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Date: MAY 15 2015
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John Kieling, Bureau Chief
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2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the 2014 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the 2014 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project. This annual monitoring report assesses overall performance of the mitigation efforts installed in Los Alamos and Pueblo watersheds. The evaluation of precipitation, storm water discharge, and constituent concentrations obtained in 2014 were used to determine the effects of mitigations installed over the past several years.

If you have any questions, please contact Steve Veenis at (505) 667-0013 (veenis@lanl.gov) or Cheryl Rodriguez at (505) 665-5330 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Michael T. Brandt, DrPH, CIH, Associate Director
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Sincerely,

Christine Gelles, Acting Manager
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MB/CG/DM/SV:sm

Enclosures: Two hard copies with electronic files – 2014 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project (EP2015-0030)

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May 2015
EP2015-0030

2014 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project

Los Alamos NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

EP2015-0030

2014 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project

May 2015

Responsible project manager:

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EXECUTIVE SUMMARY

This fifth annual monitoring report provides a summary of analytical data, discharge measurements, geomorphic changes, and precipitation data associated with storm water samples collected from the Los Alamos and Pueblo (LA/P) watershed from June to November 2014. Monitoring objectives include collecting data to evaluate the effect of mitigations installed in the LA/P watershed on stream flow and sediment and contaminant transport. Watershed mitigations evaluated include the DP Canyon grade-control structure (GCS) and associated floodplains; the Pueblo Canyon willow planting, wetland, and GCS; the Los Alamos Canyon low-head weir; and the storm water detention basins and willow planting below the Solid Waste Management Unit (SWMU) 01-001(f) drainage in Los Alamos Canyon. Pursuant to Section VII of the Compliance Order on Consent, Los Alamos National Laboratory (LANL or the Laboratory) had implemented interim measures to reduce the migration of contaminants within the LA/P watershed. These mitigations have been implemented with the overall goal to minimize the potentially erosive nature of storm water runoff, to enhance deposition of sediment, and to reduce access of contaminated sediments to storm water transport.

Gaging station and sampling locations within the LA/P watershed monitor the hydrology and sediment transport, including stations that bound the mitigation sites. Stage height/discharge is monitored at 5-min intervals at a series of gaging stations. Precipitation data are collected across the Laboratory by means of five meteorological towers and an extended rain gage network. Sampling for analytical suites specific to each reach of the watershed is conducted using portable automated samplers. Sampling equipment and the extended rain gage network are deactivated during the winter months (December to March) and reactivated in the spring.

Geomorphic changes are monitored at one background area, five sediment transport mitigation sites, and two sediment detention basin areas that have been established in the LA/P watershed. Cross-sections upgradient and downgradient and a thalweg profile of the transport mitigation sites were surveyed following the summer 2014 monsoon season. The net changes in cross-sectional areas from the previous year were calculated and used to estimate total deposition or erosion over the surveyed area. Sediment surfaces at the detention basin areas were surveyed following the summer 2014 monsoon season, and sediment deposition volumes were calculated for each detention basin.

The Los Alamos Canyon watershed experienced 14 runoff events in 2014. In Pueblo Canyon there was 1 runoff event in 2014 that began in the upper watershed and extended through the length of the wetland, past the GCS, and into lower Los Alamos Canyon. In contrast, 5 runoff events occurred in Los Alamos Canyon that extended through the watershed, past the low-head weir, and into lower Los Alamos Canyon. Thirteen runoff events flowed past the DP Canyon GCS because most of the watershed is the impervious Los Alamos townsite that drains into the canyon above the GCS. Attenuation of flow and associated sediment transport through the Pueblo Canyon wetland and GCS, the Los Alamos low-head weir and associated sediment detention basins, and the DP Canyon GCS is a primary goal of the sediment transport mitigation activities conducted in the LA/P watershed. All structures performed as designed in 2014.

The 2014 monitoring data in upper Los Alamos Canyon indicate a substantial reduction in suspended sediment concentration as floods passed through the low-head weir and associated sediment detention basins. This structure is, therefore, performing as designed.

In DP Canyon, which receives runoff primarily from the Los Alamos townsite, direct comparison of runoff and sediment yield above and below the GCS and upstream floodplains was possible in four events in 2014. Sediment yield decreased downstream between bounding stations (E038 and E039.1), which is consistent with the intent of the GCS in this canyon. Peak discharge between these gaging stations also decreased, indicating attenuation of flood energy.

Net sediment deposition occurred in most surveyed areas in the Los Alamos and DP Canyons in 2014, which is consistent with the goal of sediment transport mitigation control. Net deposition occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2014. Additional willows were planted in the Pueblo watershed to increase sediment deposition and bank stabilization. The upper Los Alamos Canyon sediment detention basins did not discharge storm water to Los Alamos Canyon in 2014 and have contained all the sediment transported by the drainage below SWMU 01-001(f). The geomorphic surveys document that the sediment transport mitigation sites are currently operating as designed and have not undergone net erosion over the period of this monitoring program.

Polychlorinated biphenyls from Los Alamos townsite and Laboratory sources were transported beyond the Laboratory boundary in 2014. The upper Los Alamos Canyon detention basins and lower Los Alamos Canyon weir/detention basin were effective at substantially reducing this transport. The transport of radionuclides in storm water with a Laboratory source was also substantially reduced by the settling of sediment above the Los Alamos Canyon weir.

Continued monitoring in 2015 is expected to confirm the sediment transport mitigation structures and associated wetlands and the floodplains in the LA/P watershed are performing as designed and to document the expected recovery of the wetland in Pueblo Canyon.

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
BDD	Buckman Direct Diversion
cfs	cubic feet per second
Consent Order	Compliance Order on Consent
DOE	Department of Energy (U.S.)
EPA	Environmental Protection Agency (U.S.)
ESH	Environment, Safety, and Health
GCS	grade-control structure
GPS	global positioning system
ICP	inductively coupled plasma
IMWP	interim measures work plan
Laboratory	Los Alamos National Laboratory
LANL	Los Alamos National Laboratory
LA/P	Los Alamos and Pueblo (watershed)
LiDAR	light detecting and ranging
MDL	method detection limit
MSS	Maintenance and Site Services (Laboratory group)
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PCB	polychlorinated biphenyl
PQL	practical quantitation limit
RPD	relative percent difference
SIMWP	supplemental interim measures work plan
SSC	suspended sediment concentration
SWMU	solid waste management unit
TAL	target analyte list (EPA)
TCDD	tetrachlorodibenzodioxin
TEF	toxicity equivalency factor
TEQ	toxic equivalency quotient
TSS	total suspended solids
UTL	upper tolerance limit
VE	vertical exaggeration
WWTF	wastewater treatment facility

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) that is managed by Los Alamos National Security, LLC. The Laboratory is located in north-central New Mexico approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site comprises an area of 36 mi^2, mostly on the Pajarito Plateau, which consists of a series of mesas separated by eastward-draining canyons. It also includes part of White Rock Canyon along the Rio Grande to the east.

This fifth annual monitoring report provides a summary of analytical data, discharge measurements, and precipitation data associated with storm water collected from the Los Alamos and Pueblo (LA/P) watershed from June 2014 to November 2014. In addition, the geomorphic changes at the sediment transport mitigation sites in the LA/P watershed are also included in this report as Appendix A. This monitoring was initially stipulated by the New Mexico Environment Department– (NMED-) approval with direction for the “Los Alamos and Pueblo Canyons Supplemental Investigation Report”: “The Permittees must install surface water monitoring stations below each newly-installed weir and develop a monitoring plan to evaluate each weir’s effectiveness” (NMED 2007, 098284). Subsequent proposed mitigation and monitoring efforts were identified and implemented per the approved “Interim Measure Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons” (hereafter, the IMWP) (LANL 2008, 101714; NMED 2008, 103007) and the approved “Supplemental Interim Measures Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons” (hereafter, the SIMWP) (LANL 2008, 105716; NMED 2009, 105014). Monitoring in 2014 was performed in accordance with the “2014 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project” (LANL 2014, 256575).

Monitoring objectives include collecting data to evaluate the effect of watershed mitigations installed in the LA/P watershed on stream flow and sediment and on contaminant transport. The discussion of flow and analytical results for suspended sediment and constituent concentrations focuses on an evaluation of the overall performance of the watershed, with specific emphasis on the effects of the mitigations implemented per the IMWP and SIMWP. The discussion in Appendix A of geomorphic stability focuses on sediment stability and mobility in the watershed as a measure of the overall stability of the watershed and the performance of the sediment-mitigation structures.

The NMED approval with modifications for the 2013 monitoring plan for sediment transport mitigation (LANL 2013, 243432; NMED 2013, 523106) also directed the Laboratory to monitor storm water above and below the detention basins below the Solid Waste Management Unit (SWMU) 01-001(f) drainage in upper Los Alamos Canyon. Watershed mitigations evaluated in this report include the DP Canyon grade-control structure (GCS) and associated floodplain; Pueblo Canyon willow planting, wetlands, and GCS; the Los Alamos Canyon low-head weir; and the storm water detention basins and associated vegetative buffer below the SWMU 01-001(f) drainage in Los Alamos Canyon.

Work began in 2014 to rehabilitate and mitigate damage to the Pueblo Canyon wetlands, GCS, and gaging station E060.1 from the September 2013 flooding. Work accomplished included planting willows below the wetlands (Appendix B), planting canary reed grass, installing piezometer transects to record water levels and willow performance, stabilizing the local banks, and undertaking Phase I post-flooding mitigation activities at gaging station E060.1, including armoring of the north bank directly downstream of the flume and stabilizing select banks. Work planned for 2015 includes installing a drop structure at the Pueblo Canyon wetland headcut, installing gaging station E059.8 equipped with a v-notch flume, and undertaking Phase II of gaging station E060.1 post-flooding mitigations, including redirecting the channel, installing spurs for bank protection, contouring the area around the gaging station, installing erosion protection measures at the downstream side of both the existing Pueblo Canyon GCS and gaging station E060.1, and constructing an access road.

Key constituents of concern in the watershed addressed in this monitoring report include radionuclides. Corrective actions at the Laboratory are subject to the 2005 Compliance Order on Consent (Consent Order). Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the NMED in accordance with U.S. Department of Energy policy.

1.1 Project Goals and Methods

The mitigations specified in the IMWP and SIMWP have been implemented with the overall goal of minimizing the potentially erosive nature of storm water runoff to enhance deposition of sediment and to reduce or eliminate the susceptibility of contaminated sediments to flood erosion. Figure 1.1-1 shows the locations of the mitigation and monitoring stations, including stream gaging stations, in the LA/P watershed. In the Pueblo Canyon watershed, the central focus of the mitigations is to maintain a physically, hydrologically, and biologically functioning wetland that can reduce peak flows and trap suspended sediment because of the presence of thick wetland vegetation. Stabilization and enhancement of the wetland were partially addressed with the installation of a GCS designed to inhibit headcutting below the terminus of the wetland and to promote the establishment of additional riparian or wetland vegetation beyond the current terminus of the wetland. Mitigations in upper portions of Pueblo Canyon above the wetland are designed primarily to reduce the flood peaks and to enhance channel/floodplain interaction before floods reach the wetland. Gaging stations are situated within the watershed to monitor the overall hydrology and sediment transport along the length of the watershed, including stations that bound the wetland.

In DP and Los Alamos Canyons, mitigations included stabilizing and partially burying the channel and adjacent floodplains in reach DP-2 in DP Canyon, which is a source of contaminants entrained in frequent floods that originate from a portion of the Los Alamos townsite. A GCS was installed in the lower part of reach DP-2 with a height that encourages channel aggradation, thus reducing the potential for erosion of contaminated sediment deposits in adjacent banks during floods. Channel aggradation in reach DP-2 should also encourage the spreading of floodwaters, thereby reducing peak discharge because of transmission loss within the reach and enhancing sediment deposition. Lower flood peaks should also reduce the erosion of contaminated sediment deposits downcanyon of the DP GCS. Mitigations in Los Alamos Canyon several kilometers below the DP Canyon confluence involved removing accumulated sediment behind the Los Alamos Canyon low-head weir to increase the residence time of floodwaters and to enhance settling of suspended sediment and associated contaminants.

Additional mitigations were implemented in Los Alamos Canyon under a separate administrative requirement (LANL 2008, 104020; NMED 2009, 105858) to address polychlorinated biphenyl (PCB) contamination associated with SWMU 01-001(f). The mitigation actions at that location involved removing contaminated sediment from the hillslope and constructing detention basins and a willow-planted vegetation buffer at the bottom of the associated hillside drainage to promote the settling of PCB-contaminated sediments in runoff from the upgradient PCB-contaminated hillslope drainage.

2.0 MONITORING IN THE LA/P WATERSHED

2.1 Discharge and Precipitation Measurements and Sampling Activities

Measurements of discharge and surface-water sampling were conducted at 12 gaging stations in the LA/P watershed in 2014. Gaging stations with concrete, trapezoidal, supercritical-flow flumes are designated Los Alamos below low-head weir (E050.1), Pueblo below grade-control structure (E060.1), DP below grade-control structure (E039.1), and Los Alamos above low-head weir (E042.1). Eight other gaging stations that complete the monitoring network in the LA/P watershed are designated as Pueblo above Acid (E055), South Fork of Acid Canyon (E055.5), Acid above Pueblo (E056), Los Alamos below Ice Rink (E026), Los Alamos above DP Canyon (E030), DP above Technical Area 21 (E038), Pueblo below the wastewater treatment plant (E059.5), and DP above Los Alamos Canyon (E040). Figure 1.1-1 shows the locations of stream gaging stations and watershed mitigations within the Laboratory's property boundary and on adjacent land owned by the County of Los Alamos.

Stage height was monitored at each LA/P gaging station at 5-min intervals in the LA/P watershed. Sutron 9210 data loggers stored each recorded stage-height measurement as it was made. Discharge was computed for each 5-min stage measurement using rating curves for each individual gaging station. Shaft-encoder float sensors installed in stilling wells were used to measure water levels at E030, E039.1, E042.1, E050.1, and E060.1. Self-contained bubbler pressure sensors (Sutron Accubar) were used to measure water levels at E038, E055, E055.5, E056, and E059.5 and to provide backup sensing at E039.1, E042.1, E050.1, and E060.1. An ultrasonic probe sensor (Siemens Milltronics "The Probe") was used to measure water levels at E026 and E040 and to provide backup sensing at E050.1 and E060.1. In 2014, approximately 1,990,000 individual stage measurements were recorded at the 12 gaging stations monitored within the LA/P watershed.

A complete record of 5-min stage height measurements for the monitoring period from June 1, 2014, to October 31, 2014, exists at E030, E039.1, E050.1, E055, E055.5, and E059.5. Five-minute stage height measurements are incomplete at E026, E056, and E060.1 because of stage-height sensor equipment failure or data logger failure. The missing stage height measurements are 1 d or less at all three of these gaging stations. Five-minute stage height records were affected periodically by silting at E040, E042.1, and E060.1; however, these stations have ultrasonic probe sensors that recorded estimates of measurements during the silting periods.

Storm water programs at the Laboratory use precipitation data collected at the Laboratory's meteorological towers. Figure 2.1-1 shows total precipitation for each month from 2011 to 2014 averaged over the Laboratory; annual heterogeneity and increase in precipitation occurs during the summer monsoon. In addition, a seasonal, extended rain gage network is deployed during the months from April to November to coincide with storm water monitoring periods. Using a geographic information system, storm water monitoring stations are assigned to an individual rain gage using the method of Thiessen polygons. Rain gages, meteorological towers, Thiessen polygons, and the drainage area for each stream gaging station associated with the LA/P watershed are presented in Figure 2.1-2.

Sampling was conducted using ISCO 3700 portable automated samplers. Two ISCO samplers were installed at each of the following locations: E026, E038, E039.1, E042.1, E050.1, E059.5, and E060.1. At locations where two samplers were installed, one sampler was configured with a 24-bottle carousel to monitor primarily suspended sediment, and the second sampler was configured with a 12-bottle carousel to monitor inorganic and organic chemicals and radionuclides. At locations where a single sampler was installed, the sampler was configured with a 12-bottle carousel to monitor suspended sediment, inorganic and organic chemicals, and radionuclides. Sampler intake lines were set above the bottom of the channel or flume and were placed perpendicularly to the direction of flow. The placement of trip levels and sampler intake lines is presented in Table 2.1-1.

Sampling equipment at gaging stations in LA/P watershed was shut down during the winter months and reactivated in the spring. During the 2014 monitoring period, activated gaging stations and sampling equipment were inspected weekly. Equipment at the 12 LA/P gaging stations was connected via telemetry to a base station, allowing real-time access to discharge measurements and battery state of charge. Inspectors reviewed telemetry daily to ensure gaging stations were functioning correctly. Inspectors inspected gaging stations and samplers when telemetry readings indicated discharge had occurred or equipment problems existed.

2.2 Sampling at the Detention Basins below the SWMU 01-001(f) Drainage

In 2014, five storm water samples were collected with automated samplers above two constructed detention basins below the SWMU 01-001(f) drainage at location CO111041. Samples were collected on three occasions downgradient of the detention basins at the culvert at the terminus of the vegetative buffer below the lower basin (CO101038). No paired samples were collected. Sampling locations and storm water control features at the detention basins below the SWMU 01-001(f) drainage are identified in Figure 2.2-1. No physical evidence of storm water flow across the lower basin spillway was observed during post-storm inspections in 2014. Samples collected at CO101038 are likely characteristic of hillslope run-on above the sampler and surface expression of alluvial water that saturates the vegetative buffer area following significant storm events.

2.3 Sampling at the Gaging Stations in the LA/P Watershed

During the monitoring period in 2014 (June 1 to October 31), the sample-triggering discharge (5 cubic feet per second [cfs] at E050.1/E060.1; 40 cfs at E038; and 10 cfs at the other gaging stations) was exceeded during 13 storm events. The storm overnight on July 15 and 16 was separate from the storm earlier in the day on July 15 and from the storm later in the day on July 16. Sampling and analyses of inorganic and organic chemicals, radionuclides, and suspended sediment occurred during 9 storm events from 1 or more of the 12 gaging stations in the LA/P watershed. A total of 37 sampling events occurred, with a sampling event defined as the collection of 1 or more samples from a specific gaging station during a specific runoff event. Maximum daily discharge at all gaging stations on days when the sample-triggering discharge is exceeded is presented in Table 2.3-1. Table 2.3-1 also summarizes the runoff events sampled at each gaging station. In 2014, the sample-triggering discharge was reached 47 times, and sampling was conducted during 37 of these storm events, resulting in an overall sampling efficiency of 79%. The reason storm water was not collected during each storm event is categorized and presented in Table 2.3-2.

2.4 Samples Collected in the LA/P Watershed

Sample suites presented in the monitoring plan vary according to the monitoring location and are based on key indicator constituents, as well as requirements stipulated by NMED, for a given portion of the watershed. Analyses were obtained from storm water collected at sampling locations, as presented in Table 2.4-1. In cases where insufficient water was collected to perform all planned analyses, analyses were prioritized in the order presented in Table 2.4-1. Up to 24 samples per event were collected for suspended sediment analysis from a single ISCO sampler containing a 24-bottle carousel at the lower gaging stations (E042.1, E050.1, E059.5, and E060.1) and upper DP Canyon gaging stations (E038 and E039.1) (Figures 1.1-1 and 2.1-2). Suspended sediment analyses at all other locations were obtained from the first and last sample in an ISCO sampler containing a 12-bottle carousel. Suspended sediment analyses were conducted using American Society for Testing and Materials (ASTM) method D3977-97, from an entire sample, and reported using the designation “Suspended Sediment Concentration” (SSC).

The U.S. Environmental Protection Agency (EPA) target analyte list (TAL) metals were analyzed in filtered and unfiltered samples at all locations. Other required analyses were conducted from unfiltered samples. Sample collection times were recorded for each individual sample bottle filled, which allowed more precise estimation of discharge and SSCs at the time samples were collected.

Analyses were conducted using the analytical methods presented in Table 2.4-2. Detection limits are provided for comparison purposes but are affected by sample-specific factors that are not fully known until after the sample is analyzed. Such sample-specific factors may include available sample volume, matrix interferences, and sample dilution. No samples collected in 2014 contained suspended sediment content greater than approximately 10%; analyses for all samples were conducted as liquid. When suspended sediment content exceeded 10%, analyses for selected radionuclides and metals are conducted on separate solid and liquid fractions, and the final result reported by the analytical laboratory is a calculated concentration of the recombined solid- and liquid-phase analyses. Table 2.4-3 presents the prioritization matrix that was used to guide the submission of analyses during 2014. The complete sequence and timing of analyses planned, samples collected, and analyses requested at each gaging station are presented in Table 2.4-4.

Analyses planned and analyses performed differ during the year for several reasons including the following:

1. Incomplete sample volumes were collected.
    a. Minimum volumes are required to obtain specified detection limits. If the volumes were insufficient select analyses were not performed.
    b. Lowest priority analyses are omitted when incomplete volumes are collected.
2. Samples are collected in glass or polyethylene bottles.
    a. Organic chemical analyses are conducted on samples collected in glass bottles and if glass bottles did not fill analyses were not performed.
    b. Boron was analyzed as an addition to the TAL metal suite, and samples were collected in polyethylene bottles. If insufficient volume was not collected in polyethylene bottles then boron analyses were not ordered.

2.5 Operational Issues

In 2014, the Laboratory performed weekly inspections at gaging stations and samplers in the LA/P watershed. Inspections of sampling and gaging station equipment were performed following a rain event that resulted in discharge. Additionally, flumes at E039.1, E042.1, E050.1, and E060.1 were inspected for sedimentation after each discharge event and cleaned on the first workday after sedimentation occurred. If inspectors were unable to repair damaged equipment at the time of inspection, additional resources were made available as quickly as possible to make repairs.

2.6 Deviations from Work Plan

Gaging station equipment at E050.1 and E060.1 was inspected weekly throughout the year; automated samplers and equipment at other gaging stations were inspected weekly from June 1 to October 31 and at least monthly from November 1 to May 31. Equipment found to be damaged or malfunctioning was repaired within 5 business days after the problem was discovered. Samples were retrieved from the field within 1 business day of sample collection using the following priority order, if necessary:

- Lower watershed at E042.1, E050.1, E059.5, and E060.1: 12 of 13 samples were collected within 1 business day.

- Upper watershed at E026, E030, E055, E055.5, E056, CO101038, and CO111041: 4 of 17 samples were collected within 1 business day.
- DP Canyon at E038, E039.1, and E040: 11 of 17 samples were collected within 1 business day.

The interval between sample collection and sample retrieval is documented in Table 2.6-1. In 2014, samples were retrieved from gaging stations 47 times. Samples were collected at gaging stations 27 times within the first business day.

If the stage could not be correctly measured because of damage or silting that occurred, these instances are documented in Table 2.6-2. In 2014, six gaging stations were damaged or malfunctioned a total of 18 times. The gaging stations and sampling equipment were repaired within 5 business days on 17 of these occasions. Discharge could have exceeded sample-triggering thresholds on 2 d because of silting or equipment malfunction, as noted in Table 2.6-2.

Battery voltage, stage height, and sensor function at each gaging station were remotely monitored daily. An on-site inspection was performed if any malfunction or sample collection event was observed. Samplers and monitoring equipment were physically inspected initially in April (with the exception of CO101038 and CO111041, which were initially inspected on June 3, 2014) and weekly between June 1, 2014, and mid-November 2014. The dates of each physical inspection at each gaging station are documented in Table 2.6-3.

3.0 WATERSHED HYDROLOGY

The topography, geology, geomorphology, and meteorology of the LA/P watershed are quite complex and include mesas, canyons, and large-elevation gradients; alluvium, volcanic tuff, pumice, and basalt; ephemeral streams, evolving stream networks (both laterally and vertically), and sediment-laden stream discharge; winter snowfall that can create spring snowmelt, intense summer monsoonal rainfall, and occasional late summer to fall tropical storm activity. Consequently, monitoring of the LA/P watershed runoff is also complex and challenging.

3.1 Drainage Areas and Impermeable Surfaces

Drainage areas unique to each gaging station (Figure 2.1-2) were developed using the ArcHydro Data Model in ArcGIS. Model inputs were developed using an elevation grid created from 4-ft light detecting and ranging (LiDAR) images (a digital elevation model from 2000), surface-water drainage culverts from the Laboratory, and the County of Los Alamos, and manual site-specific controls based on field assessments. Each drainage area defines the area that drains to the particular gaging station from either the next upstream gaging station or the headwaters of the watershed, as determined by the model inputs.

The impermeable surface area was derived from the urban-sparse-bare rock land cover type within the taxonomic-level classification system developed in the Land Cover Map for the Eastern Jemez Region (McKown et al. 2003, 087150). The specific grid data set selected to provide the land cover type was the quarter-hectare smoothed taxonomic level. Within each gaging station drainage area, the urban-sparse-bare rock land cover type was spatially queried for total acreage based upon the number of 50-ft × 50-ft grid cells that fell within the drainage boundary. This total area was then divided by the total area of the entire drainage area to derive the percent impermeable surface area. The following assumptions were made in determining the percent impermeable surface area: (1) the only available land cover data were from 2002 and 2003, and therefore, newer impermeable surfaces may not be captured; and (2) urban-sparse-bare rock grid cells that may have overlapped two drainage areas were spatially queried based upon where the center of the cell resided rather than the exact amount of each cell that fell within each drainage area.

A significant factor in the frequency of discharge at each gaging station is the ratio of permeable to impermeable surface area discharging to the gaging station or within the canyon drainage (Table 3.1-1). The 2011 Las Conchas fire affected this relationship because of soil hydrophobicity (infiltration decreases), lack of vegetation (through fall increases and evapotranspiration decreases), and lack of litter (infiltration decreases) following a medium- to high-intensity forest fire, leading to an increase in runoff, as occurred after the Cerro Grande fire (Gallaher and Koch 2004, 088747). Large post-fire runoff events have tapered off since the fire; however, since the peak of the Las Conchas fire–based sediment load, sediment concentrations have decreased but have not returned to pre-fire conditions as of yet.

3.2 Water and Sediment Transmission

Figure 3.2-1 is a flow diagram of the LA/P watershed showing each gaging station and the location of sediment transport mitigation sites. Figure 3.2-2 shows box and whisker plots of suspended sediment (both total suspended sediment [TSS] and SSC) for DP, Los Alamos, and Pueblo/Acid Canyons from up- to downstream over the past 5 yr of monitoring. As expected, Los Alamos Canyon had higher concentrations of suspended sediment as a result of the Las Conchas fire (pre-fire year 2010 was compared with the post-fire years from 2011 to 2014). In contrast, SSCs in DP and Pueblo/Acid Canyons, with the exception of E059/E059.5, are significantly less than in Los Alamos Canyon. Historical observations show that SSC in Los Alamos Canyon decreases from E026 to E050.1, particularly after crossing the Los Alamos Canyon low-head weir (between E042.1 and E050.1), increases greatly after the Guaje Canyon confluence (E099), and decreases slightly at E109.9. The influence of Guaje Canyon post-fire is extreme because 15% of the 21,000-acre watershed experienced moderate- to high-burn severity during the Las Conchas fire. Both E099 and E109.9 were not operational in 2014.

For runoff events exceeding sampling triggers in 2014, Figure 3.2-3 shows hydrographs for DP, Los Alamos, and Pueblo/Acid Canyons from up- to downstream. Table 3.2-1 summarizes the flood bore transmission downstream across the major sediment transport mitigations, including travel time of flood bore from the upstream to the downstream gaging station, peak discharges of the flood bore at the gaging station, and the percent reduction in peak discharge between the stations for every sampled runoff event in 2014. The flood bore is defined as the leading edge of the storm hydrograph as it transmits downcanyon and peak discharge is the maximum 5-min instantaneous flow rate measured during a flood. The focus was on peak discharge because it is related to stream power, and in ephemeral streams in semiarid climates, the greater the stream power, the greater the erosive force, and hence the greater the sediment transport (Bagnold 1977, 111753; Graf 1983, 111754; Lane et al. 1994, 111757).

As flood bores move from up- to downstream, peak discharge can either increase by means of alluvial groundwater and/or tributary contributions or decrease because of transmission losses (infiltration). In some events, downstream stations experienced discharge before upstream stations because of inputs from intermediate tributary drainages or localized storms centered closer to the downstream gaging station.

Figure 3.2-4 shows the hydrograph and sedigraph for gaging stations E038, E039.1, E040, E42.1, E50.1, and E059.5 that sampled through all or most of the duration of a runoff event plotted as time since the peak. Typically TSS and SSC concentrations decrease through the hydrograph as energy dissipates.

Table 3.2-2 shows the Pearson’s correlation coefficients between discharge and SSC for these stations and runoff events. Concurrent times as well as various time lags are displayed. Pearson’s correlation coefficients are computed as follows:

$$corr_{Q_t,TSS_t} = \frac{\sum_{t=0}^{n}(Q_t-\bar{Q})(SSC_t-\overline{SSC})}{\sqrt{\sum_{t=0}^{n}(Q_t-\bar{Q})^2\sum_{t=0}^{n}(SSC_t-\overline{SSC})^2}}$$

Equation 3.2-1

where Q_t is the discharge at time t, SSC_t is the SSC at time t, n is the number of measurements to be correlated ($t = 1, 2, \ldots, n$), and

$$\bar{Q} = \frac{\sum_{t=0}^{n} Q_t}{n}$$ **Equation 3.2-2**

$$\overline{SSC} = \frac{\sum_{t=0}^{n} SSC_t}{n}$$ **Equation 3.2-3**

The peak SSC can occur after the peak discharge; thus, lags between 0 and 30 min are presented with the discharge lagging behind the SSC to align the peaks (after 30 min, the correlations were reduced for all stations and all runoff events). For example, when the Pearson's correlation coefficient between Q_t and SSC_{t+5} is computed, the SSC time series begins 5 min after the discharge time series.

For stations E038, E039.1, E042.1, E050.1, and E059.5, discharge is reasonably positively correlated to SSC with little to no lag. The exceptions are when the sampler intake clogged. Figure 3.2-5 shows the linear relationship between sediment yield and runoff volume for the stations where SSC was measured throughout the runoff event over the past 3 yr of monitoring; Table 3.2-3 presents the 2012, 2013, and 2014 values shown in Figure 3.2-5. Although SSC and instantaneous discharge are not always highly correlated as a result of localized precipitation, sediment availability, or antecedent conditions, the linear relationship between sediment yield and runoff volume is well established (Onodera et al. 1993, 111759; Nichols 2006, 111758; Mingguo et al. 2007, 111756).

The runoff volume for each event was computed as follows:

$$V = \sum_{i=0}^{n} Q(t_i)(t_{i+1} - t_i) \quad ,$$ **Equation 3.2-4**

Where n = the number of instantaneous discharge measurements taken throughout the runoff event,

t_i = the time at which an instantaneous discharge measurement is taken, and

$Q(t_i)$ = the discharge (ft^3/s) at time t_i (multiplied by 60 to convert from ft^3/s to ft^3/min).

The mass of sediment for each runoff event was computed by

$$M = \sum_{j=0}^{m} Q(t_j)(t_{j+1} - t_j)\, SSC(t_j) \quad ,$$ **Equation 3.2-5**

Where m = the number of SSC samples taken throughout the storm event,

t_j = the time, j, at which an SSC sample is taken,

$Q(t_j)$ = the discharge (ft^3/s) at time t_j interpolated from the instantaneous discharge measurements taken at time t_j (multiplied by 60 to convert from ft^3/s to ft^3/min), and

$SSC(t_j)$ = SSC (mg/L) at time t_j (multiplied by 28.3×10^{-6} to convert from mg/L to kg/ft^3).

Figure 3.2-6, like Figure 3.2-5, shows the linear relationship between sediment yield and peak discharge, which is not as robust as the relationship between sediment yield and runoff volume during the past 3 yr.

3.3 Geomorphic Changes

Topographic surveys to measure sediment deposition and erosion were conducted at one background area, Pueblo Canyon Background sections above the wastewater treatment facility (WWTF) (formerly Pueblo Canyon cross-vane structure sections), as well as the following sediment transport mitigation sites: upper Pueblo Canyon willow-planting area, Pueblo Canyon wing ditch, lower Pueblo Canyon willow-planting area, Pueblo Canyon GCS, upper Los Alamos Canyon sediment detention basins, DP Canyon GCS, and Los Alamos Canyon low-head weir. A complete summary of the methods and detailed discussion of the results are provided in Appendix A.

The largest runoff events in 2014 at the sediment transport mitigation sites in the LA/P watershed occurred following heavy rains that fell on the Pajarito Plateau, the Los Alamos townsite, and the Sierra de los Valles on July 14 and 15 and on July 31, 2014. These floods were much smaller in magnitude than the large September 2013 flood event that caused significant erosion in most surveyed areas in Pueblo Canyon. In contrast to September 2013, net deposition occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2014. This is consistent with net deposition measured in most of these areas in 2010, 2011, and 2012. The net deposition observed in Los Alamos and DP Canyons was likely enhanced by the sediment mitigation structures. As required by NMED (2011, 204349), the background sites, sediment transport mitigation sites, and sediment detention basins will continue to be resurveyed annually.

3.3.1 Pueblo Canyon

Net deposition occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2014. This is in contrast to net erosion measured in most surveyed areas in 2013 but is consistent with net deposition measured in most of these areas in 2010, 2011, and 2012. In 2014, the Pueblo Canyon wing ditch area experienced the largest normalized net deposition (266 m^3/100 m), whereas the upper Pueblo Canyon willow-planting area and Pueblo Canyon GCS sediment mitigation area experienced relatively small net deposition (30 m^3/100 m and 13 m^3/100 m, respectively). For comparison, the Background sections above the WWTF recorded 84 m^3/100 m net deposition. For sections of the the lower Pueblo Canyon willow-planting area, geomorphic changes resulting from 2014 monsoonal flood events appear to be minimal and could not be distinguished from ground disturbance from transplanting reed canary grass in December 2014 and willow-planting activities in April 2014. Bank erosion in all areas as a result of 2014 flood events was minimal. Willows that had been laid down by 2013 monsoonal floods have resprouted and appear to be growing vigourously. Willows planted in sections of the lower Pueblo willow-planting area appears to be growing successfully. The regrowth of willow patches and sedimentation in the wing ditch area are consistent with the goals of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716).

3.3.2 Los Alamos and DP Canyon

Net sediment deposition occurred in most surveyed areas in the Los Alamos Canyon watershed in 2014, which is consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Net sediment deposition in DP Canyon, the upper Los Alamos Canyon sediment detention basins, and the Los Alamos Canyon low-head weir in 2014 is less than that recorded in 2013. It appears that sediment deposition behind the engineered structures in the Los Alamos Canyon watershed has been enhanced by the construction of these structures, although how far this effect propagates upstream behind the DP Canyon GCS is uncertain.

3.4 Impact and Efficiency of Watershed Mitigations

The DP and Pueblo Canyon GCSs were constructed to help reduce erosive flood energy and to cause upstream aggradation to bury existing stream channels, potentially to bury existing floodplain deposits, and in Pueblo Canyon, to stabilize an eroding wetland. As a result, the GCSs help to reduce sediment transport in that they immobilize the headcuts and prevent further headcutting that potentially could have led to additional sediment transport.

The Pueblo Canyon wing ditch was designed to divert floodwater from the main channel into an adjacent abandoned channel, spreading water more broadly over a wetland and decreasing surface water flow velocities. The previously abandoned channel to the south now functions as the main thalweg, particularly during periods of high effluent discharge and storm water runoff. Flow is also present in the northern and in a middle channel throughout most of the wing ditch area, helping to effectively distribute water across this part of the wetland, a function that the wing ditch was designed to perform.

The cross-vane structures were largely eroded during the August 15, 16, and 23, 2010, floods, then completely destroyed during the September 13, 2013, flood. This nonengineered reach is still surveyed annually, and the information is used for comparison to the reaches with engineered structures.

Willows were planted in Pueblo Canyon to aid in surface stabilization, reduce flow reduction, and inhibit sediment accumulation. Willows were initially planted in 2010 in the Upper Pueblo Canyon Willow-Planting area. Many of these willows that were laid down in the 2013 floods have re-sprouted. As long as the willows continue to survive and propagate, they will attenuate flood energy and promote local channel stability/aggradation. In 2014, an additional 9000 willows were planted in the Lower Pueblo Canyon Willow Planting Area. Details of the willow planting from 2014 are presented in Appendix B of this report, 2014 Pueblo Canyon Wetland Area Mitigation Phase I: Willow Planting Report.

DP Canyon: In 2014, sampling of storm water and SSC conducted in DP Canyon was performed above (E038) and below (E039.1) the GCS and associated floodplains on July 8, 15-16, 27, 29, and 31 and August 1, 2014 (Figure 3.4-1). SSC analyses performed from samples collected during these runoff events allow direct evaluation of changes in discharge and sediment transport through this section of DP Canyon. On July 15-16, only one SSC was analyzed at E038; thus, the data were not adequate to compute up- and downstream sediment yield comparisons. Sample collection began within 5 min of initial discharge (triggered above 40 cfs for E038 and 10 cfs for E039.1). For E038 and E039.1, respectively, the calculated sediment yield is 2.9 and 0.5 yd^3 on July 8; 3.5 and 0.7 yd^3 on July 27; 4.8 and 3.5 yd^3 on July 29; and 14 and 14 yd^3 on July 31 and August 1 (Table 3.2-3). Between these two stations, or from above to below the GCS, there is a 141%, 133%, 31%, and 0% relative percent difference (RPD) decrease in sediment yield for these events, respectively.

Decreasing storm water velocity allows for increased infiltration, thus reducing peak discharge, reducing the distance the flood bore travels downstream, and reducing the distance that sediment and associated contaminants entrained in the storm water travel downstream. Increasing infiltration reduces peak discharge, but can also decrease the total volume of storm water. In 2014, the peak discharge decreased in 14 of 21 runoff events between E038 and E039.1, with an average decrease of 53% RPD, and increased in 7 of 21 events, with an average increase of 31% RPD (Table 3.2-1). For the July 8, 27, 29, and 31 and August 1 events, the runoff volume for E038 and E039.1, respectively, is 1.7 and 0.7 acre-ft; 2.9 and 1.9 acre-ft; 5.5 and 6.2 acre-ft; and 9.7 and 11 acre-ft (Table 3.2-3). Between these two stations, or from above to below the GCS, there is an 88% RPD and 42% RPD decrease in runoff volume on July 8 and July 27, respectively, and an 11% RPD and 13% RPD increase in runoff volume on July 29 and July 31 and August 1, respectively. The increase in runoff volume is most likely caused by contributions from localized tributaries downstream of E038.

In addition to examining coinciding sampling events, watershed mitigation performance can be assessed by examining overall statistics over time. Figure 3.4-2 shows box and whisker plots for E038 and E039.1 for TSS, SSC, and peak discharge over the past 5 yr of monitoring. These plots indicate overall reductions in TSS and SSC over the 5 yr and minor reductions in mean peak discharge (i.e., erosive force) over the 5 yr through this section of DP Canyon, which is consistent with the goals of the sediment transport mitigation activities.

Pueblo Canyon: In 2014, no SSC analyses were performed in Pueblo Canyon above (E059.5) and below (E060.1) the GCS and upstream wetland for the same runoff event (Table 3.2-3). Therefore, overall statistics over the past 5 yr of monitoring must be used to assess performance. Figure 3.4-2 shows box and whisker plots for E059/E059.5 and E060.1 for TSS, SSC, and peak discharge. As these plots indicate, mean peak discharge was effectively attenuated through the Pueblo Canyon wetland in 2010, 2011, 2013, and 2014 (no flow was measured in 2012), resulting in little to no transport from the upper Pueblo watershed into lower Los Alamos Canyon. This is consistent with the goals of the sediment transport mitigation activities. It should also be noted that discharge was measured at E059/E059.5 for three events in 2014, during which no discharge was measured at E060.1, regardless of the tributary from the Los Alamos Airport that regularly discharges storm water runoff into the wetland. Thus, the discharge magnitude is being reduced through this area, which is a primary goal of the mitigation actions. In addition, TSS and SSC magnitude was reduced through the mitigation structures in 2010. No samples were collected at E060.1 in 2011, 2012, or 2013, and one sample was collected at E060.1 in 2014 but was not analyzed for SSC. In addition, in 2014, the peak discharge decreased in 9 of 9 runoff events between E059.5 and E060.1, with an average decrease of 84% RPD (Table 3.2-1).

Los Alamos Canyon: Sampling was performed in Los Alamos Canyon on July 15 and 16, 29, and 31 and on August 1 above (E042.1) and below (E050.1) the low-head weir. Analyses performed from samples collected during these runoff events allow direct evaluation of the effect of the weir and associated basins on flow and sediment transport. On July 15 and 16, only one SSC was analyzed at E042.1; thus, the data were not adequate to compute up- and downstream sediment yield comparisons. Each event had downstream decreases or a slight increase in peak discharge, total runoff volume, and a notable decrease in SSC (Figure 3.4-3; Table 3.2-3). For E042.1 and E050.1, respectively, the calculated sediment yield is 83 and 18 yd^3 on July 29, and 247 and 91 yd^3 on July 31 and August 1; the runoff volume is 16 and 11 acre-ft on July 29, and 21 and 22 acre-ft on July 31 and August 1 (Table 3.2-3). More specifically, between these two stations on July 29 and 31 and August 1, respectively, there is a 129% RPD and 92% RPD decrease in sediment yield and a 37% RPD decrease and 5% RPD increase in runoff volume. In addition, in 2014 the peak discharge decreased in 9 of 10 runoff events between E042.1 and E050.1, with an average decrease of 88% RPD (Table 3.2-3). The peak discharge increased slightly in 1 of 10 runoff events between E042.1 and E050.1, with an average increase of 2% RPD. Sediment trapping efficiency is expected to be higher in smaller events and events early in the season before the detention basins have filled with water. Flow is reduced through the weir and the upstream sediment detention basins, allowing sediment to settle out of suspension; thus, this mitigation feature is performing as designed.

In addition to examining coinciding sampling events, performance of the weir and upstream sediment detention basins can be assessed by examining overall statistics over the past 5 yr of monitoring. Figure 3-4.2 shows box and whisker plots for E042.1 and E050.1 for TSS, SSC, and peak discharge. These plots show major reductions in TSS and SSC, particularly in response to the post–Las Conchas fire years (2011, 2012, 2013, and 2014), and minor reductions in mean peak discharge; thus, the weir is performing as designed.

4.0 ANALYTICAL RESULTS

Appendix C contains all analytical results obtained from storm water runoff samples collected in the LA/P watershed during 2014. Data packages for these analyses are included with this report (on CD).

4.1 Data Exceptions

Low bias of analytical results in high-sediment content storm water has been observed in analyses performed by gamma spectroscopy, alpha spectroscopy, inductively coupled plasma (ICP) mass spectroscopy and ICP optical emission spectroscopy. This low bias can be avoided when the solid phase and liquid phase of each biphasic sample are analyzed separately and the results mathematically recombined. No biphasic samples were analyzed in 2014.

A single PCB analysis was conducted from storm water collected on 2 d at the sampler at the Inlet to Upper Detention Pond below LA-2, CO111041. The ISCO collected storm water from a small storm on July 7, filling bottles 1 and 2. A larger storm on July 8 completed filling bottles 3 through 12. Bottles 2 collected on July 7 and bottle 3 collected on July 8 were sent for PCB analysis using a single sample identification. The analytical results returned could have been produced from storm water collected on either date.

4.2 Analytes Exceeding Comparison Values

As explained in the IMWP, several actions were taken as part of an interim measure under Section VII.B of the Consent Order to mitigate transport of contaminated sediments in the LA/P watershed (LANL 2008, 101714). The analytical results from monitoring are presented and evaluated within this context. The mitigation actions were not undertaken with the objective of reducing concentrations of water-borne contaminants to specific levels, and the analytical results are therefore not compared with water-quality standards or other criteria for that purpose or for the purpose of evaluating compliance with regulatory requirements. For this report, monitoring results are compared with water-quality standards at the request of NMED to provide a basis for potential future revisions to the analytical suites.

The New Mexico Water Quality Control Commission (NMWQCC) Standards for Interstate and Intrastate Surface Waters (New Mexico Administrative Code [NMAC] 20.6.4) establish surface water criteria. Surface water within Pueblo and Acid Canyons are unclassified, nonperennial waters of the state under NMAC 20.6.4.98, with segment-specific designated uses of livestock watering, wildlife habitat, marginal warm water aquatic life, and primary contact. The criteria applicable to the marginal warm water aquatic life designation include both acute and chronic aquatic life criteria and the human health organism only criteria. Surface water within Los Alamos and DP Canyons is classified as ephemeral and intermittent waters of the state under NMAC 20.6.4.128, with segment-specific designated uses of livestock watering, wildlife habitat, limited aquatic life, and secondary contact. The criteria applicable to the limited aquatic life designation include the acute aquatic life criteria and the human health organism only criteria but do not include the chronic aquatic life criteria. In all cases, storm water results are compared with the lowest applicable criteria.

Water-quality criteria for total and total recoverable pollutants are compared with unfiltered surface water sample concentrations. The water-quality criterion for total recoverable aluminum is for filtered storm water samples using a 10-µm pore size, which were not collected in 2014. Other water-quality criteria are for dissolved concentrations of pollutants, which are compared with filtered storm water samples using a 0.45-µm pore size. Acute and chronic aquatic life criteria for dissolved cadmium, chromium, copper, lead, manganese, nickel, and zinc; and acute aquatic life criteria for dissolved silver are calculated based on the hardness of each sample. Because chromium is not analyzed as separate Cr(III) and Cr(VI) species, chromium results are compared with the lowest standard, Cr(VI), dissolved. The water-quality criteria for dioxins are the sum of the dioxin toxicity equivalents expressed as 2,3,7,8 tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Table 4.2-1 presents the NMWQCC criteria used as numeric values for comparison with monitoring results for the purposes stated above. When chemicals have water-quality criteria for multiple designated uses, the lowest value was selected to compare with analytical results. Table 4.2-2 presents the comparison of detected analytical results from 2014 with the water-quality criteria in Table 4.2-1. Analytical constituents detected above these NMWQCC criteria are adjusted gross alpha, copper, lead, mercury, selenium, total PCBs, and dioxins.

The dioxin congener 2,3,7,8-TCDD was not detected in the 13 samples in which it was analyzed in 2014. These samples were analyzed for PCBs, including 11 PCB congeners with assigned toxicity equivalency factors (TEFs). PCBs and other dioxin congeners with detected concentrations were converted to concentrations equivalent in toxicity (toxic equivalency quotients [TEQs]) to 2,3,7,8-TCDD for comparison with the NMWQCC criteria. The TEQs were calculated using the TEFs presented in Table 4.2-3 (Van den Berg et al. 2006, 106990). The detected concentration of each congener was multiplied by its TEF, and these products were summed for each detected congener to obtain the TEQ for a sample. The TEQs for each sample analyzed for dioxins and furans or PCBs are presented in Table 4.2-4 and range over 4 orders of magnitude (1.550×10^{-8} to 4.087×10^{-4} µg/L).

4.3 Relationships between Discharge, SSC, and Contaminant Concentrations

Discharge was calculated from stage height using a rating curve, which is the relationship between discharge in cubic feet per second and height of the water in feet, developed for each individual gaging station. Stage height was measured at 5-min interval and logged continuously during each sampled storm event. SSC and particle size were measured during each storm in conjunction with inorganic and organic chemicals and radionuclides. Because of low bias inherent in TSS analyses, TSS was not measured in 2014.

SSC and instantaneous discharge estimates were calculated for each sample using a linear relationship between the two corresponding analytically determined SSCs or the two corresponding physically measured discharge, as follows:

$$y = mx + b$$ **Equation 4.3-1**

where y = the calculated SSC or discharge at the time of sample collection,

m = the slope of the line,

x = the time differential in minutes between SSC sample collection or discharge measurements, and

b = the concentration of analytically determined SSC before sample analyses or corresponding physically determined discharge.

The slope is determined by dividing the difference in SSC or discharge by the difference in time, in minutes, between SSC sample collection or discharge measurements before and after analytical sample collection. This equation was used to calculate SSC and instantaneous discharge for samples collected. Where analytical results are not bounded by sediment results, the concentration of the nearest sediment result is used as an estimate of the sediment concentration at the time the sample was collected. If SSC was not measured during a storm, an estimate was not produced. The calculated SSCs and instantaneous discharges are presented in Table 4.3-1.

Background concentrations of inorganic chemical dissolved in storm water from selected reference and urban locations are presented in the report "Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico" (LANL 2013, 239557). This report also provides a statistical evaluation of dissolved metals in storm water discharging from areas unaffected by laboratory operations, including undeveloped reference areas and urban areas containing roads and structures. The 95% UTLs for dissolved metals in storm water presented in this report provide an upper bound for concentrations of dissolved metals expected in storm water not impacted by Laboratory operations.

Relationships between calculated SSC and filtered and unfiltered analytical results can be used to evaluate contaminant sources in the LA/P watershed. This evaluation in turn provides insight into the utility of future monitoring strategies. Background concentrations of inorganic chemicals, naturally occurring radionuclides, and fallout radionuclides within uncontaminated canyon sediments at the Laboratory are presented in a Laboratory report (LANL 1998, 059730) and accepted by regulatory authorities. In unfiltered storm water with known concentrations of suspended sediment, 95% of individual storm water samples containing only background concentrations of inorganic chemicals, naturally occurring radionuclides, and fallout radionuclides will be below an upper tolerance limit (UTL) for canyon sediments. These background sediment values are not interchangeable with surface water–quality values. Comparing background sediment values to unfiltered storm water is useful as a qualitative indicator of the presence and transport of a contaminant in storm water. Where the concentrations of metals and radionuclides in unfiltered storm water are greater than background concentrations, external contributions to background can be assumed.

Figures 4.3-1 through 4.3-29 present scatterplots of metals and radionuclides analyzed in Los Alamos and Pueblo Canyons with ASTM method C1070-01 suspended sediment measurements collected in 2014.

Plots show unfiltered metals concentrations in storm water less than the background UTL for canyon sediments for 10 metals: aluminum (Figure 4.3-1), antimony (Figure 4.3-2), arsenic (Figure 4.3-3), beryllium (Figure 4.3-4), iron (Figure 4.3-5), mercury (Figure 4.3-6), nickel (Figure 4.3-7), selenium (Figure 4.3-8), silver (Figure 4.3-9), and thallium (Figure 4.3-10). Also, activities of unfiltered uranium-234 (Figure 4.3-11), uranium-235 (Figure 4.3-12), and uranium-238 (Figure 4.3-13) in storm water are less than the background UTL for canyon sediments at all LA/P watershed gaging stations. Despite the lack of a source of these metals and radionuclides above background values, dissolved aluminum has concentrations of filtered metals in storm water above applicable water-quality standards.

Barium (Figure 4.3-14), cobalt (Figure 4.3-15), and manganese (Figure 4.3-16) concentrations are a component of canyon sediment transported in unfiltered LA/P storm water and are occasionally greater than sediment UTLs. In addition, unfiltered barium, cobalt, and manganese concentrations in storm water are strongly correlated across all sediment concentrations and at all Los Alamos and Pueblo gaging stations (Figure-4.3-17). The strong correlation indicates canyon sediments are the single naturally occurring background source for barium, cobalt, and manganese in the LA/P watershed.

Results for unfiltered cadmium (Figure 4.3-18), chromium (Figure 4.3-19), copper (Figure 4.3-20), lead (Figure 4.3-21), vanadium (Figure 4.3-22), and zinc (Figure 4.3-23) show select results that are greater than would be expected of sediment background UTLs in low sediment content samples. As discussed in "Evaluation of Sediment and Alluvial Groundwater in DP Canyon" (LANL 1999, 063915), in DP Canyon cadmium, chromium, copper, lead, and zinc have a Los Alamos townsite origin. The Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390), which includes DP Canyon, suggests a more complex picture of sources of metals from urban development in the Los Alamos townsite, historical releases from the Laboratory, and ash from wildfire.

Metals are not detected if their concentration is below the method detection limit (MDL), which is the smallest concentration differentiable from zero under ideal circumstances. Nondetected metals are reported at the value of the practical quantitation limit (PQL), which is the concentration of the lowest standard used to prepare the calibration curve. Metals are detected and qualified as estimated when concentrations are between the MDL and PQL. PQLs reported in 2014 are 2.5 to 10 times larger than the MDL. For most metals, this reporting convention results in one or more nondetected results appearing to be greater than one or more detected results. This nonintuitive condition is evident in the scatter plots presented in Figures 4.3-1 through 4.3-23.

The Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390) identifies americium-241, cesium-137, plutonium-238, plutonium-239/240, and strontium-90 as radionuclide chemicals of potential concern. DP and Los Alamos Canyons, downcanyon from SWMU 21-011(k), contain the largest amounts of americium-241, cesium-137, and strontium-90 in the watershed. Acid and Pueblo Canyons, downcanyon from the Technical Area 01 (TA-01) and TA-45 outfalls and from SWMU 00-030(g), contain an estimated 86% of the plutonium-239/240 inventory at the Laboratory (LANL 2004, 087390).

Activities of cesium-137 (Figure 4.3-24) in storm water are detected above UTLs for canyon sediments at gaging stations E030, E040, E042.1, E050.1, and E59.5. Cesium-137 is below canyon sediment background at E026 in Los Alamos Canyon and at E038 and E039.1 in DP Canyon. Normalized concentrations of cesium-137 decrease from E040 downcanyon. This identifies DP Canyon, below the gaging station E039.1, as the current source of cesium-137 in the Los Alamos watershed and Acid Canyon as the source in the Pueblo watershed (E059.5). This is consistent with the findings in the Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390).

Activities of strontium-90 (Figure 4.3-25) in storm water are detected above UTLs for canyon sediments at E039.1, E040, E042.1, and E050.1. Strontium-90 is below canyon sediment background at E026 and E030 in Los Alamos Canyon, at E038 in DP Canyon, and at all locations in Pueblo Canyon. Normalized concentrations of strontium-90 decrease from E039.1 downcanyon. This identifies DP Canyon, above the gaging station E039.1, as the source of strontium-90 in the LA/P watershed and is consistent with findings in the Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390).

Activities of americium-241 (Figure 4.3-26) in storm water are detected above UTLs for canyon sediments at E042.1, E050.1, and E059.5. This is consistent with SWMU 21-011(k) as the source of americium-241 in DP and Los Alamos Canyons at E042.1 and E050.1 and Acid Canyon as the source at E059.5.

Activities of plutonium-239/240 (Figure 4.3-27) in storm water do not exceed background UTLs at E026 in Los Alamos Canyon or at the head of Pueblo Canyon at E055 or in DP Canyon at E038. Other gaging stations in the LA/P watershed are found to contain plutonium-239/240 above canyon sediment background concentrations. The largest exceedances of background UTLs are measured at E056 in Acid Canyon and at E059.5 and E060.1 in lower Pueblo Canyon. Exceedances of background UTLs are also observed at E030, E042.1 and E050.1 in Los Alamos Canyon and at E039.1 and E040 in DP Canyon. Sources of plutonium-239/240 are identified in Los Alamos Canyon above the gaging station E030, DP Canyon above the gaging station E039.1, and most prominently in Acid Canyon. These observations are consistent with the findings in the Los Alamos and Pueblo Canyons investigation report (LANL 2004, 087390).

Activities of plutonium-238 (Figure 4.3-28) in storm water do not exceed background UTLs at E026 and E030 in Los Alamos Canyon; at E038 and E039.1 in DP Canyon; or at E055 in upper Pueblo Canyon. The largest exceedances of detected plutonium-238 in 2014 were at E040 and E050.1, indicating a primary source in Los Alamos Canyon above E042.1, which is consistent with a primary source from SWMU 21-011(k) discharges.

Concentrations of total PCBs (Figure 4.3-29) in storm water correlate poorly with the sediment content of the sample. The distribution and concentration of PCBs in the LA/P watershed is consistent with a complex mixture of sources, including atmospheric deposition, townsite runoff, and Laboratory sources. The largest concentrations of total PCBs were detected at E042.1 in Los Alamos Canyon and at E059.5 in Pueblo Canyon.

4.4 Storm Water Sampling below SWMU 01-001(f)

Results for the four storm water samples analyzed for total PCBs collected at the inlet to the upper detention basin below the SWMU 01-001(f) drainage range from 0.897 μg/L to 10 μg/L. Total PCB results for the three storm water samples collected at the culvert at the terminus of the vegetative buffer below the lower basin ranged from 0.0524 μg/L to 0.106 μg/L. Total PCB results are within the range of results for samples collected in 2011, 2012, and 2013. The higher result suggests the hill slope continues to be a source of PCBs even after sediment and rock were removed during corrective action at SWMU 01-001(f) in 2010. Analytical results from all samples collected at locations CO111041 and CO101038 are presented in Appendix C.

5.0 UPDATE TO 2013 REPORT

Based on changes that occurred in 2014, this report has been updated from the 2013 report. The differences are described below:

- The cross-vane structures were largely eroded during the August 15, 16, and 23, 2010 floods, and were completely destroyed during the September 2013 flood. This non-engineered reach is still surveyed annually, and the information is used for comparison to the reaches with engineered structures.
- Gaging station E109.9 was destroyed in the September 2013 flood and will not be reestablished.
- Gaging station E099 on San Ildefonso lands is not capable of collecting storm water samples. In addition, because of the geometry of the channel and its proximity to large culvert discharges, flow measurements are not reliable. This gaging station will not be included in future reports.
- Appendix B, “Hydrographs, Hyetographs, and Sedigraphs for Samples Collected,” has been omitted from the 2014 report because it does not adequately explain the complex relationship among precipitation, discharge, and sediment transport within watersheds. It will no longer be included in future reports.

6.0 CONCLUSIONS

The Los Alamos Canyon watershed experienced an average number of runoff events in 2014. The Las Conchas burn area in the upper watersheds of Los Alamos Canyon continues to regenerate, resulting in a reduction in storm water discharges associated with post-fire flooding. Attenuation of flow and associated sediment transport are primary goals of the sediment transport mitigation activities, and despite erosion through the Pueblo Canyon wetland, controls performed successfully and as intended. The 2014 monitoring data in upper Los Alamos watershed indicate a substantial reduction in SSC and peak discharge as floods passed through the low-head weir and associated sediment detention basins. These structures are, therefore, performing as designed.

DP Canyon primarily receives runoff from the Los Alamos townsite. Direct comparison of runoff and sediment yield above and below the GCS and upstream floodplains was possible during four storms. A reduction in sediment yield was observed between bounding stations (E038 and E039.1), and sediments continue to aggrade above the GCS. The DP Canyon mitigations are performing as designed.

Net sediment deposition occurred in most surveyed areas in the Pueblo, Los Alamos, and DP Canyons experiencing monsoonal flood events in 2014, which is consistent with the goal of the sediment transport mitigation work plans.

Analytical data collected from storm water samples in 2014 indicate that unfiltered copper, lead, and zinc are generally greater than natural background sediment UTLs and may be associated with runoff from developed landscapes. Radionuclides including americium-241, strontium-90, cesium-137, plutonium-239/240, and plutonium-238 were generally higher than background UTLs and are derived from legacy Laboratory operations. The Los Alamos Canyon detention basin and weir, the DP Canyon GCS, and the Pueblo Canyon wetland and GCS were effective in substantially reducing this transport.

7.0 REFERENCES AND MAP DATA SOURCES

7.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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7.2 Map Data Sources

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Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 29 November 2010.

Summer/Winter rain gage locations and networks; Los Alamos National Laboratory, Environmental Programs; Unpublished 2010 project data, Project 10-0027.

Gaging stations; Los Alamos National Laboratory, Environmental Programs; Unpublished 2011 project data, Project 11-0002; locations based on WQDB data pull from January 5, 2011.

Gaging station drainage areas; Los Alamos National Laboratory, Environmental Programs; Unpublished 2011 project data, Project 11-0002; areas developed using the ArcHydro data model.

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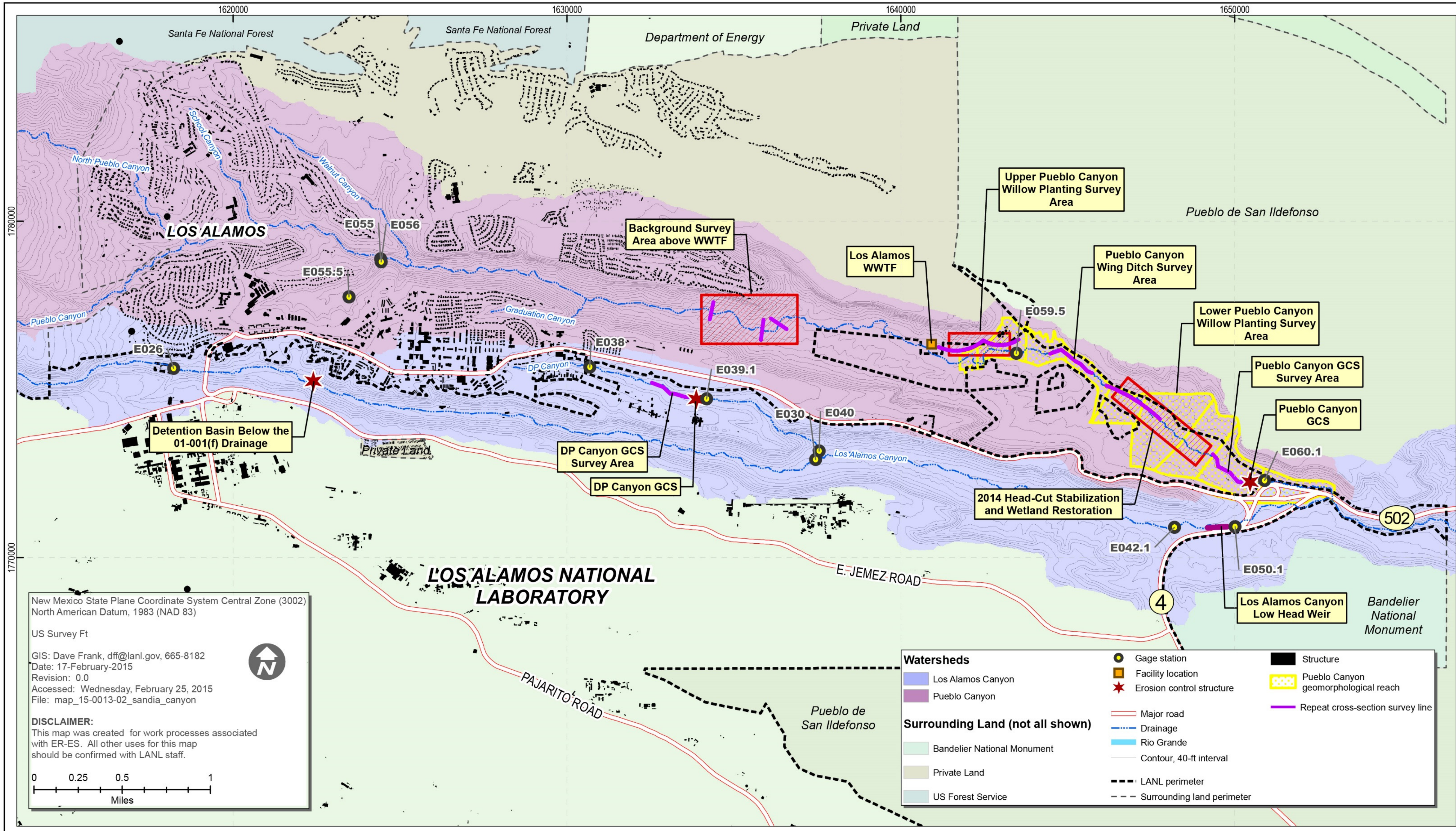


Figure 1.1-1 Los Alamos and Pueblo Canyons showing monitoring locations and sediment transport mitigation sites

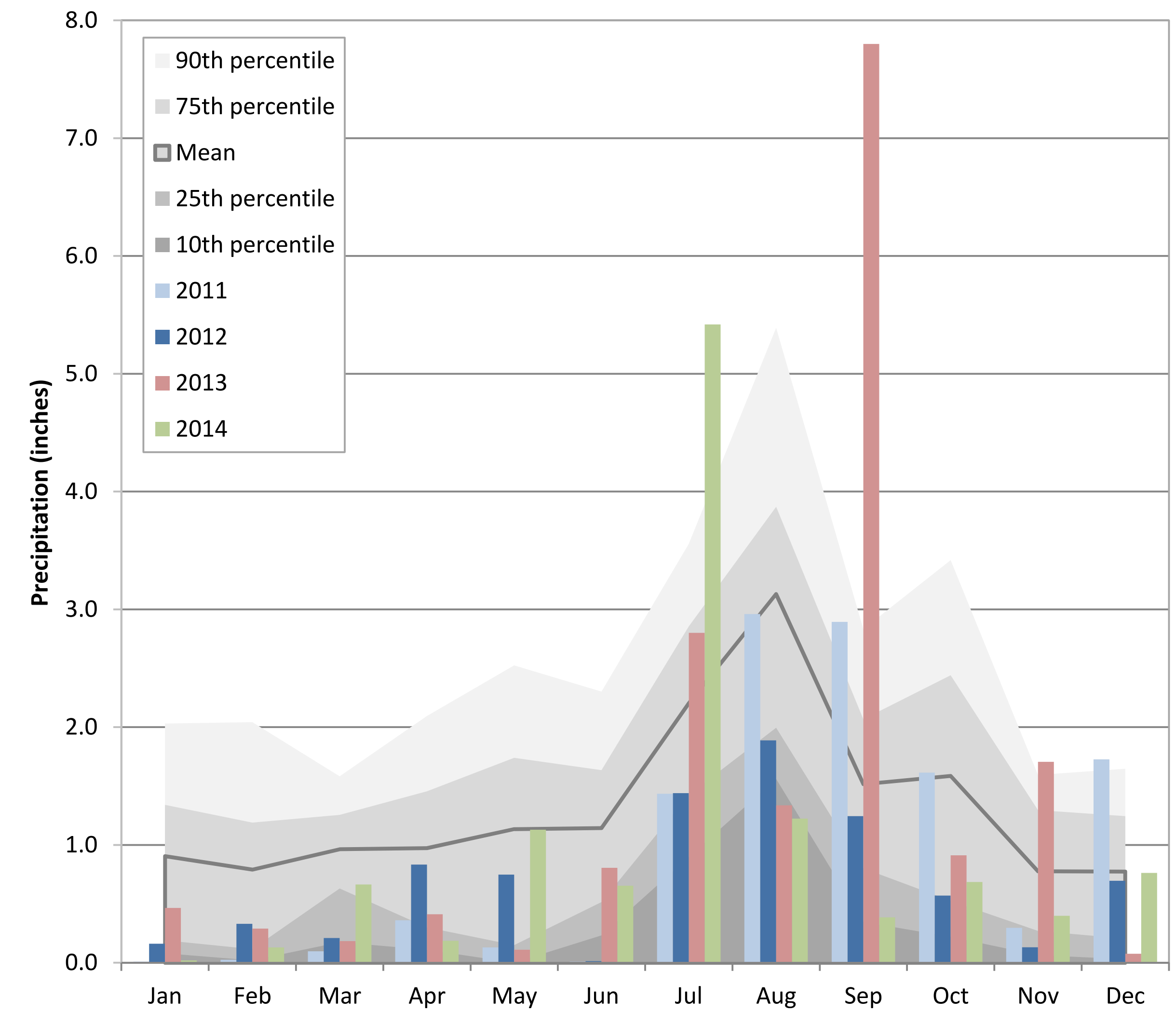


Figure 2.1-1 **Total precipitation for each month between 2011 and 2014 based on meteorological tower data averaged across the Laboratory (mean and percentiles are based on data from 1992 to 2010)**

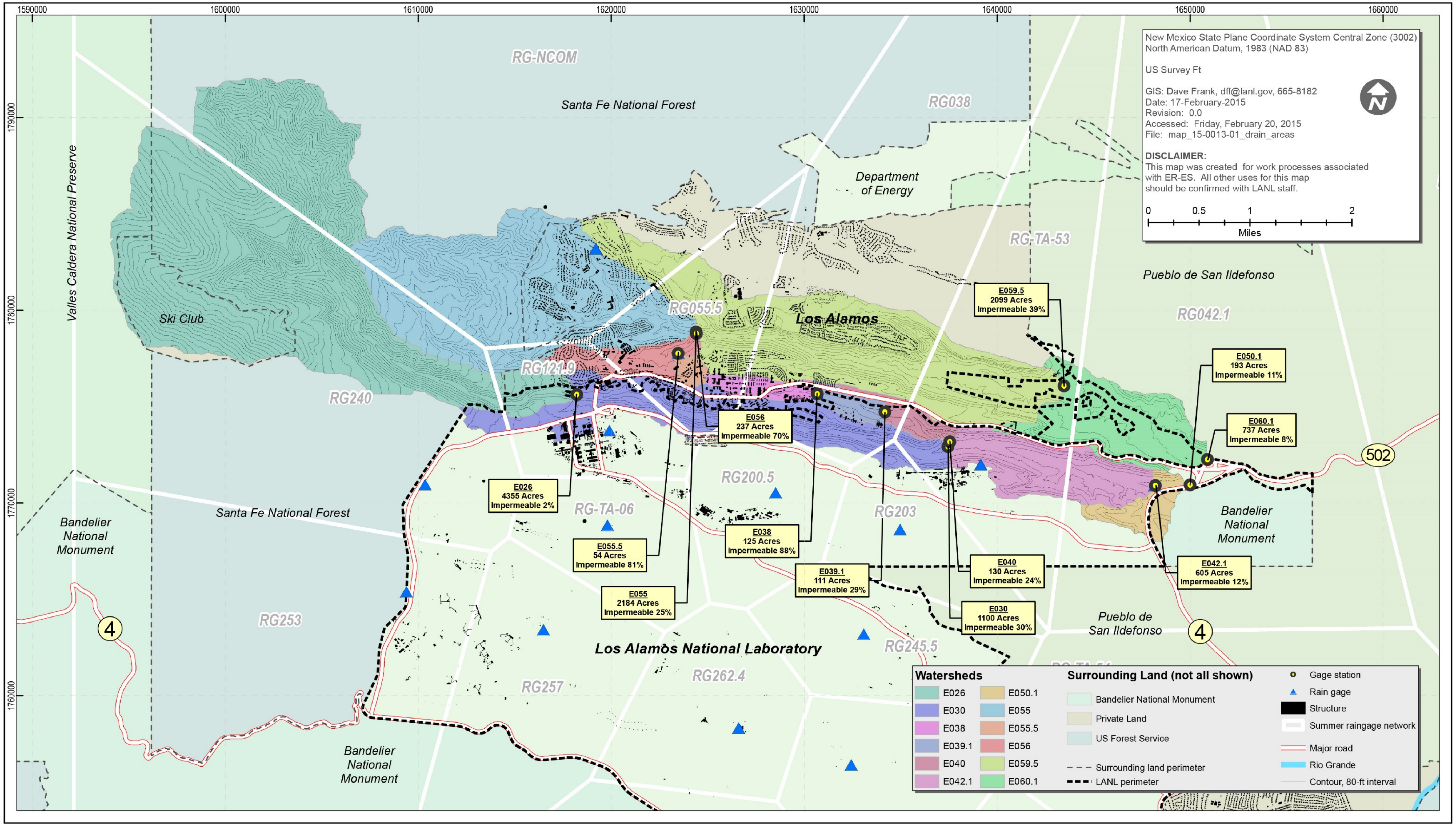


Figure 2.1-2 Los Alamos Canyon watershed showing drainage areas for each stream gaging station and associated rain gages, Thiessen polygons, and extent of the Las Conchas burn area

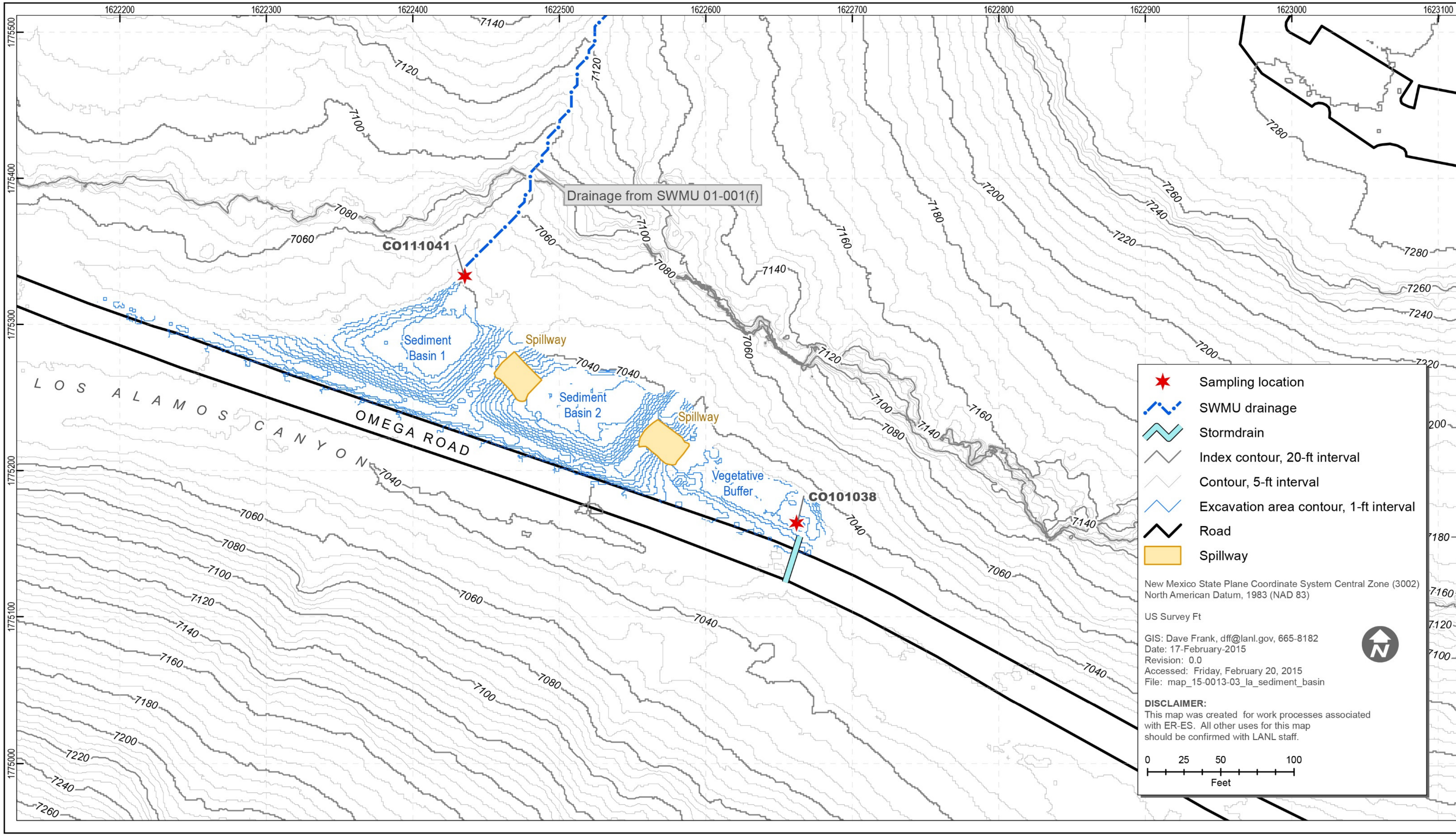


Figure 2.2-1 Sediment detention basins and sampling locations below the SWMU 01-001(f) drainage

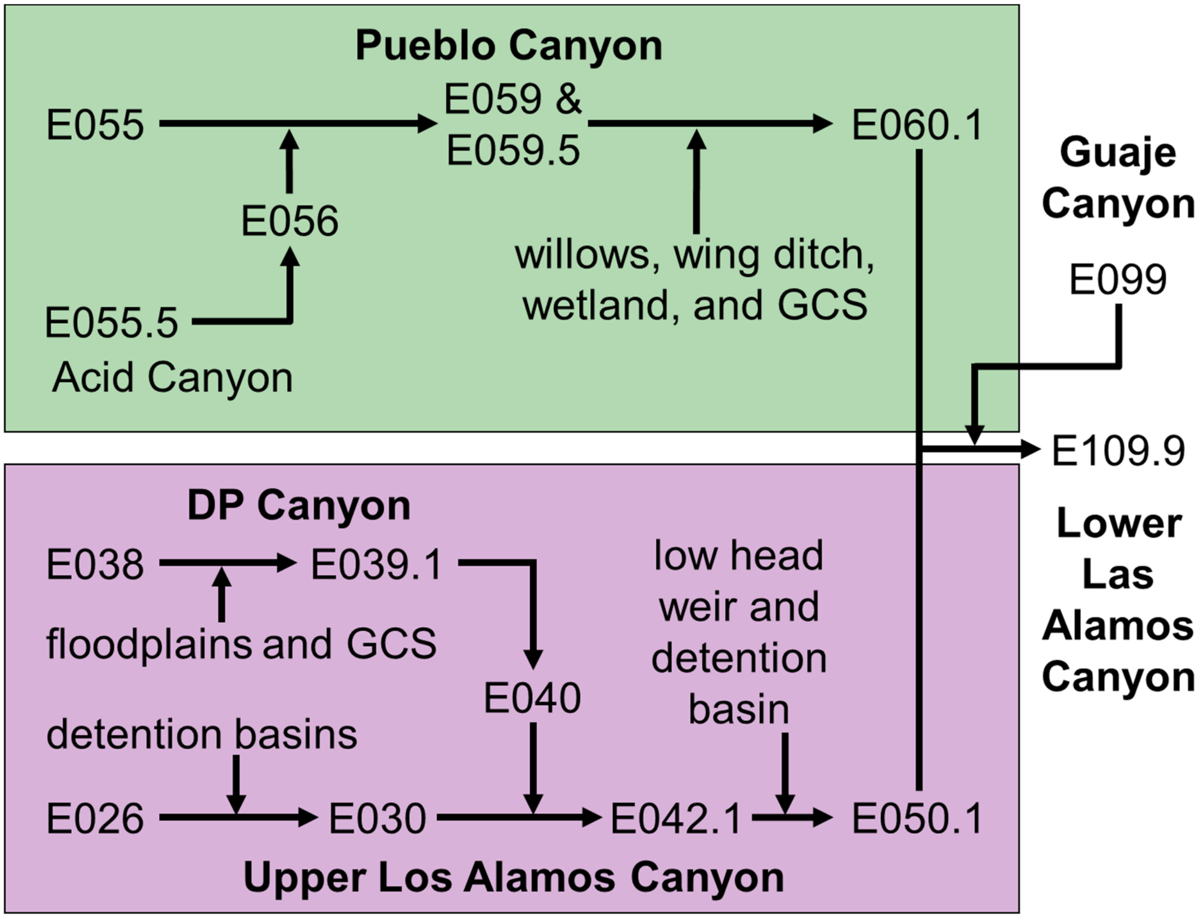


Figure 3.2-1 Flow diagram of gaging stations and sediment transport mitigation sites in the LA/P watershed

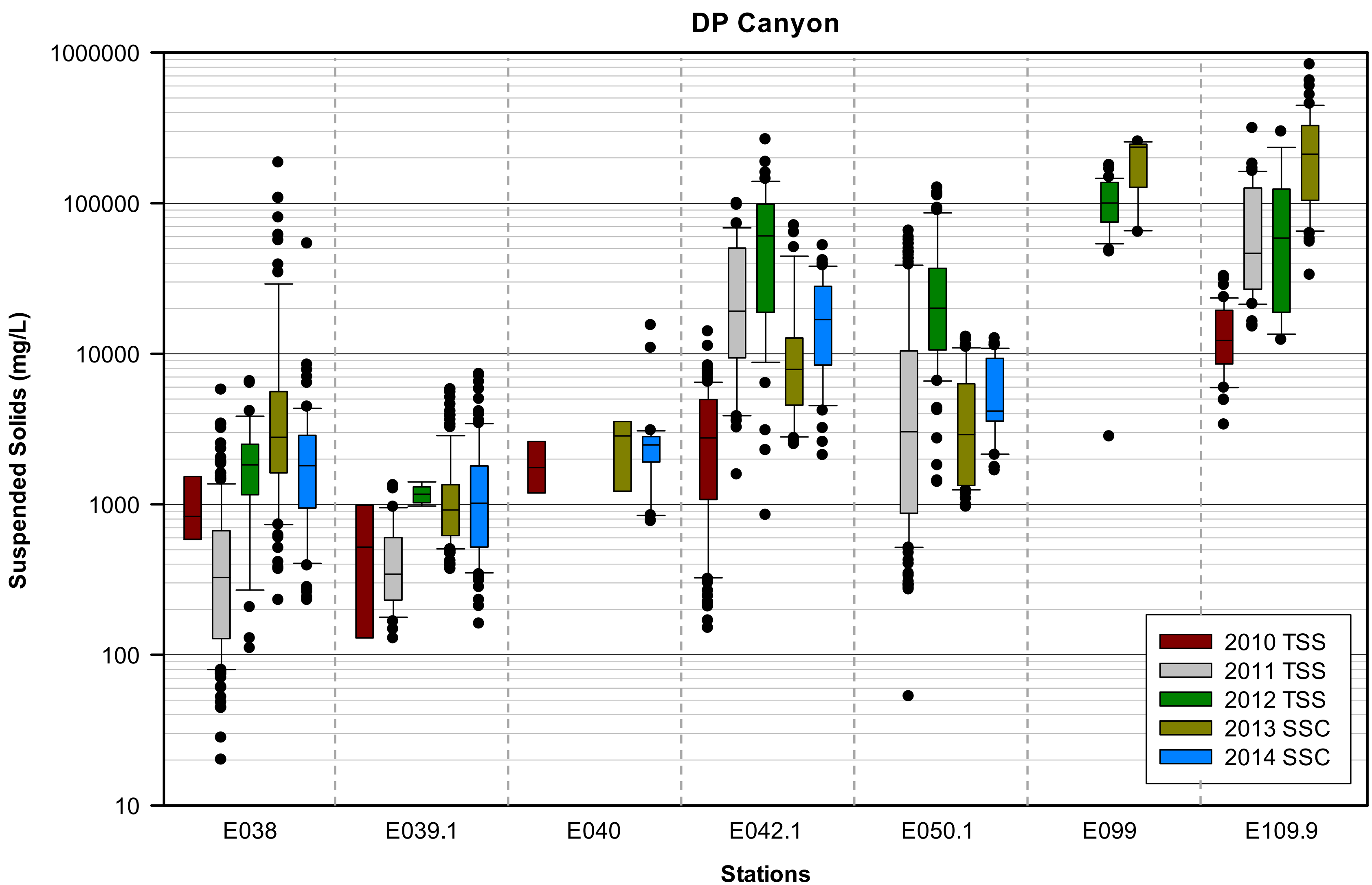


Figure 3.2-2 Box and whisker plots of TSS and SSC for all gaging stations in the LA/P watershed over the past 5 yr of monitoring. Note that TSS and SSC are determined using different methods and thus are not directly comparable.

