Stream/Wetland Restoration Plan

2015-SM-Walnut Hill – Sousa B Property
Three Rivers Land Trust
Alfred, Maine

Prepared for

Three Rivers Land Trust
Alfred, Maine

Funded by

Maine Natural Resource Conservation Program

Prepared by

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September 2016

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ILEx
WETLANDS CONSULTANTS

Stream/Wetland Restoration Plan

Wilderness Acres Property
Alfred, Maine

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A. General Information

Project Background

The Three Rivers Land Trust (3RLT) purchased a 21.3-acre parcel off Gebung Road in Alfred, Maine in 2015 as part of a Maine Natural Resources Conservation Program (MNRCP) Conservation and Restoration Grant. The MNRCP designation for the Wilderness Acres Property project is 2015-SM-Walnut Hill – Sousa B Property. The property abuts another conserved parcel also owned by 3RLT called Walnut Hill II. The land is within a Maine "Beginning With Habitat" focus area and is part of a Blanding's Turtle incubator project (MNRCP, 2015).

The conservation land is made up of steeply sloping upland and a small un-named stream and associated wetlands that runs along the eastern boundary of the property (Figure 1). This stream was diverted from its original channel and moved to the south away from an access road created as part of a proposed subdivision.

This stream flows to the Middle Branch of the Mousam River approximately 1000' southeast of the property boundary. The open area within the parcel to the west of the stream was cleared and excavated, then enhanced by 3RLT to provide Blanding's Turtle nesting areas as part of the overall incubator project.

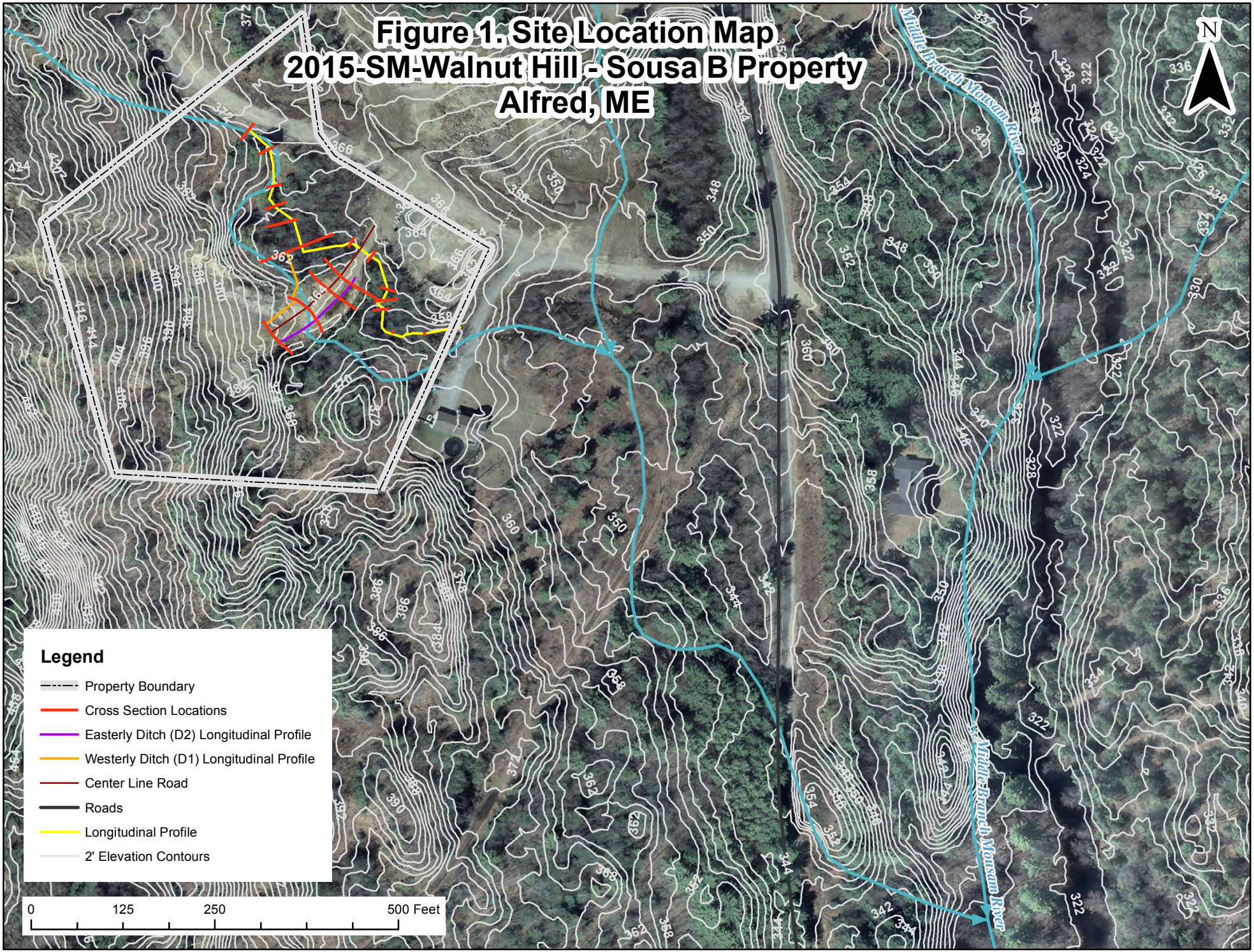
Truslow Resource Consulting (Truslow RC) was contracted by the 3RLT to prepare a Stream and Wetland Restoration Plan, obtain the permits for the project and oversee project completion. A draft post-restoration monitoring plan was also prepared for the project site. This work is being funded in part by the Maine Natural Resources Conservation Program (MNRCP). The Nature Conservancy of Maine administers the program. The following report was prepared using the Maine Natural Resource Conservation Program Restoration/Enhancement Work Plan Guidance, January 2015 as a general guide for report and plan content.

Site Description and Work Performed

The project site is located off Gebung Road in Alfred, Maine in western York County (Figure 1). This portion of Maine is within the Gulf of Maine Coastal Lowland biophysical region (MBWH, 2014). It is within the Estes Lake/Mousam River Watershed.

The surrounding area is largely forested, but the site and adjacent property have previously been mined for sand and gravel and open field and exposed ground remain within the parcel and to the west and north of the restoration site. A private home abuts the eastern boundary of the parcel. According to the MNRCP 2015 site

Figure 1. Site Location Map
2015-SM-Walnut Hill - Sousa B Property
Alfred, ME



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visit report the stream that runs to the east of the site was diverted to its current course. Silt fence that was previously installed and not removed is also found in several areas near the stream and wetland.

The upper portion of the stream follows a narrow rock lined channel with several steps, down to a broad wetland area. In this wetland, the stream follows several channels. These channels rejoin just above a 30" plastic culvert installed beneath the access road to the site. A pooled area has been created within the stream both upstream and downstream of the culvert due to partial impoundment by the culvert on the upstream side and through erosion of the streambed at the culvert outfall downstream of the culvert.

A log dam impounds water further downstream with a small step (falls) below the dam. A tributary, which drains a wetland area to the southwest, enters the stream below this pool and the stream is again channeled to a 30" culvert at the boundary with the abutting home site currently owned by William and Cheryl Tremblay. The culvert directs the stream under a driveway for the home of the abutting landowner.

This Sousa B property is within the Walnut Hill BWH focus area of statewide significance, which straddles the York, Alfred and Sanford town lines. Rare animals in this area include the northern black racer and Blanding's turtle. Significant Wildlife Habitats listed are inland wading bird and waterfowl habitat and significant vernal pools (BWH website, 2016).

Five field visits were made as part of restoration planning. The first was with Amy Titcomb of 3RLT in fall 2015, then a preliminary mapping site visit in March 2016 and a visit to develop a topographic survey of the stream from the upstream to downstream property boundary was completed in May. A visit was made by Ilex Wetland Consultants to further characterize and flag wetlands in June 2016. On August 24, 2016 we returned to the site for additional survey and wetland restoration planning work in response to comments provided by MNRCP on the Draft plan.

Site Work Performed – March to August 2016

Fieldwork was completed on March 17, May 12, June 21 and August 24, 2016. On March 17 the stream was walked from upstream to down to plan the survey work and to evaluate overall stream geomorphology. On May 12 a survey was conducted to measure stream bottom, stream bank, wetland and upland features necessary to plan culvert removal and stream restoration. Six upstream transects and three downstream transects from wetland edge or bank to bank were also completed in order to develop a longitudinal profile and stream cross sections. On August 24 additional survey work was completed on the southwestern side of the stream to characterize the filled area between the recently created turtle nesting area and the

stream. Danna Truslow, Samantha Wright and Dave Detour were involved in field assessment and surveys. Additionally Dan Coons, CWS, of Ilex Wetland Consulting visited the site in June and August and performed a wetland delineation and a wetland function and value assessment, and provided guidance on wetland area restoration.

Photos of the wetland and the wetland report are included in Appendix A.

Hydrologic Survey

Due to the altered nature of the stream along most of its course, high bank or wetland edge, low bank, and stream centerline (thalweg) were measured from upstream to downstream. Where several channels were present upstream of the culvert, additional data were also collected. Six upstream transects were measured in the field and a seventh cross section was evaluated based on other survey data. Three downstream transects were measured in the field and three additional downstream cross-sections were evaluated from the data collected. Additionally, the road and ditches west of the stream and upland areas surrounding the stream were surveyed in August to better define pre-existing conditions for wetland restoration in the filled area south of the stream crossing. The extent of the survey and the location of the cross sections evaluated are shown in Figures 1 and 2.

Figure 2 shows the impact areas, survey areas and profile and transect locations. Four temporary stations were established for surveying, and a benchmark elevation of 367' above mean seal level was assumed for the elevation of station 2. This elevation was based on the Maine GIS two foot contour data for the area. Longitudinal profile and cross section elevations are also based on this benchmark.

Wetland Delineation and Evaluation Methods

The subject property was investigated and delineated using the Routine Method outlined in the 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands (U.S. Army Corps of Engineers) to identify those wetlands that meet the current State of Maine Department of Environmental protection Wetlands Bureau (MEDEP) definition for freshwater wetlands.

Wetlands have been delineated on the basis of hydrophytic vegetation, hydric soils, and wetlands hydrology in accordance with the techniques outlined in the Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, January 1987.

The hydric soils component of delineations were investigated in accordance with The Field Indicators of Hydric Soils in the United States, Version 7.0 (2010) with Errata Indicators for use in LRR R and also the Field Indicators for Identifying Hydric Soils in New England (Version 3, April 2004), published by the New England Interstate Water Pollution Control Commission.

Referencing the above-mentioned Federal manual, Part IV "Methods", it was decided to use one of the recommended on-site methodologies, the routine determination.

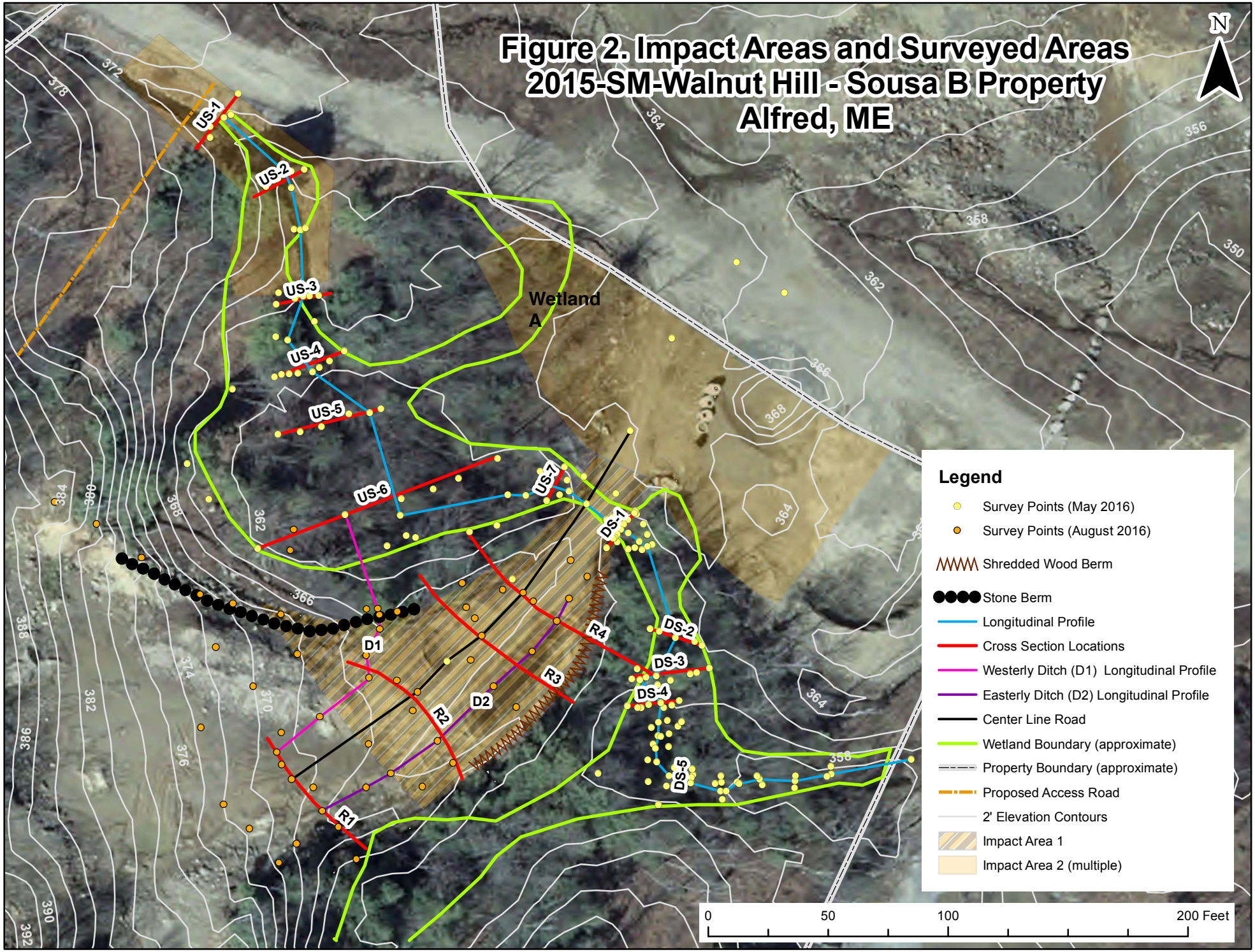
Figure 2. Impact Areas and Surveyed Areas
2015-SM-Walnut Hill - Sousa B Property
Alfred, ME
N
Wetland A
US-1
US-2
US-3
US-4
US-5
US-6
US-7
DS-1
DS-2
DS-3
DS-4
DS-5
D1
D2
R1
R2
R3
R4
Legend
Survey Points (May 2016)
Survey Points (August 2016)
Shredded Wood Berm
Stone Berm
Longitudinal Profile
Cross Section Locations
Westerly Ditch (D1) Longitudinal Profile
Easterly Ditch (D2) Longitudinal Profile
Center Line Road
Wetland Boundary (approximate)
Property Boundary (approximate)
Proposed Access Road
2' Elevation Contours
Impact Area 1
Impact Area 2 (multiple)
0
50
100
200 Feet
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The specific routine methodology utilized involves delineating the boundary of the vegetation community, and then confirming the presence of hydric soils and looking for signs of wetland hydrology.

Routine Determination

We performed a routine determination, which included observing the plant community and visually estimating the dominant vegetation and determining whether it is dominated by hydrophytic vegetation. Dominant vegetation is defined as the most abundant plant species that exceed 50% of the total dominance measure for a given stratum, plus any additional species comprising 20% or more of the total dominance measure for that stratum, are also considered.

If the area is dominated by hydrophytic vegetation, or if vegetation is sufficiently altered from a natural condition, we then verify the presence of hydric soil by digging a hole at least 16 inches deep with a tile spade and/or soil auger. The U.S. Army Corps of Engineers standards specify that the presence or hydric soils are determined utilizing the protocols and criteria established in the "Field Indicators for Identifying Hydric Soils in the United States (Region LRR R)", Version 7, New England Interstate Water Pollution Control Commission.

If hydric soils are present, we then determined if obvious signs of wetland hydrology were present during a sufficient period of the growing season. If the area meets the hydrophytic vegetation community, hydric soil and wetland hydrology criteria, then the area is a jurisdictional wetland. We repeated the process along the perceived boundary between the plant communities or hydric soils to delineate the wetland boundary.

Permit Evaluation

In order to determine the local and state permits required to complete the proposed restoration work, Danna Truslow reviewed Town of Alfred and Maine Department of Environmental Protection regulations. The permits required included a wetland and shoreland permit from the Town of Alfred and a wetland permit from the State of Maine and the US Army Corps of Engineers. These will be obtained after restoration plan approval by 3RLT and MNRCP.

B. Current Conditions

Two areas of existing wetland and stream impacts were noted and have been further characterized and assessed by Truslow RC to support the restoration plan. Impact area 1 is includes the area of stream constricted by the culvert and the filled area southwest of the stream crossing. Impact area 2 is the filled wetland area between the upper stream and access road. At Impact area 1, 3RLT previously hoped to maintain a crossing point for mowing and maintenance of the turtle nesting area. A new stream crossing point has been selected by 3RLT upstream of the wetland area. This is further described in the following restoration plan.

Impact Area Descriptions

The two impact areas are shown on Figure 2. Impacts were created by sand and gravel excavation, filling of wetland and stream areas, creation of berms and barriers, and other site modifications in preparation for development of the area.

Impact Area 1

This area surrounds an access road area that crosses the stream. The approximate area of impact shown on Figure 2 was estimated from historic air photos and site visit observations. This area extends from the break in slope on the upland side of the access road to the gate, and is approximately 8,500 square feet.

Currently a 30-inch culvert routes the stream beneath this crossing. The culvert creates an impoundment on the upstream side and is perched, creating a plunge pool on the downstream side. This area was also apparently extensively filled to create the access road. The filled area south of the culvert is primarily occupied by an unpaved access road. A drainage ditch was created east of the road which dead ends close to the stream. A berm composed of shredded wood with a silt fence was also constructed east of the ditch line. The silt fence is still visible, but has been flattened or buried in most locations.

A berm of boulders and cobbles was constructed west of the access road along the newly defined edge of the wetland. A small bounding ditch flows toward the boulder berm. Runoff appears to flow around the boulders towards the stream/wetland in this location. Some boulders continue to the north but a shredded wood berm also bounds the wetland in this area. Remnants of silt fencing were observed along the boulder and wood berm boundaries. Mature trees and multiple sampling are present between the ditch and the wetland/stream boundary to the east and west of the road suggesting this fill has been in place for many years. Historic aerial photos suggest the road was installed before 2003.

Impact Area 2

Other scattered impact areas are found throughout the northern area of the site near the wetland and stream and in the narrow upper stream area. In many of these areas silt fence has been left in place and fill has been placed in a small wetland area that drains towards the stream (this is estimated from the Berube survey map and from air photos). The approximate size of this impact area is over 13,000 square feet, although a great deal of that area is outside the wetland or stream, it does impact the stream/wetland drainage area.

Site Conditions

Specific information on site conditions is described below. This information is summarized in Table 1 and illustrated on Figure 2.

Overall Site Hydrology

Surface water drainage and hydrology at the site is somewhat complex due to the topography and historic land use. Several road crossings have impounded or changed hydrology of the stream and reduced stream courses and wetlands areas.

Water was flowing in all sections of the stream during the May 12, 2016 field survey. Water was present in the stream for the June wetland survey, but water did not appear to be moving. In August 2016 there was no streamflow observed, but the wetland was moist.

The total length of the longitudinal profile for the stream was approximately 550 feet (Figure 2 and Appendix B). The first 90 feet of stream is quite steep and rocky with a gradient of 0.06 (6% slope). In this area the stream is also quite narrow. At the base of this section the stream occupies a wide wetland area. Although there is generally a main channel, several side channels and drainage areas flow around hummocks before joining just above the upstream pool near the culvert crossing. The gradient lessens within this wetland area from 0.03 to 0.01 feet per foot (3 to 1% slope). The elevation of the upstream culvert bottom is actually 0.1 feet higher than then last segment of wetland dominated stream, creating a nearly 70 foot long pool in this upstream area. The gradient of the 20-foot long culvert was measured at 0.02 (2%).

A plunge pool extends approximately 45 feet downstream of the culvert outfall and is approximately 2' deep. A log dam impounds another deeper pool, filled with silt and decomposing vegetation approximately 145 feet downstream of the culvert. The stream between these two points is wide but narrows below the log dam where the tributary enters from the southwest. At this point the stream turns sharply east and narrows significantly. The gradient from the culvert to top of the log dam is 0.01 (1%) and below the log dam increases to 0.03 (3%) to the downstream culvert at the property boundary. The downstream channel below the log dam was v-shaped suggesting some artificial channelization in this reach.

Filled road area – Impact Area 1

This large area is a wedge-shaped area between the east and west stream segments bisected by the 30" culvert crossing. The road has a 10% slope adjacent to the newly created turtle nesting area and flattens to a 1.5% slope as the road approaches the crossing. As previously described drainage ditches and berms border the road areas. Only low herbaceous plants grow in the roadside areas, but larger trees and shrubs lie between the berm and wetland/stream edges. Figure 3 shows the road profile as well as the proposed restoration profile described in Section C.

Wetland Descriptions

Two wetlands were identified during the survey. The wetland report refers to them as wetland 1 and 2, but to distinguish them from impact area 1 and 2, they are referred to as Wetland A and B.

The primary wetland, Wetland A is located within and adjacent to the stream channel at the northeastern boundary of the site (Figure 2). Wetland B occupies a very small area near the northern tip of the property adjacent to the stormwater pond on an adjacent property and is not shown on Figure 2 but is shown in the wetland report in Appendix A.

Wetland Classification

Wetlands are typically classified according the United States Fish and Wildlife Service "Classification of Wetlands and Deepwater Habitats of the United States". This classification method is more commonly known as the Cowardin system of wetland classification.

