F.

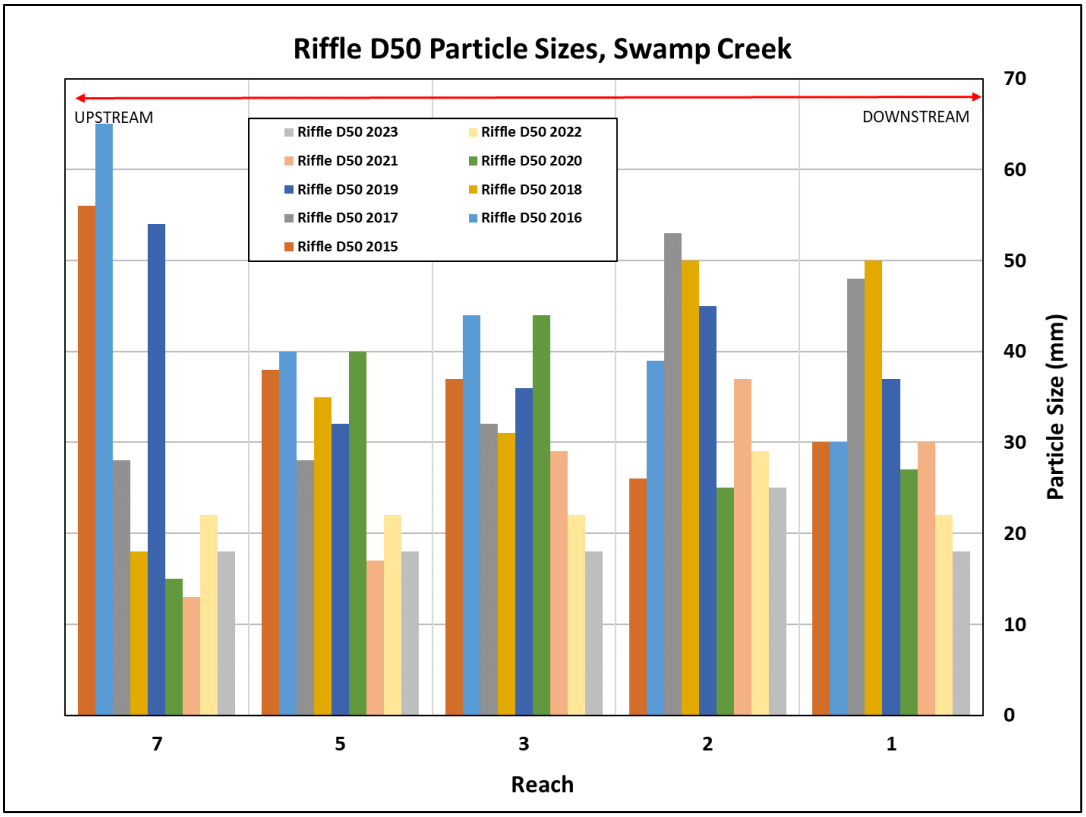


Figure 1. Mean particle sizes in one riffle sampled within each reconstructed reach within the Swamp Creek mitigation area.

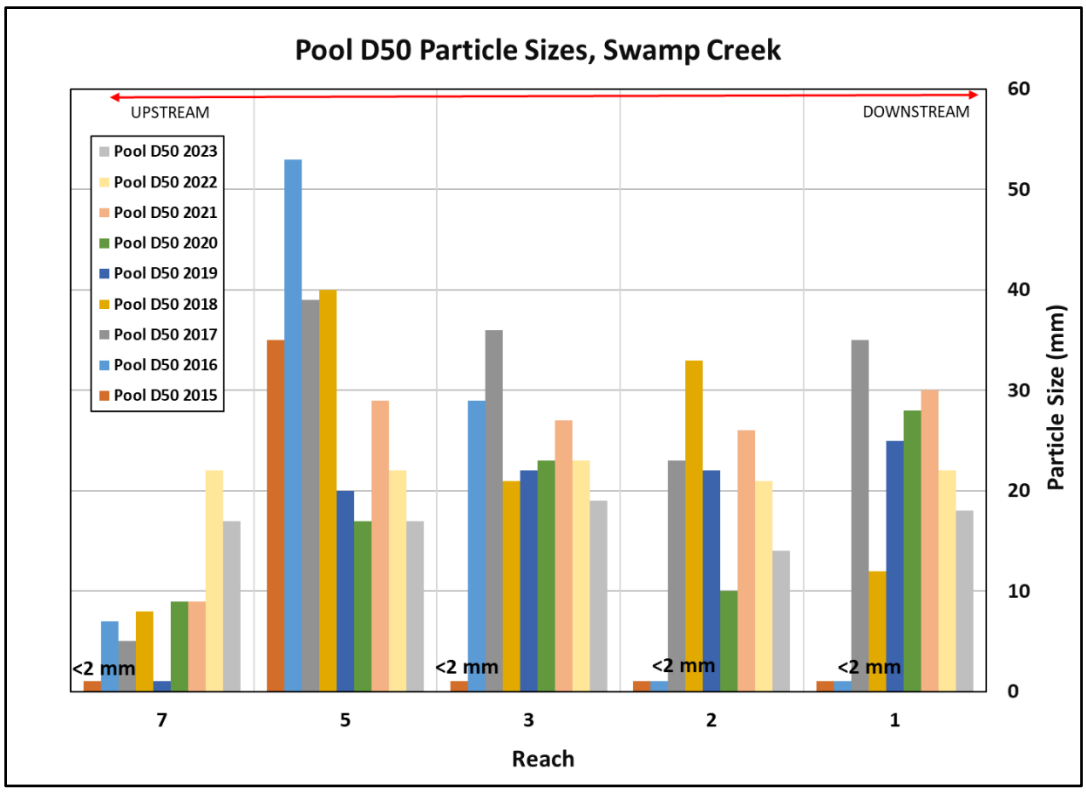


Figure 2. Mean particle sizes in one pool sampled within each reconstructed reach within the Swamp Creek mitigation area.

Conclusions

In 2023, the majority of the Swamp Creek mitigation site met the performance criteria outlined in the monitoring plan. Two of the nine monitoring sub-reaches met all performance standards (Reaches 3.2 and 3.3). Reaches 7.1 met all the performance standard in 2022, but in 2023 failed the maximum pool depth standard. All Reaches met the performance criteria for total percent cover from non-noxious species within the riparian buffer, planted shrub and tree survival, and stream bank vegetation root stability index values. Reach 7.2 failed to meet success criteria for total vegetative cover and Reaches 3.4 and reach 5 did not achieve the success criteria for noxious weed cover. The width to depth ratio performance criteria was met in all reaches and reaches except 1 and 7.2. The most problematic performance standard across all project reaches was pool depth, with only four of the nine reaches achieving the criteria. Project wide, fourteen of the surveyed pools met the performance criteria while seven did not. This is a slight decline in performance from 2022 when only six of the pools failed to meet the criteria.

Total vegetation cover and cover from woody species continued to increase within both the riparian and stream bank transects, as had noxious weed cover. Several of the previously noted eroding streambanks had healed and become more stable, due in part to the increased vegetative cover along the stream banks. The longitudinal profiles and cross sectional transects indicate that Swamp Creek may have been storing more sediment in 2023 than in 2015, but that this is likely a result of natural sediment redistribution and should not be considered problematic.

Reach 1 Conclusions

Reach 1 met all the success criteria for vegetation but did not meet the stream channel restoration success criteria. Reach 1 is well vegetated with cover from both herbaceous and

woody species gradually increasing, and low noxious weed cover. Cross sectional transect survey data indicates that this reach may be accumulating streambed substrate, which is likely contributing to the stream channel criteria failures. Changes observed in channel geometry and stream bed elevations in Reach 1 are considered natural and non-problematic. No infrastructure is being threatened and no hazard is associated with allowing these natural processes to continue.

Reach 2 Conclusions

Reach 2 met all the success criteria for vegetation and only failed to meet the performance criterion for pool depth. Redistribution of sediment within the reach has reduced pool depth at two of the three pool monitoring transects even though decreased pool depth does not appear to be problematic throughout the entire reach. The planform of this reach is also quite straight, which may limit the development and maintenance of scour pools.

Reach 3 Conclusions

Reach 3.1 met all established performance criteria except for pool depth. The reach is continuing to recover from the extensive downcutting observed in 2015, as there is less evidence of recent migration and eroding bank areas are becoming more vegetated. In 2023, the cross sectional profiles at the downstream end of reach indicate that the channel is becoming narrower as sediment deposits from high-flow events were observed on the bank. Channel narrowing may increase scour and pool depth over time. Previous monitoring reports have noted a potential threat to the frontage road posed by eroding banks in this reach, but given recent increase in bank stability, the threat seems to have subsided. Habitat complexity and heterogeneity are continuing to develop and improve within the Reach, with increased wood recruitment observed in 2023.

The 2023 monitoring event was the fifth consecutive year that reaches 3.2 and 3.3 achieved all success criteria. No bank erosion or vertical adjustments have been noted in Reach 3.3 during any of the recent monitoring visits.

Reach 3.4 met all performance standard criteria except pool depth and noxious weed cover, criteria which the reach has failed for the last three years. Redistribution of sediment within the reach has reduced pool depths at monitoring transects even though the longitudinal profile indicates that pool depths in other locations adequate. Reach 3.4 exhibited 15% noxious weed cover, which is 5% above performance criterion threshold. Multiple infestations of Canada thistle and spotted knapweed have been observed for several years along much of the riparian corridor and stream banks. Several of these infestations are located on private land and are not being controlled. Infestations located on State land will continue to be treated as part of MDT's weed control program to reduce noxious weed cover.

Reach 5 Conclusions

Reach 5 met all performance criteria except noxious weed cover in 2023. Reach 5 exhibited 27% noxious weed cover, which is an increase of 3% since 2022. Noxious weed species observed along Reach 5 include spotted knapweed, common tansy, and oxeye daisy. Reach 5 occurs on private land and is therefore not treated by MDT's weed spraying contractor. Coordination with the private landowners will be required for this reach to satisfy the noxious weed performance standard.

Reach 7 Conclusions

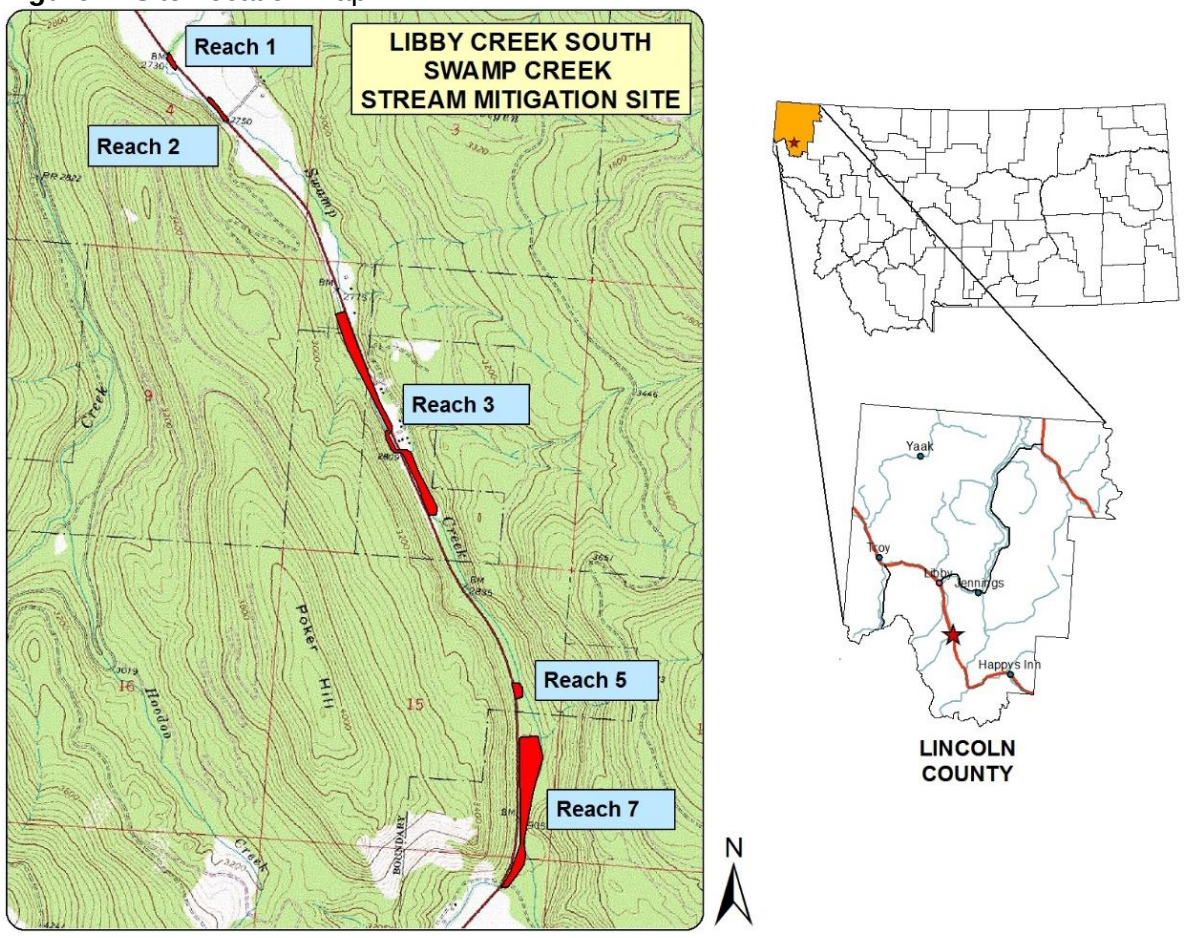
Reach 7.1 met all but one of the performance criteria in 2023, which is a change from the previous three years when all the criteria were met. Reach 7.1 exhibits robust riparian and streambank vegetation, including woody and herbaceous species, and has very little noxious weed cover. The stream channel in Reach is maintaining the desired width to depth ratio, but the pool located at T38 failed to meet the depth criteria in 2023. The longitudinal profile

indicates that reach has experienced some sediment re-distribution resulting in changes to the pool and riffle locations and a subtle smoothing of the profile.

Reach 7.2 met all of the performance standards except for width to depth ratios. In previous monitoring events, herbicide treatments appeared to have negatively impacted the herbaceous and woody vegetation in the treatment area, resulting in decreased plant cover and large patches of bare ground. These areas are recovering, and the combined vegetative cover along Reach 7.2 was 70% in 2023, which meets the combined areal cover performance standard. The average width to depth ratio in Reach 7.2 failed to meet the performance standard criterion for the fifth year in a row. High width to depth ratios in Reach 7.2 are due to above average channel widths combined with shallow average depths. Channel widths within this reach are not associated with bank erosion and have remained relatively consistent over the years. Therefore, the failure of this reach to meet the width to depth ratio performance standard is not considered problematic.

Maps, Plans, Photos:

Figure 4. 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

Noxious Weed Species List: See Appendix E

Wolman Pebble Count Data: See Appendix F

Perpendicular Transect and Longitudinal Profile Plots: See Appendix G

Plans: See Appendix H of 2015 Swamp Creek Monitoring Report on the MDT Stream Mitigation Monitoring Reports website: https://www.mdt.mt.gov/publications/brochures/stream-mitigation.aspx

References

National Integrated Drought Information System. Accessed January 2023 at: https://www.drought.gov/historical-information?state=montana&countyFips=30053&dataset=0&selectedDateUSDM=20210831

Montana Department of Agriculture (MDA). June 2019. *Montana Noxious Weed List*. Accessed September 2021 at: https://agr.mt.gov/Portals/168/Documents/Weeds/2019%20Montana%20Noxious%20Weed%20List.pdf?ver=2019-07-02-095540-487

Pick, T., P. Husby, W. Kellogg, B. Leinard, and R. Apfelbeck. 2004. Riparian Assessment: Using the NRCS Riparian Assessment Method. U.S. Department of Agriculture, Natural Resources Conservation Service. Bozeman, MT.

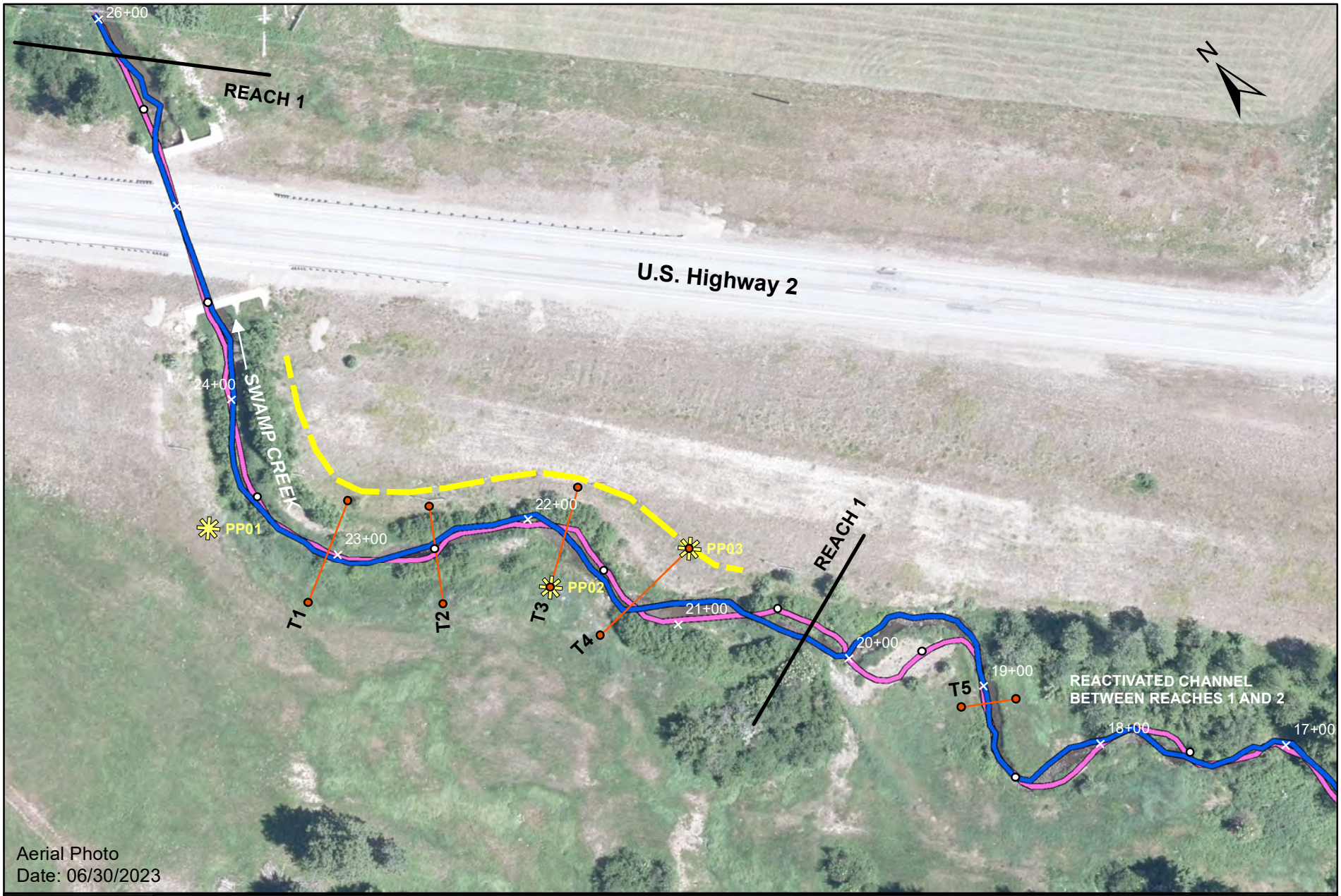
U.S. Army Corps of Engineers (USACE). 2020. *National Wetland Plant List* (Version 3.5), prepared by U.S. Army Corps of Engineers, U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH

U.S. Geological Survey (USGS). *Stream flow data for gage #12302055 – Fisher River near Libby Montana*. Accessed January 2023 at: https://waterdata.usgs.gov/nwis/dv/?ts_id=81809&format=img_stats&site_no=12302055&begin_date=20200225&end_date=20220731

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 Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect

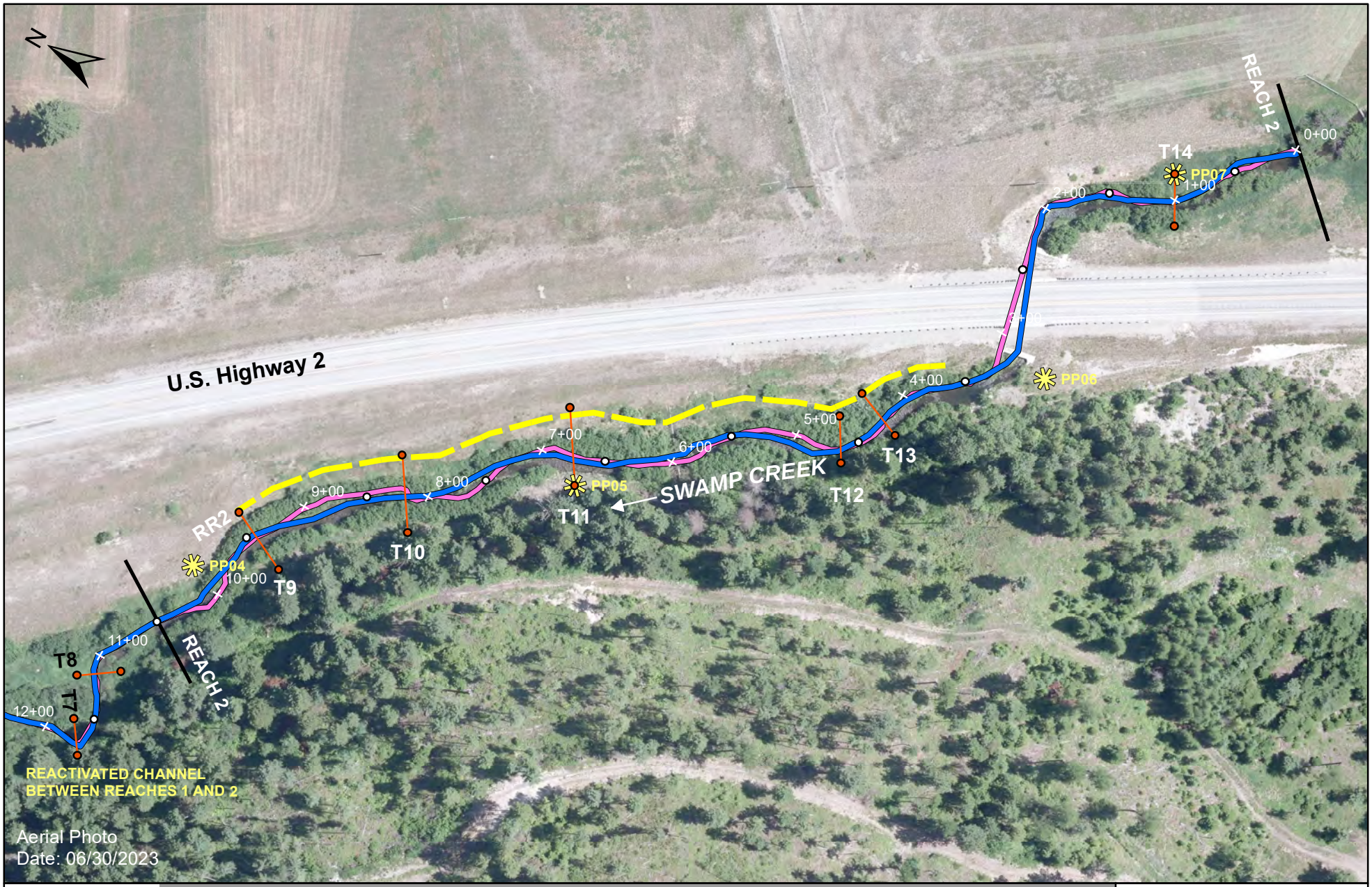
0 50 100
Feet

Swamp Creek - 2023
Reach 1
Monitoring Features

Map 1

Map Date: 12/18/2023

SwampR1_features2023.mxd



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect

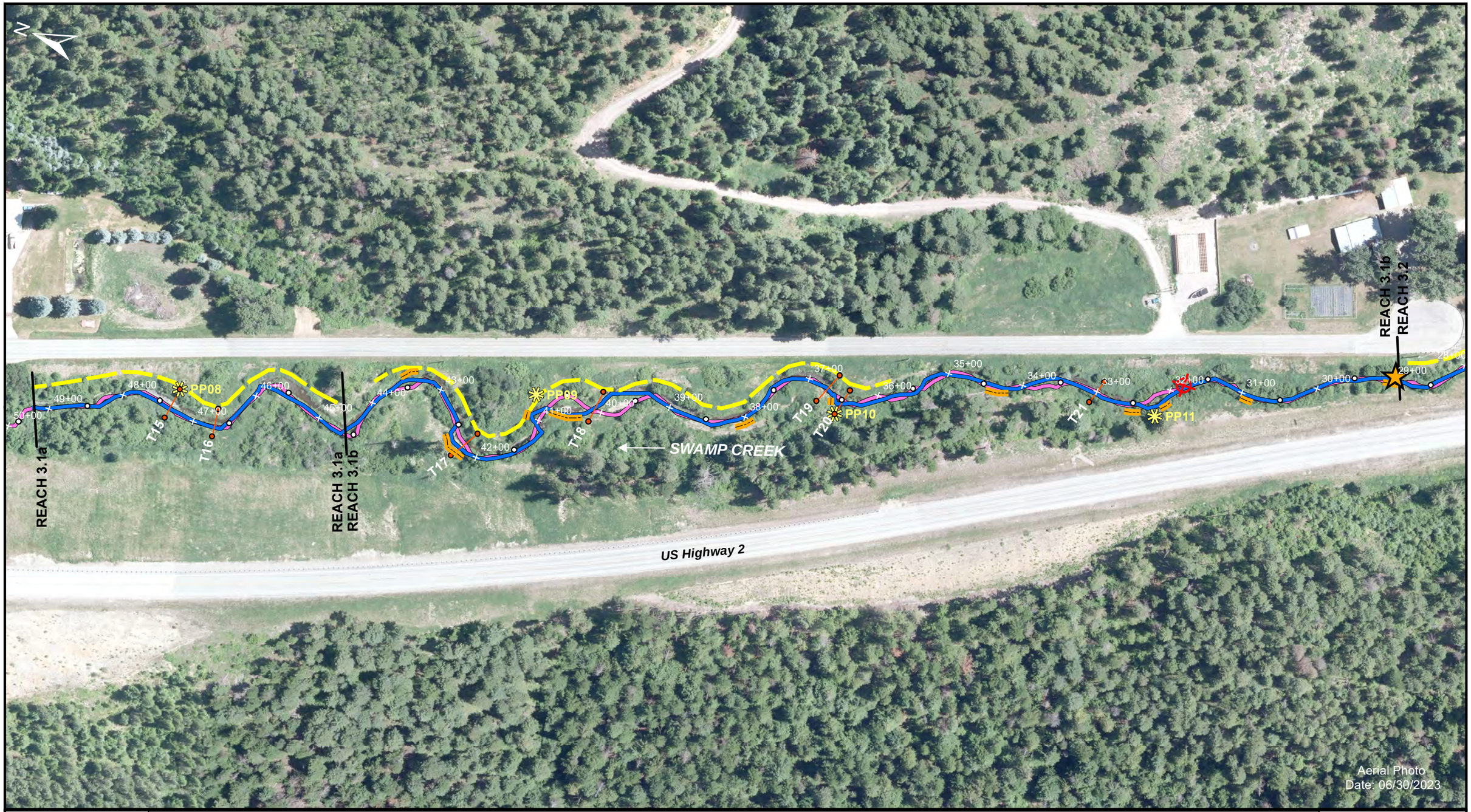
0 50 100
Feet

Swamp Creek - 2023
Reach 2
Monitoring Features

Map 2

Map Date: 12/18/2023

SwampR2_features2023.mxd



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect
- Photo Points
- Failing Rock Weir
- 2017 Headcut

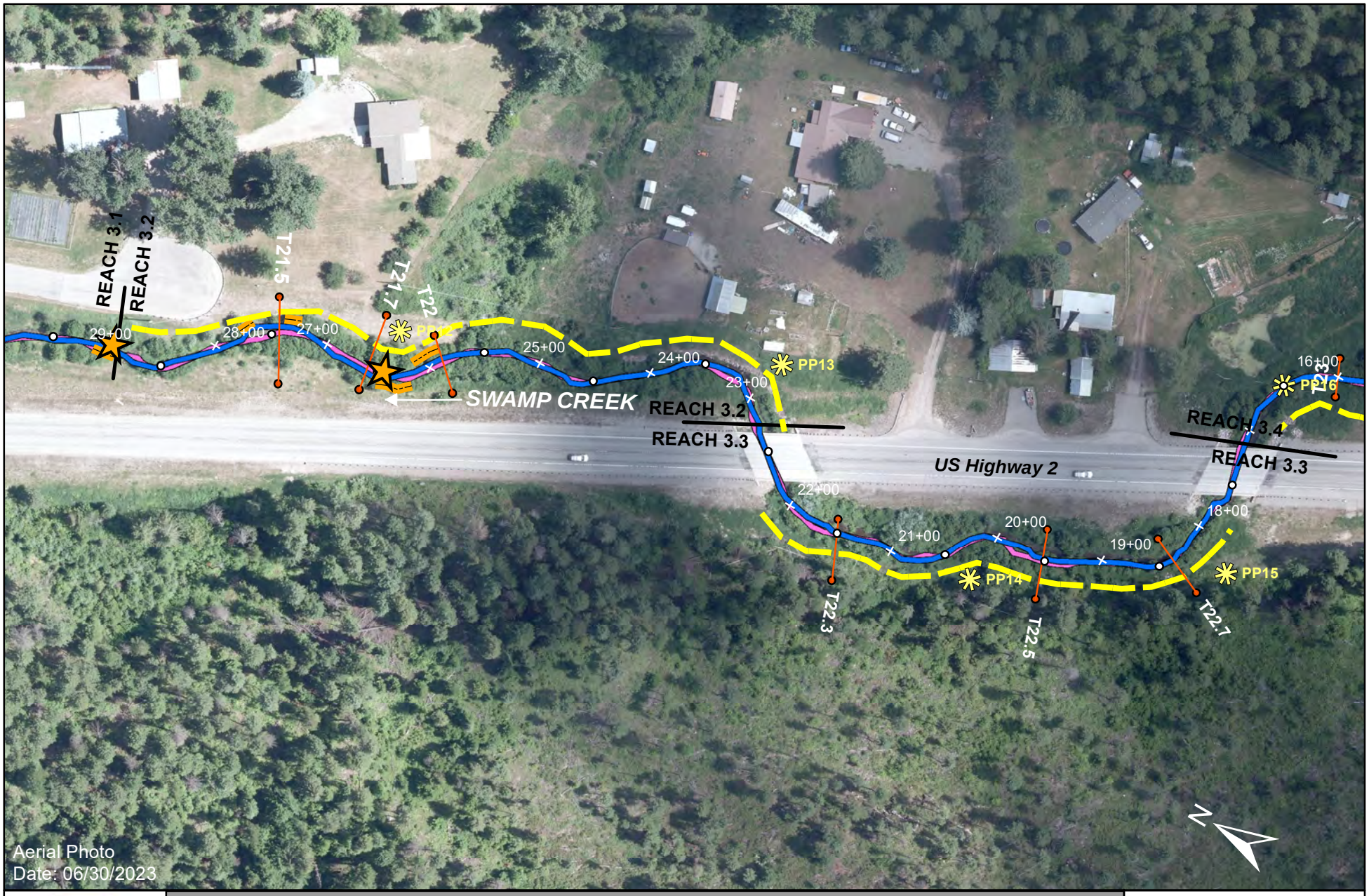
0 75 150 300 Feet

Swamp Creek- 2023
Reach 3.1
Monitoring Features

Map 3

Map Date: 12/18/2023

Swamp3.1_Features2023.mxd



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect
- Failing Rock Weir

0 75 150
Feet

Swamp Creek - 2023
Reach 3.2 and 3.3
Monitoring Features

Map 4

Map Date: 12/18/2023

SwampR3.2.3_features2023

CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect
- Photo Points
- Headcut Stabilized in 2019

