

## APPENDIX A: RIPARIAN VEGETATION GROUNDWATER / SURFACE WATER STUDY SAMPLING DESIGN

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**Susitna-Watana Hydroelectric Project  
(FERC No. 14241)**

**Riparian Instream Flow Study  
Study Plan Section 8.6**

**2014-2015 Study Implementation Report**

**Appendix A**

**Riparian Vegetation Groundwater / Surface Water  
Study Sampling Design**

Prepared for  
Alaska Energy Authority



**SUSITNA-WATANA HYDRO**

*Clean, reliable energy for the next 100 years.*

Prepared by  
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## LIST OF ACRONYMS AND SCIENTIFIC LABELS

Abbreviation	Definition
AEA	Alaska Energy Authority
ELS	Ecological Land Survey
FA	Focus Area
FERC	Federal Energy Regulatory Commission
GW	Groundwater Study 7.5
GW/SW	Groundwater/Surface Water
ISR	Initial Study Report
ITU	Integrated Terrain Unit
LiDAR	Light Detection and Ranging
PRM	Project River Mile
Project	Susitna-Watana Hydroelectric Project
RIFS	Riparian Instream Flow Study 8.6
RIP	Riparian Vegetation Study 11.6
RSP	Revised Study Plan
RVT	Rapid Vegetation Transect
TM	Technical Memorandum
TWG	Technical Workgroup
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey

## 1. INTRODUCTION

The Alaska Energy Authority (AEA) is preparing a License Application that will be submitted to the Federal Energy Regulatory Commission (FERC) for the Susitna-Watana Hydroelectric Project (Project) using the Integrated Licensing Process. The Project is located on the Susitna River, an approximately 300-mile long river in the South-central Region of Alaska. The Project's dam site will be located at Project River Mile (PRM) 187.1. The Project construction and operation would have an effect on the flows downstream of the dam site, the degree of which will ultimately depend on final Project design and operations.

Seasonal changes to the Susitna River hydro regime due to Project operations may include lower discharges during the summer reservoir refill period and higher discharges during the winter relative to current hydrologic conditions. In addition to these seasonal changes, the Project may be operated in a load-following mode to meet energy demands on an hourly basis. During load-following operations, the amount of water released from the reservoir would cycle daily according to energy demands such that higher volumes would be released during peak-load hours relative to off-peak hours. Seasonal and daily/hourly changes to Susitna River hydrology would influence downstream aquatic and riparian resources and processes related to floodplain groundwater depths and surface water floodplain inundation. To address potential downstream effects of Project operations AEA has developed, and FERC approved, a riparian groundwater vegetation study plan (detailed in Groundwater Study [GW] 7.5. Revised Study Plan [RSP] Section 7.5.4.4, Riparian Instream Flow Study 8.6 [RIFS] RSP Section 8.6.3.6 [AEA 2012], and Riparian Instream Flow, Groundwater, and Riparian Vegetation Studies FERC Determination Response submitted to the FERC July 1, 2013[R2 et al. 2013]).

During the October 17, 2014 RIFS and Riparian Vegetation Study 11.6 (RIP) Initial Study Report (ISR) Meeting, Bob Henszey, U.S. Fish & Wildlife Service (USFWS), and Greg Auble, U.S. Geological Survey (USGS), requested a detailed accounting of riparian vegetation groundwater and surface water (GW/SW) sampling design be presented to the Technical Workgroup (TWG) for review. This Technical Memorandum (TM) has been developed to present details concerning riparian vegetation GW/SW sampling design broadly described in RSP Section 8.6.3.6 Characterize Natural Floodplain Vegetation Groundwater and Surface Water Maintenance Hydroregime. The TM details include: 1) riparian vegetation GW/SW sampling design, and 2) number and locations of riparian vegetation sample plots. The riparian vegetation GW/SW sampling design builds on the RIFS (RSP Section 8.6) and RIP (RSP Section 11.6) designs, and the Riparian Instream Flow, Groundwater, and Riparian Vegetation Studies FERC Determination Response (R2 et al. 2013).

## 2. RIPARIAN VEGETATION GW/SW STUDY AREAS

As established in RSP Sections 8.6 and 11.6, and the June 2013 FERC Determination Response (R2 et al. 2013), riparian GW/SW study sites are located at Focus Areas (FA) FA-104 (Whiskers Slough), FA-115 (Slough 6A), FA-128 (Slough 8A), and FA-138 (Gold Creek) (Figure 1), and four Lower River transect sites (Figure 2). Additional satellite riparian vegetation plot locations for under- or non-represented ecotypes will be determined prior to the next study year. New

floodplain water body surface water gages were deployed in 2013 to be utilized in the lateral gradient hydrologic domain analysis and may be used in the next study year for satellite riparian vegetation plot locations.

### **3. METHODS**

The Riparian Vegetation Sampling design covering Project Area and Focus Area vegetation mapping and plant community characterization has been presented in the Riparian Vegetation Study (RSP Section 11.6.4). Riparian Vegetation GW/SW study hydrologic measurements and modeling designs have been presented in RIFS RSP Section 8.6.3.6 and GW RSP Section 7.5.4.4. Both an overview of riparian vegetation GW/SW sampling methods and additional details concerning riparian vegetation GW/SW sampling design have been developed since submittal of the RSP.