Wetland classification for Wetland A is: PFO1/41B0ao/n (Palustrine, Forested, Broad Leaved Deciduous/Needle Leaved Evergreen, Saturated, Fresh, Acid, Organic/Mineral)

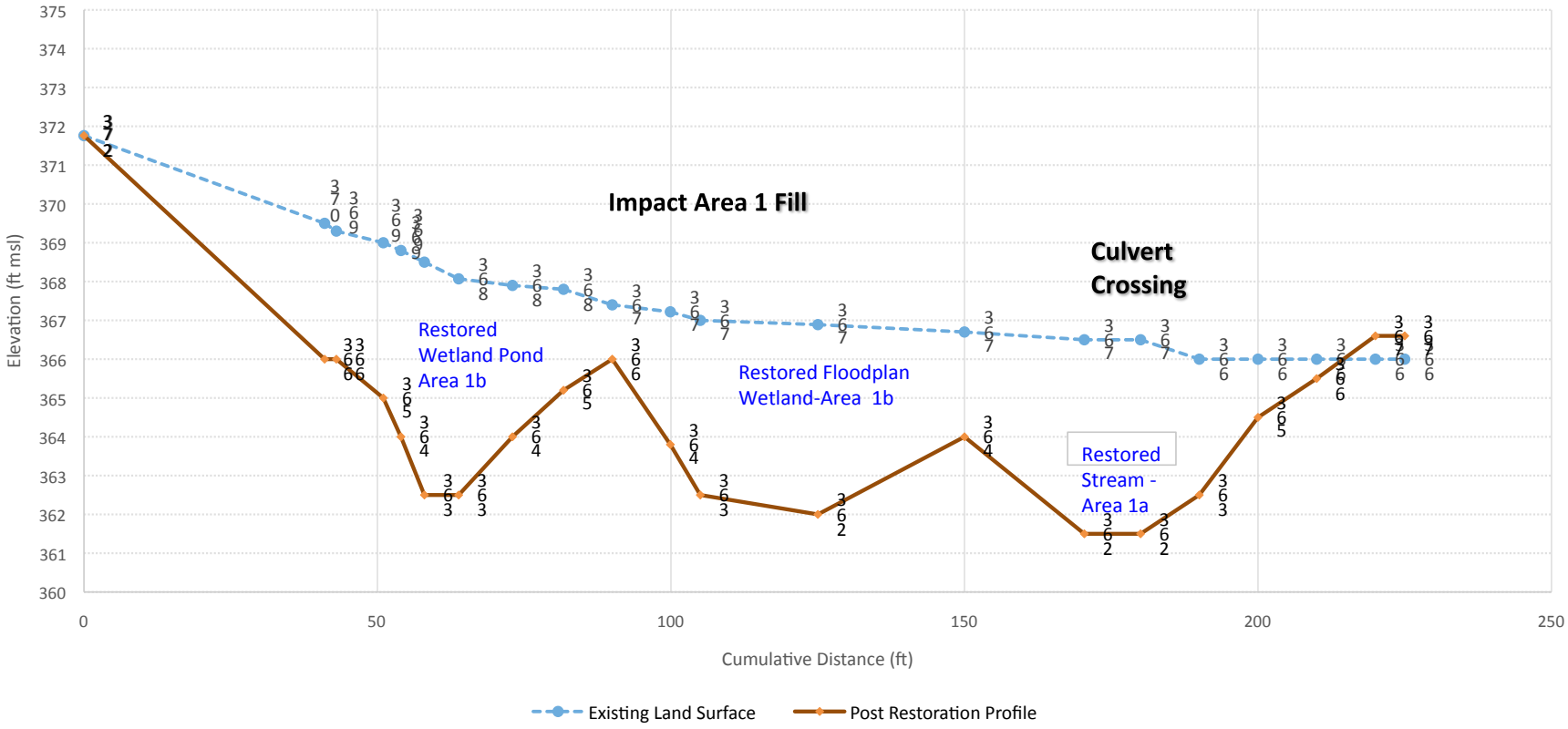
Wetland classification for Wetland B is: PEM1B0an (Palustrine, Emergent, Persistent, Saturated, Fresh, Acid, Mineral).

Wetland Classification for the stream is: R4SB6 (Riverine, Intermittent, Streambed, Organic)

Vegetation

Wetland A: Vegetation was typical of forested wetlands through Wetland A and the immediate surrounding area. Areas surrounding the wetland were largely cleared. Dominant tree species include yellow birch (*Betula alleghansis*), red maple (*Acer rubrum*), and eastern hemlock (*Tsuga canadensis*). Dominant saplings and shrubs include the above tree species, plus witch hazel (*Hamamelis viginiana*).

Figure 3 - Alfred, ME Restoration Center Line of Road Longitudinal Profile Pre and Post-Restoration Layout Walnut Hill - Sousa B Property, Alfred, ME



Dominant and prevalent herbaceous species include cinnamon fern (*Osmunda cinnamomea*), sensitive fern (O*noclea sensibilis*), interrupted fern (*Osmunda claytoniana*), jewelweed (*Impatiens capensis*), foam flower (Tiarella cordifolia), royal fern (*Osmunda regalis*), fringed sedge (*Carex crinita*), lurid sedge (C*arex lurida*), star sedge (C*arex echinata*), goldthread (*Coptis trifolia*), bristly dewberry (*Rubus hispidus*), white wood aster (*Eurybia divaricata*), poison ivy (*Toxicodendrons radicans*) , bluejoint (*calamagrostis canadensis*), starflower (*Triaentalis borealis*), bunchberry (*cornus canadensis*), blue flag iris (*iris versicolor*), marsh fern (*theylptris palustris*).

Wetland B: Wetland B has no trees, and is dominated primarily by emergent vegetation. Saplings and shrubs include red maple, meadowsweet (*Spiraea alba*), steeplebush (*Spiraea tomentossa*). Herbaceous plants include: broom sedge (*carex scoparia*), softrush (*juncus effusis*), lurid sedge (*Carex lurida*), Canada rush *(Juncus canadensis*), sensitive fern, jewelweed, and swamp candles *(Lysimachia terrestris).*

Soils

Soils within Wetland A are a combination of poorly drained loamy soils, and very poorly drained mucky soils. In portions of the wetland, they are underlain by a depleted matrix. The textures of the soils are sandy loam and mucky depending upon where in the wetland elevation they are found.

Review of the NRCS soil maps for this parcel, indicates that the soils on site are a combination Brayton and Westbury as well as Hermon stony fine sandy loams, although in our experience, these soil types do not match the soils we found in the wetlands. We caution that soil maps are not necessarily accurate at this scale and do not appear to reflect the wetland soils found at the site. Please note the attached NRCS soil map for the approximate location of the two types of soils within the parcel.

Stream

The stream that runs through this wetland is an intermittent stream that flows during and after rain events and spring snowmelt. The stream channel generally retains water within the channel when it is not flowing due to a series of natural obstructions (large woody debris) and by undersized and perched culverts. These obstructions result in the wetland and stream providing the additional function of sediment and toxicant retention and wildlife habitat. However, the culverts do restrict the natural movement of wildlife species who would otherwise occupy the upper reaches of this stream system. The stream in this area appears to be an upper reach tributary to the Mousam River.

Wetland Functions and Values

Groundwater Recharge/Discharge

With stony fine sands dominating the uplands surrounding this wetland complex, groundwater discharge appears to be the primary wetland function of this wetland. Rain and snowmelt will permeate the loose surrounding soils, and exit into the wetland where it becomes stream flow for the stream within. There is typically little standing water within the wetland, except for that found within the stream channel.

Wildlife Habitat

Wildlife habitat is also a suitable function. We noted evidence of amphibians, reptiles, birds and mammals using the wetland during or prior to our investigation. The surrounding area is largely a contiguous block of forest that is unfragmented by paved roads. Although there are dirt roads in the immediate area, these are largely gated, reducing the normal impacts one would associate with development. The proximity of sandy soils to the stream and wetland provide a range of habitats that can support a quantity and variety of wildlife.

Floodflow Alteration

Density of vegetation combines with low gradient of the wetlands and organic soils to make this a suitable function of this wetland.

Sediment/Toxicant Retention

This is also a suitable function, although significant sources of both sediment and toxicants are not in close proximity to the wetland. Loose soils (sands) are abundant nearby, but these wetlands do have a naturally vegetated buffer surrounding and reducing the value of this function within the landscape. The deep organic soils located within the wetland aid greatly in the retention of toxicants that might enter this wetland. Vegetation and topography also aid in the value of this function.

Production Export

This is also a suitable function of the wetland. Surrounding vegetation provides seeds stock, and the stream provides for a method of dispersal of the seeds to areas downstream. The unfragmented nature of the surrounding landscape provides a means for the native animals to also export carbon sources to the surrounding community.

Blanding's and Spotted Turtle Biology and Wetland Restoration

Appendix C contains a detailed description of Blanding's and Spotted Turtle habitat and considerations for restoration planning.

C. Mitigation Areas

Background wetland and stream conditions are included in Section B. Briefly, the restoration areas are within Impact Area 1 and Impact Area 2. Impact Area 1 includes the proposed stream restoration area (1a) and an area of wetland restoration (1b). These areas are shown on Figure 4. Only Wetland A will undergo restoration as Wetland B is very small and most of the wetland is not on the subject property. The proposed restoration is summarized in the following table and described in more detail below. The proposed sequence is to complete work in Area 2 followed by Area 1b and then Area 1a restoration activities.

Table 1 – Impact Area Descriptions and Proposed Restoration Sequence

Impact/ Restoration Area	Description	Cowardin Wetland Type	Rosgen Stream Type	Disturbance	Restoration Proposed
1a	Wetland A and Road Crossing, Stream	Wetland Palustrine Forested wetland Stream – Riverine, intermittent	A 3 B 3 B4 **C 3**	Filled wetland and streambed. Undersized culvert perched to create impoundment and plunge pool	1. Remove culvert at road crossing. 2. Create channel cross section similar to US3. 3. Modify pool areas upstream and downstream of culvert to blend and moderate grade. 4. Seed disturbed stream banks, and plant from onsite native shrubs to retain slope. 5. Allow streambed to recover via natural streamflow.
1b	Filled Area southwest of culvert crossing	NA - Former wetland, now filled area including access road and adjacent roadside area	NA	Former wetland area filled with silt, sand and gravel. Bermed areas to west include boulders, cobbles and partially buried silt fence. Bermed areas to east include shredded wood and partially buried silt	1. Create two wetland areas and incorporate into stream drainage. 2. Upper wetland seasonal with drainage to northwest. 3. Lower wetland floodplain area adjacent to stream with drainage primarily to northeast with potential for future channel migration. 4. Remove boulder berm at new drainage point to allow for additional wetland connection

Impact/ Restoration Area	Description	Cowardin Wetland Type	Rosgen Stream Type	Disturbance	Restoration Proposed
				fence.	5. Remove silt fence along bermed areas 6. Regrade near streams 7. Add wetland soils from area B to lower created wetland areas 8. Incorporate several smaller boulders within created wetlands for wildlife resting areas. 9. Seed and plant vegetation
2	Partially filled wetland and northeast corner, areas of buried silt fence	Palustrine scrub-shrub and emergent wetland	NA	Fill, abandoned and partially buried silt fencing	1. Remove silt fence where accessible 2. Excavate several areas within drainage to enhance hydroperiod and groundwater infiltration to area 3. Re-use excavated soils for restoration in Area 1b.

D. Detailed Stream and Restoration Plan

Restoration areas are within Impact Area 1 and Impact Area 2. Impact Area 1 includes the proposed stream restoration area (1a) and an area of wetland restoration (1b). These areas are shown on Figure 4. Profiles of restored areas are shown in Figures 3 and 5. The restoration descriptions are listed in the order that the restoration will be completed.

Restoration Area 2

The majority of Impact /Restoration Area 2 will be left in its current condition. One area of habitat/wetland enhancement will be in the wetland area that drains south to the large wetland upstream of the culvert. In order to increase hydroperiod, reduce the amount of fill in this area and to provide wetland soils for Restoration Area 1b, three to four areas will be excavated to elevation 362 to allow greater groundwater seepage and establishment of wetland pools. The area is already well shaded and natural vegetation surrounds the area so no additional planting or seeding will be necessary. Excavated soils will be stockpiled in a shady area near Area 1b.

The new crossing is proposed in the upper stream area near US-1. The crossing will be for small tractors and vehicles used for mowing and maintenance of restored areas and turtle nesting habitat (Figure 2). Additional detail on this crossing is included in Section G.

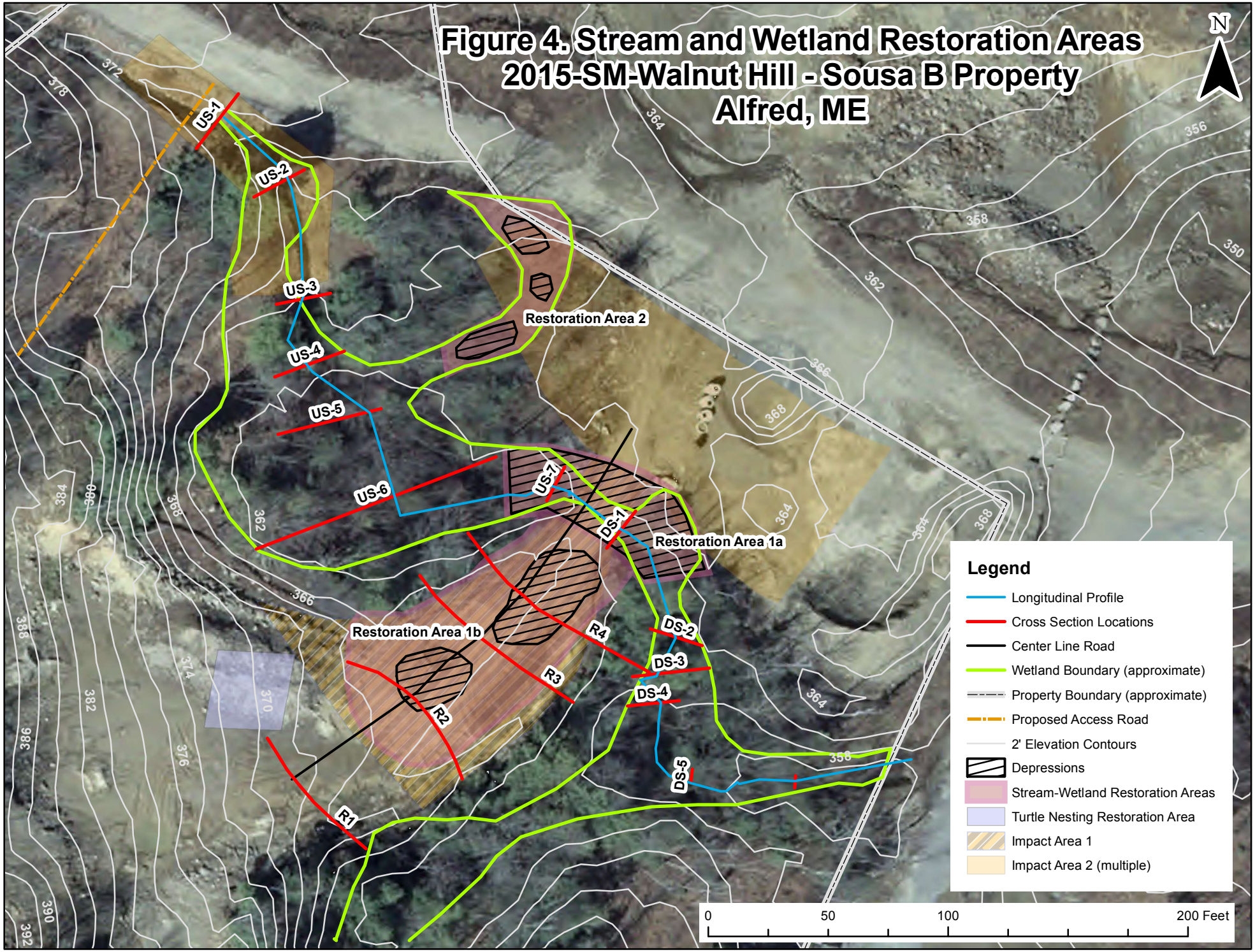
Where accessible and visible, partially buried silt fence that remains in this area will be removed and stockpiled for removal.

Restoration Area 1b

Appendix D-1 and Figure 3 illustrate the restoration proposed for this area. Area 1b will next be restored to establish two wetland areas. Since mature trees and shrubs and many other herbs are well established along the berms east and west of the filled access road, more limited wetland areas will be created. The upper wetland will be excavated to elevation 363 ft msl with a pool area of approximately 20 feet by 30 feet. Boulders and cobbles for wildlife resting areas will be placed in this low area and wetland and transitional vegetation will be re-established. Drainage Ditch 1 (east of the access road, as shown in orange in Figure 2) will be deepened and boulders will be removed from the berm to allow runoff off to flow to the wetland, which will further allow re-establishment of vegetation and wetland habitat.

A lower wetland will also be re-established close to the stream. This area will be elevated on a low terrace above the stream but can also provide floodplain during period of high flow. A pool will be excavated to 362 feet and wetland plants, bushes and trees will be established. The eastern ditch 2 (shown in purple in Figure 2) will be regraded to match the new contours but the shredded wood berm will be left in place as wetland plants and trees are well established in this area. Silt fencing will be removed during restoration of the areas around the berms and removed materials will be stockpiled for off-site removal.

Restoration will enhance storm and meltwater infiltration into the subsurface via wetland and pond areas, thus promoting groundwater recharge and longer periods of streamflow.



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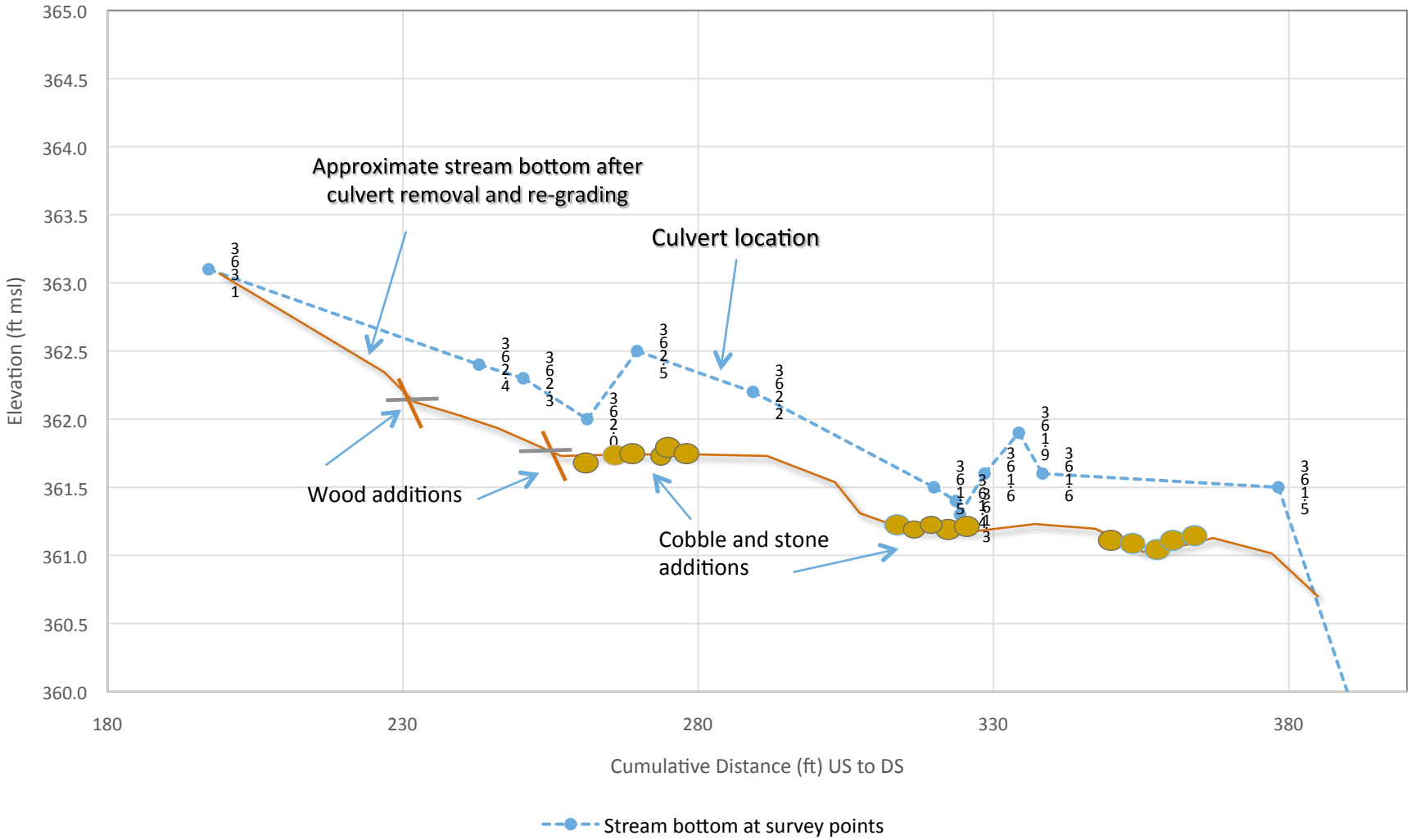
Restoration Area 1a

Appendix D-1 and Figure 5 illustrate the restoration proposed for this area. At the stream, the culvert will be removed and the channel restored to match the overall slope between the upstream and downstream portions above and below the pools created by the culvert (Figure 5) to less than a 2% (0.02) slope. Much of the berm should be removed at the stream crossing, and an area approximately 40 feet upstream and about 30 feet downstream should be modestly modified to reconnect the areas of stream flow and reconnect the upstream and downstream portions of the wetland. This may also help to increase groundwater discharge to the stream.

The restored cross section at the culvert will blend the characteristics of the upstream and downstream characteristics and reduce impacts from high intensity storms. This process may also expose the finer grained sediment below and restore a streamflow pattern similar to the more natural upper and lower reaches. In addition, adding steps with instream woody materials and stone just upstream and downstream of the former culvert crossing will create habitat and lessen upstream head cutting. The stream channel will then naturally mature after several years when continuous flow is restored between the two sides of the stream.

Figure 5 - Longitudinal Profile at culvert crossing showing pre - and post-restoration grades
Walnut Hill - Sousa B Property, Alfred, ME



This area is currently classified as Palustrine forested (PFO1) and riverine, intermittent stream channel (R4UB). The most significant component of the restoration of Area 1a and 1b in terms of wetland functions and values is the restoration of the stream channel. The removal of the berm and restoration of the channel above and below the crossing will restore the hydrology of the channel, improve aquatic passage in the channel itself, and re-establish better surface water and groundwater interaction.

Vegetation

Plants and seed mixes that will be used to re-establish wetland and riparian vegetation will replicate what is found on site. New England Wetland Plants of Amherst, MA will supply seed mixes and may be used to supply plantings if sufficient on site transplants are not available. Planting areas are shown in Appendix D-2.

Dominant riparian and wetland trees

- yellow birch (*Betula alleghansis*),
- red maple (*Acer rubrum*), and
- eastern hemlock (*Tsuga canadensis*).

Dominant saplings and shrubs

Above-listed tree species and

- witch hazel (*Hamamelis viginiana*)
- Buttonbush (*Cephalanthus occidentalis*)
- Hobblebush (*Viburnum lantanoides*).