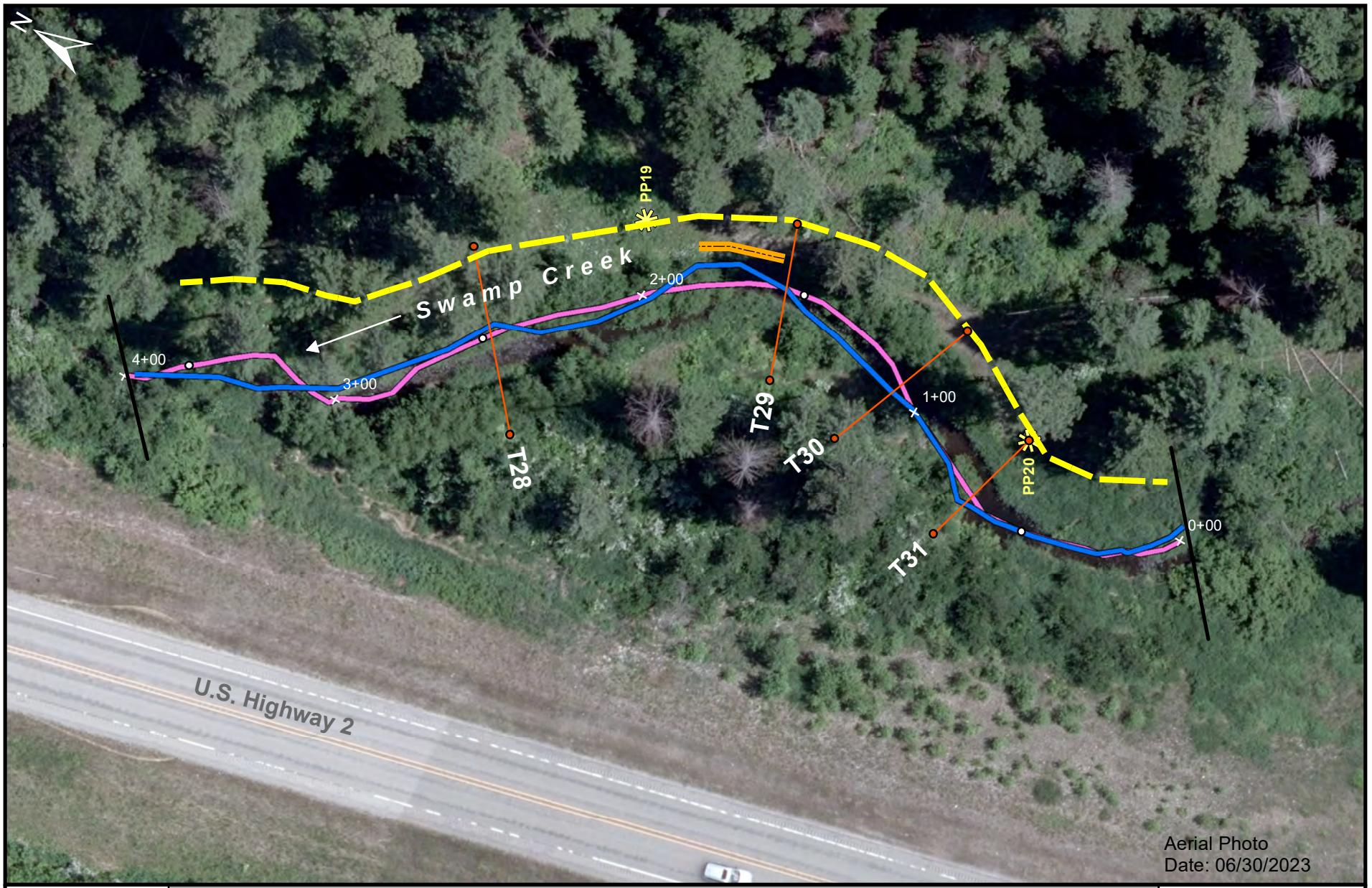
0 100 200
Feet

Swamp Creek - 2023
Reach 3.4
Monitoring Features

Map 5

Map Date: 12/06/2022

SwampR3.4_features2023



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- 2023 Eroding Banks
- Monitoring Transects
- Riparian Vegetation Belt Transect

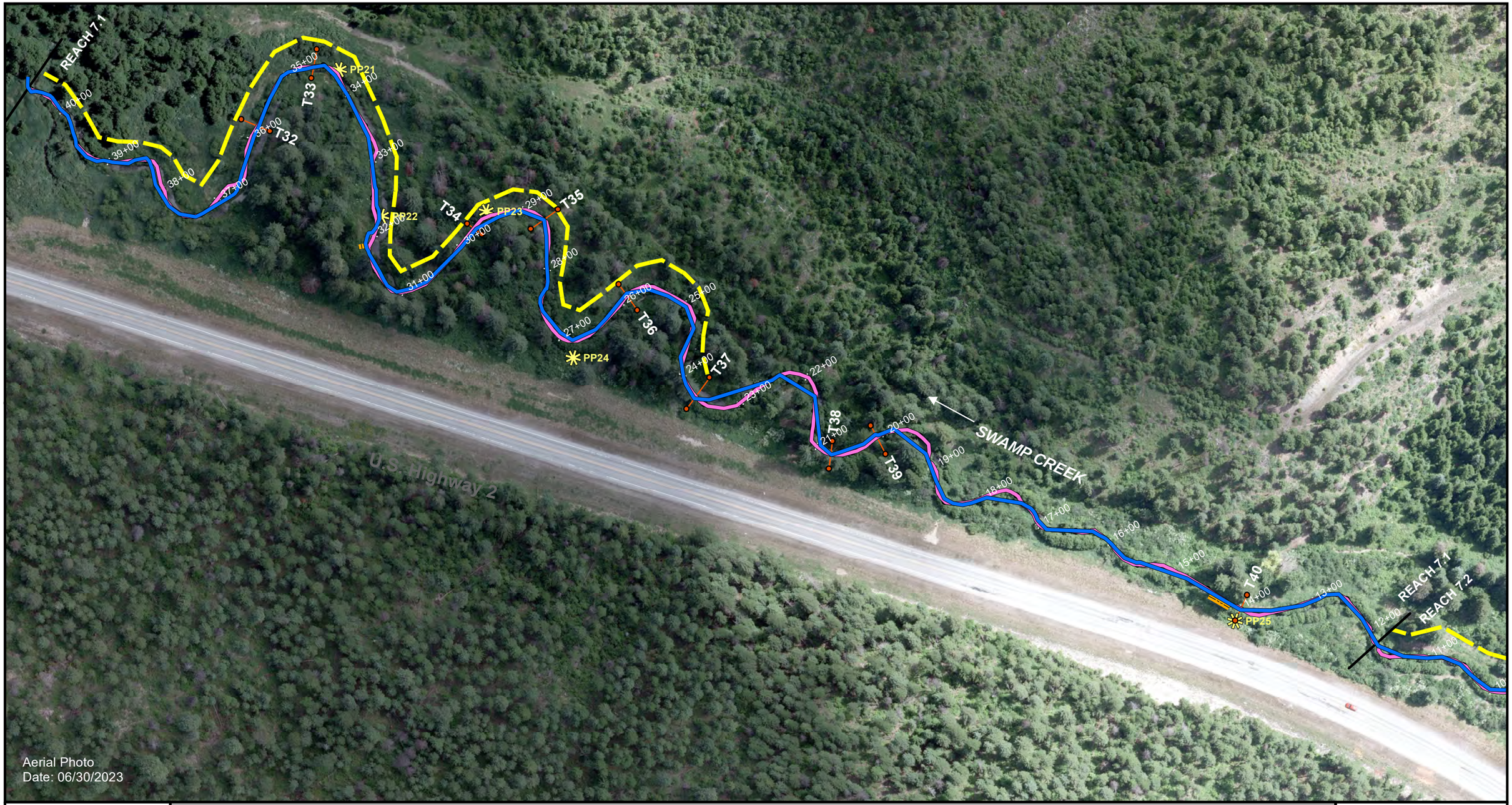
0 25 50
Feet

Swamp Creek - 2023
Reach 5
Monitoring Features

Map 6

Map Date: 12/18/2023

SwampR5_features2023.mxd



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- Eroding Banks Mapped in 2023
- Monitoring Transects
- Riparian Vegetation Belt Transect

N

0 150 300

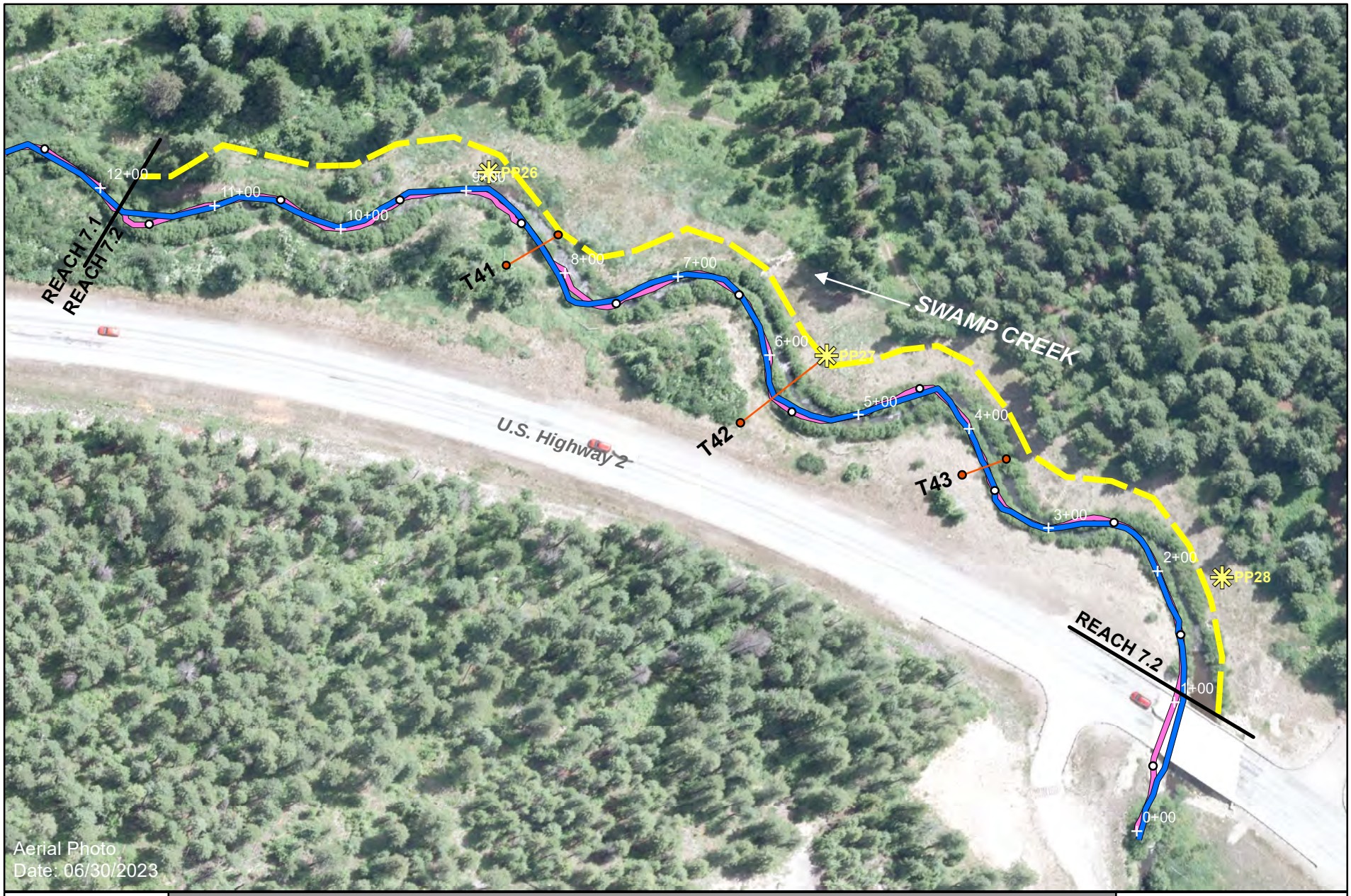
Feet

Swamp Creek- 2023 Monitoring Features Reach 7.1

Map 7

Map Date: 12/18/2023

Swamp7.1_features2023.mxd



CONFLUENCE CONSULTING

Legend

- Channel Reach Breaks
- 2015 Channel Centerline
- 2023 Channel Centerline
- Photo Points
- Monitoring Transects
- Riparian Vegetation Belt Transect

N

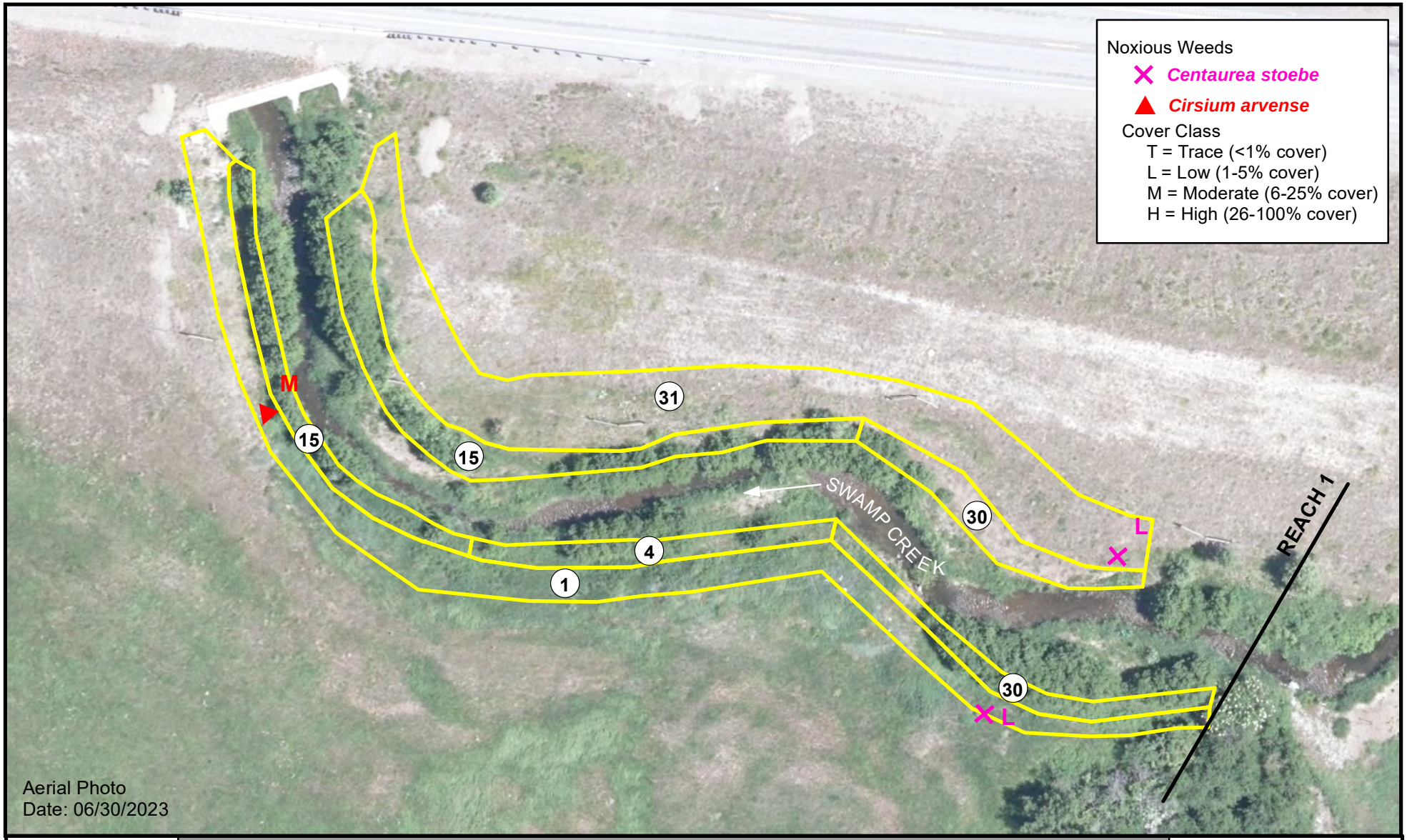
0 50 100
Feet

Swamp Creek - 2023
Reach 7.2
Monitoring Features

Map 8

Map Date: 12/18/2023

SwampR7.2_features2023.mxd



CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Break

1 Bromus/Elymus Community
4 Phalaris/Agrostis Community
15 Phalaris/Alnus Community
30 Phalaris/Equisetum Community
31 Elymus/Poa Community

N

0 15 30 60 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 1

Map 9

Map Date: 12/18/2023

Swamp1_monitor2023.mxd

CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks
- 2 Elymus Community
- 15 Phalaris/Alnus Community
- 31 Elymus/Poa Community
- 32 Agrostis/Equisetum Community

N

0 25 50 100 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 2

Map 10

Map Date: 12/18/2023

Swamp2_monitor2023.mxd

REACH 3.1a
REACH 3.1a
REACH 3.1b
REACH 3.1b
REACH 3.2
U.S. Highway 2
SWAMP CREEK

Aerial Photo
06/30/2023

Noxious Weeds
- *Tanacetum vulgare*
- *Centaurea stoebe*
- *Cirsium arvense*

Cover Class
- T = Trace (<1% cover)
- L = Low (1-5% cover)
- M = Moderate (6-25% cover)
- H = High (26-100% cover)

CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks
- 1 Bromus/Elymus Community
- 8 Phalaris Community
- 9 Alnus/Cornus Community
- 11 Tsuga/Thuja Community
- 12 Acer/Alnus Community
- 15 Phalaris/Alnus Community

N

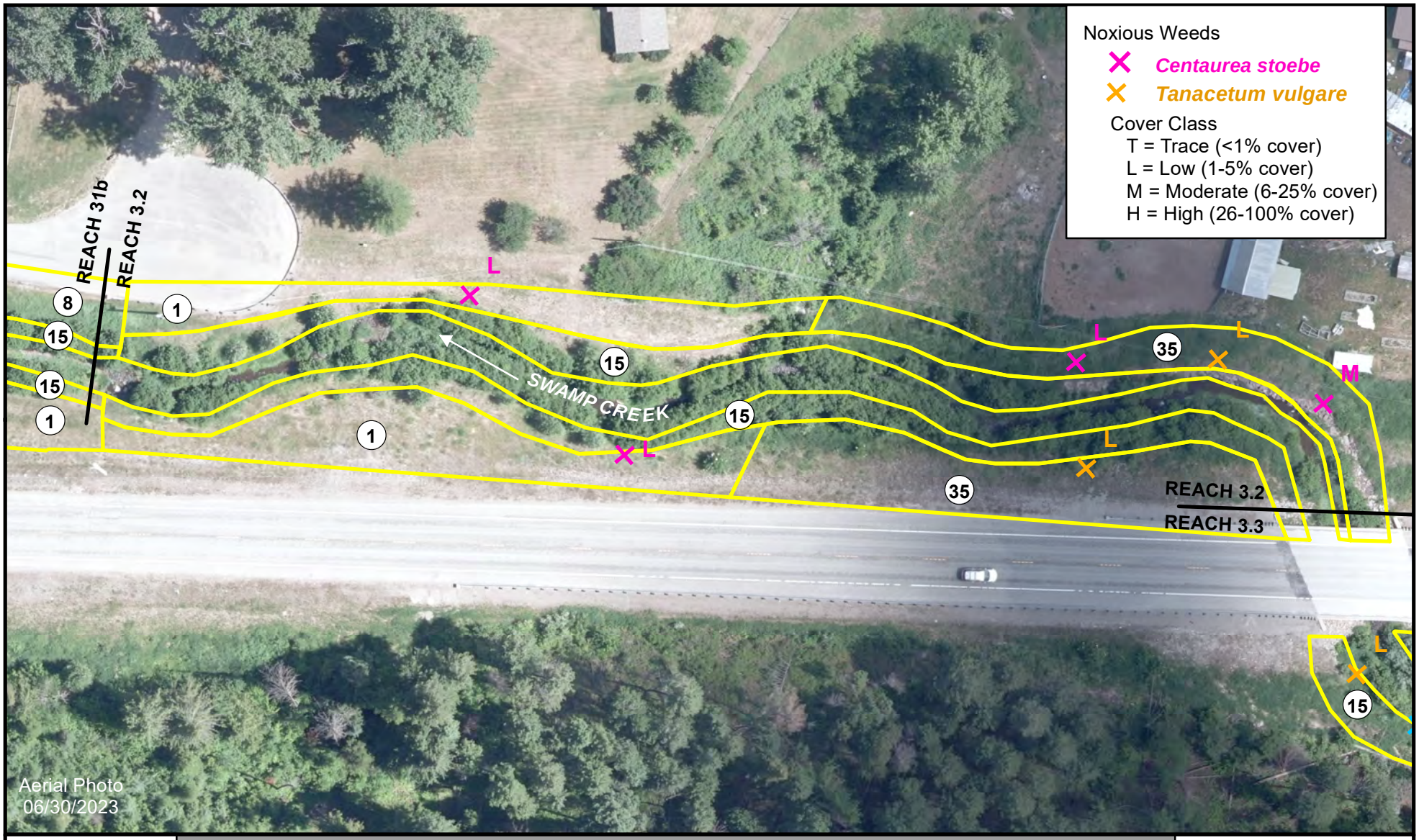
0 75 150 300 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 3.1

Map 11

Map Date: 12/18/2023

Swamp3_1_monitor2023.mxd



CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks

1 Bromus/Elymus Community
8 Phalaris Community
15 Phalaris/Alnus Community
35 Bromus/Lathyrus sylvestris Community

N

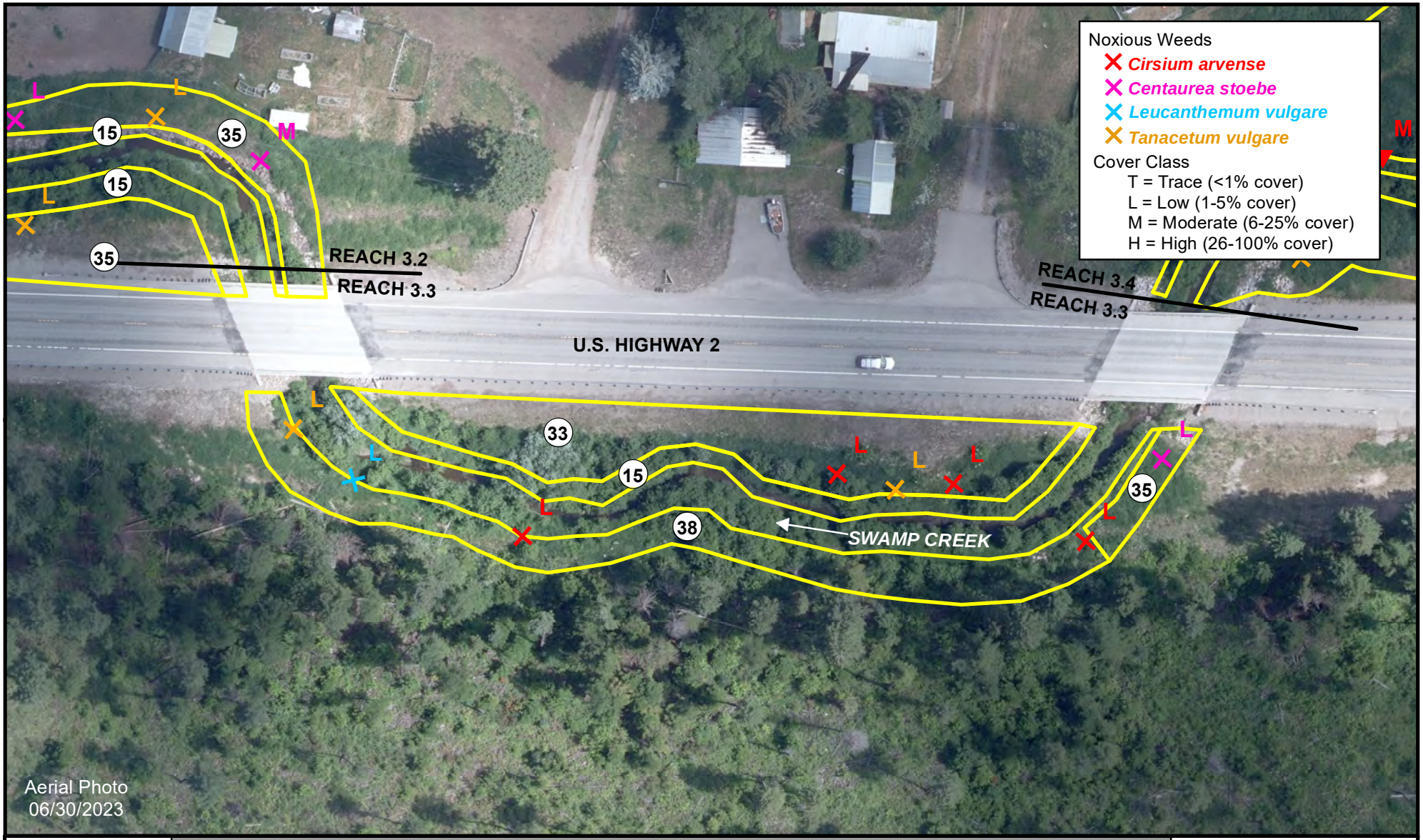
0 25 50 100 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 3.2

Map 12

Map Date: 12/18/2023

Swamp3_2_monitor2023.mxd



CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks

- 15 Phalaris/Alnus Community
- 33 Bromus/Poa Community
- 35 Bromus/Lathyrus sylvestris Community
- 38 Alnus/Equisetum arvense Community

N

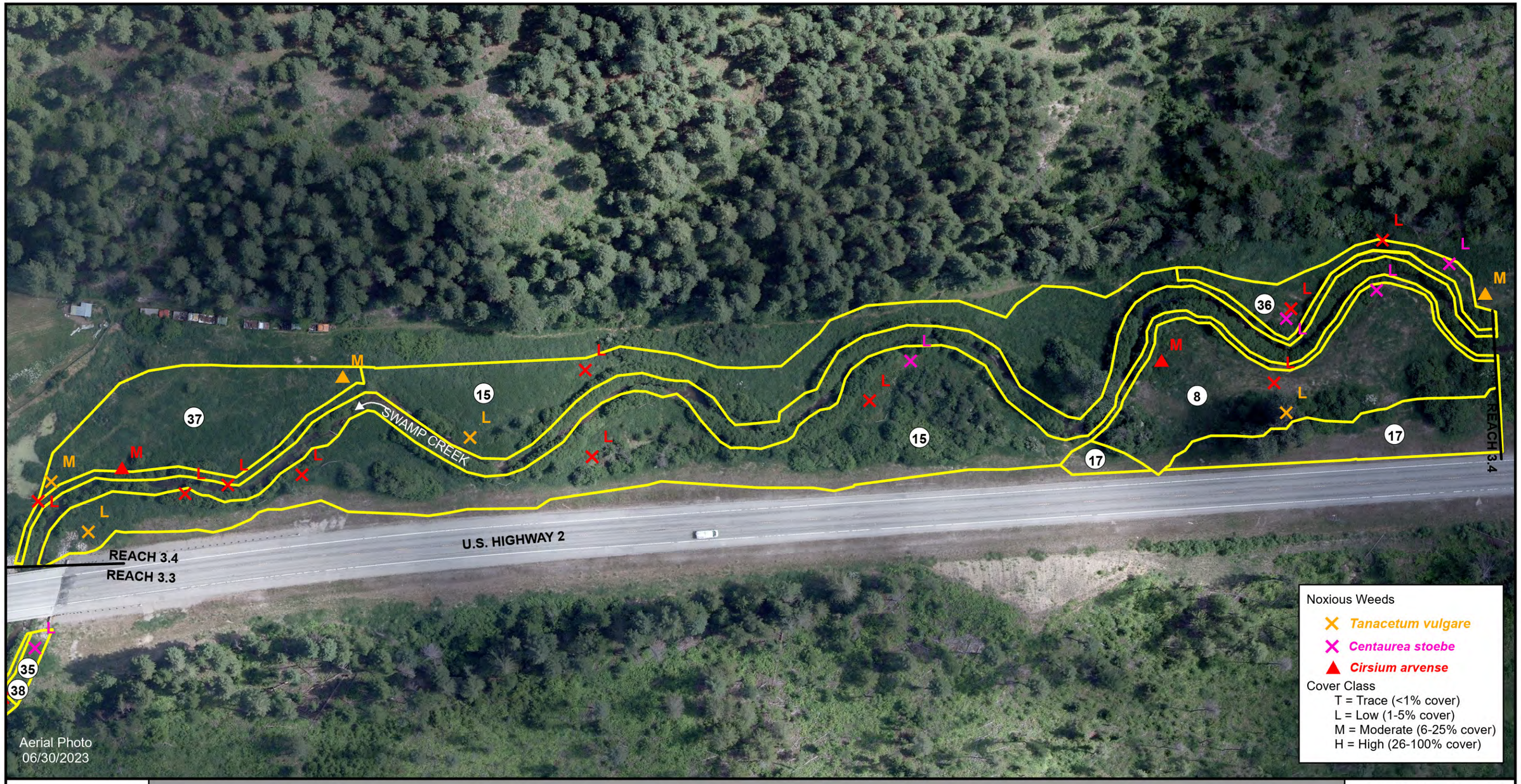
0 25 50 100 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 3.3

Map 13

Map Date: 12/18/2023

Swamp3_3_monitor2023.mxd



CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks

8 Phalaris Community
15 Phalaris/Alnus Community
17 Alnus/Symphoricarpos Community
36 Phalaris/Elymus Community
37 Carex/Phalaris Community

