APPENDIX A - GLOSSARY OF SELECTED TERMS

Abundance - In the context of salmon recovery, unless otherwise qualified, abundance refers to the number of adult fish returning to spawn.

Active channel – for a given location in a valley, the channel or channels that regularly transmit flow of water, sediment, and debris; inclusive of primary and some secondary channels.

Alluvial – of or associated with a stream or running water

Alluvium – general term for materials deposited by running water

Anadromous fish: Species that are hatched in freshwater, migrate to and mature in saltwater, and return to freshwater to spawn.

Bar – accumulation of alluvial sediment formed in the channel, along the banks, or at the mouth of a stream where a decrease in velocity during transport conditions induces deposition.

Capacity (sediment) - the ability of a current to transport a quantity of sediment, measured as the amount (e.g. mass) at a given point per unit time.

Characteristic form time – the time over which the state is expected to persist

Clast – an individual constituent, grain, or fragment of a sediment or rock produced by the mechanical or chemical disintegration of a larger rock mass. For the purposes of this report, the term is used generally to indicate a particle larger than sand (>2mm).

Colluvial – of or pertaining to colluvium.

Colluvium – general term applied to any loose, heterogeneous, and incoherent mass of soil material and/or rock fragments deposited by non-channelized gravitational movement, usually collecting at the base of slopes or hillsides.

Competence (sediment) – the ability of a current to transport sediment of a particular size, measured as the largest particle transported.

Confinement – the degree to which valley margins encroach horizontally on active channel margins.

Cross-section (XS) - diagram or drawing showing configuration or slope (e.g. ground or water surface) along a given line as it would appear if it were intersected by a vertical plane oriented cross-wise to the long axis of a feature (e.g. oriented from one streambank to the other).

Distinct population segment (DPS) - A listable entity under the ESA that meets tests of discreteness and significance according to USFWS and NMFS policy. A population is considered distinct (and hence a “species” for purposes of conservation under the ESA) if it is discrete from and significant to the remainder of its species based on factors such as physical, behavioral, or genetic characteristics, it occupies an unusual or unique ecological setting, or its loss would represent a significant gap in the species’ range.

Debris flow – sediment-water mixture where flow behavior is controlled by entrained sediment, typically exceeding 50% by volume and frequently includes some clasts in suspension.

Diversity - All the genetic and phenotypic (life history, behavioral, and morphological) variation within a population. In the context of salmon recovery, variations could include anadromy vs. lifelong residence in freshwater, fecundity, run timing, spawn timing, juvenile behavior, age at smolting, age at maturity, egg size, developmental rate, ocean distribution patterns, male and female spawning behavior, physiology, molecular genetic characteristics, etc.

Entrenchment – the degree to which channel(s) are countersunk into valley fill.

Equant – with regard to watershed shape, where the width and length are approximately the same (definitely within a factor of 1.5).

Evolutionarily significant unit (ESU) - a group of Pacific salmon or steelhead trout that is (1) substantially reproductively isolated from other conspecific units and (2) represents an important component of the evolutionary legacy of the species.

Fines – general term to describe a particles <2mm in size; inclusive of sands, silts, and clays.

Flood – a streamflow event of sufficient magnitude to exceed capacity of the active channel(s) and inundates overbank areas; unless otherwise specified, assumed to be water flow.

Geomorphic – of or pertaining processes that affect to the shape of the earth's surface.

Hydraulics – the science of fluids in motion. For the purposes of this report, movement or action caused by water.

Hydrology – the science of water properties, circulation, and distribution in space and time from delivery to a landscape from the atmosphere until it's return to the atmosphere or delivery to the ocean.

Hydromodification – any human action or result that alters natural hydraulics and/or hydrology for a site or watershed. For the mapping in this report, its use is limited to locations where earth-moving has occurred that otherwise alters or obstructs surface or groundwater flow patterns (and does not include rip-rapped banks, etc)

Hydrophyte – plant adapted to habitats of water or very wet conditions.

Hyperconcentrated flow – intermediate condition between water flow and debris flow where suspended sediment may compose 5 to 60% of the mixture by volume and is typically composed of particles sand-sized or smaller.

Induration – the hardening of a soil horizon by heat, pressure, and/or chemical action to form a hardpan; results in layer that is more resistant to erosion and with lower permeability than would otherwise be expected of a layer with similar particle composition.

Limiting factor - physical, biological, or chemical features (e.g., inadequate spawning habitat, high water temperature, insufficient prey resources) experienced by the fish that result in reductions in viable salmonid population (VSP) parameters (abundance, productivity, spatial structure, and diversity). Key limiting factors are those with the greatest impacts on a population's ability to reach a desired status.

Longitudinal Profile - diagram or drawing that shows configuration or slope of a feature (e.g. ground or water surface) along a given line as it would appear if it were intersected by a vertical plane oriented parallel to the long axis of a feature (e.g. oriented upstream to downstream).

Major population group (MPG) - a group of salmonid populations that are geographically and genetically cohesive. The MPG is a level of organization between demographically independent populations and the ESU or DPS.

Natural-origin fish - fish that were spawned and reared in the wild, regardless of parental origin.

Planform – the shape of a feature in two dimensions (horizontally), as viewed from above.

Primary channel – for a given location in a valley, the one stream channel that most frequently transmits the greatest flow; often, but not necessarily, the last channel to dry-up.

Productivity - the average number of surviving offspring per parent. Productivity is used as an indicator of a population's ability to sustain itself or its ability to rebound from low numbers. The terms "population growth rate" and "population productivity" are interchangeable when referring to measures of population production over an entire life cycle. Can be expressed as the number of recruits (adults) per spawner or the number of smolts per spawner.

Reach – section of river along which boundary conditions are sufficiently uniform such that the river maintains a near consistent structure.

Reaction time – the time taken for a system to react to a change in conditions.

Relaxation time – the time taken for the system to attain a characteristic (equilibrium) state

Salmonid - fish of the family *Salmonidae*, including salmon, trout, chars, grayling, and whitefish. In general usage, the term usually refers to salmon, trout, and chars.

Secondary channel - for a given location in a valley, any channel that is not the primary channel; may be "active" or not.

Segment – alternating patterns of reach-scale river behavior.

Smolt - a juvenile salmonid that is undergoing physiological and behavioral changes to adapt from freshwater to saltwater as it migrates toward the ocean.

Spatial structure - characteristics of a fish population's geographic distribution. Current spatial structure depends upon the presence of fish, not merely the potential for fish to occupy an area.

Thalweg – the line connecting the lowest or deepest points along a stream bed or valley..

Valley fill – unconsolidated sediments that occupy the valley floor and lie on top of bedrock; inclusive of alluvium and colluvium.

Viability criteria - criteria defined by NMFS-appointed Technical Recovery Teams to describe a viable salmonid population, based on the biological parameters of abundance, productivity, spatial structure, and diversity. These criteria are used as technical input into the recovery planning process and provide a technical foundation for development of biological delisting criteria.

Viable salmonid population (VSP) - an independent population of Pacific salmon or steelhead trout that has a negligible risk of extinction over a 100-year time frame.

VSP parameters - abundance, productivity, spatial structure, and diversity. These describe characteristics of salmonid populations that are useful in evaluating population viability. See NOAA Technical Memorandum NMFS-NWFSC-42, *Viable salmonid populations and the recovery of evolutionarily significant units* (McElhany et al. 2000).

Water flow – condition where the properties of water dictate flow behavior; generally composed of less than 5-10% suspended-sediment by volume. For the purposes of this report, "flow" and "water flow" are used interchangeably.

Glossary References:

Brierly and Fryirs (2005), Frissell et al. (1986), Kellerhals et al. (1976), Knighton (1998), Neuendorf et al. (2005), NMFS (2009), Osterkamp (2008), Pierson (2005)

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APPENDIX B - MAPS
Relative Elevation, Baseflow Habitat, and Stream Power

NOTE

Stream power calculated using indirect USGS regional equations; see body of report for discussion of under-prediction of flow magnitude by regional equations. Presented here to illustrate relative contrast along profile, not as an absolute indicator.

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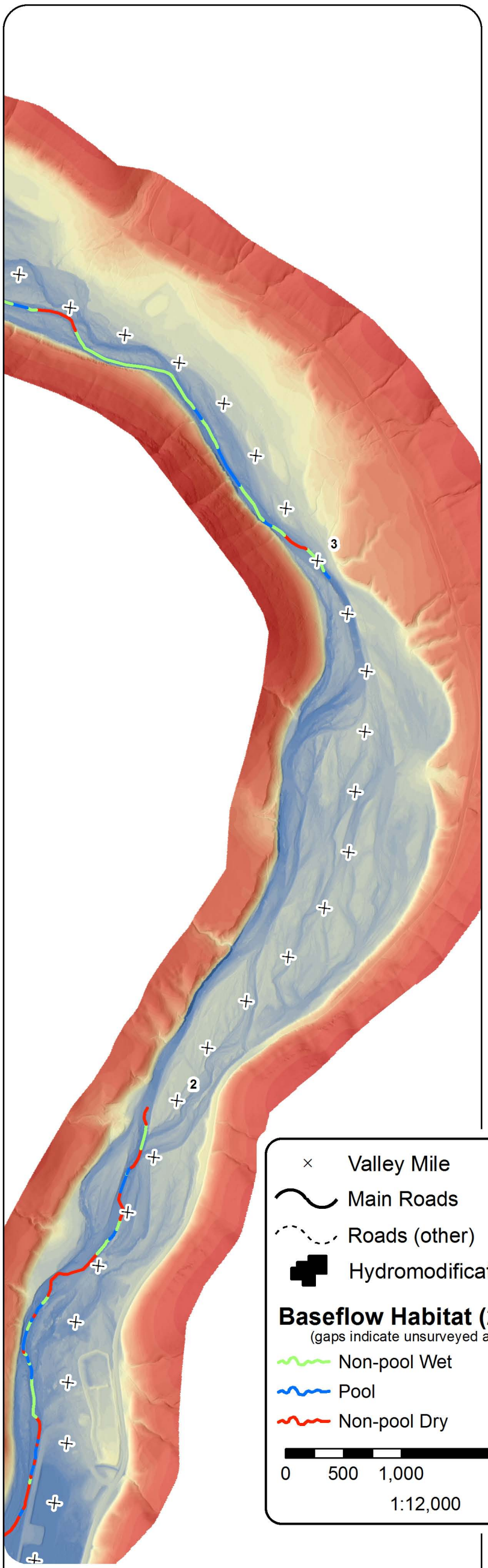
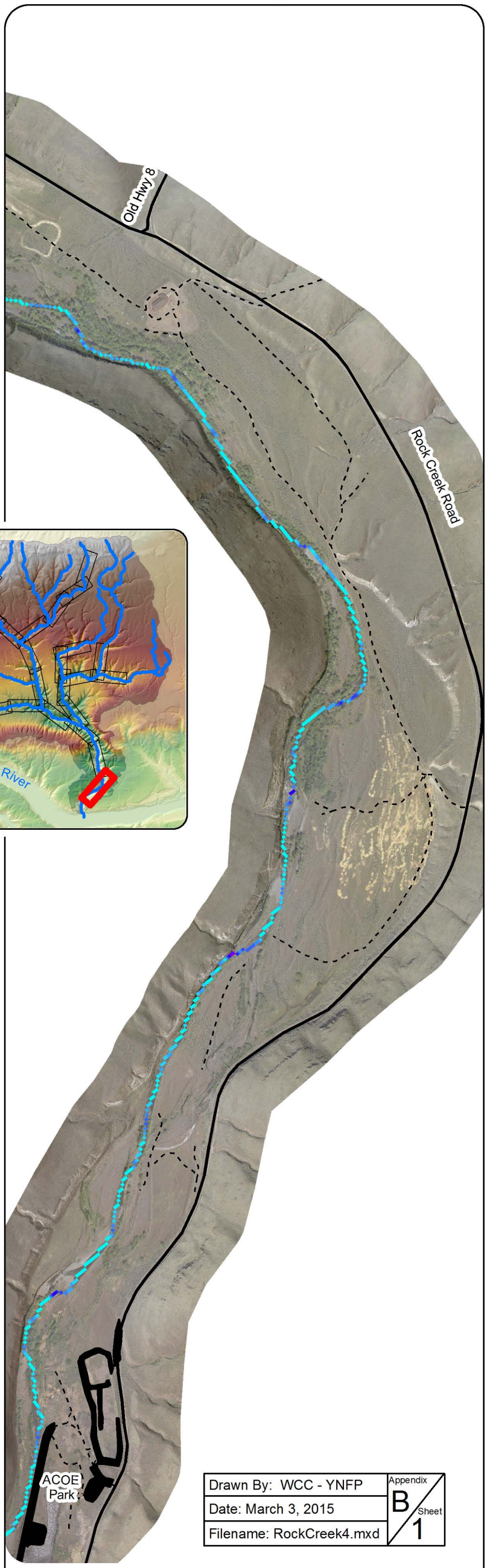
Rock Creek: Valley Miles 1.1 to 3.7

Relative DEM & Baseflow Habitat



Q10 Stream Power* & Hydromodifications



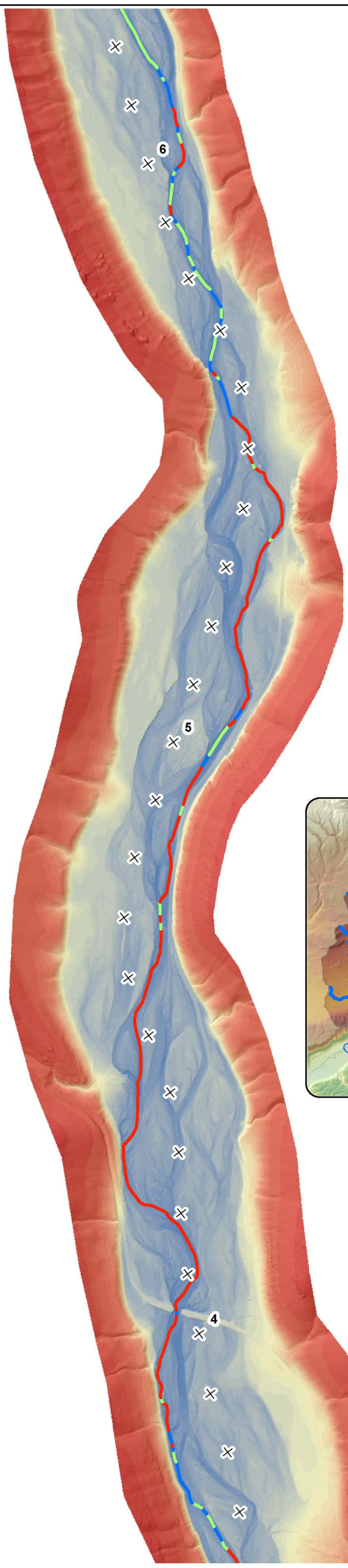
Drawn By: WCC - YNFP	Appendix B / Sheet 1
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 3.6 to 6.3