Dominant and prevalent herbaceous species

- cinnamon fern (*Osmunda cinnamomea*),
- sensitive fern (O*noclea sensibilis*),
- interrupted fern (*Osmunda claytoniana*),
- jewelweed (*Impatiens capensis*),
- foam flower (Tiarella cordifolia),
- royal fern (*Osmunda regalis*),
- frindged sedge (*Carex crinita*),
- lurid sedge (C*arex lurida*),
- star sedge (C*arex echinata*),
- goldthread (*Coptis trifolia*),
- bristly dewberry (*Rubus hispidus*),
- white wood aster (*Eurybia divaricata*),
- bluejoint (*calamagrostis canadensis*),
- starflower (*Triaentalis borealis*),
- bunchberry (*cornus canadensis*),
- blue flag iris (*iris versicolor*),
- marsh fern (*theylptris palustris*).

New England Logging Road seed mix may also be used for upland areas surrounding the wetlands that require stabilization and vegetation for erosion control and soil re-establishment. This will be well suited to the poor soils at the site.

Intermittent stream channels are used by a variety of semi-aquatic species including stream salamanders and turtles. The restoration will enhance the functions and values of the wetland.

The pools will offer a seasonal wildlife watering hole and resting areas and may also provide amphibian habitat. The lower wetland area will also provide floodplain and allow for natural re-establishment of the riparian area.

Wetland and Stream Restoration Construction Sequence:

1. Identify all principles (e.g. Three Rivers Land Trust, equipment operator, monitor) involved in the project and conduct a pre-construction meeting to discuss the project goals and sequence.
2. Stake or flag the limits of excavation and stream restoration work in the field to avoid the operation of machinery in wetlands or stream not included in the restoration plan. Stakes will indicate the approximate amount of cut and fill in the stream to achieve the post restoration grade.
3. Install sediment and erosion controls including coir rolls and/or hay bales downslope of construction and upslope of adjacent wetlands to prevent sedimentation during construction.
4. Work in the stream should be conducted during no to low flow.
5. Minimal mechanized equipment should be used within the stream channel.
6. Remove one to two feet of soil and decayed material from several locations in restoration Area 2. Stockpile for use in Restoration Area 1b.
7. Remove partially buried silt fence in Restoration Area 2 and stockpile for disposal.
8. Remove boulders from the berm where Ditch 1 enters the wetland. Remove several other boulders from the berm to encourage re-vegetation.
9. Select and set aside several smaller boulders for incorporation in the wetland/stream restoration. Stockpile additional boulders in field area or next to new access road.
10. Excavate upper wetland in Restoration Area 1b to elevation 363 in the approximate shape land shown on restoration plan in Appendix D-1.
11. Grade side slopes.
12. Add wetland soil removed from Restoration Area 2 to the base of upper wetland area. Add boulders/cobbles for wildlife resting areas
13. Install erosion control coir logs around new upper wetland perimeter
14. Excavate floodplain wetland to elevation 362 and shape adjacent land area as shown in Appendix D-1.

15. Add stockpiled wetland soils to bottom of floodplain wetland. Add boulders/cobbles for wildlife resting areas.
16. Select on-site shrubs and saplings for transplant to wetland area and edges.
17. Add topsoil to re-shaped wetland restoration areas.
18. Remove partially buried silt fence from boulder and woody berm areas and stockpile for removal.
19. Plant shrubs and seed restoration areas as shown in planting plan – Appendix D-2.
20. Regrade excavated fill on hillside or stockpile for use in a supplemental turtle nesting area. Place erosion control (coir logs) on downhill side of graded area/stockpile to minimize erosion. Seed regraded fill.
21. In Restoration Area 1a, remove existing 30" plastic culvert for disposal.
22. Restore an approximate 30-foot wide channel using a small excavator and grade berm on both stream edges.
23. Gently use small excavator to modify pool cross section to a stream cross-section and re-position stone and woody debris as needed to encourage channel formation. Stockpiled boulders and cobbles may also be added for pool development.
24. All materials should be stockpiled in non-jurisdictional upland areas.
25. The side slopes of the channel should be graded to blend in with the adjacent stream banks.
26. Shrubs and saplings will be planted as shown in the planting plan Appendix D-2.
27. The restored stream banks and newly created wetland depressions will be seeded with New England Wetmix (Appendix D).
28. The upper side slopes in the wetland and stream restoration areas should then be seeded with appropriate seed mix and mulched with two to three inches of weed free straw. NE Logging road mix for poor soils is proposed for these upland areas (Appendix D).
29. Once the stream channel restoration is complete (i.e. Area 1a), excess fill and culvert materials should be removed from the site. Where possible excavated stream sediments will be re-used in the restoration process.
30. Sediment and erosion control measures should be removed once all adjacent areas are considered stabilized.

E. Erosion Controls

Erosion control areas are marked on Appendix D-1. The erosion control measures to be taken during project completion are included in the construction sequence for stream and wetland restoration in section D. Timing for removal of these controls is also included in these steps and will depend on establishment of vegetation and possibilities for continued erosion as the area matures.

F. Invasive Species

Using no off site fill and gathering as many plant materials from the site for revegetation areas as possible will control invasive species. Topsoil or stream sediment from the site will be used for stream and wetland restoration and plantings. Mulch for plantings will be obtained from sources that will not contain materials that will propagate invasive species. Vehicles entering the site during soil disturbance will also be inspected to remove any soil materials that may contain weed seeds or invasive plant materials.

As stipulated in the MNRCP guidance, to reduce the immediate threat and minimize the long-term potential of degradation, the species included on the "Invasive and Other Unacceptable Plant Species" list in Appendix D of the Maine Natural Resource Conservation Program Restoration Work Plan Guidance shall not be included as planting stock in the overall project. Only plant materials native and indigenous to the region shall be used.

The monitoring plan also includes observation and removal of invasives if identified during the monitoring period. The Three Rivers Land Trust will be responsible for all long term monitoring and maintenance to prevent establishment or spread of invasive species.

G. Site Access and Vehicle Use

The use of any motorized vehicles, except for restoration, monitoring and maintenance will be prohibited on the property. The 3RLT will be establishing a new access point across the upper stream near Transect US-1 as shown on Figure 2. This crossing will be equipped with a bridge as shown in Appendix D-3. This will allow access across the stream to maintain the field, restored wetland areas, and turtle nesting area. In this location, the stream is narrow and stabilized by manmade channelization.

Some cutting of a trail on the west side of the stream will be necessary but can be done along a land contour to have minimal impact to the property and habitat. Property lines will be marked with conservation signage depicting 3RLT ownership and stating that motorized vehicles are prohibited. Regular monitoring should detect any trespass issues. The existing gate and on-site boulders will be used to prevent unwanted vehicular traffic.

H. Preservation

This property has been acquired in fee for its conservation values and will be preserved in perpetuity by the 3RLT. This property abuts other conservation lands. This project is a mitigation and wetland/stream restoration project that will improve habitat and stream function to a tributary of the Middle Branch of the Mousam River.

I. Construction Completion Reporting and Post-Construction Monitoring

Notification of Construction Completion

Within 60 days of completing a project that includes restoration or enhancement, the project sponsor will submit to the MNRCP a report specifying the date of completion of the restoration/enhancement work. The report shall include a description of work done, when it was completed, and photographs of the site during and after completion. An example of report contents is included in the MNRCP, 2015 guidance document, Appendix A.

If restoration or enhancement is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the project sponsor will provide the MNRCP with a letter outlining the date mitigation work began, the progress as of December 31, and the timeframe for completion. The letter will be sent no later than January 31 of the next year.

Monitoring Report Guidance

For each of the first five full growing seasons following construction of the restoration/enhancement site(s), the site(s) will be monitored and annual monitoring reports submitted. Observations will occur at least two times during the growing season – in late spring/early summer and again in late summer/early fall. Each annual monitoring report, in the format provided in the Maine Natural Resource Conservation Program Restoration Work Plan Guidance, will be submitted to MNRCP (Appendix B of that document), no later than December 15 of the year being monitored. Failure to perform the monitoring and submit monitoring reports may jeopardize funding of future projects from MNRCP.

The reports will address the following performance standards in the summary data section and will address the additional items noted in the monitoring report requirements, in the appropriate section. The reports will also include the

monitoring-report appendices. The first year of monitoring will be the first year that the site has been through a full growing season after completion of construction and planting. For this requirement, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the MNRCP, the project sponsor will contact the MNRCP as soon as the need for corrective action is discovered.

Remedial measures will be implemented - at least two years prior to the completion of the monitoring period - to attain the success standards described below within three growing seasons after completion of construction of the restoration/enhancement site. Should measures be required within two years of the end of the original monitoring period, the monitoring period will be extended to ensure two years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology will not be implemented without written approval from the MNRCP.

At least one reference site adjacent to or near each restoration/enhancement site will be described and shown on a locus map.

Wetland/Stream Monitoring

A qualified professional should monitor the restoration areas during construction and during the growing season in Year 1 and 2. Qualified 3RLT employees or volunteers can continue monitoring during years 3, 4, and 5 after the implementation of the restoration plan. (A qualified professional shall include any person identified by the 3RLT that is capable of identifying wetland boundaries, understanding hydrology, and evaluating sediment and erosion controls.) A summary report shall be prepared within 60 days of each monitoring event to assess the ecological performance standards and to recommend any remedial actions, if necessary as decribed above.

Ecological Performance Standards:

The following ecological performance standards will be utilized to assess the success of wetland and stream restoration.

1. The newly created banks of the stream channel will be stabilized by native vegetation and/or native soil materials similar to adjacent undisturbed banks by the end of the monitoring period.
2. The slopes surrounding the wetland restoration area 1b will be stable and vegetated in a manner similar to surrounding undisturbed areas.
3. The restoration areas will contain well-established native plant species by the end of the monitoring period.
4. Intermittent flow will occur in the restored stream channel during years of average or greater than average precipitation.

5. Invasive species shall not make up more than 1% of total areal plant coverage after discovery and subsequent removal.

During each monitoring event, the qualified monitor will document the condition of each restoration area and identify any necessary remedial actions. Any areas requiring stabilization will be identified.

In addition, any observed invasive plant species in the restoration areas would be identified and removed. The monitor shall coordinate with the 3RLT to properly dispose of any invasive species observed on the property to prevent dispersal or accidental introduction of invasive species to new areas or sites. Monitoring must occur at least an additional year after identification and removal of any invasive species. Any off-road vehicle use within the restoration areas will be immediately reported to the Town or 3RLT to identify necessary remedial actions (e.g. road barricades and stabilization measures).

A monitoring report will be prepared within 60 days of each monitoring event and submitted to the U.S. Army Corps of Engineers, after approval by the Town and 3RLT no later than December 15 of each monitoring year. If all of the ecological performance standards for the project are met within the five-year monitoring timeframe, the 3RLT may contact the U.S. Army Corps of Engineers to determine if the final permit conditions are met to satisfy wetland monitoring on the site.

A more detailed plan for restoration monitoring will be prepared once the stream

Restoration Monitoring and Reporting

Each year, after annual monitoring of the wetland and stream restoration sites is complete a report will be prepared. This report should be completed no more than 60 days after all field work is complete.

The report will summarize observed field conditions, evaluate those conditions against the ecological performance standards, and summarize habitat and wildlife observations as well. Any maintenance completed during the year will be listed as well. If needed, proposed modifications to the restoration design to improve ecological performance will also be included. The reports will be submitted to the Maine In-Lieu-Fee Administrator at the Maine Nature Conservancy for review and distribution to the Interagency Review Team.

J. Assessment

Final Assessment will be completed at the end of the monitoring period. The assessment will be based on the results of periodic monitoring and assessment. It will include a summary of the restoration program and assess the success of the restoration and turtle habitat enhancement based on the ecological performance standards and the goals of the restoration program.

K. Contingency

The 3RLT will oversee the project implementation and monitoring. Any contingencies will be assessed and addressed by the Stewardship Committee. Recommendations for issue resolution will be based on research and Best Management Practices, and local and State regulations.

L. Long Term Stewardship

The 3RLT will preserve this property in perpetuity to protect its conservation values. Long-term stewardship will be provided through the Stewardship Committee who will oversee and implement all monitoring and ongoing management.

M. Financial Assurances

Funding for monitoring, contingency, and long-term stewardship will be covered by a Stewardship Endowment of $2,750.

Payments to Three Rivers Land Trust will be as follows:
$17,070 (for work plan preparation and wetland restoration and) upon submission and approval of the finalized MNRCP Restoration Work Plan

$9,277 (for monitoring plan preparation, 5 year monitoring and stewardship) upon submission and approval of the Restoration Completion Report, described above.

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Appendix A

Wetland Report and Photo Log

WETLANDS CONSULTANTS

June 22, 2016

Our site visit to the site is reported to be a proposed Blandings Turtle incubator restoration site, in the Walnut Hill subdivsion. Our site visit was conducted on June 21, 2016. The site visit was confined to a 20+ acre parcel to the north and west of a homesite owned by William & Cherly Tremblay.

Our investigation of the parcel was performed at the request of Truslow Resource Consulting. We performed a delineation of the wetland boundary, and performed a wetland function and value assessment.

Present: Daniel Coons, CWS, Ilex Wetlands Consultants.

The parcel where the current restoration is proposed was reportedly purchased in early 2015 with a grant from the Maine Natural Resource Conservation Program for a project called “Blandings Turtle Incubator”. It abuts another project purchased in 2014 with MNRCP funds called Walnut HillII (the first Walnut Hill project, is about a mile to the west and does not abut either Walnut Hill II or Blandings Turtle Incubator.

We are pleased to provide this report relative to a wetland delineation we completed at the above property. We have completed our on site analysis of the wetlands present at the above indicated parcel pursuant to the request of Truslow Resource Consulting.

The wetlands delineation was conducted on June 21, 2016 to confirm the location of the jurisdictional wetland boundaries on the investigated subject property. This investigation has been prepared from data collected by on-site observations as well as other recorded sources.

Methods:

The subject property was investigated and delineated using the Routine Method outlined in the 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands (U.S. Army Corps of Engineers) to identify those wetlands that meet the current State of Maine Department of Environmental protection Wetlands Bureau (NHDES) definition for freshwater wetlands.

Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, January, 1987.

The hydric soils component of delineations were investigated in accordance with Field Indicators of Hydric Soils in the United States, Version 7.0 (2010) with Errata Indicators for use in LRR R, and also The Field Indicators for Identifying Hydric Soils in New England (Version 3, April 2004), published by the New England Interstate Water Pollution Control Commission.

Referencing the above mentioned Federal manual, Part IV “Methods”, it was decided to use one of the recommended on-site methodologies, the routine determination. The specific routine methodology utilized involves delineating the boundary of the vegetation community, and then confirming the presence of hydric soils and looking for signs of wetland hydrology.

Routine Determination:

We performed a routine determination which included observing the plant community and visually estimating the dominant vegetation and determining whether it is dominated by hydrophytic vegetation. Dominant vegetation is defined as the most abundant plant species that exceed 50% of the total dominance measure for a given stratum, plus any additional species comprising 20% or more of the total dominance measure for that stratum, are also considered.

If the area is dominated by hydrophytic vegetation, or if vegetation is sufficiently altered from a natural condition, we then verify the presence of hydric soil by digging a hole at least 16 inches deep with a tile spade and/or soil auger. The U.S. Army Corps of Engineers standards specify that the presence or hydric soils are determined utilizing the protocols and criteria established in the “Field Indicators for Identifying Hydric Soils in the United States (Region LRR R)”, Version 7, New England Interstate Water Pollution Control Commission.

If hydric soils are present, we then determined if obvious signs of wetland hydrology were present during a sufficient period of the growing season. If the area meets the hydrophytic vegetation community, hydric soil and wetland hydrology criteria, then the area is a jurisdictional wetland. We repeat the process along the perceived boundary between the plant communities or hydric soils to delineate the wetland boundary.

Findings:

The wetland delineations of the property were conducted on June 21, 2016. We discovered two defined area of wetlands near Pheasant Run. One wetland

A second small wetland includes drainage from the road, and then runs perpendicular to the road.

The Wetland 1 boundary was flagged with pink flagging using an alpha numeric method of point identification along the boundary. We commenced with flag WF1 near the northeast edge of the property, and proceeded westerly in a counter-clockwise direction. We crossed the afore-mentioned access road at flag numbers WF9 and 10. The wetland approached the road at both flags WF16 and 27, wrapping around the wetland, recrossing the access road at WF38 and 39. The wetland extended southerly between the clearing and the Tremblay parcel before ending with flag WF71 adjacent to WF1.

Wetland 2 flagging commenced near Pheasant Run, at the northern corner point of the property. The boundary was identified by flags WF101 to WF110.

Wetland data forms (Routine Method) have been completed and are attached to this report. Dominant and prevalent vegetation species are noted below, as able to be determined on the date of investigation.

Soil pits were dug to at least 20 inches in depth, and soil colors and hydric soil type noted, and hydrology measured. These data plots were conducted to document soils and hydrology typical of this portion of the site.

Color photographs of the site were also taken to document the site conditions.

Please refer to the Appendix for copies of the completed data forms, soil and tax maps, and color photographs of the site.

Wetland Classification

Wetlands are typically classified according the United States Fish and Wildlife Service “Classification of Wetlands and Deepwater Habitats of the United States”. This classification method is more commonly known as the Cowardin system of wetland classification.

Wetland classification for Wetland 1 is:

PFO1/41B0ao/n (Palustrine, Forested, Broad Leaved Deciduous/Needle Leaved Evergreen, Saturated, Fresh, Acid, Organic/Mineral)

Wetland classification for Wetland 2 is:

PEM1B0an (Palustrine, Emergent, Persistent, Saturated, Fresh, Acid, Mineral).

R4SB6 (Riverine, Intermittent, Streambed, Organic

Vegetation – Wetland 1

Vegetation was forested through Wetland 1 and the immediate surrounding area. Areas surrounding the wetland were largely cleared. Dominant tree species ind-lude yellow birch (*Betula alleghansis*), red maple (*Acer rubrum*), and eastern hemlock (*Tsuga canadensis*). Dominant saplings and shrubs include the above tree species, plus witch hazel (*Hamamelis viginiana*). Dominant and prevalent herbaceous species include: cinnamon fern (*Osmunda cinnamomea*), sensitive fern (O*noclea sensibilis*), interrupted fern (*Osmunda claytoniana*), spotted touch-me-not (*Impatiens capensis*), foam flower (Tiarella cordifolia), royal fern (*Os-munda regalis*), frindged sedge (*Carex crinita*), lurid sedge (C*arex lurida*), star sedge (C*arex echinata*), goldthread (*Coptis trifolia*), bristly dewberry (*Rubus his-pidus*), white wood aster (*Eurybia divaricata*), poison ivy (*Toxicodendrons radi-cans*) , bluejoint (*calamagrostis canadensis*), starflower (*Triaentalis borealis*), bunchberry (*cornus canadensis*), blue flag iris (*iris versicolor*), marsh fern (*theylp-tris palustris*).

Vegetation – Wetland 2

Wetland 2 had no trees, and was dominated primarily by emergent vegetation. Saplings and shrubs include red maple, meadowsweet (*Spiraea alba*), steeplebush (*Spiraea to-mentossa*). Herbaceous plants include: broom sedge (*carex scoparia*), softrush (*juncus effusis*), lurid sedge (*Carex lurida*), canada rush *(Juncus canadensis*), sensitive fern, jewelweed, and swamp candles *(Lysimachia terrestris).*

Soils

Soils within the wetland are a combination of poorly drained loamy soils, and very poorly drained mucky soils. In portions of the wetland, they are underlain by a depleted matrix. The texture of the soils are sandy loam and mucky depending upon where in the wetland elevation they are found.

Review of the NRCS soil maps for this parcel, indicates that the soils on site are a combination Brayton and Westbury as well as Hermon stony fine sandy loams, although in our experience, these soil types do not match the soils we found in the wetlands. We caution that soil maps are not necessarily accurate at this scale and do not appear to reflect the wetland soils found at the site. Please note the attached NRCS soil map for the approximate location of the two types of soils within the parcel.

The stream that runs through this wetland is an intermittent stream that flows during and after rain events and spring snowmelt. The stream channel generally retains water within the channel when it is not flowing due to a series of natural obstructions (large woody debris) and by undersized and perched culverts. These obstructions result in the wetland and stream providing the additional function of sediment and toxicant retention and wildlife habitat. However, the culverts do restrict the natural movement of wildlife species who would otherwise occupy the upper reaches of this stream system. The stream in this area appears to be an upper reach tributary to the Mousam River.

Wetland Functions and Values

Groundwater Recharge/Discharge

With stony fine sands dominating the uplands surrounding this wetland complex, groundwater discharge appears to be the primary wetland function of this wetland. Rain and snowmelt will permeate the loose surrounding soils, and exit into the wetland where it become stream flow for the stream within. There is typically little standing water within the wetland, except for that found within the stream channel.

Wildlife Habitat

Wildlife habitat is also a suitable function. We noted evidence of amphibians, reptiles, birds and mammals using the wetland during or prior to our investigation. The surrounding area is largely a contiguous block of forest that is unfragmented by paved roads. Although there are dirt roads in the immediate area, these are largely gated, reducing the normal impacts one would associate with development. The proximity of sandy soils, to the stream and wetland provide a range of habitats that can support a quantity and variety of wildlife.

Floodflow Alteration

Density of vegetation, combines with low gradient of the wetlands and organic soils to make this a suitable function of this wetland.

Sediment/Toxicant Retention

This is also a suitable function, although significant sources of both sediment and toxicants are not in close proximity to the wetland. Loose soils (sands) are abundant nearby, but these wetlands do have a naturally vegetated buffer surrounding and reducing the value of this function within the landscape. The deep organic soils located within the wetland aid greatly in the retention of toxicant's that might

Production Export

This is also a suitable function of the wetland. Surrounding vegetation provides seeds stock, and the stream provides for a method of dispersal of the seeds to areas downstream. The unfragmented nature of the surrounding landscape provides a means for the native animals to also export carbon sources to the surrounding community.