N

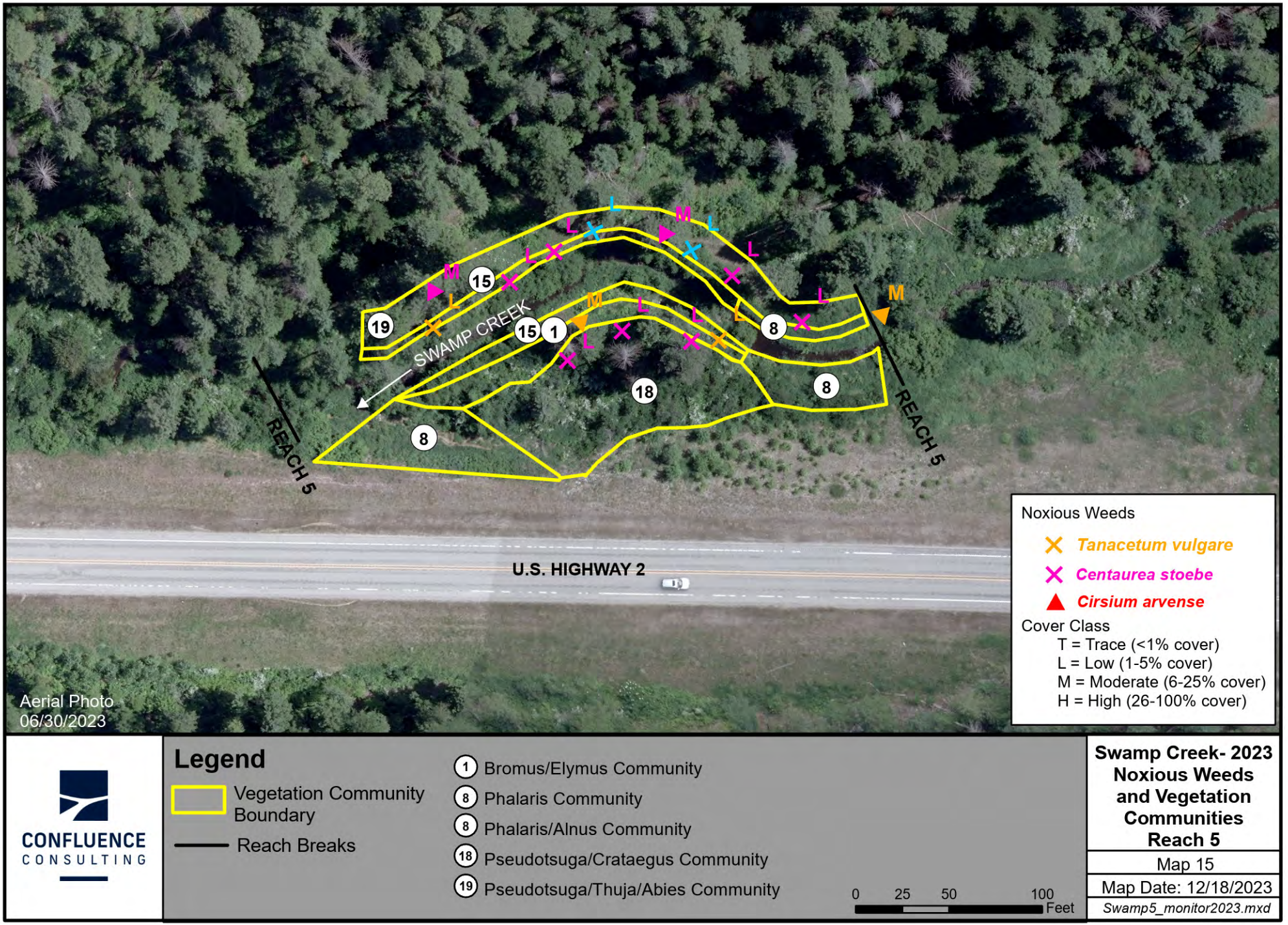
0 50 100 200 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 3.4

Map 14

Map Date: 12/18/2023

Swamp3_4_monitor2023.mxd


SWAMP CREEK
REACH 5
REACH 5
U.S. HIGHWAY 2
Aerial Photo
06/30/2023
Noxious Weeds
Tanacetum vulgare
Centaurea stoebe
Cirsium arvense
Cover Class
T = Trace (<1% cover)
L = Low (1-5% cover)
M = Moderate (6-25% cover)
H = High (26-100% cover)
Legend
Vegetation Community Boundary
Reach Breaks
1 Bromus/Elymus Community
8 Phalaris Community
8 Phalaris/Alnus Community
18 Pseudotsuga/Crataegus Community
19 Pseudotsuga/Thuja/Abies Community
0 25 50 100 Feet
CONFLUENCE CONSULTING
Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 5
Map 15
Map Date: 12/18/2023
Swamp5_monitor2023.mxd

Noxious Weeds

- *Tanacetum vulgare*
- *Centaurea stoebe*
- *Cirsium arvense*

Cover Class

T = Trace (<1% cover)
L = Low (1-5% cover)
M = Moderate (6-25% cover)
H = High (26-100% cover)

REACH 7.1

SWAMP CREEK

U.S. HIGHWAY 2

REACH 7.1
REACH 7.2

Aerial Photo
06/30/2023

CONFLUENCE CONSULTING

Legend

- Vegetation Community Boundary
- Reach Breaks

15 Phalaris/Alnus Community
22 Alnus/Abies/Pseudotsuga Community
25 Crataegus/Philadelphus Community
28 Pseudotsuga/Abies Community

N

0 70 140 280 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 7.1

Map 16

Map Date: 12/18/2023

Swamp7_1_monitor2023.mxd

CONFLUENCE CONSULTING

Legend

Vegetation Community Boundary

Reach Breaks

1 Bromus/Elymus Community
2 Elymus Community
8 Phalaris Community
15 Phalaris/Alnus Community
25 Crataegus/Philadelphus Community

N

0 25 50 100 Feet

Swamp Creek- 2023 Noxious Weeds and Vegetation Communities Reach 7.2

Map 17

Map Date: 12/18/2023

Swamp7_2_monitor2023.mxd

APPENDIX B
PROJECT AREA PHOTOGRAPHS

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

PHOTO INFORMATION

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

CONFLUENCE CONSULTING

2014 **2023**

Photo Point 1.1: View looking south at Reach 1.

2014 **2023**

Photo Point 1.2: View looking south southeast at Reach 1.

2014 **2023**

Photo Point 1.3: View looking east southeast at Reach 1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 1.4: View looking east at Reach 1.

2014 **2023**

Photo Point 2.1: View looking south southeast at Reach 1.

2014 **2023**

Photo Point 2.2: View looking southeast at Reach 1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 2.3: View looking east at Reach 1.

2014 **2023**

Photo Point 2.4: View looking northeast at Reach 1.

2014 **2023**

Photo Point 2.5: View looking north at Reach 1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 3.1: View looking south at Reach 1.

2014 **2023**

Photo Point 3.2: View looking southwest at Reach 1.

2014 **2023**

Photo Point 3.3: View looking west at Reach 1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 3.4: View looking northwest at Reach 1.

2014 **2023**

Photo Point 3.5 View looking north at Reach 1.

2014 **2023**

Photo Point 4.1: View looking south southeast at Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 4.2: View looking south at Reach 2.

2014 **2023**

Photo Point 4.3: View looking southwest at Reach 2.

2014 **2023**

Photo Point 4.4:: View looking west at Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 4.5: View looking northwest at Reach 2.

2014 **2023**

Photo Point 5.1: View looking southeast at Reach 2.

2014 **2023**

Photo Point 5.2: View looking east south east Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 5.3: View looking east at Reach 2.

2014 **2023**

Photo Point 5.4: View looking east northeast at Reach 2.

2014 **2023**

Photo Point 5.6: View looking northeast at Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 6.1: View looking north northeast at Reach 2.

2014 **2023**

Photo Point 6.2: View looking north northwest at Reach 2.

2014 **2023**

Photo Point 7.1: View looking north northwest (downstream) at the upstream end of Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 7.2: View looking west at the upstream end of Reach 2.

2014 **2023**

Photo Point 7.4: View looking southwest at the upstream end of Reach 2.

2014 **2023**

Photo Point 7.5: View looking south (upstream) at the upstream end of Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 8.1: View looking north at Reach 3.1.

2014 **2023**

Photo Point 8.2: View looking west at Reach 3.1.

2014 **2023**

Photo Point 8.3: View looking southwest at Reach 3.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 8.4: View looking south southwest at Reach 3.1.

2014 **2023**

Photo Point 8.5: View looking south at Reach 3.1.

2014 **2023**

Photo Point 9.1: View looking south at Reach 3.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 9.2: View looking southwest at Reach 3.1.

2014 **2023**

Photo Point 9.3: View looking northeast at Reach 3.1.

2014 **2023**

Photo Point 10.1: View looking north northwest at Reach 3.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 10.2: View looking northeast at Reach 3.1.

2014 **2023**

Photo Point 11.1: View looking south at Reach 3.1.

2014 **2023**

Photo Point 11.2: View looking north at Reach 3.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 12.1: View looking north northwest at Reach 3.2

2014 **2023**

Photo Point 12.2: View looking west at Reach 3.2.

2014 **2023**

Photo Point 12.3: View looking west southwest at Reach 3.2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 12.4: View looking south southwest at Reach 3.2.

2014 **2023**

Photo Point 12.5: View looking south at Reach 3.2.

2014 **2023**

Photo Point 13.1 View looking north northwest at Reach 3.2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 14.1: View looking north at Reach 3.3.

2014 **2023**

Photo Point 14.2: View looking east at Reach 3.3.

2014 **2023**

Photo Point 14.3: View looking south southeast at Reach 3.3.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 15.1: View looking north northwest at Reach 3.3.

2014 **2023**

Photo Point 15.2: View looking east at Reach 3.3.

2014 **2023**

Photo Point 16.1: View looking south southwest at Reach 3.4.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 16.2: View looking west at Reach 3.4.

2014 **2023**

Photo Point 17.1: View looking south at Reach 3.4. Due to dense vegetation, this photo was taken from a different location than in 2014.

2014 **2023**

Photo Point 17.2: View looking south east at Reach 3.4. Due to dense vegetation, this photo was taken from a different location than in 2014.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 17.3: View looking east at Reach 3.4.

2014 **2023**

Photo Point 17.4: View looking northeast at Reach 3.4.

2014 **2023**

Photo Point 17.5: View looking north at Reach 3.4.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 18.1: View looking southwest at Reach 3.4.

2014 **2023**

Photo Point 18.2: View looking west at Reach 3.4.

2014 **2023**

Photo Point 18.3: View looking northwest at Reach 3.4.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 18.4: View looking north at Reach 3.4.

2014 **2023**

Photo Point 19.1: View looking south southwest at Reach 5.

2014 **2023**

Photo Point 19.2: View looking south west at Reach 5.
Note that this photo was taken from a different location than the original due to the presence of dense vegetation.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 19.3: View looking northwest at Reach 5.
Note that this photo was taken from a different location than the original due to the presence of dense vegetation.

2014 **2023**

Photo Point 20.1: View looking west south west at Reach 5.

2014 **2023**

Photo Point 20.4: View looking north northwest at Reach 5.

PHOTO INFORMATION

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 20.5: View looking north northwest at Reach 5.

2014 **2023**

Photo Point 21.1: View looking southwest at Reach 7.1.

2014 **2023**

Photo Point 21.2: View looking northwest at Reach 7.1.

PHOTO INFORMATION

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 22.1: View looking west at Reach 7.1.

2014 **2023**

Photo Point 22.2: View looking south at Reach 7.1.

2014 **2023**

Photo Point 23.1: View looking south at Reach 7.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 23.2: View looking west at Reach 7.1.

2014 **2023**

Photo Point 24.1: View looking northeast at Reach 7.1.

2014 **2023**

Photo Point 24.2: View looking east at Reach 7.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 24.3: View looking east southeast at Reach 7.1.

2014 **2023**

Photo Point 24.4: View looking southeast at Reach 7.1.

2014 **2023**

Photo Point 25.1: View looking north at Reach 7.1.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 25.2: View looking east at Reach 7.1.

2014 **2023**

Photo Point 25.3: View looking south at Reach 7.1.

2014 **2023**

Photo Point 26.1: View looking south (2014) and west (2022) at Reach 7.2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 26.2: View looking north at Reach 7.2.

2014 **2023**

Photo Point 27.1: View looking south at Reach 7.2.

2014 **2023**

Photo Point 27.2: View looking southwest at Reach 7.2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 27.4: View looking west northwest at Reach 7.2.

2014 **2023**

Photo Point 27.5: View looking north at Reach 7.2.

2014 **2023**

Photo Point 28.1: View looking west southwest at Reach 7.2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2014 and 2023 Monitoring Events

2014 **2023**

Photo Point 28.2: View looking west at Reach 7.2.

2014 **2023**

Photo Point 28.3: View looking north northwest at Reach 7.2.

2018 **2023**

Additional Photo 1: Washed out riprap placed to stabilize seep just downstream of bridge in Reach 2.

PROJECT NAME: Swamp Creek Stream Mitigation Site

DATE: 2021 and 2023 Monitoring Events

2021

2023

Additional Photo 2: Failed rock weir flanked by channel at upstream end of Reach 3.1.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 1: T1 Center looking upstream East.

Survey Photo 2: T1 Center downstream looking North.

Survey Photo 3: T2 Center looking East upstream.

Survey Photo 4: T2 Center looking Northwest downstream.

Survey Photo 5: T3 Center looking East upstream.

Survey Photo 6: T3 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 7: T4 Center looking South upstream.

Survey Photo 8: T4 Center looking Northwest Downstream.

Survey Photo 9: T5 Center looking South upstream.

Survey Photo 10: T5 Center looking North downstream.

Survey Photo 11: T6 Center looking East upstream.

Survey Photo 12: T6 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 13: T7 Center looking South upstream.

Survey Photo 14: T7 Center looking North downstream.

Survey Photo 15: T8 Center looking South upstream.

Survey Photo 16: T8 Center looking North downstream.

Survey Photo 17: T9 Center looking Southeast upstream.

Survey Photo 18: T9 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 19: T10 Center looking Southeast upstream.

Survey Photo 20: T10 Center looking Northwest downstream.

Survey Photo 21: T11 Center looking East upstream.

Survey Photo 22: T11 Center looking West downstream.

Survey Photo 23: T12 Center looking East upstream.

Survey Photo 24: T12 Center looking West downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 25: T13 Center looking East upstream.

Survey Photo 26: T13 Center looking West downstream.

Survey Photo 27: T14 Center looking East upstream.

Survey Photo 28: T14 Center looking West downstream.

Survey Photo 29: T15 Center looking Northeast upstream.

Survey Photo 30: T15 Center looking Southwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 31: T16 Center looking Southeast upstream.

Survey Photo 32: T16 Center looking West downstream.

Survey Photo 33: T17 Center looking South upstream.

Survey Photo 34: T17 Center looking North downstream.

Survey Photo 35: T18 Center looking South upstream.

Survey Photo 36: T18 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 37: T19 Center looking South upstream.

Survey Photo 38: T19 Center looking North downstream.

Survey Photo 39: T20 Center looking South upstream.

Survey Photo 40: T20 Center looking North downstream.

Survey Photo 41: T21 Center looking Southeast upstream.

Survey Photo 42: T21 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 43: T21.5 Center looking South upstream.

Survey Photo 44: T21.5 Center looking North downstream.

Survey Photo 45: T21.7 Center looking South upstream.

Survey Photo 46: T21.7 Center looking North downstream.

Survey Photo 47: T22 Center looking Southeast upstream.

Survey Photo 48: T22 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 49: T22.3 Center looking Southeast upstream.

Survey Photo 50: T22.3 Center looking Northwest downstream.

Survey Photo 51: T22.5 Center looking Southeast upstream.

Survey Photo 52: T22.5 Center looking Northwest downstream.

Survey Photo 53: T22.7 Center looking Southeast upstream.

Survey Photo 54: T22.7 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 55: T23 Center looking Southeast upstream.

Survey Photo 56: T23 Center looking Northwest downstream.

Survey Photo 57: T24 Center looking South upstream.

Survey Photo 58: T24 Center looking Northwest downstream.

Survey Photo 59: T25 Center looking South upstream.

Survey Photo 60: T25 Center looking North downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 61: T26 Center looking East upstream.

Survey Photo 62: T26 Center looking West downstream.

Survey Photo 63: T27 Center looking East upstream.

Survey Photo 64: T27 Center looking West downstream.

Survey Photo 65: T28 Center looking Southeast upstream.

Survey Photo 66: T28 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 67: T29 Center looking Southeast upstream.

Survey Photo 68: T29 Center looking Northwest downstream.

Survey Photo 69: T30 Center looking South upstream.

Survey Photo 70: T30 Center looking North downstream.

Survey Photo 71: T31 Center looking South upstream.

Survey Photo 72: T31 Center looking North downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 73: T32 Center looking East upstream.

Survey Photo 74: T32 Center looking West downstream.

Survey Photo 75: T33 Center looking Southeast upstream.

Survey Photo 76: T33 Center looking Northwest downstream.

Survey Photo 77: T34 Center looking Southeast upstream.

Survey Photo 78: T34 Center looking West downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 79: T35 Center looking Southwest upstream.

Survey Photo 80: T35 Center looking North downstream.

Survey Photo 81: T36 Center looking Southwest upstream.

Survey Photo 82: T36 Center looking North downstream.

Survey Photo 83: T37 Center looking South upstream.

Survey Photo 84: T37 Center looking North downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 85: T38 Center looking Southeast upstream.

Survey Photo 86: T38 Center looking North downstream.

Survey Photo 87: T39 Center looking Southeast upstream.

Survey Photo 88: T39 Center looking Northwest downstream.

Survey Photo 89: T40 Center looking Southeast upstream.

Survey Photo 90: T40 Center looking Northwest downstream.

SURVEY PHOTO LOG

SITE NAME: Swamp Creek
MONITORING YEAR: 2023

Survey Photo 91: T41 Center looking South upstream.

Survey Photo 92: T41 Center looking North downstream.

Survey Photo 93: T42 Center looking Southwest upstream.

Survey Photo 94: T42 Center looking Northeast downstream.

Survey Photo 95: T43 Center looking Southwest upstream.

Survey Photo 96: T43 Center looking Northeast downstream.

APPENDIX C
2015 – 2023 COMPREHENSIVE PLANT SPECIES LIST

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

Channel Segment 1 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Acer glabrum	Rocky Mountain Maple	FACU
Achillea millefolium	Common Yarrow	FACU
Agropyron cristatum	Crested Wheatgrass	UPL
Agrostis stolonifera	Spreading Bent	FAC
Alnus incana	Speckled Alder	FACW
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC
Anaphalis margaritacea	Pearly-Everlasting	FACU
Angelica arguta	Lyall's Angelica	FACW
Artemisia biennis	Biennial Wormwood	FACW
Beckmannia syzigachne	American Slough Grass	OBL
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	UPL
Carex bebbii	Bebb's Sedge	OBL
Carex pellita	Woolly Sedge	OBL
Carex simulata	Analogue Sedge	OBL
Carex sp.	Sedge	N/A
Carex stipata	Stalk-Grain Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Centaurea stoebe	Spotted Knapweed	UPL
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Collomia linearis	Narrow-Leaf Mountain-Trumpet	FACU
Crataegus douglasii	Black Hawthorn	FAC
Deschampsia caespitosa	Tufted Hair Grass	FACW
Elymus canadensis	Nodding Wild Rye	FAC
Elymus lanceolatus	Streamside Wild Rye	FACU
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
Festuca idahoensis	Bluebunch Fescue	FACU
Filago arvensis	Field Fluffweed	UPL
Glyceria grandis	American Manna Grass	OBL
Hordeum jubatum	Fox-Tail Barley	FAC
Hypericum perforatum	Common St. John's-Wort	FACU
Juncus bufonius	Toad Rush	FACW

Channel Segment 1 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Juncus effusus	Lamp Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus nodosus	Knotted Rush	OBL
Juncus tenuis	Lesser Poverty Rush	FAC
Lactuca serriola	Prickly Lettuce	FACU
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Mahonia repens	Creeping Oregon-Grape	UPL
Medicago lupulina	Black Medick	FACU
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Mimulus guttatus	Seep Monkey-Flower	OBL
Myosotis scorpioides	True Forget-Me-Not	FACW
Nasturtium officinale	Watercress	OBL
Pascopyrum smithii	Western-Wheat Grass	FACU
Penstemon confertus	Yellow Penstemon	UPL
Phalaris arundinacea	Reed Canary Grass	FACW
Phleum pratense	Common Timothy	FAC
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
Potentilla drummondii	Drummond's Cinquefoil	FAC
Prunus virginiana	Choke Cherry	FACU
Osmorhiza purpurea	Purple Sweet-Cicely	FAC
Ranunculus aquatilis	White Water-Crowfoot	OBL
Rosa woodsii	Woods' Rose	FACU
Rubus idaeus	Common Red Raspberry	FACU
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix sitchensis	Sitka Willow	FACW
Salix sp.	Willow	N/A
Sambucus racemosa	Red Elder	FACU
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Solanum dulcamara	Climbing Nightshade	FAC
Solidago canadensis	Canadian Goldenrod	FACU
Symphoricarpos albus	Common Snowberry	FACU

Channel Segment 1 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Symphyotrichum campestre	Western Meadow Aster	UPL
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU
Tanacetum vulgare	Common Tansy	FACU
Taraxacum officinale	Common Dandelion	FACU
Tragopogon dubius	Meadow Goat's-Beard	UPL
Trifolium pratense	Red Clover	FACU
Trifolium repens	White Clover	FAC
Verbascum thapsus	Great Mullein	FACU
Veronica americana	American-Brooklime	OBL
Vicia americana	American Purple Vetch	FAC

[1] 2020 NWPL (USACE 2020)

New species identified in 2023 are **bolded.**

Channel Segment 2 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Acer glabrum	Rocky Mountain Maple	FACU
Achnatherum nelsonii	Nelson's Rice Grass	UPL
Agrostis stolonifera	Spreading Bent	FAC
Alnus incana	Speckled Alder	FACW
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC
Amelanchier alnifolia	Saskatoon Service-Berry	FACU
Anaphalis margaritacea	Pearly-Everlasting	FACU
Arctium minus	Lesser Burrdock	UPL
Arctostaphylos uva-ursi	Kinnikinnick	FACU
Artemisia biennis	Biennial Wormwood	FACW
Astragalus cicer	Chickpea Milkvetch	UPL
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	UPL
Bromus tectorum	Cheatgrass	UPL
Calamagrostis canadensis	Bluejoint	FACW
Carduus nutans	Nodding Plumeless-Thistle	UPL
Carex bebbii	Bebb's Sedge	OBL
Carex pellita	Woolly Sedge	OBL
Carex simulata	Analogue Sedge	OBL
Carex stipata	Stalk-Grain Sedge	OBL
Carex vesicaria	Lesser Bladder Sedge	OBL
Centaurea stoebe	Spotted Knapweed	UPL
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Chenopodium rubrum	Red Goosefoot	FACW
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cornus alba	Red Osier	FACW
Dactylis glomerata	Orchard Grass	FACU
Deschampsia caespitosa	Tufted Hair Grass	FACW
Elymus canadensis	Nodding Wild Rye	FAC
Elymus glaucus	Blue Wild Rye	FACU
Elymus lanceolatus	Streamside Wild Rye	FACU
Elymus repens	Creeping Wild Rye	FAC
Elymus trachycaulus	Slender Wild Rye	FAC
Epilobium brachycarpum	Panicled Willowhearb	UPL
Epilobium ciliatum	Fringed Willowherb	FACW
Equisetum arvense	Field Horsetail	FAC
Equisetum hyemale	Tall Scouring-Rush	FACW

Channel Segment 2 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Festuca idahoensis	Bluebunch Fescue	FACU
Filago arvensis	Field Fluffweed	UPL
Galium triflorum	Fragrant Bedstraw	FACU
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Heracleum maximum	American Cow-Parsnip	FAC
Hordeum jubatum	Fox-Tail Barley	FAC
Hypericum perforatum	Common St. John's-Wort	FACU
Juncus balticus	Baltic Rush	FACW
Juncus effusus	Lamp Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus nodosus	Knotted Rush	OBL
Juncus tenuis	Lesser Poverty Rush	FAC
Lactuca serriola	Prickly Lettuce	FACU
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Maianthemum stellatum	Starry False Solomon's-Seal	FAC
Matricaria discoidea	Pineapple-Weed	FACU
Medicago lupulina	Black Medick	FACU
Medicago sativa	Alfalfa	UPL
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Mimulus guttatus	Seep Monkey-Flower	OBL
Myosotis scorpioides	True Forget-Me-Not	FACW
Nasturtium officinale	Watercress	OBL
Penstemon confertus	Yellow Penstemon	UPL
Persicaria amphibia	Water Smartweed	OBL
Phalaris arundinacea	Reed Canary Grass	FACW
Phleum pratense	Common Timothy	FAC
Piperia dilatata	Scentbottle	FACW
Plantago major	Great Plantain	FAC
Poa compressa	Flat-Stem Blue Grass	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Populus angustifolia	Narrow-Leaf Cottonwood	FACW
Populus balsamifera	Balsam Poplar	FAC
Pseudoroegneria spicata	Bluebunch Wheatgrass	UPL
Ranunculus aquatilis	White Water-Crowfoot	OBL
Rorippa palustris	Bog Yellowcress	OBL
Rosa woodsii	Woods' Rose	FACU

Channel Segment 2 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Rubus parviflorus	Western Thimble-Berry	FACU
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix sitchensis	Sitka Willow	FACW
Sambucus racemosa	Red Elder	FACU
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Sisymbrium altissimum	Tall Hedge-Mustard	FACU
Solanum dulcamara	Climbing Nightshade	FAC
Solidago canadensis	Canadian Goldenrod	FACU
Sonchus arvensis	Field Sow-Thistle	FACU
Sonchus asper	Spiny-Leaf Sow-Thistle	FACU
Symphoricarpos albus	Common Snowberry	FACU
Symphyotrichum campestre	Western Meadow Aster	UPL
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU
Tanacetum vulgare	Common Tansy	FACU
Taraxacum officinale	Common Dandelion	FACU
Tragopogon dubius	Meadow Goat's-Beard	UPL
Trifolium repens	White Clover	FAC
Urtica dioica	Stinging Nettle	FAC
Verbascum thapsus	Great Mullein	FACU
Veronica americana	American-Brooklime	OBL

[1] 2020 NWPL (USACE 2020)

New species identified in 2023 are **bolded.**

Channel Segment 3 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Abies lasiocarpa	Subalpine Fir	FACU
Acer glabrum	Rocky Mountain Maple	FACU
Achillea millefolium	Common Yarrow	FACU
Agropyron cristatum	Crested Wheatgrass	UPL
Agrostis stolonifera	Spreading Bent	FAC
Algae, brown	Algae, brown	N/A
Algae, green	Algae, green	N/A
Alnus incana	Speckled Alder	FACW
Alopecurus aequalis	Short-Awn Meadow Foxtail	OBL
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC
Amelanchier alnifolia	Saskatoon Service-Berry	FACU
Artemisia absinthium	Absinthium	UPL
Beckmannia syzigachne	American Slough Grass	OBL
Berberis repens	Creeping Oregon Grape	UPL
Bidens cernua	Nodding Burr-Marigold	OBL
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	UPL
Calamagrostis canadensis	Bluejoint	FACW
Carex aquatilis	Leafy Tussock Sedge	OBL
Carex bebbii	Bebb's Sedge	OBL
Carex simulata	Analogue Sedge	OBL
Carex stipata	Stalk-Grain Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Carex vesicaria	Lesser Bladder Sedge	OBL
Centaurea stoebe	Spotted Knapweed	UPL
Cerastium fontanum	Common Mouse-Ear Chickweed	FACU
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Chenopodium album	Lamb's-Quarters	FACU
Chenopodium rubrum	Red Goosefoot	FACW
Cichorium intybus	Chicory	FACU
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cornus alba	Red Osier	FACW
Crataegus douglasii	Black Hawthorn	FAC
Deschampsia caespitosa	Tufted Hair Grass	FACW
Deschampsia elongata	Slender Hair Grass	FACW
Descurainia sophia	Herb Sophia	UPL
Dryopteris expansa	Spreading Wood Fern	FACW

Channel Segment 3 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Eleocharis palustris	Common Spike-Rush	OBL
Elymus canadensis	Nodding Wild Rye	FAC
Elymus glaucus	Blue Wild Rye	FACU
Elymus lanceolatus	Streamside Wild Rye	FACU
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
Filago arvensis	Field Fluffweed	UPL
Galium aparine	Sticky-Willy	FACU
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Glyceria striata	Fowl Manna Grass	OBL
Heracleum maximum	American Cow-Parsnip	FAC
Hordeum jubatum	Fox-Tail Barley	FAC
Hylotelephium spectabile	Showy Stonecrop	UPL
Hypericum perforatum	Common St. John's-Wort	FACU
Impatiens ecalcarata	Spurless Touch-Me-Not	FACW
Juncus bufonius	Toad Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus nodosus	Knotted Rush	OBL
Juncus tenuis	Lesser Poverty Rush	FAC
Lactuca serriola	Prickly Lettuce	FACU
Lathyrus sylvestris	Flat Pea	UPL
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Madia glomerata	Mountain Tarplant	FACU
Maianthemum stellatum	Starry False Solomon's-Seal	FAC
Medicago lupulina	Black Medick	FACU
Medicago sativa	Alfalfa	UPL
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Mimulus guttatus	Seep Monkey-Flower	OBL
Myosotis scorpioides	True Forget-Me-Not	FACW
Nasturtium officinale	Watercress	OBL
Pascopyrum smithii	Western-Wheat Grass	FACU
Peritoma serrulata	Rocky Mountain Beeplant	FACU

Channel Segment 3 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Persicaria amphibia	Water Smartweed	OBL
Persicaria lapathifolia	Dock-Leaf Smartweed	FACW
Phalaris arundinacea	Reed Canary Grass	FACW
Philadelphus lewisii	Lewis' Mock Orange	UPL
Phleum pratense	Common Timothy	FAC
Pinus ponderosa	Ponderosa Pine	FACU
Plantago lanceolata	English Plantain	FACU
Plantago major	Great Plantain	FAC
Plantago patagonica	Woolly Plaintain	UPL
Poa compressa	Flat-Stem Blue Grass	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Populus angustifolia	Narrow-Leaf Cottonwood	FACW
Populus balsamifera	Balsam Poplar	FAC
Potentilla norvegica	Norwegian Cinquefoil	FAC
Prunella vulgaris	Common Selfheal	FACU
Prunus virginiana	Choke Cherry	FACU
Pseudoroegneria spicata	Bluebunch Wheatgrass	UPL
Pseudotsuga menziesii	Douglas-Fir	FACU
Ranunculus aquatilis	White Water-Crowfoot	OBL
Ranunculus repens	Creeping Buttercup	FAC
Rorippa palustris	Bog Yellowcress	OBL
Rosa woodsii	Woods' Rose	FACU
Rubus idaeus	Common Red Raspberry	FACU
Rubus parviflorus	Western Thimble-Berry	FACU
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix lasiandra	Pacific Willow	FACW
Salix sitchensis	Sitka Willow	FACW
Sambucus racemosa	Red Elder	FACU
Schedonorus pratensis	Meadow False Rye Grass	FACU
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Silene sp.	Campion	NA
Sisymbrium altissimum	Tall Hedge-Mustard	FACU
Solanum dulcamara	Climbing Nightshade	FAC
Solidago canadensis	Canadian Goldenrod	FACU
Sonchus arvensis	Field Sow-Thistle	FACU

