Rush Creek Project, FERC Project No. 1389

AQ 1 – Instream Flow Technical Study Report

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List of Acronyms

ADCP	Acoustic Doppler Current Profiler
cfs	cubic feet per second
FERC	Federal Energy Regulatory Commission
GIS	Geographic Information System
HEC-RAS	Hydrologic Engineering Center River Analysis System
HSC	Habitat Suitability Criteria
IFIM	Instream Flow Incremental Methodology
LADWP	Los Angeles Department of Water and Power
LiDAR	Light Detection and Ranging
PCWA	Placer County Water Association
PHABSIM	Physical Habitat Simulation
Project	Rush Creek Project
PSP	Proposed Study Plan
RSP	Revised Study Plan
RTK GPS	Real Time Kinematic Global Positioning System
SCE	Southern California Edison
SEFA	System for Environmental Flow Analysis
SI	Suitability Index
SR-158	State Route 158
SZF	Stage of Zero Flow
TSP	Technical Study Plan
TSR	Technical Study Report
TWG	Technical Working Group
WUA	Weight Usable Area
1D	One Dimensional
2D	Two Dimensional

1 INTRODUCTION

The AQ 1 – Instream Flow Technical Study Report (AQ 1 TSR) describes the methods and results associated with implementation of the AQ 1 – Instream Flow Technical Study Plan (AQ 1 TSP) for the Rush Creek Project (Project). The AQ 1 TSP was included in Southern California Edison Company's (SCE) Revised Study Plan[1] and was approved by the Federal Energy Regulatory Commission (FERC) on October 26, 2022, as part of Study Plan Determination (FERC 2022). Specifically, this report provides a characterization of instream flow habitat (aquatic and riparian) and channel maintenance as a function of flow.

2 STUDY OBJECTIVES

Study objectives include the following:

- Characterize aquatic and riparian habitat and channel maintenance as a function of flow using ecological principles and hydraulic/habitat modeling (e.g., Bovee et al. 1998).
- Provide hydraulic modeling data, as needed, to evaluate:
  - Potential restoration of the Rush Creek channel within the former lakebed of Waugh Lake,
  - The potential enhancement of the Rush Creek and South Rush Creek channels near State Route 158 (SR-158) to address localized flooding, and
  - Sediment scour/deposition in Rush Creek near the Silver Lake inlet.

3 STUDY IMPLEMENTATION

Study elements described in the AQ 1 TSP were initiated in 2023. A summary of the study elements that have been completed, study elements that are outstanding, and any deviations or proposed modifications to the AQ 1 TSP are discussed in the following subsections.

3.1 STUDY ELEMENTS COMPLETED

All study elements were completed.

3.2 VARIANCES FROM THE AQ 1 – INSTREAM FLOW TECHNICAL STUDY PLAN

There are no study variances.

[1] SCE filed a Proposed Study Plan (PSP) on May 26, 2022. Four comment letters were filed on the PSP; and six study plans were revised. Therefore, SCE filed a Revised Study Plan (RSP) on September 23, 2022. FERC subsequently issued a Study Plan Determination on October 26, 2022, approving all study plans for the Rush Creek Project.

4 STUDY AREA AND STUDY SITES

- The study area for evaluation of the instream flow in the Project-affected stream segments is identified in Table AQ 1-1 and Map AQ 1-1.

5 STUDY APPROACH

5.1 INSTREAM FLOW MODELING

The following sections describe the instream flow habitat modeling approach.

5.1.1 Historical Instream Flow Incremental Methodology (IFIM) Study

- The instream flow modeling developed during the previous relicensing effort (EA Engineering, Science, and Technology 1986) in Rush Creek below Rush Meadows Dam was summarized, including:
  - Data collection locations
  - Calibration flows
  - Target species and life stages
  - Habitat Suitability Criteria (HSC) curves
  - Weighted usable area (WUA) curves
  - Rationale/criteria for establishment of the current minimum instream flows, if available

5.1.2 Current IFIM Study - Selected Stream Segments

- Instream flow hydraulics and habitat were modeled in the following Project-affected stream segments (see Table AQ 1-1; Map AQ 1-1).
- Additional locations/cross-sections identified in the TERR 1 – Botanical Resources Technical Study Plan (TERR 1 TSP) and AQ 5 – Geomorphology Technical Study Plan (AQ 5 TSP) related to initiation of sediment motion/bankfull flow and riparian community inundation were modeled.

5.1.3 Current IFIM Study - Quantification of Habitat Versus Flow Relationships

5.1.3.1 Target Species / Life Stages/ Habitat Suitability Criteria

- The target species and life stages for instream flow habitat modeling were finalized in collaboration with interested resource agencies and stakeholders (Aquatic Technical Working Group [TWG]) during a meeting held on January 10, 2024, (including follow-up email correspondence) based on management importance and/or sensitivity to Project operations.

- It was agreed, in collaboration with the Aquatic TWG, that SCE would use the rainbow trout HSC recently developed in collaboration with resource agencies for the Placer County Water Agency (PCWA) Middle Fork Project relicensing (PCWA 2011). The PCWA trout HSC were used to represent overall habitat for rainbow trout, brook trout, and brown species (fry, juvenile, adult, and spawning/incubation life stages) in the selected Project-affected stream segments in Rush Creek.

- A species distribution map and life stage periodicity chart (i.e., season of occurrence) for fish within Project-affected stream segments/reaches was developed based on existing information (e.g., literature and agency consultation) and the AQ 6 – Fish Population and Barriers Technical Study Report (AQ 6 TSR; SCE 2025a) results (Figure AQ 6-1 and Table AQ 6-3). Rainbow and brook trout were located upstream the Rush Creek Powerhouse and rainbow and brown trout were in the stream below the powerhouse. Adult and juvenile trout are present in the system year-around, brown trout and brook trout fry are present February–August and rainbow trout fry are present June–September. Rainbow trout spawning/incubation occurs March–June and brown and brook trout spawning occurs October–November.

- Sierra Nevada yellow-legged frogs were not modeled because occupied breeding and rearing habitat was not identified in Project-affected stream segments/reaches (AQ 7 – Special-status Amphibians Technical Study Report [AQ 7 TSR]; SCE 2025b).

5.1.3.2 Data Collection and Sampling Approach for Hydraulic and Aquatic Habitat Modeling

- Data collection for hydraulic and aquatic habitat modeling was completed at representative mesohabitat types to support 1D hydrodynamics and habitat models (Appendix A). 2D models were also used in areas where other issues such as channel enhancement/restoration or sediment scour/deposition are being addressed (Appendix A). In plunge pool habitats, empirical hydraulic and habitat data was collected.

  - Data from each mesohabitat type was weighted and combined to develop a representation of hydrodynamics and habitat for the larger stream segment. The weighting was based on the percentage of each mesohabitat within the stream segment. Within a stream segment, mesohabitat types were sampled in approximate proportion to their abundance.

  - Approximately ten mesohabitat units within each stream segment were modeled. This provided enough sampling to replicate each major mesohabitat type (e.g., two mesohabitat samples of each type) and provided for additional sampling in abundant and/or important mesohabitat types.

  - Mesohabitat types (e.g., cascades, falls/chutes) that did not contain significant habitat for the primary target species were not collected or modeled.

- Data collection in mesohabitat units incorporated the following approach:
  - One to three cross-sections were placed in each mesohabitat unit to represent habitat over a range of flows for 1D modeling.
  - Where 2D hydraulics and habitat modeling are conducted, the entire habitat units were represented.
  - Channel topography at the 1D modeling sites was in the form of cross-sections. Cross-sections were marked with semi-permanent headpins and locations were recorded with a total station. In the case of 2D modeling, topography was collected as topographic surveys and break lines.
  - Empirical water surface elevations were measured for at least three calibration discharges at each cross-section for 1D modeling and at least two calibration discharges along the length of the 2D modeling reaches. The discharges spanned the range of flows of interest (Table AQ 1-1).
  - Empirical velocity data was collected across each cross-section at the mid-flow at 20–25 cells/locations. Velocity data was not collected for hydraulic control cross-sections, as controls were used only to identify stage of zero flow and for potential step backwater modeling.
  - All velocities were collected with calibrated velocity meters or Acoustic Doppler Current Profilers (ADCP). Discharges were measured using standard gaging techniques (e.g., Rantz 1982).

- In the steep gradient reach from below Gem Dam to above Horsetail Falls, five plunge pool mesohabitat units were empirically mapped at three calibration flows. Two of the plunge pools were located above Agnew Lake and three of the plunge pools were located below Agnew Lake (see Map AQ 1-1). The three flows were a high flow (40 cubic feet per second [cfs]), a medium flow (8–11 cfs), and a low flow (4 cfs).

5.1.3.3 Evaluation of Silver Lake Backwater Effects

- To help assess the effects of Silver Lake water surface elevations on upstream hydraulics (backwater effects) and flow fluctuations below the Rush Creek Powerhouse the following data were collected/obtained:
  - Pressure transducers (≤15 minute data collection) were installed at the Silver Lake outflow and in the Rush Creek channel in two locations upstream of Silver Lake (near SR-158 downstream of the powerhouse tailrace, near the instream flow site upstream of the Silver Lake inlet).

- The Los Angeles Department of Water and Power (LADWP) Rush Creek gage above Grant Lake 15-minute data were obtained.
- Developed stage-discharge relationships at each stage recording location.

5.1.3.4 Hydrodynamics Modeling

- PHABSIM (Milhous et al. 1989; Jowett et al. 2023) based 1D hydraulics and 2D hydrodynamics modeling procedures were used for modeling water surface elevations and velocities at each instream modeling site. The System for Environmental Flow Analysis [SEFA] software was used for the 1D study sites and HEC-RAS 2D was used for the 2D instream flow modeling sites.
- Hydraulics/hydrodynamics (depth, velocity, water surface elevations) were modeled over a range of discharges, appropriate to the Project hydrology, for each stream segment (Table AQ 1-1).

5.1.3.5 Habitat Modeling

- Habitat modeling was conducted consistent with the IFIM approach (Bovee et al. 1998; Jowett et al. 2023). The general approach was as follows:
  - Collected substrate and vegetation information for habitat modeling across each cross-section (1D) or throughout the modeled channel (2D) that was compatible with the HSC criteria.
  - Used the hydraulics/hydrodynamics modeling (see above) to obtain depth and velocity, which was then combined with substrate and the HSC criteria to calculate habitat at the cross-sections (1D) or throughout the sites (2D[2]).
  - Developed habitat versus flow relationships for each species life stage over a wide range of flows (15–30 flows).
  - Completed a habitat time series analysis comparing the seasonal and daily habitat under Proposed Action, historical, existing, and unimpaired hydrology.
  - Compared and contrasted the amount of habitat during different biologically significant time periods (e.g., reproduction, rearing) to help identify habitat limiting factors and time periods.
  - In Rush Creek downstream of the Rush Creek Powerhouse, characterized the effects of flows and flow fluctuations on Silver Lake/Rush Creek stage. Also, incorporated the AQ 2 – Hydrology Technical Study Report (AQ 2 TSR; SCE 2025c) operations model sub-daily flow analysis based on existing and

[2] This habitat modeling process is implicit in the SEFA 1D modeling software, however, for HEC-RAS 2D, SCE used Python code to combine the depth and velocity results from HEC-RAS with a layer of channel index (substrate and vegetation) and a file containing the HSC to calculate habitat.

Proposed Action operations, into the habitat modeling to address potential effects of flow fluctuations on fish habitat.

- A wetted perimeter versus flow relationships were developed in the select stream segments to characterize available habitat for other aquatic species (i.e., macroinvertebrates and amphibians) under different flow regimes. A time series analysis of the wetter perimeter versus flow relationships was developed.

- Identified the time periods, flow conditions, and life stages when habitat is a limiting factor for fish, special-status amphibians, benthic macroinvertebrates, and riparian resources under historical, existing, Proposed Action, and unimpaired hydrology.

5.1.3.6 Empirical Plunge Pool Modeling

- Representative plunge pools were selected (Table AQ 1-1) in steep gradient reaches and mapped at the calibration flows for hydrodynamics modeling. The amount of the plunge pool that provided rearing habitat for the target fish species and life stages was mapped. Habitat was mapped on a fix grid with a spacing of approximately 2–5 feet. Depth and velocity were mapped at a series of flows and habitat was determined using the species/life stage specific habitat suitability criteria. A flow versus suitable habitat area relationship was estimated for each individual plunge pool and then for all plunge pools by summing the mapped habitat.

5.1.3.7 Riparian and Sediment Transport Modeling

- Flow versus riparian habitat stage-discharge relationship and high flow recession rates were characterized at selected transects identified in the TERR 1 TSP.

- Flow versus initiation of sediment movement and bankfull at selected cross-sections were characterized in the AQ 5 – Geomorphology Technical Study Report (AQ 5 TSR; SCE 2025d).

5.2 EVALUATION OF POTENTIAL RUSH CREEK CHANNEL RESTORATION IN THE FORMER LAKEBED OF WAUGH LAKE

The following describes the collection/analysis of information to evaluate potential restoration of the Rush Creek channel in the former Waugh lakebed, including:

- The local hydrology in Rush Creek and South Rush Creek near SR-158, Rush Creek Powerhouse Tailrace, Reversed Creek, and inflow to Silver Lake developed in the AQ 2 – Hydrology Technical Study Plan (AQ 2 TSP) for historical, existing, Proposed Action, and unimpaired hydrology.

- Detailed topographic data for the channel using a combination of methods, including Light Detection and Ranging (LiDAR), aerial photogrammetry and supplemental total station surveys, as needed was collected (August 28–August 30, 2024).

- Channel and floodplain substrate polygons were mapped for hydraulic roughness characterization and erosion modeling in the field using a Geographic Information System (GIS) tablet (no riparian vegetation was present along the channel).

- The water surface edges along the channel at the time of the aerial photogrammetry data collection (August 30, 2024; flow 11.8 cfs) were used to calibrate the model. Only one water surface/discharge was available for data collection.

- HEC-RAS 2D was used to characterize channel hydraulics (stage-discharge relationships along the channel) and erosion potential over the range of unimpaired flows (e.g., 10% to 90% exceedance flows).

- A HEC-RAS 1D sediment transport model was developed evaluate erosion potential with removal of the dam.

5.3 EVALUATION OF POTENTIAL ENHANCEMENT OF RUSH CREEK AND SOUTH RUSH CREEK CHANNELS NEAR SR-158

The following describes the information collected necessary to identify/evaluate potential enhancement of the Rush Creek/South Rush Creek channels near SR-158 to address potential localized flooding during high-runoff events including:

- The local hydrology was summarized for Rush Creek and South Rush Creek near SR-158, Rush Creek Powerhouse Tailrace, Reversed Creek, and inflow to Silver Lake in the AQ 2 TSR for Proposed Action, historical, existing, and unimpaired hydrology.

- Detailed topographic information for South Rush Creek near SR-158 and the cross-sections/topography in the Rush Creek and powerhouse tailrace channels, was collected using a combination of LiDAR, aerial photogrammetry, and total station surveys.

- The channel and floodplain substrate and riparian vegetation (see TERR 1 – Botanical Resources Technical Study Report [TERR 1 TSR]; SCE 2025e) was mapped and characterized for hydraulic roughness characterization.

- Water surface elevations were modeled and calibrated along the channel at three different flows.

- Current channel conditions were mapped for items (i.e., downed trees, sediment, riparian encroachment, culverts) which impede flows in Rush Creek and South Rush Creek near SR-158 (see the TERR 1 TSR for riparian vegetation characterization and AQ 5 TSR for channel and large woody debris characterization).

- HEC-RAS 2D modeling was used to characterize channel and culvert hydraulics and identify potential localized flooding near SR-158 under the Proposed Action, existing, historical and unimpaired hydrology.

- Potential enhancements (e.g., berms, channel modification, clearing of the channel) for Rush Creek and South Rush Creek channels were identified, as appropriate, for use after preparation of the License Application.

5.4 EVALUATION OF SEDIMENT DEPOSITION/TRANSPORT IN RUSH CREEK AT THE SILVER LAKE INLET

The following describes the information collected necessary to evaluate hydrology related scour/deposition of sediment in the Rush Creek channel near the inlet of Silver Lake:

- The Rush Creek inflow hydrology to Silver Lake was developed and summarized in the AQ 2 TSR for Proposed Action, historical, existing, and unimpaired conditions.

- Detailed topographic information was collected for Rush Creek near the inlet using a combination of LiDAR, aerial photogrammetry, total station surveys, and/or GPS tagged sonar, as needed.

- The channel and floodplain substrate and riparian vegetation (see TERR 1 TSR) was mapped and characterized suitable for hydraulic roughness characterization.

- Water surface elevations along the channel for model calibration were surveyed at three different flows.

- A stage-discharge relationship of Rush Creek at Silver Lake over a range of flows was used to incorporate backwater effects in the channel hydraulic modeling.

- HEC-RAS 2D was used to characterize channel hydraulics and identify potential sediment scour/deposition conditions under the Proposed Action, existing, historical and unimpaired hydrology.

    - Three representative water year types were modeled; Wet (2017), Normal (2001), and Dry (2020).

    - Four scenarios were modeled: existing, Proposed Action, historical, and unimpaired.

6 STUDY RESULTS

The following provides the study results for instream flow modeling, evaluation of potential channel restoration in the former Waugh Lake, evaluation of potential enhancements of Rush Creek and South Rush Creek channels near SR-158, and evaluation of sediment deposition/transport in Rush Creek near the Silver Lake Inlet.

6.1 INSTREAM FLOW MODELING

6.1.1 Previous IFIM Study

- Data collection included the following:
  - Eighteen cross-sections were collected for the 1986 IFIM Study in Rush Creek between Rush Meadows Dam and Gem Lake.
  - Cross-sections were collected in three areas: upper section of riffles and runs; a center section of meadow pools; and a lower gorge section of cascades, runs, and pools.
  - Three calibration flows were used for the study: high flow (30 cfs), medium flow (15 cfs), and low flow (5 cfs).
  - The target species were rainbow trout and brook trout. Life stages for both species and the habitat modeling approach for cover were adult with cover (both combined and specific), juvenile with cover (both combined and specific), and fry with cover (specific only).
- HSC curves were based on the May 14, 1987, filing (Ascension No. 19870520-0659) which contains the November 1986 Instream Flow and Fisheries Studies. The suitability index (SI) curves for specific cover were provided by the United States Fish and Wildlife Service, based on the Aceintuno study (unpublished at the time). The cover-specific SI curves were based both on the frequency distributions of depth and velocity where fish were observed and the frequency distributions of random observations of depth and velocity where fish were not observed. The SI curves for cover-combined, different from the cover-specific curves described above, were determined by EA's raw data. The cover-combined curves were based on all the data for a given species and life stage, irrespective of cover and uncorrected for habitat availability.
- Optimal WUA for juveniles and fry of both target species was determined to be between 5 and 20 cfs (mostly below 10 cfs). This optimal WUA was the same regardless of the HSC curve used, cover-combined or cover-specific HSC curve. Optimal WUA for adults of both species was higher, in the 30–60 cfs range, as determined by the cover-specific HSC curve. Optimal WUA for adult rainbow trout was reached at higher flows than optimal WUA for adult brook trout. Maximum WUA spawning habitat for both species occurred between 90 and 100 cfs.

- Minimum instream flows below Rush Meadows Dam were included in the SCE FERC license issued on February 4, 1997. At the time of the FERC Environmental Assessment, adult rainbow trout was the primary target biological resource in the reach. California Department of Fish and Game, United States Forest Service, and SCE agreed on a 10 cfs minimum flow or the natural flow in the stream reach, whichever is less. The flow was not optimum for adult life stages; however, the study determined that there was not enough available water within the upper Rush Creek basin to maintain constant levels of optimal adult WUA.

6.1.2 Current IFIM Study - Selected Stream Segments

- Selected stream segments for instream flow hydraulics and/or habitat in the Project-affected stream segments are found in Table AQ 1-1 and Map AQ 1-1.

6.1.3 Current IFIM Study - Quantification of Habitat Versus Flow Relationships

6.1.3.1 Target Species / Life Stages / Habitat Suitability Criteria

- The HSC curves agreed to by the Aquatic TWG were for nonspecific trout, which included rainbow trout, brook trout, and brown trout life stages (adult, juvenile, fry, and spawning). The HSC curves are shown in Figures AQ 1-1 through AQ 1-9 (bold black line).

6.1.3.2 Data Collection and Sampling Approach for Hydraulic and Aquatic Habitat Modeling

Mesohabitat

- Detailed mesohabitat mapping data for each study reach is provided in Appendix A. A summary of the mesohabitat data is provided in Table AQ 1-2 along with the number and type of cross-sections placed in each mesohabitat type and/or the number of mesohabitat units in the 2D Modeling or plunge pool modeling analyses.

- Rush Creek below Gem Dam to the Confluence of Reverse Creek – 14 cross-sections were placed in nine different mesohabitat units (representing four habitat types) (Table AQ 1-2; Map AQ 1-2). Four cross-sections were placed in low gradient riffles, one in a high gradient riffle, five in runs, and four in pools. One additional cross-section was placed on a pool downstream control. Controls were used only to identify the stage of zero flow (SZF) for other cross-sections within the pool mesohabitat. Additionally, five plunge pools in this stream segment were empirically mapped to establish a flow versus habitat relationship (Map AQ 1-2).

- Rush Creek Above Silver Lake – For the 2D modeling reaches, entire habitat units were represented (Table AQ 1-2).

- Rush Creek below Silver Lake – 23 cross-sections were placed in thirteen different mesohabitat units (representing four habitat types) (Table AQ 1-2; Map AQ 1-2). Six cross-sections were placed in low-gradient riffles, two in high gradient riffles, seven in runs, and eight in pools. Four additional cross-sections were placed at the downstream control of the pools.

- South Rush Creek – For the 2D modeling reaches, entire habitat units were represented (Table AQ 1-2).

Geometry

- Cross-section plots for each of the 1D modeling sites above and below Silver Lake are provided in Appendix B and Appendix C, respectively.

- 2D topography collected with a combination of Real Time Kinematic Global Positioning System (RTK GPS), single beam sonar (bathymetry), walking total station collection, and LiDAR/photogrammetry (above water topography) for Rush Creek Above Silver Lake is shown Appendix D. South Rush Creek topography, collected with a total station, is also shown in Appendix D.

Empirical Data Sets

- Water surface elevations for model calibration were surveyed for three or four calibration discharges at each cross-section (1D modeling sites) or along the length of the modeling reach (2D modeling sites) (Table AQ 1-1). Appendix B and Appendix C contain cross-section plots with water surface elevations for each of the 1D modeling sites, respectively, and Appendix D contains data for both 2D modeling sites.

  - Rush Creek below Rush Meadows Dam – Water surface elevations were measured at three calibration discharges that were dependent on natural flow availability. All flows were relatively high due to the high runoff year: low flow (28.4–28.9 cfs), medium flow (42–54.5 cfs), and high flow (94.2–95.3 cfs).

  - Rush Creek below Gem Dam to the confluence with Reverse Creek – Water surface elevations were measured at three calibration discharges: low flow (4–9 cfs), medium flow (10–19 cfs), and high flow (37–47 cfs).

  - South Rush Creek 2D Site – Water surface elevations were collected along the length of the site for three calibration discharges: low flow (1.9 cfs), medium flow (2.6 cfs) and high flow (74.6 cfs). Discharges/water surface elevations included the flows from the unnamed tributary that enters South Rush Creek upstream of SR-158.

  - Rush Creek Above Silver Lake – Water surface elevations were collected along the reach at three calibration discharges: low flow (10.9 cfs), medium flow (21.2 cfs) and high flow (135 cfs).

  - Rush Creek Below Silver Lake – Water surface elevations were measured at four calibration flows: low flow (16–19 cfs), medium flow (38–44 cfs), high flow (145–167 cfs), and very high flow (529 cfs).

- Velocity data sets for model calibration and/or validation were surveyed typically at one discharge (Table AQ 1-1). In areas where the depth limited the ability to collect wading velocities, an ADCP was used to measure velocity and the two data sets (ADCP and wading) were combined in the office. Appendix B and Appendix C contain cross-section plots with velocity data for each of the 1D modeling sites, respectively, and Appendix D contains data for both 2D modeling sites.

  - Rush Creek below Rush Meadows Dam – Calibration velocities at the riparian and geomorphology cross-sections were measured at medium flow (42–54.5 cfs).

  - Rush Creek below Gem Dam to the Confluence with Reverse Creek – Calibration velocities were measured at medium flow (10–19 cfs).

  - South Rush Creek 2D Site – Calibration velocities were collected at four cross-sections at the medium flow (2.6 cfs).

  - Rush Creek Above Silver Lake – Calibration velocities were collected at six cross-sections at high flow (135 cfs).

  - Rush Creek Below Silver Lake – Calibration velocities were collected at medium flow (38–44 cfs).

- In the steep gradient plunge pool section of Rush Creek Below Gem Dam to above Horsetail Falls reach, five plunge pool mesohabitat units were empirically mapped at three calibration flows. Two of the plunge pools were located above Agnew Lake and three of the plunge pools were located below Agnew Lake (see Map AQ 1-2). The three flows were low flow (4 cfs), medium flow (8–11 cfs), and high flow (40 cfs).

Substrate and Vegetation Mapping

- At the 1D instream flow modeling sites, substrate and vegetation were mapped along each cross-section using the size class and codes in Table AQ 1-3. Substrate size classes were recorded as percent dominant and percent subdominant. The mapped substrate and vegetation data for each of the 1D sites are provided in Appendix B and Appendix C, respectively.

- At the 2D instream flow modeling sites, substrate was mapped using polygons that represented patches of similar substrate composition that were delineated by the percent dominant and percent subdominant substrate type. Mapped substrate and vegetation for both 2D sites are found in Appendix D.

6.1.3.3 Evaluation of the Silver Lake Backwater Effects

- Figure AQ 1-10 shows the water surface elevations along Rush Creek from Silver Lake upstream to Reverse Creek. The water surface elevations were measured at different time/flow periods and show that the backwater from Silver Lake extend primarily upstream to near the Rush Creek Powerhouse Tailrace. The highest flow measured was 528 cfs at the LADWP Rush Creek Gage above Grant Lake (Figure AQ1-10).

6.1.3.4 Hydrodynamics Modeling

- 1D Hydrodynamics Modeling
  - SEFA software was used for the hydraulic and habitat modeling at the 1D sites. The cross-section geometry, empirical water surface elevations, calibration velocities, SZF, and HSC codes for substrate and vegetation were entered into the model software. The software data files are available electronically upon request.
  - Water surface elevation stage-discharge regression equations were used for the water surface modeling and for each of the 1D modeling sites are presented in Appendix E and Appendix F, respectively. Modeled versus measured water surface elevation comparisons for each 1D site are provided in Appendix G and Appendix H.
  - Velocity modeling used the measured velocities at medium flow to calculate “Manning’s n” velocity distribution factors at each cell in the cross-sections. The “Manning’s n” values were then used to extrapolate velocities at higher and lower flows. Some modification of channel edge “Manning’s n” velocity distribution factors was necessary to represent reasonable velocity flow fields at higher flow. Each cross-section was examined, and modification of the edge “Manning’s n” values was implemented as needed. Appendix G and Appendix H show the original “Manning’s n” values and final values used in the modeling for each of the 1D sites, respectively. The appendices also show the modeled versus measured velocities at each cross-section.
- 2D Hydrodynamics Modeling
  - HEC-RAS 2D models were constructed using the surveyed topography, including appropriately placed break lines, and a Manning’s n layer to represent the hydraulic roughness of the substrate and vegetation polygons. Appendix I shows the Mannings n values used for the calibration of the Rush Creek Above Silver Lake and South Rush Creek modeling sites. The initial roughness was adjusted to calibrate the model using field measured water surface elevations. For example, roughness was increased in both the Rush Creek Above Silver Lake and the South Rush Creek sites due to willows growing along the stream and/or wood debris in the channel.

- Stage-discharge relationships were calculated for the downstream boundary of each reach (Appendix I). The pressure transducer installed in the middle of the Rush Creek Above Silver Lake site was used to extend the rating curve for the site to higher flows.

- Comparison of the measured and modeled velocities for Rush Creek Above Silver Lake and for South Rush Creek is shown in Appendix I.

6.1.3.5 Habitat Modeling

- Habitat versus flow plots for the each of the study reaches are found in Figures AQ 1-11 through AQ 1-14. Adult, juvenile, and fry habitat appear to increase continuously as flows increase due to over-bank habitat. For adult trout, SCE used two model runs in each reach to help differentiate in-bank versus out-of-bank habitat. For one run, the adult substrate HSC criteria were set to zero for vegetation (modified runs) and for the other the HSC were held at full suitability for vegetation (e.g., grass, willow, shrub). In the case of adult habitat, the discussion below focuses on the modified HSC results (in-bank habitat).

  - Adult trout habitat versus flow relationships show an inflection point occurs at the following flow ranges (i.e., increased flow provides less habitat increase):
    - Rush Creek below Gem Dam to Reverse Creek: 20–25 cfs
    - Rush Creek above Silver Lake: 40–50 cfs
    - Rush Creek below Silver Lake: 45–60 cfs
    - South Rush Creek: 20–30 cfs
  - The habitat versus flow relationships do not account for flow availability. Flow availability will be addressed in subsequent modeling and reporting (see Section 3.3; habitat time series modeling).

  - Trout spawning habitat versus flow relationships were different at each of the modeling sites due to channel hydraulics and spawning gravel availability. Typically, there was less spawning habitat than adult habitat. The maximum amount of spawning habitat (in channel) occurred at approximately the following flows:
    - Rush Creek below Gem Dam to Reverse Creek: 10 cfs
    - Rush Creek above Silver Lake: No spawning habitat because the channel is deep and low gradient with a predominately sand bed.
    - Rush Creek below Silver Lake: 55 cfs
    - South Rush Creek: 15 cfs
- Trout juvenile and fry habitat was not limiting in the study reaches. Juvenile and fry habitat exceeded adult and spawning habitat in the low to moderate flow ranges and in most cases, at high flows when the stream was near or exceeded bankfull, a large amount of habitat was available.

- For the 2D modeling sites (Rush Creek above Silver Lake and South Rush Creek) the habitat modeling results are shown spatially with plan view images at each flow in Appendix J; Appendix K; Appendix L; and Appendix M. These images illustrate the overbank habitat at higher flows.

- Appendix N contains the habitat time series analysis plots for each trout life stage based on their periodicity (biologically significant time periods; Section 5.1.3) at four locations (Rush Creek below Gem Dam to Reverse Creek, Rush Creek above Silver Lake, Rush Creek below Silver Lake, and South Rush Creek) comparing seasonal habitat under Proposed Action, historical, existing, and unimpaired hydrology.

  - Rush Creek below Gem Dam to Reversed Creek – Existing and proposed flows result in nearly the same amount of habitat. Unimpaired flows consistently show more habitat than the proposed flows for adult, juvenile, fry, and spawning life stages.

  - Rush Creek above Silver Lake – Existing and proposed flows result in nearly the same amount of habitat. Proposed flows, when compared to unimpaired flows, show more habitat for adults and juveniles in all months except for May and June. Proposed flows show less fry show less habitat than unimpaired conditions during the February to August period. There is no spawning in this reach due to lack of gravel substrate.

  - Rush Creek below Silver Lake – Existing and proposed flows result in nearly the same amount of habitat. Proposed flows often have more habitat than unimpaired conditions. Proposed flow spawning habitat during March through June (rainbow trout spawning) and October through November (brown or brook trout spawning) was similar to or greater than unimpaired flow spawning habitat (Appendix N Figure AQ 1-N12a) (see effective spawning habitat below).

  - South Rush Creek – Existing and proposed flows result in nearly the same amount of habitat while unimpaired flows consistently show more habitat than the proposed flows for adult, juvenile, fry, and spawning life stages.

- In Rush Creek downstream of the Rush Creek Powerhouse, the effect of flow fluctuations on habitat was characterized using the AQ 2 – Hydrology TSP operations model sub-daily flow analysis for Proposed Action and existing hydrology. Spawning habitat can be particularly sensitive to fluctuating flows as redds may become dewatered or scoured. Appendix N Figure AQ 1-N12b shows effective spawning habitat for rainbow and brown trout below Silver Lake (redds remain watered and free of scour during the incubation period). No spawning gravels/spawning was present above Silver Lake.

  - The Proposed Action and existing conditions effective spawning/incubation habitat was similar for both spring spawning (rainbow trout) and fall spawning (brown trout). This occurs because the two hydrology scenarios are very

similar. During the March through June spawning/incubation period approximately 50% of the time spawning/incubation habitat is low. During the fall (October–November) spawning period this does not occur. Also, effective spawning habitat was less than time series spawning habitat that did not account for potential dewatering or scour of redds (see Appendix N Figures AQ 1-N12a versus AQ 1-N12b).

- Figure AQ 1-15 to Figure AQ1-18 show the wetted perimeter/width results for the four reaches. The two 2D sites show average wetted width instead of wetted perimeter. The results show inflection points at approximately 175 cfs, 400 cfs, 75 cfs, and >60 cfs for Rush Creek below Gem Dam: Rush Creek above Silver Lake; Rush Creek below Silver Lake; and South Rush Creek, respectively. Wetted perimeter versus flow relationships can be used to characterizes available habitat for macroinvertebrates.

- Wetted perimeter time series relationships (exceedance plots) under different flow regimes (Proposed Action, historical, existing, and unimpaired hydrology) are shown in Appendix O.

  - Rush Creek below Gem Dam – There was very little difference in wetter perimeter between Proposed flow and existing flow conditions. The Proposed and existing scenarios have less wetted perimeter compared to the unimpaired flow conditions (all months).

  - Rush Creek above Silver Lake - There was very little difference in wetter perimeter between Proposed and existing flow conditions. Wetted perimeter is greater under the Proposed conditions when compared to unimpaired except in the months of May and June.

  - Rush Creek below Silver Lake - There was very little difference in wetter perimeter between Proposed and existing flow conditions. Wetted perimeter is greater under Proposed conditions compared to unimpaired except in the months of May and June.

  - South Rush Creek – There was very little difference in wetter perimeter between Proposed and existing flow conditions. The Proposed and existing scenarios have less wetted perimeter under compared to the unimpaired flow conditions (all months).

- The time periods and flow conditions where fish life stages are potentially limited by habitat are identified below for historical, existing, Proposed Action, and unimpaired hydrology based primarily on a review of the time series analysis (Appendix N).

  - **Rush Creek below Gem Dam to Reverse Creek** – Adult trout are likely limited during the summer and early fall minimum flows season when habitat is at a minimum and water temperature is warmer. Because of the steep gradient

habitat (e.g., plunge pools), spill periods could also limit all life stages of trout (e.g., limited high flow refugia). Juvenile and fry habitat is likely not limited, particularly in comparison to adult habitat. Typically, juvenile and fry habitat is more abundant than adult habitat. Spawning habitat is available at a moderate level from March – June and October - November.

- **Rush Creek above Silver Lake** – Other than the lack of spawning gravel/spawning habitat (sand bed stream), habitat was not limiting for the other life stages.
- **Rush Creek below Silver Lake** – Habitat was not limited trout life stages, except effective spawning habitat is low March – June (see effective spawning habitat above).
- **South Rush Creek** – All life stages are limited in South Rush Creek due to low flows in the low flow season (August – March (see AQ 2 TSR, Figure AQ 2-60).

- Other species such as benthic macroinvertebrates and riparian vegetation could be limited by instream flow habitat. In the absence of other unique limiting factors (e.g., out of season high flow events, substrate, etc.), summer low flow conditions can be a typical limiting factor. The reach with the lowest summer flows, Rush Creek below Gem Dam to Reverse Creek, is a very high gradient reach with limiting factors, in part, unrelated to flow. The steep, bedrock reach has limited floodplain habitat for the development of riparian vegetation and limited substrate diversity for macroinvertebrates (Allan et al. 2021).

6.1.3.6 Empirical Plunge Pool Modeling

- For the steep gradient reach, Gem dam to above Horsetail Falls, plunge pool empirical habitat mapping results are shown in Figure AQ 1-19 (see Map AQ 1-2) at the three calibration flows 4 cfs, 8–11 cfs, and 40 cfs. At the high calibration flow, the two pools located above Agnew Lake were difficult to access safely and a large portion of each pool was turbulent. The lower three pools also had increased turbulence at the high flow and therefore less rearing habitat for trout life stages. Fry habitat decreased with flow in the plunge pools due to increased velocity and turbulence. Both adult and juvenile habitat peaked at the middle flow mapped, 10 cfs. From the shape of the habitat versus flow relationship, it is likely that juvenile and adult habitat would peak somewhere in the 10–20 cfs range.

6.1.3.7 Riparian and Sediment Transport Modeling

- Flow versus following: (1) riparian habitat stage-discharge relationship; (2) seasonal hydrographs; (3) high flow recurrence intervals; (4) Q1.5 flow frequency under Proposed versus unimpaired conditions; and (5) cross-section inundation characteristics are described below based on the analyses specified in the TERR 1 TSR.

- TERR 1 TSR Table TERR 1-1 shows the sampling reaches and locations within the reach. Figures AQ 1-20 through AQ 1-24 show the flow/stage relationships at the surveyed riparian plots (TERR 1 TSR Table TERR 1- 9).

- The following hydrology analyses are provided in Appendix P based on the historical, existing, Proposed Action, and unimpaired hydrology (developed in the AQ 2 TSR) at each stream segments:

  - Annual Hydrology Patterns – Annual hydrographs of average daily flows by water year type (dry, normal, wet) are summarized in Appendix P, Figures AQ 1-P1 through AQ 1-P6. In general, there was little difference between the existing flow conditions and the proposed flow conditions at all locations. Flows in Rush Creek at Rush Meadows Dam were similar for unimpaired, existing, and Proposed conditions. At the Rush Creek below Agnew Dam; Rush Creek at SR-158; and South Rush Creek sites; unimpaired flows were greater than existing and Proposed flows. In the Rush Creek above Silver and Rush Creek below Silver Lake reaches, unimpaired flows were higher than existing and Proposed flows, but the existing and Proposed high flow patterns were reasonably well developed.
  - Recurrence Intervals – Flood frequency curves for each flow condition are shown in Appendix P Figures AQ 1-P7 through AQ 1-P11. Below Rush Meadows Dam the Proposed and unimpaired flows were identical (dam is removed). Below Agnew Dam and above SR-158, Proposed high flow recurrence interval flows were higher than existing conditions and lower than unimpaired conditions. Above Silver Lake and below Silver Lake, Proposed high flow recurrence flow intervals were similar to unimpaired and existing conditions were lower. In South Rush Creek above SR-158, Proposed recurrence interval flows were less than unimpaired and greater than existing conditions.
  - Frequency of High Flows – The number of days that the Q1.5 (1.5-year recurrence interval) flow was exceeded for Proposed and unimpaired conditions is shown in Appendix P Figures AQ 1-P12 through AQ 1-P17.
    - Rush Creek at Rush Meadows Dam – The Q1.5 frequency of occurrence was the same for Proposed and unimpaired conditions (i.e., the dam is removed).
    - Rush Creek below Agnew Dam, Rush Creek at SR-158, and South Rush Creek – The Q1.5 flows occur at a lower frequency under Proposed compared to unimpaired conditions (particularly in dry years).
    - Rush Creek above Silver Lake – The number of days the Q1.5 flow occur in the Proposed scenario was lower than under the unimpaired scenario; however, in wet and normal years, the difference was small.
    - Rush Creek below Silver Lake – The Proposed and unimpaired scenario Q1.5 flow frequencies were nearly identical.

- Recession rates for spring/early summer flows during the time of spring seed release and seed setting (during the receding limb of the hydrograph) by water year type are shown in Appendix P Figures AQ 1-P18 through AQ 1-P23.
  - Literature studies show that seedlings typically survive down ramping rates that range from 0.4 to 1.6 inches per day. Seedlings can survive down ramping rates of up to 3.9 inches per day, depending on various factors such as species, substrate characteristics, and other sources of water (e.g., seeps, hillslope runoff, precipitation) (Braatne et al. 1996; Amlin and Rood 2002; Shaforth et al. 2017).
  - Each recession rate plot (Figures AQ 1-P18 through AQ 1-P23) shows the average yearly recession for normal, wet and dry water years at each riparian transect. Included in the plots is a reference line that represents a 1.6 inches per day recession rate. All transects had an average recession rate of less than 1.6 inches per day.
- The relationships between existing inundation characteristics and the distribution of dominant riparian species across the floodplain at each of the Project-affected stream segments are shown in Appendix P Figures AQ 1-P24 through AQ 1-P29.
  - At all sites, flows ≥Q1.5 are typically required to inundate the riparian vegetation.

- Flow versus initiation of sediment movement and bankfull at selected cross-sections was characterized in the AQ 5 TSR.

6.2 Evaluation of Potential Rush Creek Channel Restoration in the Former Lakebed of Waugh Lake

The following describes the data and modeling developed to evaluate potential restoration of the Rush Creek channel in the former lakebed of Waugh Lake. An outline of the Restoration Plan is in provided in Section 5, Appendix 5-B of FLA.

- Unimpaired flows from 10 cfs to 591 cfs; including the 2-year, 5-year, and 10-year recurrence flows (264 cfs, 392 cfs, 485 cfs) were used for the hydrodynamics modeling and shear stress evaluation (see AQ 2 TSR).

- Figure AQ 1-25 shows the final topography. The topography does not include the current dam (i.e., the dam was removed from the topography).

- Figure AQ 1-26 shows polygons representing the channel and floodplain substrate mapped for hydraulic roughness characterization and erosion modeling. Table AQ 1-4 contains the mapped substrate classification and the corresponding Manning's n used in the model.

- Water surface elevations at a low observed flow (11.8 cfs) and gage data from Rush Meadows Dam were used to calibrate the HEC-RAS 2D Model. Figure AQ 1-27 shows two comparisons of measured and modeled water surface elevation.

- The HEC-RAS 2D modeling used a steady flow at the upstream boundary and a downstream boundary condition of normal depth with a friction slope of 0.0306. The downstream boundary was located approximately 560 feet downstream of Meadows Dam. An example of the modeled hydrodynamics (depth) is shown in Figure AQ 1-28.

- Figures AQ 1-Q1 through AQ 1- Q13 in Appendix Q show the HEC-RAS 2D model depth results over a range of flows and Figures AQ 1-Q14 through AQ 1-Q26 show the velocity results from the HEC-RAS 2D model over a range of flows.

- Figures AQ 1- R1 through AQ 1- R13 in Appendix R show the resulting shear stress from the HEC-RAS 2D model. Figures AQ 1-R14 through AQ 1-R26 show the erosion potential based on modeled shear stress and calculated critical shear stress from the bed material mapped in the field. Table AQ 1-4 contains the critical shear stress calculated for each of the mapped substrates.

- Critical shear stress was calculated for the HEC-RAS-2D hydrodynamics model output using the following equation and Wilcock et al. (2009) was used to determine the Shields Parameter.

$$\tau_c = D * \tau_c^* * g * (\rho_s - \rho)$$

τ_c – Critical Shear Stress (lbs/ft^2)

D – D_{50} of substrate (ft)

τ_c^* - Shields Parameter

g - acceleration of gravity (32.2 f/s^2)

ρ_s – substrate density (5.15 slugs/ft^3)

ρ – water density (1.94 slugs/ft^3)

  - A GIS analysis was used to determine where the shear stress results from the HEC-RAS-2D model exceeded the critical shear stress from the mapped substrate. Figures AQ 1-R14 to AQ 1-R26 (Appendix R) show the results of where the modeled shear stress exceeded the critical shear stress. The analysis was partly dependent on modeling judgement regarding how the mapped substrate, which consisted of a mix of larger substrate and sand, characterized in the critical shear stress calculations.

  - In general, most of the potential erosion occurred in areas of sand and silt. The coarse substrate hydraulic control present in the lower reach of the lakebed resists potential erosion. With removal of the dam there will likely be loss of fines that are currently present on top of the larger substrate but the modeling suggests that the control will resist channel downcutting/headcutting.

- A HEC-RAS 1D sediment transport model was used to estimate the channel erosion/deposition and the extent of potential headcutting due to Rush Meadow Dam removal over a modeling period of record (see below).
  - The proposed elevation of dam removal is 9,368.6 feet. This may be modified in the future depending on this modeling and other factors. In the HEC-RAS 1D sediment transport model the proposed dam elevation was implemented as an armored/fixed bed control. The same downstream boundary condition used above in the 2D hydrodynamics model was used for the sediment transport model. The boundary was located 560 feet downstream of the dam.
  - Three periods of unimpaired flows were run to observe the potential headcutting and channel erosion with the dam removal. The hydrology periods were 2017 (wet), 2017 through 2022 (wet, normal and dry years), and a 10-year period that represented all water year types (2013 through 2022).
  - Bed armoring depths, the maximum depth to allow the channel to erode, were based on field probing depths.
  - Figure AQ 1-29 shows a plot of the channel invert change for the three modeling periods.

- The natural grade control that exists at near station 1400 would be a good location to add in additional grade controls to prevent head cutting in the restoration plan.
  - Erosion of 1-3 feet of bed material is expected from the dam removal location at station 560 to the natural control location at station 1400. Most of the channel erosion is predicted based on the field probing depths.
  - Similarly, upstream of the natural channel grade control feature, some erosion of the channel is expected (several feet) without installation of grade control features (e.g., rock vortex weirs).
  - It will be important to implement erosion controls (e.g., grade controls) in the Restoration Plan to minimize erosion of channel sediments in the Waugh Lakebed.

6.3 EVALUATION OF POTENTIAL ENHANCEMENT OF RUSH CREEK AND SOUTH RUSH CREEK CHANNELS NEAR SR-158

The following describes the data and modeling that was used to identify/evaluate potential enhancement of the Rush Creek/South Rush Creek channels near SR-158 to address potential localized flooding during high-runoff events.

- Figures AQ 1-S1 through AQ 1-S3 (Appendix S) show modeled Proposed Action, historical, existing, and unimpaired hydrology at each of the culverts under SR-158 (South Rush Creek, Rush Creek, and powerhouse tailrace).

- Detailed topographic data and water surface elevation data for Rush Creek, South Rush Creek, and the Rush Creek Powerhouse Tailrace near SR-158 are shown in Appendix B, Appendix C, and Appendix E (see Section 6.1.3 above). Figures AQ 1-30 through AQ 1-32 and Table AQ 1-5 show the Silver Lake backwater (Figure AQ 1-10) relationships on the culvert tailraces and pictures of the SR-158 culvert crossings for Rush Creek, South Rush Creek, and the Rush Creek Powerhouse Tailrace, respectively.

- The hydrodynamics roughness characterization for South Rush Creek 2D modeling is shown in Appendix D. For Rush Creek, the 1D transect substrate data in Appendix B were converted to Manning's n values. For the Rush Creek Powerhouse Tailrace, pictures of the substrate were used to develop Manning's n values.

- Hydrodynamics model calibration to measured water surface elevations for Rush Creek, South Rush Creek, and the Rush Creek Powerhouse Tailrace near SR-158 are shown in Appendix G and Appendix I (see Section 6.1.3).

- The channels were mapped for items that potentially impede flows in Rush Creek and South Rush Creek near SR-158 (i.e., downed trees) (AQ 5 TSR) and riparian vegetation (TERR 1 TSR). AQ 5 TSR Table AQ 5-23, Map AQ 5-6, and Appendix H show the large woody debris mapping. Large woody debris was extensive in some areas. For example, Figure AQ 1-33 shows large woody debris at a location in the South Rush Creek channel downstream of SR-158.

- 2D modeling of South Rush Creek for an observed high flow of 100 cfs on July 13, 2023, is shown in Figure AQ 1-34. Table AQ 1-6 and Figure AQ 1-35 show the water elevation upstream of the South Rush Creek SR-158 culverts over a range of flows. A low point on SR-158 is located southeast of the culverts. At high flows, the water surface upstream of the roadway low point is different than at the culvert. Figure AQ 1-35 shows the water surface overtopping the roadway low point at approximately 220 cfs. AQ 1-35b shows a profile of the water surface at the culverts under multiple backwater conditions. Under all but the lowest flow (47.4 cfs), the flows in South Rush Creek add to the culvert backwater and increase overbanking potential. This is due to the low gradient channel downstream of the culvert. Peak flows for Unimpaired, Historical, Proposed Action, and Existing

Conditions from 1990–2022 are found in AQ 2 TSR Table AQ 2-A7. Maximum Proposed Action flow is 193 cfs, existing condition flow is 192 cfs, and unimpaired is 208 cfs. These flows are close to the elevation that the roadway overtops; however, the hydrology modeled high flows are conservative and actual measured flows are typically lower (see discussion below regarding measured versus modeled flows).

- 2D modeling of Rush Creek and the powerhouse tailrace for an observed high flow of 380 cfs and 110 cfs, respectively, on July 13, 2023, are shown in Figure AQ 1-36 and AQ 1-37. Tables AQ 1-7 and AQ 1-8 and Figures AQ 1-38 and AQ 1-39 summarize the results of the hydraulic modeling of culverts for Rush Creek and the Rush Creek Powerhouse Tailrace at SR-158, respectively. No SR-158 roadway overtopping occurs for the powerhouse tailrace under current and future operations. For the tailrace, maximum flows are approximately 110 cfs. At the Rush Creek culvert, however, overtopping could occur at approximately 900 cfs. Peak flows for Rush Creek for unimpaired, historical, Proposed Action, and existing conditions from 1990–2022 are found in AQ 2 TSR Table AQ 2-A4. Maximum flows are 649 cfs, 644 cfs, and 743 cfs for Proposed Action, existing, and unimpaired, respectively. These flows were developed using the hydrology operations model (AQ 2 TSR) without real-time operator management of Gem dam storage immediately prior to high flow events. In high water years SCE operations use forecasted inflows and storage to manage spills from Gem reservoir. Measured flows below the Agnew flume (including powerhouse flows) are typically lower than the modeled flows (Figure AQ 1-40). The hydrology model high flows are, therefore, a conservative estimate of the high flows that could occur.

- The following potential enhancements have been identified that could be utilized either alone or in combination to reduce the potential for localized flooding in the vicinity of SR-158, including the homes immediately upstream and downstream of the SR-158. The hydrodynamics model and tools developed in this TSR could be used to help evaluate these potential enhancements. The potential enhancements identified below may be outside the scope of FERC relicensing:

  - Backwater Elevation on SR-158 Culverts

    - The boulders in the outlet channel of Silver Lake could be removed to increase conveyance out of the lake and reduce the lake water surface elevation during high flows. This would reduce the backwater elevation on the SR-158 culverts and improve conveyance through the culverts.

  - South Rush Creek

    - An earthen berm (e.g., 2–3 feet high) could be constructed behind the homes along the unnamed tributary down to the roadway. An earthen berm could also be constructed along South Rush Creek downstream of the SR-158 culvert between South Rush Creek and the downstream home. The berm would reduce potential flooding.

- An additional culvert could be installed at the SR-158 crossing to improve conveyance and reduce water surface elevations upstream of SR-158.
- The South Rush Creek channel downstream of the SR-158 culvert could be cleared of large woody debris, encroached vegetation, and/or straightened to improve the conveyance of the channel downstream of SR-158.
- The Rush Creek/South Rush Creek channel split on the mountain below Horsetail Falls could be modified to route more flow through the Rush Creek Channel and reduce flows and potential localized flooding in South Rush Creek. The natural flow split is composed of primarily bedrock and boulders but is susceptible to change at any time in the future, which could decrease or increase flows in the South Rush Creek channel.

▪ Rush Creek

- Localized flooding does not appear to be an issue in this area; however, the channel downstream of the SR-158 crossing could be cleared of in-channel riparian vegetation and large woody debris to improve conveyance of the channel, reduce the backwater on the culvert, and reduce the water surface elevation upstream of the culvert.

▪ Rush Creek Powerhouse Tailrace

- Localized flooding does not appear to be an issue in this area.

6.4 EVALUATION OF SEDIMENT DEPOSITION/TRANSPORT IN RUSH CREEK AT THE SILVER LAKE INLET

The following describes the data and modeling that was used to evaluate hydrology related scour/deposition of sediment in the Rush Creek channel near the inlet of Silver Lake (Figure AQ 1-41):

- The Rush Creek inflow hydrology to Silver Lake developed in AQ 2 TSR for Proposed Action, historical, existing, and unimpaired conditions was used to evaluate potential scour/deposition of sediment in the Rush Creek channel near the inlet of Silver Lake. AQ 2 TSR Tables AQ 2-A5 and Figure AQ 2-69 show that the Proposed Action exhibits slightly higher annual peak flows than the existing conditions.

- Three water years were selected to evaluate sediment transport at the inlet: a high discharge year (2017 wet), medium discharge year (2001 normal), and a low discharge year (2020 dry). Figure AQ 1-42 shows the hydrology for each of the example years (2017 wet, 2001 normal, 2020 dry).

- The 2D modeling topography that was collected for Rush Creek at the Silver Lake inlet using a combination of RTK GPS, single beam sonar (bathymetry), walking total station collection, and LiDAR/photogrammetry (above water topography) is shown Appendix D.

- The 2D modeling site substrate was mapped using polygons that represented patches of similar substrate composition that were delineated by the percent dominant and percent subdominant substrate type. Mapped substrate and vegetation are shown in Appendix D.

- The HEC-RAS 2D model was constructed using the surveyed topography and a Manning's n layer to represent the hydraulic roughness of the substrate and vegetation polygons. Appendix I shows the Manning's n values used for calibration of the Rush Creek Above Silver Lake model. The initial roughness was adjusted to calibrate the model using field measured water surface elevations.

- A stage-discharge relationship was calculated for the downstream boundary of the reach (Appendix I). The pressure transducer installed in the middle of the Rush Creek Above Silver Lake site was used to extend the rating curve for the site to higher flows. Figure AQ 1-43 shows the final relationship used for sediment transport modeling. The stage-discharge relationship incorporates the backwater effects of Silver Lake (Figure AQ 1-10). At higher flows the lake elevation increases due to the hydraulics at the lake outlet. The outlet includes large boulders that were apparently installed historically to increase the elevation of the lake.

- The Silver Lake backwater (Figure AQ 1-10) has a large effect on hydraulics in the Silver Lake inlet. Figures AQ 1-44 through 1-46 show example hydraulic model results at a low flow (20 cfs), a moderate flow (250 cfs) and a higher flow (1,200 cfs). The channel becomes inundated at a relatively low flow, e.g., 145–250 cfs (Figure AQ 1-45). As the flows increase and the channel inundates further, the velocities slow (Figure AQ 1-44 to Figure AQ 1-46), the shear stress reduces, and the suspended sediment and bedload deposit in the channel and the delta. There is a narrow range of flows which have the potential to maintain a channel in the inlet area (approximately 145–250 cfs) (Figure AQ 1-47). At higher flows, shear stress decreases, which reduces the ability of the flows to transport suspended sediment and bedload material. In addition to increased depth and reduced velocity/shear, the higher flows inundate large portions of the meadow, including an alcove near the houses. The inundated meadow and alcove also provide locations for suspended sediment and bedload to deposit.

- Figures AQ 1-48, AQ 1-49, and AQ 1-50 show the 2D model scour/deposition results for unimpaired flows in 2020 dry, 2001 normal, and 2017 wet, respectively. The low discharge year (2020 dry) showed the least amount of deposition in the Silver Lake inlet area. The high flow year (2017 wet) had intermediate deposition and the medium flow year (2001 normal) resulted in the most deposition. Figure AQ 1-42 shows that the low flow year (2020 dry) hydrology was frequently in the 145–250 cfs channel scour range. All modeled years resulted in deposition at the delta at the end of the channel. At the delta, water deepens and velocity slow and any transported sediment drops out (primarily sand). The highest flow year slow resulted in the most deposition in the alcove area. Overall, minimal scour occurred in the model runs, primarily sediment deposition. The Silver Lake inlet is a natural deposition area due to the lake level.

- Appendix T provides scour/deposition results for each of the representative model years (wet, normal, dry) and scenarios (unimpaired, historical, Proposed Action, and existing conditions). The Proposed Action and existing conditions have similar hydrology and the model runs show similar deposition at the Silver Lake inlet; therefore, we anticipate that the Proposed Action would result in similar scour/deposition in the Silver Lake inlet as existing conditions.

- Minimizing sediment transported into Rush Creek is one way to reduce deposition at the Silver Lake inlet over time. For example, reducing watershed erosion would help reduce deposition. The AQ 5 TSR characterizes watershed erosion (mass wasting, roads, Project operations) and suspended sediment in Rush Creek, Reversed Creek, and tributaries. Suspended sediment concentrations were similar in each of the streams. Project related erosion was not identified as a significant source of sediment. The natural watershed characteristics (significant mass wasting sites) appear to be the primary source of sediment. Historically, watershed perturbations (ski area, development, etc.) may have been sources of sediment to Silver Lake. In the Project area (Rush Creek upstream of Rush Creek powerhouse), the natural lakes/Project lakes (Gem Lake, Agnew Lake) provide sediment traps that help reduce watershed derived sediment.

- Reduction in the Silver Lake elevation is another way to increase channel scour/reduce sediment deposition in the inlet area. For example, removing the rocks at the outlet of Silver Lake would result in increased scour and reduce deposition. Figure AQ 1-51 shows the increase in shear stress with a reduction of 1 foot in lake elevation (e.g., removal of some of the rocks at the outlet).

- In summary, the primary way to affect large change of Silver Lake inlet deposition in the vicinity of homes/boat docks is to lower the Silver Lake level to allow scour of the channel. Otherwise, the high lake level will always slow Rush Creek flow and allow sediment to deposit in the channel, except over a very narrow range of flows (e.g., 145–250 cfs). Based on 2D modeling the low flow years (e.g., 2020 dry) resulted in the least amount of deposition in the channel. In all modeled years, however, deposition occurred on the delta. Rush Creek suspended or bedload sediment that reaches the deep-water area in the vicinity of the delta will naturally deposit there.

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TABLES

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Table AQ 1-1. Location of Selected Stream Segments and Instream Flow Modeling Calibration Data.

Stream Segment Name	Segment Length (miles) / River Miles (RM)	Sampling Location River Mile / Site ID	Methods	Purpose	Flow Range of Interest (cfs)[3]	Water Surface Elevation Calibration Flows (cfs)[4]	Velocity Calibration/ Validation Flows (cfs)[5]
Rush Creek							
Waugh Lake (to be completed summer 2024)	1.51 (RM 22.24–23.75)	RM 22.24–23.75	HEC-RAS 1D/2D and River2D (if needed)	Hydraulic modeling for potential channel restoration	0.7–189	1–3 * 7–12 * 50–60 *	7–12 * 50–60 * if safe
Rush Creek below Rush Meadows Dam	1.83 (RM 20.41–22.24)	RM 20.41–22.24	Cross-section hydraulic modeling	Sediment transport, bankfull flow, and riparian vegetation	0.7–189	28.4–28.9* 42–54.5* 94.2–95.3*	42–54.5 *
Rush Creek Below Gem Dam to the Confluence with Reversed Creek	1.99 (RM 17.49–19.48)	RM 18.40–18.60 and RM 17.50–17.60	Cross-sections in 5 mesohabitat units (pool, run, low and high gradient riffle) in approx. proportion to availability	Hydraulic modeling, aquatic habitat modeling, sediment transport, bankfull flow, and riparian vegetation	1.0–279	4–9 10–19 37-47	10–19
		RM 17.65–18.40 and RM 19.18–19.46	5 empirical plunge pool habitats	Empirical aquatic habitat modeling	1.0–279	4 8–11 40	8–11
		RM 17.50–17.60	HEC-RAS 1D/2D	Hydraulic modeling to evaluate potential enhancement of the Rush Creek Channel	1.0–279	4–9 10–19 37–47	10–19
Rush Creek Powerhouse Tailrace	—	—	HEC-RAS 1D/2D	Hydraulic modeling to evaluate potential backwater effects at the SR-158 culvert	0–100	1 42 106	— (not needed for this prismatic channel)
Rush Creek Above Silver Lake, including Lake Inlet	1.01 (RM 16.48–17.49)	RM 16.48–17.49	HEC-RAS 1D/2D and River2D (if needed)	• Hydraulic modeling, aquatic habitat modeling, sediment transport, bankfull flow, and riparian vegetation • Hydraulic modeling to evaluate sediment scour/deposition at Silver Lake Inlet	1.0–383	10.9 21.2 135	135
Rush Creek Below Silver Lake	2.69 (RM 13.20–15.89)	RM 13.20–15.89	Cross-sections in 10 mesohabitat units (e.g., pool, run, low and high gradient riffle) in approx. proportion to availability	Hydraulic modeling, aquatic habitat modeling, sediment transport, bankfull flow, and riparian vegetation	1.0–383	16–19 38–44 145–167 529	38–44
South Rush Creek							
South Rush Creek	0.46 (RM 0.0–0.46)	RM 0.0–0.2	HEC-RAS 1D/2D and River2D (if needed)	• Hydraulic modeling, aquatic habitat modeling, sediment transport, bankfull flow, and riparian vegetation • Hydraulic modeling for potential enhancement of the Rush Creek and/or South Rush Creek channel	0–60	1.9 0.61–2.6 41.8–74.6	0.61–2.6

[3] 5% to 95% unimpaired flow exceedance values
[4] Approximate/target flow ranges for hydraulic model data collection. Actual flows at time of data collection may be different.
* Flow data collection dependent on natural flow availability.
[5] If the high calibration flow is accessible and safe to collect velocity data, collect velocity data at high flow instead of the medium flow. Otherwise collect velocities at medium flow.

Table AQ 1-2. Summary Mesohabitat by Reach

Habitat Type	Length, ft	% Habitat	Number of Mesohabitat Units Sampled	Number of Cross-Sections Sampled
Rush Creek Below Gem Dam to Reverse Creek (without PLP)				
HGR	78.6	4.6	1	1
LGR	543.1	31.6	3	4
POOL	422.5	24.6	2	4
RUN	673.5	39.2	3	5
Total Without PLP	**1717.7**	**100**	**9**	**14**
Rush Creek Below Gem Dam to Reverse Creek (with PLP)				
PLP	1336.4	23.7	5	Plunge Pool Analys
Total including PLP	**5628.1**	**100**	**5**	**--**
Rush Creek Above Silver Lake				
POOL	2,601.8	51.9	8	2D Modeling
RUN	2,414.8	48.1	8	2D Modeling
Total	5,016.6	100	16	--
Rush Creek Below Silver Lake				
HGR	903.9	6.2	1	2
LGR	4,655.7	31.7	4	6
POOL	5,157.1	35.1	4	8
RUN	3,955.8	27.0	4	7
Total	**14,672.5**	**100**	**13**	**23**

Key: HGR = High Gradient Riffle
LGR = High Gradient Riffle
PLP = Plunge Pool
POOL = Pool
RUN = Run

Table AQ 1-3. Substrate and Vegetation Types Mapped at Instream Flow Sites

Code	Substrate/Vegetation	Size Range, in
silt/clay	silt/clay	<0.1
sand	sand	0.1–0.2
SG	small gravel	0.2–1
MG	medium gravel	1–2
LG	large gravel	2–3
SC	small cobble	3–6
MC	medium cobble	6–9
LC	large cobble	9–12
SB	small boulder	12–40
LB	large boulder	>40
RB	rough bedrock (Cobble/Boulder Consistency)	--
SmBr	smooth bedrock	--
OM	organic debris - leaf/detritus	--
WD or LWD	woody debris (Log/diam, stick pile/sizes)	--
WIL	Willow	--
GR	Grass	--
SH	Shrub	--

Table AQ 1-4. Substrate, Manning's *n*, and Calculated Critical Shear Stress for Former Waugh Lakebed

Substrate	Manning's n	Calculated Critical Shear Stress (lbs/ft^2)
Cobble Boulder Bedrock	0.06	4.08
Woody Debris on Sand-Silt	0.035	0.00053
Gravel Cobble	0.04	1.02
Sand Silt	0.015	0.00053
Silty Sand on fractured Bedrock-Cobble	0.025	1.02
Sand	0.02	0.0093
Sand Gravel	0.03	0.0373

Table AQ 1-5. Culvert Backwater/Tailwater Elevations at Different Flows Below Silver Lake

Flow Above Grant Lake (cfs)	Culvert Backwater Elevation (ft)		
	South Rush Creek	Rush Creek	Powerhouse Tailrace
20	No Backwater	No Backwater	No Backwater
100	7226.6	7224.6	7223.7
250	7227.3	7226	7224.9
400	7227.7	7226.9	7225.6
600	7228.2	7227.9	7226.2
800	7228.6	7228.6	7226.7
1000	7229.3	7229.3	7227.1

Table AQ 1-6. South Rush Creek HEC-RAS 2D Modeled SR-158 Culvert Capacity Simulations for Three Different Backwater/Tailwater Conditions (None, Medium, High)

South Rush Creek Flow (cfs)	Upstream Culvert Water Surface Elevation (ft) (at different backwater elevations)		
	Backwater Elevation, ft (flow below Silver Lake, cfs)		
	None	7227.7 (400)	7228.6 (800)
47.7	7228.11	7228.18	7228.74
110.6	7229.04	7229.04	7229.27
151.6	7229.55	7229.55	7229.7
200	7230.17	7230.17	7230.25
220	7230.4	7230.4	7230.47

Table AQ 1-7. Rush Creek HEC-RAS 2D Modeled SR-158 Culvert Capacity Simulations for Three Different Backwater/Tailwater Conditions (None, Medium, High)

Rush Creek Flow (cfs)	Upstream Culvert Water Surface Elevation (ft) (at different backwater elevations)			
	Backwater Elevation, ft (flow below Silver Lake, cfs)			
	None	7227.7 (400)	7228.6 (800)	7229 (900)
242.3	7226.2	7227.0	7228.7	--
379.4	7226.9	7227.3	7228.8	--
538.4	7227.5	7227.6	7228.8	--
600	7227.7	7227.8	7228.9	--
700	7228.1	7228.1	7229.1	--
900	--	--	--	7231.5

Table AQ 1-8. Rush Creek Powerhouse Tailrace HEC-RAS 2D Modeled SR-158 Culvert Capacity Simulations at a Maximum Discharge (110 cfs) for a Range of Backwater/Tailwater Conditions

Powerhouse Tailrace Flow (cfs)	Upstream Culvert Water Surface Elevation (ft) (at different backwater elevations)	Backwater Elevation (ft) (flow below Silver Lake, cfs)
110	7222.0	None
110	7224.2	7223.7 (100)
110	7225.2	7224.9 (250)
110	7225.8	7225.6 (400)
110	7226.4	7226.2 (600)
110	7226.9	7226.7 (800)

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FIGURES

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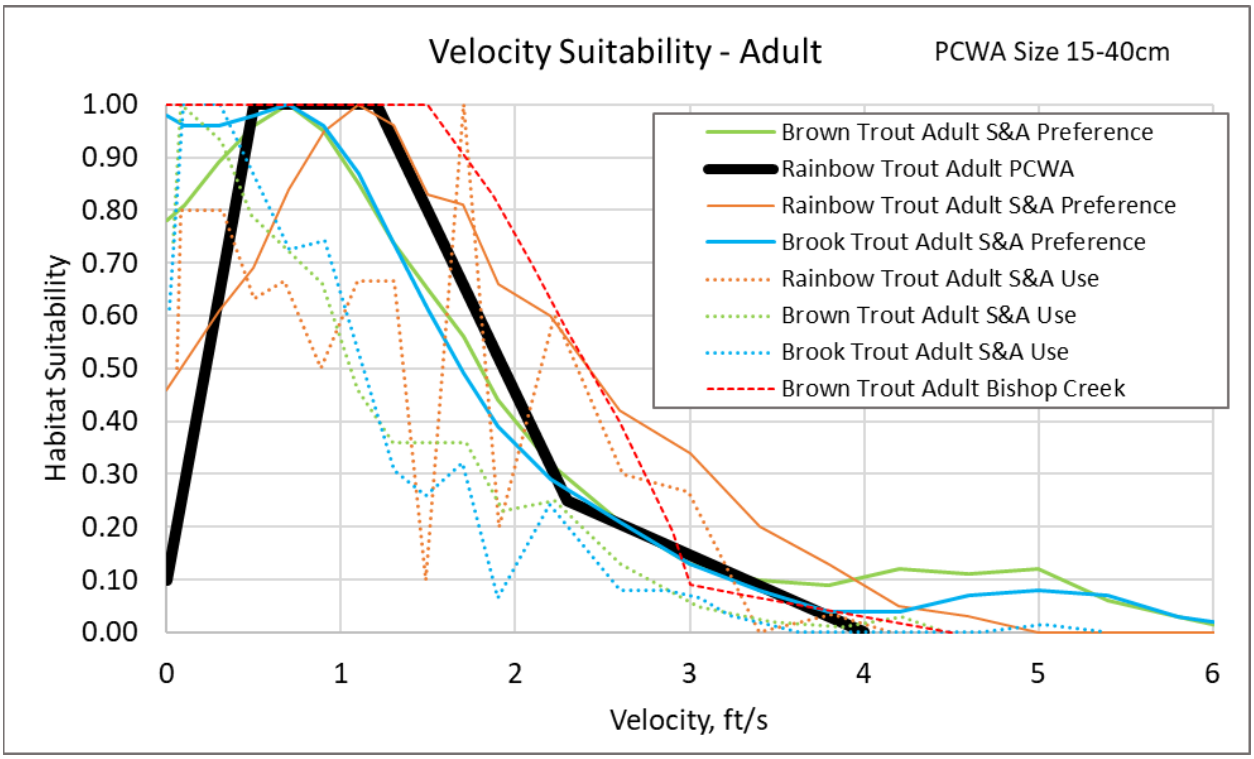


Figure AQ 1-1. Rush Creek Adult Trout Velocity Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

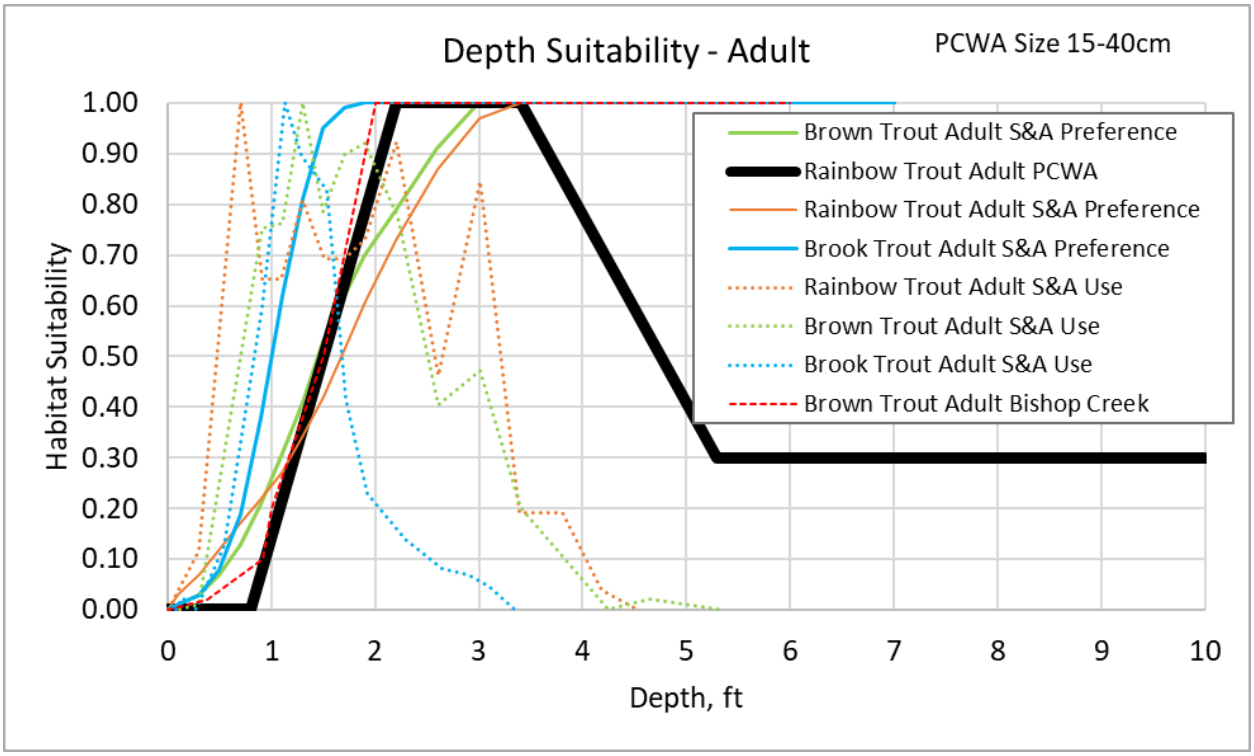


Figure AQ 1-2. Rush Creek Adult Trout Depth Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

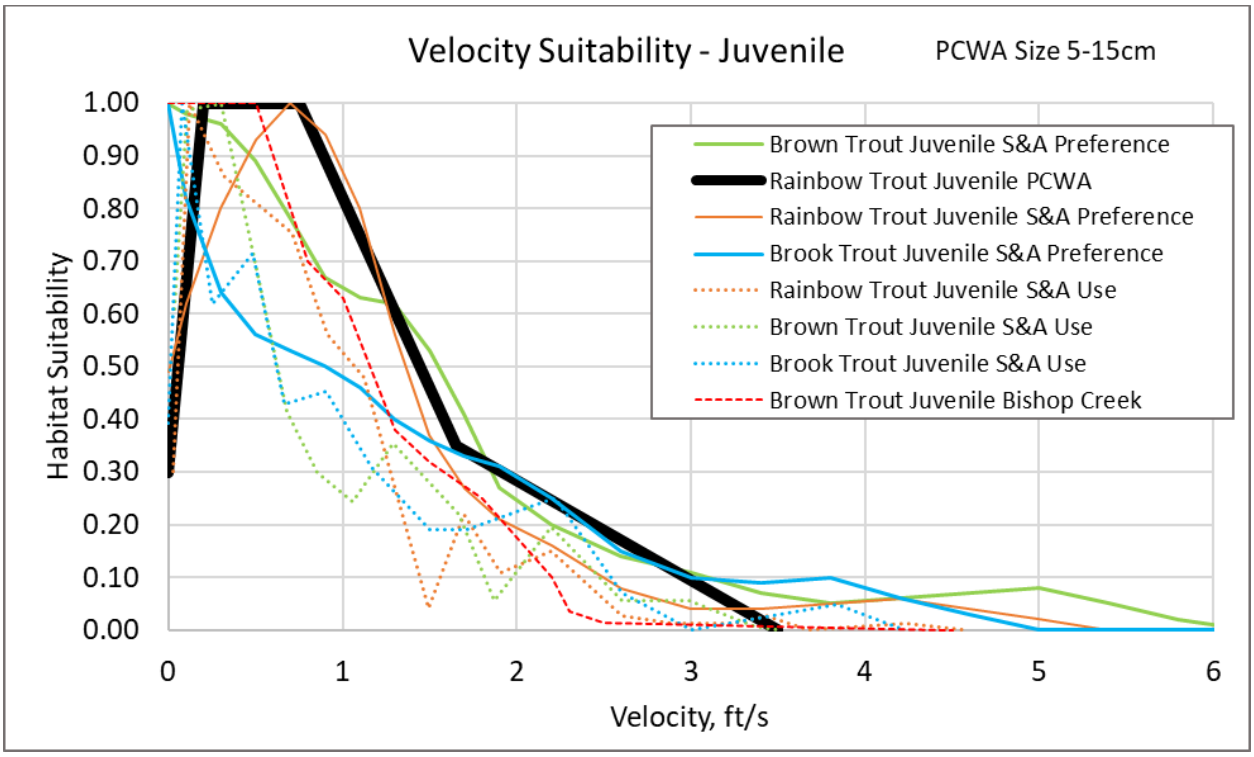


Figure AQ 1-3. Rush Creek Juvenile Trout Velocity Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

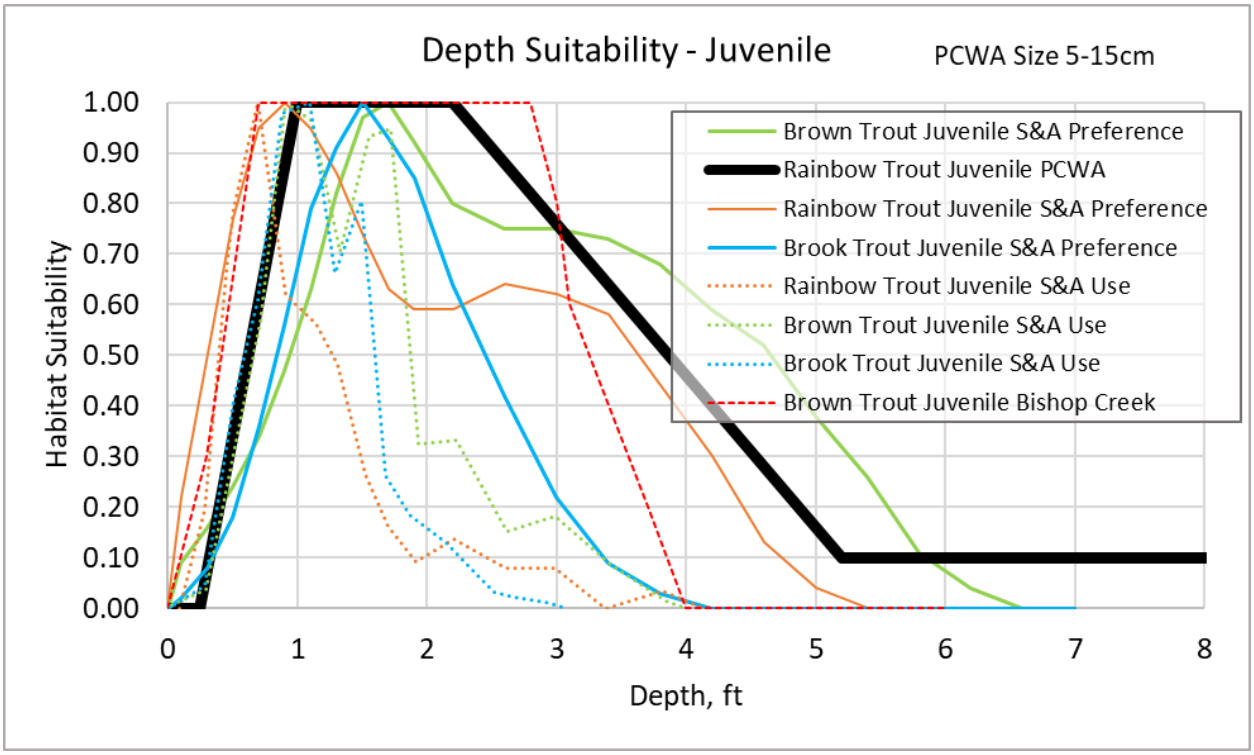


Figure AQ 1-4. Rush Creek Juvenile Trout Depth Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

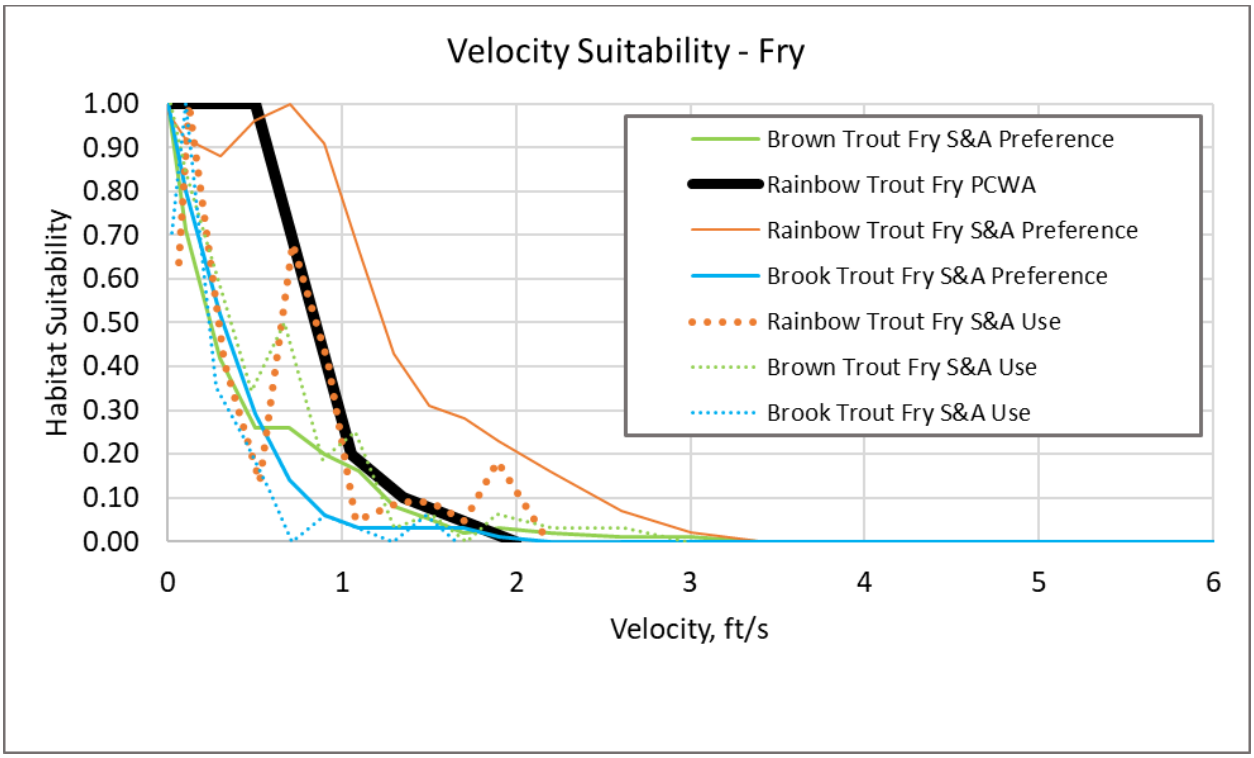


Figure AQ 1-5. Rush Creek Fry Velocity Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

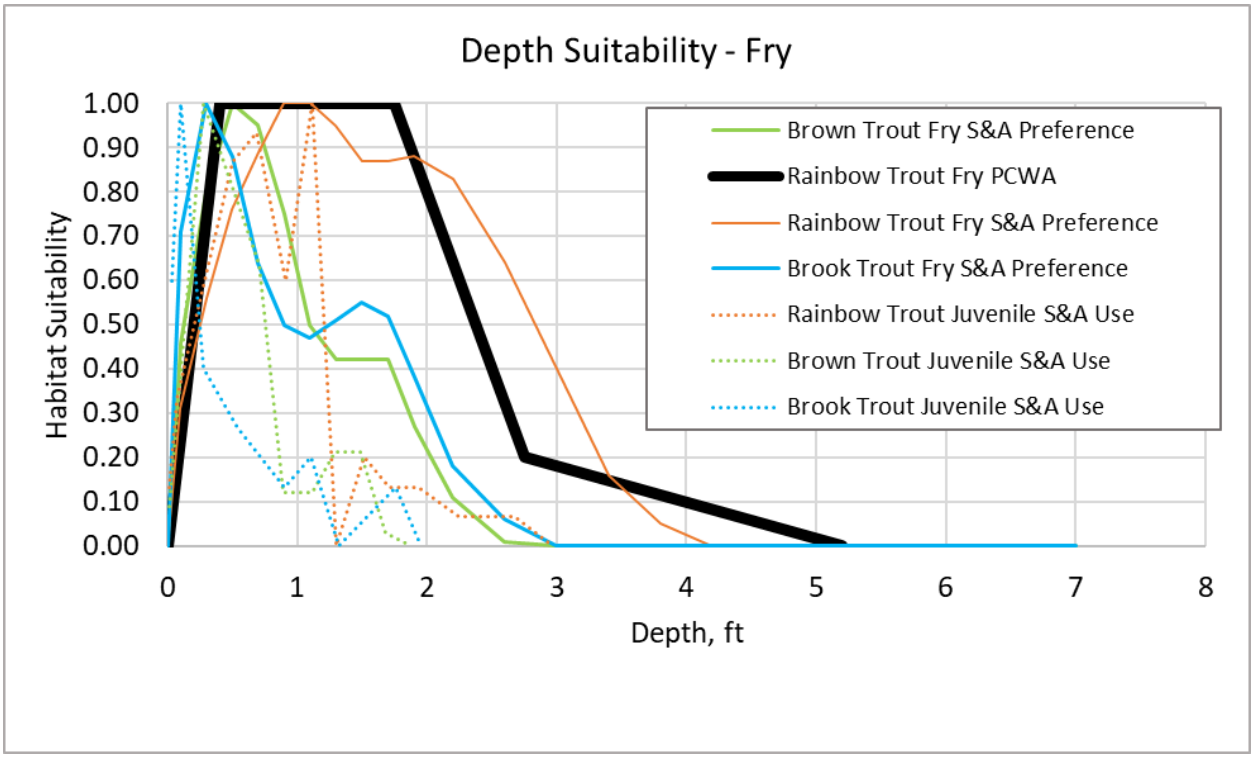


Figure AQ 1-6. Rush Creek Fry Depth Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

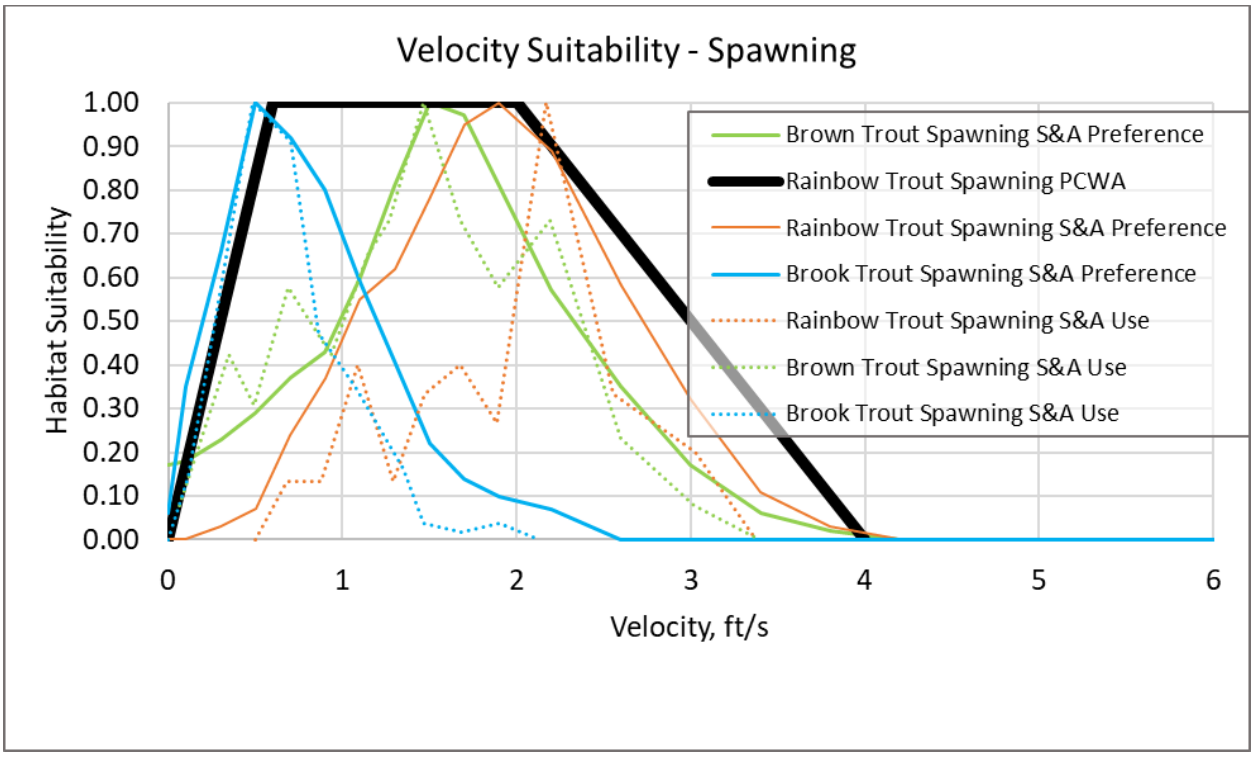


Figure AQ 1-7. Rush Creek Trout Spawning Velocity Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

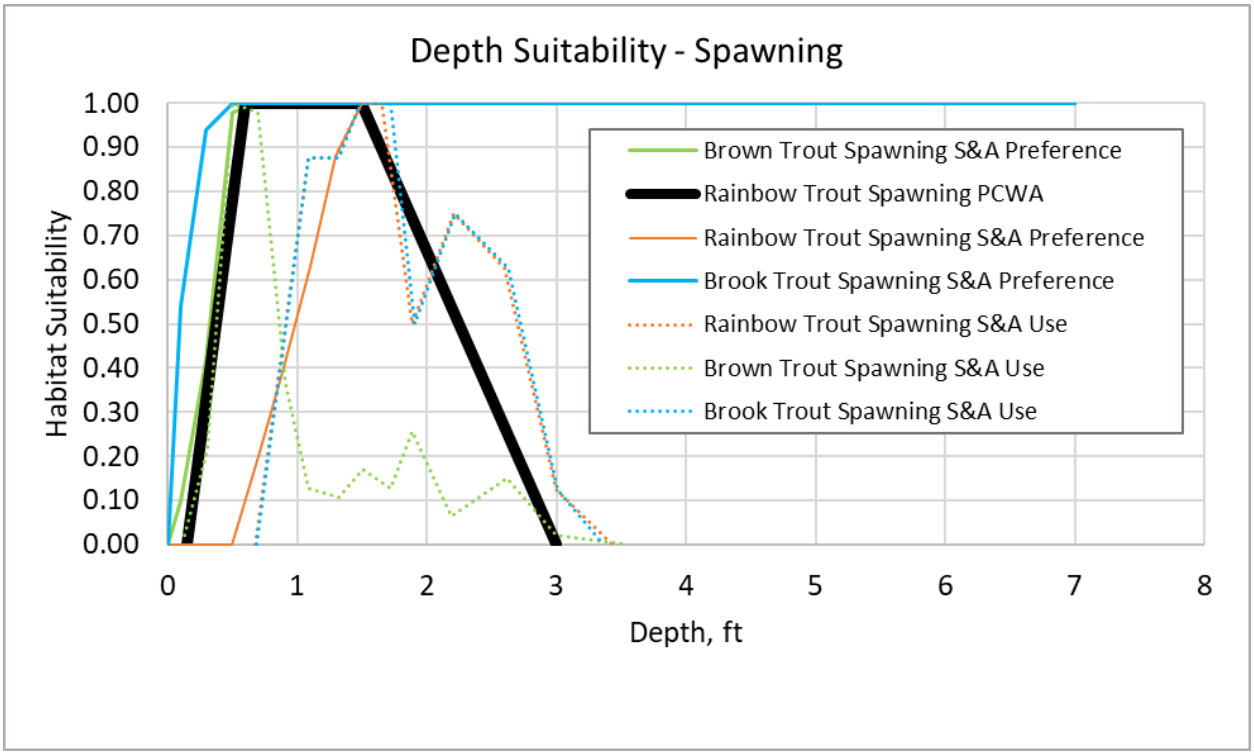


Figure AQ 1-8. Rush Creek Trout Spawning Depth Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

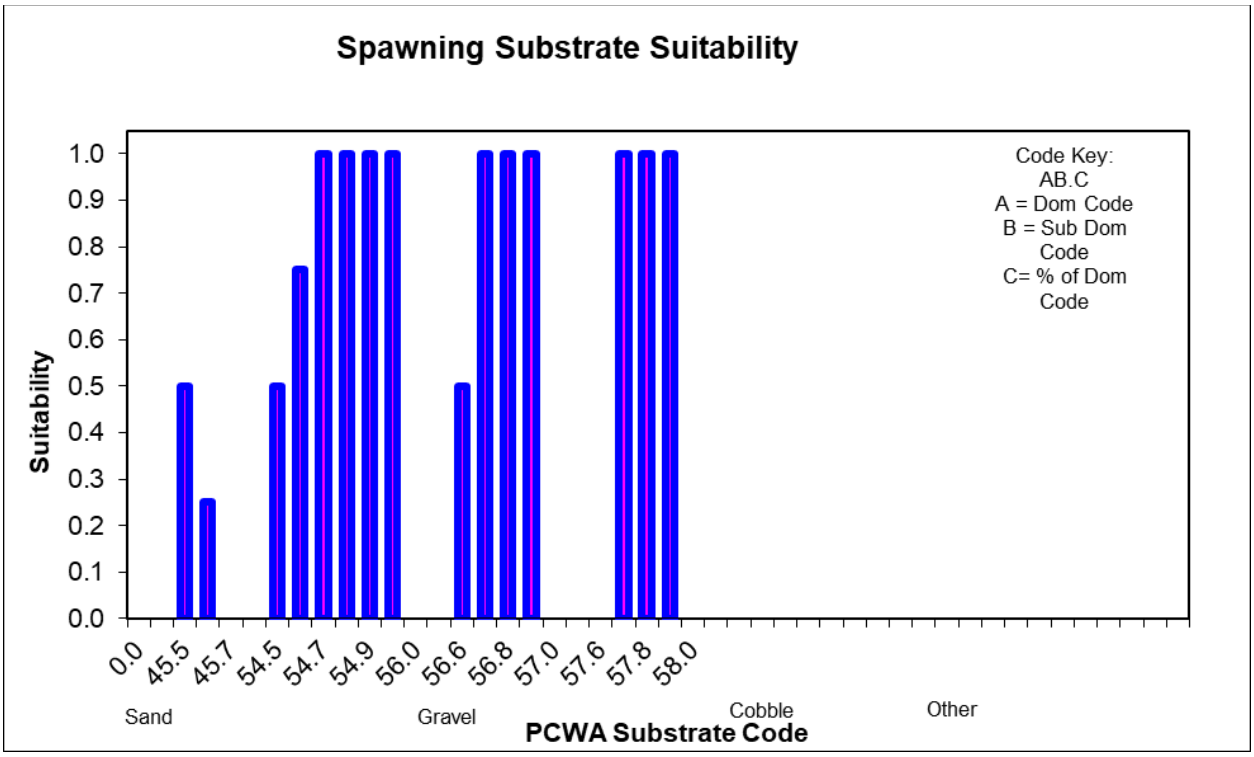


Figure AQ 1-9. Rush Creek Trout Spawning Substrate Habitat Suitability Criteria (PCWA HSC) for Rainbow Trout, Brook Trout, and Brown Trout

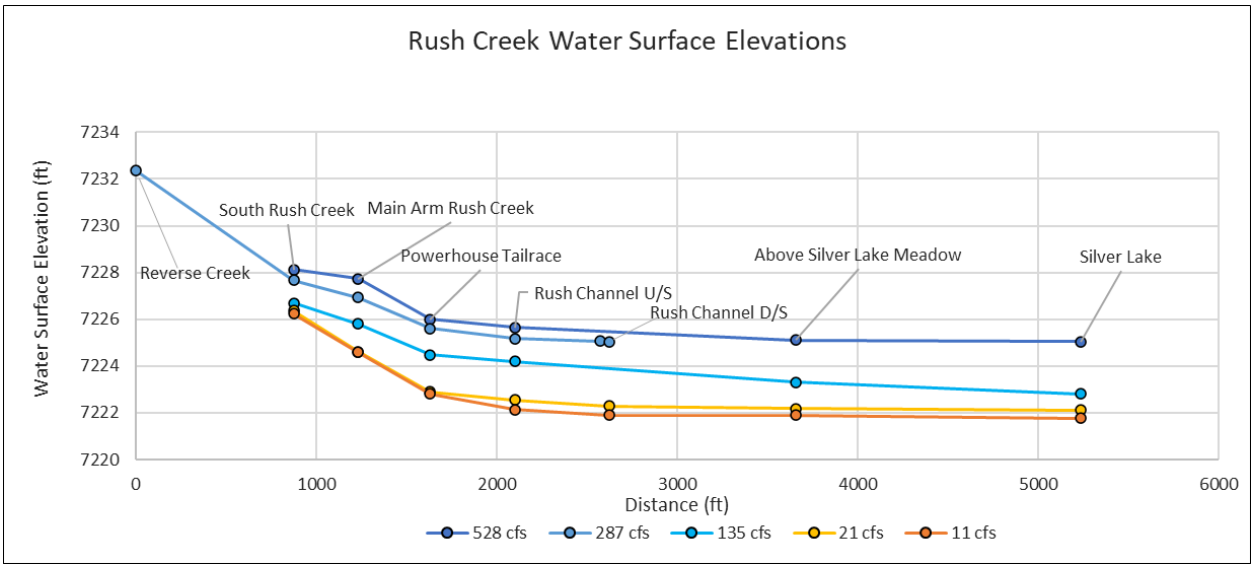
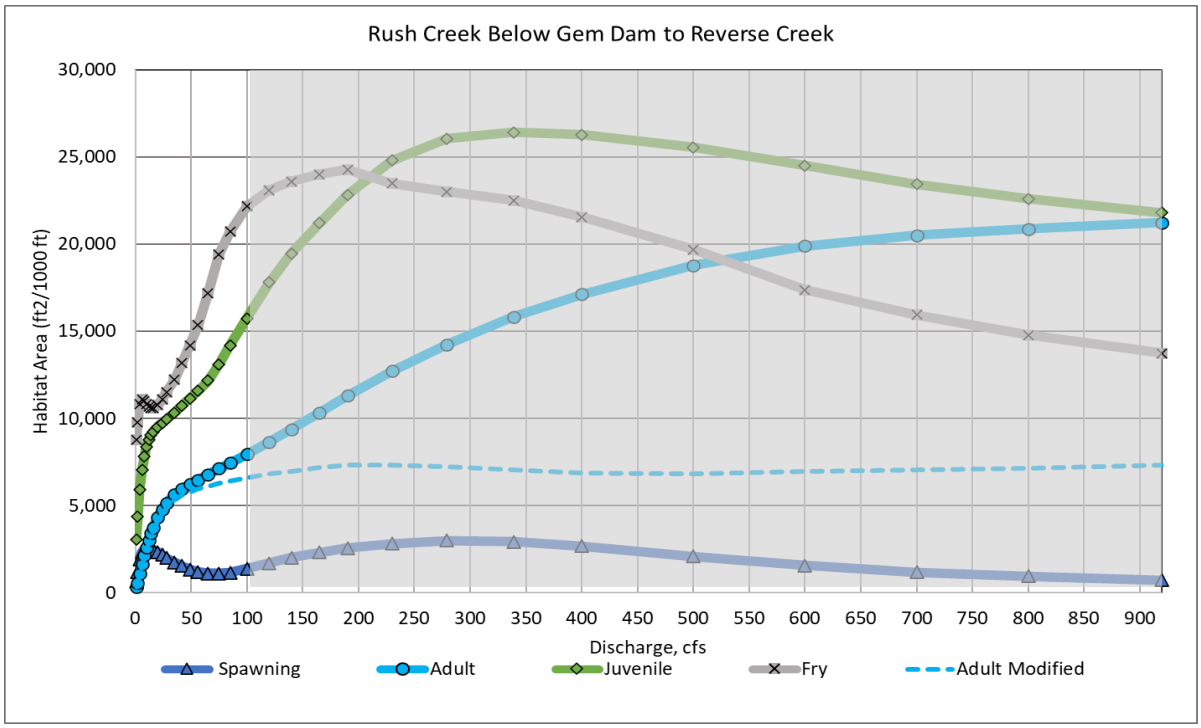


Figure AQ 1-10. Rush Creek Water Surface Elevations at Various Discharges Showing the Silver Lake Backwater



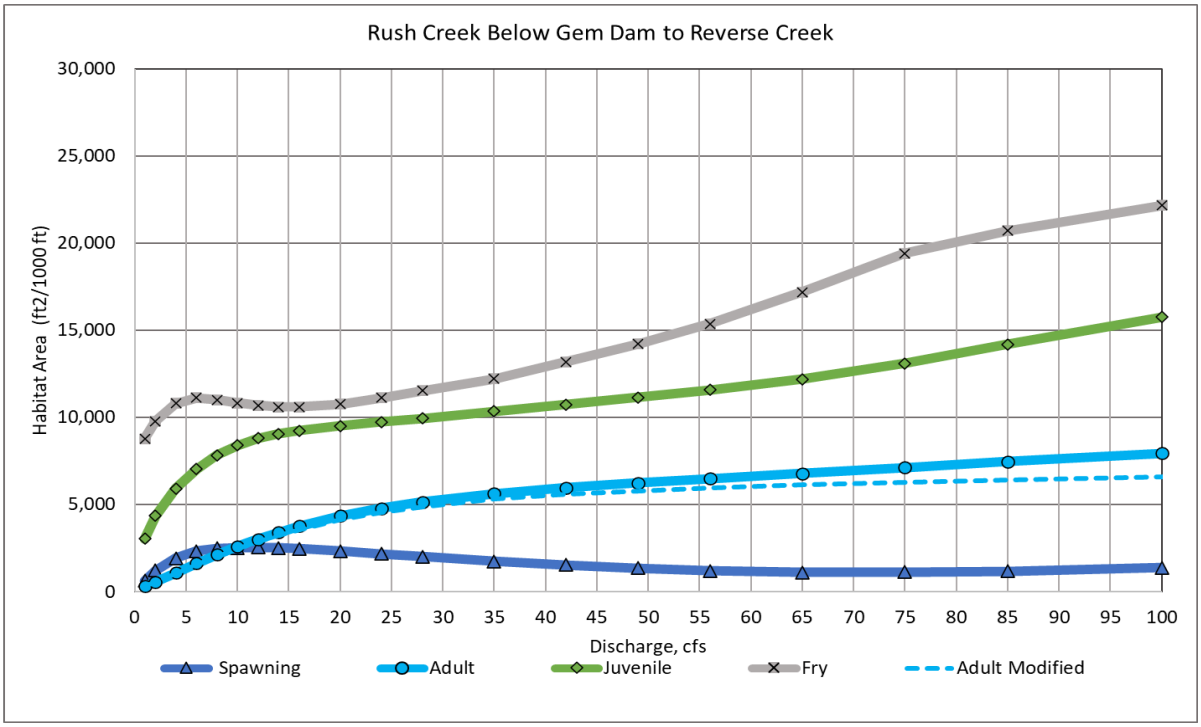
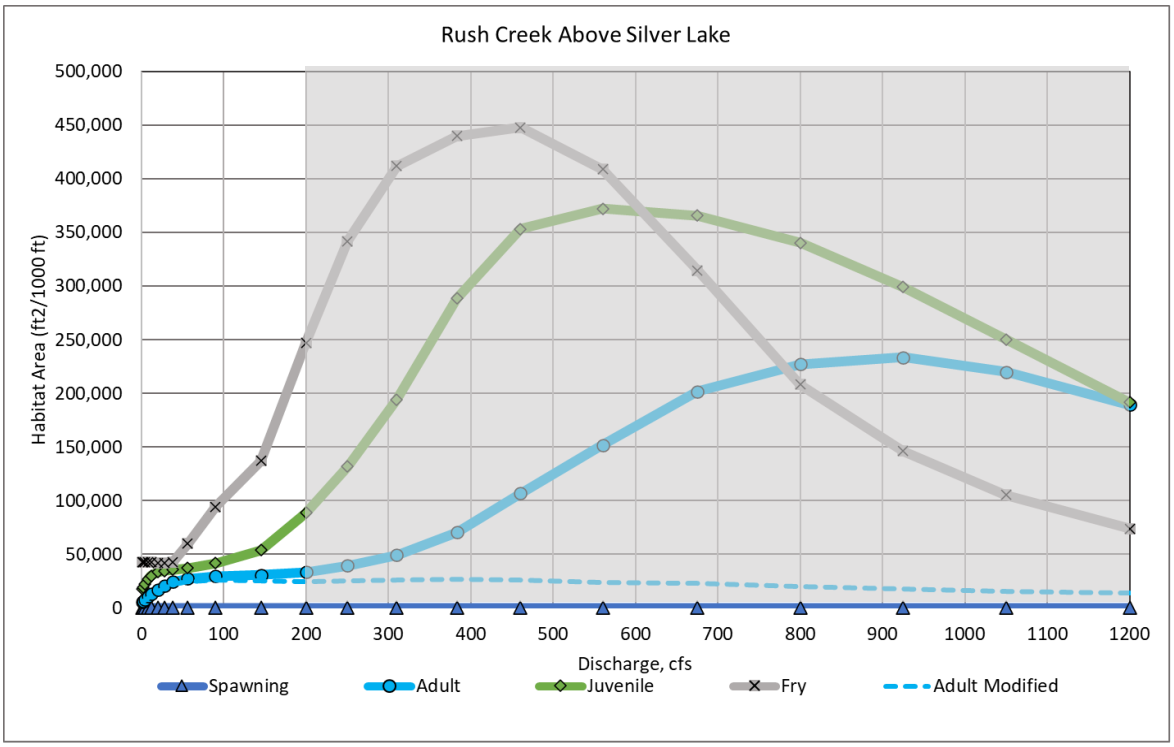


Figure AQ 1-11. Habitat versus flow relationships for Rush Creek Below Gem Dam to Reverse Creek shown for the full flow range (top) and a lower flow range (bottom). The grayed area above 100 cfs (top) represents where the habitat modeling is extrapolated substantially above the calibration data and is less accurate.



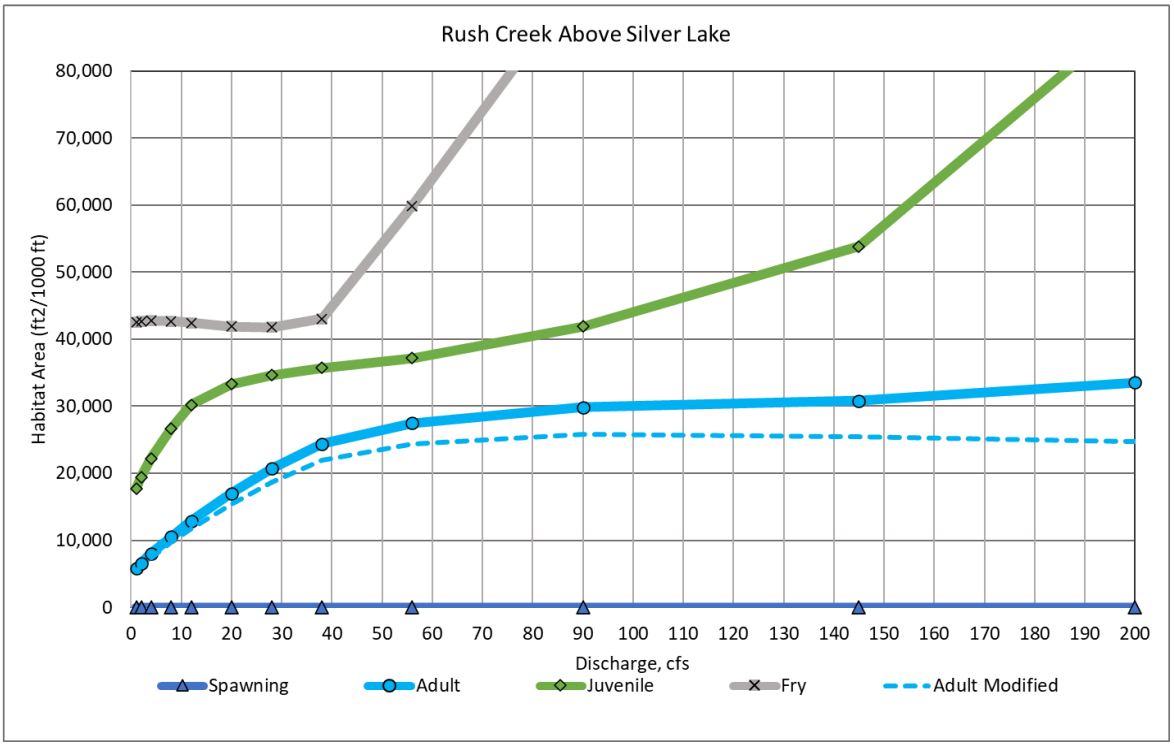


Figure AQ 1-12. Habitat versus flow relationships for Rush Creek Above Silver Lake shown for the full flow range (top) and a lower flow range (bottom). The grayed area above 200 cfs (top) represents where the habitat modeling is extrapolated substantially above the calibration data and is less accurate.

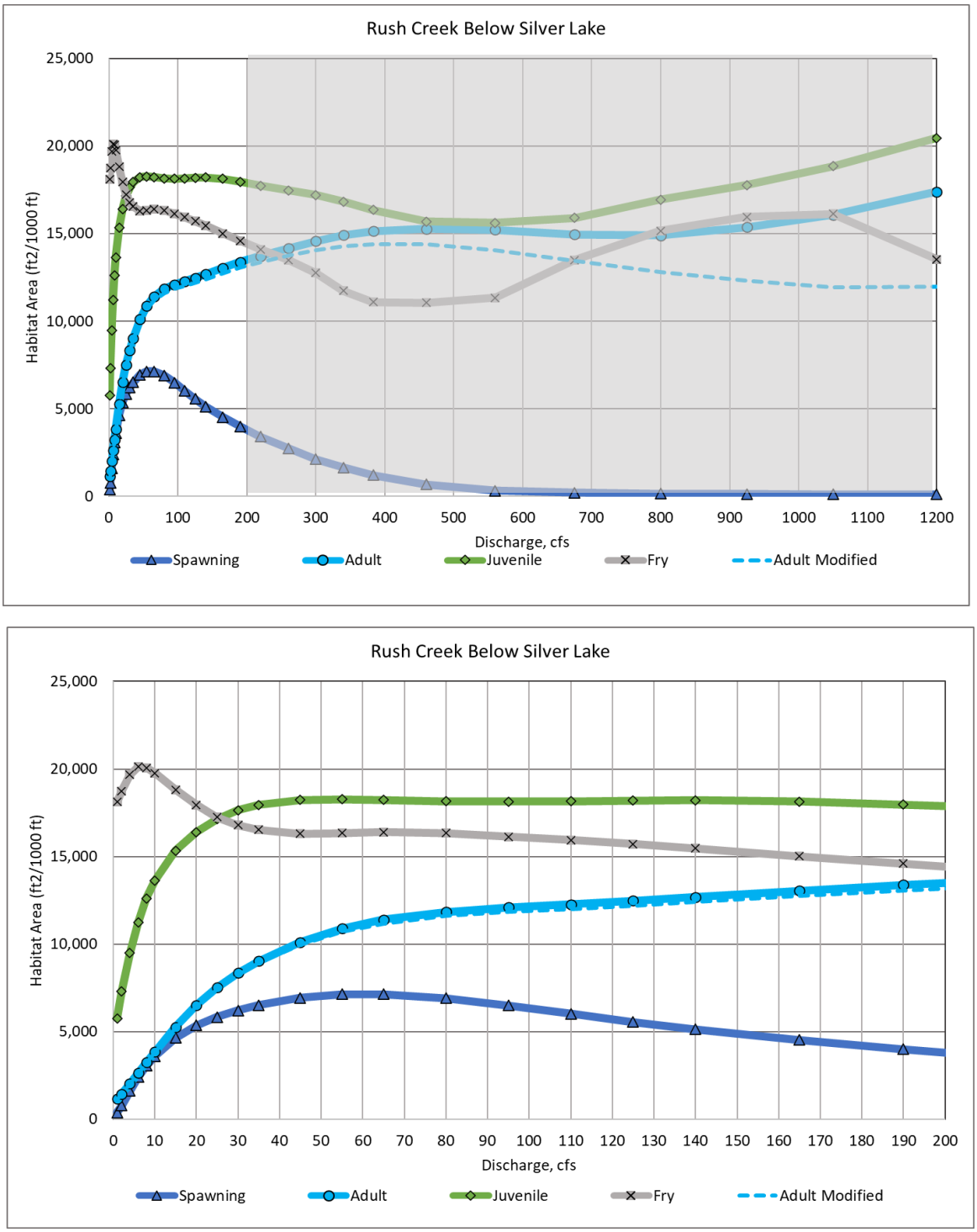
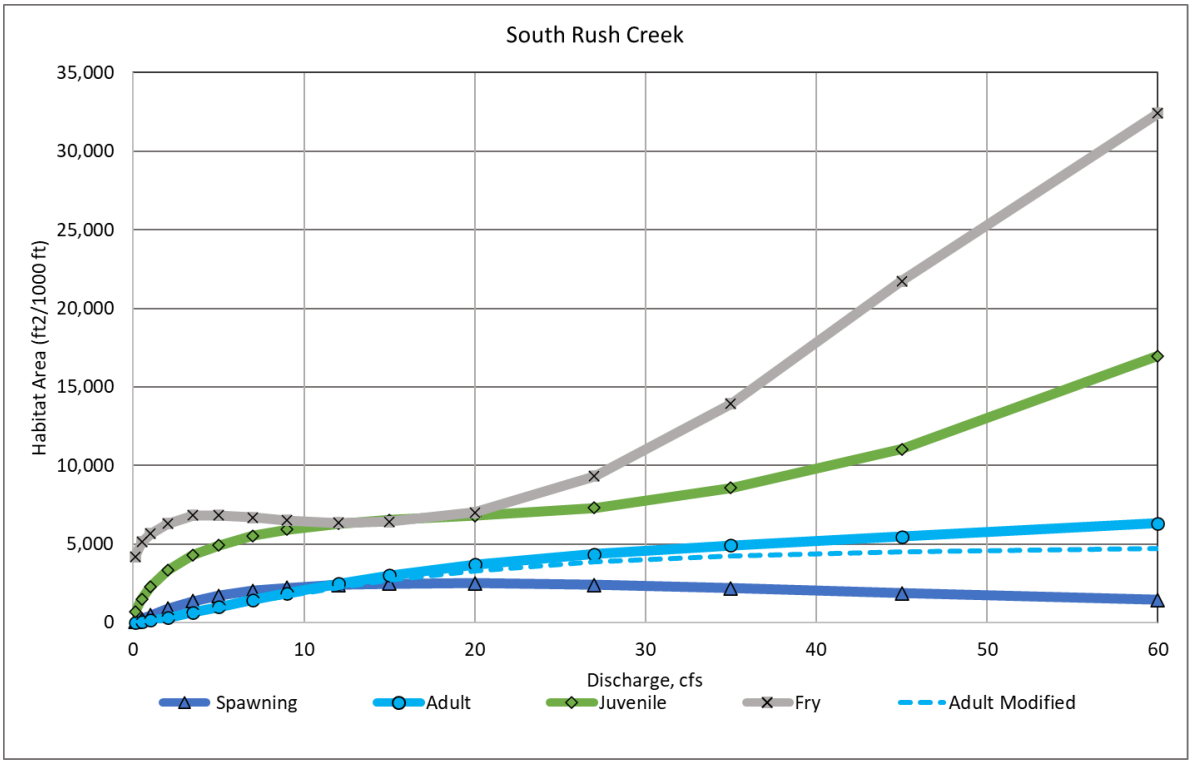


Figure AQ 1-13. Habitat versus flow relationships for Rush Creek Below Silver Lake shown for the full flow range (top) and a lower flow range (bottom). The grayed area above 200 cfs (top) represents where the habitat modeling is extrapolated substantially above the calibration data and is less accurate.



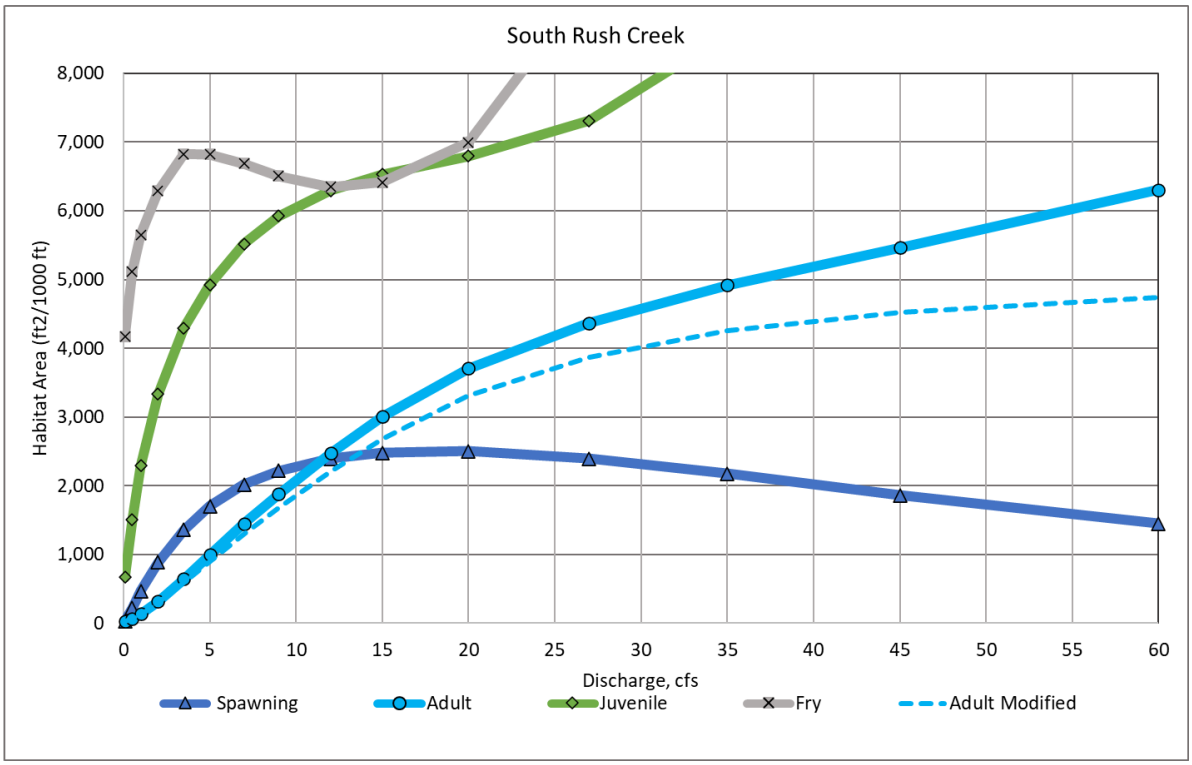


Figure AQ 1-14. Habitat versus flow relationships for South Rush Creek shown over the full flow range (top) and a lower flow range (bottom).

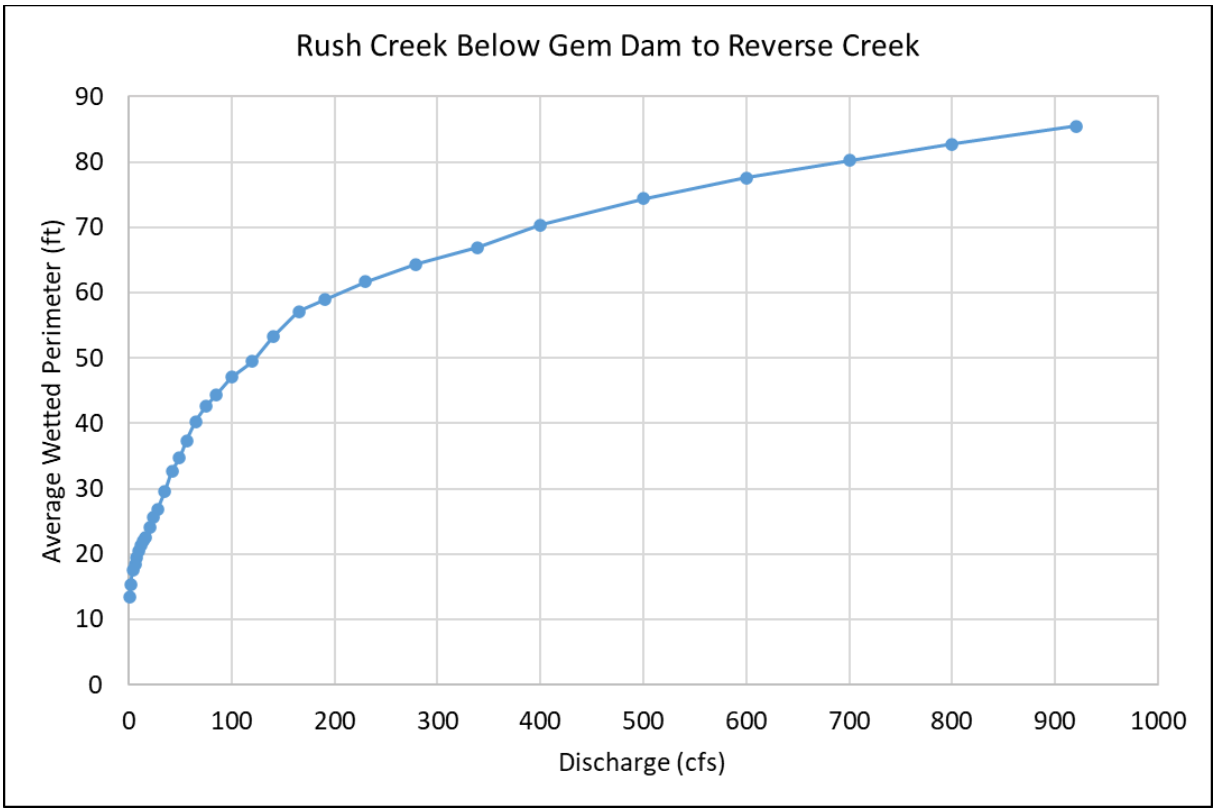


Figure AQ 1-15. Wetted Perimeter for Rush Creek below Gem Dam to Reverse Creek

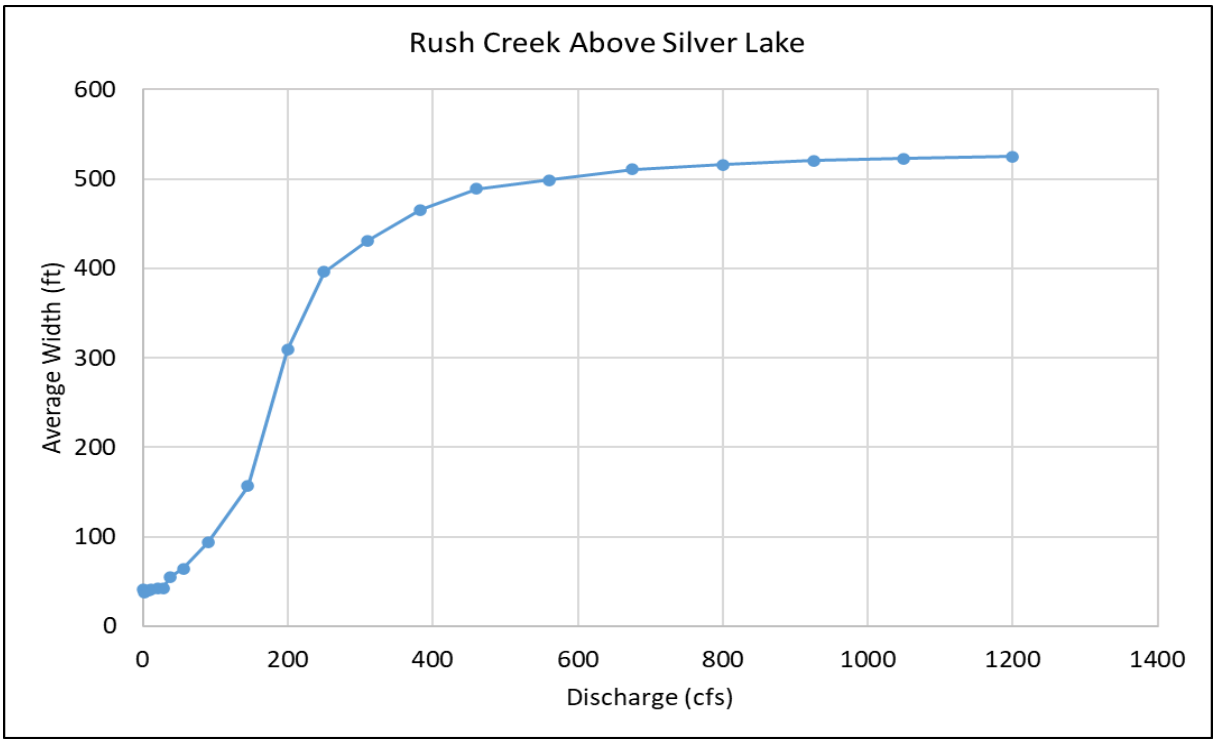


Figure AQ 1-16. Wetted Perimeter for Rush Creek above Silver Lake

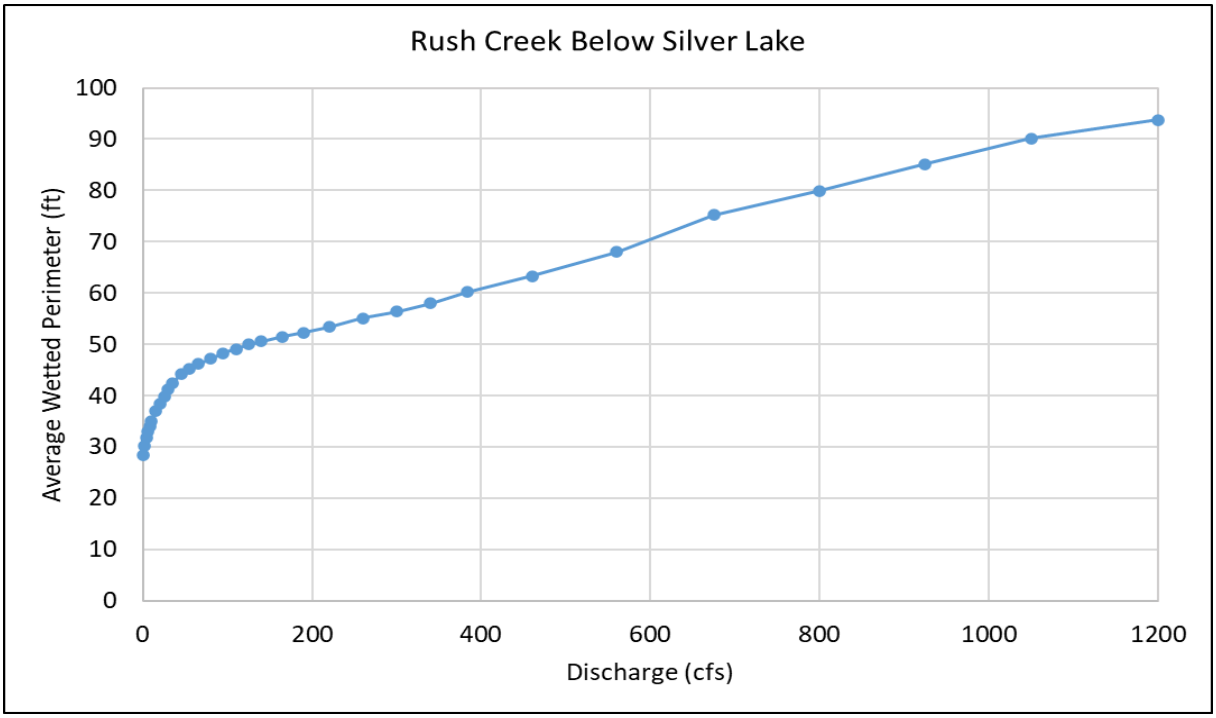


Figure AQ 1-17. Wetted Perimeter for Rush Creek below Silver Lake

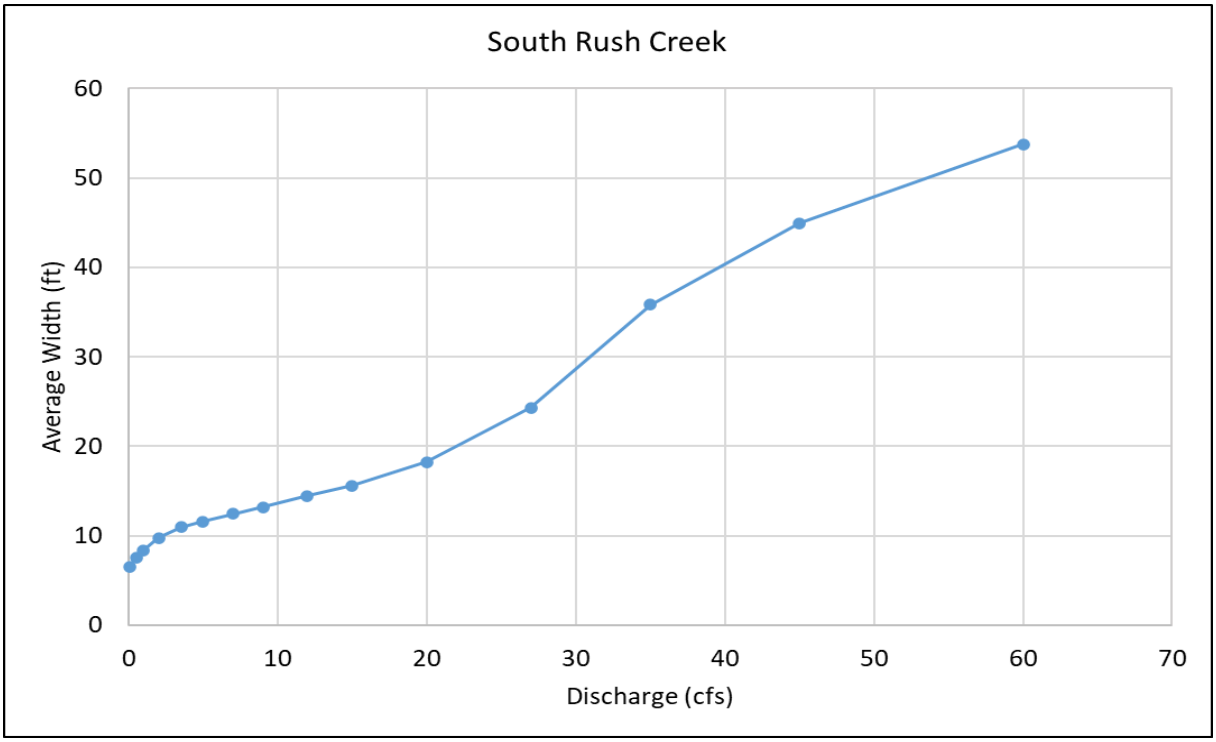


Figure AQ 1-18. Wetted Perimeter for South Rush Creek

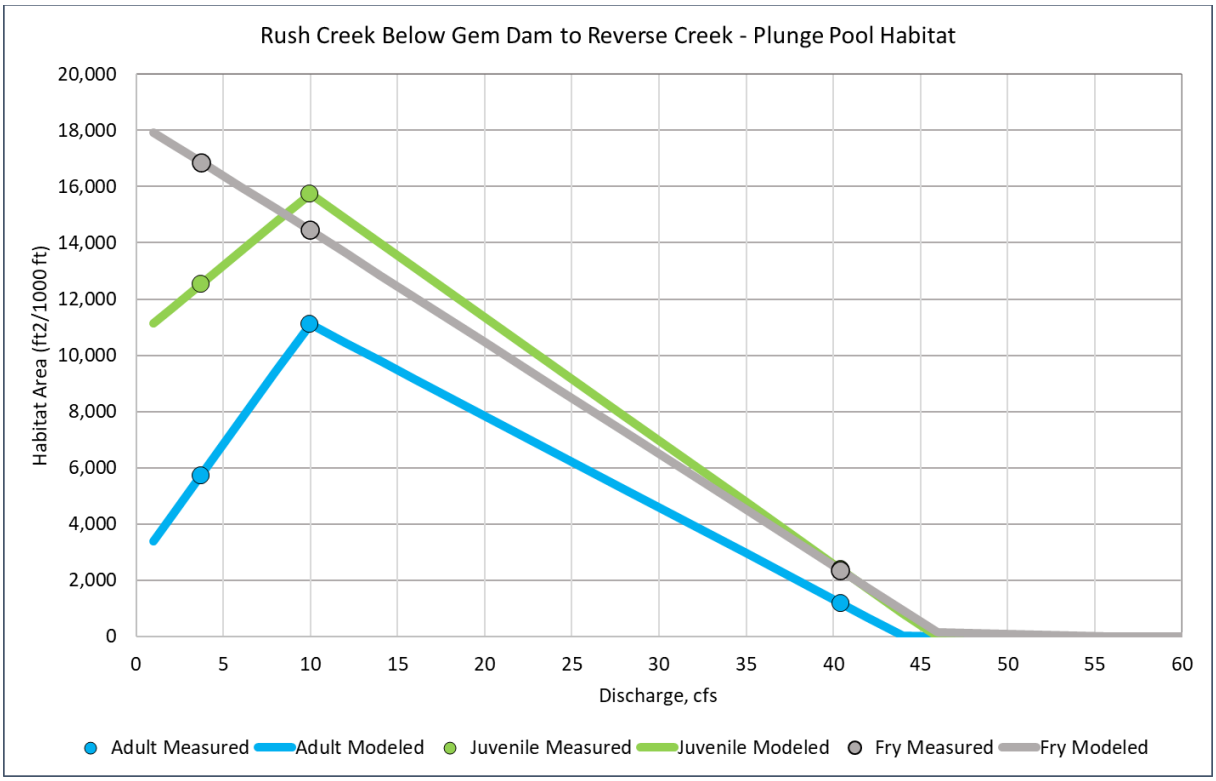


Figure AQ 1-19. Plunge pool habitat area versus flow relationship for Rush Creek Below Gem Dam reach

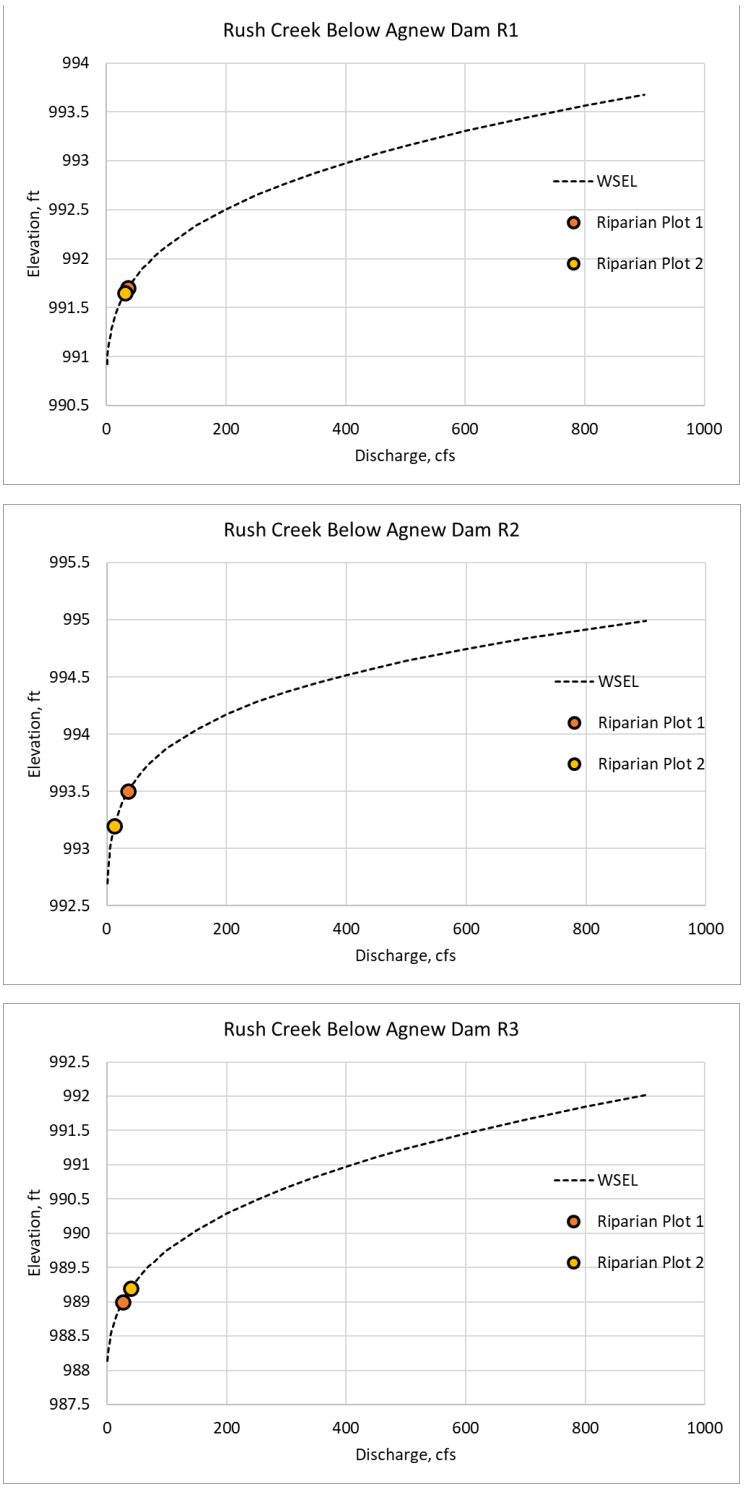


Figure AQ 1-20. Riparian vegetation plots versus flow relationship for Rush Creek below Agnew Dam

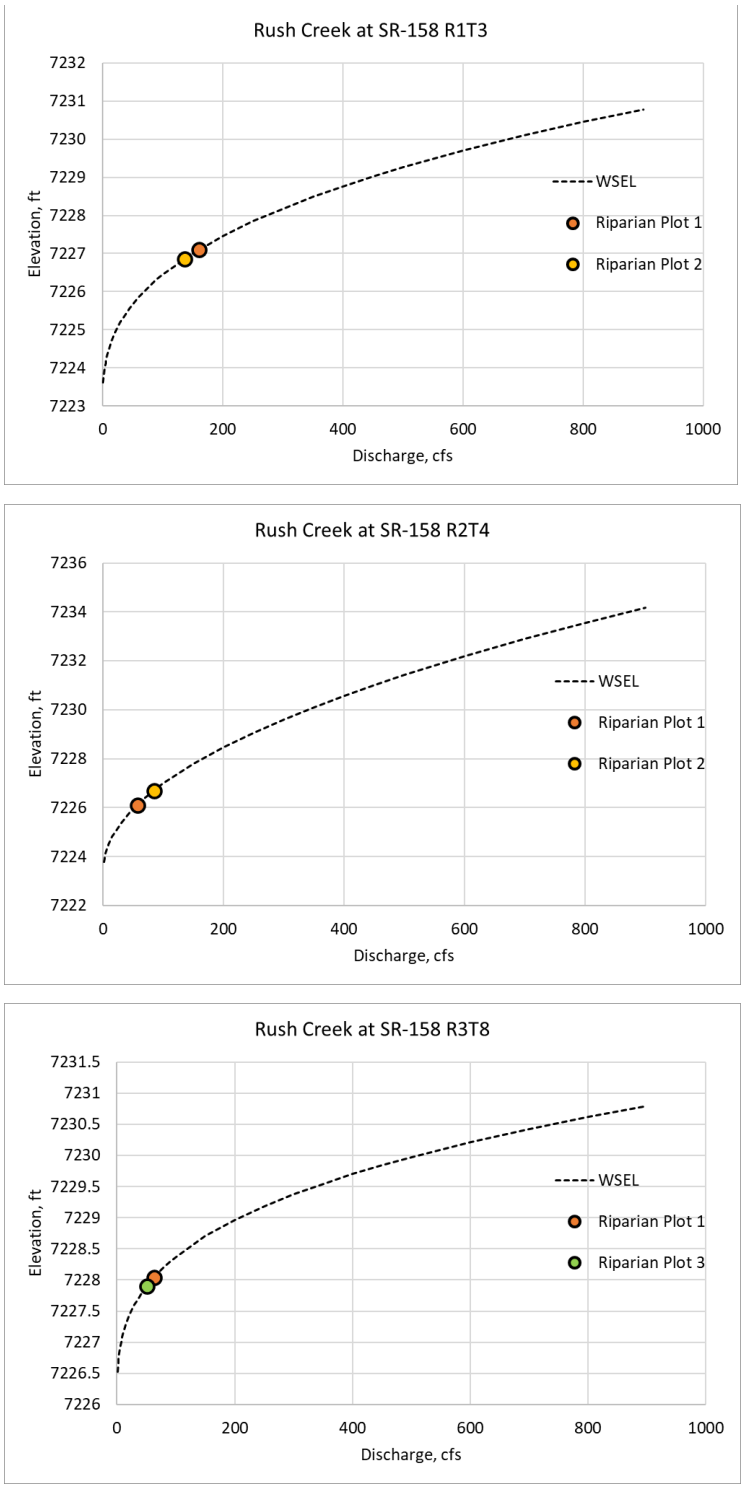


Figure AQ 1-21. Riparian Vegetation Plots Versus Flow Relationship for Rush Creek at SR-158

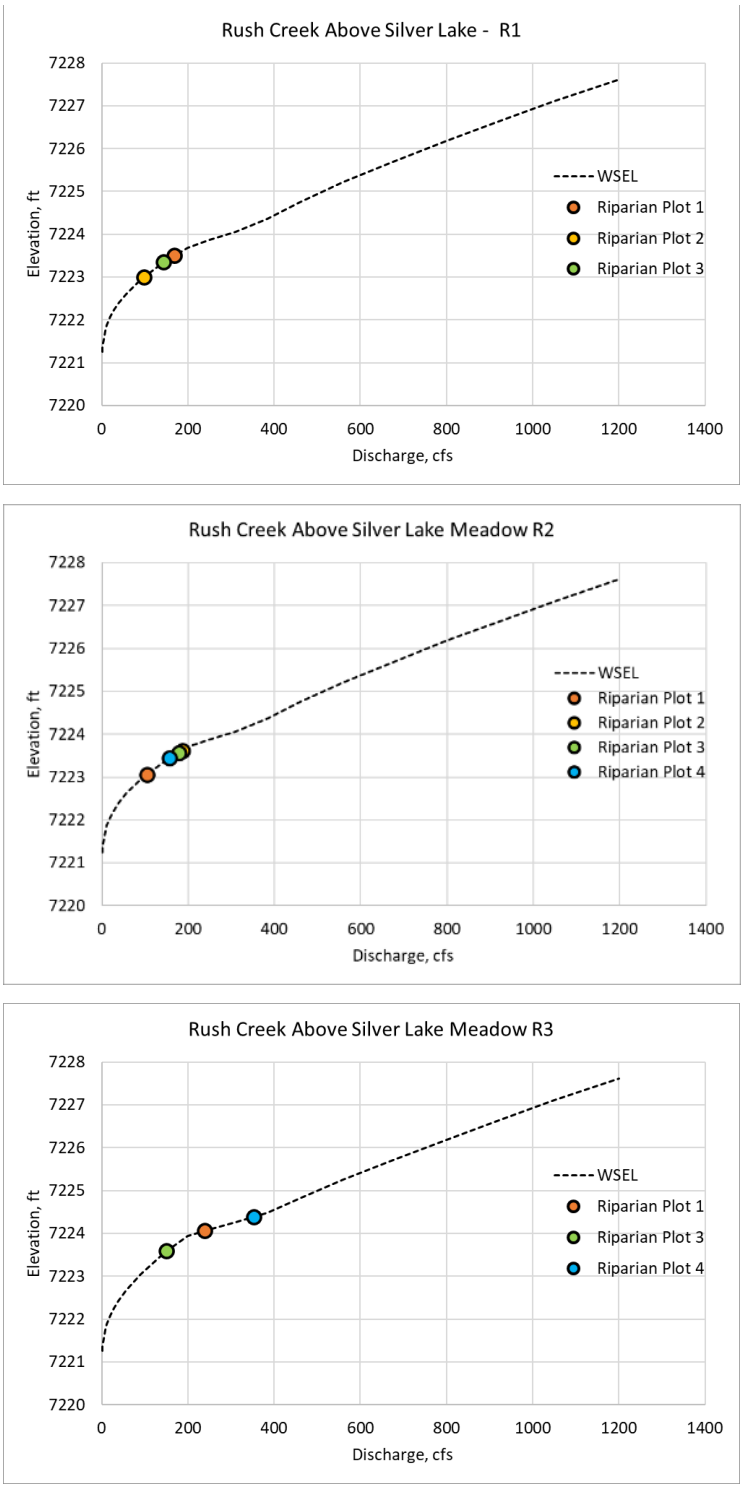


Figure AQ 1-22. Riparian Vegetation Plots Versus Flow Relationship for Rush Creek above Silver Lake

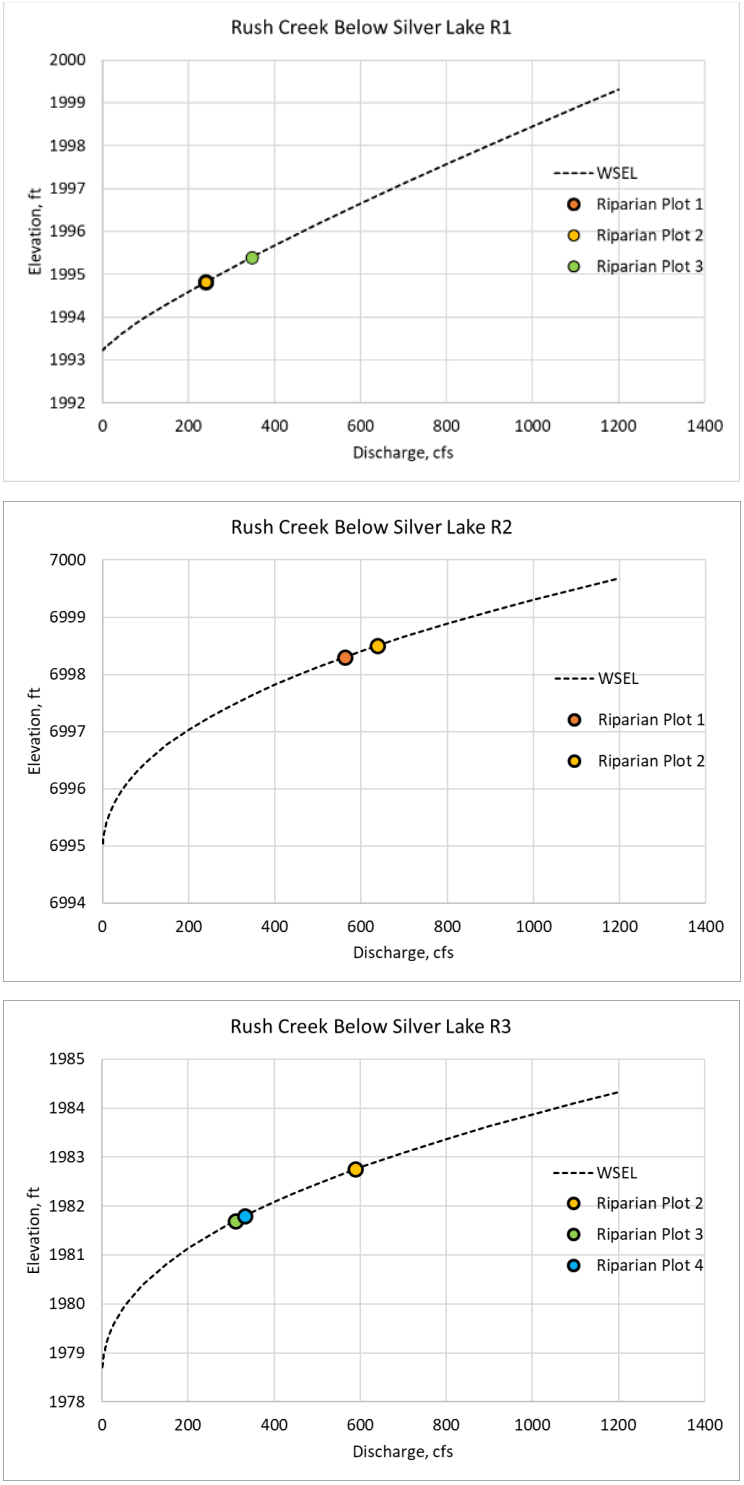


Figure AQ 1-23. Riparian Vegetation Plots Versus Flow Relationship for Rush Creek below Silver Lake

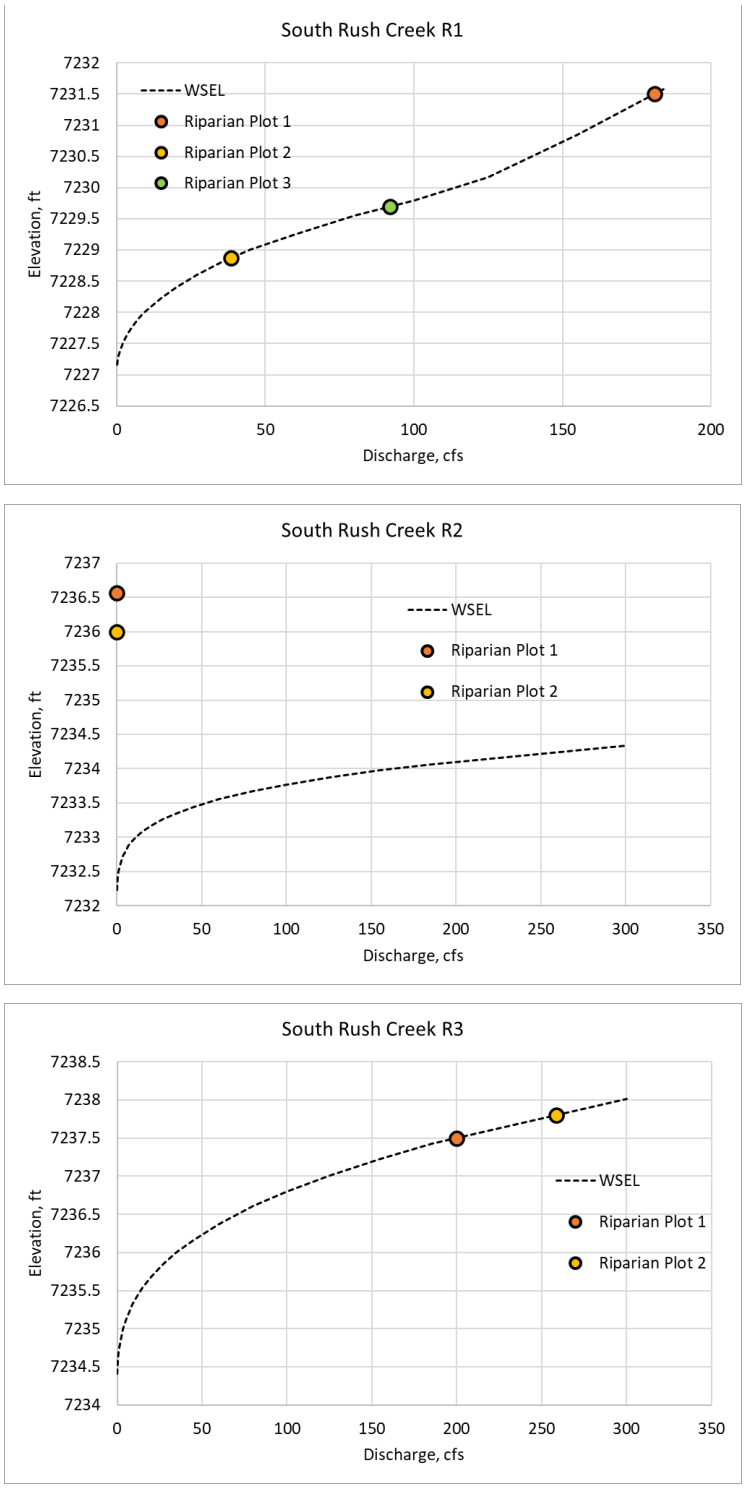


Figure AQ 1-24. Riparian Vegetation Plots Versus Flow Relationship for South Rush Creek

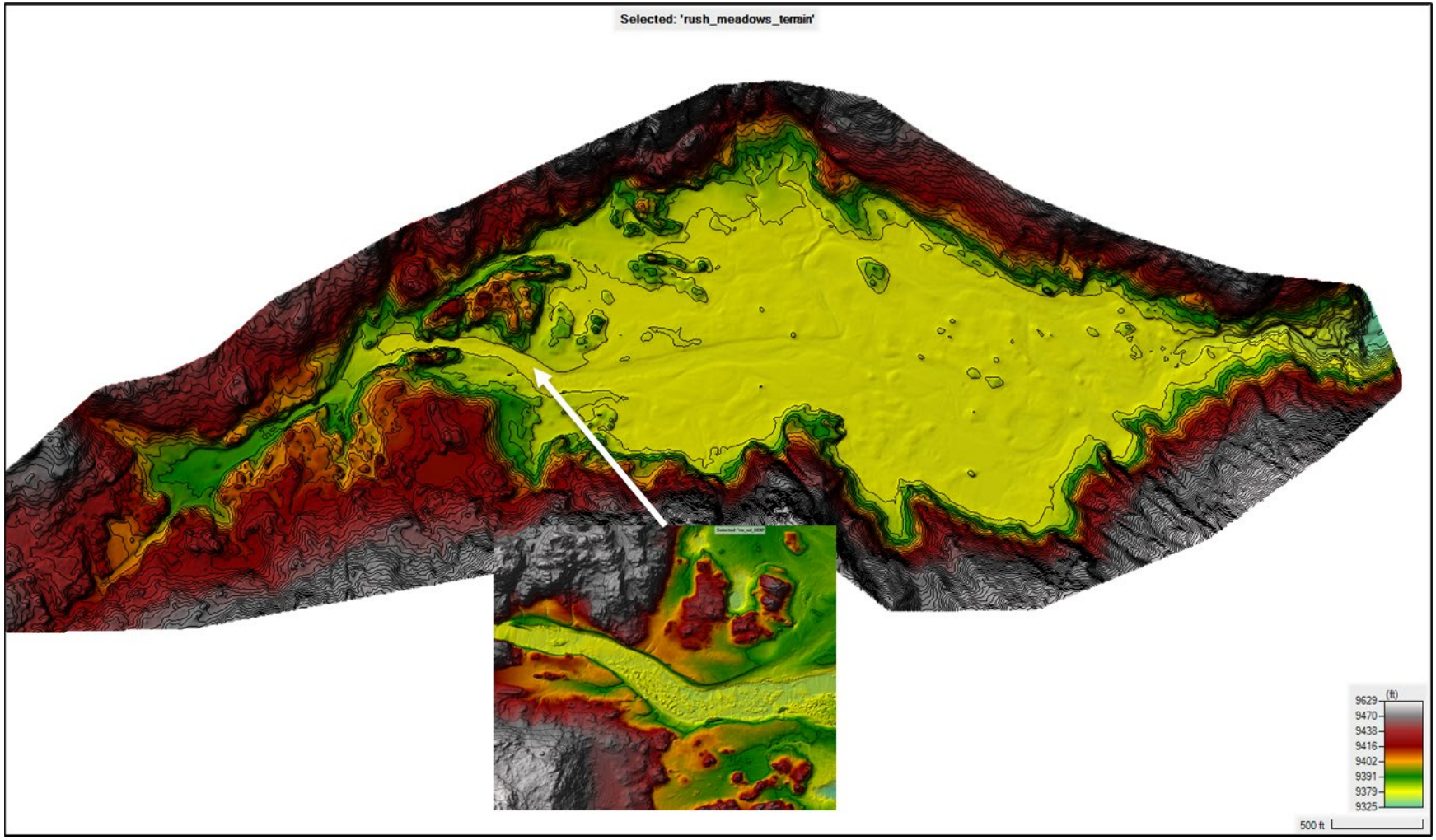


Figure AQ 1-25. Topography for Rush Creek and the Former Waugh Lakebed Developed Using LiDAR and RTK GPS

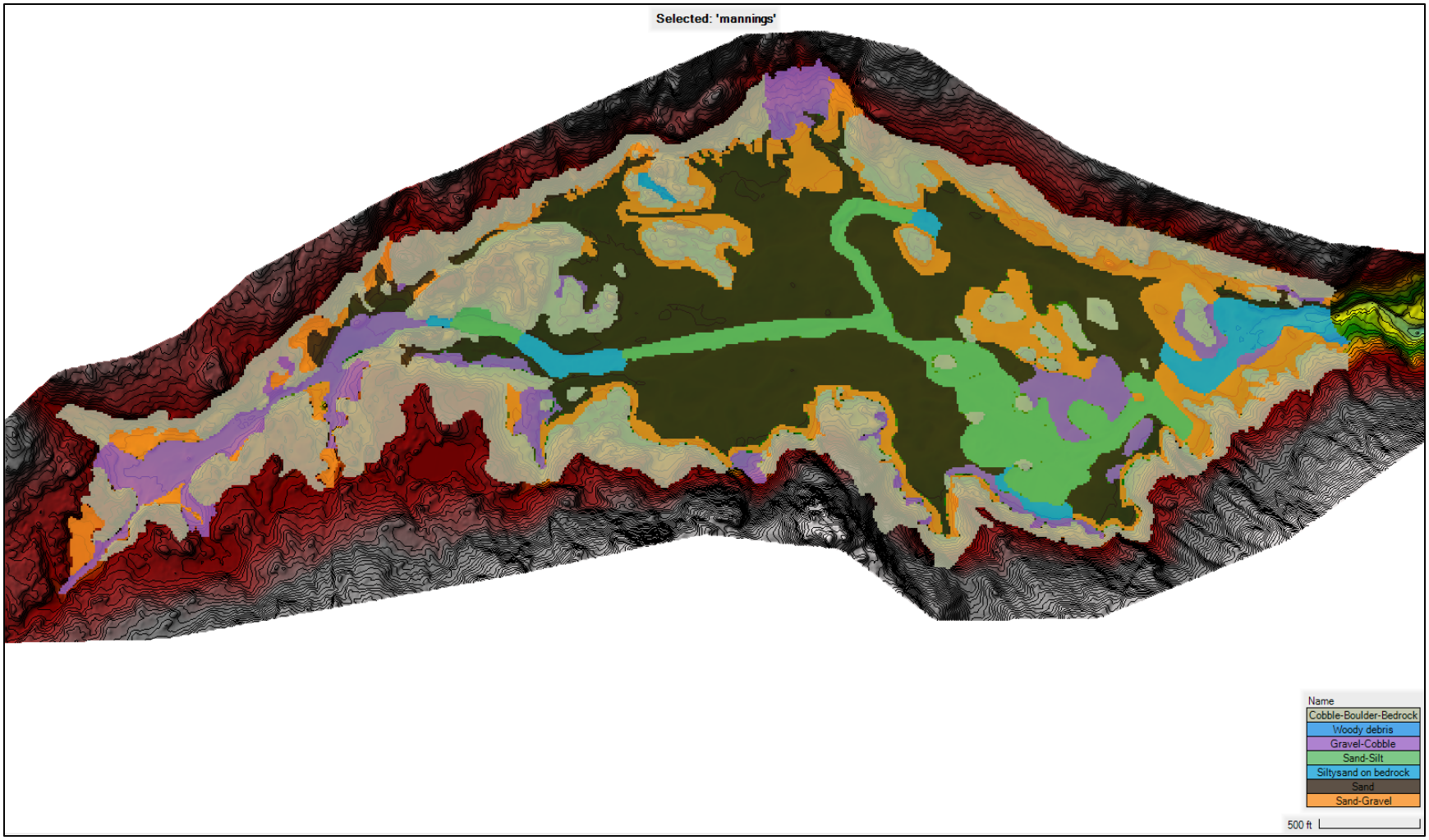
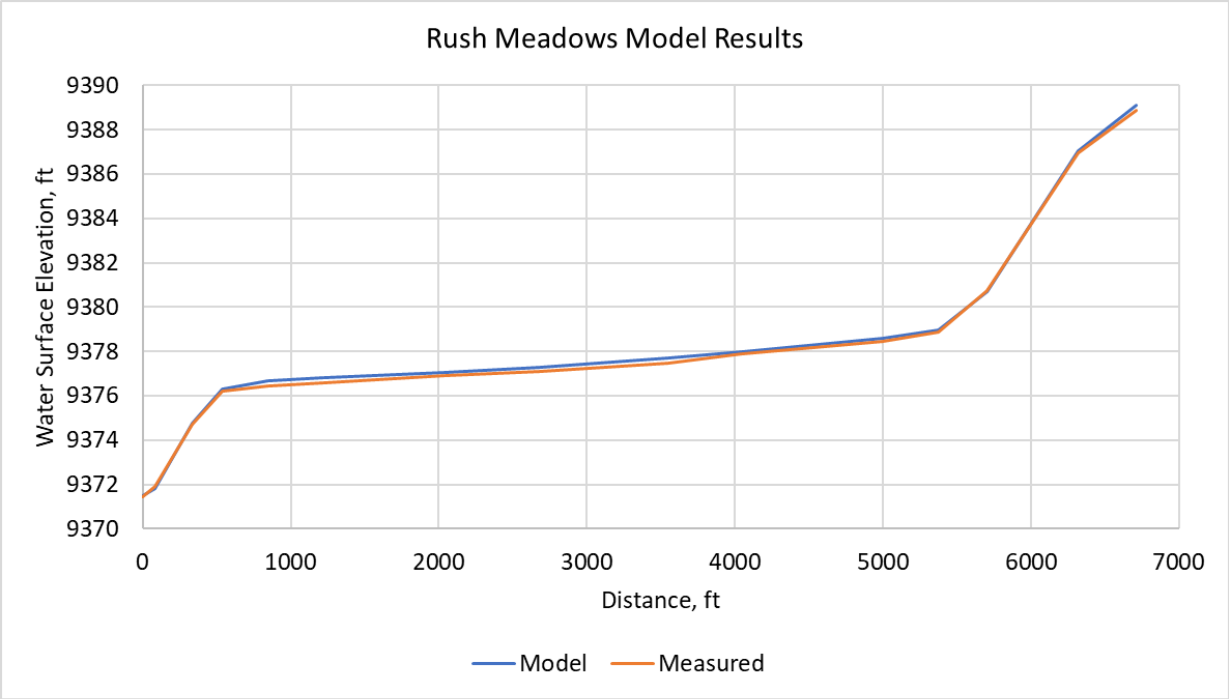


Figure AQ 1-26. Mapped Substrate for Rush Creek and the Former Waugh Lakebed



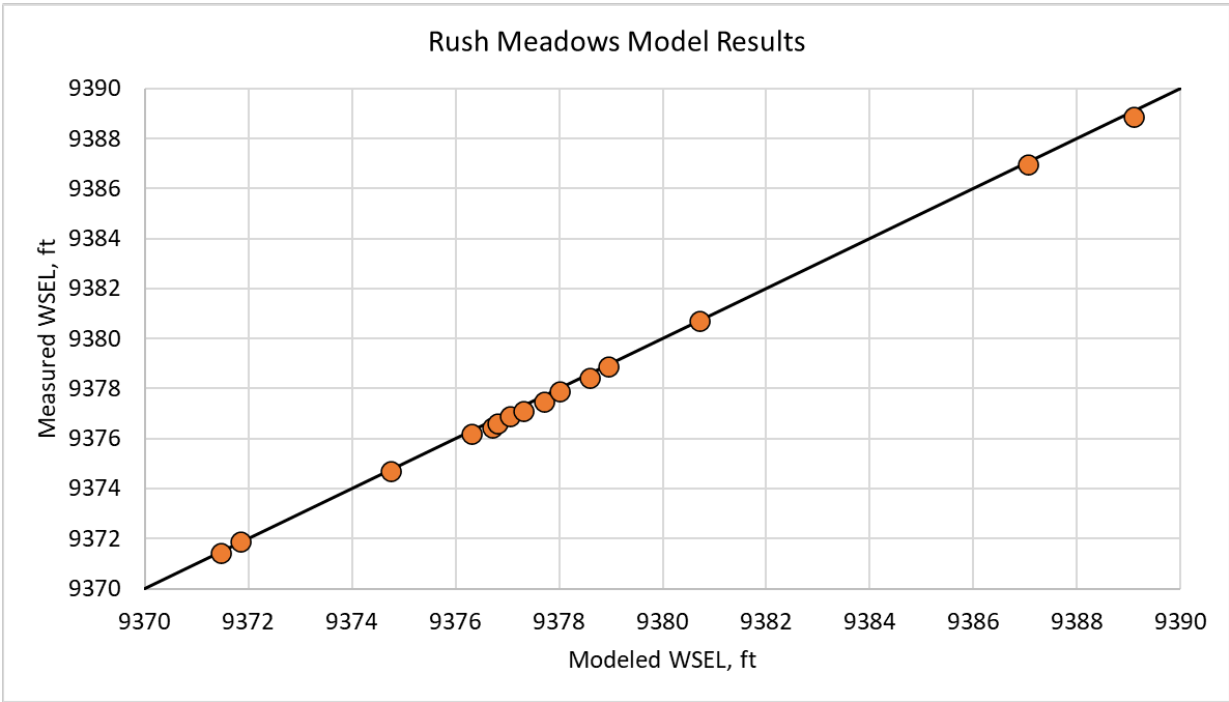


Figure AQ 1-27. Modeled and Measured Water Surface Elevation Comparison for the Rush Meadows HEC-RAS 2D Model

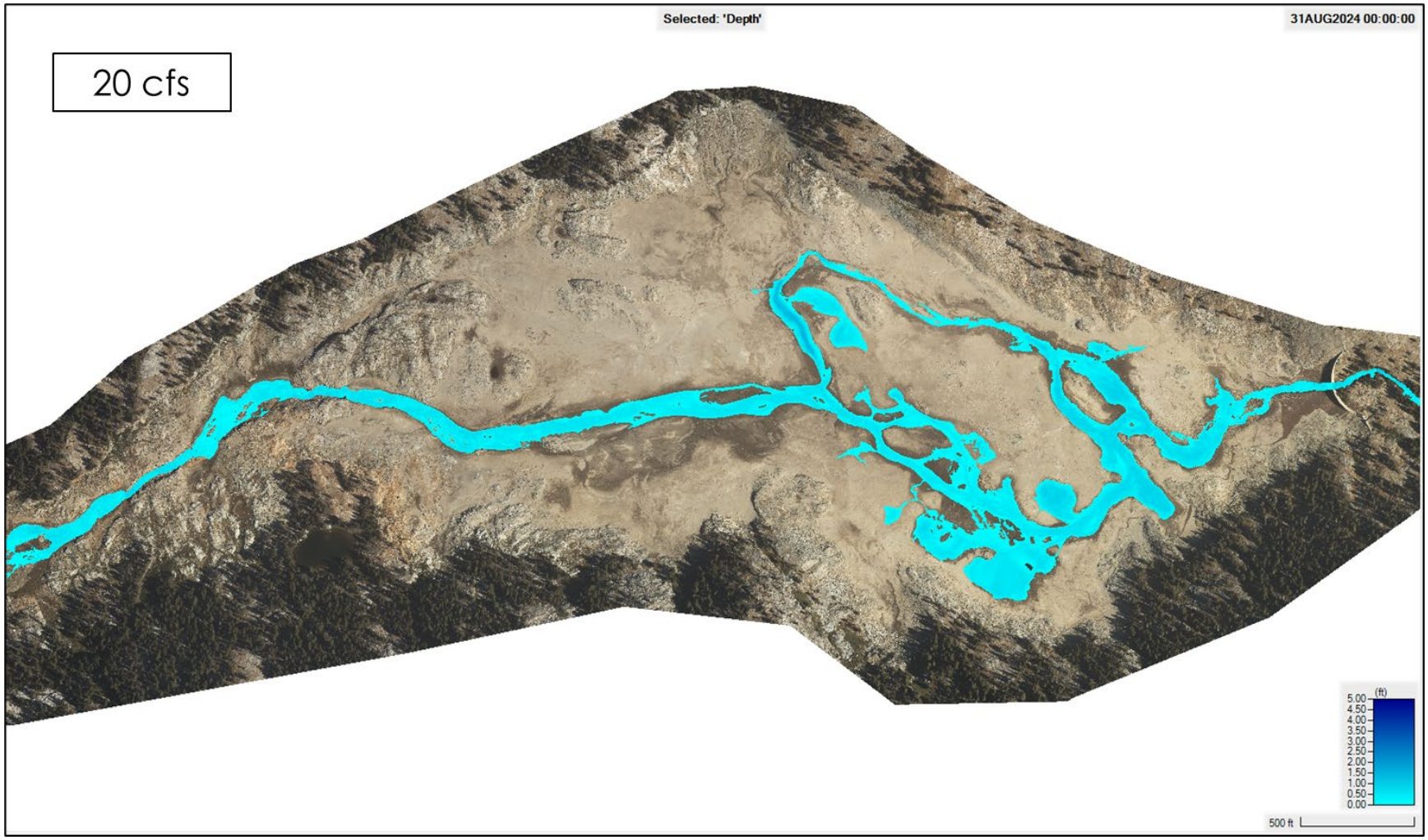


Figure AQ 1-28. Rush Meadows 2D-Hydrodynamics Model Depth Results for a Flow of 20 cfs (with Rush Meadows Dam Removed)

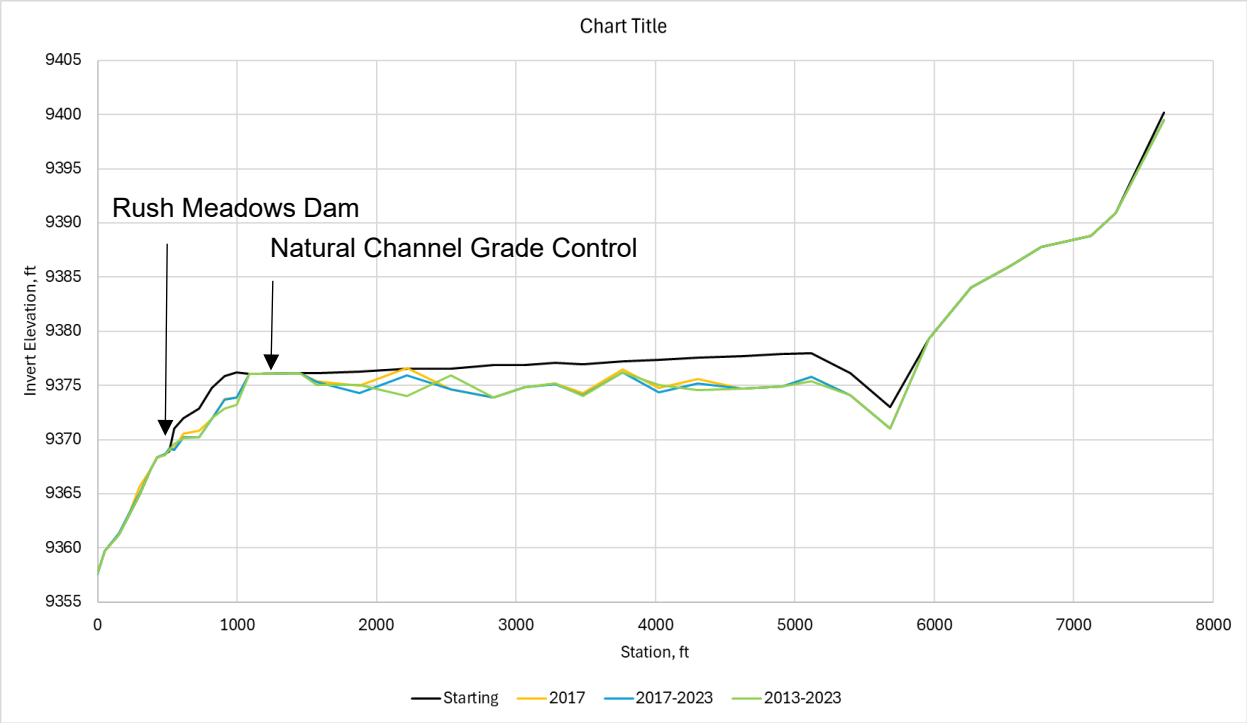


Figure AQ 1-29. Waugh Lakebed Channel Invert Profiles for the HEC-RAS 1D Sediment Modeling Scenarios 2017, 2017–2023, and 2013–2023

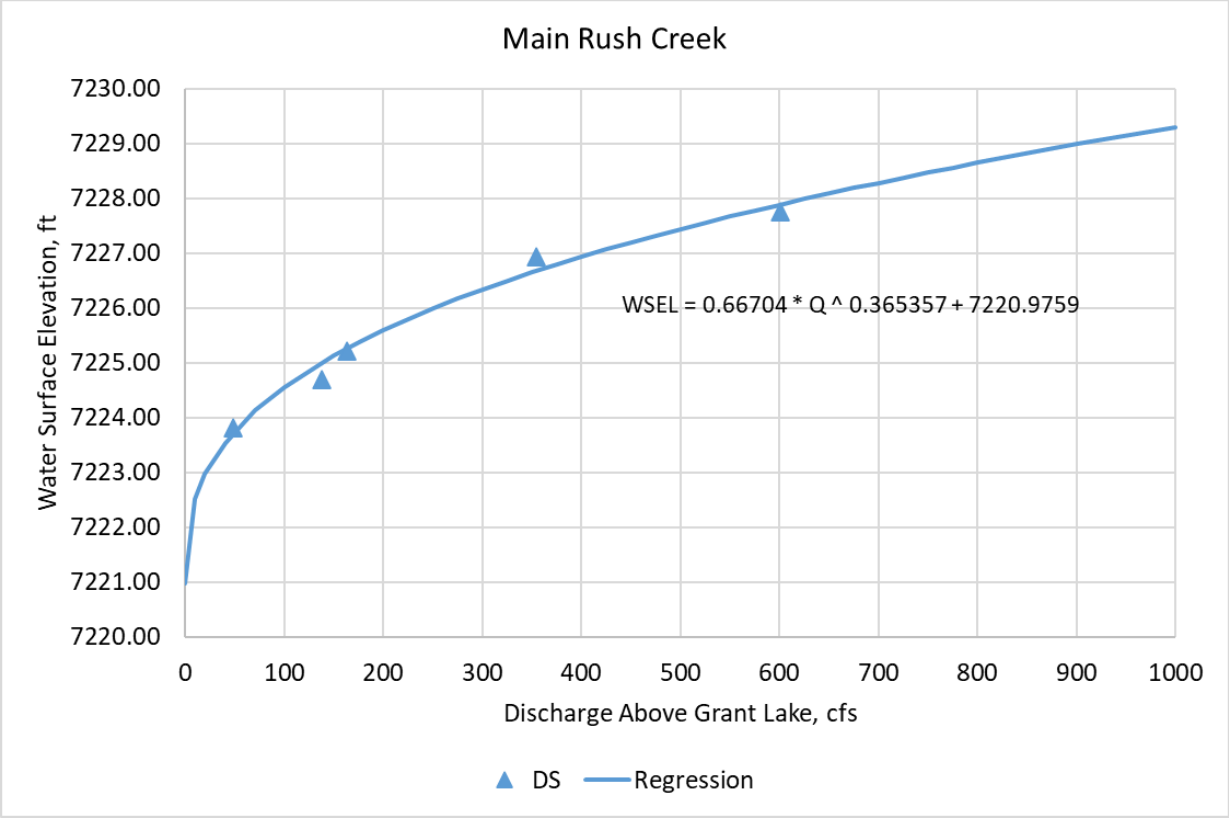


Figure AQ 1-30. Rush Creek Backwater Relationship for Culvert Modeling at SR-158 (Top) and Pictures of the Culvert Inlet (Left Bottom) and Culvert Outlet (Right Bottom)

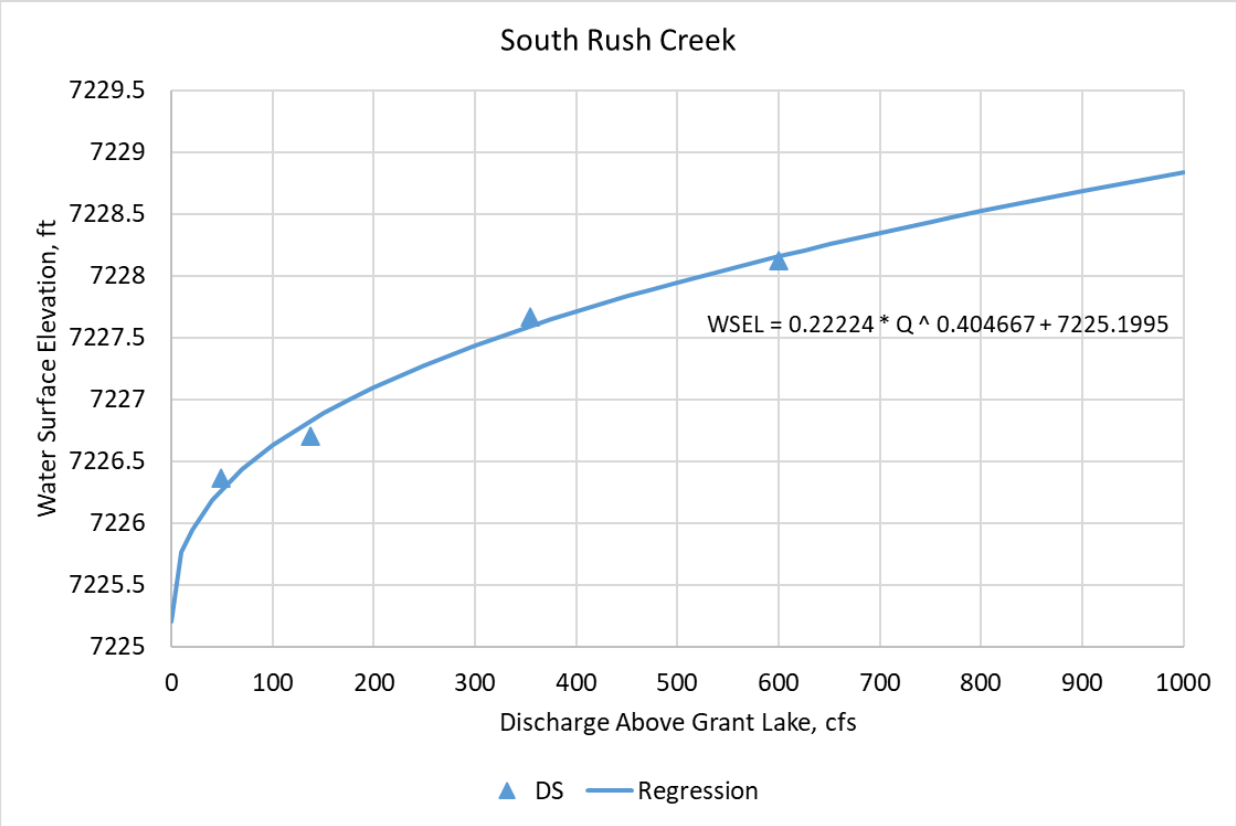


Figure AQ 1-31. South Rush Creek Backwater Relationship for Culvert Modeling at SR-158 (Top) and Pictures of the Culvert Inlet (Left Bottom) and Culvert Outlet (Right Bottom)

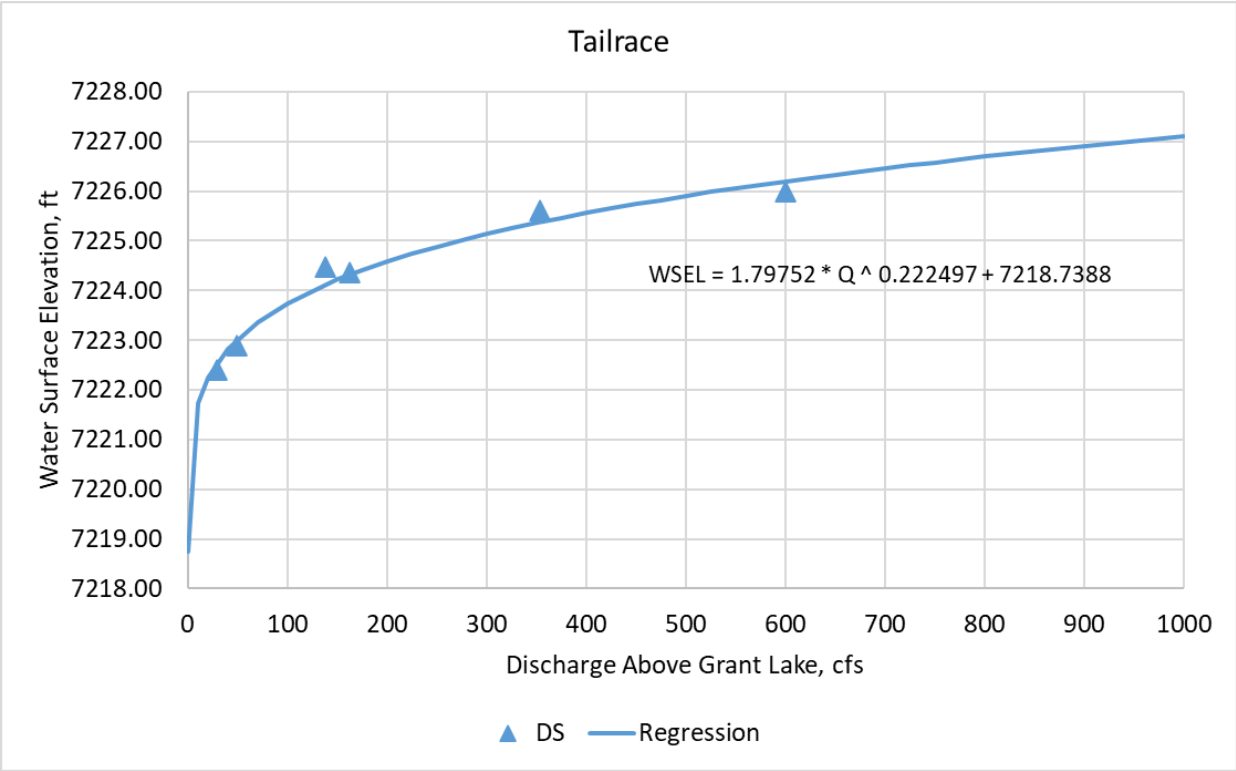


Figure AQ 1-32. Rush Creek Powerhouse Tailrace Backwater Relationship for Culvert Modeling at SR-158 (Top) and Pictures of the Culvert Inlet (Left Bottom) and Culvert Outlet (Right Bottom)

Figure AQ 1-33. Example of Large Woody Debris Aggregation in South Rush Creek Downstream of SR-158

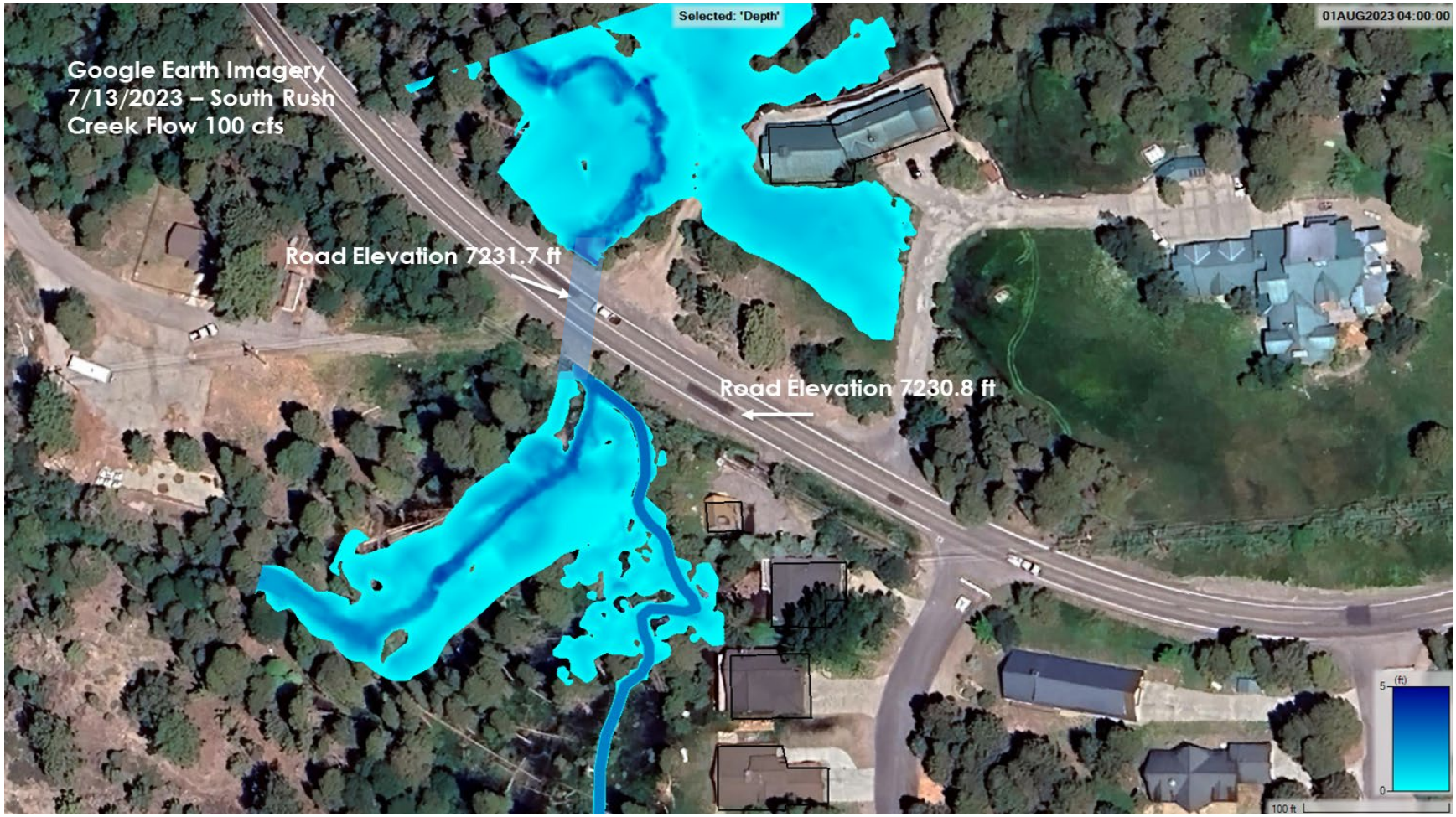


Figure AQ 1-34. Depth Results for the South Rush Creek SR-158 Culvert Modeling at a Flow of Approximately 100 cfs

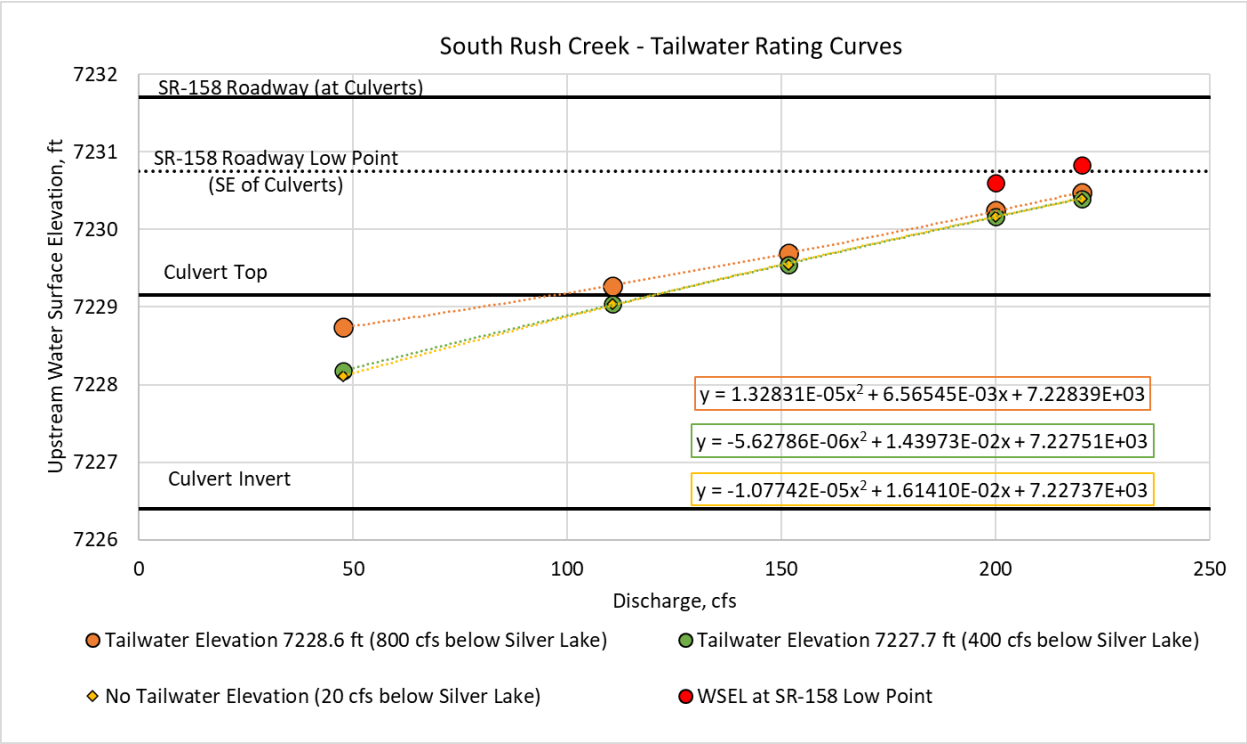
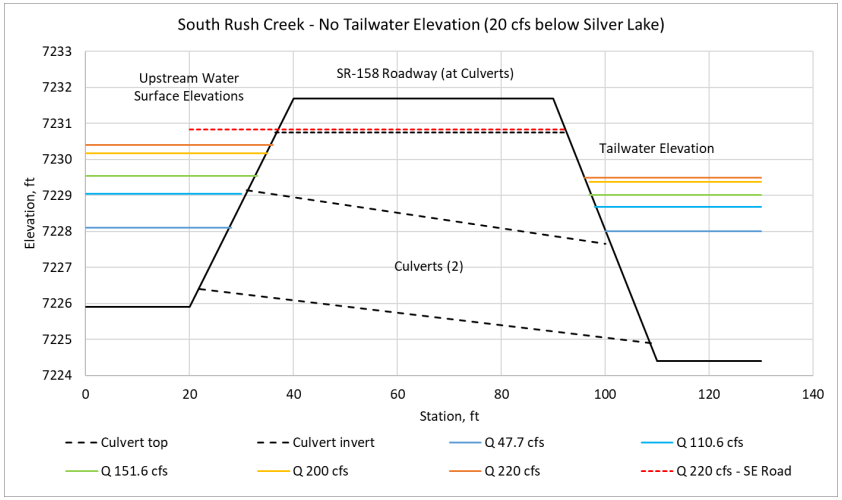
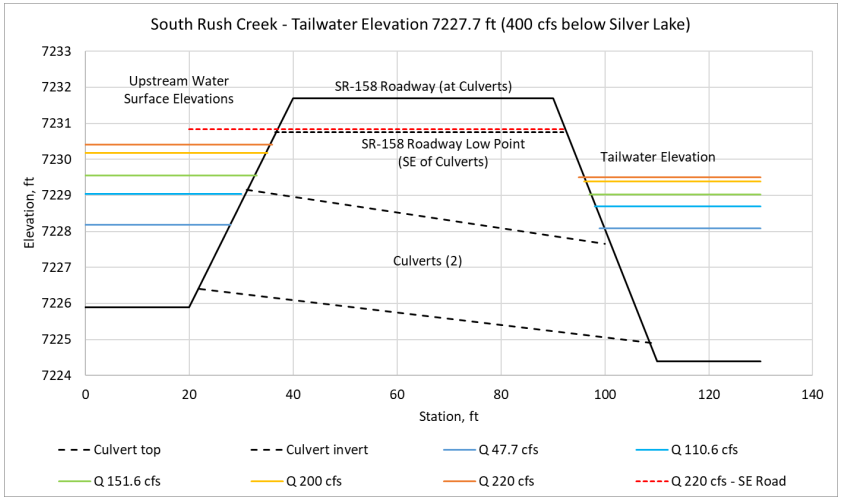


Figure AQ 1-35a. Stage-Discharge Relationship Upstream of the South Rush Creek Culvert





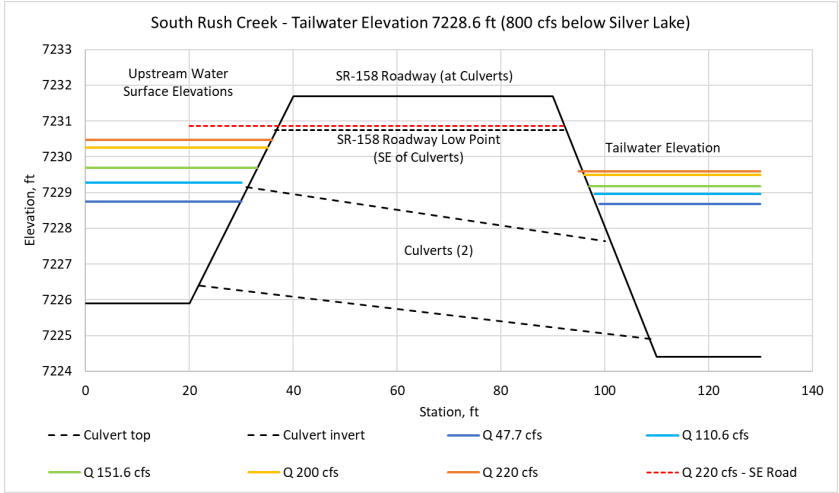


Figure AQ 1-35b. Stage-Discharge Relationship Upstream of the South Rush Creek SR-158 Culvert

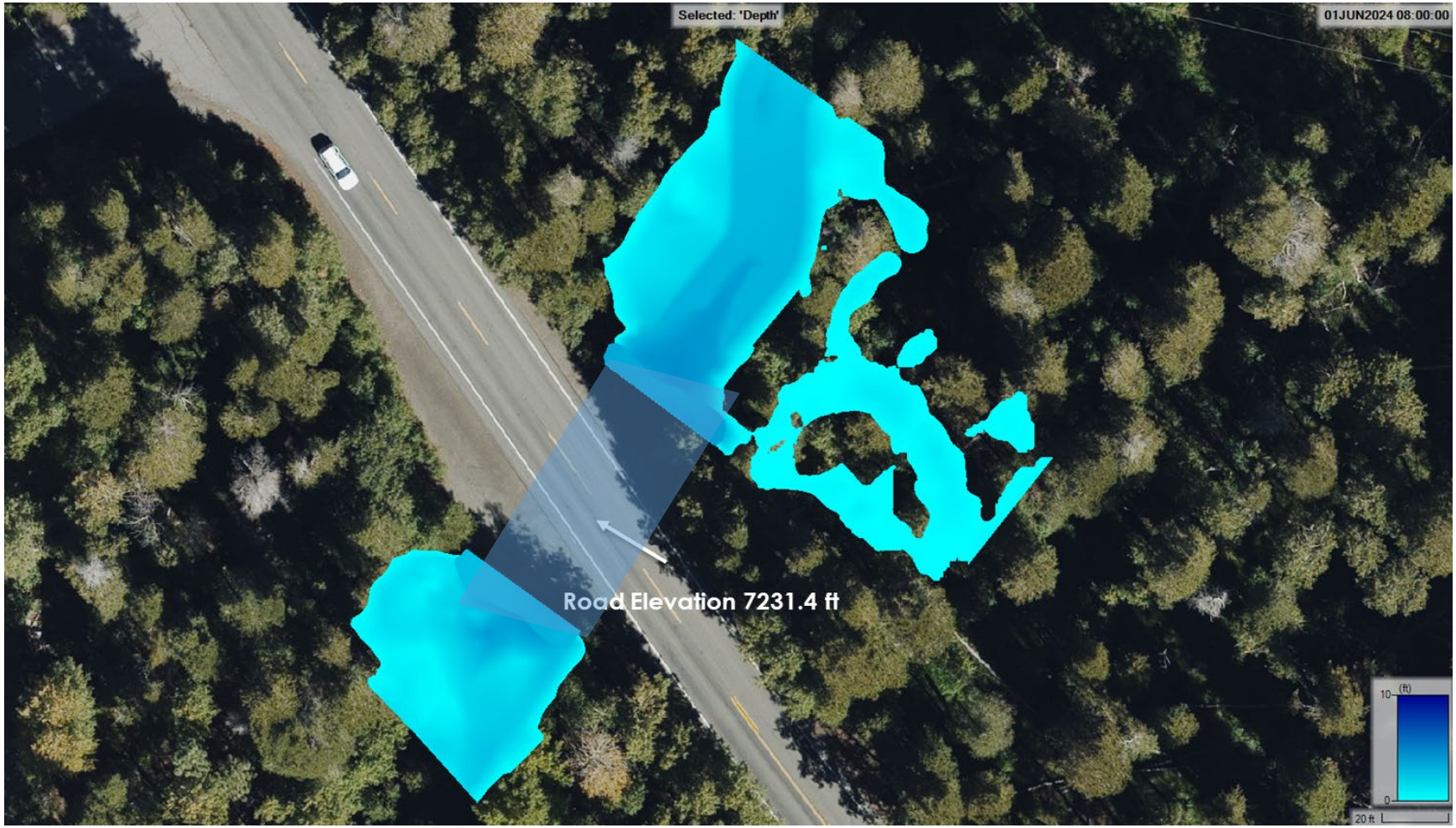


Figure AQ 1-36. Depth Results for Culvert Modeling at the Rush Creek SR-158 Culvert at a Flow of Approximately 380 cfs

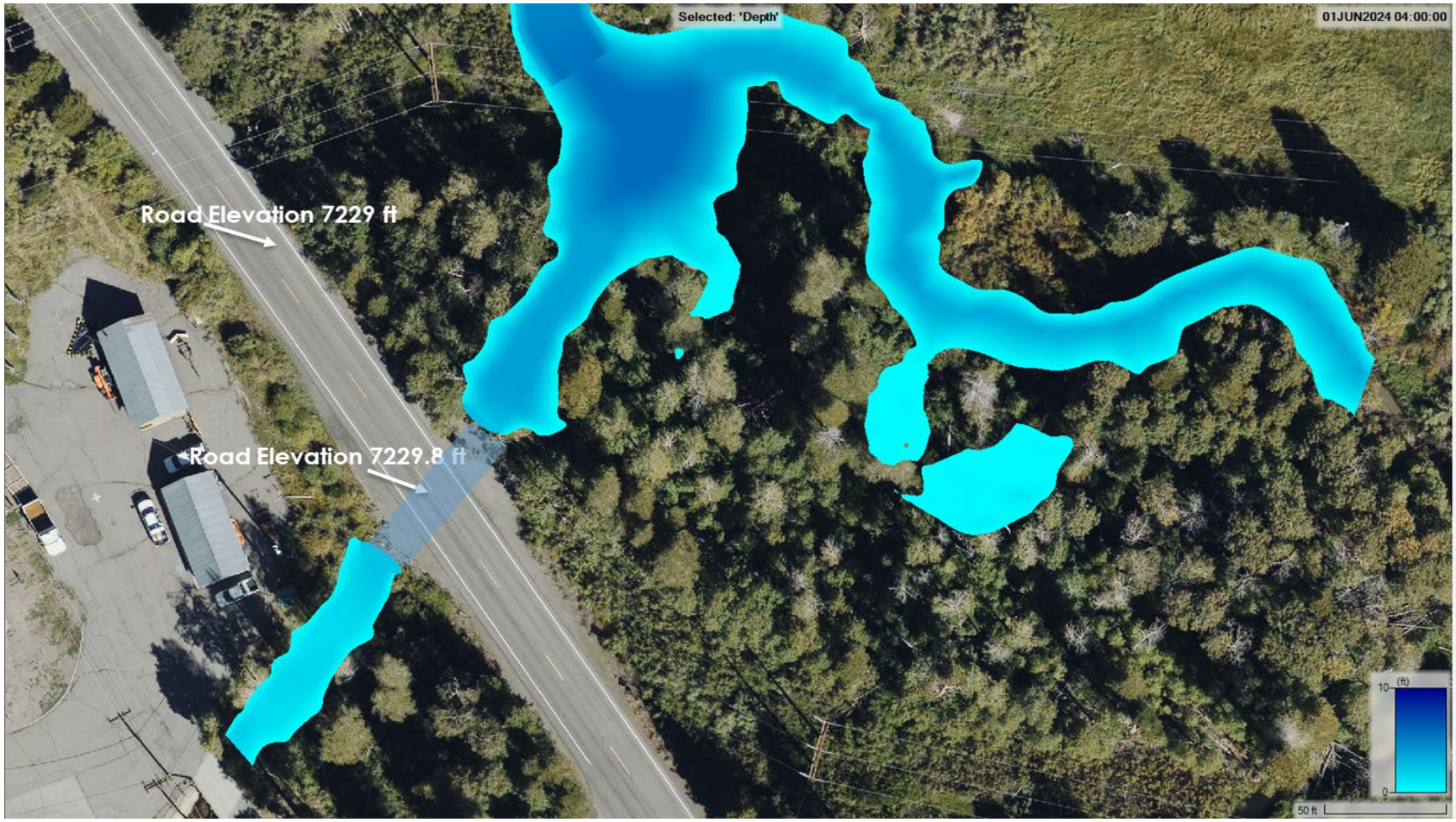


Figure AQ 1-37. Depth Results for Culvert Modeling at the Rush Creek Powerhouse Tailrace SR-158 Culvert at a Flow of Approximately 110 cfs

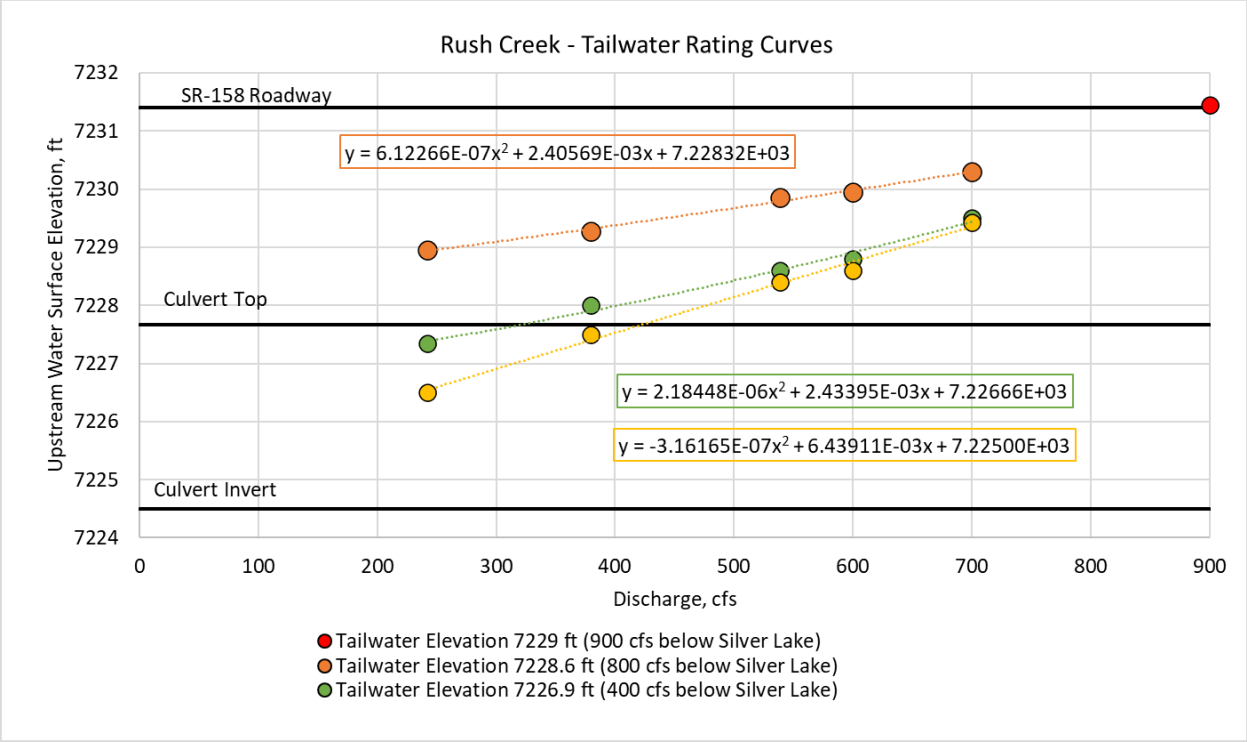


Figure AQ 1-38a. Stage-Discharge Relationship Upstream of the Rush Creek SR-158 Culvert

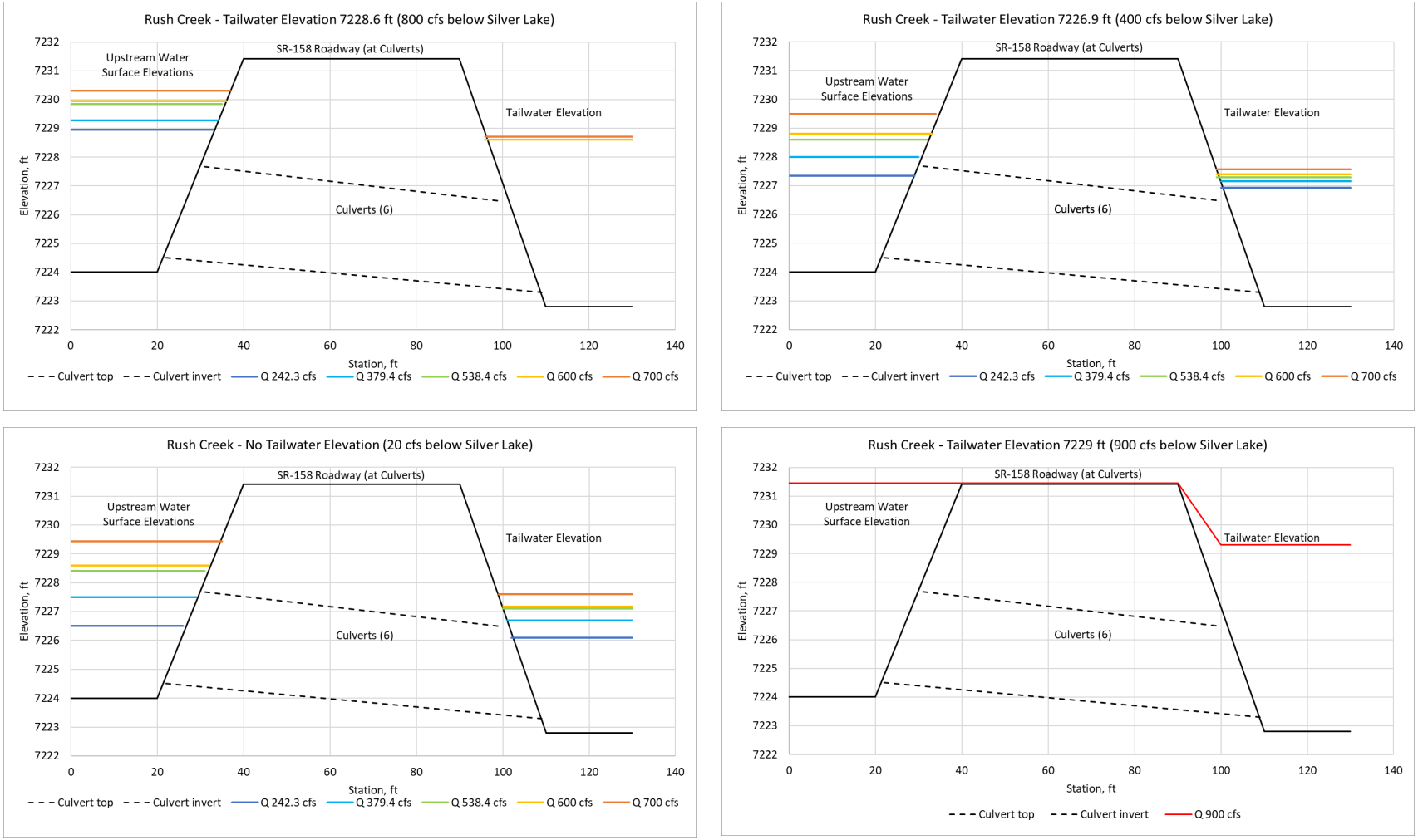


Figure AQ 1-38b. Stage-Discharge Relationship Upstream of the Rush Creek SR-158 Culvert

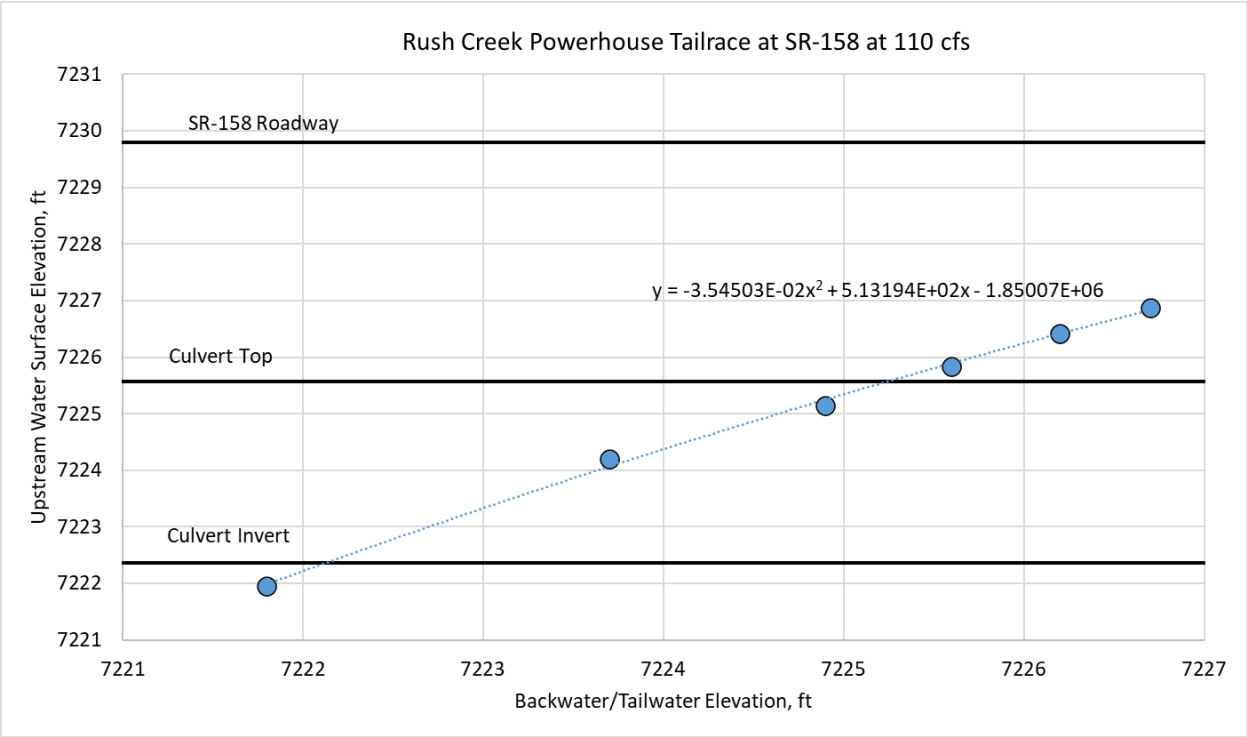


Figure AQ 1-39a. Stage-Discharge Relationship Upstream of the Rush Creek Powerhouse Tailrace SR-158 Culvert

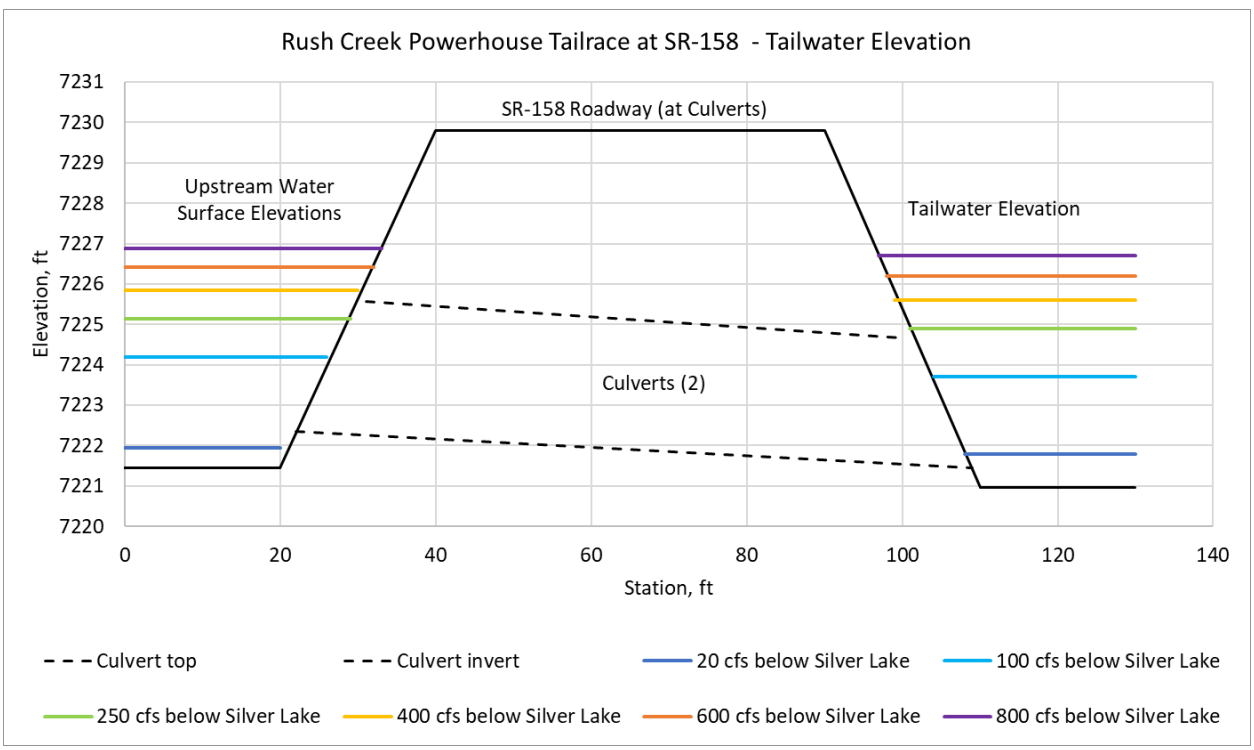


Figure AQ 1-39b. Stage-Discharge Relationship Upstream of the Rush Creek Powerhouse Tailrace SR-158 Culvert

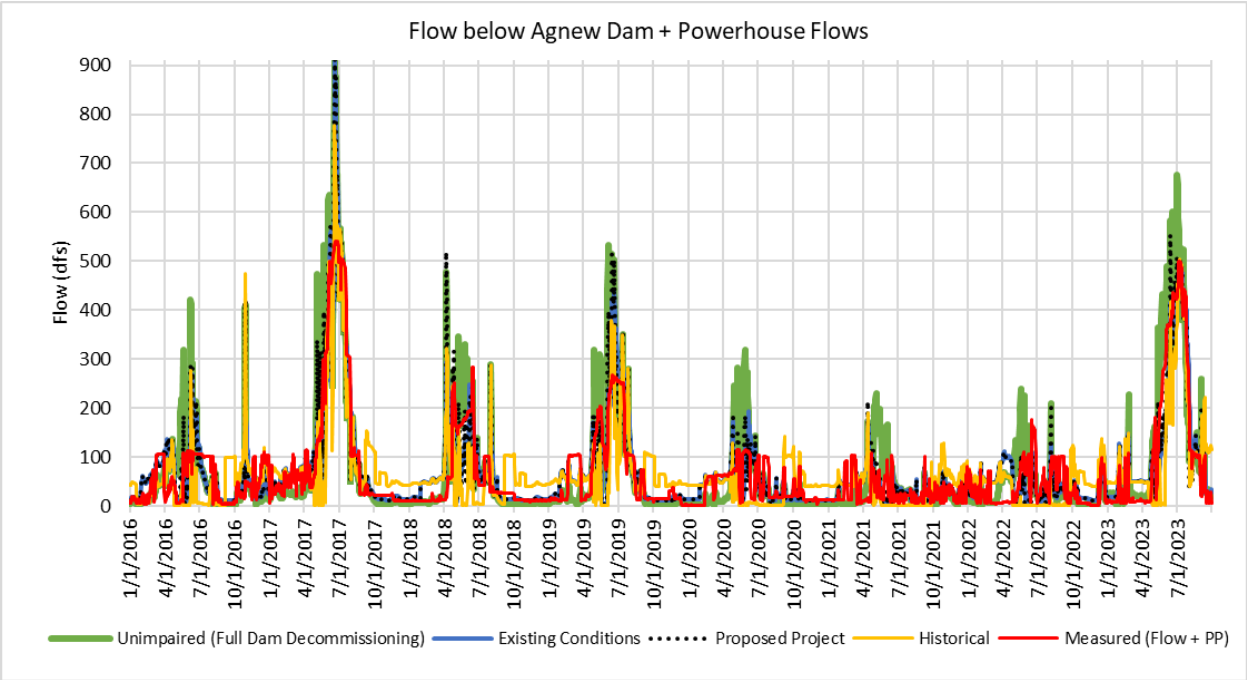


Figure AQ 1-40. Measured flow below Agnew Dam compared to modeled unimpaired, existing, Proposed Action, and historical flows. The measured flows illustrate real-time operator management of Gem dam storage immediately prior to high flow events under actual operations compared to modeled operations. In high water years SCE operations use forecasted inflows and storage to minimize spills from Gem reservoir.

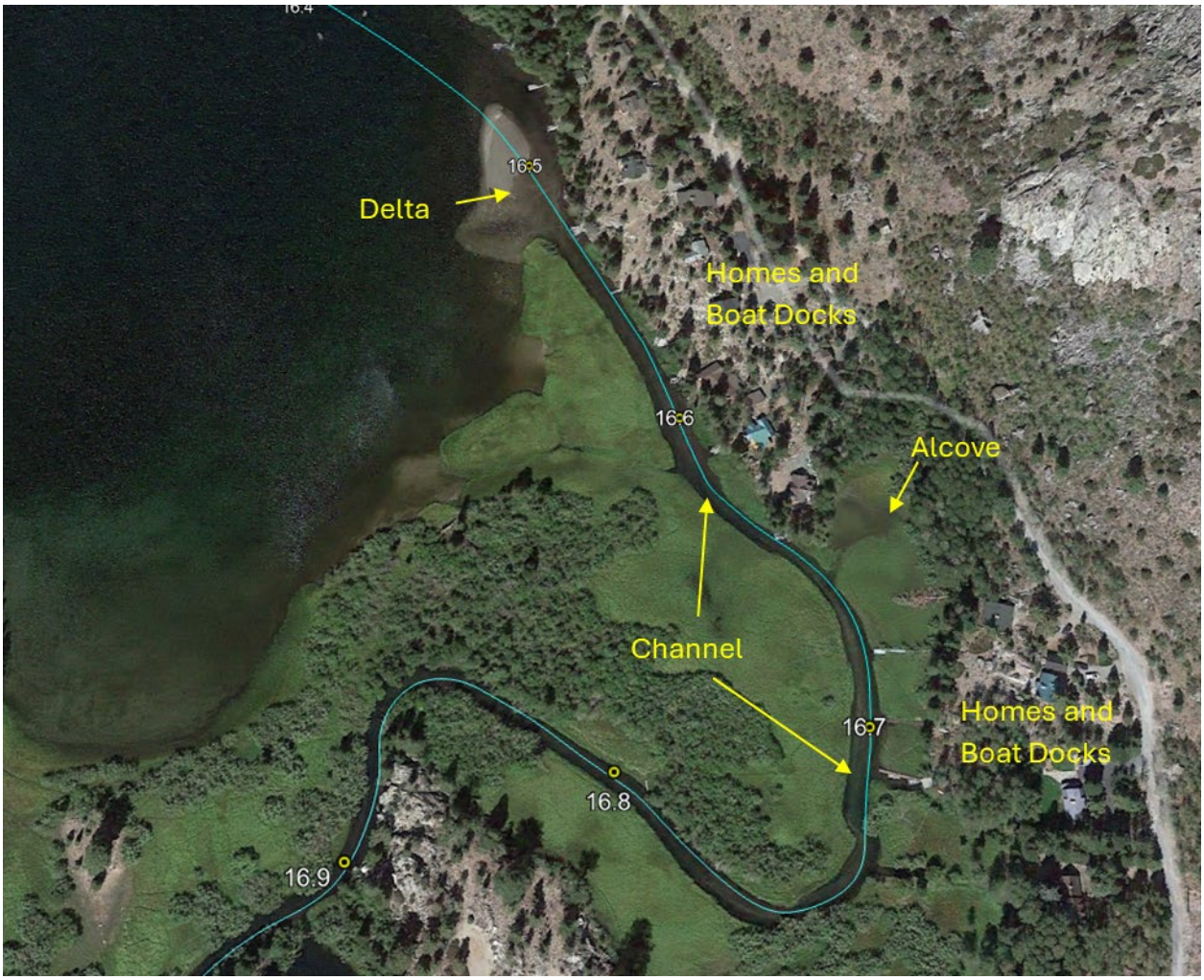


Figure AQ 1-41. Silver Lake Inlet

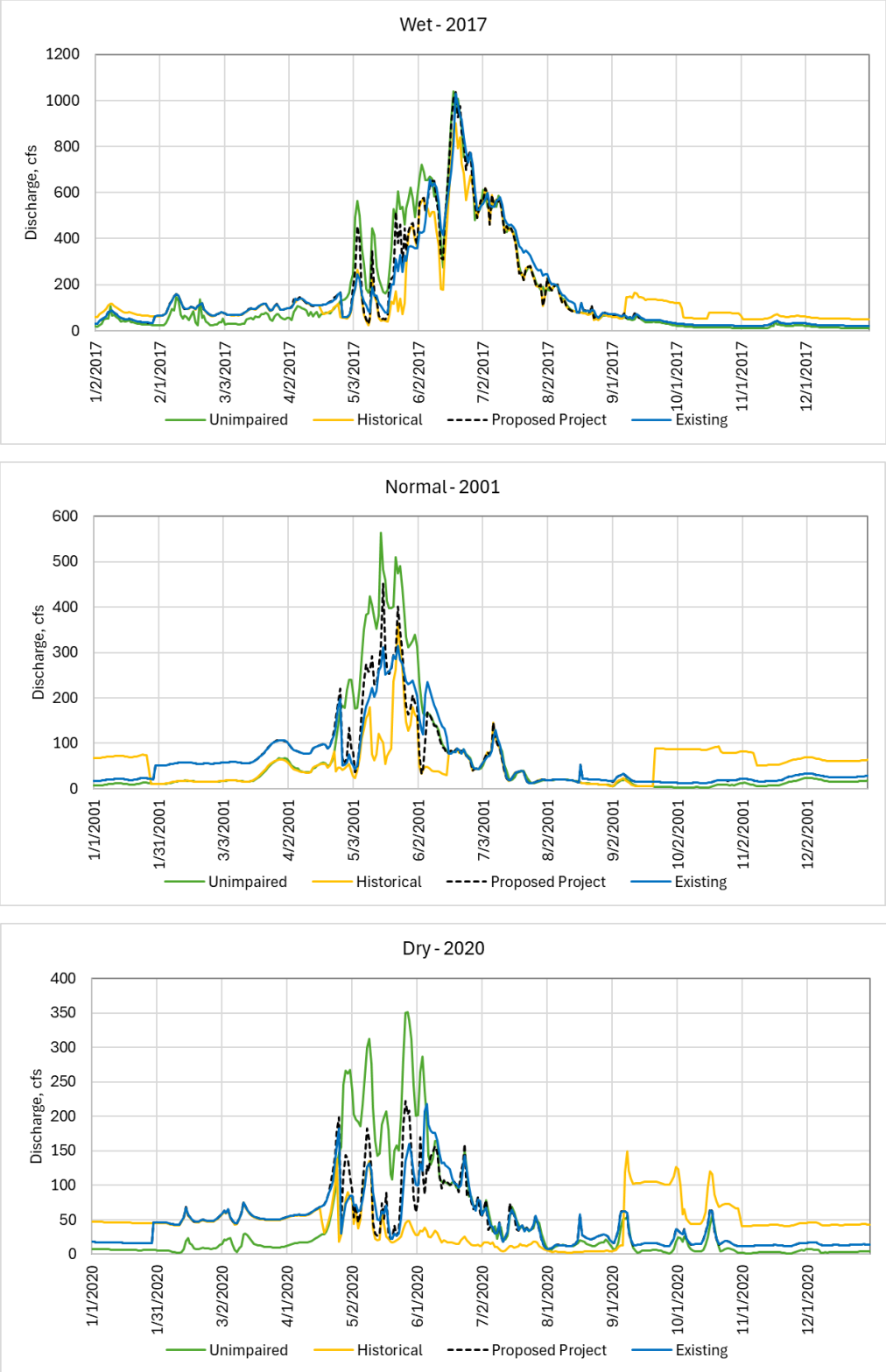


Figure AQ 1-42. Hydrology for Wet (2017), Normal (2001) and Dry (2020) Water Years (Note the Y-Axis Scale Change)

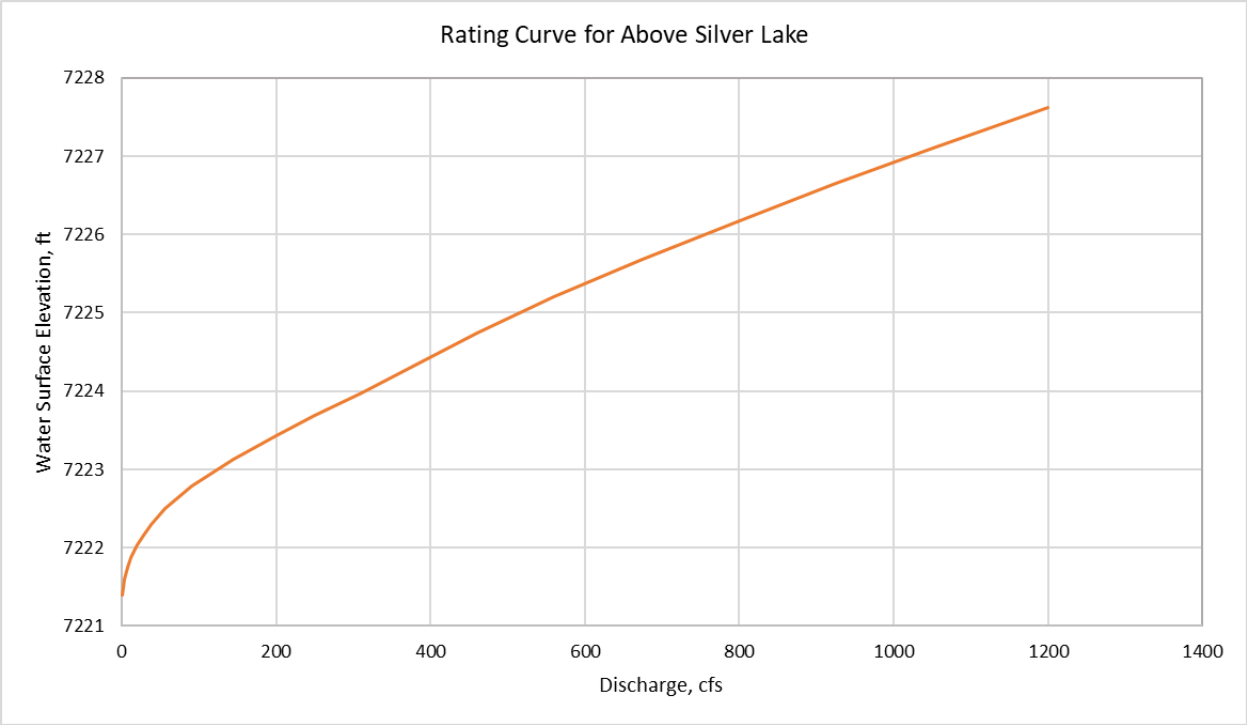


Figure AQ 1-43. Rating Curve Used for Hydraulic and Sediment Transport Model of Rush Creek above Silver Lake

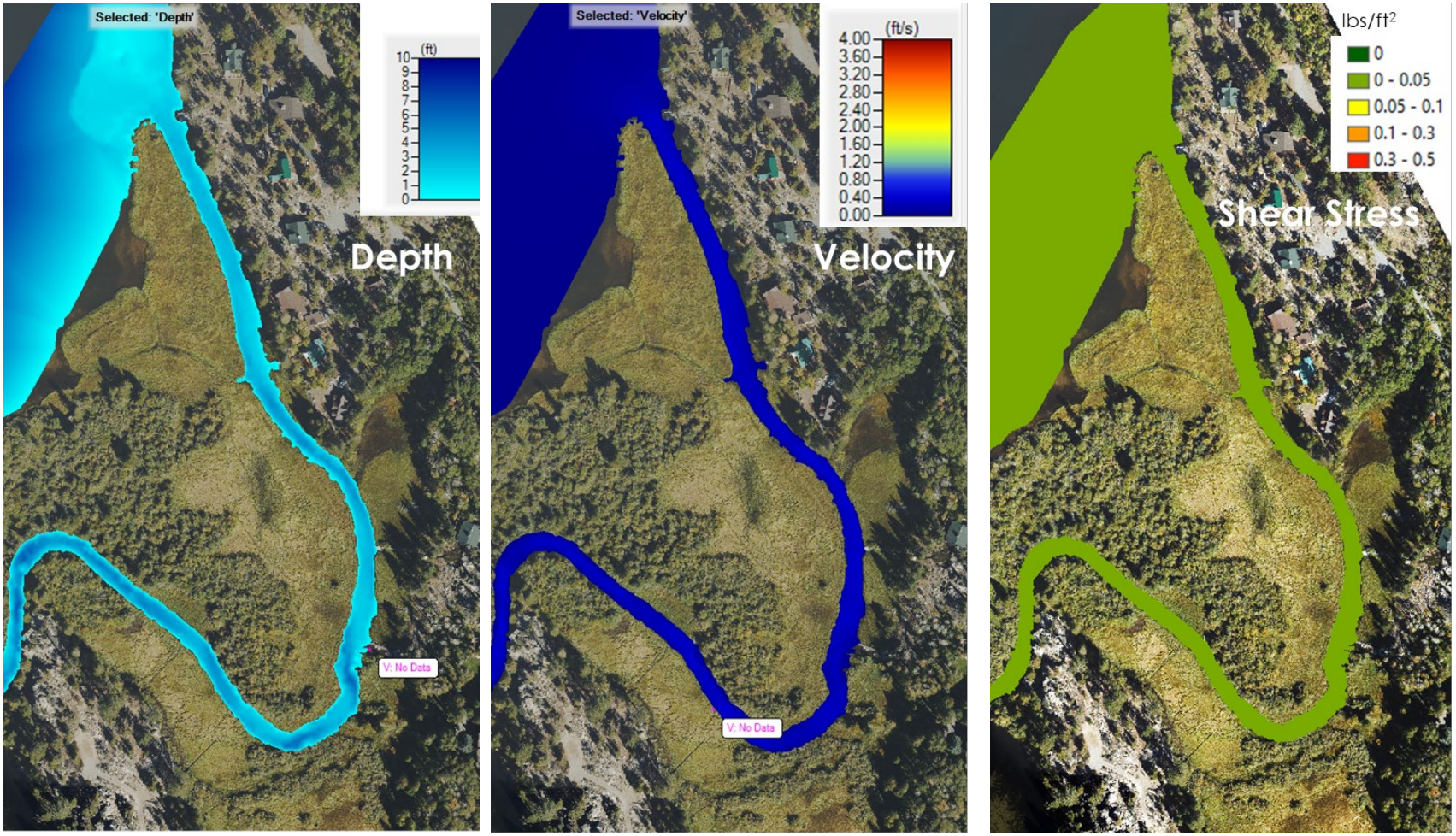


Figure AQ 1-44. Modeled Low Flow Hydraulic Conditions at the Silver Lake Inlet (20 cfs)

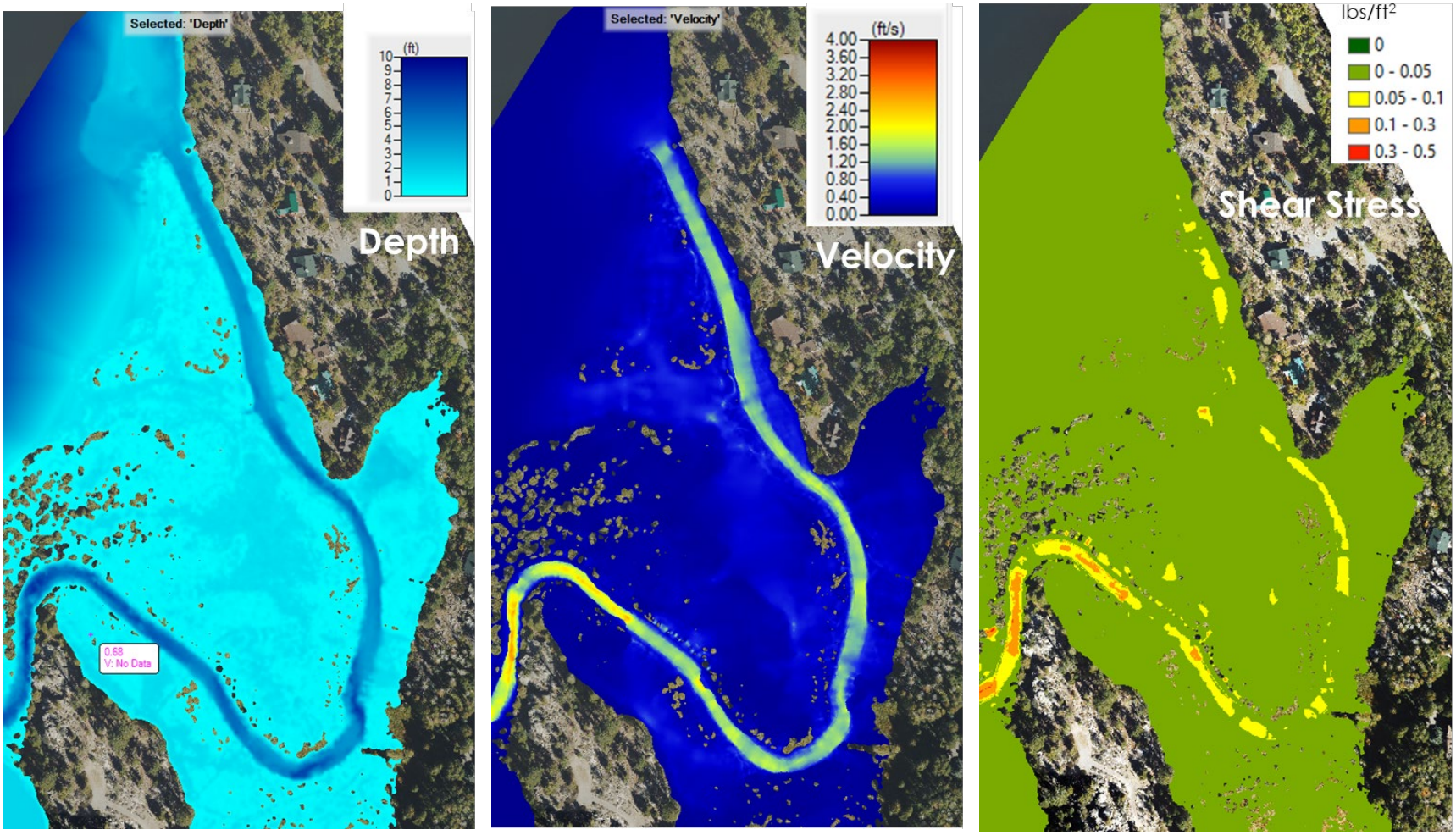


Figure AQ 1-45. Modeled Moderate Flow Hydraulic Conditions at the Silver Lake Inlet (250 cfs)

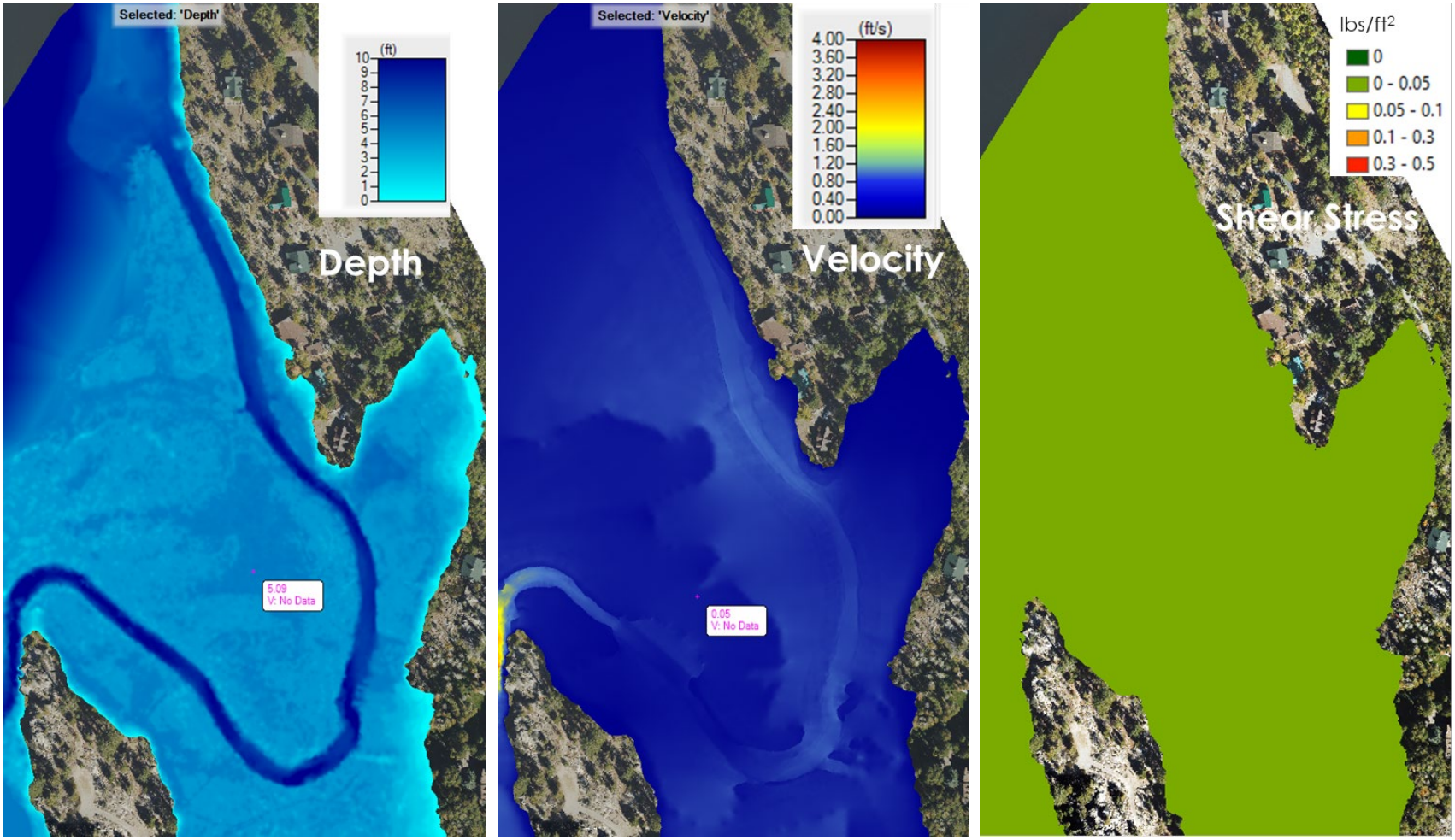


Figure AQ 1-46. Modeled Higher Flow Hydraulic Conditions at the Silver Lake Inlet (1,200 cfs)

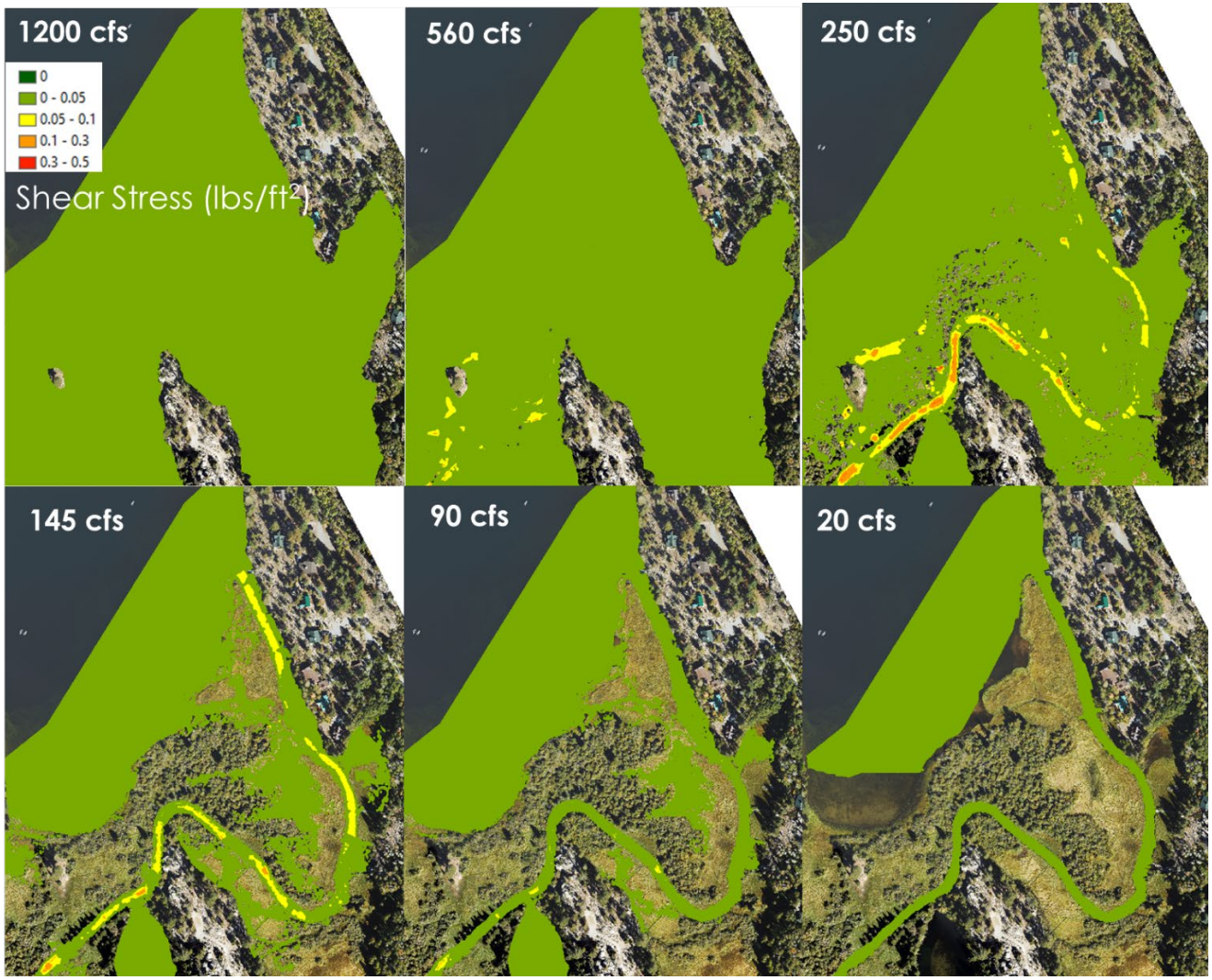


Figure AQ 1-47. Modeled shear stress examples at the Silver Lake inlet at 20, 90, 145, 250, 560, and 1200 cfs. Note that the highest shear stress (that maintains scour in the channel) occurs in the range of 145 – 250 cfs. Higher flows create a backwater in Silver Lake inlet that inundates the channel, reduces shear stress, and allows deposition of sediment.

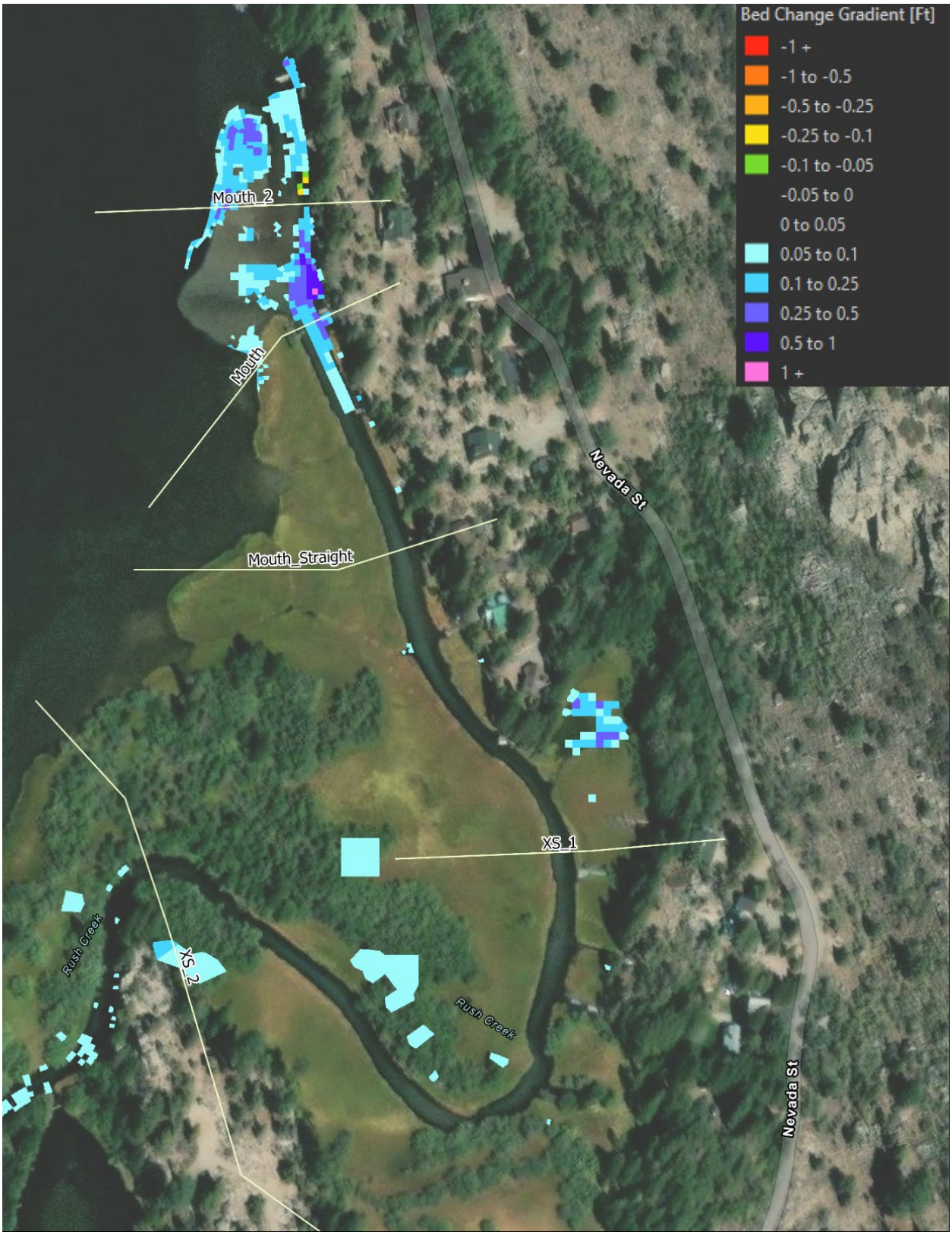


Figure AQ 1-48. 2D Model Sediment Scour/Deposition at the Silver Lake Inlet for a Wet Year (2017) Unimpaired Hydrology

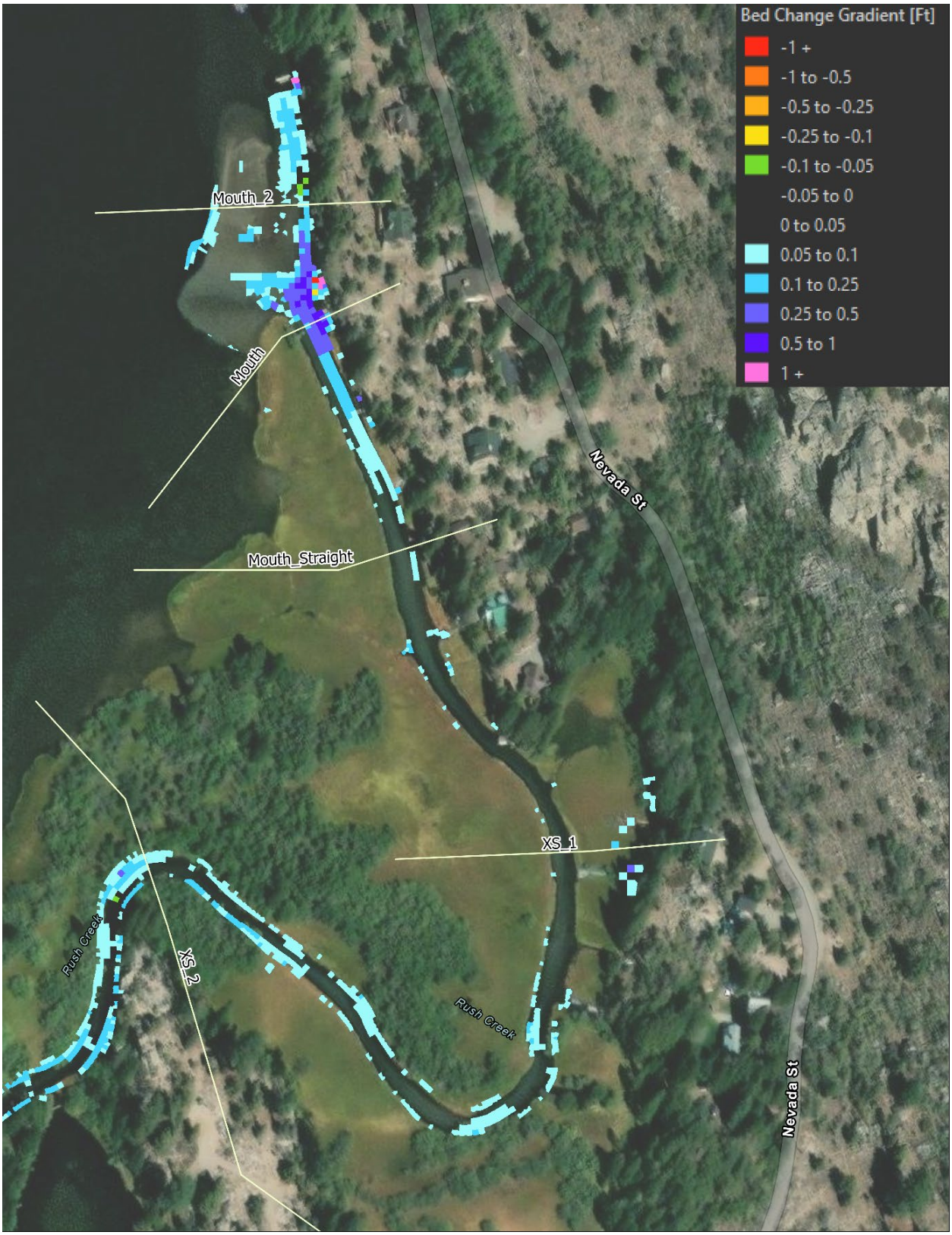


Figure AQ 1-49. 2D Model Sediment Scour/Deposition at the Silver Lake Inlet for a Normal Year (2001) Unimpaired Hydrology

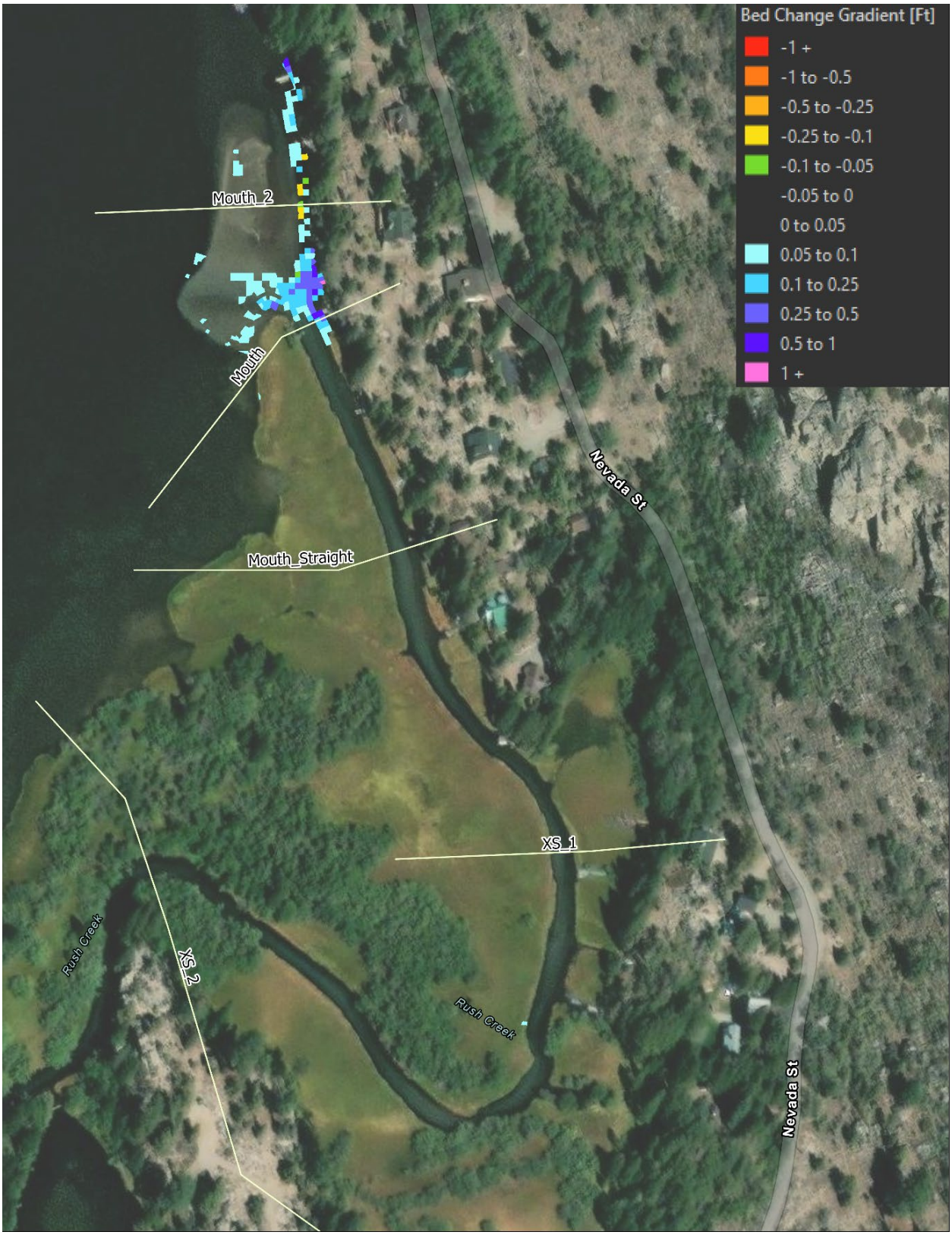


Figure AQ 1-50. 2D Model Sediment Scour/Deposition at the Silver Lake Inlet for a Dry Year (2020) Unimpaired Hydrology

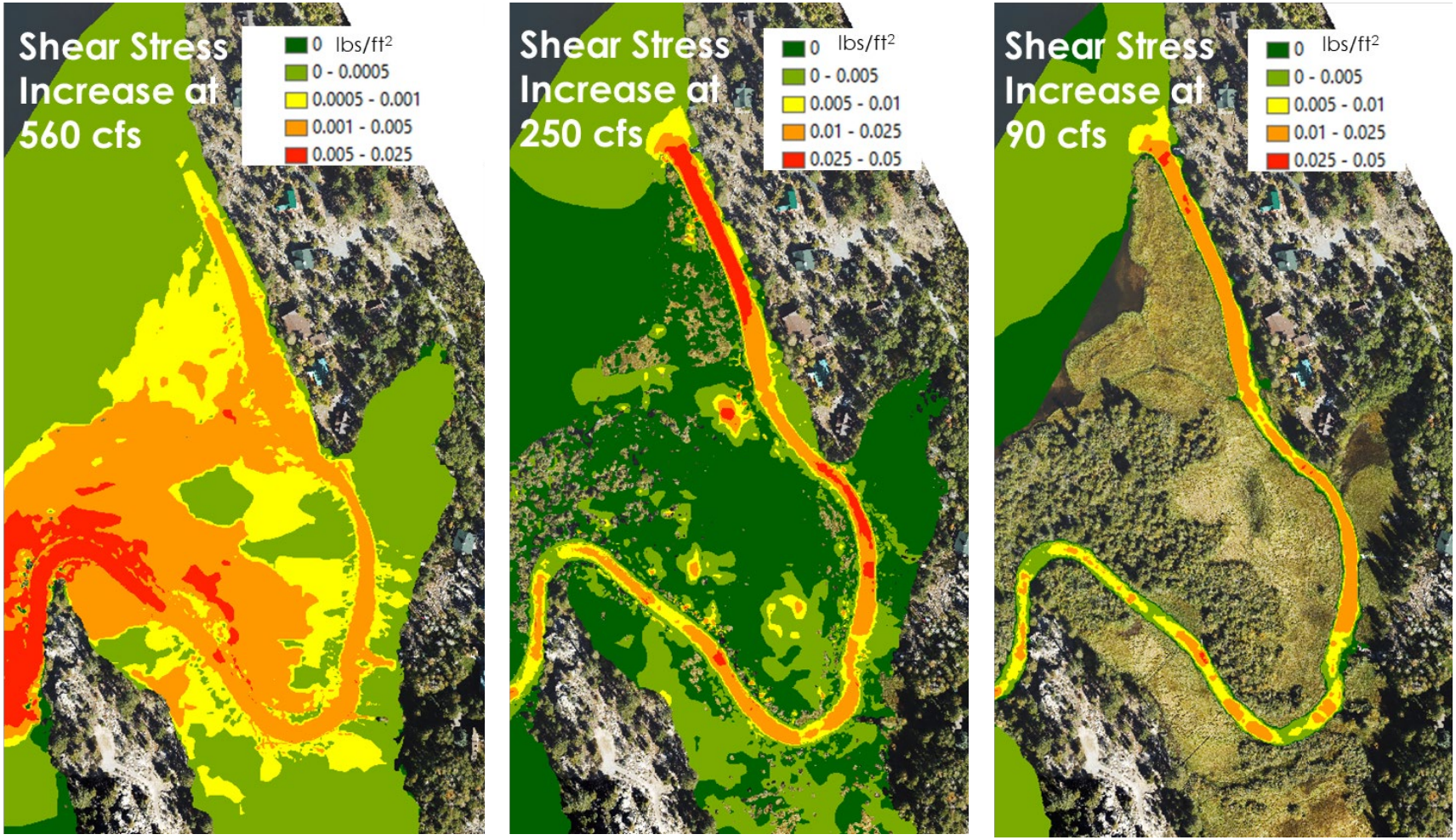


Figure AQ 1-51. 2D Model Increases in Shear Stress at the Silver Lake Inlet for Three Flows with a 1-Foot Reduction in the Silver Lake Elevation (e.g., Removing Rocks at the Silver Lake Outlet).