#### **3.1. Hydrology Observations and Modeling**

##### **3.1.1. Groundwater and Surface Water Measurements**

Water surface elevations are measured at both groundwater stations and surface-water stations within each of the Focus Areas. Groundwater depths are measured at wells located in FA-104 (Whiskers Slough), FA-115 (Slough 6A), FA-128 (Slough 8A), and FA-138 (Gold Creek). GW/SW measurements are used to develop groundwater statistics used in the riparian vegetation frequency response curve analyses (Henszey et al. 2004). These data from the various stations, including those associated with specific transects for analysis of GW/SW interactions, cover the range of hydrologic conditions from summer through fall freeze-up, winter, and spring snowmelt and breakup.

In 2014, 42 additional staff gages were installed in various Focus Areas and other locations to provide data for lateral hydrologic gradient analyses. A subset of these gages may be utilized to capture additional satellite riparian vegetation sample plots for the riparian vegetation GW/SW study.

##### **3.1.2. Groundwater and Surface Water Modeling**

Groundwater measurements will be used to generate seasonal water-depth statistics for the riparian vegetation response curve analyses (Henszey et al. 2004; Rains et al. 2004). Response curve analysis details can be found in RSP Section 8.6.3.6.2 and follow Henszey et al. 2004 methodology. Surface water floodplain inundation frequency maps will be generated for the entire study area using 1-D HEC-RAS model with RAS-MAPPER software. Two-dimensional modeling will be utilized to generate flood frequency inundation maps for the Focus Areas as discussed in the Fluvial Geomorphology Modeling Study RSP Section 6.6.

## 3.2. Riparian Vegetation Sampling Methods

### 3.2.1. Sample Design

Three sampling designs are currently being employed for the riparian vegetation study as described in Study 11.6 ISR, Part A, Section 3.2.1.1. These include Ecological Land Survey (ELS) plot sampling at Focus Areas, ELS plot sampling at Non-Focus Area (i.e., Satellite Areas), and Integrated Terrain Unit (ITU) plot sampling along ITU mapping transects.

A fourth sample design will be employed for the purposes of the riparian vegetation GW/SW study. Rapid vegetation transects (RVT) will be utilized to sample vegetation frequency along GW transects for use in developing riparian ecotype and plant species response curves as detailed in RIFS RSP Section 8.6.3.6.2 (Figures 3-8).

#### 3.2.1.1. Rapid Vegetation Transects

A minimum of 5 RVTs will be placed in each ecotype along each GW well transect in addition to any intensive sample plots (Figures 3-5). The RVTs will be evenly distributed along elevation gradients of each ecotype as determined by Light Detection and Ranging (LiDAR) digital elevation model and Focus Area GW transect location. Figure 9 displays a conceptual example of the placement of RVTs in ecotypes along the GW transect in FA-115 (Slough 6A). RVTs will be 25 meters in length and oriented perpendicular to the associated GW transect. Along each RVT, vegetation will be measured at sampling points spaced one meter apart (25 points total) using the point-intercept method (Figure 10). Point-intercept sampling at each point along RVTs will be conducted using the same methods used for points along vegetation sampling lines in ELS plots as described in Study 11.6 ISR, Part A, Section 4.2.5. Each RVT will be considered the sampling unit. ELS plots at Focus Areas will be used in addition to RVTs to model plant frequency response curves along GW gradients.

#### 3.2.1.2. Sample Size for Groundwater Wells, Vegetation Plots, and Gaging Stations

Table 1 provides the sample size for GW wells in each ecotype and Focus Area. There are 22 existing aquatic resource wells, 37 existing riparian resource wells, and 5 proposed riparian resource wells for a total of 64 GW wells located in 13 ecotypes.

Table 2 provides the total number of planned and completed ELS plots and planned RVTs by ecotype and study location in the Middle Susitna River. The table also displays the spatial extent (acres) and percent of the total area of each Focus Area for each ecotype. There are 132 planned ELS plots, 40 completed ELS plots, and 75 planned RVTs for a total of 247 vegetation plots in 17 ecotypes.

Table 3 displays the number of existing riparian GW wells and RVTs in the Lower Susitna River. There are 10 existing GW wells and 30 planned RVTs.

Table 4 displays the sample size for existing gage stations by ecotype, study area, and purpose. There are 7 existing gaging stations with the purpose of monitoring GW and 35 existing gaging stations with the purpose of monitoring SW for a total of 42 gaging stations in 13 ecotypes.

Note that Table 2 does not include completed and planned ITU vegetation mapping plots as they are not utilized in the riparian vegetation GW/SW study. ITU mapping plots include:



Completed ITU mapping plots:	322
Planned ITU mapping plots:	210
Total:	532

### **3.3. Groundwater and Surface Water Direct Gradient Analyses**

A direct gradient analysis (Whittaker 1967) will be used to characterize the relationship between GW/SW gradients and plant community composition throughout the study area as described in RSP Section 8.6. Non-linear models will be used to fit plant species response curves to water-level gradients ranging from shallow GW to standing water as described in Henszey et al. (2004). Groundwater summary statistics (e.g., 7 or 10 day high water average depth) and riparian plant frequency measurements will be used in the analysis. One-dimensional and 2-D hydraulic models will generate floodplain inundation curves to be utilized in a direct gradient analysis of current distribution of floodplain vegetation relative to frequency and duration of inundation using the gaging period of record data. Surface water direct gradient methods will follow those used by Auble et al. (1994), Franz and Bazzaz (1977); and Rains et al. (2004).