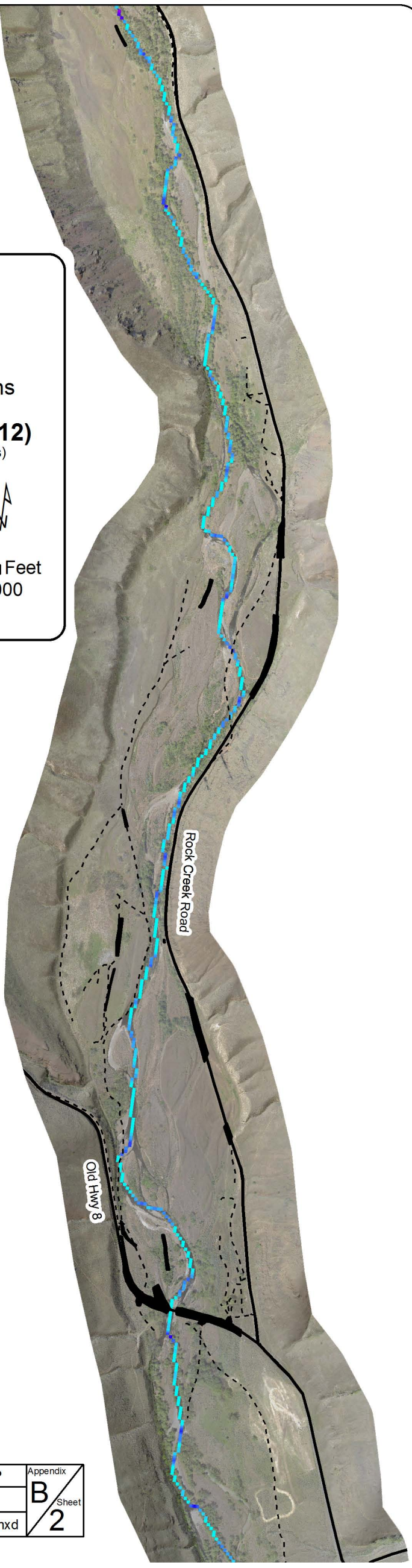
Relative DEM & Baseflow Habitat



-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

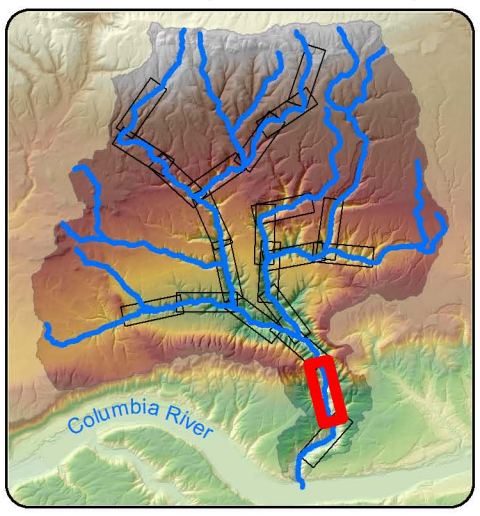
Pool

Non-pool Dry

N

Feet
0 500 1,000 2,000

1:12,000



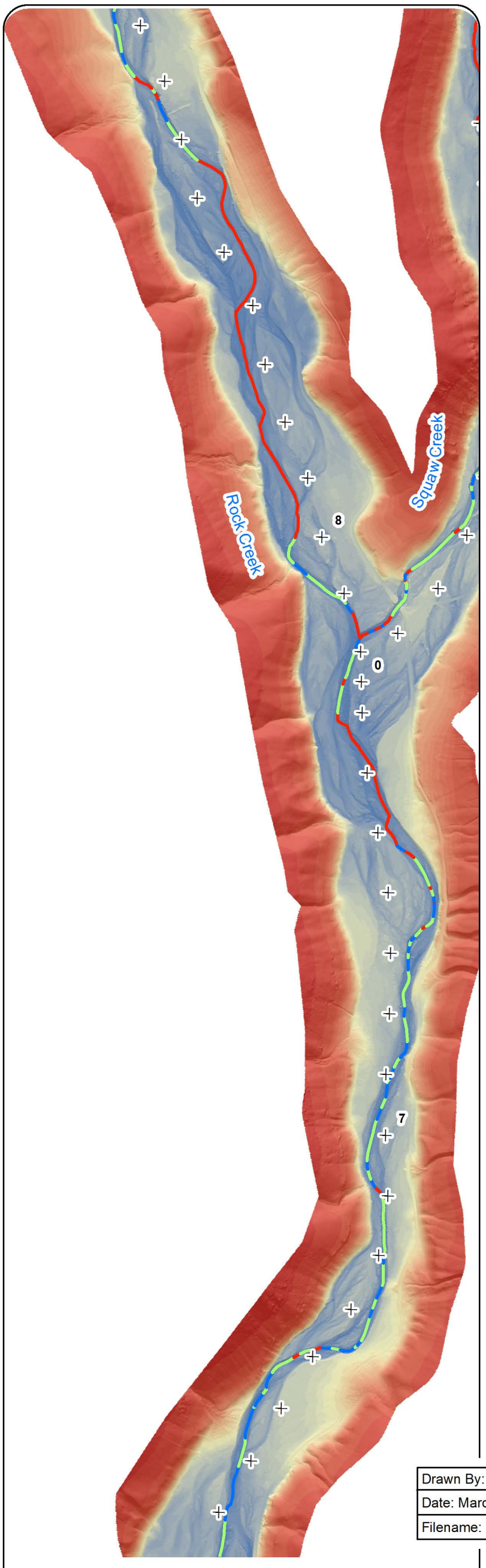
Drawn By: WCC - YNFP	Appendix B / Sheet 2
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 6.2 to 8.9

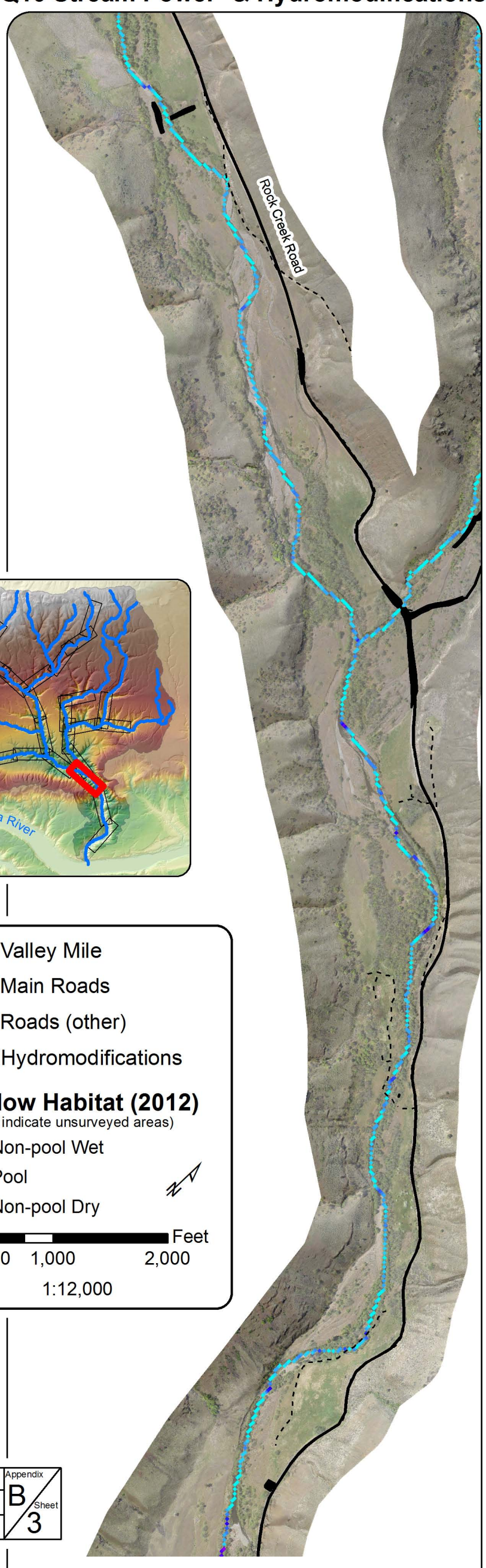
Relative DEM & Baseflow Habitat



-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

Feet
0 500 1,000 2,000

1:12,000

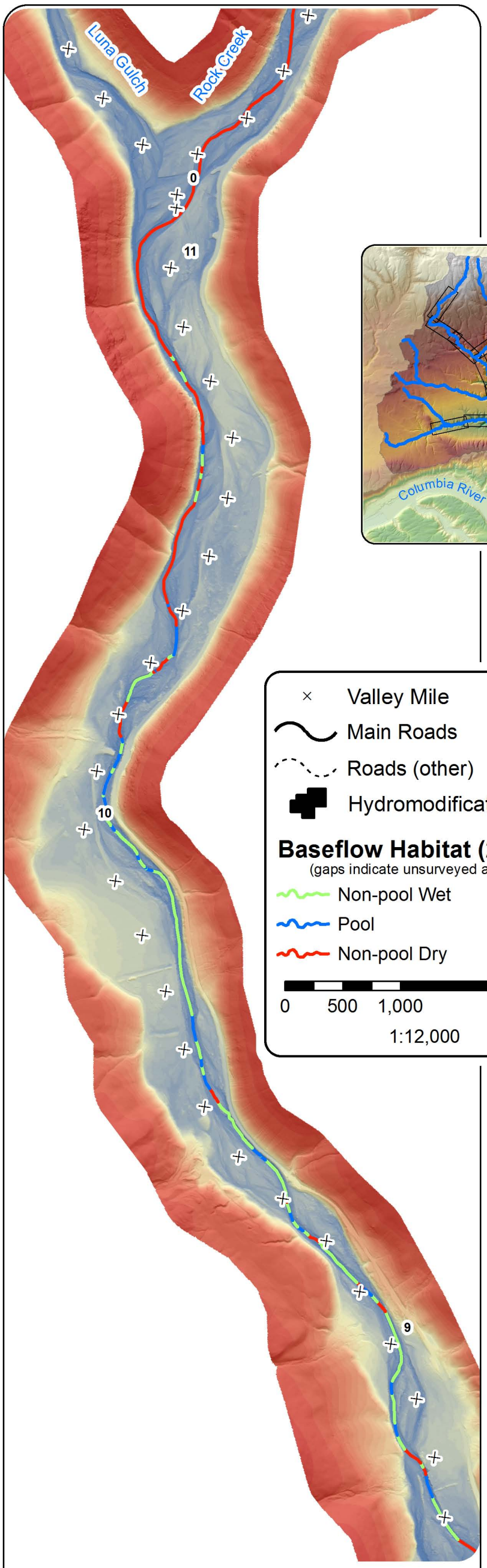
Drawn By: WCC - YNFP	Appendix B / Sheet 3
Date: March 3, 2015	
Filename: RockCreek4.mxd	

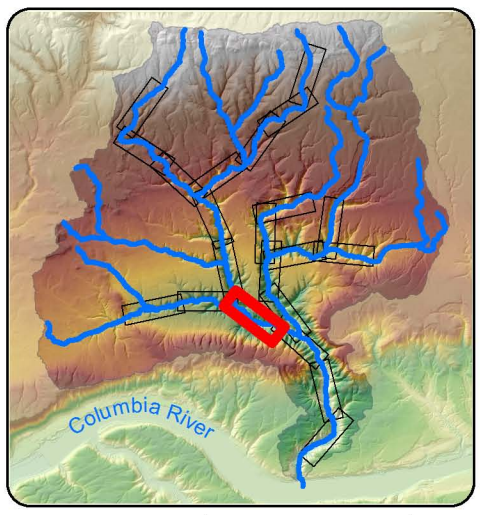
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 8.6 to 11.5

Relative DEM & Baseflow Habitat





× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

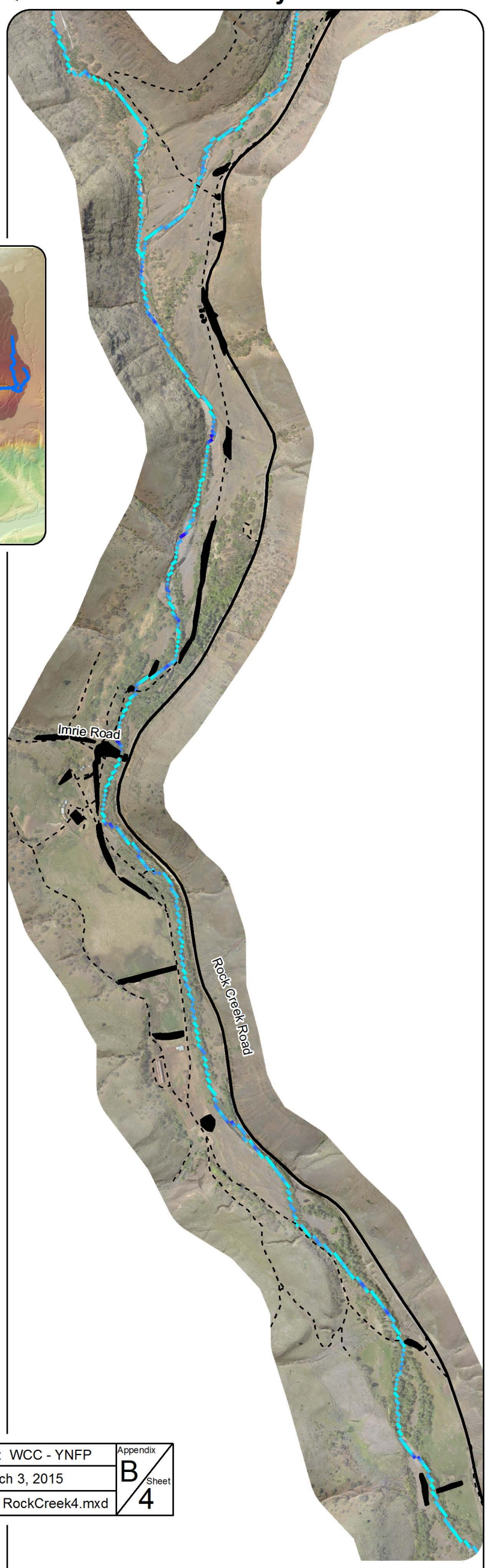
Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

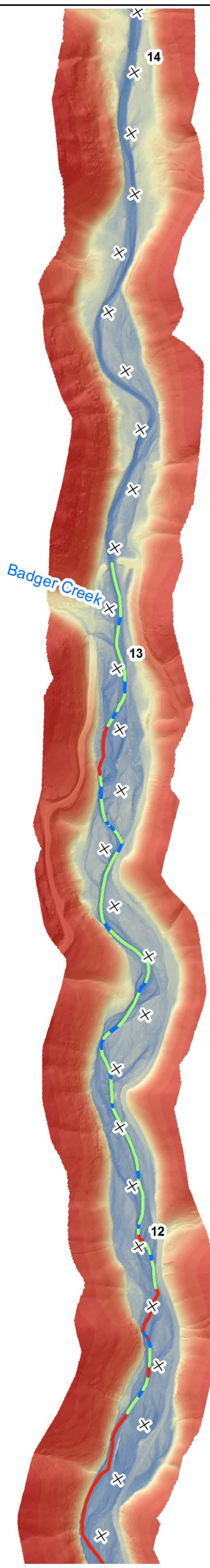
Drawn By: WCC - YNFP	Appendix B / Sheet 4
Date: March 3, 2015	
Filename: RockCreek4.mxd	

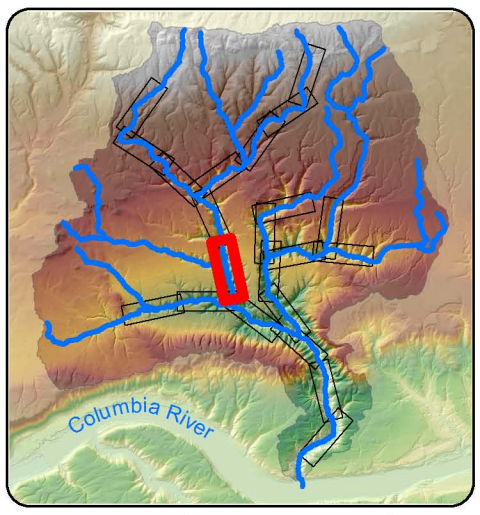
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 11.4 to 14.1

Relative DEM & Baseflow Habitat





- Valley Mile
- Main Roads
- Roads (other)
- Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

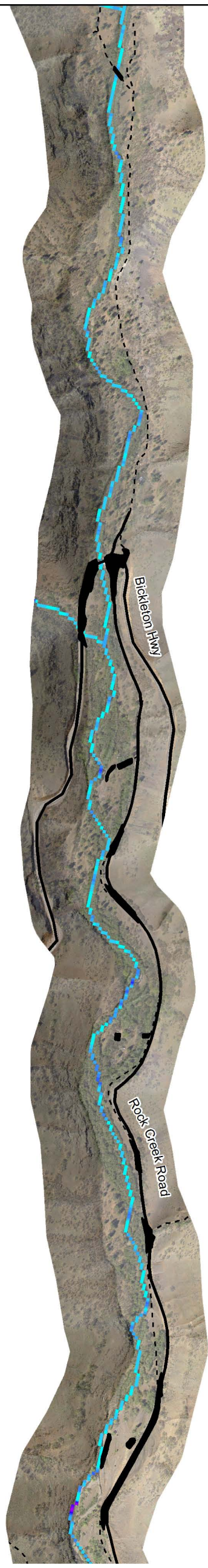
- Non-pool Wet
- Pool
- Non-pool Dry

Feet
0 500 1,000 2,000
1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 5
Date: March 3, 2015	
Filename: RockCreek4.mxd	

-3.5 0 5 10 20 50 70 100 400
Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications

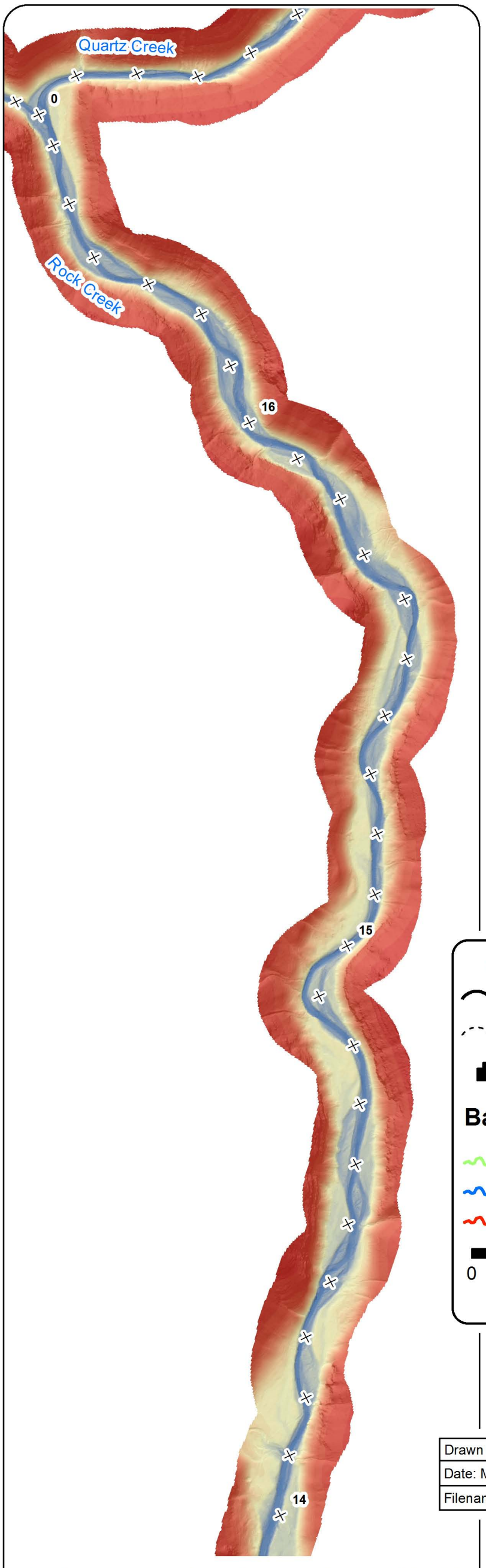


0 2 7 12 17 22 30 50
Total Stream Power (kW)