Revegetation Following Restoration

We understand that restoration of the wetlands and surrounding slopes is anticipated as part of this project. We suggest that herbaceous plants within the wetland include native species similar in composition to those species present prior to restoration, such as: cinnamon fern (*Osmunda cinnamomea*), sensitive fern (O*noclea sensibilis*), interrupted fern (*Osmunda claytoniana*), spotted touch-me-not (*Impatiens capensis*), foam flower (*Tiarella cordifolia*), royal fern (*Osmunda regalis*), frindged sedge (*Carex crinita*), lurid sedge (C*arex lurida*), star sedge (C*arex echinata*), goldthread (*Coptis trifolia*), bristly dewberry (*Rubus hispidus*), and white wood aster (*Eurybia divaricata*). The upland slopes adjacent to the wetlands should be populated by shrubs and herbaceous species capable of withstanding conditions found in well drained, sandy poor soils. We suggest the species mix include shrubs such as low bush blueberry (*vaccinium angustifolium*), huckleberry *(Gaylussacia baccata*), sweet fern (*Comptonia peregrina*), meadow sweet (*Spiraea alba)*, steeple bush (*Spiraea tomentossa*), and sheep laurel (*Kalmia angustifolia*). Herbaceous species could include wild lupine (*Lupinus polyphyllus*), bunchberry, (*Cornus canadensis*) false solomon's seal *(Maianthemum racemosum)*, common cinquefoil (*Potentilla simplex)*, trailing arbutus (*Epigaea repens)*, closed gentian (*Gentiana clausa)*, and bracken fern *(Pteridium aquilnum)*.

Summary

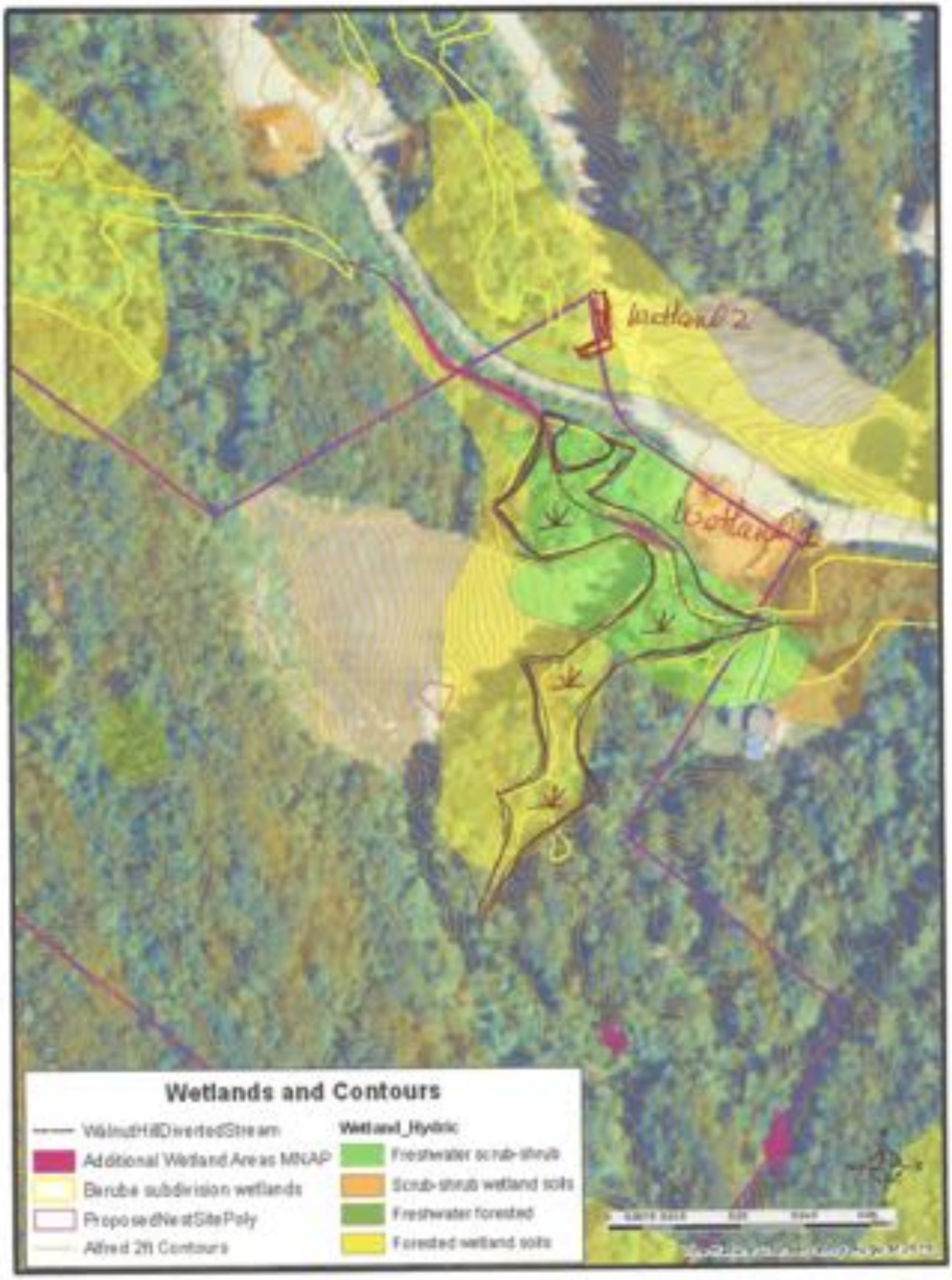
The wetland we investigated, is in whole a moderate quality wetland that would rank higher in value if it were larger. However, this forested wetland provides many qualities due to the variety of classes, vegetation and soils. An intermittent stream traverses the wetland

In our professional opinion, the drainage ditch for the pond is not a wetland. It was created, probably at the same time as the pond. Any hydrology inputs are ephemeral, and all the ditch is surrounded on all sides by uplands. While the sand at the base of the ditch show redoximorphic features, in light of the above we are of the opinion that this is not a wetland.

We wish to thank you again for allowing us to be of service, and ask you to advise if any further services are desired.

Very truly yours,

Daniel Coons, CWS, CESSWI
Certified Wetland Scientist #264
Ilex Wetlands Consultants


Wetland 2
Wetland 1
Wetlands and Contours
WalnutHillDivertedStream
Additional Wetland Areas MNAP
Berube subdivision wetlands
ProposedNestSitePoly
Alfred 2ft Contours
Wetland_Hydric
Freshwater scrub-shrub
Scrub-shrub wetland soils
Freshwater forested
Forested wetland soils


Untitled Map
Write a description for your map.
Legend
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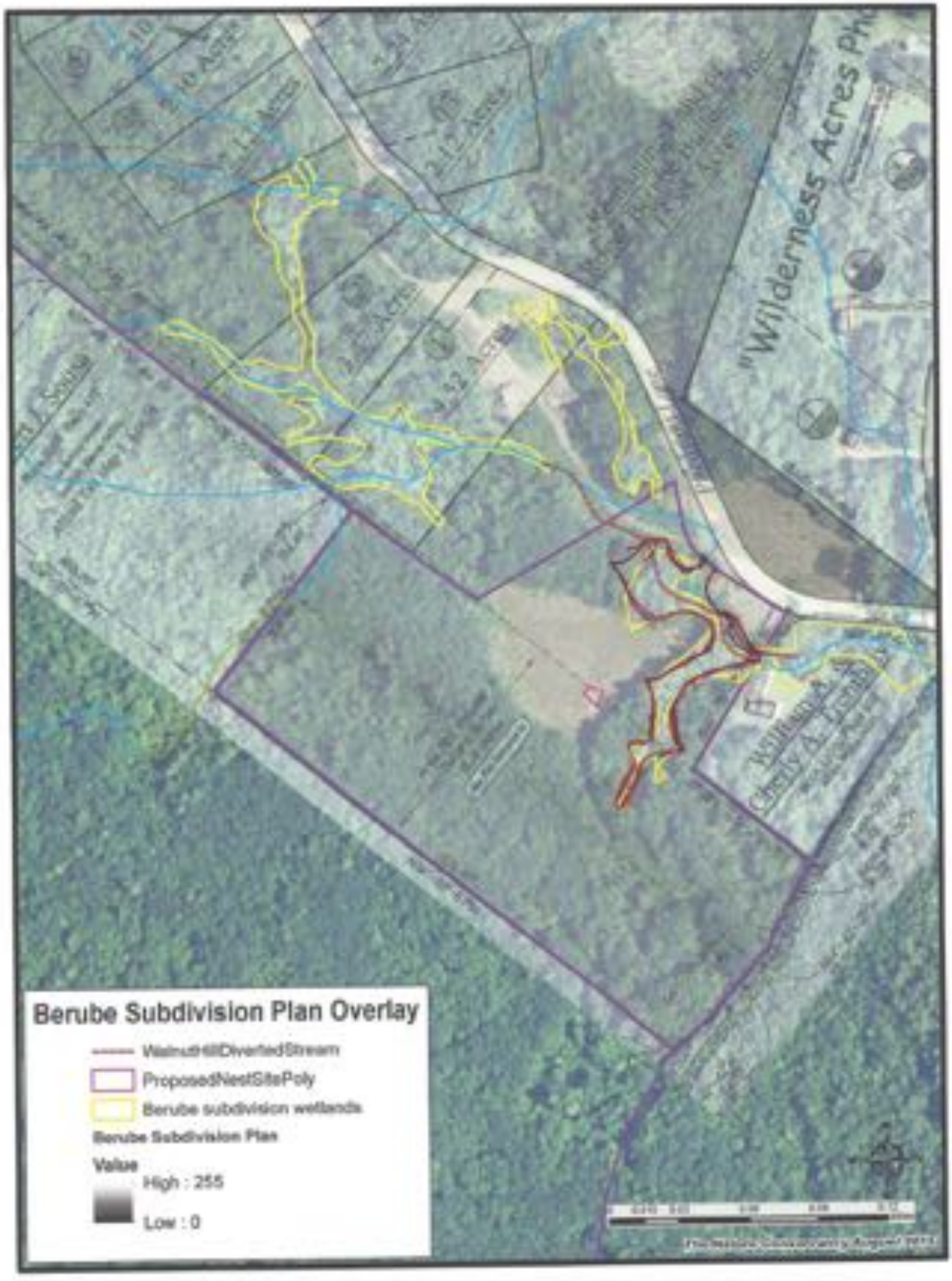
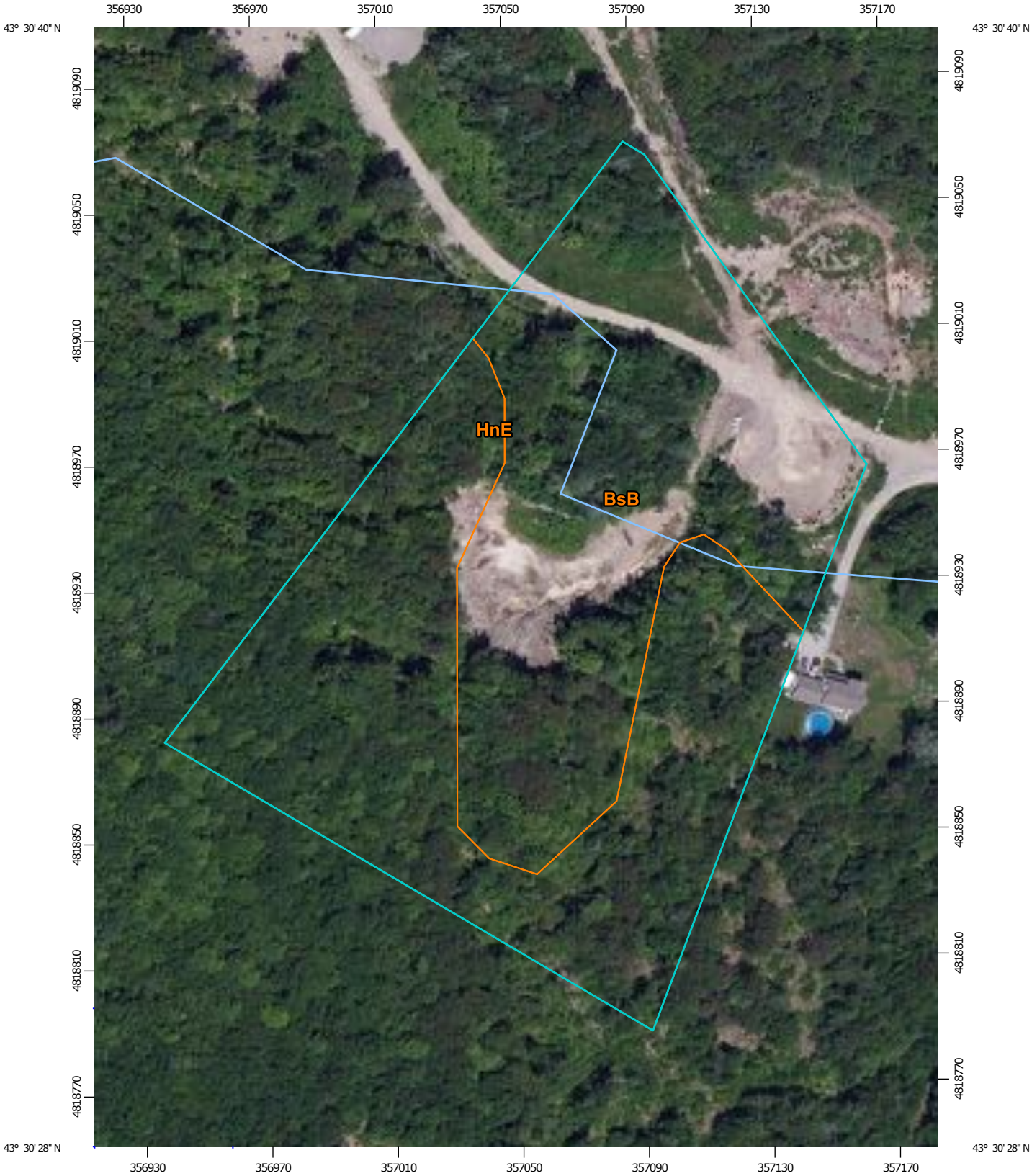
Google earth


"Wilderness Acres Ph
Berube Subdivision Plan Overlay
WalnutHillDivertedStream
ProposedNestSitePoly
Berube subdivision wetlands
Berube Subdivision Plan
Value
High : 255
Low : 0

Soil Map—York County, Maine
(Berube Soil Map)



Map Scale: 1:1,730 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: York County, Maine
Survey Area Data: Version 14, Sep 11, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 20, 2010—Jul 18, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

York County, Maine (ME031)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BsB	Brayton and Westbury very stony fine sandy loams, 0 to 8 percent slopes	4.0	50.5%
HnE	Hermon extremely stony fine sandy loam, 15 to 60 percent slopes	4.0	49.5%
Totals for Area of Interest		**8.0**	**100.0%**

Facing west in Wetland 1

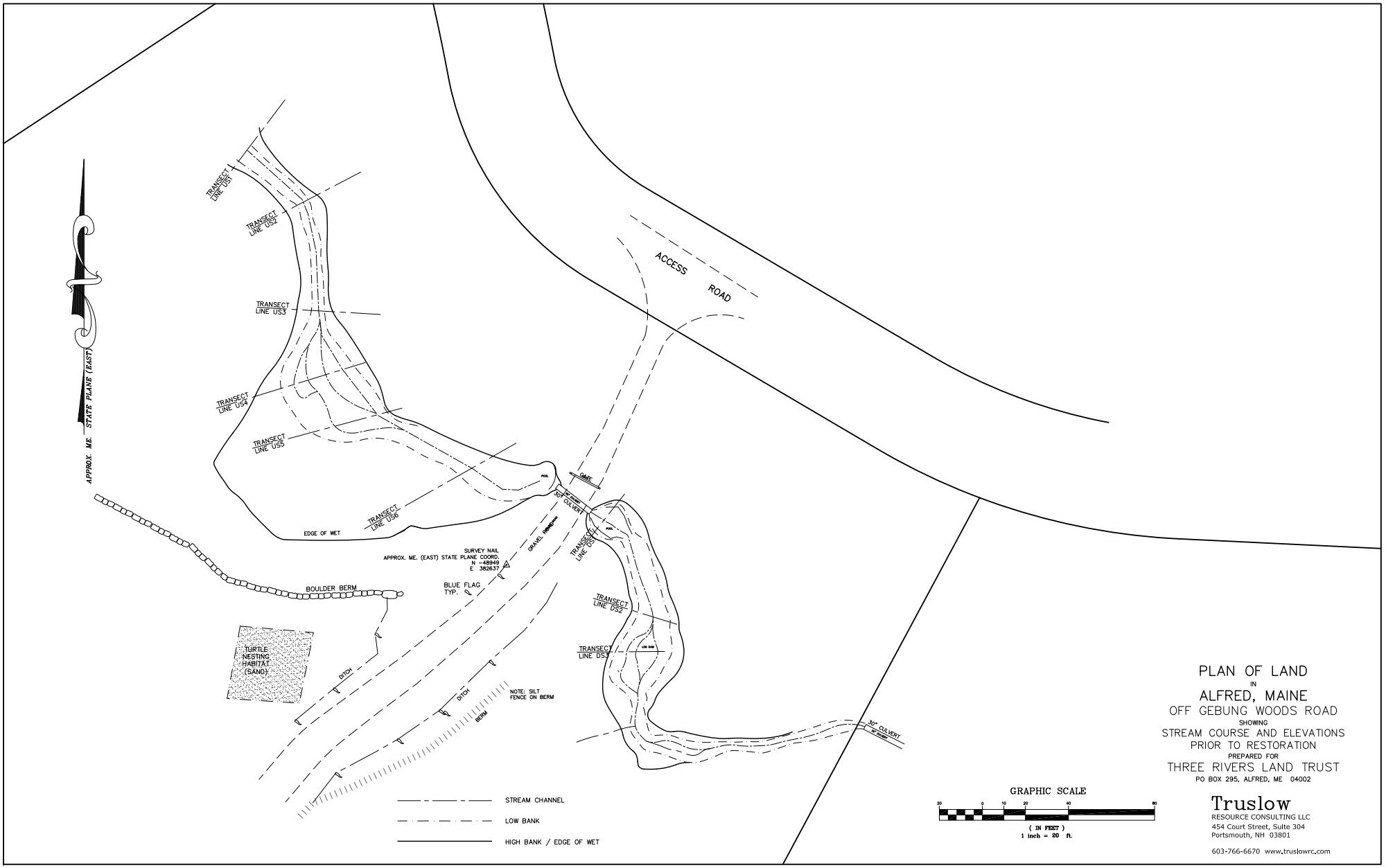
Facing north in wetland

View of the stream in the wetland

Raccoon footprints in wetland soils

Appendix B

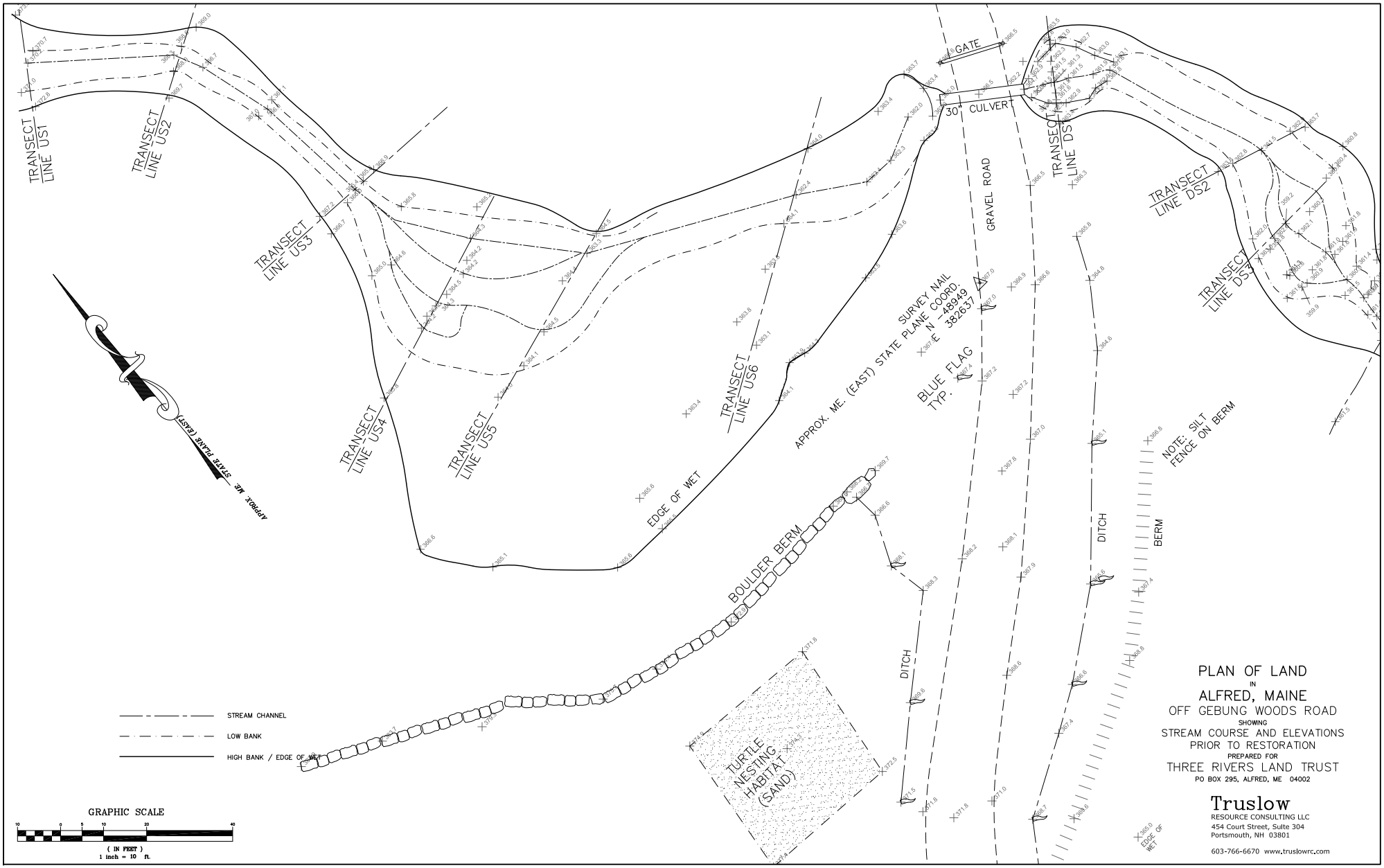
Stream Longitudinal Profiles and Cross Sections



PLAN OF LAND
IN
ALFRED, MAINE
OFF GEBUNG WOODS ROAD
SHOWING
STREAM COURSE AND ELEVATIONS
PRIOR TO RESTORATION
PREPARED FOR
THREE RIVERS LAND TRUST
PO BOX 295, ALFRED, ME 04002

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Truslow
RESOURCE CONSULTING LLC
454 Court Street, Sulte 304
Portsmouth, NH 03801
603-766-6670 www.truslowrc.com