Channel Segment 3 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Sorbus sitchensis	Sitka Mountain-Ash	FAC
Symphoricarpos albus	Common Snowberry	FACU
Symphyotrichum campestre	Western Meadow Aster	UPL
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU
Tanacetum vulgare	Common Tansy	FACU
Taraxacum officinale	Common Dandelion	FACU
Thalictrum occidentale	Western Meadow-Rue	FACU
Thlaspi arvense	Field Pennycress	UPL
Thuja plicata	Western Arborvitae	FAC
Tragopogon dubius	Meadow Goat's-beard	UPL
Tragopogon pratensis	Meadow Goat's-beard	UPL
Trifolium aureum	Yellow Clover	UPL
Trifolium pratense	Red Clover	FACU
Trifolium repens	White Clover	FAC
Tripleurospermum inodorum	Scentless False Mayweed	UPL
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

[1] 2020 NWPL (USACE 2020)

New species identified in 2023 are **bolded.**

Channel Segment 5 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Abies grandis	Grand Fir	FACU
Acer glabrum	Rocky Mountain Maple	FACU
Achillea millefolium	Common Yarrow	FACU
Agrostis stolonifera	Spreading Bent	FAC
Alnus incana	Speckled Alder	FACW
Amelanchier alnifolia	Saskatoon Service-Berry	FACU
Anaphalis margaritacea	Pearly Everlasting	FACU
Astragalus americanus	American Milkvetch	FAC
Beckmannia syzigachne	American Slough Grass	OBL
Boechera stricta	Canadian Rockcress	FACU
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	UPL
Bromus tectorum	Cheatgrass	UPL
Calamagrostis canadensis	Bluejoint	FACW
Campanula sp.	Bellflower	N/A
Carex bebbii	Bebb's Sedge	OBL
Carex simulata	Analogue Sedge	OBL
Carex stipata	Stalk-Grain Sedge	OBL
Centaurea stoebe	Spotted Knapweed	UPL
Cerastium fontanum	Common Mouse-Ear Chickweed	FACU
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cornus alba	Red Osier	FACW
Crataegus douglasii	Black Hawthorn	FAC
Deschampsia caespitosa	Tufted Hair Grass	FACW
Elymus glaucus	Blue Wild Rye	FACU
Elymus repens	Creeping Wild Rye	FAC
Elymus trachycaulus	Slender Wild Rye	FAC
Epilobium ciliatum	Fringed Willowherb	FACW
Fragaria vesca	Woodland Strawberry	FACU
Galium aparine	Sticky-Willy	FACU
Gayophytum diffusum	Diffuse Groundsmoke	UPL
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Glycyrrhiza lepidota	American Licorice	FAC
Hieracium umbellatum	**Narrowleaf Hawkweed**	**UPL**
Lactuca serriola	Prickly Lettuce	FACU

Channel Segment 5 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Lathyrus sulvestris	Flat Pea	UPL
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Mahonia repens	Creeping Oregon-Grape	UPL
Medicago lupulina	Black Medick	FACU
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Mimulus guttatus	Seep Monkey-Flower	OBL
Myosotis scorpioides	True Forget-Me-Not	FACW
Nasturtium officinale	Watercress	OBL
Nemophila breviflora	Small-Flower Baby-Blue-Eyes	UPL
Penstemon confertus	Yellow Penstemon	UPL
Penstemon sp.	Penstemon	N/A
Phalaris arundinacea	Reed Canary Grass	FACW
Philadelphus lewisii	Lewis' Mock Orange	UPL
Phleum pratense	Common Timothy	FAC
Pinus ponderosa	Ponderosa Pine	FACU
Plantago major	Great Plantain	FAC
Poa compressa	Flat-Stem Blue Grass	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Populus angustifolia	Narrow-Leaf Cottonwood	FACW
Populus balsamifera	Balsam Poplar	FAC
Potentilla norvegica	Norwegian Cinquefoil	FAC
Prunus virginiana	Choke Cherry	FACU
Pseudotsuga menziesii	Douglas-Fir	FACU
Ranunculus repens	Creeping Buttercup	FAC
Rosa woodsii	Woods' Rose	FACU
Rubus idaeus	Common Red Raspberry	FACU
Rubus parviflorus	Western Thimble-Berry	FACU
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Sambucus racemosa	Red Elder	FACU
Solidago canadensis	Canadian Goldenrod	FACU
Sonchus arvensis	Field Sow-Thistle	FACU
Spiraea betulifolia	Shiny-Leaf Meadowsweet	FACU
Symphoricarpos albus	Common Snowberry	FACU
Symphyotrichum campestre	Western Meadow Aster	UPL
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU
Tanacetum vulgare	Common Tansy	FACU

Channel Segment 5 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Taraxacum officinale	Common Dandelion	FACU
Trifolium pratense	Red Clover	FACU
Trifolium repens	White Clover	FAC
Urtica dioica	Stinging Nettle	FAC
Verbascum thapsus	Great Mullein	FACU
Verbena stricta	Hoary Verbena	UPL
Veronica americana	American-Brooklime	OBL

[1] 2020 NWPL (USACE 2020)

New species identified in 2023 are **bolded.**

Channel Segment 7 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Abies grandis	Grand Fir	FACU
Acer glabrum	Rocky Mountain Maple	FACU
Achillea millefolium	Common Yarrow	FACU
Agropyron cristatum	Crested Wheatgrass	UPL
Agrostis stolonifera	Spreading Bent	FAC
Algae, green	Algae, green	N/A
Alnus incana	Speckled Alder	FACW
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC
Amelanchier alnifolia	Saskatoon Service-Berry	FACU
Anaphalis margaritacea	Pearly Everlasting	FACU
Antennaria neglecta	Field Pussytoes	FACU
Arnica cordifolia	Heart-Leaved Arnica	UPL
Beckmannia syzigachne	American Slough Grass	OBL
Bidens cernua	Nodding Burr-Marigold	OBL
Bromus inermis	Smooth Brome	UPL
Bromus japonicus	Japanese Brome	UPL
Calamagrostis stricta	Slim-Stem Reed Grass	FACW
Campanula rotundifolia	Bluebell-of-Scotland	FACU
Campanula parryi	Parry's Bellflower	FAC
Carex atherodes	Wheat Sedge	OBL
Carex bebbii	Bebb's Sedge	OBL
Carex interior	**Interior Sedge**	**OBL**
Carex simulata	Analogue Sedge	OBL
Carex stipata	Stalk-Grain Sedge	OBL
Carex vesicaria	Lesser Bladder Sedge	OBL
Carex utriculata	Northwest Territory Sedge	OBL
Centaurea stoebe	Spotted Knapweed	UPL
Cerastium fontanum	Common Mouse-Ear Chickweed	FACU
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU
Cicuta douglasii	Western Water-Hemlock	OBL
Cirsium arvense	Canadian Thistle	FAC
Cirsium vulgare	Bull Thistle	FACU
Cornus alba	Red Osier	FACW
Crataegus douglasii	Black Hawthorn	FAC
Deschampsia caespitosa	Tufted Hair Grass	FACW
Deschampsia elongata	Slender Hair Grass	FACW
Descurainia sophia	Herb Sophia	UPL
Eleocharis palustris	Common Spike-Rush	OBL
Elymus hispidus	Intermediate Wheatgrass	UPL

Channel Segment 7 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
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
Fragaria vesca	Woodland Strawberry	FACU
Fraxinus pennsylvanica	Green Ash	FAC
Galium aparine	Sticky-Willy	FACU
Galium boreale	Northern Bedstraw	FACU
Gayophytum diffusum	Diffuse Groundsmoke	UPL
Geum macrophyllum	Large-Leaf Avens	FAC
Glyceria grandis	American Manna Grass	OBL
Glyceria striata	Fowl Manna Grass	OBL
Heracleum maximum	American Cow-Parsnip	FAC
Hieracium aurantiacum	Orange Hawkweed	UPL
Hieracium umbellatum	**Narrowleaf Hawkweed**	**UPL**
Hordeum jubatum	Fox-Tail Barley	FAC
Hypericum perforatum	Common St. John's-Wort	FACU
Juncus bufonius	Toad Rush	FACW
Juncus ensifolius	Dagger-Leaf Rush	FACW
Juncus nodosus	Knotted Rush	OBL
Juncus tenuis	Lesser Poverty Rush	FAC
Lactuca serriola	Prickly Lettuce	FACU
Larix occidentalis	Western Larch	FACU
Lathyrus sylvestris	Flat Pea	UPL
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Mahonia repens	Creeping Oregon-Grape	UPL
Maianthemum stellatum	Starry False Solomon's-Seal	FAC
Medicago lupulina	Black Medick	FACU
Melilotus officinalis	Yellow Sweet-Clover	FACU
Mentha arvensis	American Wild Mint	FACW
Mimulus guttatus	Seep Monkey-Flower	OBL
Nasturtium officinale	Watercress	OBL
Osmorhiza purpurea	Purple Sweet-Cicely	FAC
Ozomelis trifida	Pacific Mitrewort	FAC
Pascopyrum smithii	Western-Wheat Grass	FACU
Penstemon confertus	Yellow Penstemon	UPL
Phalaris arundinacea	Reed Canary Grass	FACW

Channel Segment 7 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Philadelphus lewisii	Lewis' Mock Orange	UPL
Phleum pratense	Common Timothy	FAC
Plantago major	Great Plantain	FAC
Plantago patagonica	Woolly Plaintain	UPL
Poa compressa	Flat-Stem Blue Grass	FACU
Poa palustris	Fowl Blue Grass	FAC
Poa pratensis	Kentucky Blue Grass	FAC
Populus angustifolia	Narrow-Leaf Cottonwood	FACW
Populus balsamifera	Balsam Poplar	FACU
Potentilla norvegica	Norwegian Cinquefoil	FAC
Picea engelmannii	Engelmann Spruce	FAC
Pseudotsuga menziesii	Douglas-Fir	FACU
Prunella vulgaris	Common Selfheal	FACU
Prunus virginiana	Choke Cherry	FACU
Pseudotsuga menziesii	Douglas-Fir	FACU
Ranunculus aquatilis	White Water-Crowfoot	OBL
Rorippa palustris	Bog Yellowcress	OBL
Rosa woodsii	Woods' Rose	FACU
Rubus idaeus	Common Red Raspberry	FACU
Rubus parviflorus	Western Thimble-Berry	FACU
Rumex crispus	Curly Dock	FAC
Rumex salicifolius	Willow Dock	FACW
Salix bebbiana	Gray Willow	FACW
Salix drummondiana	Drummond's Willow	FACW
Salix sitchensis	Sitka Willow	FACW
Sambucus racemosa	Red Elder	FACU
Scirpus microcarpus	Red-Tinge Bulrush	OBL
Shepherdia canadensis	Russet Buffalo-Berry	FACU
Solidago canadensis	Canadian Goldenrod	FACU
Spirea betulifolia	Shiny-Leaf Meadowsweet	FACU
Symphoricarpos albus	Common Snowberry	FACU
Symphyotrichum campestre	Western Meadow Aster	UPL
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU
Tanacetum vulgare	Common Tansy	FACU
Taraxacum officinale	Common Dandelion	FACU
Thalictrum occidentalis	Western Meadow-Rue	FACU
Thuja plicata	Western Arborvitae	FAC
Tragopogon dubius	Meadow Goat's-Beard	UPL
Trifolium pratense	Red Clover	FACU

Channel Segment 7 Vegetation Species List – 2015-2023

Scientific Name	Common Name	[1] Wetland Indicator Status
Trifolium repens	White Clover	FAC
Urtica dioica	Stinging Nettle	FAC
Verbascum thapsus	Great Mullein	FACU
Verbena stricta	Hoary Verbena	UPL
Veronica americana	American-Brooklime	OBL
Viola sp.	Violet	N/A

[1] 2020 NWPL (USACE 2020)

New species identified in 2023 are **bolded.**

APPENDIX D
2023 STREAM BANK VEGETATION COMPOSITION

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

Segment 1, Reach 1 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Acer glabrum	Rocky Mountain Maple	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	3
*Alnus incana**	Speckled Alder	FACW	4
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC	0
Bare Ground	Bare Ground	N/A	2
Bromus inermis	Smooth Brome	UPL	0
Bromus japonicus	Japanese Brome	UPL	1
Carex utriculata	Northwest Territory Sedge	OBL	0
Centaurea stoebe	Spotted Knapweed	UPL	2
Cirsium arvense	Canadian thistle	FAC	0
Collomia linearis	Narrow-Leaf Mountain-Trumpet	FACU	0
Elymus canadensis	Nodding Wild Rye	FAC	0
Elymus hispidis	Intermediate Wheatgrass	UPL	1
Elymus repens	Creeping Wild Rye	FAC	1
Elymus trachycaulus	Slender Wild Rye	FAC	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	3
Glyceria grandis	American Manna Grass	OBL	0
Hypericum perforatum	Common St. John's-Wort	FACW	0
Lactuca serriola	Prickly Lettuce	FACU	1
Leucanthemum vulgare	Ox-Eye Daisy	FACU	0
Melilotus officinalis	Yellow Sweet-Clover	FACU	1
Mentha arvensis	American Wild Mint	FACW	0
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	2
Nasturtium officinale	Watercress	OBL	2
Pascopyrum smithii	Western-Wheat Grass	FACU	1
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	1
Poa palustris	Fowl Blue Grass	FAC	0
Poa pratensis	Kentucky Blue Grass	FAC	2
Populus balsamifera	Balsam Poplar	FAC	1
Prunus virginiana	Choke Cherry	FACU	0
Rosa woodsii	Woods' Rose	FACU	0
Rumex crispus	Curly Dock	FAC	0
Rumex salicifolius	Willow Dock	FACW	1
Salix bebbiana	Gray Willow	FACW	1
Salix drummondiana	Drummond's Willow	FACW	1
Salix sitchensis	Sitka Willow	FACW	0

Segment 1, Reach 1 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Scirpus microcarpus	Red-Tinge Bulrush	OBL	2
Symphoricarpos albus	Common Snowberry	FACU	0
Symphyotrichum campestre	Western Meadow Aster	UPL	2
Tanacetum vulgare	Common Tansy	FACU	0
Verbascum thapsus	Great Mullein	FACU	0
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 2, Reach 2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Acer glabrum	Rocky Mountain Maple	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	2
*Alnus incana**	Speckled Alder	FACW	4
Alopecurus arundinaceus	Creeping Meadow-Foxtail	FAC	0
Anaphalis margaritacea	Pearly-Everlasting	FACU	0
Bare Ground	Bare Ground	NA	1
Bromus inermis	Smooth Brome	UPL	2
Carduus nutans	Nodding Plumeless-Thistle	UPL	0
Centaurea stoebe	Spotted Knapweed	UPL	1
Chamerion angustifolium	Fireweed	UPL	0
Cicuta douglasii	Western Water-Hemlock	OBL	0
Cirsium arvense	Canadian Thistle	FAC	1
Cornus alba	Red Osier	FACW	1
Crataegus douglasii	Black Hawthorn	FAC	0
Dactylis glomerata	Orchard Grass	FACU	0
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus canadensis	Nodding Wild Rye	FAC	1
Elymus lanceolatus	Streamside Wild Rye	FACU	0
Elymus repens	Creeping Wild Rye	FAC	2
Elymus trachycaulus	Slender Wild Rye	FAC	1
Epilobium brachycarpum	Panicled Willowhearb	UPL	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
*Equisetum arvense**	Field Horsetail	FAC	2
Glyceria grandis	American Manna Grass	OBL	1
Hieracium umbellatum	Narrowleaf Hawkweed	UPL	0
Hypericum perforatum	Common St. John's-Wort	FACU	0
Juncus balticus	Baltic Rush	FACW	0
Lactuca serriola	Prickly Lettuce	FACU	1
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Medicago lupulina	Black Medick	FACU	0
Melilotus officinalis	Yellow Sweet-Clover	FACU	0
Mentha arvensis	American Wild Mint	FACW	1
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	3
Nasturtium officinale	Watercress	OBL	2
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Poa pratensis	Kentucky Blue Grass	FAC	1

Segment 2, Reach 2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Populus balsamifera	Balsam Poplar	FAC	2
Ranunculus repens	Creeping Buttercup	FAC	0
Rosa woodsii	Woods' Rose	FACU	1
Rubus parviflorus	Western Thimble-Berry	FACU	0
Rumex salicifolius	Willow Dock	FACW	0
Salix bebbiana	Gray Willow	FACW	1
Salix drummondiana	Drummond's Willow	FACW	0
Salix sitchensis	Sitka Willow	FACW	1
Scirpus microcarpus	Red-Tinge Bulrush	OBL	1
Solanum dulcamara	Climbing Nightshade	FAC	0
Symphoricarpos albus	Common Snowberry	FACU	1
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	2
Tanacetum vulgare	Common Tansy	FACU	0
Taraxacum officinale	Common Dandelion	FACU	0
Tragopogon dubius	Yellow Salsify	UPL	0
Trifolium repens	White Clover	FAC	0
Urtica dioica	Stinging Nettle	FAC	0
Verbascum thapsus	Great Mullein	FACU	1
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)

*Denotes dominant vegetation observed along stream bank

Segment 3, Reach 3.1a Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Agrostis stolonifera	Spreading Bent	FAC	2
*Alnus incana**	Speckled Alder	FACW	3
Bare Ground	Bare Ground	NA	2
Bromus inermis	Smooth Brome	UPL	1
Carex bebbii	Bebb's Sedge	OBL	0
Centaurea stoebe	Spotted Knapweed	UPL	1
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian Thistle	FAC	1
Cirsium vulgare	Bull Thistle	FACU	0
Cornus alba	Red Osier	FACW	1
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus lanceolatus	Streamside Wild Rye	FACU	0
Elymus repens	Creeping Wild Rye	FAC	1
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	1
Equisetum hyemale	Tall Scouring-Rush	FACW	0
Glyceria grandis	American Manna Grass	OBL	0
Lathyrus sylvestris	Flat Pea	UPL	3
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Melilotus officinalis	Yellow Sweet-Clover	FACU	1
Mentha arvensis	American Wild Mint	FACW	2
Mimulus guttatus	Seep Monkey-Flower	OBL	2
Myosotis scorpioides	True Forget-Me-Not	FACW	2
Nasturtium officinale	Watercress	OBL	2
Pascopyrum smithii	Western-Wheat Grass	FACU	0
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Poa palustris	Fowl Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	1
Ranunculus aquatilis	White Water-Crowfoot	OBL	0
Rubus idaeus	Common Red Raspberry	FACU	0
Rumex occidentalis	Western Dock	FACW	0
Salix bebbiana	Gray Willow	FACW	0
Salix sitchensis	Sitka Willow	FACW	0
Scirpus microcarpus	Red-Tinge Bulrush	OBL	0
Solidago canadensis	Canadian Goldenrod	FACU	1
Symphyotrichum campestre	Western Meadow Aster	UPL	2
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	1
Tanacetum vulgare	Common Tansy	FACU	1

Segment 3, Reach 3.1a Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Trifolium repens	White Clover	FAC	0
Typha latifolia	Broad-Leaf Cat-Tail	OBL	0
Verbascum thapsus	Great Mullein	FACU	1
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 3, Reach 3.1b Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Agrostis stolonifera	Spreading Bent	FAC	2
Alnus incana	Speckled Alder	FACW	3
Bare Ground	Bare Ground	N/A	2
Centaurea stoebe	Spotted Knapweed	UPL	1
Cicuta douglasii	Western Water-Hemlock	OBL	0
Cirsium arvense	Canadian Thistle	FAC	1
Cirsium vulgare	Bull Thistle	FACU	0
Cornus alba	Red Osier	FACW	1
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus repens	Creeping Wild Rye	FAC	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	2
Equisetum hyemale	Tall Scouring-Rush	FACW	0
Glyceria grandis	American Manna Grass	OBL	1
Heracleaum maximum	American Cow-Parsnip	FAC	0
Juncus ensifolius	Dagger-Leaf Rush	FACW	0
Juncus nodosus	Knotted Rush	OBL	0
Lactuca serriola	Prickly Lettuce	FACU	0
Lathyrus sylvestris	Flat Pea	UPL	2
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Melilotus officinalis	Yellow Sweet-Clover	FACU	1
Mentha arvensis	American Wild Mint	FACW	2
Mimulus guttatus	Seep Monkey-Flower	OBL	2
Myosotis scorpioides	True Forget-Me-Not	FACW	2
Nasturtium officinale	Watercress	OBL	2
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Plantago major	Great Plantain	FAC	0
Poa palustris	Fowl Blue Grass	FAC	0
Poa pratensis	Kentucky Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	1
Ranunculus aquatilis	White Water-Crowfoot	OBL	0
Rosa woodsii	Woods' Rose	FACU	1
Rubus idaeus	Common Red Raspberry	FACU	0
Rubus parviflorus	Western Thimble-Berry	FACU	0
Rumex crispus	Curly Dock	FAC	0
Salix bebbiana	Gray Willow	FACW	1
Salix sitchensis	Sitka Willow	FACW	0
Sambucus racemosa	Red Elder	FACU	0

Segment 3, Reach 3.1b Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Scirpus microcarpus	Red-Tinge Bulrush	OBL	0
Silene sp.	Campion	NA	0
Solidago canadensis	Canadian Goldenrod	FACU	0
Symphyotrichum campestre	Western Meadow Aster	UPL	2
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	1
Tanacetum vulgare	Common Tansy	FACU	1
Typha latifolia	Broad-Leaf Cat-Tail	OBL	0
Urtica dioica	Stinging Nettle	FAC	0
Verbascum thapsus	Great Mullein	FACU	0
Veronica americana	American-Brookline	OBL	0

[1] 2020 NWPL (USACE 2020)

*Denotes dominant vegetation observed along stream bank

Segment 3, Reach 3.2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Acer glabrum	Rocky Mountain Maple	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	3
Alnus incana	Speckled Alder	FACW	3
Bare Ground	Bare Ground	N/A	2
Carex stipata	Stalk-Grain Sedge	OBL	0
Centaurea stoebe	Spotted Knapweed	UPL	1
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian Thistle	FAC	0
Cornus alba	Red Osier	FACW	0
Crataegus douglasii	Black Hawthorn	FAC	0
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus repens	Creeping Wild Rye	FAC	1
Epilobium brachycarpum	Panicled Willowherb	UPL	0
Epilobium ciliatum	Fringed Willowherb	FACW	2
Equisetum arvense	Field Horsetail	FAC	2
Glyceria grandis	American Manna Grass	OBL	1
Hypericum perforatum	Common St. John's-Wort	FACU	0
Lactuca serriola	Prickly Lettuce	FACU	1
Lathyrus sylvestris	Flat Pea	UPL	3
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Medicago lupulina	Black Medick	FACU	0
Medicago sativa	Alfalfa	UPL	0
Melilotus officinalis	Yellow Sweet-Clover	FACU	0
Mentha arvensis	American Wild Mint	FACW	2
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	3
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Poa palustris	Fowl Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	1
Ranunculus aquatilis	White Water-Crowfoot	OBL	1
Ranunculus repens	Creeping Buttercup	FAC	1
Rosa woodsii	Woods' Rose	FACU	0
Rumex crispus	Curly Dock	FAC	0
Scirpus microcarpus	Red-Tinge Bulrush	OBL	1
Symphyotrichum campestre	Western Meadow Aster	FACU	1
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	2
Tanacetum vulgare	Common Tansy	FACU	1
Taraxacum officinale	Common Dandelion	FACU	0

Segment 3, Reach 3.2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Tragopogon dubius	Meadow Goat's-Beard	UPL	0
Trifolium pratense	Red Clover	FACU	0
Trifolium repens	White Clover	FAC	0
Typha latifolia	Broad-Leaf Cat-Tail	OBL	0
Verbascum thapsus	Great Mullein	FACU	0
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 3, Reach 3.3 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Agrostis stolonifera	Spreading Bent	FAC	2
Algae, green	Algae, green	N/A	0
Alnus incana	Speckled Alder	FACW	3
Angelica arguta	Lyall's Angelica	FACW	0
Bare Ground	Bare Ground	NA	1
Calamagrostis canadensis	Bluejoint	FACW	1
Carex atherodes	Wheat Sedge	OBL	1
Centaurea stoebe	Spotted Knapweed	UPL	1
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU	0
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian Thistle	FAC	1
Cornus alba	Red Osier	FACW	2
Crataegus douglasii	Black Hawthorn	FAC	1
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus repens	Creeping Wild Rye	FAC	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	3
Equisetum hyemale	Tall Scouring-Rush	FACW	0
Geum macrophyllum	Large-Leaf Avens	FAC	0
Glyceria grandis	American Manna Grass	OBL	1
Hypericum perforatum	Common St. John's-Wort	FACU	0
Juncus ensifolius	Dagger-Leaf Rush	FACW	1
Juncus nodosus	Knotted Rush	OBL	1
Juncus tenuis	Lesser Poverty Rush	FAC	1
Lactuca serriola	Prickly Lettuce	FACU	0
Larix occidentalis	Western Larch	FACU	0
Lathyrus sylvestris	Flat Pea	UPL	2
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Melilotus officinalis	Yellow Sweet-Clover	FACU	0
Mentha arvensis	American Wild Mint	FACW	1
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	3
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Plantago major	Great Plantain	FAC	0
Poa palustris	Fowl Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	2
Ranunculus aquatilis	White Water-Crowfoot	OBL	1
Ranunculus repens	Creeping Buttercup	FAC	1

Segment 3, Reach 3.3 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Rosa woodsii	Woods' Rose	FACU	1
Rubus idaeus	Common Red Raspberry	FACU	1
Rumex crispus	Curly Dock	FAC	0
Rumex salicifolius	Willow Dock	FACW	0
Salix lasiandra	Pacific Willow	FACW	0
Scirpus microcarpus	Red-Tinge Bulrush	OBL	1
Solidago canadensis	Canadian Goldenrod	FACU	0
Symphoricarpos albus	Common Snowberry	FACU	1
Symphyotrichum campestre	Western Meadow Aster	FACU	1
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	2
Tanacetum vulgare	Common Tansy	FACU	1
Trifolium repens	White Clover	FAC	0
Typha latifolia	Broad-Leaf Cat-Tail	OBL	0
Urtica dioica	Stinging Nettle	FAC	0
Verbascum thapsus	Great Mullein	FACU	0
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)

*Denotes dominant vegetation observed along stream bank

Segment 3, Reach 3.4 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Agrostis stolonifera	Spreading Bent	FAC	2
*Alnus incana**	Speckled Alder	FACW	4
Bare Ground	Bare Ground	N/A	1
Carex atherodes	Wheat Sedge	OBL	1
Carex bebbii	Bebb's Sedge	OBL	1
Carex stipata	Stalk-Grain Sedge	OBL	0
Carex vesicaria	Lesser Bladder Sedge	OBL	0
Centaurea stoebe	Spotted Knapweed	UPL	1
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU	0
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian Thistle	FAC	1
Cirsium vulgare	Bull Thistle	FACU	0
Cornus alba	Red Osier	FACW	1
Crataegus douglasii	Black Hawthorn	FAC	0
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Eleocharis palustris	Common Spike-Rush	OBL	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	2
Geum macrophyllum	Large-Leaf Avens	FAC	0
Glyceria grandis	American Manna Grass	OBL	2
Hieracium umbellatum	Narrowleaf Hawkweed	UPL	0
Juncus ensifolius	Dagger-Leaf Rush	FACW	1
Juncus nodosus	Knotted Rush	OBL	1
Juncus tenuis	Lesser Poverty Rush	FAC	0
Lathyrus sylvestris	Flat Pea	UPL	3
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Maianthemum stellatum	Starry False Solomon's-Seal	FAC	0
Melilotus officinalis	Yellow Sweet-Clover	FACU	0
Mentha arvensis	American Wild Mint	FACW	1
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	2
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Plantago major	Great Plantain	FAC	0
Plantago patagonica	Woolly Plaintain	UPL	0
Poa palustris	Fowl Blue Grass	FAC	1
Poa pratensis	Kentucky Blue Grass	FAC	0
Populus balsamifera	Balsam Poplar	FAC	1
Potentilla norvegica	Norwegian Cinquefoil	FAC	0

Segment 3, Reach 3.4 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Prunella vulgaris	Common Selfheal	FACU	0
Ranunculus aquatilis	White Water-Crowfoot	OBL	0
Ranunculus repens	Creeping Buttercup	FAC	0
Rosa woodsii	Woods' Rose	FACU	0
Rumex crispus	Curly Dock	FAC	0
Salix bebbiana	Gray Willow	FACW	0
Salix lasiandra	Pacific Willow	FACW	0
Salix sitchensis	Sitka Willow	FACW	0
Scirpus microcarpus	Red-Tinge Bulrush	OBL	1
Solidago canadensis	Canadian Goldenrod	FACU	1
Symphoricarpos albus	Common Snowberry	FACU	0
Symphyotrichum campestre	Western Meadow Aster	UPL	0
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	1
Tanacetum vulgare	Common Tansy	FACU	1
Taraxacum officinale	Common Dandelion	FACU	0
Trifolium pratense	Red Clover	FACU	1
Trifolium repens	White Clover	FAC	1
Typha latifolia	Broad-Leaf Cat-Tail	OBL	0
Urtica dioica	Stinging Nettle	FAC	1
Veronica americana	American-Brooklime	OBL	0

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 5, Reach 5 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Acer glabrum	Rocky Mountain Maple	FACU	0
Achillea millefolium	Common Yarrow	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	1
*Alnus incana**	Speckled Alder	FACW	3
Anaphalis margaritacea	Pearly-Everlasting	FACU	0
Bare Ground	Bare Ground	N/A	2
Centaurea stoebe	Spotted Knapweed	UPL	3
Cicuta douglasii	Western Water-Hemlock	OBL	0
Cirsium arvense	Canadian Thistle	FAC	0
Cornus alba	Red Osier	FACW	1
Crataegus douglasii	Black Hawthorn	FAC	0
Deschampsia caespitosa	Tufted Hair Grass	FACW	2
Elymus glaucus	Blue Wild Rye	FACU	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Fragaria vesca	Woodland Strawberry	FACU	0
Geum macrophyllum	Large-Leaf Avens	FACU	0
Glyceria grandis	American Manna Grass	OBL	1
Hieracium umbellatum	Narrowleaf Hawkweed	UPL	0
Lathyrus sulvestris	Flat Pea	UPL	1
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Mentha arvensis	American Wild Mint	FACW	1
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Myosotis scorpioides	True Forget-Me-Not	FACW	1
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Poa palustris	Fowl Blue Grass	FAC	0
Poa pratensis	Kentucky Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	0
Ranunculus repens	Creeping Buttercup	FAC	0
Rosa woodsii	Woods' Rose	FACU	0
Rubus idaeus	Common Red Raspberry	FACU	1
Rubus parviflorus	Western Thimble-Berry	FACU	0
Solidago canadensis	Canadian Goldenrod	FACU	2
Symphoricarpos albus	Common Snowberry	FACU	1
Symphyotrichum campestre	Western Meadow Aster	UPL	0
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	1
Tanacetum vulgare	Common Tansy	FACU	2
Trifolium pratense	Red Clover	FACU	1