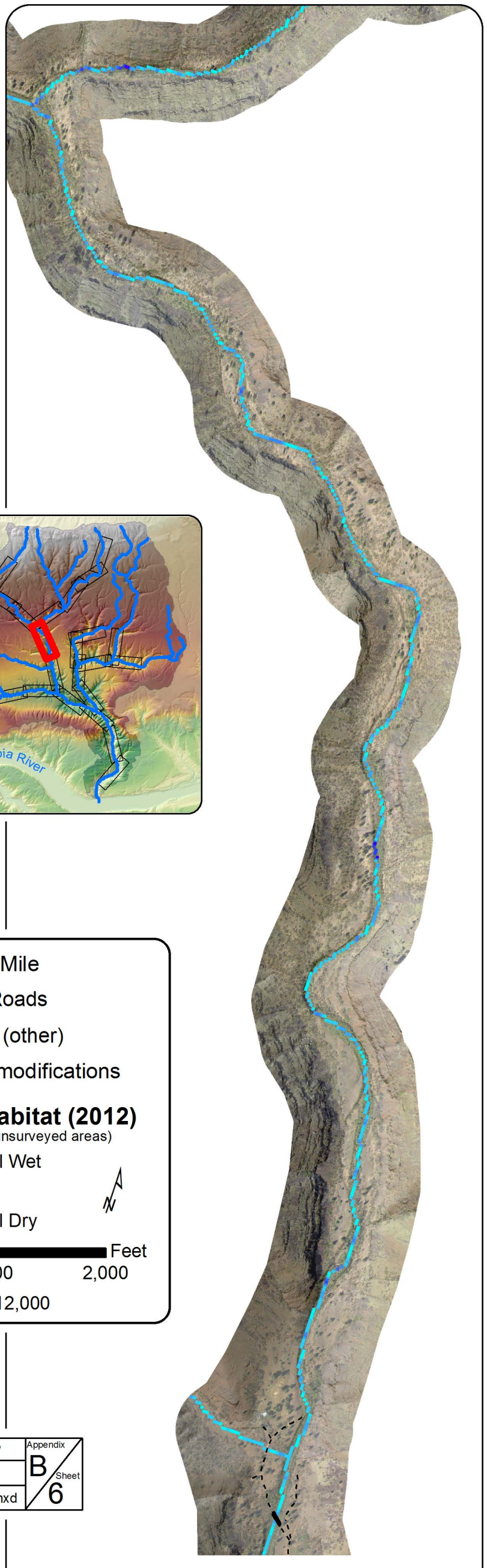
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 13.9 to 16.9

Relative DEM & Baseflow Habitat



Q10 Stream Power* & Hydromodifications



× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

N

0 500 1,000 2,000 Feet

1:12,000

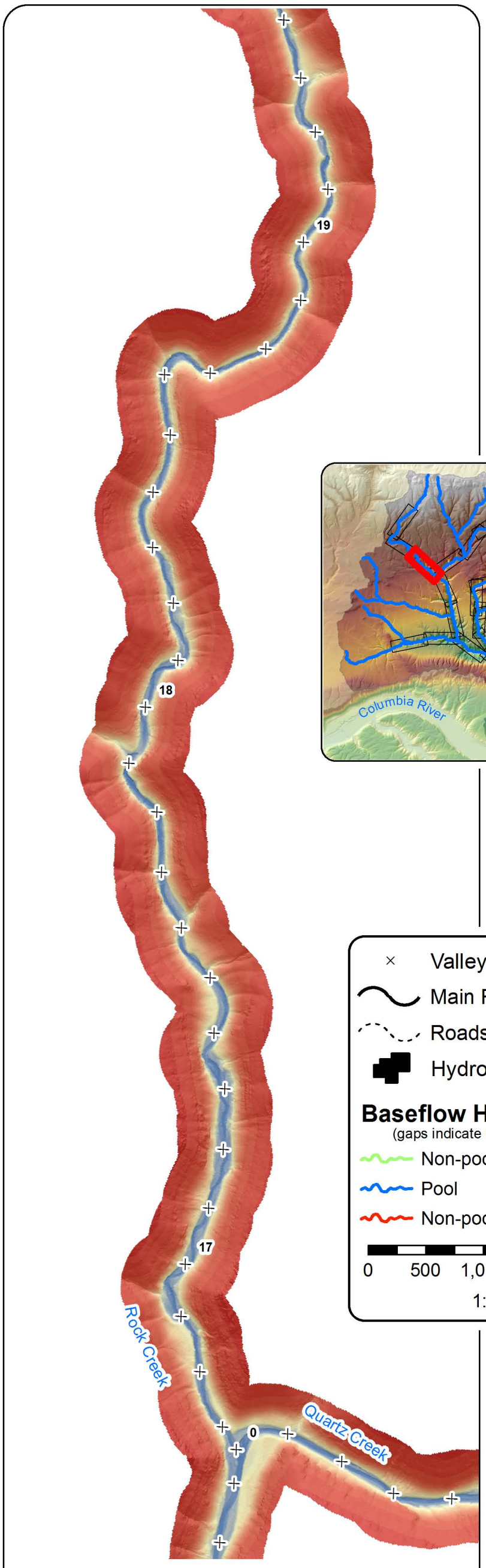
Drawn By: WCC - YNFP	Appendix B / Sheet 6
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 16.5 to 19.4

Relative DEM & Baseflow Habitat



× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

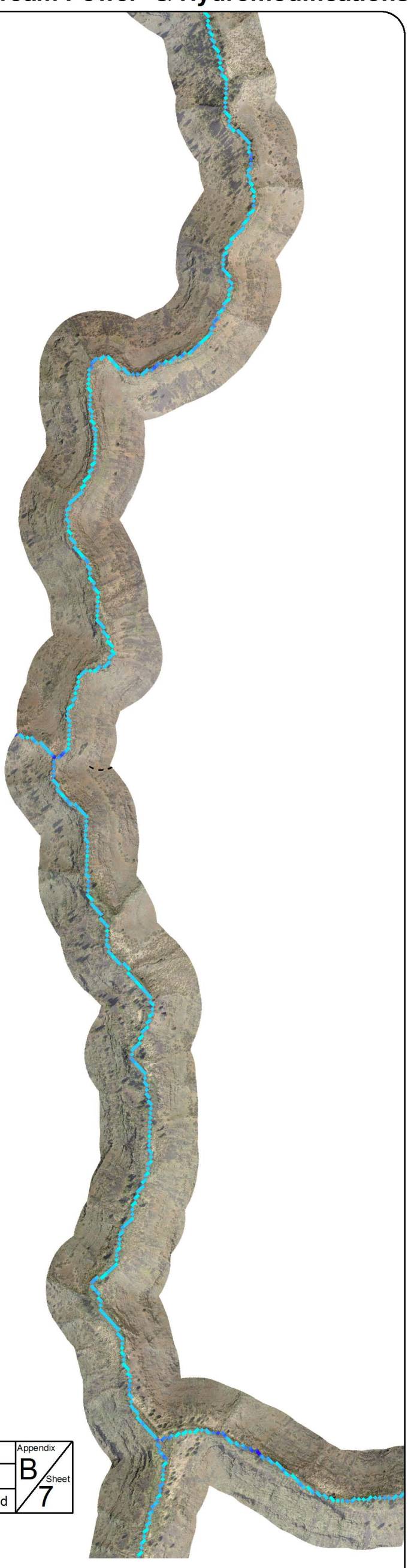
Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



Drawn By:	WCC - YNFP
Date:	March 3, 2015
Filename:	RockCreek4.mxd

Appendix B / Sheet 7

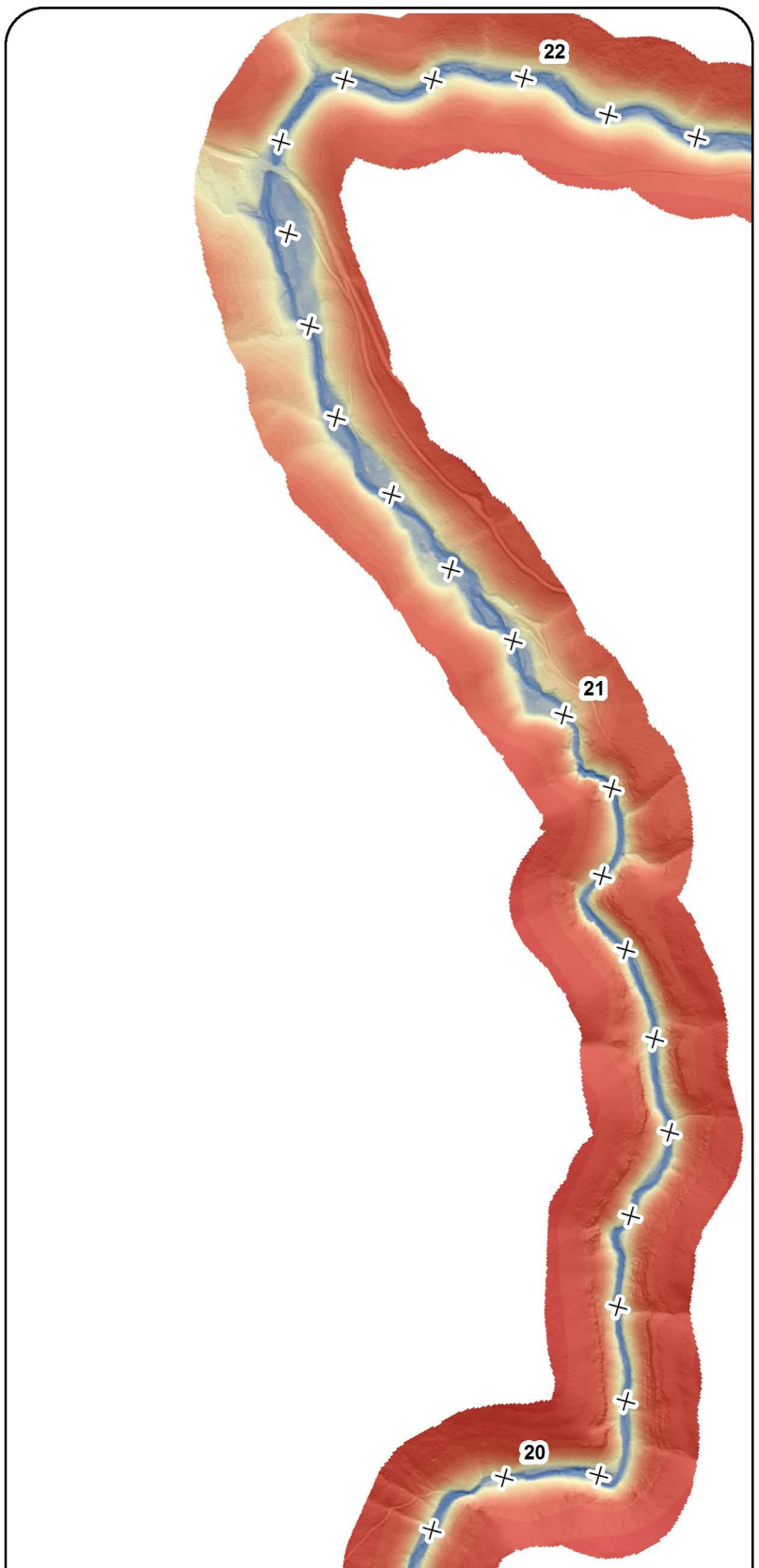
0 2 7 12 17 22 30 50

Total Stream Power (kW)

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 18.6 to 22.3

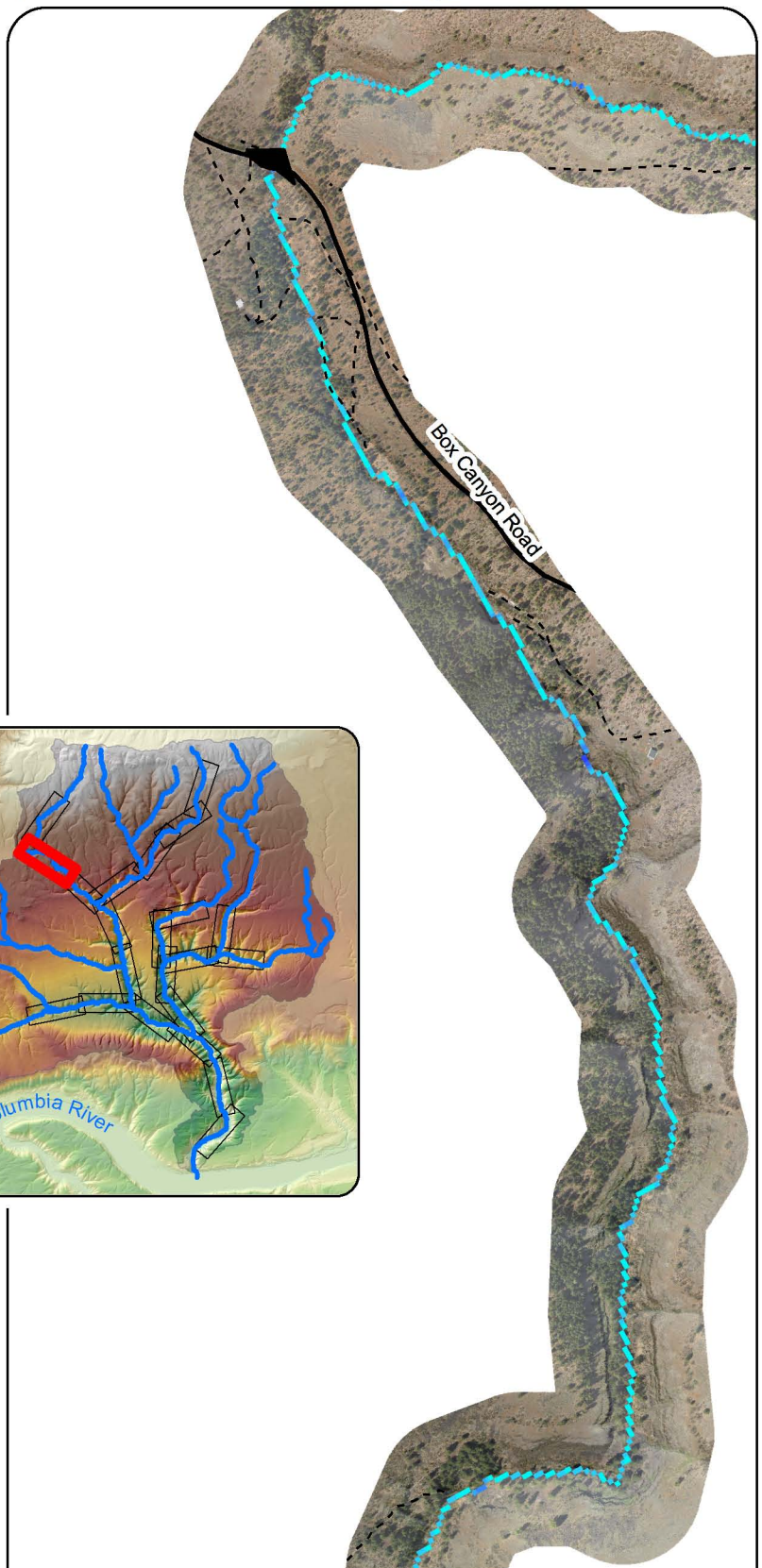
Relative DEM & Baseflow Habitat



-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)