MAPS

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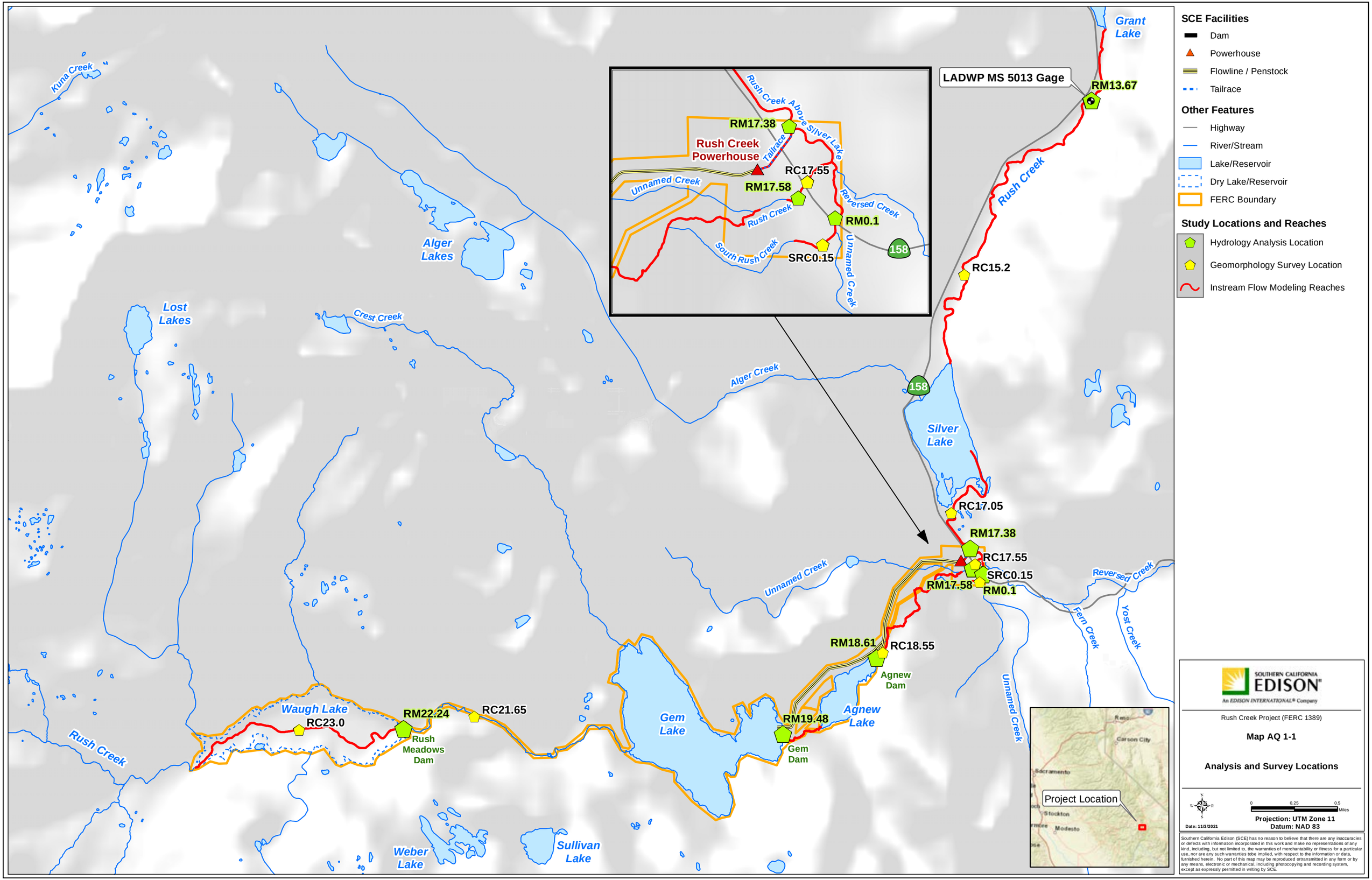

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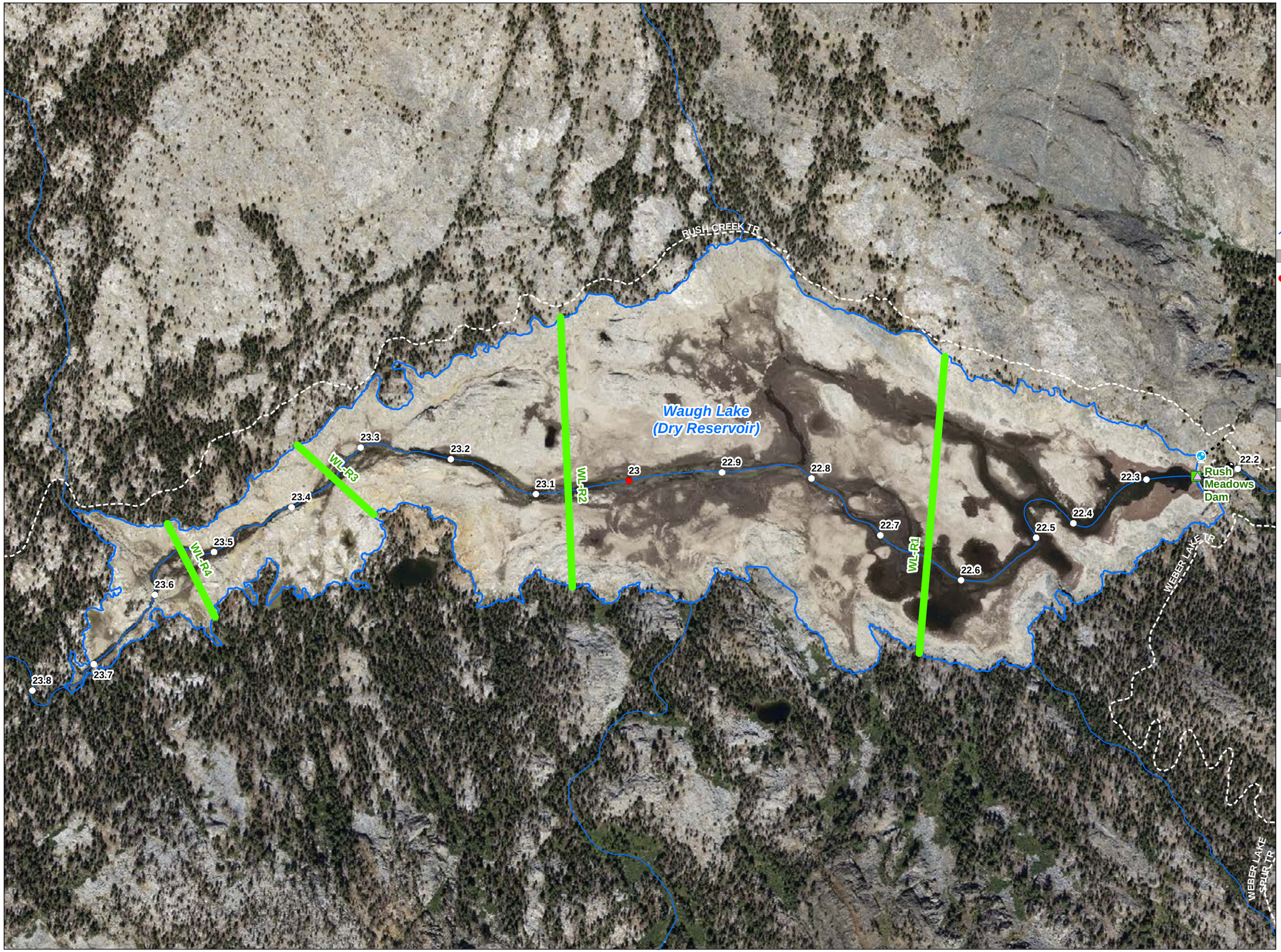

SCE Facilities

- Powerhouse
- Dam
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- Reservoir Gage
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- Water Body
- Non-Project Trail
- River Mile / 10th Mile

AQ 1 Study

- Plunge Pool Locations

1-D Cross Sections

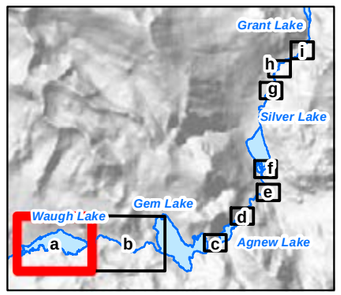
- AQ1 Instream Flow Transect

2-D Model Site Locations

- Modelling Site Extent

AQ 5 / TERR 1 Transects

- AQ 5 Geomorphology Transect
- TERR 1 Riparian Transect



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Rush Creek Project (FERC 1389)

Map AQ 1-2a

1-D Cross Section and 2-D Model Site Locations

0 250 500 Feet

Date: 4/11/2024

Projection: UTM Zone 11
Datum: NAD 83

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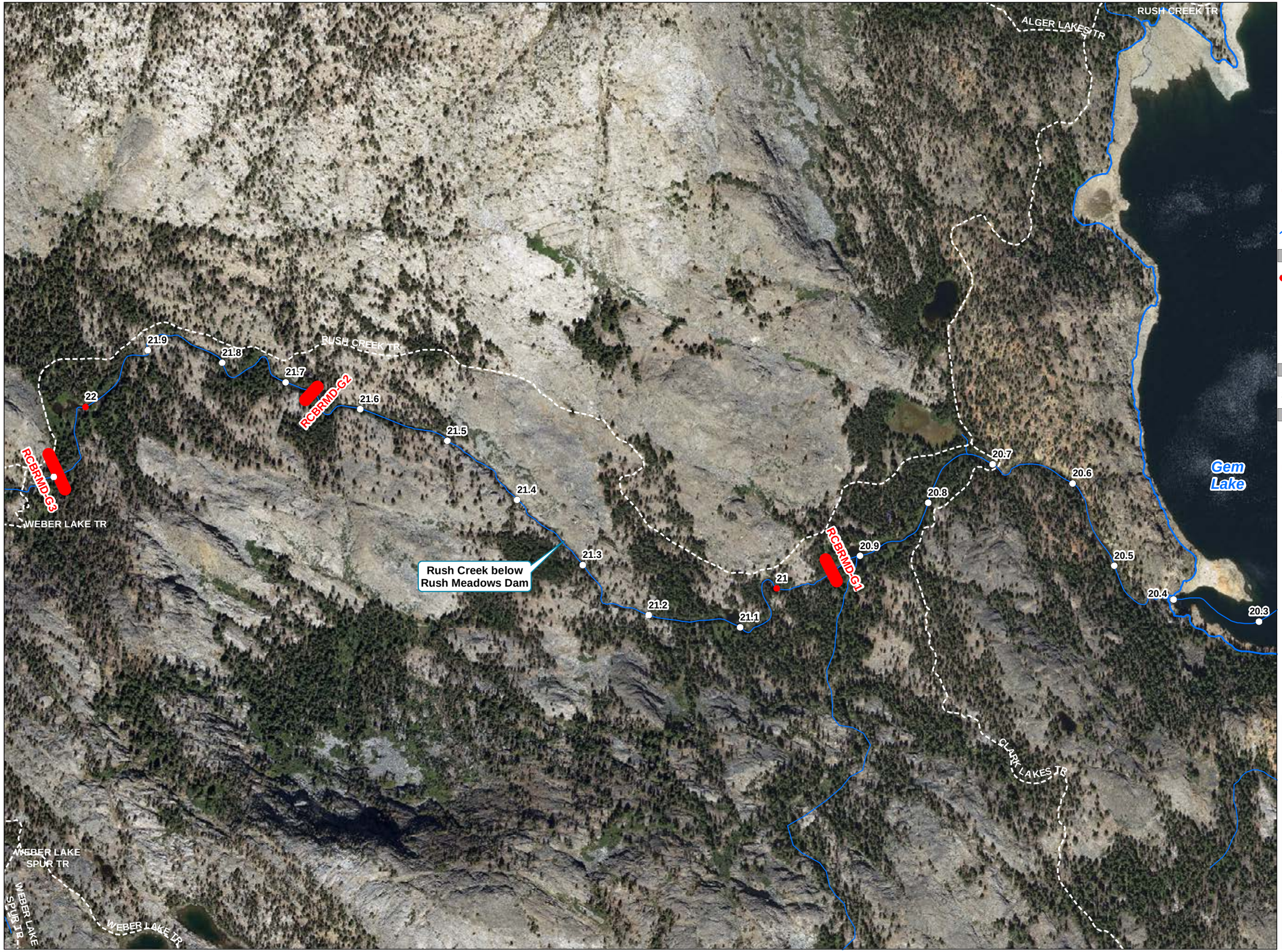

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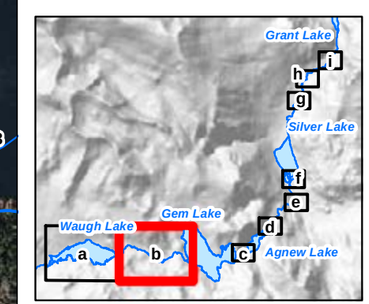
2-D Model Site Locations

- Modelling Site Extent

AQ 5 / TERR 1 Transects

- AQ 5 Geomorphology Transect
- TERR 1 Riparian Transect



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Rush Creek Project (FERC 1389)

Map AQ 1-2b

1-D Cross Section and 2-D Model Site Locations

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- Dam
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- Reservoir Gage
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2-D Model Site Locations

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AQ 5 / TERR 1 Transects

- AQ 5 Geomorphology Transect
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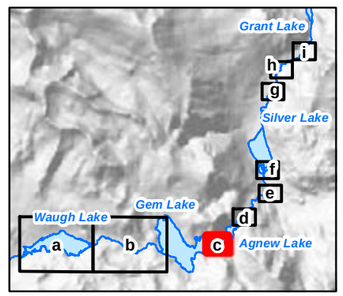

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Rush Creek Project (FERC 1389)

Map AQ 1-2c

1-D Cross Section and 2-D Model Site Locations

0 50 100 Feet

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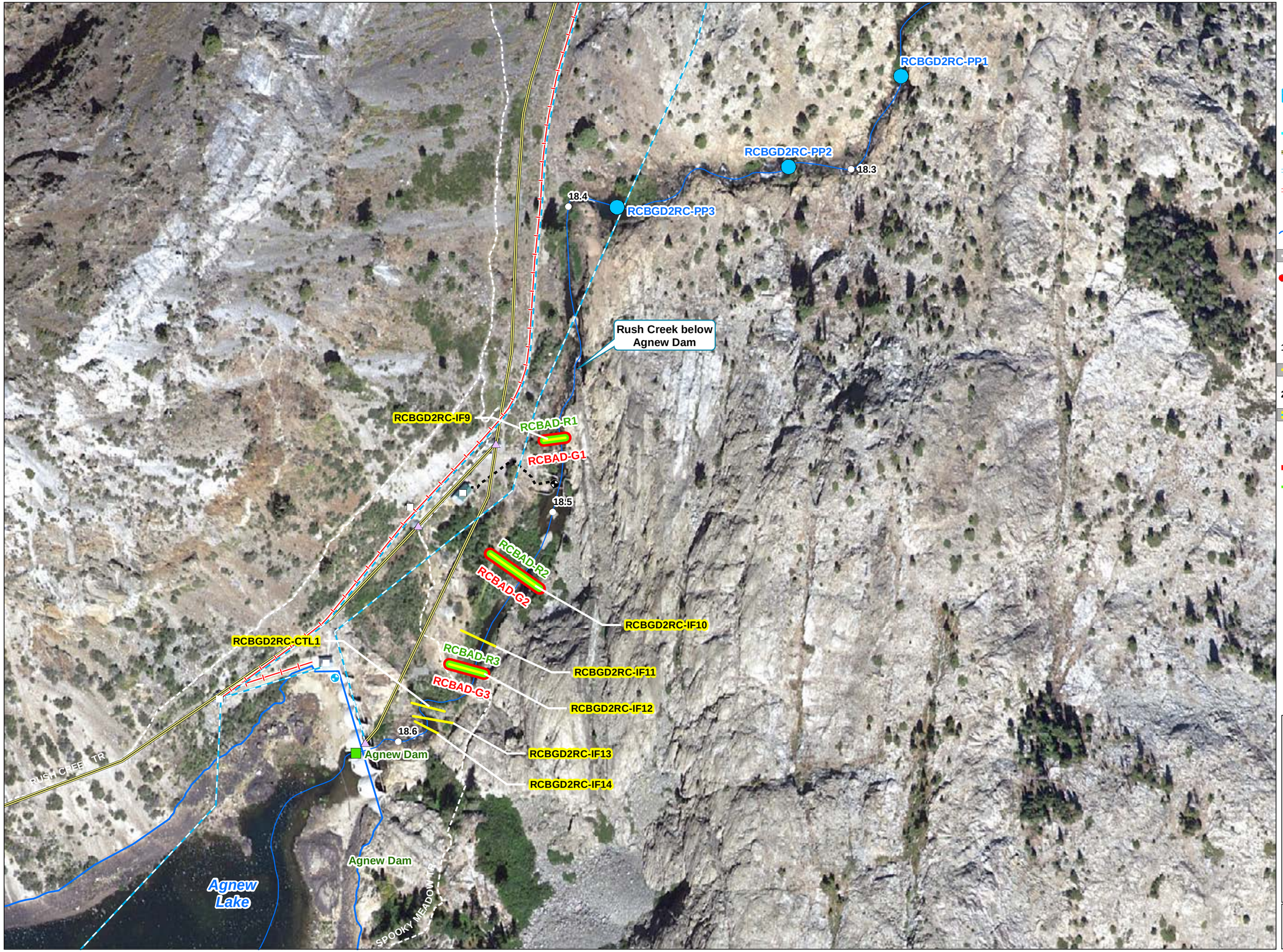

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AQ 5 / TERR 1 Transects

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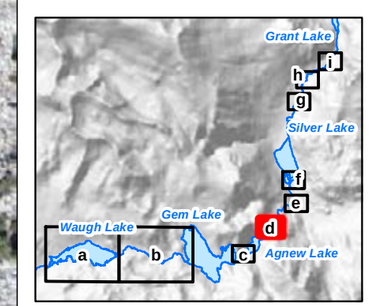

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Rush Creek Project (FERC 1389)

Map AQ 1-2d

1-D Cross Section and 2-D Model Site Locations

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0 50 100 Feet

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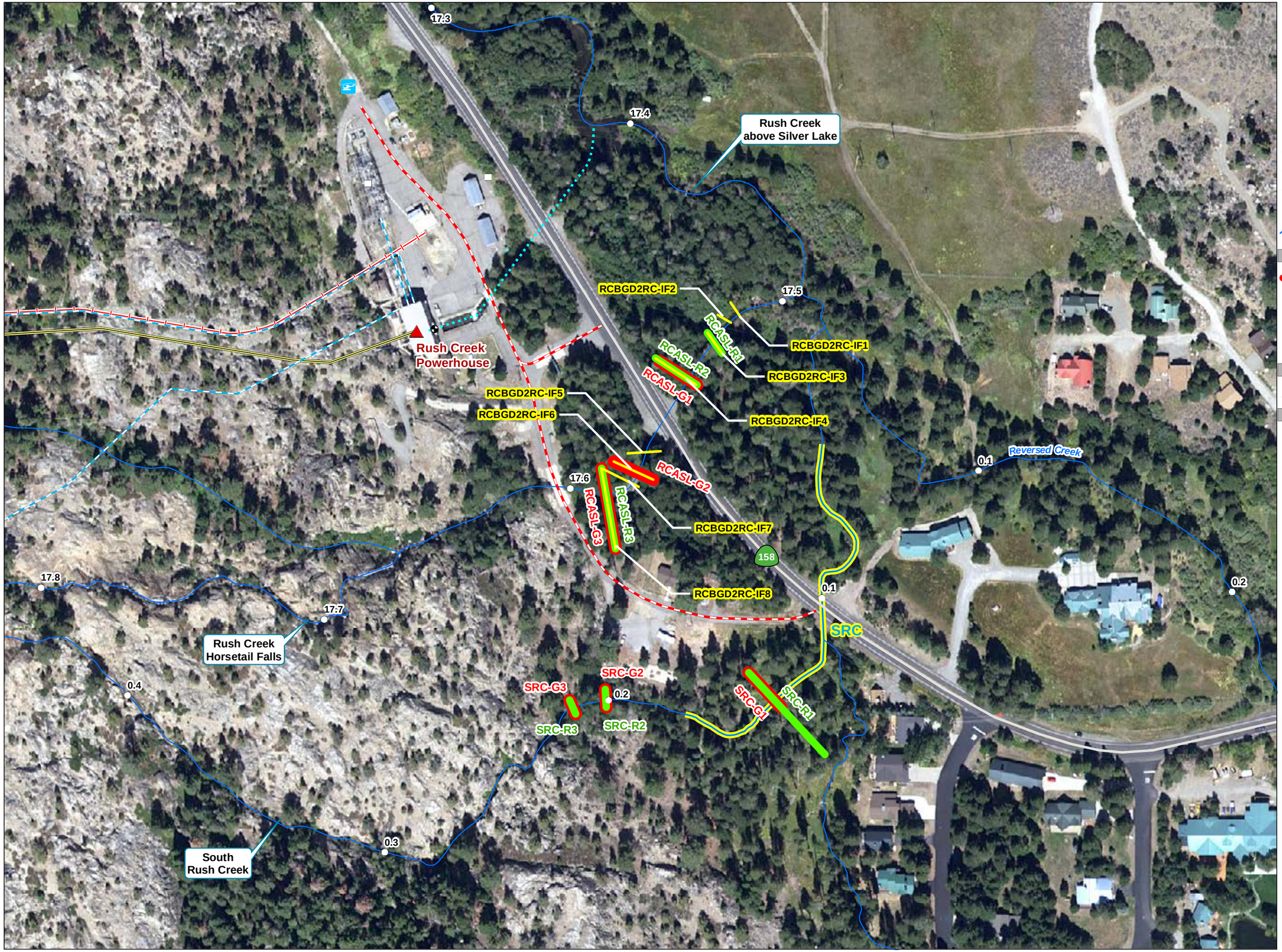

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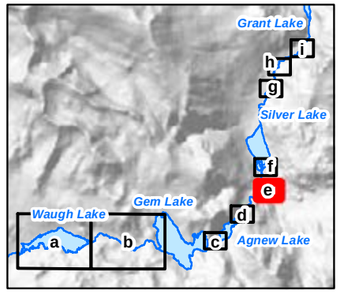

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Rush Creek Project (FERC 1389)

Map AQ 1-2e

1-D Cross Section and 2-D Model Site Locations

0 75 150 Feet

Projection: UTM Zone 11
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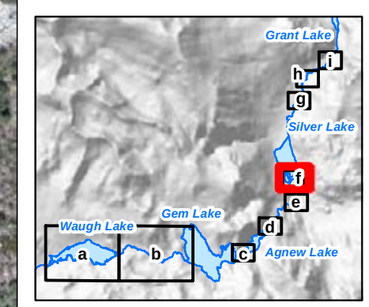

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Rush Creek Project (FERC 1389)

Map AQ 1-2f

1-D Cross Section and 2-D Model Site Locations

0 75 150 Feet

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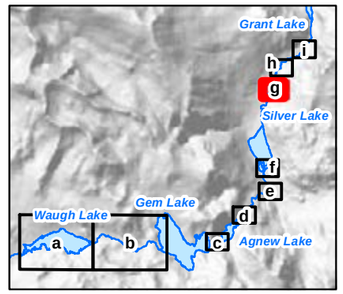

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Rush Creek Project (FERC 1389)

Map AQ 1-2g

1-D Cross Section and 2-D Model Site Locations

0 50 100 Feet

Date: 4/11/2024

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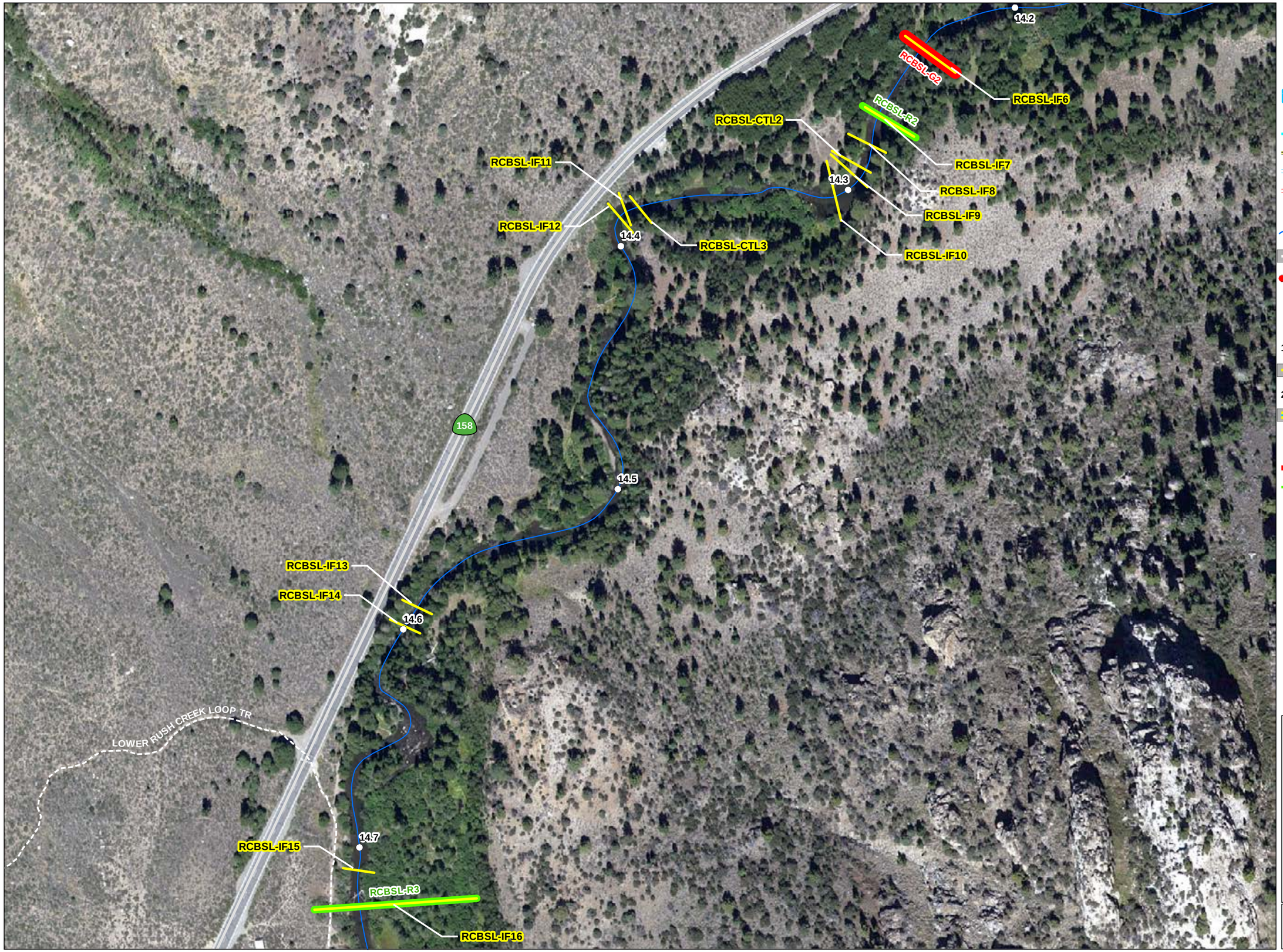

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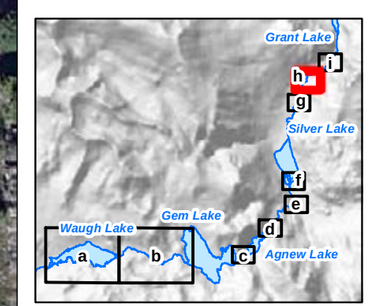

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Rush Creek Project (FERC 1389)

Map AQ 1-2h

1-D Cross Section and 2-D Model Site Locations

0 50 100 Feet

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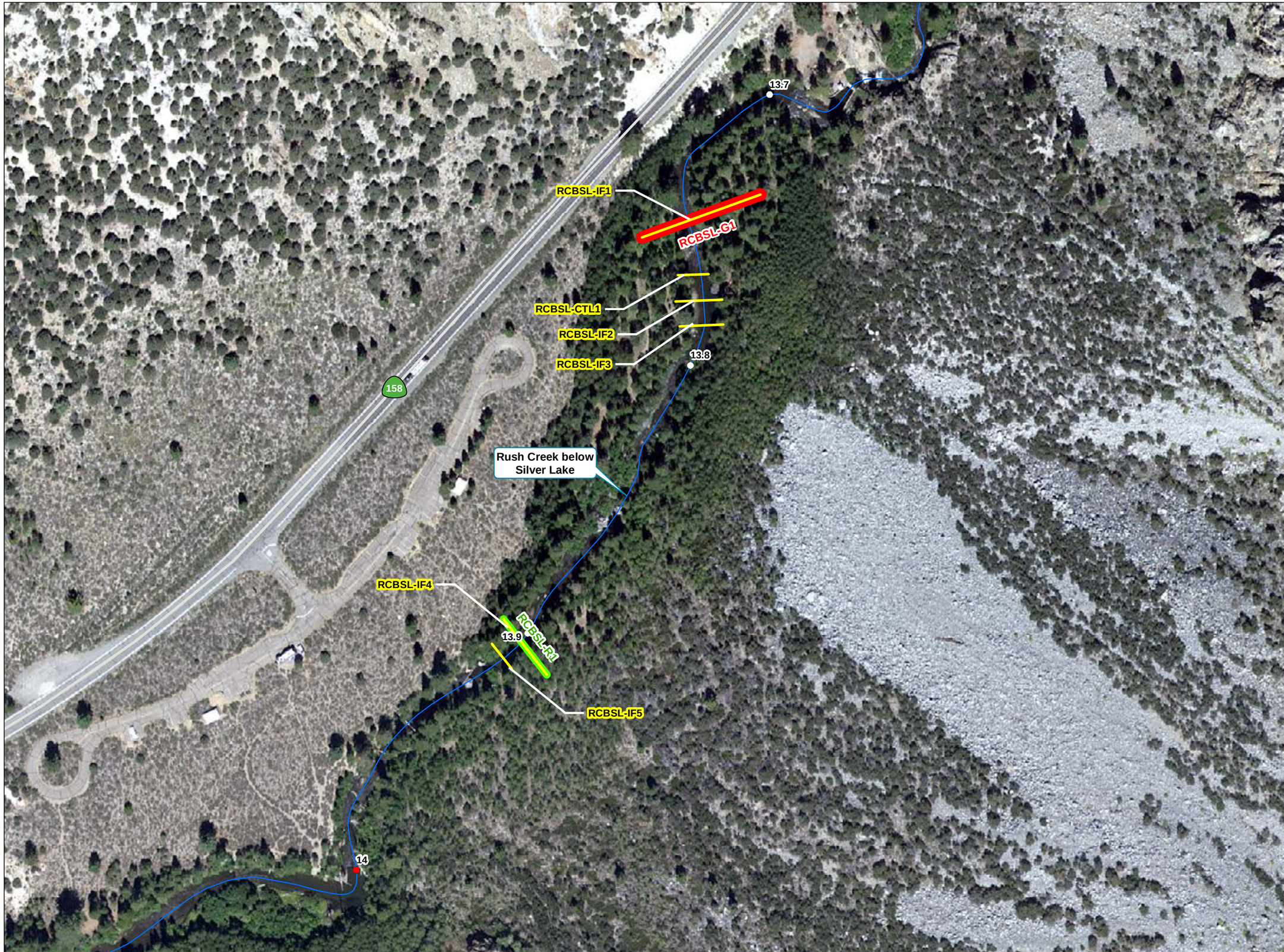

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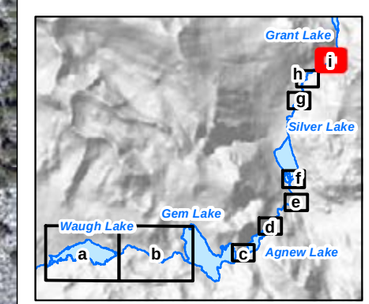

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Rush Creek Project (FERC 1389)

Map AQ 1-2i

1-D Cross Section and 2-D Model Site Locations

0 50 100 Feet

Projection: UTM Zone 11
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APPENDIX A

Rush Creek Mesohabitat Data

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INTRODUCTION

Rush Creek mesohabitat mapped by river mile (see Map AQ 1-1 for river miles) are provided in Table AQ 1-A1. The mesohabitat types are as follows:

- CAS = Cascade
- CFP = Confluence Pool
- CRP = Corner Pool
- DMP = Dam Pool
- GLD = Glide
- HGR = High Gradient Riffle
- LGR = Low Gradient Riffle
- LSP = Long Shallow Pool
- MCP = Mid Channel Pool
- PKW = Pocket Water
- PLP = Plunge Pool
- RUN = Run
- SCP = Side Channel Pool
- SRN = Slow Run
- STP = Step Pool
- STR = Step Run

Table AQ 1-A1. Rush Creek Mesohabitat

Length ft	Length Mile	From River Mile	To River Mile	Label
Rush Creek Below Silver Lake				
76	0.014	13.107	13.122	LGR
26	0.005	13.122	13.127	MCP
91	0.017	13.127	13.144	CRP
93	0.018	13.144	13.161	LGR
138	0.026	13.161	13.188	CRP
375	0.071	13.188	13.259	LGR
77	0.015	13.259	13.273	LGR
108	0.021	13.273	13.294	RUN
113	0.021	13.294	13.315	LGR
52	0.010	13.315	13.325	LSP
85	0.016	13.325	13.341	LGR
59	0.011	13.341	13.352	RUN
49	0.009	13.352	13.361	LGR
63	0.012	13.361	13.373	MCP
46	0.009	13.373	13.382	LGR
170	0.032	13.382	13.414	HGR
106	0.020	13.414	13.434	MCP
56	0.011	13.434	13.445	HGR
55	0.010	13.445	13.455	MCP
26	0.005	13.455	13.460	RUN
131	0.025	13.460	13.485	LGR
77	0.015	13.485	13.499	MCP
20	0.004	13.499	13.503	HGR
111	0.021	13.503	13.524	LGR
73	0.014	13.524	13.538	SRN
89	0.017	13.538	13.555	LGR
39	0.007	13.555	13.562	MCP
75	0.014	13.562	13.576	HGR
41	0.008	13.576	13.584	MCP
33	0.006	13.584	13.590	LGR
42	0.008	13.590	13.598	LSP
55	0.010	13.598	13.609	HGR
23	0.004	13.609	13.613	MCP

Length ft	Length Mile	From River Mile	To River Mile	Label
102	0.019	13.613	13.632	HGR
43	0.008	13.632	13.640	LSP
152	0.029	13.640	13.669	HGR
88	0.017	13.669	13.686	MCP
39	0.007	13.686	13.693	HGR
100	0.019	13.693	13.712	LSP
43	0.008	13.712	13.720	RUN
68	0.013	13.720	13.733	LGR
68	0.013	13.733	13.746	MCP
122	0.023	13.746	13.769	LGR
122	0.023	13.769	13.792	LSP
118	0.022	13.792	13.815	LGR
53	0.010	13.815	13.825	MCP
148	0.028	13.825	13.853	LGR
43	0.008	13.853	13.861	DMP
120	0.023	13.861	13.884	RUN
56	0.011	13.884	13.894	LGR
91	0.017	13.894	13.912	RUN
78	0.015	13.912	13.926	MCP
157	0.030	13.926	13.956	LGR
27	0.005	13.956	13.961	MCP
101	0.019	13.961	13.980	LGR
32	0.006	13.980	13.986	HGR
45	0.009	13.986	13.995	RUN
25	0.005	13.995	14.000	HGR
174	0.033	14.000	14.033	CRP
177	0.034	14.033	14.066	SRN
40	0.008	14.066	14.074	LGR
502	0.095	14.074	14.169	LGR
78	0.015	14.169	14.184	STP
204	0.039	14.184	14.222	STR
40	0.008	14.222	14.230	MCP
218	0.041	14.230	14.271	LGR
82	0.016	14.271	14.287	RUN

Length ft	Length Mile	From River Mile	To River Mile	Label
162	0.031	14.287	14.318	LSP
182	0.034	14.318	14.352	LGR
83	0.016	14.352	14.368	RUN
53	0.010	14.368	14.378	LGR
122	0.023	14.378	14.401	LSP
99	0.019	14.401	14.420	LGR
99	0.019	14.420	14.439	RUN
146	0.028	14.439	14.466	LGR
152	0.029	14.466	14.495	LGR
37	0.007	14.495	14.502	SRN
90	0.017	14.502	14.519	MCP
31	0.006	14.519	14.525	RUN
118	0.022	14.525	14.547	MCP
202	0.038	14.547	14.586	LGR
179	0.034	14.586	14.620	HGR
89	0.017	14.620	14.636	LGR
22	0.004	14.636	14.641	RUN
78	0.015	14.641	14.655	LGR
112	0.021	14.655	14.676	RUN
128	0.024	14.676	14.701	MCP
220	0.042	14.701	14.742	RUN
389	0.074	14.742	14.816	CRP
421	0.080	14.816	14.896	SRN
85	0.016	14.896	14.912	LGR
102	0.019	14.912	14.931	MCP
127	0.024	14.931	14.955	LGR
257	0.049	14.955	15.004	SRN
72	0.014	15.004	15.018	LGR
330	0.062	15.018	15.080	CRP
125	0.024	15.080	15.104	RUN
108	0.020	15.104	15.124	LGR
176	0.033	15.124	15.158	CRP
51	0.010	15.158	15.167	LGR
75	0.014	15.167	15.182	MCP

Length ft	Length Mile	From River Mile	To River Mile	Label
55	0.010	15.182	15.192	LGR
135	0.026	15.192	15.218	RUN
21	0.004	15.218	15.222	MCP
59	0.011	15.222	15.233	CRP
18	0.003	15.233	15.236	LGR
203	0.038	15.236	15.275	CRP
148	0.028	15.275	15.303	LGR
135	0.026	15.303	15.328	MCP
79	0.015	15.328	15.343	RUN
213	0.040	15.343	15.383	CRP
83	0.016	15.383	15.399	LGR
120	0.023	15.399	15.422	RUN
255	0.048	15.422	15.470	CRP
39	0.007	15.470	15.478	RUN
181	0.034	15.478	15.512	CRP
256	0.048	15.512	15.561	CRP
151	0.029	15.561	15.589	RUN
145	0.027	15.589	15.617	CRP
125	0.024	15.617	15.640	RUN
87	0.017	15.640	15.657	MCP
94	0.018	15.657	15.675	RUN
122	0.023	15.675	15.698	MCP
484	0.092	15.698	15.789	RUN
67	0.013	15.789	15.802	RUN
119	0.023	15.802	15.825	MCP
99	0.019	15.825	15.844	LGR/GLD
225	0.043	15.844	15.886	RUN/GLD
Silver Lake				
3,353	0.635	15.886	16.521	SILVER LAKE
Rush Creek Above Silver Lake				
485	0.092	16.521	16.613	RUN/GLD
494	0.094	16.613	16.707	CRP
87	0.016	16.707	16.723	MCP
54	0.010	16.723	16.733	RUN

Length ft	Length Mile	From River Mile	To River Mile	Label
90	0.017	16.733	16.750	CRP
513	0.097	16.750	16.848	RUN
153	0.029	16.848	16.877	CRP
79	0.015	16.877	16.892	MCP
216	0.041	16.892	16.933	RUN
168	0.032	16.933	16.964	MCP
181	0.034	16.964	16.999	RUN
377	0.071	16.999	17.070	CRP
56	0.011	17.070	17.081	RUN
81	0.015	17.081	17.096	CRP
106	0.020	17.096	17.116	RUN
124	0.023	17.116	17.140	CRP
77	0.015	17.140	17.154	LSP
689	0.131	17.154	17.285	RUN
220	0.042	17.285	17.327	CRP
105	0.020	17.327	17.346	CRP
260	0.049	17.346	17.396	CRP
60	0.011	17.396	17.407	CRP
55	0.010	17.407	17.418	RUN
56	0.011	17.418	17.428	CRP
38	0.007	17.428	17.435	RUN
170	0.032	17.435	17.467	CRP
21	0.004	17.467	17.471	RUN
150	0.028	17.471	17.500	CRP
Rush Creek Below Gem Dam to Reverse Creek				
6	0.001	17.500	17.501	DMP
50	0.009	17.501	17.510	LGR
55	0.010	17.510	17.521	MCP
76	0.014	17.521	17.535	RUN
60	0.011	17.535	17.546	LGR
94	0.018	17.546	17.564	RUN
10	0.002	17.564	17.566	LGR
33	0.006	17.566	17.572	RUN
19	0.004	17.572	17.576	HGR

Length ft	Length Mile	From River Mile	To River Mile	Label
78	0.015	17.576	17.591	SRN
52	0.010	17.591	17.600	LGR
65	0.012	17.600	17.613	SRN
59	0.011	17.613	17.624	HGR
41	0.008	17.624	17.632	SRN
47	0.009	17.632	17.641	HGR
349	0.066	17.641	17.707	CAS
84	0.016	17.707	17.723	STP
100	0.019	17.723	17.742	CAS
37	0.007	17.742	17.749	PLP
229	0.043	17.749	17.792	CAS
10	0.002	17.792	17.794	STP
81	0.015	17.794	17.809	HGR
23	0.004	17.809	17.814	PLP
30	0.006	17.814	17.819	CAS
21	0.004	17.819	17.823	PLP
41	0.008	17.823	17.831	CAS
28	0.005	17.831	17.837	RUN
94	0.018	17.837	17.854	CAS
234	0.044	17.854	17.899	STP
131	0.025	17.899	17.923	CAS
71	0.013	17.923	17.937	PLP
53	0.010	17.937	17.947	CAS
24	0.005	17.947	17.952	PLP
42	0.008	17.952	17.960	CAS
164	0.031	17.960	17.991	STP
23	0.004	17.991	17.995	MCP
54	0.010	17.995	18.005	HGR
68	0.013	18.005	18.018	SRN
33	0.006	18.018	18.024	HGR
36	0.007	18.024	18.031	CAS
102	0.019	18.031	18.051	SRN
12	0.002	18.051	18.053	CAS
202	0.038	18.053	18.091	PLP

Length ft	Length Mile	From River Mile	To River Mile	Label
524	0.099	18.091	18.190	CAS
45	0.009	18.190	18.199	CAS
39	0.007	18.199	18.206	LGR
153	0.029	18.206	18.235	HGR
125	0.024	18.235	18.259	RUN
37	0.007	18.259	18.266	MCP
12	0.002	18.266	18.268	PLP
26	0.005	18.268	18.273	CAS
22	0.004	18.273	18.277	MCP
21	0.004	18.277	18.281	CAS
52	0.010	18.281	18.291	STP
74	0.014	18.291	18.305	HGR
32	0.006	18.305	18.311	CAS
26	0.005	18.311	18.316	CAS
28	0.005	18.316	18.321	PLP
127	0.024	18.321	18.345	CAS
22	0.004	18.345	18.349	PLP
101	0.019	18.349	18.369	CAS
32	0.006	18.369	18.375	LGR
118	0.022	18.375	18.397	PLP
33	0.006	18.397	18.403	LGR
32	0.006	18.403	18.409	RUN
99	0.019	18.409	18.428	LGR
51	0.010	18.428	18.438	SRN
183	0.035	18.438	18.472	PLP
55	0.010	18.472	18.483	LGR
22	0.004	18.483	18.487	PLP
102	0.019	18.487	18.506	MCP
136	0.026	18.506	18.532	LGR
150	0.028	18.532	18.560	RUN
49	0.009	18.560	18.570	LGR
54	0.010	18.570	18.580	RUN
61	0.012	18.580	18.591	PLP
108	0.020	18.591	18.612	CAS

Length ft	Length Mile	From River Mile	To River Mile	Label
Agnew Lake				
2514	0.476	18.612	19.088	UNMAPPED
Rush Creek Between Agnew Lake and Gem Dam				
38	0.007	19.088	19.095	RUN
56	0.011	19.095	19.106	LGR
92	0.018	19.106	19.123	RUN
26	0.005	19.123	19.128	LGR
63	0.012	19.128	19.140	RUN
66	0.013	19.140	19.152	LGR
57	0.011	19.152	19.163	RUN
27	0.005	19.163	19.168	STP
167	0.032	19.168	19.200	CAS
20	0.004	19.200	19.204	PLP
427	0.081	19.204	19.285	CAS
36	0.007	19.285	19.292	RUN
213	0.040	19.292	19.332	CAS
51	0.010	19.332	19.341	PLP
162	0.031	19.341	19.372	CAS
17	0.003	19.372	19.375	PLP
17	0.003	19.375	19.379	CAS
22	0.004	19.379	19.383	PLP
90	0.017	19.383	19.400	CAS
9	0.002	19.400	19.402	HGR
11	0.002	19.402	19.404	PLP
8	0.001	19.404	19.405	CAS
22	0.004	19.405	19.409	PLP
51	0.010	19.409	19.419	CAS
52	0.010	19.419	19.429	HGR
42	0.008	19.429	19.437	PLP
25	0.005	19.437	19.442	CAS
36	0.007	19.442	19.448	STP*
43	0.008	19.448	19.457	CAS
11	0.002	19.457	19.459	PLP
55	0.010	19.459	19.469	CAS*

Length ft	Length Mile	From River Mile	To River Mile	Label
Gem Lake				
4922	0.932	19.469	20.401	UNMAPPED
Rush Creek Below Rush Meadows Dam				
184	0.035	20.401	20.436	CAS
75	0.014	20.436	20.450	SRN
83	0.016	20.450	20.466	MCP
7	0.001	20.466	20.467	HGR
129	0.024	20.467	20.492	LGR
73	0.014	20.492	20.506	HGR
96	0.018	20.506	20.524	LGR
34	0.006	20.524	20.530	RUN
60	0.011	20.530	20.542	LGR
74	0.014	20.542	20.556	HGR
65	0.012	20.556	20.568	LGR
50	0.010	20.568	20.578	MCP
21	0.004	20.578	20.581	CAS
89	0.017	20.581	20.598	HGR
47	0.009	20.598	20.607	SRN
30	0.006	20.607	20.613	CAS
30	0.006	20.613	20.619	HGR
49	0.009	20.619	20.628	LGR
31	0.006	20.628	20.634	SRN
30	0.006	20.634	20.640	HGR
36	0.007	20.640	20.647	SRN
32	0.006	20.647	20.653	MCP
28	0.005	20.653	20.658	HGR
24	0.004	20.658	20.662	MCP
10	0.002	20.662	20.664	CAS
64	0.012	20.664	20.676	MCP
13	0.002	20.676	20.679	HGR
25	0.005	20.679	20.684	PLP
27	0.005	20.684	20.689	CAS
56	0.011	20.689	20.699	RUN
32	0.006	20.699	20.705	LGR

Length ft	Length Mile	From River Mile	To River Mile	Label
42	0.008	20.705	20.713	HGR
498	0.094	20.713	20.808	LSP
80	0.015	20.808	20.823	RUN
163	0.031	20.823	20.854	LSP
156	0.029	20.854	20.883	RUN
29	0.005	20.883	20.888	LGR
116	0.022	20.888	20.910	MCP
228	0.043	20.910	20.954	HGR
59	0.011	20.954	20.965	MCP
22	0.004	20.965	20.969	CAS
19	0.004	20.969	20.972	LSP
101	0.019	20.972	20.991	HGR
60	0.011	20.991	21.003	MCP
37	0.007	21.003	21.010	HGR
74	0.014	21.010	21.024	LSP
35	0.007	21.024	21.030	LGR
35	0.007	21.030	21.037	MCP
52	0.010	21.037	21.047	SRN
22	0.004	21.047	21.051	HGR
49	0.009	21.051	21.060	SRN
67	0.013	21.060	21.073	LGR
40	0.008	21.073	21.081	RUN
14	0.003	21.081	21.084	LGR
27	0.005	21.084	21.089	LSP
42	0.008	21.089	21.097	RUN
112	0.021	21.097	21.118	MCP
123	0.023	21.118	21.141	HGR
51	0.010	21.141	21.151	SRN
187	0.035	21.151	21.186	HGR
45	0.009	21.186	21.195	MCP
24	0.005	21.195	21.199	HGR
43	0.008	21.199	21.207	LGR
52	0.010	21.207	21.217	HGR
56	0.011	21.217	21.228	STP

Length ft	Length Mile	From River Mile	To River Mile	Label
17	0.003	21.228	21.231	CAS
53	0.010	21.231	21.241	STP
38	0.007	21.241	21.248	CAS
13	0.002	21.248	21.251	LGR
8	0.002	21.251	21.252	LSP
16	0.003	21.252	21.255	LGR
31	0.006	21.255	21.261	MCP
47	0.009	21.261	21.270	STP
42	0.008	21.270	21.278	CAS
106	0.020	21.278	21.298	HGR
39	0.007	21.298	21.305	SRN
21	0.004	21.305	21.309	HGR
46	0.009	21.309	21.318	LGR
59	0.011	21.318	21.329	HGR
37	0.007	21.329	21.336	LSP
40	0.008	21.336	21.344	HGR
17	0.003	21.344	21.347	MCP
19	0.004	21.347	21.351	HGR
82	0.015	21.351	21.366	SRN
42	0.008	21.366	21.374	STP
23	0.004	21.374	21.379	CAS
33	0.006	21.379	21.385	STP
14	0.003	21.385	21.387	CAS
7	0.001	21.387	21.389	PLP
15	0.003	21.389	21.392	CAS
27	0.005	21.392	21.397	MCP
41	0.008	21.397	21.404	HGR
81	0.015	21.404	21.420	STP
14	0.003	21.420	21.422	CAS
22	0.004	21.422	21.427	STP
13	0.002	21.427	21.429	CAS
44	0.008	21.429	21.437	SRN
19	0.004	21.437	21.441	CAS
33	0.006	21.441	21.447	SRN

Length ft	Length Mile	From River Mile	To River Mile	Label
9	0.002	21.447	21.449	MCP
20	0.004	21.449	21.453	HGR
38	0.007	21.453	21.460	SRN/PKW
32	0.006	21.460	21.466	HGR
58	0.011	21.466	21.477	STP
10	0.002	21.477	21.479	CAS
37	0.007	21.479	21.486	STP
94	0.018	21.486	21.504	HGR
49	0.009	21.504	21.513	MCP
34	0.007	21.513	21.520	HGR
111	0.021	21.520	21.541	MCP
13	0.002	21.541	21.543	CAS
34	0.006	21.543	21.550	MCP
124	0.023	21.550	21.573	HGR
20	0.004	21.573	21.577	MCP
78	0.015	21.577	21.592	LGR
96	0.018	21.592	21.610	SRN
43	0.008	21.610	21.618	MCP
46	0.009	21.618	21.627	HGR
48	0.009	21.627	21.636	SRN
97	0.018	21.636	21.654	HGR
113	0.021	21.654	21.676	LGR
51	0.010	21.676	21.685	RUN
87	0.017	21.685	21.702	HGR
80	0.015	21.702	21.717	LSP
64	0.012	21.717	21.729	HGR
39	0.007	21.729	21.737	LSP
141	0.027	21.737	21.763	HGR
32	0.006	21.763	21.769	MCP
53	0.010	21.769	21.780	HGR
61	0.012	21.780	21.791	MCP
67	0.013	21.791	21.804	HGR
124	0.023	21.804	21.827	RUN
38	0.007	21.827	21.835	MCP

Length ft	Length Mile	From River Mile	To River Mile	Label
30	0.006	21.835	21.840	HGR
51	0.010	21.840	21.850	SRN
9	0.002	21.850	21.852	LSP
105	0.020	21.852	21.872	HGR
70	0.013	21.872	21.885	STP
50	0.010	21.885	21.894	CAS
92	0.017	21.894	21.912	STP
72	0.014	21.912	21.925	HGR
333	0.063	21.925	21.988	LSP
24	0.005	21.988	21.993	LGR
84	0.016	21.993	22.009	SCP
68	0.013	22.009	22.022	HGR
31	0.006	22.022	22.028	MCP
106	0.020	22.028	22.048	HGR
45	0.009	22.048	22.056	LSP
261	0.049	22.056	22.106	HGR
16	0.003	22.106	22.109	PLP
36	0.007	22.109	22.116	CAS
9	0.002	22.116	22.118	MCP
27	0.005	22.118	22.123	HGR
18	0.003	22.123	22.126	LSP
26	0.005	22.126	22.131	CAS
15	0.003	22.131	22.134	LSP
42	0.008	22.134	22.142	CAS
174	0.033	22.142	22.175	HGR
69	0.013	22.175	22.188	SRN
40	0.008	22.188	22.196	HGR
53	0.010	22.196	22.206	LSP
98	0.019	22.206	22.224	HGR
112	0.021	22.224	22.245	STP
Rush Meadows Dam				
195	0.037	22.245	22.282	RUN/GLD
54	0.010	22.282	22.293	LGR
153	0.029	22.293	22.321	HGR

Length ft	Length Mile	From River Mile	To River Mile	Label
73	0.014	22.321	22.335	SRN
33	0.006	22.335	22.342	LGR
68	0.013	22.342	22.354	MCP
15	0.003	22.354	22.357	LGR
175	0.033	22.357	22.390	LSP
22	0.004	22.390	22.394	RUN
178	0.034	22.394	22.428	LSP
153	0.029	22.428	22.457	RUN
80	0.015	22.457	22.472	CFP
3111	0.589	22.472	23.061	RUN/GLD
39	0.007	23.061	23.069	LSP
116	0.022	23.069	23.091	RUN/GLD
92	0.018	23.091	23.108	LSP
457	0.087	23.108	23.195	RUN
273	0.052	23.195	23.247	LSP
96	0.018	23.247	23.265	LGR
199	0.038	23.265	23.303	RUN
337	0.064	23.303	23.366	LGR
33	0.006	23.366	23.373	MCP
54	0.010	23.373	23.383	LGR
114	0.022	23.383	23.404	MCP
71	0.013	23.404	23.418	HGR
98	0.019	23.418	23.436	RUN
48	0.009	23.436	23.445	HGR
80	0.015	23.445	23.461	RUN
141	0.027	23.461	23.487	LGR
80	0.015	23.487	23.503	RUN
98	0.019	23.503	23.521	MCP
330	0.062	23.521	23.584	LGR
169	0.032	23.584	23.616	STP
120	0.023	23.616	23.638	HGR
77	0.015	23.638	23.653	RUN
124	0.023	23.653	23.677	HGR
143	0.027	23.677	23.704	LGR

Length ft	Length Mile	From River Mile	To River Mile	Label
50	0.009	23.704	23.713	CFP
242	0.046	23.713	23.759	HGR
34	0.006	23.759	23.765	MCP
13706	2.596	23.765	28.963	UNMAPPED

APPENDIX B

Field Data (Rush Creek Below Gem Dam to Reverse Creek)

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INTRODUCTION

The raw field data collected at each of the cross sections are provided in Table AQ 1-B1. Included in the table are the point data collected along the cross section, including the surveyed bed elevation, the depth from water surface, the measured velocity and observed substrate and vegetation.

Table AQ 1-B1. Rush Creek Below Gem Dam Field Data for Cross sections IF1 To IF14

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
Rush Creek Below Gem Dam Cross Section IF1						
0	7226.74	--	--			
2.5	7226.74	--	--			LPT01 on pin
11.7	7226.71	--	--		LWD/saplings/grass 50/25/25	LPT01 on ground
13	7226.18	--	--		LWD/saplings/grass 50/25/25	
15.5	7222.37	--	--		LWD/saplings/grass 50/25/25	
16	7222.32	1.95	0.93		LWD/saplings/grass 50/25/25	
16.5	7222.32	2.00	0.73		LWD/saplings/grass 50/25/25	
17	7222.32	2.00	0.66		LWD/saplings/grass 50/25/25	
17.5	7222.32	2.00	0.90	lg/mg		
18	7222.32	2.00	0.83	lg/mg		
18.5	7222.22	2.00	0.85	lg/mg		
19	7222.17	2.10	0.83	lg/mg		
19.5	7222.12	2.15	0.89	lg/mg		
20	7222.12	2.20	0.65	lg/mg		
20.5	7222.02	2.20	0.58	lg/mg		
21	7221.92	2.30	0.57	lg/mg		
21.5	7221.82	2.40	0.64	lg/mg		
22	7221.77	2.50	0.30	lg/mg		
22.5	7221.77	2.55	0.26	lg/mg		
23	7221.87	2.55	0.26	lg/mg		
23.5	7221.87	2.45	0.23	lg/mg		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
24	7221.92	2.45	0.10	lg/mg		
25	7222.52	2.40	-0.05	lg/mg		
25.5	7222.62	1.80	-0.16	sg/sand 75/25		
26	7222.92	1.70	-0.11	sg/sand 75/25		
26.5	7223.32	1.40	-0.15	sg/sand 75/25		
27	7223.32	1.00	-0.20	sg/sand 75/25		
27.5	7223.32	1.00	-0.18	WD/sand 75/25		
28	7223.47	1.00	-0.18	WD/sand 75/25		
28.5	7223.57	0.85	-0.05	WD/sand 75/25		
29	7224.32	0.75	-0.06	WD/sand 75/25		
30	7224.58	0.00	0.00	WD/sand 75/25		
32.7	7225.24	--	--	WD/sand 75/25		
37.6	7225.20	--	--		grass	
37.61	7225.87	--	--		grass	RPT01 base of stake
50	7225.87	--	--		grass	
Rush Creek Below Gem Dam Cross Section IF2						
0	7226.418	--	--		WD/grass	
0.9	7226.418	--	--		WD/grass	LPT2 on pin (ground)
2.9	7225.218	--	--		WD/grass	
4.7	7224.848	--	--		WD/grass	
8.4	7224.628	--	--		WD/grass	
10	7224.328	0.0	0.00		OM/grass	
10.5	7223.428	0.9	-0.03		OM/grass	

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
11	7222.978	1.4	0.22	sg/sand		
11.5	7222.628	1.7	0.27	sg/sand		
12	7222.628	1.7	0.46	sg/sand		
12.5	7222.528	1.8	0.55	sg/sand		
13	7222.528	1.8	0.98	sg/sand 75/25		
13.5	7222.478	1.9	1.10	sg/sand 75/25		
14	7222.478	1.9	0.87	sg/sand 75/25		
14.5	7222.428	1.9	1.07	sg/sand 75/25		
15	7222.428	1.9	1.23	sg/sand 75/25		
15.5	7222.528	1.8	1.41	sg/sand 75/25		
16	7222.628	1.7	1.56	sg/sand 75/25		
16.5	7222.728	1.6	1.19	sg/sand 75/25		
17	7222.728	1.6	0.42	sg/sand 75/25		
17.5	7222.828	1.5	0.22		wd/grass 40/60	
18	7223.028	1.3	0.14		wd/grass 40/60	
18.5	7223.228	1.1	0.23		wd/grass 40/60	
19	7223.328	1.0	0.22		wd/grass 40/60	
19.5	7223.278	1.1	0.16		wd/grass 40/60	
20	7223.228	1.1	0.03		wd/grass 40/60	
20.5	7223.228	1.1	-0.11		wd/grass 40/60	
21	7223.278	1.1	-0.05	sand/WD		
21.5	7223.328	1.0	-0.07	sand/WD		
22	7223.378	1.0	-0.03	sand/WD		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
22.5	7223.428	0.9	-0.13	sand/WD		
23	7223.628	0.7	-0.05	sand/WD		
23.5	7223.678	0.7	-0.04		OM/grass 30/70	
24	7224.028	0.3	0.00		OM/grass 30/70	
24.5	7224.278	0.1	0.00		OM/grass 30/70	
25	7224.278	0.1	0.00		OM/grass 30/70	
25.5	7224.128	0.2	0.00		OM/grass 30/70	
27	7224.328	0.0	0.00		OM/grass 30/70	
27.6	7225.458	--	--		OM/grass 30/70	RPT2 on stump
27.6	7225.608	--	--			RPT2 pin
40	7225.608	--	--			
Rush Creek Below Gem Dam Cross Section IF3						
0	7227.108	--	--			
11.7	7227.108	--	--			LP
17.2	7225.558	--	--		LWD	
21.3	7224.498	0	0		LWD	
21.75	7224.048	0.45	0		OM	
22.5	7223.948	0.55	-0.01		OM	
23.25	7223.898	0.6	0.01		OM	
24	7223.798	0.7	0.01		OM	
24.75	7223.798	0.7	0.01		OM	
25.5	7223.698	0.8	0		OM	
26.25	7223.598	0.9	0		OM	

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
27	7223.448	1.05	0.05		OM	
27.75	7223.198	1.3	0.08		OM	
28.5	7223.198	1.3	0.21		OM	
29.25	7222.698	1.8	0.29		OM	
30	7222.698	1.8	0.43	lg		
30.75	7222.698	1.8	0.43	lg		
31.5	7222.798	1.7	0.37	lg		
32.25	7223.398	1.1	0.2	lg		
33	7223.048	1.45	0.59	lg		
33.75	7223.298	1.2	0.73	lg		
34.5	7223.398	1.1	0.73	lg		
35.25	7223.698	0.8	0.75	lg		
36	7223.698	0.8	0.84	lg		
36.75	7223.548	0.95	0.91	lg		
37.5	7223.298	1.2	0.86	lg		
38.25	7223.198	1.3	0.78	lg		
39	7223.098	1.4	0.73	lg		
39.75	7223.098	1.4	0.73	lg		
40.5	7223.198	1.3	0.88	lg		
41.25	7223.248	1.25	0.62	lg		
42	7223.398	1.1	0.14	lg		
42.75	7223.898	0.6	0	lg		
43.7	7224.498	0	0		LWD	

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
47.8	7224.948	--	--		LWD	
51.6	7225.378	--	--		OM	
54.8	7226.028	--	--		OM	
57.8	7226.858	--	--		OM	
70	7226.858	--	--		OM	
Rush Creek Below Gem Dam Cross Section IF4						
0	7226.708	--	--	mg/sand 50/50		
2.3	7226.708	--	--	mg/sand 50/50	grass & trees >2' apart	LPT4 on pin
3.4	7226.708	--	--	sand/OM	grass & trees >2' apart	
12.6	7226.788	--	--	sand/OM	grass & trees >2' apart	
15.3	7226.008	--	--	sand/OM	grass & trees >2' apart	
19.6	7226.388	--	--	sand/OM	grass & trees >2' apart	
27.3	7226.168	--	--	sand/OM	grass & trees >2' apart	
31.2	7226.138	--	--	sand/OM	grass & trees >2' apart	
36.3	7224.978	--	--	sand/OM	grass & trees >2' apart	
38.9	7225.588	--	--	sand/OM	grass & trees >2' apart	
40.9	7224.578	--	--	sand/OM	grass & trees >2' apart	
41.5	7224.598	0	0	sand/OM	grass & trees >2' apart	LEW
42	7224.398	0.2	0.028	sand/OM	grass	Woody Debris US
42.5	7224.298	0.3	0.071	sand/OM	grass	Woody Debris US
43	7224.198	0.4	0.09	sand/OM	grass	Woody Debris US
43.5	7224.198	0.4	0.057	sand/OM	grass	Woody Debris US
44	7224.098	0.5	0.026	sand/OM	grass	Woody Debris US

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
44.5	7224.098	0.5	0.031	sand/OM	grass	Woody Debris US
45	7223.998	0.6	0.016	sand/OM	grass	Woody Debris US
45.5	7223.898	0.7	0.006	sand/OM	grass	Woody Debris US
46	7223.898	0.7	0.003	sand/OM	grass	Woody Debris US
46.5	7223.798	0.8	0.02	sand/OM	grass	Woody Debris US
47	7223.898	0.7	0.047	sand/OM	grass	Woody Debris US
47.5	7223.798	0.8	0.195	sand/OM	grass	Woody Debris US
48	7223.748	0.85	0.438	sg/mg 75/25	grass	Woody Debris US
48.5	7223.698	0.9	0.438	sg/mg 75/25	grass	Woody Debris US
49	7223.648	0.95	0.698	sg/mg 75/25	grass	Woody Debris US
49.5	7223.598	1	0.98	sg/mg 75/25	grass	Woody Debris US
50	7223.598	1	1.27	sg/mg 75/25	grass	Woody Debris US
50.5	7223.498	1.1	1.25	sg/mg 75/25	grass	Woody Debris US
51	7223.448	1.15	1.79	sg/mg 75/25	grass	
51.5	7223.448	1.15	2.02	sg/mg 75/25	grass	
52	7223.448	1.15	1.75	sg/mg 75/25	grass	
52.5	7223.598	1	2.01	sg/mg 75/25	grass	
53	7223.598	1	2.03	sg/mg 75/25	grass	
53.5	7223.598	1	2.04	sg/mg 75/25	grass	
54	7223.598	1	2.05	sg/mg 75/25	grass	
54.5	7223.498	1.1	1.87	sg/mg 75/25	grass	
55	7223.648	0.95	1.27	sg/mg 75/25	grass	
55.5	7223.698	0.9	0.99	sg/mg 75/25	grass	

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
56	7224.098	0.5	0.06	OM/sand	grass	
56.5	7224.398	0.2	0.02	OM/sand	grass	
57.5	7224.598	0	0	OM/sand	grass	REW
59	7224.798	--	--	OM/sand	grass	
62.3	7225.028	--	--	sand/sg	grass	
64.1	7225.628	--	--	sand/sg	dense trees	
68	7226.028	--	--	sand/sg	dense trees	
69.9	7226.708	--	--	OM	dense trees	
76.5	7227.058	--	--	OM	dense trees	RPT4 on pin
76.6	7227.058	--	--	OM	dense trees	off stump
Rush Creek Below Gem Dam Cross Section IF5						
4.8	7230.91	--	--	sand/mg/sb 25/50/25		LPT5
9.4	7227.3	--	--	sand/mg/sb 25/50/25		
14.1	7226.37	--	--	sand		
16.8	7226.59	--	--	sg/sand		
29.2	7226.57	--	--	sg/sand 75/25		
33	7225.62	--	--	sand/sg		
33.3	7225.623	0.00	0.00	sand/sg		LB WSEL
33.5	7224.723	0.90	0.46	mg/lg/sc 25/50/25		
33.9	7224.523	1.10	0.47	mg/lg/sc 25/50/25		
34.3	7224.523	1.10	1.07	mg/lg/sc 25/50/25		
34.7	7224.623	1.00	1.47	mg/lg/sc 25/50/25		
35.1	7224.623	1.00	1.65	mg/lg/sc 25/50/25		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
35.5	7224.773	0.85	1.68	mg/lg/sc 25/50/25		
35.9	7224.773	0.85	1.70	mg/lg/sc 25/50/25		
36.3	7224.823	0.80	1.65	mg/lg/sc 25/50/25		
36.7	7224.923	0.70	1.56	mg/lg/sc 25/50/25		
37.1	7224.823	0.80	1.72	mg/lg/sc 25/50/25		
37.5	7224.923	0.70	2.58	lg/mg		
37.9	7225.023	0.60	2.22	lg/mg		
38.3	7225.023	0.60	2.79	lg/mg		
38.7	7225.223	0.40	2.36	lg/mg		
39.1	7225.223	0.40	2.60	lg/mg		
39.5	7225.123	0.50	2.11	lg/mg		
39.9	7225.123	0.50	1.74	lg/mg		
40.3	7225.123	0.50	0.58	lg/mg		
40.7	7225.323	0.30	0.68	lg/mg		
41.1	7225.423	0.20	0.73	lg/mg		
41.5	7225.423	0.20	0.32	lg/mg		
41.9	7225.423	0.20	0.95	lg/mg		
42.3	7225.423	0.20	1.35	lg/mg		
42.7	7225.523	0.10	0.74	lg/mg		
43.1	7225.523	0.10	0.00	lg/mg		
43.5	7225.523	0.10	0.00	lg/mg		
43.9	7225.573	0.05	0.00	lg/mg		
44	7225.623	0.00	0.00	lg/mg		RB WSEL

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
44.2	7225.68	--	--	lg/mg		
47.8	7226.38	--	--	sg/mg		
53.8	7226.33	--	--	OM		
62.8	7229.55	--	--	mg/lg 75/25		
72.4	7230.91	--	--	OM		
Rush Creek Below Gem Dam Cross Section IF6						
0	7228.84	--	--			
1.5	7228.63	--	--			
25	7228.598	--	--	lc/OM 50/50		LBTP6
31.5	7227.858	--	--	lc/OM 50/50		
35.5	7227.388	--	--	lc/OM 50/50		
46	7226.778	--	--	OM		
54.7	7227.478	--	--	sand/sg		
58.7	7226.788	--	--	sand/sg 75/25		
60.8	7227.028	--	--	lg/sg 75/25		
66	7226.338	--	--	sg/lc/sc 25/50/25		
67.3	7226.503	0	0	sg/lc/sc 25/50/25		LEW
69.2	7226.303	0.2	1.17	sg/lc/sc 25/50/25		
69.6	7226.403	0.1	2.48	sg/lc/sc 25/50/25		
69.9	7226.403	0.1	2.27	sg/lc/sc 25/50/25		
70.3	7226.403	0.1	2.77	sg/lc/sc 25/50/25		
70.7	7226.203	0.3	2.75	lg/sc 50/50		
71.1	7226.303	0.2	1.58	lg/sc 50/50		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
71.5	7226.003	0.5	2.1	lg/sc 50/50		
71.9	7226.003	0.5	3.13	lg/sc 50/50		
72.3	7226.103	0.4	3.64	lg/sc 50/50		
72.7	7226.103	0.4	3.17	lg/sc 50/50		
73.1	7225.803	0.7	1.875	lg/sc 50/50		
73.5	7225.903	0.6	3.21	sb/lc/sc 25/25/50		behind rock
73.9	7226.003	0.5	4.32	sb/lc/sc 25/25/50		behind rock
74.3	7226.103	0.4	0.03	sb/lc/sc 25/25/50		behind rock
74.7	7225.903	0.6	1.495	sb/lc/sc 25/25/50		behind rock
75.3	7225.803	0.7	1.62	sb/lc/sc 25/25/50		behind rock
75.8	7225.803	0.7	3.09	sb/lc/sc 25/25/50		behind rock
76.2	7225.503	1	2.19	sb/lc/sc 25/25/50		behind rock
76.6	7225.403	1.1	2.295	sb/lc/sc 25/25/50		
77	7225.503	1	1.33	sb/lc/sc 25/25/50		
77.4	7225.503	1	1.85	sb/lc/sc 25/25/50		
77.8	7225.803	0.7	1.99	sb/lc/sc 25/25/50		
78.2	7225.703	0.8	1.27	sb/lc/sc 25/25/50		
78.6	7225.503	1	1.83	sb/lc/sc 25/25/50		
79.3	7225.953	0.55	0.47	sb/lc/sc 25/25/50		REW
80.5	7226.628	--	--	OM		
85.7	7228.928	--	--	mg/lg 75/25		
88.2	7228.728	--	--	mg/lg 75/26		
93.5	7229.368	--	--	OM		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
97.8	7230.028	--	--	OM		RBTP6
Rush Creek Below Gem Dam Cross Section IF7						
0	7229.01	--	--			
11.7	7228.378	--	--	OM		LPT7
13.5	7227.748	--	--	OM		
17.5	7227.798	--	--	OM		
21.2	7227.398	--	--	sand/sg/mg 50/25/25		
32	7227.458	--	--	sand/sg 75/25		
37	7227.778	--	--	mg/sg/sand 25/50/25		
38	7227.658	--	--	sand/sg 75/25		
43	7228.098	--	--	mg/lg/sg 50/25/25		
47.7	7227.518	--	--	mg/lg/sg 50/25/25		
50	7227.798	--	--	mg/lg/sg 50/25/25		
53.7	7226.858	--	--	mg/lg 75/25		
54.3	7226.983	0	0	mg/lg 75/25		LEW
55	7226.783	0.2	0.238	mg/lg 75/25		
55.5	7226.483	0.5	0.133	mg/lg 75/25		
56	7226.383	0.6	0.095	lg/sc/lc 25/25/50		
56.5	7226.283	0.7	0.096	lg/sc/lc 25/25/50		
57	7225.983	1	0.077	lg/sc/lc 25/25/50		
57.5	7225.783	1.2	0.008	lg/sc/lc 25/25/50		
58	7225.683	1.3	0.065	lg/sc/lc 25/25/50		
58.5	7225.618	1.365	0.121	lg/sc/lc 25/25/50		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
59	7225.483	1.5	0.362	lg/sc/lc 25/25/50		
59.5	7225.483	1.5	0.517	lg/sc/lc 25/25/50		
60	7225.383	1.6	0.672	lg/sc/lc 25/25/50		
60.5	7225.383	1.6	0.638	lg/sc/lc 25/25/50		
61	7225.333	1.65	1.003	lg/sc/lc 25/25/50		
61.5	7225.183	1.8	1.113	lg/sc/lc 25/25/50		
62	7225.083	1.9	1.049	lg/sc/lc 25/25/50		
62.5	7225.383	1.6	0.971	lg/sc/lc 25/25/50		
63	7225.483	1.5	1.017	lg/sc/lc 25/25/50		
63.5	7225.083	1.9	0.842	lg/sc/lc 25/25/50		
64	7224.983	2	0.73	lg/sc/lc 25/25/50		
64.5	7225.233	1.75	0.578	lg/sc/lc 25/25/50		
65	7225.283	1.7	0.512	lg/sc/lc 25/25/50		
65.5	7225.383	1.6	0.321	lg/sc/lc 25/25/50		
66	7225.483	1.5	0.376	lg/sc/lc 25/25/50		
66.5	7225.383	1.6	0.286	lg/sc/lc 25/25/50		
67	7225.333	1.65	0.267	lg/sc/lc 25/25/50		
67.5	7225.283	1.7	0.284	lg/sc/lc 25/25/50		
68	7225.583	1.4	0.203	lg/sc/lc 25/25/50		
68.3	7225.483	1.5	0.142	lg/sc/lc 25/25/50		
69	7225.483	1.5	0.088	sand/sc/lg 50/25/25		
69.5	7225.583	1.4	0.121	sand/sc/lg 50/25/25		
70	7226.383	0.6	0.063	sand/sc/lg 50/25/25		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
70.5	7226.383	0.6	-0.132	sand/sc/lg 50/25/25		
71	7226.783	0.2	-0.027	sand/sc/lg 50/25/25		
71.5	7226.783	0.2	-0.0007	sand/sc/lg 50/25/25		
72.1	7226.808	--	--	sand/sc/lg 50/25/25		REW
72.3	7226.983	0	0	sand/mg 75/25		
73.6	7228.358	--	--	sand/mg 75/26		
75.8	7229.018	--	--	sc/sg 25/75		
77.5	7229.608	--	--	sc/sg 25/75		RPT7
Rush Creek Below Gem Dam Cross Section IF8						
0	7229.27	--	--			
26.2	7228.378	--	--	OM		
29	7227.928	--	--	OM		
35	7228.258	--	--	OM		
39	7227.978	--	--	sand/OM		
41	7227.798	--	--	sg/sand 75/25		
45	7227.758	--	--	sg/sand 75/25		
50.8	7228.038	--	--	sg/sand 75/25		
52	7227.888	--	--	mg/lg 75/25		
54.2	7227.108	--	--	mg/lg 75/25		
54.6	7227.168	0	0	lg/sc/lc 25/50/25		LEW
55	7227.068	0.1	0.02	lg/sc/lc 25/50/25		
55.5	7227.018	0.15	0.21	lg/sc/lc 25/50/25		45
56	7226.968	0.2	0.15	lg/sc/lc 25/50/25		45

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
56.5	7226.768	0.4	0.29	lg/sc/lc 25/50/25		
57	7226.668	0.5	0.65	lg/sc/lc 25/50/25		
57.5	7226.718	0.45	0.38	lg/sc/lc 25/50/25		
58	7226.818	0.35	0.52	lg/sc/lc 25/50/25		
58.5	7226.768	0.4	0.73	lg/sc/lc 25/50/25		
59	7226.718	0.45	0.82	lg/sc/lc 25/50/25		
59.5	7226.468	0.7	0.81	lg/sc/lc 25/50/25		
60	7226.768	0.4	0.87	lg/sc/lc 25/50/25		
60.5	7226.568	0.6	1.25	lg/sc/lc 25/50/25		
61	7226.468	0.7	1.39	lg/sc/lc 25/50/25		
61.5	7226.468	0.7	1.2	lg/sc/lc 25/50/25		
62	7226.118	1.05	1.19	lg/sc/lc 25/50/25		
62.5	7226.168	1	1.18	lg/sc/lc 25/50/25		
63	7226.168	1	1.24	lg/sc/lc 25/50/25		
63.5	7225.968	1.2	0.9	lg/sc/lc 25/50/25		
64	7226.218	0.95	1.45	lg/sc/lc 25/50/25		
64.5	7226.168	1	0.93	lg/sc/lc 25/50/25		
65	7226.368	0.8	0.41	lg/sc/lc 25/50/25		
65.5	7226.168	1	0.47	lg/sc/lc 25/50/25		
66	7226.168	1	0.5	lg/sc/lc 25/50/25		
66.5	7226.168	1	0.83	lg/sc/lc 25/50/25		
67	7226.218	0.95	0.61	lg/sc/lc 25/50/25		
67.5	7226.368	0.8	0.72	lg/sc/lc 25/50/25		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
68	7226.468	0.7	0.66	lg/sc/lc 25/50/25		
68.5	7226.468	0.7	1.06	lg/sc/lc 25/50/25		
69	7226.518	0.65	1.05	lg/sc/lc 25/50/25		
69.5	7226.568	0.6	0.75	lg/sc/lc 25/50/25		
70	7226.568	0.6	0.52	lg/sc/lc 25/50/25		45
70.5	7226.668	0.5	0.51	lg/sc/lc 25/50/25		45
71	7226.868	0.3	0.32	lg/sc/lc 25/50/25		45
71.5	7226.968	0.2	0.11	lg/sc/lc 25/50/25		45
72.6	7227.168	0	0	lg/sc/lc 25/50/25		REW
73	7227.098	--	--	lg/sc/lc 25/50/25		
74.2	7227.718	--	--	lg/sc/lc 25/50/25		
76.7	7227.938	--	--	lg/sc/lc 25/50/25		
79	7228.538	--	--	lg/sc/lc 25/50/25		
83.3	7228.988	--	--	lg/sc/lc 25/50/25		
92	7228.138	--	--	OM		
101	7227.838	--	--	OM		
112.2	7229.038	--	--	OM		
Rush Creek Below Gem Dam Cross Section IF9						
0	1000	--	--	BR		LPT9
5.5	992.95	--	--	BR		
7.3	991.75	--	--	sb		
10	991.65	--	--	lc/mc 50/50	willow	
13	991.45	--	--	lc/mc 50/50	willow	

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
14.4	991.76	--	--	lc/mc 50/50	willow	
17.5	991.71	--	--	lc/mc 50/50	willow	
18	991.445	0	0	grass/mc		
18.5	991.245	0.2	1.14	grass/mc		LEW
19	991.445	0	0	lc/sb 75/25		
19.5	991.445	0	0	lc/sb 75/25		.2 Above Water, Rock
20	991.01	--	--	lc/sb 75/25		.2 Above Water, Rock
20	991.245	0.2	1.39	lc/sb 75/25		
20.5	990.745	0.7	1.49	lc/sb 75/25		
21	990.645	0.8	3.425	lc/sb 75/25		Turbulent Riffle
21.5	991.145	0.3	5.36	sb		
22	991.145	0.3	2.89	sb		
22.5	991.145	0.3	3.77	sb		
23	990.795	0.65	4.51	sb		
23.5	990.845	0.6	4.7	br		
24	991.045	0.4	3.49	br		
24.5	991.145	0.3	1.11	br		
25	991.145	0.3	2.2	br		
25.5	991.045	0.4	3.7	br		
26	991.145	0.3	4.02	br		
26.5	991.045	0.4	3.84	br		
27	990.845	0.6	1.88	br		
27.5	990.645	0.8	3.09	br		Turbulent Riffle

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
28	990.545	0.9	2.725	br		Turbulent Riffle
28.5	990.795	0.65	3.14	br		
29	990.745	0.7	2.53	sb/lc		
29.5	991.245	0.2	1.31	sb/lc		
30	991.345	0.1	0	sb/lc		
30.5	991.245	0.2	1.85	sb/lc		
31	991.245	0.2	2.32	sb/lc		
31.5	990.945	0.5	2.18	sb/lc		
32	991.045	0.4	0.75	sb/lc		
32.5	990.845	0.6	0.61	sb/lc		
33	990.845	0.6	0.01	sb/lc		
33.5	991.245	0.2	0.22	sb/lc		
34	991.245	0.2	0.18	br		
34.2	991.34	--	--	br		REW
34.5	991.445	0	0	br		
35.6	991.65	--	--	br		
38.1	998.17	--	--	br		RPT9
Rush Creek Below Gem Dam Cross Section IF10						
11	1000	--	--	BR		LPT10
18.2	997.22	--	--	BR/LB		
24	995.8	--	--	BR/LB		
57	994.0163113	--	--	sc/mc		
60	993.8541578	--	--	om/sg/mg		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
70.9	993.265	0	0	om/sg/mg		
71.6	993.065	0.2	0.83	om/sg/mg		
72.3	992.865	0.4	1.02	om/sg/mg		
73	992.265	1	1.39	lg mg 75/25		
73.7	992.215	1.05	2.13	lg mg 75/25		
74.4	991.965	1.3	2.38	lg mg 75/25		
75.1	992.165	1.1	2.25	lg mg 75/25		
75.8	992.165	1.1	2.3	lg/sc 75/25		
76.5	992.215	1.05	2.47	sc/lg/mc 50/25/25		
77.2	992.465	0.8	2.28	sc/lg/mc 50/25/25		
77.9	992.615	0.65	1.26	sc/lg/mc 50/25/25		
78.6	992.665	0.6	1.11	sc/lg/mc 50/25/25		
79.3	992.665	0.6	1.6	sc/lg/mc 50/25/25		
80	992.915	0.35	1.78	sc/lg/mc 50/25/25		
80.7	992.565	0.7	1.49	sc/lg/mc 50/25/25		
81.4	992.665	0.6	1.49	lc/mc/sc		
82.1	993.065	0.2	2.33	lc/mc/sc		
82.8	992.865	0.4	0.91	lc/mc/sc		
83.5	992.865	0.4	1.25	lc/mc/sc		
84.2	992.865	0.4	0.71	lc/mc/sc		
84.9	992.865	0.4	0.82	lc/mc/sc		
85.6	992.865	0.4	2.62	lc/mc/sc		
86.3	992.765	0.5	-0.27	lg/om 75/25		eddy

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
87	992.765	0.5	2.63	lg/om 75/25		
87.7	992.665	0.6	1.08	lg/om 75/25		
88.4	992.665	0.6	1.05	om		
88.5	992.96	0.53	0.90	om		
89.1	993.165	0.1	0	om		
89.4	993.165	0.1	0	om		
97.8	994.55	--	--	br		
105	997.35	--	--			
114	1000	--	--			RPT10
Rush Creek Below Gem Dam Cross Section IF11						
0.9	994.23	--	--	sg/mg		LPT11
5	992.21	--	--	OM/mg 25/75		
9	990.49	--	--	OM/mg 25/75		
11	988.55	--	--	OM/mg 25/75		
24	988.94	--	--	OM/mg 25/75		
27.8	988.64	0	0	OM		LEW
28.3	988.38	--	--	OM		
28.5	988.44	0.2	0.01	LC/SB 75/25		
29.5	987.74	0.9	0.03	LC/SB 75/25		
30.5	987.74	0.9	0.24	LC/SB 75/25		
31.5	987.54	1.1	0.05	LC/SB 75/25		
32.5	987.54	1.1	0.15	LC/SB 75/25		
33.5	987.74	0.9	0.19	LC/SB 75/25		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
34.5	987.14	1.5	0.06	LC/SB 75/25		
35.5	987.14	1.5	0.14	LC/SB 75/25		45
36.5	986.89	1.75	0.25	LC/SB 75/25		
37.5	986.94	1.7	0.27	LC/SB 75/25		
38.5	987.04	1.6	0.14	LC/SB 75/25		
39.5	986.94	1.7	0.35	LC/SB 75/25		
40.5	986.74	1.9	0.33	LC/SB 75/25		
41.5	987.04	1.6	0.48	LC/SB 75/25		
42.5	986.89	1.75	0.12	MC/LC		
43.5	987.14	1.5	0.46	MC/LC		
44.5	987.24	1.4	0.43	MC/LC		
45.5	987.34	1.3	0.26	MC/LC		
46.5	987.24	1.4	0.12	MC/LC		
47.5	987.14	1.5	0.08	MC/LC		
48.5	987.54	1.1	0.01	MC/LC		
49.5	987.44	1.2	-0.01	MC/LC		
50.5	987.79	0.85	-0.01	MC/LC		
51.5	988.24	0.4	-0.01	MC/LC		
52.5	988.49	0.15	0	MC/LC		
52.9	988.43	--	--	MC/LC		
53.4	988.54	0.1	0	MC/LC		REW
60.2	992.11	--	--	LG/SC		RPT11

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
Rush Creek Below Gem Dam Cross Section IF12						
1	993.65	--	--	LB/MC		LPT12
1.5	993.01	--	--	LB/MC		
5	992.91	--	--	OM		
11	992.43	--	--	OM		
15	991.8	--	--	LG/MC/OM		
17	990.73	--	--	LG/MC/OM		
21.6	989.72	--	--	OM		
25	989.19	--	--	OM		
31	988.96	--	--	OM		
34.2	988.67	--	--	OM		
34.5	988.48	--	--	OM		
34.3	988.625	0.1	0	OM		LEW
34.8	988.425	0.3	0.45	LC/SB 75/25		
35.3	988.025	0.7	0.53	LC/SB 75/25		
35.8	987.825	0.9	0.65	LC/SB 75/25		
36.3	987.925	0.8	1	LC/SB 75/25		45
36.8	987.925	0.8	0.97	LC/SB 75/25		45
37.3	988.025	0.7	1	LC/SB 75/25		
37.8	987.925	0.8	0.75	LC/SB 75/25		
38.3	988.125	0.6	0.66	LC/SB 75/25		
38.8	988.025	0.7	-0.2	LC/SB 75/25		eddy
39.3	988.025	0.7	0.43	LC/SB 75/25		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
39.8	987.925	0.8	1.06	LC/SB 75/25		
40.3	987.925	0.8	1.25	LC/SB 75/25		
40.8	987.725	1	1.06	LC/SB 75/25		
41.3	987.725	1	1.35	LC/SB 75/25		
41.8	987.925	0.8	1.52	LC/SB 75/25		
42.3	987.825	0.9	1.51	LC/SB 75/25		
42.8	987.825	0.9	1.06	LC/SB 75/25		
43.3	988.025	0.7	1.18	LC/SB 75/25		
43.8	988.225	0.5	1.06	LC/SB 75/25		
44.3	988.225	0.5	0.9	LC/SB 75/25		
44.8	988.225	0.5	1.03	LC/SB 75/25		
45.3	988.325	0.4	1.26	LC/SB 75/25		
45.8	988.625	0.1	0	LC/SB 75/25		
46.3	988.625	0.1	0	LC/SB 75/25		
46.8	988.625	0.1	0	LC/SB 75/25		
47.3	988.225	0.5	0.29	LC/SB 75/25		
47.8	988.025	0.7	0.5	LC/SB 75/25		
48.3	987.925	0.8	0.44	LC/SB 75/25		
48.8	988.225	0.5	0.4	LC/SB 75/25		
49.3	988.325	0.4	0.05	LG/MC/OM		
49.8	988.725	0	0	LG/MC/OM		
49.6	988.44	--	--	LG/MC/OM		
50.8	989.6	--	--	LG/MC/OM		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
53.4	988.87	--	--	LG/MC/OM		
58	989.8	--	--	LG/MC		
61.3	991.58	--	--	LG/MC		
62.8	992.96	--	--	LG/MC		RPT12
Rush Creek Below Gem Dam Cross Section IFCT1						
1	994.59	--	--			
1.8	993.87	--	--			
3.3	992.24	--	--			
5	991.51	--	--			
8	991.34	--	--			
10.5	990.76	--	--			
11	990.72	--	--			
11.8	990.4	--	--			
12.5	990.1	--	--			
13.4	990.27	--	--			
13.9	990.4	--	--			
14.1	989.69	--	--			
14.7	989.75	--	--			
15.4	990.15	--	--			
16.2	990.64	--	--			
17.7	990.86	--	--			
19.2	990.99	--	--			
25	991.39	--	--			

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
30	991.61	--	--			
37	991.48	--	--			
45	991.19	--	--			
51	991.84	--	--			
56	992.09	--	--			
59	992.19	--	--			
59.2	992.46	--	--			
65	991.2	--	--			
70	991.37	--	--			
77	989.49	--	--			
80	989.07	--	--			
81.7	990.39	--	--			
83	993	--	--			
Rush Creek Below Gem Dam Cross Section IF13						
0	998.16	--	--	Bedrock		lpt13 bottom
3.7	998.3	--	--	Bedrock		
5.7	994.92	--	--	Bedrock		
7	994.71	--	--	Bedrock		
8.3	991	0.00	0.00	Bedrock		
8.6	990.78	0.00	0.00	Bedrock		LEW
9	990.5	0.50	0.12	Bedrock		
10	989	2.00	0.02	Bedrock		
11	987.1	3.90	0.06	LC/SB		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
12	987.7	3.30	0.18	LC/SB		
13	987.4	3.60	0.14	LC/SB		
14	987.8	3.20	0.04	LC/SB		
15	987.9	3.10	0.08	LC/SB		
16	988.1	2.90	0.24	LC/SB		
17	988.2	2.80	-0.01	LC/SB		
18	988.3	2.70	0.07	LC/SB		
19	988.3	2.70	0.03	LC/SB		
20	988.35	2.65	0.07	LC/SB		
21	988.6	2.40	0.02	LC/SB		
22	988.6	2.40	0.35	SC/LG		
23	988.6	2.40	0.35	SC/LG		
24	988.9	2.10	0.28	SC/LG		
25	988.55	2.45	0.48	SC/LG		
26	988.7	2.30	0.31	SC/LG		
27	988.9	2.10	-0.10	SC/LG		
28	989.3	1.70	-0.10	SC/LG		
29	989.5	1.50	0.35	MC/SC		
30	989.65	1.35	0.35	MC/SC		
31	989.7	1.30	0.26	MC/SC		
32	990.4	0.60	0.31	MC/SC		
33	990.65	0.35	0.10	MC/SC		
34	990.55	0.45	0.01	MC/SC		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
35	991.1	-0.10	0.00	MC/SC		
36	991.1	-0.10	0.00	MC/SC		
37	990.8	0.20	0.05	MC/SC		
38	990.8	0.20	0.05	MC/SC		
39	990.9	0.10	0.00	MC/SC		
40	991	0.00	0.00	MC/SC		
40.4	991	0.00	0.00	MC/SC		REW
42.5	991.57	--	--	BR/OM		
56	991.16	--	--	BR/OM		
59	990.64	--	--	BR/OM		
61	989.67	--	--	BR/OM		
63.7	989.16	--	--	BR/OM		
65.7	989.54	--	--	75/25 BR/SC		
68.6	994.8	--	--	75/25 BR/SC		
68.6	994.8	--	--	Bedrock		
Rush Creek Below Gem Dam Cross Section IF14						
1	1000.10	--	--	BR		
2.4	998.27	--	--	BR		
2.9	998.20	--	--	BR		
3.7	995.35	--	--	BR		
4.4	996.25	--	--	BR		
5.4	994.75	--	--	BR		
7	992.10	--	--	BR		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
7.65	991.59	0.00	0.00	BR		
7.9	991.39	0.17	0.03	BR		
8.25	990.97	0.40	0.08	BR		
8.4	990.79	0.37	0.07	BR		
9.25	990.46	0.20	0.01	80/20 LC/SB		
9.4	990.40	0.23	0.20	80/20 LC/SB		
10.25	989.82	0.40	1.30	80/20 LC/SB		
11.25	989.13	1.10	0.72	80/20 LC/SB		
12.25	988.45	2.00	0.26	80/20 LC/SB		
16	985.88	3.56	0.15	80/20 LC/SB		
18.25	986.68	4.50	0.08	80/20 LC/SB		
19.25	987.04	4.20	-0.18	80/20 LC/SB		
20	987.31	3.90	0.03	80/20 LC/SB		
20.25	987.38	3.80	0.10	80/20 LC/SB		
21.25	987.65	3.60	0.10	80/20 LC/SB		
22.25	987.91	3.40	0.15	80/20 LC/SB		
23.25	988.18	3.10	-0.07	80/20 LC/SB		
24.25	988.45	2.90	0.23	80/20 LC/SB		
25	988.65	2.60	0.16	80/20 LC/SB		
25.25	988.74	2.50	0.13	80/20 LC/SB		
26.25	989.09	2.20	0.42	80/20 LC/SB		
27	989.35	1.90	0.42	80/20 LC/SB		
27.25	989.31	1.80	0.42	80/20 LC/SB		

Station (ft).	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Substrate	Vegetation	Notes
28.25	989.14	2.40	0.02	BR		
29	989.01	2.18	0.07	BR		
29.25	989.12	2.10	0.08	BR		
30.25	989.56	1.50	0.18	BR		
30.6	989.72	1.50	0.29	BR		
31.25	989.68	1.50	0.49	BR		
32	989.64	1.28	0.63	BR		
32.25	989.60	1.20	0.67	BR		
33.25	989.45	1.40	1.31	BR		
33.4	989.43	1.39	1.26	BR		
34.25	989.82	1.30	0.97	BR		
35	990.16	0.40	0.24	BR		
35.25	990.76	0.10	0.00	BR		
35.3	990.88	0.08	0.00	BR		
35.45	991.61	0.00	0.00	BR		
36	994.30	--	--	BR		
39.6	995.96	--	--	BR		
39.6	995.94	--	--	BR		

Key:
BR = bed rock
LB = left bank
LC = large cobble
LG = large gravel
LP = left pin
LPT = left pin transect
LWD = large woody debris
MG = medium gravel
OM = organic matter
OM = organic matter
RBT = right bank transect
REW = right edge of water
RPT = right pin transect
SB = small boulder
SC = small cobble
SG = small gravel
US =upstream
WD = woody debris
WSEL= water surface elevation

APPENDIX C

Field Data (Rush Creek Below Silver Lake)

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INTRODUCTION

The raw field data collected at each of the cross sections are provided in Table AQ 1-B1. Included in the table are the point data collected along the cross section, including the surveyed bed elevation, the depth from water surface, the measured velocity and observed substrate and vegetation.

Table AQ 1- C1. Rush Creek Downstream of Silver Lake Field Data for Cross sections IF1 to IF23

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
Rush Creek Below Silver Lake Cross Section IF1						
0.0	1004.22	--	--			LB Top of Nail, US of lodgepole
0.0	1003.90	--	--			LB bottom of nail
4.0	1003.34	--	--			US Jeffrey pine
9.0	1003.03	--	--			
10.5	1003.10	--	--			
16.0	1002.83	--	--			
19.0	1003.00	--	--			
24.0	1002.63	--	--			
29.0	1002.10	--	--			
32.5	1002.02	--	--			
33.5	1001.71	--	--			edge of trail
34.2	1001.51	--	--			
35.6	1001.60	--	--			edge of trail
36.5	1001.88	--	--			
39.0	1001.70	--	--			
42.0	1001.47	--	--			

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.0	1001.09	--	--			
49.6	1001.00	--	--			LPT1 @ ground, US 9" aspen
51.0	1000.62	--	--		Grass	
52.7	1000.72	--	--		Grass	
55.0	1000.56	--	--		Grass	
57.0	1000.38	--	--		Grass	
58.7	1000.15	--	--		Grass	
59.8	999.99	--	--		Grass	TOB
60.4	999.61	--	--		Grass	
60.9	999.49	--	--		Grass	BF
61.1	999.02	--	--		Grass	edge of aspen sampling/veg
62.0	998.56	--	--		Grass	
63.1	998.46	--	--		Grass	
63.3	998.25	--	--		Grass	
63.9	998.14	0.00	0.00		WD	LEW
64.4	998.04	0.08	0.21		WD	
65.1	997.97	0.20	0.50	SG		
65.2	997.96	0.19	0.47	SG		LEW @ 10:07 / willow roots
66.0	997.75	0.14	0.21	SG		
66.6	997.75	0.10	0.02	50/50 LG/MG		
68.0	997.75	0.24	0.71	50/50 LG/MG		
68.1	997.75	0.25	0.76	50/25/25 LG/MG/SG		
69.6	997.81	0.25	1.64	50/25/25 LG/MG/SG		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
70.0	997.83	0.24	1.59	50/25/25 LG/MG/SG		
71.1	997.80	0.20	1.44	50/50 LG/MG		
72.0	997.77	0.23	1.94	50/50 LG/MG		
72.6	997.73	0.25	2.27	75/25 LG/SC		
74.1	997.62	0.30	0.78	50/25/25 LG/SC/MG		Default
74.7	997.58	0.38	0.67	50/25/25 LG/SC/MG		Fitted SZF
75.6	997.54	0.50	0.50	50/25/25 LG/SC/MG		
77.1	997.47	0.40	2.73	50/25/25 LG/SC/MG		edge of US willow canopy
77.1	997.47	0.40	2.73	75/25 LG/MG		
78.6	997.49	0.55	2.62	50/25/25 LG/SC/MG		
80.1	997.51	0.55	2.20	50/25/25 LG/SC/MG		
80.5	997.51	0.56	2.19	50/25/25 LG/SC/MG		
81.6	997.49	0.60	2.15	50/25/25 LG/SC/MG		
83.1	997.47	0.60	2.50	50/50 LG/SC		
83.7	997.46	0.60	2.33	50/50 LG/SC		
84.6	997.38	0.60	2.08	50/50 LG/SC		
86.0	997.26	0.65	2.27	50/50 LG/SC		
86.1	997.26	0.65	2.28	50/50 MC/SC		
87.6	997.26	0.75	1.07	50/50 MC/SC		
87.8	997.26	0.73	1.30	50/50 MC/SC		
89.1	997.37	0.60	2.83	50/50 SC/LG		
90.0	997.45	0.72	3.06	50/50 SC/LG		
90.6	997.43	0.80	3.22	75/25 SC/MC		
92.1	997.38	0.80	2.51	75/25 SC/MC		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
93.0	997.35	0.68	2.32	75/25 SC/MC		
93.6	997.33	0.60	2.20	50/50 SC/LG		
95.1	997.29	0.70	2.57	75/25 LG/SC		
96.0	997.26	0.82	2.41	75/25 LG/SC		edge of pine canopy
96.6	997.23	0.90	2.30	50/25/25 SC/LG/MG		
98.0	997.17	0.90	1.97	50/25/25 SC/LG/MG		thalweg
98.1	997.18	0.90	1.95	50/50 SC/LG		
99.6	997.26	0.90	0.99	75/25 LG/SC		
101.0	997.34	0.81	0.95	75/25 LG/SC		
101.1	997.36	0.80	0.95	50/50 LG/SC		
102.6	997.60	0.60	1.23	SC		
103.0	997.66	0.52	1.00	SC		
104.1	997.82	0.30	0.37	SAND		
104.3	997.85	0.27	0.32	SAND		
105.4	998.11	0.13	0.05	SAND		REW @ 10:15 / edge of grassy veg
105.6	998.17	0.10	0.01	SAND		
105.9	998.25	0.00	0.00	SAND, REW		
106.0	998.28	--	--	soil, pine needles		Toe of bank
106.1	999.01	--	--	soil, pine needles		
106.6	999.46	--	--	soil, pine needles		BF
107.0	999.62	--	--		lodgepole pine roots	lodgepole pine roots
107.8	1000.78	--	--		base of roses	base of roses
108.6	1001.19	--	--			TOB

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
110.2	1001.47	--	--		base of lg lodgepole	base of lg lodgepole
110.7	1001.59	--	--			RPT1 top of nail @ root of pin
113.0	1001.49	--	--			
116.0	1001.18	--	--			
117.5	1001.09	--	--			edge of dogwood canopy
122.5	1001.15	--	--			
125.0	1001.17	--	--			
130.0	1000.99	--	--			
136.0	1000.86	--	--			
144.0	1001.35	--	--			
150.5	1001.57	--	--			
154.5	1001.33	--	--			
167.0	1001.43	--	--			
174.0	1001.53	--	--			
178.6	1001.11	--	--			
182.0	1001.44	--	--			
209.3	1001.81	--	--			
210.0	1001.82	--	--			
Rush Creek Below Silver Lake Cross Section IFCT1						
0.0	1003.36	--	--			LPT1 TOP
0.0	1002.95	--	--			LPT1 GROUND
2.0	1002.31	--	--			
4.0	1001.97	--	--			

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
5.0	1001.83	--	--			
5.7	1001.64	--	--			
6.1	1001.41	--	--			
7.6	1000.93	--	--			
8.8	1000.85	--	--			
9.7	1000.59	--	--			
10.4	1000.40	--	--			
10.7	1000.11	--	--			LEW
12.0	998.31	--	--			
14.0	998.03	--	--			
15.4	997.78	--	--			
18.2	998.17	--	--			
20.0	998.02	--	--			
23.3	997.83	--	--			
25.7	997.93	--	--			
27.9	997.80	--	--			
30.7	997.75	--	--			
32.7	997.90	--	--			
35.0	997.79	--	--			
36.5	998.01	--	--			
38.8	998.19	--	--			Use T1
41.0	998.06	--	--			Use T1
42.5	997.95	--	--			Use T1
44.5	997.86	--	--			

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
47.4	997.81	--	--			
49.2	997.89	--	--			
51.0	998.63	--	--			REW
51.1	1000.37	--	--			
51.5	1000.89	--	--			
52.6	1001.13	--	--			
55.0	1001.13	--	--			
55.6	1001.57	--	--			RPCT1 GROUND
55.6	1001.75	--	--			RPCT1 TOP
60.0	1002.02	--	--			
Rush Creek Below Silver Lake Cross Section IF2						
0.0	1004.44	--	--		Grass	LPT2 TOP
0.0	1003.97	--	--		Grass	LPT2 GROUND
4.0	1003.67	--	--	SILT/SAND		
7.0	1003.38	--	--	SILT/SAND		
9.0	1003.04	--	--	SILT/SAND		
10.8	1002.49	--	--	SILT/SAND		
12.8	1002.05	--	--	SILT/SAND		
15.0	1001.48	--	--	SILT/SAND		
18.0	1000.73	--	--	SILT/SAND		
21.0	1000.44	--	--	SILT/SAND		
25.3	999.97	--	--	SILT/SAND		
28.5	999.41	--	--	SILT/SAND		
30.6	999.07	--	--	SAND/SG		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
32.4	998.78	0.00	0.00	SAND/SG		LEW
33.0	998.68	0.10	0.05	SG/SAND 75/25		
34.0	998.48	0.30	0.04	SG/SAND 75/25		
35.0	998.28	0.50	-0.05	SG/SAND 75/25		
36.0	997.98	0.80	-0.13	SG/SAND 75/25		
37.0	997.68	1.10	-0.05	SG/SAND 75/25		
38.0	997.33	1.45	-0.04	SG/SAND 75/25		
39.0	997.33	1.45	0.02	SG/SAND 75/25		
40.0	997.08	1.70	0.16	SG/SAND 75/25		
41.0	996.88	1.90	0.16	SG/SAND 75/25		
42.0	996.68	2.10	0.20	SG/SAND 75/25		ADP start at 43
43.0	996.30	2.48	0.60	SG/SAND 75/25		
43.2	996.25	2.53	0.25	SG/SAND 75/25		
43.4	996.22	2.56	0.50	SG/SAND 75/25		
43.7	996.18	2.60	0.41	SG/SAND 75/25		
43.9	996.17	2.61	0.62	SG/SAND 75/25		
44.2	996.12	2.66	0.11	SG/SAND 75/25		
44.5	996.01	2.77	0.31	SG/SAND 75/25		
44.8	995.95	2.83	0.41	SG/SAND 75/25		
45.0	995.88	2.90	0.27	SG/SAND 75/25		
45.3	995.82	2.96	0.58	SG/SAND 75/25		
45.6	995.76	3.02	0.23	SG/SAND 75/25		
45.9	995.67	3.11	0.36	SG/SAND 75/25		
46.2	995.57	3.21	0.33	SG/SAND 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.5	995.50	3.28	0.31	SG/SAND 75/25		
46.9	995.42	3.36	0.29	SG/SAND 75/25		
47.1	995.33	3.45	0.14	SG/SAND 75/25		
47.4	995.21	3.57	0.32	SG/SAND 75/25		
47.9	995.09	3.69	0.53	SG/SAND 75/25		
48.2	994.99	3.79	0.48	SG/SAND 75/25		
49.2	994.70	4.08	0.62	SG/SAND 75/25		
49.5	994.60	4.18	0.51	SG/SAND 75/25		
49.8	994.55	4.23	0.24	SG/SAND 75/25		
50.1	994.51	4.27	0.12	SG/SAND 75/25		
50.3	994.48	4.30	0.23	SG/SAND 75/25		
50.6	994.41	4.37	0.60	SG/SAND 75/25		
50.9	994.33	4.45	0.40	SG/SAND 75/25		
51.2	994.27	4.51	0.24	SG/SAND 75/25		
51.4	994.18	4.60	0.60	SG/SAND 75/25		
51.7	994.17	4.61	0.26	SG/SAND 75/25		
52.0	994.06	4.72	0.38	SG/SAND 75/25		
52.2	994.02	4.76	0.28	SG/SAND 75/25		
52.5	994.02	4.76	0.06	SG/SAND/SB 50/25/25		
52.7	994.04	4.74	0.03	SG/SAND/SB 50/25/25		
53.0	994.05	4.73	0.32	SG/SAND/SB 50/25/25		
53.3	994.04	4.74	0.19	SG/SAND/SB 50/25/25		
53.6	993.98	4.80	0.34	SG/SAND/SB 50/25/25		
53.9	994.03	4.75	0.25	SG/SAND/SB 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
54.3	993.93	4.85	0.49	SG/SAND/SB 50/25/25		
54.6	993.91	4.87	0.06	SG/SAND/SB 50/25/25		
54.9	993.83	4.95	0.25	SG/SAND/SB 50/25/25		
55.2	993.83	4.95	0.55	SG/SAND/SB 50/25/25		
55.5	993.79	4.99	0.29	SG/SAND/SB 50/25/25		
55.7	993.79	4.99	0.33	SG/SAND/SB 50/25/25		
55.9	993.81	4.97	0.20	SG/SAND/SB 50/25/25		
56.1	993.84	4.94	0.14	SG/SAND/SB 50/25/25		
56.2	993.99	4.79	0.12	SG/SAND/SB 50/25/25		
56.4	994.07	4.71	0.05	SG/SAND/SB 50/25/25		
56.6	994.05	4.73	0.45	SG/SAND/SB 50/25/25		
56.8	993.99	4.79	0.31	SG/SAND/SB 50/25/25		
57.0	993.96	4.82	0.40	SG/SAND/SB 50/25/25		
57.3	994.13	4.65	0.16	SG/SAND/SB 50/25/25		
57.7	994.27	4.51	0.21	SG/SAND/SB 50/25/25		
58.0	994.27	4.51	0.27	SG/SAND/SB 50/25/25		
58.3	994.34	4.44	0.34	SG/SAND/SB 50/25/25		
58.8	994.55	4.23	0.23	SG/SAND/SB 50/25/25		
59.1	994.66	4.12	0.38	SG/SAND/SB 50/25/25		
59.4	994.75	4.03	0.56	SG/SAND/SB 50/25/25		
59.8	994.78	4.00	0.08	SG/SAND/SB 50/25/25		
60.7	994.94	3.84	0.39	Silt/Sand		
61.3	994.87	3.91	0.77	Silt/Sand		
62.1	994.83	3.95	0.77	Silt/Sand		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
63.3	995.05	3.73	0.73	Silt/Sand		
64.0	995.18	3.60	1.05	Silt/Sand		
64.6	995.16	3.62	0.70	Silt/Sand		
64.9	995.22	3.56	0.78	Silt/Sand		
65.2	995.54	3.24	0.38	Silt/Sand		
65.6	995.54	3.24	0.71	Silt/Sand		
66.1	995.71	3.07	0.48	Silt/Sand		
66.3	995.81	2.97	0.32	Silt/Sand		
66.6	995.85	2.93	0.50	Silt/Sand		
66.7	995.86	2.92	0.07	Silt/Sand		
67.1	995.95	2.83	1.23	Silt/Sand		
67.3	995.92	2.86	0.33	Silt/Sand		
67.6	995.97	2.81	0.26	Silt/Sand		
67.8	996.05	2.73	0.44	Silt/Sand		
68.0	996.20	2.58	0.13	Silt/Sand		
68.1	996.21	2.57	0.11	Silt/Sand		
68.2	996.19	2.59	0.64	Silt/Sand		
68.3	996.31	2.47	0.37	Silt/Sand		
68.6	996.27	2.51	0.28	Silt/Sand		
68.8	996.28	2.50	0.32	Silt/Sand		
69.1	996.23	2.55	0.41	Silt/Sand		
69.2	996.29	2.49	0.11	Silt/Sand		
69.4	996.37	2.41	0.81	Silt/Sand		
69.6	996.37	2.41	0.33	Silt/Sand		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
69.8	996.39	2.39	0.75	Silt/Sand		
70.0	996.45	2.33	0.56	Silt/Sand		
70.2	996.53	2.25	0.69	Silt/Sand		
70.4	996.50	2.28	0.41	Silt/Sand		
70.6	996.58	2.20	0.68	Silt/Sand		
70.8	996.68	2.10	0.48	Silt/Sand		
71.1	996.69	2.09	0.60	Silt/Sand		
71.3	996.76	2.02	0.25	Silt/Sand		
71.6	997.06	1.72	0.41	Silt/Sand		
71.8	997.08	1.70	0.38	Silt/Sand		
72.0	996.97	1.81	0.20	Silt/Sand		
72.2	996.89	1.89	0.00	Silt/Sand		
72.3	996.90	1.88	0.00	Silt/Sand		
72.5	996.89	1.89	0.29	Silt/Sand		
72.6	997.12	1.66	1.19	Silt/Sand		
72.7	996.99	1.79	0.60	Silt/Sand		
72.8	997.04	1.74	0.24	Silt/Sand		
72.9	997.06	1.72	0.44	Silt/Sand		
73.1	997.09	1.69	0.73	Silt/Sand		
73.3	997.10	1.68	0.52	Silt/Sand		
73.7	997.21	1.57	0.19	Silt/Sand		
75.0	997.59	1.19	0.00	Silt/Sand		
76.0	997.84	0.94	0.00	Silt/Sand		
78.0	998.80	--	--	Silt/Sand		10:33 REW

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
78.2	999.03	--	--			
79.8	1000.49	--	--			
81.0	1001.33	--	--			
82.0	1002.22	--	--			RPT2
82.9	1002.40	--	--			RPT2 GRND
82.9	1002.81	--	--			
Rush Creek Below Silver Lake Cross Section IF3						
20.7	1003.57	--	--	SILT/DETRITUS		LPT3 TOP
21.0	1003.68	--	--	SILT/DETRITUS		
24.0	1003.94	--	--	SILT/DETRITUS		
26.8	1003.96	--	--	SILT/DETRITUS		
28.2	1003.48	--	--	SILT/DETRITUS		
30.0	1002.82	--	--		Grass	
32.0	1001.96	--	--		Grass	
34.0	1001.17	--	--		Grass	
35.0	1000.89	--	--		Grass	
35.8	1000.81	--	--		Grass	
36.2	1000.51	--	--		Grass	
37.3	1000.59	--	--		Grass	
38.9	1000.52	--	--		Pine Tree Roots	
40.0	1000.15	--	--		Pine Tree Roots	
40.2	998.82	--	--		Pine Tree Roots	LEW 10:58

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
40.6	998.83	0.00	0.00		Pine Tree Roots	LEW
41.0	998.53	0.30	0.05	SILT/SAND/SG		
42.0	998.43	0.40	0.13	SILT/SAND/SG		
43.0	998.33	0.50	0.12	SILT/SAND/SG		
44.0	998.23	0.60	-0.15	SILT/SAND/SG		BEHIND BOULDER
45.0	998.13	0.70	0.11	SILT/SAND/SG		
46.0	997.73	1.10	-0.01	SILT/SAND/SG		BEHIND BOULDER
47.0	997.33	1.50	-0.14	SILT/SAND/SG		BEHIND BOULDER
48.0	997.63	1.20	-0.15	SAND/SG/SC		
49.0	997.03	1.80	0.09	SAND/SG/SC		
50.0	996.80	2.03	0.29	SAND/SG/SC		
50.2	996.62	2.21	0.44	SAND/SG/SC		
50.4	996.63	2.20	0.49	SAND/SG/SC		
50.4	996.60	2.23	0.60	SAND/SG/SC		
50.8	996.72	2.11	0.56	SAND/SG/SC		
51.0	996.74	2.09	0.39	SAND/SG/SC		
51.3	996.73	2.10	0.61	MC/LC/SB Pocket MG		
51.7	996.50	2.33	0.66	MC/LC/SB Pocket MG		
52.0	996.50	2.33	0.58	MC/LC/SB Pocket MG		
52.2	996.61	2.22	0.62	MC/LC/SB Pocket MG		
52.5	996.49	2.34	0.96	MC/LC/SB Pocket MG		
52.8	996.62	2.21	1.10	MC/LC/SB Pocket MG		
53.2	996.64	2.19	0.97	MC/LC/SB Pocket MG		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
53.5	996.67	2.16	0.87	MC/LC/SB Pocket MG		
54.0	996.70	2.13	1.21	MC/LC/SB Pocket MG		
54.3	996.50	2.33	1.33	MC/LC/SB Pocket MG		
54.7	996.26	2.57	0.97	MC/LC/SB Pocket MG		
54.8	996.16	2.67	1.27	MC/LC/SB Pocket MG		
55.1	996.11	2.72	0.76	MC/LC/SB Pocket MG		
55.5	996.02	2.81	0.57	MC/LC/SB Pocket MG		
55.8	995.96	2.87	0.70	MC/LC/SB Pocket MG		
56.2	995.94	2.89	1.01	MC/LC/SB Pocket MG		
56.6	995.89	2.94	0.82	MC/LC/SB Pocket MG		
57.0	995.88	2.95	0.90	MC/LC/SB Pocket MG		
57.4	995.79	3.04	1.04	MC/LC/SB Pocket MG		
57.8	995.70	3.13	1.20	MC/LC/SB Pocket MG		
58.3	995.66	3.17	1.08	MC/LC/SB Pocket MG		
58.7	995.65	3.18	0.84	MC/LC/SB Pocket MG		
59.0	995.55	3.28	0.68	LC/SB		
59.3	995.52	3.31	0.66	LC/SB		
59.7	995.45	3.38	0.82	LC/SB		
60.0	995.34	3.49	0.87	LC/SB		
60.3	995.30	3.53	0.71	LC/SB		
60.6	995.25	3.58	0.50	LC/SB		
61.0	995.17	3.66	0.63	LC/SB		
61.4	995.05	3.78	0.89	LC/SB		
61.8	995.05	3.78	1.16	LC/SB		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
62.2	995.04	3.79	1.15	LC/SB		
62.7	994.97	3.86	1.63	LC/SB		
63.1	994.94	3.89	0.96	LC/SB		
63.5	994.99	3.84	0.73	LC/SB		
64.0	995.70	3.13	1.69	LC/SB		
64.5	996.06	2.77	0.70	LC/SB		
64.8	996.30	2.53	0.43	LC/SB		
65.1	996.56	2.27	1.11	LC/SB		
68.5	998.83	--	--	LC/SB		REW 11:01
69.0	999.46	--	--	LC/SB		
69.6	999.93	--	--	LC/SB		
70.0	1000.74	--	--	LC/SB		
71.7	1001.85	--	--	LC/SB		
73.4	1002.34	--	--	LC/SB		RPT3 GROUND
73.4	1002.43	--	--	LC/SB		RPT3 TOP
Rush Creek Below Silver Lake Cross Section IF4						
6.3	1995.87	--	--		Tree Roots	
9.0	1995.48	--	--		Grass/ Roots	
10.6	1995.12	--	--	ROOTS/SAND/SILT	Roots	
19.5	1994.82	--	--	SAND		
20.2	1994.14	--	--		Grass	
23.5	1993.67	--	--	SILT/SAND		
26.7	1993.75	--	--	SG/SAND 75/25		
28.5	1993.61	0.00	0.00	SG/SAND 75/25		LEW (velocity)

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
28.6	1993.59	--	--	SG/SAND 75/25		LEW T4
29.5	1993.51	0.10	-0.43	SG/SAND/LG 50/25/25		
30.5	1993.26	0.35	0.41	SG/SAND/LG 50/25/25		
31.5	1993.01	0.60	0.52	SG/SAND/LG 50/25/25		
32.5	1993.04	0.57	0.61	SC/LG 75/25		
33.5	1992.96	0.65	0.51	SC/LG 75/25		
34.5	1992.89	0.72	1.00	SC/LG 75/25		
35.5	1992.81	0.80	0.73	SC/LG 75/25		
36.5	1992.86	0.75	1.27	SC/LG 75/25		
37.5	1992.61	1.00	1.14	SC/LG 75/25		
38.5	1992.61	1.00	1.46	SC/LG 75/25		ds small boulder
39.5	1992.39	1.22	1.38	SC/LG 75/25		
40.5	1992.21	1.40	1.35	SC/LG 75/25		
41.5	1992.13	1.48	1.46	SC/LG 75/25		
42.5	1992.11	1.50	1.57	SC/LG 75/25		
43.5	1992.11	1.50	1.50	SC/LG 75/25		
44.5	1991.86	1.75	1.43	SC/MC 50/50		
45.5	1991.61	2.00	1.56	SC/MC 50/50		
46.5	1991.66	1.95	1.57	SC/MC 50/50		
47.5	1991.81	1.80	1.69	SC/MC 50/50		
48.5	1991.66	1.95	1.99	SC/MC 50/50		
49.5	1991.61	2.00	1.04	SC/MC 50/50		
50.5	1992.09	1.52	0.88	SC/MC 50/50		
51.5	1992.41	1.20	0.04	SC/MC 50/50		woody roots

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
52.9	1992.91	0.70	0.11	ROOTS W/ SC/MG		
53.6	1993.63	0.00	0.00	ROOTS W/ SC/MG		REW T4
54.3	1993.61	0.00	0.00	ROOTS W/ SC/MG		woody roots, REW (velocity)
55.0	1995.38	--	--		Grass	
56.0	1995.82	--	--		Grass	
57.0	1996.40	--	--		Grass	
58.0	1996.72	--	--		Grass	RPT4
Rush Creek Below Silver Lake Cross Section IF5						
4.0	1998.37	--	--		Pine Tree	
7.6	1996.32	--	--	SAND		
11.3	1996.03	--	--	SAND		
14.2	1996.29	--	--	SAND		
16.0	1996.53	--	--	SAND		
17.4	1996.82	--	--	SAND		LPT5
18.8	1996.65	--	--	SAND		
22.8	1996.26	--	--	SAND		
26.0	1995.15	--	--	SAND/ROOTS		
28.5	1993.94	0.00	0.00	SAND/ROOTS		LEW (velocity)
28.6	1993.94	--	--	SAND/ROOTS		T5 LEW
29.7	1993.79	0.15	0.32	SG/MG 50/50		
30.9	1993.89	0.05	0.22	SG/MG 50/50		
32.1	1993.69	0.25	0.74	SG/MG 50/50		
33.3	1993.54	0.40	0.66	LG/MG/SG 45/45/10		
34.5	1993.49	0.45	1.00	LG/MG/SG 45/45/10		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
35.7	1993.34	0.60	1.02	LG/MG/SG 45/45/10		
36.9	1993.24	0.70	0.42	SC/LG 25/75		
38.1	1993.19	0.75	0.94	SC/LG 25/75		
39.3	1993.24	0.70	1.40	SC/LG 25/75		
40.5	1993.04	0.90	1.81	SC/LG 25/75		
41.7	1993.04	0.90	1.52	SC/LG 25/75		
42.9	1992.94	1.00	2.00	LC/SC/LG 40/40/20		
44.1	1993.19	0.75	1.91	LC/SC/LG 40/40/20		
45.3	1993.04	0.90	1.84	LG/SC 50/50		
46.5	1993.04	0.90	1.67	LG/SC 50/50		
47.7	1992.84	1.10	1.46	LG/SC 50/50		
48.9	1992.84	1.10	1.49	LG/SC 50/50		
50.1	1992.84	1.10	1.49	LG/SC 50/50		
51.3	1992.74	1.20	1.58	LG/SG/MG 40/40/20		
52.5	1992.79	1.15	1.73	LG/SG/MG 40/40/20		
53.7	1992.82	1.12	1.68	LG/SG/MG 40/40/20		
54.9	1992.84	1.10	1.58	LG/SG/MG 40/40/20		
56.1	1992.94	1.00	1.32	LG/SG/MG 40/40/20		
57.3	1993.04	0.90	1.53	LG/SG/MG 40/40/20		
58.5	1993.04	0.90	1.39	MG/SG/LG 40/40/20		
59.7	1992.99	0.95	1.16	MG/SG/LG 40/40/20		
60.9	1992.94	1.00	0.73	SAND/SG 75/25		
62.1	1993.14	0.80	0.19	SAND/SG 75/25		
63.3	1993.52	0.42	-0.05	SG/SAND 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
65.0	1993.94	0.00	0.00	SG/SAND 75/25		T5 REW
65.0	1993.94	--	--	SG/SAND 75/25		REW (velocity)
66.0	1995.26	--	--	MG	Roots/Grass	
68.0	1995.93	--	--	MG	Roots/Grass	
69.3	1997.13	--	--	MG	Roots/Grass	TOP RPT5
Rush Creek Below Silver Lake Cross Section IF6						
0.0	7000.49	--	--	Grass/Pine Needles	Grass/Juniper trees	LPT6 top of pin
0.0	7000.34	--	--	Grass/Pine Needles	Juniper	bottom LBP in US side of tree
1.0	6999.47	--	--	Grass/Pine Needles		
6.5	6998.92	--	--	SAND/SILT 50/50		edge of trail
9.2	6998.74	--	--	GR/PINE NEEDLES 75/25		edge of trail
14.0	6998.43	--	--	GR/PINE NEEDLES 75/25		willow canopy extent/ grass
17.0	6997.90	--	--	SAND SILT 50/50		lodgepole/jeffery
20.0	6997.73	--	--	SAND SILT 50/50		
22.2	6997.38	--	--	SAND SILT 50/50		TOB/ aspen saplings
22.5	6996.68	--	--	SAND SILT 50/50		BF/small sand deposit topo bench used 3ft downstream of xs
22.8	6996.30	--	--	SAND SILT 50/50		Toe vertical bank
23.5	6996.00	--	--	SAND SILT 50/50		
24.2	6995.62	--	--	SAND SILT 50/50		
24.5	6995.51	--	--	SAND SILT 50/50		
24.8	6995.03	--	--	MG/SC 50/50		edge of grass, approximate willow root

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
24.9	6994.98	0.00	0.00	MG/SC 50/50		
25.1	6994.88	0.06	0.12	MG/SC 50/50		
26.0	6994.59	0.35	0.67	MG/SC 50/50		
26.1	6994.56	0.35	0.72	MG/SC 50/50		
27.0	6994.44	0.35	1.12	MG/SC 50/50		
27.7	6994.35	0.56	1.18	MC		
28.0	6994.33	0.65	1.21	MC		
29.0	6994.28	0.75	2.08	MG/LG 50/50		
30.0	6994.23	0.75	0.87	SC/MC 50/50		
31.0	6994.18	0.65	2.34	SC/MC 50/50		
31.0	6994.18	0.65	2.34	SC/MC 50/50		
32.0	6994.09	0.80	1.96	LG/SC 25/75		
33.0	6994.01	1.00	1.42	LG/SC 25/75		
33.7	6993.95	1.00	1.36	LG/SC 25/75		Willow canopy extent (US/DS)
34.0	6993.96	1.00	1.33	LG/SC 25/75		
35.0	6994.00	0.90	2.41	LG/SC 25/75		
35.5	6994.02	0.95	2.19	LG/SC 25/75		
36.0	6994.03	1.00	1.97	MG/LG/SC 25/50/25		
37.0	6994.04	0.85	2.48	MG/LG/SC 25/50/25		
38.0	6994.05	0.90	2.58	MG/LG/SC 25/50/25		
39.0	6994.06	1.05	2.78	MG/LG/SC 25/50/25		
39.5	6994.06	1.05	2.74	MG/LG/SC 25/50/25		
40.0	6994.06	1.05	2.70	MG/LG/SC 25/50/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
41.0	6994.06	0.90	2.70	MG/LG/SC 25/50/25		
42.0	6994.06	0.95	2.70	MG/LG/SC 25/50/25		
43.0	6994.06	1.00	2.59	MG/LG/SC 25/50/25		
43.0	6994.06	1.00	2.59	MG/LG/SC 25/50/25		
44.0	6994.12	0.70	2.26	MG/LG/SC 25/50/25		
45.0	6994.18	0.70	2.34	MG/LG 50/50		
46.0	6994.23	0.70	1.22	MG/LG 50/50		
47.0	6994.29	0.70	1.96	MG/LG 50/50		
47.0	6994.29	0.70	1.96	MG/LG 50/50		
48.0	6994.33	0.60	2.03	MG/LG 50/50		
49.0	6994.36	0.60	1.88	MG/LG 50/50		
50.0	6994.40	0.55	1.65	MG/LG 50/50		willow canpoy extent (US)
50.0	6994.40	0.55	1.65	MG/LG 50/50		
51.0	6994.43	0.50	1.63	MG/LG 50/50		
52.0	6994.47	0.45	1.26	MG		
53.0	6994.50	0.40	1.37	MG		
53.0	6994.50	0.40	1.37	MG		
54.0	6994.59	0.35	1.22	MG		
55.0	6994.67	0.30	1.01	SG		
55.0	6994.67	0.30	1.01	SG		
56.0	6994.80	0.20	0.82	SAND/SG 75/25		
56.5	6994.87	0.15	0.41	SAND/SG 75/25		
57.0	6994.88	0.10	0.00	SAND/SG 75/25		
58.0	6994.89	0.10	0.00	SAND/SG 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
59.0	6994.91	0.10	0.00	SG/MG 50/50		
59.0	6994.91	0.10	0.00	SG/MG 50/50		
60.5	6994.97	0.00	0.00	SG/MG 50/50		
61.0	6994.99	--	--	SILT		
63.0	6995.28	--	--		Grass	edge of carex (sedge)
65.0	6995.67	--	--		Grass	
66.5	6996.07	--	--		Grass	toe bank
66.8	6996.68	--	--		Grass	Carex; BF seedlings us at similar elevation
67.0	6996.86	--	--		Grass	
68.6	6997.95	--	--		Grass	Carex, rose; TOB approx elevation of adjacent aspen
70.0	6998.48	--	--	SAND/SILT 50/50		
72.0	6999.09	--	--	SAND/SILT 50/50		
72.6	6999.35	--	--	SAND/SILT 50/50		base lodgepole; RBP Top nail is in lodgepole root
72.6	6999.21	--	--	SAND/SILT 50/50		base lodgepole; bottom RBP
74.3	6999.31	--	--			Base lodgepole
76.0	6999.20	--	--		lodgepole forest/grass	
78.0	6998.79	--	--		lodgepole forest/grass	
81.0	6998.72	--	--		lodgepole forest/grass	
86.0	6998.75	--	--		lodgepole forest/grass	

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
91.0	6998.71	--	--		lodgepole forest/grass	
96.0	6998.91	--	--		lodgepole forest/grass	
103.0	6998.73	--	--		lodgepole forest/grass	
108.0	6998.84	--	--		lodgepole forest/grass; aspen subdominate	
112.0	6999.15	--	--		lodgepole forest/grass; aspen subdominate	
122.0	6999.41	--	--		lodgepole forest/grass; aspen subdominate	FPW (no Nail or pin marker)
Rush Creek Below Silver Lake Cross Section IF7						
0.0	7001.33	--	--		Tree	TOP LPT7
0.0	7000.64	--	--		Tree	BOTTOM OF PIN
2.2	6999.58	--	--		Grass/Roots	
3.2	6998.68	--	--		Grass/Roots	
4.0	6998.26	--	--		Grass/Roots	
4.2	6997.61	--	--		Grass/Roots	
5.1	6996.79	--	--		Grass/Roots	
6.0	6996.65	--	--		Grass/Roots	
7.1	6996.03	0.00	0.00	SAND/SG		LEW (VELOCITY)

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
7.3	6995.96	--	--	SAND/SG		LEW T7 AT 15:29
9.1	6995.93	0.10	0.25	LG/MG/SG		
11.1	6995.83	0.20	0.02	LG/MG/SG		
13.1	6995.93	0.10	0.45	LG/MG/SG		
15.1	6995.78	0.25	1.29	LG/SC 75/25		
17.1	6995.83	0.20	1.59	LG/SC 75/25		
19.1	6995.83	0.20	0.86	LG/SC 75/25		
21.1	6995.93	0.10	0.27	SB/LG 50/50		
23.1	6995.83	0.20	1.01	SB/LG 50/50		
25.1	6995.83	0.20	0.45	LG/SC/MG 50/25/25		
27.1	6995.63	0.40	0.94	LG/SC/MG 50/25/25		
29.1	6995.78	0.25	1.93	LG/SC/MG 50/25/25		
31.1	6995.68	0.35	1.41	LG/SC/MG 50/25/25		
33.1	6995.63	0.40	1.65	LG/SC/MG 50/25/25		
35.1	6995.48	0.55	1.87	LG/SC/MG 50/25/25		
37.1	6995.48	0.55	3.37	LG/SC/MG 50/25/25		
39.1	6995.48	0.55	3.39	LG/SC/MG 50/25/25		
41.1	6995.38	0.65	3.84	LG/SC/MG 50/25/25		
43.1	6995.23	0.80	3.23	SB		
45.1	6994.83	1.20	2.24	LG/SC 75/25		
47.1	6995.13	0.90	2.17	LG/SC 75/25		
49.1	6995.13	0.90	2.05	LG/SC 75/25	Willow in Stream	
54.5	6996.10	0.00	0.00		Willow in Stream	REW T7 AT 15:20

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
54.5	6996.03	--	--		Willow in Stream	REW(VELOCITY)
54.6	6996.80	--	--		Willow	
56.0	6997.63	--	--		Willow	
57.2	6998.01	--	--		Willow	
58.9	6998.52	--	--		Willow	
60.5	6998.49	--	--		Willow	
64.0	6998.41	--	--		Willow/Grass	
67.5	6998.16	--	--		Willow/Grass	
69.0	6998.48	--	--		Willow/Grass	
72.4	6998.56	--	--		Willow/Grass	
Rush Creek Below Silver Lake Cross Section IF8						
0.0	7002.31	--	--		Grass	LPT8 TOP
0.0	7002.04	--	--		Grass	LPT8 GRND
5.2	7000.23	--	--		Grass	
5.9	6999.75	--	--		Grass	
11.2	6998.83	--	--		Grass	
14.2	6997.97	--	--		Grass	
17.0	6997.52	--	--		Grass	
20.9	6997.66	--	--		Grass	
22.5	6997.73	--	--		Grass	
25.6	6997.16	--	--		Grass	
26.5	6996.41	--	--		Grass	LEW 16:25
26.5	6995.60	0.80	0.02	Sand/SG 50/50		LEW TOPO VELOCITY

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
28.0	6995.40	1.00	0.17	Sand/SG 50/50		
29.5	6995.10	1.30	0.24	SC/SG/MG 25/25/50		
31.0	6995.15	1.25	0.56	SC/SG/MG 25/25/50		
32.5	6995.30	1.10	0.83	SC/SG/MG 25/25/50		
34.0	6995.20	1.20	0.78	SC/SG/MG 25/25/50		
35.5	6995.05	1.35	0.86	SC/SG/MG 25/25/50		
37.0	6995.20	1.20	1.02	LG/SC 75/25		
38.5	6995.30	1.10	0.93	LG/SC 75/25		
40.0	6995.30	1.10	0.69	SC/LG 85/15		
41.5	6995.50	0.90	0.91	SC/LG 85/15		
43.0	6995.60	0.80	1.08	SC/LG 85/15		
44.5	6995.70	0.70	1.13	SC/LG 85/15		
46.0	6995.70	0.70	1.54	SC/LG 85/15		
47.5	6995.60	0.80	1.51	SC/LG 85/15		
49.0	6995.30	1.10	1.71	SC/LG 75/25		
50.5	6995.20	1.20	1.36	SC/LG 75/25		
52.0	6995.00	1.40	1.23	SC/LG 75/25		
53.5	6995.00	1.40	1.18	SC/LG 75/25		
55.0	6995.00	1.40	0.85	MG/LG/SC 50/25/25		
56.5	6994.90	1.50	0.71	MG		
58.0	6994.90	1.50	0.51	SILT		
59.5	6994.90	1.50	0.49	SILT		
61.0	6995.40	1.00	0.19	SILT		
62.9	6996.40	0.00	0.00	SILT	Grass	REW VELOCITY

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
63.6	6996.39	--	--	GR/SILT 75/25	Grass	REW 16:13
65.8	6997.44	--	--	GR/SILT 75/25	Grass	
67.0	6998.07	--	--	GR/SILT 75/25	Grass	
67.8	6998.33	--	--	GR/SILT 75/25	Grass	
68.6	6998.90	--	--	GR/SILT 75/25	Grass	
69.5	6998.92	--	--	GR/SILT 75/25	Grass	
71.3	6998.73	--	--	GR/SILT 75/25	Grass	
74.6	6999.06	--	--	GR/SILT 75/25	Grass	
76.7	6999.63	--	--	GR/SILT 75/25	Grass	
82.3	7001.79	--	--	GR/SILT 75/25	Grass	GRND AT RBP
82.3	7002.12	--	--	GR/SILT 75/25	Grass	TOP RPT8 NAIL US SIDE OF ASPEN
Rush Creek Below Silver Lake Cross Section IFCT2						
0.0	7004.40	--	--		Grass	LP CT2
0.7	7003.57	--	--		Grass	
6.0	7003.15	--	--		Grass	
20.0	7001.93	--	--		Grass	
25.0	7001.32	--	--		Grass	
30.0	7000.47	--	--		Grass	
35.0	6999.49	--	--		Grass	
37.4	6998.43	--	--		Grass/Pinetree	
39.0	6997.72	--	--		Grass	
43.0	6997.20	--	--	SG/MG 75/25		
49.0	6996.69	--	--	MG/SG 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
51.3	6996.56	--	--	MG/SG 75/25		LEW
55.0	6996.40	--	--	MG/LG 75/25		
56.0	6996.33	--	--	MG/LG 75/25		
57.0	6996.30	--	--	MG/LG 75/25		
59.0	6996.09	--	--	MG/LG 75/25		
61.0	6995.93	--	--	MG/LG 75/25		
63.0	6995.70	--	--	LG/MG 50/50		
65.0	6995.72	--	--	LG/MG 50/50		
67.0	6995.49	--	--	LG/SC 50/50		
69.0	6995.05	--	--	LG/SC 50/50		
71.0	6994.80	--	--	SC/LG 75/25		
73.0	6994.71	--	--	SC/LG 75/25		
75.0	6994.37	--	--	SC/LG 75/25		
77.0	6994.14	--	--	SC/LG 75/25		
79.0	6994.00	--	--	SC/LG 75/25		
81.0	6994.20	--	--	SB		
83.0	6994.47	--	--	SB		
83.8	6996.91	--	--	SB		BOULDER
84.8	6996.53	--	--	SB		REW GR
85.3	6997.62	--	--		MOSS/ROOTS	
86.0	6997.88	--	--		MOSS/ROOTS	
87.3	6998.92	--	--		MOSS/ROOTS	
89.1	7000.30	--	--		MOSS/ROOTS	RP CT2

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
Rush Creek Below Silver Lake Cross Section IF9						
10.8	7003.88	--	--	SAND	Grass	LPT9
11.5	7003.46	--	--	SAND	Grass	
15.0	7002.63	--	--	SAND	Grass	
16.0	7002.46	--	--	SAND	Grass	
21.0	7002.10	--	--	SAND	Grass	
26.0	7001.91	--	--	SAND	Grass	
31.0	7001.44	--	--	SAND	Grass	
37.4	7000.75	--	--	SAND/SILT		
38.6	6999.65	--	--	SAND/SILT		
45.0	6998.51	--	--	SAND/SILT		
50.0	6997.99	--	--		Grass	
56.0	6997.17	--	--	SG/MG 50/50		
60.0	6997.00	--	--	SG/MG 50/50		
62.2	6996.54	0.00	0.00	SG/MG 50/50		LEW velocity
62.6	6996.54	--	--	SG/MG 50/50		LEW
63.0	6996.44	0.10	0.00	SG/MG 50/50		
64.0	6996.34	0.20	0.15	SG/MG/LG		
65.0	6996.04	0.50	0.34	SG/MG/LG		
66.0	6995.84	0.70	0.39	SG/MG/LG		
67.0	6995.54	1.00	0.42	SG/MG/LG		
68.0	6995.24	1.30	0.49	LG/SC 75/25		
69.0	6995.04	1.50	0.58	LG/SC 75/25		
70.0	6994.74	1.80	0.56	LG/SC 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
71.0	6994.64	1.90	0.58	MG/SG 50/50		
72.0	6994.49	2.05	0.67	MG/SG 50/50		
73.0	6994.44	2.10	0.22	MG/SG 50/50		
74.0	6994.34	2.20	0.21	MG/SG 50/50		
75.0	6994.19	2.35	0.29	SC/MC 50/50		
76.0	6993.84	2.70	0.31	SC/MC 50/50		
77.0	6993.89	2.65	0.35	SC/MC 50/50		
78.0	6993.64	2.90	0.55	SC/MC 50/50		
79.0	6993.54	3.00	0.66	SC/MC 50/50		
80.0	6993.24	3.30	0.65	LC/MC 75/25		
81.0	6993.34	3.20	0.80	LC/MC 75/25		
82.0	6993.49	3.05	0.89	LC/MC 75/25		
83.0	6993.29	3.25	0.88	LC/MC 75/25		
84.0	6993.39	3.15	0.69	LC/MC 75/25		
85.0	6993.14	3.40	0.80	LC/MC 75/25		
86.0	6992.94	3.60	0.67	LC/MC 75/25		
87.0	6992.74	3.80	0.67	LC/MC 75/25		
88.0	6992.79	3.75	0.61	LB		
89.0	6995.04	1.50	-0.15	LB		
90.5	6996.53	0.00	0.00	LB		REW GRAVEL velocity
90.5	6996.54	--	--	LB		REW
92.4	6998.80	--	--	LB		
94.0	7000.54	--	--	LB		
95.6	7000.77	--	--	LB		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
97.2	6999.59	--	--	LB		
98.0	6998.63	--	--	LB		
102.3	7001.19	--	--	LB		
104.8	7002.49	--	--	LB		
105.0	7002.82	--	--	LB		
106.0	7003.29	--	--	LB		
106.7	7003.53	--	--	LB		RPT9
Rush Creek Below Silver Lake Cross Section IF10						
0.0	7003.86	--	--	SB		LPT10
3.0	7002.89	--	--	SAND/GR 50/50		
7.0	7002.65	--	--	SAND/GR 20/80		
11.0	7002.24	--	--	SAND/GR 20/80		
15.0	7001.75	--	--	SAND/GR 20/80		
19.0	7001.34	--	--	SAND/GR 50/50		
24.0	7000.73	--	--	SAND/GR 50/50		
25.0	7000.41	--	--	SAND/SILT 50/50		
28.8	6998.59	--	--	SAND/SILT 50/50		
32.0	6998.24	--	--	SAND/SILT 50/50		
36.0	6997.64	--	--	SAND/SILT 50/50		
38.1	6997.33	--	--	SAND/SILT 50/50		
38.7	6996.78	--	--	SAND/SILT 50/50		
40.1	6996.56	--	--	SAND/SILT 50/50		LEW
40.1	6996.56	0.00	0.00	SAND/SILT 50/50		LEW
41.1	6996.36	0.20	-0.09	SG/SAND 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
42.1	6996.21	0.35	-0.01	SG/SAND 50/50		
43.1	6996.01	0.55	-0.05	SG/SAND 50/50		
44.1	6995.76	0.80	-0.21	SG/SAND 50/50		
45.1	6995.56	1.00	-0.18	SG/SAND 50/50		
46.1	6995.06	1.50	-0.13	SG/SAND 50/50		
47.1	6994.91	1.65	-0.17	SG/SAND 50/50		
48.1	6994.91	1.65	-0.11	SG/SAND 50/50		ADP after here
49.1	6995.04	1.52	0.26	SG/SAND 50/50		
49.3	6995.05	1.51	0.14	SG/SAND 50/50		
49.6	6994.99	1.57	0.19	SG/SAND 50/50		
50.6	6994.87	1.69	0.13	SG/SAND 50/50		
51.1	6994.85	1.71	0.14	SG/SAND 50/50		
52.0	6994.85	1.71	0.17	SG/SAND 50/50		
52.6	6994.68	1.88	0.12	SG/SAND 50/50		
53.2	6994.63	1.93	0.20	SG/SAND 50/50		
53.8	6994.54	2.02	0.16	SG/SAND 50/50		
54.4	6994.49	2.07	0.16	SG/SAND 50/50		
54.9	6994.46	2.10	0.14	SG/SAND 50/50		
55.4	6994.46	2.10	0.12	SG/SAND 50/50		
55.9	6994.38	2.18	0.12	SG/SAND 50/50		
56.4	6994.08	2.48	0.09	SG/SAND 50/50		
56.9	6993.92	2.64	0.09	SG/SAND 50/50		
57.5	6993.78	2.78	0.09	SG/SAND 50/50		
58.2	6993.67	2.89	0.15	SG/SAND 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
58.9	6993.82	2.74	0.13	SG/SAND 50/50		
59.6	6993.56	3.00	0.10	MC/SG/SILT/OG 30/30/30/10		
60.2	6993.37	3.19	0.06	MC/SG/SILT/OG 30/30/30/10		
60.7	6993.33	3.23	0.03	MC/SG/SILT/OG 30/30/30/10		
61.5	6993.32	3.24	0.12	MC/SG/SILT/OG 30/30/30/10		
62.1	6993.52	3.04	0.02	MC/SG/SILT/OG 30/30/30/10		
62.7	6993.36	3.20	0.04	MC/SG/SILT/OG 30/30/30/10		
63.2	6993.29	3.27	0.10	MC/SG/SILT/OG 30/30/30/10		
63.7	6993.22	3.34	0.11	MC/SG/SILT/OG 30/30/30/10		
64.3	6993.22	3.34	0.26	MC/SG/SILT/OG 30/30/30/10		
64.9	6993.12	3.44	0.19	MC/SG/SILT/OG 30/30/30/10		
65.6	6993.35	3.21	0.24	MC/SG/SILT/OG 30/30/30/10		
66.5	6993.15	3.41	0.36	MC/SG/SILT/OG 30/30/30/10		
67.1	6993.18	3.38	0.45	MC/SG/SILT/OG 30/30/30/10		
67.7	6993.23	3.33	0.62	MC/SG/SILT/OG 30/30/30/10		
68.0	6993.22	3.34	0.51	MC/SG/SILT/OG 30/30/30/10		
68.6	6993.28	3.28	0.62	MC/SG/SILT/OG 30/30/30/10		
69.1	6993.42	3.14	0.61	MC/SG/SILT/OG 30/30/30/10		
69.8	6993.44	3.12	0.65	MC/SG/SILT/OG 30/30/30/10		
70.3	6993.46	3.10	0.59	MC/SG/SILT/OG 30/30/30/10		
70.8	6993.40	3.16	0.62	MC/SG/SILT/OG 30/30/30/10		
71.4	6993.48	3.08	0.84	MC/SG/SILT/OG 30/30/30/10		
72.2	6993.42	3.14	0.67	MC/SG/SILT/OG 30/30/30/10		
73.1	6993.61	2.95	0.95	MC/SG/SILT/OG 30/30/30/10		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
73.7	6993.72	2.84	0.91	MC/SG/SILT/OG 30/30/30/10		
74.2	6993.75	2.81	1.53	MC/SG/SILT/OG 30/30/30/10		
74.7	6993.83	2.73	0.86	MC/SG/SILT/OG 30/30/30/10		
75.2	6993.85	2.71	0.92	MC/SG/SILT/OG 30/30/30/10		
75.7	6993.82	2.74	0.85	MC/SG/SILT/OG 30/30/30/10		
76.5	6993.97	2.59	1.04	SG/SAND 30/70		
77.3	6993.85	2.71	0.96	SG/SAND 30/70		
77.9	6993.91	2.65	1.13	SG/SAND 30/70		
78.4	6994.02	2.54	0.85	SG/SAND 30/70		
78.9	6993.96	2.60	0.76	SG/SAND 30/70		
79.9	6993.99	2.57	0.57	SG/SAND 30/70		
80.3	6994.03	2.53	0.75	SG/SAND 30/70		
81.0	6994.08	2.48	0.46	SG/SAND 30/70		
81.6	6994.23	2.33	0.61	SAND/OG 90/10		
83.1	6994.66	1.90	0.21	SAND/OG 90/10		
84.1	6994.86	1.70	0.22	SAND/OG 90/10		
85.1	6995.31	1.25	0.13	SAND/OG 90/10		
86.1	6995.36	1.20	0.19	SAND/OG 90/10		
87.1	6995.26	1.30	0.06	SAND/OG 90/10		
88.1	6995.11	1.45	-0.07	SAND/OG 90/10		
89.1	6995.06	1.50	-0.03	SAND/OG 90/10		
90.1	6994.86	1.70	-0.04	SAND/OG 90/10		
91.1	6994.61	1.95	-0.01	SAND/OG 90/10		
92.1	6994.56	2.00	-0.08	SAND/OG 90/10		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
93.1	6994.51	2.05	-0.14	LG/MC/SC/SILT 20/20/40/20		
94.1	6994.66	1.90	-0.07	LG/MC/SC/SILT 20/20/40/20		
95.1	6994.76	1.80	-0.14	LG/MC/SC/SILT 20/20/40/20		
96.1	6995.36	1.20	-0.17	LG/MC/SC/SILT 20/20/40/20		
97.1	6994.96	1.60	-0.22	LG/SC/SILT 40/30/30		
98.1	6995.06	1.50	-0.29	LG/SC/SILT 40/30/30		
99.1	6995.56	1.00	-0.25	LG/SC/SILT 40/30/30		
100.1	6995.56	1.00	-0.31	LG/SC/SILT 40/30/30		
101.1	6995.71	0.85	-0.23	LG/SC/SILT 40/30/30		
102.1	6996.06	0.50	-0.29	LG/SC/SILT 40/30/30		
103.1	6996.16	0.40	-0.26	LG/SC/SILT 40/30/30		
104.1	6996.26	0.30	-0.05	SAND/SILT 50/50		
105.1	6996.46	0.10	0.00	SAND/SILT 50/50		
105.7	6996.56	0.00	0.00	SAND/SILT 50/50		REW
106.1	6996.56	--	--	SAND/SILT 50/50		REW Velocity
108.0	6996.71	--	--			
113.0	6996.99	--	--			
116.0	6996.98	--	--			
119.0	6996.69	--	--			
122.0	6996.46	--	--			
124.0	6996.49	--	--			
129.0	6996.41	--	--			
133.2	6996.49	--	--			
134.0	6998.78	--	--			

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
135.0	7000.27	--	--			
136.5	7000.74	--	--			RPT10
Rush Creek Below Silver Lake Cross Section IFCT3						
11.0	7991.39	--	--		roots/grass	Top horizontal nail in aspen, LPCT3
11.2	7990.63	--	--		roots/grass	bottom ground below nail
12.0	7989.75	--	--		roots/grass	
13.2	7988.97	--	--		roots/grass	
13.5	7988.23	--	--	LG/SC 75/25		LEW 16:17hrs water depth 0.06
14.5	7988.16	--	--	LG/SC 75/25		
16.4	7988.27	--	--	LG/SC 75/25		
16.9	7988.83	--	--	LG/SC 75/25		
17.3	7988.20	--	--	LG/SC 75/25		
17.8	7988.67	--	--	SC/LG 75/25		
18.2	7988.16	--	--	SC/LG 75/25		
19.8	7987.91	--	--	SC/LG 75/25		
20.6	7987.80	--	--	SC/LG 75/25		
21.6	7987.99	--	--	SC/LG 75/25		
22.5	7988.65	--	--	SC/LG 75/25		top boulder
23.1	7988.59	--	--	SC/LG 75/25		top boulder
24.0	7987.98	--	--	SB		bottom boulder/between boulders
24.3	7988.80	--	--	SB		edge boulder
25.6	7989.97	--	--	SB		top boulder

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
27.0	7988.10	--	--	SB		bottom edge boulder
27.7	7988.33	--	--	SB		
28.6	7987.29	--	--	SB/MC 50/50		
29.6	7987.18	--	--	SB/MC 50/50		
30.4	7987.60	--	--	SB/MC 50/50		
31.4	7987.56	--	--	SB/MC 50/50		
32.5	7987.26	--	--	SB/MC 50/50		
33.7	7988.12	--	--	SB/MC 50/50		boulder edge/side
37.0	7988.10	--	--	SC/LG 50/50		boulder edge/side
38.5	7986.82	--	--	SC/LG 50/50		edge (bottom) boulder
40.0	7986.87	--	--	SC/LG 50/50		
41.6	7986.95	--	--	SC/LG 50/50		
43.3	7987.24	--	--	LG/MG 50/50		
44.8	7987.53	--	--	LG/MG 50/50		
46.5	7987.68	--	--	MG/SG/LG 50/25/25		
48.7	7987.75	--	--	MG/SG/LG 50/25/25		
50.6	7987.84	--	--	MG/SG/LG 50/25/25		
53.0	7987.84	--	--	MG/SG/LG 50/25/25		
54.5	7987.89	--	--	MG/SG/LG 50/25/25		
55.5	7987.78	--	--		Willow	
56.0	7987.85	--	--		Willow	REW 16:37hrs water depth 0.16'
62.0	7988.54	--	--		WD/dirt	Outside edge woody debris jam
63.5	7989.39	--	--		WD/dirt	

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
67.0	7989.62	--	--		WD/dirt	
77.0	7991.31	--	--		WD/dirt	
84.0	7992.63	--	--		WD/dirt	Ground at nail
84.0	7992.85	--	--		WD/dirt	Top vert nail base of lodgepole RPCT3
Rush Creek Below Silver Lake Cross Section IF11						
11.0	7994.68	--	--	SB	Grass 25%	Top 1/4" bolt LPT11 in boulder
11.7	7993.69	--	--	SB		
12.9	7993.52	--	--	SB		
13.3	7993.66	--	--	SB		
13.8	7993.43	--	--	SB		
14.0	7992.81	--	--	SB		
16.5	7991.50	--	--	SB		
17.5	7990.65	--	--	SG/Sand 50/50		
19.0	7990.36	--	--	SG/Sand 50/50		
20.4	7989.32	--	--	SB/SC/MC 50/25/25		
21.7	7988.92	--	--	SB/SC/MC 50/25/25		
22.2	7988.18	--	--	SB/SC/MC 50/25/25		
22.3	7987.97	0.10	0.00	SB/SC/MC 50/25/25		LEW
22.7	7988.87	0.00	0.00	SB/SC/MC 50/25/25		
22.8	7988.07	0.00	0.00	SB/SC/MC 50/25/25		LEW 16:00 hrs water depth 0.06' (12.1 FS)
23.0	7987.97	0.10	0.00	SB/SC/MC 50/25/25		
24.0	7988.87	0.00	0.00	SB/SC/MC 50/25/25		.8 ABOVE WATER

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
25.0	7987.87	0.20	-0.13	SB/SC/MC 50/25/25		
26.0	7987.97	0.10	0.00	SB/SC/MC 50/25/25		
27.0	7989.07	0.00	0.00	SB/SC/MC 50/25/25		1 ABOVE WATER
28.0	7986.97	1.10	0.28	SB/SC/MC 50/25/25		
29.0	7986.52	1.55	0.27	SB/SC/MC 50/25/25		SEE ADP
32.0	7985.75	2.32	0.83	SB/SC/MC 50/25/25		
32.0	7985.74	2.33	0.94	SB/SC/MC 50/25/25		
32.0	7986.44	1.63	0.84	SB/SC/MC 50/25/25		
32.0	7986.10	1.97	1.05	SB/SC/MC 50/25/25		
32.1	7986.44	1.63	1.26	SB/SC/MC 50/25/25		
32.1	7985.75	2.32	1.06	SB/SC/MC 50/25/25		
32.2	7985.72	2.35	0.67	SB/SC/MC 50/25/25		
32.3	7985.68	2.39	0.40	SB/SC/MC 50/25/25		
32.6	7986.11	1.96	0.54	SB/SC/MC 50/25/25		
32.8	7986.43	1.64	1.20	SB/SC/MC 50/25/25		
32.9	7986.48	1.59	1.05	SB/SC/MC 50/25/25		
33.1	7986.48	1.59	0.56	SB/SC/MC 50/25/25		
33.3	7986.48	1.59	0.74	SB/SC/MC 50/25/25		
34.0	7986.23	1.84	0.47	SB/SC/MC 50/25/25		
34.2	7986.28	1.79	0.60	SB/SC/MC 50/25/25		
34.5	7986.34	1.73	0.89	SB/SC/MC 50/25/25		
34.8	7986.30	1.77	0.37	SB/SC/MC 50/25/25		
34.9	7986.67	1.40	0.70	SB/SC/MC 50/25/25		
35.3	7986.79	1.28	0.26	SB/SC/MC 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
35.6	7986.81	1.26	0.31	SB/SC/MC 50/25/25		
35.7	7986.77	1.30	0.42	SB/SC/MC 50/25/25		
35.9	7986.75	1.32	0.30	SB/SC/MC 50/25/25		
36.0	7986.70	1.37	0.56	SB/SC/MC 50/25/25		
36.0	7985.07	3.00	0.60	SB/SC/MC 50/25/25		
36.5	7985.10	2.97	0.86	SB/SC/MC 50/25/25		
37.0	7985.06	3.01	0.62	SB/SC/MC 50/25/25		
37.5	7985.09	2.98	1.08	SB/SC/MC 50/25/25		
38.1	7985.05	3.02	0.75	SB/SC/MC 50/25/25		
38.5	7985.35	2.72	0.72	SB/SC/MC 50/25/25		
38.8	7985.56	2.51	0.89	SB/SC/MC 50/25/25		
39.3	7985.80	2.27	0.59	SB/SC/MC 50/25/25		
39.8	7986.08	1.99	0.85	SB/SC/MC 50/25/25		
40.4	7986.00	2.07	0.59	SB/SC/MC 50/25/25		
41.0	7985.76	2.31	1.06	SB/SC/MC 50/25/25		
41.4	7984.99	3.08	0.99	SB/SC/MC 50/25/25		
41.8	7984.60	3.47	0.84	SB/SC/MC 50/25/25		
42.3	7984.56	3.51	1.03	SB/SC/MC 50/25/25		
42.8	7984.57	3.50	0.92	SB/SC/MC 50/25/25		
43.3	7984.85	3.22	1.17	SB/SC/MC 50/25/25		
43.6	7985.33	2.74	1.17	SB/SC/MC 50/25/25		
43.9	7985.28	2.79	1.07	SB/SC/MC 50/25/25		
44.2	7984.97	3.10	0.87	SB/SC/MC 50/25/25		
44.5	7984.97	3.10	1.08	SB/SC/MC 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
44.8	7984.85	3.22	0.88	SB/SC/MC 50/25/25		
45.3	7984.59	3.48	1.30	SB/SC/MC 50/25/25		
45.5	7984.76	3.31	0.99	SB/SC/MC 50/25/25		
45.9	7984.57	3.50	0.79	SB/SC/MC 50/25/25		
46.6	7984.47	3.60	0.75	SB/SC/MC 50/25/25		
47.2	7984.29	3.78	0.67	MG/SC 75/25		
47.7	7984.36	3.71	0.37	MG/SC 75/25		
48.4	7984.56	3.51	0.54	MG/SC 75/25		
49.0	7984.63	3.44	0.64	MG/SC 75/25		
49.6	7984.73	3.34	0.32	MG/SC 75/25		
50.0	7984.91	3.16	0.40	MG/SC 75/25		
50.8	7985.01	3.06	0.38	MG/SC 75/25		
51.4	7985.08	2.99	0.25	MG/SC 75/25		
52.0	7985.18	2.89	0.13	MG/SG 50/50		
52.7	7985.53	2.54	0.29	MG/SG 50/50		
53.1	7985.74	2.33	0.29	MG/SG 50/50		
53.5	7985.80	2.27	0.18	Sand Silt 50/50		
57.0	7986.67	1.40	0.13	Sand Silt 50/50		ADP
58.0	7987.07	1.00	0.08	Sand Silt 50/50		
59.0	7987.32	0.75	-0.04	SG/Sand		
60.0	7987.47	0.60	-0.02	SG/Sand		
61.0	7987.87	0.20	-0.08	Sand		
62.5	7988.03	--	--	Sand		REW 16:05 hrs
62.8	7988.07	0.00	0.00	Sand		REW

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
64.6	7988.53	--	--	Sand		
67.4	7988.80	--	--	Roots/Woody Veg		
69.1	7990.63	--	--	Roots/Woody Veg		
71.8	7991.67	--	--	Fastest flow dirt WD		
77.7	7992.71	--	--	Fastest flow dirt WD		
78.0	7992.90	--	--	Fastest flow dirt WD		Top pk Nail RPT11 base of lodgepole
Rush Creek Below Silver Lake Cross Section IF12						
0.0	7996.70	--	--	silt/SG/SB 50/25/25		top 1/4" bolt in boulder LPT12
0.0	7996.64	--	--	silt/SG/SB 50/25/25		bott 1/4" bolt on boulder
0.0	7996.70	--	--	silt/SG/SB 50/25/25		LPT12
1.8	7994.36	--	--	silt/SG/SB 50/25/25		bott. Boulder
3.6	7993.61	--	--	silt/SG/SB 50/25/25		
5.1	7992.95	--	--	silt/SG/SB 50/25/25		
6.9	7992.14	--	--		Willow	
8.6	7991.34	--	--		Willow	
10.5	7990.35	--	--	Sand/ SG 50/50		
12.3	7989.64	--	--	Sand/ SG 50/50		
12.9	7988.79	--	--	SG/MG 50/50		
14.2	7988.28	--	--	SG/MG 50/50		
15.3	7988.10	--	--	SG/MG 50/50		LEW 15:31hrs
16.3	7988.15	0.00	0.00	SC/SG/Sand 25/50/25		LEW
17.0	7987.70	0.45	-0.26	SC/SG/Sand 25/50/25		
18.0	7987.65	0.50	-0.29	SC/SG/Sand 25/50/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
19.0	7987.25	0.90	-0.11	SC/SG/Sand 25/50/25		
20.0	7987.05	1.10	-0.01	SB		
21.0	7987.75	0.40	-0.18	Sand/SC/MG 50/25/25		ADP
23.0	7986.37	1.78	0.17	Sand/SC/MG 50/25/25		
23.6	7986.45	1.70	0.11	Sand/SC/MG 50/25/25		
23.8	7986.17	1.98	0.21	Sand/SC/MG 50/25/25		
24.5	7986.03	2.12	0.28	Sand/SC/MG 50/25/25		
25.0	7985.90	2.25	0.15	Sand/SC/MG 50/25/25		
25.7	7986.03	2.12	0.15	SB		
26.3	7985.67	2.48	0.33	SB		
26.9	7985.65	2.50	0.35	SB		
27.4	7985.96	2.19	0.16	SB/LC/MC/Sand (15)		
27.8	7986.16	1.99	0.21	SB/LC/MC/Sand (15)		
28.1	7985.82	2.33	0.23	SB/LC/MC/Sand (15)		
28.3	7985.62	2.53	0.35	SB/LC/MC/Sand (15)		
28.4	7985.46	2.69	0.49	SB/LC/MC/Sand (15)		
28.7	7985.43	2.72	0.18	SB/LC/MC/Sand (15)		
29.1	7985.36	2.79	0.49	SB/LC 50/50		
29.6	7985.05	3.10	0.76	SB/LC 50/50		
29.9	7985.12	3.03	0.55	SB/LC 50/50		
30.4	7985.26	2.89	0.95	SB/LC 50/50		
30.8	7985.10	3.05	1.02	SB/LC 50/50		
31.2	7984.52	3.63	0.71	SB/LC 50/50		
32.1	7984.60	3.55	0.73	SB/LC 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
32.6	7984.62	3.53	0.48	SB/LC 50/50		
33.0	7984.55	3.60	0.50	SB/LC 50/50		
33.3	7984.64	3.51	0.74	SB/LC 50/50		
33.7	7984.88	3.27	0.96	SB/LC 50/50		
33.9	7985.05	3.10	0.79	SB/LC 50/50		
34.3	7985.25	2.90	0.87	SB/LC 50/50		
35.1	7985.35	2.80	0.87	SB/LC/MC split evenly		
35.7	7984.79	3.36	1.08	SB/LC/MC split evenly		
36.0	7984.36	3.79	0.86	SB/LC/MC split evenly		
36.4	7984.24	3.91	1.03	SB/LC/MC split evenly		
36.7	7984.24	3.91	0.83	SB/LC/MC split evenly		
37.1	7984.49	3.66	0.71	SB/LC/MC split evenly		
37.7	7984.49	3.66	0.61	SB/LC/MC split evenly		
38.0	7984.41	3.74	0.51	SB/LC/MC split evenly		
39.2	7984.41	3.74	0.58	SB/LC/MC split evenly		
39.6	7984.40	3.75	0.52	SB/LC/MC split evenly		
40.0	7984.23	3.92	0.75	SB/LC/MC split evenly		
40.5	7983.87	4.28	0.71	SB/LC/MC split evenly		
40.9	7984.35	3.80	0.56	SB/LC/MC split evenly		
41.3	7984.11	4.04	0.37	SB/LC/MC split evenly		
41.8	7983.89	4.26	0.32	SB/LC/MC split evenly		
42.6	7983.90	4.25	0.70	SB/LC/MC split evenly		
43.1	7983.75	4.40	0.63	SB/LC/MC split evenly		
43.5	7983.61	4.54	0.36	SB/LC/MC split evenly		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
44.0	7983.65	4.50	0.54	SB/LC/MC split evenly		
44.5	7983.90	4.25	0.47	SB/LC/MC split evenly		
45.4	7983.99	4.16	0.20	SB/LC/MC split evenly		
46.0	7984.06	4.09	0.17	SB/LC/MC split evenly		
46.5	7984.22	3.93	0.21	SB/LC/MC split evenly		
47.1	7984.20	3.95	0.12	MG/SG/LG split evenly		
47.6	7984.49	3.66	0.05	MG/SG/LG split evenly		
48.0	7984.63	3.52	0.10	MG/SG/LG split evenly		
48.9	7984.80	3.35	0.09	MG/SG/LG split evenly		
50.0	7984.92	3.23	0.05	Sand/SG 50/50		
50.8	7985.13	3.02	0.05	Sand/SG 50/50		
51.4	7985.30	2.85	0.06	Sand/SG 50/50		
51.9	7985.53	2.62	0.07	Sand/SG 50/50		
52.4	7985.67	2.48	0.07	Sand/SG 50/50		
53.2	7985.82	2.33	0.10	Sand/SG 50/50		
53.6	7985.95	2.20	0.10	Sand/SG 50/50		
54.1	7986.02	2.13	0.10	Sand/SG 50/50		
56.0	7986.70	1.45	-0.17	Silt/SB 75/25		ADP
57.0	7987.70	0.45	-0.16	Silt/SB 75/25		
58.0	7987.25	0.90	-0.06	Silt/SB 75/25		
59.0	7987.35	0.80	-0.10	Silt/SB 75/25		
60.0	7987.85	0.30	-0.01	Silt/SB 75/25		
61.0	7988.05	--	--	Silt/SB 75/25		REW 15:35hrs
61.2	7988.15	0.00	0.00	Silt/SB 75/25		REW

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
63.5	7988.80	--	--	Silt/SB 75/25		
65.0	7989.76	--	--	WD/Silt 25/75		
66.6	7991.05	--	--	WD/Silt 25/75		
69.0	7992.35	--	--		Forest floor, pine needles, sticks	
74.1	7993.15	--	--		Forest floor, pine needles, sticks	RPT12
74.2	7993.19	--	--		Forest floor, pine needles, sticks	Top RPT12; Wood stake and yellow tent stake
Rush Creek Below Silver Lake Cross Section IF13						
0.0	8988.71	--	--	SB		New LPT13 top 1/4" bolt in boulder
0.7	8987.09	--	--		WD/DETRITUS	bottom of boulder
5.4	8986.46	--	--		WD/DETRITUS	
6.7	8985.93	--	--		WD/DETRITUS	
9.3	8985.61	--	--	SB		
11.0	8985.56	--	--	SB		
12.0	8984.64	--	--	WD W/SILT POCKETS		
14.3	8983.82	--	--	WD W/SILT POCKETS		
16.5	8983.63	--	--	WD W/SILT POCKETS		
19.1	8983.37	0.00	0.00	SB/LG 90/10		LEW
19.2	8983.23	--	--	SB/LG 90/10		LEW 14:20hrs
20.9	8983.07	0.30	0.18	MG/SG/SC 40/40/20		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
21.9	8982.87	0.50	0.79	MG/SG/SC 40/40/20		
22.9	8982.87	0.50	-0.31	MG/SG/SC 40/40/20		
23.9	8982.87	0.50	1.09	SC/MC/LG 30/30/30		
24.9	8982.67	0.70	1.94	SC/MC/LG 30/30/30		
25.9	8982.47	0.90	2.38	SC/MC/LG 30/30/30		
26.9	8982.57	0.80	2.27	SC/MC/LG 30/30/30		
27.9	8982.97	0.40	2.59	SC/MC/LG 30/30/30		
28.9	8982.87	0.50	2.31	SC/MC/LG 30/30/30		
29.9	8982.67	0.70	2.11	MC/LC/SB 40/40/20		
30.9	8982.67	0.70	1.64	MC/LC/SB 40/40/20		
31.9	8982.92	0.45	1.84	MC/LC/SB 40/40/20		
32.9	8982.67	0.70	0.73	MC/LG 75/25		
33.9	8982.67	0.70	1.25	MC/LG 75/25		
34.9	8982.47	0.90	1.54	MC/LG 75/25		
35.9	8982.77	0.60	0.79	MC/LG 75/25		
36.9	8982.57	0.80	1.23	MC/LG 75/25		
37.9	8982.37	1.00	2.94	SB		
38.9	8983.17	0.20	0.35	SB		
39.9	8982.47	0.90	0.36	SB		
40.9	8982.47	0.90	2.07	SC/LG 50/50		
41.9	8982.17	1.20	2.54	SC/LG 50/50		
42.9	8982.17	1.20	2.41	SC/LG 50/50		
43.9	8982.07	1.30	2.71	SC/LG 50/50		
44.9	8982.17	1.20	2.07	SC/LG 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
45.9	8982.17	1.20	1.72	LG/MG 50/50		
46.9	8983.07	0.30	2.66	SB/LG 50/50		
47.9	8982.92	0.45	2.36	SB/LG 50/50		
48.9	8982.87	0.50	1.50	SG/MG/SAND 33/33/33		
49.9	8982.57	0.80	1.15	SG/MG/SAND 33/33/33		
50.1	8982.34	--	--	UNDERCUT MOSS/ROOTS		REW 14:25hrs water depth 0.9'
50.6	8984.01	0.20	0.61	UNDERCUT MOSS/ROOTS		REW Bank Undercut
50.7	8984.01	--	--	UNDERCUT MOSS/ROOTS		
52.3	8984.13	--	--	MC W/ ROOTS		
54.7	8984.88	--	--	MC W/ ROOTS		ground next to pin
55.0	8985.24	--	--	SB	Debris Forest	Top RPT13 nail in root
57.1	8985.44	--	--	SB	Debris Forest	
57.9	8986.14	--	--	SB	Debris Forest	
58.6	8986.46	--	--	SB	Debris Forest	
Rush Creek Below Silver Lake Cross Section IF14						
0.0	8987.67	--	--		Grass	Top horizontal nail in aspen LPT14
0.0	8987.67	--	--		Grass	LPT14
0.6	8986.55	--	--	SB	Grass	
1.3	8986.57	--	--	SB		
2.8	8985.87	--	--	SG/Sand 50/50		
5.4	8985.57	--	--	SB		
7.2	8985.20	--	--	SB		
9.3	8984.91	--	--	MG/SG 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
10.3	8984.84	--	--	SC/MC 50/50		
10.5	8983.70	--	--	SC/MC 50/50		LEW Velocity
10.8	8983.20	0.50	-0.02	SC/MC 50/50		Small Patch MG/SG
12.0	8983.15	0.55	-0.02	SC/MC 50/50		
13.0	8982.80	0.90	-0.14	SC/MC 50/50		
14.0	8982.70	1.00	0.37	SC/MC 50/50		
15.0	8982.70	1.00	0.75	SC/MC 50/50		
16.0	8983.00	0.70	1.36	MG/SG 50/50		
17.0	8983.15	0.55	1.45	MG/SG 50/50		
18.0	8983.20	0.50	1.12	MG/SG 50/50		
19.0	8982.90	0.80	0.58	MG/SG 50/50		
20.0	8983.10	0.60	-0.28	MG/SG 50/50		
21.0	8982.80	0.90	1.79	SC/SB/MG 40/20/40		
22.0	8982.80	0.90	1.36	SC/SB/MG 40/20/40		
23.0	8983.20	0.50	2.17	SC/SB/MG 40/20/40		
24.0	8982.65	1.05	2.05	SB		
25.0	8982.70	1.00	1.40	SB		
26.0	8983.20	0.50	2.54	SB/SAND 95/5		
27.0	8982.40	1.30	1.48	SB/SAND 95/5		
28.0	8982.35	1.35	1.56	SC/SB 75/25		
29.0	8982.20	1.50	1.35	SC/SB 75/25		
30.0	8982.20	1.50	1.28	SC/SB 75/25		
31.0	8982.70	1.00	2.83	SC/SB 75/25		
32.0	8982.50	1.20	2.91	SC/SB 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
33.0	8983.50	0.20	2.01	SC/SB 50/50		ON ROCK
34.0	8982.70	1.00	2.15	SC/SB 50/50		
35.0	8983.05	0.65	2.13	SC/SB 50/50		
36.0	8983.00	0.70	2.47	SC/SB 50/50		
37.0	8982.75	0.95	3.14	SC/SB 50/50		
38.0	8983.00	0.70	2.19	SC/SB 50/50		
39.0	8982.90	0.80	2.96	SC/SB 50/50		
40.0	8982.80	0.90	-0.06	SC/SB 50/50		
41.0	8982.90	0.80	-0.25	SB/LG 75/25		
42.0	8983.25	0.45	3.61	SB/LG 75/25		
43.0	8983.30	0.40	0.02	SB/LG 75/25		
44.0	8983.60	0.10	0.00	SG/Sand 50/50		
45.0	8983.65	0.05	0.00	MC		
45.5	8983.64	--	--	MC		REW
45.8	8983.70	0.00	0.00	MC		REW
46.6	8984.04	--	--	Root/MG		
48.0	8985.92	--	--		Lodgepole	
48.3	8986.33	--	--		Lodgepole	RPT14
48.4	8986.34	--	--		Lodgepole	Top Nail in base lodgepole RPT14
49.3	8986.33	--	--			
53.3	8987.87	--	--			

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
Rush Creek Below Silver Lake Cross Section IF15						
0.0	1985.25	--	--	GR/SILT 75/25		BLSL LPT15 top wood stake
0.3	1984.29	--	--	GR/SILT 75/25		BLSL LPT15 bott wood stake
3.6	1984.16	--	--	GR/SILT 75/25		BLSL T15
4.7	1983.70	--	--	GR/SILT 75/25		BLSL T15
10.1	1982.65	--	--		Willow	BLSL T15
12.1	1981.00	--	--		Willow	BLSL T15
14.0	1979.64	0.00	0.00		Willow	LEW VELOCITY
16.5	1979.19	0.45	0.12	SAND/MG/SG 25/25/50		
18.5	1979.24	0.40	0.24	SAND/MG/SG 25/25/50		
20.5	1979.14	0.50	0.31	SAND/MG/SG 25/25/50		
22.5	1978.84	0.80	0.60	LG/MG 50/50		
24.5	1978.59	1.05	0.73	LG/MG 50/50		
26.5	1978.44	1.20	0.90	LG/MG 50/50		
28.5	1978.44	1.20	1.05	LG/MG 50/50		
30.5	1978.44	1.20	1.28	LG/MG 50/50		
32.5	1978.44	1.20	1.19	LG/SC/MG 50/25/25		
34.5	1978.39	1.25	1.45	LG/SC/MG 50/25/25		
36.5	1977.79	1.85	1.73	MG/SG 50/50		
38.5	1977.79	1.85	1.56	MG/SG 50/50		
40.5	1977.79	1.85	1.65	SG/MG 75/25		
42.5	1978.54	1.10	1.41	SG/SAND 50/50		
44.5	1978.79	0.85	1.23	SG/SAND 50/50		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.5	1978.94	0.70	1.09	SG/SAND 50/50		
48.5	1978.94	0.70	0.52	SAND		
50.5	1979.19	0.45	0.27	GR/SILT 25/75		
51.1	1979.59	--	--	GR/SILT 25/75		BLSL T15 REW 20231009 17:04hrs STA 50.9
51.2	1979.64	0.00	0.00	GR/SILT 25/75		REW VELOCITY
53.2	1980.02	--	--	GR/SILT 25/75		BLSL T15
57.2	1980.50	--	--	GR/SILT 25/75		BLSL T15
60.4	1980.80	--	--	GR/SILT 25/75		BLSL T15
62.7	1981.45	--	--	GR/SILT 25/75		BLSL T15
65.8	1981.67	--	--	GR/SILT 25/75		BLSL RPT15 bott wood stake
66.4	1982.60	--	--	GR/SILT 25/75		BLSL RPT15 top wood stake STA 65.5
Rush Creek Below Silver Lake Cross Section IF16						
0.0	1985.68	--	--		Grass	BLSL LPT16 top wood stake STA 0.7
0.5	1985.41	--	--		Grass	BLSL LPT16 bott wood stake STA 0.7
4.0	1984.43	--	--		Grass	BLSL T16
6.3	1982.57	--	--		Grass	BLSL T16
9.9	1981.78	--	--		Grass	BLSL T16
11.2	1980.66	--	--	SILT, GR 25/75	Grass	BLSL T16
14.2	1980.08	--	--	SILT, GR 25/75	Grass	BLSL T16
14.3	1979.63	0.00	0.00	MG/LG/SC 50/25/25		LEW
14.6	1979.43	0.20	-0.07	MG/LG/SC 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
16.1	1979.13	0.50	0.16	MG/LG/SC 50/25/25		
17.6	1979.03	0.60	0.74	MG/LG/SC 50/25/25		
19.1	1978.93	0.70	0.64	SG		
20.6	1978.83	0.80	1.01	SG		
22.1	1978.93	0.70	1.27	SG		
23.6	1978.53	1.10	0.94	SAND/SG 50/50		
25.1	1978.63	1.00	1.33	SAND/SG 50/50		
26.6	1978.43	1.20	1.36	SAND/SG 50/50		
28.1	1978.48	1.15	1.45	SAND/SG 25/75		
29.6	1978.53	1.10	1.50	SAND/SG 25/75		
31.1	1978.58	1.05	1.48	SAND/SG 25/75		
32.6	1978.68	0.95	1.47	SAND/SG 25/75		
34.1	1978.68	0.95	1.54	SAND/SG 25/75		
35.6	1978.68	0.95	1.43	SAND/SG 25/75		
37.1	1978.68	0.95	1.44	SAND/SG 25/75		
38.6	1978.68	0.95	1.33	SAND/SG 50/50		
40.1	1978.63	1.00	1.15	SAND/SG 50/50		
41.6	1978.68	0.95	1.04	SAND/SG 50/50		
43.1	1978.68	0.95	1.02	SAND/SG 50/50		
44.6	1978.63	1.00	0.81	SAND/SG 50/50		
46.1	1978.78	0.85	0.57	SAND/SG 50/50		
47.6	1978.63	1.00	0.39	SAND/SG 50/50	Willow Overhang	
49.1	1978.78	0.85	-0.08	SILT	Willow Overhang	

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
50.5	1979.43	0.20	0.02	SILT	Willow Overhang	
50.6	1979.59	--	--	SILT/GR 25/75	Willow Overhang	BLSL T16 REW
50.7	1979.63	0.00	0.00	SILT/GR 25/75	Willow Overhang	REW
51.8	1979.98	--	--	SILT/GR 25/75	Willow Overhang	BLSL T16
54.8	1979.62	--	--	SILT	Willow Overhang	BLSL T16
56.6	1979.72	--	--	SILT		BLSL T16
58.1	1980.91	--	--	SILT		BLSL T16
58.4	1980.85	--	--	SILT/GR 25/75		BLSL T16
61.8	1981.65	--	--	SILT/GR 25/75		BLSL T16
70.0	1981.76	--	--	SILT/GR 50/50		BLSL T16
74.9	1982.54	--	--	SILT/GR 50/50		BLSL RPT16 bott nail STA 73.9
75.2	1982.75	--	--	SILT/GR 50/50		BLSL RPT16 top nail STA 73.9
Rush Creek Below Silver Lake Cross Section IF17						
0.0	984.26	--	--		Grass	LPT17
2.0	984.00	--	--		Grass	
4.0	983.45	--	--		Grass	
6.0	983.19	--	--		Grass	
8.0	982.51	--	--		Grass	
10.0	982.14	--	--		Grass	

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
12.0	981.75	--	--		Willow	
13.7	980.09	--	--		Willow	
14.5	980.00	--	--	SILT/SC/MG 60/10/30		LEW
14.5	979.96	0.00	0.00	SAND/SG 75/25		LEW
16.0	979.81	0.15	0.11	SAND/SG 75/25		
17.5	979.71	0.25	0.11	SG/SAND 75/25		
19.0	979.56	0.40	0.32	SG/SAND 75/25		
20.5	979.46	0.50	0.24	MG/SC 75/25		
22.0	979.16	0.80	1.00	MG/SC 75/25		
23.5	979.26	0.70	2.05	SB/MC/SC 25/50/25		
25.0	979.51	0.45	3.19	SB/MC/SC 25/50/25		
26.5	979.01	0.95	2.64	SB/MC/SC 25/50/25		
28.0	978.96	1.00	2.24	SC/LG/SB 45/45/10		
29.5	979.11	0.85	1.19	SC/LG/SB 45/45/10		
31.0	979.01	0.95	2.91	SC/LG/SB 45/45/10		
32.5	979.01	0.95	1.68	SC/LG/SB 45/45/10		
34.0	978.61	1.35	3.20	SC/LG/SB 45/45/10		
35.5	979.06	0.90	3.15	SC/LG/SB 45/45/10		
37.0	978.96	1.00	1.36	MB/SG/MC 50/25/25		
38.5	979.16	0.80	0.01	MB/SG/MC 50/25/26		
40.0	979.46	0.50	1.52	SC/SB 75/25		
41.5	979.56	0.40	2.65	SC/SB 75/25		
43.0	979.36	0.60	2.85	SC/SB 75/25		
44.5	979.26	0.70	1.56	SC/SB 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.0	979.51	0.45	0.61	SG/SC/MG 40/20/40		
47.5	979.61	0.35	0.72	SG/SC/MG 40/20/40		
49.0	979.56	0.40	0.13	SC/SB/LG 70/15/15		
50.5	979.66	0.30	0.76	SC/SB/LG 70/15/15		
52.0	979.66	0.30	0.34	SC/SB/LG 70/15/15		
53.5	979.76	0.20	0.90	SC/SB/LG 70/15/15		
55.7	979.86	0.10	0.09	SAND/SG/SC 50/25/25		
56.4	979.92	--	--	SAND/SG/SC 50/25/25		REW? (NOT LABELED ON DATA SHEET)
56.7	979.96	0.00	0.00	GR/SILT 75/25		REW
59.0	980.34	--	--	GR/SILT 75/25		
61.0	981.09	--	--	GR/SILT 75/25		
63.3	982.25	--	--		Aspen	
66.0	982.58	--	--	GR/SILT 75/25		
66.4	983.66	--	--	MB		
67.2	984.11	--	--	MB		Possibly RPT17, not labeled on data sheet
Rush Creek Below Silver Lake Cross Section IF18						
0.0	985.88	--	--	GR/SILT 75/25	Grass	Juniper; Top LBP (Nail in upstream side of Juniper
0.0	985.55	--	--	GR/SILT 75/25	Grass	Juniper; base us side of Juniper
1.3	985.11	--	--	GR/SILT 75/25	Grass	Juniper; grass understory
3.6	984.60	--	--		Grass	Juniper
4.0	984.39	--	--		Grass	Juniper/grass

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
6.5	983.48	--	--		Grass	
8.0	982.77	--	--		Grass	Juniper/grass; approx exterior willow canopy extent
8.8	982.46	--	--	GR/SILT 75/25	Grass	FP Bench
10.7	982.25	--	--	GR/SILT 75/25	Grass	Willow/grass; FP Bench
11.2	981.99	--	--	GR/SILT 75/25	Grass	FP Bench
11.8	981.65	--	--	GR/SILT 75/25	Grass	BF; FP Bench
12.5	981.02	--	--	GR/SILT 75/25	Grass	
12.8	980.24	--	--	SILT/LG 75/25	Grass	willow grass; LEW 15:17 hrs
12.8	980.15	--	--	SILT/LG 75/25		willow
13.6	979.96	--	--	SILT/LG 75/25		willow base (root not exposed)
14.0	979.90	0.10	--	SILT/LG 75/25		
15.5	979.65	0.30	-0.01	SILT/LG 75/25		
17.0	979.41	0.60	0.07	MC/LG/SC/SAND 25/25/25/25		willow
17.0	979.41	0.60	0.07	MC/LG/SC/SAND 25/25/25/25		
18.5	979.31	0.80	0.48	MC/LG/SC/SAND 25/25/25/25		
19.5	979.24	1.13	0.83	MC/LG/SC/SAND 25/25/25/25		willow; exterior willow canopy
20.0	979.22	1.30	1.01	MC/LG/SC/SAND 25/25/25/25		
21.5	979.14	1.00	0.68	MC/LG/SC/SAND 25/25/25/25		
22.0	979.12	1.00	0.61	MC/LG/SC/SAND 25/25/25/25		
23.0	979.07	1.00	0.48	LC/LG/SAND 25/50/25		
23.5	979.05	1.05	0.80	LC/LG/SAND 25/50/25		
24.5	978.96	1.15	1.45	LC/LG/SAND 25/50/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
25.0	978.91	1.20	1.58	LC/LG/SAND 25/50/25		TW
26.0	978.97	1.30	1.83	LC/LG/SAND 25/50/25		
26.7	979.01	1.39	2.08	LC/LG/SAND 25/50/25		
27.5	979.13	1.50	2.37	LC/LG/SAND 25/50/25		
28.5	979.27	1.37	2.00	LC/LG/SAND 25/50/25		
29.0	979.27	1.30	1.82	LC/LG/SAND 25/50/25		
30.5	979.29	1.15	2.22	LG/SAND 75/25		
32.0	979.30	1.20	1.62	LG/SAND 75/25		
32.8	979.31	1.23	1.69	LG/SAND 75/25		
33.5	979.36	1.25	1.74	LC/SB 50/50		
34.6	979.45	0.74	1.55	LC/SB 50/50		
35.0	979.50	0.55	1.48	LC/SB 50/50		
36.0	979.64	0.72	1.29	LC/SB 50/50		
36.5	979.58	0.80	1.19	LC/SB 50/50		
37.0	979.51	0.77	0.98	LC/SB 50/50		
38.0	979.49	0.70	0.57	LC/SB 50/50		
39.2	979.46	0.66	0.44	LG/MG/SC 50/25/25		
39.5	979.47	0.65	0.40	LG/MG/SC 50/25/25		
41.0	979.54	0.85	1.61	LG/MG/SC 50/25/25		
42.0	979.59	0.85	1.00	LG/MG/SC 50/25/25		
42.5	979.64	0.85	0.70	LG/MG/SC 50/25/25		
44.0	979.77	0.60	-0.04	LG/MG/SC 50/25/25		Willow canopy extent
44.0	979.77	0.60	-0.04	LG/MG/SC 50/25/25		
45.5	979.89	0.50	0.34	LG/MG/SC 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.3	979.96	0.37	0.84	LC/SC 75/25		
47.0	980.00	0.25	1.27	LC/SC 75/25		
48.3	980.06	0.38	0.64	LC/SC 75/25		
48.5	980.07	0.40	0.54	LC/SC 75/25		
50.0	980.12	0.40	0.36	SC/LG/SILT 25/25/50		
51.0	980.16	0.35	0.39	SC/LG/SILT 25/25/50		
52.0	980.18	0.30	0.43	SILT/SC 75/25		
53.5	980.21	0.20	0.16	SILT/SC 75/25		
53.5	980.21	0.20	0.16	SILT/SC 75/25		
55.0	980.30	0.30	0.15	SILT/SC 75/25		
55.2	980.31	0.29	0.14	SILT/GR 75/25		Horsetails/grass; REW 15:30
56.5	980.61	0.20	0.05	SILT/GR 75/25		
56.5	980.61	0.20	0.05	SILT/GR 75/25		
57.3	980.81	0.00	0.00	SILT/GR 75/25		
57.6	980.89	--	--	SILT/GR 75/25		
57.8	981.22	--	--	GR/SILT 75/25		small downed log (buried)
58.8	981.45	--	--	GR/SILT 75/25		
59.0	981.65	--	--	GR/SILT 75/25		BF approximate elevation of willow and adjacent aspen; -DS BF indicated for ~0.1' lower (9.36)
59.3	981.95	--	--	GR/SILT 75/25		
60.4	982.45	--	--	GR/SILT 75/25		
63.0	982.80	--	--	GR/SILT 75/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
66.0	982.79	--	--	GR/SILT 75/25		
68.0	983.26	--	--	GR/SILT 75/25		
69.0	983.62	--	--	GR/SILT 75/25		
69.5	983.97	--	--	GR/SILT 75/25		ground next to RBP-horizontal nail
69.5	984.41	--	--	GR/SILT 75/25		Top horizontal nail RBP
71.4	984.39	--	--	GR/SILT 75/25		FPW
Rush Creek Below Silver Lake Cross Section IF19						
0.0	985.08	--	--	SB		BLSL LPT19 top bolt
2.0	984.03	--	--	GR, SILT 75/25		BLSL T19
2.8	983.57	--	--	GR, SILT 75/25		BLSL T19
4.6	982.90	--	--	GR, SILT 75/25		BLSL T19
5.6	982.38	--	--	SILT		BLSL T19
6.2	981.14	--	--	SILT		BLSL T19
7.9	980.77	--	--	GR/SILT 75/25		BLSL T19
8.0	980.65	0.00	0.00	SILT	Willow Overhang	LEW VELOCITY
8.3	980.43	--	--	SILT	Willow Overhang	BLSL T19 LEW 20231009 15:37 STA 19.6
10.0	979.80	0.85	0.34	SILT	Willow Overhang	
11.5	979.95	0.70	0.20	SILT	Willow Overhang	
13.0	980.25	0.40	0.39	SILT	Willow Overhang	

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
14.5	979.70	0.95	0.43	SILT, LG 75/25	Willow Overhang	
16.0	979.65	1.00	0.40	SC/SILT 75/25	Willow Overhang	
17.5	979.50	1.15	0.40	SC/SILT 75/25		
19.0	979.65	1.00	0.63	SC/SILT 75/25		
20.5	979.60	1.05	0.94	SC/SILT 75/25		
22.0	979.60	1.05	-0.44	SC/LG/SAND 50/25/25		Rock Snot
23.5	979.40	1.25	0.75	SC/LG/SAND 50/25/25		Rock Snot
25.0	979.40	1.25	1.42	SC/LG/SAND 50/25/25		Rock Snot
26.5	979.50	1.15	1.07	SC/LG/SAND 50/25/25		Rock Snot
28.0	979.25	1.40	1.32	SC/LG/SAND 50/25/25		Rock Snot
29.5	979.25	1.40	1.45	SC/LG/SAND 50/25/25		Rock Snot
31.0	979.35	1.30	1.75	SC/LG/SAND 50/25/25		Rock Snot
32.5	979.30	1.35	1.27	SC/LG/SAND 50/25/25		Rock Snot
34.0	979.15	1.50	1.91	SC/LG/SAND 25/50/25		
35.5	979.15	1.50	1.82	SC/LG/SAND 25/50/25		
37.0	979.05	1.60	1.53	SC/LG/SAND 25/50/25		
38.5	979.30	1.35	1.83	LG/SAND 75/25		
40.0	979.30	1.35	1.57	LG/SAND 75/25		
41.5	979.50	1.15	1.93	LG/SAND 75/25		
43.0	979.65	1.00	1.07	LG/SAND 75/25		
44.5	979.80	0.85	0.05	SILT		
46.5	980.42	--	--	SILT		BLSL T19 REW 20231009 15:39hrs STA 57.6

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
46.6	980.65	0.00	0.00	SILT		REW VELOCITY
48.2	980.71	--	--	SILT/GR 75/25		BLSL T19
49.7	981.16	--	--	SB/SILT/GR 50/25/25		BLSL T19
51.0	982.36	--	--	SB/SILT/GR 50/25/25		BLSL T19
53.7	982.85	--	--	GR/SILT 75/25		BLSL T19
56.4	983.31	--	--	GR/SILT 75/25		BLSL T19
57.8	983.25	--	--	GR/SILT 75/25		BLSL T19
62.7	983.62	--	--	GR/SILT 75/25		BLSL T19
68.2	984.01	--	--	GR/SILT 50/50		BLSL T19
71.7	984.66	--	--	SND/GR/MG 25/50/25		BLSL T19
72.9	985.06	--	--	SB		BLSL T19 top RB bolt
Rush Creek Below Silver Lake Cross Section IF20						
0.0	986.16	--	--	GR/SILT 75/25	Grass	BLSL LPT20 top wood stake STA 1.6
1.2	985.55	--	--	GR/SILT 75/25	Grass	BLSL T20
3.3	985.00	--	--	SAND/SG 50/50		BLSL T20
5.0	985.15	--	--	SAND/GR 25/75		BLSL T20
9.8	984.85	--	--	GR/SILT 75/25		BLSL T20
14.2	984.45	--	--	GR/SILT 75/25		BLSL T20
16.8	984.19	--	--	GR/SILT 75/25		BLSL T20
21.1	983.35	--	--	SG/SAND/SILT 50/25/25		BLSL T20
22.1	982.17	--	--	SG/SAND/SILT 50/25/25		BLSL T20
24.3	981.83	--	--	SG/SAND/SILT 50/25/25		BLSL T20
25.1	981.88	--	--	GR/SILT 50/50		BLSL T20

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
25.9	981.95	--	--	GR/SILT 50/50		BLSL T20
28.0	981.27	--	--	GR/SILT 50/50		BLSL T20
28.4	981.30	--	--	GR/SILT 50/50		BLSL T20
28.5	981.10	0.00	0.00	SILT/SAND 50/50		LEW VELOCITY
29.7	980.90	0.20	-0.01	SILT/SAND 50/50		
30.2	980.93	--	--	SILT/SAND 50/50		BLSL T20 LEW 20231009 15:50hrs STA 30.9
30.9	980.85	0.25	0.09	SILT/SAND 50/50		
32.1	980.75	0.35	0.18	SILT/SAND 50/50		
33.3	980.55	0.55	0.29	SILT/SAND 50/50		
34.5	980.35	0.75	0.09	SILT/SAND 50/50		
35.7	980.30	0.80	-0.06	SILT/SAND 50/50		
36.9	980.15	0.95	0.34	SILT/SAND 50/50		
38.1	980.10	1.00	0.32	SILT/SAND 50/50		
39.3	980.00	1.10	0.39	SILT/SAND 50/50		
40.5	979.95	1.15	0.28	SILT/SAND 50/50		
41.7	979.80	1.30	0.16	MG/SAND/SILT 50/25/25		
42.9	979.60	1.50	0.27	MG/SAND/SILT 50/25/25		
44.1	979.45	1.65	0.58	MG/SAND/SILT 50/25/25		
45.3	979.40	1.70	0.80	SC/MC/LG 50/25/25		
46.5	979.25	1.85	0.74	SC/MC/LG 50/25/25		
47.7	979.20	1.90	0.62	SC/MC/LG 50/25/25		
48.9	979.20	1.90	0.98	SC/MC/LG 50/25/25		
50.1	979.30	1.80	1.12	SC/MC/LG 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
51.3	979.10	2.00	0.43	SC/MC/LG 50/25/25		
52.5	979.20	1.90	1.13	SC/LG/SAND 25/50/25		
53.7	979.25	1.85	1.28	SC/LG/SAND 25/50/25		
54.9	979.20	1.90	1.56	SC/LG/SAND 25/50/25		
56.1	979.00	2.10	1.23	SC/LG/SAND 25/50/25		
57.3	979.10	2.00	1.29	SC/LG/SAND 25/50/25		
58.5	979.00	2.10	1.15	SC/LG/SAND 25/50/25		
59.7	978.90	2.20	1.08	SC/LG/SAND 25/50/25		
60.9	979.00	2.10	1.12	SC/LG/SAND 25/50/25		
62.1	979.05	2.05	1.11	SILT/SAND 50/50		
63.3	979.45	1.65	0.91	SILT/SAND 50/50		
64.5	979.85	1.25	0.60	SILT/SAND 50/50		
65.7	980.10	1.00	0.28	SILT/SAND 50/50		
66.9	980.35	0.75	0.34	SC/SILT 50/50		
68.3	980.70	0.40	0.24	SC/SILT 50/50		
69.3	981.10	0.00	0.00	SC/SILT 50/50		REW VELOCITY
69.5	981.48	--	--	SC/SILT 50/50		BLSL T20
71.9	982.91	--	--	SC/SILT 50/50		BLSL T20
72.3	983.11	--	--	SILT/GR 25/75	Grass	BLSL T20
77.7	983.78	--	--	SILT/GR 25/75	Grass	BLSL T20
82.8	984.84	--	--	SILT/GR 25/75	Grass	BLSL T20 STA 83 no pin
119.2	991.20	--	--	SILT/GR 25/75	Grass	BLSL RPT20 ground RB horz nail in aspen no STA
120.1	992.29	--	--	SILT/GR 25/75	Grass	BLSL RPT20 top horz nail in aspen no STA

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
Rush Creek Below Silver Lake Cross Section IF21						
0.0	985.38	--	--	LC		BLSL LPT21 top bolt
1.0	984.80	--	--	LC		BLSL T21
3.6	984.49	--	--	LC		BLSL T21
7.3	983.98	--	--	GR/SILT 75/25	Grass	BLSL T21
11.0	983.72	--	--	GR/SILT 75/25	Grass	BLSL T21
14.2	983.23	--	--	GR/SILT 75/25	Grass	BLSL T21
15.0	982.94	--	--	GR/SILT 75/25	Grass	BLSL T21
15.2	982.24	--	--	GR/SILT 75/25	Grass	BLSL T21
16.2	981.43	0.10	0.00	SG/SAND 50/50		LEW (VELOCITY)
16.3	981.36	--	--	SG/SAND 50/50		BLSL T21 LEW 20231009 14:39hrs STA 15.5
21.5	981.03	0.50	0.38	LG/SC 75/25		
23.0	980.43	1.10	2.29	LG/SC 75/25		
24.5	980.63	0.90	1.79	LG/SC 75/25		
26.0	980.73	0.80	-0.50	LC/SC/MG 50/25/25		
28.1	980.83	0.70	1.60	LC/SC/MG 50/25/25		
29.5	980.83	0.70	-0.56	LC/SC/MG 50/25/25		
30.9	981.03	0.50	1.61	LC/SC/MG 50/25/25		
32.6	980.88	0.65	0.67	LC/SC/MG 50/25/25		
34.0	980.73	0.80	0.61	LC/SC/MG 50/25/25		
35.5	980.83	0.70	0.36	LC/SC/MG 50/25/25		
37.0	981.13	0.40	1.43	LC/SC/MG 50/25/25		
38.5	981.28	0.25	1.98	LC/SC/MG 50/25/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
40.0	980.78	0.75	2.79	LC/SC/MG 50/25/25		
41.5	981.33	0.20	2.62	LC/SC/MG 50/25/25		
43.0	980.53	1.00	2.48	SC/LG 50/50		
44.5	980.73	0.80	4.00	SC/LG 50/50		
46.0	980.28	1.25	2.32	SC/LG 50/50		
47.5	980.83	0.70	2.94	MG/LG 75/25		
49.0	980.73	0.80	2.27	MG/LG 75/25		
50.5	980.63	0.90	2.85	MG/LG 75/25		
52.0	980.83	0.70	2.39	MG/LG 75/25		
53.5	980.83	0.70	1.75	SILT/MG/WILLOW 50/25/25		
55.0	981.03	0.50	0.60	SILT/MG/WILLOW 50/25/25		
56.0	981.30	--	--	GR/SILT 75/25	Grass	BLSL T21 REW 20231009 14:41hrs STA 55.8
56.8	981.47	--	--	GR/SILT 75/25	Grass	BLSL T21
56.9	981.53	0.00	0.00	GR/SILT 75/25	Grass	REW
57.3	982.33	--	--	GR/SILT 75/25	Grass	BLSL T21
58.2	983.04	--	--	GR/SILT 75/25	Grass	BLSL T21
60.7	983.96	--	--	GR/SILT 75/25	Grass	BLSL T21
62.7	984.13	--	--	GR/SILT 75/25	Grass	BLSL T21
63.9	984.01	--	--	GR/SILT 75/25	Grass	BLSL T21
64.6	983.83	--	--	GR/SILT 75/25	Grass	BLSL T21
65.7	983.90	--	--	GR/SILT 75/25	Grass	BLSL T21
67.7	984.05	--	--	GR/SILT 75/25	Grass	BLSL T21
68.5	985.22	--	--	GR/SILT 75/25	Grass	BLSL T21 top RB nail STA 68.0

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
Rush Creek Below Silver Lake Cross Section IFCT4						
0.0	987.39	--	--			BLSL LPCT4 top yellow tent stake
0.5	987.22	--	--			BLSL CT4
3.1	986.74	--	--			BLSL CT4
6.2	986.21	--	--			BLSL CT4
8.5	985.99	--	--			BLSL CT4
10.5	985.22	--	--			BLSL CT4
13.1	985.00	--	--			BLSL CT4
16.5	984.91	--	--			BLSL CT4
19.2	985.06	--	--			BLSL CT4
23.3	984.99	--	--			BLSL CT4
27.9	984.69	--	--			BLSL CT4
31.4	984.32	--	--			BLSL CT4
32.7	984.02	--	--			BLSL CT4
33.2	982.82	--	--			BLSL CT4
33.9	982.18	--	--			BLSL CT4 REW 20231009 14:51hrs STA 38.0
34.4	982.02	--	--			BLSL CT4
35.5	981.75	--	--			BLSL CT4
37.1	981.61	--	--			BLSL CT4
38.6	981.64	--	--			BLSL CT4
39.1	982.24	--	--			BLSL CT4
39.4	982.22	--	--			BLSL CT4
39.6	981.71	--	--			BLSL CT4

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
39.9	982.23	--	--			BLSL CT4
40.3	982.19	--	--			BLSL CT4
40.8	982.12	--	--			BLSL CT4
41.7	981.27	--	--			BLSL CT4
42.8	981.18	--	--			BLSL CT4
43.9	981.14	--	--			BLSL CT4
44.9	981.23	--	--			BLSL CT4
45.9	981.11	--	--			BLSL CT4
47.3	981.05	--	--			BLSL CT4
47.5	981.60	--	--			BLSL CT4
48.2	981.72	--	--			BLSL CT4
48.5	981.29	--	--			BLSL CT4
49.0	981.15	--	--			BLSL CT4
50.6	981.06	--	--			BLSL CT4
51.3	981.11	--	--			BLSL CT4
51.7	981.61	--	--			BLSL CT4
52.2	980.95	--	--			BLSL CT4
53.2	980.94	--	--			BLSL CT4
53.7	980.96	--	--			BLSL CT4
53.9	981.46	--	--			BLSL CT4
54.3	980.96	--	--			BLSL CT4
55.2	981.01	--	--			BLSL CT4
56.2	980.98	--	--			BLSL CT4
57.0	981.14	--	--			BLSL CT4

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
57.9	981.05	--	--			BLSL CT4
59.1	981.15	--	--			BLSL CT4
60.5	981.23	--	--			BLSL CT4
61.0	980.96	--	--			BLSL CT4
62.3	980.93	--	--			BLSL CT4
64.0	980.97	--	--			BLSL CT4
65.0	980.85	--	--			BLSL CT4
66.2	981.14	--	--			BLSL CT4
66.5	982.00	--	--			BLSL CT4
67.4	982.11	--	--			BLSL CT4
68.6	981.97	--	--			BLSL CT4
69.6	981.02	--	--			BLSL CT4
71.0	981.04	--	--			BLSL CT4
72.4	981.10	--	--			BLSL CT4
73.8	981.13	--	--			BLSL CT4
75.8	981.02	--	--			BLSL CT4
78.4	981.14	--	--			BLSL CT4
80.4	981.37	--	--			BLSL CT4
82.5	981.80	--	--			BLSL CT4
83.0	982.12	--	--			BLSL CT4 REW 20231009 14:56hrs STA 85.8
83.5	982.76	--	--			BLSL CT4
84.5	983.26	--	--			BLSL CT4
86.5	983.99	--	--			BLSL CT4

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
90.1	984.87	--	--			BLSL CT4
93.1	985.21	--	--			BLSL CT4
97.8	985.30	--	--			BLSL CT4 no pin
Rush Creek Below Silver Lake Cross Section IF22						
0.0	984.15	--	--		Grass	BLSL LPT22 top pin STA 13.8
0.0	984.20	--	--		Grass	LPT22
0.3	983.66	--	--		Grass	BLSL T22 pin
3.0	983.49	--	--		Grass	BLSL T22
5.4	983.50	--	--		Grass	BLSL T22
7.5	983.82	--	--		Grass	BLSL T22
9.7	984.22	--	--		Grass	BLSL T22
11.5	984.42	--	--		Grass	BLSL T22
13.2	984.46	--	--		Grass	BLSL T22
13.4	984.46	--	--		Grass	BLSL T22
15.5	984.46	--	--		Grass	BLSL T22
17.3	984.15	--	--		Grass	BLSL T22
18.5	983.71	--	--		Grass	BLSL T22
20.8	983.10	--	--		Willow/Grass 25/75	BLSL T22
21.8	982.65	--	--		Willow/Grass 25/75	BLSL T22
24.6	982.31	--	--		Willow/Grass 25/75	BLSL T22
26.5	982.41	--	--		Willow/Grass 25/75	BLSL T22

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
29.4	982.18	--	--	GR/SILT 75/25	Grass	BLSL T22
31.4	982.29	--	--	GR/SILT 75/25	Grass	BLSL T22
33.5	982.86	--	--	GR/SILT 75/25	Grass	BLSL T22
34.9	983.01	--	--	GR/SILT 75/25	Grass	BLSL T22
37.7	983.05	--	--	SAND		BLSL T22
40.7	983.06	--	--	SAND		BLSL T22
45.4	982.66	--	--	SAND		BLSL T22
46.9	982.50	--	--	SG		
47.0	982.49	0.00	0.00	SG		LEW
47.9	982.40	0.10	-0.15	SG		
48.9	982.25	0.25	0.00	SG		
49.3	982.39	--	--	SG		BLSL T22
49.9	982.05	0.45	0.01	SG		
50.9	981.90	0.60	-0.04	SG		
51.0	982.15	--	--	SG		BLSL T22 LEW 12:40hrs STA 62.9
51.9	981.60	0.90	-0.01	SG		
52.9	981.30	1.20	-0.03	SG/SILT 25/75		
53.9	981.05	1.45	0.01	SG/SILT 25/75		
54.9	980.80	1.70	0.07	SG/SILT 25/75		
59.5	980.26	2.24	0.14	SILT		ADP Data begin
60.1	980.10	2.40	0.19	SILT		
60.7	979.89	2.61	0.23	SILT		
61.1	979.84	2.66	0.22	SILT		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
61.8	979.58	2.92	0.21	SILT		
62.6	979.35	3.15	0.20	SILT		
63.5	979.23	3.27	0.19	SILT		
64.2	979.03	3.47	0.20	SILT		
64.9	978.84	3.66	0.29	SILT		
65.6	978.65	3.85	0.32	SILT		
66.3	978.49	4.01	0.31	SILT		
67.2	978.29	4.21	0.39	SILT		
67.9	978.13	4.37	0.41	SILT		
68.7	977.96	4.54	0.31	SILT		
69.5	977.81	4.69	0.43	SILT		
70.2	977.69	4.81	0.36	SILT		
71.0	977.60	4.90	0.38	SILT		
71.8	977.47	5.03	0.23	SILT		
72.6	977.47	5.03	0.32	SILT		
73.4	977.52	4.98	0.39	SILT		
74.1	977.58	4.92	0.41	SILT		
74.7	977.57	4.93	0.37	SILT		
75.4	977.56	4.94	0.48	SILT		
76.2	977.52	4.98	0.43	SILT		
76.9	977.57	4.93	0.42	SILT		
77.6	977.62	4.88	0.55	SILT		
78.0	977.53	4.97	0.44	SILT		
78.9	977.57	4.93	0.38	SILT		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
79.6	977.64	4.86	0.44	SILT		
80.3	977.64	4.86	0.46	SILT		
81.0	977.69	4.81	0.43	SILT		
81.9	977.68	4.82	0.46	SILT		
82.6	977.72	4.78	0.41	SILT		
83.4	977.81	4.69	0.32	SILT		
84.1	977.87	4.63	0.17	SILT		
84.8	977.96	4.54	0.07	SILT		
85.7	977.96	4.54	0.11	SILT		
86.4	977.96	4.54	0.01	SILT		
87.2	978.04	4.46	0.06	SILT		
87.9	978.09	4.41	0.09	SILT		
88.5	978.22	4.28	0.22	SILT		
88.8	978.42	4.08	0.30	SILT		
89.5	978.55	3.95	0.19	SILT		
90.2	978.60	3.90	0.08	SILT		
90.9	978.65	3.85	0.14	SILT		
91.3	978.44	4.06	0.13	SILT		
92.1	978.55	3.95	0.27	SILT		
93.2	978.56	3.94	0.10	SILT		
93.8	978.51	3.99	0.22	SILT		
94.2	978.72	3.78	0.23	SILT		
94.7	978.64	3.86	0.21	SILT		
95.4	978.63	3.87	0.11	SILT		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
96.1	978.63	3.87	0.22	SILT		
96.6	978.74	3.76	0.13	SILT		
97.3	979.08	3.42	0.13	SILT	Some Detritus	
101.3	982.15	--	--		Willow	BLSL T22 REW 12:45hrs STA 114.0
102.1	983.68	--	--		Willow	BLSL T22
103.2	984.43	--	--		Willow	BLSL T22
105.9	984.82	--	--		Willow	BLSL T22
108.5	985.19	--	--		Willow	BLSL T22
110.6	986.07	--	--		Willow	BLSL T22
111.3	986.08	--	--		Willow/Grass	BLSL T22
116.2	986.24	--	--		Willow/Grass	BLSL T22
121.8	986.59	--	--	GR/SILT/SG 50/25/25	Grass	BLSL T22
128.8	987.24	--	--	GR/SILT/SG 50/25/25	Grass	BLSL T22
131.1	987.61	--	--	GR/SILT/SG 50/25/25	Grass	BLSL T22
133.8	987.75	--	--	GR/SILT/SG 50/25/25	Grass	BLSL T22
134.5	988.67	--	--	GR/SILT/SG 50/25/25	Grass	BLSL T22 top RB wood stake STA 146.6
Rush Creek Below Silver Lake Cross Section IF23						
0.0	987.03	--	--	75/25 GR/SILT	Grass	BLSL LPT23 top 1/4" rock bolt
1.4	986.18	--	--	75/25 GR/SILT	Grass	BLSL T23
6.7	985.07	--	--	75/25 GR/SILT	Grass	BLSL T23
9.8	984.87	--	--	75/25 GR/SILT	Grass	BLSL T23
15.0	984.60	--	--	SILT/GR 50/50	Grass	BLSL T23

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
20.8	984.66	--	--	SILT/GR 25/75	Grass	BLSL T23
24.3	984.56	--	--	SILT/GR 25/75	Grass	BLSL T23
26.7	984.14	--	--	SILT/GR 25/75	Grass	BLSL T23
27.0	984.13	--	--	SILT/GR 25/75	Grass	BLSL T23
27.6	983.65	--	--	SILT/GR 25/75	Grass	BLSL T23
28.6	982.75	--	--	SILT/GR 25/75	Grass	BLSL T23
29.4	982.43	--	--	SAND/SILT 25/75		BLSL T23
29.4	982.46	0.00	0.00	SAND/SILT 25/75		LEW
30.1	981.86	0.60	0.08	SAND/SILT 25/75		
31.8	980.96	1.50	0.10	SAND/SILT 25/75		
33.5	979.91	2.55	0.32	MG/SILT 50/50		
35.2	979.96	2.50	0.47	MC/MG/SILT 25/50/25		
36.9	979.91	2.55	0.55	MC/MG/SILT 25/50/25		
38.6	979.81	2.65	0.62	MC/MG/SILT 25/50/25		
40.3	979.86	2.60	0.69	LC/MC 50/50		
42.0	979.81	2.65	0.66	MG/SILT 50/50		
43.7	979.56	2.90	0.85	MG/SILT 50/50		
45.4	979.91	2.55	0.82	MG/SILT 50/50		
47.1	980.26	2.20	0.94	MG/SILT 50/50		
48.8	980.36	2.10	1.09	SAND/SILT/SG 25/50/25		
50.5	980.46	2.00	0.99	SAND/SILT/SG 25/50/25		
52.5	980.56	1.90	0.93	SAND/SILT/SG 25/50/25		
53.9	980.71	1.75	0.74	SAND/SILT/SG 25/50/25		
55.6	980.76	1.70	0.60	SAND/SILT/SG 25/50/25		

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
56.3	980.86	1.60	0.51	SAND/SILT/SG 25/50/25		
58.0	980.86	1.60	0.47	SAND/SILT 50/50		
59.7	981.06	1.40	0.33	SAND/SILT 50/50		
61.4	981.26	1.20	0.20	SAND/SILT 50/50		
63.1	981.51	0.95	0.11	SAND/SILT 50/50		
64.8	981.56	0.90	0.07	SAND/SILT 50/50		
66.5	981.61	0.85	0.00	SAND/SILT 50/50		
68.2	981.66	0.80	-0.05	SAND/SILT 50/50		
69.9	982.46	0.00	0.06	GR/SILT 75/25	Grass	GRASS
75.7	982.46	0.00	0.00	GR/SILT 75/25	Grass	BACKWATER SEPARATE PAST THIS REW
78.4	982.16	--	--	GR/SILT 75/25	Grass	BLSL T23
78.6	982.22	--	--	GR/SILT 75/25	Grass	BLSL T23
81.7	982.22	--	--	GR/SILT 75/25	Grass	BLSL T23
84.1	982.18	--	--	GR/SILT 75/25	Grass	BLSL T23
86.1	982.26	--	--	GR/SILT 75/25	Grass	BLSL T23
87.3	982.12	--	--	GR/SILT 75/25	Grass	BLSL T23
89.4	982.07	--	--	GR/SILT 75/25	Grass	BLSL T23
92.7	982.10	--	--	GR/SILT 75/25	Grass	BLSL T23
95.8	982.31	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
98.8	982.38	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
100.7	982.38	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
101.9	982.50	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
106.7	982.79	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23

Station (ft)	Bed Elevation (ft)	Depth (ft)	Velocity Measured (ft/s)	Sub	Vegetation	Notes
111.5	983.55	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
114.4	983.44	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL T23
115.5	983.77	--	--	WIL/SILT/GR 50/25/25	Willow	BLSL RPT23 bott pin

Key: ADP (ADCP) = Acoustic Doppler Profiler or Acoustic Doppler Current Profiler
BF = bank full
BLSL = below Silver Lake
BOTT = bottom
DS = downstream
GR = grass
GRND = ground
LB = left bank
LBP = left bank pin
LEW = left edge of water
LG = large gravel
LP = left pin
LPT = left pin transect
MC = medium cobble
MG = medium gravel
MG = medium gravel
RB = right bank
REW = right edge of water
SG = small gravel
STA = station
SZF = stage of zero flow
TOB = top of bank
TOPO = topographic survey point
TW = thalweg
US = upstream
WD = woody debris
WIL= willow
XS = cross section

APPENDIX D

Field Data Rush Creek 2-D Sites

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INTRODUCTION

The following figures show the field data collected at the 2-D sites. Figures AQ 1-D1 and AQ 1-D2 are the mapped topography for Above Silver Lake and South Rush Creek. Figures AQ 1-D3 and AQ 1-D4 show the measured water surface elevations for Above Silver Lake and South Rush Creek. Figures AQ 1-D5 and AQ 1-D6 show the mapped substrate and vegetation for Above Silver Lake and South Rush Creek.

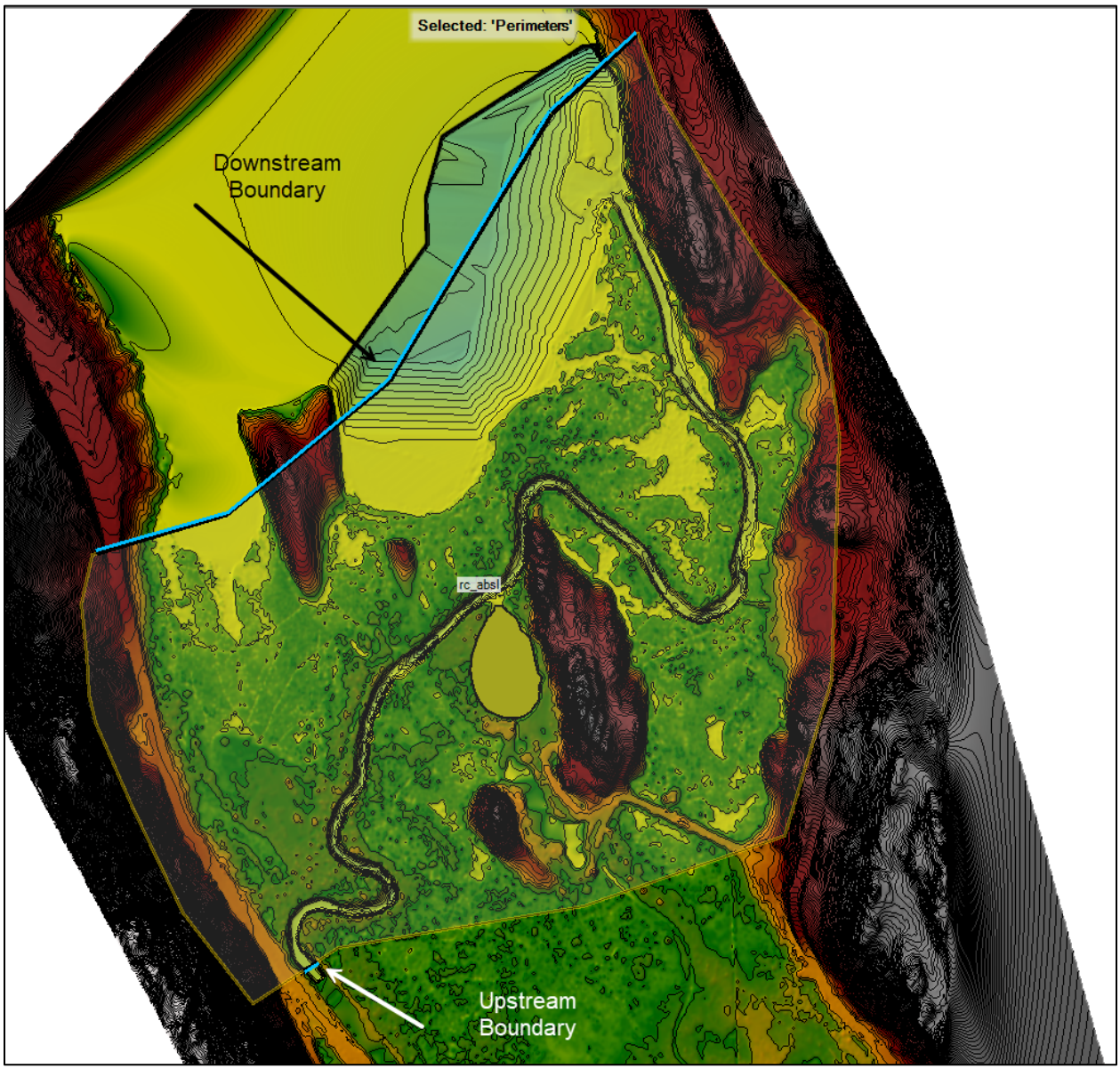

Figure AQ 1-D1. Mapped Topography for Rush Creek above Silver Lake

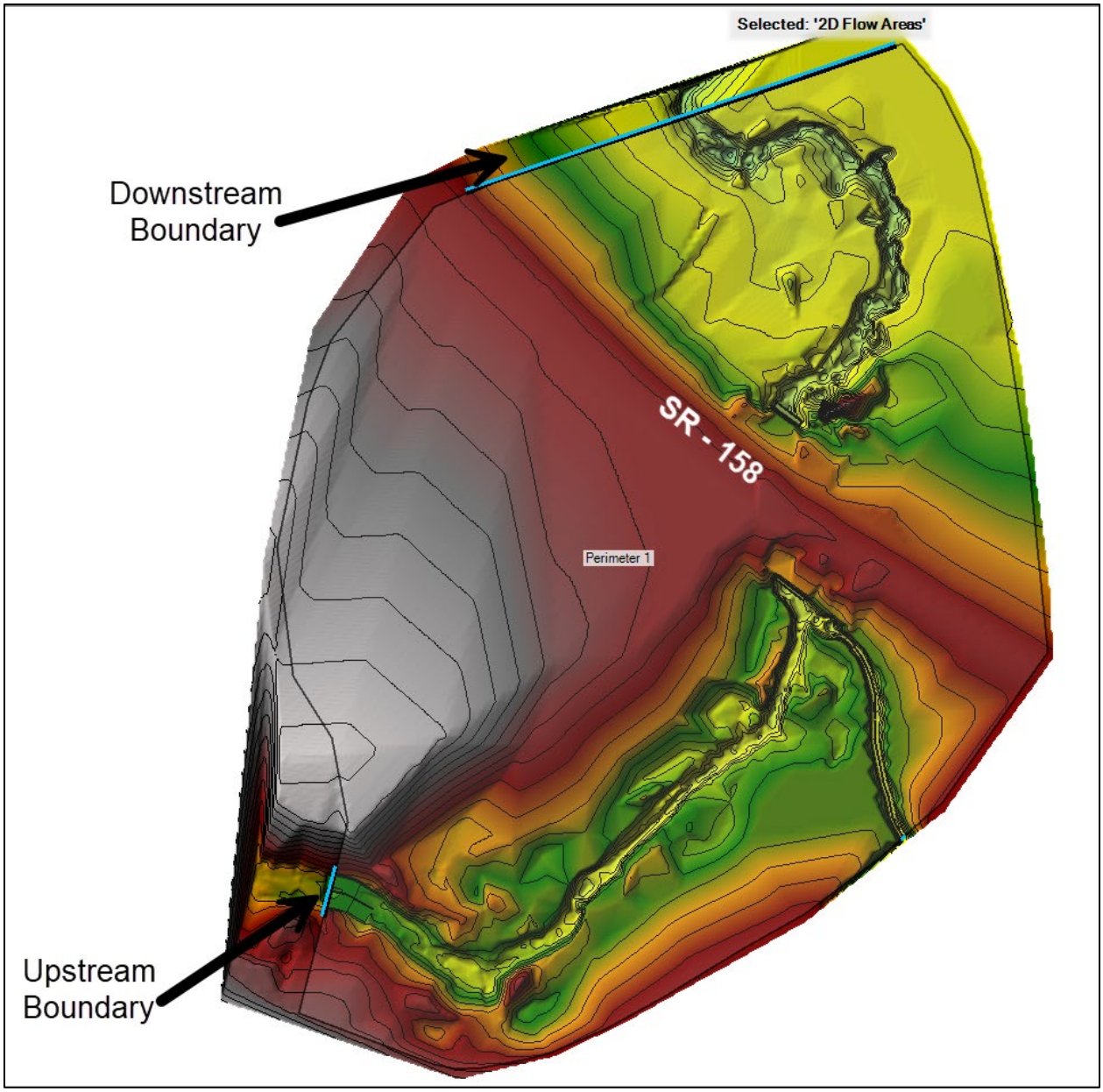

Figure AQ 1-D2. Mapped Topography for South Rush Creek

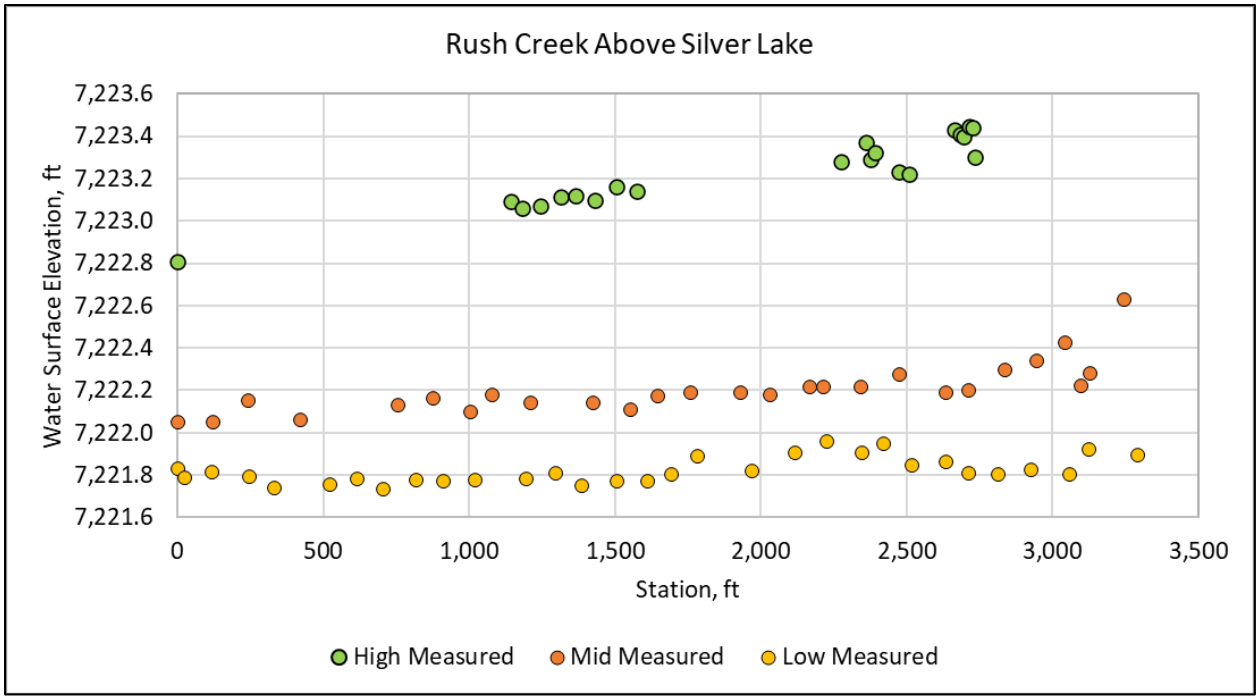

Figure AQ 1-D3. Measured Water Surface Elevation for Rush Creek above Silver Lake

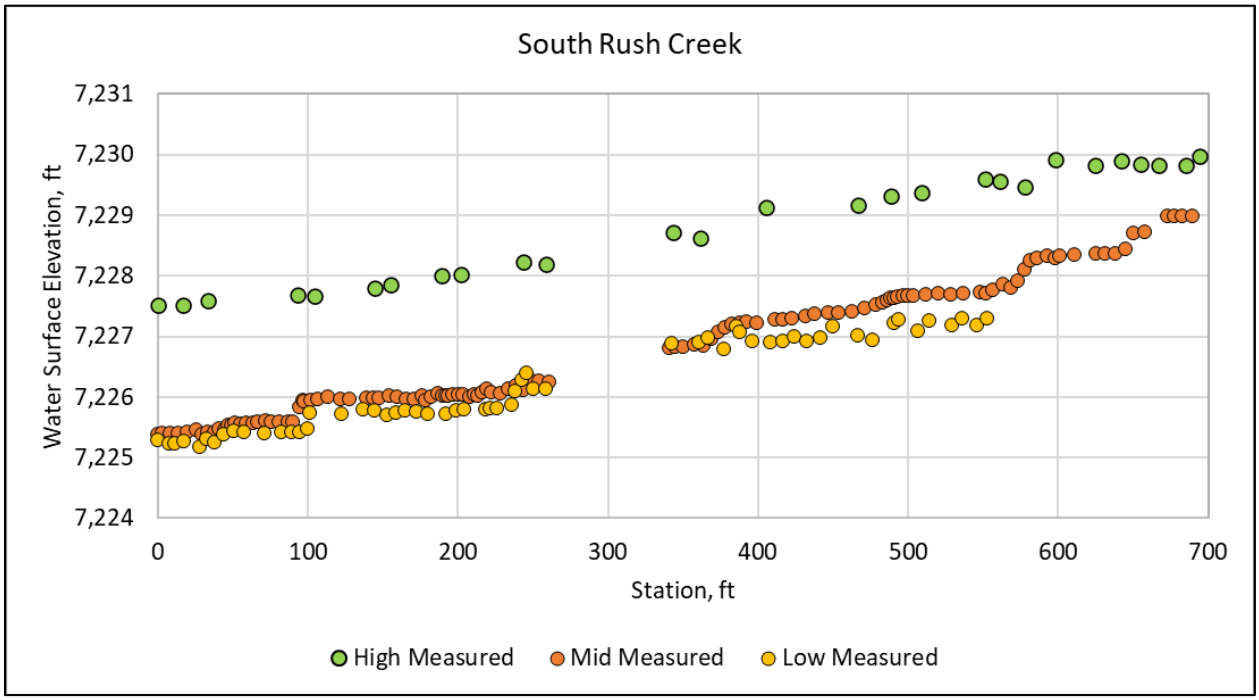

Figure AQ 1-D4. Measured Water Surface Elevation for South Rush Creek.

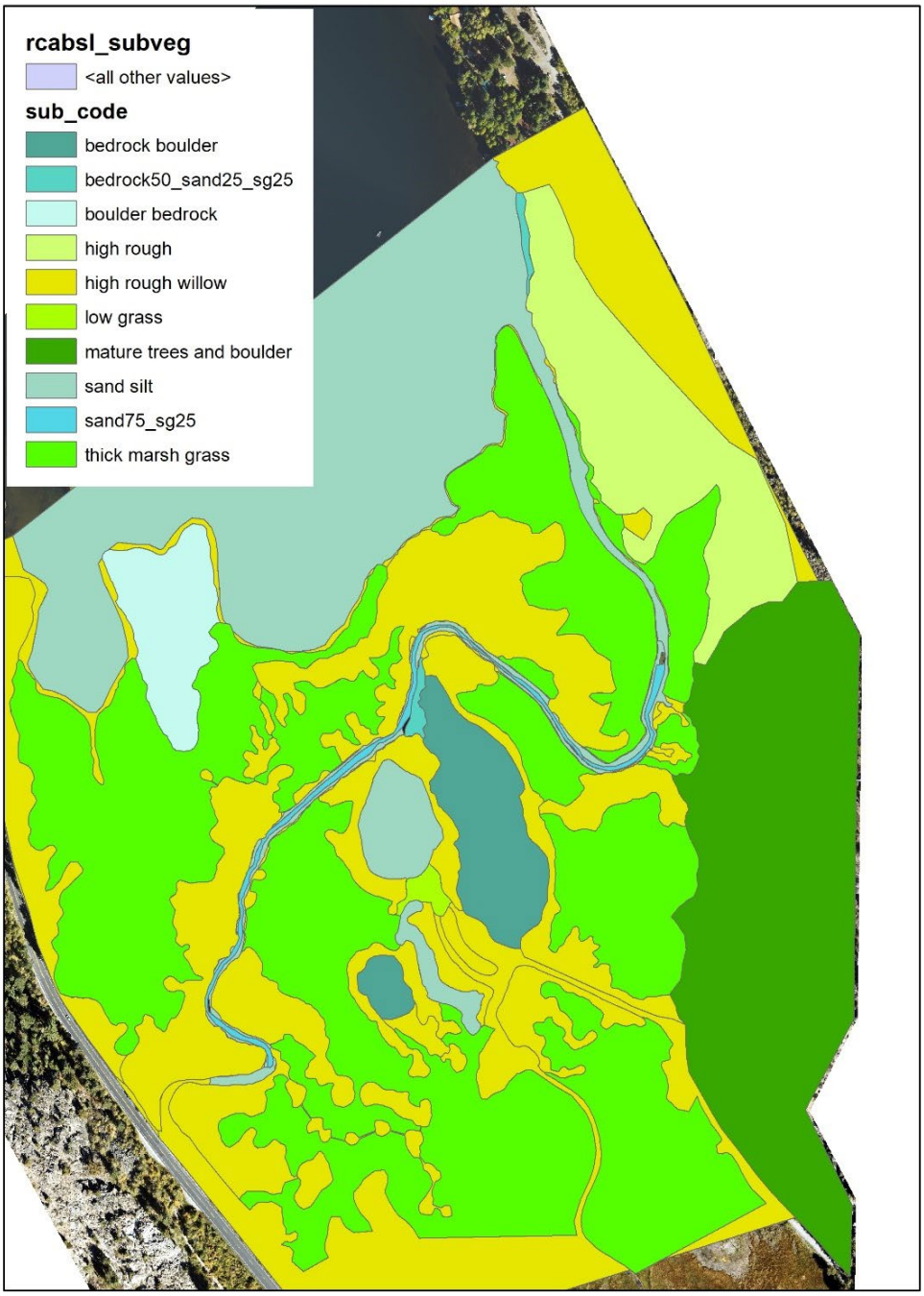

Figure AQ 1-D5. Mapped Substrate and Vegetation Polygons for Rush Creek above Silver Lake

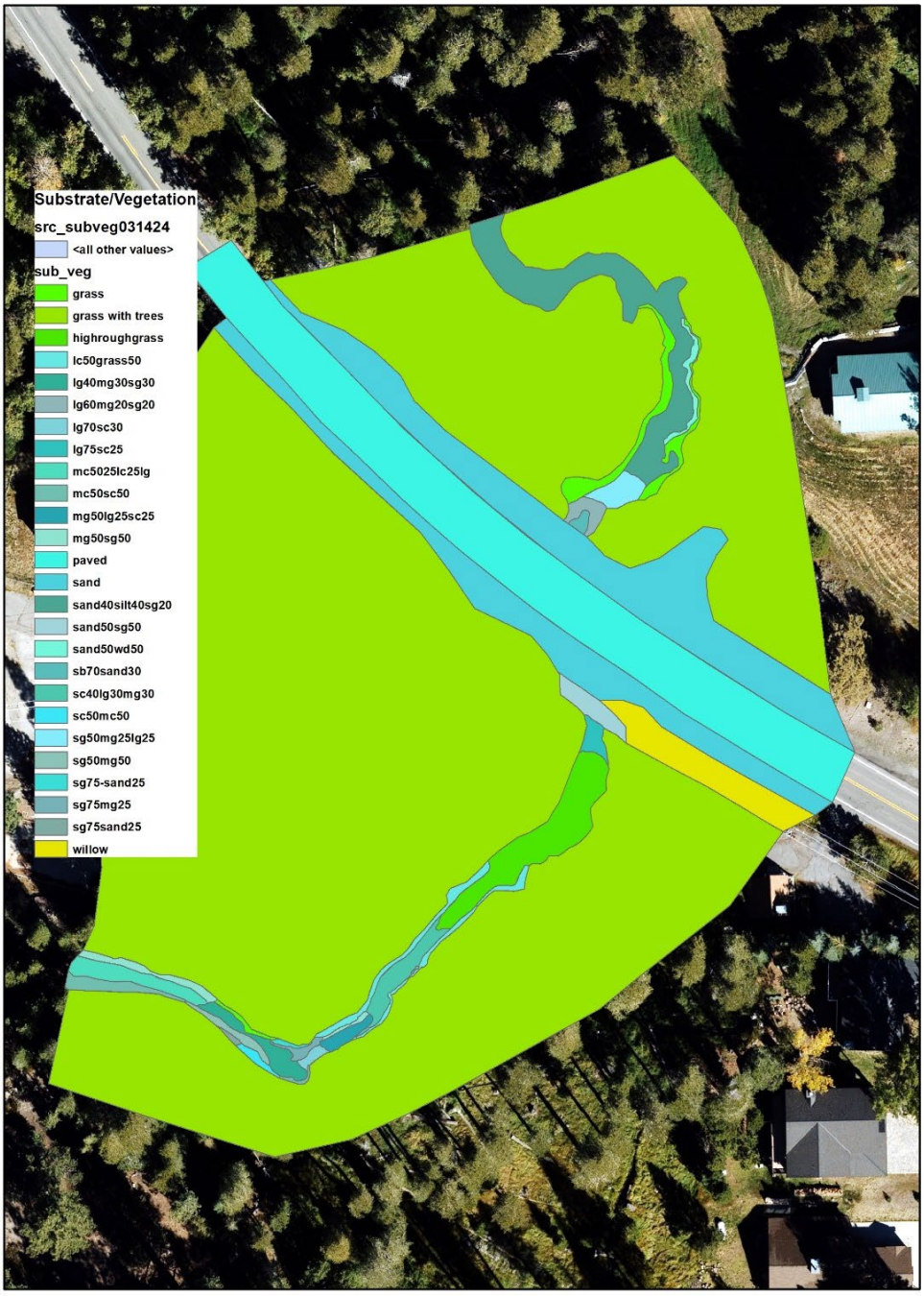

Figure AQ 1-D6. Mapped Substrate and Vegetation Polygons for South Rush Creek

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APPENDIX E

Rating Curves (Rush Creek below Gem Dam to Reverse Creek)

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INTRODUCTION

The following Table AQ 1-E1 and Figures AQ 1-E1 through AQ 1-E3 show the rating curves for the cross sections that were survey together as a group. Plotting on the same graph will highlight any issues with the rating curves themselves, they should not cross and upstream cross sections should not be lower than downstream cross sections. Figures AQ 1-E4 through AQ 1-E18 show each individual rating curve.