Segment 5, Reach 5 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Urtica dioica	Stinging Nettle	FAC	0

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 7, Reach 7.1 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Abies grandis	Grand Fir	FACU	0
Achillea millefolium	Common Yarrow	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	2
*Alnus incana**	Speckled Alder	FACW	4
Bare Ground	Bare Ground	N/A	1
Calamagrostis stricta	Slim-Stem Reed Grass	FACW	0
Carex atherodes	Wheat Sedge	OBL	0
Carex bebbii	Bebb's Sedge	OBL	1
Centaurea stoebe	Spotted Knapweed	UPL	1
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian Thistle	FAC	1
Cirsium vulgare	Bull Thistle	FACU	1
Cornus alba	Red Osier	FACW	2
Deschampsia caespitosa	Tufted Hair Grass	FACW	3
Elymus repens	Creeping Wild Rye	FAC	1
Elymus trachycaulus	Slender Wild Rye	FAC	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Field Horsetail	FAC	1
Galium aparine	Sticky-Willy	FACU	0
Geum macrophyllum	Large-Leaf Avens	FAC	0
Glyceria grandis	American Manna Grass	OBL	2
Heracleum maximum	American Cow-Parsnip	FAC	0
Juncus ensifolius	Dagger-Leaf Rush	FACW	1
Lathyrus sylvestris	Flat Pea	UPL	1
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Maianthemum stellatum	False Solomon's Seal	FAC	0
Mentha arvensis	American Wild Mint	FACW	2
Mimulus guttatus	Seep Monkey-Flower	OBL	1
Osmorhiza purpurea	Purple Sweet-Cicely	FAC	0
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Picea engelmannii	Engelmann's Spruce	FAC	0
Poa compressa	Flat-Stem Blue Grass	FACU	0
Poa palustris	Fowl Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	1
Pseduotsuga menziesii	Douglas-Fir	FACU	0
Ranunculus aquatilis	White Water-Crowfoot	OBL	1
Ranunculus repens	Creeping Buttercup	FAC	1

Segment 7, Reach 7.1 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Rosa woodsii	Woods' Rose	FACU	1
Rubus idaeus	Common Red Raspberry	FACU	2
Rubus parviflorus	Western Thimble-Berry	FACU	1
Rumex crispus	Curly Dock	FAC	0
Salix bebbiana	Gray Willow	FACW	1
Salix drummondiana	Drummond's Willow	FACW	0
Scirpus microcarpus	Red-Tinge Bulrush	OBL	1
Solidago canadensis	Canadian Goldenrod	FACU	0
Symphoricarpos albus	Common Snowberry	FACU	1
Symphyotrichum campestre	Western Meadow Aster	UPL	1
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	0
Tanacetum vulgare	Common Tansy	FACU	3
Trifolium pratense	Red Clover	FACU	0
Trifolium repens	White Clover	FAC	1
Urtica dioica	Stinging Nettle	FAC	1
Verbascum thapsus	Great Mullein	FACU	0
Veronica americana	American-Brooklime	OBL	1

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

Segment 7, Reach 7.2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Acer glabrum	Rocky Mountain Maple	FACU	1
Achillea millefolium	Common Yarrow	FACU	0
Agrostis stolonifera	Spreading Bent	FAC	2
*Alnus incana**	Speckled Alder	FACW	4
Bare Ground	Bare Ground	N/A	2
Carex bebbii	Bebb's Sedge	OBL	1
Carex interior	Inland Sedge	OBL	0
Centaurea stoebe	Spotted Knapweed	UPL	1
Chamaenerion angustifolium	Narrow-Leaf Fireweed	FACU	0
Cicuta douglasii	Western Water-Hemlock	OBL	1
Cirsium arvense	Canadian thistle	FAC	1
Cornus alba	Red Osier	FACW	1
Crataegus douglasii	Black Hawthorn	FAC	0
Deschampsia caespitosa	Tufted Hair Grass	FACW	3
Elymus trachycaulus	Slender Wild Rye	FAC	0
Epilobium ciliatum	Fringed Willowherb	FACW	1
Equisetum arvense	Tall Scouring-Rush	FACW	1
Equisetum hyemale	Tall Scouring-Rush	FACW	0
Glyceria grandis	American Manna Grass	OBL	1
Juncus ensifolius	Dagger-Leaf Rush	FACW	0
Juncus nodosus	Knotted Rush	OBL	0
Lathyrus sylvestris	Flat Pea	UPL	1
Leucanthemum vulgare	Ox-Eye Daisy	FACU	1
Medicago lupulina	Black Medick	FACU	0
Melilotus officinalis	Yellow Sweet-Clover	FACU	0
Mentha arvensis	American Wild Mint	FACW	2
Mimulus guttatus	Seep Monkey-Flower	OBL	1
*Phalaris arundinacea**	Reed Canary Grass	FACW	4
Phleum pratense	Common Timothy	FAC	0
Poa palustris	Fowl Blue Grass	FAC	1
Poa pratensis	Kentucky Blue Grass	FAC	1
Populus balsamifera	Balsam Poplar	FAC	1
Ranunculus aquatilis	White Water-Crowfoot	OBL	1
Rosa woodsii	Woods' Rose	FACU	0
Rubus idaeus	Common Red Raspberry	FACU	1
Rumex crispus	Curly Dock	FAC	0
Salix bebbiana	Gray Willow	FACW	0
Salix sitchensis	Sitka Willow	FACW	0

Segment 7, Reach 7.2 Stream Bank Vegetation - 2023

Scientific Name	Common Name	[1] Wetland Indicator Status	Stream Bank Cover Class
Scirpus microcarpus	Red-Tinge Bulrush	OBL	0
Solidago canadensis	Canadian Goldenrod	FACU	0
Symphoricarpos albus	Common Snowberry	FACU	1
Symphyotrichum foliaceum	Alpine Leafy-Head American-Aster	FACU	1
Tanacetum vulgare	Common Tansy	FACU	2
Taraxacum officinale	Common Dandelion	FACU	0
Trifolium pratense	Red Clover	FACU	1
Trifolium repens	White Clover	FAC	0
Urtica dioica	Stinging Nettle	FAC	0
Verbascum thapsus	Great Mullein	FACU	1
Veronica americana	American-Brooklime	OBL	1

[1] 2020 NWPL (USACE 2020)
*Denotes dominant vegetation observed along stream bank

APPENDIX E
2023 NOXIOUS WEED SPECIES LIST

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

Table E-1. Montana State-listed noxious weed species observed in 2023 at the Swamp Creek Stream Mitigation Site.

Category*	Scientific Name	Common Name
Priority 2A	*Hieracium aurantiacum*	Orange Hawkweed
Priority 2B	*Centaurea stoebe*	Spotted Knapweed
	Cirsium arvense	Canada Thistle
	Hypericum perforatum	St. Johnswort
	Leucanthemum vulgare	Oxeye Daisy
	Tanacetum vulgare	Common Tansy

*Based on the Montana Dept. of Agriculture's Noxious Weed List, June 2019

APPENDIX F
2023 WOLMAN PEBBLE COUNT DATA

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

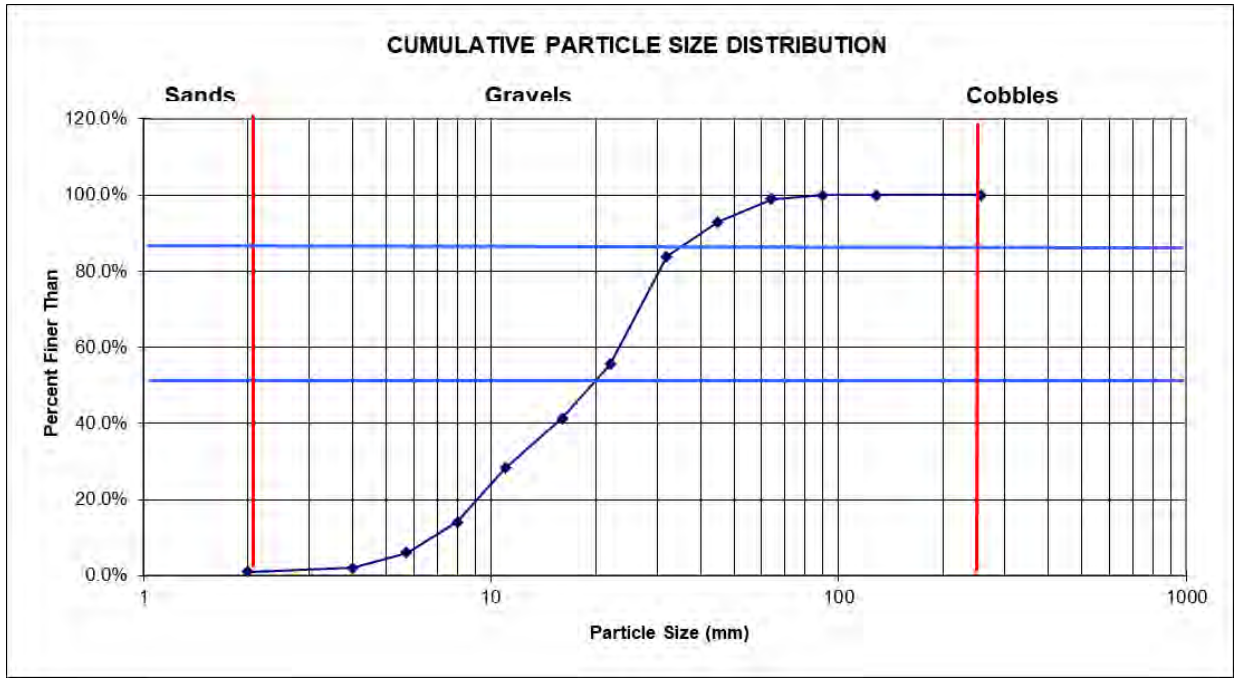
Reach 1 **Wolman Pebble Count Data**

Riffle @ Transect 2

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	1	1.0%	1.0%
VF Gravel	2	0	0.0%	1.0%
VF Gravel	4	1	1.0%	2.0%
F Gravel	5.7	4	4.0%	6.1%
F Gravel	8	8	8.1%	14.1%
Med Gravel	11	14	14.1%	28.3%
Med Gravel	16	13	13.1%	41.4%
C Gravel	22	14	14.1%	55.6%
C Gravel	32	28	28.3%	83.8%
VC Gravel	45	9	9.1%	92.9%
VC Gravel	64	6	6.1%	99.0%
SM Cobble	90	1	1.0%	100.0%
SM Cobble	128	0	0.0%	100.0%
LG Cobble	256	0	0.0%	100.0%

total count = 99

Read From Graph		
D_{50} =	18	mm
D_{84} =	23	mm

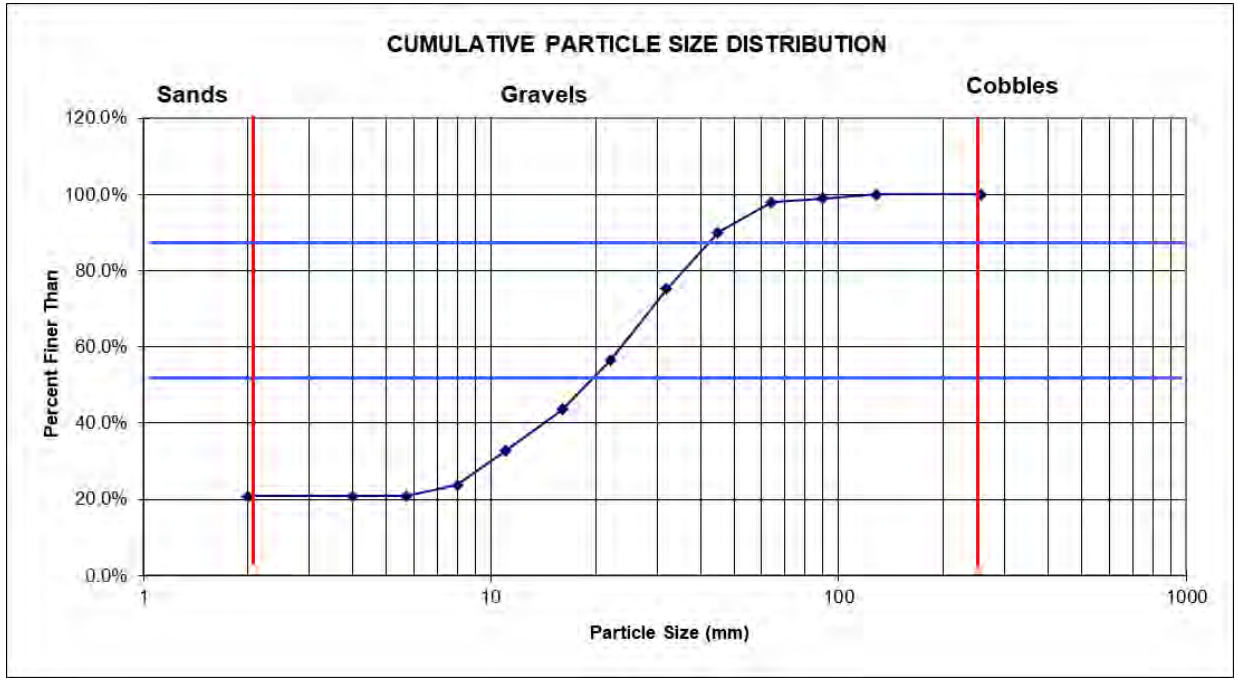


Pool @ Transect 1

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	21	20.8%	20.8%
VF Gravel	2	0	0.0%	20.8%
VF Gravel	4	0	0.0%	20.8%
F Gravel	5.7	0	0.0%	20.8%
F Gravel	8	3	3.0%	23.8%
Med Gravel	11	9	8.9%	32.7%
Med Gravel	16	11	10.9%	43.6%
C Gravel	22	13	12.9%	56.4%
C Gravel	32	19	18.8%	75.2%
VC Gravel	45	15	14.9%	90.1%
VC Gravel	64	8	7.9%	98.0%
SM Cobble	90	1	1.0%	99.0%
SM Cobble	128	1	1.0%	100.0%
LG Cobble	256	0	0.0%	100.0%

total count = 101

Read From Graph		
D_{50} =	18	mm
D_{84} =	41	mm



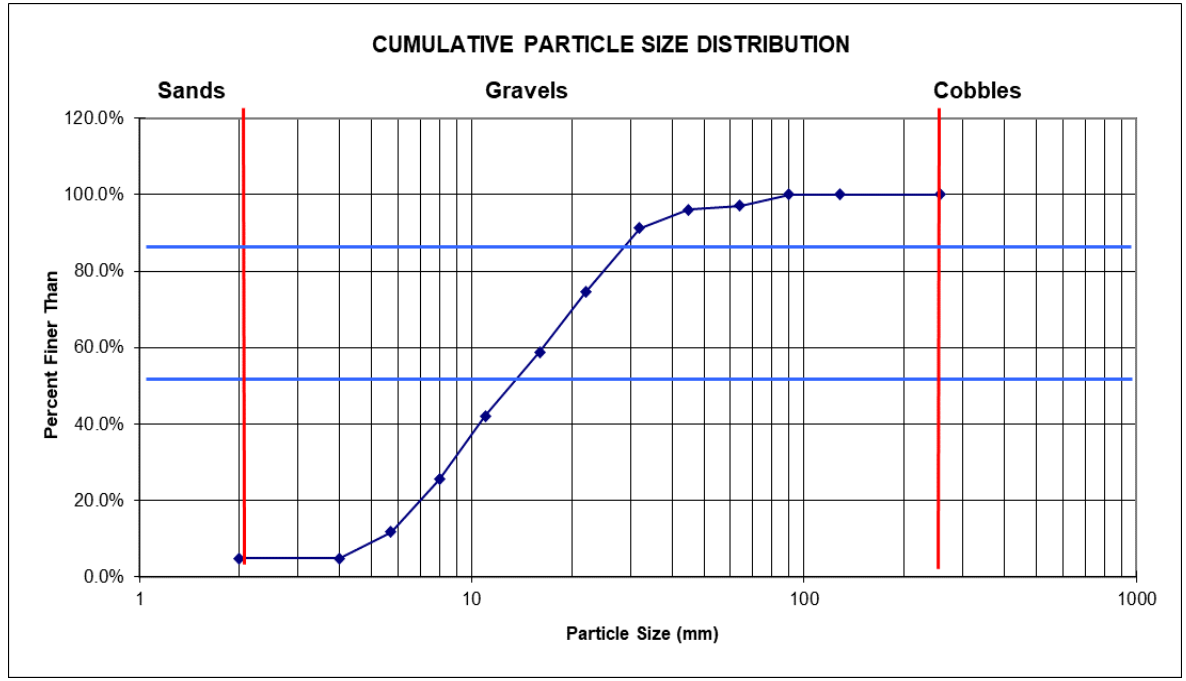
Reach 2 **Wolman Pebble Count Data**

Riffle @ Transect 9

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	5	4.9%	4.9%
VF Gravel	2	0	0.0%	4.9%
VF Gravel	4	7	6.9%	11.8%
F Gravel	5.7	14	13.7%	25.5%
F Gravel	8	17	16.7%	42.2%
Med Gravel	11	17	16.7%	58.8%
Med Gravel	16	16	15.7%	74.5%
C Gravel	22	17	16.7%	91.2%
C Gravel	32	5	4.9%	96.1%
VC Gravel	45	1	1.0%	97.1%
VC Gravel	64	3	2.9%	100.0%
SM Cobble	90	0	0.0%	100.0%
SM Cobble	128	0	0.0%	100.0%
LG Cobble	256	0	0.0%	100.0%

total count = 102

Read From Graph		
D_{50} =	25	mm
D_{84} =	90	mm

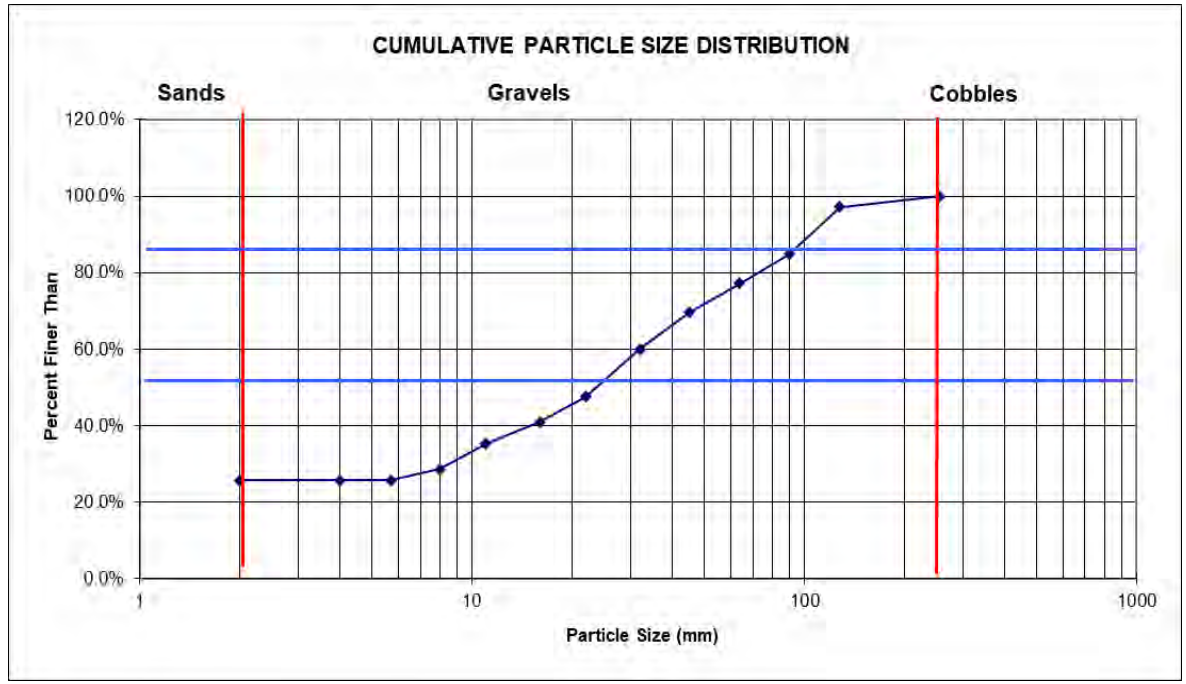


Pool @ Transect 11

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	27	25.7%	25.7%
VF Gravel	2	0	0.0%	25.7%
VF Gravel	4	0	0.0%	25.7%
F Gravel	5.7	3	2.9%	28.6%
F Gravel	8	7	6.7%	35.2%
Med Gravel	11	6	5.7%	41.0%
Med Gravel	16	7	6.7%	47.6%
C Gravel	22	13	12.4%	60.0%
C Gravel	32	10	9.5%	69.5%
VC Gravel	45	8	7.6%	77.1%
VC Gravel	64	8	7.6%	84.8%
SM Cobble	90	13	12.4%	97.1%
SM Cobble	128	3	2.9%	100.0%
LG Cobble	256	0	0.0%	100.0%

total count = 105

Read From Graph		
D_{50} =	14	mm
D_{84} =	28	mm



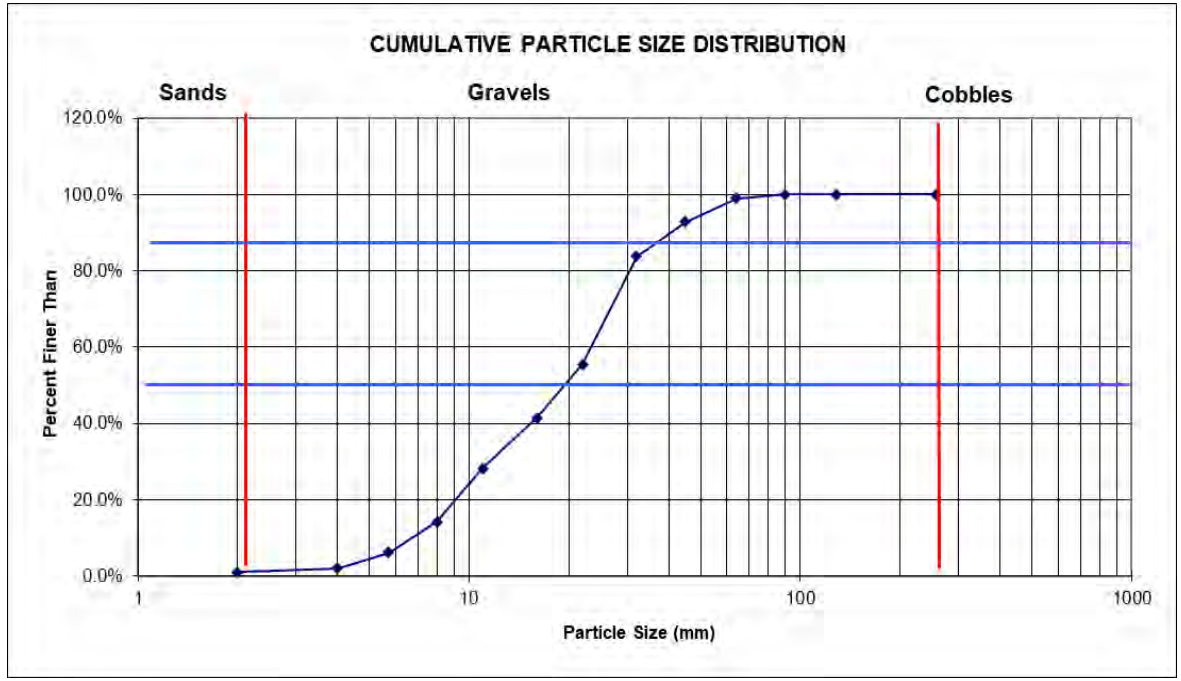
Reach 3 **Wolman Pebble Count Data**

Riffle @ Transect 15

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	0	0.0%	0.0%
VF Gravel	2	0	0.0%	0.0%
VF Gravel	4	0	0.0%	0.0%
F Gravel	5.7	4	4.0%	4.0%
F Gravel	8	6	6.1%	10.1%
Med Gravel	11	15	15.2%	25.3%
Med Gravel	16	12	12.1%	37.4%
C Gravel	22	11	11.1%	48.5%
C Gravel	32	29	29.3%	77.8%
VC Gravel	45	19	19.2%	97.0%
VC Gravel	64	5	5.1%	102.0%
SM Cobble	90	0	0.0%	102.0%
SM Cobble	128	0	0.0%	102.0%
LG Cobble	256	0	0.0%	102.0%

total count = 101

Read From Graph		
D_{50} =	18	mm
D_{84} =	34	mm

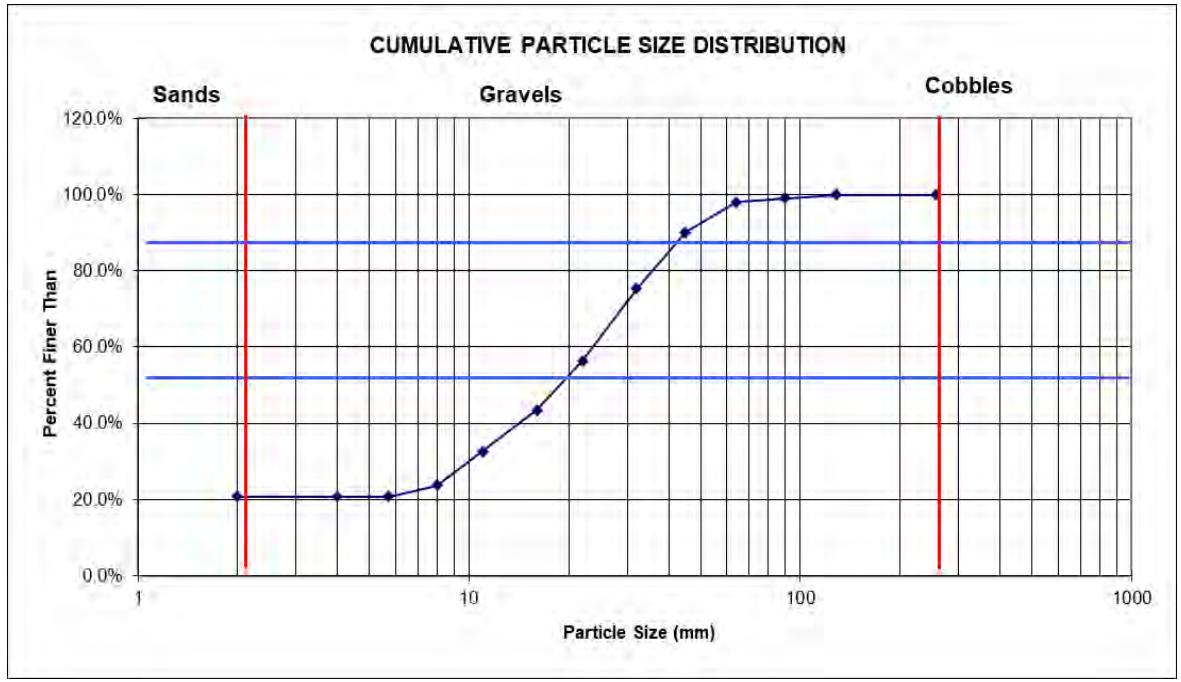


Pool @ Transect 16

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	15	14.9%	14.9%
VF Gravel	2	0	0.0%	14.9%
VF Gravel	4	3	3.0%	17.8%
F Gravel	5.7	8	7.9%	25.7%
F Gravel	8	9	8.9%	34.7%
Med Gravel	11	10	9.9%	44.6%
Med Gravel	16	8	7.9%	52.5%
C Gravel	22	15	14.9%	67.3%
C Gravel	32	12	11.9%	79.2%
VC Gravel	45	11	10.9%	90.1%
VC Gravel	64	11	10.9%	101.0%
SM Cobble	90	2	2.0%	103.0%
SM Cobble	128	0	0.0%	103.0%
LG Cobble	256	0	0.0%	103.0%

total count = 104

Read From Graph		
D_{50} =	19	mm
D_{84} =	31	mm



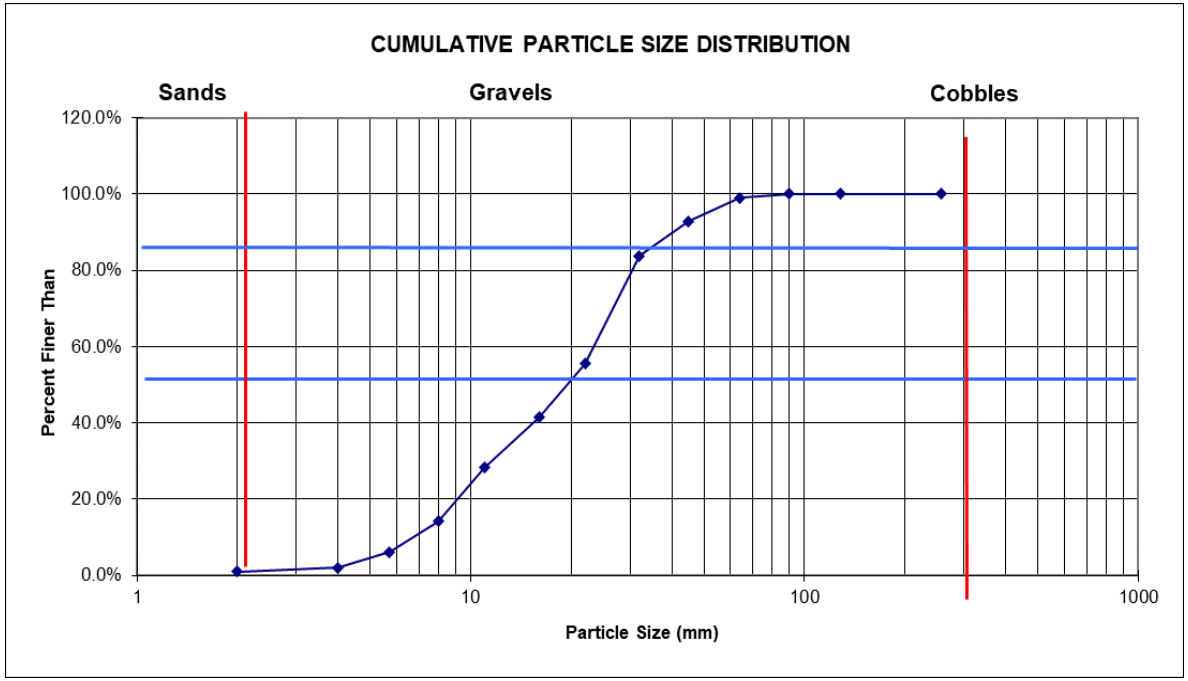
Reach 5 **Wolman Pebble Count Data**

Riffle @ Transect 30

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	5	5.1%	5.1%
VF Gravel	2	0	0.0%	5.1%
VF Gravel	4	3	3.0%	8.1%
F Gravel	5.7	4	4.0%	12.1%
F Gravel	8	7	7.1%	19.2%
Med Gravel	11	13	13.1%	32.3%
Med Gravel	16	7	7.1%	39.4%
C Gravel	22	15	15.2%	54.5%
C Gravel	32	14	14.1%	68.7%
VC Gravel	45	16	16.2%	84.8%
VC Gravel	64	10	10.1%	94.9%
SM Cobble	90	7	7.1%	102.0%
SM Cobble	128	0	0.0%	102.0%
LG Cobble	256	0	0.0%	102.0%