(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

Feet

0 500 1,000 2,000

1:12,000

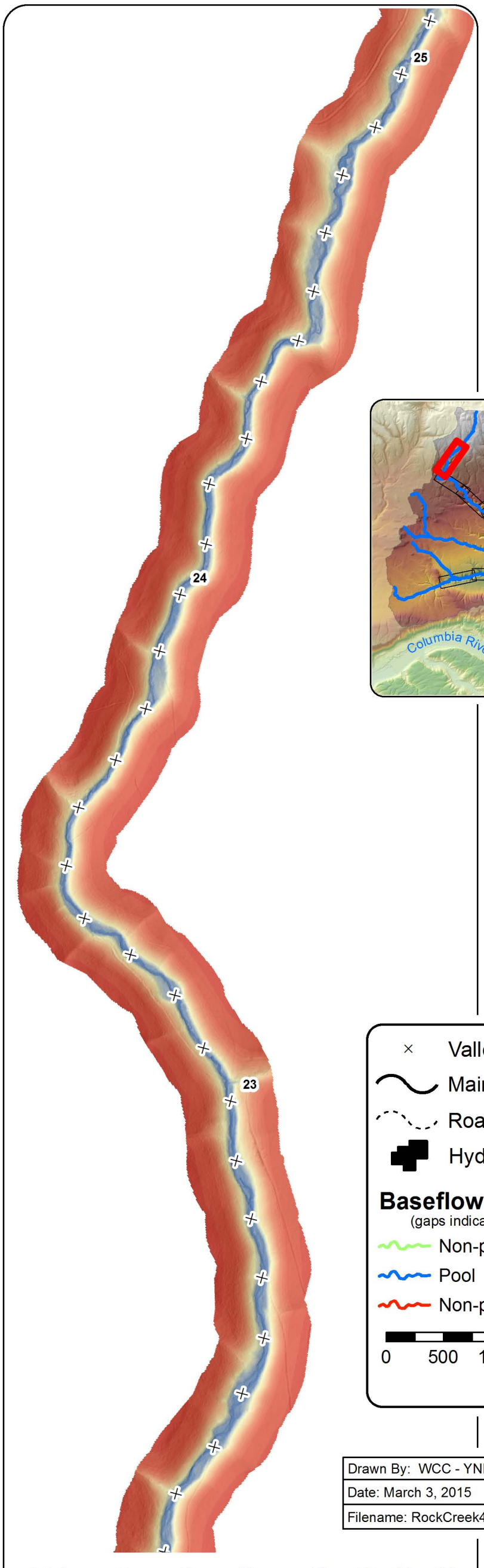
Drawn By: WCC - YNFP	Appendix B / Sheet 8
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Rock Creek: Valley Miles 22.1 to 25.0

Relative DEM & Baseflow Habitat



× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

Feet
0 500 1,000 2,000

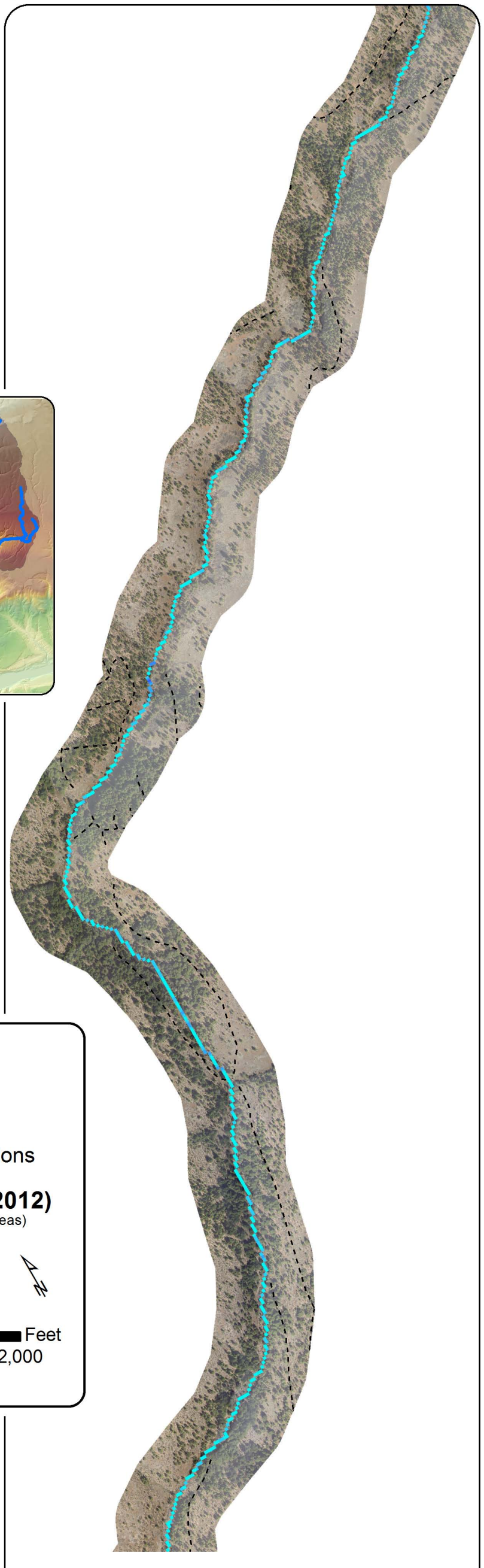
1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 9
Date: March 3, 2015	
Filename: RockCreek4.mxd	

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

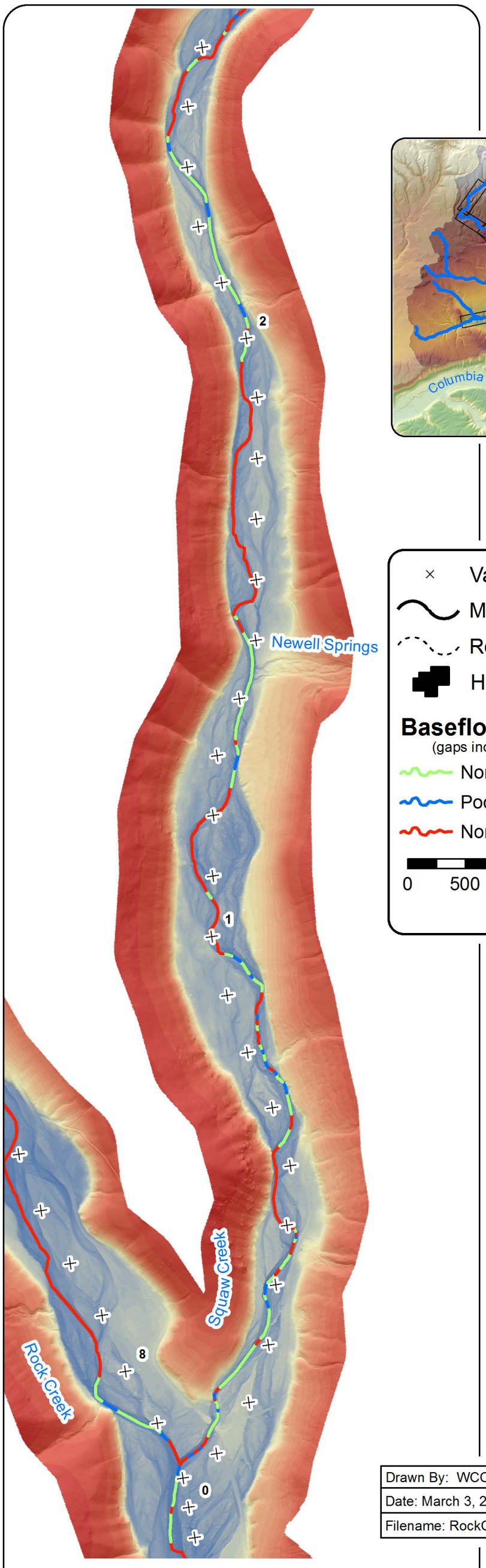
Total Stream Power (kW)

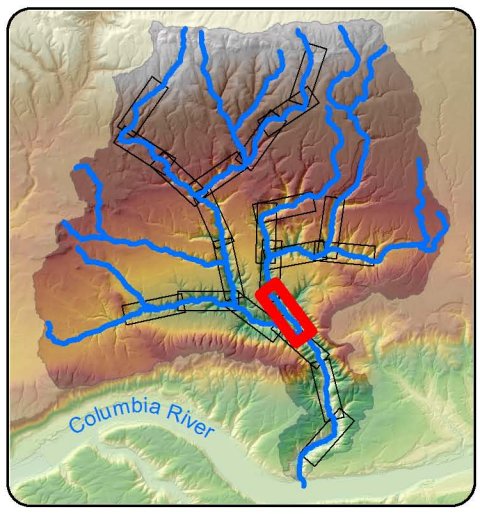
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Squaw Creek: Valley Miles 0.0 to 2.6

Relative DEM & Baseflow Habitat





× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

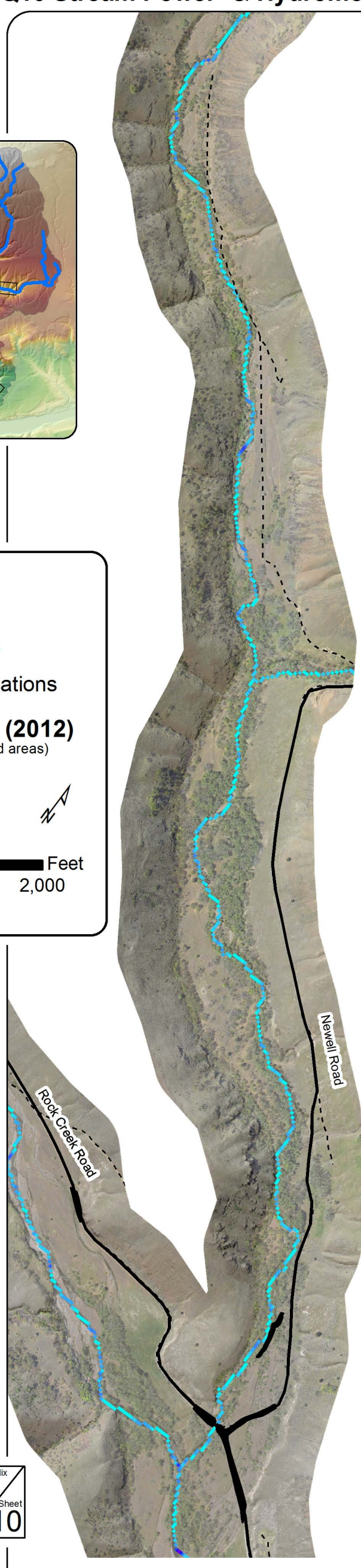
Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

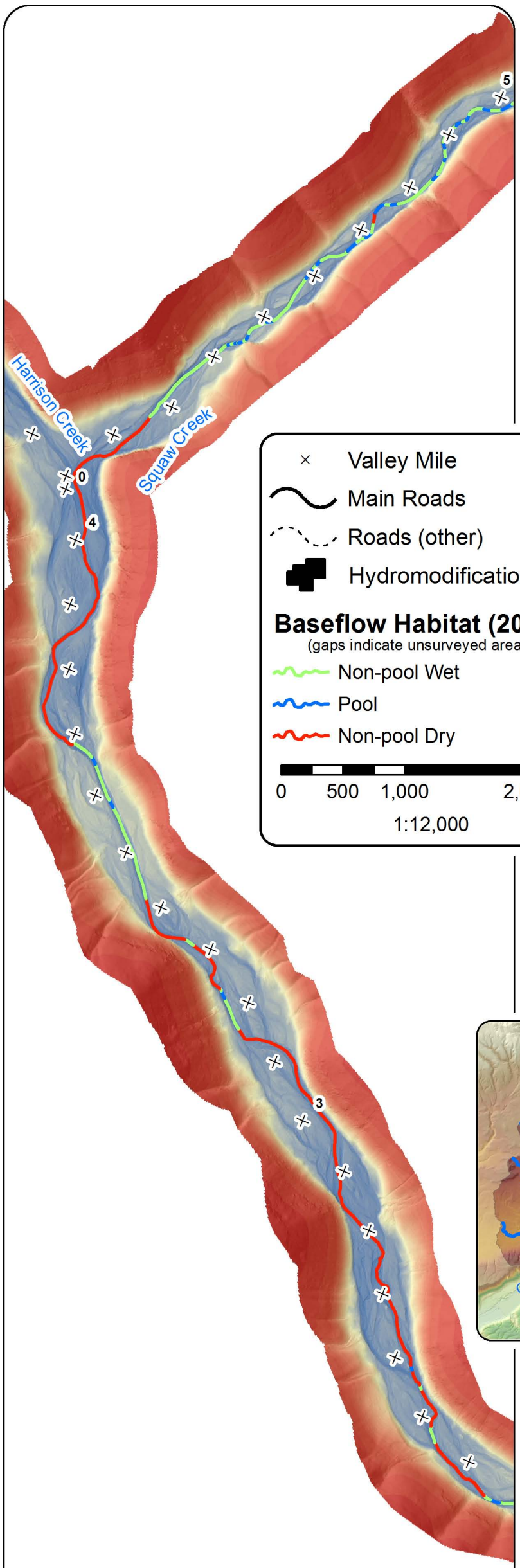
Drawn By: WCC - YNFP	Appendix B Sheet 10
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Squaw Creek: Valley Miles 1.9 to 4.6

Relative DEM & Baseflow Habitat



× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

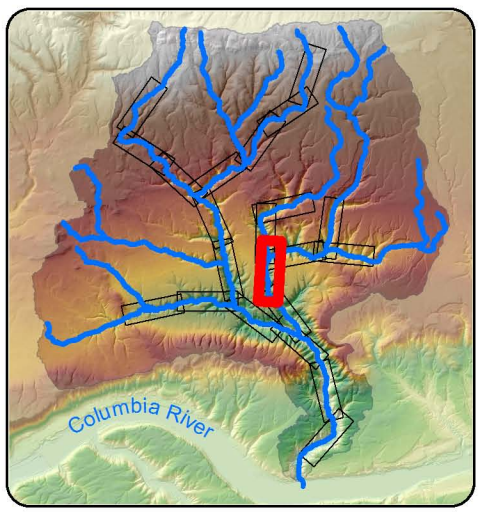
Pool

Non-pool Dry

N

0 500 1,000 2,000 Feet

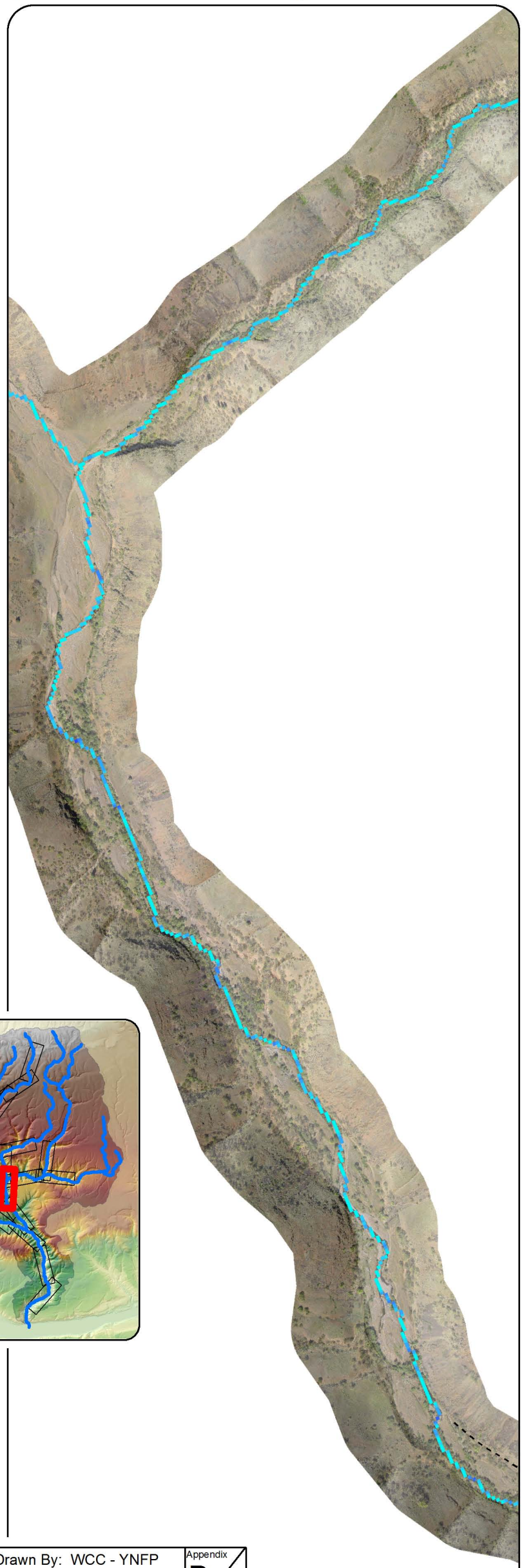
1:12,000



-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



Drawn By:	WCC - YNFP
Date:	March 3, 2015
Filename:	RockCreek4.mxd

Appendix B / Sheet 11

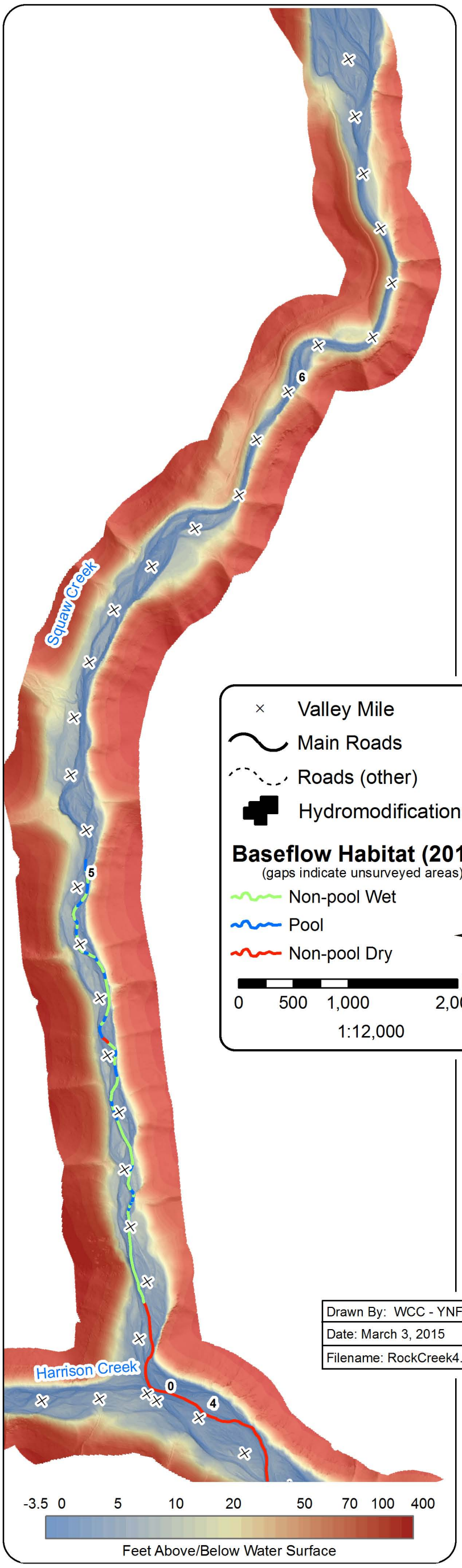
0 2 7 12 17 22 30 50

Total Stream Power (kW)