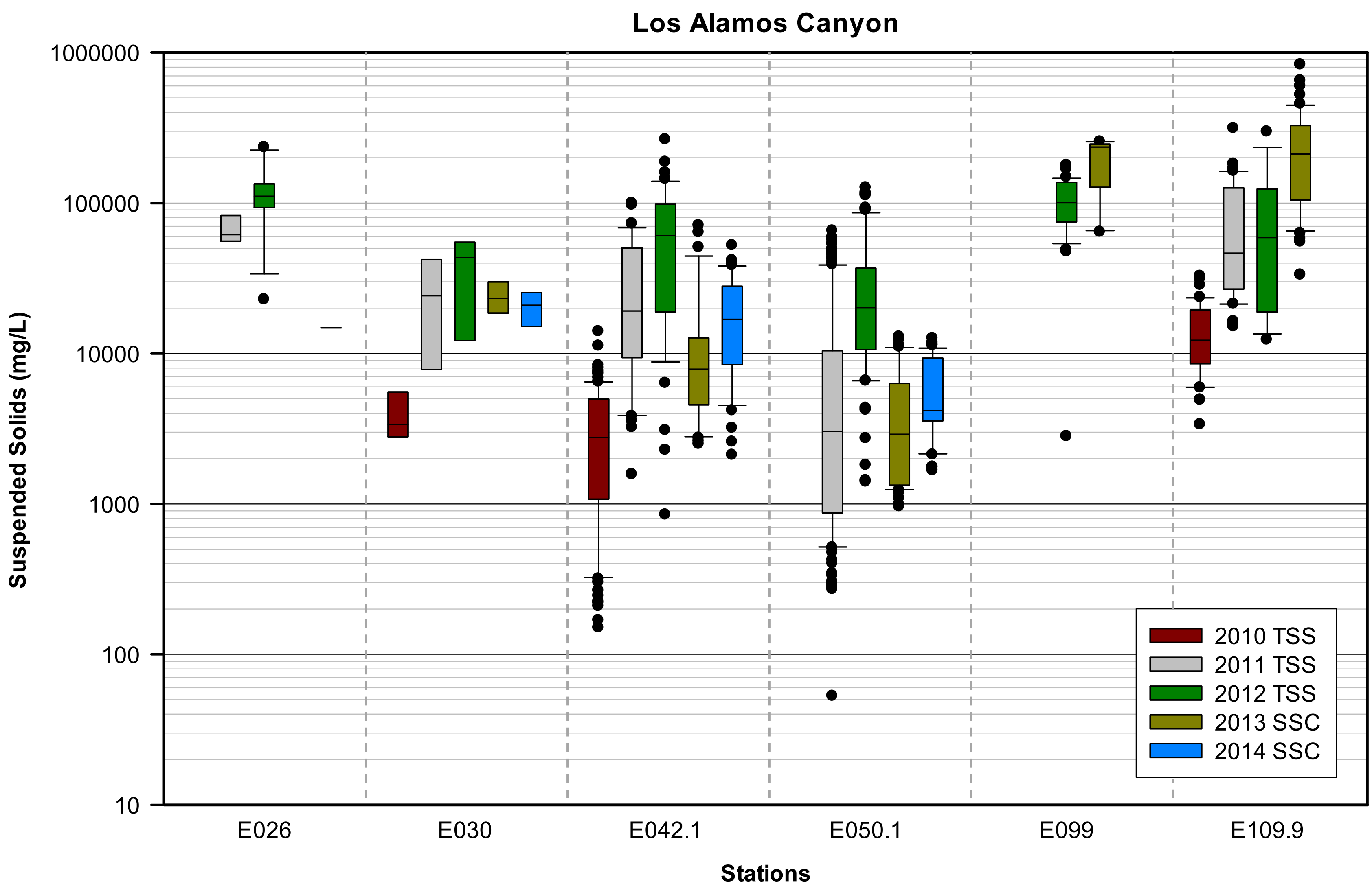


Figure 3.2-2 (continued) **Box and whisker plots of TSS and SSC for all gaging stations in the LA/P watershed over the past 5 yr of monitoring. Note that TSS and SSC are determined using different methods and thus are not directly comparable.**

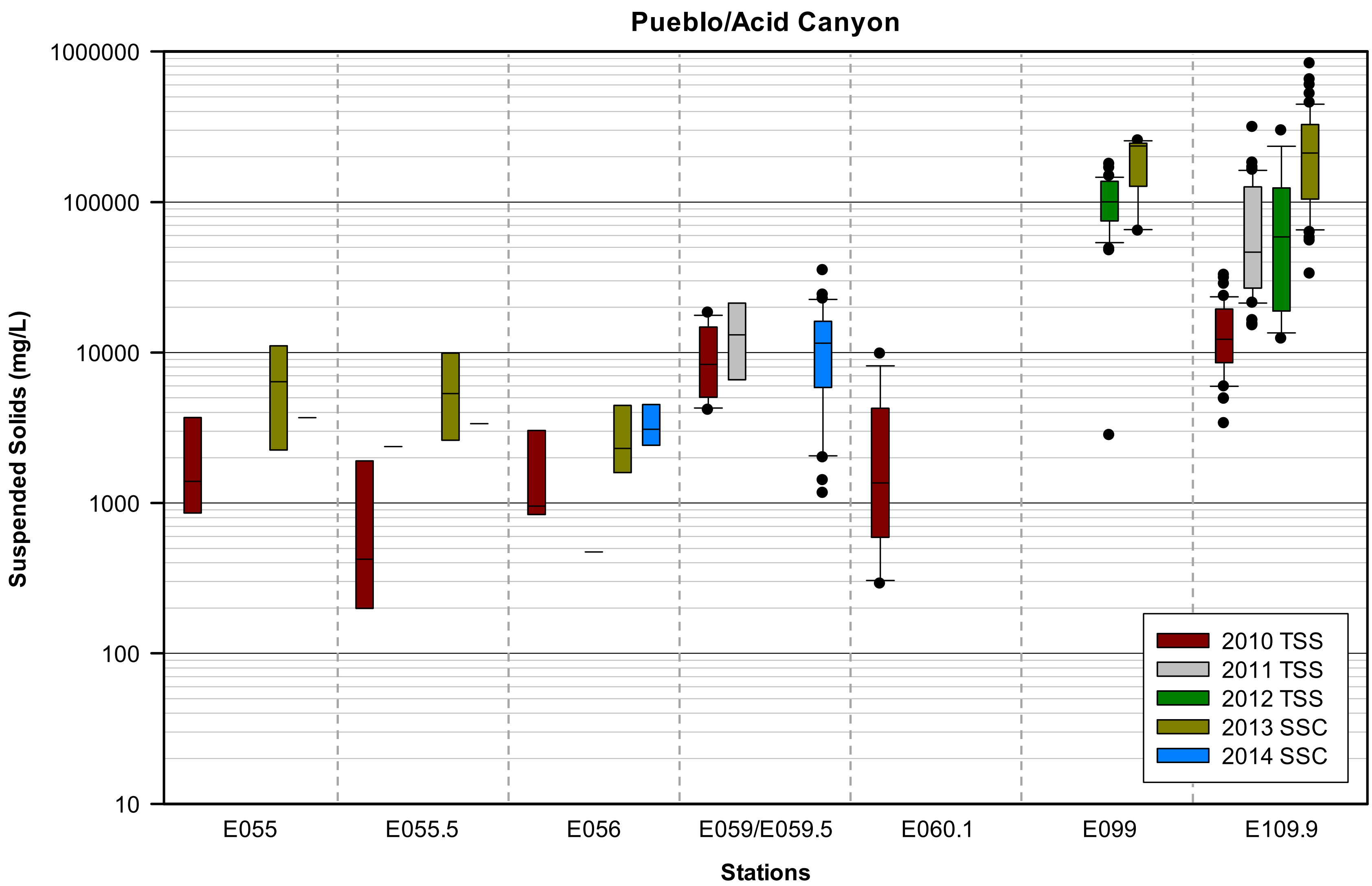


Figure 3.2-2 (continued) **Box and whisker plots of TSS and SSC for all gaging stations in the LA/P watershed over the past 5 yr of monitoring. Note that TSS and SSC are determined using different methods and thus are not directly comparable.**

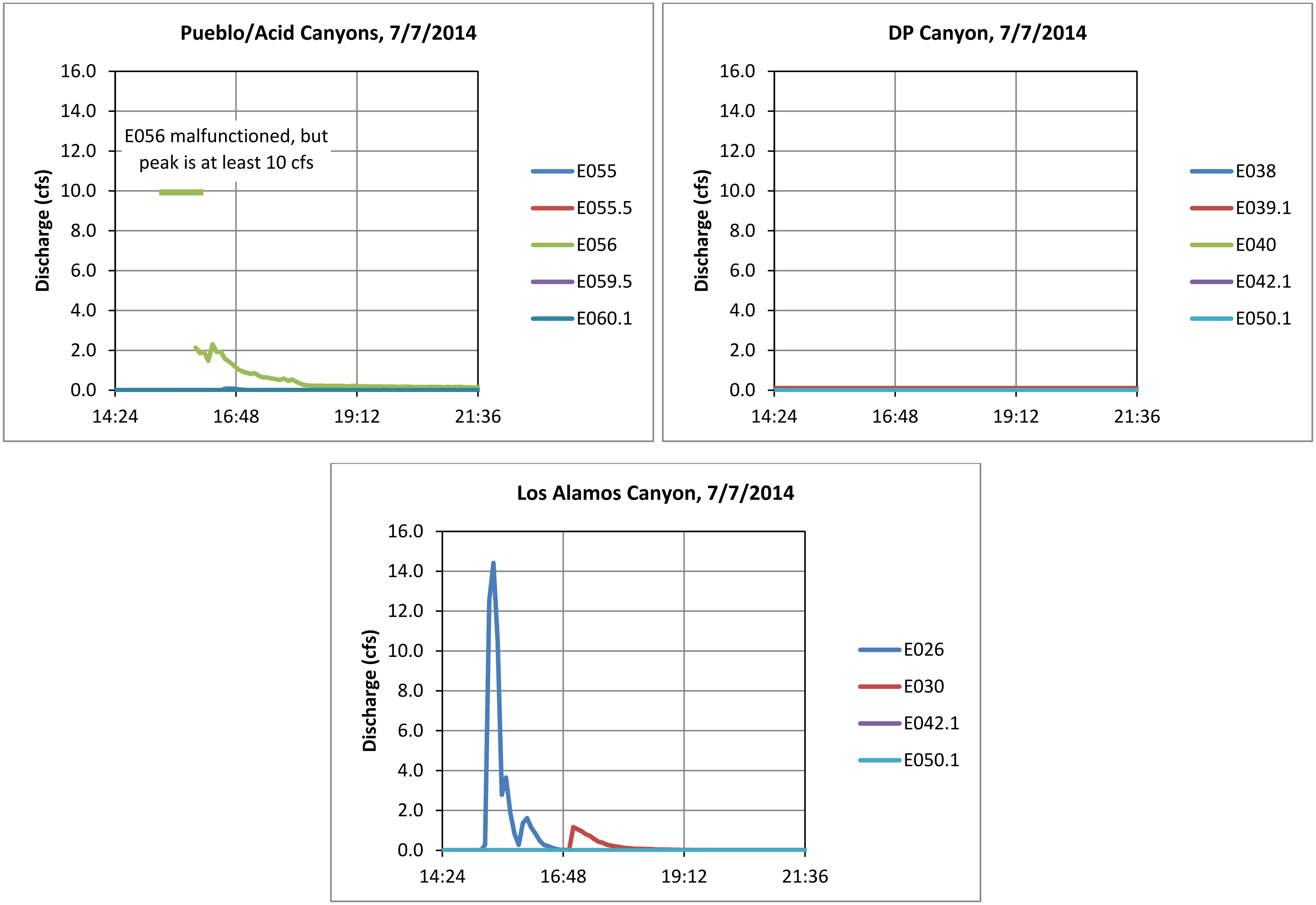


Figure 3.2-3 Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

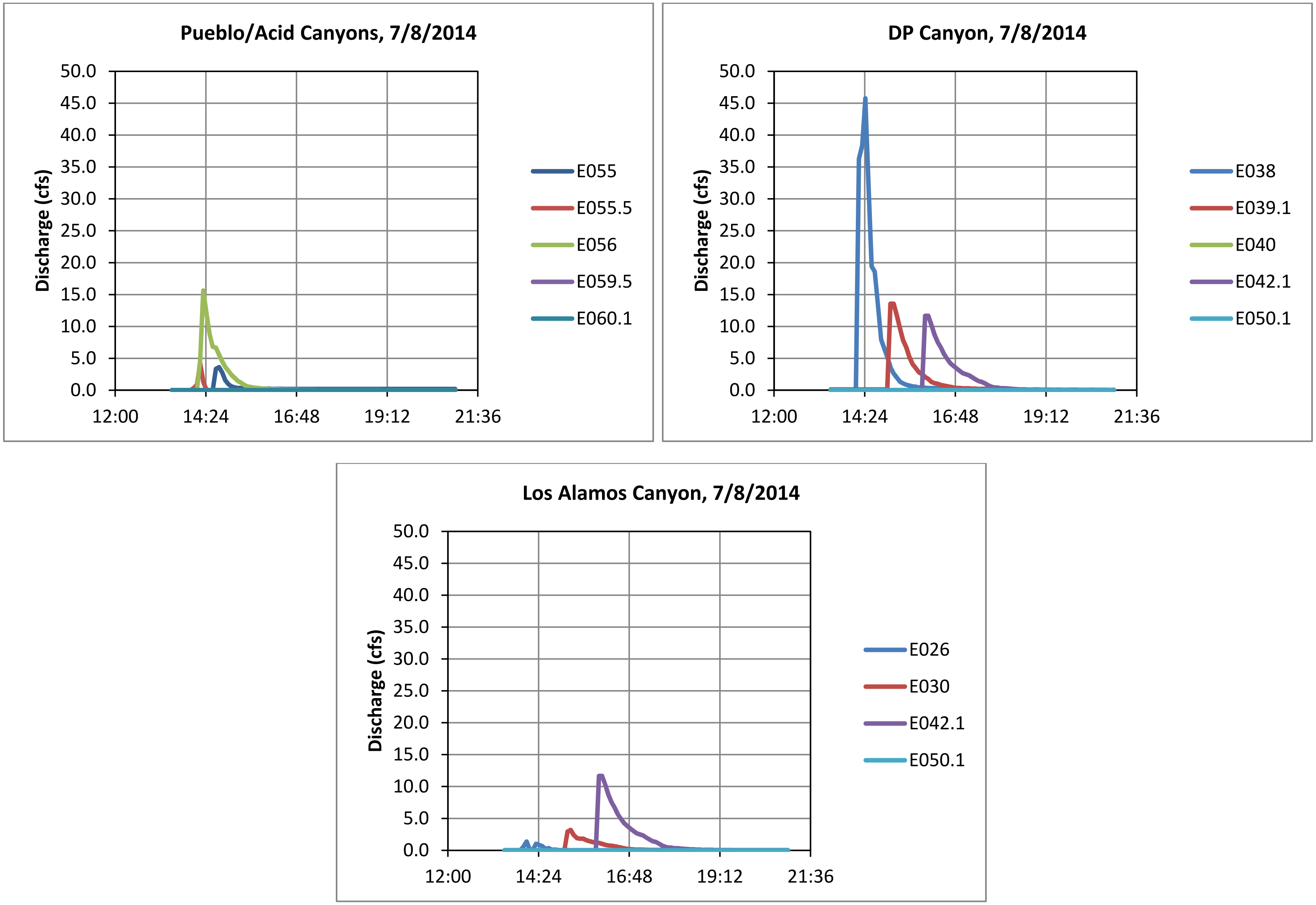


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

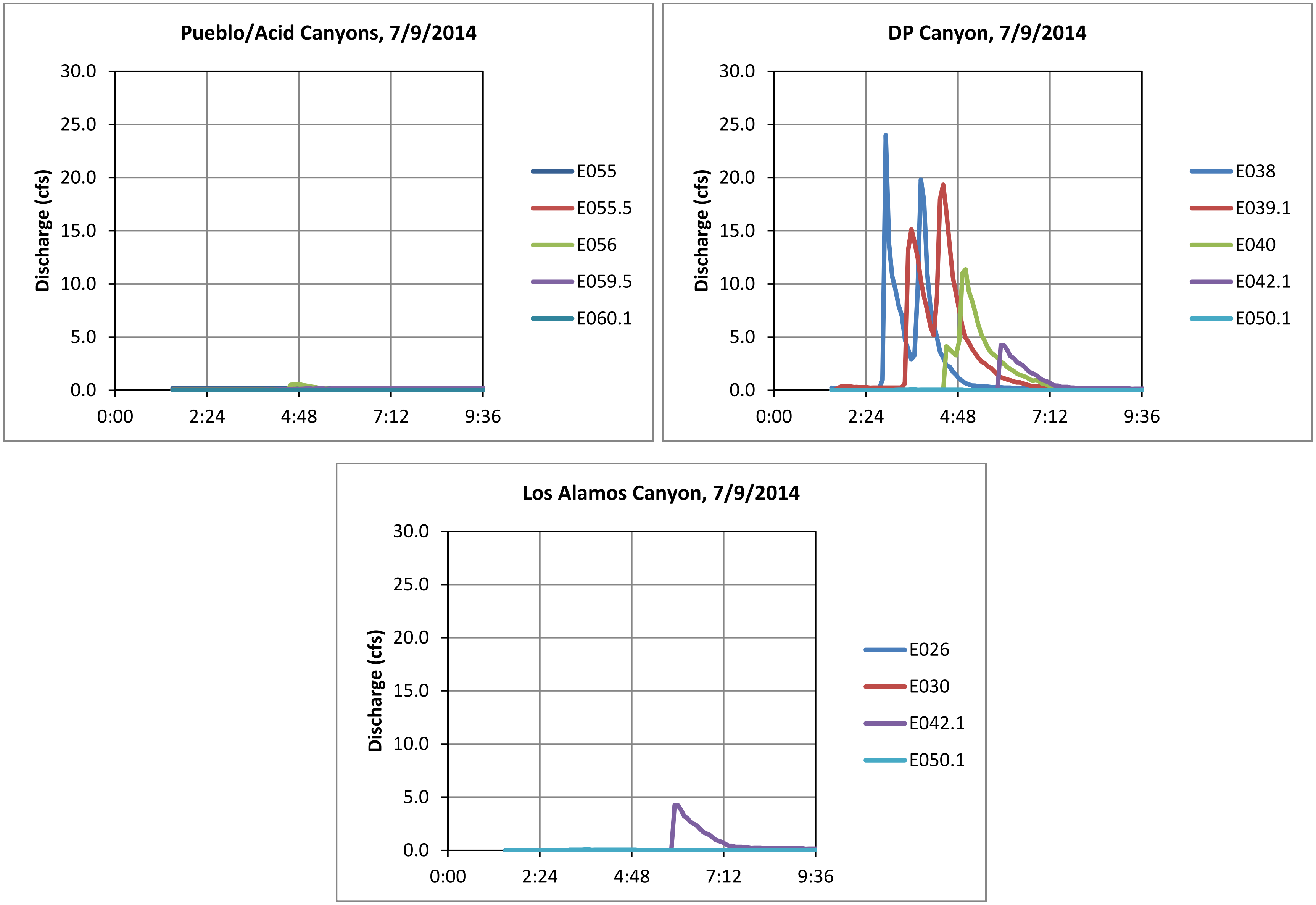


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

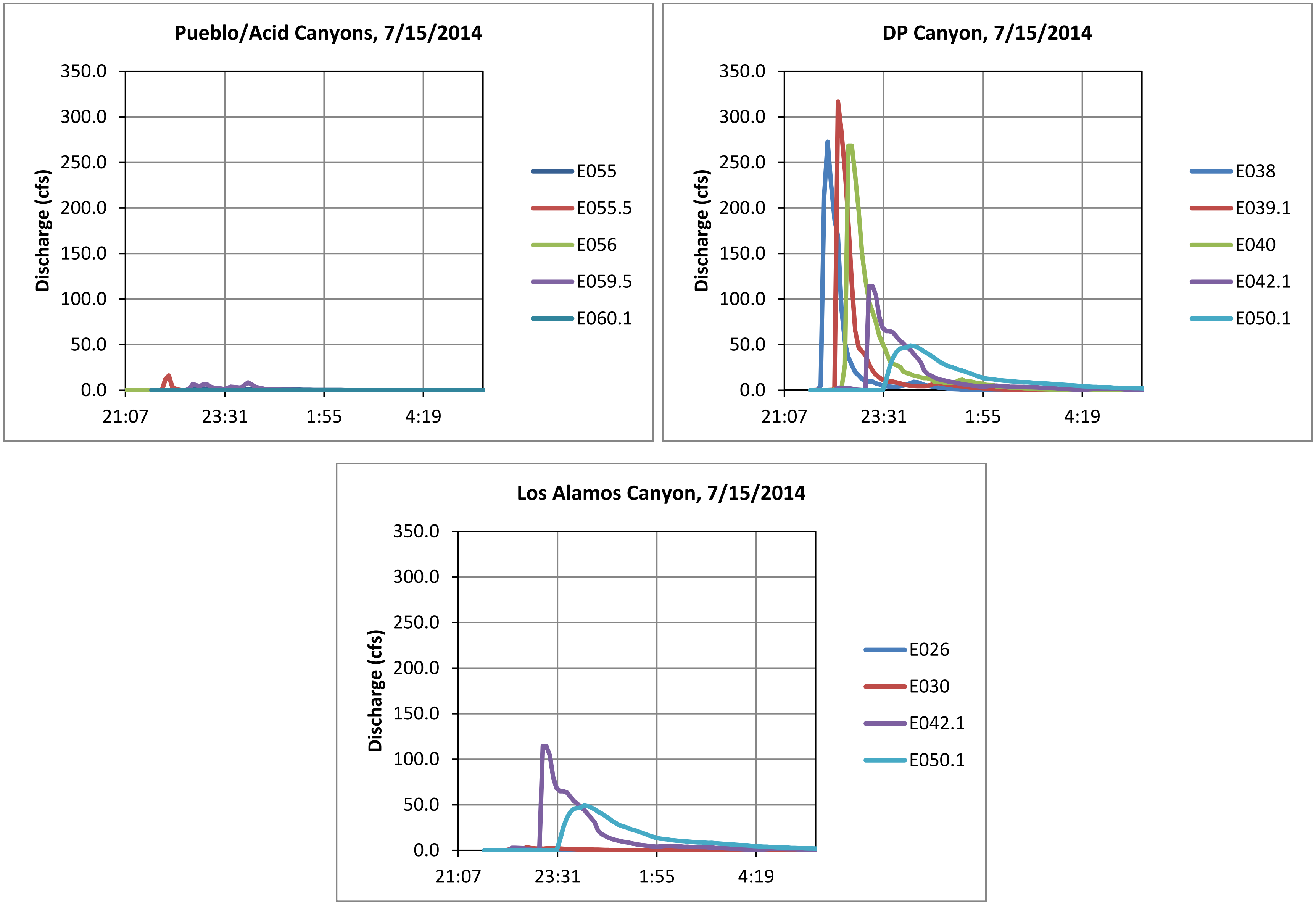


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

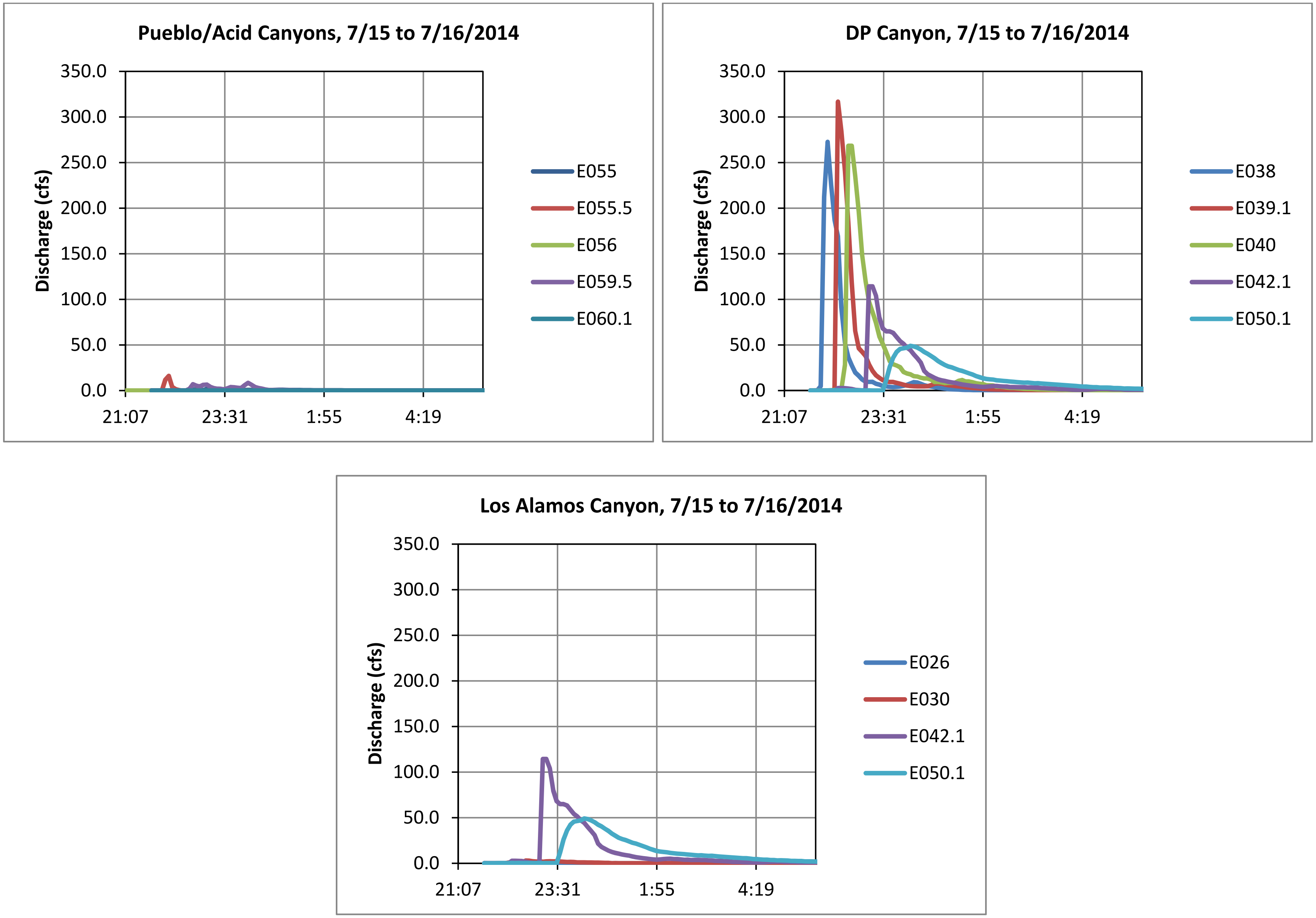


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

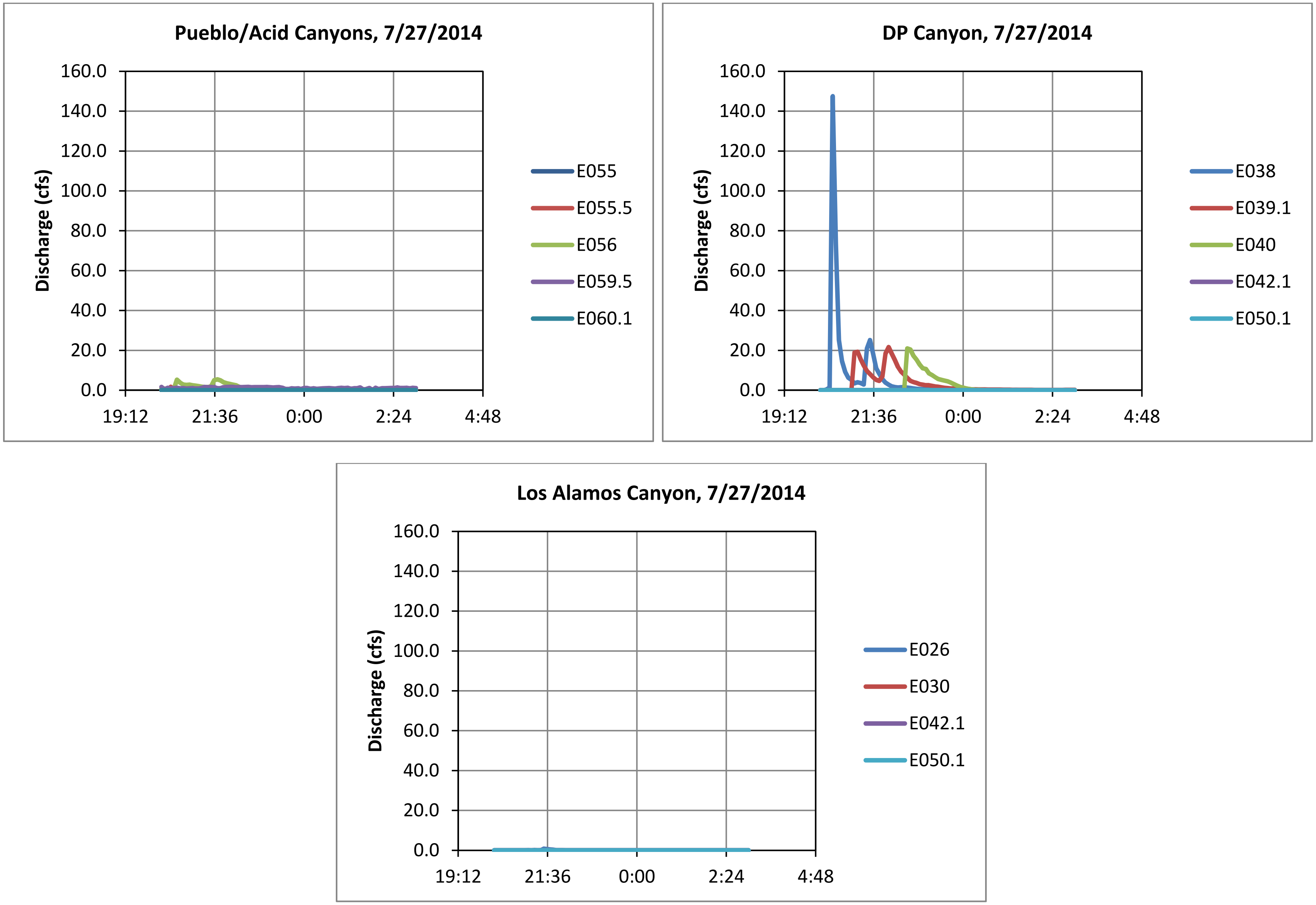


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

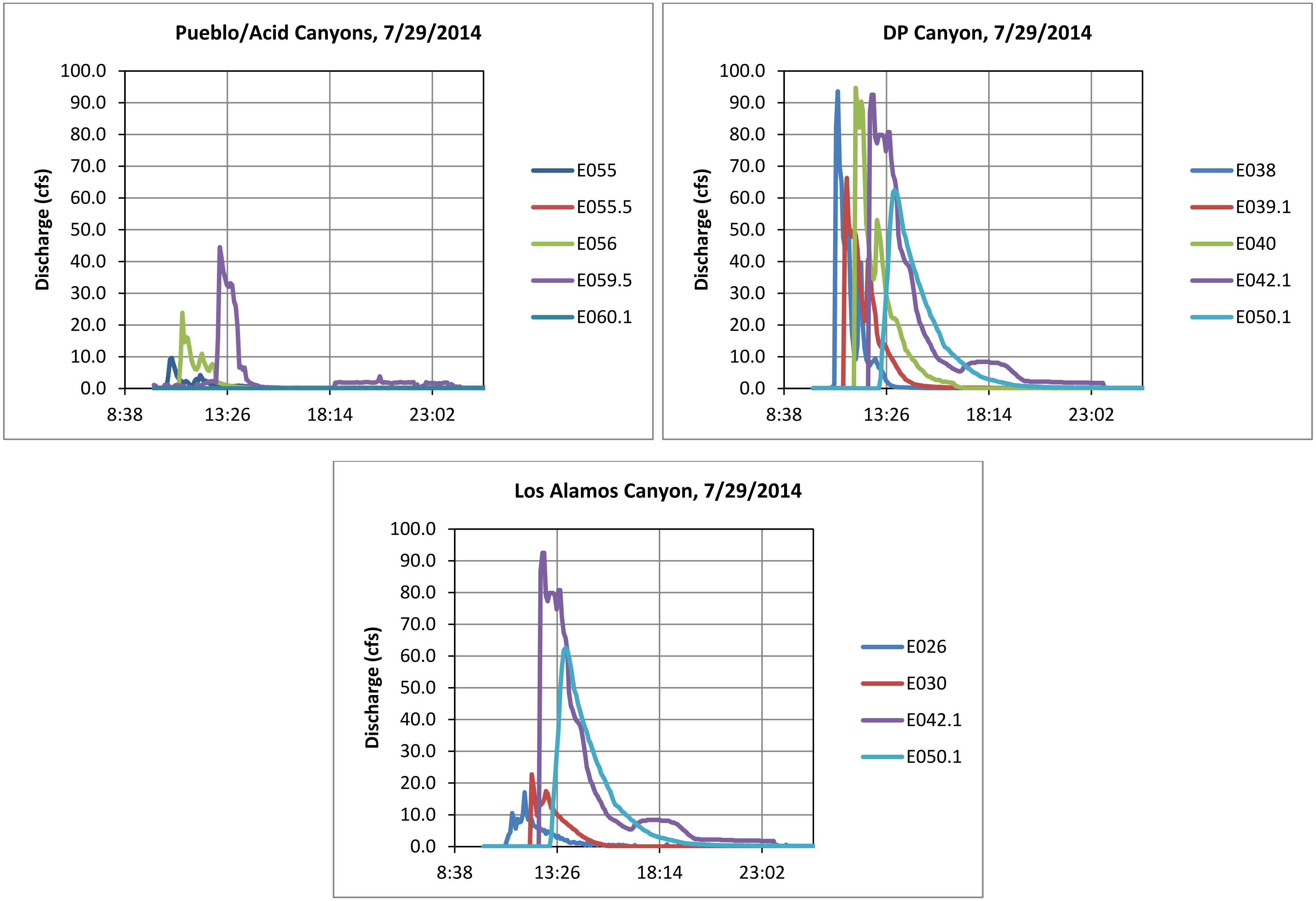


Figure 3.2-3 (continued) Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches

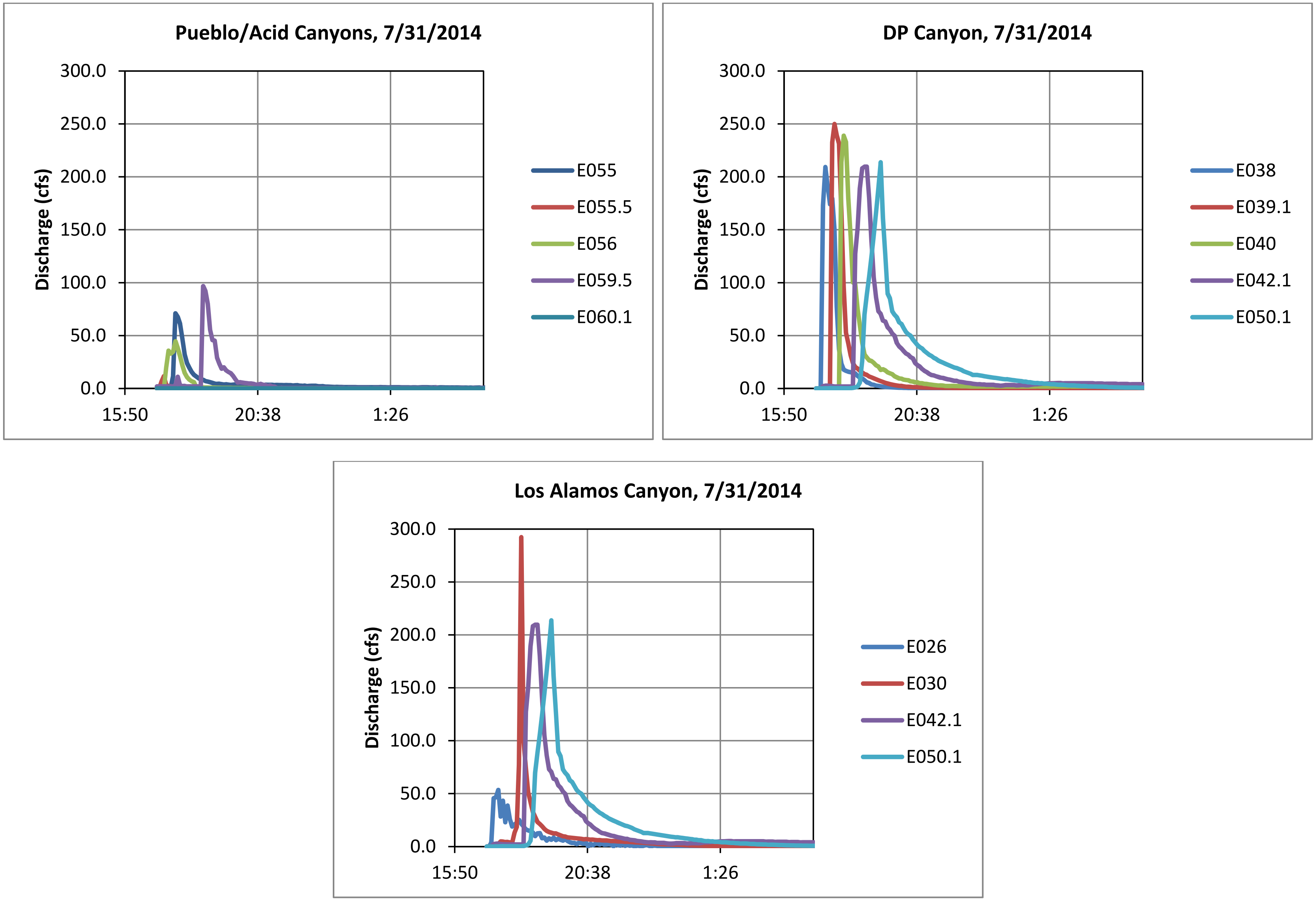


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

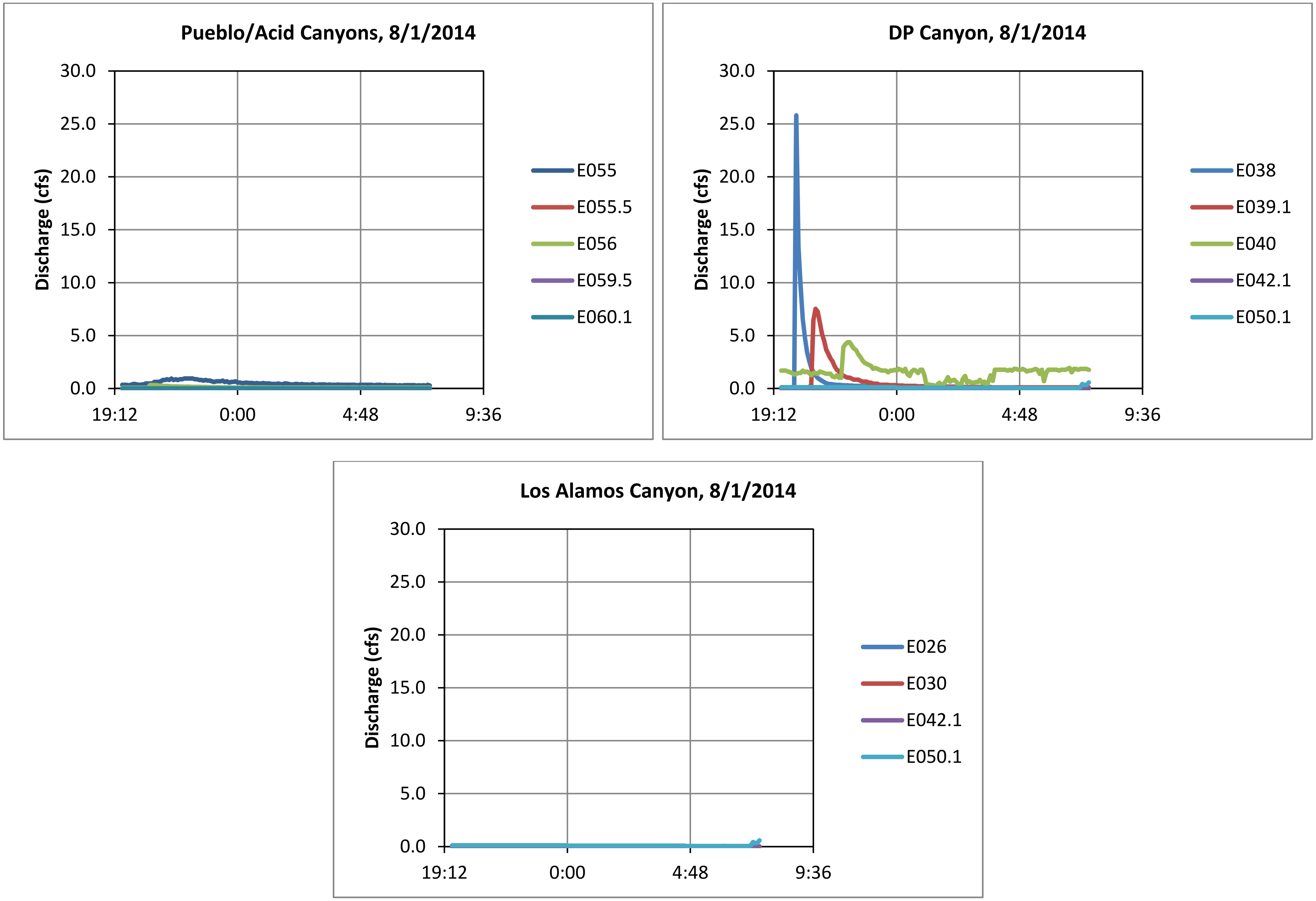


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

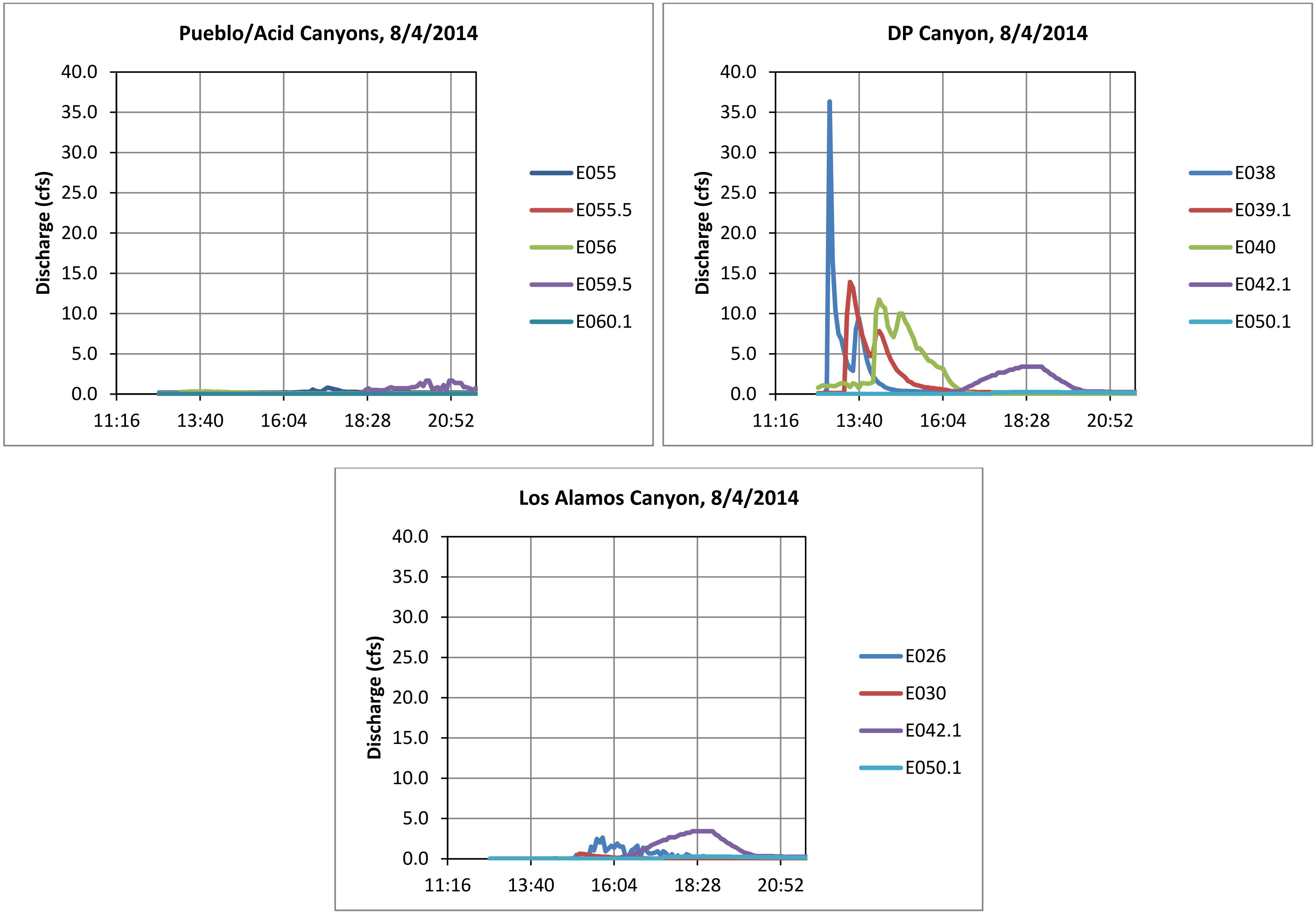


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

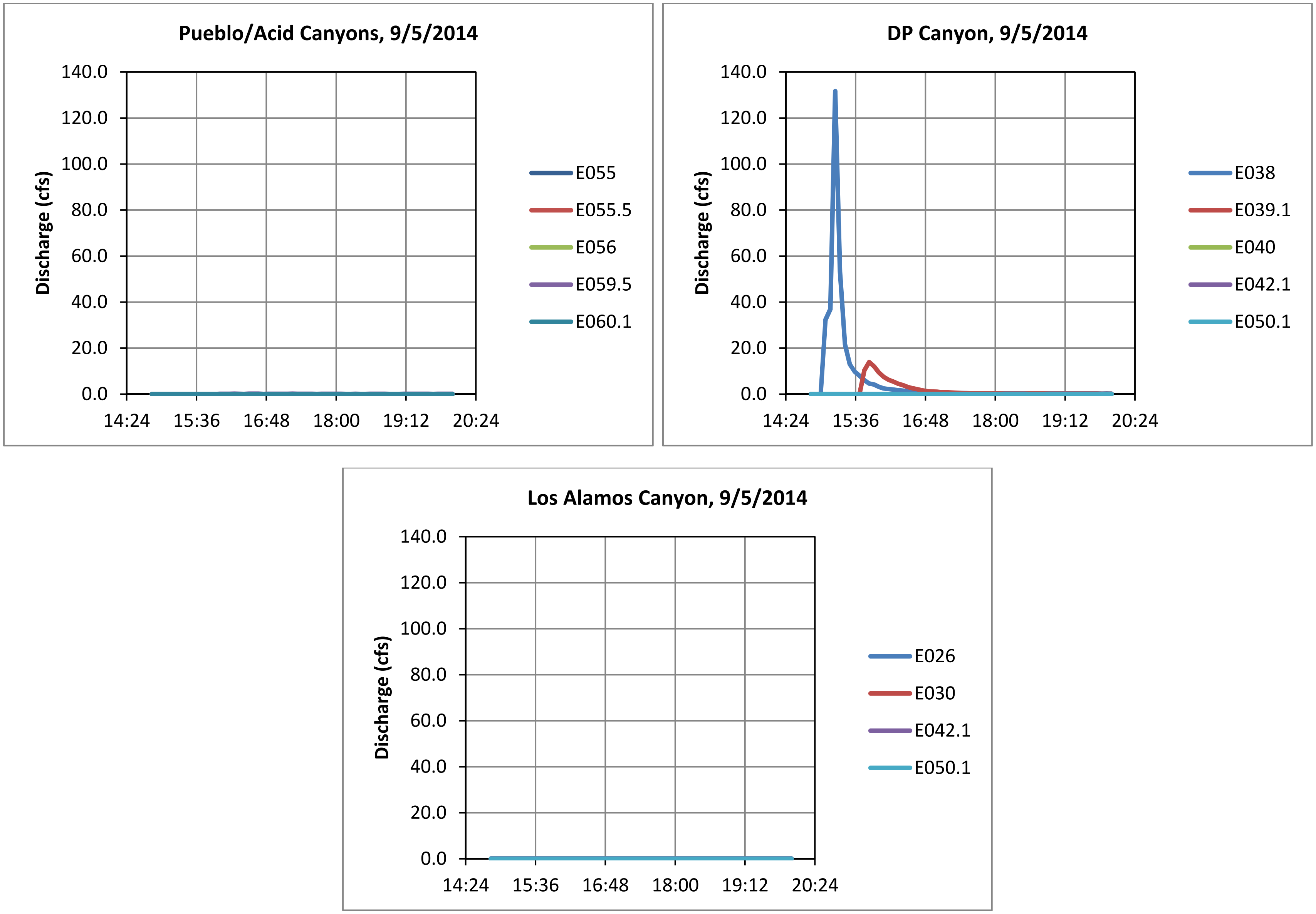


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

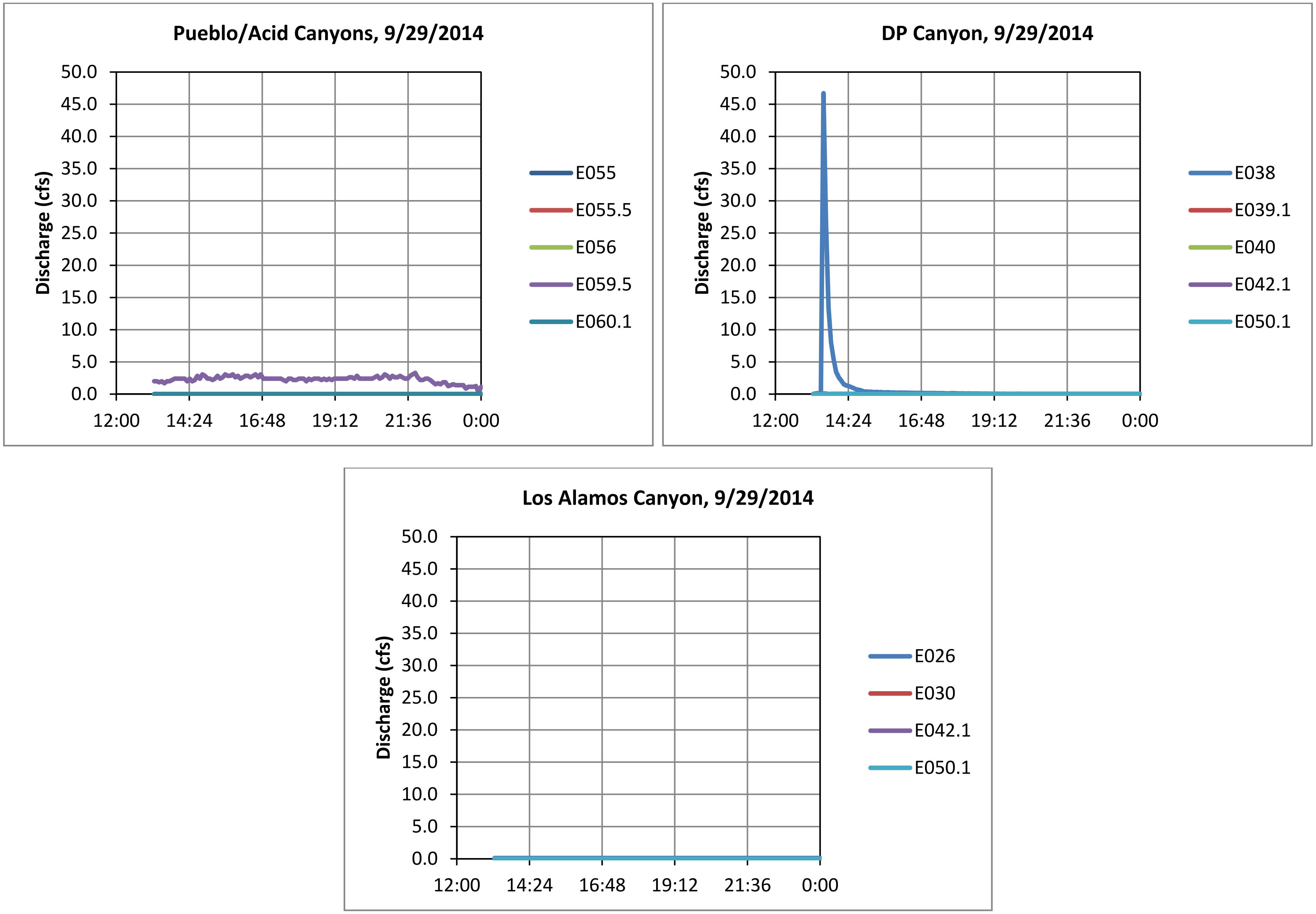


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

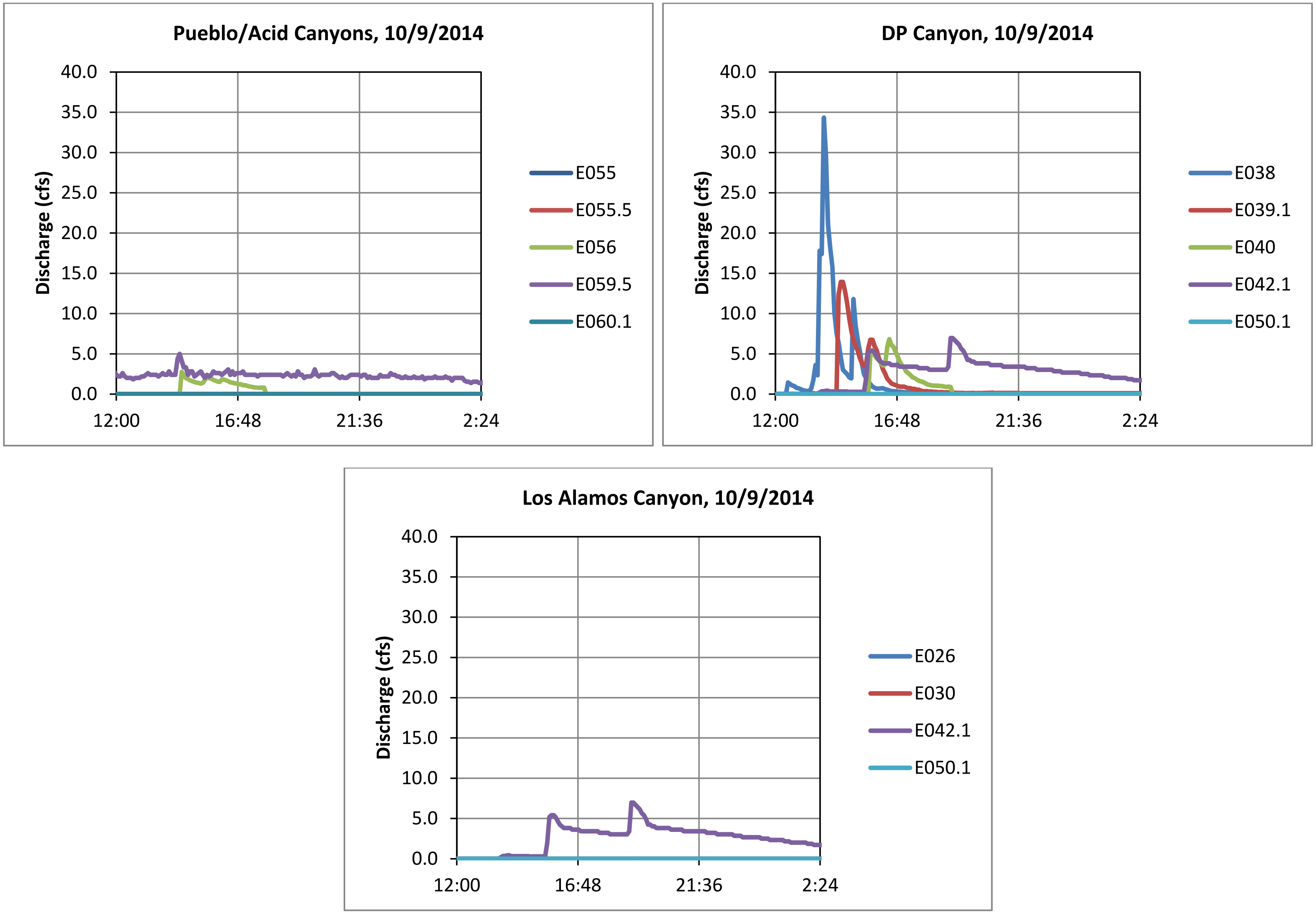


Figure 3.2-3 (continued) **Hydrographs during each sample-triggering runoff event for each canyon from up- to downstream reaches**

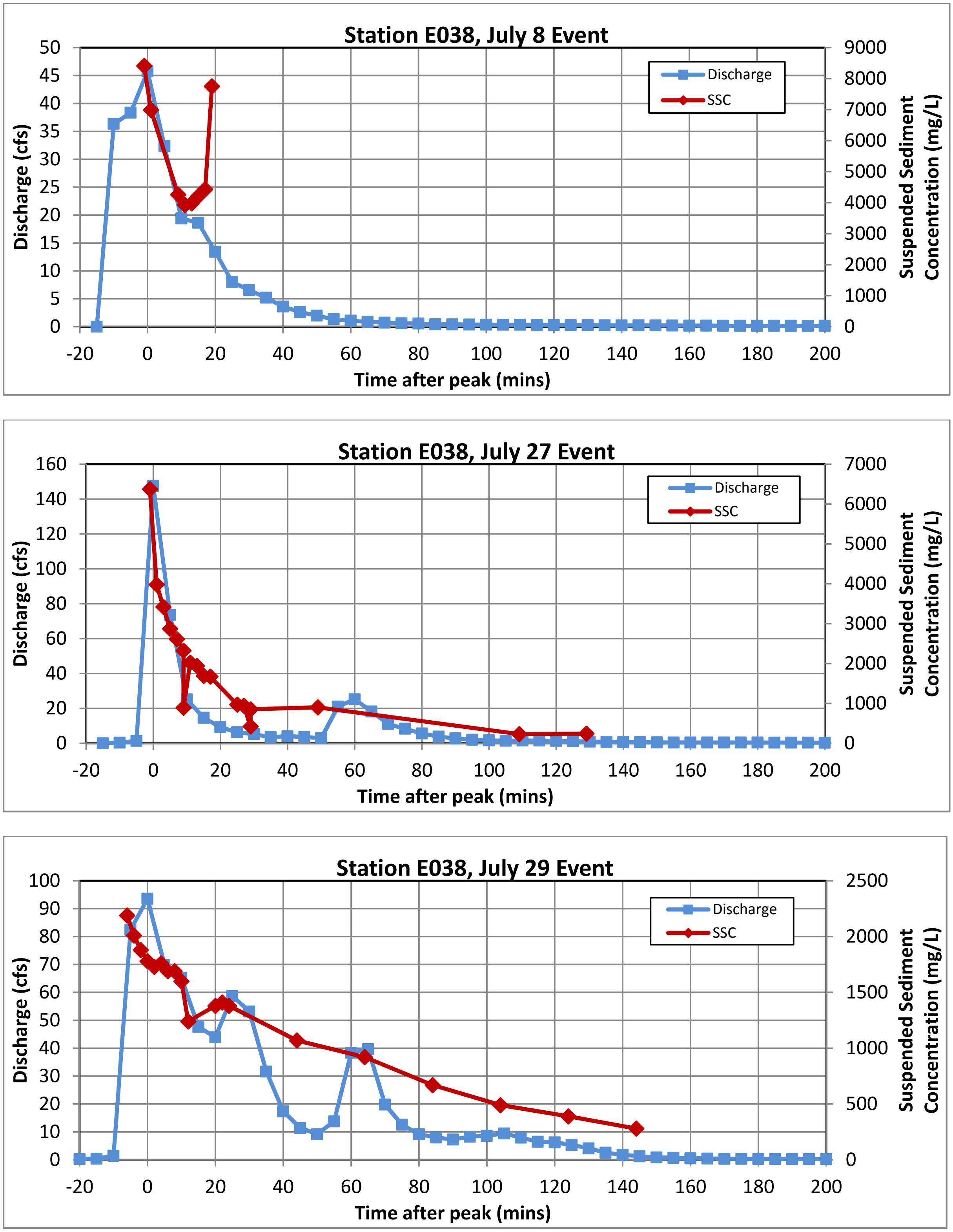
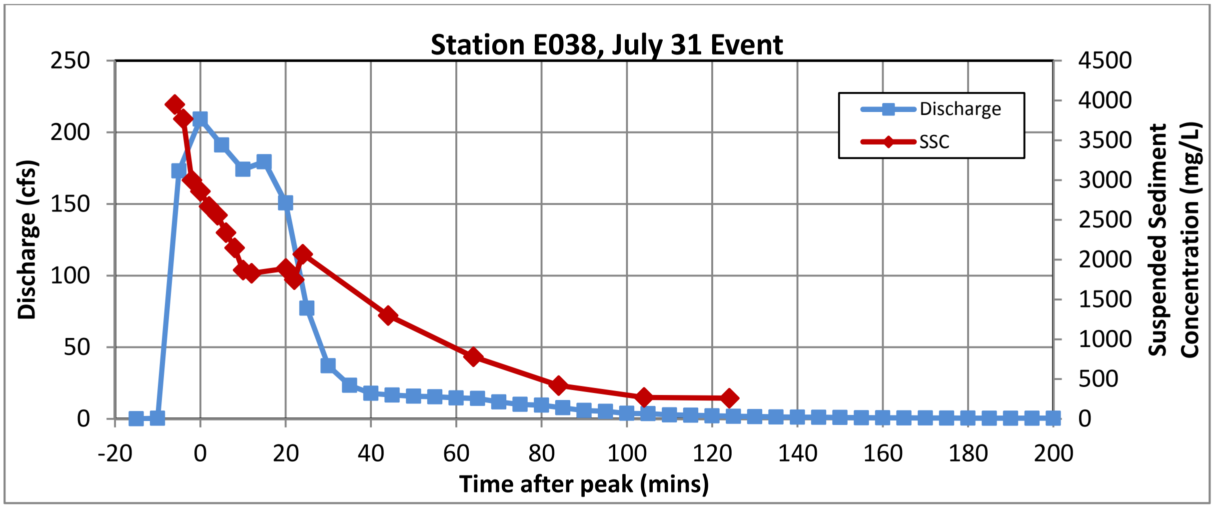
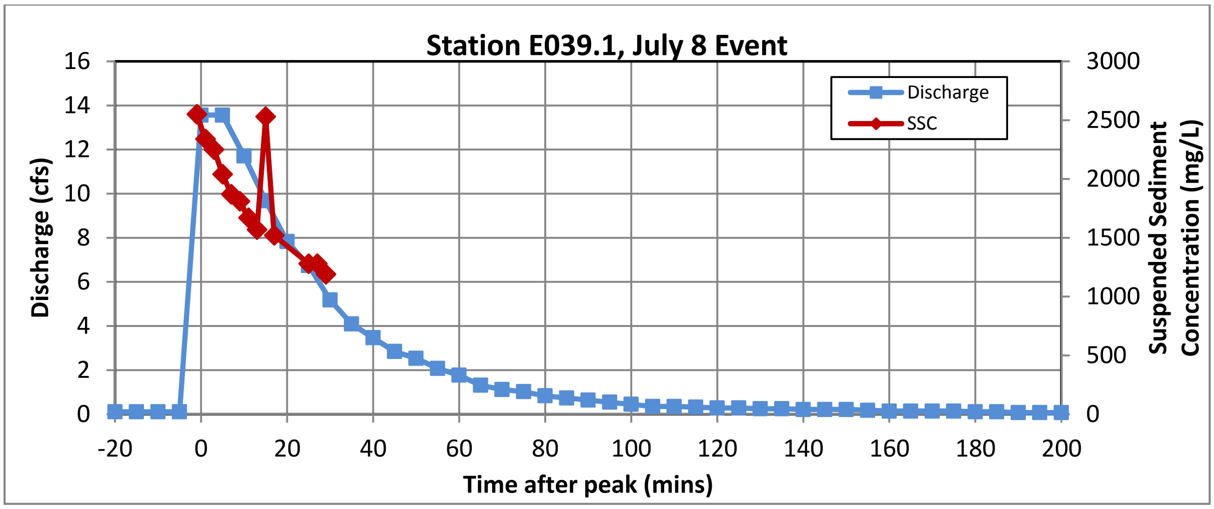


Figure 3.2-4 Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5





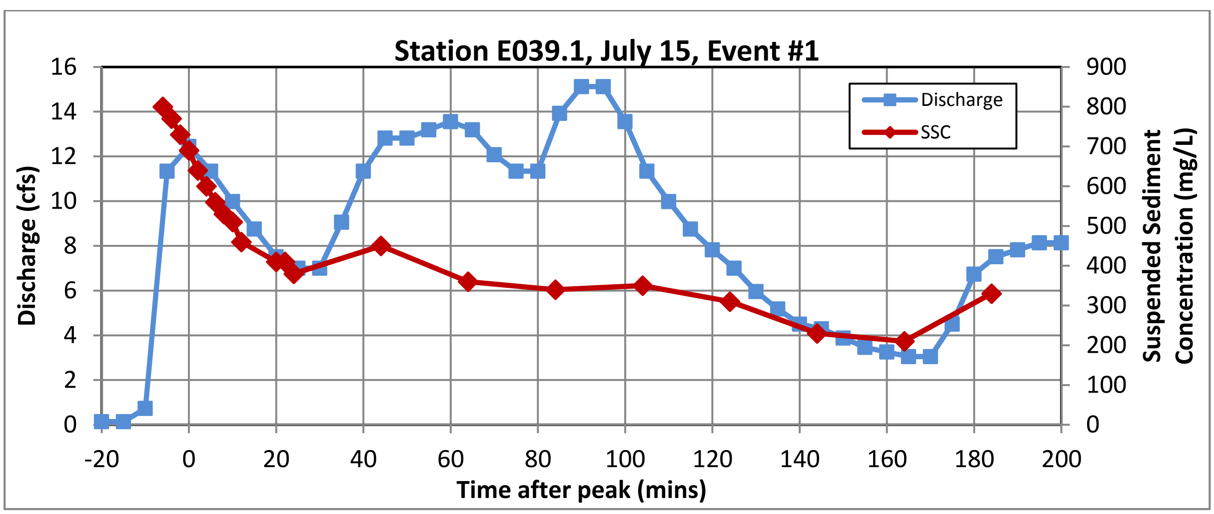
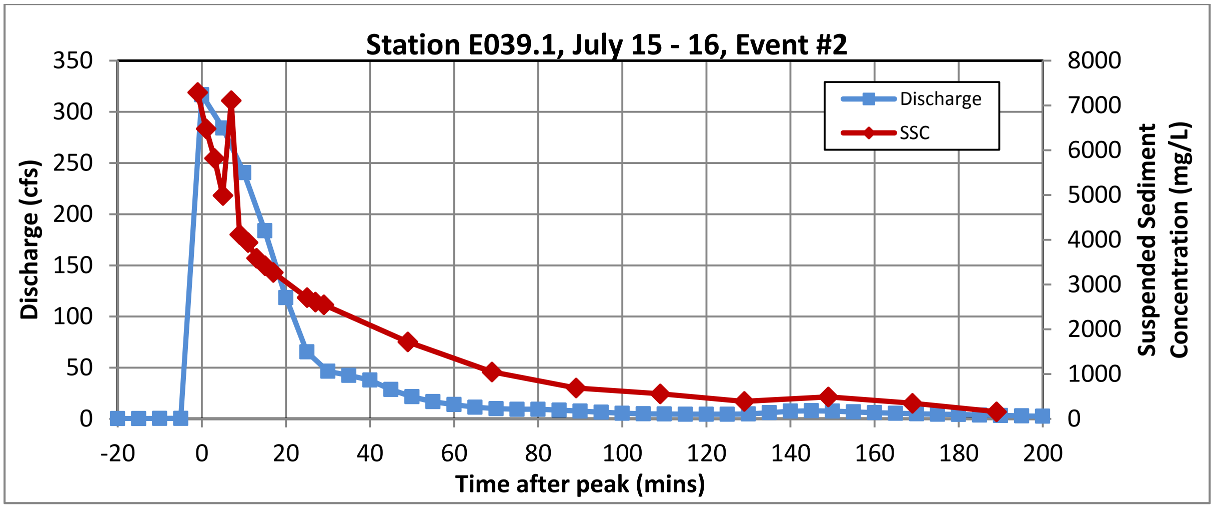
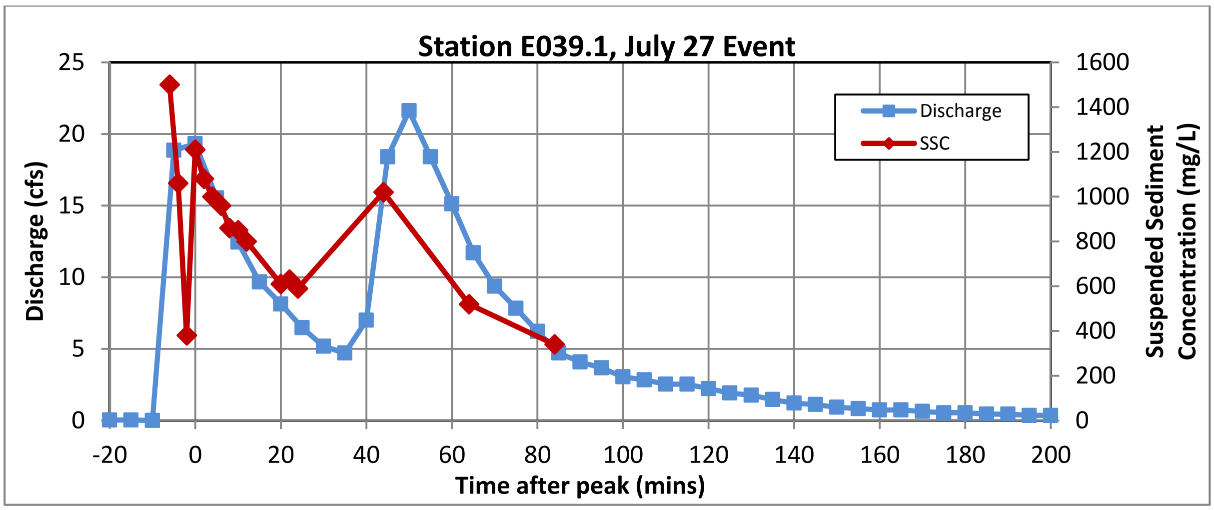


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**





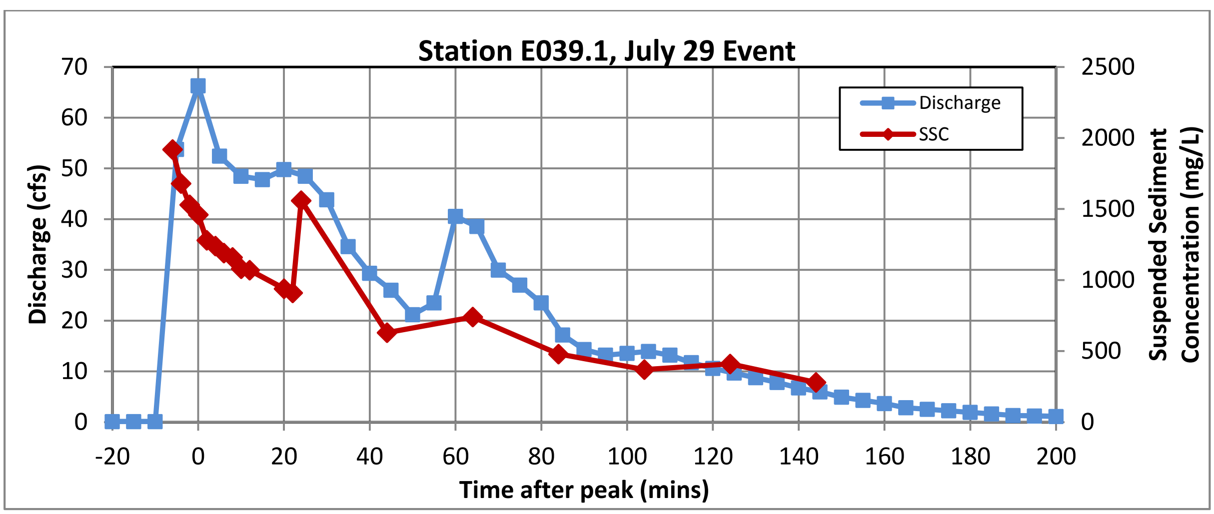
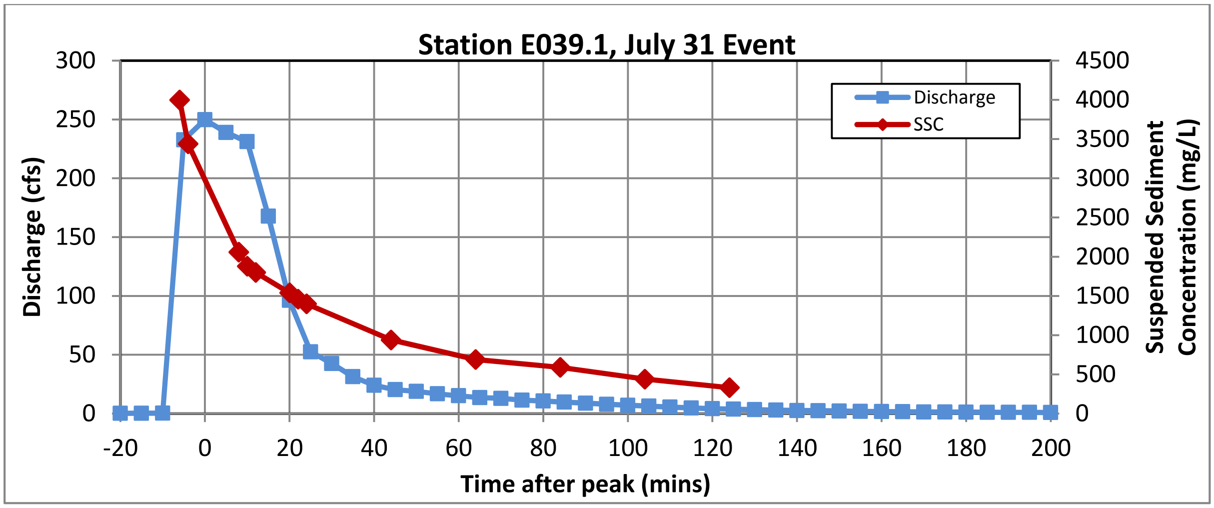
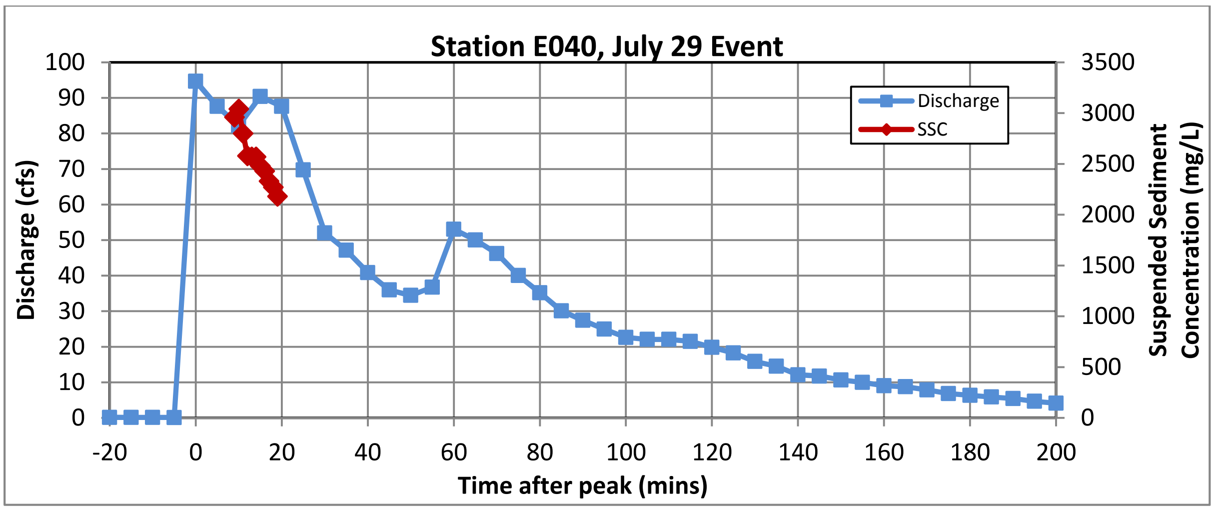


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**





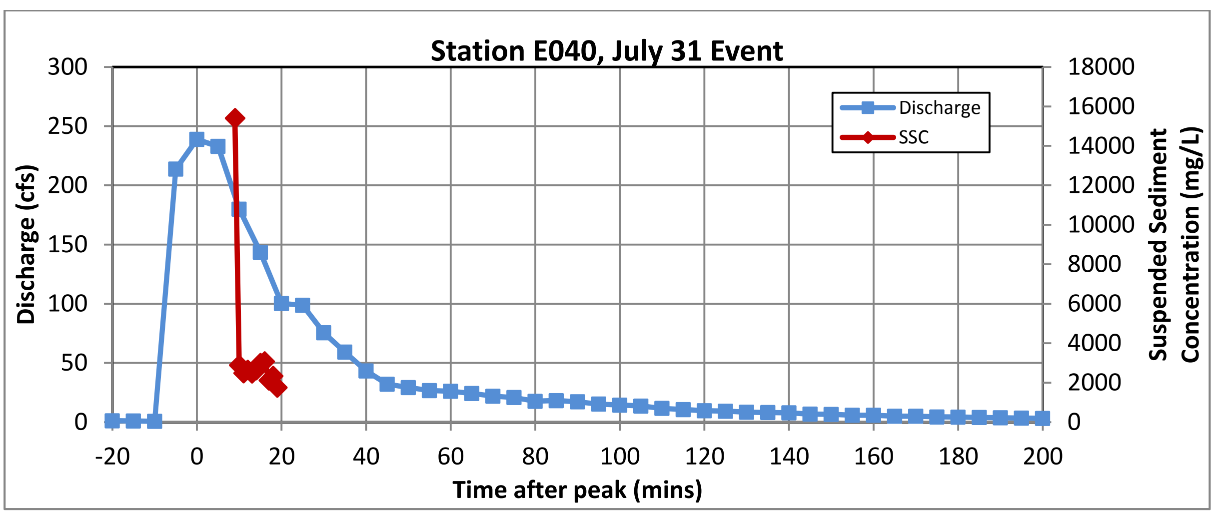
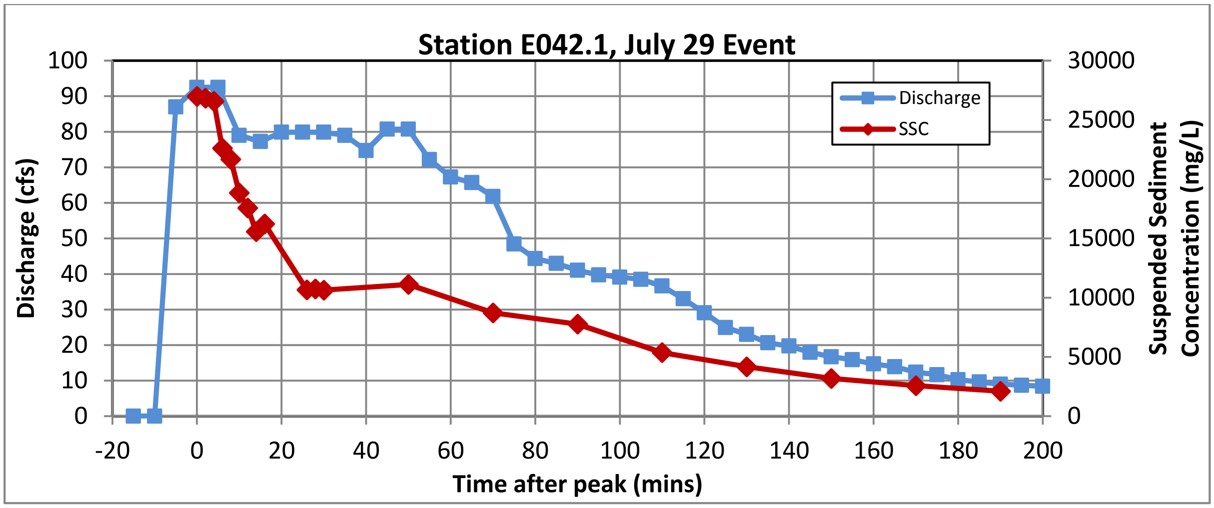
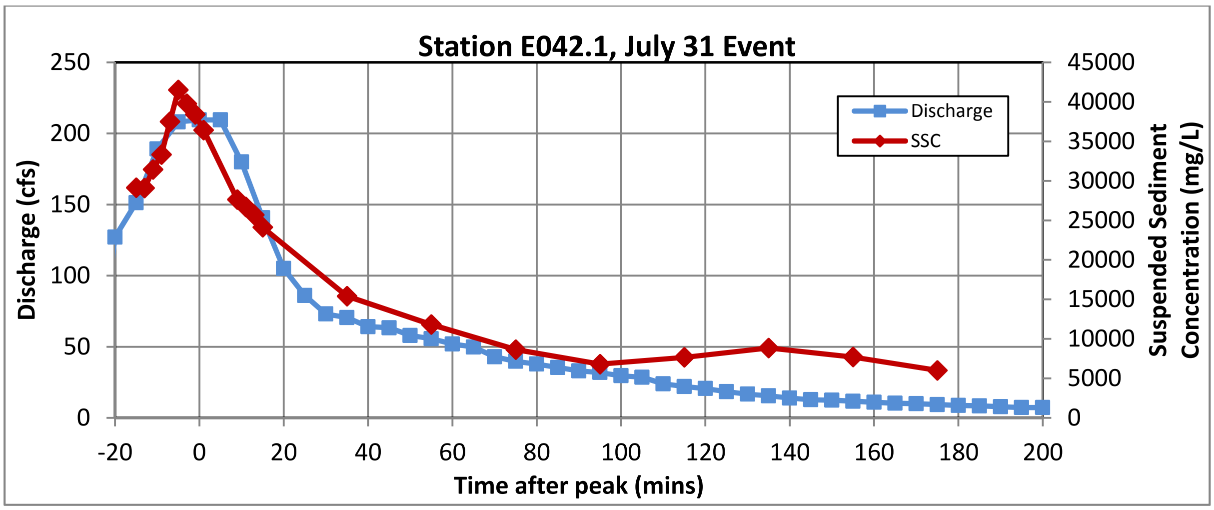


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**





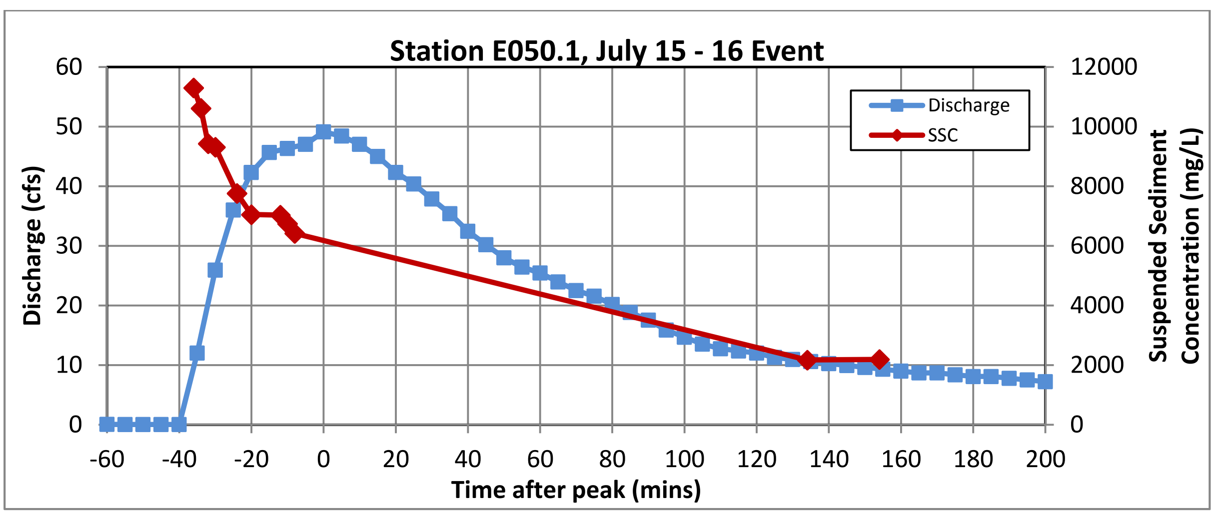
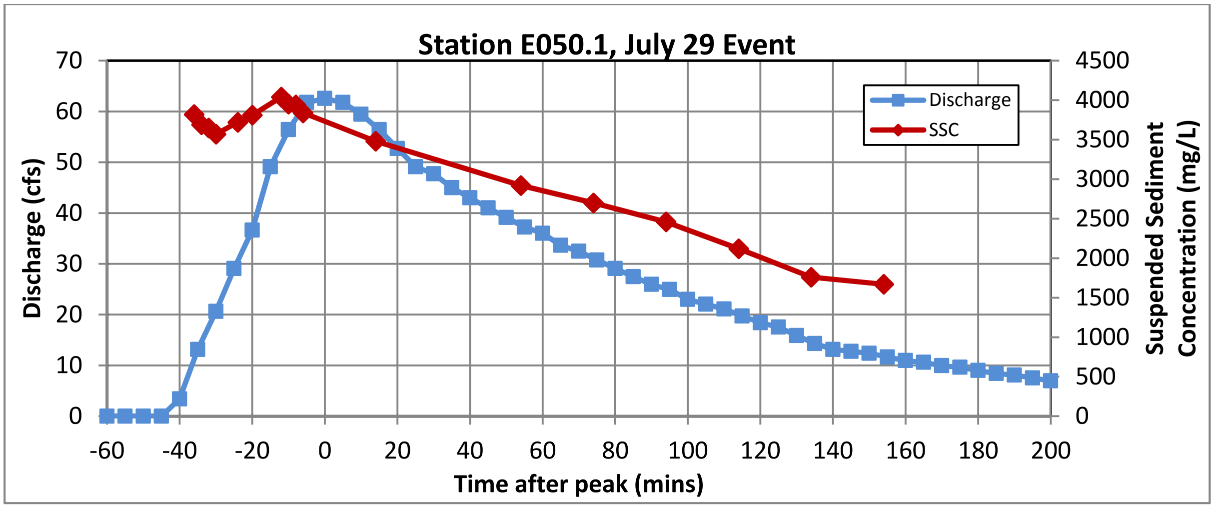
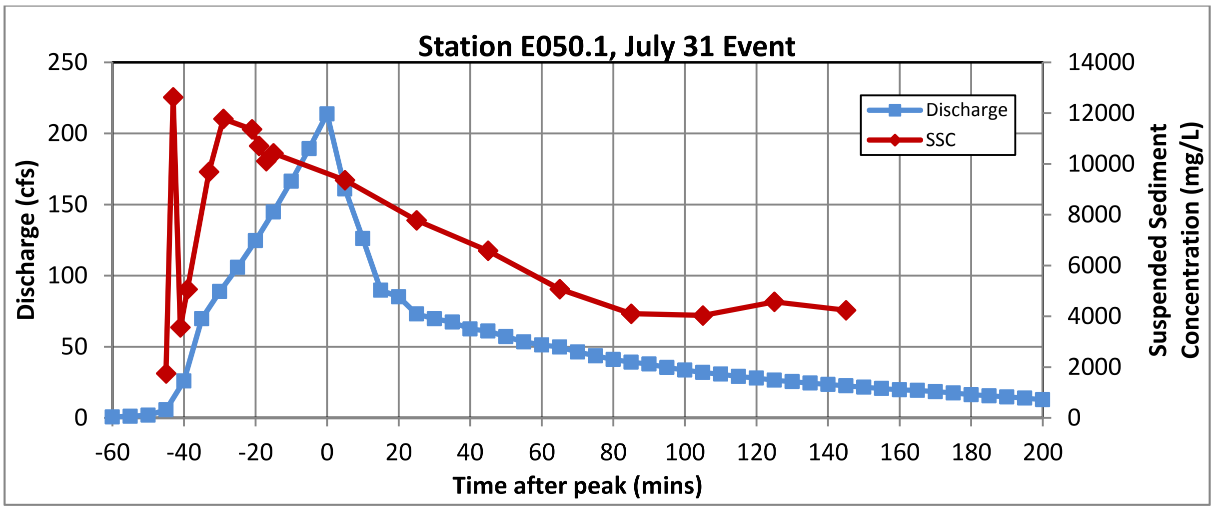


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**





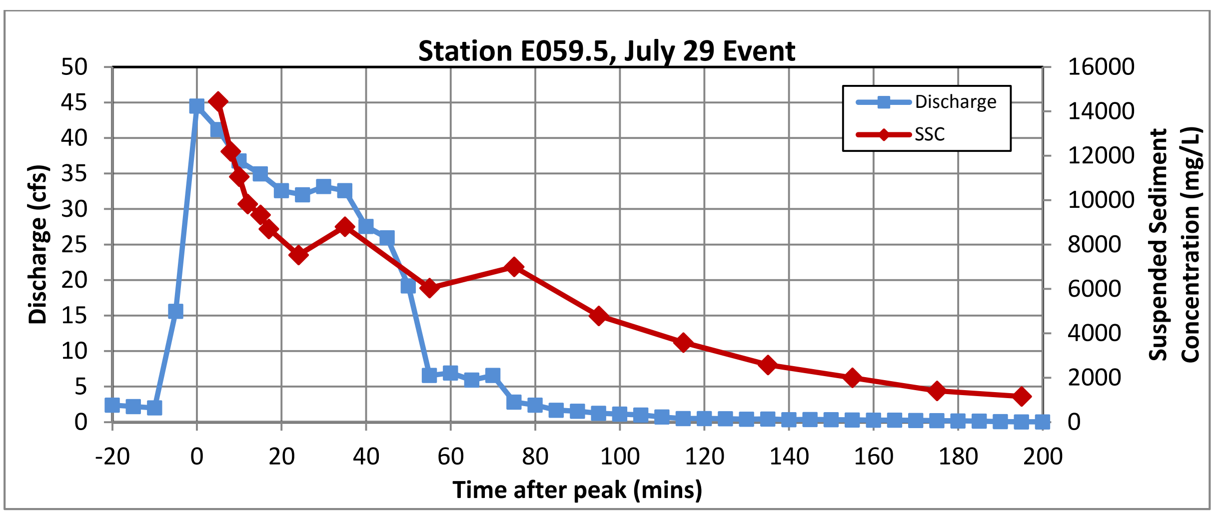


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**

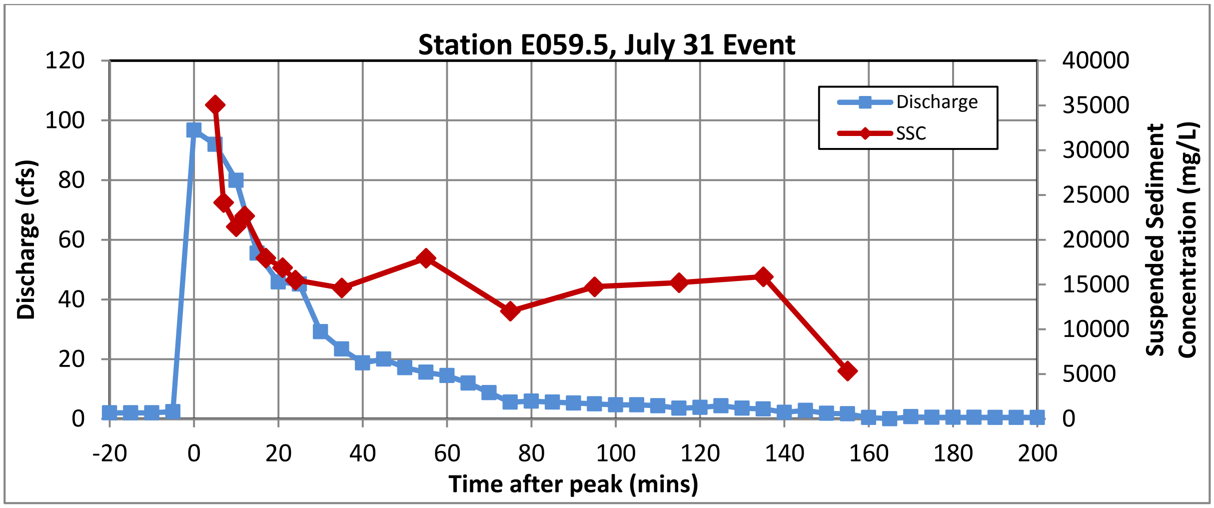


Figure 3.2-4 (continued) **Discharge and SSC for sampled events at E038, E039.1, E040, E042.1, E050.1, and E059.5**

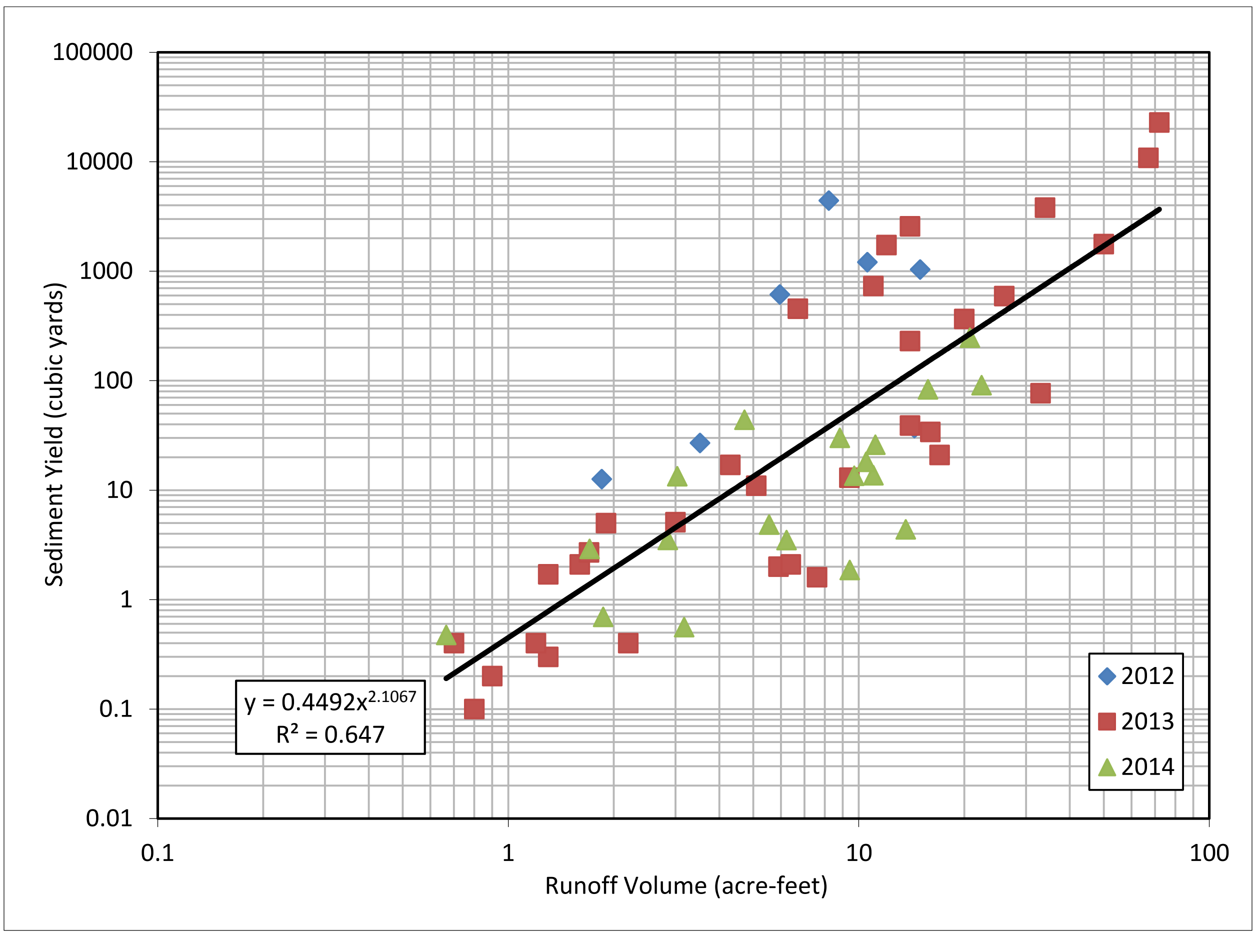


Figure 3.2-5 **Relationship between SSC-based sediment yield and runoff volume over the past 3 yr of monitoring**

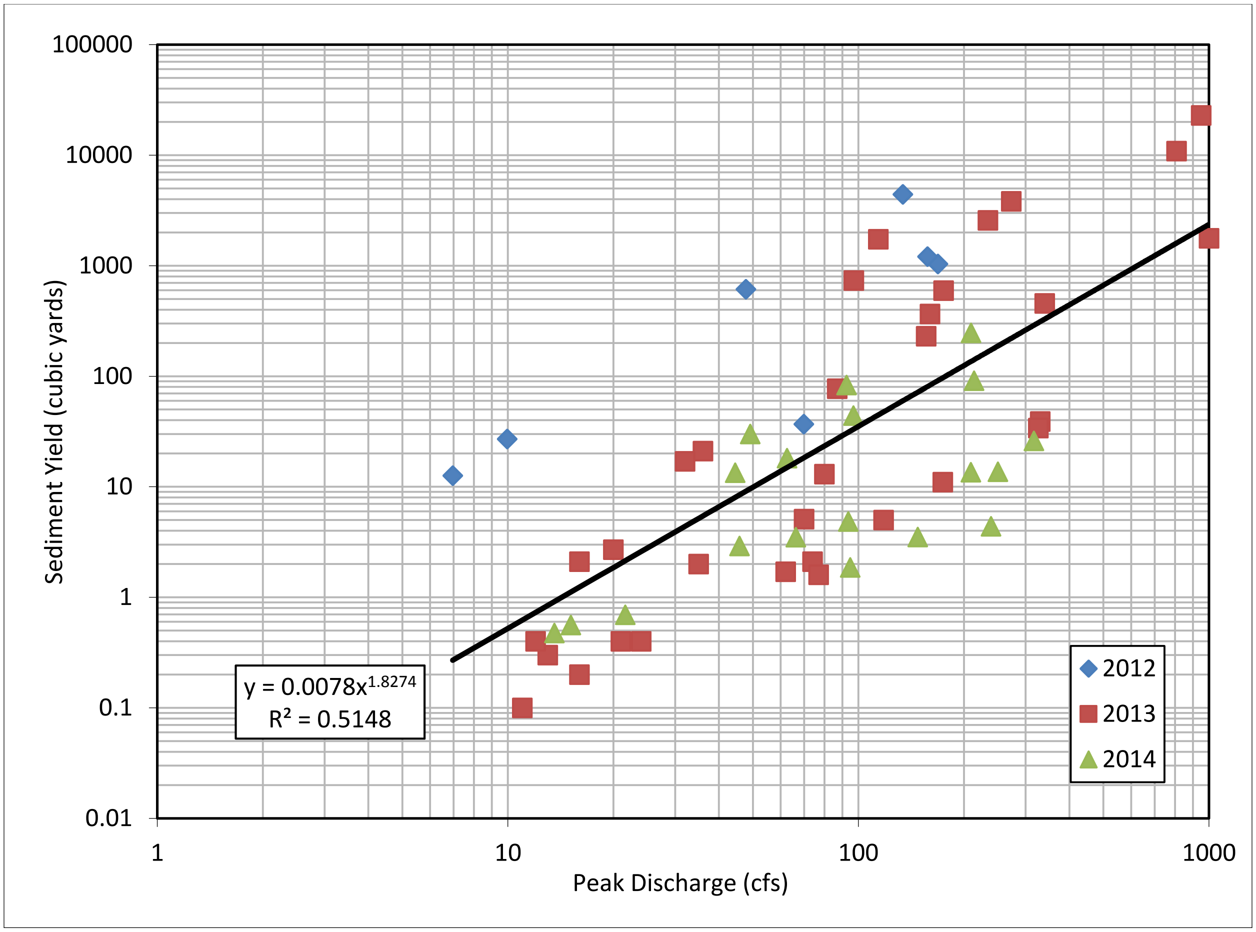
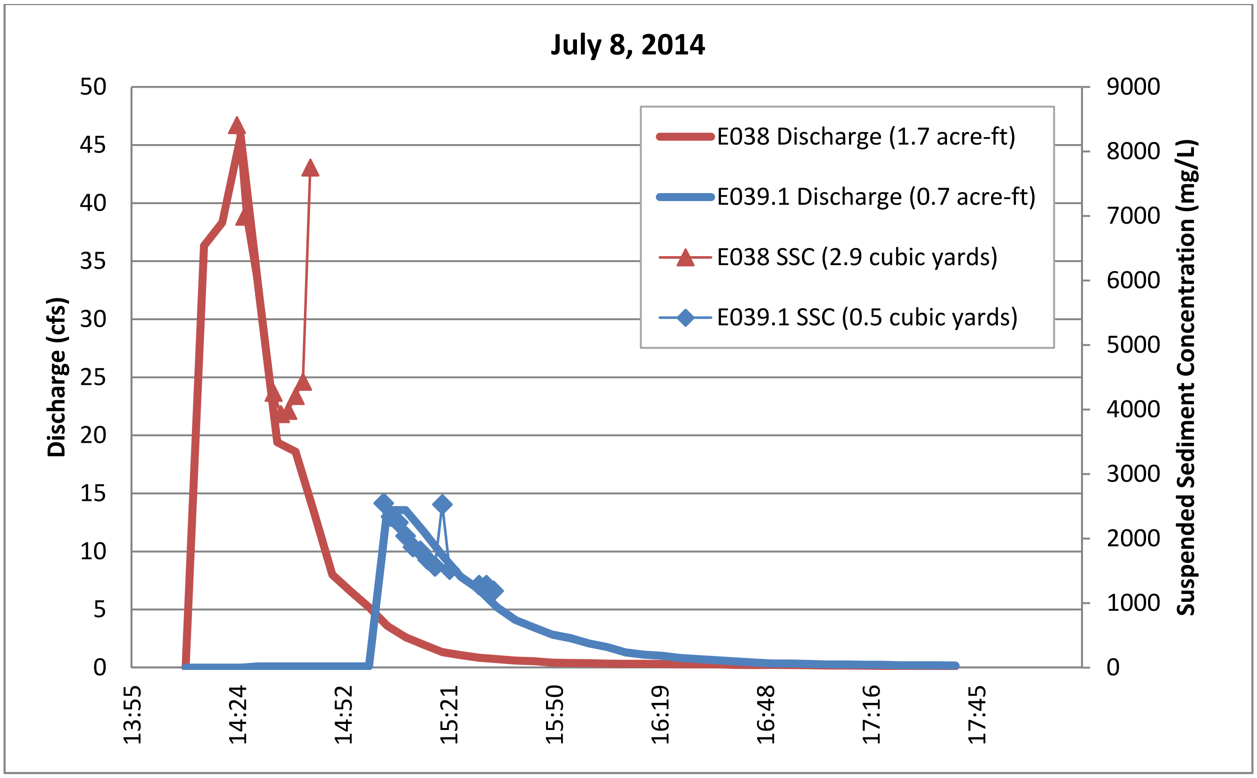


Figure 3.2-6 Relationship between SSC-based sediment yield and peak discharge over the past 3 yr of monitoring