PLAN OF LAND

IN

ALFRED, MAINE

OFF GEBUNG WOODS ROAD

SHOWING

STREAM COURSE AND ELEVATIONS PRIOR TO RESTORATION

PREPARED FOR

THREE RIVERS LAND TRUST

PO BOX 295, ALFRED, ME 04002

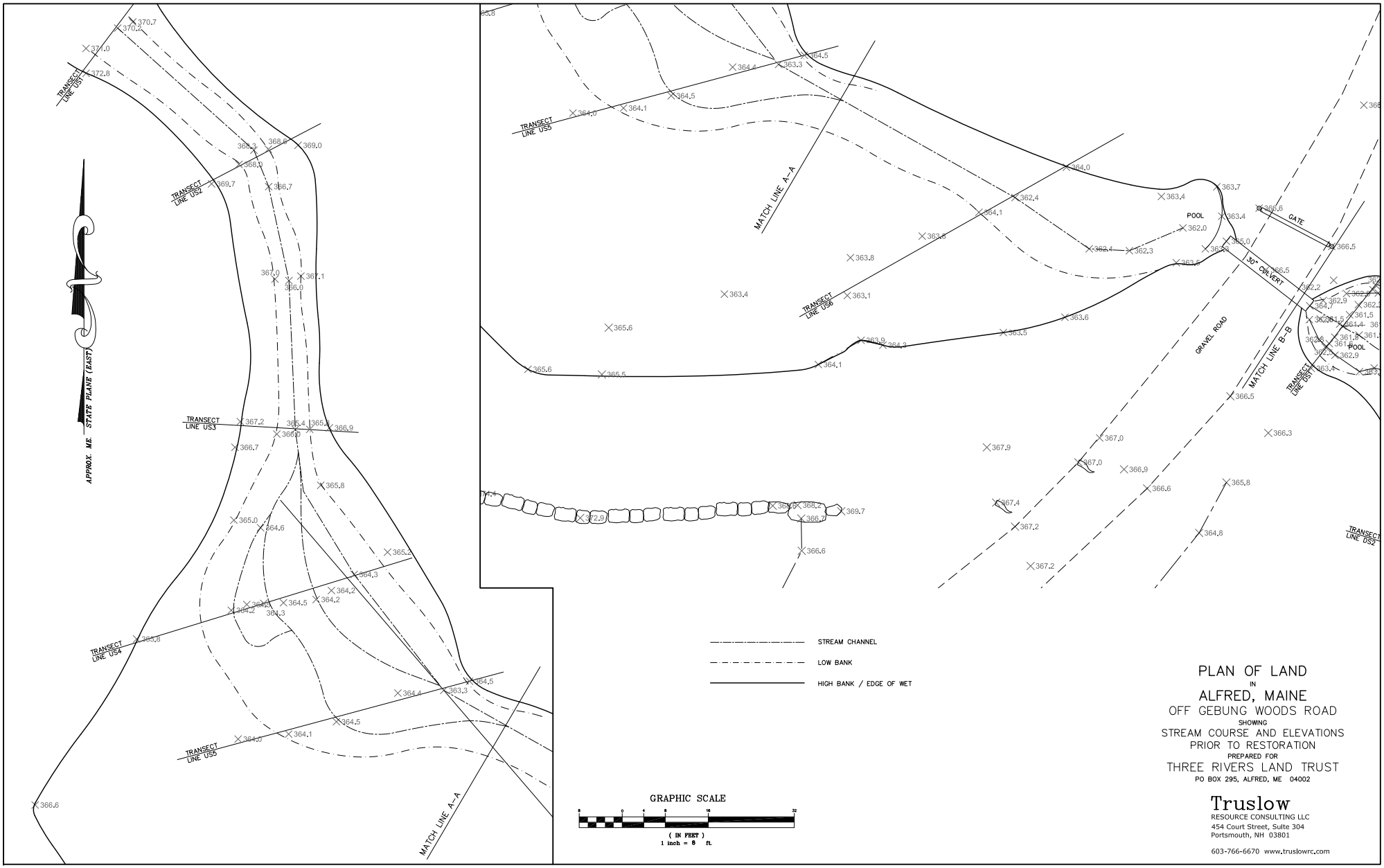
Truslow

RESOURCE CONSULTING LLC

454 Court Street, Suite 304

Portsmouth, NH 03801

603-766-6670 www.truslowrc.com



PLAN OF LAND
IN
ALFRED, MAINE
OFF GEBUNG WOODS ROAD
SHOWING
STREAM COURSE AND ELEVATIONS
PRIOR TO RESTORATION
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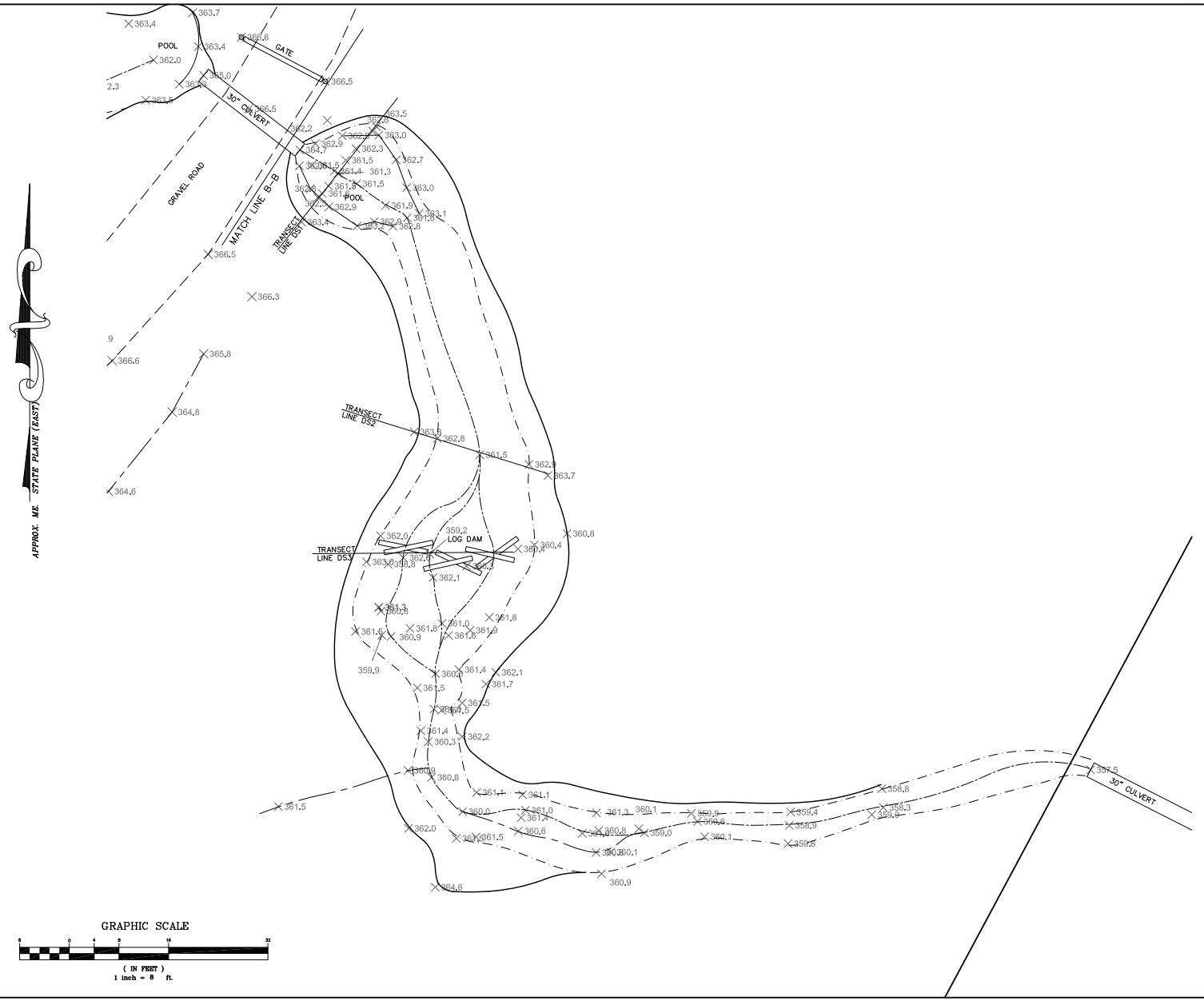

GRAPHIC SCALE

(IN FEET)
1 inch = 8 ft.

PLAN OF LAND
IN
ALFRED, MAINE
OFF GEBUNG WOODS ROAD
SHOWING
STREAM COURSE AND ELEVATIONS
PRIOR TO RESTORATION
PREPARED FOR
THREE RIVERS LAND TRUST
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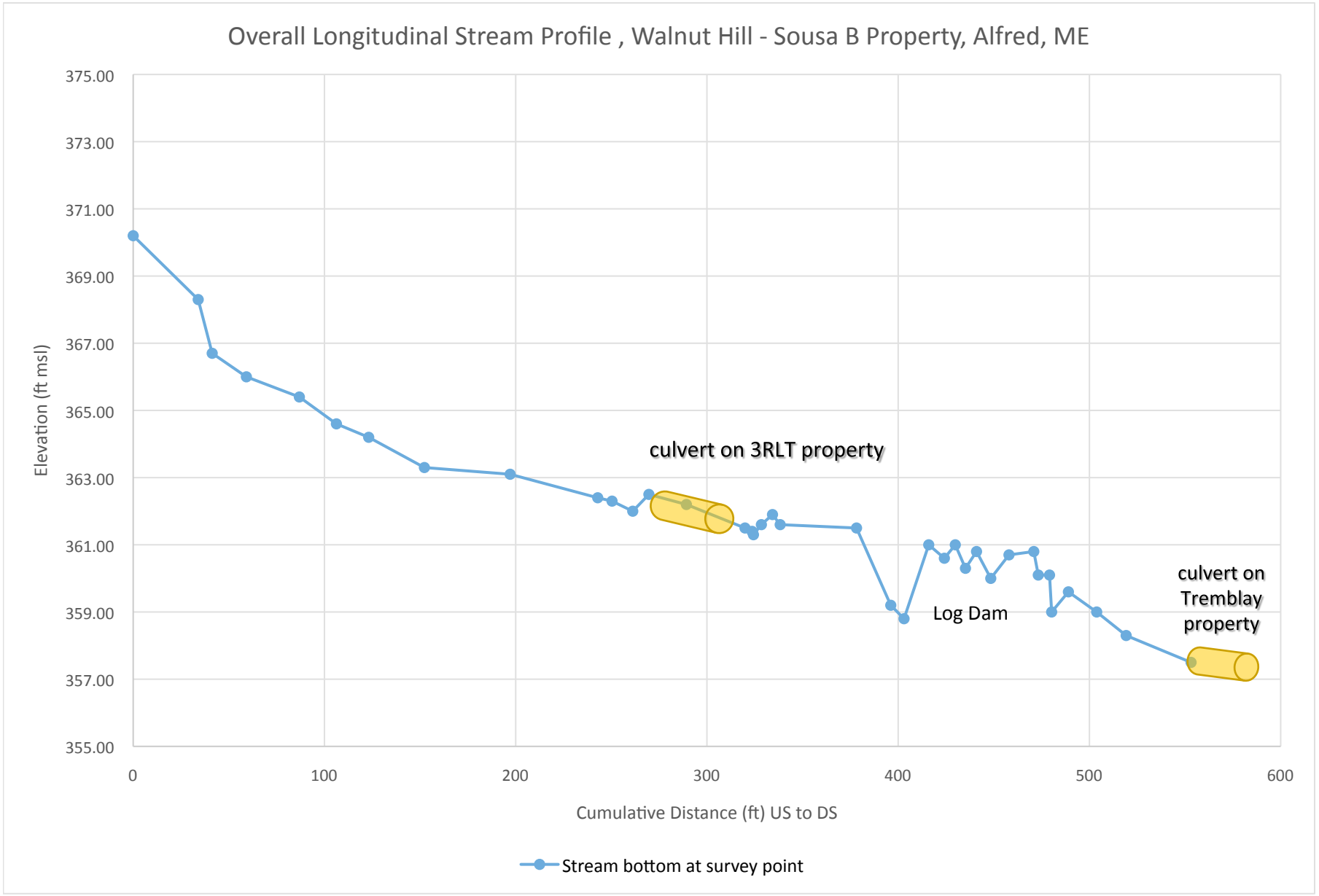
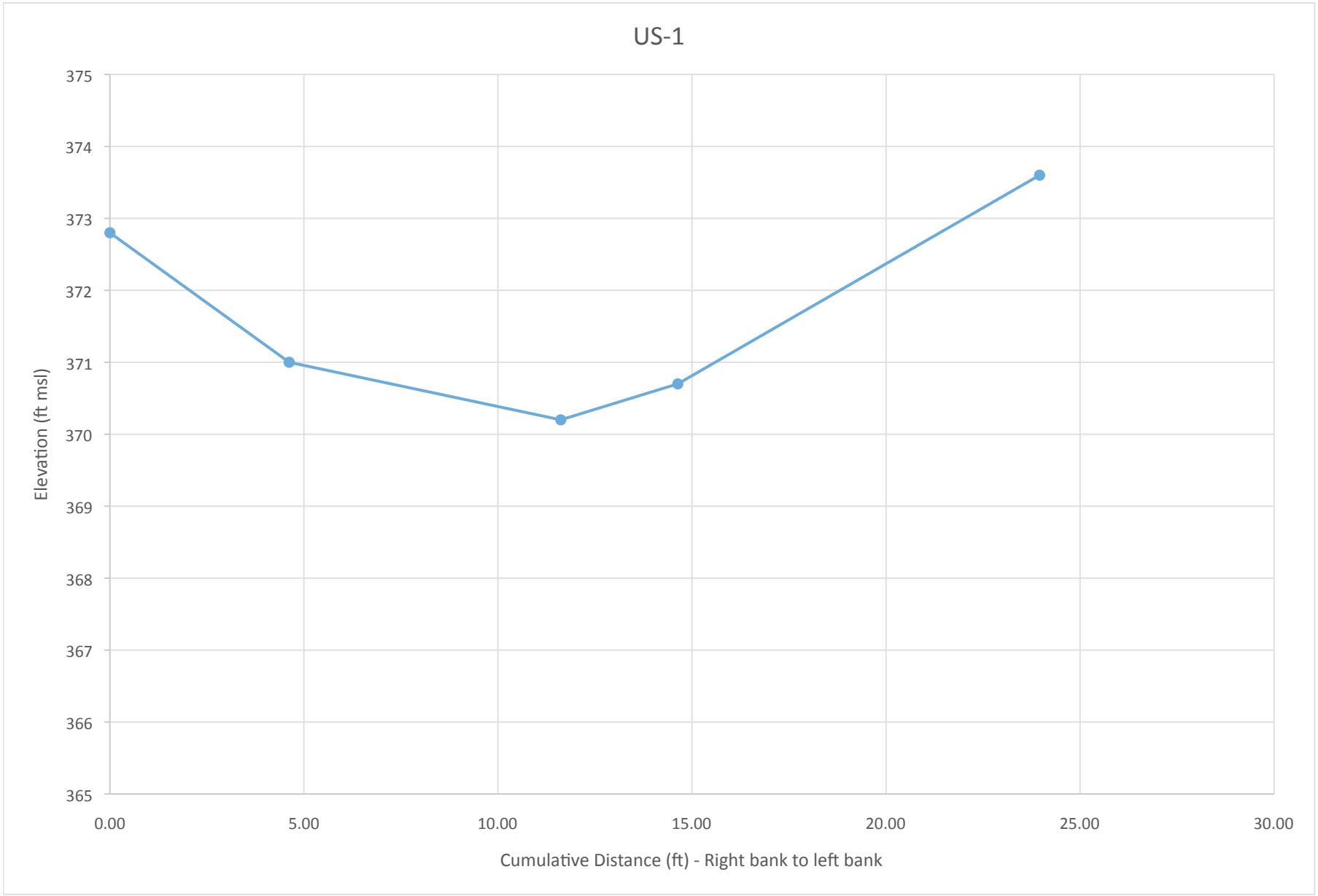
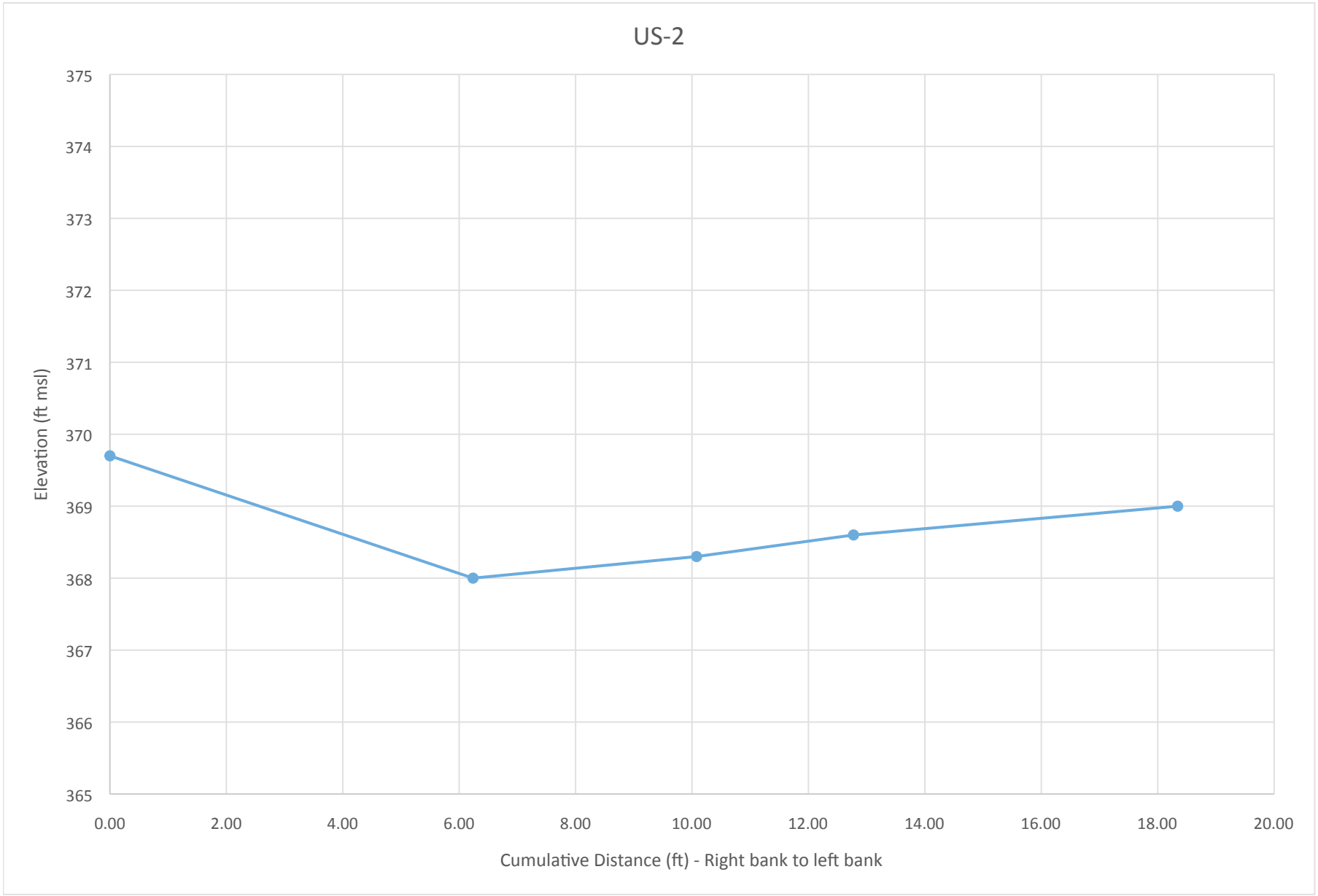
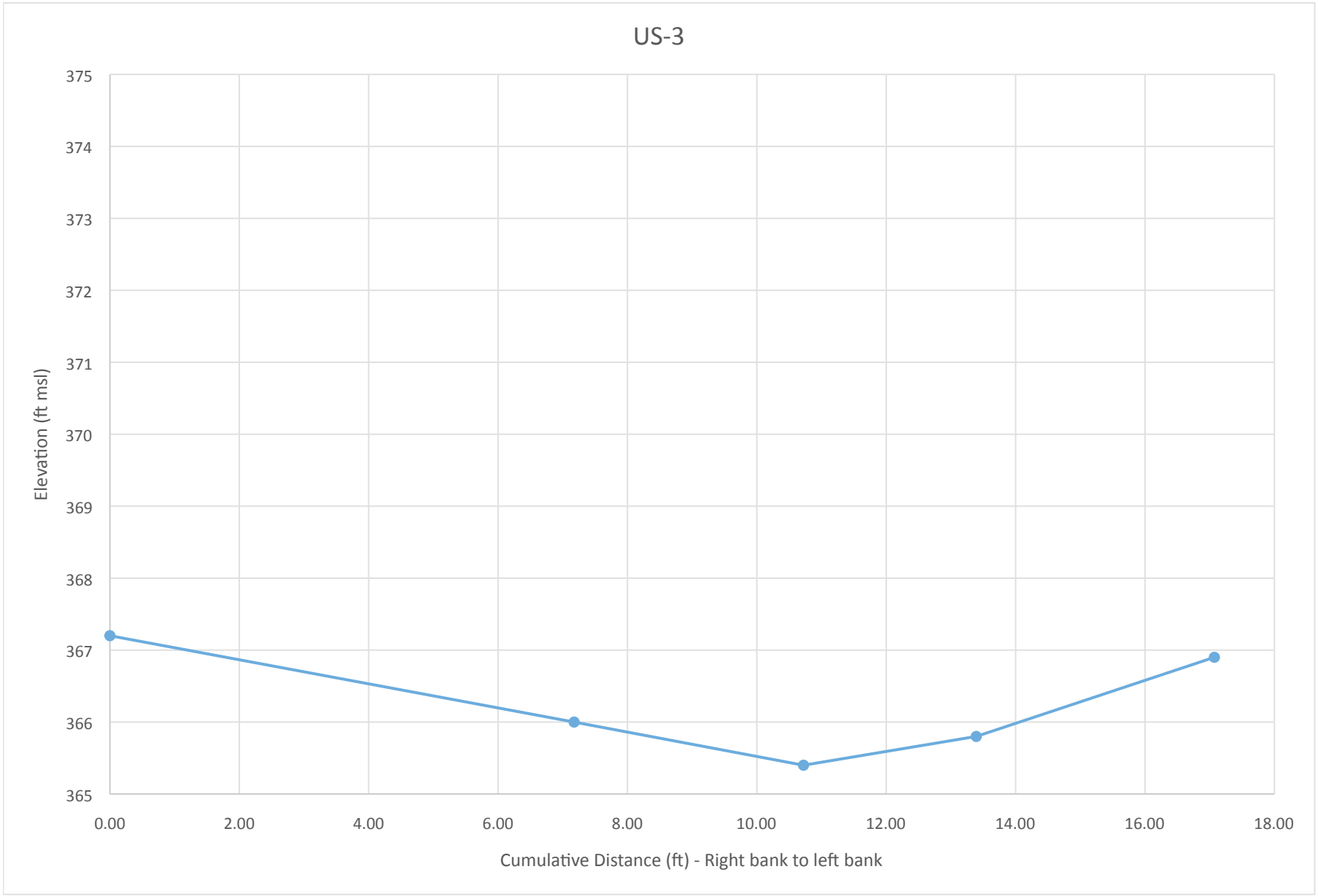