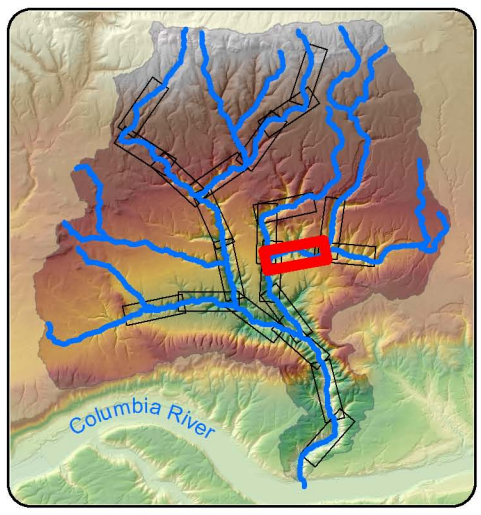
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Squaw Creek: Valley Miles 3.8 to 6.8

Relative DEM & Baseflow Habitat



Q10 Stream Power* & Hydromodifications



Drawn By: WCC - YNFP	Appendix B / Sheet 12
Date: March 3, 2015	
Filename: RockCreek4.mxd	

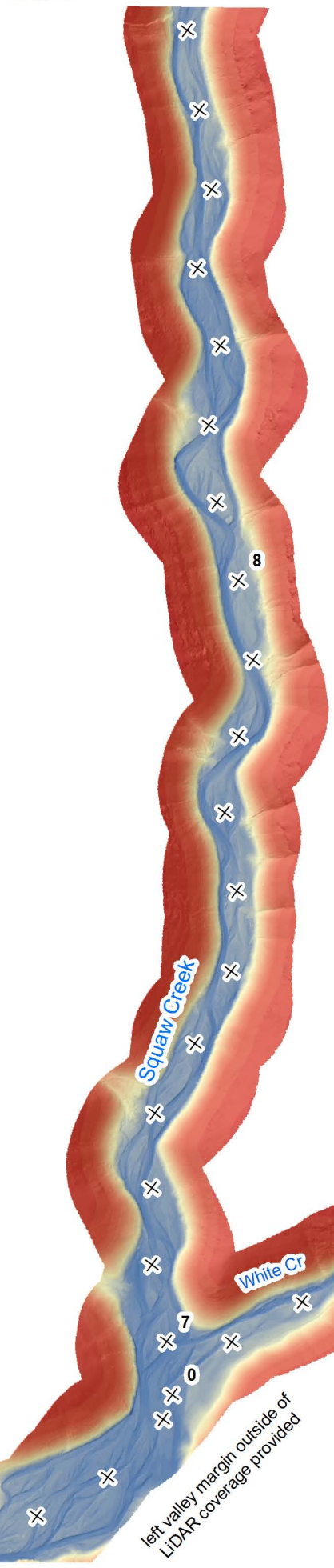
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

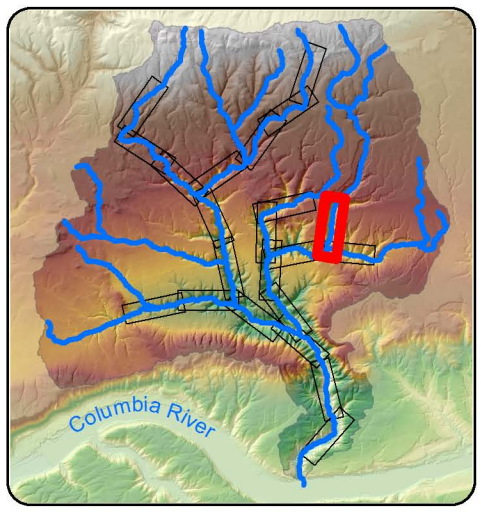
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Squaw Creek: Valley Miles 6.5 to 8.8

Relative DEM & Baseflow Habitat

DEM truncated due to seam in LIDAR





Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

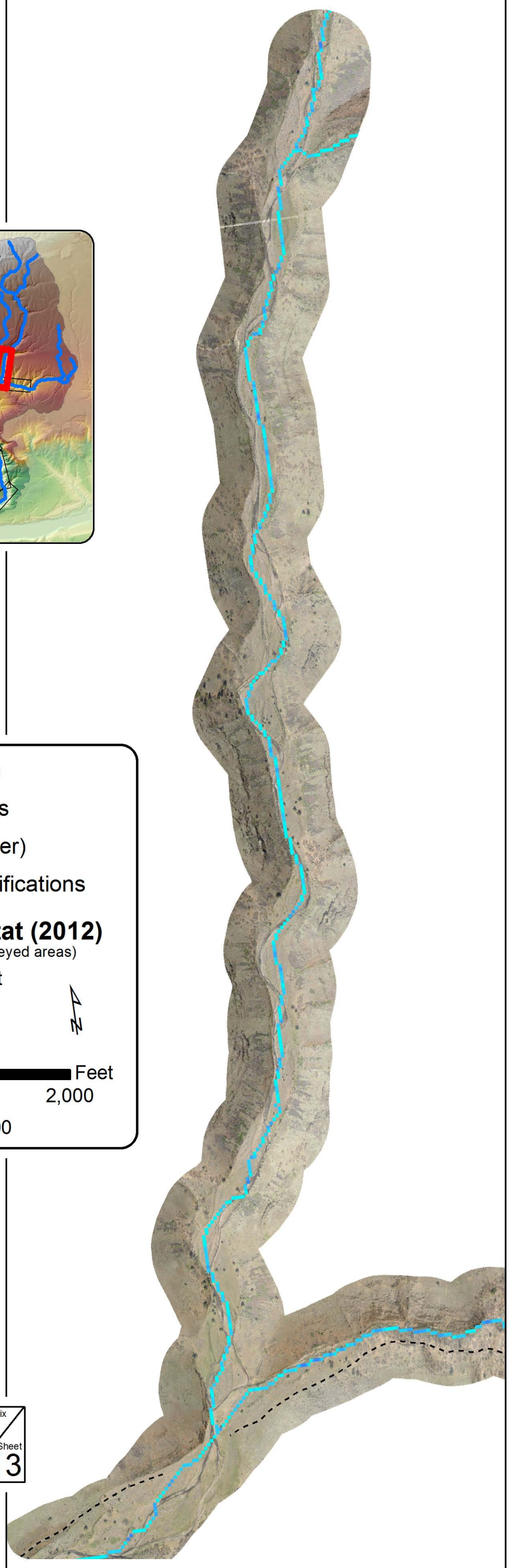
Feet
0 500 1,000 2,000
1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 13
Date: March 3, 2015	
Filename: RockCreek4.mxd	

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



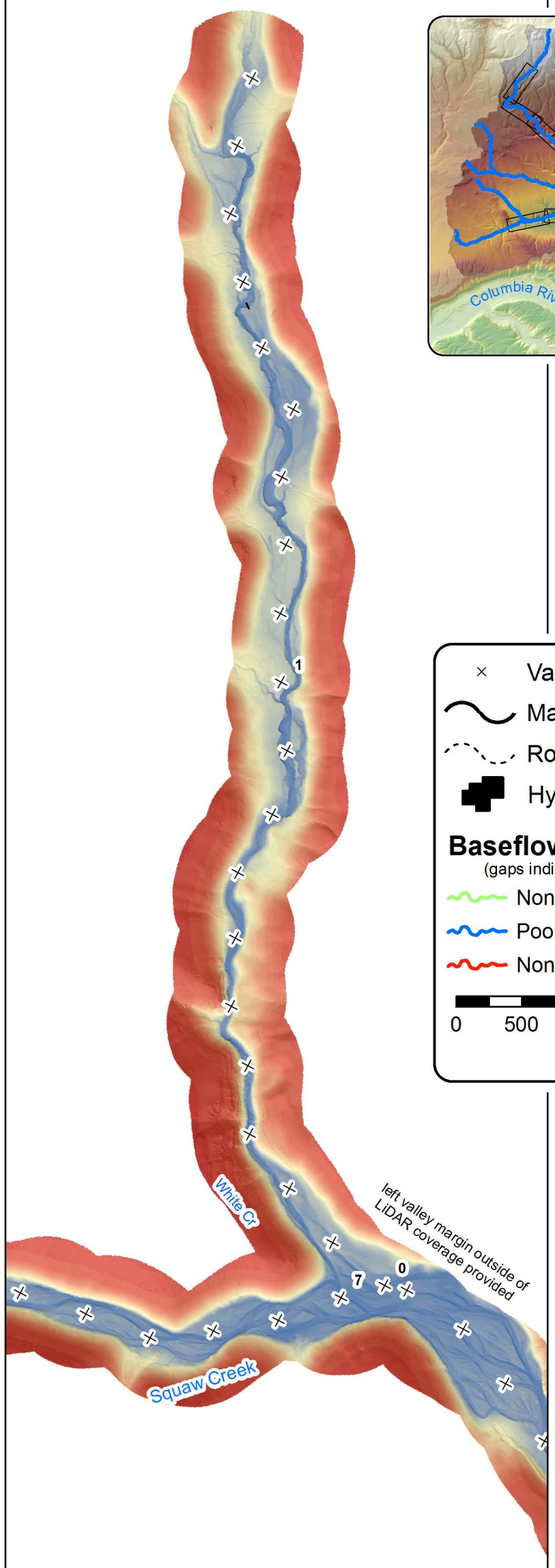
0 2 7 12 17 22 30 50

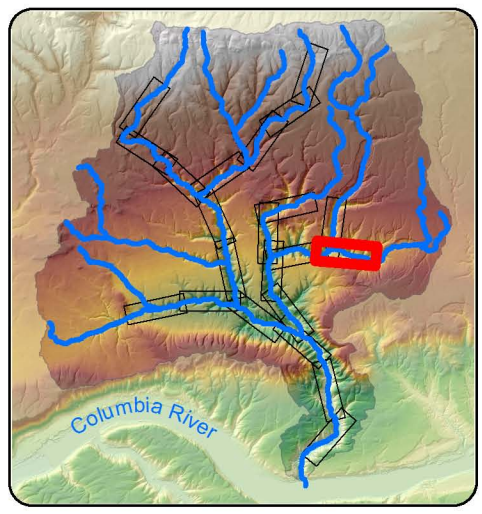
Total Stream Power (kW)

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

White Creek: Valley Miles 0.0 to 1.9

Relative DEM & Baseflow Habitat



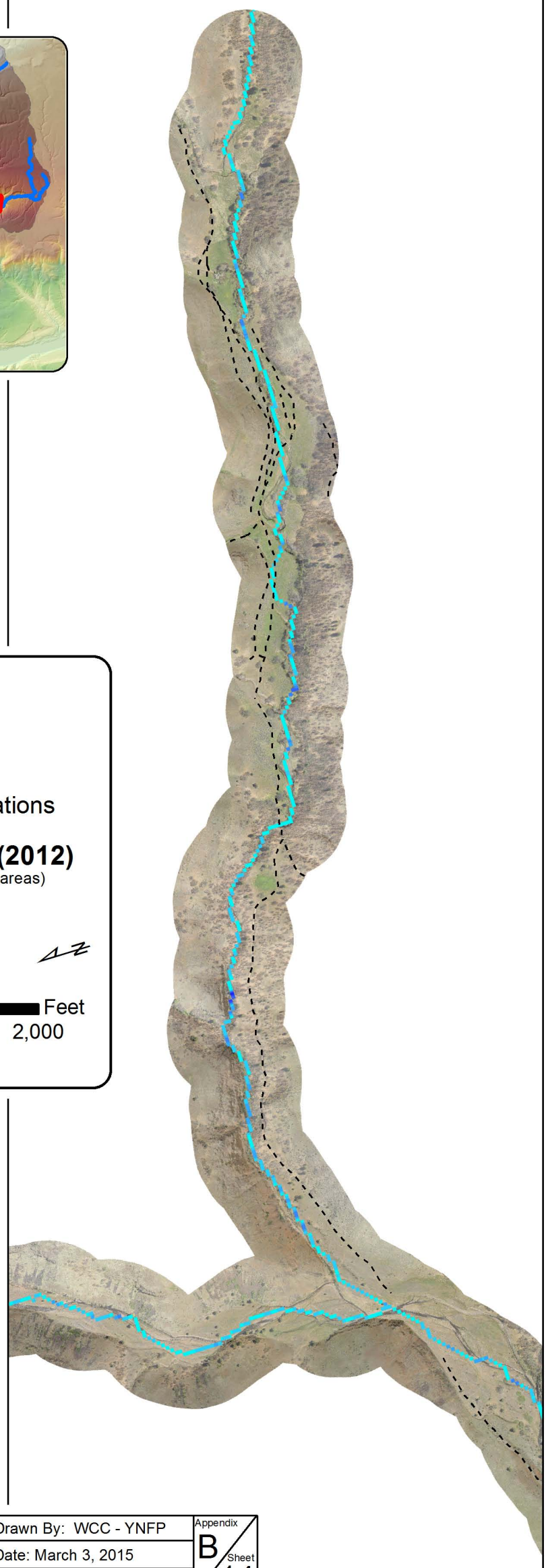


Valley Mile
Main Roads
Roads (other)
Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)
Non-pool Wet
Pool
Non-pool Dry

Feet
0 500 1,000 2,000
1:12,000

Q10 Stream Power* & Hydromodifications

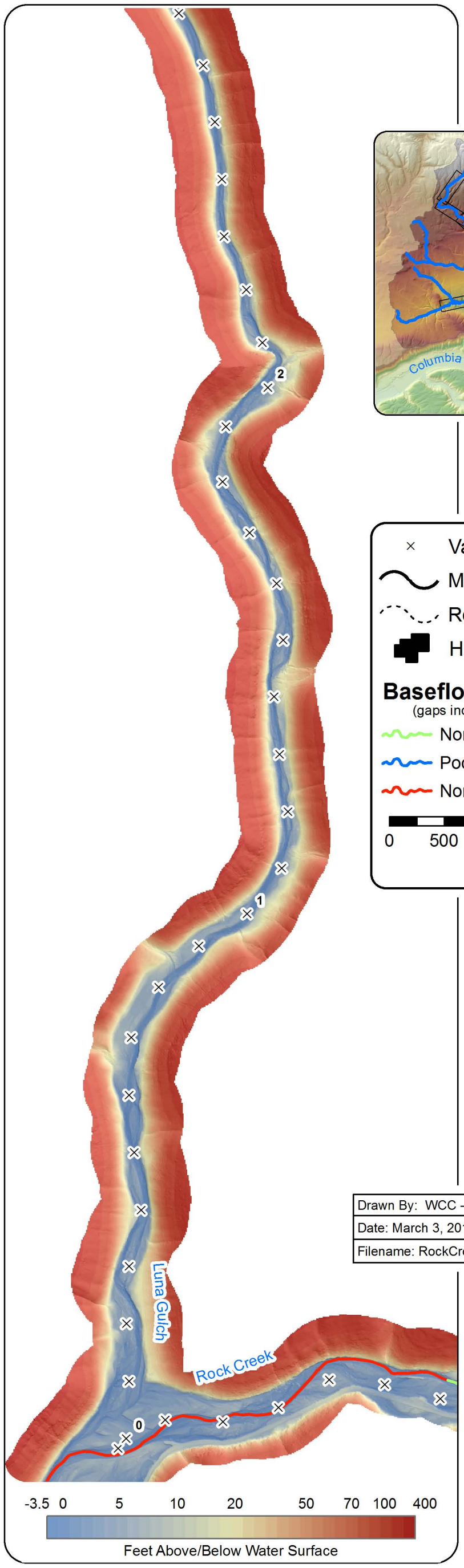


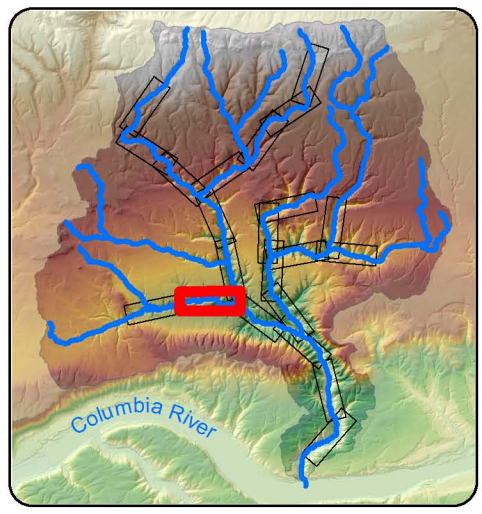
Drawn By: WCC - YNFP	Appendix B Sheet 14
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Luna Gulch: Valley Miles 0.0 to 2.7