Table AQ 1-E1. Below Gem Dam Rating Curves Coefficient and Stage of Zero Flow

Rating Curves below Gem Dam[1]			
Transect	**a**	**b**	**szf**
Rush Creek below Gem Dam IF1	0.851644	0.334567	7222.4
Rush Creek below Gem Dam IF2	0.818836	0.340978	7222.45
Rush Creek below Gem Dam IF3	0.624718	0.370809	7223
Rush Creek below Gem Dam IF4	0.347993	0.503876	7223.448
Rush Creek below Gem Dam IF5	0.662537	0.225514	7224.523
Rush Creek below Gem Dam IF6	0.459489	0.32986	7225.403
Rush Creek below Gem Dam IF7	0.849886	0.237002	7225.453
Rush Creek below Gem Dam IF8	0.55671	0.317596	7225.968
Rush Creek below Gem Dam IF9	0.37787	0.310787	990.545
Rush Creek below Gem Dam IF10	0.728776	0.209316	991.965
Rush Creek below Gem Dam IF11	1.203422	0.183701	986.74
Rush Creek below Gem Dam IF12	0.416945	0.34273	987.725
Rush Creek below Gem Dam IFCT1	1.074444	0.240118	989.07
Rush Creek below Gem Dam IF13	0.874416	0.258681	989.47
Rush Creek below Gem Dam IF14	0.946026	0.261269	989.47

[1] Stage=aQ^b +szf; Q=discharge; szf=stage of zero flow

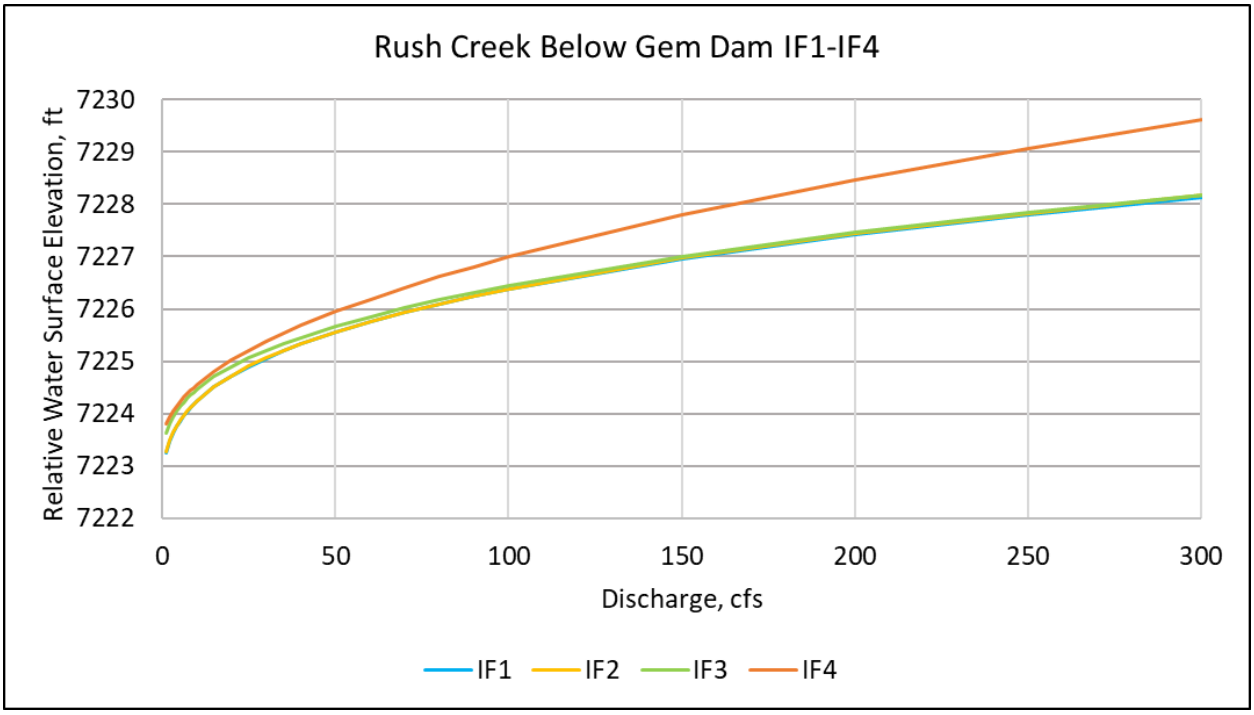

Figure AQ 1-E1. Rating Curves for Rush Creek below Gem Dam Cross Sections IF1 through IF4

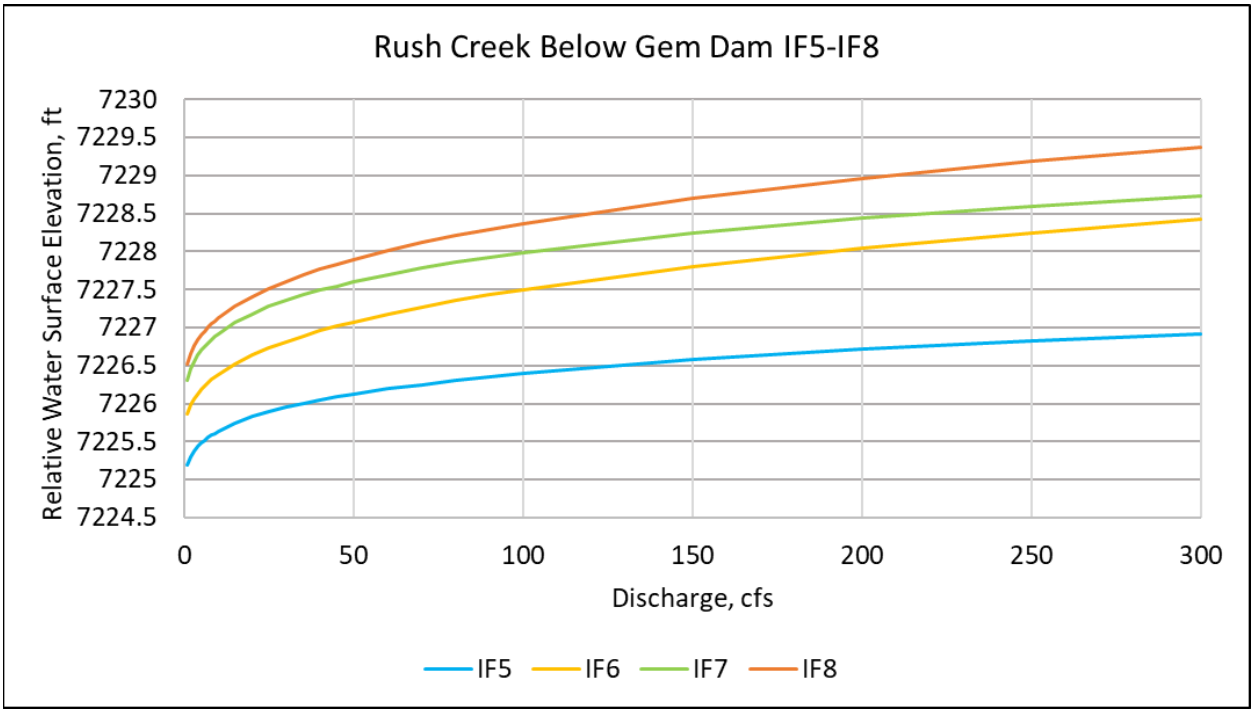

Figure AQ 1-E2. Rating Curves for Rush Creek below Gem Dam Cross Sections IF5 through IF8

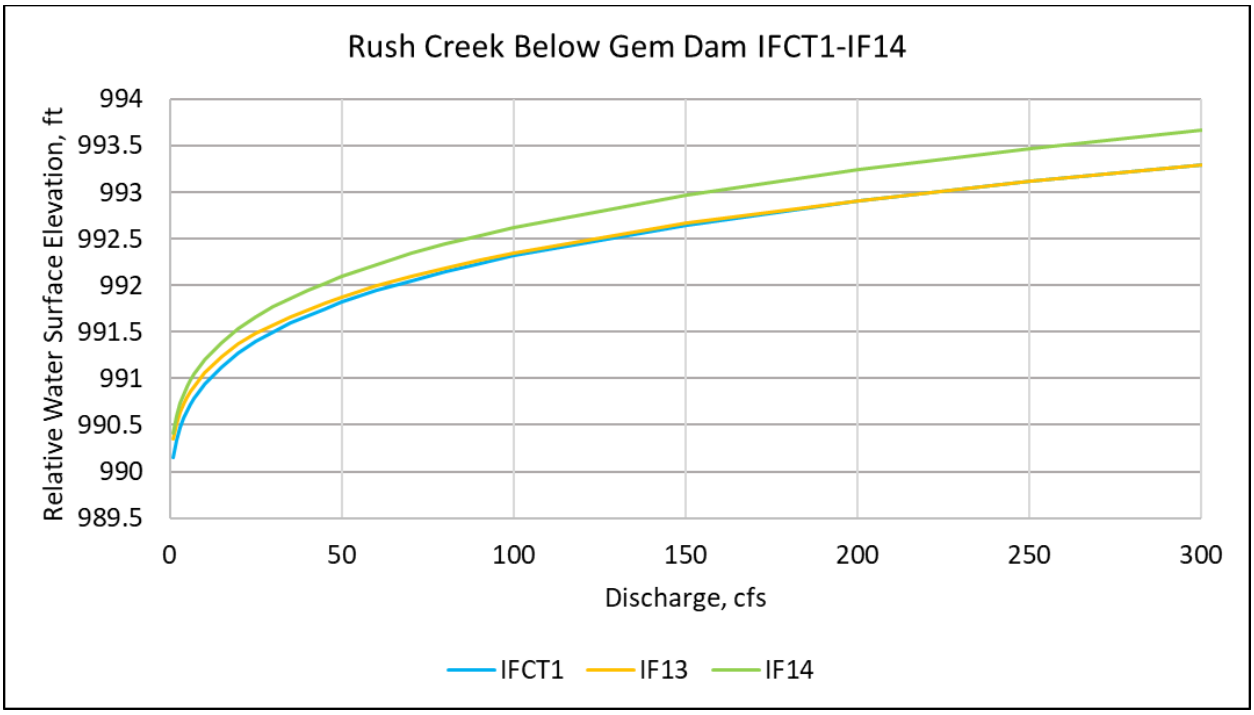

Figure AQ 1-E3. Rating Curves for Rush Creek below Gem Dam Cross Sections IFCT1 through IF14

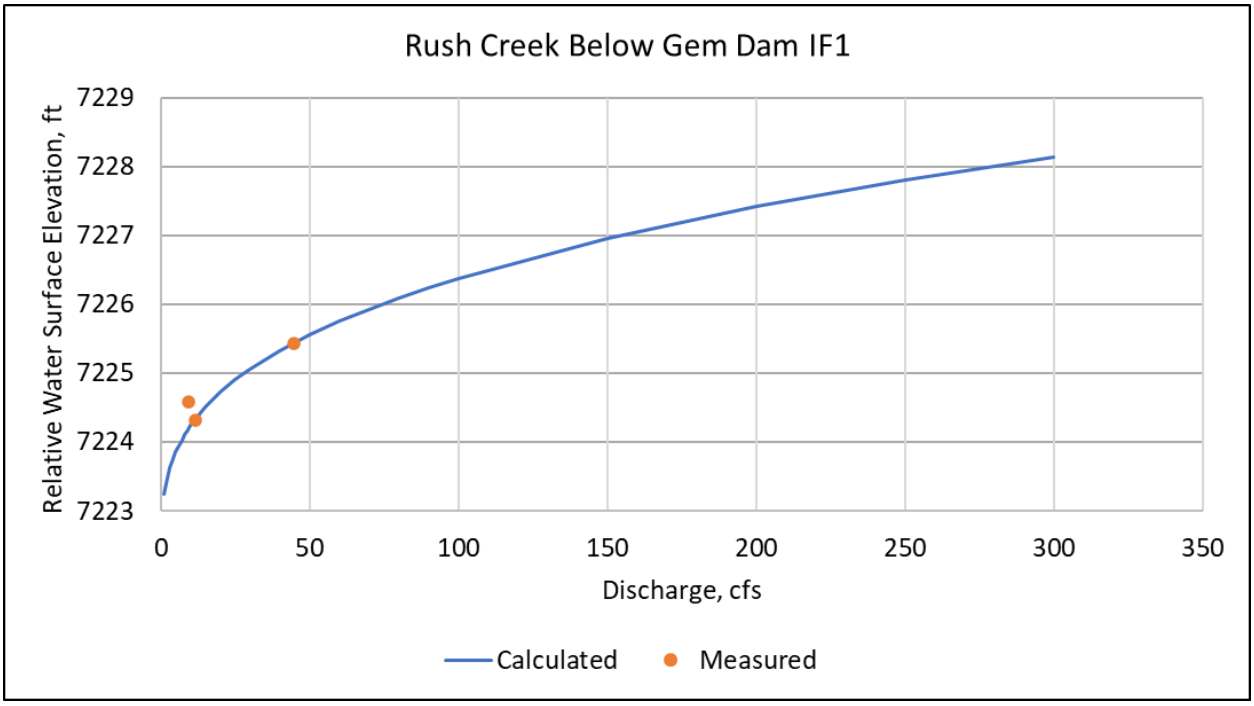

Figure AQ 1-E4. Rating Curves for Rush Creek below Gem Dam Cross Sections IF1

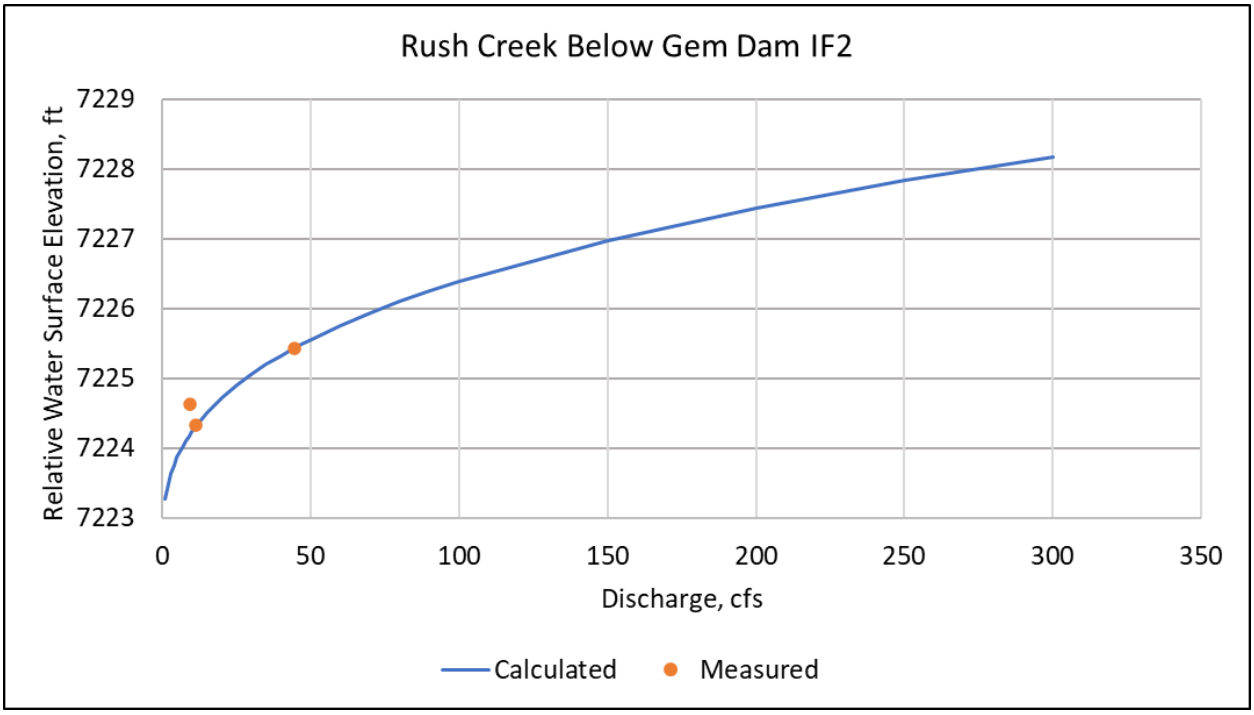

Figure AQ 1-E5. Rating Curves for Rush Creek below Gem Dam Cross Sections IF2

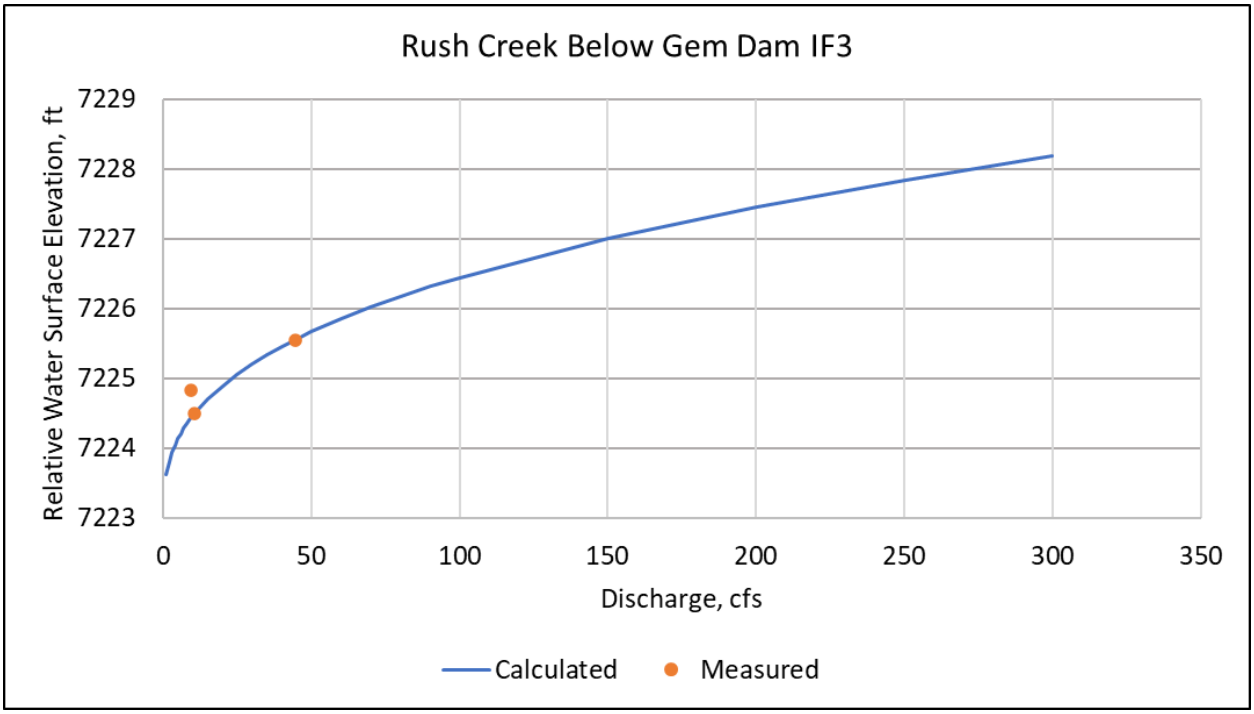

Figure AQ 1-E6. Rating Curves for Rush Creek below Gem Dam Cross Sections IF3

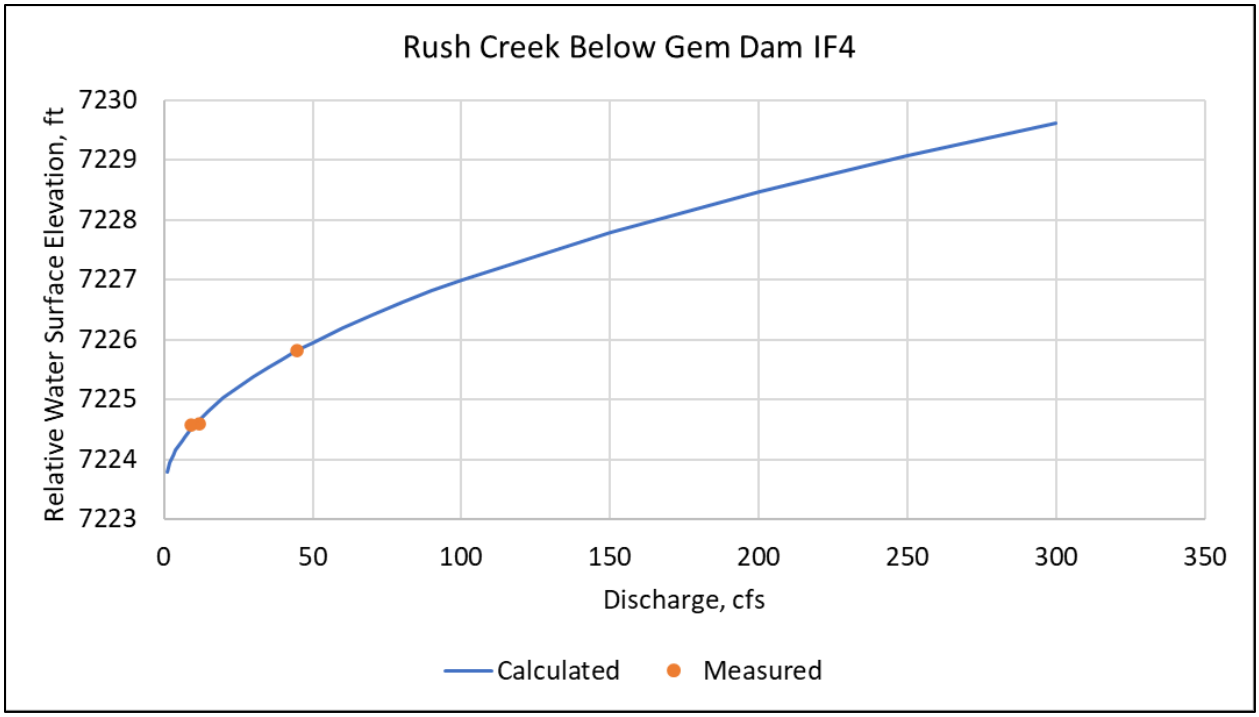

Figure AQ 1-E7. Rating Curves for Rush Creek below Gem Dam Cross Sections IF4

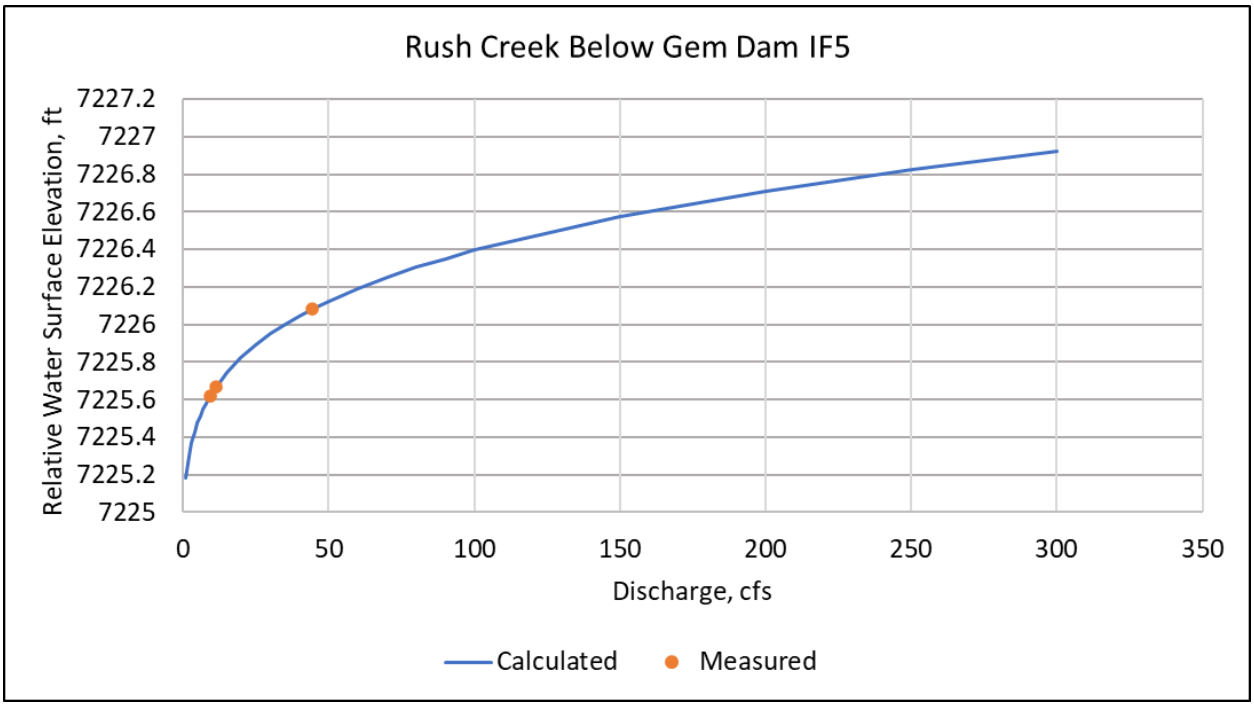

Figure AQ 1-E8. Rating Curves for Rush Creek below Gem Dam Cross Sections IF5

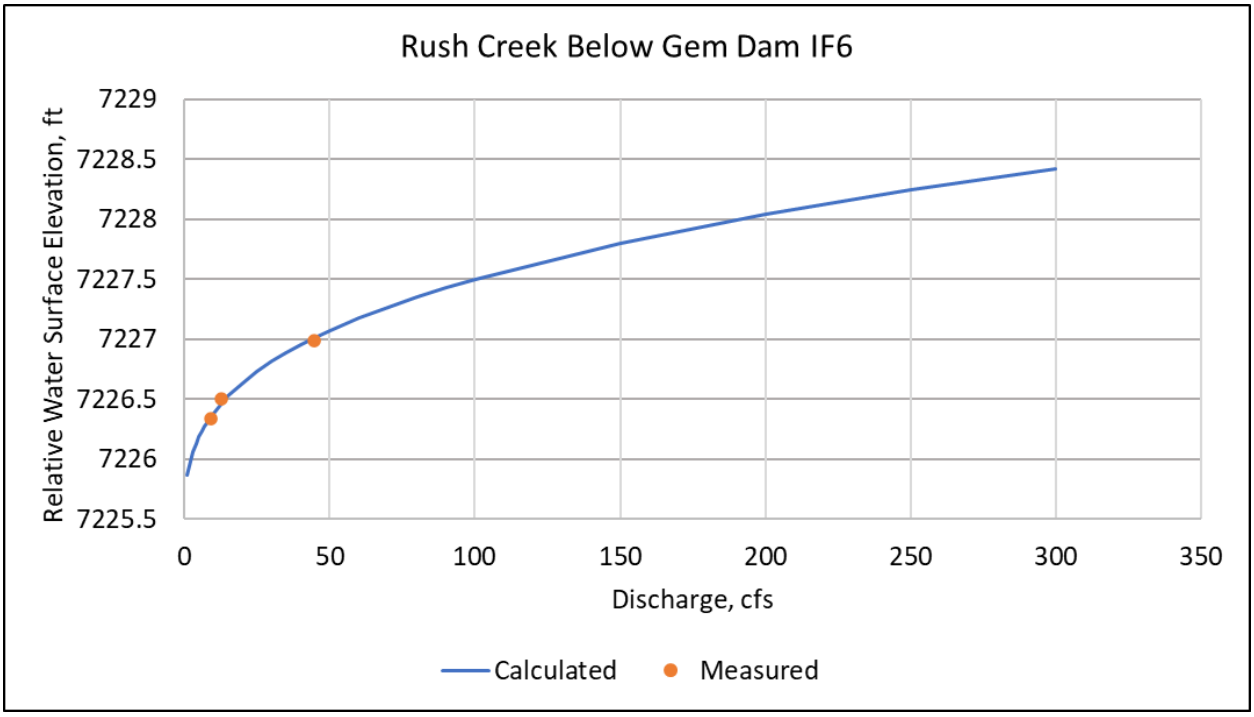

Figure AQ 1-E9. Rating Curves for Rush Creek below Gem Dam Cross Sections IF6

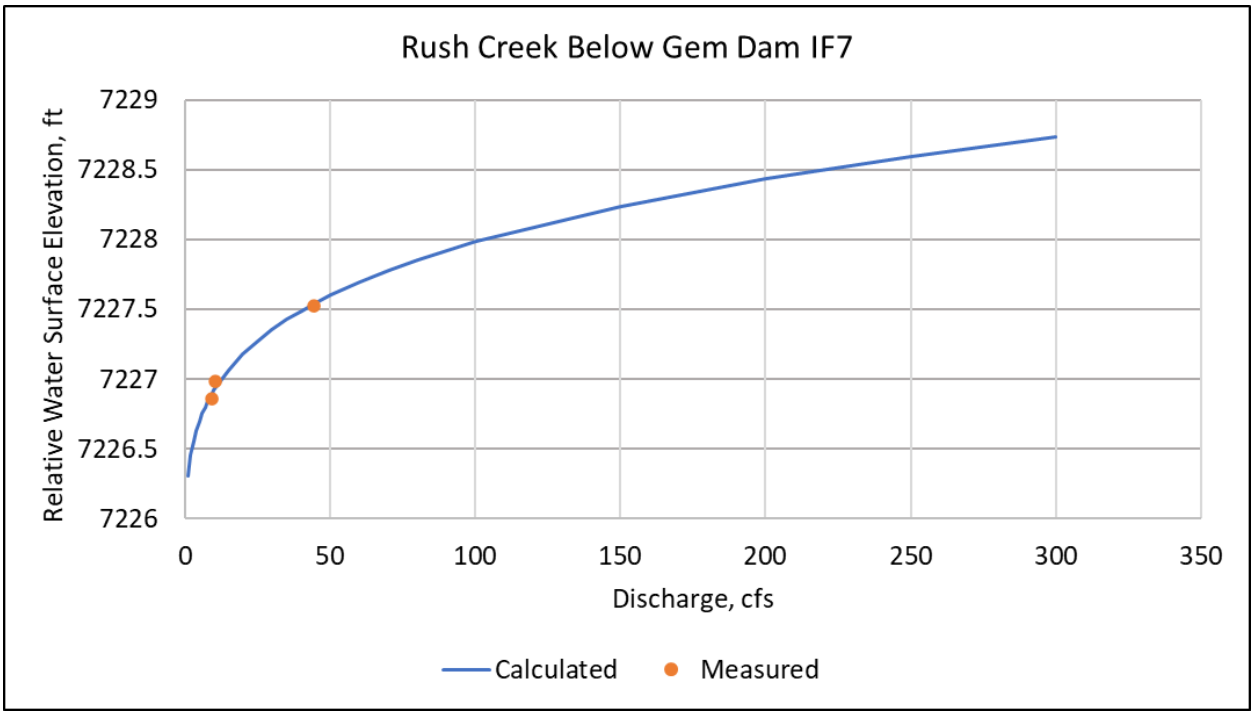

Figure AQ 1-E10. Rating Curves for Rush Creek below Gem Dam Cross Sections IF7

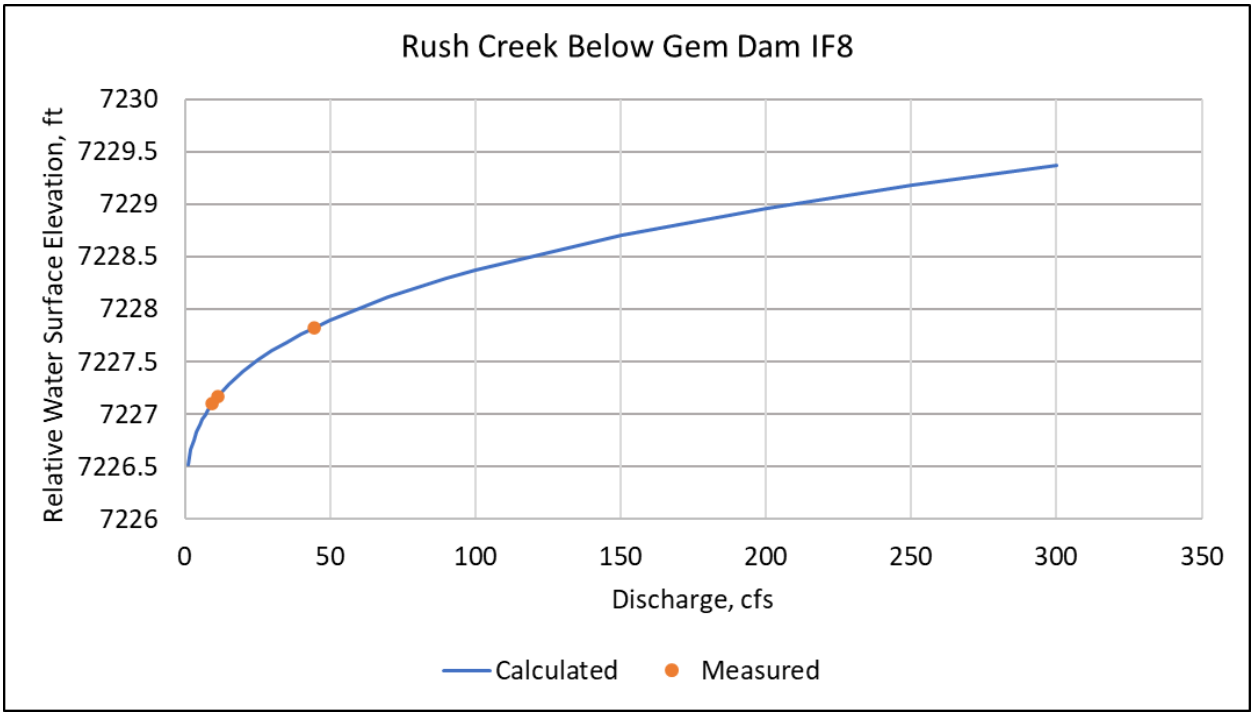

Figure AQ 1-E11. Rating Curves for Rush Creek below Gem Dam Cross Sections IF8

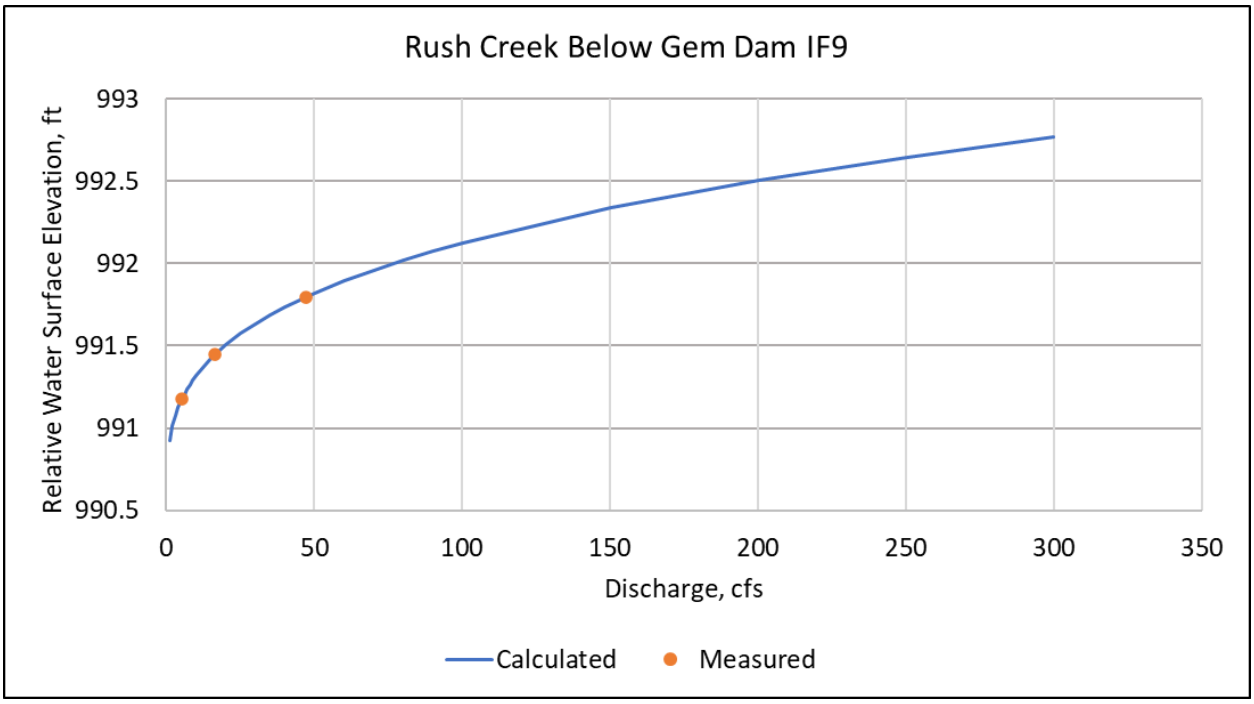

Figure AQ 1-E12. Rating Curves for Rush Creek below Gem Dam Cross Sections IF9

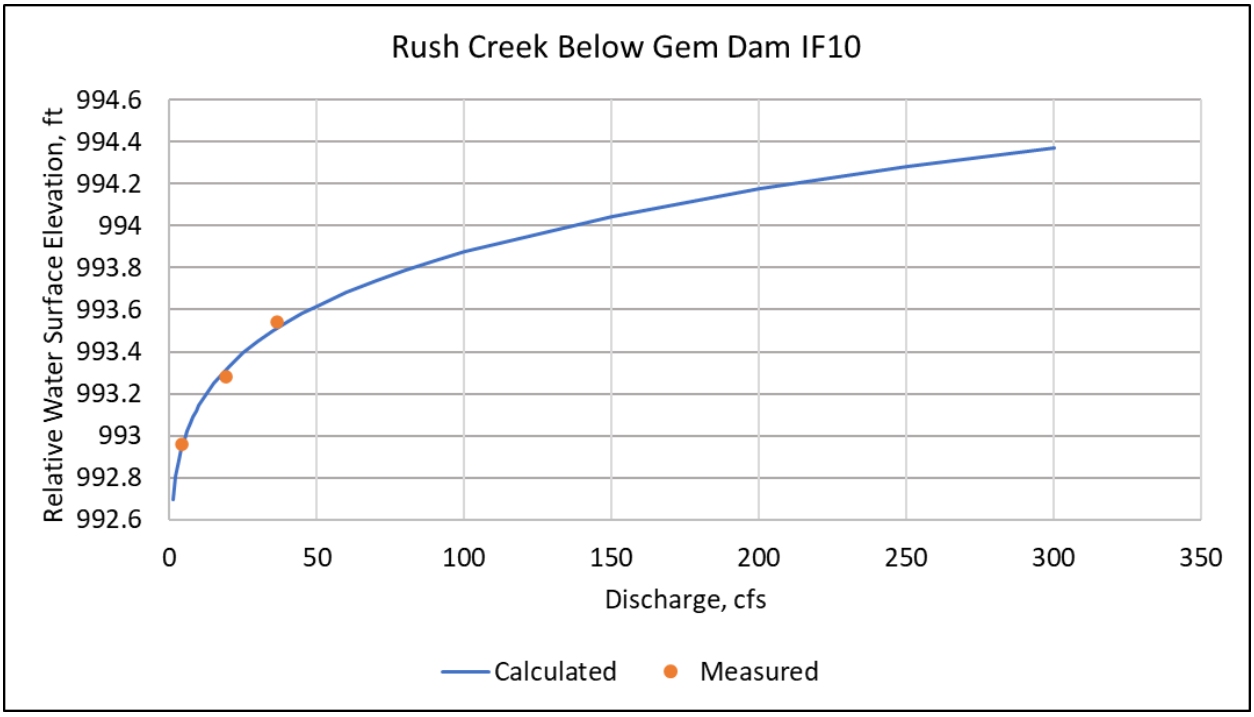

Figure AQ 1-E13. Rating Curves for Rush Creek below Gem Dam Cross Sections IF10

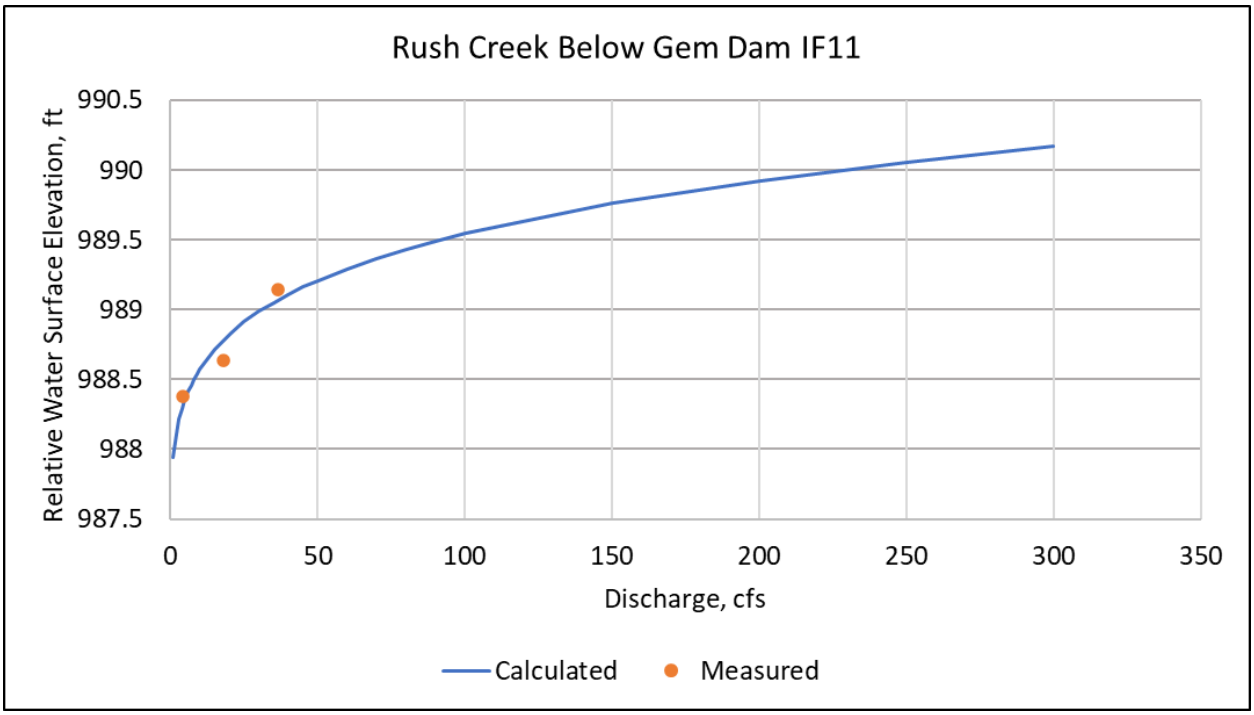

Figure AQ 1-E14. Rating Curves for Rush Creek below Gem Dam Cross Sections IF11

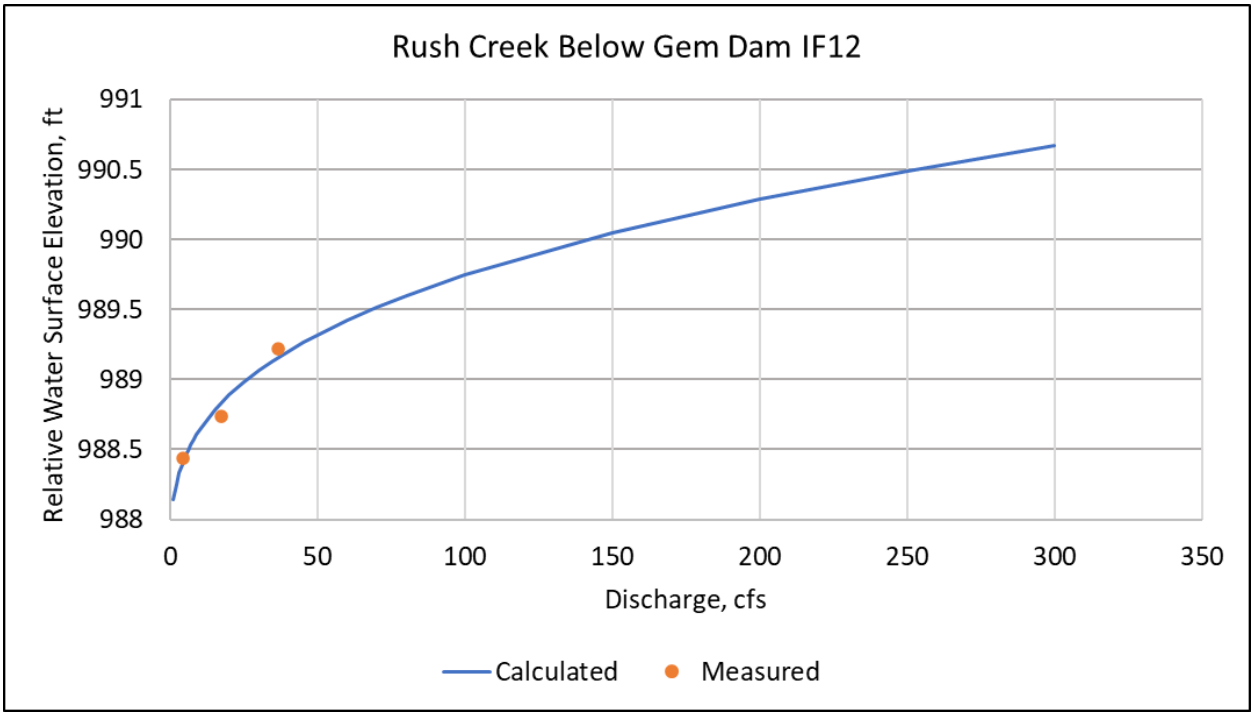

Figure AQ 1-E15. Rating Curves for Rush Creek below Gem Dam Cross Sections IF12

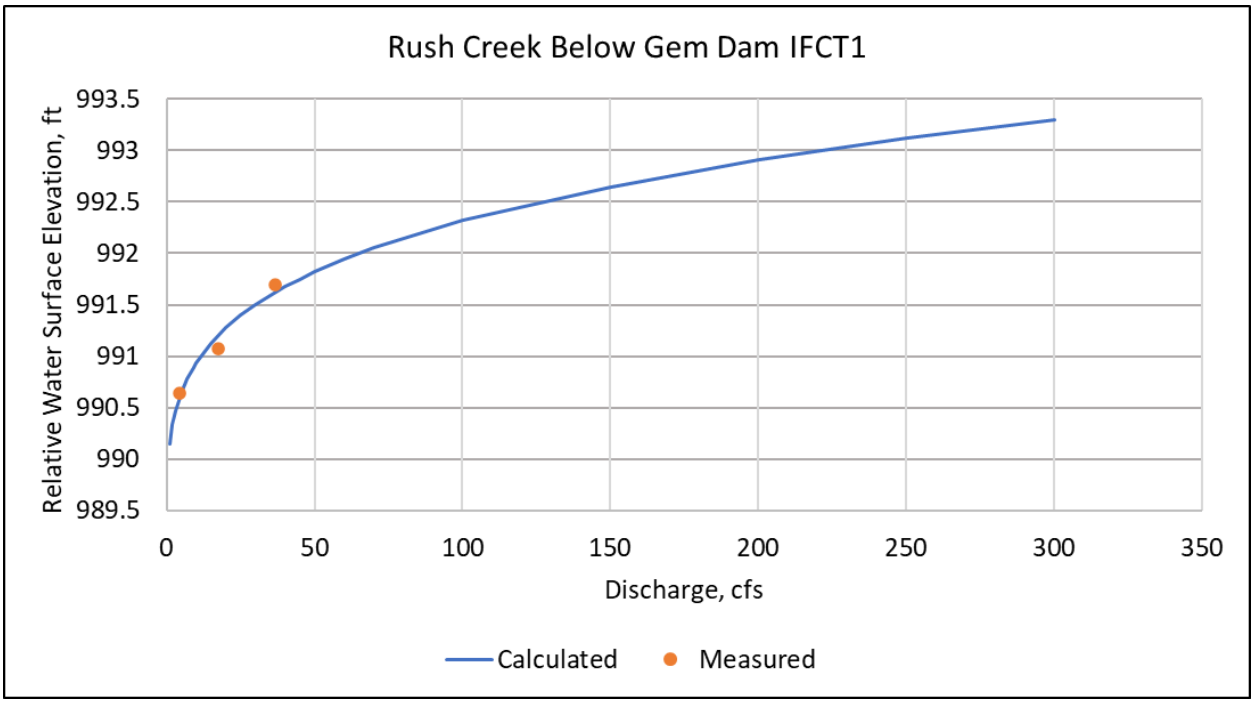

Figure AQ 1-E16. Rating Curves for Rush Creek below Gem Dam Cross Sections IFCT1

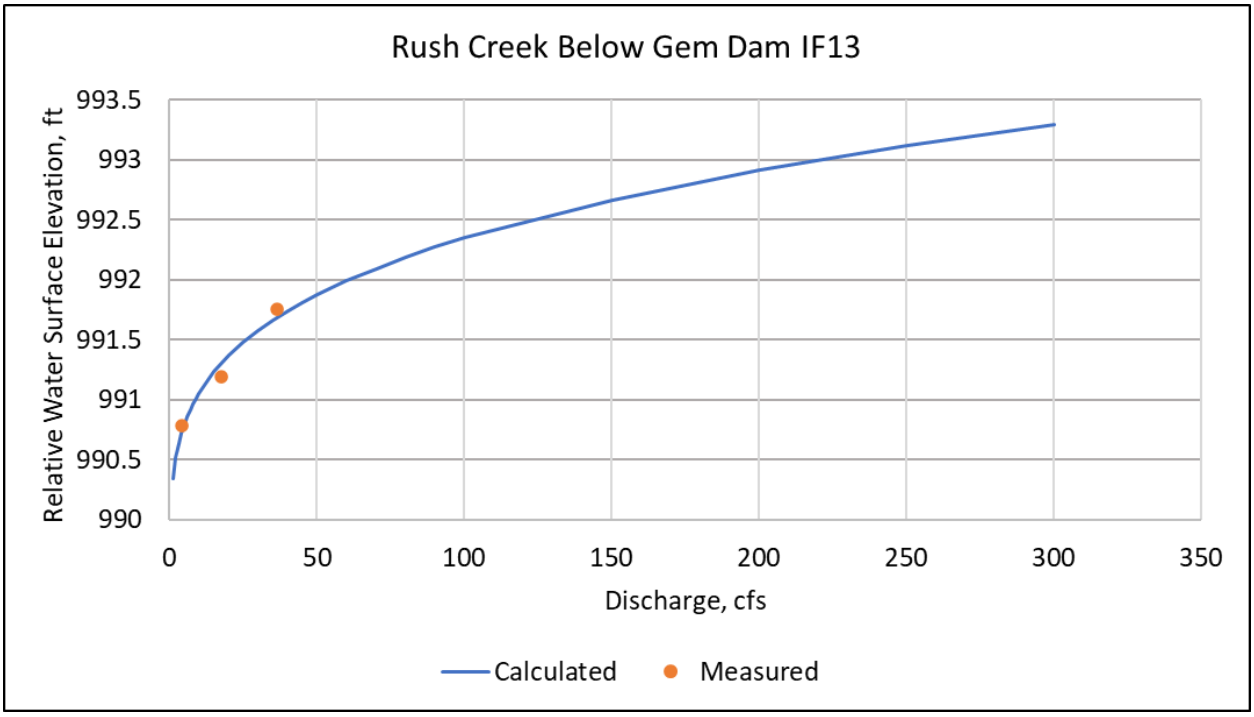

Figure AQ 1-E17. Rating Curves for Rush Creek below Gem Dam Cross Sections IF13

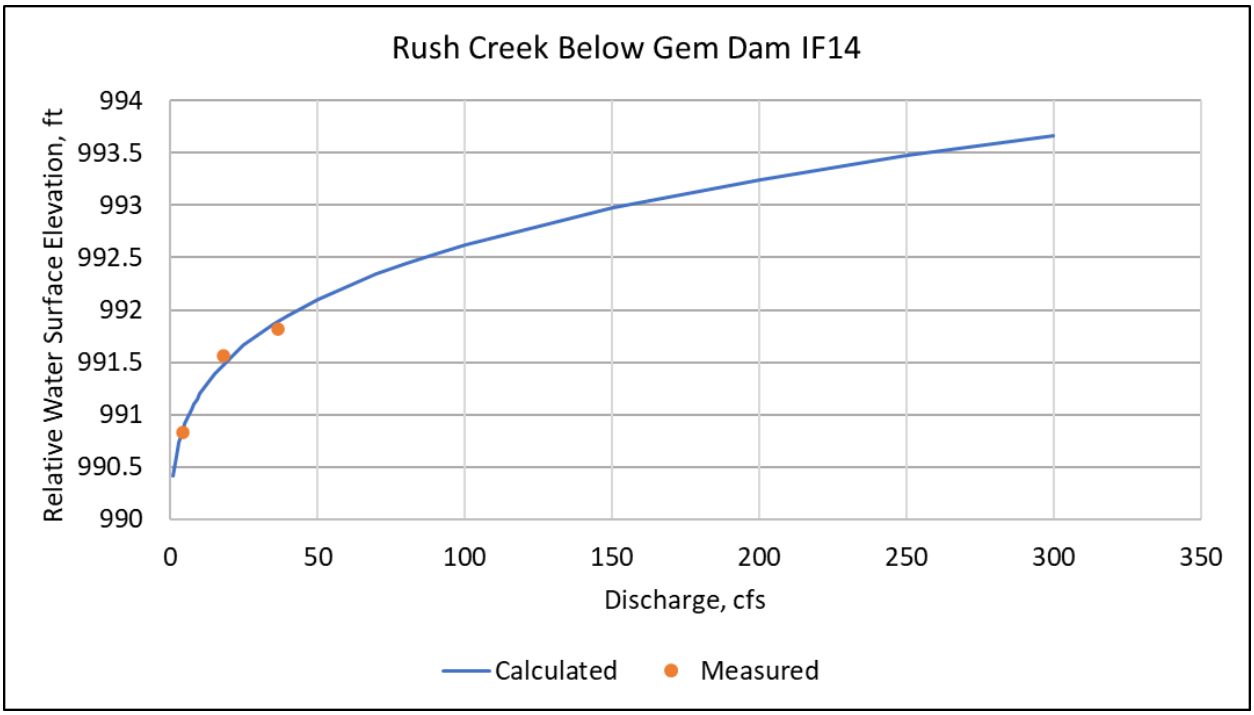

Figure AQ 1-E18. Rating Curves for Rush Creek below Gem Dam Cross Sections IF14

APPENDIX F

Rating Curves (Rush Creek below Silver Lake)

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INTRODUCTION

The following Table AQ 1-F1 and Figures AQ 1-E1 through AQ 1-F7 show the rating curves for the cross sections that were survey together as a group. Plotting on the same graph will highlight any issues with the rating curves themselves, they should not cross and upstream cross sections should not be lower than downstream cross sections. Figures AQ 1-F8 through AQ 1-F34 show each individual rating curve.

Table AQ 1-F1. Below Silver Lake Rating Curves Coefficient and Stage of Zero Flow

Rating Curves below Silver Lake			
Transect	**a**	**b**	**szf**
Rush Creek below Silver Lake IF1	0.011917	0.867461	997.8551
Rush Creek below Silver Lake IFCT1	0.007336	0.948813	998.4179
Rush Creek below Silver Lake IF2	0.015625	0.830698	998.4179
Rush Creek below Silver Lake IF3	0.013655	0.85455	998.4849
Rush Creek below Silver Lake IF4	0.017562	0.825213	1993.207
Rush Creek below Silver Lake IF5	0.057556	0.649111	1993.303
Rush Creek below Silver Lake IF6	0.244796	0.395504	6993.95
Rush Creek below Silver Lake IF7	0.214246	0.440054	6994.827
Rush Creek below Silver Lake IF8	0.227249	0.42406	6995.302
Rush Creek below Silver Lake IFCT2	0.027195	0.77074	6996.016
Rush Creek below Silver Lake IF9	0.021493	0.811904	6996.057
Rush Creek below Silver Lake IF10	0.019427	0.825645	6996.107
Rush Creek below Silver Lake IFCT3	0.119038	0.556603	7987.078
Rush Creek below Silver Lake IF11	0.139265	0.531502	7987.139
Rush Creek below Silver Lake IF12	0.139644	0.532035	7987.139
Rush Creek below Silver Lake IF13	0.366256	0.356271	8982.07
Rush Creek below Silver Lake IF14	0.463571	0.337288	8982.2
Rush Creek below Silver Lake IF15	0.641615	0.304753	1977.789
Rush Creek below Silver Lake IF16	0.268535	0.435551	1978.434
Rush Creek below Silver Lake IF17	0.008714	0.922482	979.6801
Rush Creek below Silver Lake IF18	0.067988	0.61782	979.7707
Rush Creek below Silver Lake IF19	0.096445	0.563869	979.8662
Rush Creek below Silver Lake IF20	0.042048	0.693912	980.5242
Rush Creek below Silver Lake IF21	0.057648	0.635736	980.8721
Rush Creek below Silver Lake IFCT4	0.076361	0.569254	981.627
Rush Creek below Silver Lake IF22	0.048305	0.663345	981.7993
Rush Creek below Silver Lake IF23	0.060043	0.639542	981.7993

Stage=aQ^b +szf; Q=discharge; szf=stage of zero flow

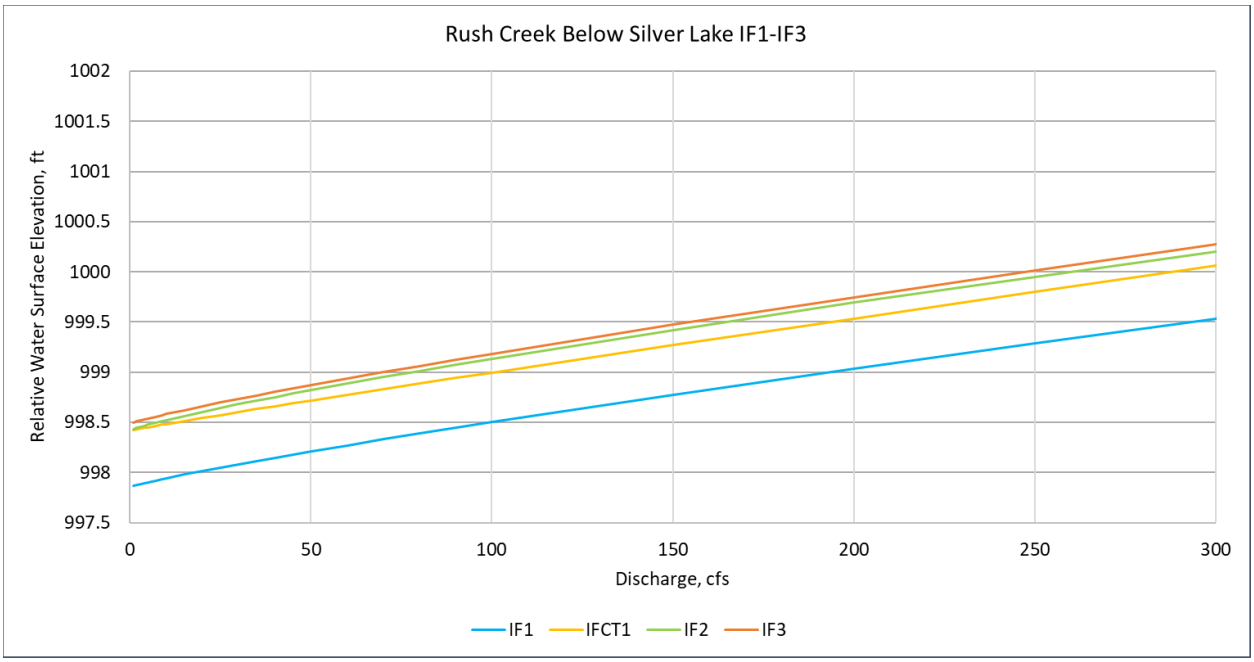

Figure AQ 1-F1. Rating Curves for Rush Creek below Silver Lake Cross Sections IF1 through IF3

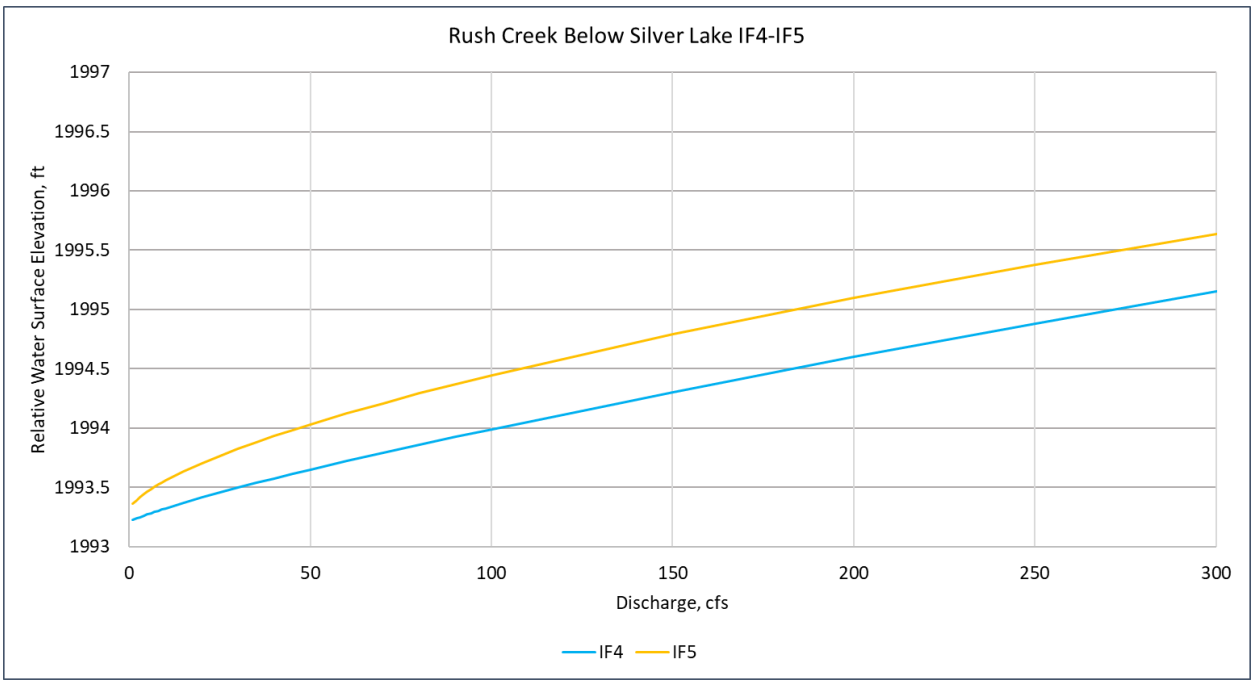

Figure AQ 1-F2. Rating Curves for Rush Creek below Silver Lake Cross Sections IF4 through IF5

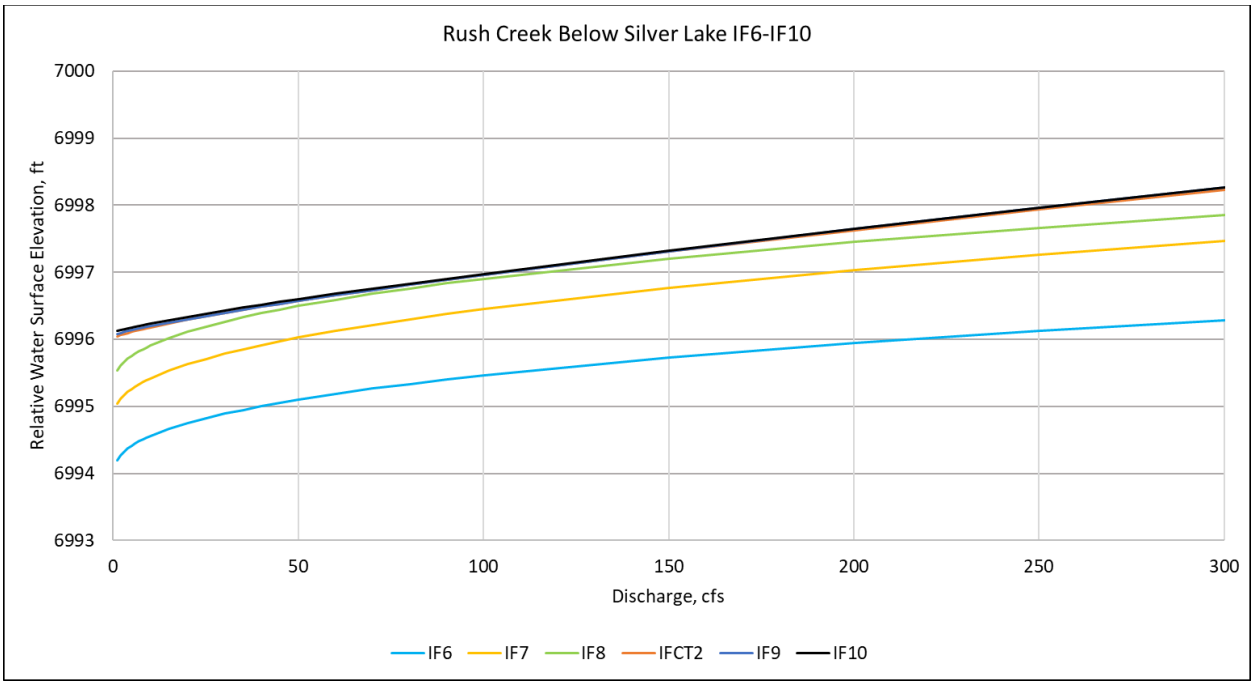

Figure AQ 1-F3. Rating Curves for Rush Creek below Silver Lake Cross Sections IF6 through IF10

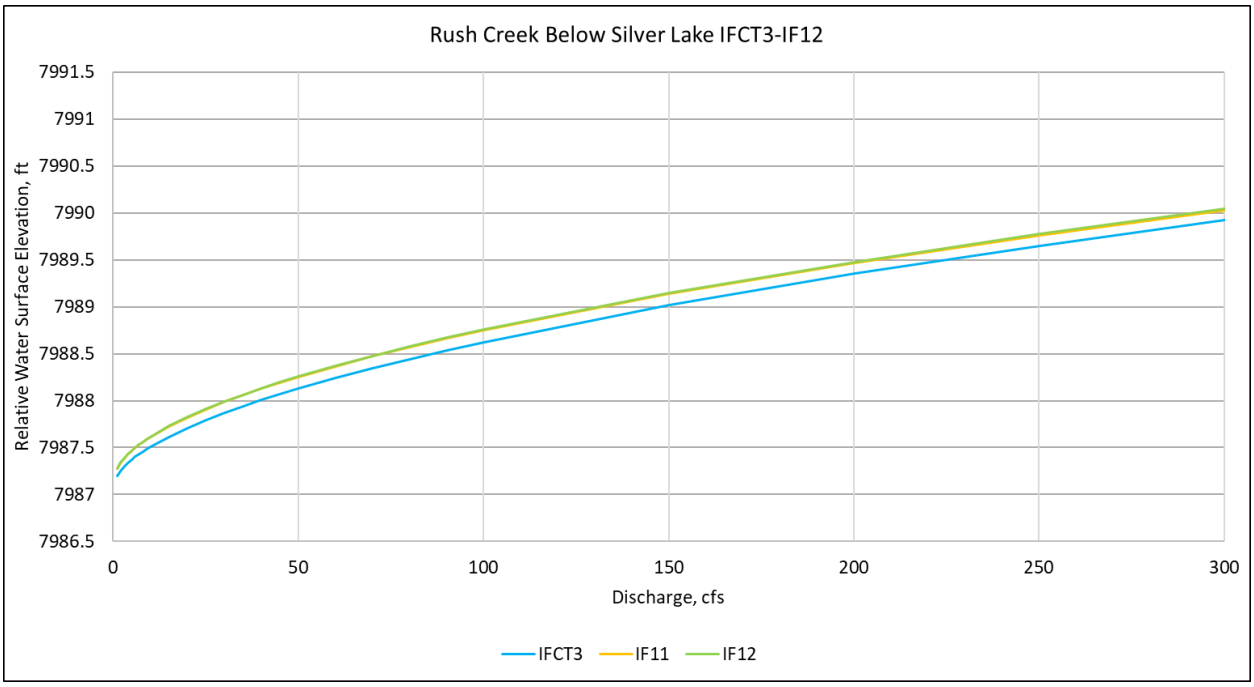

Figure AQ 1-F4. Rating Curves for Rush Creek below Silver Lake Cross Sections IFCT3 through IF12

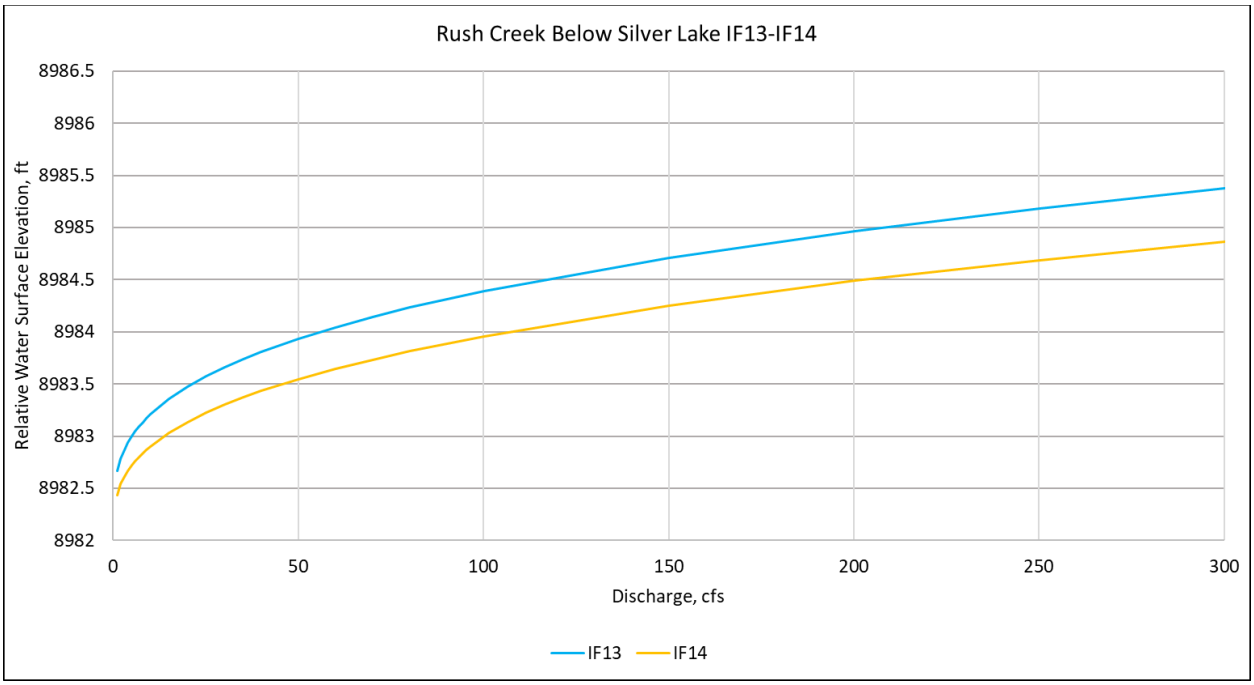

Figure AQ 1-F5. Rating Curves for Rush Creek below Silver Lake Cross Sections IF13 through IF14

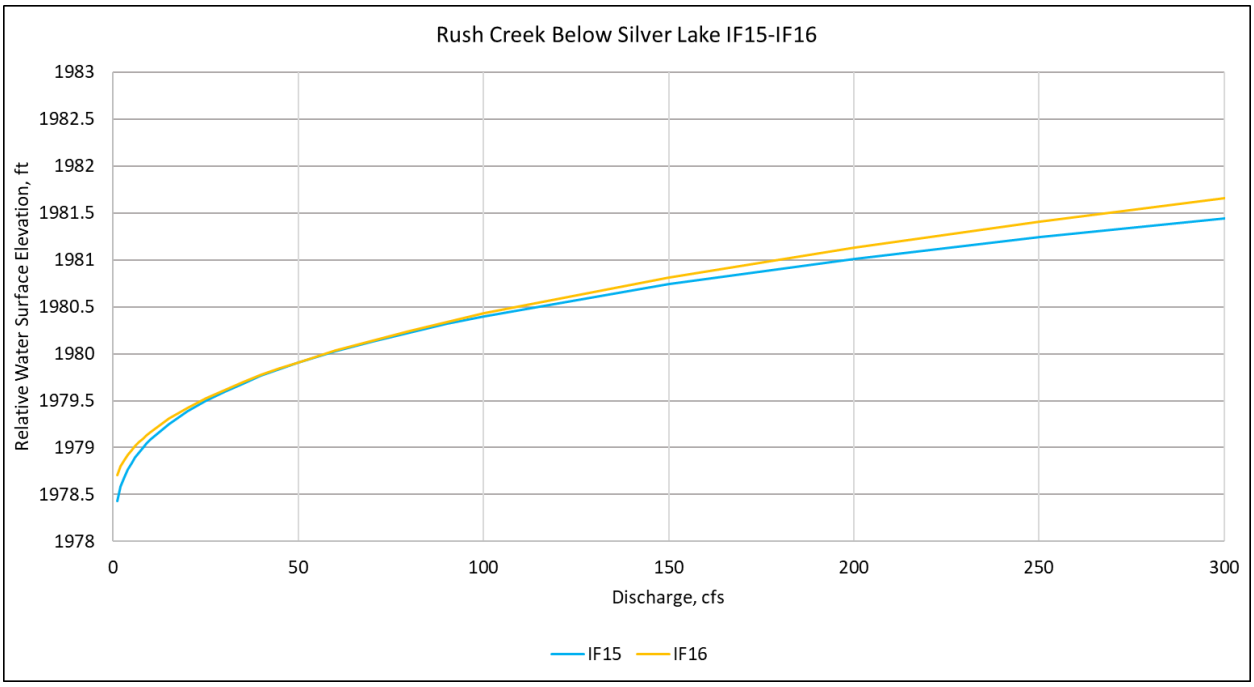

Figure AQ 1-F6. Rating Curves for Rush Creek below Silver Lake Cross Sections IF15 through IF16

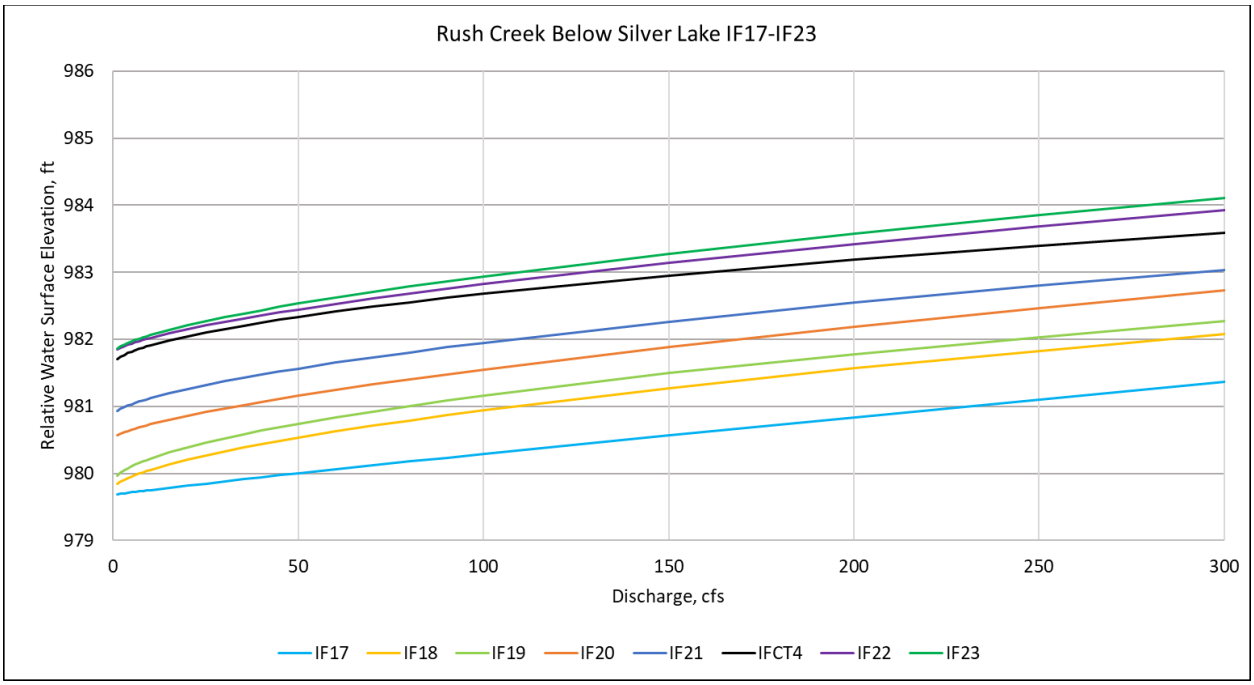

Figure AQ 1-F7. Rating Curves for Rush Creek below Silver Lake Cross Sections IF17 through IF23

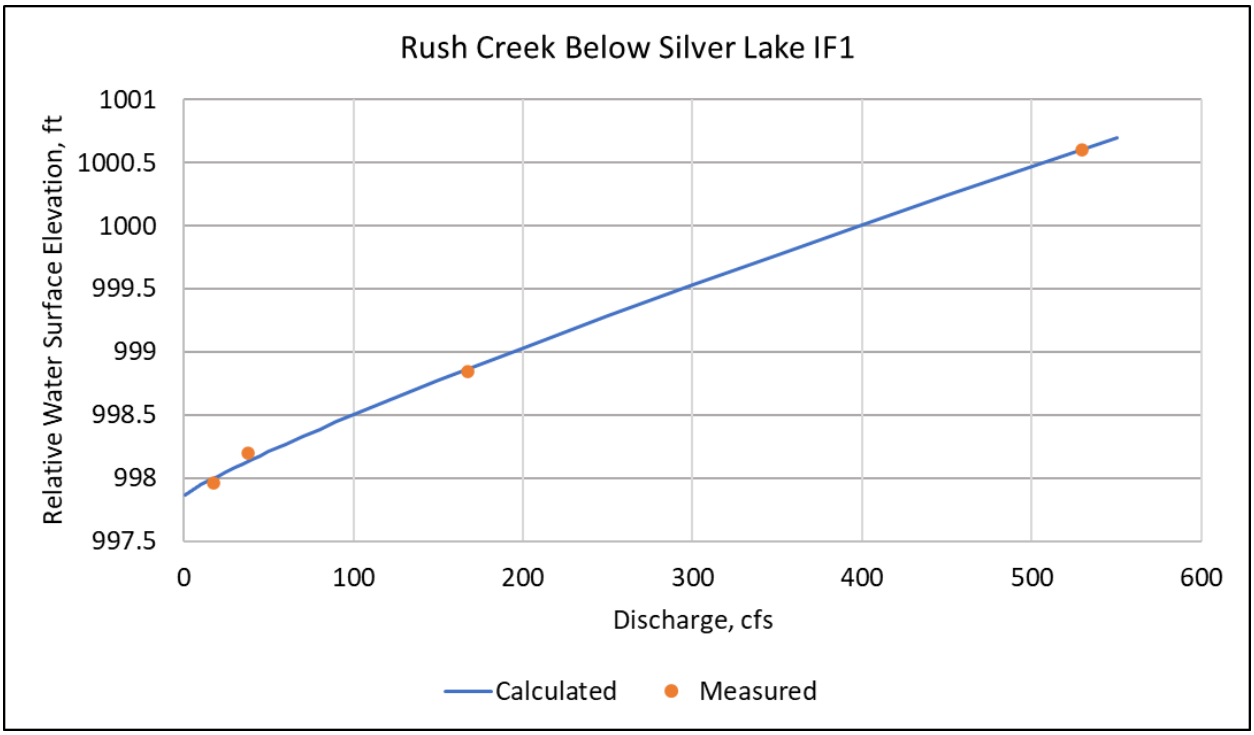

Figure AQ 1-F8. Rating Curve for Rush Creek below Silver Lake Cross Section IF1

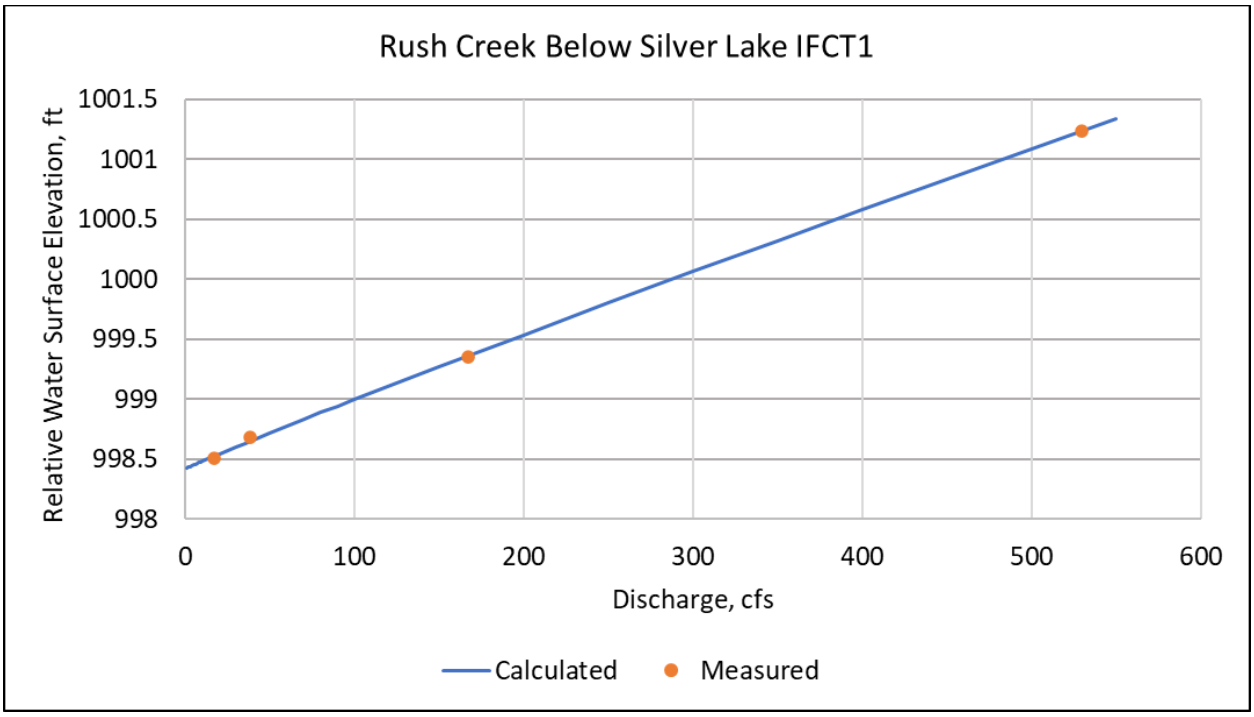

Figure AQ 1-F9. Rating Curve for Rush Creek below Silver Lake Cross Section IFCT1

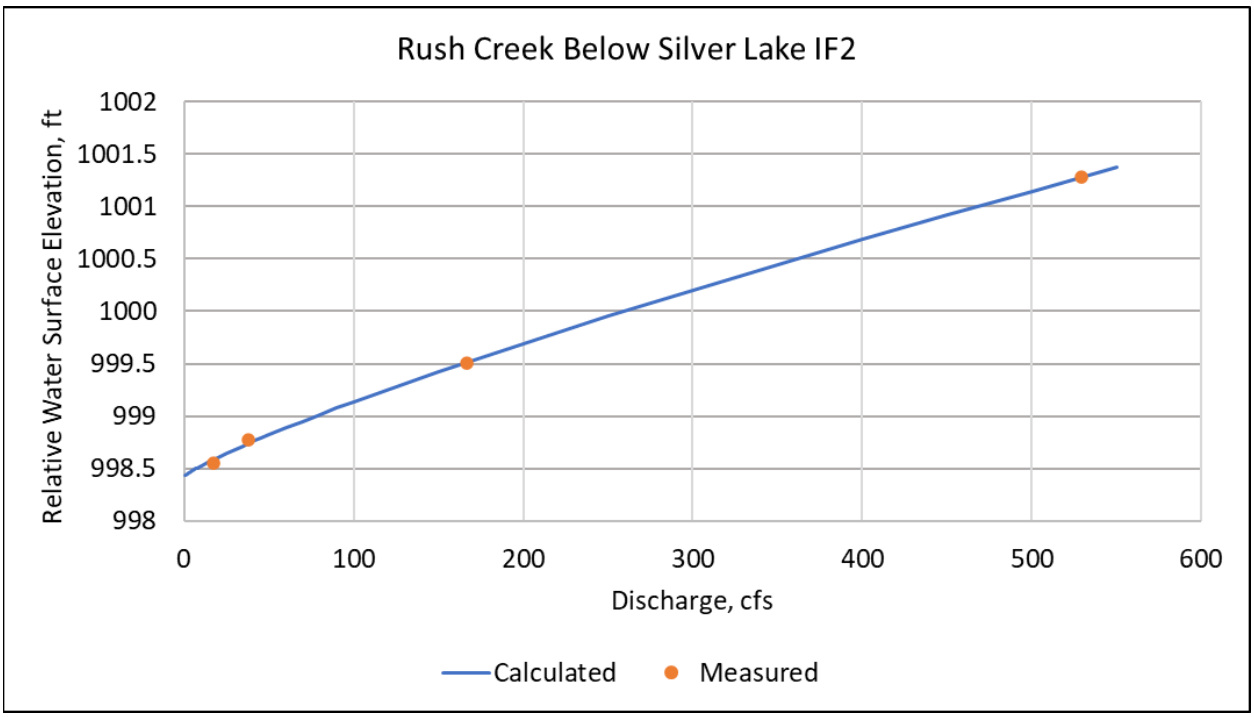

Figure AQ 1-F10. Rating Curve for Rush Creek below Silver Lake Cross Section IF2

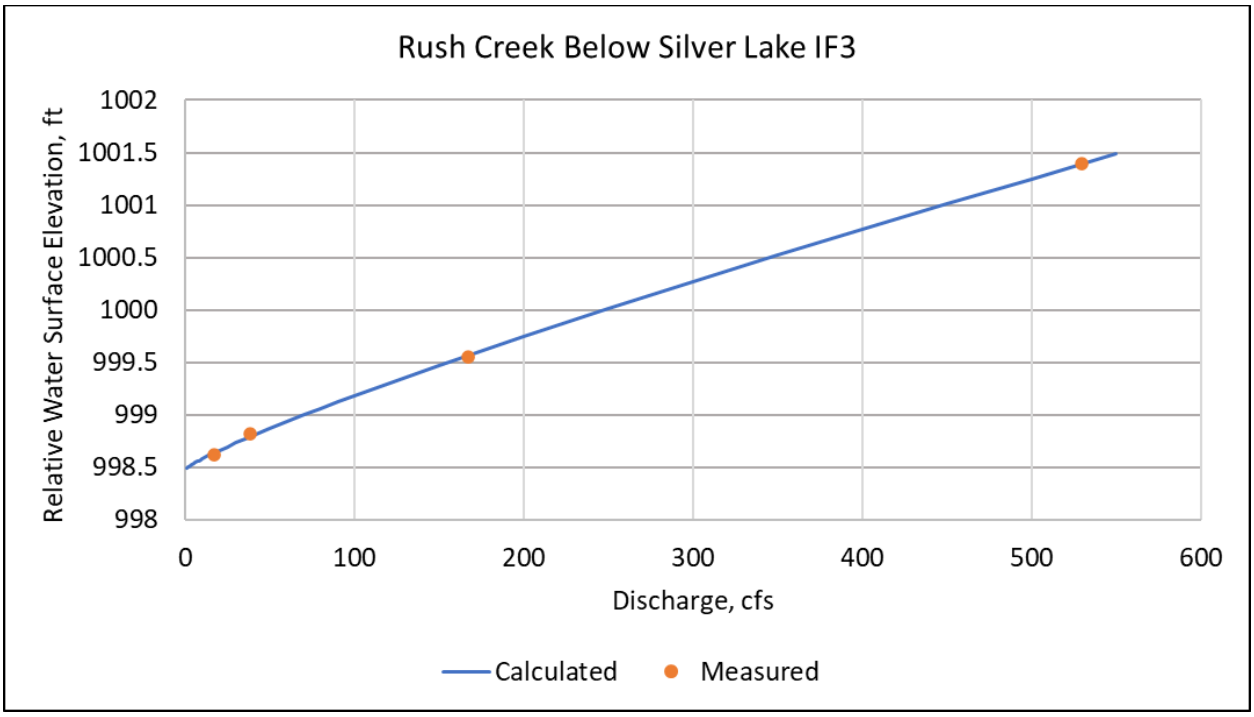

Figure AQ 1-F11. Rating Curve for Rush Creek below Silver Lake Cross Section IF3

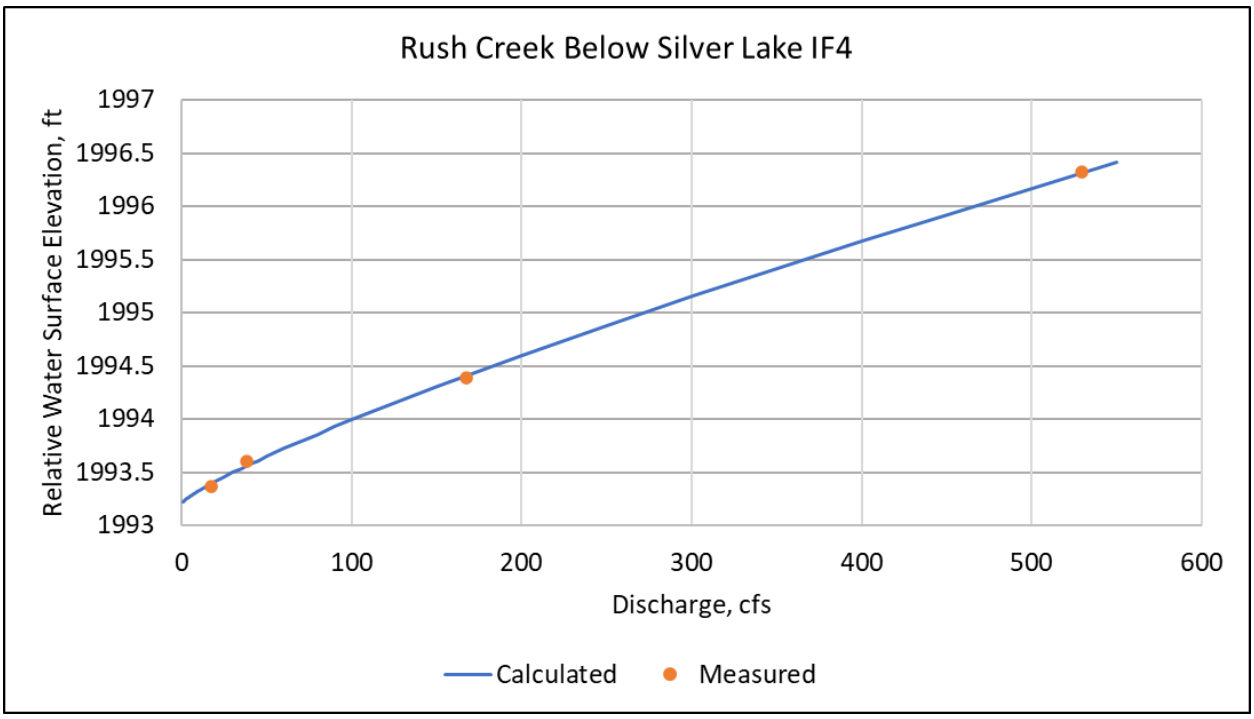

Figure AQ 1-F12. Rating Curve for Rush Creek below Silver Lake Cross Section IF4

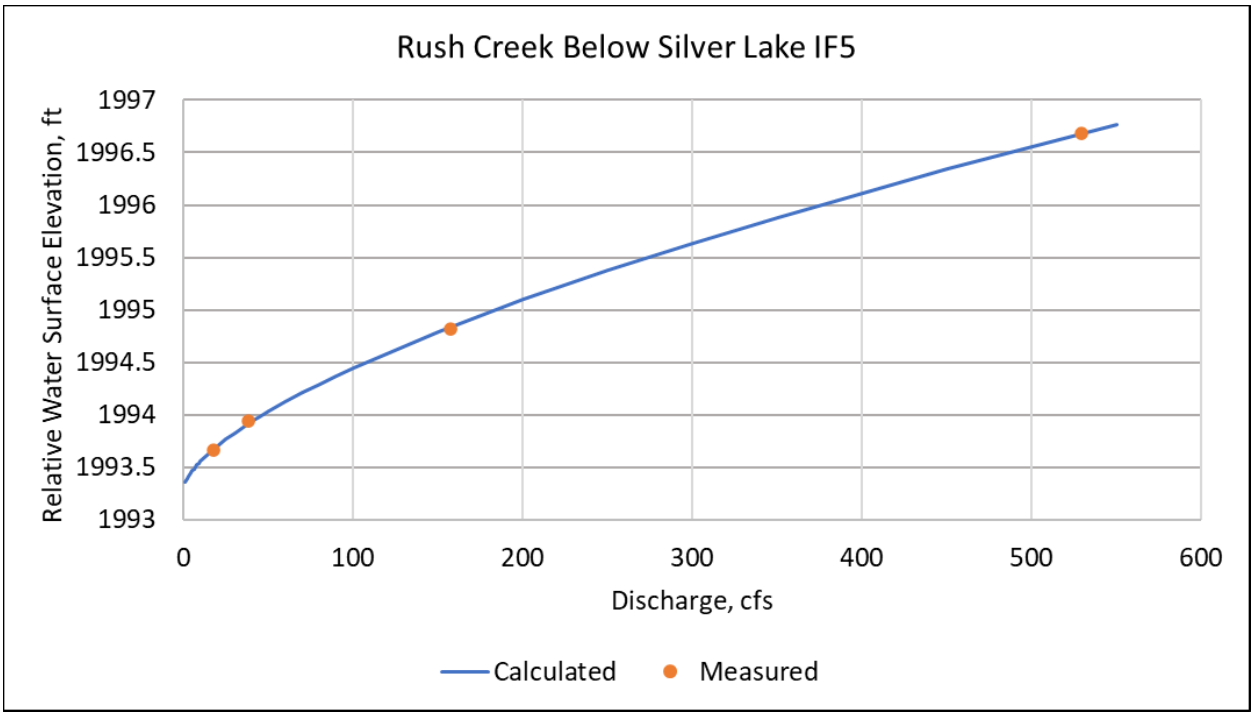

Figure AQ 1-F13. Rating Curve for Rush Creek below Silver Lake Cross Section IF5

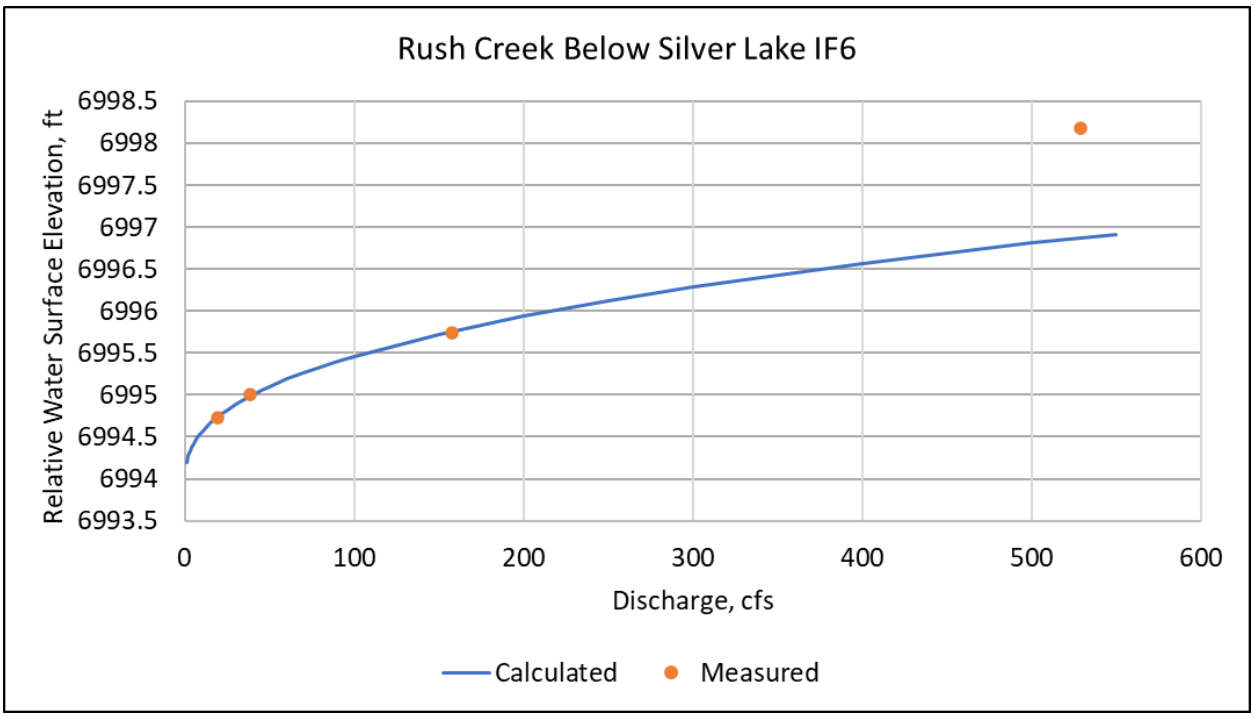

Figure AQ 1-F14. Rating Curve for Rush Creek below Silver Lake Cross Section IF6

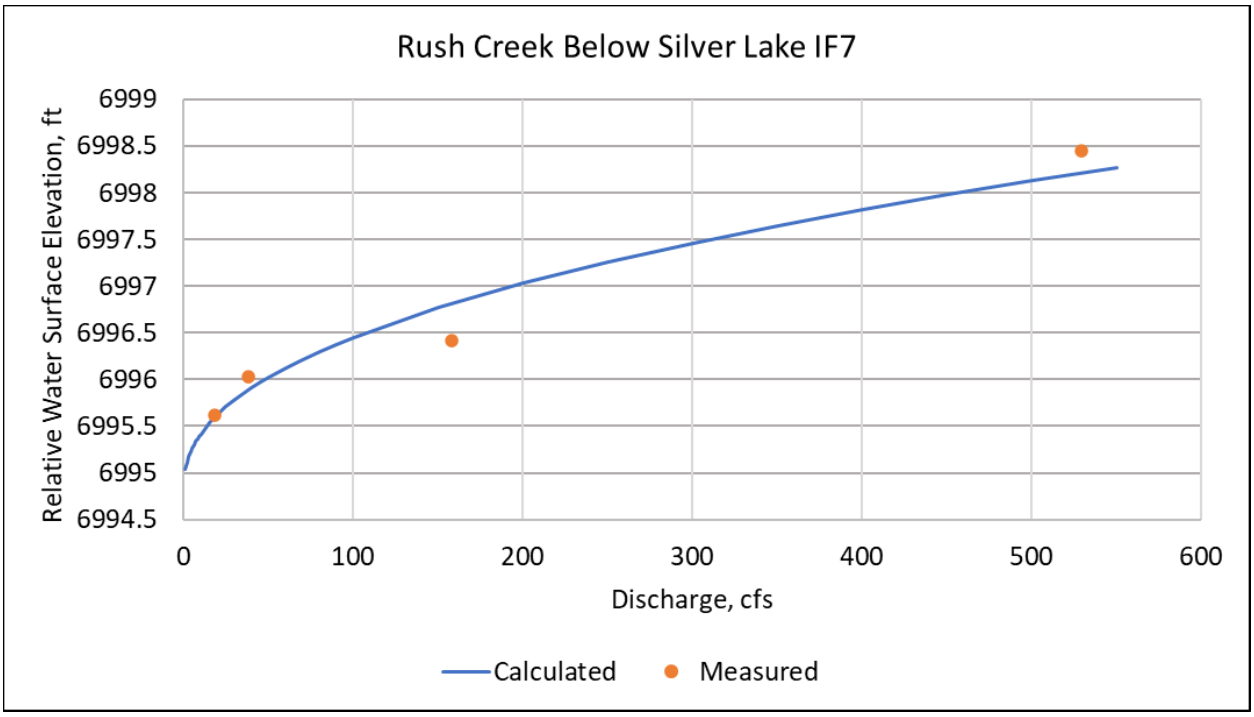

Figure AQ 1-F15. Rating Curve for Rush Creek below Silver Lake Cross Section IF7

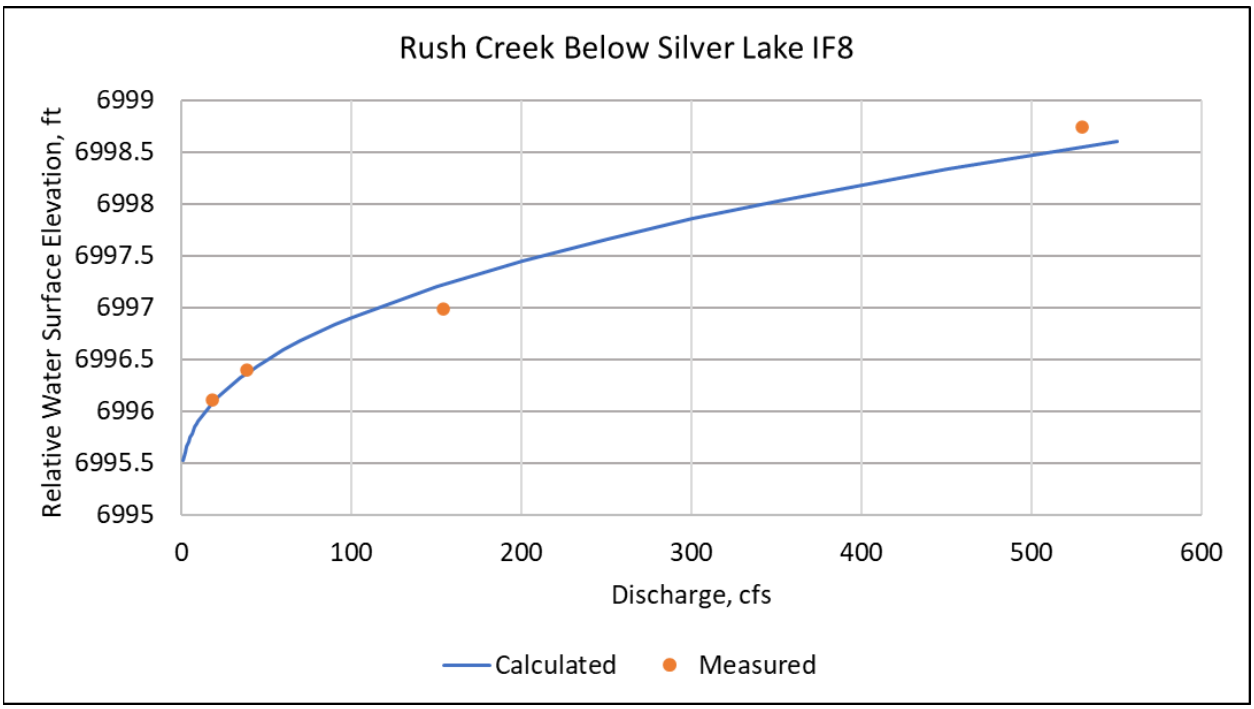

Figure AQ 1-F16. Rating Curve for Rush Creek below Silver Lake Cross Section IF8

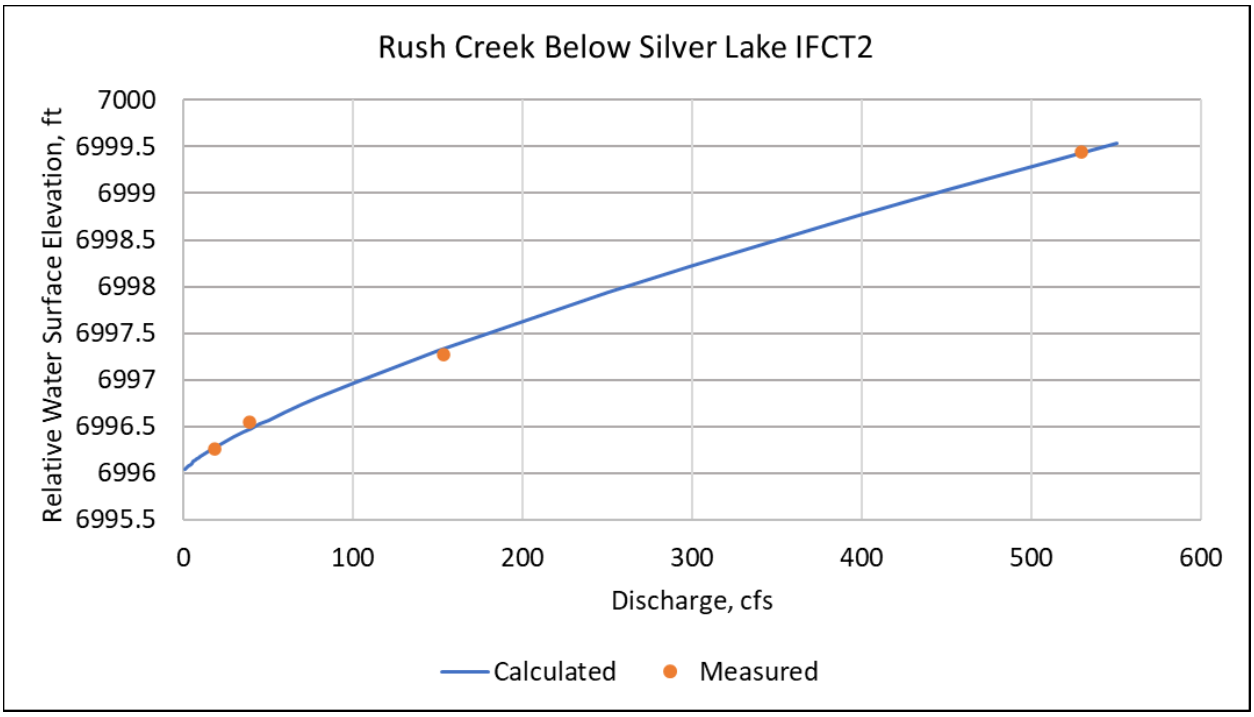

Figure AQ 1-F17. Rating Curve for Rush Creek below Silver Lake Cross Section IFCT2

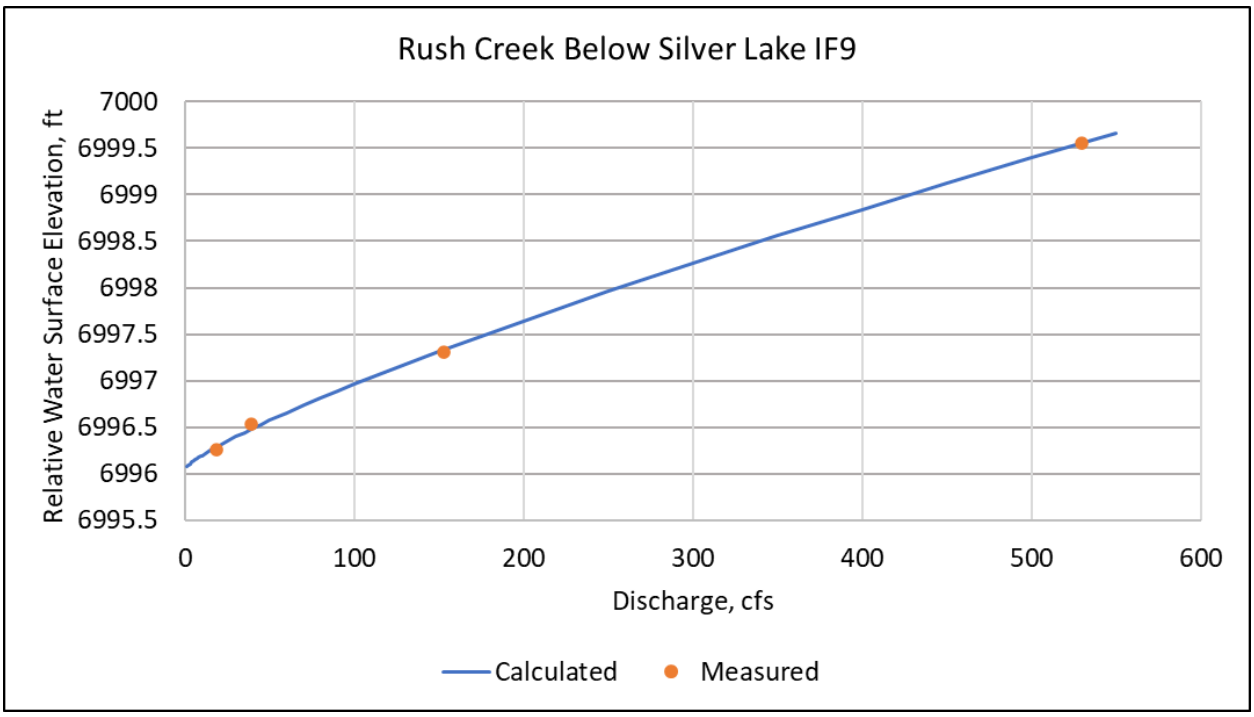

Figure AQ 1-F18. Rating Curve for Rush Creek below Silver Lake Cross Section IF9

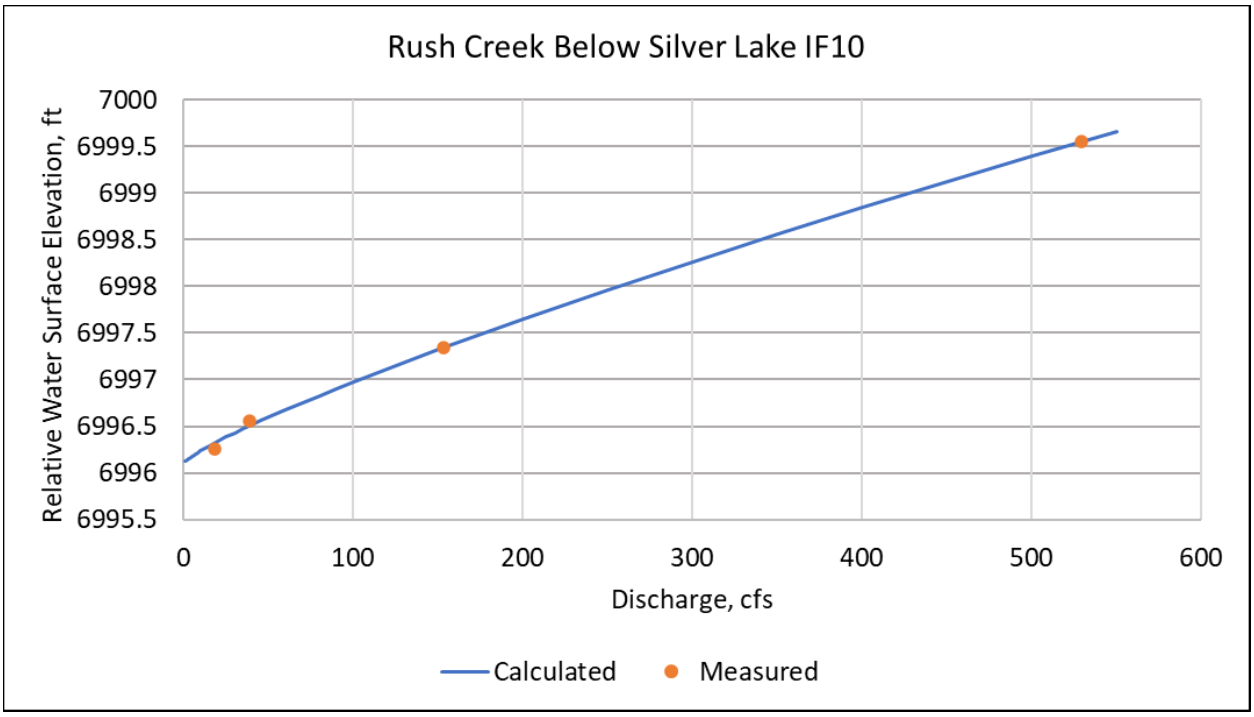

Figure AQ 1-F19. Rating Curve for Rush Creek below Silver Lake Cross Section IF10

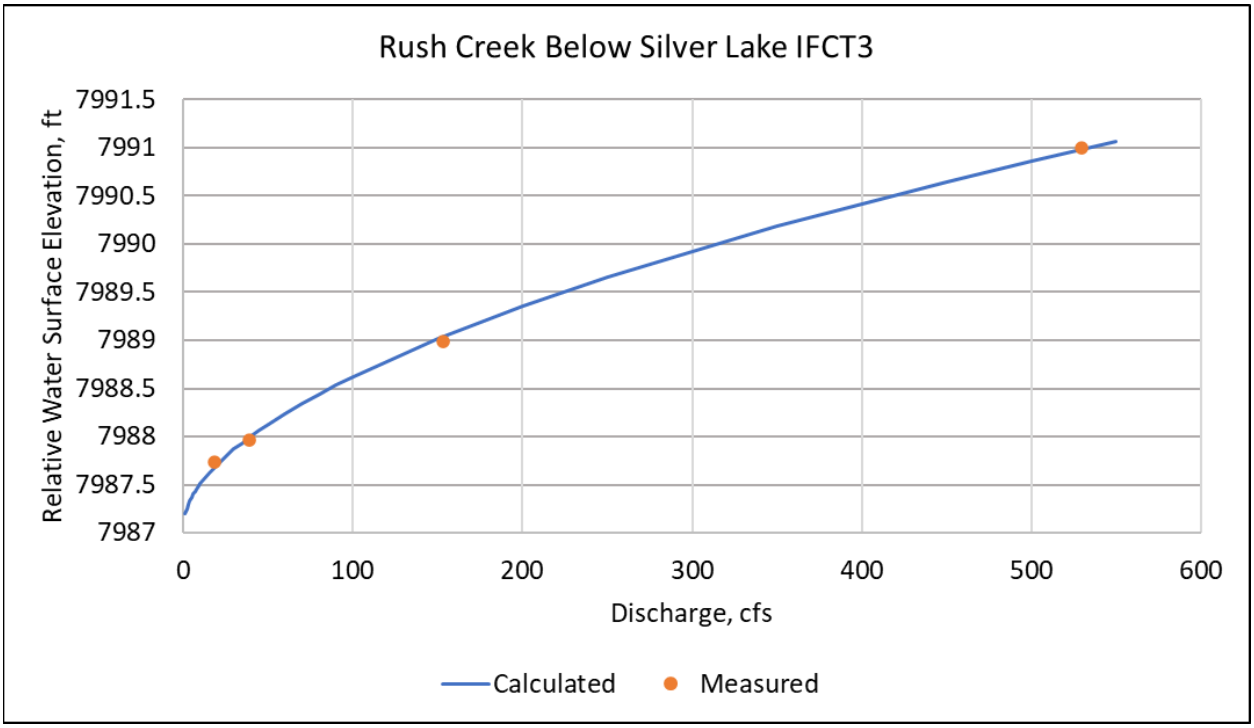

Figure AQ 1-F20. Rating Curve for Rush Creek below Silver Lake Cross Section IFCT3

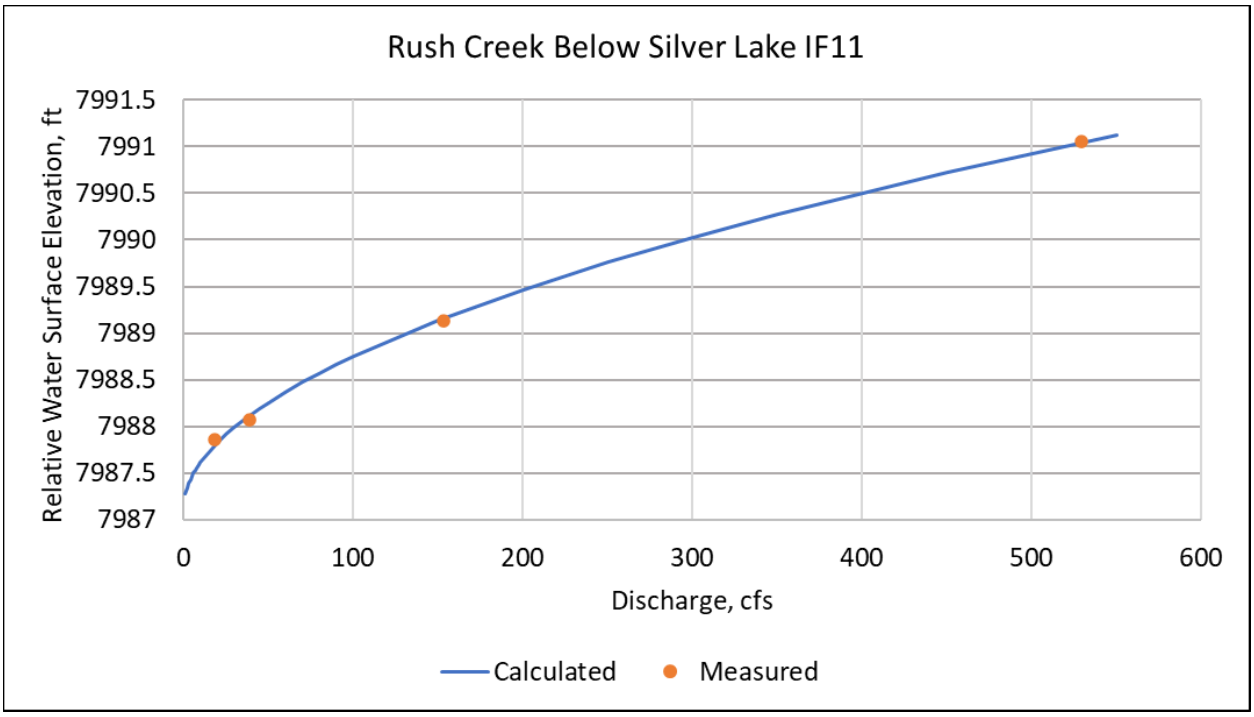

Figure AQ 1-F21. Rating Curve for Rush Creek below Silver Lake Cross Section IF11

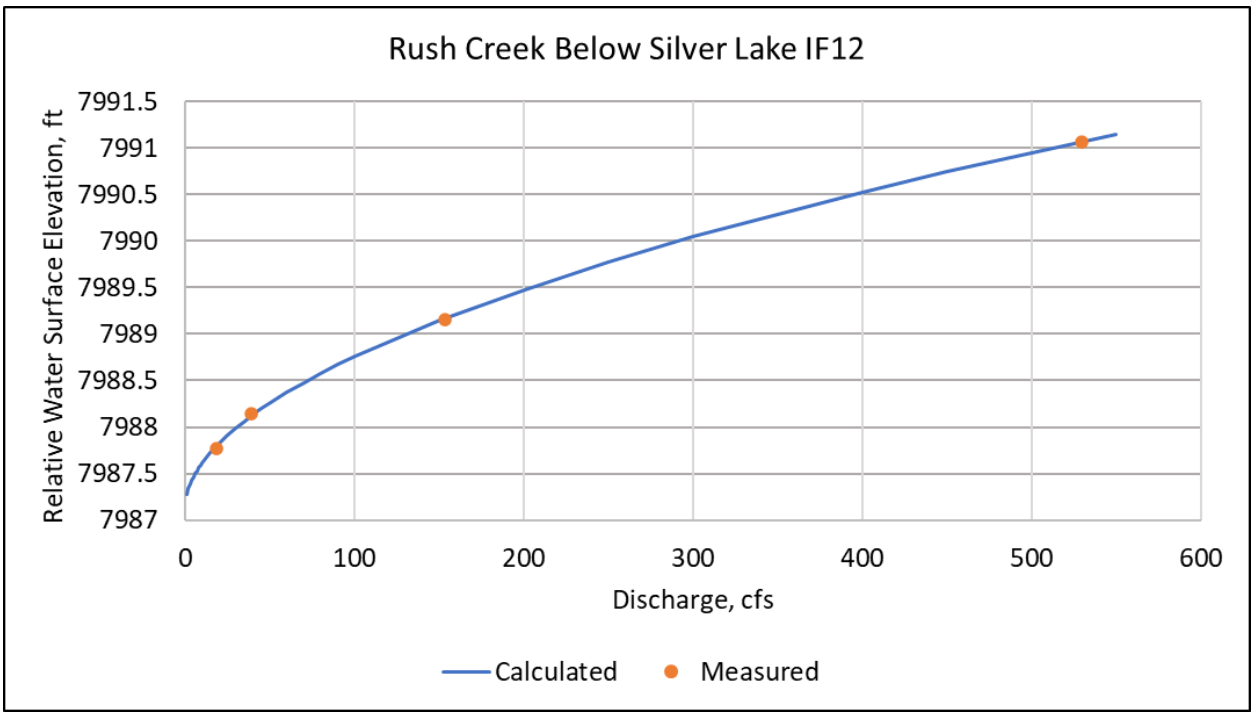

Figure AQ 1-F22. Rating Curve for Rush Creek below Silver Lake Cross Section IF12

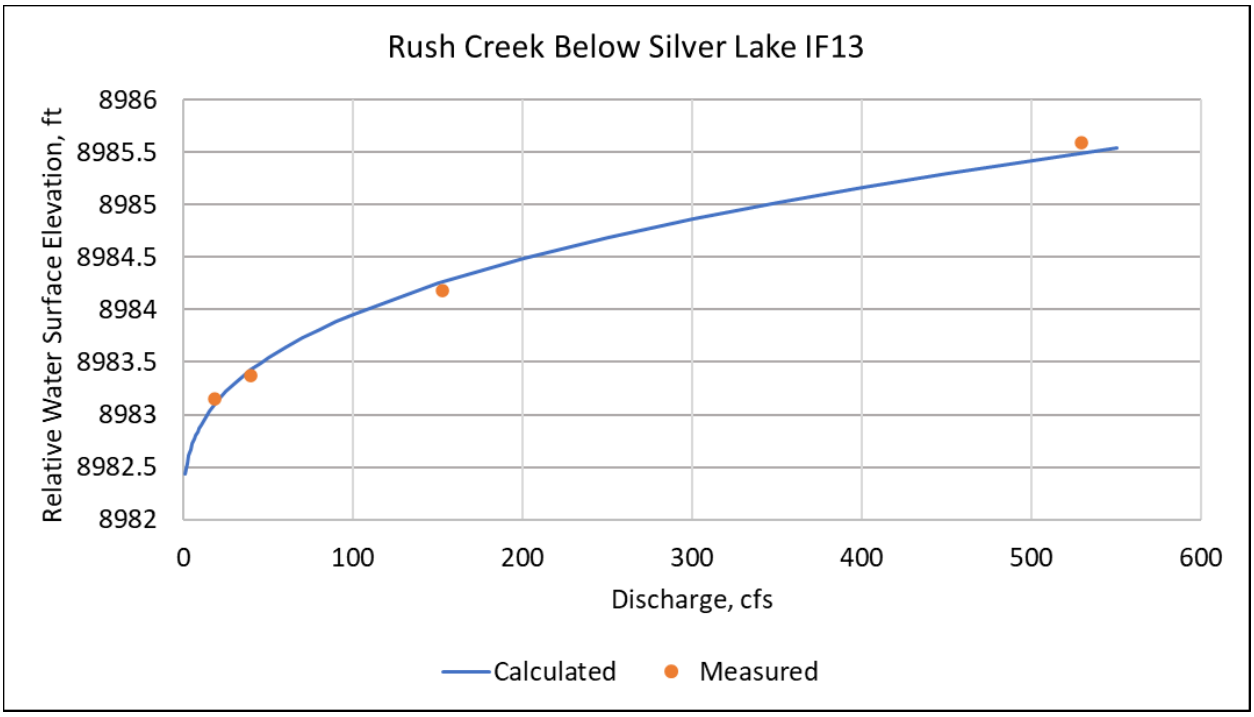

Figure AQ 1-F23. Rating Curve for Rush Creek below Silver Lake Cross Section IF13

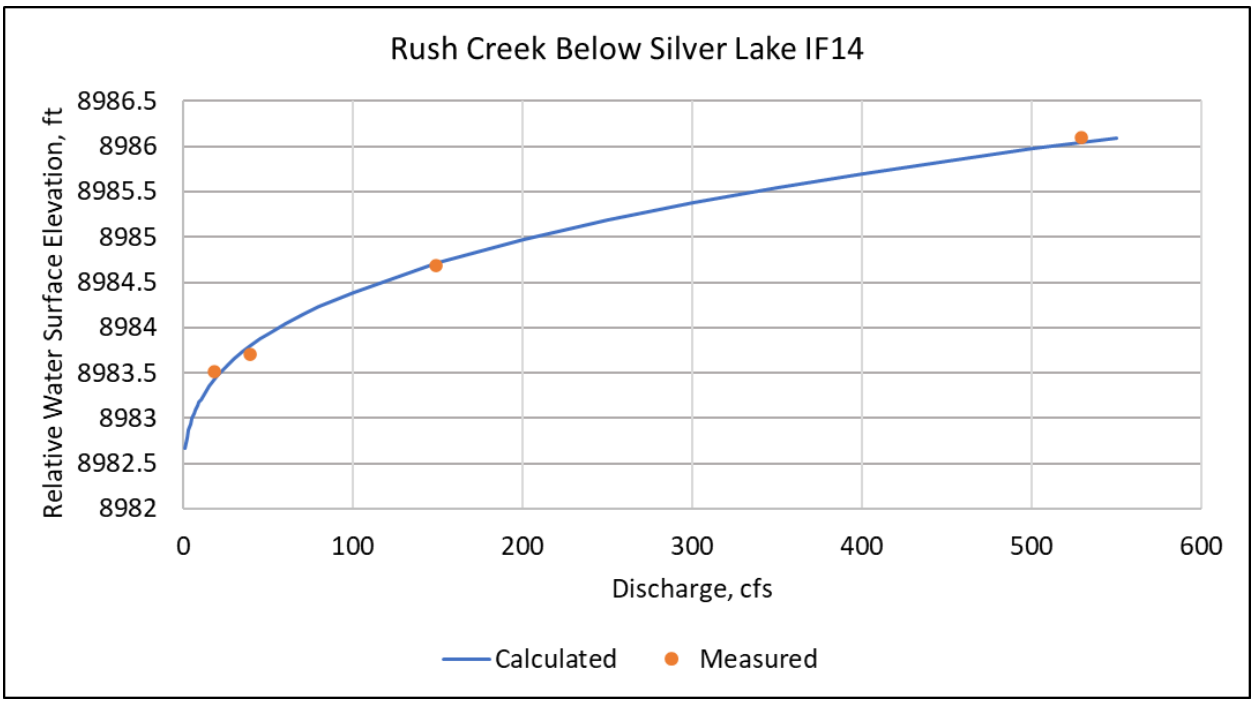

Figure AQ 1-F24. Rating Curve for Rush Creek below Silver Lake Cross Section IF14

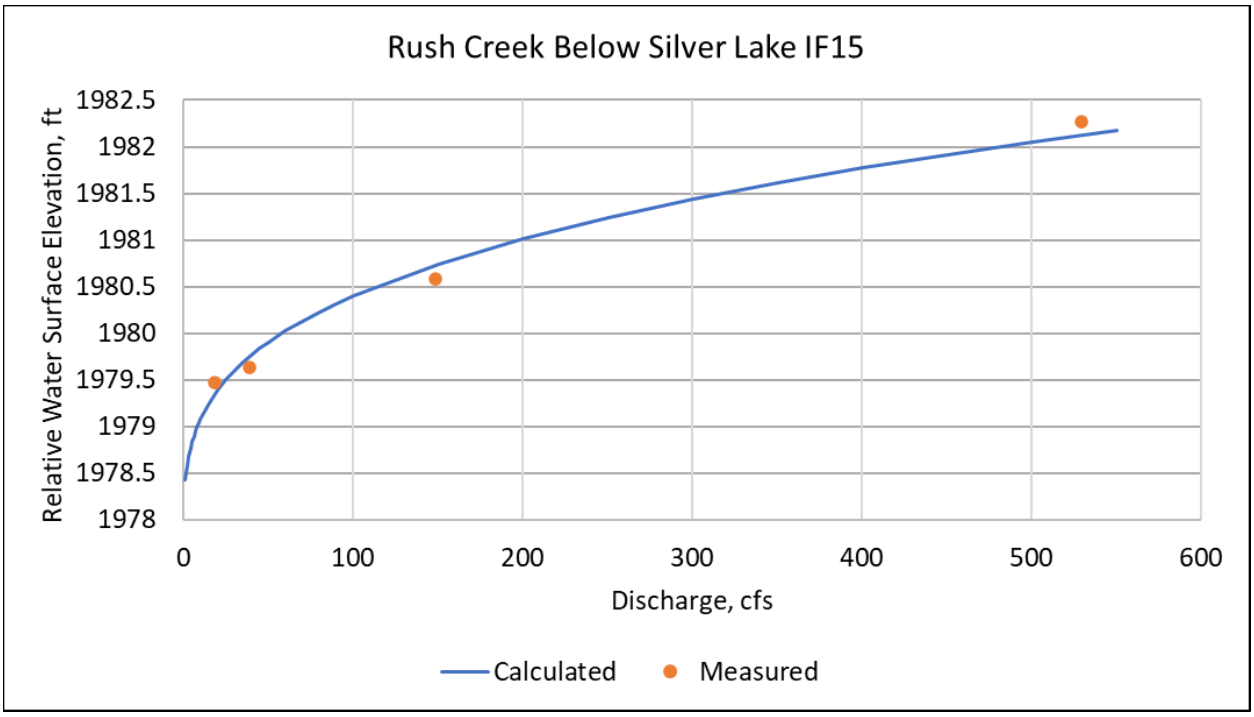

Figure AQ 1-F25. Rating Curve for Rush Creek below Silver Lake Cross Section IF15

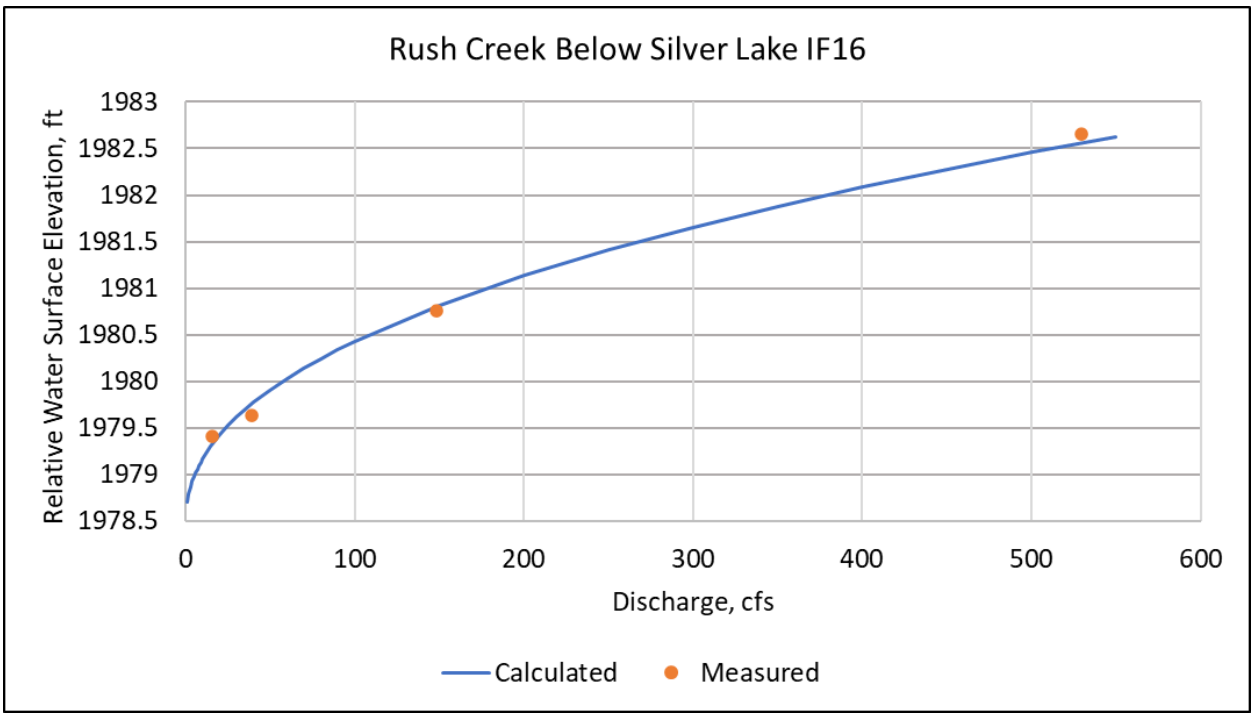

Figure AQ 1-F26. Rating Curve for Rush Creek below Silver Lake Cross Section IF16

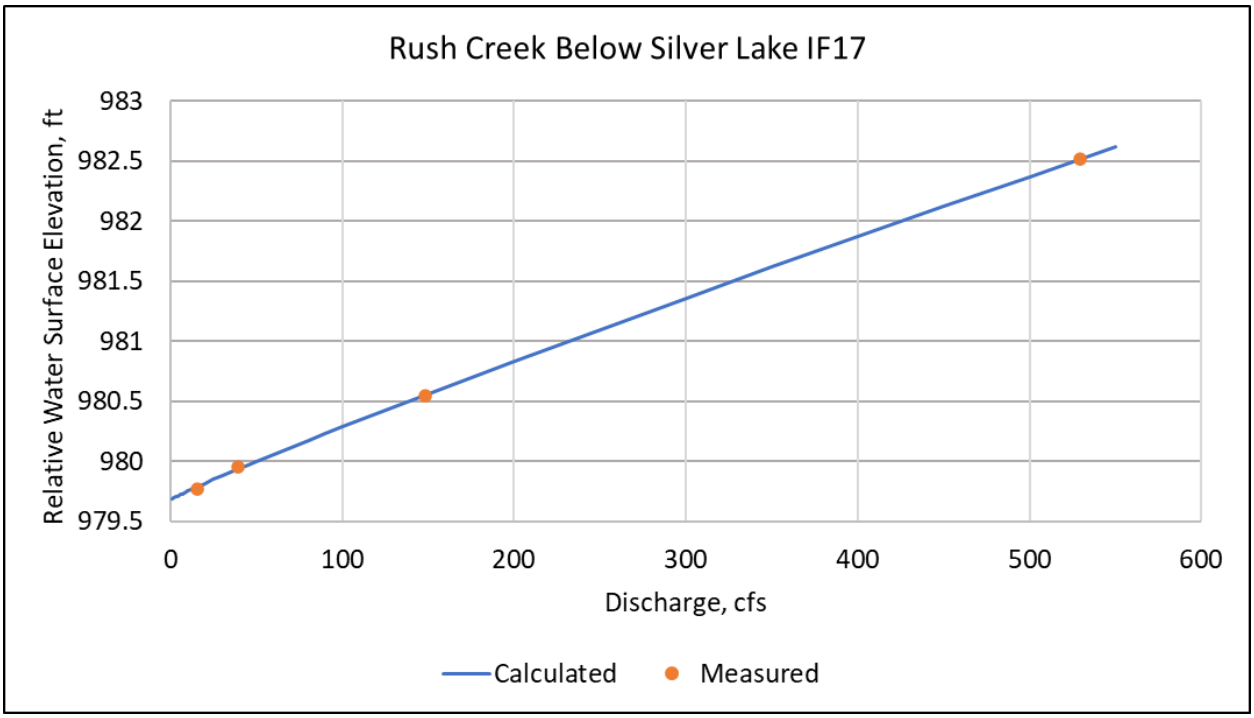

Figure AQ 1-F27. Rating Curve for Rush Creek below Silver Lake Cross Section IF17

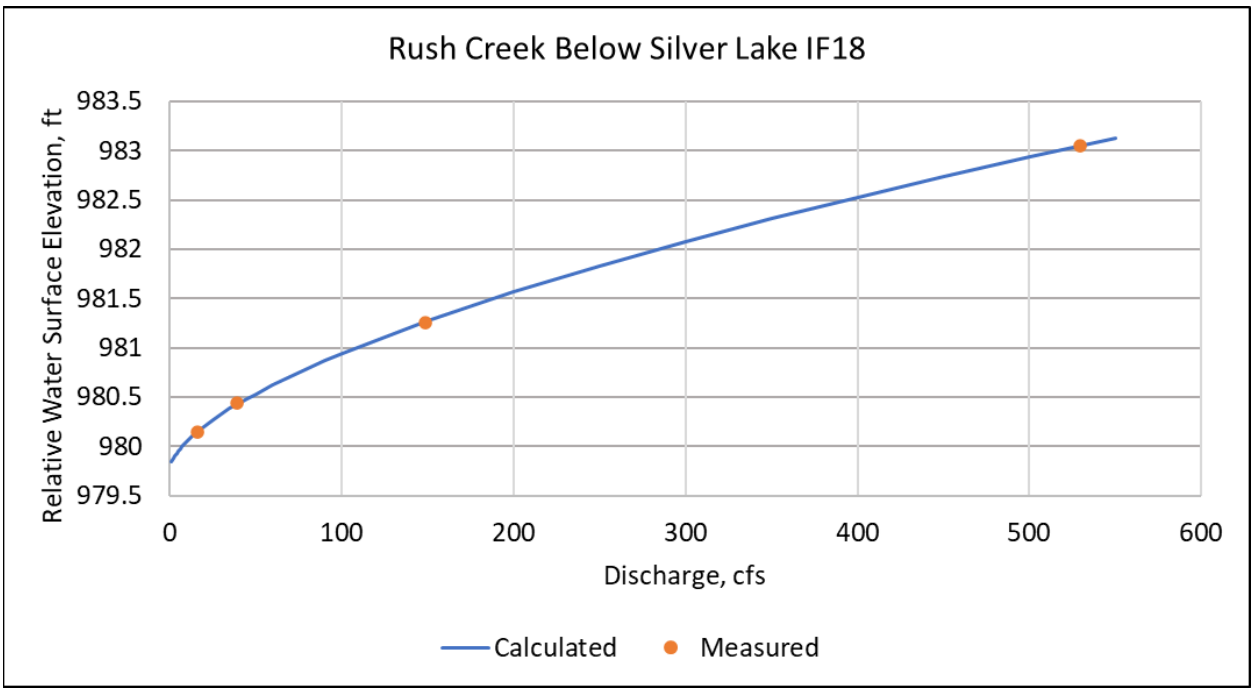

Figure AQ 1-F28. Rating Curve for Rush Creek below Silver Lake Cross Section IF18

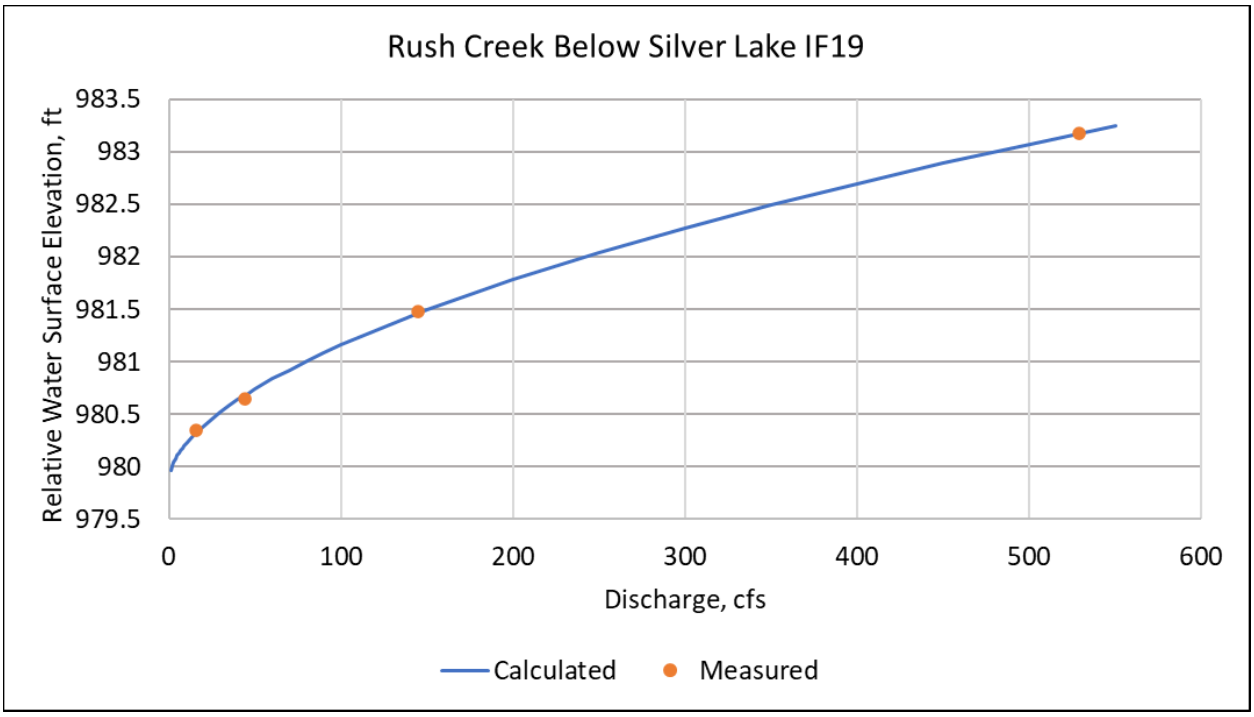

Figure AQ 1-F29. Rating Curve for Rush Creek below Silver Lake Cross Section IF19

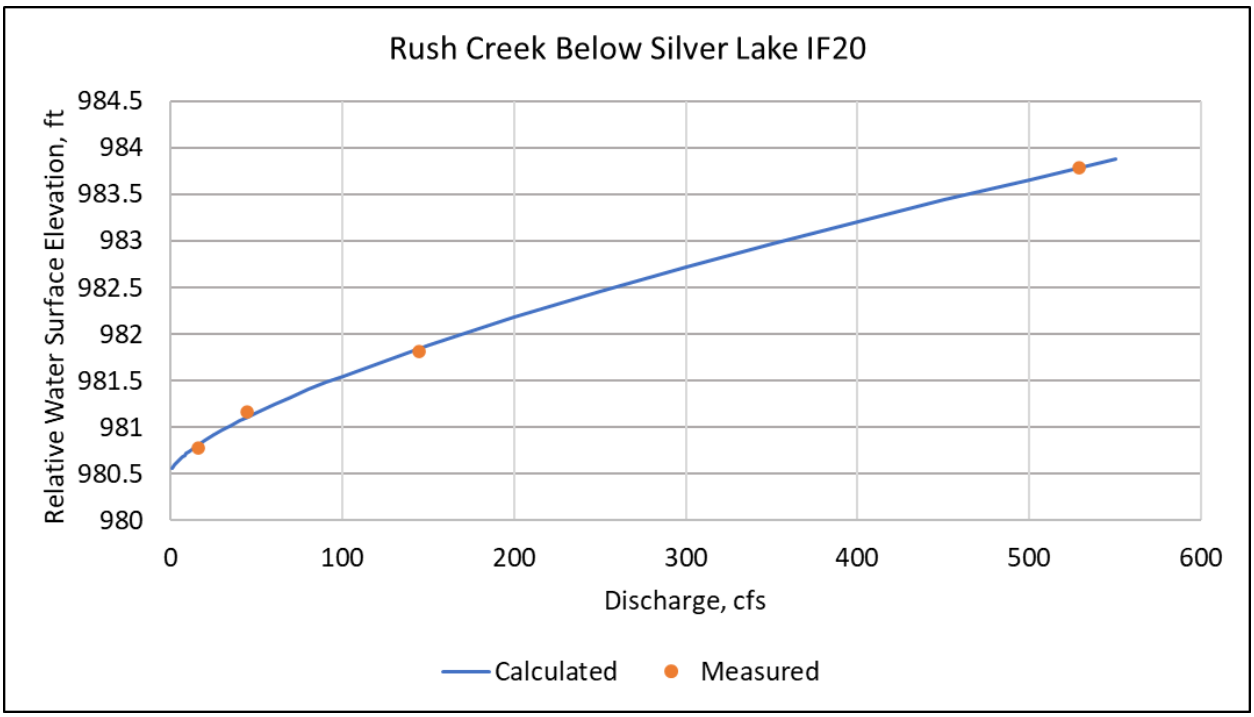

Figure AQ 1-F30. Rating Curve for Rush Creek below Silver Lake Cross Section IF20

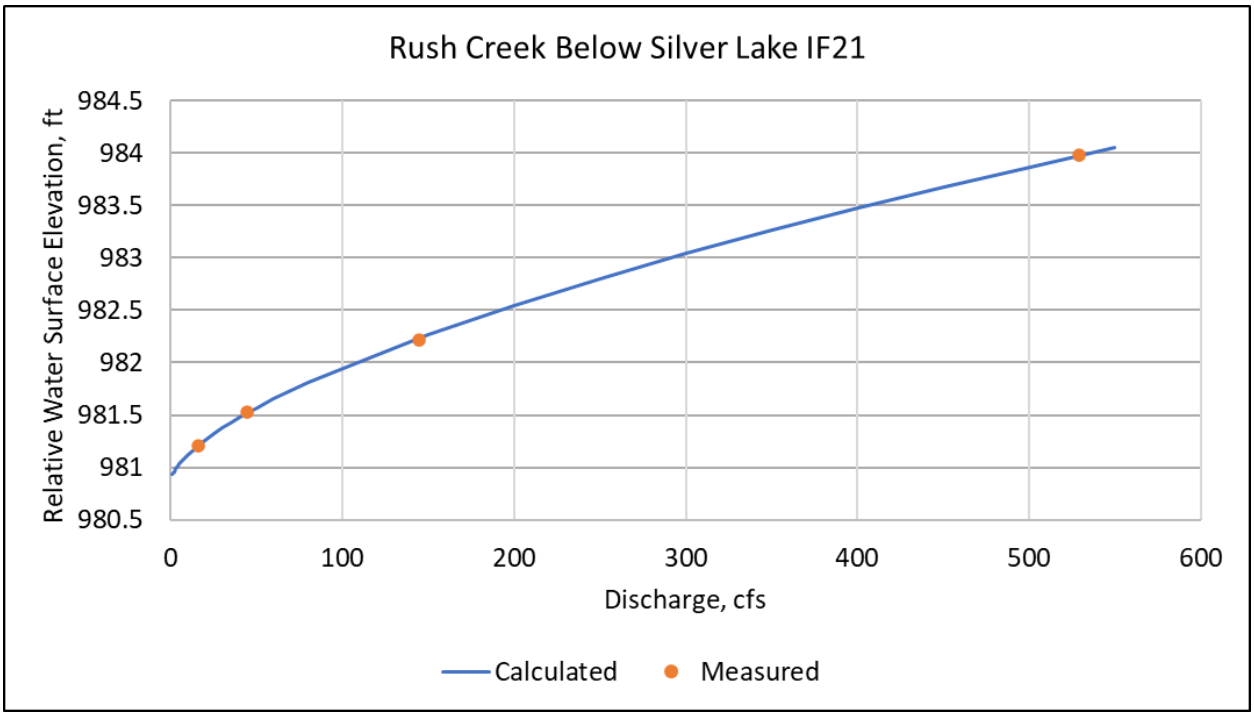

Figure AQ 1-F31. Rating Curve for Rush Creek below Silver Lake Cross Section IF21

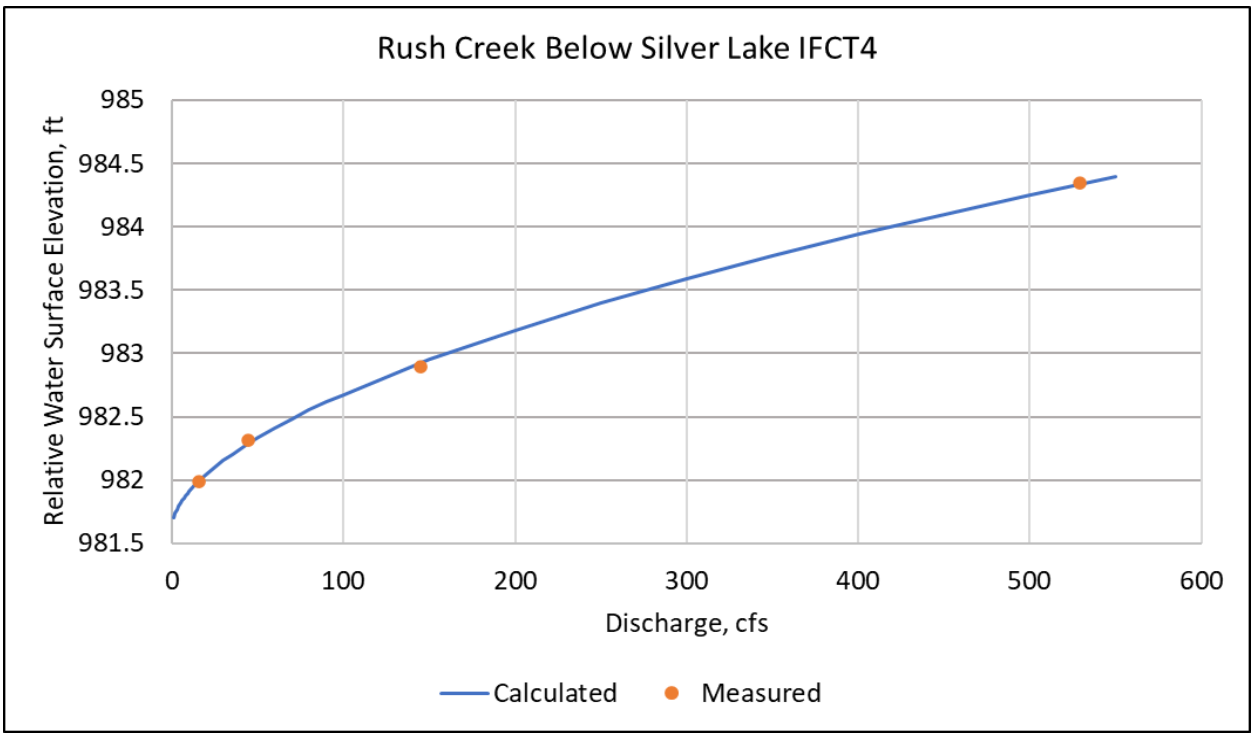

Figure AQ 1-F32. Rating Curve for Rush Creek below Silver Lake Cross Section IFCT4

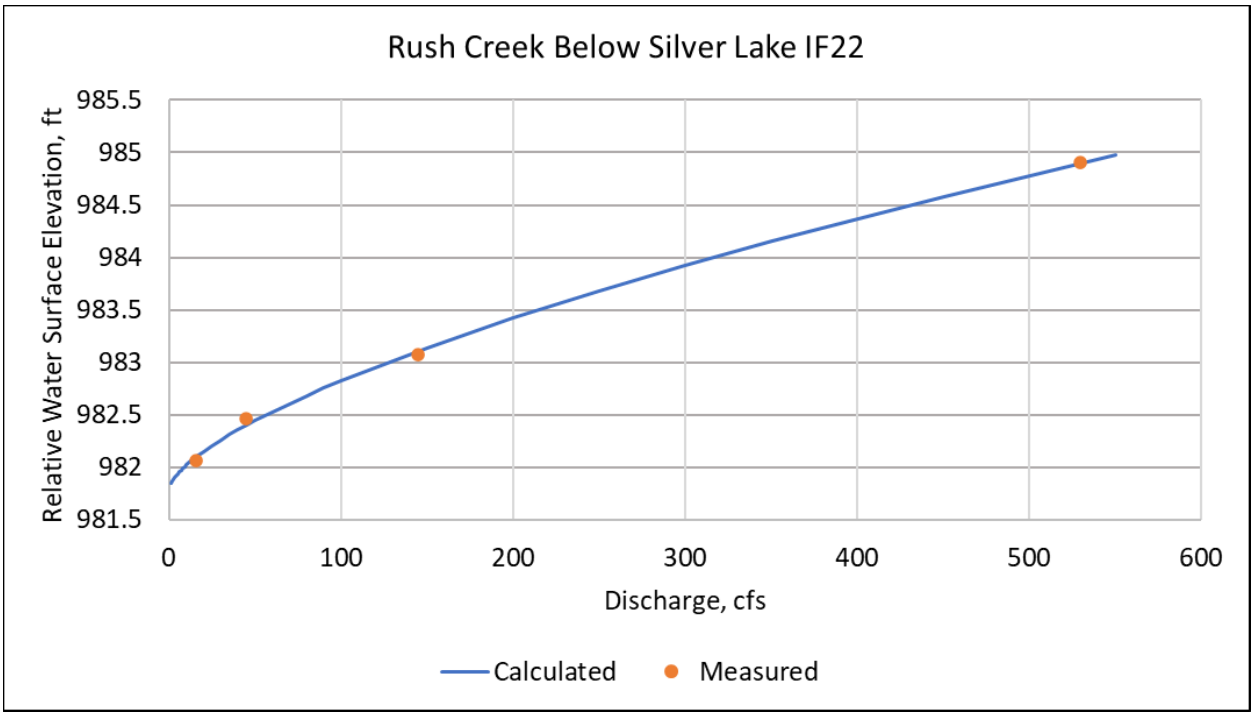

Figure AQ 1-F33. Rating Curve for Rush Creek below Silver Lake Cross Section IF22

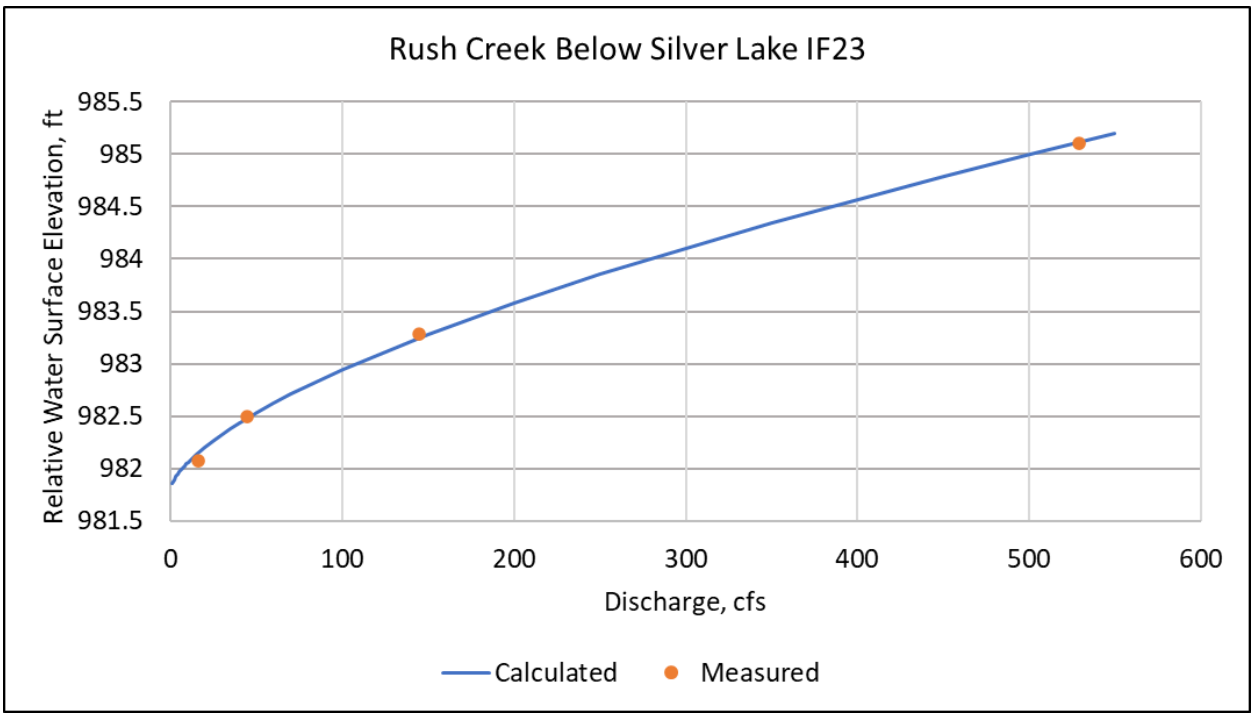

Figure AQ 1-F34. Rating Curve for Rush Creek below Silver Lake Cross Section IF23

APPENDIX G

Modeled Versus Measured Hydraulics (Rush Creek Gem Dam to Reverse Creek)

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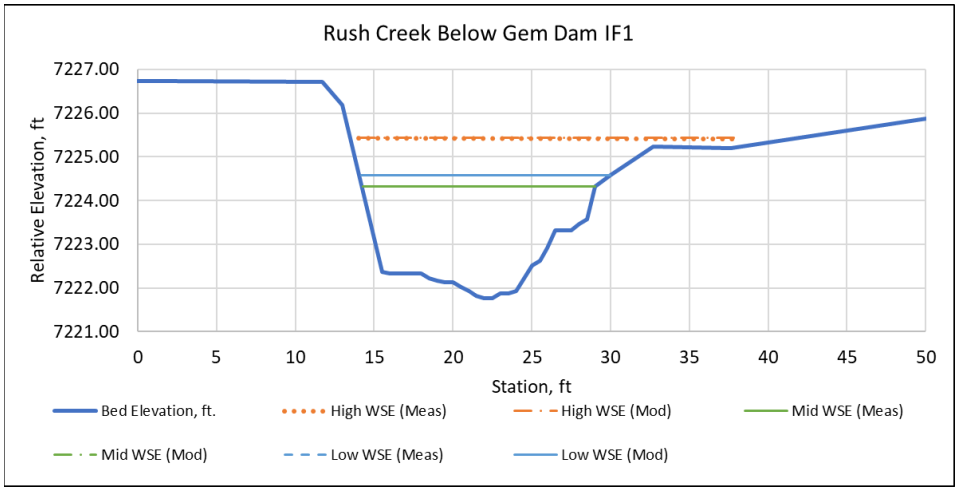
INTRODUCTION

The following Figure AQ 1-G1 through Figure AQ 1-G6 show a comparison between the measured water surface elevation and the modeled water surface elevation. Figure AQ 1-G7 through Figure AQ 1-G11 show the comparison between the measured velocity and the modeled velocity. Figure AQ 1-G12 through Figure AQ 1-G16 show the comparison between the original Mannings n and the adjusted Mannings n.



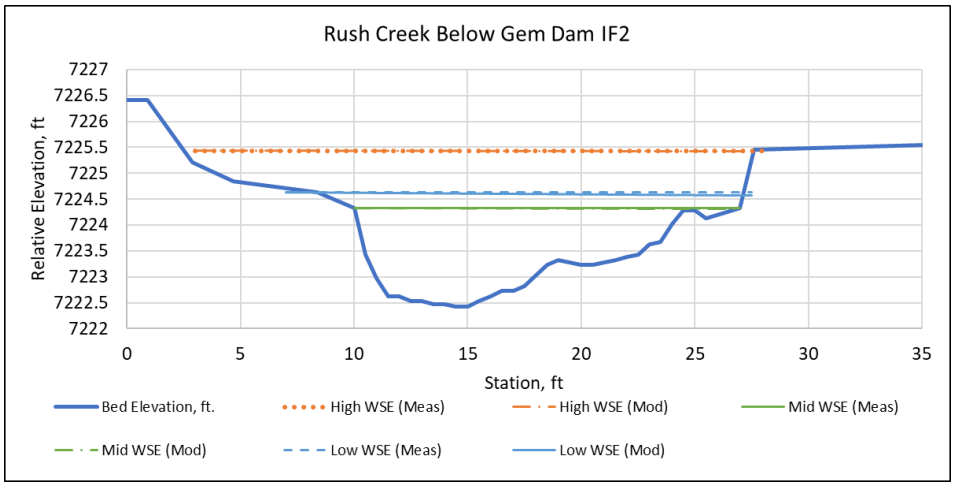


Figure AQ 1-G1. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Sections IF1 (top) and IF2 (bottom)

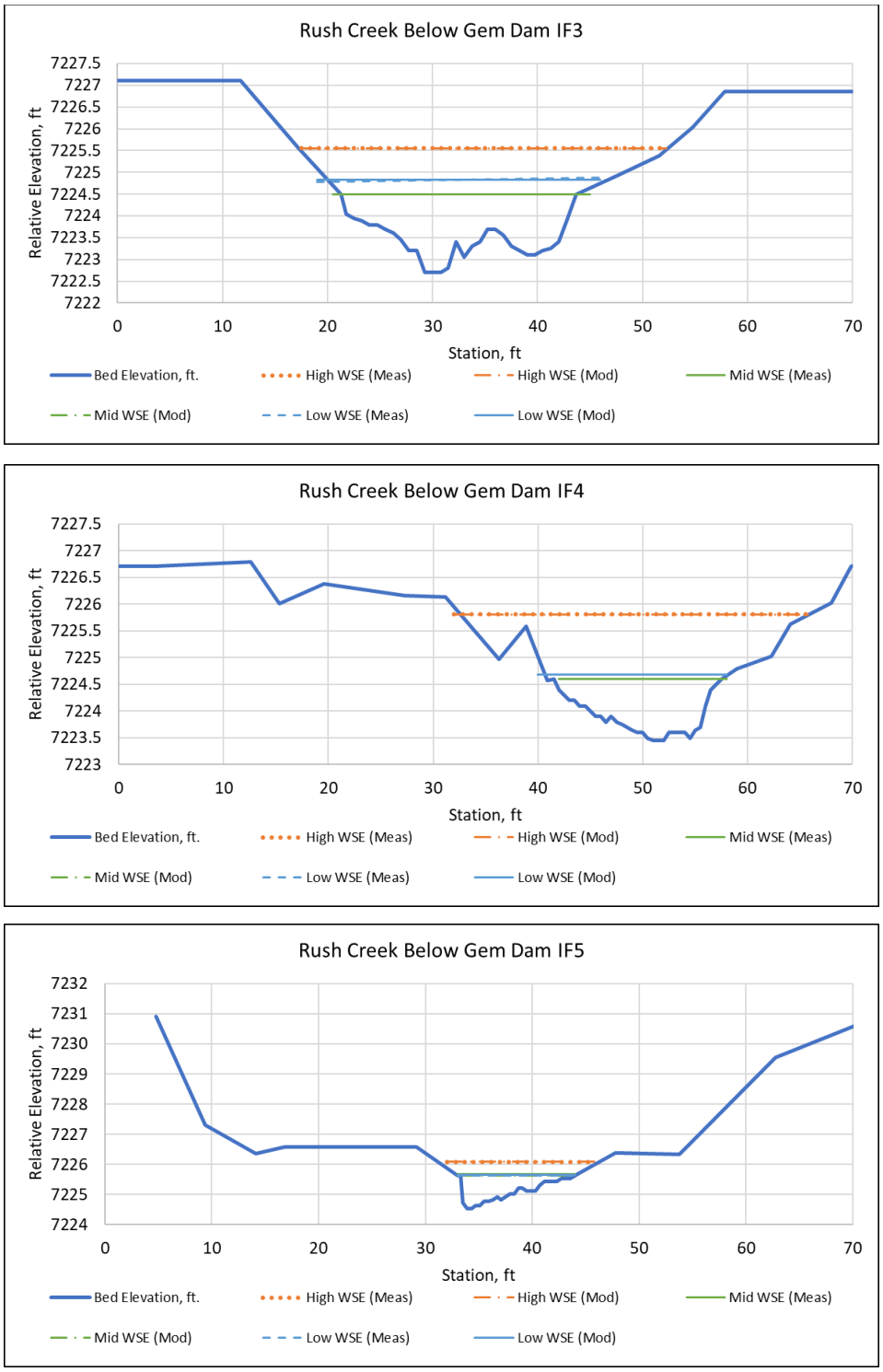


Figure AQ 1-G2. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Sections IF3 (top), IF4 (middle), and IF5 (bottom)

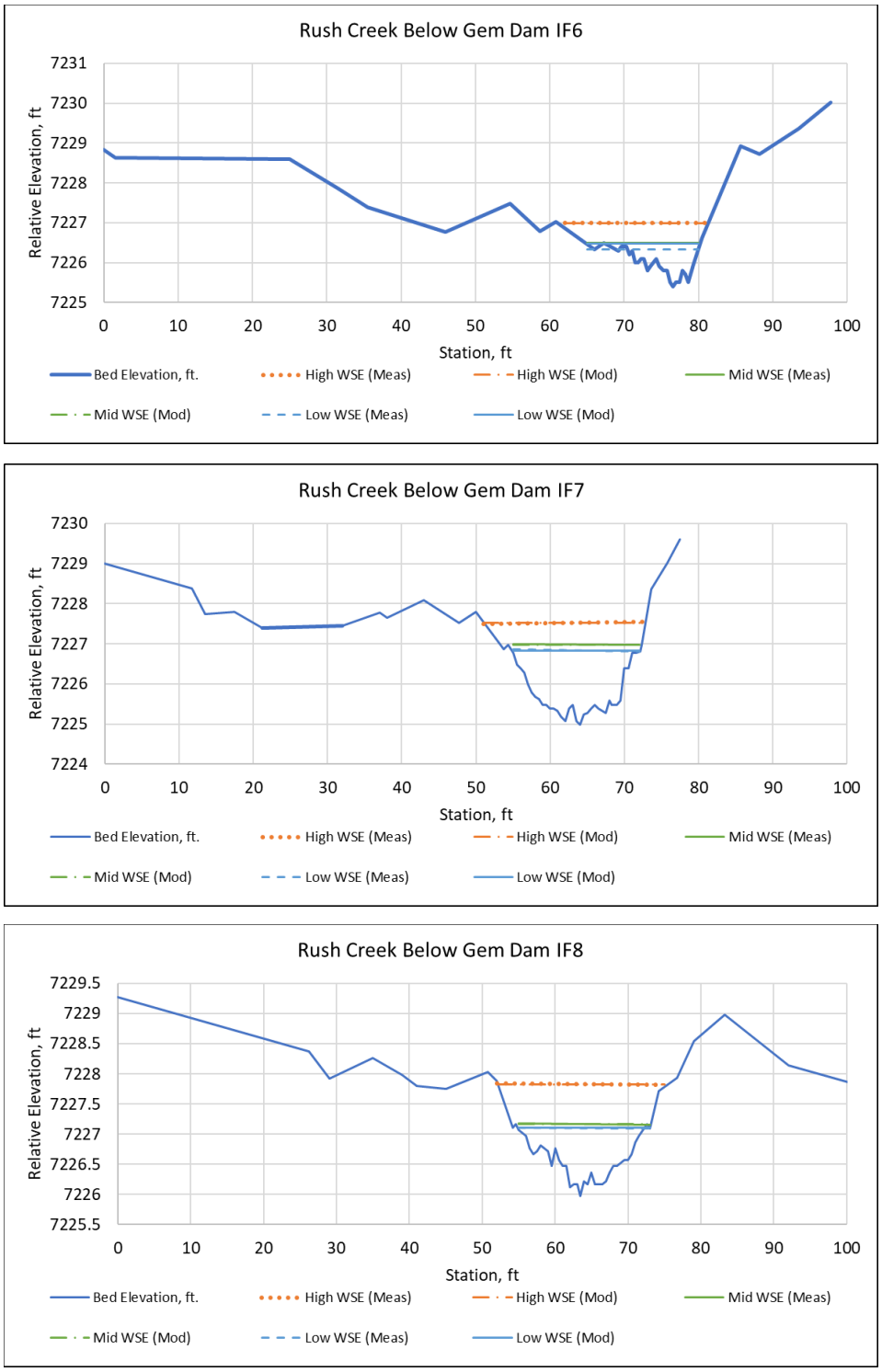


Figure AQ 1-G3. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Sections IF6 (top), IF7 (middle), and IF8 (bottom)

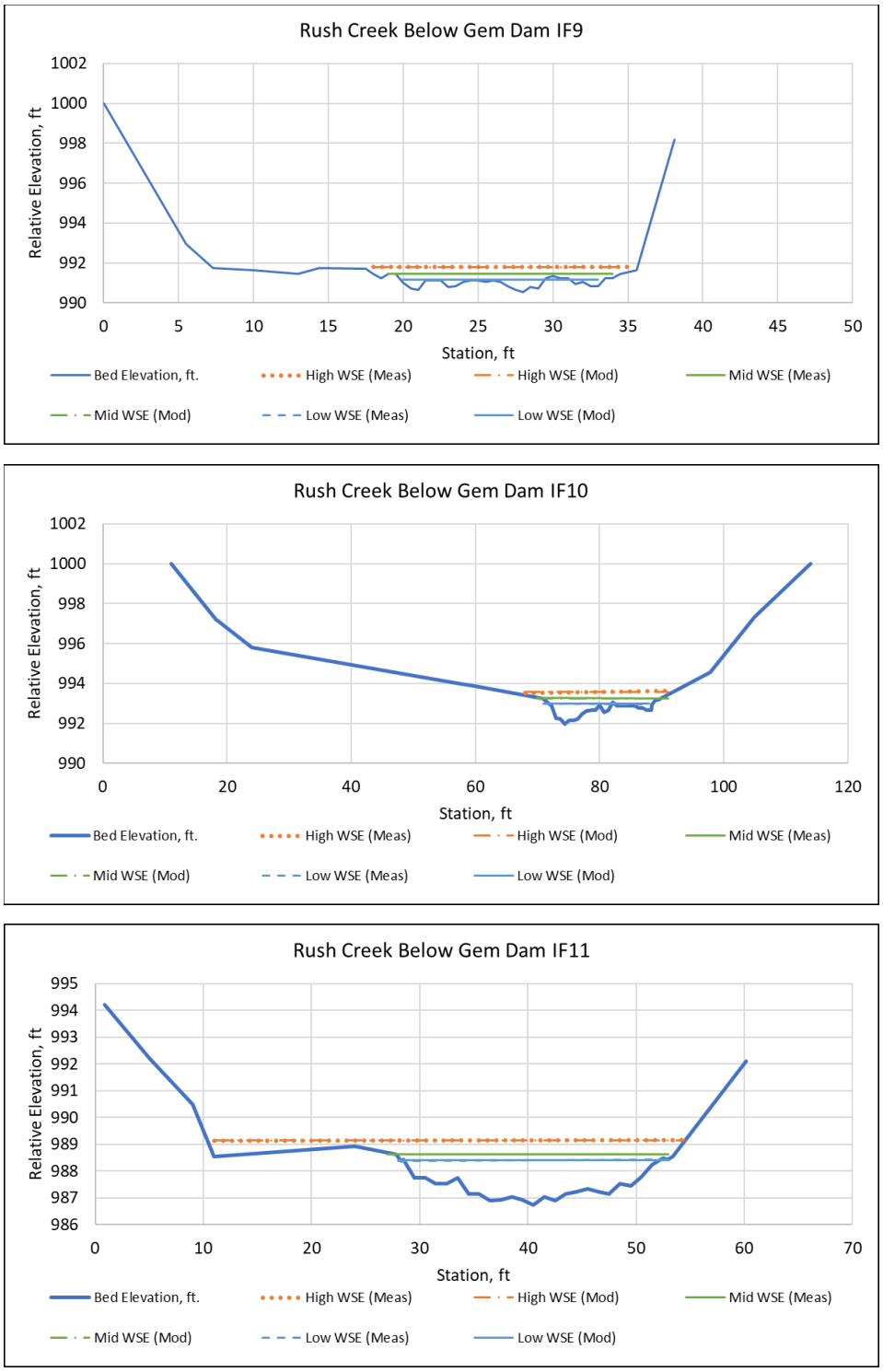


Figure AQ 1-G4. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Sections IF9 (top), IF10 (middle), and IF11 (bottom)

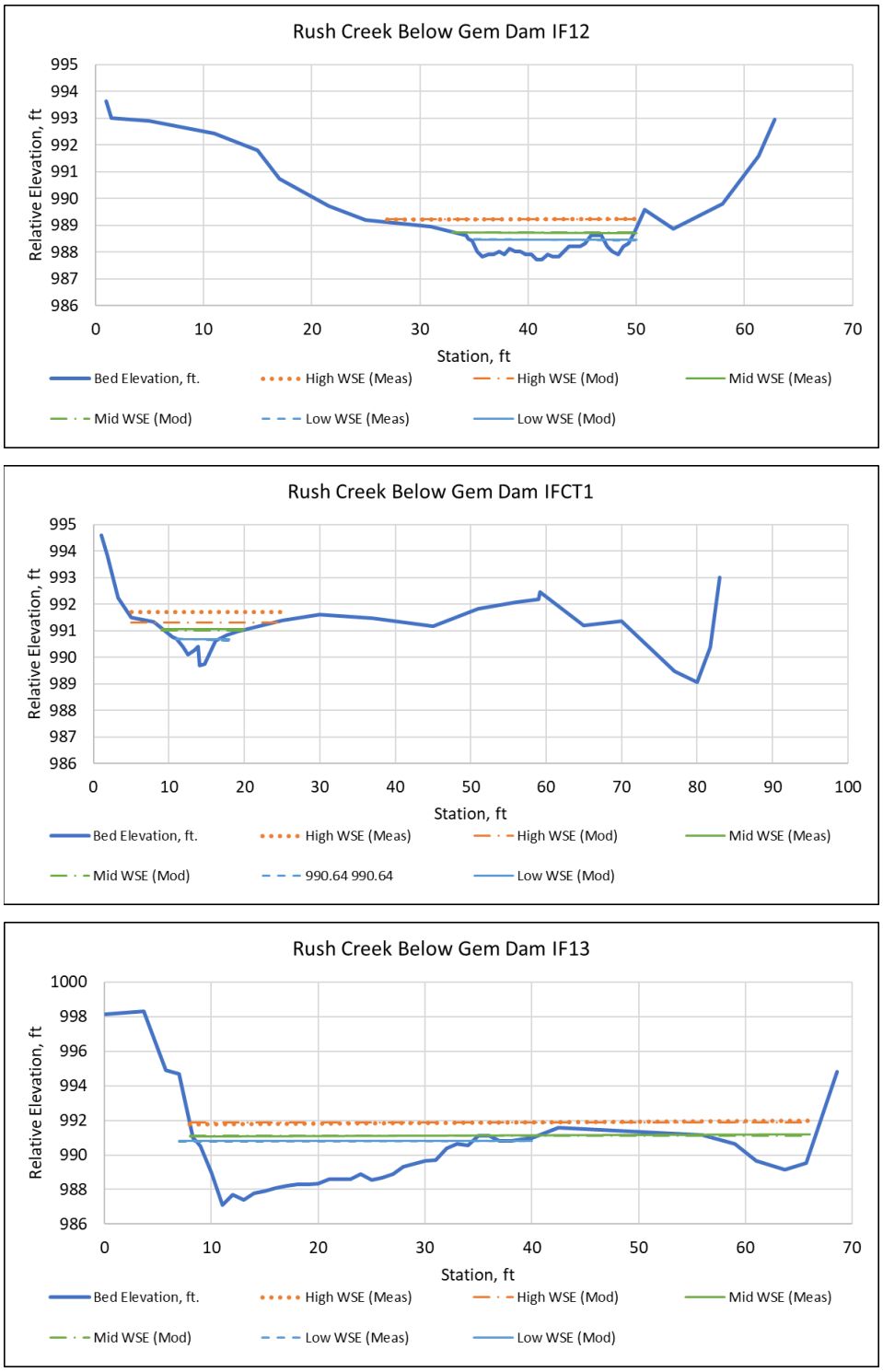


Figure AQ 1-G5. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Sections IF12 (top), IFCT1 (middle), and IF13 (bottom)

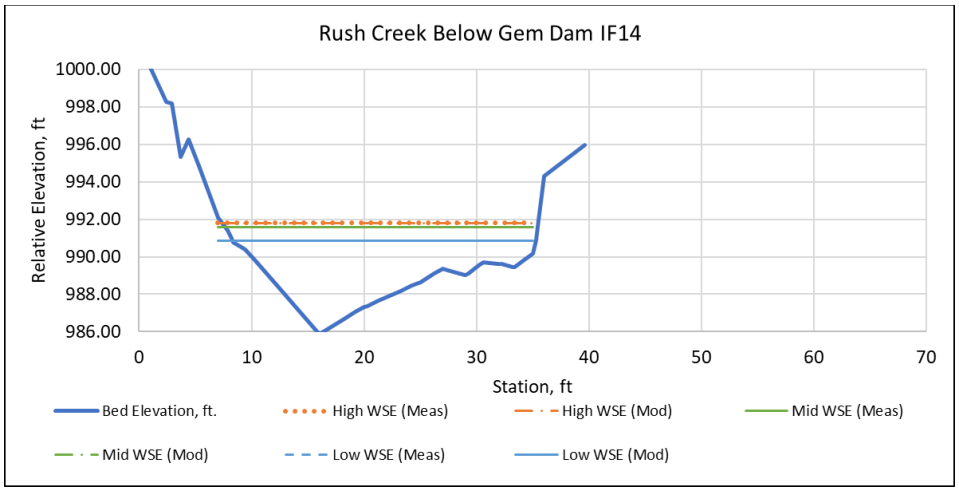


Figure AQ 1-G6. Comparison of measured and modeled water surface elevation for Rush Creek below Gem Dam Cross Section IF12=4

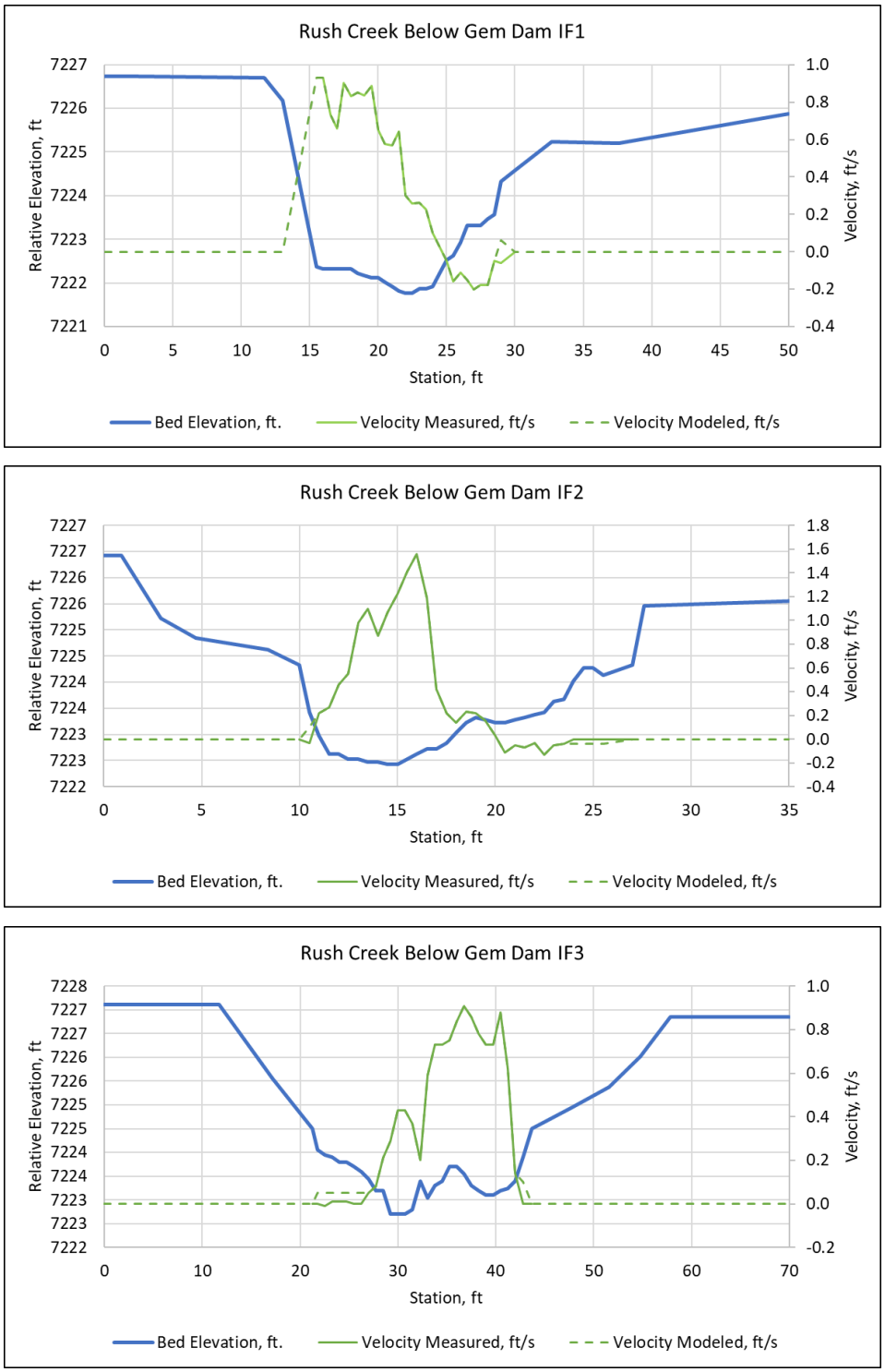


Figure AQ 1-G7. Comparison of measured and modeled velocity for Rush Creek below Gem Dam Cross Sections IF1 (top), IF2 (middle), and IF3 (bottom)

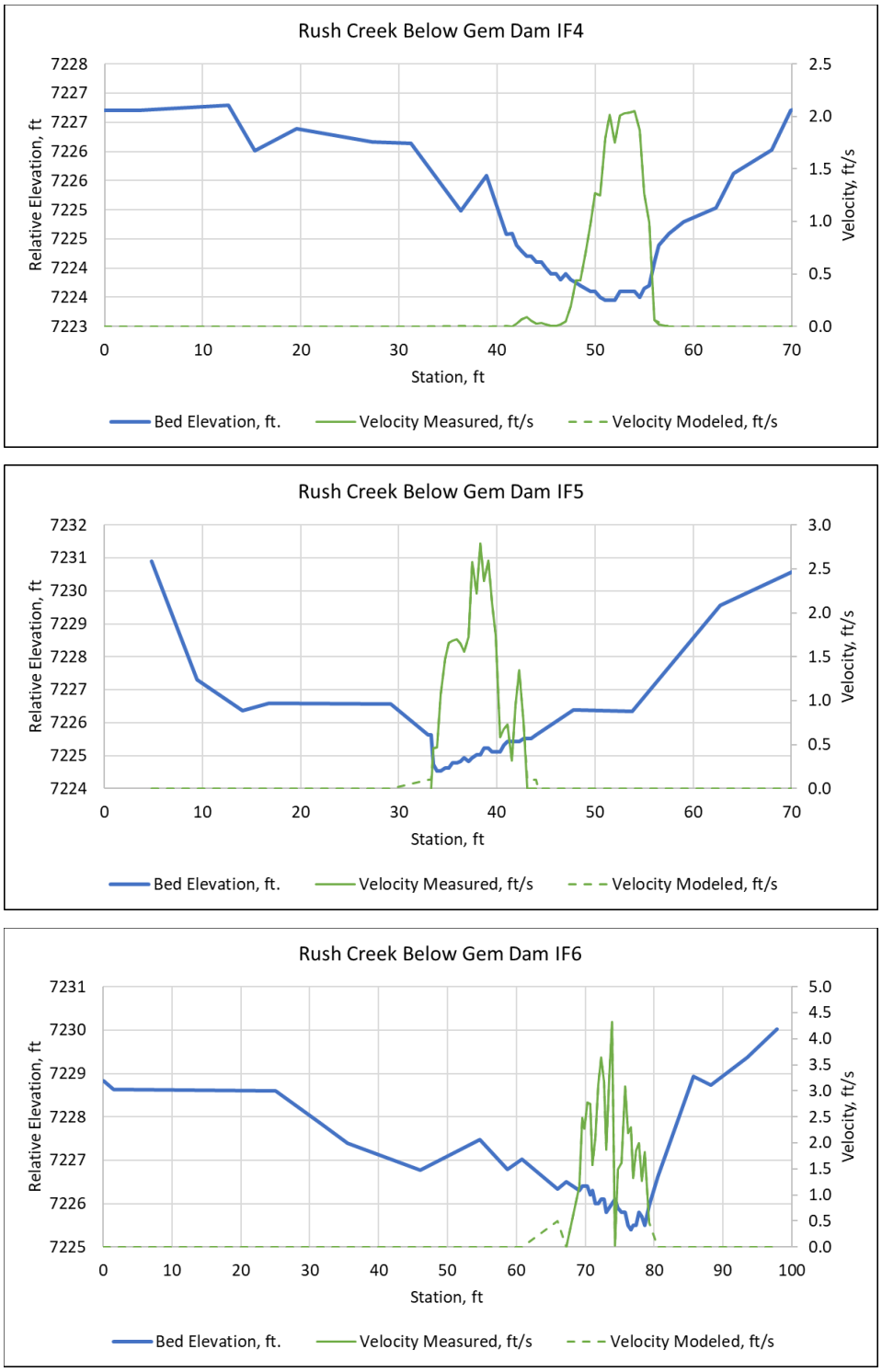
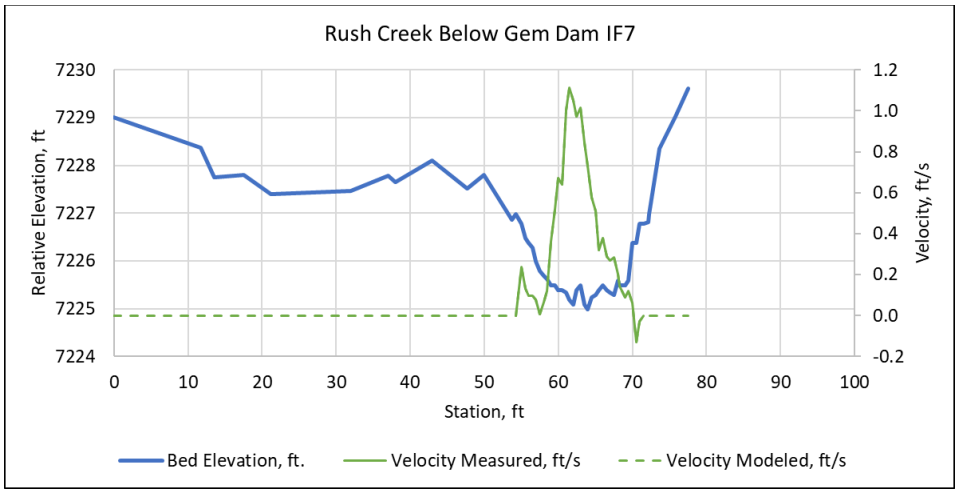
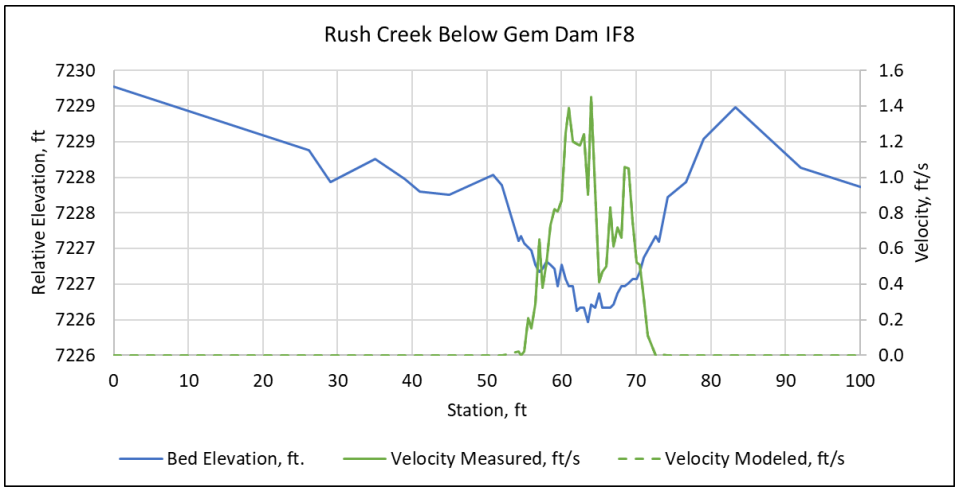


Figure AQ 1-G8. Comparison of measured and modeled velocity for Rush Creek below Gem Dam Cross Sections IF4 (top), IF5 (middle), and IF6 (bottom)





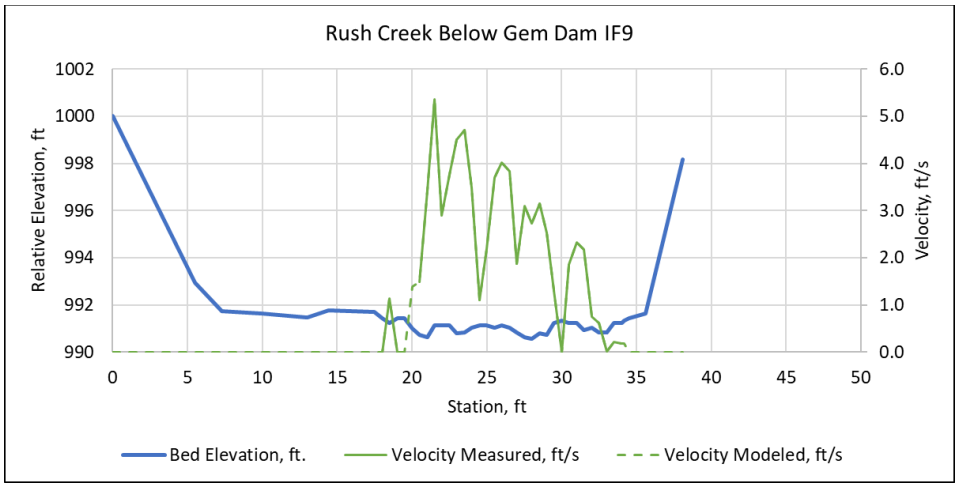


Figure AQ 1-G9. Comparison of measured and modeled velocity for Rush Creek below Gem Dam Cross Sections IF7 (top), IF8 (middle), and IF9 (bottom)

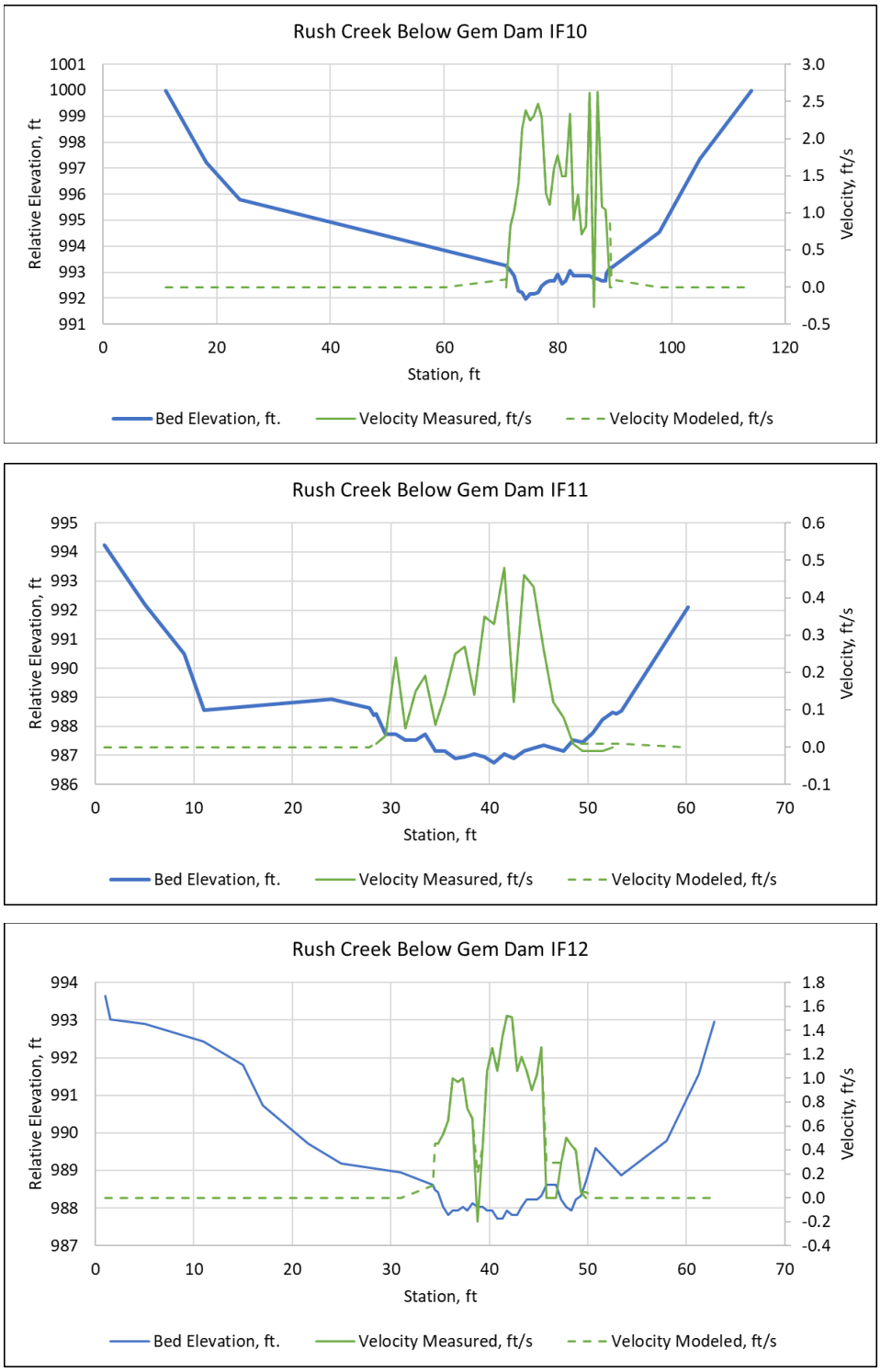


Figure AQ 1-G10. Comparison of measured and modeled velocity for Rush Creek below Gem Dam Cross Sections IF10 (top), IF11 (middle), and IF12 (bottom)

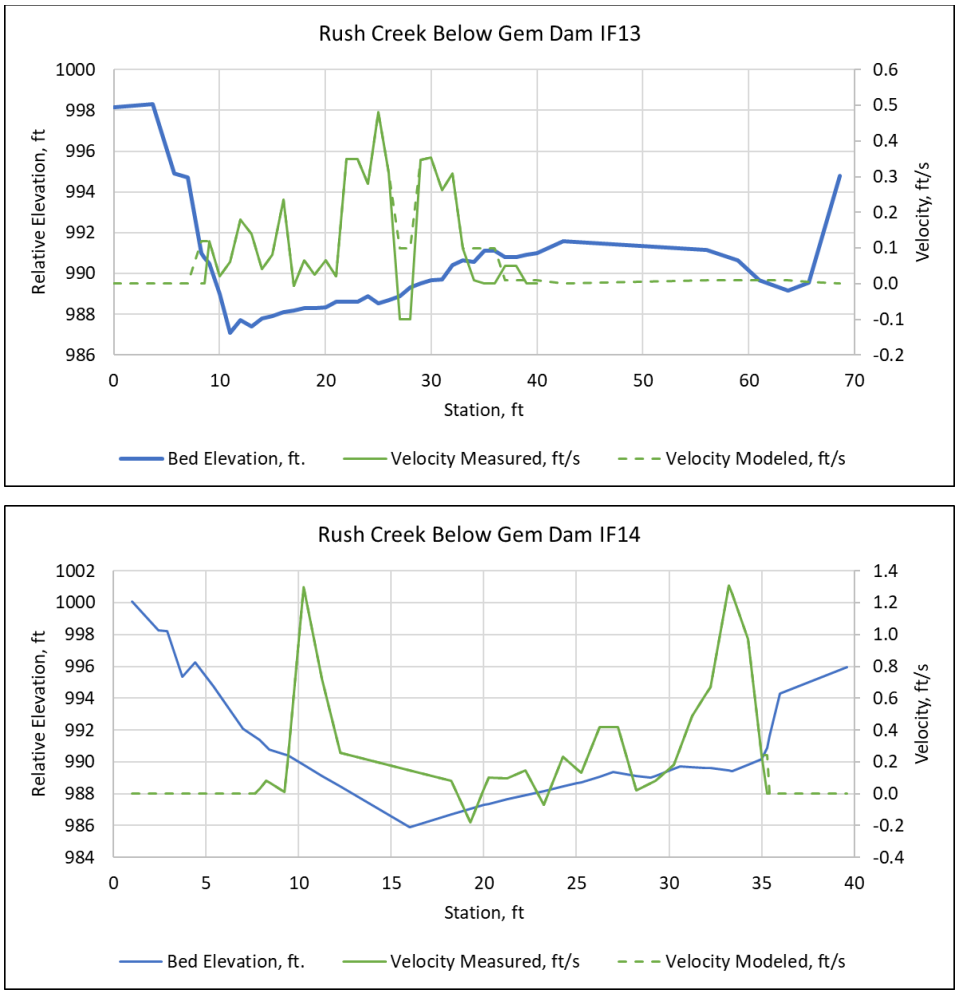


Figure AQ 1-G11. Comparison of measured and modeled velocity for Rush Creek below Gem Dam Cross Sections IF13 (top) and IF14 (bottom).

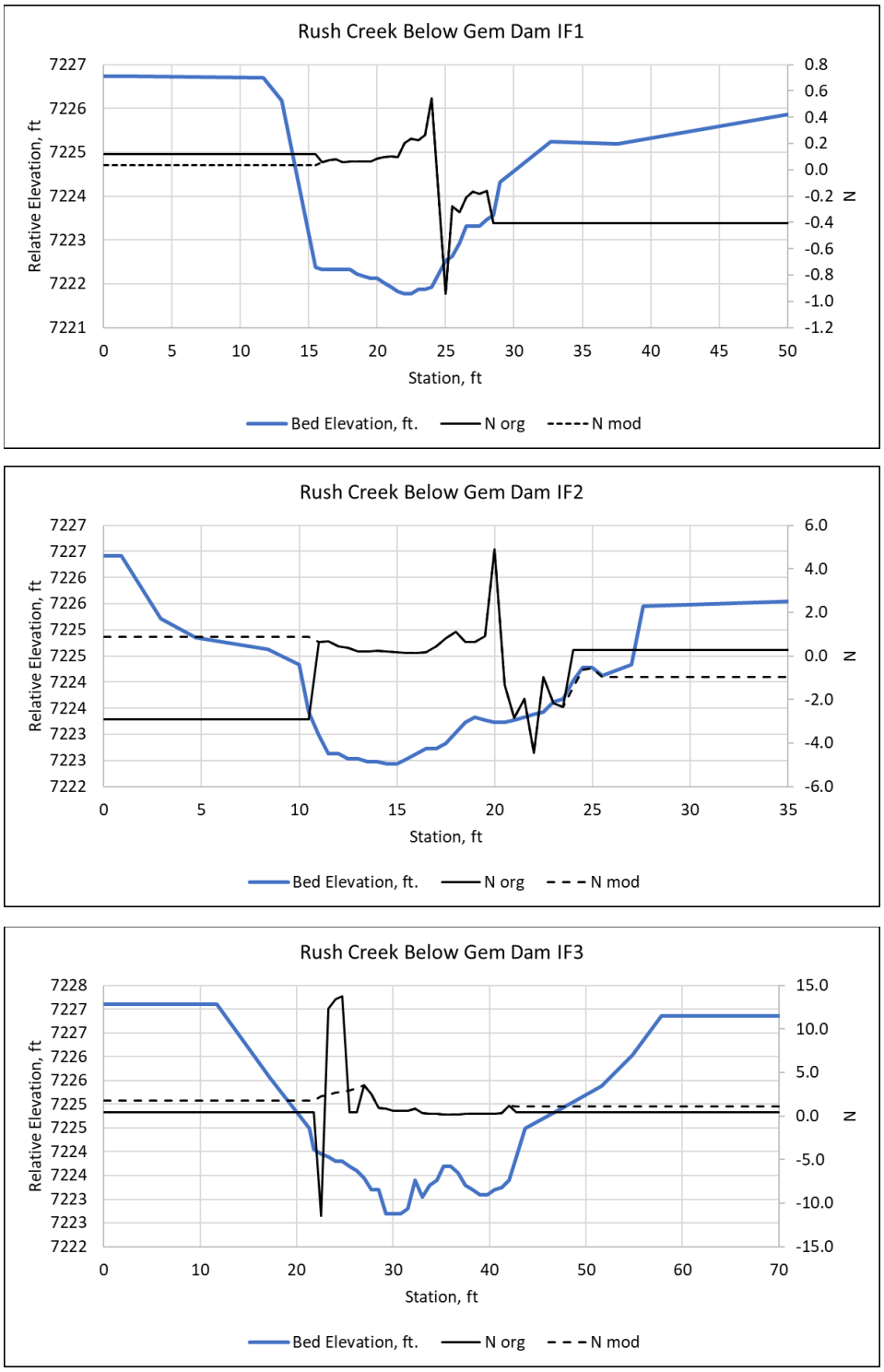


Figure AQ 1-G12. Comparison of original and modified Mannings n for Rush Creek below Gem Dam Cross Sections IF1 (top), IF2 (middle), and IF3 (bottom)

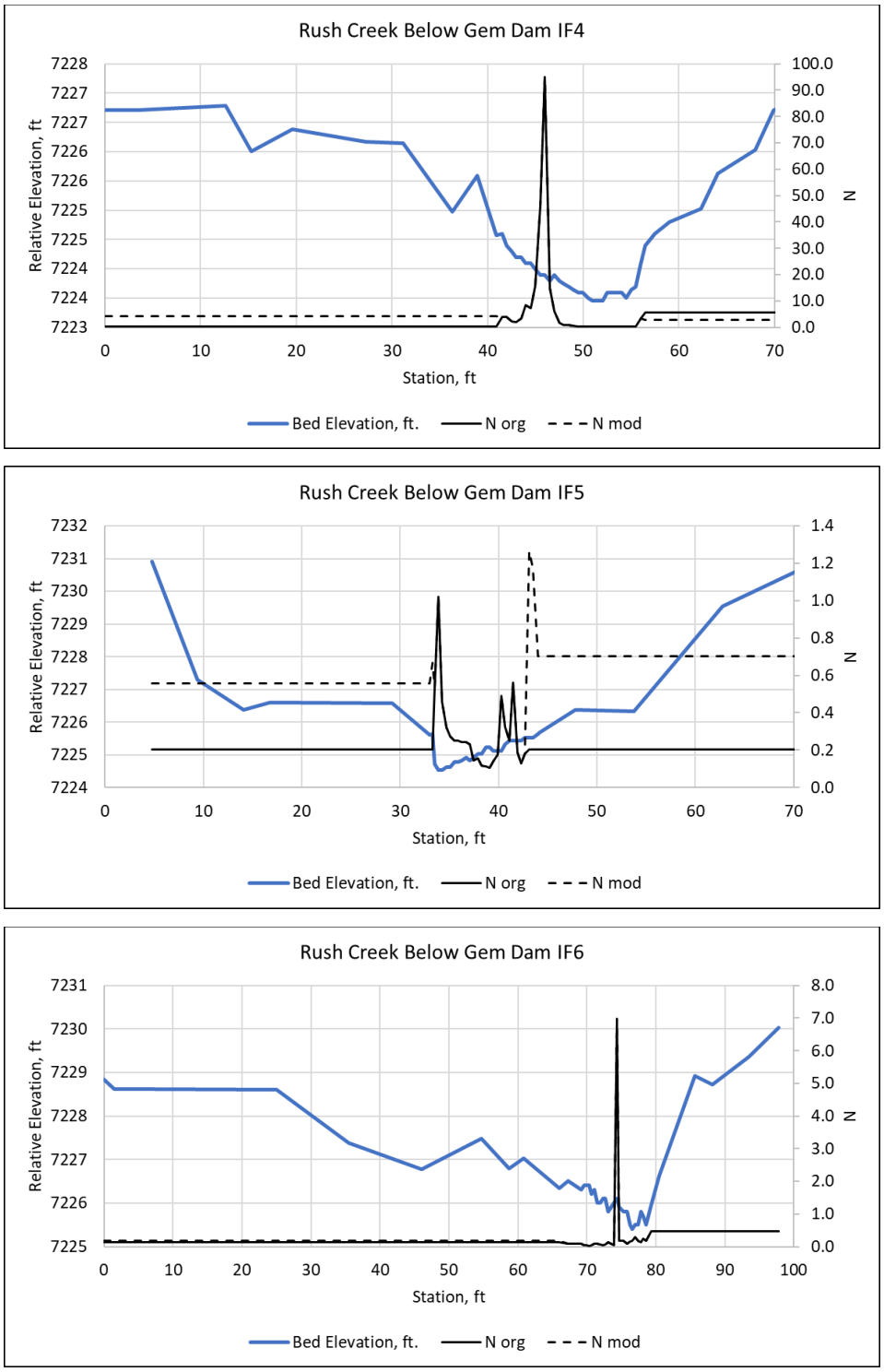


Figure AQ 1-G13. Comparison of original and modified Mannings n for Rush Creek below Gem Dam Cross Sections IF4 (top), IF5 (middle), and IF6 (bottom)

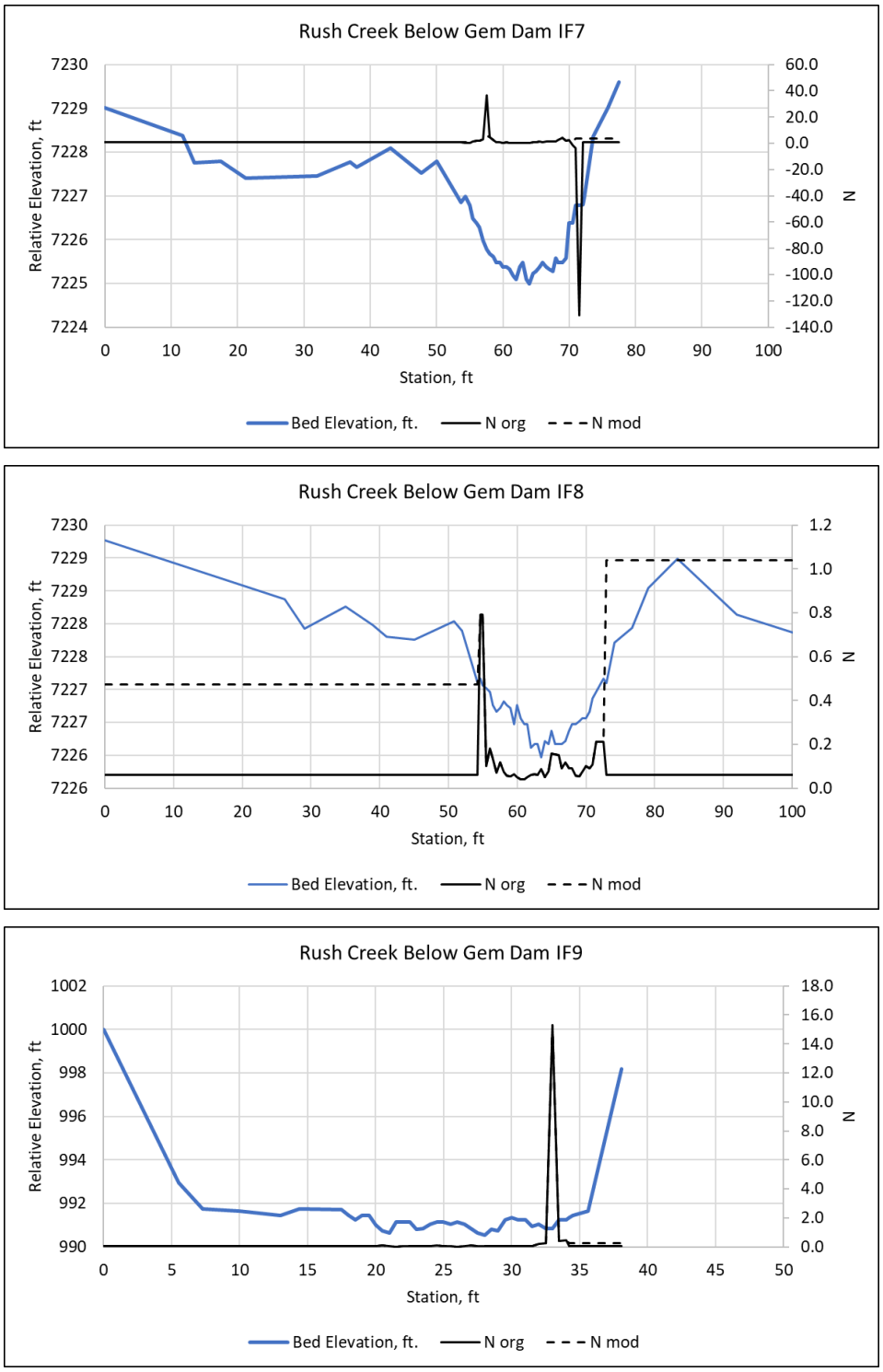


Figure AQ 1-G14. Comparison of original and modified Mannings n for Rush Creek below Gem Dam Cross Sections IF7 (top), IF8 (middle), and IF9 (bottom)

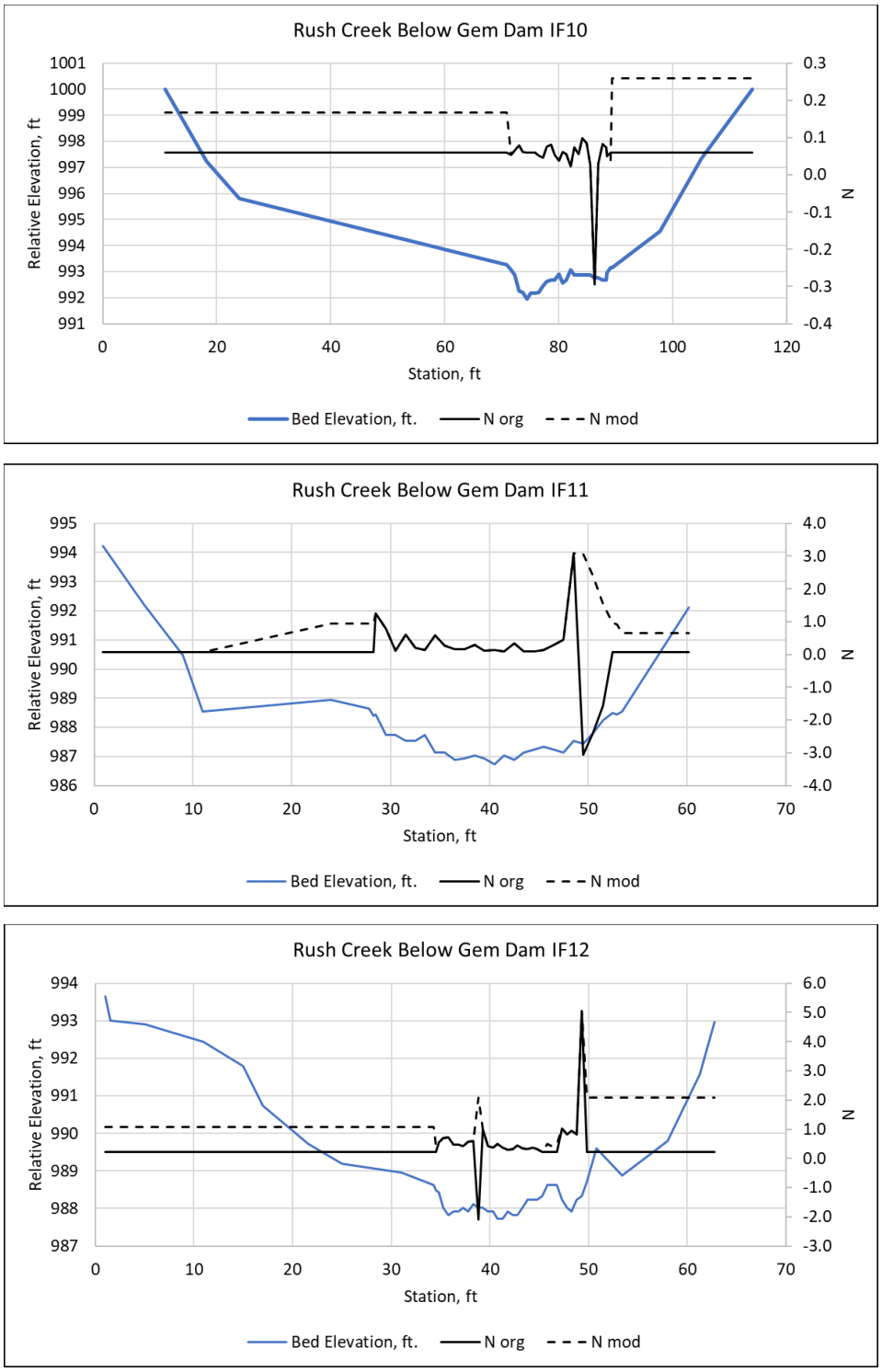


Figure AQ 1-G15. Comparison of original and modified Mannings n for Rush Creek below Gem Dam Cross Sections IF10 (top), IF11 (middle), and IF12 (bottom)

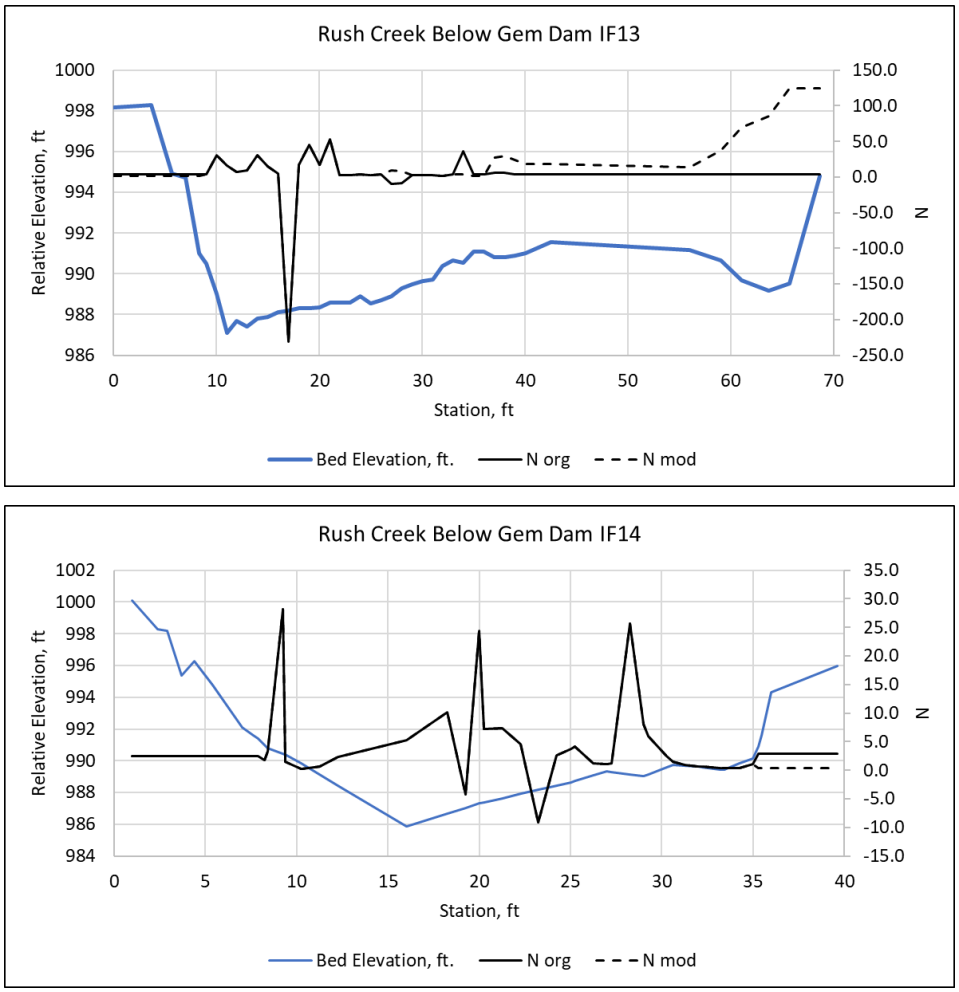


Figure AQ 1-G16. Comparison of original and modified Mannings n for Rush Creek below Gem Dam Cross Sections IF13 (top) and IF14 (bottom)

APPENDIX H

Modeled Versus Measured Hydraulics (Rush Creek below Silver Lake)

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INTRODUCTION

The following Figure AQ 1-H1 through Figure AQ 1-H10 show a comparison between the measured water surface elevation and the modeled water surface elevation. Figure AQ 1-H11 through Figure AQ 1-H18 show the comparison between the measured velocity and the modeled velocity. Figure AQ 1-H19 through Figure AQ 1-H26 show the comparison between the original Mannings n and the adjusted Mannings n.

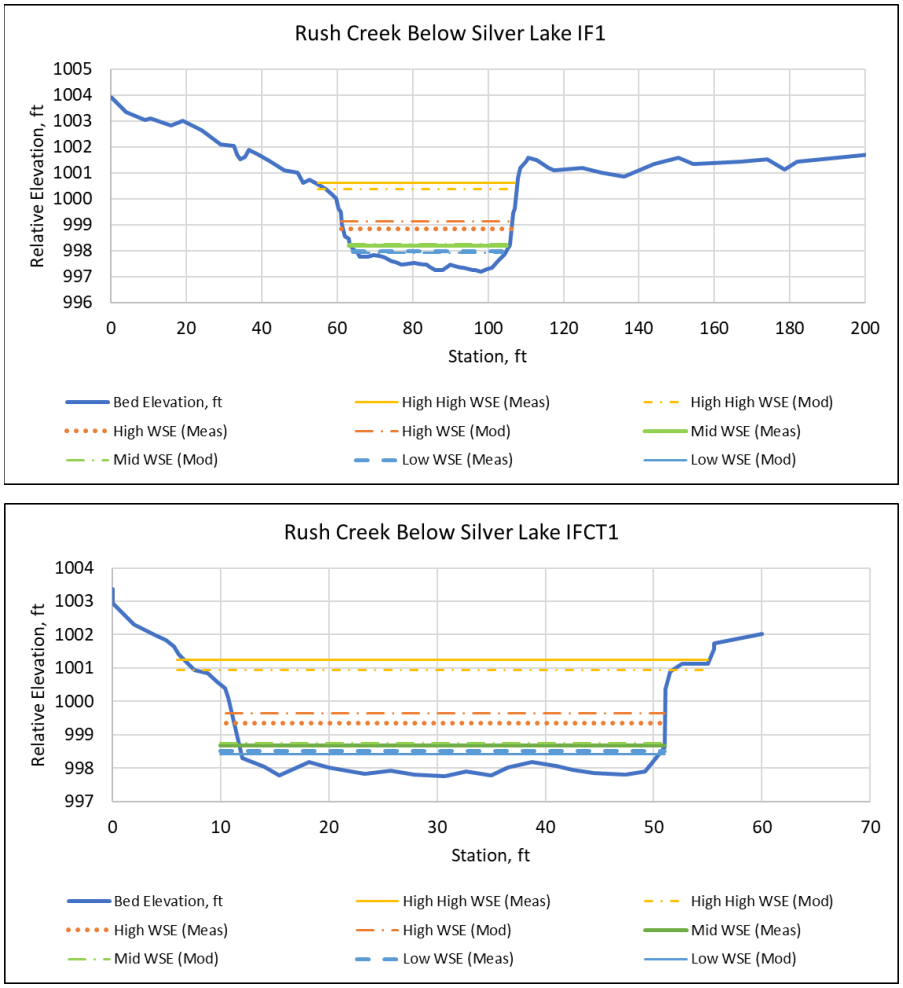


Figure AQ 1-H1. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF1 (top) and IFCT1 (bottom)

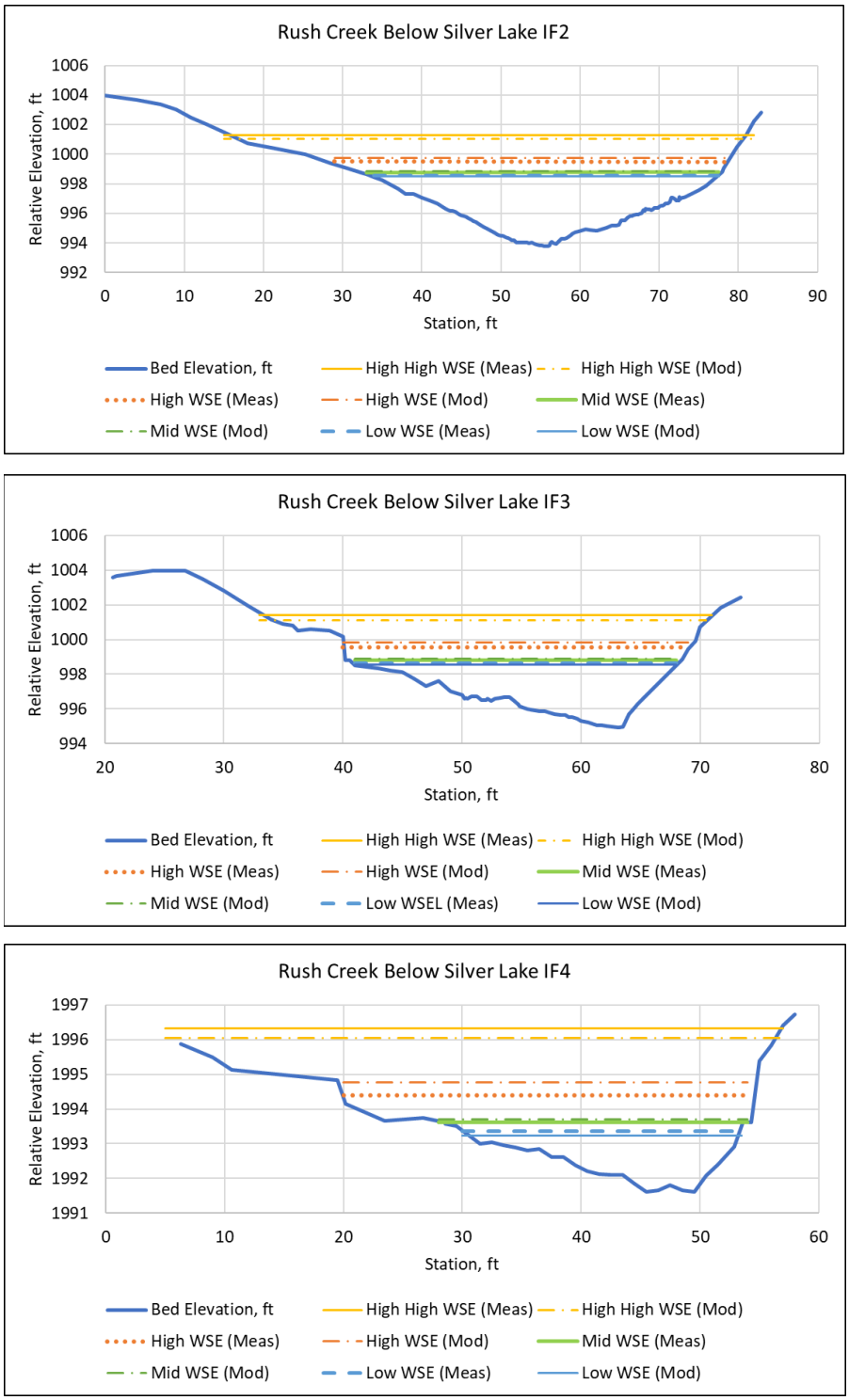


Figure AQ 1-H2. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF2 (top), IF3 (middle), and IF4 (bottom)

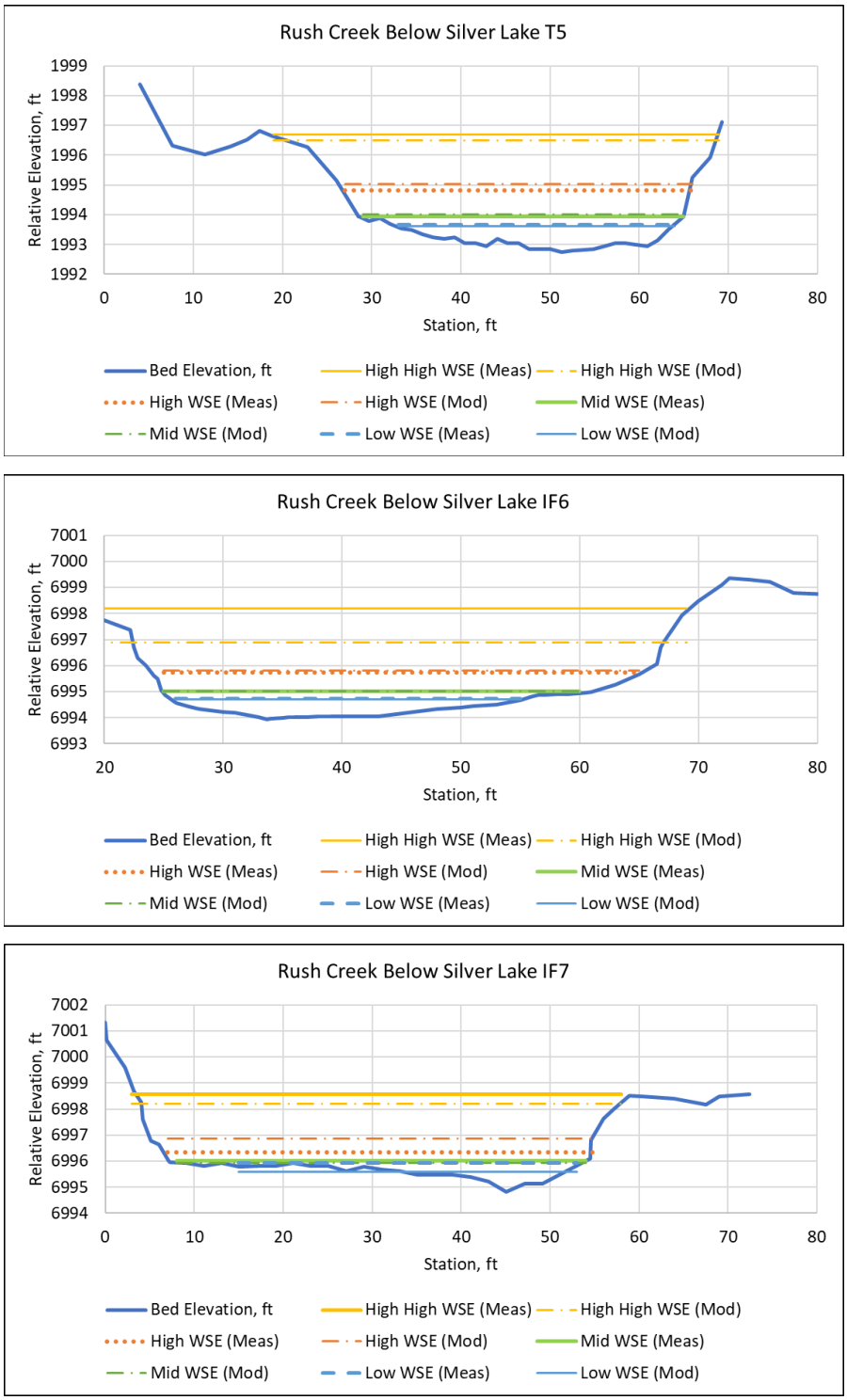


Figure AQ 1-H3. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF5 (top), IF6 (middle), and IF7 (bottom)

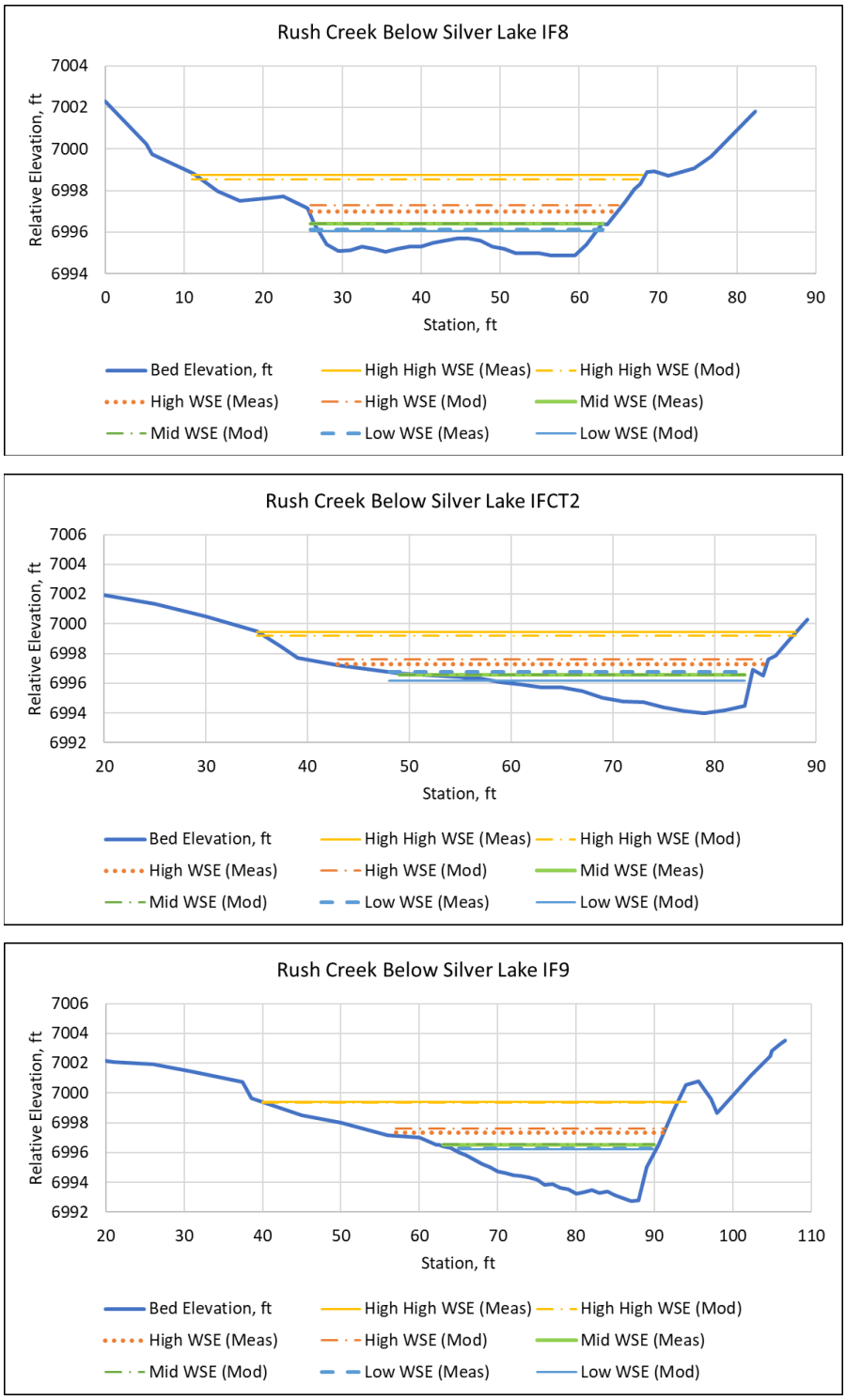


Figure AQ 1-H4. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF8 (top), IFCT2 (middle), and IF9 (bottom)

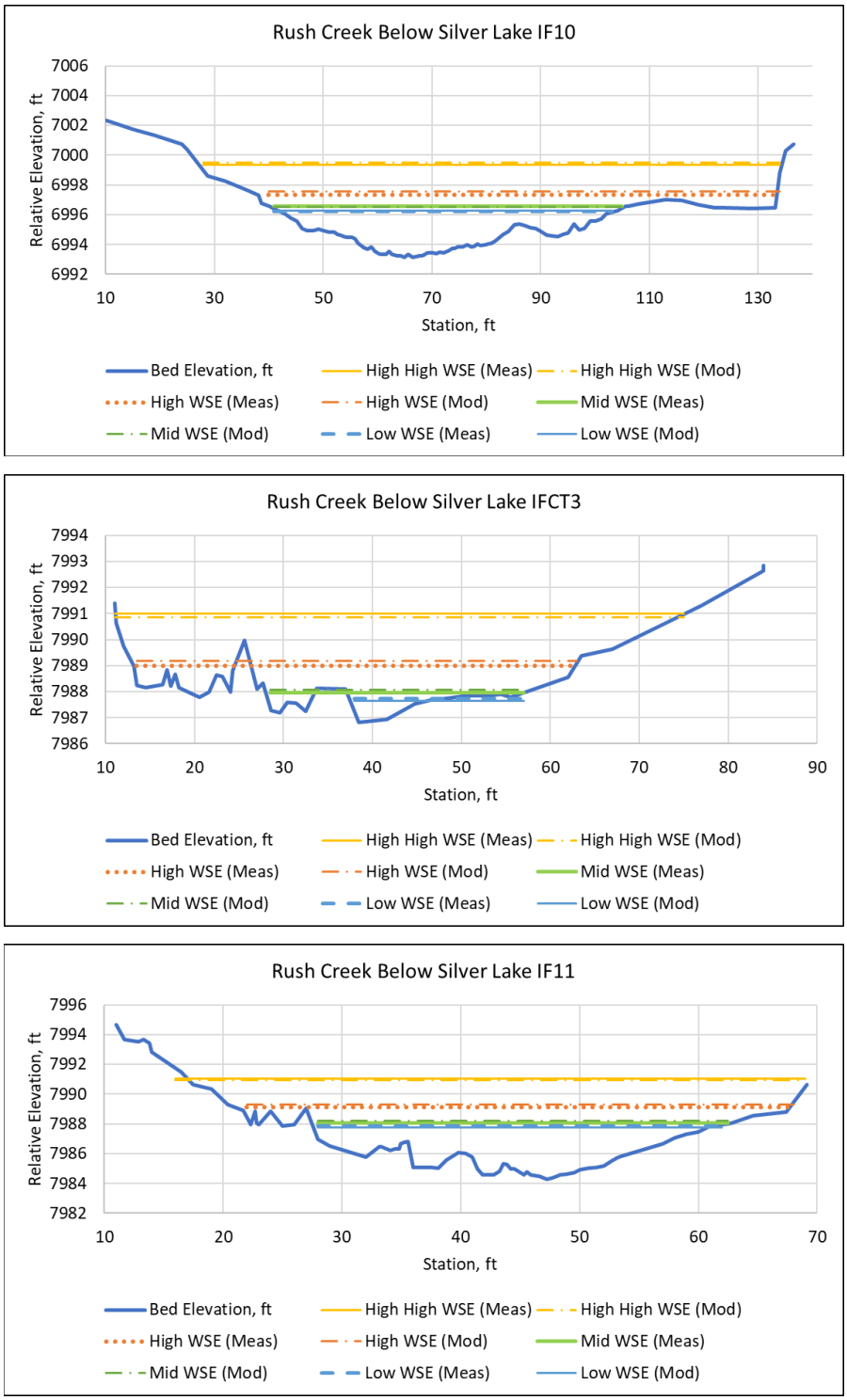


Figure AQ 1-H5. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF10 (top), IFCT3 (middle), and IF11 (bottom)

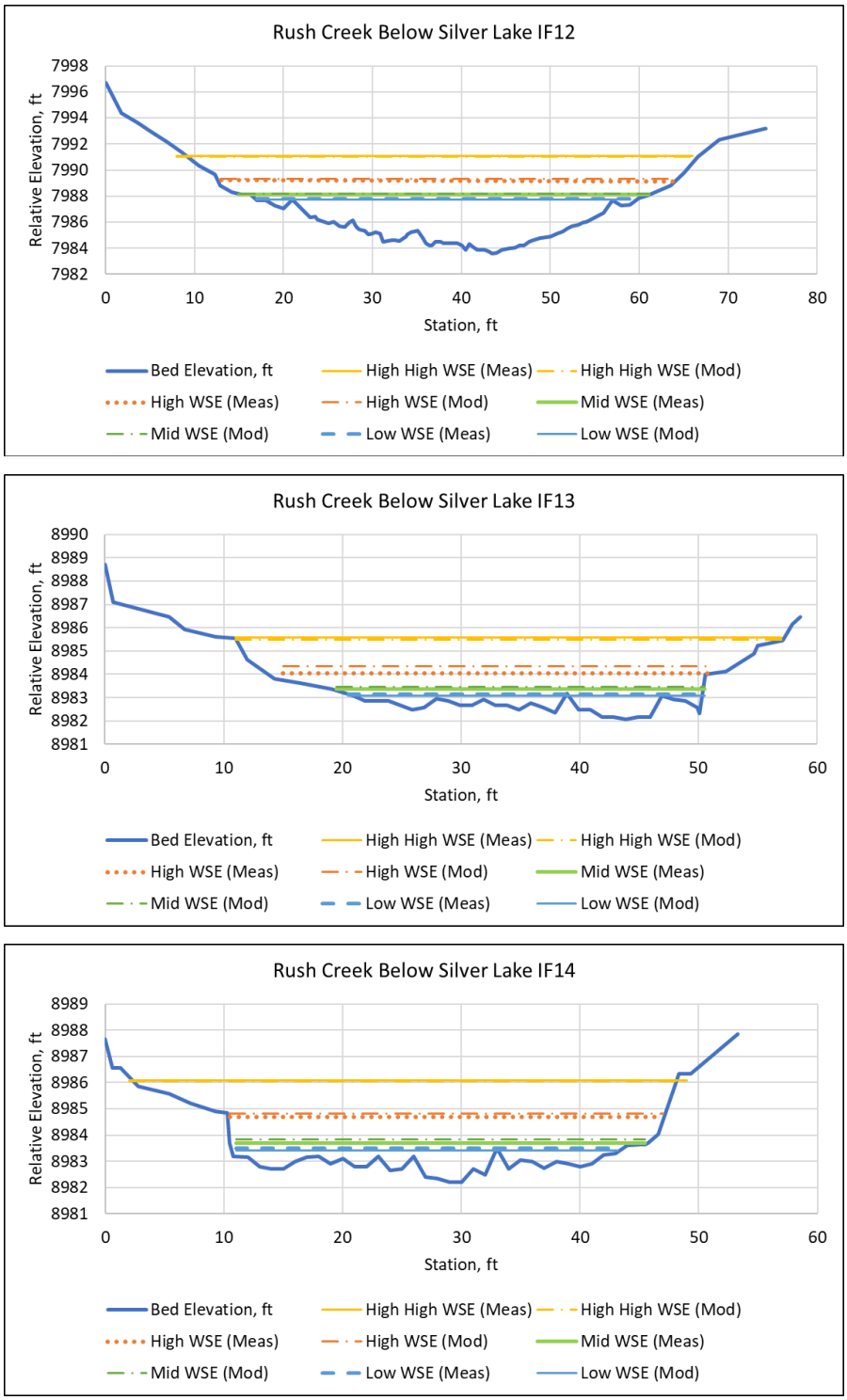


Figure AQ 1-H6. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF12 (top), IF13 (middle), and IF14 (bottom)

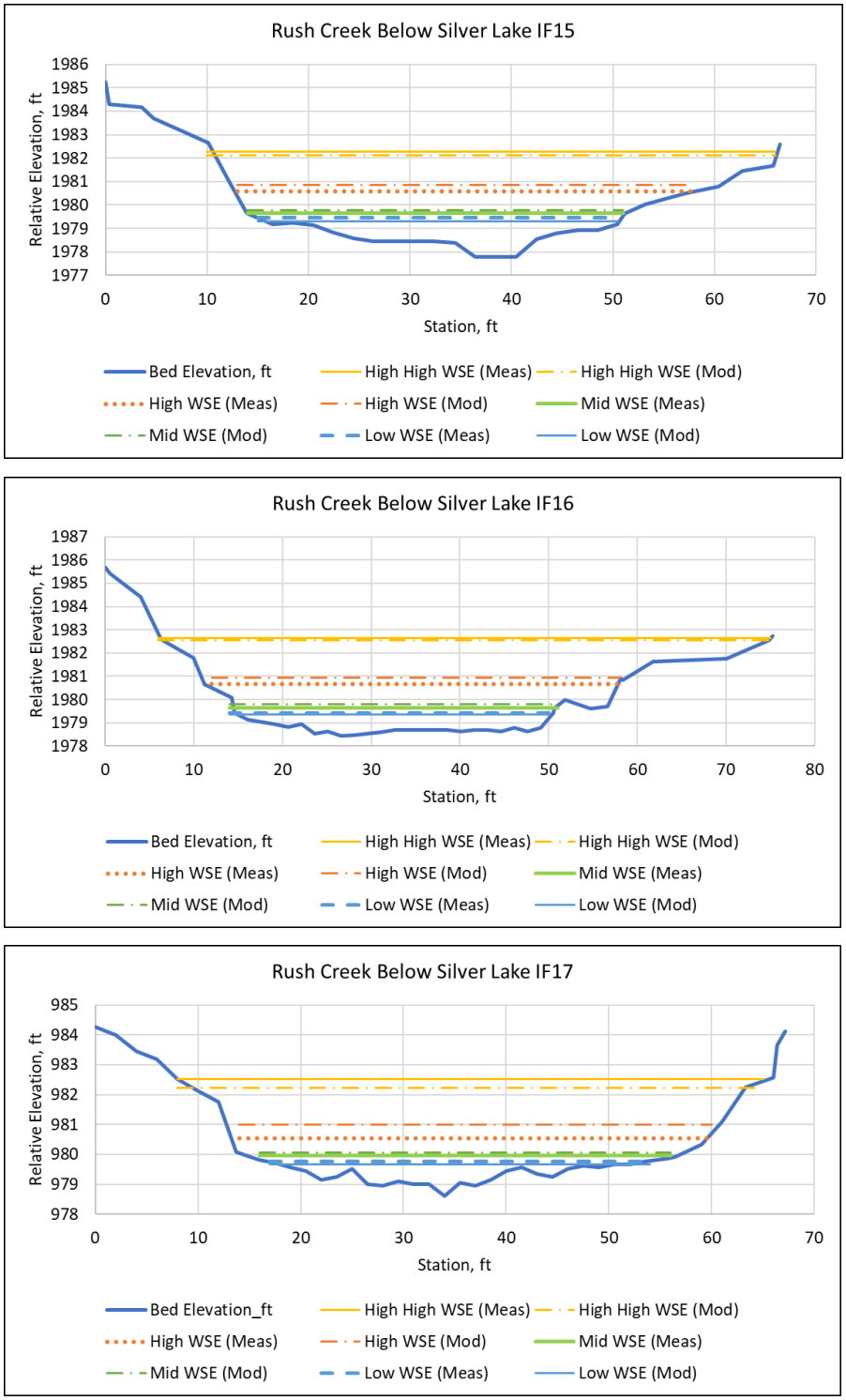


Figure AQ 1-H7. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF15 (top), IF16 (middle), and IF17 (bottom)

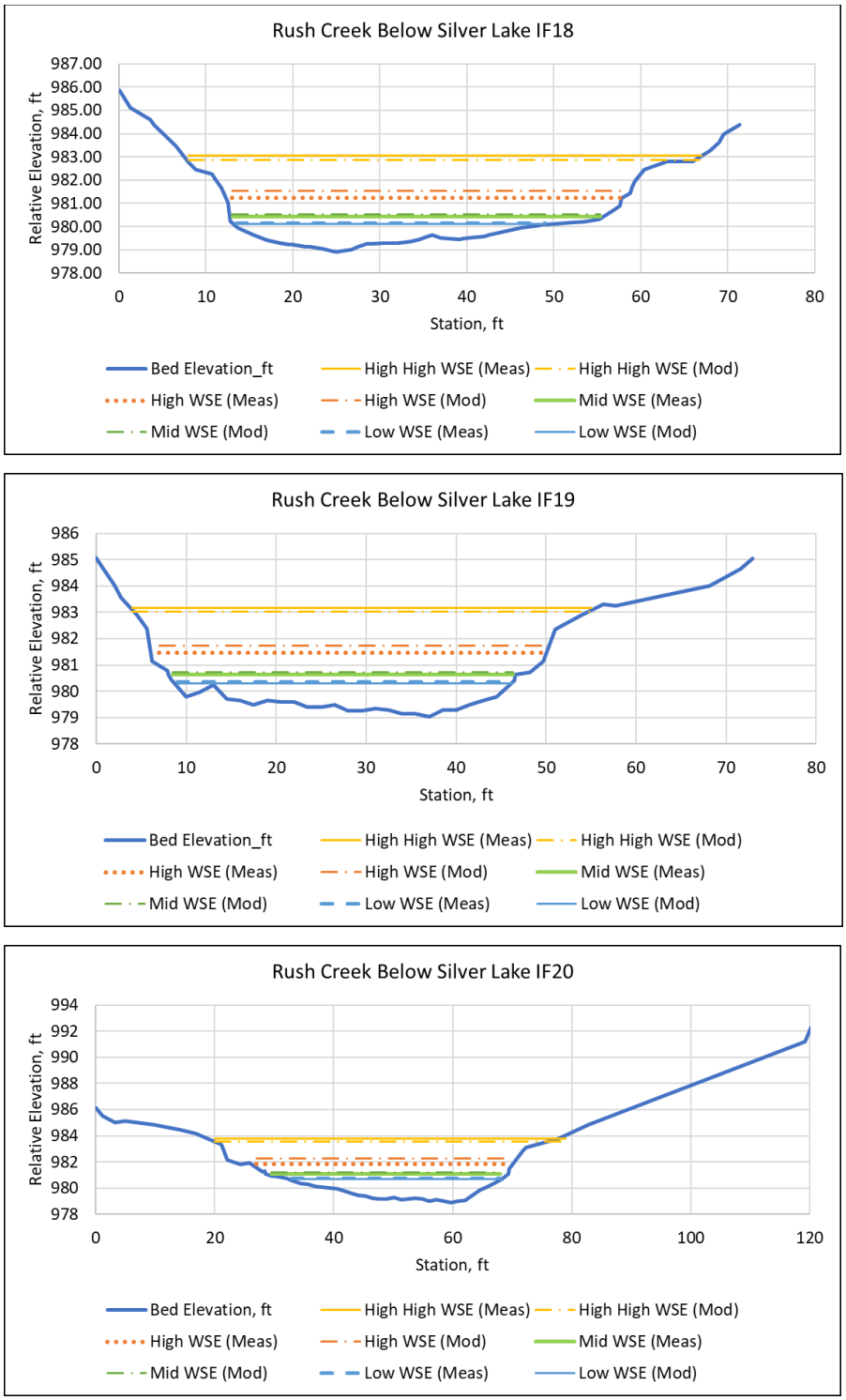


Figure AQ 1-H8. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF18 (top), IF19 (middle), and IF20 (bottom)

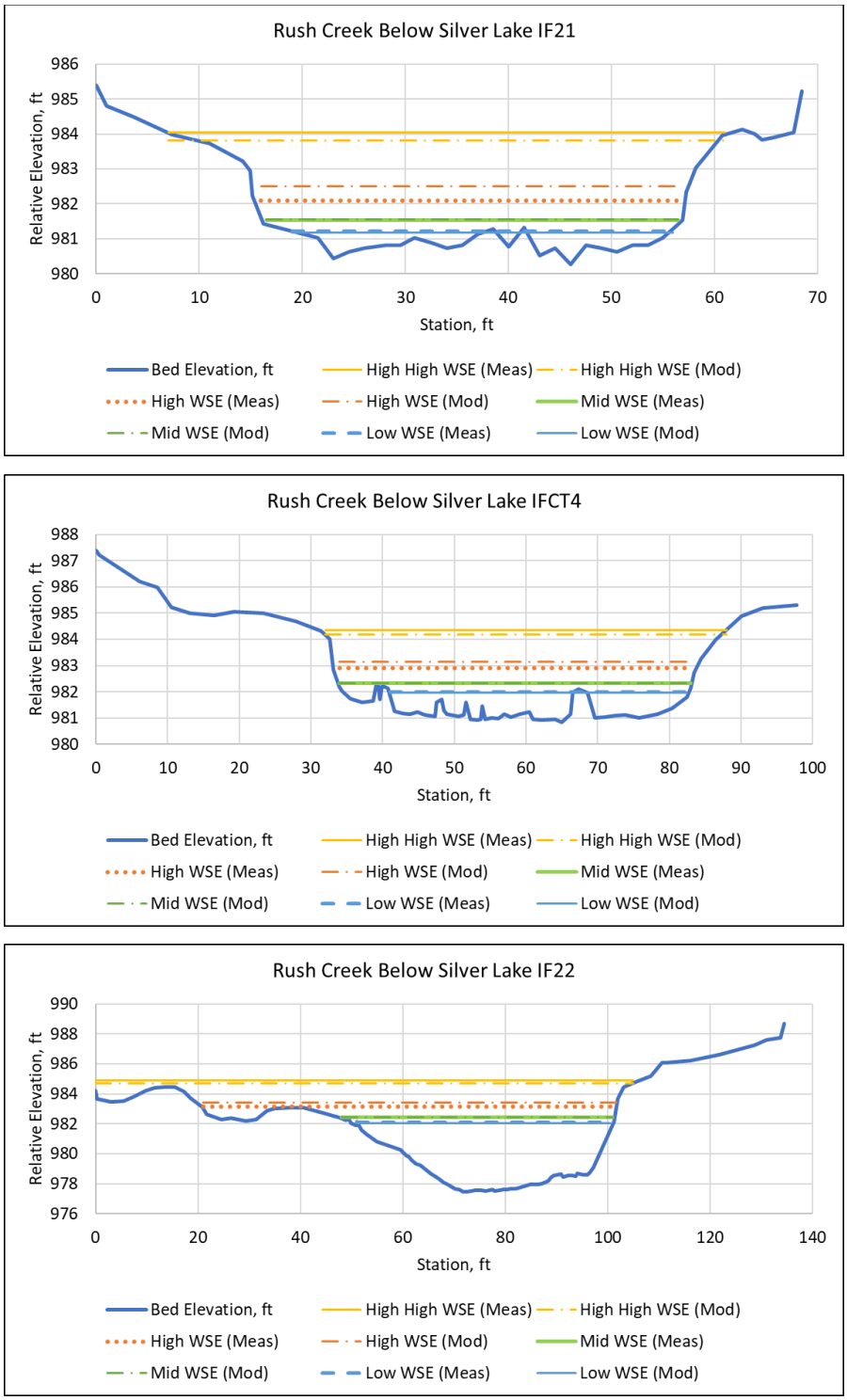


Figure AQ 1-H9. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF21 (top), IFCT4 (middle), and IF22 (bottom)

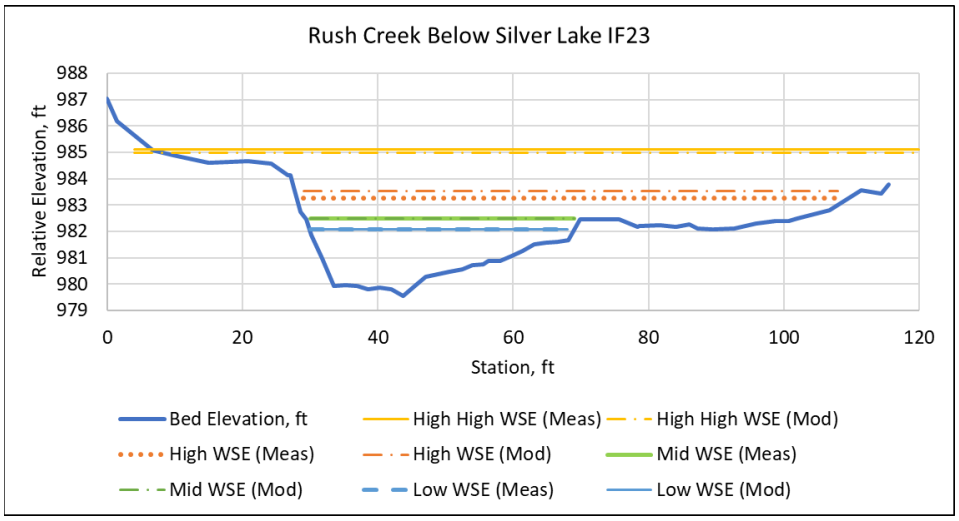


Figure AQ 1-H10. Comparison of measured and modeled water surface elevation for Rush Creek below Silver Lake Cross Sections IF23

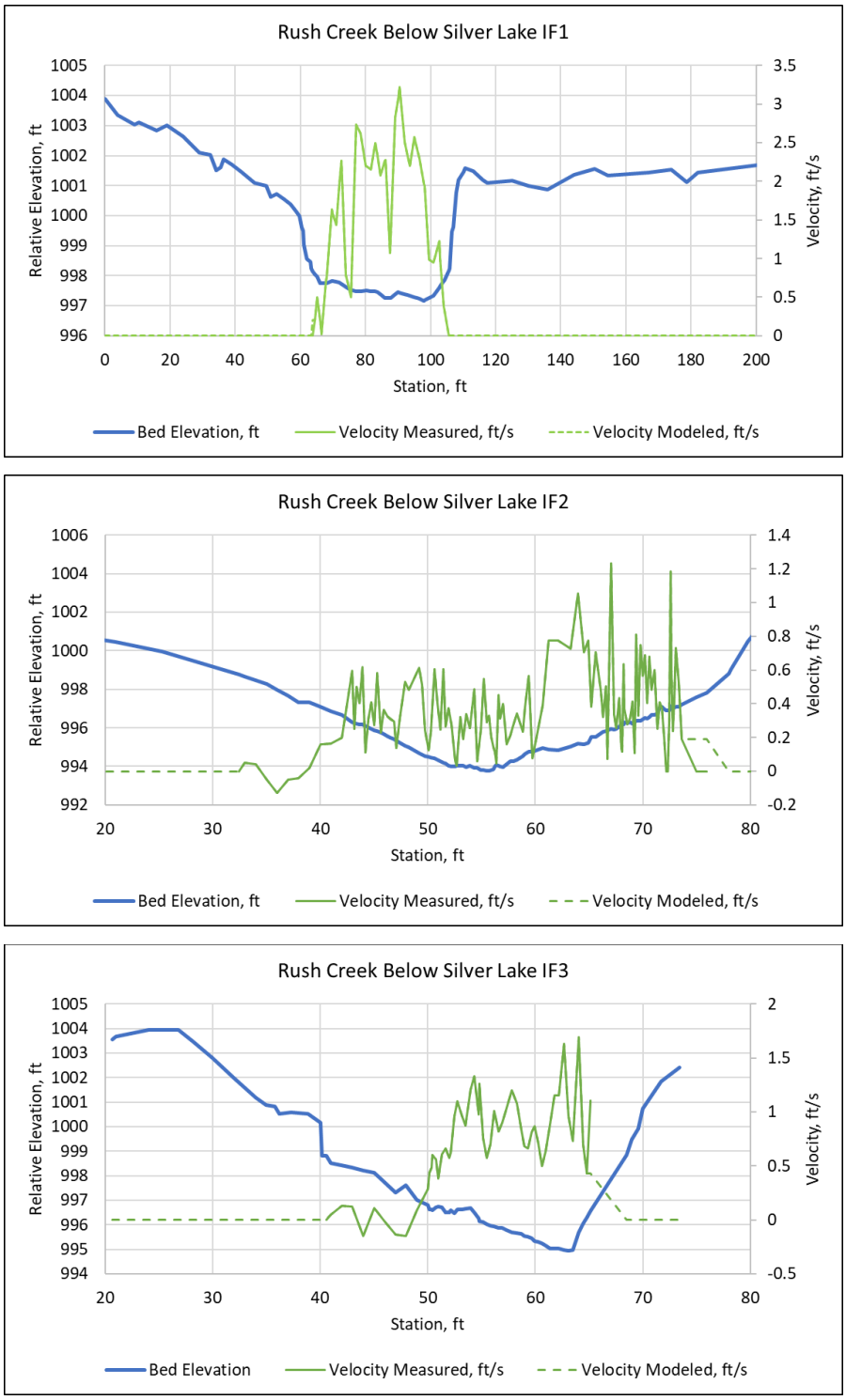


Figure AQ 1-G11. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF1 (top), IF2 (middle), and IF3 (bottom)

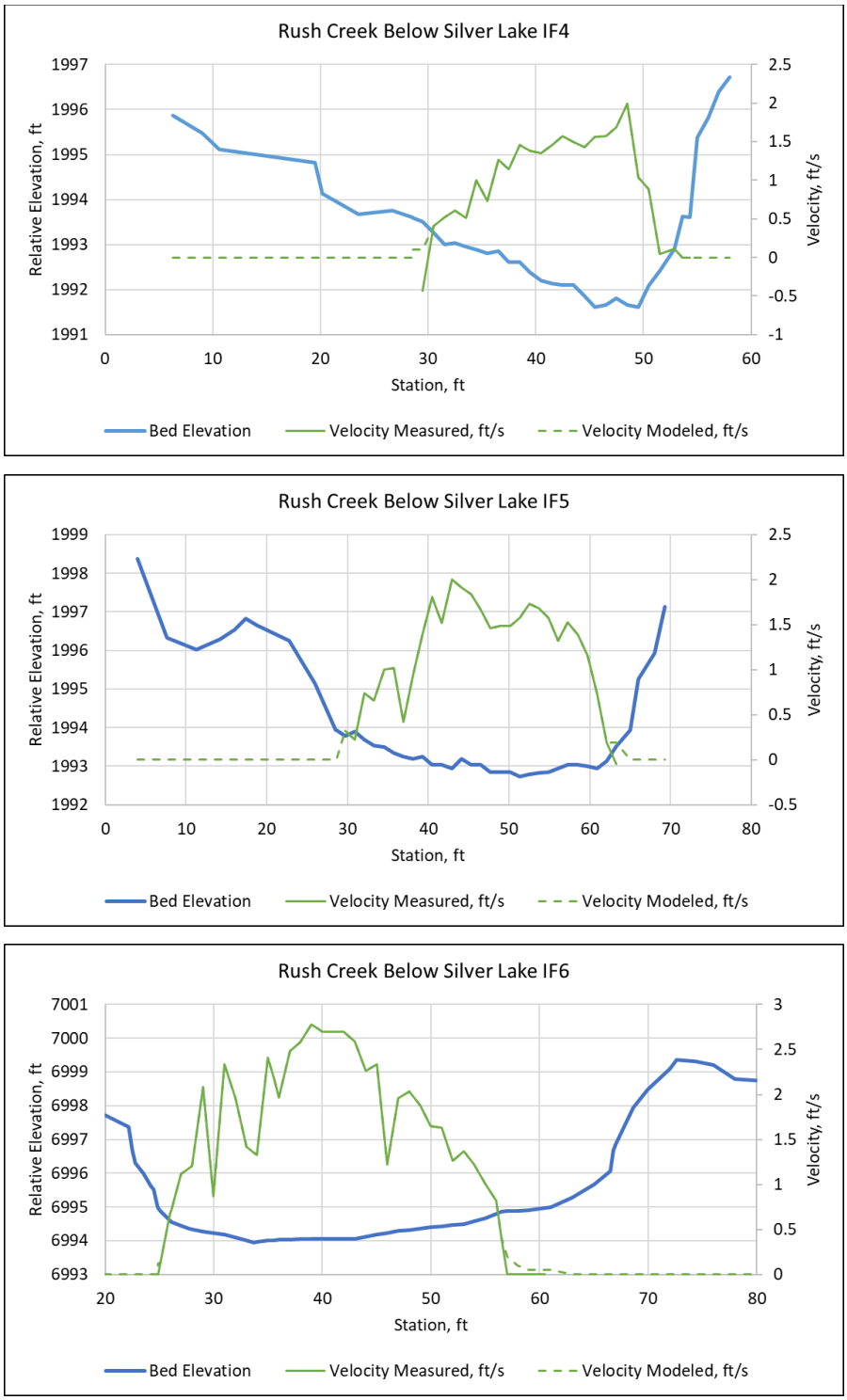


Figure AQ 1-G12. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF4 (top), IF5 (middle), and IF6 (bottom)