total count = 101

Read From Graph		
D_{50} =	18	mm
D_{84} =	32	mm

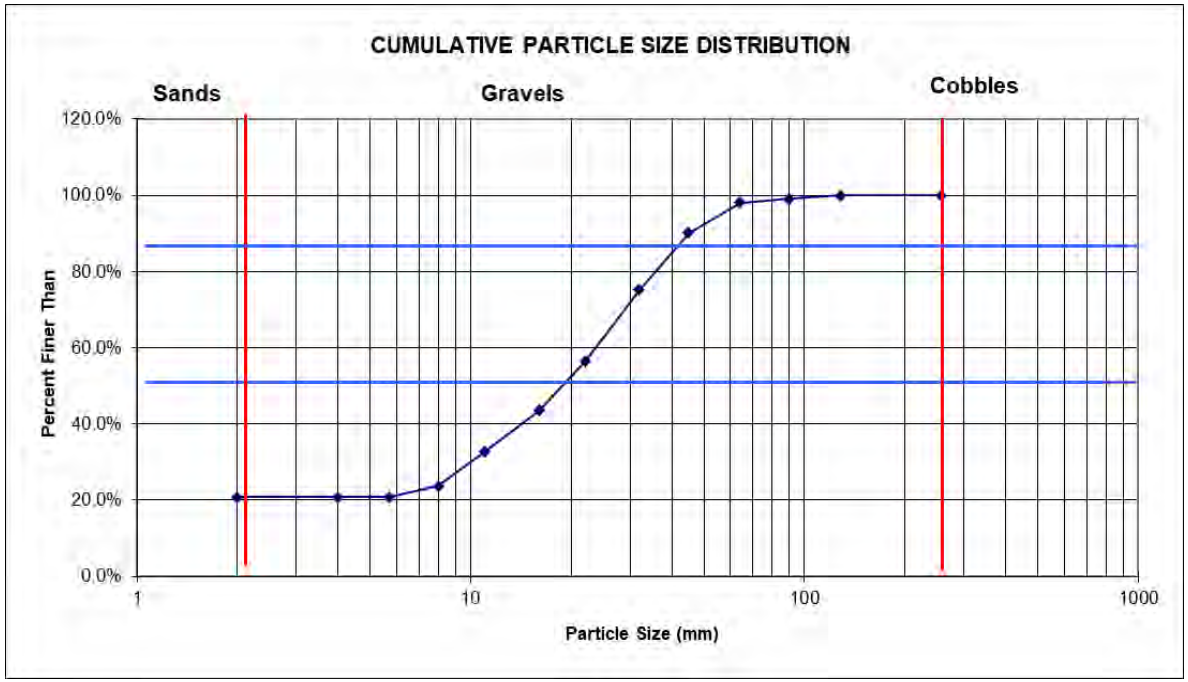


Pool @ Transect 29

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	10	9.9%	9.9%
VF Gravel	2	0	0.0%	9.9%
VF Gravel	4	1	1.0%	10.9%
F Gravel	5.7	6	5.9%	16.8%
F Gravel	8	7	6.9%	23.8%
Med Gravel	11	12	11.9%	35.6%
Med Gravel	16	11	10.9%	46.5%
C Gravel	22	10	9.9%	56.4%
C Gravel	32	18	17.8%	74.3%
VC Gravel	45	13	12.9%	87.1%
VC Gravel	64	8	7.9%	95.0%
SM Cobble	90	3	3.0%	98.0%
SM Cobble	128	0	0.0%	98.0%
LG Cobble	256	0	0.0%	98.0%

total count = 99

Read From Graph		
D_{50} =	17	mm
D_{84} =	30	mm



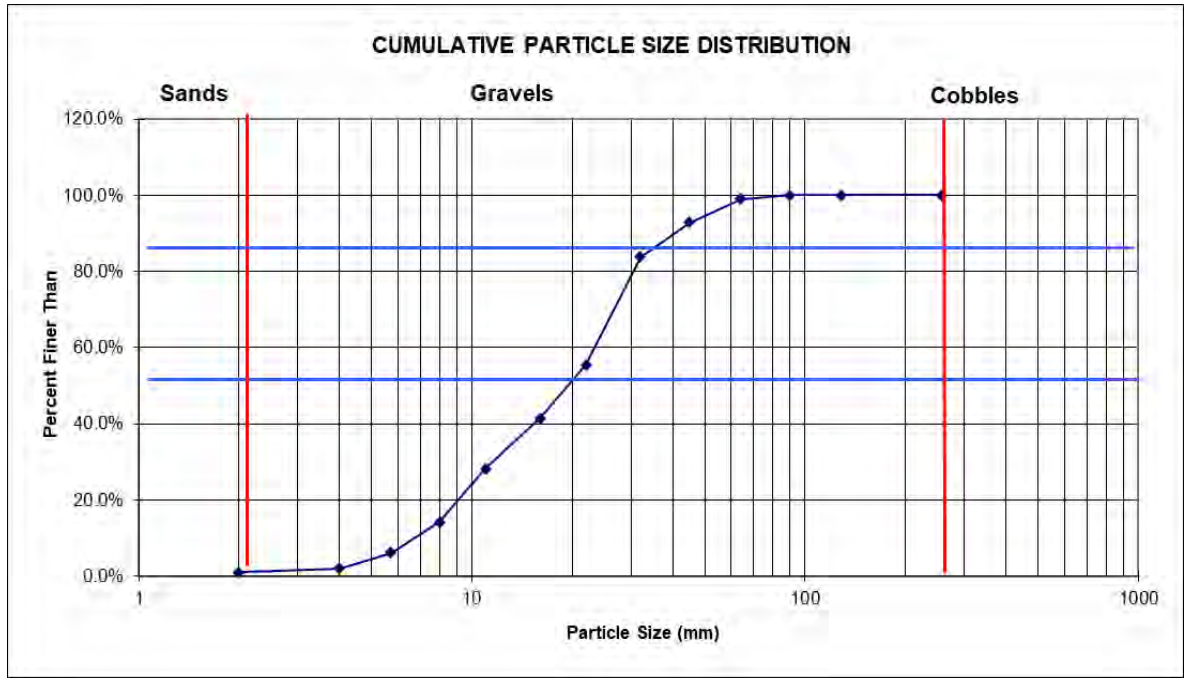
Reach 7 **Wolman Pebble Count Data**

Riffle @ Transect 43

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	3	3.0%	3.0%
VF Gravel	2	0	0.0%	3.0%
VF Gravel	4	0	0.0%	3.0%
F Gravel	5.7	4	4.0%	7.1%
F Gravel	8	5	5.1%	12.1%
Med Gravel	11	11	11.1%	23.2%
Med Gravel	16	4	4.0%	27.3%
C Gravel	22	6	6.1%	33.3%
C Gravel	32	11	11.1%	44.4%
VC Gravel	45	24	24.2%	68.7%
VC Gravel	64	17	17.2%	85.9%
SM Cobble	90	11	11.1%	97.0%
SM Cobble	128	7	7.1%	104.0%
LG Cobble	256	0	0.0%	104.0%

total count = 103

Read From Graph		
D_{50} =	18	mm
D_{84} =	33	mm

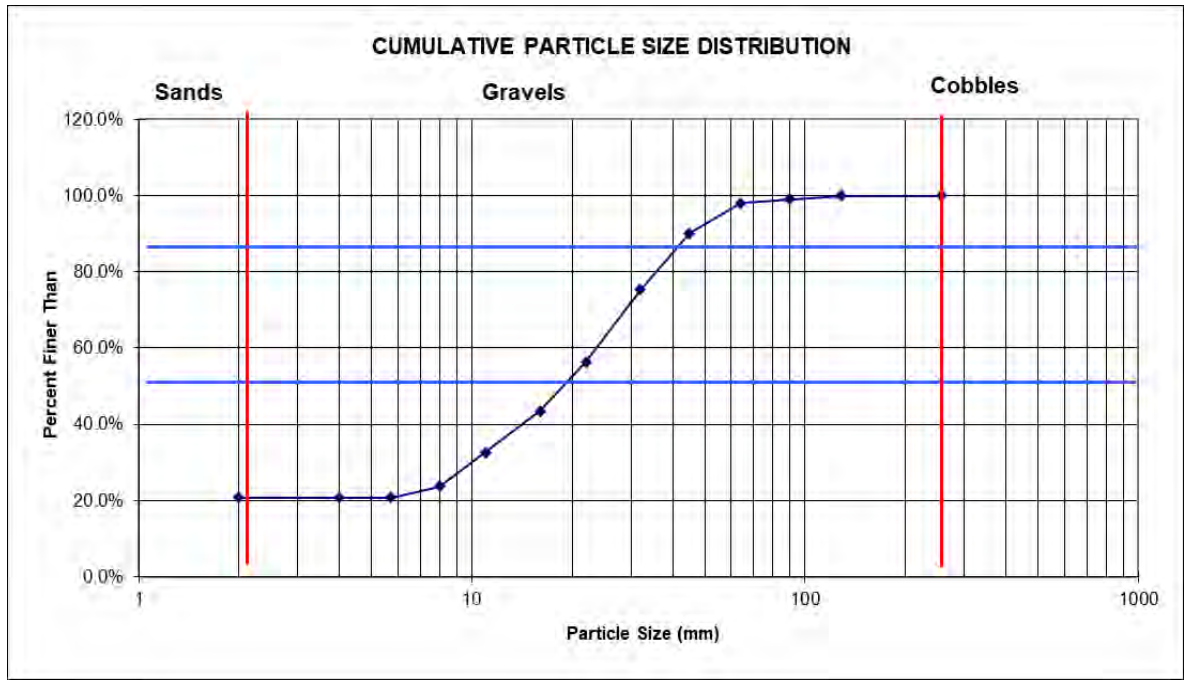


Pool @ Transect 42

PARTICLE	SEIVE OPENING MILLIMETERS	PASSING COUNT	PERCENT	CUMULATIVE PERCENT
Sand	<2	16	15.8%	15.8%
VF Gravel	2	0	0.0%	15.8%
VF Gravel	4	6	5.9%	21.8%
F Gravel	5.7	5	5.0%	26.7%
F Gravel	8	11	10.9%	37.6%
Med Gravel	11	16	15.8%	53.5%
Med Gravel	16	16	15.8%	69.3%
C Gravel	22	12	11.9%	81.2%
C Gravel	32	13	12.9%	94.1%
VC Gravel	45	5	5.0%	99.0%
VC Gravel	64	1	1.0%	100.0%
SM Cobble	90	0	0.0%	100.0%
SM Cobble	128	0	0.0%	100.0%
LG Cobble	256	0	0.0%	100.0%

total count = 101

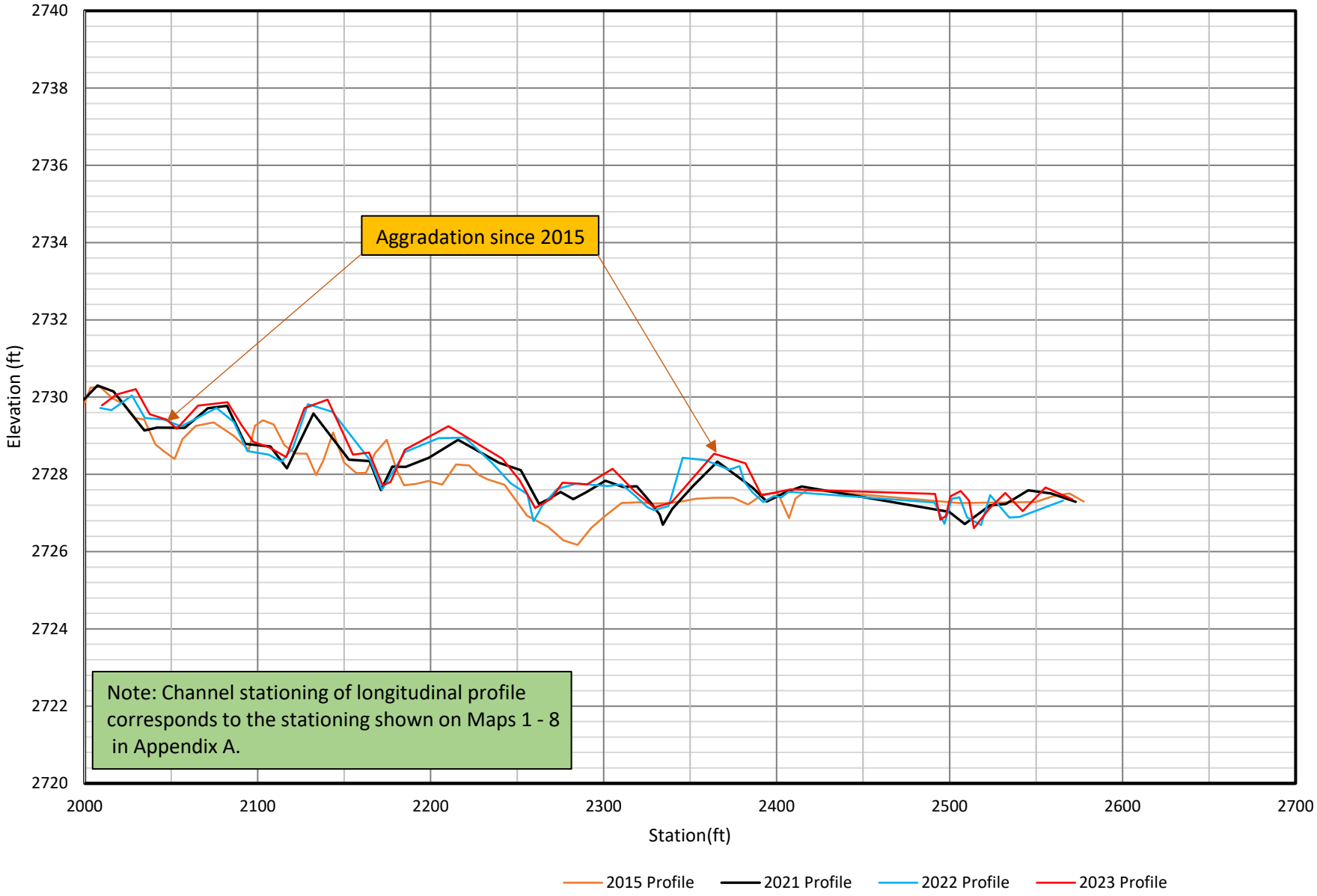
Read From Graph		
D_{50} =	17	mm
D_{84} =	30	mm



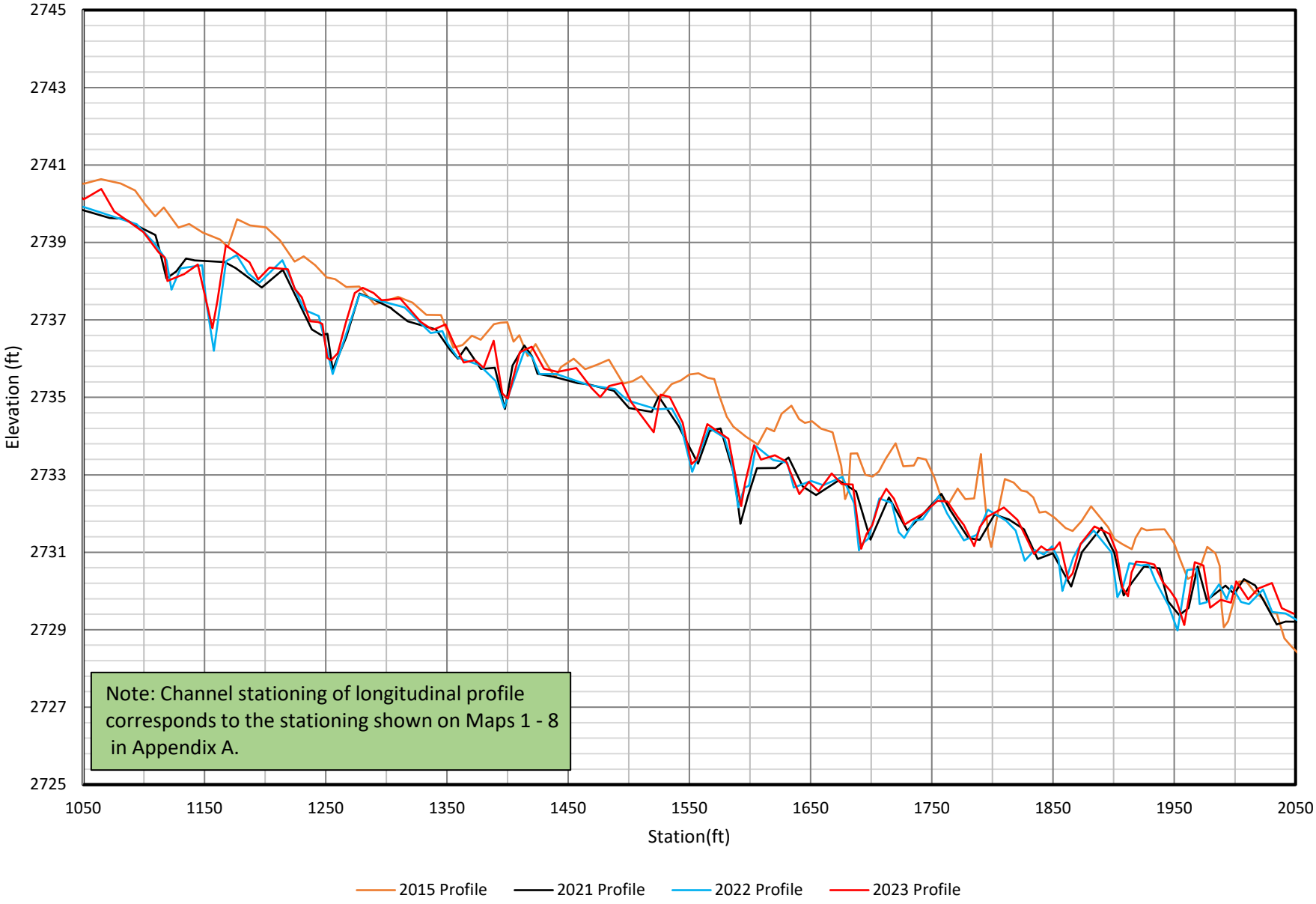
APPENDIX G
LONGITUDINAL PROFILE AND PERPENDICULAR TRANSECT PLOTS

MDT Stream Mitigation Monitoring
Swamp Creek
Lincoln County, Montana

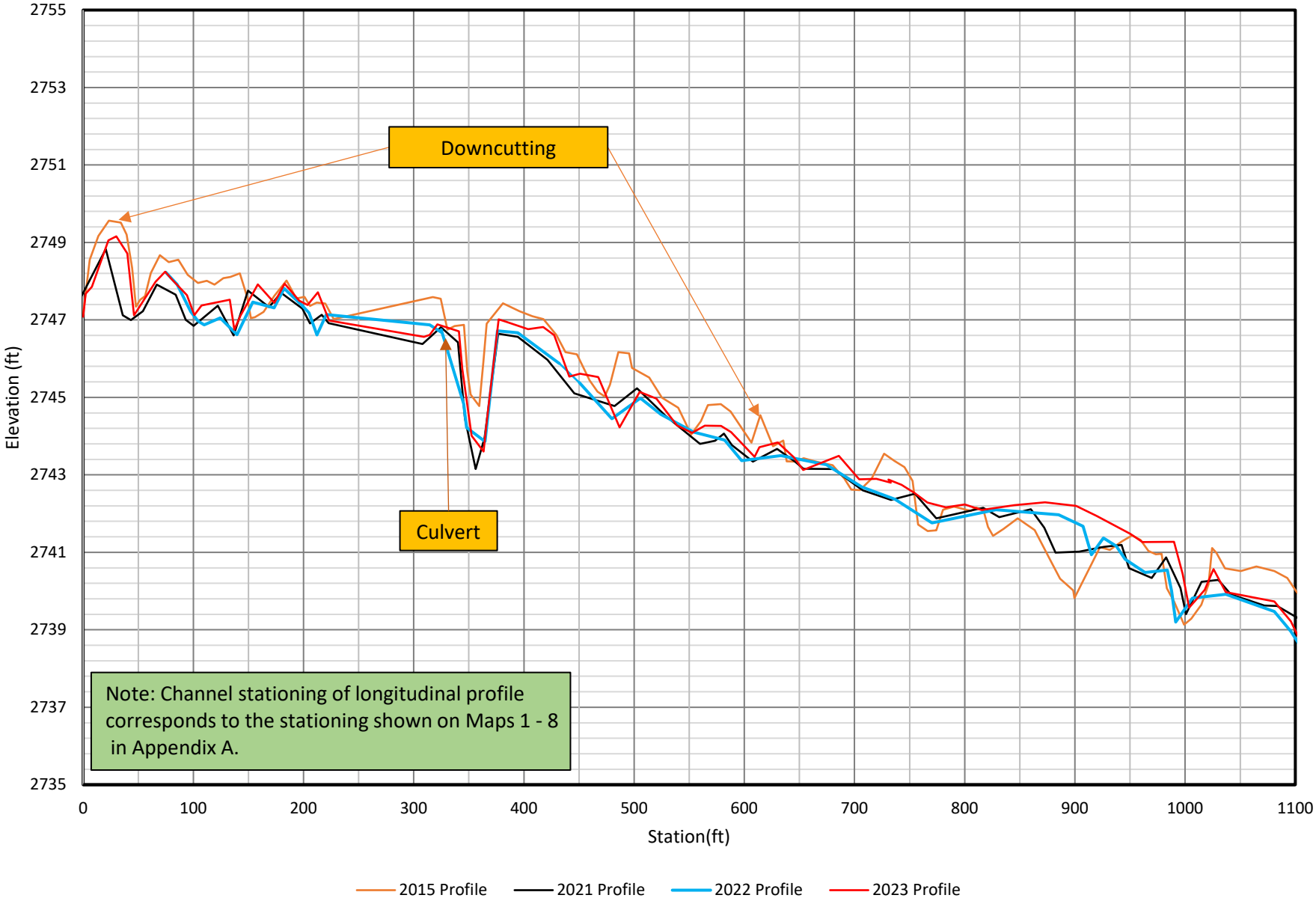
Swamp Creek Longitudinal Profile: Reach 1



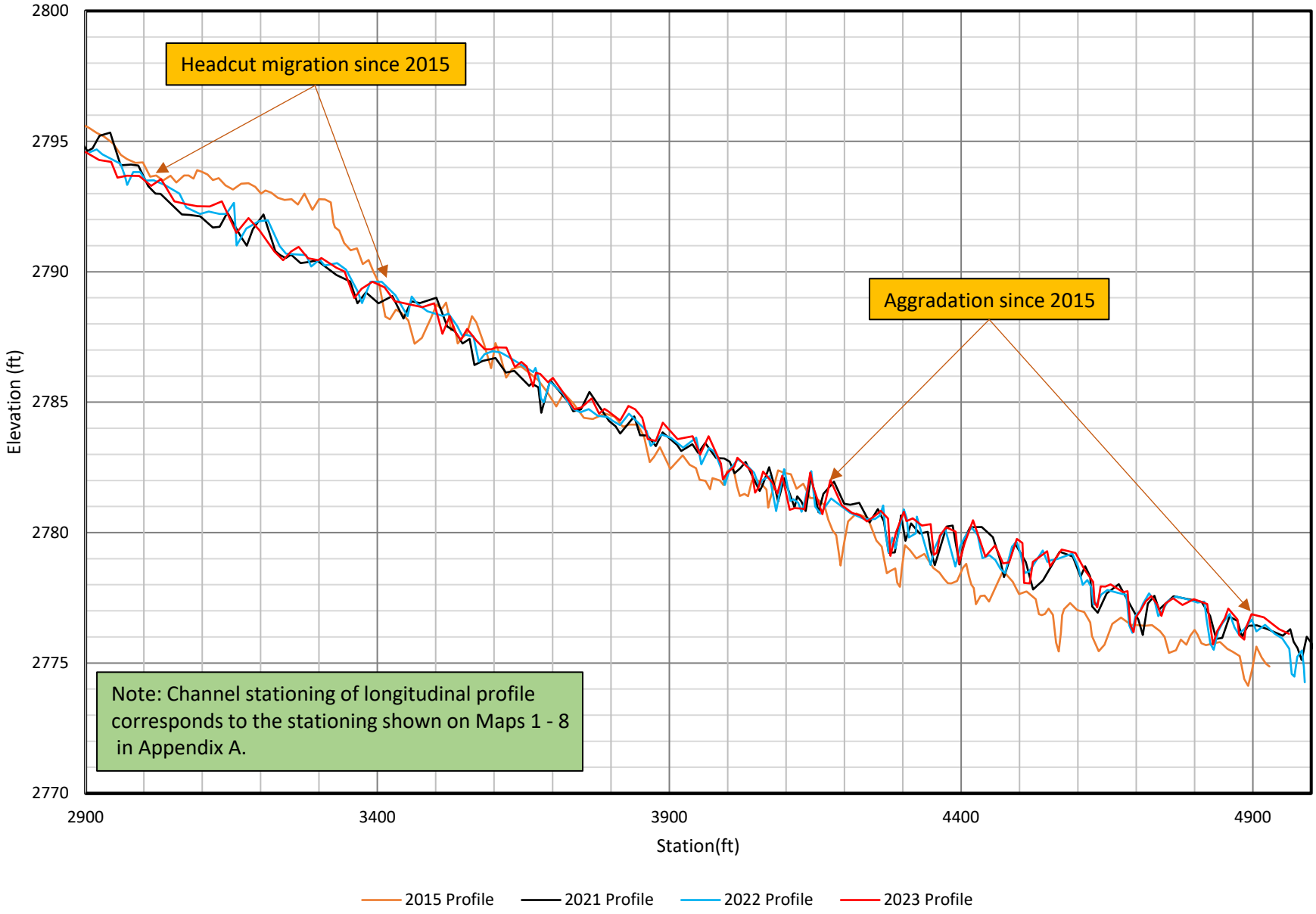
Swamp Creek Longitudinal Profile: Transition between Reaches 1 and 2



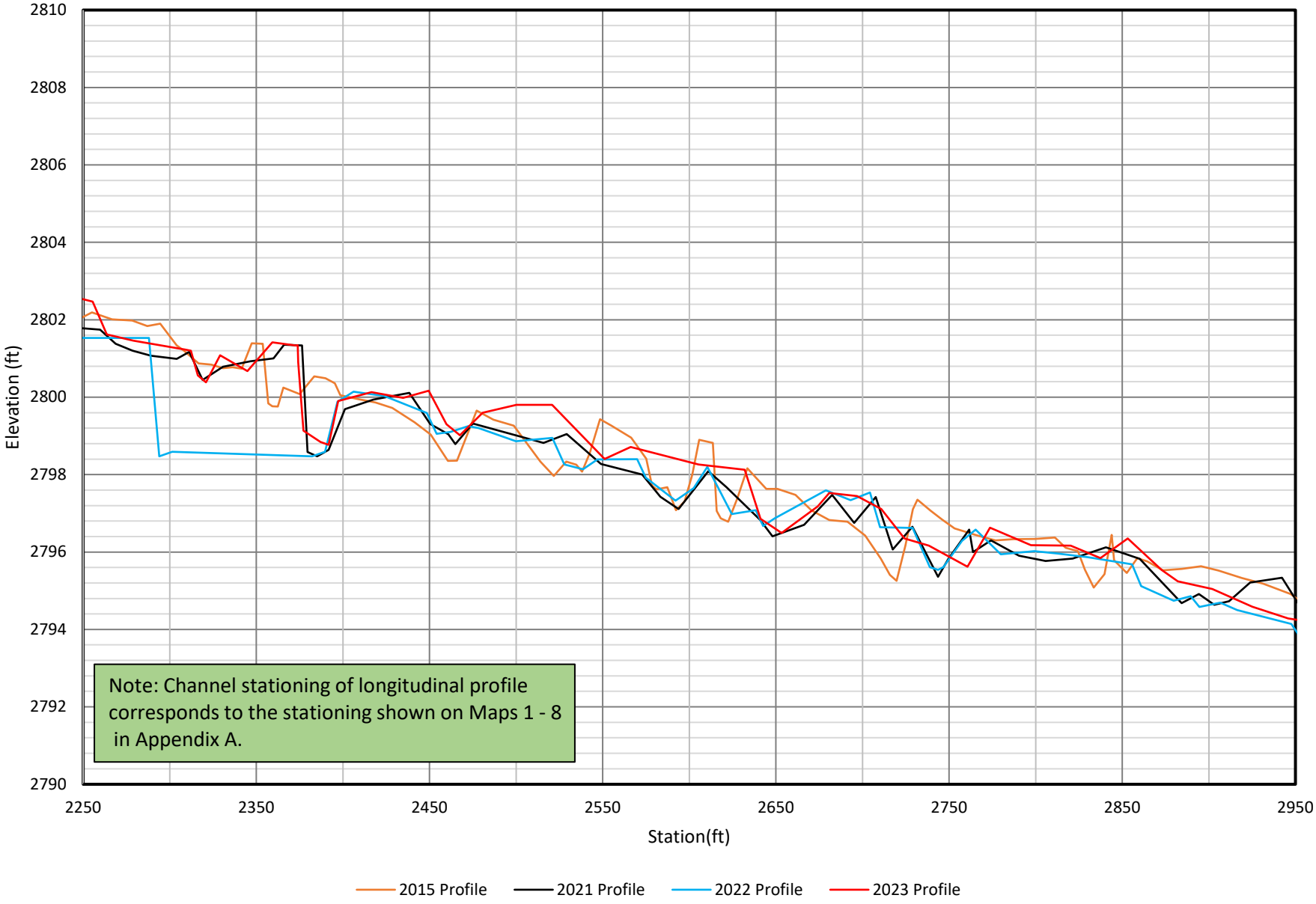
Swamp Creek Longitudinal Profile: Reach 2