#### 4. LITERATURE CITED

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## 5. TABLES

**Table 1. Middle River wells.**

Ecotype	Focus Area	Existing Aquatic Wells	Existing Riparian Wells	Planned Riparian Wells	Grand Total
Lowland Organic-rich Bluejoint-Herb Meadow	FA-115		1		1
<b>Lowland Organic-rich Bluejoint-Herb Meadow Total</b>			<b>1</b>		<b>1</b>
Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated	FA-138	1			1
<b>Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated Total</b>		<b>1</b>			<b>1</b>
Riverine Loamy Ostrich Fern Meadow	FA-104		3		3
	FA-115		3		3
	FA-138	2			2
<b>Riverine Loamy Ostrich Fern Meadow Total</b>		<b>2</b>	<b>6</b>		<b>8</b>
Riverine Loamy Spruce-Birch Forest	FA-104	1	1	1	3
	FA-115		3		3
<b>Riverine Loamy Spruce-Birch Forest Total</b>		<b>1</b>	<b>4</b>	<b>1</b>	<b>6</b>
Riverine Sandy Alder-Willow Tall Shrub	FA-115	1			1
	FA-128	1	4		5
<b>Riverine Sandy Alder-Willow Tall Shrub Total</b>		<b>2</b>	<b>4</b>		<b>6</b>
Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub	FA-104	3	2		5
	FA-128	4			4
	FA-138	2			2
<b>Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub Total</b>		<b>9</b>	<b>2</b>		<b>11</b>
Riverine Sandy Bluejoint-Herb Meadow	FA-104			1	1
	FA-115		1		1
<b>Riverine Sandy Bluejoint-Herb Meadow Total</b>			<b>1</b>	<b>1</b>	<b>2</b>
Riverine Sandy Pole-sized Balsam Poplar Forest	FA-104		1		1
<b>Riverine Sandy Pole-sized Balsam Poplar Forest Total</b>			<b>1</b>		<b>1</b>

Ecotype	Focus Area	Existing Aquatic Wells	Existing Riparian Wells	Planned Riparian Wells	Grand Total
Riverine Sandy Timber-sized Balsam Poplar Forest	FA-104	1	1		2
	FA-115			1	1
	FA-128	1	6		7
<b>Riverine Sandy Timber-sized Balsam Poplar Forest Total</b>		<b>2</b>	<b>7</b>	<b>1</b>	<b>10</b>
Riverine Sandy-Loamy Balsam Poplar Large Tree Forest	FA-104	1			1
	FA-128	1	5		6
	FA-138	1			1
<b>Riverine Sandy-Loamy Balsam Poplar Large Tree Forest Total</b>		<b>3</b>	<b>5</b>		<b>8</b>
Riverine Sandy-Loamy Spruce-Balsam Poplar Forest	FA-104		1		1
	FA-115			1	1
	FA-128		2		2
	FA-138	1			1
<b>Riverine Sandy-Loamy Spruce-Balsam Poplar Forest Total</b>		<b>1</b>	<b>3</b>	<b>1</b>	<b>5</b>
Riverine Wet Sedge-Forb Marsh	FA-104			1	1
	FA-115	1			1
<b>Riverine Wet Sedge-Forb Marsh Total</b>		<b>1</b>		<b>1</b>	<b>2</b>
Upland Loamy Spruce-Birch Forest	FA-104		2		2
	FA-115		1		1
<b>Upland Loamy Spruce-Birch Forest Total</b>			<b>3</b>		<b>3</b>
<b>Grand Total</b>		<b>22</b>	<b>37</b>	<b>5</b>	<b>64</b>

**Table 2. Middle River vegetation.**

Ecotype	Study Location	Focus Area Spatial Extent (acres)	% of Total Focus Area	Planned ELS Plots	Completed ELS Plots	Planned Rapid Veg Transects	Total
Lowland Loamy Birch Forest	FA-115	6.7	1.4%	2			2
<b>Lowland Loamy Birch Forest Total</b>				<b>2</b>			<b>2</b>
Lowland Organic-rich Bluejoint-Herb Meadow	FA-115	11.3	2.3%	1	1	5	7
<b>Lowland Organic-rich Bluejoint-Herb Meadow Total</b>				<b>1</b>	<b>1</b>	<b>5</b>	<b>7</b>
Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated	FA-104	7.8	1.2%		2		2
	FA-115	17.6	3.6%	1	1		2
	FA-128	39.4	6.3%	5			5
	FA-138	29.5	7.9%	2			2
	Satellite Area	--	--	1	1		2
<b>Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated Total</b>				<b>9</b>	<b>4</b>		<b>13</b>
Riverine Loamy Birch Forest	FA-115	8.8	1.8%	2			2
<b>Riverine Loamy Birch Forest Total</b>				<b>2</b>			<b>2</b>
Riverine Loamy Large Umbel Meadow	FA-138	6.4	1.7%	1			1
	Satellite Area	--	--	3	2		5
<b>Riverine Loamy Large Umbel Meadow Total</b>				<b>4</b>	<b>2</b>		<b>6</b>
Riverine Loamy Ostrich Fern Meadow	FA-104	23.8	3.7%	2	2	5	9
	FA-115	37.5	7.6%	2		5	7
	FA-138	7.7	2.1%	4			4
	Satellite Area	--	--	4			4
<b>Riverine Loamy Ostrich Fern Meadow Total</b>				<b>12</b>	<b>2</b>	<b>10</b>	<b>24</b>