Relative DEM & Baseflow Habitat





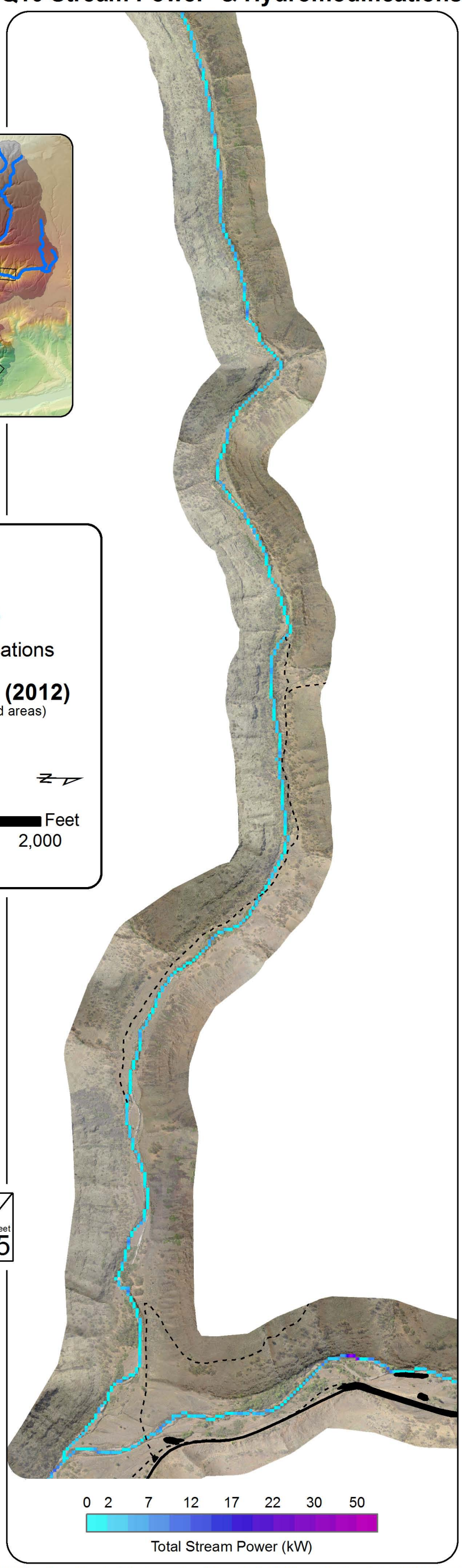
Valley Mile
Main Roads
Roads (other)
Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)
Non-pool Wet
Pool
Non-pool Dry

Feet
0 500 1,000 2,000
1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 15
Date: March 3, 2015	
Filename: RockCreek4.mxd	

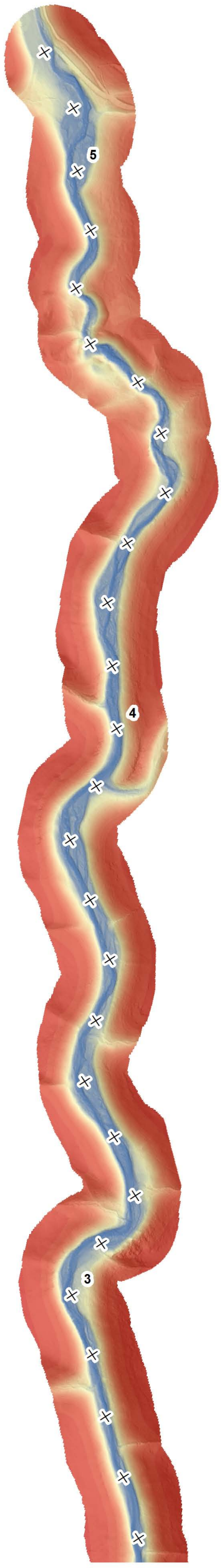
Q10 Stream Power* & Hydromodifications

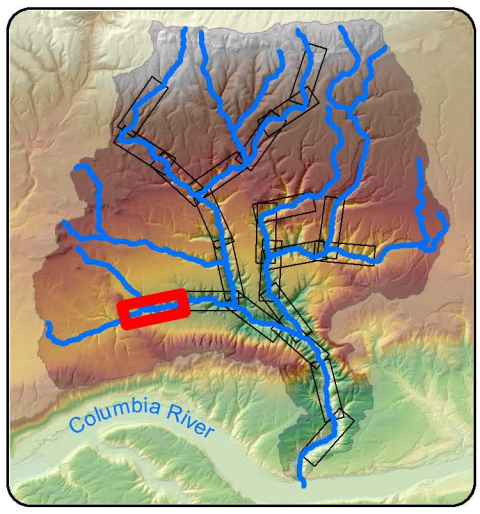


Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Luna Gulch: Valley Miles 2.6 to 5.3

Relative DEM & Baseflow Habitat





× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

N

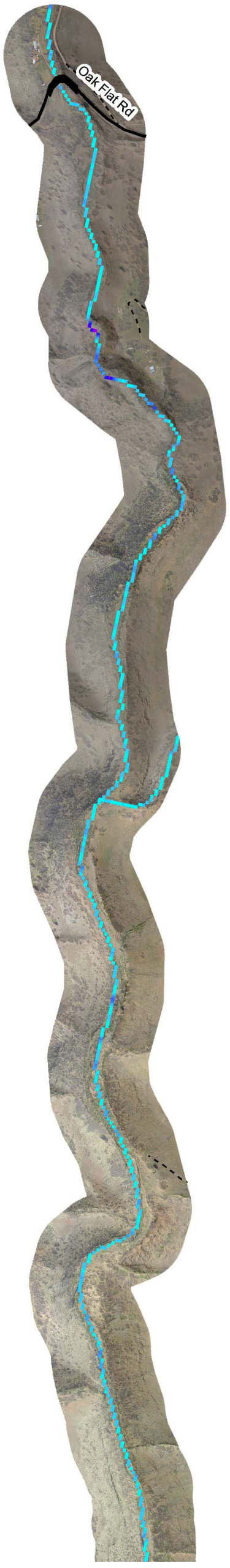
Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

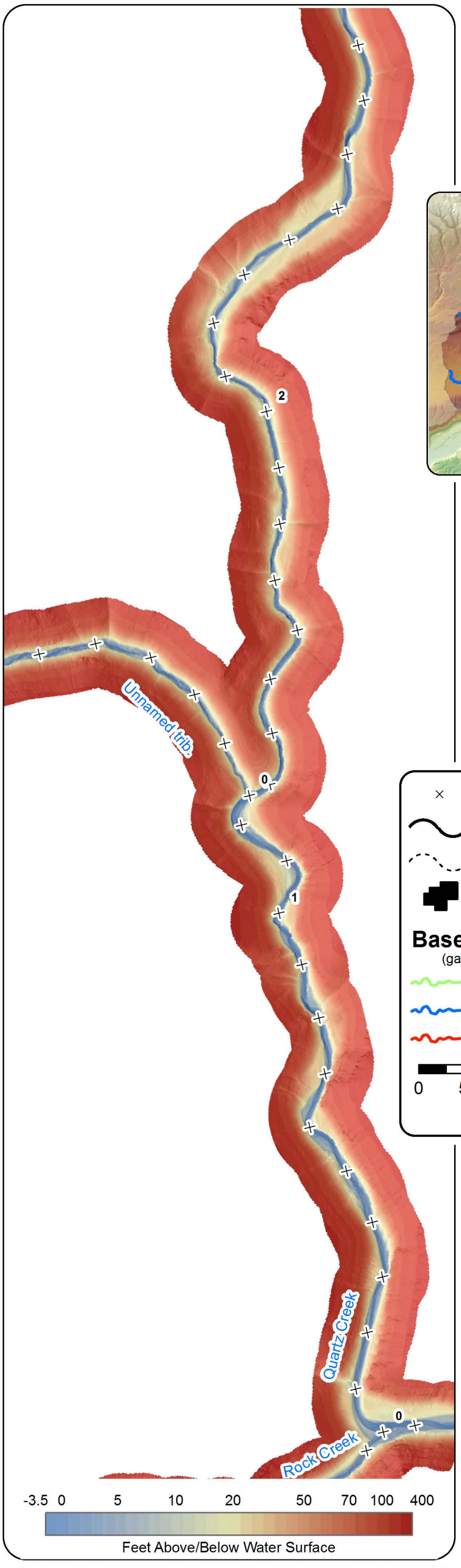
Drawn By: WCC - YNFP	Appendix B Sheet 16
Date: March 3, 2015	
Filename: RockCreek4.mxd	

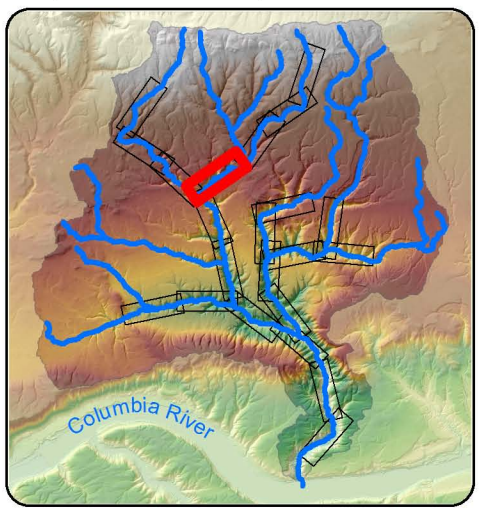
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Quartz Creek: Valley Miles 0.0 to 2.9

Relative DEM & Baseflow Habitat





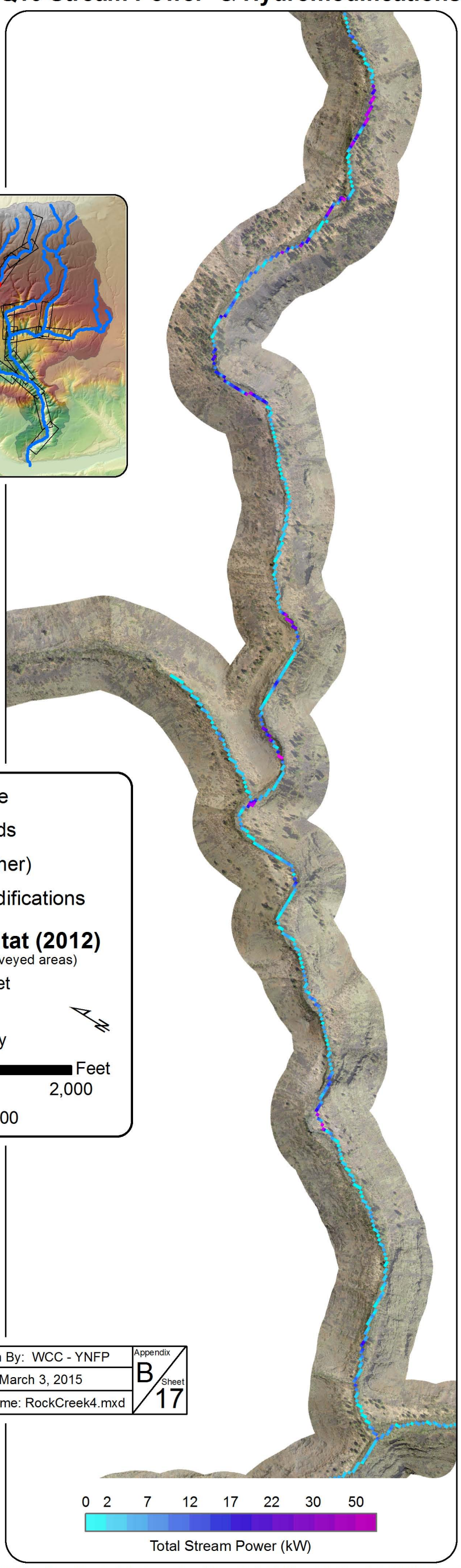
Valley Mile
Main Roads
Roads (other)
Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)
Non-pool Wet
Pool
Non-pool Dry

Feet
0 500 1,000 2,000
1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 17
Date: March 3, 2015	
Filename: RockCreek4.mxd	

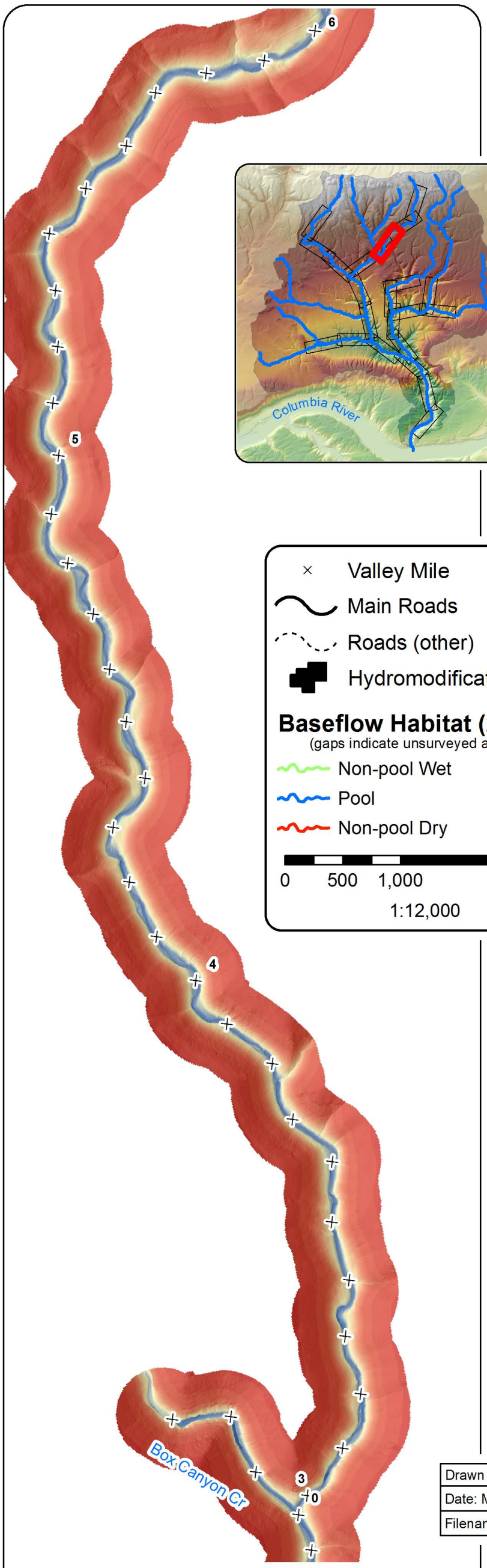
Q10 Stream Power* & Hydromodifications



Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Quartz Creek: Valley Miles 2.9 to 6.1

Relative DEM & Baseflow Habitat



Q10 Stream Power* & Hydromodifications

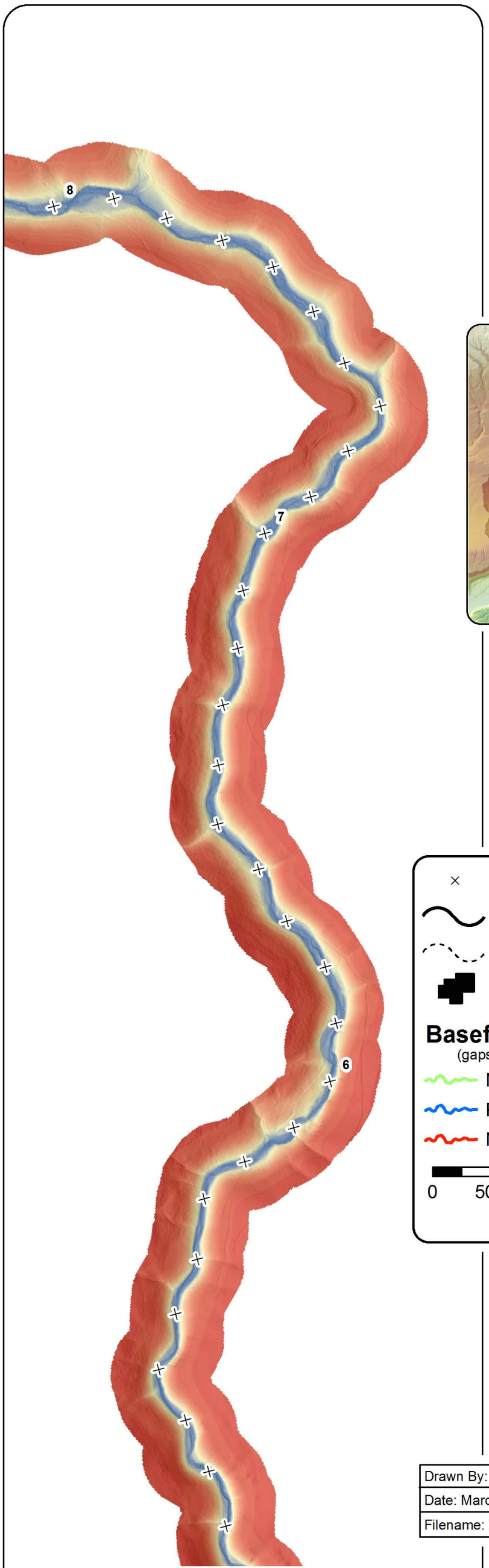
Drawn By: WCC - YNFP	Appendix B Sheet 18
Date: March 3, 2015	
Filename: RockCreek4.mxd	