Overall Longitudinal Stream Profile , Walnut Hill - Sousa B Property, Alfred, ME
375.00
373.00
371.00
369.00
367.00
365.00
363.00
361.00
359.00
357.00
355.00
Elevation (ft msl)
0
100
200
300
400
500
600
Cumulative Distance (ft) US to DS
culvert on 3RLT property
Log Dam
culvert on Tremblay property
Stream bottom at survey point


US-1
375
374
373
372
371
370
369
368
367
366
365
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Cumulative Distance (ft) - Right bank to left bank


US-2
375
374
373
372
371
370
369
368
367
366
365
Elevation (ft msl)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
Cumulative Distance (ft) - Right bank to left bank


US-3
375
374
373
372
371
370
369
368
367
366
365
Elevation (ft msl)
0.00
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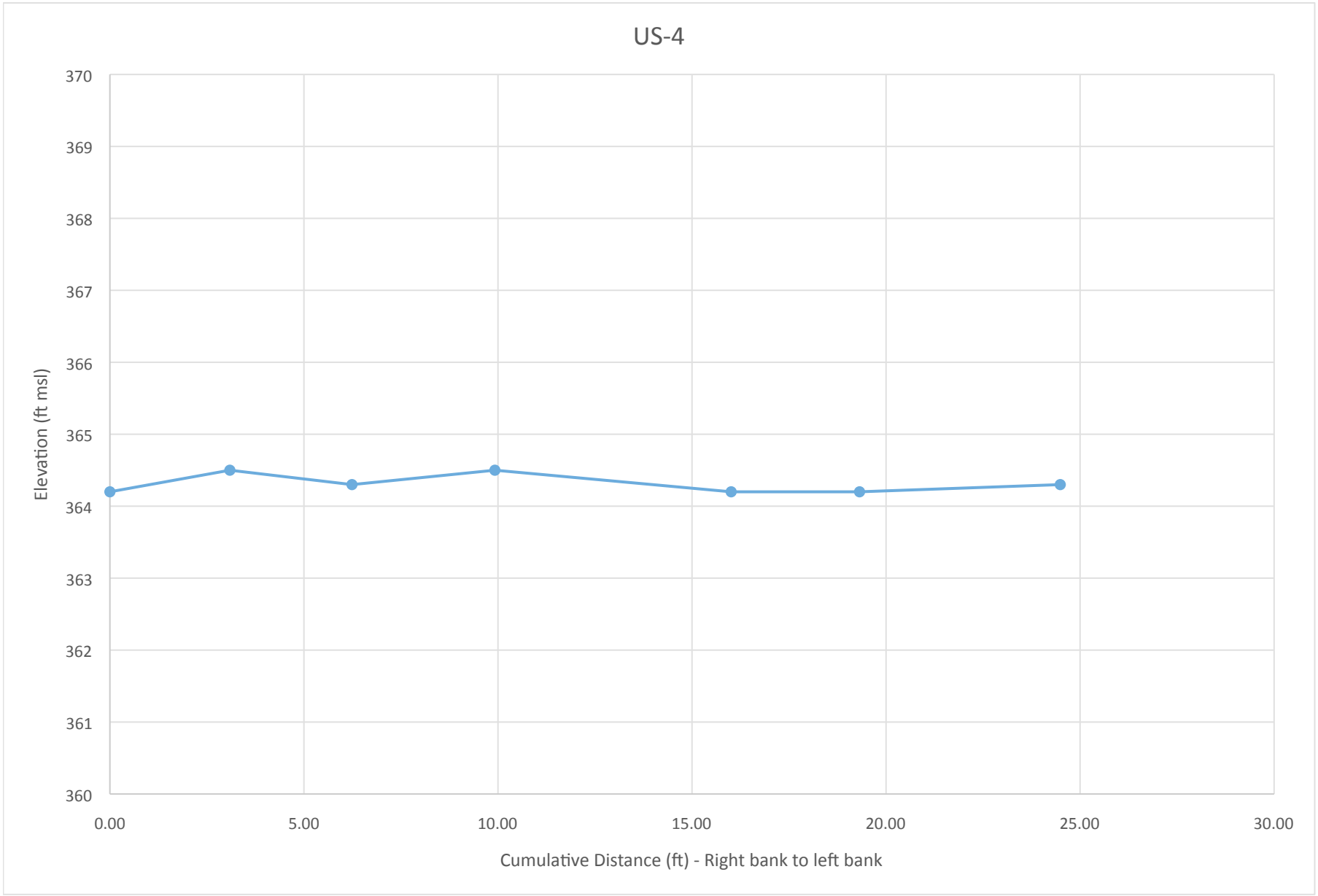
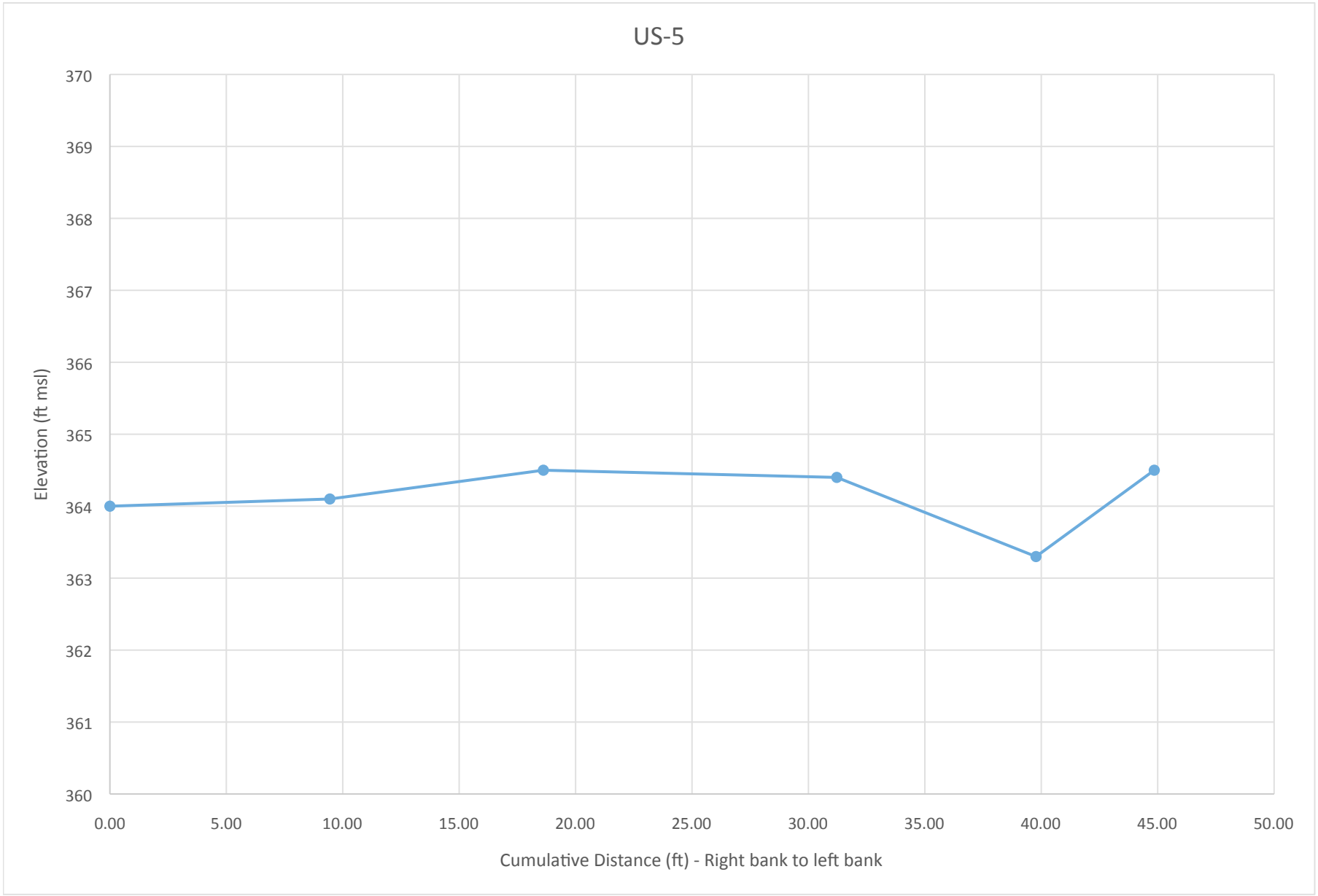
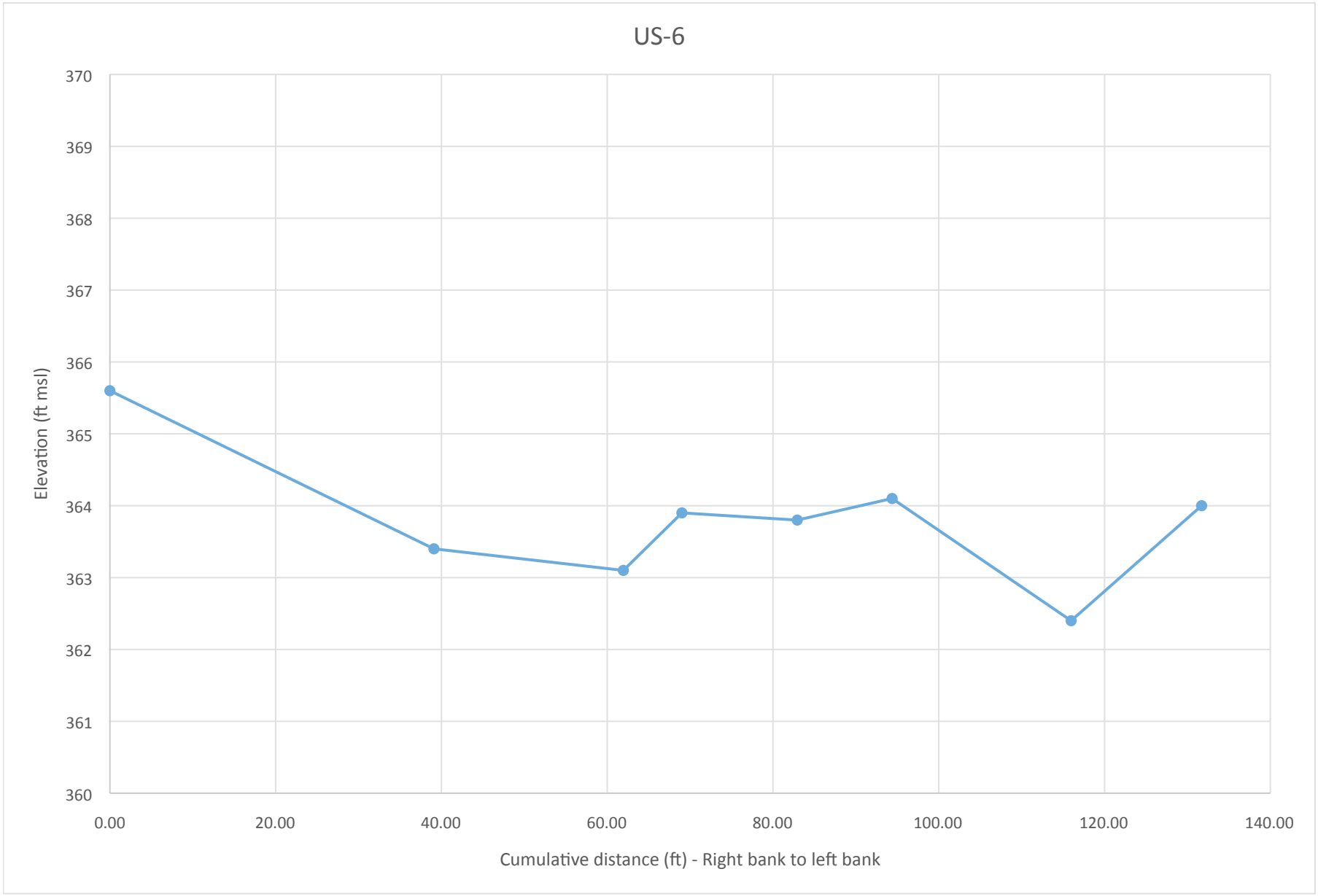
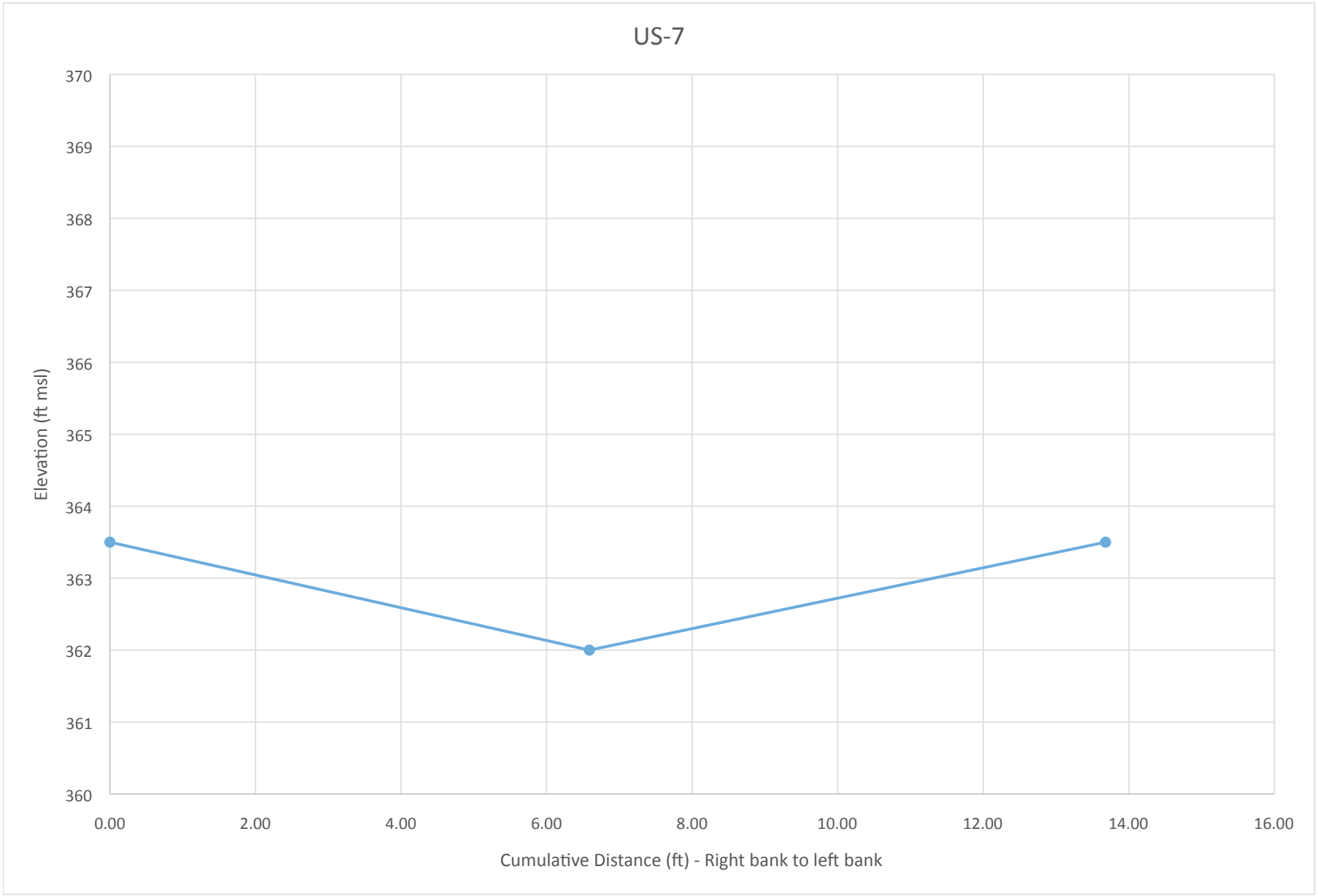
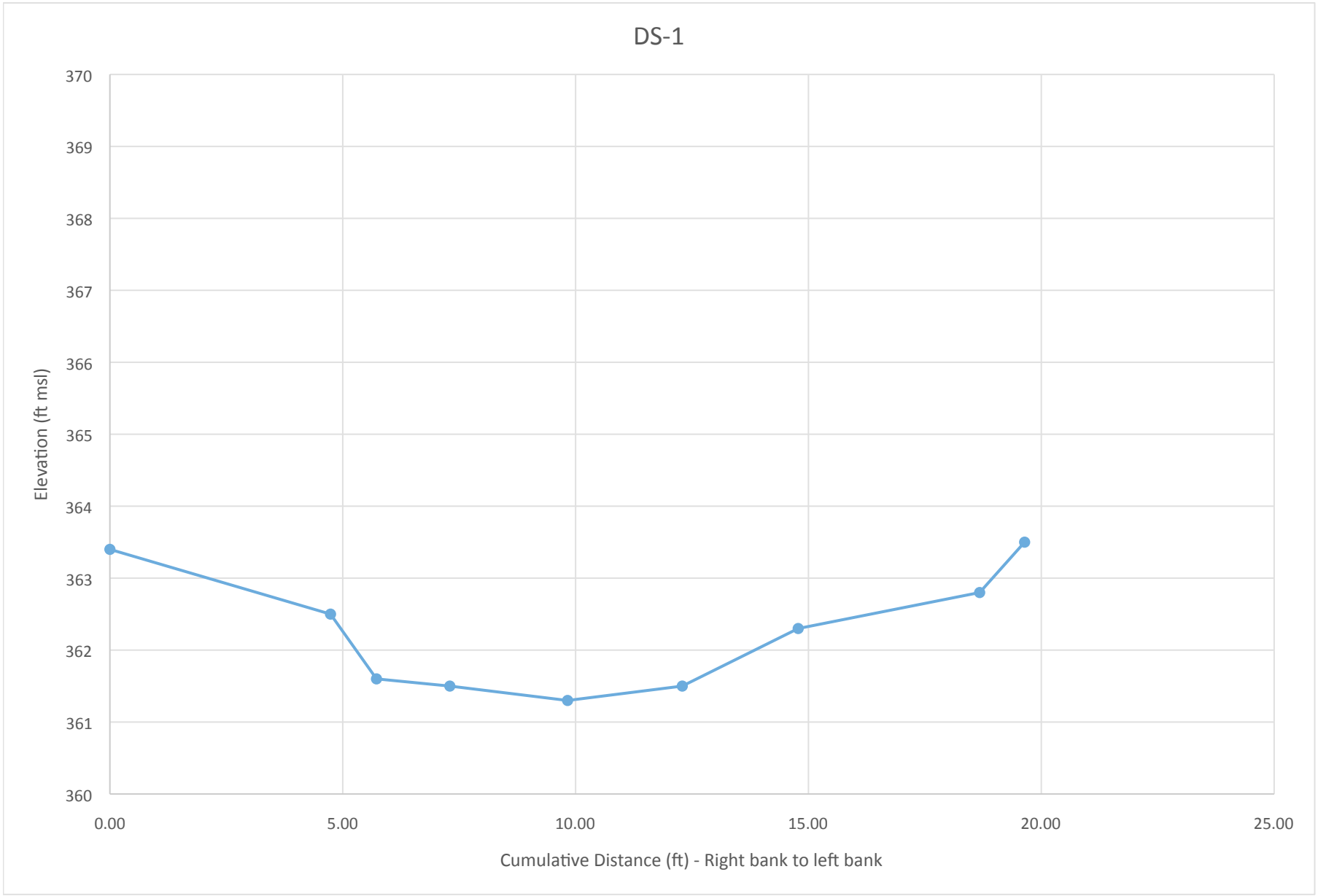
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
Cumulative Distance (ft) - Right bank to left bank

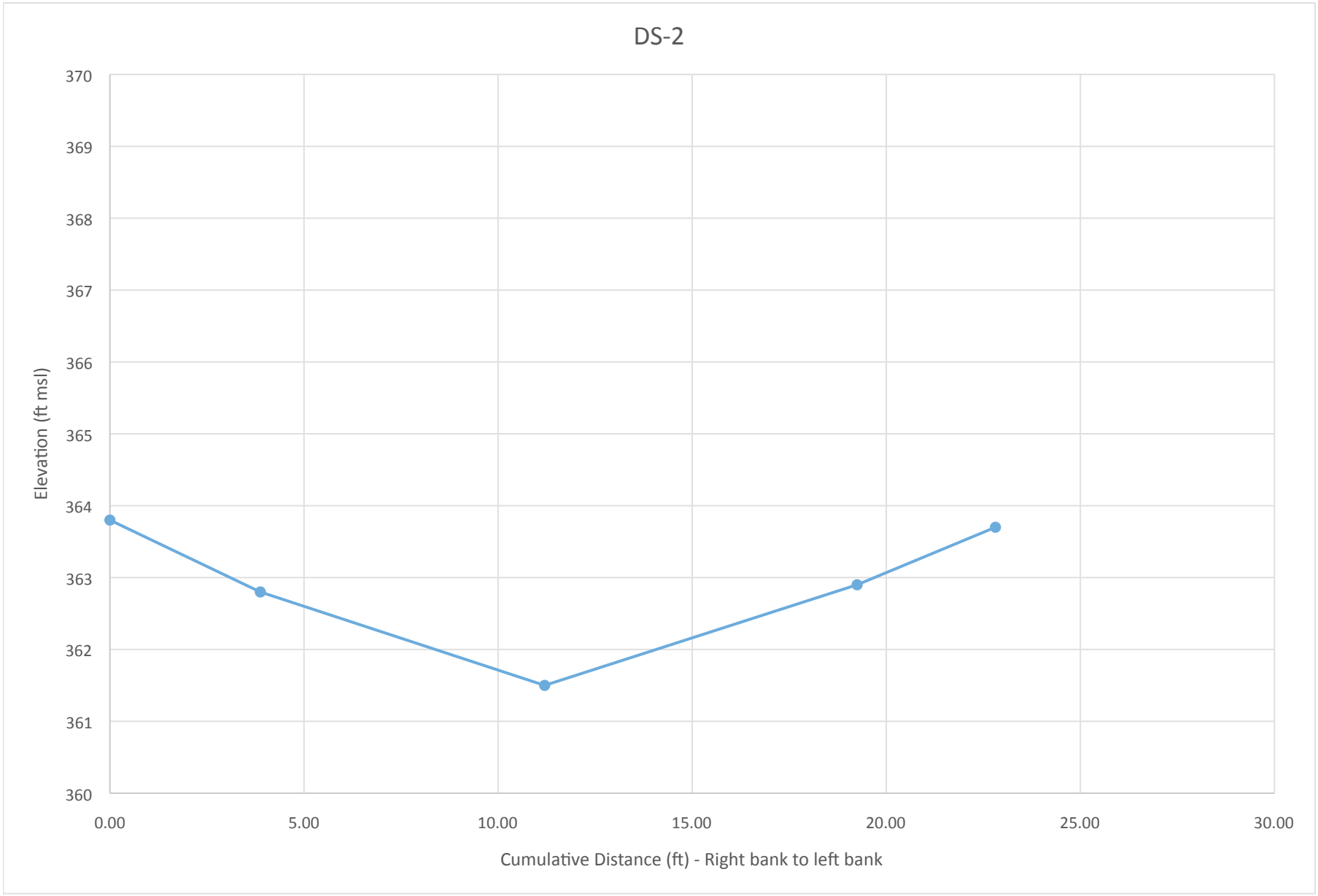

US-4
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Cumulative Distance (ft) - Right bank to left bank