Ecotype	Study Location	Focus Area Spatial Extent (acres)	% of Total Focus Area	Planned ELS Plots	Completed ELS Plots	Planned Rapid Veg Transects	Total
Riverine Loamy Spruce-Birch Forest	FA-104	182.0	28.3%	5	2		7
	FA-115	47.7	9.6%	3	2		5
	FA-128	7.7	1.2%			5	5
<b>Riverine Loamy Spruce-Birch Forest Total</b>				<b>8</b>	<b>4</b>	<b>5</b>	<b>17</b>
Riverine Sandy Alder-Willow Tall Shrub	FA-115	4.4	0.9%			5	5
	FA-128	92.9	15.0%	7		5	12
	FA-138	26.9	7.3%	2		5	7
	Satellite Area	--	--	1			1
<b>Riverine Sandy Alder-Willow Tall Shrub Total</b>				<b>10</b>		<b>15</b>	<b>25</b>
Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub	FA-104	37.7	5.9%	1	3	5	9
	FA-115	7.2	1.5%	1	1		2
	FA-128	39.9	6.4%	5		5	10
	FA-138	22.7	6.1%	1		5	6
	Satellite Area	--	--	1	1		2
<b>Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub Total</b>				<b>9</b>	<b>5</b>	<b>15</b>	<b>29</b>
Riverine Sandy Bluejoint-Herb Meadow	FA-104	15.5	2.4%	2			2
	FA-115	13.4	2.7%	2	3	5	10
	Satellite Area	--	--	4			4
<b>Riverine Sandy Bluejoint-Herb Meadow Total</b>				<b>8</b>	<b>3</b>	<b>5</b>	<b>16</b>

Ecotype	Study Location	Focus Area Spatial Extent (acres)	% of Total Focus Area	Planned ELS Plots	Completed ELS Plots	Planned Rapid Veg Transects	Total
Riverine Sandy Pole-sized Balsam Poplar Forest	FA-104	10.5	1.6%	1	3	5	9
	FA-115	14.1	2.9%	4			4
	FA-128	45.2	7.3%	5			5
	FA-138	20.2	5.5%	1		5	6
	Satellite Area	--	--	2			2
<b>Riverine Sandy Pole-sized Balsam Poplar Forest Total</b>				<b>13</b>	<b>3</b>	<b>10</b>	<b>26</b>
Riverine Sandy Spruce Forest	Satellite Area	--	--	4			4
<b>Riverine Sandy Spruce Forest Total</b>				<b>4</b>			<b>4</b>
Riverine Sandy Timber-sized Balsam Poplar Forest	FA-104	22.1	3.4%		4	5	9
	FA-115	55.9	11.3%	3	1	5	9
	FA-128	30.1	4.8%	4		5	9
	FA-138	68.2	18.4%	5		5	10
	Satellite Area	--	--	1			1
<b>Riverine Sandy Timber-sized Balsam Poplar Forest Total</b>				<b>13</b>	<b>5</b>	<b>20</b>	<b>38</b>
Riverine Sandy-Loamy Balsam Poplar Large Tree Forest	FA-104	2.5	0.4%			5	5
	FA-115	32.3	6.5%	4			4
	FA-128	159.6	25.7%	8		5	13
	FA-138	30.4	8.2%	2			2
	Satellite Area	--	--	2			2
<b>Riverine Sandy-Loamy Balsam Poplar Large Tree Forest Total</b>				<b>16</b>		<b>10</b>	<b>26</b>



Ecotype	Study Location	Focus Area Spatial Extent (acres)	% of Total Focus Area	Planned ELS Plots	Completed ELS Plots	Planned Rapid Veg Transects	Total
Riverine Sandy-Loamy Spruce-Balsam Poplar Forest	FA-104	33.7	5.2%	1	4	5	10
	FA-115	46.1	9.3%	5			5
	FA-128	159.6	25.7%	4		5	9
	FA-138	42.5	11.5%	2			2
	Satellite Area	--	--	2			2
<b>Riverine Sandy-Loamy Spruce-Balsam Poplar Forest Total</b>				<b>14</b>	<b>4</b>	<b>10</b>	<b>28</b>
Riverine Wet Sedge-Forb Marsh	FA-115	6.2	1.2%		1	5	6
	FA-138	10.9	2.9%	2		5	7
	Satellite Area	--	--	2	1		3
<b>Riverine Wet Sedge-Forb Marsh Total</b>				<b>4</b>	<b>2</b>	<b>10</b>	<b>16</b>
Upland Loamy Spruce-Birch Forest	FA-104	158.1	24.6%	3	3	5	11
	FA-115	6.6	1.3%		2	5	7
<b>Upland Loamy Spruce-Birch Forest Total</b>				<b>3</b>	<b>5</b>	<b>10</b>	<b>18</b>
<b>Grand Total</b>				<b>132</b>	<b>40</b>	<b>125</b>	<b>297</b>