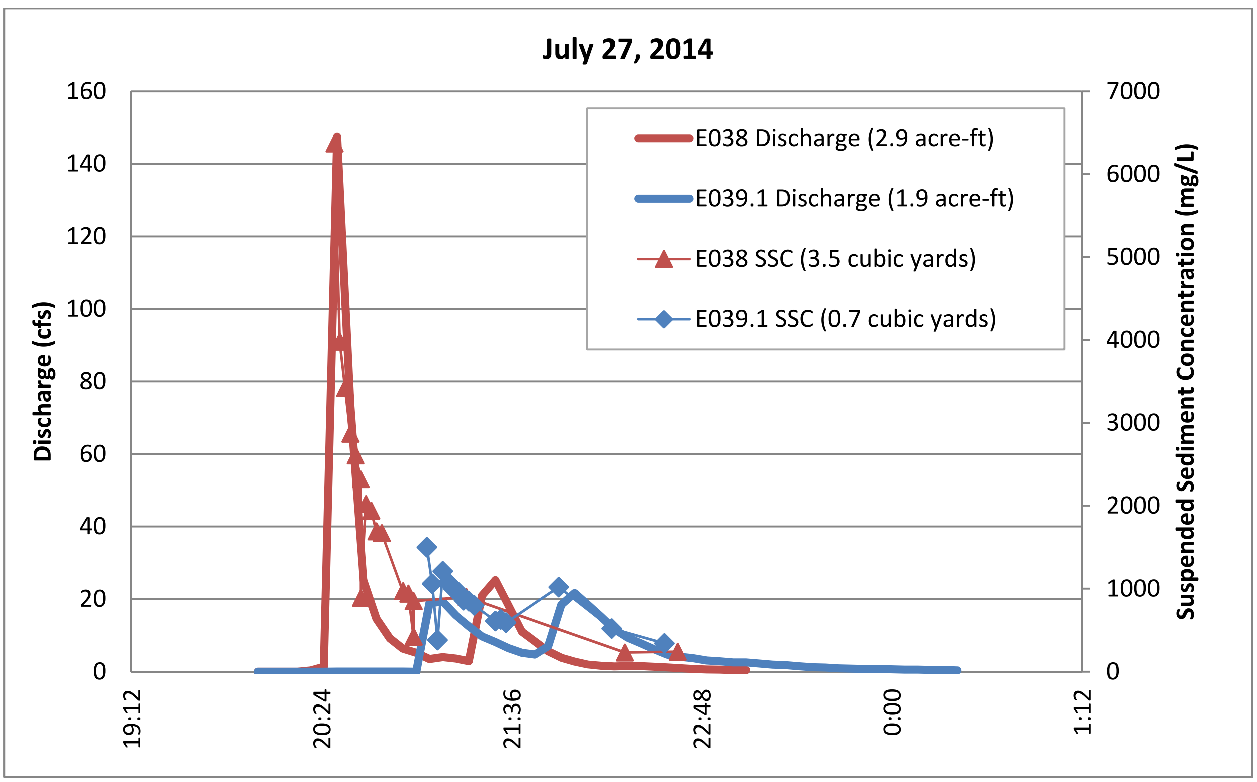
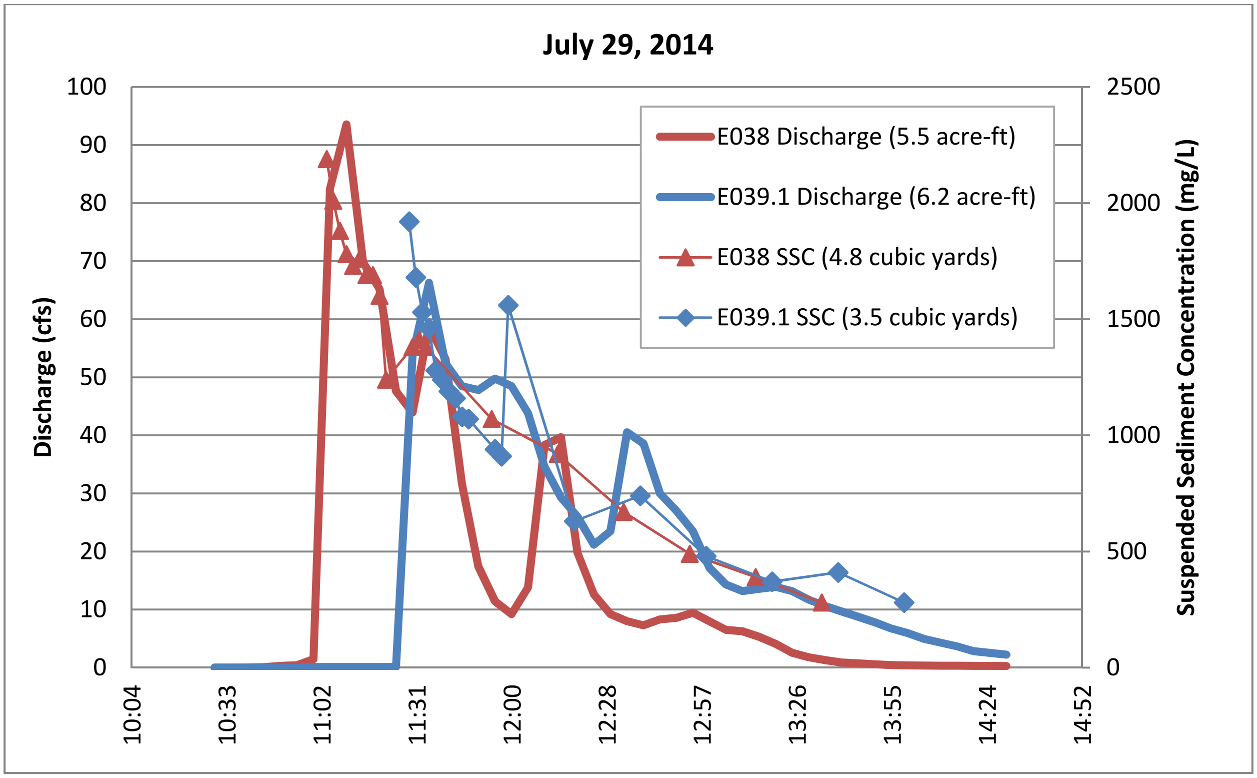


Figure 3.4-1 Discharge and SSC at E038 and E039.1 in DP Canyon on days when sampling of the same runoff event occurred



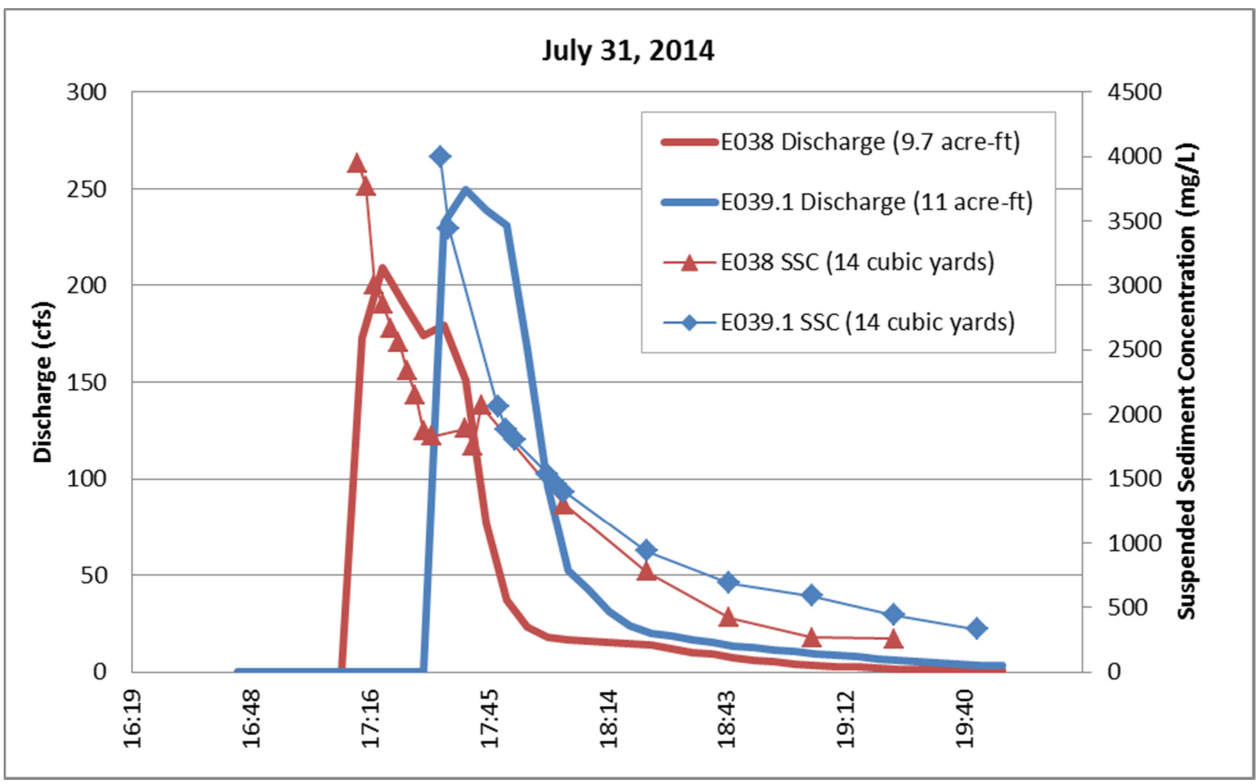


Figure 3.4-1 (continued) Discharge and SSC at E038 and E039.1 in DP Canyon on days when sampling of the same runoff event occurred

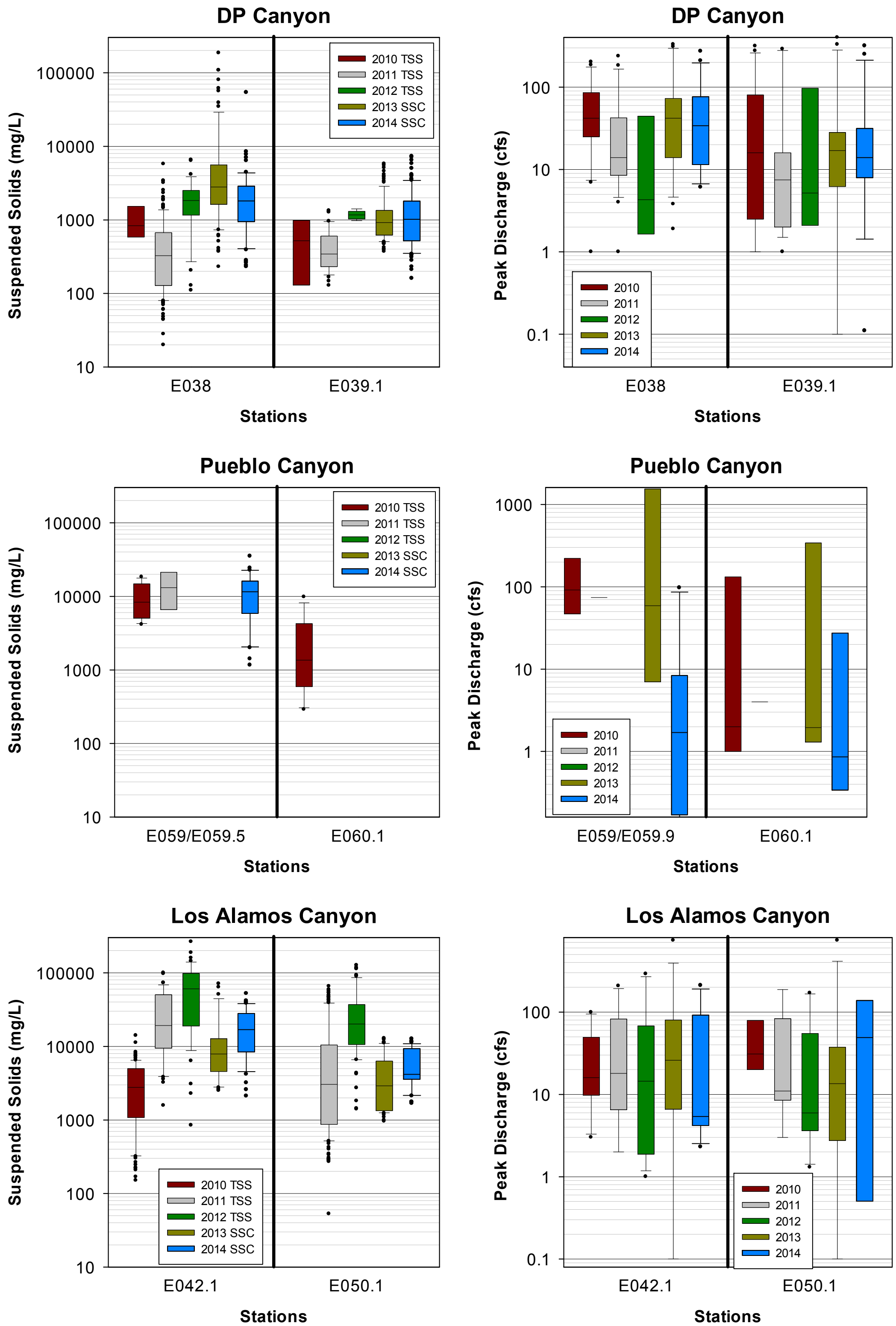
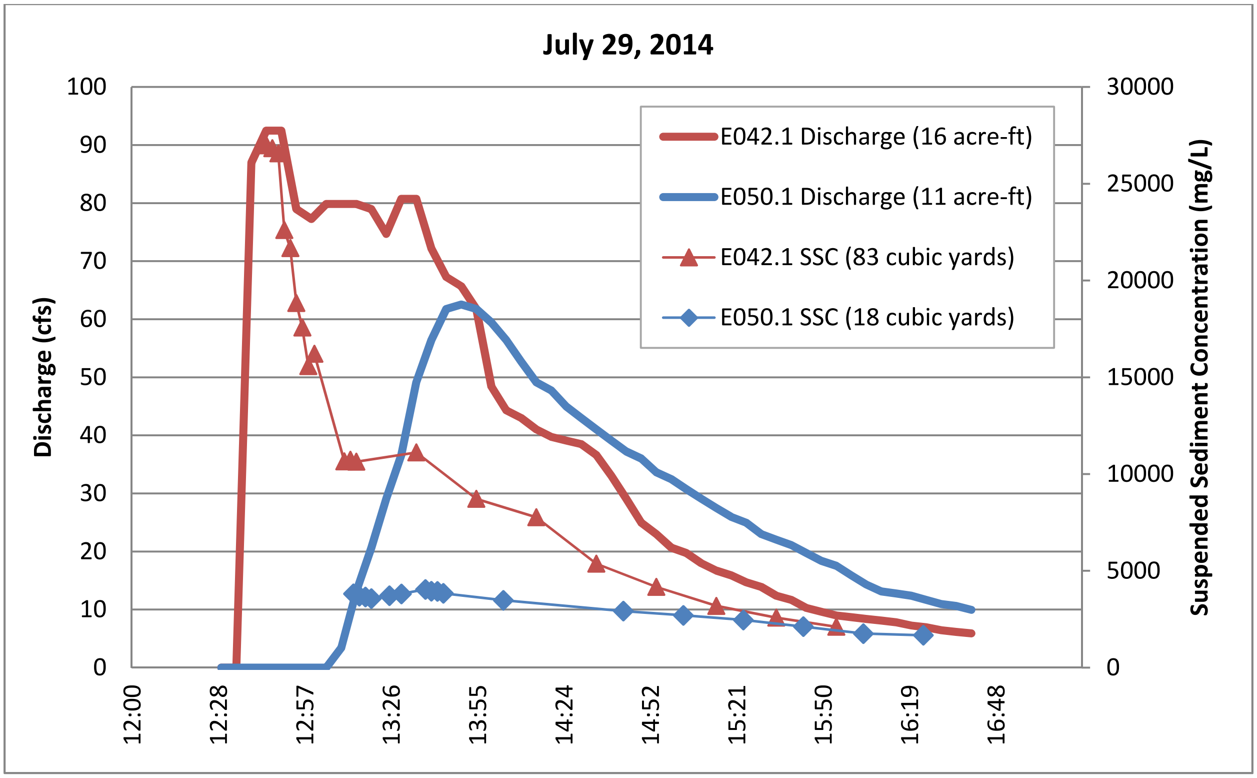


Figure 3.4-2 Box and whisker plots of TSS and SSC (left) and peak discharge (right) upstream and downstream of the watershed mitigations in DP (top), Los Alamos (middle), and Pueblo (bottom) Canyons over the past 5 yr of monitoring. Note that TSS and SSC are determined using different methods and thus are not directly comparable.



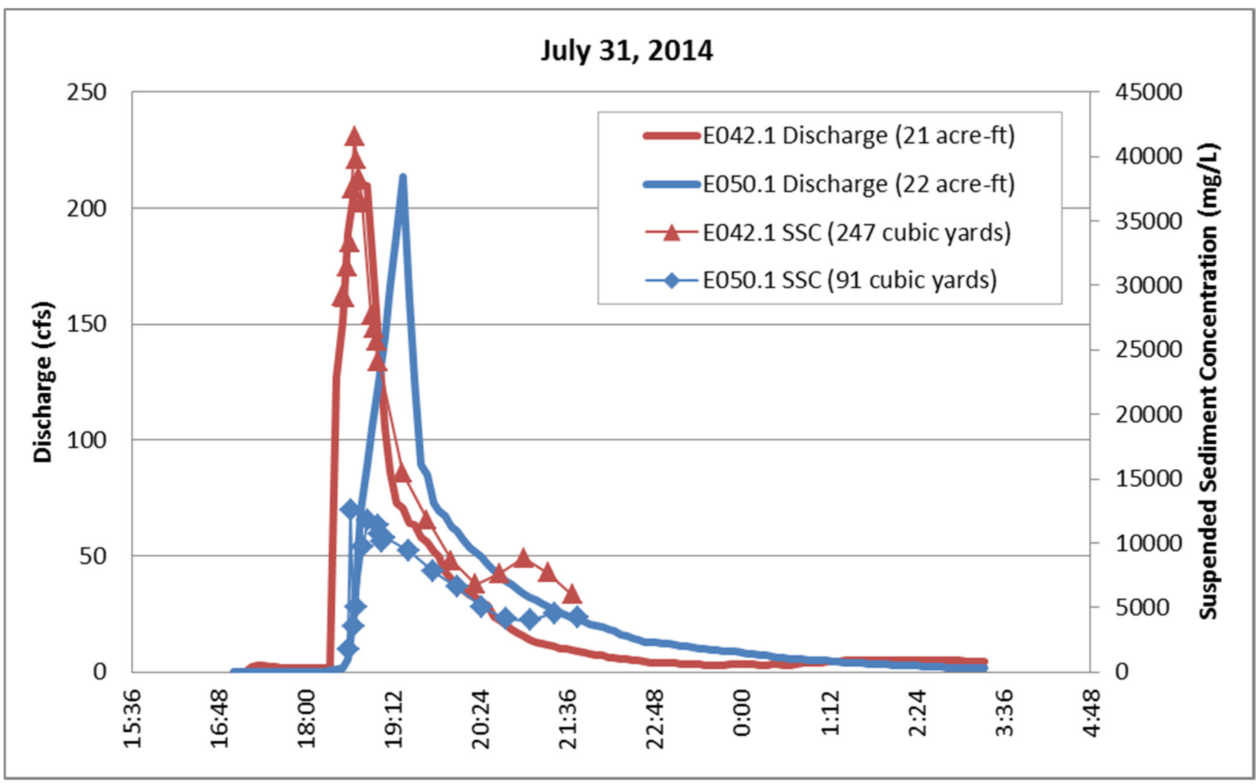


Figure 3.4-3 Discharge and SSC at E042.1 and E050.1 in upper Los Alamos Canyon on days when sampling of the same runoff event occurred

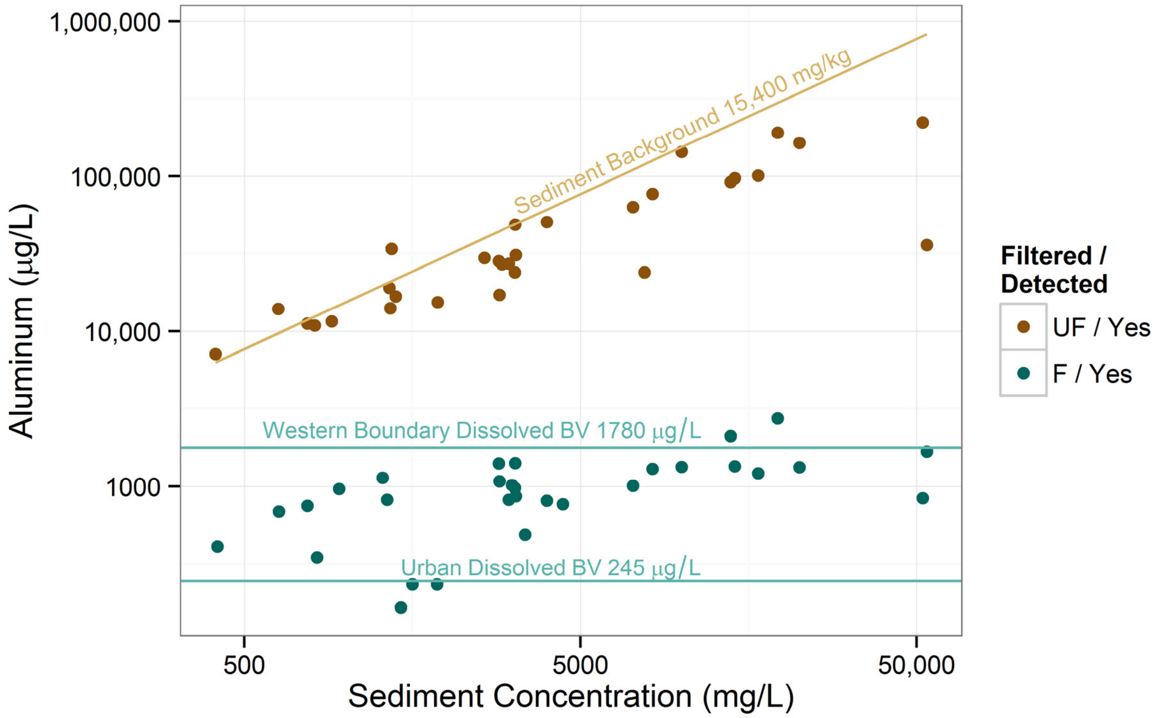


Figure 4.3-1 SSC vs. aluminum for each gaging station

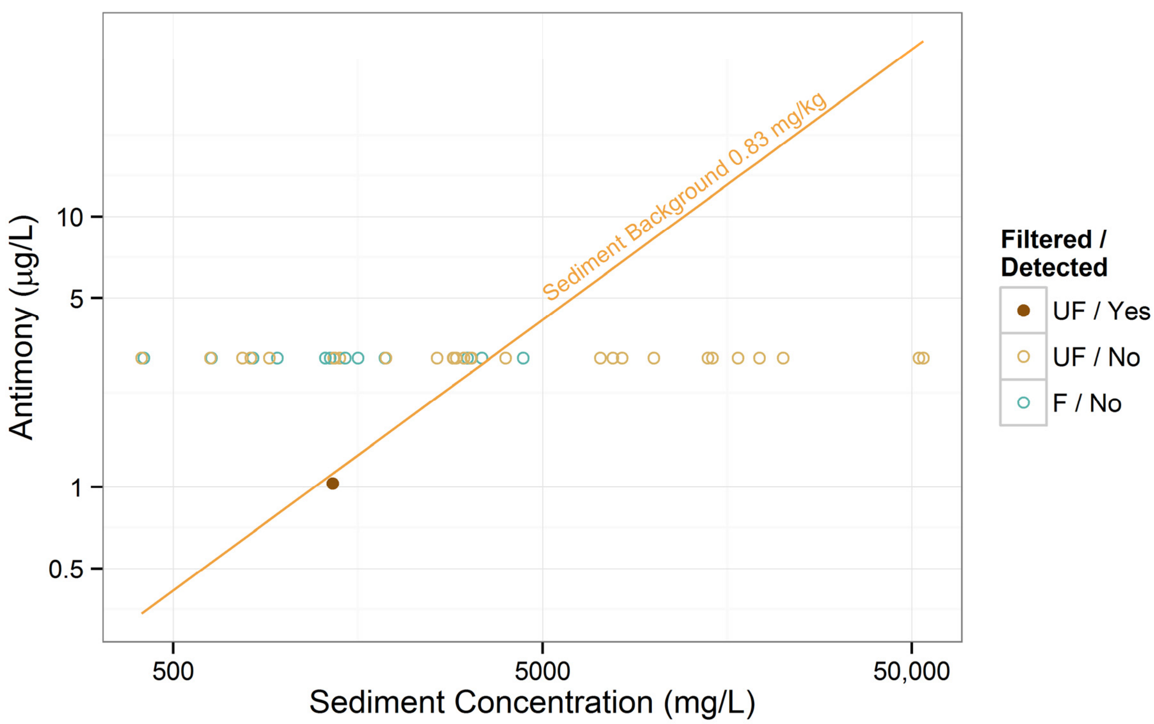


Figure 4.3-2 SSC vs. antimony for each gaging station

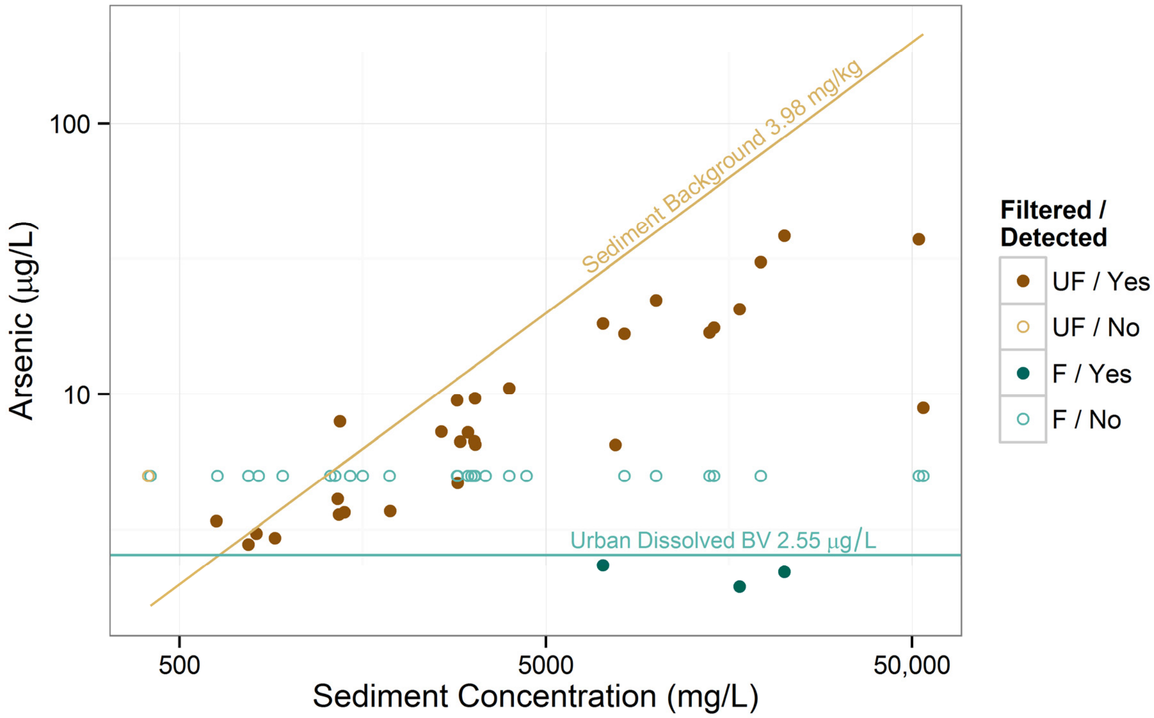


Figure 4.3-3 SSC vs. arsenic for each gaging station

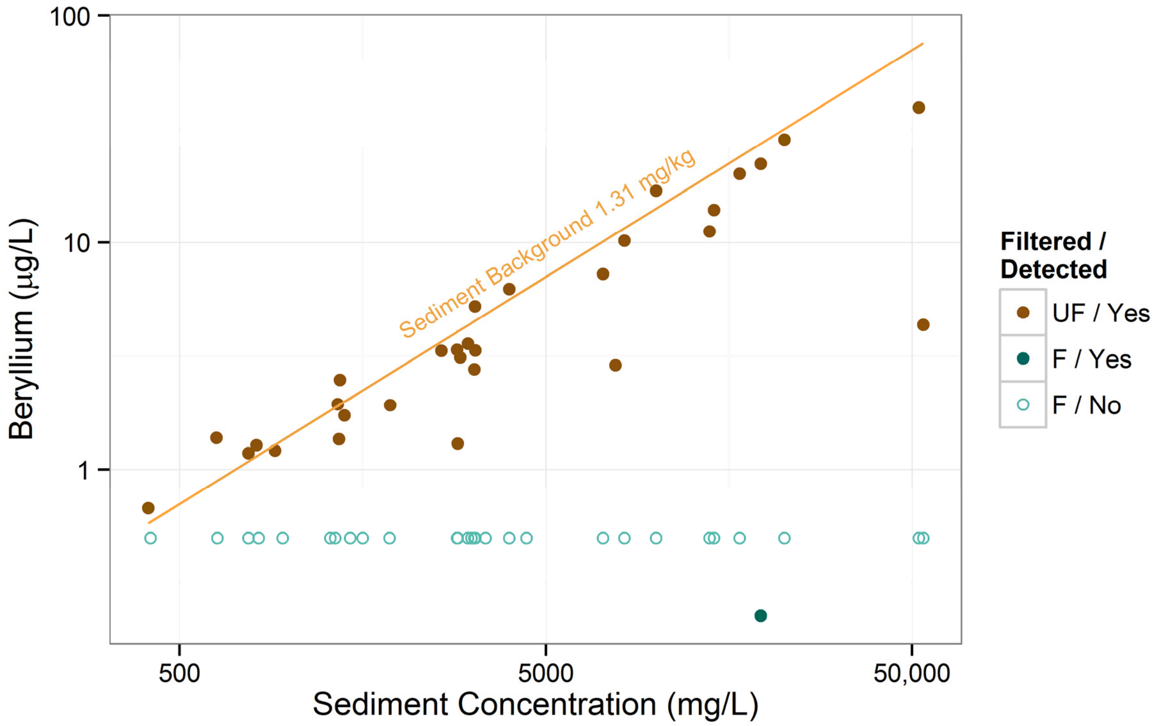


Figure 4.3-4 SSC vs. beryllium for each gaging station

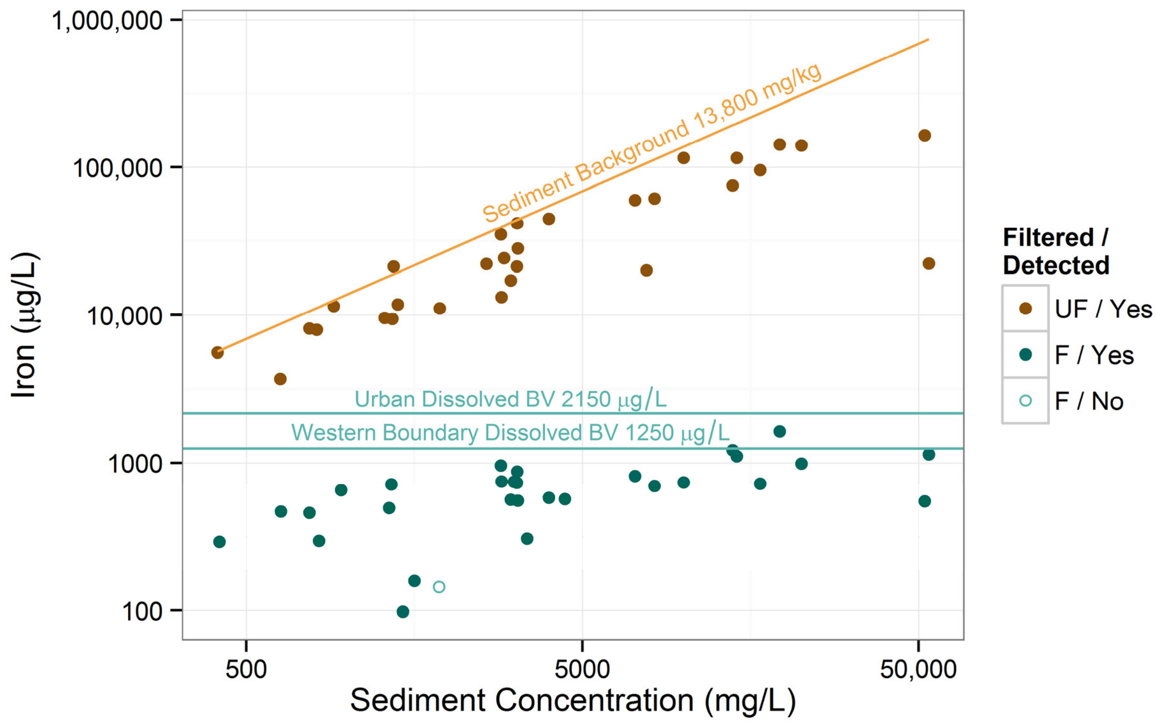


Figure 4.3-5 SSC vs. iron for each gaging station

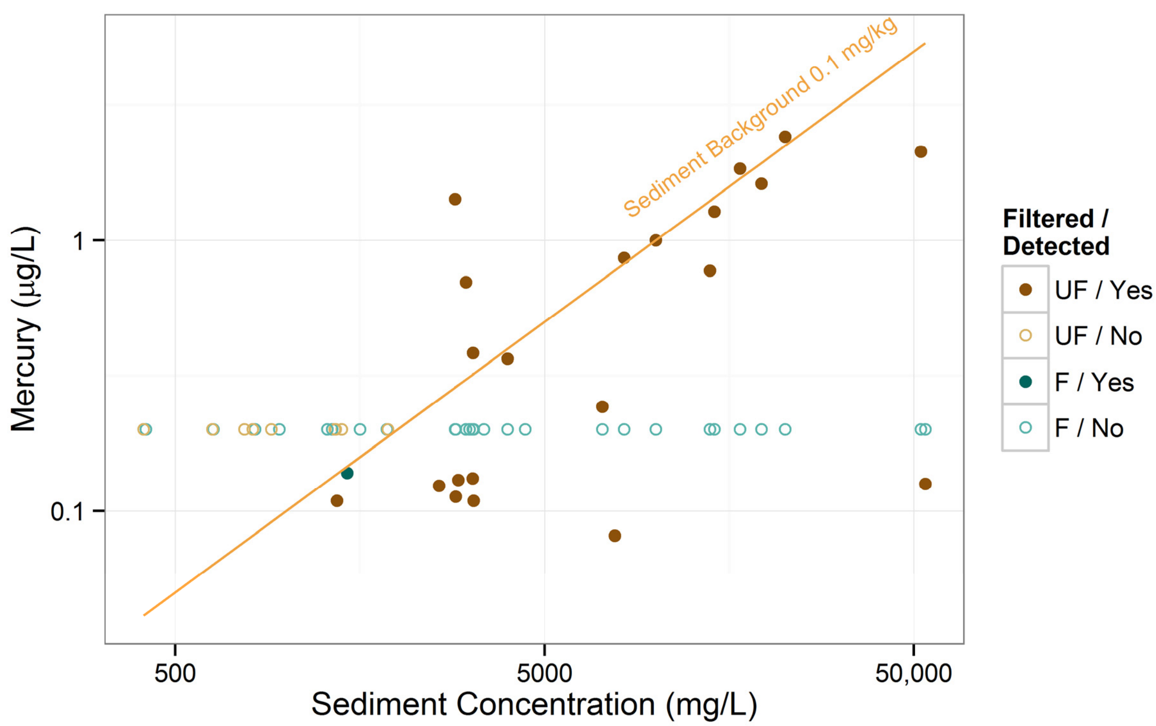


Figure 4.3-6 SSC vs. mercury for each gaging station

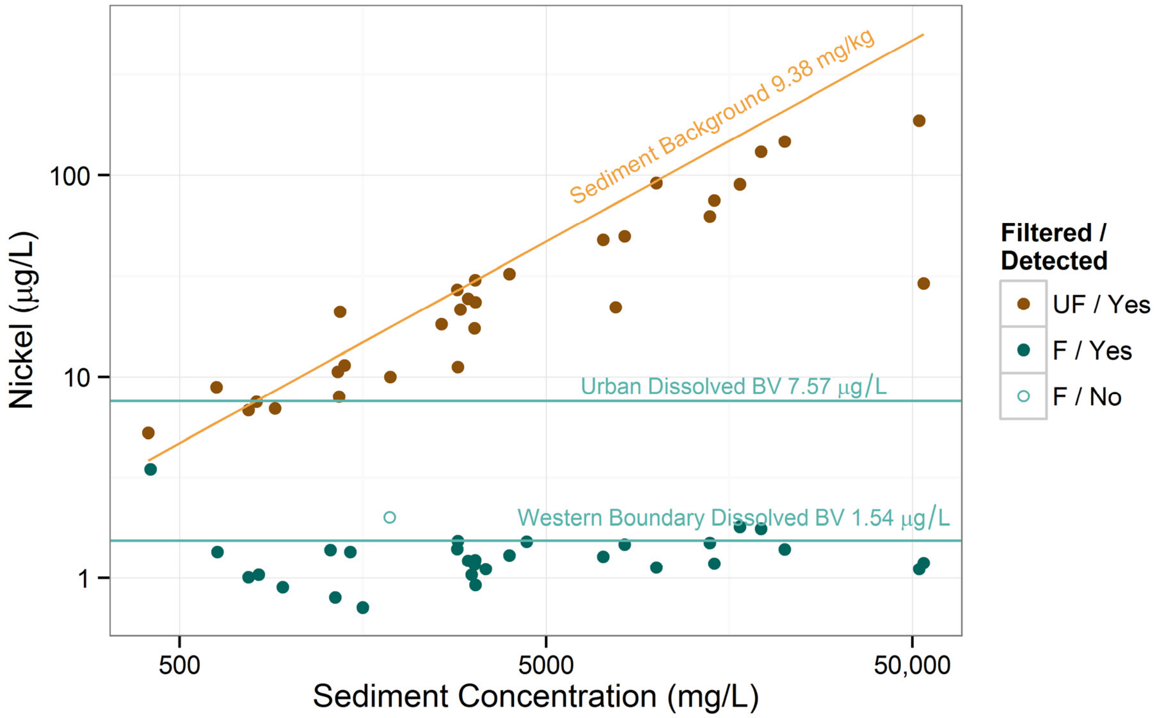


Figure 4.3-7 SSC vs. nickel for each gaging station

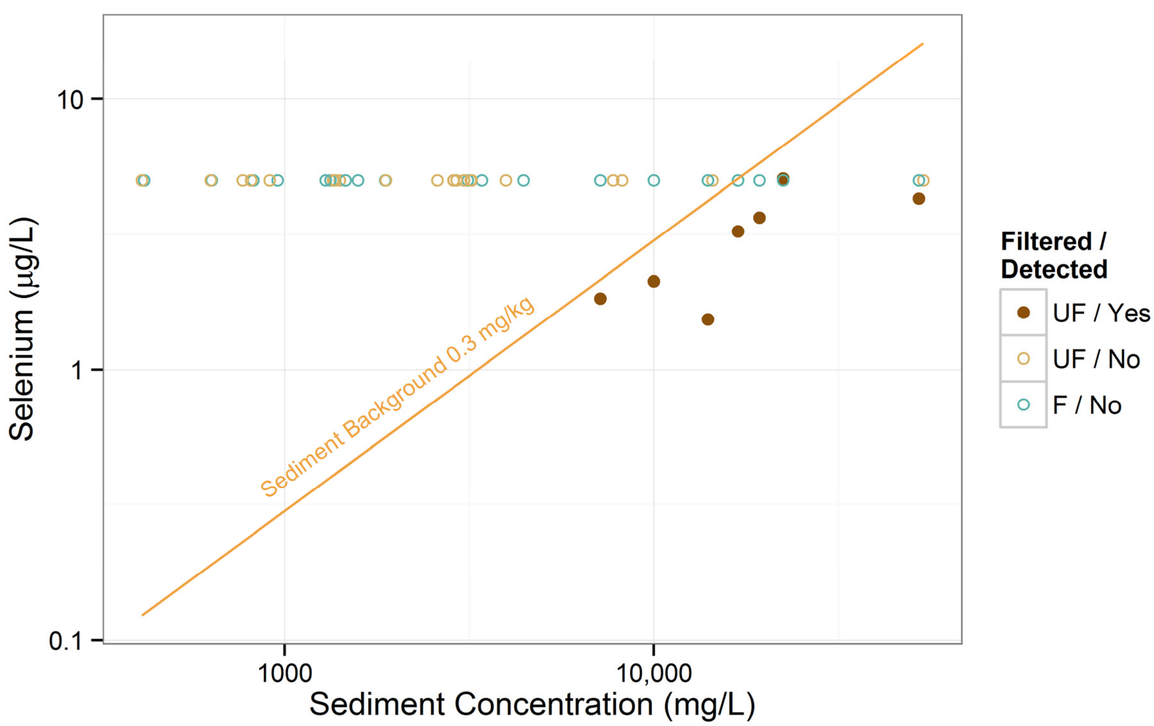


Figure 4.3-8 SSC vs. selenium for each gaging station

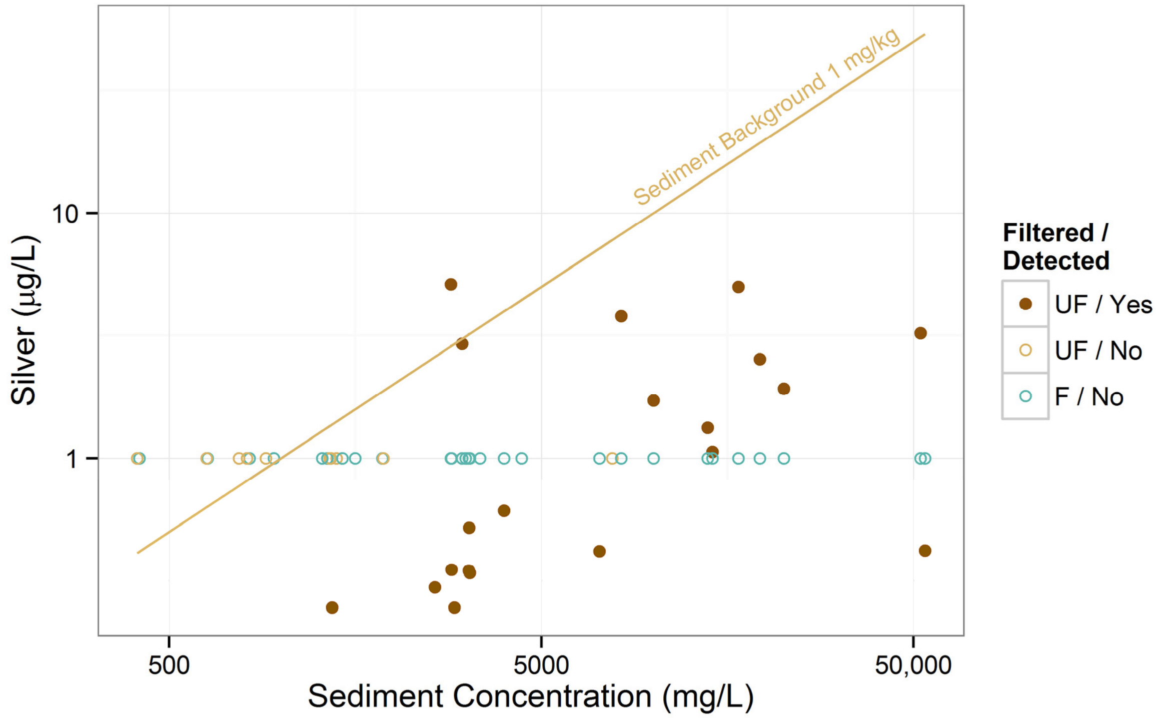


Figure 4.3-9 SSC vs. silver for each gaging station

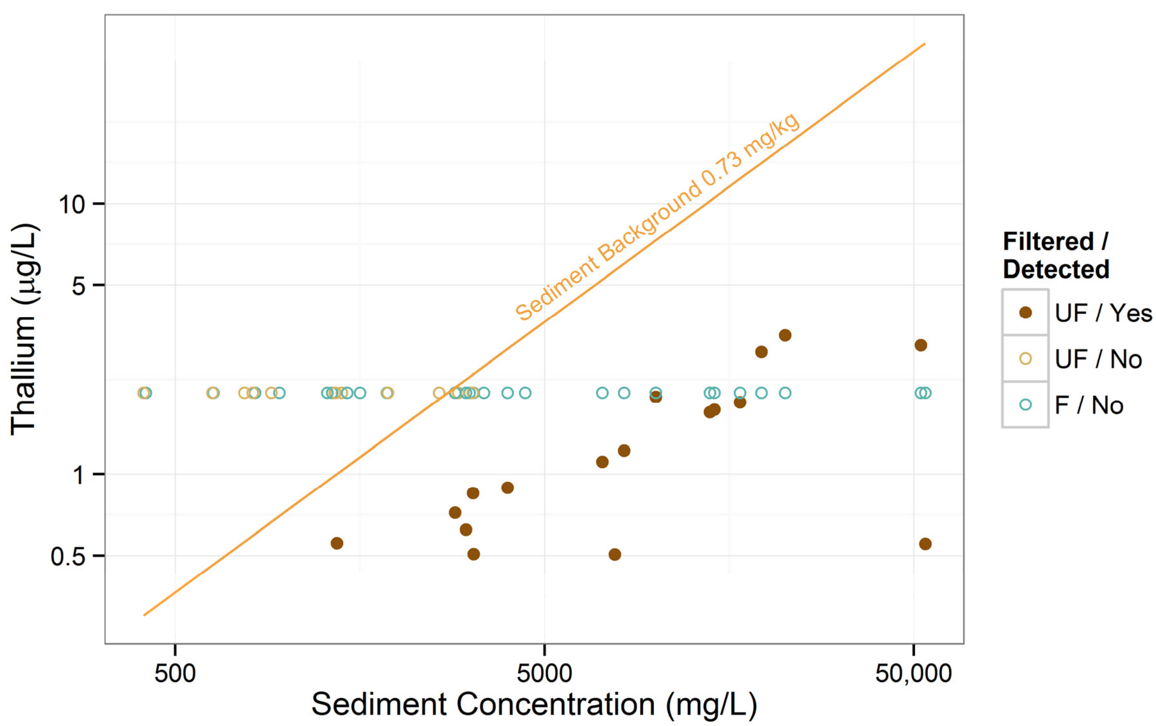


Figure 4.3-10 SSC vs. thallium for each gaging station

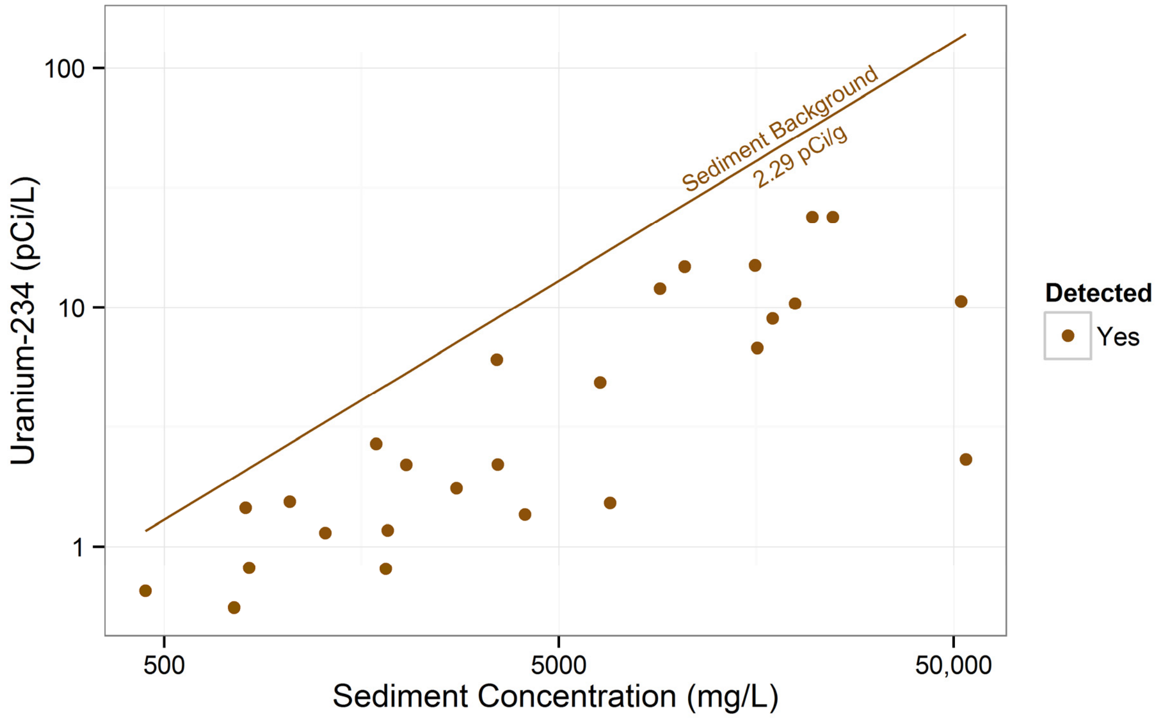


Figure 4.3-11 SSC vs. uranium-234 for each gaging station

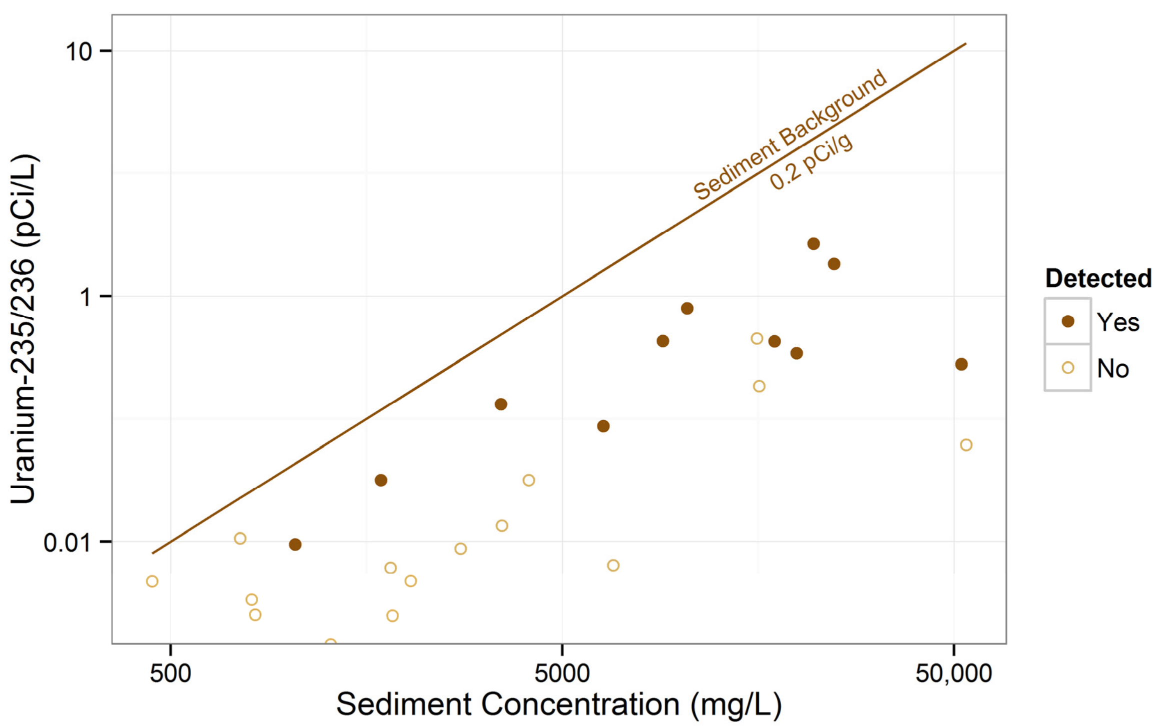


Figure 4.3-12 SSC vs. uranium-235/236 for each gaging station

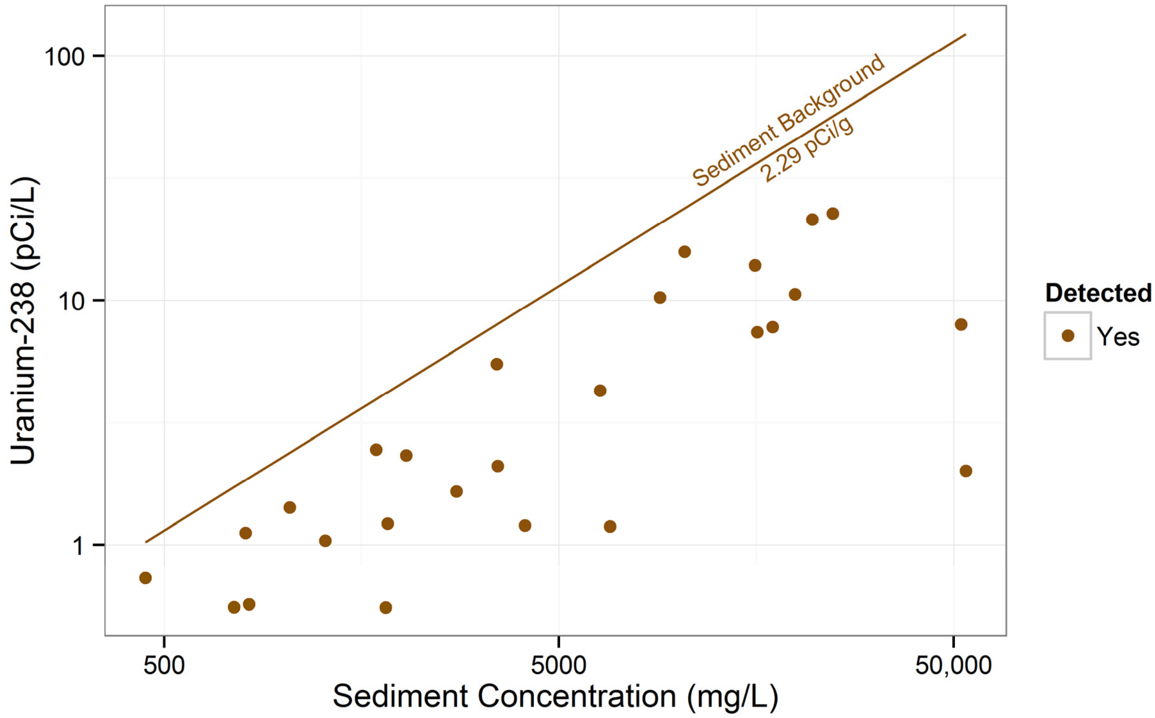


Figure 4.3-13 SSC vs. uranium-238 for each gaging station

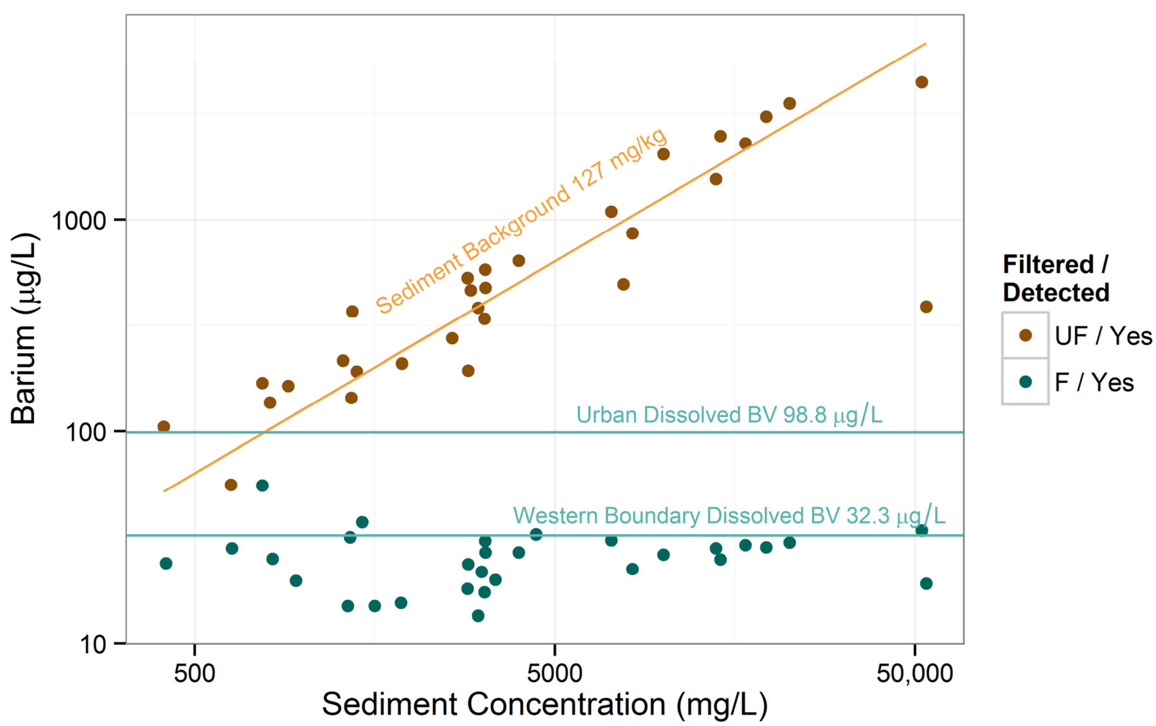


Figure 4.3-14 SSC vs. barium for each gaging station

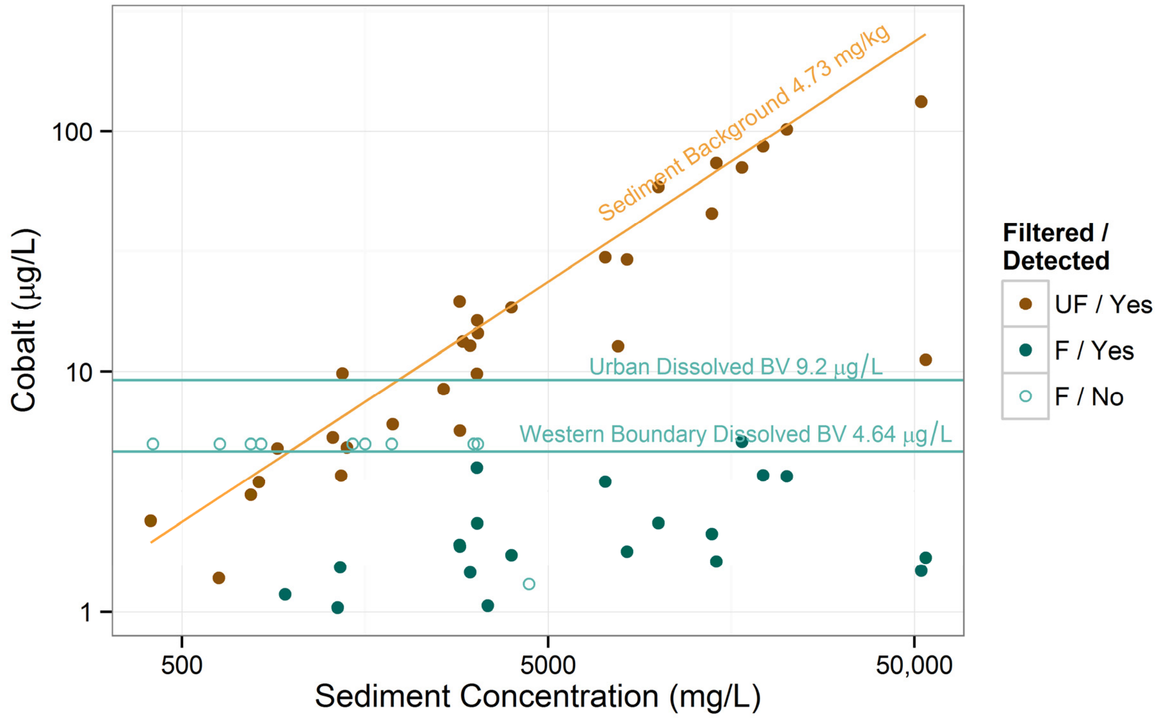


Figure 4.3-15 SSC vs. cobalt for each gaging station

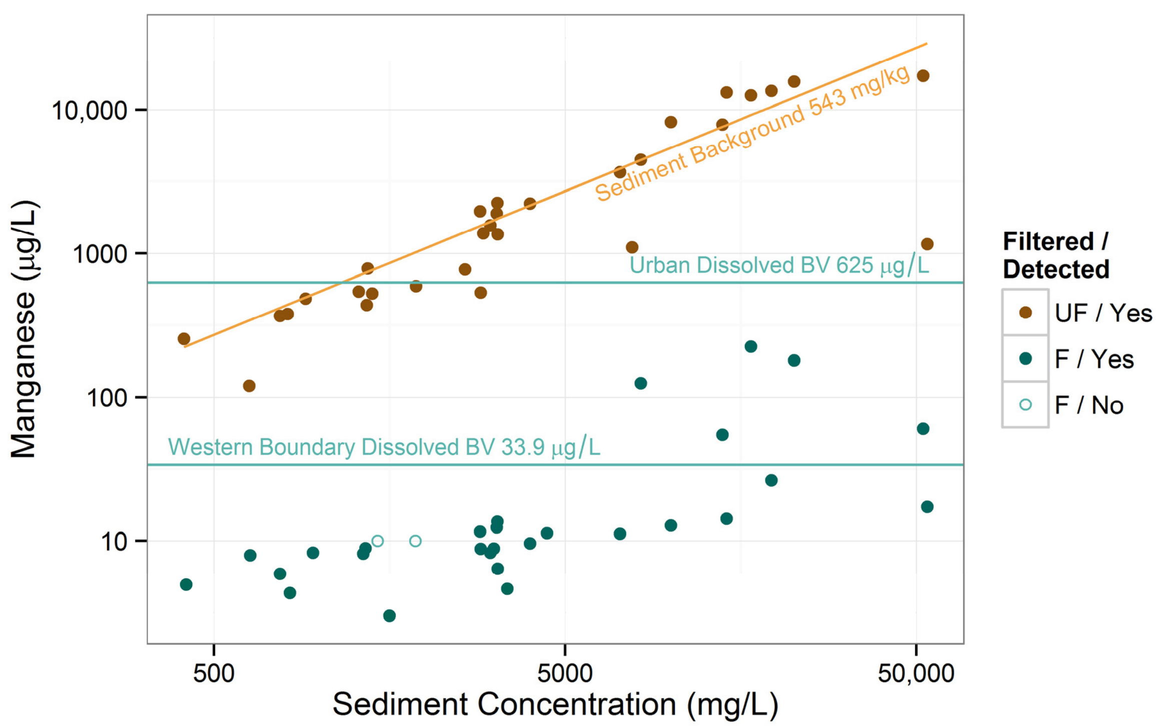


Figure 4.3-16 SSC vs. manganese for each gaging station

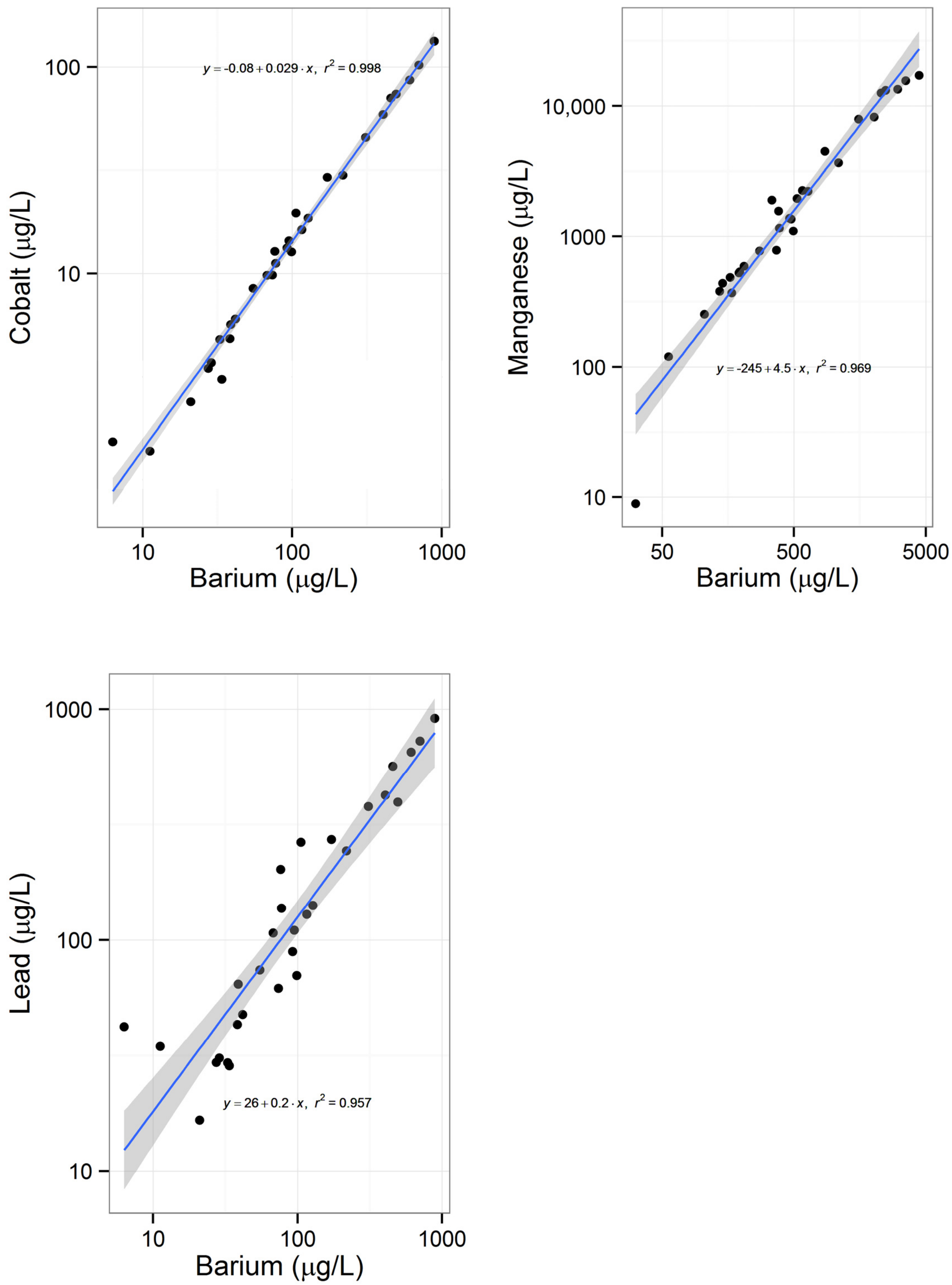


Figure 4.3-17 Correlation between barium and cobalt, manganese, and lead concentrations for each gaging station

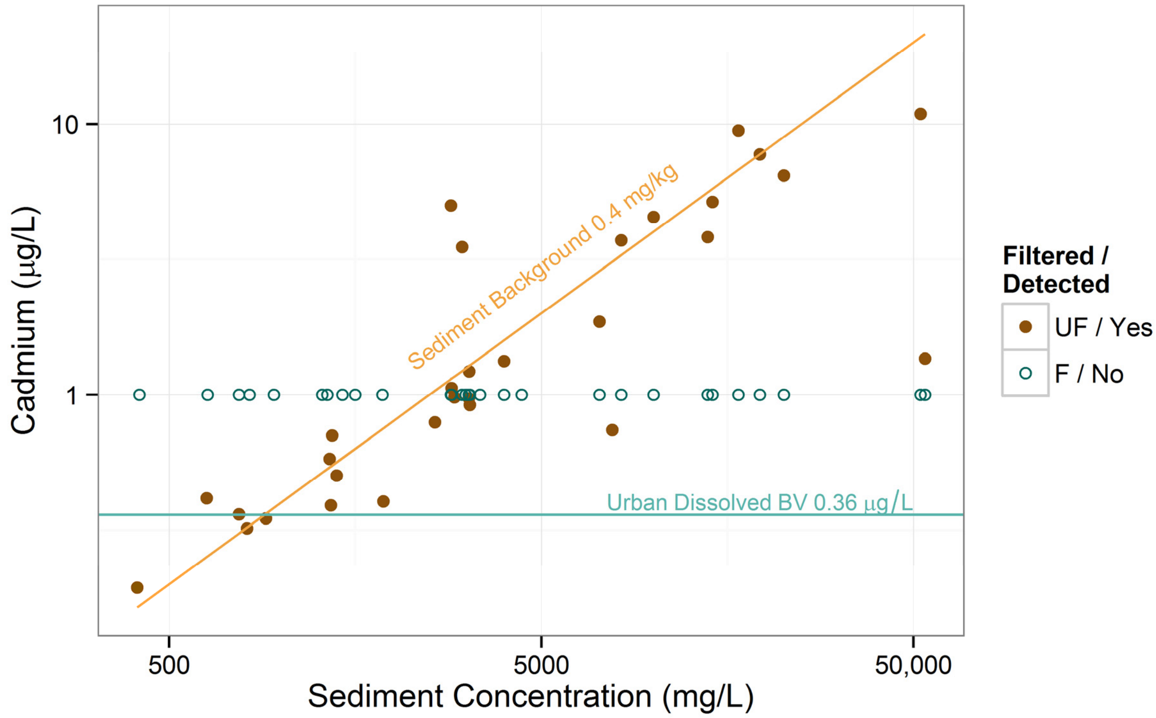


Figure 4.3-18 SSC vs. cadmium for each gaging station

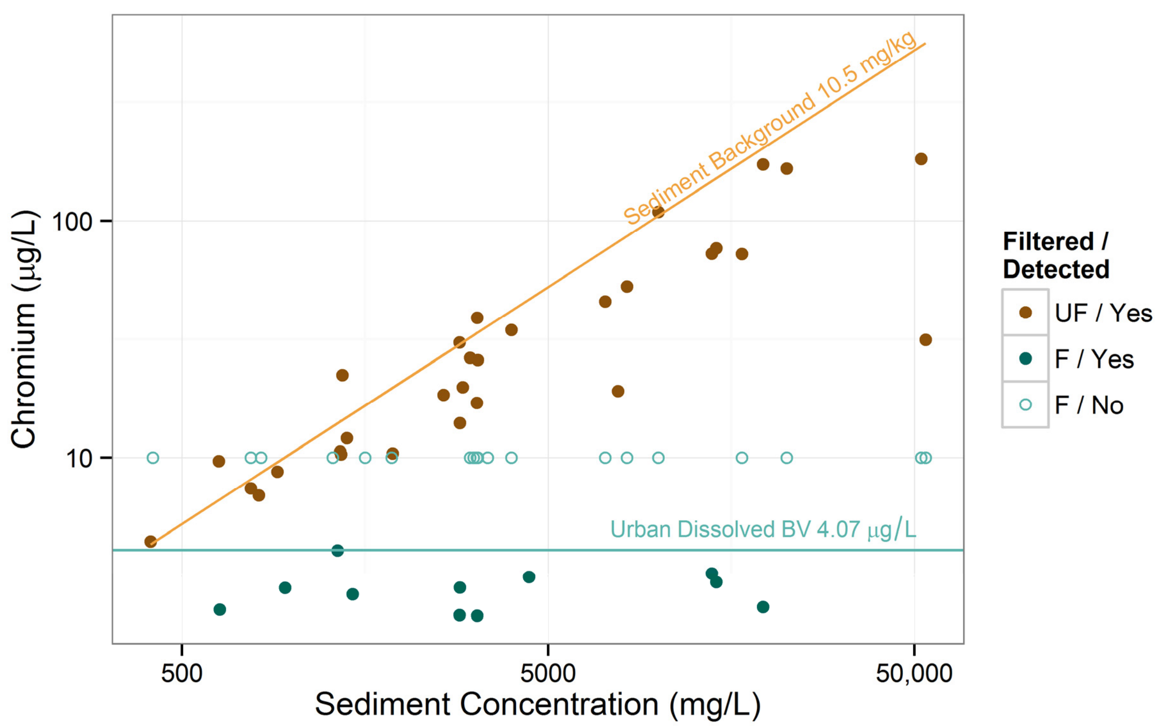


Figure 4.3-19 SSC vs. chromium for each gaging station

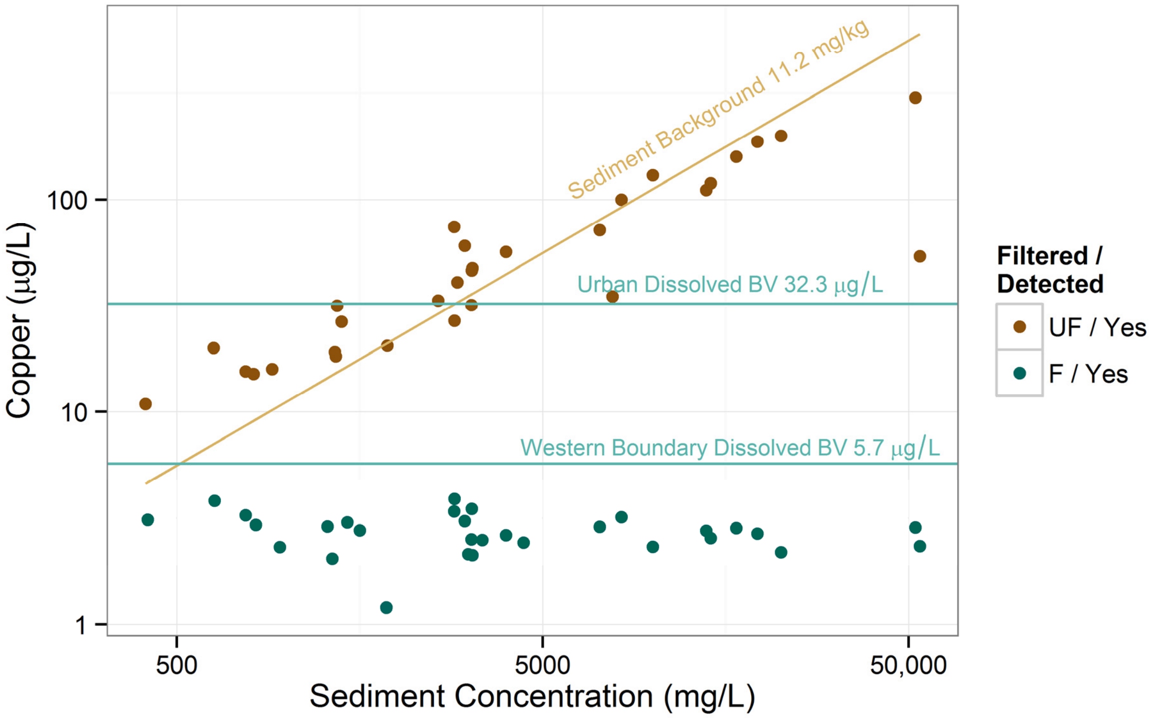


Figure 4.3-20 SSC vs. copper for each gaging station

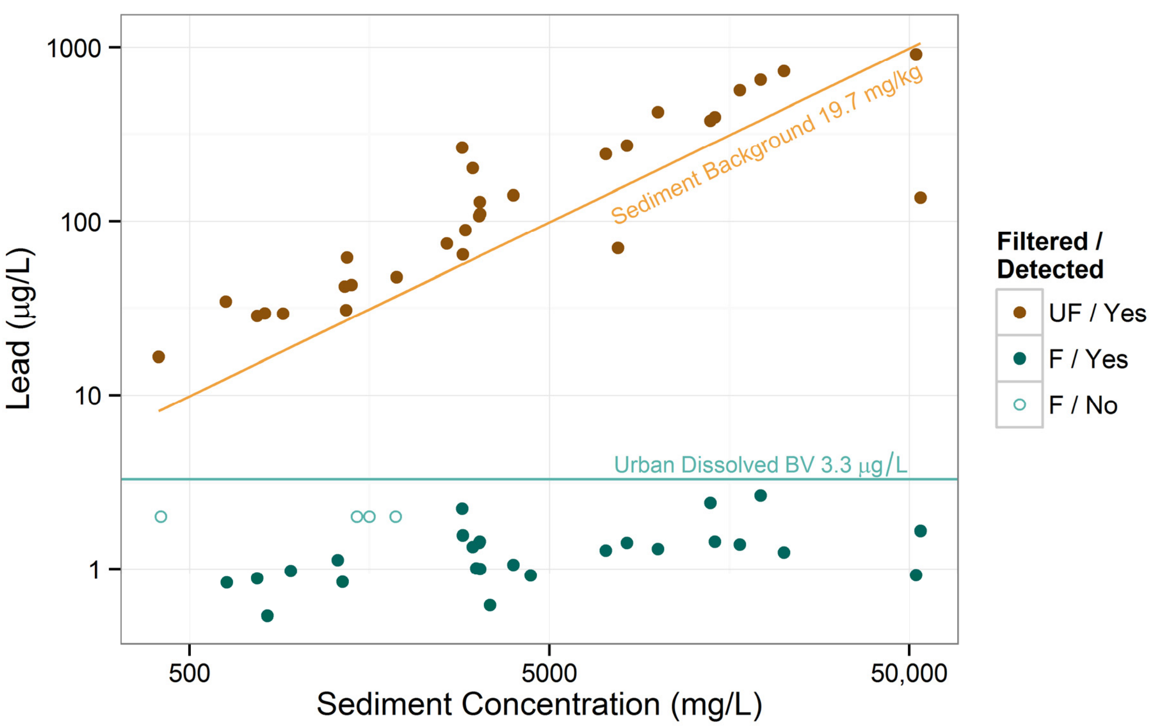


Figure 4.3-21 SSC vs. lead for each gaging station

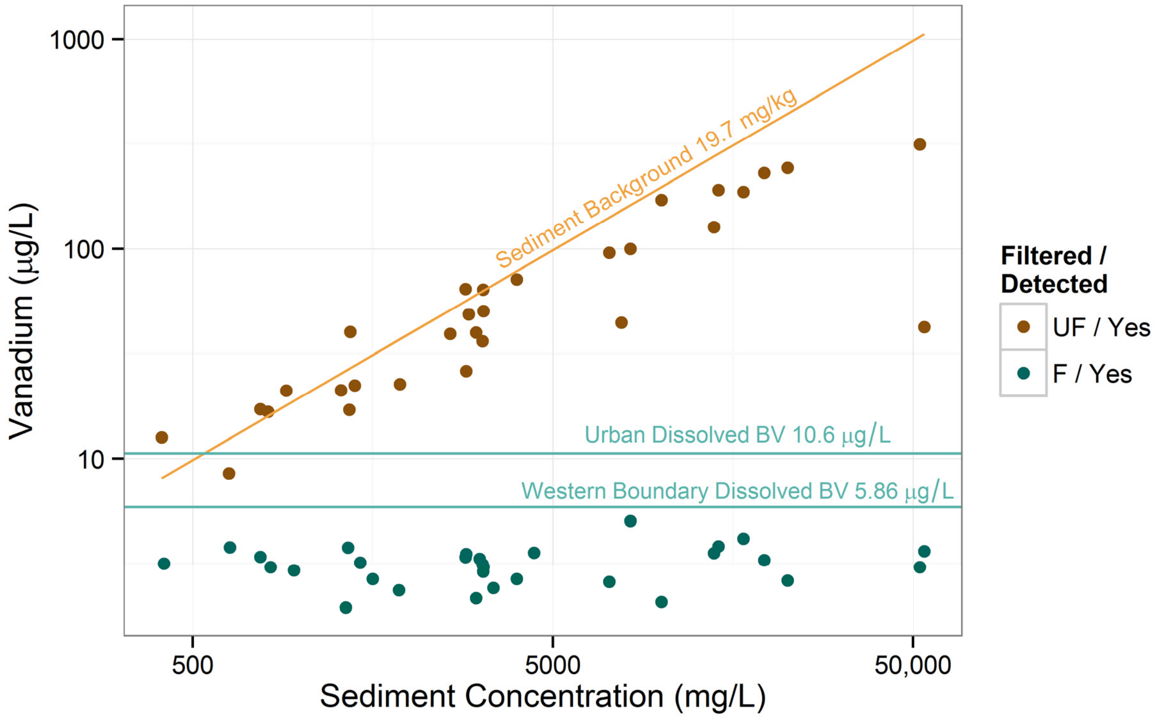


Figure 4.3-22 SSC vs. vanadium for each gaging station

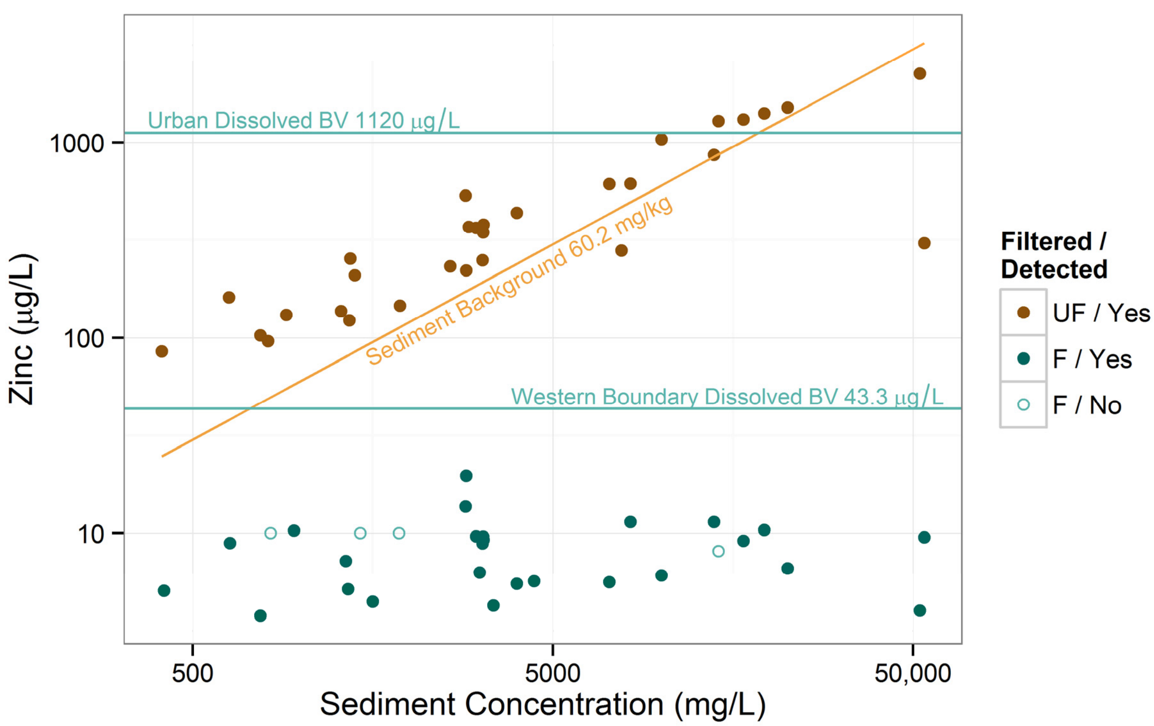


Figure 4.3-23 SSC vs. zinc for each gaging station

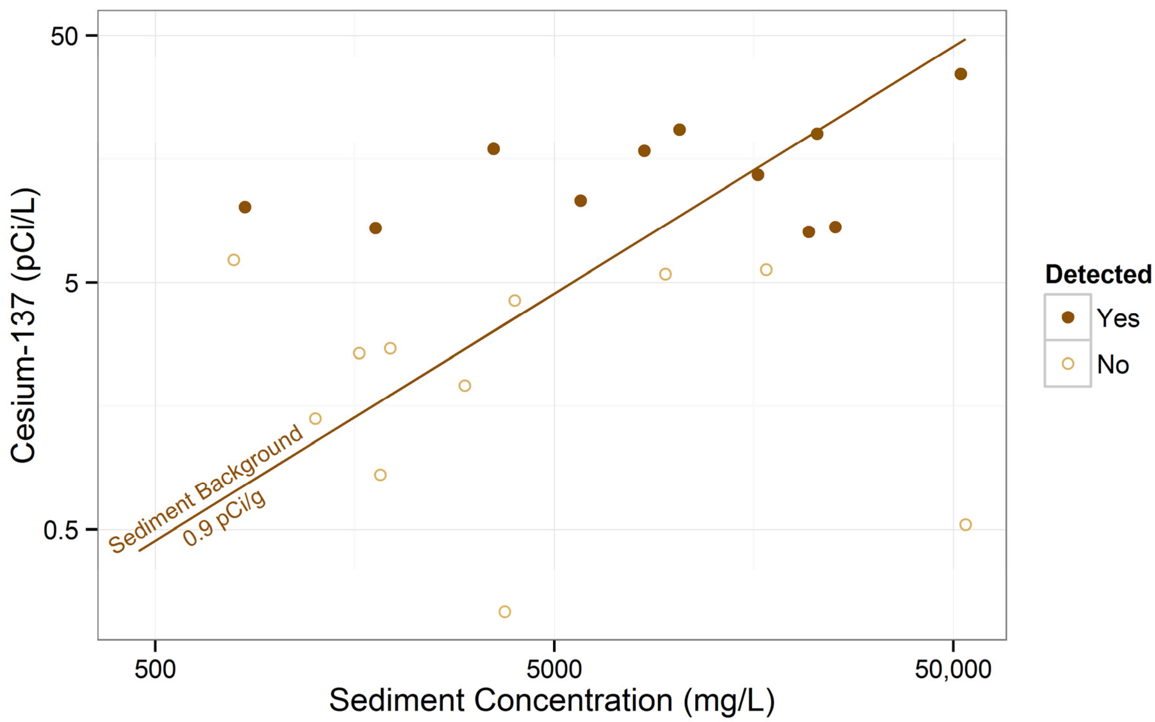


Figure 4.3-24 SSC vs. cesium-137 for each gaging station

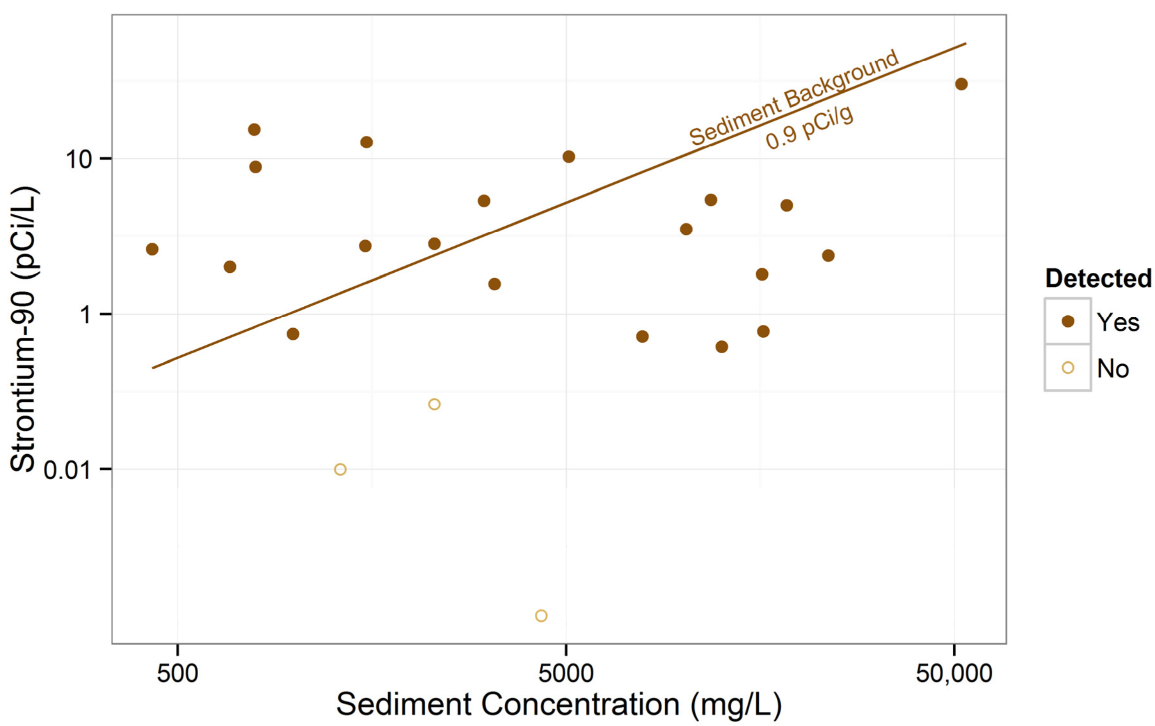


Figure 4.3-25 SSC vs. strontium-90 for each gaging station

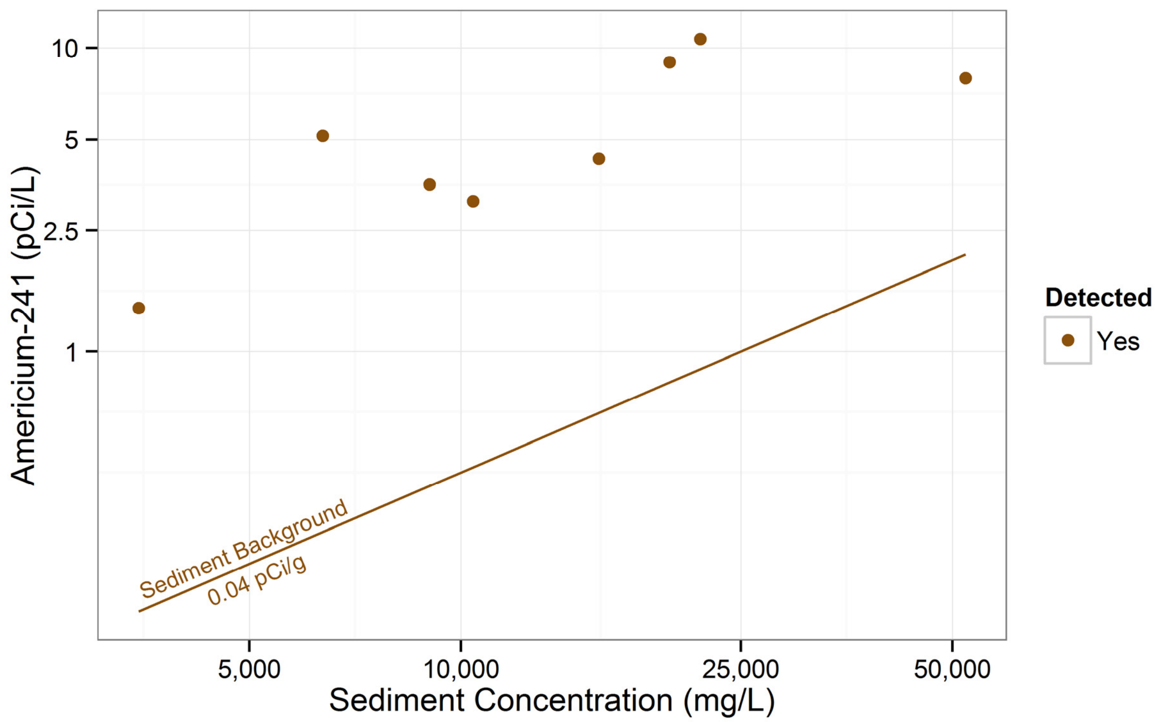


Figure 4.3-26 SSC vs. americium-241 for each gaging station

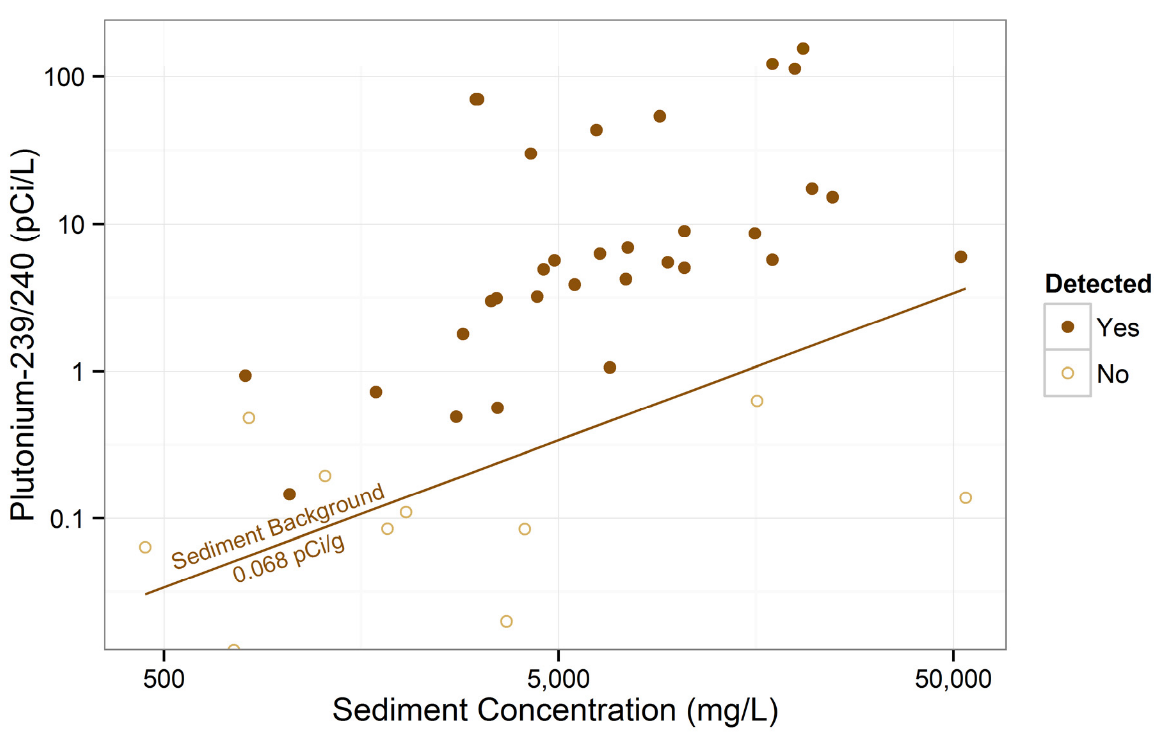


Figure 4.3-27 SSC vs. plutonium-239/240 for each gaging station

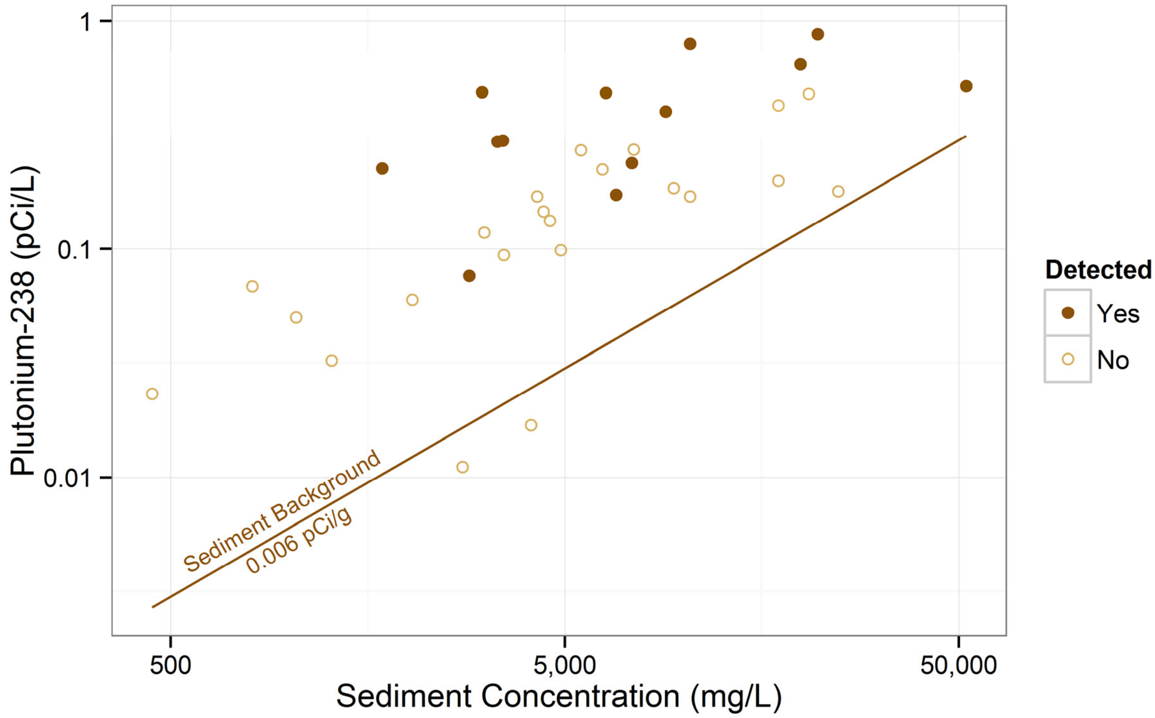


Figure 4.3-28 SSC vs. plutonium-238 for each gaging station

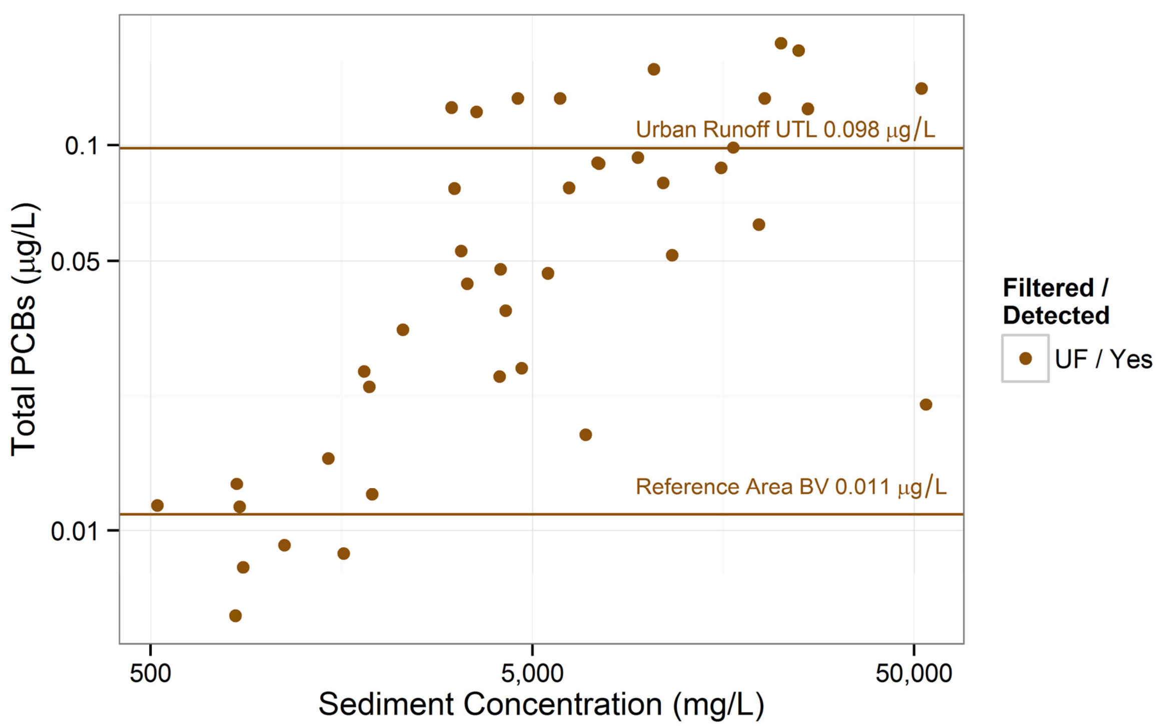


Figure 4.3-29 SSC vs. total PCBs for each gaging station

Table 2.1-1
Equipment Configuration at LA/P Gaging Stations

Gaging Station	Stage Measurement Sensor	Communication Method with Datalogger	Sampler Trip Level (Aboveground) (ft)	Sampler Intake Level (Aboveground) (in.)
E026	Probe	Radio telemetry	0.78	4
E030	Encoder	Radio telemetry	1.54	4
E038	Bubbler	Radio telemetry	2.0	4
E039.1	Encoder, bubbler	Radio telemetry	0.58	4
E040	Probe	Radio telemetry	2.73	4
E042.1	Encoder, bubbler	Radio telemetry	0.58	4
E050.1	Encoder, bubbler, probe	Radio telemetry	0.4	2.4
E055	Bubbler	Radio telemetry	1.5	4
E055.5	Bubbler	Radio telemetry	5.11	4
E056	Bubbler	Radio telemetry	2.18	4
E059.5	Bubbler	Radio telemetry	1.8	4
E060.1	Encoder, bubbler, probe	Radio telemetry	0.4	2.4

Table 2.3-1
Maximum Daily Discharge and Storm Water Sampling in the LA/P Watershed in 2014

Date	Los Alamos Canyon Discharge (cfs)[a]							Pueblo and Acid Canyon Discharge (cfs)[a]				
	DP Canyon			Los Alamos Canyon				Acid Canyon		Pueblo Canyon		
	E038	E039.1	E040	E026	E030	E042.1	E050.1	E055.5	E056	E055	E059.5	E060.1
7 July	0 NS[b]	<1 NS	0 NS	14 NS[c]	1.2 NS	0 NS	0 NS	0 NS	>10 S	0 NS	0 NS	0 NS
8 July	45 S[d]	14 S	0 NS	1.4 NS	3.2 NS	11 S	0 NS	4 NS	16 NS	3 NS	0 NS	0 NS
9 July	24 NS	19 NS	11 S	0 NS	0 NS	4 NS	0 NS	0 NS	<1 NS	0 NS	0 NS	0 NS
15 July	31 NS	15 S	14.5 S	0 NS	<1 NS	4.2 NS	0 NS	0 NS	1.2 NS	<1 NS	7 NS	0 NS
15–16 July	270 S	320 S	270 S	0 NS	2.9 NS	110 S	46 S	16 S	31 S	1 NS	<1 NS	0 NS
16 July	19 NS	12 S	11 NS	0 NS	1.1 NS	2 NS	0 NS	0 NS	<1 NS	0 NS	8 NS	0 NS
27 July	150 S	22 S	21 NS	<1 NS	0 NS	0 NS	0 NS	1 NS	5.4 NS	0 NS	2 NS	0 NS
29 July	93 S	66 S	95 S	17 NS	23 S	92 S	63 S	0 NS	24 S	9 NS	44 S	0 NS
31 July – 1 Aug	210 S	250 S	240 S	54 S	290 S	210 S	210 S	11 S	45 NS	70 S	97 S	54 S
4 Aug	36 NS	14 NS	12 NS	2.6 NS	<1 NS	3 NS	<1 NS	0 NS	<1 NS	0 NS	2 NS	0 NS
5 Sep	130 NS	14 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS
29 Sep	46 NS	<1 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	0 NS	3 NS	0 NS
9 Oct	34 NS	14 NS	7 NS	0 NS	0 NS	6 NS	0 NS	0 NS	2.8 NS	0 NS	5 NS	0 NS

[a] Maximum discharge values reported have an accuracy of ± 50 cfs.