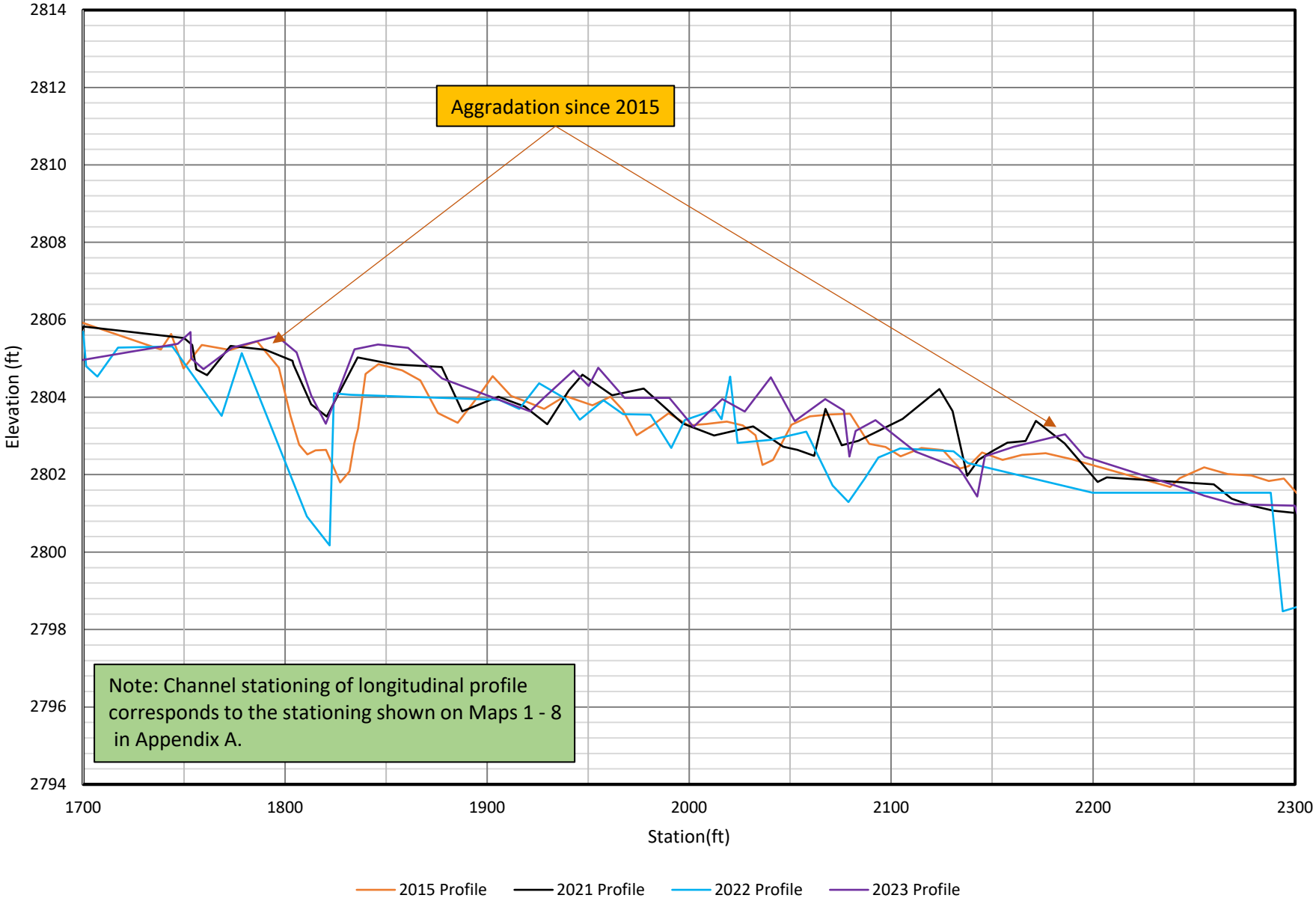
Swamp Creek Longitudinal Profiles: Reach 3.1



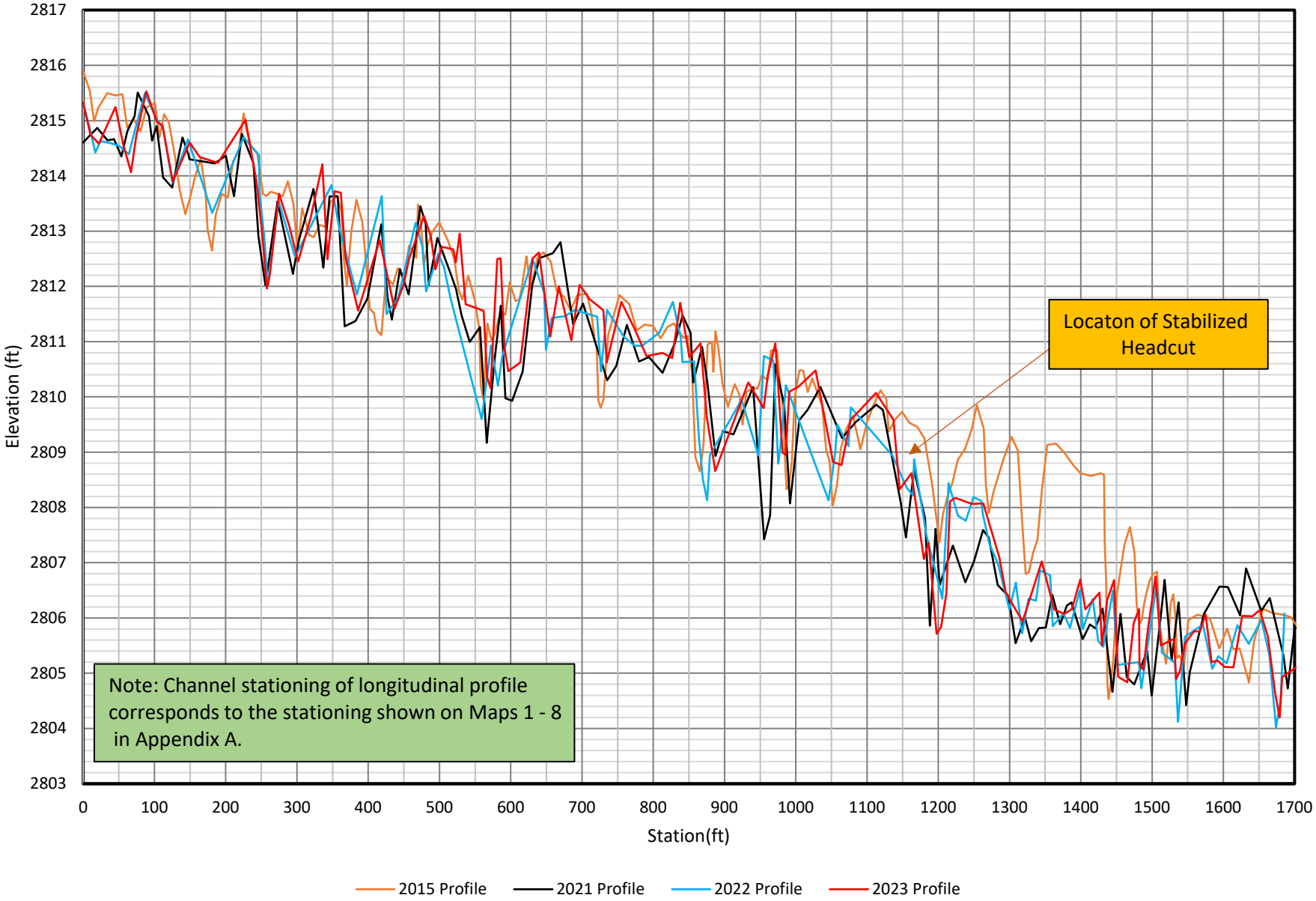
Swamp Creek Longitudinal Profile: Reach 3.2



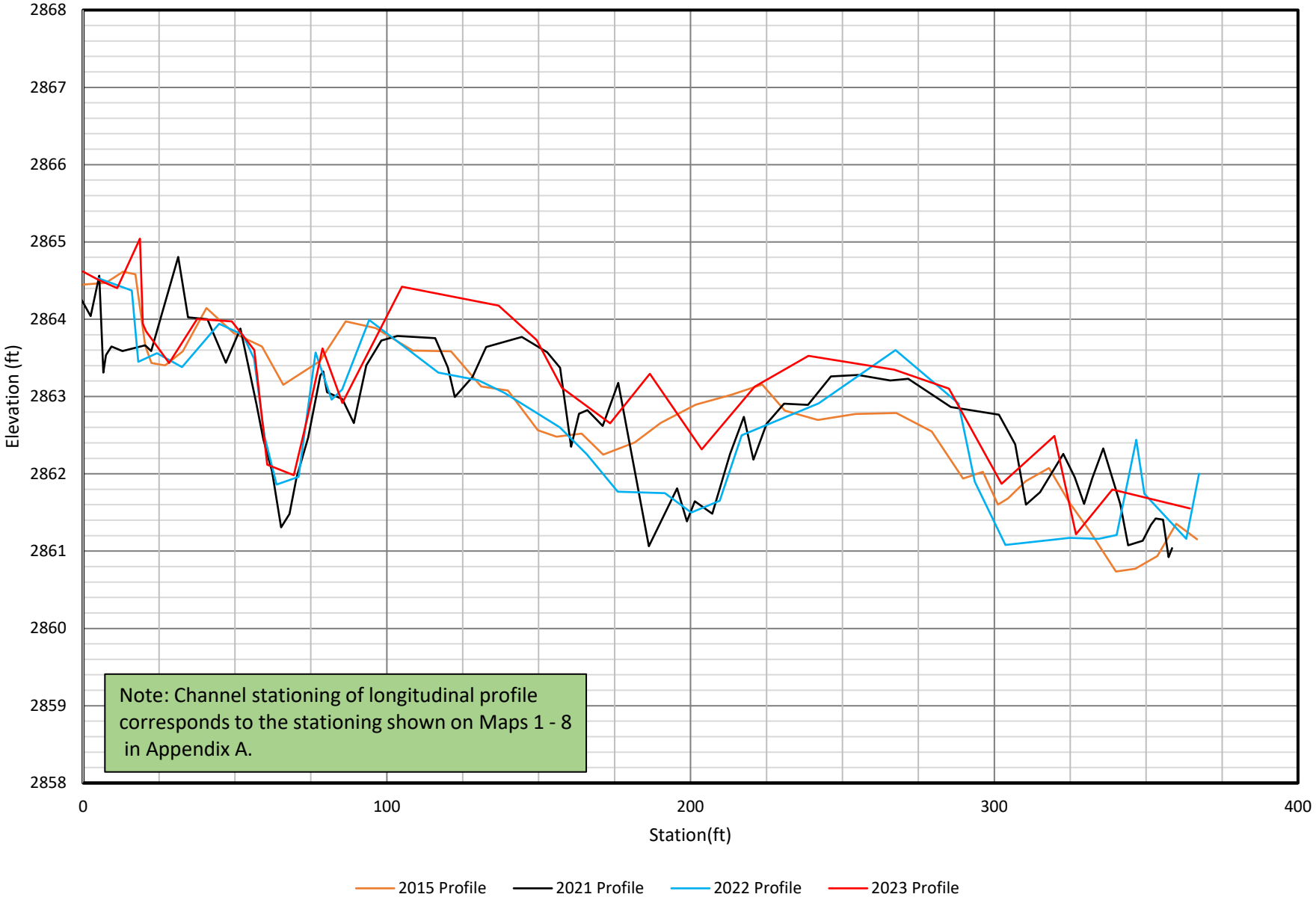
Swamp Creek Longitudinal Profiles: Reach 3.3



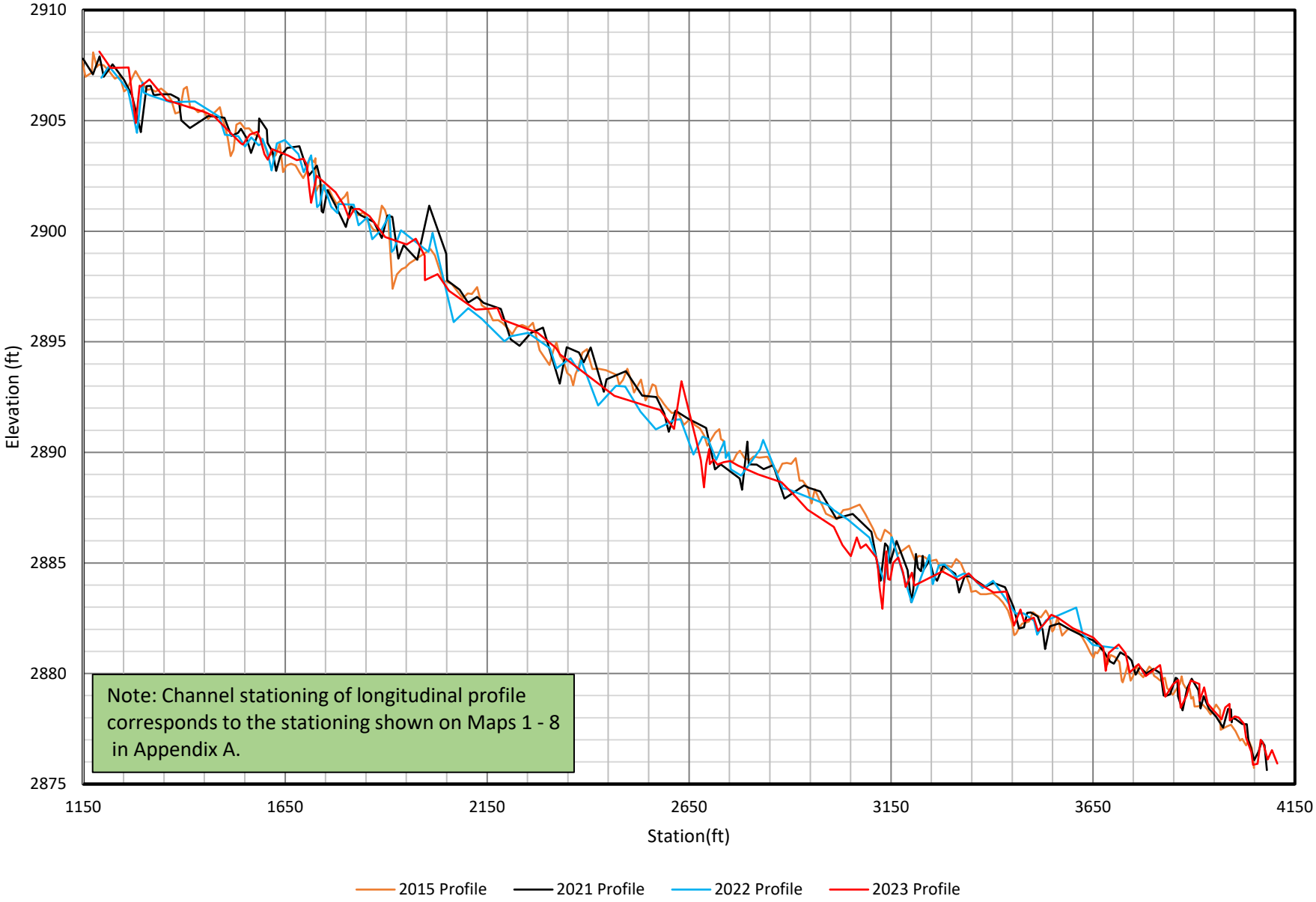
Swamp Creek Longitudinal Profile: Reach 3.4



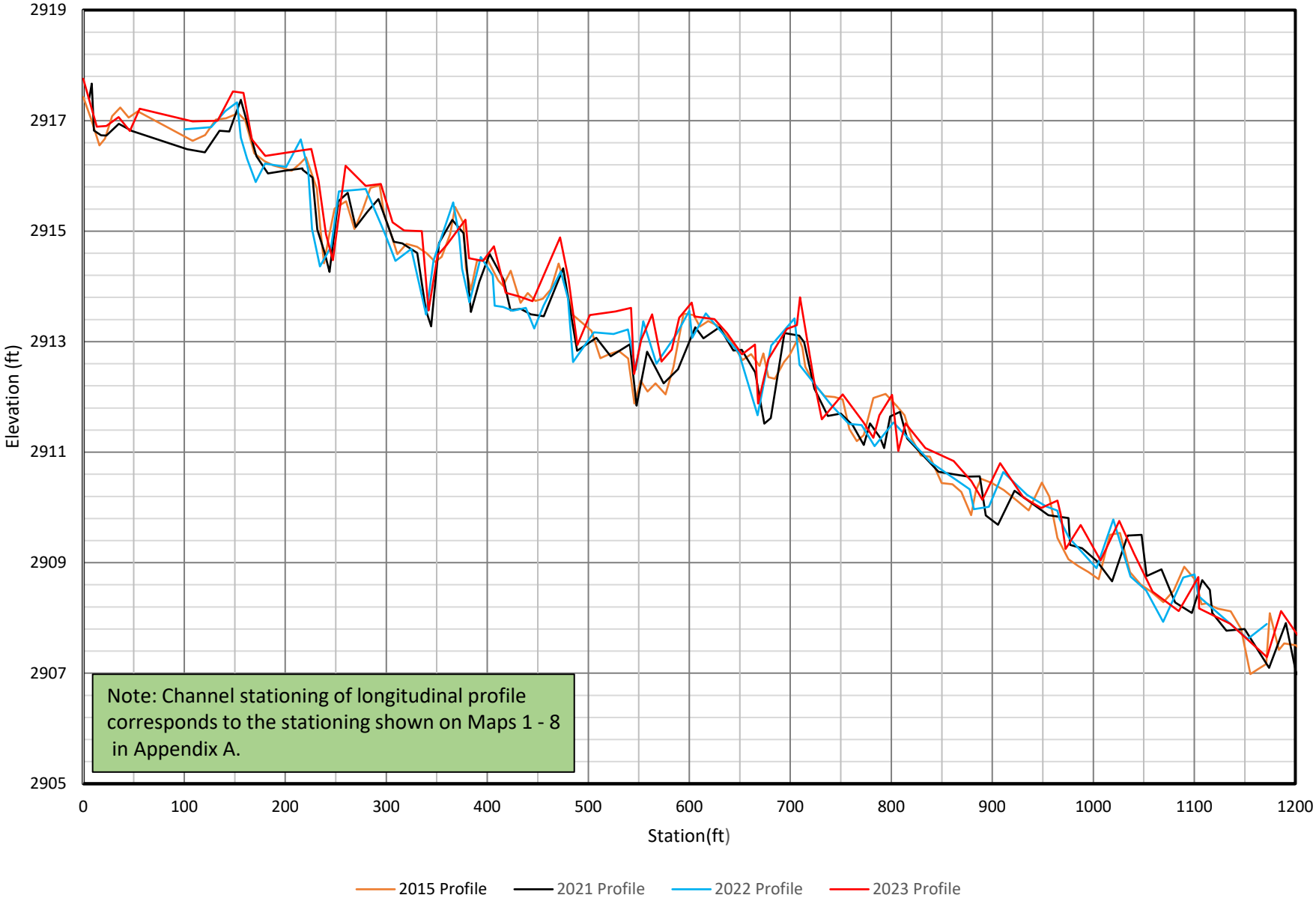
Swamp Creek Longitudinal Profile: Reach 5



Swamp Creek Longitudinal Profile: Reach 7.1

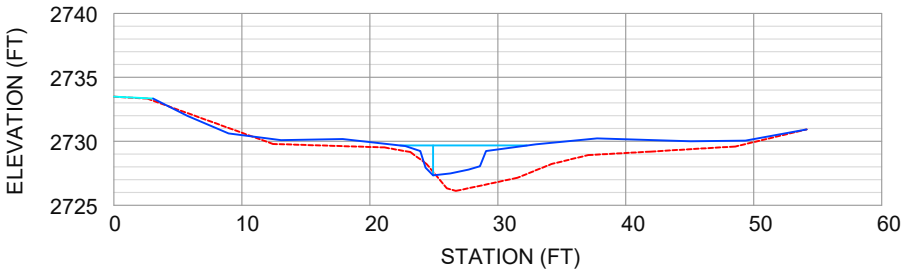


Swamp Creek Longitudinal Profile: Reach 7.2

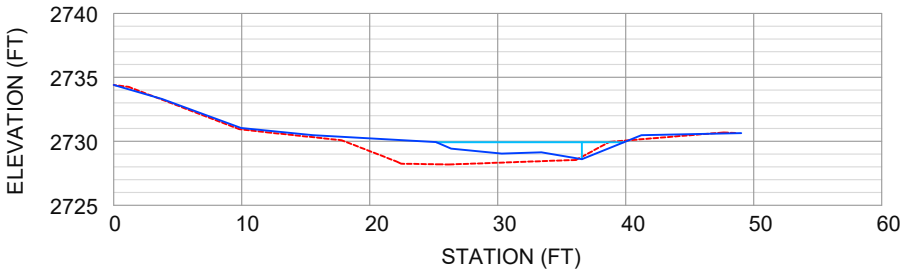


REACH 1

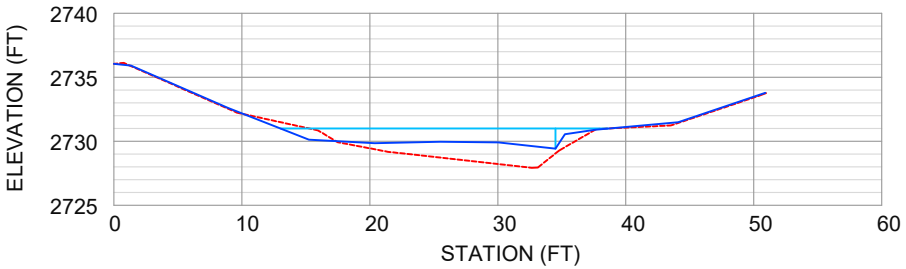
T1 POOL



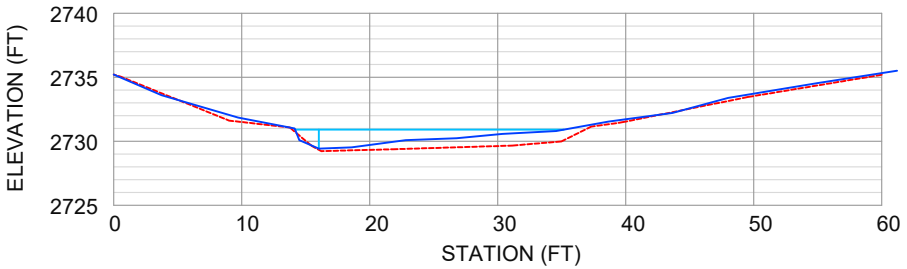
T2 RIFFLE



T3 POOL

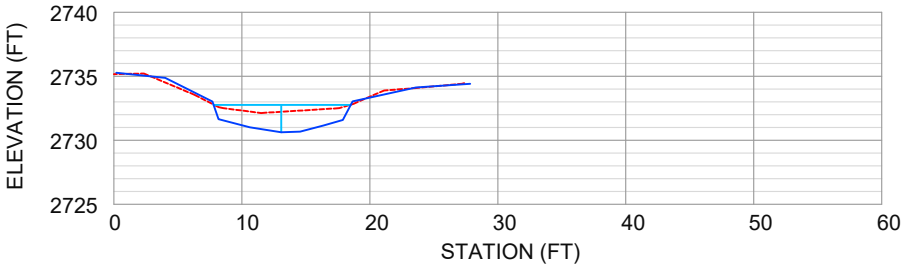


T4 RIFFLE

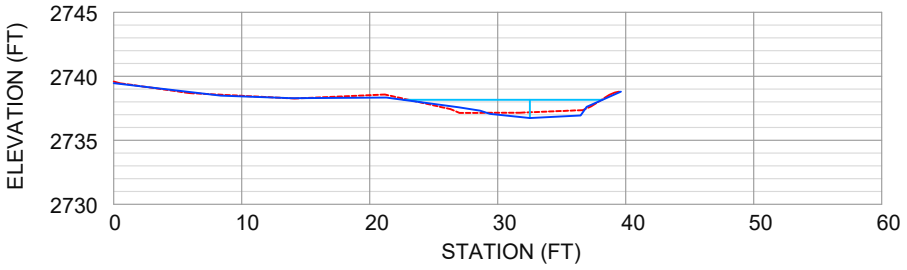


REACTIVATED CHANNEL BETWEEN REACHES 1 AND 2

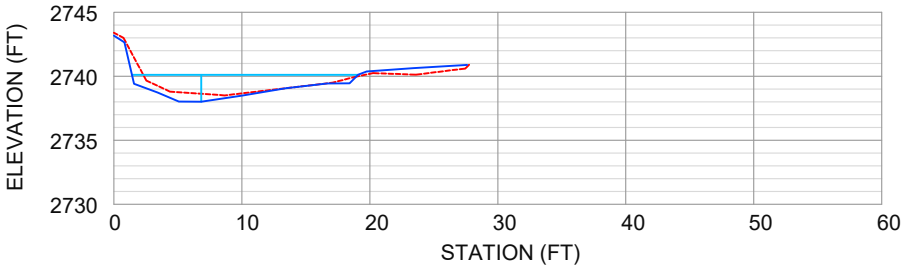
T5 RIFFLE



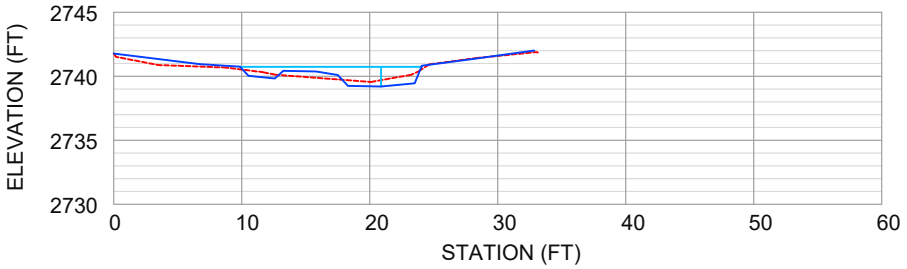
T6 RIFFLE



T7 POOL



T8 POOL



LEGEND

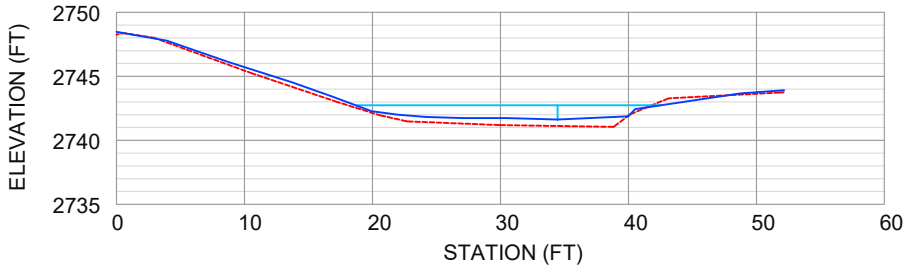
2015 CROSS SECTION

2023 CROSS SECTION

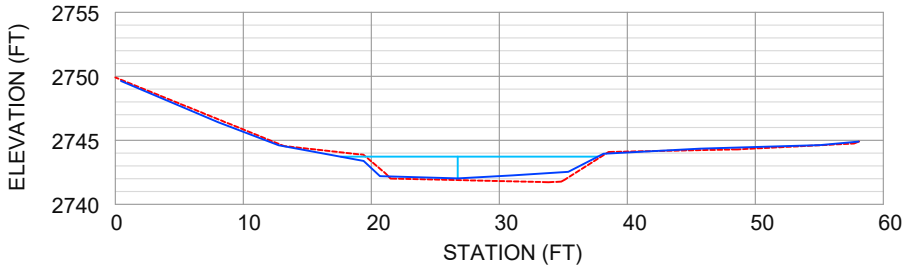
2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 2

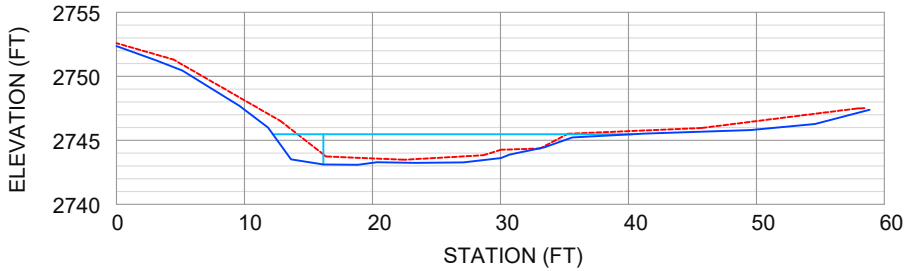
T9 POOL



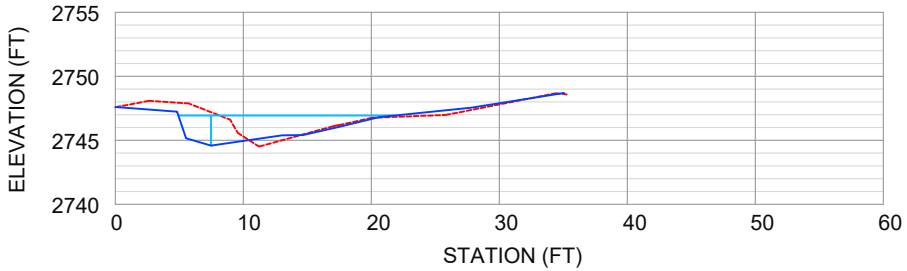
T10 RIFFLE



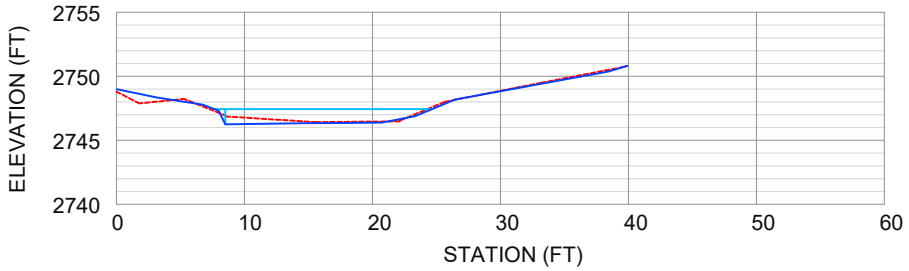
T11 RIFFLE



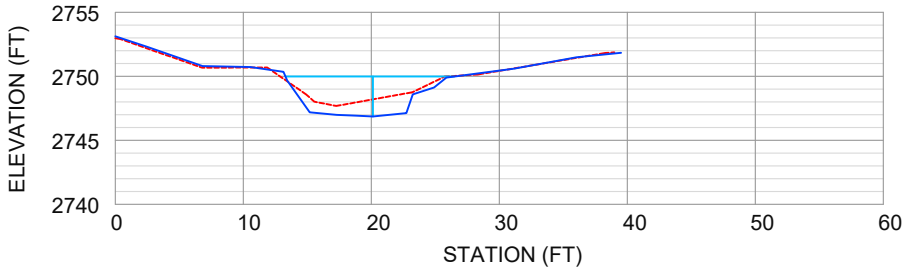
T12 POOL



T13 RIFFLE



T14 POOL

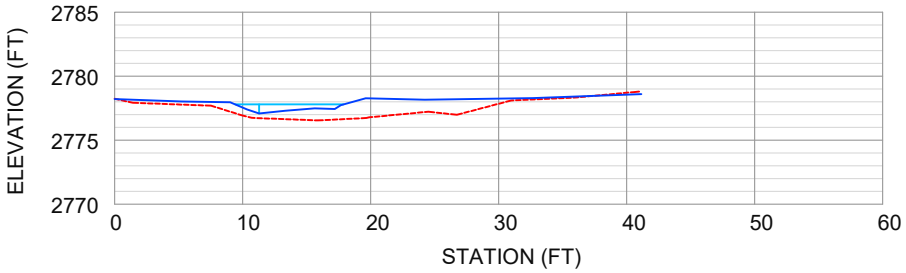


LEGEND

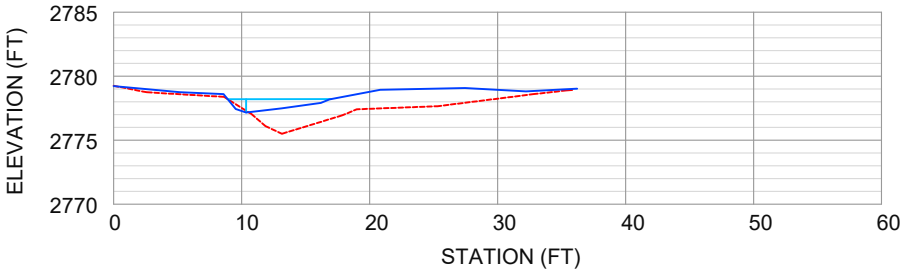
- 2015 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 3.1