**Table 3. Lower River wells and vegetation.**

<b>Ecotype</b>	<b>Transect</b>	<b>Existing Wells</b>	<b>Planned Rapid Veg Transects</b>
Riverine Sandy Alder-Willow Tall Shrub	LR1	1	3
	LR4	3	9
<b>Riverine Sandy Alder-Willow Tall Shrub Total</b>		<b>4</b>	<b>12</b>
Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub	LR4	1	3
<b>Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub Total</b>		<b>1</b>	<b>3</b>
Riverine Sandy Pole-sized Balsam Poplar Forest	LR1	1	3
	LR2	1	3
<b>Riverine Sandy Pole-sized Balsam Poplar Forest Total</b>		<b>2</b>	<b>6</b>
Riverine Sandy Rose-Willow Low Shrub	LR3	1	3
<b>Riverine Sandy Rose-Willow Low Shrub Total</b>		<b>1</b>	<b>3</b>
Riverine Sandy Timber-sized Balsam Poplar Forest	LR2	1	3
	LR3	1	3
<b>Riverine Sandy Timber-sized Balsam Poplar Forest Total</b>		<b>2</b>	<b>6</b>
<b>Grand Total</b>		<b>10</b>	<b>30</b>

**Table 4. Existing gage stations.**

Ecotype	Purpose			Grand Total
	Study Location	Groundwater	Surface Water	
Riverine Circumneutral Beaver Pond	FA-115		2	2
	FA-138		1	1
	FA-141		1	1
	Satellite Area		2	2
<b>Riverine Circumneutral Beaver Pond Total</b>			<b>6</b>	<b>6</b>
Riverine Circumneutral Glacial River	FA-104	2	1	3
	FA-115		2	2
	FA-128	2	2	4
	FA-138	1	2	3
	FA-144		1	1
<b>Riverine Circumneutral Glacial River Total</b>		<b>5</b>	<b>8</b>	<b>13</b>
Riverine Complex	FA-144		1	1
	Satellite Area		1	1
<b>Riverine Complex Total</b>			<b>2</b>	<b>2</b>
Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated	FA-128		1	1
	FA-138		2	2
	FA-144		1	1
<b>Riverine Gravelly Wormwood-Horsetail Barrens and Partially Vegetated Total</b>			<b>4</b>	<b>4</b>
Riverine Loamy Birch Forest	Satellite Area		1	1
<b>Riverine Loamy Birch Forest Total</b>			<b>1</b>	<b>1</b>
Riverine Loamy Ostrich Fern Meadow	FA-115		1	1
	Satellite Area		1	1
<b>Riverine Loamy Ostrich Fern Meadow Total</b>			<b>2</b>	<b>2</b>
Riverine Loamy Spruce-Birch Forest	Satellite Area		1	1
<b>Riverine Loamy Spruce-Birch Forest Total</b>			<b>1</b>	<b>1</b>

Ecotype	Purpose			Grand Total
	Study Location	Groundwater	Surface Water	
Riverine Sandy Alder-Willow Tall Shrub	FA-128	1	1	2
	FA-138		1	1
	FA-141		1	1
	Satellite Area		1	1
<b>Riverine Sandy Alder-Willow Tall Shrub Total</b>		<b>1</b>	<b>4</b>	<b>5</b>
Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub	FA-128		1	1
<b>Riverine Sandy Balsam Poplar Sapling-Alder-Willow Tall Shrub Total</b>			<b>1</b>	<b>1</b>
Riverine Sandy Bluejoint-Herb Meadow	FA-115		1	1
	Satellite Area		2	2
<b>Riverine Sandy Bluejoint-Herb Meadow Total</b>			<b>3</b>	<b>3</b>
Riverine Sandy Timber-sized Balsam Poplar Forest	FA-144		1	1
<b>Riverine Sandy Timber-sized Balsam Poplar Forest Total</b>			<b>1</b>	<b>1</b>
Riverine Sandy-Loamy Spruce-Balsam Poplar Forest	FA-138	1		1
	Satellite Area		1	1
<b>Riverine Sandy-Loamy Spruce-Balsam Poplar Forest Total</b>		<b>1</b>	<b>1</b>	<b>2</b>
Riverine Slough	FA-104		1	1
<b>Riverine Slough Total</b>			<b>1</b>	<b>1</b>
<b>Grand Total</b>		<b>7</b>	<b>35</b>	<b>42</b>