[b] NS = Sample was not collected.

[c] Blue highlight in cell indicates no sample was collected on a day with recorded discharge above the triggering threshold at that gaging station.

[d] S = Sample was collected. Cell is highlighted in peach.

Table 2.3-2
Sampling Operational Issues during the Monitoring Year

Gaging Station	Date	Peak Discharge (cfs)	Reason	Comment
E026	7/7/2014	14	Equipment calibration	New stage measurement sensor installed and appropriate trigger level was not yet calibrated.
E026	7/29/2014	17	Equipment calibration	New stage measurement sensor installed and appropriate trigger level was not yet calibrated.
E038	9/5/2014	130	Operator error	Sampler collected storm water discharge on September 5, 2014. Monitoring plan required analysis of SSC. The project operator incorrectly recommended collected water be left on-site.
E038	9/29/2014	46	Operator error	Sampler filled with storm water collected September 29, 2014. Monitoring plan required analysis of SSC. The project operator incorrectly recommended collected water be left on-site.
E039.1	8/4/2014	14	Personnel availability	Sampler filled with storm water collected Thursday, July 31, 2014. Next inspection at gaging station was Tuesday, August 5, 2014. Sampler was not reset to collect discharge on Monday, August 4, 2014.
E039.1	9/5/2014	14	Operator error	Sampler filled with storm water collected September 5, 2014. Monitoring plan required analysis of SSC. The project operator incorrectly recommended collected water be left on-site.
E039.1	10/9/2014	14	Operator error	Sampler filled with storm water collected September 9, 2014. Monitoring plan required analysis of SSC. The project operator incorrectly recommended collected water be left on-site.
E040	7/27/2014	21	Operator error	Sampler filled with storm water collected July 27, 2014. Monitoring plan required chemical and radiochemical analysis. The project operator incorrectly recommended collected water be left on-site.
E040	8/4/2014	12	Personnel availability	Sampler filled with storm water collected Thursday, July 31, 2014. Next inspection at gaging station was Monday, August 4, 2014, at 16:15 MST. Sampler was not reset to collect discharge, which peaked at about 14:15 MST on Monday, August 4, 2014.
E056	7/8/2014	16	Personnel availability	Sampler filled with storm water collected Monday, July 7, 2014. Next inspection at gaging station was Thursday, July 10, 2014. Sampler was not reset to collect discharge from Tuesday, July 8, storm.
E056	7/31/2014	45	Personnel availability	Sampler filled with storm water collected Tuesday, July 29, 2014. Next inspection at gaging station was Tuesday, August 5, 2014. Sampler was not reset to collect discharge from Monday, July 31, storm.

Table 2.4-1
Locations and Analytical Suites for Storm Water Samples

Monitoring Group	Locations	Analytical Suites[a]
Upper Los Alamos Canyon gaging stations	E026, E030	PCBs (by EPA Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, dioxin/furans, strontium-90, TAL[b] metals, hardness, SSC, particle size
DP Canyon gaging stations	E038, E039.1, E040	PCBs (by EPA Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, strontium-90, TAL metals, hardness, SSC, particle size
Upper Pueblo Canyon and Acid Canyon gaging stations	E055, E055.5, E056	PCBs (by EPA Method 1668A), isotopic plutonium, TAL metals, hardness, SSC, particle size
Lower Los Alamos Canyon gaging stations	E042.1, E050.1	PCBs (by EPA Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, americium-241 (by alpha spectroscopy), dioxins/furans, strontium-90, TAL metals, hardness, SSC, particle size
Lower Pueblo Canyon gaging stations	E059.5, E060.1	PCBs (by EPA Method 1668A), gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, americium-241 (by alpha spectroscopy), strontium-90, TAL metals, hardness, SSC, particle size
Detention basins and vegetative buffer below the SWMU 01-001(f) drainage	CO101038, CO111041	PCBs (by EPA Method 1668A), TAL metals, hardness, isotopic uranium, total organic carbon, SSC, particle size
BDD-Required Monitoring	E050.1, E060.1	PCBs (by EPA Method 1668A), dioxins/furans, gamma spectroscopy radionuclides, isotopic plutonium, isotopic uranium, americium-241 (by alpha spectroscopy), strontium-90, gross alpha, gross beta, radium-226/radium-228, TAL metals, hardness, SSC, particle size

[a] Suites are listed in order of priority to guide analysis of limited water volume. SSC is independent of prioritization because it is derived from separate sample bottles.

[b] TAL = Hardness is calculated from calcium and magnesium, components of the TAL list.

Table 2.4-2
Analytical Requirements for Storm Water Samples

Analytical Suite	Method	Detection Limit[a]	Upper Los Alamos Canyon	DP Canyon	Upper Pueblo Canyon and Acid Canyon	Fire-Affected Lower Watershed	Lower Pueblo Canyon	BDD-Required Monitoring	Detention Basins below the SWMU 01-001(f) Drainage
PCBs	EPA:1668A	25 pg/L	√[b]	√	√	√	√	—[c]	√
Isotopic plutonium	HASL-300	0.5 pCi/L	√	√	√	√	√	—	—
Gamma spectroscopy	EPA:901.1	10 pCi/L (cesium-137)	√	√	—	√	√	—	—
Isotopic uranium	HASL-300	0.5 pCi/L	√	√	—	√	√	—	√
Americium-241	HASL-300	0.5 pCi/L	√	—	—	√	√	—	—
Strontium-90	EPA:905.0	0.5 pCi/L	√	√	—	√	√	—	—
TAL[d] metals	EPA:200.7/200.8/245.2	Variable	√	√	√	√	√	—	√
Dioxins and furans	EPA:1613B	50 pg/L	√	—	—	√	—	—	—
Gross alpha	EPA:900	10 pCi/L	—	—	—	—	—	√	—
Gross beta	EPA:900	10 pCi/L	—	—	—	—	—	√	—
Radium-226/radium-228	EPA:903.1/EPA:904	0.5/0.5 pCi/L	—	—	—	—	—	√	—
SSC	EPA:160.2	10 mg/L	√	√	√	√	√	—	√
Total organic carbon	SW-846:9060	0.5 mg/L	—	—	—	—	—	—	√
Particle size	ASTM:C1070	0.01%	√	√	√	√	√	—	—

[a] MDL or minimum detectable activity concentration for radionuclides.

[b] √ = Monitoring planned.

[c] — = Monitoring not planned.

[d] Hardness is calculated from filtered calcium and magnesium, components of the TAL list.

Table 2.4-3
Factors Contributing to Analytical Suite Prioritization

Gaging Station	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
Upper Los Alamos and DP Canyon Gaging Station					
E026, E030, E038, E039.1, E040	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U,	Yes	Yes	1
	3	Strontium-90	Yes	Yes	1
	4	Dioxins and furans	Yes	No	1
	5	TAL Metals+B+U (F/UF*)	No	Yes	0.25/0.25
Upper Pueblo Canyon and Acid Canyon Gaging Station					
E055, E055.5, E056	1	PCBs	Yes	No	1
	2	Iso Pu	Yes	Yes	1
	3	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	4	Dioxins and furans	Yes	No	1
	5	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
Lower Los Alamos Canyon Gaging Station					
E042.1	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Dioxins and furans	Yes	No	1
	4	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	5	Strontium-90	Yes	Yes	1
E050.1	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Strontium-90, Gross alpha/beta (UF)	Yes	Yes	1
	4	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	5	Dioxins and furans	Yes	No	1
	6	Radium-226 and Radium-228 (UF)	Yes	Yes	2

Table 2.4-3 (continued)

Gaging Station	Priority	Analytical Suite	Glass Bottle	Polyethylene Bottle	Minimum Volume Required (L)
Lower Los Alamos Canyon Gaging Station					
E042.1	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Dioxins and furans	Yes	No	1
	4	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	5	Strontium-90	Yes	Yes	1
E050.1	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Strontium-90, Gross alpha/beta (UF)	Yes	Yes	1
	4	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	5	Dioxins and furans	Yes	No	1
	6	Radium-226 and Radium-228 (UF)	Yes	Yes	2
Lower Pueblo Canyon Gaging Station					
E059.5	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	4	Strontium-90	Yes	Yes	1
E060.1	1	PCBs	Yes	No	1
	2	Gamma spectroscopy, Iso Pu, Iso U, Am-241	Yes	Yes	1
	3	Strontium-90, Gross alpha/beta (UF)	Yes	Yes	1
	4	TAL Metals+B+U (F/UF)	No	Yes	0.25/0.25
	5	Dioxins and furans	Yes	No	1
	6	Radium-226 and Radium-228 (UF)	Yes	Yes	2
Detention Basin and Vegetated Buffer below the SWMU 01-001(f) Drainage					
CO111041, CO101038	1	PCBs	Yes	No	1
	2	TAL Metals (F/UF)	No	Yes	0.25/0.25
	3	Iso U	Yes	Yes	1
	4	Total organic carbon	Yes	Yes	0.04

* F/UF = Analyses of both filtered (F) and unfiltered (UF) splits.

Table 2.4-4
Planned and Actual Analyses

CO111038 Sampler at the culvert at the terminus of the vegetative buffer below the lower basin, sampled 7/15/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	22:23	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF[a])	22:34	Trigger+11	PCBs (UF)
3	Trigger+2	PCBs (UF)			
4	Trigger+3	TAL metals (F[b]/UF)	22:36	Trigger+13	TAL metals (F/UF)[c]
5	Trigger+4	Isotopic uranium (UF)	22:37	Trigger+14	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	22:38	Trigger+15	TOC[d] (UF)
7	Trigger+6	Extra bottle	22:39	Trigger+16	DOC[e] (F)
8	Trigger+7	Extra bottle	22:40	Trigger+17	Anions
9	Trigger+8	Extra bottle	22:41	Trigger+18	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			
CO111038 Sampler at the culvert at the terminus of the vegetative buffer below the lower basin, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	17:05	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF)	17:06	Trigger+1	PCBs (UF)
3	Trigger+2	PCBs (UF)			
4	Trigger+3	TAL metals (F/UF)	17:08	Trigger+3	TAL metals (F/UF)
5	Trigger+4	Isotopic uranium (UF)	17:09	Trigger+4	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	17:10	Trigger+5	TOC (UF)
7	Trigger+6	Extra bottle	17:11	Trigger+6	DOC (F)
8	Trigger+7	Extra bottle	17:12	Trigger+7	Anions
9	Trigger+8	Extra bottle	17:13	Trigger+8	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

Table 2.4-4 (continued)

CO111038 Sampler at the culvert at the terminus of the vegetative buffer below the lower basin, sampled 8/4/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	12:25	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF)	12:26	Trigger+1	PCBs (UF)
3	Trigger+2	PCBs (UF)			
4	Trigger+3	TAL metals (F/UF)	12:28	Trigger+3	TAL metals (F/UF)
5	Trigger+4	Isotopic uranium (UF)	12:29	Trigger+4	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	12:30	Trigger+5	TOC (UF)
7	Trigger+6	Extra bottle	12:31	Trigger+6	DOC (F)
8	Trigger+7	Extra bottle	12:32	Trigger+7	Anions
9	Trigger+8	Extra bottle	12:33	Trigger+8	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

CO111041 Sampler at inlet to upper detention pond below LA-2, sampled 7/7/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	7/7/14 15:12	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF)	7/7/14 15:42	Trigger+30	PCBs (UF)
3	Trigger+2	PCBs (UF)	7/8/14 17:08		
4	Trigger+3	TAL metals (F/UF)	Samples Collected on 7/8/2014		
5	Trigger+4	Isotopic uranium (UF)			
6	Trigger+5	TOC (UF)			
7	Trigger+6	Extra bottle			
8	Trigger+7	Extra bottle			
9	Trigger+8	Extra bottle			
10	Trigger+9	Extra bottle	Remaining samples bottles not filled.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

Table 2.4-4 (continued)

CO111041 Sampler at inlet to upper detention pond below LA-2, sampled 7/8/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	7/7/14 15:12	Samples collected on 7/7/2014	
2	Trigger+1	PCBs (UF)	7/7/14 15:42		
3	Trigger+2	PCBs (UF)	7/8/14 17:08		
4	Trigger+3	TAL metals (F/UF)	7/8/14 17:09	Trigger	TAL metals (F/UF)
5	Trigger+4	Isotopic uranium (UF)	7/8/14 17:10	Trigger+1	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	7/8/14 17:11	Trigger+2	TOC (UF)
7	Trigger+6	Extra bottle	7/8/14 17:12	Trigger+3	DOC(F)
8	Trigger+7	Extra bottle	7/8/14 17:13	Trigger+4	Anions
9	Trigger+8	Extra bottle	7/8/14 17:14	Trigger+5	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			
CO111041 Sampler at inlet to upper detention pond below LA-2, sampled 7/15/2014					
	Planned		**Actual**		
Sample Bottle (1 L)	**12-Bottle ISCO Start Time (min)**	**Analytical Suite**	**Sample Collection Time**	**12-Bottle ISCO Start Time (min)**	**Analyses Requested**
1	Trigger	SSC, Particle Size	1:11	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF)	1:12	Trigger+1	PCBs (UF)
3	Trigger+2	PCBs (UF)			
4	Trigger+3	TAL metals (F/UF)	2:02	Trigger+51	TAL metals (F/UF)
5	Trigger+4	Isotopic uranium (UF)	2:03	Trigger+52	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	2:04	Trigger+53	TOC (UF)
7	Trigger+6	Extra bottle	2:05	Trigger+54	DOC(F)
8	Trigger+7	Extra bottle	2:06	Trigger+55	Anions
9	Trigger+8	Extra bottle	2:07	Trigger+56	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

Table 2.4-4 (continued)

CO111041 Sampler at inlet to upper detention pond below LA-2, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	17:12	Trigger	SSC, Particle Size
2	Trigger+1	PCBs (UF)	17:13	Trigger+1	PCBs (UF)
3	Trigger+2	PCBs (UF)			
4	Trigger+3	TAL metals (F/UF)	17:15	Trigger+3	TAL metals (F/UF)
5	Trigger+4	Isotopic uranium (UF)	17:16	Trigger+4	Isotopic uranium (UF)
6	Trigger+5	TOC (UF)	17:17	Trigger+5	TOC (UF)
7	Trigger+6	Extra bottle	17:18	Trigger+6	DOC (F)
8	Trigger+7	Extra bottle	17:19	Trigger+7	Anions
9	Trigger+8	Extra bottle	17:20	Trigger+8	Alkalinity, pH (UF)
10	Trigger+9	Extra bottle	Remaining samples not retrieved for analysis.		
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

CO111041 Sampler at inlet to upper detention pond below LA-2, sampled 8/4/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suite	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC, Particle Size	12:33	Trigger	TAL metals (F/UF)
2	Trigger+1	PCBs (UF)	12:34	Trigger+1	PCBs (UF)
3	Trigger+2	PCBs (UF)	Samples not collected.		
4	Trigger+3	TAL metals (F/UF)			
5	Trigger+4	Isotopic uranium (UF)			
6	Trigger+5	TOC (UF)			
7	Trigger+6	Extra bottle			
8	Trigger+7	Extra bottle			
9	Trigger+8	Extra bottle			
10	Trigger+9	Extra bottle			
11	Trigger+10	Extra bottle			
12	Trigger+11	Extra bottle			

Table 2.4-4 (continued)

E026, Sampler at Los Alamos below Ice Rink, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	17:35	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	17:38	Max+13	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy(UF)	17:41	Max+16	Gamma spectroscopy(UF)
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	17:42	Max+17	Isotopic plutonium; isotopic uranium (UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	17:45	Max+20	Strontium-90 (UF)
8	Max+17	Dioxins and furans (UF)	17:47	Max+22	Dioxins and furans (UF)
9	Max+18	Dioxins and furans (UF)			
10	Max+19	TAL metals (F/UF)	17:50	Max+25	TAL metals (F/UF)
11	Max+20	SSC	17:51	Max+26	SSC
12	Max+21	Extra bottle	Remaining sample not retrieved for analysis		

E030, Los Alamos above DP, sampled 7/29/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	12:24	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	12:25	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy(UF)	12:28	Max+14	Gamma spectroscopy(UF)
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	12:30	Max+16	Isotopic plutonium; isotopic uranium (UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	12:33	Max+19	Strontium-90 (UF)
8	Max+17	Dioxins and furans (UF)	12:34	Max+20	Dioxins and furans (UF)
9	Max+18	Dioxins and furans (UF)			
10	Max+19	TAL metals (F/UF)	12:37	Max+23	TAL metals (F/UF)
11	Max+20	SSC	12:39	Max+25	SSC
12	Max+21	Extra bottle	Remaining sample not retrieved for analysis.		

Table 2.4-4 (continued)

E030, Los Alamos above DP, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, particle size	18:24	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	18:25	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy(UF)	18:28	Max+14	Gamma spectroscopy(UF)
5	Max+14	Isotopic plutonium; isotopic uranium (UF)	18:30	Max+16	Isotopic plutonium; isotopic uranium (UF)
6	Max+15	Isotopic plutonium; isotopic uranium (UF)			
7	Max+16	Strontium-90 (UF)	18:33	Max+19	Strontium-90 (UF)
8	Max+17	Dioxins and furans (UF)	18:34	Max+20	Dioxins and furans (UF)
9	Max+18	Dioxins and furans (UF)			
10	Max+19	TAL metals (F/UF)	18:37	Max+23	TAL metals (F/UF)
11	Max+20	SSC	18:39	Max+25	SSC
12	Max+21	Extra bottle	Remaining sample not retrieved for analysis.		

E040, DP above Los Alamos, sampled 7/9/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	5:09	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	5:10	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy (UF)	5:12	Max+13	Gamma spectroscopy (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	5:13	Max+14	Isotopic uranium; isotopic plutonium (UF)
6	Max+15	Isotopic uranium; isotopic plutonium (UF)			
7	Max+16	Strontium-90 (UF)	5:16	Max+17	Strontium-90 (UF)
8	Max+17	TAL metals (F/UF)	5:17	Max+19	Alkalinity, pH (UF)
9	Max+18	SSC	5:18	Max+20	DOC (F), Anions
10	Max+19	Extra bottle	5:19	Max+21	TAL metals (UF)
11	Max+20	Extra bottle	5:20	Max+22	TAL metals (F)
12	Max+21	Extra bottle	5:21	Max+23	SSC

Table 2.4-4 (continued)

E040, DP above Los Alamos, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	2:49	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	2:50	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy (UF)	2:52	Max+13	TAL metals (F)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	2:54	Max+15	TAL metals (UF)
6	Max+15	Isotopic uranium; isotopic plutonium (UF)	2:55	Max+16	Isotopic uranium; isotopic plutonium (UF)
7	Max+16	Strontium-90 (UF)			
8	Max+17	TAL metals (F/UF)	2:57	Max+18	Strontium-90 (UF)
9	Max+18	SSC	2:58	Max+19	Gamma spectroscopy (UF)
10	Max+19	Extra bottle	2:59	Max+20	SSC
11	Max+20	Extra bottle	3:00	Max+21	SSC
12	Max+21	Extra bottle	3:10	Max+31	SSC

E040, DP above Los Alamos, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	22:49	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	22:50	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy (UF)	22:52	Max+13	Gamma spectroscopy (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Isotopic uranium; isotopic plutonium (UF)	22:54	Max+15	Isotopic uranium; isotopic plutonium (UF)
7	Max+16	Strontium-90 (UF)			
8	Max+17	TAL metals (F/UF)	22:56	Max+17	Strontium-90 (UF)
9	Max+18	SSC			
10	Max+19	Extra bottle	22:58	Max+19	TAL metals (F)
11	Max+20	Extra bottle	22:59	Max+20	TAL metals (UF)
12	Max+21	Extra bottle	23:00	Max+21	SSC

Table 2.4-4 (continued)

E040, DP above Los Alamos, sampled 7/16/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	16:09	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)	16:10	Max+11	PCBs (UF)
3	Max+12	PCBs (UF)			
4	Max+13	Gamma spectroscopy (UF)	16:12	Max+13	Gamma spectroscopy (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	16:13	Max+14	Isotopic uranium; isotopic plutonium (UF)
6	Max+15	Isotopic uranium; isotopic plutonium (UF)			
7	Max+16	Strontium-90 (UF)	16:15	Max+16	Strontium-90 (UF)
8	Max+17	TAL metals (F/UF)	16:16	Max+17	SSC
9	Max+18	SSC	16:17	Max+18	SSC
10	Max+19	Extra bottle	16:18	Max+19	TAL metals (F)
11	Max+20	Extra bottle	16:19	Max+20	TAL metals (UF)
12	Max+21	Extra bottle	Remaining samples not retrieved for analysis.		

E040, DP above Los Alamos, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	12:09	Max+10	SSC
2	Max+11	PCBs (UF)	12:10	Max+11	SSC
3	Max+12	PCBs (UF)	12:11	Max+12	SSC
4	Max+13	Gamma spectroscopy (UF)	12:12	Max+13	SSC
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	12:13	Max+14	SSC
6	Max+15	Isotopic uranium; isotopic plutonium (UF)	12:14	Max+15	SSC
7	Max+16	Strontium-90 (UF)	12:15	Max+16	SSC
8	Max+17	TAL metals (F/UF)	12:16	Max+17	SSC
9	Max+18	SSC	12:17	Max+18	SSC
10	Max+19	Extra bottle	12:18	Max+19	SSC
11	Max+20	Extra bottle	12:19	Max+20	SSC
12	Max+21	Extra bottle	Remaining samples not retrieved for analysis.		

Table 2.4-4 (continued)

E040, DP above Los Alamos, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	18:09	Max+10	SSC
2	Max+11	PCBs (UF)	18:10	Max+11	SSC
3	Max+12	PCBs (UF)	18:11	Max+12	SSC
4	Max+13	Gamma spectroscopy (UF)	18:12	Max+13	SSC
5	Max+14	Isotopic uranium; isotopic plutonium (UF)	18:13	Max+14	SSC
6	Max+15	Isotopic uranium; isotopic plutonium (UF)	18:14	Max+15	SSC
7	Max+16	Strontium-90 (UF)	18:15	Max+16	SSC
8	Max+17	TAL metals (F/UF)	18:16	Max+17	SSC
9	Max+18	SSC	18:17	Max+18	SSC
10	Max+19	Extra bottle	18:18	Max+19	SSC
11	Max+20	Extra bottle	18:19	Max+20	SSC
12	Max+21	Extra bottle	Remaining samples not retrieved for analysis.		

E055, Pueblo above Acid, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	17:50	Max+10	SSC, Particle Size
2	Max+11	PCB (UF)	17:51	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	17:53	Max+13	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	17:54	Max+14	TAL metals (F/UF)
6	Max+15	SSC	17:56	Max+16	SSC
7	Max+16	Extra bottle	17:57	Max+17	DOC (F)
8	Max+17	Extra bottle	17:58	Max+18	Anions
9	Max+18	Extra bottle	17:59	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

<table>
<tr><th colspan="6">E055.5, South Fork of Acid Canyon, sampled 7/15/2014</th></tr>
<tr><th rowspan="2">Sample Bottle (1 L)</th><th colspan="2">Planned</th><th colspan="3">Actual</th></tr>
<tr><th>12-Bottle ISCO Start Time (min)</th><th>Analytical Suites</th><th>Sample Collection Time</th><th>12-Bottle ISCO Start Time (min)</th><th>Analyses Requested</th></tr>
<tr><td>1</td><td>Max+10</td><td>SSC, Particle Size</td><td>22:19</td><td>Max+10</td><td>SSC, Particle Size</td></tr>
<tr><td>2</td><td>Max+11</td><td>PCB (UF)</td><td rowspan="2">22:22</td><td rowspan="2">Max+13</td><td rowspan="2">PCB (UF)</td></tr>
<tr><td>3</td><td>Max+12</td><td>PCB (UF)</td></tr>
<tr><td>4</td><td>Max+13</td><td>Isotopic plutonium (UF)</td><td colspan="3" rowspan="9">Sample missed, no liquid detected.</td></tr>
<tr><td>5</td><td>Max+14</td><td>TAL metals (F/UF)</td></tr>
<tr><td>6</td><td>Max+15</td><td>SSC</td></tr>
<tr><td>7</td><td>Max+16</td><td>Extra bottle</td></tr>
<tr><td>8</td><td>Max+17</td><td>Extra bottle</td></tr>
<tr><td>9</td><td>Max+18</td><td>Extra bottle</td></tr>
<tr><td>10</td><td>Max+19</td><td>Extra bottle</td></tr>
<tr><td>11</td><td>Max+20</td><td>Extra bottle</td></tr>
<tr><td>12</td><td>Max+21</td><td>Extra bottle</td></tr>
<tr><th colspan="6">E055.5, South Fork of Acid Canyon, sampled 7/31/2014</th></tr>
<tr><th rowspan="2">Sample Bottle (1 L)</th><th colspan="2">Planned</th><th colspan="3">Actual</th></tr>
<tr><th>12-Bottle ISCO Start Time (min)</th><th>Analytical Suites</th><th>Sample Collection Time</th><th>12-Bottle ISCO Start Time (min)</th><th>Analyses Requested</th></tr>
<tr><td>1</td><td>Max+10</td><td>SSC, Particle Size</td><td>17:24</td><td>Max+10</td><td>TAL metals (F/UF)</td></tr>
<tr><td>2</td><td>Max+11</td><td>PCB (UF)</td><td rowspan="2">17:28</td><td rowspan="2">Max+14</td><td rowspan="2">PCB (UF)</td></tr>
<tr><td>3</td><td>Max+12</td><td>PCB (UF)</td></tr>
<tr><td>4</td><td>Max+13</td><td>Isotopic plutonium (UF)</td><td>17:33</td><td>Max+19</td><td>Isotopic plutonium (UF)</td></tr>
<tr><td>5</td><td>Max+14</td><td>TAL metals (F/UF)</td><td colspan="3" rowspan="8">Sample missed, no liquid detected.</td></tr>
<tr><td>6</td><td>Max+15</td><td>SSC</td></tr>
<tr><td>7</td><td>Max+16</td><td>Extra bottle</td></tr>
<tr><td>8</td><td>Max+17</td><td>Extra bottle</td></tr>
<tr><td>9</td><td>Max+18</td><td>Extra bottle</td></tr>
<tr><td>10</td><td>Max+19</td><td>Extra bottle</td></tr>
<tr><td>11</td><td>Max+20</td><td>Extra bottle</td></tr>
<tr><td>12</td><td>Max+21</td><td>Extra bottle</td></tr>
</table>

Table 2.4-4 (continued)

E056, Acid above Pueblo, sampled 7/7/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	16:00	Max+10	SSC, Particle Size
2	Max+11	PCB (UF)	16:01	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	16:03	Max+13	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	16:05	Max+15	TAL metals (F/UF)
6	Max+15	SSC	16:06	Max+16	SSC
7	Max+16	Extra bottle	16:07	Max+17	DOC (F)
8	Max+17	Extra bottle	16:08	Max+18	Anions
9	Max+18	Extra bottle	16:09	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

E056, Acid above Pueblo, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	22:30	Max+10	SSC, Particle Size
2	Max+11	PCB (UF)	22:31	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	22:34	Max+14	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	22:35	Max+15	TAL metals (F/UF)
6	Max+15	SSC	22:36	Max+16	SSC
7	Max+16	Extra bottle	22:37	Max+17	DOC (F)
8	Max+17	Extra bottle	22:38	Max+18	Anions
9	Max+18	Extra bottle	22:40	Max+20	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E056, Acid above Pueblo, sampled 7/29/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	SSC, Particle Size	11:40	Max+10	SSC, Particle Size
2	Max+11	PCB (UF)	11:41	Max+11	PCB (UF)
3	Max+12	PCB (UF)			
4	Max+13	Isotopic plutonium (UF)	11:42	Max+12	Isotopic plutonium (UF)
5	Max+14	TAL metals (F/UF)	11:44	Max+14	TAL metals (F/UF)
6	Max+15	SSC	11:46	Max+16	SSC
7	Max+16	Extra bottle	11:47	Max+17	DOC (F)
8	Max+17	Extra bottle	11:48	Max+18	Anions
9	Max+18	Extra bottle	11:49	Max+19	Alkalinity, pH (UF)
10	Max+19	Extra bottle	Remaining samples not retrieved for analysis.		
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

E038, DP above TA-21, sampled 7/8/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	14:35	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	14:38	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	14:39	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	14:41	Max+16	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	14:42	Max+17	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	14:44	Max+19	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	22:20	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	22:23	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	22:24	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	22:26	Max+16	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	22:27	Max+17	TAL Metals (F/UF)
8	Max+17	Extra bottle	22:28	Max+18	Alkalinity, pH (UF)
9	Max+18	Extra bottle	22:30	Max+20	DOC (F)
10	Max+19	Extra bottle	22:31	Max+21	Anions
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			
E038, DP above TA-21, sampled 7/27/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	20:40	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	20:43	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	20:44	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	20:46	Max+16	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	20:48	Max+18	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	20:50	Max+20	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/8/2014					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	14:24	Trigger	SSC
2	Trigger+2	SSC	14:26	Trigger+2	SSC, Particle Size
3	Trigger+4	SSC	14:28	Trigger+4	DOC (F)
4	Trigger+6	SSC	14:30	Trigger+6	Anions
5	Trigger+8	SSC	14:32	Trigger+8	Alkalinity, pH (UF)
6	Trigger+10	SSC	14:34	Trigger+10	SSC
7	Trigger+12	SSC	14:36	Trigger+12	SSC
8	Trigger+14	SSC	14:38	Trigger+14	SSC
9	Trigger+16	SSC	14:40	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	14:42	Trigger+18	SSC
11	Trigger+20	SSC	14:44	Trigger+20	SSC
12	Trigger+22	SSC	Sample missed. No liquid detected.		
13	Trigger+24	SSC			
14	Trigger+26	SSC			
15	Trigger+28	SSC			
16	Trigger+30	SSC			
17	Trigger+50	SSC			
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	22:04	Trigger	SSC, Particle Size
2	Trigger+2	SSC	Sample missed. Equipment malfunction.		
3	Trigger+4	SSC			
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+10	SSC			
7	Trigger+12	SSC			
8	Trigger+14	SSC			
9	Trigger+16	SSC			
10	Trigger+18	SSC, Particle Size			
11	Trigger+20	SSC			
12	Trigger+22	SSC			
13	Trigger+24	SSC			
14	Trigger+26	SSC			
15	Trigger+28	SSC			
16	Trigger+30	SSC			
17	Trigger+50	SSC			
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/29/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	11:20	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	11:23	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	11:24	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	11:26	Max+16	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	11:27	Max+17	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	11:29	Max+19	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/27/2014					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	20:29	Trigger	SSC
2	Trigger+2	SSC	20:31	Trigger+2	SSC
3	Trigger+4	SSC	20:33	Trigger+4	SSC
4	Trigger+6	SSC	20:35	Trigger+6	SSC
5	Trigger+8	SSC	20:37	Trigger+8	SSC
6	Trigger+10	SSC	20:39	Trigger+10	SSC
7	Trigger+12	SSC	20:41	Trigger+12	SSC
8	Trigger+14	SSC	20:43	Trigger+14	SSC
9	Trigger+16	SSC	20:45	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	20:47	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	20:49	Trigger+20	DOC (F)
12	Trigger+22	SSC	20:51	Trigger+22	Anions
13	Trigger+24	SSC	20:53	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	20:55	Trigger+26	SSC
15	Trigger+28	SSC	20.57	Trigger+28	SSC
16	Trigger+30	SSC	20:59	Trigger+30	SSC
17	Trigger+50	SSC	21:19	Trigger+50	SSC
18	Trigger+70	SSC	21:39	Trigger+70	SSC
19	Trigger+90	SSC	21:59	Trigger+90	SSC
20	Trigger+110	SSC	22:19	Trigger+110	SSC
21	Trigger+130	SSC	22:39	Trigger+130	SSC
22	Trigger+150	SSC	Sample missed. No liquid detected.		
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	11:04	Trigger	SSC
2	Trigger+2	SSC	11:06	Trigger+2	SSC
3	Trigger+4	SSC	11:08	Trigger+4	SSC
4	Trigger+6	SSC	11:10	Trigger+6	SSC
5	Trigger+8	SSC	11:12	Trigger+8	SSC
6	Trigger+10	SSC	11:14	Trigger+10	SSC
7	Trigger+12	SSC	11:16	Trigger+12	SSC
8	Trigger+14	SSC	11:18	Trigger+14	SSC
9	Trigger+16	SSC	11:20	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	11:22	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	11:24	Trigger+20	DOC (F)
12	Trigger+22	SSC	11:26	Trigger+22	Anions
13	Trigger+24	SSC	11:28	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	11:30	Trigger+26	SSC
15	Trigger+28	SSC	11:32	Trigger+28	SSC
16	Trigger+30	SSC	11:34	Trigger+30	SSC
17	Trigger+50	SSC	11:54	Trigger+50	SSC
18	Trigger+70	SSC	12:14	Trigger+70	SSC
19	Trigger+90	SSC	12:34	Trigger+90	SSC
20	Trigger+110	SSC	12:54	Trigger+110	SSC
21	Trigger+130	SSC	13:14	Trigger+130	SSC
22	Trigger+150	SSC	13:34	Trigger+150	SSC
23	Trigger+170	SSC	Sample missed. No liquid detected.		
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	17:30	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	17:32	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	17:34	Max+14	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	17:36	Max+16	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	17:37	Max+17	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	17:39	Max+19	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E038, DP above TA-21, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	17:14	Trigger	SSC
2	Trigger+2	SSC	17:16	Trigger+2	SSC
3	Trigger+4	SSC	17:18	Trigger+4	SSC
4	Trigger+6	SSC	17:20	Trigger+6	SSC
5	Trigger+8	SSC	17:22	Trigger+8	SSC
6	Trigger+10	SSC	17:24	Trigger+10	SSC
7	Trigger+12	SSC	17:26	Trigger+12	SSC
8	Trigger+14	SSC	17:28	Trigger+14	SSC
9	Trigger+16	SSC	17:30	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	17:32	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	17:34	Trigger+20	DOC (F)
12	Trigger+22	SSC	17:36	Trigger+22	Anions
13	Trigger+24	SSC	17:38	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	17:40	Trigger+26	SSC
15	Trigger+28	SSC	17:42	Trigger+28	SSC
16	Trigger+30	SSC	17:44	Trigger+30	SSC
17	Trigger+50	SSC	18:04	Trigger+50	SSC
18	Trigger+70	SSC	18:24	Trigger+70	SSC
19	Trigger+90	SSC	18:44	Trigger+90	SSC
20	Trigger+110	SSC	19:04	Trigger+110	SSC
21	Trigger+130	SSC	19:24	Trigger+130	SSC
22	Trigger+150	SSC	Sample missed. No liquid detected.		
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/8/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	15:14	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	15:17	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	15:19	Max+15	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	15:22	Max+18	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	15:24	Max+20	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	15:27	Max+23	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

E039.1, DP below grade-control structure, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	1:19	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	1:23	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	1:24	Max+15	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	1:27	Max+18	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	1:29	Max+20	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	1:32	Max+23	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/8/2014					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	15:04	Trigger	SSC
2	Trigger+2	SSC	15:06	Trigger+2	SSC
3	Trigger+4	SSC	15:08	Trigger+4	SSC
4	Trigger+6	SSC	15:10	Trigger+6	SSC
5	Trigger+8	SSC	15:12	Trigger+8	SSC
6	Trigger+10	SSC	15:14	Trigger+10	SSC
7	Trigger+12	SSC	15:16	Trigger+12	SSC
8	Trigger+14	SSC	15:18	Trigger+14	SSC
9	Trigger+16	SSC	15:20	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	15:22	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	15:24	Trigger+20	DOC (F)
12	Trigger+22	SSC	15:26	Trigger+22	Anions
13	Trigger+24	SSC	15:28	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	15:30	Trigger+26	SSC
15	Trigger+28	SSC	15:32	Trigger+28	SSC
16	Trigger+30	SSC	15:34	Trigger+30	SSC
17	Trigger+50	SSC	Sample missed. No liquid detected.		
18	Trigger+70	SSC			
19	Trigger+90	SSC			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/15/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	1:04	Trigger	SSC
2	Trigger+2	SSC	1:06	Trigger+2	SSC
3	Trigger+4	SSC	1:08	Trigger+4	SSC
4	Trigger+6	SSC	1:10	Trigger+6	SSC
5	Trigger+8	SSC	1:12	Trigger+8	SSC
6	Trigger+10	SSC	1:14	Trigger+10	SSC
7	Trigger+12	SSC	1:16	Trigger+12	SSC
8	Trigger+14	SSC	1:18	Trigger+14	SSC
9	Trigger+16	SSC	1:20	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	1:22	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	1:24	Trigger+20	DOC (F)
12	Trigger+22	SSC	1:26	Trigger+22	Anions
13	Trigger+24	SSC	1:28	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	1:30	Trigger+26	SSC
15	Trigger+28	SSC	1:32	Trigger+28	SSC
16	Trigger+30	SSC	1:34	Trigger+30	SSC
17	Trigger+50	SSC	1:54	Trigger+50	SSC
18	Trigger+70	SSC	2:14	Trigger+70	SSC
19	Trigger+90	SSC	2:34	Trigger+90	SSC
20	Trigger+110	SSC	2:54	Trigger+110	SSC
21	Trigger+130	SSC	3:14	Trigger+130	SSC
22	Trigger+150	SSC	3:34	Trigger+150	SSC
23	Trigger+170	SSC	3:54	Trigger+170	SSC
24	Trigger+190	SSC	4:14	Trigger+190	SSC

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/15-16/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	7/15/14 22:34	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	7/15/14 22:37	Max+13	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	7/15/14 22:39	Max+15	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	7/15/14 22:42	Max+18	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	7/15/14 22:44	Max+20	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	7/15/14 22:47	Max+23	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

E039.1, DP below grade-control structure, sampled 7/27/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	21:19	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	21:21	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	21:24	Max+15	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	21:27	Max+18	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	21:29	Max+20	TAL metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	21:32	Max+23	TAL metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis		
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/15–7/16/2014					
Sample Bottle (1 L)	Planned		Actual		
	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	7/15/14 22:24	Trigger	SSC
2	Trigger+2	SSC	7/15/14 22:26	Trigger+2	SSC
3	Trigger+4	SSC	7/15/14 22:28	Trigger+4	SSC
4	Trigger+6	SSC	7/15/14 22:30	Trigger+6	SSC
5	Trigger+8	SSC	7/15/14 22:32	Trigger+8	SSC
6	Trigger+10	SSC	7/15/14 22:34	Trigger+10	SSC
7	Trigger+12	SSC	7/15/14 22:36	Trigger+12	SSC
8	Trigger+14	SSC	7/15/14 22:38	Trigger+14	SSC
9	Trigger+16	SSC	7/15/14 22:40	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	7/15/14 22:42	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	7/15/14 22:44	Trigger+20	DOC (F)
12	Trigger+22	SSC	7/15/14 22:46	Trigger+22	Anions
13	Trigger+24	SSC	7/15/14 22:48	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	7/15/14 22:50	Trigger+26	SSC
15	Trigger+28	SSC	7/15/14 22:52	Trigger+28	SSC
16	Trigger+30	SSC	7/15/14 22:54	Trigger+30	SSC
17	Trigger+50	SSC	7/15/14 23:14	Trigger+50	SSC
18	Trigger+70	SSC	7/15/14 23:34	Trigger+70	SSC
19	Trigger+90	SSC	7/15/14 23:54	Trigger+90	SSC
20	Trigger+110	SSC	7/16/14 0:14	Trigger+110	SSC
21	Trigger+130	SSC	7/16/14 0:34	Trigger+130	SSC
22	Trigger+150	SSC	7/16/14 0:54	Trigger+150	SSC
23	Trigger+170	SSC	7/16/14 1:14	Trigger+170	SSC
24	Trigger+190	SSC	7/16/14 1:34	Trigger+190	SSC

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/27/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	21:04	Trigger	SSC
2	Trigger+2	SSC	21:06	Trigger+2	SSC
3	Trigger+4	SSC	21:08	Trigger+4	SSC
4	Trigger+6	SSC	21:10	Trigger+6	SSC
5	Trigger+8	SSC	21:12	Trigger+8	SSC
6	Trigger+10	SSC	21:14	Trigger+10	SSC
7	Trigger+12	SSC	21:16	Trigger+12	SSC
8	Trigger+14	SSC	21:18	Trigger+14	SSC
9	Trigger+16	SSC	21:20	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	21:22	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	21:24	Trigger+20	DOC (F)
12	Trigger+22	SSC	21:26	Trigger+22	Anions
13	Trigger+24	SSC	21:28	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	21:30	Trigger+26	SSC
15	Trigger+28	SSC	21:32	Trigger+28	SSC
16	Trigger+30	SSC	21:34	Trigger+30	SSC
17	Trigger+50	SSC	21:54	Trigger+50	SSC
18	Trigger+70	SSC	22:14	Trigger+70	SSC
19	Trigger+90	SSC	22:34	Trigger+90	SSC
20	Trigger+110	SSC	Sample missed. No liquid detected.		
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	11:44	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	11:48	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic uranium; isotopic plutonium (UF)	11:49	Max+15	Isotopic uranium; isotopic plutonium (UF)
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)	11:52	Max+18	Strontium-90 (UF)
7	Max+16	TAL Metals (F/UF)	11:54	Max+20	TAL Metals (F)
8	Max+17	Extra bottle			
9	Max+18	Extra bottle	11:57	Max+23	TAL Metals (UF)
10	Max+19	Extra bottle			
11	Max+20	Extra bottle	Remaining samples not retrieved for analysis.		
12	Max+21	Extra bottle			

E039.1, DP below grade-control structure, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	Sample missed. No liquid detected.		
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)			
4	Max+13	Isotopic uranium; isotopic plutonium (UF)			
5	Max+14	Isotopic uranium; isotopic plutonium (UF)			
6	Max+15	Strontium-90 (UF)			
7	Max+16	TAL Metals (F/UF)			
8	Max+17	Extra bottle			
9	Max+18	Extra bottle			
10	Max+19	Extra bottle			
11	Max+20	Extra bottle			
12	Max+21	Extra bottle			

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	11:29	Trigger	SSC
2	Trigger+2	SSC	11:31	Trigger+2	SSC
3	Trigger+4	SSC	11:33	Trigger+4	SSC
4	Trigger+6	SSC	11:35	Trigger+6	SSC
5	Trigger+8	SSC	11:37	Trigger+8	SSC
6	Trigger+10	SSC	11:39	Trigger+10	SSC
7	Trigger+12	SSC	11:41	Trigger+12	SSC
8	Trigger+14	SSC	11:43	Trigger+14	SSC
9	Trigger+16	SSC	11:45	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	11:47	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	11:49	Trigger+20	DOC (F)
12	Trigger+22	SSC	11:51	Trigger+22	Anions
13	Trigger+24	SSC	11:53	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	11:55	Trigger+26	SSC
15	Trigger+28	SSC	11:57	Trigger+28	SSC
16	Trigger+30	SSC	11:59	Trigger+30	SSC
17	Trigger+50	SSC	12:19	Trigger+50	SSC
18	Trigger+70	SSC	12:39	Trigger+70	SSC
19	Trigger+90	SSC	12:59	Trigger+90	SSC
20	Trigger+110	SSC	13:19	Trigger+110	SSC
21	Trigger+130	SSC	13:39	Trigger+130	SSC
22	Trigger+150	SSC	13:59	Trigger+150	SSC
23	Trigger+170	SSC			
24	Trigger+190	SSC	Sample missed. No liquid detected.		

Table 2.4-4 (continued)

E039.1, DP below grade-control structure, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	17:34	Trigger	SSC
2	Trigger+2	SSC	17:36	Trigger+2	SSC
3	Trigger+4	SSC	17:38	Trigger+4	TAL Metals (F/UF)
4	Trigger+6	SSC	17:40	Trigger+6	Gamma spectroscopy (UF)
5	Trigger+8	SSC	17:42	Trigger+8	Isotopic uranium; isotopic plutonium (UF)
6	Trigger+10	SSC			
7	Trigger+12	SSC	17:46	Trigger+12	Strontium-90 (UF)
8	Trigger+14	SSC	17:48	Trigger+14	SSC
9	Trigger+16	SSC	17:50	Trigger+16	SSC
10	Trigger+18	SSC, Particle Size	17:52	Trigger+18	SSC, Particle Size
11	Trigger+20	SSC	17:54	Trigger+20	DOC (F)
12	Trigger+22	SSC	17:56	Trigger+22	Anions
13	Trigger+24	SSC	17:58	Trigger+24	Alkalinity, pH (UF)
14	Trigger+26	SSC	18:00	Trigger+26	SSC
15	Trigger+28	SSC	18:02	Trigger+28	SSC
16	Trigger+30	SSC	18:04	Trigger+30	SSC
17	Trigger+50	SSC	18:24	Trigger+50	SSC
18	Trigger+70	SSC	18:44	Trigger+70	SSC
19	Trigger+90	SSC	19:04	Trigger+90	SSC
20	Trigger+110	SSC	19:24	Trigger+110	SSC
21	Trigger+130	SSC	19:44	Trigger+130	SSC
22	Trigger+150	SSC	Sample missed. No liquid detected.		
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/8/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	16:14	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	16:16	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	16:17	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+16	Dioxins/furans (UF)	16:19	Max+15	Dioxins/furans (UF)
7	Max+17	TAL metals (F/UF)	16:20	Max+16	TAL metals (F/UF)
8	Max+18	Strontium-90 (UF)	Sampler malfunction. Sample collection not successful.		
9	Max+60	PCBs (UF)	17:14	Max+70	PCBs (UF)
10	Max+61	Isotopic plutonium (UF)	Sampler malfunction. Sample collection not successful.		
11	Max+105	PCBs (UF)	17:49	Max+105	PCBs (UF)
12	Max+106	Isotopic plutonium (UF)	17:49	Max+105	Strontium-90 (UF)

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/8/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sampling attempted but collection not successful.		
2	Trigger+2	SSC			
3	Trigger+4	SS			
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+12	SSC			
7	Trigger+14	SSC			
8	Trigger+16	SSC			
9	Trigger+18	SSC, Particle Size			
10	Trigger+20	SSC			
11	Trigger+22	SSC			
12	Trigger+24	SSC			
13	Trigger+26	SSC			
14	Trigger+28	SSC			
15	Trigger+30	SSC			
16	Trigger+50	SSC			
17	Trigger+70	SSC, Particle Size			
18	Trigger+90	SSC			
19	Trigger+110	SSC, Particle Size			
20	Trigger+130	SSC			
21	Trigger+150	SSC			
22	Trigger+170	SSC			
23	Trigger+190	SSC			
24	Trigger+210	SSC			

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/15–7/16/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	7/15/14 23:24	Max+10	SSC, Particle Size
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	7/15/14 23:26	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	7/15/14 23:27	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+15	Dioxins/furans (UF)	7/15/14 23:29	Max+15	Dioxins/furans (UF)
7	Max+16	TAL metals (F/UF)	7/15/14 23:30	Max+16	TAL metals (F/UF)
8	Max+17	Strontium-90 (UF)	Sampler malfunction. Sample collection not successful.		
9	Max+60	PCBs (UF)	7/16/14 0:14	Max+60	PCBs (UF)
10	Max+61	Isotopic plutonium (UF)	Sampler malfunction. Sample collection not successful.		
11	Max+105	PCBs (UF)	7/16/14 0:59	Max+105	PCBs (UF)
12	Max+106	Isotopic plutonium (UF)	7/16/14 0:59	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/15–7/16/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	23:15	Trigger	SSC, Particle Size
2	Trigger+2	SSC	23:17	Trigger+2	Strontium-90 (UF)
3	Trigger+4	SSC	Sampling attempted but collection not successful.		
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+12	SSC			
7	Trigger+14	SSC			
8	Trigger+16	SSC			
9	Trigger+18	SSC, Particle Size			
10	Trigger+20	SSC			
11	Trigger+22	SSC			
12	Trigger+24	SSC			
13	Trigger+26	SSC			
14	Trigger+28	SSC			
15	Trigger+30	SSC			
16	Trigger+50	SSC			
17	Trigger+70	SSC, Particle Size			
18	Trigger+90	SSC			
19	Trigger+110	SSC, Particle Size			
20	Trigger+130	SSC			
21	Trigger+150	SSC			
22	Trigger+170	SSC			
23	Trigger+190	SSC			
24	Trigger+210	SSC			

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/29/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	12:59	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	13:01	Max+12	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	13:02	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+15	Dioxins/furans (UF)	13:04	Max+15	Dioxins/furans (UF)
7	Max+16	TAL metals (F/UF)	13:05	Max+16	TAL metals (F/UF)
8	Max+17	Strontium-90	Sampler malfunction. Sample collection not successful.		
9	Max+60	PCBs (UF)	13:49	Max+60	PCBs (UF)
10	Max+61	Isotopic plutonium (UF)	13:49	Max+60	Isotopic plutonium (UF)
11	Max+105	PCBs (UF)	14:34	Max+105	PCBs (UF)
12	Max+106	Isotopic plutonium (UF)	14:34	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	12:45	Trigger	SSC
2	Trigger+2	SSC	12:47	Trigger+2	SSC
3	Trigger+4	SSC	12:49	Trigger+4	SSC
4	Trigger+6	SSC	12:51	Trigger+6	SSC
5	Trigger+8	SSC	12:53	Trigger+8	SSC
6	Trigger+12	SSC	12:55	Trigger+10	SSC
7	Trigger+14	SSC	12:57	Trigger+12	SSC
8	Trigger+16	SSC	12:59	Trigger+14	SSC
9	Trigger+18	SSC, Particle Size	13:01	Trigger+16	SSC, Particle Size
10	Trigger+20	SSC	13:03	Trigger+18	DOC (F)
11	Trigger+22	SSC	13:05	Trigger+20	Anions
12	Trigger+24	SSC	13:07	Trigger+22	Alkalinity, pH (UF)
13	Trigger+26	SSC	13:09	Trigger+24	Strontium-90 (UF)
14	Trigger+28	SSC	13:11	Trigger+26	SSC
15	Trigger+30	SSC	13:13	Trigger+28	SSC
16	Trigger+50	SSC	13:15	Trigger+30	SSC
17	Trigger+70	SSC, Particle Size	13:35	Trigger+50	SSC, Particle Size
18	Trigger+90	SSC	13:55	Trigger+70	SSC
19	Trigger+110	SSC, Particle Size	14:15	Trigger+90	SSC, Particle Size
20	Trigger+130	SSC	14:35	Trigger+110	SSC
21	Trigger+150	SSC	14:55	Trigger+130	SSC
22	Trigger+170	SSC	15:15	Trigger+150	SSC
23	Trigger+190	SSC	15:35	Trigger+170	SSC
24	Trigger+210	SSC	15:55	Trigger+190	SSC

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/31/2014					
Sample Bottle (1 L)	Planned		Actual		
	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	18:59	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	19:03	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	19:05	Max+16	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+15	Dioxins/furans (UF)	19:09	Max+20	Dioxins/furans (UF)
7	Max+16	TAL metals (F/UF)	19:11	Max+22	TAL metals (F/UF)
8	Max+17	Strontium-90 (UF)	19:13	Max+24	Strontium-90 (UF)
9	Max+60	PCBs (UF)	19:49	Max+60	PCBs (UF)
10	Max+61	Isotopic plutonium (UF)	19:49	Max+60	Isotopic plutonium (UF)
11	Max+105	PCBs (UF)	20:34	Max+105	PCBs (UF)
12	Max+105	Isotopic plutonium (UF)	20:34	Max+105	Isotopic plutonium (UF)

Table 2.4-4 (continued)

E042.1, Los Alamos above low-head weir, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	18:30	Trigger	SSC
2	Trigger+2	SSC	18:32	Trigger+2	SSC
3	Trigger+4	SSC	18:34	Trigger+4	SSC
4	Trigger+6	SSC	18:36	Trigger+6	SSC
5	Trigger+8	SSC	18:38	Trigger+8	SSC
6	Trigger+10	SSC	18:40	Trigger+10	SSC
7	Trigger+12	SSC	18:42	Trigger+12	SSC
8	Trigger+14	SSC	18:44	Trigger+14	SSC
9	Trigger+16	SSC, Particle Size	18:46	Trigger+16	SSC, Particle Size
10	Trigger+18	SSC	18:48	Trigger+18	DOC (F)
11	Trigger+20	SSC	18:50	Trigger+20	Anions
12	Trigger+22	SSC	18:52	Trigger+22	Alkalinity, pH (UF)
13	Trigger+24	SSC	18:54	Trigger+24	SSC
14	Trigger+26	SSC	18:56	Trigger+26	SSC
15	Trigger+28	SSC	18:58	Trigger+28	SSC
16	Trigger+30	SSC	19:00	Trigger+30	SSC
17	Trigger+50	SSC, Particle Size	19:20	Trigger+50	SSC, Particle Size
18	Trigger+70	SSC	19:40	Trigger+70	SSC
19	Trigger+90	SSC, Particle Size	20:00	Trigger+90	SSC, Particle Size
20	Trigger+110	SSC	20:20	Trigger+110	SSC
21	Trigger+130	SSC	20:40	Trigger+130	SSC
22	Trigger+150	SSC	21:00	Trigger+150	SSC
23	Trigger+170	SSC	21:20	Trigger+170	SSC
24	Trigger+190	SSC	21:40	Trigger+190	SSC

Table 2.4-4 (continued)

<table>
<tr><th colspan="7">E050.1, Los Alamos below low-head weir, sampled 7/16/2014</th></tr>
<tr><th rowspan="2">Sample Bottle (1 L)</th><th colspan="2">Planned</th><th colspan="3">Actual</th></tr>
<tr><th>12-Bottle ISCO Start Time (min)</th><th>Analytical Suites</th><th>Sample Collection Time</th><th>12-Bottle ISCO Start Time (min)</th><th>Analyses Requested</th></tr>
<tr><td>1</td><td>Max+10</td><td>PCBs (UF)</td><td rowspan="2">0:19</td><td rowspan="2">Max+10</td><td rowspan="2">PCBs (UF)</td></tr>
<tr><td>2</td><td>Max+11</td><td>PCBs (UF)</td></tr>
<tr><td>3</td><td>Max+12</td><td>Gamma spectroscopy (UF)</td><td rowspan="2">0:22</td><td rowspan="2">Max+13</td><td rowspan="2">Gamma spectroscopy (UF)</td></tr>
<tr><td>4</td><td>Max+13</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td></tr>
<tr><td>5</td><td>Max+14</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td><td colspan="3" rowspan="4">Sampler malfunction. Sample collection not successful.</td></tr>
<tr><td>6</td><td>Max+16</td><td>Strontium-90 (UF)</td></tr>
<tr><td>7</td><td>Max+17</td><td>TAL Metals (F/UF)</td></tr>
<tr><td>8</td><td>Max+18</td><td>Dioxins/furans (UF)</td></tr>
<tr><td>9</td><td>Max+60</td><td>PCB (UF)</td><td>1:09</td><td>Max+60</td><td>Dioxins/furans (UF)</td></tr>
<tr><td>10</td><td>Max+61</td><td>Isotopic plutonium (UF)</td><td>1:09</td><td>Max+60</td><td>Isotopic plutonium (UF)</td></tr>
<tr><td>11</td><td>Max+105</td><td>PCB (UF)</td><td>1:54</td><td>Max+105</td><td>PCBs (UF)</td></tr>
<tr><td>12</td><td>Max+106</td><td>Isotopic plutonium (UF)</td><td>1:54</td><td>Max+105</td><td>Strontium-90 (UF)</td></tr>
</table>

Table 2.4-4 (continued)

E050.1, Los Alamos below low-head weir, sampled 7/15-16/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	7/15/14 23:34	Trigger	SSC
2	Trigger+2	SSC	7/15/14 23:36	Trigger+2	SSC
3	Trigger+4	SSC	7/15/14 23:38	Trigger+4	SSC
4	Trigger+6	SSC	7/15/14 23:40	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	7/15/14 23:42	Trigger+8	Radium-226 and Radium-228 (UF)
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	7/15/14 23:46	Trigger+12	SSC
8	Trigger+14	Gross alpha/beta (UF)	7/15/14 23:48	Trigger+14	Gross alpha/beta (UF)
9	Trigger+16	SSC, Particle Size	7/15/14 23:50	Trigger+16	SSC, Particle Size
10	Trigger+18	SSC	7/15/14 23:52	Trigger+18	DOC (F)
11	Trigger+20	SSC	7/15/14 23:54	Trigger+20	Anions
12	Trigger+22	SSC	7/15/14 23:56	Trigger+22	Alkalinity, pH (UF)
13	Trigger+24	SSC	7/15/14 23:58	Trigger+24	SSC, Particle Size
14	Trigger+26	SSC	7/16/14 0:00	Trigger+26	SSC
15	Trigger+28	SSC	7/16/14 0:02	Trigger+28	SSC
16	Trigger+30	SSC	7/16/14 0:04	Trigger+30	Isotopic plutonium, americium-241, and isotopic uranium (UF)
17	Trigger+50	SSC, Particle Size			
18	Trigger+70	SSC	7/16/14 0:44	Trigger+70	Radium-226 and Radium-228 (UF)
19	Trigger+90	SSC, Particle Size			
20	Trigger+110	SSC	7/16/14 1:24	Trigger+110	TAL metals (F/UF)
21	Trigger+130	SSC	7/16/14 1:44	Trigger+130	Isotopic plutonium (UF)
22	Trigger+150	SSC			
23	Trigger+170	SSC	7/16/14 2:24	Trigger+170	SSC
24	Trigger+190	SSC	7/16/14 2:44	Trigger+190	SSC

Table 2.4-4 (continued)

<table>
<tr><th colspan="6">E050.1, Los Alamos below low-head weir, sampled 7/29/2014</th></tr>
<tr><th rowspan="2">Sample Bottle (1 L)</th><th colspan="2">Planned</th><th colspan="3">Actual</th></tr>
<tr><th>12-Bottle ISCO Start Time (min)</th><th>Analytical Suites</th><th>Sample Collection Time</th><th>12-Bottle ISCO Start Time (min)</th><th>Analyses Requested</th></tr>
<tr><td>1</td><td>Max+10</td><td>PCBs (UF)</td><td rowspan="2">13:59</td><td rowspan="2">Max+10</td><td rowspan="2">PCBs (UF)</td></tr>
<tr><td>2</td><td>Max+11</td><td>PCBs (UF)</td></tr>
<tr><td>3</td><td>Max+12</td><td>Gamma spectroscopy (UF)</td><td>14:02</td><td>Max+13</td><td>Gamma spectroscopy (UF)</td></tr>
<tr><td>4</td><td>Max+13</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td><td rowspan="2">14:04</td><td rowspan="2">Max+15</td><td rowspan="2">Isotopic plutonium, americium-241, and isotopic uranium (UF)</td></tr>
<tr><td>5</td><td>Max+14</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td></tr>
<tr><td>6</td><td>Max+16</td><td>Strontium-90 (UF)</td><td colspan="3" rowspan="3">Sampler malfunction. Sample collection not successful.</td></tr>
<tr><td>7</td><td>Max+17</td><td>TAL Metals (F/UF)</td></tr>
<tr><td>8</td><td>Max+18</td><td>Dioxins/furans (UF)</td></tr>
<tr><td>9</td><td>Max+60</td><td>PCB (UF)</td><td>14:49</td><td>Max+60</td><td>Dioxins/furans (UF)</td></tr>
<tr><td>10</td><td>Max+61</td><td>Isotopic plutonium (UF)</td><td>14:49</td><td>Max+60</td><td>Isotopic plutonium (UF)</td></tr>
<tr><td>11</td><td>Max+105</td><td>PCB (UF)</td><td>15:34</td><td>Max+145</td><td>PCB (UF)</td></tr>
<tr><td>12</td><td>Max+106</td><td>Isotopic plutonium (UF)</td><td>15:34</td><td>Max+145</td><td>Strontium-90 (UF)</td></tr>
</table>

Table 2.4-4 (continued)

E050.1, Los Alamos below low-head weir, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:14	Trigger	SSC
2	Trigger+2	SSC	13:16	Trigger+2	SSC
3	Trigger+4	SSC	13:18	Trigger+4	SSC
4	Trigger+6	SSC	13:20	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	13:22	Trigger+8	Radium-226 and Radium-228 (UF)
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	13:26	Trigger+12	SSC
8	Trigger+14	Gross alpha/beta (UF)	13:28	Trigger+14	Gross alpha/beta (UF)
9	Trigger+16	SSC, Particle Size	13:30	Trigger+16	SSC, Particle Size
10	Trigger+18	SSC	13:32	Trigger+18	DOC (F)
11	Trigger+20	SSC	13:34	Trigger+20	Anions
12	Trigger+22	SSC	13:36	Trigger+22	Alkalinity, pH (UF)
13	Trigger+24	SSC	13:38	Trigger+24	SSC
14	Trigger+26	SSC	13:40	Trigger+26	SSC
15	Trigger+28	SSC	13:42	Trigger+28	SSC
16	Trigger+30	SSC	13:44	Trigger+30	SSC
17	Trigger+50	SSC, Particle Size	14:04	Trigger+50	SSC, Particle Size
18	Trigger+70	SSC	14:24	Trigger+70	TAL Metals (UF)
19	Trigger+90	SSC, Particle Size	14:44	Trigger+90	SSC, Particle Size
20	Trigger+110	SSC	15:04	Trigger+110	SSC
21	Trigger+130	SSC	15:24	Trigger+130	SSC
22	Trigger+150	SSC	15:44	Trigger+150	SSC
23	Trigger+170	SSC	16:04	Trigger+170	SSC
24	Trigger+190	SSC	16:24	Trigger+190	SSC

Table 2.4-4 (continued)

E050.1, Los Alamos below low-head weir, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	19:00	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	19:04	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	19:06	Max+16	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+16	Strontium-90 (UF)	19:10	Max+20	Strontium-90 (UF)
7	Max+17	TAL Metals (F/UF)	19:12	Max+22	TAL Metals (F/UF)
8	Max+18	Dioxins/furans (UF)	19:14	Max+24	Dioxins/furans (UF)
9	Max+60	PCB (UF)	19:50	Max+60	Isotopic plutonium (UF)
10	Max+61	Isotopic plutonium (UF)	19:50	Max+60	PCB (UF)
11	Max+105	PCB (UF)	20:35	Max+105	Isotopic plutonium (UF)
12	Max+106	Isotopic plutonium (UF)	20:35	Max+105	PCB (UF)

Table 2.4-4 (continued)

E050.1, Los Alamos below low-head weir, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	18:35	Trigger	SSC
2	Trigger+2	SSC	18:37	Trigger+2	SSC
3	Trigger+4	SSC	18:39	Trigger+4	SSC
4	Trigger+6	SSC	18:41	Trigger+6	SSC
5	Trigger+8	Radium-226 (UF)	18:43	Trigger+8	Radium-226 and Radium-228 (UF)
6	Trigger+10	Radium-228 (UF)			
7	Trigger+12	SSC	18:47	Trigger+12	SSC
8	Trigger+14	Gross alpha/beta (UF)	18:49	Trigger+14	Gross alpha/beta (UF)
9	Trigger+16	SSC, Particle Size	18:51	Trigger+16	SSC, Particle Size
10	Trigger+18	SSC	18:53	Trigger+18	DOC (F)
11	Trigger+20	SSC	18:55	Trigger+20	Anions
12	Trigger+22	SSC	18:57	Trigger+22	Alkalinity, pH (UF)
13	Trigger+24	SSC	18:59	Trigger+24	SSC
14	Trigger+26	SSC	19:01	Trigger+26	SSC
15	Trigger+28	SSC	19:03	Trigger+28	SSC
16	Trigger+30	SSC	19:05	Trigger+30	SSC
17	Trigger+50	SSC, Particle Size	19:25	Trigger+50	SSC, Particle Size
18	Trigger+70	SSC	19:45	Trigger+70	SSC
19	Trigger+90	SSC, Particle Size	20:05	Trigger+90	SSC, Particle Size
20	Trigger+110	SSC	20:25	Trigger+110	SSC
21	Trigger+130	SSC	20:45	Trigger+130	SSC
22	Trigger+150	SSC	21:05	Trigger+150	SSC
23	Trigger+170	SSC	21:25	Trigger+170	SSC
24	Trigger+190	SSC	21:45	Trigger+190	SSC

Table 2.4-4 (continued)

<table>
<tr><th colspan="7">E059.5, Pueblo below LAC WWTF, sampled 7/29/2014</th></tr>
<tr><th rowspan="2">Sample Bottle (1 L)</th><th colspan="2">Planned</th><th colspan="3">Actual</th></tr>
<tr><th>12-Bottle ISCO Start Time (min)</th><th>Analytical Suites</th><th>Sample Collection Time</th><th>12-Bottle ISCO Start Time (min)</th><th>Analyses Requested</th></tr>
<tr><td>1</td><td>Max+10</td><td>PCBs (UF)</td><td rowspan="2">13:14</td><td rowspan="2">Max+10</td><td rowspan="2">PCBs (UF)</td></tr>
<tr><td>2</td><td>Max+11</td><td>PCBs (UF)</td></tr>
<tr><td>3</td><td>Max+12</td><td>Gamma spectroscopy (UF)</td><td>13:19</td><td>Max+15</td><td>Gamma spectroscopy (UF)</td></tr>
<tr><td>4</td><td>Max+13</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td><td rowspan="2">13:21</td><td rowspan="2">Max+17</td><td rowspan="2">Isotopic plutonium, americium-241, and isotopic uranium (UF)</td></tr>
<tr><td>5</td><td>Max+14</td><td>Isotopic plutonium, americium-241, and isotopic uranium (UF)</td></tr>
<tr><td>6</td><td>Max+16</td><td>TAL metals (F)</td><td>13:26</td><td>Max+22</td><td>Dioxins/furans (UF)</td></tr>
<tr><td>7</td><td>Max+17</td><td>TAL metals (UF)</td><td colspan="3" rowspan="2">Sampler malfunction. Sample collection not successful.</td></tr>
<tr><td>8</td><td>Max+18</td><td>Strontium-90 (UF)</td></tr>
<tr><td>9</td><td>Max+60</td><td>PCBs (UF)</td><td>14:04</td><td>Max+60</td><td>PCBs (UF)</td></tr>
<tr><td>10</td><td>Max+61</td><td>Isotopic plutonium (UF)</td><td>14:04</td><td>Max+60</td><td>Isotopic plutonium (UF)</td></tr>
<tr><td>11</td><td>Max+105</td><td>PCBs (UF)</td><td>14:49</td><td>Max+105</td><td>PCBs (UF)</td></tr>
<tr><td>12</td><td>Max+106</td><td>Isotopic plutonium (UF)</td><td>14:49</td><td>Max+105</td><td>Isotopic plutonium (UF)</td></tr>
</table>

Table 2.4-4 (continued)

E059.5, Pueblo below LAC WWTF, sampled 7/29/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	13:10	Trigger	SSC
2	Trigger+2	SSC	13:13	Trigger+3	SSC
3	Trigger+4	SSC	13:15	Trigger+5	SSC
4	Trigger+6	SSC	13:17	Trigger+7	SSC
5	Trigger+8	SSC	13:20	Trigger+10	SSC
6	Trigger+10	SSC	13:22	Trigger+12	SSC
7	Trigger+12	SSC	13:25	Trigger+15	TAL Metals (F/UF)
8	Trigger+14	SSC	13:27	Trigger+17	Strontium-90 (UF)
9	Trigger+16	SSC, Particle Size	13:29	Trigger+19	SSC, Particle Size
10	Trigger+18	SSC	13:31	Trigger+21	DOC (F)
11	Trigger+20	SSC	13:34	Trigger+24	Anions
12	Trigger+22	SSC	13:36	Trigger+26	Alkalinity, pH (UF)
13	Trigger+24	SSC	Sampler malfunction. Sample collection not successful.		
14	Trigger+26	SSC			
15	Trigger+28	SSC			
16	Trigger+30	SSC	13:40	Trigger+30	SSC
17	Trigger+50	SSC, Particle Size	14:00	Trigger+50	SSC, Particle Size
18	Trigger+70	SSC	14:20	Trigger+70	SSC
19	Trigger+90	SSC, Particle Size	14:40	Trigger+90	SSC, Particle Size
20	Trigger+110	SSC	15:00	Trigger+110	SSC
21	Trigger+130	SSC	15:20	Trigger+130	SSC
22	Trigger+150	SSC	15:40	Trigger+150	SSC
23	Trigger+170	SSC	16:00	Trigger+170	SSC
24	Trigger+190	SSC	16:20	Trigger+190	SSC

Table 2.4-4 (continued)

E059.5, Pueblo below LAC WWTF, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	18:49	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	18:53	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	18:55	Max+16	Isotopic plutonium, americium-241, and isotopic uranium (UF)
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)			
6	Max+16	TAL metals (F)	18:59	Max+20	Dioxins/furans (UF)
7	Max+17	TAL metals (UF)	19:01	Max+22	TALMetals (F/UF)
8	Max+18	Strontium-90 (UF)	19:03	Max+24	Strontium-90 (UF)
9	Max+60	PCBs (UF)	19:39	Max+60	PCBs (UF)
10	Max+61	Isotopic plutonium (UF)	Sample missed. No liquid detected.		
11	Max+105	PCBs (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E059.5, Pueblo below LAC WWTF, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	18:45	Trigger	SSC
2	Trigger+2	SSC	18:47	Trigger+2	SSC
3	Trigger+4	SSC	18:50	Trigger+5	SSC
4	Trigger+6	SSC	18:52	Trigger+7	SSC
5	Trigger+8	SSC	18:54	Trigger+9	Isotopic plutonium (UF)
6	Trigger+10	SSC	18:57	Trigger+12	SSC
7	Trigger+12	SSC	18:59	Trigger+14	Isotopic plutonium (UF)
8	Trigger+14	SSC	19:01	Trigger+16	SSC
9	Trigger+16	SSC, Particle Size	19:03	Trigger+18	Anions
10	Trigger+18	SSC	19:04	Trigger+19	SSC, Particle Size
11	Trigger+20	SSC	19:06	Trigger+21	DOC (F)
12	Trigger+22	SSC	19:10	Trigger+25	Alkalinity, pH (UF)
13	Trigger+24	SSC	Sampler malfunction. Sample collection not successful.		
14	Trigger+26	SSC			
15	Trigger+28	SSC			
16	Trigger+30	SSC	19:15	Trigger+30	SSC
17	Trigger+50	SSC, Particle Size	19:35	Trigger+50	SSC, Particle Size
18	Trigger+70	SSC	19:55	Trigger+70	SSC
19	Trigger+90	SSC, Particle Size	20:15	Trigger+90	SSC, Particle Size
20	Trigger+110	SSC	20:35	Trigger+110	SSC
21	Trigger+130	SSC	20:55	Trigger+130	SSC
22	Trigger+150	SSC	21:15	Trigger+150	SSC
23	Trigger+170	SSC	Sample missed. No liquid detected.		
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E059.5, Pueblo below LAC WWTF, sampled 8/10/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	15:49	Max+10	PCBs (UF)
2	Max+11	PCBs (UF)			
3	Max+12	Gamma spectroscopy (UF)	15:53	Max+14	Gamma spectroscopy (UF)
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	Sample missed. No liquid detected.		
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)	15:57	Max+18	TAL Metals (F/UF)
6	Max+16	TAL metals (F)	Sample missed. No liquid detected.		
7	Max+17	TAL metals (UF)			
8	Max+18	Strontium-90 (UF)			
9	Max+60	PCBs (UF)	16:39	Max+60	Dioxins/furans (UF)
10	Max+61	Isotopic plutonium (UF)	16:39	Max+60	Isotopic plutonium (UF)
11	Max+105	PCBs (UF)	17:24	Max+105	PCBs (UF)
12	Max+106	Isotopic plutonium (UF)	17:24	Max+105	Strontium-90 (UF)

Table 2.4-4 (continued)

E059.5, Pueblo below LAC WWTF, sampled 8/10/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	Sample missed. No liquid detected.		
2	Trigger+2	SSC			
3	Trigger+4	SSC			
4	Trigger+6	SSC			
5	Trigger+8	SSC			
6	Trigger+10	SSC			
7	Trigger+12	SSC			
8	Trigger+14	SSC			
9	Trigger+16	SSC, Particle Size			
10	Trigger+18	SSC			
11	Trigger+20	SSC			
12	Trigger+22	SSC			
13	Trigger+24	SSC			
14	Trigger+26	SSC			
15	Trigger+28	SSC			
16	Trigger+30	SSC			
17	Trigger+50	SSC, Particle Size			
18	Trigger+70	SSC			
19	Trigger+90	SSC, Particle Size			
20	Trigger+110	SSC			
21	Trigger+130	SSC			
22	Trigger+150	SSC			
23	Trigger+170	SSC			
24	Trigger+190	SSC			

Table 2.4-4 (continued)

E060.1, Pueblo below grade-control structure, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	12-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	12-Bottle ISCO Start Time (min)	Analyses Requested
1	Max+10	PCBs (UF)	20:29	Max+10	Isotopic Plutonium (UF)
2	Max+11	PCBs (UF)	20:30		
3	Max+12	Gamma spectroscopy (UF)	20:32		
4	Max+13	Isotopic plutonium, americium-241, and isotopic uranium (UF)	20:33		
5	Max+14	Isotopic plutonium, americium-241, and isotopic uranium (UF)	20:34		
6	Max+16	Strontium-90 (UF)	Sampler malfunction. Sample collection not successful.		
7	Max+17	TAL Metals (F/UF)			
8	Max+18	Dioxins/furans (UF)			
9	Max+60	PCB (UF)	Sample missed. Pump jammed.		
10	Max+61	Isotopic plutonium (UF)			
11	Max+105	PCB (UF)			
12	Max+106	Isotopic plutonium (UF)			

Table 2.4-4 (continued)

E060.1, Pueblo below grade-control structure, sampled 7/31/2014					
	Planned		Actual		
Sample Bottle (1 L)	24-Bottle ISCO Start Time (min)	Analytical Suites 24-Bottle ISCO 1-L Poly Wedge	Sample Collection Time	24-Bottle ISCO Start Time (min)	Analyses Requested
1	Trigger	SSC	19:54	Sample missed. No liquid detected.	
2	Trigger+2	SSC	19:56		
3	Trigger+4	SSC	19:59		
4	Trigger+6	SSC	20:01		
5	Trigger+8	Radium-226 (UF)	20:03		
6	Trigger+12	Radium-228 (UF)	20:05		
7	Trigger+14	SSC	20:07	Trigger+13	TAL metals (UF)
8	Trigger+16	Gross alpha/beta (UF)	20:10	Sample missed. No liquid detected.	
9	Trigger+18	SSC, Particle Size	20:12		
10	Trigger+20	SSC	10:14		
11	Trigger+22	SSC	20:16		
12	Trigger+24	SSC	20:18		
13	Trigger+26	SSC	20:20		
14	Trigger+28	SSC	Sampler malfunction. Sample collection not successful.		
15	Trigger+30	SSC			
16	Trigger+50	SSC	20:24	Sample missed. No liquid detected.	
17	Trigger+70	SSC, Particle Size	20:44		
18	Trigger+90	SSC	21:04		
19	Trigger+110	SSC, Particle Size	21:04		
20	Trigger+130	SSC	21:44		
21	Trigger+150	SSC	22:04		
22	Trigger+170	SSC	22:24		
23	Trigger+190	SSC	22:44		
24	Trigger+210	SSC	23:04		

[a] UF = Unfiltered.
[b] F = Filtered.
[c] F/UF = Analyses of both filtered (F) and unfiltered (UF) splits.
[d] TOC = Total organic carbon.
[e] DOC = Dissolved organic carbon.

Table 2.6-1
Sample Collection and Sample Retrieval Working Day Intervals

Location	Count of Sampled Storm Events	Count Retrieved on First Working Day	Count Retrieved after First Working Day	Comment
CO101038	3	0	3	2 d between sample collection on Tue 7/15 sample retrieval on Thu 7/17. 4 d between sample collection on Thu 7/31 sample retrieval on Mon 8/04. 7 d between sample collection on Mon 8/04 sample retrieval on Mon 8/11.
CO111041	5	1	4	2 d between sample collection on Mon 7/07 sample retrieval on Wed 7/09. 1 d between sample collection on Tue 7/08 sample retrieval on Wed 7/09. 2 d between sample collection on Tue 7/15 sample retrieval on Thu 7/17 4 d between sample collection on Thu 7/31 sample retrieval on Mon 8/04. 7 d between sample collection on Mon 8/04 sample retrieval on Mon 8/11.
E026	1	0	1	4 d between sample collection on Thu 7/31 sample retrieval on Mon 8/04.
E030	2	1	1	1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 4 d between sample collection on Thu 7/31 sample retrieval on Mon 8/04.
E038	5	3	2	2 d between sample collection on Tue 7/08 sample retrieval on Thu 7/10. 1 d between sample collection on Tue 7/15 sample retrieval on Wed 7/16. 1 d between sample collection on Sun 7/27 sample retrieval on Mon 7/28. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 5 d between sample collection on Thu 7/31 sample retrieval on Tue 8/05.
E039.1	7	4	3	2 d between sample collection on Tue 7/08 sample retrieval on Thu 7/10. 0 d between sample collection on Tue 7/15 sample retrieval on Tue 7/15. 2 d between sample collection on Tue 7/15 sample retrieval on Thu 7/17. 1 d between sample collection on Wed 7/16 sample retrieval on Thu 7/17. 1 d between sample collection on Sun 7/27 sample retrieval on Mon 7/28. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 5 d between sample collection on Thu 7/31 sample retrieval on Tue 8/05.

Table 2.6-1 (continued)

Location	Count of Sampled Storm Events	Count Retrieved on First Working Day	Count Retrieved after First Working Day	Comment
E040	5	4	1	0 d between sample collection on Wed 7/09 sample retrieval on Wed 7/09. 0 d between sample collection on Tue 7/15 sample retrieval on Tue 7/15. 1 d between sample collection on Tue 7/15 sample retrieval on Wed 7/16. 5 d between sample collection on Wed 7/16 sample retrieval on Mon 7/21. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30.
E042.1	5	5	0	1 d between sample collection on Tue 7/08 sample retrieval on Wed 7/09. 1 d between sample collection on Tue 7/15 sample retrieval on Wed 7/16. 0 d between sample collection on Wed 7/16 sample retrieval on Wed 7/16. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 1 d between sample collection on Thu 7/31 sample retrieval on Fri 8/01.
E050.1	4	4	0	1 d between sample collection on Tue 7/15 sample retrieval on Wed 7/16. 0 d between sample collection on Wed 7/16 sample retrieval on Wed 7/16. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 1 d between sample collection on Thu 7/31 sample retrieval on Fri 8/01.
E055	1	0	1	5 d between sample collection on Thu 7/31 sample retrieval on Tue 8/05.
E055.5	2	0	2	2 d between sample collection on Tue 7/15 sample retrieval on Thu 7/17. 5 d between sample collection on Thu 7/31 sample retrieval on Tue 8/05.
E056	3	2	1	3 d between sample collection on Mon 7/07 sample retrieval on Thu 7/10. 1 d between sample collection on Tue 7/15 sample retrieval on Wed 7/16. 1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30.
E059.5	3	2	1	1 d between sample collection on Tue 7/29 sample retrieval on Wed 7/30. 4 d between sample collection on Thu 7/31 sample retrieval on Mon 8/04. 1 d between sample collection on Sun 8/10 sample retrieval on Mon 8/11.
E060.1	1	1	0	1 d between sample collection on Thu 7/31 sample retrieval on Fri 8/01.

Table 2.6-2
Gaging Station Operational Issues during the 2014 Monitoring Year

Gaging Station	Operational Issue	Issue Date	Repair Date	Working Days from Issue to Repair	Potential Discharge above Trigger
E026	Temporary probe malfunction.	8/7/2014	8/7/2014	0	None
E030	None				None
E039.1	None				None
E040	Silting	7/9/2014	7/9/2014	0	None
	Silting	7/15/2014	7/15/2014	0	None
	Silting (second storm event after silt cleaned in the morning	7/15/2014	7/16/2014	1	None
	Silting	7/16/2014	7/21/2014	3	Yes, possible on 7/19/2014
	Silting	7/27/2014	7/28/2014	1	None
	Silting	7/29/2014	7/30/2014	1	None
	Silting, water was still flowing when the first site visit was made after the storm event	8/4/2014	8/11/2014	5	None.
	Silting	10/9/2014	10/14/2014	2	None
E042.1	Silting, field crew arrived on 7/16/2014 and cleaned out the lower intake. MSS* was scheduled for silt cleanout on 7/22/2014.	7/15/2014	7/22/2014	5	None
	Silting.	7/29/2014	7/30/2014	1	None
	Silting.	10/9/2014	10/14/2014	2	None
E050.1	None				None
E055	None				None
E055.5	None				None
E056	Equipment malfunction. The bubbler malfunctioned temporarily during the storm event.	7/7/2014	7/7/2014	0	Yes
E059.5	None				None
E060.1	Lightning interference caused a reset to the data logger.	6/8/2014	6/9/2014	1	None
	Silting.	7/31/2014	8/1/2014	1	None
	MSS dislodged the encoder tape during cleanout.	10/17/2014	10/20/2014	1	None

* MSS = Maintenance and Site Services (Laboratory group).

Table 2.6-3
Gaging Station and Sampler Inspection Intervals

Inspection Date	Days from Previous Inspection													
	CO101038	CO111041	E026	E030	E038	E039.1	E040	E042.1	E050.1	E055	E055.5	E056	E059.5	E060.1
9-Apr-14			Initial											
11-Apr-14			—*						Initial					Initial
17-Apr-14			—						—					—
18-Apr-14			—						7					7
23-Apr-14			—						—				Initial	—
24-Apr-14			—	Initial			Initial	Initial	6				—	6
25-Apr-14			—	—	Initial	Initial	—	—	—				—	—
28-Apr-14			—	—	—	—	—	4	—				—	—
30-Apr-14			—	—	—	—	—	—	—	Initial	Initial	Initial	—	—
2-May-14			23	—	—	—	—	—	8	—	—	—	—	8
9-May-14			—	—	—	—	—	—	7	—	—	—	—	7
15-May-14			—	21	—	—	21	—	—	—	—	—	—	—
16-May-14			—	—	—	—	—	—	7	16	—	16	—	7
20-May-14			—	—	25	25	—	—	—	—	20	—	—	—
21-May-14			19	—	—	—	—	23	—	—	—	—	—	—
22-May-14			—	—	—	—	—	—	6	—	—	—	—	—
23-May-14			—	—	—	—	—	—	—	—	—	—	—	7
30-May-14			—	—	—	—	—	—	8	—	—	—	—	7
3-Jun-14	Initial	Initial	13	—	—	—	—	13	—	—	—	—	—	—
4-Jun-14	—	—	—	20	15	15	20	—	—	19	15	19	42	—
6-Jun-14	—	—	—	—	—	—	—	—	7	—	—	—	—	7
9-Jun-14	—	—	—	—	—	—	—	—	—	—	—	—	—	3
10-Jun-14	7	7	7	6	—	—	6	7	—	—	—	—	6	—

Table 2.6-3 (continued)

Inspection Date	Days from Previous Inspection													
	CO101038	CO111041	E026	E030	E038	E039.1	E040	E042.1	E050.1	E055	E055.5	E056	E059.5	E060.1
11-Jun-14	—	—	—	—	—	—	—	—	—	7	7	7	—	—
13-Jun-14	—	—	—	—	9	9	—	—	7	—	—	—	—	4
17-Jun-14	7	7	7	7	—	4	7	7	—	6	—	6	7	—
20-Jun-14	—	—	—	—	7	—	—	—	7	—	9	—	—	7
24-Jun-14	7	7	7	—	—	—	—	—	—	7		7	7	-
25-Jun-14	—	—	—	8	—	—	8	8	5	—	—	—	—	—
26-Jun-14	—	—	—	—	6	9	—	—	—	—	6	—	—	6
1-Jul-14	7	7	7	6	-	5	6	6	—	—	—	—	7	—
2-Jul-14	—	—	—	—	6	—	—	—	—	8	6	8	—	—
3-Jul-14	—	—	—	—	—	—	—	—	8	—	—	—	—	7
8-Jul-14	7	—	7	7	—	—	7	7	—	—	—	—	—	—
9-Jul-14	—	8	—	1	—	—	1	1	6	—	—	—	8	—
10-Jul-14	—	—	—	—	8	9	-	—	—	8	8	8	—	7
14-Jul-14	6	5	6	5	—	—	5	5	—	—	—	—	—	—
15-Jul-14	—	—	—	—	—	5	1	—	—	—	—	—	6	5
16-Jul-14	—	—	—	—	6	—	—	—	—	—	—	6	—	—
17-Jul-14	3	3	—	—	—	2	—	—	—	—	7	—	—	—
21-Jul-14	—	—	—	7	—	—	5	—	—	—	—	—	—	—
22-Jul-14	—	4	7	—	6	5	—	6	—	6	5	6	7	—
24-Jul-14	7	-	-	—	—	—	—	—	8	—	—	—	—	9
28-Jul-14	4	7	7	7	6	6	7	—	—	—	—	—	—	—
29-Jul-14	—	—	—	—	—	—	—	7	—	—	—	—	—	—
30-Jul-14	2	—	—	2	2	2	2	1	6	8	8	8	8	—
31-Jul-14	—	—	—	—	—	—	—	—	—	—	—	—	—	7

Table 2.6-3 (continued)

Inspection Date	Days from Previous Inspection													
	CO101038	CO111041	E026	E030	E038	E039.1	E040	E042.1	E050.1	E055	E055.5	E056	E059.5	E060.1
1-Aug-14	—	—	—	—	—	—	—	—	—	—	—	—	—	1
4-Aug-14	5	7	7	5	—	—	5	—	—	—	—	—	5	—
5-Aug-14	—	—	—	—	6	6	—	—	—	6	6	6	—	—
6-Aug-14	—	—	—	—	—	—	—	—	—	—	—	—	2	—
7-Aug-14	—	—	—	—	—	—	—	6	6	—	—	—	—	6
11-Aug-14	7	7	7	7	—	—	7	—	—	—	—	—	5	—
12-Aug-14	—	—	—	—	7	7	—	—	—	7	7	7	—	—
13-Aug-14	—	—	—	—	—	—	—	6	6	—	—	—	—	6
19-Aug-14	8	7	8	8	—	—	8	6	—	—	—	—	8	—
20-Aug-14	—	—	—	—	8	8	—	—	—	8	8	8	—	—
21-Aug-14	—	—	—	—	—	—	—	—	8	—	—	—	—	8
25-Aug-14	—	—	6	—	—	—	—	6	—	—	—	—	6	—
26-Aug-14	7	7	—	7	-	6	7	—	—	—	—	—	—	—
27-Aug-14	—	—	—	—	—	—	—	—	—	7	7	7	—	—
28-Aug-14	—	—	3	—	—	—	—	—	—	—	1	—	—	—
29-Aug-14	—	—	—	—	9	—	—	—	8	—	—	—	—	8
3-Sep-14	8	8	6	8	5	8	8	9	—	—	—	—	—	—
4-Sep-14	—	—	—	—	1	1	—	1	6	8	7	8	10	6
8-Sep-14	5	5	5	—	4	4	—	—	—	—	—	—	—	—
9-Sep-14	—	—	—	6	—	—	6	5	—	—	—	—	—	—
10-Sep-14	—	—	—	—	—	—	—	—	—	6	6	6	—	—
12-Sep-14	—	—	—	—	—	—	—	—	8	—	—	—	8	8
15-Sep-14	7	7	7	—	—	—	—	—	—	—	—	—	—	—
16-Sep-14	—	—	—	7	8	8	7	7	—	—	—	—	—	—
17-Sep-14	—	—	—	—	—	—	—	—	—	7	7	7	—	—
18-Sep-14	—	—	—	—	—	—	—	—	6	—	—	—	6	6

Table 2.6-3 (continued)

Inspection Date	Days from Previous Inspection													
	CO101038	CO111041	E026	E030	E038	E039.1	E040	E042.1	E050.1	E055	E055.5	E056	E059.5	E060.1
22-Sep-14	7	7	7	6	—	—	6	6	—	—	—	—	—	—
23-Sep-14	—	—	—	—	—	—	—	—	—	6	6	6	—	—
24-Sep-14	—	—	—	—	8	8	—	—	—	—	—	—	—	—
26-Sep-14	—	—	—	—	—	—	—	—	8	—	—	—	8	8
29-Sep-14	7	7	7	7	—	—	7	7	—	—	—	—	—	—
30-Sep-14	—	—	—	—	—	—	—	—	—	7	7	7	4	—
2-Oct-14	—	—	—	—	8	8	—	—	6	—	—	—	2	6
6-Oct-14	7	7	7	7	—	—	7	7	—	—	—	—	—	—
7-Oct-14	—	—	—	—	—	—	—	—	—	7	7	7	5	—
8-Oct-14	—	—	—	—	6	6	—	—	—	—	—	—	—	—
10-Oct-14	—	—	—	—	—	—	—	—	8	—	—	—	—	8
14-Oct-14	8	8	8	8	—	2	8	8	—	—	7	—	—	—
15-Oct-14	—	—	—	—	7	4	—	—	—	8	—	8	—	—
16-Oct-14	—	—	—	—	—	—	—	—	6	-	—	—	9	6
20-Oct-14	6	6	6	6	—	—	6	6	—	—	—	—	—	4
21-Oct-14	—	—	—	—	—	—	—	—	—	6	7	6	—	—
22-Oct-14	—	—	—	—	7	7	—	—	—	—	—	—	—	—
24-Oct-14	—	—	4	—	—	—	—	—	8	—	—	—	8	4
28-Oct-14	8	8	4	8	—	—	8	8	—	—	—	—	—	—
29-Oct-14	—	—	—	—	—	—	—	—	—	8	8	8	—	—
30-Oct-14	—	—	—	—	8	8	—	—	6	—	—	—	6	6

Table 2.6-3 (continued)

Inspection Date	Days from Previous Inspection													
	CO101038	CO111041	E026	E030	E038	E039.1	E040	E042.1	E050.1	E055	E055.5	E056	E059.5	E060.1
3-Nov-14	6	6	6	6	—	—	6	6	—	—	—	—	—	—
4-Nov-14	—	—	—	—	—	—	—	—	—	6	6	6	—	—
5-Nov-14	—	—	—	—	6	6	—	—	—	—	—	—	—	—
6-Nov-14	—	—	—	—	—	—	—	—	7	—	—	—	7	7
10-Nov-14	7	7	7	7	5	5	7	7	—	—	—	—	—	—
12-Nov-14	—	—	—	—	—	—	—	—	—	8	8	8	—	—
13-Nov-14	—	—	—	—	—	—	—	—	7	—	—	—	7	7
17-Nov-14	7	7	7	7	—	—	7	7	—	—	—	—	—	—
19-Nov-14					9	9			—	7	7	7	—	—
21-Nov-14									8				8	8
25-Nov-14									—					4
4-Dec-14									13					9
10-Dec-14									6					6
19-Dec-14									9					9
23-Dec-14									4					4

Note: Gray shading indicates samplers were deactivated during winter months.