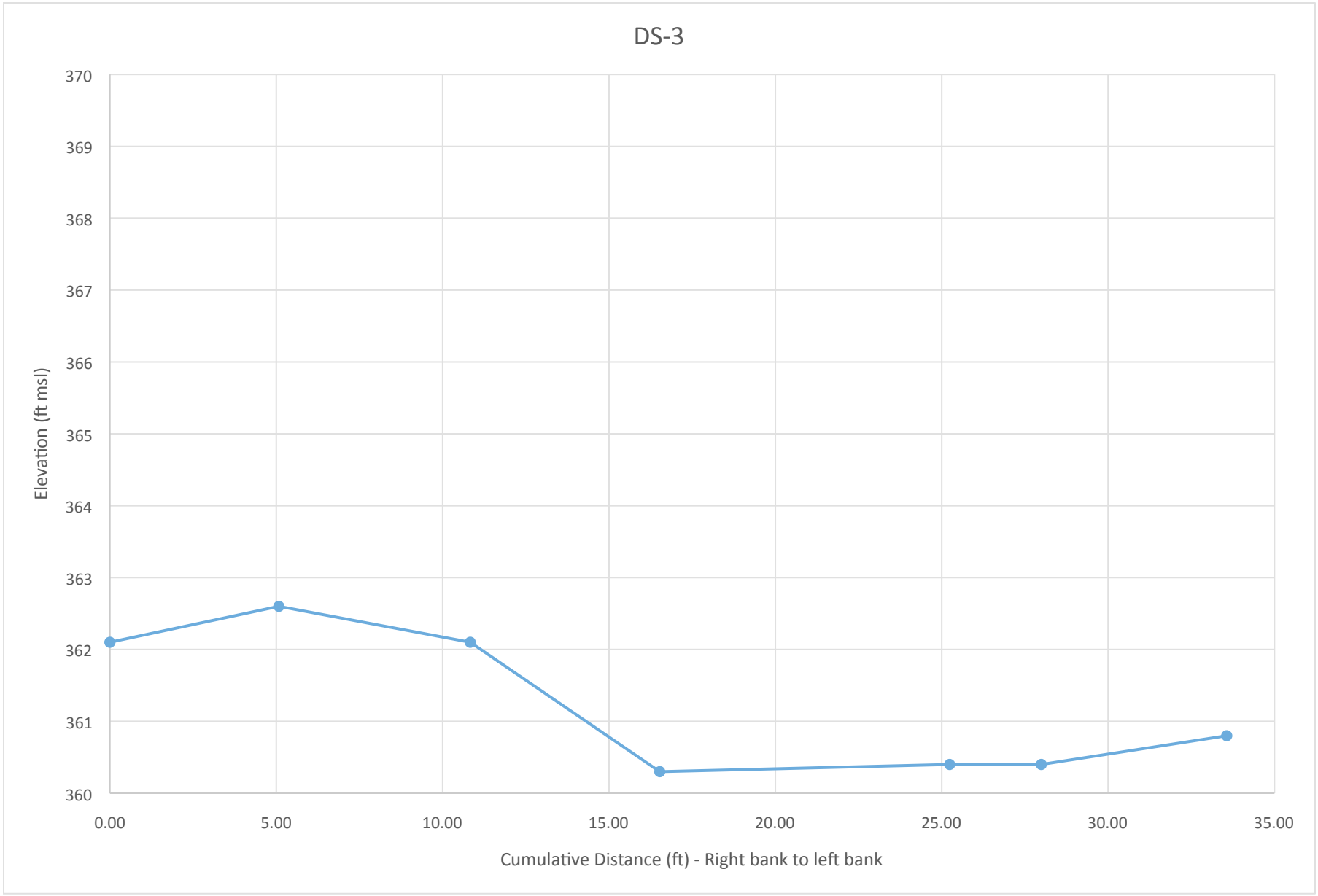

US-5
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
Cumulative Distance (ft) - Right bank to left bank

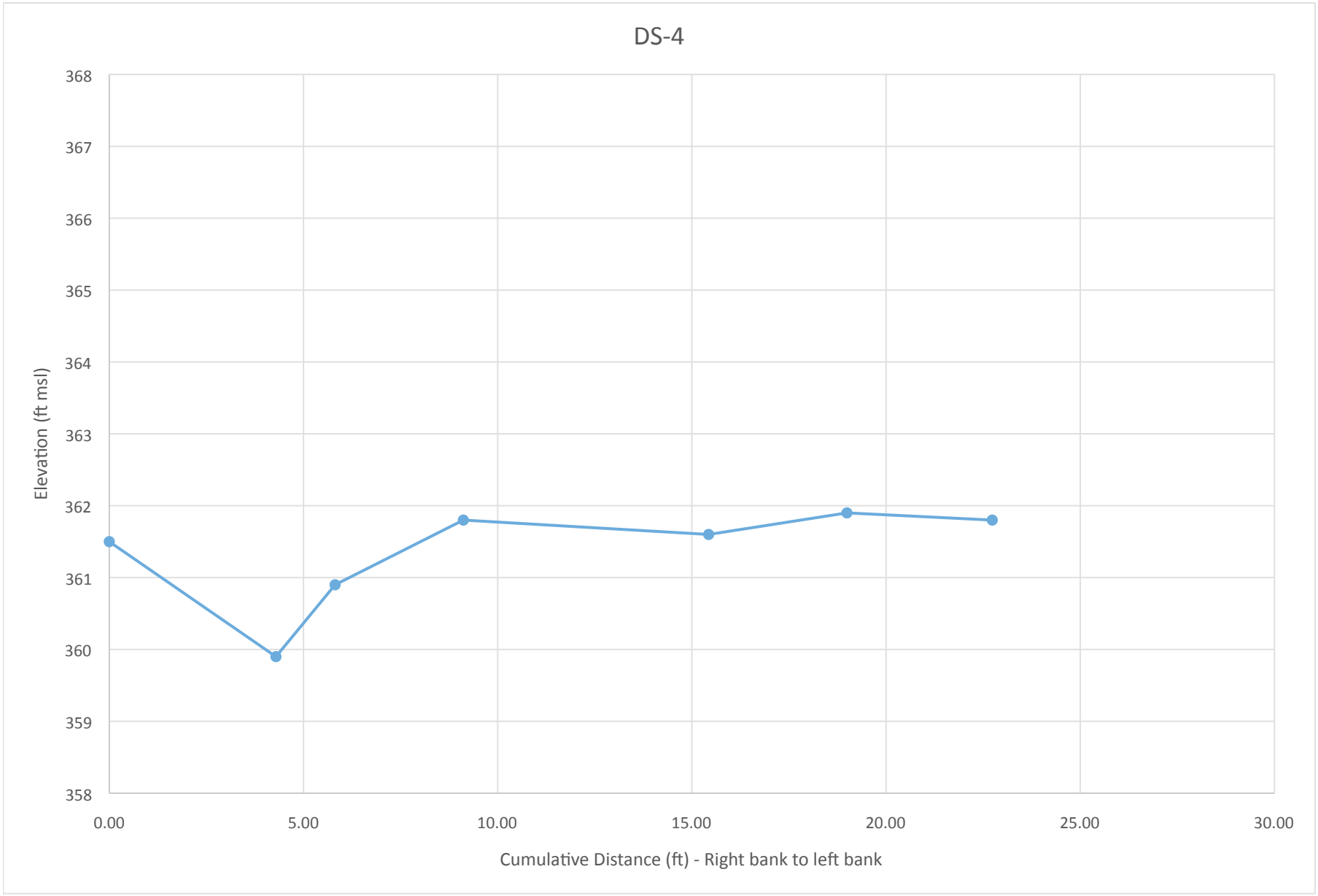

US-6
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
Cumulative distance (ft) - Right bank to left bank

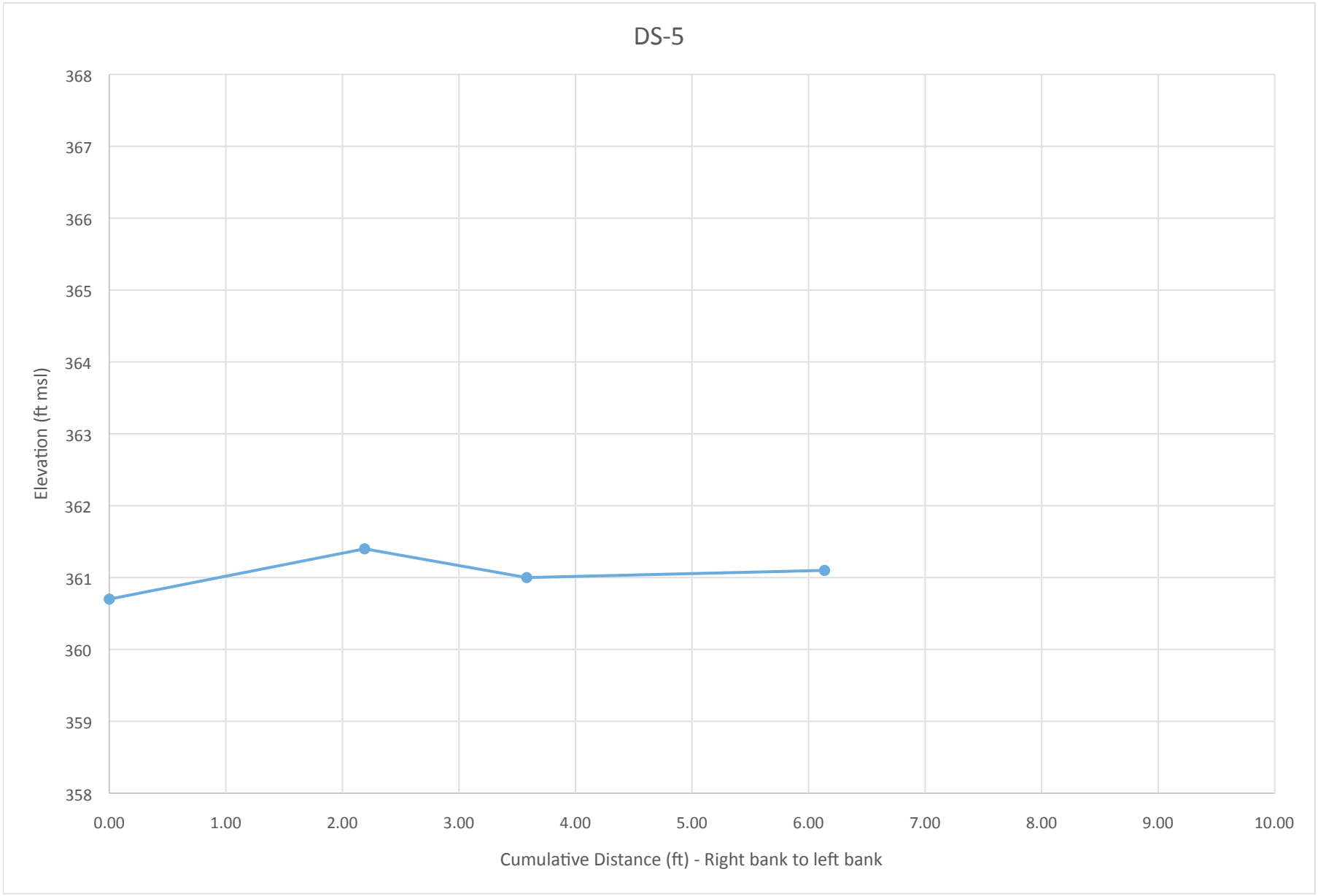

US-7
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
Cumulative Distance (ft) - Right bank to left bank

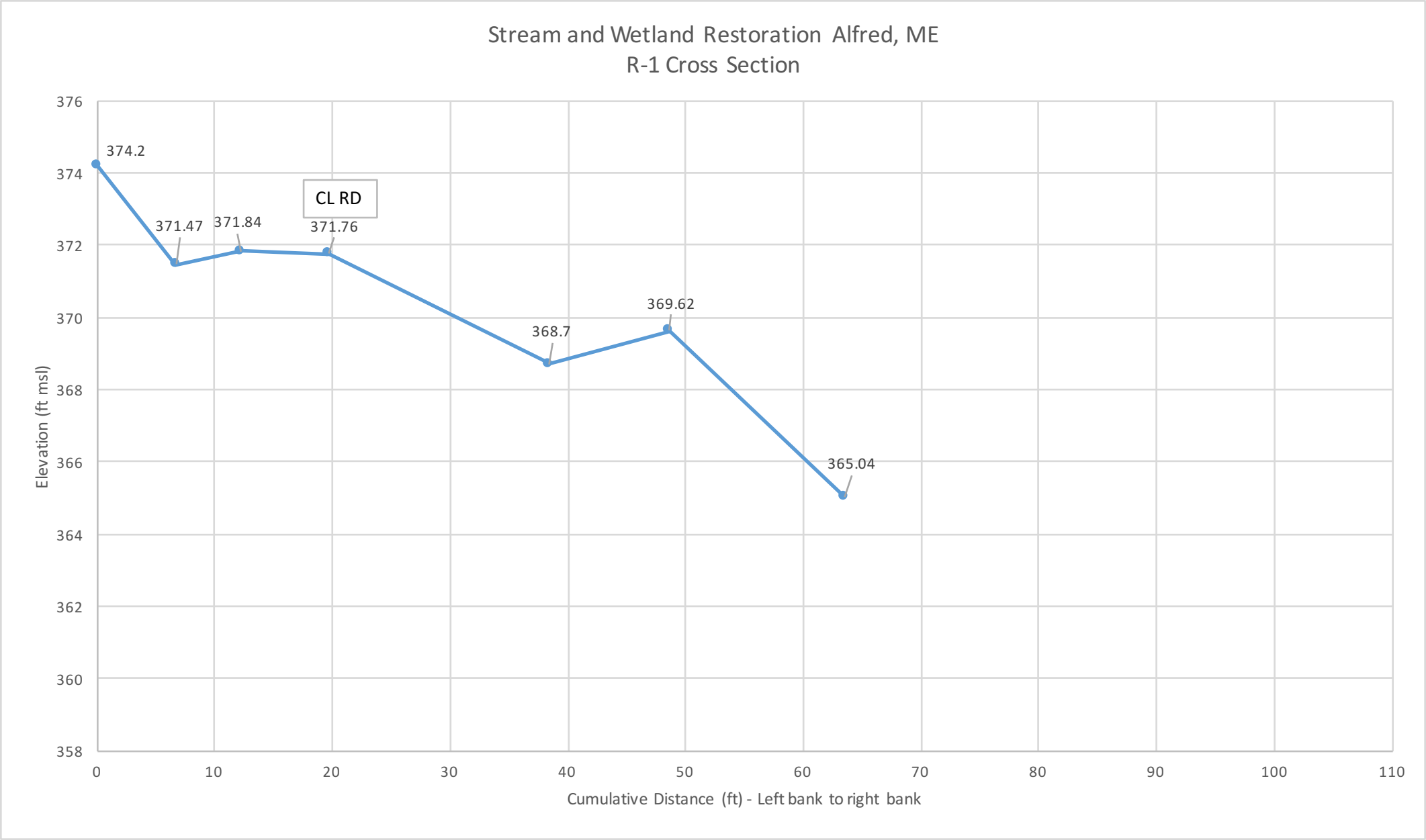

DS-1
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
Cumulative Distance (ft) - Right bank to left bank

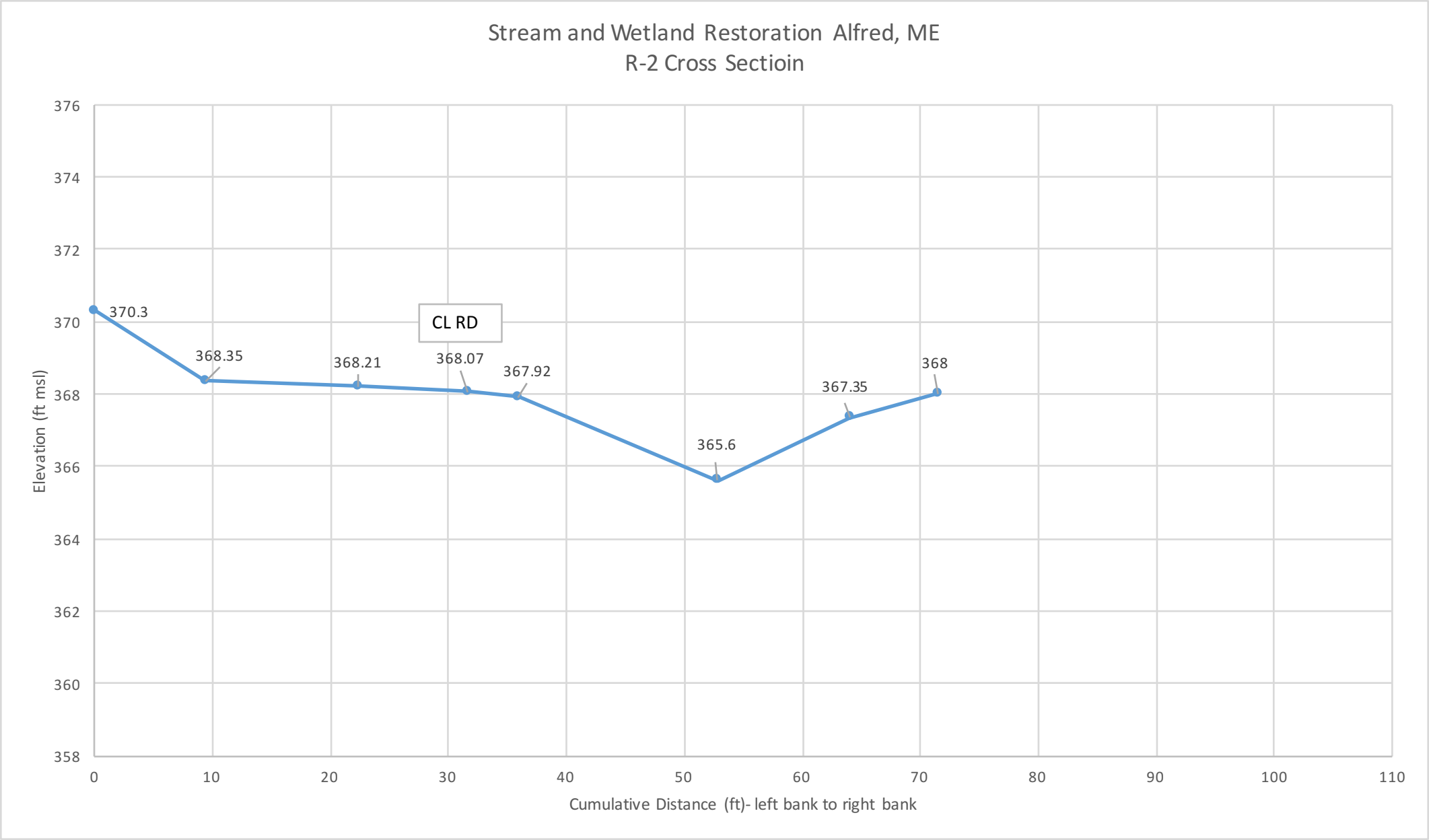

DS-2
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Cumulative Distance (ft) - Right bank to left bank

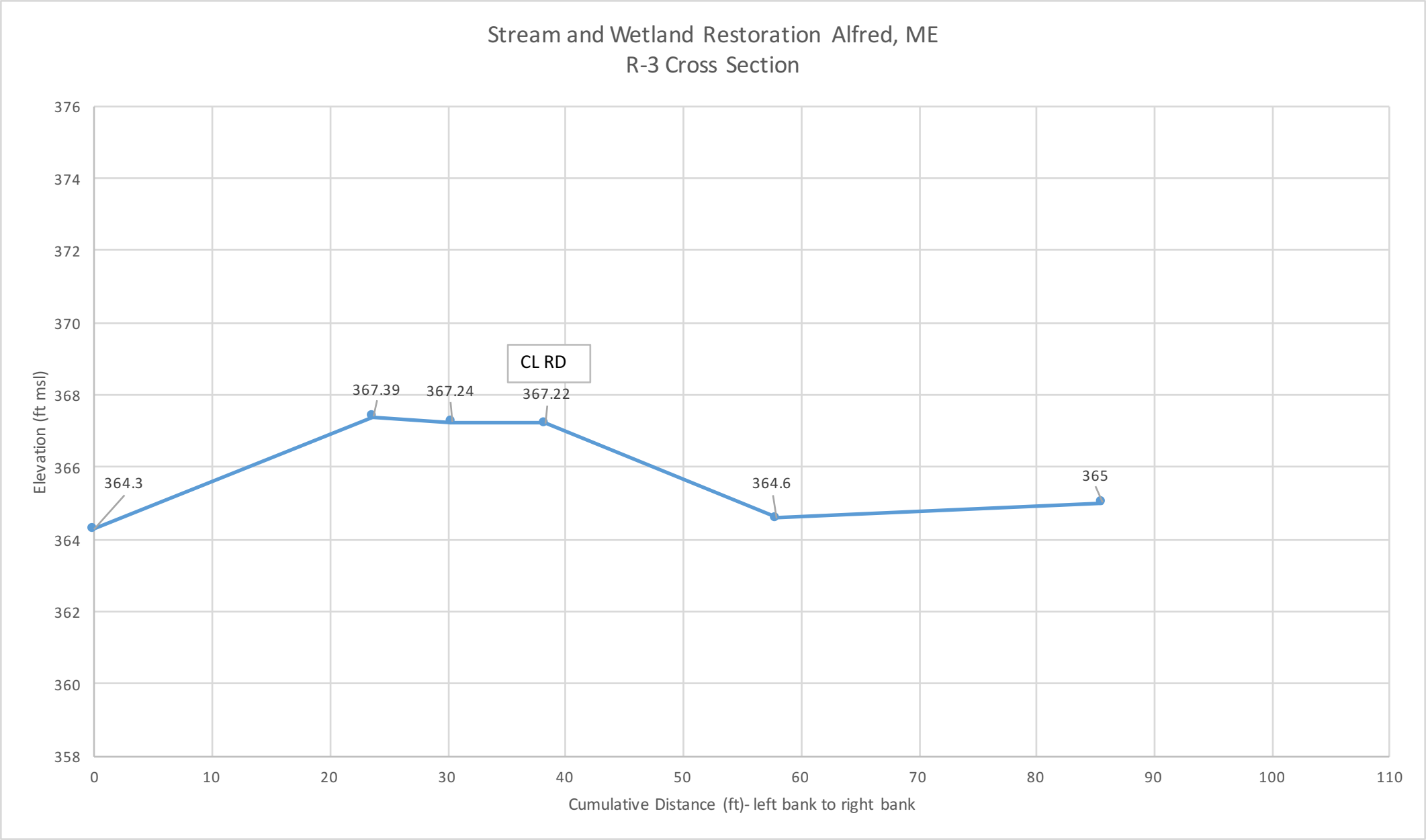

DS-3
370
369
368
367
366
365
364
363
362
361
360
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Cumulative Distance (ft) - Right bank to left bank