## 6. FIGURES

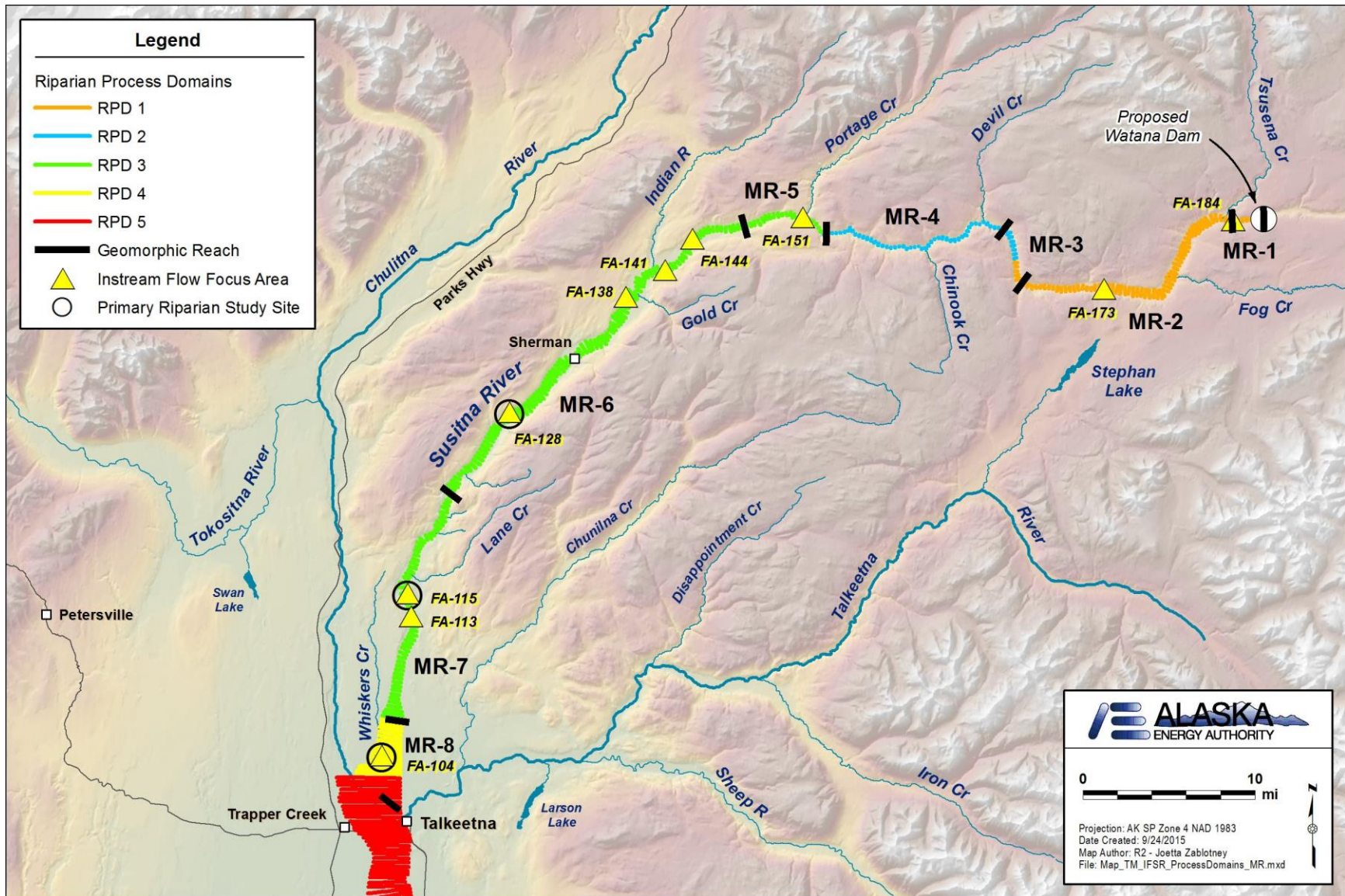


Figure 1. Riparian process domains, Focus Areas and riparian study sites.