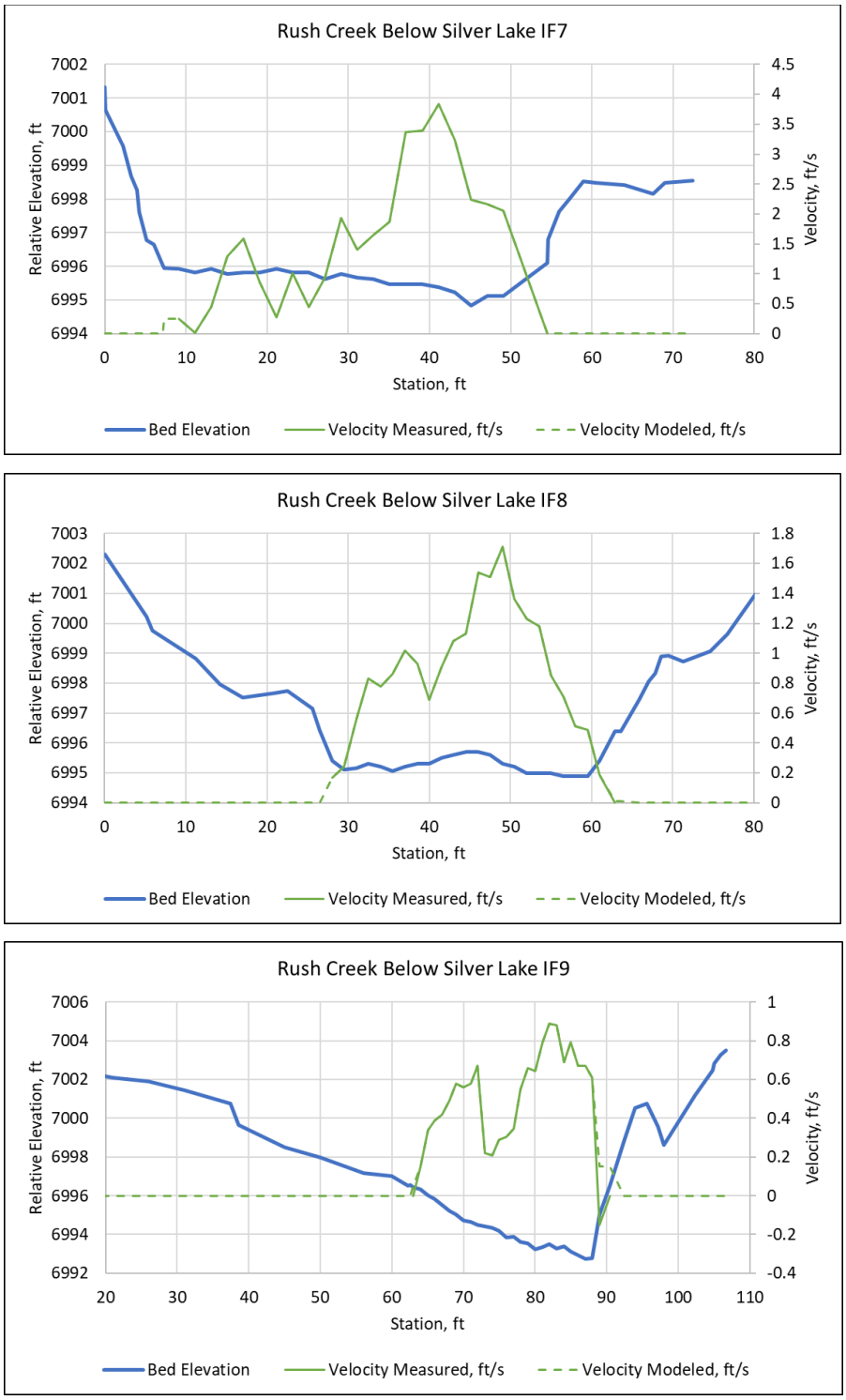


Figure AQ 1-G13. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF7 (top), IF8 (middle), and IF9 (bottom)

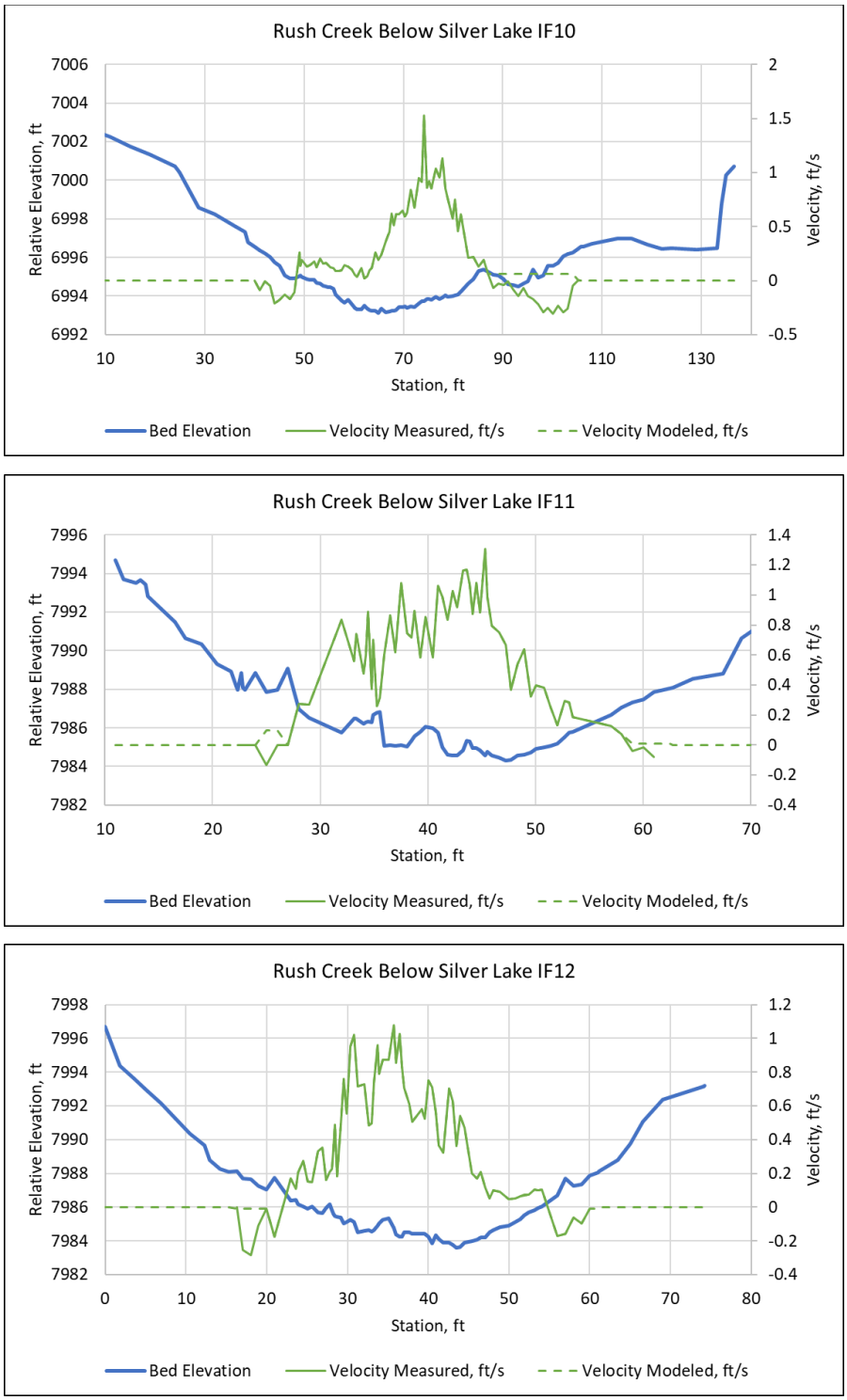


Figure AQ 1-G14. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF10 (top), IF11 (middle), and IF12 (bottom)

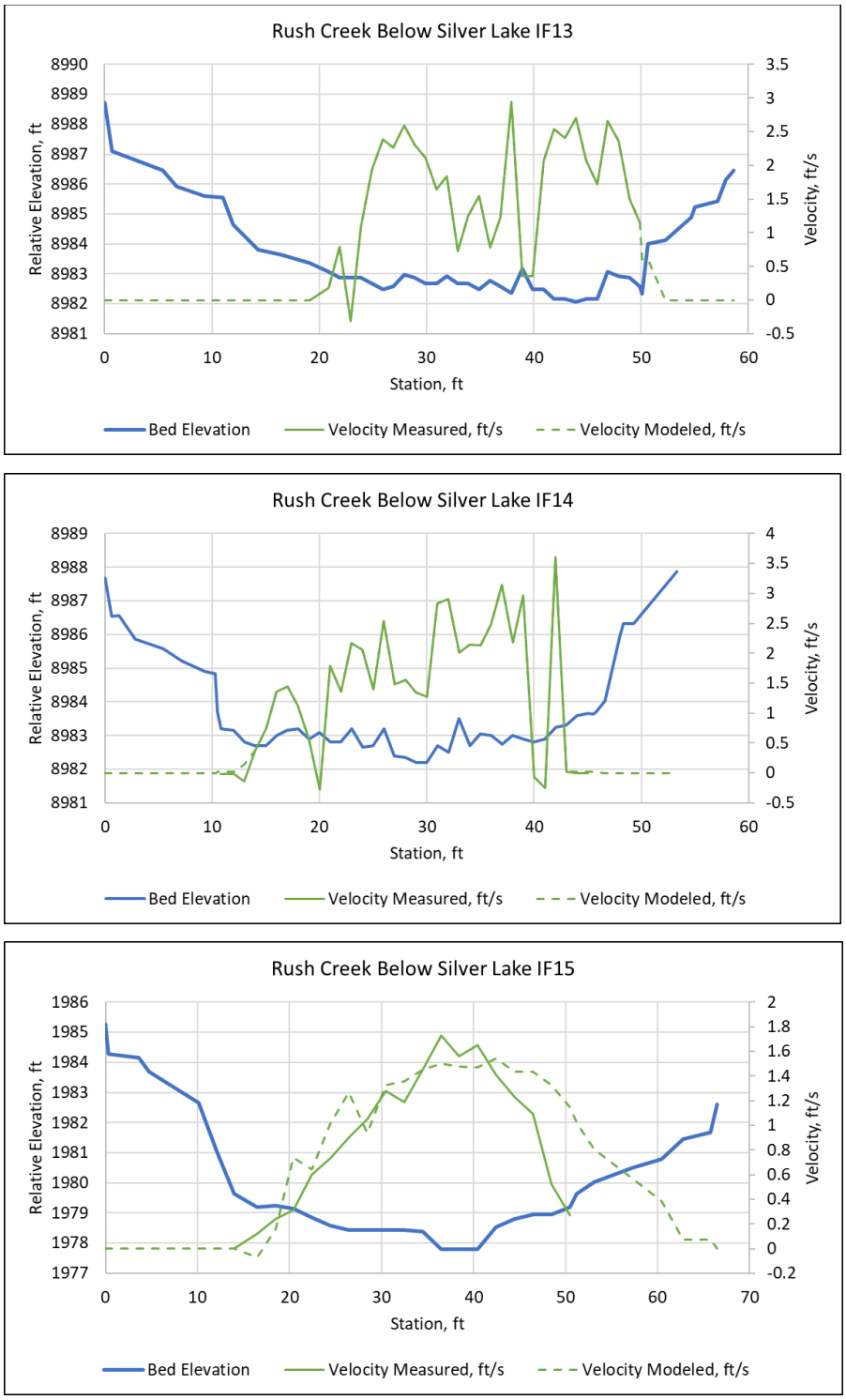


Figure AQ 1-G15. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF13 (top), IF14 (middle), and IF15 (bottom)

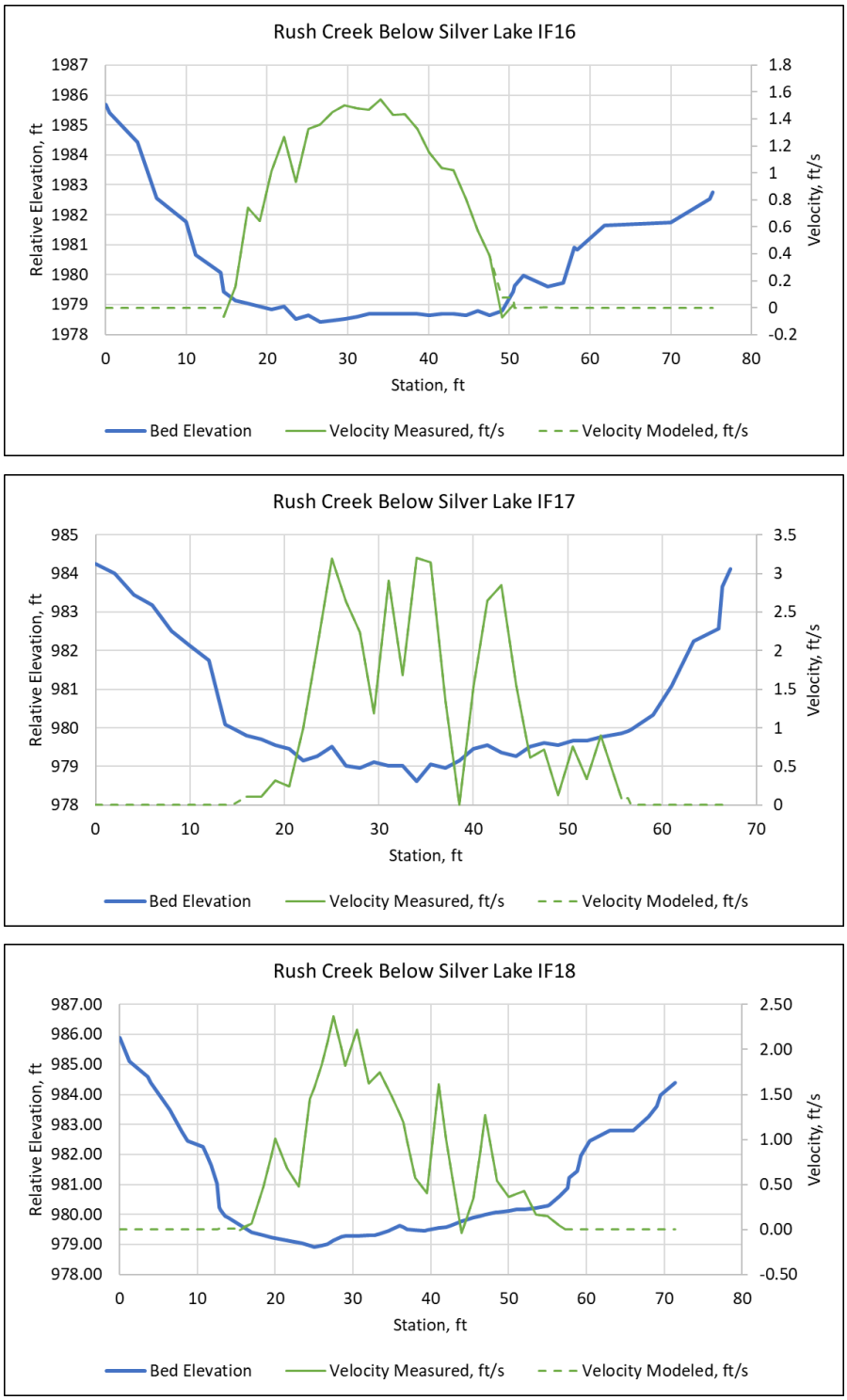


Figure AQ 1-G16. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF16 (top), IF17 (middle), and IF18 (bottom)

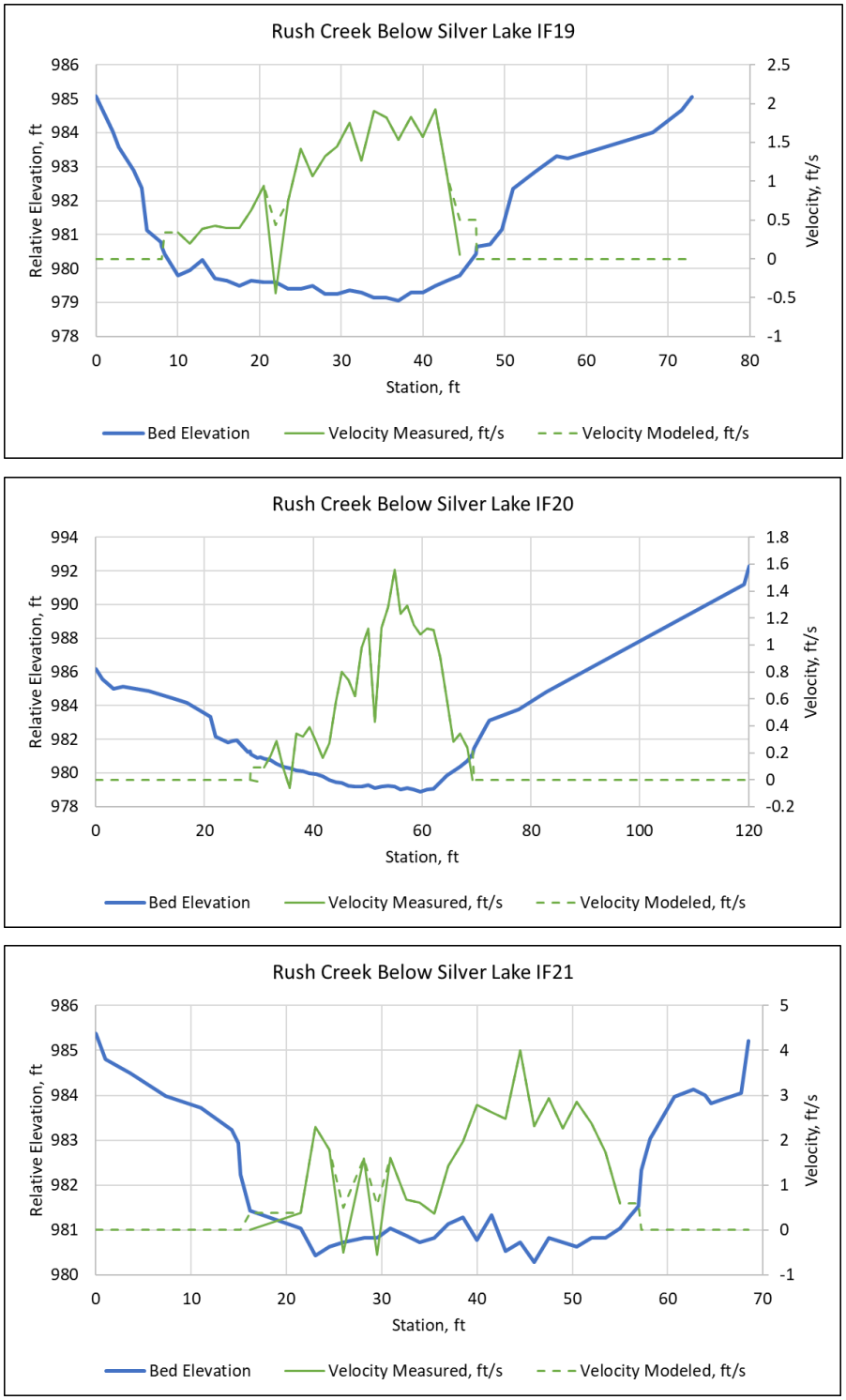
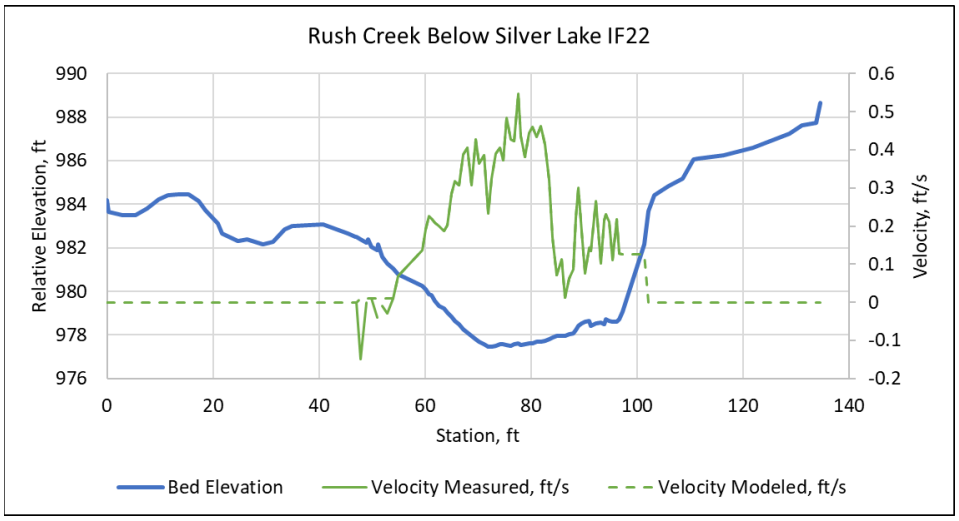


Figure AQ 1-G17. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF19 (top), IF20 (middle), and IF21 (bottom)



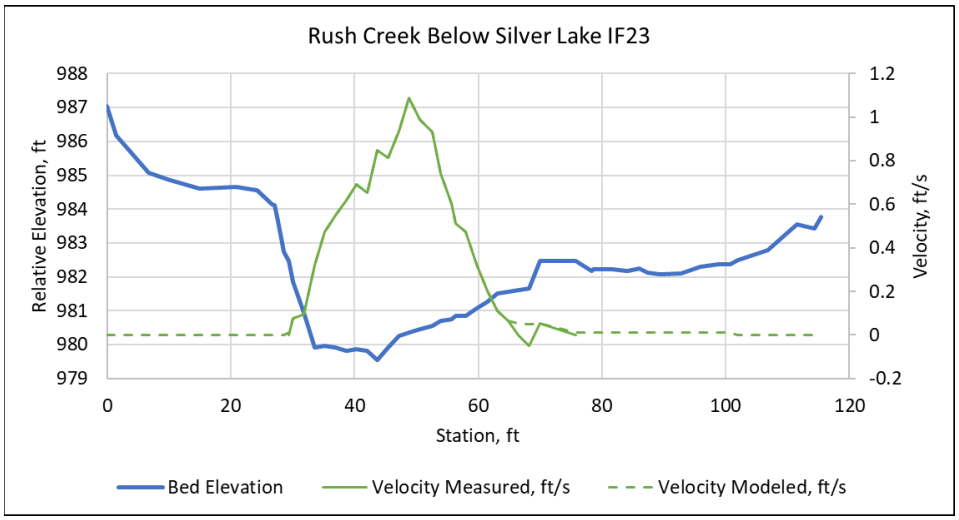


Figure AQ 1-G18. Comparison of measured and modeled velocity for Rush Creek below Silver Lake Cross Sections IF22 (top) and IF23 (bottom)

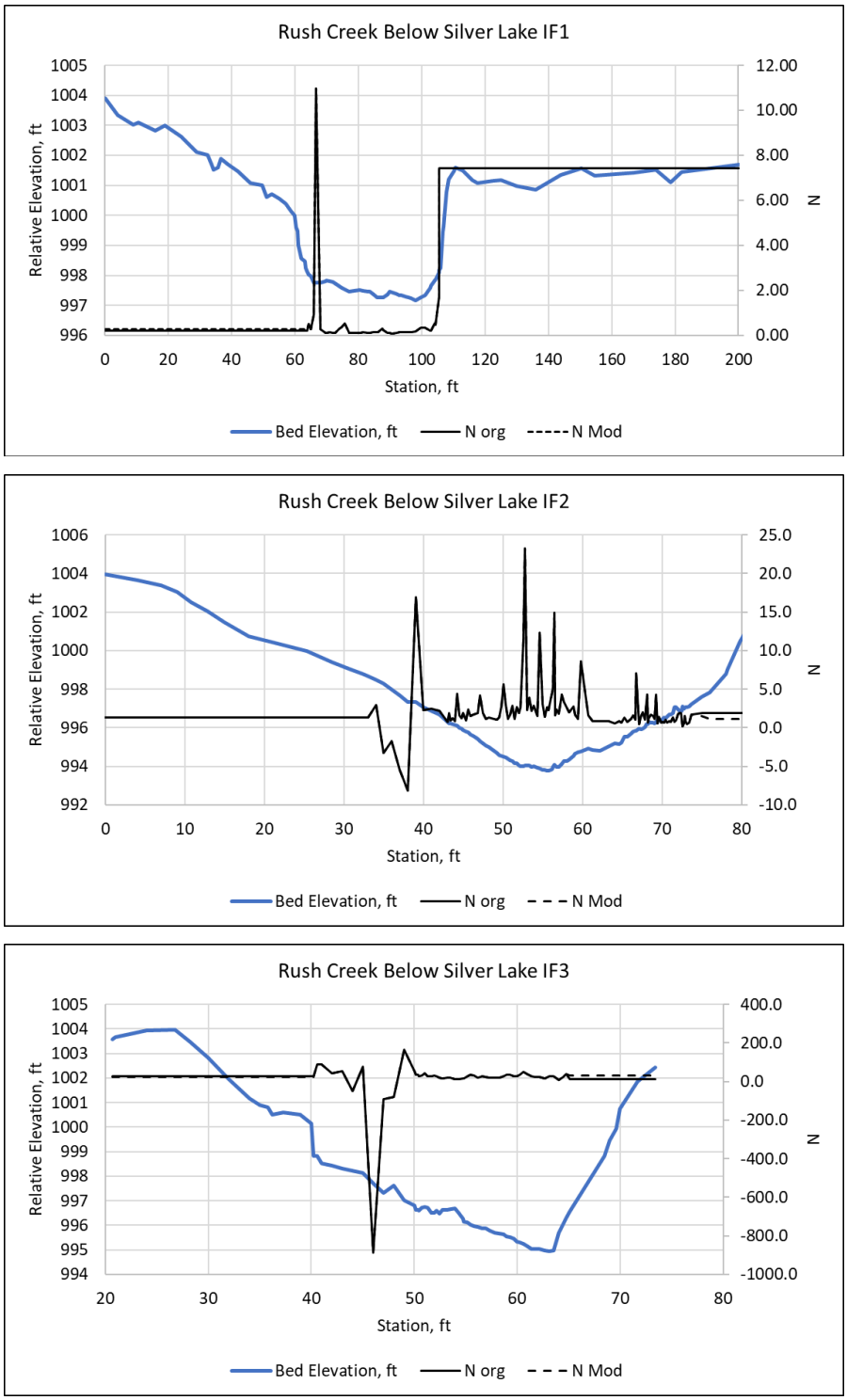


Figure AQ 1-G19. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF1 (top), IF2 (middle), and IF3 (bottom)

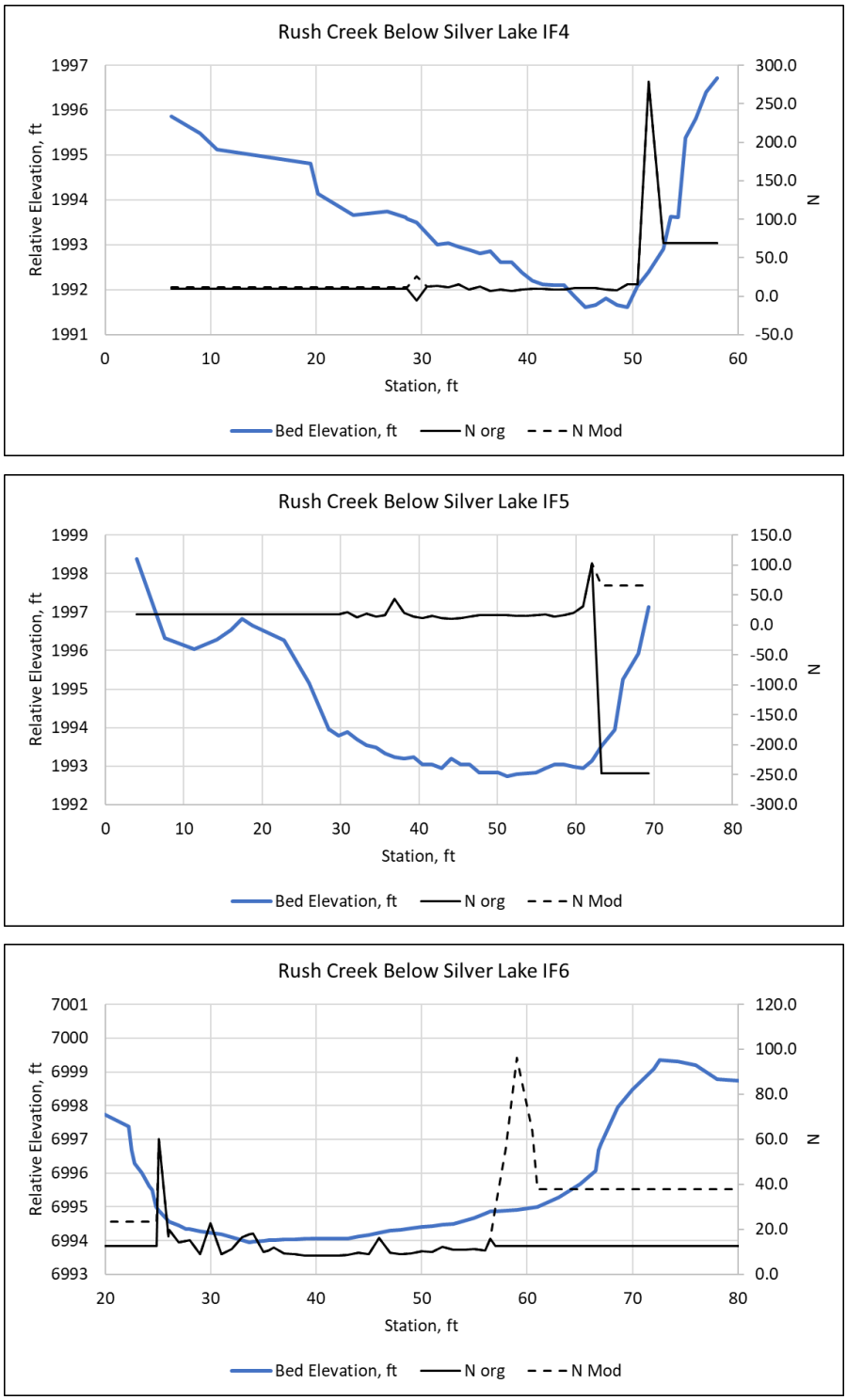


Figure AQ 1-G20. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF4 (top), IF5 (middle), and IF6 (bottom)

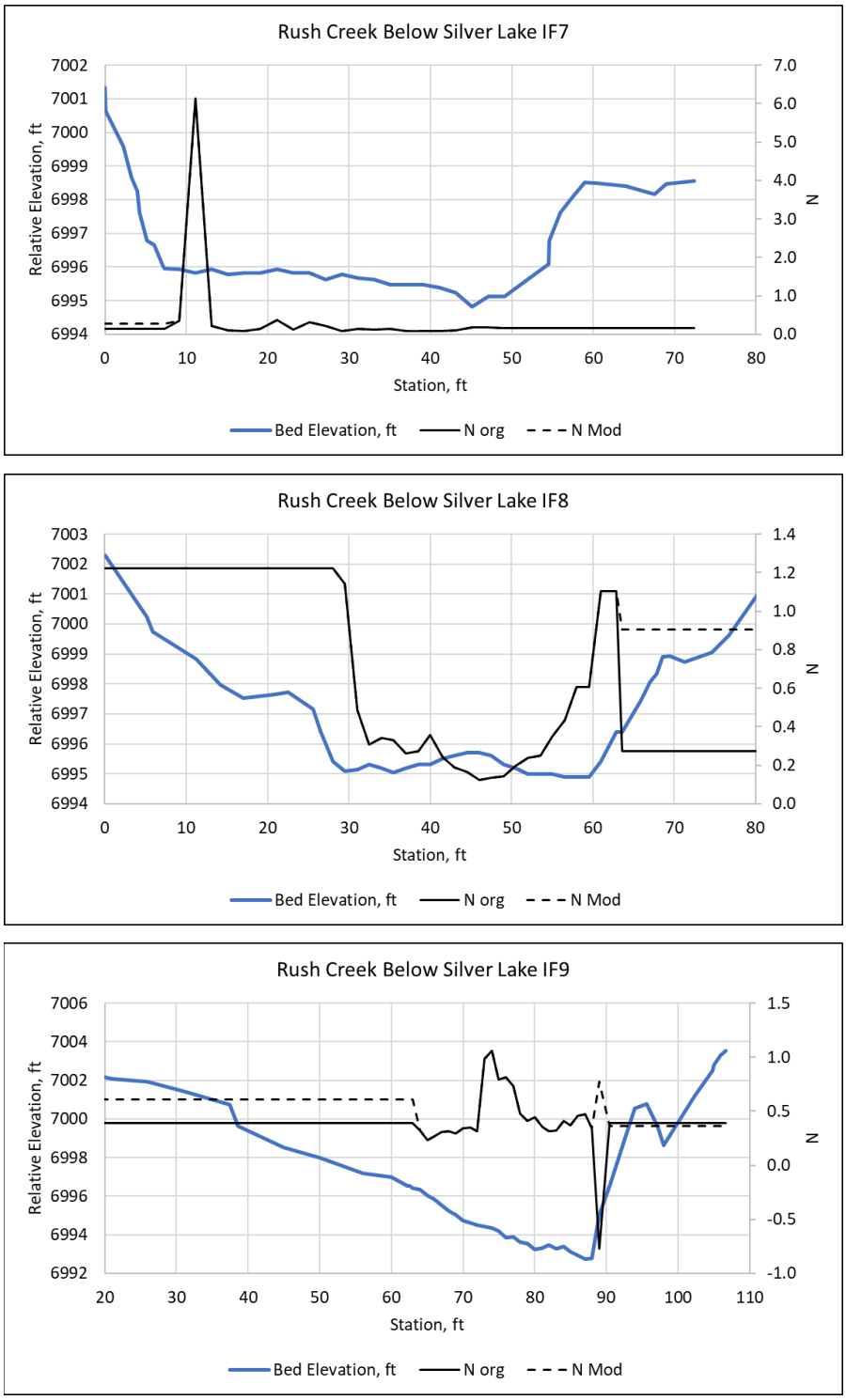


Figure AQ 1-G21. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF7 (top), IF8 (middle), and IF9 (bottom)

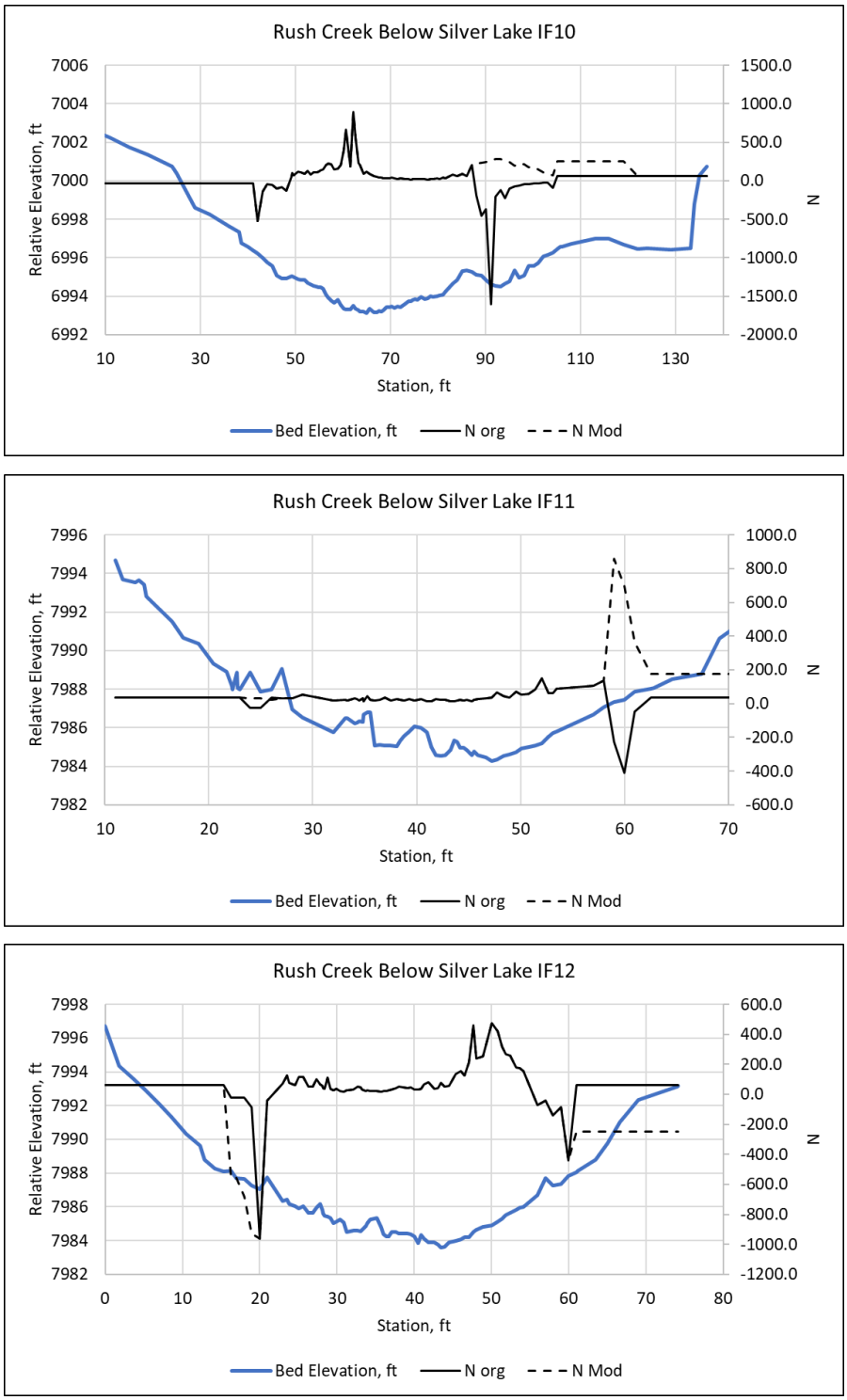


Figure AQ 1-G22. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF10 (top), IF11 (middle), and IF12 (bottom)

Figure AQ 1-G23. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF13 (top), IF14 (middle), and IF15 (bottom)

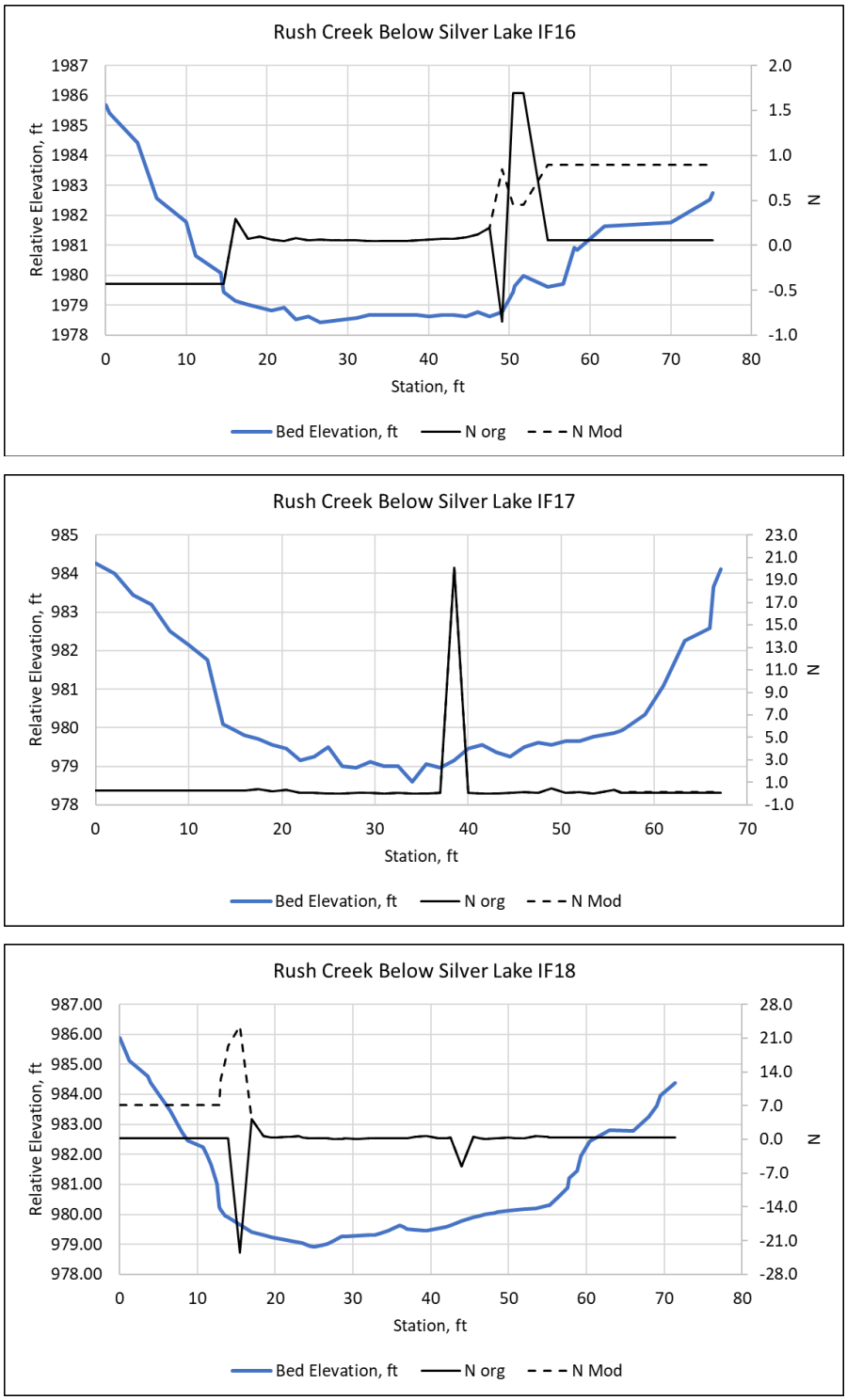


Figure AQ 1-G24. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF16 (top), IF17 (middle), and IF18 (bottom)

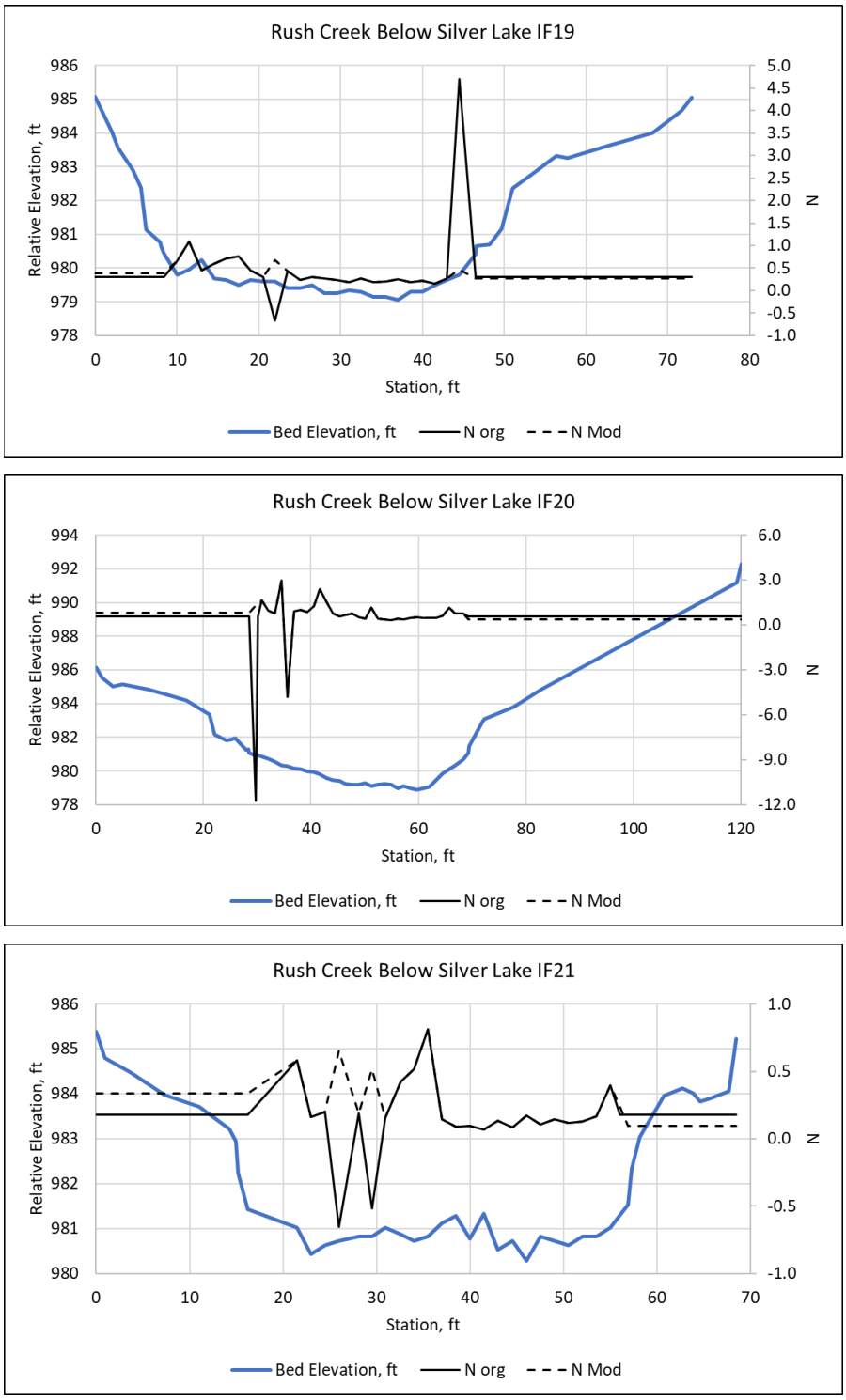
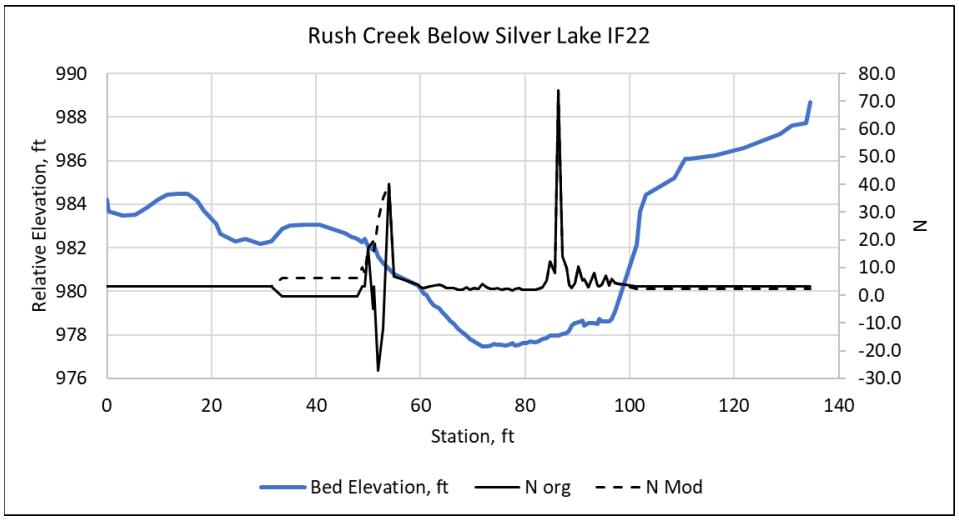


Figure AQ 1-G25. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF19 (top), IF20 (middle), and IF21 (bottom)



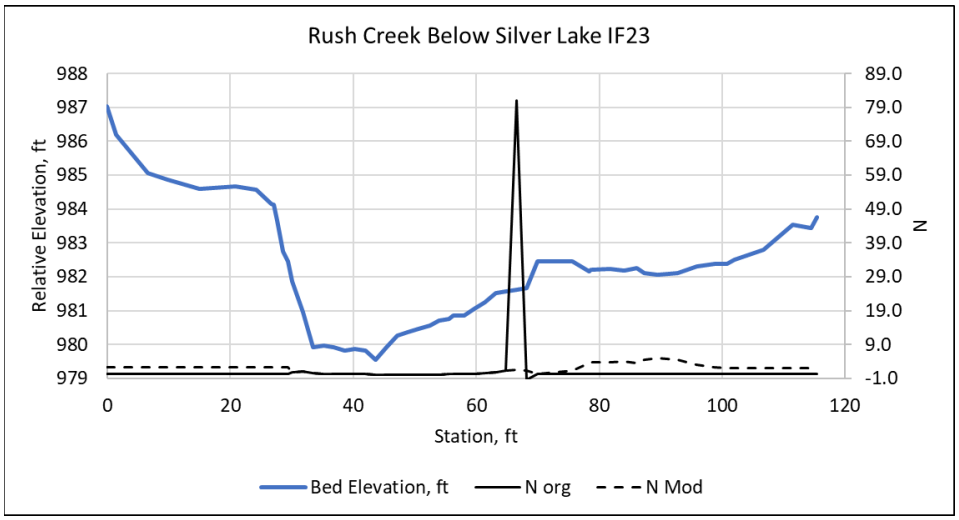


Figure AQ 1-G26. Comparison of original and modified Mannings n for Rush Creek below Silver Lake Cross Sections IF22 (top) and IF23 (bottom)

APPENDIX I

Model Calibration and Validation Rush Creek 2-D Sites

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INTRODUCTION

Table AQ 1-I1 and AQ 1-I2 show the Mannings n used for hydraulic roughness for the 2-D sites Rush Creek Above Silver Lake and South Rush Creek. Figures AQ 1-I1 and AQ 1-I2 show the rating curves used for the downstream boundary conditions at Rush Creek Above Silver Lake and South Rush Creek. Figure AQ 1-I3 shows the water surface calibration along the Rush Creek Above Silver Lake 2-D site. Figure AQ 1-I4 through Figure AQ 1-I6 show the water surface calibration along the South Rush Creek 2-D site. Figures AQ 1-I7 through AQ 1-I12 compare the measured velocities and the modeled velocities along 6 cross sections within the Above Silver Lake 2-D model. Figures AQ 1-I13 through AQ 1-I16 compare the measured and modeled velocities along the 4 cross sections within the South Rush Creek 2-D model.

Table AQ 1-I1. Summary of Mannings n used in Rush Creek Above Silver Lake 2D Model

Polygon	Observed	Mannings n
1	sand75_sg25	0.04
2	bedrock50_sand25_sg25	0.05
3	thick marsh grass	0.035
4	high rough	0.05
5	high rough willow	0.15
6	mature trees and boulder	0.1
7	bedrock boulder	0.05
8	sand silt	0.04
9	low grass	0.03
10	boulder bedrock	0.05

Table AQ 1-I2. Summary of Mannings *n* used in South Rush Creek 2D Model

Polygon	Observed	Mannings n
1	grass with trees	0.15
2	paved	0.02
3	sand	0.03
4	willow	0.15
5	mg50lg25sc25	0.04
6	mg50sg50	0.04
7	sg75mg25	0.04
8	sg75-sand25	0.04
9	sg50mg50	0.04
10	sg75sand25	0.04
11	sc50mc50	0.045
12	mc5025lc25lg	0.045
13	mc50sc50	0.045
14	thick grass	0.55
15	lg40mg30sg30	0.04
16	lg70sc30	0.04
17	lc50grass50	0.04
18	highroughgrass	0.055
19	lg75sc25	0.04
20	sand50sg50	0.04
21	sb70sand30	0.04
22	lg60mg20sg20	0.04
23	sg50mg25lg25	0.04
24	sand40silt40sg20	0.1
25	sand50wd50	0.1
26	sc40lg30mg30	0.04

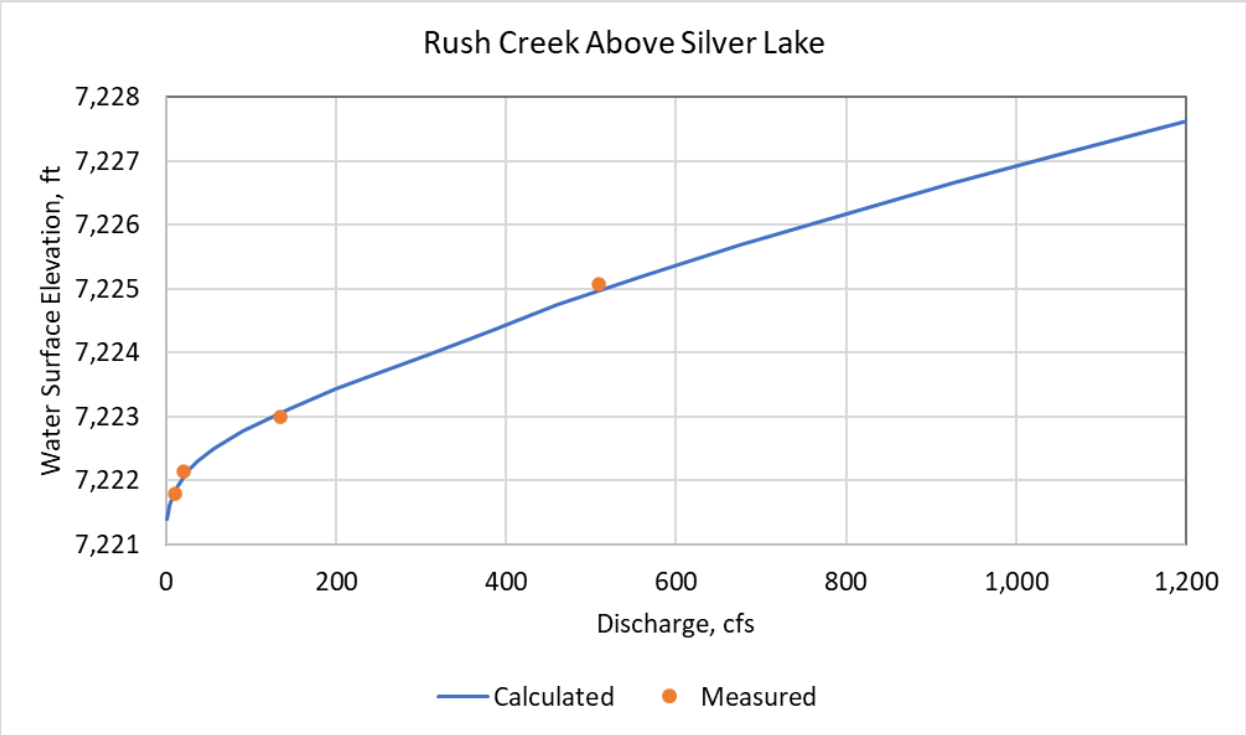

Figure AQ 1-I1. Rating Curve for Rush Creek Above Silver Lake

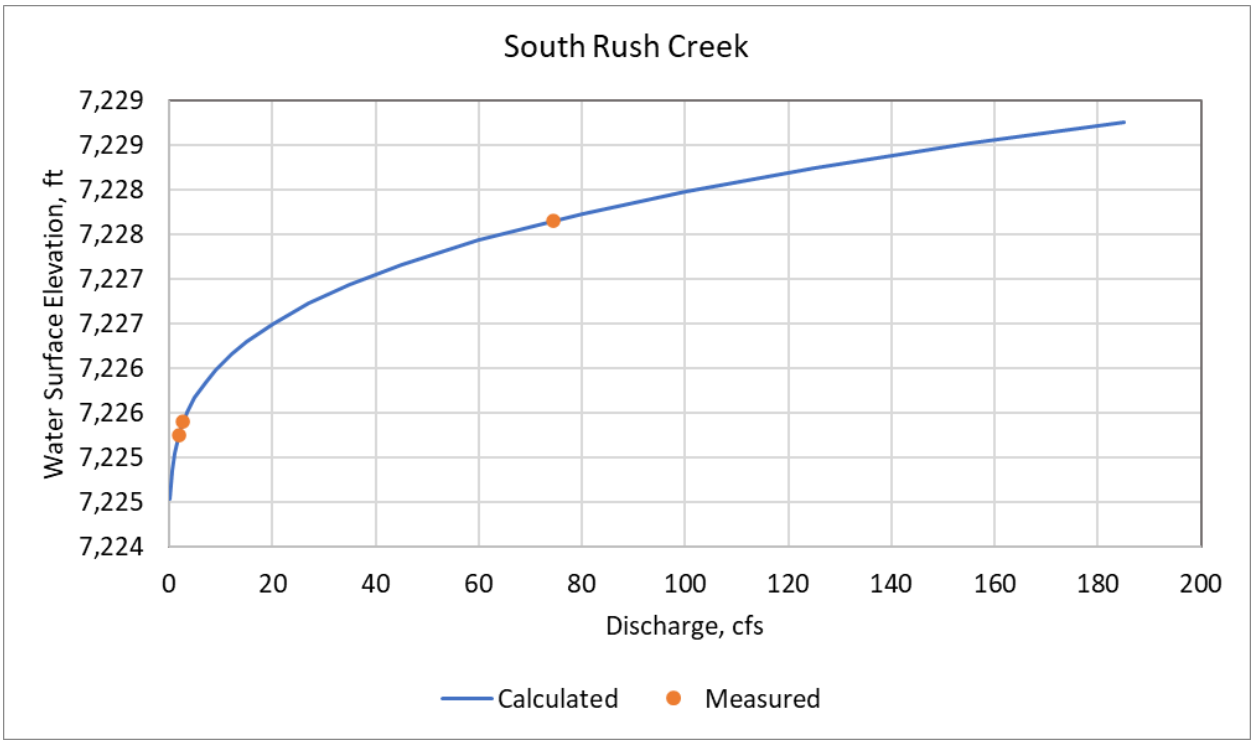

Figure AQ 1-I2. Rating Curve for South Rush Creek

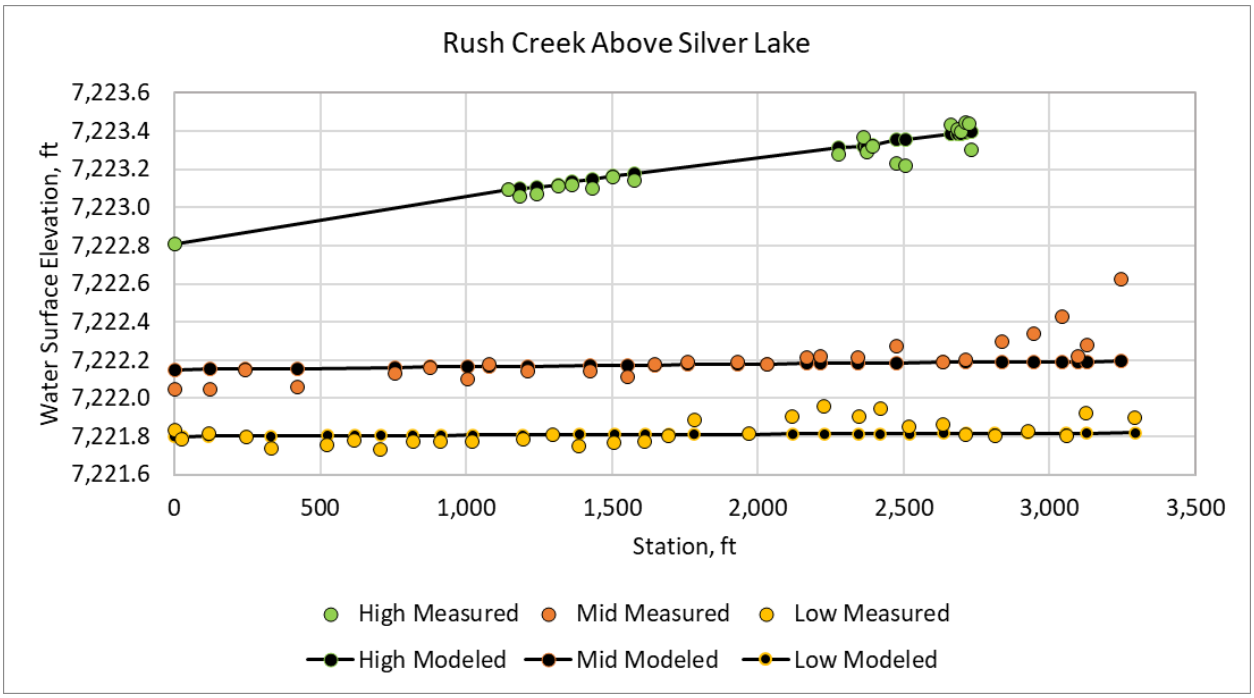

Figure AQ 1-I3. Rush Creek Above Silver Lake Water Surface Calibration

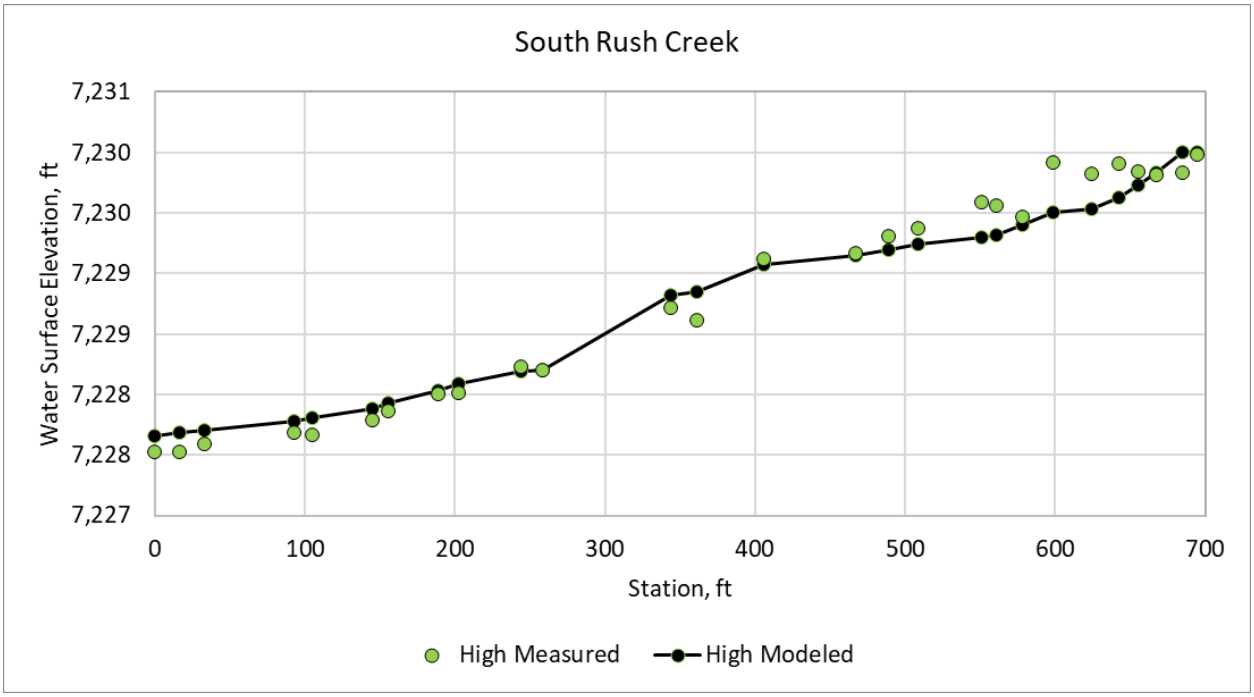

Figure AQ 1-I4. South Rush Creek High Water Surface Calibration

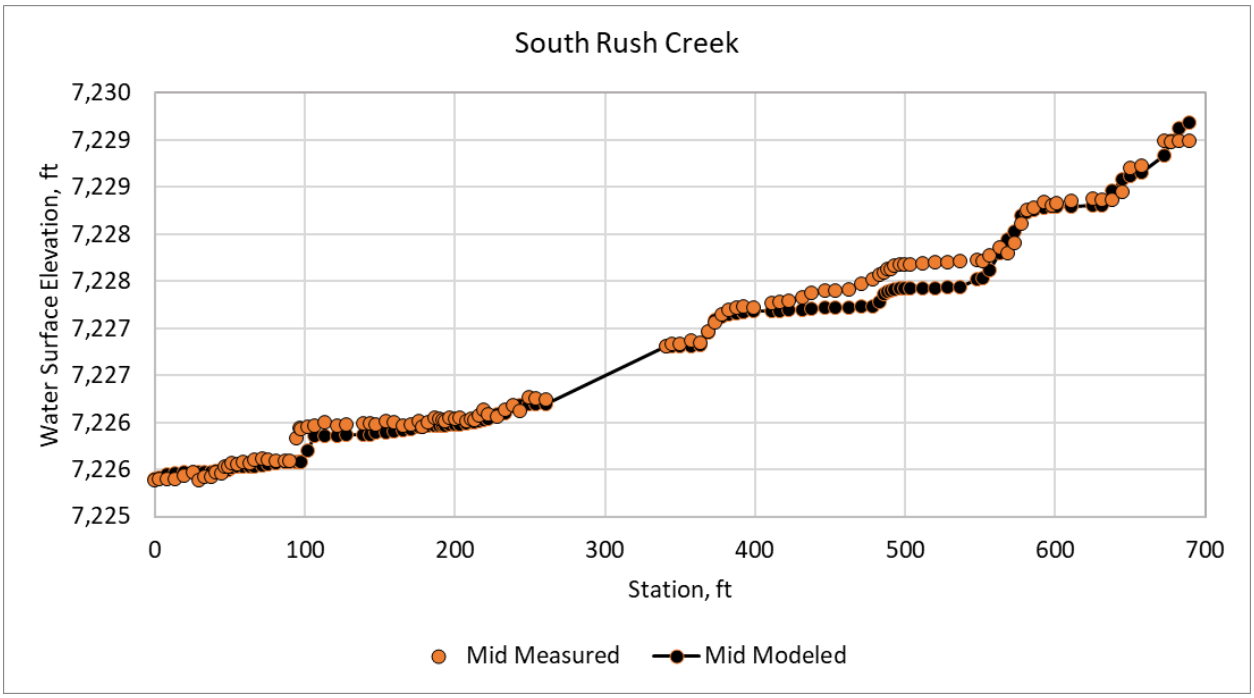

Figure AQ 1-I5. South Rush Creek Mid Water Surface Calibration

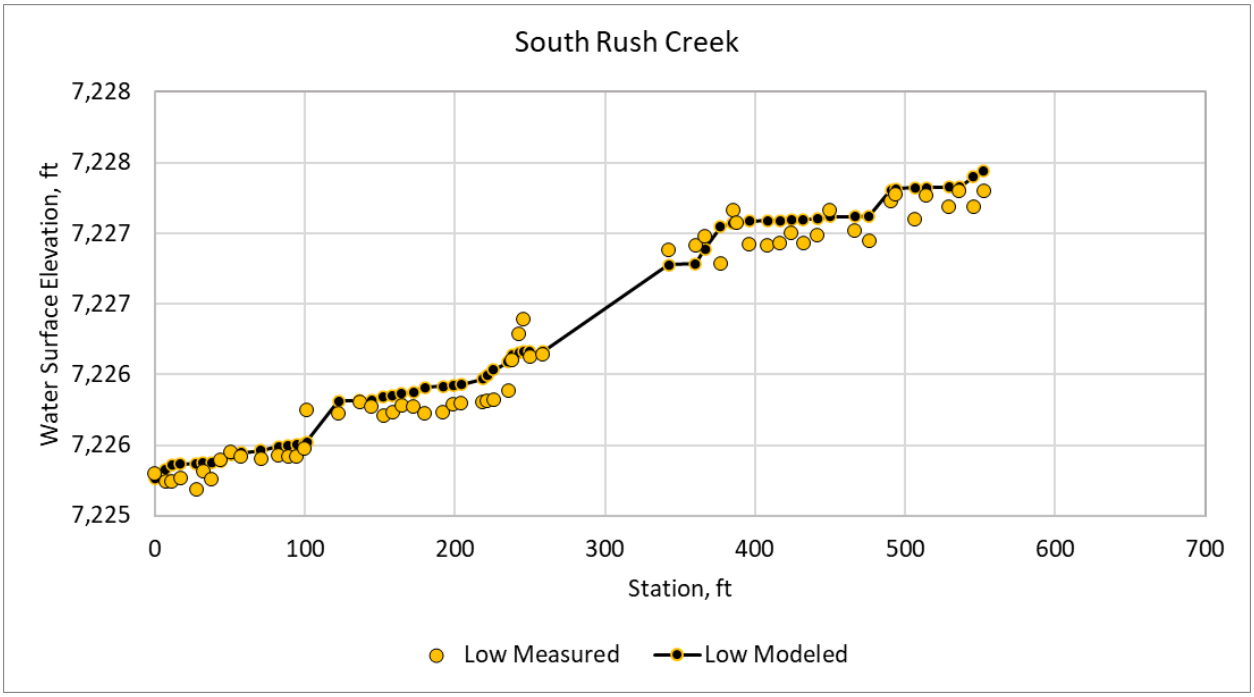

Figure AQ 1-I6. South Rush Creek Low Water Surface Calibration

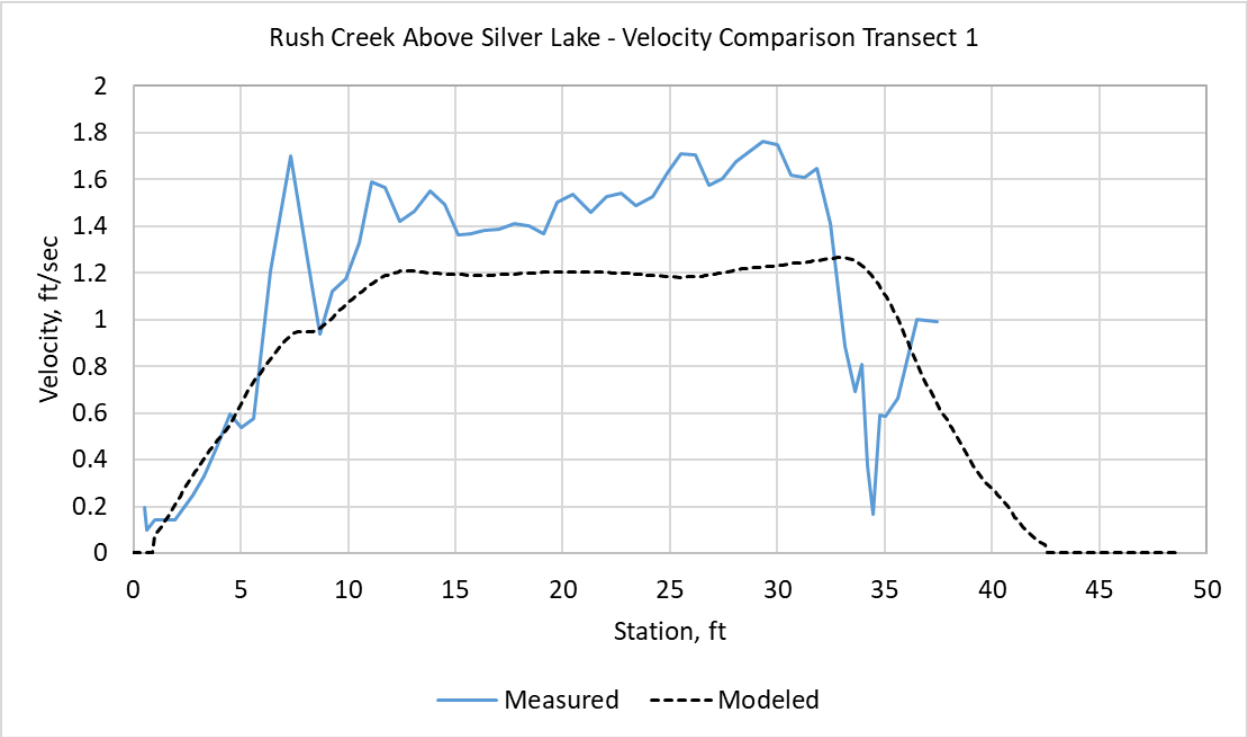

Figure AQ 1-I7. Above Silver Lake Velocity Comparison Cross Section 1

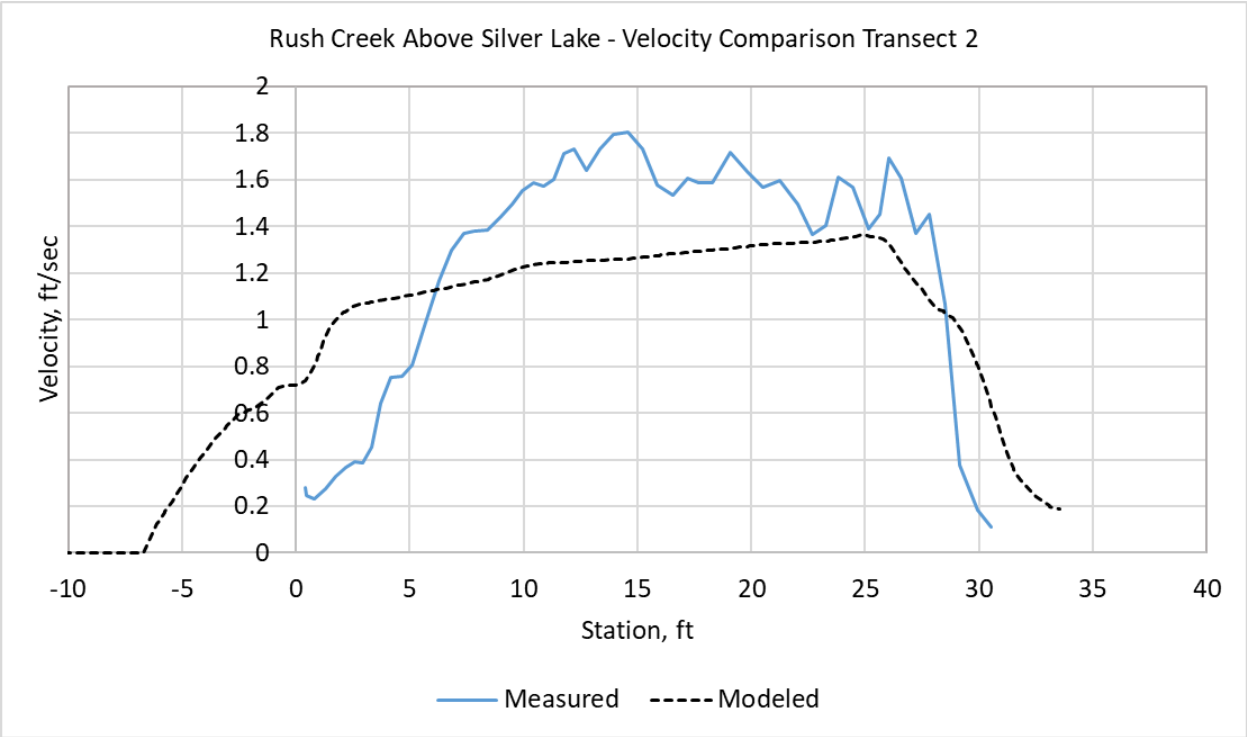

Figure AQ 1-I8. Above Silver Lake Velocity Comparison Cross Section 2

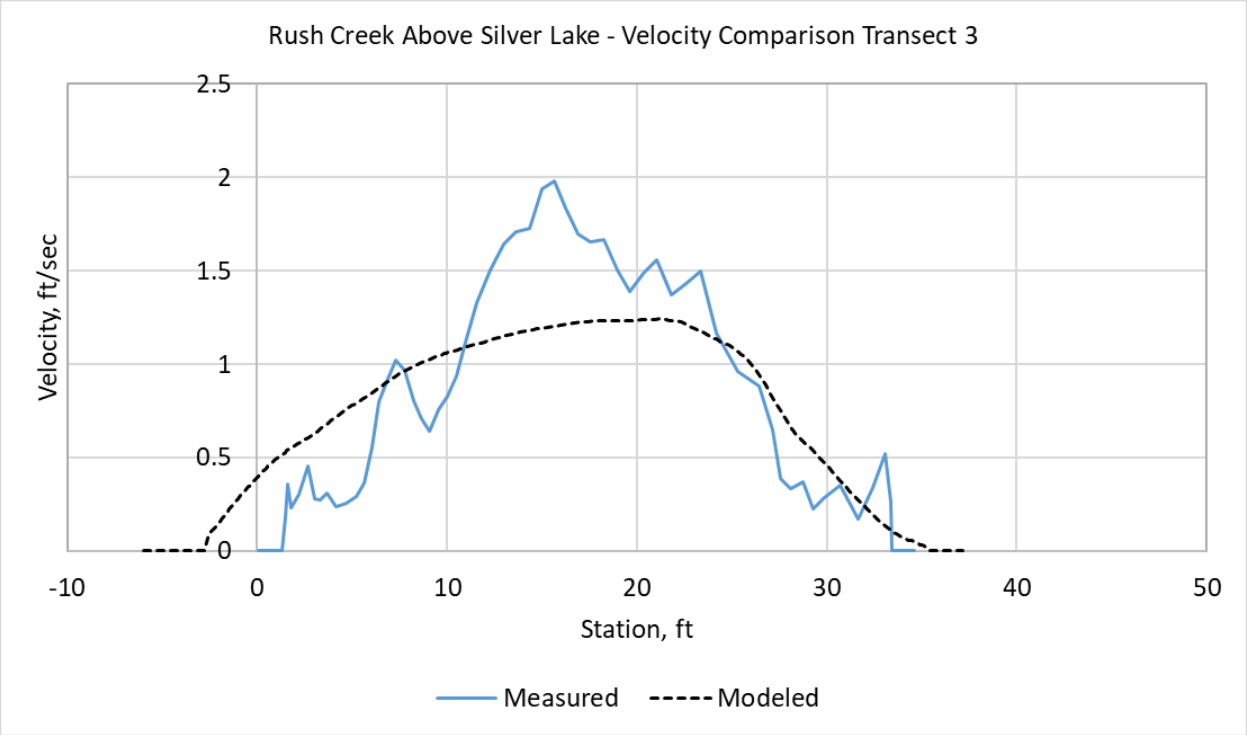

Figure AQ 1-I9. Above Silver Lake Velocity Comparison Cross Section 3

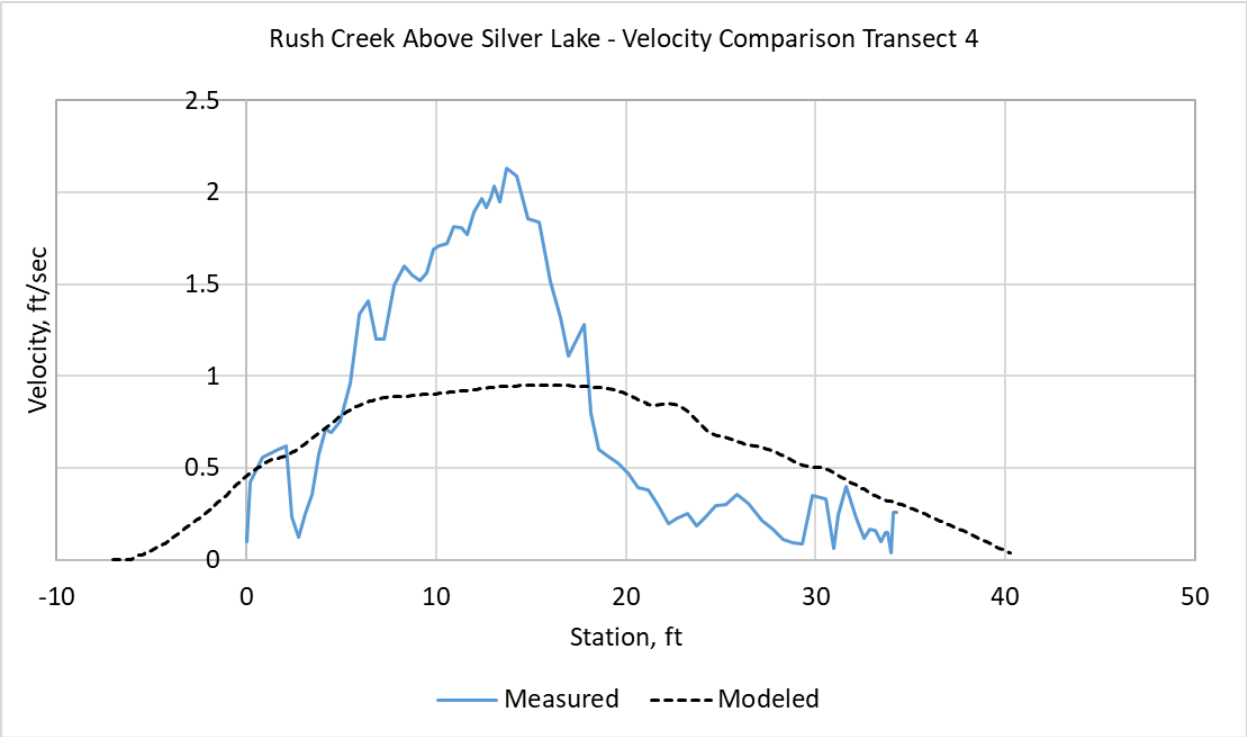

Figure AQ 1-I10. Above Silver Lake Velocity Comparison Cross Section 4

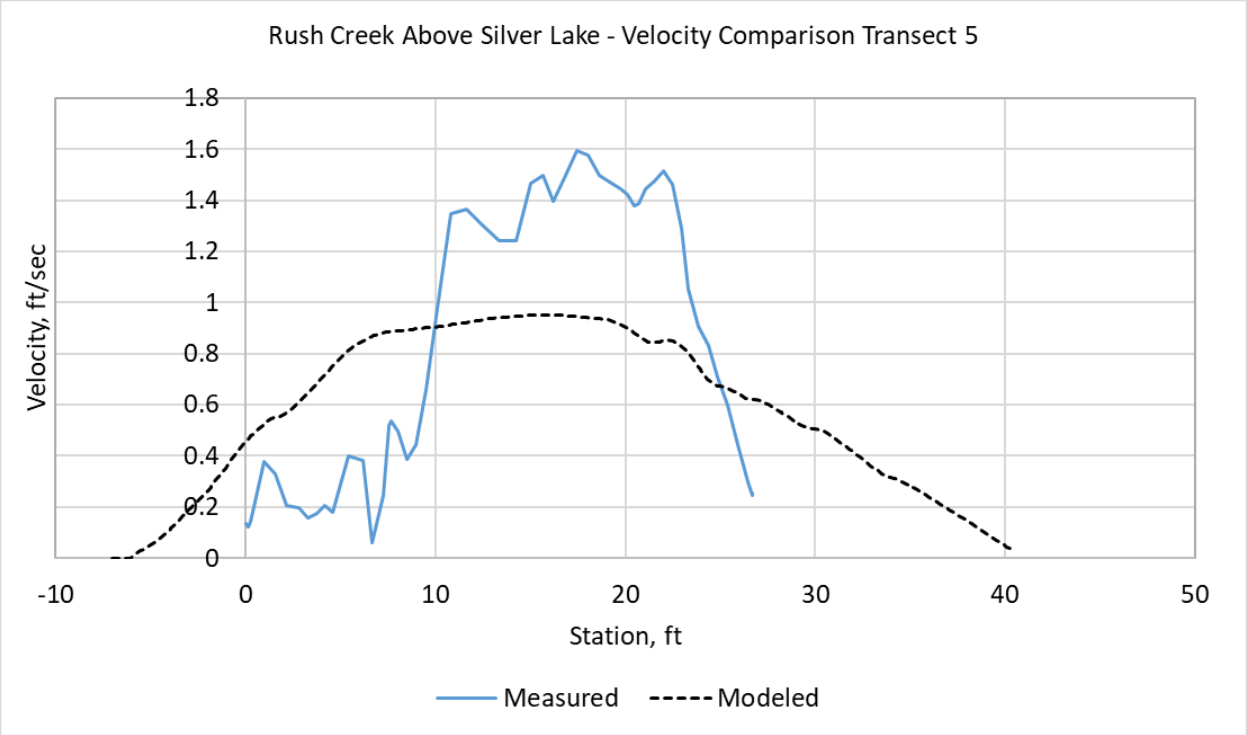

Figure AQ 1-I11. Above Silver Lake Velocity Comparison Cross Section 5

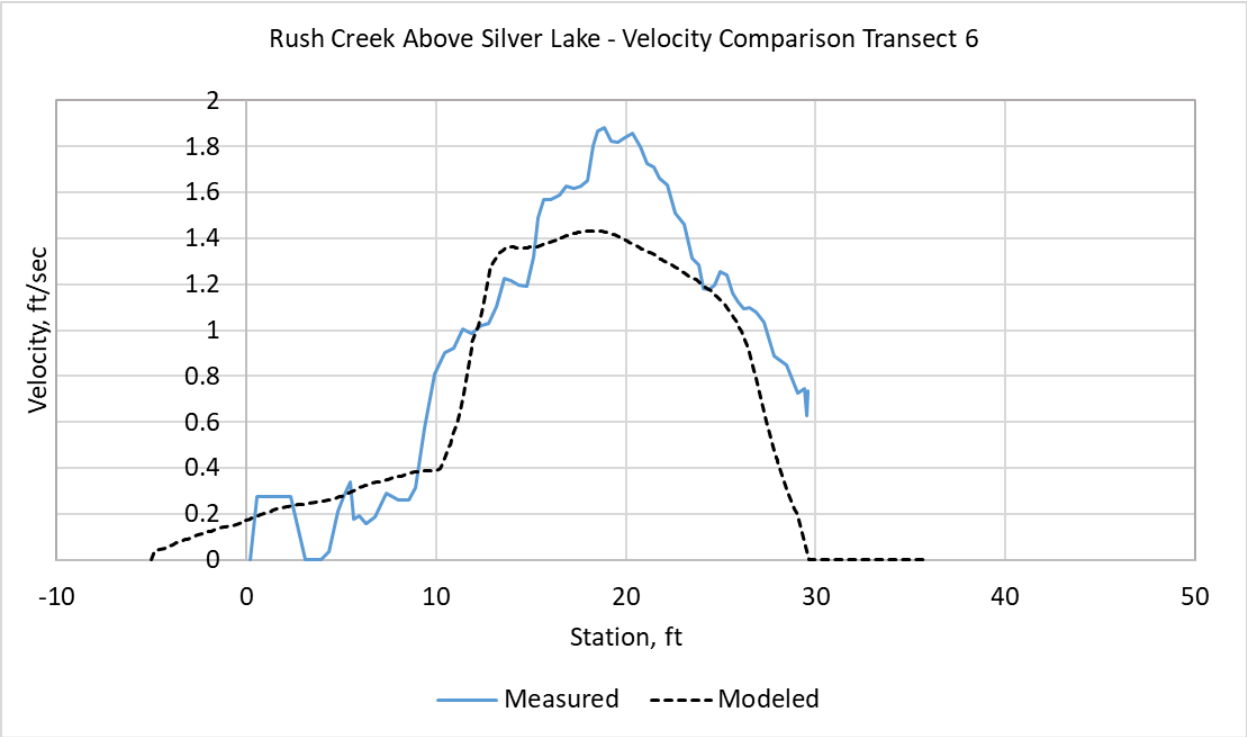

Figure AQ 1-I12. Above Silver Lake Velocity Comparison Cross Section 6

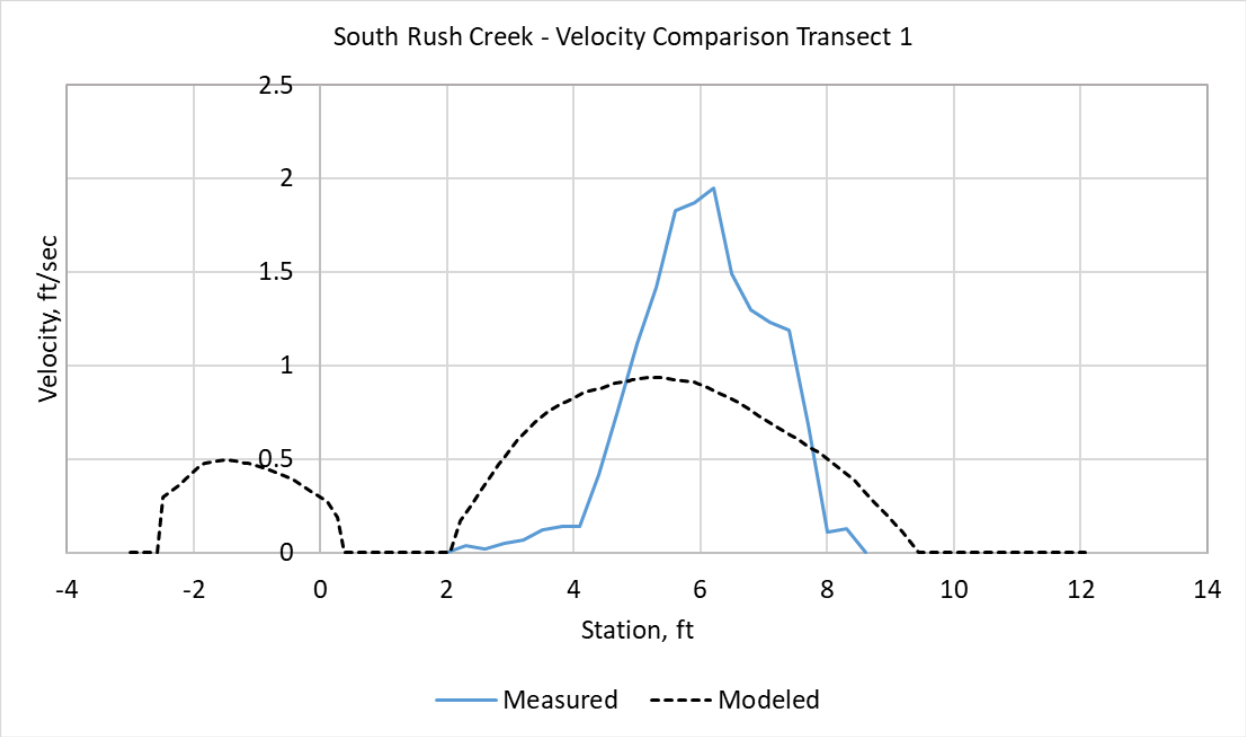

Figure AQ 1-I13. South Rush Creek Velocity Comparison Cross Section 1

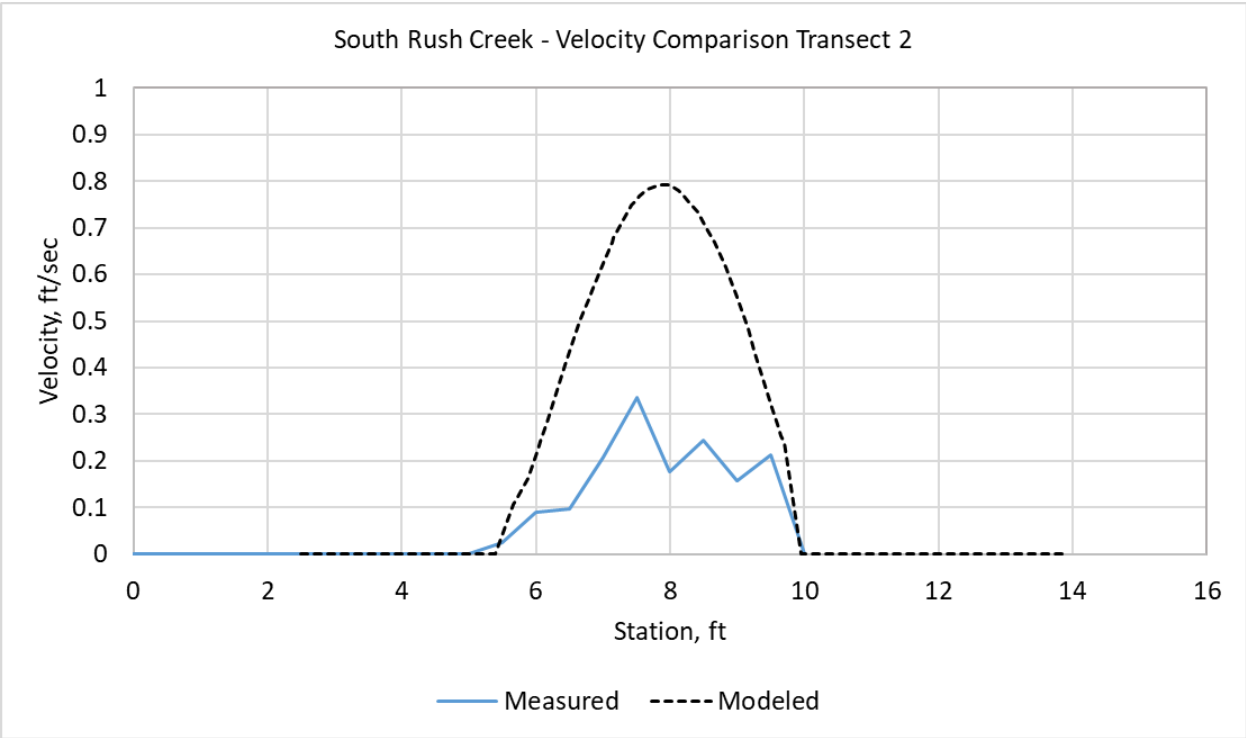

Figure AQ 1-I14. South Rush Creek Velocity Comparison Cross Section 2

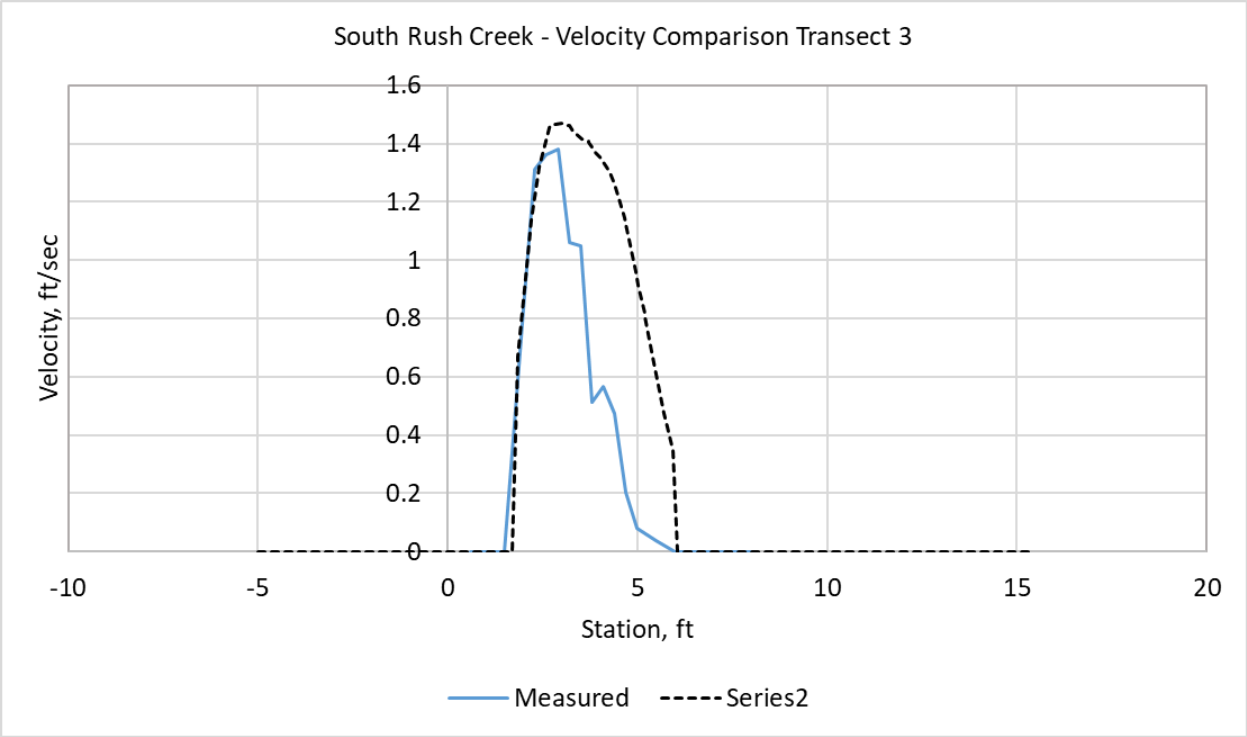

Figure AQ 1-I15. South Rush Creek Velocity Comparison Cross Section 3

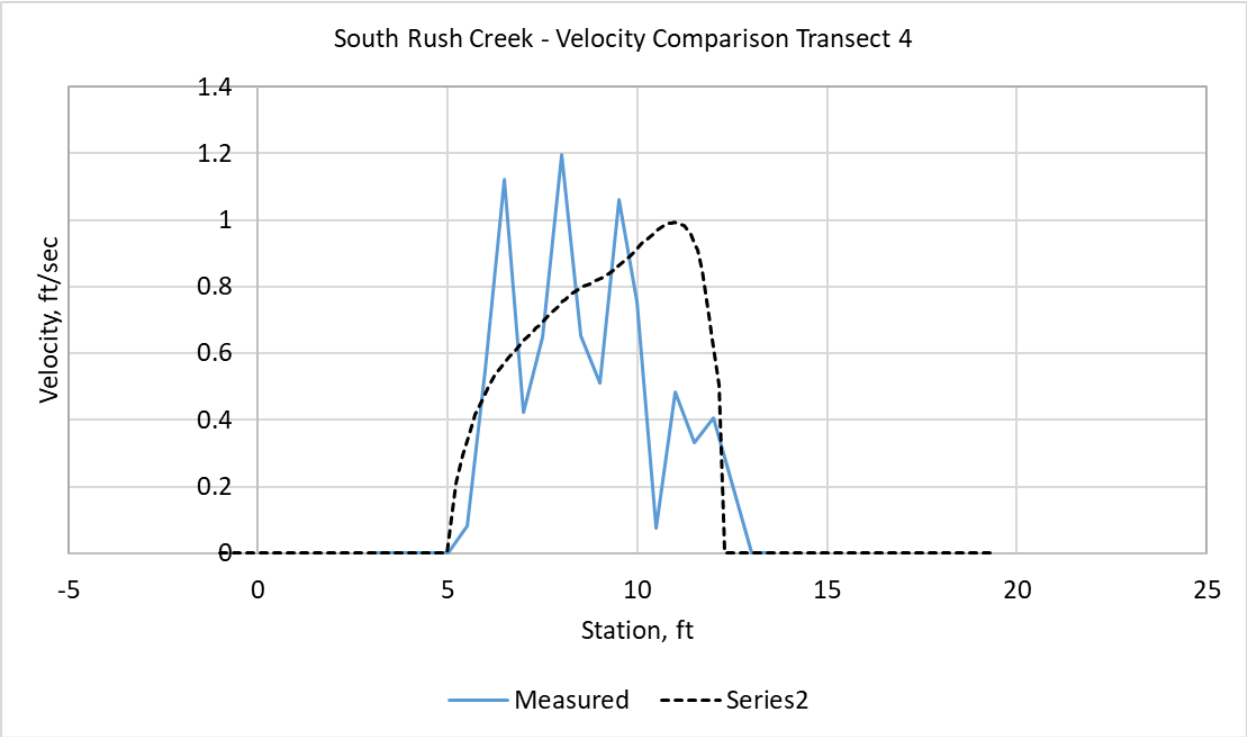

Figure AQ 1-I16. South Rush Creek Velocity Comparison Cross Section 4

APPENDIX J

2-D Habitat Suitability
(Rush Creek above Silver Lake)

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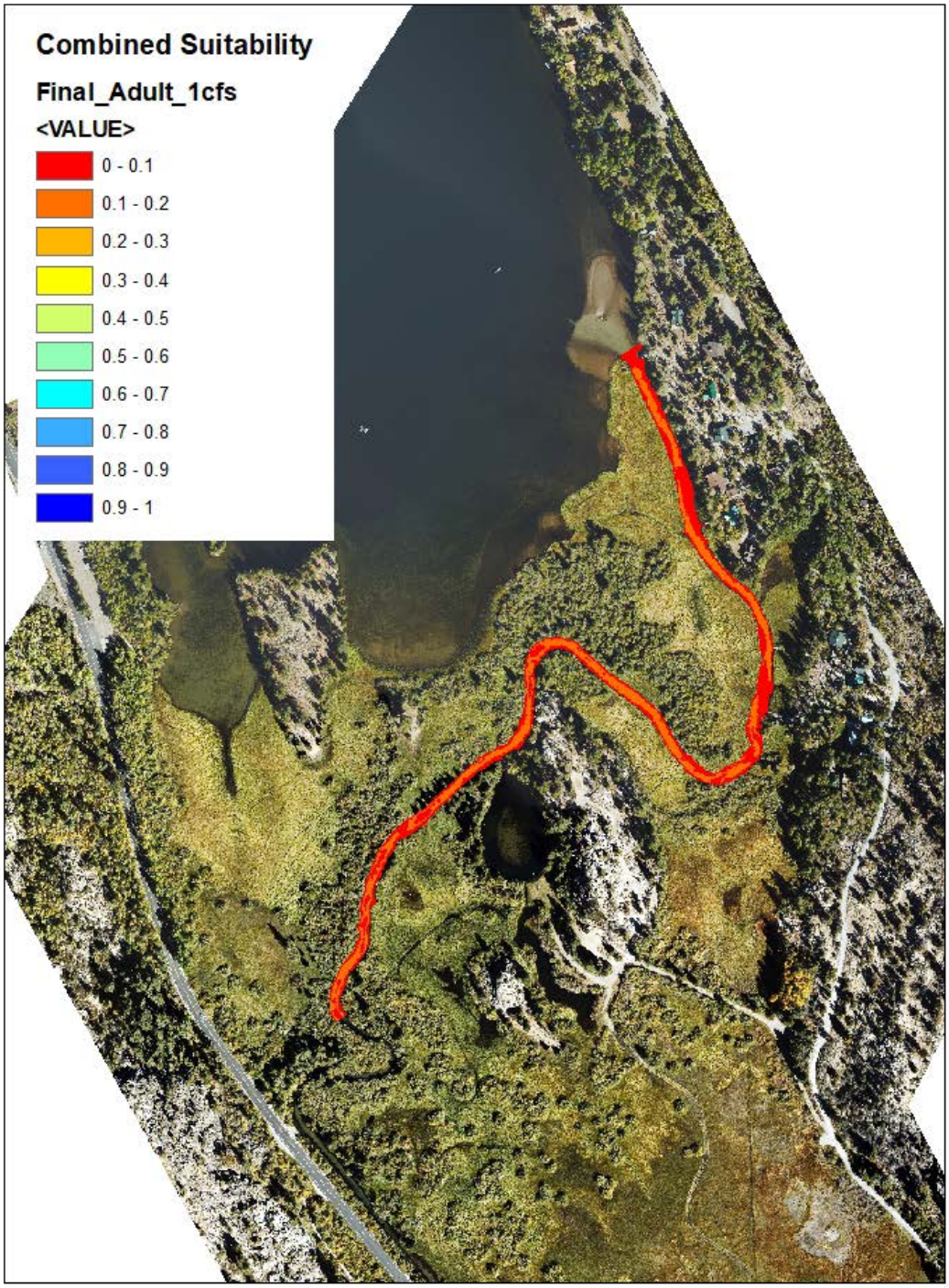
INTRODUCTION

The following figures show the habitat results for the adult, juvenile, and fry lifestages (due to lack of spawning substrate in this reach there is no spawning habitat) for the Above Silver Lake 2-D site. The values of habitat match suitability values with a scale of 0 (no habitat) to 1 (100 % habitat). The results in this appendix represent original substrate suitability applied to each lifestage.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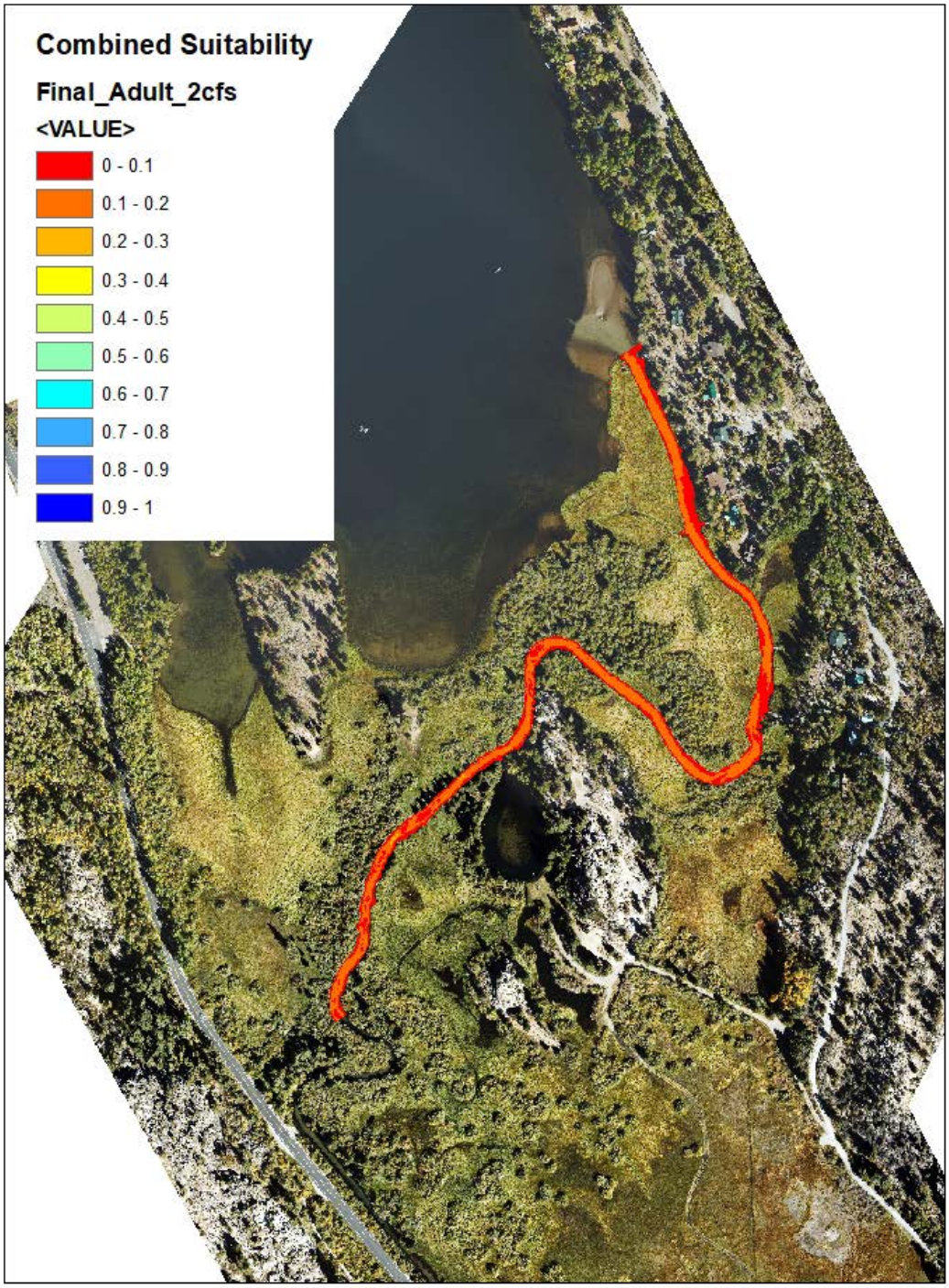
0.7 - 0.8
0.8 - 0.9
0.9 - 1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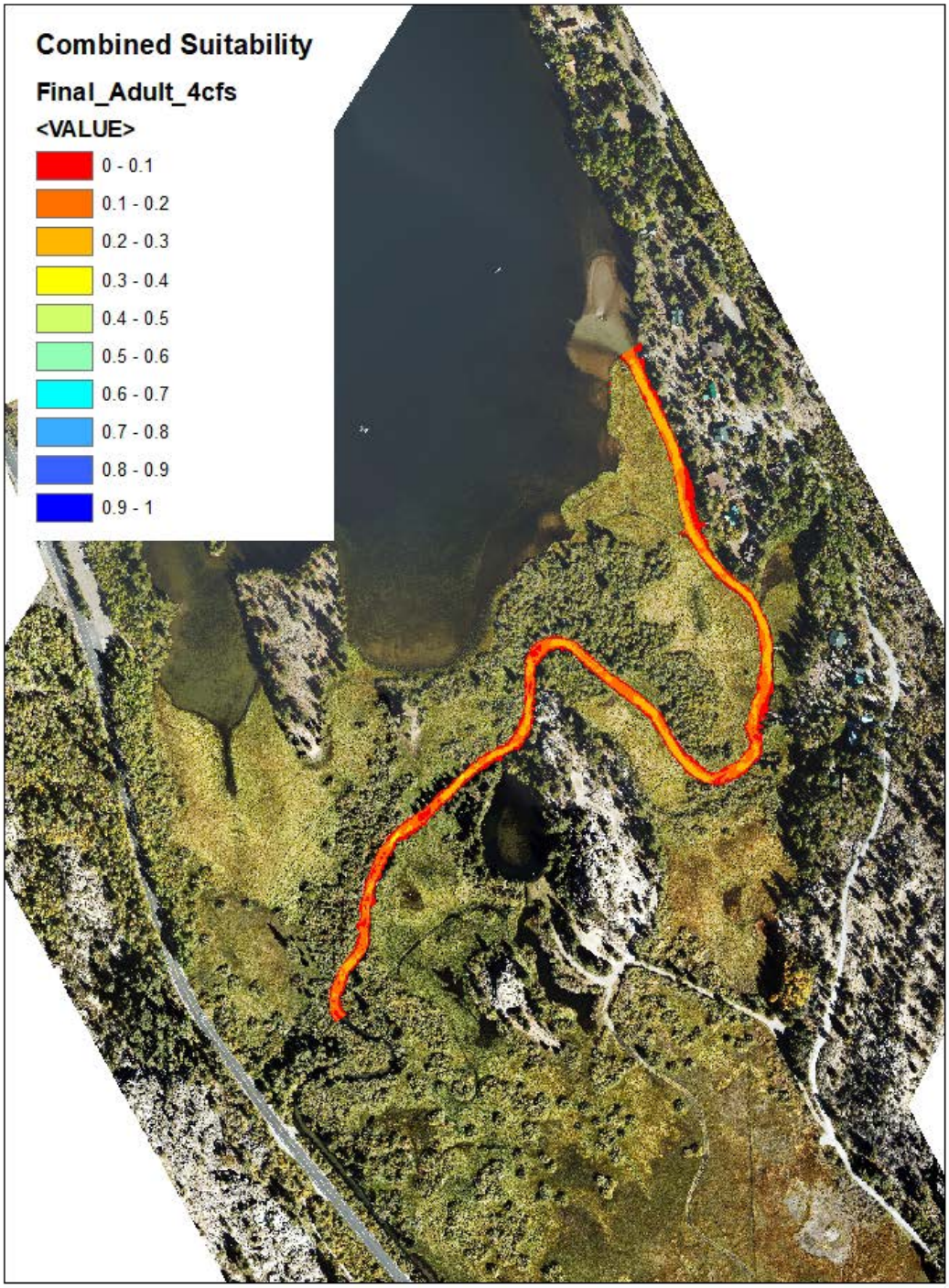
0.9 - 1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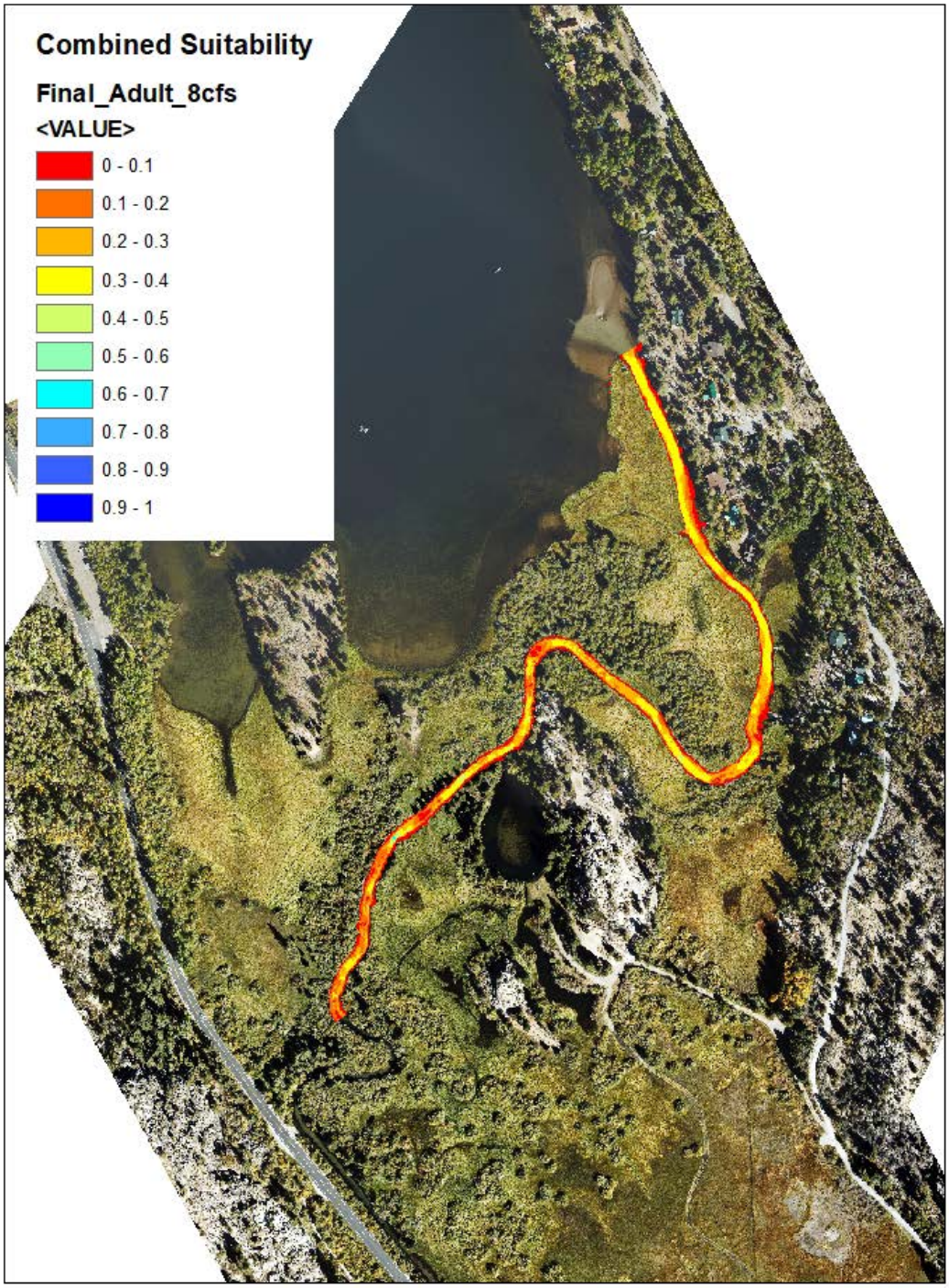
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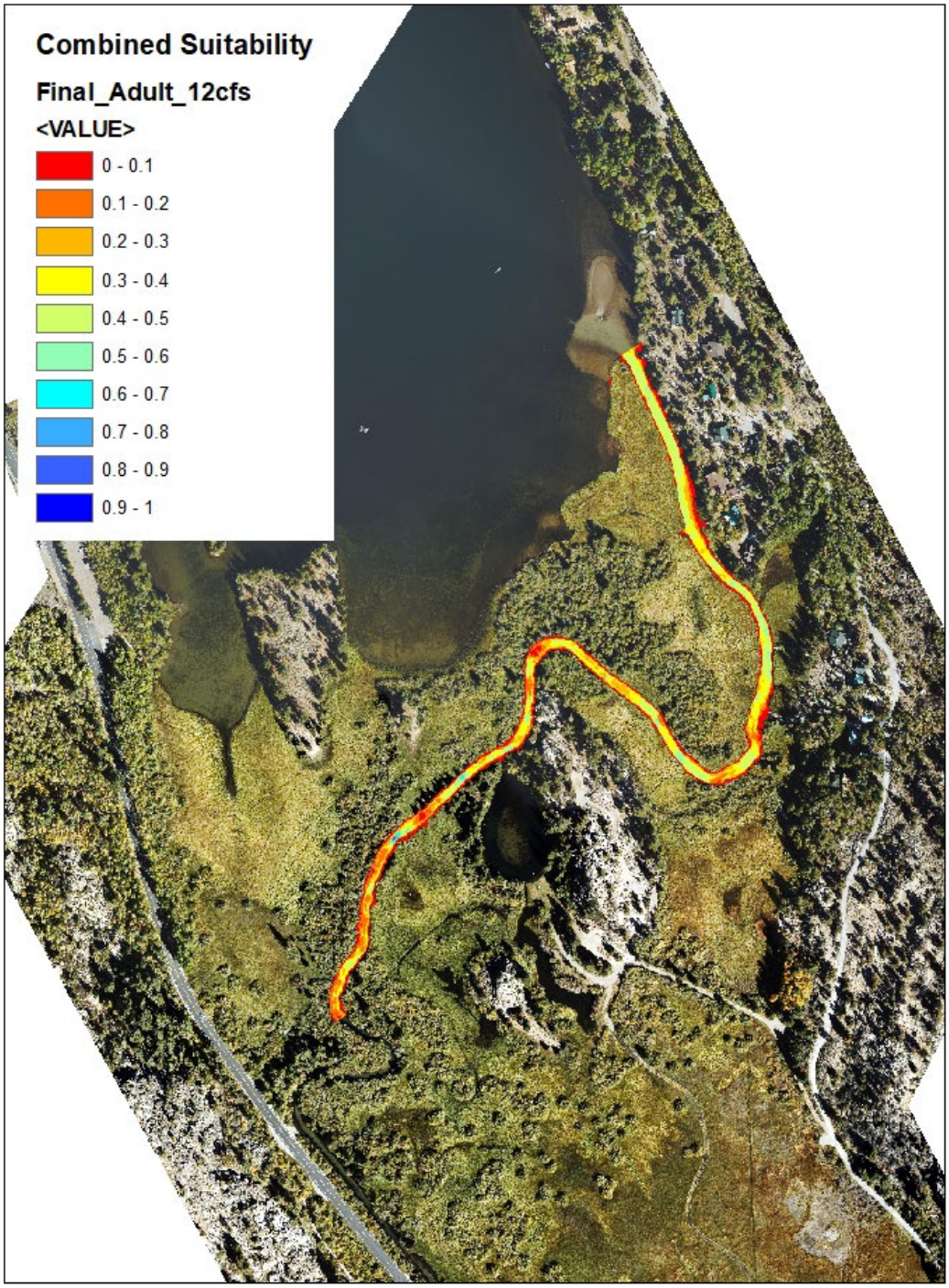
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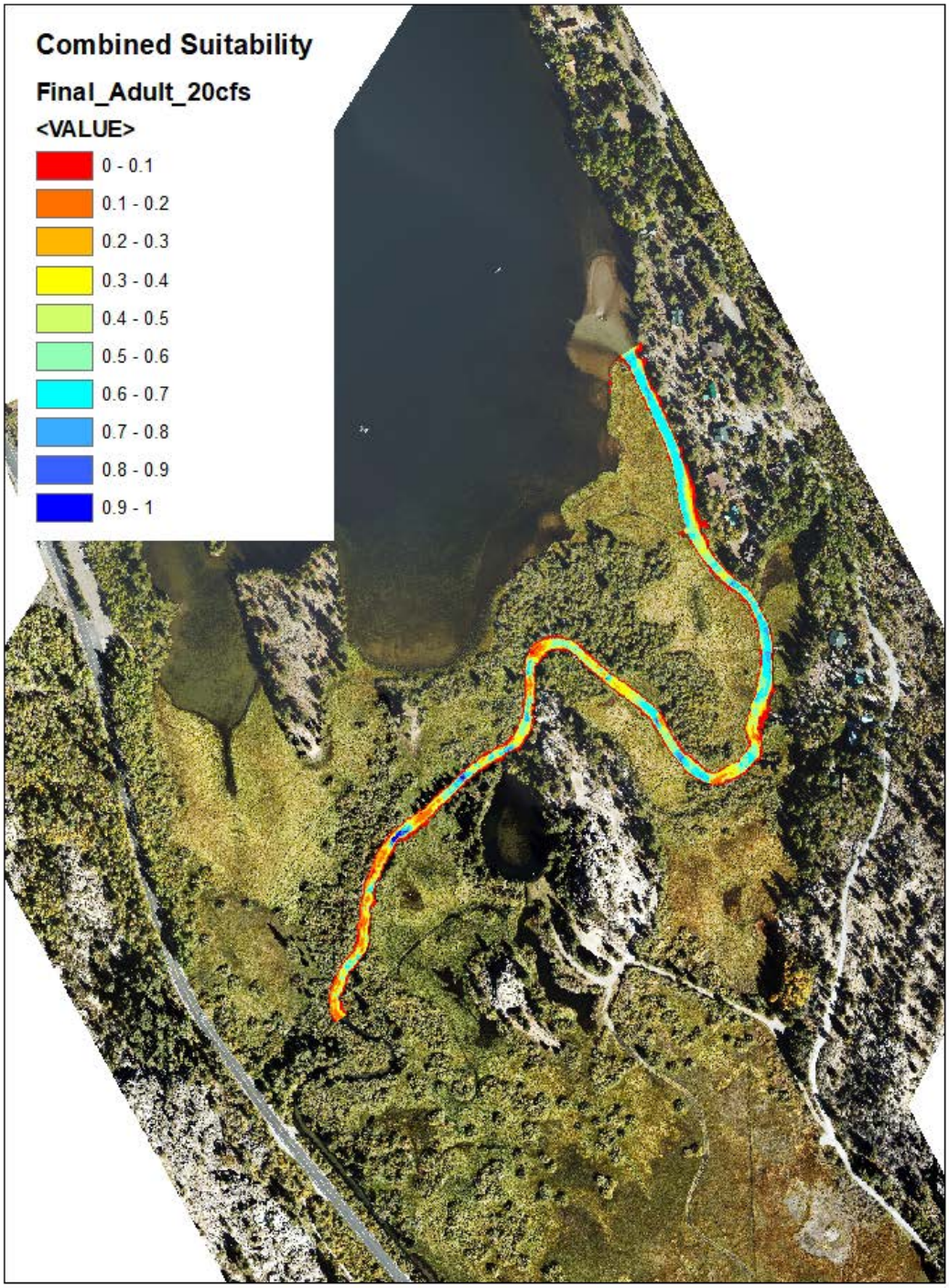
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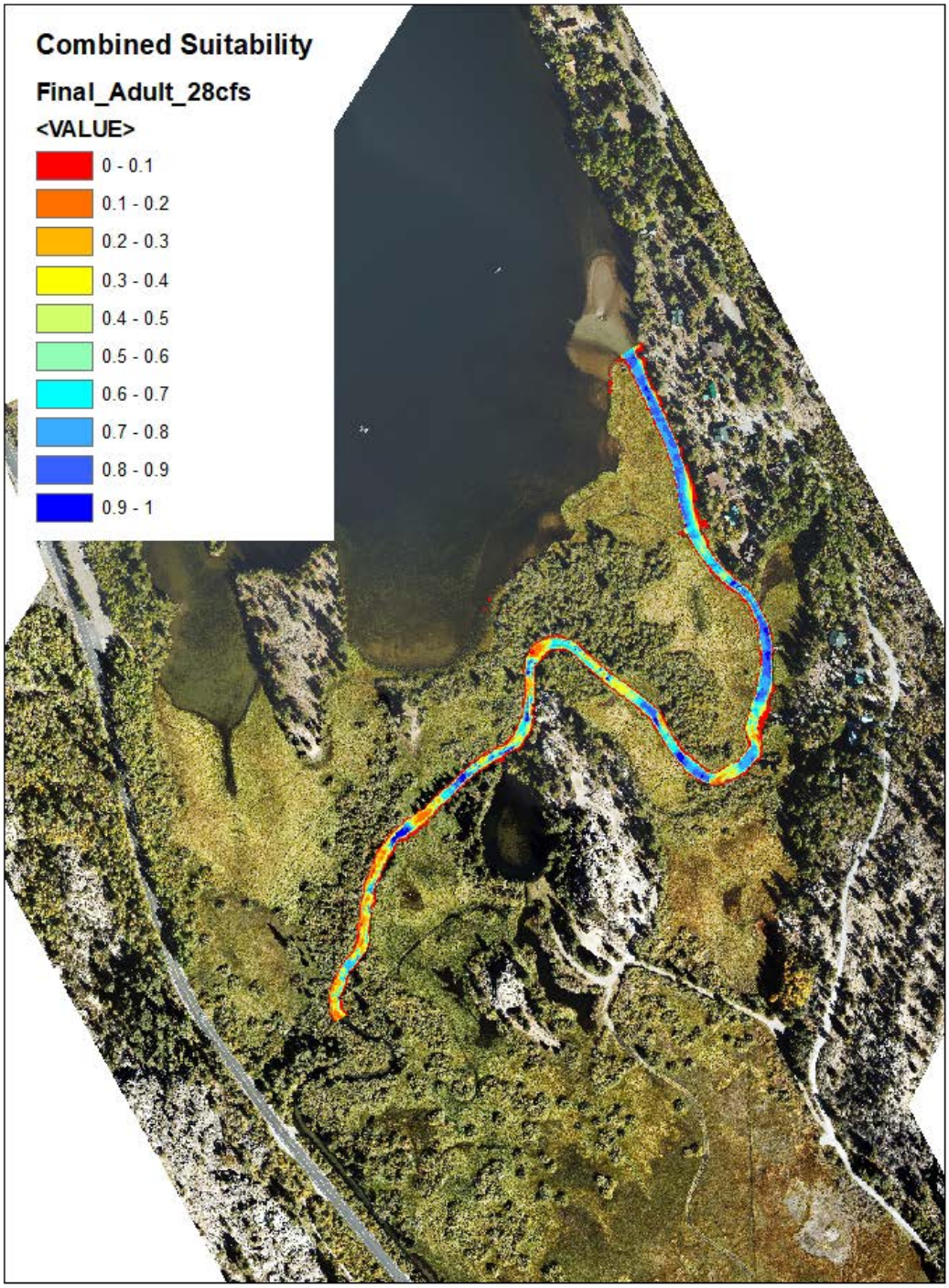
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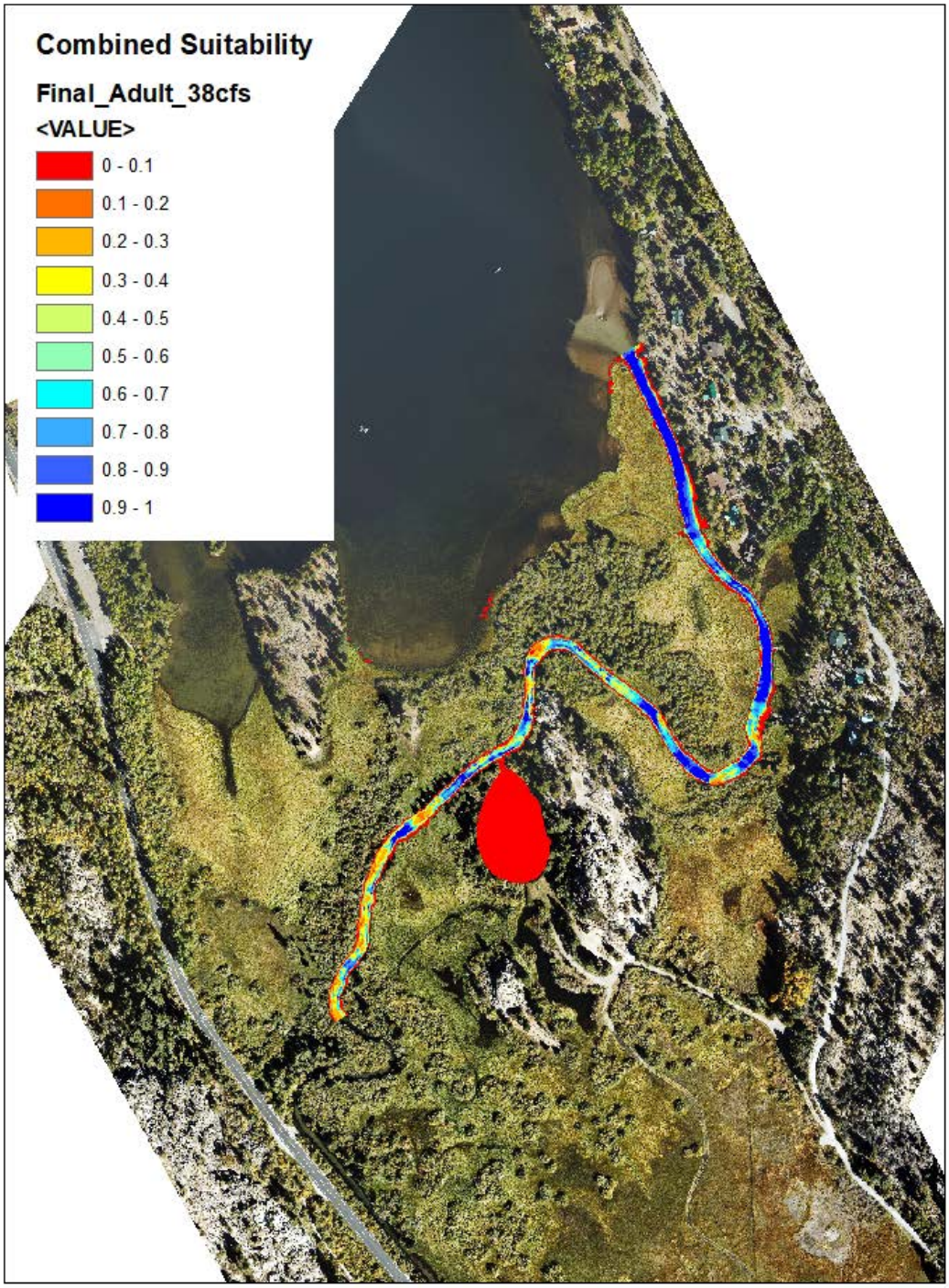
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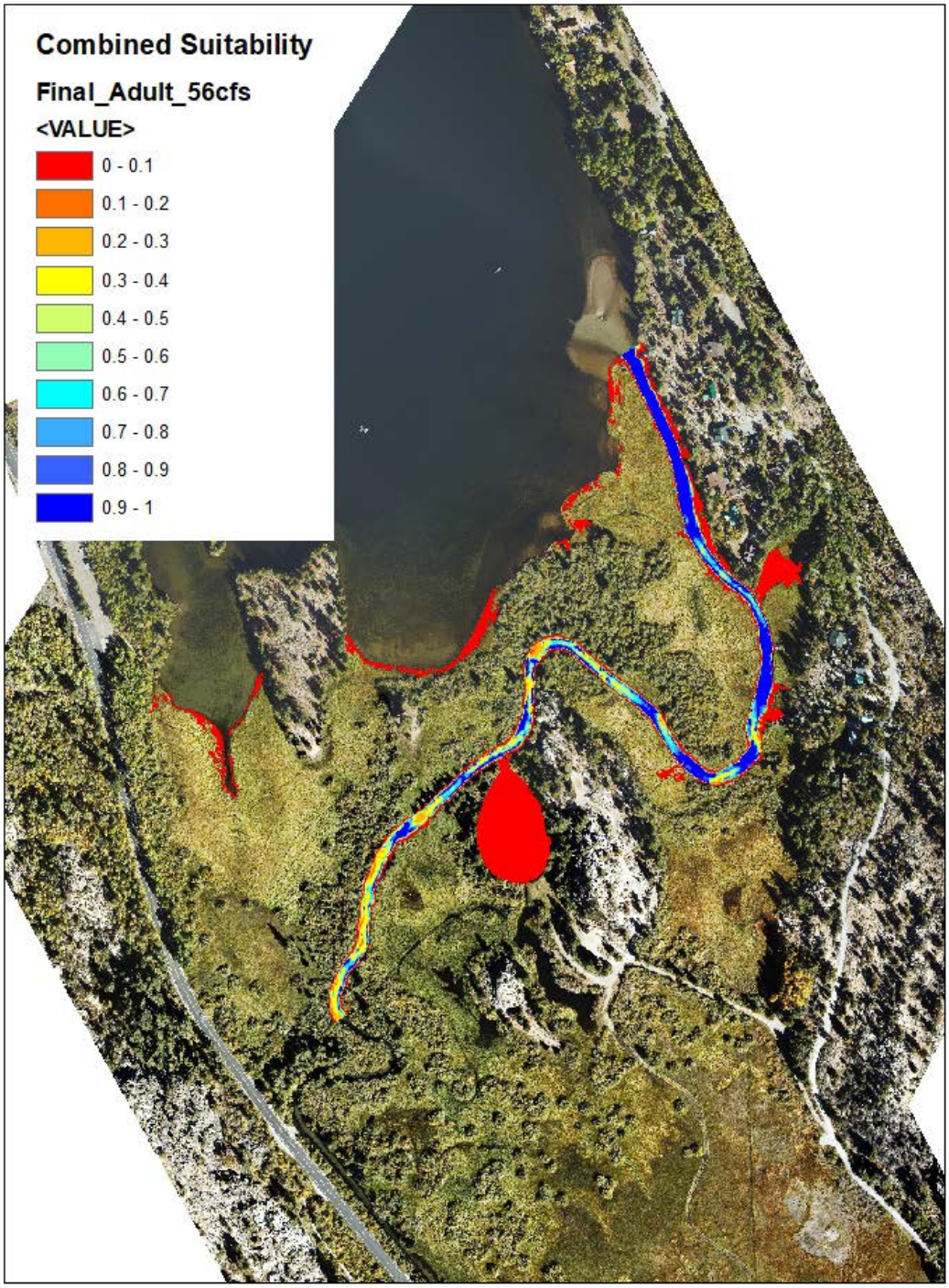
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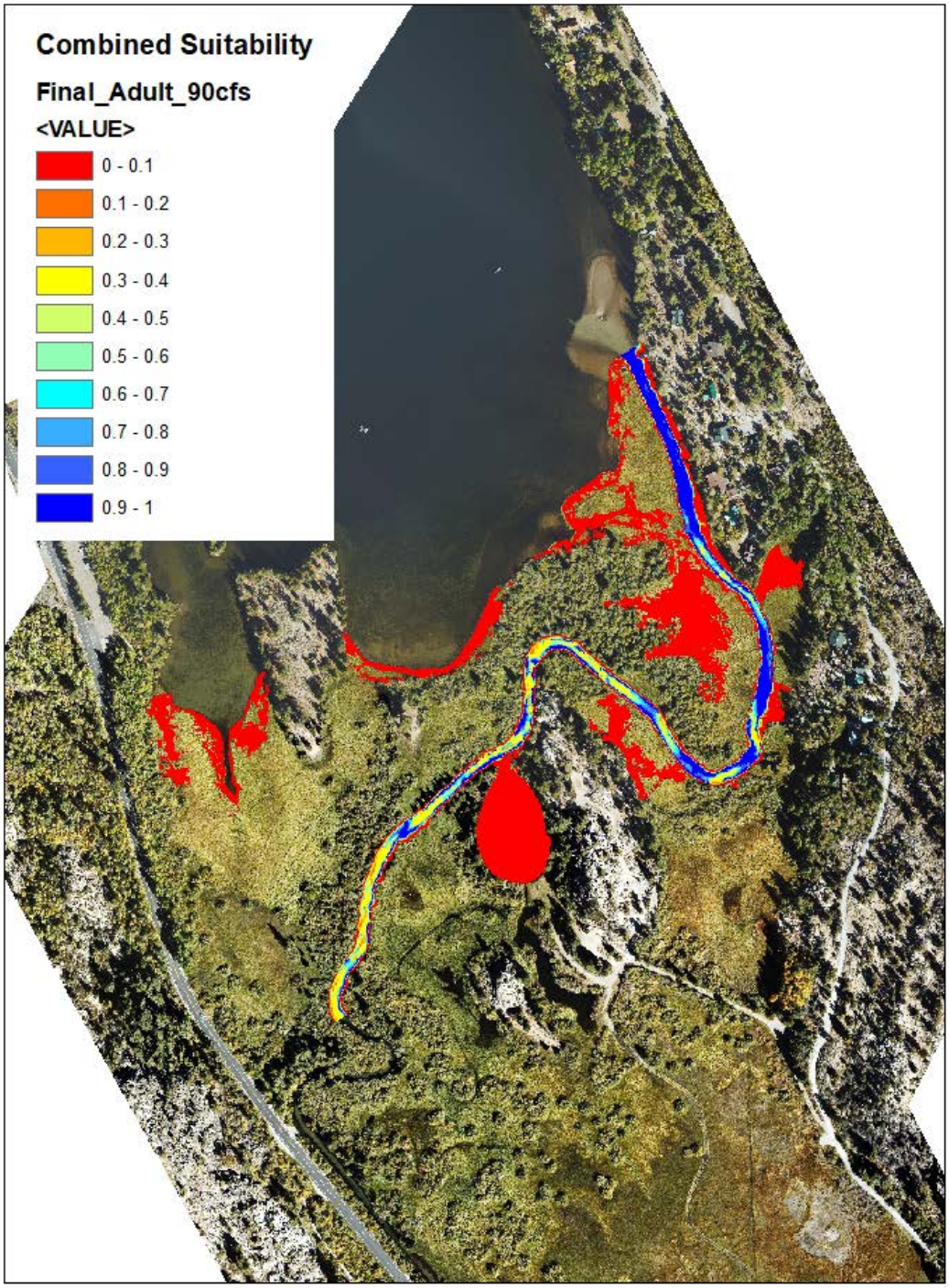
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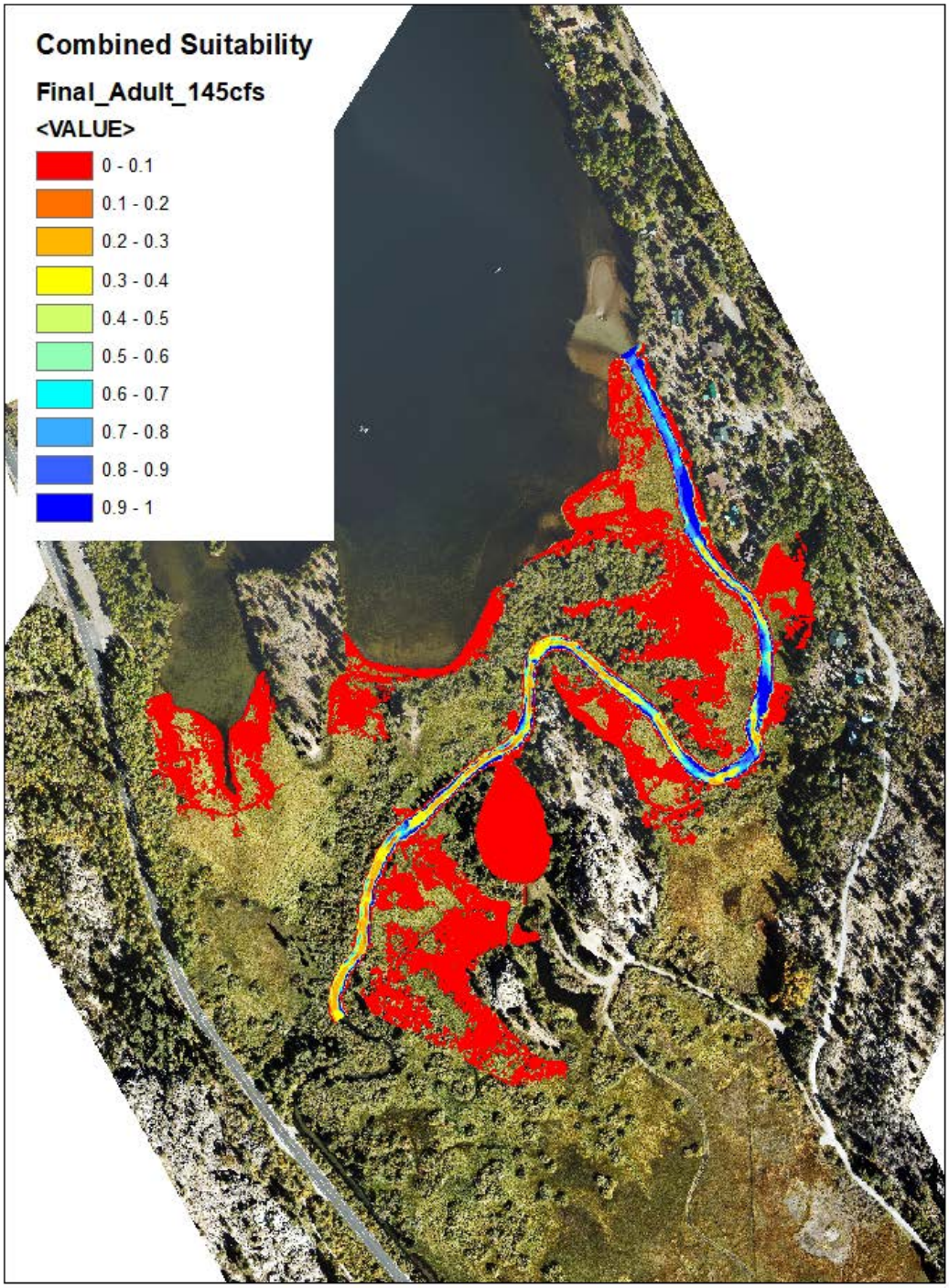
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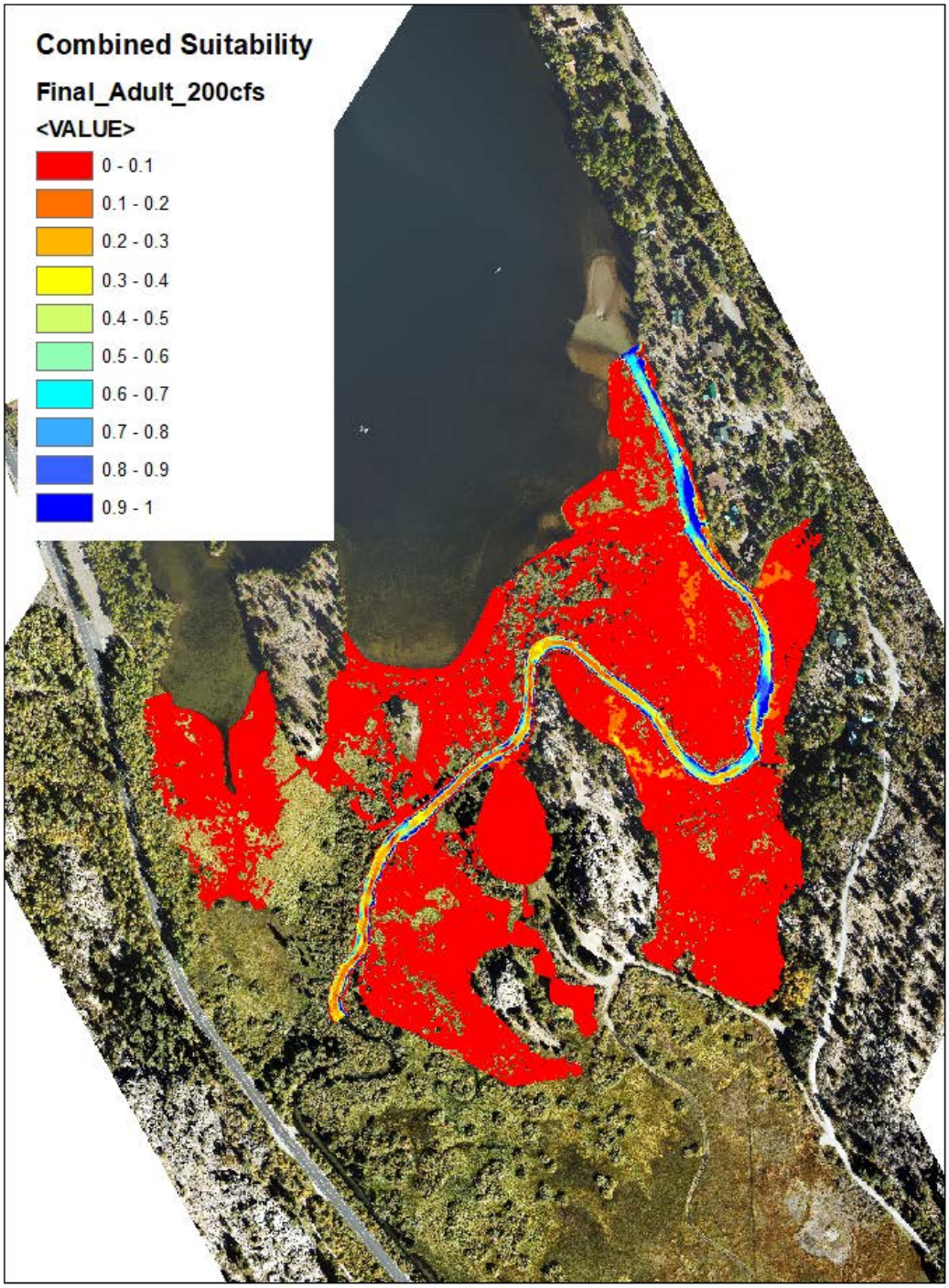
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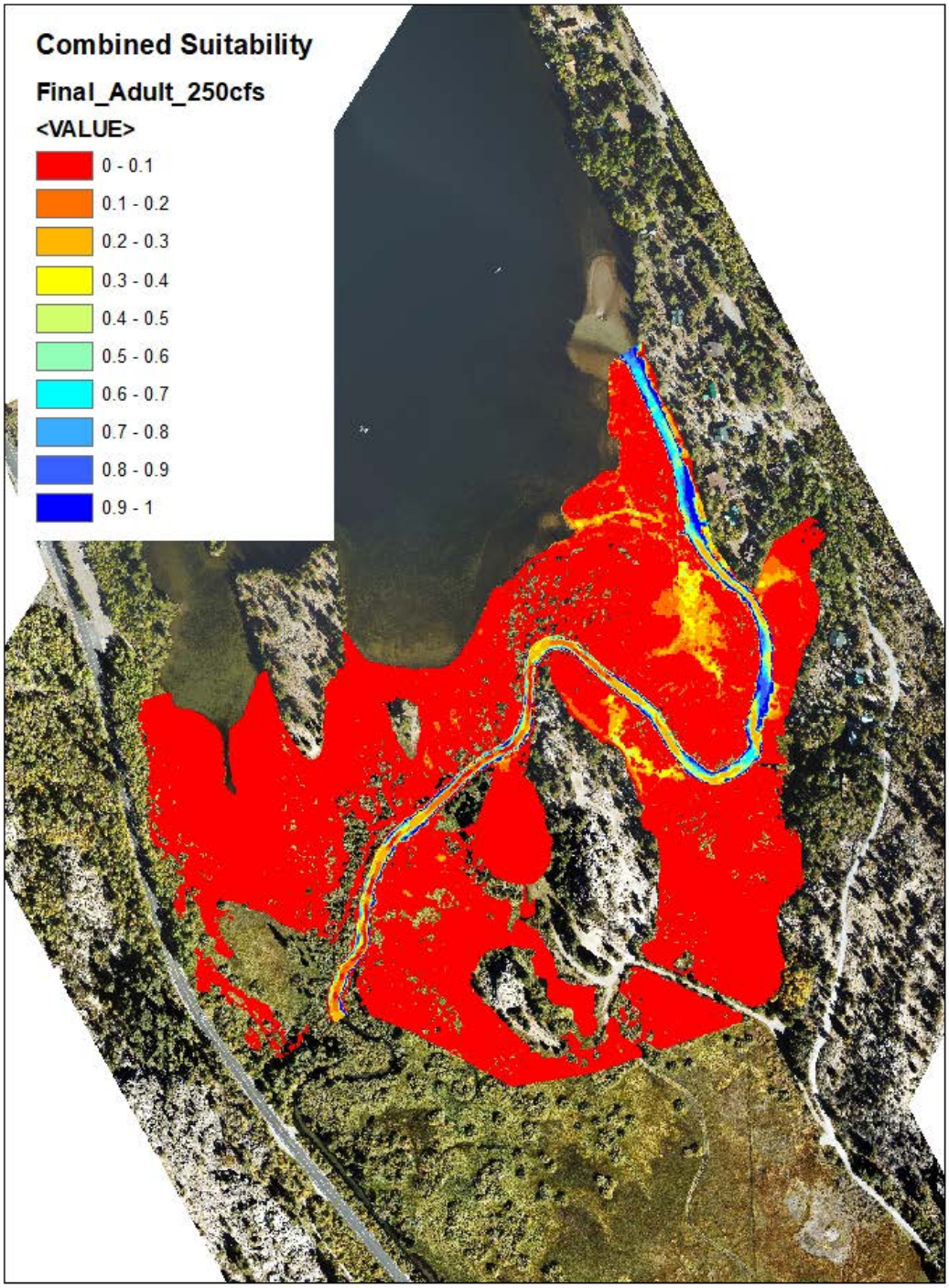
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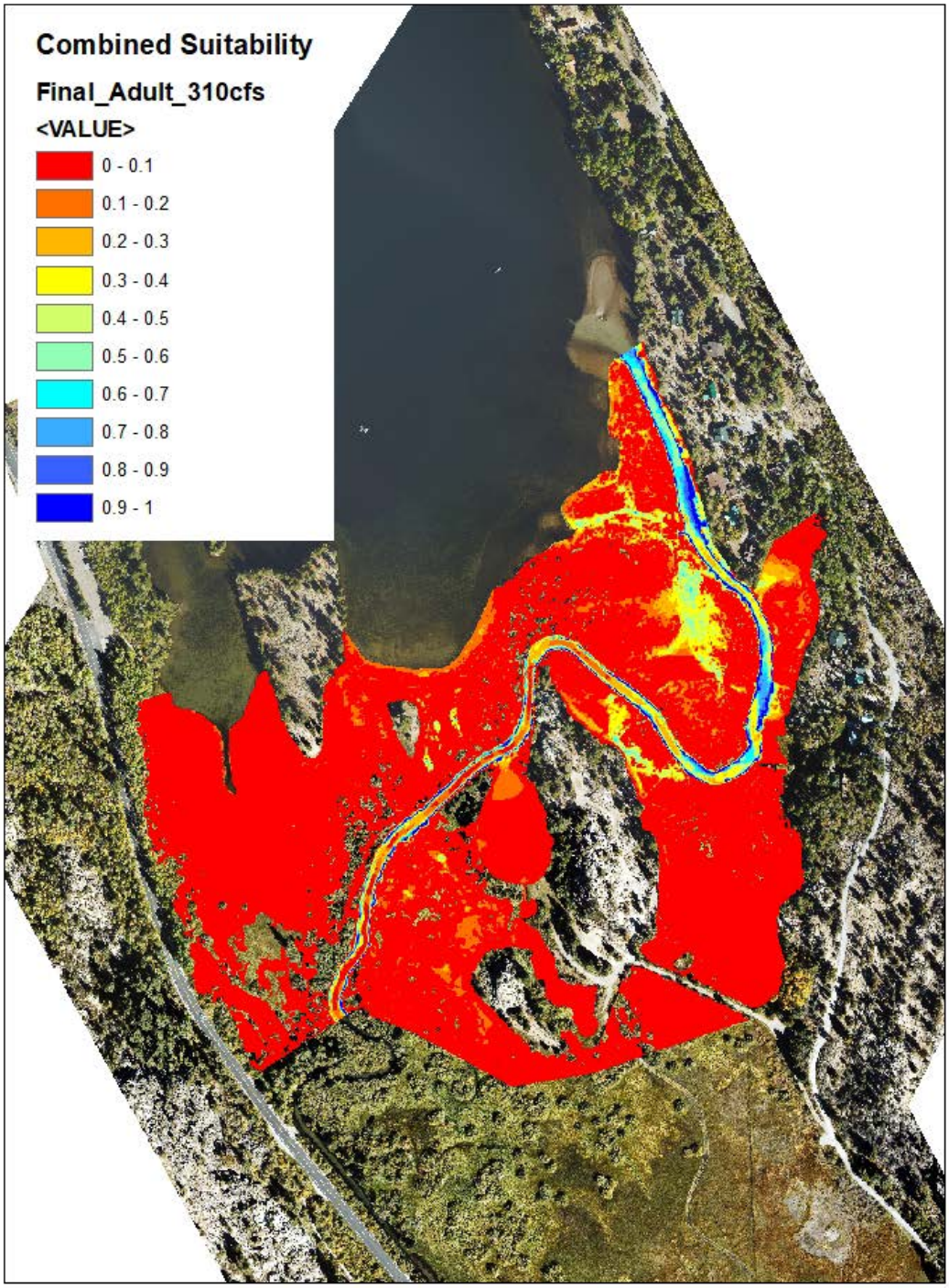
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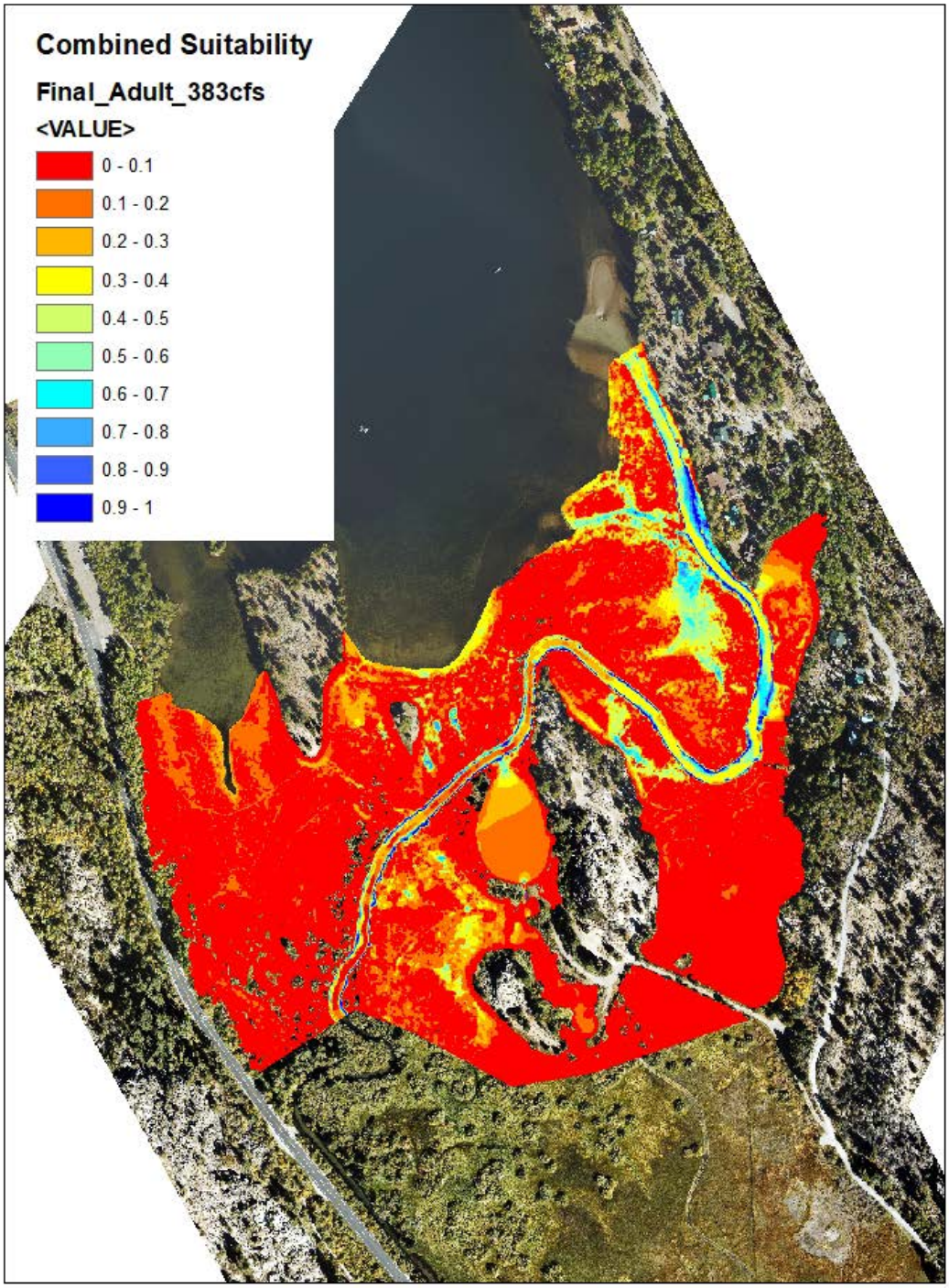
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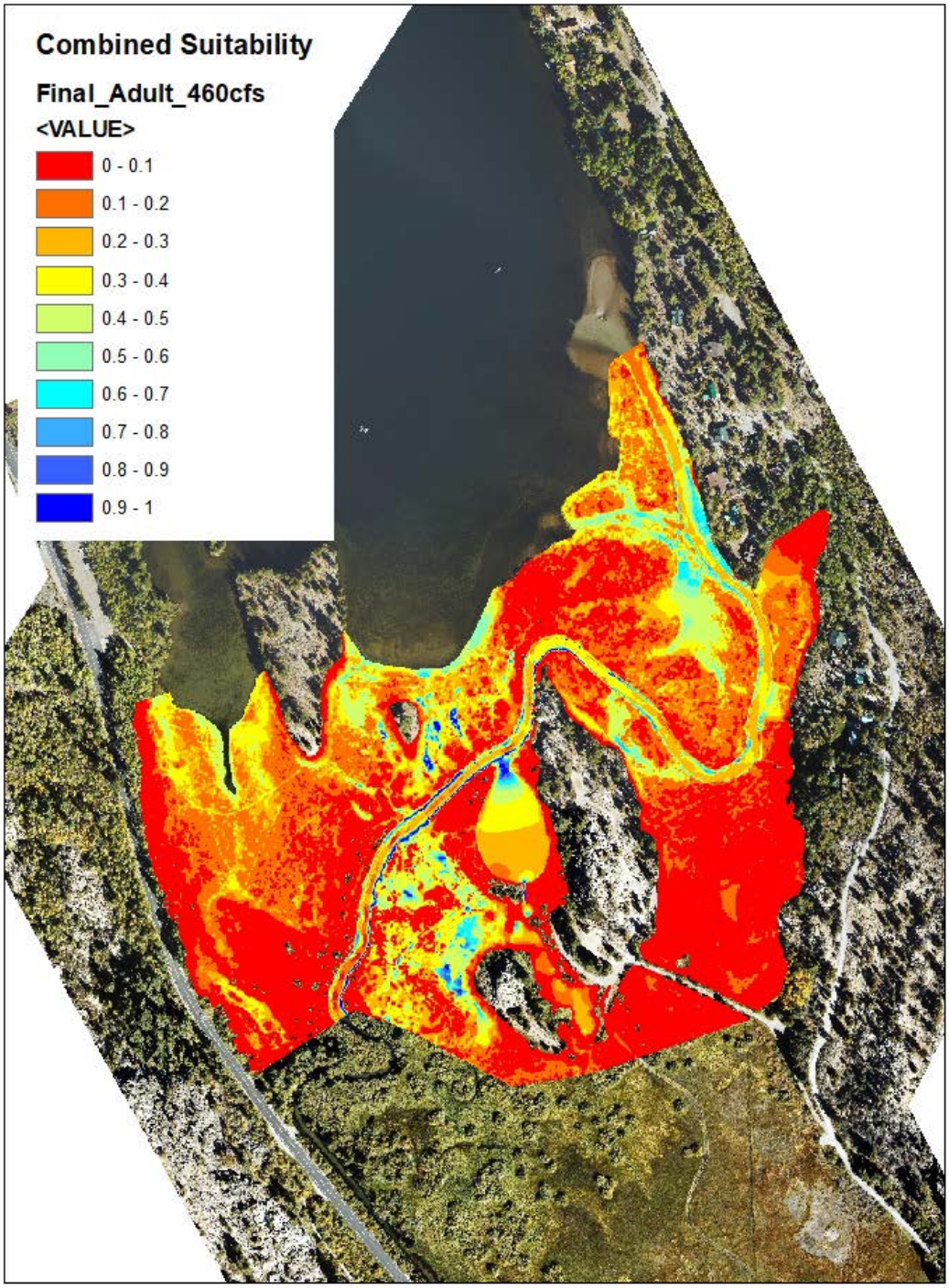
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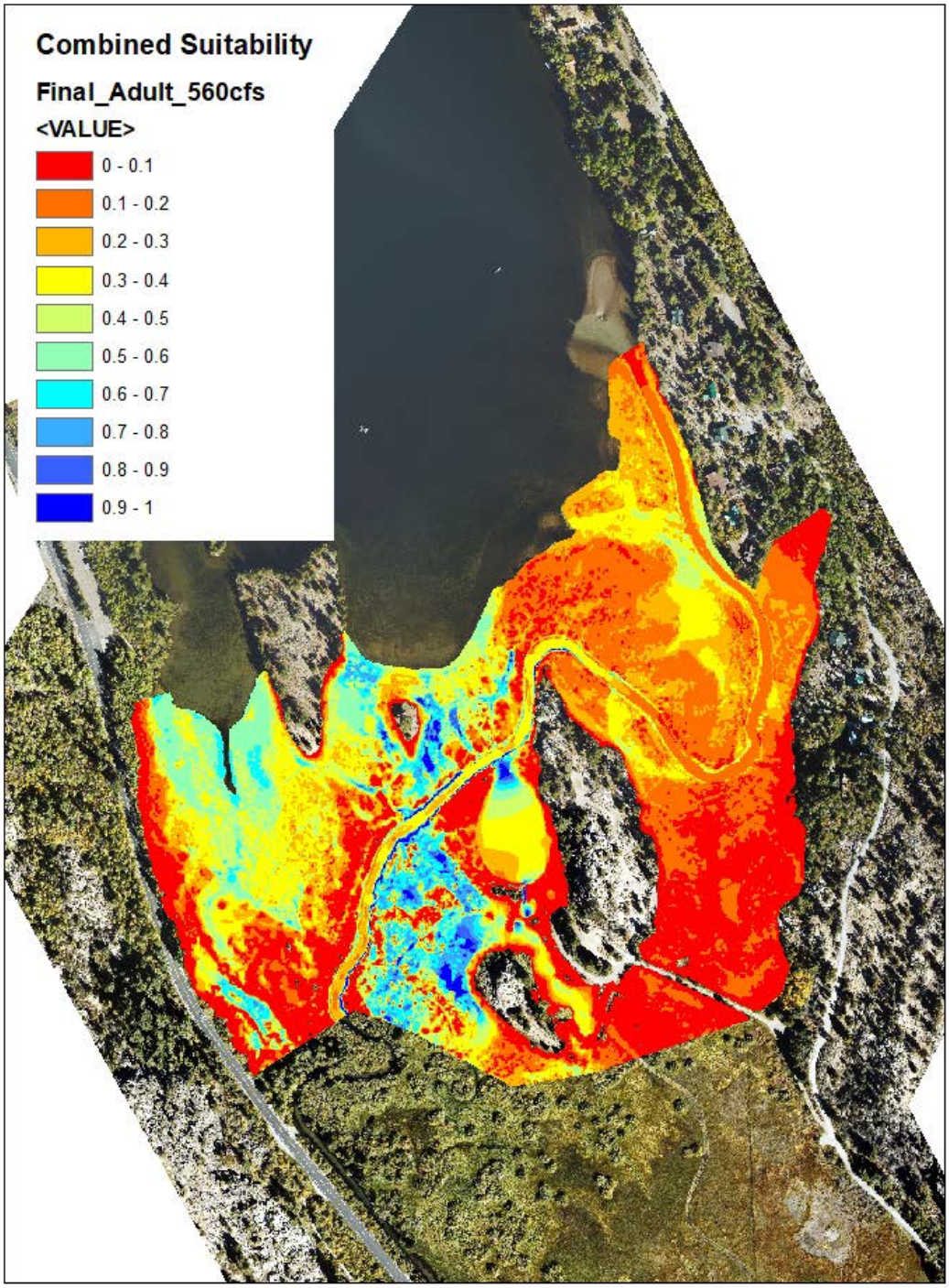
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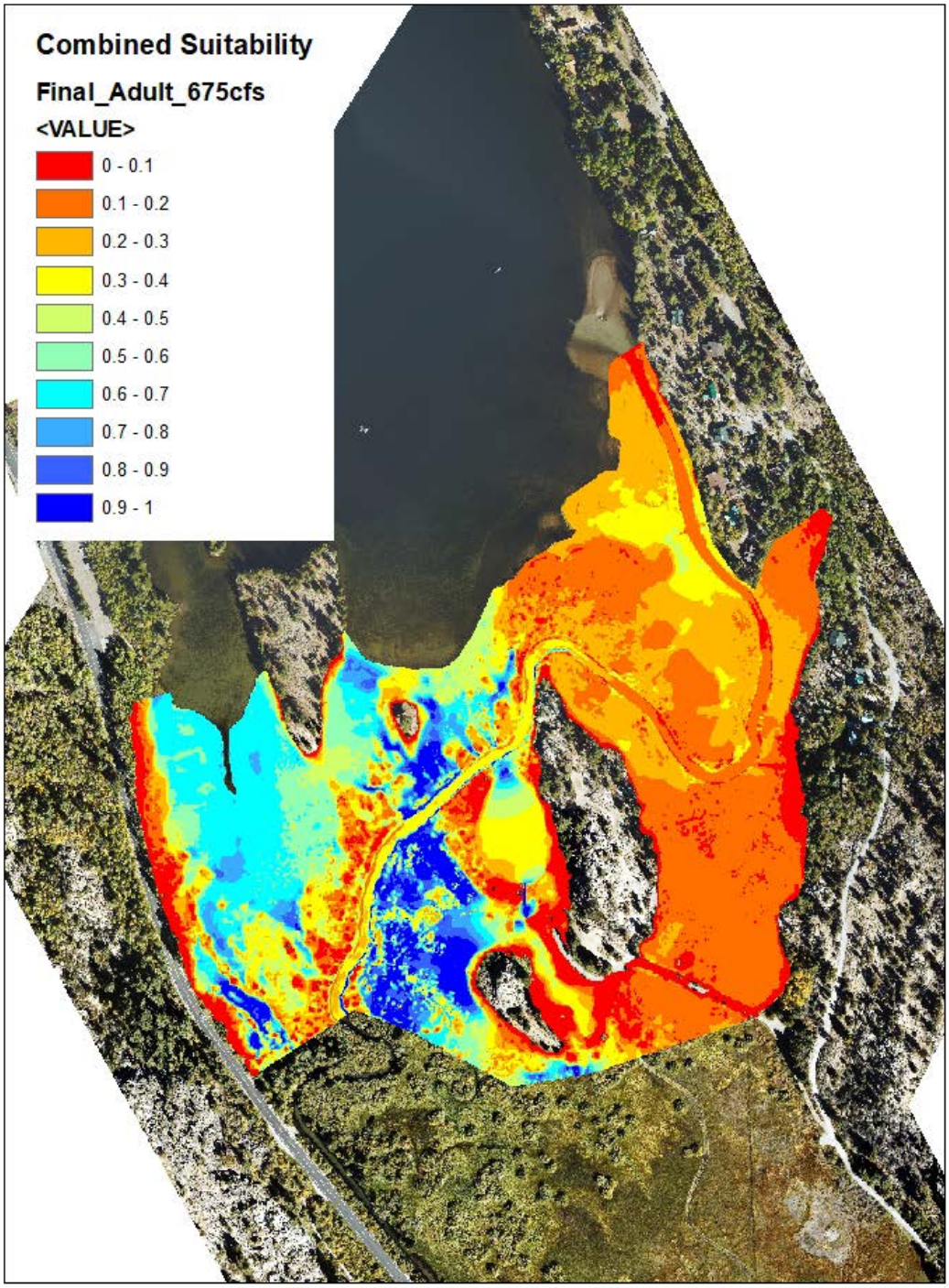
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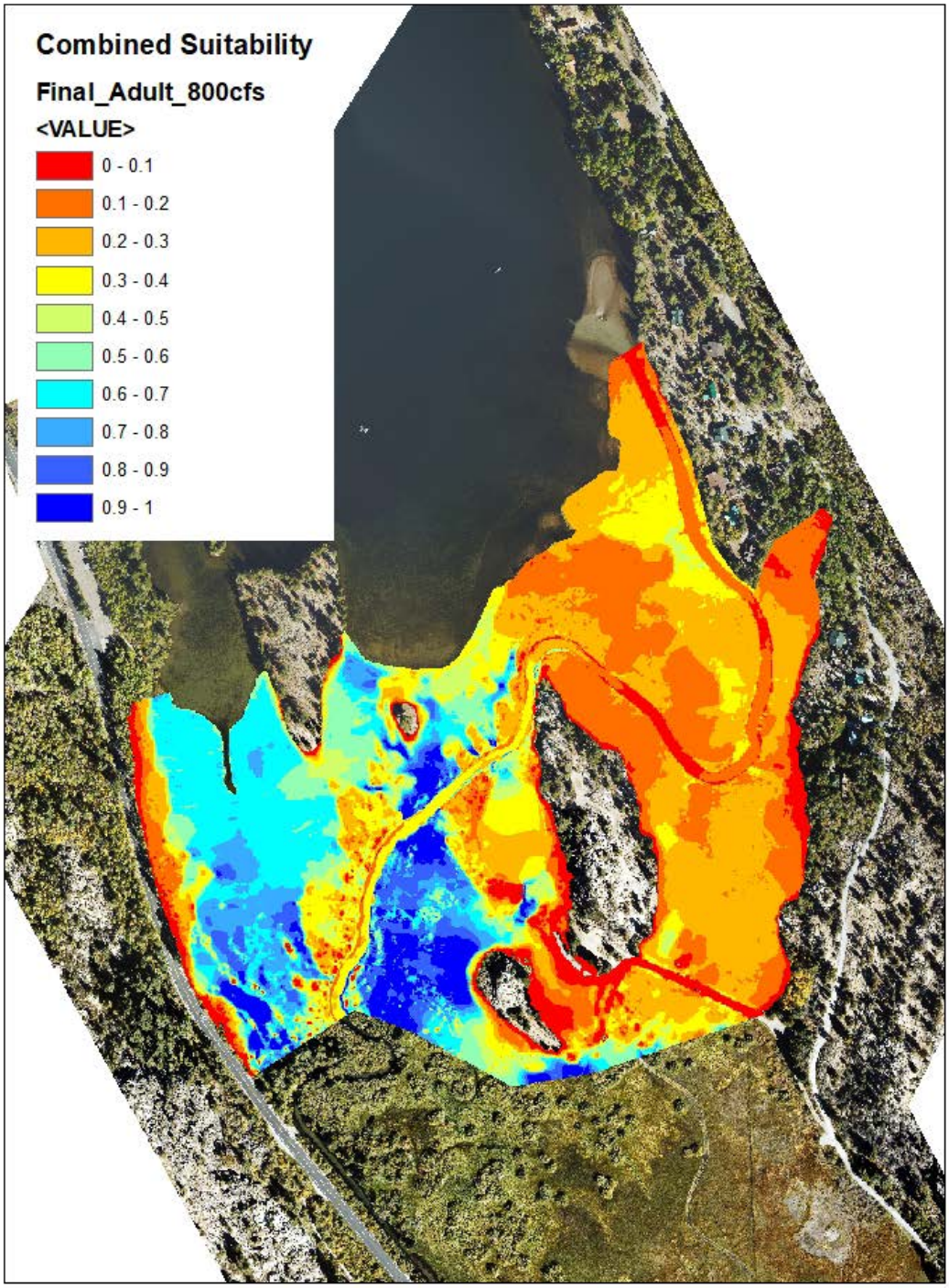
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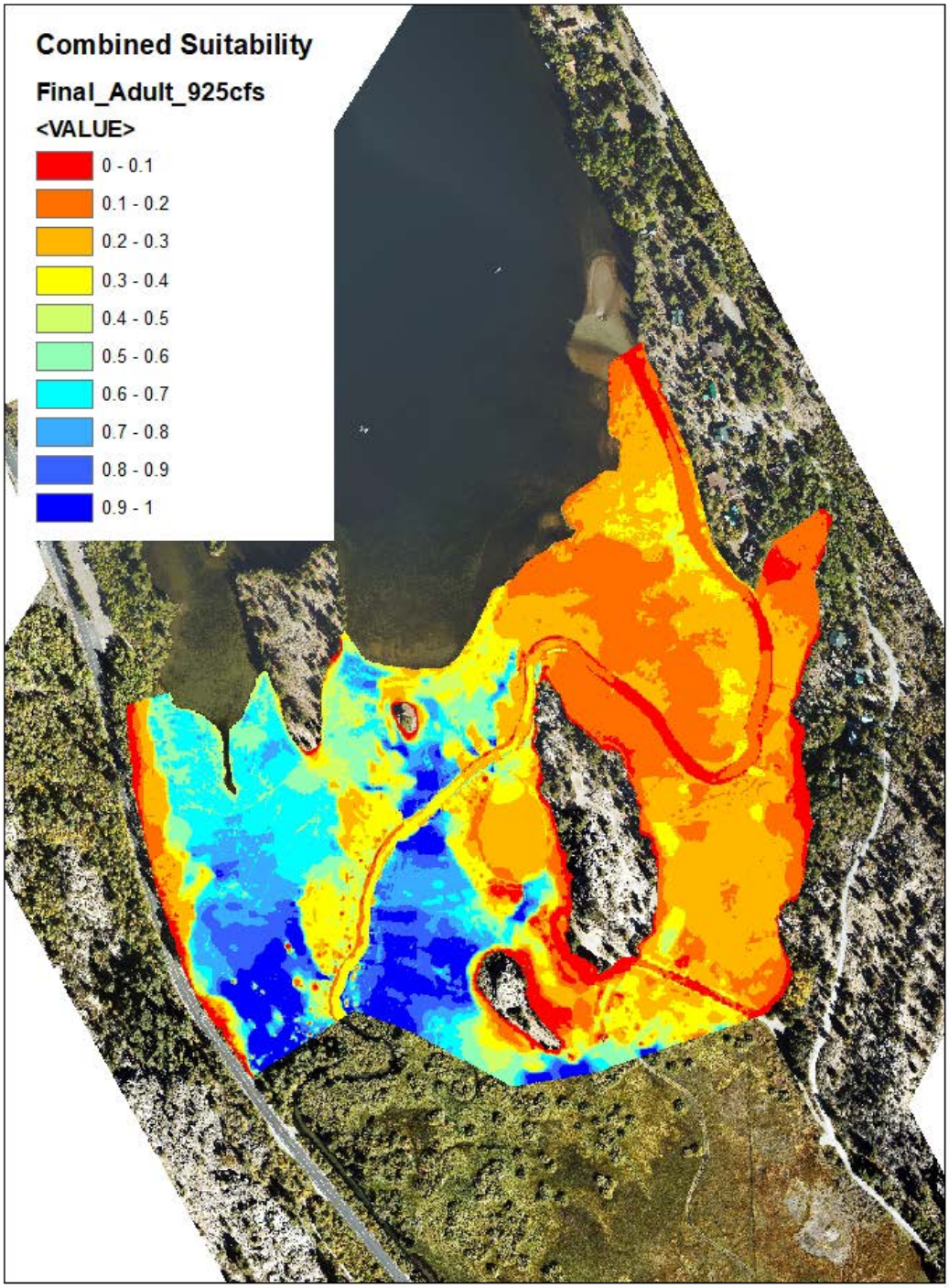
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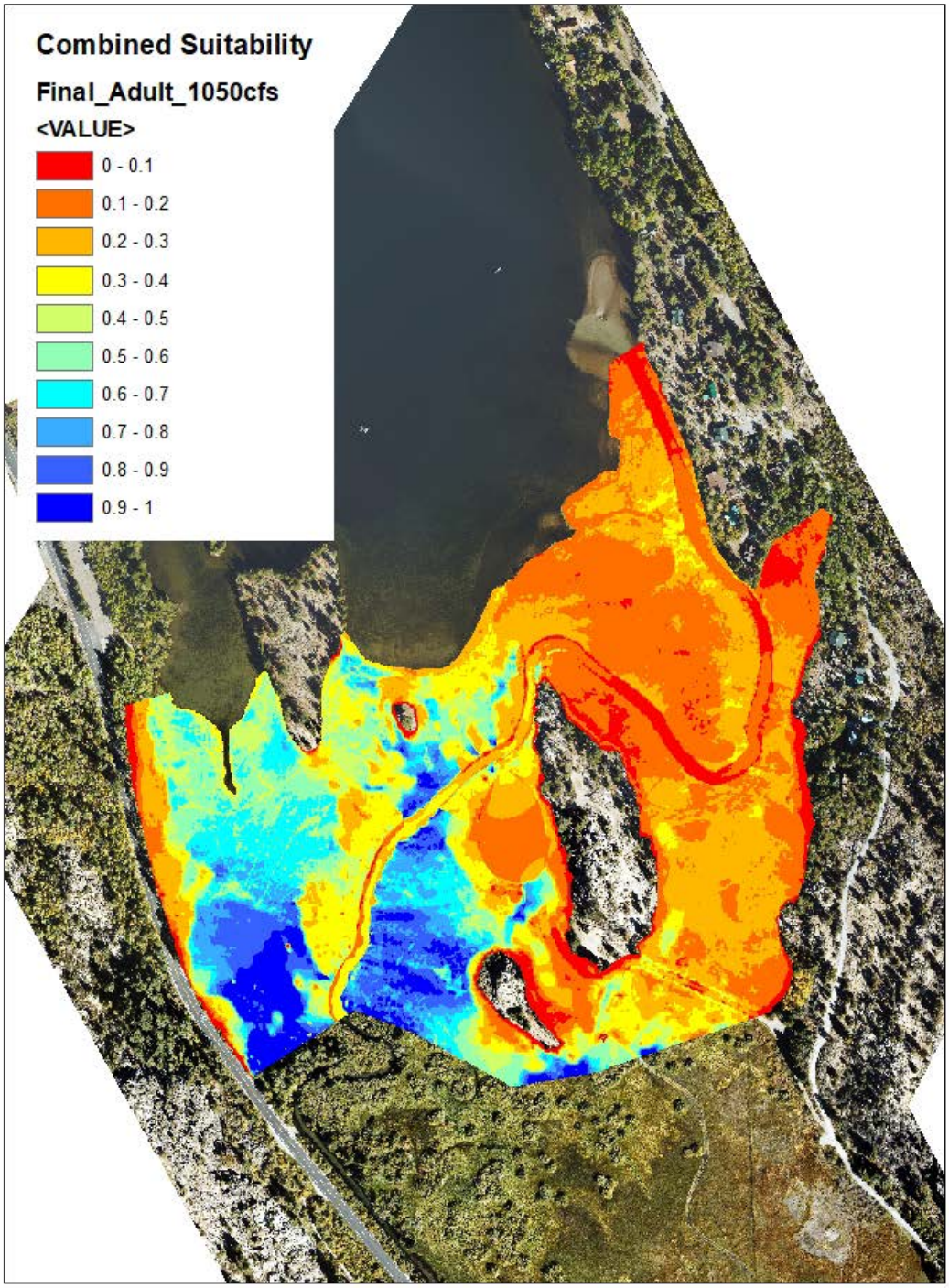
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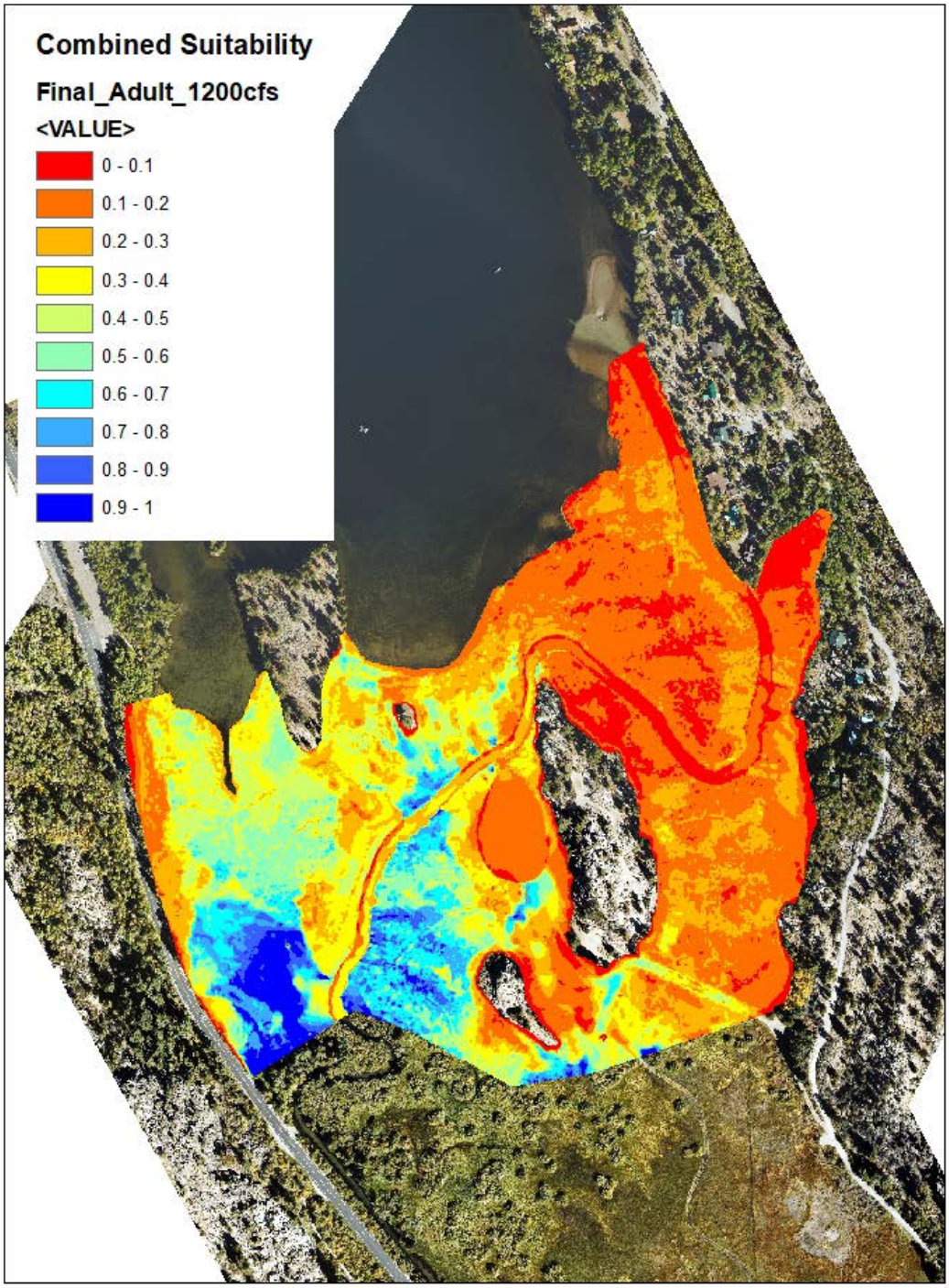
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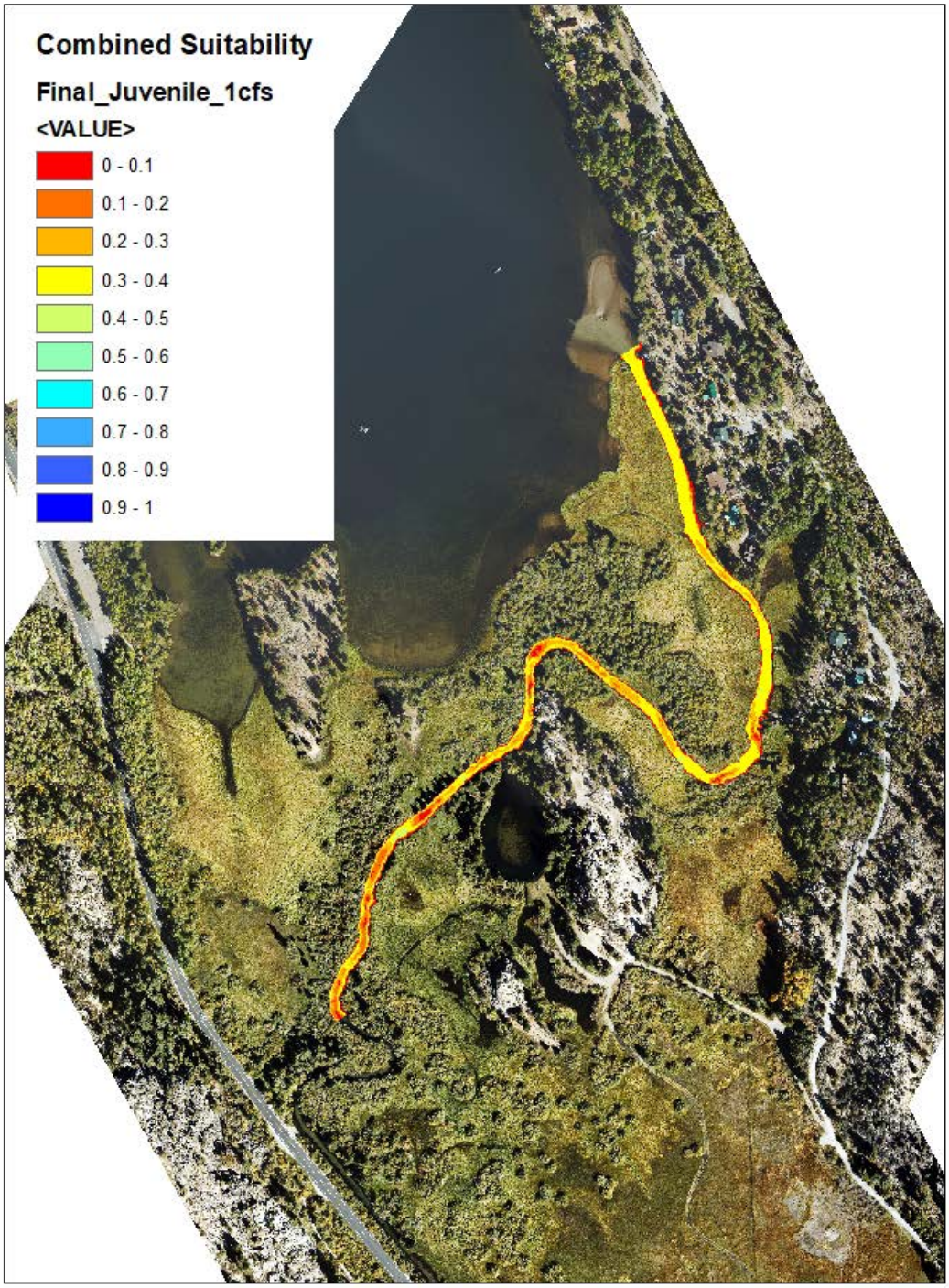
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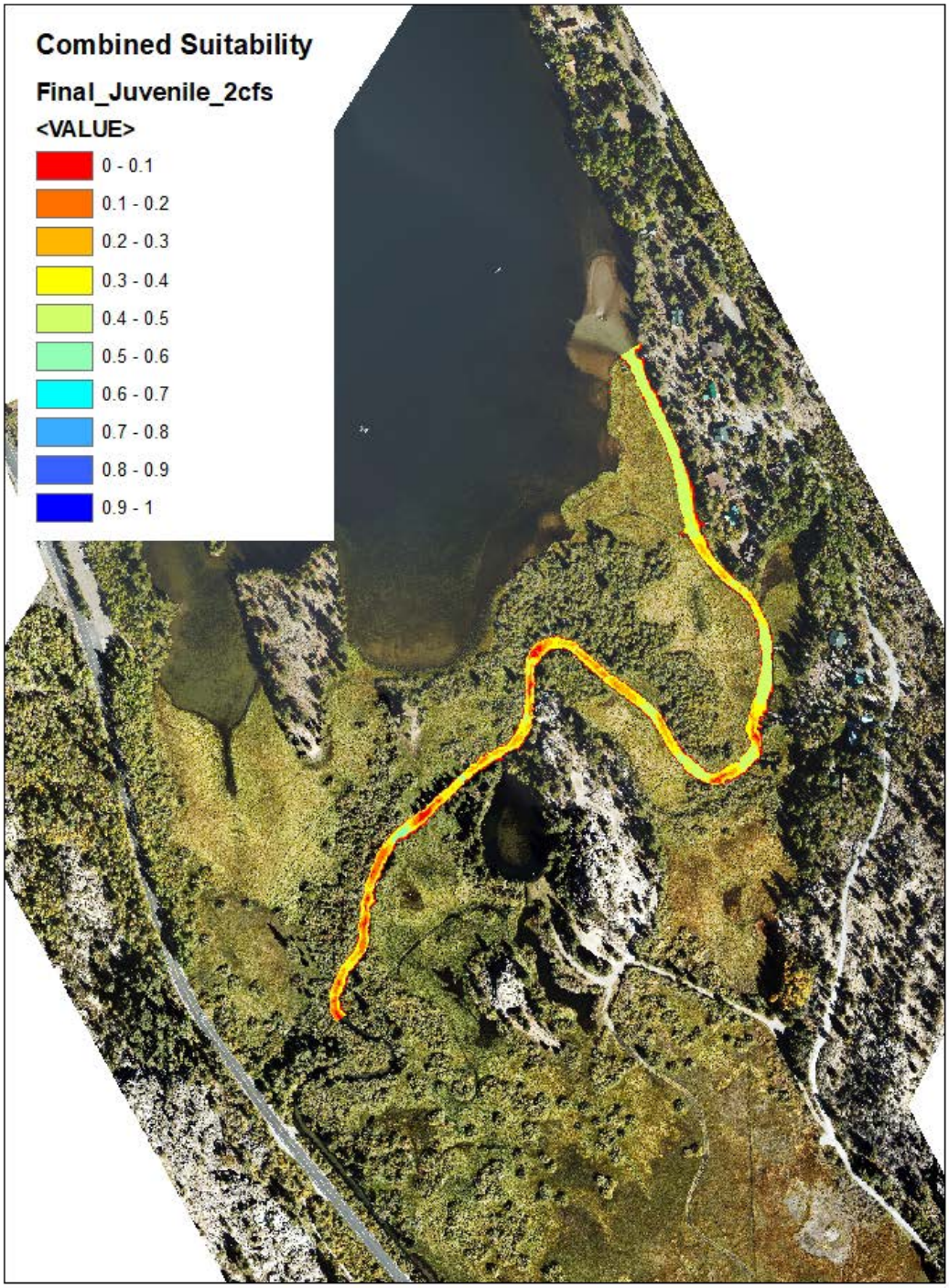
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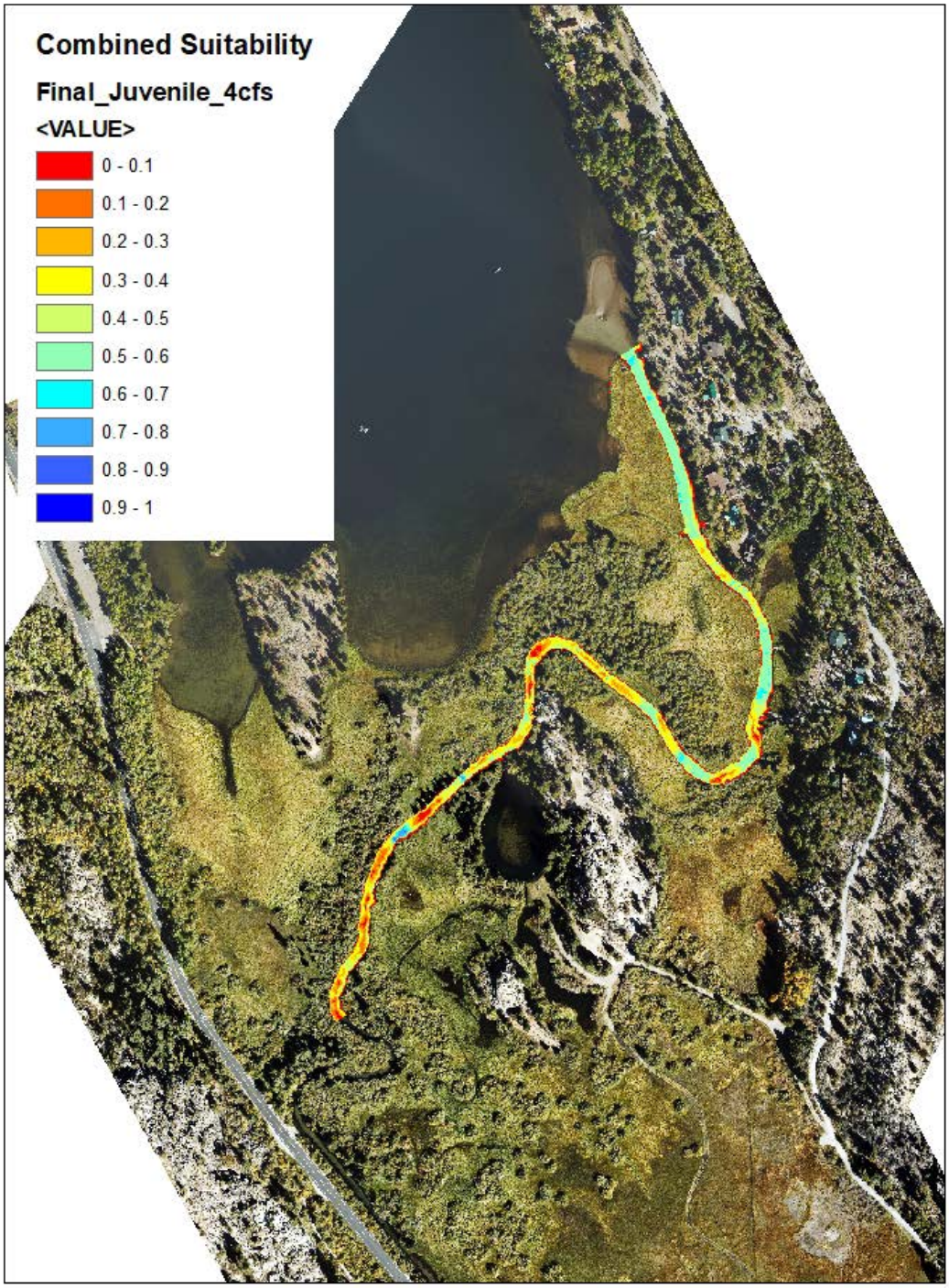
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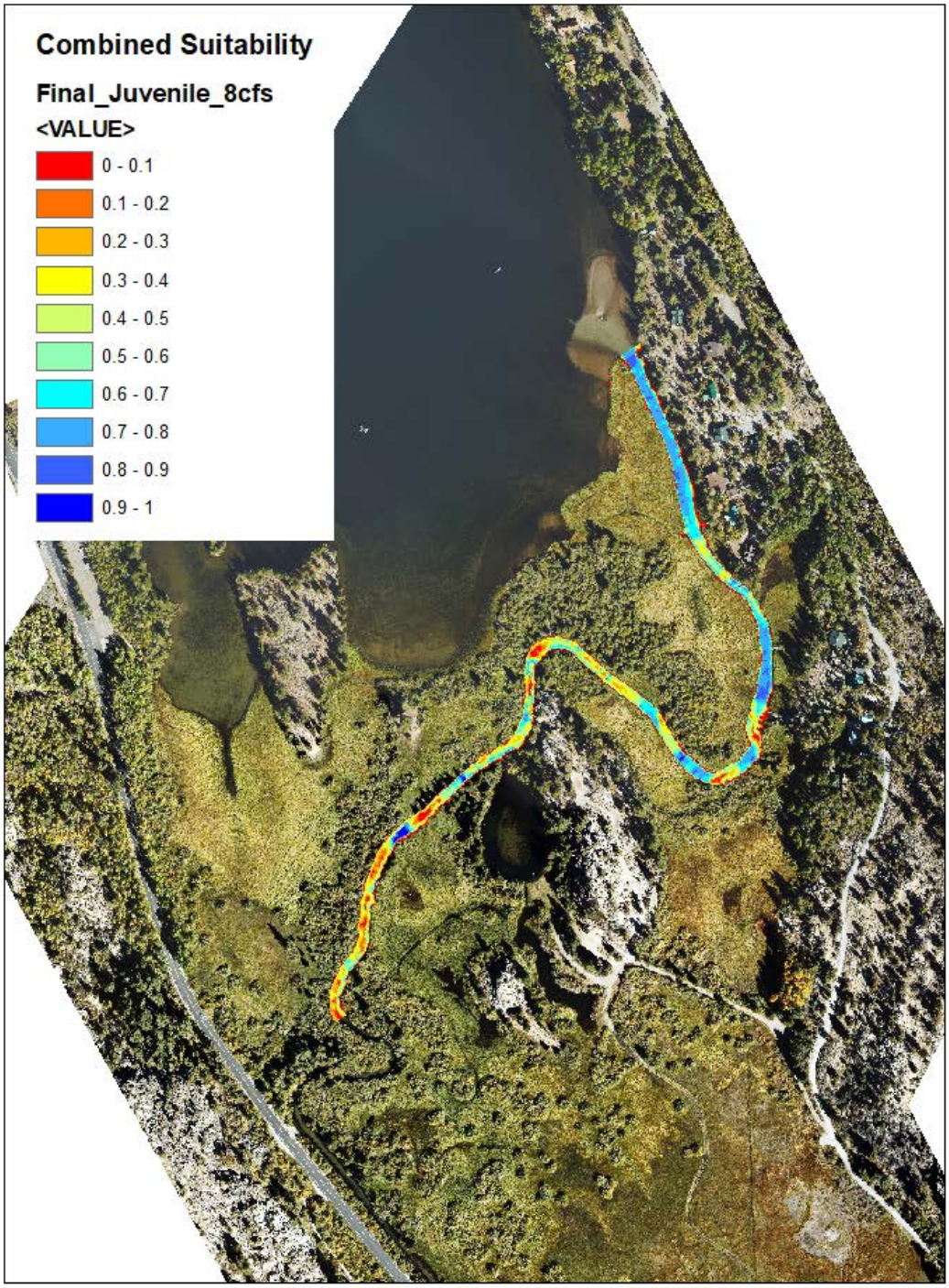
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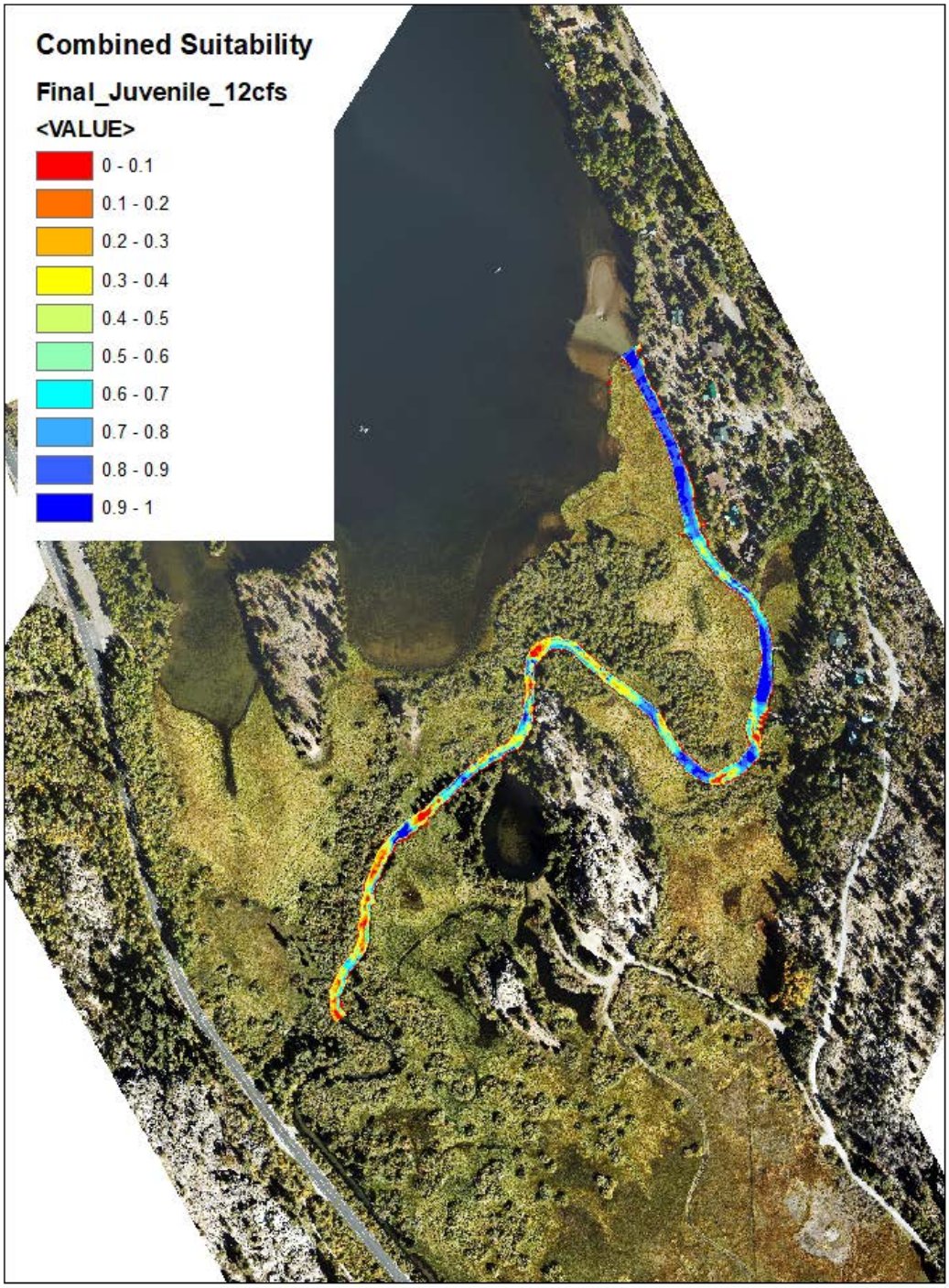
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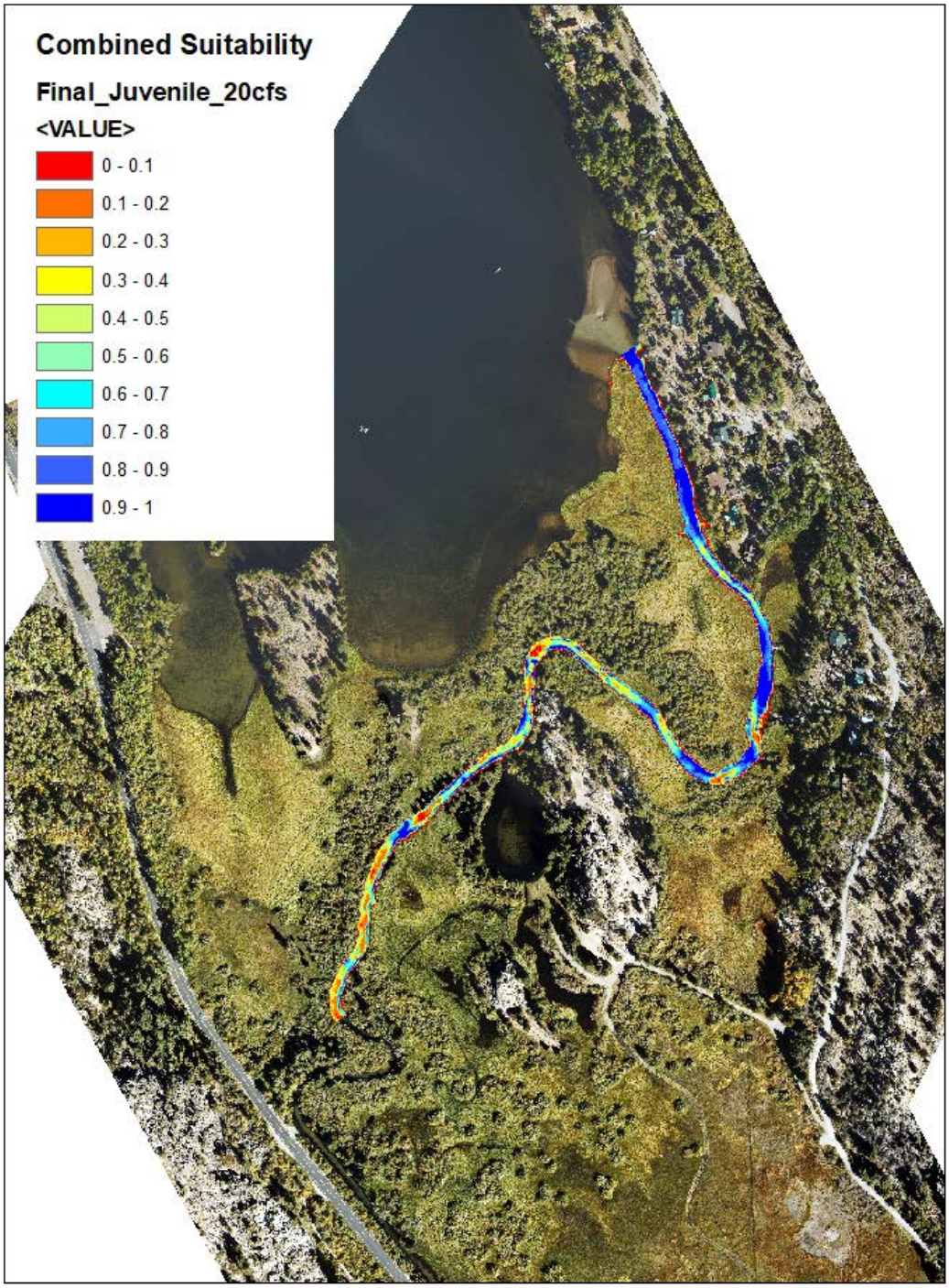
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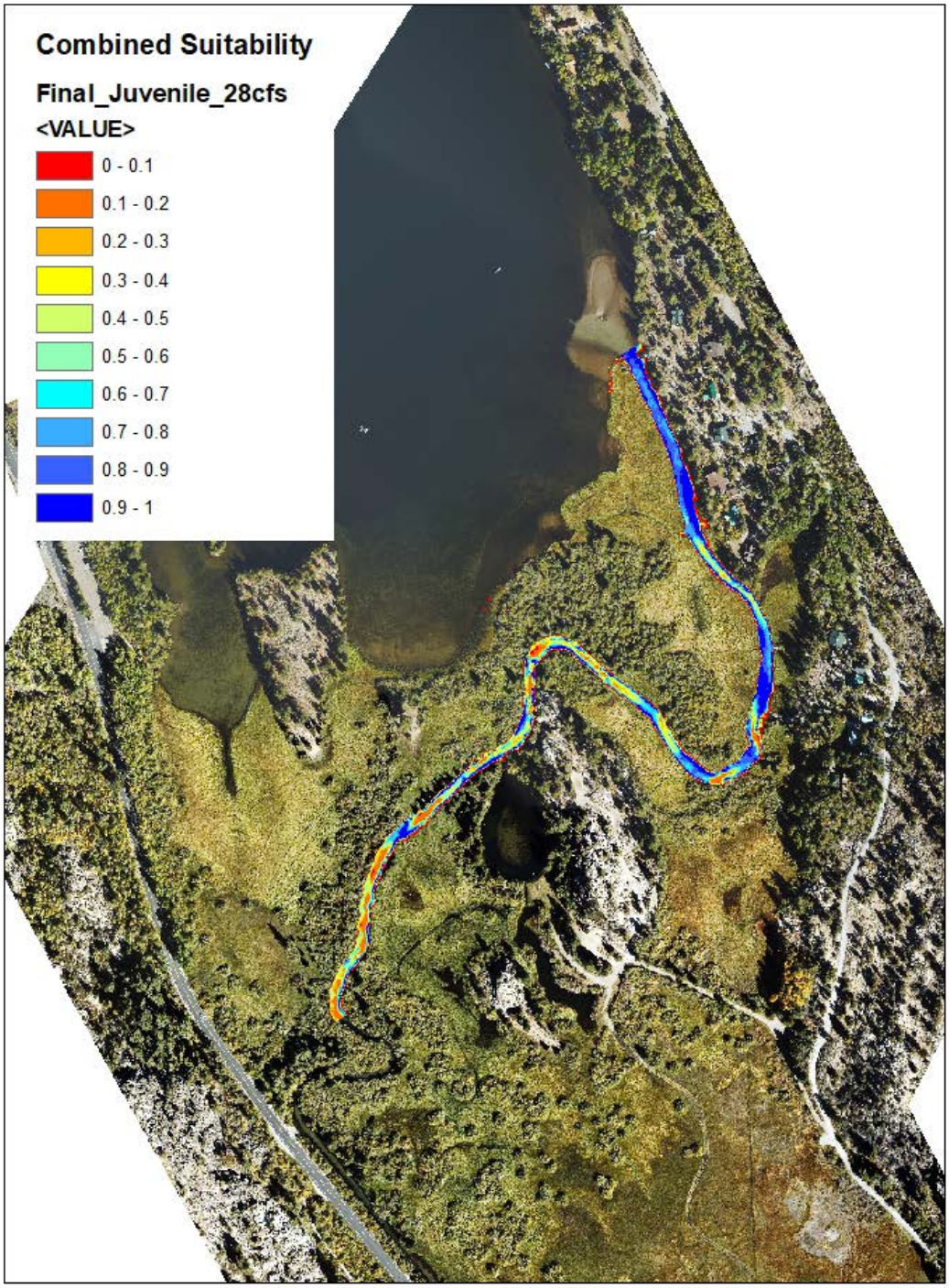
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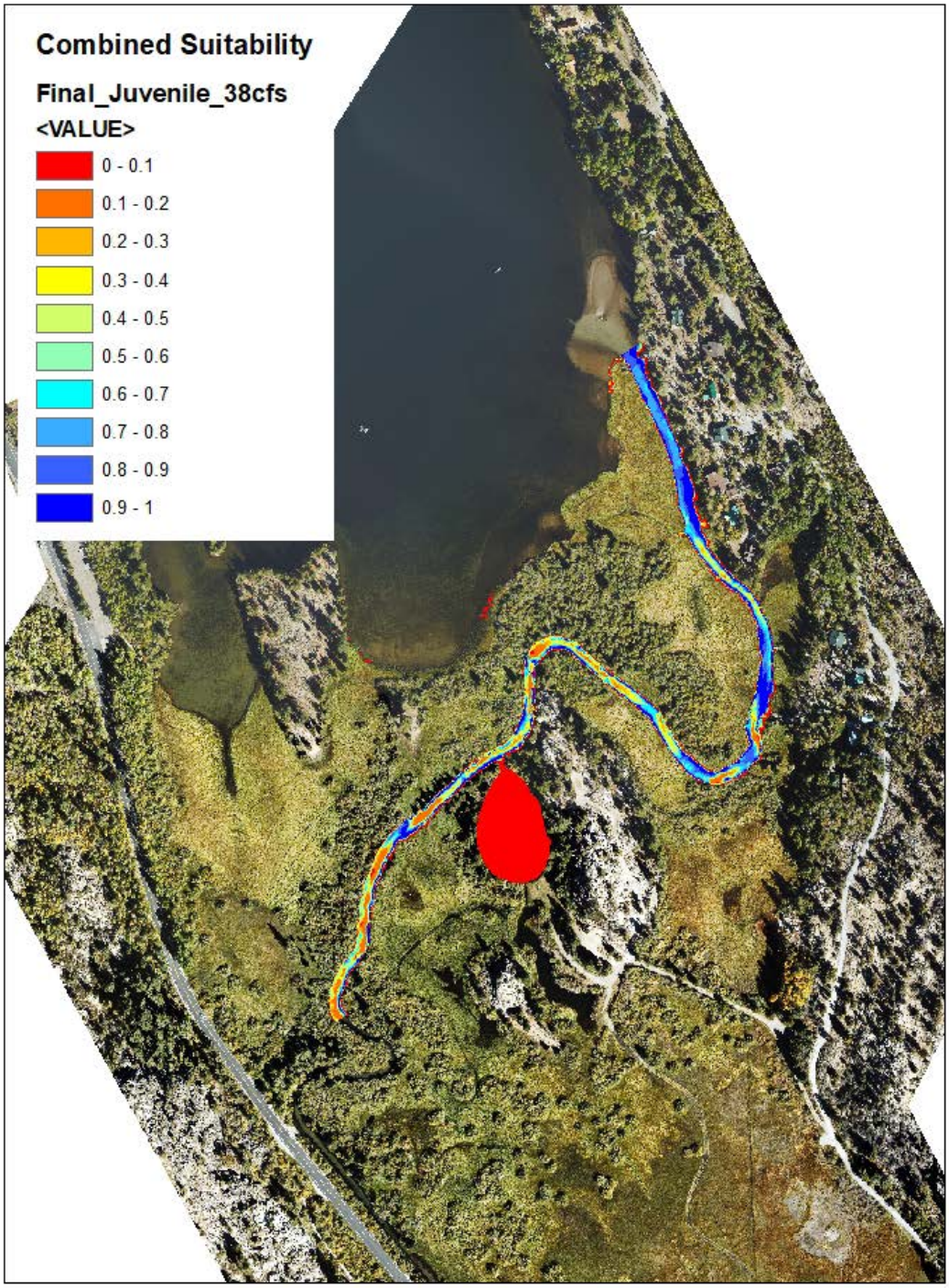
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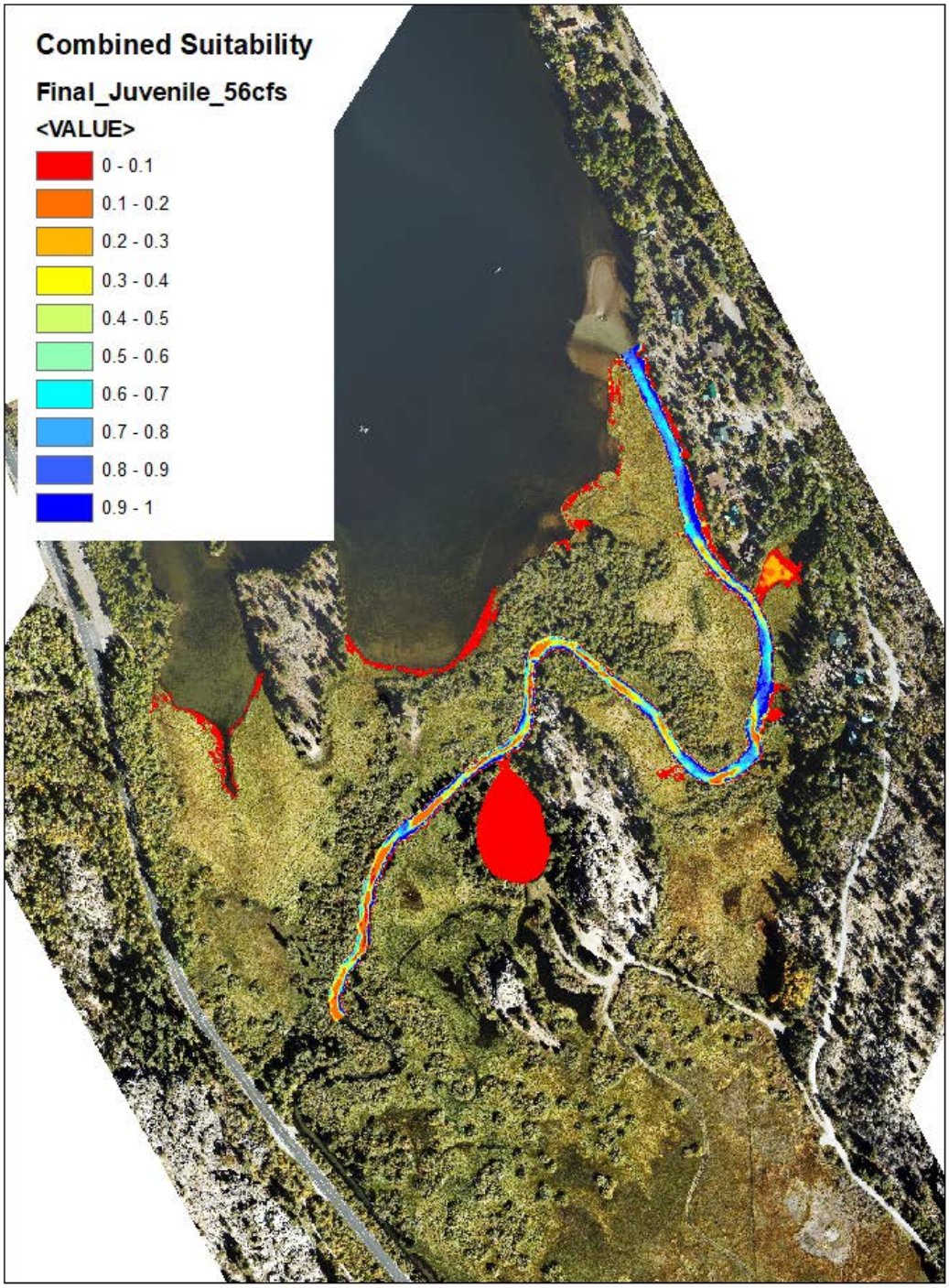
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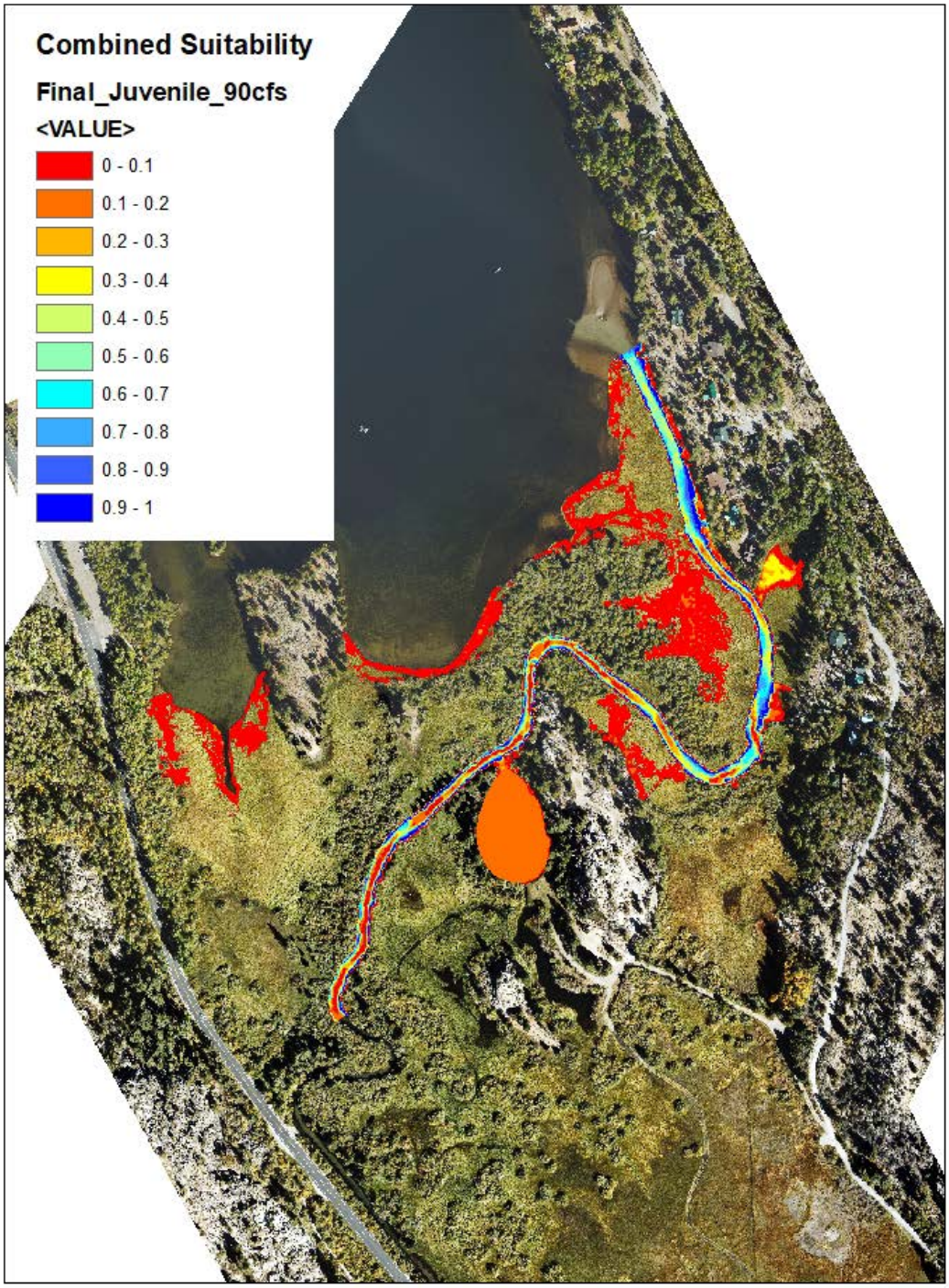
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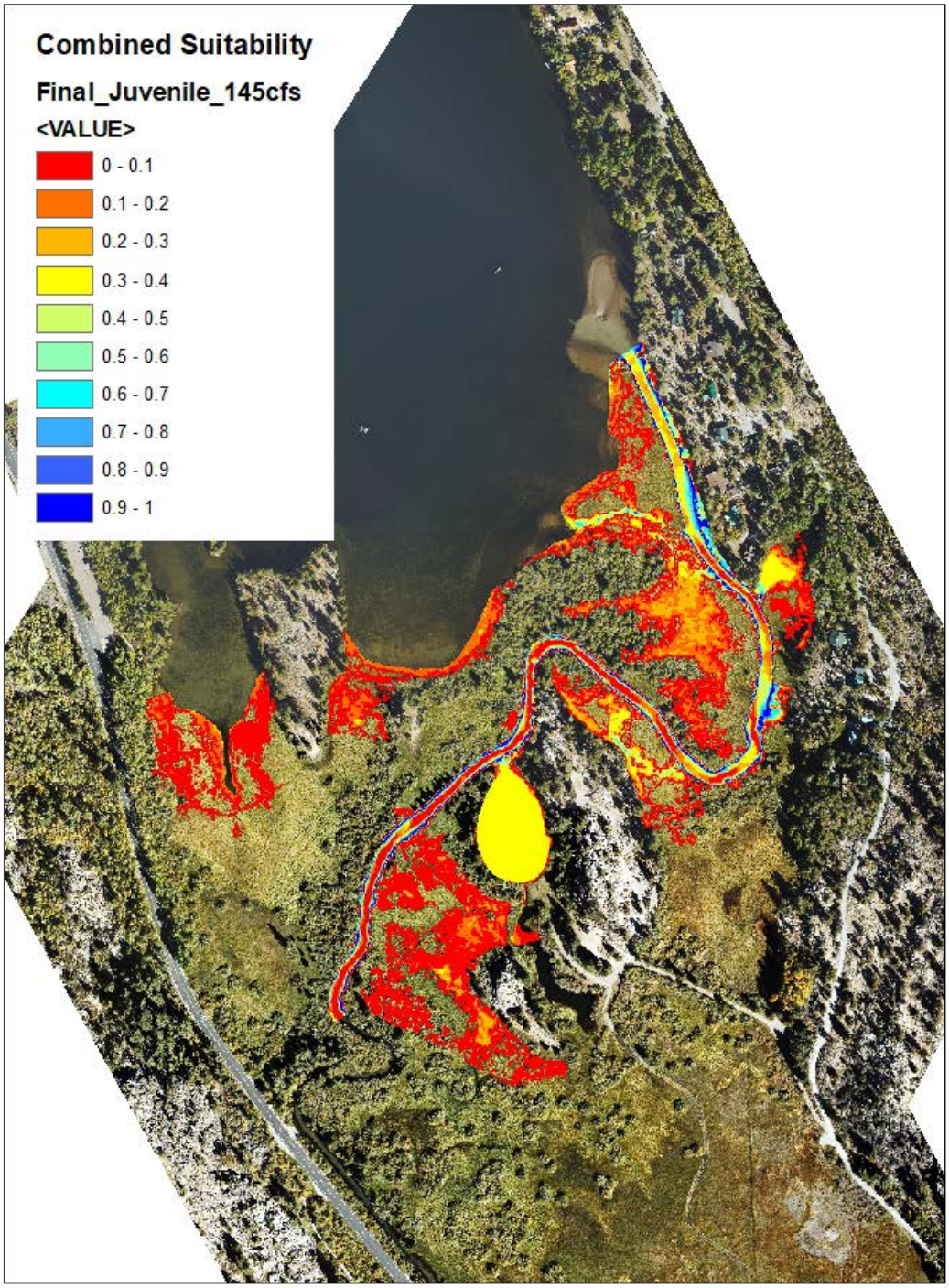
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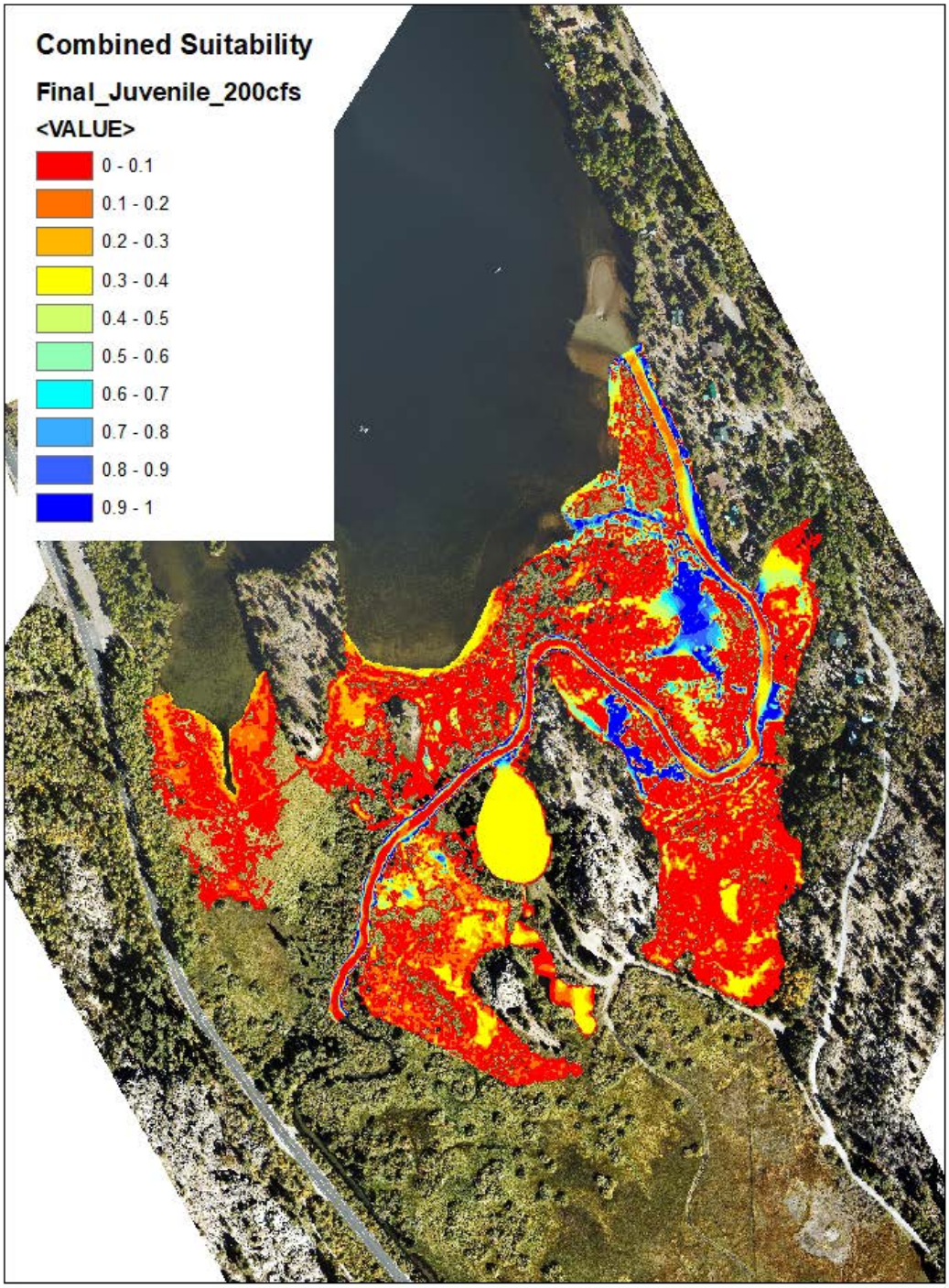
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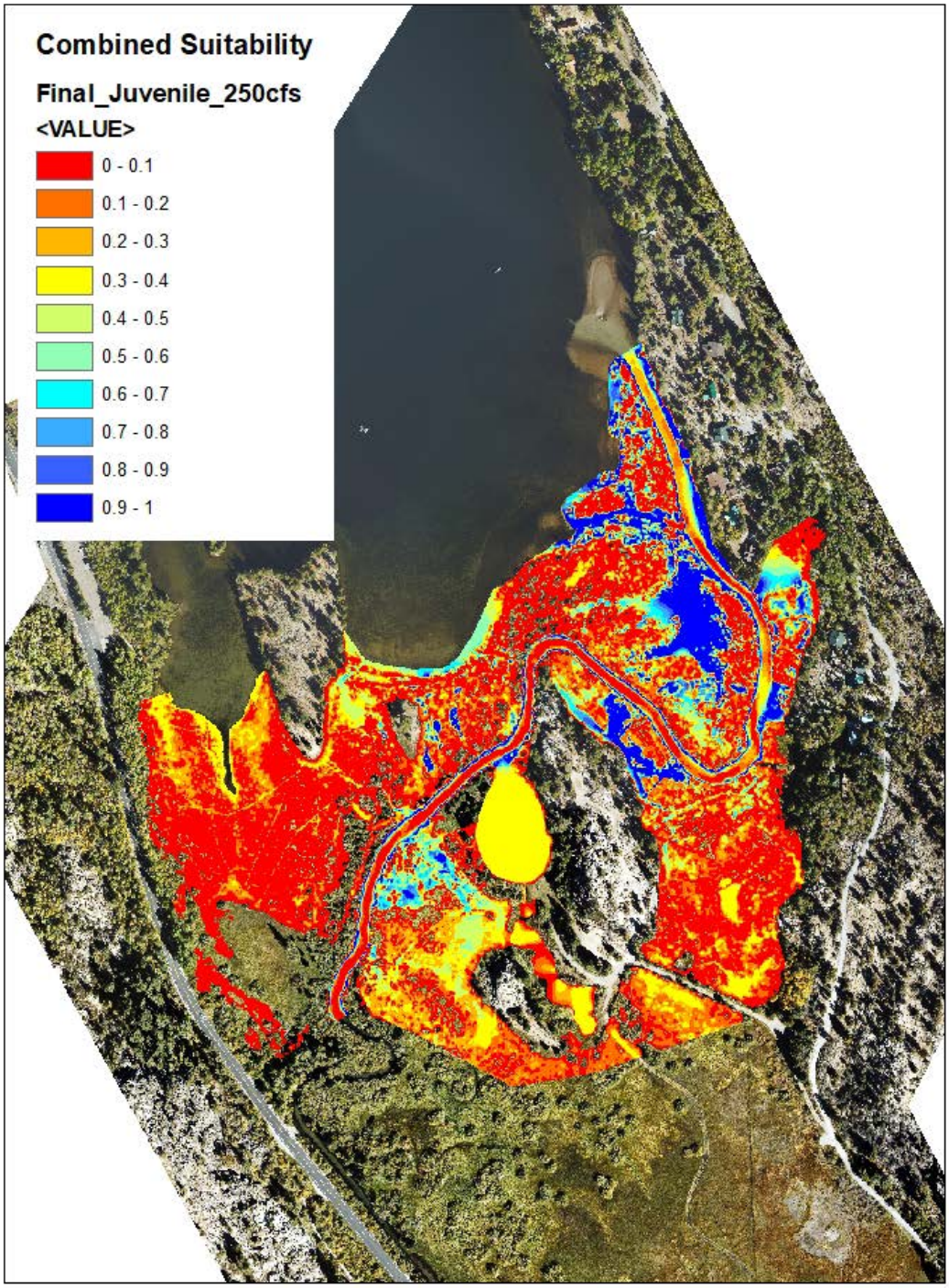
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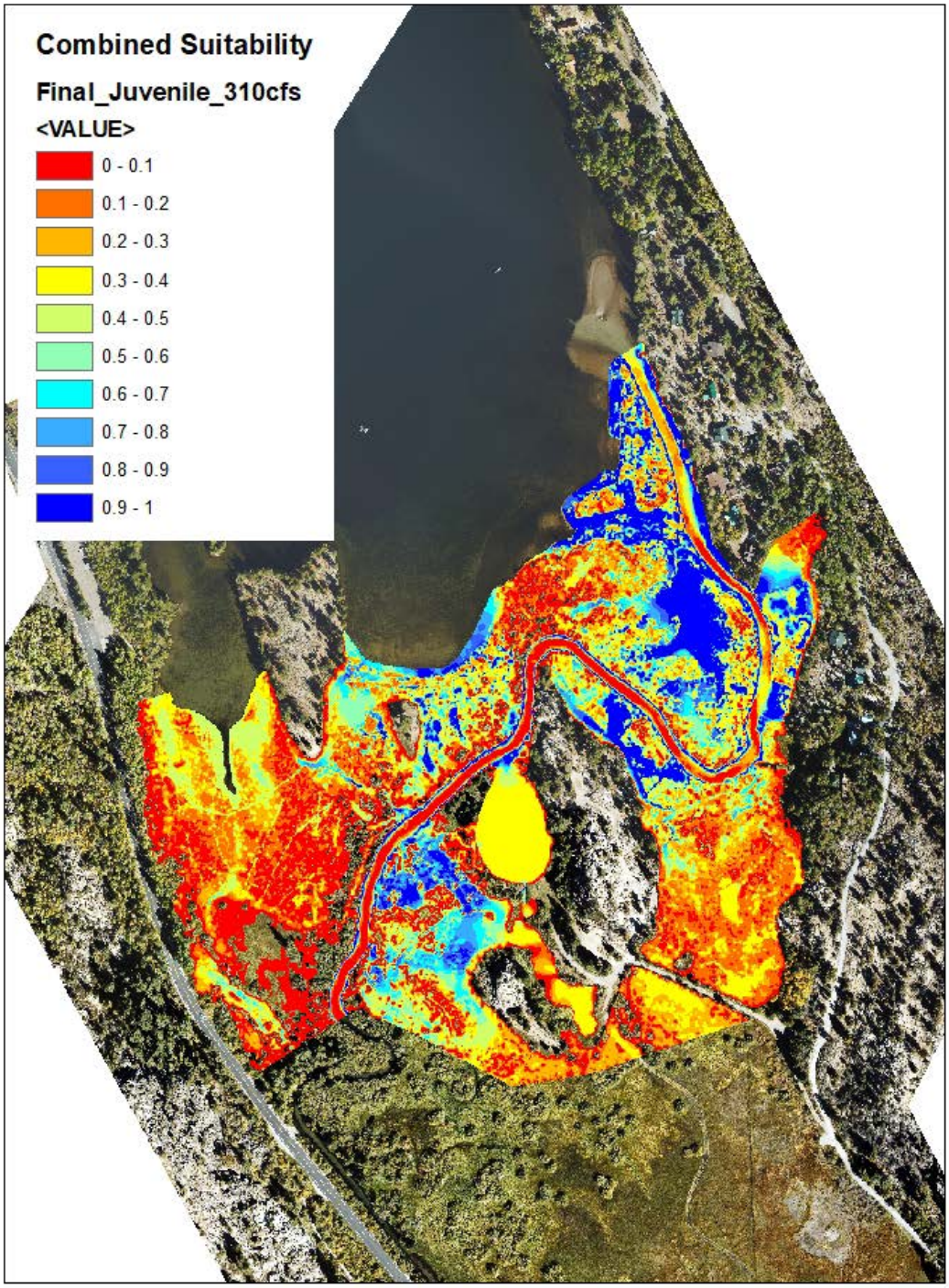
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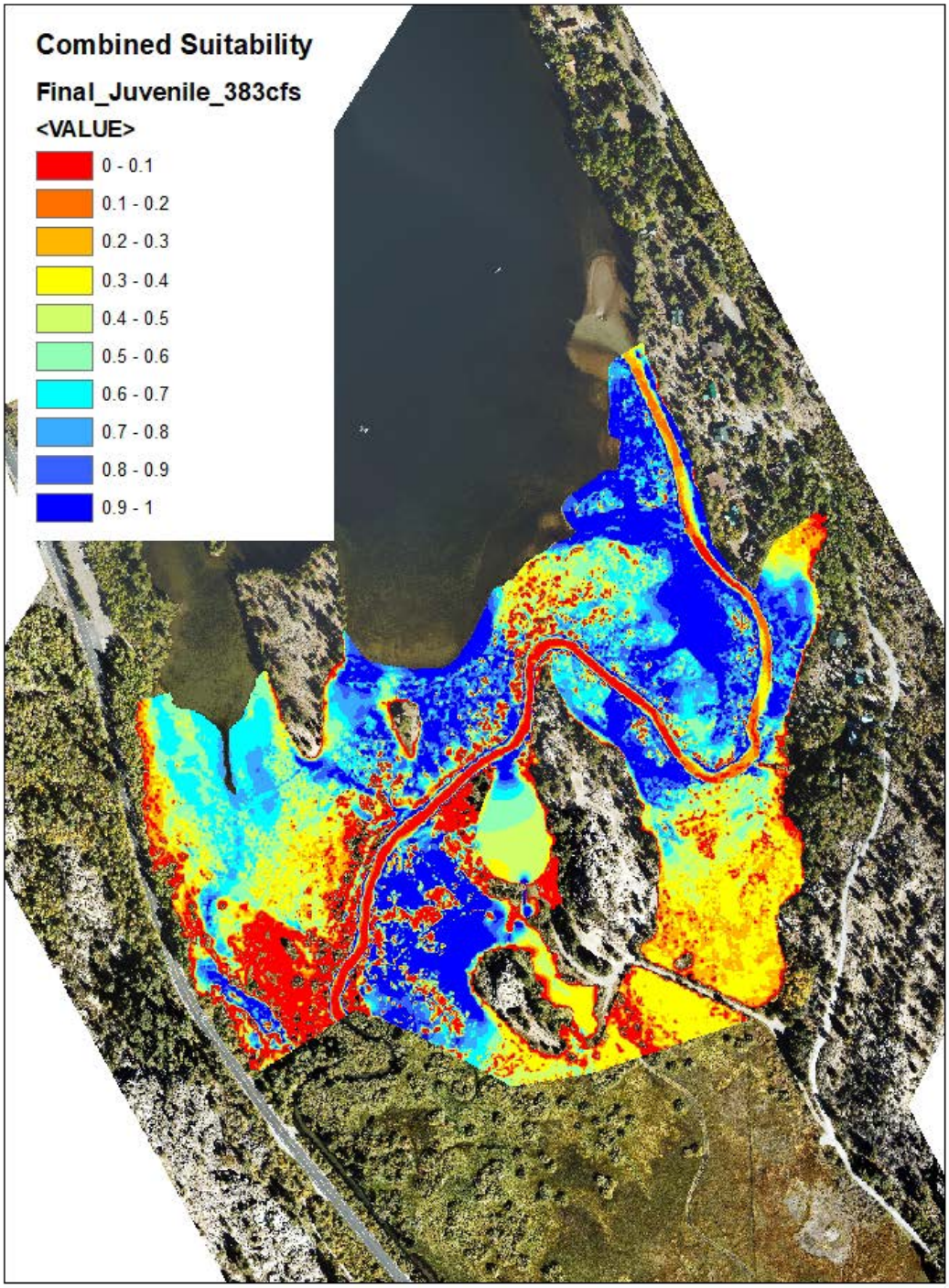
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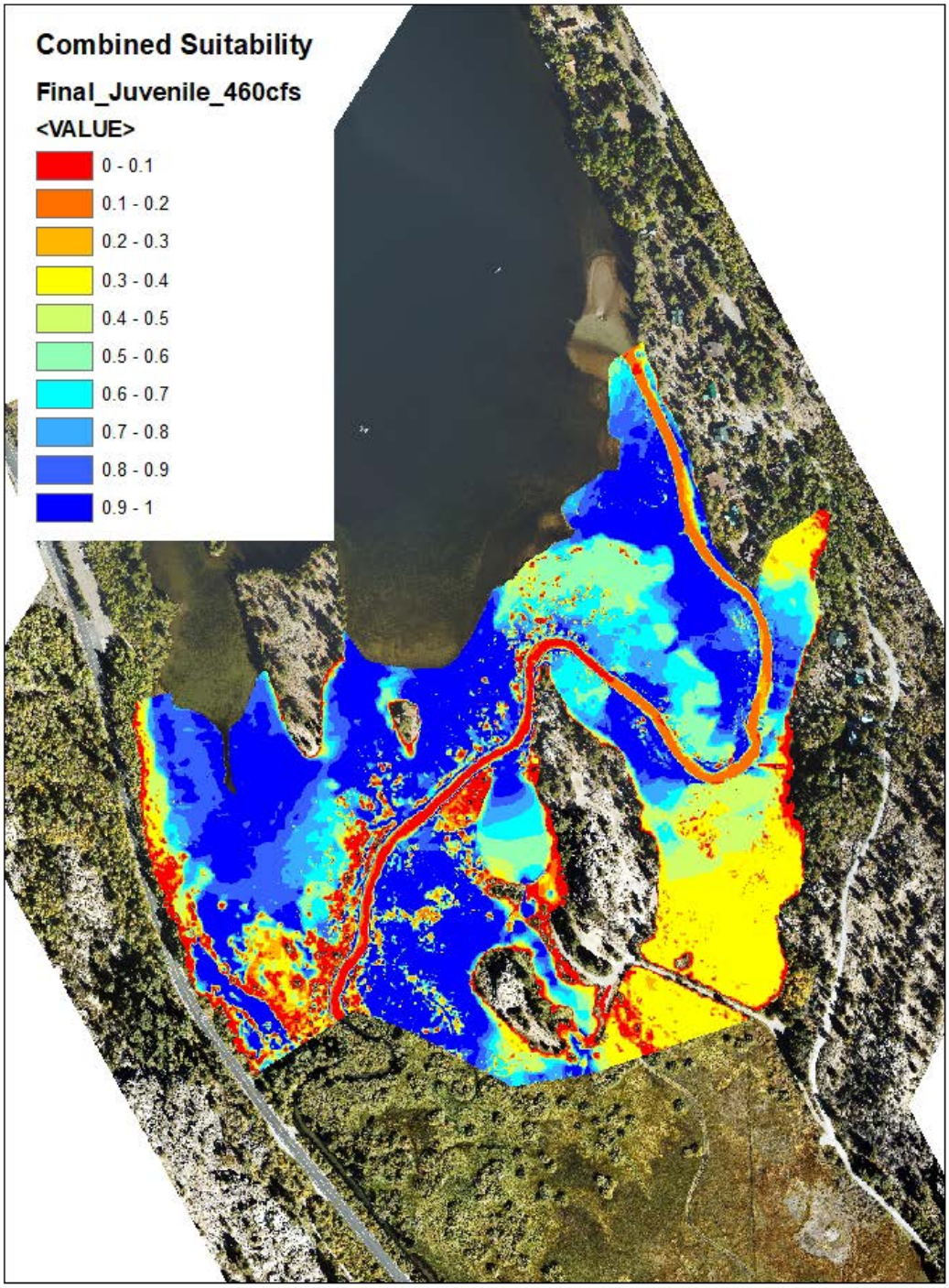
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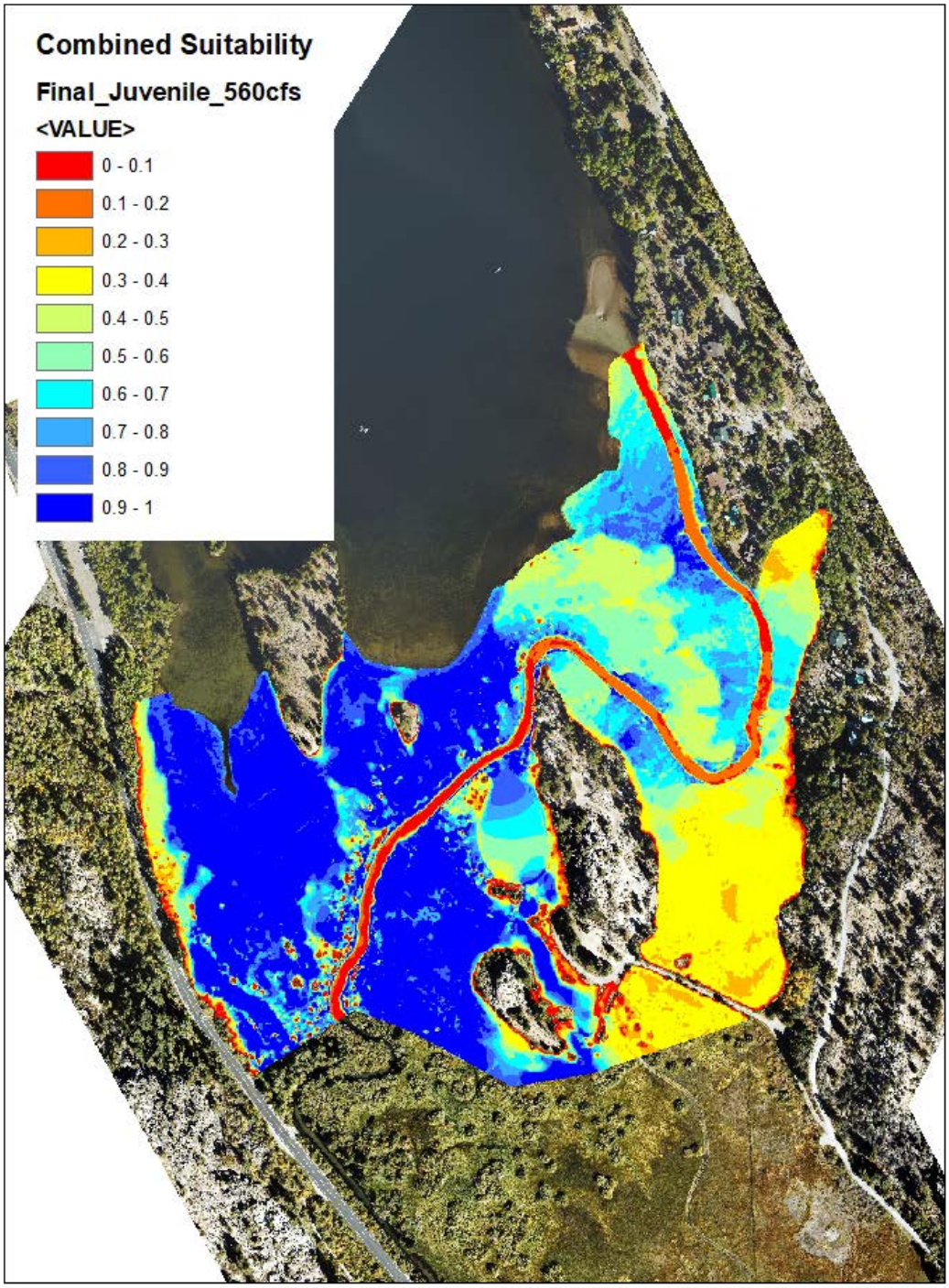
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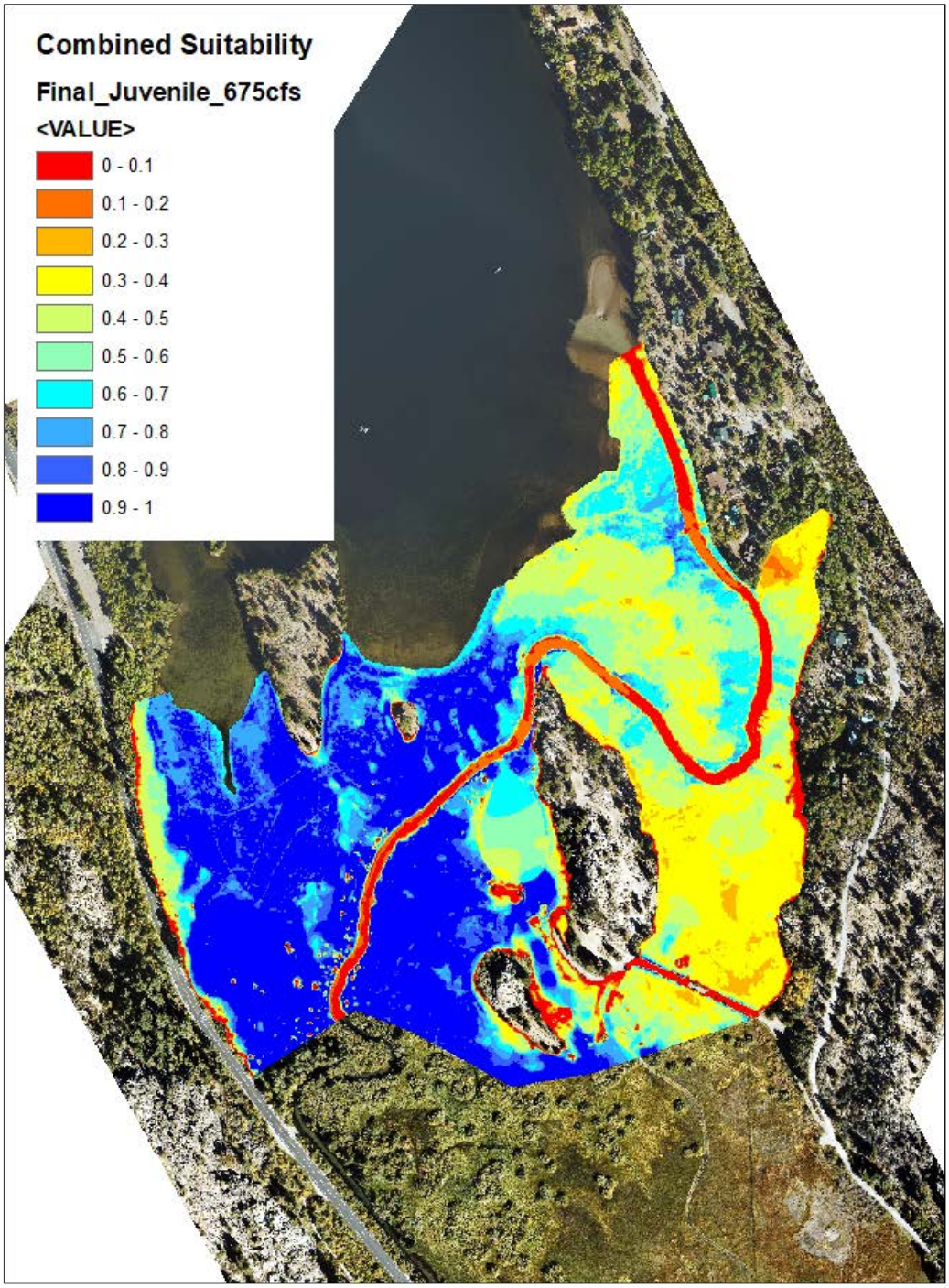
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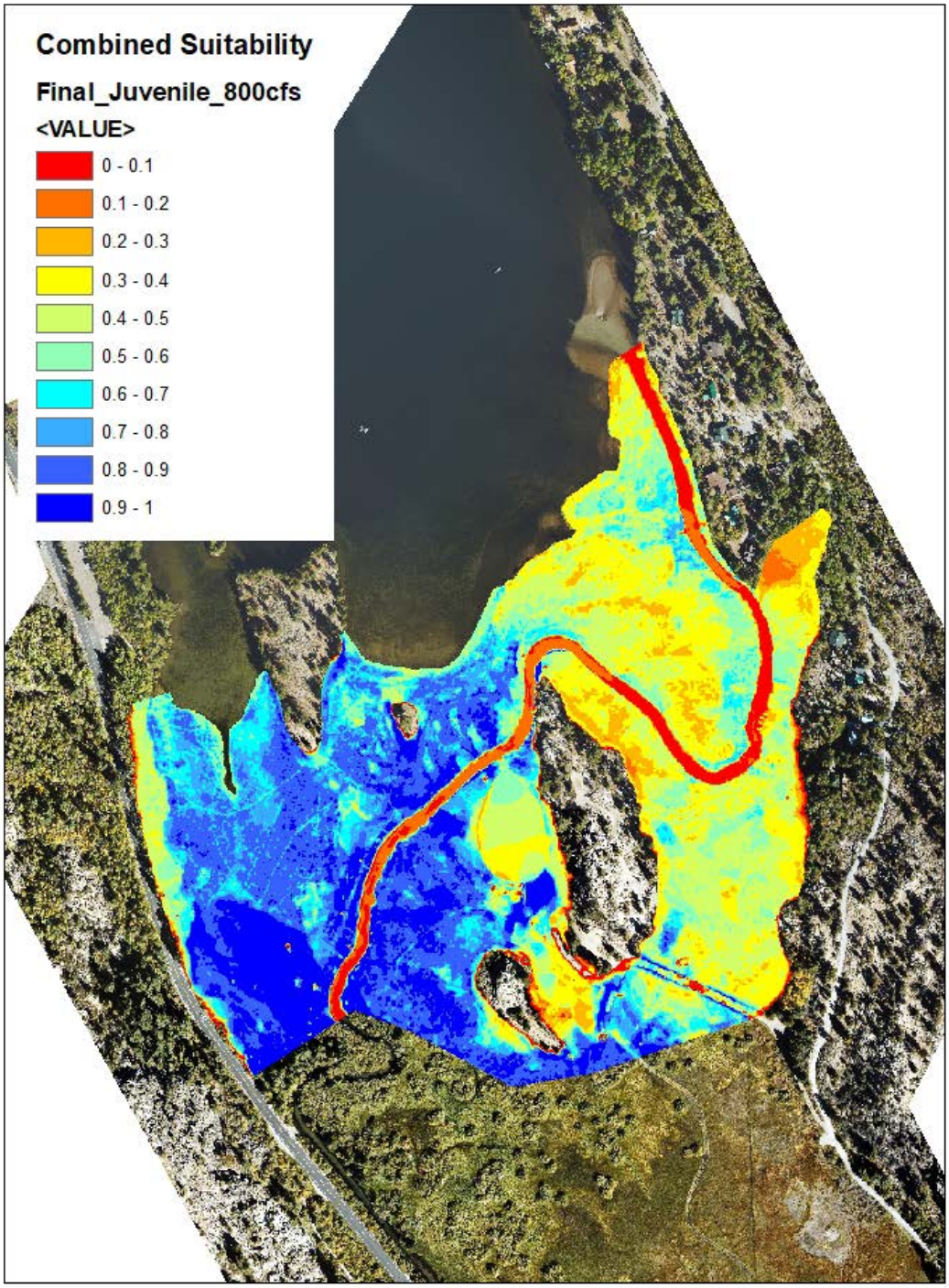
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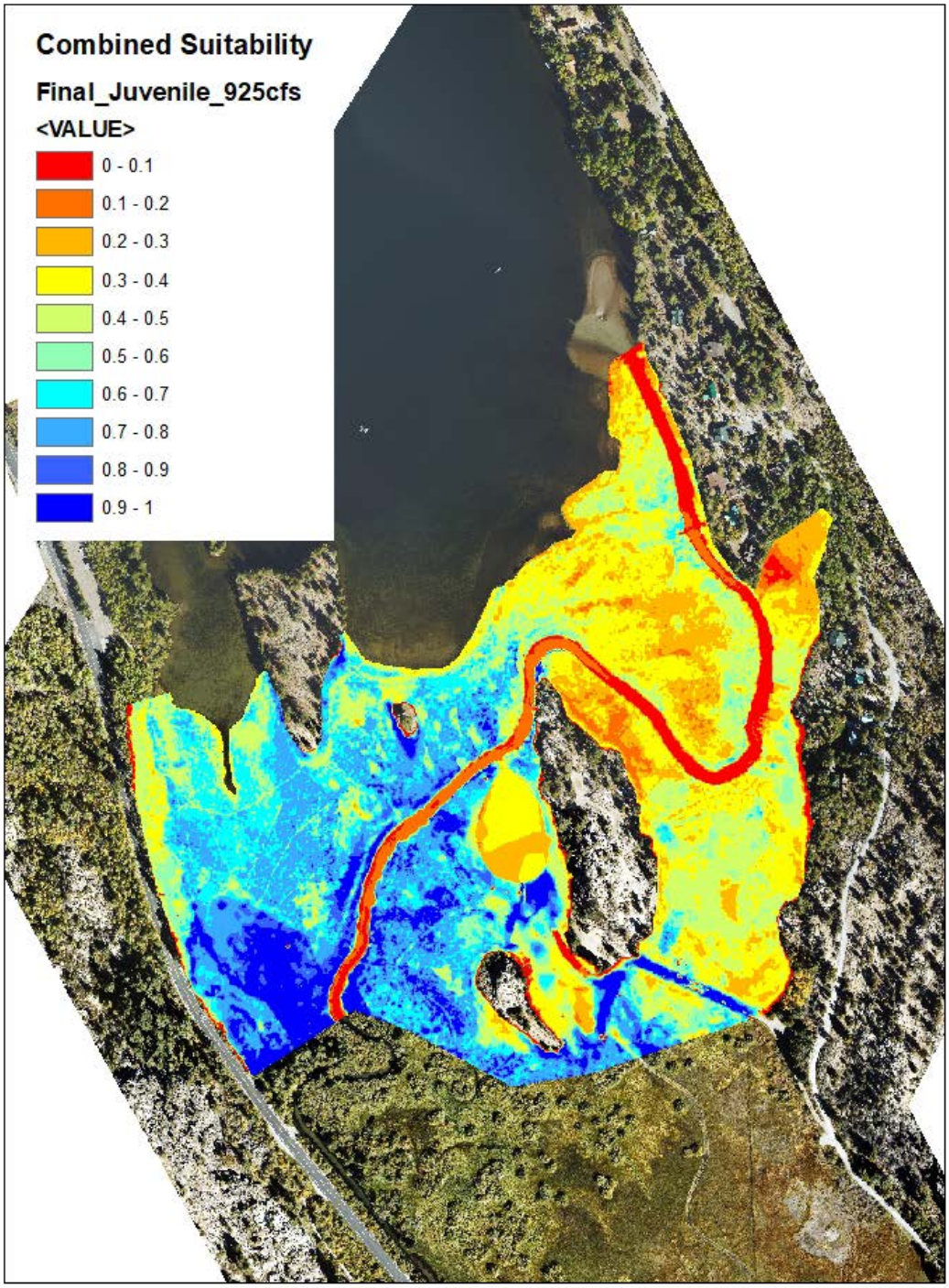
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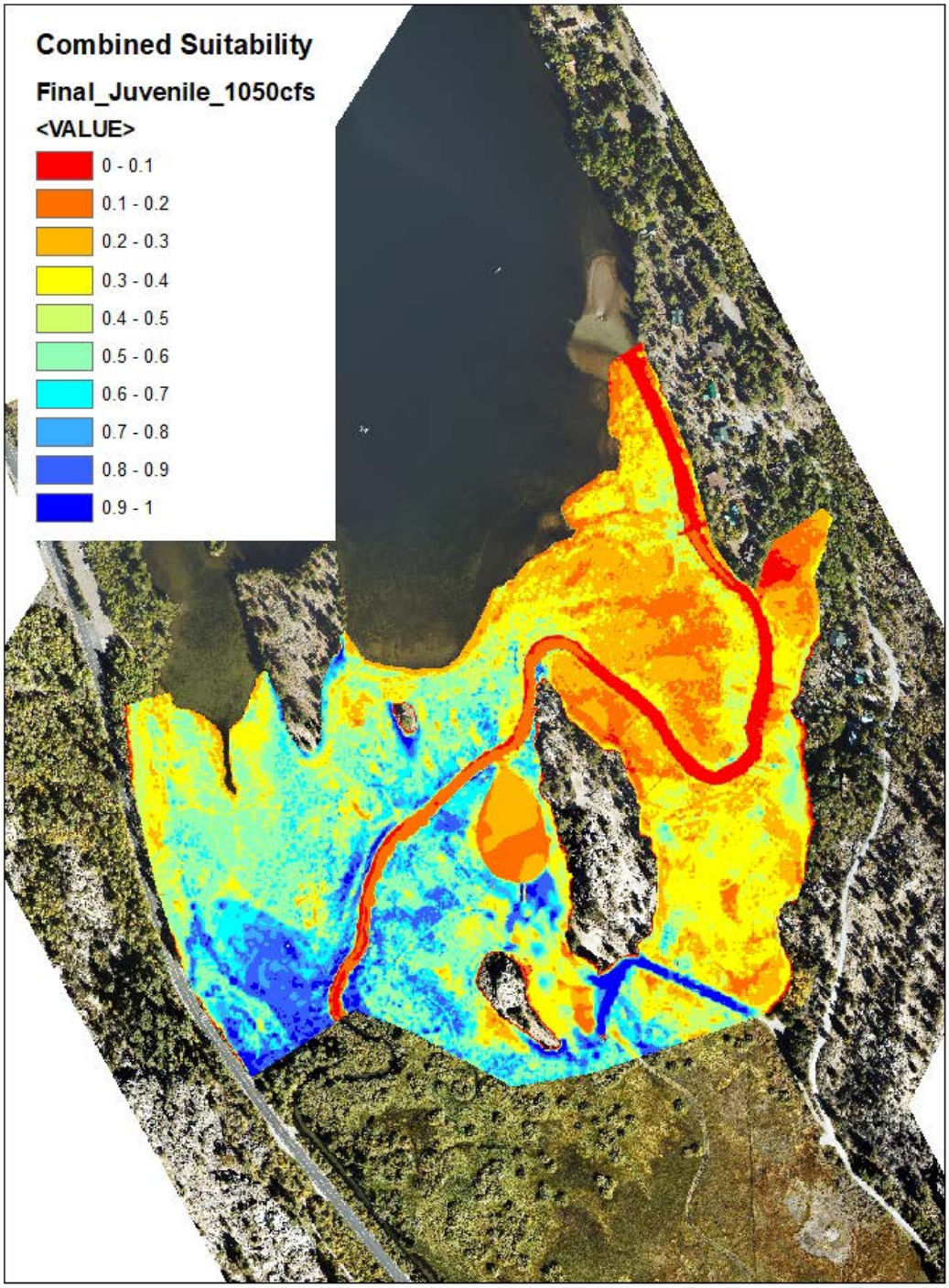
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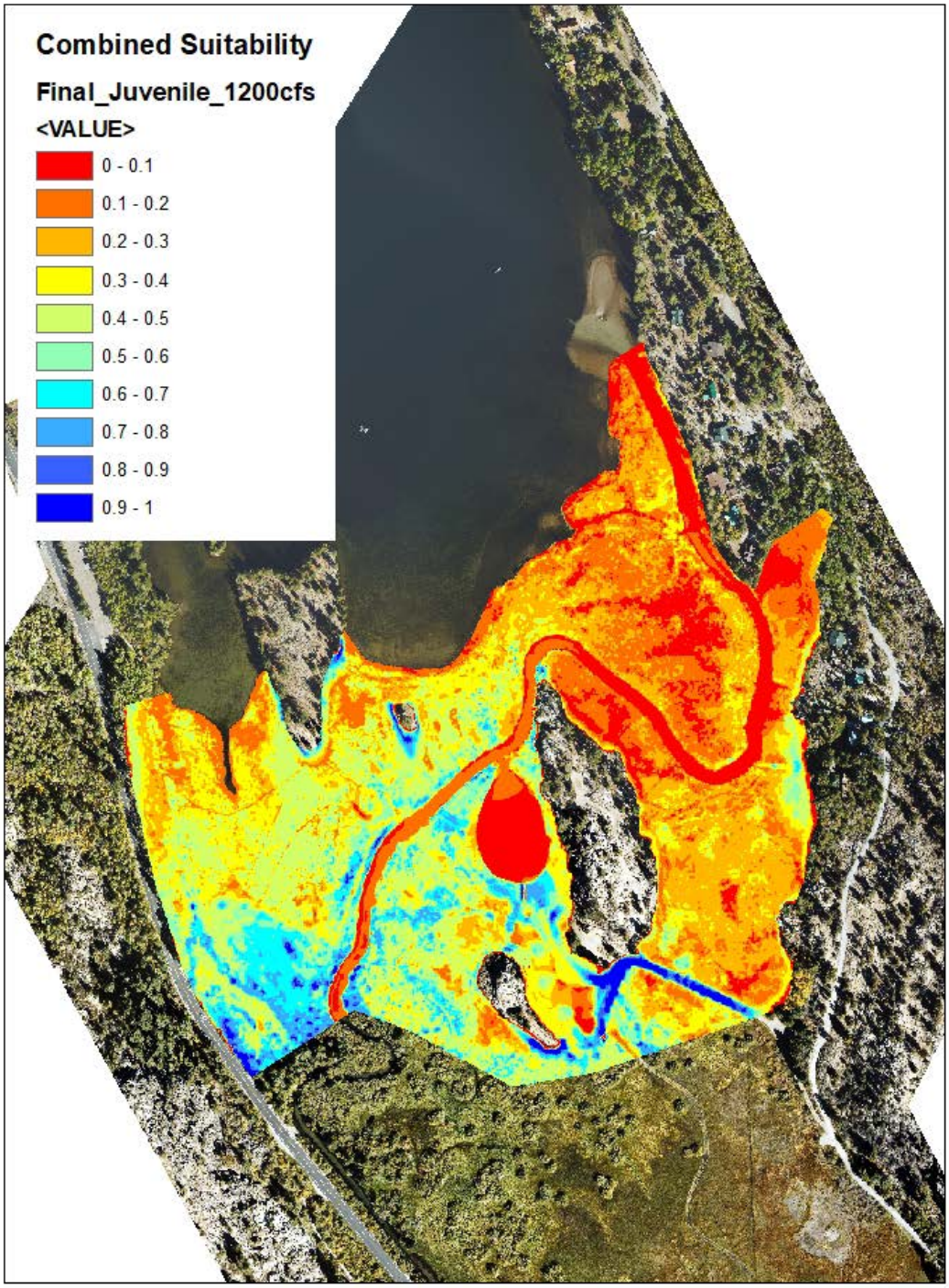
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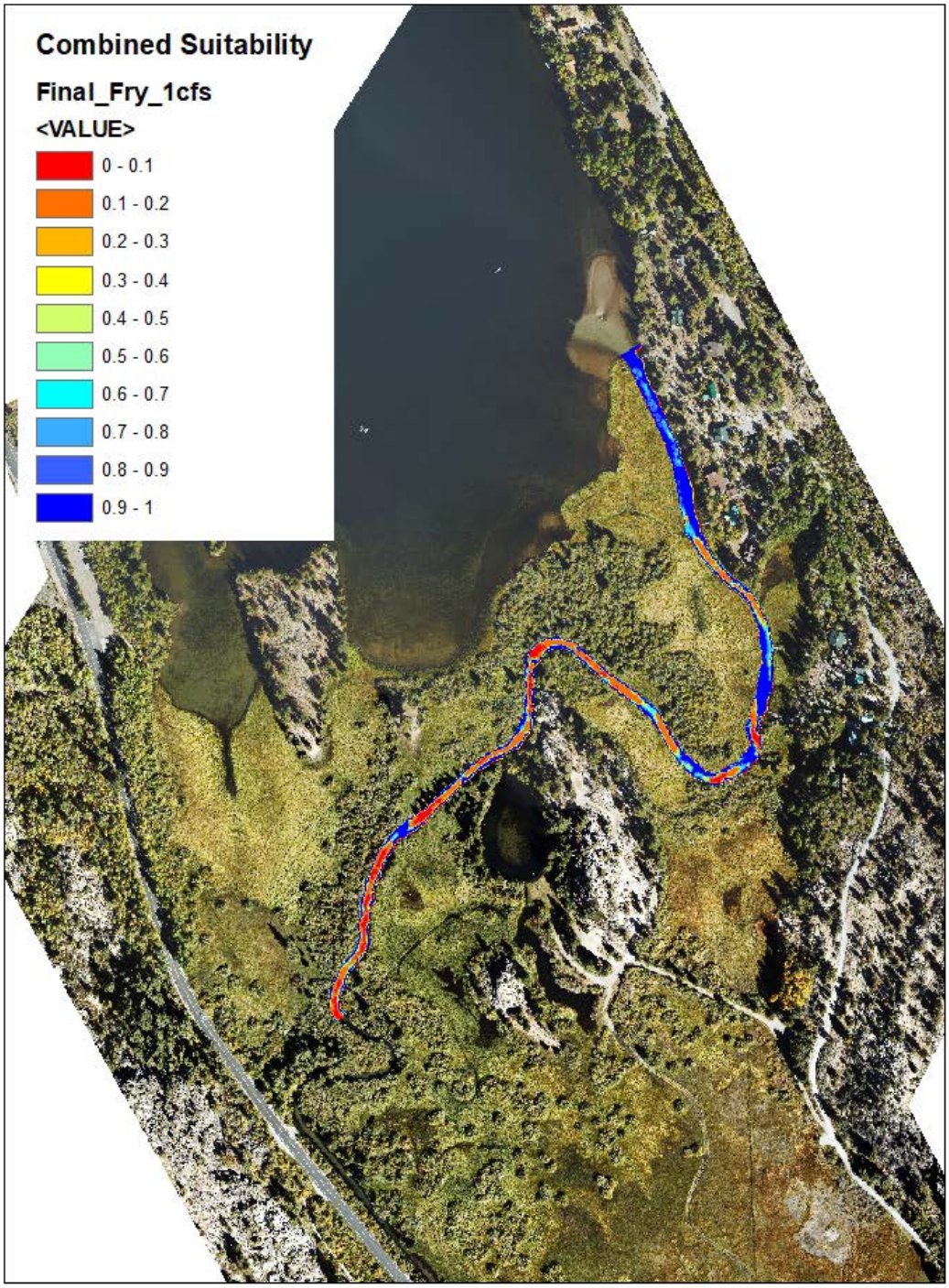
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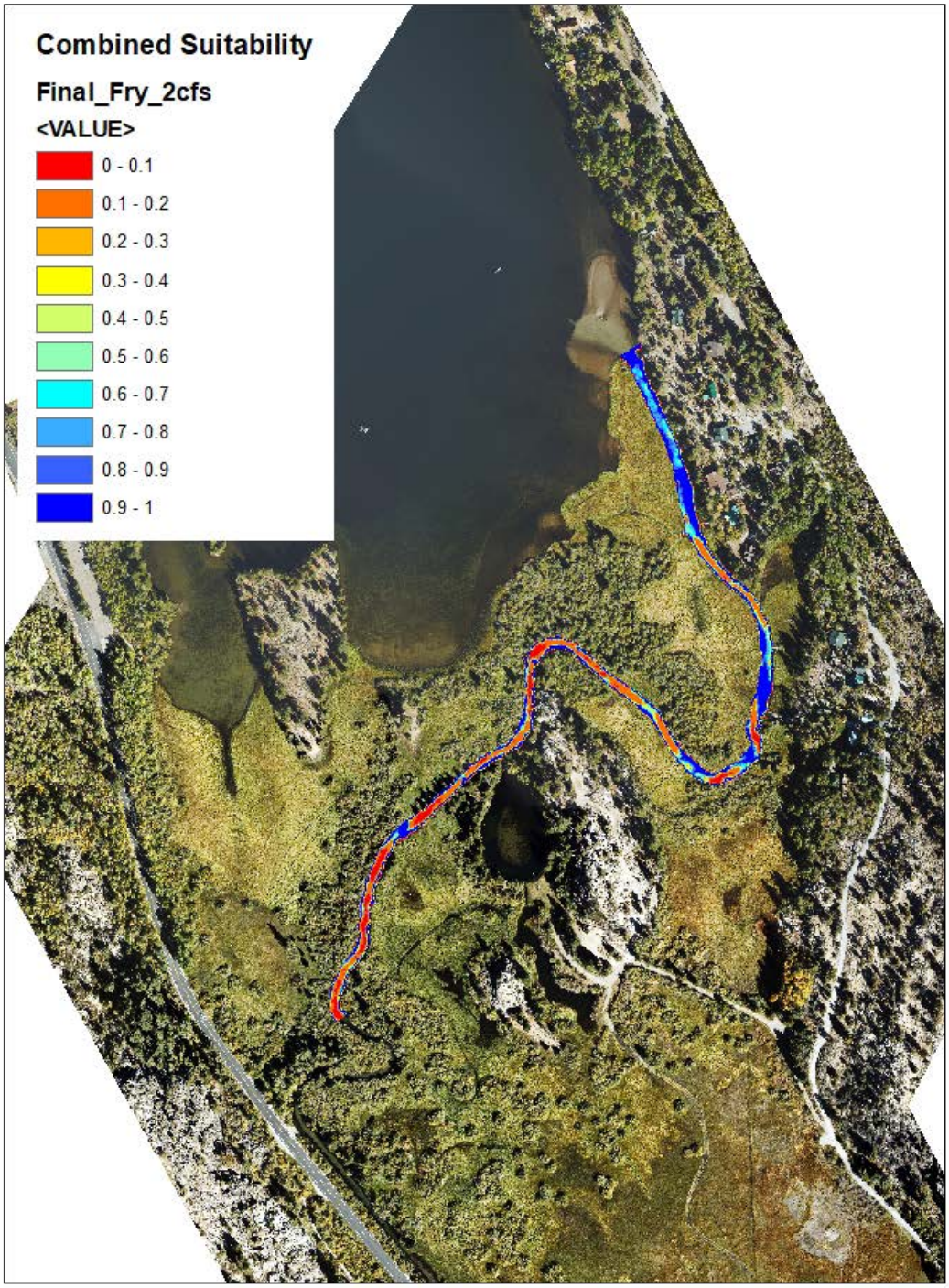
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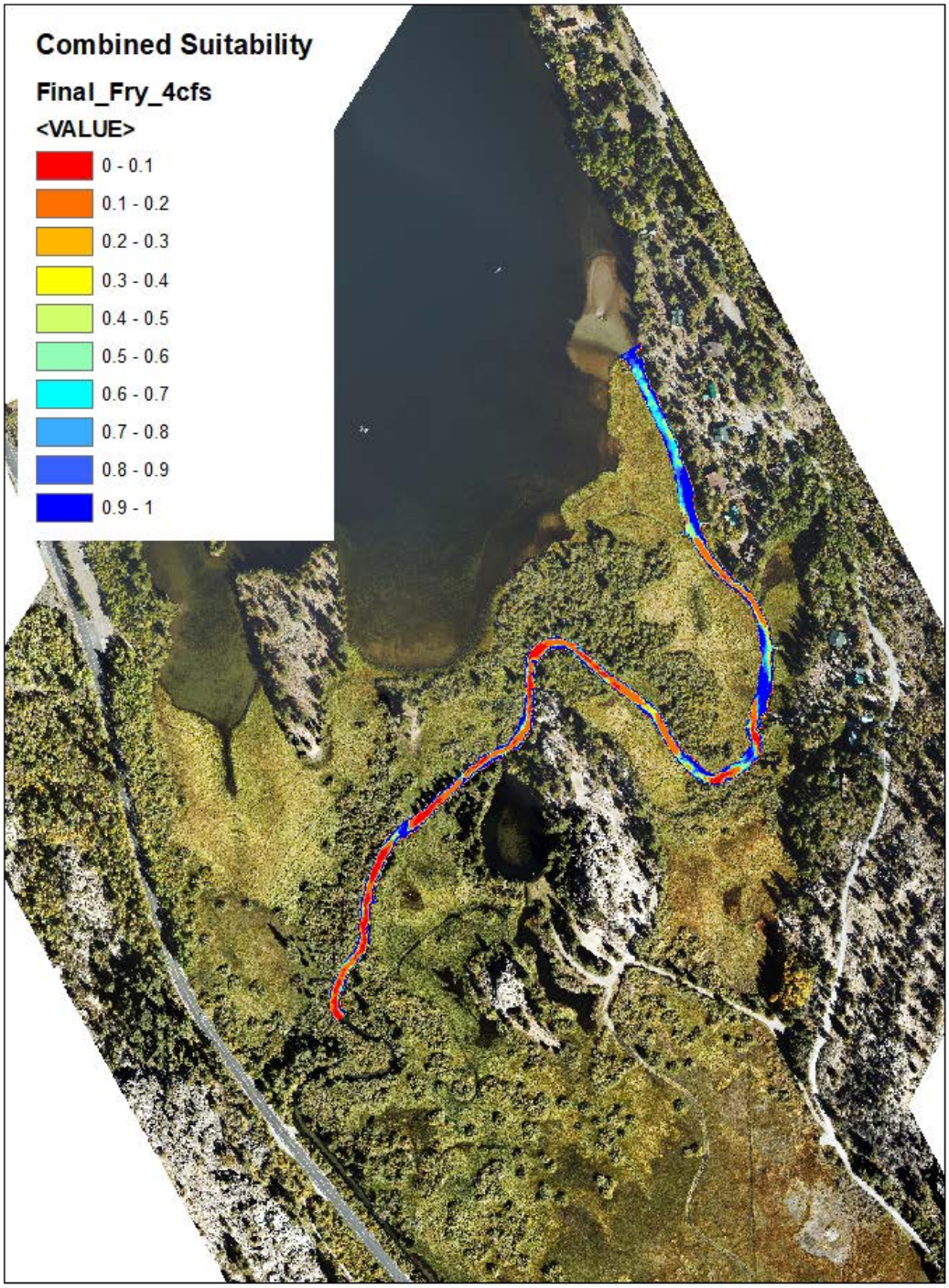
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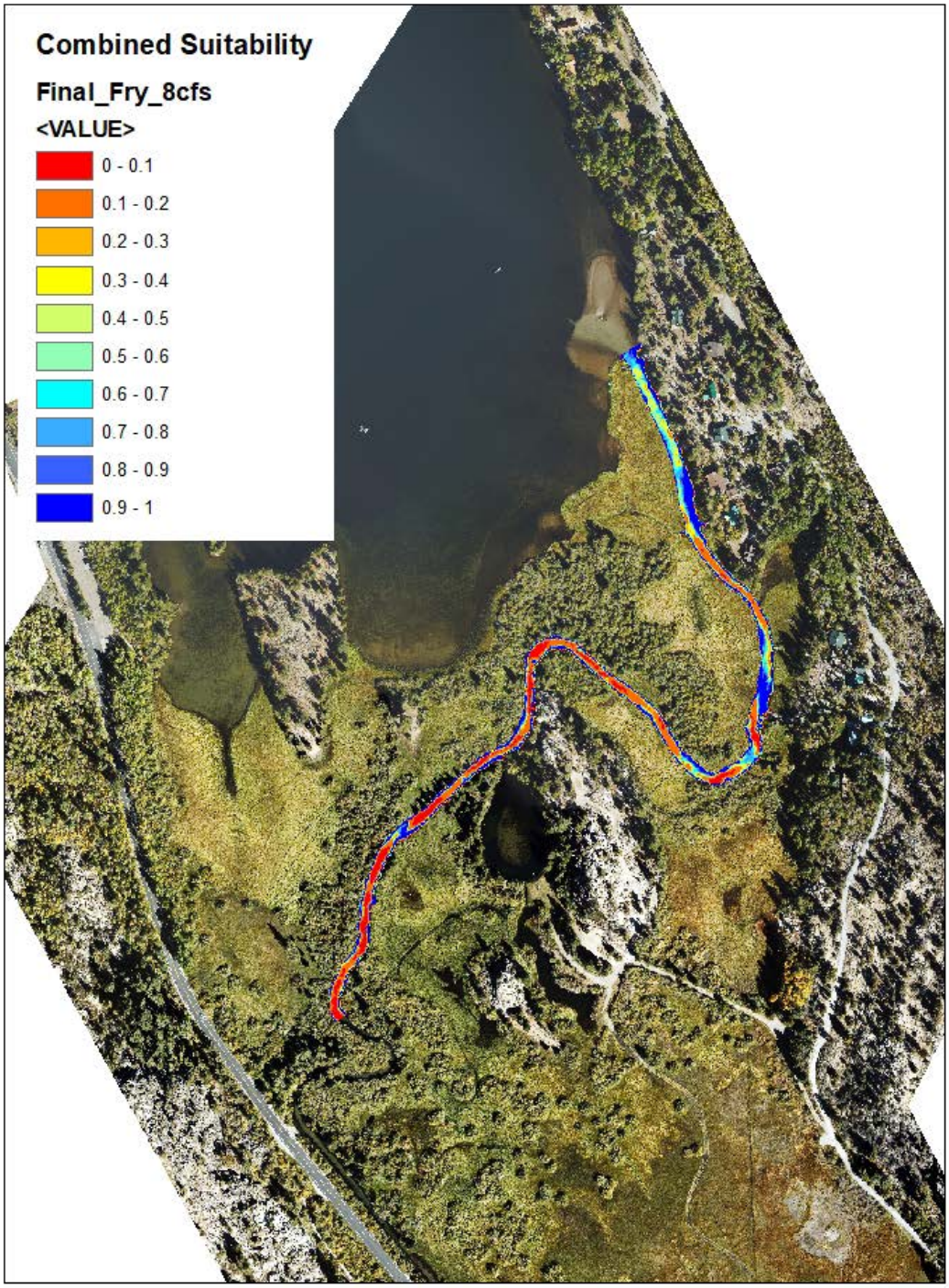
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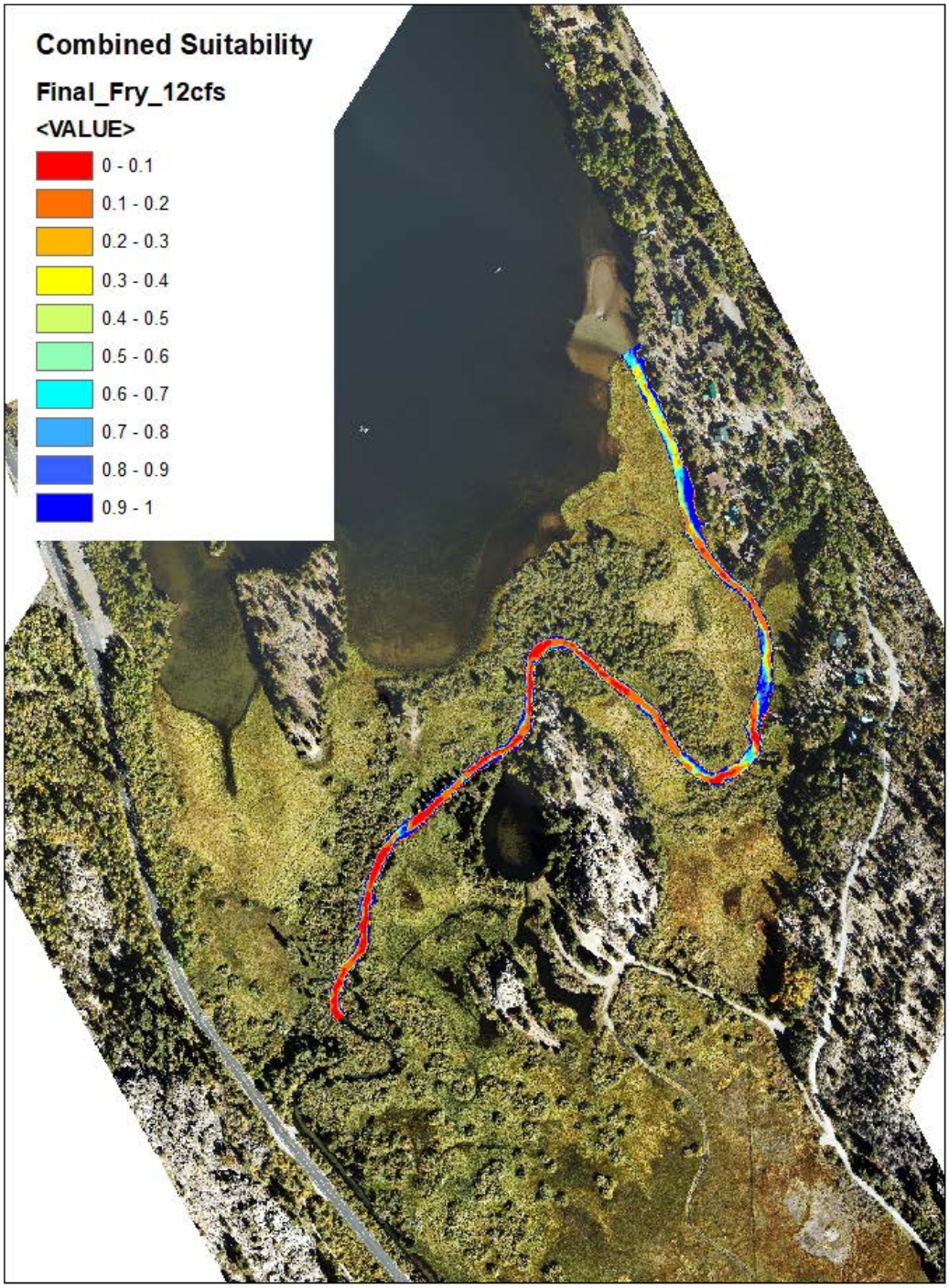
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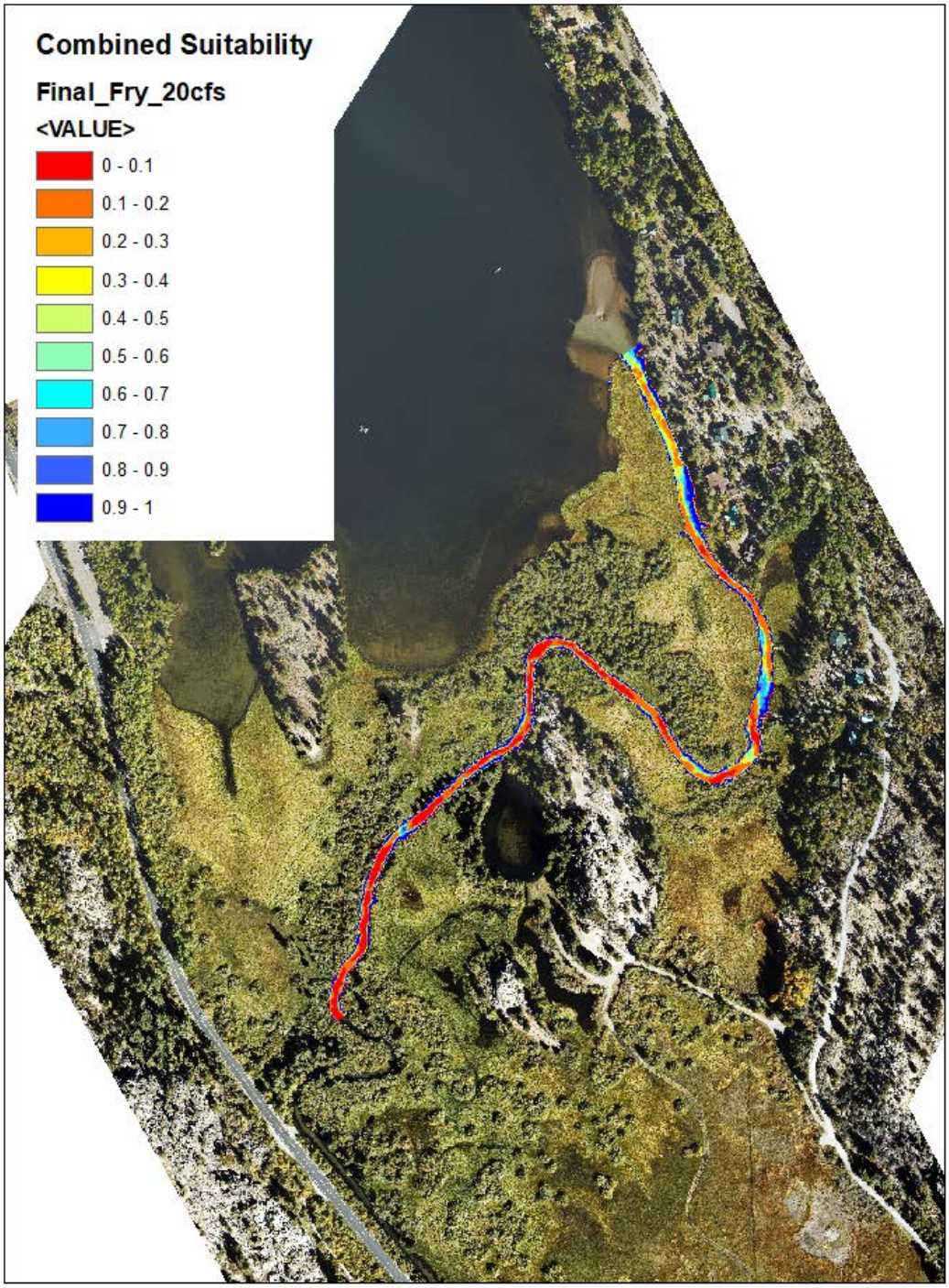
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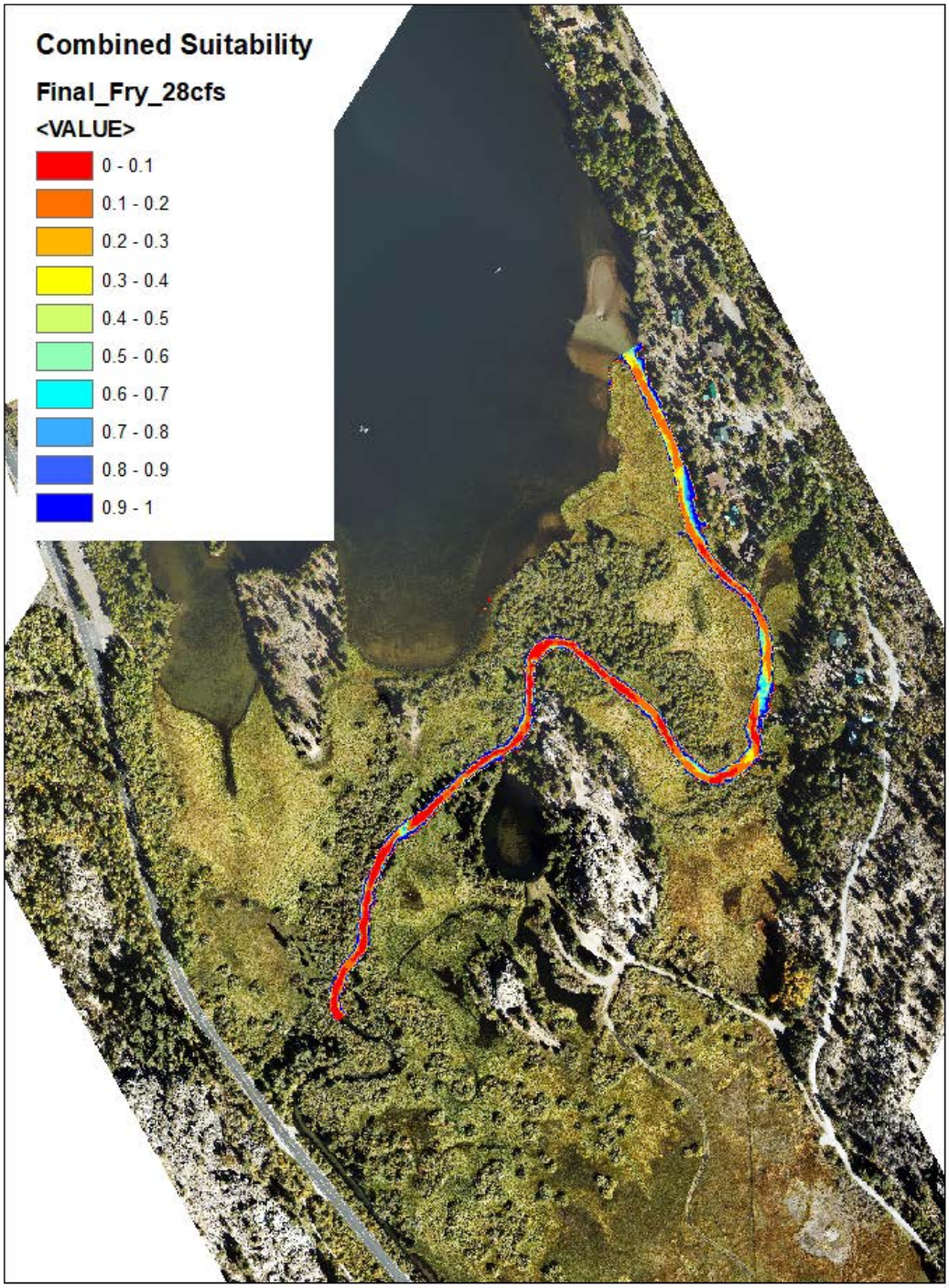
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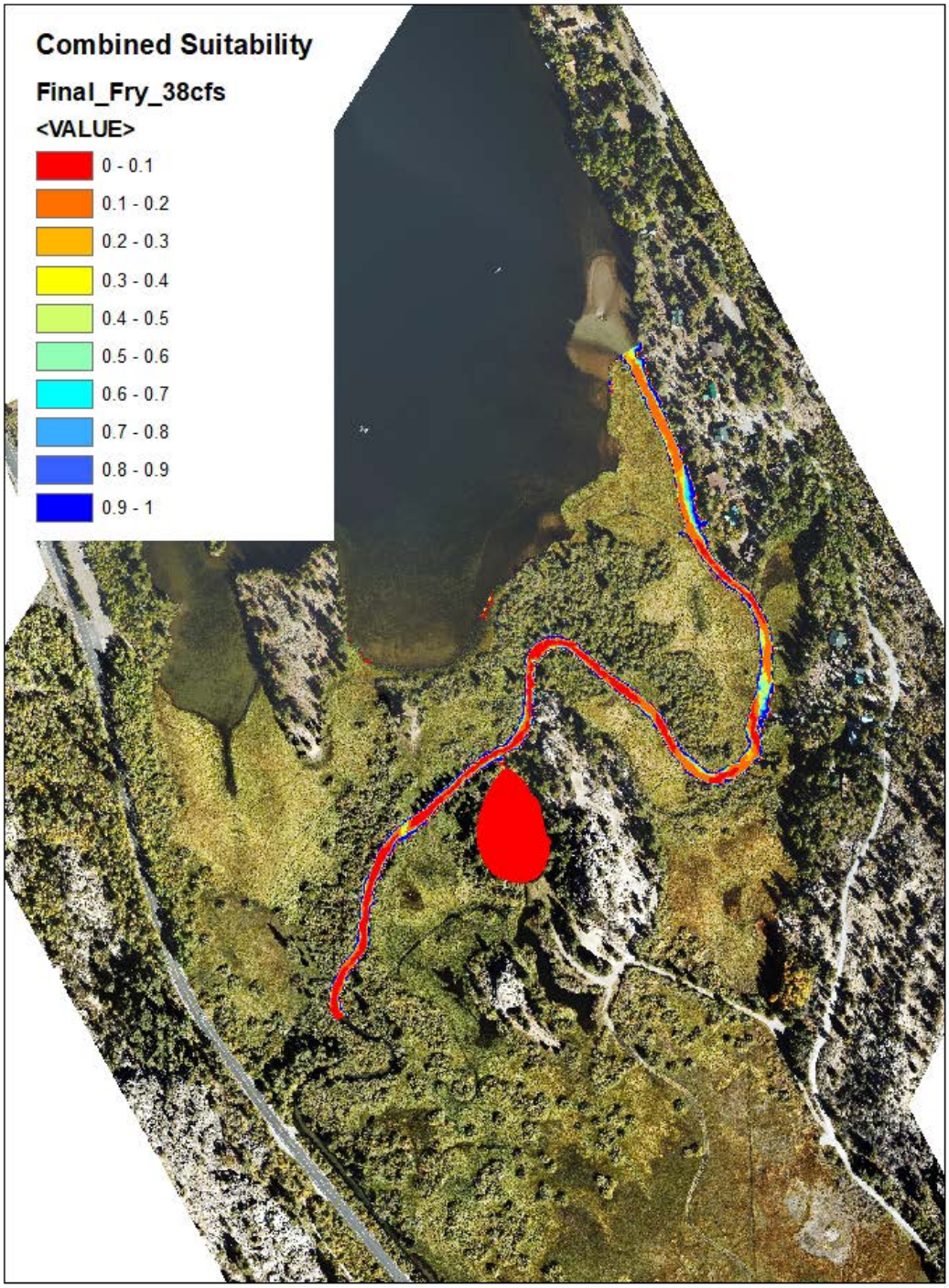
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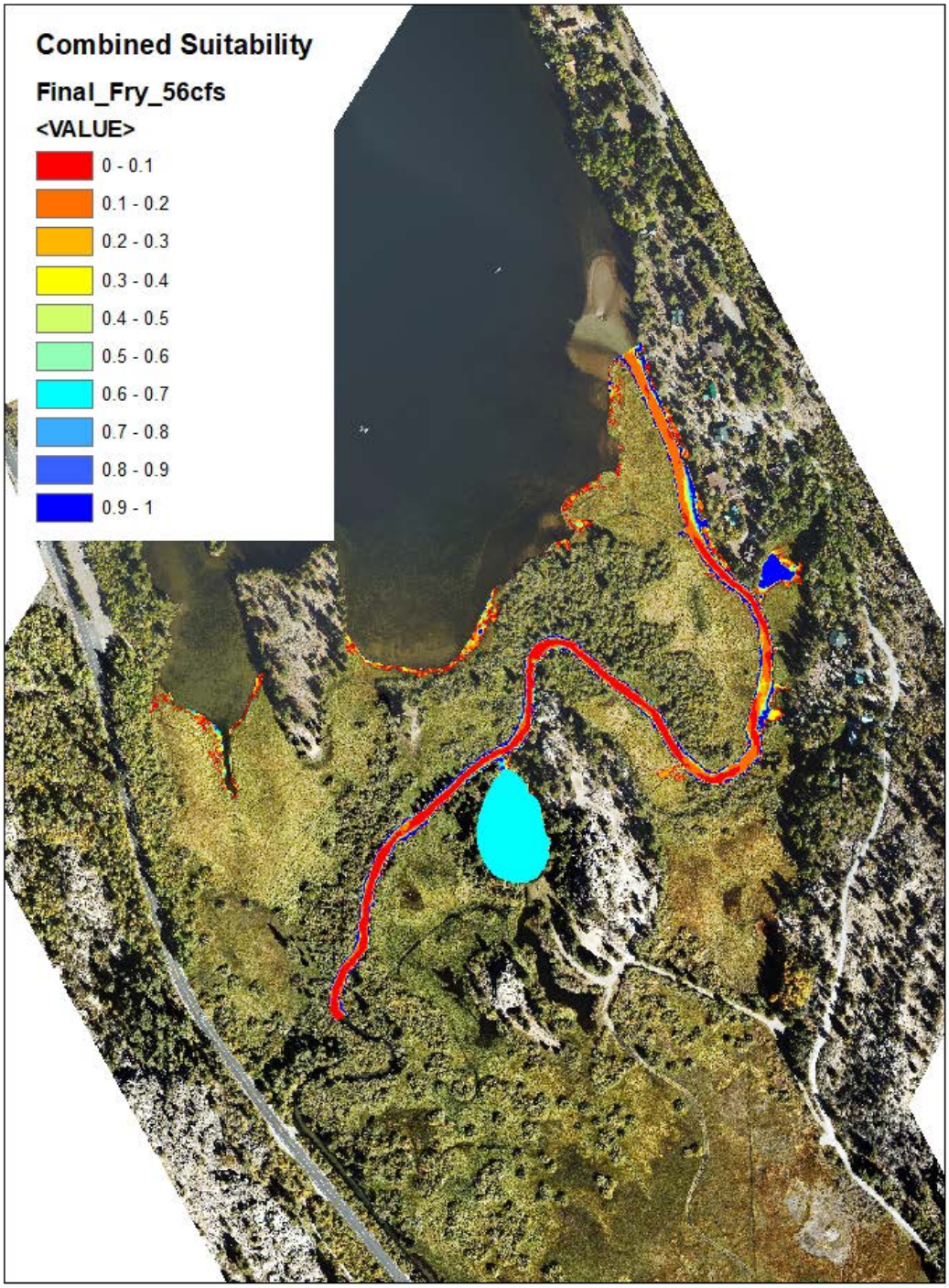
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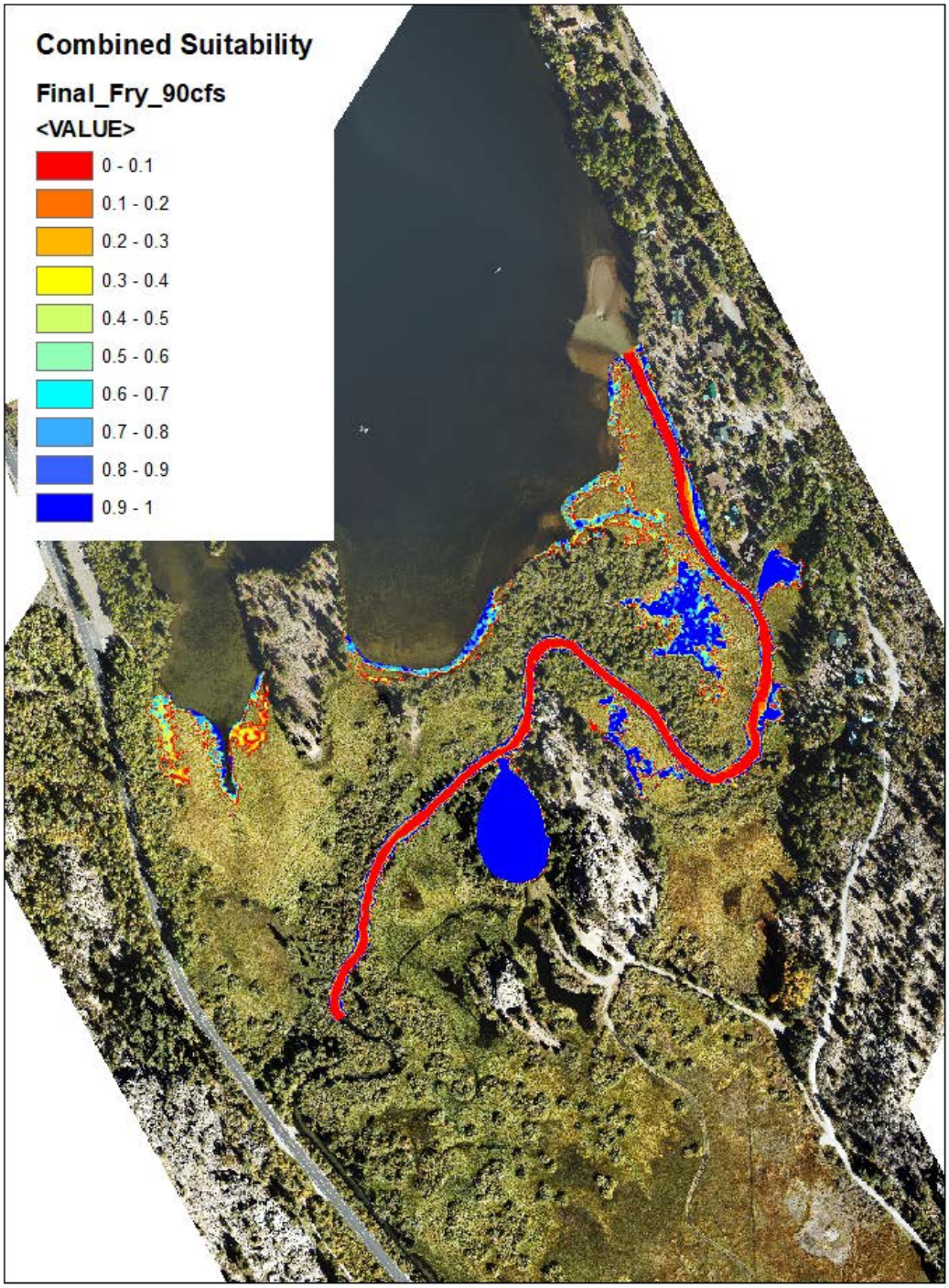
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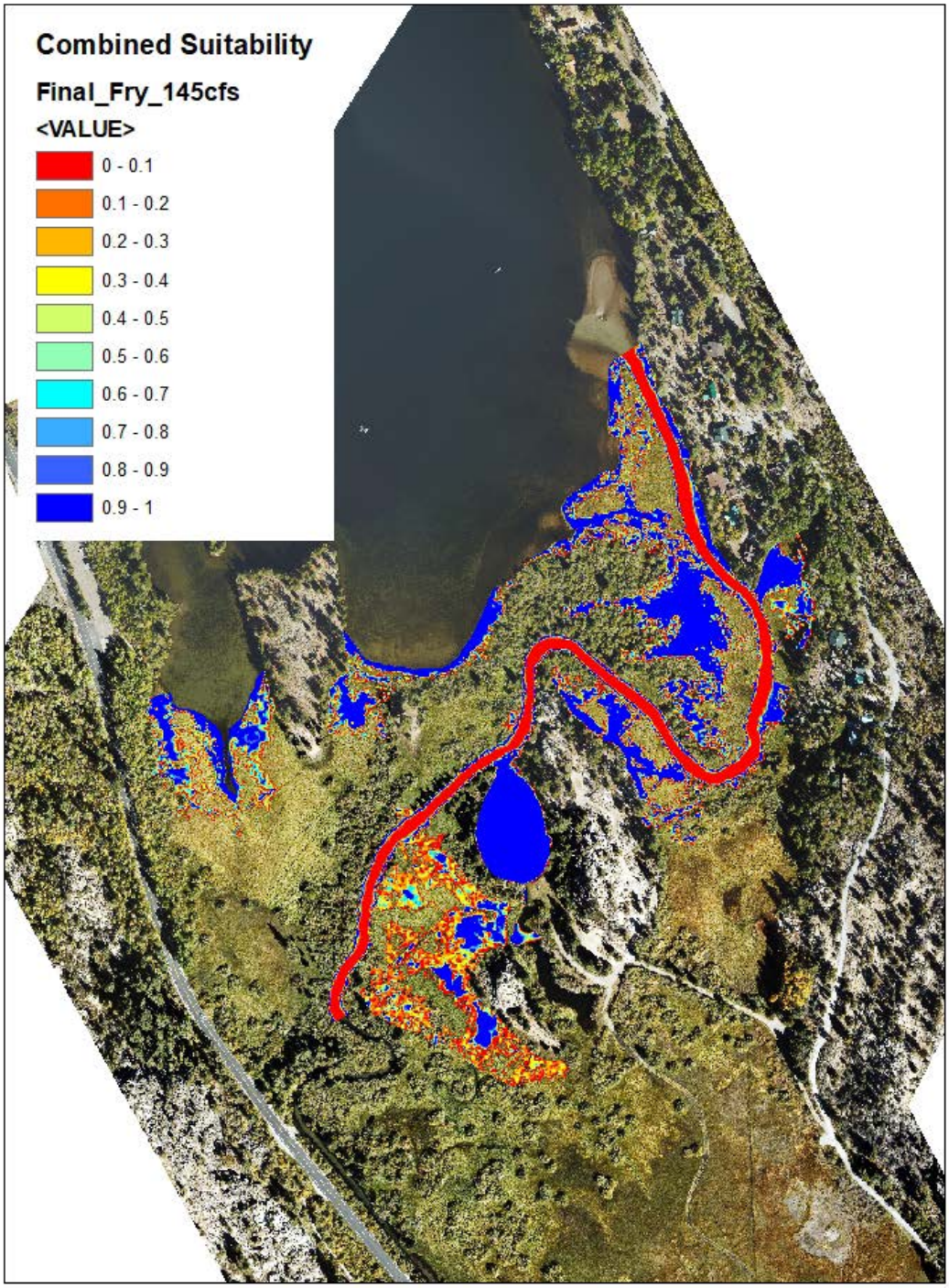
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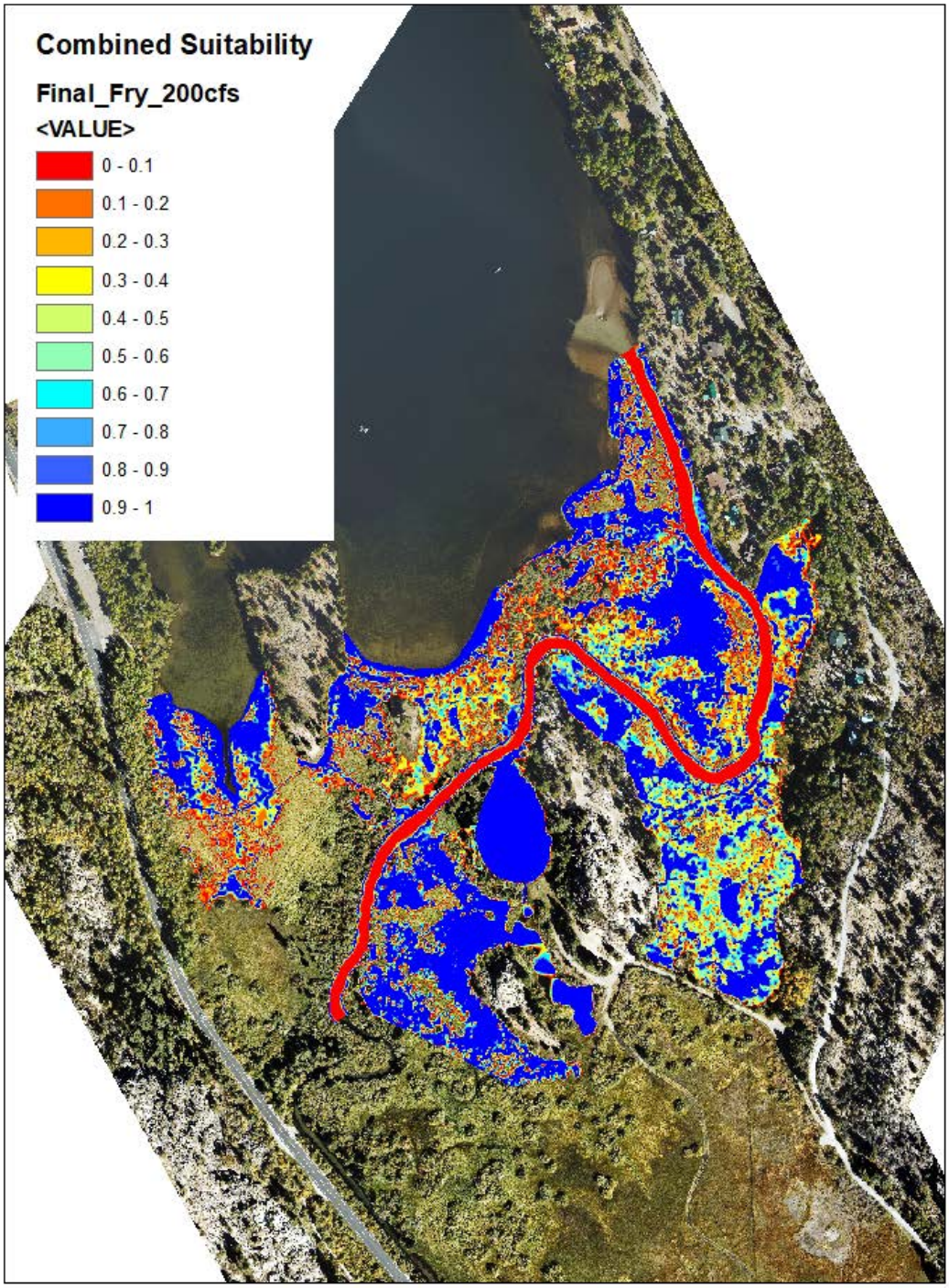
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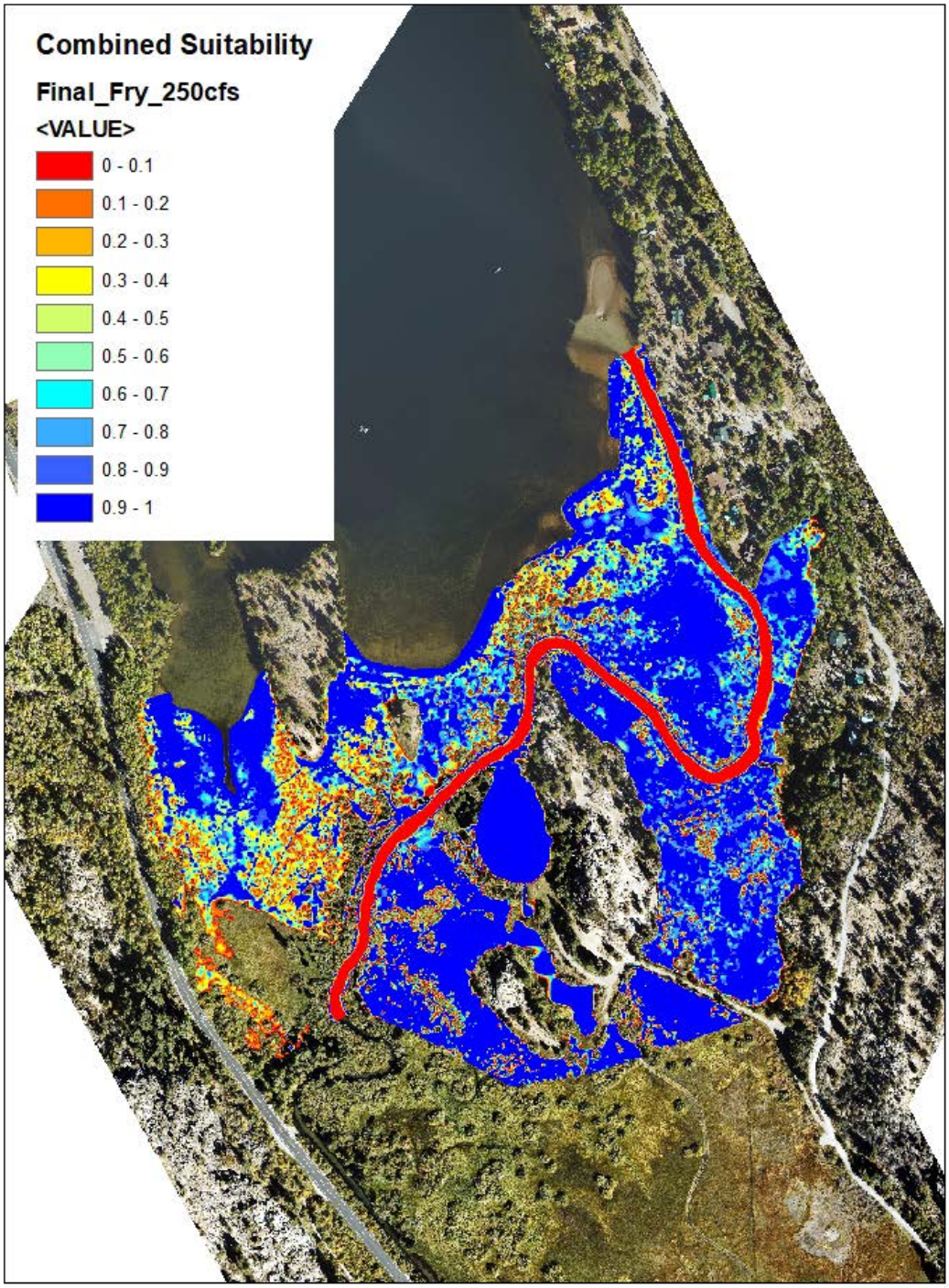
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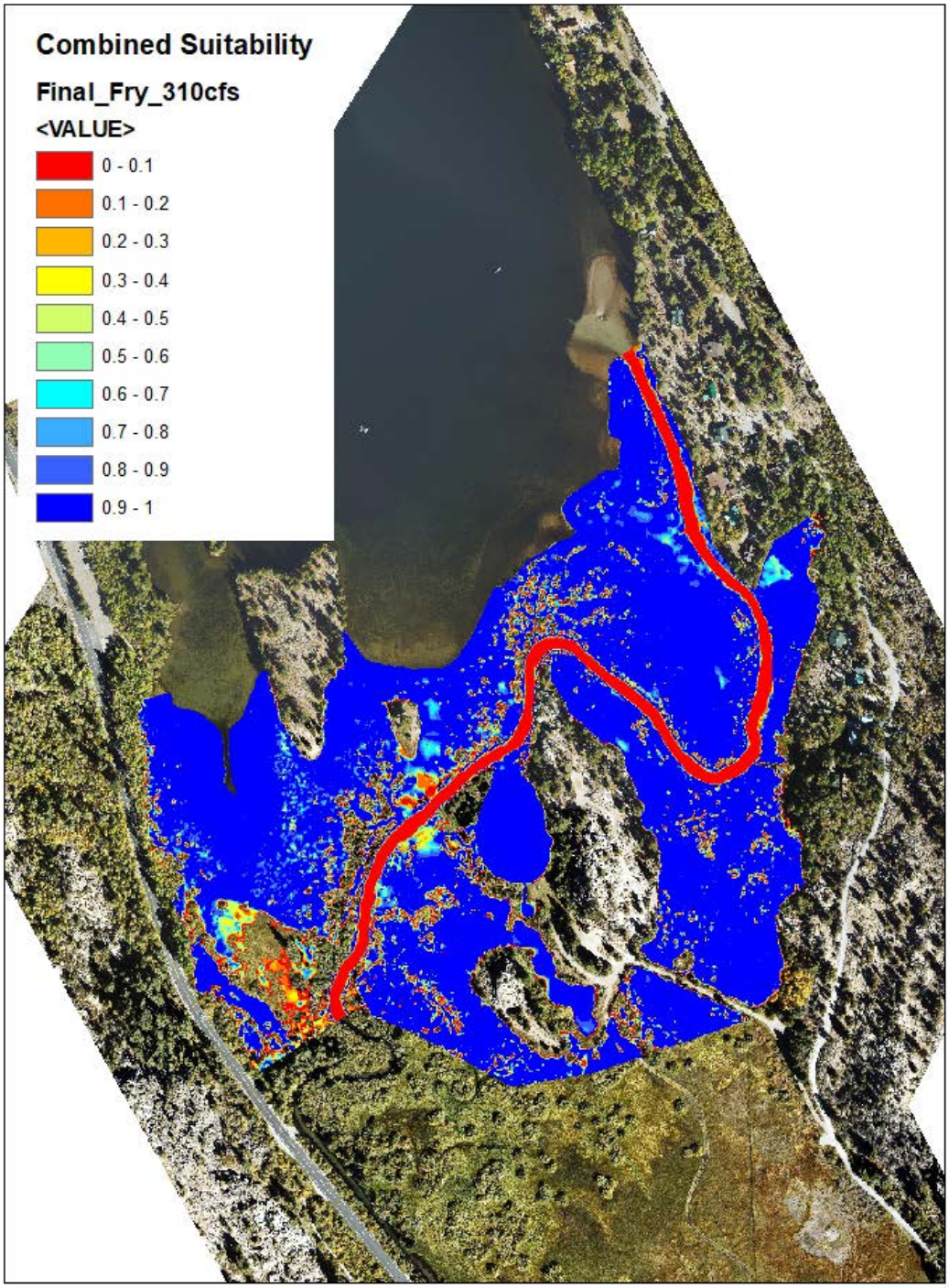
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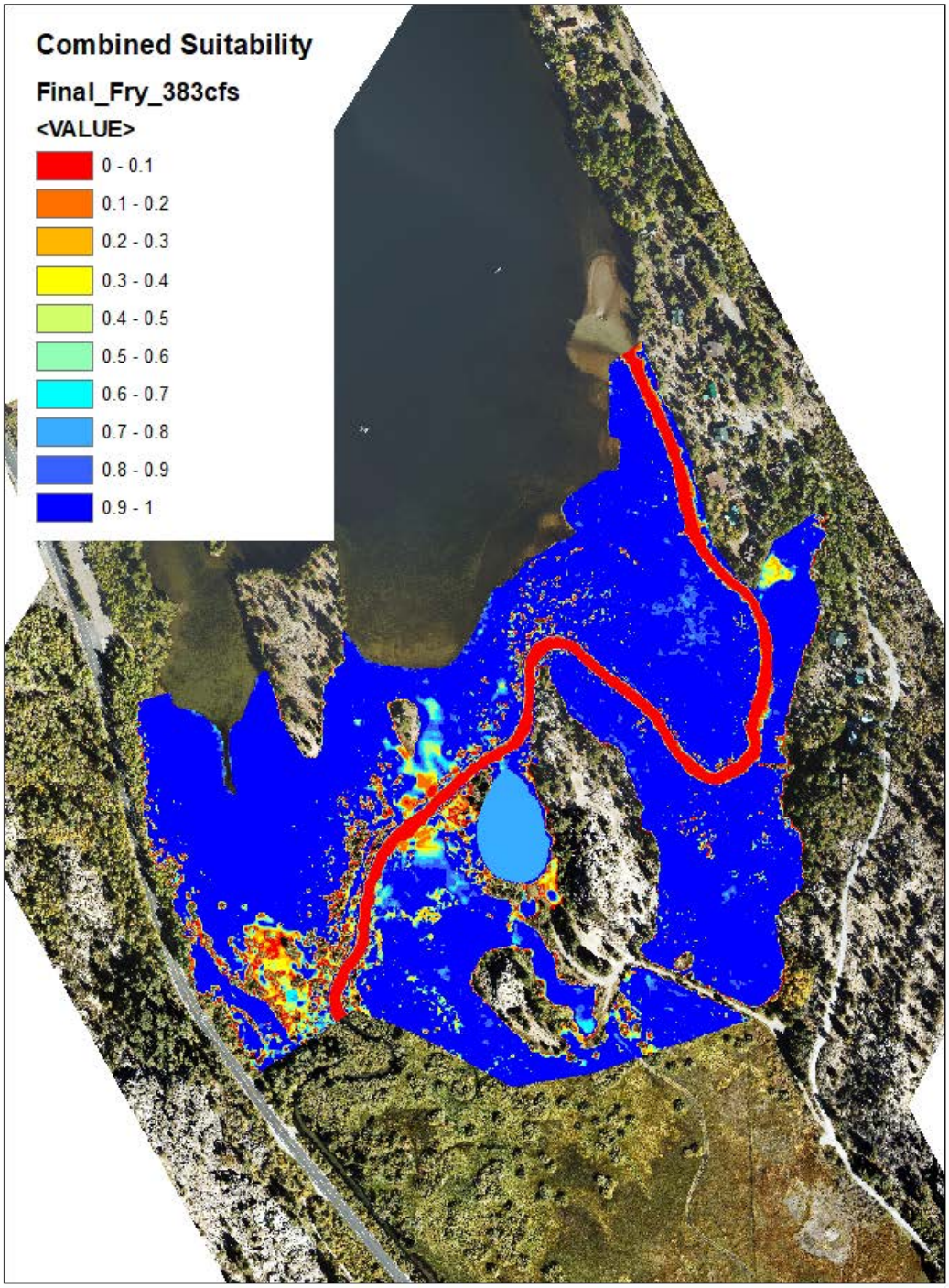
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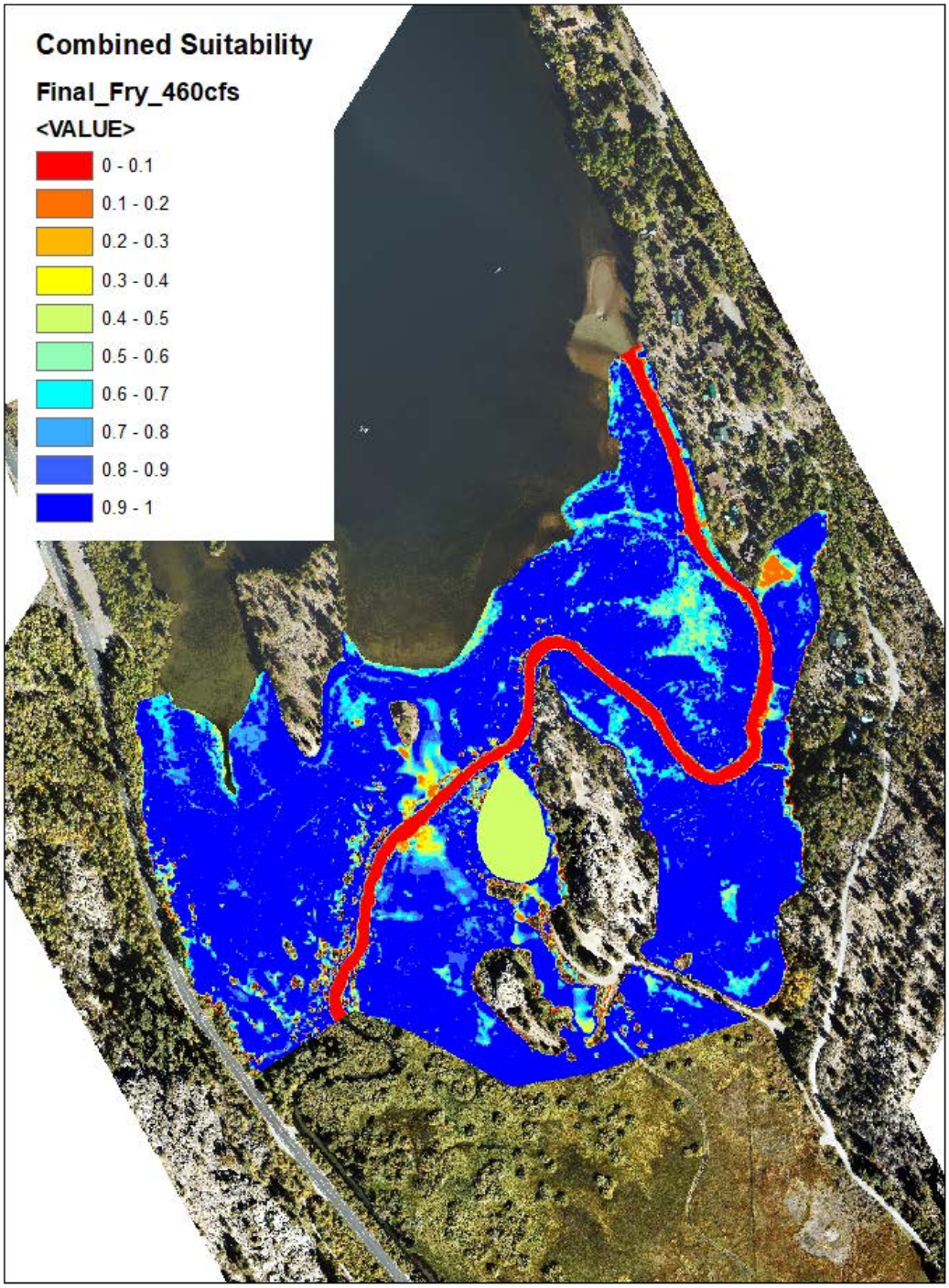
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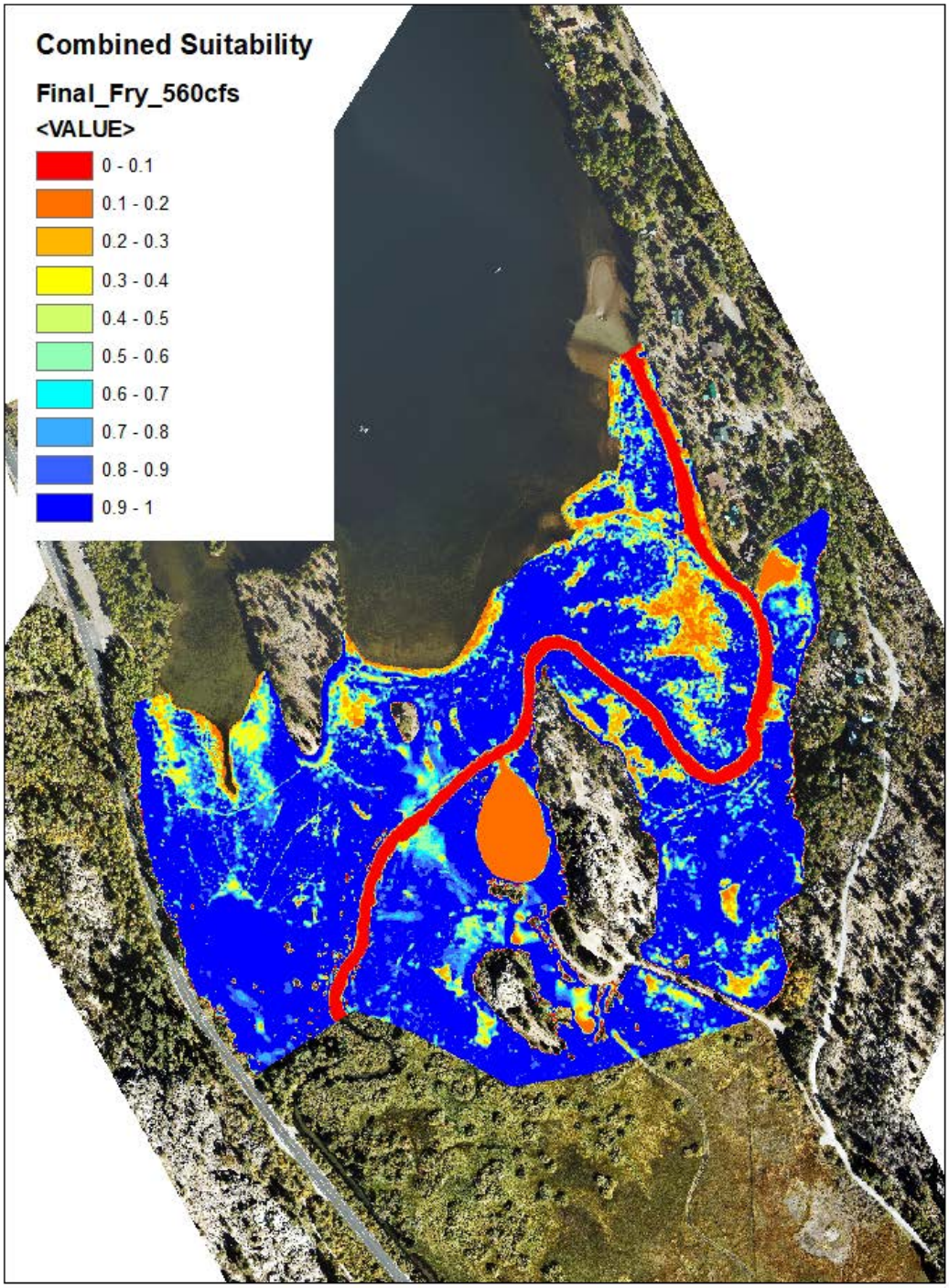
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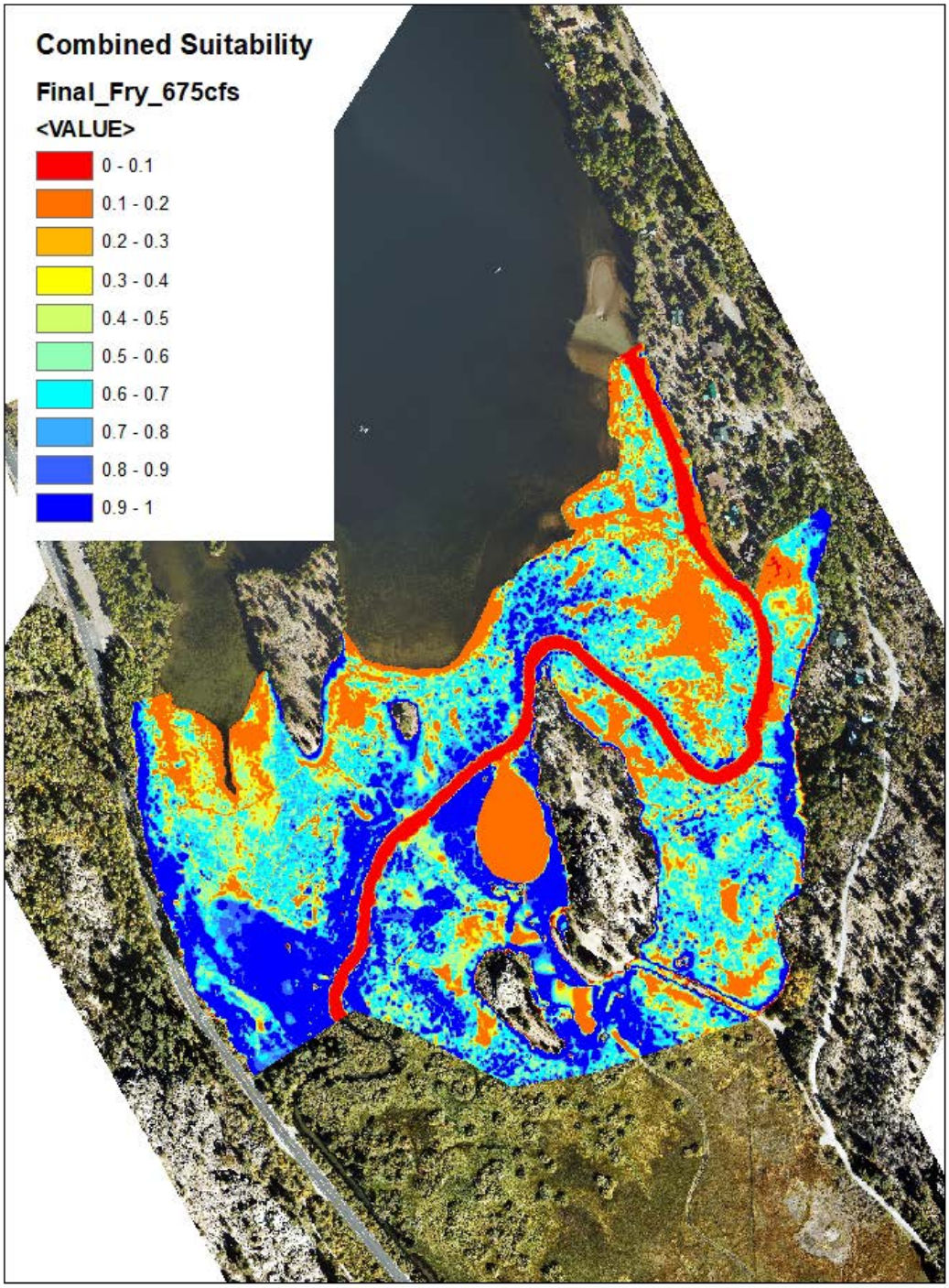
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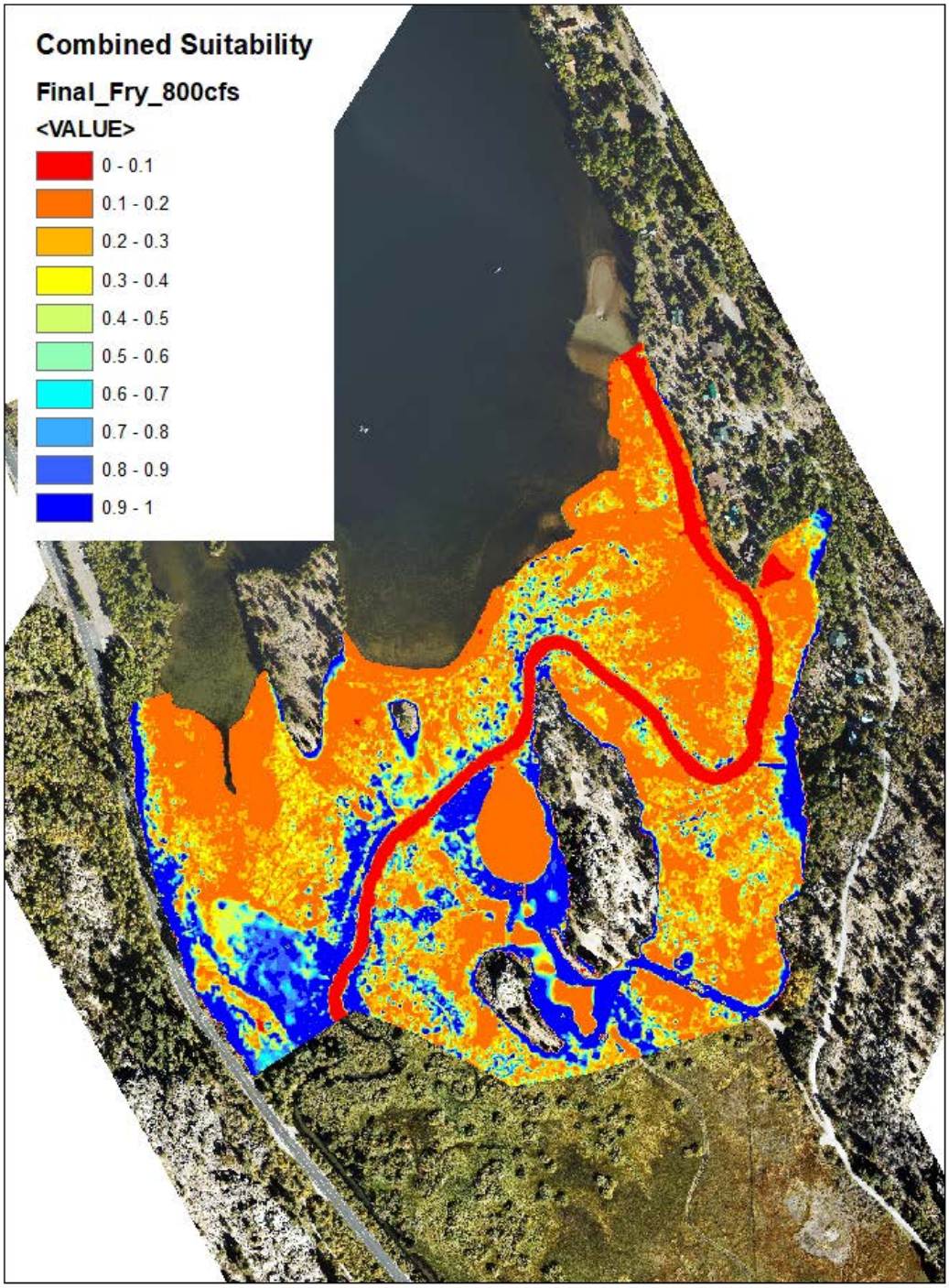
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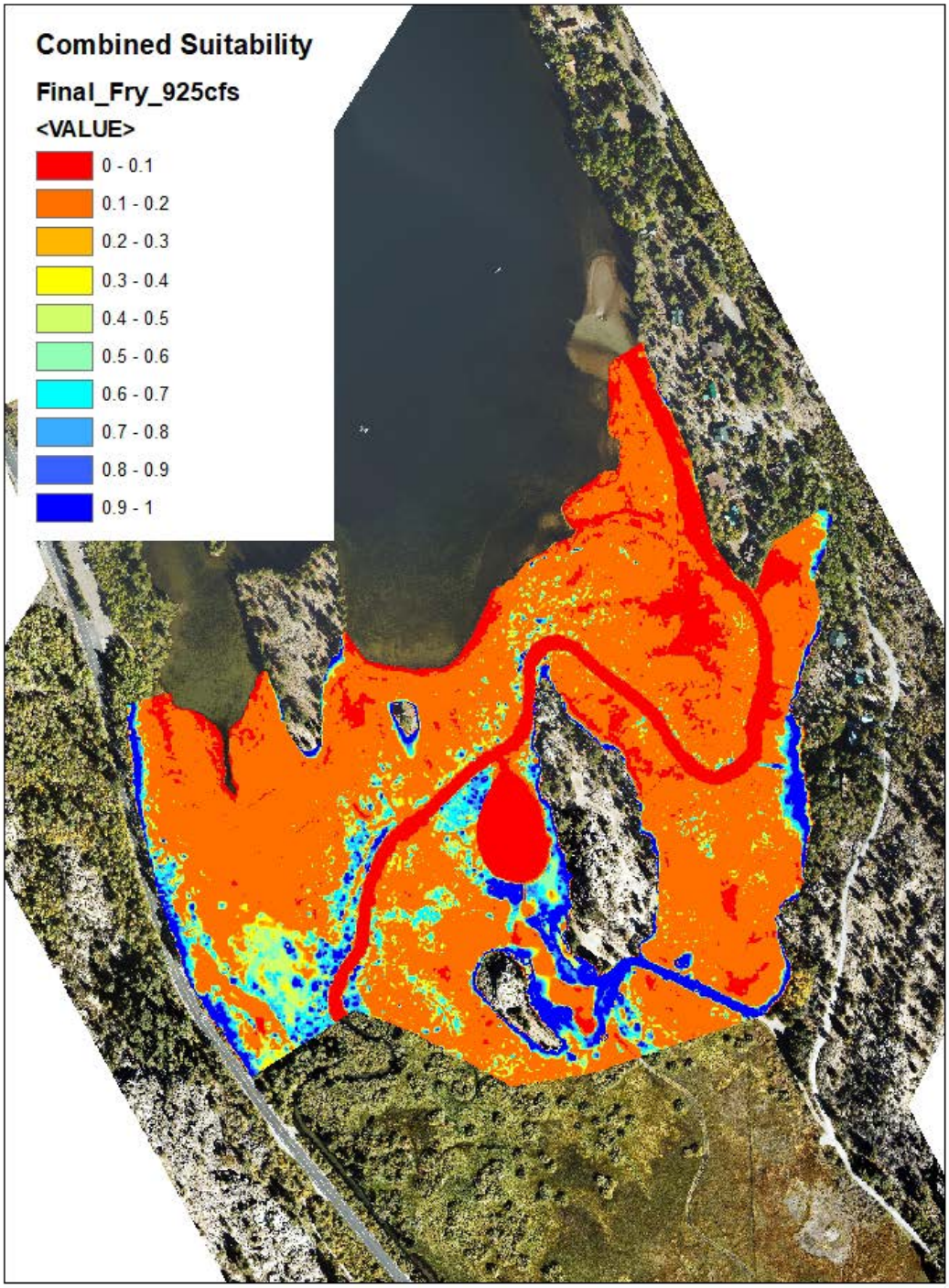
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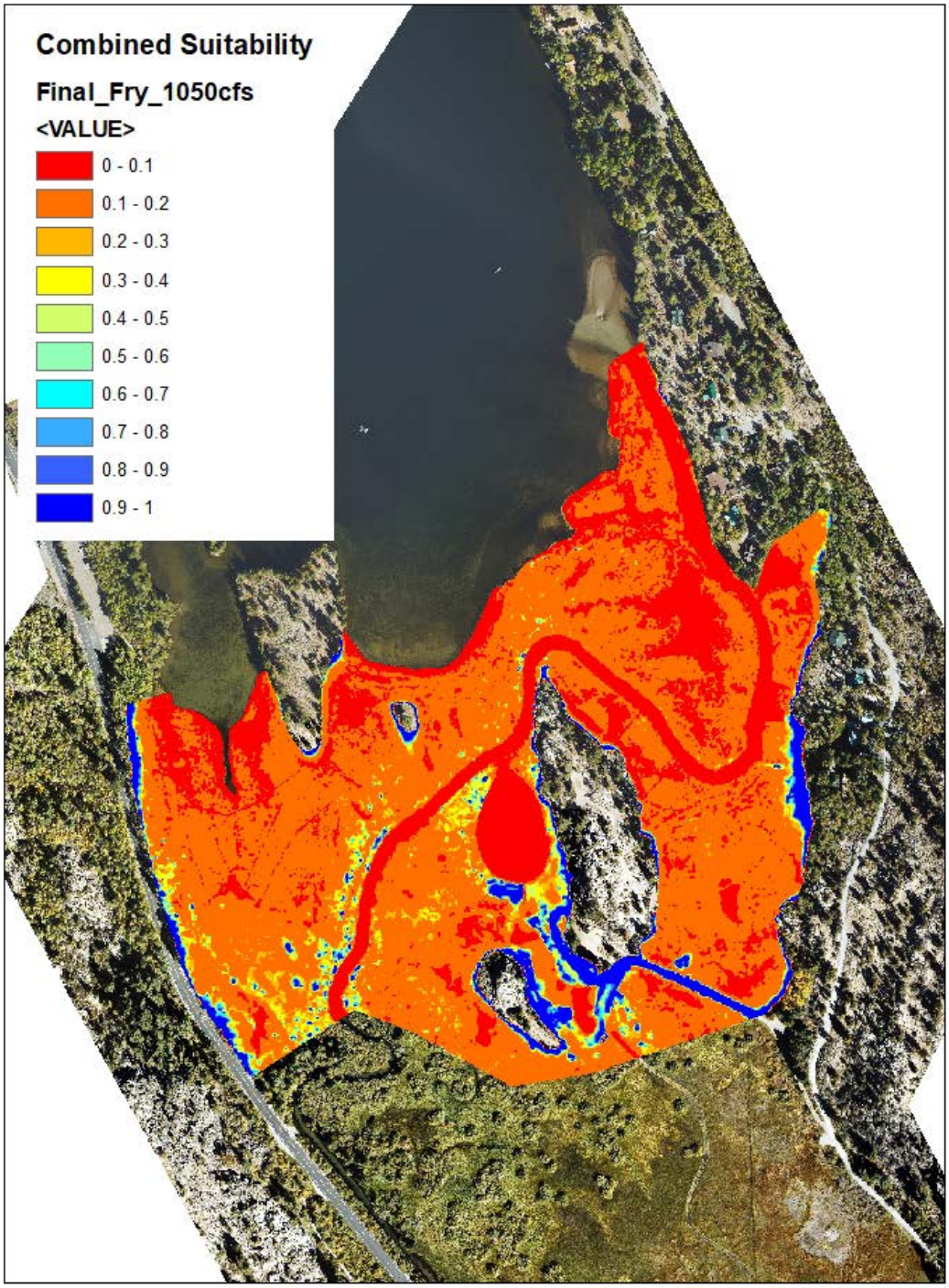
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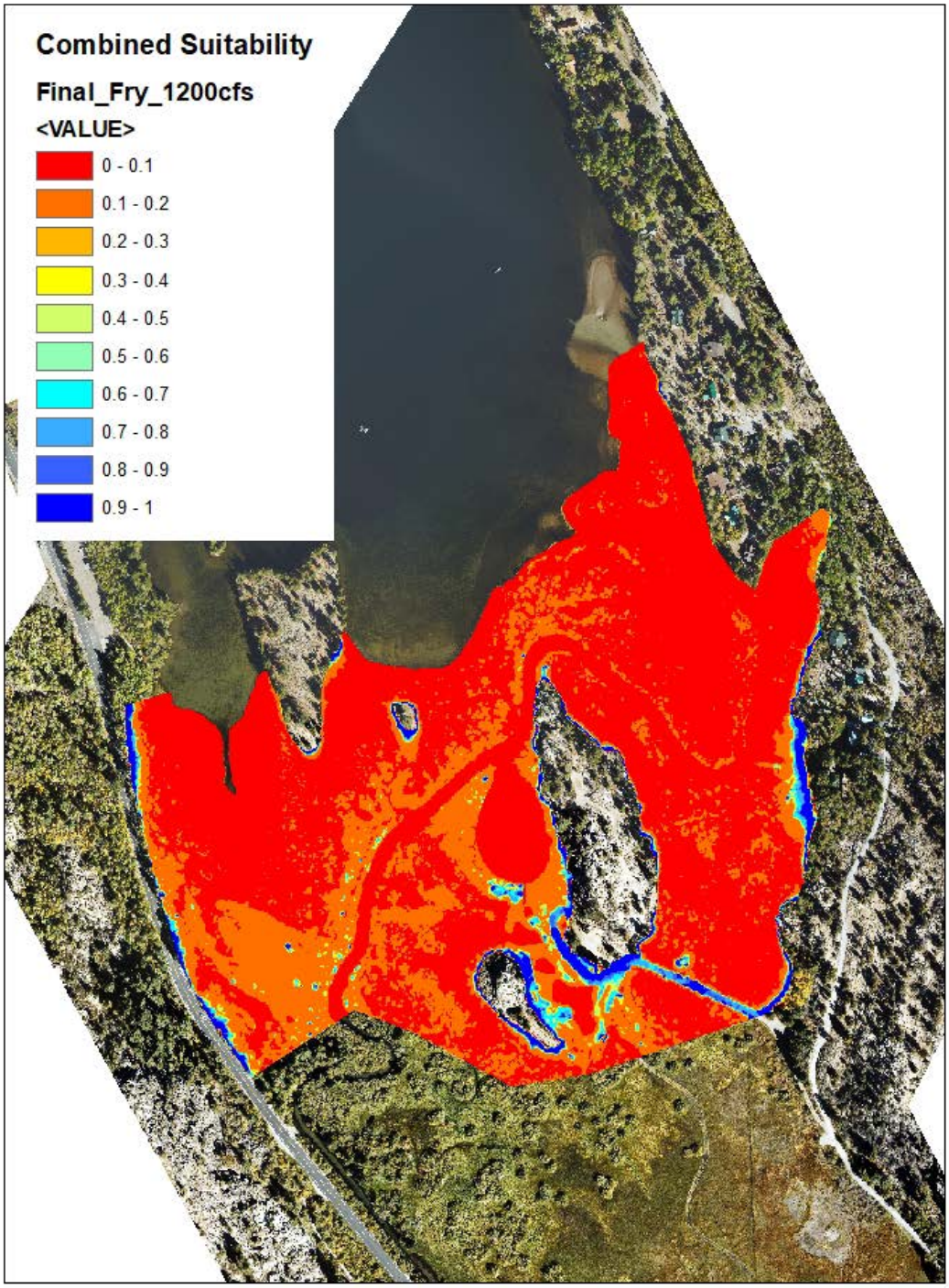
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APPENDIX K