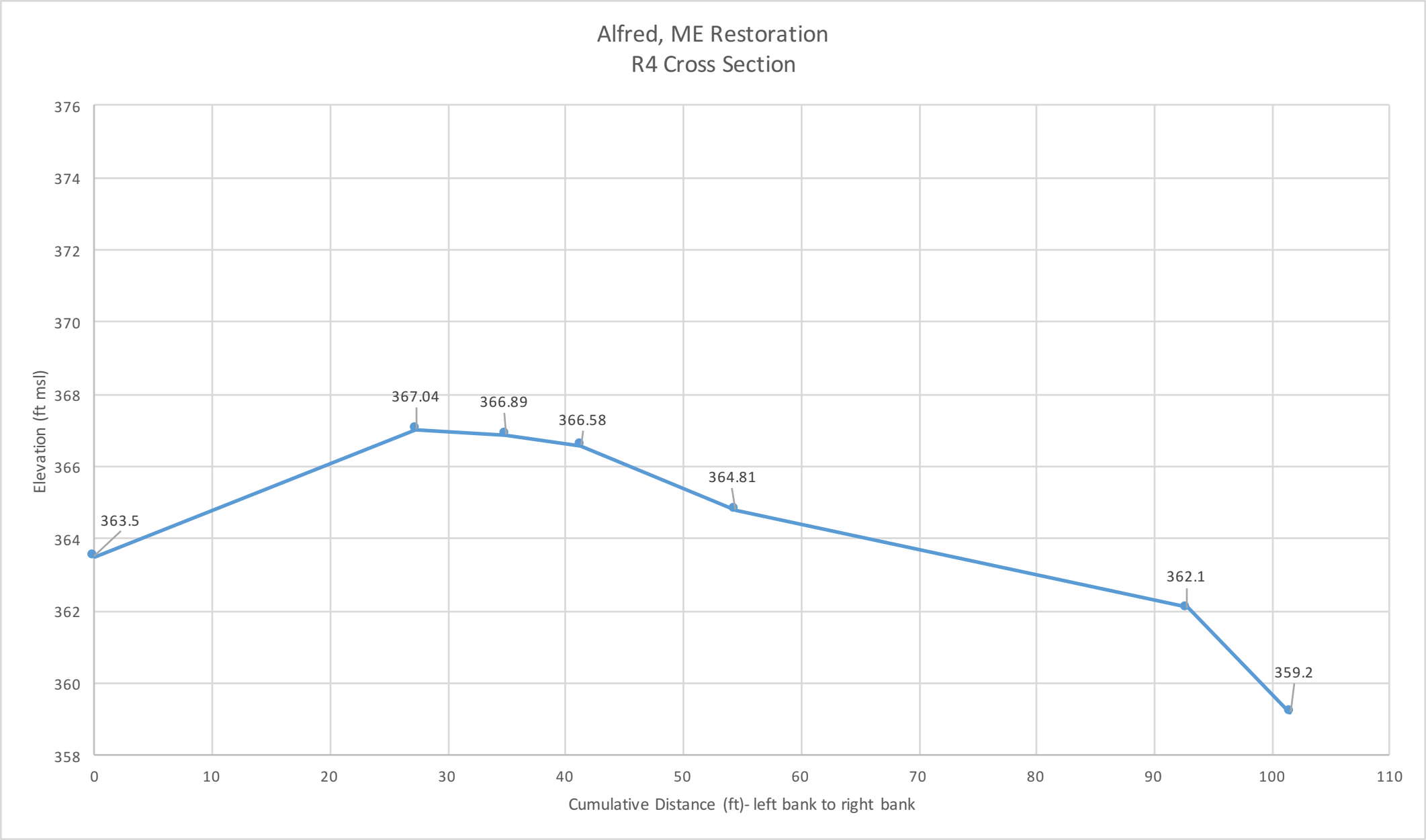

DS-4
368
367
366
365
364
363
362
361
360
359
358
Elevation (ft msl)
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Cumulative Distance (ft) - Right bank to left bank


DS-5
368
367
366
365
364
363
362
361
360
359
358
Elevation (ft msl)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
Cumulative Distance (ft) - Right bank to left bank


Stream and Wetland Restoration Alfred, ME
R-1 Cross Section
Elevation (ft msl)
376
374
372
370
368
366
364
362
360
358
374.2
371.47
371.84
371.76
CL RD
368.7
369.62
365.04
0
10
20
30
40
50
60
70
80
90
100
110
Cumulative Distance (ft) - Left bank to right bank


Stream and Wetland Restoration Alfred, ME
R-2 Cross Sectioin
Elevation (ft msl)
376
374
372
370
368
366
364
362
360
358
370.3
368.35
368.21
368.07
367.92
365.6
367.35
368
CL RD
0
10
20
30
40
50
60
70
80
90
100
110
Cumulative Distance (ft)- left bank to right bank


Stream and Wetland Restoration Alfred, ME
R-3 Cross Section
Elevation (ft msl)
376
374
372
370
368
366
364
362
360
358
0
10
20
30
40
50
60
70
80
90
100
110
Cumulative Distance (ft)- left bank to right bank
CL RD
364.3
367.39
367.24
367.22
364.6
365


Alfred, ME Restoration
R4 Cross Section
Elevation (ft msl)
376
374
372
370
368
366
364
362
360
358
0
10
20
30
40
50
60
70
80
90
100
110
Cumulative Distance (ft)- left bank to right bank
363.5
367.04
366.89
366.58
364.81
362.1
359.2

Appendix C

Blanding's and Spotted Turtle Biology

Blanding's Turtle and Spotted Turtle Biology

Blanding's turtle (*Emys blandingii*, a.k.a. *Emydoidea blandingii*) and spotted turtle (*Clemmys guttata*) are both rare turtle species with disjunct populations ranging from approximately Michigan to Maine in the United States. The spotted turtle range also extends down the eastern half of the country into Florida. In Maine, both species are restricted largely to the southern section of the state with Blanding's turtle being the most restricted with occurrences only known in the southern York and Cumberland Counties. Currently, Blanding's turtle is listed as State Endangered and the spotted turtle is listed as State Threatened in Maine. Due to their rarity, the habitat use of both species has been extensively studied in the state through cooperative efforts of both the Maine Department of Inland Fisheries and Wildlife and the University of Maine, to help guide conservation and management efforts.

Blanding's Turtle - As an adult, the Blanding's turtle has a black to dark olive carapace (i.e. top shell), with irregular shaped tan to shallow streaks and spots. Some observers describe the carapace as appearing like an old German helmet. Blanding's turtles also have exceptionally long necks when extended, with a bright yellow neck, throat, and chin. Males and females are differentiated by upper jaw color and plastron (i.e. lower shell) shape. Males have a hinged plastron and a darkly pigmented (as opposed to yellow) upper jaw.

The Blanding's turtle has an extremely late age of first reproduction, with females reaching sexual maturity generally between 14 and 20 years of age. This late age of first reproduction, as well as high nest mortality, is attributed in part to their rarity. The loss of only a few reproducing females through additive mortality (e.g. road mortality from cars) can have drastic implications for population growth and maintenance.

Blanding's turtles use a variety of wetland types including vernal pools, marshes, wet meadows, forested swamps, and beaver impoundments. In Maine, similar to spotted turtles, Blanding's turtles generally emerge from overwintering habitats in April and then disperse to vernal pools and other wetlands to feed on amphibian eggs and larvae. Blanding's turtles differ slightly from spotted turtles in being more closely associated with forested wetlands in the spring before traveling to wetlands with abundant wood frog egg masses /larvae in the summer, and then deepwater wetlands in late summer and early fall (Beaudry et al. 2009). Studies in Maine have found that Blanding's turtles travel to as many as six different wetlands in a season and regularly travel overland to access different habitats (Joyal et al. 2001). Juvenile Blanding's turtles are known to occupy habitats such as emergent sedge and alder habitats, which contain shallow aquatic areas surrounding emergent root masses. These areas may offer refugia from predators and reduce intraspecific competition with larger turtles (Pappas and Brecke 1992). Although this semi-aquatic species utilizes a variety of wetlands, Blanding's turtles also require upland soils for nesting and they utilize uplands for basking and dispersal, similar to spotted turtles. In

Maine, mating generally occurs from May to July with most nesting occurring around mid to late June (Beaudry et al. 2009).

Spotted Turtle - The spotted turtle is a relatively small species averaging only above four to six inches long. This species is characterized by a black carapace with distinct yellow dots, similar to the coloration of a spotted salamander. The spots tend to be rounder and more widely spaced compared to the Blanding's turtle streaks and spots. Males are differentiated from females by having brown eyes, a tan chin, a long, thicker tail, and a concave plastron for breeding. Females have yellow chins, orange eyes, and a convex to flat plastron.

The spotted turtle has a shorter age of first reproduction compared to Blanding's, averaging approximately 7 to 10 years of age. Similar to Blanding's, spotted turtles generally emerge from hibernacula (i.e. overwintering habitats) in April, which can be permanent or seasonal wetlands. Spotted turtles then typically spend the spring in seasonal wetlands with abundant wood frog egg masses and then spend less time in forested wetlands through late summer, as compared to Blanding's turtles. Spotted turtles also tend to use wetlands with higher mean emergent cover and higher mean sphagnum moss, compared to Blanding's turtles (Beaudry et al. 2009). Beaudry et al. 2009 identified four general activity periods for spotted turtles including spring (basking, foraging, and mating period following emergence from wintering wetlands), early summer (foraging and nesting), late summer (reduced activity and aestivation), and fall (movements to deeper wetlands for overwintering). These distinct seasonal patterns lead spotted turtles to use a diversity of wetlands and to make regular overland movements to meet their habitat needs.

Unlike Blanding's, spotted turtles in Maine typically exhibit an obvious period of aestivation (77.5% of radio-tagged spotted turtles) ranging from a few days to over seven weeks (Beaudry et al. 2009). Aestivation may occur in a variety of places including upland leaf litter under a forest canopy, in dried beds of seasonal wetlands, or in floating sphagnum mats. Although spotted turtles require wetlands for specific seasonal needs, they also make regular migrations into upland habitats and require safe dispersal routes to meet their complex habitat requirements.

Nesting Biology Implications for Blanding's and Spotted Turtles:

This regular seasonal migration to feeding, breeding, nesting, aestivation, and overwintering habitats exposes Blanding's and spotted turtles to a variety of threats. Turtles may move a mile or more from wetlands to nesting habitats. Nesting generally occurs in dry soils but nesting locations can be quite variable. Prior to large landscape alteration by humans, natural nesting sites were likely most often confined to small exposed areas in woodlands, rocky outcrops, exposed areas near river banks, and forest openings created by natural disturbances (e.g. wind, fire). Recent research has shown that approximately 84% of Blanding's nesting sites and 64% of spotted turtle nesting sites are considered anthropogenic and include

borrow pits, quarries, dredge piles, house lots/yards, and road shoulders (Beaudry et al. 2010). Blanding's turtles use recently disturbed sites including quarry and borrow pits more often than spotted turtles, although both use anthropogenic sites more often than natural sites (Beaudry et al. 2010). And, although both species travel long distances to reach nesting sites, the distance traveled by spotted turtles (148 meters) is generally less than the median distance traveled by Blanding's turtle (1006 meters).

Anthropogenic sites provide adequate nesting habitat but generally expose females to additive mortality though vehicle collisions, increased predation from pets, and collection. A number of researchers have offered that turtle nest site manipulation may be a valuable tool in habitat restoration and management (Marchand and Litvaitis 2003.

Beaudry et al. 2010 further suggest that "judicious placement of artificial nest sites" could modify upland use by nesting females to ultimately reduce adult mortality and risk exposure. Within populations of both species, some individuals appear to re-use the same general nesting sites from year to year, while individuals of both species also utilize new nest areas (Beaudry et al 2010). This lends promise to the use of artificial nest sites as a management tool. The following restoration plan specifically seeks to accomplish this by improving nesting habitat near documented and potential spotted and Blanding's turtle locations, in a large unfragmented block of land.

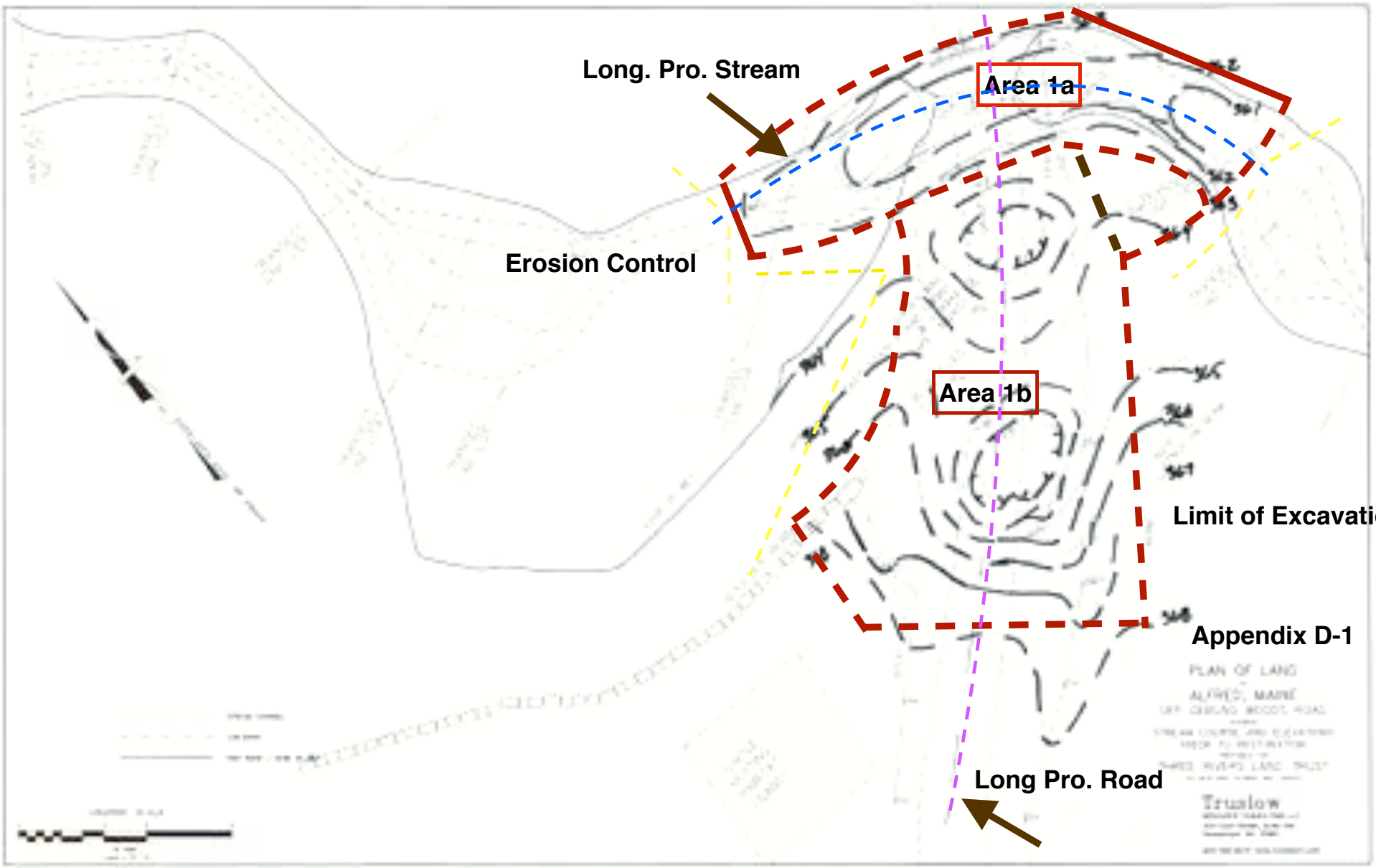
Appendix D – Restoration and Construction Diagrams and Specifications

D-1 Detailed restoration layout for Areas 1a and 1b

D-2 Planting plan for Areas 1a and 1b

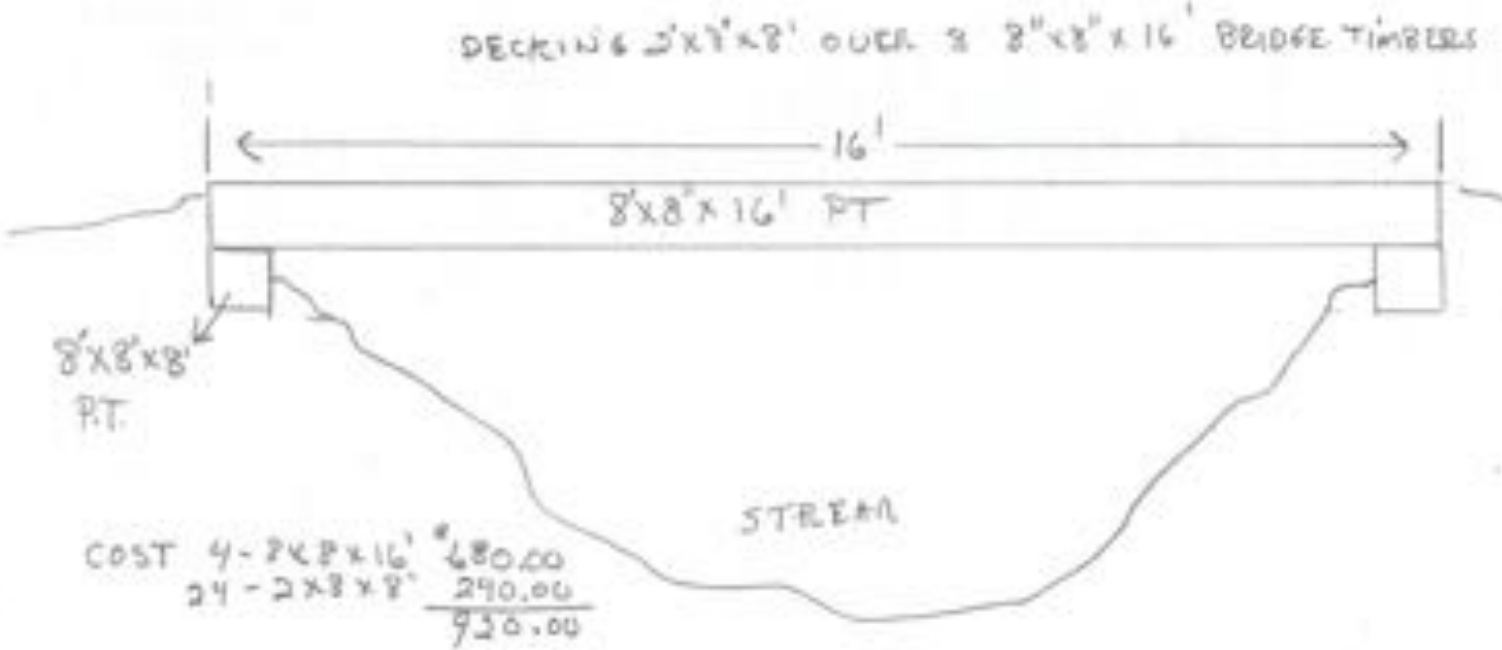
D-3 New access road bridge design

D-4 Seed mix specifications


Long. Pro. Stream
Area 1a
Erosion Control
Area 1b
Limit of Excavation
Appendix D-1
Long Pro. Road


Appendix D-2
Planting Areas - Native shrubs, herbs and saplings
PLAN OF LAND
ALFRED, MAINE
Trueblow

Appendix D-3 New Acess Road Bridge Design



NEW ENGLAND WETLAND PLANTS, INC

820 WEST STREET, AMHERST, MA 01002
PHONE: 413-548-8000 FAX 413-549-4000
EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

New England Logging Road Seed Mix

Botanical Name	Common Name	Indicator
Festuca rubra	Creeping Red Fescue	FACU
Schizachyrium scoparium	Little Bluestem	FACU
Panicum virgatum	Switch Grass	FAC
Elymus virginicus	Virginia Wild Rye	FACW-
Andropogon gerardii	Big Bluestem	FAC
Sorghastrum nutans	Indian Grass	UPL
Panicum clandestinum	Deer Tongue	FAC+
Chamaecrista fasciculata	Partridge Pea	FACU
Agrostis scabra	Rough Bentgrass/Ticklegrass	FAC
Juncus tenuis	Path Rush	FAC
Juncus effusus	Soft Rush	FACW+

PRICE PER LB. $26.00
REQ. QUANTITY: 2 LBS.
TOTAL $52.00
APPLY: 20 LBS/ACRE
1 LB/2200 SQ FT
MINIMUM QUANTITY: 2 LBS

The New England Logging Road Seed Mix was originally designed for restoring Maine logging roads, but has application on other types of restoration sites. Provides native plant cover in low fertility and compacted soils. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or early Fall seeding. Late Spring and Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged.

Price is $/bulk pound, FOB warehouse, plus S&H and applicable taxes.

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