* — = Gaging station is between inspection dates.

Table 3.1-1
Drainage Area and Impermeable Surface Percentage in the Los Alamos Canyon Watersheds

Canyon	Gaging Station	Drainage Area (acres)	Impermeable Surface (%)
Acid	E055.5	53	81
Acid*	E056	237	70
Acid	Acid Canyon above E056	290	72
Pueblo	E055	2191	25
Pueblo*	E059	1827	39
Pueblo*	E060.1	1006	8
Pueblo	Pueblo Canyon above E060.1	5310	29
DP	E038	144	88
DP*	E039.1	112	29
DP*	E040	133	24
DP	DP Canyon above E039.1	256	62
DP	DP Canyon above E040	388	49
LA	E026	4534	2
LA*	E030	960	30
LA*	E042.1	601	12
LA*	E050.1	195	11
LA*	E109.9 (including Guaje Canyon)	25,800	8
LA	Los Alamos Canyon above E050.1	6680	10
LA	Los Alamos, Pueblo, and Guaje Canyons above E109.9	37,800	11
LA*	Los Alamos Canyon between E050.1, E060.1, and E109.9	4761	19
Guaje	E099	21,000	5

* Drainage area marked by an asterisk does not extend to head of watershed above gaging station. The drainage areas without an asterisk extend from the gaging station to the head of the watershed.

Table 3.2-1
Travel Time of Flood Bore, Peak Discharge, Increase or Decrease in Peak Discharge, and Percent Change in Peak Discharge from Upstream to Downstream Gaging Stations for 2014 Runoff Events Exceeding Sampling Triggers across the Watershed Mitigations

Date	Travel Time from E038 to E039.1 (min)	Peak Discharge (cfs)		+/–[a]	%[a]	Travel Time from E042.1 to E050.1 (min)	Peak Discharge (cfs)		+/–	%	Travel Time from E059.5 to E060.1 (min)	Peak Discharge (cfs)		+/–	%
		E038	E039.1				E042.1	E050.1				E059.5	E060.1		
7/7	—[b]	0	0.11	+	100	—	—	—	—	—	—	—	—	—	—
7/8	40	46	14	–	70	—	12	0	–	100	—	—	—	—	—
7/9	90	24	19	–	21	—	4.2	0	–	100	—	0.17	0	-	100
7/15	50	32	12	–	63	—	4.2	0	–	100	-10	0.17	0.18	N	N
	45	9.2	14	+	34	—	2.3	0	–	100	—	—	—	—	—
	30	11	15	+	27	—	—	—	—	—	—	—	—	—	—
	50	6.1	8.1	+	25	—	—	—	—	—	—	—	—	—	—
7/15-7/16	15	273	317	+	14	60	114	49	–	57	–80	8.4	0.86	N	N
7/27	40	147	19	–	87	—	—	—	—	—	—	1.7	0	–	100
	30	25	22	–	12	—	—	—	—	—	—	—	—	—	—
7/29	25	94	66	–	30	65	92	63	–	32	210	44	0.50	–	99
	20	59	50	–	15	—	—	—	—	—	—	—	—	—	—
	20	40	41	+	2	—	—	—	—	—	—	—	—	—	—
7/31	20	209	250	+	16	35	210	214	+	2	100	97	54	–	44
8/1	45	26	7.5	–	71	—	5.2	0	–	100	625	1.0	0.86	–	14
8/4	35	36	14	–	61	–20	3.4	0.25	N	N	—	1.7	0	–	100
	35	9.5	7.8	–	18	—	—	—	—	—	—	—	—	—	—
9/5	35	132	14	–	89	—	—	—	—	—	—	0.13	0	–	100
9/29	—	47	0	–	100	—	—	—	—	—	—	3.3	0	–	100
10/9	40	34	14	–	59	—	5.4	0	–	100	—	5.0	0	–	100
	40	12	6.7	–	44	—	7.0	0	–	100	—	—	—	—	—
Min	15	0	0	—	2	–20	2	0	—	2	–80	0	0	—	14
Mean	37	61	43	—	46	35	42	30	—	79	169	15	5	—	84
Max	90	273	317	—	100	65	210	214	—	100	625	97	54	—	100

[a] + = Increase; – = decrease; % = percent change in peak discharge; N = little to no change in peak discharge; G = negative travel time (i.e., peak of downstream gaging station occurred before peak of upstream gaging station).

[b] — = Result not applicable.

Table 3.2-2
Pearson's Correlation Coefficients between Post-Flood Bore Discharge (Q) and SSC for Each Gaging Station Sampled during 2014

Time Lag	E038				E039.1					
	7/8	7/27	7/29	7/31	7/8	7/15	7/15	7/27	7/29	7/31
Q_t, TSS_t	0.62	0.90	0.92	0.81	0.69	0.54	0.93	0.59	0.82	0.80
Q_t, TSS_{t-5}	0.87	0.95	0.93	0.82	0.75	0.58	0.94	0.49	0.77	0.87
Q_t, TSS_{t-10}	0.75	0.96	0.92	0.83	0.61	0.54	0.93	0.26	0.88	0.91
Q_t, TSS_{t-15}	0.72	0.95	0.90	0.83	0.54	0.47	0.92	0.38	0.76	0.98
Q_t, TSS_{t-20}	0.92	0.95	0.93	0.84	0.47	0.38	0.91	0.35	0.67	0.93
Q_t, TSS_{t-25}	0.98	0.92	0.85	0.87	0.97	0.32	0.91	0.33	0.62	0.94
Q_t, TSS_{t-30}	n/a*	0.96	0.89	0.90	0.98	0.28	0.83	0.15	0.51	n/a

Time Lag	E042.1		E050.1			E059.5	
	7/29	7/31	7/15	7/29	7/31	7/29	7/31
Q_t, TSS_t	0.86	0.98	0.03	0.53	0.69	0.91	0.82
Q_t, TSS_{t-5}	0.86	0.97	0.07	0.66	0.70	0.85	0.84
Q_t, TSS_{t-10}	0.84	0.94	0.00	0.73	0.61	0.84	0.89
Q_t, TSS_{t-15}	0.83	0.88	0.27	0.71	0.52	0.83	0.93
Q_t, TSS_{t-20}	0.84	0.81	0.63	0.60	0.20	0.83	0.86
Q_t, TSS_{t-25}	0.85	0.70	0.84	0.28	-0.05	0.85	0.88
Q_t, TSS_{t-30}	0.87	0.56	0.78	-0.31	-0.41	0.86	0.95

Note: Maximum correlations are shaded in gray.

* n/a = Not applicable because data points are limited (i.e., less than 3).

Table 3.2-3
SSC-Based Sediment Yield and Runoff Volume for Sampled 2012, 2013, and 2014 Runoff Events

Gaging Station	Date	Sediment Yield (tons)	Sediment Yield (yd^3)[a]	Runoff Volume (acre-feet)	Peak Discharge (cfs)
2012 Runoff Events					
E042.1	10/12/2012	82	37	14	70
E050.1	7/11/2012	9883	4425	8.2	130
E050.1	7/24/2012	60	27	3.5	9.9
E050.1	8/3/2012	2320	1039	15	170
E050.1	9/28/2012	28	13	1.8	7.0
E109.9	7/5/2012	1369	613	5.9	48
E109.9	8/24/2012	2706	1211	11	160
2013 Runoff Events					
E038	6/14/2013	11	5.1	3.0	70
E038	6/30/2013	11	5.0	1.9	120
E038	7/12/2013	87	39	14	330
E038	7/28/2013	4.7	2.1	1.6	74
E038	8/5/2013	25	11	5.1	170
E038	8/9/2013	3.8	1.7	1.3	62
E039.1	6/14/2013	0.6	0.3	1.3	13
E039.1	6/30/2013	0.3	0.1	0.8	11
E039.1	7/12/2013	75	34	16	330
E039.1	7/28/2013	0.8	0.4	1.2	24
E039.1	8/4/2013	0.8	0.4	0.7	12
E039.1	8/9/2013	0.5	0.2	0.9	16
E039.1	9/10/2013	4.4	2.0	5.9	35
E039.1	9/12/2013	3.6	1.6	7.6	77
E039.1	11/5/2013	0.9	0.4	2.2	21
E042.1	7/12/2013	817	366	20	160
E042.1	8/5/2013	29	13	9.4	80
E042.1	9/10/2013	48	21	17	36
E050.1	7/12/2013	39	17	4.3	32
E050.1	8/5/2013	6.1	2.7	1.7	20
E050.1	9/10/2013	4.6	2.1	6.4	11
E050.1	9/12/2013	171	77	33	87
E099	7/12/2013	5748	2574	14	230
E099	8/5/2013	1015	455	6.7	340
E109.9	7/8/2013	3880	1737	12	110
E109.9	7/12/2013[b]	1326	594	26	180
E109.9	7/20/2013[b]	24305	10883	67	810

Table 3.2-3 (continued)

Gaging Station	Date	Sediment Yield (tons)	Sediment Yield (yd^3)[a]	Runoff Volume (acre-feet)	Peak Discharge (cfs)
E109.9	7/25/2013	1639	734	11	100
E109.9	7/26/2013[b]	515	230	14	160
E109.9	8/3/2013	51060	22862	72	950
E109.9	8/5/2013[b]	3955	1771	50	1000
E109.9	8/9/2013	8524	3816	34	270
2014 Runoff Events					
E038	7/8/2014	6.5	2.9	1.7	46
E038	7/27/2014	7.9	3.5	2.9	148
E038	7/29/2014	11	4.8	5.5	94
E038	7/31/2014	30	14	9.7	209
E039.1	7/8/2014	1.1	0.5	0.7	14
E039.1	7/15/2014	1.3	0.6	3.2	15
E039.1	7/15/2014	58	26	11	317
E039.1	7/27/2014	1.6	0.7	1.9	22
E039.1	7/29/2014	7.8	3.5	6.2	66
E039.1	7/31/2014	31	14	11	250
E040	7/29/2014	4.2	1.9	9.4	95
E040	7/31/2014	9.8	4.4	14	239
E042.1	7/29/2014	186	83	16	92
E042.1	7/31/2014	551	247	21	210
E050.1	7/15/2014	67	30	8.8	49
E050.1	7/29/2014	41	18	11	63
E050.1	7/31/2014	204	91	22	214
E059.5	7/29/2014	30	13	3.0	44
E059.5	7/31/2014	98	44	4.7	97
E038	7/8/2014	6.5	2.9	1.7	46

Note: Sediment yield and runoff volume were calculated only from sampled events with reliable hydrographs and sedigraphs. Thus, the September 12, 2013, sampling at E026 and E109.9 was excluded.

[a] Volumetric sediment yield was computed using a soil bulk density of 2650 kg/m^3 and volume = mass/density.

[b] Samples were not collected throughout the entire hydrograph (see Figure 3.2-3); thus, sediment yields may be underestimated.

Table 4.2-1
NMWQCC Surface Water-Quality Criteria

Analytical Suite[a]	Analyte Name	Field Prep	Acute Aquatic	Chronic Aquatic	Human Health Persistent	Livestock Watering	Wildlife Habitat
DIOX/FUR	Dioxin (TEQ)	UF[b]	n/a[c]	n/a	0.000000051	n/a	n/a
METALS	Aluminum	10F[d]	HD[e]	HD	n/a	n/a	n/a
METALS	Antimony	F[f]	n/a	n/a	640	n/a	n/a
METALS	Arsenic	F	340	150	9	200	n/a
METALS	Boron	F	n/a	n/a	n/a	5000	n/a
METALS	Cadmium	F	HD	HD	n/a	50	n/a
METALS	Chromium	F	n/a	n/a	n/a	1000	n/a
METALS	Chromium III	F	HD	HD	n/a	n/a	n/a
METALS	Chromium VI	F	16	11	n/a	n/a	n/a
METALS	Cobalt	F	n/a	n/a	n/a	1000	n/a
METALS	Copper	F	HD	HD	n/a	500	n/a
METALS	Lead	F	HD	HD	n/a	100	n/a
METALS	Manganese	F	HD	HD	n/a	n/a	n/a
METALS	Mercury	F	1.4	0.77	n/a	n/a	n/a
METALS	Mercury	UF	n/a	n/a	n/a	10	0.77
METALS	Nickel	F	HD	HD	4600	n/a	n/a
METALS	Selenium	F	n/a	n/a	4200	50	n/a
METALS	Selenium	UF	20	5	n/a	n/a	5
METALS	Silver	F	HD	n/a	n/a	n/a	n/a
METALS	Thallium	F	n/a	n/a	0.47	n/a	n/a
METALS	Vanadium	F	n/a	n/a	n/a	100	n/a
METALS	Zinc	F	HD	HD	26,000	25,000	n/a
WET_CHEM	Cyanide (Total)	UF	22	5.2	140	n/a	5.2
PCB_CONG	Total PCB	UF	2	0.014	0.00064	n/a	0.014
RAD	Gross alpha, adjusted	UF	n/a	n/a	n/a	15	n/a
RAD	Radium-226 and Radium-228	UF	n/a	n/a	n/a	30	n/a

[a] All units are µg/L except for RAD, which are pCi/L.

[b] UF = Unfiltered.

[c] n/a = Not applicable.

[d] 10F = Filtration using 10-µm pore size.

[e] HD = Hardness-dependent criteria calculated using the hardness as mg $CaCO_3$/L measured in each sample.

[f] F = Filtration using 0.45-µm pore size.

Table 4.2-2
NMWQCC Surface Water-Quality Criteria Exceedances in 2014

Canyon	Gaging Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result[a] (µg/L)	Hardness Result (mg/L)	WQ Criteria[a] (µg/L)	Water-Quality Criterion
Acid	E055.5	WTLAP-14-77124	7/15/2014	Total PCBs	Y	0.0437	n/a[b]	0.00064	Human Health Organism Only
Acid	E055.5	WTLAP-14-76958	7/31/2014	Copper, dissolved	Y	2.53	16.6	1.93	Chronic Aquatic Life
Acid	E055.5	WTLAP-14-76958	7/31/2014	Lead, dissolved	Y	2.18	16.6	0.341	Chronic Aquatic Life
Acid	E055.5	WTLAP-14-76944	7/31/2014	Mercury	Y	1.03	n/a	0.77	Wildlife Habitat
Acid	E055.5	WTLAP-14-77138	7/31/2014	Total PCBs	Y	0.0393	n/a	0.00064	Human Health Organism Only
Acid	E056	WTLAP-14-76903	7/7/2014	Copper, dissolved	Y	3.89	15.9	1.86	Chronic Aquatic Life
Acid	E056	WTLAP-14-76903	7/7/2014	Lead, dissolved	Y	1.56	15.9	0.324	Chronic Aquatic Life
Acid	E056	WTLAP-14-77111	7/7/2014	Total PCBs	Y	0.0177	n/a	0.00064	Human Health Organism Only
Acid	E056	WTLAP-14-76945	7/15/2014	Cadmium, dissolved	N[c]	1	11.2	0.0935	Chronic Aquatic Life
Acid	E056	WTLAP-14-76945	7/15/2014	Copper, dissolved	Y	3.06	11.2	1.38	Chronic Aquatic Life
Acid	E056	WTLAP-14-76945	7/15/2014	Lead, dissolved	Y	1.34	11.2	0.218	Chronic Aquatic Life
Acid	E056	WTLAP-14-77125	7/15/2014	Total PCBs	Y	0.0771	n/a	0.00064	Human Health Organism Only
Acid	E056	WTLAP-14-76959	7/29/2014	Cadmium, dissolved	N	1	12.6	0.102	Chronic Aquatic Life
Acid	E056	WTLAP-14-76959	7/29/2014	Copper, dissolved	Y	3.4	12.6	1.53	Chronic Aquatic Life
Acid	E056	WTLAP-14-76959	7/29/2014	Lead, dissolved	Y	2.22	12.6	0.249	Chronic Aquatic Life
Acid	E056	WTLAP-14-76973	7/29/2014	Mercury	Y	1.42	n/a	0.77	Wildlife Habitat
Acid	E056	WTLAP-14-77139	7/29/2014	Total PCBs	Y	0.053	n/a	0.00064	Human Health Organism Only
Pueblo	E055	WTLAP-14-76914	7/31/2014	Copper, dissolved	Y	2.51	17.7	2.04	Chronic Aquatic Life
Pueblo	E055	WTLAP-14-76914	7/31/2014	Lead, dissolved	Y	1.42	17.7	0.366	Chronic Aquatic Life
Pueblo	E055	WTLAP-14-77122	7/31/2014	Total PCBs	Y	0.0264	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-76909	7/29/2014	Copper, dissolved	Y	3.2	25.8	2.81	Chronic Aquatic Life
Pueblo	E059.5	WTLAP-14-85747	7/29/2014	Dioxin (TEQ)	N	1.044E-06	n/a	5.10E-08	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-76909	7/29/2014	Lead, dissolved	Y	1.42	25.8	0.56	Chronic Aquatic Life
Pueblo	E059.5	WTLAP-14-76923	7/29/2014	Mercury	Y	0.862	n/a	0.77	Wildlife Habitat
Pueblo	E059.5	WTLAP-14-77117	7/29/2014	Total PCBs	Y	0.0517	n/a	0.00064	Human Health Organism Only

Table 4.2-2 (continued)

Canyon	Gaging Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result (µg/L)	Hardness Result (mg/L)	WQ Criteria (µg/L)	Water-Quality Criterion
Pueblo	E059.5	WTLAP-14-77167	7/29/2014	Total PCBs	Y	0.0372	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-77171	7/29/2014	Total PCBs	Y	0.0774	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-85749	7/31/2014	Dioxin (TEQ)	N	1.278E-06	n/a	5.10E-08	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-76965	7/31/2014	Lead, dissolved	Y	1.39	30.3	0.671	Chronic Aquatic Life
Pueblo	E059.5	WTLAP-14-76979	7/31/2014	Mercury	Y	1.84	n/a	0.77	Wildlife Habitat
Pueblo	E059.5	WTLAP-14-77145	7/31/2014	Total PCBs	Y	0.184	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-77187	7/31/2014	Total PCBs	Y	0.0984	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-85750	8/10/2014	Dioxin (TEQ)	N	6.602E-06	n/a	5.10E-08	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-77007	8/10/2014	Lead, dissolved	Y	2.12	29	0.639	Chronic Aquatic Life
Pueblo	E059.5	WTLAP-14-77159	8/10/2014	Total PCBs	Y	0.0253	n/a	0.00064	Human Health Organism Only
Pueblo	E059.5	WTLAP-14-77198	8/10/2014	Total PCBs	Y	0.00221	n/a	0.00064	Human Health Organism Only
Pueblo	E060.1	WTLAP-14-85752	7/31/2014	Mercury	Y	1.63	n/a	0.77	Wildlife Habitat
Pueblo	E060.1	WTLAP-14-85752	7/31/2014	Selenium, total recoverable	Y	6.01	n/a	5	Wildlife Habitat, Chronic Aquatic Life
DP	E038	WTLAP-14-77115	7/8/2014	Total PCBs	Y	0.0251	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-14-77129	7/15/2014	Total PCBs	Y	0.0212	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-14-77143	7/27/2014	Total PCBs	Y	0.0154	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-14-77157	7/29/2014	Total PCBs	Y	0.00873	n/a	0.00064	Human Health Organism Only
DP	E038	WTLAP-14-85931	7/31/2014	Total PCBs	Y	0.0236	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-14-77116	7/8/2014	Total PCBs	Y	0.0259	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-14-77130	7/15/2014	Total PCBs	Y	0.0116	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-14-77144	7/15/2014	Total PCBs	Y	0.0475	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-14-77158	7/27/2014	Total PCBs	Y	0.0115	n/a	0.00064	Human Health Organism Only
DP	E039.1	WTLAP-14-85647	7/29/2014	Total PCBs	Y	0.00917	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-14-77114	7/9/2014	Total PCBs	Y	0.0124	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-14-77128	7/15/2014	Total PCBs	Y	0.00601	n/a	0.00064	Human Health Organism Only

Table 4.2-2 (continued)

Canyon	Gaging Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result (µg/L)	Hardness Result (mg/L)	WQ Criteria (µg/L)	Water-Quality Criterion
DP	E040	WTLAP-14-77142	7/15/2014	Total PCBs	Y	0.0132	n/a	0.00064	Human Health Organism Only
DP	E040	WTLAP-14-77156	7/16/2014	Total PCBs	Y	0.00803	n/a	0.00064	Human Health Organism Only
Los Alamos	E026	WTLAP-14-76659	7/31/2014	Dioxin (TEQ)	N	6.66E-08	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E026	WTLAP-14-77120	7/31/2014	Total PCBs	Y	0.132	n/a	0.00064	Human Health Organism Only
Los Alamos	E030	WTLAP-14-76657	7/29/2014	Dioxin (TEQ)	N	1.794E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E030	WTLAP-14-76924	7/29/2014	Mercury	Y	1.28	n/a	0.77	Wildlife Habitat
Los Alamos	E030	WTLAP-14-77118	7/29/2014	Total PCBs	Y	0.0622	n/a	0.00064	Human Health Organism Only
Los Alamos	E030	WTLAP-14-76664	7/31/2014	Dioxin (TEQ)	N	2.944E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E030	WTLAP-14-76938	7/31/2014	Mercury	Y	2.42	n/a	0.77	Wildlife Habitat
Los Alamos	E030	WTLAP-14-76938	7/31/2014	Selenium, total recoverable	Y	5.07	n/a	5	Wildlife Habitat, Chronic Aquatic Life
Los Alamos	E030	WTLAP-14-77132	7/31/2014	Total PCBs	Y	0.124	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76658	7/8/2014	Dioxin (TEQ)	N	5.439E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76925	7/8/2014	Mercury	Y	1.98	n/a	0.77	Wildlife Habitat
Los Alamos	E042.1	WTLAP-14-77119	7/8/2014	Total PCBs	Y	0.801	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77168	7/8/2014	Total PCBs	Y	0.0982	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77172	7/8/2014	Total PCBs	Y	0.0787	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76665	7/15/2014	Dioxin (TEQ)	N	1.591E-05	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76939	7/15/2014	Mercury	Y	2.13	n/a	0.77	Wildlife Habitat
Los Alamos	E042.1	WTLAP-14-77133	7/15/2014	Total PCBs	Y	0.14	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77177	7/16/2014	Total PCBs	Y	0.335	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77181	7/16/2014	Total PCBs	Y	0.0792	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76672	7/29/2014	Dioxin (TEQ)	N	2.095E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76981	7/29/2014	Mercury	Y	0.773	n/a	0.77	Wildlife Habitat
Los Alamos	E042.1	WTLAP-14-77147	7/29/2014	Total PCBs	Y	0.0872	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77184	7/29/2014	Total PCBs	Y	0.0465	n/a	0.00064	Human Health Organism Only

Table 4.2-2 (continued)

Canyon	Gaging Station	Field Sample ID	Sample Collection Date	Parameter	Detect Flag	Parameter Result (µg/L)	Hardness Result (mg/L)	WQ Criteria (µg/L)	Water-Quality Criterion
Los Alamos	E042.1	WTLAP-14-77188	7/29/2014	Total PCBs	Y	0.0927	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76679	7/31/2014	Dioxin (TEQ)	N	5.386E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-76995	7/31/2014	Mercury	Y	1.62	n/a	0.77	Wildlife Habitat
Los Alamos	E042.1	WTLAP-14-77161	7/31/2014	Total PCBs	Y	0.176	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77193	7/31/2014	Total PCBs	Y	0.157	n/a	0.00064	Human Health Organism Only
Los Alamos	E042.1	WTLAP-14-77197	7/31/2014	Total PCBs	Y	0.0898	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-76763	7/15/2014	Gross alpha, adjusted[c]	Y	306	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-14-76660	7/16/2014	Dioxin (TEQ)	N	3.548E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-77121	7/16/2014	Total PCBs	Y	0.132	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-77169	7/16/2014	Total PCBs	Y	0.125	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-76667	7/29/2014	Dioxin (TEQ)	N	1.027E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-76766	7/29/2014	Gross alpha, adjusted	Y	158	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-14-77135	7/29/2014	Total PCBs	Y	0.122	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-77180	7/29/2014	Total PCBs	Y	0.0331	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-76674	7/31/2014	Dioxin (TEQ)	N	1.129E-06	n/a	5.1E-08	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-76767	7/31/2014	Gross alpha, adjusted	Y	180	n/a	15	Livestock Watering
Los Alamos	E050.1	WTLAP-14-76983	7/31/2014	Mercury	Y	1	n/a	0.77	Wildlife Habitat
Los Alamos	E050.1	WTLAP-14-77149	7/31/2014	Total PCBs	Y	0.0796	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-77185	7/31/2014	Total PCBs	Y	0.132	n/a	0.00064	Human Health Organism Only
Los Alamos	E050.1	WTLAP-14-77189	7/31/2014	Total PCBs	Y	0.0893	n/a	0.00064	Human Health Organism Only

[a] Units for columns "Parameter Result" and "WQ [Water-Quality] Criteria" are µg/L with the exception of adjusted gross alpha, which is in pCi/L.

[b] n/a = Not applicable.

[c] Nondetected results that have a MDL greater than the water-quality criteria potentially exceed the water-quality criteria, and thus are included in this table.

[d] Adjusted gross-alpha activity concentration (pCi/L) is computed as gross-alpha activity concentration (pCi/L) minus 0.667 times total uranium concentration (µg/L). The nearest total uranium result on the hydrograph to the gross-alpha result is used. This methodology is recommended in the "Procedures for Assessing Water Quality Standards Attainment for the State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report: Assessment Protocol" (available at https://www.env.nm.gov/swqb/protocols/2014/AssessmentProtocol-w-Appendices-2014.pdf).

Table 4.2-3
Dioxin and Furan TEFs for the Dibenzodioxins and Dibenzofurans

Analyte Code	Analyte	TEF
35822-46-9	Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]	0.01
67562-39-4	Heptachlorodibenzofuran[1,2,3,4,6,7,8-]	0.01
55673-89-7	Heptachlorodibenzofuran[1,2,3,4,7,8,9-]	0.01
39227-28-6	Hexachlorodibenzodioxin[1,2,3,4,7,8-]	0.1
57653-85-7	Hexachlorodibenzodioxin[1,2,3,6,7,8-]	0.1
19408-74-3	Hexachlorodibenzodioxin[1,2,3,7,8,9-]	0.1
70648-26-9	Hexachlorodibenzofuran[1,2,3,4,7,8-]	0.1
57117-44-9	Hexachlorodibenzofuran[1,2,3,6,7,8-]	0.1
72918-21-9	Hexachlorodibenzofuran[1,2,3,7,8,9-]	0.1
60851-34-5	Hexachlorodibenzofuran[2,3,4,6,7,8-]	0.1
3268-87-9	Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]	0.0003
39001-02-0	Octachlorodibenzofuran[1,2,3,4,6,7,8,9-]	0.0003
40321-76-4	Pentachlorodibenzodioxin[1,2,3,7,8-]	1
57117-41-6	Pentachlorodibenzofuran[1,2,3,7,8-]	0.03
57117-31-4	Pentachlorodibenzofuran[2,3,4,7,8-]	0.3
1746-01-6	Tetrachlorodibenzodioxin[2,3,7,8-]	1
51207-31-9	Tetrachlorodibenzofuran[2,3,7,8-]	0.1

Table 4.2-4
TCDD TEQs in 2014 Storm Water Samples

Gaging Station	Collection Date	Sample ID	2,3,7,8-TCDD TEQ (µg/L)
CO101038	7/15/14	WTLAP-14-77112	0.0000002000800
CO101038	7/31/14	WTLAP-14-77126	0.0000023954300
CO101038	8/4/14	WTLAP-14-77140	0.0000048193270
CO111041	7/7/14	WTLAP-14-77113	0.0001479657000
CO111041	7/15/14	WTLAP-14-77127	0.0000110591500
CO111041	7/31/14	WTLAP-14-77141	0.0000384011000
CO111041	8/4/14	WTLAP-14-77155	0.0000329716000
E026	7/31/14	WTLAP-14-76659	0.0000000666000
E026	7/31/14	WTLAP-14-77120	0.0000016451020
E030	7/29/14	WTLAP-14-76657	0.0000017940000
E030	7/29/14	WTLAP-14-77118	0.0000013122710
E030	7/31/14	WTLAP-14-76664	0.0000029442000
E030	7/31/14	WTLAP-14-77132	0.0000033873150
E038	7/8/14	WTLAP-14-77115	0.0000009645010
E038	7/15/14	WTLAP-14-77129	0.0000008885160
E038	7/27/14	WTLAP-14-77143	0.0000000284029

Table 4.2-4 (continued)

Gaging Station	Collection Date	Sample ID	2,3,7,8-TCDD TEQ (µg/L)
E038	7/29/14	WTLAP-14-77157	0.0000000179652
E038	7/31/14	WTLAP-14-85931	0.0000012437570
E039.1	7/8/14	WTLAP-14-77116	0.0000010441420
E039.1	7/15/14	WTLAP-14-77130	0.0000000317634
E039.1	7/15/14	WTLAP-14-77144	0.0000020067670
E039.1	7/27/14	WTLAP-14-77158	0.0000000208300
E039.1	7/29/14	WTLAP-14-85647	0.0000000154180
E040	7/9/14	WTLAP-14-77114	0.0000000210140
E040	7/15/14	WTLAP-14-77128	0.0000000112221
E040	7/15/14	WTLAP-14-77142	0.0000000216790
E040	7/16/14	WTLAP-14-77156	0.0000000117600
E042.1	7/8/14	WTLAP-14-76658	0.0000054389000
E042.1	7/8/14	WTLAP-14-77119	0.0000225775300
E042.1	7/8/14	WTLAP-14-77168	0.0000025321310
E042.1	7/8/14	WTLAP-14-77172	0.0000024304320
E042.1	7/15/14	WTLAP-14-76665	0.0000159061000
E042.1	7/15/14	WTLAP-14-77133	0.0000039905480
E042.1	7/16/14	WTLAP-14-77177	0.0000130199430
E042.1	7/16/14	WTLAP-14-77181	0.0000020490910
E042.1	7/29/14	WTLAP-14-76672	0.0000020950000
E042.1	7/29/14	WTLAP-14-77147	0.0000019902230
E042.1	7/29/14	WTLAP-14-77184	0.0000009909740
E042.1	7/29/14	WTLAP-14-77188	0.0000022895210
E042.1	7/31/14	WTLAP-14-76679	0.0000053855000
E042.1	7/31/14	WTLAP-14-77161	0.0000033194260
E042.1	7/31/14	WTLAP-14-77193	0.0000042213850
E042.1	7/31/14	WTLAP-14-77197	0.0000024001150
E050.1	7/16/14	WTLAP-14-76660	0.0000035478000
E050.1	7/16/14	WTLAP-14-77121	0.0000049616790
E050.1	7/16/14	WTLAP-14-77169	0.0000043028490
E050.1	7/29/14	WTLAP-14-76667	0.0000010270000
E050.1	7/29/14	WTLAP-14-77135	0.0000038059460
E050.1	7/29/14	WTLAP-14-77180	0.0000010137570
E050.1	7/31/14	WTLAP-14-76674	0.0000011289000
E050.1	7/31/14	WTLAP-14-77149	0.0000026759480
E050.1	7/31/14	WTLAP-14-77185	0.0000033999250
E050.1	7/31/14	WTLAP-14-77189	0.0000020534770

Table 4.2-4 (continued)

Gaging Station	Collection Date	Sample ID	2,3,7,8-TCDD TEQ (µg/L)
E055	7/31/14	WTLAP-14-77122	0.0000000250160
E055.5	7/15/14	WTLAP-14-77124	0.0000000755830
E055.5	7/31/14	WTLAP-14-77138	0.0000000802470
E056	7/7/14	WTLAP-14-77111	0.0000000357980
E056	7/15/14	WTLAP-14-77125	0.0000013280910
E056	7/29/14	WTLAP-14-77139	0.0000001677390
E059.5	7/29/14	WTLAP-14-77117	0.0000011364360
E059.5	7/29/14	WTLAP-14-77167	0.0000000727260
E059.5	7/29/14	WTLAP-14-77171	0.0000015260100
E059.5	7/29/14	WTLAP-14-85747	0.0000010435000
E059.5	7/31/14	WTLAP-14-77145	0.0000051370890
E059.5	7/31/14	WTLAP-14-77187	0.0000031458010
E059.5	7/31/14	WTLAP-14-85749	0.0000012779000
E059.5	8/10/14	WTLAP-14-77159	0.0000000369630
E059.5	8/10/14	WTLAP-14-77198	0.0000000041250
E059.5	8/10/14	WTLAP-14-85750	0.0000066024000

Table 4.3-1
Calculated SSC and Instantaneous Discharge Determined for Each Sample Collected during 2014 in the LA/P Watershed

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
CO101038	07/15/2014 22:23	UF[a]	WTLAP-14-77024	SSC[b]	390	na[c]
CO101038	07/15/2014 22:34	UF	WTLAP-14-77112	Not estimated	NE[d]	na
CO101038	07/15/2014 22:36	F[e]	WTLAP-14-76904	Not estimated	NE	na
CO101038	07/15/2014 22:36	UF	WTLAP-14-76918	Not estimated	NE	na
CO101038	07/15/2014 22:37	UF	WTLAP-14-76807	Not estimated	NE	na
CO101038	07/15/2014 22:38	UF	WTLAP-14-77015	Not estimated	NE	na
CO101038	07/15/2014 22:39	F	WTLAP-14-76684	Not estimated	NE	na
CO101038	07/15/2014 22:40	F	WTLAP-14-76824	Not estimated	NE	na
CO101038	07/15/2014 22:41	UF	WTLAP-14-76612	Not estimated	NE	na
CO101038	07/31/2014 17:05	UF	WTLAP-14-77038	SSC	380	na
CO101038	07/31/2014 17:06	UF	WTLAP-14-77126	Not estimated	NE	na
CO101038	07/31/2014 17:08	F	WTLAP-14-76946	Not estimated	NE	na
CO101038	07/31/2014 17:08	UF	WTLAP-14-76932	Not estimated	NE	na
CO101038	07/31/2014 17:09	UF	WTLAP-14-76810	Not estimated	NE	na

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
CO101038	07/31/2014 17:10	UF	WTLAP-14-77018	Not estimated	NE	na
CO101038	07/31/2014 17:11	F	WTLAP-14-76695	Not estimated	NE	na
CO101038	07/31/2014 17:12	F	WTLAP-14-76835	Not estimated	NE	na
CO101038	07/31/2014 17:13	UF	WTLAP-14-76623	Not estimated	NE	na
CO101038	08/04/2014 12:25	UF	WTLAP-14-77052	SSC	340	na
CO101038	08/04/2014 12:26	UF	WTLAP-14-77140	Not estimated	NE	na
CO101038	08/04/2014 12:28	F	WTLAP-14-76960	Not estimated	NE	na
CO101038	08/04/2014 12:28	UF	WTLAP-14-76974	Not estimated	NE	na
CO101038	08/04/2014 12:29	UF	WTLAP-14-76811	Not estimated	NE	na
CO101038	08/04/2014 12:30	UF	WTLAP-14-77019	Not estimated	NE	na
CO101038	08/04/2014 12:31	F	WTLAP-14-76706	Not estimated	NE	na
CO101038	08/04/2014 12:32	F	WTLAP-14-76846	Not estimated	NE	na
CO101038	08/04/2014 12:33	UF	WTLAP-14-76634	Not estimated	NE	na
CO111041	07/07/2014 15:12	UF	WTLAP-14-77025	SSC	10300	na
CO111041	07/07/2014 15:42	UF	WTLAP-14-77113	Not estimated	NE	na
CO111041	07/15/2014 01:11	UF	WTLAP-14-77039	SSC	470	na
CO111041	07/15/2014 01:12	UF	WTLAP-14-77127	Not estimated	NE	na
CO111041	07/15/2014 02:02	UF	WTLAP-14-76933	Not estimated	NE	na
CO111041	07/15/2014 02:03	UF	WTLAP-14-76809	Not estimated	NE	na
CO111041	07/15/2014 02:04	UF	WTLAP-14-77017	Not estimated	NE	na
CO111041	07/15/2014 02:05	F	WTLAP-14-76696	Not estimated	NE	na
CO111041	07/15/2014 02:06	F	WTLAP-14-76836	Not estimated	NE	na
CO111041	07/15/2014 02:07	UF	WTLAP-14-76624	Not estimated	NE	na
CO111041	07/31/2014 17:12	UF	WTLAP-14-77053	SSC	13800	na
CO111041	07/31/2014 17:13	UF	WTLAP-14-77141	Not estimated	NE	na
CO111041	07/31/2014 17:15	F	WTLAP-14-76961	Not estimated	NE	na
CO111041	07/31/2014 17:15	UF	WTLAP-14-76975	Not estimated	NE	na
CO111041	07/31/2014 17:16	UF	WTLAP-14-76812	Not estimated	NE	na
CO111041	07/31/2014 17:17	UF	WTLAP-14-77020	Not estimated	NE	na
CO111041	07/31/2014 17:18	F	WTLAP-14-76707	Not estimated	NE	na
CO111041	07/31/2014 17:19	F	WTLAP-14-76847	Not estimated	NE	na
CO111041	07/31/2014 17:20	UF	WTLAP-14-76635	Not estimated	NE	na
E026	07/31/2014 17:35	UF	WTLAP-14-77032	SSC	23600	43
E026	07/31/2014 17:38	UF	WTLAP-14-77120	Estimated	20300	31
E026	07/31/2014 17:41	UF	WTLAP-14-76733	Estimated	17000	26

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E026	07/31/2014 17:42	UF	WTLAP-14-76775	Estimated	15900	29
E026	07/31/2014 17:45	UF	WTLAP-14-76873	Estimated	12600	39
E026	07/31/2014 17:47	UF	WTLAP-14-76659	Estimated	10400	34
E026	07/31/2014 17:50	F	WTLAP-14-76912	Estimated	7160	26
E026	07/31/2014 17:50	UF	WTLAP-14-76926	Estimated	7160	26
E026	07/31/2014 17:51	UF	WTLAP-14-77262	SSC	6060	24
E030	07/29/2014 12:24	UF	WTLAP-14-77030	SSC	20000	15
E030	07/29/2014 12:25	UF	WTLAP-14-77118	Estimated	19600	14
E030	07/29/2014 12:28	UF	WTLAP-14-76731	Estimated	18300	11
E030	07/29/2014 12:30	UF	WTLAP-14-76774	Estimated	17400	9.8
E030	07/29/2014 12:33	UF	WTLAP-14-76871	Estimated	16100	12
E030	07/29/2014 12:34	UF	WTLAP-14-76657	Estimated	15700	12
E030	07/29/2014 12:37	F	WTLAP-14-76910	Estimated	14400	13
E030	07/29/2014 12:37	UF	WTLAP-14-76924	Estimated	14400	13
E030	07/29/2014 12:39	UF	WTLAP-14-77261	SSC	13500	13
E030	07/31/2014 18:24	UF	WTLAP-14-77044	SSC	26600	79
E030	07/31/2014 18:25	UF	WTLAP-14-77132	Estimated	26300	74
E030	07/31/2014 18:28	UF	WTLAP-14-76740	Estimated	25300	60
E030	07/31/2014 18:30	UF	WTLAP-14-76779	Estimated	24700	51
E030	07/31/2014 18:33	UF	WTLAP-14-76880	Estimated	23700	46
E030	07/31/2014 18:34	UF	WTLAP-14-76664	Estimated	23400	44
E030	07/31/2014 18:37	F	WTLAP-14-76952	Estimated	22400	38
E030	07/31/2014 18:37	UF	WTLAP-14-76938	Estimated	22400	38
E030	07/31/2014 18:39	UF	WTLAP-14-77267	SSC	21800	35
E038	07/08/2014 14:24	UF	WTLAP-14-77555	SSC	8410	44
E038	07/08/2014 14:26	UF	WTLAP-14-77027	SSC	6990	42
E038	07/08/2014 14:28	F	WTLAP-14-76686	Estimated	6310	37
E038	07/08/2014 14:30	F	WTLAP-14-76826	Estimated	5620	32
E038	07/08/2014 14:32	UF	WTLAP-14-76614	Estimated	4940	27
E038	07/08/2014 14:34	UF	WTLAP-14-77557	SSC	4260	22
E038	07/08/2014 14:35	UF	WTLAP-14-77115	Estimated	4100	19
E038	07/08/2014 14:36	UF	WTLAP-14-77558	SSC	3930	19
E038	07/08/2014 14:38	UF	WTLAP-14-76728	Estimated	3980	18
E038	07/08/2014 14:38	UF	WTLAP-14-76728	SSC	3980	18
E038	07/08/2014 14:38	UF	WTLAP-14-77559	SSC	3980	18
E038	07/08/2014 14:38	UF	WTLAP-14-77559	SSC	3980	18

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/08/2014 14:39	UF	WTLAP-14-76772	Estimated	4100	18
E038	07/08/2014 14:40	UF	WTLAP-14-77560	SSC	4210	18
E038	07/08/2014 14:41	UF	WTLAP-14-76868	Estimated	4320	17
E038	07/08/2014 14:42	F	WTLAP-14-76907	Estimated	4430	16
E038	07/08/2014 14:42	F	WTLAP-14-76907	SSC	4430	16
E038	07/08/2014 14:42	UF	WTLAP-14-77561	SSC	4430	16
E038	07/08/2014 14:42	UF	WTLAP-14-77561	SSC	4430	16
E038	07/08/2014 14:44	UF	WTLAP-14-76921	Estimated	7750	14
E038	07/08/2014 14:44	UF	WTLAP-14-76921	SSC	7750	14
E038	07/08/2014 14:44	UF	WTLAP-14-77562	SSC	7750	14
E038	07/08/2014 14:44	UF	WTLAP-14-77562	SSC	7750	14
E038	07/15/2014 22:04	UF	WTLAP-14-77041	SSC	53700	170
E038	07/15/2014 22:20	UF	WTLAP-14-77129	Not estimated	NE	190
E038	07/15/2014 22:23	UF	WTLAP-14-76737	Not estimated	NE	180
E038	07/15/2014 22:24	UF	WTLAP-14-76777	Not estimated	NE	170
E038	07/15/2014 22:26	UF	WTLAP-14-76877	Not estimated	NE	150
E038	07/15/2014 22:27	F	WTLAP-14-76949	Not estimated	NE	140
E038	07/15/2014 22:27	UF	WTLAP-14-76935	Not estimated	NE	140
E038	07/15/2014 22:28	UF	WTLAP-14-76625	Not estimated	NE	120
E038	07/15/2014 22:30	F	WTLAP-14-76697	Not estimated	NE	91
E038	07/15/2014 22:31	F	WTLAP-14-76837	Not estimated	NE	83
E038	07/27/2014 20:29	UF	WTLAP-14-77597	SSC	6370	120
E038	07/27/2014 20:31	UF	WTLAP-14-77605	SSC	3980	130
E038	07/27/2014 20:33	UF	WTLAP-14-77611	SSC	3420	100
E038	07/27/2014 20:35	UF	WTLAP-14-77612	SSC	2870	73
E038	07/27/2014 20:37	UF	WTLAP-14-77613	SSC	2610	54
E038	07/27/2014 20:39	UF	WTLAP-14-77603	SSC	2320	35
E038	07/27/2014 20:39	UF	WTLAP-14-77603	SSC	890	35
E038	07/27/2014 20:39	UF	WTLAP-14-77614	SSC	2320	35
E038	07/27/2014 20:39	UF	WTLAP-14-77614	SSC	890	35
E038	07/27/2014 20:40	UF	WTLAP-14-77143	Estimated	1460	25
E038	07/27/2014 20:41	UF	WTLAP-14-77615	SSC	2020	23
E038	07/27/2014 20:43	UF	WTLAP-14-76746	Estimated	1940	18
E038	07/27/2014 20:43	UF	WTLAP-14-76746	SSC	1940	18
E038	07/27/2014 20:43	UF	WTLAP-14-77616	SSC	1940	18
E038	07/27/2014 20:43	UF	WTLAP-14-77616	SSC	1940	18

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/27/2014 20:44	UF	WTLAP-14-76782	Estimated	1820	16
E038	07/27/2014 20:45	UF	WTLAP-14-77617	SSC	1690	14
E038	07/27/2014 20:46	UF	WTLAP-14-76886	Estimated	1680	13
E038	07/27/2014 20:47	UF	WTLAP-14-77055	SSC	1670	12
E038	07/27/2014 20:48	F	WTLAP-14-76963	Estimated	1580	11
E038	07/27/2014 20:49	F	WTLAP-14-76708	Estimated	1500	10
E038	07/27/2014 20:50	UF	WTLAP-14-76977	Estimated	1410	9
E038	07/27/2014 20:51	F	WTLAP-14-76848	Estimated	1320	8.4
E038	07/27/2014 20:53	UF	WTLAP-14-76636	Estimated	1140	7.2
E038	07/27/2014 20:55	UF	WTLAP-14-77599	SSC	970	6
E038	07/27/2014 20:57	UF	WTLAP-14-77600	SSC	940	3.6
E038	07/27/2014 20:59	UF	WTLAP-14-77601	SSC	420	1.2
E038	07/27/2014 20:59	UF	WTLAP-14-77601	SSC	850	1.2
E038	07/27/2014 20:59	UF	WTLAP-14-77604	SSC	420	1.2
E038	07/27/2014 20:59	UF	WTLAP-14-77604	SSC	850	1.2
E038	07/27/2014 21:19	UF	WTLAP-14-77602	SSC	900	2.2
E038	07/27/2014 22:19	UF	WTLAP-14-77606	SSC	230	1
E038	07/27/2014 22:39	UF	WTLAP-14-77607	SSC	240	0.2
E038	07/29/2014 11:04	UF	WTLAP-14-77618	SSC	2190	66
E038	07/29/2014 11:06	UF	WTLAP-14-77626	SSC	2010	84
E038	07/29/2014 11:08	UF	WTLAP-14-77632	SSC	1880	89
E038	07/29/2014 11:10	UF	WTLAP-14-77633	SSC	1780	93
E038	07/29/2014 11:12	UF	WTLAP-14-77634	SSC	1730	83
E038	07/29/2014 11:14	UF	WTLAP-14-77635	SSC	1760	74
E038	07/29/2014 11:16	UF	WTLAP-14-77636	SSC	1690	68
E038	07/29/2014 11:18	UF	WTLAP-14-77637	SSC	1690	67
E038	07/29/2014 11:20	UF	WTLAP-14-77157	Estimated	1600	65
E038	07/29/2014 11:20	UF	WTLAP-14-77157	SSC	1600	65
E038	07/29/2014 11:20	UF	WTLAP-14-77638	SSC	1600	65
E038	07/29/2014 11:20	UF	WTLAP-14-77638	SSC	1600	65
E038	07/29/2014 11:22	UF	WTLAP-14-77069	SSC	1240	58
E038	07/29/2014 11:23	UF	WTLAP-14-76755	Estimated	1260	54
E038	07/29/2014 11:24	F	WTLAP-14-76719	Estimated	1280	51
E038	07/29/2014 11:24	UF	WTLAP-14-76787	Estimated	1280	51
E038	07/29/2014 11:26	F	WTLAP-14-76859	Estimated	1310	46
E038	07/29/2014 11:26	UF	WTLAP-14-76895	Estimated	1310	46

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/29/2014 11:27	F	WTLAP-14-77005	Estimated	1330	45
E038	07/29/2014 11:28	UF	WTLAP-14-76647	Estimated	1340	45
E038	07/29/2014 11:29	UF	WTLAP-14-76991	Estimated	1360	44
E038	07/29/2014 11:30	UF	WTLAP-14-77620	SSC	1380	43
E038	07/29/2014 11:32	UF	WTLAP-14-77621	SSC	1410	49
E038	07/29/2014 11:34	UF	WTLAP-14-77622	SSC	1380	55
E038	07/29/2014 11:54	UF	WTLAP-14-77623	SSC	1070	12
E038	07/29/2014 12:14	UF	WTLAP-14-77624	SSC	920	39
E038	07/29/2014 12:34	UF	WTLAP-14-77625	SSC	670	8.2
E038	07/29/2014 12:54	UF	WTLAP-14-77627	SSC	490	8.8
E038	07/29/2014 13:14	UF	WTLAP-14-77628	SSC	390	5.2
E038	07/29/2014 13:34	UF	WTLAP-14-77629	SSC	280	1
E038	07/31/2014 17:14	UF	WTLAP-14-85910	SSC	3950	140
E038	07/31/2014 17:16	UF	WTLAP-14-85911	SSC	3770	180
E038	07/31/2014 17:18	UF	WTLAP-14-85912	SSC	3000	190
E038	07/31/2014 17:20	UF	WTLAP-14-85913	SSC	2860	210
E038	07/31/2014 17:22	UF	WTLAP-14-85914	SSC	2670	200
E038	07/31/2014 17:24	UF	WTLAP-14-85915	SSC	2560	190
E038	07/31/2014 17:26	UF	WTLAP-14-85916	SSC	2340	190
E038	07/31/2014 17:28	UF	WTLAP-14-85917	SSC	2150	180
E038	07/31/2014 17:30	UF	WTLAP-14-85918	SSC	1870	170
E038	07/31/2014 17:30	UF	WTLAP-14-85918	SSC	1870	170
E038	07/31/2014 17:30	UF	WTLAP-14-85931	Estimated	1870	170
E038	07/31/2014 17:30	UF	WTLAP-14-85931	SSC	1870	170
E038	07/31/2014 17:32	UF	WTLAP-14-85927	SSC	1830	180
E038	07/31/2014 17:32	UF	WTLAP-14-85927	SSC	1830	180
E038	07/31/2014 17:32	UF	WTLAP-14-85932	Estimated	1830	180
E038	07/31/2014 17:32	UF	WTLAP-14-85932	SSC	1830	180
E038	07/31/2014 17:34	F	WTLAP-14-85928	Estimated	1840	180
E038	07/31/2014 17:34	UF	WTLAP-14-85936	Estimated	1840	180
E038	07/31/2014 17:36	F	WTLAP-14-85929	Estimated	1860	170
E038	07/31/2014 17:36	UF	WTLAP-14-85933	Estimated	1860	170
E038	07/31/2014 17:37	F	WTLAP-14-85934	Estimated	1870	170
E038	07/31/2014 17:38	UF	WTLAP-14-85930	Estimated	1880	160
E038	07/31/2014 17:39	UF	WTLAP-14-85935	Estimated	1880	160
E038	07/31/2014 17:40	UF	WTLAP-14-85919	SSC	1890	150

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E038	07/31/2014 17:42	UF	WTLAP-14-85920	SSC	1750	120
E038	07/31/2014 17:44	UF	WTLAP-14-85921	SSC	2070	92
E038	07/31/2014 18:04	UF	WTLAP-14-85922	SSC	1300	16
E038	07/31/2014 18:24	UF	WTLAP-14-85923	SSC	780	14
E038	07/31/2014 18:44	UF	WTLAP-14-85924	SSC	420	7.4
E038	07/31/2014 19:04	UF	WTLAP-14-85925	SSC	270	3
E038	07/31/2014 19:24	UF	WTLAP-14-85926	SSC	260	1.2
E039.1	07/08/2014 15:04	UF	WTLAP-14-77639	SSC	2550	11
E039.1	07/08/2014 15:06	UF	WTLAP-14-77646	SSC	2340	14
E039.1	07/08/2014 15:08	UF	WTLAP-14-77652	SSC	2250	14
E039.1	07/08/2014 15:10	UF	WTLAP-14-77653	SSC	2040	14
E039.1	07/08/2014 15:12	UF	WTLAP-14-77654	SSC	1870	13
E039.1	07/08/2014 15:14	UF	WTLAP-14-77116	Estimated	1810	12
E039.1	07/08/2014 15:14	UF	WTLAP-14-77116	SSC	1810	12
E039.1	07/08/2014 15:14	UF	WTLAP-14-77655	SSC	1810	12
E039.1	07/08/2014 15:14	UF	WTLAP-14-77655	SSC	1810	12
E039.1	07/08/2014 15:16	UF	WTLAP-14-77656	SSC	1670	11
E039.1	07/08/2014 15:17	UF	WTLAP-14-76729	Estimated	1620	11
E039.1	07/08/2014 15:18	UF	WTLAP-14-77657	SSC	1570	10
E039.1	07/08/2014 15:19	UF	WTLAP-14-76773	Estimated	2050	10
E039.1	07/08/2014 15:20	UF	WTLAP-14-77658	SSC	2530	9.7
E039.1	07/08/2014 15:22	UF	WTLAP-14-76869	Estimated	1520	8.9
E039.1	07/08/2014 15:22	UF	WTLAP-14-76869	SSC	1520	8.9
E039.1	07/08/2014 15:22	UF	WTLAP-14-77028	SSC	1520	8.9
E039.1	07/08/2014 15:22	UF	WTLAP-14-77028	SSC	1520	8.9
E039.1	07/08/2014 15:24	F	WTLAP-14-76687	Estimated	1460	8.2
E039.1	07/08/2014 15:24	F	WTLAP-14-76908	Estimated	1460	8.2
E039.1	07/08/2014 15:26	F	WTLAP-14-76827	Estimated	1400	7.6
E039.1	07/08/2014 15:27	UF	WTLAP-14-76922	Estimated	1370	7.4
E039.1	07/08/2014 15:28	UF	WTLAP-14-76615	Estimated	1340	7.2
E039.1	07/08/2014 15:30	UF	WTLAP-14-77640	SSC	1280	6.7
E039.1	07/08/2014 15:32	UF	WTLAP-14-77641	SSC	1280	6.1
E039.1	07/08/2014 15:34	UF	WTLAP-14-77642	SSC	1190	5.5
E039.1	07/15/2014 01:04	UF	WTLAP-14-77659	SSC	800	9.2
E039.1	07/15/2014 01:06	UF	WTLAP-14-77666	SSC	770	12
E039.1	07/15/2014 01:08	UF	WTLAP-14-77672	SSC	730	12

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	07/15/2014 01:10	UF	WTLAP-14-77673	SSC	690	12
E039.1	07/15/2014 01:12	UF	WTLAP-14-77674	SSC	640	12
E039.1	07/15/2014 01:14	UF	WTLAP-14-77675	SSC	600	12
E039.1	07/15/2014 01:16	UF	WTLAP-14-77676	SSC	560	11
E039.1	07/15/2014 01:18	UF	WTLAP-14-77677	SSC	530	11
E039.1	07/15/2014 01:19	UF	WTLAP-14-77130	Estimated	520	10
E039.1	07/15/2014 01:20	UF	WTLAP-14-77678	SSC	510	10
E039.1	07/15/2014 01:22		WTLAP-14-77042	SSC	460	9.5
E039.1	07/15/2014 01:23	UF	WTLAP-14-76738	Estimated	454	9.2
E039.1	07/15/2014 01:24	F	WTLAP-14-76698	Estimated	448	9
E039.1	07/15/2014 01:24	UF	WTLAP-14-76778	Estimated	448	9
E039.1	07/15/2014 01:26	F	WTLAP-14-76838	Estimated	435	8.5
E039.1	07/15/2014 01:27	UF	WTLAP-14-76878	Estimated	429	8.3
E039.1	07/15/2014 01:28	UF	WTLAP-14-76626	Estimated	422	8
E039.1	07/15/2014 01:29	F	WTLAP-14-76950	Estimated	416	7.8
E039.1	07/15/2014 01:30	UF	WTLAP-14-77660	SSC	410	7.5
E039.1	07/15/2014 01:32	UF	WTLAP-14-76936	Estimated	410	7.3
E039.1	07/15/2014 01:32	UF	WTLAP-14-76936	SSC	410	7.3
E039.1	07/15/2014 01:32	UF	WTLAP-14-77661	SSC	410	7.3
E039.1	07/15/2014 01:32	UF	WTLAP-14-77661	SSC	410	7.3
E039.1	07/15/2014 01:34	UF	WTLAP-14-77662	SSC	380	7.1
E039.1	07/15/2014 01:54	UF	WTLAP-14-77663	SSC	450	13
E039.1	07/15/2014 02:14	UF	WTLAP-14-77664	SSC	360	13
E039.1	07/15/2014 02:34	UF	WTLAP-14-77665	SSC	340	13
E039.1	07/15/2014 02:54	UF	WTLAP-14-77667	SSC	350	12
E039.1	07/15/2014 03:14	UF	WTLAP-14-77668	SSC	310	7.2
E039.1	07/15/2014 03:34	UF	WTLAP-14-77669	SSC	230	4.3
E039.1	07/15/2014 03:54	UF	WTLAP-14-77670	SSC	210	3.1
E039.1	07/15/2014 04:14	UF	WTLAP-14-77671	SSC	330	7.4
E039.1	07/15/2014 22:24	UF	WTLAP-14-77679	SSC	7290	250
E039.1	07/15/2014 22:26	UF	WTLAP-14-77686	SSC	6480	310
E039.1	07/15/2014 22:28	UF	WTLAP-14-77692	SSC	5820	300
E039.1	07/15/2014 22:30	UF	WTLAP-14-77693	SSC	4990	280
E039.1	07/15/2014 22:32	UF	WTLAP-14-77694	SSC	7110	270
E039.1	07/15/2014 22:34	UF	WTLAP-14-77144	Estimated	4120	250
E039.1	07/15/2014 22:34	UF	WTLAP-14-77144	SSC	4120	250

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	07/15/2014 22:34	UF	WTLAP-14-77695	SSC	4120	250
E039.1	07/15/2014 22:34	UF	WTLAP-14-77695	SSC	4120	250
E039.1	07/15/2014 22:36	UF	WTLAP-14-77696	SSC	3940	230
E039.1	07/15/2014 22:37	UF	WTLAP-14-76747	Estimated	3760	220
E039.1	07/15/2014 22:38	UF	WTLAP-14-77697	SSC	3590	210
E039.1	07/15/2014 22:39	UF	WTLAP-14-76783	Estimated	3500	200
E039.1	07/15/2014 22:40	UF	WTLAP-14-77698	SSC	3420	180
E039.1	07/15/2014 22:42	UF	WTLAP-14-76887	Estimated	3270	160
E039.1	07/15/2014 22:42	UF	WTLAP-14-76887	SSC	3270	160
E039.1	07/15/2014 22:42	UF	WTLAP-14-77056	SSC	3270	160
E039.1	07/15/2014 22:42	UF	WTLAP-14-77056	SSC	3270	160
E039.1	07/15/2014 22:44	F	WTLAP-14-76709	Estimated	3130	130
E039.1	07/15/2014 22:44	F	WTLAP-14-76964	Estimated	3130	130
E039.1	07/15/2014 22:46	F	WTLAP-14-76849	Estimated	2990	110
E039.1	07/15/2014 22:47	UF	WTLAP-14-76978	Estimated	2920	97
E039.1	07/15/2014 22:48	UF	WTLAP-14-76637	Estimated	2850	87
E039.1	07/15/2014 22:50	UF	WTLAP-14-77680	SSC	2710	65
E039.1	07/15/2014 22:52	UF	WTLAP-14-77681	SSC	2610	58
E039.1	07/15/2014 22:54	UF	WTLAP-14-77682	SSC	2550	50
E039.1	07/15/2014 23:14	UF	WTLAP-14-77683	SSC	1720	23
E039.1	07/15/2014 23:34	UF	WTLAP-14-77684	SSC	1050	10
E039.1	07/15/2014 23:54	UF	WTLAP-14-77685	SSC	690	7.7
E039.1	07/16/2014 00:14	UF	WTLAP-14-77687	SSC	560	4.8
E039.1	07/16/2014 00:34	UF	WTLAP-14-77688	SSC	390	4.7
E039.1	07/16/2014 00:54	UF	WTLAP-14-77689	SSC	490	7.6
E039.1	07/16/2014 01:14	UF	WTLAP-14-77690	SSC	350	5
E039.1	07/16/2014 01:34	UF	WTLAP-14-77691	SSC	160	3.3
E039.1	07/27/2014 21:04	UF	WTLAP-14-77699	SSC	1500	15
E039.1	07/27/2014 21:06	UF	WTLAP-14-77706	SSC	1060	19
E039.1	07/27/2014 21:08	UF	WTLAP-14-77712	SSC	380	19
E039.1	07/27/2014 21:10	UF	WTLAP-14-77713	SSC	1210	19
E039.1	07/27/2014 21:12	UF	WTLAP-14-77714	SSC	1080	18
E039.1	07/27/2014 21:14	UF	WTLAP-14-77715	SSC	1000	16
E039.1	07/27/2014 21:16	UF	WTLAP-14-77716	SSC	960	15
E039.1	07/27/2014 21:18	UF	WTLAP-14-77717	SSC	860	14
E039.1	07/27/2014 21:19	UF	WTLAP-14-77158	Estimated	855	13

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	07/27/2014 21:20	UF	WTLAP-14-77718	SSC	850	12
E039.1	07/27/2014 21:21	UF	WTLAP-14-76756	Estimated	825	12
E039.1	07/27/2014 21:22	UF	WTLAP-14-77070	SSC	800	11
E039.1	07/27/2014 21:24	F	WTLAP-14-76720	Estimated	752	10
E039.1	07/27/2014 21:24	UF	WTLAP-14-76788	Estimated	752	10
E039.1	07/27/2014 21:26	F	WTLAP-14-76860	Estimated	705	9.4
E039.1	07/27/2014 21:27	UF	WTLAP-14-76896	Estimated	681	9.1
E039.1	07/27/2014 21:28	UF	WTLAP-14-76648	Estimated	658	8.8
E039.1	07/27/2014 21:29	F	WTLAP-14-77006	Estimated	634	8.4
E039.1	07/27/2014 21:30	UF	WTLAP-14-77700	SSC	610	8.1
E039.1	07/27/2014 21:32	UF	WTLAP-14-76992	Estimated	630	7.5
E039.1	07/27/2014 21:32	UF	WTLAP-14-76992	SSC	630	7.5
E039.1	07/27/2014 21:32	UF	WTLAP-14-77701	SSC	630	7.5
E039.1	07/27/2014 21:32	UF	WTLAP-14-77701	SSC	630	7.5
E039.1	07/27/2014 21:34	UF	WTLAP-14-77702	SSC	590	6.8
E039.1	07/27/2014 21:54	UF	WTLAP-14-77703	SSC	1020	16
E039.1	07/27/2014 22:14	UF	WTLAP-14-77704	SSC	520	12
E039.1	07/27/2014 22:34	UF	WTLAP-14-77705	SSC	340	5
E039.1	07/29/2014 11:29	UF	WTLAP-14-85653	SSC	1920	43
E039.1	07/29/2014 11:31	UF	WTLAP-14-85660	SSC	1680	56
E039.1	07/29/2014 11:33	UF	WTLAP-14-85664	SSC	1530	61
E039.1	07/29/2014 11:35	UF	WTLAP-14-85665	SSC	1460	66
E039.1	07/29/2014 11:37	UF	WTLAP-14-85666	SSC	1280	61
E039.1	07/29/2014 11:39	UF	WTLAP-14-85667	SSC	1240	55
E039.1	07/29/2014 11:41	UF	WTLAP-14-85668	SSC	1190	52
E039.1	07/29/2014 11:43	UF	WTLAP-14-85669	SSC	1160	50
E039.1	07/29/2014 11:44	UF	WTLAP-14-85647	Estimated	1120	49
E039.1	07/29/2014 11:45	UF	WTLAP-14-85670	SSC	1080	48
E039.1	07/29/2014 11:47	UF	WTLAP-14-85671	SSC	1070	48
E039.1	07/29/2014 11:48	UF	WTLAP-14-85648	Estimated	1050	48
E039.1	07/29/2014 11:49	F	WTLAP-14-85673	Estimated	1040	48
E039.1	07/29/2014 11:49	UF	WTLAP-14-85649	Estimated	1040	48
E039.1	07/29/2014 11:51	F	WTLAP-14-85674	Estimated	1000	48
E039.1	07/29/2014 11:52	UF	WTLAP-14-85650	Estimated	989	49
E039.1	07/29/2014 11:53	UF	WTLAP-14-85672	Estimated	972	49
E039.1	07/29/2014 11:54	F	WTLAP-14-85651	Estimated	956	49

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E039.1	07/29/2014 11:55	UF	WTLAP-14-85654	SSC	940	50
E039.1	07/29/2014 11:57	UF	WTLAP-14-85652	Estimated	910	30
E039.1	07/29/2014 11:57	UF	WTLAP-14-85652	SSC	910	30
E039.1	07/29/2014 11:57	UF	WTLAP-14-85655	SSC	910	30
E039.1	07/29/2014 11:57	UF	WTLAP-14-85655	SSC	910	30
E039.1	07/29/2014 11:59	UF	WTLAP-14-85656	SSC	1560	10
E039.1	07/29/2014 12:19	UF	WTLAP-14-85657	SSC	630	27
E039.1	07/29/2014 12:39	UF	WTLAP-14-85658	SSC	740	39
E039.1	07/29/2014 12:59	UF	WTLAP-14-85659	SSC	480	43
E039.1	07/29/2014 13:19	UF	WTLAP-14-85661	SSC	370	14
E039.1	07/29/2014 13:39	UF	WTLAP-14-85662	SSC	410	9.9
E039.1	07/29/2014 13:59	UF	WTLAP-14-85663	SSC	280	15
E039.1	07/31/2014 17:34	UF	WTLAP-14-85889	SSC	4000	190
E039.1	07/31/2014 17:36	UF	WTLAP-14-85890	SSC	3440	240
E039.1	07/31/2014 17:38	F	WTLAP-14-85901	Estimated	3210	240
E039.1	07/31/2014 17:38	UF	WTLAP-14-85902	Estimated	3210	240
E039.1	07/31/2014 17:40	UF	WTLAP-14-85903	Estimated	2980	250
E039.1	07/31/2014 17:42	UF	WTLAP-14-85904	Estimated	2750	250
E039.1	07/31/2014 17:46	UF	WTLAP-14-85905	Estimated	2290	240
E039.1	07/31/2014 17:48	UF	WTLAP-14-85891	SSC	2060	230
E039.1	07/31/2014 17:50	UF	WTLAP-14-85892	SSC	1880	230
E039.1	07/31/2014 17:52	UF	WTLAP-14-85906	SSC	1800	210
E039.1	07/31/2014 17:54	F	WTLAP-14-85907	Estimated	1740	180
E039.1	07/31/2014 17:56	F	WTLAP-14-85908	Estimated	1670	130
E039.1	07/31/2014 17:58	UF	WTLAP-14-85909	Estimated	1600	67
E039.1	07/31/2014 18:00	UF	WTLAP-14-85893	SSC	1540	96
E039.1	07/31/2014 18:02	UF	WTLAP-14-85894	SSC	1460	79
E039.1	07/31/2014 18:04	UF	WTLAP-14-85895	SSC	1400	61
E039.1	07/31/2014 18:24	UF	WTLAP-14-85896	SSC	940	21
E039.1	07/31/2014 18:44	UF	WTLAP-14-85897	SSC	690	14
E039.1	07/31/2014 19:04	UF	WTLAP-14-85898	SSC	590	9.9
E039.1	07/31/2014 19:24	UF	WTLAP-14-85899	SSC	440	6.4
E039.1	07/31/2014 19:44	UF	WTLAP-14-85900	SSC	330	3.8
E040	07/09/2014 05:09	UF	WTLAP-14-77026	SSC	1960	8.2
E040	07/09/2014 05:10	UF	WTLAP-14-77114	Estimated	1900	8
E040	07/09/2014 05:12	UF	WTLAP-14-76727	Estimated	1780	7.6

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E040	07/09/2014 05:13	UF	WTLAP-14-76771	Estimated	1720	7.4
E040	07/09/2014 05:16	UF	WTLAP-14-76867	Estimated	1530	6.8
E040	07/09/2014 05:17	UF	WTLAP-14-84553	Estimated	1470	6.6
E040	07/09/2014 05:18	F	WTLAP-14-84554	Estimated	1410	6.4
E040	07/09/2014 05:19	UF	WTLAP-14-76920	Estimated	1350	6.2
E040	07/09/2014 05:20	F	WTLAP-14-76906	Estimated	1290	6
E040	07/09/2014 05:21	UF	WTLAP-14-77260	SSC	1230	5.8
E040	07/15/2014 01:22	UF	WTLAP-14-77142	Not estimated	NE	0
E040	07/15/2014 02:49	UF	WTLAP-14-77040	SSC	840	12
E040	07/15/2014 02:50	UF	WTLAP-14-77128	Estimated	834	12
E040	07/15/2014 02:52	F	WTLAP-14-76948	Estimated	822	12
E040	07/15/2014 02:54	UF	WTLAP-14-76934	Estimated	810	12
E040	07/15/2014 02:55	UF	WTLAP-14-76776	Estimated	804	12
E040	07/15/2014 02:57	UF	WTLAP-14-76876	Estimated	792	7.2
E040	07/15/2014 02:58	UF	WTLAP-14-76736	Estimated	786	4.8
E040	07/15/2014 02:59	UF	WTLAP-14-77266	SSC	780	2.4
E040	07/15/2014 22:49	UF	WTLAP-14-77054	SSC	10900	240
E040	07/15/2014 22:52	UF	WTLAP-14-76745	Estimated	8400	220
E040	07/15/2014 22:54	UF	WTLAP-14-76781	Estimated	6740	200
E040	07/15/2014 22:56	UF	WTLAP-14-76885	Estimated	5080	160
E040	07/15/2014 22:58	F	WTLAP-14-76962	Estimated	3420	78
E040	07/15/2014 22:59	UF	WTLAP-14-76976	Estimated	2590	39
E040	07/15/2014 23:00	UF	WTLAP-14-77272	SSC	1760	150
E040	07/16/2014 16:09	UF	WTLAP-14-77068	SSC	890	9.2
E040	07/16/2014 16:10	UF	WTLAP-14-77156	Estimated	873	9
E040	07/16/2014 16:12	UF	WTLAP-14-76754	Estimated	839	8.6
E040	07/16/2014 16:13	UF	WTLAP-14-76786	Estimated	821	8.4
E040	07/16/2014 16:15	UF	WTLAP-14-76894	Estimated	787	8
E040	07/16/2014 16:16	UF	WTLAP-14-77278	SSC	770	7.8
E040	07/16/2014 16:18	F	WTLAP-14-77004	Not estimated	NE	7.4
E040	07/16/2014 16:19	UF	WTLAP-14-76990	Not estimated	NE	7.2
E040	07/29/2014 12:09	UF	WTLAP-14-85543	SSC	2960	83
E040	07/29/2014 12:10	UF	WTLAP-14-85544	SSC	3040	82
E040	07/29/2014 12:11	UF	WTLAP-14-85545	SSC	2800	84
E040	07/29/2014 12:12	UF	WTLAP-14-85546	SSC	2580	85
E040	07/29/2014 12:13	UF	WTLAP-14-85547	SSC	2570	87

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E040	07/29/2014 12:14	UF	WTLAP-14-85548	SSC	2570	88
E040	07/29/2014 12:15	UF	WTLAP-14-85549	SSC	2480	90
E040	07/29/2014 12:16	UF	WTLAP-14-85550	SSC	2430	90
E040	07/29/2014 12:17	UF	WTLAP-14-85551	SSC	2330	89
E040	07/29/2014 12:18	UF	WTLAP-14-85552	SSC	2270	89
E040	07/29/2014 12:19	UF	WTLAP-14-85553	SSC	2180	88
E040	07/31/2014 18:09	UF	WTLAP-14-85769	SSC	15400	190
E040	07/31/2014 18:10	UF	WTLAP-14-85770	SSC	2890	180
E040	07/31/2014 18:11	UF	WTLAP-14-85771	SSC	2490	170
E040	07/31/2014 18:12	UF	WTLAP-14-85772	SSC	2650	170
E040	07/31/2014 18:13	UF	WTLAP-14-85773	SSC	2480	160
E040	07/31/2014 18:14	UF	WTLAP-14-85774	SSC	2640	150
E040	07/31/2014 18:15	UF	WTLAP-14-85775	SSC	3000	140
E040	07/31/2014 18:16	UF	WTLAP-14-85776	SSC	3080	130
E040	07/31/2014 18:17	UF	WTLAP-14-85777	SSC	2120	130
E040	07/31/2014 18:18	UF	WTLAP-14-85778	SSC	2340	120
E040	07/31/2014 18:19	UF	WTLAP-14-85779	SSC	1760	110
E042.1	07/08/2014 16:14	UF	WTLAP-14-77119	Not estimated	NE	8.4
E042.1	07/08/2014 16:16	UF	WTLAP-14-76732	Not estimated	NE	7.8
E042.1	07/08/2014 16:17	UF	WTLAP-14-76792	Not estimated	NE	7.6
E042.1	07/08/2014 16:19	UF	WTLAP-14-76658	Not estimated	NE	7.2
E042.1	07/08/2014 16:20	F	WTLAP-14-76911	Not estimated	NE	7
E042.1	07/08/2014 16:20	UF	WTLAP-14-76925	Not estimated	NE	7
E042.1	07/08/2014 17:14	UF	WTLAP-14-77172	Not estimated	NE	2
E042.1	07/08/2014 17:49	UF	WTLAP-14-76872	Not estimated	NE	0
E042.1	07/08/2014 17:49	UF	WTLAP-14-77168	Not estimated	NE	0
E042.1	07/15/2014 23:15	UF	WTLAP-14-77045	SSC	52200	110
E042.1	07/15/2014 23:17	UF	WTLAP-14-76881	Not estimated	NE	110
E042.1	07/15/2014 23:24	UF	WTLAP-14-77133	Not estimated	NE	84
E042.1	07/15/2014 23:26	UF	WTLAP-14-76741	Not estimated	NE	77
E042.1	07/15/2014 23:27	UF	WTLAP-14-76797	Not estimated	NE	75
E042.1	07/15/2014 23:29	UF	WTLAP-14-76665	Not estimated	NE	70
E042.1	07/15/2014 23:30	F	WTLAP-14-76953	Not estimated	NE	68
E042.1	07/15/2014 23:30	UF	WTLAP-14-76939	Not estimated	NE	68
E042.1	07/16/2014 00:14	UF	WTLAP-14-77177	Not estimated	NE	40
E042.1	07/16/2014 00:59	UF	WTLAP-14-77181	Not estimated	NE	43

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	07/16/2014 00:59	UF	WTLAP-14-77241	Not estimated	NE	43
E042.1	07/29/2014 12:45	UF	WTLAP-14-77766	SSC	27000	92
E042.1	07/29/2014 12:47	UF	WTLAP-14-77772	SSC	26800	92
E042.1	07/29/2014 12:49	UF	WTLAP-14-77778	SSC	26600	92
E042.1	07/29/2014 12:51	UF	WTLAP-14-77780	SSC	22600	89
E042.1	07/29/2014 12:53	UF	WTLAP-14-77781	SSC	21700	84
E042.1	07/29/2014 12:55	UF	WTLAP-14-77782	SSC	18800	78
E042.1	07/29/2014 12:57	UF	WTLAP-14-77783	SSC	17600	47
E042.1	07/29/2014 12:59	UF	WTLAP-14-77147	Estimated	15600	16
E042.1	07/29/2014 12:59	UF	WTLAP-14-77147	SSC	15600	16
E042.1	07/29/2014 12:59	UF	WTLAP-14-77784	SSC	15600	16
E042.1	07/29/2014 12:59	UF	WTLAP-14-77784	SSC	15600	16
E042.1	07/29/2014 13:01	UF	WTLAP-14-76750	Estimated	16200	77
E042.1	07/29/2014 13:01	UF	WTLAP-14-76750	SSC	16200	77
E042.1	07/29/2014 13:01	UF	WTLAP-14-77104	SSC	16200	77
E042.1	07/29/2014 13:01	UF	WTLAP-14-77104	SSC	16200	77
E042.1	07/29/2014 13:02	UF	WTLAP-14-76800	Estimated	15700	78
E042.1	07/29/2014 13:03	F	WTLAP-14-76711	Estimated	15100	78
E042.1	07/29/2014 13:04	UF	WTLAP-14-76672	Estimated	14600	79
E042.1	07/29/2014 13:05	F	WTLAP-14-76851	Estimated	14000	79
E042.1	07/29/2014 13:05	F	WTLAP-14-76967	Estimated	14000	79
E042.1	07/29/2014 13:05	UF	WTLAP-14-76981	Estimated	14000	79
E042.1	07/29/2014 13:07	UF	WTLAP-14-76639	Estimated	12900	79
E042.1	07/29/2014 13:09	UF	WTLAP-14-76890	Estimated	11800	79
E042.1	07/29/2014 13:11	UF	WTLAP-14-77768	SSC	10700	79
E042.1	07/29/2014 13:13	UF	WTLAP-14-77769	SSC	10700	79
E042.1	07/29/2014 13:15	UF	WTLAP-14-77770	SSC	10600	79
E042.1	07/29/2014 13:35	UF	WTLAP-14-77059	SSC	11100	80
E042.1	07/29/2014 13:49	UF	WTLAP-14-77188	Estimated	9440	65
E042.1	07/29/2014 13:49	UF	WTLAP-14-77213	Estimated	9440	65
E042.1	07/29/2014 13:55	UF	WTLAP-14-77771	SSC	8720	61
E042.1	07/29/2014 14:15	UF	WTLAP-14-77088	SSC	7770	41
E042.1	07/29/2014 14:34	UF	WTLAP-14-77184	Estimated	5490	36
E042.1	07/29/2014 14:34	UF	WTLAP-14-77244	Estimated	5490	36
E042.1	07/29/2014 14:35	UF	WTLAP-14-77773	SSC	5370	36
E042.1	07/29/2014 14:55	UF	WTLAP-14-77774	SSC	4170	23

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	07/29/2014 15:15	UF	WTLAP-14-77775	SSC	3190	16
E042.1	07/29/2014 15:35	UF	WTLAP-14-77776	SSC	2580	12
E042.1	07/29/2014 15:55	UF	WTLAP-14-77777	SSC	2110	8
E042.1	07/31/2014 18:30	UF	WTLAP-14-77785	SSC	29100	150
E042.1	07/31/2014 18:32	UF	WTLAP-14-77791	SSC	29100	170
E042.1	07/31/2014 18:34	UF	WTLAP-14-77798	SSC	31400	180
E042.1	07/31/2014 18:36	UF	WTLAP-14-77799	SSC	33300	190
E042.1	07/31/2014 18:38	UF	WTLAP-14-77800	SSC	37500	200
E042.1	07/31/2014 18:40	UF	WTLAP-14-77801	SSC	41500	210
E042.1	07/31/2014 18:42	UF	WTLAP-14-77802	SSC	39800	210
E042.1	07/31/2014 18:44	UF	WTLAP-14-77803	SSC	38400	210
E042.1	07/31/2014 18:46	UF	WTLAP-14-77109	SSC	36400	210
E042.1	07/31/2014 18:48	F	WTLAP-14-76722	Estimated	34200	210
E042.1	07/31/2014 18:50	F	WTLAP-14-76862	Estimated	32000	210
E042.1	07/31/2014 18:52	UF	WTLAP-14-76650	Estimated	29800	200
E042.1	07/31/2014 18:54	UF	WTLAP-14-77786	SSC	27600	180
E042.1	07/31/2014 18:56	UF	WTLAP-14-77787	SSC	26700	140
E042.1	07/31/2014 18:58	UF	WTLAP-14-77788	SSC	25700	72
E042.1	07/31/2014 18:59	UF	WTLAP-14-77161	Estimated	24900	37
E042.1	07/31/2014 19:00	UF	WTLAP-14-77789	SSC	24100	140
E042.1	07/31/2014 19:03	UF	WTLAP-14-76759	Estimated	22800	120
E042.1	07/31/2014 19:05	UF	WTLAP-14-76805	Estimated	21900	100
E042.1	07/31/2014 19:09	UF	WTLAP-14-76679	Estimated	20200	90
E042.1	07/31/2014 19:11	F	WTLAP-14-77009	Estimated	19300	83
E042.1	07/31/2014 19:11	UF	WTLAP-14-76995	Estimated	19300	83
E042.1	07/31/2014 19:13	UF	WTLAP-14-76899	Estimated	18500	78
E042.1	07/31/2014 19:20	UF	WTLAP-14-77073	SSC	15400	70
E042.1	07/31/2014 19:40	UF	WTLAP-14-77790	SSC	11800	55
E042.1	07/31/2014 19:49	UF	WTLAP-14-77193	Estimated	10400	49
E042.1	07/31/2014 19:49	UF	WTLAP-14-77219	Estimated	10400	49
E042.1	07/31/2014 20:00	UF	WTLAP-14-77093	SSC	8640	39
E042.1	07/31/2014 20:20	UF	WTLAP-14-77792	SSC	6800	31
E042.1	07/31/2014 20:34	UF	WTLAP-14-77197	Estimated	7400	24
E042.1	07/31/2014 20:34	UF	WTLAP-14-77257	Estimated	7400	24
E042.1	07/31/2014 20:40	UF	WTLAP-14-77793	SSC	7660	22
E042.1	07/31/2014 21:00	UF	WTLAP-14-77794	SSC	8850	15

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E042.1	07/31/2014 21:20	UF	WTLAP-14-77795	SSC	7700	11
E042.1	07/31/2014 21:40	UF	WTLAP-14-77796	SSC	6010	9
E050.1	07/15/2014 23:34		WTLAP-14-77804	SSC	11300	9.6
E050.1	07/15/2014 23:36	UF	WTLAP-14-77810	SSC	10600	15
E050.1	07/15/2014 23:38	UF	WTLAP-14-77816	SSC	9430	20
E050.1	07/15/2014 23:40	UF	WTLAP-14-77817	SSC	9310	26
E050.1	07/15/2014 23:42	UF	WTLAP-14-76815	Estimated	8790	30
E050.1	07/15/2014 23:46	UF	WTLAP-14-77818	SSC	7760	37
E050.1	07/15/2014 23:48	UF	WTLAP-14-76763	Estimated	7400	40
E050.1	07/15/2014 23:50	UF	WTLAP-14-77097	SSC	7050	42
E050.1	07/15/2014 23:52	F	WTLAP-14-76690	Estimated	7040	44
E050.1	07/15/2014 23:54	F	WTLAP-14-76830	Estimated	7040	45
E050.1	07/15/2014 23:56	UF	WTLAP-14-76618	Estimated	7040	37
E050.1	07/15/2014 23:58	UF	WTLAP-14-77033	SSC	7030	18
E050.1	07/16/2014 00:00	UF	WTLAP-14-77806	SSC	6740	46
E050.1	07/16/2014 00:02	UF	WTLAP-14-77807	SSC	6420	47
E050.1	07/16/2014 00:04	UF	WTLAP-14-76793	Estimated	6360	47
E050.1	07/16/2014 00:19	UF	WTLAP-14-77121	Estimated	5910	47
E050.1	07/16/2014 00:22	UF	WTLAP-14-76734	Estimated	5820	46
E050.1	07/16/2014 00:44	UF	WTLAP-14-77081	Estimated	5160	36
E050.1	07/16/2014 01:09	UF	WTLAP-14-76660	Estimated	4410	26
E050.1	07/16/2014 01:09	UF	WTLAP-14-77202	Estimated	4410	26
E050.1	07/16/2014 01:24	F	WTLAP-14-76913	Estimated	3970	22
E050.1	07/16/2014 01:24	UF	WTLAP-14-76927	Estimated	3970	22
E050.1	07/16/2014 01:44	UF	WTLAP-14-85050	Estimated	3370	16
E050.1	07/16/2014 01:54	UF	WTLAP-14-76874	Estimated	3070	14
E050.1	07/16/2014 01:54	UF	WTLAP-14-77169	Estimated	3070	14
E050.1	07/16/2014 02:24	UF	WTLAP-14-77814	SSC	2170	11
E050.1	07/16/2014 02:44	UF	WTLAP-14-77815	SSC	2190	9.4
E050.1	07/29/2014 13:14	UF	WTLAP-14-77819	SSC	3820	11
E050.1	07/29/2014 13:16	UF	WTLAP-14-77825	SSC	3690	15
E050.1	07/29/2014 13:18	UF	WTLAP-14-77831	SSC	3650	18
E050.1	07/29/2014 13:20	UF	WTLAP-14-77832	SSC	3570	21
E050.1	07/29/2014 13:22	UF	WTLAP-14-76818	Estimated	3620	24
E050.1	07/29/2014 13:26	UF	WTLAP-14-77833	SSC	3720	31
E050.1	07/29/2014 13:28	UF	WTLAP-14-76766	Estimated	3760	34

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E050.1	07/29/2014 13:30	UF	WTLAP-14-77100	SSC	3810	37
E050.1	07/29/2014 13:32	F	WTLAP-14-76701	Estimated	3870	42
E050.1	07/29/2014 13:34	F	WTLAP-14-76841	Estimated	3920	47
E050.1	07/29/2014 13:36	UF	WTLAP-14-76629	Estimated	3980	51
E050.1	07/29/2014 13:38	UF	WTLAP-14-77820	SSC	4040	53
E050.1	07/29/2014 13:40	UF	WTLAP-14-77821	SSC	3950	56
E050.1	07/29/2014 13:42	UF	WTLAP-14-77822	SSC	3940	59
E050.1	07/29/2014 13:44	UF	WTLAP-14-77823	SSC	3840	61
E050.1	07/29/2014 13:59	UF	WTLAP-14-77135	Estimated	3570	12
E050.1	07/29/2014 14:02	UF	WTLAP-14-76743	Estimated	3520	58
E050.1	07/29/2014 14:04	UF	WTLAP-14-76796	Estimated	3480	57
E050.1	07/29/2014 14:04	UF	WTLAP-14-76796	SSC	3480	57
E050.1	07/29/2014 14:04	UF	WTLAP-14-77047	SSC	3480	57
E050.1	07/29/2014 14:04	UF	WTLAP-14-77047	SSC	3480	57
E050.1	07/29/2014 14:24	F	WTLAP-14-76955	Estimated	3200	46
E050.1	07/29/2014 14:24	UF	WTLAP-14-76941	Estimated	3200	46
E050.1	07/29/2014 14:44	UF	WTLAP-14-77084	SSC	2920	38
E050.1	07/29/2014 14:49	UF	WTLAP-14-76667	Estimated	2860	36
E050.1	07/29/2014 14:49	UF	WTLAP-14-77208	Estimated	2860	36
E050.1	07/29/2014 15:04	UF	WTLAP-14-77826	SSC	2700	31
E050.1	07/29/2014 15:24	UF	WTLAP-14-77827	SSC	2460	25
E050.1	07/29/2014 15:34	UF	WTLAP-14-76883	Estimated	2290	22
E050.1	07/29/2014 15:34	UF	WTLAP-14-77180	Estimated	2290	22
E050.1	07/29/2014 15:44	UF	WTLAP-14-77828	SSC	2120	20
E050.1	07/29/2014 16:04	UF	WTLAP-14-77829	SSC	1760	15
E050.1	07/29/2014 16:24	UF	WTLAP-14-77830	SSC	1670	12
E050.1	07/31/2014 18:35	UF	WTLAP-14-77834	SSC	1750	5.6
E050.1	07/31/2014 18:37	UF	WTLAP-14-77840	SSC	12600	14
E050.1	07/31/2014 18:39	UF	WTLAP-14-77846	SSC	3560	22
E050.1	07/31/2014 18:41	UF	WTLAP-14-77847	SSC	5060	35
E050.1	07/31/2014 18:43	UF	WTLAP-14-76819	Estimated	6600	52
E050.1	07/31/2014 18:47	UF	WTLAP-14-77848	SSC	9690	77
E050.1	07/31/2014 18:49	UF	WTLAP-14-76767	Estimated	10700	85
E050.1	07/31/2014 18:51	UF	WTLAP-14-77105	SSC	11800	92
E050.1	07/31/2014 18:53	F	WTLAP-14-76712	Estimated	11700	99
E050.1	07/31/2014 18:55	F	WTLAP-14-76852	Estimated	11600	110

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E050.1	07/31/2014 18:57	UF	WTLAP-14-76640	Estimated	11500	64
E050.1	07/31/2014 18:59	UF	WTLAP-14-77835	SSC	11400	21
E050.1	07/31/2014 19:00	UF	WTLAP-14-77149	Estimated	11000	120
E050.1	07/31/2014 19:01	UF	WTLAP-14-77836	SSC	10700	130
E050.1	07/31/2014 19:03	UF	WTLAP-14-77837	SSC	10100	140
E050.1	07/31/2014 19:04	UF	WTLAP-14-76752	Estimated	10300	140
E050.1	07/31/2014 19:05	UF	WTLAP-14-77838	SSC	10400	140
E050.1	07/31/2014 19:06	UF	WTLAP-14-76801	Estimated	10400	150
E050.1	07/31/2014 19:10	UF	WTLAP-14-76892	Estimated	10200	170
E050.1	07/31/2014 19:12	F	WTLAP-14-76969	Estimated	10000	180
E050.1	07/31/2014 19:12	UF	WTLAP-14-76983	Estimated	10000	180
E050.1	07/31/2014 19:14	UF	WTLAP-14-76674	Estimated	9940	180
E050.1	07/31/2014 19:25	UF	WTLAP-14-77061	SSC	9360	160
E050.1	07/31/2014 19:45	UF	WTLAP-14-77839	SSC	7780	73
E050.1	07/31/2014 19:50	UF	WTLAP-14-77189	Estimated	7480	70
E050.1	07/31/2014 19:50	UF	WTLAP-14-77214	Estimated	7480	70
E050.1	07/31/2014 20:05	UF	WTLAP-14-77089	SSC	6580	61
E050.1	07/31/2014 20:25	UF	WTLAP-14-77841	SSC	5070	50
E050.1	07/31/2014 20:35	UF	WTLAP-14-77185	Estimated	4580	44
E050.1	07/31/2014 20:35	UF	WTLAP-14-77245	Estimated	4580	44
E050.1	07/31/2014 20:45	UF	WTLAP-14-77842	SSC	4100	39
E050.1	07/31/2014 21:05	UF	WTLAP-14-77843	SSC	4030	32
E050.1	07/31/2014 21:25	UF	WTLAP-14-77844	SSC	4570	26
E050.1	07/31/2014 21:45	UF	WTLAP-14-77845	SSC	4240	23
E055	07/31/2014 17:50	UF	WTLAP-14-77034	SSC	5180	61
E055	07/31/2014 17:51	UF	WTLAP-14-77122	Estimated	4680	58
E055	07/31/2014 17:53	UF	WTLAP-14-77203	Estimated	3690	53
E055	07/31/2014 17:54	F	WTLAP-14-76914	Estimated	3190	50
E055	07/31/2014 17:54	UF	WTLAP-14-76928	Estimated	3190	50
E055	07/31/2014 17:56	UF	WTLAP-14-77263	SSC	2200	38
E055	07/31/2014 17:57	F	WTLAP-14-76691	Not estimated	NE	28
E055	07/31/2014 17:58	F	WTLAP-14-76831	Not estimated	NE	19
E055	07/31/2014 17:59	UF	WTLAP-14-76619	Not estimated	NE	9.4
E055.5	07/15/2014 22:19	UF	WTLAP-14-77036	SSC	3370	1.4
E055.5	07/15/2014 22:22	UF	WTLAP-14-77124	Not estimated	NE	0.6
E055.5	07/31/2014 17:24	F	WTLAP-14-76958	Not estimated	NE	2.2

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E055.5	07/31/2014 17:24	UF	WTLAP-14-76944	Not estimated	NE	2.2
E055.5	07/31/2014 17:28	UF	WTLAP-14-77138	Not estimated	NE	2
E055.5	07/31/2014 17:33	UF	WTLAP-14-77210	Not estimated	NE	0.8
E056	07/07/2014 16:00	UF	WTLAP-14-77023	SSC	7900	2.1
E056	07/07/2014 16:01	UF	WTLAP-14-77111	Estimated	6890	2.1
E056	07/07/2014 16:03	UF	WTLAP-14-77199	Estimated	4880	2
E056	07/07/2014 16:05	F	WTLAP-14-76903	Estimated	2870	1.9
E056	07/07/2014 16:05	UF	WTLAP-14-76917	Estimated	2870	1.9
E056	07/07/2014 16:06	UF	WTLAP-14-77259	SSC	1860	1.9
E056	07/07/2014 16:07	F	WTLAP-14-76683	Not estimated	NE	1.9
E056	07/07/2014 16:08	F	WTLAP-14-76823	Not estimated	NE	1.9
E056	07/07/2014 16:09	UF	WTLAP-14-76611	Not estimated	NE	1.9
E056	07/15/2014 22:30	UF	WTLAP-14-77037	SSC	3130	15
E056	07/15/2014 22:31	UF	WTLAP-14-77125	Estimated	3120	14
E056	07/15/2014 22:34	UF	WTLAP-14-77205	Estimated	3080	12
E056	07/15/2014 22:35	F	WTLAP-14-76945	Estimated	3060	11
E056	07/15/2014 22:35	UF	WTLAP-14-76931	Estimated	3060	11
E056	07/15/2014 22:36	UF	WTLAP-14-77265	SSC	3050	11
E056	07/15/2014 22:37	F	WTLAP-14-76694	Not estimated	NE	10
E056	07/15/2014 22:38	F	WTLAP-14-76834	Not estimated	NE	9.7
E056	07/15/2014 22:40	UF	WTLAP-14-76622	Not estimated	NE	8.8
E056	07/29/2014 11:40	UF	WTLAP-14-77051	SSC	3380	13
E056	07/29/2014 11:41	UF	WTLAP-14-77139	Estimated	3250	12
E056	07/29/2014 11:42	UF	WTLAP-14-77211	Estimated	3120	11
E056	07/29/2014 11:44	F	WTLAP-14-76959	Estimated	2860	10
E056	07/29/2014 11:44	UF	WTLAP-14-76973	Estimated	2860	10
E056	07/29/2014 11:46	UF	WTLAP-14-77271	SSC	2600	8.9
E056	07/29/2014 11:47	F	WTLAP-14-76705	Not estimated	NE	8.6
E056	07/29/2014 11:48	F	WTLAP-14-76845	Not estimated	NE	8.2
E056	07/29/2014 11:49	UF	WTLAP-14-76633	Not estimated	NE	7.8
E059.5	07/29/2014 13:10	UF	WTLAP-14-77403	SSC	14400	41
E059.5	07/29/2014 13:13	UF	WTLAP-14-77409	SSC	12200	39
E059.5	07/29/2014 13:14	UF	WTLAP-14-77117	Estimated	11600	38
E059.5	07/29/2014 13:15	UF	WTLAP-14-77415	SSC	11100	37
E059.5	07/29/2014 13:17	UF	WTLAP-14-77417	SSC	9830	36
E059.5	07/29/2014 13:19	UF	WTLAP-14-76730	Estimated	9500	35

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E059.5	07/29/2014 13:20	UF	WTLAP-14-77418	SSC	9340	35
E059.5	07/29/2014 13:21	UF	WTLAP-14-76791	Estimated	9020	35
E059.5	07/29/2014 13:22	UF	WTLAP-14-77419	SSC	8710	34
E059.5	07/29/2014 13:25	F	WTLAP-14-76909	Estimated	8200	33
E059.5	07/29/2014 13:25	UF	WTLAP-14-76923	Estimated	8200	33
E059.5	07/29/2014 13:26	UF	WTLAP-14-85747	Estimated	8040	33
E059.5	07/29/2014 13:27	UF	WTLAP-14-76870	Estimated	7870	33
E059.5	07/29/2014 13:29	UF	WTLAP-14-77095	SSC	7530	32
E059.5	07/29/2014 13:31	F	WTLAP-14-76688	Estimated	7760	32
E059.5	07/29/2014 13:34	F	WTLAP-14-76828	Estimated	8110	33
E059.5	07/29/2014 13:36	UF	WTLAP-14-76616	Estimated	8340	33
E059.5	07/29/2014 13:40	UF	WTLAP-14-77407	SSC	8810	33
E059.5	07/29/2014 14:00	UF	WTLAP-14-77029	SSC	6040	7
E059.5	07/29/2014 14:04	UF	WTLAP-14-77171	Estimated	6230	7
E059.5	07/29/2014 14:04	UF	WTLAP-14-77200	Estimated	6230	7
E059.5	07/29/2014 14:20	UF	WTLAP-14-77408	SSC	7000	3
E059.5	07/29/2014 14:40	UF	WTLAP-14-77079	SSC	4790	1
E059.5	07/29/2014 14:49	UF	WTLAP-14-77167	Estimated	4250	1
E059.5	07/29/2014 14:49	UF	WTLAP-14-77227	Estimated	4250	1
E059.5	07/29/2014 15:00	UF	WTLAP-14-77410	SSC	3590	0
E059.5	07/29/2014 15:20	UF	WTLAP-14-77411	SSC	2580	0
E059.5	07/29/2014 15:40	UF	WTLAP-14-77412	SSC	2000	0
E059.5	07/29/2014 16:00	UF	WTLAP-14-77413	SSC	1410	0
E059.5	07/29/2014 16:20	UF	WTLAP-14-77414	SSC	1160	0
E059.5	07/31/2014 18:45	UF	WTLAP-14-77479	SSC	35100	92
E059.5	07/31/2014 18:47	UF	WTLAP-14-77485	SSC	24200	87
E059.5	07/31/2014 18:49	UF	WTLAP-14-77145	Estimated	22400	82
E059.5	07/31/2014 18:50	UF	WTLAP-14-77491	SSC	21500	80
E059.5	07/31/2014 18:52	UF	WTLAP-14-77493	SSC	22700	70
E059.5	07/31/2014 18:53	UF	WTLAP-14-76748	Estimated	21700	66
E059.5	07/31/2014 18:54	UF	WTLAP-14-77212	Estimated	20800	61
E059.5	07/31/2014 18:55	UF	WTLAP-14-76799	Estimated	19800	56
E059.5	07/31/2014 18:57	UF	WTLAP-14-77495	SSC	18000	34
E059.5	07/31/2014 18:59	UF	WTLAP-14-77243	Estimated	17400	13
E059.5	07/31/2014 18:59	UF	WTLAP-14-85749	Estimated	17400	13
E059.5	07/31/2014 19:01	F	WTLAP-14-76965	Estimated	16900	46

Table 4.3-1 (continued)

Gaging Station	Sample Collection Date and Time	Field Prep	Sample ID	SSC Source	Calculated SSC (mg/L)	Calculated Instantaneous Discharge (cfs)
E059.5	07/31/2014 19:01	F	WTLAP-14-76965	SSC	16900	46
E059.5	07/31/2014 19:01	UF	WTLAP-14-76979	Estimated	16900	46
E059.5	07/31/2014 19:01	UF	WTLAP-14-76979	SSC	16900	46
E059.5	07/31/2014 19:01	UF	WTLAP-14-77497	SSC	16900	46
E059.5	07/31/2014 19:01	UF	WTLAP-14-77497	SSC	16900	46
E059.5	07/31/2014 19:03	F	WTLAP-14-76850	Estimated	16000	45
E059.5	07/31/2014 19:03	UF	WTLAP-14-76888	Estimated	16000	45
E059.5	07/31/2014 19:04	UF	WTLAP-14-77103	SSC	15500	45
E059.5	07/31/2014 19:06	F	WTLAP-14-76710	Estimated	15300	42
E059.5	07/31/2014 19:10	UF	WTLAP-14-76638	Estimated	15000	29
E059.5	07/31/2014 19:15	UF	WTLAP-14-77483	SSC	14600	23
E059.5	07/31/2014 19:35	UF	WTLAP-14-77057	SSC	17900	16
E059.5	07/31/2014 19:39	UF	WTLAP-14-77187	Estimated	16800	14
E059.5	07/31/2014 19:55	UF	WTLAP-14-77484	SSC	12000	6
E059.5	07/31/2014 20:15	UF	WTLAP-14-77087	SSC	14800	5
E059.5	07/31/2014 20:35	UF	WTLAP-14-77486	SSC	15200	4
E059.5	07/31/2014 20:55	UF	WTLAP-14-77487	SSC	15900	3
E059.5	07/31/2014 21:15	UF	WTLAP-14-77488	SSC	5360	2
E059.5	08/10/2014 15:49	UF	WTLAP-14-77159	Not estimated	NE	8.8
E059.5	08/10/2014 15:53	UF	WTLAP-14-76757	Not estimated	NE	5
E059.5	08/10/2014 15:57	F	WTLAP-14-77007	Not estimated	NE	1.8
E059.5	08/10/2014 15:57	UF	WTLAP-14-76993	Not estimated	NE	1.8
E059.5	08/10/2014 16:39	UF	WTLAP-14-77218	Not estimated	NE	1
E059.5	08/10/2014 16:39	UF	WTLAP-14-85750	Not estimated	NE	1
E059.5	08/10/2014 17:24	UF	WTLAP-14-76897	Not estimated	NE	1
E059.5	08/10/2014 17:24	UF	WTLAP-14-77198	Not estimated	NE	1
E060.1	07/31/2014 20:07	UF	WTLAP-14-85752	Not estimated	NE	34
E060.1	07/31/2014 20:29	UF	WTLAP-14-85751	Not estimated	NE	52

[a] UF = Unfiltered.