2-D Habitat Suitability Modified Substrate (Rush Creek Above Silver Lake)

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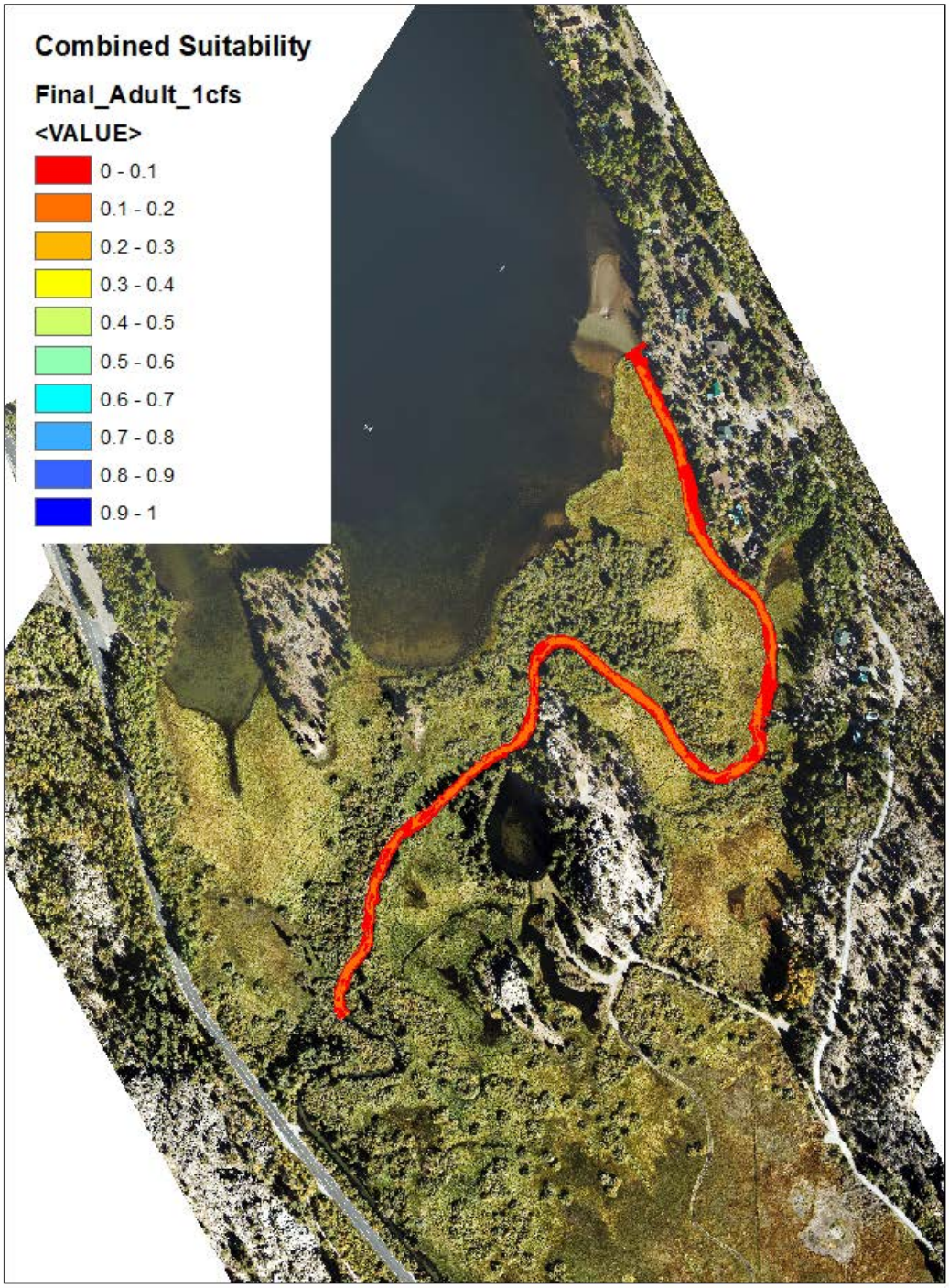
INTRODUCTION

The following figures show the habitat results for the adult lifestage for the Above Silver Lake 2-D site. The values of habitat match suitability values with a scale of 0 (no habitat) to 1 (100 % habitat). The results in this appendix represent modified substrate suitability applied to the adult lifestage.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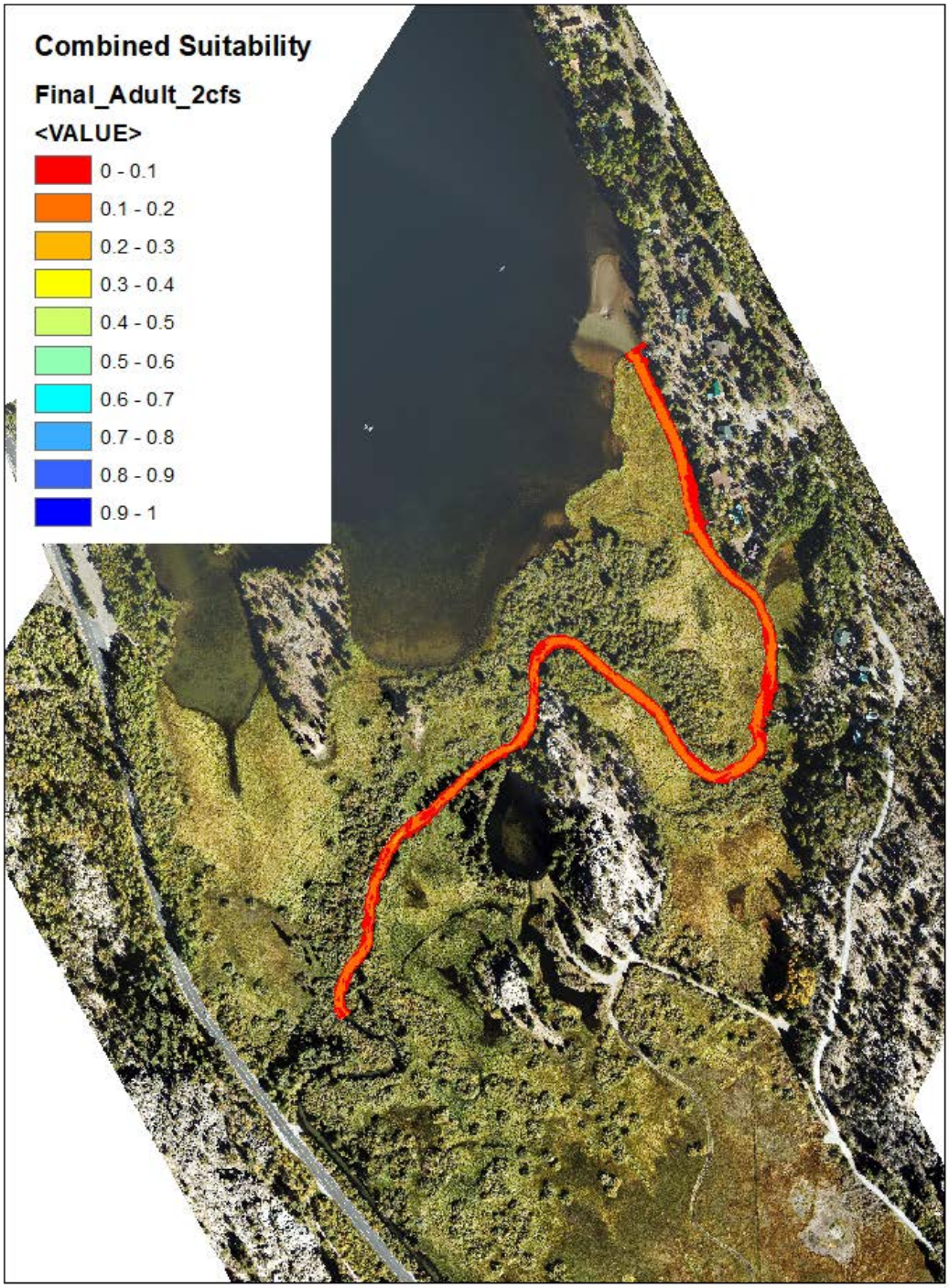
0.9 - 1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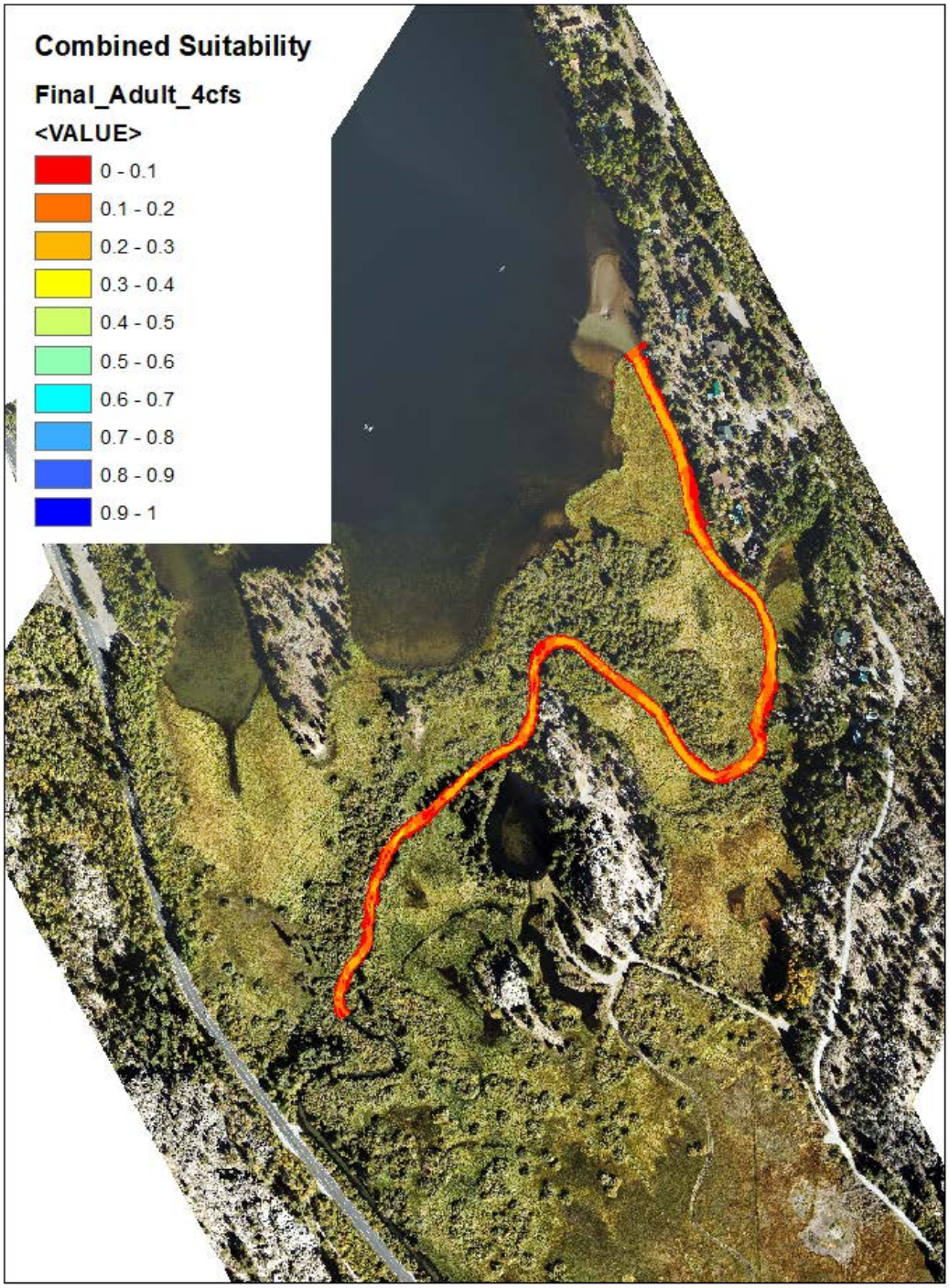
0.9 - 1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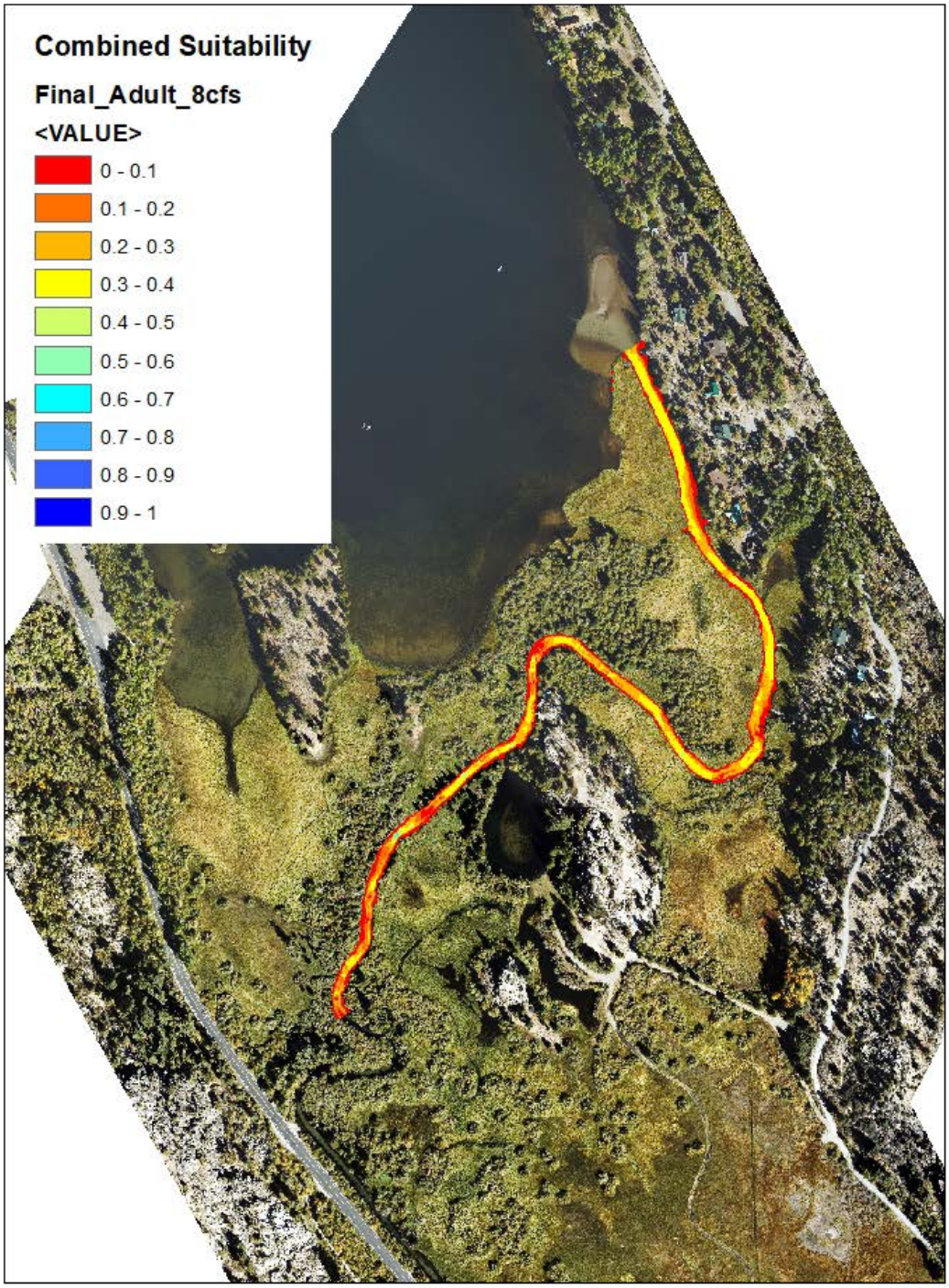
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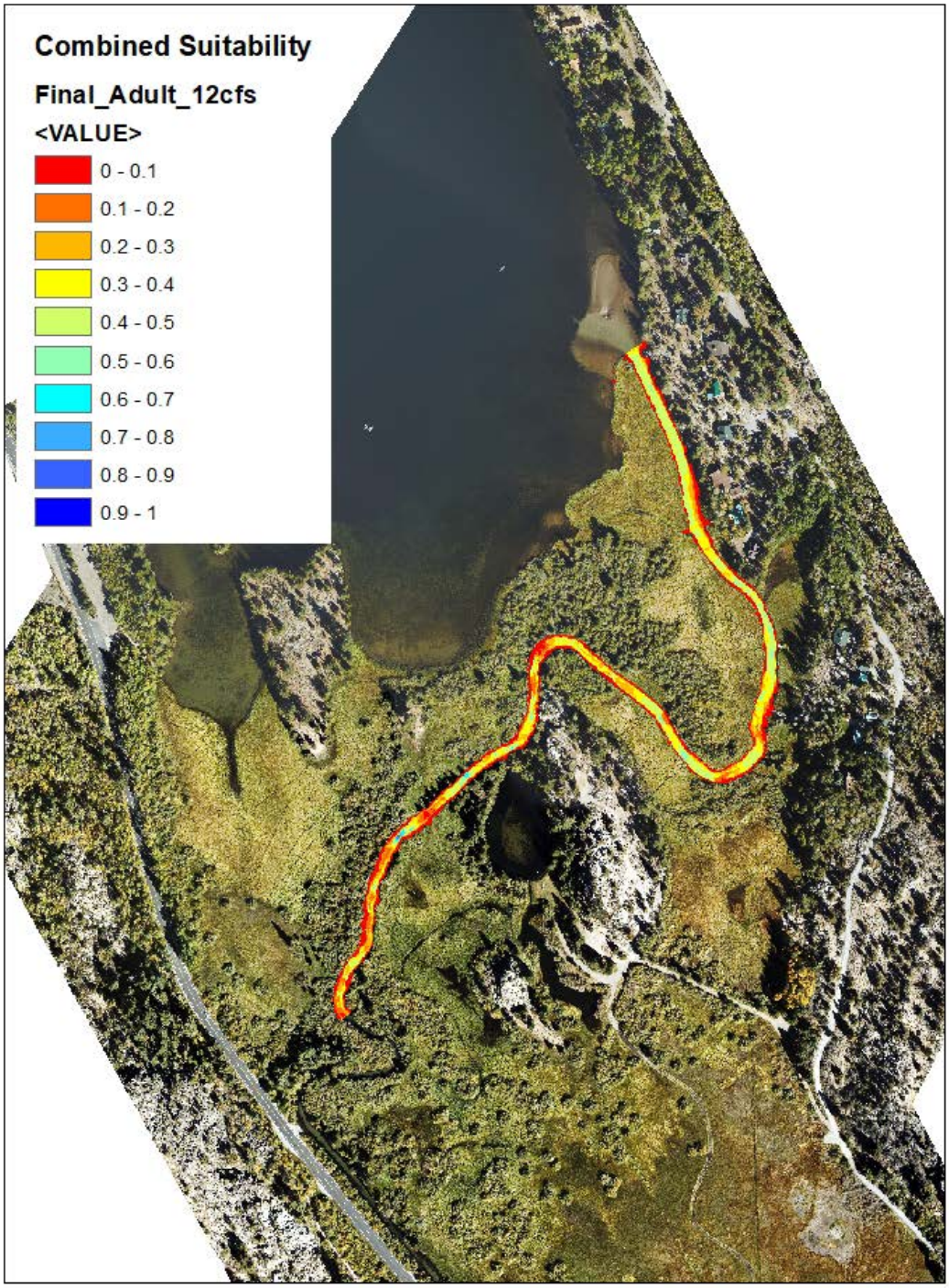
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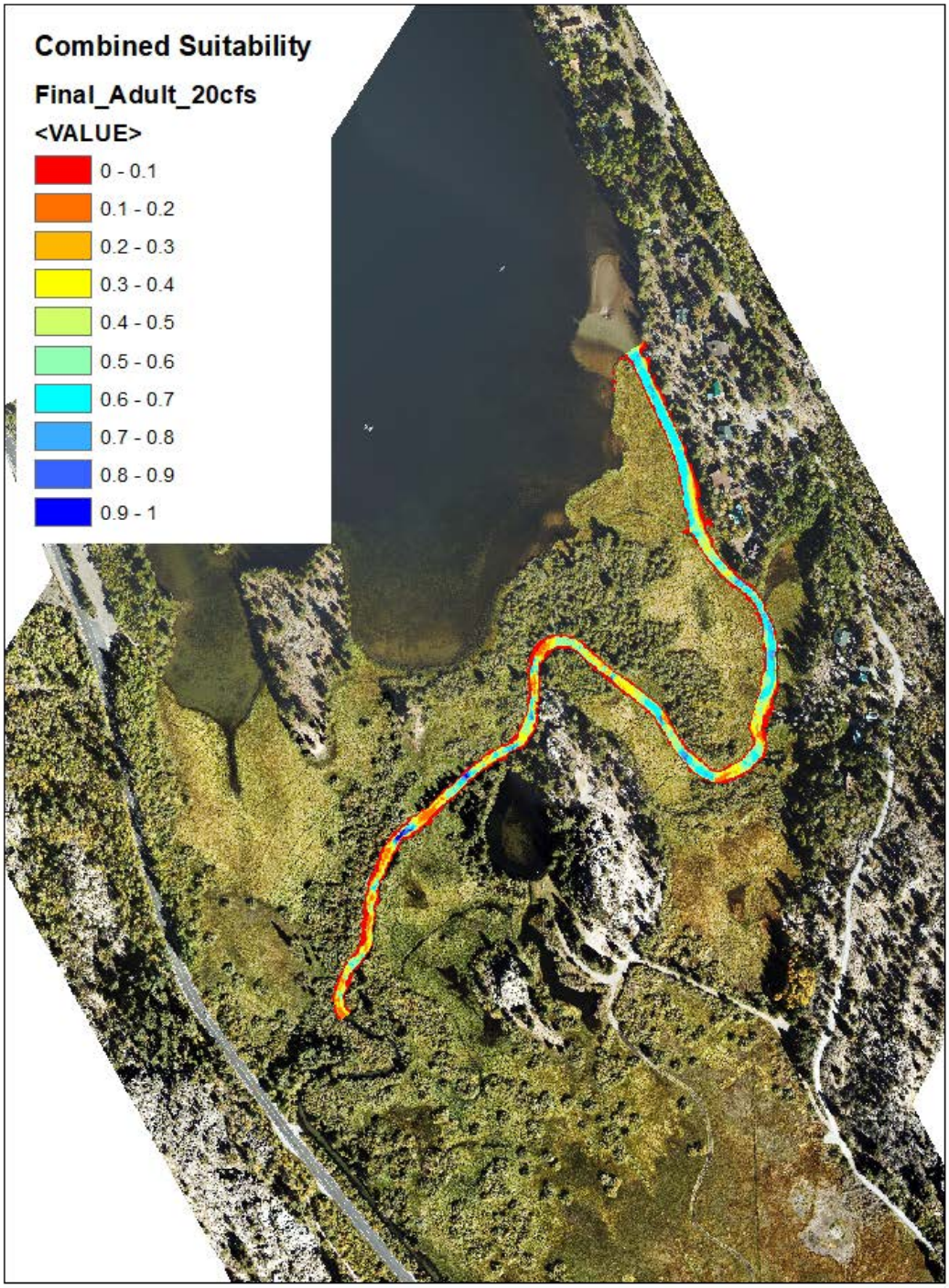
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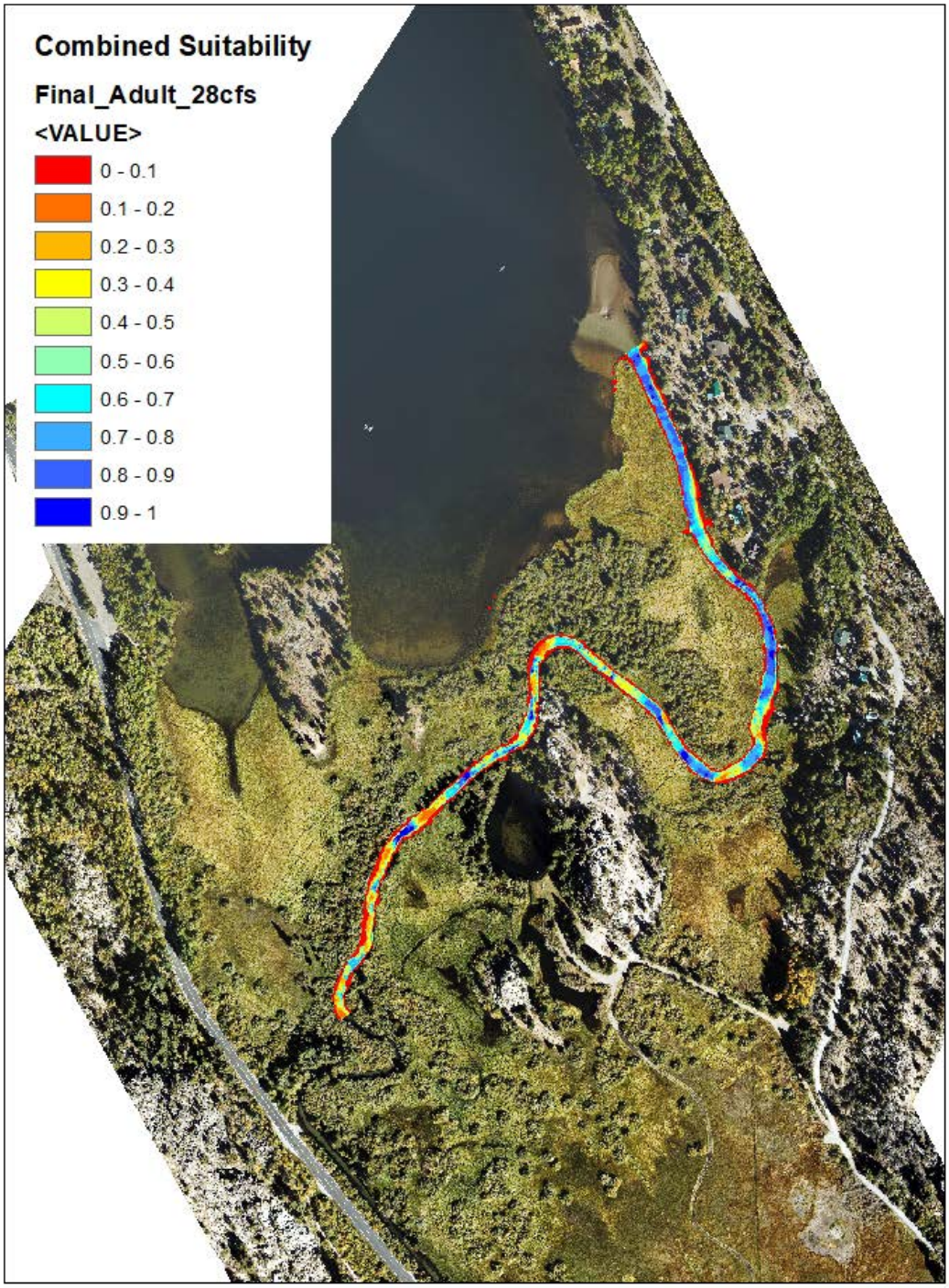
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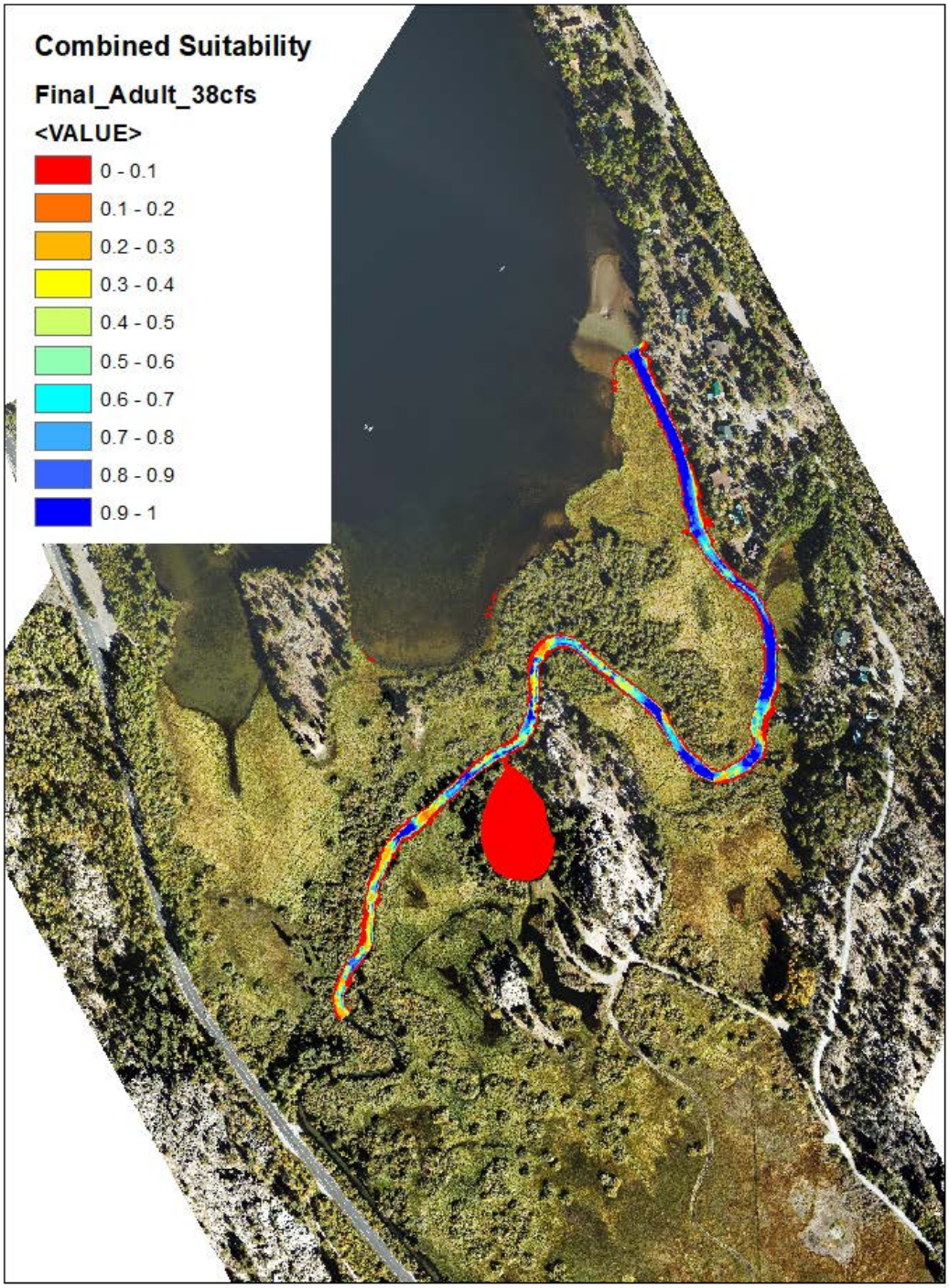
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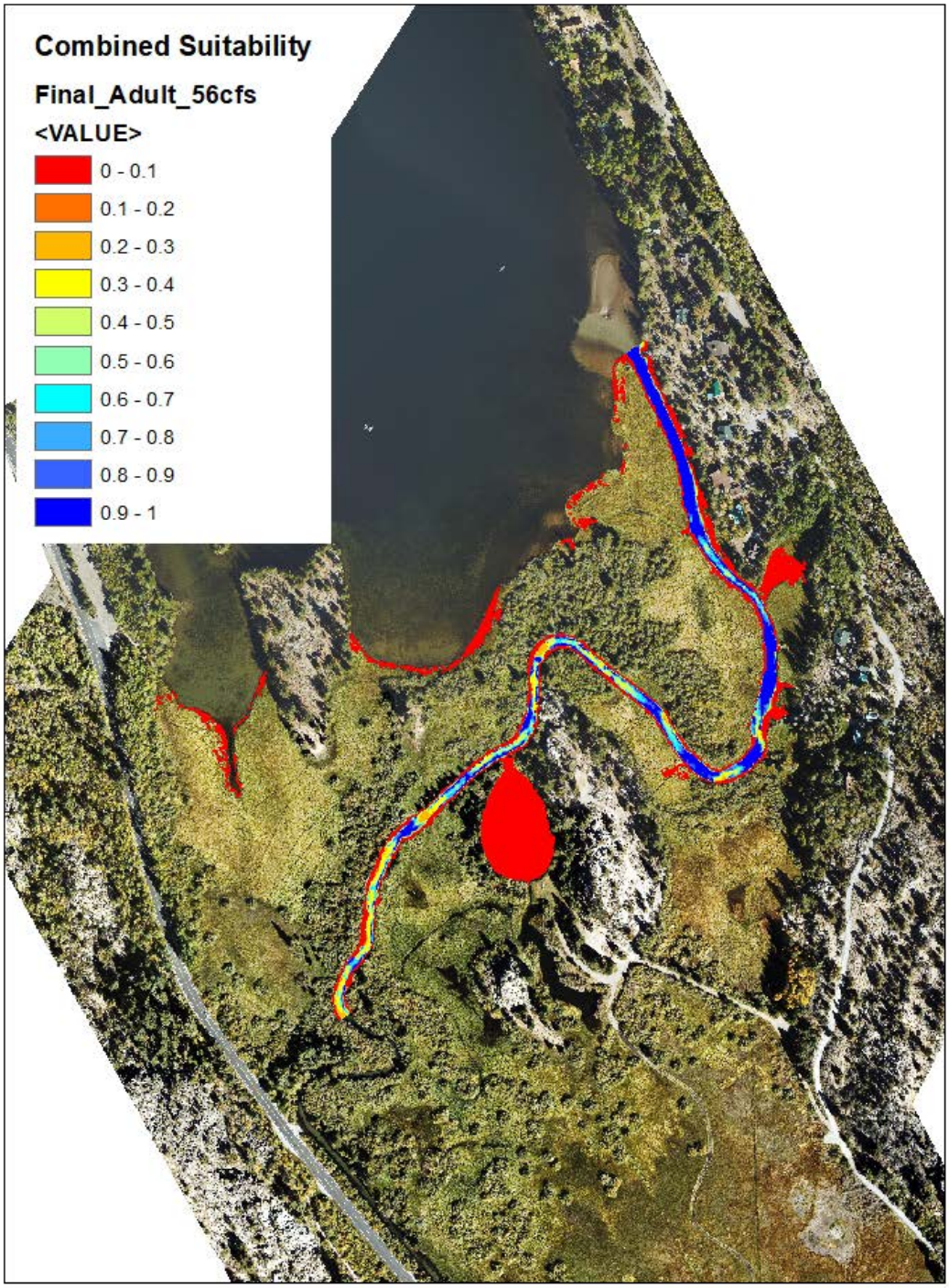
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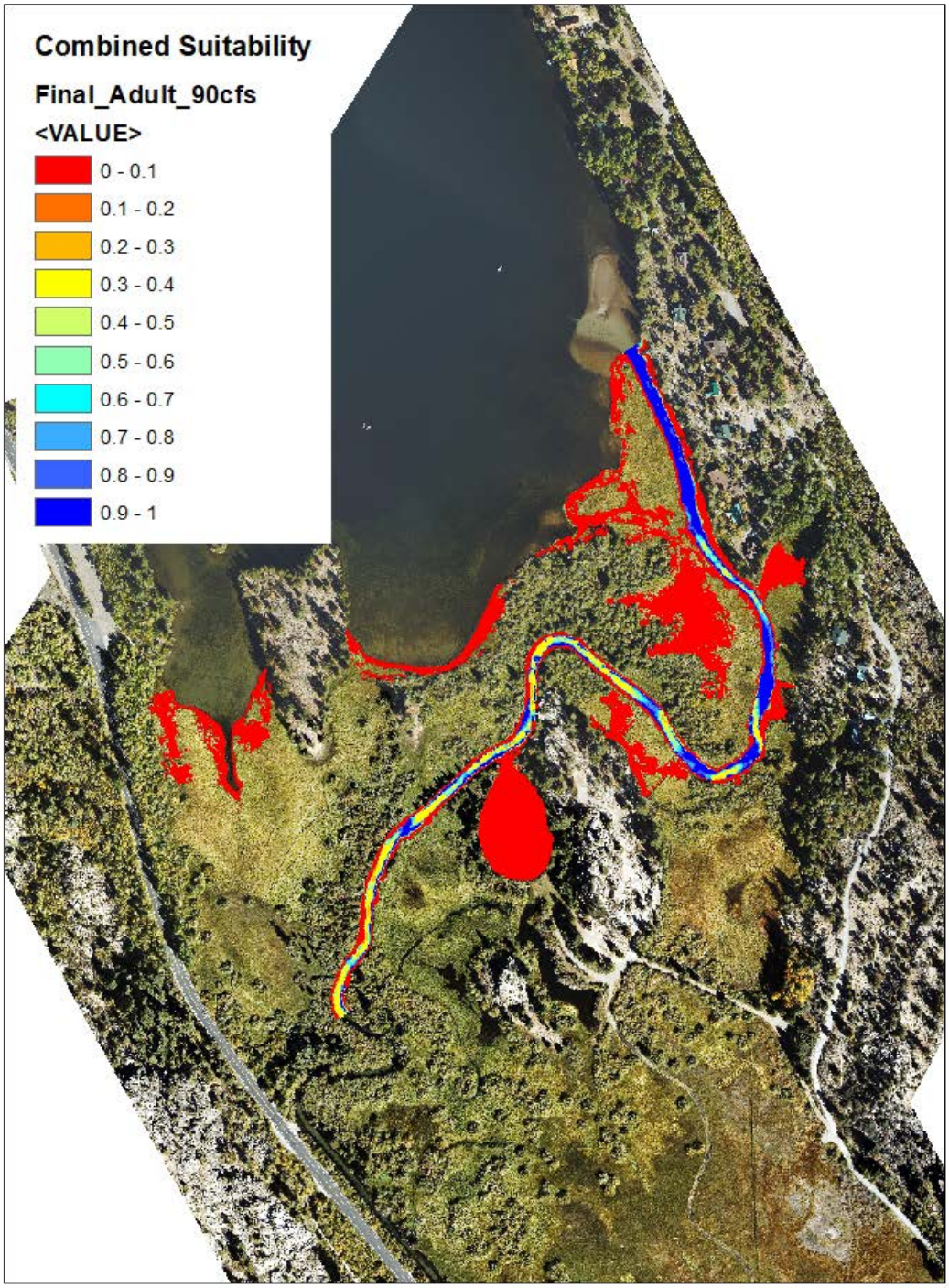
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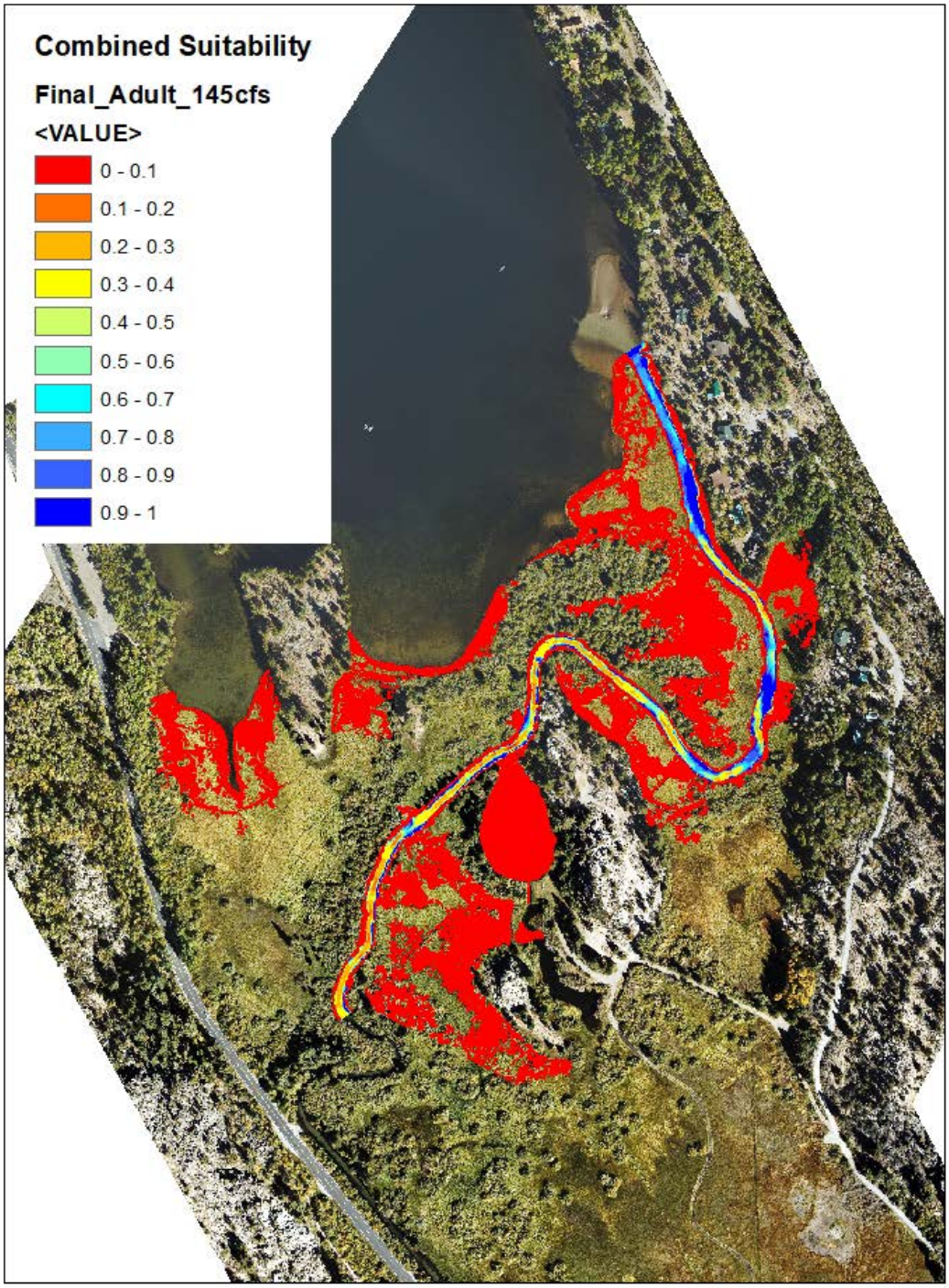
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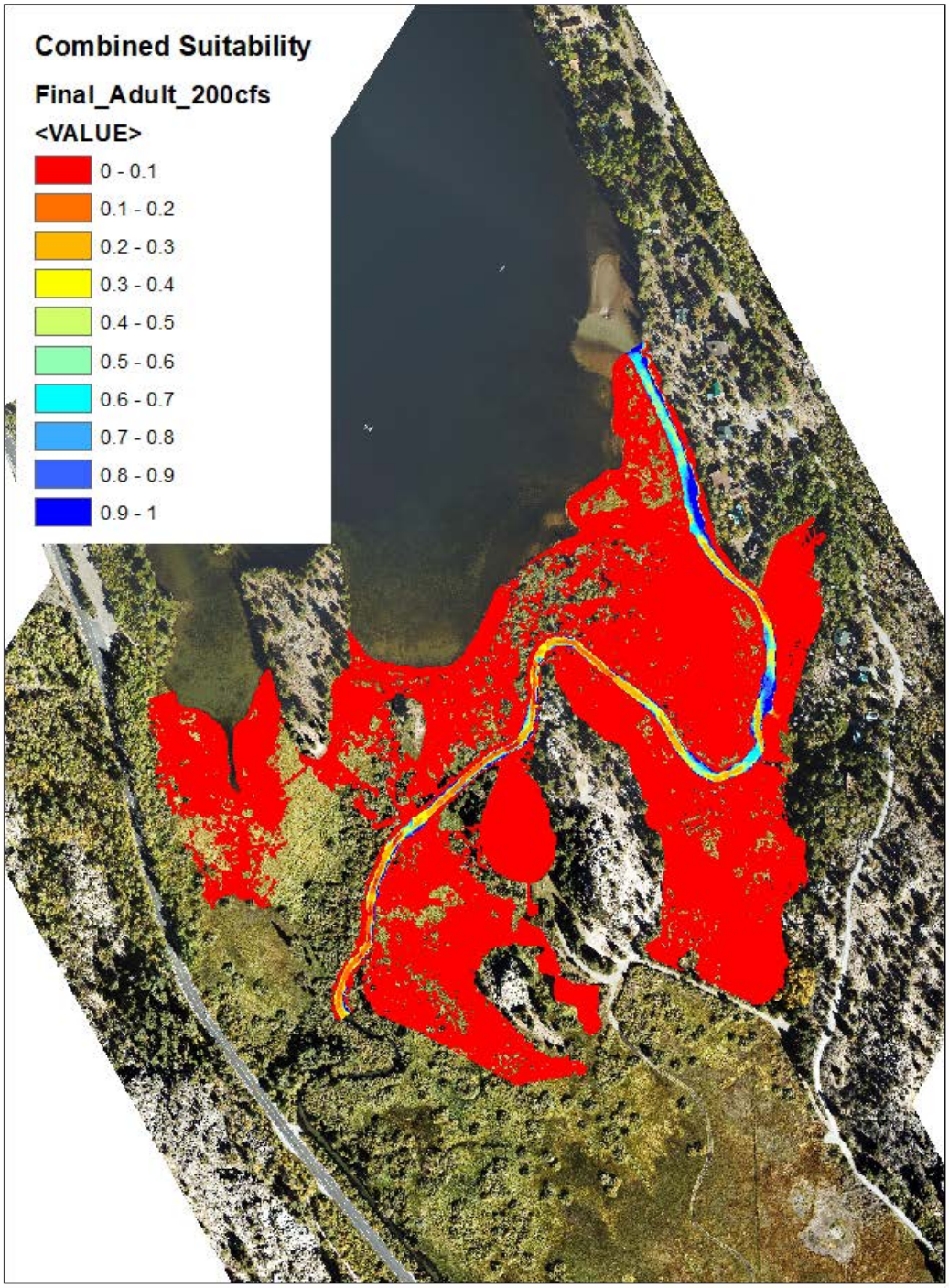
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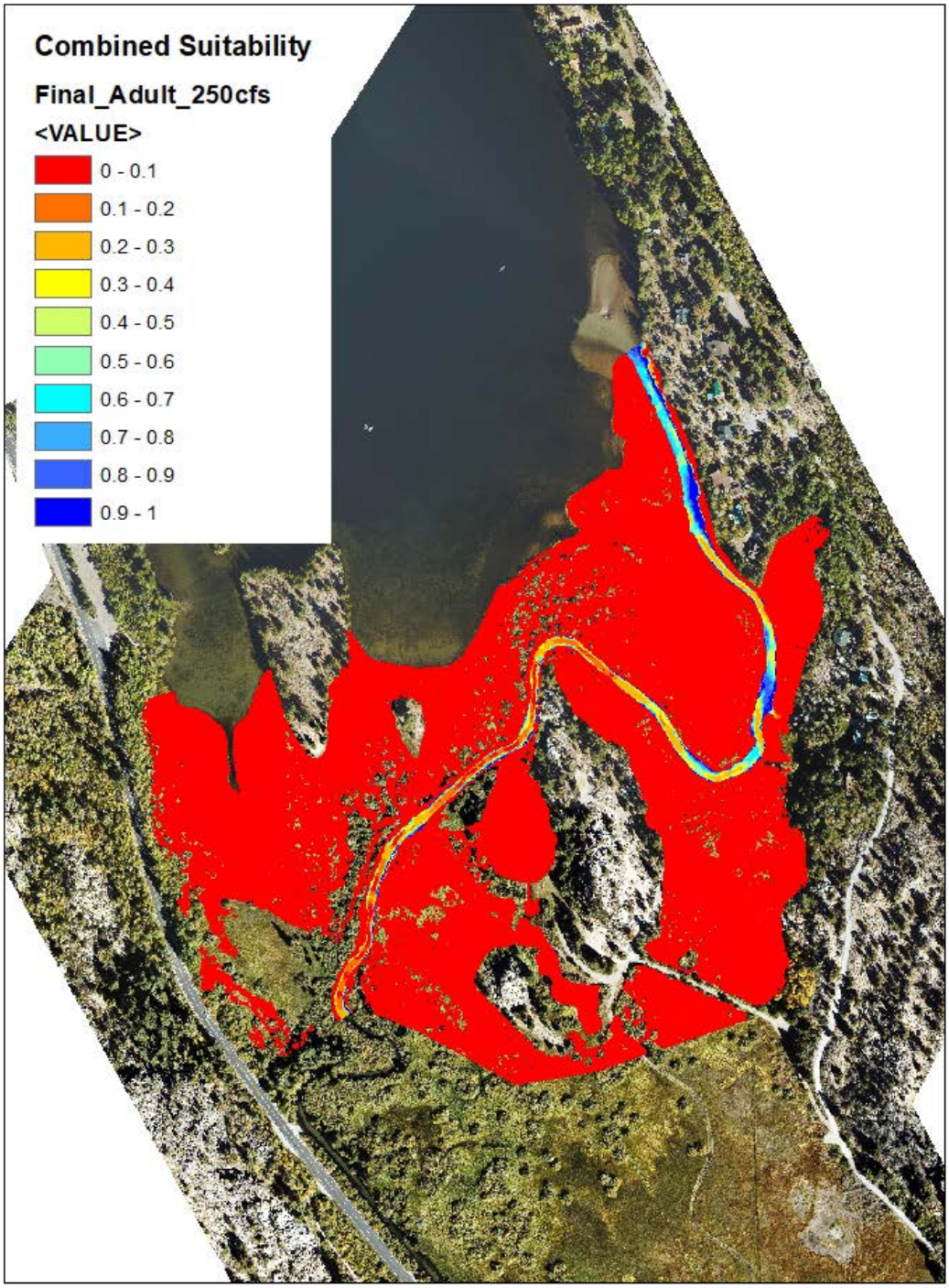
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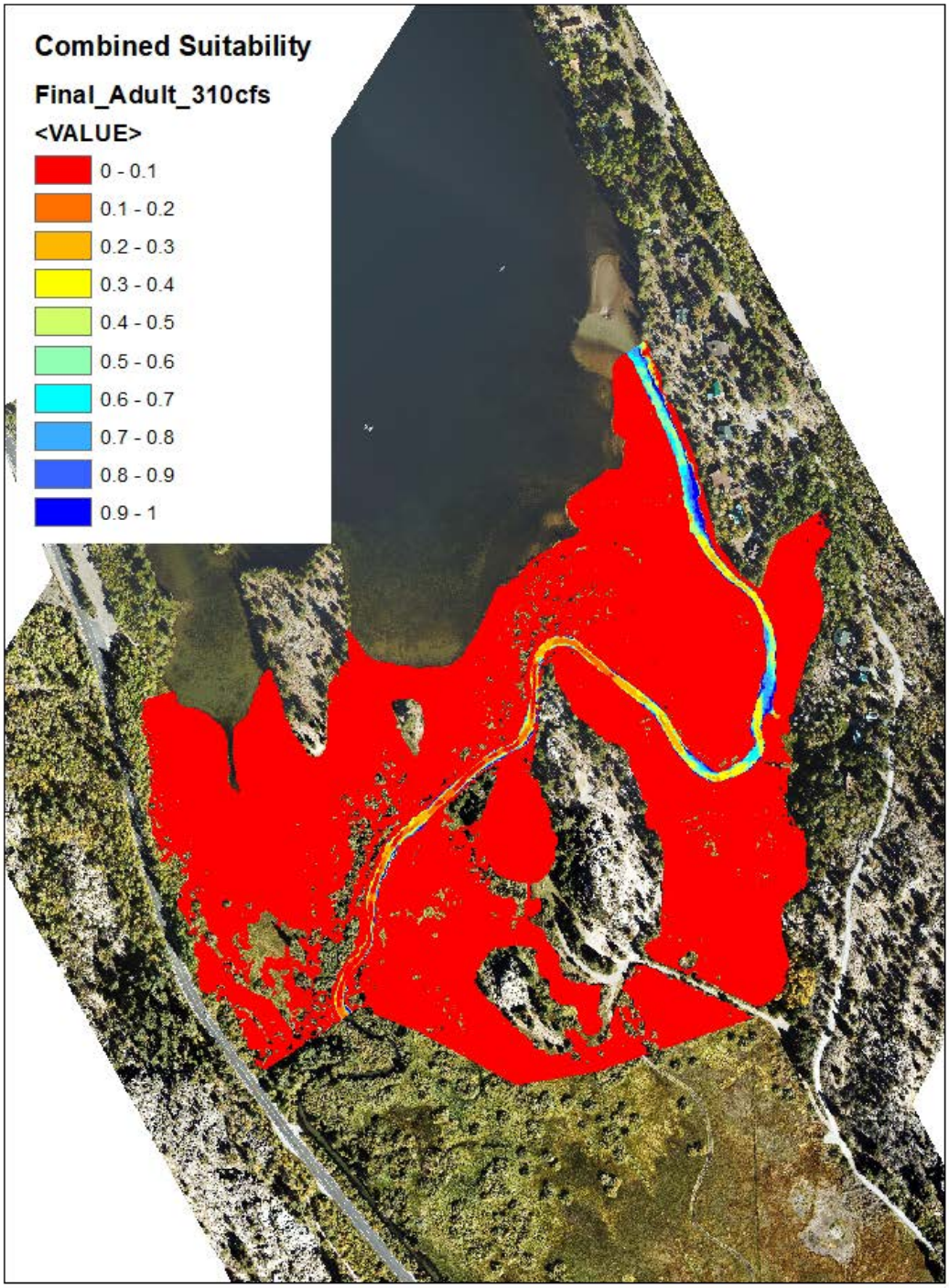
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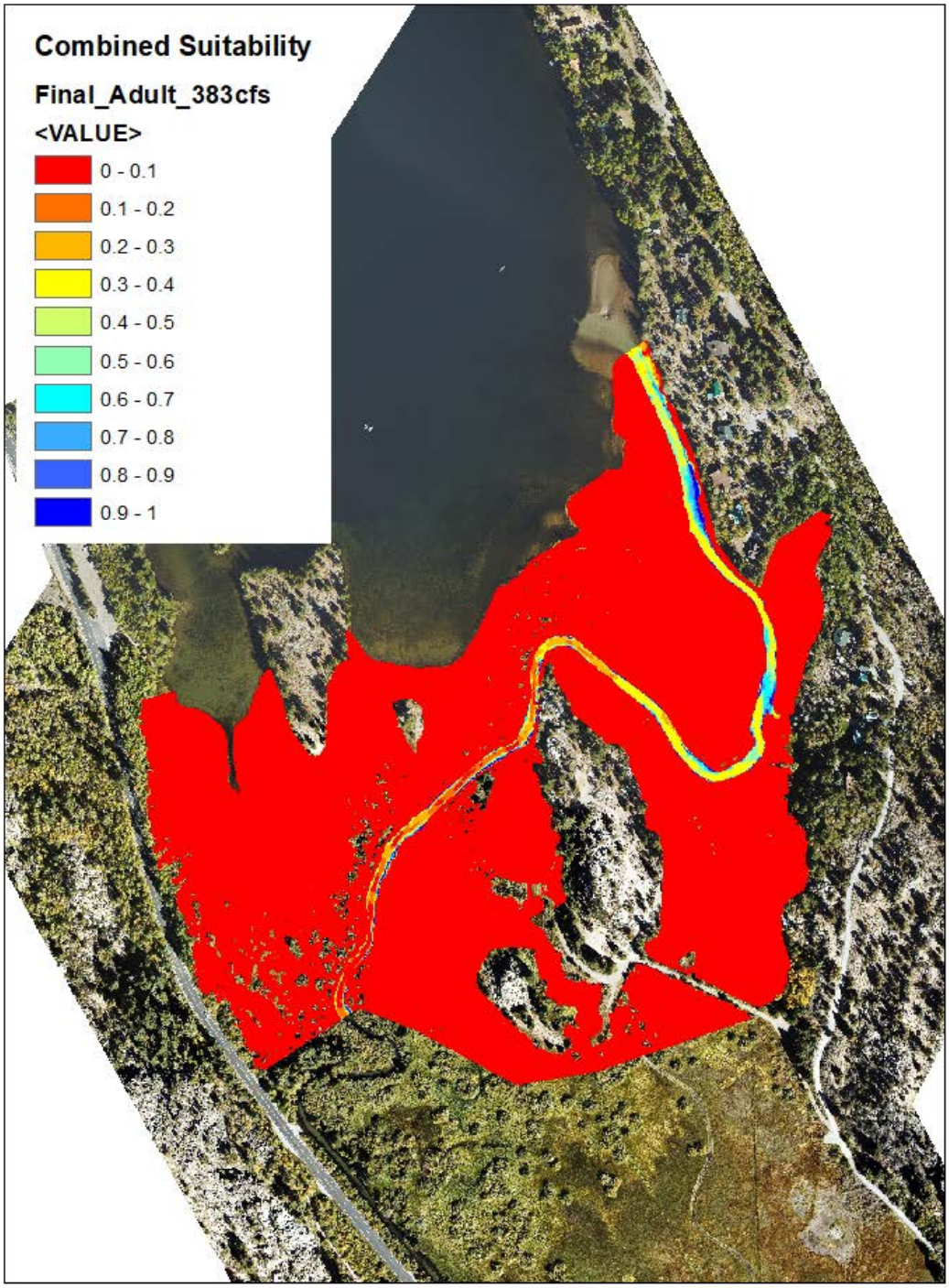
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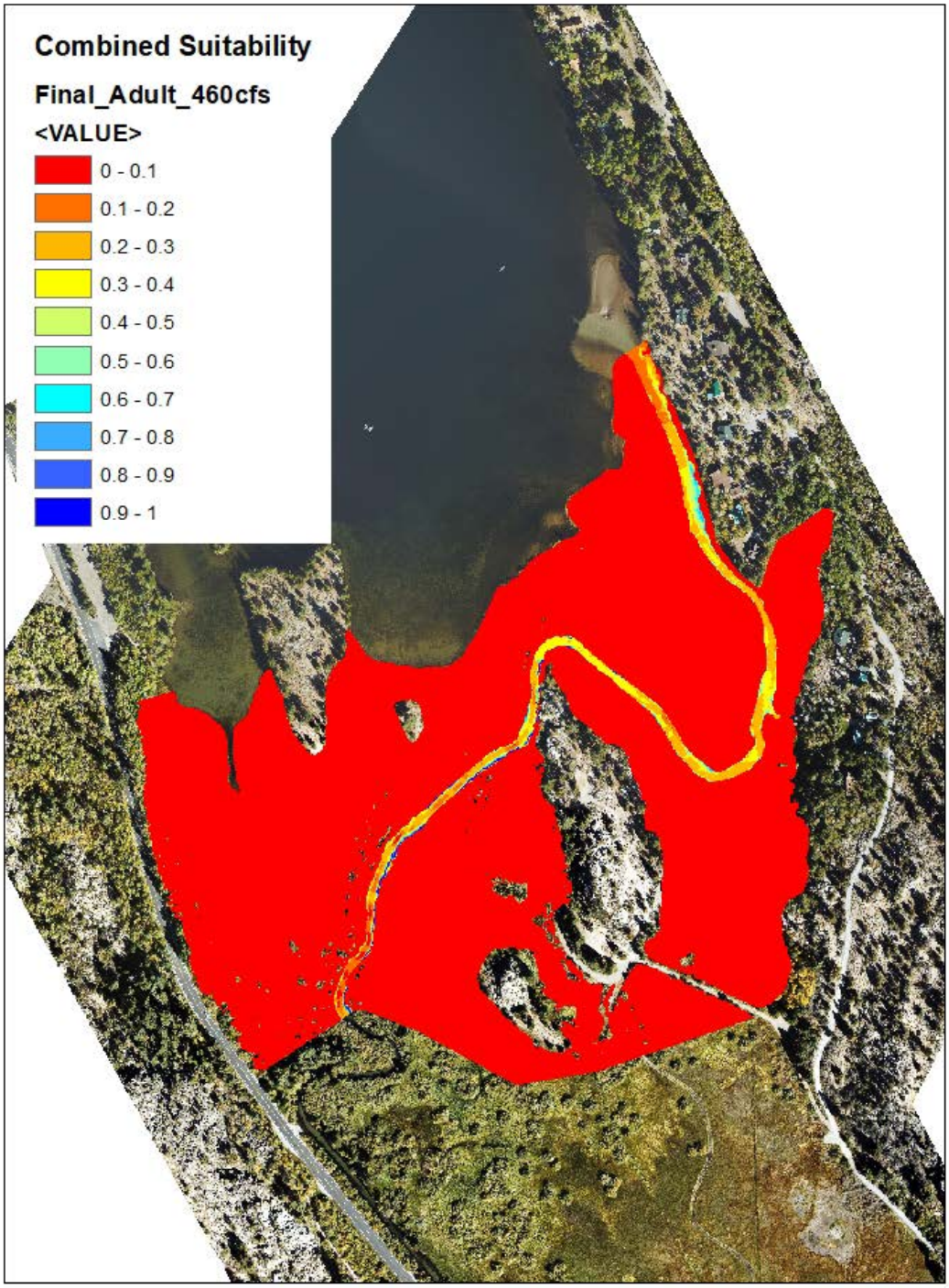
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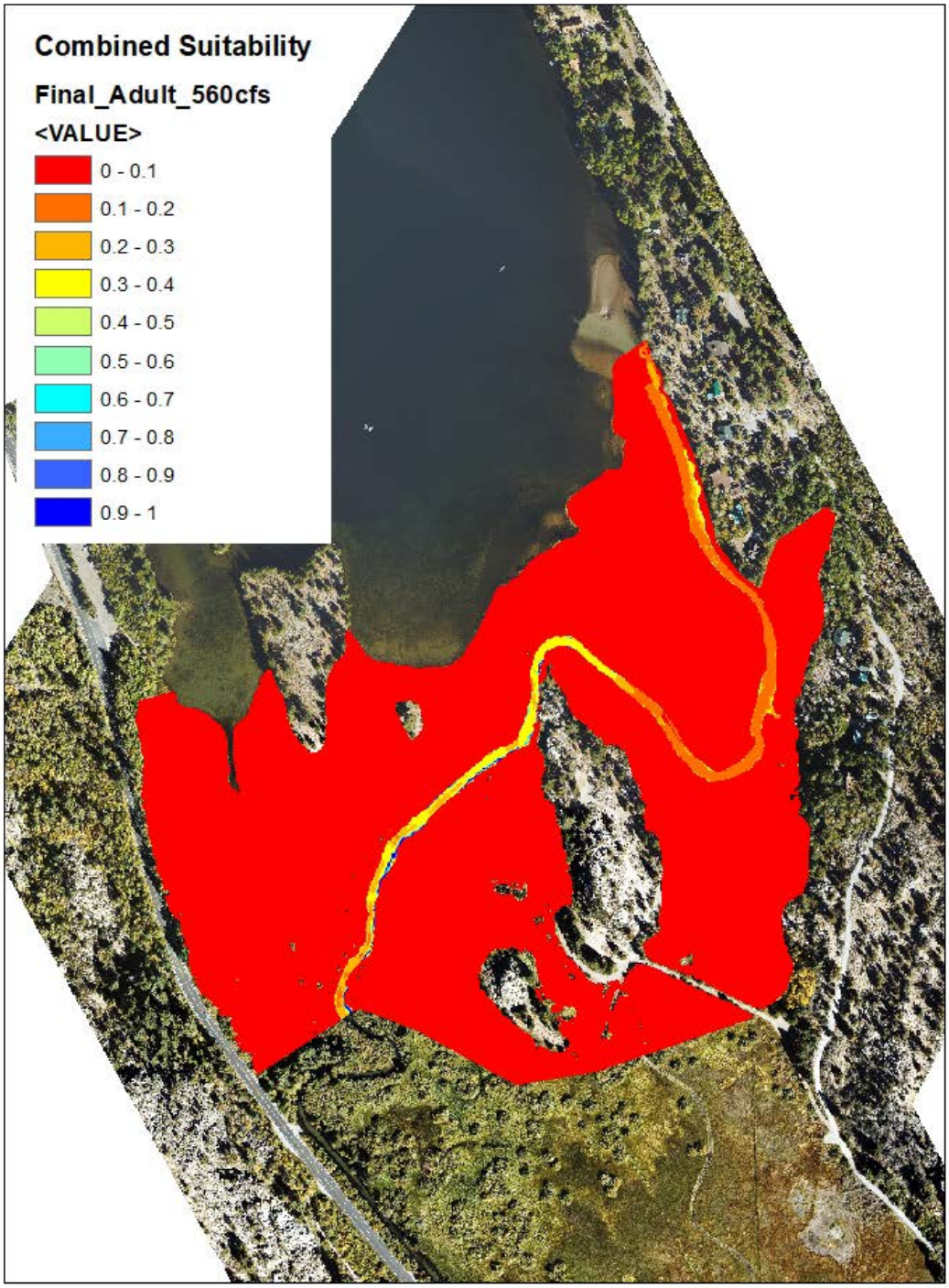
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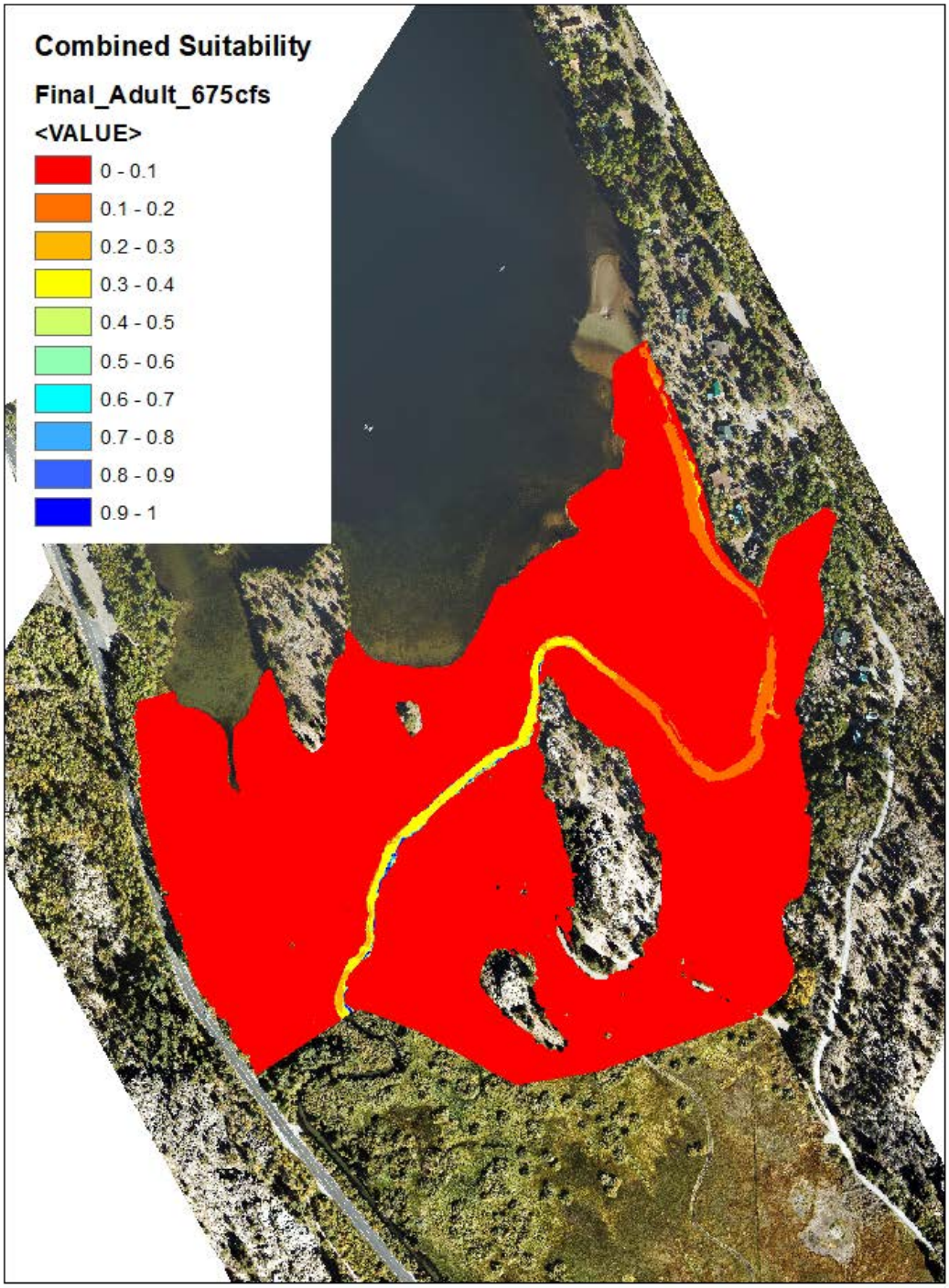
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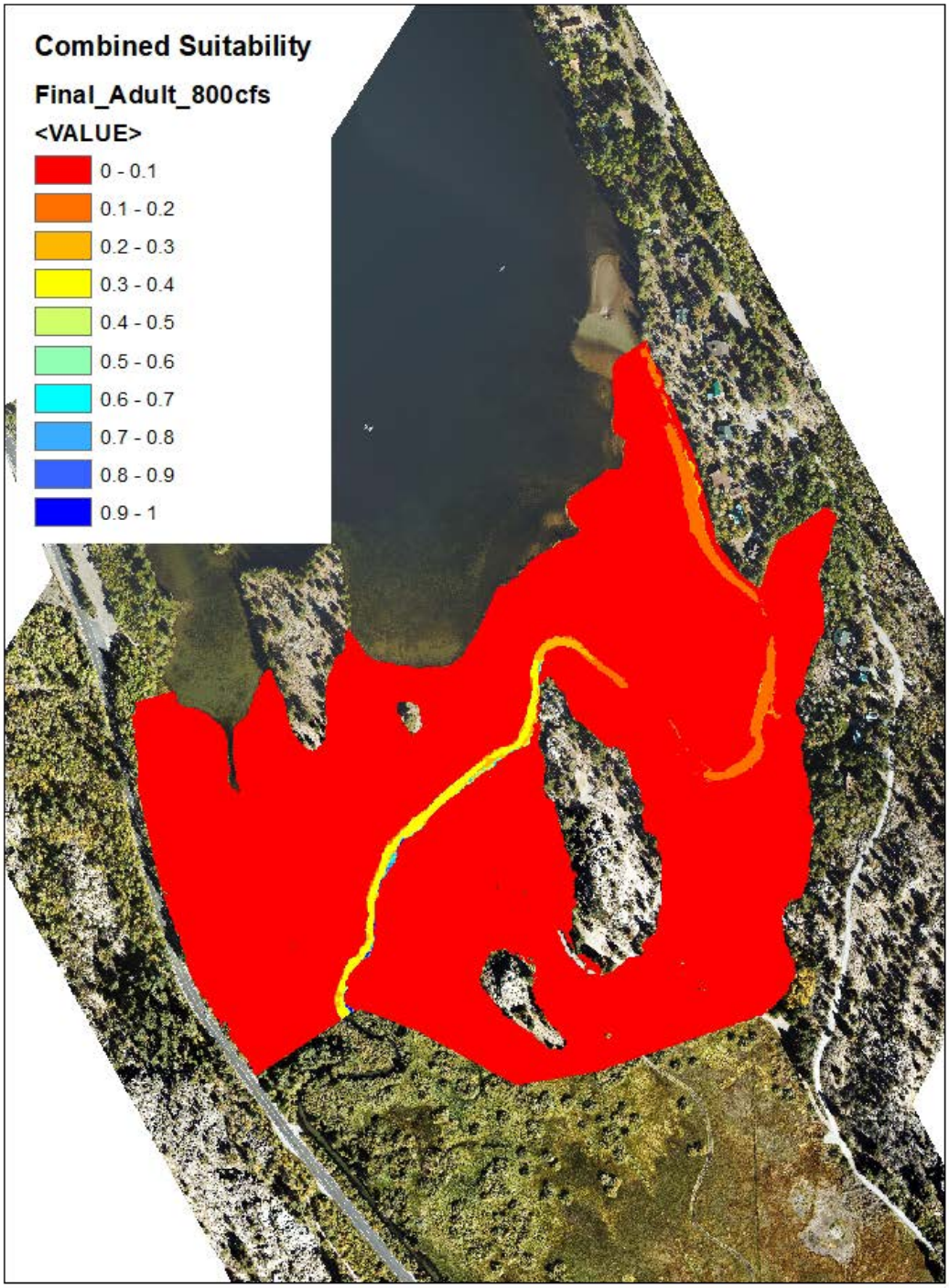
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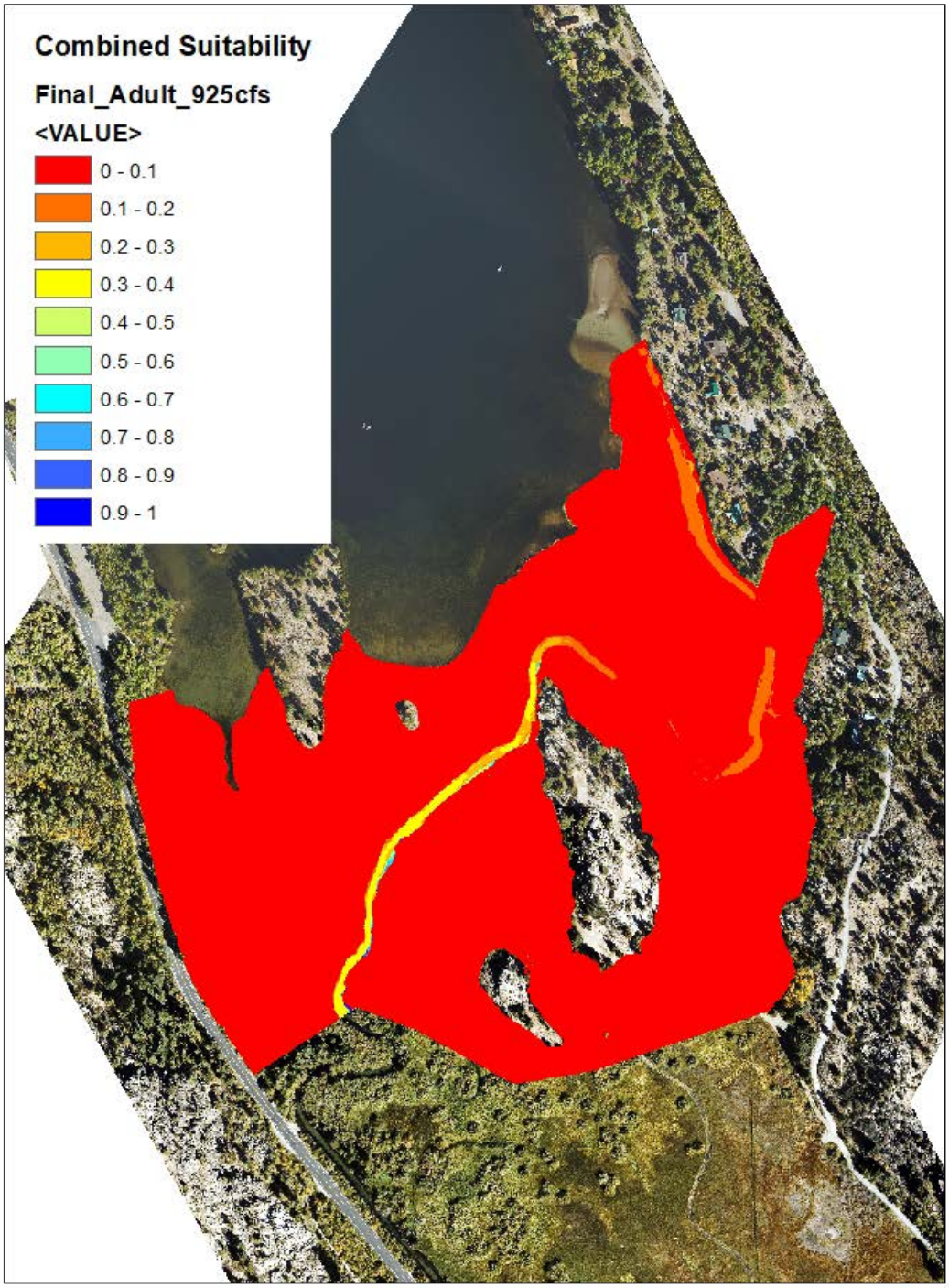
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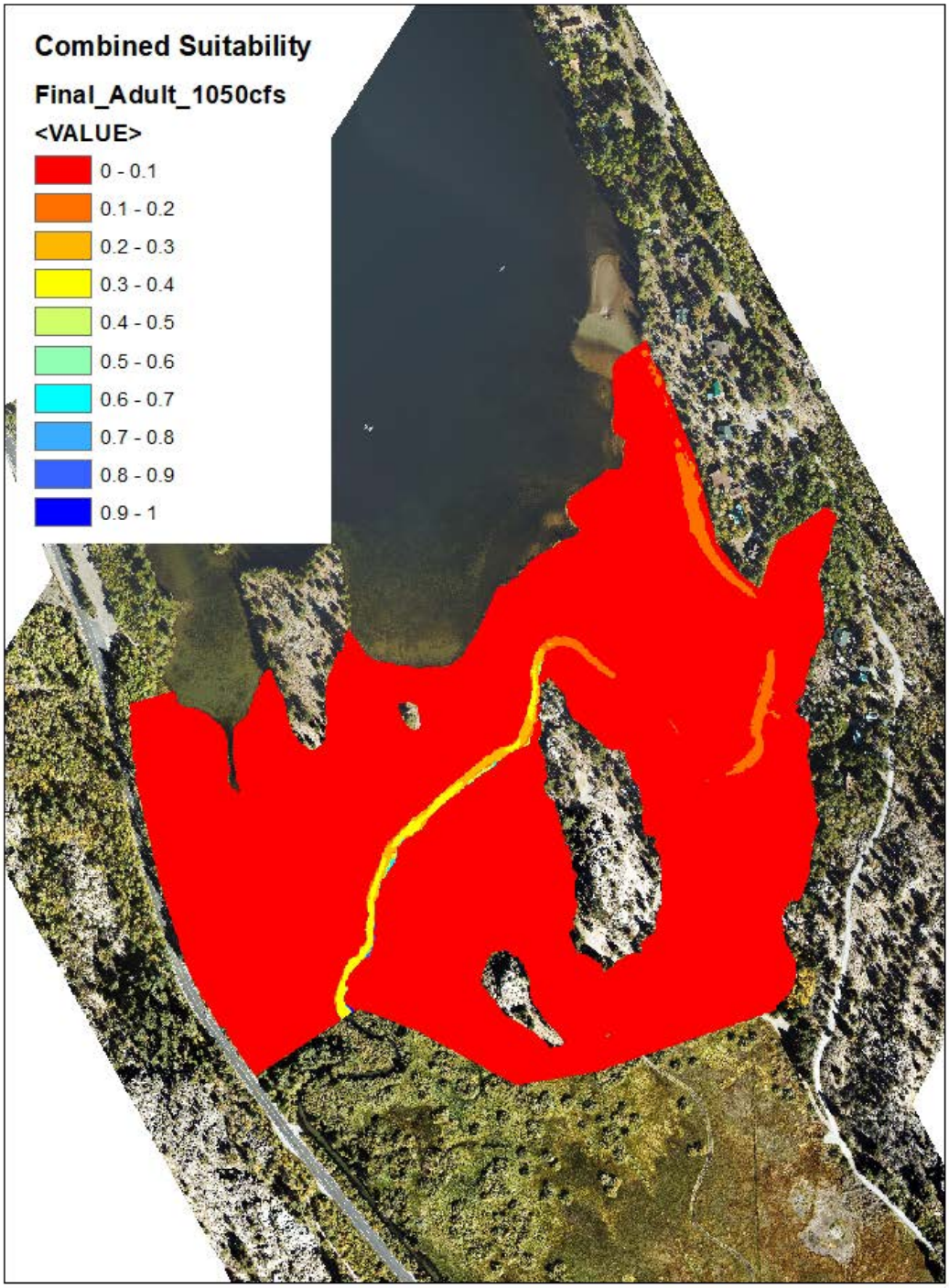
0.9 - 1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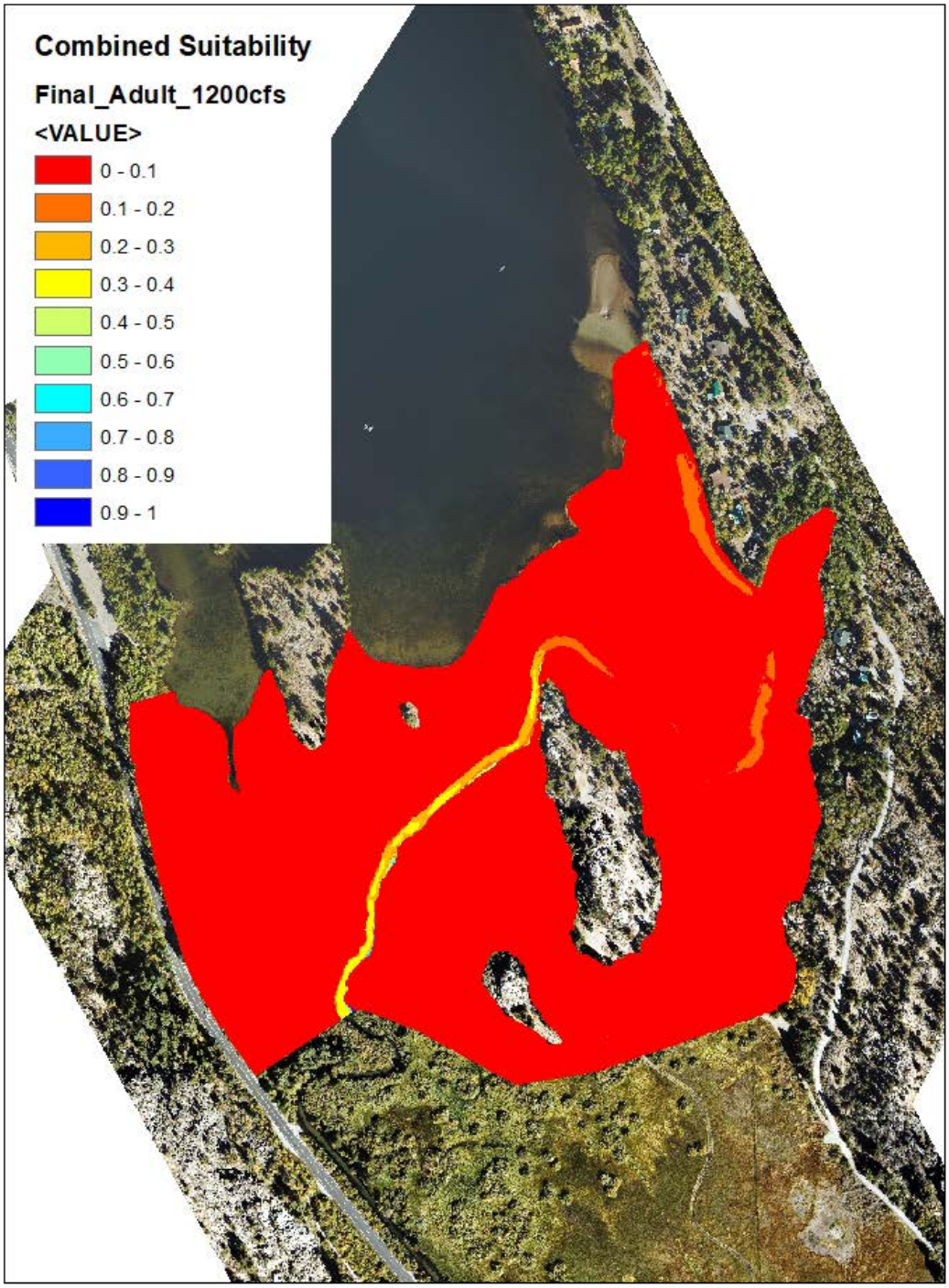
0.9 - 1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0.7 - 0.8
0.8 - 0.9
0.9 - 1

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APPENDIX L

2-D Habitat Suitability (South Rush Creek)

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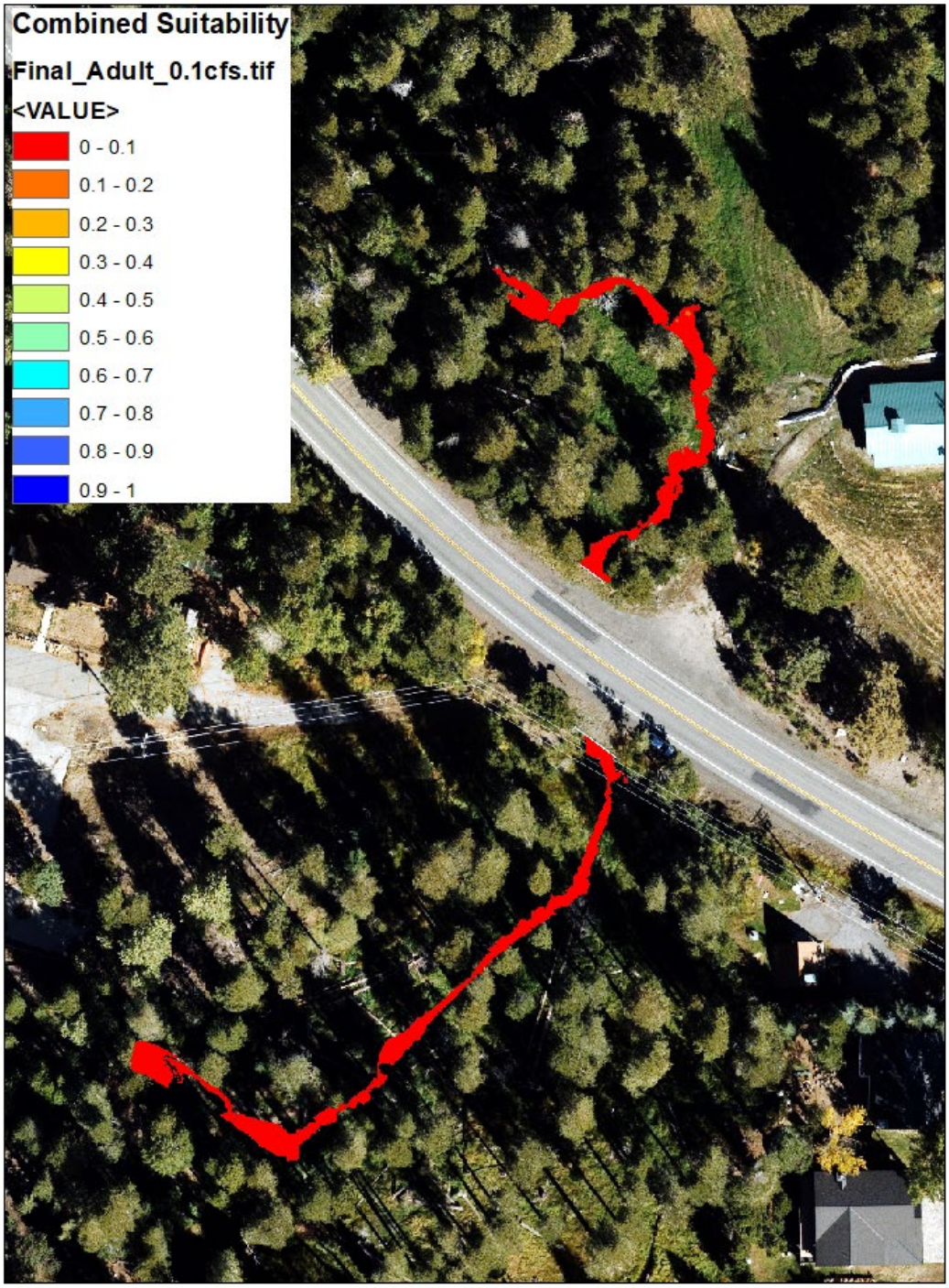
INTRODUCTION