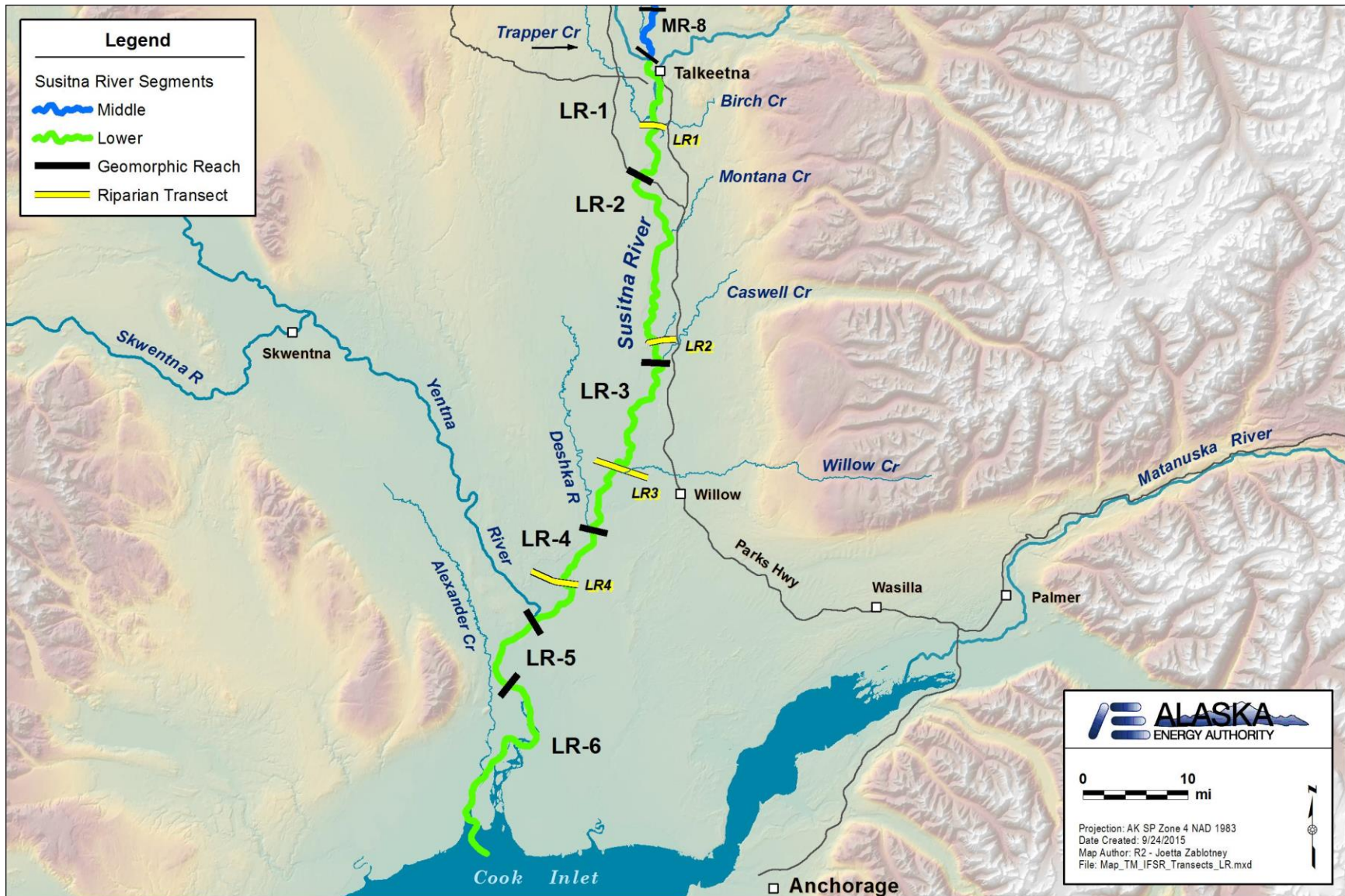


Figure 2. Lower River riparian transects locations.