[b] SSC = Measured using ASTM method D3977-97.

[c] na = Not available.

[d] NE = Not estimated.

[e] F = Filtered.

Appendix A

2014 Geomorphic Changes at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyons Watershed

CONTENTS

Figures

Tables

Attachments

A-1.0 INTRODUCTION

This report evaluates geomorphic changes that occurred in 2014 at sediment transport mitigation sites in the Los Alamos and Pueblo Canyon watersheds within and near Los Alamos National Laboratory (LANL or the Laboratory). Survey data reported previously (LANL 2011, 200902; LANL 2012, 218411; LANL 2013, 239233, Appendix C; LANL 2014, 257592) are compared with subsequent survey data obtained in fall 2014 and winter 2015, following the summer 2014 monsoon season, as specified in the Los Alamos National Laboratory Environmental Surveillance Program Sampling and Analysis Plan for Sediment, 2012 (LANL 2012, 213568). These surveys will be repeated after the 2015 monsoon season, and the results will be presented in a report to the New Mexico Environment Department (NMED) by March 31, 2016. NMED has specified that the Laboratory include the results of inspections of stream-bank armoring in the south fork of Acid Canyon in the annual report on geomorphic changes in the Los Alamos and Pueblo Canyon watersheds (NMED 2010, 109693), and these results are included herein. NMED has also specified that monitoring reports include information on the health and success of willow plantings as well as photographic documentation of willow plantings, grade-control structures (GCSs), and examples of erosion and deposition at surveyed cross-sections (NMED 2011, 204349); therefore, these observations and photographs are included herein. Figure A-1.0-1 shows the locations of sites discussed in this report, and Attachment A-1 presents photographs of the sediment transport mitigation sites.

A-2.0 HYDROLOGIC EVENTS DURING 2014 MONSOON SEASON

The largest runoff events in 2014 at the sediment transport mitigation sites in the Los Alamos and Pueblo Canyon watersheds occurred following heavy rains that fell on the Pajarito Plateau, Los Alamos townsite, and the Jemez Mountains from July 14 to 16, and on July 31, 2014. The maximum measured discharge occurred in DP Canyon on July 15, 2014, at the E039.1 gaging station below the DP Canyon GCS. The peak discharge was 320 cubic feet per second (cfs), approximately 40% less than peak discharge measured in 2013 (550 cfs) (LANL 2014, 257592). Maximum discharges in Los Alamos and Pueblo Canyons were measured on July 31, 2014. Peak discharge in Pueblo Canyon was 97 cfs at E059.5, just below the Los Alamos County Wastewater Treatment Facility (WWTF). This is more than an order of magnitude less than the 2013 peak discharge in Pueblo Canyon, which was 1500 cfs recorded on September 13, 2013 at E059 above the WWTF (this gaging station was decommissioned after the 2013 flood). Peak discharge in Los Alamos Canyon was 290 cfs at E030 in Upper Los Alamos Canyon above the confluence with DP Canyon. This discharge is about 70% less than the 2013 peak discharge in Los Alamos Canyon, which was 970 cfs recorded on September 13, 2013, at E030. Runoff from 2014 rainfall events flowed within the channel(s) formed by 2013 floods. Therefore, post-2014 monsoon season cross-sections were surveyed between inner benchmarks established on individual cross-sections, either during previous surveys or during the current survey.

A-3.0 SURVEYS AT SEDIMENT TRANSPORT MITIGATION SITES

Surveys were conducted at all sediment transport mitigation sites specified in the 2014 Monitoring Plan for Los Alamos and Pueblo Canyons Sediment Transport Mitigation Project (LANL 2012, 213568). Surveys were conducted using a combination of a differentially corrected global positioning system (GPS) and a total station tied to GPS control points, depending on tree cover. The general locations of all survey areas are shown in Figure A-1.0-1, and these surveys are discussed below. Surveyed cross-sections are shown in figures with a vertical exaggeration (VE) of 2.5 times, and channel thalweg profiles are shown with a VE of 5 times, 15 times, or 20 times. Raw survey data (x and y coordinates using the New Mexico State Plane coordinate system and elevations of all survey points) for surveyed cross-sections are included electronically as Attachment A-2 (on CD included with this document). Distances along each cross-section and along each thalweg profile used for the figures in this report were calculated using basic geometry (Pythagorean theorem) and are also included in Attachment A-2.

Cross-section and thalweg figures include the latest resurvey data and previous survey data. The comparison between these data indicates where erosion and deposition have occurred along each section over the last year. Surveyed cross-sections were checked in the field to confirm elevational differences between surveys and verify that erosion or deposition indicated by the plotted data were not artifacts of the surveys (such as may result from different survey point spacing or slight differences in survey location) or topographic changes not related to flooding (e.g., gopher mounds, road blading outside the floodplain, ground disturbance from new willow plantings and/or stream bank erosion mitigation efforts, or slope wash from side hills/drainages). The net changes in cross-sectional area caused by 2014 flooding along each section were calculated and used to estimate total deposition or erosion over the surveyed area, normalized as m^3 per 100 m of channel for comparison with previous studies and are presented as summary tables in this report. The net deposition or erosion that occurred in each area in 2014 is compared with changes that occurred in previous years. At each cross-section, the changes in thalweg elevation from 2009 to 2014 are compiled in tables and are used to indicate whether, on average, the channel has been stable, aggrading, or incising. In the channel thalweg figures, the distance along the survey can vary between the original survey and the resurvey because of changes in thalweg sinuosity, resulting in changes in thalweg gradient. These changes in thalweg gradient are also summarized in this report.

A-3.1 Pueblo Canyon Background Sections above the Wastewater Treatment Facility

Two cross-sections were originally surveyed in the vicinity of each of the three Pueblo Canyon cross-vane structures in April 2010, one 50 ft upcanyon and one 50 ft downcanyon of the apex rock of each structure. Channel thalweg profiles were also surveyed over these 100-ft distances. These cross-sections and thalweg profiles were resurveyed in December 2010, October 2011, November 2012, February and March 2014, and January and February 2015. The cross-vane structures were largely eroded during the 2013 floods, and the boulders comprising the structures were washed downstream, effectively destroying the cross-vane structures. The six cross-sections and associated thalwegs in this area (Figure A-1.0-1) have therefore been renamed Pueblo Canyon Background sections above the Waste Water Treatment Facility, BG-1 through BG-6. Cross-section and thalweg profile locations for all the Pueblo Canyon Background sections above the WWTF are shown on an orthophotograph in Figure A-3.1-1, and the cross-sections and thalweg profiles are also shown on a geomorphic map in Figure A-3.1-2 (geomorphic mapping from 1997; LANL 2004, 087390). BG-1 and BG-2 are located within P-2W, and BG-3 through BG-6 are located a short distance east of P-2W (Figures A-3.1-1 and A-3.1-2).The cross-sections and thalweg profiles for BG-1 and BG-2, BG-3 and BG-4, and BG-5 and BG-6 are shown in Figure A-3.1-3. Net sediment deposition occurred at five of the six BG cross-sections, and net sediment erosion occurred at one cross-section during the summer 2014 monsoon season, as summarized in Table A-3.1-1.

Maximum aggradation (net sediment deposition) was 0.9 ft at BG-3 in an area of channel aggradation (Figure A-3.1-3 and Photo A1-1, Attachment A-1). Maximum incision (net erosion) was 1.4 ft at BG-6 in an area of lateral channel migration and bank erosoin (Figure A-3.1-3 and Photo A1-2, Attachment A-1). Normalized net 2014 sediment deposition at the BG sections averaged 84 m^3/100 m (Table A-3.1-1). As measured in 1997, an estimated 1768 m^3/100 m of post-1942 sediment existed in reach P-2W, which contains BG-1 and BG-2 (LANL 2004, 087390). Therefore, the magnitude of net 2014 sediment deposition is about 5% of the 1942 to 1997 total.

Net sediment deposition occurred at the BG sites in 2010 and 2011, net erosion occurred in 2012 and 2013, and net deposition occurred in 2014. Overall, a total of 85 m^3/100 m cumulative sediment deposition has occurred at these sites from 2010 to 2014 (Figure A-3.1-4). On average, the channel thalweg at the BG 1-6 cross-sections aggraded by 0.2 ft in 2014 compared with 0.3 ft of incision in 2013 (Table A-3.1-1). Figure A-3.1-3 also indicates changes to the channel thalweg (net aggradation) that occurred during the summer 2014 monsoon season.

These data are consistent with conclusions from most previous assessments, which indicated that net sediment deposition since 1998 in this part of Pueblo Canyon had been relatively stable (LANL 2012, 218411). The exception to this trend was the relatively large net erosion that occurred during 2013 flood events. The net deposition that occurred in 2014 was associated with channel aggradation in this part of Pueblo Canyon, while banks remained relatively unchanged from 2013.

A-3.2 Upper Pueblo Canyon Willow-Planting Area

A total of 18 cross-sections were surveyed in November 2009 where willows were planted in spring 2008 and spring 2009 in the part of Pueblo Canyon downstream from the then new Los Alamos WWTF outfall and upstream from the access road to the WWTF. These cross-sections were divided into groups of six within the upper, middle, and lower thirds of the willow-planting area (UPW 1-6, UPW 7-12, and UPW 13-18, respectively). Cross-sections UPW 1–6 are located upstream and at the westerrnmost edge of Reach P-3FW, and cross-sections UPW 7–12, and UPW 13–18 are all located in Reach P-3W (Figure A-1.0-1). Within each group the cross-sections were spaced at 100-ft intervals. Longitudinal channel thalweg profiles were also surveyed over 500-ft intervals through each of these three areas. These cross-sections and thalweg profiles were resurveyed in April 2010, October 2011, November 2012 and January 2013, January and February 2014, and January 2015. Stream banks in this area were surveyed in January and February 2014. Cross-section locations, thalweg profile locations, and stream banks are shown on the orthophotograph in Figure A-3.2-1, and the cross-sections, thalweg profile, and stream banks are also shown on a geomorphic map in Figure A-3.2-2 (geomorphic mapping from 1997; LANL 2004, 087390). The cross-sections and thalweg profiles for UPW 1-6, UPW 7-12, and UPW 13-18 are shown in Figures A-3.2-3, A-3.2-4, and A-3.2-5, respectively. Geomorphic changes that occurred at these cross-sections in 2014 are summarized in Table A-3.2-1.

Maximum deposition of new sediment was 1.7 ft at cross-section UPW-6, and the maximum erosion was 6.8 ft, also at cross-section UPW-6 (Figure A-3.2-3). The erosion at section UPW-6 was associated with lateral migration of the stream bank (Photo A1-3, Attachment A-1), and deposition was associated with channel aggradation next to the stream bank and northward migration of the main channel (Figure A-3.2-3; Photo A1-3). With the exception of UPW-6, only minor bank erosion was recorded at the UPW cross-sections during 2014. Nine of the cross-sections had net sediment deposition during 2014 (primarily in the upper and lower ends of the UPW survey area), and nine cross-sections had net erosion. Normalized net 2014 sediment deposition in the UPW area averaged 30 m^3/100 m (Table A-3.2-1). As measured in 1997, post-1942 sediment deposition in reach P-3W, which includes part of the surveyed area, was estimated to be 3357 m^3/100 m (LANL 2004, 087390). Therefore, the magnitude of net 2014 sediment deposition is about 1% of the 1942 to 1997 total.

Net deposition occurred at these sites in 2010 to 2012, in 2013, and in 2014. Overall, a total of 178 m^3/100 m cumulative net erosion over 2010 to 2014 (Figure A-3.2-6). In 2014, depostion occurred in the upper and lower thirds of the Upper Pueblo Canyon willow-planting area (Table A-3.2-1). The channel thalweg incised by an average of 0.2 ft in 2014, with greater incision (0.5 ft) observed in the middle third of the Upper Pueblo Canyon willow-planting area (Table A-3.2-1). This is similar in magnitude to channel incision observed in 2013 and represents a change from overall channel aggradation observed from 2010 to 2012 (Table A-3.2-1). Figures A-3.2-3 through A-3.2-5 also indicate changes to the channel thalweg gradient that occurred in 2014, showing overall channel incision in all three sections of the Upper Pueblo Canyon willow-planting area. Gradient changes in the Upper Pueblo Canyon willow-planting area are associated with changes in sinuosity and bed elevation.

These data indicate that sediment deposition occurred in this part of Pueblo Canyon following the relatively large net erosion that occurred in this area in 2013 (Figure A-3.2-6). Before 2013, net sediment deposition/ eroision in this part of Pueblo Canyon had been relatively stable since 1998 (LANL 2011, 200902).

A-3.3 Pueblo Canyon Wing Ditch Area

Five cross-sections were surveyed at 100-ft intervals downcanyon from the Pueblo Canyon wing ditch in November 2009. Longitudinal thalweg profiles of the northern active channel and a formerly abandoned channel to the south where the wing ditch directs water were also surveyed over this distance. These cross-sections and the thalweg profiles were resurveyed in May 2011, October 2011, January 2013, December 2013, and January 2015. The wing ditch is a short distance downstream from where the road to the Los Alamos County WWTF crosses the Pueblo Canyon stream channel, and the culverts at this crossing were plugged during a runoff event on August 16, 2010. In 2011, the County of Los Alamos rebuilt the road crossing to better withstand large runoff events and to pass flow more effectively (LANL 2011, 200902). The formerly abandoned channel to the south now functions as the main thalweg, particularly during periods of high effluent discharge and storm water runoff. Flow is also present in the northern and in a middle channel throughout most of the wing ditch area, helping to effectively distribute water across this part of the wetland (a function that the wing ditch was designed to perform). September 2013 floods overtopped the road next to the wing ditch, and the County of Los Alamos conducted some additional regrading and road construction that extended onto the southern end of all of the cross-sections after this flood event. The southern end points of all wing ditch cross-sections have been moved to the north side of the road to avoid an area of regular Los Alamos County road maintainance.

Cross-sections WD-1 through WD-5 are located in contiguous reaches P-3C and P-3E (Figure A-1.0-1).Cross-section and thalweg profile locations are shown on an orthophotograph in Figure A-3.3-1, and the cross-sections and thalweg profile locations are also shown on a geomorphic map in Figure A-3.3-2 (geomorphic mapping from 1996–1997; LANL 2004, 087390). The cross-sections and the thalweg profiles are shown in Figure A-3.3-3. Geomorphic changes that occurred at these cross-sections during 2014 are summarized in Table A-3.3-1.

Maximum sediment deposition was 1.9 ft at the former location of the northern thalweg at section WD-1, resulting in southward lateral migration of this channel (Figure A-3.3-3 and Photo A1-4, Attachment A-1). The maximum incision (net erosion) was 0.8 ft in an area of channel incision in the central part of cross-section WD-5 (Figure A-3.3-3 and Photo A1-5, Attachment A-1). Each of the five cross-sections had net deposition during 2014 (Table A-3.3-1). Normalized 2014 net deposition over the surveyed area below the wing ditch averaged 266 m^3/100 m (Table A-3.3-1). As measured in 1997, post-1942 sediment deposition in reach P-3E, a short distance east of the surveyed wing ditch area, was estimated to be 6691 m^3/100 m (LANL 2004, 087390). Therefore, the magnitude of net 2014 sediment deposition is about 4% of the magnitude of the 1942 to 1997 total.

The 2014 net deposition represents a three-fold increase in deposition compared with the total 2010 to 2012 net deposition of 87 m^3/100 m (Figure A-3.3-4). The large September 2013 flood event resulted in a net 2013 sediment deposition that was about 8 times greater than the magnitude of net 2014 sediment deposition (Figure A-3.3-4). Overall, a total of 2473 m^3/100 m cumulative net deposition from 2010 to 2014 (Figure A-3.3-4).Most of the 2014 sediment deposition in the wing ditch area is associated with aggradation and deposition in the former northern thalweg, On average, the main channel thalweg near the wing ditch incised by 0.5 ft in 2014 compared with 0.5 ft of aggradation in 2013 (Table A-3.3-1). This change in thalweg gradient was associated with a large change in the main channel location wherein the thalweg reoccupied the southern channel (Figure A-3.3-3) As presented in Figure A-3.3-3, the average thalweg gradient of the active channel increased in 2014. This increase was a result of the change in channel configuration discussed above.

These data indicate that a relatively large amount of sediment deposition has occurred in the wing ditch area, particularly in 2013 and 2014 (Figure A-3.3-4). As measured in 1997, post-1942 sediment deposition in reach P-3E, a short distance east of the surveyed wing ditch area, was estimated to be 6691 m^3/100 m (LANL 2004, 087390). Therefore, the magnitude of net 2010 to 2014 sediment deposition is approximately equaivalent to 35% of the magnitude of the 1942 to 1997 total sediment deposition. The wing ditch has been effective in dispersing flows across the valley floor downstream of the structure, resulting in overall aggradation.

A-3.4 Lower Pueblo Canyon Willow-Planting Area

A total of 23 cross-sections were surveyed in September 2009 at 100-ft intervals within reaches P-3FE and P-4W in an area where willows were planted in spring 2009 (Figure A-1.0-1). The surveys extended for 1100 ft above and below a transition area separating a broad upcanyon wetland (P-3FE) from a narrower downcanyon wetland within incised geomorphic surfaces (P-4W). A longitudinal channel thalweg profile was also surveyed in September 2009 over this 2200-ft interval. These cross-sections and thalweg profiles were resurveyed in April and May 2011 and in October and November 2011 (LANL 2011, 200902). Cross-sections were resurveyed in November and December 2012, but the thalweg was not resurveyed at this time (LANL 2013, 239233, Appendix C). Cross-sections and thalweg profiles were resurveyed from December 2013 to February 2014 (LANL 2014, 257592). Cross-sections from the transition area (LPW+0) to the end of the area (LPW+1100) were surveyed in January 2014. Because reed canary grass transplanting (December 2014), willow-planting activities (April 2014), and planned local bank stabilization below the wetlands (Spring 2015) in the Lower Pueblo Canyon willow-planting area, the upper cross sections from LPW-1100 to LPW-0 and the entire Lower Pueblo Canyon willow-planting area, thalweg was not surveyed following the 2014 monsoon season. These post-2014 monsoon season cross-sections will be surveyed before the 2015 monsoon season once the local bank stabilization below the Pueblo Canyon wetlands is complete in the spring of 2015, thereby providing a baseline for post-2015 monsoon season surveys. Stream banks in this area were surveyed in January and March 2012 and resurveyed in January and February 2014. Cross-section and thalweg profile locations and stream banks are shown on an orthophotograph in Figure A-3.4-1 and on a geomorphic map in Figure A-3.4-2 (geomorphic mapping from 1996–1997; LANL 2004, 087390). Cross-sections LPW-1100 through LPW 0 are in P-3FE, and sections LPW+100 through LPW+1100 are in P-4W (Figures A-3.4-1 and A-3.4-2). This area was subject to extensive ground disturbance within the active channel and nearby low flood plain surfaces during 2014 willow planting and construction activities (Figure A-3.4-3 and Photo A1-6, Attachment A-1), and 2014 floods did not extend beyond this area of ground disturbance. The 2014 monsoonal flood events did not result in erosion or deposition of a magnitude that could be distinguished from the ground disturbance resulting from bank stabilzation and willow-planting activities; therefore, the January 2015 surveyed cross-sections are considered new baseline profiles (Figure A-3.4-3).

Geomorphic changes in the lower Pueblo Canyon willow-planting area from 2010 to 2013 are discussed in (LANL 2012, 213568). Because of the large September 2013 flood event, normalized net erosion in the upper half and the lower half of the lower willow-planting area exceeded the 2010 to 2012 net sediment deposition by a factor of 6 and 29 times, respectively (Figures A-3.4-4 and A-3.4-5, respectively). In contrast, geomorphic changes resulting from 2014 monsoonal flood events appear to be minimal and could not be distinguished from ground disturbance from construction and willow-planting activities. Banks in this area were not significantly modified by 2014 floods. January 2015 surveys and planned 2015 pre-monsoon surveys in the upper part of the LPW area will be used as new baseline surveys for the active channel and nearby low floodplain areas.

A-3.5 Pueblo Canyon GCS Area

A total of 15 cross-sections within Reach P-4E were surveyed in April 2010 at 100-ft intervals upstream of the Pueblo Canyon GCS, and 3 cross-sections were surveyed at 100-ft intervals downstream from the GCS (Figure A-1.0-1). A longitudinal channel thalweg profile was also surveyed over this 1800-ft interval. Because some ground disturbance associated with site restoration occurred after the April 2010 surveys were completed, the area of disturbance was resurveyed in June 2010 (LANL 2011, 206488). These surveys were repeated in April and October 2011, February 2014, and December 2014 and January 2015. The Pueblo Canyon GCS area was not resurveyed following the summer 2012 monsoon season because: the lack of monsoonal flows through this area in 2012, downstream attenuation of WWTF effluent discharge, and the absence of significant net deposition or incision in the lower Pueblo Canyon willow-planting area upstream of the Pueblo Canyon GCS survey area. Stream banks in the Pueblo Canyon GCS area were surveyed in January 2012 and were resurveyed in February 2014. Cross-section and thalweg profile locations and stream banks are shown on the orthophotograph in Figure A-3.5-1 and on a geomorphic map in Figure A-3.5-2 (geomorphic mapping from 1996 to 1997; LANL 2004, 087390). The cross-sections and the channel thalweg profile are shown in Figure A-5.5-3. Geomorphic changes that occurred at these cross-sections during 2014 from monsoonal flooding are summarized in
Tables A-3.5-1 (above the Pueblo Canyon GCS) and A-3.5-2 (below the Pueblo Canyon GCS). In January 2015, the Pueblo Canyon GCS was revisited to document the condition of the structure. Photographs of the GCS are included in Attachment A-1, Photo A1-7.

Above the Pueblo Canyon GCS, the maximum sediment deposition was 0.6 ft at cross-section PUGCS-900 (900 ft above the GCS), and a maximum erosion of 0.9 ft occurred at PUGCS-100 (Table A-3.5-1). The erosion at PUGCS-100 was associated with channel incision, likely enhanced by construction activities above the PUGCS (Photo A1-8, Attachment A-1), and deposition at PUGCS-900 was associated with channel aggradation (Photo A1-9, Attachment A-1). Five of the 15 cross-sections above the GCS had net erosion and 10 had net deposition. Normalized net deposition above the GCS averaged 13 m^3/100 m in 2014 (Table A-3.5-1). For comparison, as measured in 1997, there was an estimated 7021 m^3/100 m of post-1942 sediment in reach P-4E, which includes the GCS (LANL 2004, 087390). Therefore, the magnitude of net 2014 sediment deposition is about 0.1% of the magnitude of the 1942 to 1997 total.

Below the Pueblo Canyon GCS, maximum sediment deposition was 0.4 ft at cross-section PUGCS+200 (200 ft below the GCS), and a maximum erosion of 3.0 ft occurred at PUGCS+200 (Figure A-3.5-3 and Table A-3.5-2). The erosion at PUGCS+200 was associated with bank erosion and lateral channel migration, and deposition at PUGCS+200 was associated with aggradation within the channel. Net sediment erosion occurred below the GCS, averaging −104 m^3/100 m (Table A-3.5-2). The area below the Pueblo Canyon GCS was also affected by construction of a new road to access the canyon bottom (see PUGCS+100 section; Figure A-3.5-3).

On average, the main channel thalweg above the PUGCS was unchanged (neither incised nor aggraded) in 2014 compared with 0.9 ft of aggradation in 2013 (Table A-3.5-1). As presented in Figure A-3.5-3, the average thalweg gradient of the active channel remained unchanged between 2013 and 2014. On average, the channel thalweg below the PUGCS aggraded by 0.2 ft, while and the channel gradient remained unchanged between 2013 and 2014 (Table A-3.5-1; Figure A-3.5-3).

Net deposition occurred in this area in 2010 and 2011, and minimal change occurred in 2012, resulting in 286 m^3/100 m net deposition from 2010 to 2012 (Figure A-3.5-4). In 2013, net erosion occurred, and in 2014 net deposition occurred. Overall, net deposition from 2010 to 2014 was 43 m^3/100 m (Figure A-3.5-4).

Based on this year's assessment, following net erosion in 2013, the Pueblo Canyon GCS area changed minimally in 2014. Floods were significantly attenuated by the time they reached this area, resulting in minor net sediment deposition and minimal bank erosion.

A-3.6 Upper Los Alamos Canyon Sediment Retention Basins

The upper Los Alamos Canyon sediment retention basins, constructed at the base of the drainage below Solid Waste Management Unit (SWMU) 01-001(f) (LA-SMA-2 or Hillside 140), were excavated on July 8 to 11, 2011, after the Las Conchas fire (LANL 2011, 206488). The basins were resurveyed in July 2011, and Basin 1 was resurveyed in October 2011 (LANL 2011, 200902). Following the excavation of 2011 monsoon season sedimentation, Basin 1 was resurveyed in January 2013 (LANL 2013, 239233). No appreciable sediment was deposited in Basin 2 between July 2011 and January 2013. Basin 1 was surveyed in April 2014, before the 2014 summer monsoon season, and again in December 2014, after the 2014 summer monsoon season. The 2011 topography is presented in Figure A-3.6-1. Figure A-3.6-1 also shows variations in total 2014 monsoon season sediment thickness, determined by subtracting the April 2014 topographic surface from the December 2014 surface. Maximum sediment thickness resulting from the 2014 monsoon season is 15 cm (0.5 ft) in the northern part of the small coarse sediment lobe where the drainage enters the northeast part of the basin (Figure A-3.6-1). Sediment in the lobe proximal to the drainage is mostly coarse-grained, whereas fine-grained sediment was observed in hand-dug holes in the center of the basin. Based on field observations, 2014 sediment in the central part of the basin is 5–9 cm thick. This is consistent with sediment thickness determined from the survey data (Figure A-3.6-1). An estimated 7 m^3 of sediment accumulated in Basin 1 during the summer 2014 monsoon season compared with approximately 71 m^3 of sediment that was deposited in Basin 1 during the 2013 monsoon season (LANL 2014, 257592). Based on the areas and 2014 sediment thickness in the coarse sediment lobe and the remainder of Basin 1, it is estimated that 25% of the 2014 sediment in upper Los Alamos Canyon Basin 1 is coarse-grained, and 75% of the sediment is fine-grained. Flood waters do not appear to have spilled from Basin 1 into Basin 2, and therefore, there was no 2014 sediment deposition in Basin 2. Based on the deposition of sediment observed in Basin 1 and the absence of any appreciable sediment deposition in Basin 2, nearly all the sediment transported by the small drainage below SWMU 01-001(f) is being contained in the upper Los Alamos Canyon sediment retention basins. Photographs of the sediment retention basins are shown in Photo A1-10, Attachment A-1.

A-3.7 DP Canyon GCS Area

A total of 11 cross-sections were surveyed in April and May 2010 at 100-ft intervals upstream of the DP Canyon GCS in Reach DP-2 (Figure A-1.0-1), and 2 cross-sections were surveyed at 125 ft and 225 ft downstream from the GCS and Reach DP-2, below the E039.1 gaging station (LANL 2012, 218411). A longitudinal channel thalweg profile was also surveyed over this 1325-ft interval. The area above the GCS was first resurveyed in November and December 2010, and the area below the GCS was resurveyed in March 2011 after ice melted from the channel bed (LANL 2011, 200902). The area above and below the GCS was resurveyed in October 2011 and in November and December 2012 (LANL 2013, 239233). In February 2013, an additional cross-section was surveyed 20 ft above the GCS (DPGCS–20). All DPGCS cross-sections were resurveyed in March and April 2014 and most recently in November and December 2014. Cross-section and thalweg profile locations are shown on an orthophotograph in Figure A-3.7-1 and on a geomorphic map of Reach DP-2 in Figure A-3.7-2 (geomorphic mapping from 1998; LANL 2004, 087390). The cross-sections and thalweg profile are shown in Figure A-3.7-3. Geomorphic changes that occurred at these cross-sections during 2014 from monsoonal flooding are summarized in Tables A-3.7-1 (above DP GCS) and 3.7-2 (below DP GCS). Photographs of the GCS are shown in Photo A1-11 Attachment A-1.

Net sediment deposition occurred at 10 of the 12 cross-sections above the GCS during the summer 2014 monsoon season, and net sediment erosion occurred at two cross-sections (Table A-3.7-1). Maximum sediment depositional thickness was 2.5 ft at the cross-section 400 ft above the GCS, and the maximum erosion was 1.9 ft at the cross-section 200 ft above the GCS (Figure A-3.7-3 and Table A-3.7-1). Maximum sediment deposition was associated with aggradation in what was formerly the main channel at DPGCS-400 (Figure A-3.7-3 and Photo A1-12, Attachment A-1), and maximum incision was associated with progressive channel incision at DPGCS-200 (Figure A-3.7-3 and Photo A1-13, Attachment A-1). Normalized net sediment deposition above the GCS averaged 85 m^3/100 m (Table A-3.7-1). For comparison, as measured in 1997, there was an estimated 749 m^3/100 m of post-1942 sediment in reach DP-2, which contains the GCS (LANL 2004, 087390). Therefore, the magnitude of net 2014 sediment deposition is about 12% of the magnitude of the 1942 to 1997 total.

The magnitude of 2014 net sediment deposition is approximatly 71% of the magnitude of 2013 sediment deposition (Figure A-3.7-4). Overall, a total of 393 m^3/100 m cumulative sediment deposition has occurred at these sites from 2010 to 2014 (Figure A-3.7-4). Most of the 2014 sediment deposition occurred between DPGCS-400 and DPGCS-1100, with the greatest sediment volume deposited at DPGCS-600 (Table A-3.7-1 and Figure A-3.7-3). This sediment deposition includes both channel aggradation and overbank deposition and is similar to sediment deposition observed in this area during previous monitoring efforts (LANL 2011, 200902). It appears that the locus of sediment deposition is prograding downstream and migrating laterally.

In the area below the DP Canyon GCS, net sediment erosion occurred at both cross-sections (Figure A-3.7-3 and Table A-3.7-2). No sediment deposition was measured at these two cross-sections, and maximum sediment erosion was 1.6 ft at the cross-section 225 ft below the GCS (Figure 3.7-3). Net sediment erosion occurred below the DP Canyon GCS, averaging −72 m^3/100 m (Table A-3.7-2).

On average, the stream channel upstream of the GCS aggraded by 0.2 ft in 2013 compared with 0.4 ft of aggradation in 2013 (Table A-3.7-1). Downstream of the GCS, the channel incised by an average of 0.4 ft in 2014, compared with 0.7 ft of incision in 2013 (Table A-3.7-2). As shown in Figure A-3.7-3, the channel thalweg gradient remained unchanged above the GCS and increased below the GCS in 2014.

The area upstream of the DP Canyon GCS experienced net sediment deposition during the 2014 monsoon season. This is consistent with annual net deposition observed in this area from 2010 to 2013 (Figure A-3.7-4). It appears sediment deposition behind the engineered structure has been enhanced by the construction of this structure, although how far this effect propagates upstream behind the DP Canyon GCS is uncertain.

A-3.8 Los Alamos Canyon Low-Head Weir

The sediment retention basins above the Los Alamos Canyon low-head weir (the LA Weir) were excavated from July 8 to July 11, 2011, following the Las Conchas fire (LANL 2011, 206488). The upper two basins (Basins 1 and 2) were resurveyed in October 2011 after the 2011 monsoon season, and the lower basin (Basin 3) was resurveyed in March 2012 after ponded water had evaporated (LANL 2012, 218411). Basins 1 and 3 were resurveyed in November 2012; Basin 2 had standing water and was not resurveyed in November 2012 (LANL 2013, 239233). All three basins were resurveyed in May 2013 following excavation in March and April 2013. Basins 1 and 2 were resurveyed in December 2013, and

Basin 3 was resurveyed in February 2014. All three basins were resurveyed in June 2014 following excavation in April 2014. Basins 1 and 2 were surveyed in February 2015; Basin 3 had standing water in the eastern (downstream) portion in February 2015 so it could only be partially surveyed. To obtain an estimated sediment volume for the submerged portion of Basin 3, points were surveyed around the perimeter. Points for the interior of the submerged portion of Basin 3 were estimated to simulate a relatively flat surface and allow the kriging software to generate a surface to calculate sediment volume.

Figure A-3.8-1 shows variations in total sediment thicknesses in the LA Weir sediment basins, determined by subtracting the June 2014 surface from the February 2015 surface. The area of Basin 3 that was submerged in February 2015 is shown in blue, and points that were estimated to generate the sediment surface in the submerged area are shown as blue dots. Maximum sediment thickness in Basin 3 resulting from the 2014 monsoon season is 0.6 m (2.1 ft). An estimated 219 m^3 of sediment accumulated in Basin 3 during the summer 2014 monsoon season (Table 3.8-1). Maximum sediment thickness in Basin 2 resulting from the 2014 monsoon season is 0.91 m (3.0 ft) and is locacted in a coarse-sand lobe in the central part of the basin (Figure A-3.8-1). An estimated 168 m^3 of sediment accumulated in Basin 2 during the summer 2014 monsoon season (Table 3.8-1). Maximum sediment thickness in Basin 1 resulting from the 2014 monsoon season is 0.91 m (3.0 ft) and is in the central part of the basin (Figure A-3.8-1). An estimated 167 m^3 of sediment accumulated in Basin 1 during the summer 2014 monsoon season. Table A-3.8-1 summarizes volume changes in each of the three sediment retention basins during this period. The weir is shown in Photo A1-14, Attachment A-1; the coarse-sand lobe in Basin 2 is shown in Photo A1-15, Attachment A-1.

Field observations indicate that approximately 80% of the 2014 sediment deposited in Basin 1 and 65% of the 2014 sediment deposited in Basin 2 was coarse-grained sediment transported as bed load. The remaining 20% and 35%, respectively, of the total sediment volume in Basins 1 and 2 is fine-grained sediment transported as suspended load. This is in contrast to 2013 sediment deposits in Basins 1 and 2, which were approximately 100% coarse-grained sediment that was transported as bed load (LANL 2013, 239233). In Basin 3, 2014 deposits comprised approximately 35% coarse-grained sediment and 65% fine-grained sediment, similar to the 40% coarse-grained sediment and 60% fine-grained sediment deposited in 2013. The total sediment accumulation rate in the basins above the weir during the 2014 monsoon season was less than measured in the years before the Las Conchas fire, as shown in Table A-3.8-2 (the Las Conchas fire occurred in June 2011). Annual sediment deposition at the LA Weir in 2011, 2012, and 2013 was approximately an order of magnitude greater than the annual sediment deposition recorded in 2010, the year before the Las Conchas fire (Table A-3.8-2). Sediment accumulation in 2014 was similar to that recorded in 2010, indicating the soils are being revegetated and stabilized, thus reducing erosion and sedimentation in the upstream fire-affected areas. The relative percentages of 2014 coarse and fine sediment are similar to 2012 and previous years (Table A-3.8-1). The predominance of coarse sediment at the weir in 2013 was likely from the large runoff events that occurred in September 2013, during which small tributary drainages appear to have contributed significant volumes of coarse sediment. Runoff events of similar magnitude were not recorded in 2014, so contributions of coarse sediment from these tributary channels was likely much less than occurred in 2013.

A-4.0 OBSERVATIONS OF WILLOWS IN PUEBLO CANYON

From 2008 to 2010, willows were planted in three areas in Pueblo Canyon downstream from the new Los Alamos WWTF, with the goal of enhancing riparian habitat, stabilizing surfaces, and slowing floodwaters. These areas are referred to as the upper Pueblo Canyon willow-planting area (section A-3.2),the Pueblo Canyon wing ditch (section A-3.3),the lower Pueblo Canyon willow-planting area (section A-3.4), and the Pueblo Canyon GCS (section A-3.5). Observations were made of willows in these areas in fall 2011, winter 2013, spring 2014, and winter of 2014 and 2015. Willow success was variable in these areas and appears to be related to substrate conditions and preexisting vegetation as well as to the occurrence and persistence of water and substrate stability, as discussed below. The success of the willows was also affected by the large September 2013 flood event, which laid down and/or uprooted many willows, resulting in substantial willow mortality.

In 2015, the upper Pueblo Canyon willow-planting area had the tallest willows and the thickest stands of willows in the surveyed areas. In the upper Pueblo Canyon willow-planting area, willows laid down by the monsoon floods of summer 2013 had resprouted and showed vigorous growth (Photos A1-16 and A1-17, Attachment A-1).

In the lower Pueblo Canyon willow-planting area (Figures A-1.0-1 and A-3.4-1), willows were originally planted in a thin strip along the main channel and locally along a side channel. This was an area with thick preexisting vegetation dominated by reed canary grass (*Phalaris arundinacea*), and much of the area has a fine-grained substrate. Most planted willow stalks did not survive, with willow success estimated to be less than 1% in this area in 2014. Poor success in this area was related to the thick preexisting vegetation that would compete with the willows, and the effects of the large 2013 flood events that uprooted and eroded many surviving willows from the original planting. The commonly fine-grained substrate and damage to willow stalks by animals observed during the previous willow surveys may also have contributed to the poor success rate in this area.

One dense native willow patch is located on a post-1942 geomorphic surface near the LPW+100 cross-section. This patch was partially eroded during the September 2013 flood, with remaining willows up to 3 m tall. These willows were established before the recent planting and indicate locally favorable conditions on higher surfaces, at least at the time they were established. The remaining willows on this post-1942 surface have exhibited good growth and recovery during 2014, following damage to the willow patch during the September 2013 flood.

During the 2014 surveys, areas with sufficient thickness of saturated coarse sediments were identified, and willow cuttings were subsequently planted between the LPW−200 and LPW+1100 cross-sections (Figure A-3.4-1). Survival success of these plantings has been excellent and is estimated to be at least 90%.

A-5.0 SOUTH FORK OF ACID CANYON INSPECTION

The stream bank armoring that was emplaced in the south fork of Acid Canyon in April 2010 (LANL 2010, 109280) was inspected after the 2011 monsoon season (LANL 2012, 218411); after the 2012 monsoon season (LANL 2013, 239233); after the 2013 monsoon season (LANL 2014, 257592); and again after the 2014 monsoon season. The rock armoring remained intact, as shown in Photo A1-18, Attachment A-1.

A-6.0 SUMMARY

Net deposition occurred in most surveyed areas in the Pueblo Canyon watershed during monsoonal flood events in 2014. This is in contrast to net erosion measured in most surveyed areas in 2013 but is consistent with net deposition measured in most of these areas in 2010, 2011, and 2012. The Pueblo Canyon wing ditch area experienced the largest normalized net deposition (266 m^3/100 m), whereas the upper Pueblo Canyon willow-planting area and Pueblo Canyon GCS sediment mitigation areas experienced relatively small net deposition (30 m^3/100 m and 13 m^3/100 m, respectively). For comparison, the BG sections above WWTF recorded 84 m^3/100 m net deposition. For sections of the lower Pueblo Canyon willow-planting area, geomorphic changes resulting from 2014 monsoonal flood events appear to be minimal and could not be distinguished from ground disturbance resulting from construction and willow-planting activities. Bank erosion in all areas as a result of 2014 flood events was minimal. Willows that had been laid down by 2013 monsoonal floods have resprouted and appear to be growing vigorously. Success of willows planted in the lower Pueblo Canyon willow-planting area sections appears to be excellent. The regrowth of willow patches and sedimentation in the wing ditch area are consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716).

Net sediment deposition occurred in most surveyed areas in the Los Alamos Canyon watershed in 2013, which is consistent with the goal of the sediment transport mitigation work plans (LANL 2008, 101714; LANL 2008, 105716). Net sediment deposition in DP Canyon, the upper Los Alamos Canyon sediment retention basin, and the LA Weir in 2014 is less than that recorded in 2013. It appears sediment deposition behind the engineered structures in the Los Alamos Canyon watershed has been enhanced by the construction of these structures, although how far this effect propagates upstream behind the structures is uncertain.

Recommend actions include continuing annual resurveys at all BG sections, sediment transport mitigation sites, and sediment retention basins. Additional actions include completing the post-2014 monsoon season survey at the cross-sections in the lower Pueblo Canyon willow-planting area from LPW-1100 to LPW-0 and the thalweg following the completion of the local bank stabilization below the Pueblo Canyon wetlands in spring 2015. These post-construction surveys will provide a baseline for post-2015 monsoon season surveys.

A-7.0 REFERENCES AND MAP DATA SOURCES

A-7.1 References

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

LANL (Los Alamos National Laboratory), April 2004. "Los Alamos and Pueblo Canyons Investigation Report," Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 087390)

LANL (Los Alamos National Laboratory), February 2008. "Interim Measure Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons," Los Alamos National Laboratory document LA-UR-08-1071, Los Alamos, New Mexico. (LANL 2008, 101714)

LANL (Los Alamos National Laboratory), October 2008. "Supplemental Interim Measures Work Plan to Mitigate Contaminated Sediment Transport in Los Alamos and Pueblo Canyons," Los Alamos National Laboratory document LA-UR-08-6588, Los Alamos, New Mexico. (LANL 2008, 105716)

LANL (Los Alamos National Laboratory), April 2010. "Documentation of Completion of Stream Bank Stabilization in the South Fork of Acid Canyon," Los Alamos National Laboratory document LA-UR-10-1877, Los Alamos, New Mexico. (LANL 2010, 109280)

LANL (Los Alamos National Laboratory), February 2011. "Baseline Geomorphic Conditions at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds, Revision 1," Los Alamos National Laboratory document LA-UR-11-0936, Los Alamos, New Mexico. (LANL 2011, 200902)

LANL (Los Alamos National Laboratory), September 2011. "Las Conchas Wildfire Effects and Mitigation Actions in Affected Canyons," Los Alamos National Laboratory document LA-UR-11-4793, Los Alamos, New Mexico. (LANL 2011, 206488)

LANL (Los Alamos National Laboratory), March 2012. "Los Alamos National Laboratory Environmental Surveillance Program Sampling and Analysis Plan for Sediment, 2012," Los Alamos National Laboratory document LA-UR-12-1132, Los Alamos, New Mexico. (LANL 2012, 213568)

LANL (Los Alamos National Laboratory), May 2012. "2011 Geomorphic Changes at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds," Los Alamos National Laboratory document LA-UR-12-21330, Los Alamos, New Mexico. (LANL 2012, 218411)

LANL (Los Alamos National Laboratory), March 2013. "Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2012," Los Alamos National Laboratory document LA-UR-13-22113, Los Alamos, New Mexico. (LANL 2013, 239233)

LANL (Los Alamos National Laboratory), March 2014. "Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013," Los Alamos National Laboratory document LA-UR-14-24516, Los Alamos, New Mexico. (LANL 2014, 257592)

NMED (New Mexico Environment Department), May 11, 2010. "Approval, Documentation of Completion of Armoring of Stream Banks in South Fork Acid Canyon," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 109693)

NMED (New Mexico Environment Department), July 1, 2011. "Approval with Modifications, 2010 Geomorphic Changes at Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyon Watersheds," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 204349)

A-7.2 Map Data Sources

The following list provides data sources for maps included in the main body of this report.

2000 LIDAR Hypsography; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; 1:1,200; Work in progress.

Drainage; Los Alamos National Laboratory, Environment and Remediation Support Services; 1:24,000; May 15, 2006.

Gaging stations; Los Alamos National Laboratory, Waste and Environmental Services Division; 1:2,500; March 19, 2011.

Grade control structures; Los Alamos National Laboratory, Environment and Remediation Support Services; Unknown; May 17, 2011.

LANL boundary; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; Unknown; August 16, 2010.

LANL area orthophoto; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; 1'=200'; February 25, 2009.

Location IDs; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division; 1:2,500; May 19, 2011.

Other property boundary; Los Alamos National Laboratory, Earth and Environmental Sciences GIS Lab; Unknown; August 16, 2010.

Pueblo and DP Canyon cross sections and thalwegs; Los Alamos National Laboratories, Earth and Environmental Sciences GIS Lab; Unknown; May 2011.

Roads, surfaced; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; Unknown; November 30, 2010.

Technical area boundary; Los Alamos National Laboratory, Site Planning and Project Initiation Group, Infrastructure Planning Office; Unknown; August 16, 2010.

Watershed; Los Alamos National Laboratory, Environment and Remediation Support Services; 1:2,500; November 2, 2006.

Wells; Los Alamos National Laboratory, ESH&Q Waste and Environmental Services Division; 1:2,500; May 19, 2011.

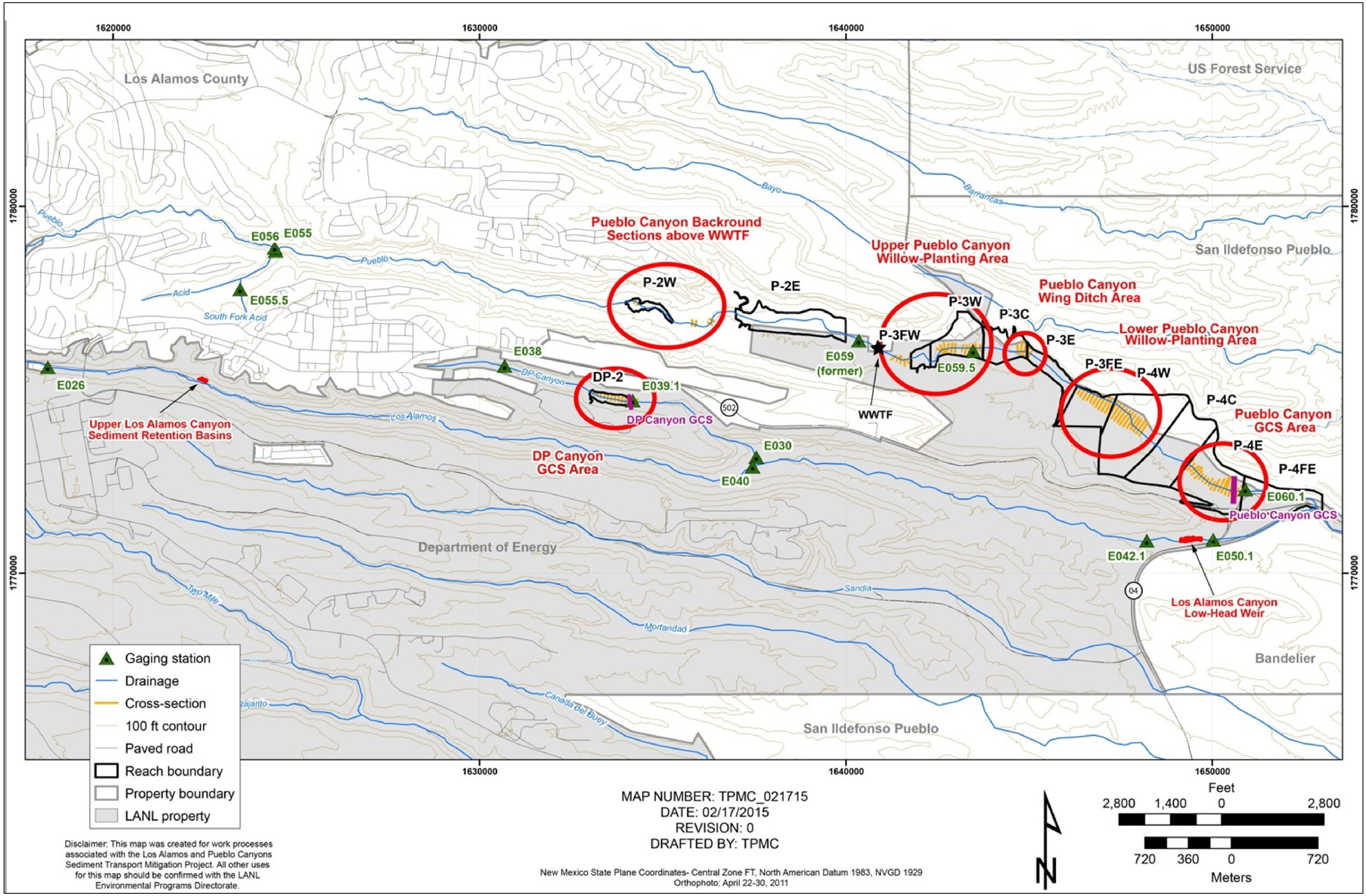


Figure A-1.0-1 Los Alamos and Pueblo Canyon watersheds, showing sediment transport mitigation sites, survey cross-sections, and stream gaging stations

Figure A-3.1-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles at the Pueblo Canyon Background sections above the WWTF

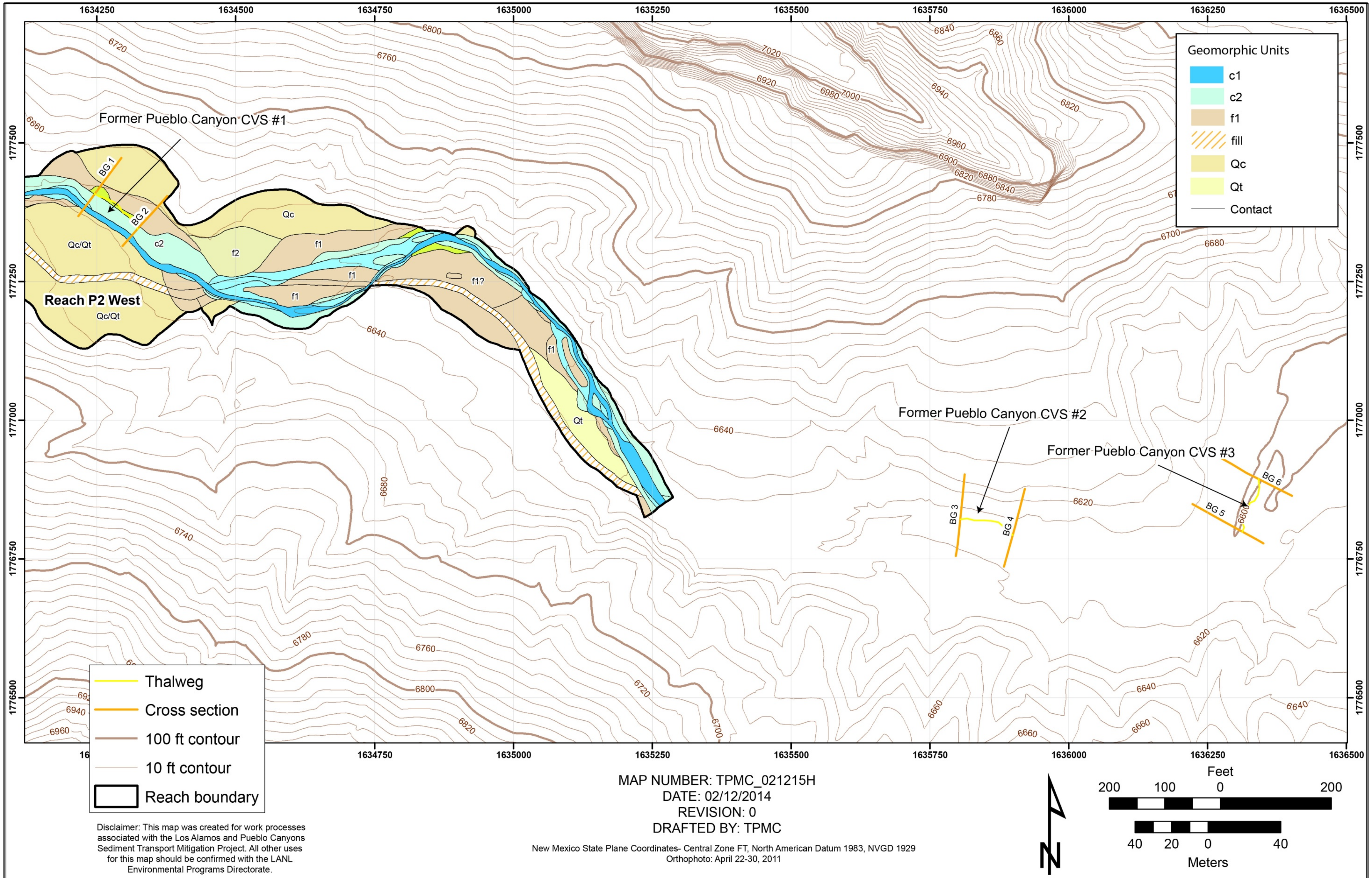


Figure A-3.1-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profile at the Pueblo Canyon Background sections above the WWTF; geomorphic mapping from 1997

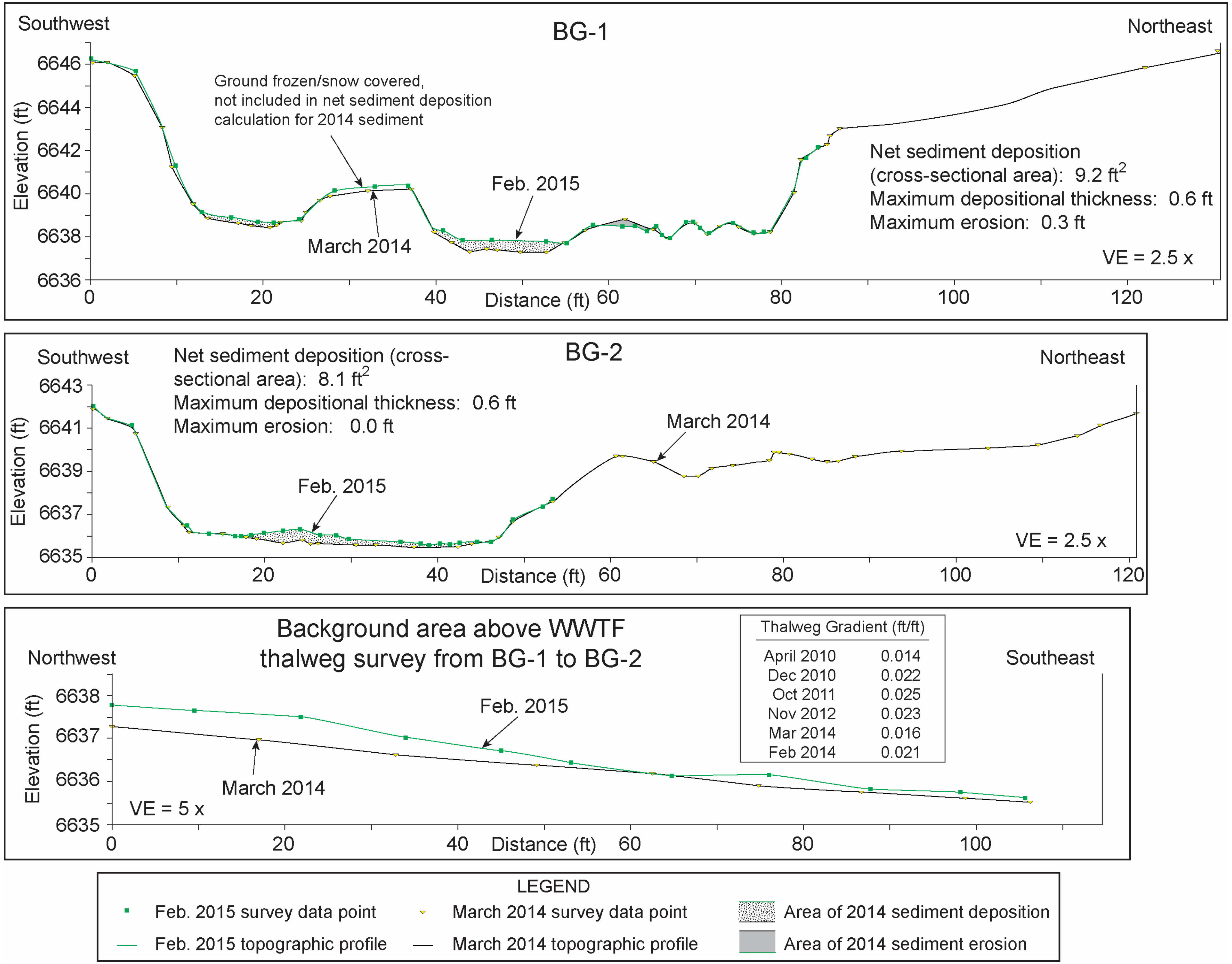


Figure A-3.1-3 Cross-sections and thalweg profile at the Pueblo Canyon Background sections above the WWTF

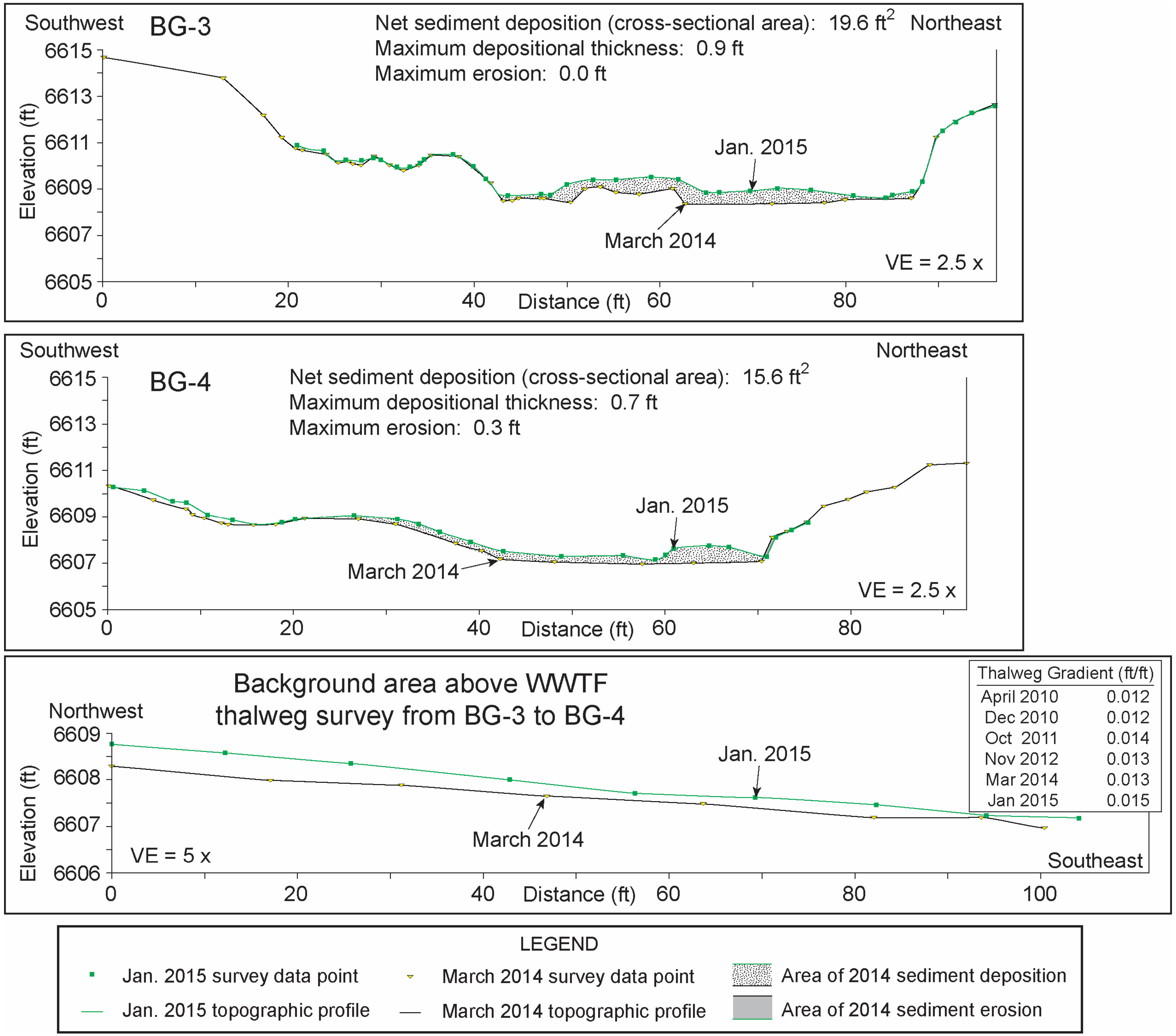
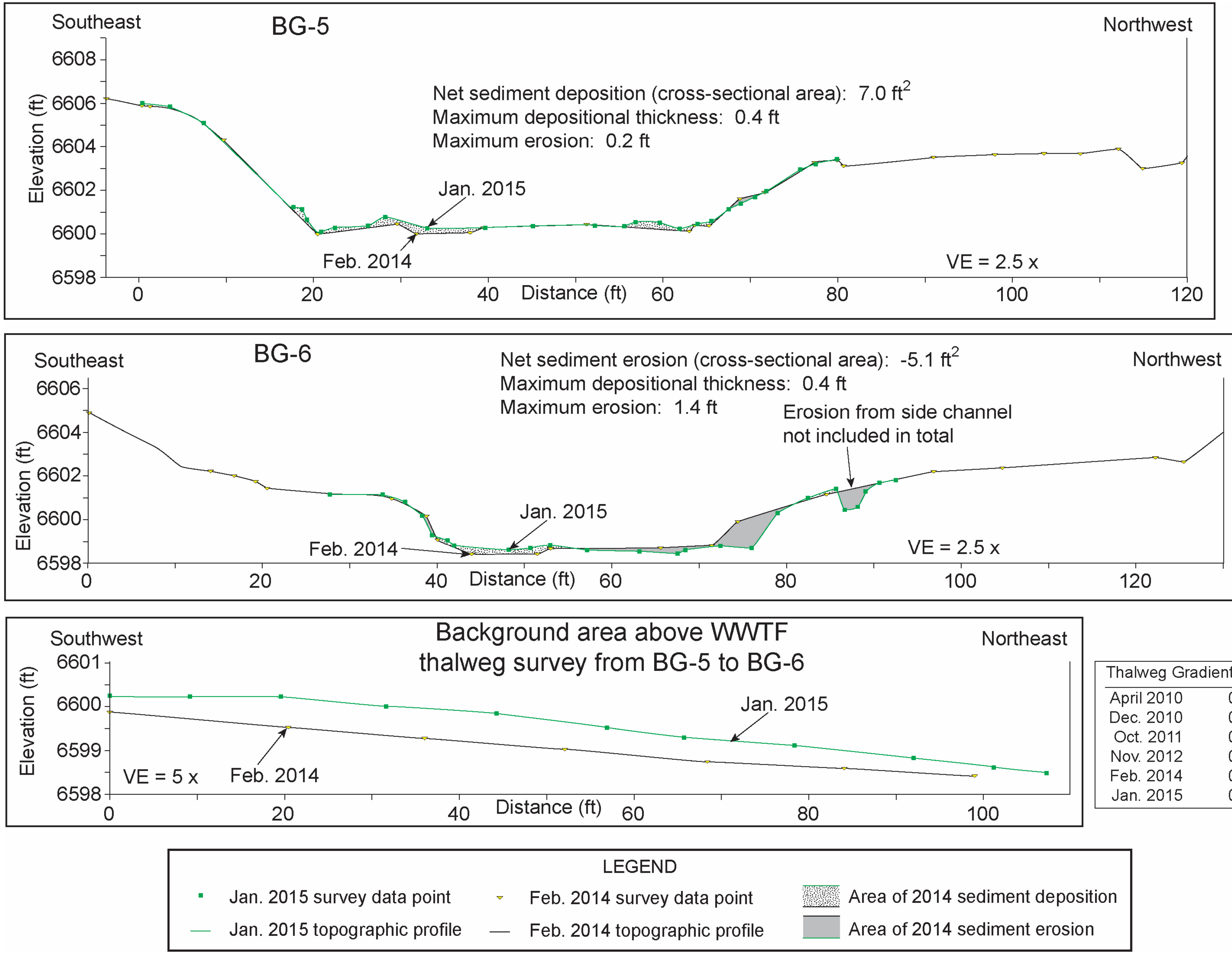


Figure A-3.1-3 (continued) **Cross-sections and thalweg profile at the Pueblo Canyon Background sections above the WWTF**



Thalweg Gradient (ft/ft)	
April 2010	0.012
Dec. 2010	0.015
Oct. 2011	0.015
Nov. 2012	0.014
Feb. 2014	0.015
Jan. 2015	0.016

Figure A-3.1-3 (continued) **Cross-sections and thalweg profile at the Pueblo Canyon Background sections above the WWTF**

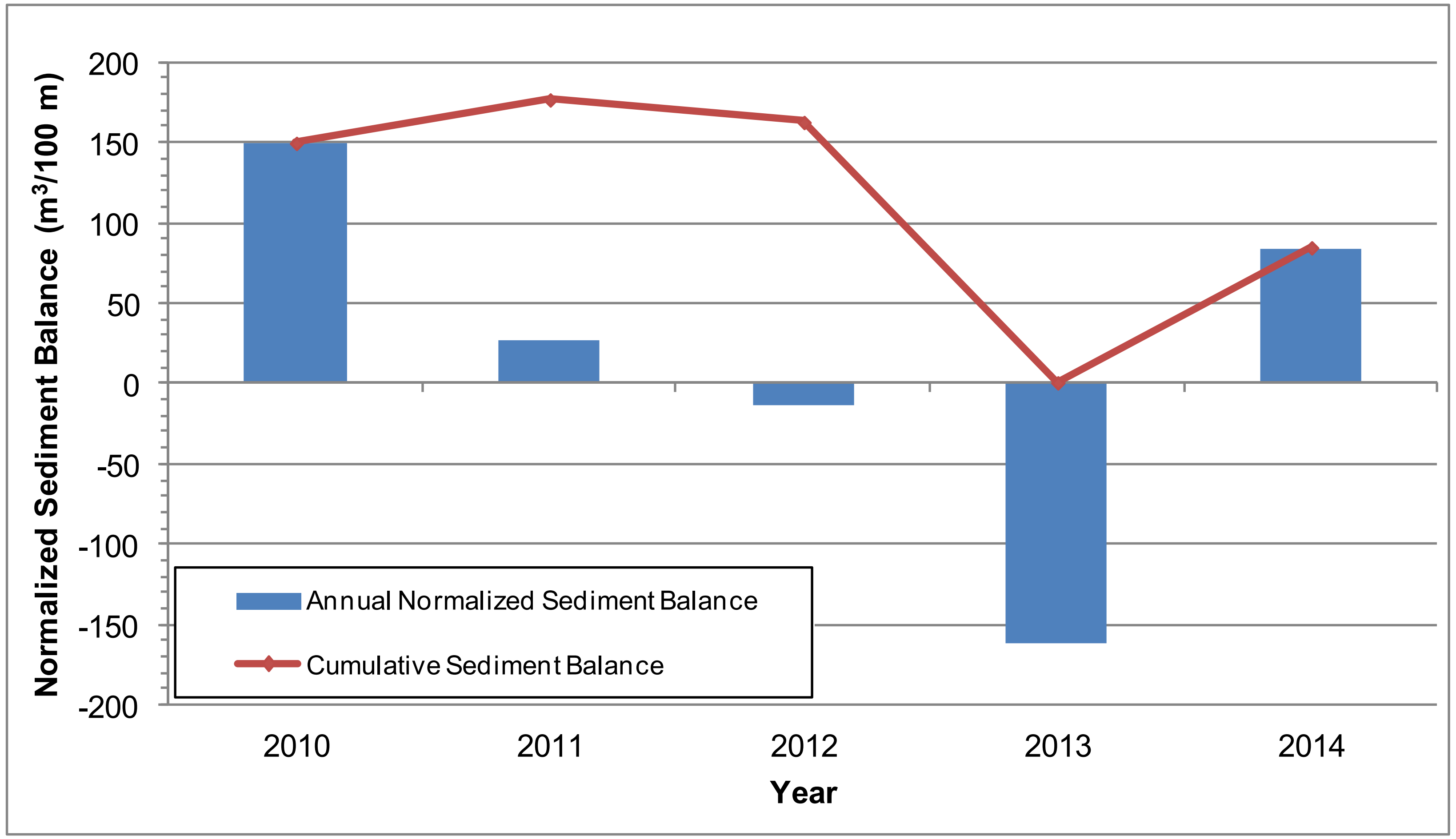


Figure A-3.1-4 2010–2014 sediment balance at the Pueblo Canyon Background sections above WWTF. Positive sediment balance values indicate deposition, negative values indicate erosion.

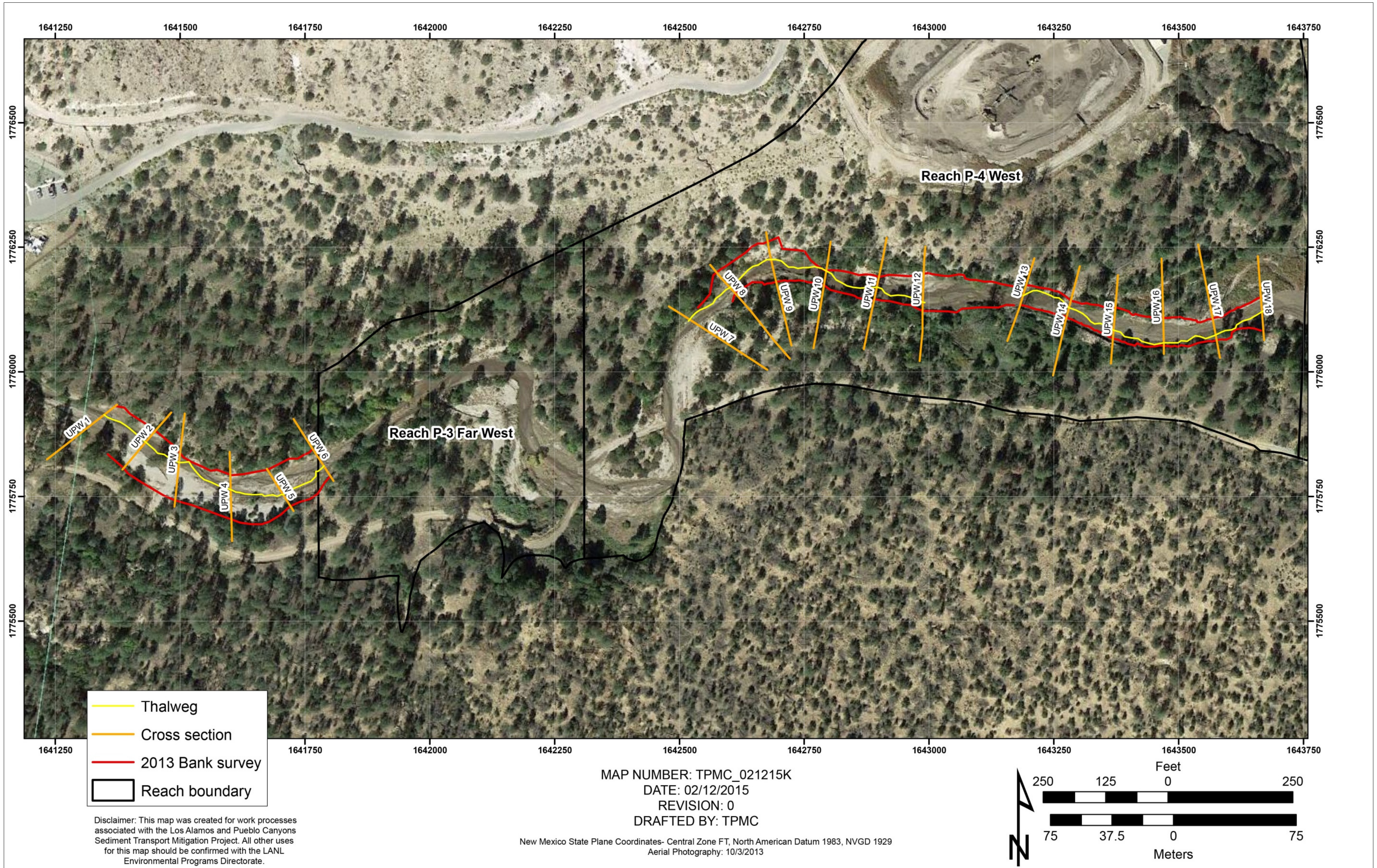


Figure A-3.2-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles in the Upper Pueblo Canyon willow-planting area

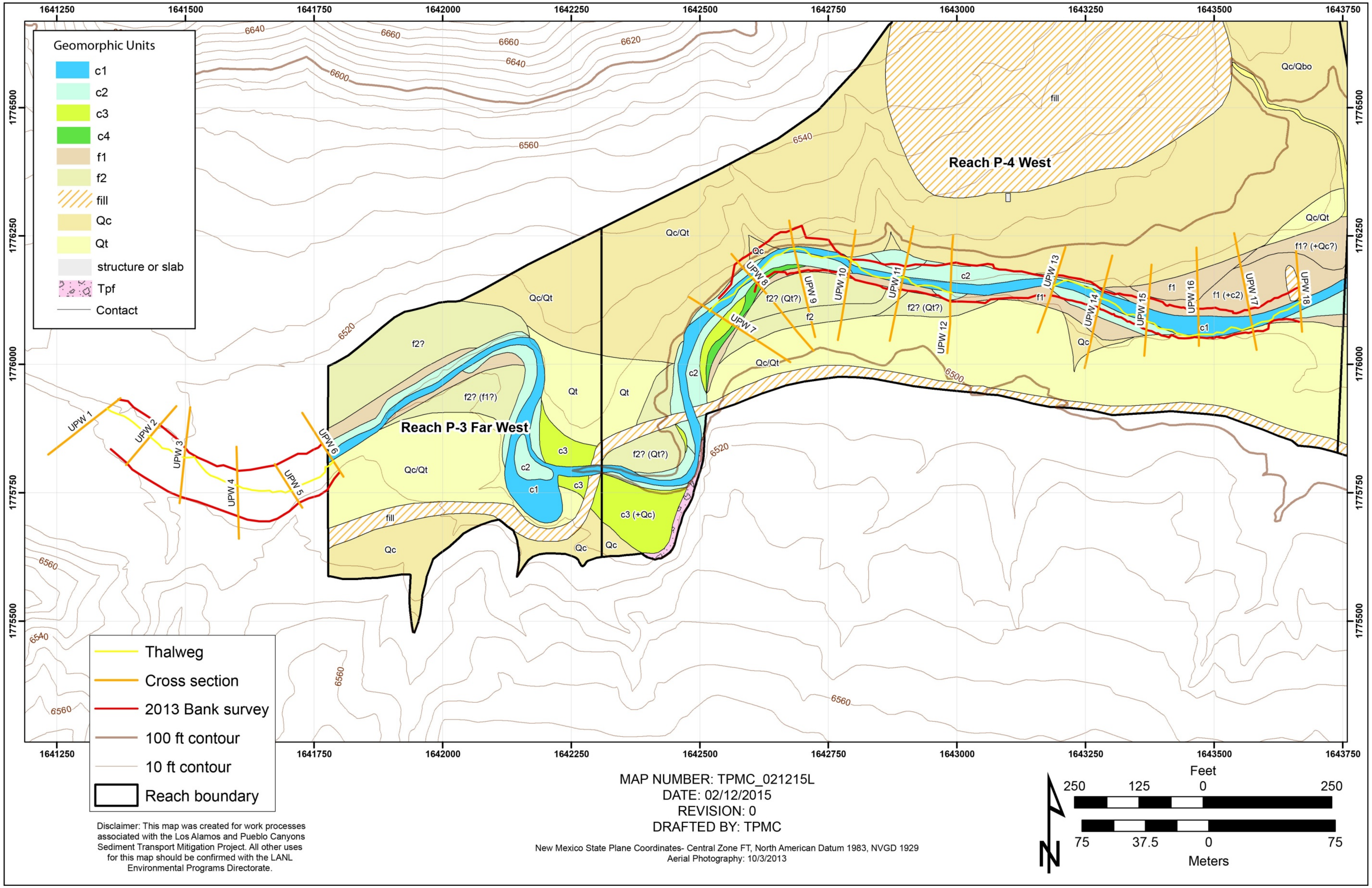


Figure A-3.2-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profiles in the Upper Pueblo Canyon willow-planting area; geomorphic mapping from 1997

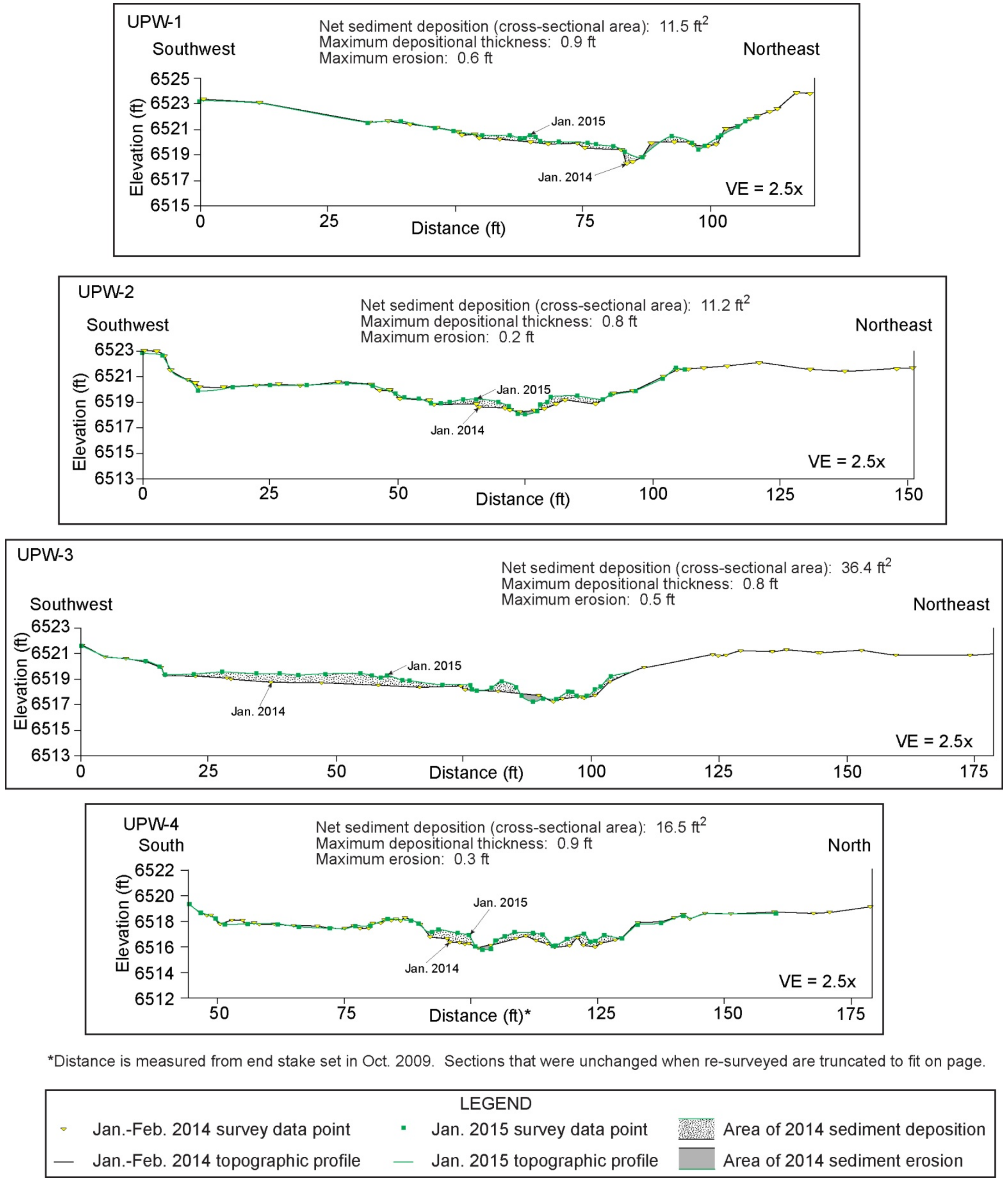
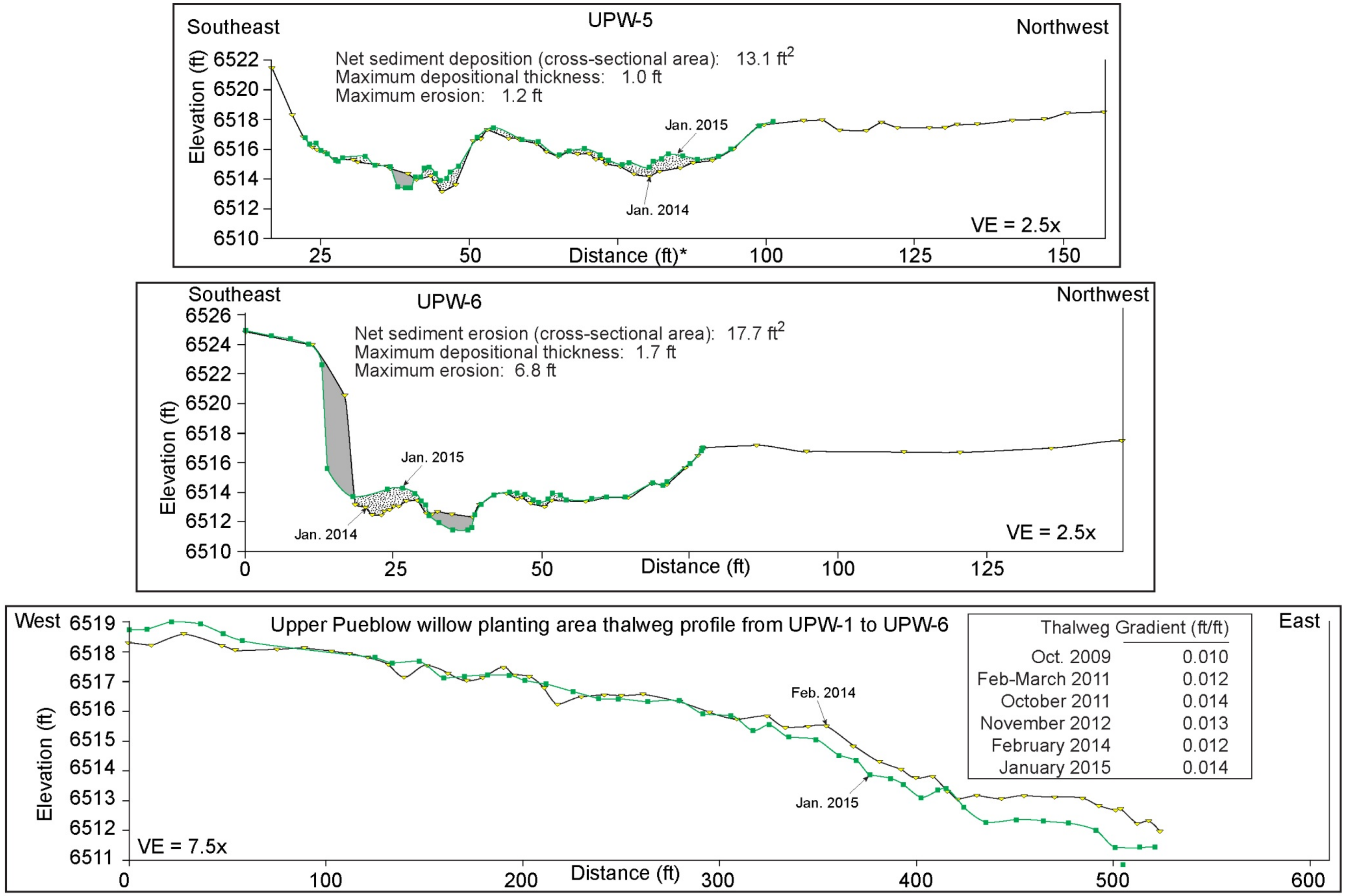


Figure A-3.2-3 Cross-sections and thalweg profile in upper third of Upper Pueblo Canyon willow-planting area



*Distance is measured from end stake set in Oct. 2009. Sections that were unchanged when re-surveyed are truncated to fit on page.