The following figures show the habitat results for the adult, juvenile, fry, and spawning lifestages for the South Rush Creek 2-D site. The values of habitat match suitability values with a scale of 0 (no habitat) to 1 (100 % habitat). The results in this appendix represent original substrate suitability applied to the adult lifestage.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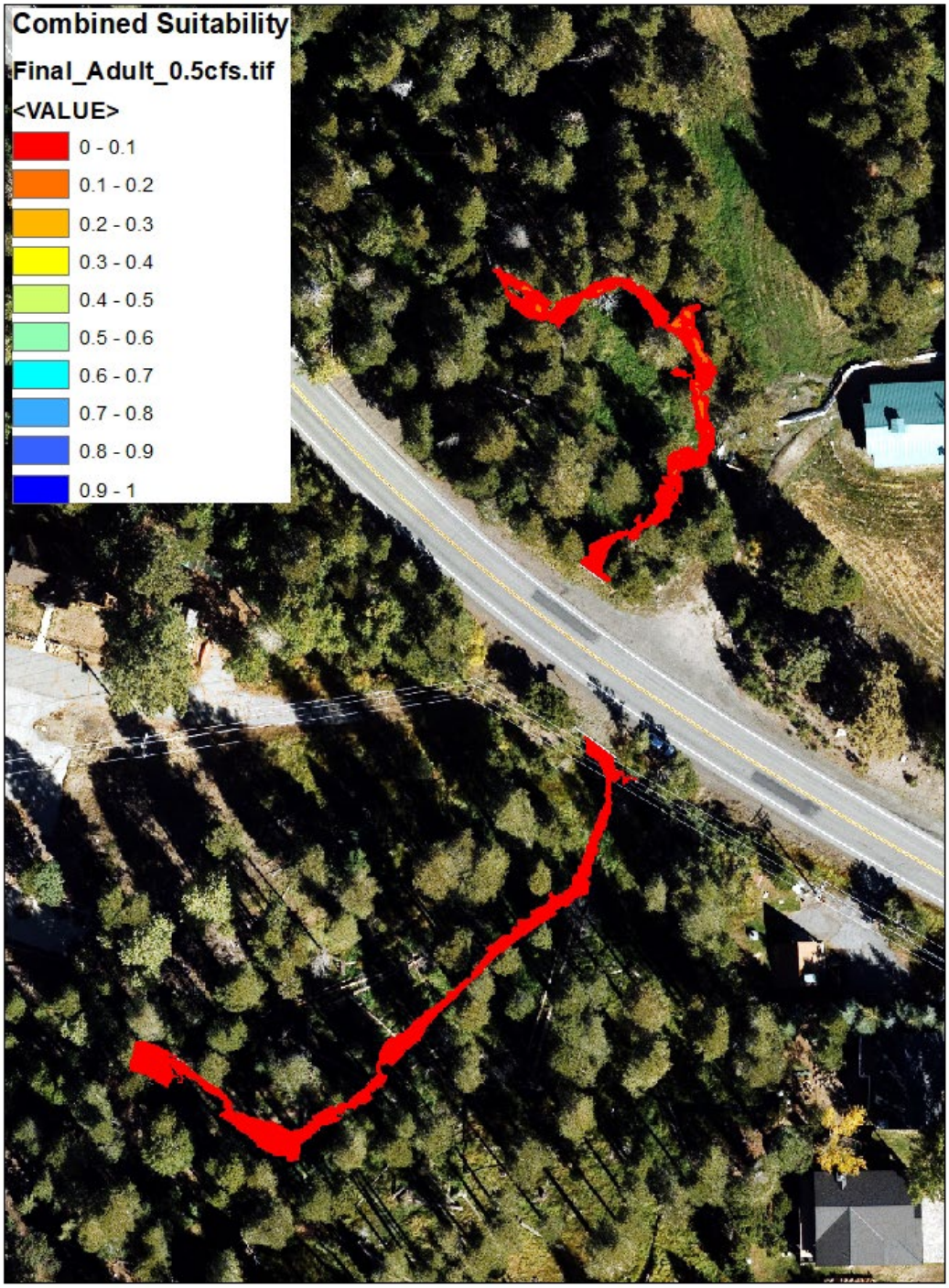
0.7 - 0.8
0.8 - 0.9
0.9 - 1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0.7 - 0.8
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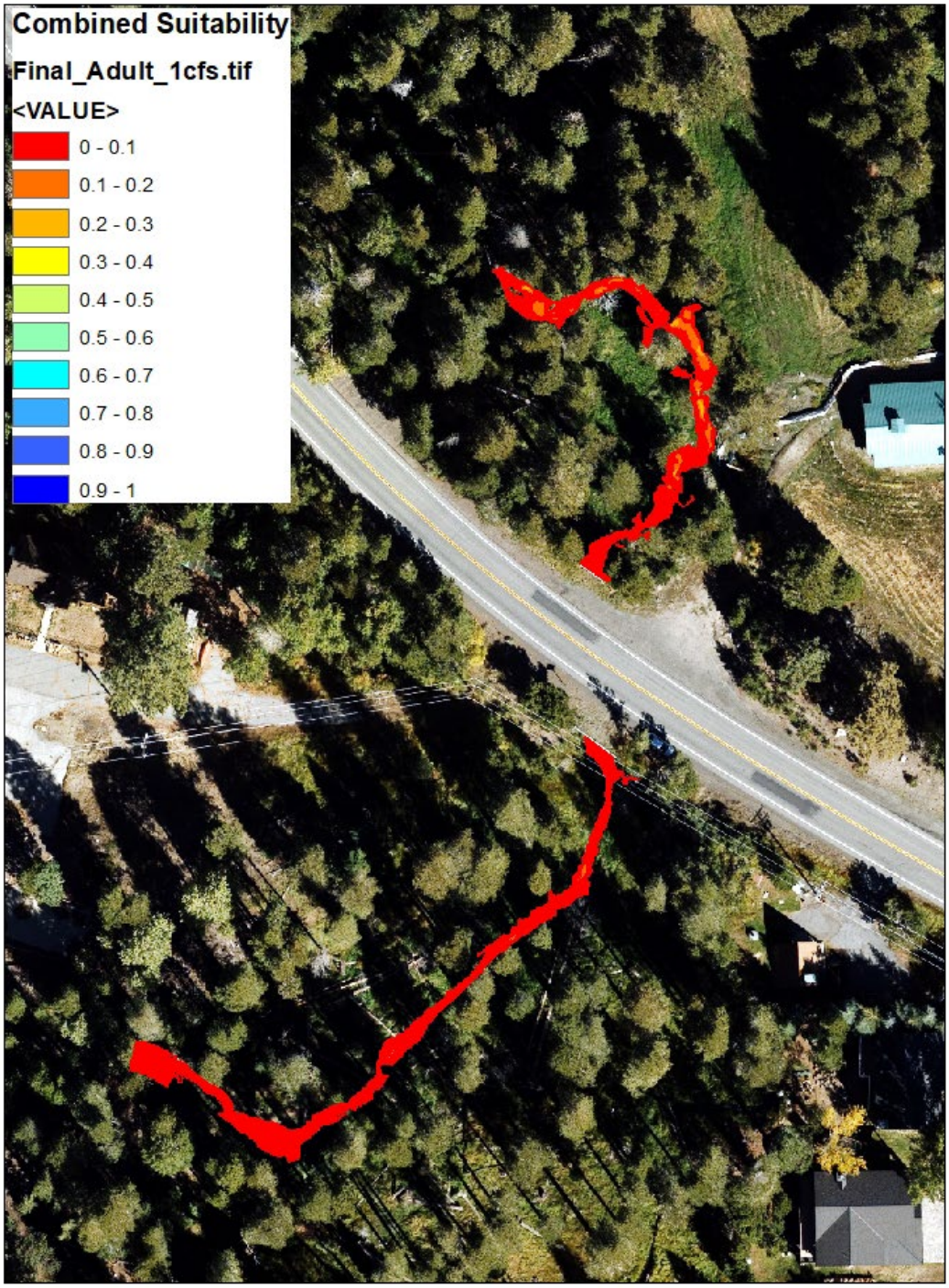
0.9 - 1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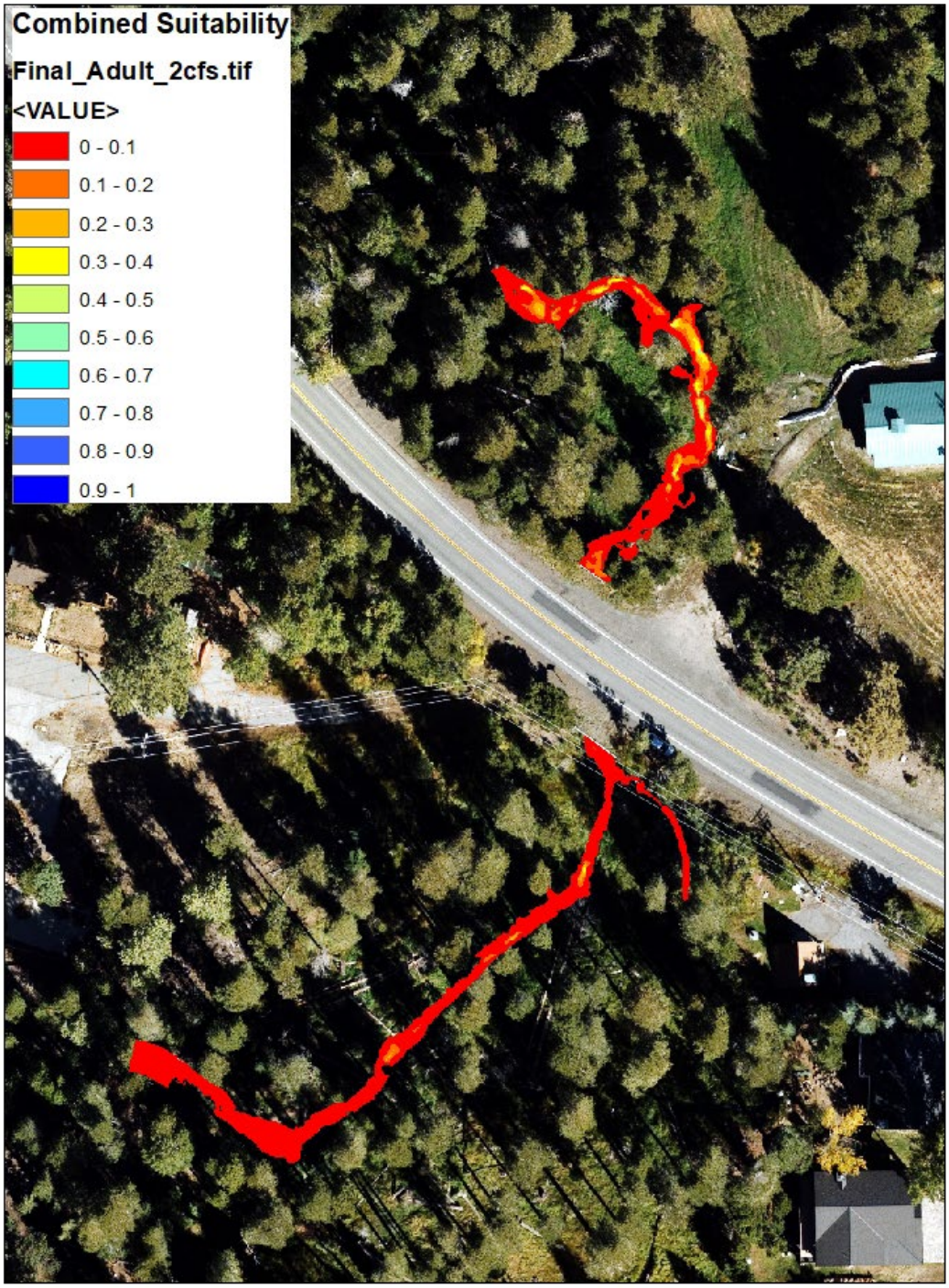
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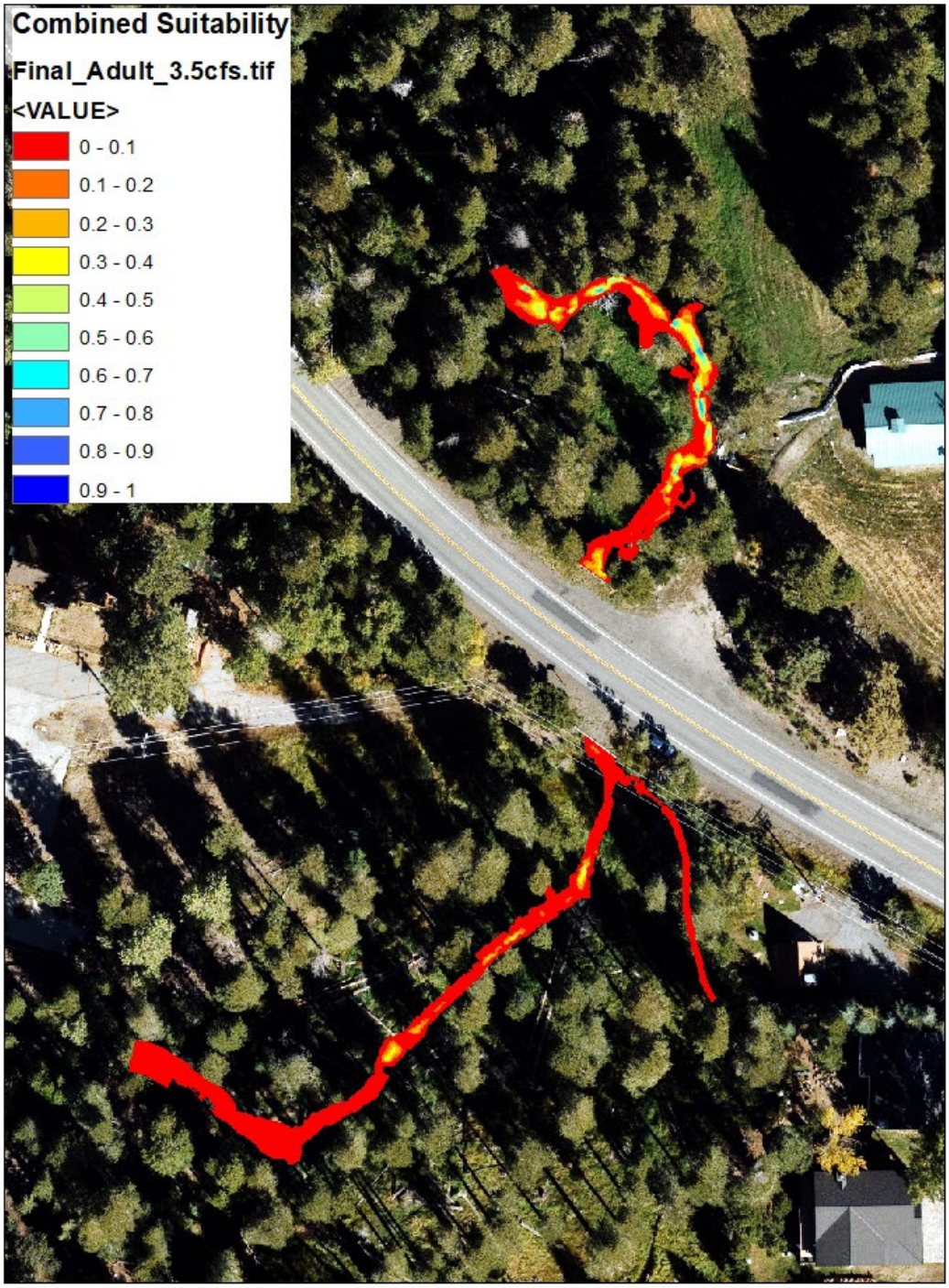
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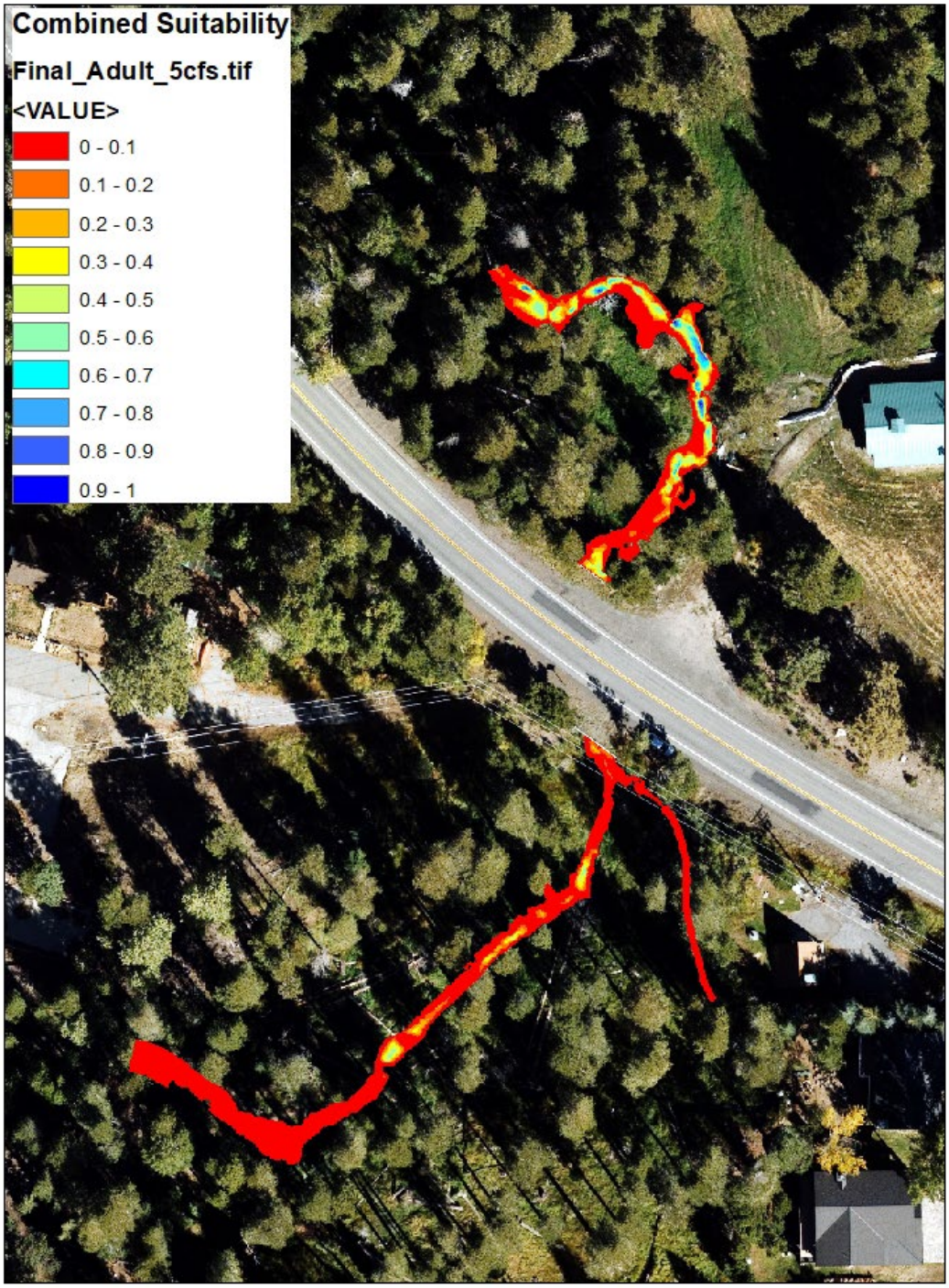
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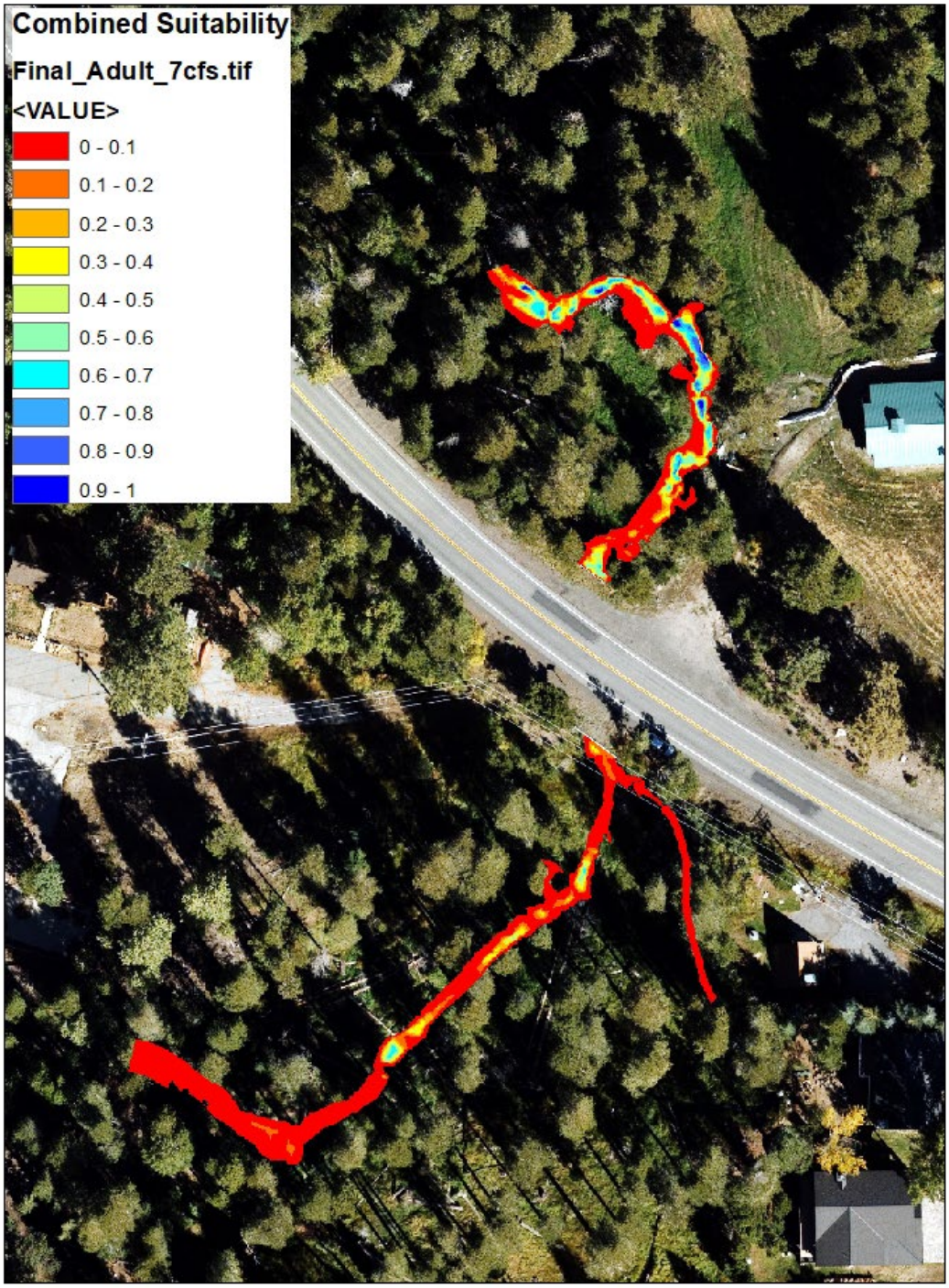
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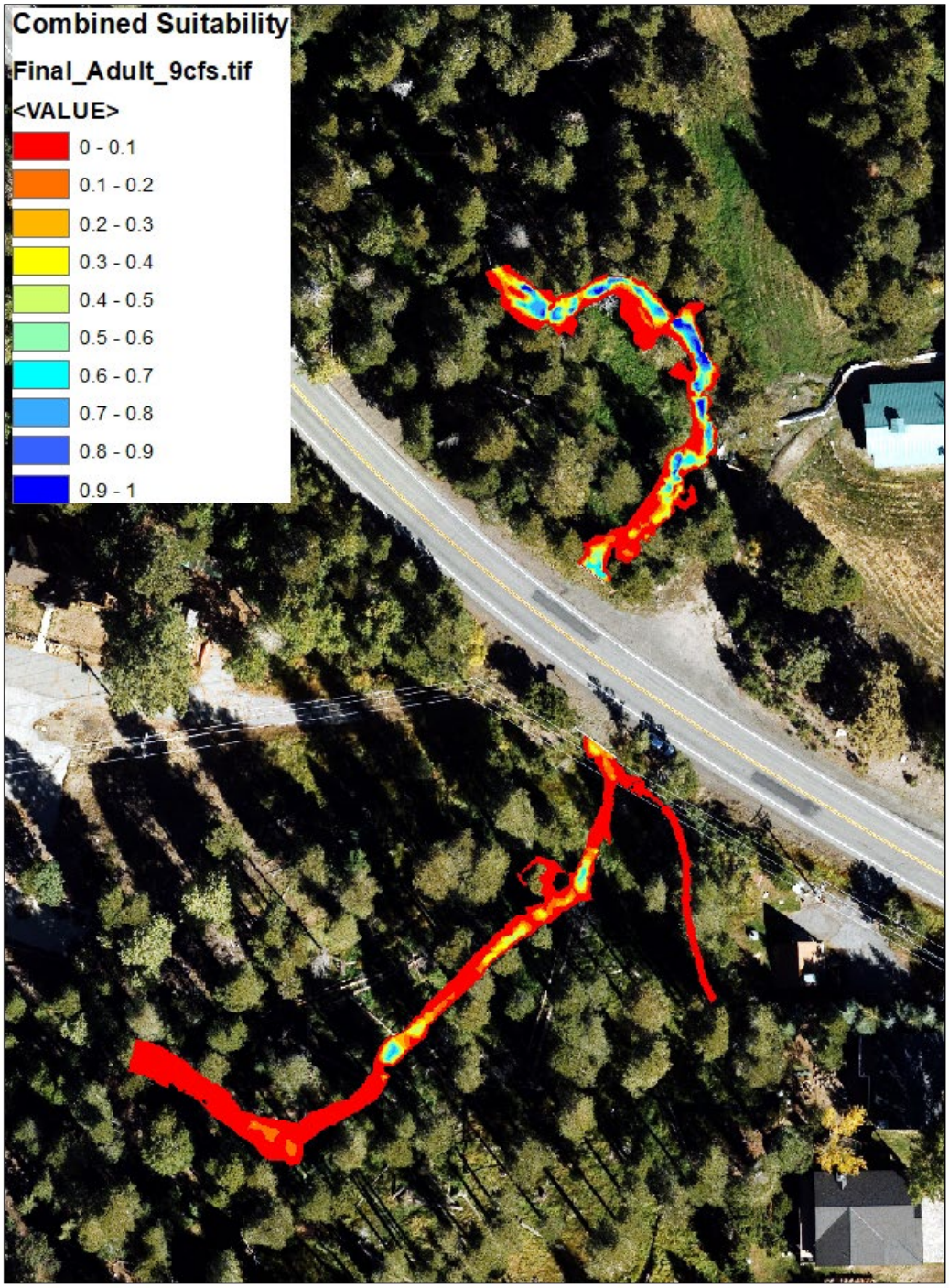
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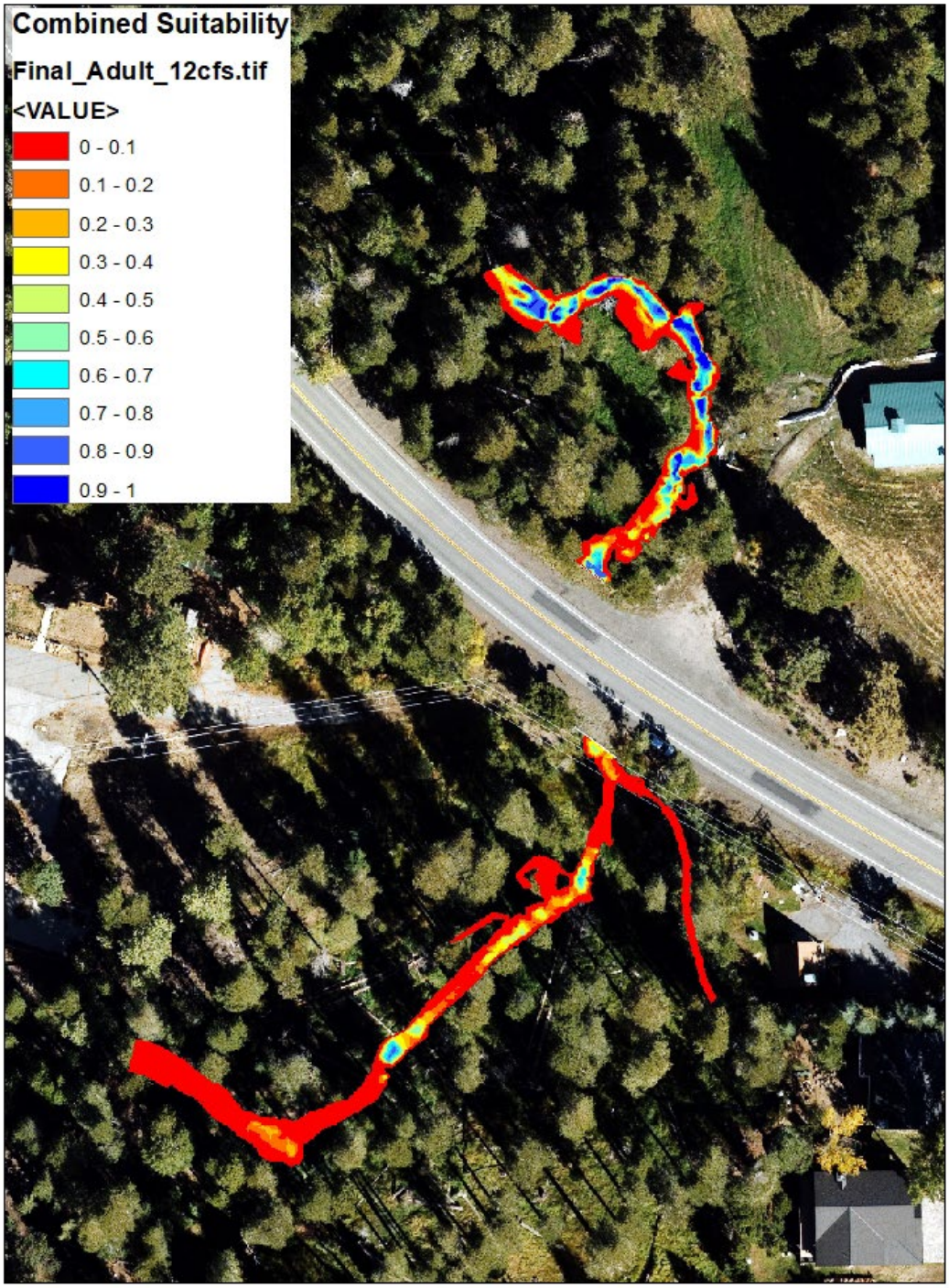
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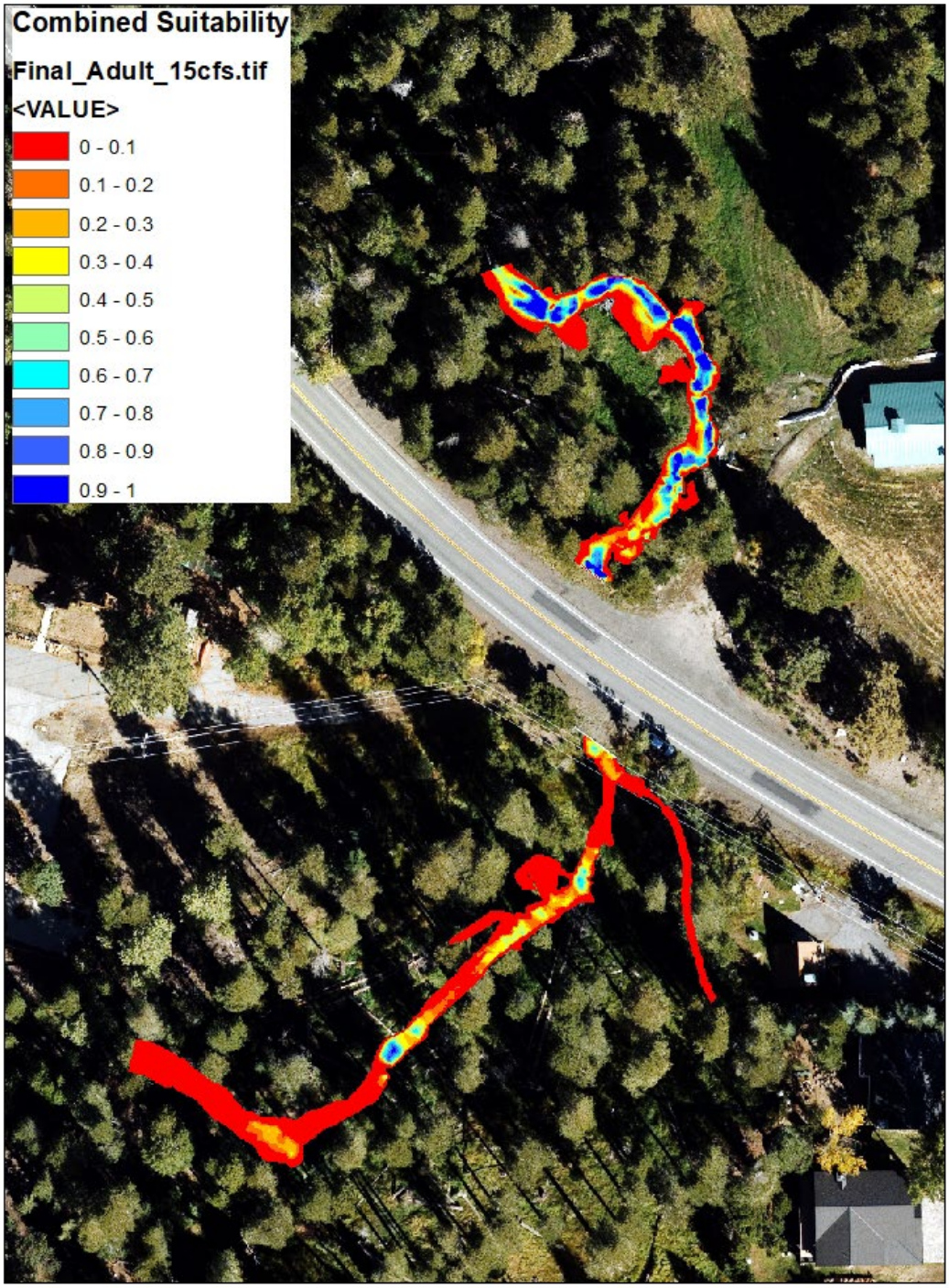
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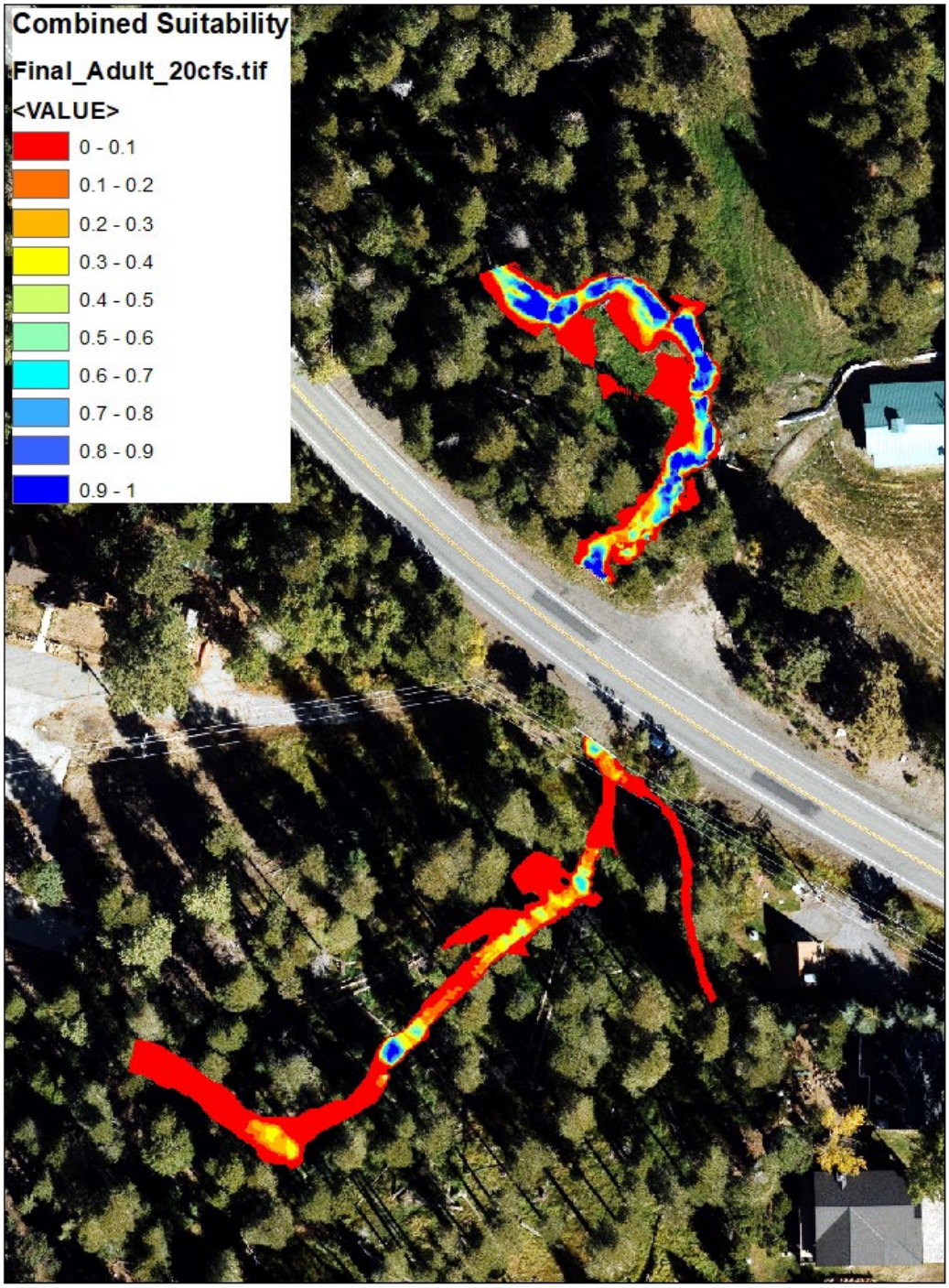
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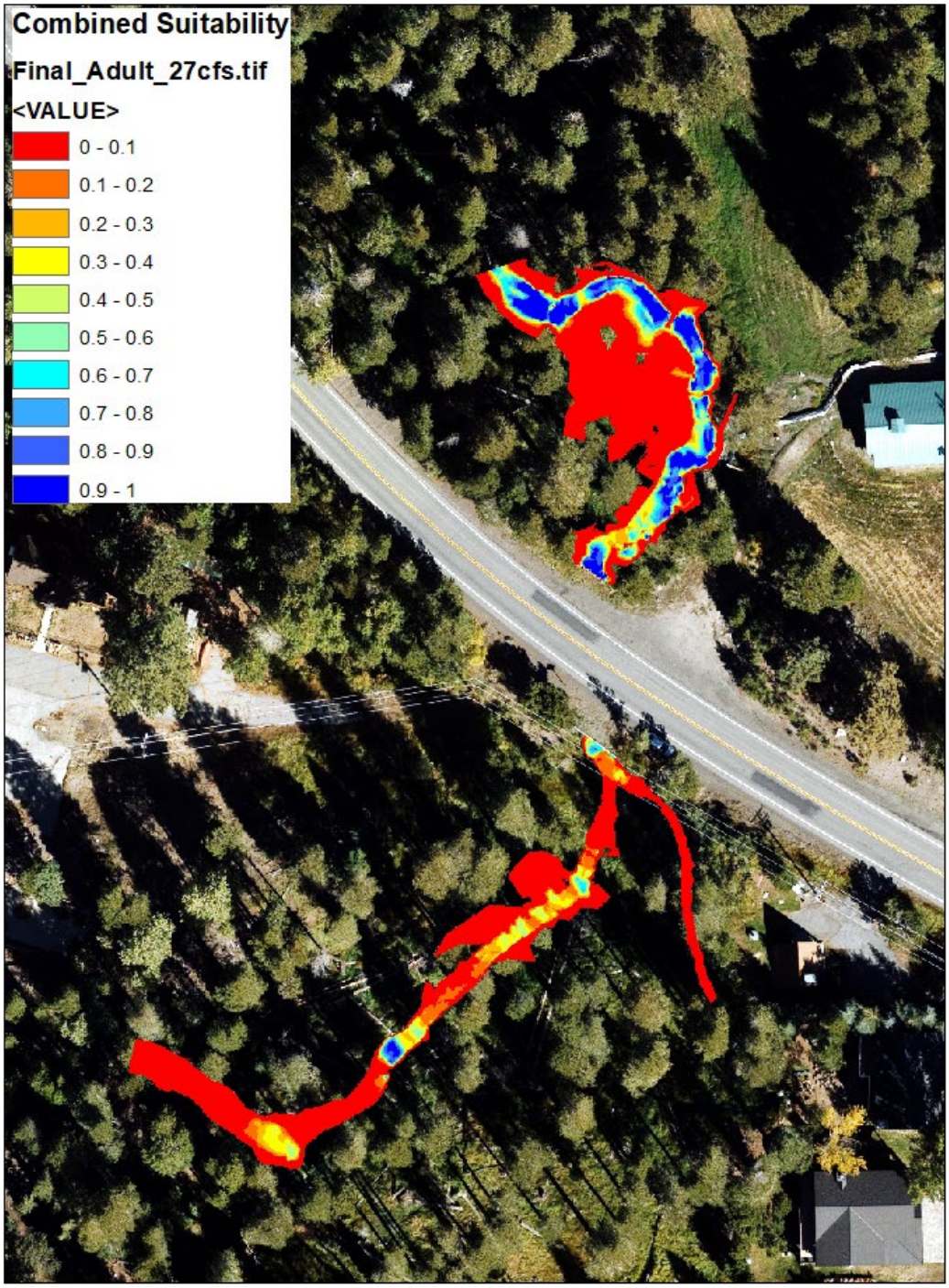
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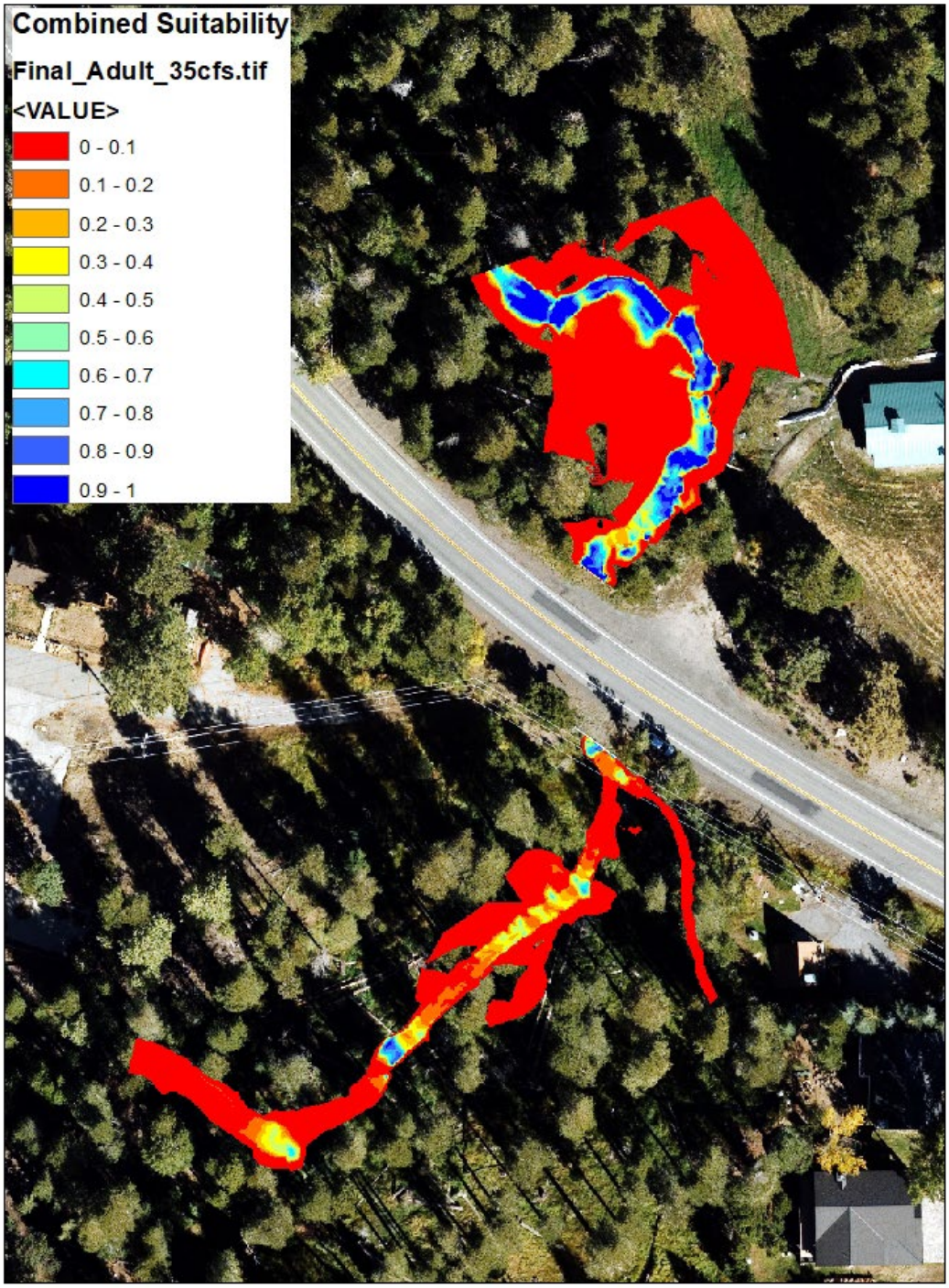
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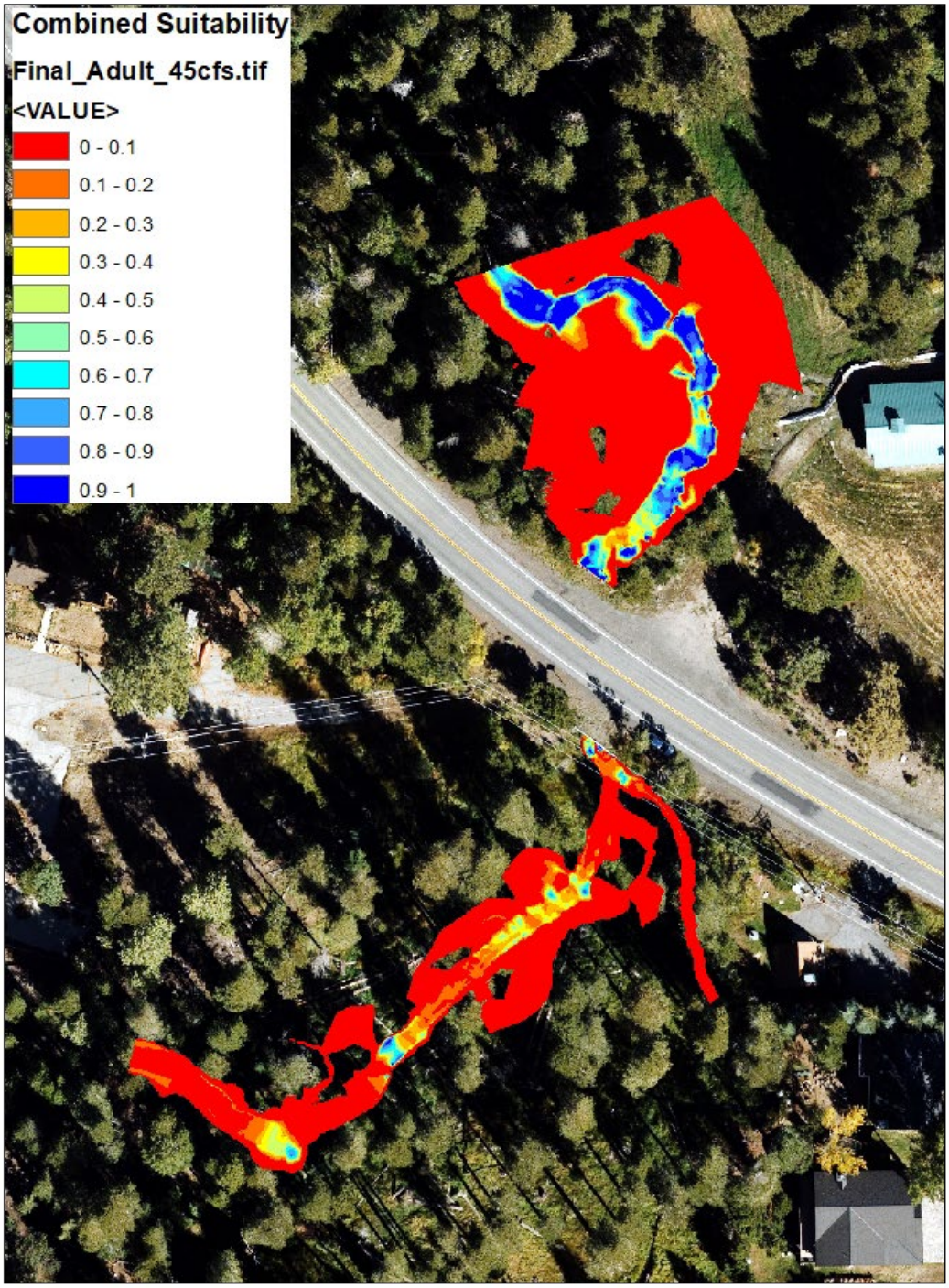
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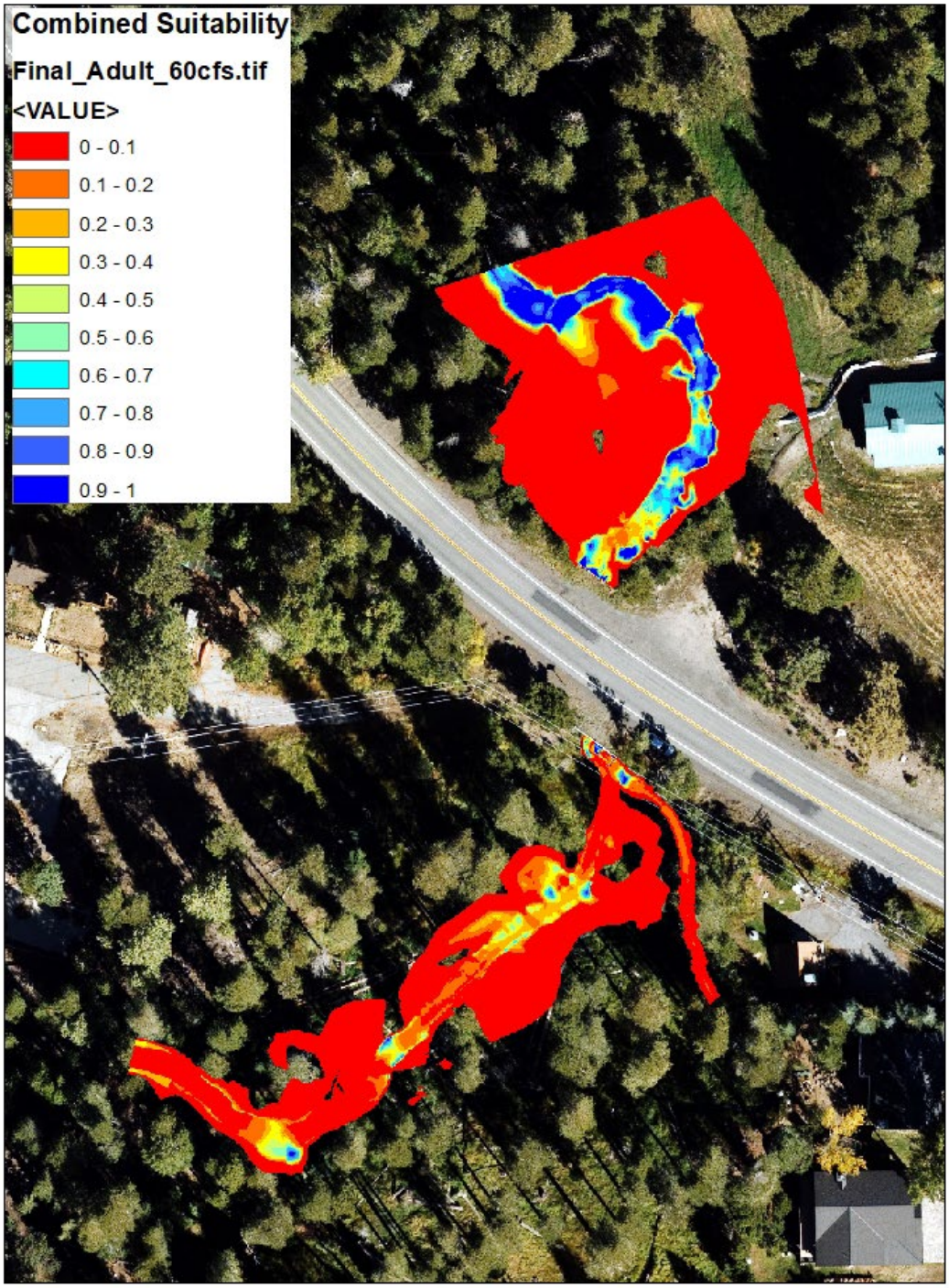
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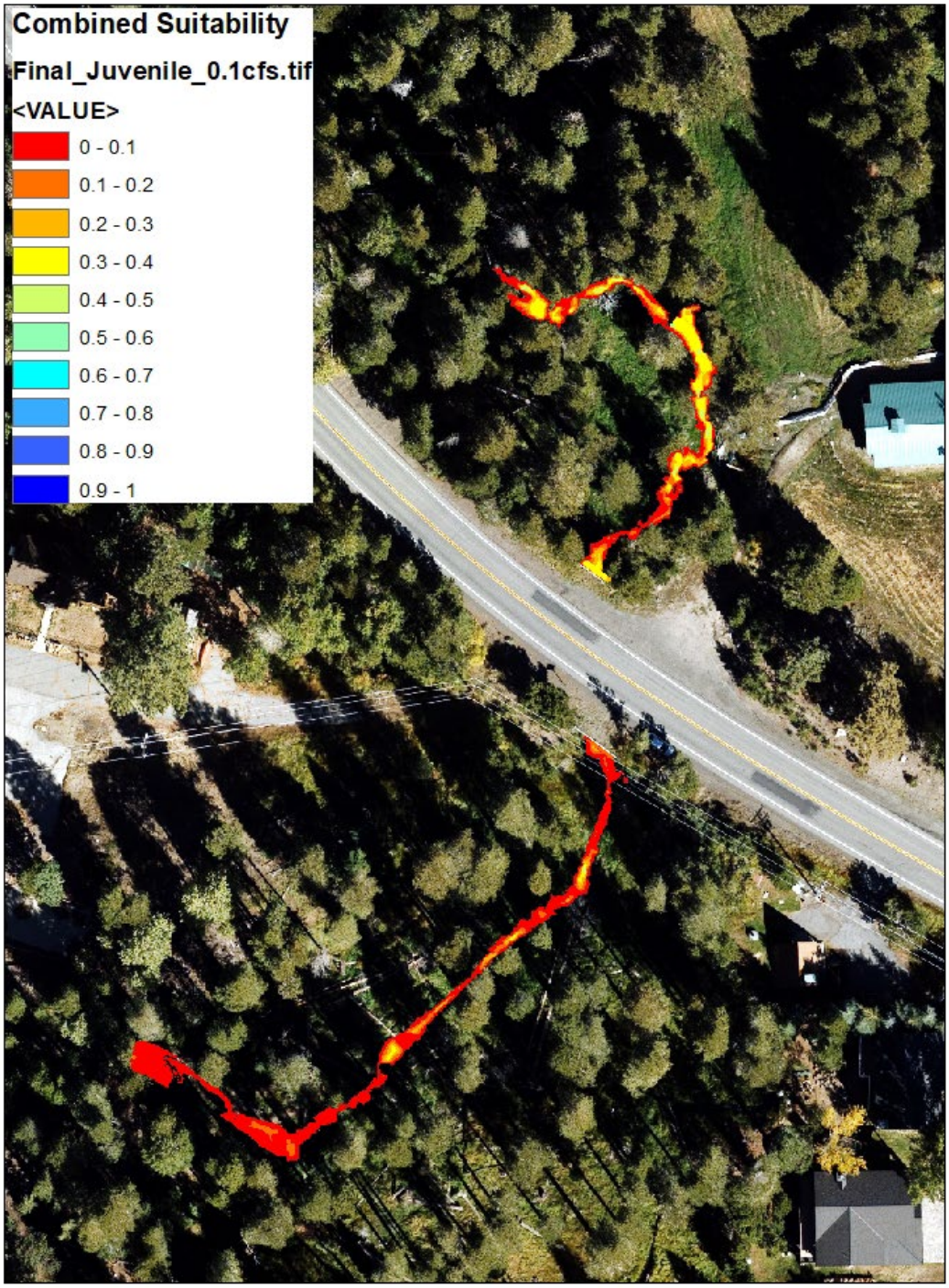
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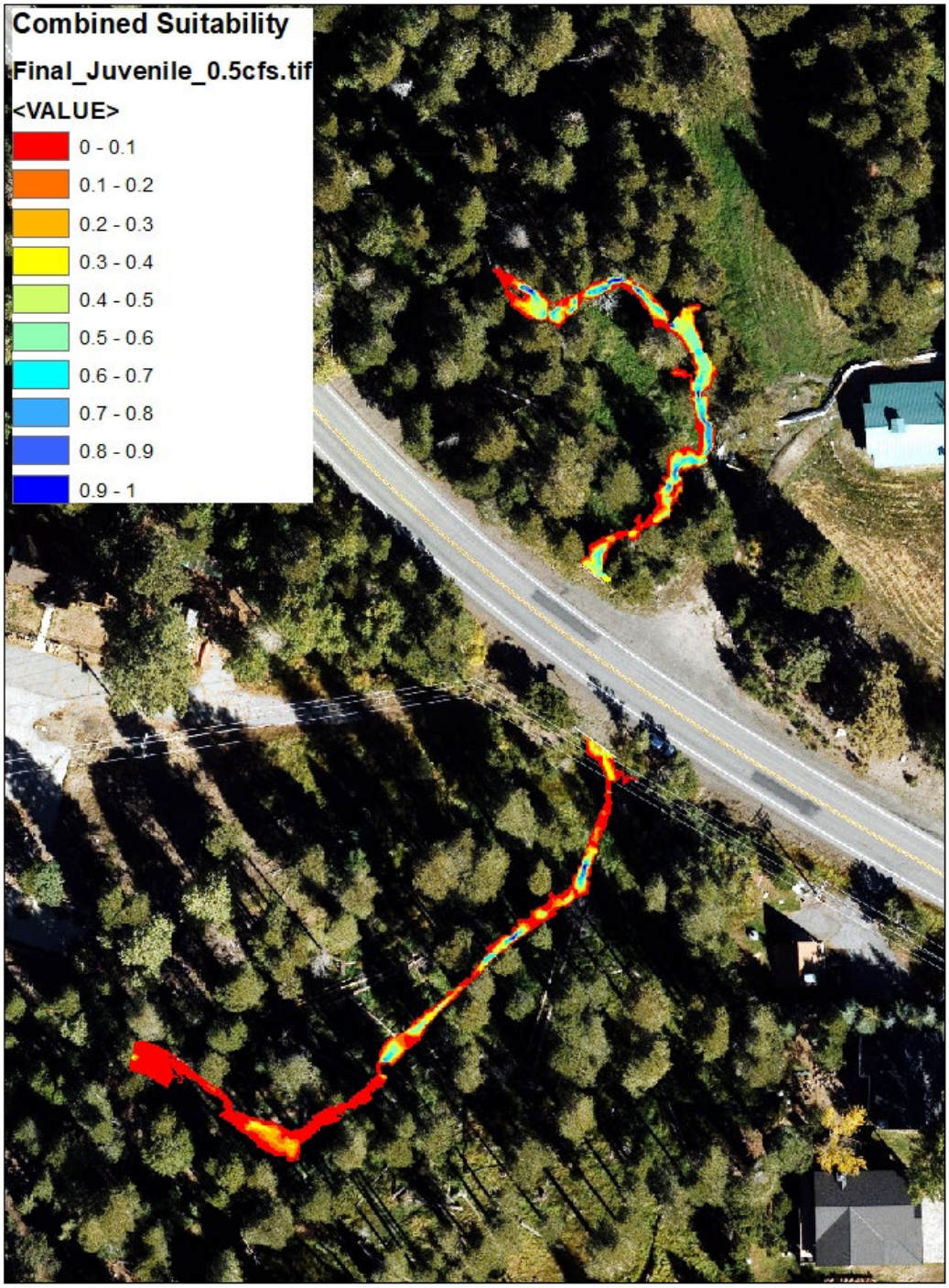
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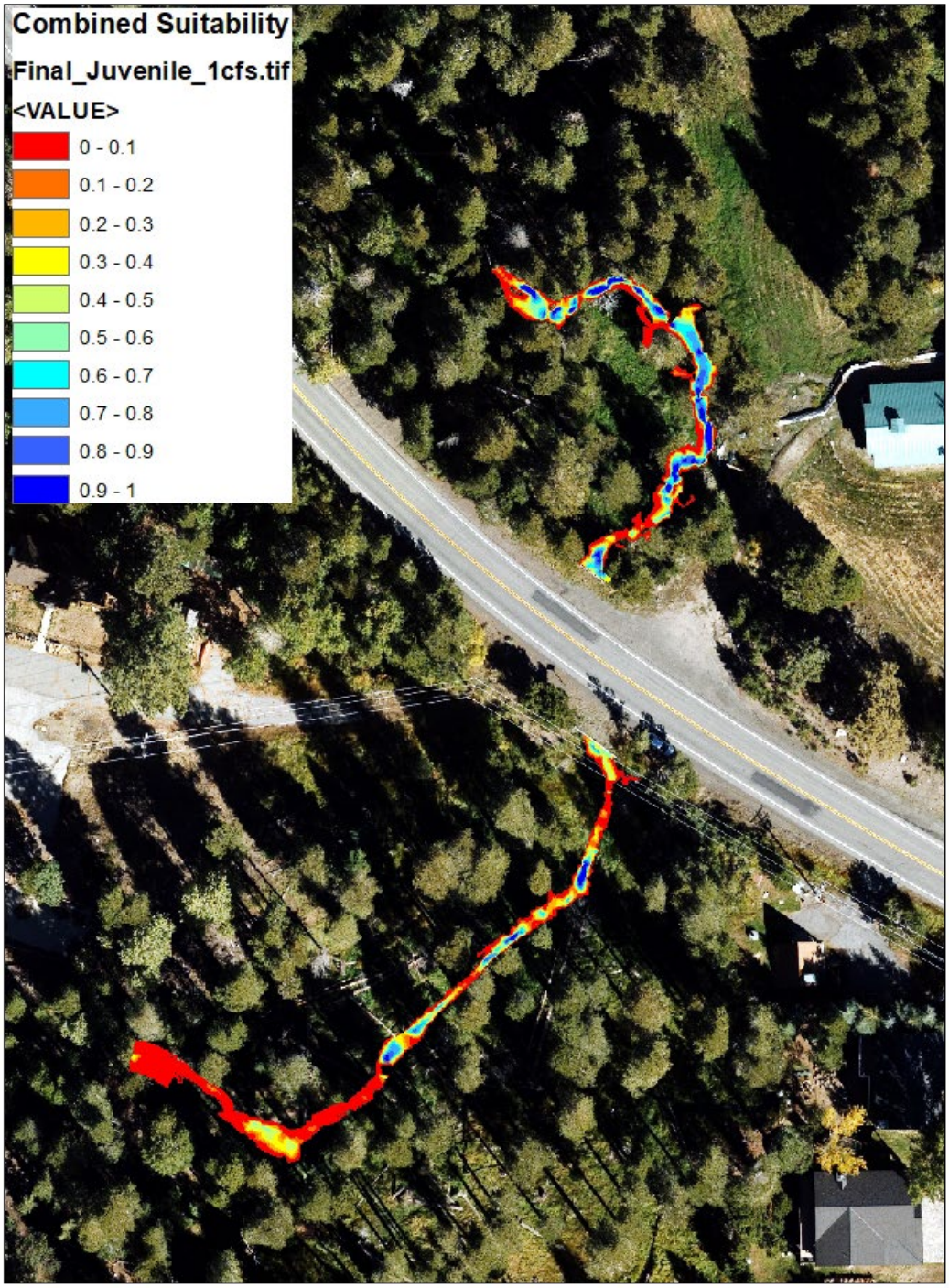
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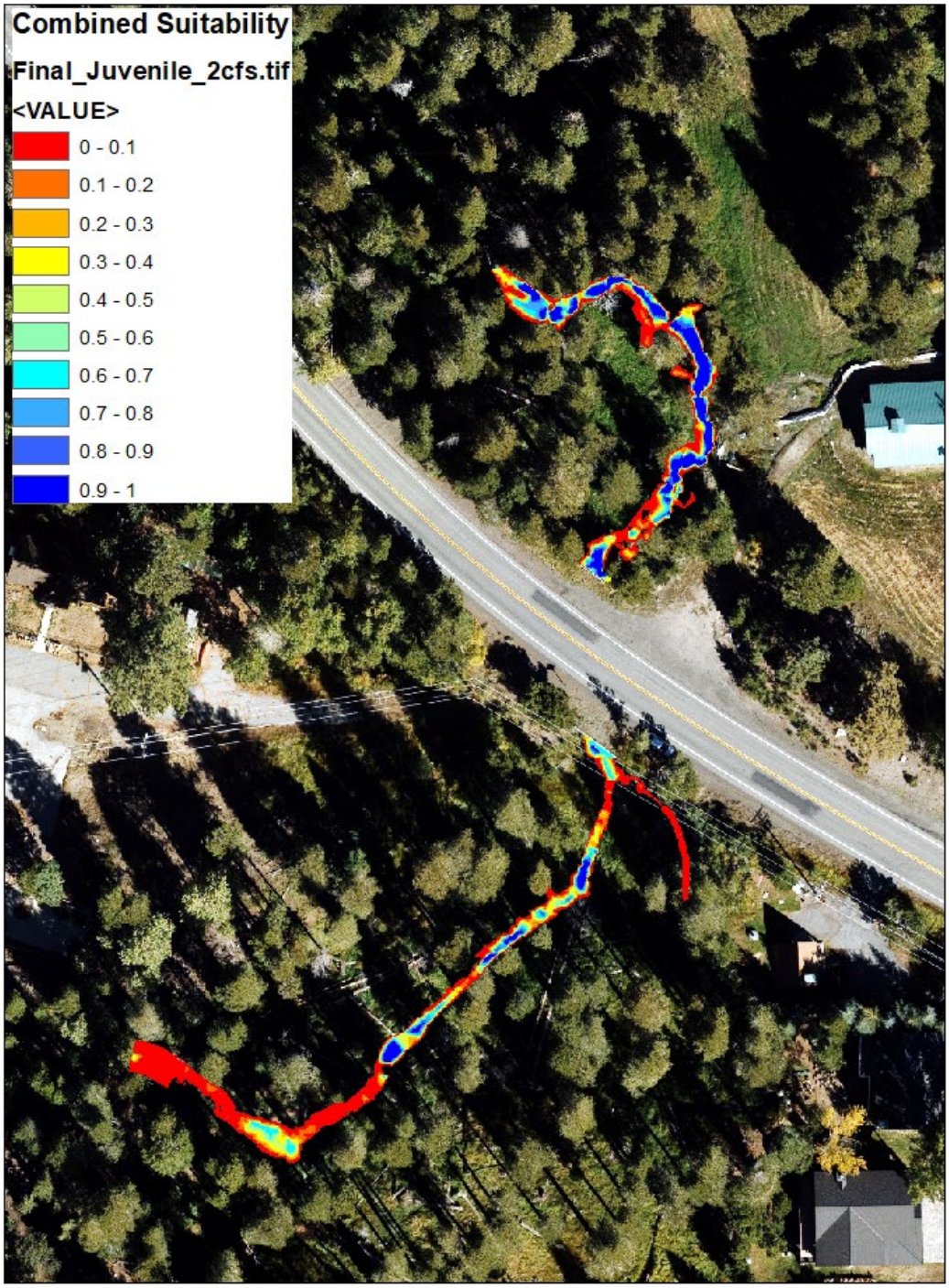
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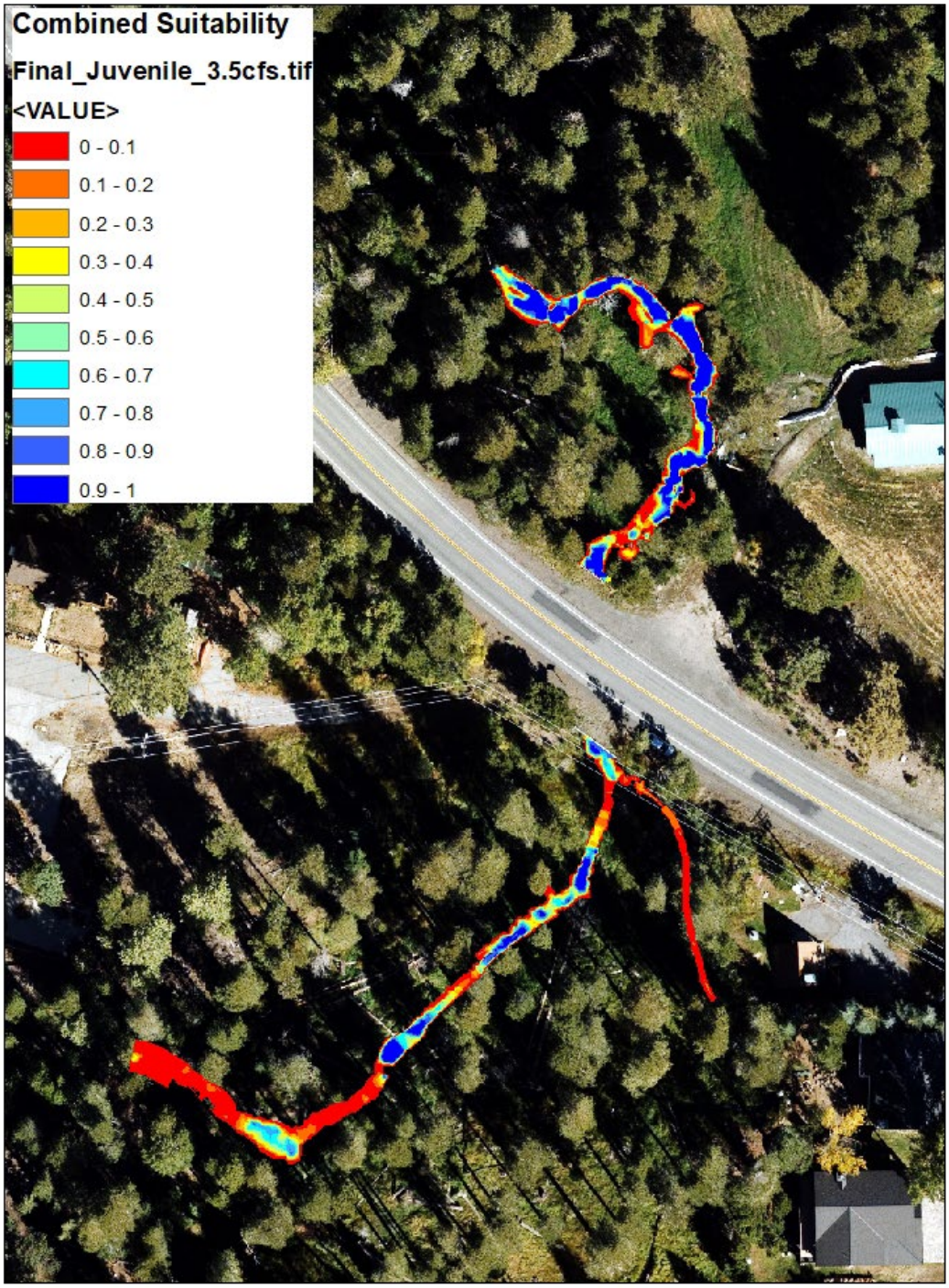
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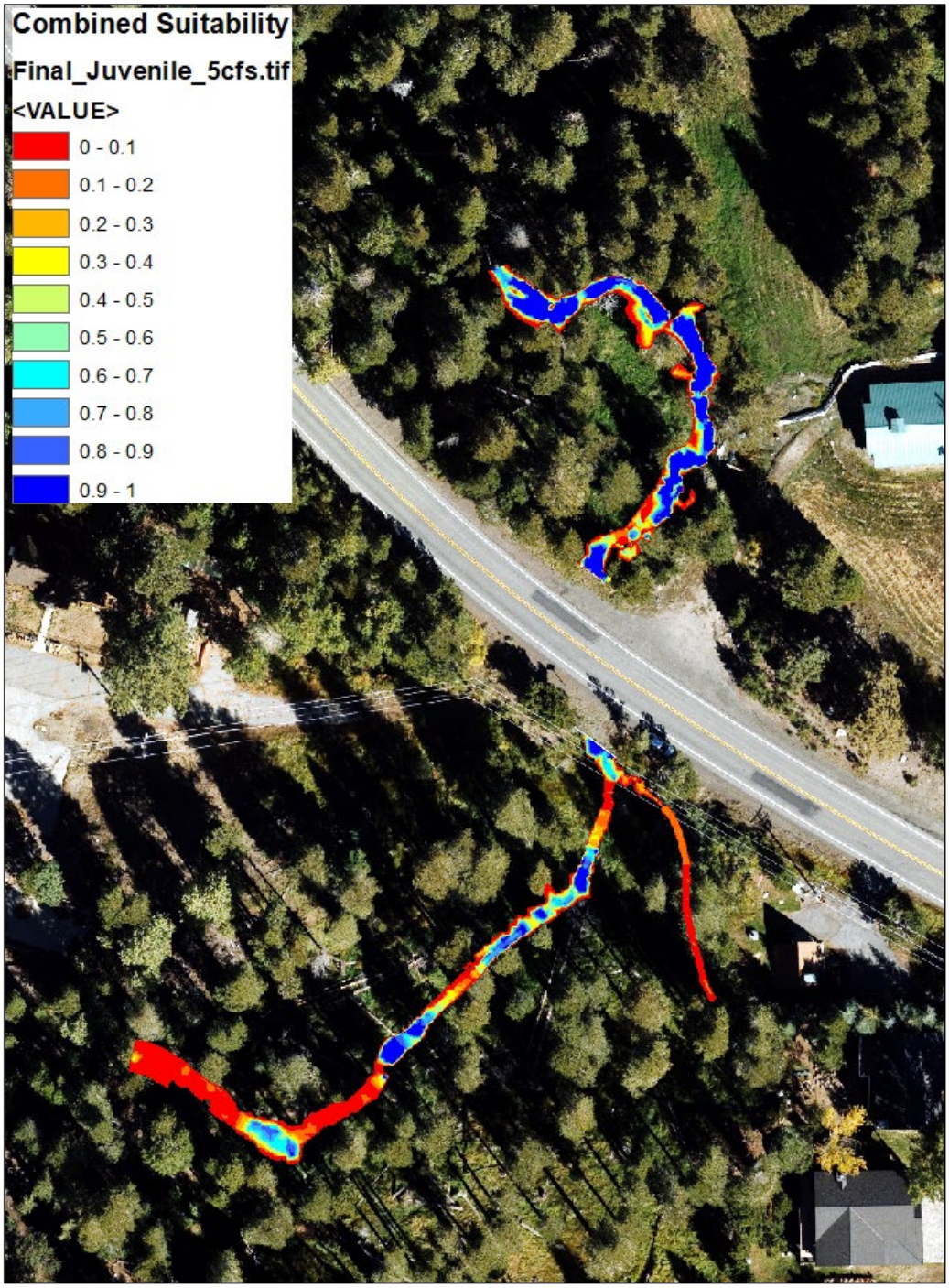
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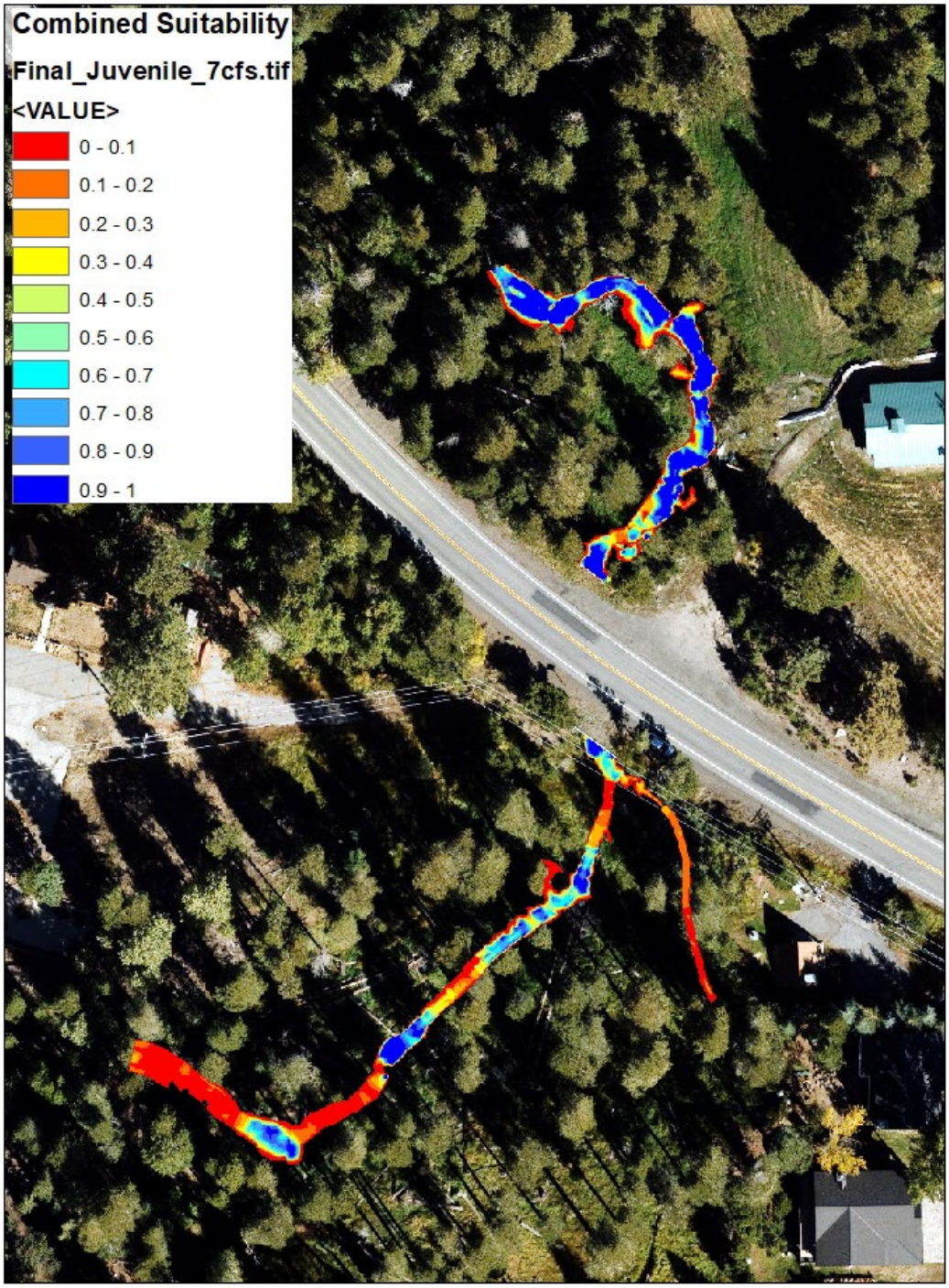
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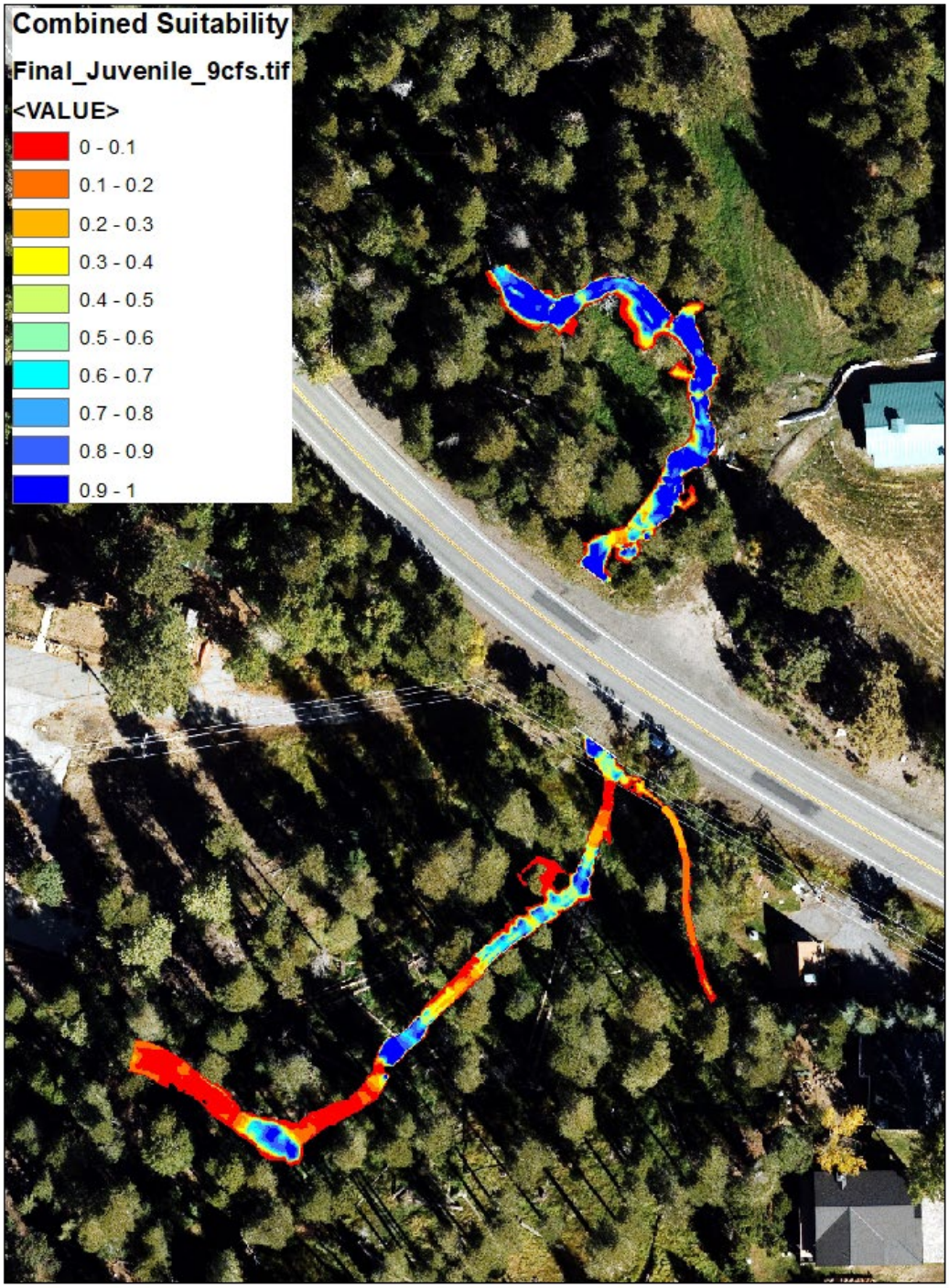
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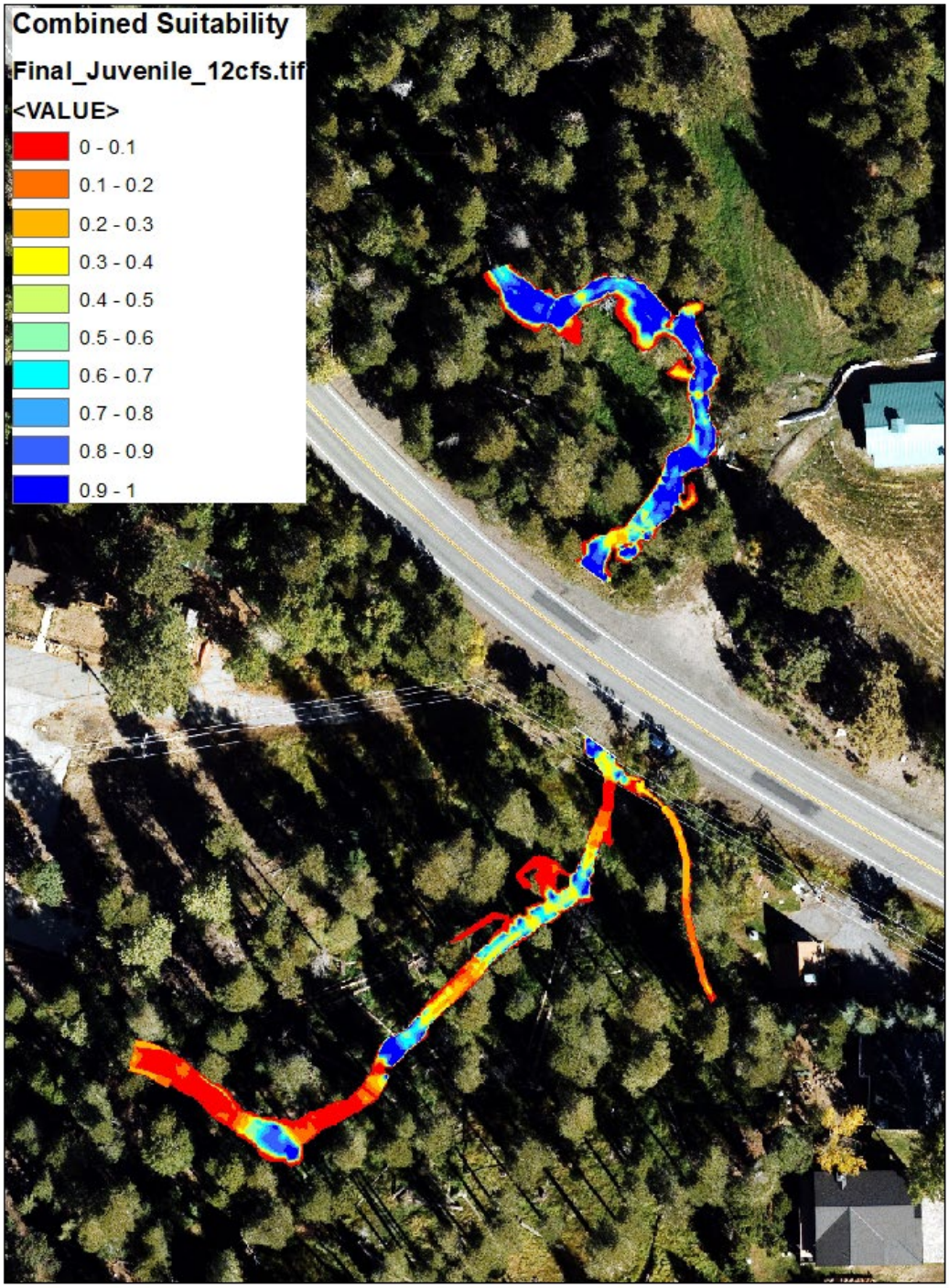
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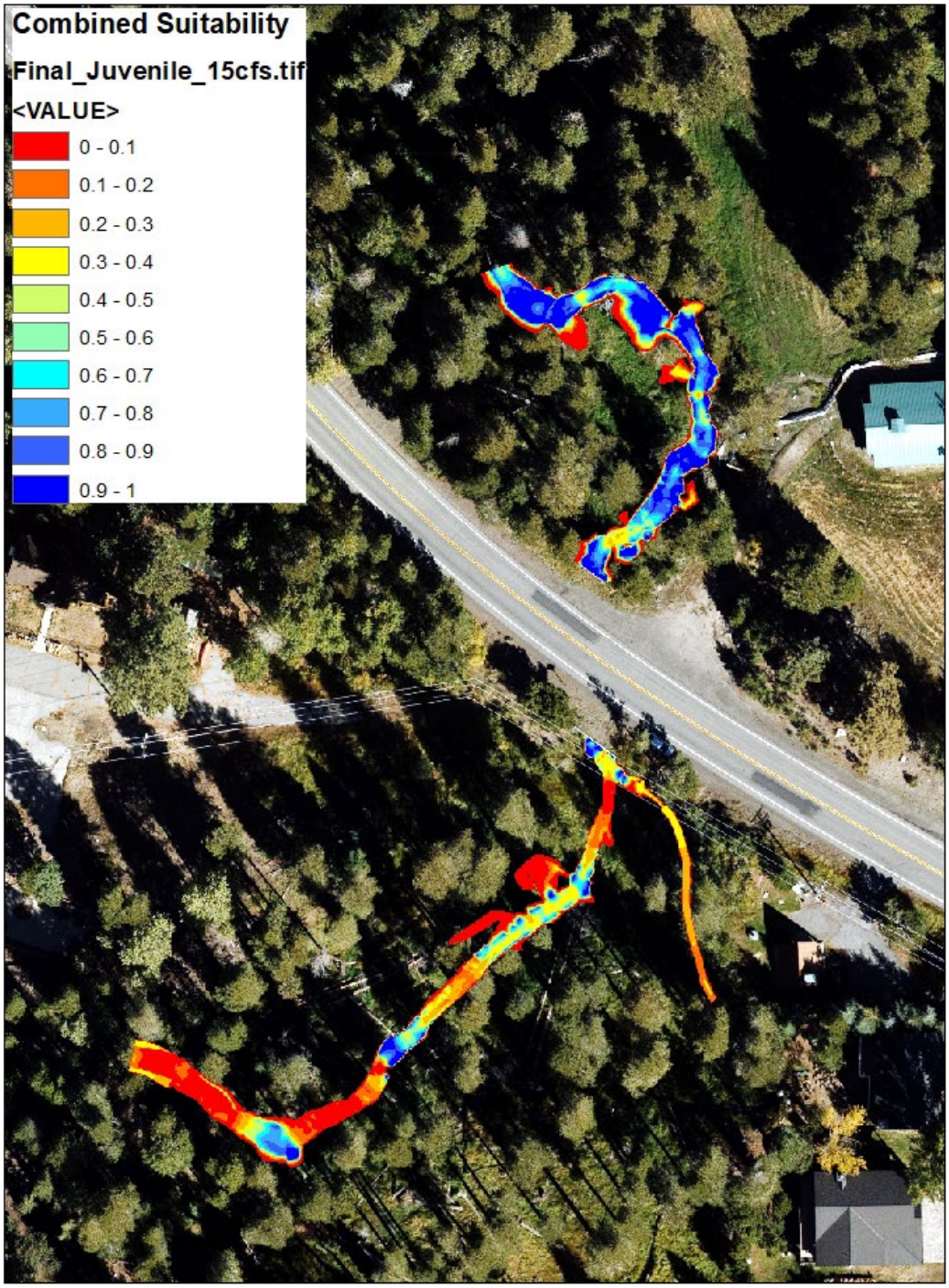
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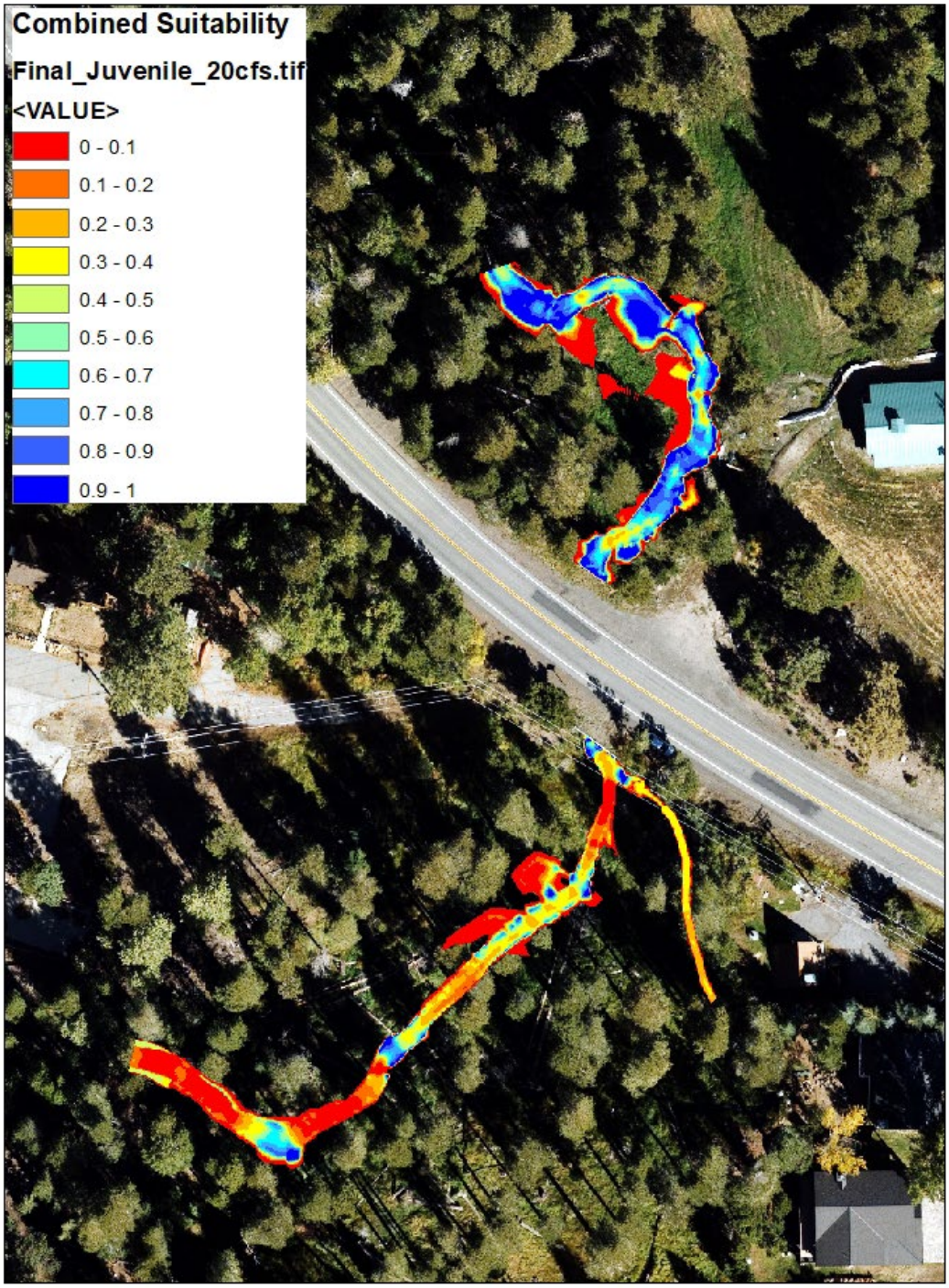
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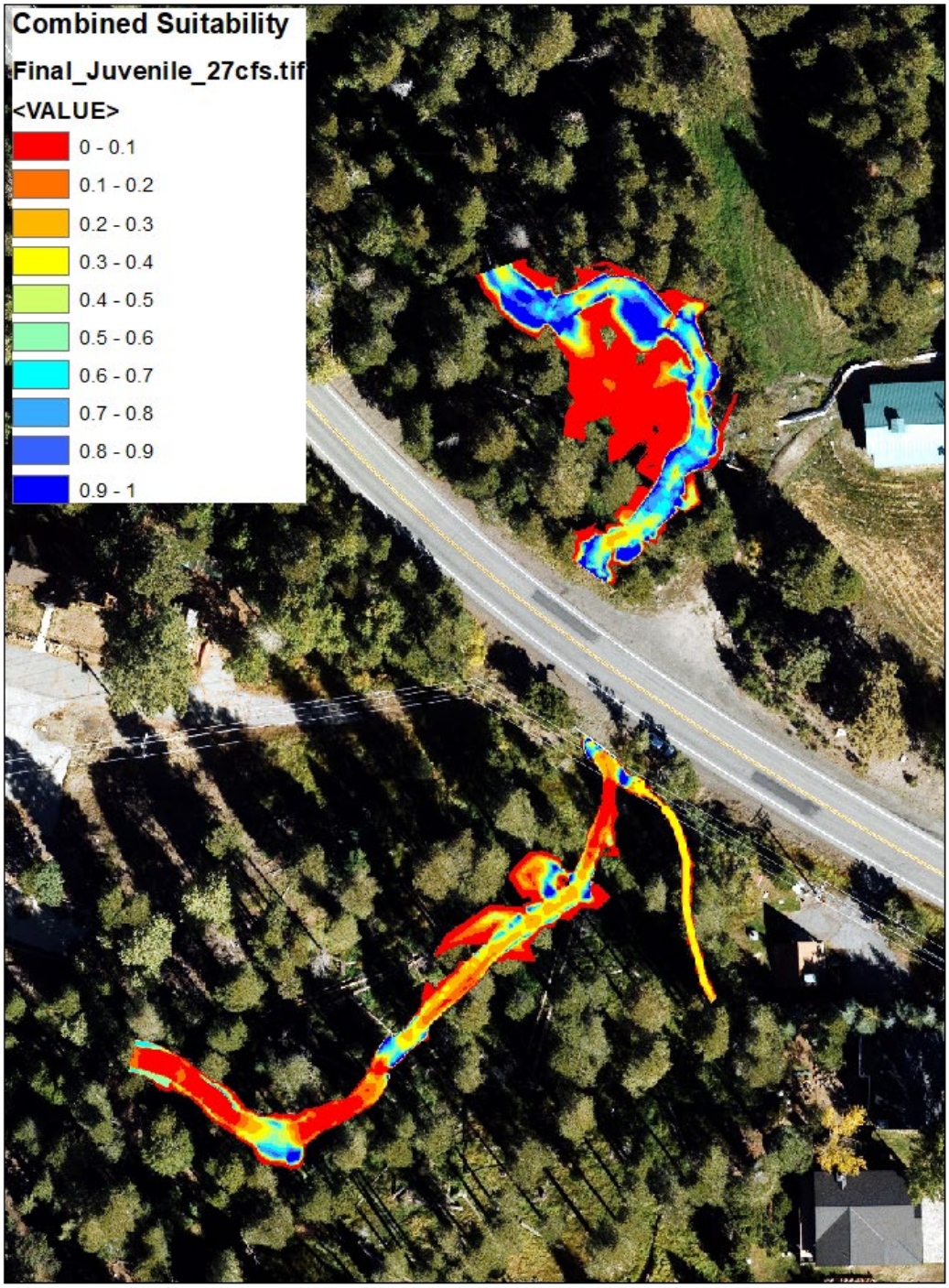
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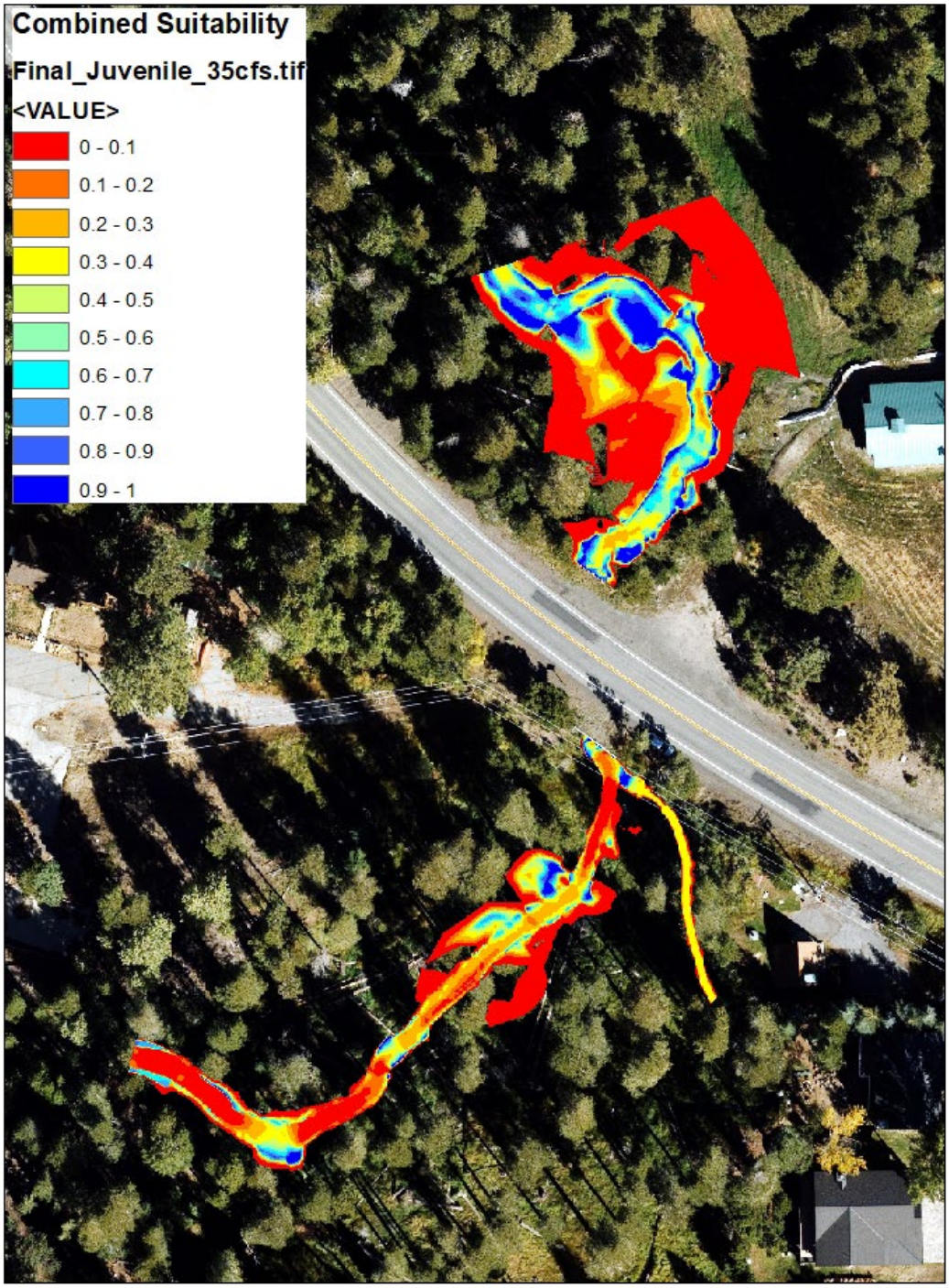
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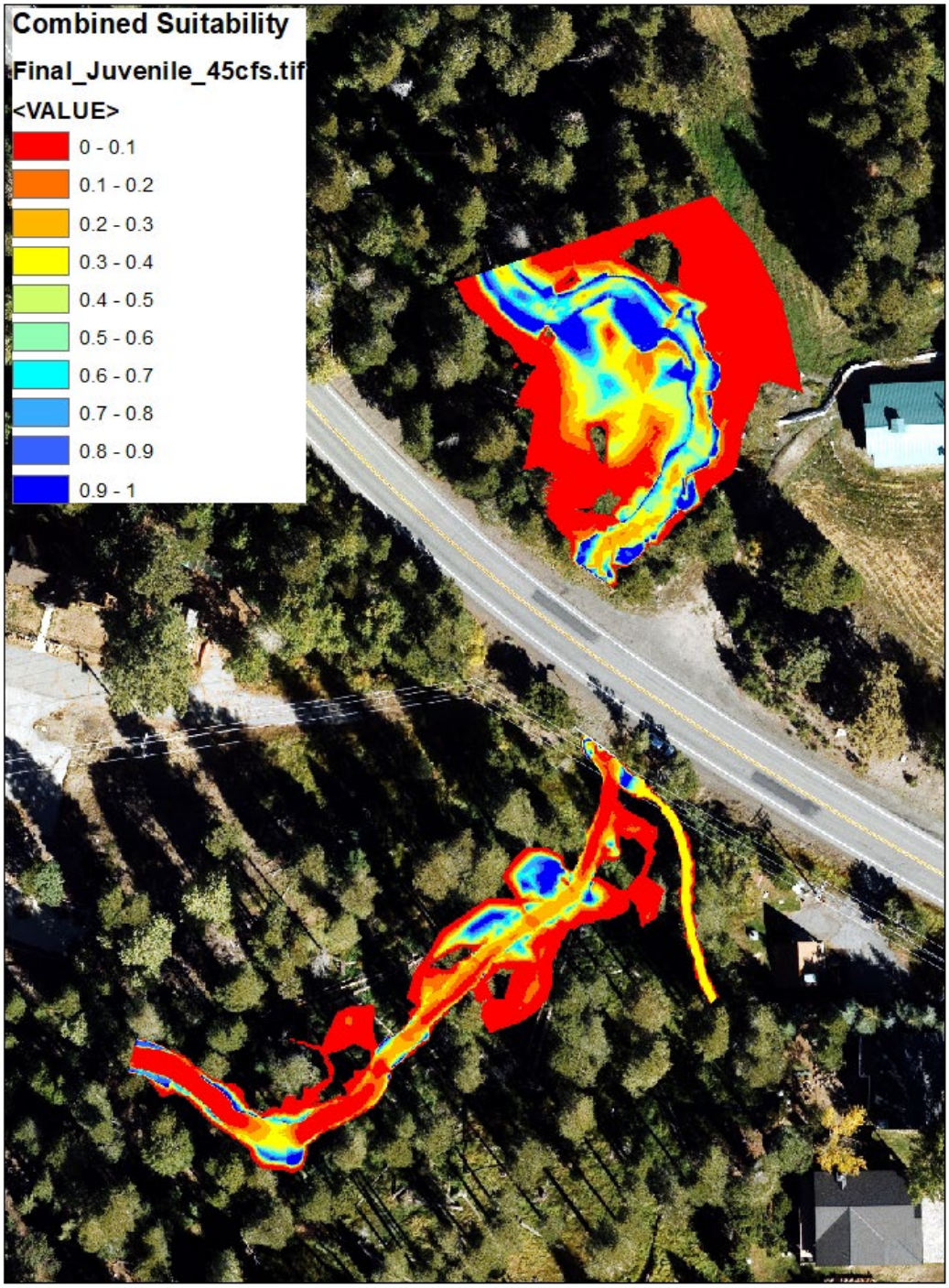
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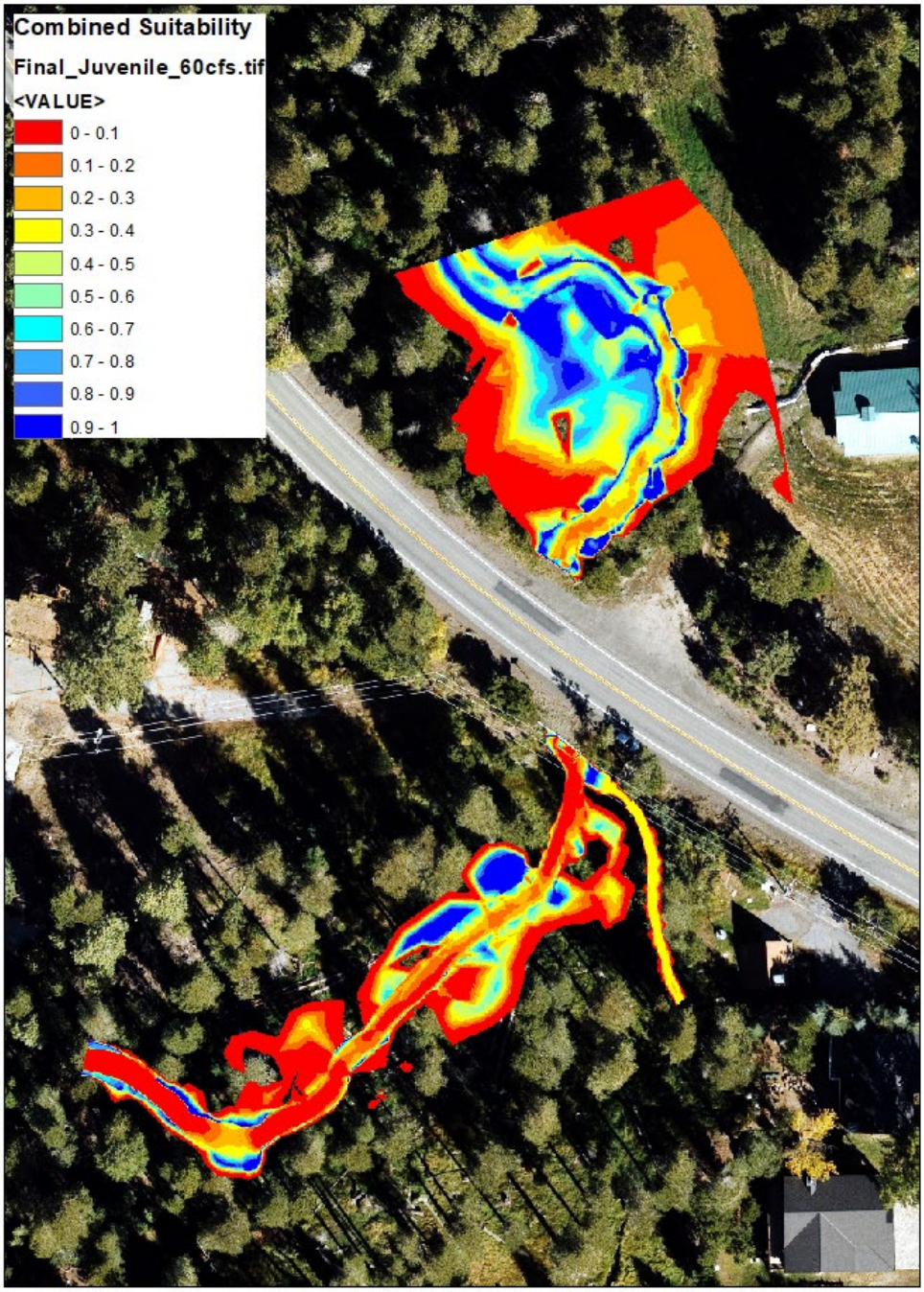
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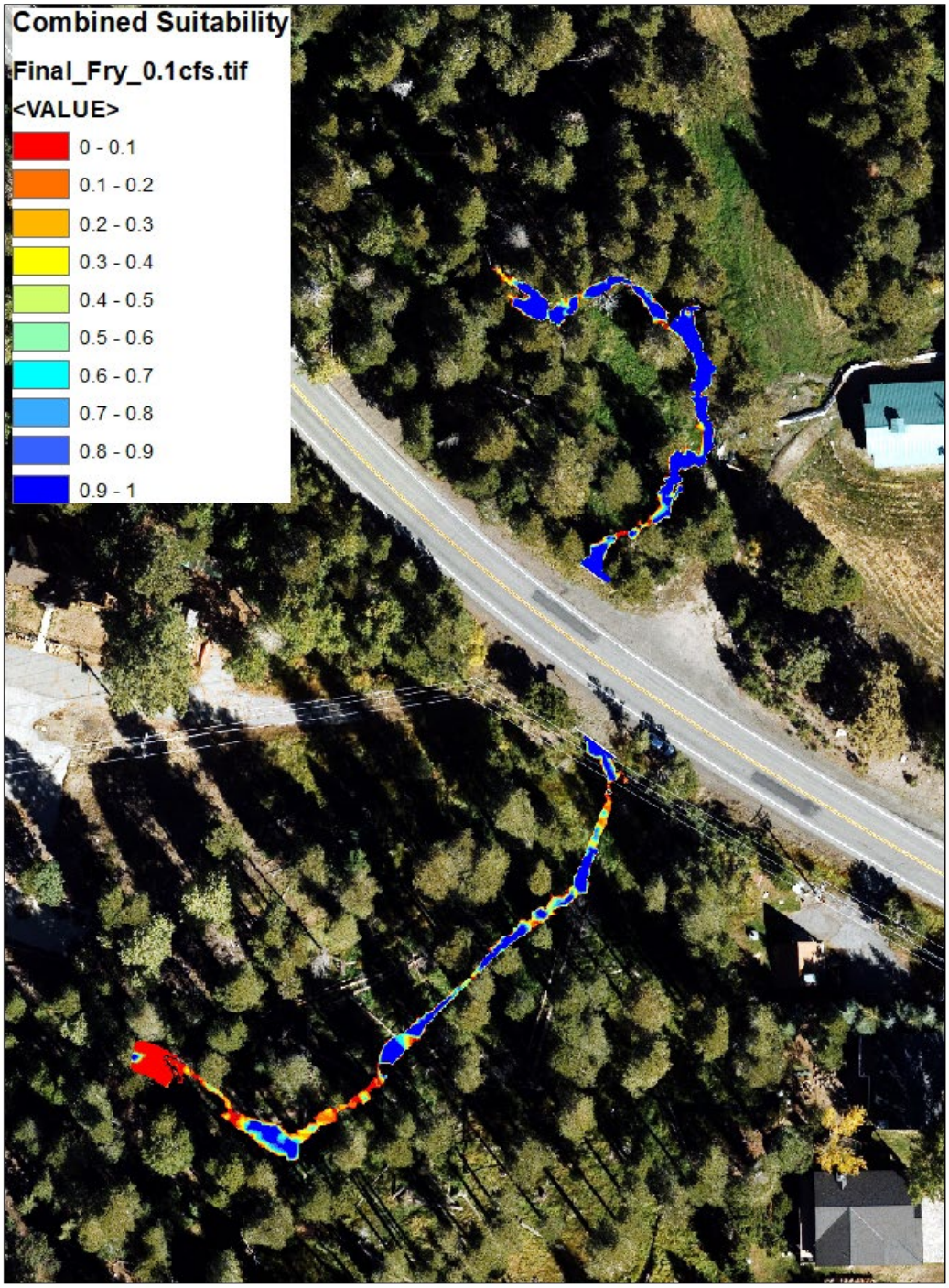
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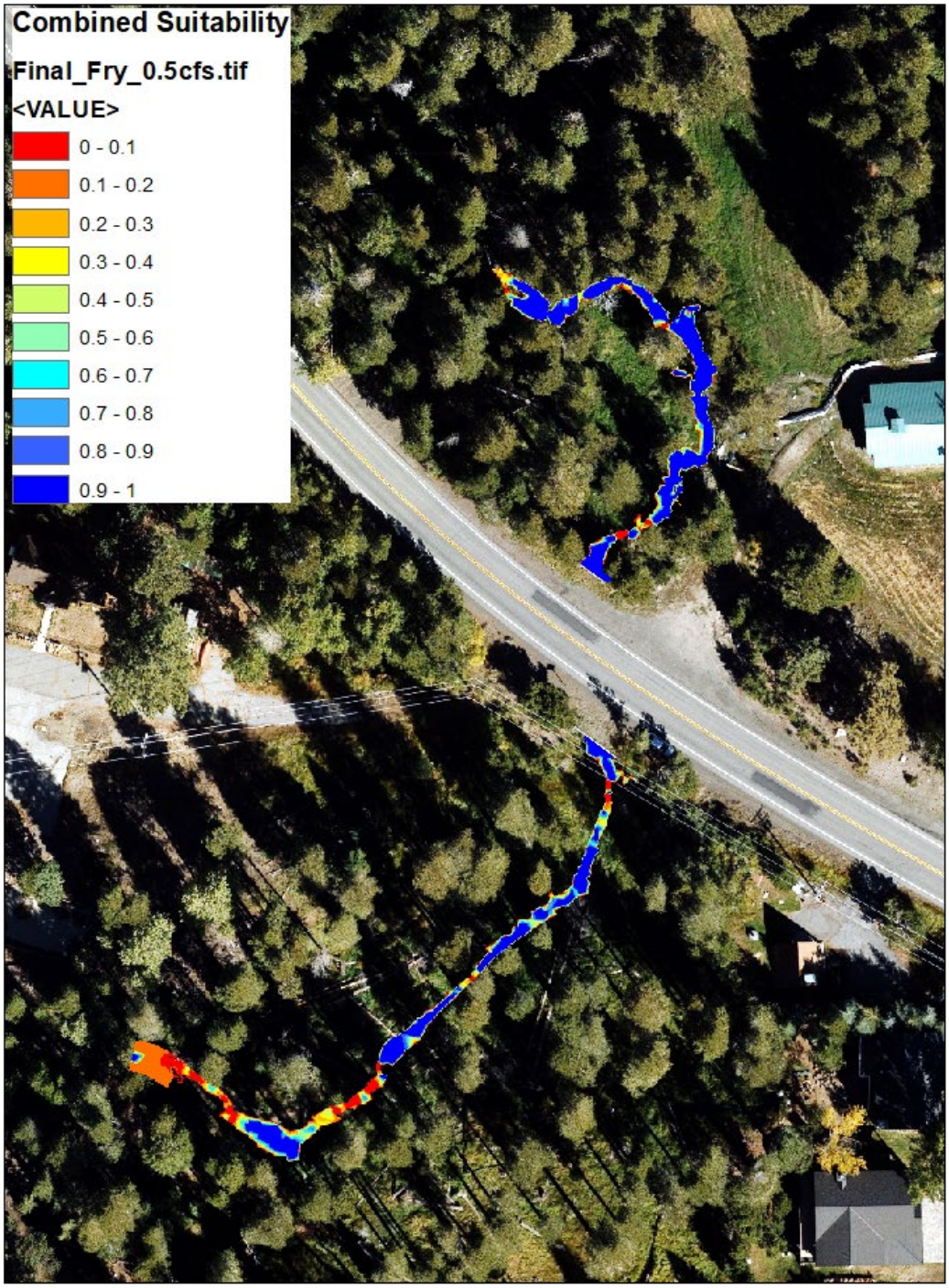
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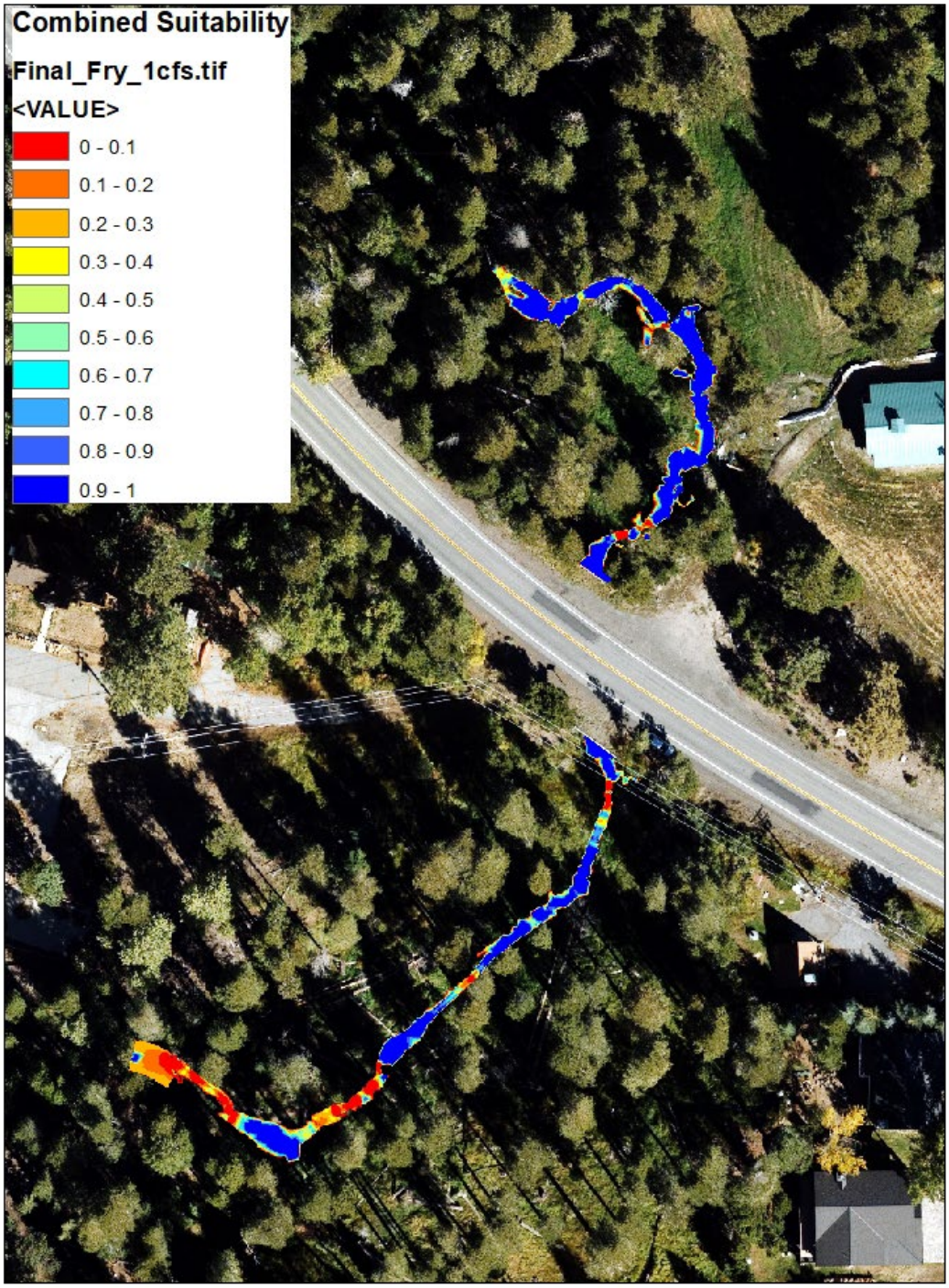
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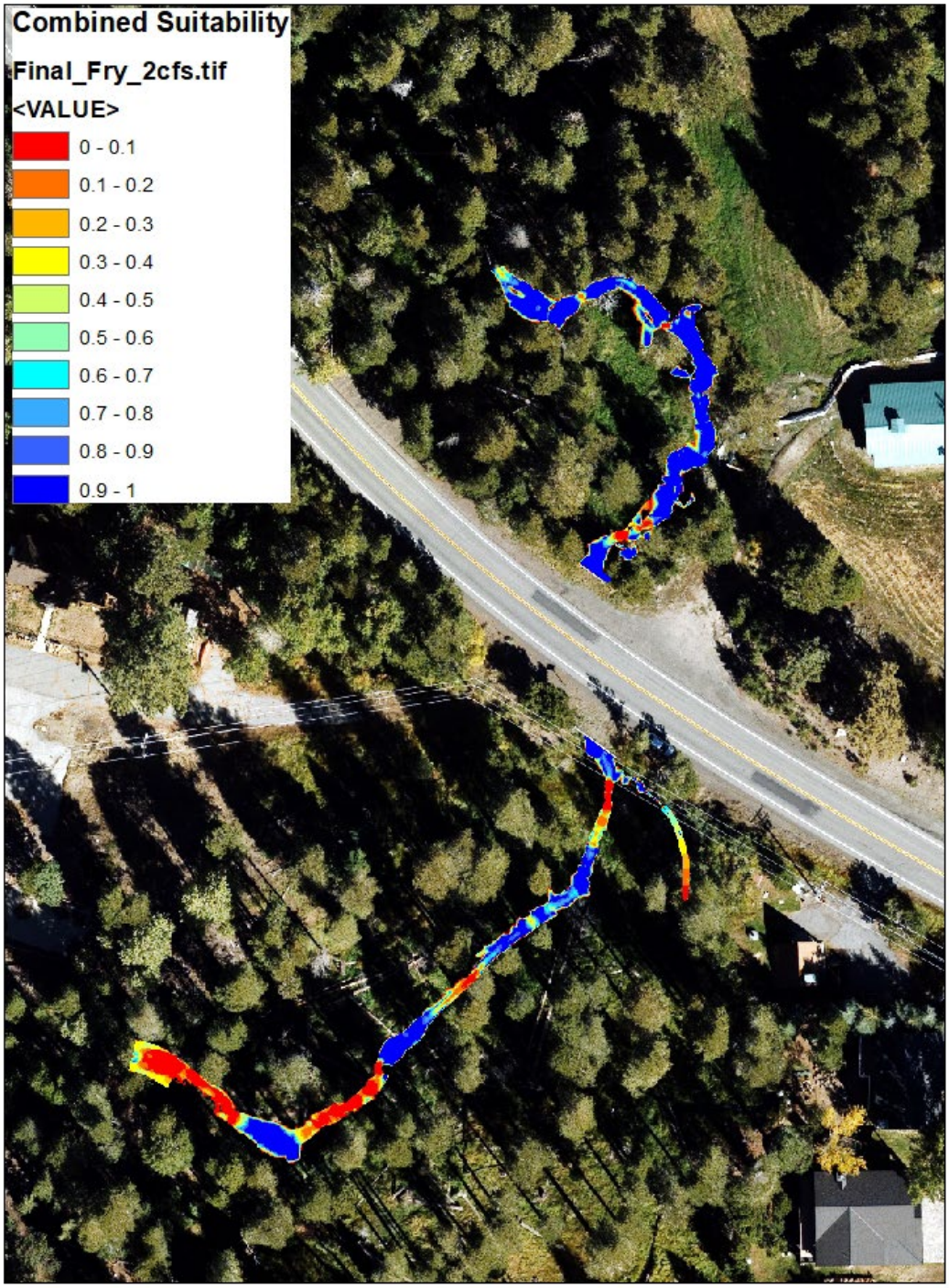
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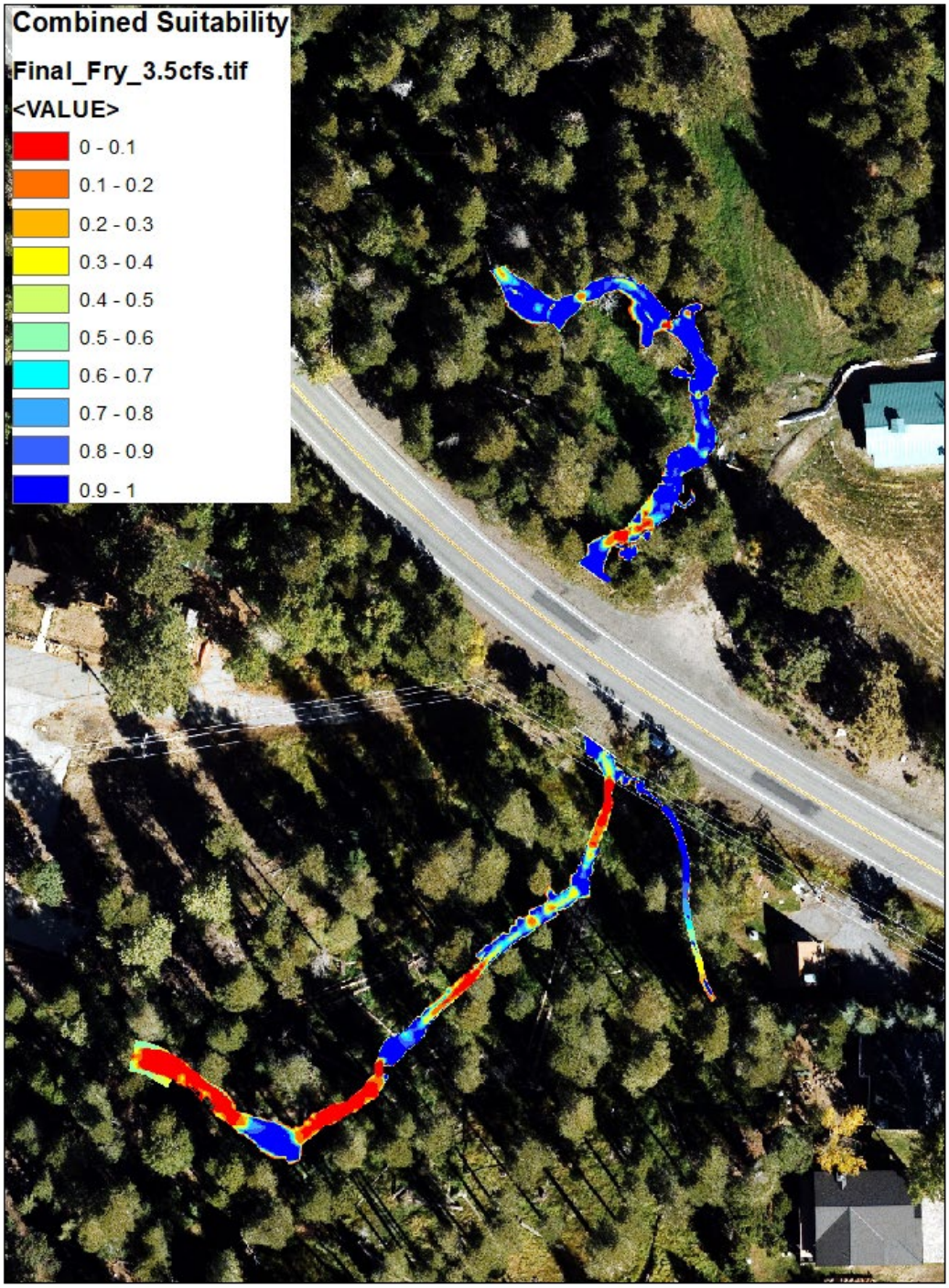
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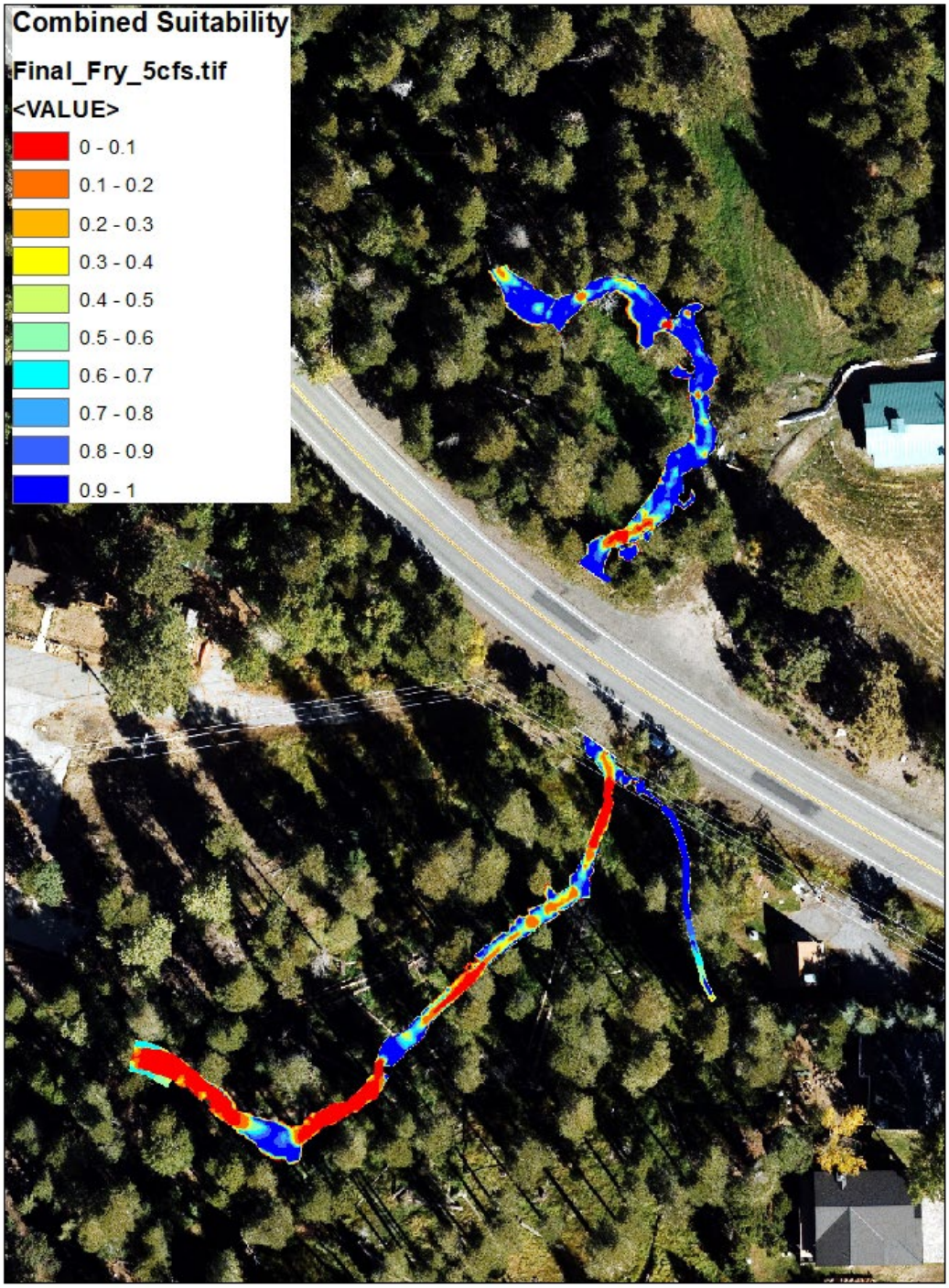
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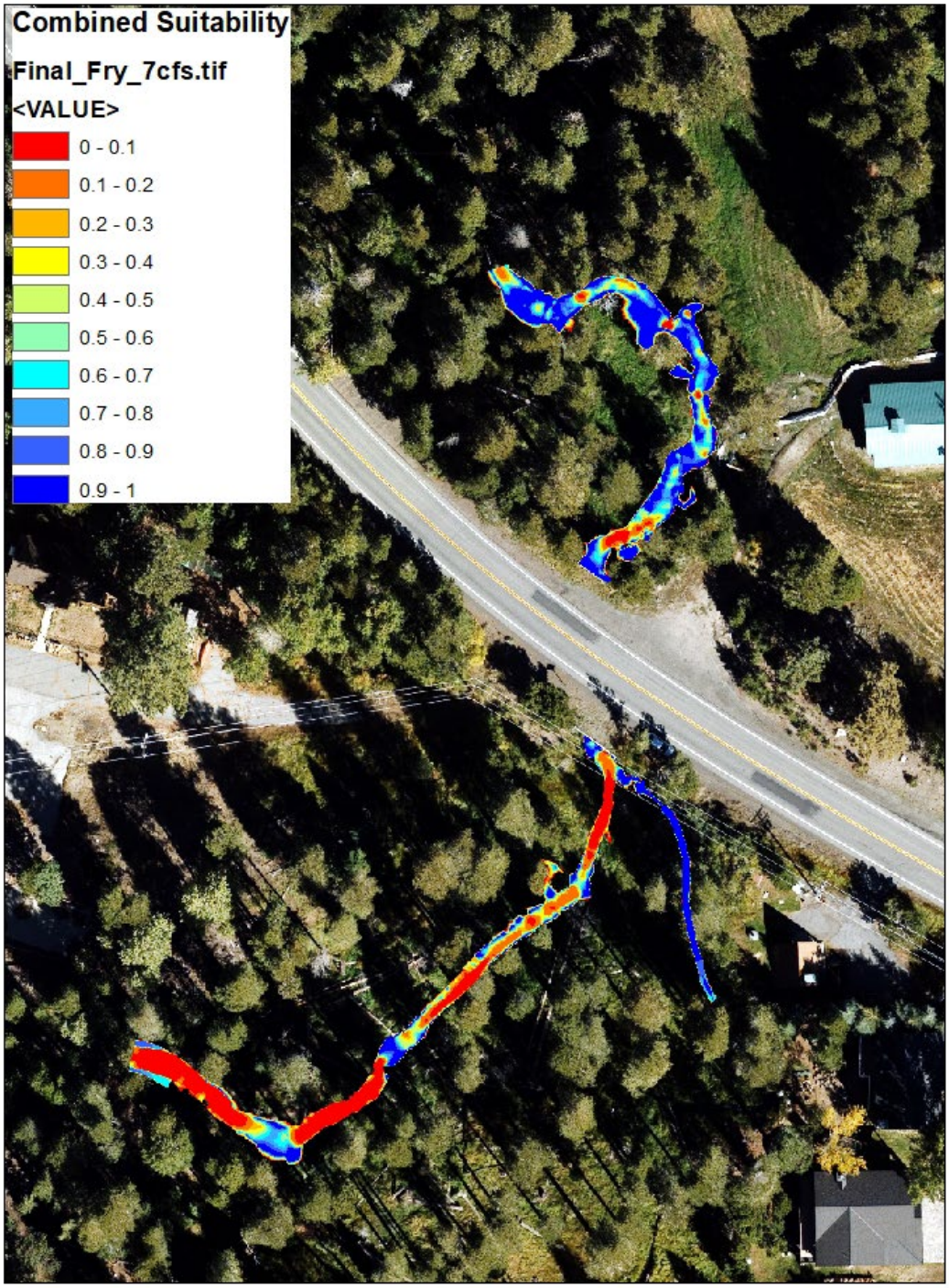
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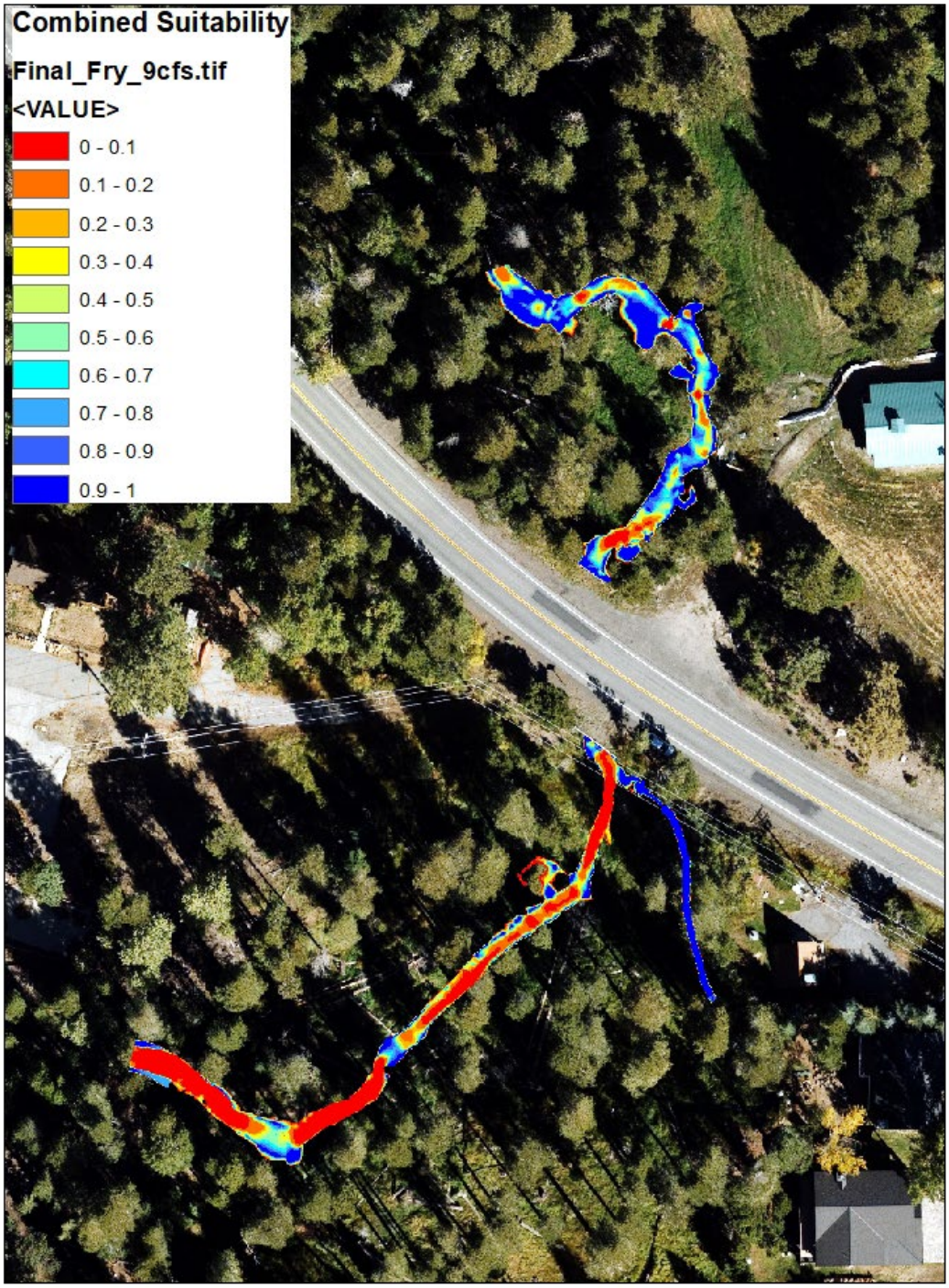
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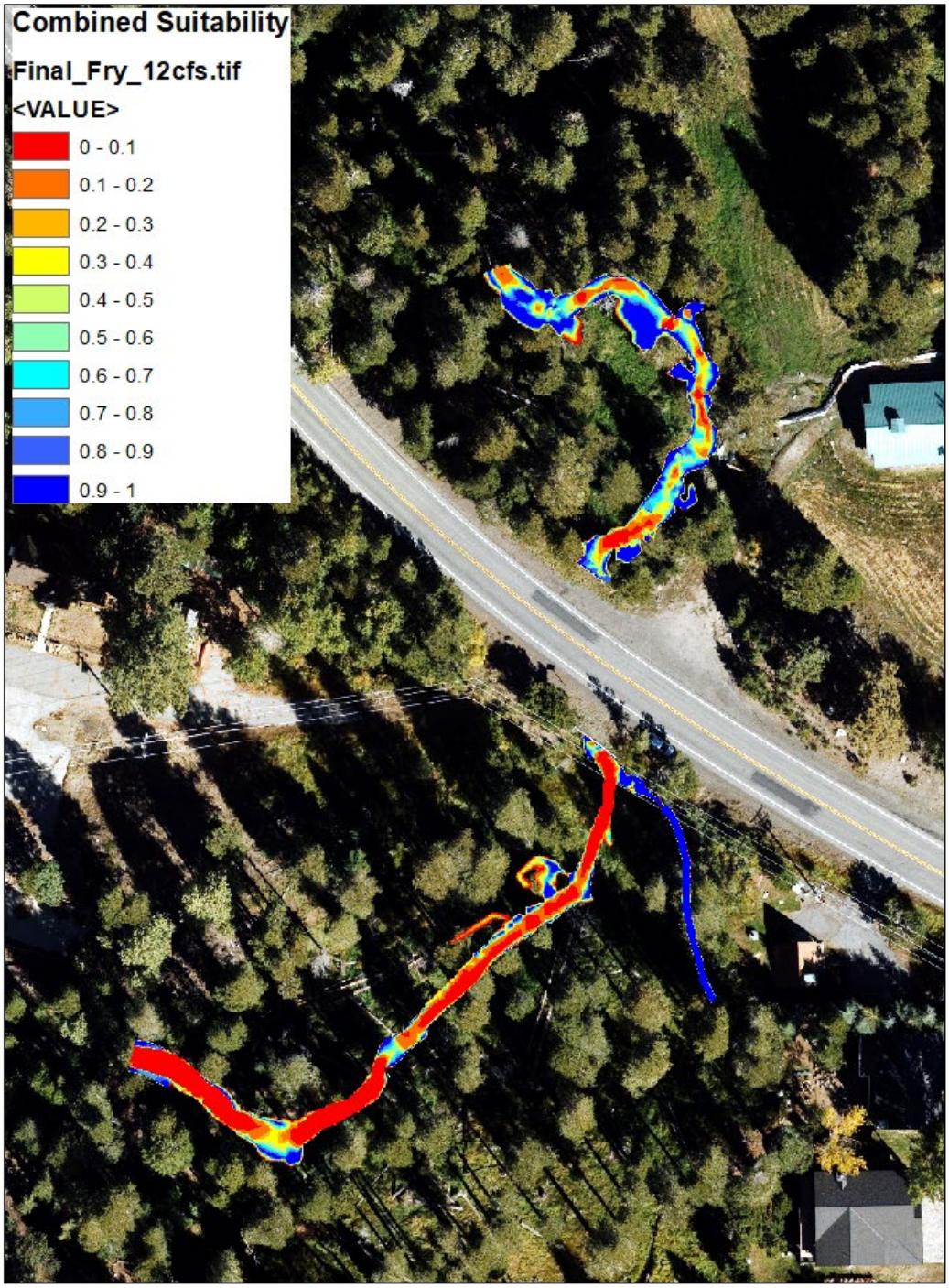
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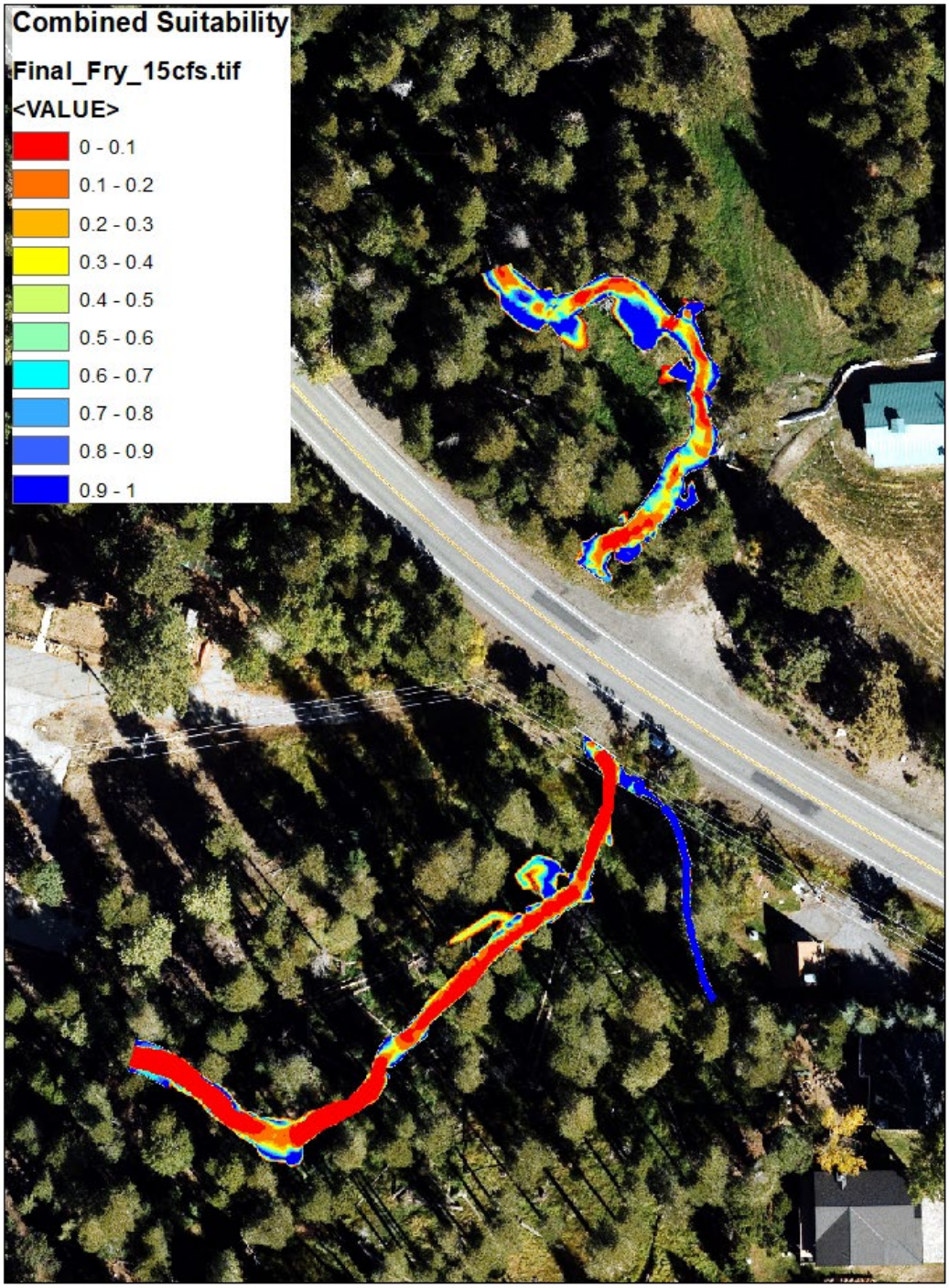
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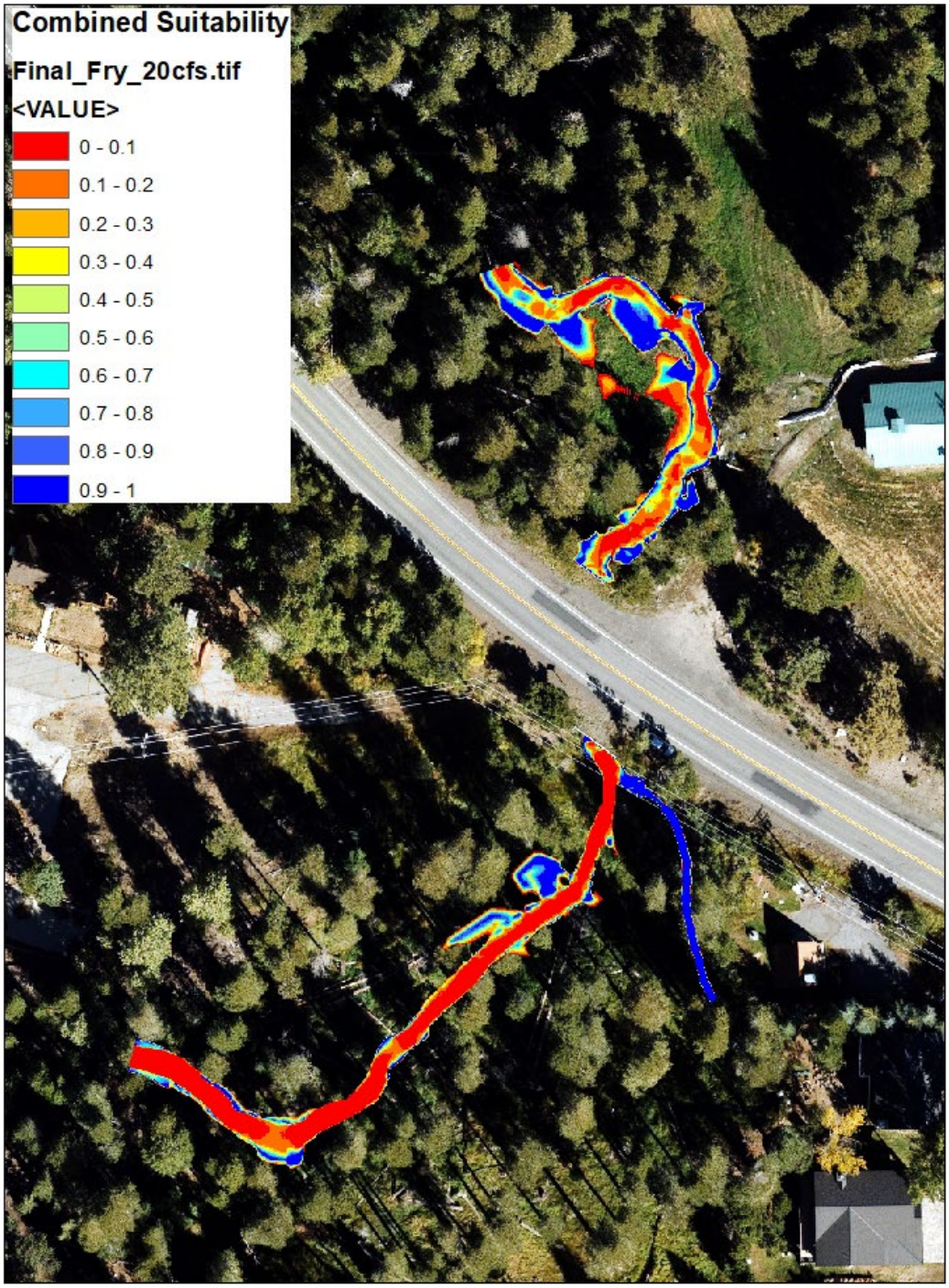
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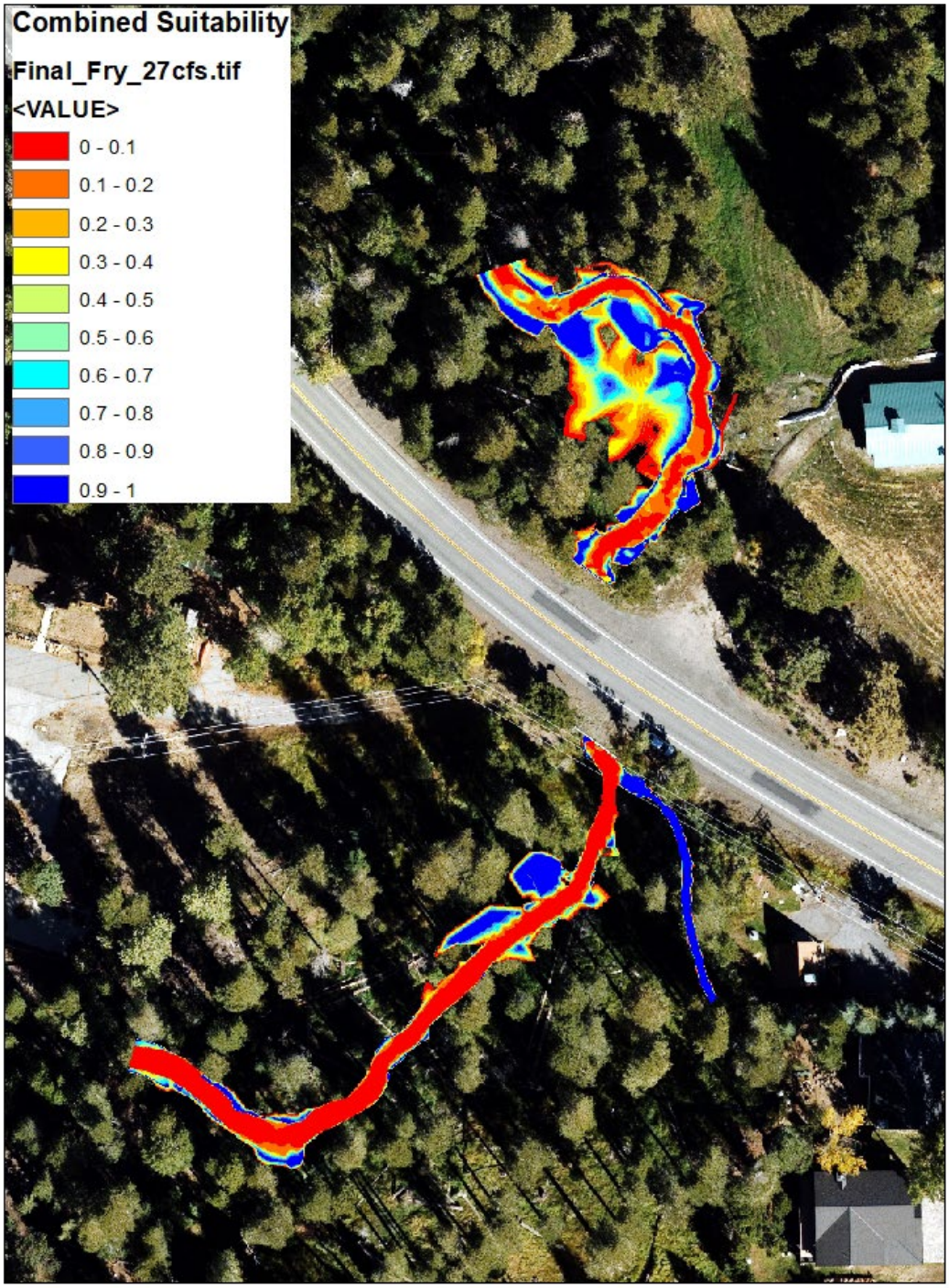
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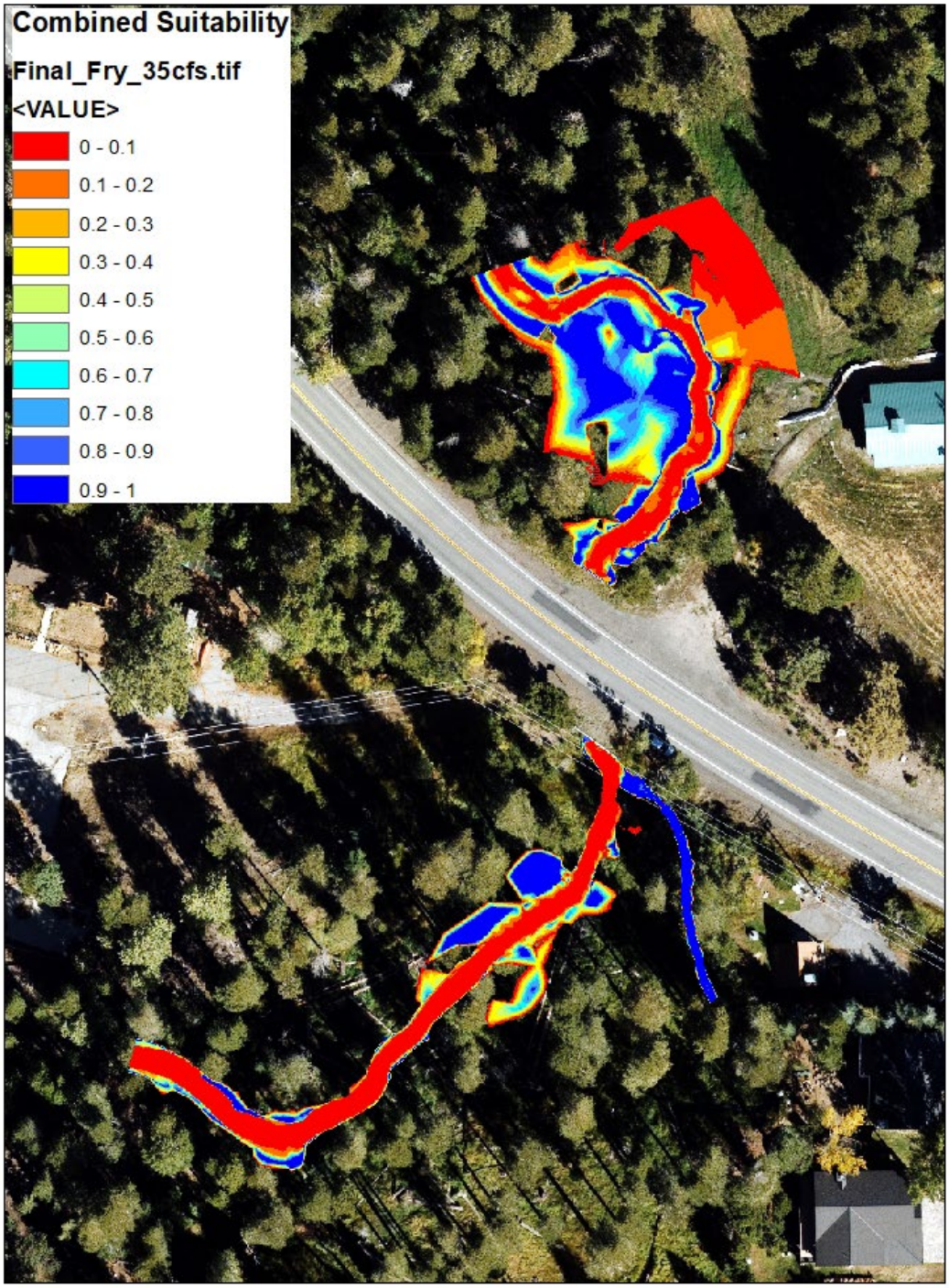
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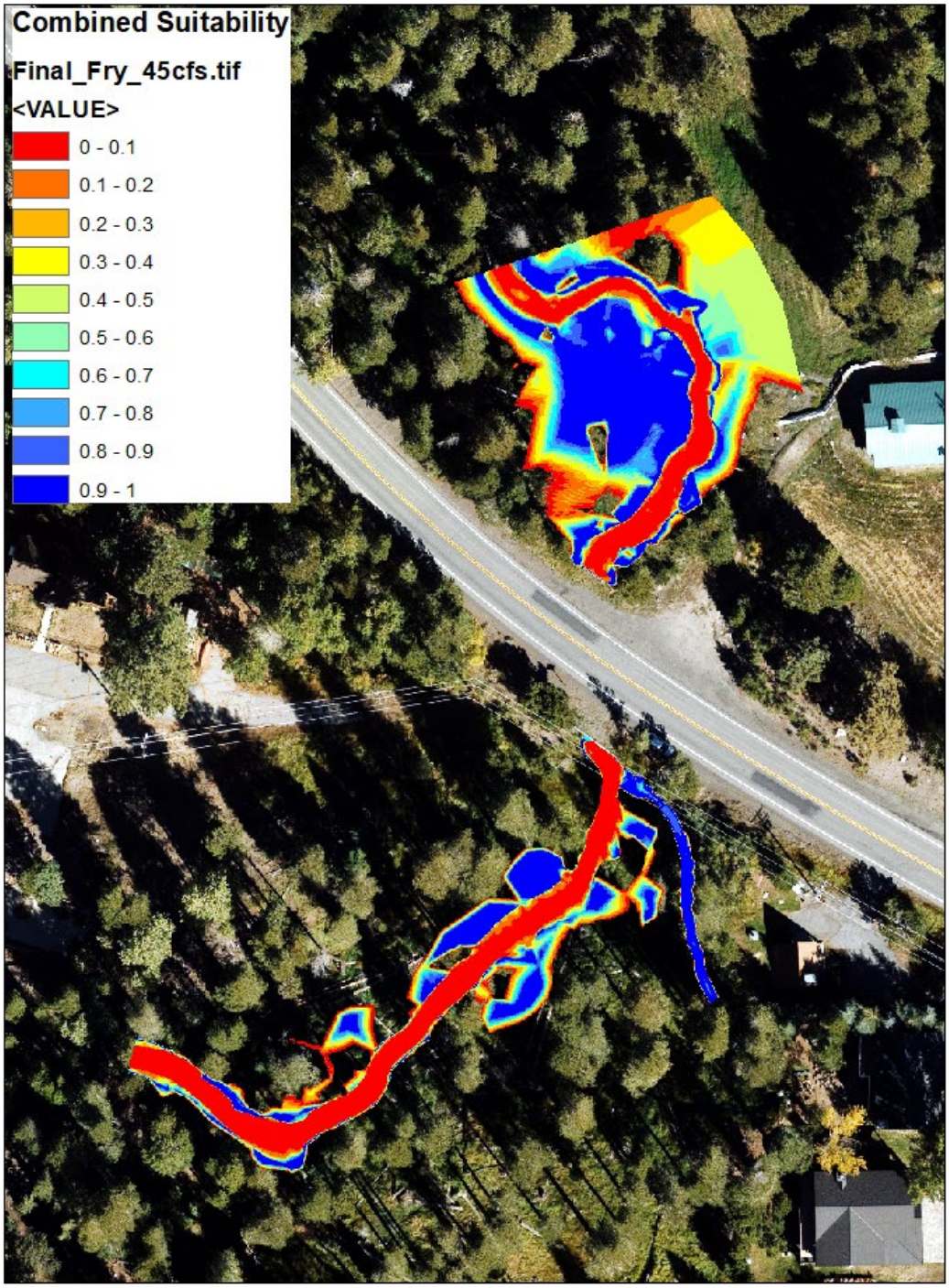
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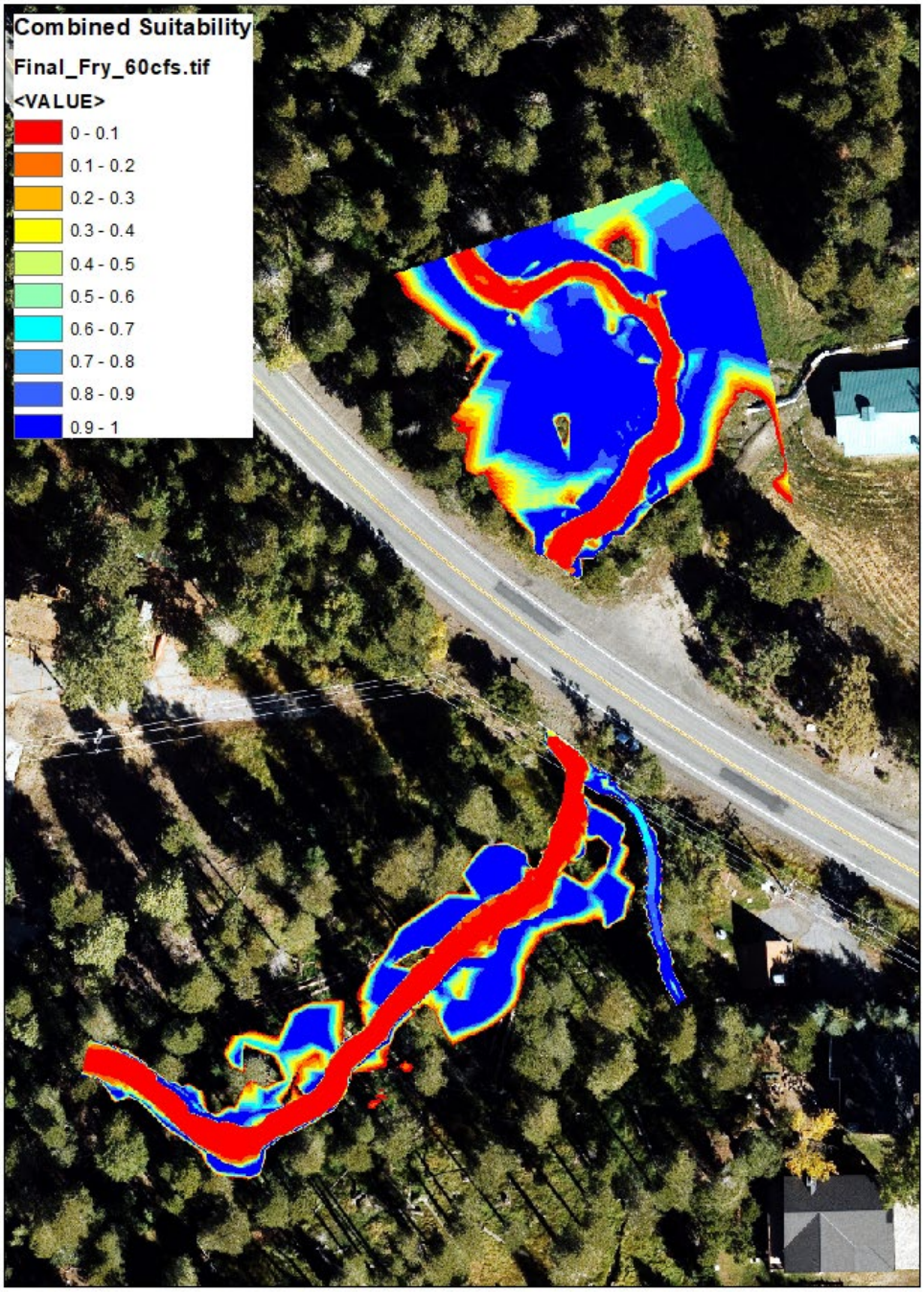
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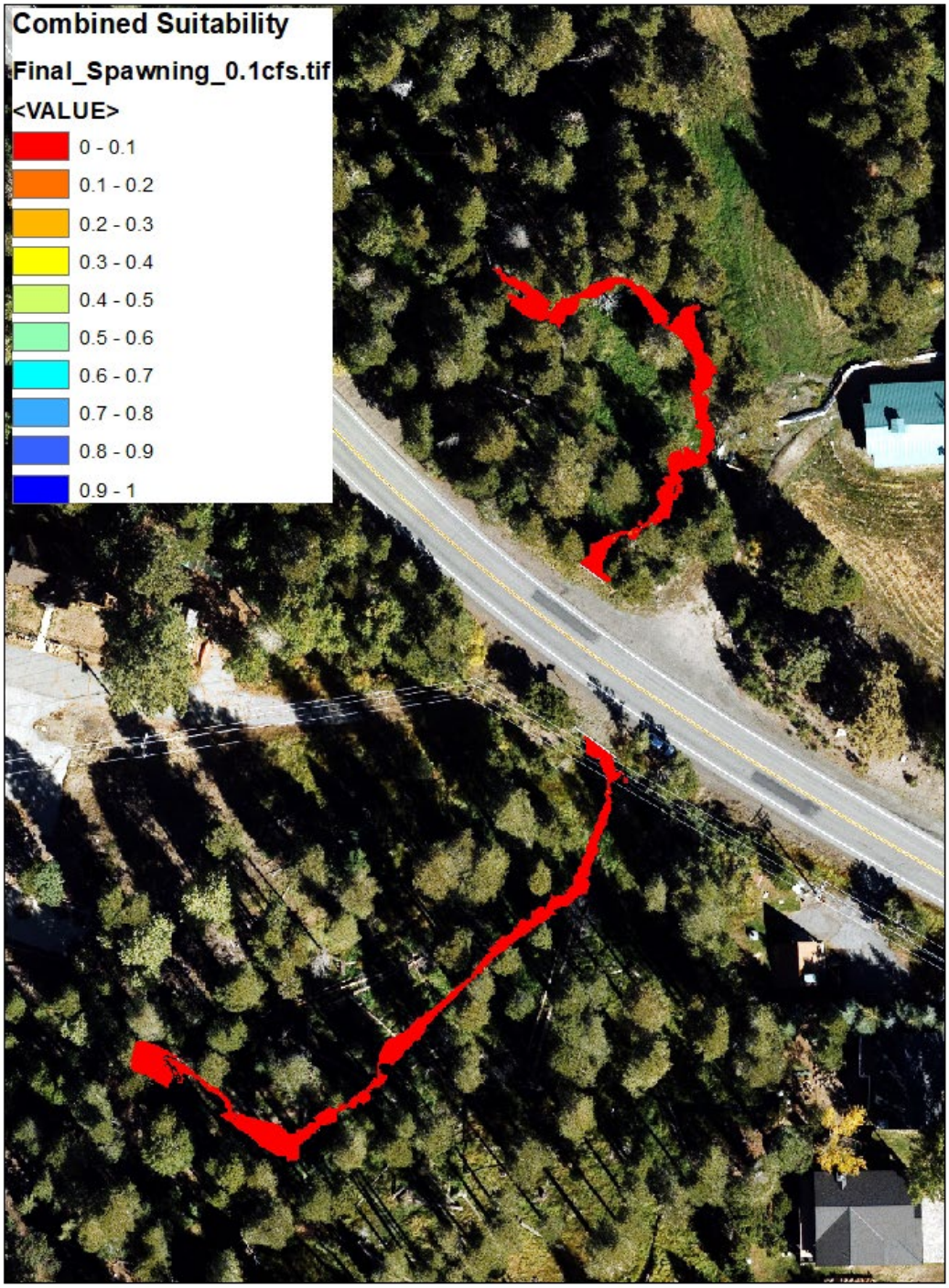
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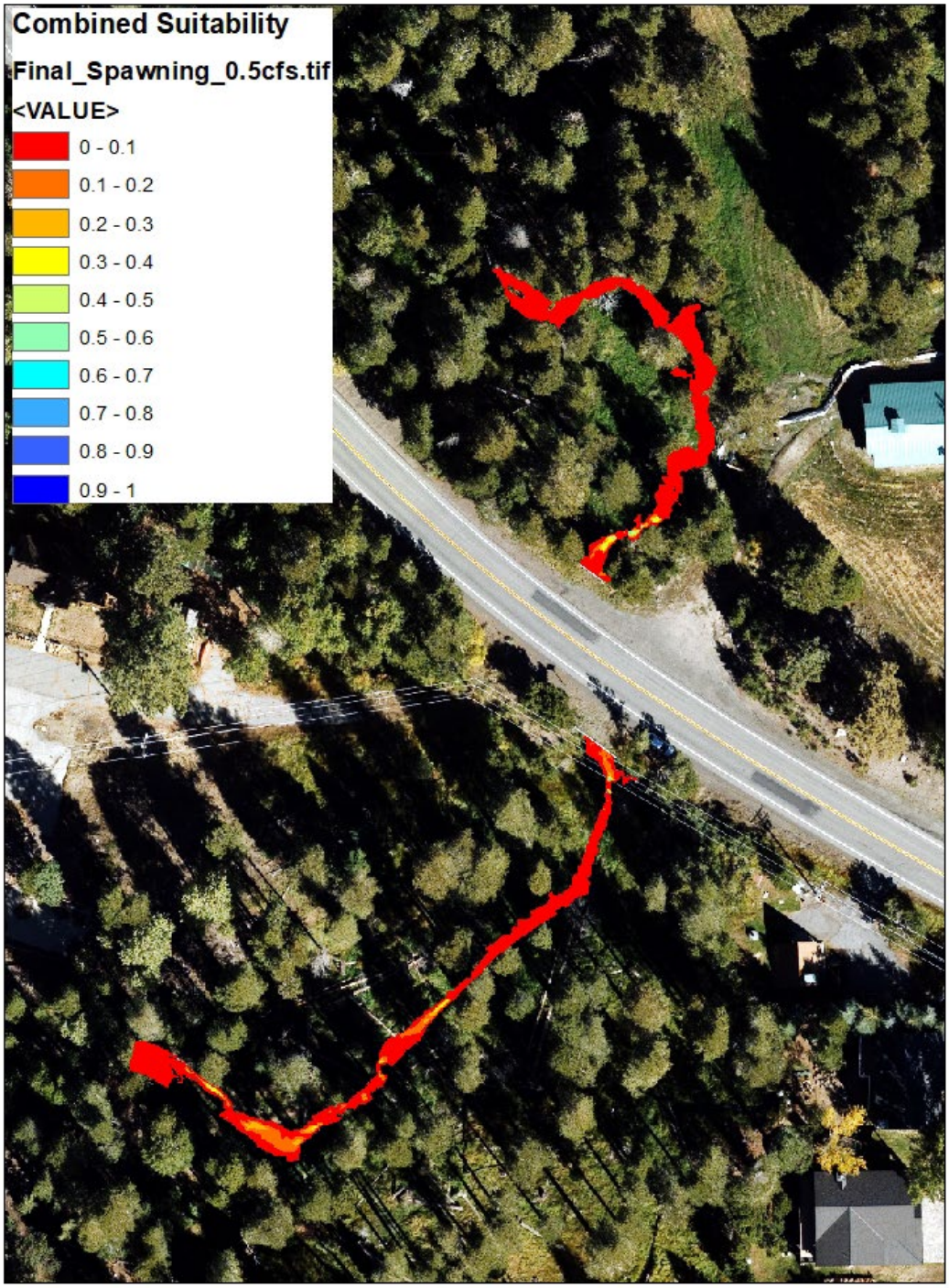
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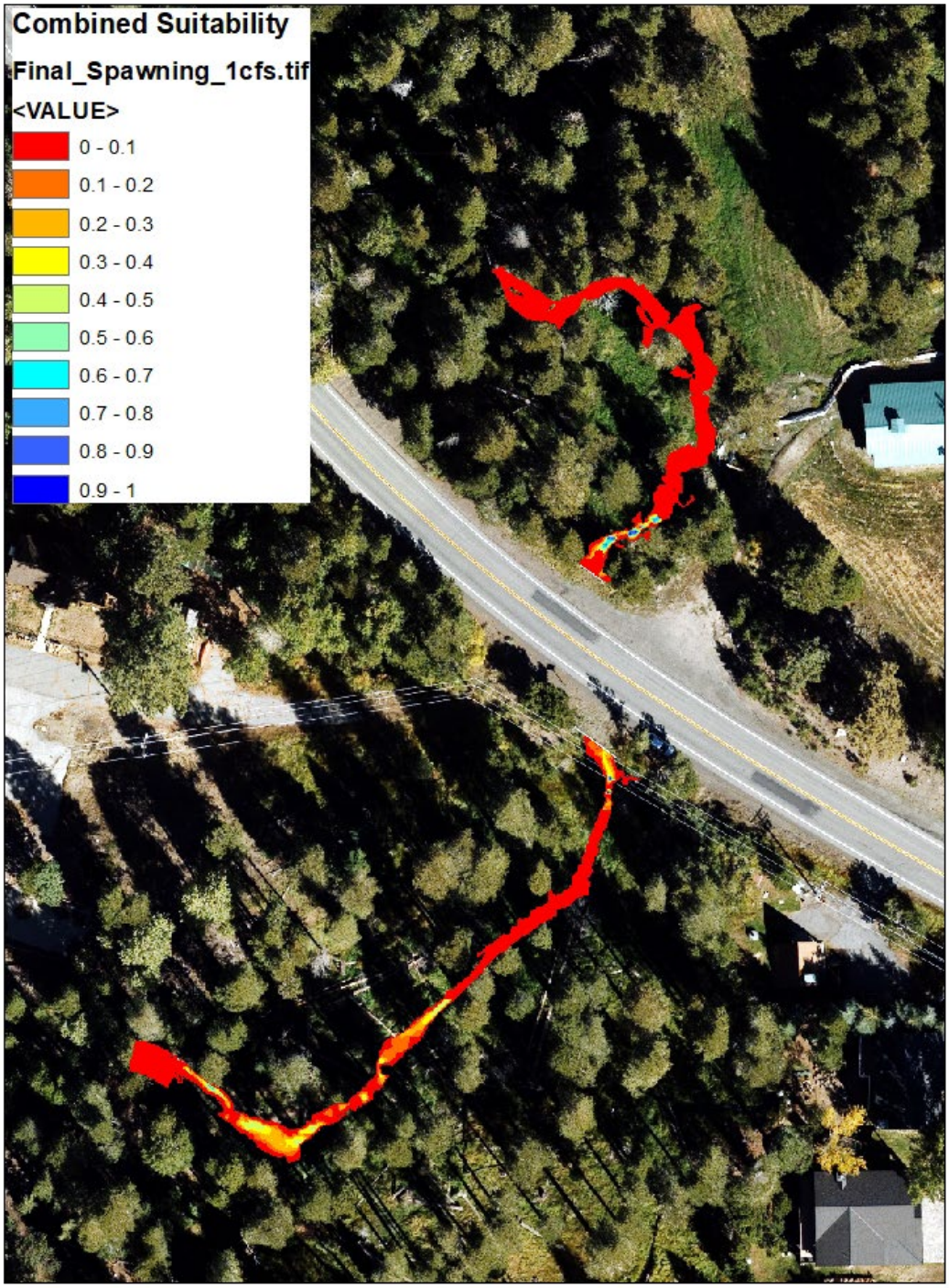
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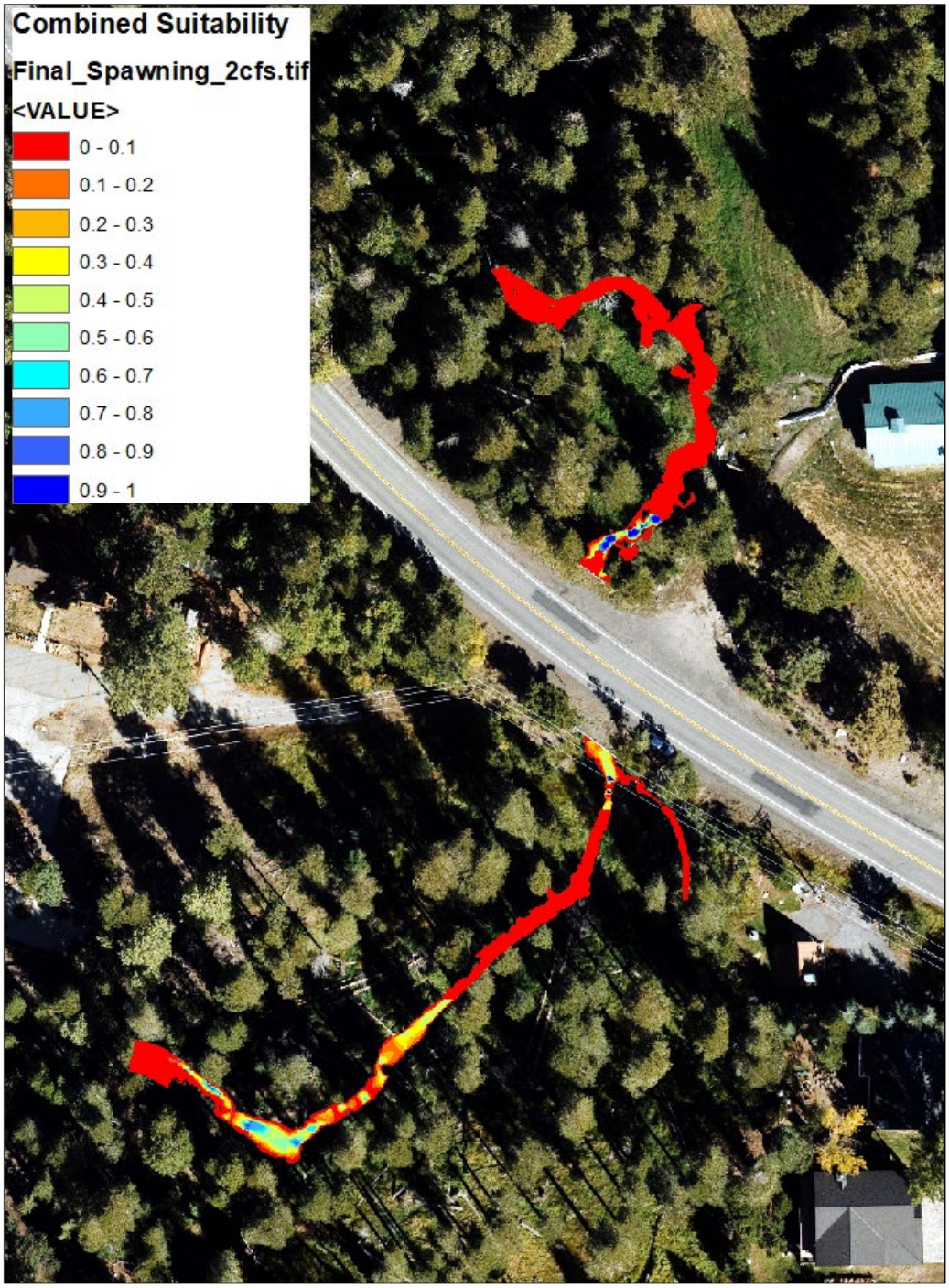
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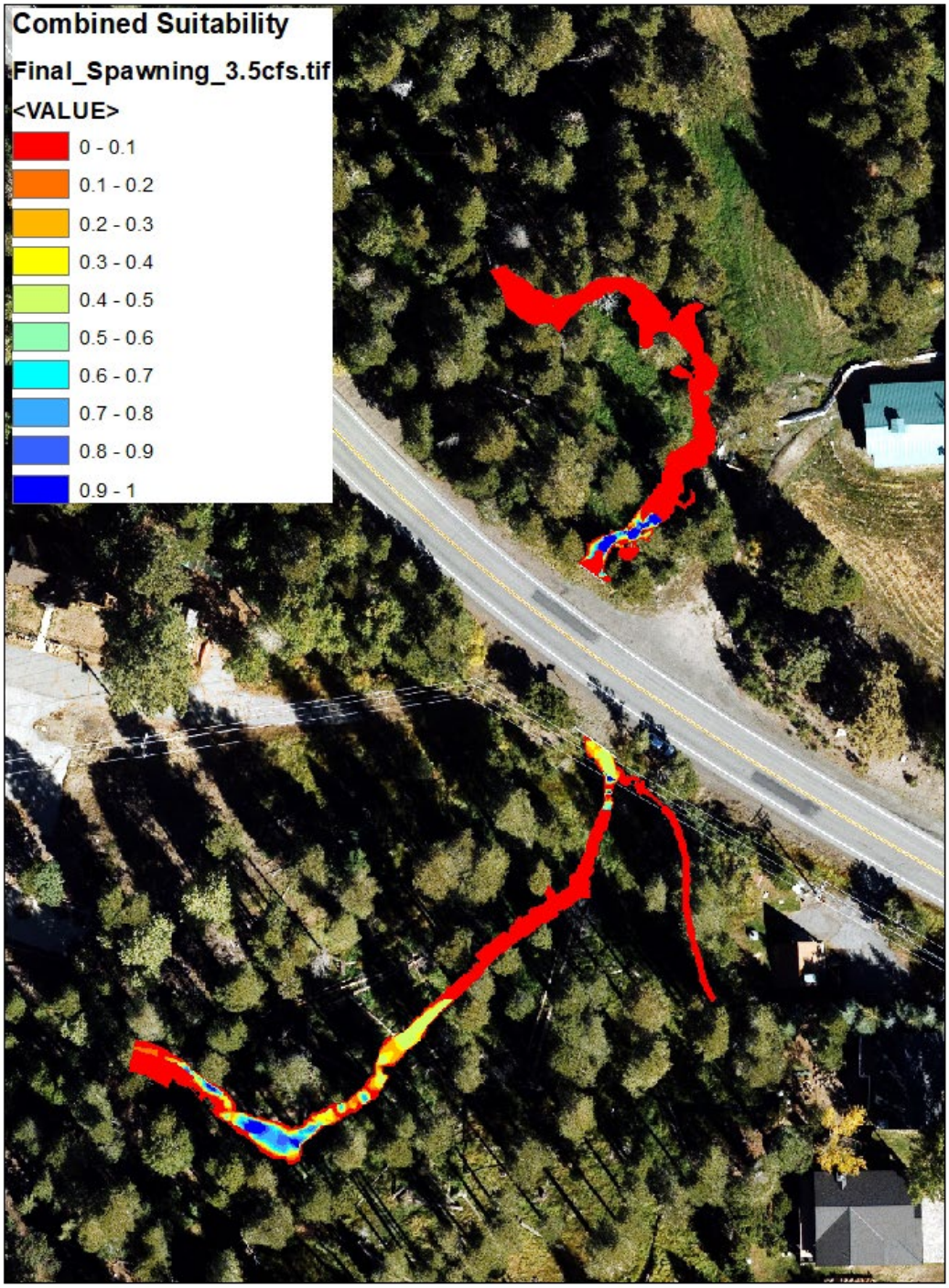
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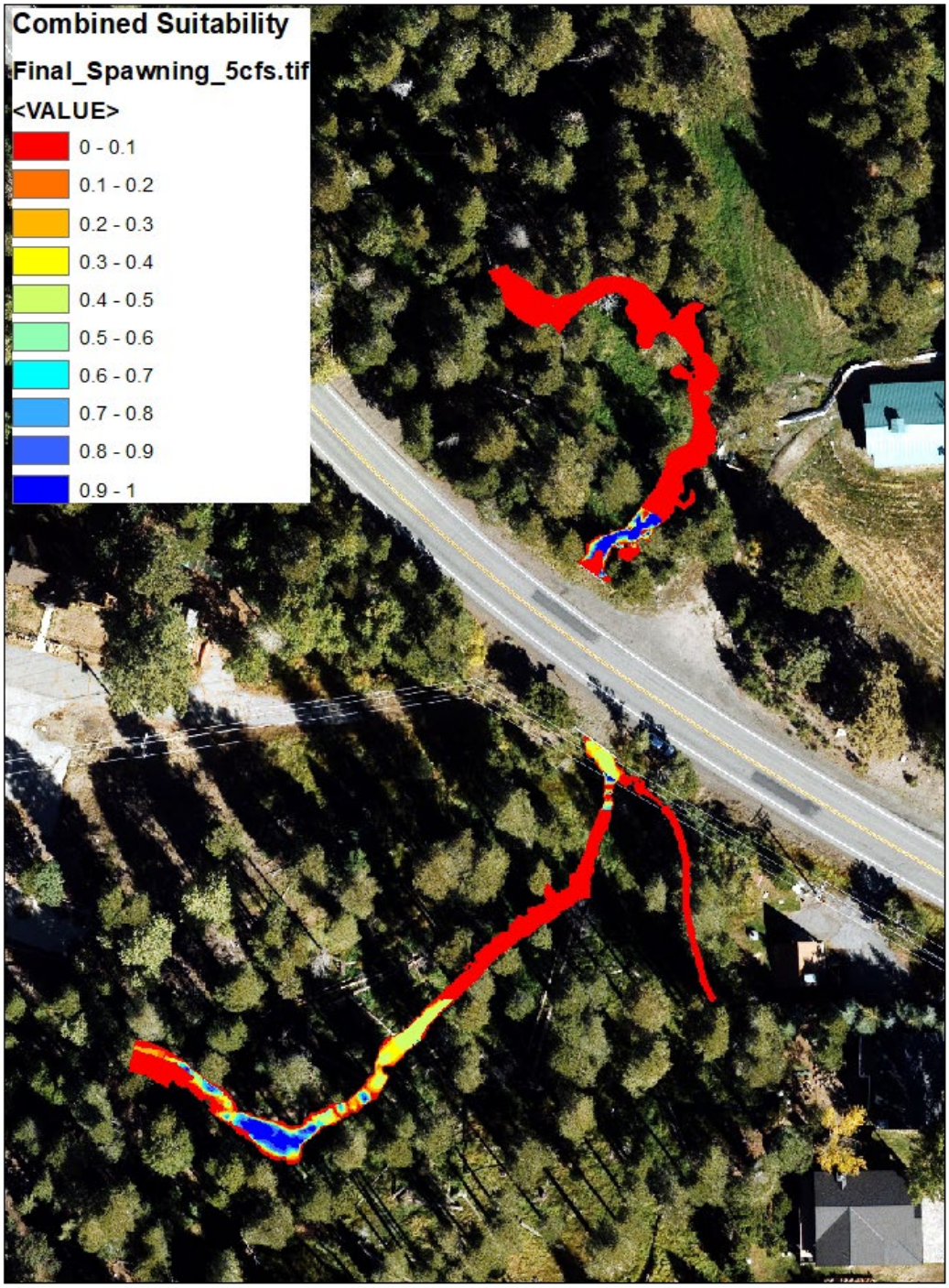
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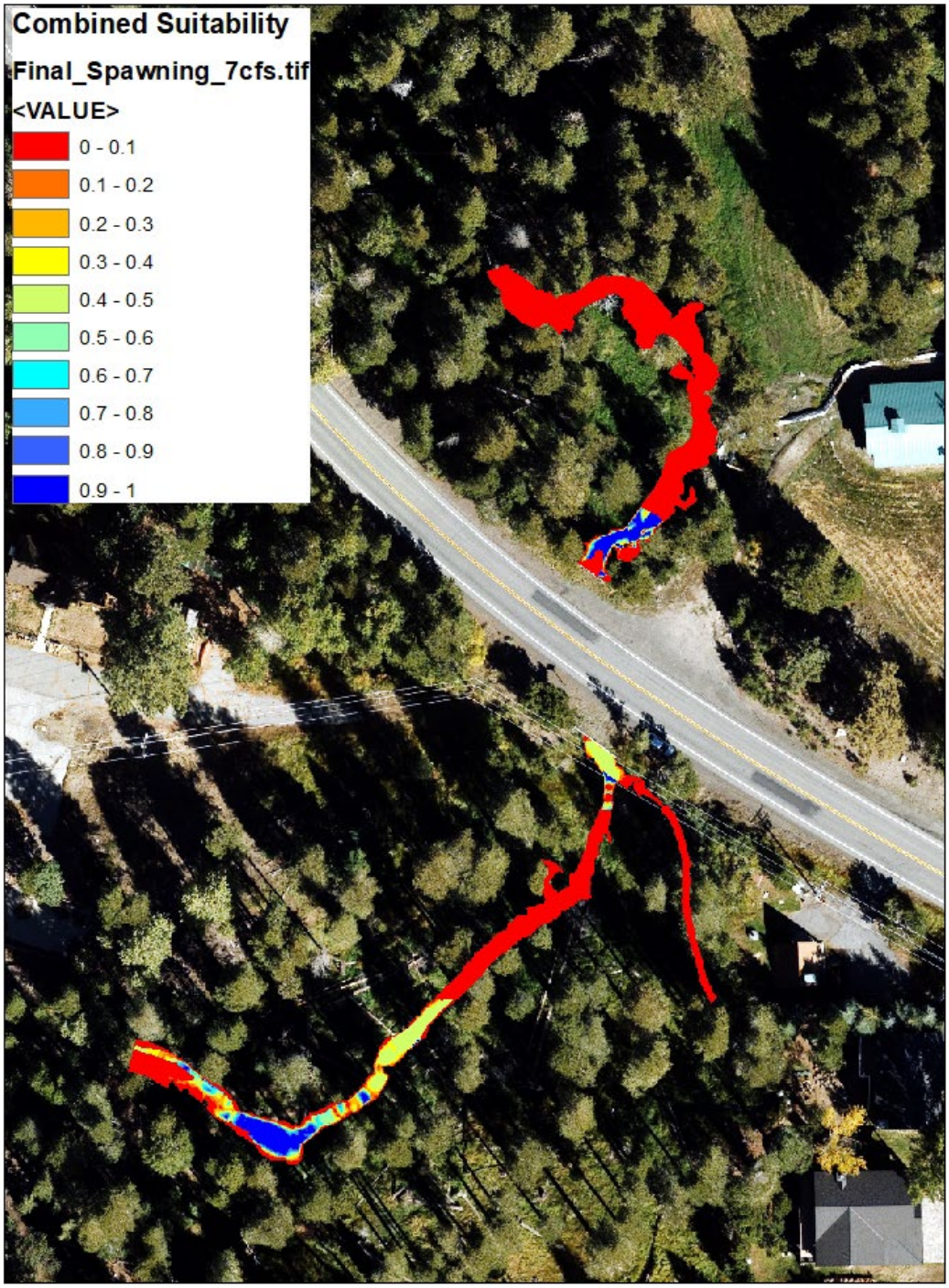
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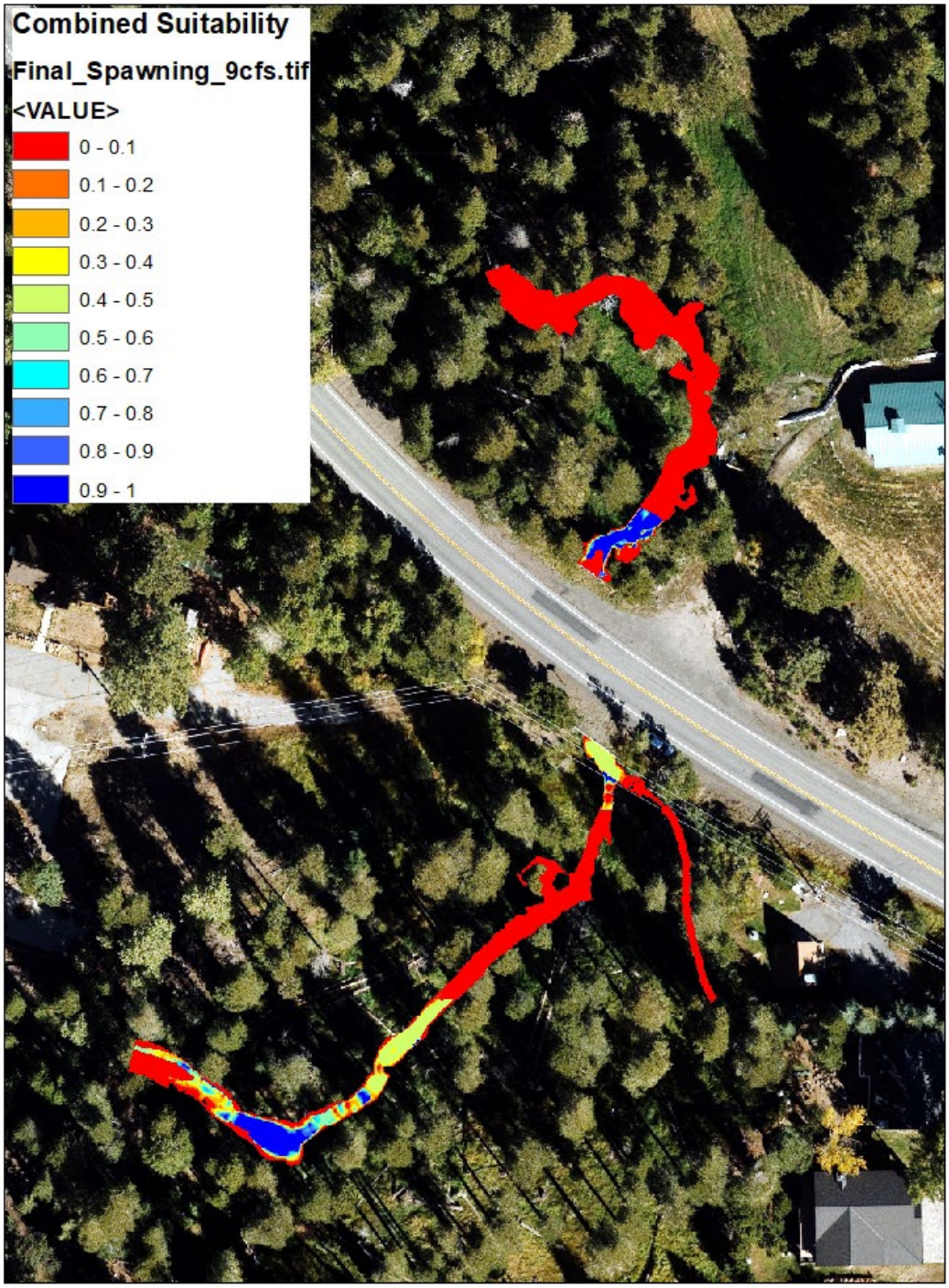
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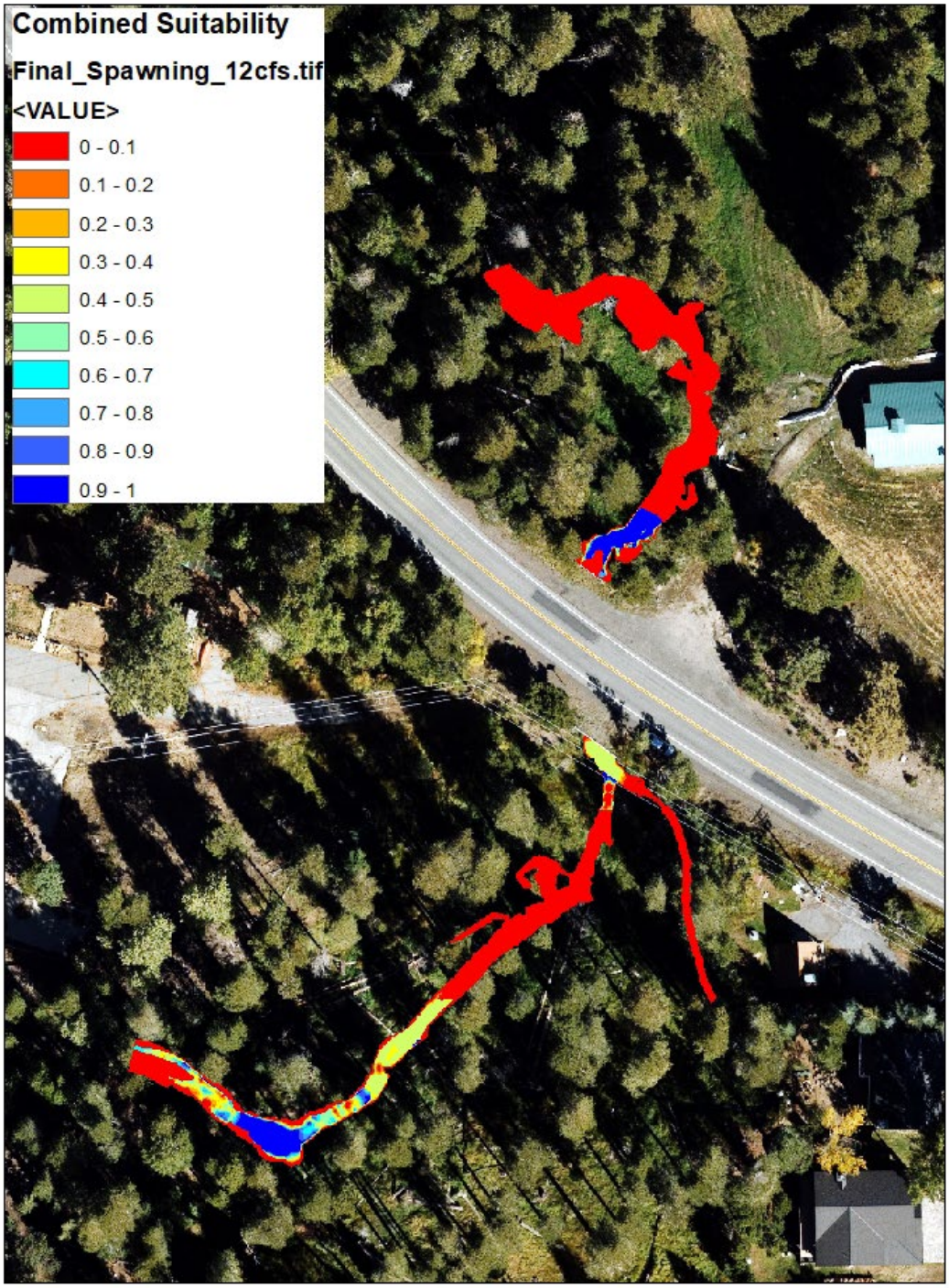
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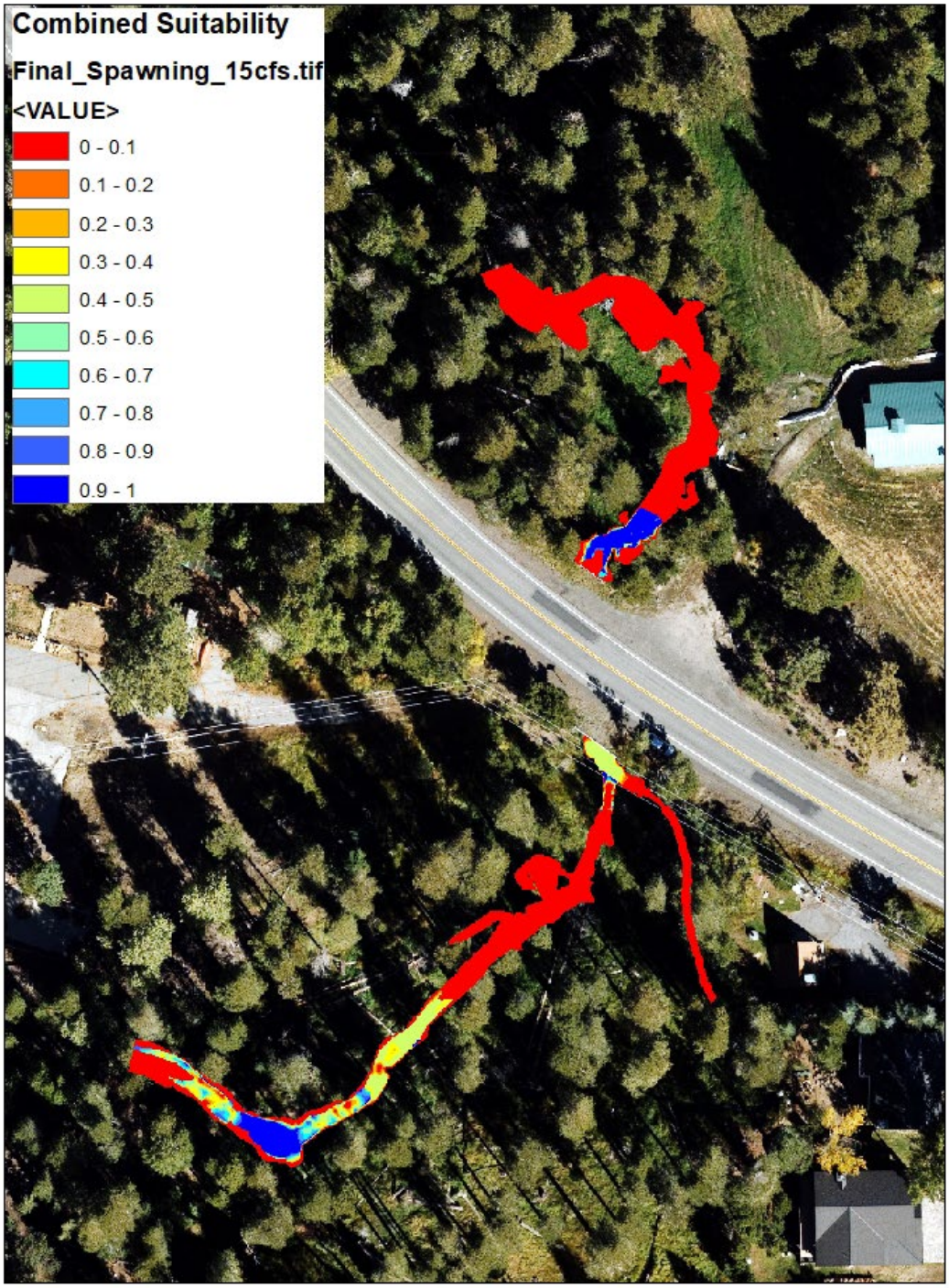
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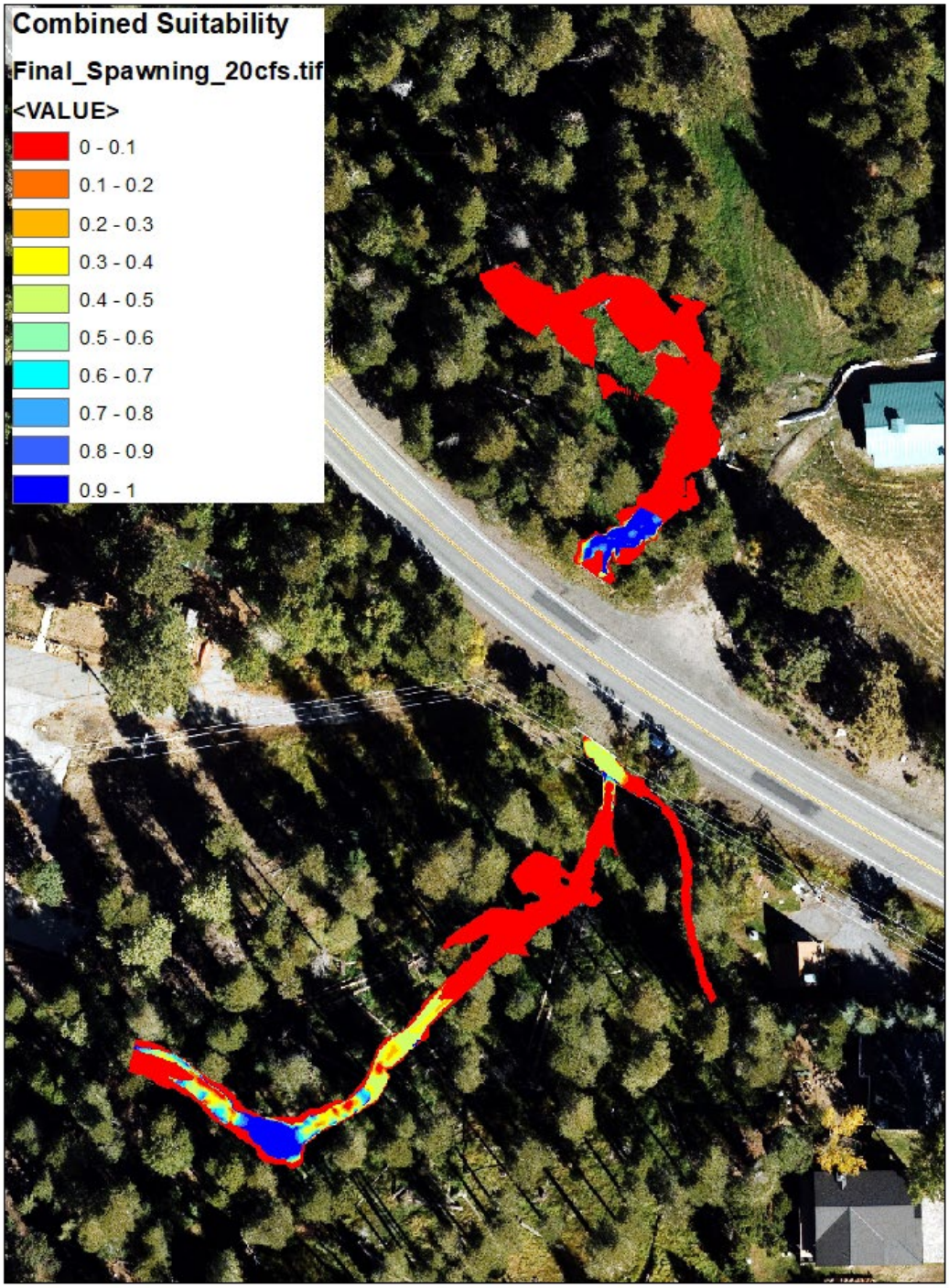
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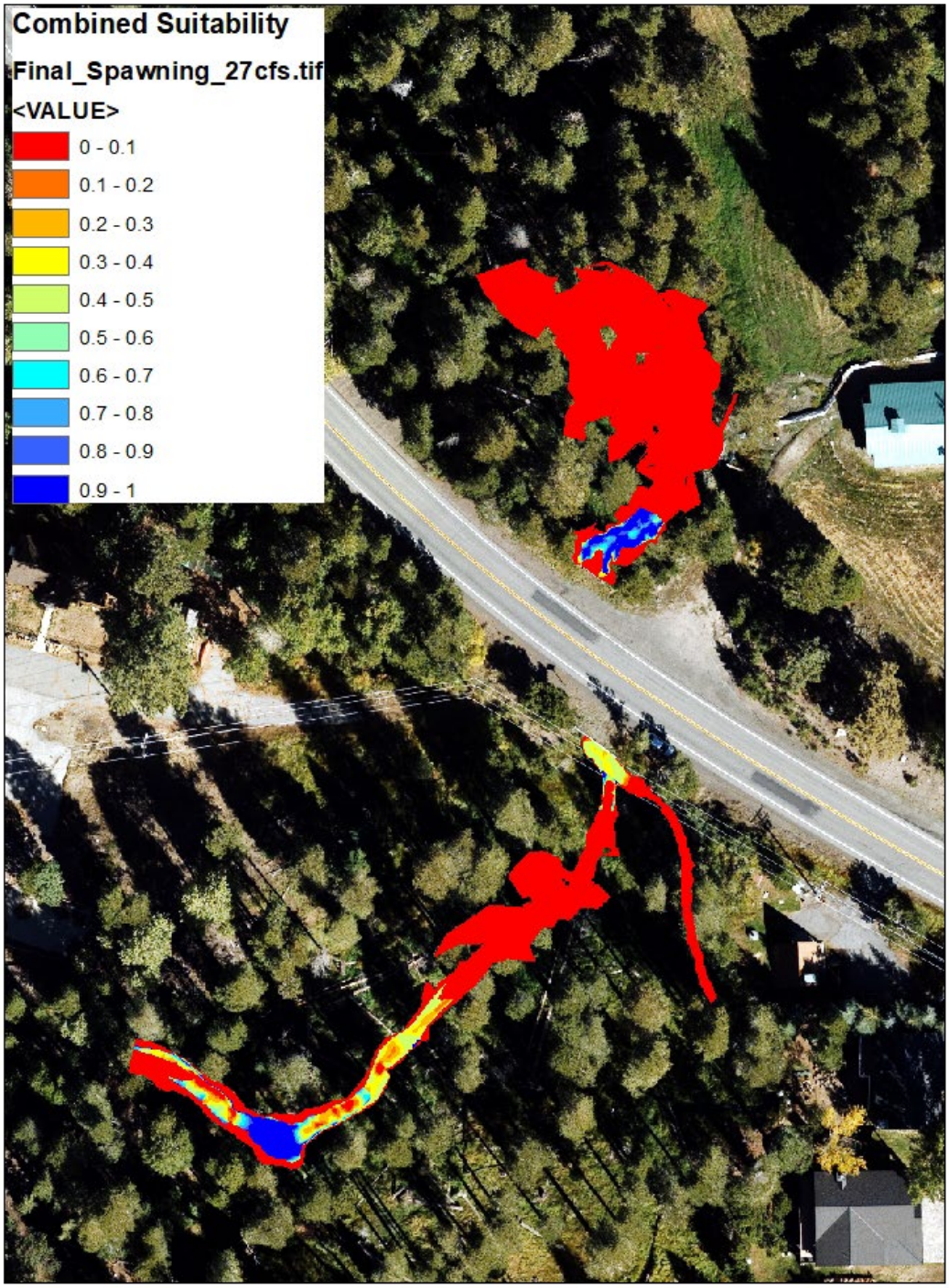
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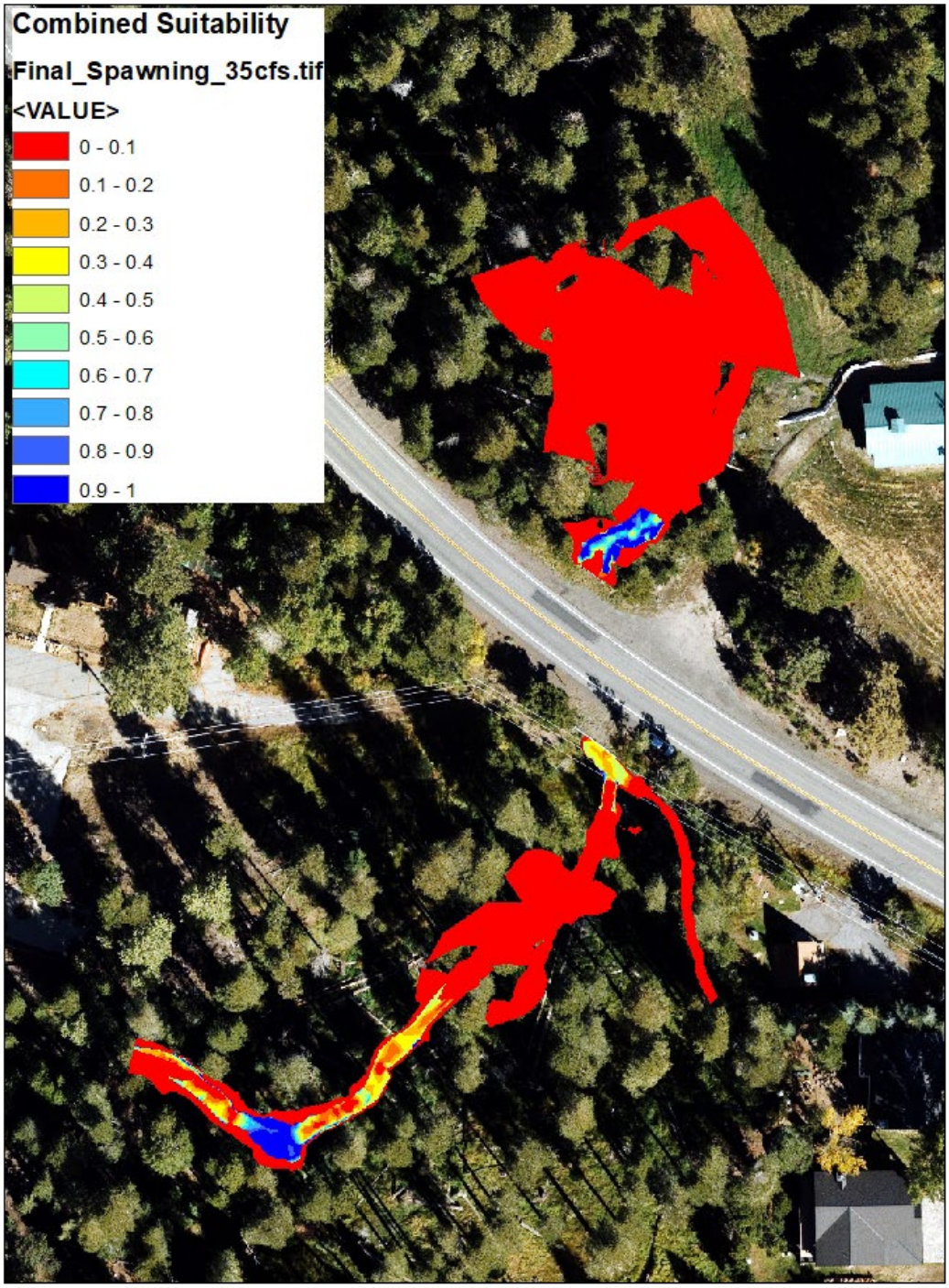
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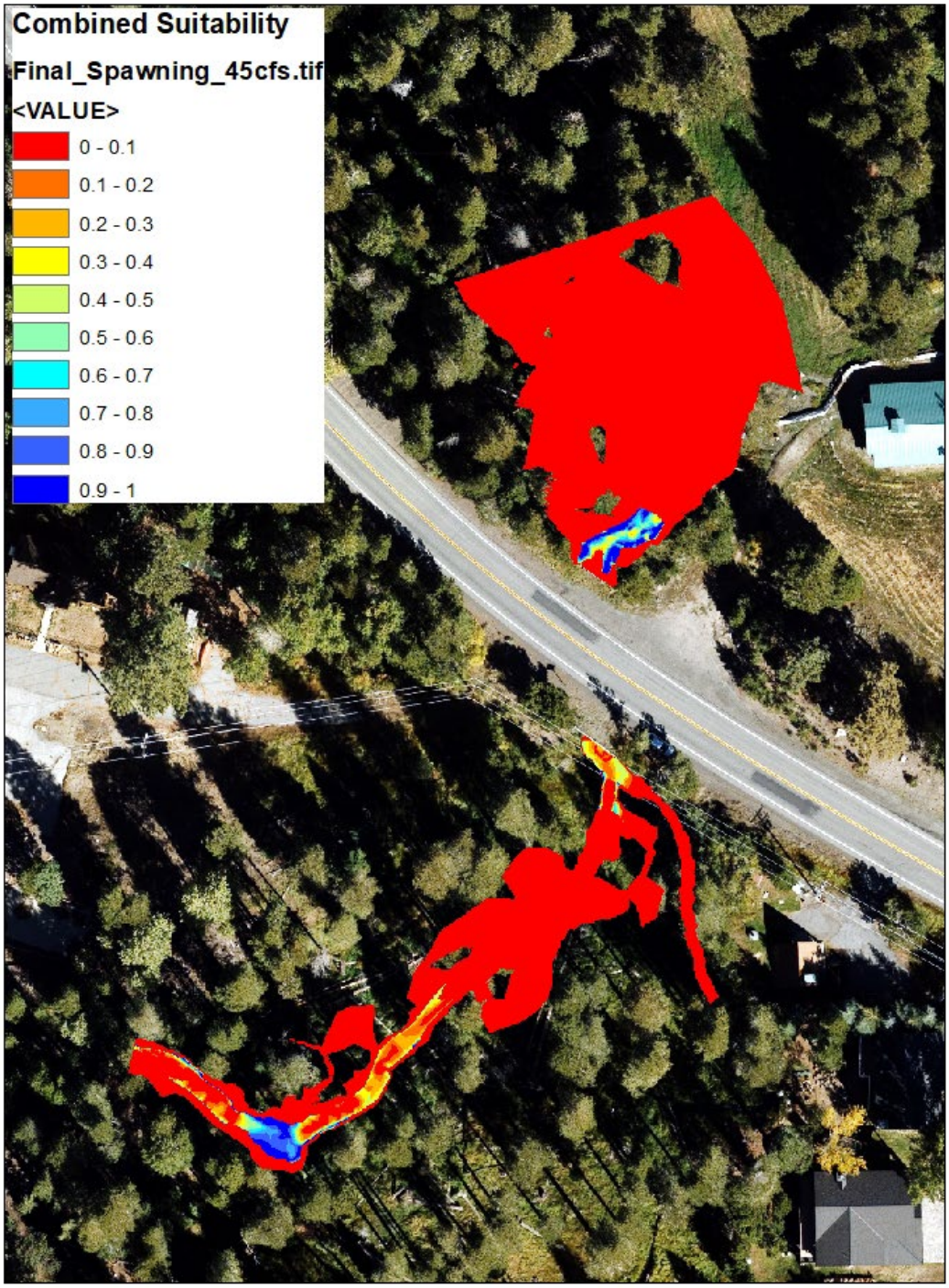
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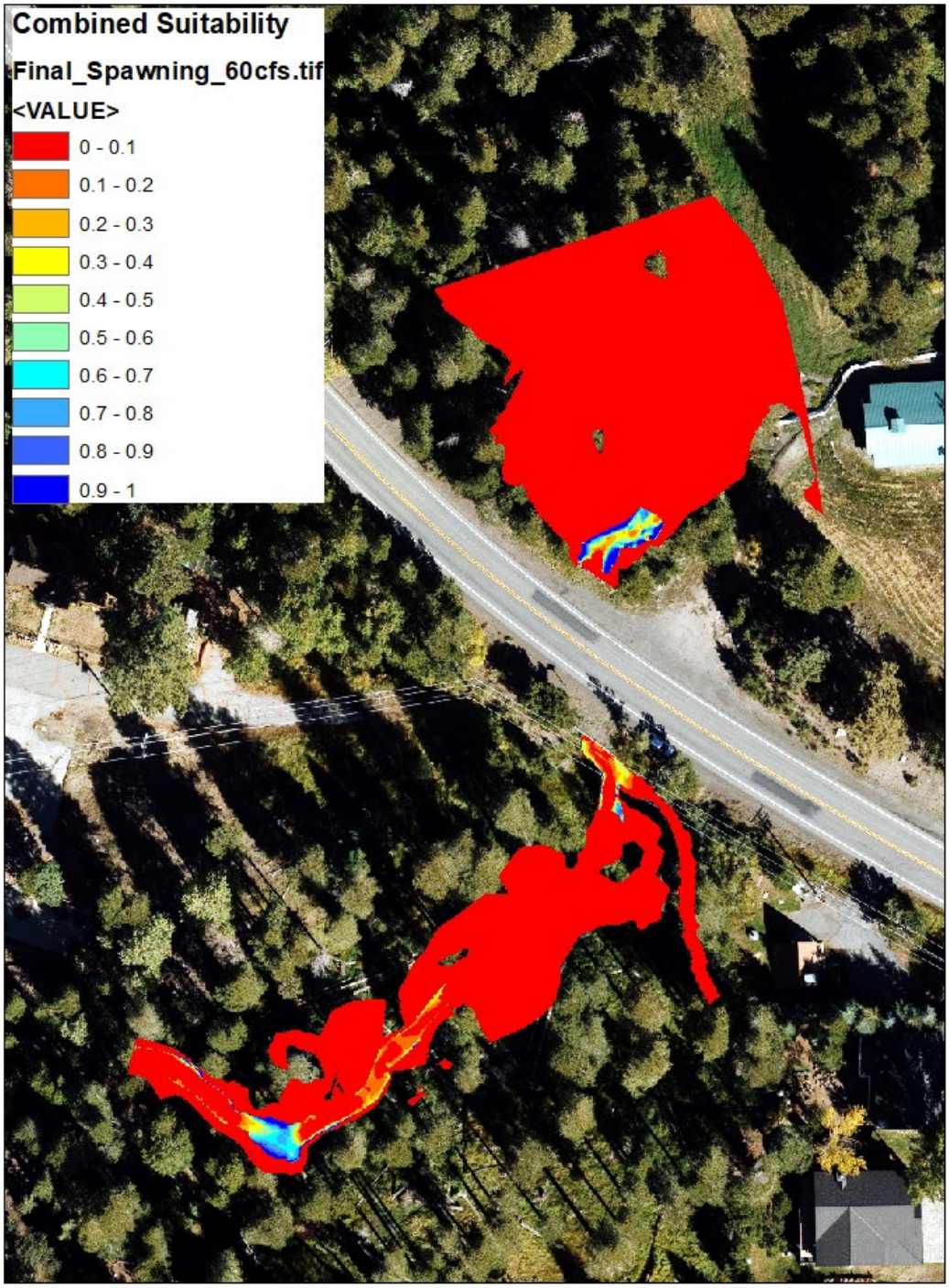
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APPENDIX M

2-D Habitat Suitability Modified Substrate (South Rush Creek)

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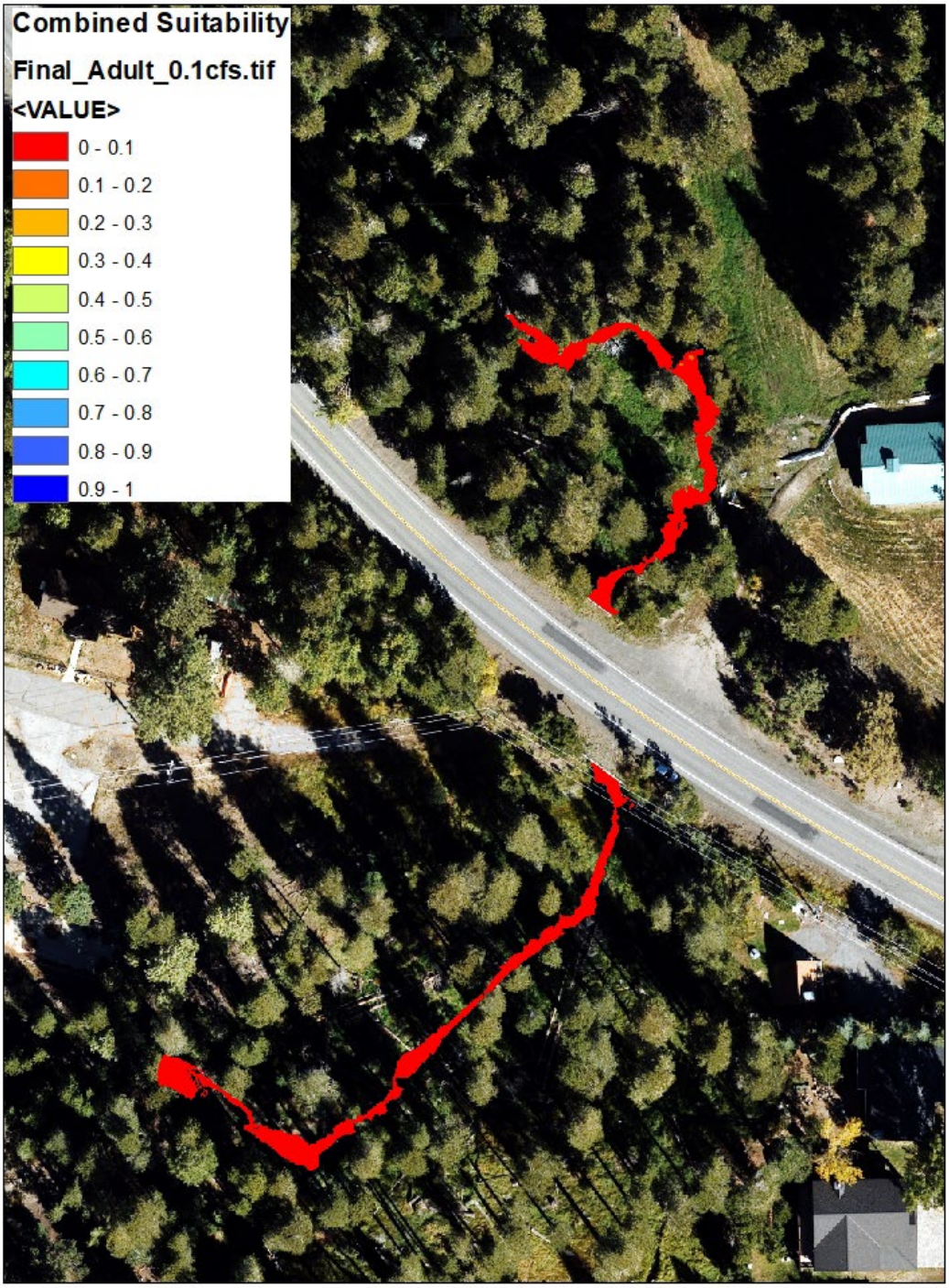
INTRODUCTION

The following figures show the habitat results for the adult lifestage for the South Rush Creek 2-D site. The values of habitat match suitability values with a scale of 0 (no habitat) to 1 (100 % habitat). The results in this appendix represent modified substrate suitability applied to the adult lifestage.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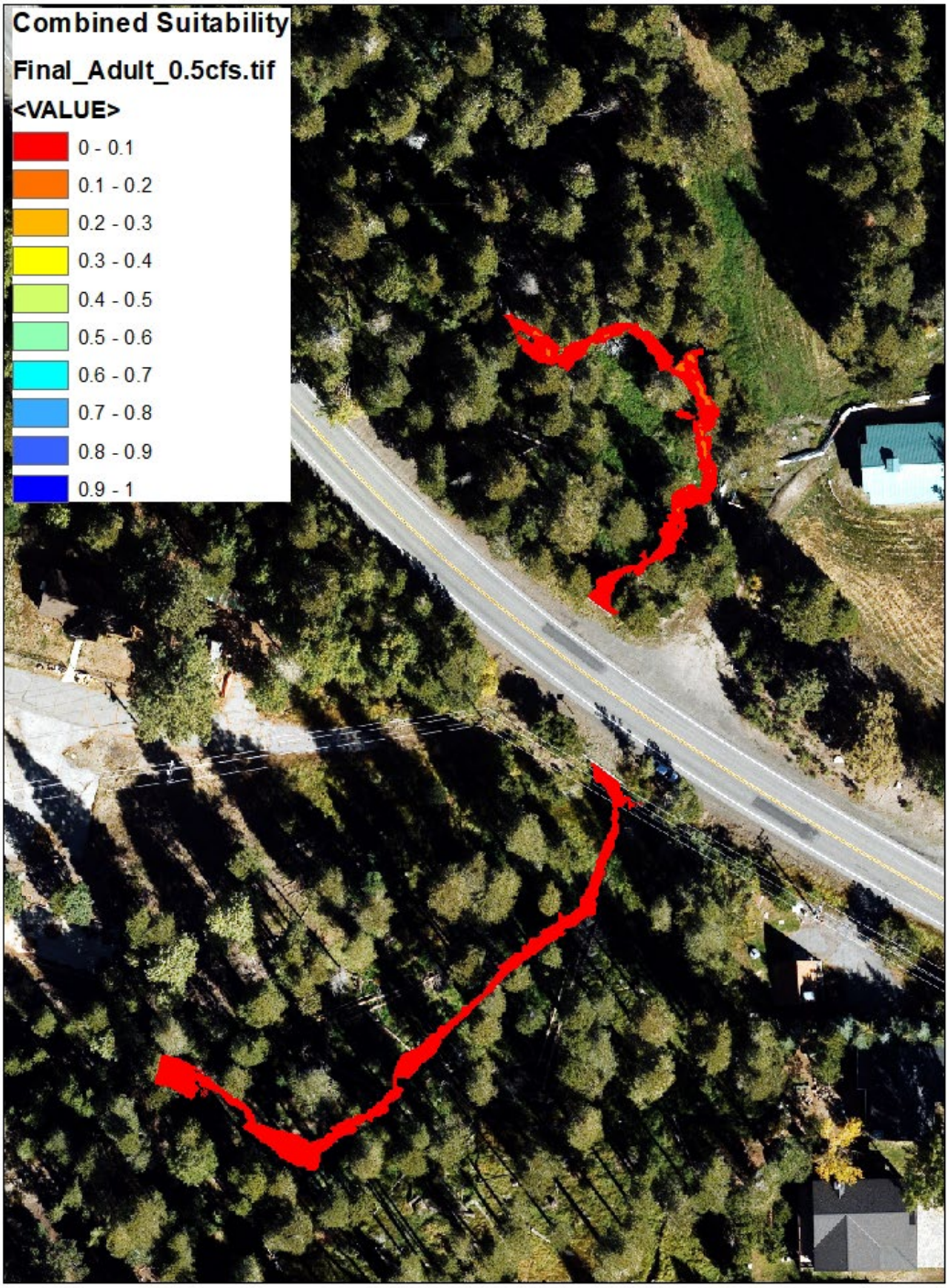
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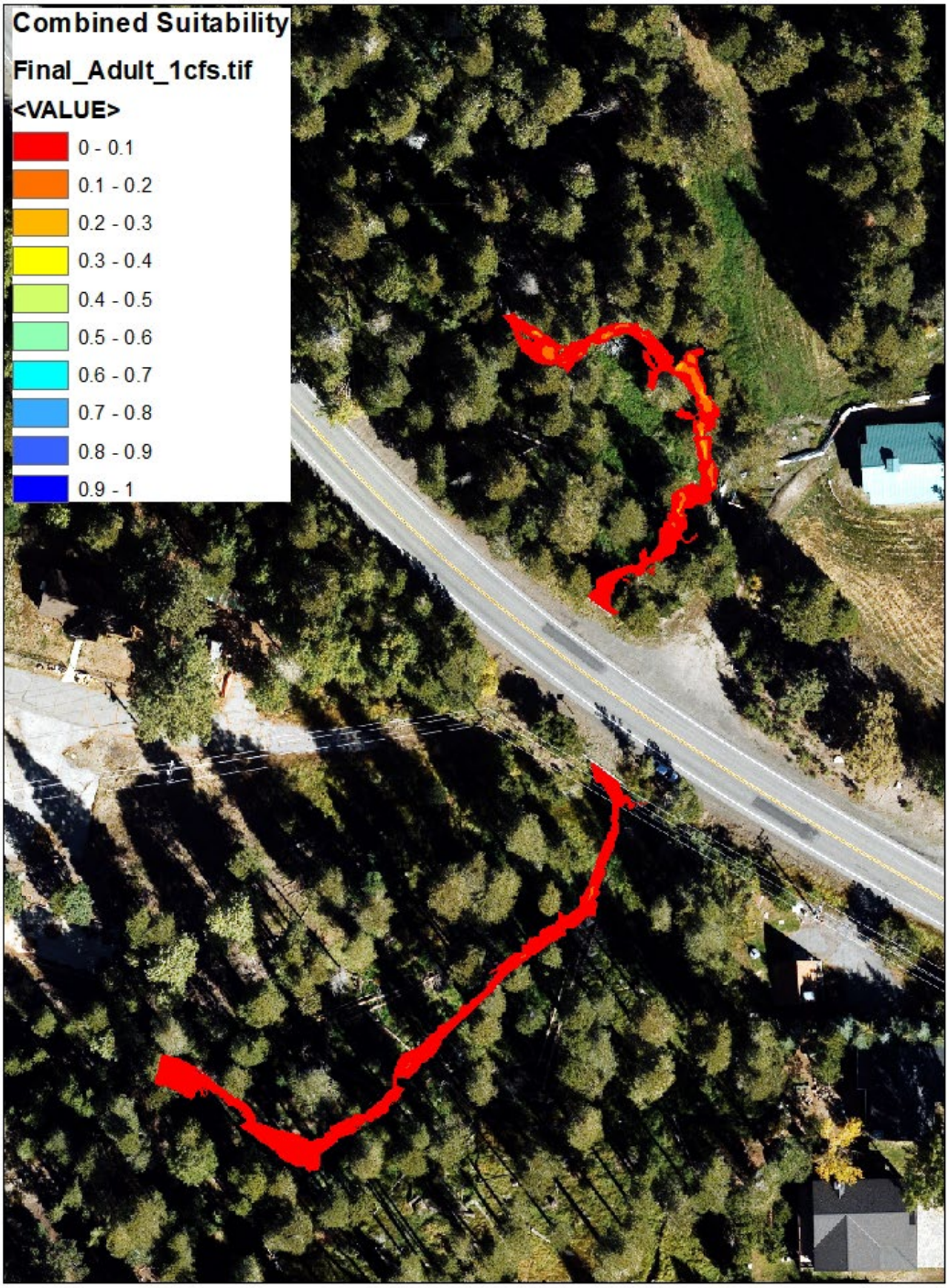
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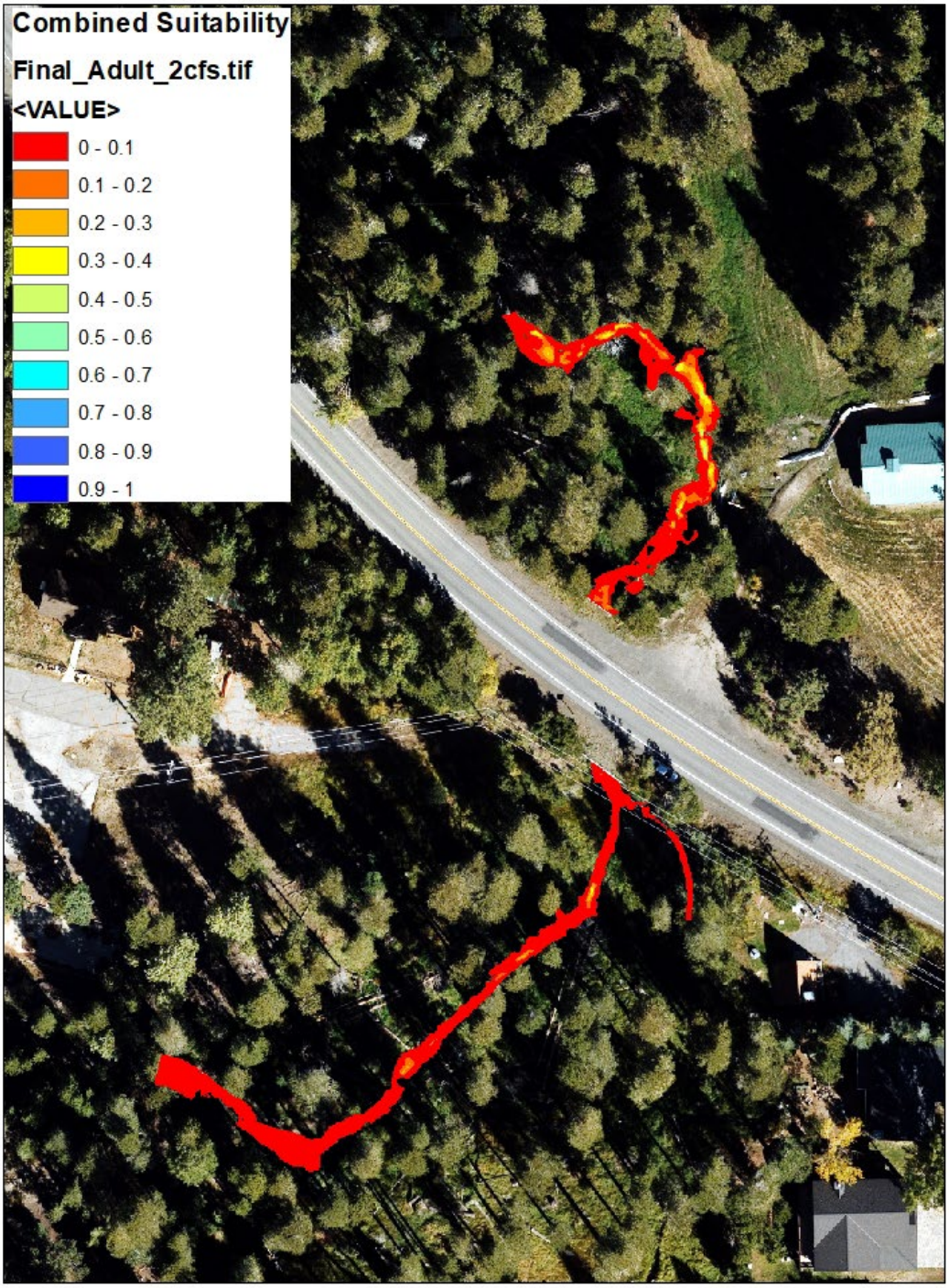
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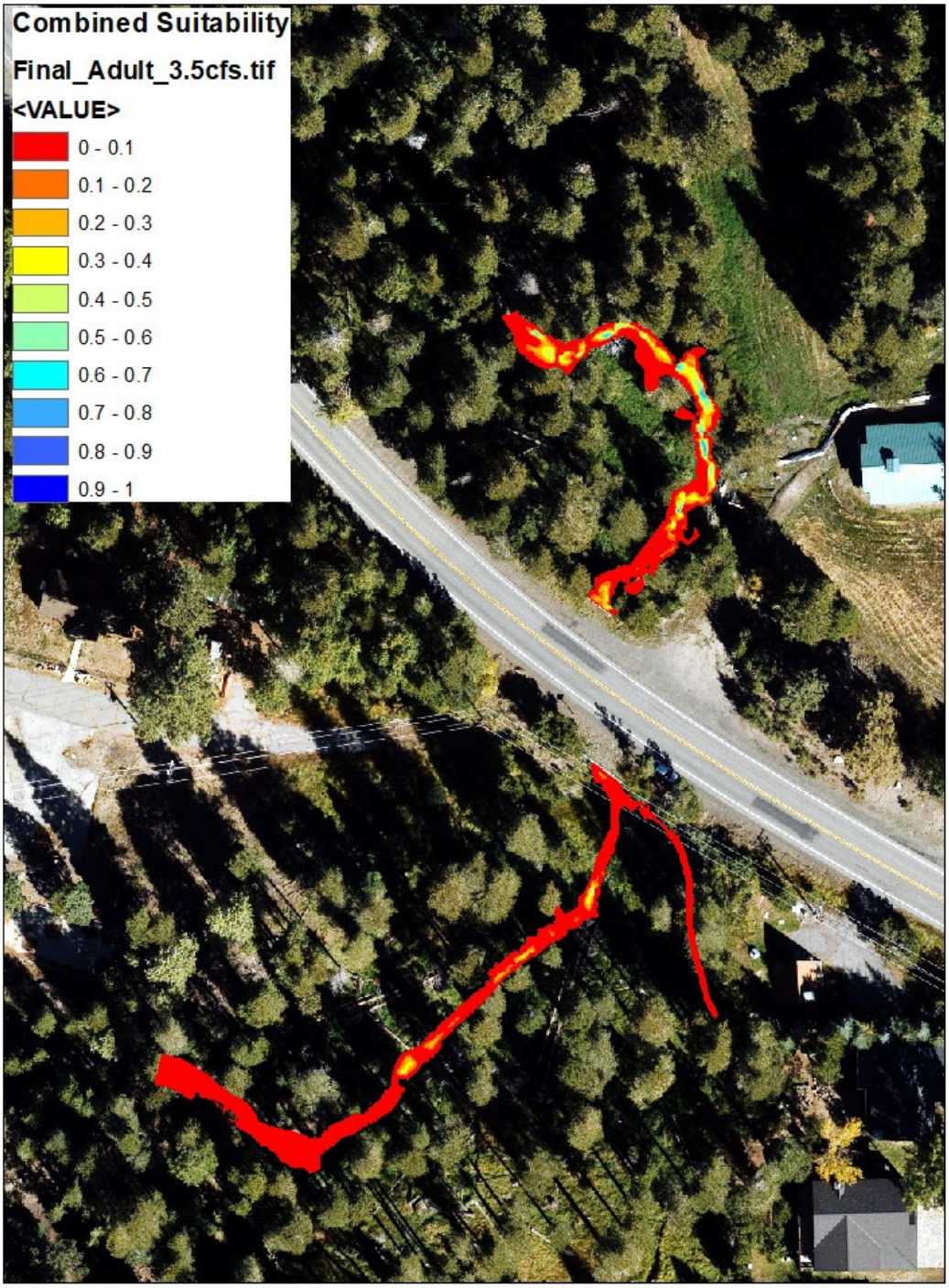
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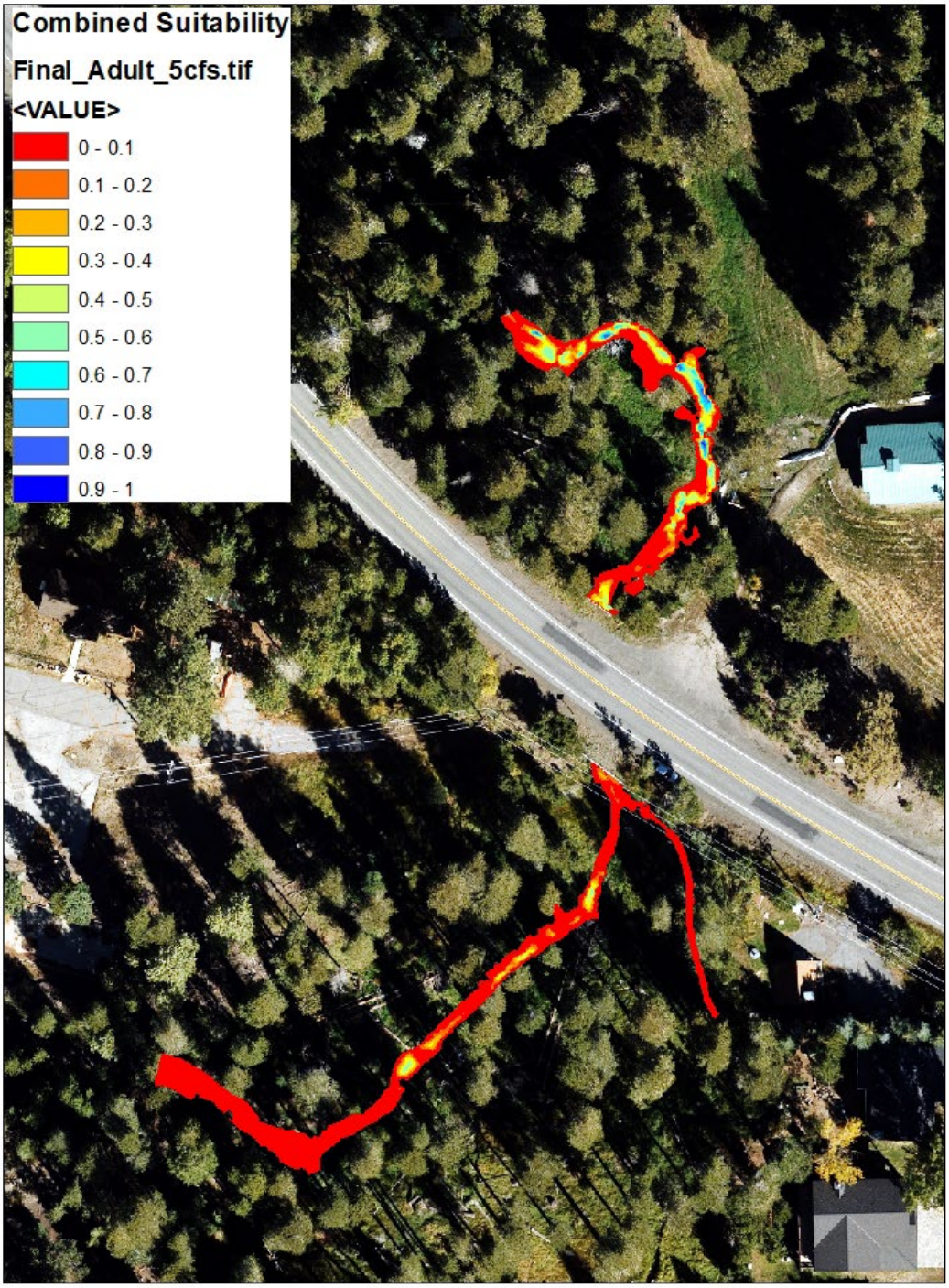
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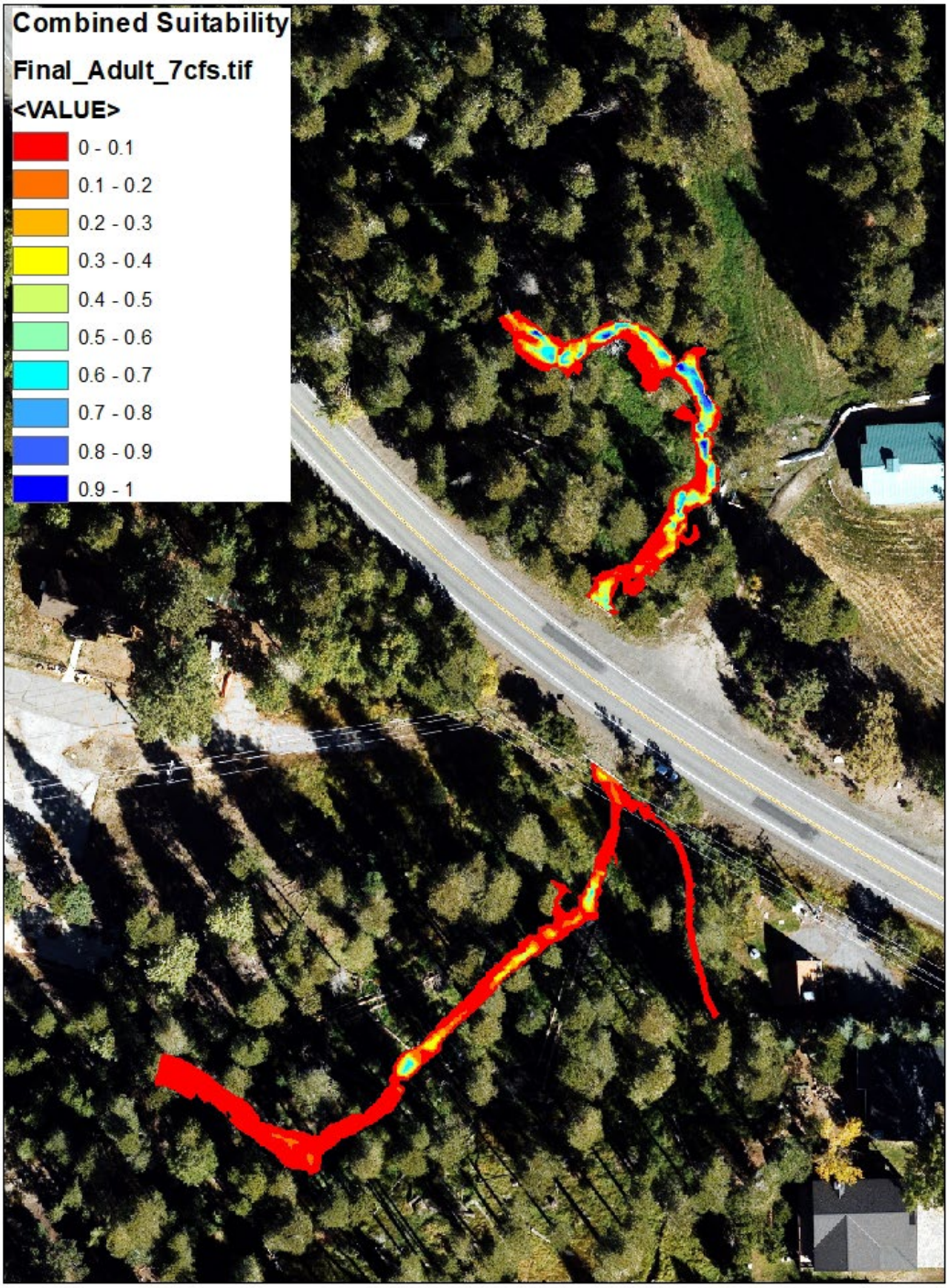
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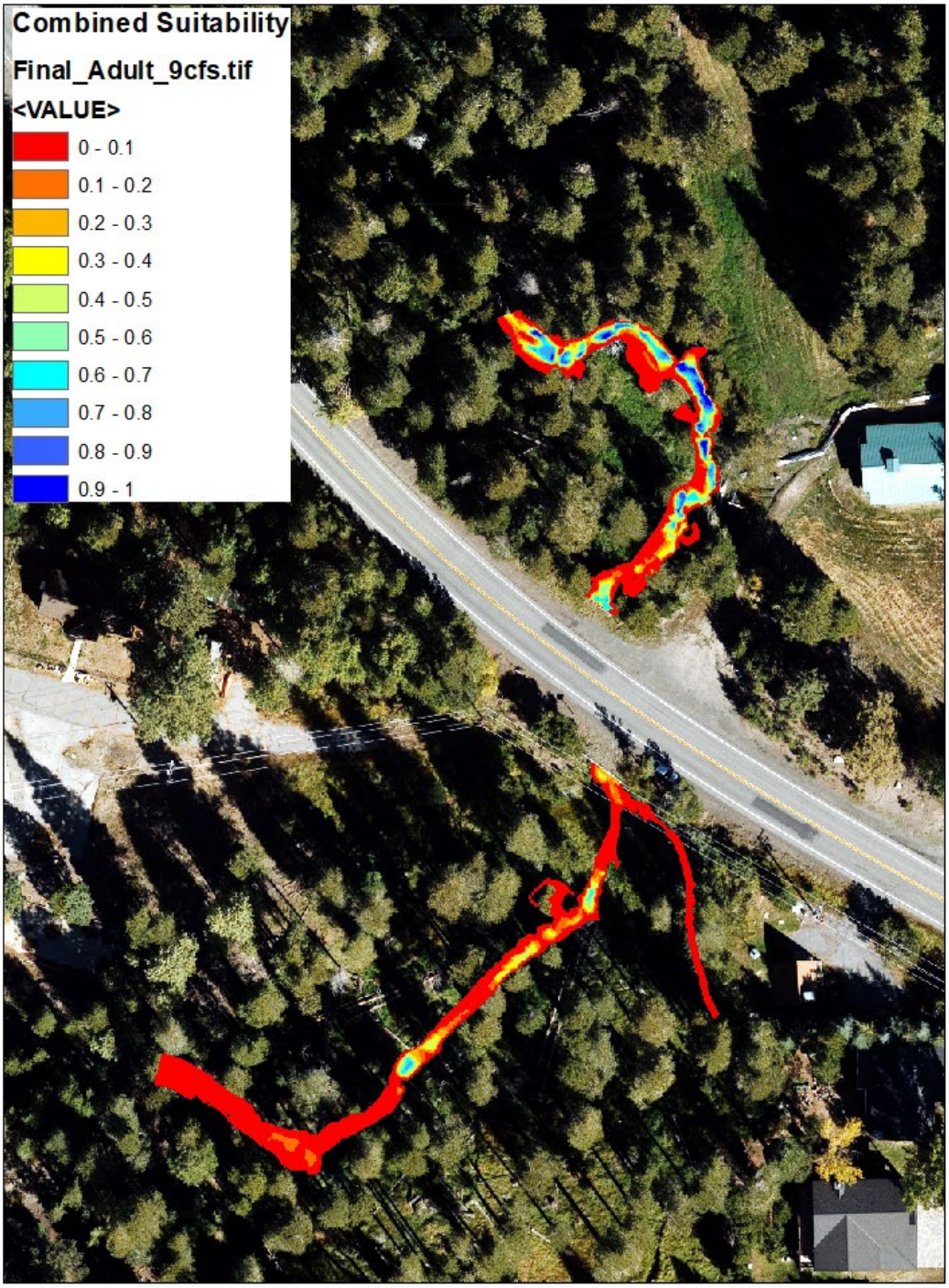
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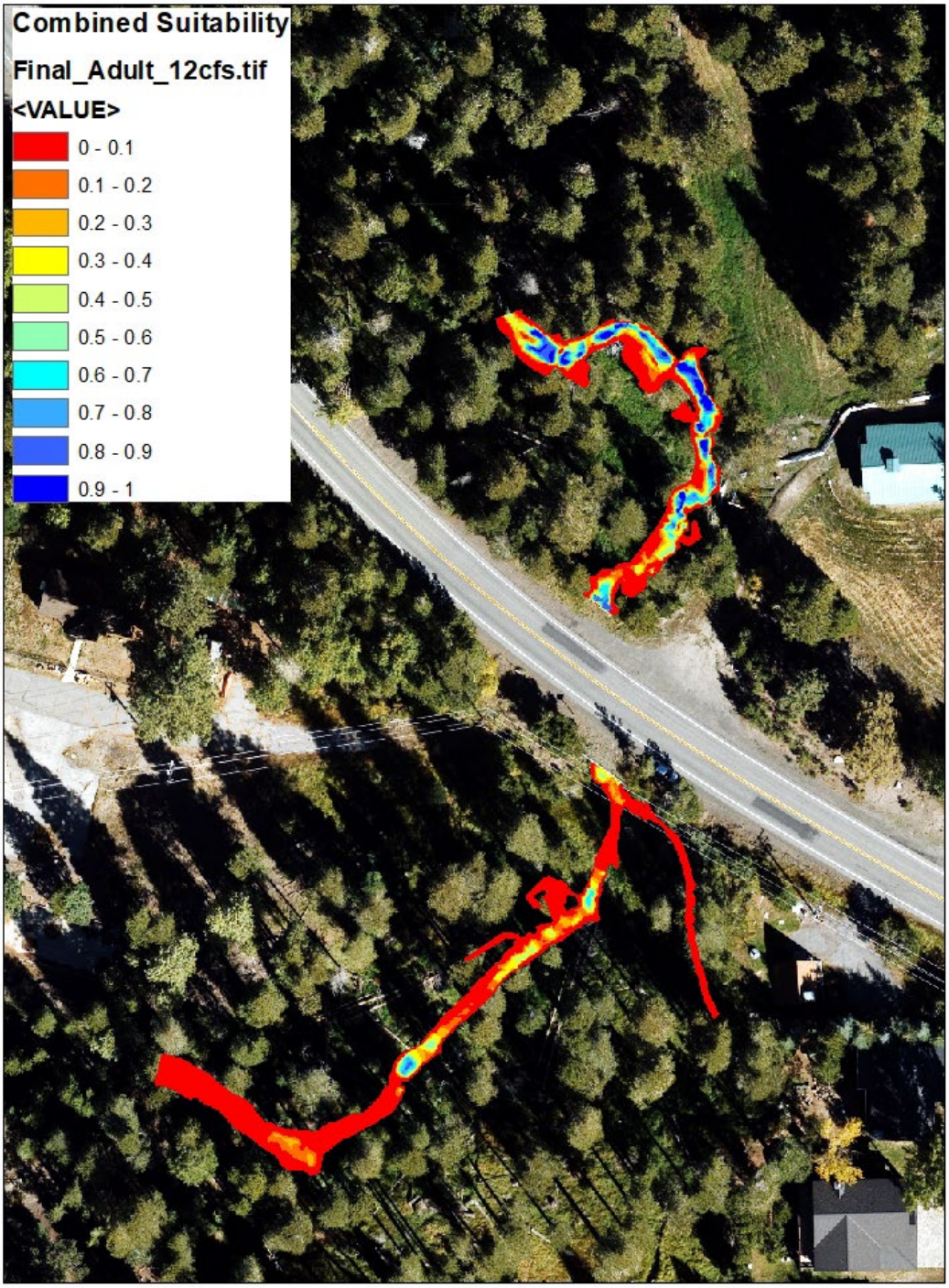
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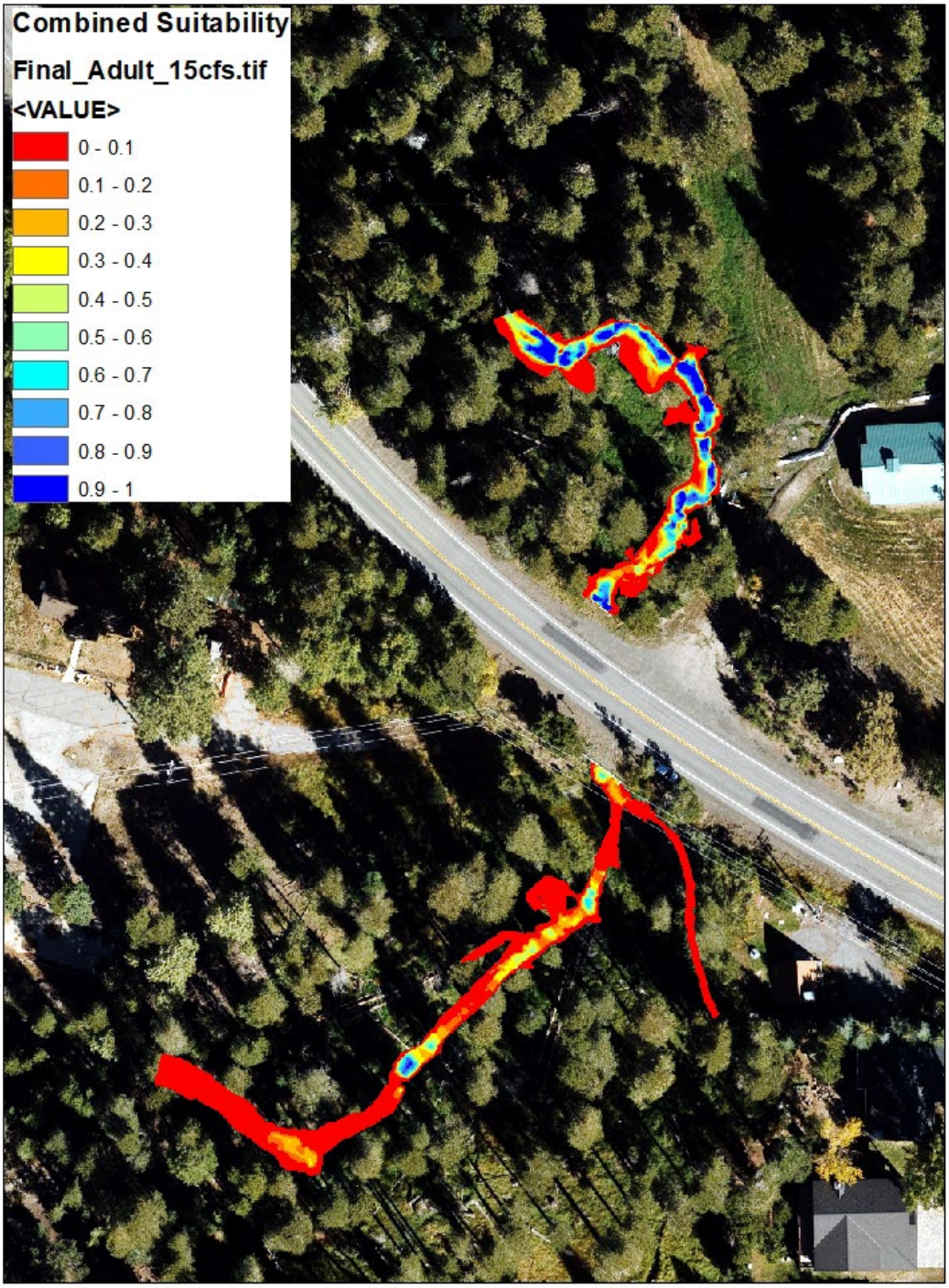
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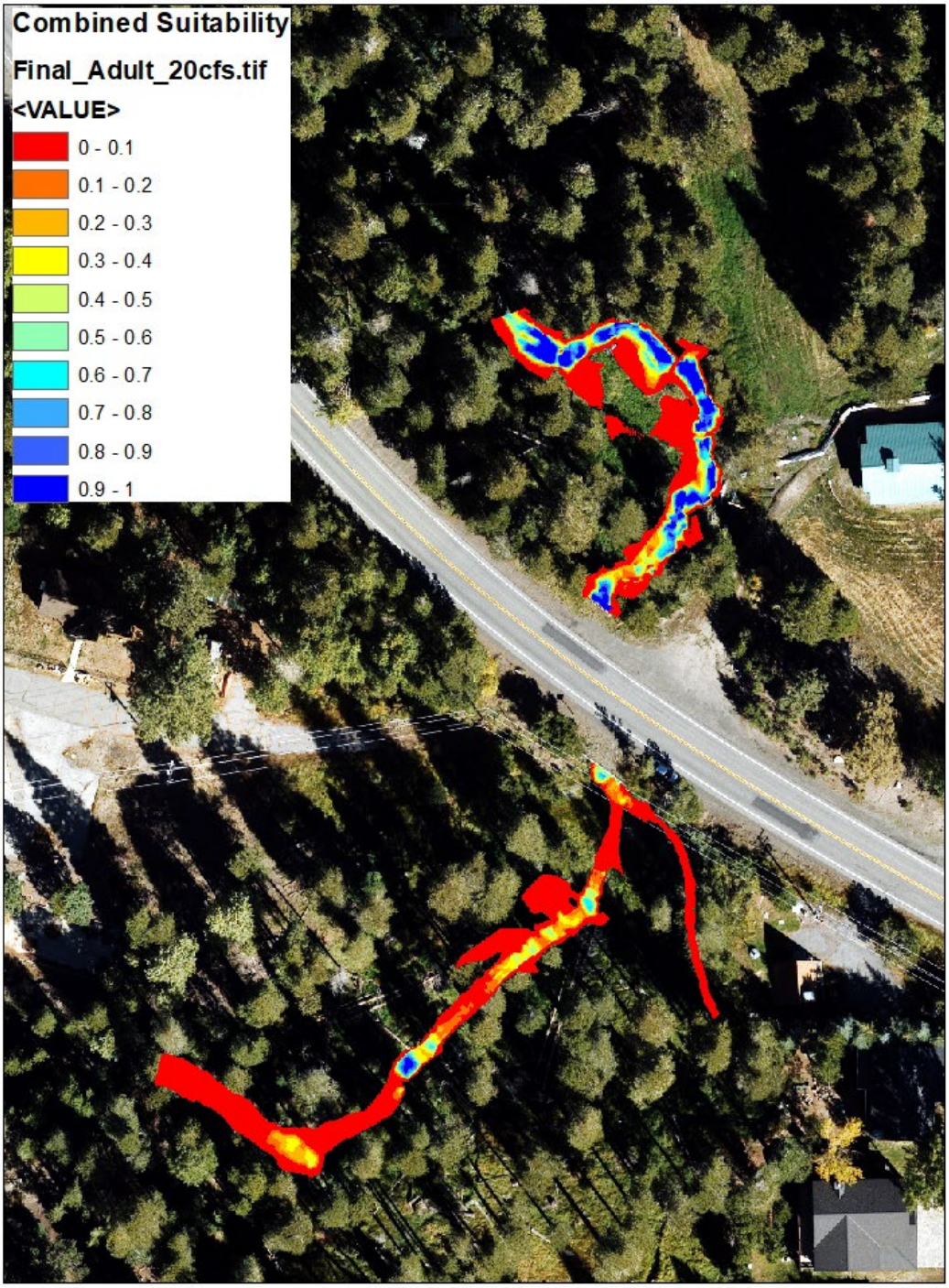
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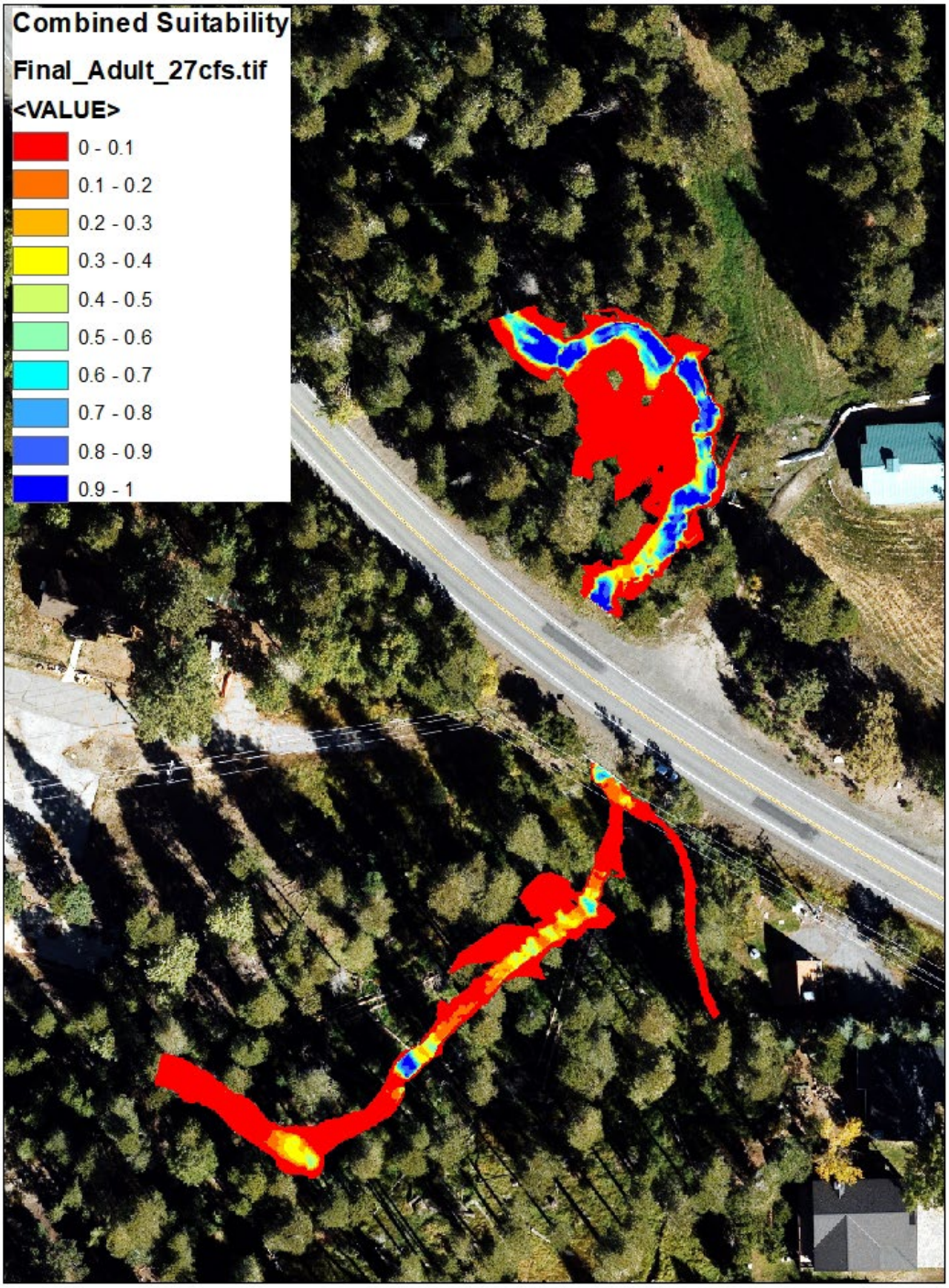
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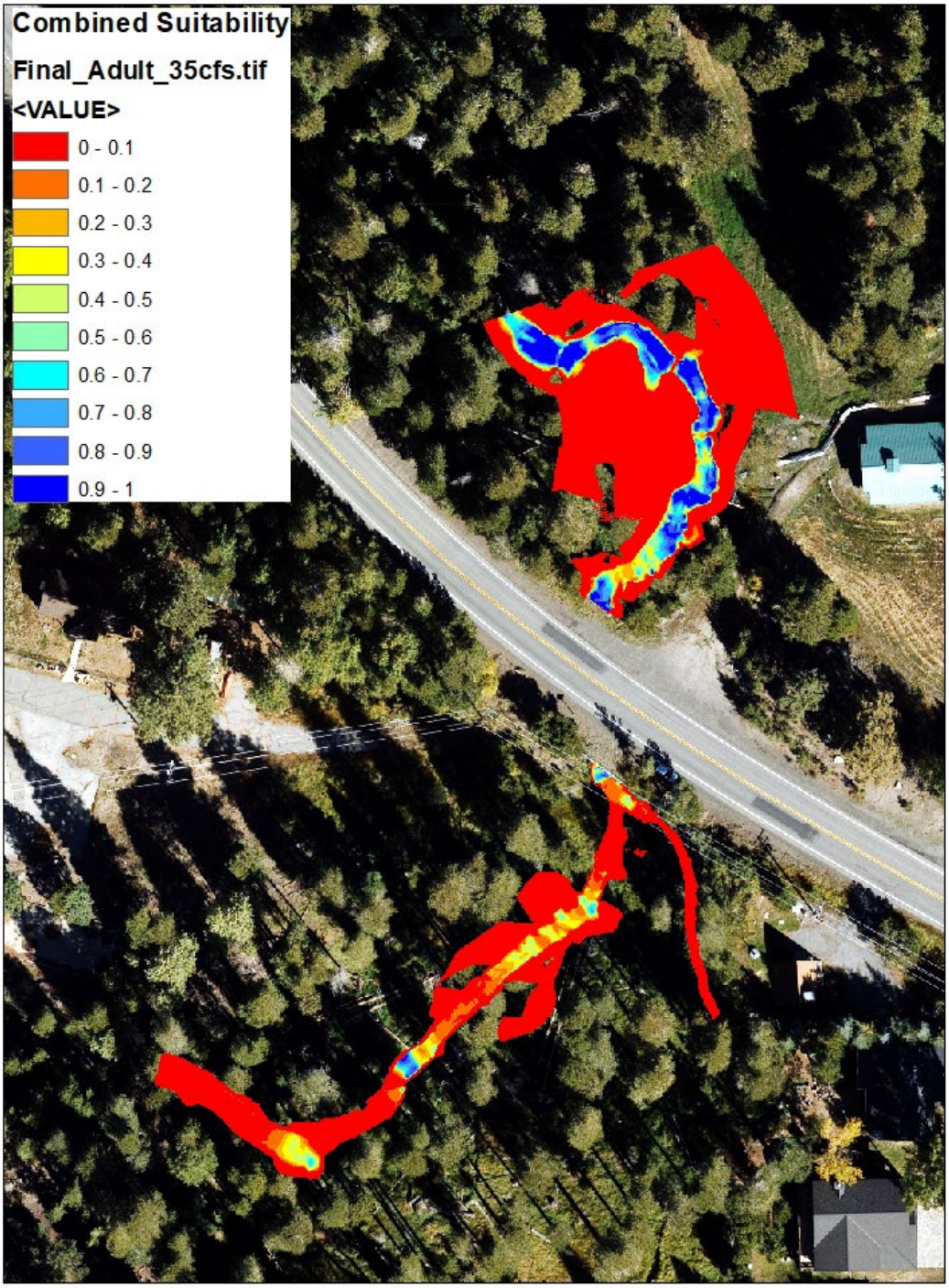
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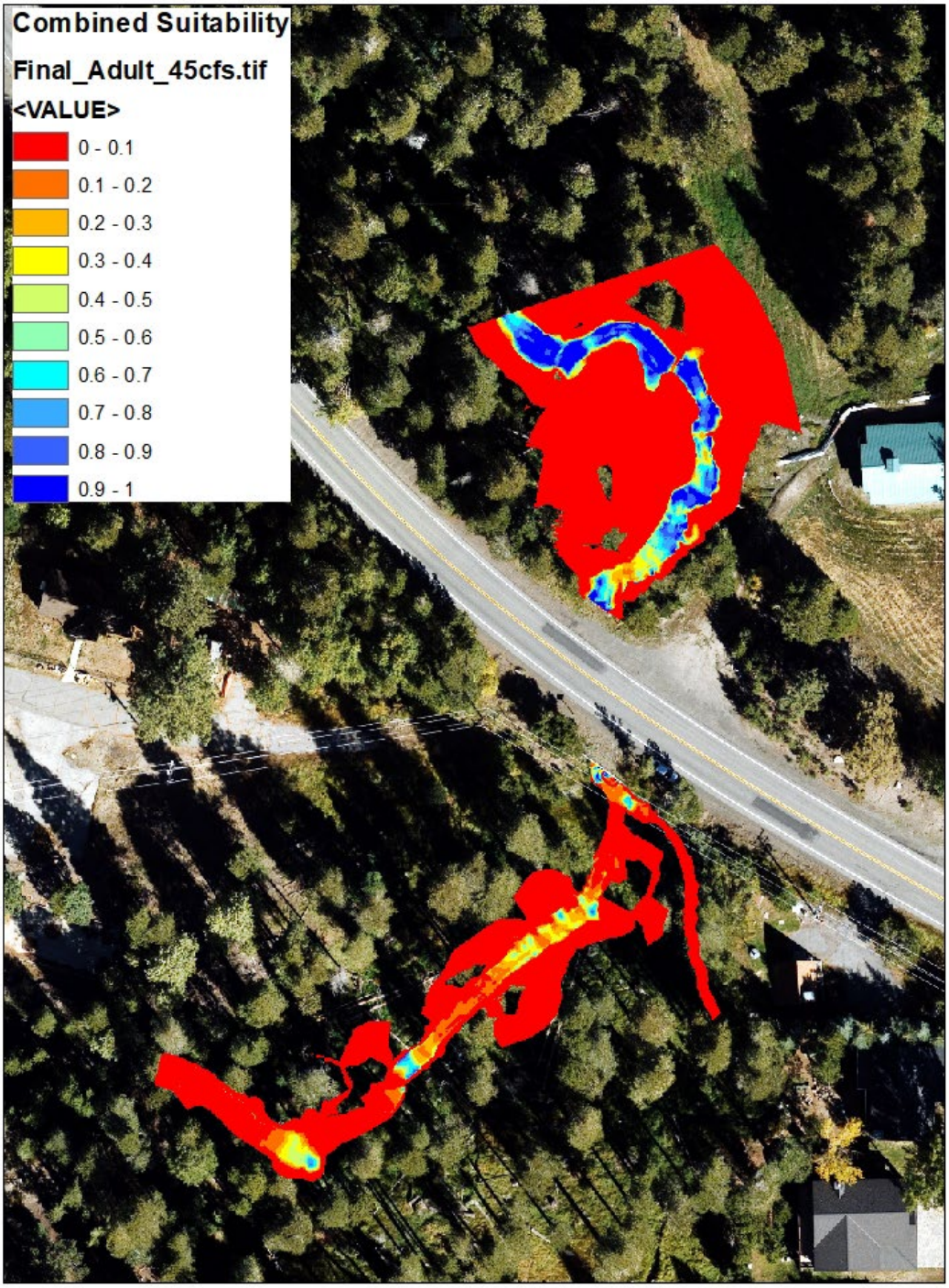
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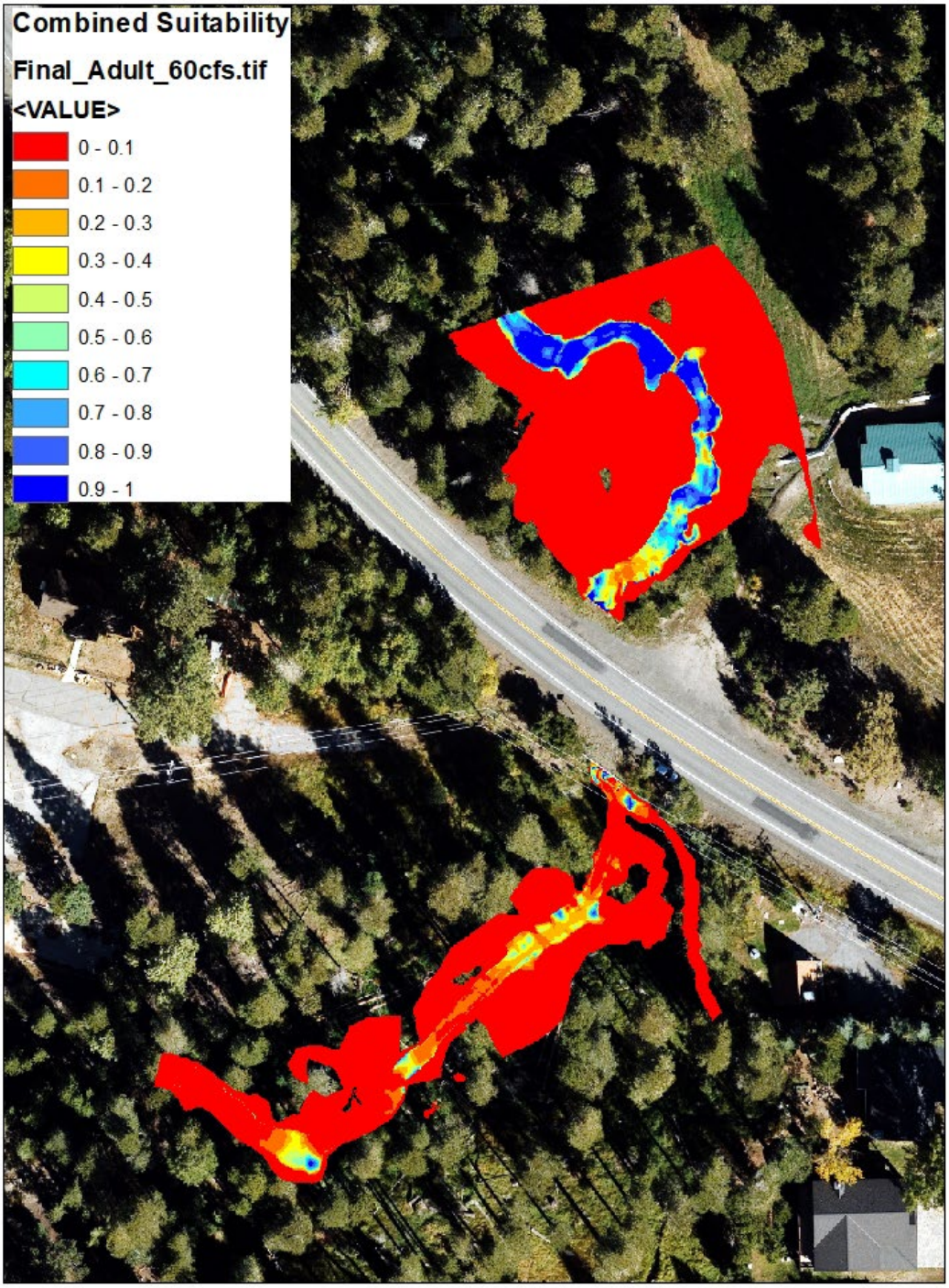
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APPENDIX N

Habitat Time Series

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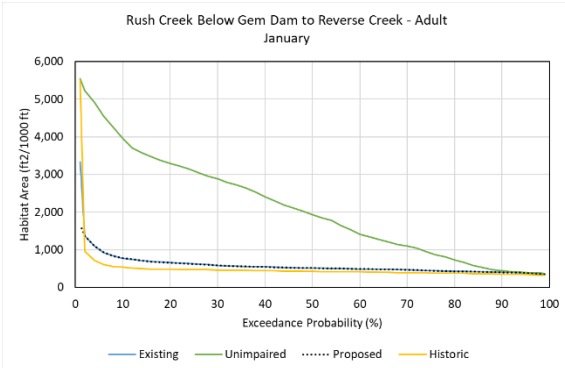
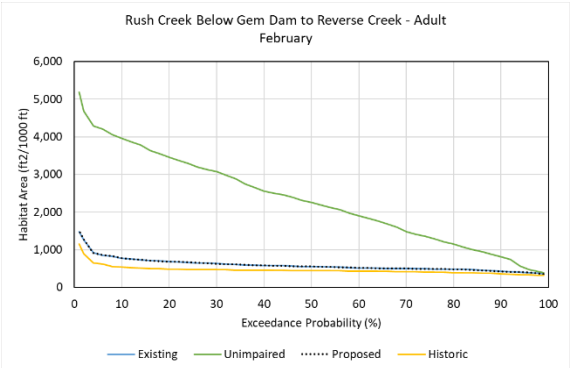
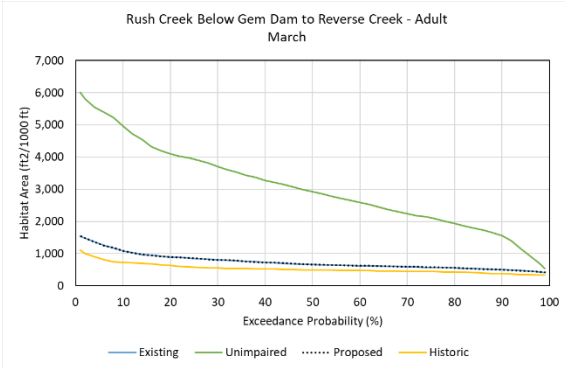
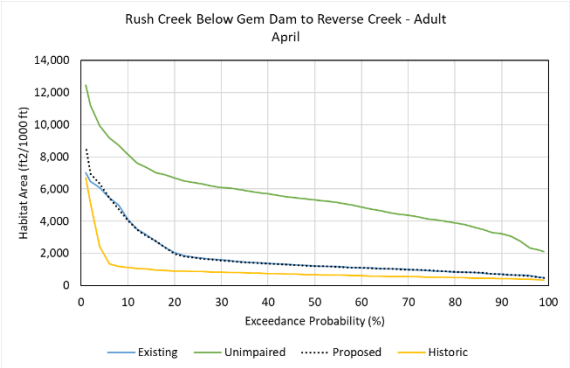
INTRODUCTION

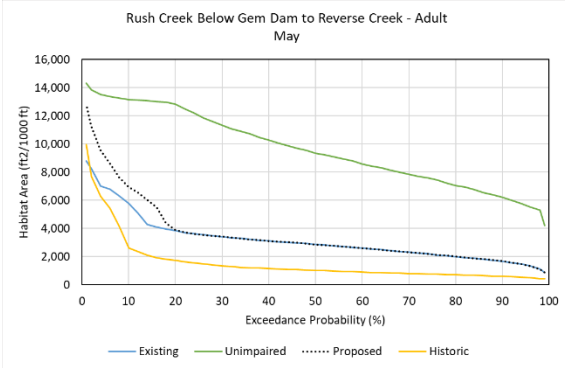
The following figures show the habitat time series results for all life stages (adult, juvenile, fry, and spawning) at Rush Creek below Gem Dam, Rush Creek above Silver Lake, Rush Creek below Silver Lake and South Rush Creek.