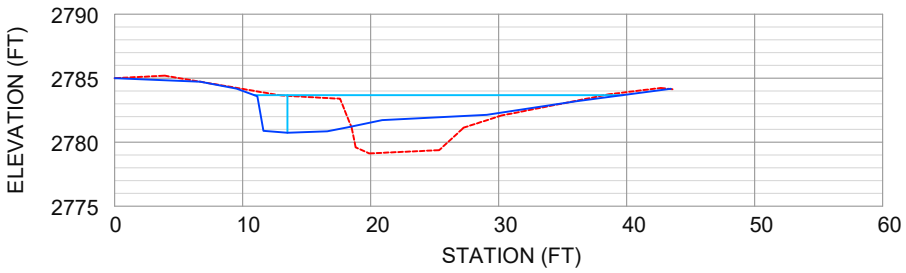
T15 RIFFLE



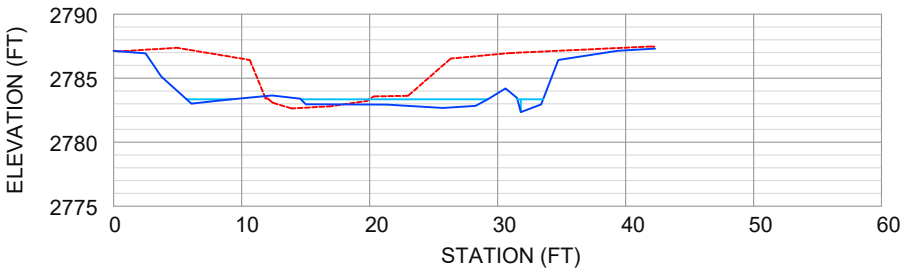
T16 POOL



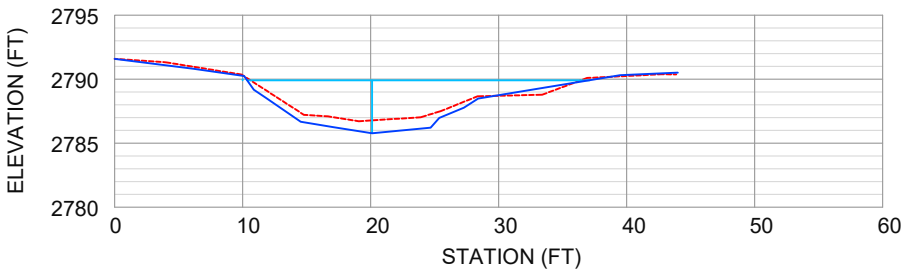
T17 POOL



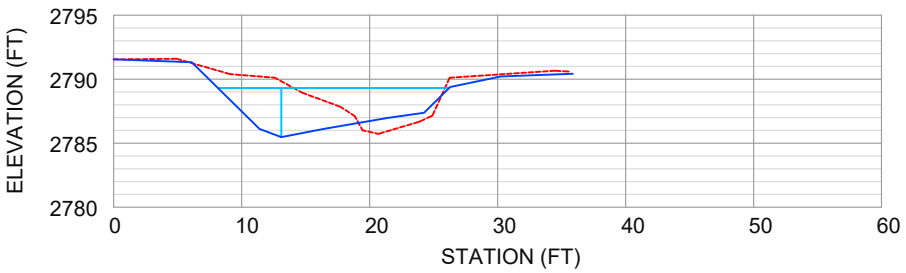
T18 RIFFLE



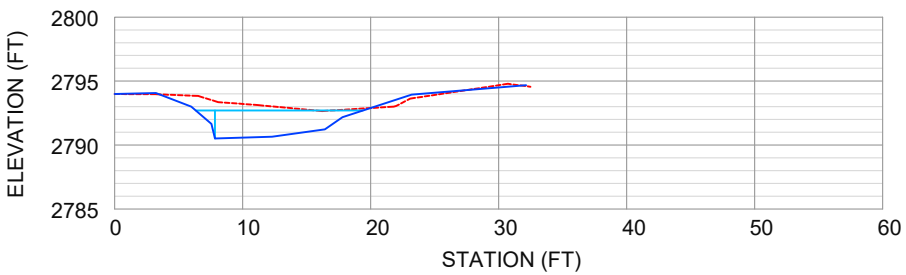
T19 RIFFLE



T20 POOL



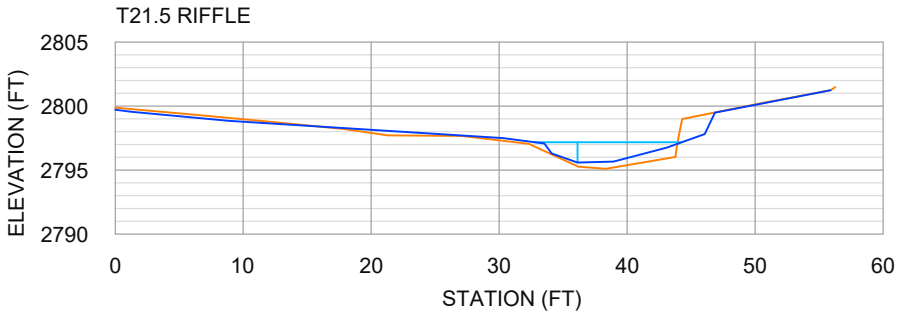
T21 RIFFLE

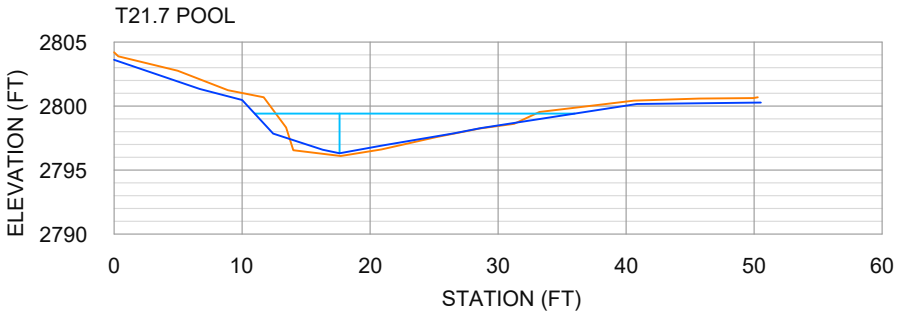


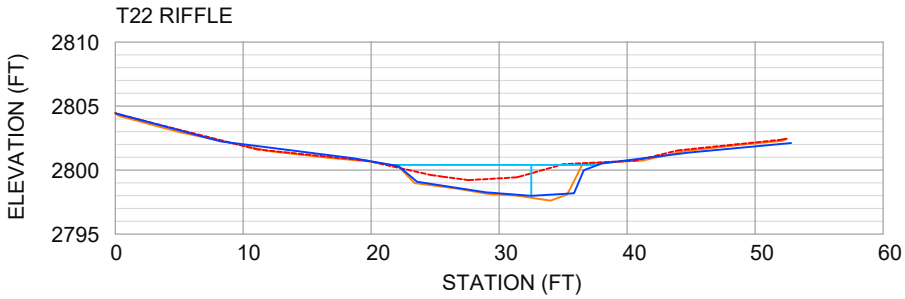
LEGEND

- 2015 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 3.2





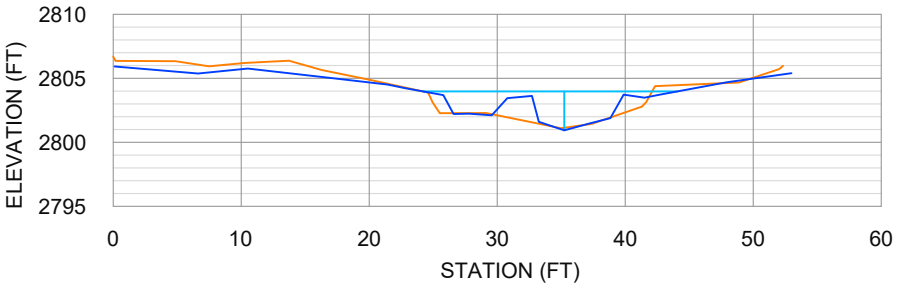


LEGEND

- 2015 CROSS SECTION
- 2018 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 3.3

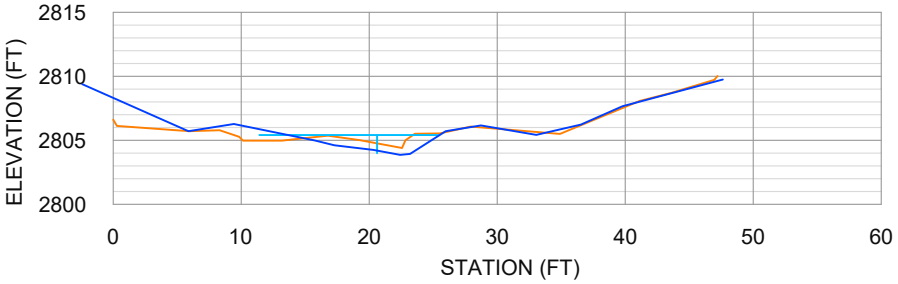
T22.3 POOL



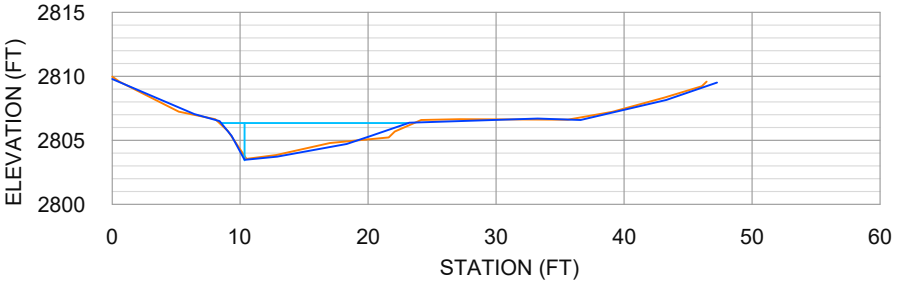
LEGEND

- 2018 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

T22.5 RIFFLE

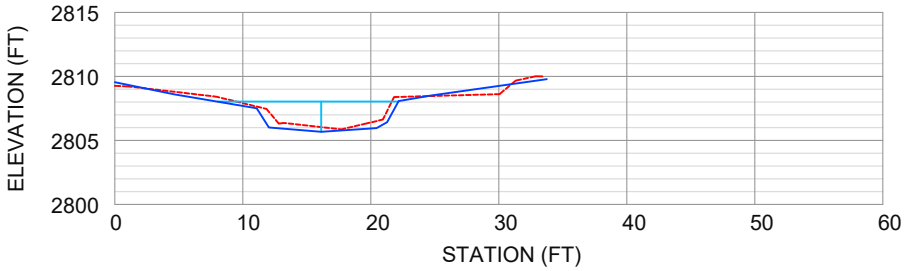


T22.7 POOL

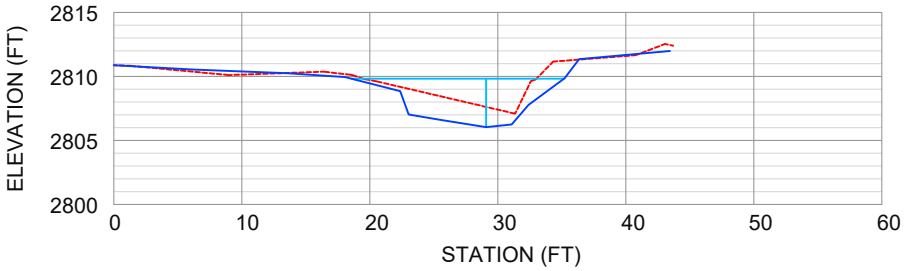


REACH 3.4

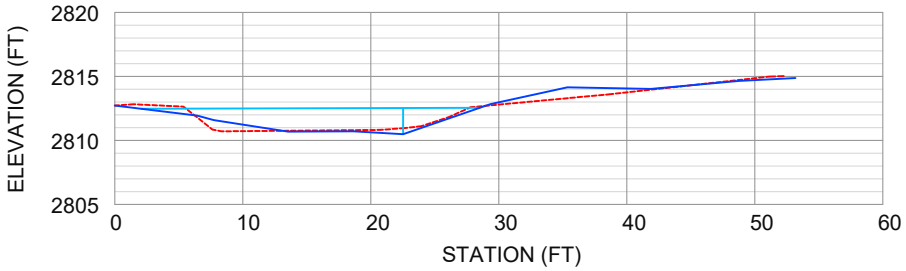
T23 RIFFLE



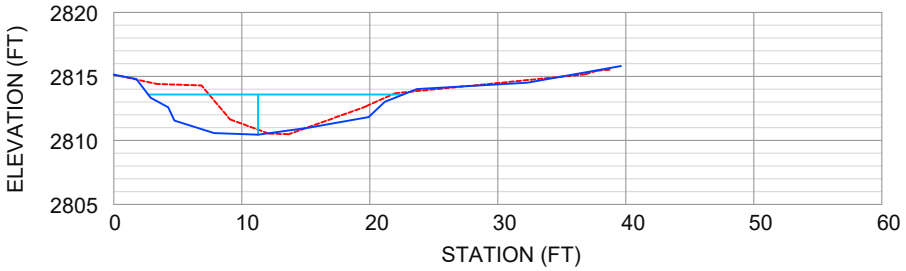
T24 POOL



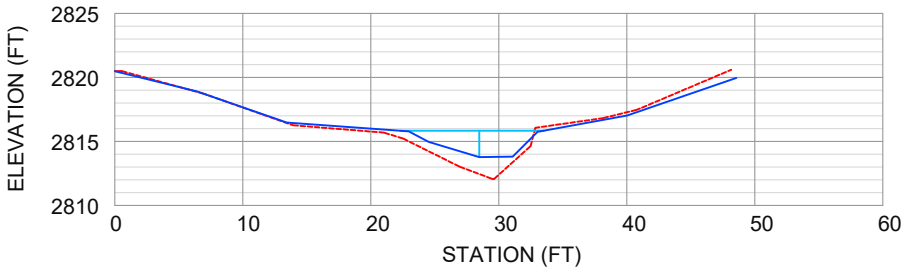
T25 RIFFLE



T26 POOL



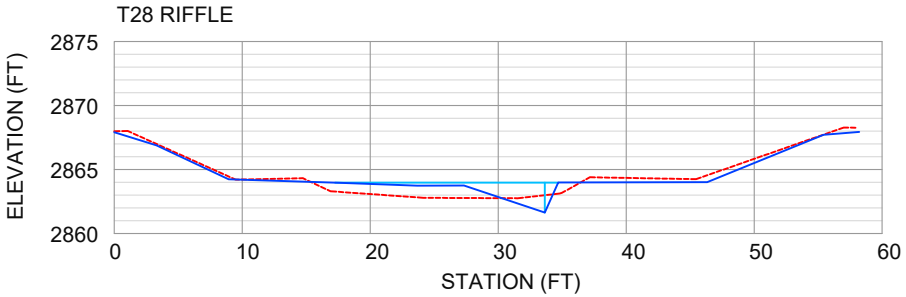
T27 POOL

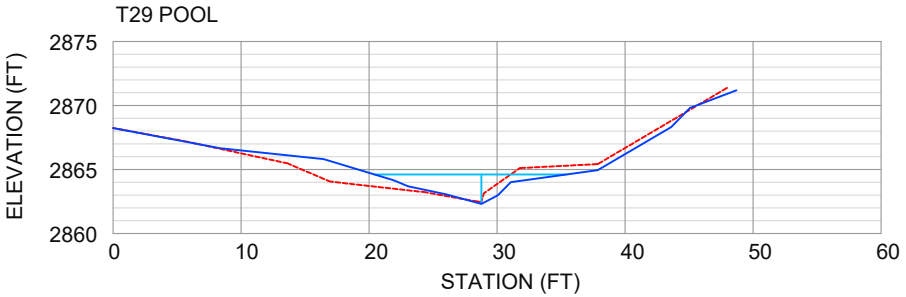


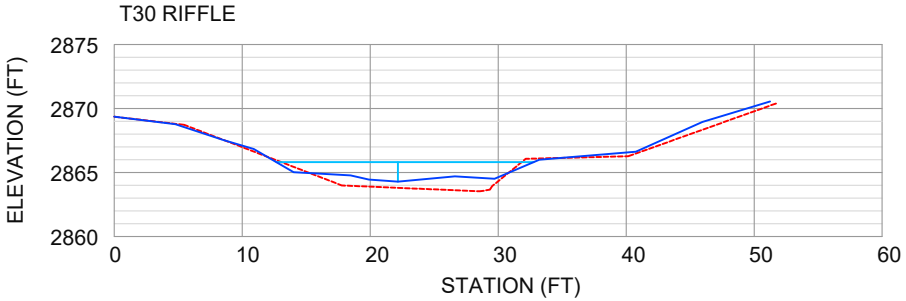
LEGEND

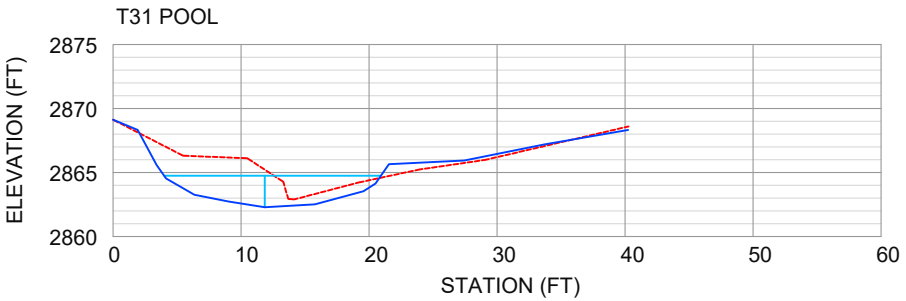
- 2015 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

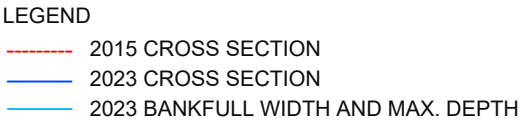
REACH 5


T28 RIFFLE
ELEVATION (FT)
2875
2870
2865
2860
0
10
20
30
40
50
60
STATION (FT)

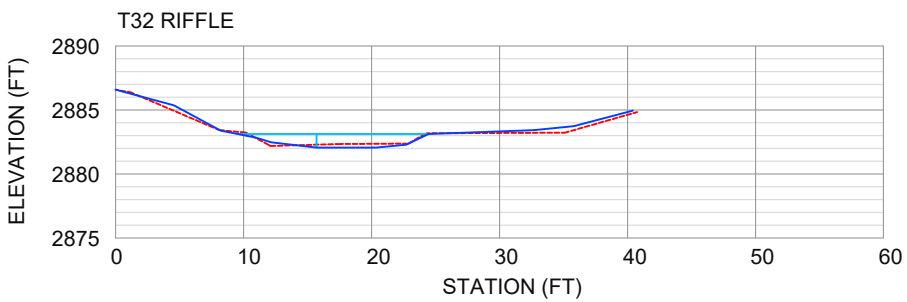

T29 POOL
ELEVATION (FT)
2875
2870
2865
2860
0
10
20
30
40
50
60
STATION (FT)

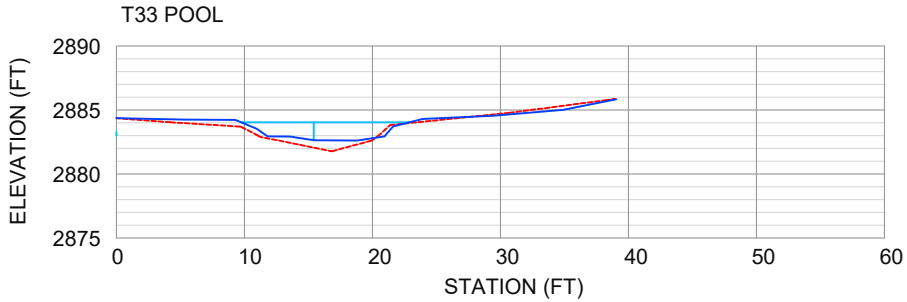

T30 RIFFLE
ELEVATION (FT)
2875
2870
2865
2860
0
10
20
30
40
50
60
STATION (FT)

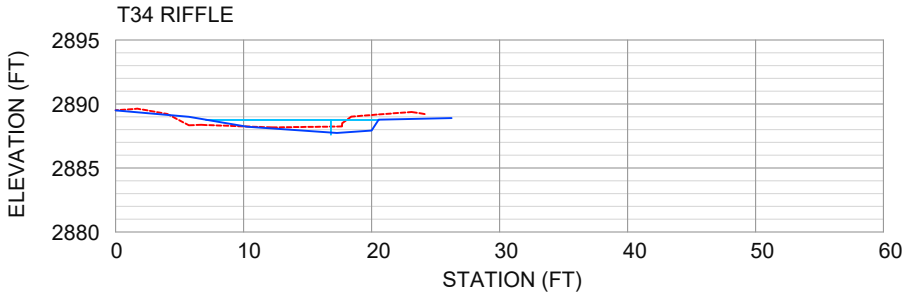

T31 POOL
ELEVATION (FT)
2875
2870
2865
2860
0
10
20
30
40
50
60
STATION (FT)

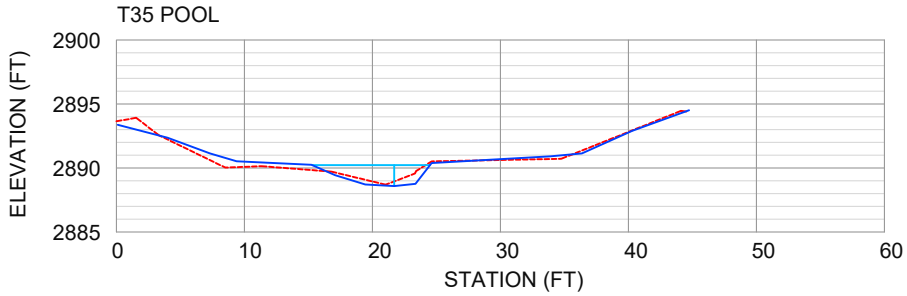

LEGEND
2015 CROSS SECTION
2023 CROSS SECTION
2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 7.1









LEGEND

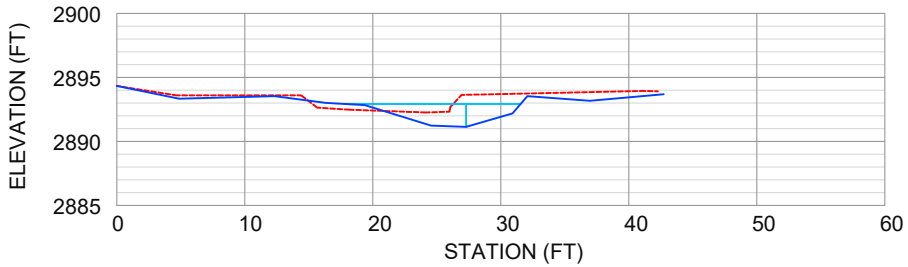
2015 CROSS SECTION

2023 CROSS SECTION

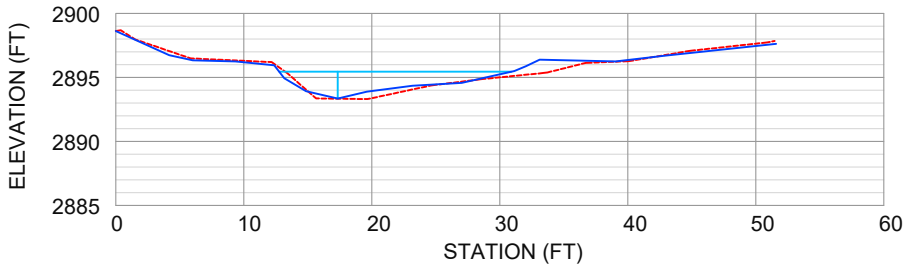
2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 7.1 (continued)

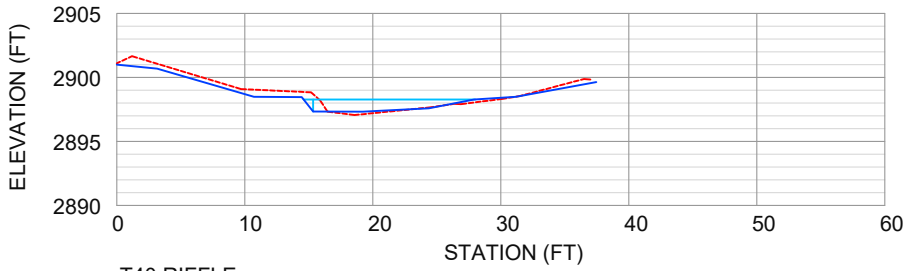
T36 RIFFLE



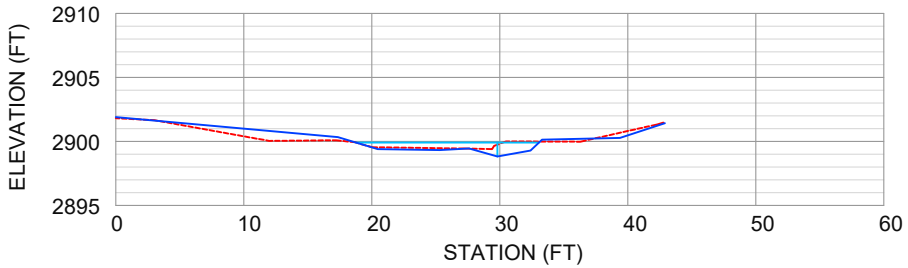
T37 POOL



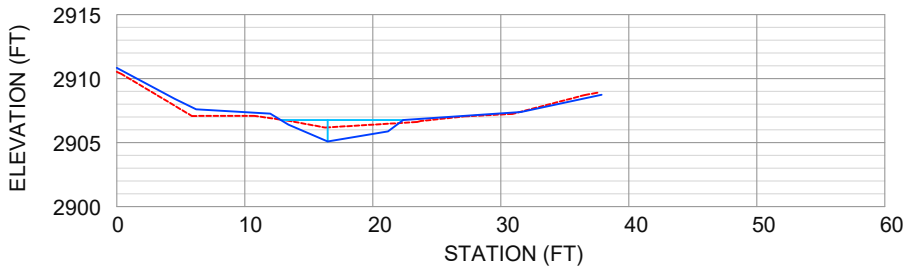
T38 POOL



T39 RIFFLE



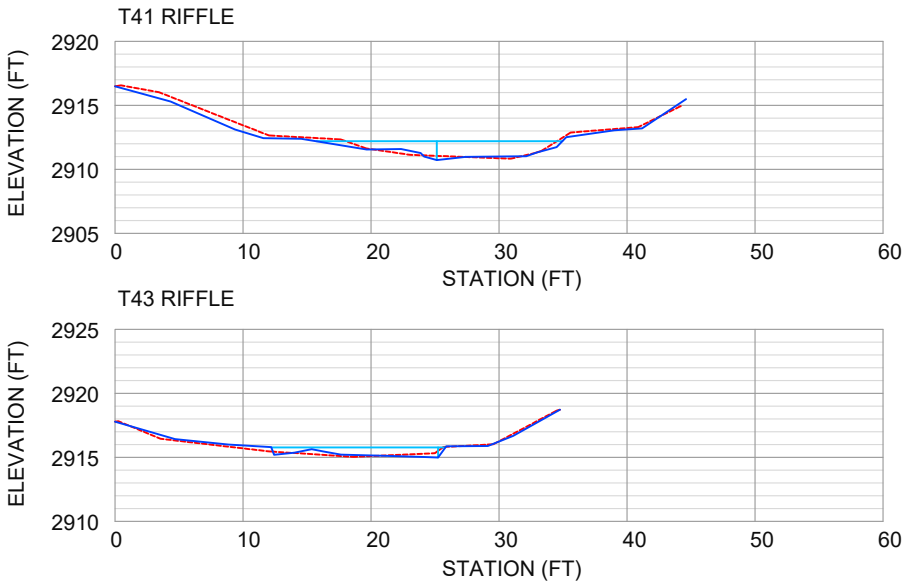
T40 RIFFLE

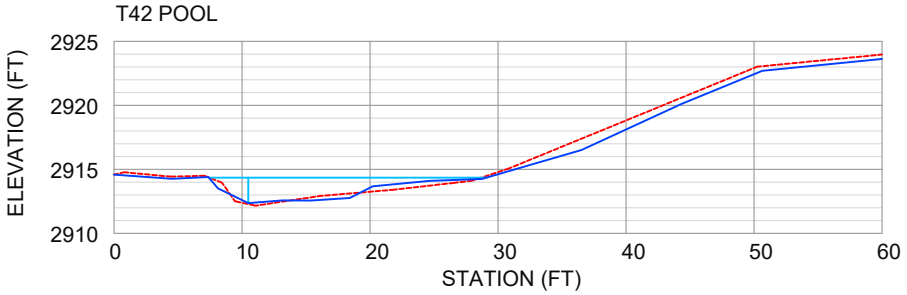


LEGEND

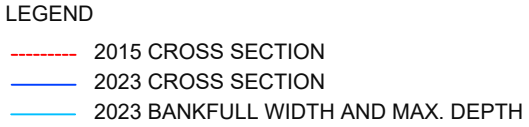
- 2015 CROSS SECTION
- 2023 CROSS SECTION
- 2023 BANKFULL WIDTH AND MAX. DEPTH

REACH 7.2


T41 RIFFLE
ELEVATION (FT)
2920
2915
2910
2905
0
10
20
30
40
50
60
STATION (FT)


T42 POOL
ELEVATION (FT)
2925
2920
2915
2910
0
10
20
30
40
50
60
STATION (FT)

T43 RIFFLE
ELEVATION (FT)
2925
2920
2915
2910
0
10
20
30
40
50
60
STATION (FT)


LEGEND
2015 CROSS SECTION
2023 CROSS SECTION
2023 BANKFULL WIDTH AND MAX. DEPTH