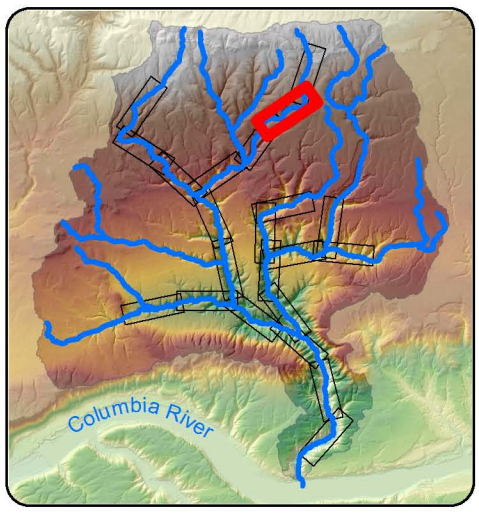
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Quartz Creek: Valley Miles 5.0 to 8.1

Relative DEM & Baseflow Habitat





Q10 Stream Power* & Hydromodifications

Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

0 2 7 12 17 22 30 50

Total Stream Power (kW)

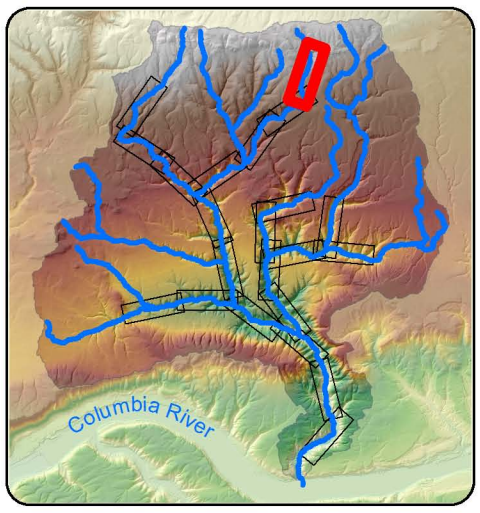
Drawn By: WCC - YNFP	Appendix B / Sheet 19
Date: March 3, 2015	
Filename: RockCreek4.mxd	

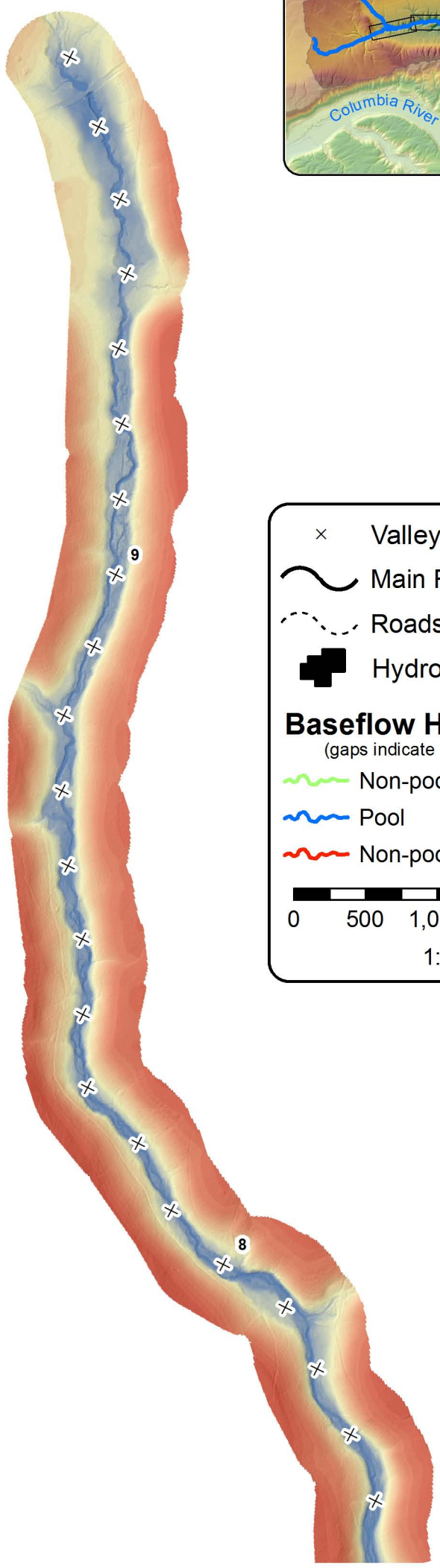
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Quartz Creek: Valley Miles 7.5 to 9.7

Relative DEM & Baseflow Habitat





- Valley Mile
- Main Roads
- Roads (other)
- Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

- Non-pool Wet
- Pool
- Non-pool Dry

N

Feet
0 500 1,000 2,000

1:12,000

-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications

Drawn By: WCC - YNFP	Appendix B / Sheet 20
Date: March 3, 2015	
Filename: RockCreek4.mxd	

0 2 7 12 17 22 30 50

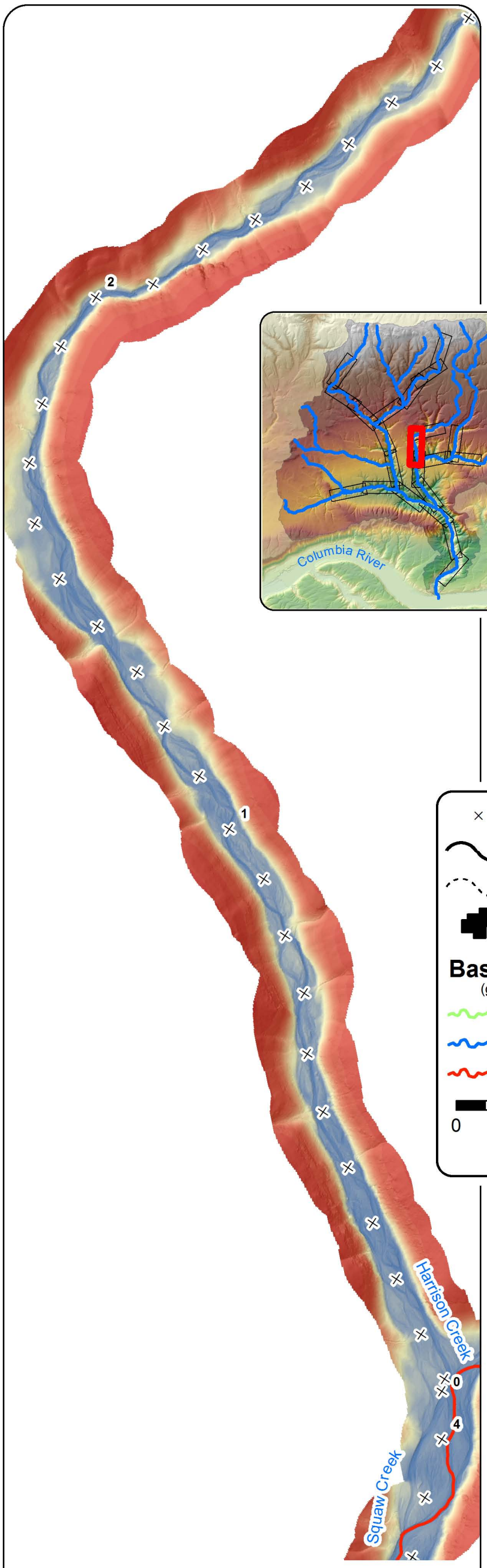
Total Stream Power (kW)

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

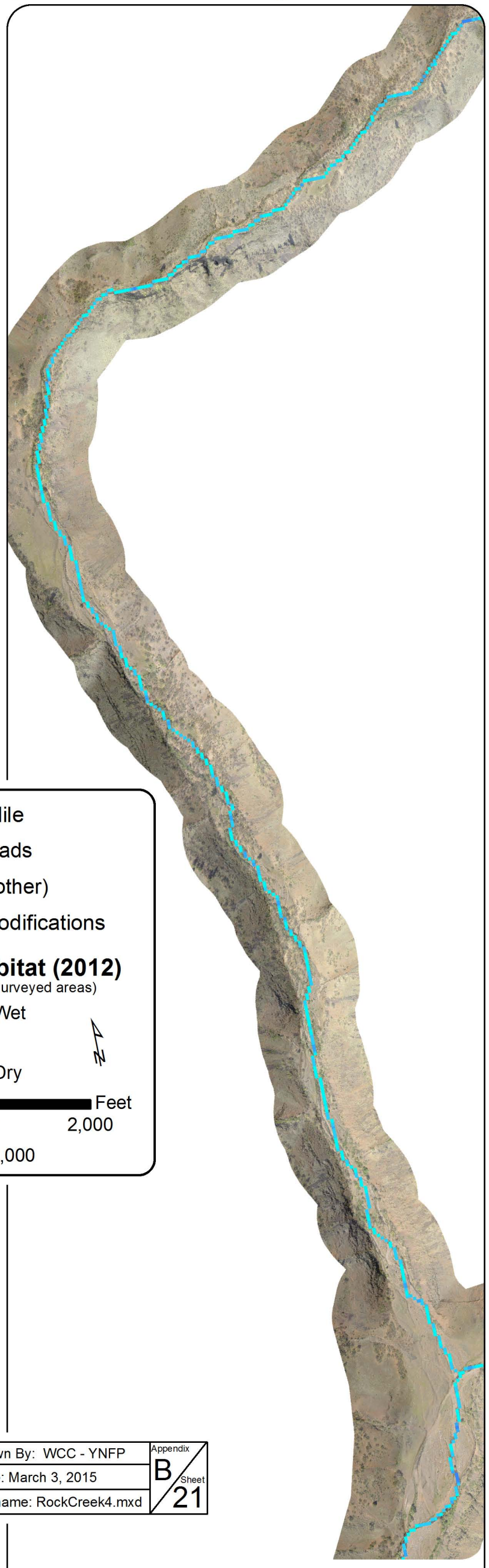
* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Harrison Creek: Valley Miles 0.0 to 2.5

Relative DEM & Baseflow Habitat



Q10 Stream Power* & Hydromodifications



× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)
(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

Feet
0 500 1,000 2,000

1:12,000

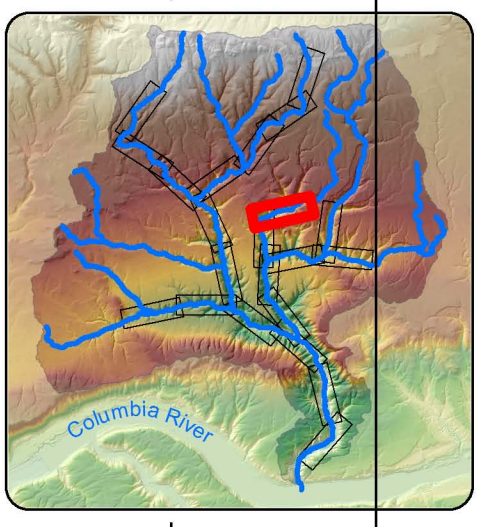
Drawn By: WCC - YNFP	Appendix B / Sheet 21
Date: March 3, 2015	
Filename: RockCreek4.mxd	

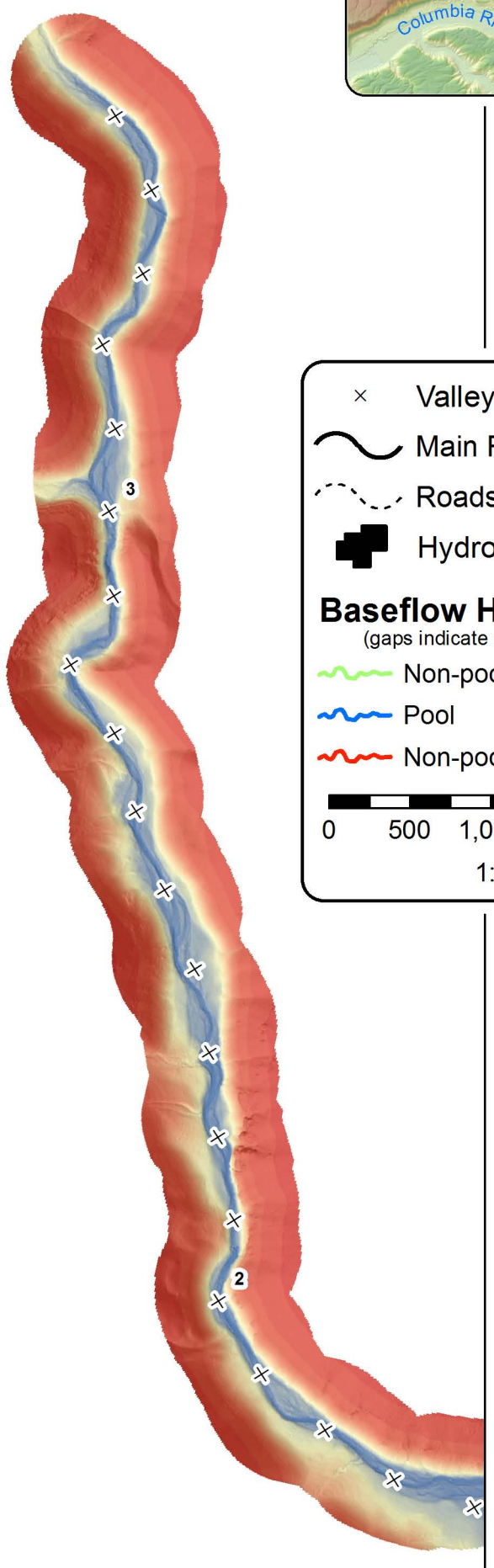
Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

Harrison Creek: Valley Miles 1.6 to 3.5

Relative DEM & Baseflow Habitat

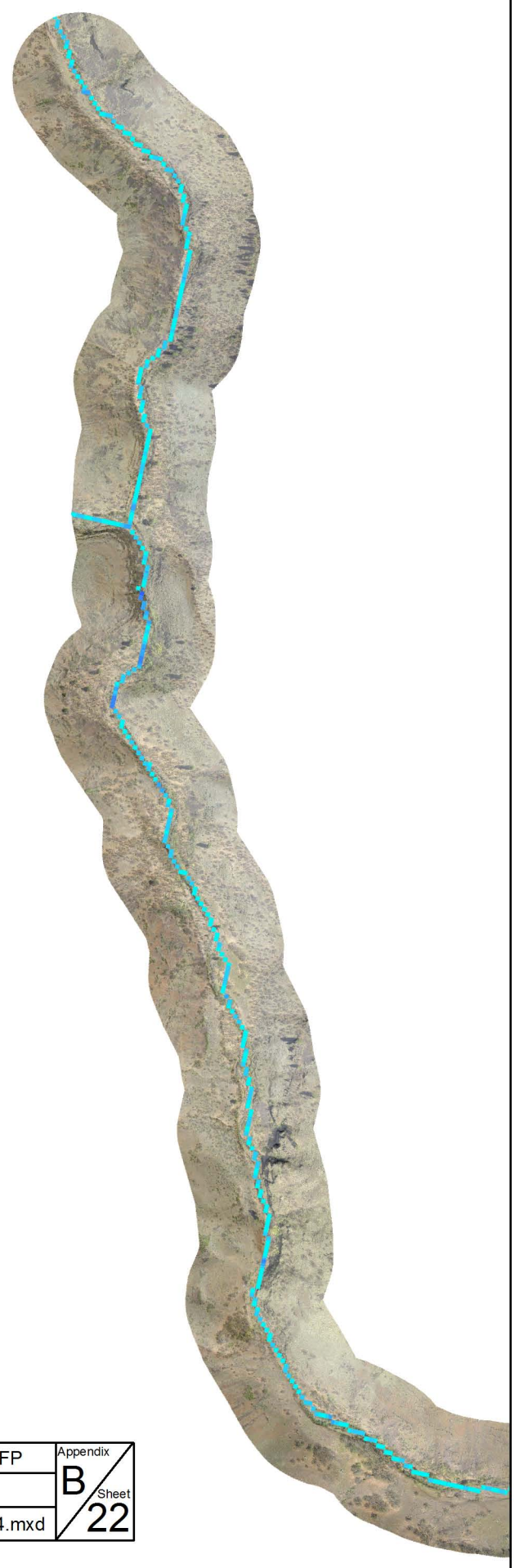




-3.5 0 5 10 20 50 70 100 400

Feet Above/Below Water Surface

Q10 Stream Power* & Hydromodifications



0 2 7 12 17 22 30 50

Total Stream Power (kW)

× Valley Mile

Main Roads

Roads (other)

Hydromodifications

Baseflow Habitat (2012)

(gaps indicate unsurveyed areas)

Non-pool Wet

Pool

Non-pool Dry

N

Feet

0 500 1,000 2,000

1:12,000

Drawn By: WCC - YNFP	Appendix B / Sheet 22
Date: March 3, 2015	
Filename: RockCreek4.mxd	

Base photography and LiDAR used to generate relative DEM flown April 2012. Inset map DEM 2013 NED. Baseflow habitat based on Allen et al. 2014a. All other data YNFP 2014.

* linear representation of total stream power magnitude at a station of a 10-year recurrence flood. Does *not* indicate horizontal extent of inundation.