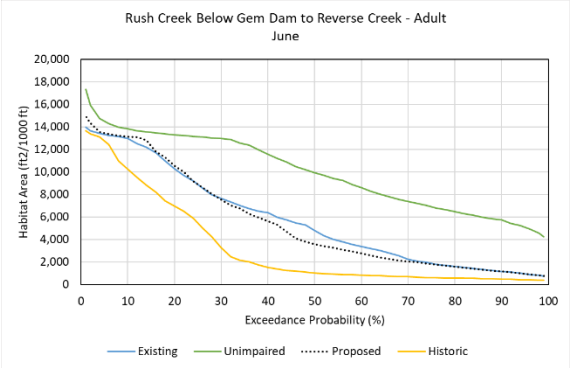












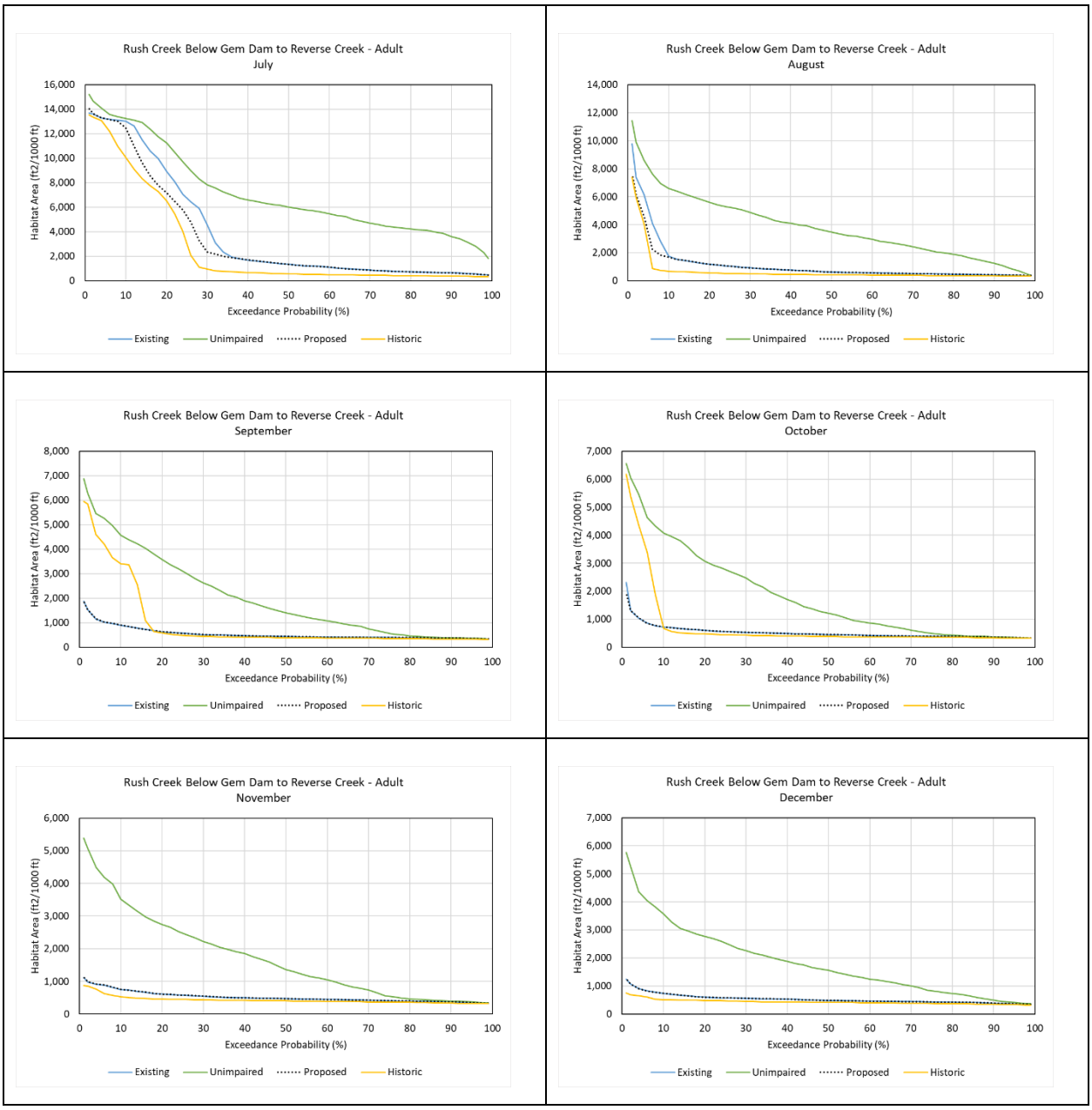
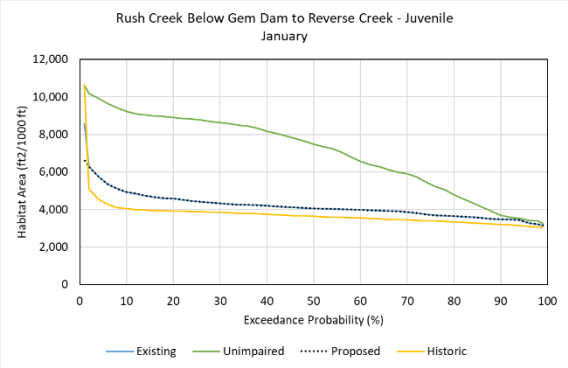
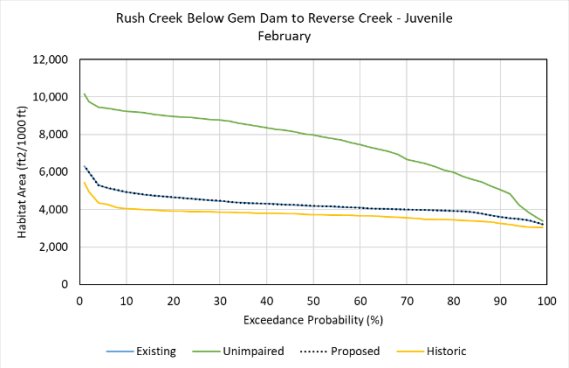
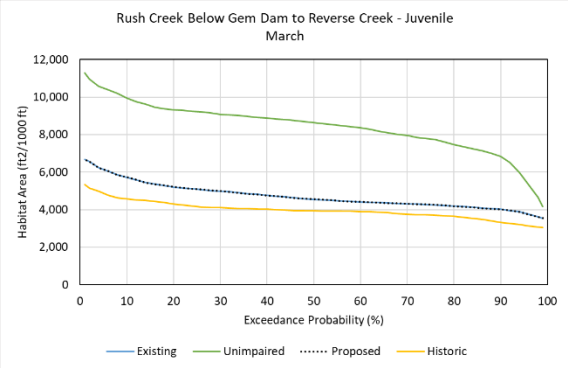
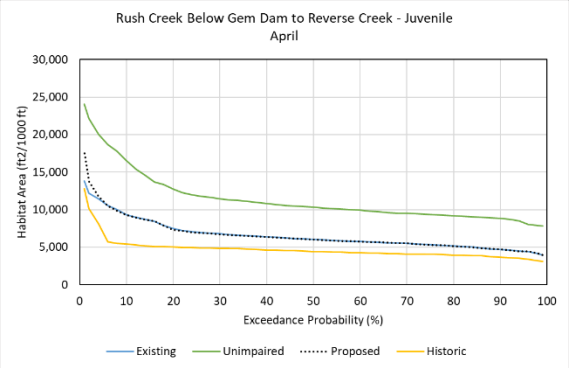


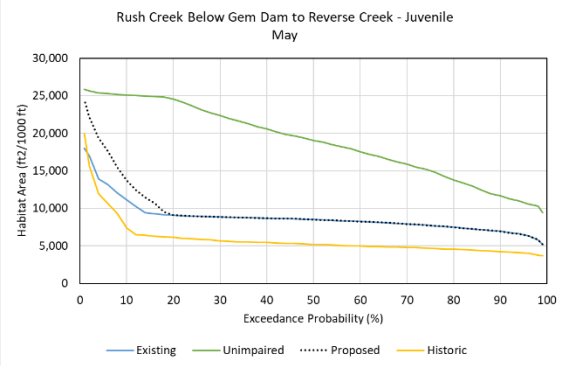
Figure AQ 1-N1. Time Series Adult Trout Habitat for Rush Creek Below Gem Dam

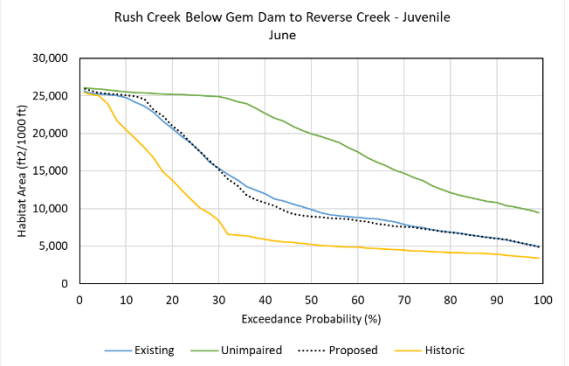

Rush Creek Below Gem Dam to Reverse Creek - Juvenile
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

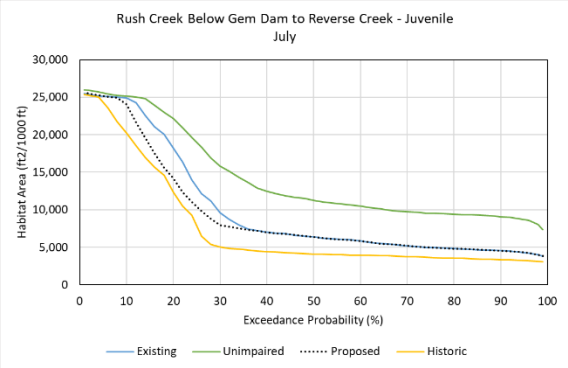

Rush Creek Below Gem Dam to Reverse Creek - Juvenile
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

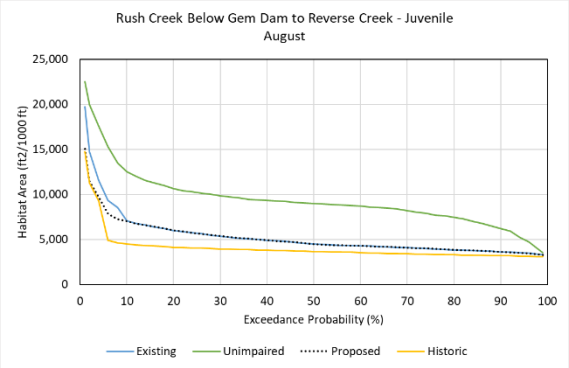

Rush Creek Below Gem Dam to Reverse Creek - Juvenile
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Gem Dam to Reverse Creek - Juvenile
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Gem Dam to Reverse Creek - Juvenile
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Gem Dam to Reverse Creek - Juvenile
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Gem Dam to Reverse Creek - Juvenile
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Gem Dam to Reverse Creek - Juvenile
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

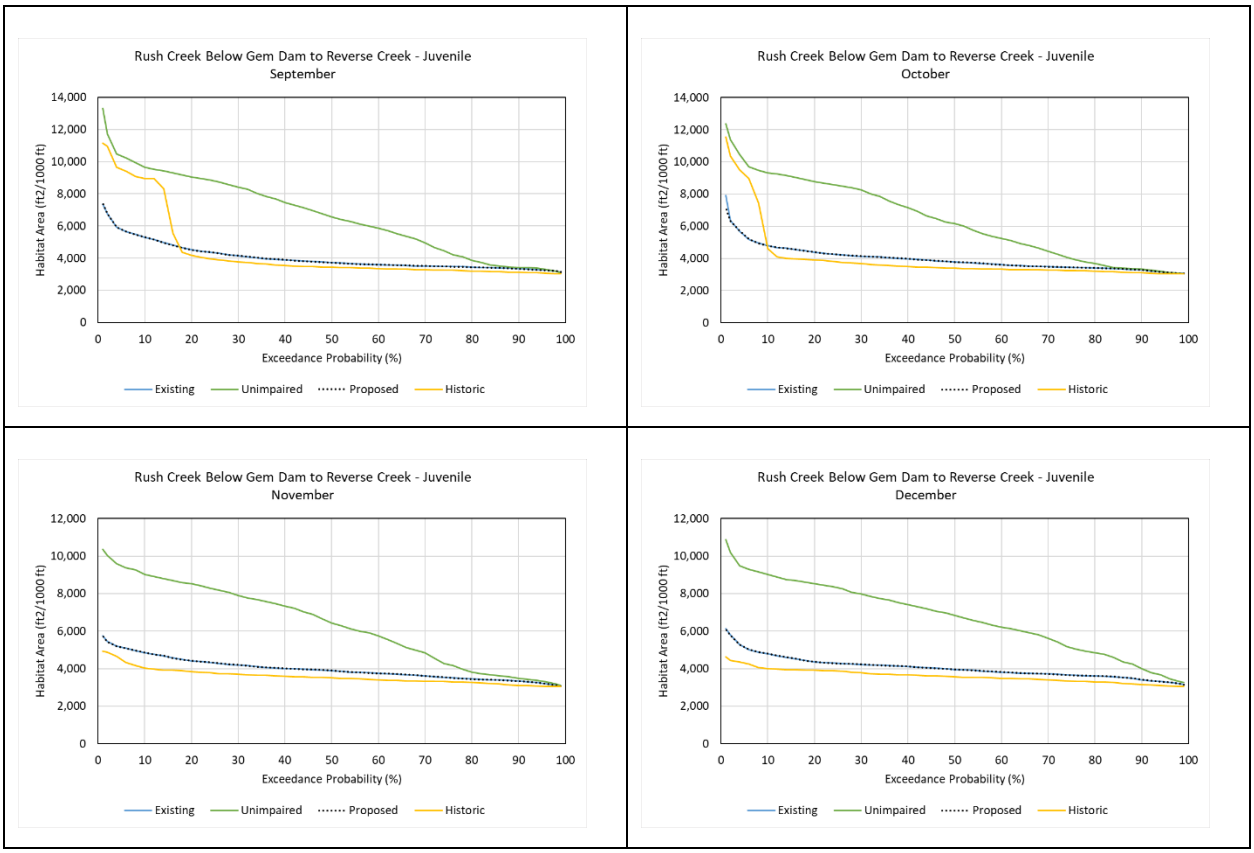


Figure AQ 1-N2. Time Series Juvenile Trout Habitat for Rush Creek Below Gem Dam

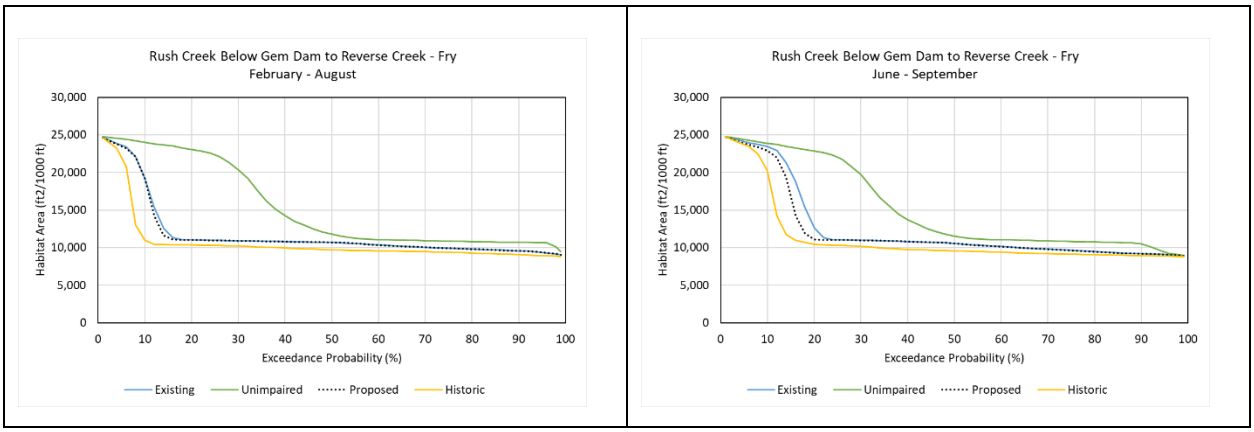


Figure AQ 1-N3. Time Series Fry Trout Habitat for Rush Creek Below Gem Dam

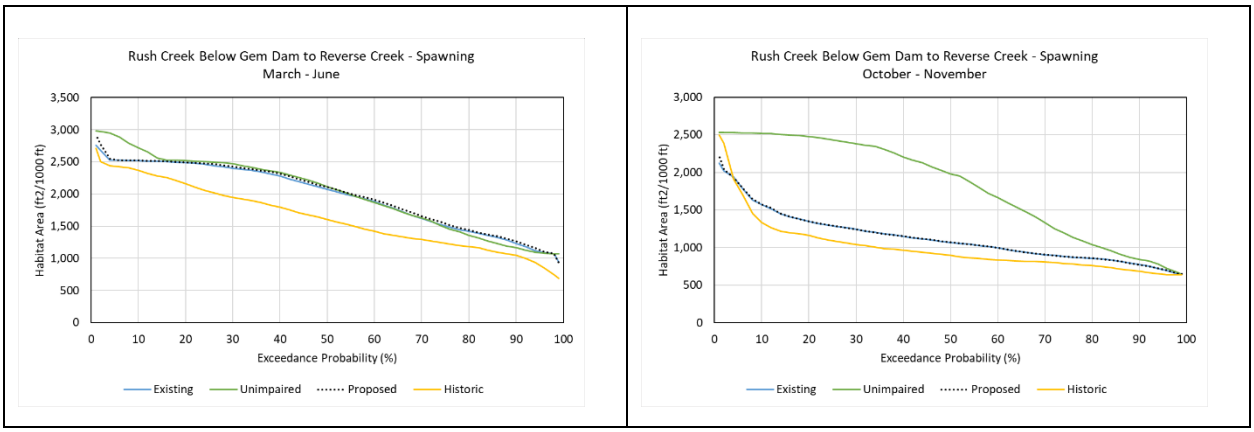
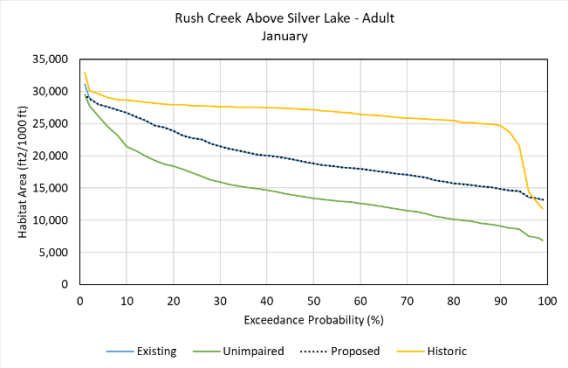
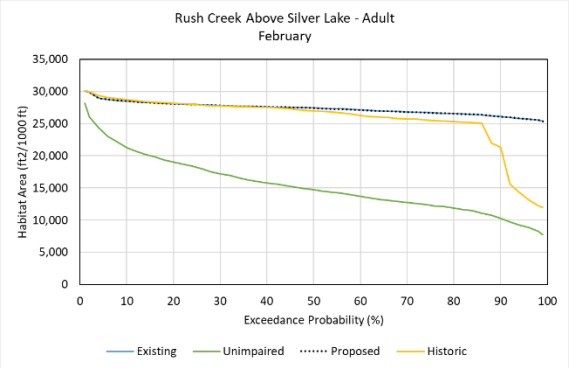
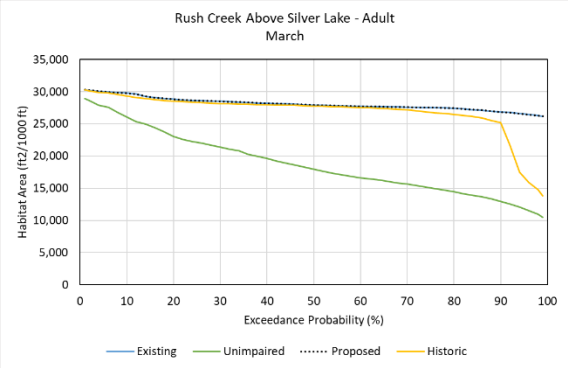
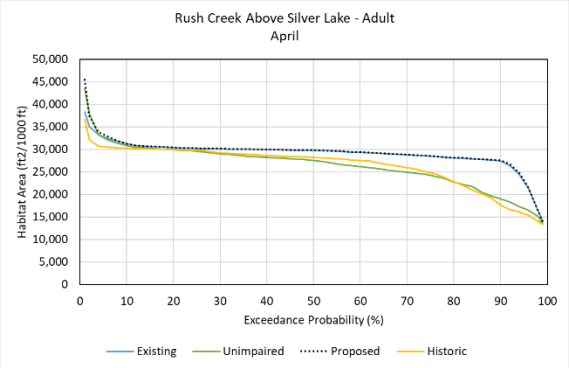


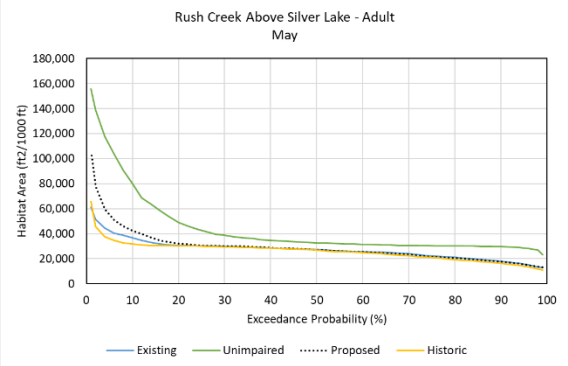
Figure AQ 1-N4. Time Series Spawning Trout Habitat for Rush Creek Below Gem Dam

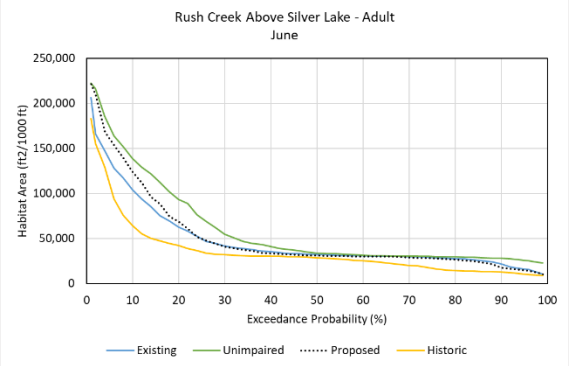

Rush Creek Above Silver Lake - Adult
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

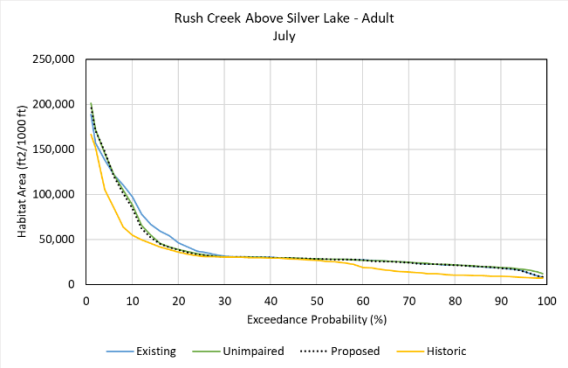

Rush Creek Above Silver Lake - Adult
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

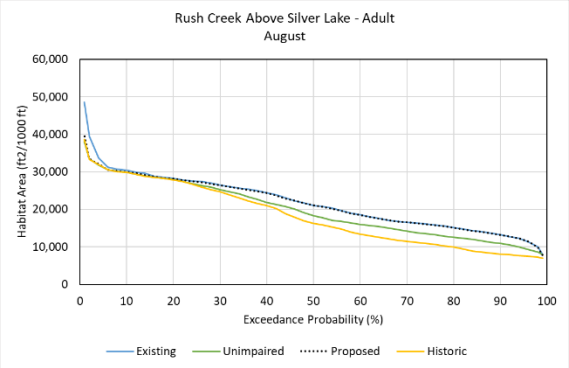

Rush Creek Above Silver Lake - Adult
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Adult
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Adult
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Adult
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Adult
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Adult
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

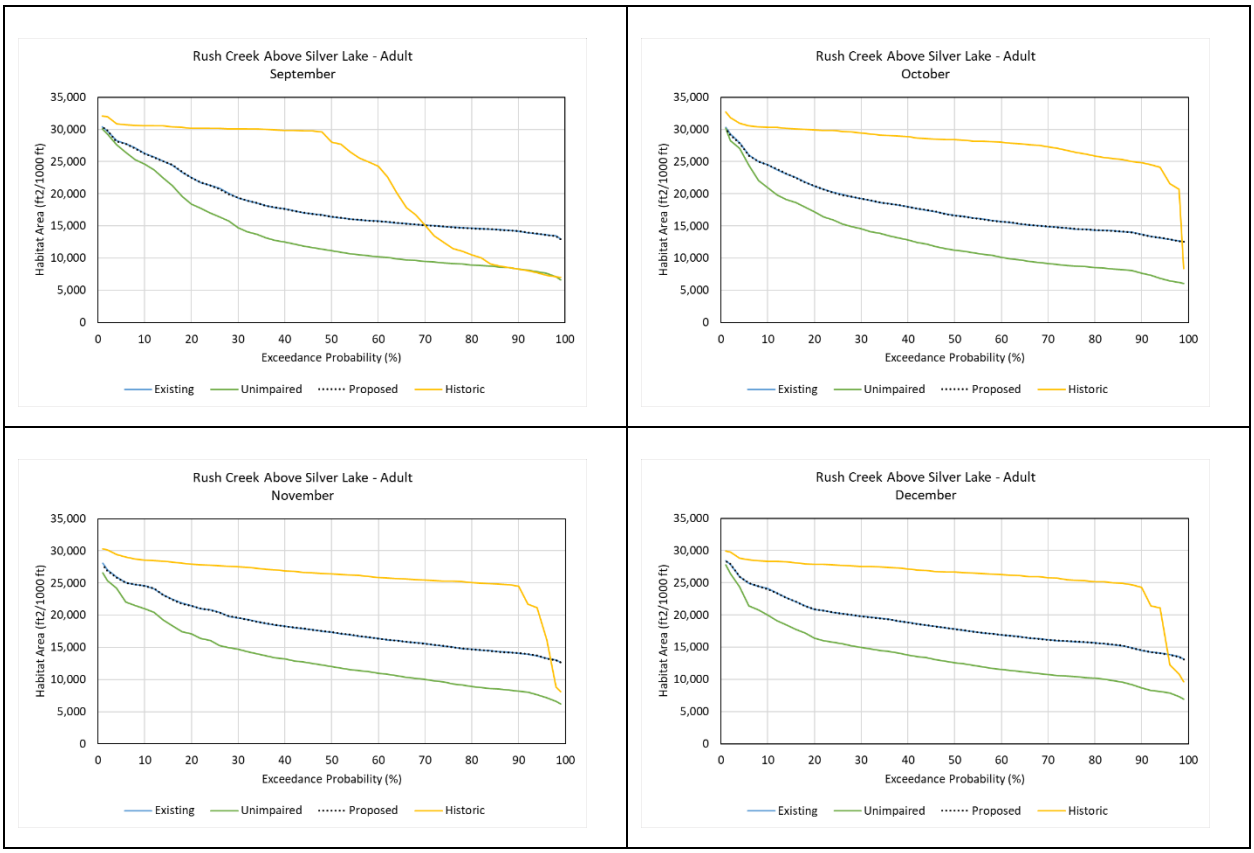
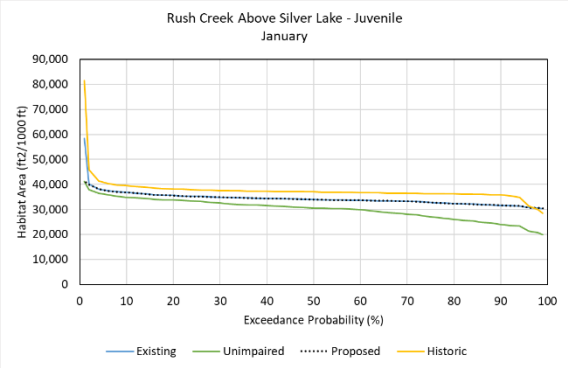
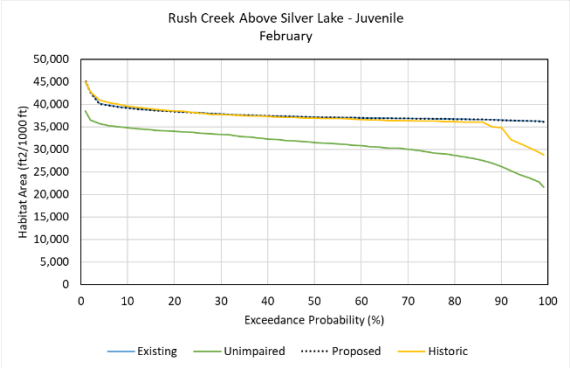
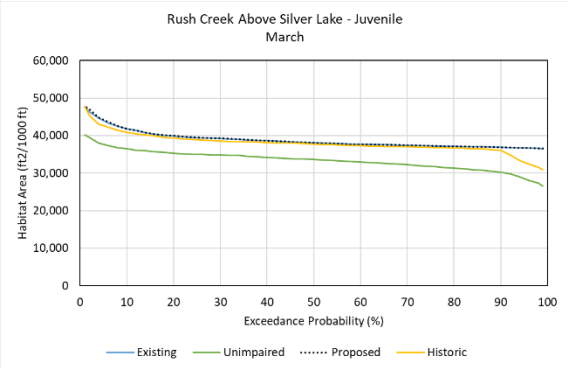
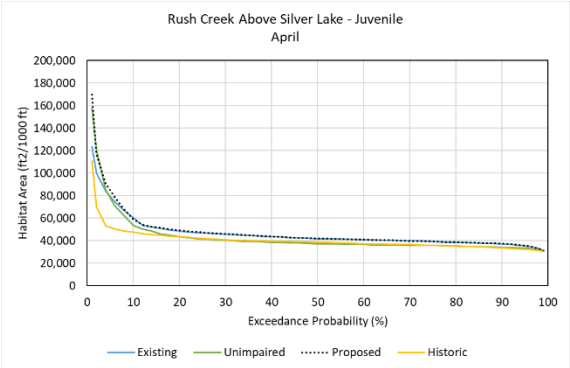


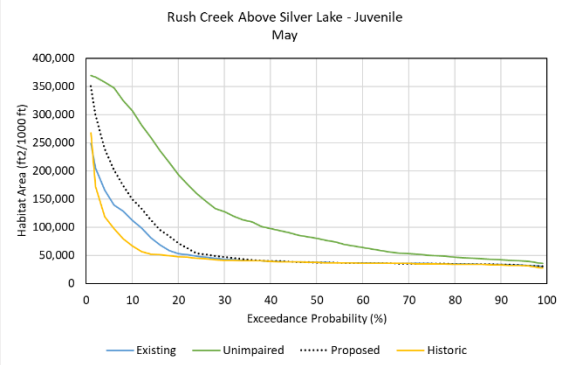
Figure AQ 1-N5. Time Series Adult Trout Habitat for Rush Creek Above Silver Lake

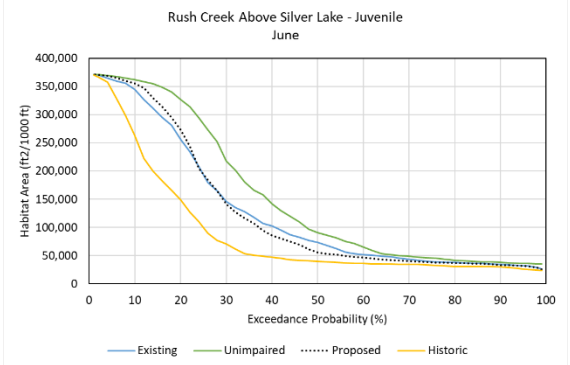

Rush Creek Above Silver Lake - Juvenile
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Juvenile
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Juvenile
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Juvenile
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Juvenile
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Above Silver Lake - Juvenile
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

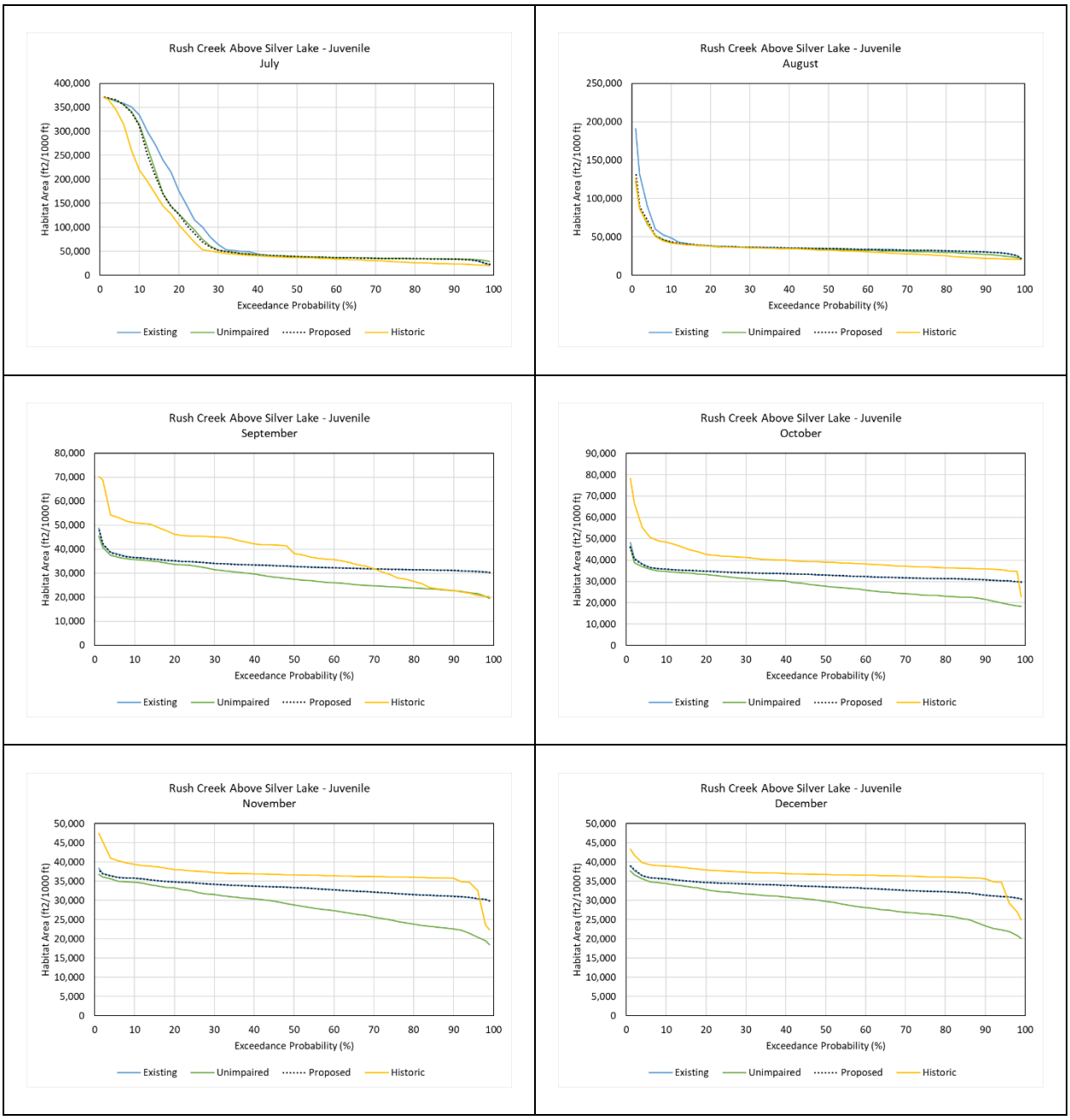


Figure AQ 1-N6. Time Series Juvenile Trout Habitat for Rush Creek Above Silver Lake

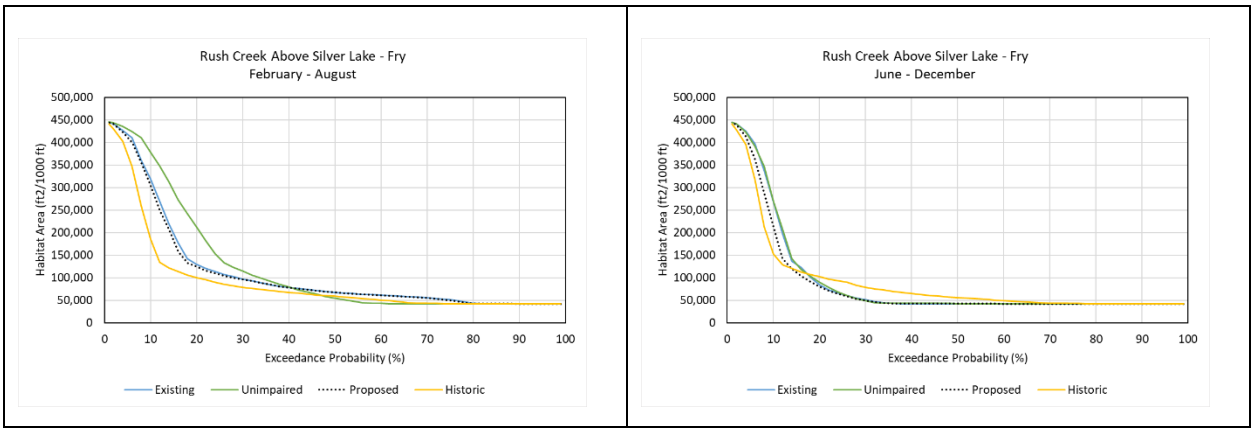
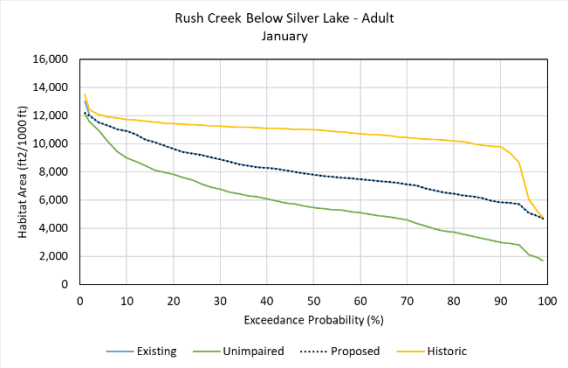
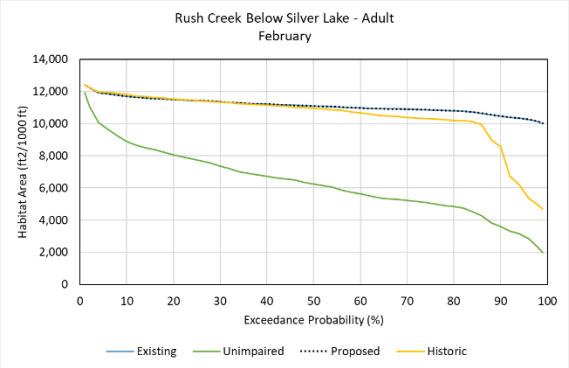
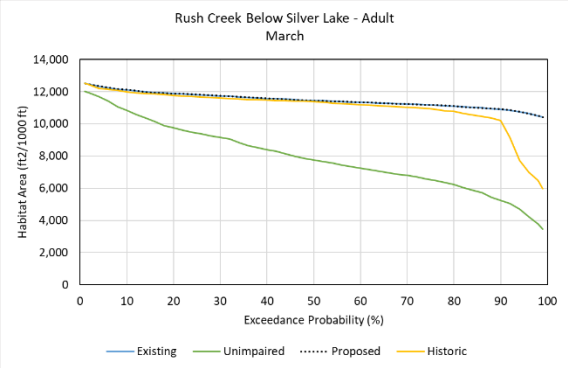
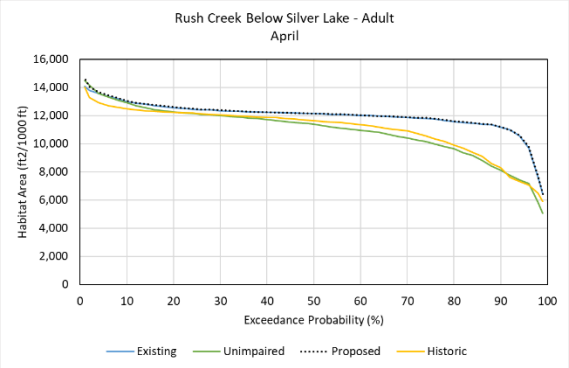


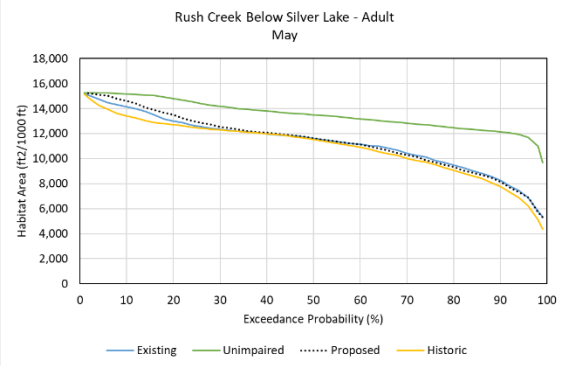
Figure AQ 1-N7. Time Series Fry Trout Habitat for Rush Creek Above Silver Lake

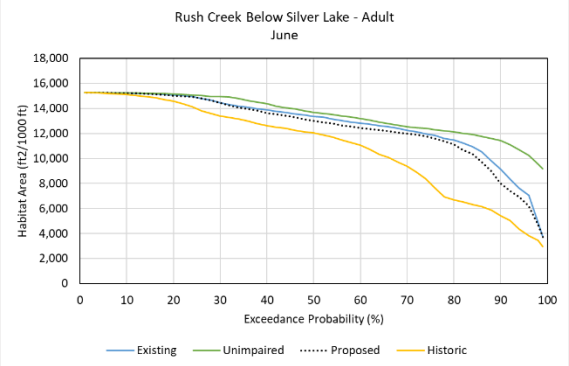

Rush Creek Below Silver Lake - Adult
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

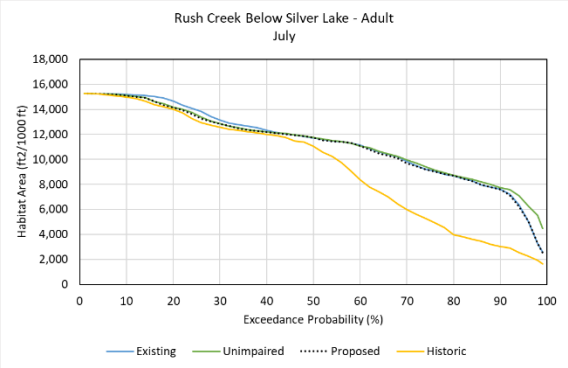

Rush Creek Below Silver Lake - Adult
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

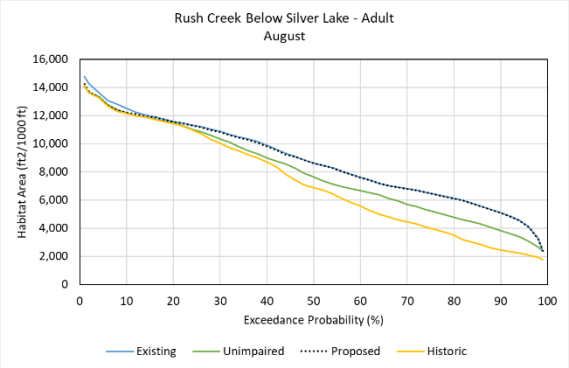

Rush Creek Below Silver Lake - Adult
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Adult
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Adult
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Adult
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Adult
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Adult
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

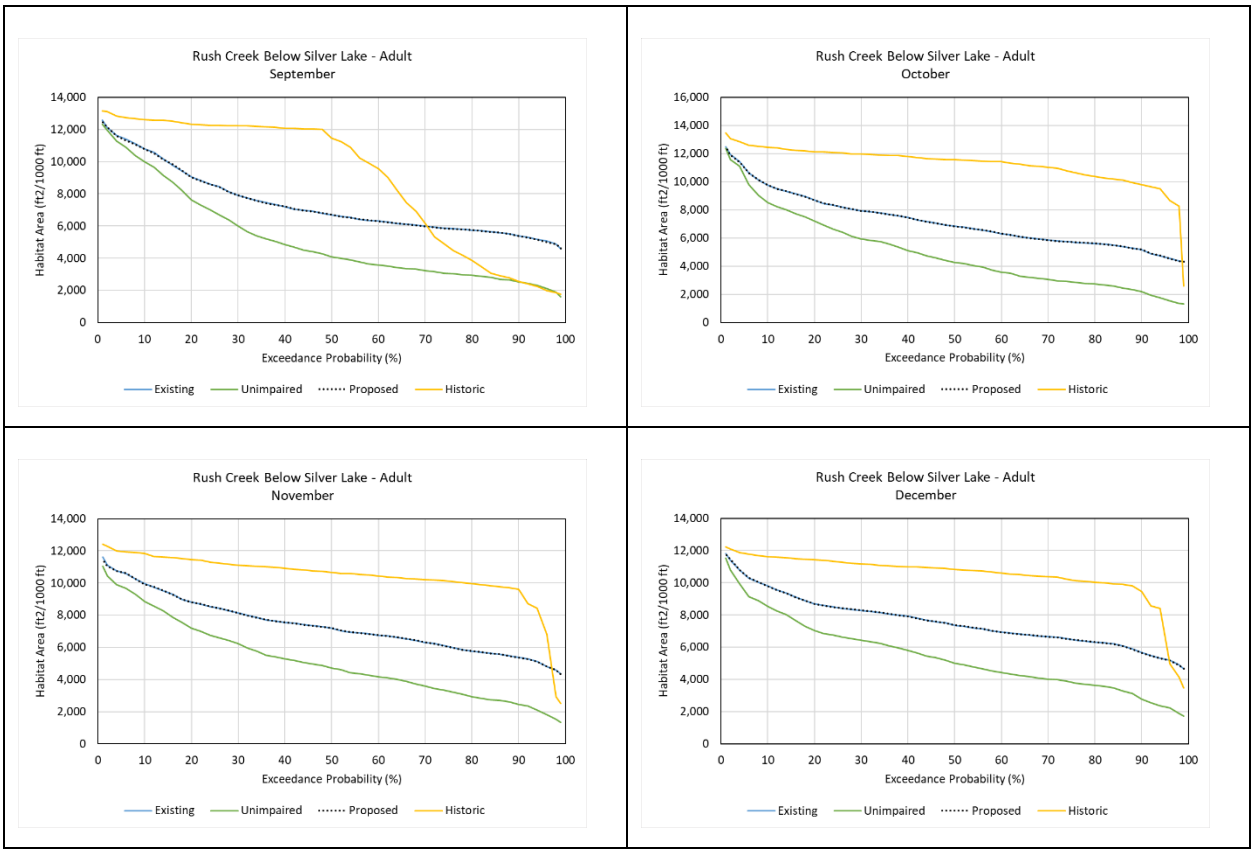
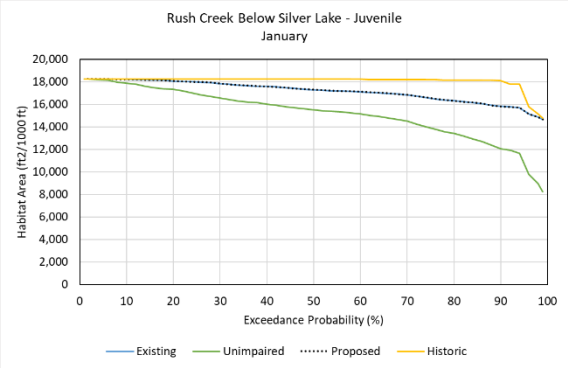
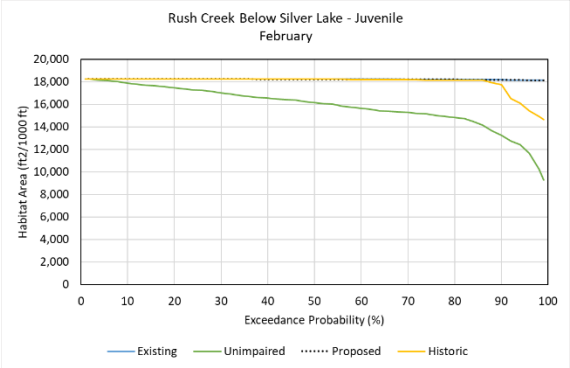
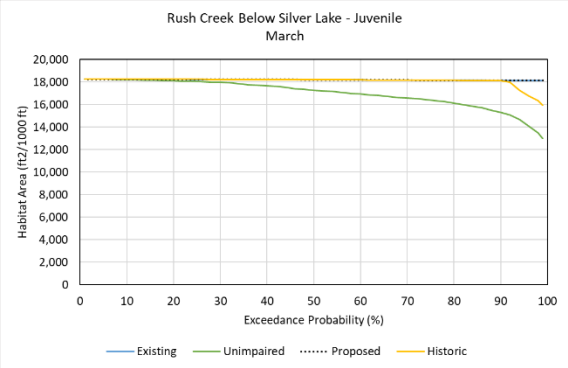
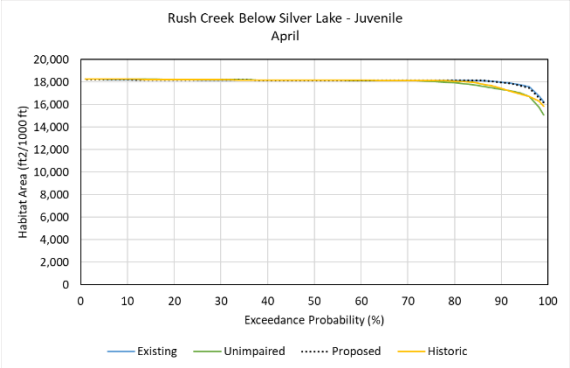


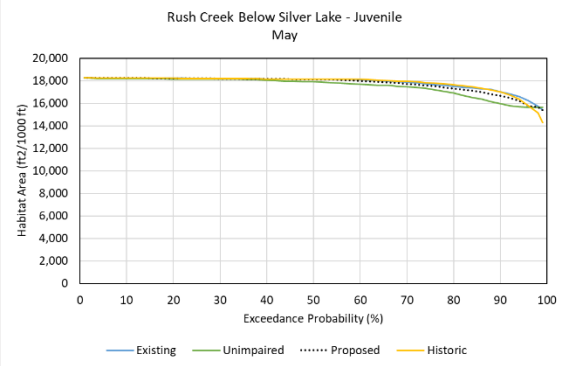
Figure AQ 1-N8. Time Series Adult Trout Habitat for Rush Creek Below Silver Lake

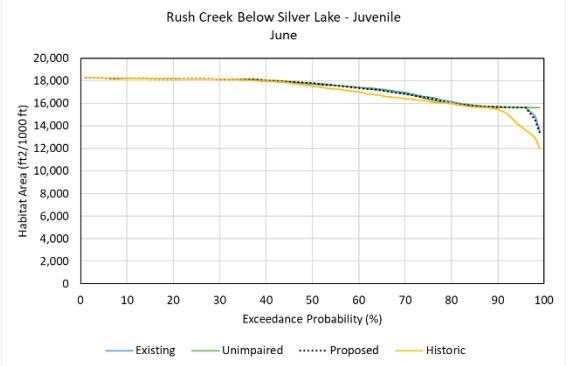

Rush Creek Below Silver Lake - Juvenile
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

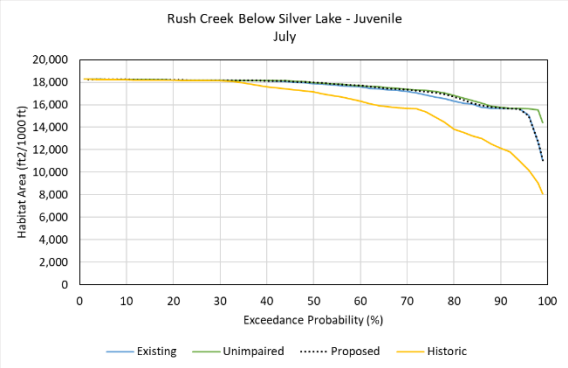

Rush Creek Below Silver Lake - Juvenile
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

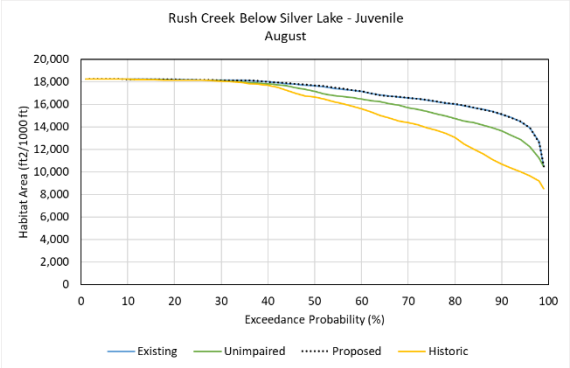

Rush Creek Below Silver Lake - Juvenile
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Juvenile
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Juvenile
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Juvenile
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Juvenile
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


Rush Creek Below Silver Lake - Juvenile
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

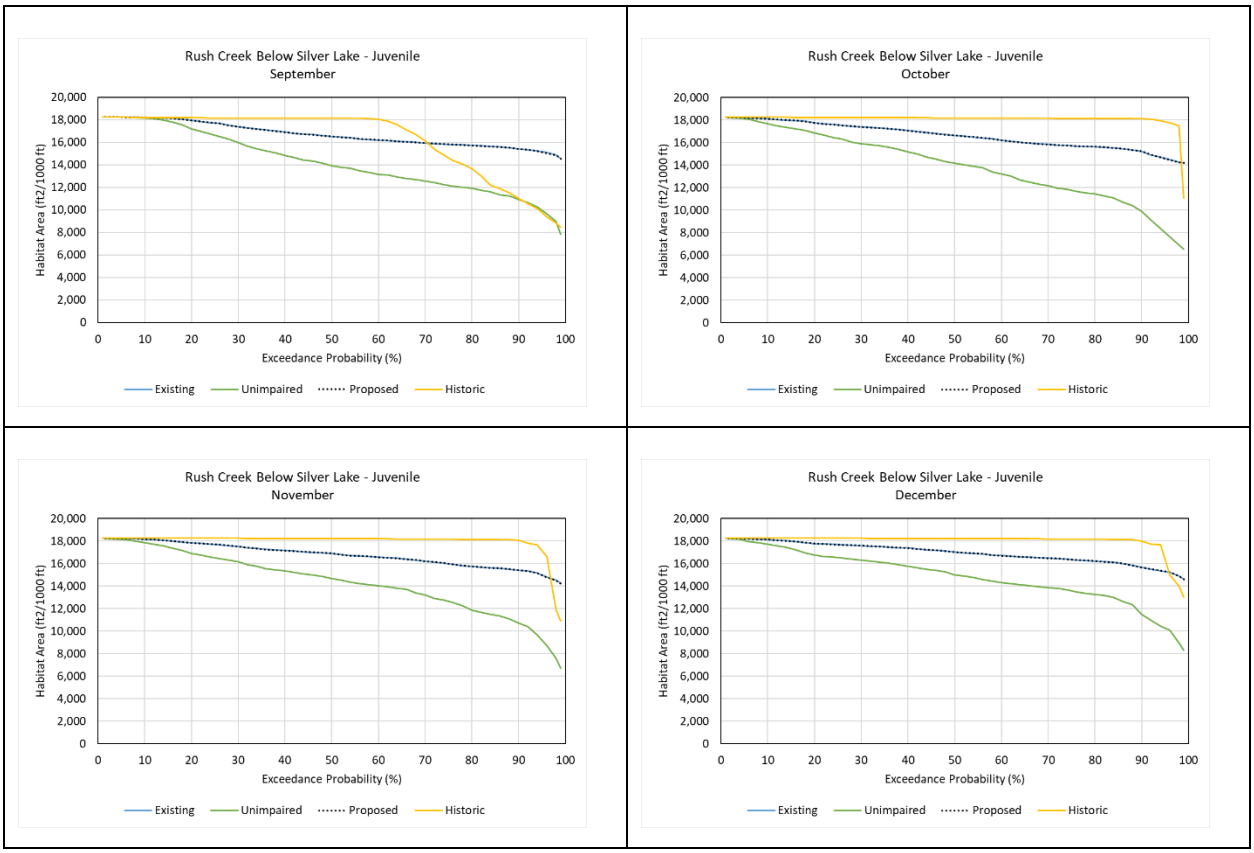


Figure AQ 1-N9. Time Series Juvenile Trout Habitat for Rush Creek Below Silver Lake

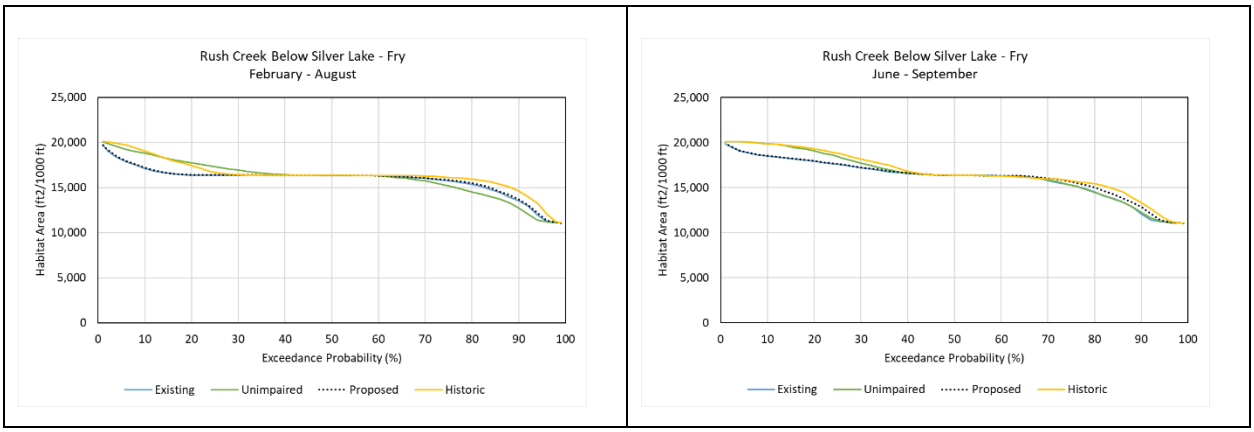


Figure AQ 1-N10. Time Series Fry Trout Habitat for Rush Creek Below Silver Lake

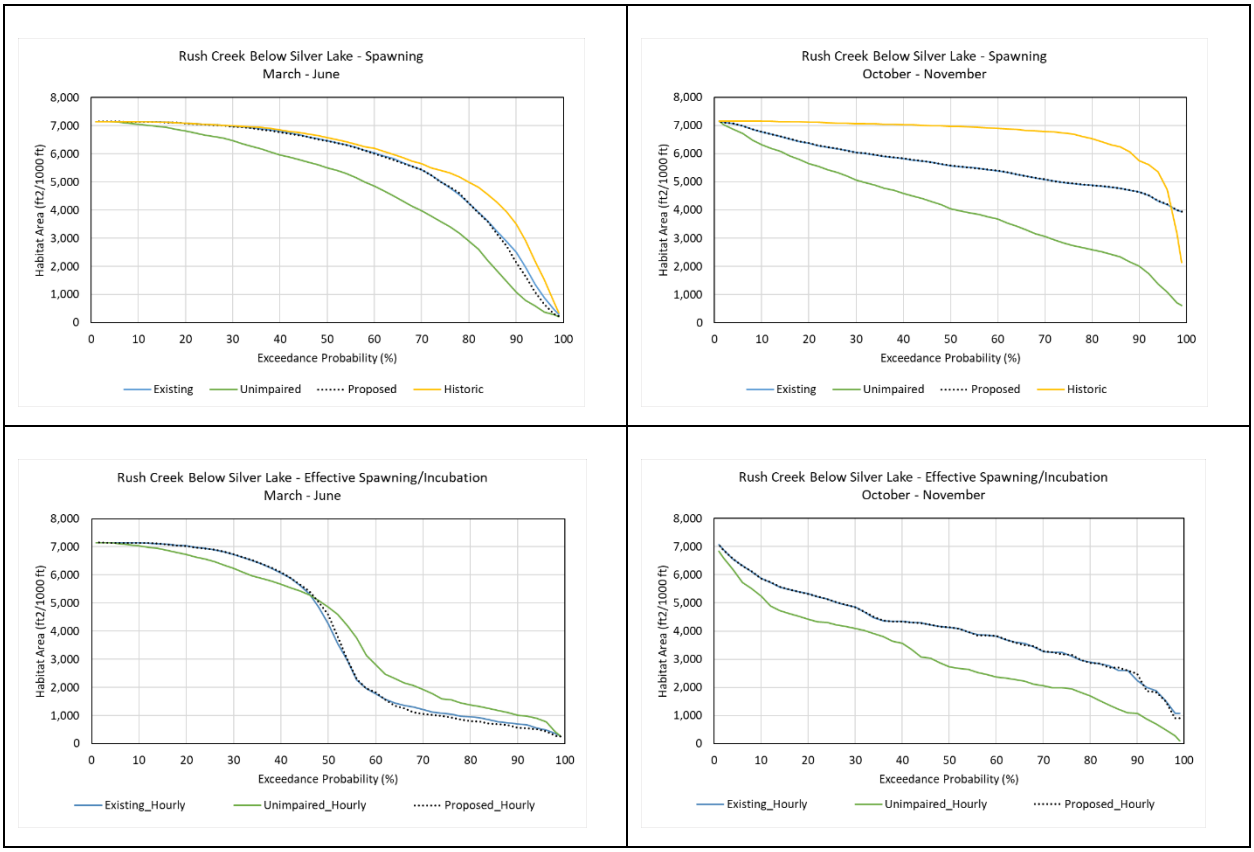
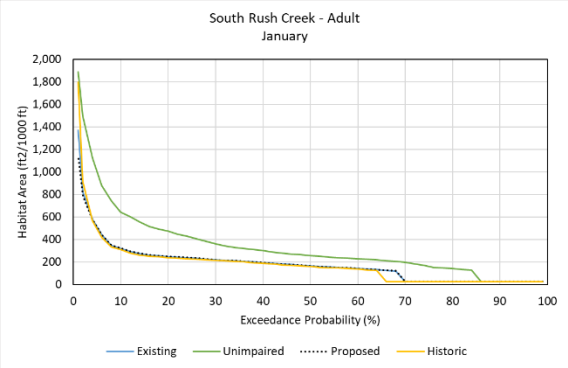
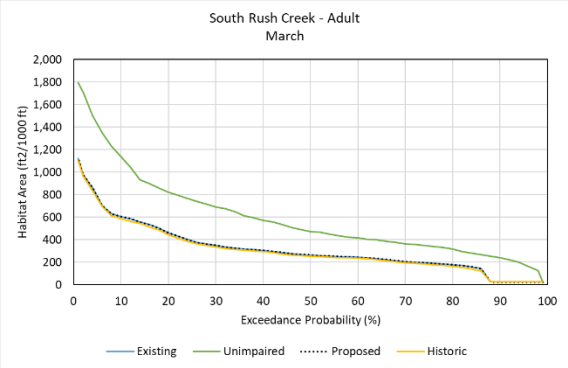
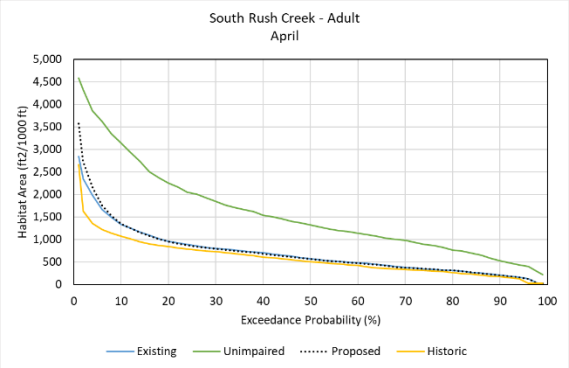


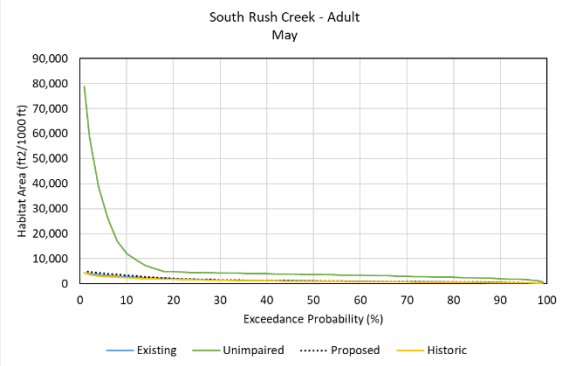
Figure AQ 1-N11a-b. Spawning (a) and effective spawning / incubation (b) habitat series exceedance for Rush Creek below Silver Lake (rainbow trout March – June; brown trout October – November) based on average daily and hourly flows.

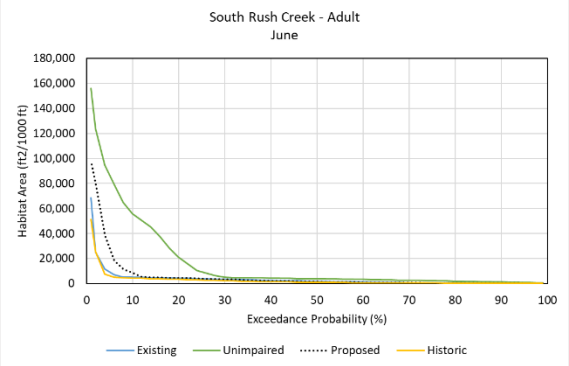

South Rush Creek - Adult
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

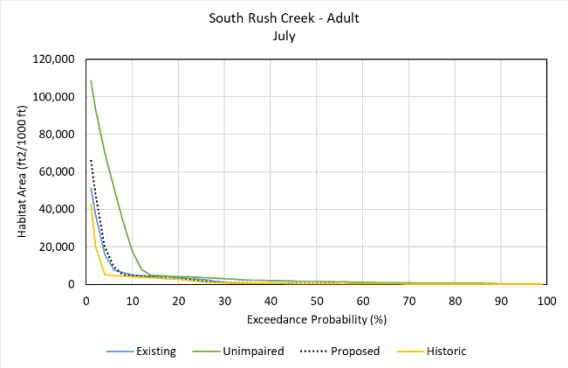
South Rush Creek - Adult
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

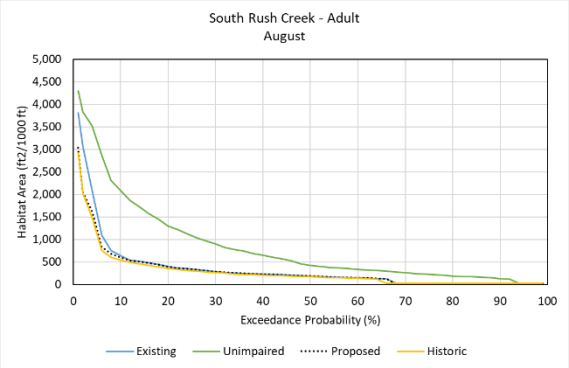

South Rush Creek - Adult
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Adult
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Adult
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Adult
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Adult
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Adult
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

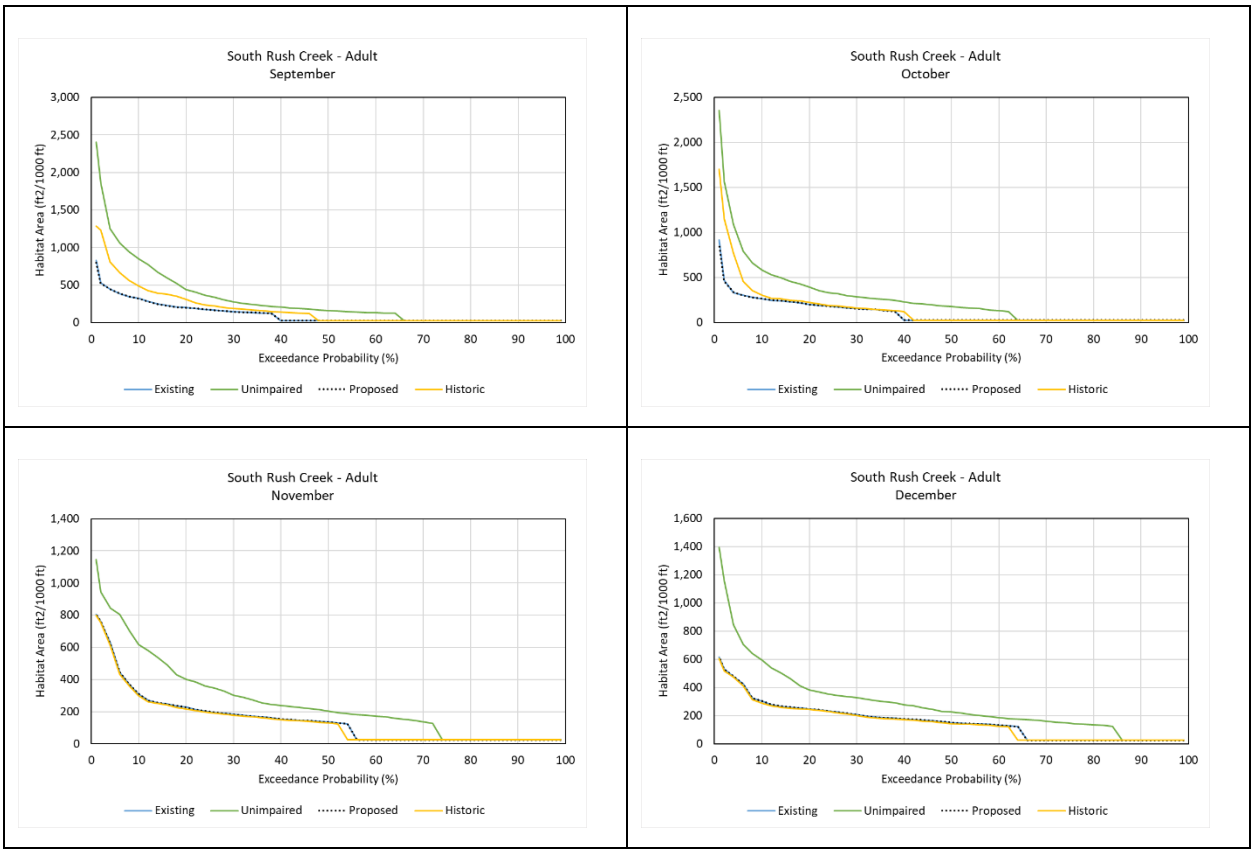
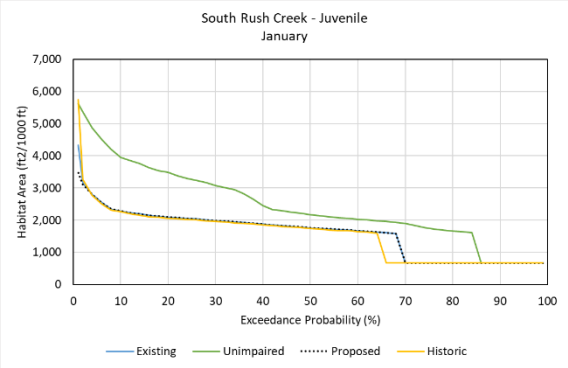
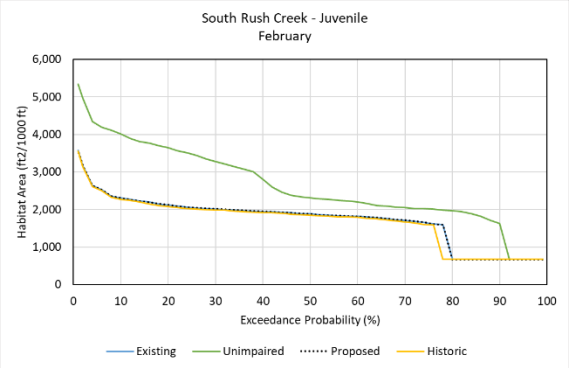
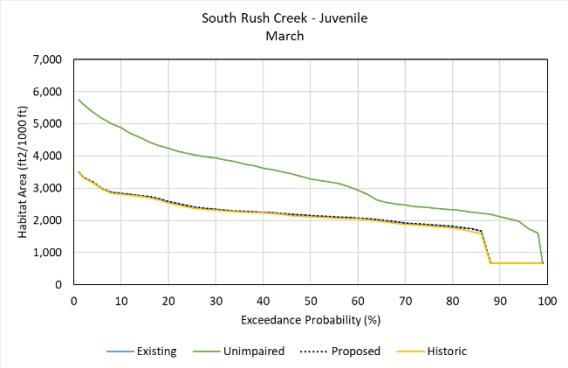
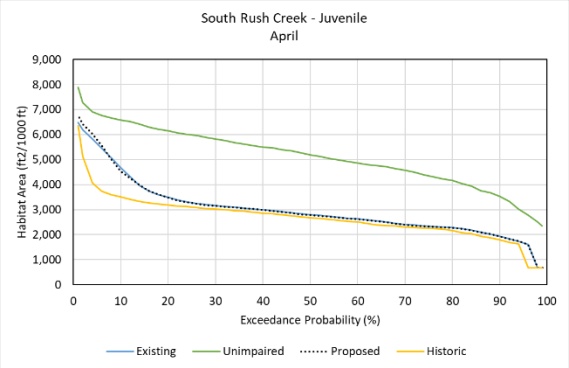


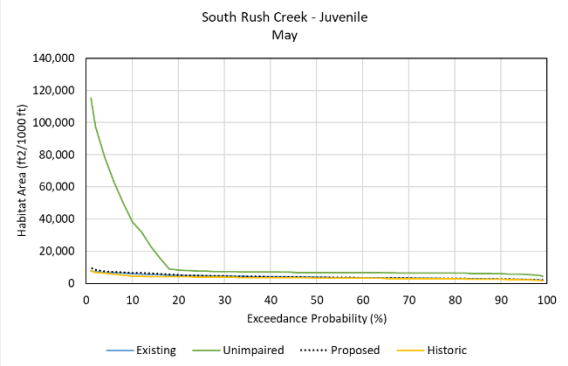
Figure AQ 1-N12. Time Series Adult Trout Habitat for South Rush Creek

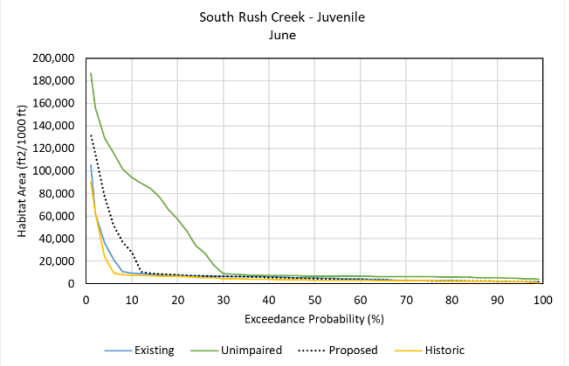

South Rush Creek - Juvenile
January
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

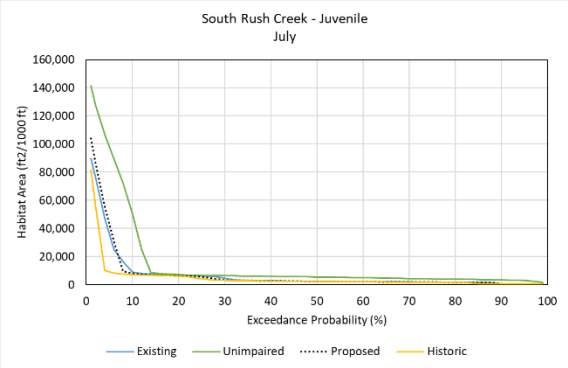

South Rush Creek - Juvenile
February
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

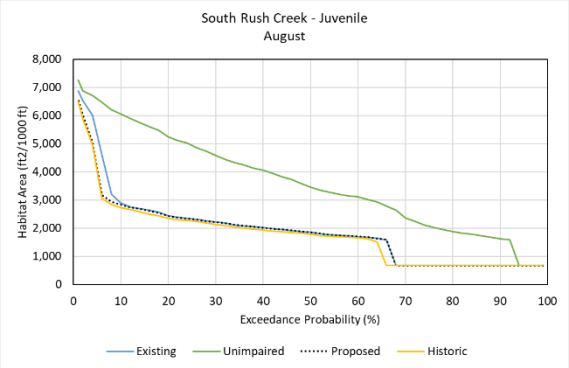

South Rush Creek - Juvenile
March
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Juvenile
April
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Juvenile
May
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Juvenile
June
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Juvenile
July
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic


South Rush Creek - Juvenile
August
Habitat Area (ft2/1000 ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historic

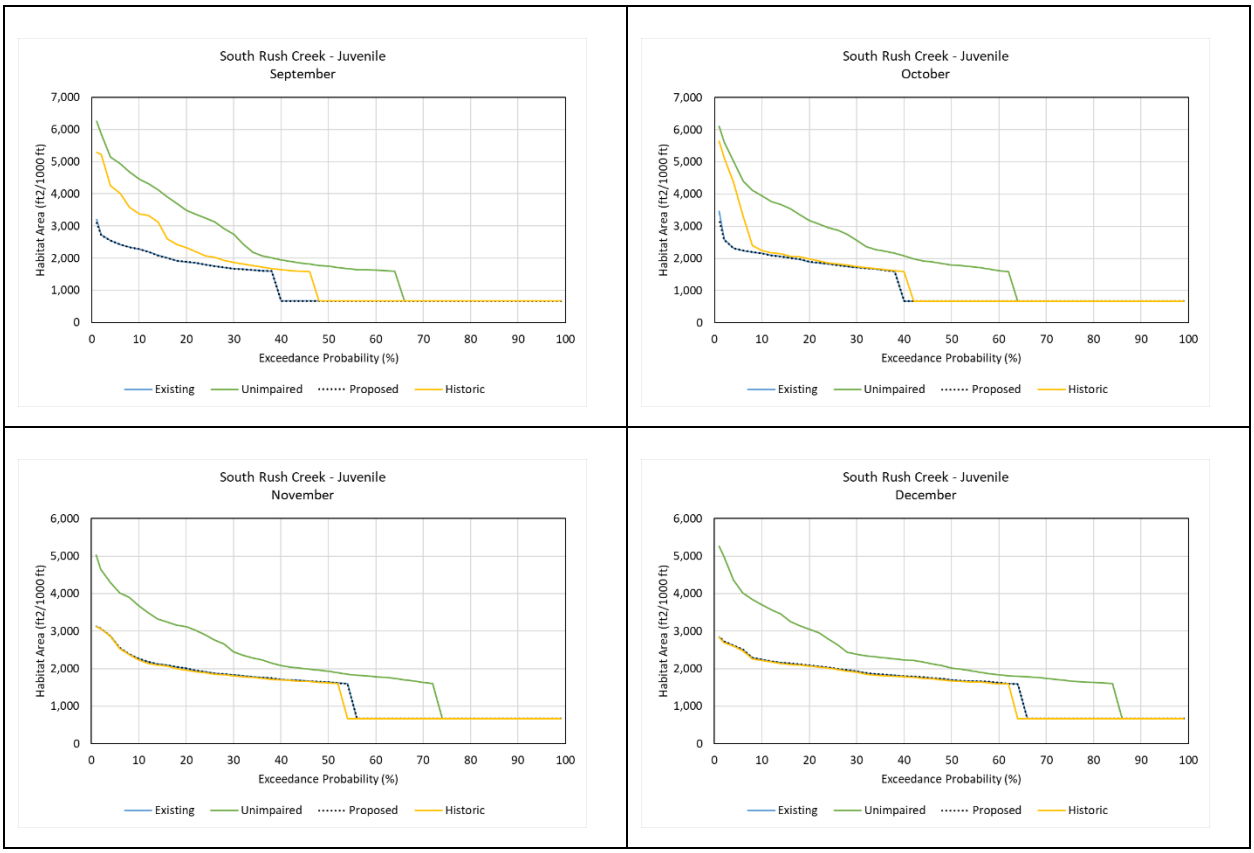


Figure AQ 1-N13. Time Series Juvenile Trout Habitat for South Rush Creek

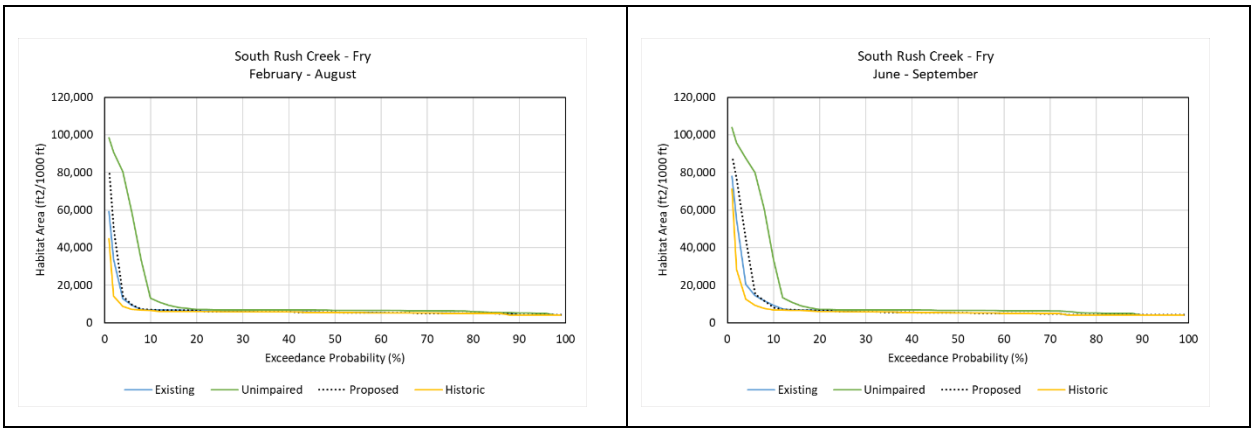


Figure AQ 1-N14. Time Series Fry Trout Habitat for South Rush

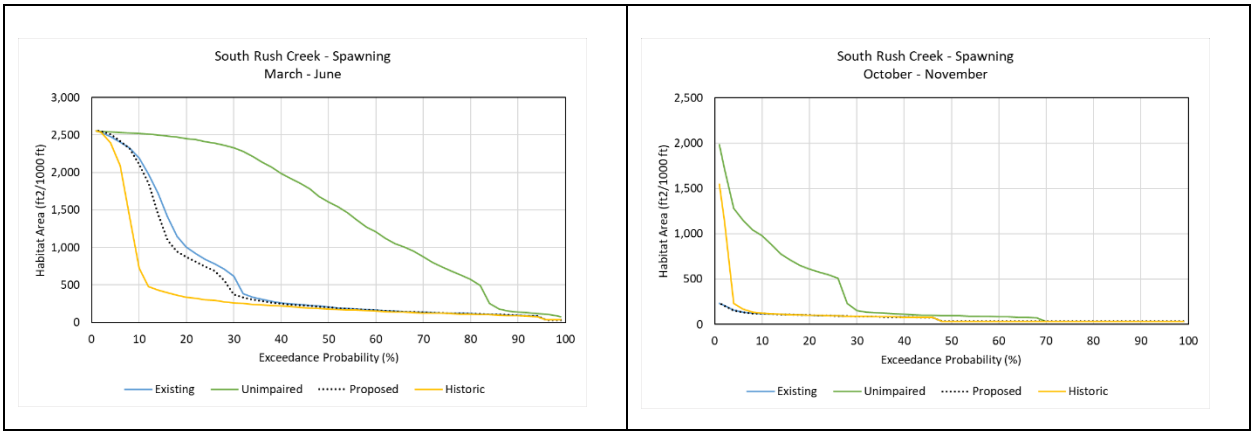


Figure AQ 1-N15. Time Series Spawning Trout Habitat for South Rush Creek

APPENDIX O

Wetted Perimeter Time Series

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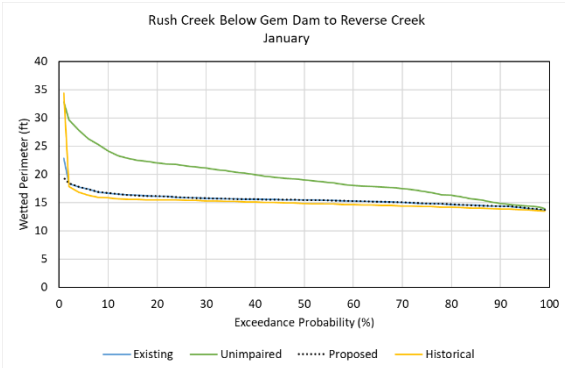
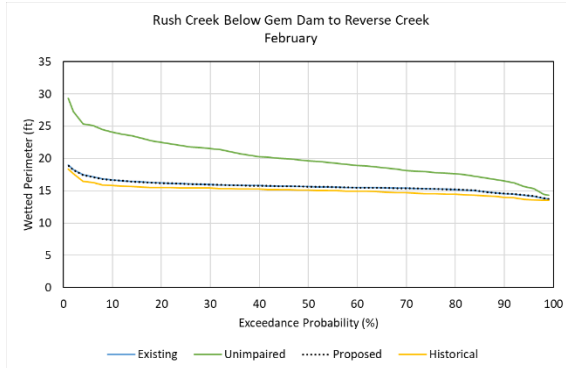
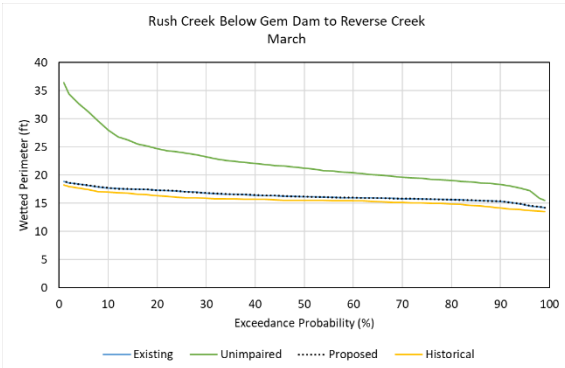
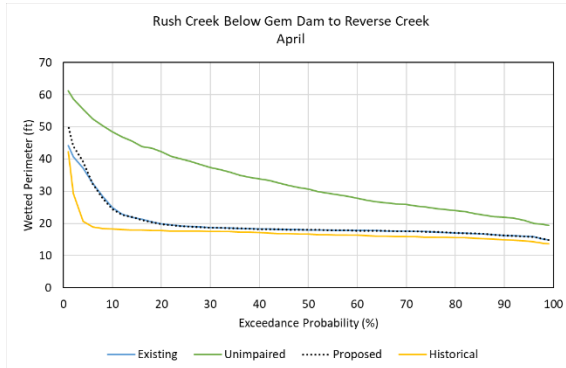
INTRODUCTION

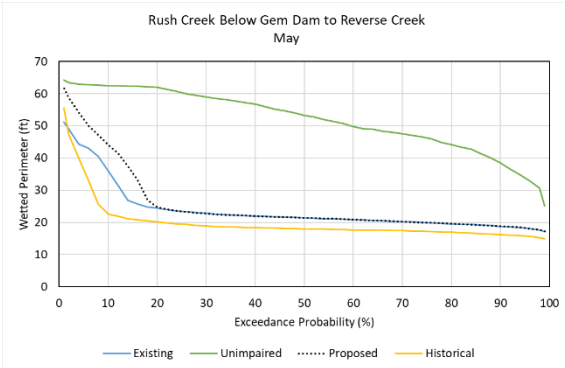
The following figures show the wetted perimeter time series results at Rush Creek below Gem Dam, Rush Creek above Silver Lake, Rush Creek below Silver Lake and South Rush Creek.

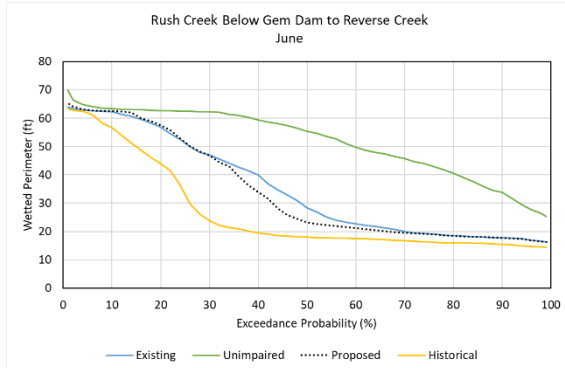












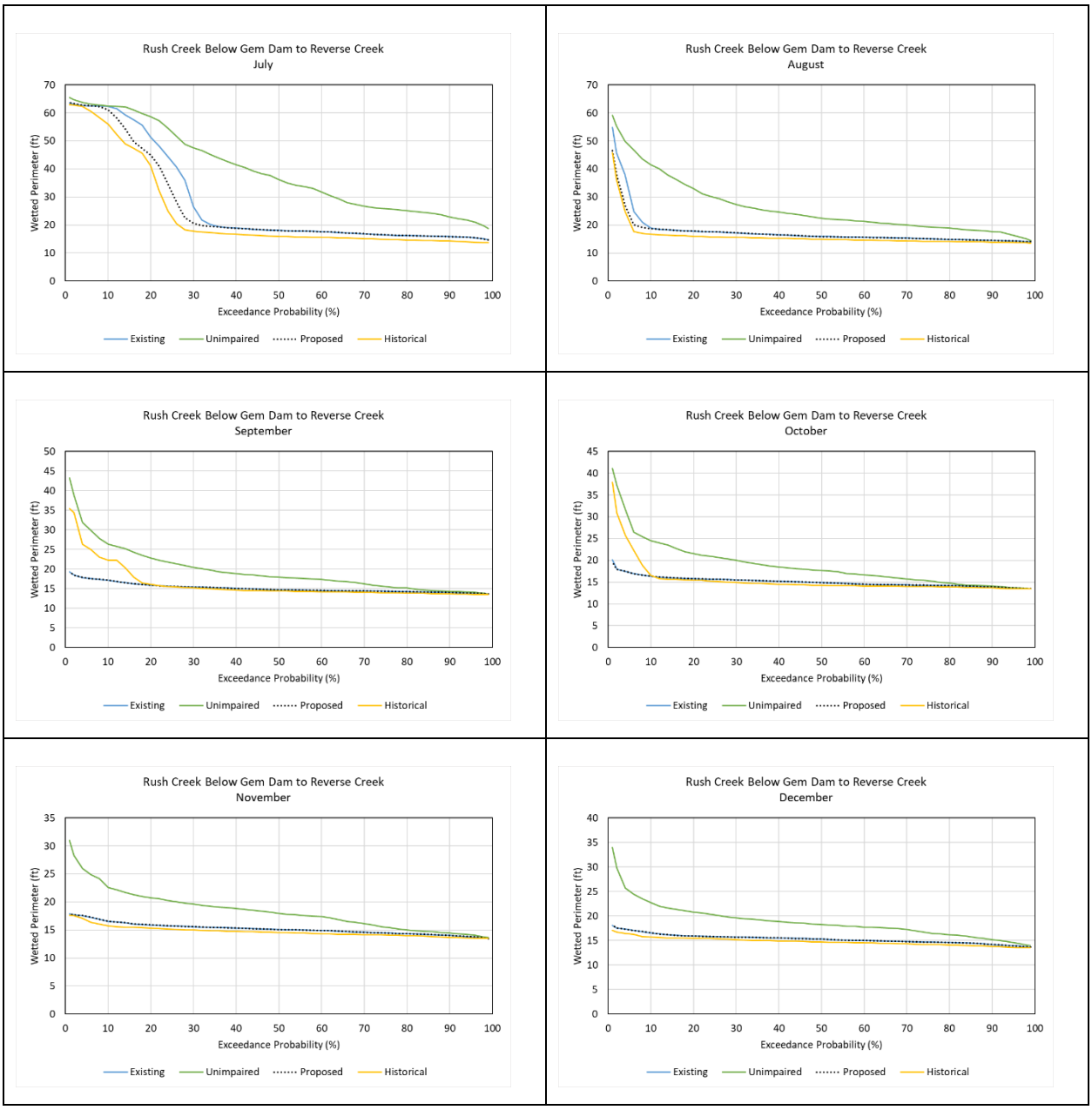
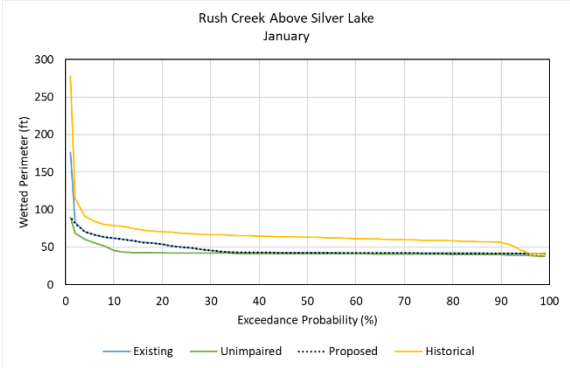
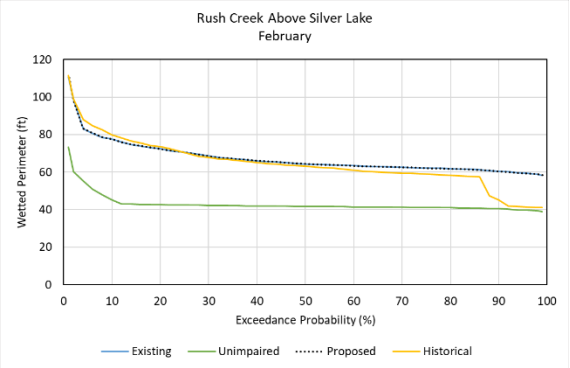
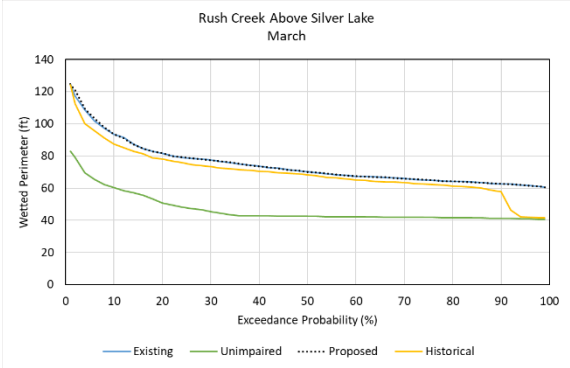
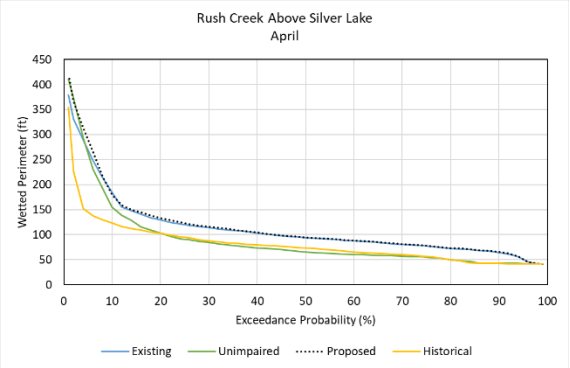


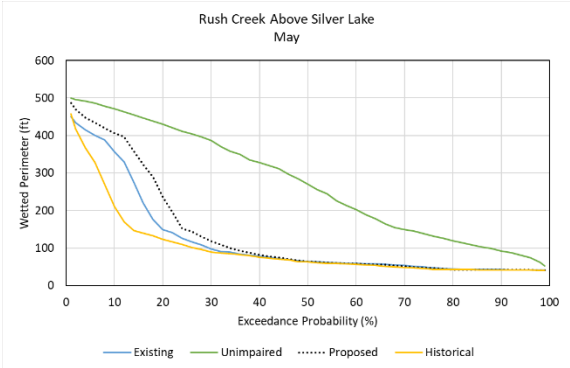
Figure AQ 1-O1. Wetter Perimeter Time Series for Rush Creek below Gem Dam

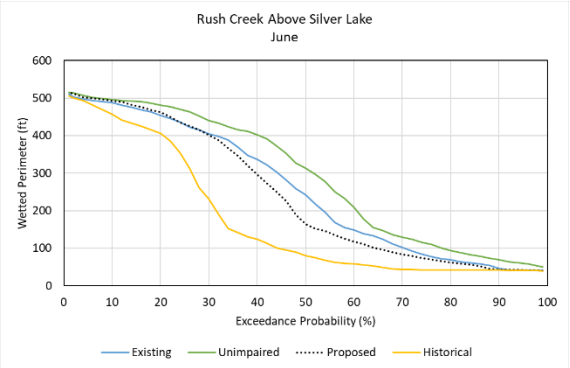

Rush Creek Above Silver Lake
January
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

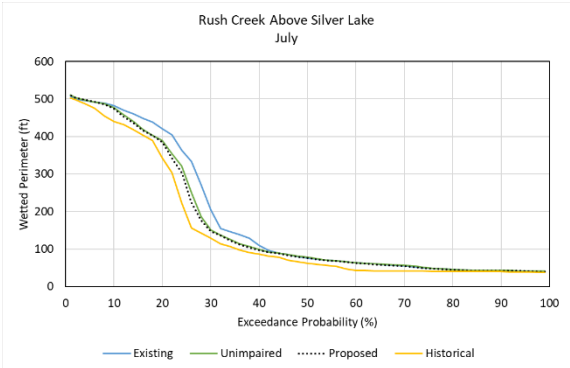

Rush Creek Above Silver Lake
February
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

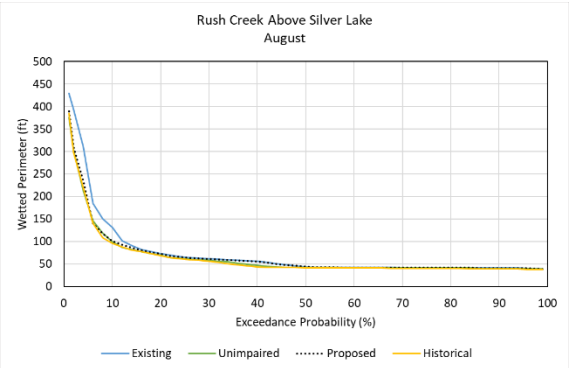

Rush Creek Above Silver Lake
March
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Above Silver Lake
April
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Above Silver Lake
May
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Above Silver Lake
June
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Above Silver Lake
July
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Above Silver Lake
August
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

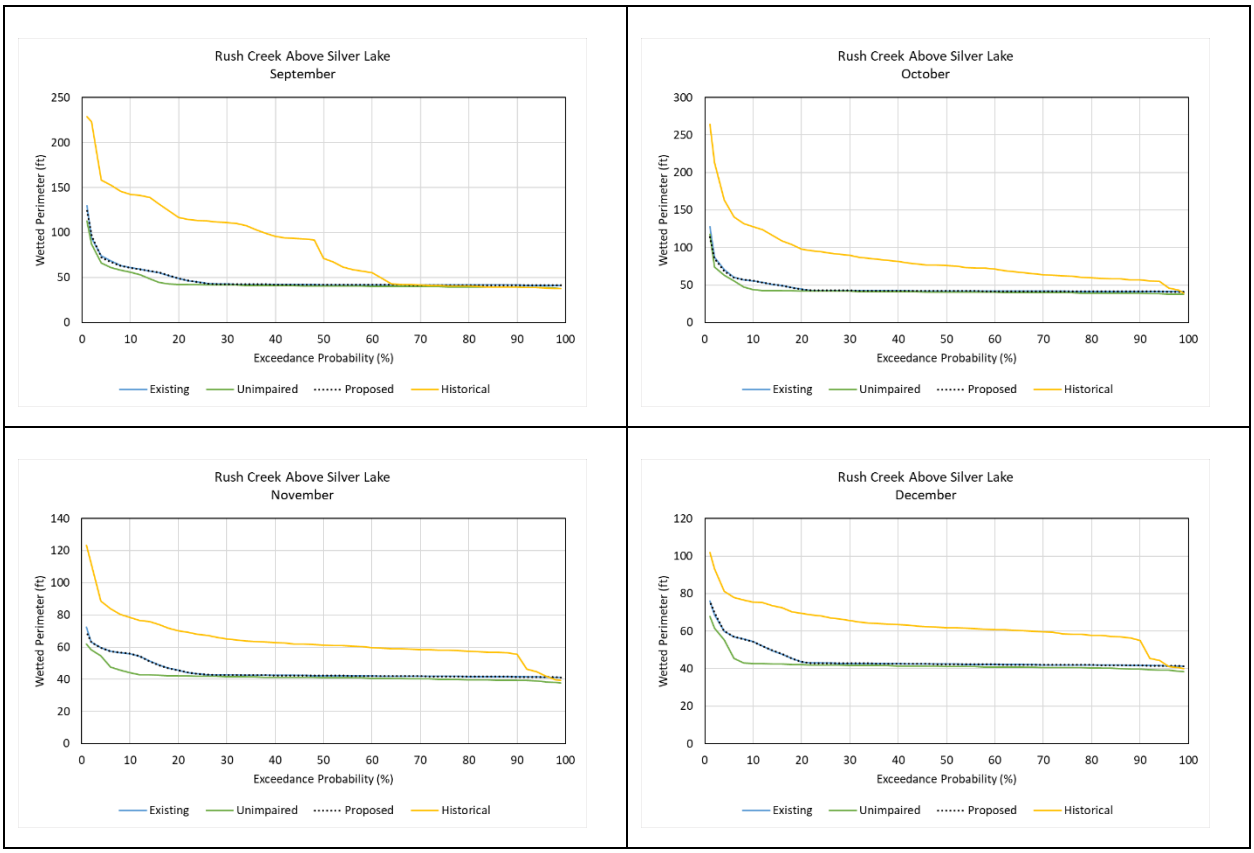
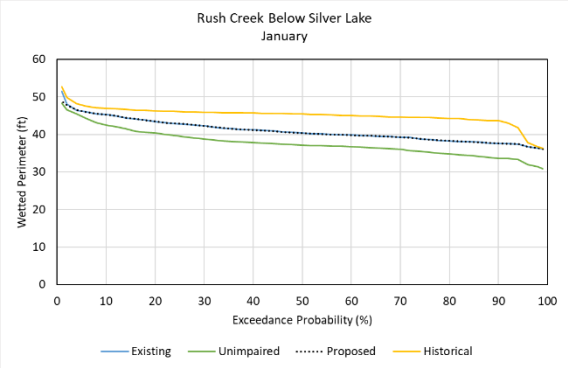
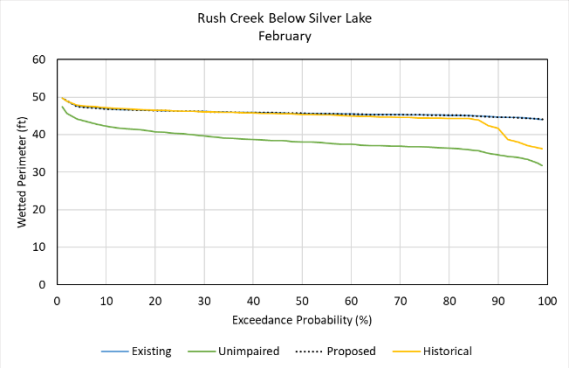
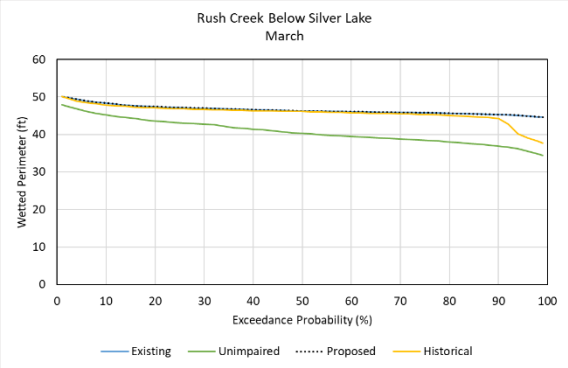
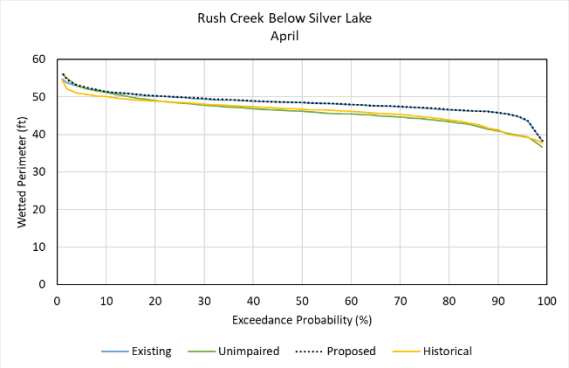


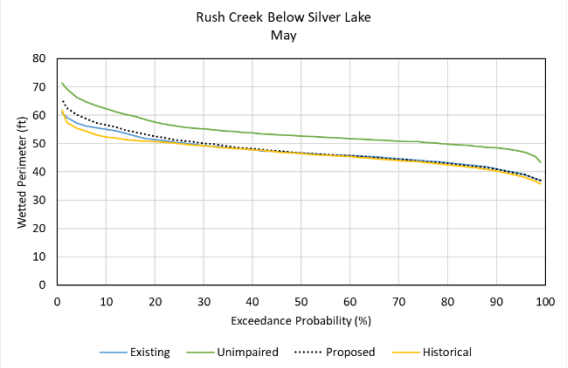
Figure AQ 1-O2. Wetter Perimeter Time Series for Rush Creek above Silver Lake

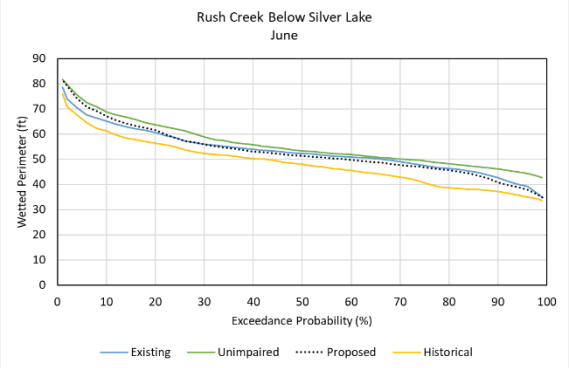

Rush Creek Below Silver Lake
January
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

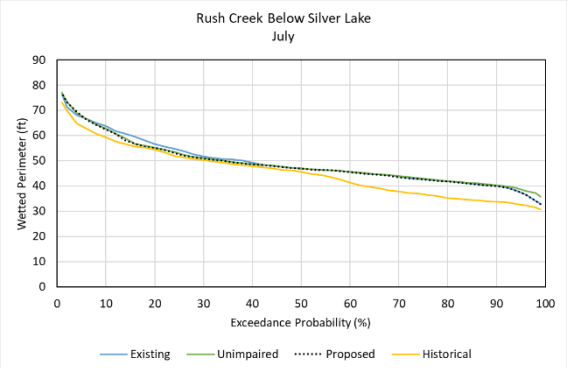

Rush Creek Below Silver Lake
February
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

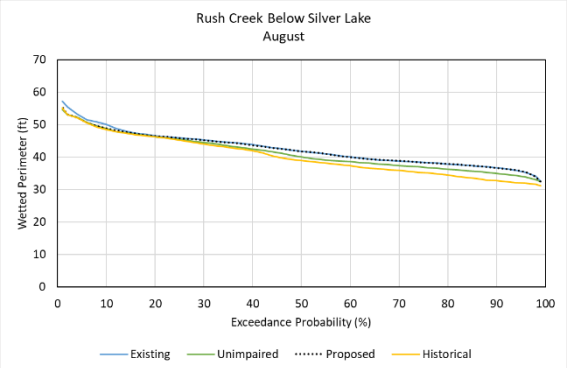

Rush Creek Below Silver Lake
March
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Below Silver Lake
April
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Below Silver Lake
May
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Below Silver Lake
June
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Below Silver Lake
July
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


Rush Creek Below Silver Lake
August
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

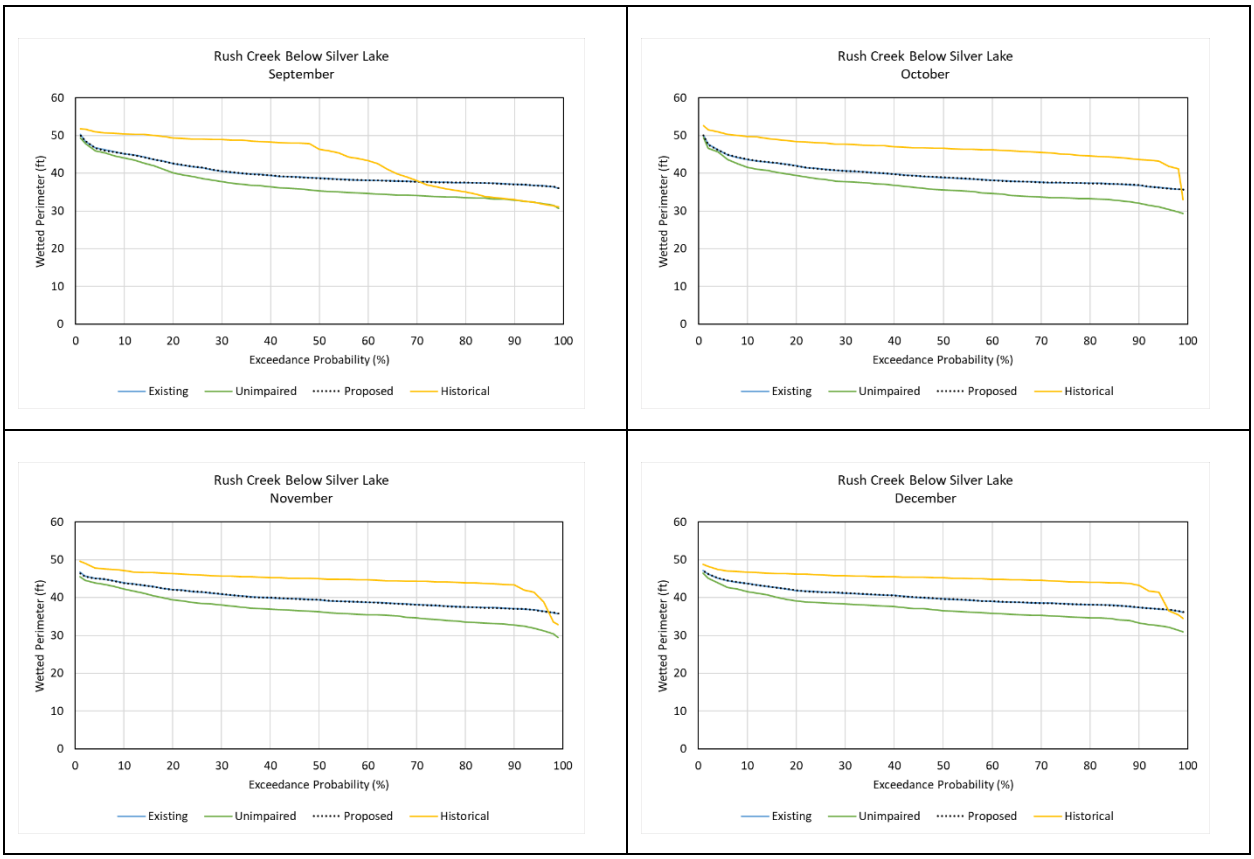
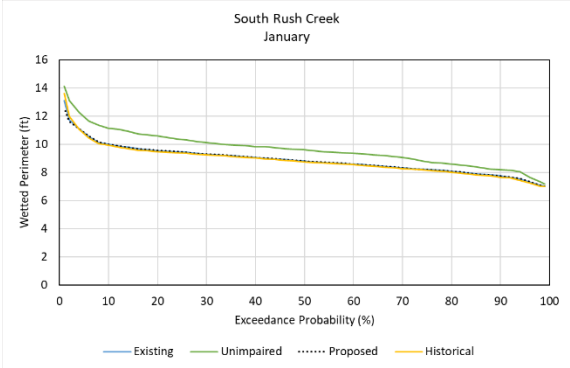
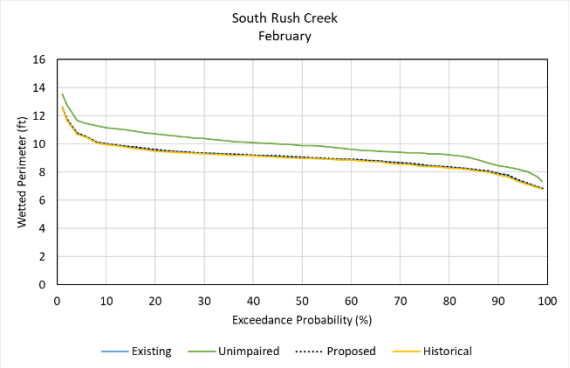
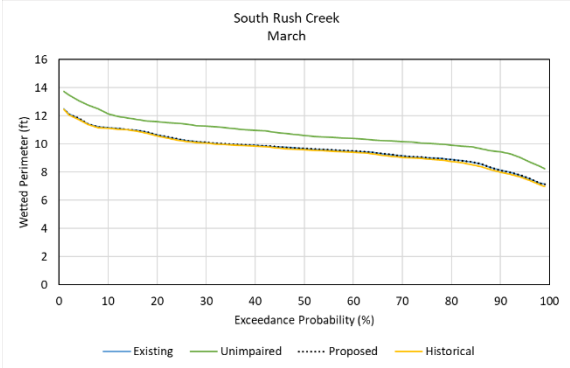
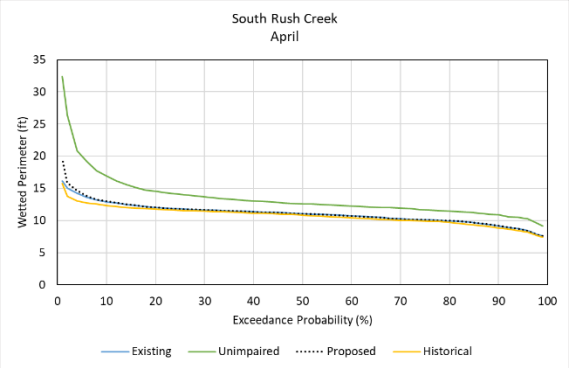


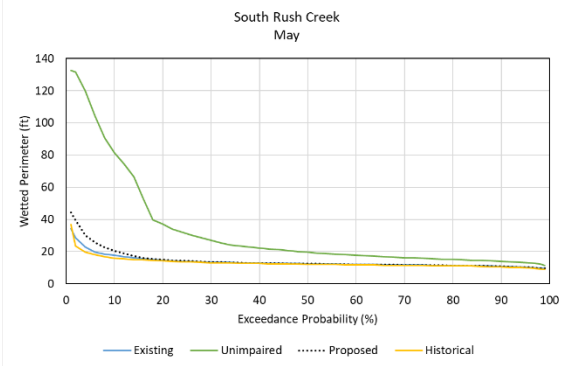
Figure AQ 1-O3. Wetter Perimeter Time Series for Rush Creek below Silver Lake

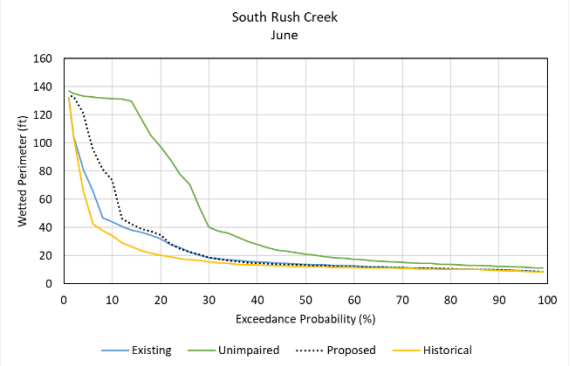

South Rush Creek
January
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

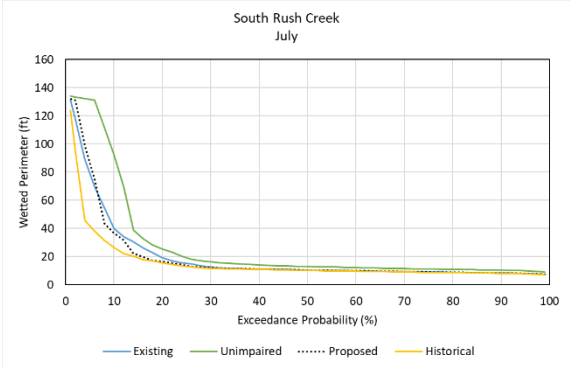

South Rush Creek
February
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

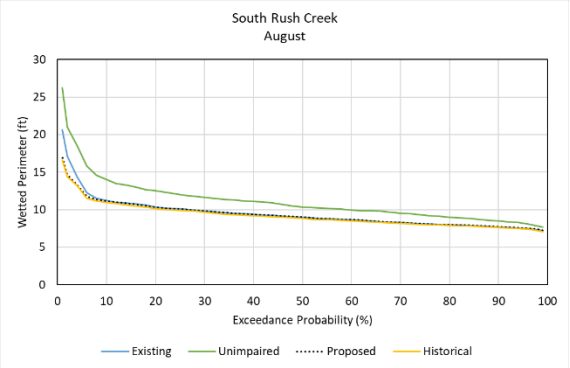

South Rush Creek
March
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


South Rush Creek
April
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


South Rush Creek
May
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


South Rush Creek
June
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


South Rush Creek
July
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical


South Rush Creek
August
Wetted Perimeter (ft)
Exceedance Probability (%)
Existing
Unimpaired
Proposed
Historical

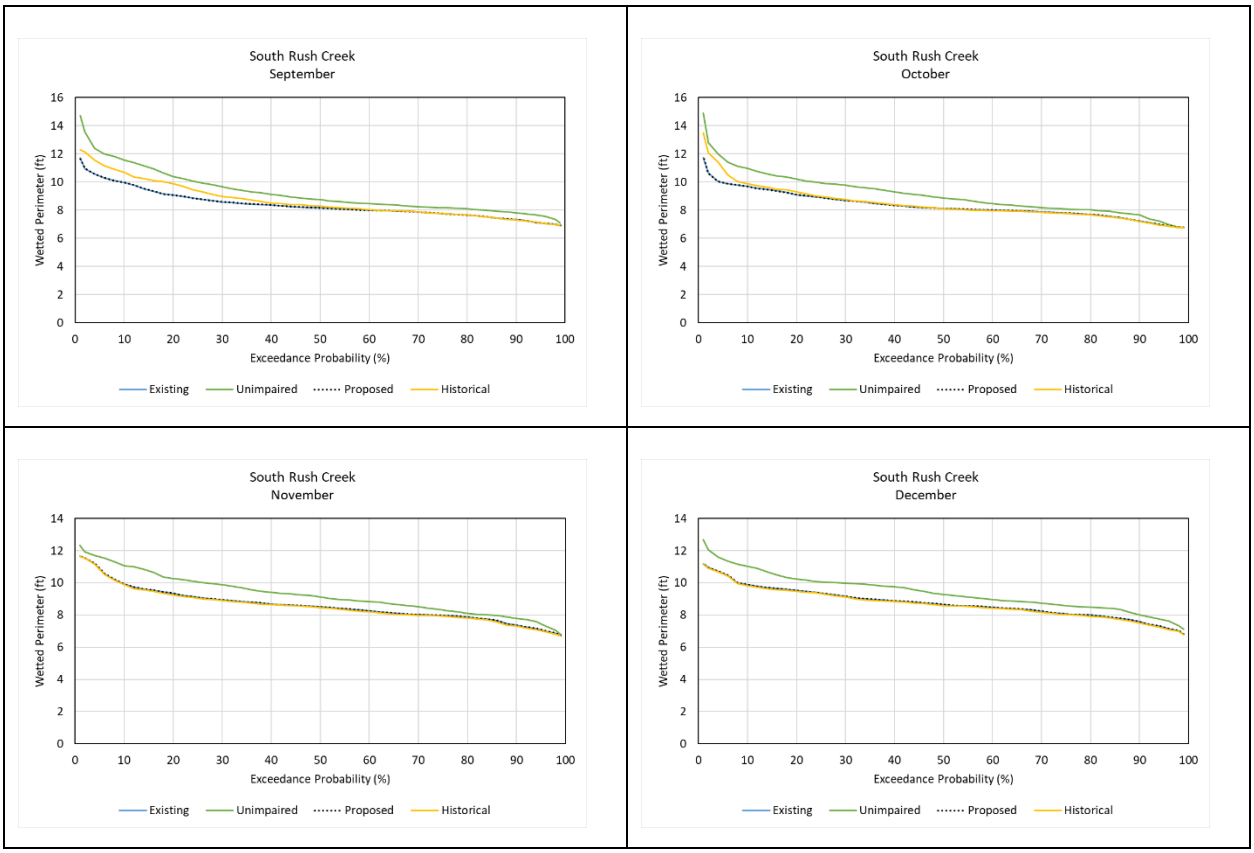


Figure AQ 1-O4. Wetter Perimeter Time Series for South Rush Creek

APPENDIX P

Riparian Results

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INTRODUCTION

The following figures show the results of the relationship between the riparian vegetation and flow conditions. Figures AQ 1-P1 through AQ 1-P6 summarize the annual hydrographs of the monthly average daily flows by water year type. Figures AQ 1-P7 through AQ 1-P11 show the recurrence intervals of the peak high flow events for each flow scenario. Figures AQ 1-P12 through AQ 1-P17 show the number of days that the impaired and unimpaired Q1.5 flows are exceeded under all, normal, wet, and dry water years. Figures AQ 1-P18 through AQ 1-P23 show recession rates of spring/early summer flows during the time of spring seed release and seed setting (during the receding limb of the hydrograph) by water year type. Figures AQ 1-P24 through AQ 1-P29 summarize the relationship between proposed inundation characteristics and the distribution of dominant riparian species across the floodplain at each of the selected Project-affected stream segments.

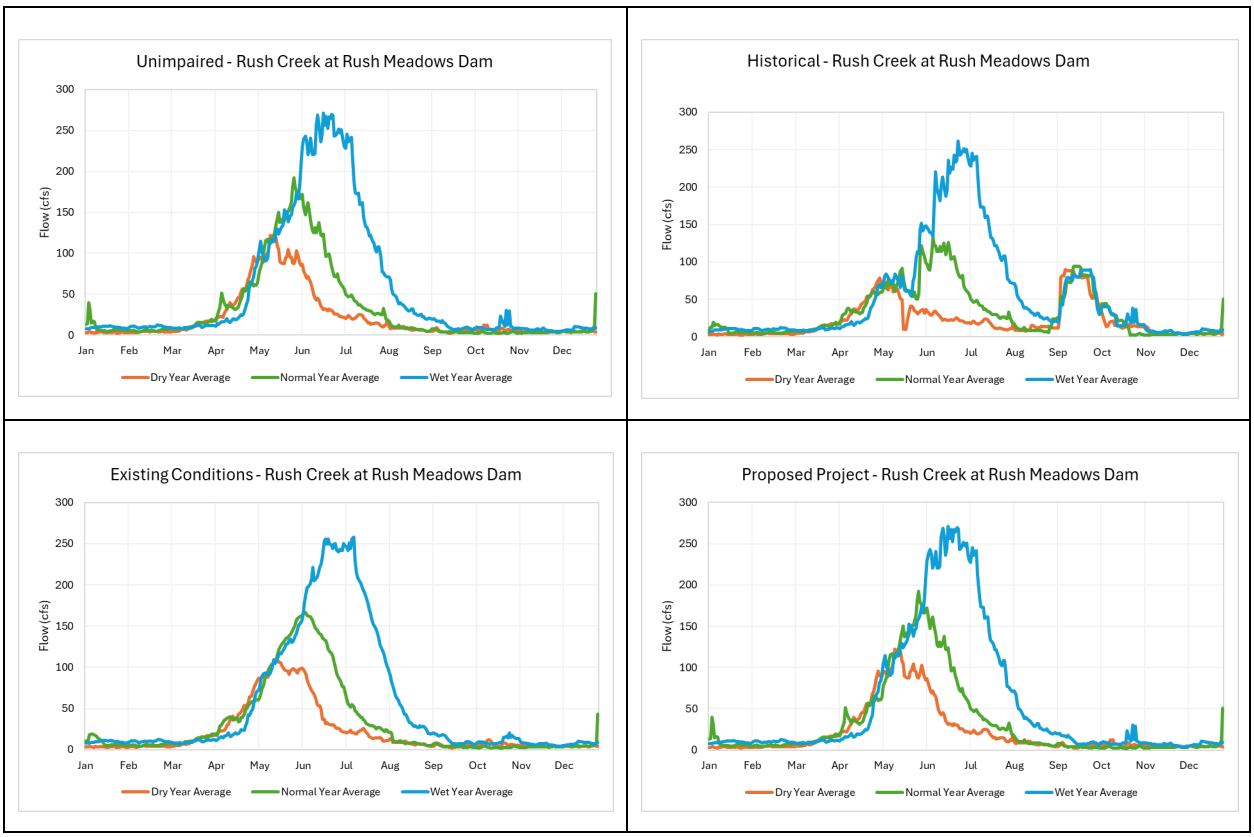


Figure AQ 1-P1. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for Rush Creek at Rush Meadows Dam

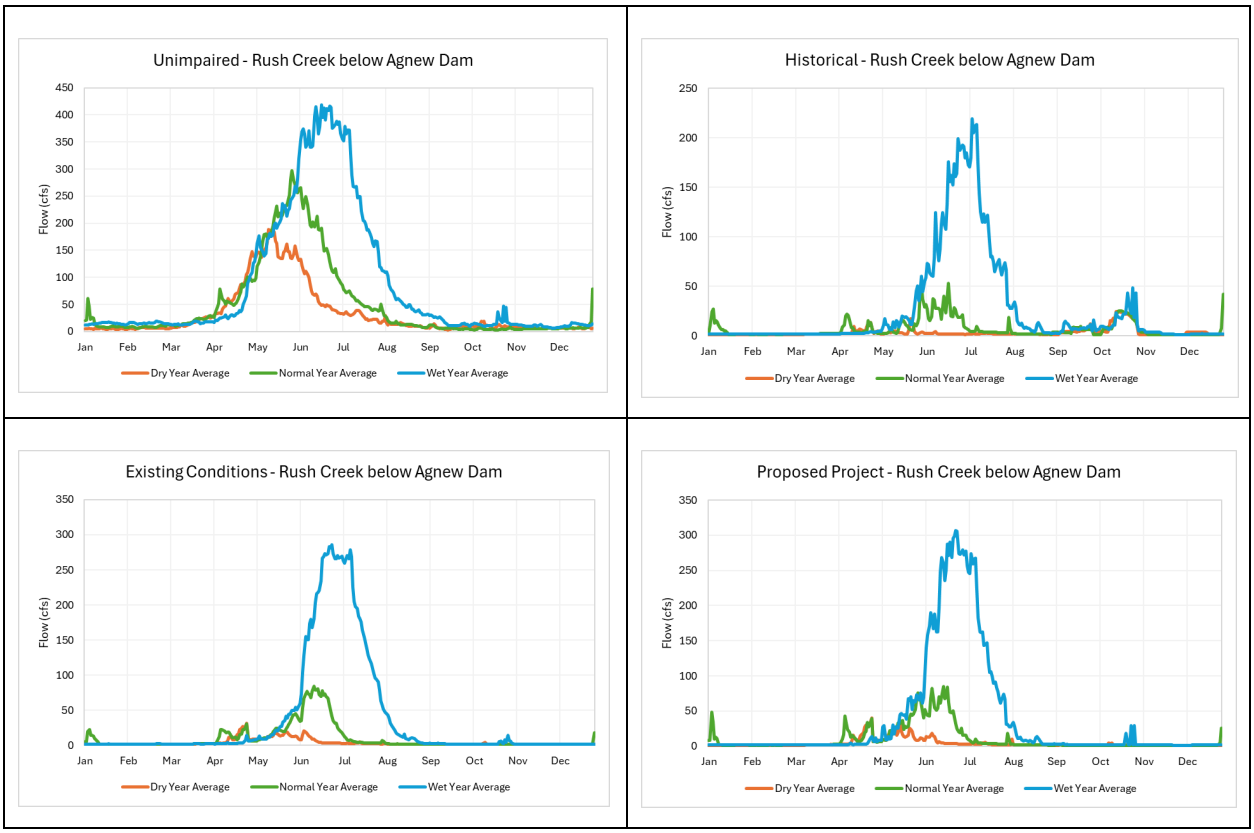


Figure AQ 1-P2. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for Rush Creek Below Agnew Dam

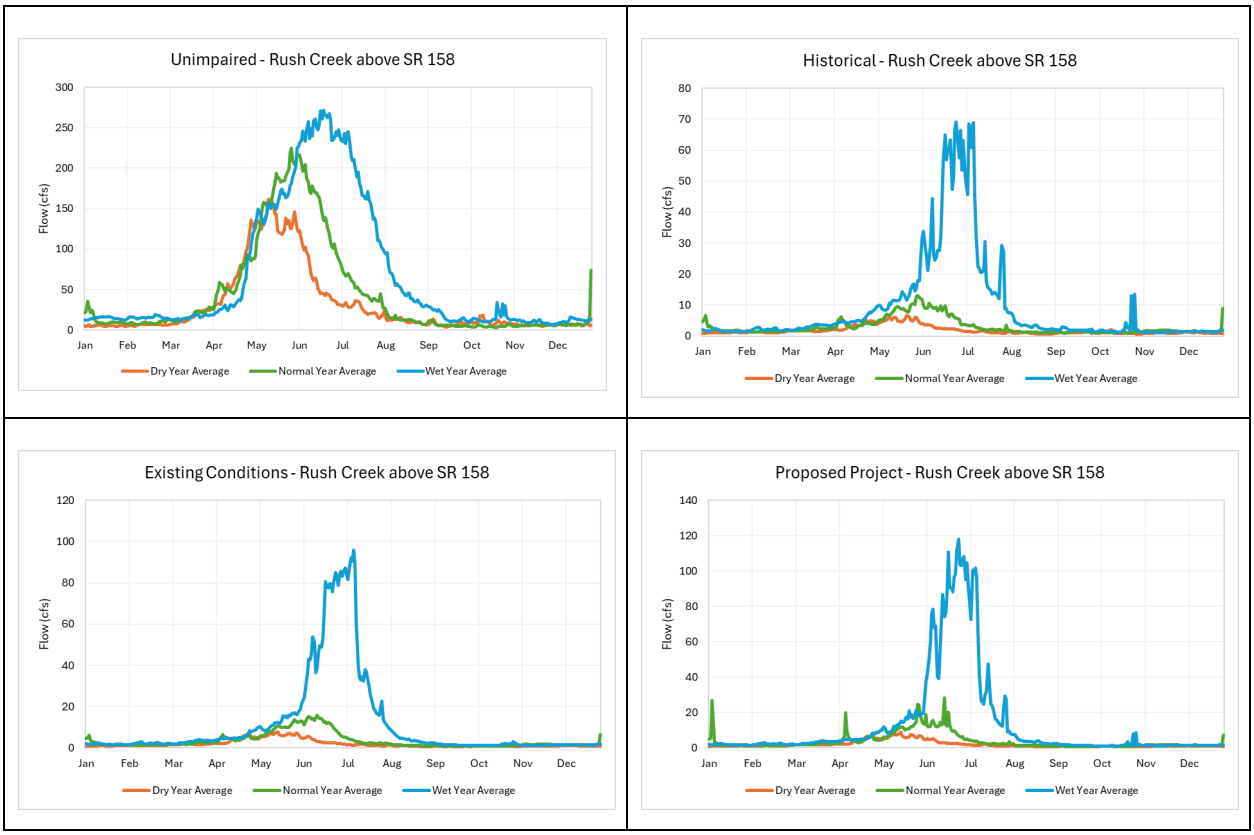


Figure AQ 1-P3. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for Rush Creek at SR-158

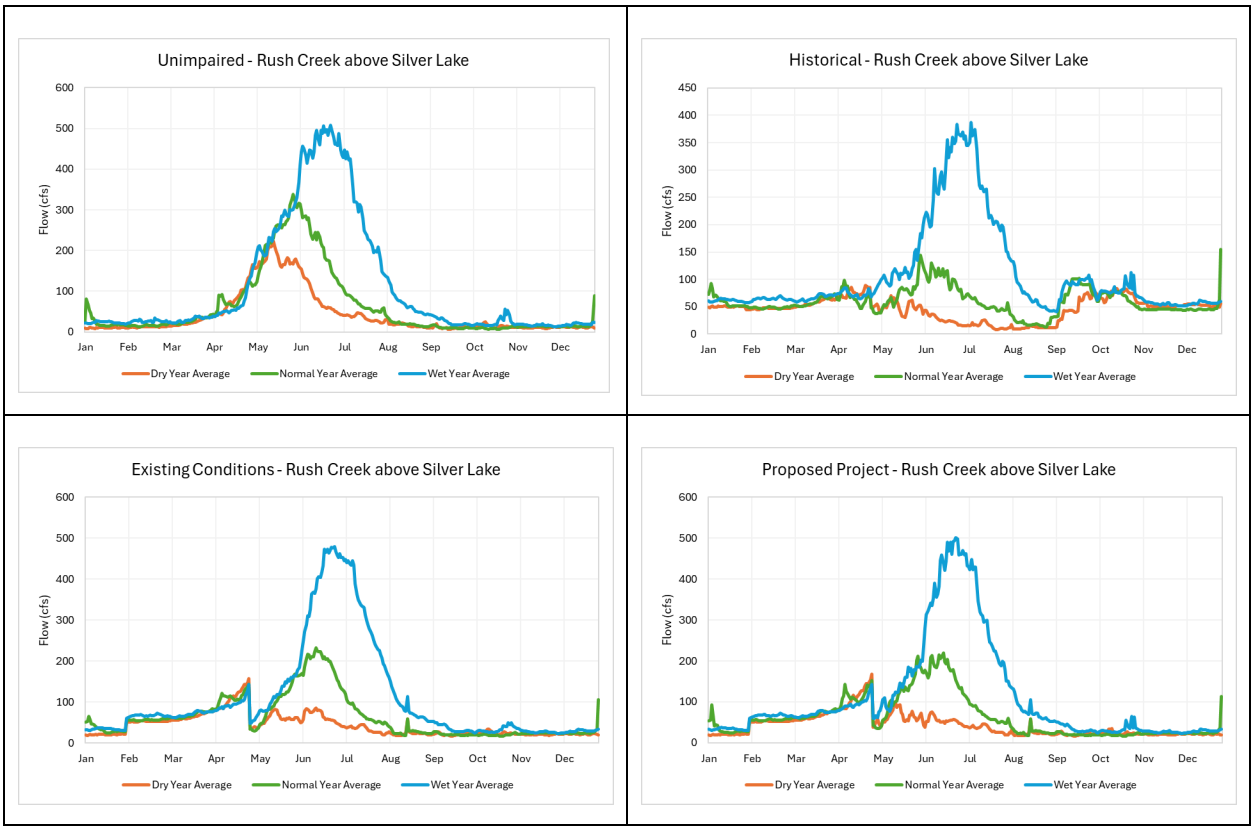


Figure AQ 1-P4. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for Rush Creek Above Silver Lake

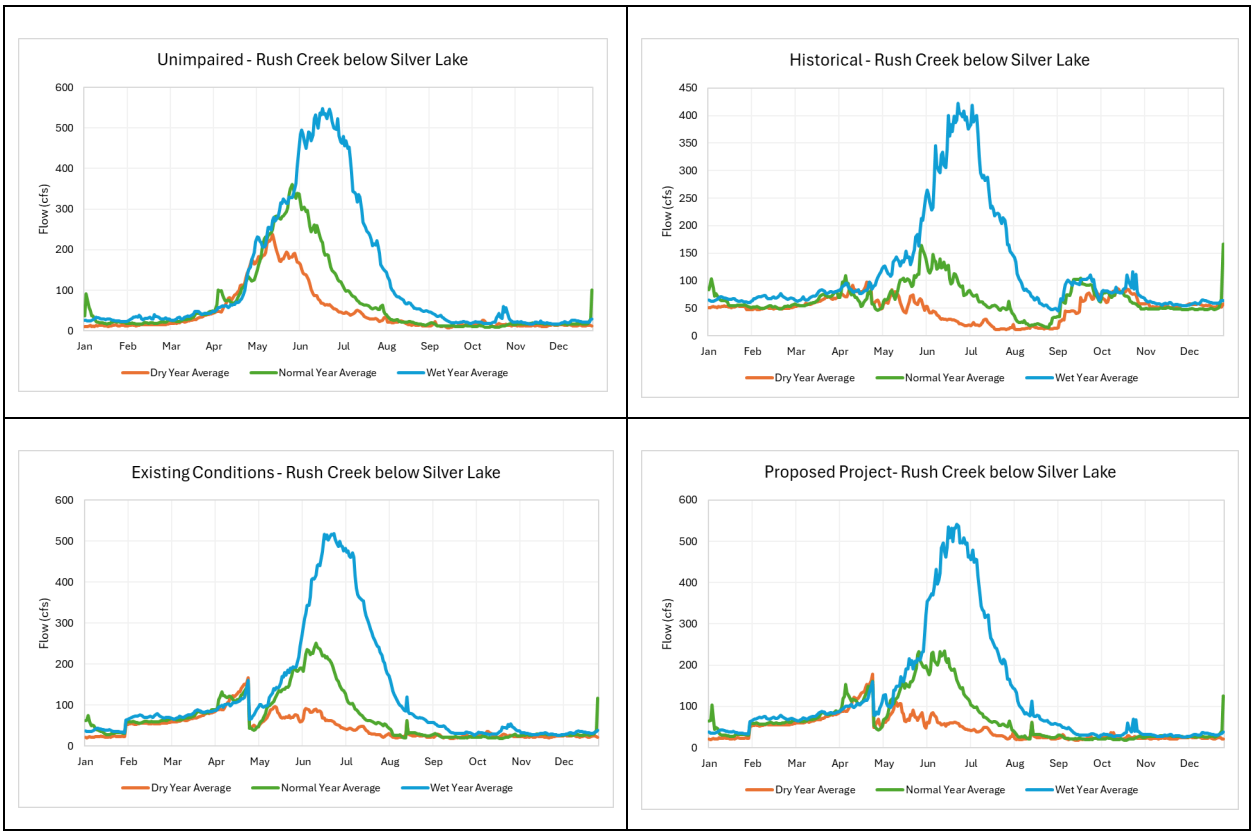


Figure AQ 1-P5. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for Rush Creek Below Silver Lake

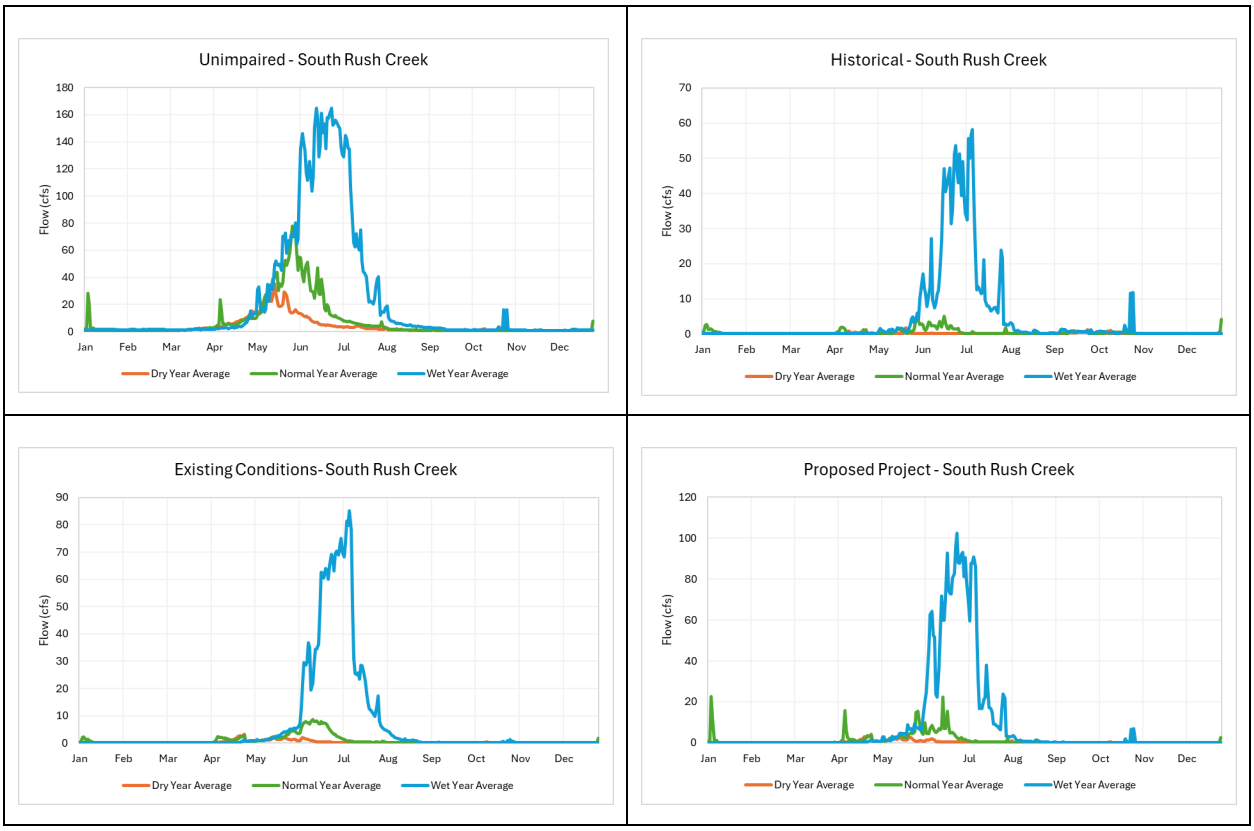


Figure AQ 1-P6. January to December Annual Monthly Flow Exceedance Plots by Water Year Type for South Rush Creek

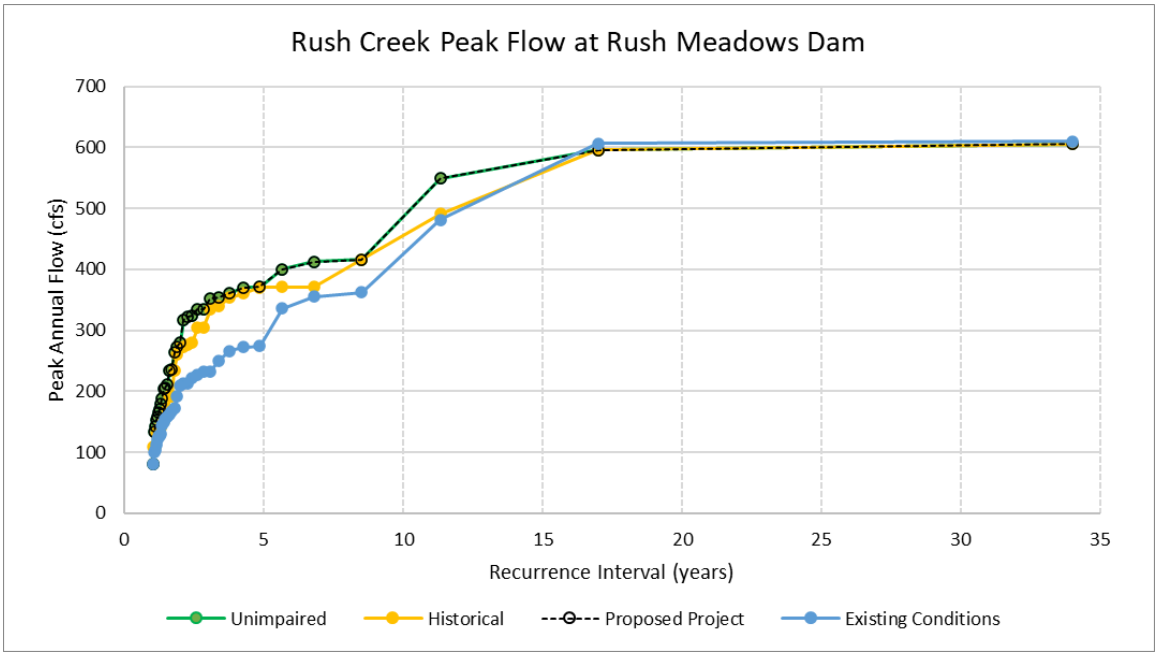


Figure AQ 1-P7. Recurrence Interval for Rush Creek at Rush Meadows Dam for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

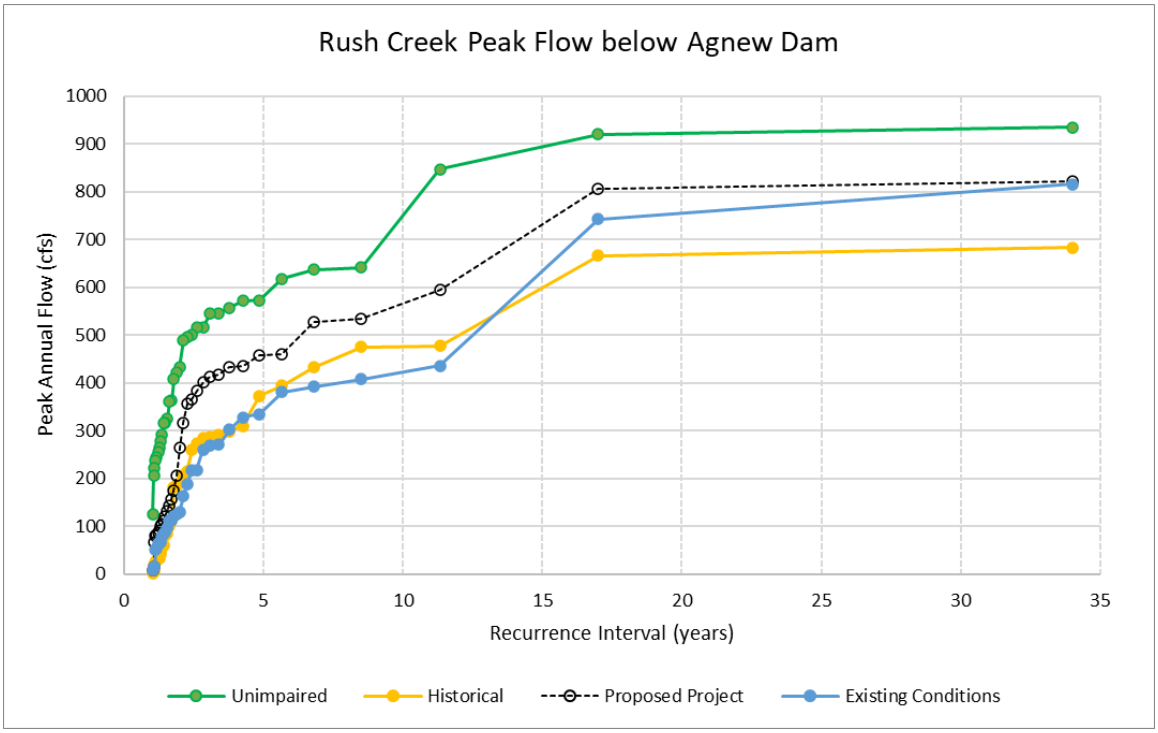


Figure AQ 1-P8. Recurrence Interval for Rush Creek Below Agnew Dam for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

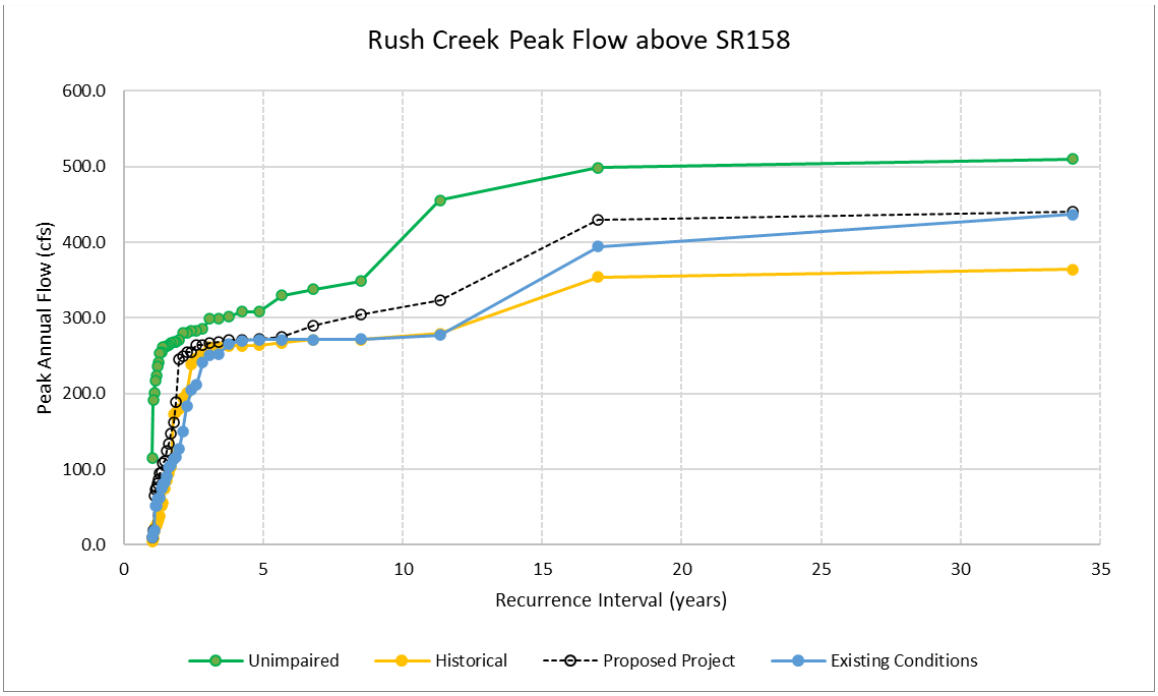


Figure AQ 1-P9. Recurrence Interval for Rush Creek at SR-158 for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

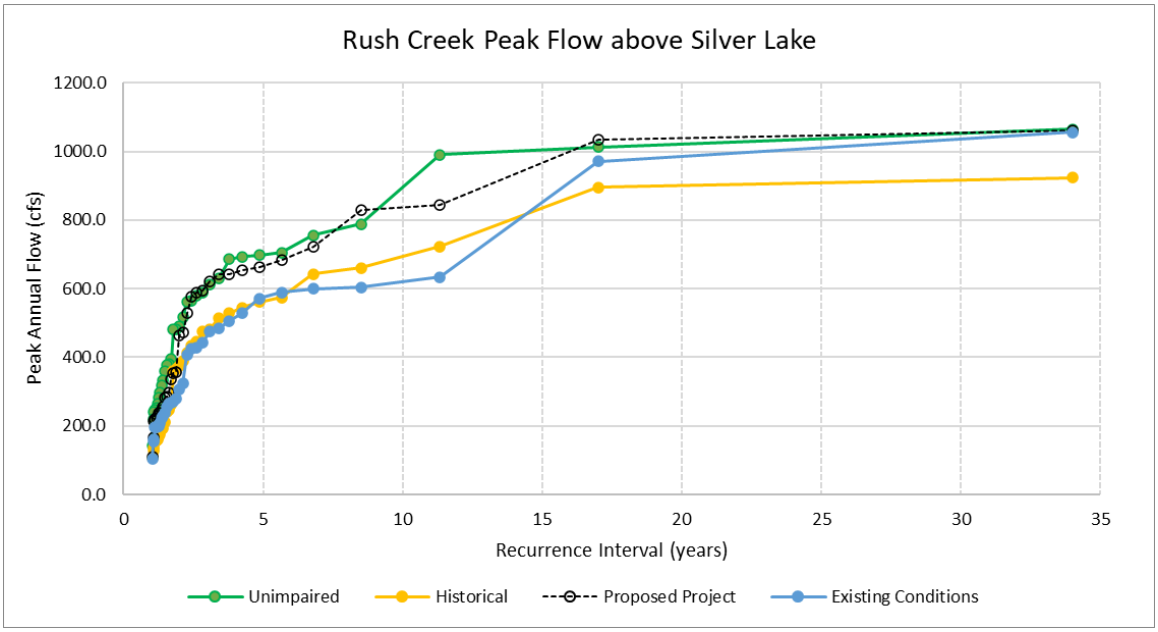


Figure AQ 1-P9. Recurrence Interval for Rush Creek Above Silver Lake for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

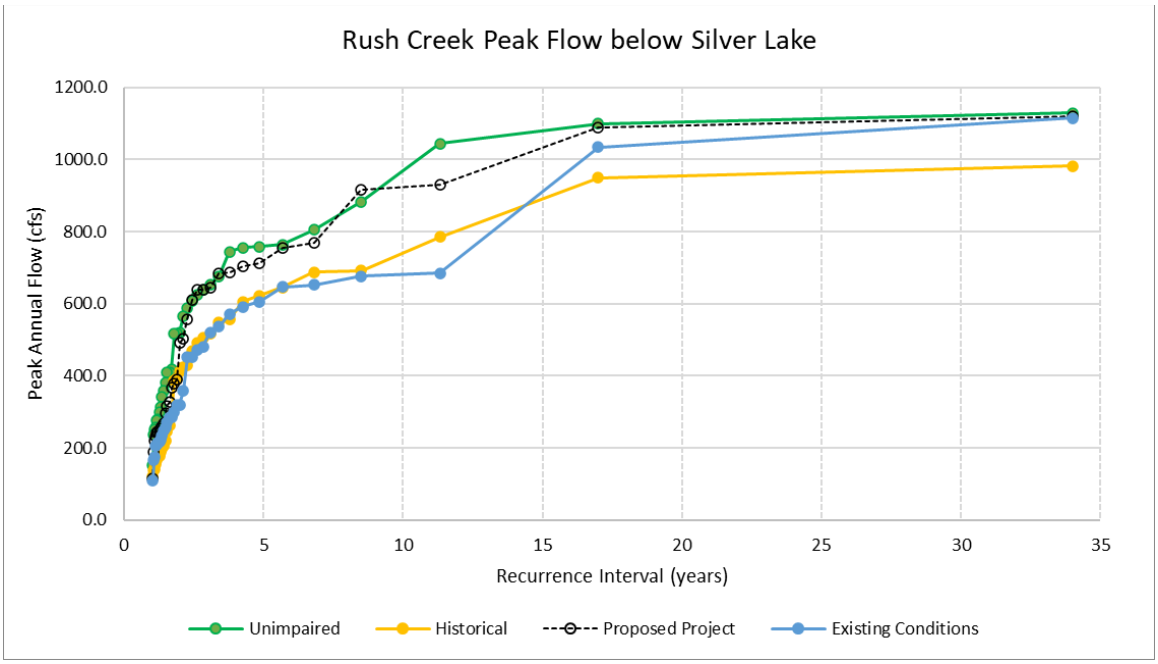


Figure AQ 1-P10. Recurrence Interval for Rush Creek Below Silver Lake for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

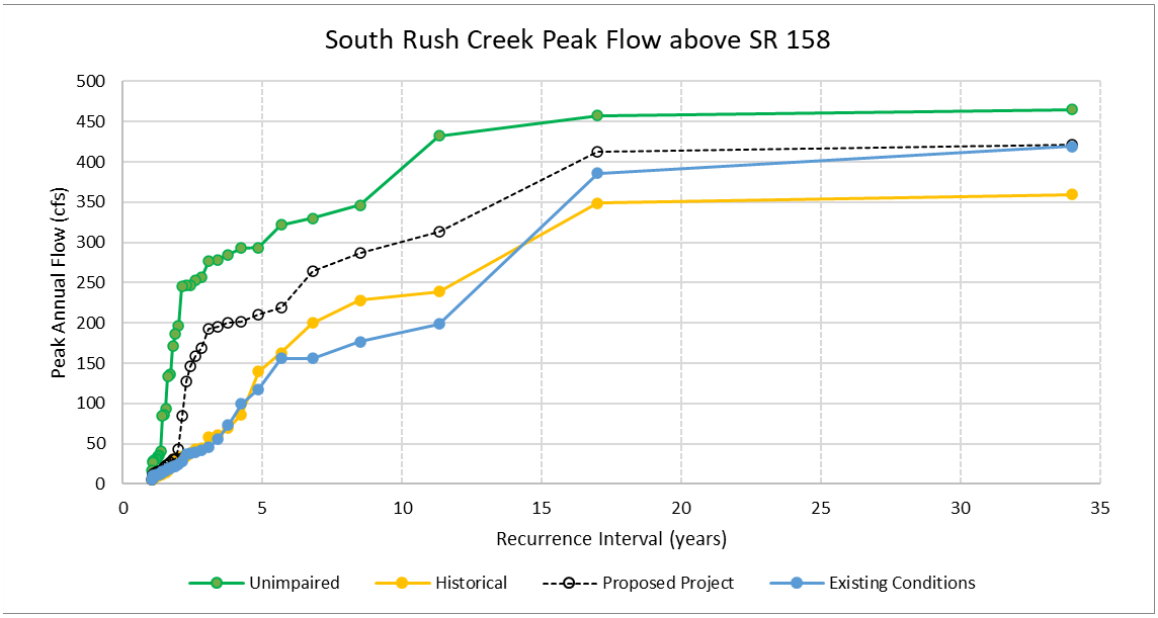


Figure AQ 1-P11. Recurrence Interval for South Rush Creek for Unimpaired, Historical, Proposed Project and Existing Conditions Flow Scenarios

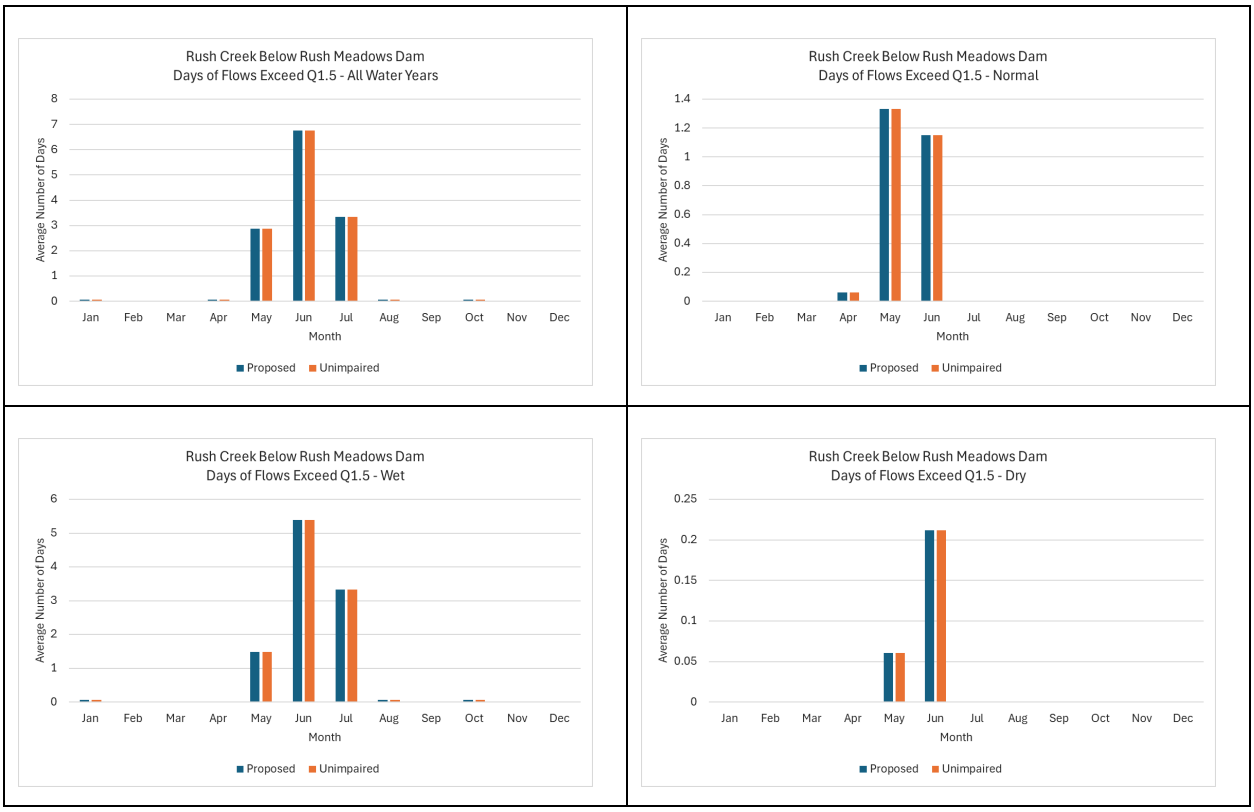


Figure AQ 1-P12. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for Rush Creek at Rush Meadows Dam

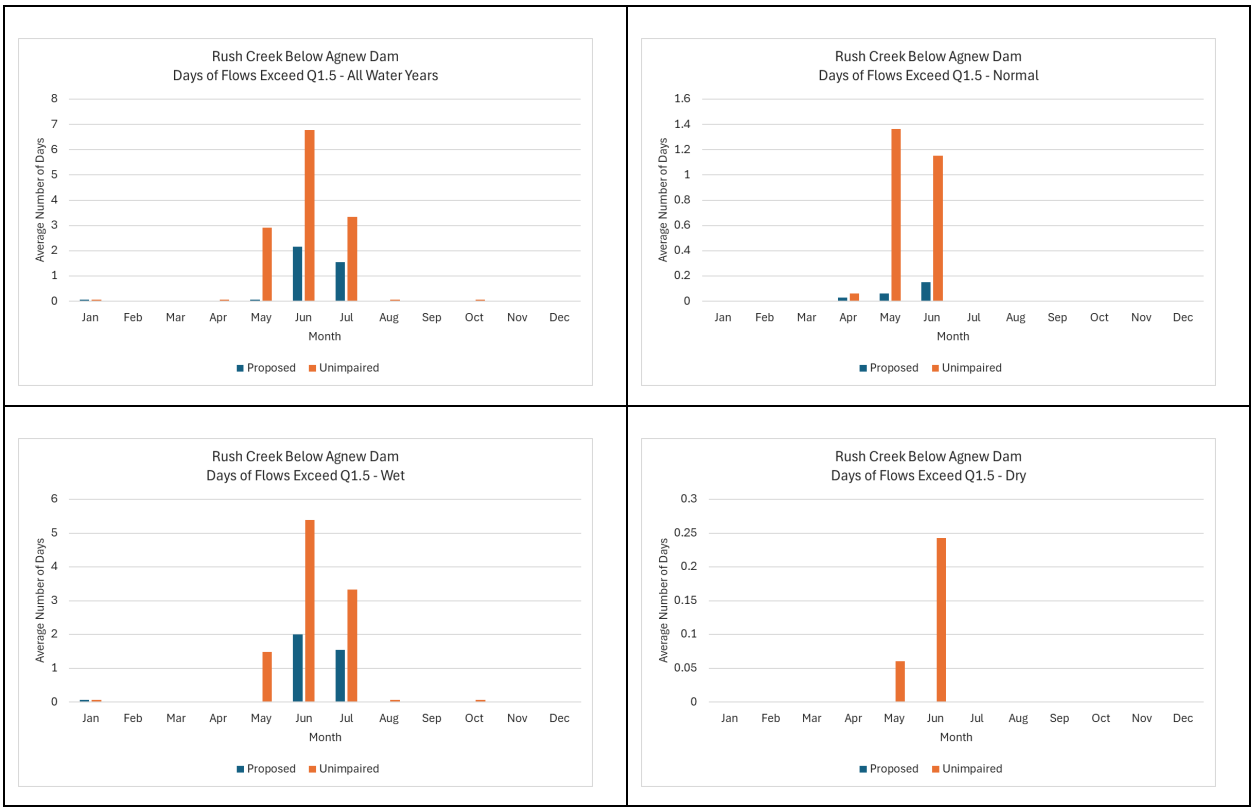


Figure AQ 1-P13. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for Rush Creek Below Agnew Dam

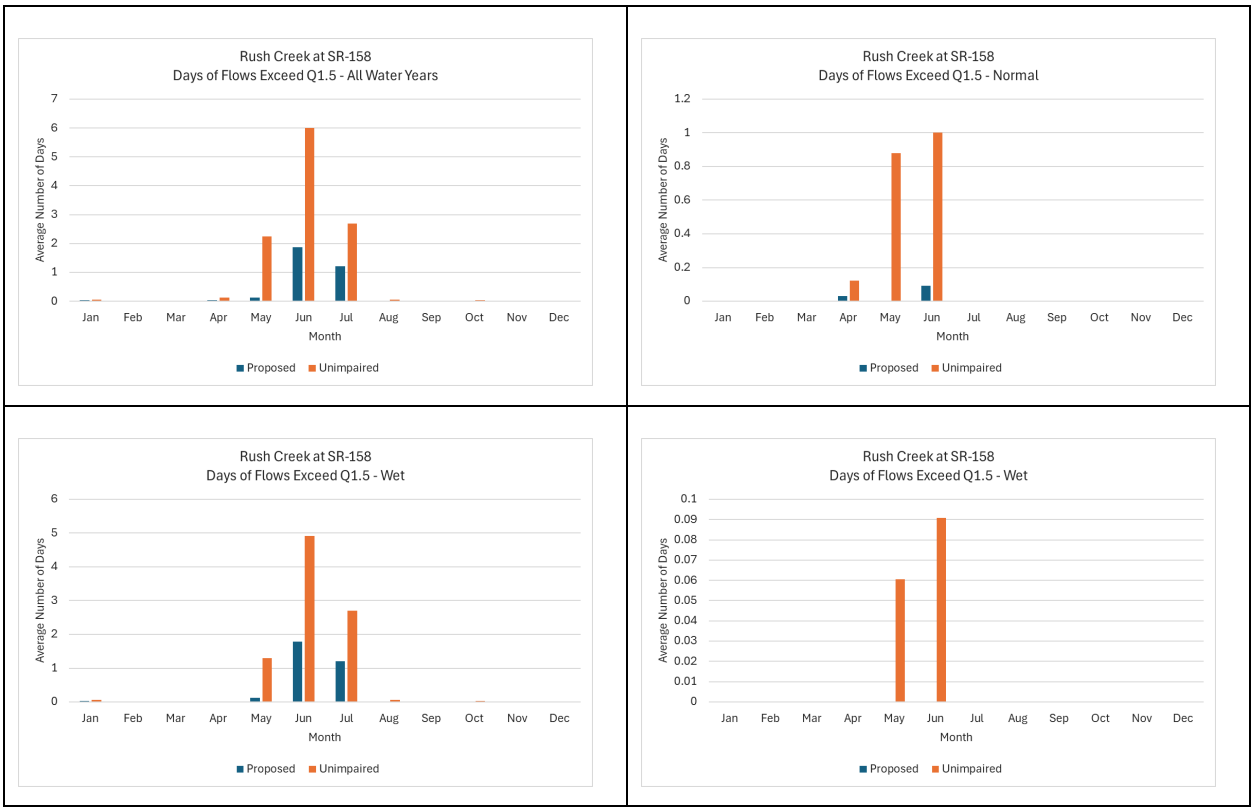


Figure AQ 1-P14. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for Rush Creek at SR-158

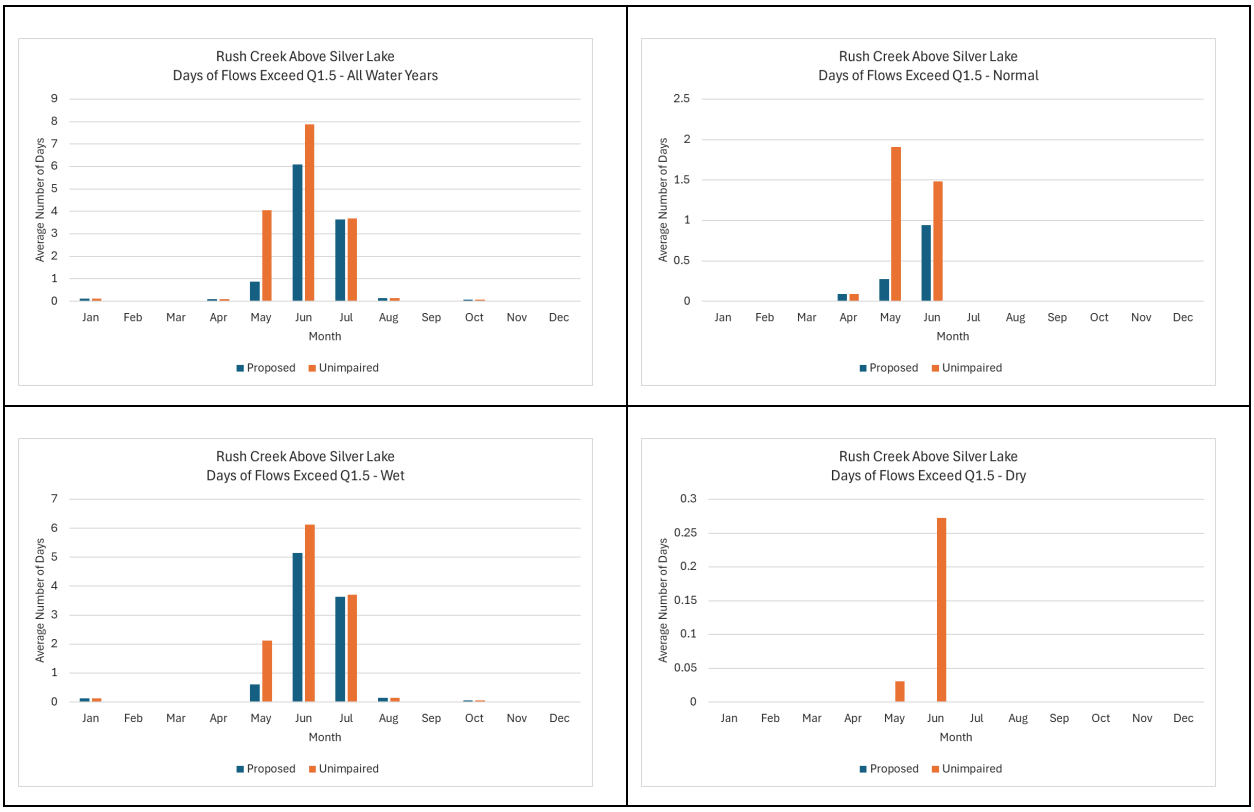


Figure AQ 1-P15. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for Rush Creek Above Silver Lake

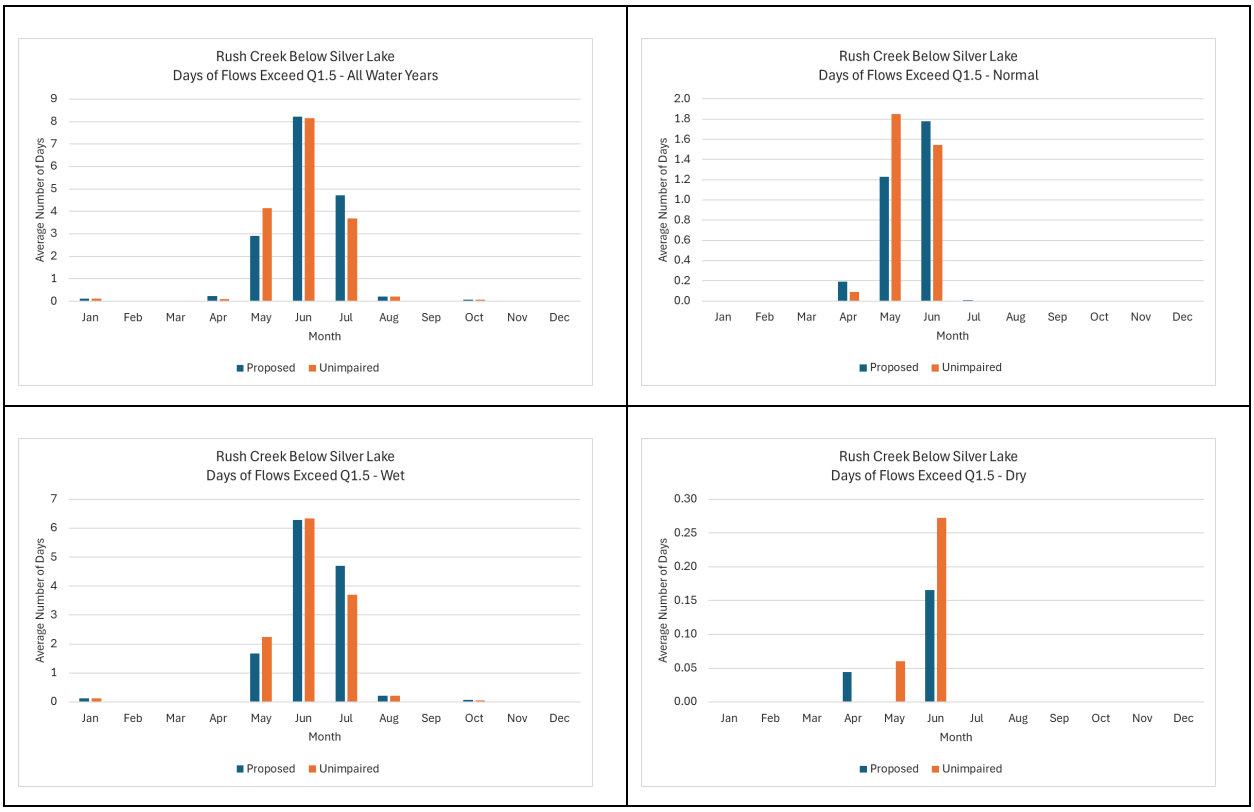


Figure AQ 1-P16. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for Rush Creek Below Silver Lake

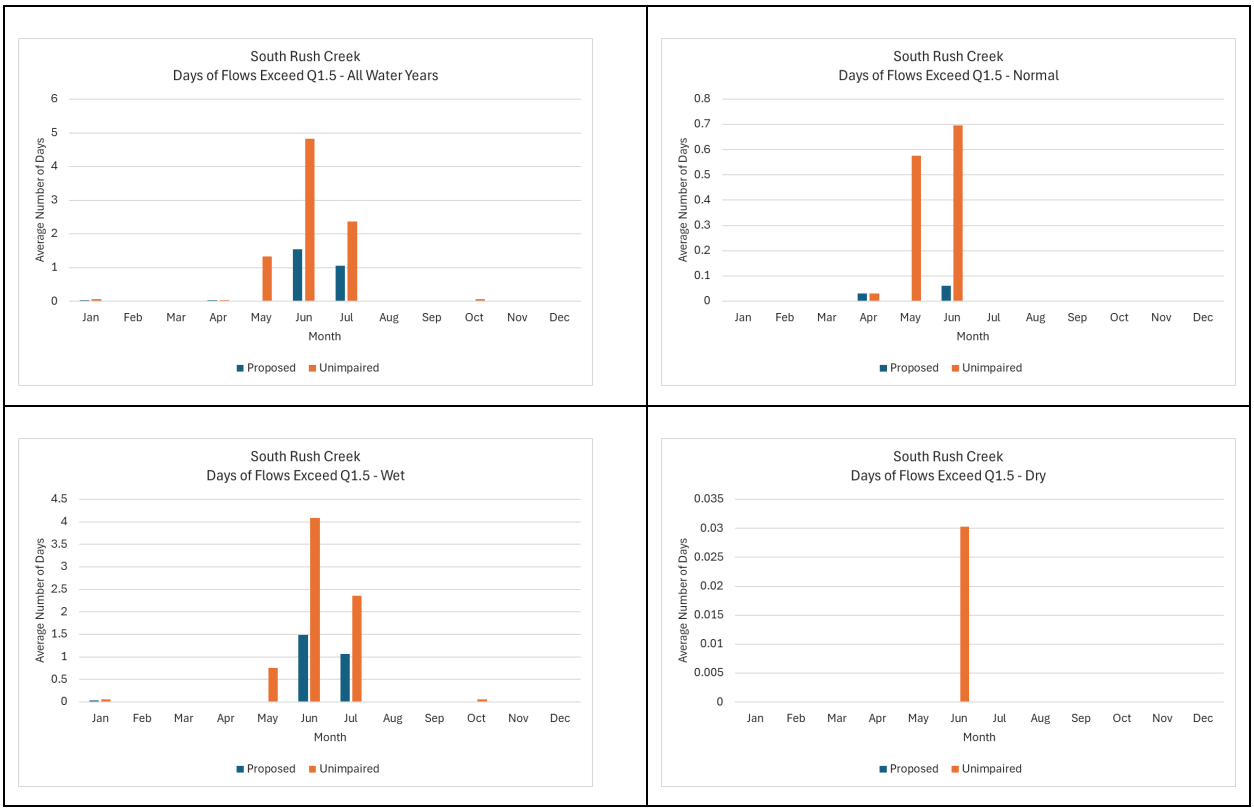
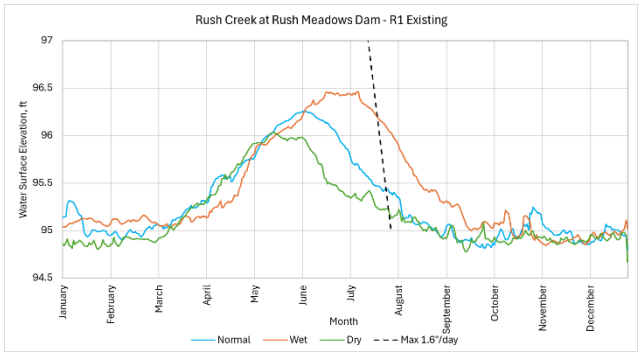
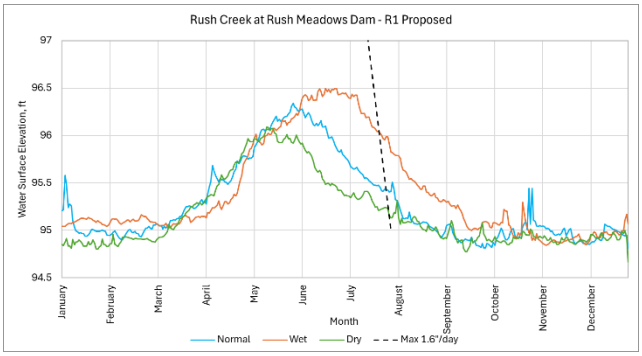
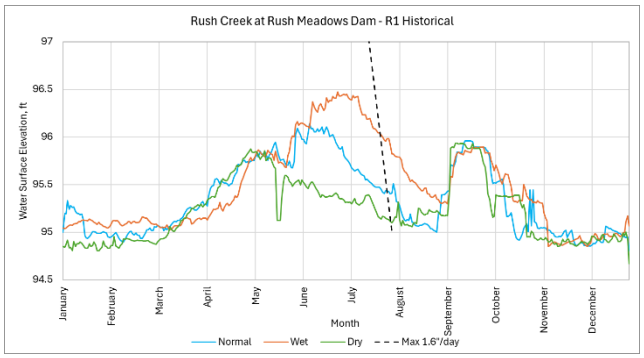
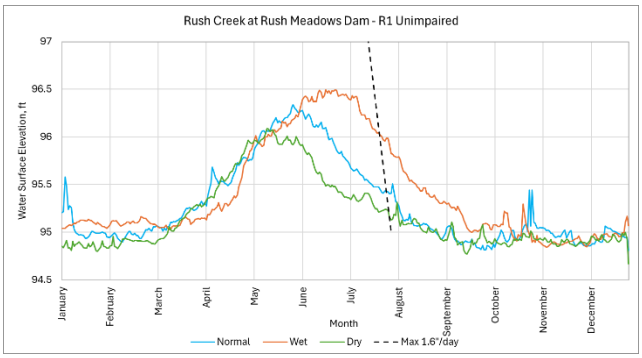


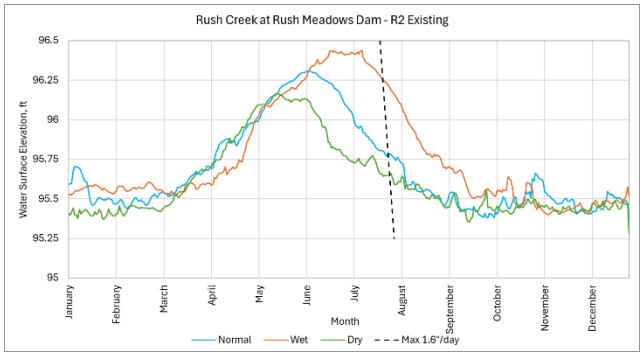
Figure AQ 1-P17. The Numbers of Days that the Proposed and Unimpaired Flows are Exceeded by the Q1.5 Flow for South Rush Creek

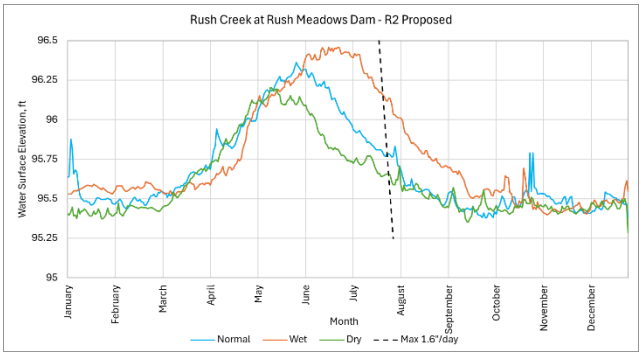

Rush Creek at Rush Meadows Dam - R1 Existing
Water Surface Elevation, ft
97
96.5
96
95.5
95
94.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

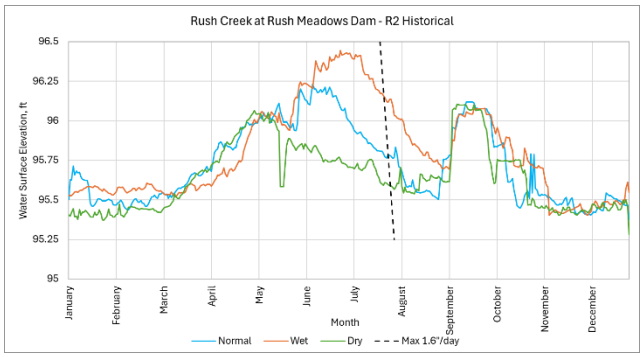

Rush Creek at Rush Meadows Dam - R1 Proposed
Water Surface Elevation, ft
97
96.5
96
95.5
95
94.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

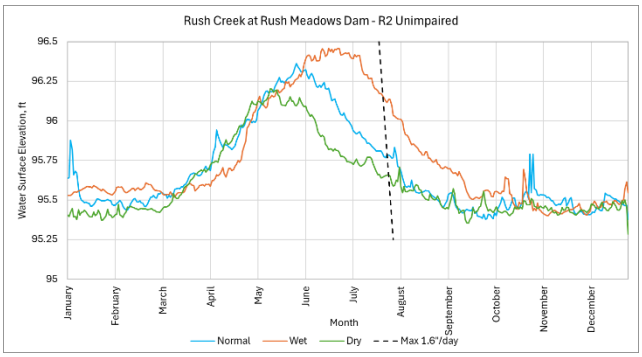

Rush Creek at Rush Meadows Dam - R1 Historical
Water Surface Elevation, ft
97
96.5
96
95.5
95
94.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at Rush Meadows Dam - R1 Unimpaired
Water Surface Elevation, ft
97
96.5
96
95.5
95
94.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at Rush Meadows Dam - R2 Existing
Water Surface Elevation, ft
96.5
96.25
96
95.75
95.5
95.25
95
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at Rush Meadows Dam - R2 Proposed
Water Surface Elevation, ft
96.5
96.25
96
95.75
95.5
95.25
95
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at Rush Meadows Dam - R2 Historical
Water Surface Elevation, ft
96.5
96.25
96
95.75
95.5
95.25
95
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at Rush Meadows Dam - R2 Unimpaired
Water Surface Elevation, ft
96.5
96.25
96
95.75
95.5
95.25
95
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

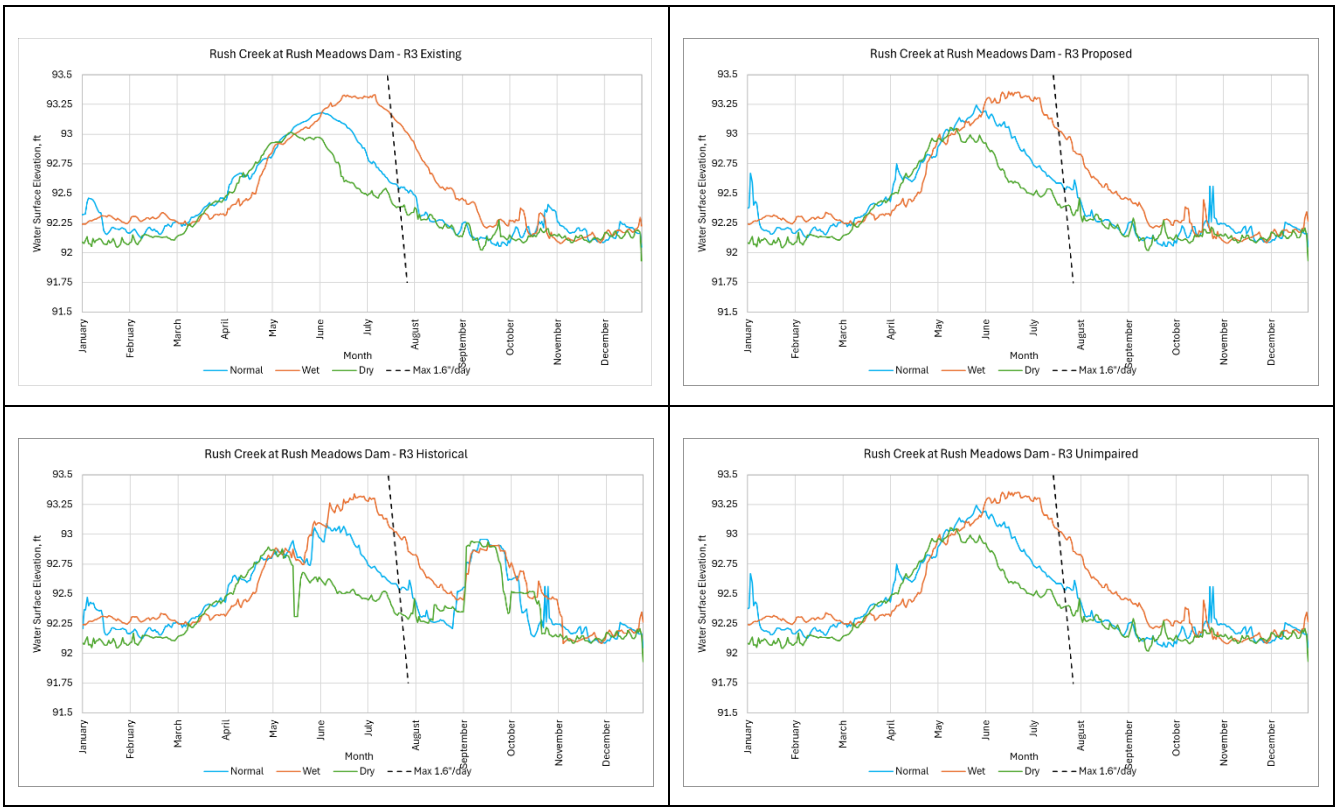
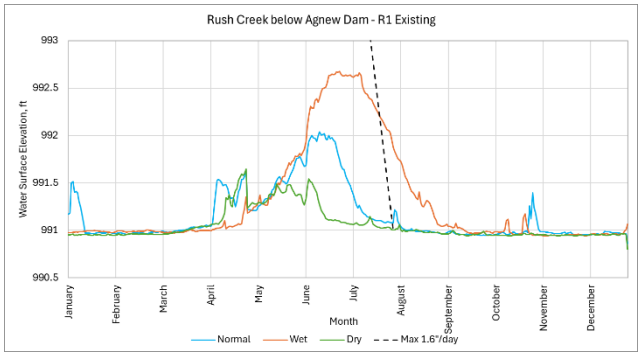
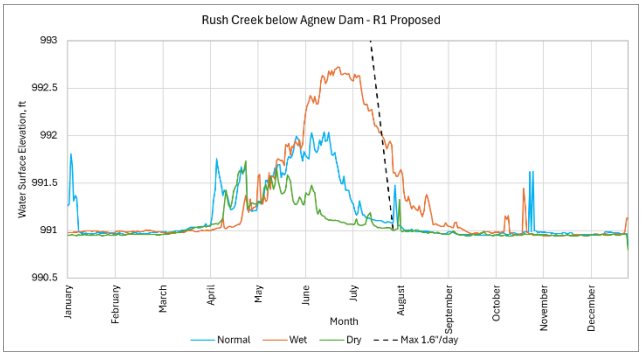
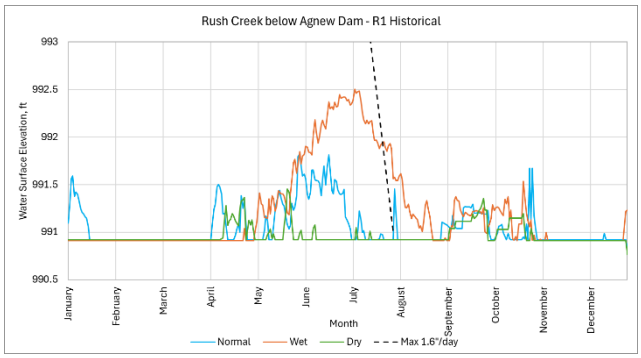
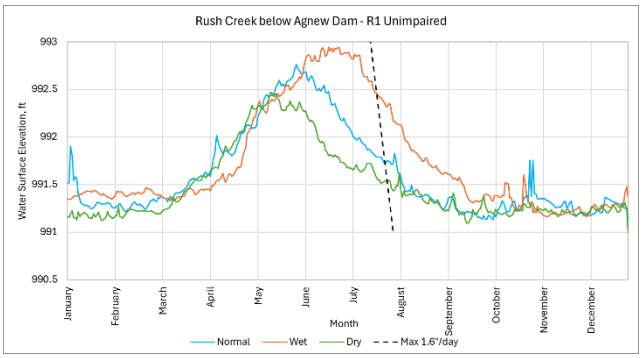


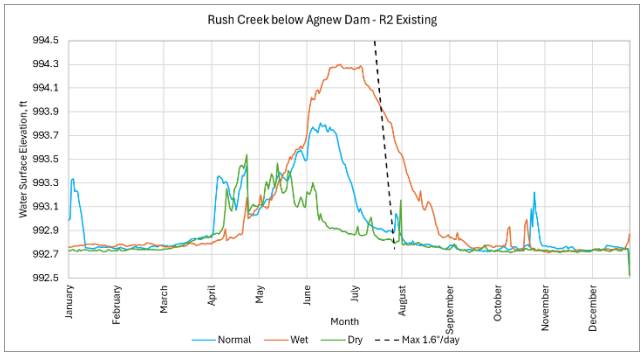
Figure AQ 1-P18. Recession Rates for Rush Creek at Rush Meadows Dam

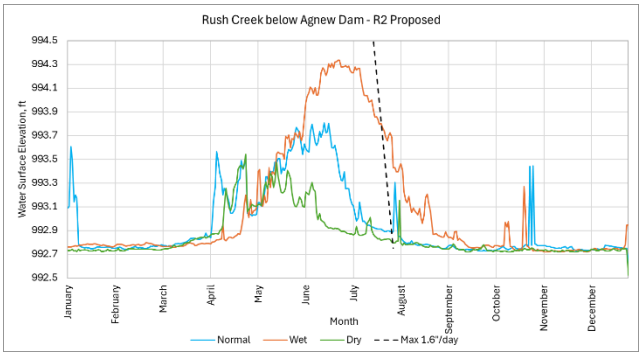

Rush Creek below Agnew Dam - R1 Existing
Water Surface Elevation, ft
993
992.5
992
991.5
991
990.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

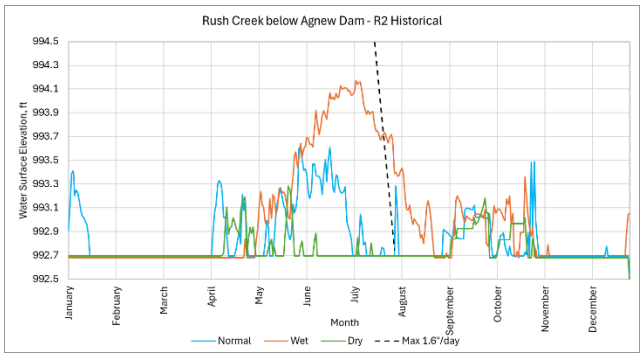

Rush Creek below Agnew Dam - R1 Proposed
Water Surface Elevation, ft
993
992.5
992
991.5
991
990.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

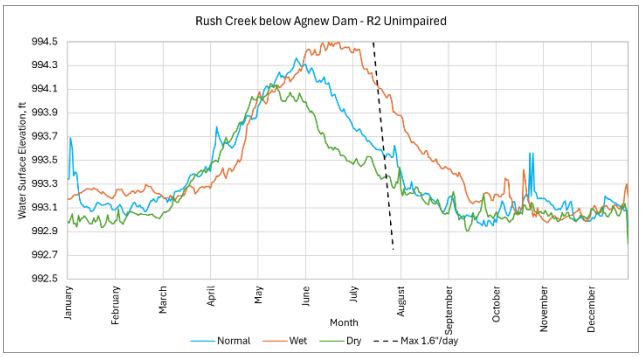

Rush Creek below Agnew Dam - R1 Historical
Water Surface Elevation, ft
993
992.5
992
991.5
991
990.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Agnew Dam - R1 Unimpaired
Water Surface Elevation, ft
993
992.5
992
991.5
991
990.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Agnew Dam - R2 Existing
Water Surface Elevation, ft
994.5
994.3
994.1
993.9
993.7
993.5
993.3
993.1
992.9
992.7
992.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Agnew Dam - R2 Proposed
Water Surface Elevation, ft
994.5
994.3
994.1
993.9
993.7
993.5
993.3
993.1
992.9
992.7
992.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Agnew Dam - R2 Historical
Water Surface Elevation, ft
994.5
994.3
994.1
993.9
993.7
993.5
993.3
993.1
992.9
992.7
992.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Agnew Dam - R2 Unimpaired
Water Surface Elevation, ft
994.5
994.3
994.1
993.9
993.7
993.5
993.3
993.1
992.9
992.7
992.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

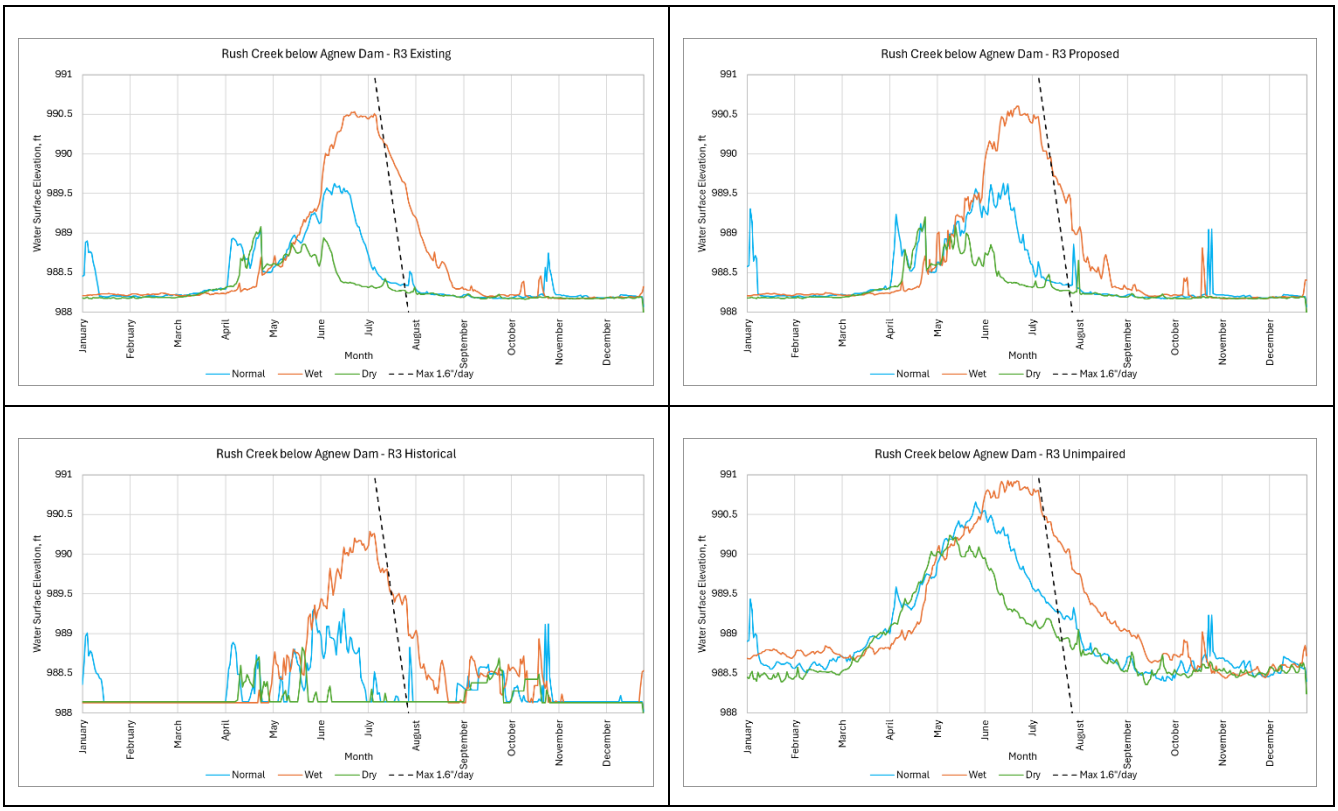
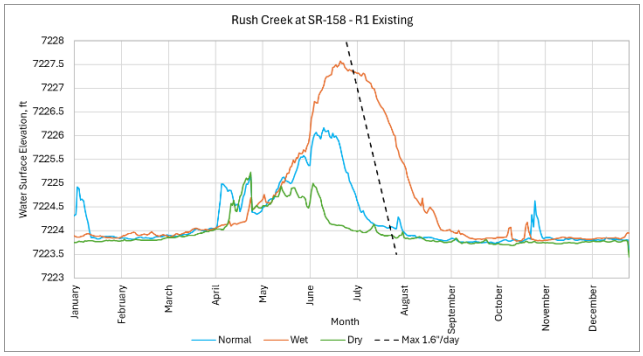
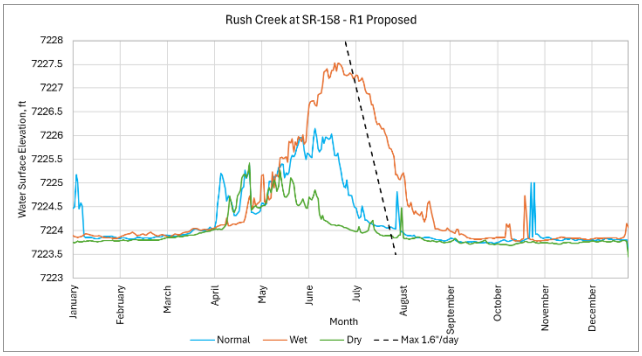
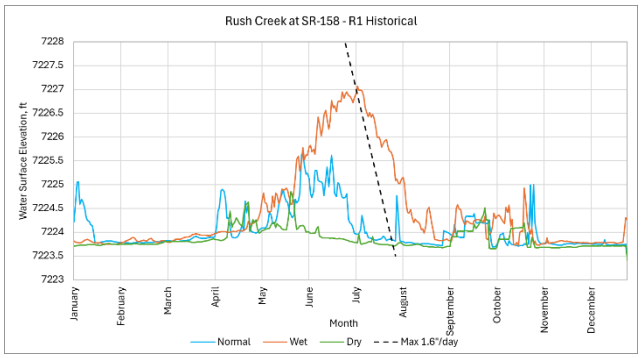
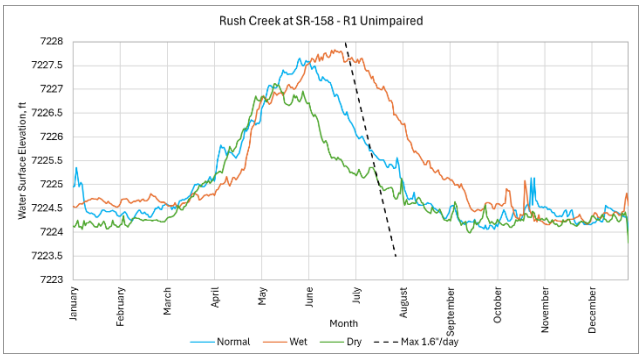


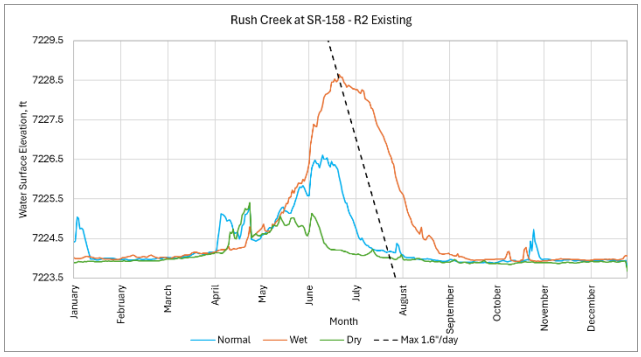
Figure AQ 1-P19. Recession Rates for Rush Creek Below Agnew Dam

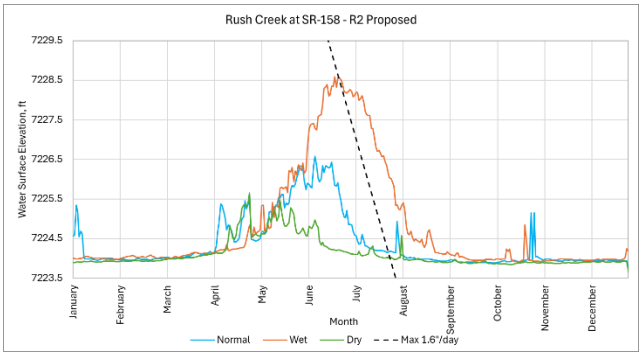

Rush Creek at SR-158 - R1 Existing
Water Surface Elevation, ft
7228
7227.5
7227
7226.5
7226
7225.5
7225
7224.5
7224
7223.5
7223
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

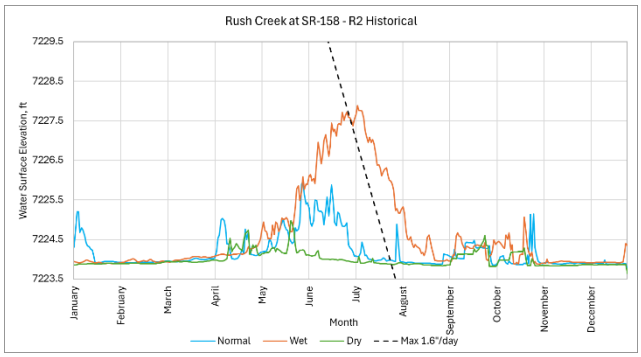

Rush Creek at SR-158 - R1 Proposed
Water Surface Elevation, ft
7228
7227.5
7227
7226.5
7226
7225.5
7225
7224.5
7224
7223.5
7223
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

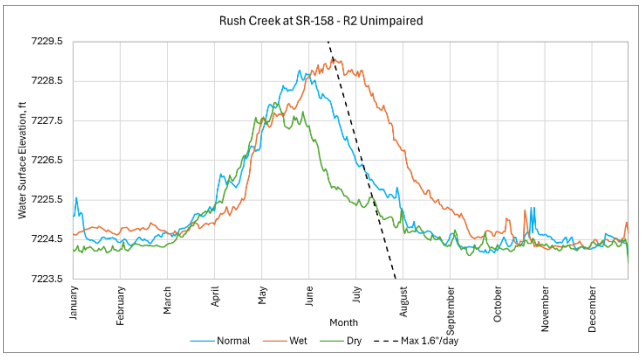

Rush Creek at SR-158 - R1 Historical
Water Surface Elevation, ft
7228
7227.5
7227
7226.5
7226
7225.5
7225
7224.5
7224
7223.5
7223
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at SR-158 - R1 Unimpaired
Water Surface Elevation, ft
7228
7227.5
7227
7226.5
7226
7225.5
7225
7224.5
7224
7223.5
7223
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at SR-158 - R2 Existing
Water Surface Elevation, ft
7229.5
7228.5
7227.5
7226.5
7225.5
7224.5
7223.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at SR-158 - R2 Proposed
Water Surface Elevation, ft
7229.5
7228.5
7227.5
7226.5
7225.5
7224.5
7223.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at SR-158 - R2 Historical
Water Surface Elevation, ft
7229.5
7228.5
7227.5
7226.5
7225.5
7224.5
7223.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek at SR-158 - R2 Unimpaired
Water Surface Elevation, ft
7229.5
7228.5
7227.5
7226.5
7225.5
7224.5
7223.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

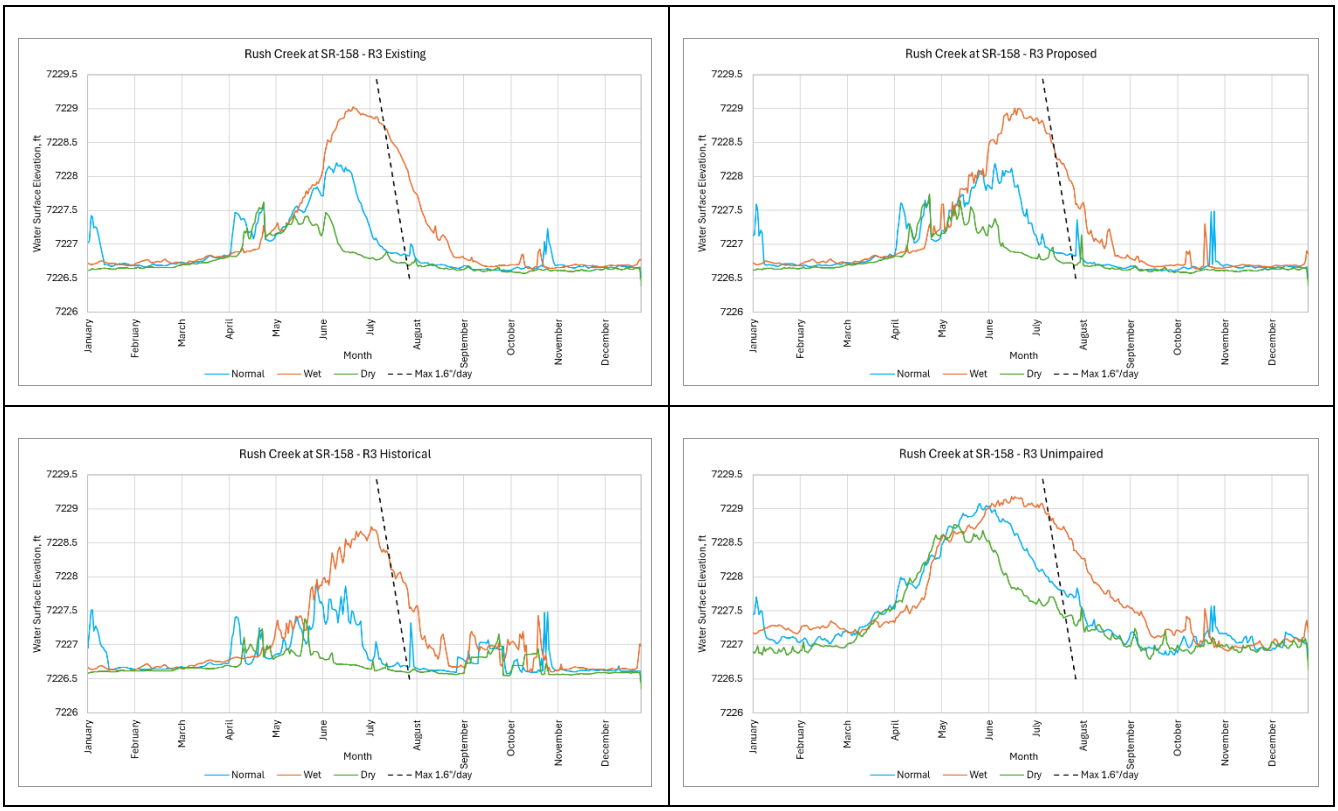
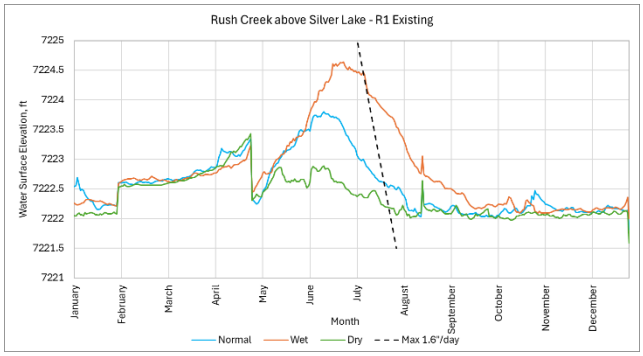
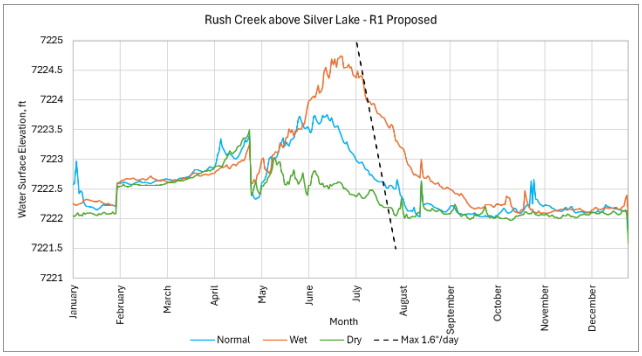
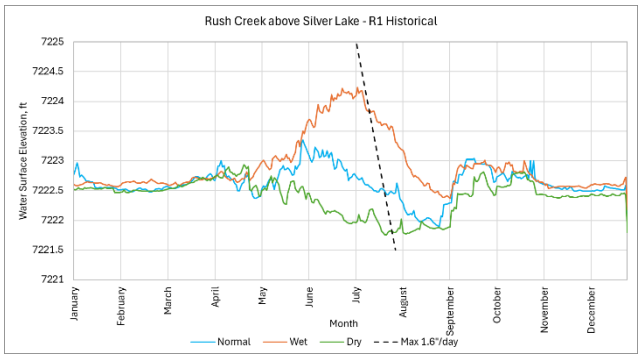
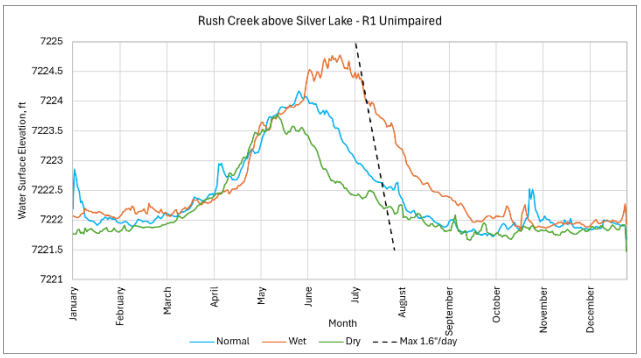


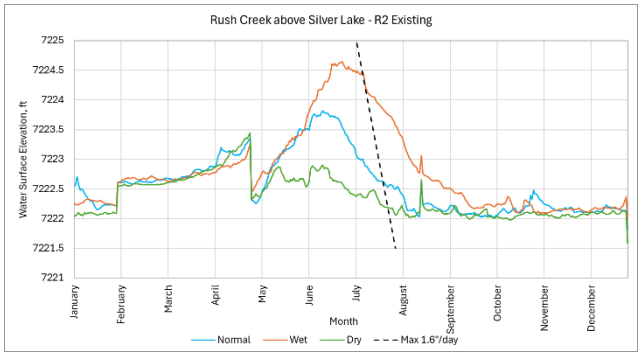
Figure AQ 1-P20. Recession Rates for Rush Creek at SR-158

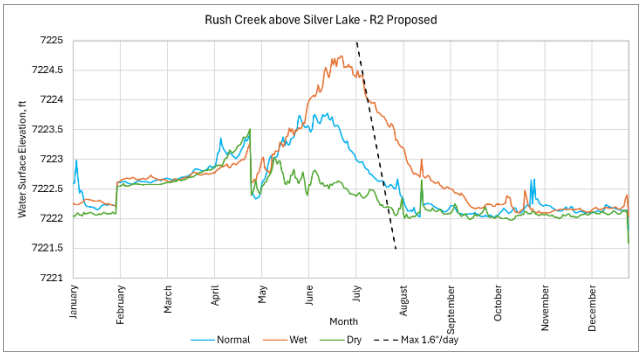

Rush Creek above Silver Lake - R1 Existing
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

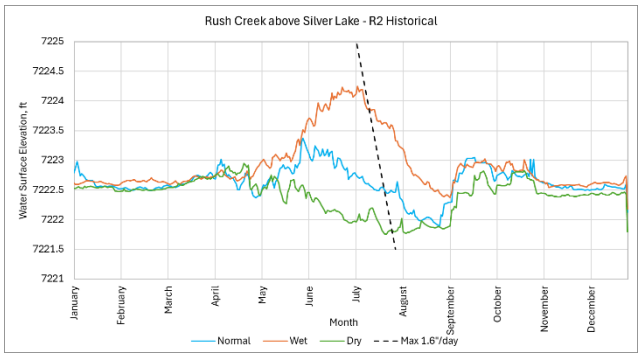

Rush Creek above Silver Lake - R1 Proposed
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

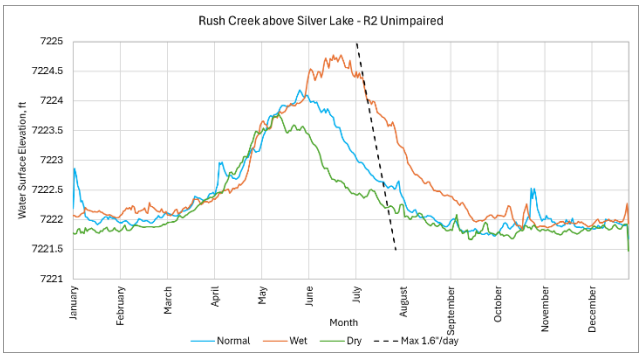

Rush Creek above Silver Lake - R1 Historical
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek above Silver Lake - R1 Unimpaired
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek above Silver Lake - R2 Existing
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek above Silver Lake - R2 Proposed
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek above Silver Lake - R2 Historical
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek above Silver Lake - R2 Unimpaired
Water Surface Elevation, ft
7225
7224.5
7224
7223.5
7223
7222.5
7222
7221.5
7221
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

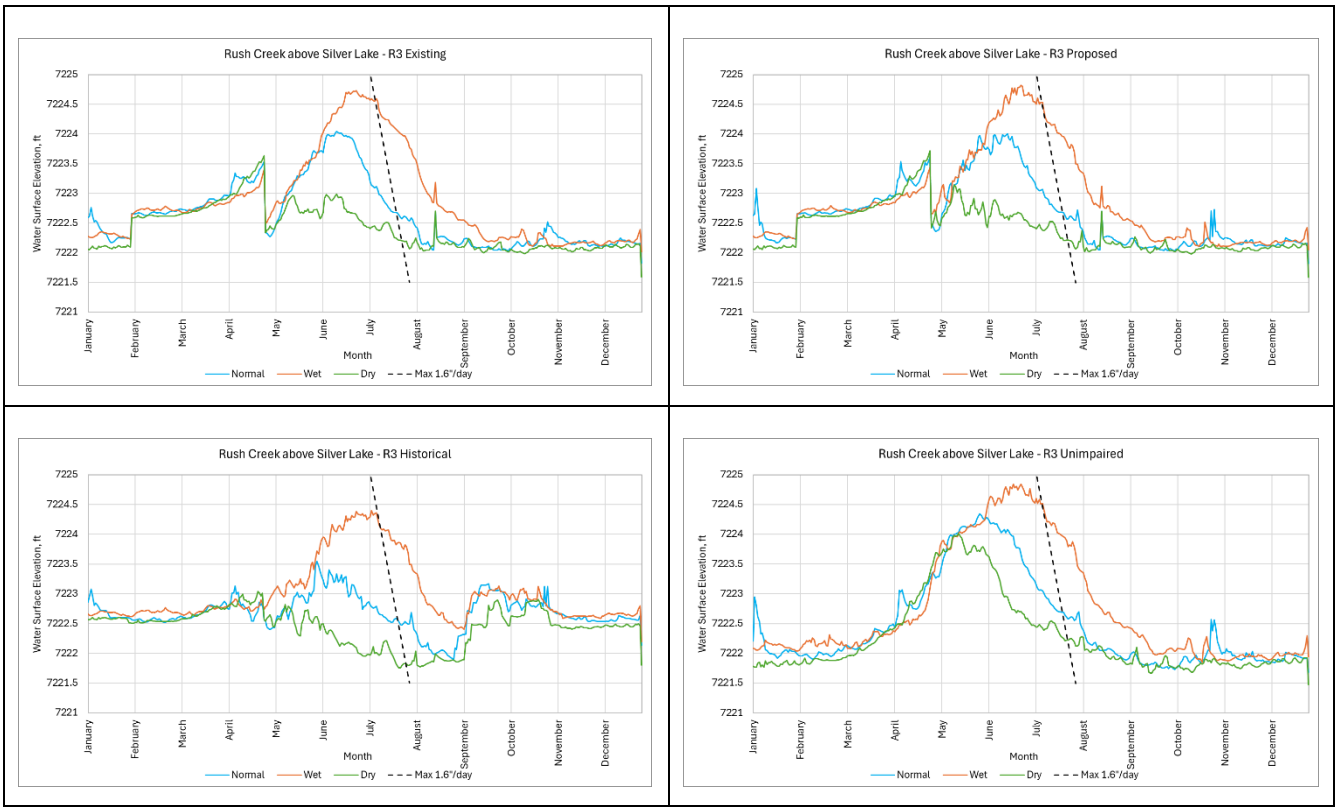
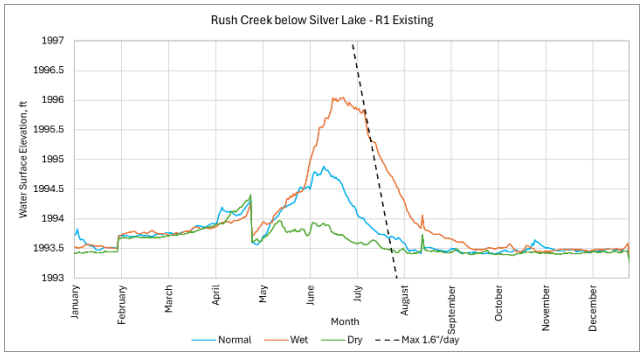
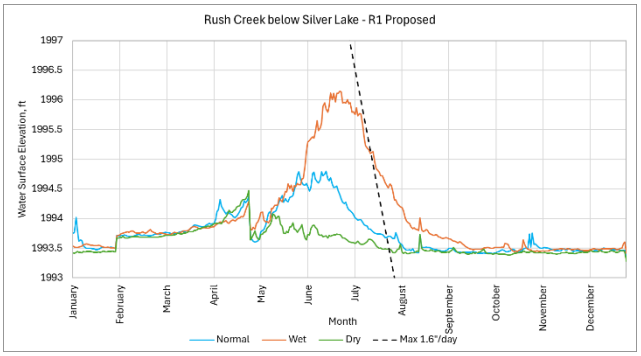
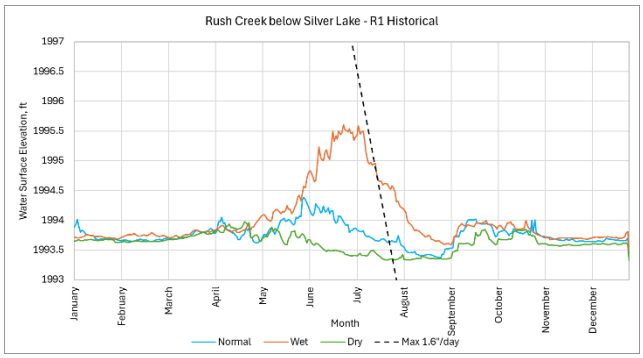
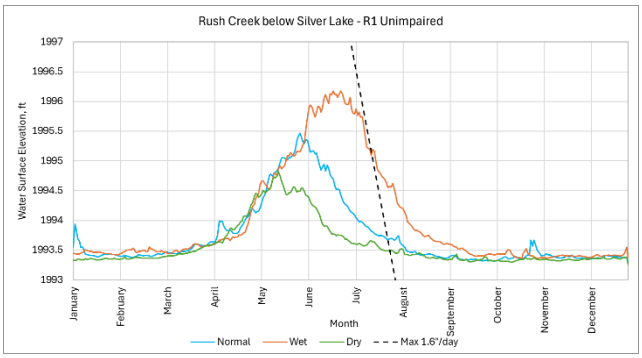


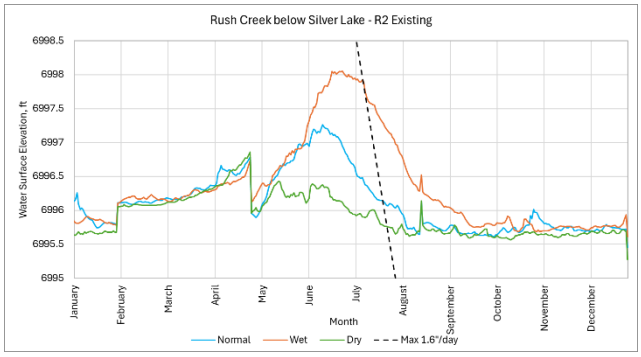
Figure AQ 1-P21. Recession Rates for Rush Creek Above Silver Lake

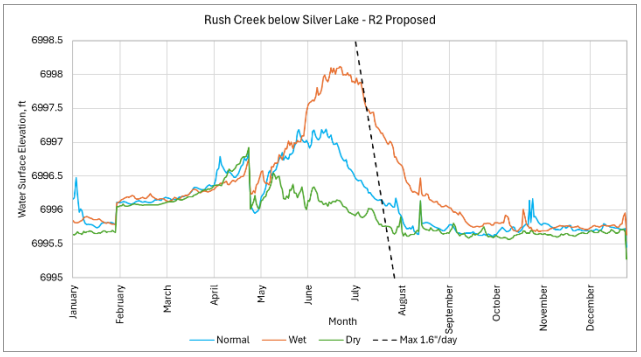

Rush Creek below Silver Lake - R1 Existing
Water Surface Elevation, ft
1997
1996.5
1996
1995.5
1995
1994.5
1994
1993.5
1993
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

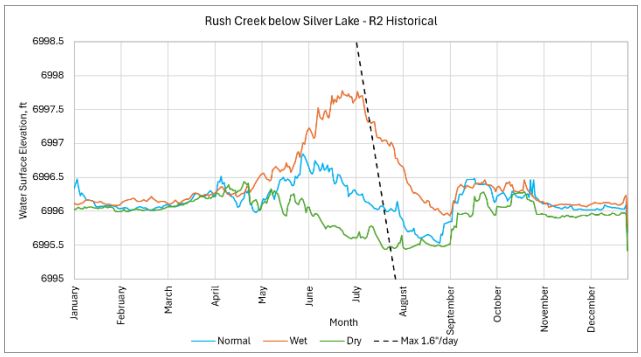

Rush Creek below Silver Lake - R1 Proposed
Water Surface Elevation, ft
1997
1996.5
1996
1995.5
1995
1994.5
1994
1993.5
1993
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

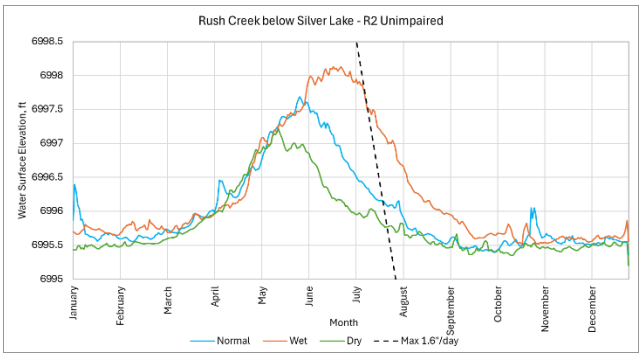

Rush Creek below Silver Lake - R1 Historical
Water Surface Elevation, ft
1997
1996.5
1996
1995.5
1995
1994.5
1994
1993.5
1993
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Silver Lake - R1 Unimpaired
Water Surface Elevation, ft
1997
1996.5
1996
1995.5
1995
1994.5
1994
1993.5
1993
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Silver Lake - R2 Existing
Water Surface Elevation, ft
6998.5
6998
6997.5
6997
6996.5
6996
6995.5
6995
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Silver Lake - R2 Proposed
Water Surface Elevation, ft
6998.5
6998
6997.5
6997
6996.5
6996
6995.5
6995
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Silver Lake - R2 Historical
Water Surface Elevation, ft
6998.5
6998
6997.5
6997
6996.5
6996
6995.5
6995
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


Rush Creek below Silver Lake - R2 Unimpaired
Water Surface Elevation, ft
6998.5
6998
6997.5
6997
6996.5
6996
6995.5
6995
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

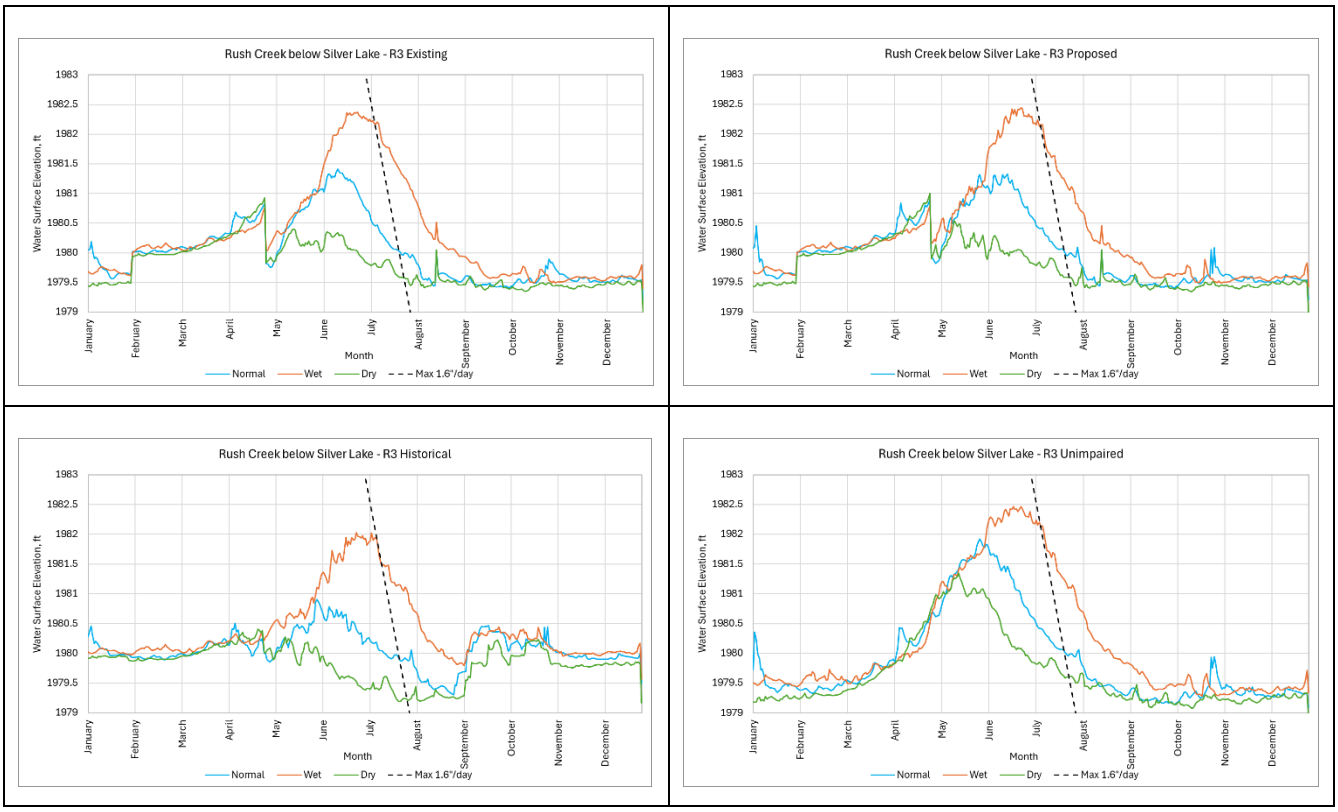
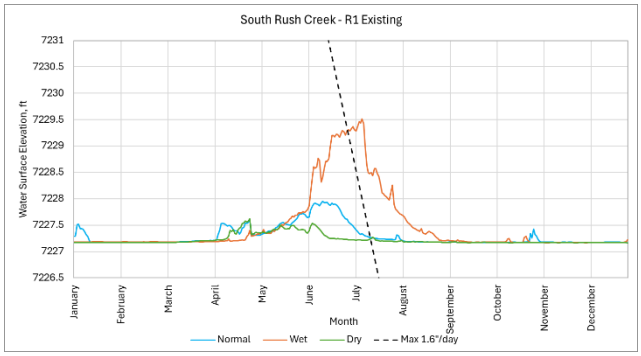
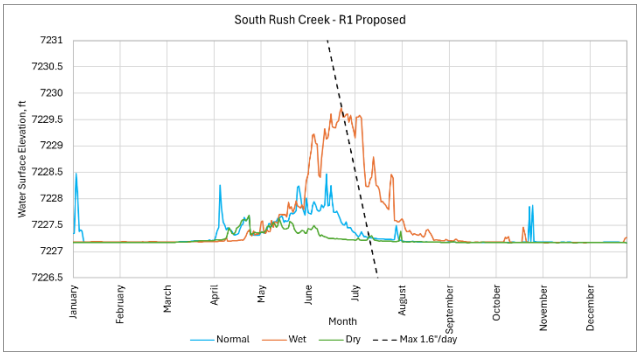
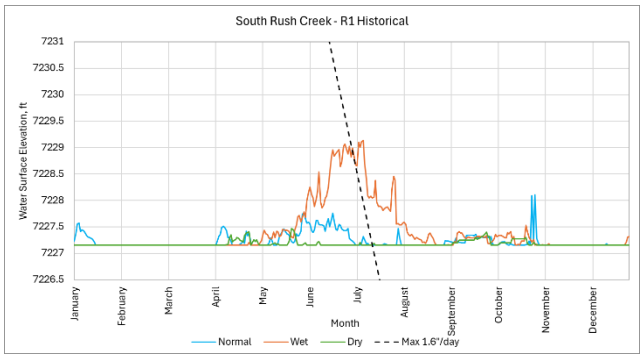
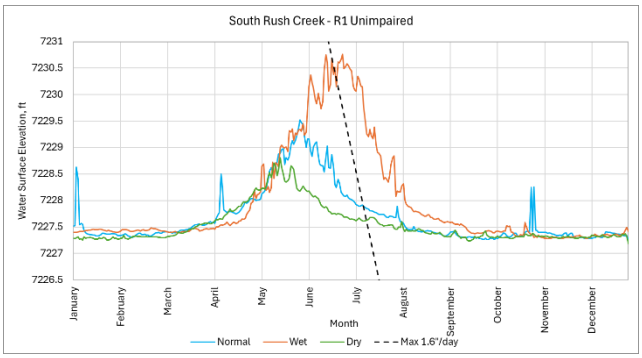


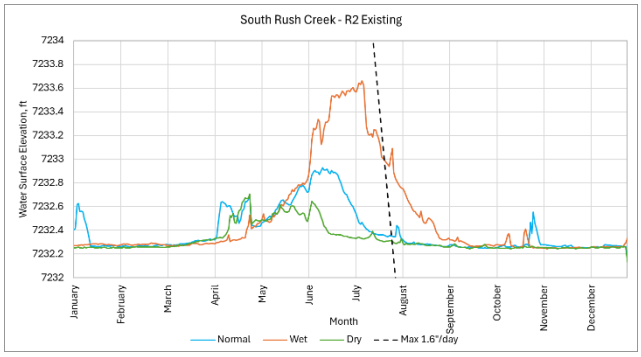
Figure AQ 1-P22. Recession Rates for Rush Creek Below Silver Lake

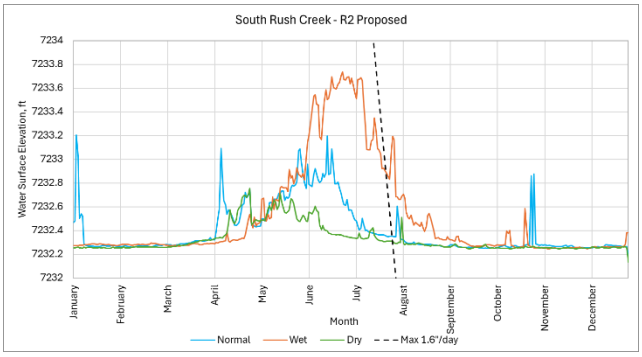

South Rush Creek - R1 Existing
Water Surface Elevation, ft
7231
7230.5
7230
7229.5
7229
7228.5
7228
7227.5
7227
7226.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

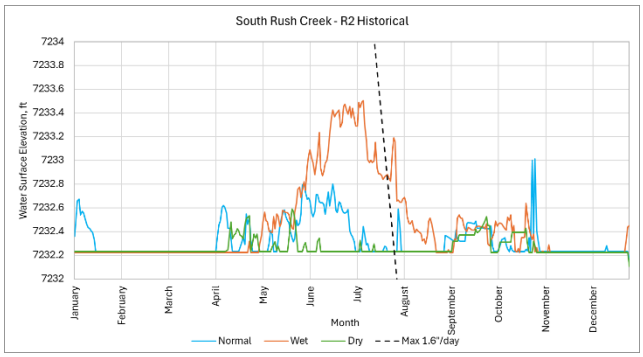

South Rush Creek - R1 Proposed
Water Surface Elevation, ft
7231
7230.5
7230
7229.5
7229
7228.5
7228
7227.5
7227
7226.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

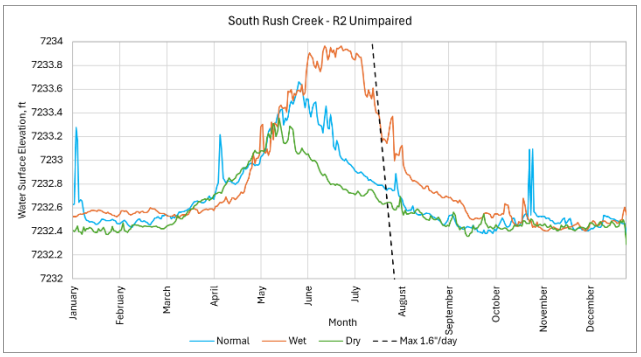

South Rush Creek - R1 Historical
Water Surface Elevation, ft
7231
7230.5
7230
7229.5
7229
7228.5
7228
7227.5
7227
7226.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


South Rush Creek - R1 Unimpaired
Water Surface Elevation, ft
7231
7230.5
7230
7229.5
7229
7228.5
7228
7227.5
7227
7226.5
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


South Rush Creek - R2 Existing
Water Surface Elevation, ft
7234
7233.8
7233.6
7233.4
7233.2
7233
7232.8
7232.6
7232.4
7232.2
7232
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


South Rush Creek - R2 Proposed
Water Surface Elevation, ft
7234
7233.8
7233.6
7233.4
7233.2
7233
7232.8
7232.6
7232.4
7232.2
7232
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


South Rush Creek - R2 Historical
Water Surface Elevation, ft
7234
7233.8
7233.6
7233.4
7233.2
7233
7232.8
7232.6
7232.4
7232.2
7232
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day


South Rush Creek - R2 Unimpaired
Water Surface Elevation, ft
7234
7233.8
7233.6
7233.4
7233.2
7233
7232.8
7232.6
7232.4
7232.2
7232
January
February
March
April
May
June
July
August
September
October
November
December
Month
Normal
Wet
Dry
Max 1.6"/day

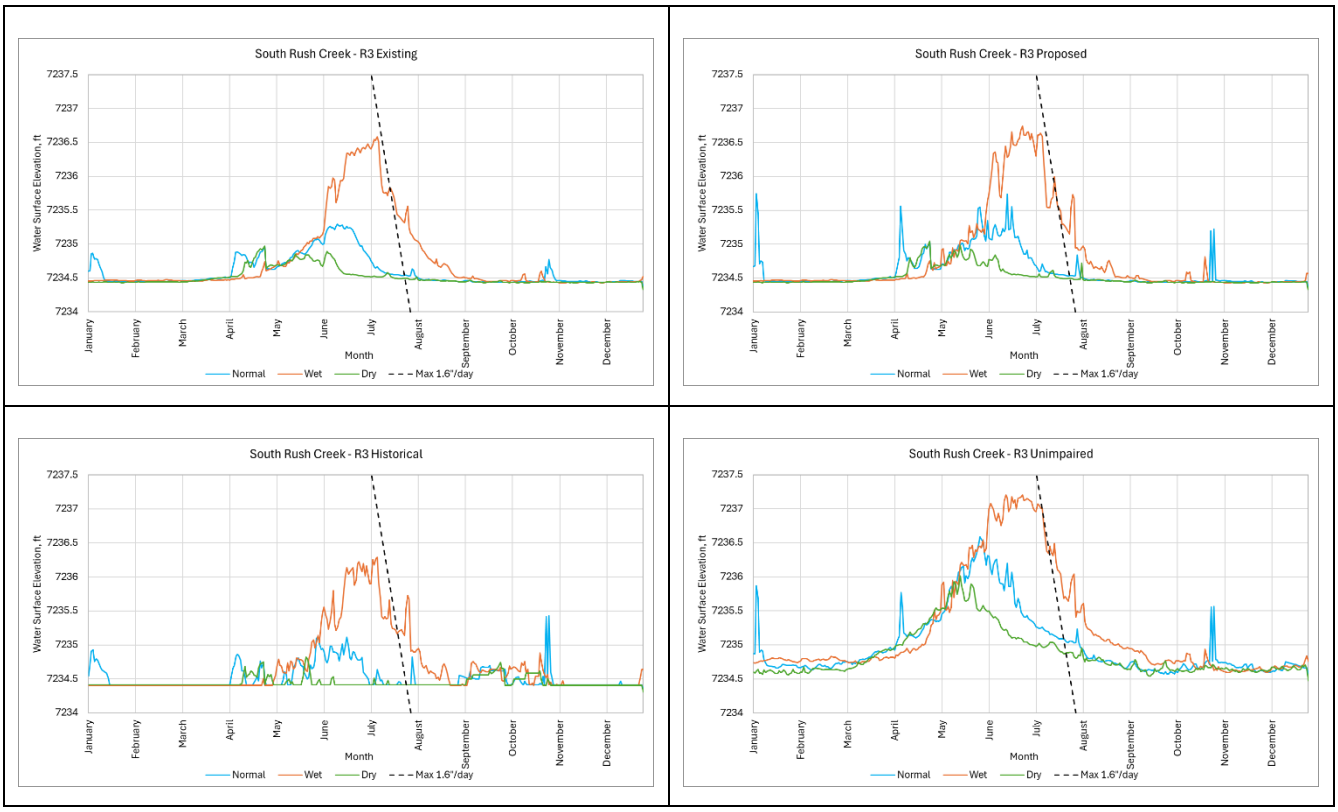


Figure AQ 1-P23. Recession Rates for South Rush Creek

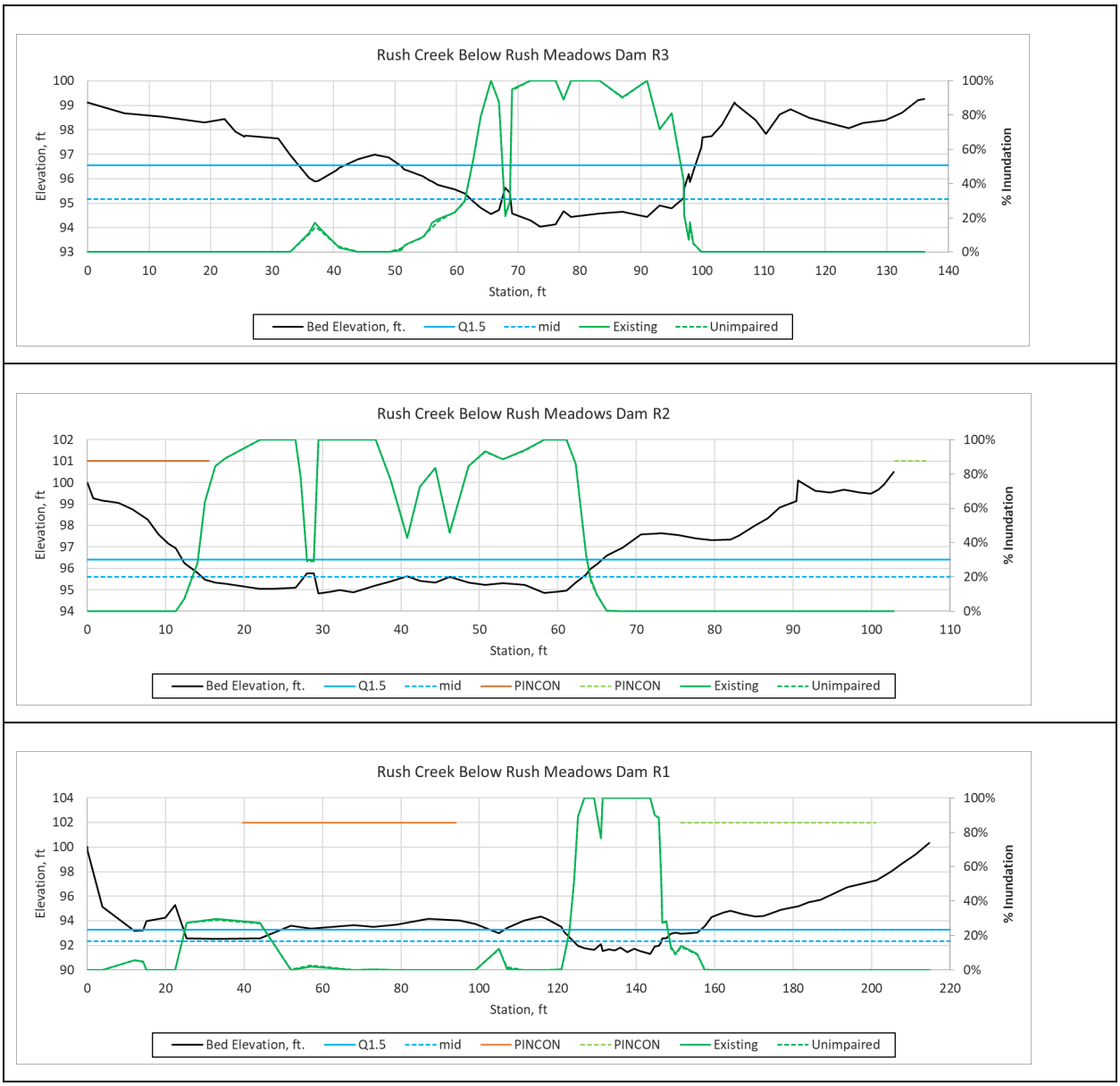


Figure AQ 1-P24. Rush Creek below Rush Meadows Dam inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

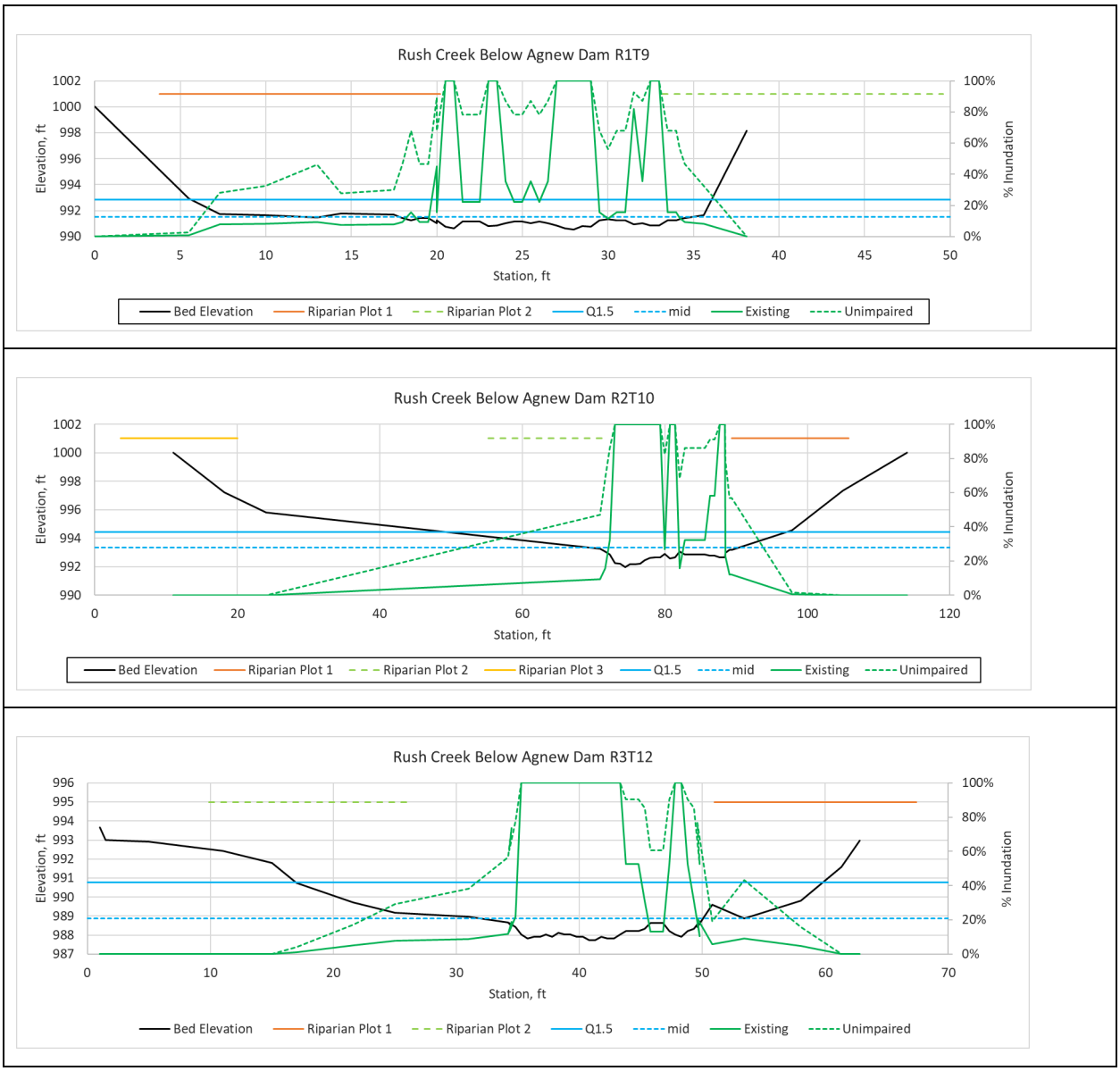


Figure AQ 1-P25. Rush Creek at below Agnew Dam inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

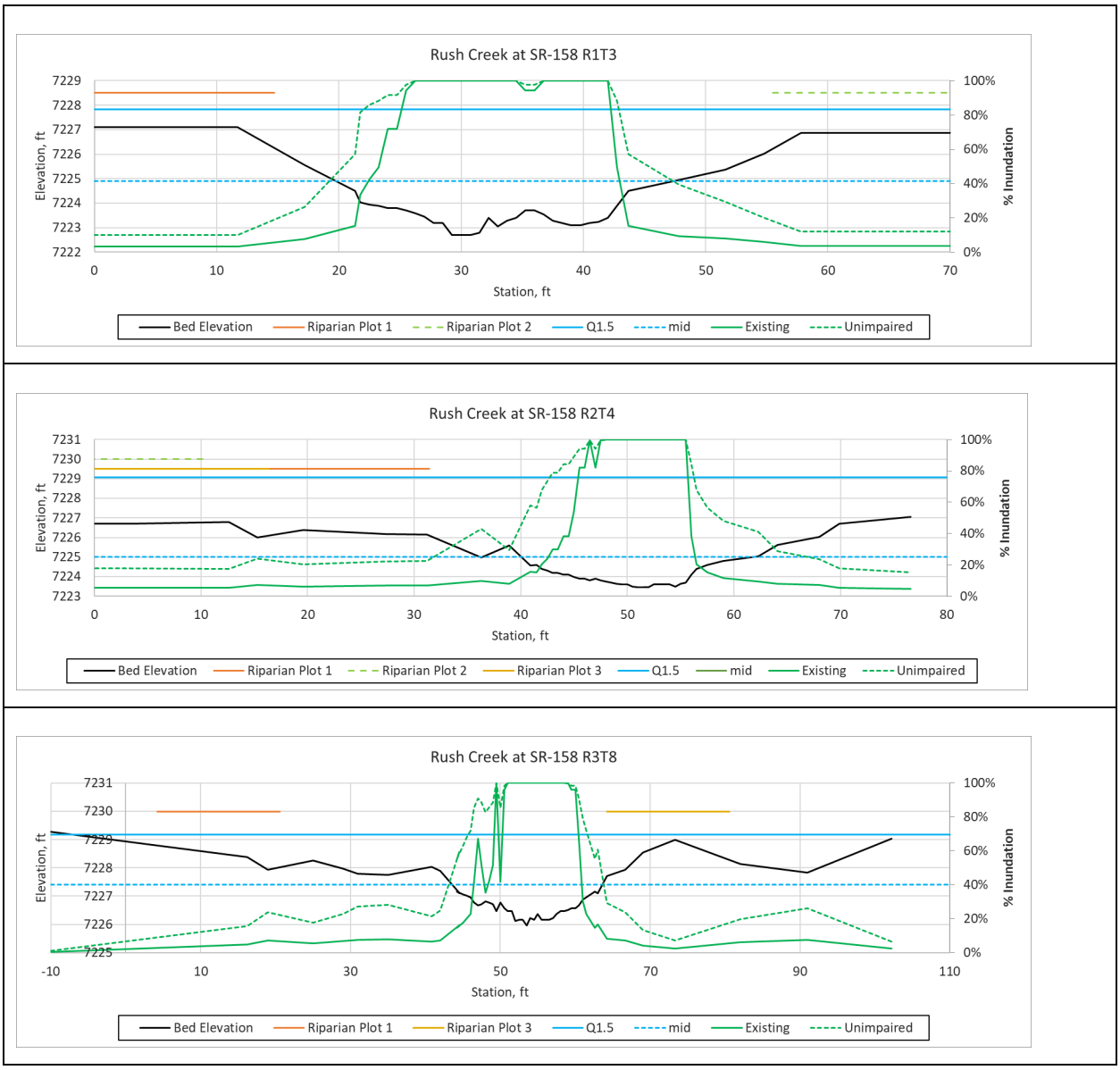


Figure AQ 1-P26. Rush Creek at SR-158 inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

Figure AQ 1-P27. Rush Creek above Silver Lake inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

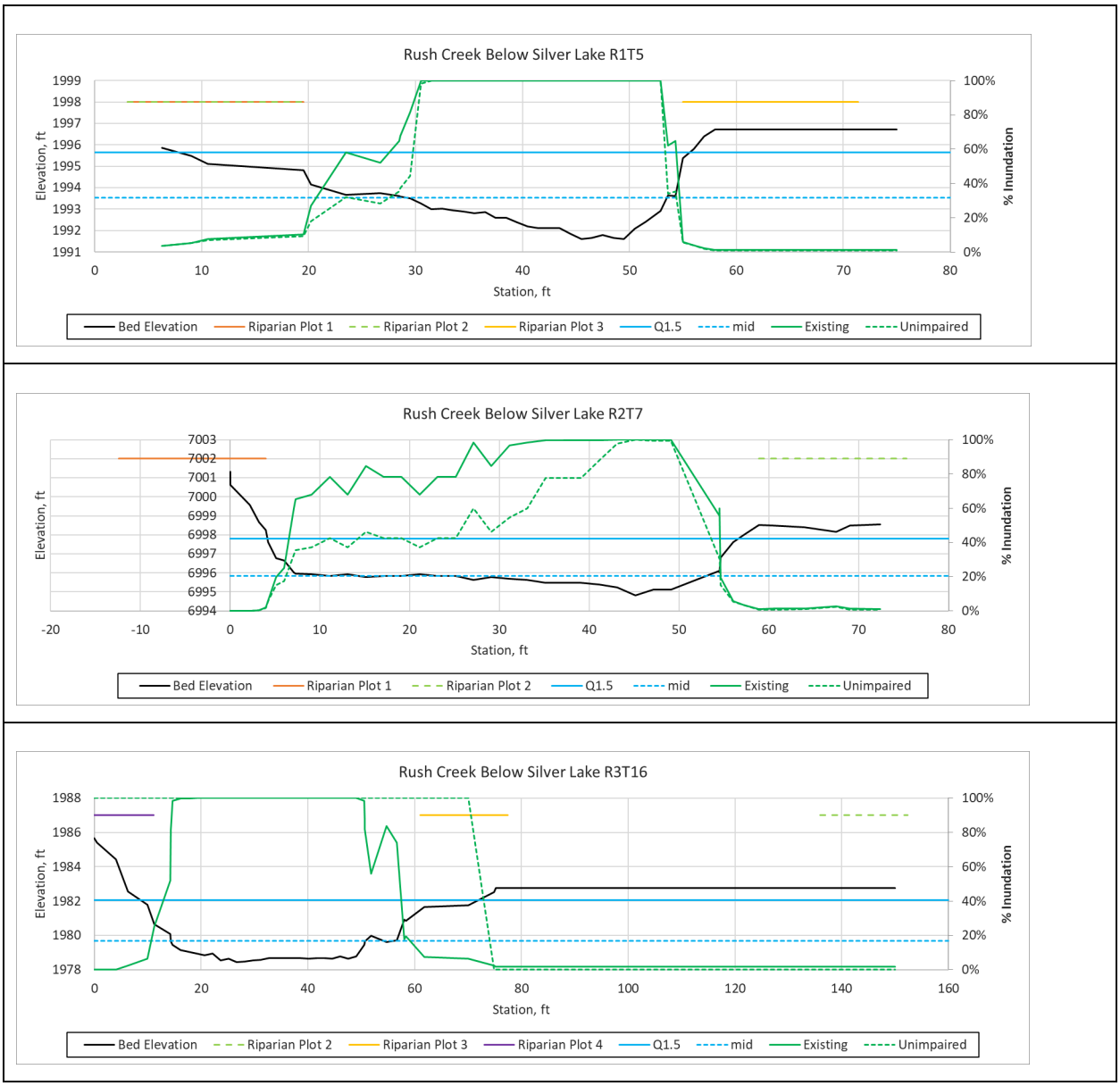


Figure AQ 1-P28. Rush Creek below Silver Lake inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

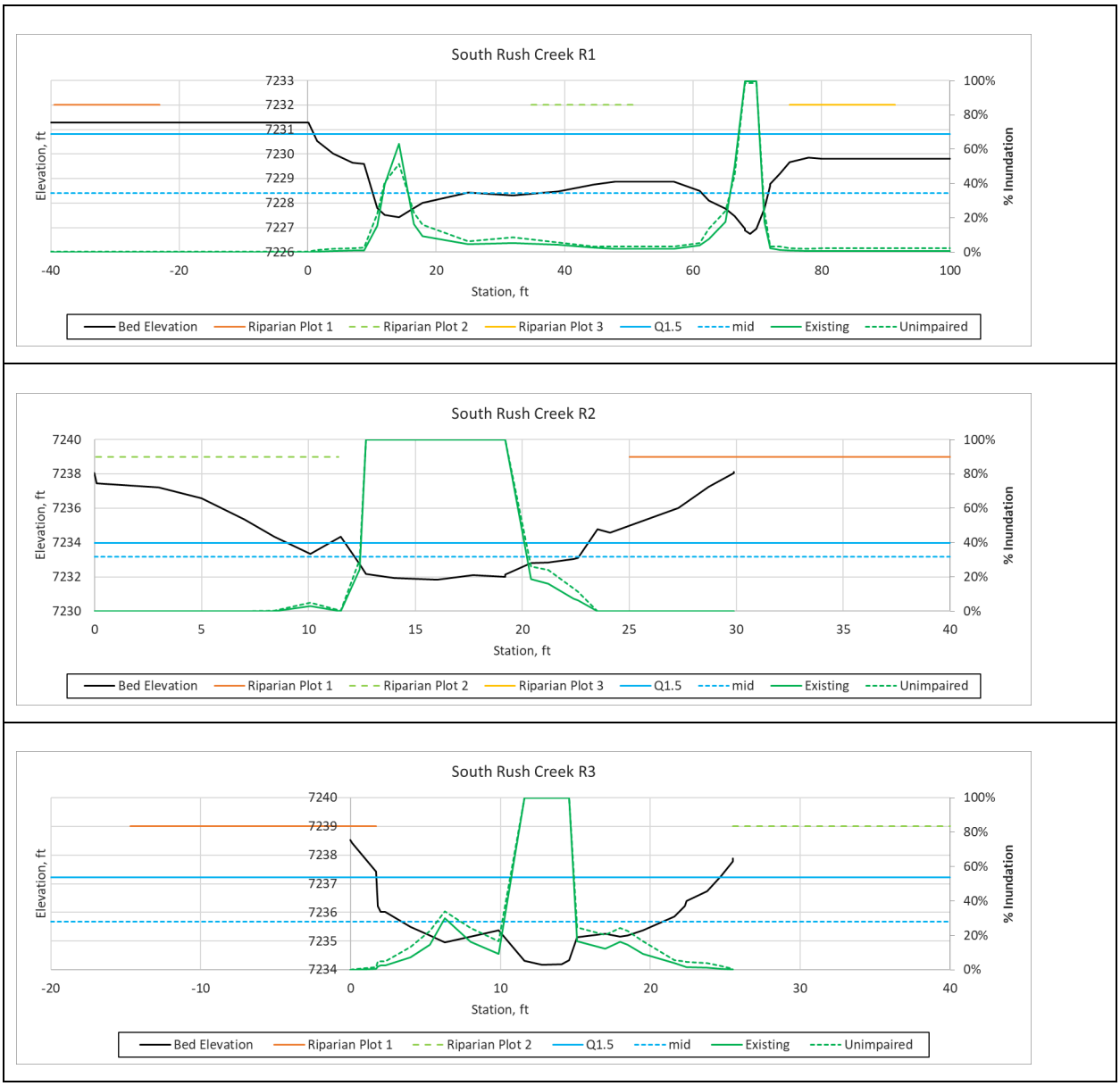


Figure AQ 1-P29. South Rush Creek inundation at riparian transects R1 – R3 showing medium discharge (mid) and 1.5-year recurrence interval (Q1.5) flow elevations and the percent of time inundated for existing and unimpaired conditions.

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APPENDIX Q

Hydraulic Model Results for Rush Creek in Waugh Lakebed

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INTRODUCTION

The following figures (AQ 1-Q1 through AQ 1-Q13) contain the depth results of the HEC-RAS2D hydraulic modeling of Rush Creek with Rush Meadows Dam removed. Figures AQ 1-Q14 through AQ 1-Q26 contain the velocity results.

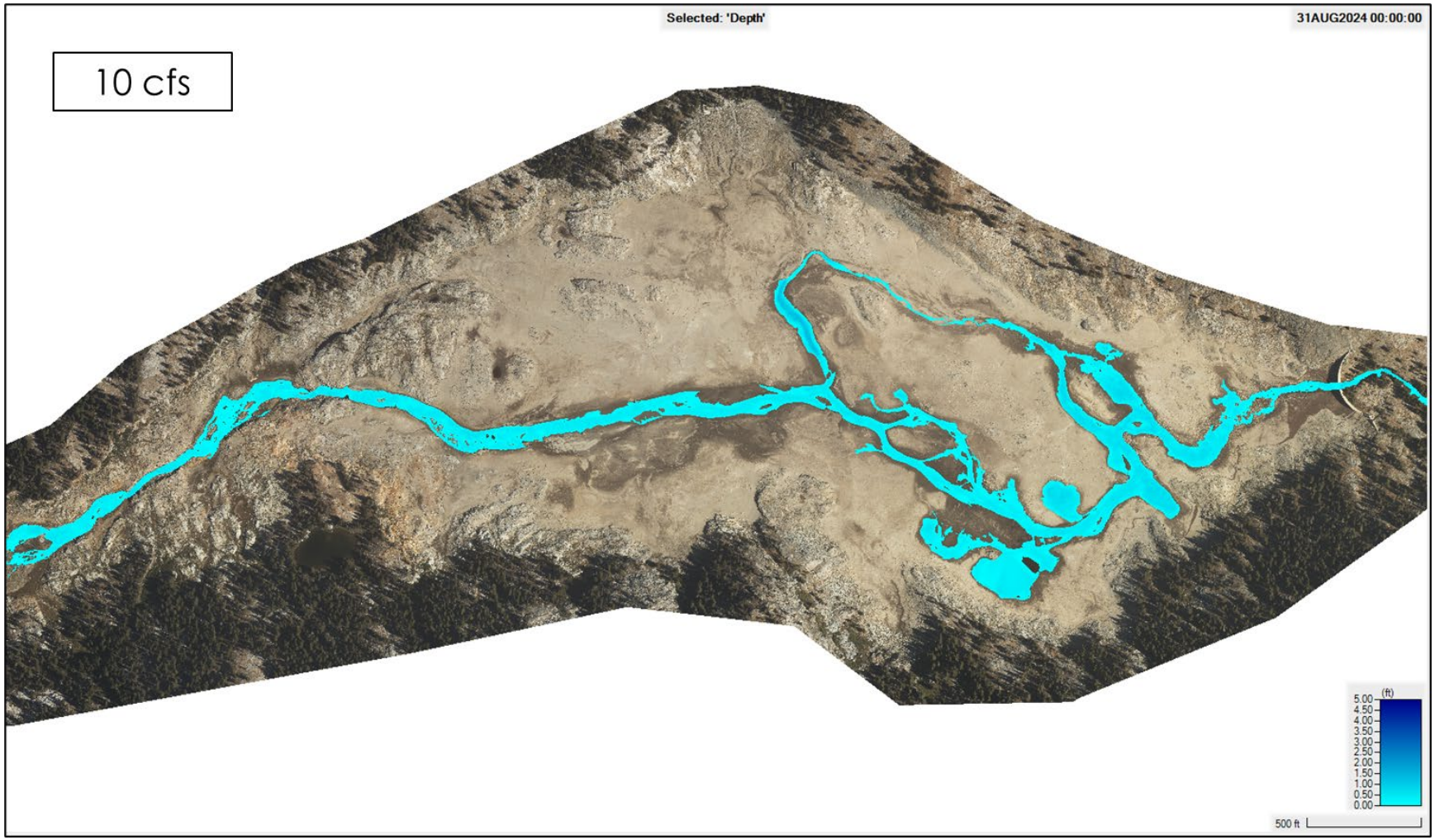

Figure AQ 1-Q1. Depth results for 10 cfs with Rush Meadows Dam removed.

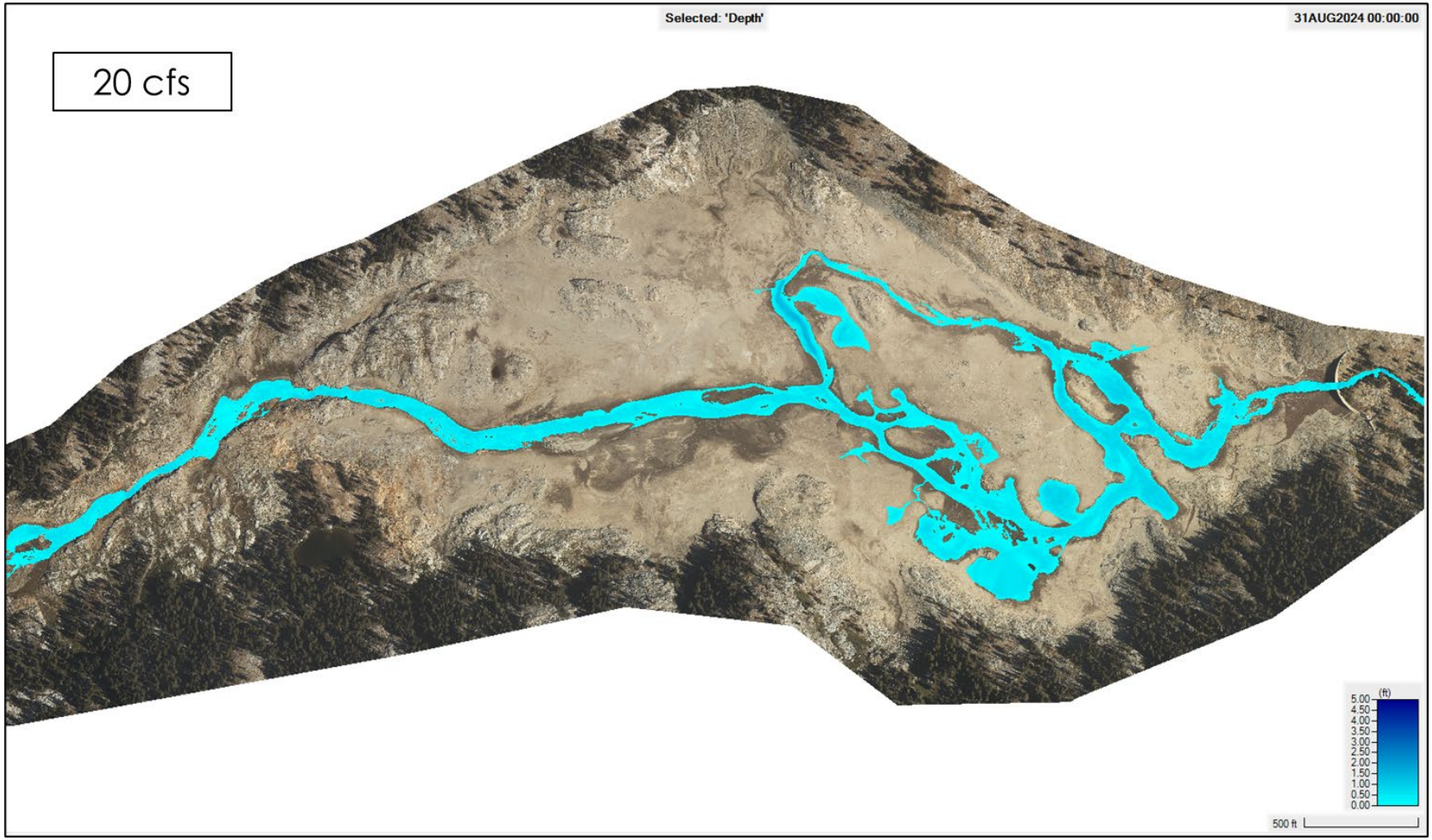

Figure AQ 1-Q2. Depth results for 20 cfs with Rush Meadows Dam removed.

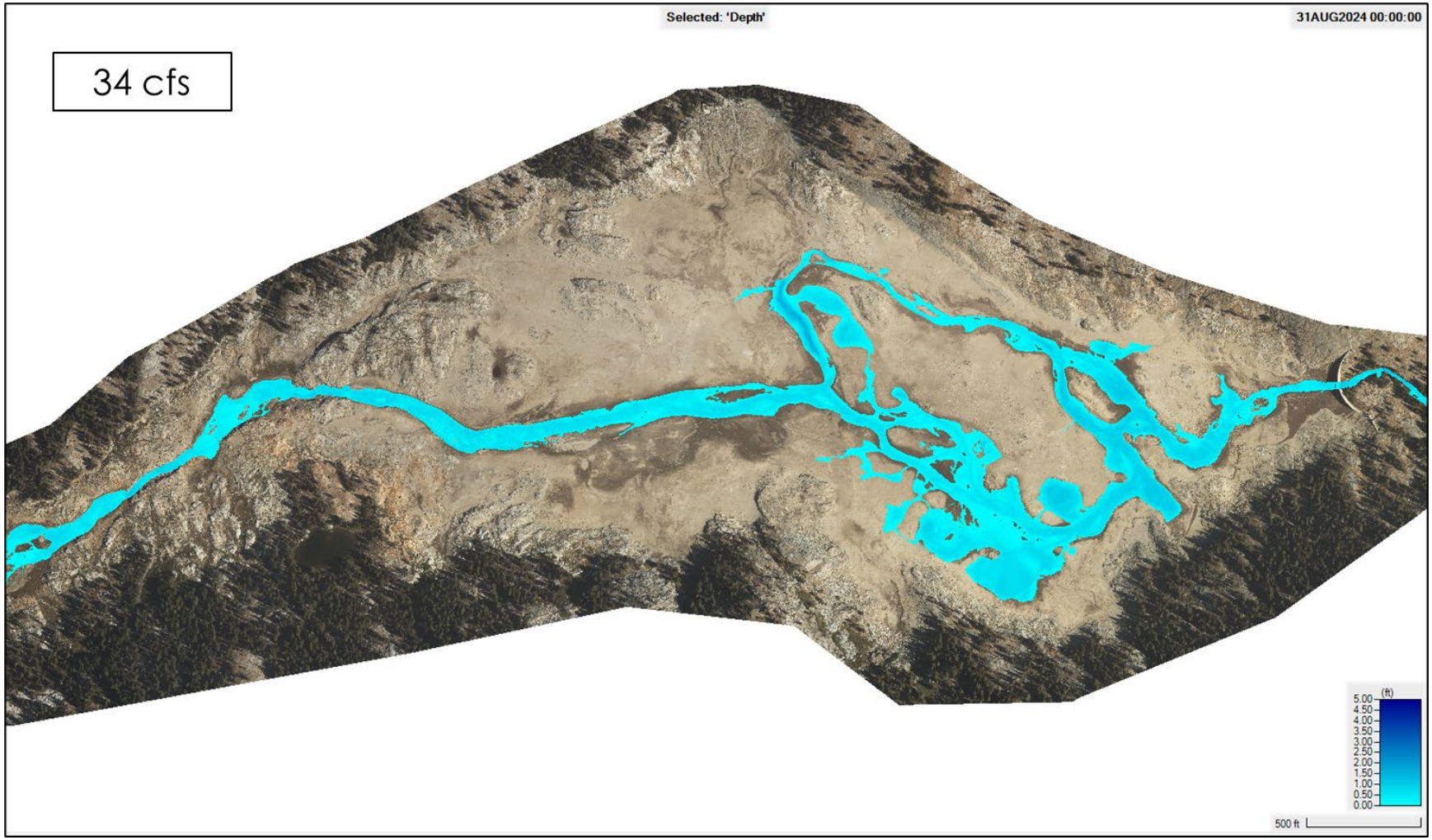

Figure AQ 1-Q3. Depth results for 34 cfs with Rush Meadows Dam removed.

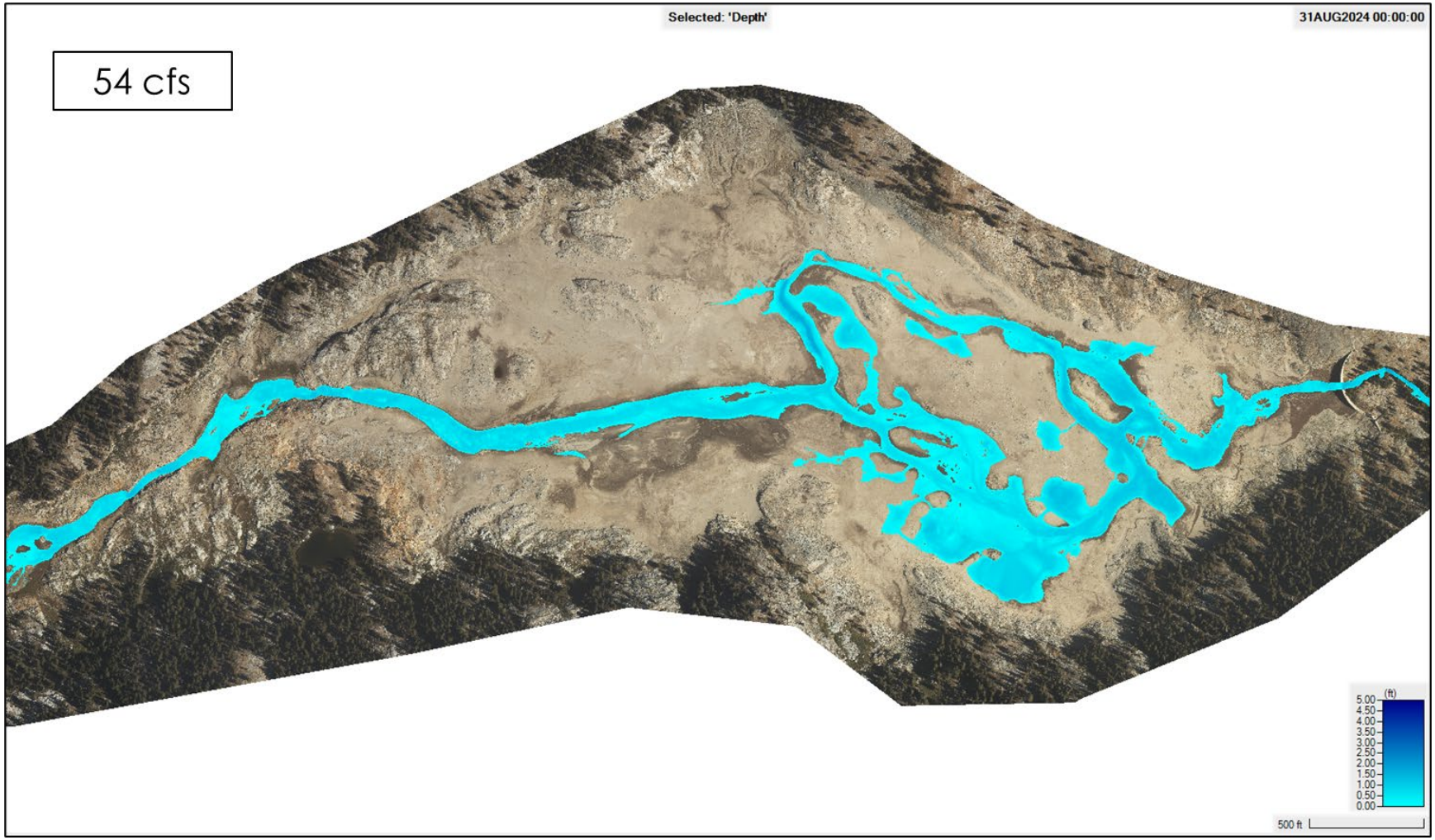

Figure AQ 1-Q4. Depth results for 54 cfs with Rush Meadows Dam removed.

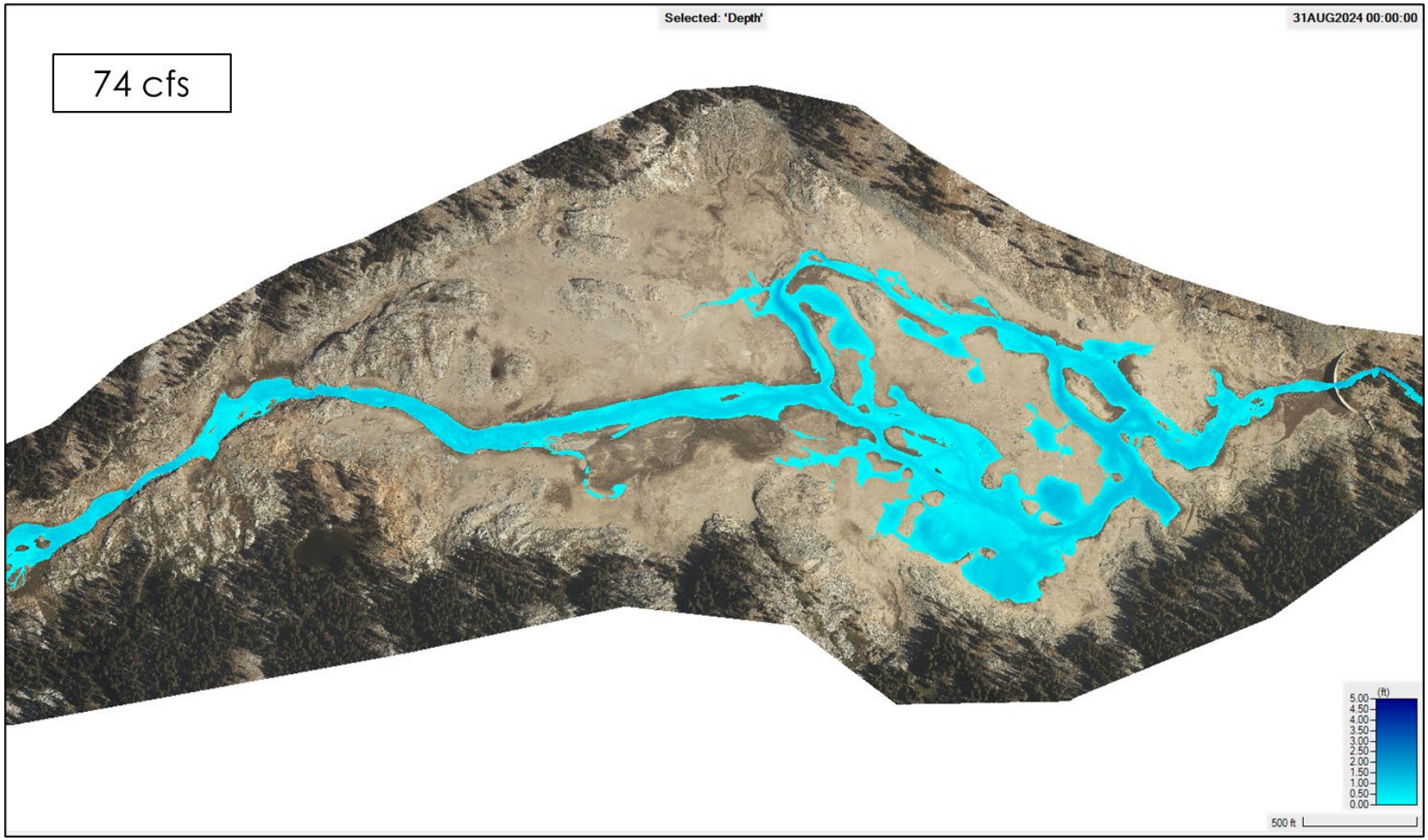

Figure AQ 1-Q5. Depth results for 74 cfs with Rush Meadows Dam removed.

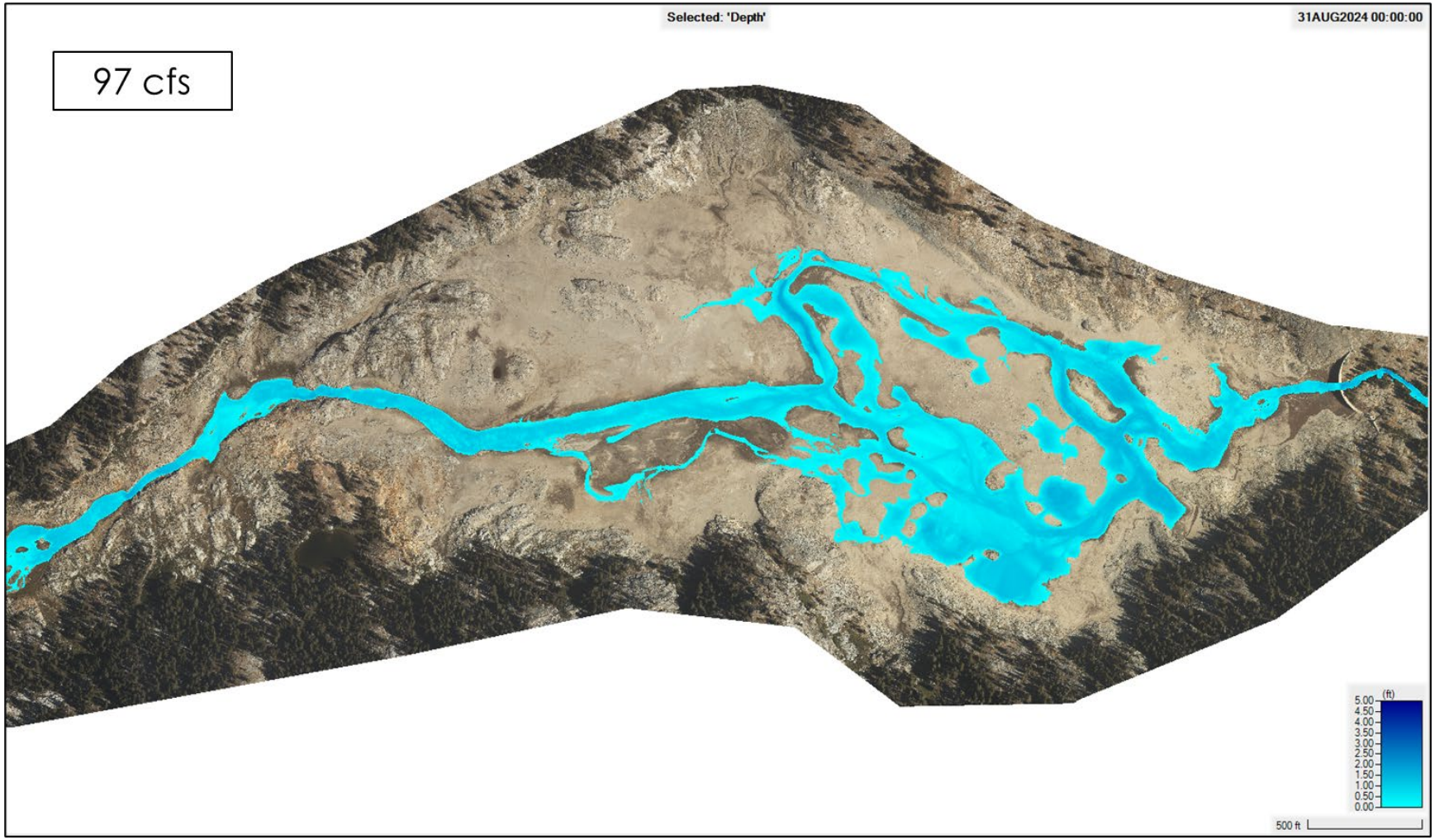

Figure AQ 1-Q6. Depth results for 97 cfs with Rush Meadows Dam removed.