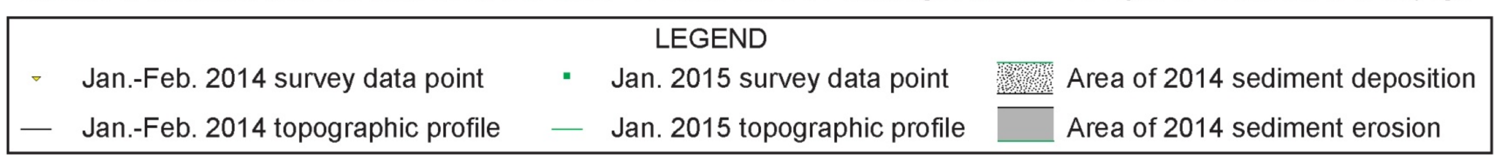


Figure A-3.2-3 (continued) **Cross-sections and thalweg profile in upper third of Upper Pueblo Canyon willow-planting area**

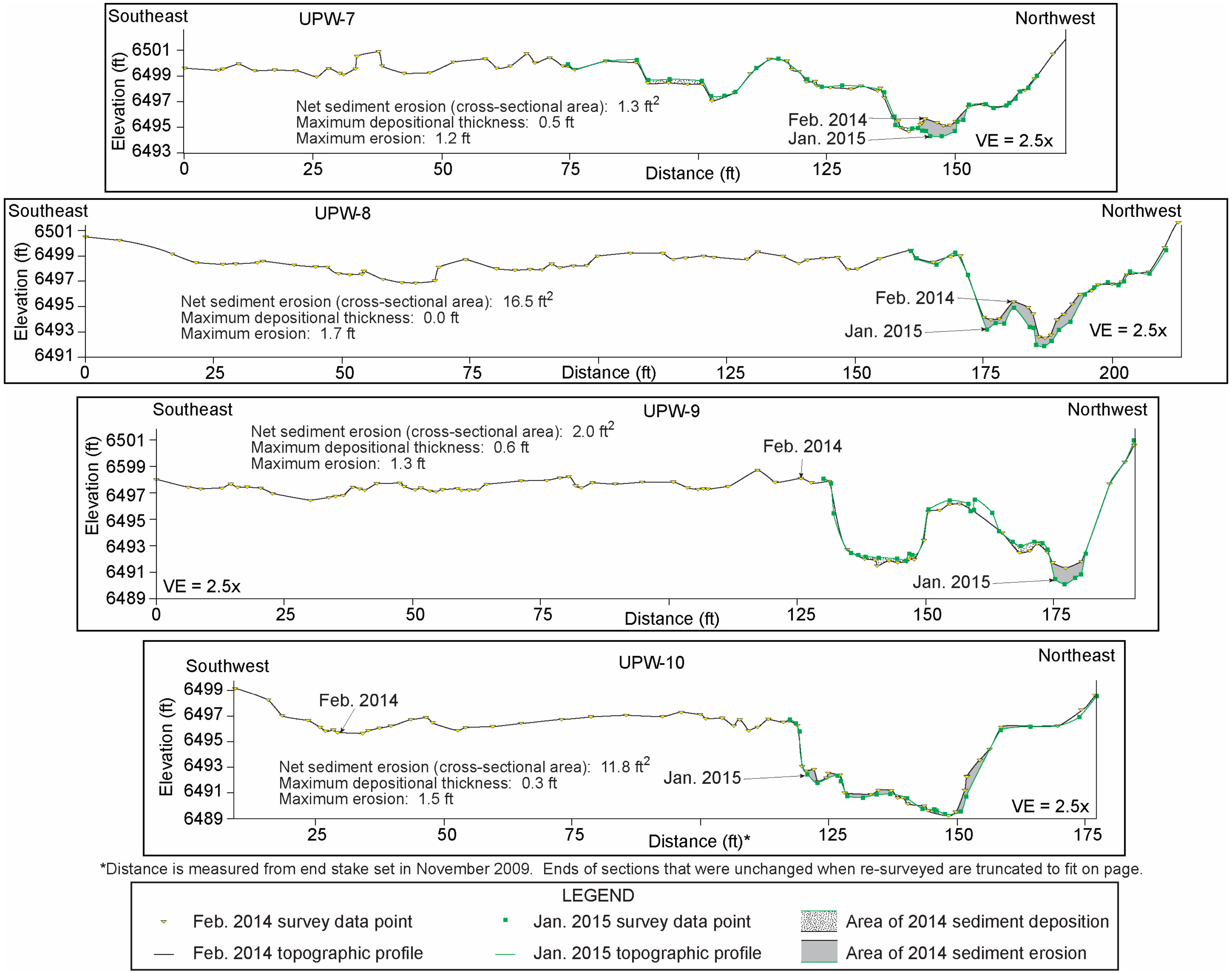


Figure A-3.2-4 Cross-sections and thalweg profile in middle third of Upper Pueblo Canyon willow-planting area

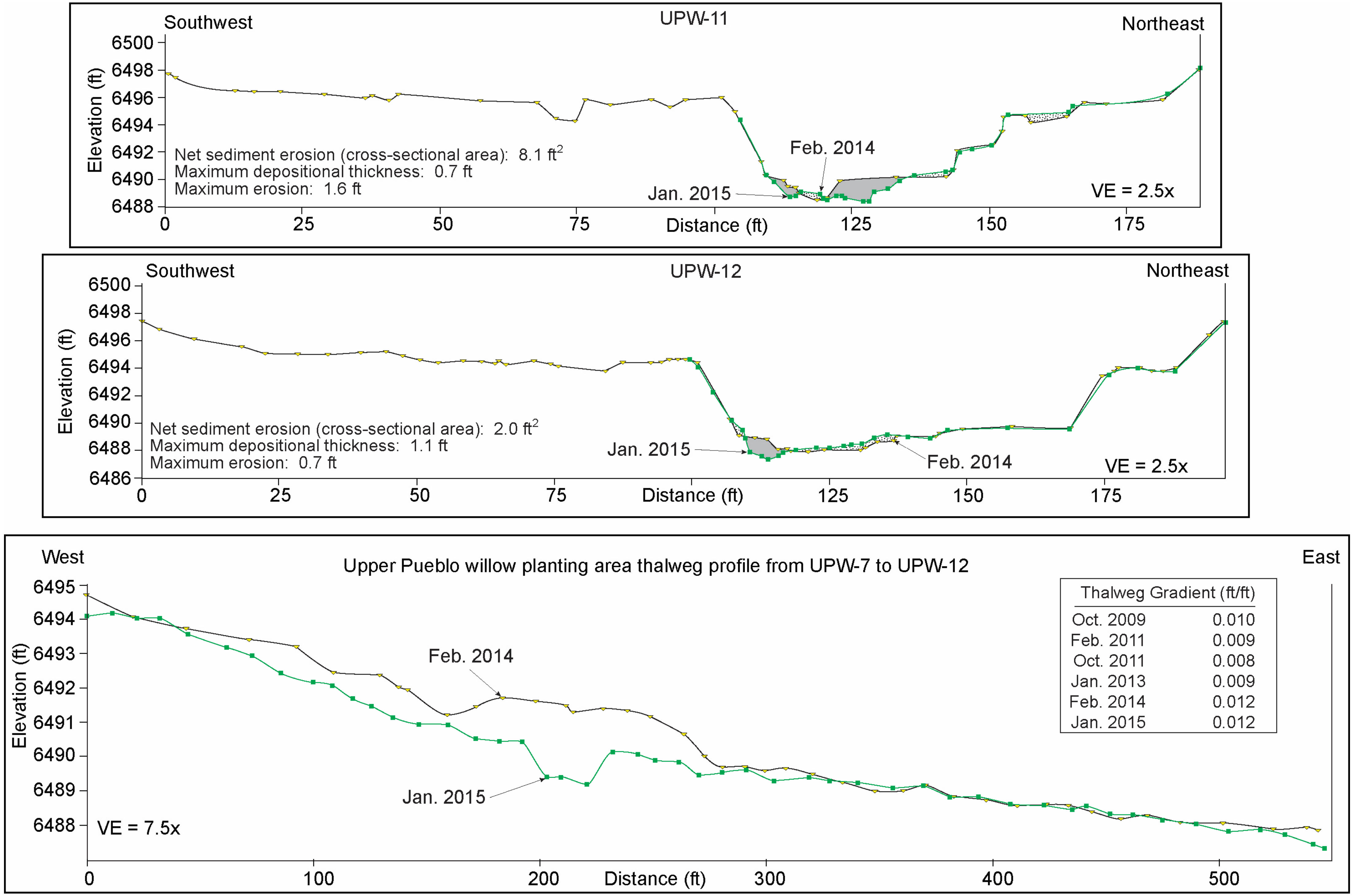
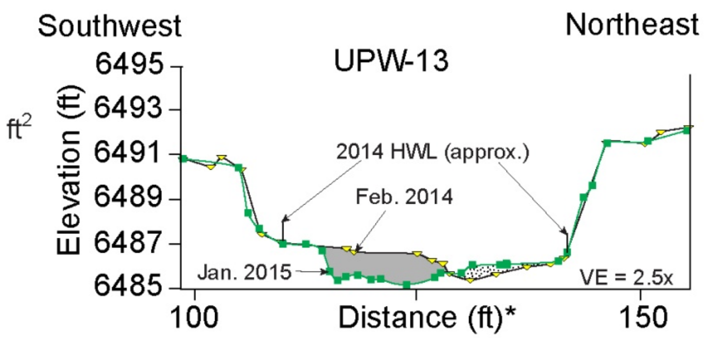
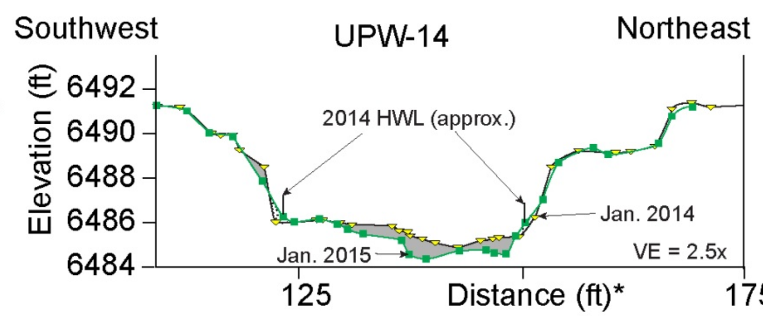


Figure A-3.2-4 (continued) **Cross-sections and thalweg profile in middle third of Upper Pueblo Canyon willow-planting area**

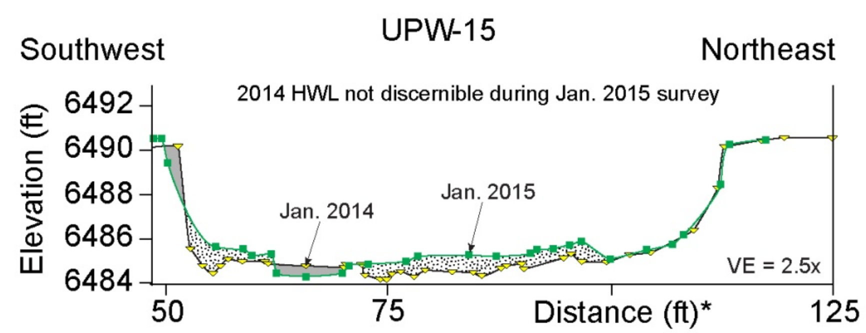
Net sediment erosion (cross-sectional area): 10.6 ft^2
Maximum depositional thickness: 0.7 ft
Maximum erosion: 1.5 ft



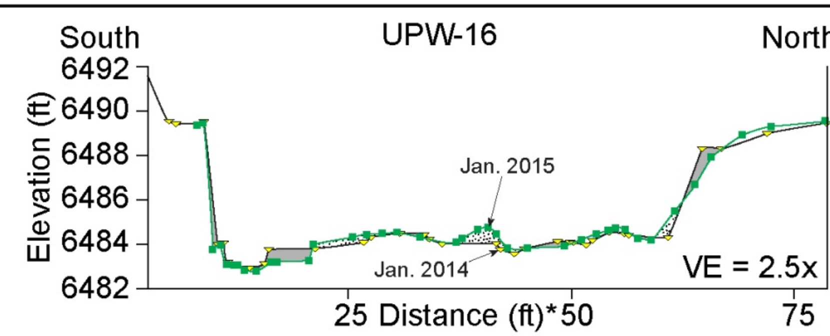
Net sediment erosion (cross-sectional area): 9.4 ft^2
Maximum depositional thickness: 0.7 ft
Maximum erosion: 1.0 ft



Net sediment deposition (cross-sectional area): 23.5 ft^2
Maximum depositional thickness: 1.5 ft
Maximum erosion: 1.9 ft



Net sediment deposition (cross-sectional area): 1.6 ft^2
Maximum depositional thickness: 0.8 ft
Maximum erosion: 2.2 ft

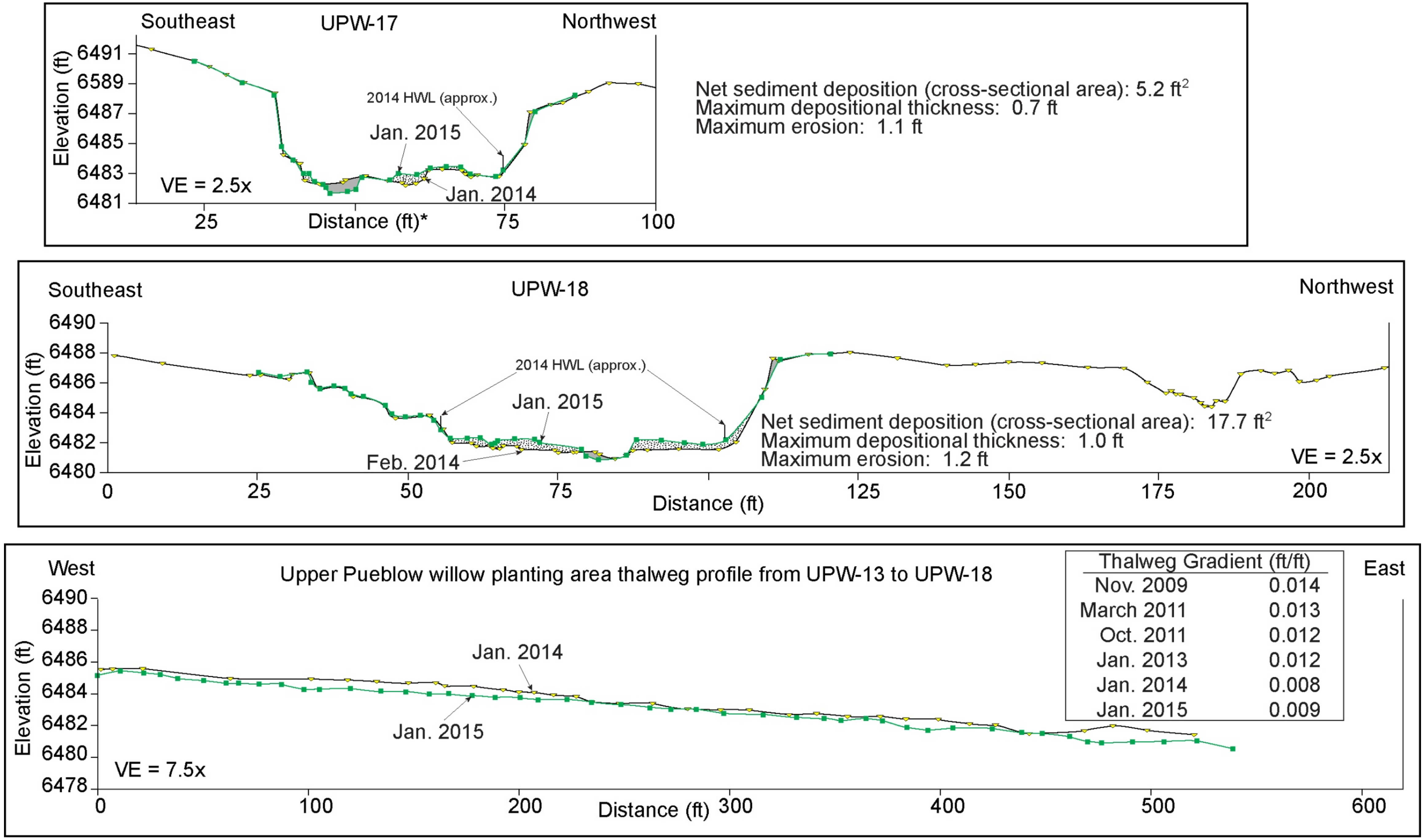


*Distance is measured from end stake set in 2009. Ends of sections that were unchanged when re-surveyed are truncated to fit on page.

LEGEND

Jan. 2014 survey data point	Jan. 2015 survey data point	Area of 2014 sediment deposition
Jan. 2014 topographic profile	Jan. 2015 topographic profile	Area of 2014 sediment erosion

Figure A-3.2-5 Cross-sections and thalweg profile in lower third of Upper Pueblo Canyon willow-planting area



*Distance is measured from end stake set in April, 2010. Ends of sections that were unchanged when re-surveyed are truncated to fit on page.

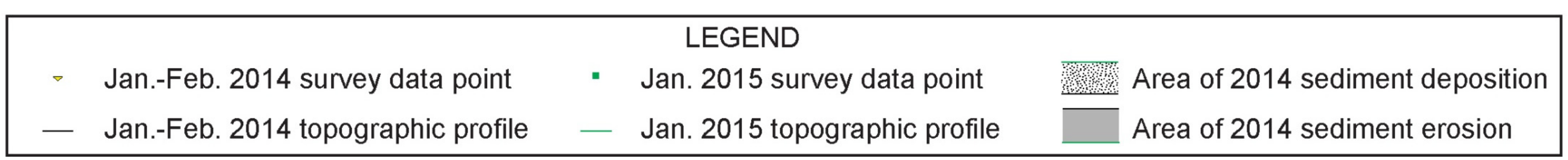


Figure A-3.2-5 (continued) **Cross-sections and thalweg profile in lower third of Upper Pueblo Canyon willow-planting area**

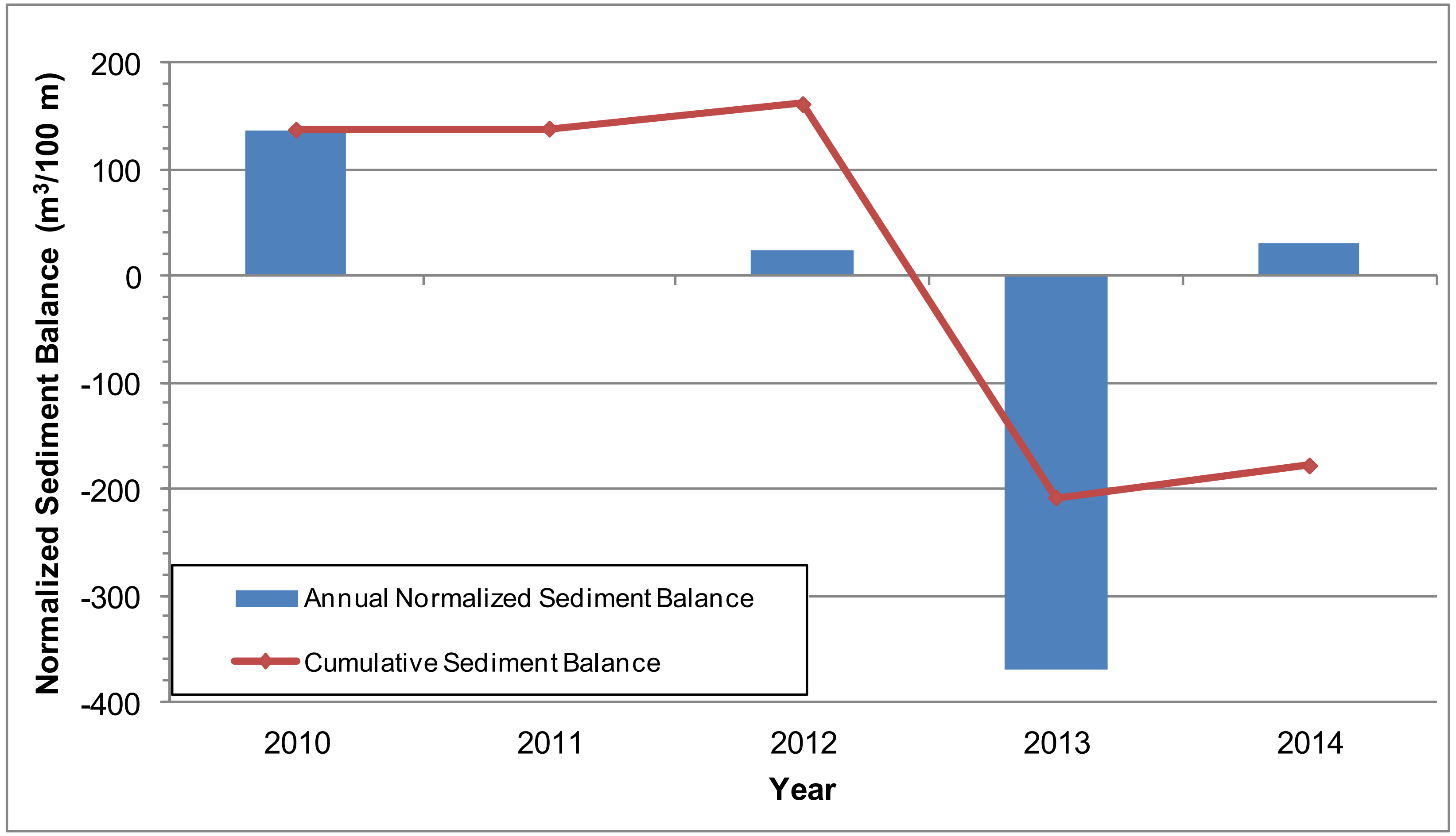


Figure A-3.2-6 **2010–2014 sediment balance at Upper Pueblo Canyon willow-planting area. Positive sediment balance values indicate deposition, negative values indicate erosion.**

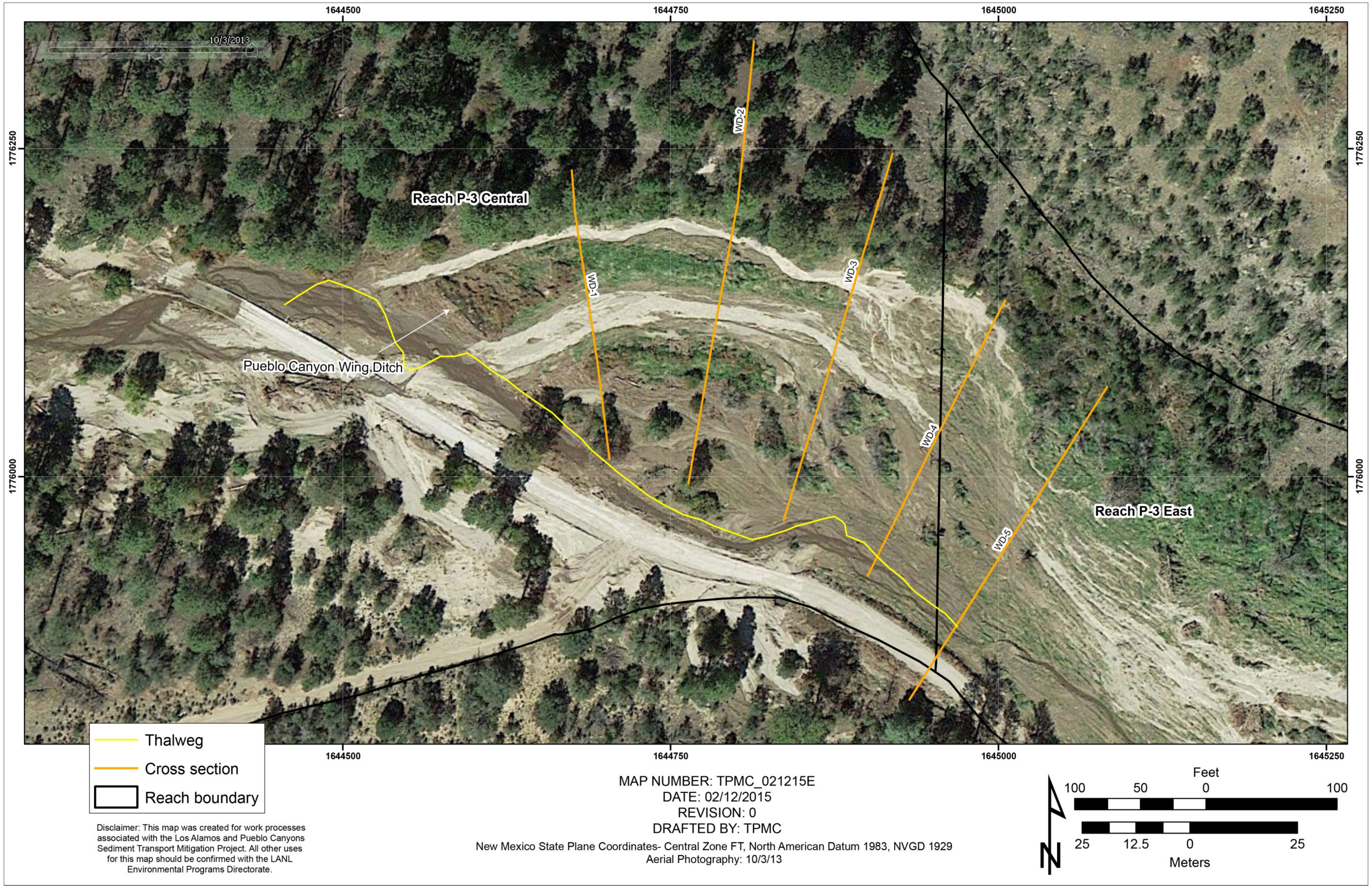


Figure A-3.3-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profiles near the Pueblo Canyon wing ditch

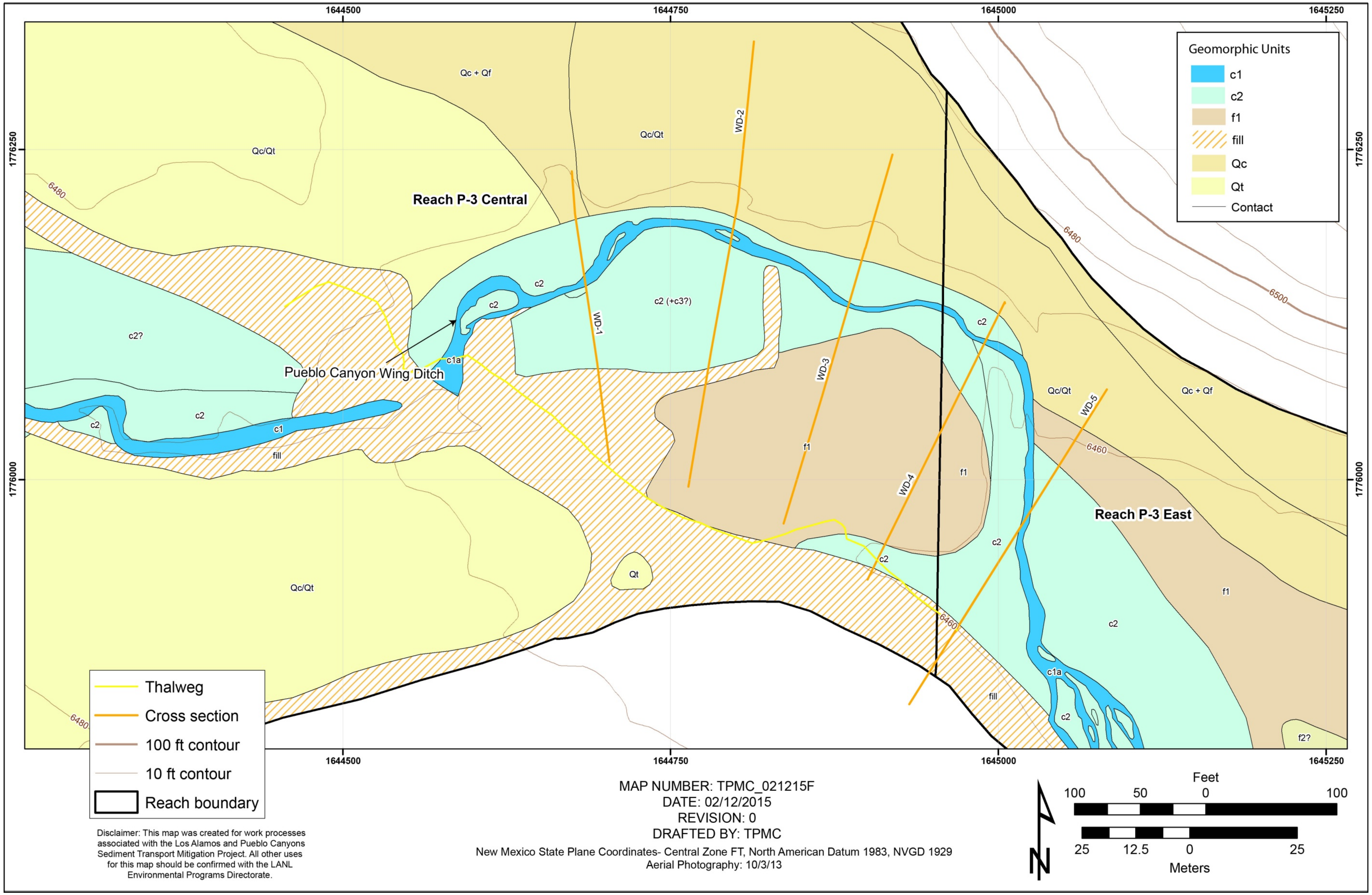


Figure A-3.3-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profiles near the Pueblo Canyon wing ditch; geomorphic mapping from 1996–1997

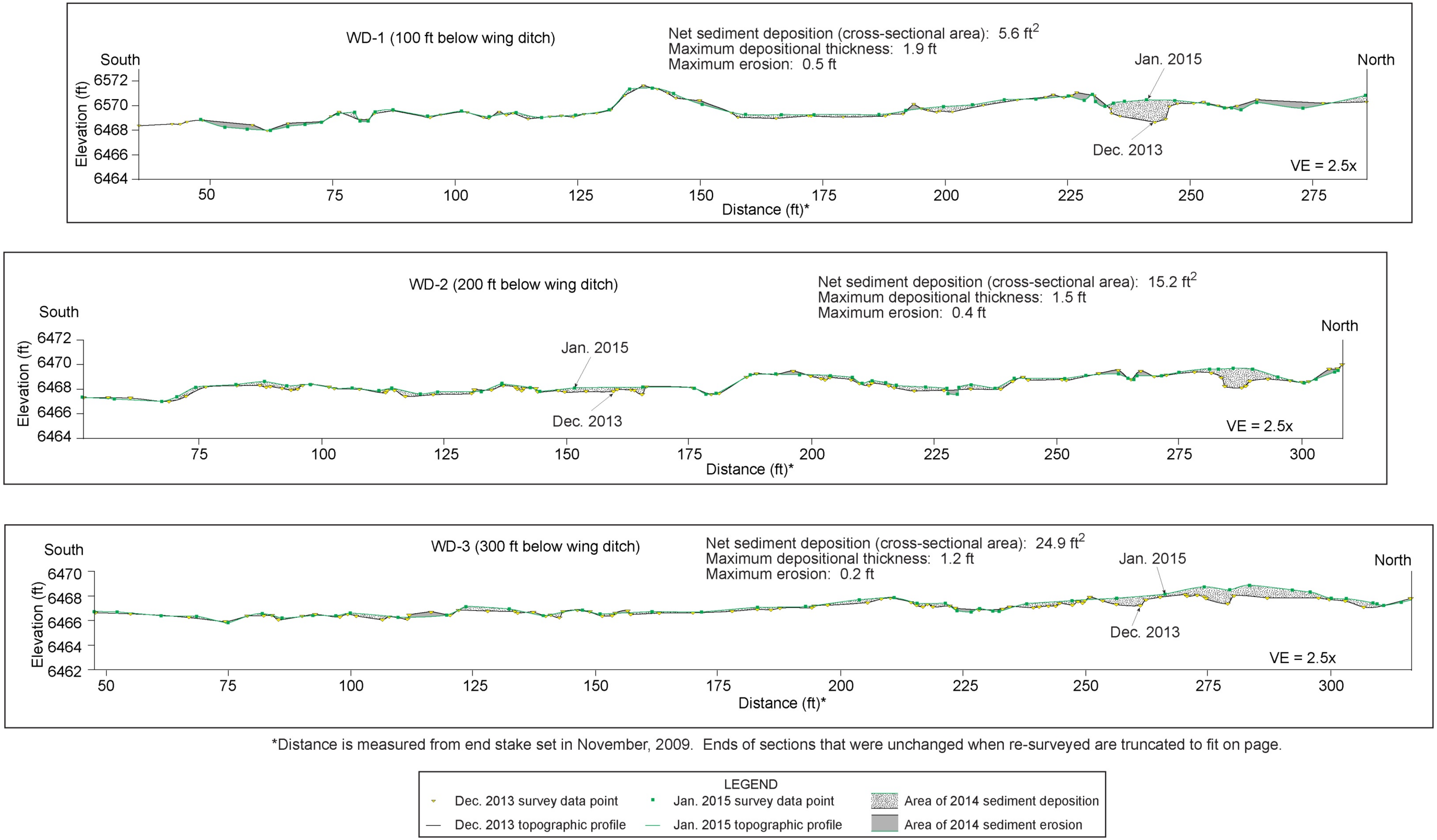


Figure A-3.3-3 Cross-sections below the Pueblo Canyon wing ditch

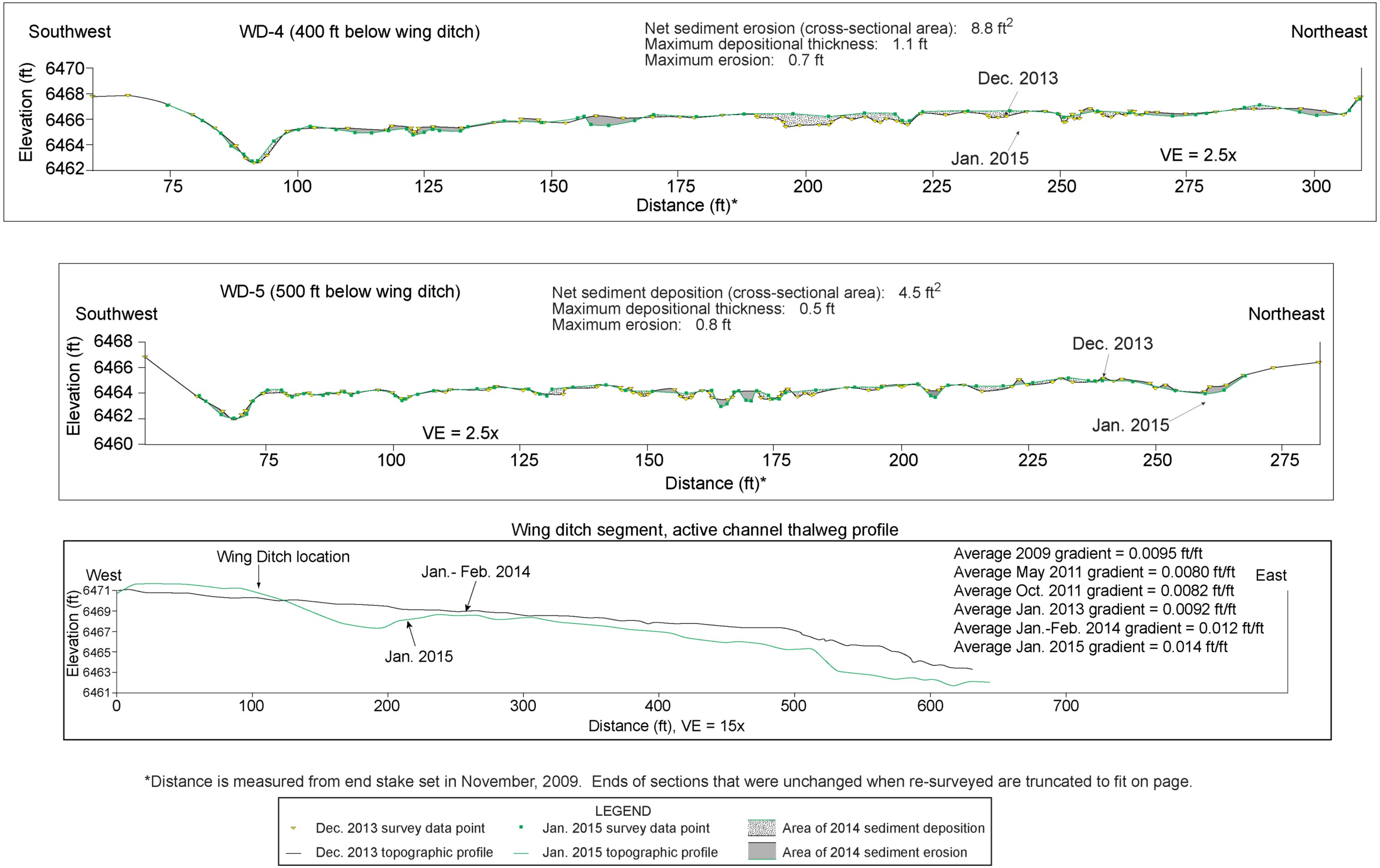


Figure A-3.3-3 (continued) **Cross-sections below the Pueblo Canyon wing ditch**

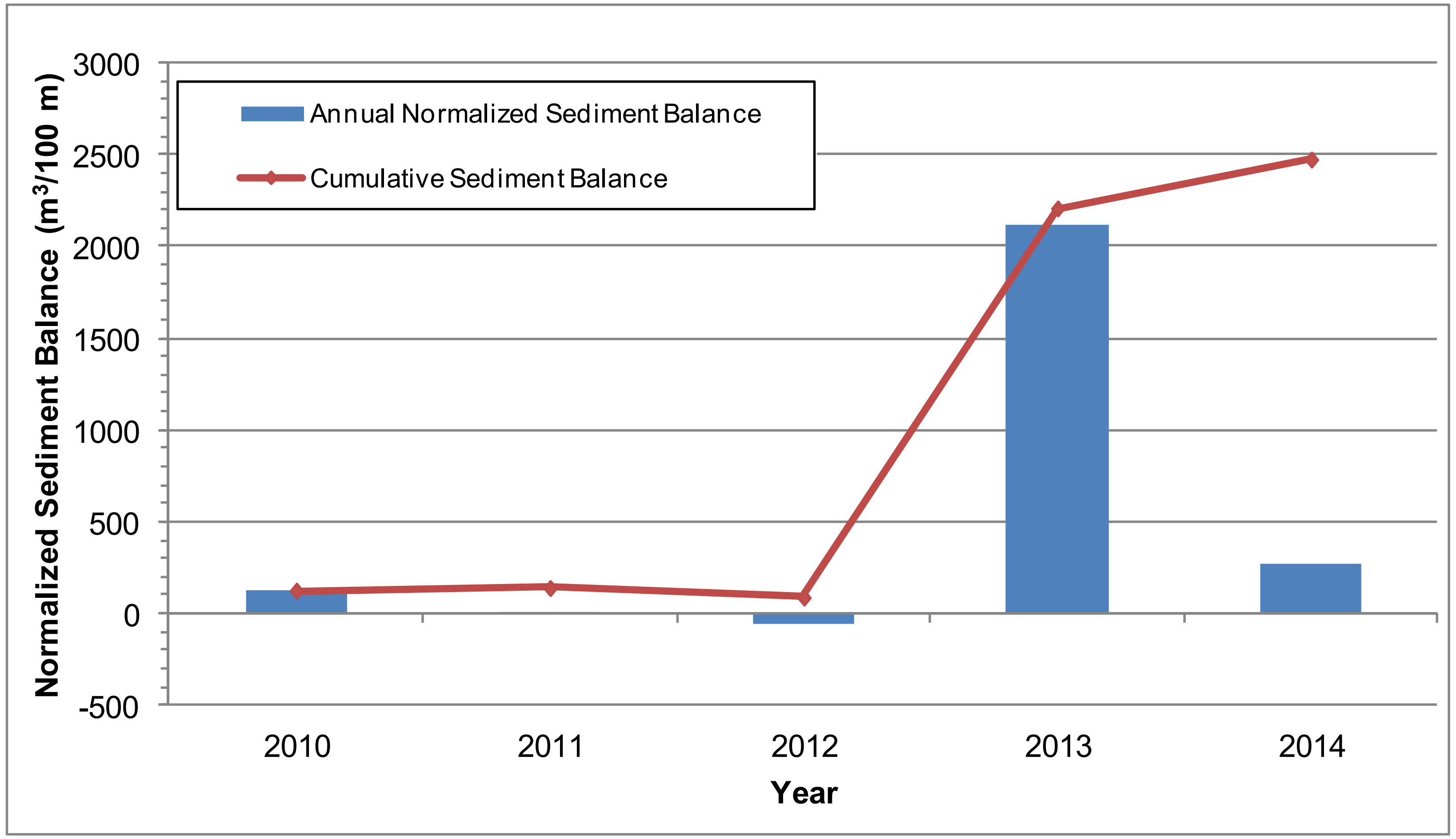


Figure A-3.3-4 **2010–2014 sediment balance below the Pueblo Canyon wing ditch. Positive sediment balance values indicate deposition, negative values indicate erosion.**

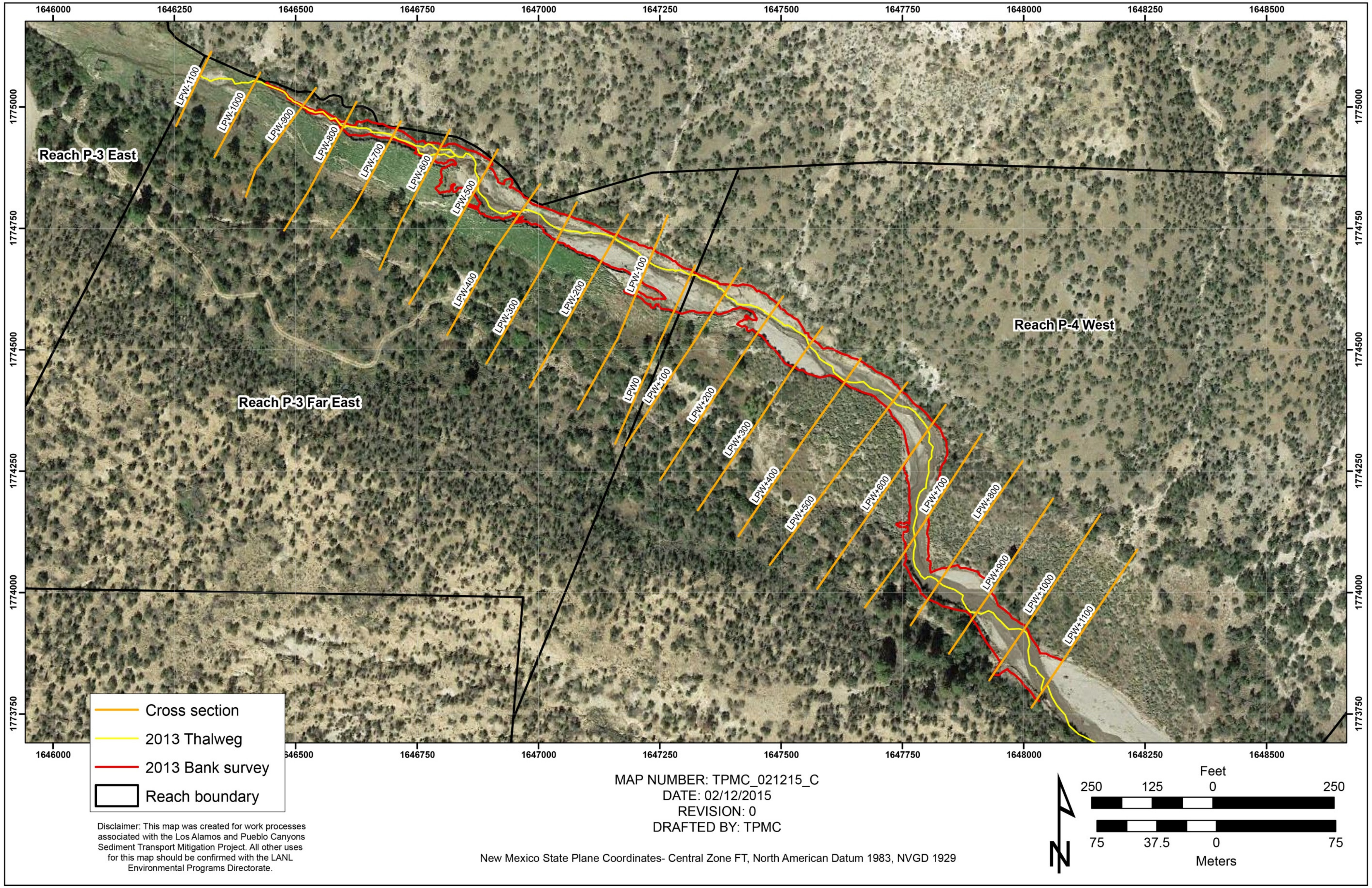


Figure A-3.4-1 **Orthophoto showing the locations of surveyed cross-sections and stream banks in the Lower Pueblo Canyon willow-planting area. Because of ongoing bank stabilization activities, cross-sections from LPW-1100 to LPW-0 and the entire Lower Pueblo Canyon willow-planting area thalweg were not surveyed following the 2014 monsoon season.**

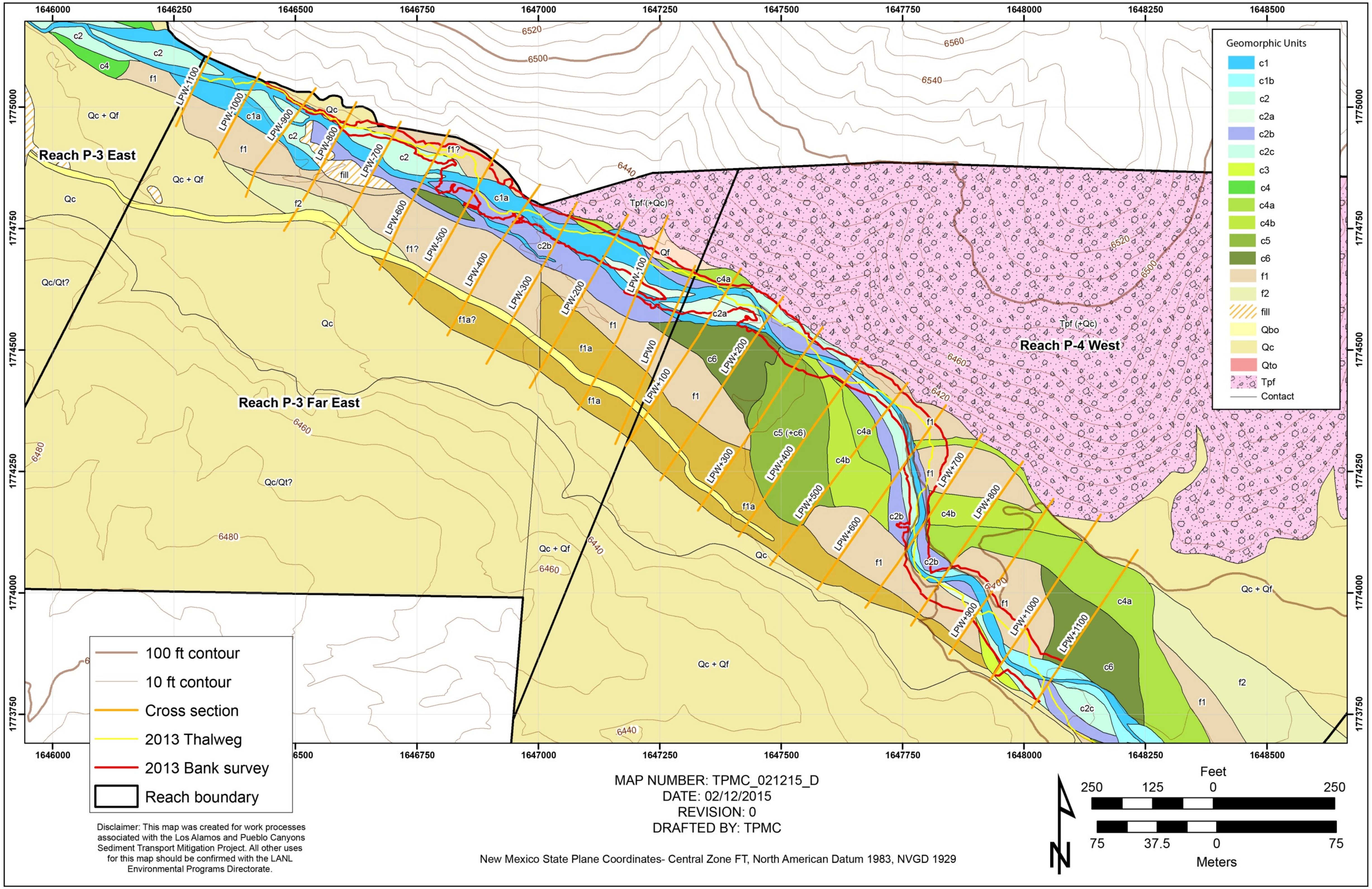


Figure A-3.4-2 Geomorphic map showing the locations of surveyed cross-sections and stream banks in the lower Pueblo Canyon willow-planting area; geomorphic mapping from 1996–1997. Because of ongoing bank stabilization activities, cross-sections from LPW-1100 to LPW-0 and the entire Lower Pueblo Canyon willow-planting area thalweg were not surveyed following the 2014 monsoon season.

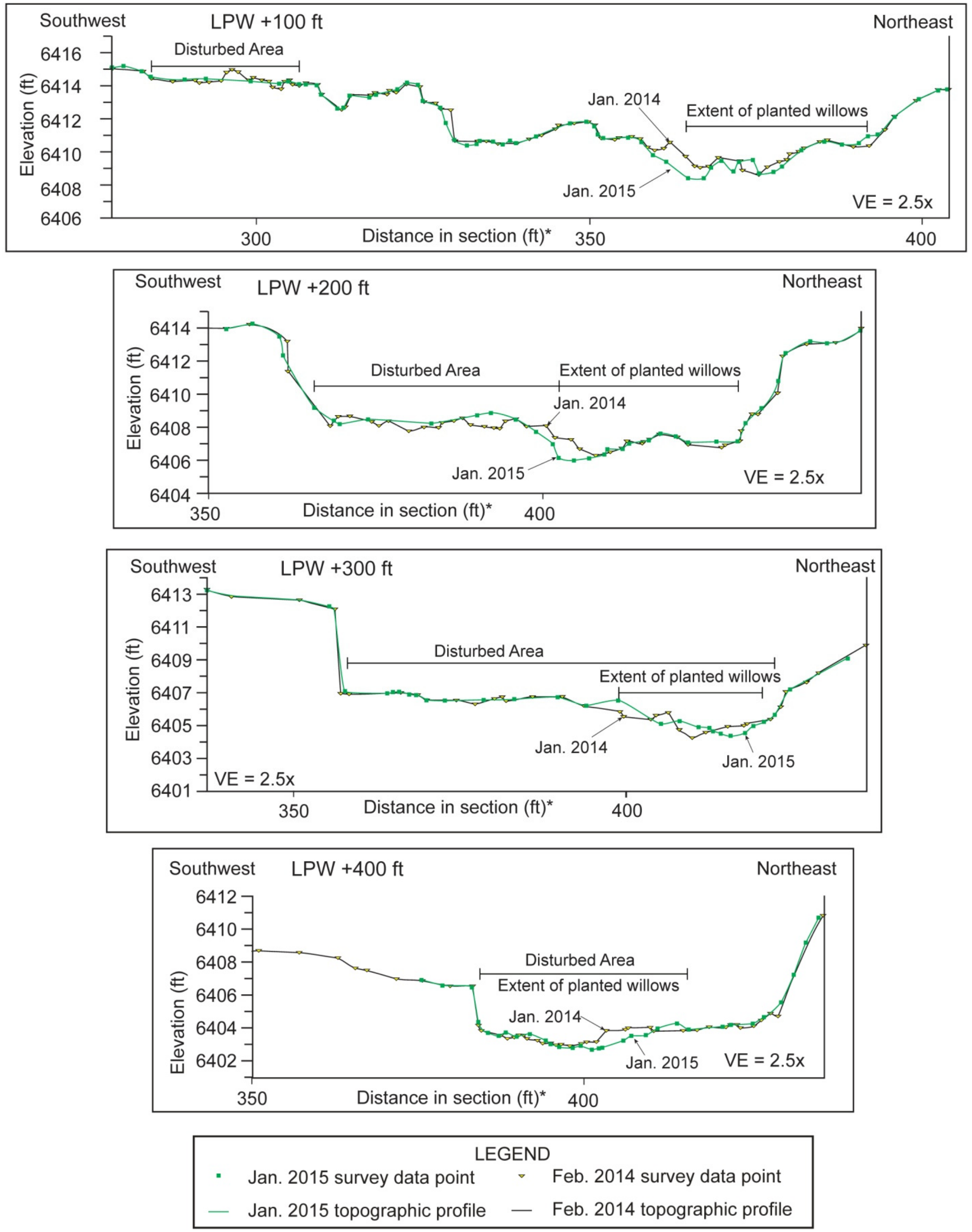


Figure A-3.4-3 Cross-sections in the Lower Pueblo Canyon willow-planting area

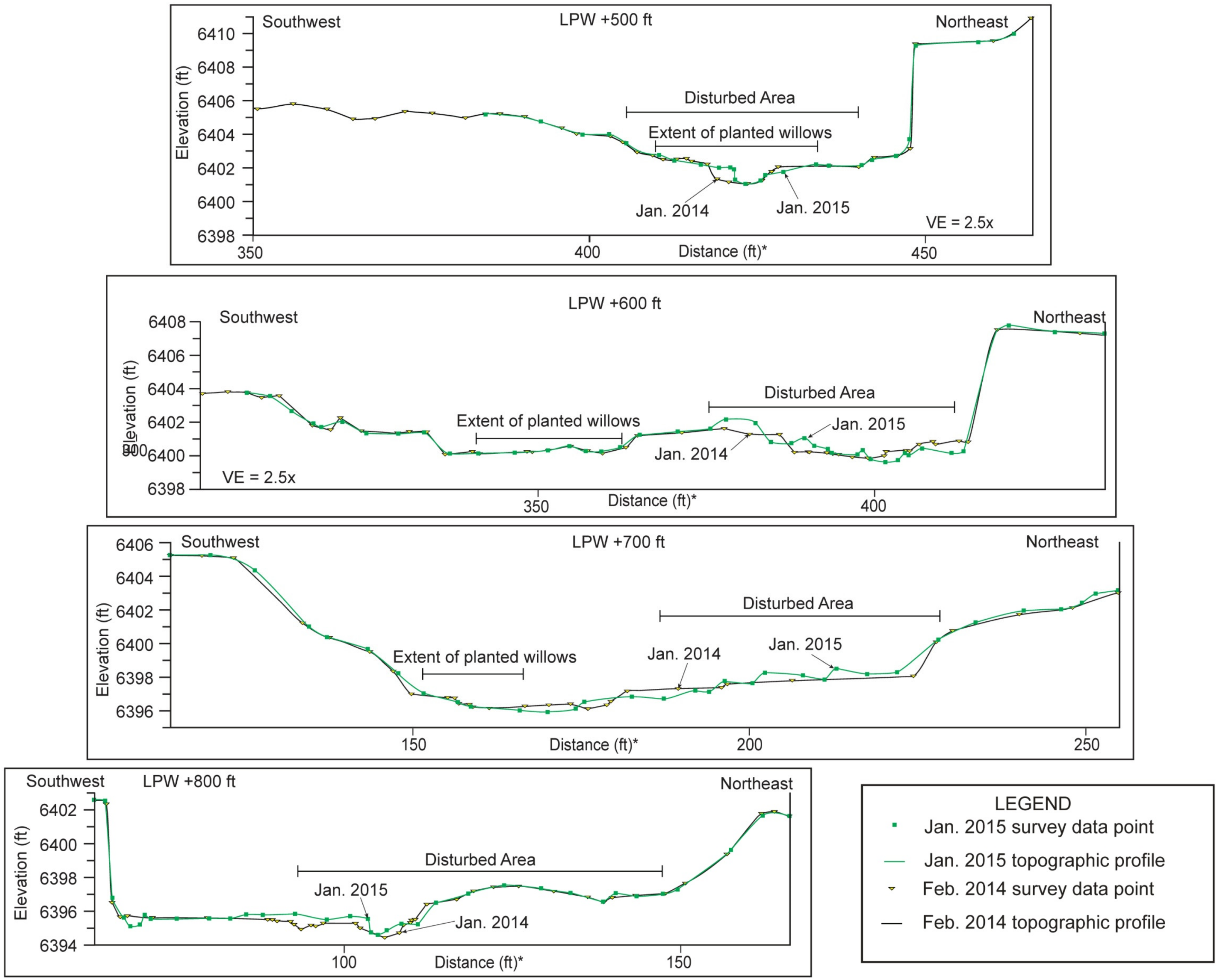


Figure A-3.4-3 (continued) **Cross-sections in the Lower Pueblo Canyon willow-planting area**

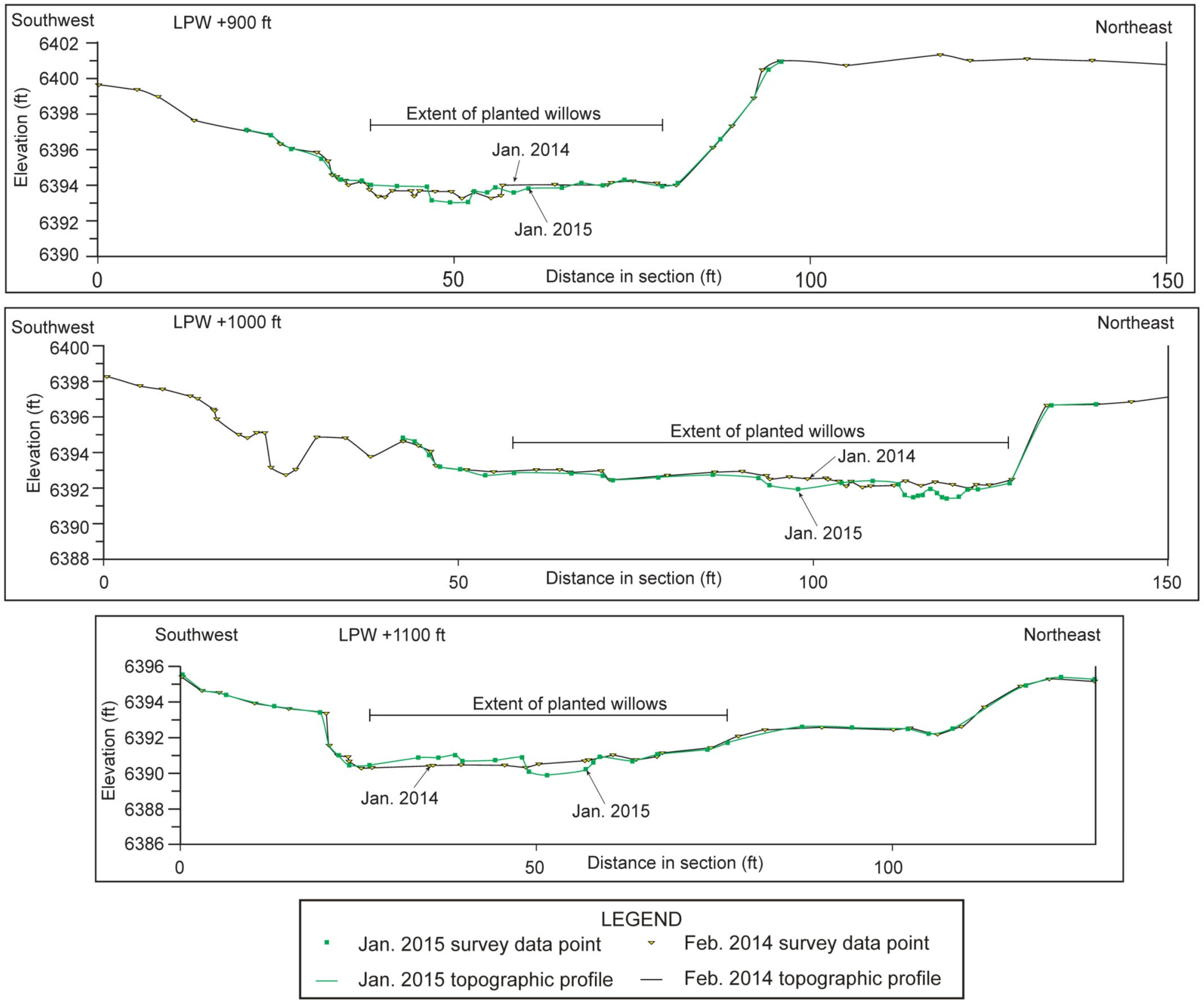


Figure A-3.4-3 (continued) **Cross-sections in the Lower Pueblo Canyon willow-planting area**

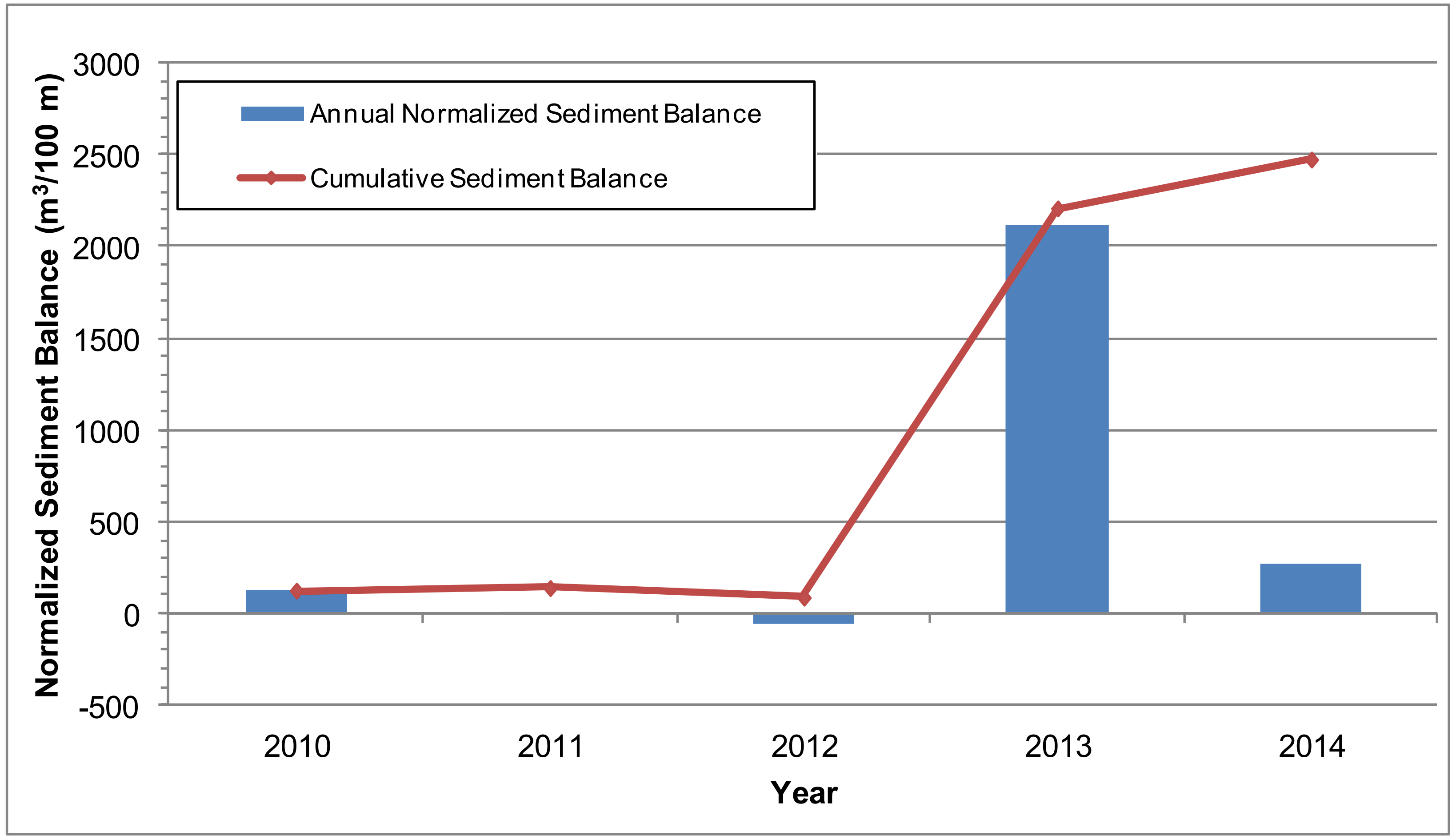


Figure A-3.4-4 **2010–2014 sediment balance below the Pueblo Canyon wing ditch. Positive sediment balance values indicate deposition, negative values indicate erosion.**

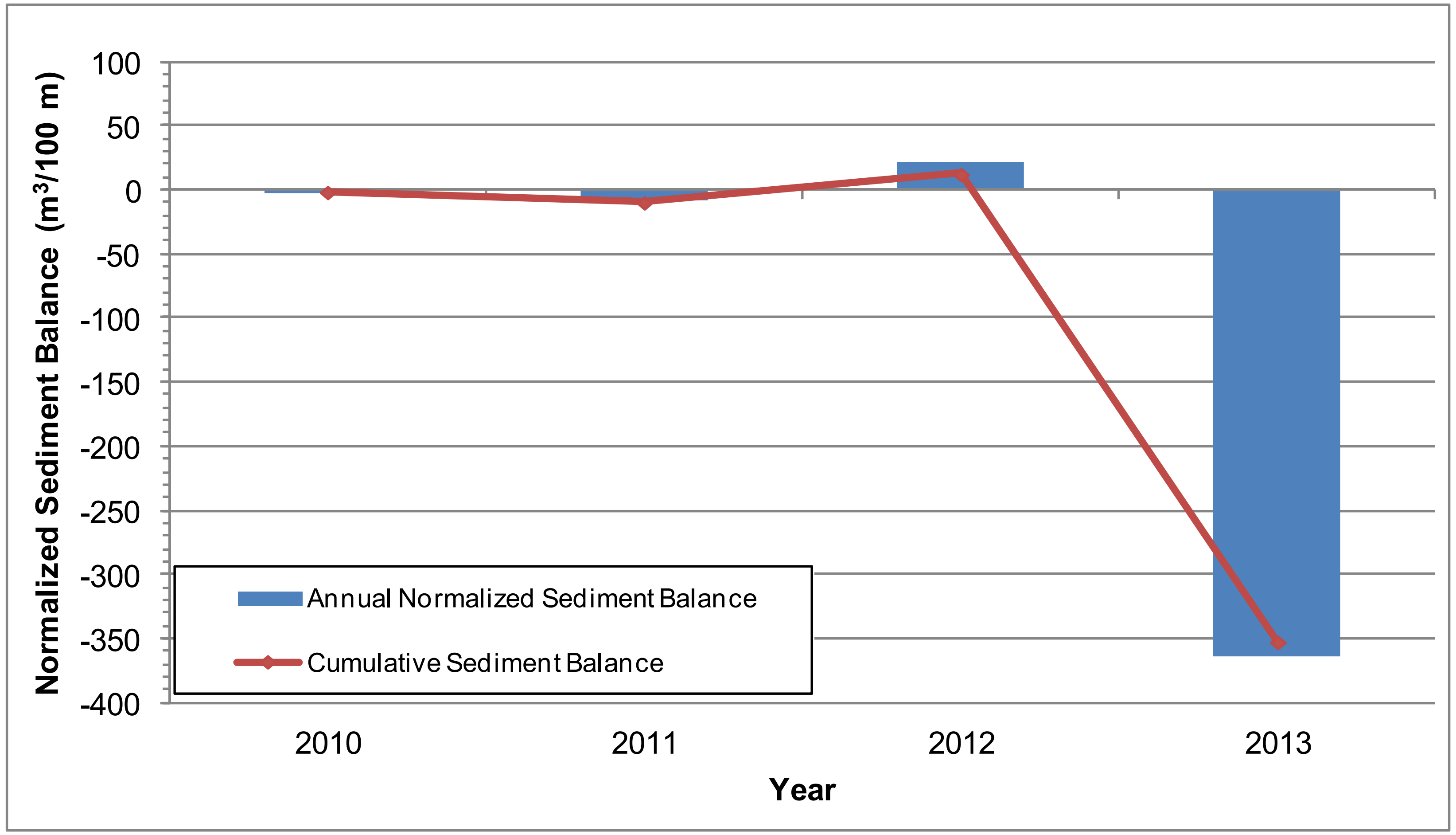


Figure A-3.4-5 **2010–2014 sediment balance at the Lower Pueblo Canyon willow-planting area (LPW-0 to LPW+1100). Positive sediment balance values indicate deposition, negative values indicate erosion.**

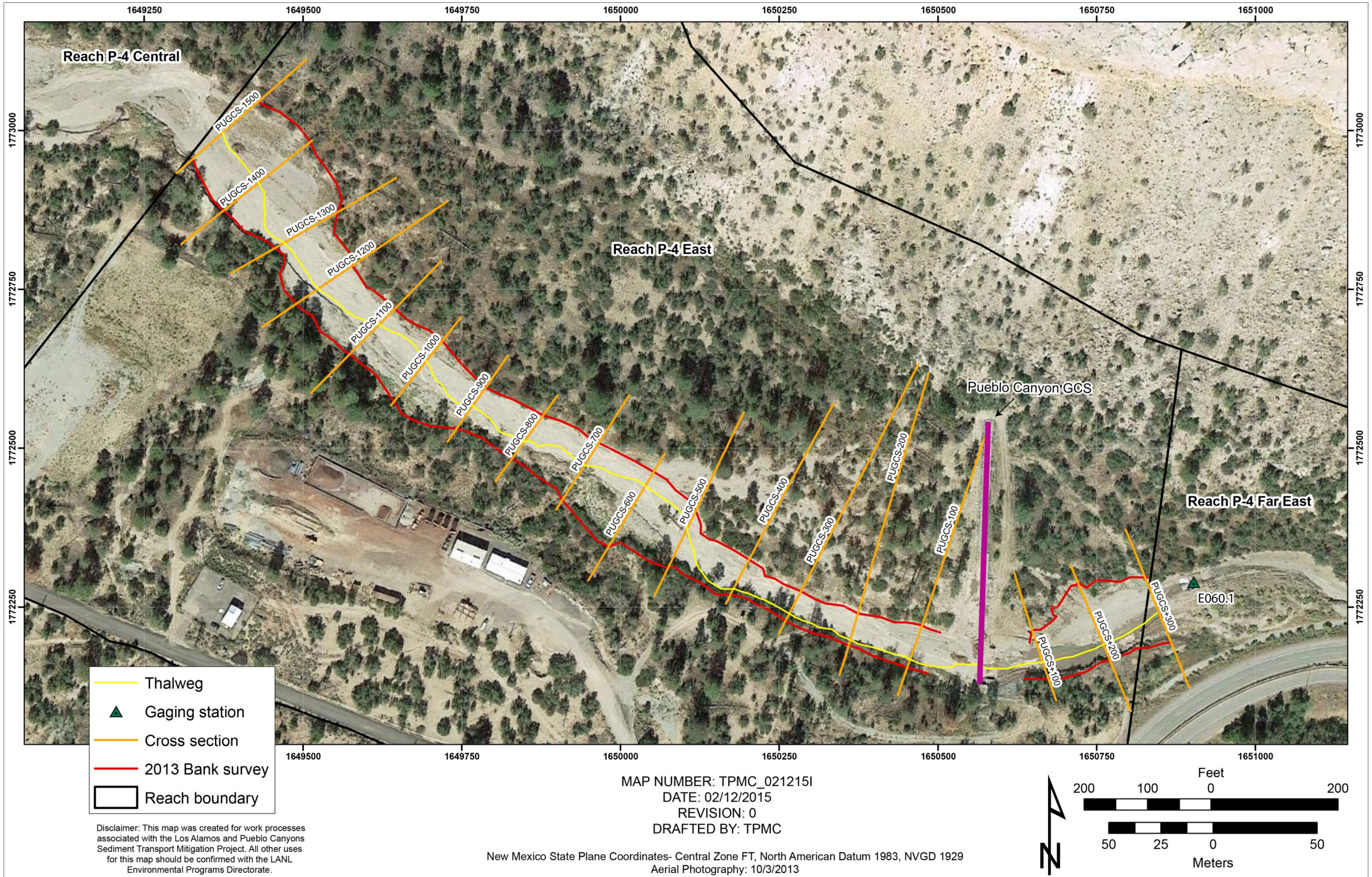


Figure A-3.5-1 Orthophoto showing the locations of surveyed cross-sections and stream banks in the Pueblo Canyon GCS area

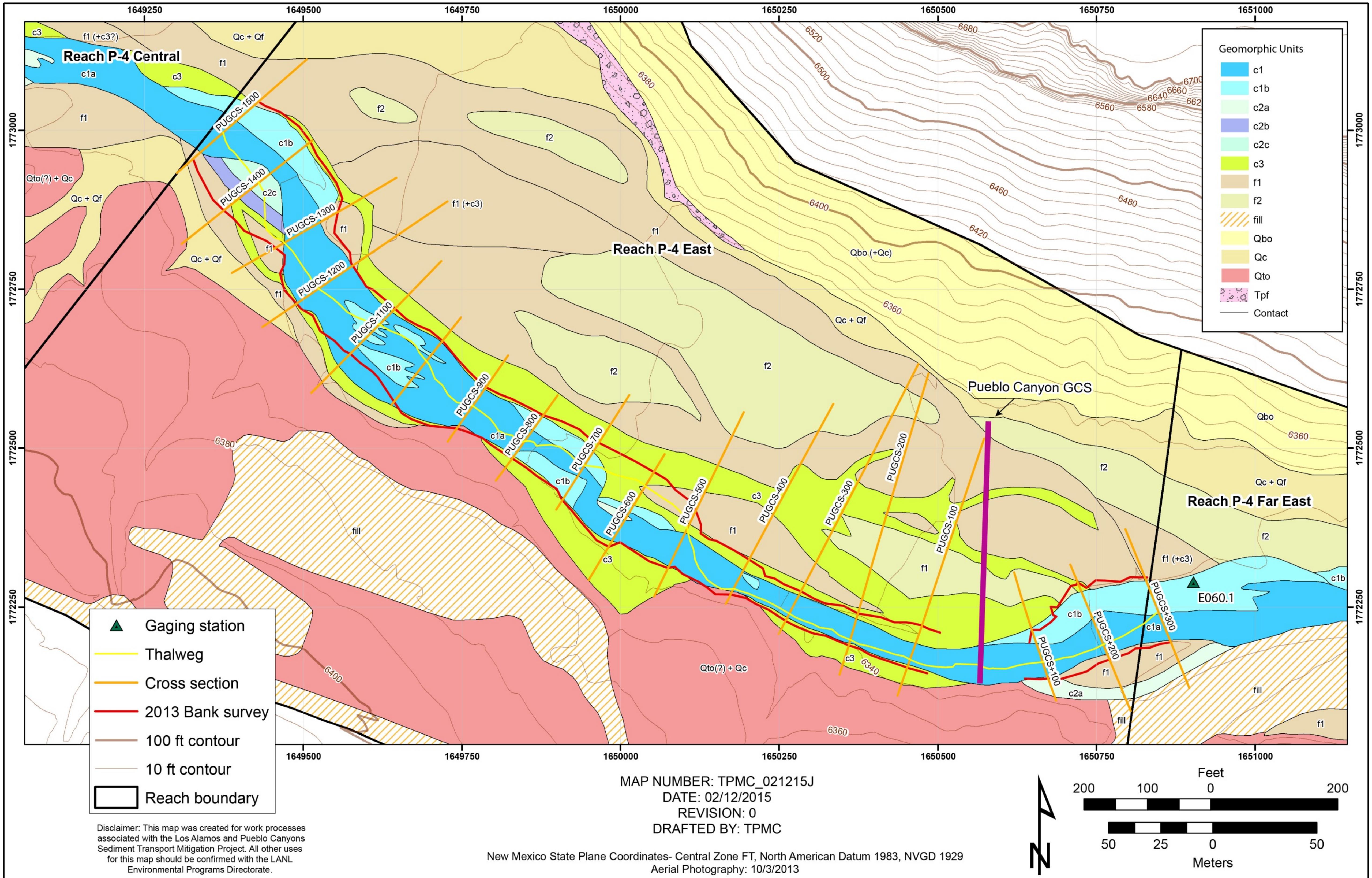


Figure A-3.5-2 Geomorphic map showing the locations of surveyed cross-sections and stream banks in the Pueblo Canyon GCS area; geomorphic mapping from 1996–1997

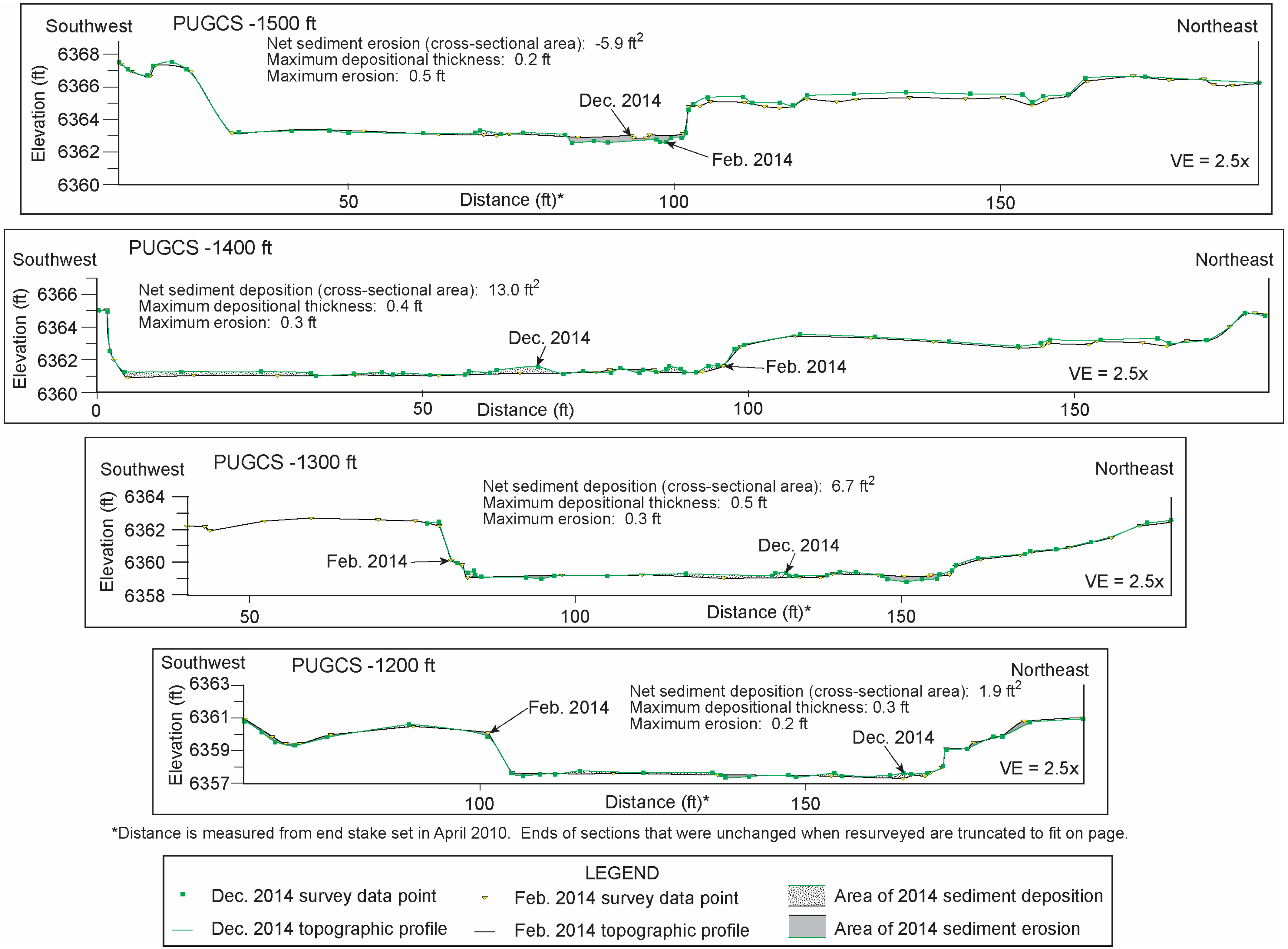


Figure A-3.5-3 Cross-sections and thalweg profile in the Pueblo Canyon GCS area

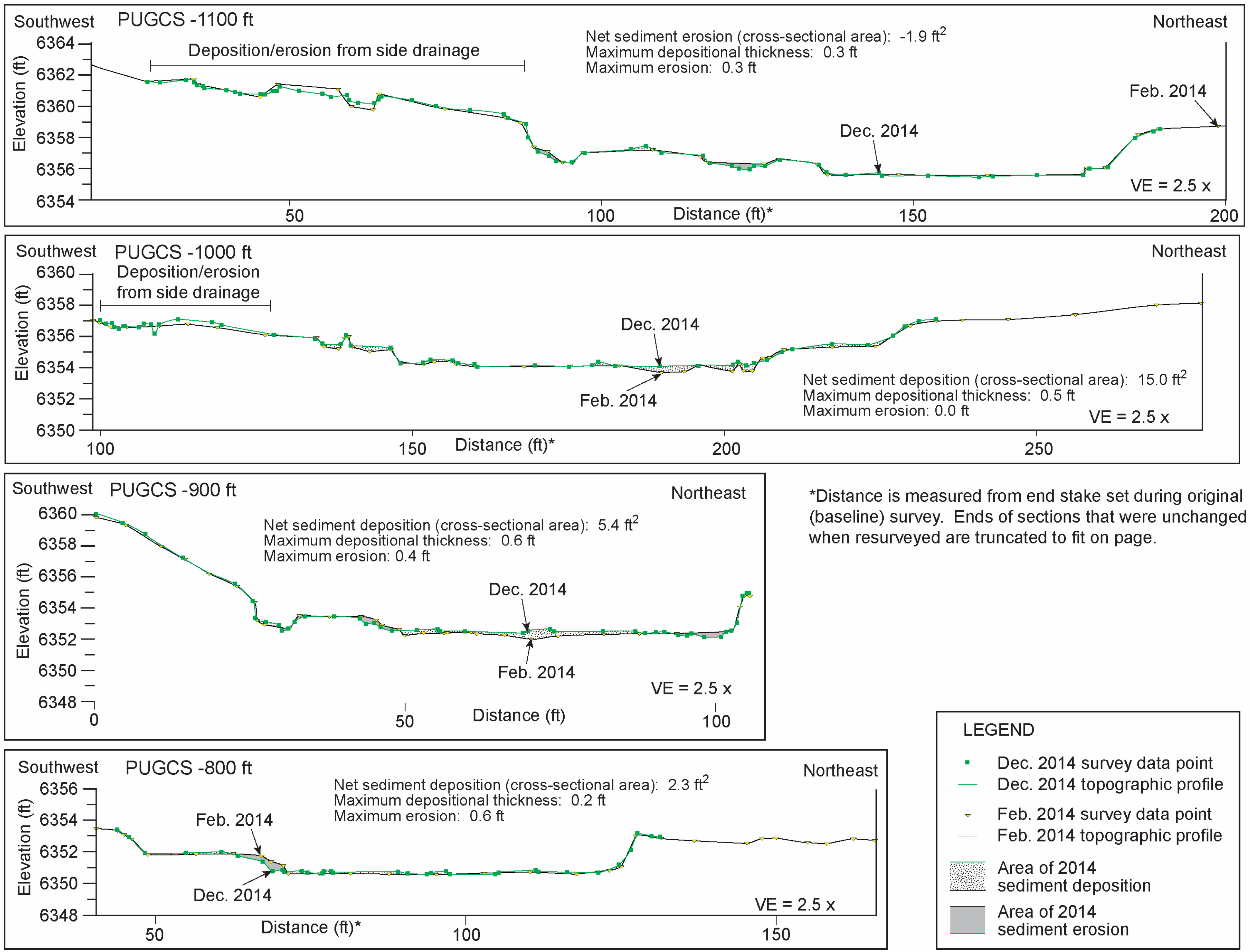
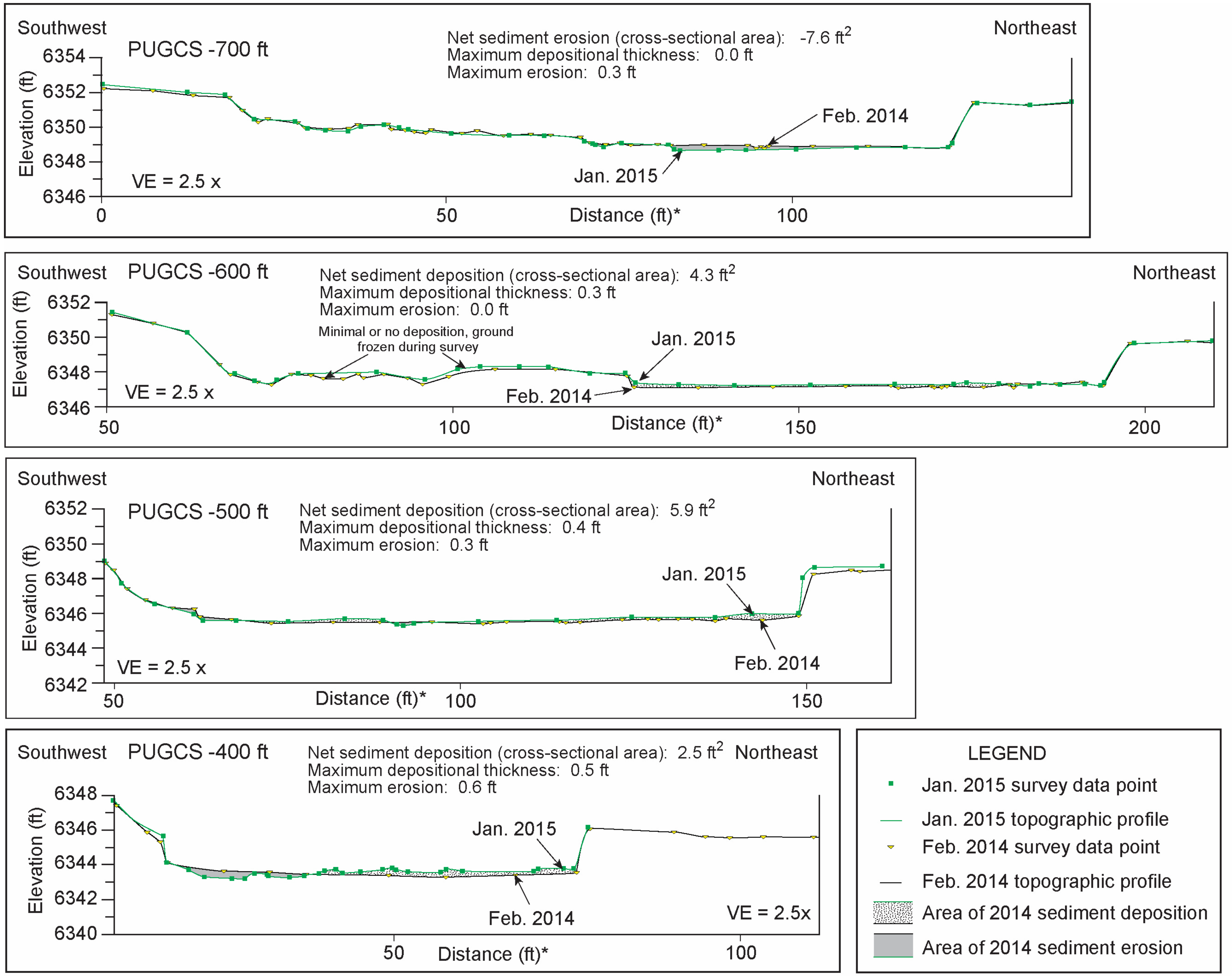
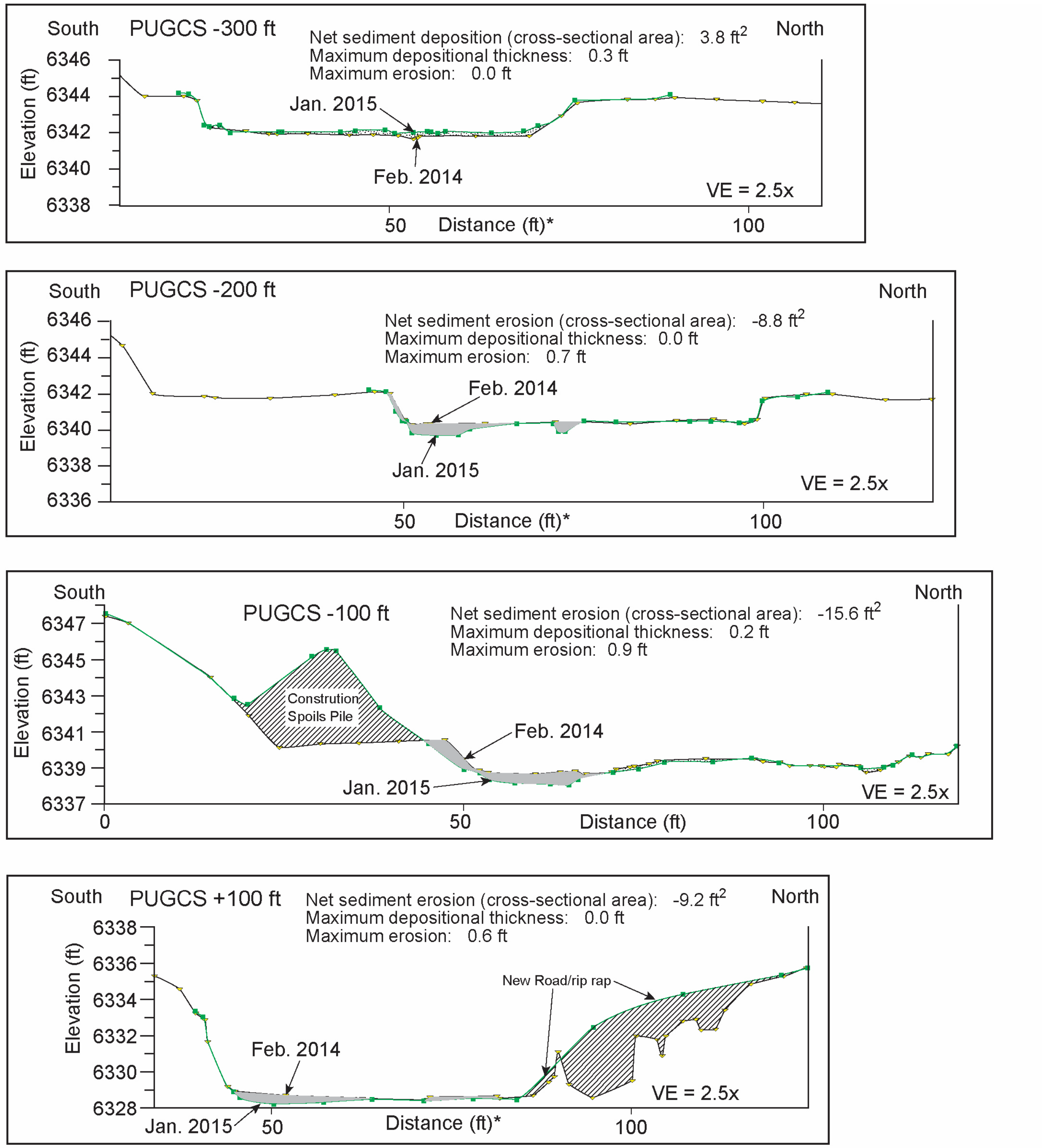


Figure A-3.5-3 (continued) **Cross-sections and thalweg profile in the Pueblo Canyon GCS area**



*Distance is measured from end stake set in Oct. 2009. Sections that were unchanged when re-surveyed are truncated to fit on page.

Figure A-3.5-3 (continued) **Cross-sections and thalweg profile in the Pueblo Canyon GCS area**



*Distance is measured from end stake set during original (baseline) survey. Ends of sections that were unchanged when resurveyed are truncated to fit on page.