APPENDIX C - STREAM PROFILES

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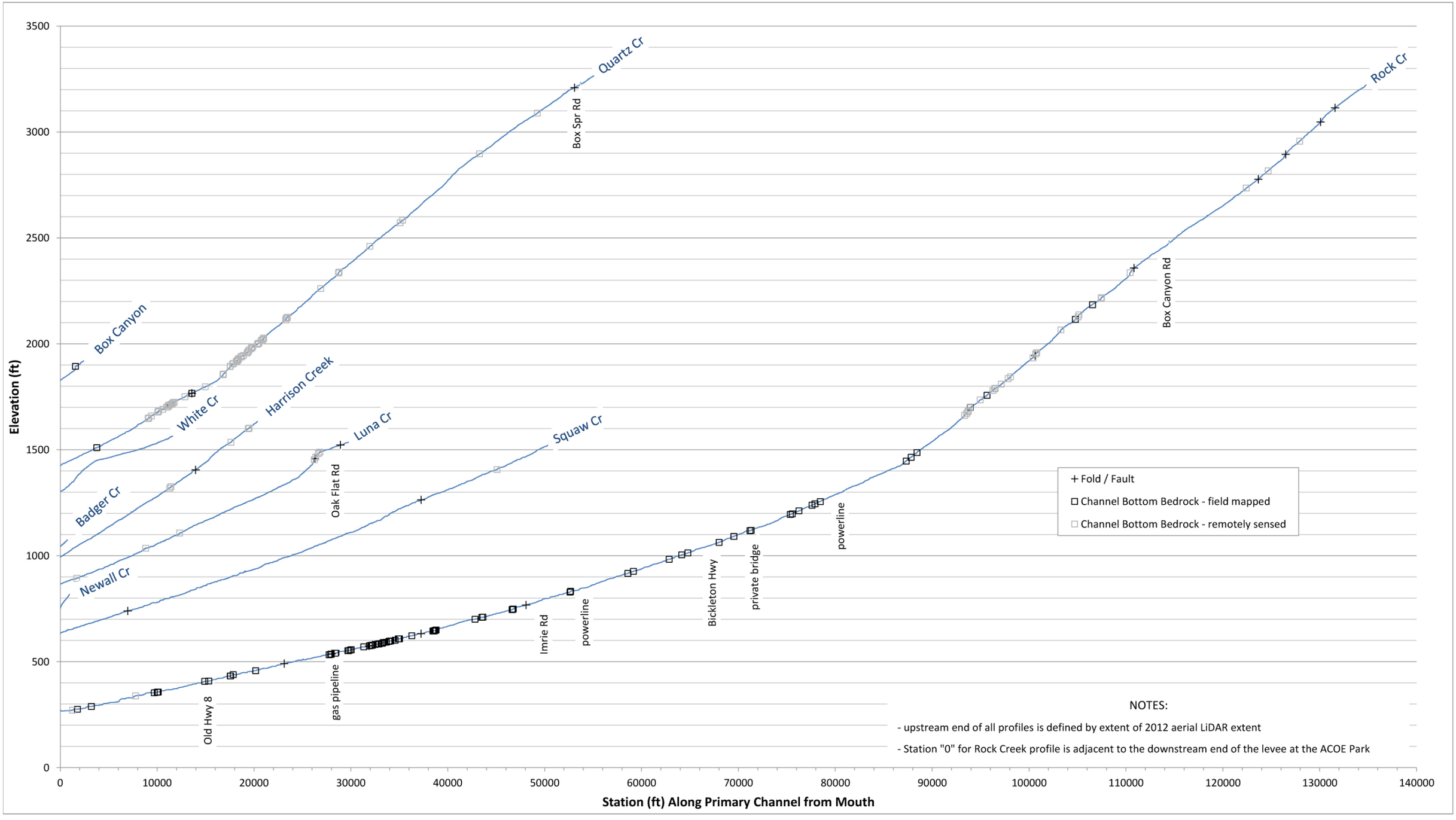
Elevation (ft)
3500
3000
2500
2000
1500
1000
500
0
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
100000
110000
120000
130000
140000
Station (ft) Along Primary Channel from Mouth
Box Canyon
White Cr
Harrison Creek
Luna Cr
Squaw Cr
Quartz Cr
Rock Cr
Badger Cr
Newall Cr
Box Spr Rd
Oak Flat Rd
Box Canyon Rd
Old Hwy 8
gas pipeline
Imrie Rd
powerline
Bickleton Hwy
private bridge
powerline
+ Fold / Fault
Channel Bottom Bedrock - field mapped
Channel Bottom Bedrock - remotely sensed
NOTES:
- upstream end of all profiles is defined by extent of 2012 aerial LiDAR extent
- Station "0" for Rock Creek profile is adjacent to the downstream end of the levee at the ACOE Park

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APPENDIX D - OBSERVATIONS ON 2012 LIDAR
Quality and Field Accuracy

High-resolution topography derived from aerial LiDAR collected in 2012 (WSI 2102) provides far superior detail than any other available topographic data sources. However, it was not without some data quality issues. While identified issues (figures D1 through D5) were generally inconsequential for processing and analyses in this study, they have relevant implications if used for hydraulic modeling or design purposes and should be accounted for accordingly.

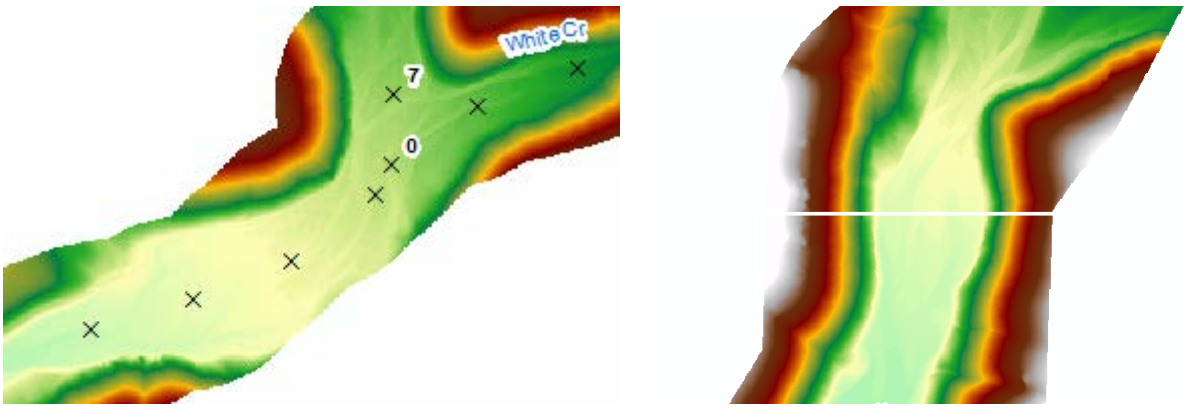

Figure D1. Examples from Squaw Cr where LiDAR doesn't wrap onto adjacent hillslope (left) and bare earth DEM had a seam (right).

Figure D2. Example of an artificial projection into stream channel by terrain data artifact (left) , in this case extending 17' into a channel with 24' toe width. Aerial photograph of same site (right).

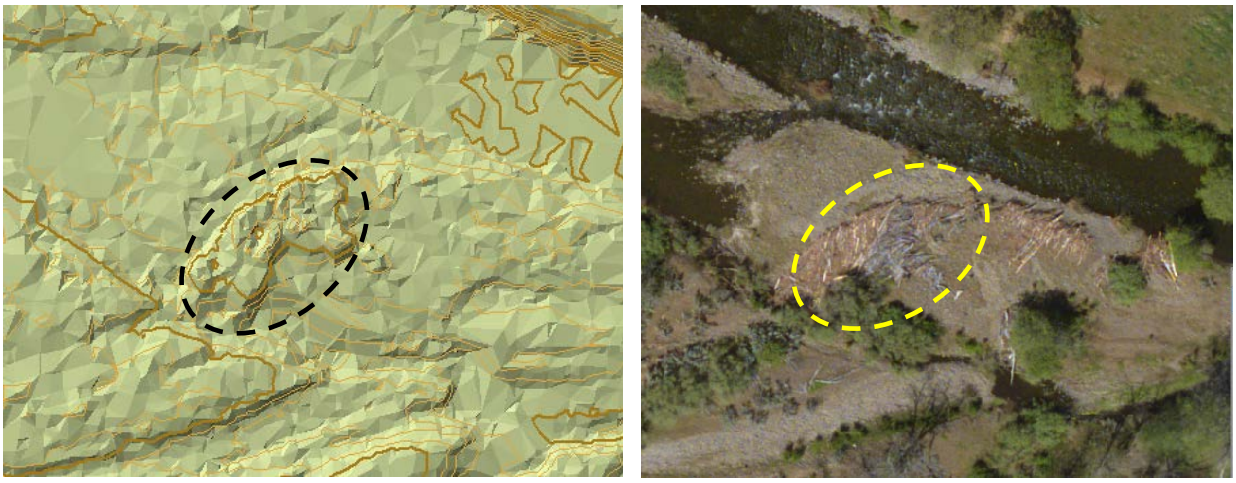

Figure D3. Example of woody debris raft causing a 2-3' high spot in the terrain model. Circled feature is likely reasonably stable to at least Q2. In the absence of stabilizing vegetation, it is likely mobile at Q25 and above. At discharges between Q2 and Q25, how to treat in a hydraulic model would depend on study objectives and would require discretion by the modeler.

Figure D4. Examples of blackberry patches 5-7' above ground surface, which typically has a 1-3' vertical effect on the terrain model, often less when under tree canopy.

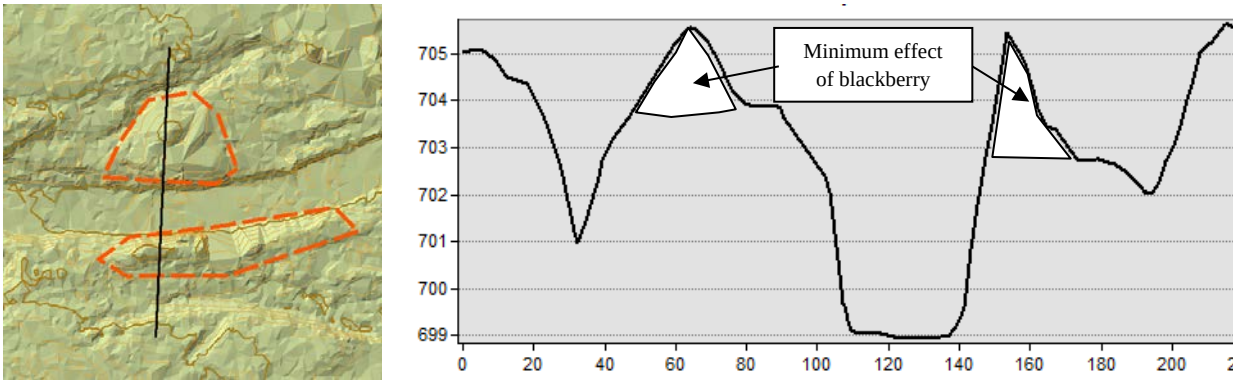

Figure D5. Example of blackberry effect on terrain model (left) on cross-section (right) has implications for hydraulic modeling.

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APPENDIX E - LOCATIONS FOR FURTHER INVESTIGATION

Locations for Further Evaluation and Screening for Potential Instream Enhancement

The lower 13.2 valley-miles (VM) of Rock Creek and lower 5.05 VM of Squaw Creek were screened for promising locations to collect more detailed site information, potentially leading to design and treatment of more persistent habitat enhancements. Low-flow habitat information was not available outside the screened area.

Aerial photography from 1938, 1960, 1969, 1981, 1990, 1996, 2006, 2009, and 2012 was used to evaluate channel migration and combined with 2012 low-flow habitat data mapped on 1:1,200 streamlines.

It needs to be emphasized that these are not locations being recommended for treatment. They are locations that have promise to provide longer duration effects associated with more intensive treatments (e.g. LWD jams). The value of treatment implementation at these sites is dependent upon fisheries population status (viability), management objectives, and further site evaluation.

Locations were selected (Table D1) where the primary stream channel occupied the same planform alignment through time. Field precision should be considered +/- 50 horizontal feet. Fields indicate:

SiteName: "R" or "S" prefix for Rock or Squaw creeks, respectively. Number indicate valley miles upstream from mouth of stream (railroad bridge for Rock Creek; Rock/Squaw confluence for Squaw).

Lat: degrees north latitude

Long: degrees west longitude

Priority: score from 1 (high) to 5 (very low) indicating potential benefits to salmonid habitat and likely duration; based on a combination of positive and negative elements, including:

- planform fidelity through time (+)
- valley margin contact (+)
- projecting valley margin contact (+)
- valley margin contact with bedrock (+)
- existing pool with maximum depth > 1.0m (+)
- particularly warm summer stream temperatures (-)
- exotic fish species documented in feature or nearby (-)
- poor site access for crews and/or equipment (-)

Primary channel occupation for a given year of aerial photography coverage:

- Y – "Yes"; primary channel occupied location in that year
- N – "No"; primary channel did not occupy location in that year
- U – "Unknown"; no aerial photography coverage at location that year
- M – "Maybe"; aerial coverage available, but unable to determine channel alignment

Table E1. Prioritized (1 = high; 5 = very low) sites for follow-up evaluation of instream enhancement potential.

Stream	Site	Lat	Long	Priority	Aerial1938	Aerial1960	Aerial1969	Aerial1981	Aerial1990	Aerial1996	Aerial2006	Aerial2012
Rock	S00.72	45.804046	-120.469505	3	M	Y	Y	Y	Y	Y	Y	Y
Rock	R02.97	45.733005	-120.432914	3	Y	Y	Y	Y	Y	Y	M	Y
Rock	R03.09	45.734783	-120.433403	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R03.19	45.736297	-120.433288	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R03.76	45.743583	-120.436759	4	M	N	M	Y	Y	Y	Y	Y
Rock	R05.65	45.769962	-120.440856	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R05.75	45.771713	-120.441017	4	Y	N	Y	Y	M	Y	Y	Y
Rock	R06.10	45.77618	-120.44345	3	Y	M	M	Y	Y	Y	Y	Y
Rock	R06.45	45.780536	-120.447814	2	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R06.64	45.783382	-120.447357	3	M	M	Y	Y	Y	Y	Y	Y
Rock	R06.75	45.784957	-120.447959	3	M	M	Y	Y	Y	Y	Y	Y
Rock	R06.92	45.786613	-120.450813	2	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.07	45.788394	-120.452774	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.14	45.789318	-120.453277	1	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.20	45.789985	-120.454307	2	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.31	45.791091	-120.45578	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.37	45.792198	-120.456169	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R07.88	45.795639	-120.465705	4	N	N	Y	Y	Y	Y	Y	Y
Rock	R07.97	45.795425	-120.467742	3	Y	M	M	Y	Y	Y	Y	Y
Rock	R08.86	45.800743	-120.484504	4	Y	Y	M	Y	Y	Y	Y	Y
Rock	R08.94	45.801303	-120.485786	5	N	N	M	Y	Y	Y	Y	Y
Rock	R09.09	45.802192	-120.488845	5	M	N	Y	Y	Y	Y	Y	Y
Rock	R09.27	45.801807	-120.49237	5	N	N	N	N	M	M	Y	Y
Rock	R09.37	45.802146	-120.494651	4	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R09.85	45.80421	-120.503776	4	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R11.86	45.824222	-120.524795	3	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R12.34	45.830921	-120.528221	4	Y	M	Y	M	Y	Y	Y	Y
Rock	R12.59	45.833511	-120.529014	2	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R12.71	45.835384	-120.529106	2	Y	Y	Y	Y	Y	Y	Y	Y
Rock	R12.80	45.836658	-120.530151	3	M	Y	Y	Y	Y	M	Y	Y
Rock	R13.02	45.839897	-120.530426	4	Y	Y	N	Y	Y	M	Y	Y
Rock	R13.11	45.841114	-120.530845	3	Y	Y	Y	Y	Y	Y	Y	Y
Squaw	S00.19	45.797176	-120.465126	2	Y	N	Y	Y	Y	Y	Y	Y
Squaw	S00.37	45.79972	-120.465667	4	M	N	N	Y	M	Y	Y	Y
Squaw	S00.90	45.805656	-120.472183	3	Y	Y	Y	Y	Y	Y	Y	Y
Squaw	S01.30	45.809528	-120.477439	2	M	Y	Y	Y	Y	Y	Y	Y
Squaw	S01.45	45.8115	-120.478881	3	U	Y	Y	Y	Y	Y	Y	Y
Squaw	S02.02	45.818058	-120.486206	3	U	Y	Y	Y	Y	Y	Y	Y
Squaw	S02.23	45.819683	-120.489639	3	U	Y	Y	Y	Y	Y	Y	Y
Squaw	S03.23	45.832988	-120.493721	4	U	Y	U	Y	Y	Y	Y	Y
Squaw	S03.57	45.83786	-120.494644	4	N	N	U	Y	Y	Y	Y	Y
Squaw	S03.65	45.838905	-120.494644	4	N	N	U	Y	Y	Y	Y	Y
Squaw	S04.45	45.84624	-120.485206	4	U	N	U	Y	Y	Y	Y	Y
Squaw	S04.54	45.846565	-120.483451	3	U	Y	U	Y	Y	Y	Y	Y
Squaw	S04.67	45.847248	-120.480789	3	U	Y	U	Y	Y	Y	Y	Y
Squaw	S04.84	45.847991	-120.477485	3	U	Y	U	Y	Y	Y	Y	Y