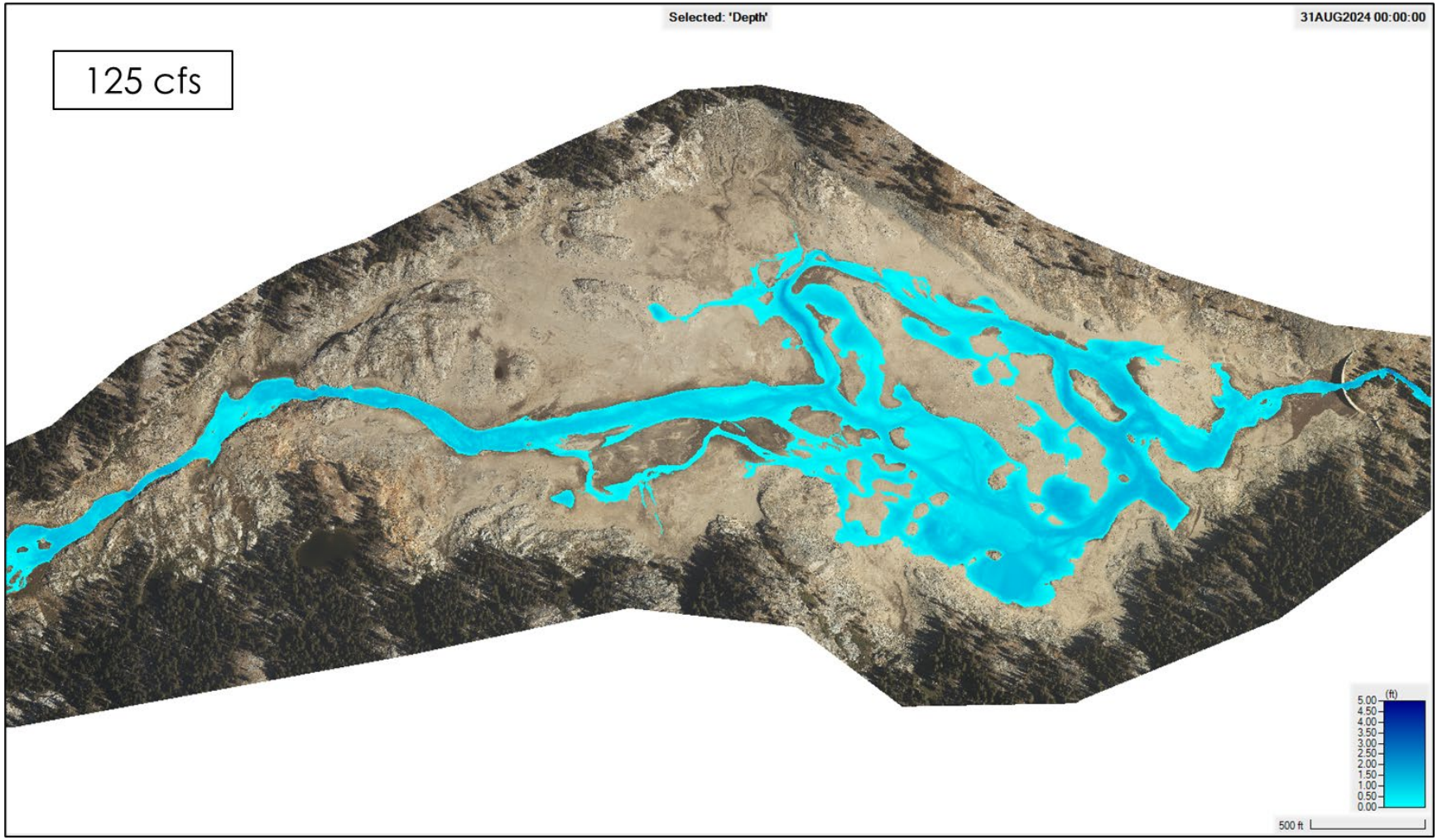

Figure AQ 1-Q7. Depth results for 125 cfs with Rush Meadows Dam removed.

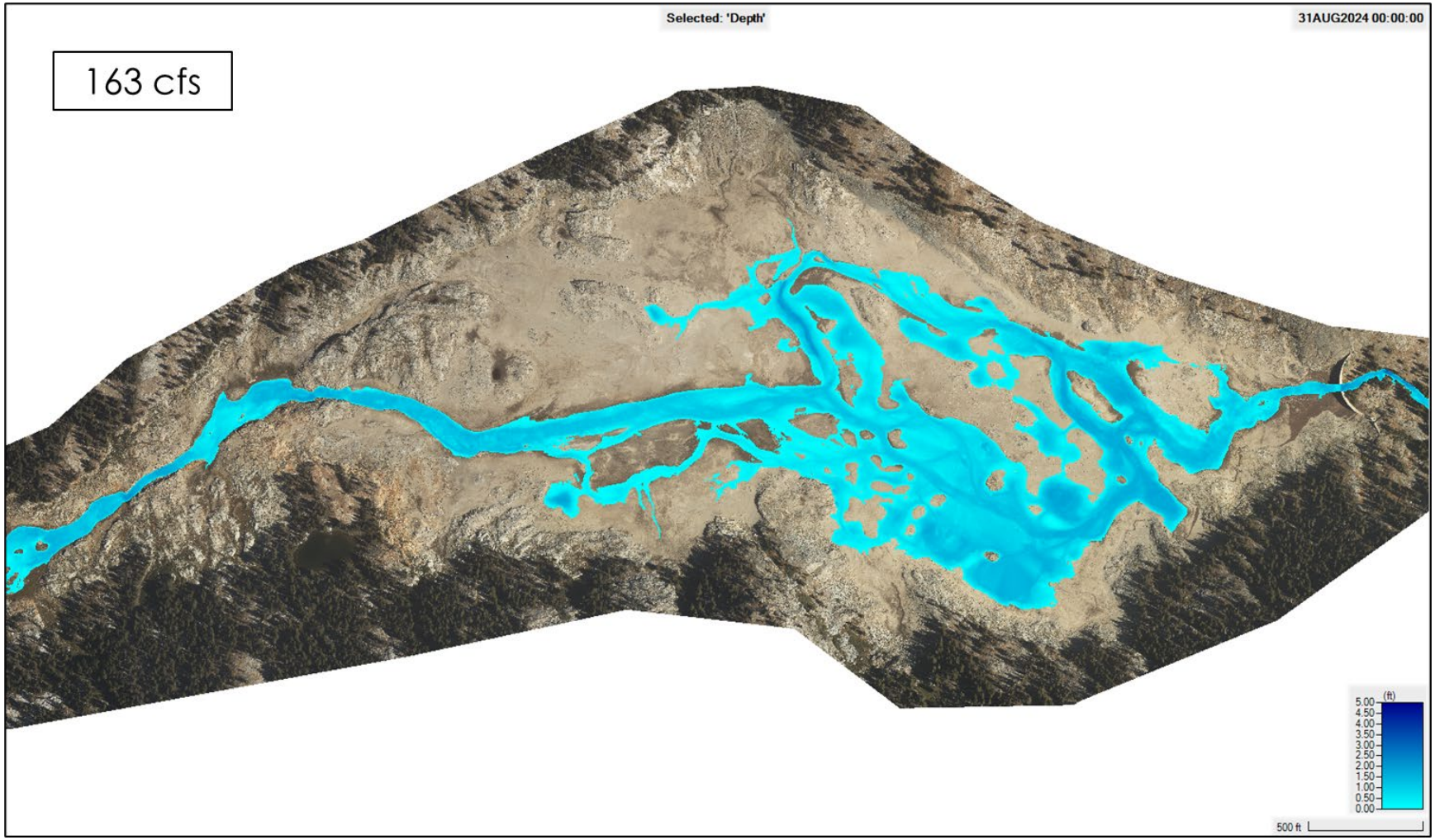

Figure AQ 1-Q8. Depth results for 163 cfs with Rush Meadows Dam removed.

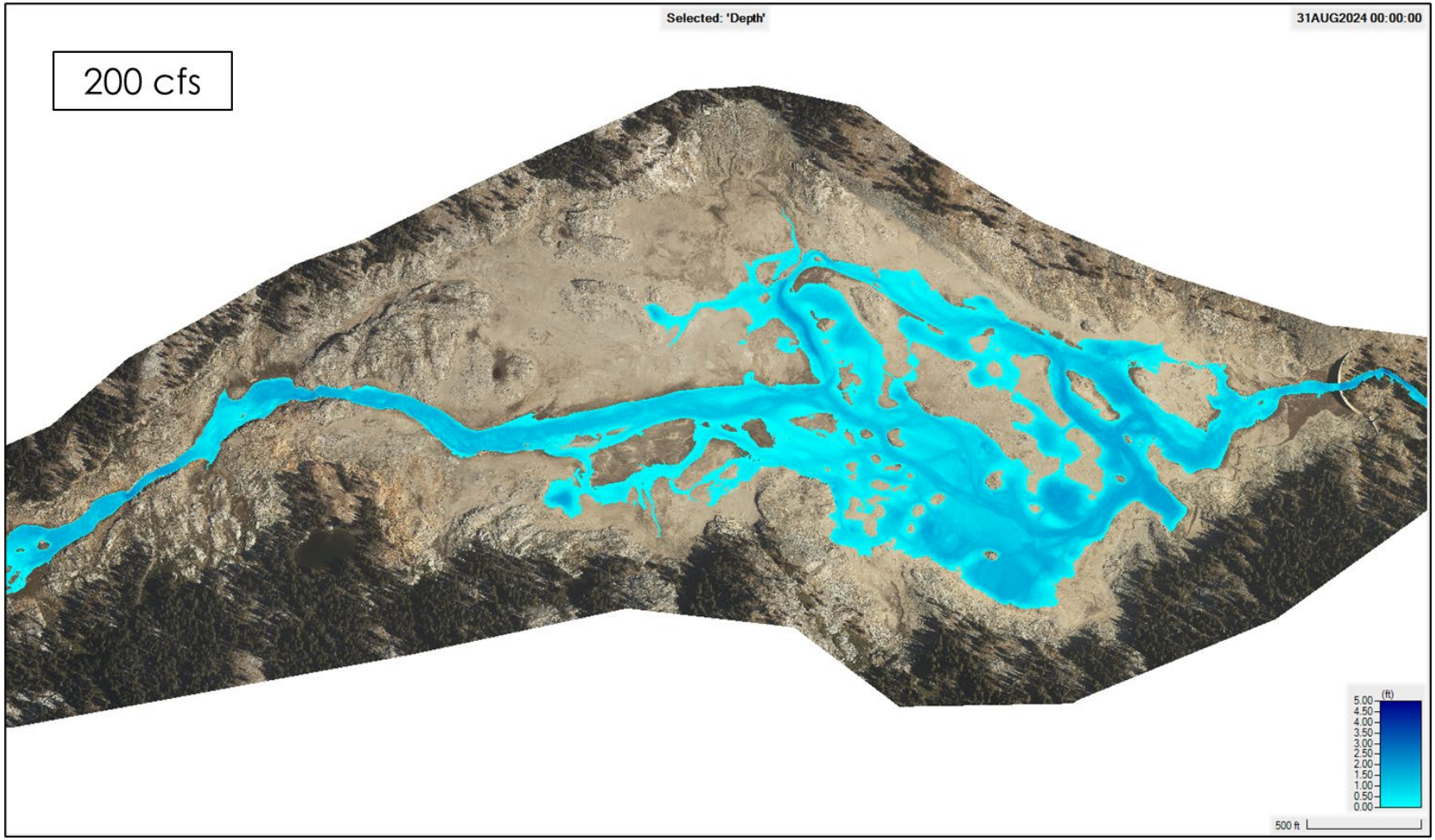

Figure AQ 1-Q9. Depth results for 200 cfs with Rush Meadows Dam removed.

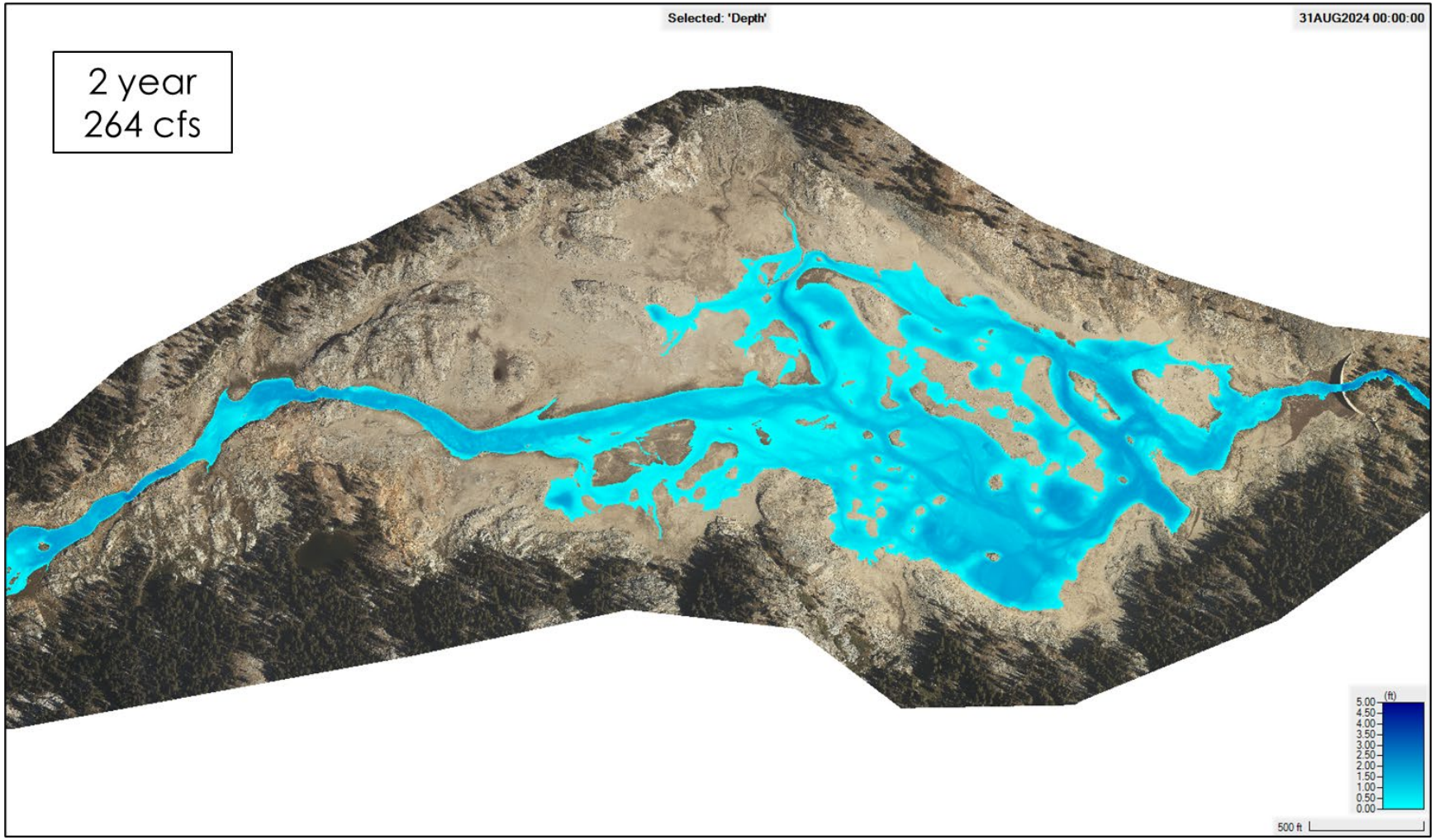

Figure AQ 1-Q10. Depth results for 264 cfs with Rush Meadows Dam removed.

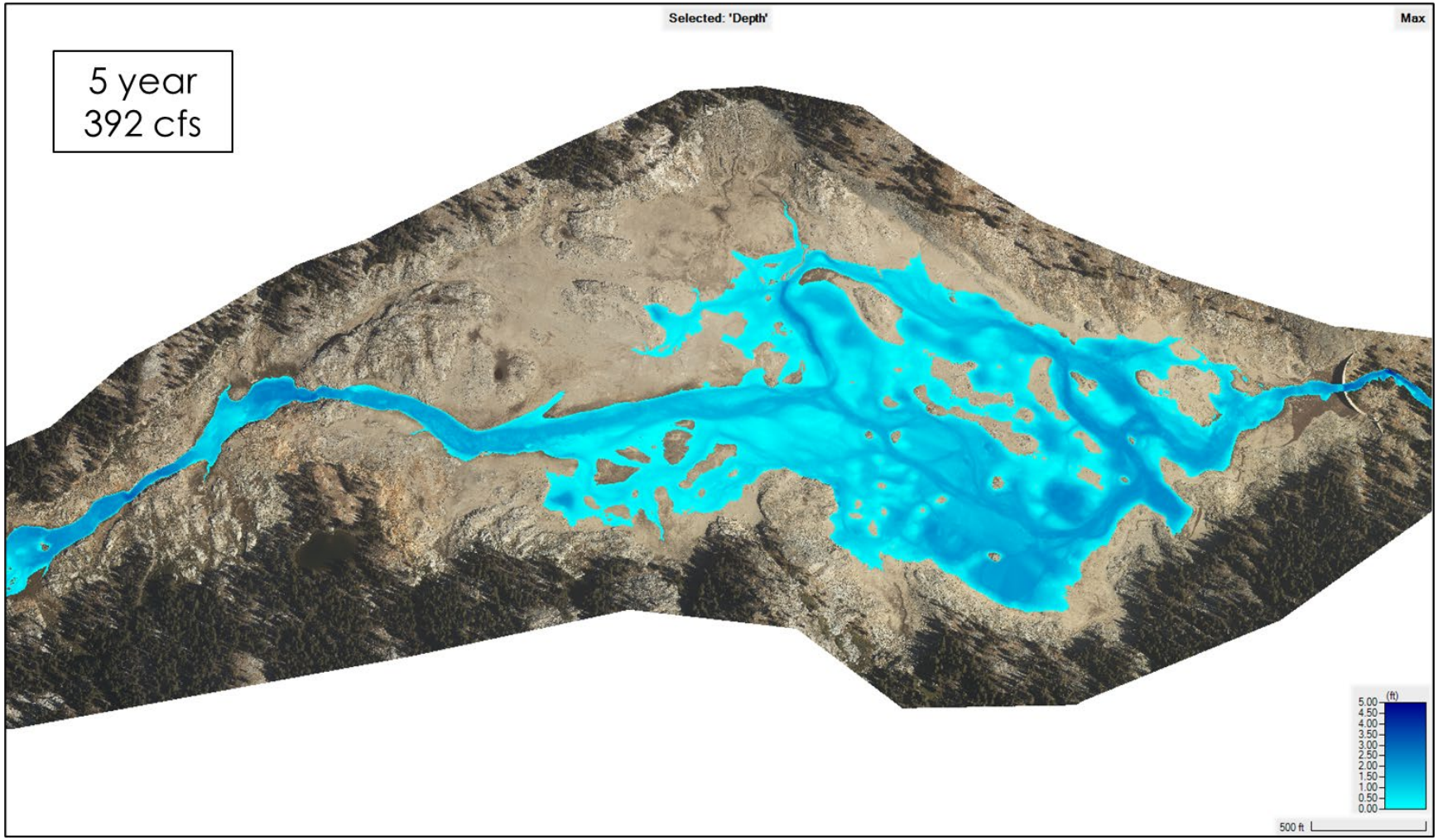

Figure AQ 1-Q11. Depth results for 392 cfs with Rush Meadows Dam removed.

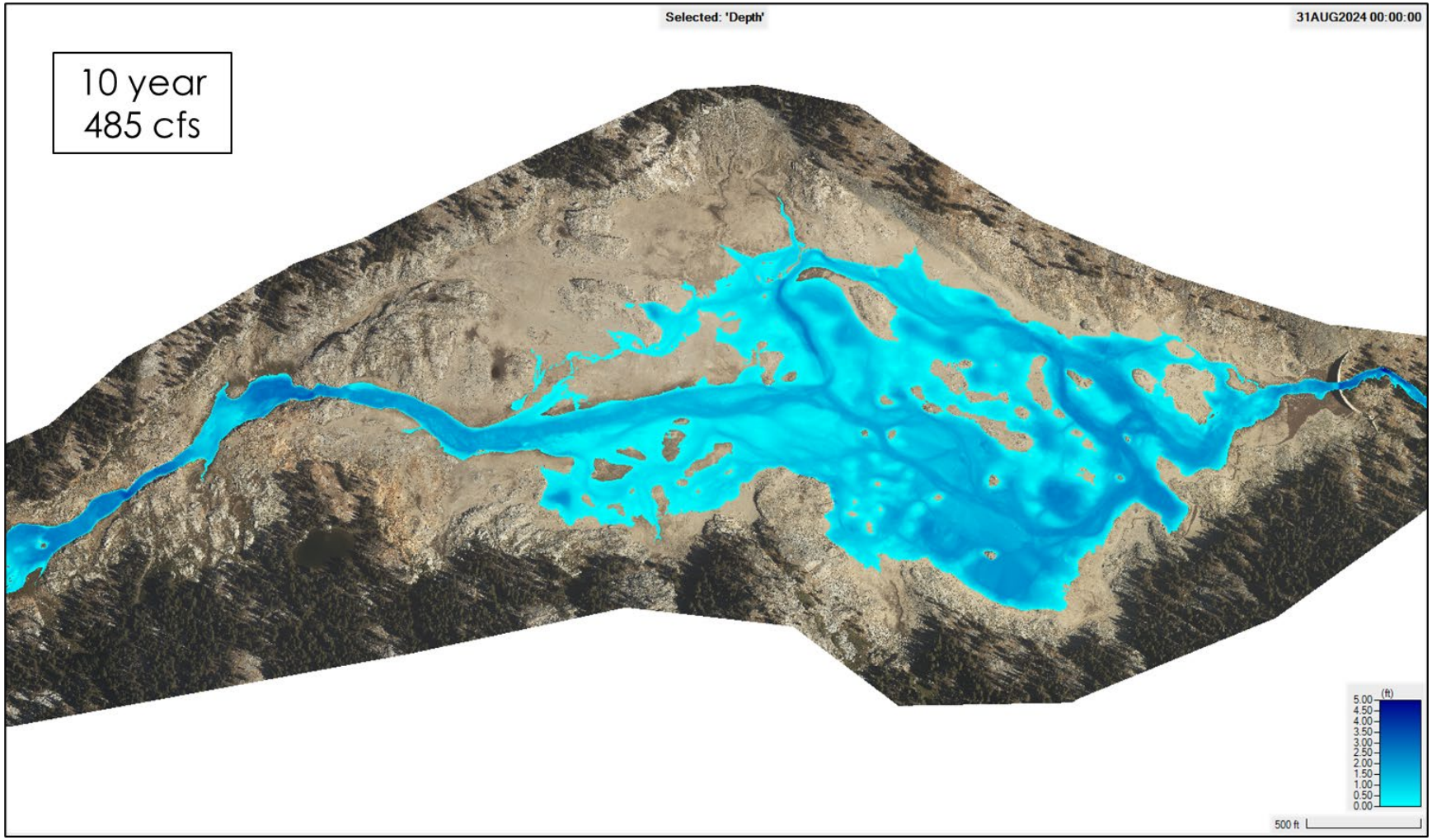

Figure AQ 1-Q12. Depth results for 485 cfs with Rush Meadows Dam removed.

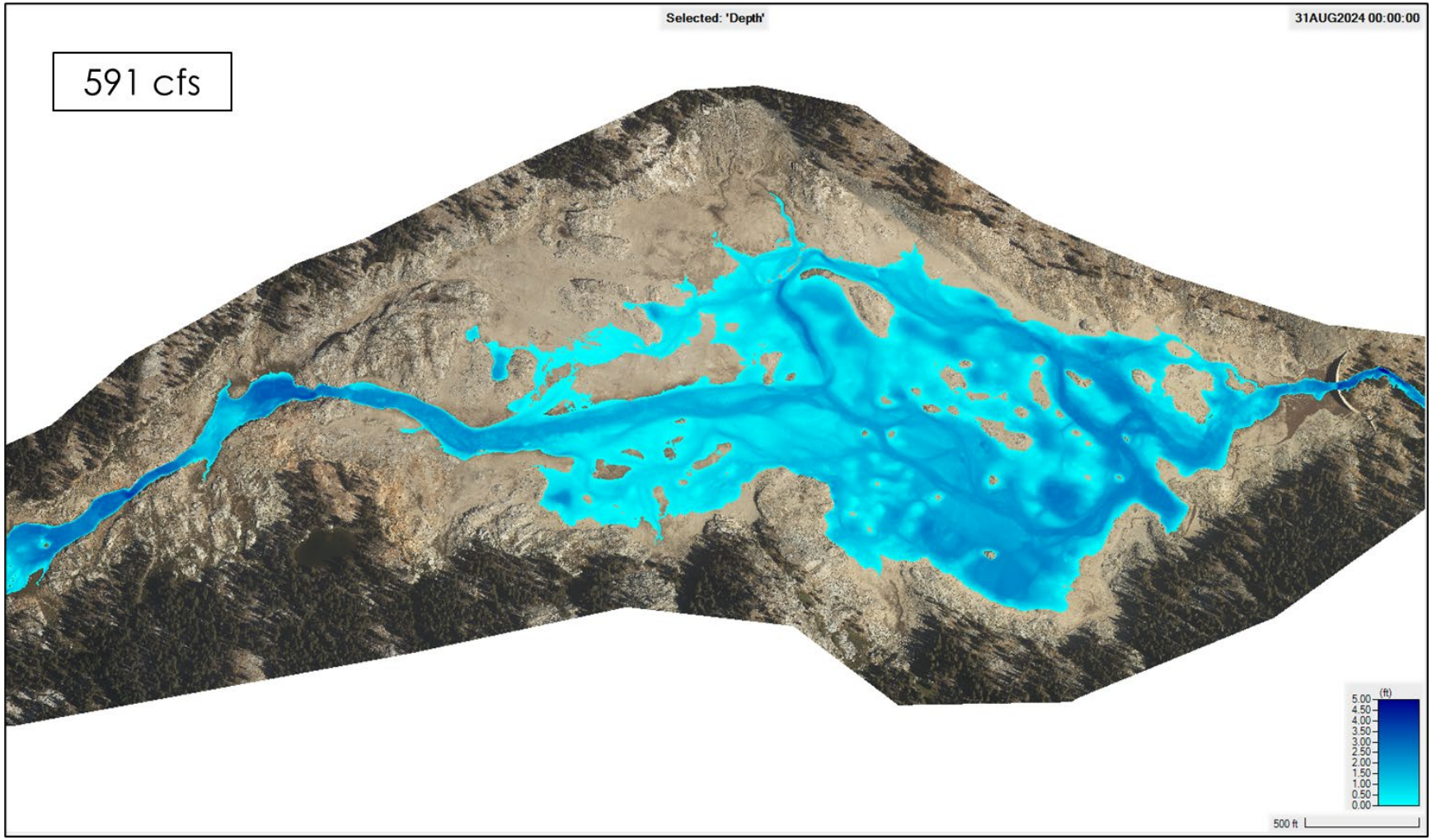

Figure AQ 1-Q13. Depth results for 591 cfs with Rush Meadows Dam removed.

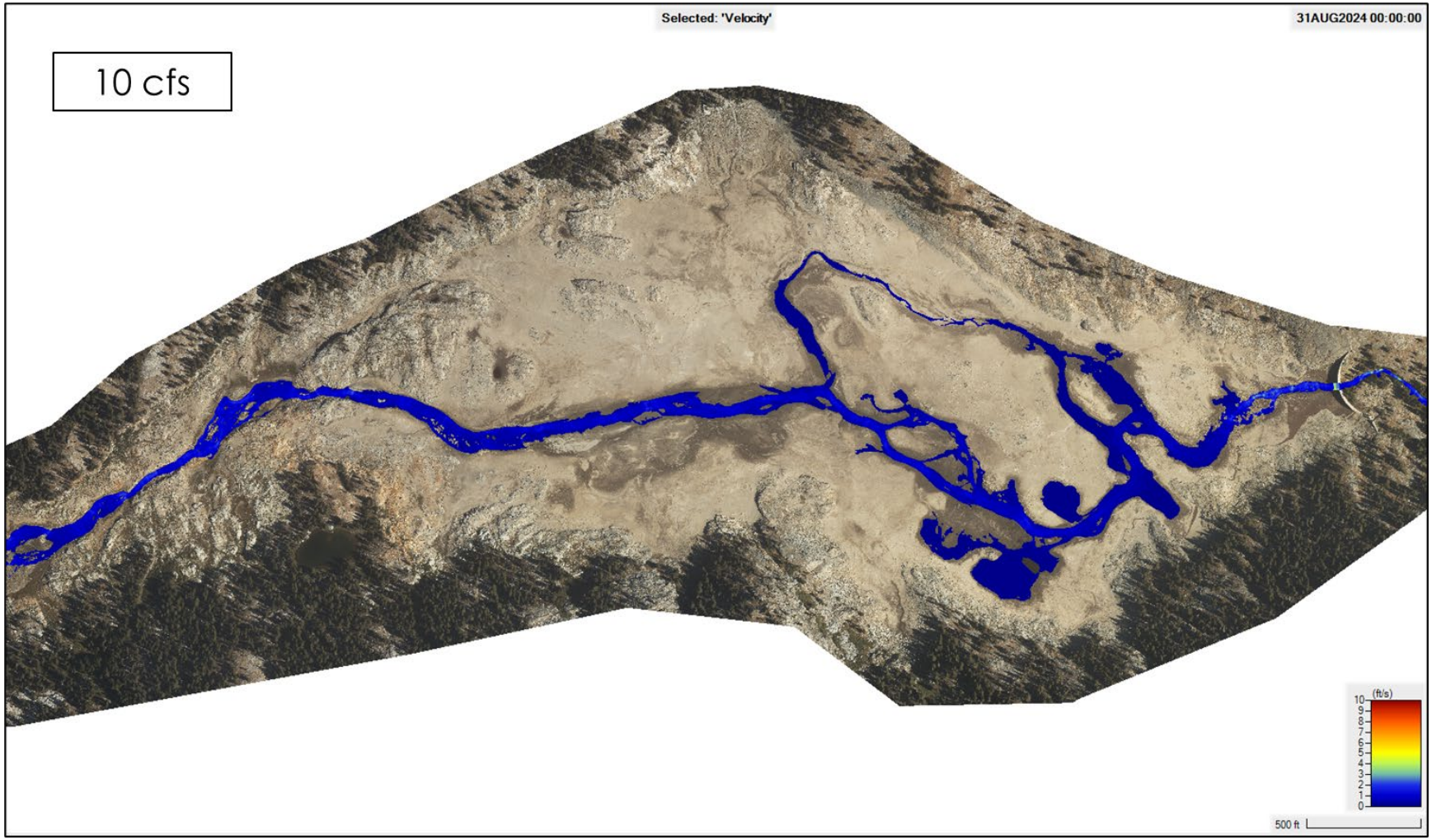

Figure AQ 1-Q14. Velocity results for 10 cfs with Rush Meadows Dam removed.

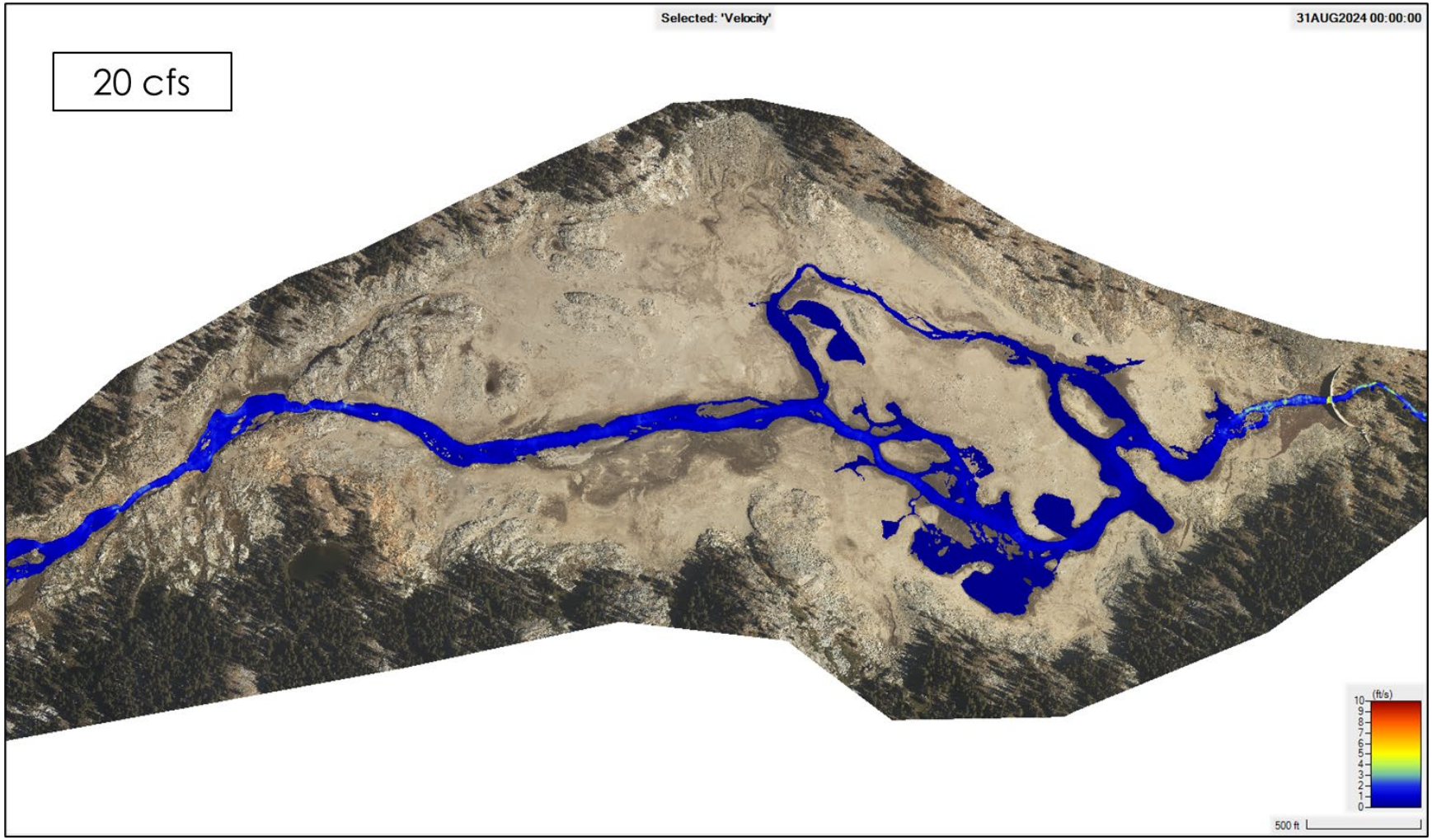

Figure AQ 1-Q15. Velocity results for 20 cfs with Rush Meadows Dam removed.

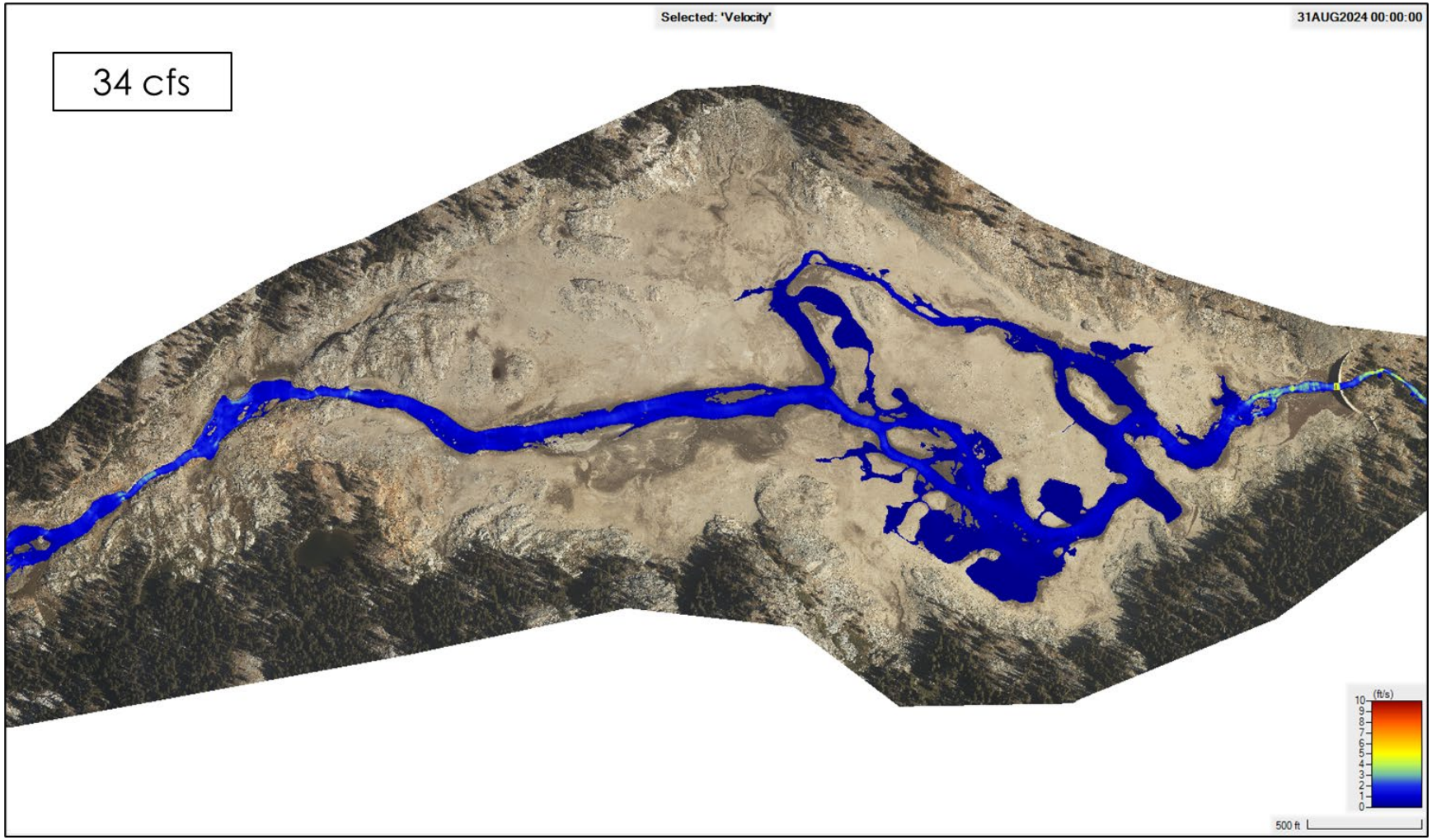

Figure AQ 1-Q16. Velocity results for 34 cfs with Rush Meadows Dam removed.

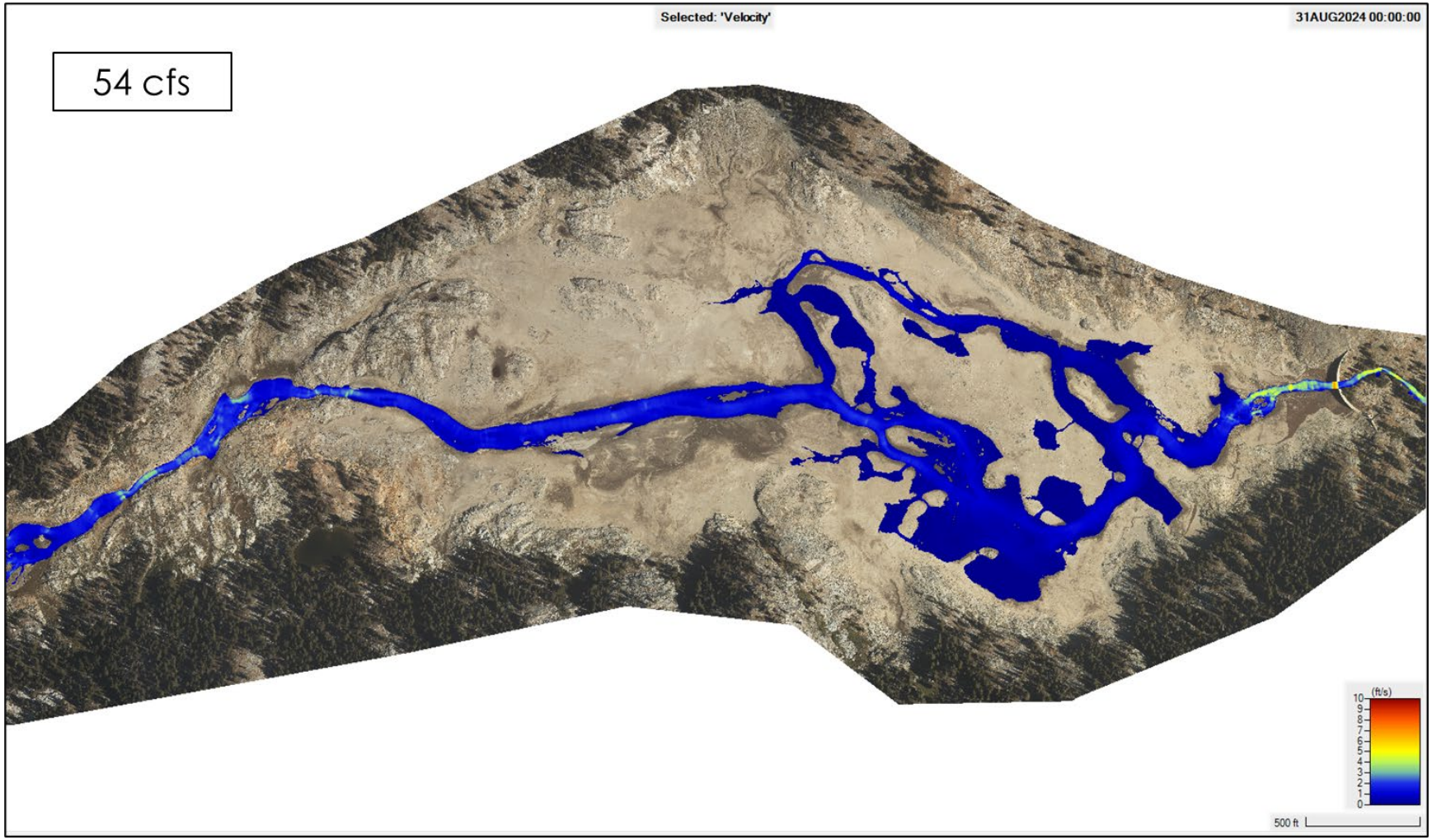

Figure AQ 1-Q17. Velocity results for 54 cfs with Rush Meadows Dam removed.

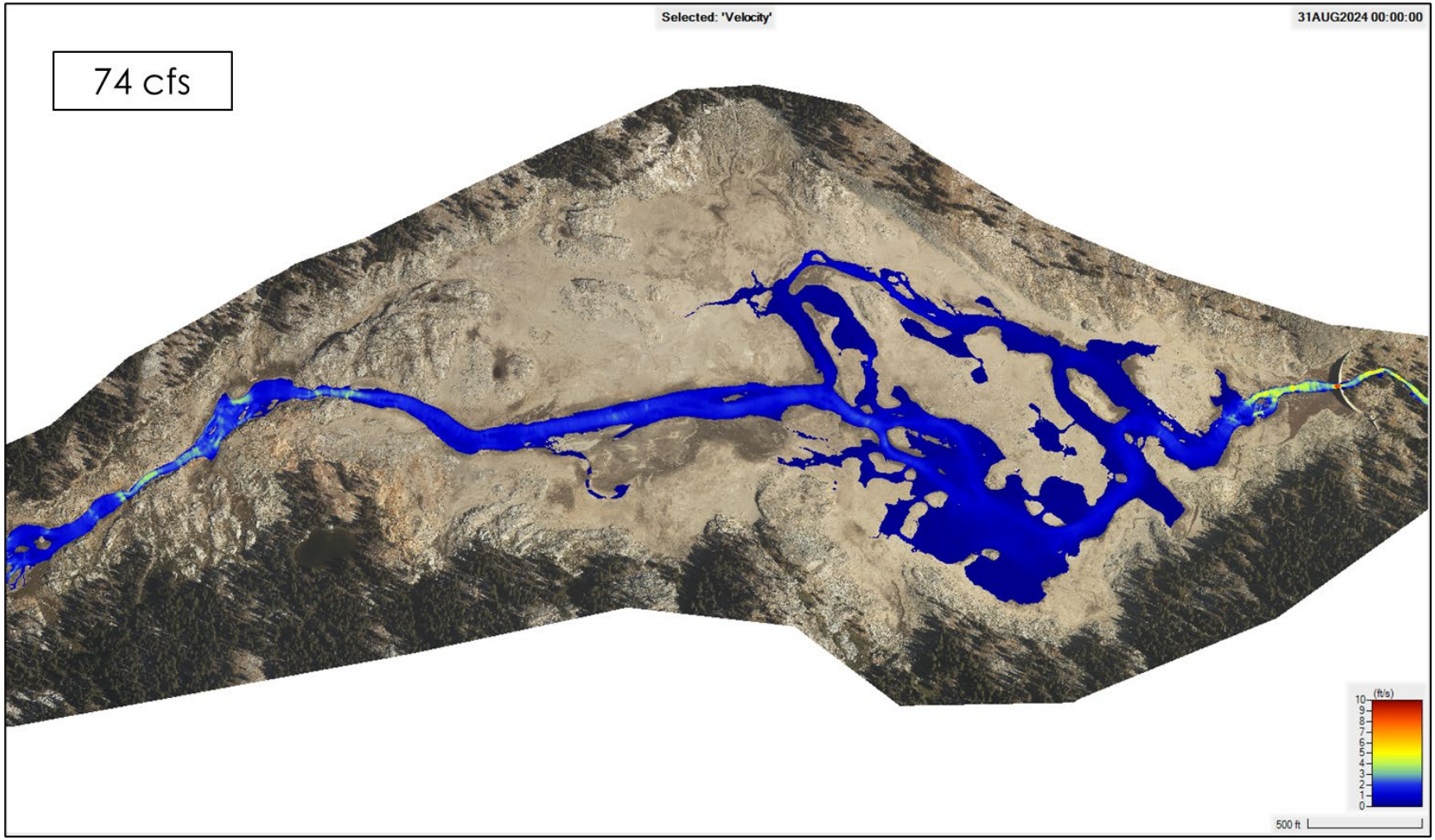

Figure AQ 1-Q18. Velocity results for 74 cfs with Rush Meadows Dam removed.

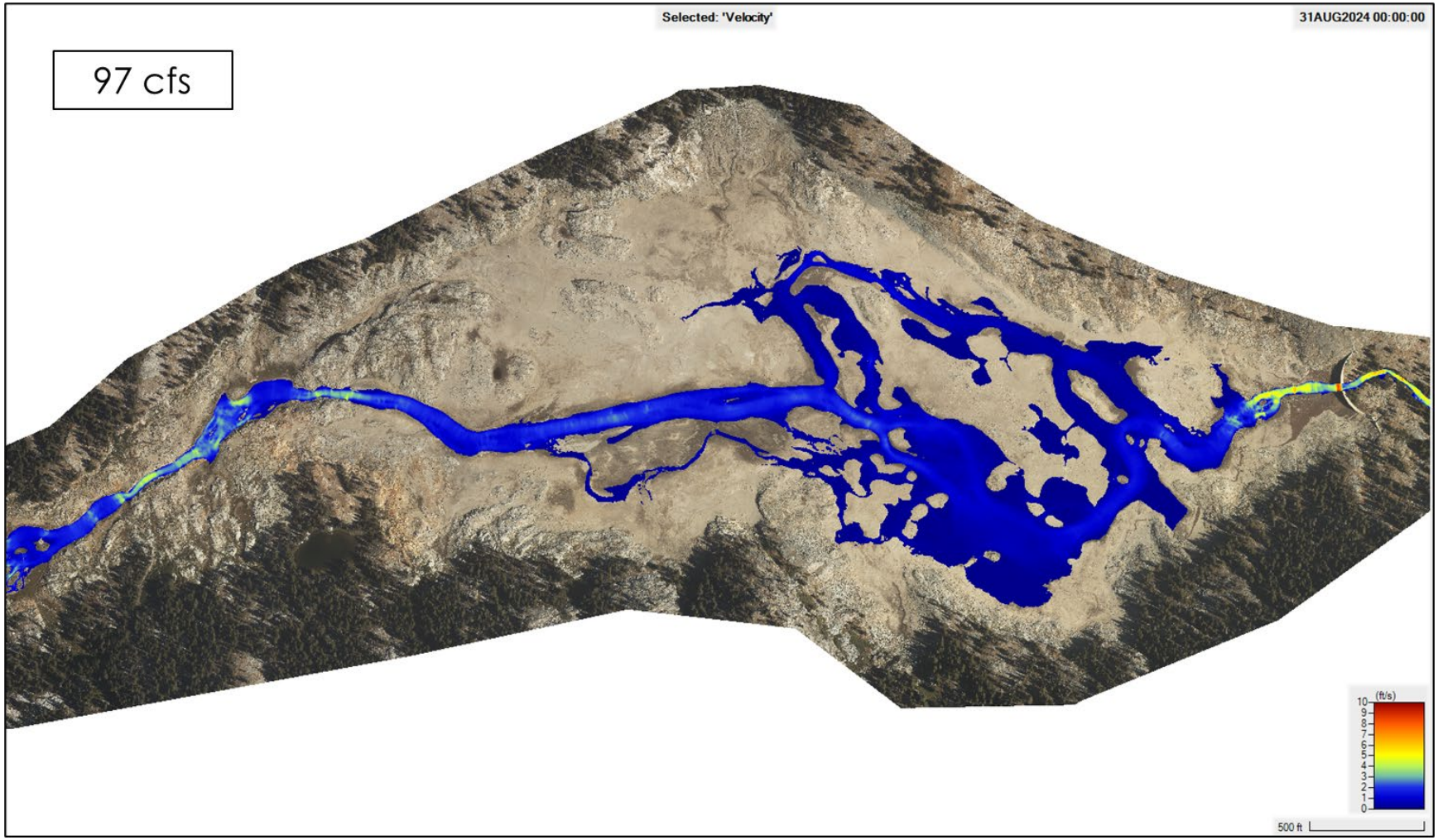

Figure AQ 1-Q19. Velocity results for 97 cfs with Rush Meadows Dam removed.

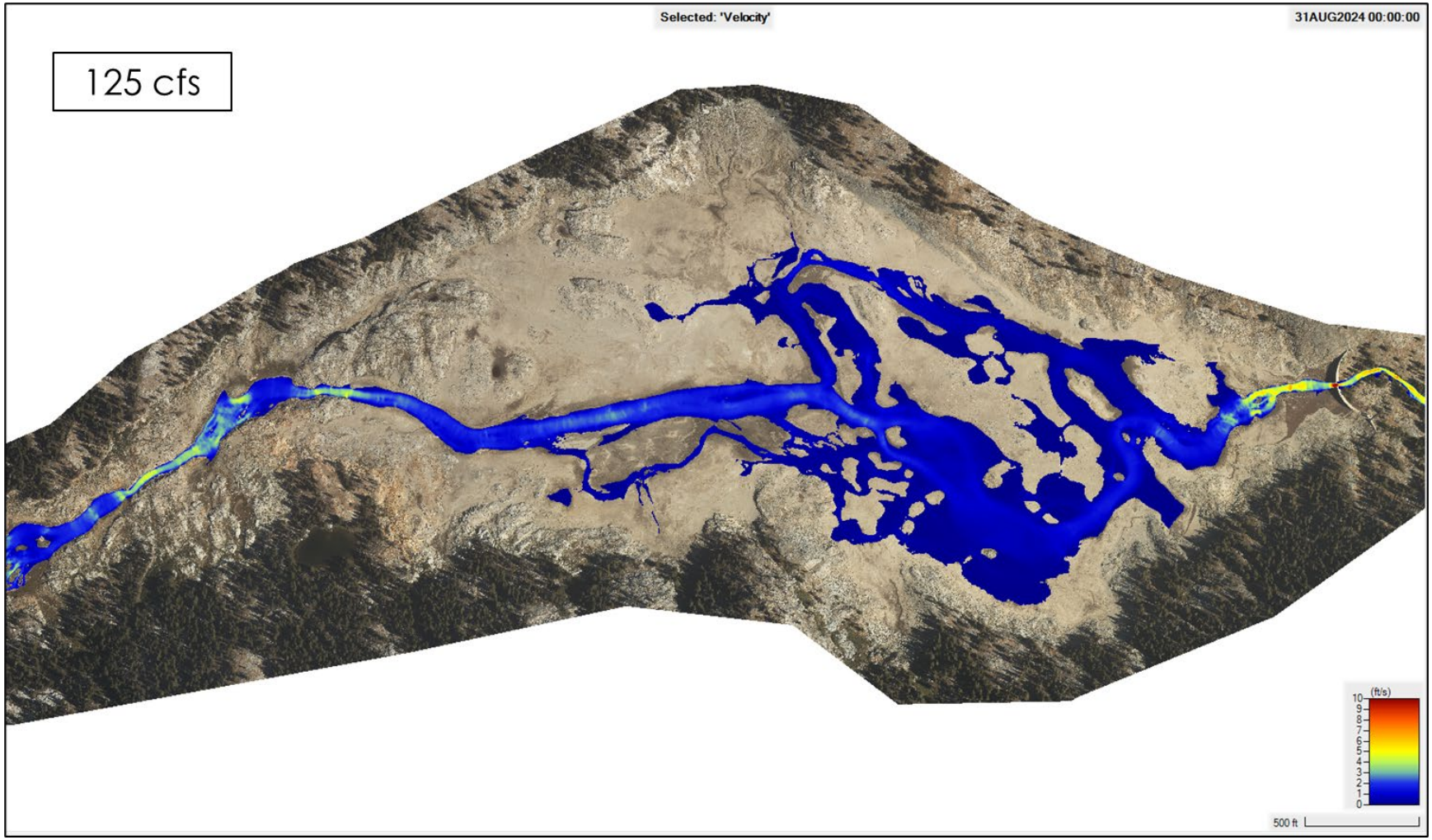

Figure AQ 1-Q20. Velocity results for 125 cfs with Rush Meadows Dam removed.

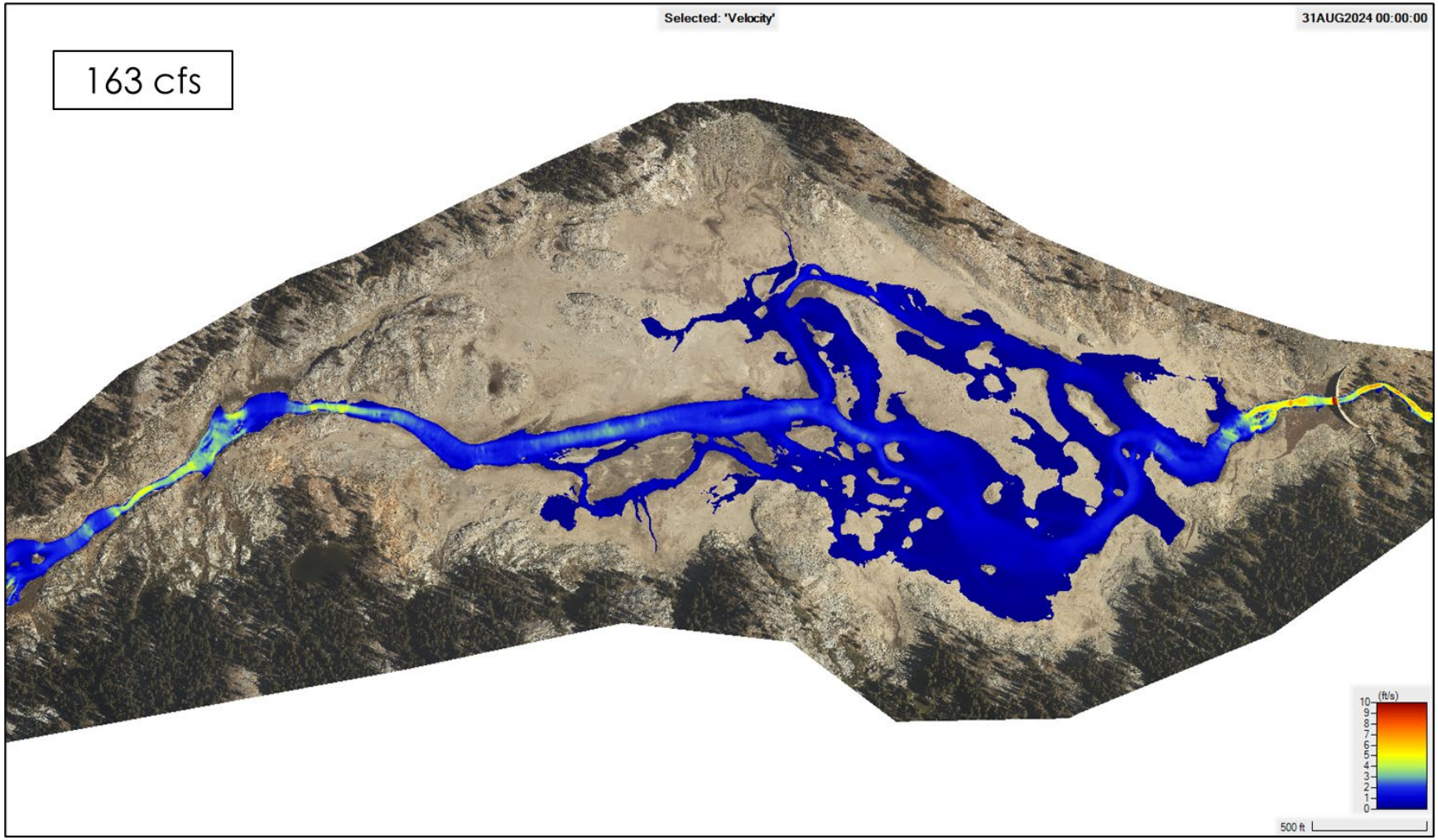

Figure AQ 1-Q21. Velocity results for 163 cfs with Rush Meadows Dam removed.

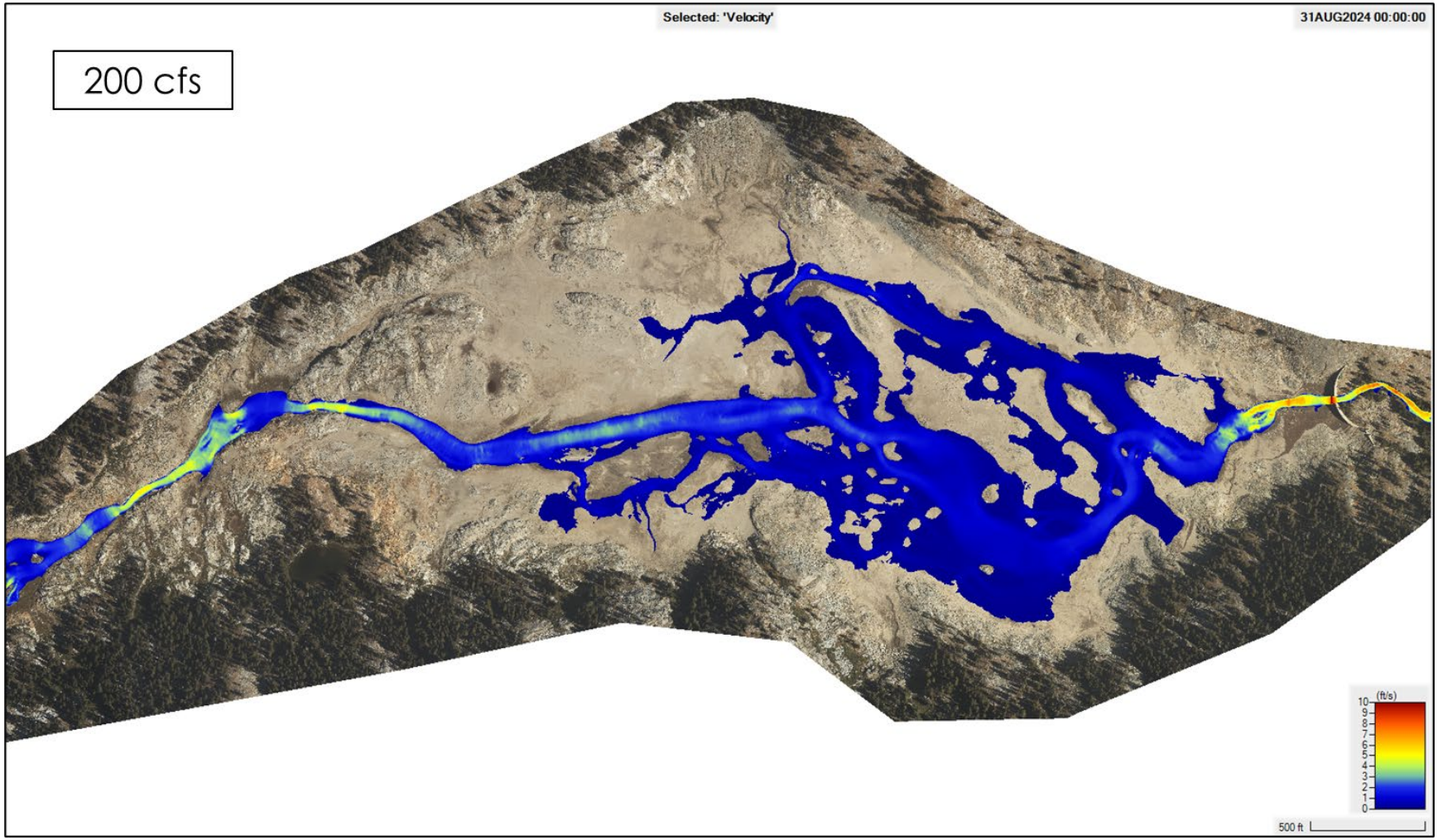

Figure AQ 1-Q22. Velocity results for 200 cfs with Rush Meadows Dam removed.

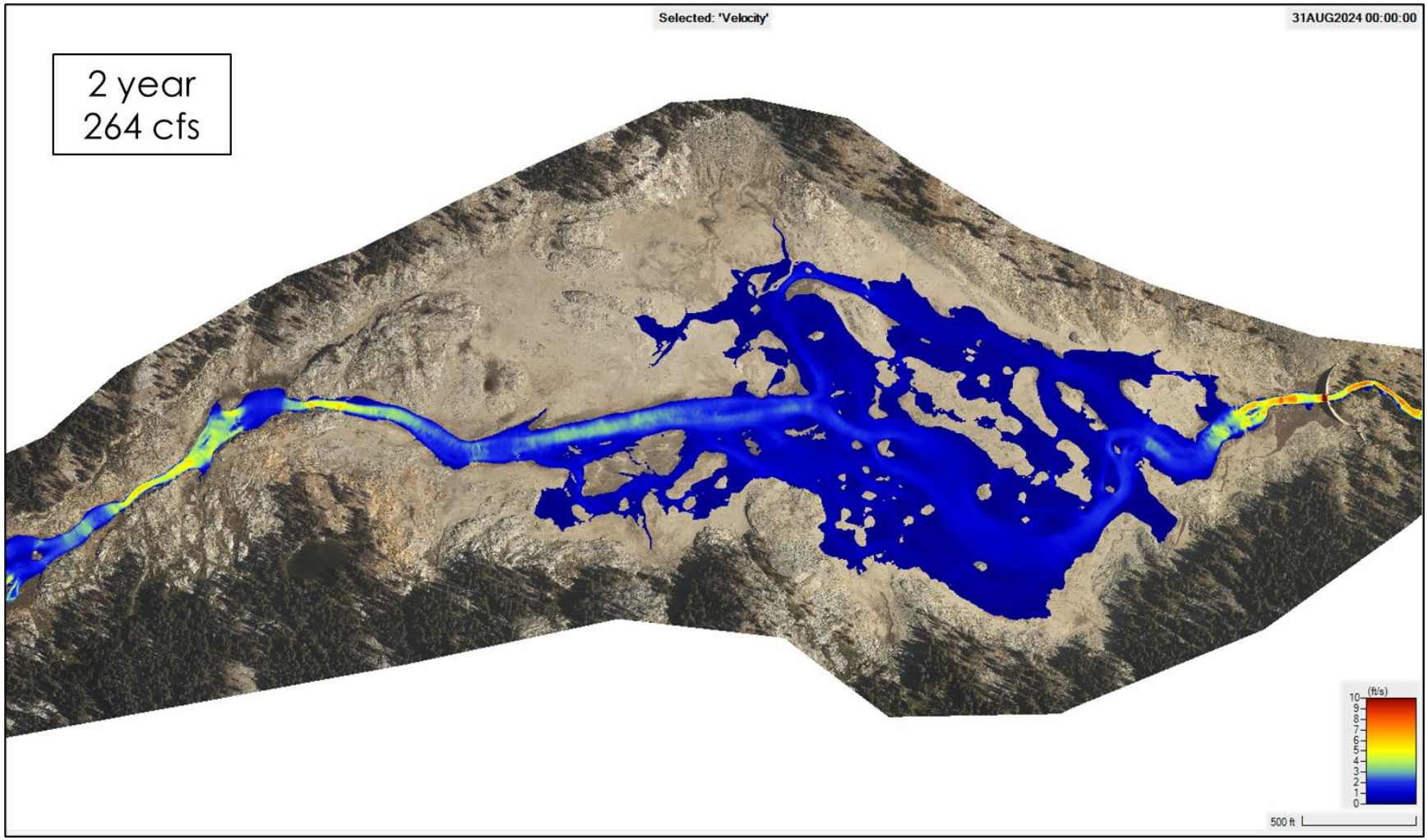

Figure AQ 1-Q23. Velocity results for 264 cfs with Rush Meadows Dam removed.

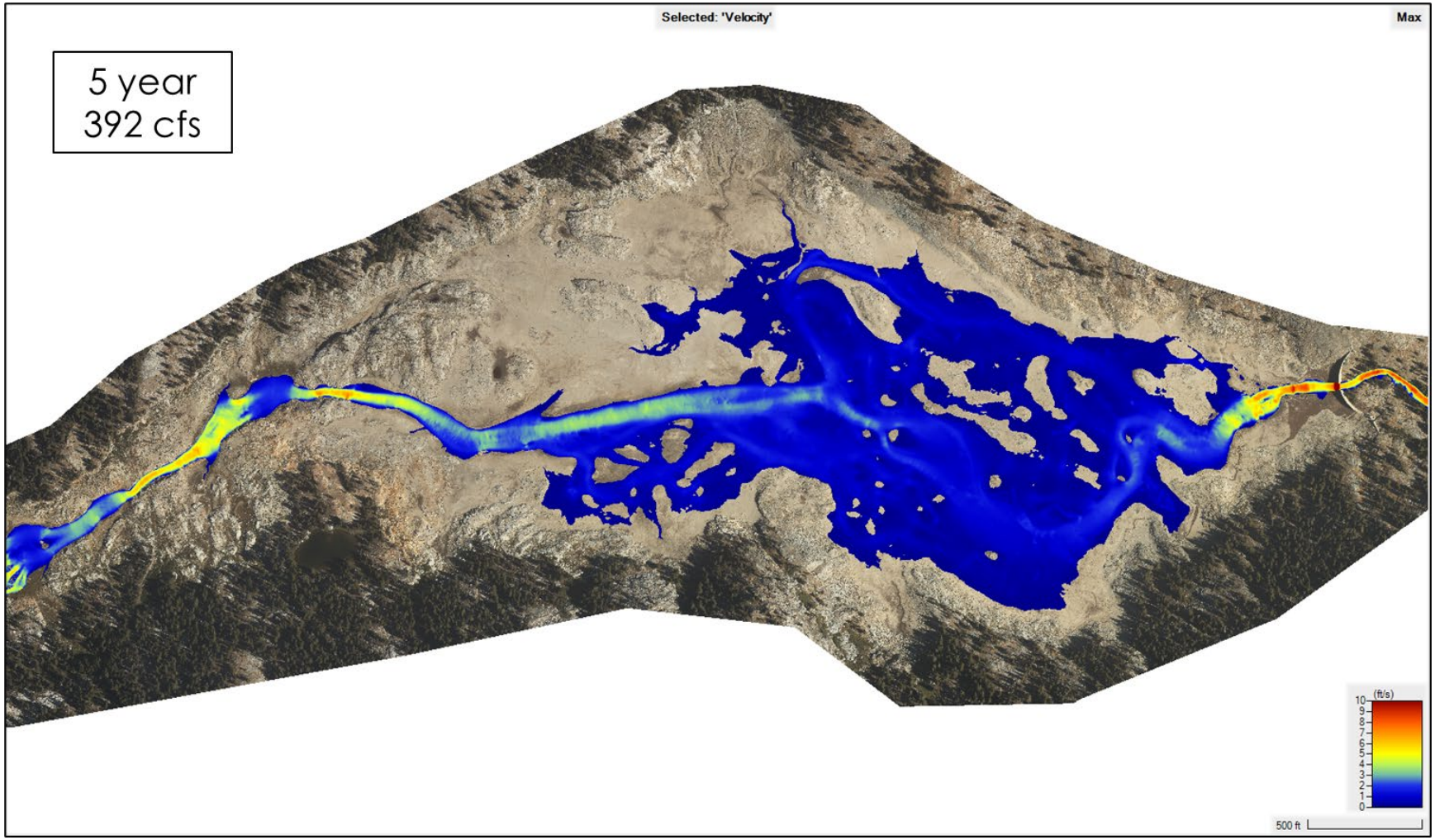

Figure AQ 1-Q24. Velocity results for 392 cfs with Rush Meadows Dam removed.

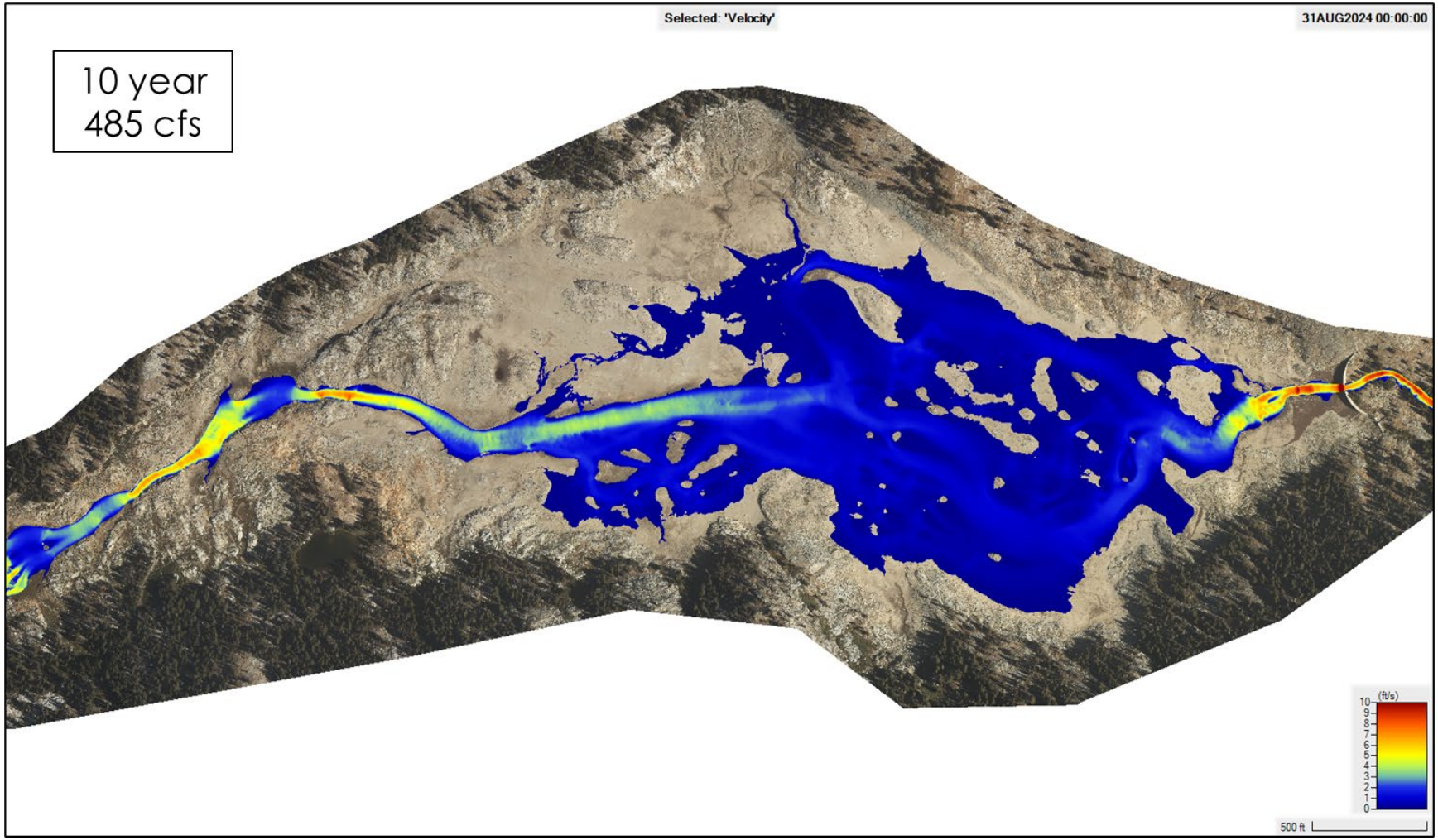

Figure AQ 1-Q25. Velocity results for 485 cfs with Rush Meadows Dam removed.

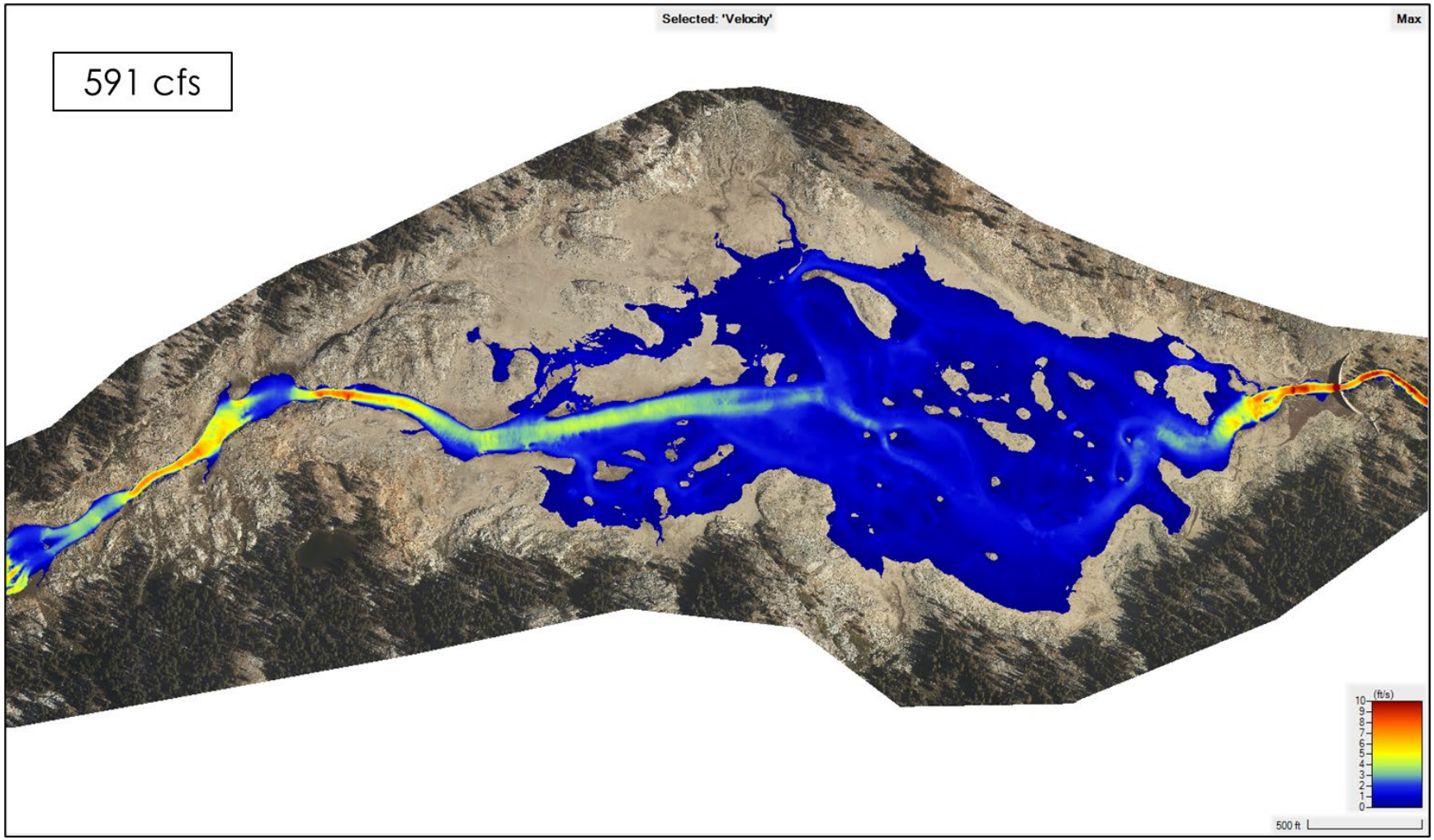

Figure AQ 1-Q26. Velocity results for 591 cfs with Rush Meadows Dam removed.

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APPENDIX R

Shear Stress Model Results for Rush Creek in Waugh Lakebed

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INTRODUCTION

The following figures (AQ 1-R1 through AQ 1-R13) contain the shear stress results of the HEC-RAS2D hydraulic modeling of Rush Creek with Rush Meadows Dam removed. The figures show two scales, Figures with an “a” show a shear stress scale of 0-2.5 lbs/ft^2 and Figures with a “b” have a shear stress scale of 0-0.1 lbs/ft^2. Figures AQ 1-R14 through AQ 1-R26 contain the areas with potential erosion calculated as shear stress model results that exceed the critical shear stress of the bed material.

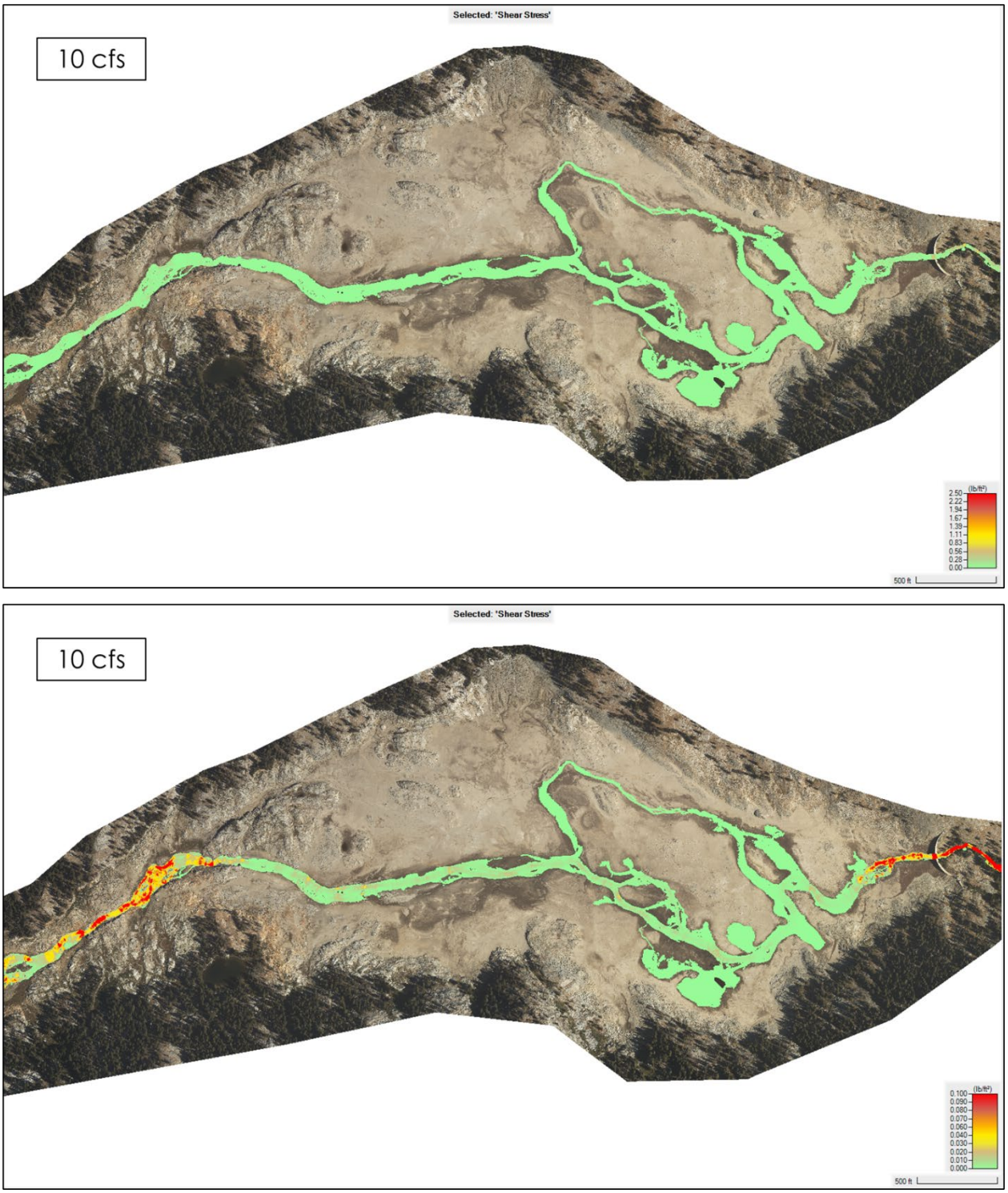

Figure AQ 1-R1. Shear stress results for 10 cfs with Rush Meadows Dam removed.

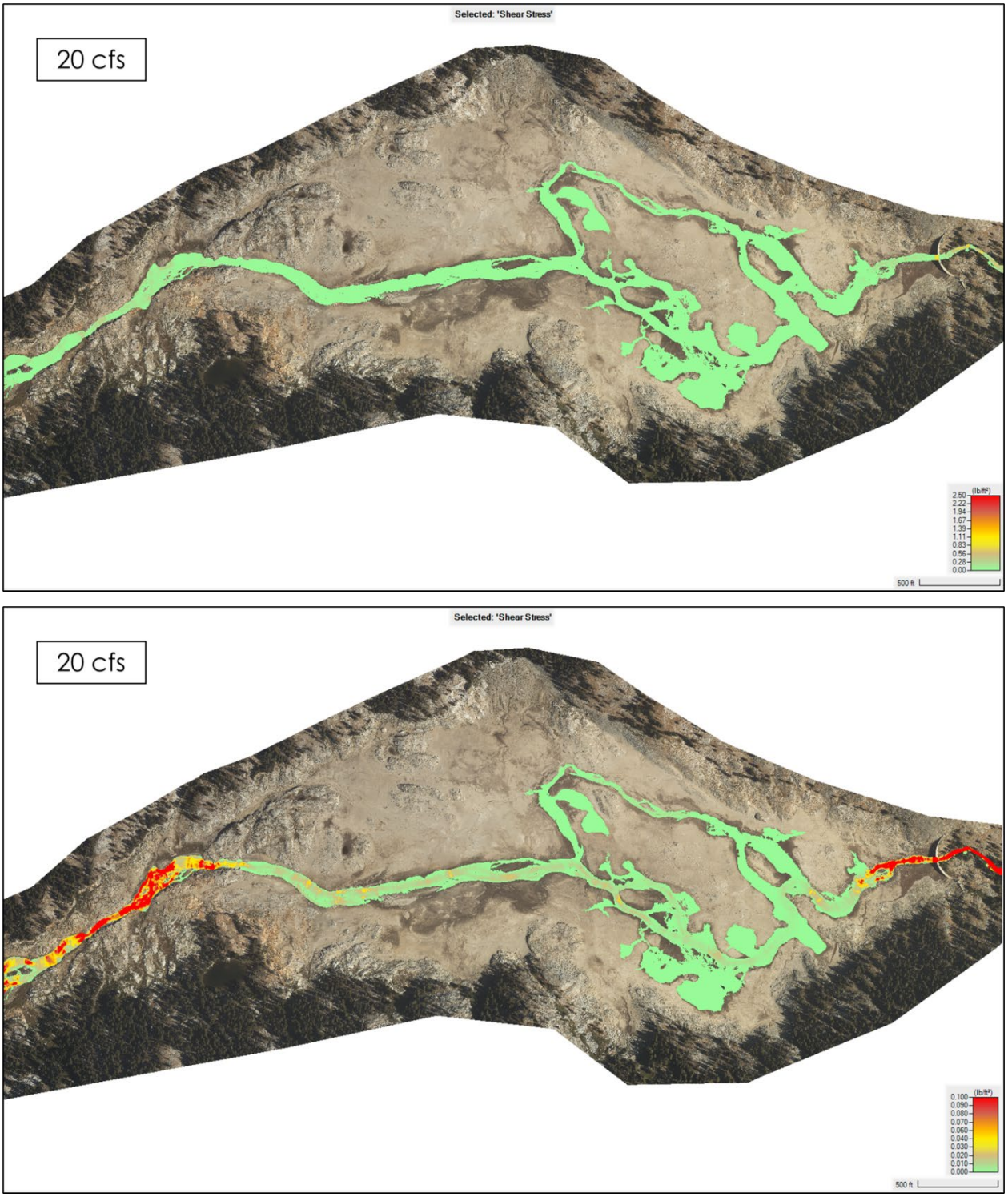

Figure AQ 1-R2. Shear stress results for 20 cfs with Rush Meadows Dam removed.

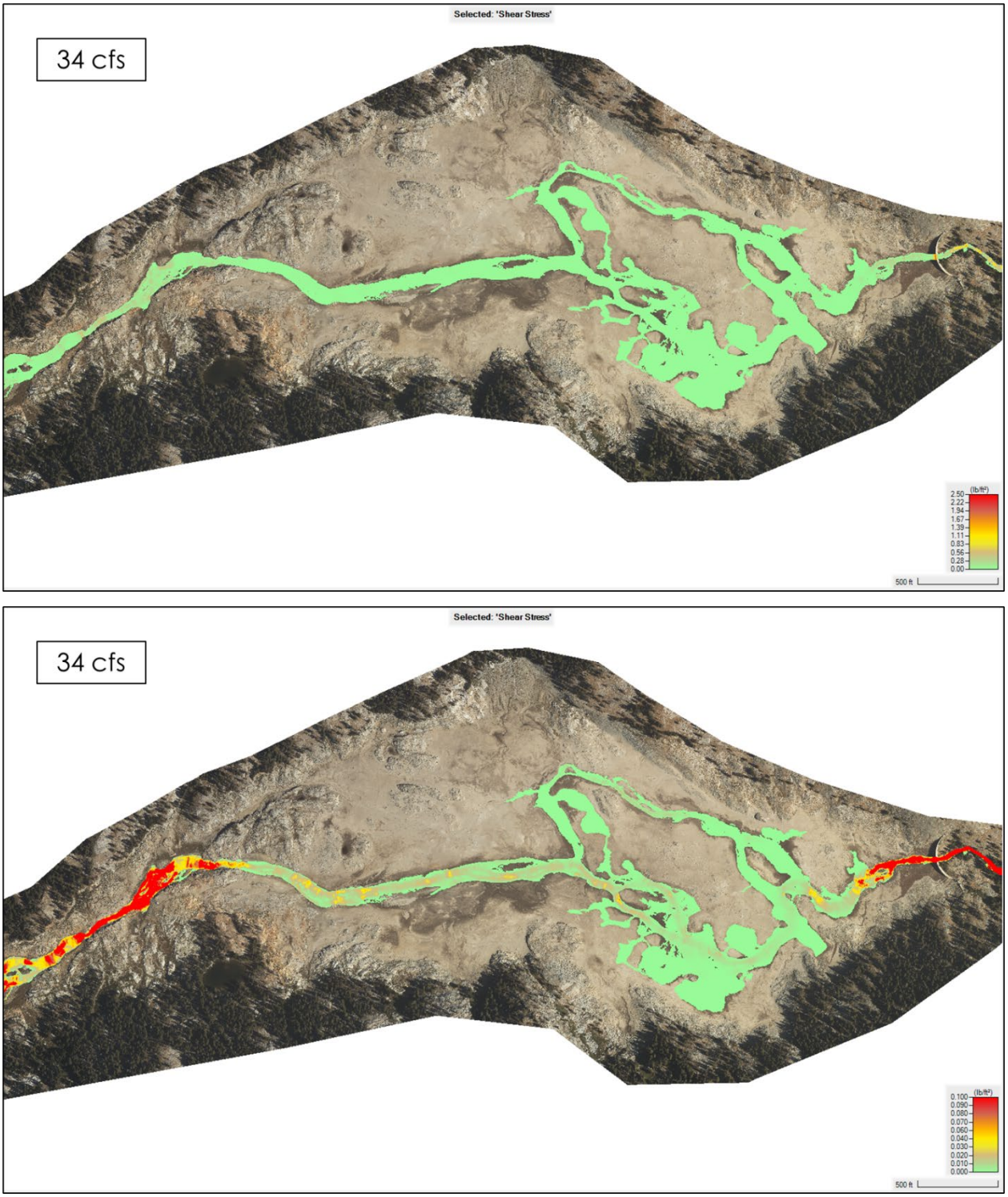

Figure AQ 1-R3. Shear stress results for 34 cfs with Rush Meadows Dam removed.

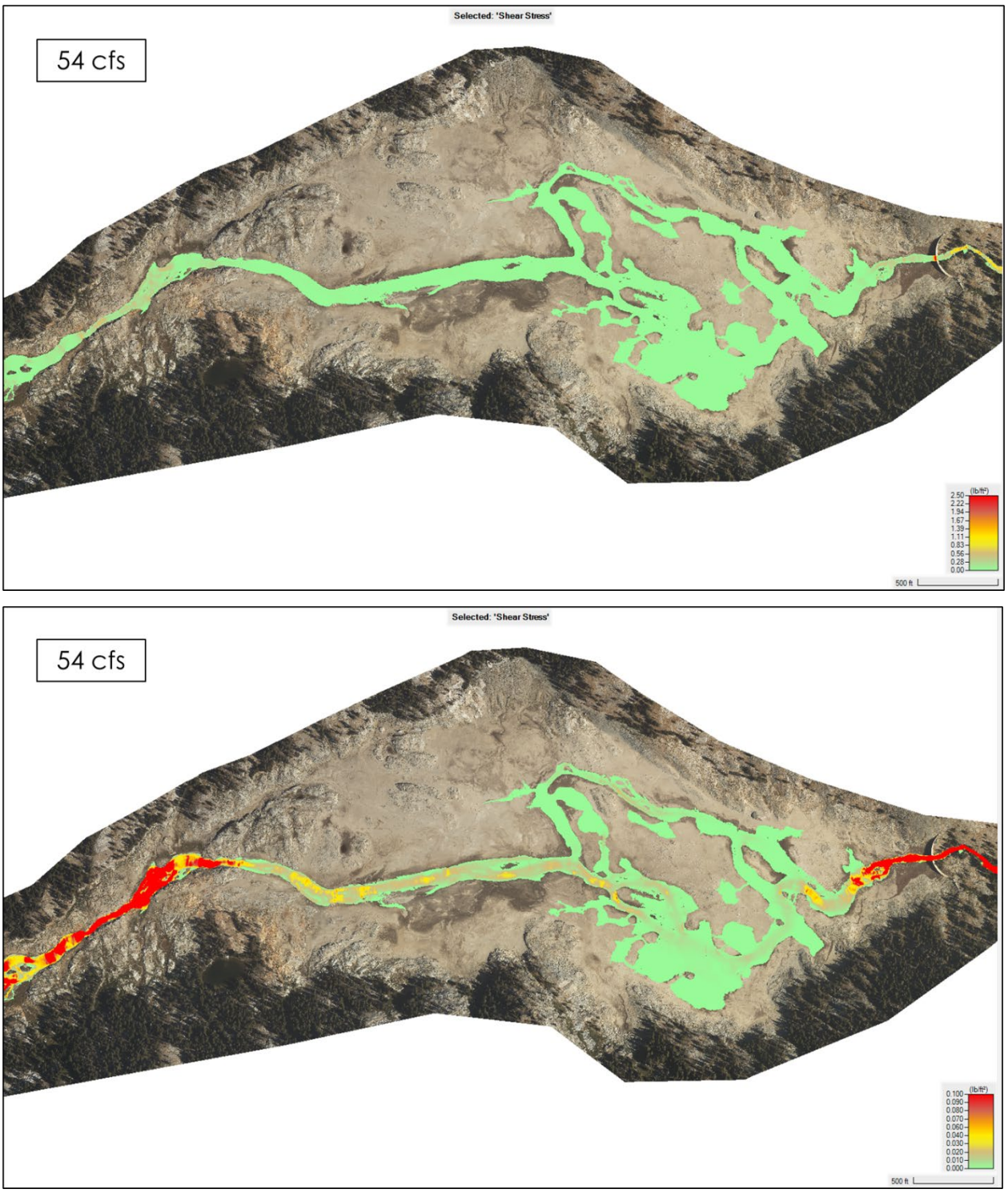

Figure AQ 1-R4. Shear stress results for 54 cfs with Rush Meadows Dam removed.

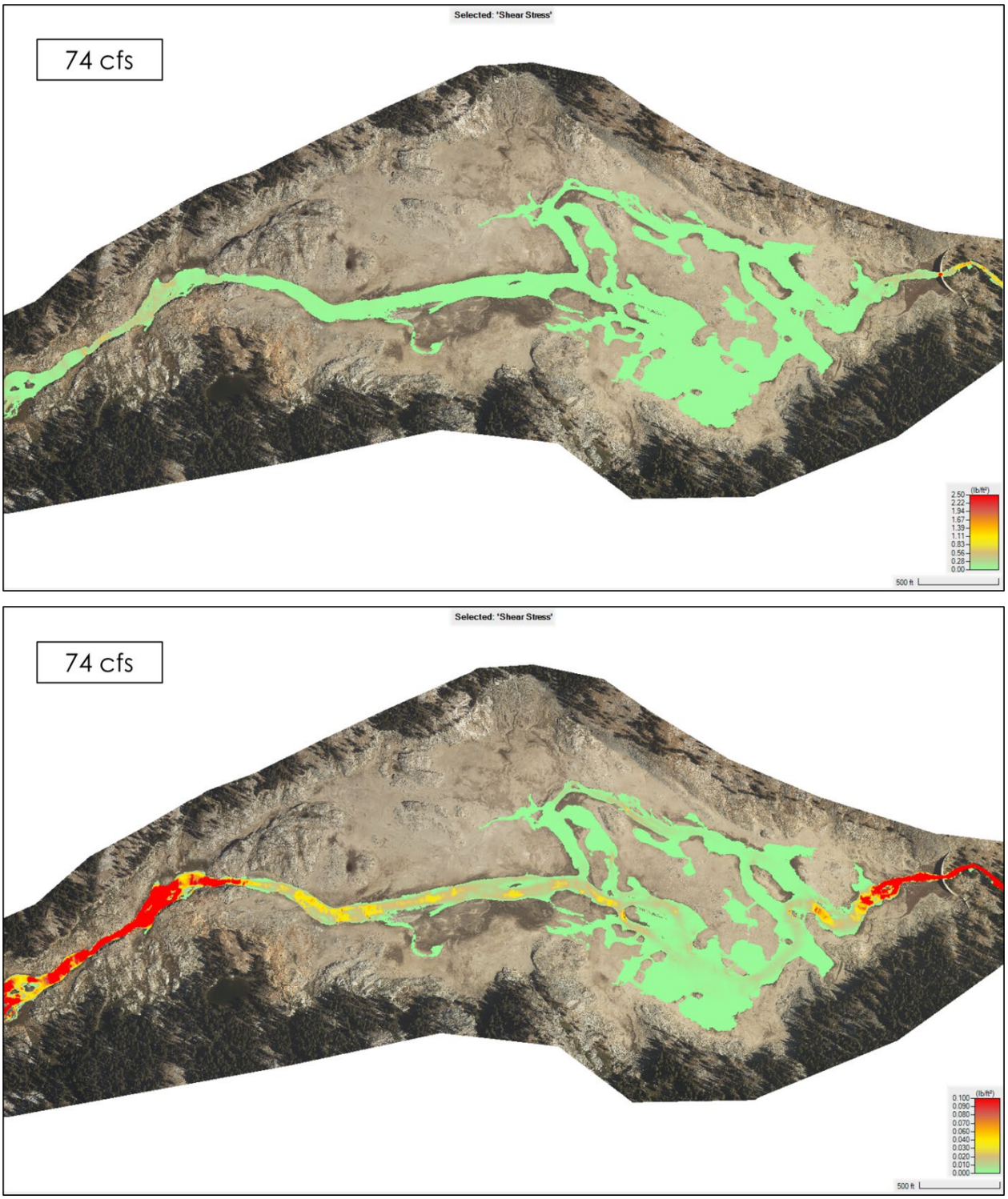

Figure AQ 1-R5. Shear stress results for 74 cfs with Rush Meadows Dam removed.

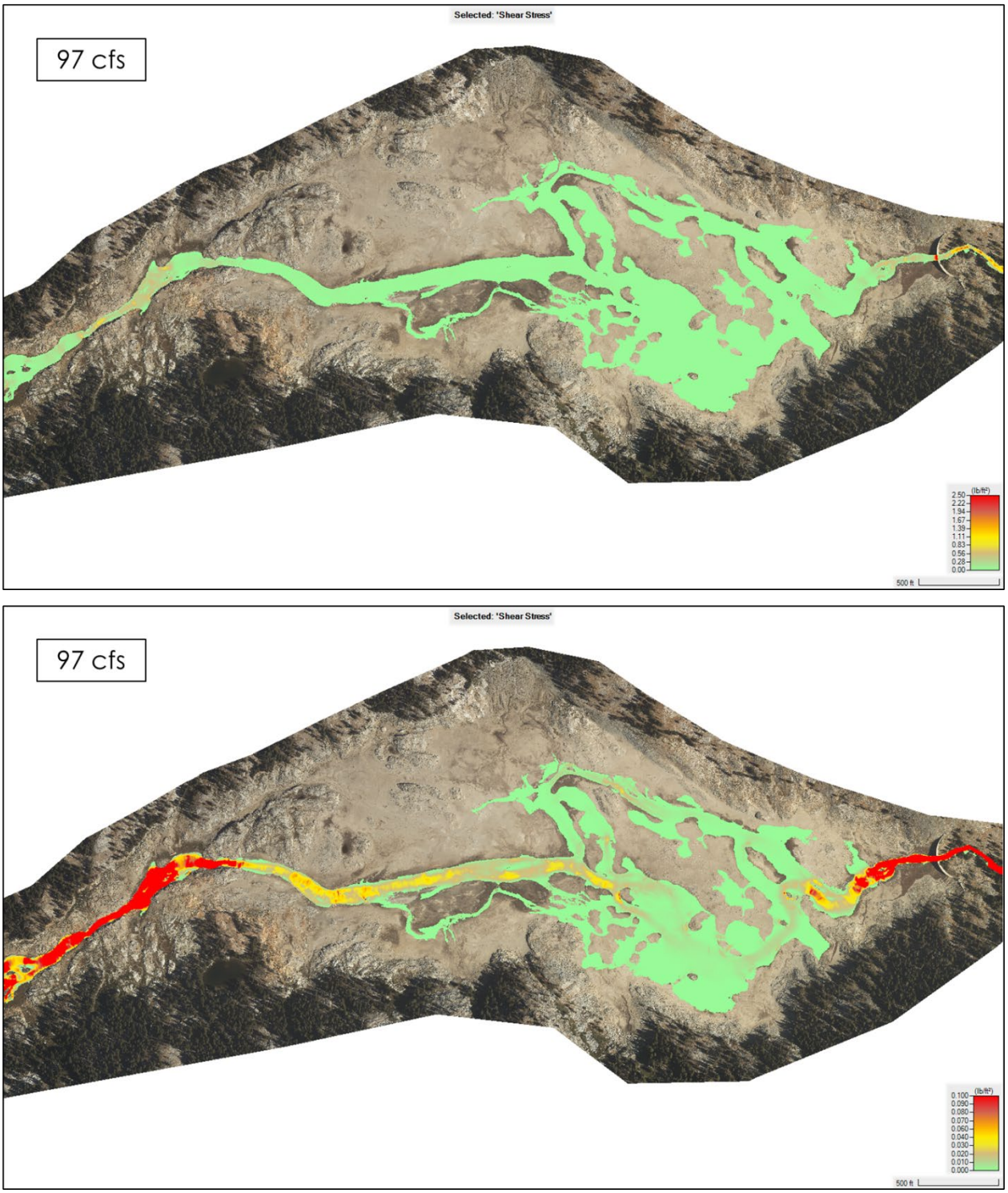

Figure AQ 1-R6. Shear stress results for 97 cfs with Rush Meadows Dam removed.

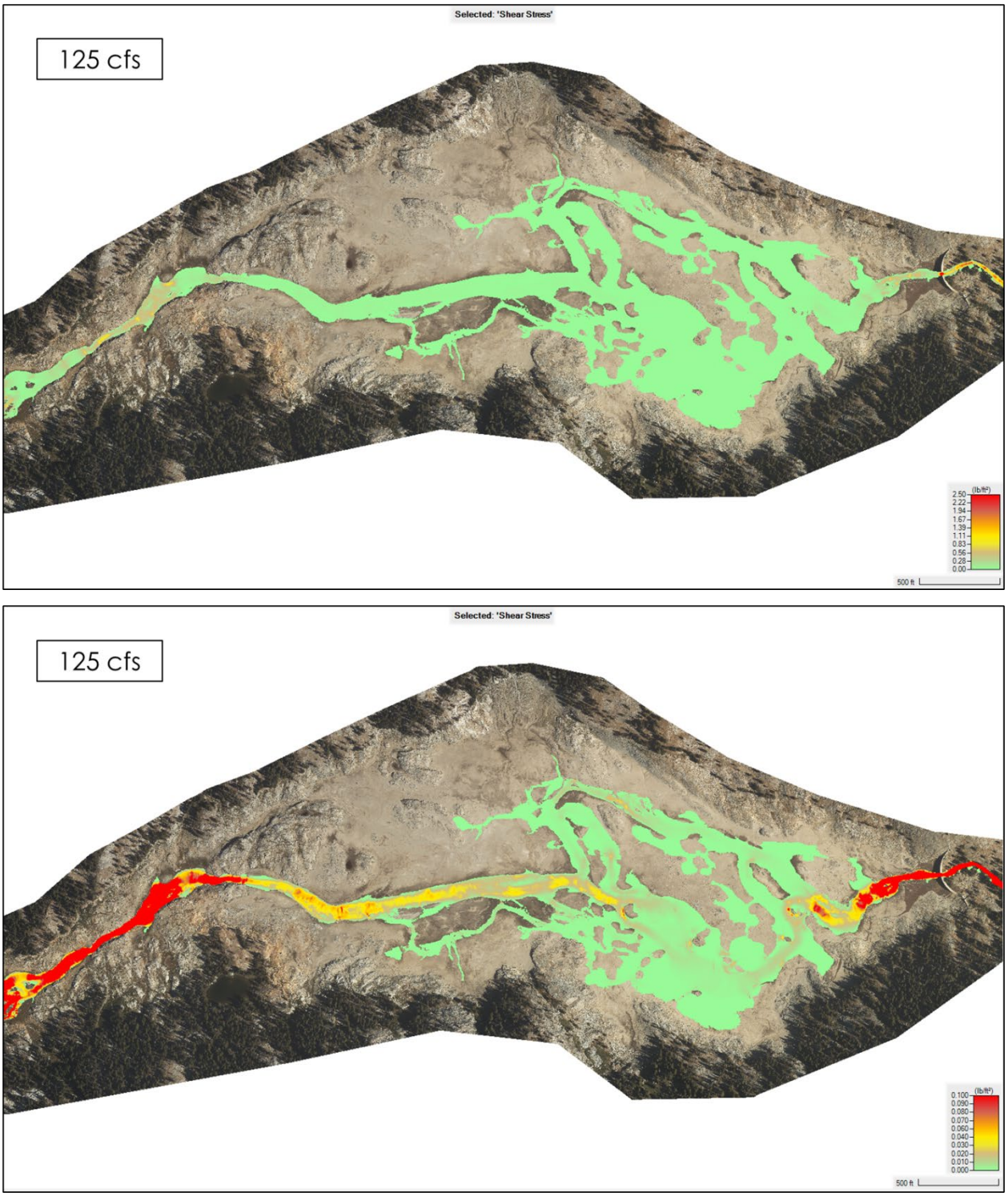

Figure AQ 1-R7. Shear stress results for 125 cfs with Rush Meadows Dam removed.

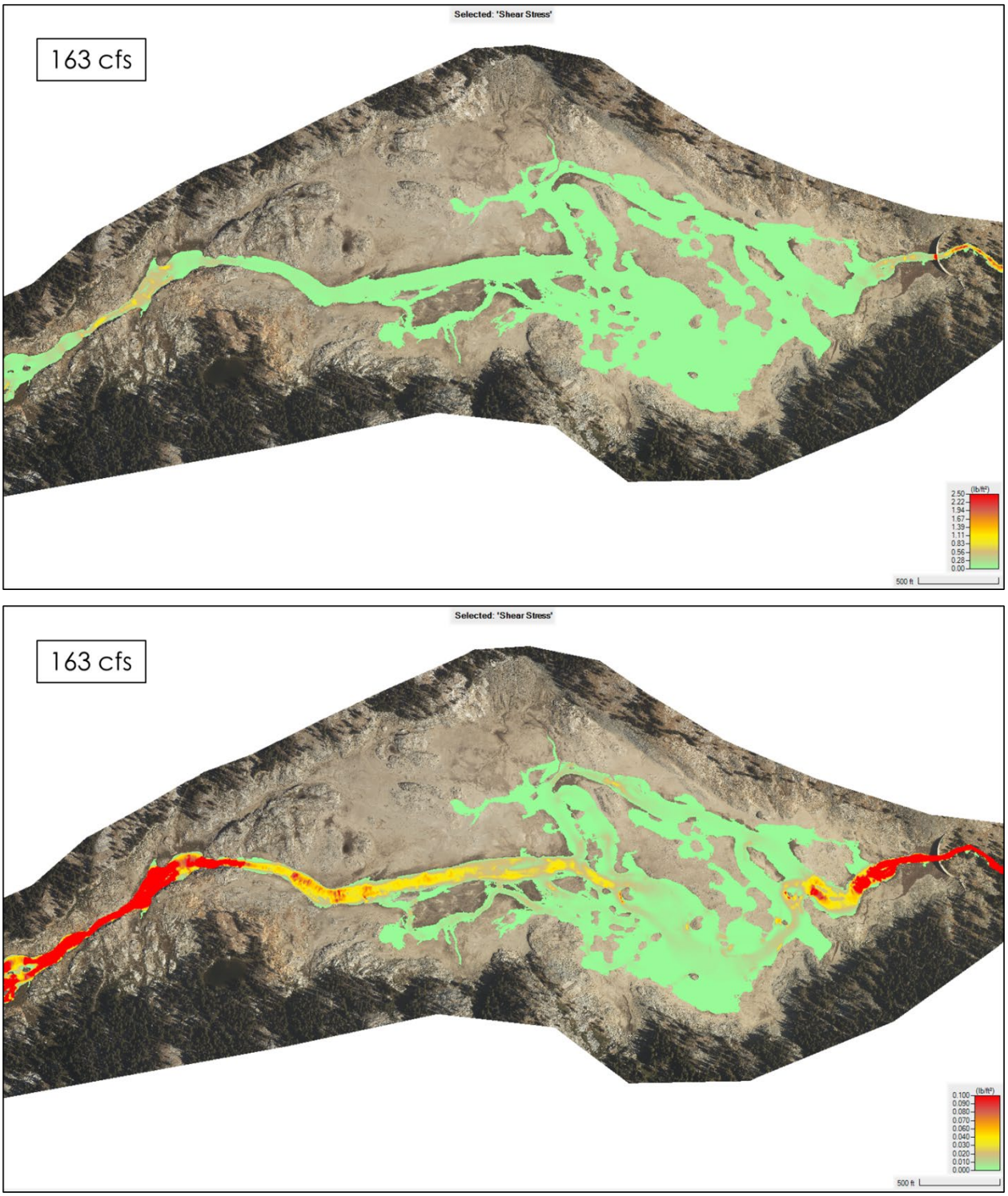

Figure AQ 1-R8. Shear stress results for 163 cfs with Rush Meadows Dam removed.

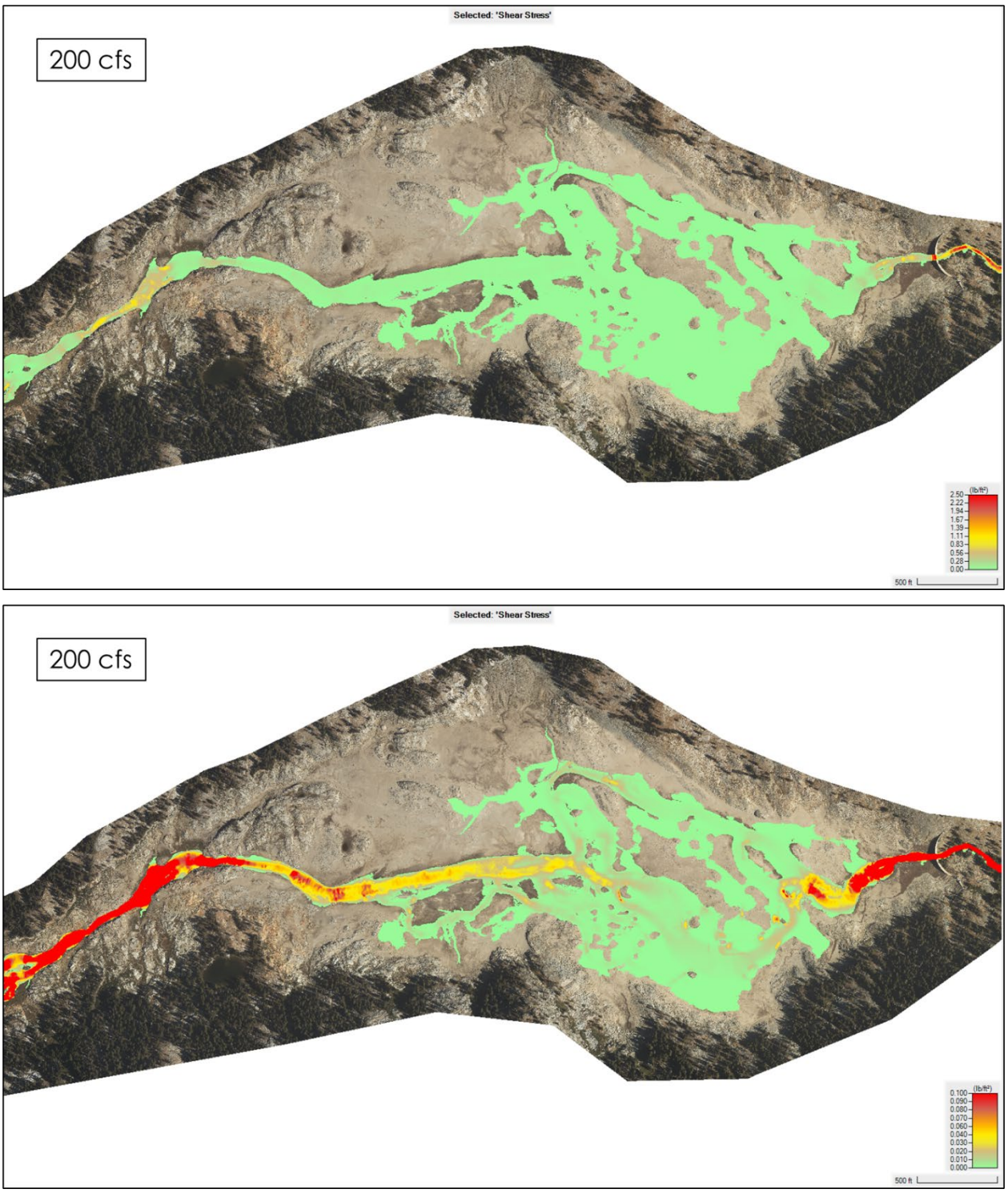

Figure AQ 1-R9. Shear stress results for 200 cfs with Rush Meadows Dam removed.

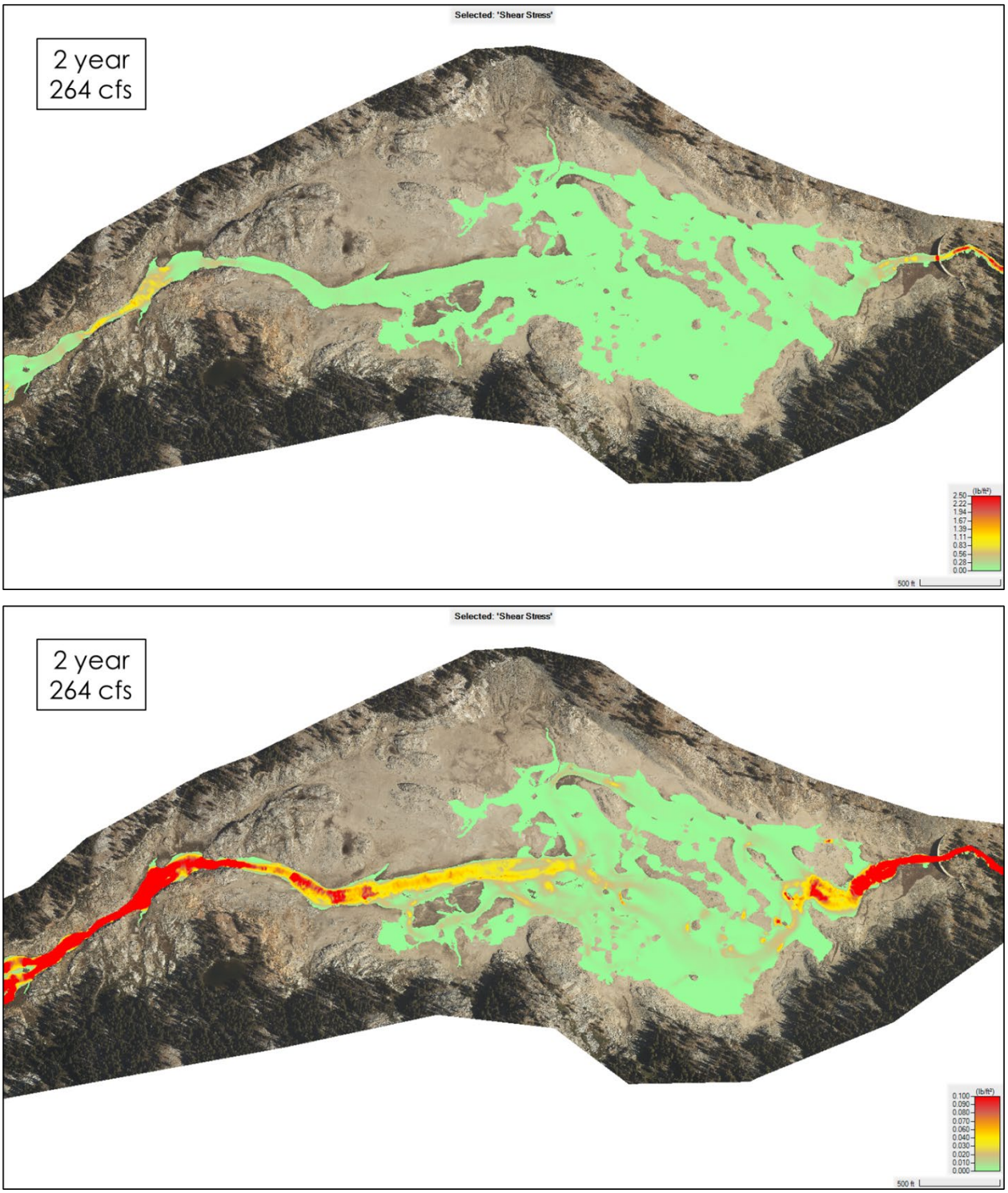

Figure AQ 1-R10. Shear stress results for 264 cfs with Rush Meadows Dam removed.

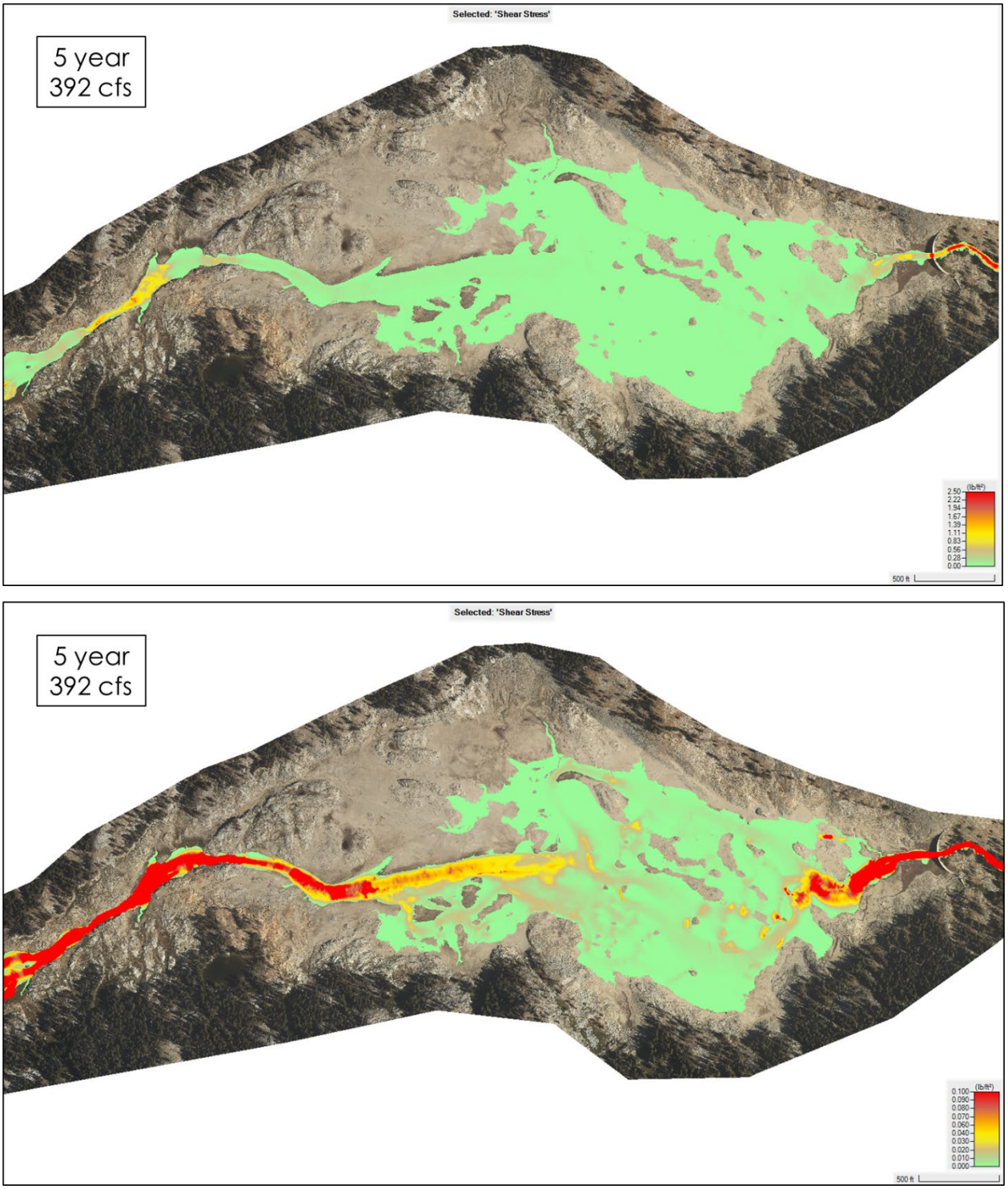

Figure AQ 1-R11. Shear stress results for 392 cfs with Rush Meadows Dam removed.

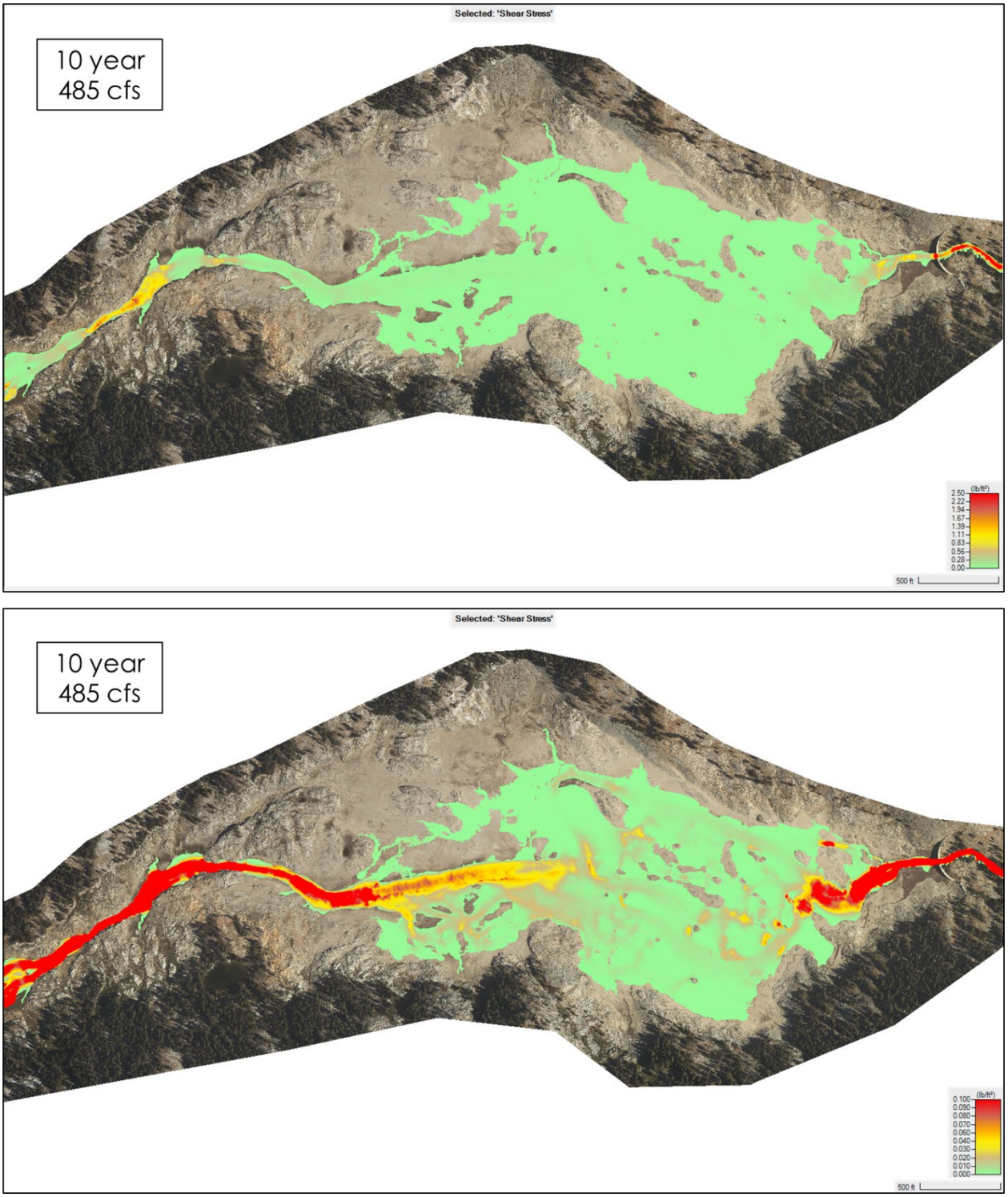

Figure AQ 1-R12. Shear stress results for 485 cfs with Rush Meadows Dam removed.

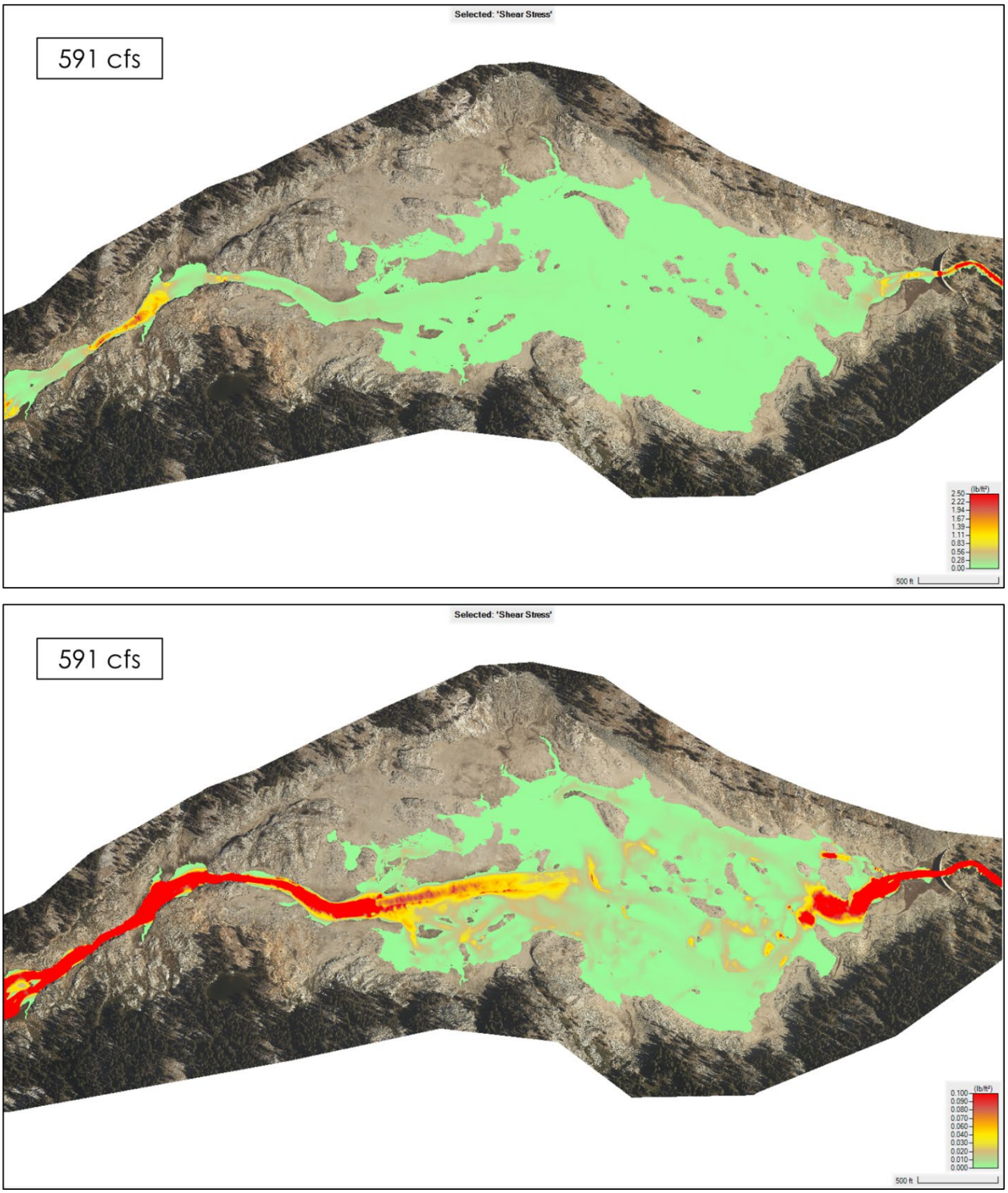

Figure AQ 1-R13. Shear stress results for 591 cfs with Rush Meadows Dam removed.

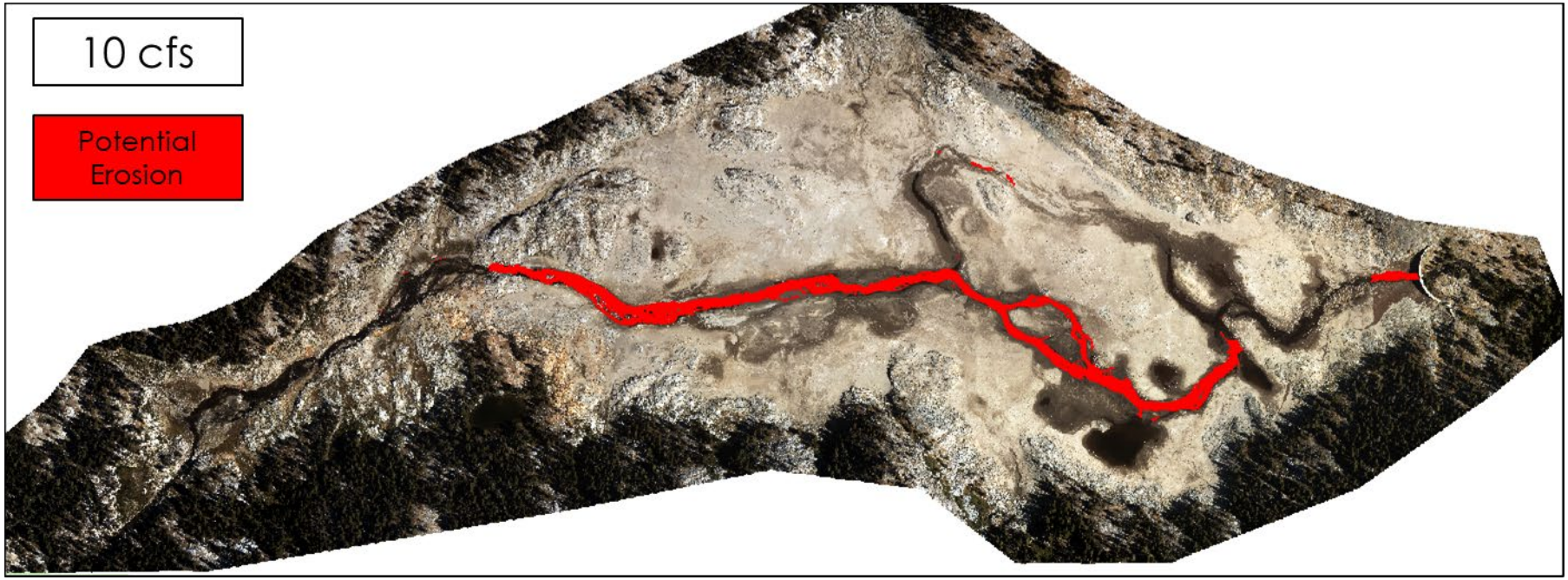

Figure AQ 1-R14. Erosion potential results for 10 cfs with Rush Meadows Dam removed.

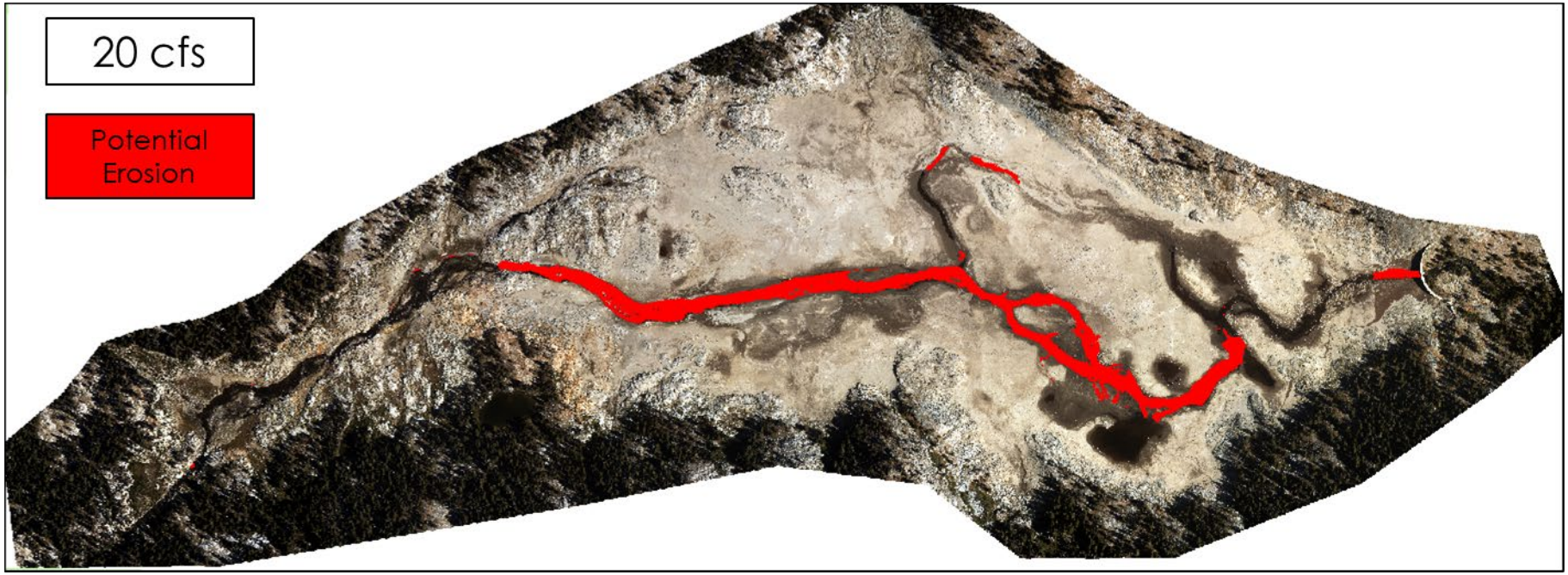

Figure AQ 1-R15. Erosion potential results for 20 cfs with Rush Meadows Dam removed.

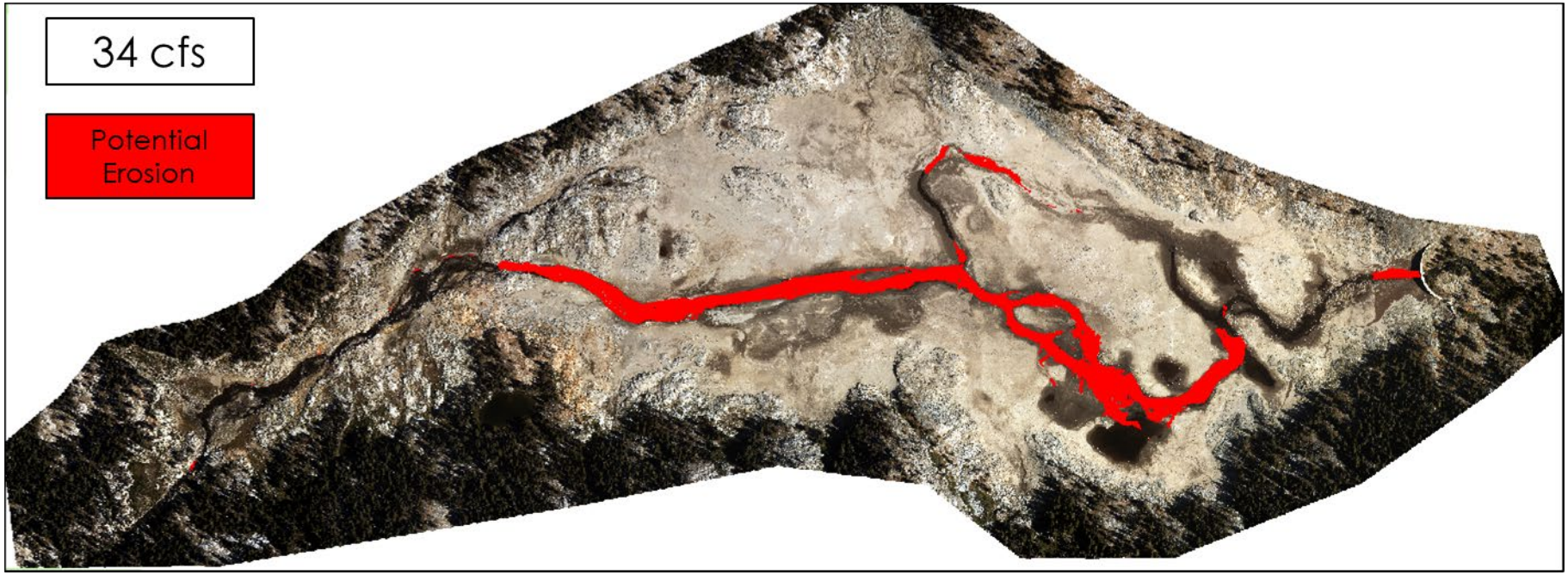

Figure AQ 1-R16. Erosion potential results for 34 cfs with Rush Meadows Dam removed.

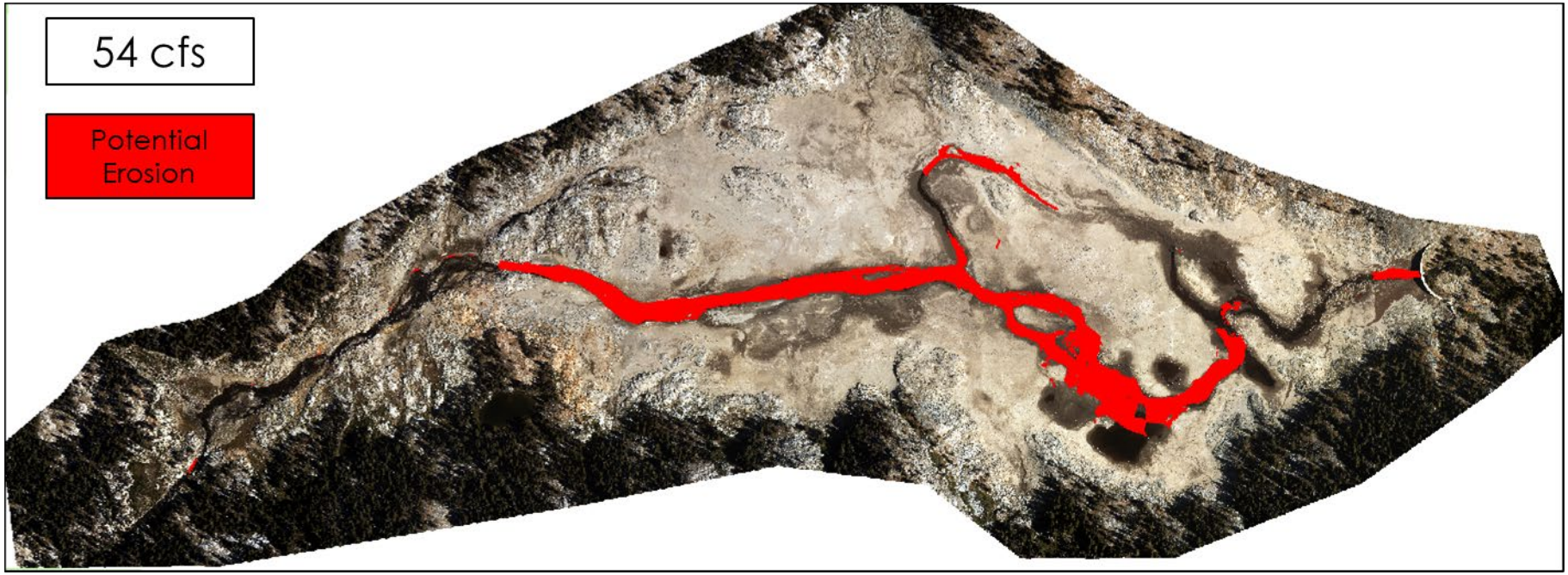

Figure AQ 1-R17. Erosion potential results for 54 cfs with Rush Meadows Dam removed.

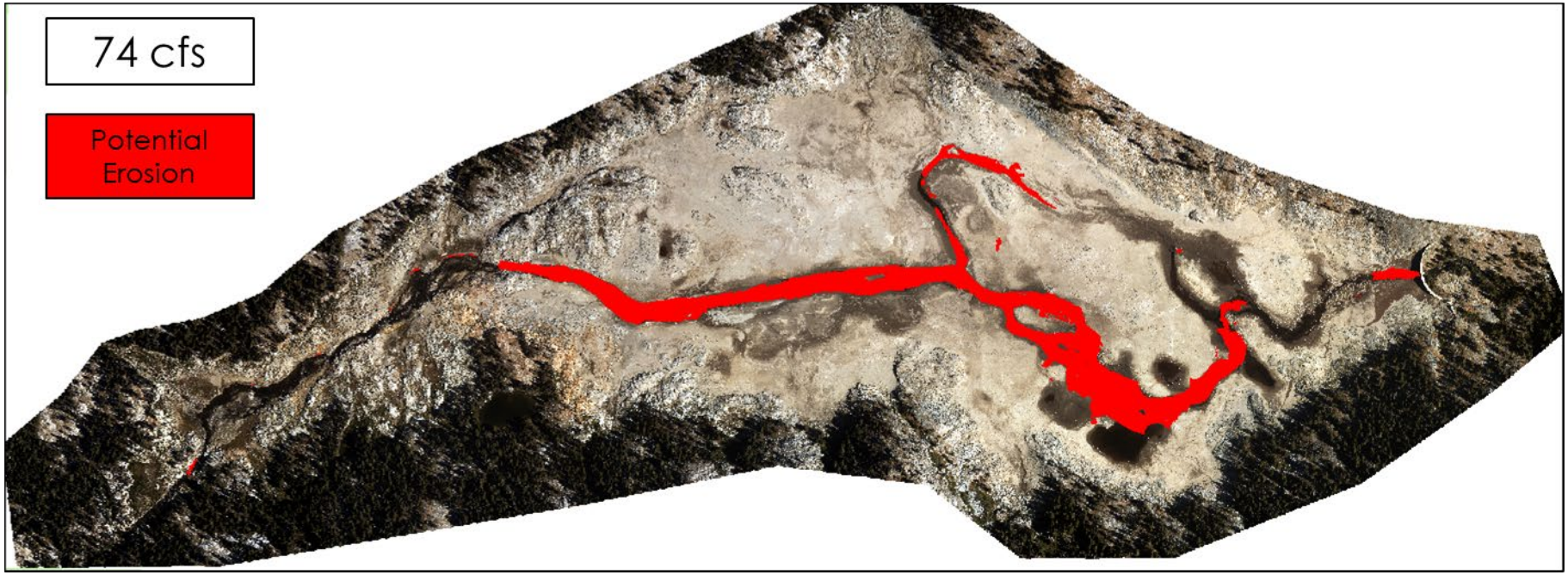

Figure AQ 1-R18. Erosion potential results for 74 cfs with Rush Meadows Dam removed.

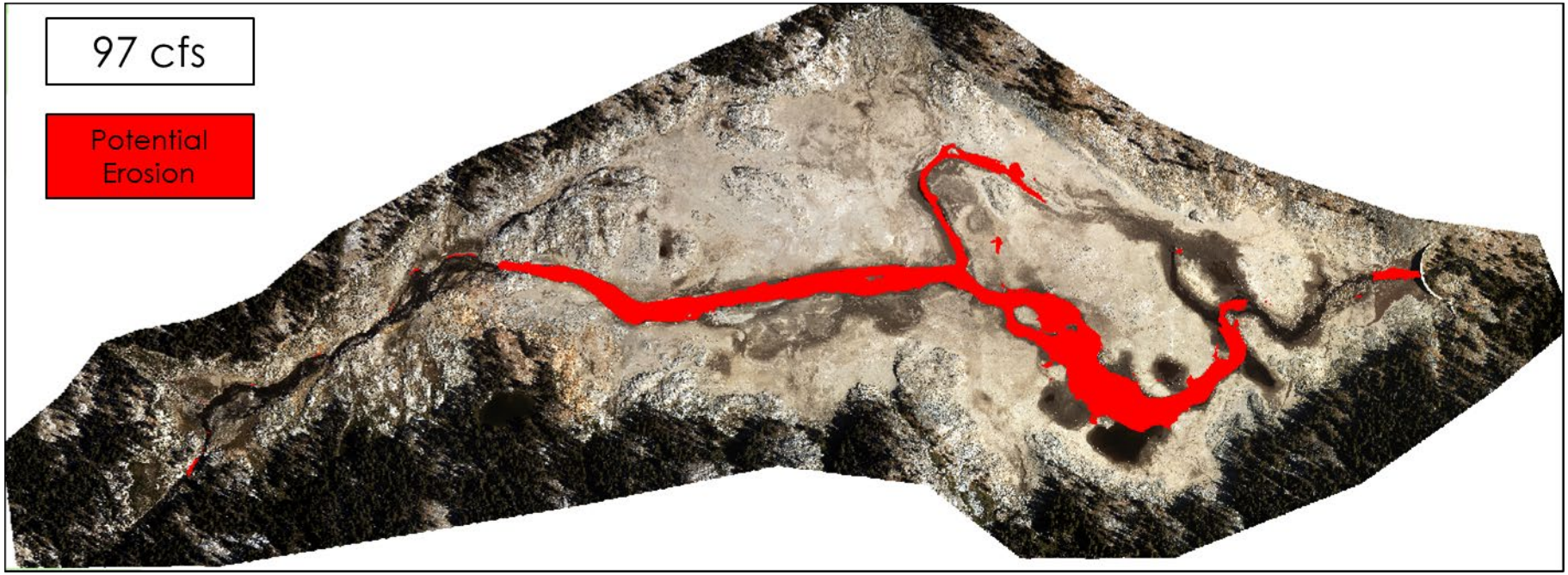

Figure AQ 1-R19. Erosion potential results for 97 cfs with Rush Meadows Dam removed.

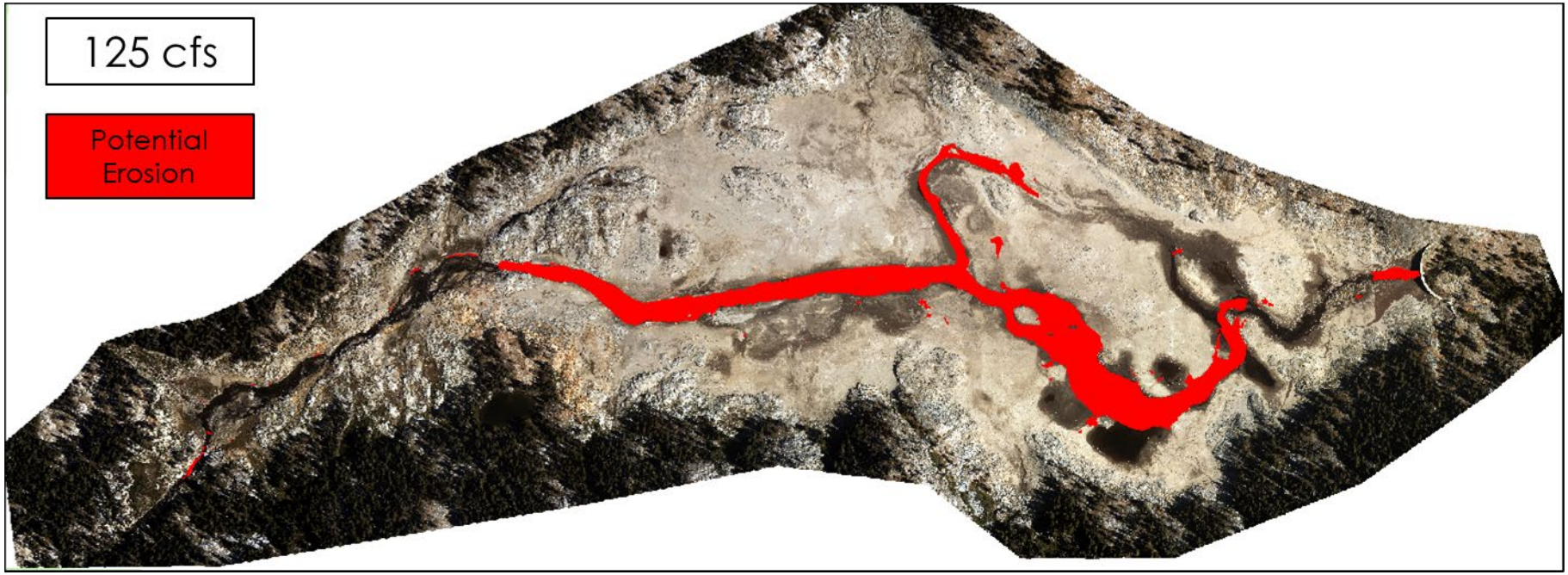

Figure AQ 1-R20. Erosion potential results for 125 cfs with Rush Meadows Dam removed.

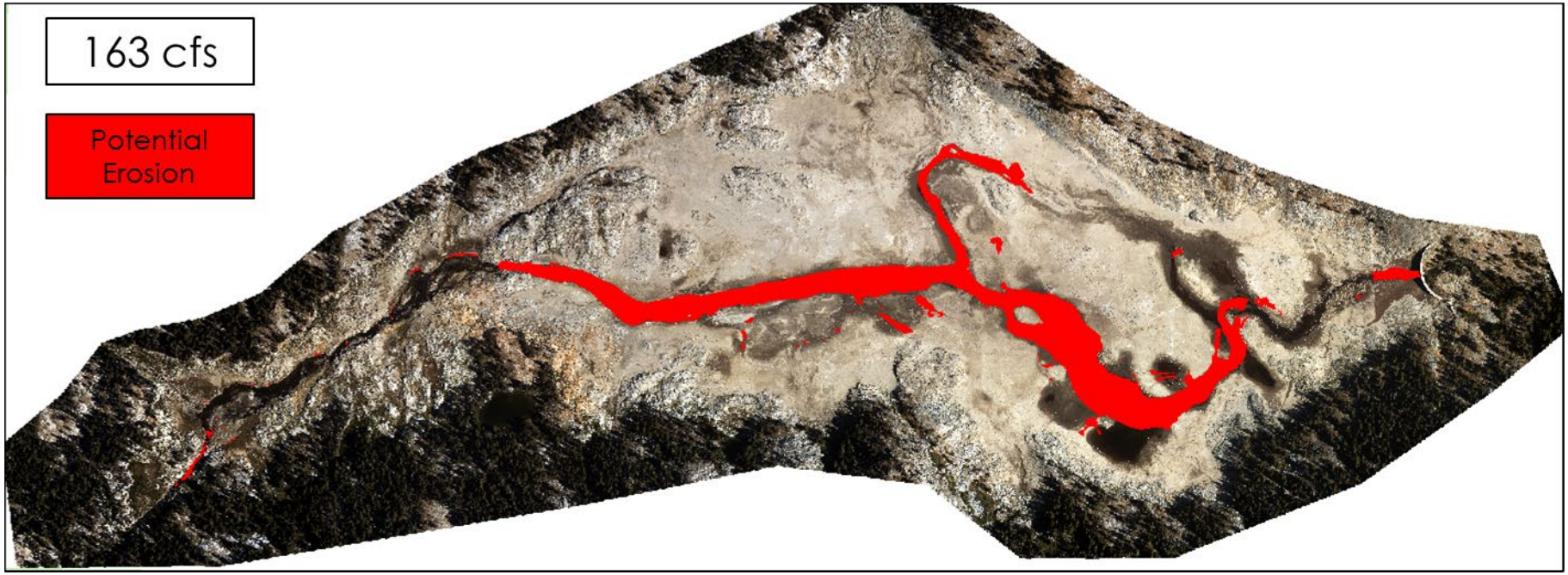

Figure AQ 1-R21. Erosion potential results for 163 cfs with Rush Meadows Dam removed.

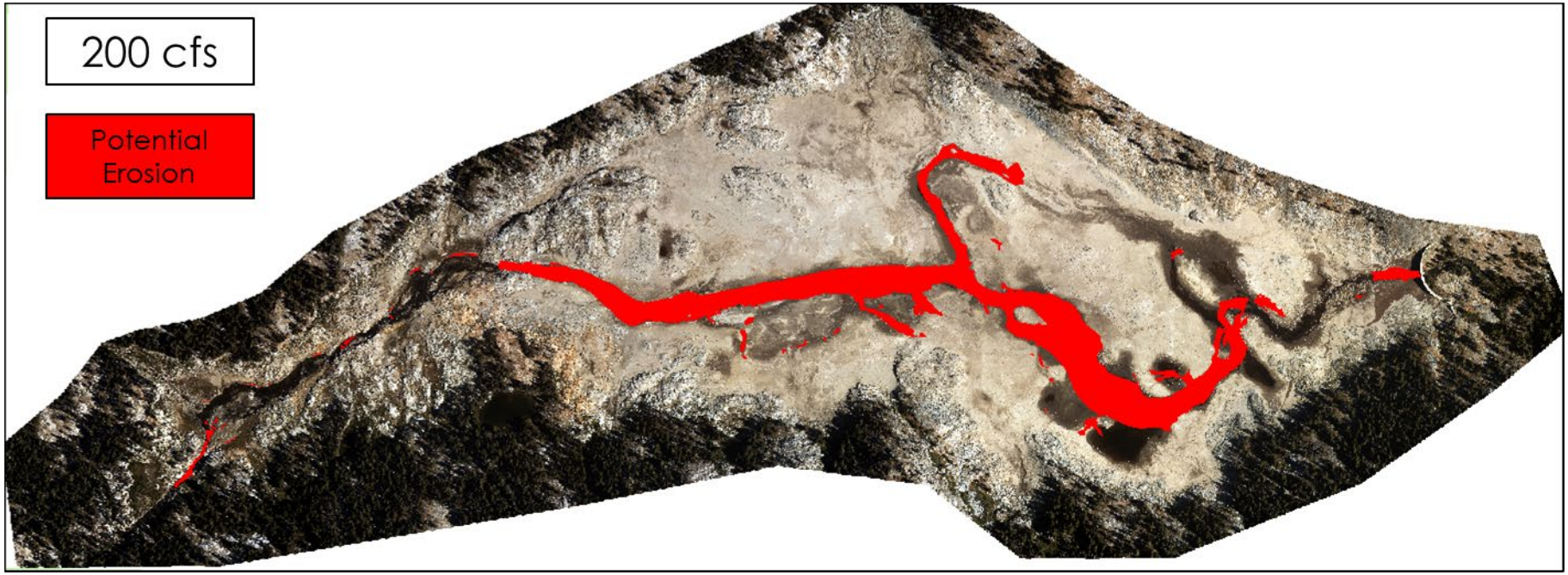

Figure AQ 1-R22. Erosion potential results for 200 cfs with Rush Meadows Dam removed.

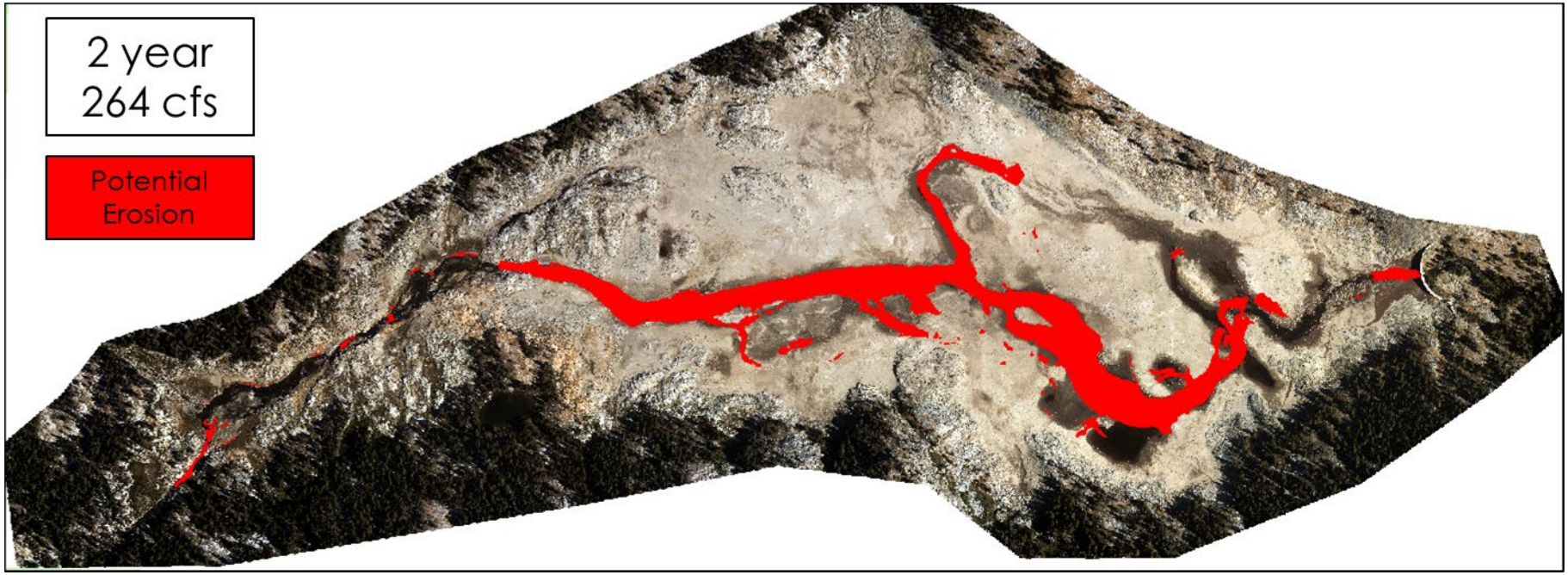

Figure AQ 1-R23. Erosion potential results for 264 cfs with Rush Meadows Dam removed.

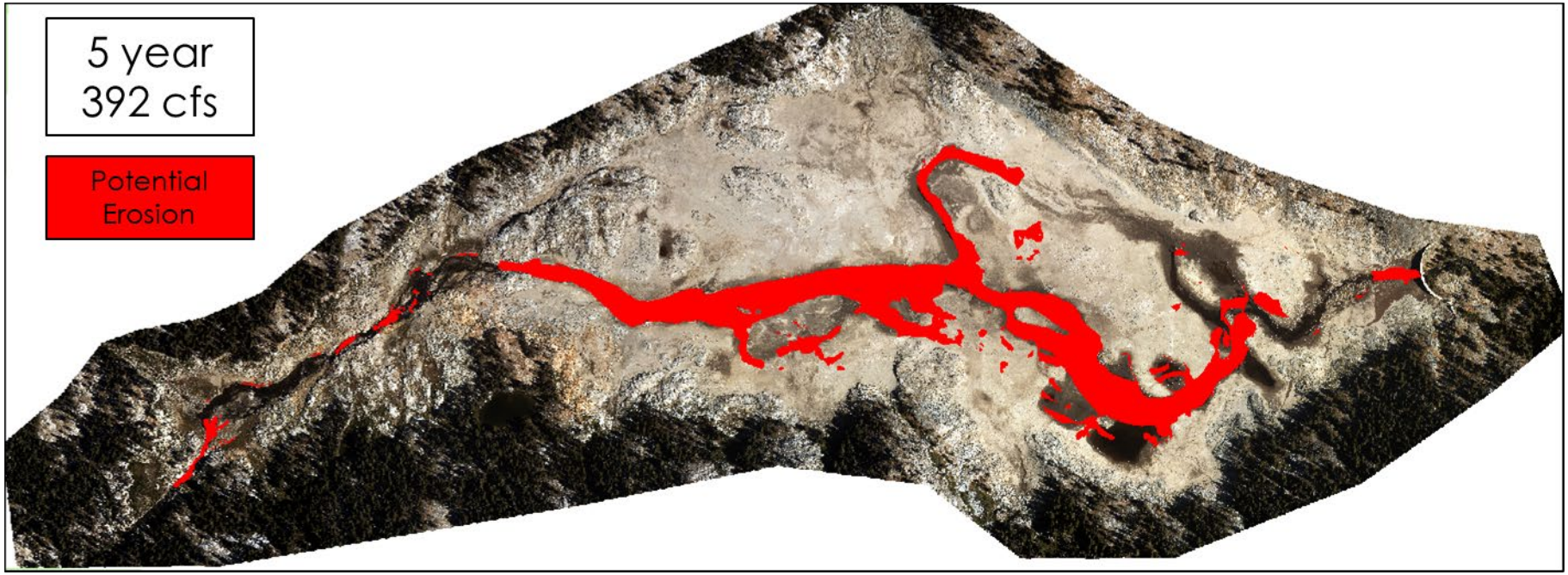

Figure AQ 1-R24. Erosion potential results for 392 cfs with Rush Meadows Dam removed.

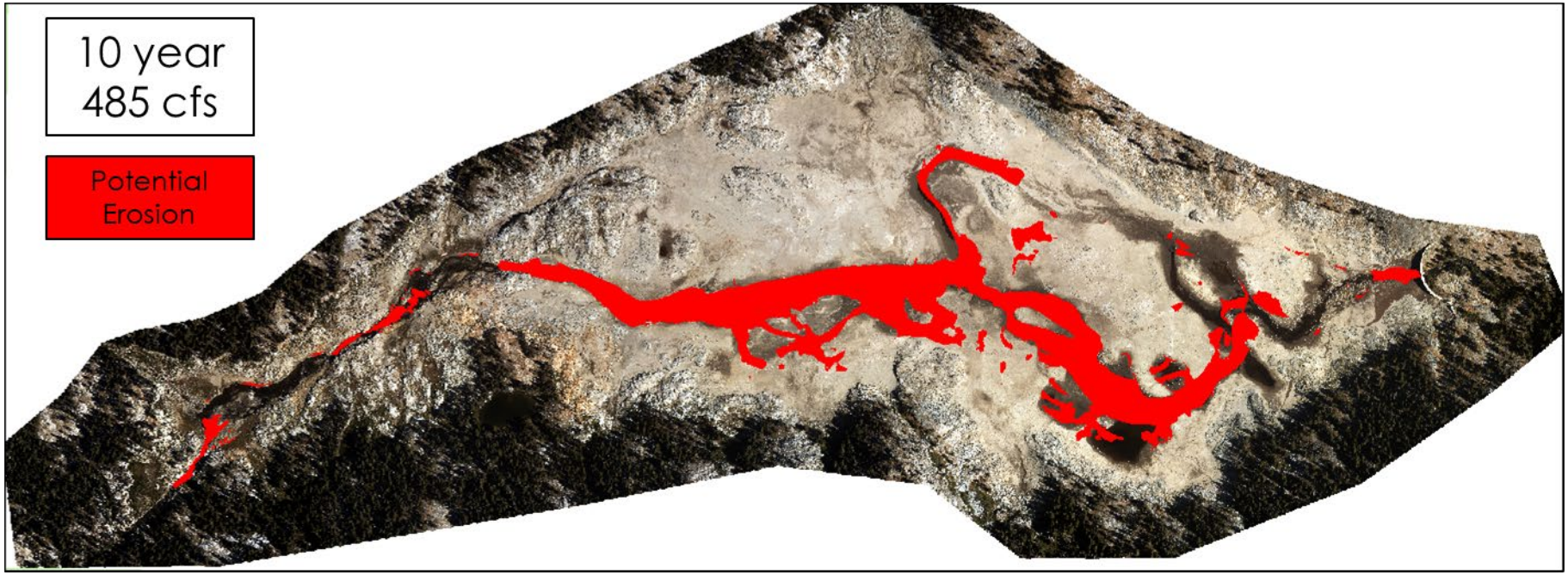

Figure AQ 1-R25. Erosion potential results for 485 cfs with Rush Meadows Dam removed.

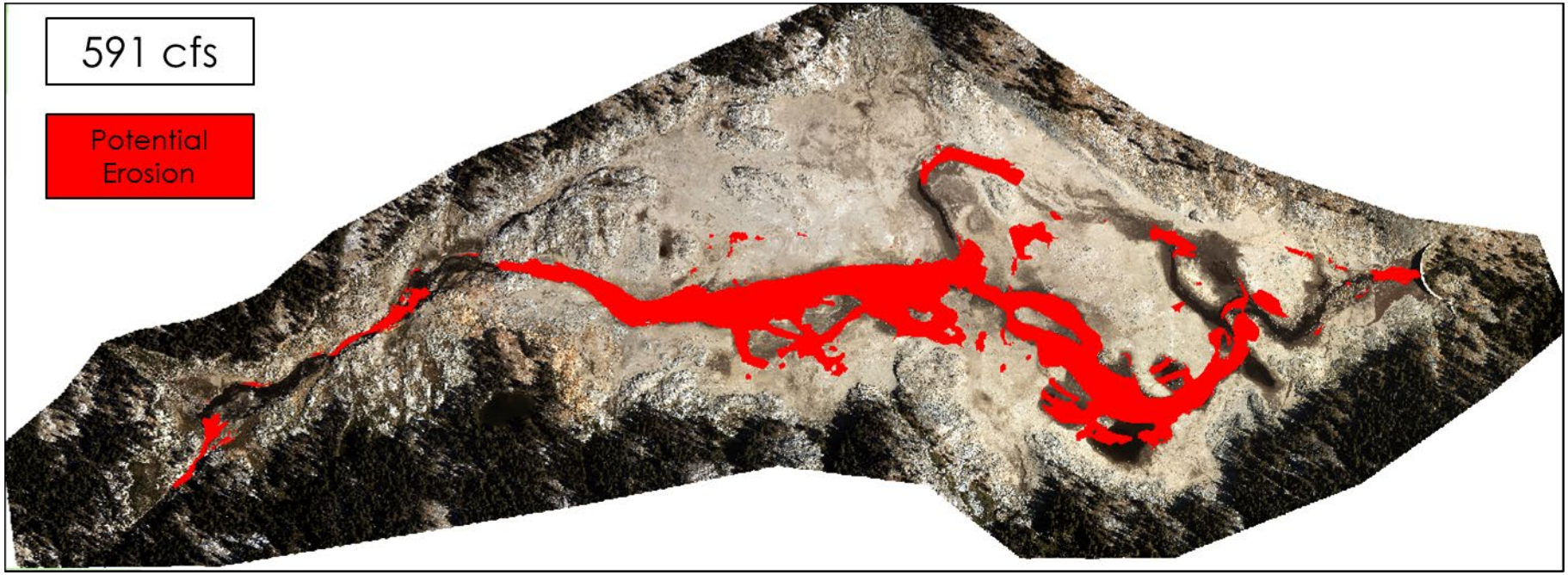

Figure AQ 1-R26. Erosion potential results for 591 cfs with Rush Meadows Dam removed.

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APPENDIX S

Hydrology at SR-158 Culverts

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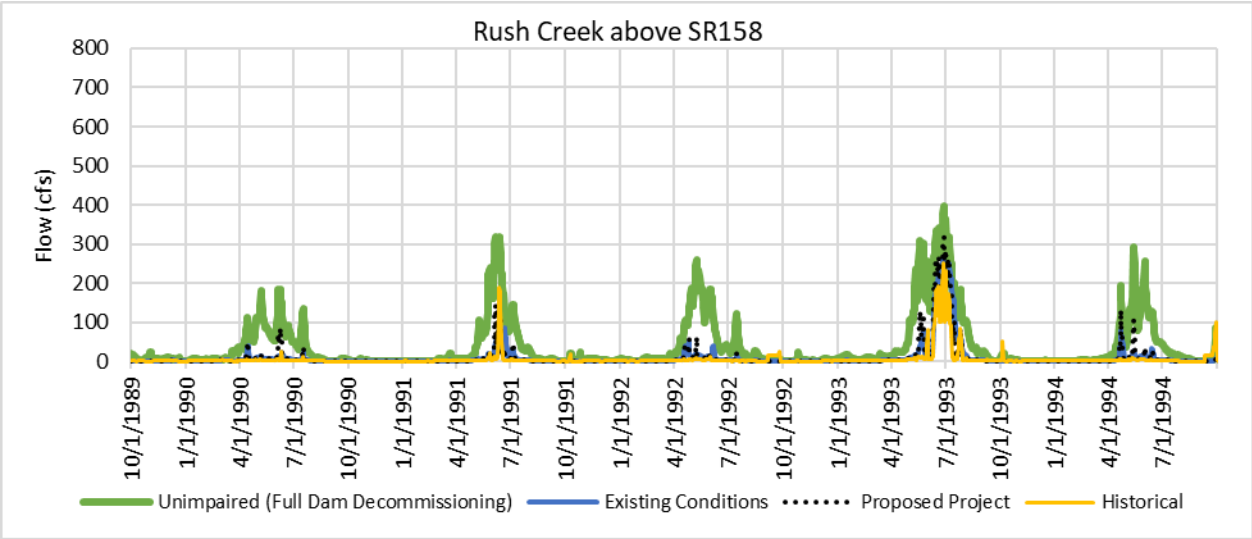
INTRODUCTION

The following figures (AQ 1-S1 through AQ 1-S3) contain the hydrology results for flows at the SR-158 culvert crossings for Rush Creek, South Rush Creek, and the Rush Creel powerhouse tailrace locations.



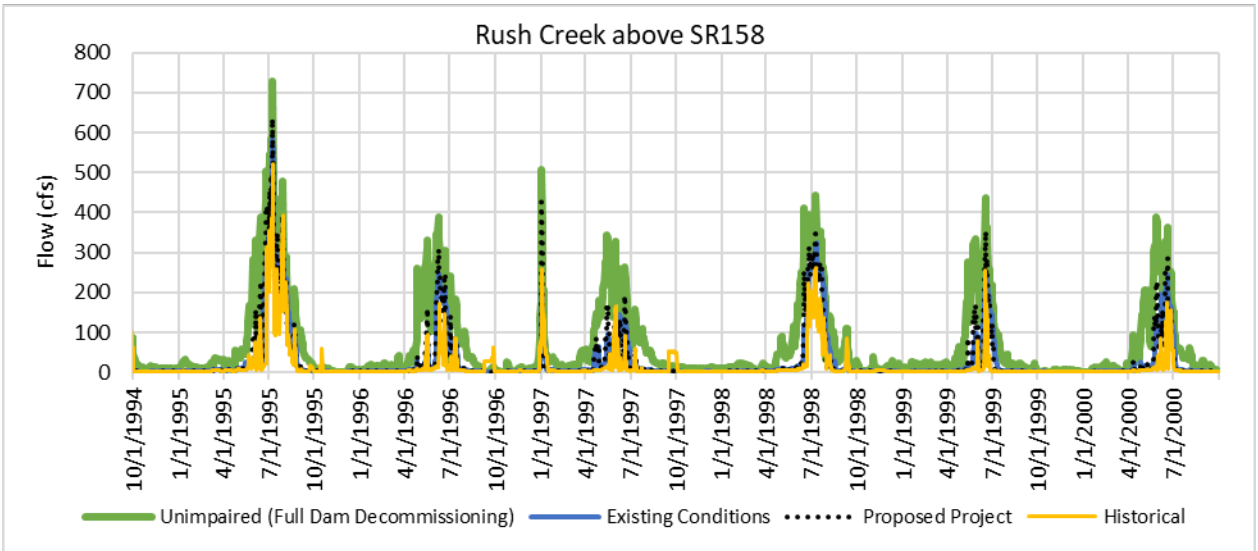
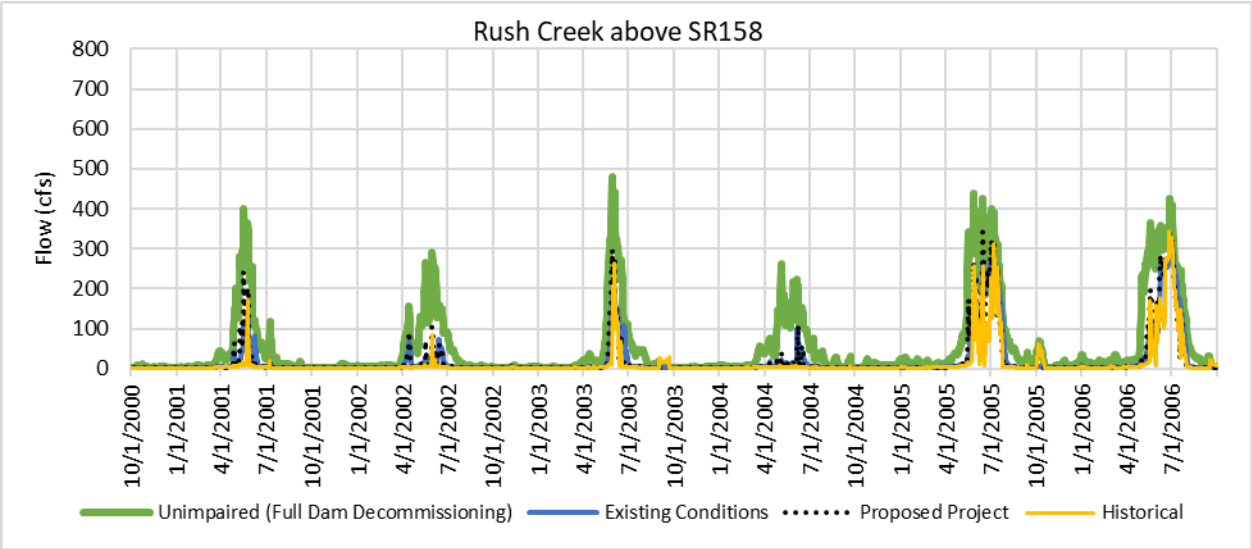


Figure AQ 1-S1. Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



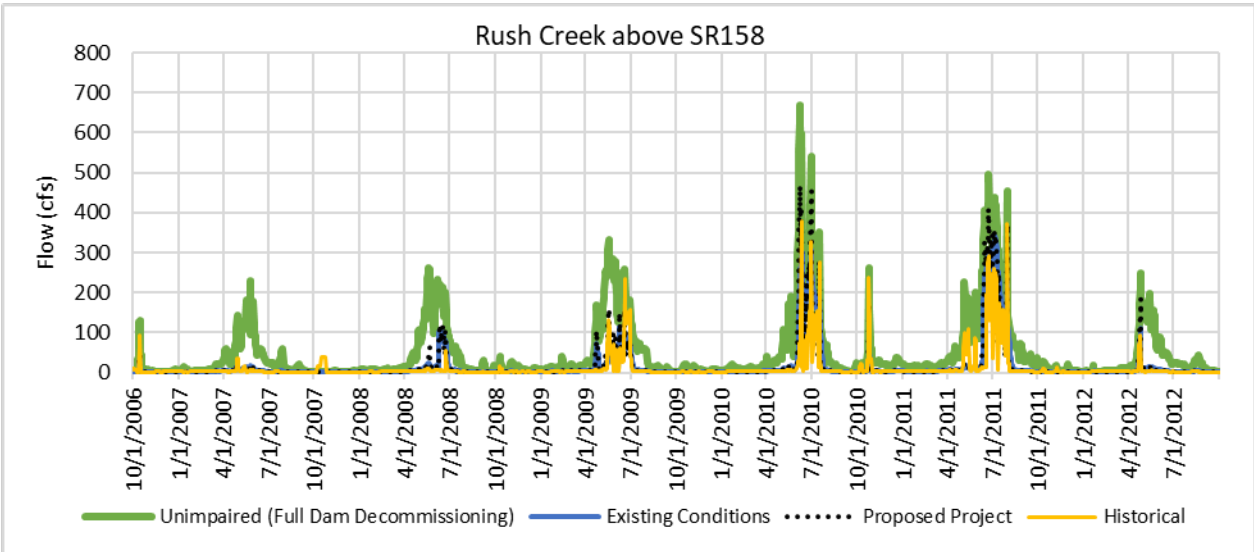
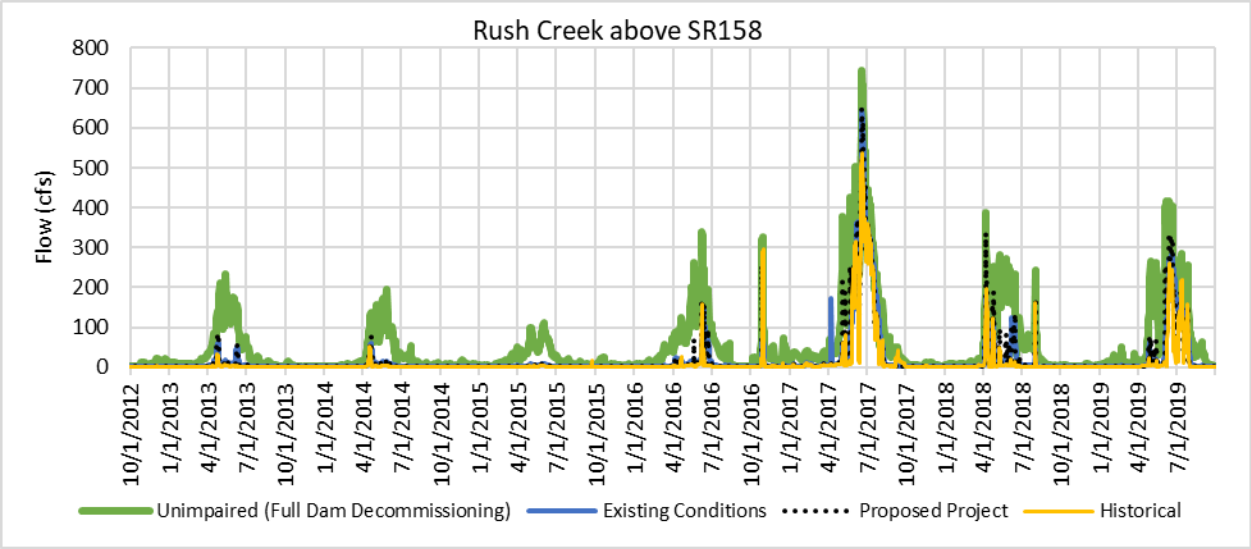


Figure AQ 1-S1. Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



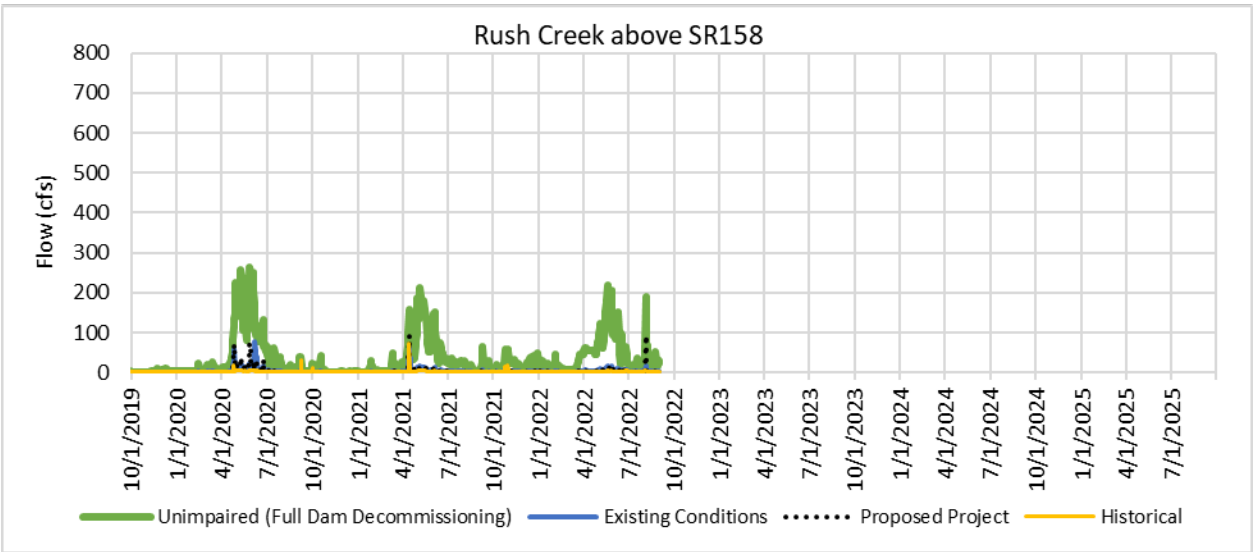
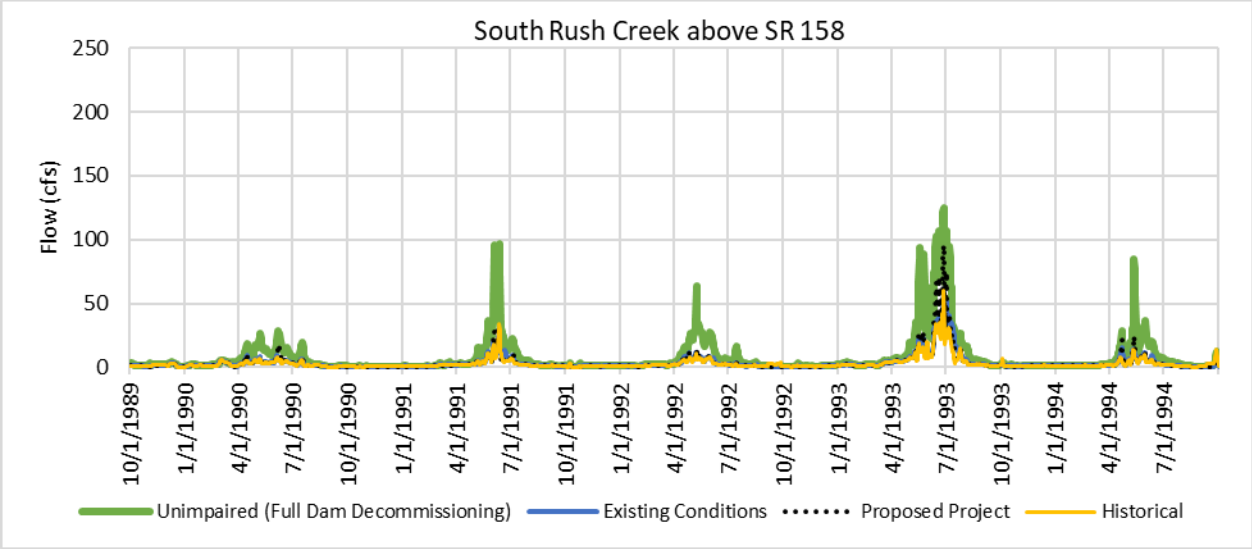


Figure AQ 1-S1. Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



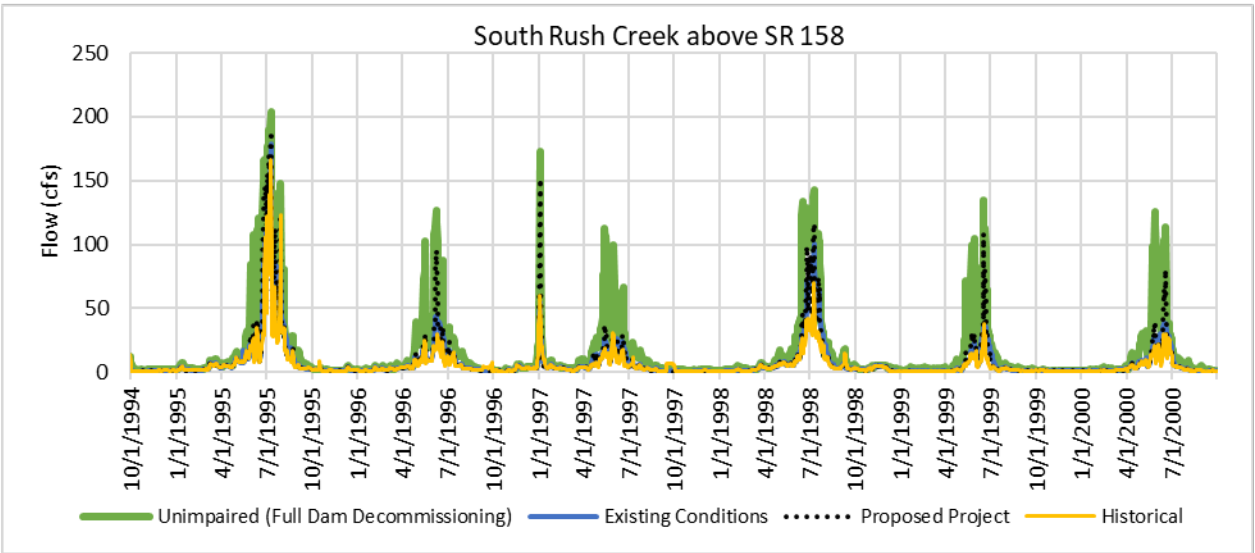
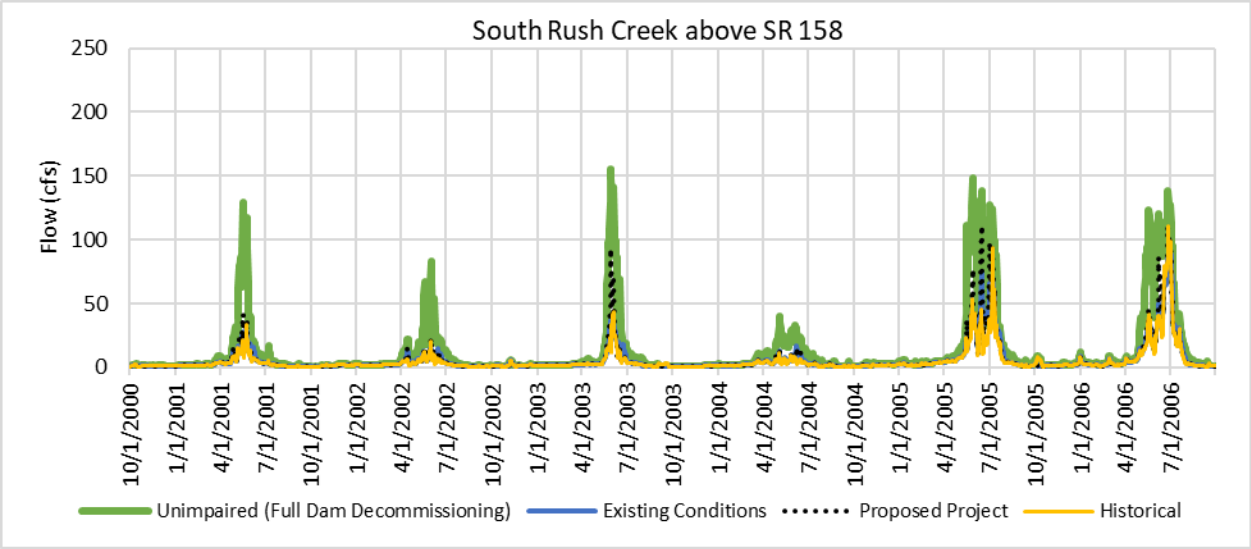


Figure AQ 1-S2. South Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



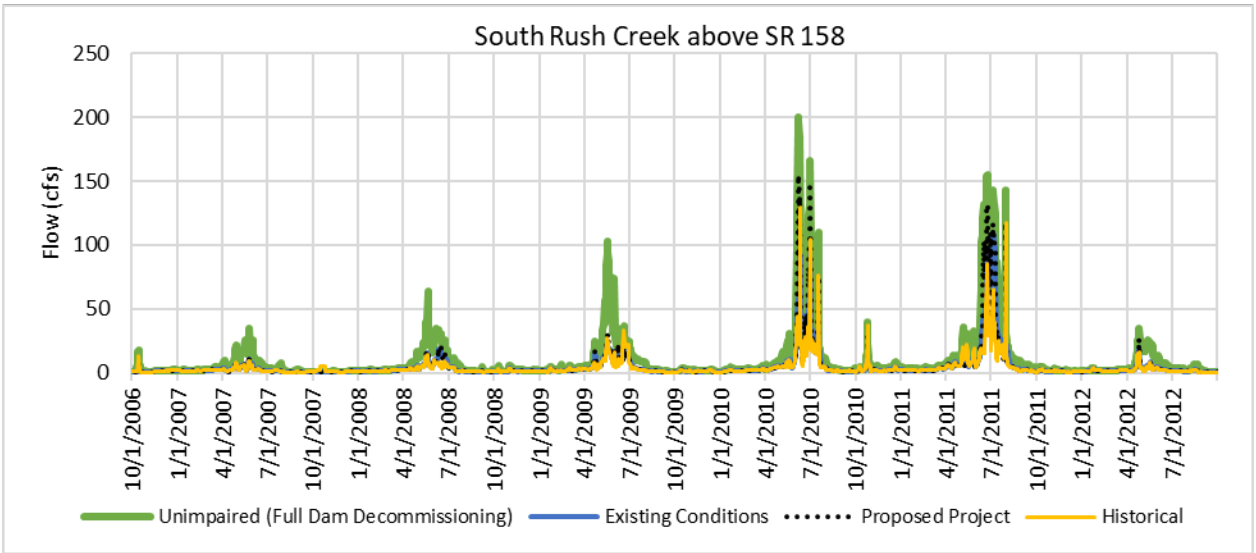
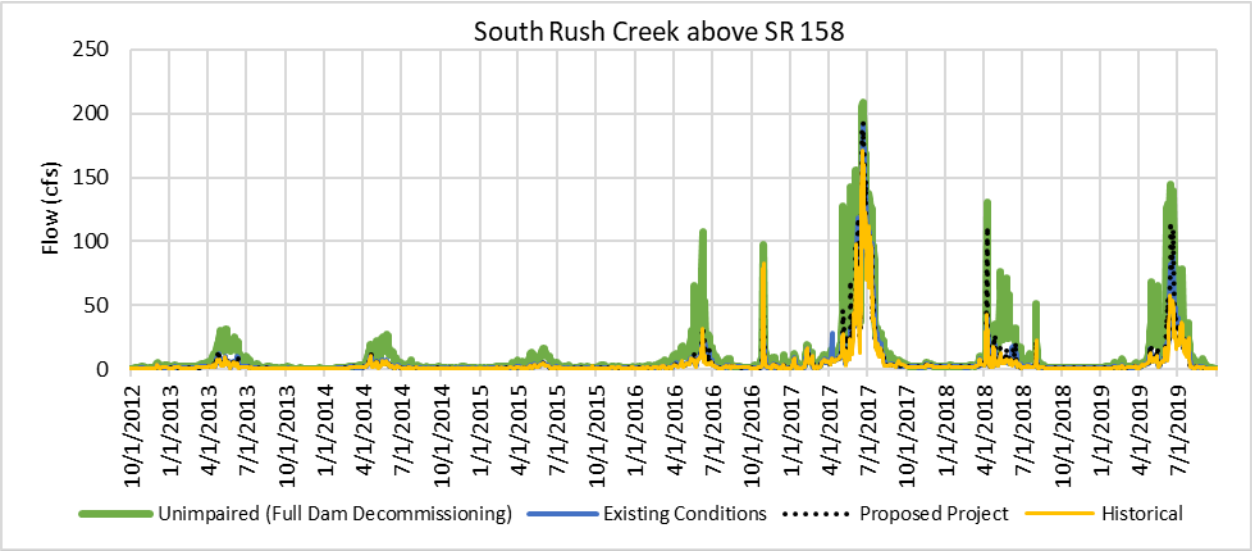


Figure AQ 1-S2. South Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



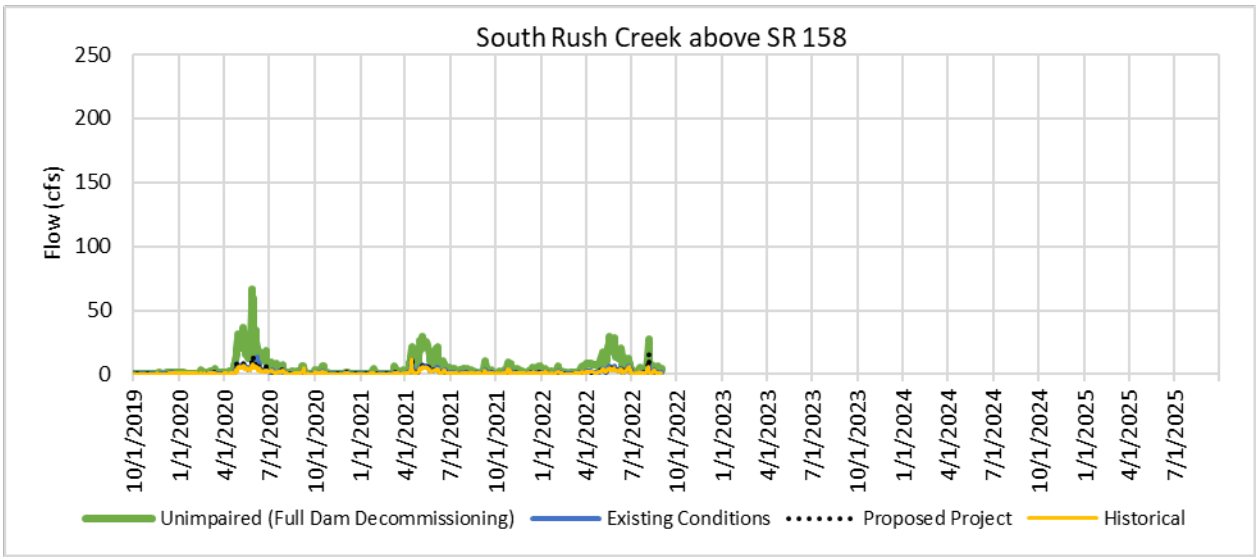
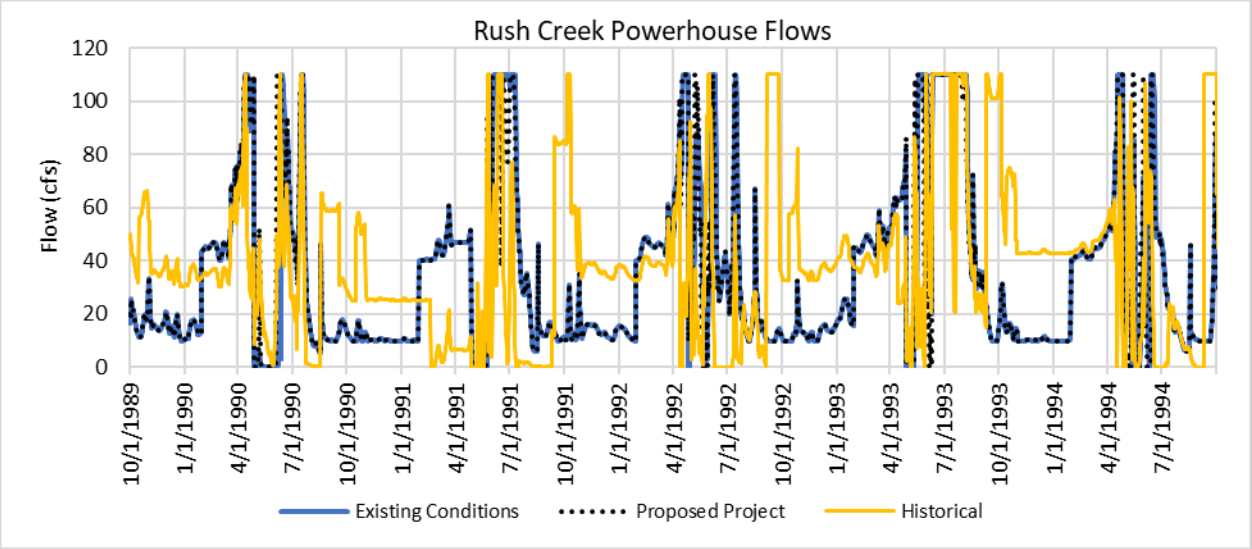


Figure AQ 1-S2. South Rush Creek flows for unimpaired, existing conditions, Proposed Project, and historical for Rush Creek at SR158.



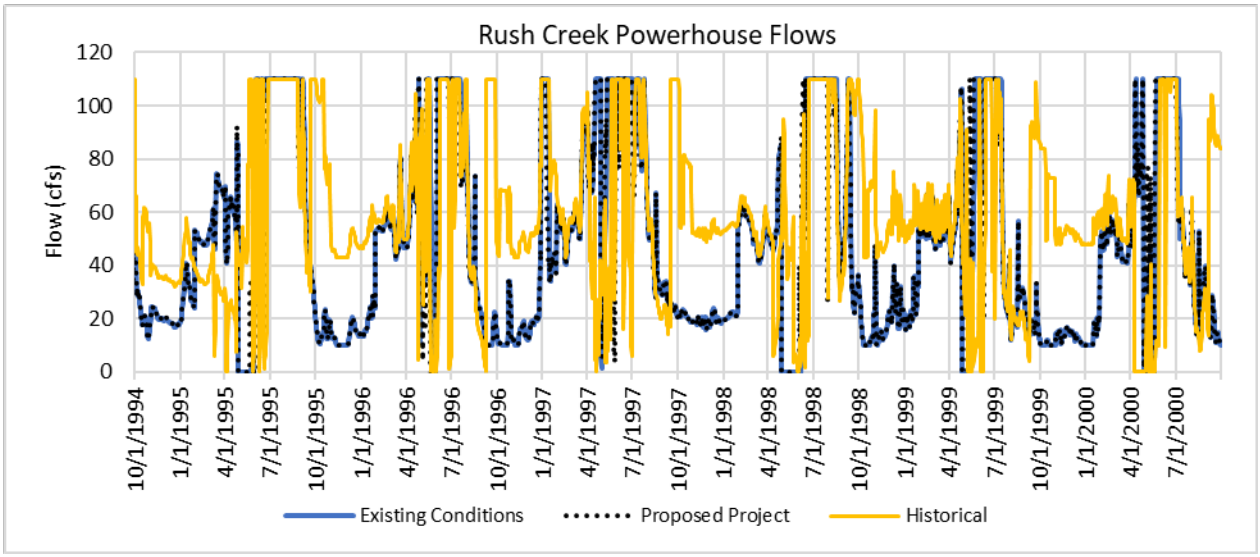
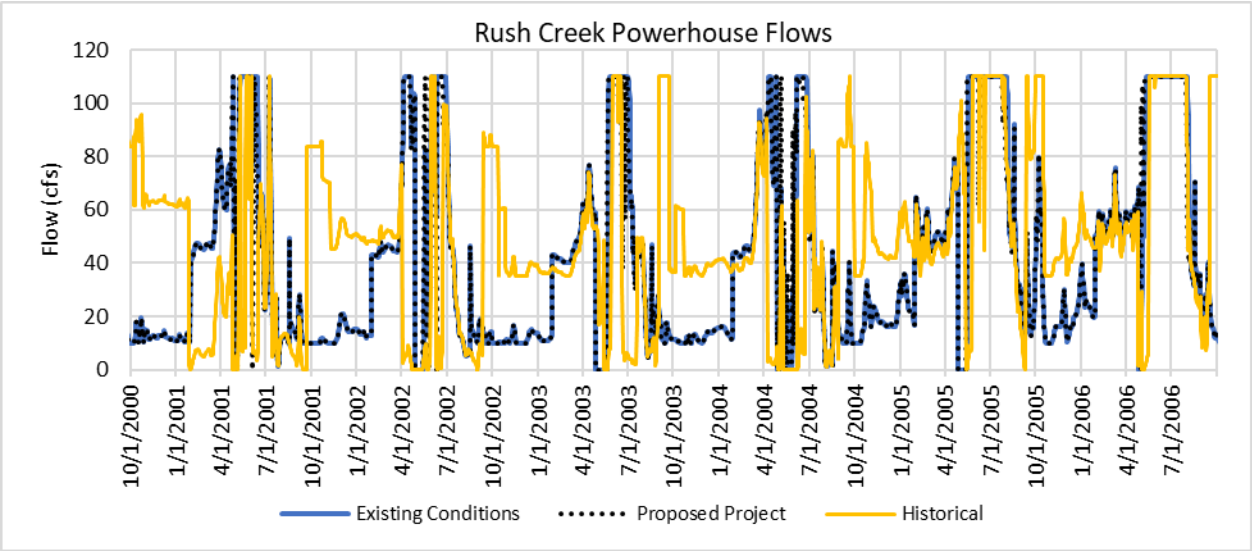


Figure AQ 1-S3. Rush Creek Powerhouse flows for existing conditions, Proposed Project, and historical for Rush Creek at SR158.



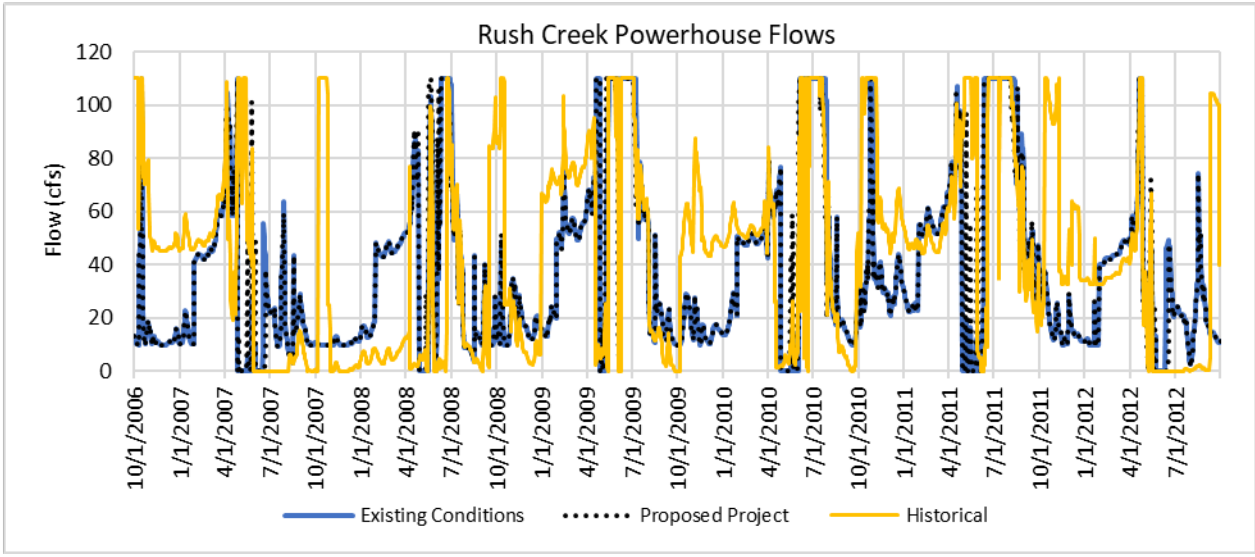
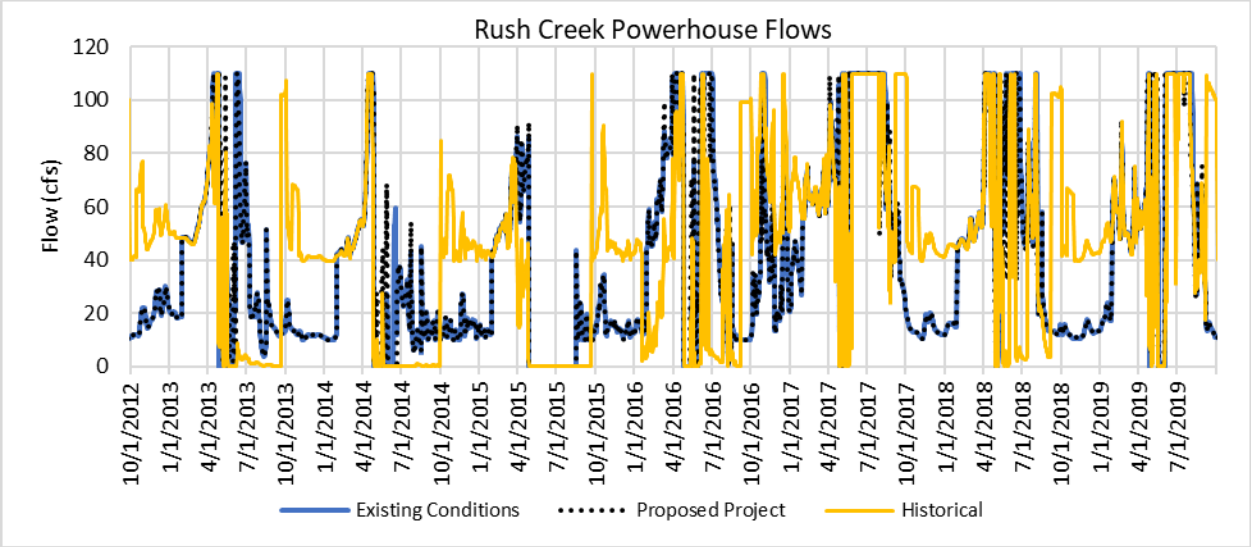


Figure AQ 1-S3. Rush Creek Powerhouse flows for existing conditions, Proposed Project, and historical for Rush Creek at SR158.



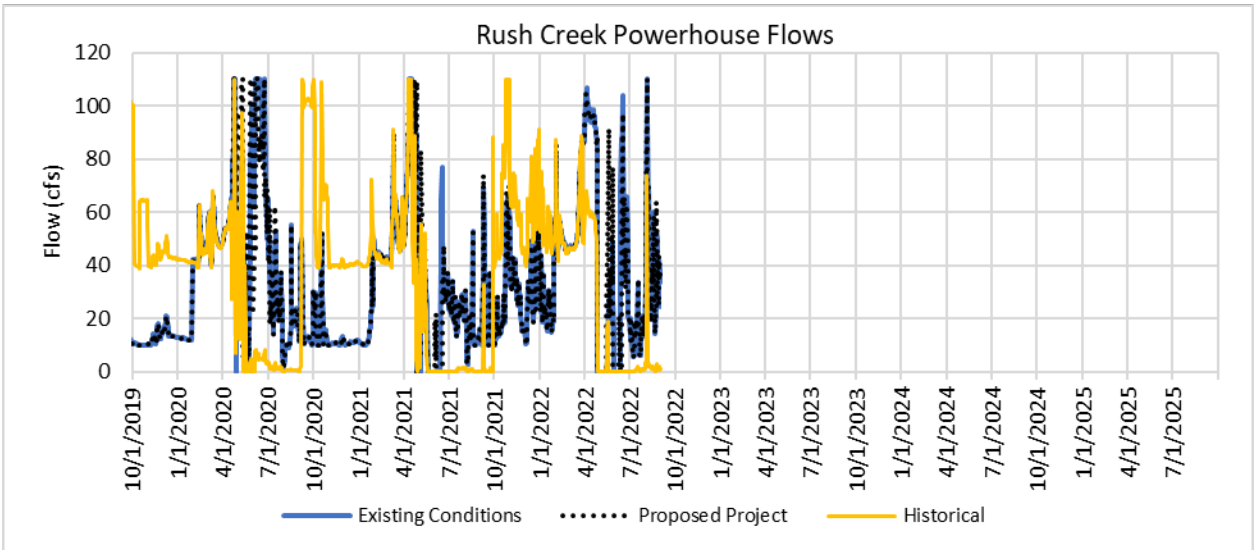


Figure AQ 1-S3. Rush Creek Powerhouse flows for existing conditions, Proposed Project, and historical for Rush Creek at SR158.

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APPENDIX T

Silver Lake Inlet Model Result

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INTRODUCTION

The following figures (AQ 1-T1 through AQ 1-T12) contain the bed change results for the three water year types; Wet (2017), Normal (2001), and Dry (2020) and four flow scenarios; unimpaired, historical, Proposed Project, and existing.

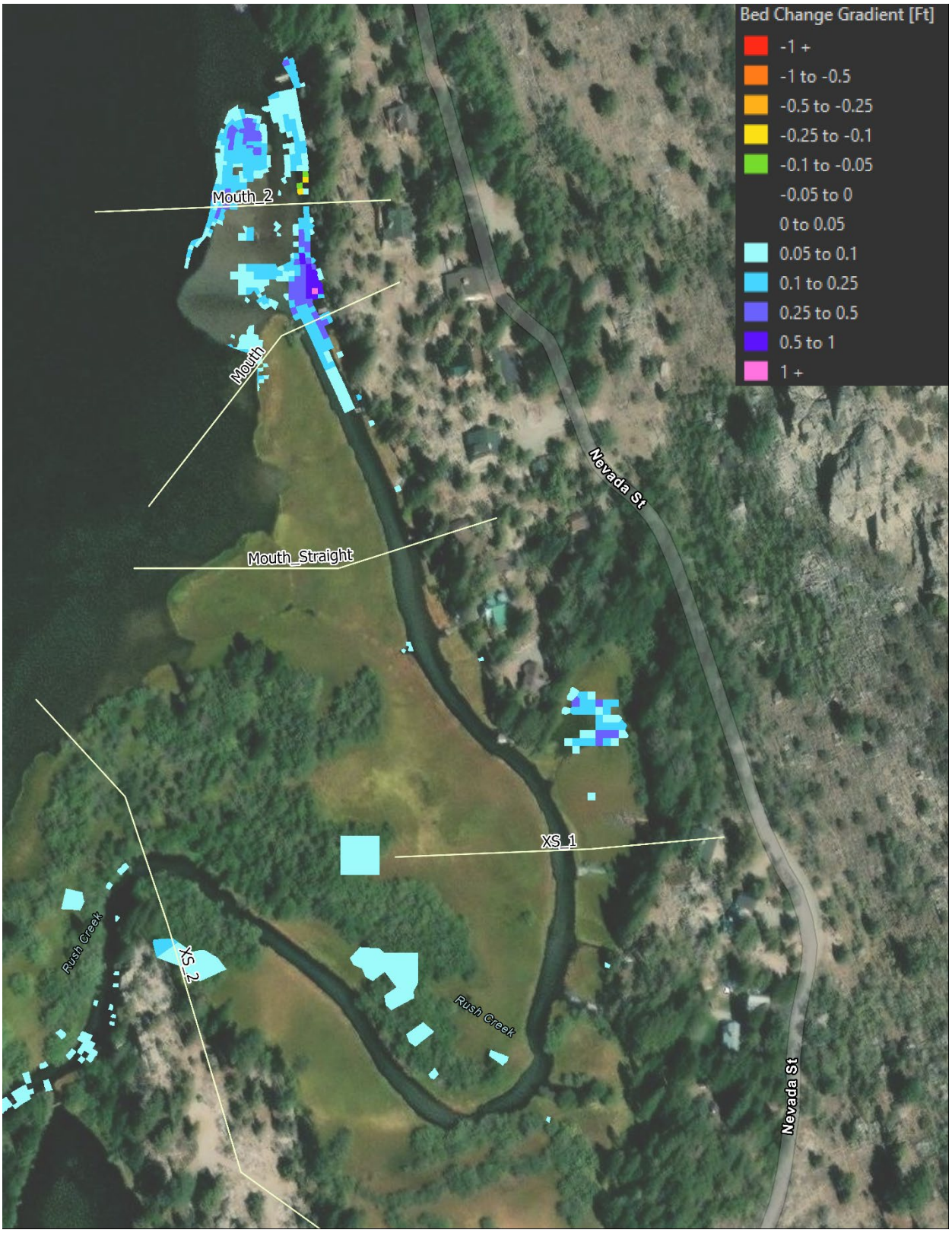

Figure AQ 1-T1. Wet water year (2017) bed change for unimpaired conditions scenario.

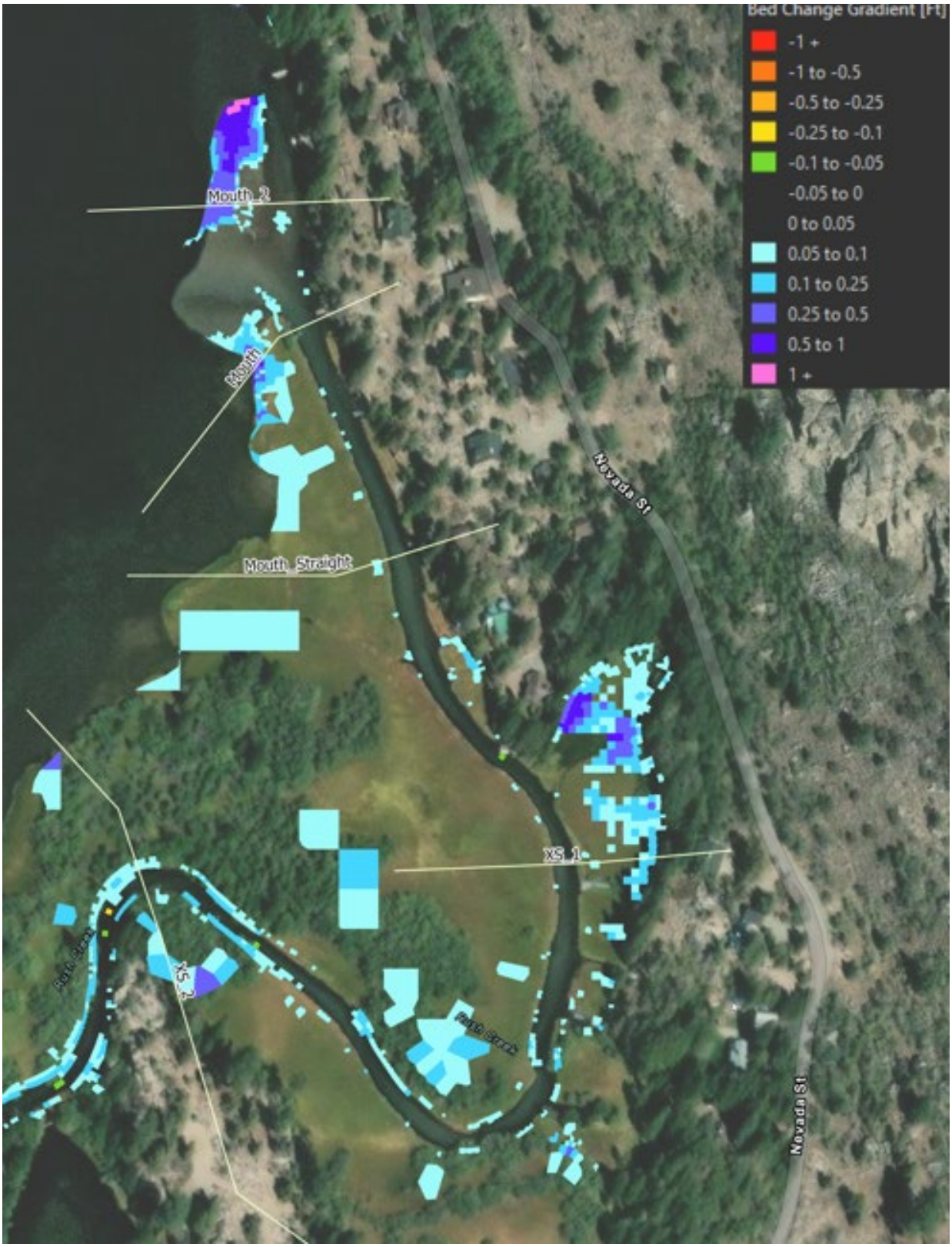

Figure AQ 1-T2. Wet water year (2017) bed change for historical scenario.

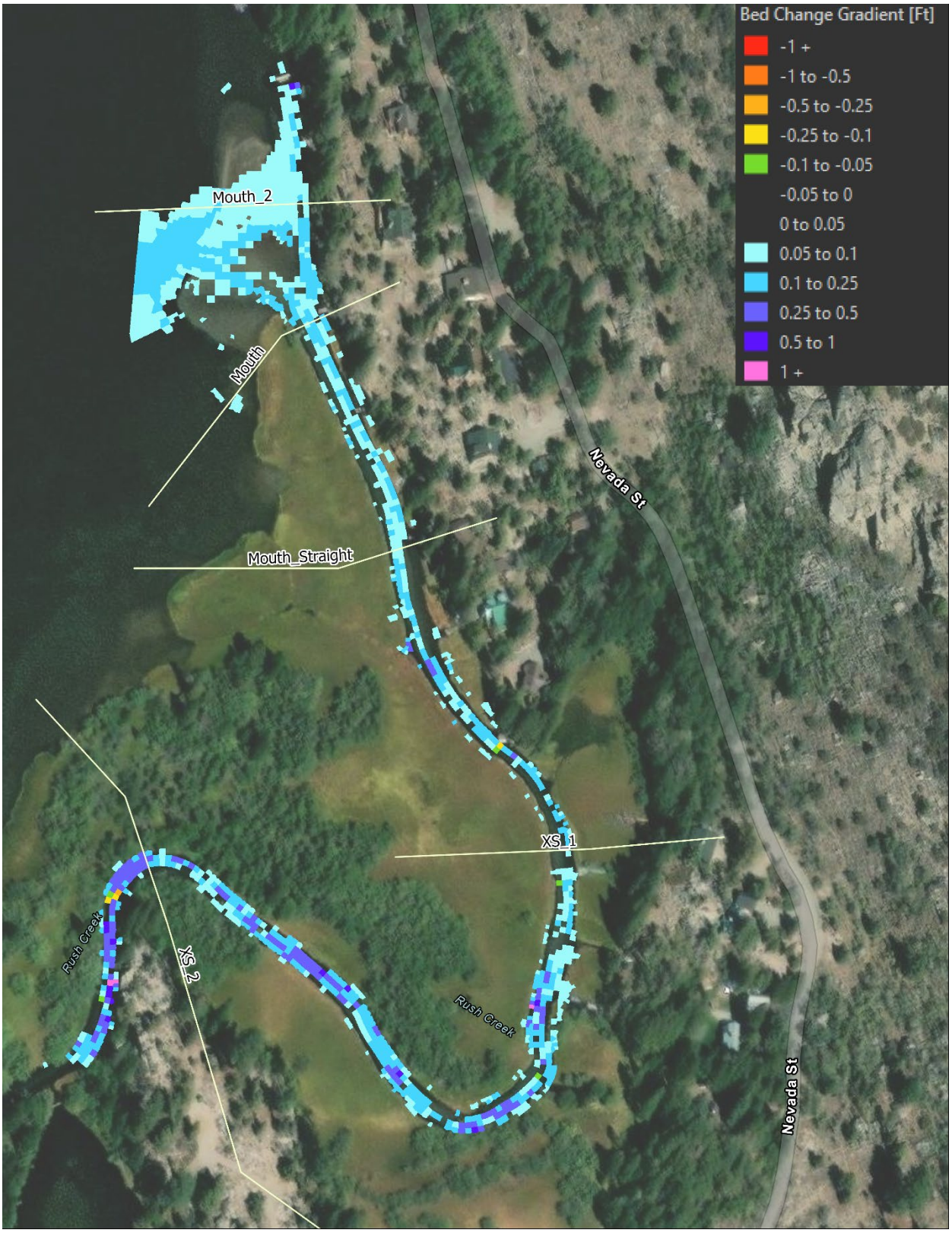

Figure AQ 1-T3. Wet water year (2017) bed change for Proposed Project scenario.

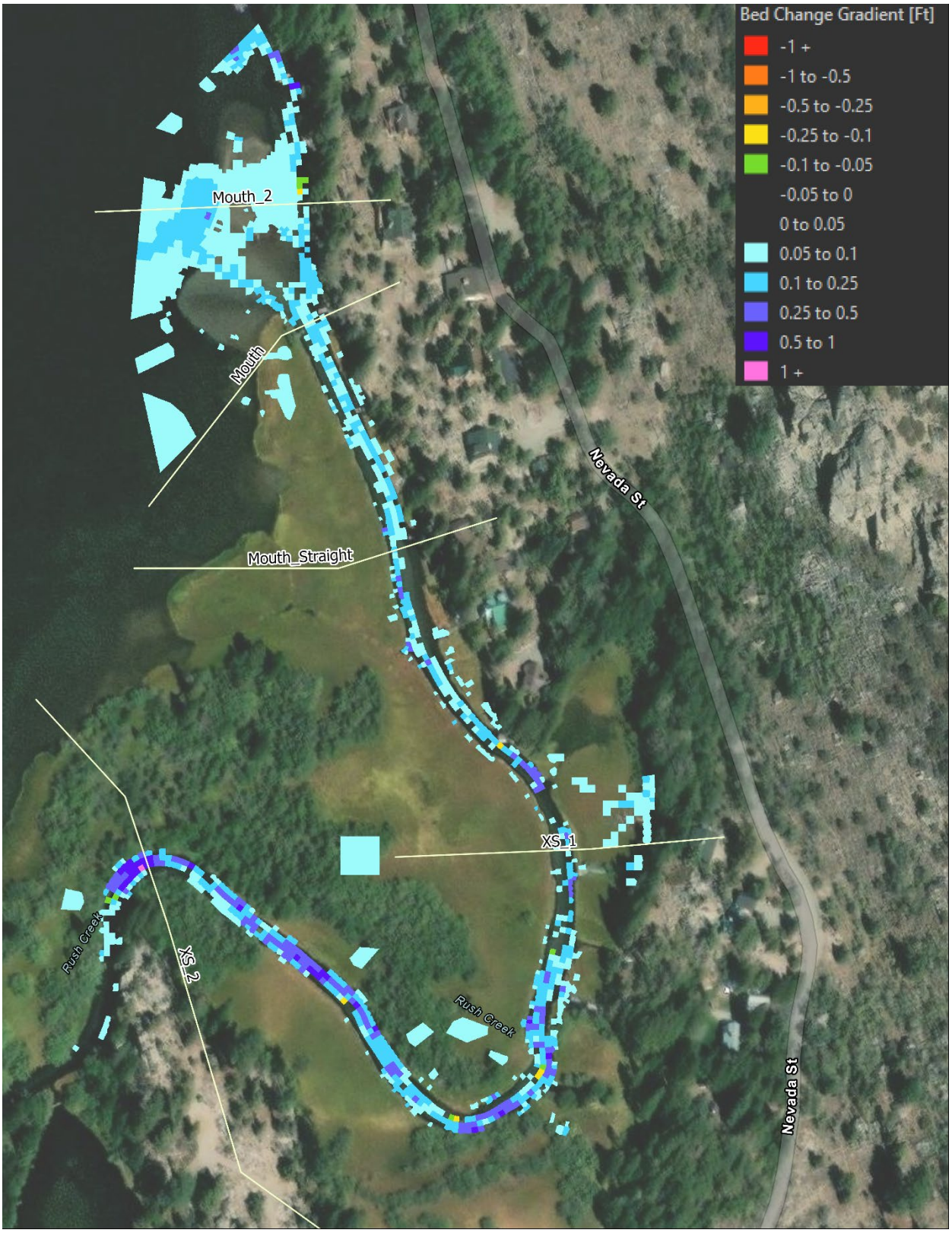

Figure AQ 1-T4. Wet water year (2017) bed change for existing conditions scenario.

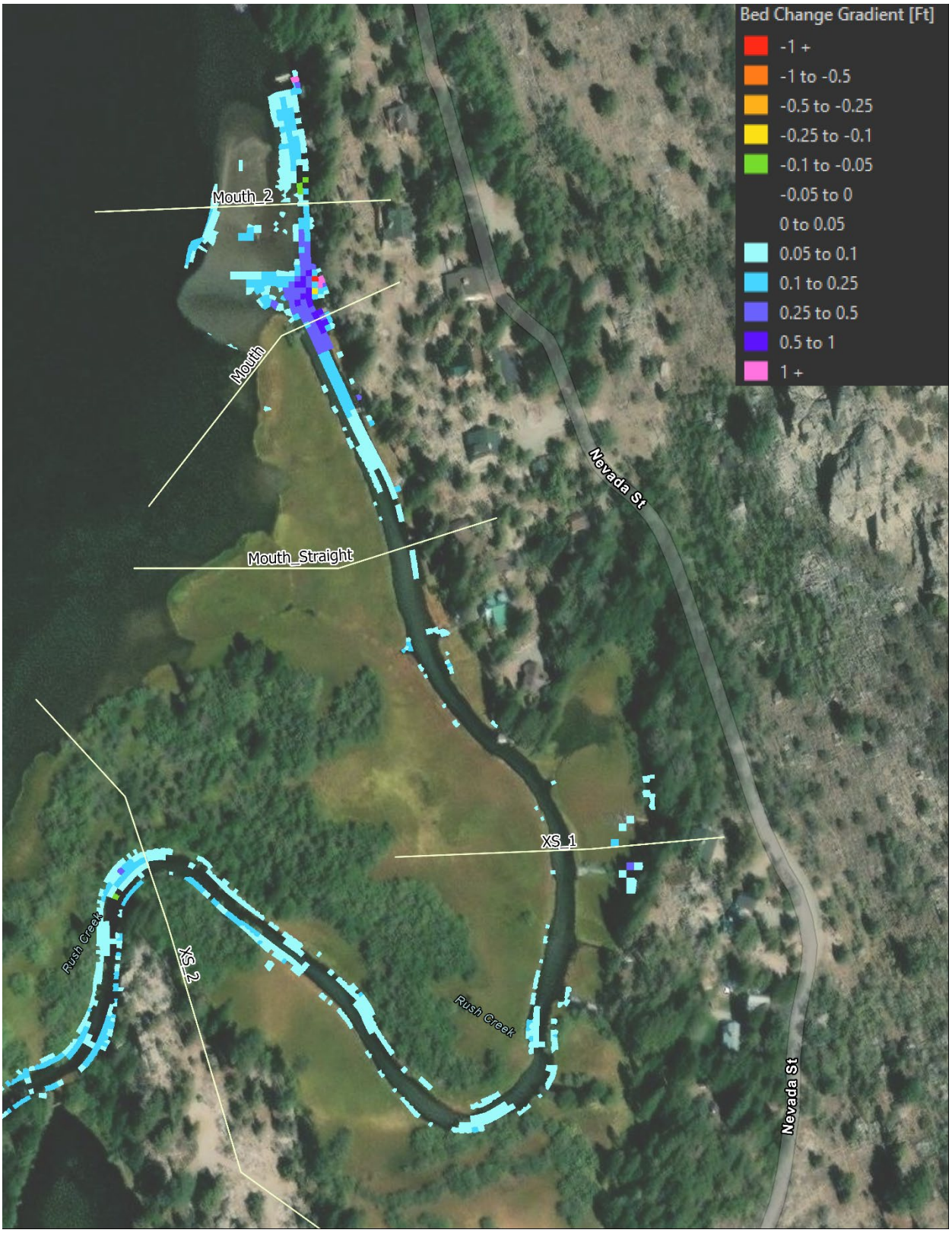

Figure AQ 1-T5. Normal water year (2001) bed change for unimpaired conditions scenario.

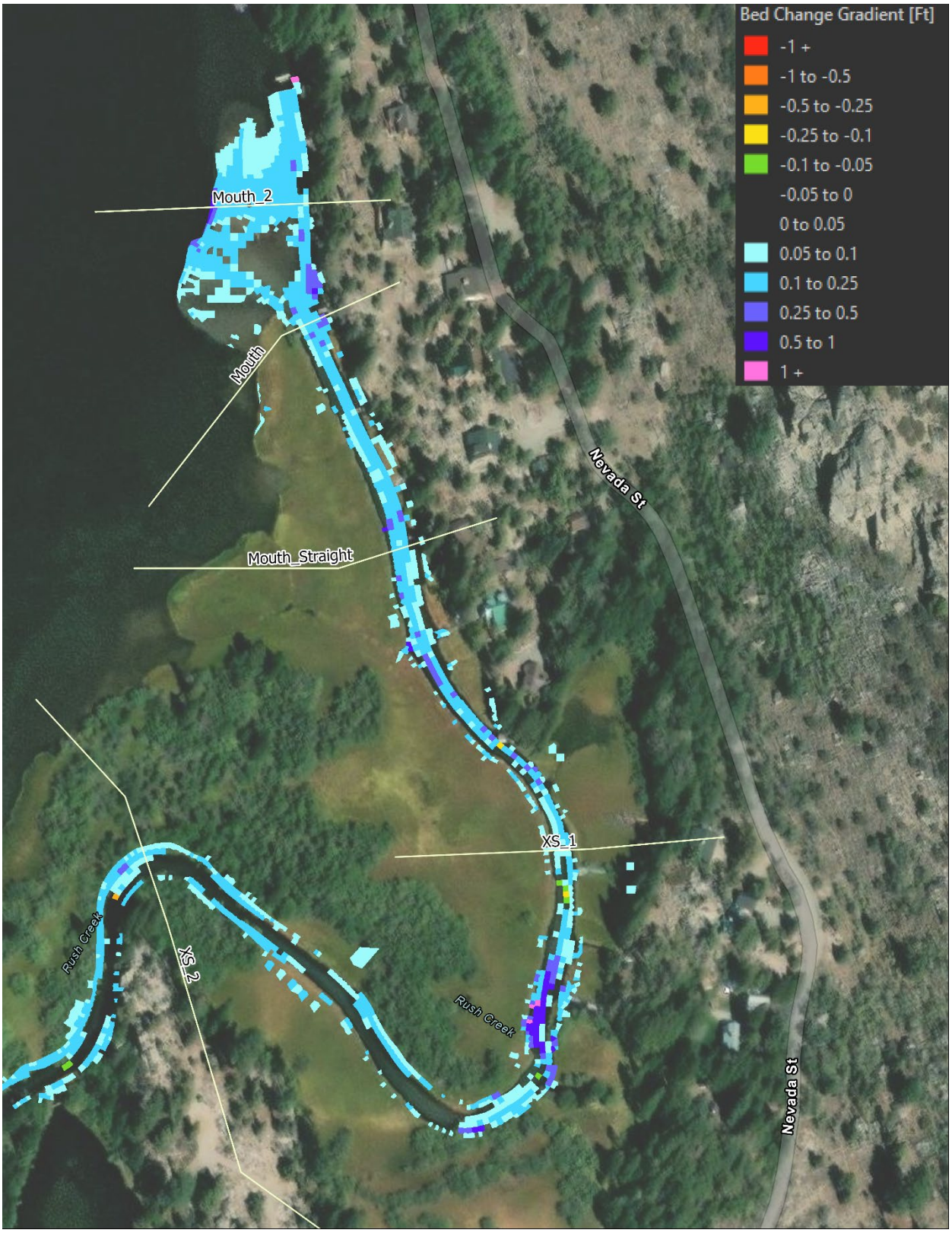

Figure AQ 1-T6. Normal water year (2001) bed change for historical scenario.

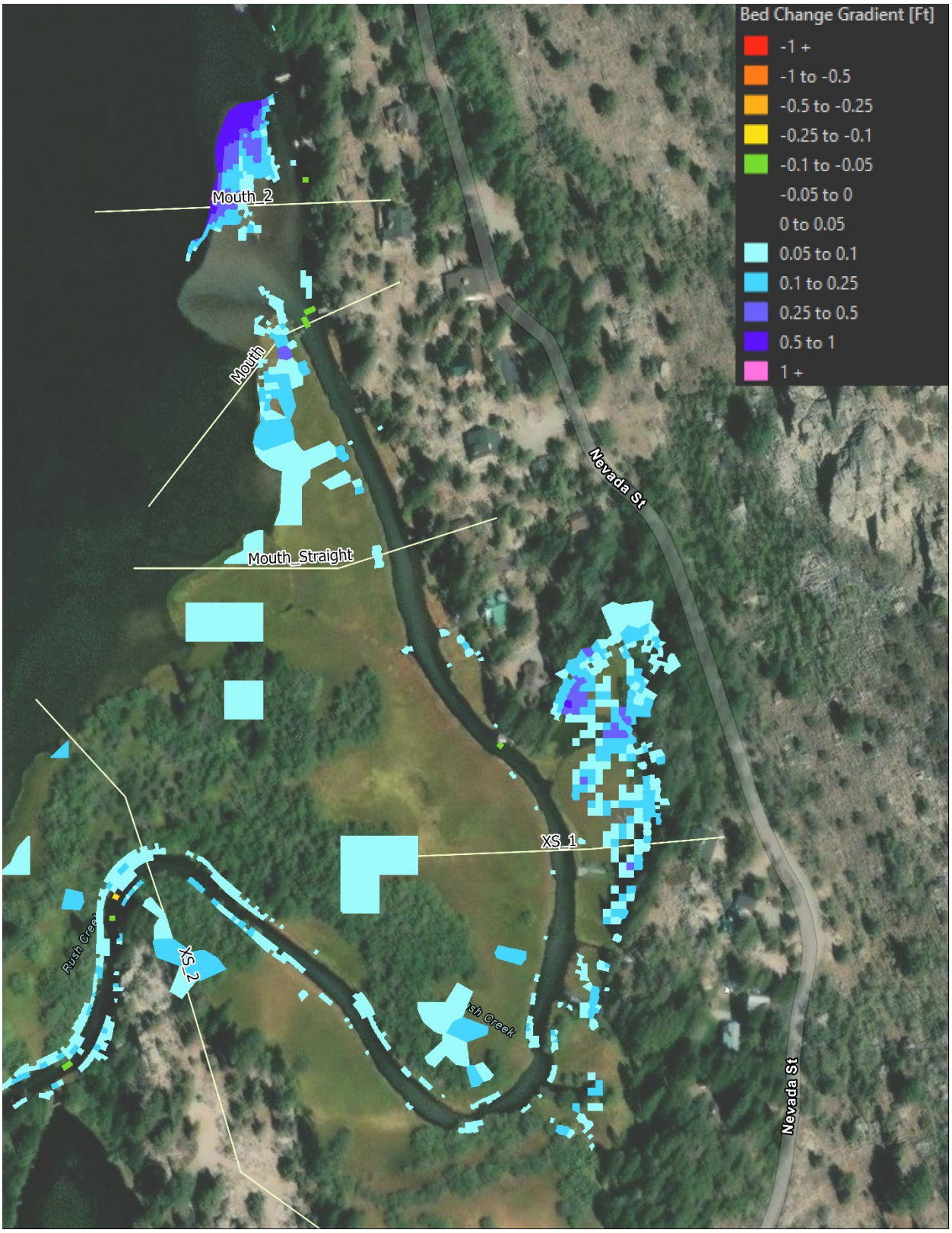

Figure AQ 1-T7. Normal water year (2001) bed change for Proposed Project scenario.

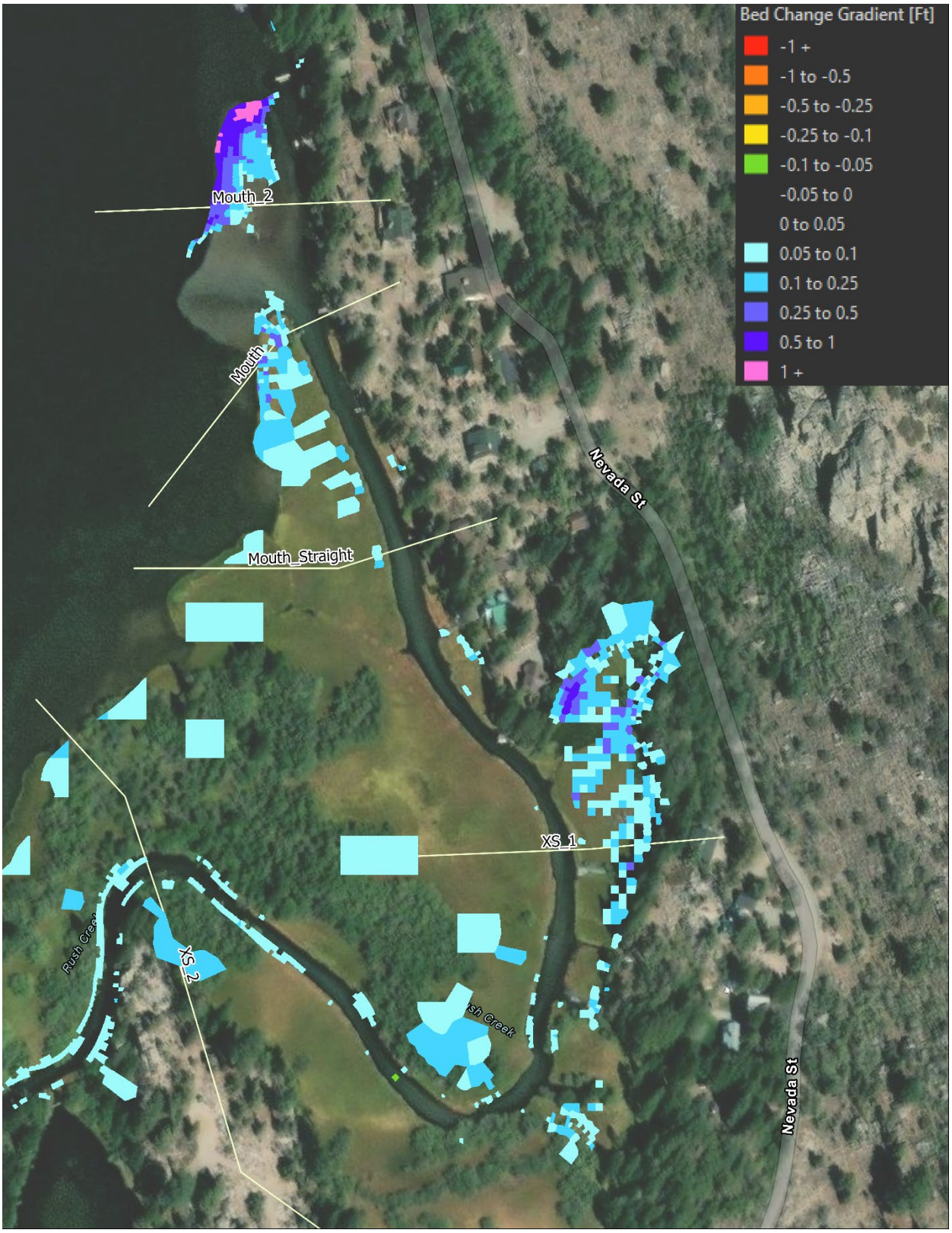

Figure AQ 1-T8. Normal water year (2001) bed change for existing conditions scenario.

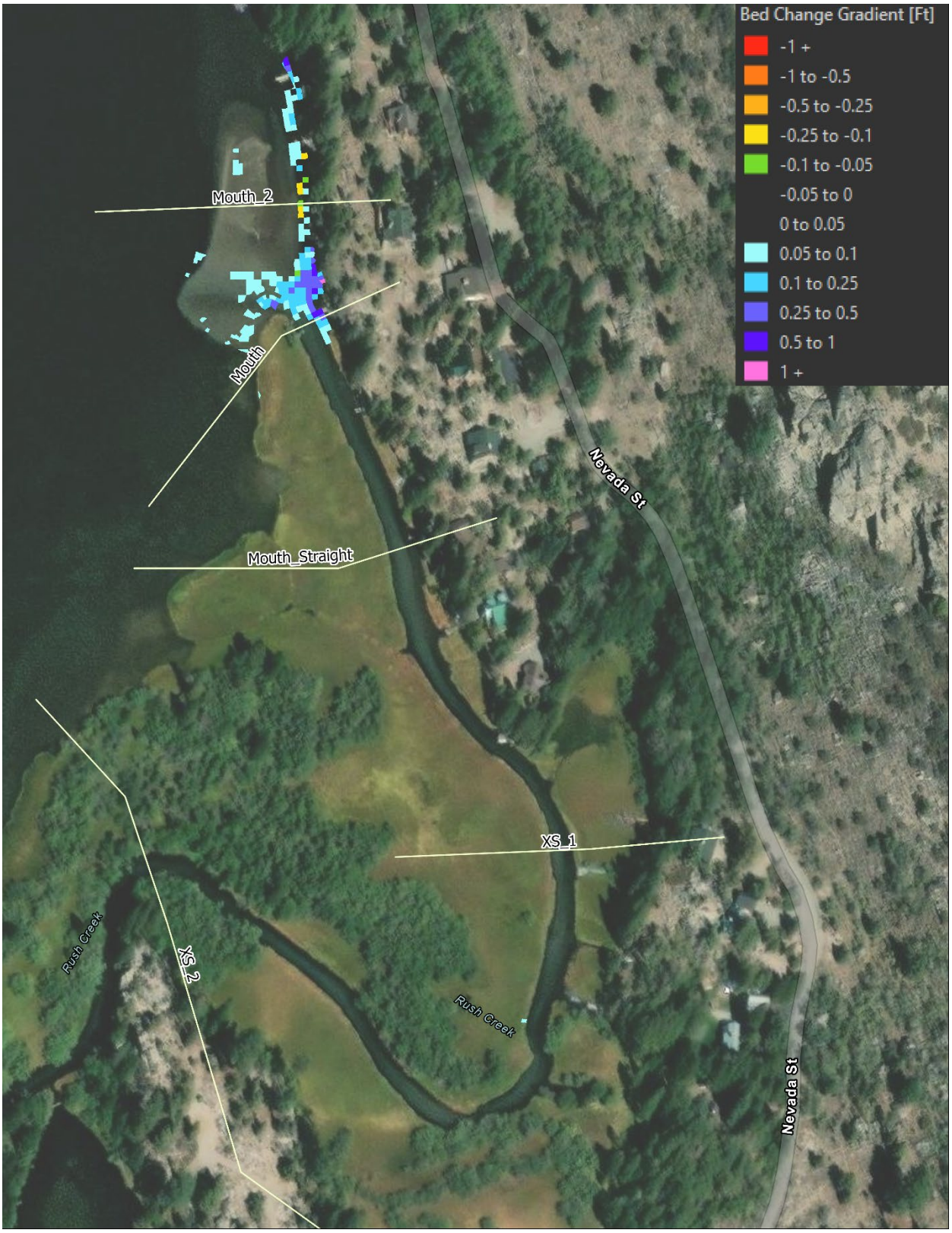

Figure AQ 1-T9. Dry water year (2020) bed change for unimpaired conditions scenario.

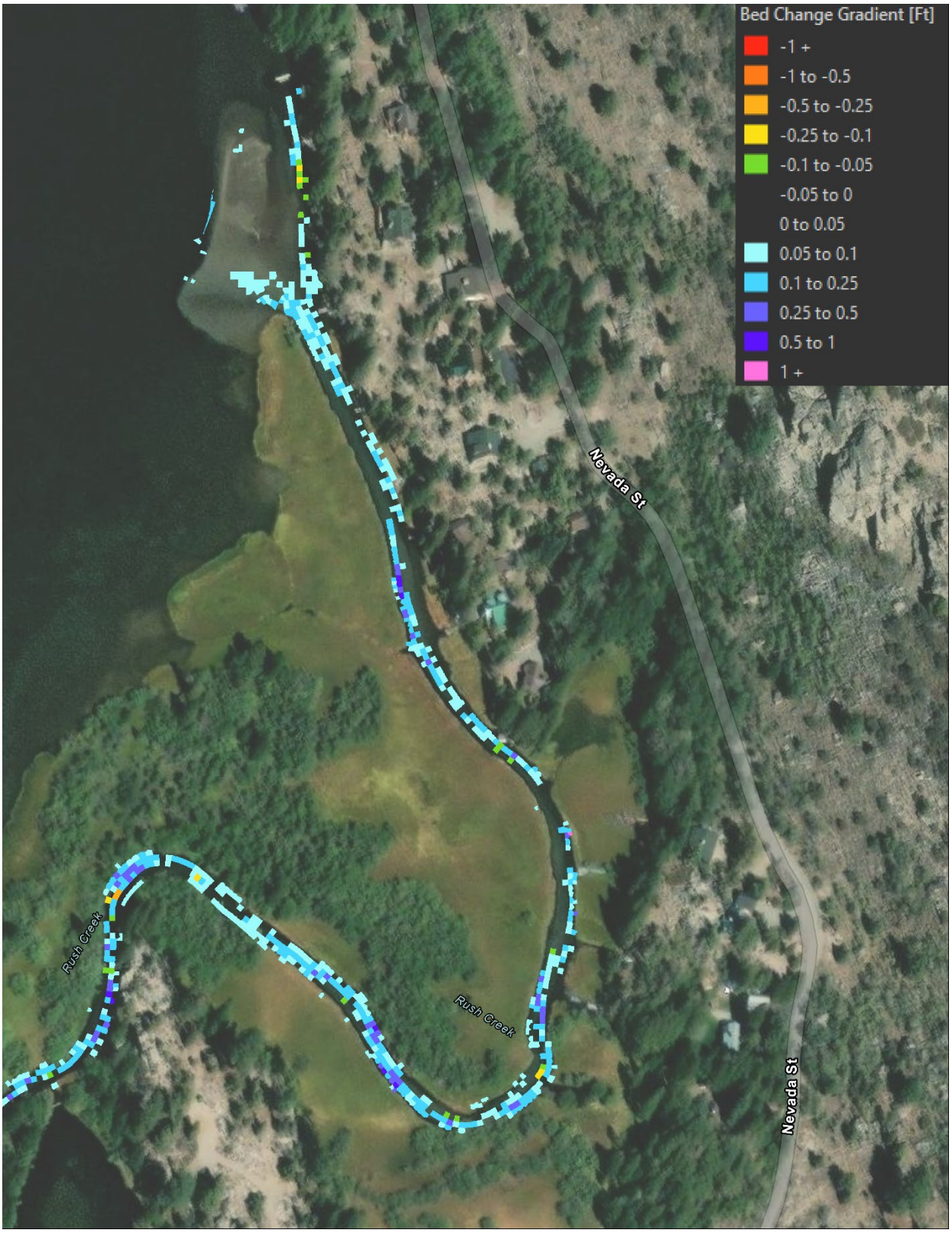

Figure AQ 1-T10. Dry water year (2020) bed change for historical scenario.

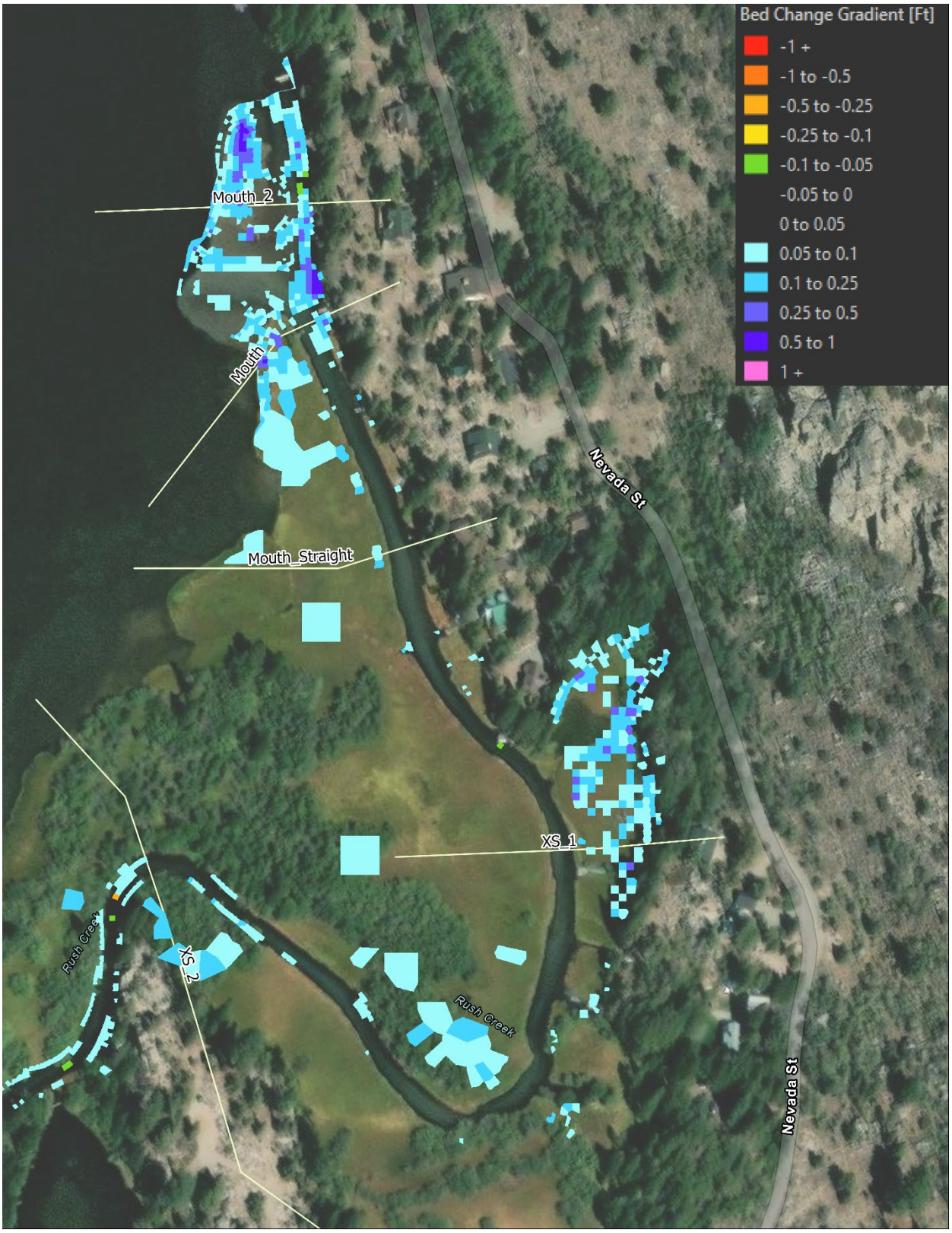

Figure AQ 1-T11. Dry water year (2020) bed change for Proposed Project scenario.

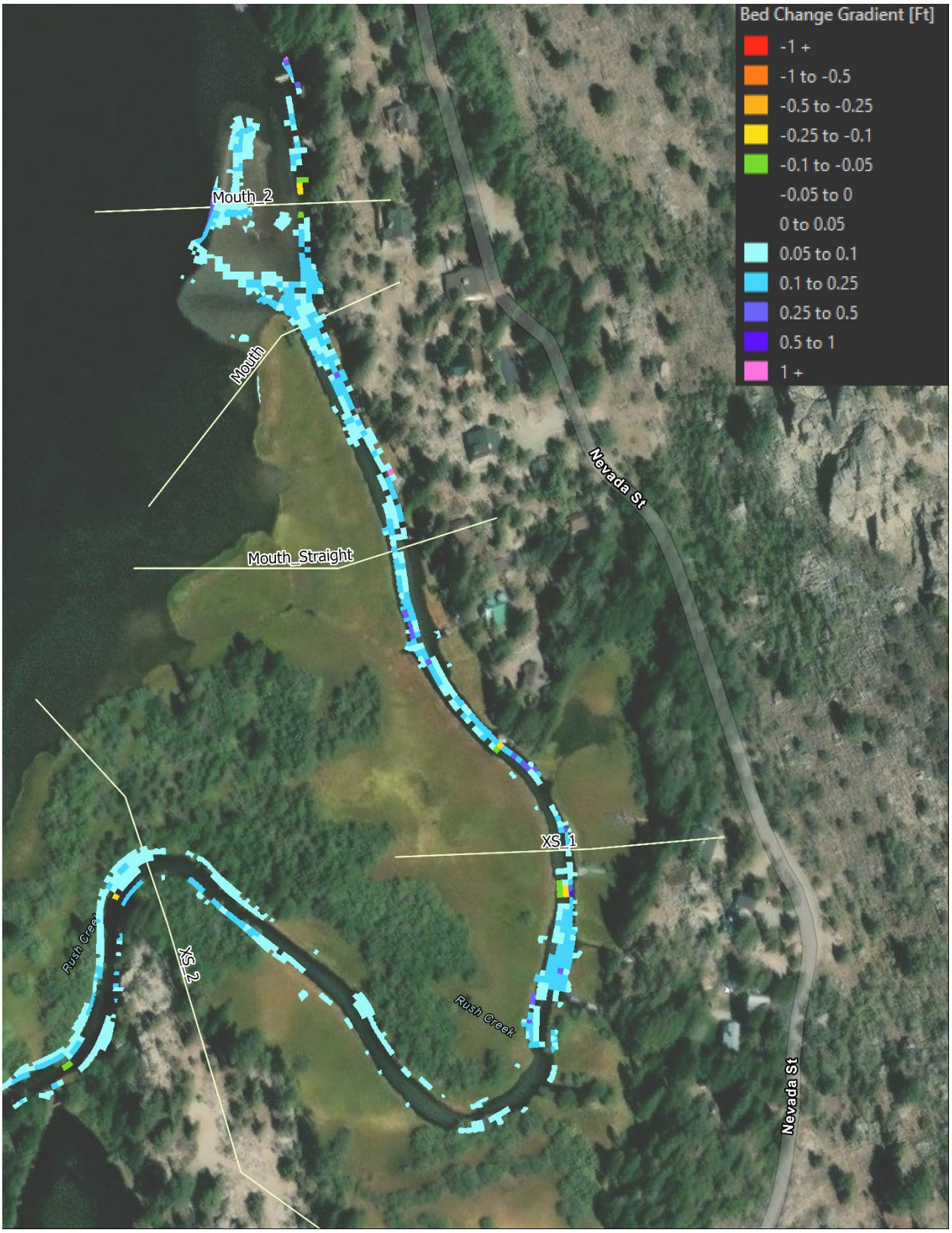

Figure AQ 1-T12. Dry water year (2020) bed change for existing conditions scenario.

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