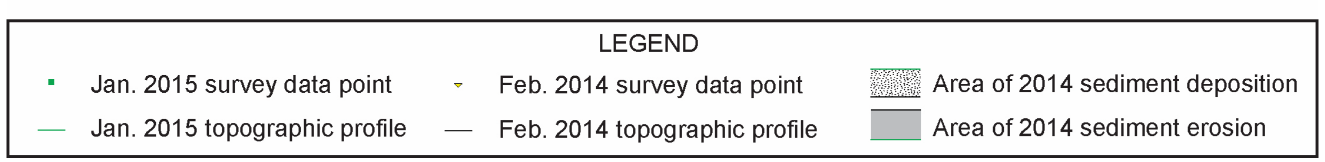


Figure A-3.5-3 (continued) Cross-sections and thalweg profile in the Pueblo Canyon GCS area

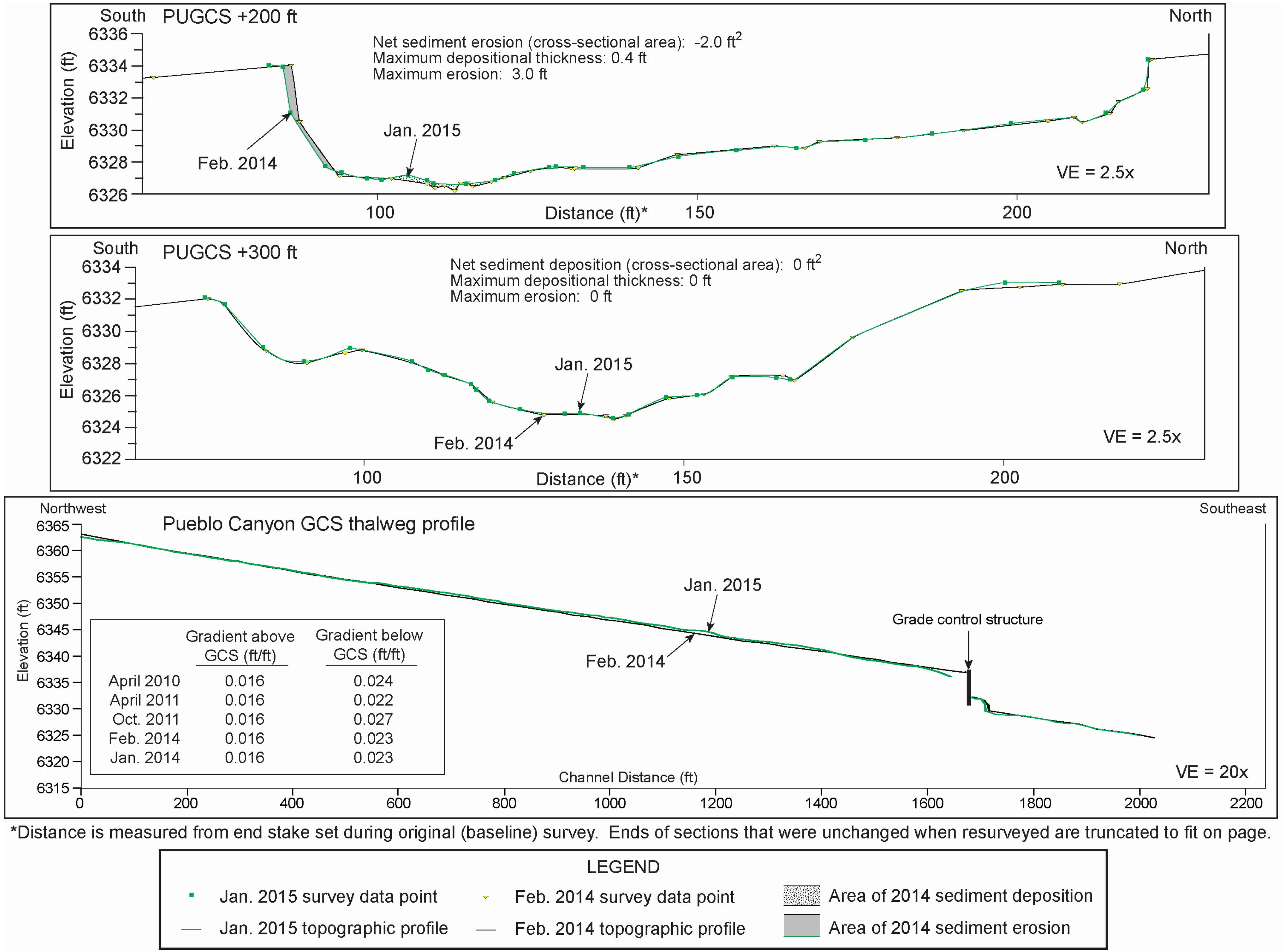


Figure A-3.5-3 (continued) **Cross-sections and thalweg profile in the Pueblo Canyon GCS area**

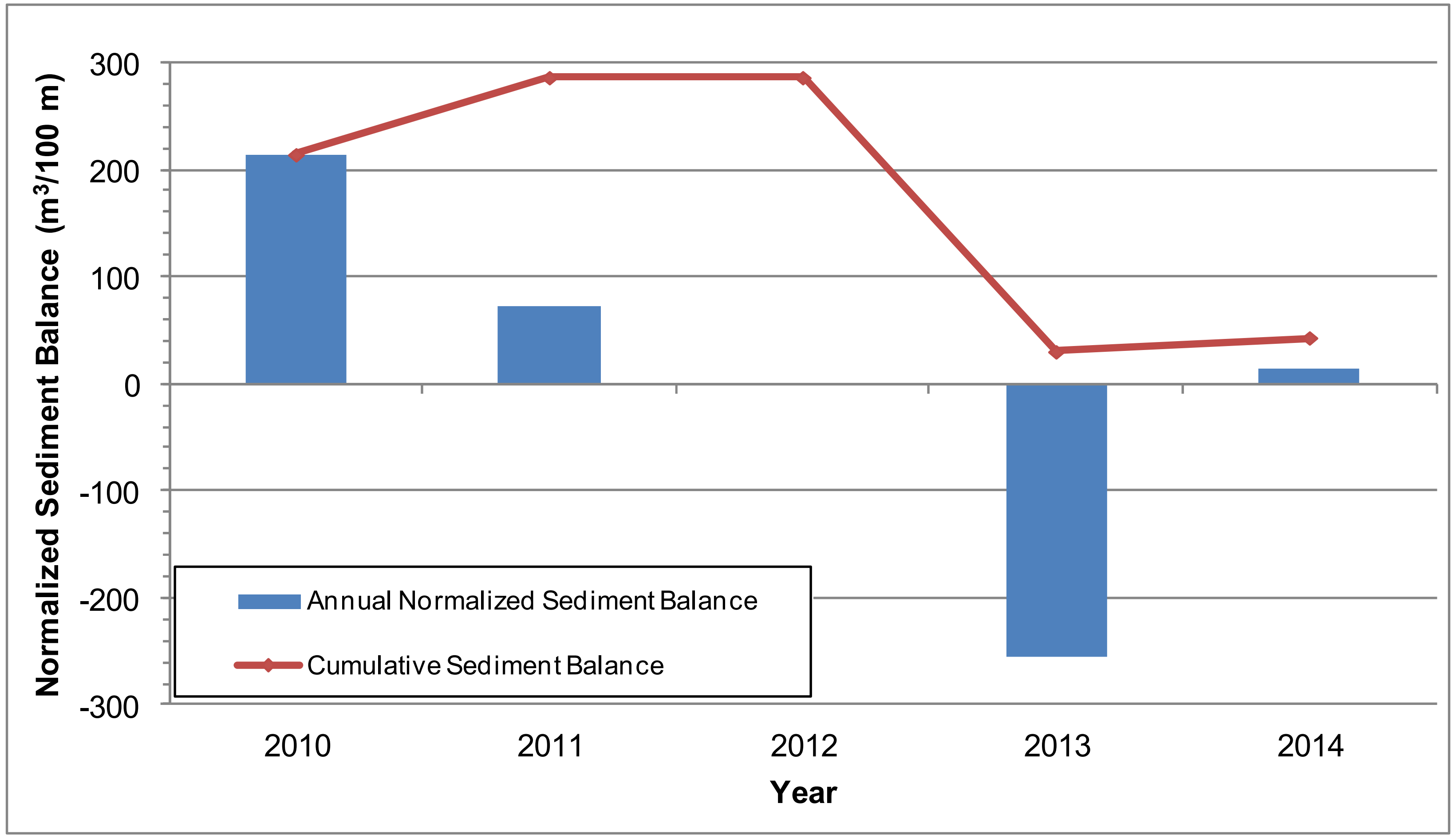


Figure A-3.5-4 **2010–2014 sediment balance at the Pueblo Canyon GCS area. Positive sediment balance values indicate deposition, negative values indicate erosion.**

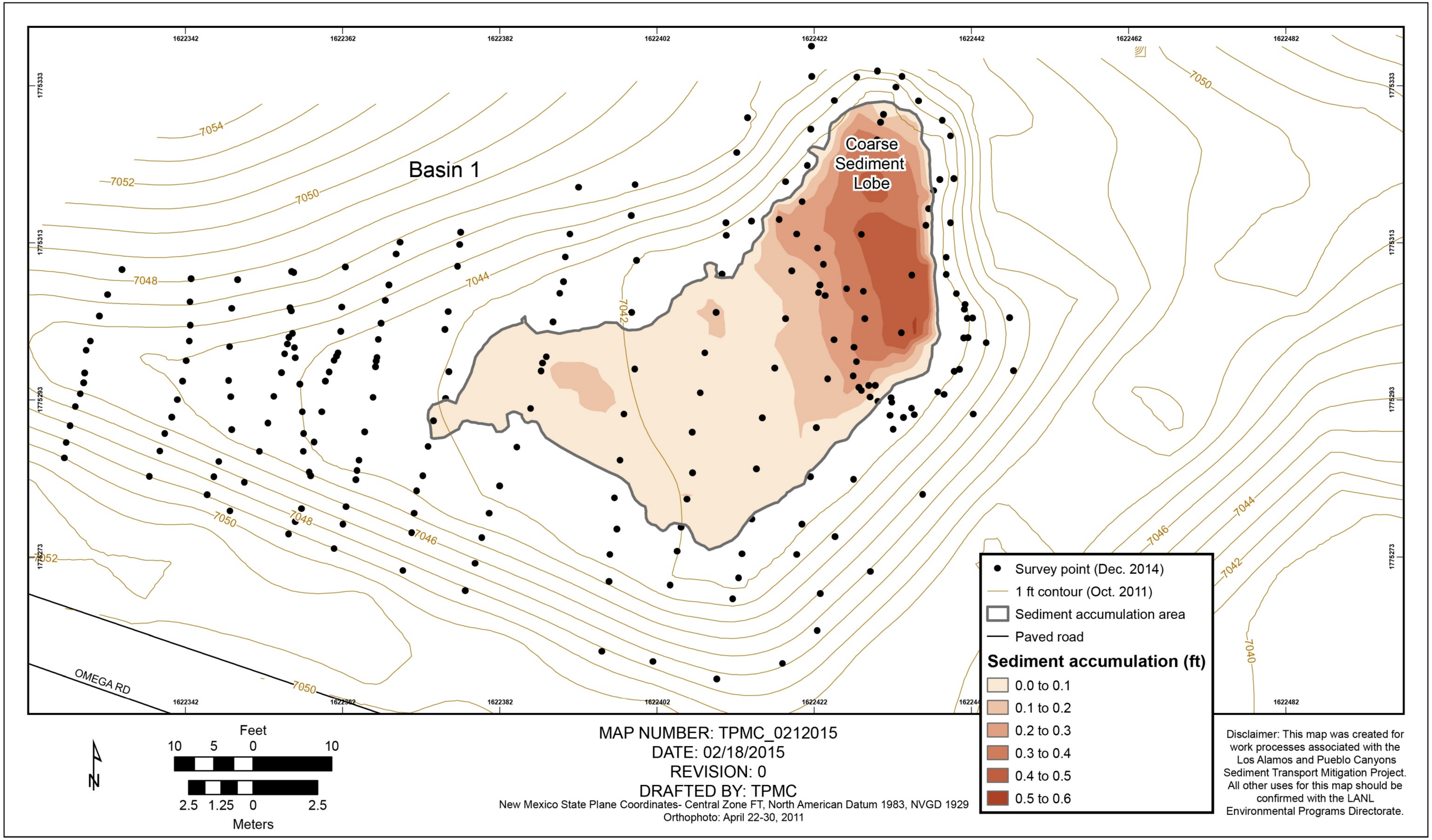


Figure A-3.6-1 October 2011 topography and isopachs of total thickness of accumulated sediment in Basin 1 from 2014 monsoon season at the upper Los Alamos Canyon sediment retention basins

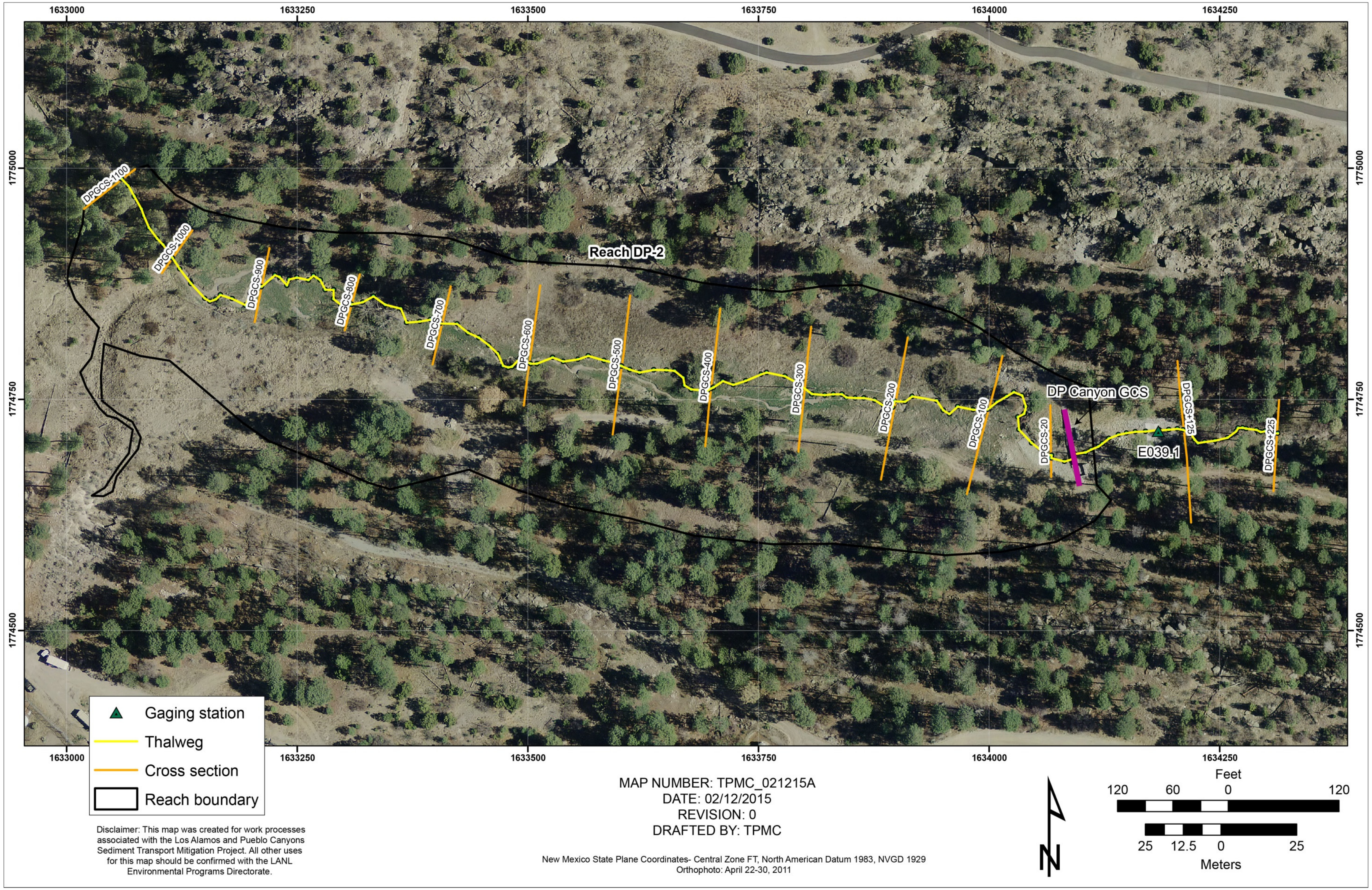


Figure A-3.7-1 Orthophoto showing the locations of surveyed cross-sections and thalweg profile near the DP Canyon GCS

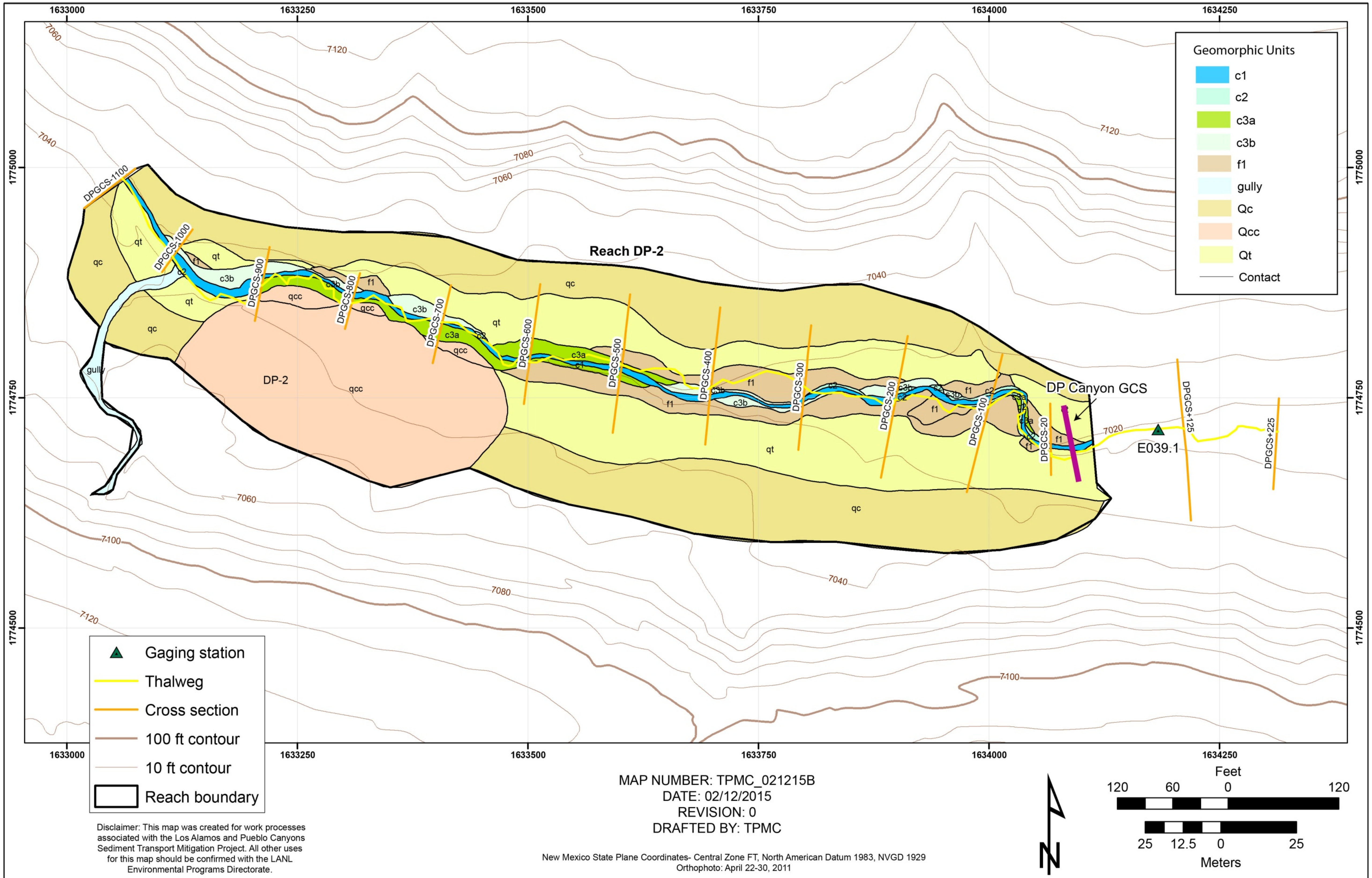


Figure A-3.7-2 Geomorphic map showing the locations of surveyed cross-sections and thalweg profile near the DP Canyon GCS; geomorphic mapping from 1998

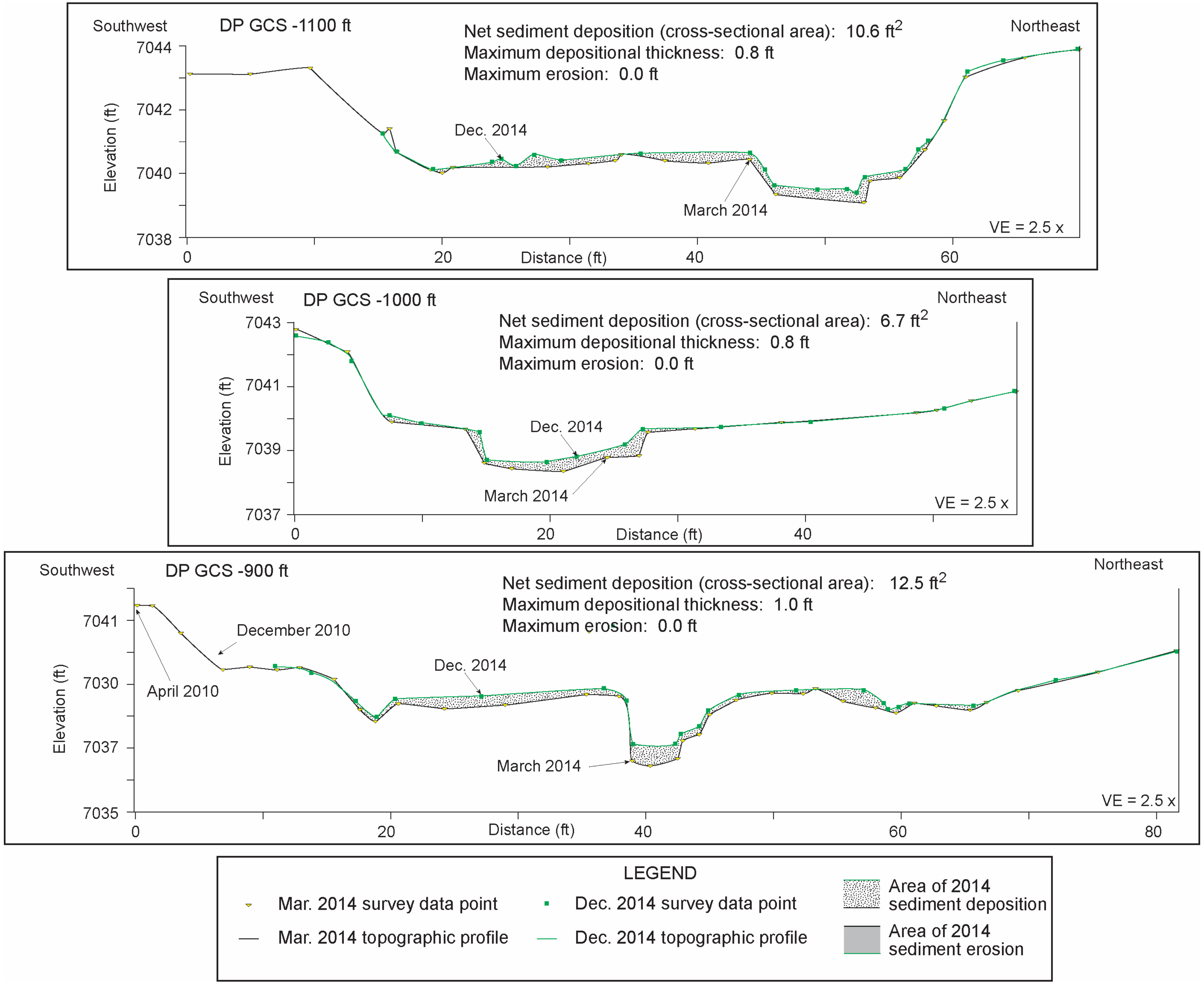


Figure A-3.7-3 Cross-sections and thalweg profile near the DP Canyon GCS

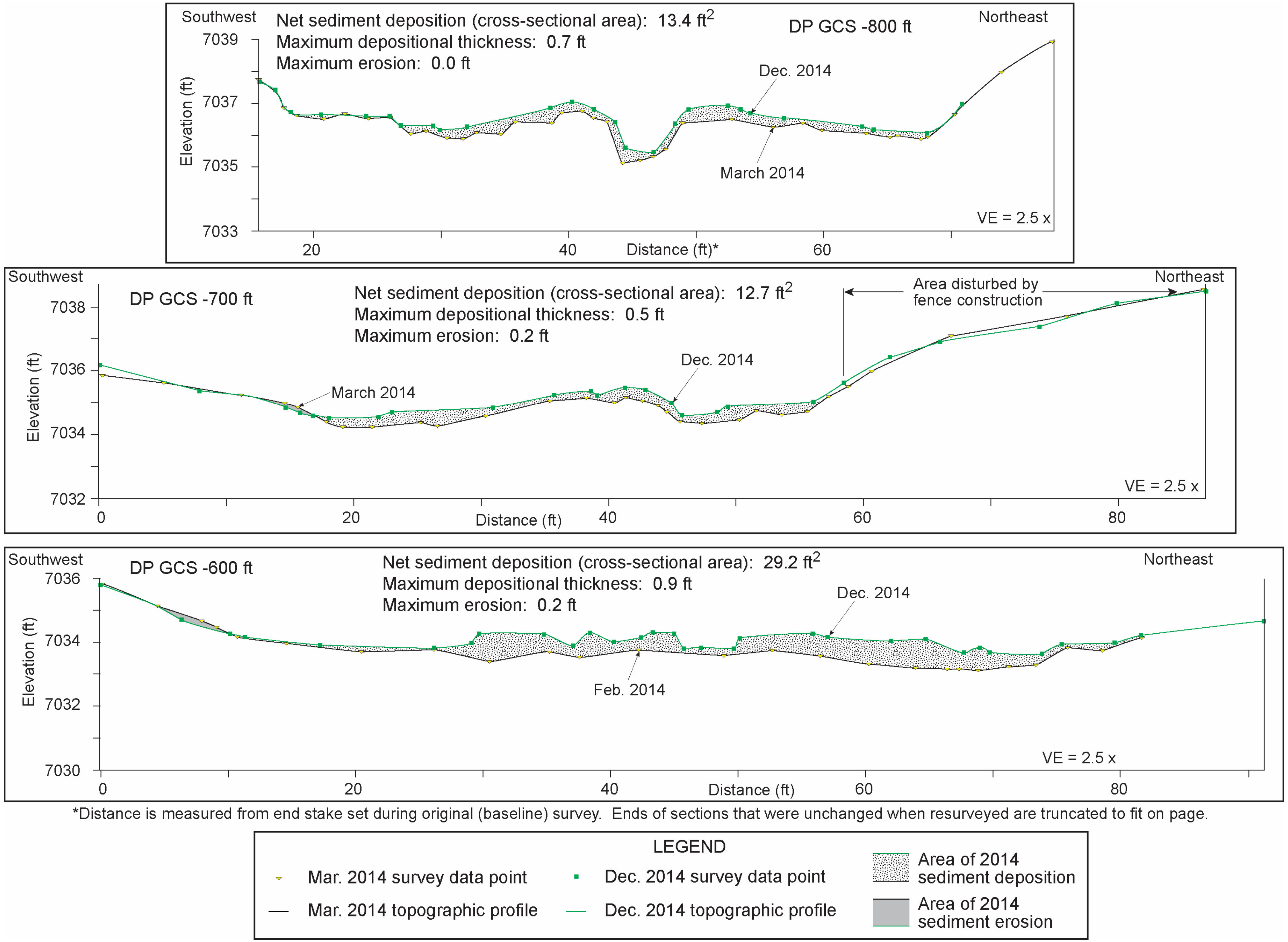


Figure A-3.7-3 (continued) **Cross-sections and thalweg profile near the DP Canyon GCS**

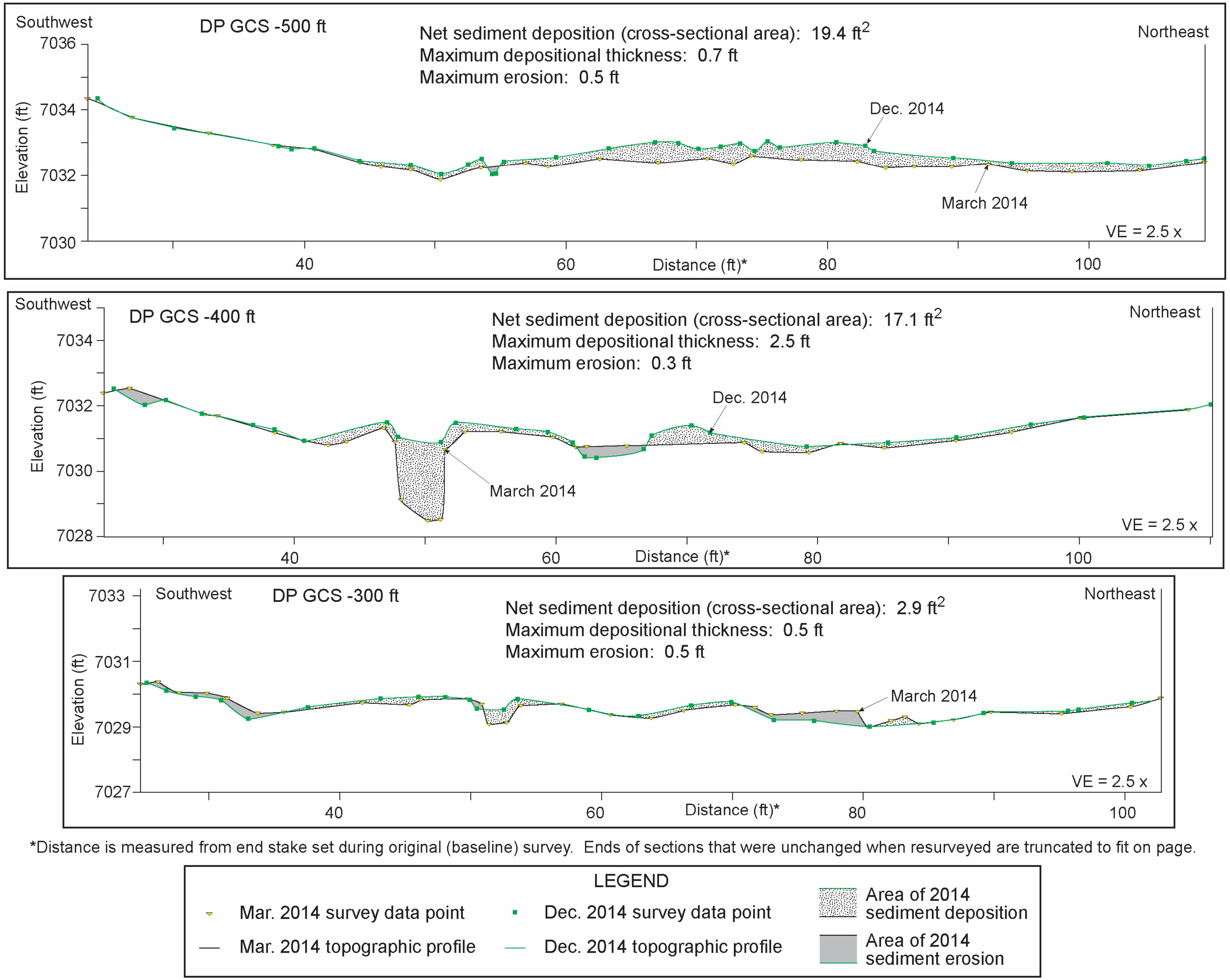
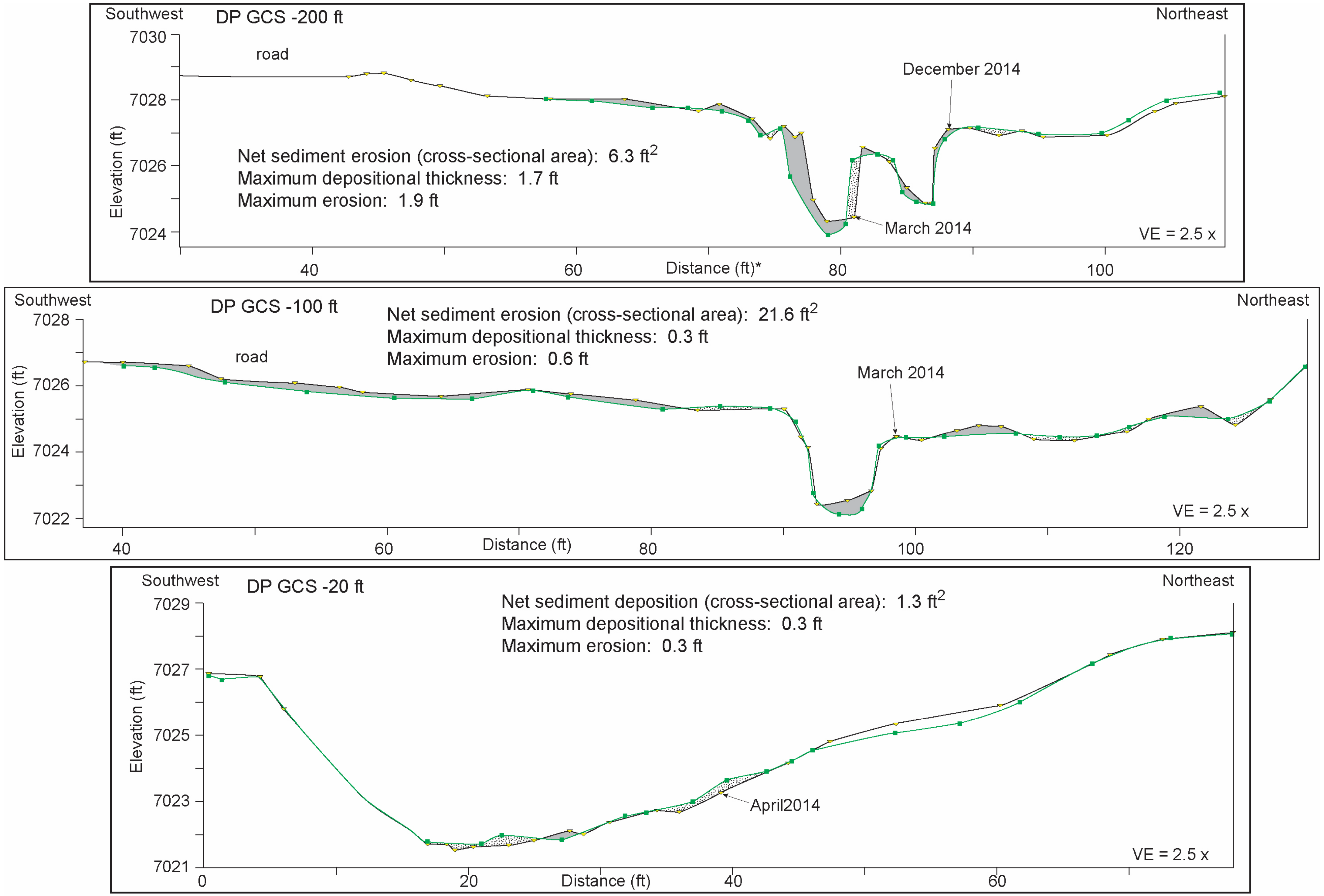


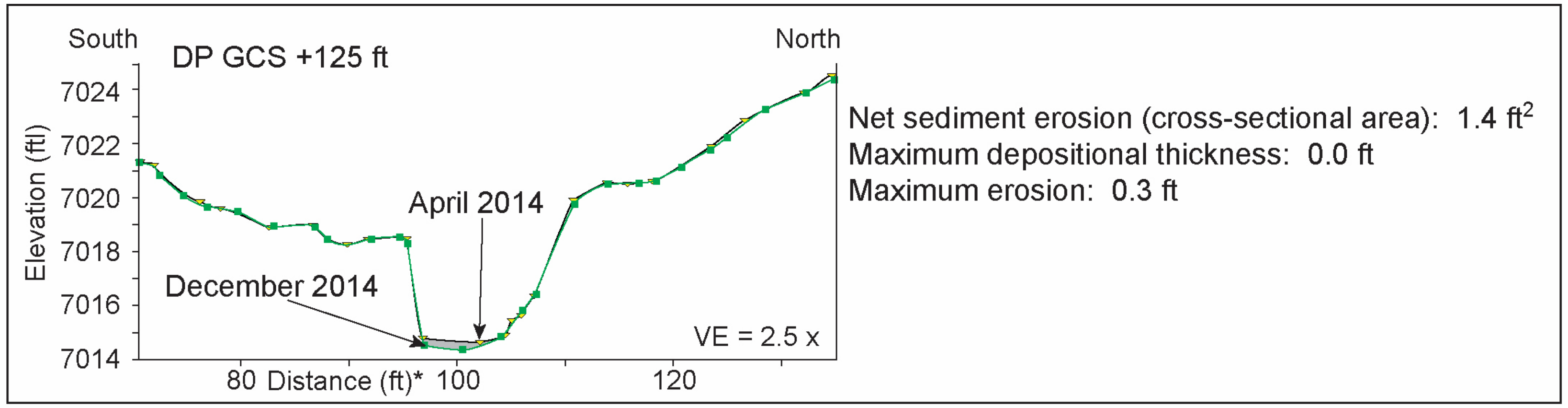
Figure A-3.7-3 (continued) **Cross-sections and thalweg profile near the DP Canyon GCS**

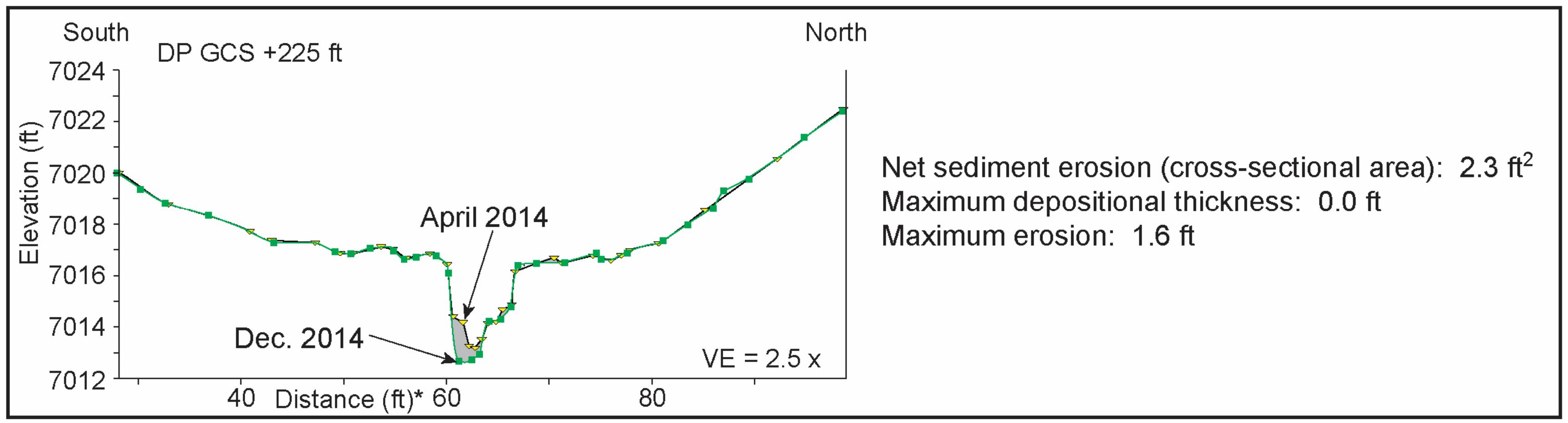


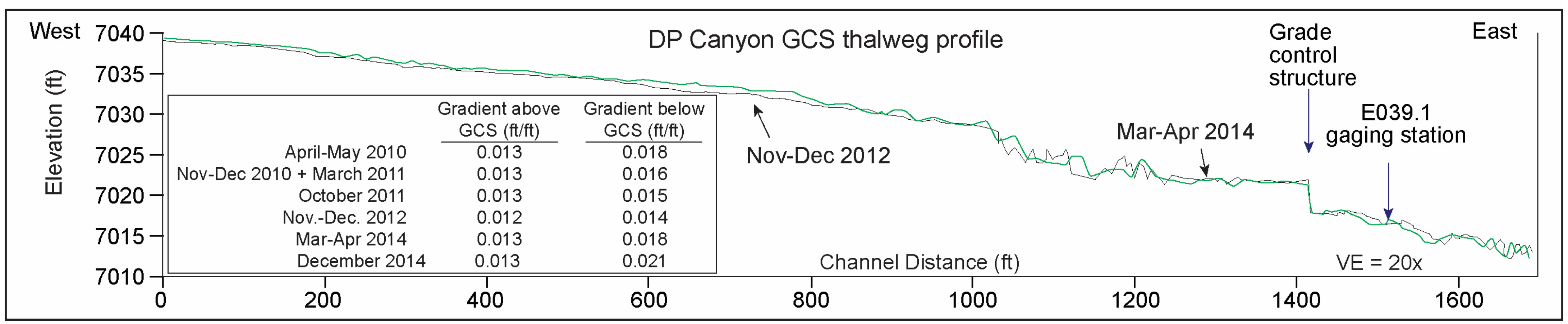
*Distance is measured from end stake set during original (baseline) survey. Ends of sections that were unchanged when resurveyed are truncated to fit on page.

LEGEND
- Mar. 2014 survey data point
- Mar. 2014 topographic profile
- Dec. 2014 survey data point
- Dec. 2014 topographic profile
- Area of 2014 sediment deposition
- Area of 2014 sediment erosion

Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS







	Gradient above GCS (ft/ft)	Gradient below GCS (ft/ft)
April-May 2010	0.013	0.018
Nov-Dec 2010 + March 2011	0.013	0.016
October 2011	0.013	0.015
Nov.-Dec. 2012	0.012	0.014
Mar-Apr 2014	0.013	0.018
December 2014	0.013	0.021

*Distance is measured from end stake set during original (baseline) survey. Ends of sections that were unchanged when resurveyed are truncated to fit on page.

LEGEND
- Mar. 2014 survey data point
- Mar. 2014 topographic profile
- Dec. 2014 survey data point
- Dec. 2014 topographic profile
- Area of 2014 sediment deposition
- Area of 2014 sediment erosion

Figure A-3.7-3 (continued) Cross-sections and thalweg profile near the DP Canyon GCS

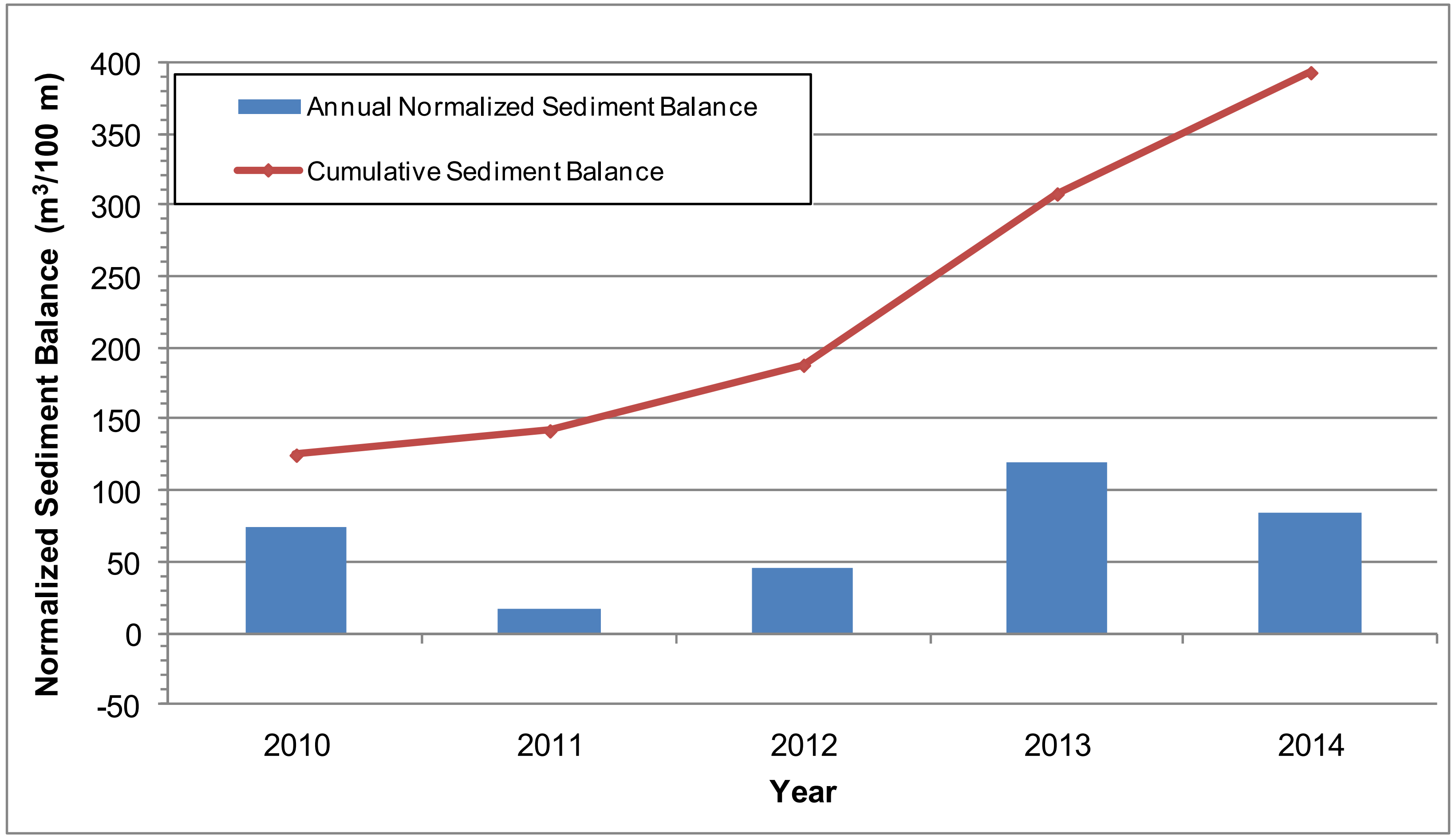


Figure A-3.7-4 **2010–2014 sediment balance at the DP Canyon GCS area. Positive sediment balance values indicate deposition, negative values indicate erosion.**

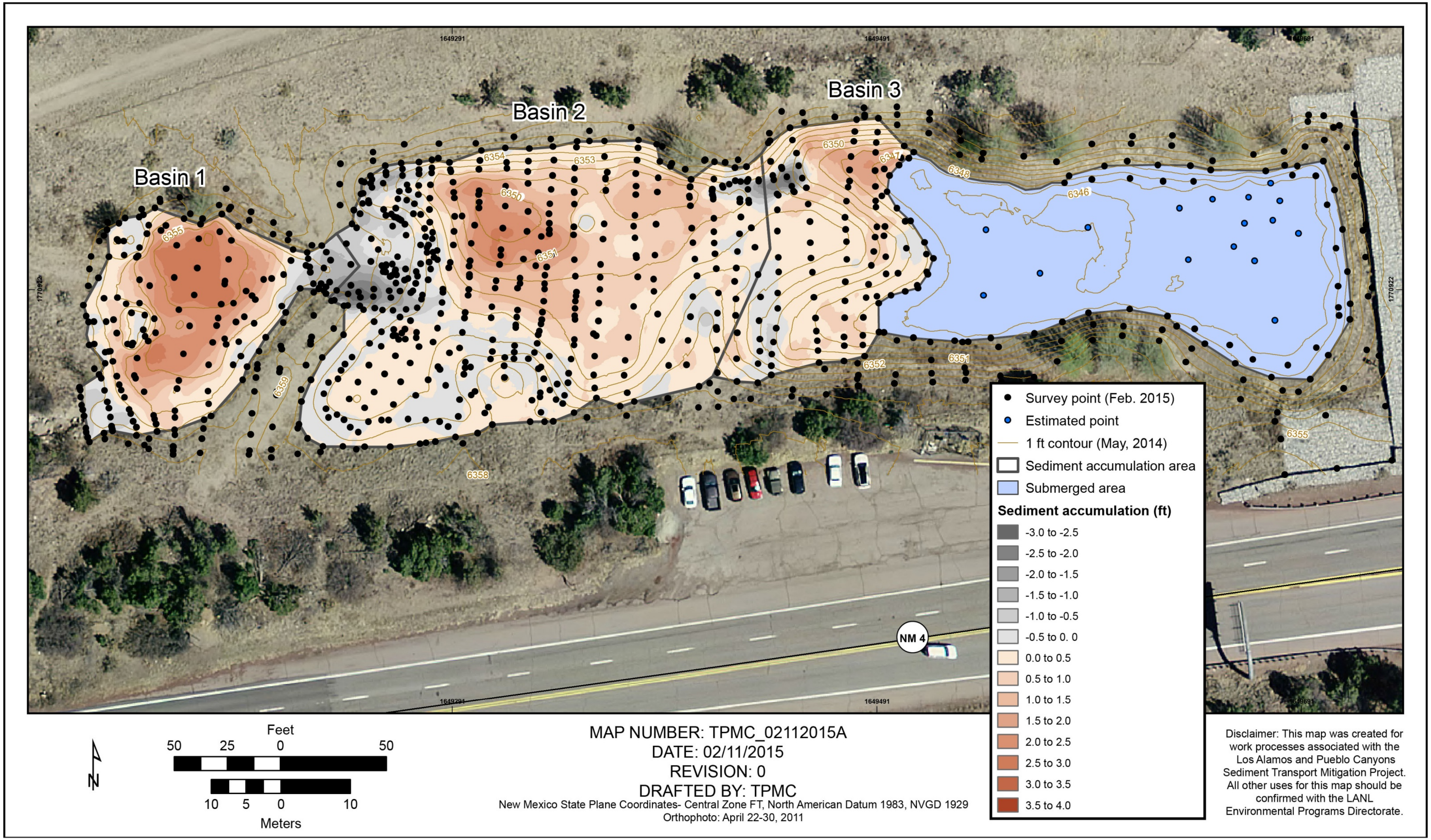


Figure A-3.8-1 Topographic map of sediment retention basins above the Los Alamos Canyon low-head weir and isopachs of total thickness of accumulated sediment in Basins 1, 2, and 3 from 2014 monsoon season

Table A-3.1-1
Summary of Geomorphic Changes at Pueblo Canyon Background Sections above WWTF Cross-Sections

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft²)	2014 Normalized Net Sediment Deposition (m³/100 m)*	2013 Normalized Net Sediment Deposition (m³/100 m)*	2012 Normalized Net Sediment Deposition (m³/100 m)*	2011 Normalized Net Sediment Deposition (m³/100 m)*	2010 Normalized Net Sediment Deposition (m³/100 m)*	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
BG-1	0.6	0.3	9.2	85	-283	-33	33	207	0.4	-0.7	-0.2	0.2	0.5
BG-2	0.6	0.0	8.1	75	-132	-36	44	101	0.0	0.2	0.0	-0.1	-0.3
BG-3	0.9	0.0	19.6	182	-141	3	40	281	0.3	-0.1	-0.1	0.4	0.3
BG-4	0.7	0.3	15.6	145	88	6	30	81	0.2	-0.1	0.0	0.1	0.4
BG-5	0.4	0.2	7.0	65	-519	-7	-15	112	0.0	-0.7	-0.2	0.0	0.2
BG-6	0.4	1.4	-5.1	-47	18	-15	29	118	0.0	-0.6	-0.2	0.1	0.0
		Average	**9.1**	**84**	**-162**	**-14**	**27**	**150**	**0.2**	**-0.3**	**-0.1**	**0.1**	**0.2**

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.2-1
Summary of Geomorphic Changes at the Upper Pueblo Canyon Willow-Planting Area Cross-Sections

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft²)	2014 Normalized Net Sediment Deposition (m³/100 m)*	2013 Normalized Net Sediment Deposition (m³/100 m)*	2012 Normalized Net Sediment Deposition (m³/100 m)*	2011 Normalized Net Sediment Deposition (m³/100 m)*	2010 Normalized Net Sediment Deposition (m³/100 m)*	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Upper Third of Upper Willow-Planting Area													
UPW-1	0.9	0.6	11.5	107	592	18	200	276	0.5	0.6	-0.1	1.2	1.0
UPW-2	0.8	0.2	11.2	104	451	32	175	95	-0.2	1.5	0.2	0.3	1.1
UPW-3	0.8	0.5	36.4	338	880	218	141	371	0.0	0.6	0.7	0.8	1.0
UPW-4	0.9	0.3	16.5	153	1275	97	125	415	-0.1	1.8	-0.1	0.5	0.6
UPW-5	1.0	1.2	13.1	122	1299	0	154	175	0.2	1.2	0.2	-0.2	0.4
UPW-6	1.7	6.8	-17.7	-164	482	9	28	151	-0.9	2.0	0.1	0.0	0.2
		Average, Upper Third	**11.8**	**110**	**830**	**62**	**137**	**247**	**-0.1**	**1.3**	**0.2**	**0.4**	**0.7**
Middle Third of Upper Willow-Planting Area													
UPW-7	0.5	1.2	-1.3	-12	238	59	25	187	-0.4	0.1	1.1	-0.9	-0.4
UPW-8	--	1.7	-16.5	-153	184	5	34	90	-0.7	-0.4	0.1	-0.8	0.1
UPW-9	0.6	1.3	-2.0	-19	-482	17	1	265	-1.3	-1.6	0.2	-0.1	-0.3
UPW-10	0.3	1.5	-11.8	-110	-295	0	30	162	0.1	-2.7	0.1	-0.2	0.4
UPW-11	0.7	1.6	-8.1	-75	-678	0	0	388	0.0	-1.8	0.0	0.1	0.0
UPW-12	1.1	0.7	-2.0	-19	-2224	17	12	-41	-0.5	-1.7	0.2	0.0	-0.5
		Average, Middle Third	**-7.0**	**-65**	**-543**	**16**	**17**	**175**	**-0.5**	**-1.4**	**0.3**	**-0.3**	**-0.1**

Table A-3.2-1 (continued)

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)*	2013 Normalized Net Sediment Deposition (m^3/100 m)*	2012 Normalized Net Sediment Deposition (m^3/100 m)*	2011 Normalized Net Sediment Deposition (m^3/100 m)*	2010 Normalized Net Sediment Deposition (m^3/100 m)*	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
Lower Third of Upper Willow-Planting Area													
UPW-13	0.7	1.5	-10.6	-98	-1187	0	12	129	-0.2	-2.5	0.0	-0.1	0.1
UPW-14	0.7	1.0	-9.4	-87	-919	6	-36	70	-0.5	-1.5	0.0	-0.2	-0.3
UPW-15	1.5	1.9	23.5	218	-1752	5	-212	2	0.1	-0.5	0.1	-0.8	-0.5
UPW-16	0.8	2.2	1.6	15	-1168	-70	-197	-147	-0.1	-0.7	-0.1	0.1	-0.7
UPW-17	0.7	1.1	5.2	48	-797	16	-388	-4	-0.6	-0.1	-0.1	-0.4	-0.3
UPW-18	1.0	1.2	17.7	164	-2537	-19	-82	-123	-0.1	-0.3	0.1	0.2	-1.0
Average, Lower Third			**4.7**	**43**	**-1393**	**-10**	**-150**	**-12**	**-0.2**	**-0.9**	**0.0**	**-0.2**	**-0.4**
Average, Upper Pueblo Canyon			**3.2**	**30**	**-369**	**23**	**1**	**137**	**-0.2**	**-0.3**	**0.2**	**0.0**	**0.0**

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.3-1
Summary of Geomorphic Changes at the Pueblo Canyon Wing Ditch Cross-Sections

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)*	2013 Normalized Net Sediment Deposition (m^3/100 m)*	2012 Normalized Net Sediment Deposition (m^3/100 m)*	2011 Normalized Net Sediment Deposition (m^3/100 m)*	2010 Normalized Net Sediment Deposition (m^3/100 m)*	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
WD-1	1.9	0.5	32.8	304	2222	-11	67	219	-0.7	1.5	-0.6	1.3	1.0
WD-2	1.5	0.4	39.0	362	1664	-6	25	424	-1.1	1.8	-0.2	0.0	1.7
WD-3	1.2	0.2	53.4	496	2510	-11	-39	50	-1.5	2.0	-0.6	0.7	1.3
WD-4	1.1	0.7	13.8	128	2479	-72	0	-125	0.2	-2.4	0.2	0.1	1.4
WD-5	0.5	0.8	4.5	42	1722	-157	16	58	0.7	-0.5	-1.1	0.0	1.1
Average			**28.7**	**266**	**2120**	**-52**	**14**	**125**	**-0.5**	**0.5**	**-0.5**	**0.4**	**1.3**

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.5-1
Summary of Geomorphic Changes at Cross-Sections above the Pueblo Canyon GCS

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)[a]	2013 Normalized Net Sediment Deposition (m^3/100 m)[a]	2012 Normalized Net Sediment Deposition (m^3/100 m)[a]	2011 Normalized Net Sediment Deposition (m^3/100 m)[a]	2010 Normalized Net Sediment Deposition (m^3/100 m)[a]	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
PUGCS −1500 ft	0.2	0.5	-5.9	-55	-1299	na[b]	269	-2785	-0.1	1.0	0.1	0.2
PUGCS −1400 ft	0.4	0.3	13.0	121	-2115	na	139	121	-0.1	-0.1	0.2	0.4
PUGCS −1300 ft	0.5	0.3	6.7	62	-1310	na	37	2813	-0.1	-0.9	0.0	0.3
PUGCS −1200 ft	0.3	0.2	1.9	18	-634	na	408	1968	0.0	-1.6	0.6	0.1
PUGCS −1100 ft	0.3	0.3	-1.9	-18	-843	na	269	-678	0.0	0.6	-0.1	-0.4
PUGCS −1000 ft	0.5	0.0	15.0	139	36	na	-56	678	0.1	1.6	0.1	0.1
PUGCS −900 ft	0.6	0.4	5.4	50	63	na	-316	1903	0.0	0.7	0.6	0.8
PUGCS −800 ft	0.2	0.6	2.3	21	119	na	-74	-232	0.0	2.1	0.2	-1.2
PUGCS −700 ft	0.0	0.3	-7.6	-71	-94	na	0	-390	0.0	0.7	0.1	-0.5
PUGCS −600 ft	0.3	0.0	4.3	40	-724	na	0	-121	0.0	-0.4	0.7	0.1
PUGCS −500 ft	0.4	0.3	5.9	55	-728	na	93	28	0.0	1.9	-0.1	-0.5
PUGCS −400 ft	0.5	0.6	2.5	23	358	na	353	-1170	0.0	1.9	0.1	-0.2
PUGCS −300 ft	0.3	0.0	3.8	35	386	na	-56	371	0.1	1.5	0.1	0.2
PUGCS −200 ft	0.0	0.7	-8.8	-82	1408	na	9	-111	-0.2	3.0	0.1	-0.3
PUGCS −100 ft	0.2	0.9	-15.6	-145	1557	na	0	808	-0.2	2.3	0.1	0.2
		Average	**1.4**	**13**	**-256**	**na**	**72**	**214**	**0.0**	**0.9**	**0.2**	**-0.1**

[a] Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

[b] na = Not available. The Pueblo Canyon GCS was not surveyed in 2012 because of a lack of monsoonal flow in this area.

Table A-3.5-2
Summary of Geomorphic Changes at Cross-Sections below the Pueblo Canyon GCS

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)[a]	2013 Normalized Net Sediment Deposition (m^3/100 m)[a]	2012 Normalized Net Sediment Deposition (m^3/100 m)[a]	2011 Normalized Net Sediment Deposition (m^3/100 m)[a]	2010 Normalized Net Sediment Deposition (m^3/100 m)[a]	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
PUGCS +100 ft	0.0	0.6	-9.2	-85	-843	na[b]	0	-260	-0.1	-0.3	0.1	-0.8
PUGCS +200 ft	0.4	3.0	-2.0	-19	-850	na	74	-1448	0.1	-1.3	0.1	0.1
PUGCS +300 ft	0.0	0.0	0.0	0	298	na	0	-826	0.0	1.3	-0.1	0.0
		Average	**-11.2**	**-104**	**-1395**	**na**	**25**	**-845**	**0.1**	**-0.3**	**0.0**	**-0.2**

[a] Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

[b] na = Not available. The Pueblo Canyon GCS was not surveyed in 2012 because of a lack of monsoonal flow in this area.

Table A-3.7-1
Summary of Geomorphic Changes at Cross-Sections above the DP Canyon GCS

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)[a]	2013 Normalized Net Sediment Deposition (m^3/100 m)[a]	2012 Normalized Net Sediment Deposition (m^3/100 m)[a]	2011 Normalized Net Sediment Deposition (m^3/100 m)[a]	2010 Normalized Net Sediment Deposition (m^3/100 m)[a]	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
DPGCS −1100 ft	0.8	0.0	10.6	98	52	0	2	50	0.3	0.2	0.2	-0.4	0.2
DPGCS −1000 ft	0.8	0.0	6.7	62	26	22	39	26	0.3	0.0	0.1	0.1	0.1
DPGCS −900 ft	1.0	0.0	12.5	116	71	71	57	110	0.7	0.3	0.5	-0.8	0.7
DPGCS −800 ft	0.7	0.0	13.4	124	123	27	100	30	0.4	0.9	0.0	1.1	-0.8
DPGCS −700 ft	0.5	0.2	12.7	118	117	45	38	59	0.3	0.8	0.5	0.6	-0.5
DPGCS −600 ft	0.9	0.2	29.2	271	267	61	1	93	0.7	0.9	0.3	0.5	0.2
DPGCS −500 ft	0.7	0.5	19.4	180	220	117	6	130	0.4	1.0	0.3	0.5	0.2
DPGCS −400 ft	2.5	0.3	17.1	159	64	87	15	100	-0.3	0.6	-0.4	0.7	0.4
DPGCS −300 ft	0.5	0.5	2.9	27	119	57	45	150	0.2	0.2	-0.4	0.1	0.8
DPGCS −200 ft	1.7	1.9	-6.3	-58	119	-6	-52	50	-0.4	-0.8	1.4	-1.7	-0.3
DPGCS −100 ft	0.3	0.6	-21.6	-158[b]	141[b]	29	-67	18	-0.3	0.6[c]	-0.2	-0.2	-0.6
DPGCS −20 ft	0.3	0.3	1.3			na[c]	na	na			na	na	na
		Average	**8.2**	**85**	**120**	**46**	**17**	**74**	**0.2**	**0.4**	**0.2**	**0.1**	**0.0**

[a] Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

[b] Average value of normalized net sediment deposition for DPCGS -100 ft and DPGCS -20 ft, projected over the 100 ft distance to the GCS. This 2013 average value is not comparable with previous years because of the addition of the DPGCS -20-ft line in February 2013.

[c] na = Not available. Cross-section line DPGCS -20 ft was established in February 2013.

Table A-3.7-2
Summary of Geomorphic Changes at Cross-Sections below the DP Canyon GCS

Section Name	2014 Maximum New Sediment Thickness (ft)	2014 Maximum Erosion (ft)	2014 Net Sediment Cross-Sectional Area (ft^2)	2014 Normalized Net Sediment Deposition (m^3/100 m)*	2013 Normalized Net Sediment Deposition (m^3/100 m)*	2012 Normalized Net Sediment Deposition (m^3/100 m)*	2011 Normalized Net Sediment Deposition (m^3/100 m)*	2010 Normalized Net Sediment Deposition (m^3/100 m)*	2014 Thalweg Elevation Change (ft)	2013 Thalweg Elevation Change (ft)	2012 Thalweg Elevation Change (ft)	2011 Thalweg Elevation Change (ft)	2010 Thalweg Elevation Change (ft)
DPGCS +125 ft	0.0	1.4	-1.4	-13	-121	0.0	-113	189	-0.2	-0.4	0.0	-0.9	1.7
DPGCS +225 ft	0.0	1.6	-2.4	-22	-23	16	-35	20	-0.5	-1.0	0.3	-0.1	0.0
		Average	**-1.9**	**-18**	**-72**	**8**	**-74**	**105**	**-0.4**	**-0.7**	**0.1**	**-0.5**	**0.8**

* Normalized net sediment deposition is total estimated volume per 100 ft divided by distance between surveyed cross-sections (100 ft = 0.0305 km).

Table A-3.8-1
Sediment Volume Changes at Los Alamos Canyon Low-Head Weir, 2011–2014

Site	Total Net Change (ft^3)	Total Net Change (m^3)	Estimated Percent Coarse Sediment	Estimated Percent Fine Sediment	Estimated Volume Coarse Sediment (m^3)	Estimated Volume Fine Sediment (m^3)
July 2011 to March 2012						
Basin 1 (west)	8400	240	50%	50%	120	120
Basin 2 (central)	15,500	440	5%	95%	22	418
Basin 3 (east)	50,600	1430	0%	100%	0	1430
Total	**74,500**	**2110**	**n/a***	**n/a**	**142**	**1968**
March 2012 to November 2012						
Basin 1 (west)	700	20	20%	80%	4	16
Basin 2 (central)	8800	250	0%	100%	0	250
Basin 3 (east)	81,100	2300	0%	100%	0	2300
Total	**90,600**	**2570**	**n/a**	**n/a**	**4**	**2566**
May 2013 to February 2014						
Basin 1 (west)	19,057	540	100%	0%	540	0
Basin 2 (central)	67,917	1923	100%	0%	1923	0
Basin 3 (east)	95,133	2694	40%	60%	1078	1616
Total	**182,106**	**5157**	**n/a**	**n/a**	**3541**	**1616**
February 2014 to February 2015						
Basin 1 (west)	5895	167	80%	20%	134	33
Basin 2 (central)	5940	168	65%	35%	109	59
Basin 3 (east)	7744	219	35%	65%	38	181
Total	**19,579**	**554**	**n/a**	**n/a**	**281**	**273**

* n/a = Not applicable.

Table A-3.8-2
Sediment Accumulation at Los Alamos Canyon Low-Head Weir, 2000–2014

Period	Total Sedimentation (m^3)	Approximate Annual Sedimentation (m^3/yr)
June 2000 to May 2002	822	411
May 2002 to August 2005	3377	1126
August 2005 to July 2007	2555	1278
July 2007 to September 2008	138	138
September 2008 to May 2009	0	—*
May 2009 to July 2010	510	510
July 2010 to March 2011	274	274
March 2011 to July 2011	0	—
July 2011 to March 2012	2110	2110
March 2012 to November 2012	2570	2570
May 2013 to February 2014	5157	5157
February 2014 to February 2015	554	554
June 2000 to February 2015	**18,067**	**1200**

*— = Not calculated; not in storm water runoff season.

Attachment A-1

Photographs of Sediment Transport Mitigation Sites in the Los Alamos and Pueblo Canyons Watershed

Photo A1-1 February 2015 photograph of cross-section BG-3 in area of channel aggradation, looking downstream

Photo A1-2 February 2015 photograph of cross-section BG-6 in area of lateral stream bank migration, looking downstream

Photo A1-3 February 2015 photograph of lateral bank migration and northward stream channel migration in the area of maximum sediment erosion and maximum sediment deposition at cross-section UPW-6, looking downstream

Photo A1-4 February 2015 photograph of sand lobe in the area of maximum sediment deposition at cross-section WD-1, looking upstream

Photo A1-5 February 2015 photograph of area of maximum sediment erosion below the Pueblo Canyon wing ditch at cross-section WD-5, looking upstream

Photo A1-6 February 2015 photograph showing ground disturbance from willow planting/construction activities in the lower half of the Lower Pueblo Canyon willow-planting area cross-sections, LPW+200, looking downstream

(a)

(b)

Photo A1-7 January 2015 photographs of the Pueblo Canyon grade-control structure: (a) looking downstream (b) looking upstream

Photo A1-8 February 2015 photograph of area of maximum sediment erosion above the Pueblo Canyon grade-control structure, PUGCS-100, looking downstream. Surface likely modified during excavation of the intake above the PUGCS.

Photo A1-9 February 2015 photograph of area of maximum sediment deposition above the Pueblo Canyon grade-control structure, PUGCS-900, looking downstream


(a)


(b)

Photo A1-10 February 2015 photographs of the Upper Los Alamos Canyon sediment retention Basin 1: (a) looking downstream at upper sediment retention basin (b) upstream at coarse sediment lobe


(a)


(b)

Photo A1-11 February 2015 photographs of the DP Canyon grade-control structure: (a) looking downstream (b) looking upstream

Photo A1-12 February 2015 photograph of maximum sediment deposition at DP-400 cross-section, looking downstream

Photo A1-13 February 2015 photograph of maximum incision at DP-200 cross-section, looking downstream

Photo A1-14 January 2015 photograph of the Los Alamos Canyon low-head weir, looking north

Photo A1-15 January 2015 photograph of sediment accumulation and delta in Basin 2 at the LA Canyon Los Alamos Canyon low-head weir; Basin 3 is visible in the background.

Photo A1-16 March 2015 photo of willow resprouting in Upper Pueblo Canyon willow-planting area


(a)


(b)

Photo A1-17 Repeat photographs of thick willow patches in upper third of Upper Pueblo Canyon willow-planting area looking upstream near UPW-5 cross-section: (a) May 2014 (b) February 2015

Photo A1-18 November 2014 photograph of rock armoring along stream banks in the south fork of Acid Canyon, looking upstream

Attachment A-2

Cross-Section Survey Data (on CD included with this document)

Appendix B

Pueblo Canyon Wetland Area
Mitigation Phase I: Willow Planting

B-1.0 INTRODUCTION

This appendix describes activities performed during willow planting as the first phase of Pueblo Canyon Wetland Area Mitigation project. Heavy rains and subsequent runoff events from September 10 to 15, 2013, resulted in the upstream migration and widening of a headcut within the wetland area downstream of the Los Alamos Wastewater Treatment Facility in lower Pueblo Canyon (LANL 2014, 257592). The primary objective of the plantings is to promote stabilization, ecological functions, sediment aggradation, and hydraulic stability of the Pueblo wetlands in areas damaged by 2013 floods. Willow-planting treatment in the wetland area of Pueblo Canyon was undertaken as part of mitigation efforts supporting the objectives of the Boundary Protection Campaign. These objectives include addressing legacy contaminant migration and other nonpoint source pollutants found within canyon systems, minimizing potential Los Alamos National Laboratory (LANL or the Laboratory) impacts to downstream stakeholders, maintaining and/or reducing risks associated with off-site sediment transport beyond the facility boundary, and reducing peak discharges at the Laboratory boundary.

B-2.0 FIELD ACTIVITIES

The area of Pueblo Canyon downstream from the post-September 2013 headcut position has been divided into four Restoration Areas (RAs) for the purposes of stream channel mitigation. Ten bank areas were designated within RA-1 through RA-4 for willow planting (Figures B-2.0-1 through B-2.0-4). In April 2014, willows were planted along the stream channel and in a 10-ft wide buffer area around the channel to promote sediment aggradation and to stabilize the channel against further bank erosion.

Photographs were taken during and after field work to document field methods and planting results. Select photographs are presented in this report, and additional photographs were taken for future comparison purposes. Photo point locations are shown in Figures B-2.0-1 through B-2.0-4.

B-2.1 Methods

Willow size, transportation and storage, planting, and quality assurance specifications were provided to the field team before willow planting. Upon shipment, willows were stored in water troughs and were then brought to the site in buckets of water before planting (Figure B-2.1-1, background). Willows were planted using two Stihl one-man augers: a model BT 121 earth auger (Figure B-2.1-1) and a model BT 45 planting auger (Figure B-2.1-2). The BT 121 reached a maximum depth of 2.5 ft using a standard bit. The BT 45 reached a maximum depth of 2.8 ft using a fabricated 34-in. bit. After the field personnel augered to the maximum depth allowable by the auger or to refusal, they planted each willow and carefully backfilled to ensure the willow’s root ball was in contact with moist sand/soil. In more saturated areas, sediment caved into the auger hole and effectively backfilled the willow planting. In RA-1 and RA-2, approximately 5% of the willow bundles were marked at 2 ft to physically verify adequate planting depth. In RA-3 and RA-4, approximately 50% of the willow bundles were marked at 2.5 ft to physically verify adequate planting depth. If refusal was encountered, willows were only planted if the depth of the hole was greater than 1 ft. Depths at refusal were predominantly greater than 1.5 ft. Willows were planted with a slight downstream angle to allow water to flow readily over them in case of flooding.

Willows dimensions were specified to have a basal diameter between 0.5 and 1.5 in. and to be at least 3 ft in length. At least 10% of planted willows were randomly measured for size specification for quality assurance. An estimated 3% of planted willows were less than the 0.5-in.-minimum specified diameter, with these thinner willows measuring about 0.35 in. in diameter. No willows exceeded the maximum 1.5-in. diameter. Willow length averaged between 3 and 3.3 ft long. One bundle contained willows that were all 2.5 ft long. These shorter willows were interspersed with taller willows from a different bundle.

Willows were planted on an approximately 4-ft grid spacing in overbank buffer areas throughout the Pueblo Canyon RAs, wherever there was sufficient moisture and where refusal was at depths greater than 1 ft. The exception is RA-1 where there was no overbank area (Figure B-2.0-1). Willows were planted on either a square yard or 3-ft grid spacing in the stream channel buffer areas in RA 2 and RA-3.

B-2.2 Willow Plantings

In RA-1, willows were planted approximately every 3 ft along the stream channel and on a 4-ft grid within the stream channel buffer zone Bank 1 (Figures B-2.0-1 and B-2.2-1). A total of 540 willows were planted in RA-1 (Table B-2.2-1). RA-1 had the highest rate of refusal (Table B-2.2-2), which was predominantly caused by shallow Tertiary Puye Formation bedrock.

Willows were planted approximately every 1–2 ft along the stream channel in RA-2 and RA-3, Banks 2 through 8 (Figures 2.0-2, 2.0-3, and 2.2-2). Additionally, islands of willows were planted in the flat sandy floodplain in Banks 7 through 9 to promote stream braiding and to slow high energy flows (Figures B-2.2-3 and B-2.2-4). Willows were planted on a 3-ft grid in channel buffer zones in RA-2 and RA-3, subject to adequate moisture and depth to refusal. A total of 4510 and 3385 willows were planted in RA-2 and RA-3, respectively (Table B-2.2-1). Refusal was higher in RA-2 than at RA-3 (Table B-2.2-2), and shallow bedrock was the predominant cause of refusal in the upper half of RA-2 (Figure B-2.2-5) and along the south side of the stream channel in RA-3 Bank 7. Refusal at other locations was primarily caused by imbricated gravel and cobbles in the streambed.

Extra willows remaining after planting in the upper 3 RAs were planted in RA-4 Banks 9 and 10 (Figure B-2.0-4). Willow spacing in RA-4 Bank 9 was similar to planting in RA-2 and RA-3. Willow spacing was increased to every 10–20 ft along the channel in Bank 10 because of the lower water table in this area (Figure B-2.2-6). Willow planting in Bank 10 will be used to assess survival of willows at the more downstream areas where less alluvial water is available. A total of 1265 willows were planted in RA-4 (Table B-2.2-1).

Willows were also planted at the base of two designated coir bank areas within RA-2 (Figure B-2.0-2). These areas were stabilized with coir logs to prevent bank migration and erosion. Willow-planting density in these areas was typically between 4 and 8 in., but up to 1 ft apart because of auger refusal (Figure B-2.1-1 and Figure B-2.2-7).

Although 9400 willows were planned, a total of 9700 willows were planted in the 4 RAs to compensate for the small percentage of shorter or narrower willows. During a site visit on April 29, 2014, new buds were observed on some of the planted willows, especially in Banks 2 through 7. The healthiest buds were observed on the thinner willows (Figure 2.2-8), but some buds were also growing on thicker willows (Figure B-2.2-9). On June 4, approximately 97–99% of the willows were observed to have sprouted leaves and appeared to be thriving. By late July, survival rates were estimated at 95% and the willow stakes had fully leafed out (Figure B-2.2-10 to Figure B-2.2-14).

2.3 Vegetation Surveys

Photographic surveys were taken after the completion of field work to document baseline vegetation conditions. Photographic locations were staked approximately every 200 ft, beginning just upstream of Bank 1 in RA-1 (Figures B-2.0-1 through B-2.0-4). At each location photographs were taken from the stream channel looking upstream and downstream, and from the stake looking towards the stream channel. The baseline vegetation photos will be used for comparison purposes for future status reports.

3.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID or ESH ID. This information is also included in text citations. ER IDs were assigned by the Environmental Programs Directorate's Records Processing Facility (IDs through 599999), and ESH IDs are assigned by the Environment, Safety, and Health (ESH) Directorate (IDs 600000 and above). IDs are used to locate documents in the Laboratory's Electronic Document Management System and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the New Mexico Environment Department Hazardous Waste Bureau and the ESH Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included

LANL (Los Alamos National Laboratory), March 2014. "Storm Water Performance Monitoring in the Los Alamos/Pueblo Watershed during 2013," Los Alamos National Laboratory document LA-UR-14-24516, Los Alamos, New Mexico. (LANL 2014, 257592)

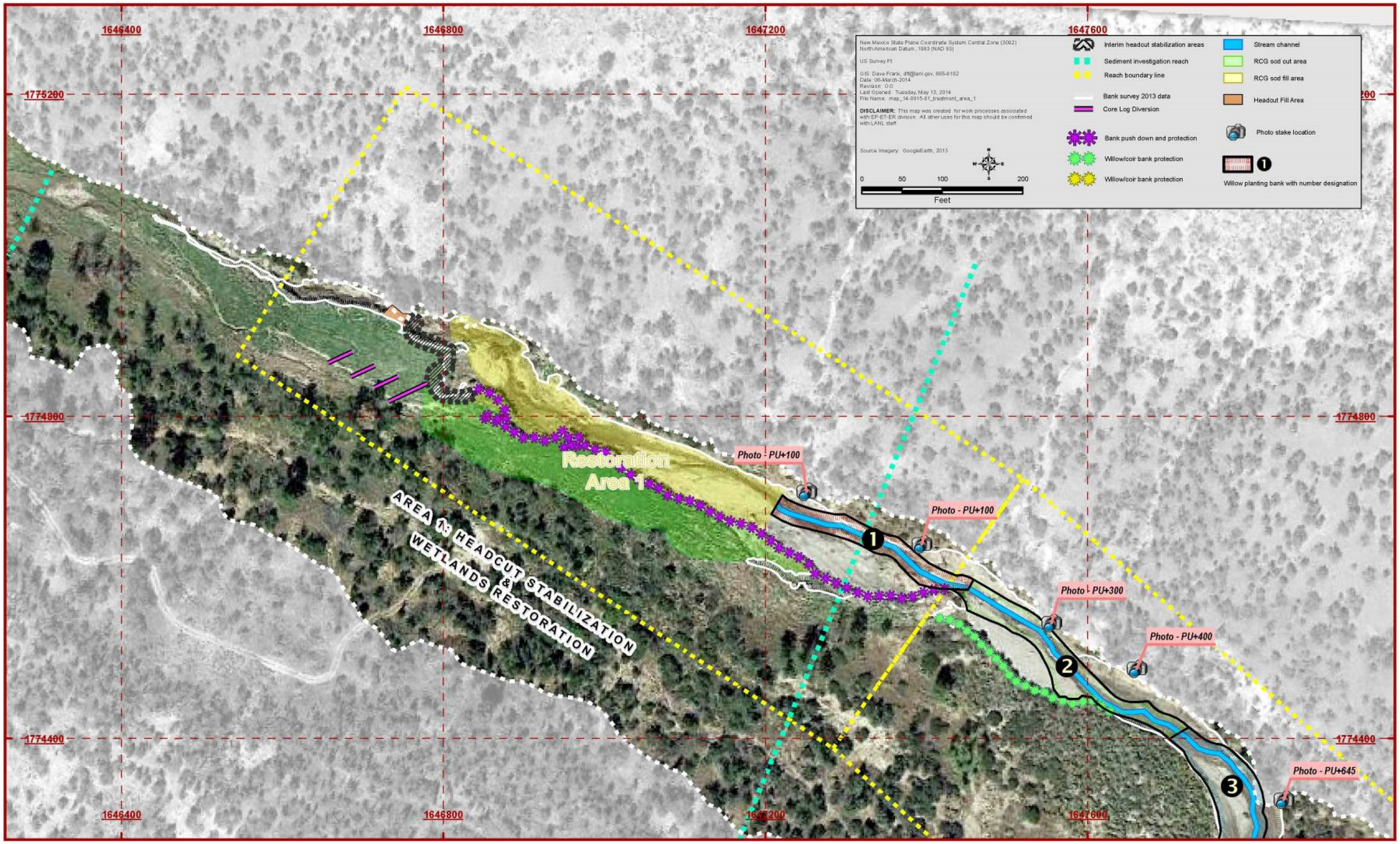


Figure B-2.0-1 RA-1 and upper half of RA-2 showing numbered willow-planting bank areas, other proposed stabilization areas, and photo points

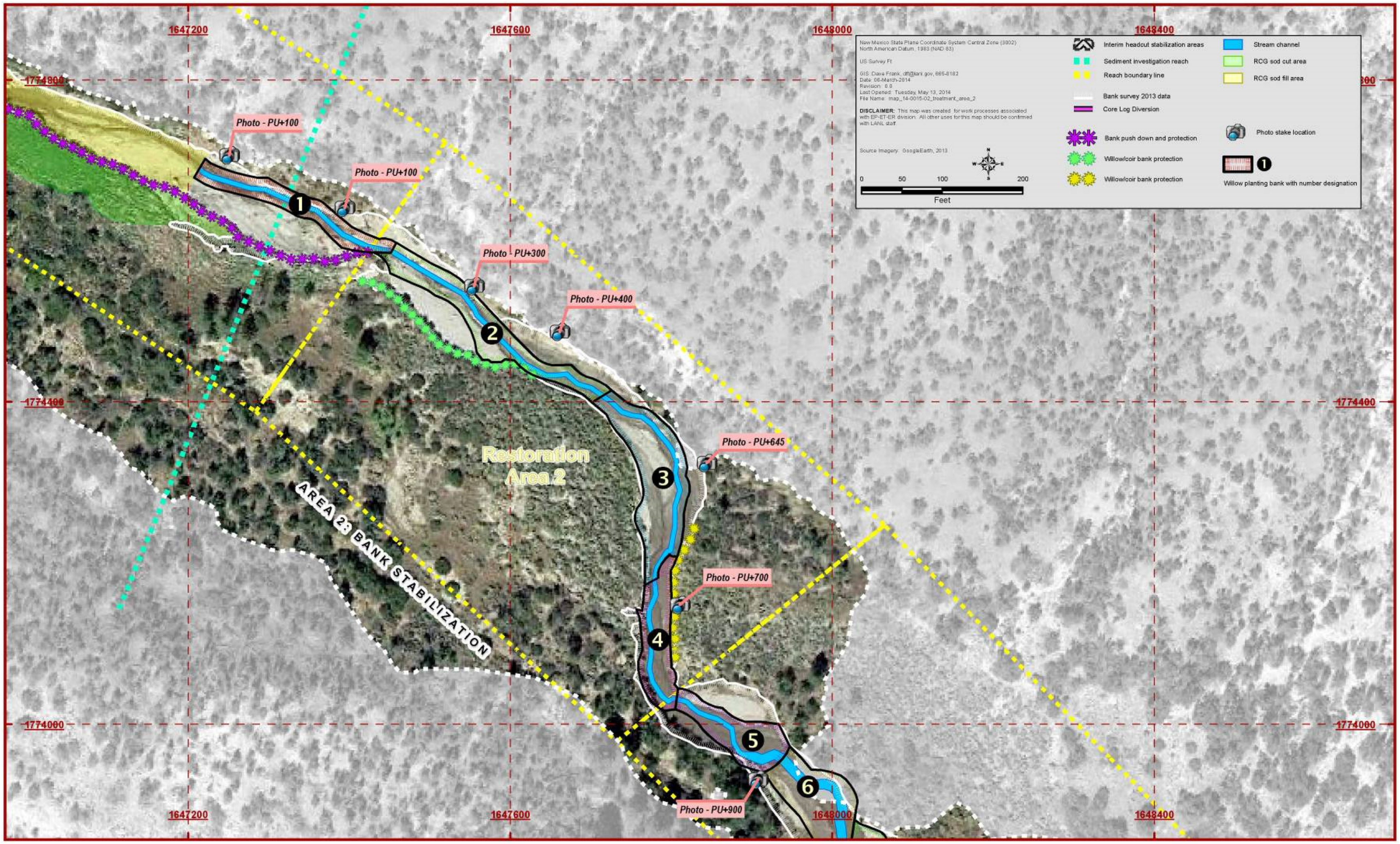


Figure B-2.0-2 RA-2 showing numbered willow-planting bank areas and photo points

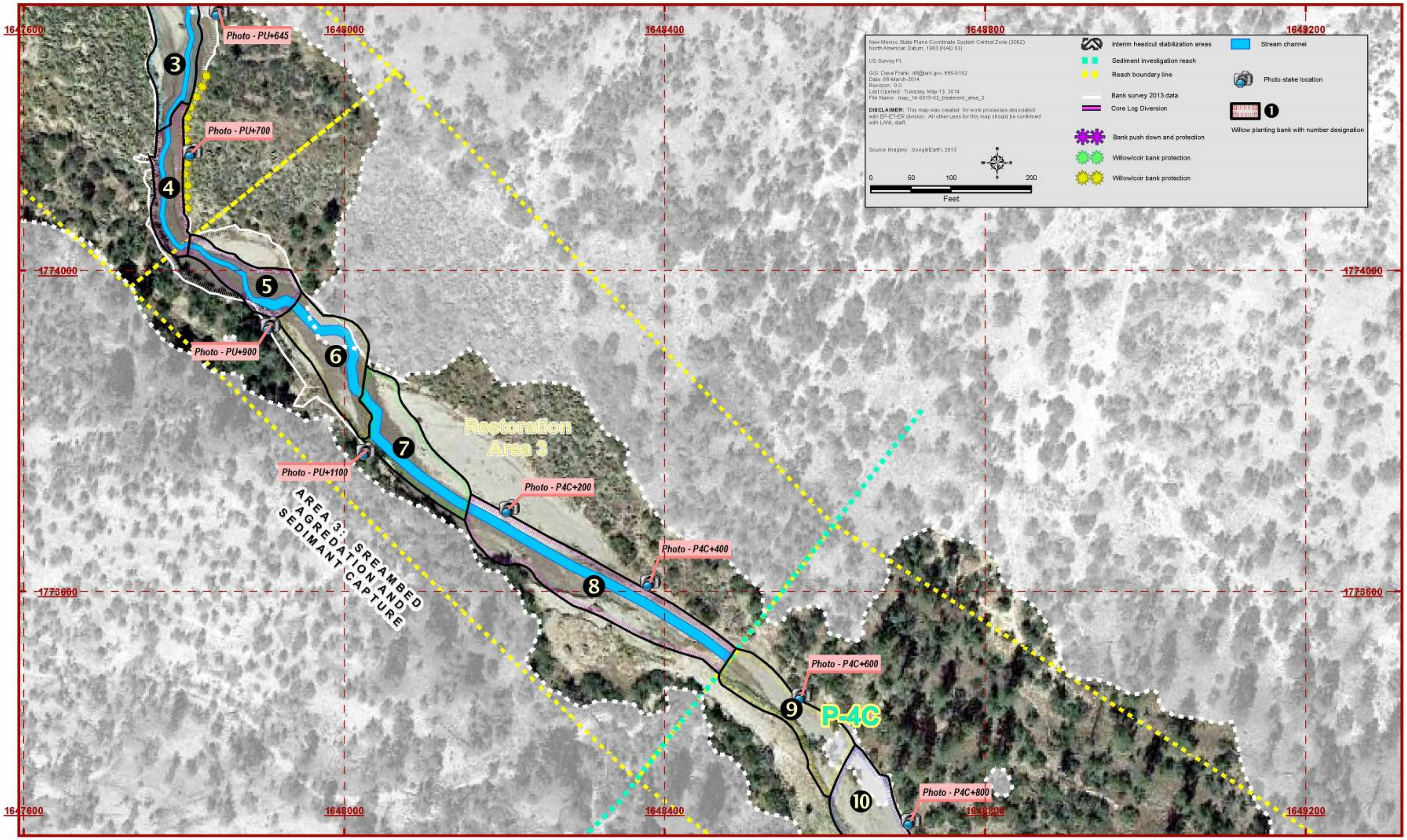


Figure B-2.0-3 RA-3 showing numbered willow-planting bank areas and photo points

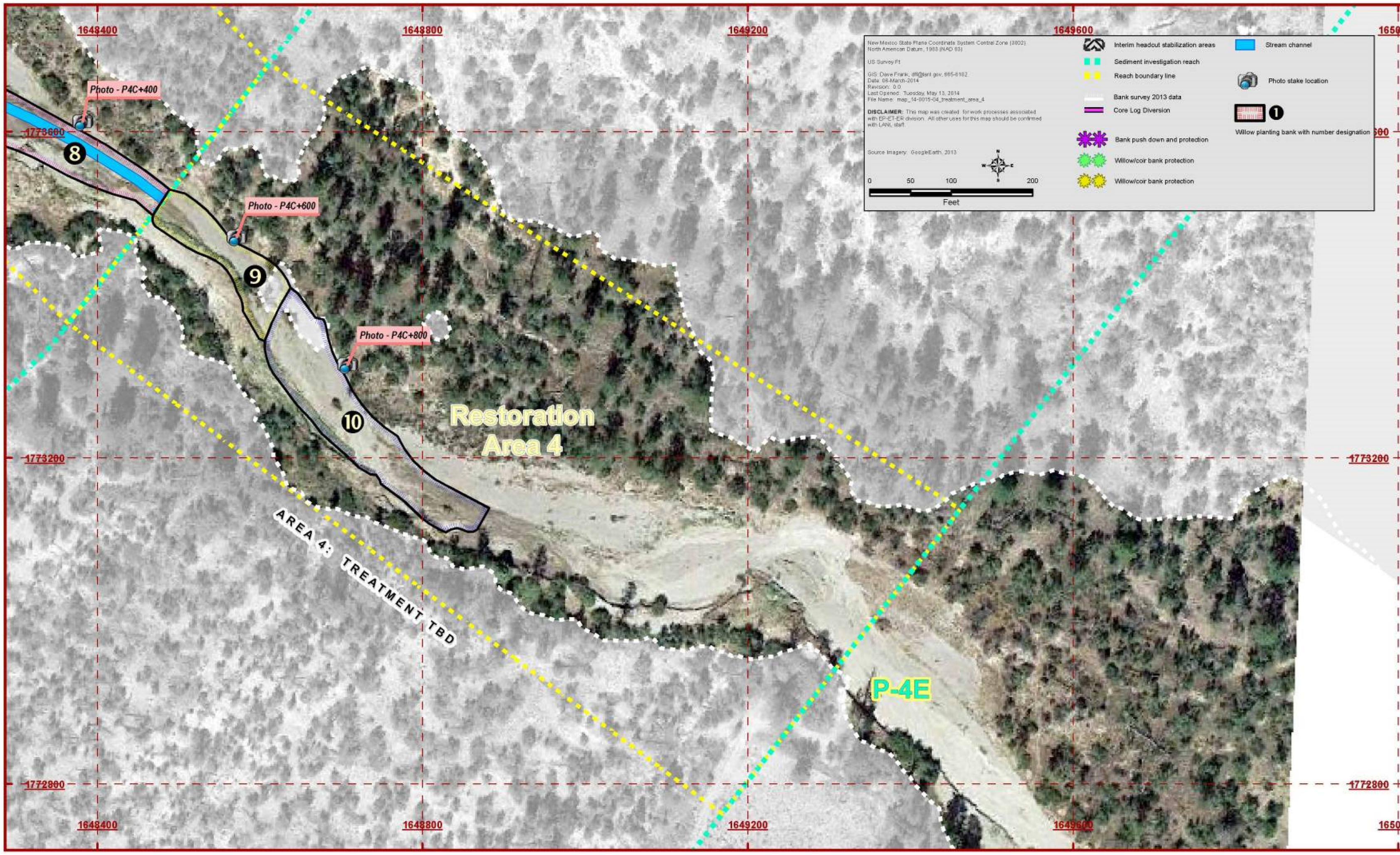


Figure B-2.0-4 **RA-4 showing numbered willow planting bank areas and photo points. Willows were not planted downstream of Bank 10.**

Figure B-2.1-1 Stihl BT 121 auger planting at Coir Bank 2, April 17, 2014

Figure B-2.1-2 Stihl BT 45 planting auger, April 17, 2014

Figure B-2.2-1 RA-1 planting formations, April 17, 2014

Figure B-2.2-2 Bank 3 (back left) and Bank 4 (front right) with coir Bank 2 shown at the edge of the right of the photo. Note stream channel, overbank, and coir bank willow spacing in RA-2, April 17, 2014.

Figure B-2.2-3 Braiding channel looking upstream at Bank 8, April 17, 2014

Figure B-2.2-4 Braiding channel looking downstream at Bank 9, April 17, 2014

Figure B-2.2-5 Tertiary Puye Formation bedrock exposed in Bank 2 at the surface causing refusal. Tertiary Puye Formation bedrock also present in Bank 1, April 17, 2014

Figure B-2.2-6 Planting formation at RA-4, April 17, 2014

Figure B-2.2-7 Coir Bank 1 tight willow spacing, April 17, 2014

Figure B-2.2-8 Leaves on thinner willow, May 9, 2014

Figure B-2.2-9 Leaves on thicker willow, May 9, 2014

Figure B-2.2-10 Willow planting Bank 8, view to west, July 7, 2014

Figure B-2.2-11 Willow planting bank 6 view to west, July 7, 2014

Figure B-2.2-12 Willow planting bank 3 view to north, July 7, 2014.

Figure B-2.2-13 Willow planting bank 3 view to east, July 7, 2014

Table B-2.2-1
Total willows planted and sediment descriptions in Lower Pueblo Canyon by Restoration Area and Bank Number

RA	Bank Number	Willows Planted	Sediment Description
1	**1**	540	Shallow/exposed Tertiary Puye Formation bedrock, sand, gravel, and cobbles; some organic material; moist sediment
2	2	770	Shallow/exposed Tertiary Puye Formation bedrock in the upper part; sand, gravel, and cobbles throughout; saturated near stream but drier up on the banks
2	Coir Bank 1	1300	Mostly sandy with some cobbles and gravel; drier but still some moisture around 2-ft depth; planted willows along depression of old channel up on bank
2	3	900	Mostly sand, gravel, cobbles, and larger boulders; some shallow/exposed Tertiary Puye Formation along the middle bend of the stream channel; drier on the upper bank but still some moisture
2	Coir Bank 2	825	Sandy with lots of gravel and cobbles, some boulders with possible shallow Tertiary Puye Formation towards upstream end; cobbles caused frequent refusal, mostly around 1.5- to 2-ft deep; drier with some moisture
2	4	715	Very rocky with sand, gravel, cobbles and boulders; saturated near stream and decent moisture throughout
RA-2 Subtotal		**4510**	
3	5	725	Fewer cobbles and boulders than RA-2, mostly gravels, sands, and some cobbles; good saturation along stream and downstream part of the bank
3	6	760	Mostly sand with some gravel and cobbles; saturation near stream and some moisture in upper bank areas
3	7	575	Some shallow/exposed Tertiary Puye Formation bedrock on south side of channel at the bend, but mostly sandy soil with some gravel and cobbles; larger leafy plants growing with some grass preserved. Muddier saturated soil underneath and otherwise good saturation in the channel and along the lower banks; began planting islands to create braided channel.
3	8	1325	Sandy with gravel and cobbles; sediment mostly saturated in wide stream plain along bank and islands for stream braiding; larger leafy plants and grasses have provide saturation within muddier soil
RA-3 Subtotal		**3385**	
4	9	1115	Sandy with gravel and cobbles; sediment has good saturation along the main stream channel but quickly dries out away from main channel on South side
4	10	150	Sandy with gravel and cobbles; sediment has good saturation along the main stream channel but quickly dries out away from main channel on south side; larger leafy plants and grasses have more moisture and muddier soil on north and south side of channel
RA-4 Subtotal		**1265**	
Total		**9700**	

Note: Willow totals include the willows planted along the stream, in the 10-ft channel buffer and the bank number designated (except for the coir bank totals). See bank borders in Figures B-F2.0-1 through Figure B-2.0-4.

Table B-2.2-2
Approximate Percentage of Refusal for Auger Holes by RA

RA	Approximate % Refusal
RA-1	80−90
RA-2	65−75
RA-3	25−35
RA-4	10−20

Appendix C

Analytical Results, Analytical Reports,
and 5-Minute Discharge Results
(on CD included with this document)