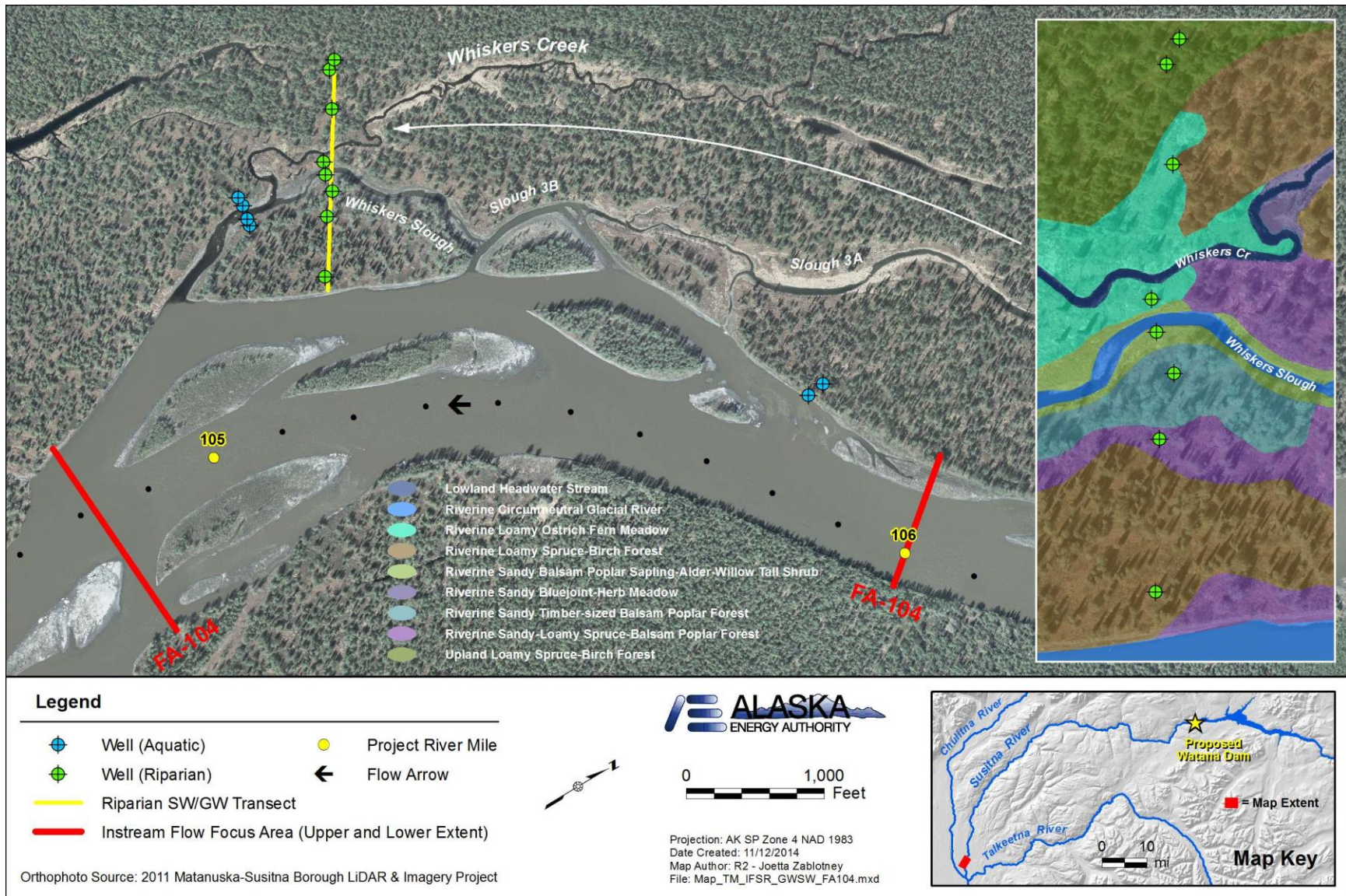


Figure 3. FA-104 (Whiskers Slough) Riparian and aquatic well locations. Inset: Ecotype overlay of riparian well transect.



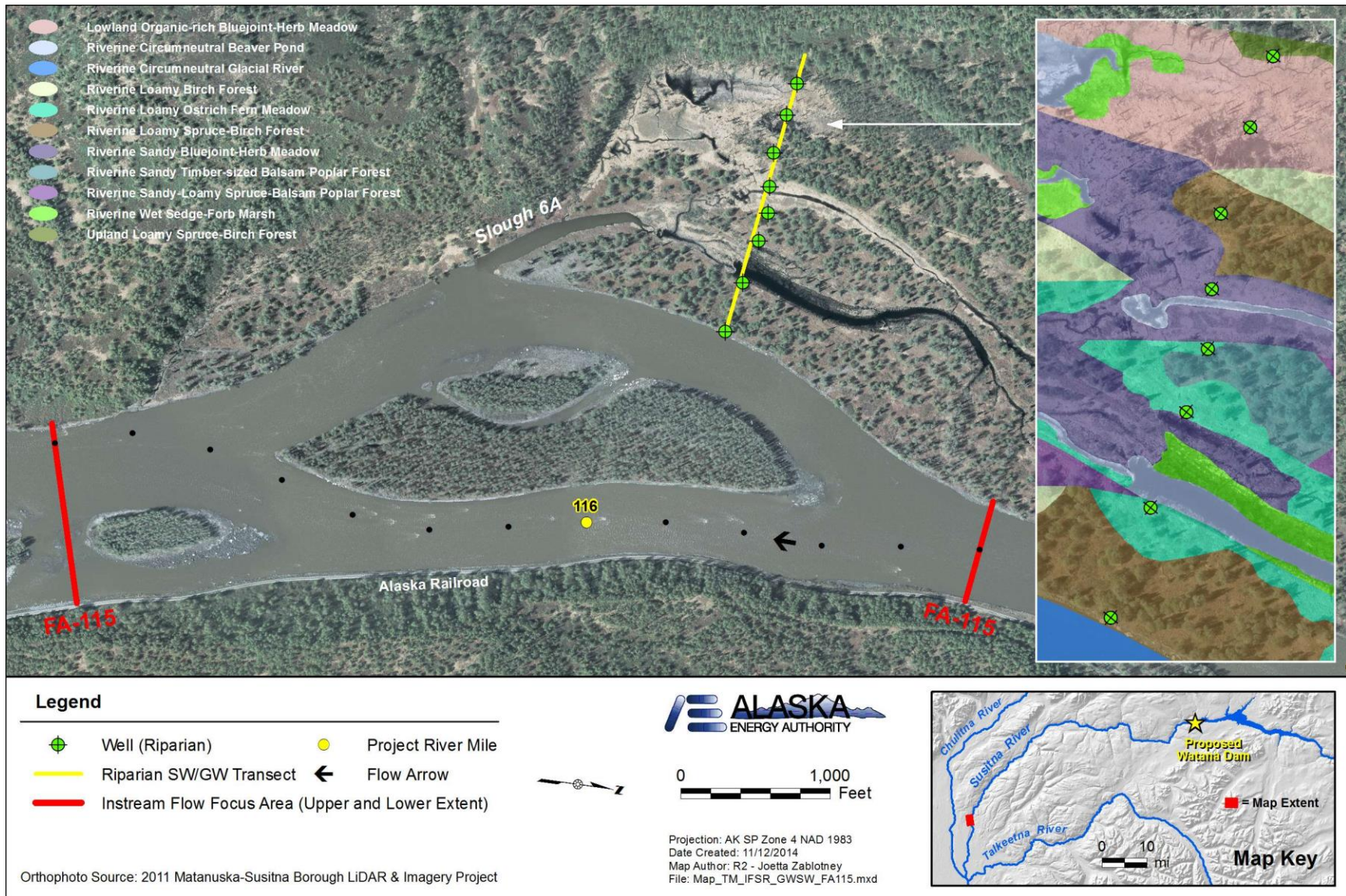


Figure 4. FA-115 (Slough 6A) Riparian and aquatic well locations. Inset: Ecotype overlay of riparian well transect.



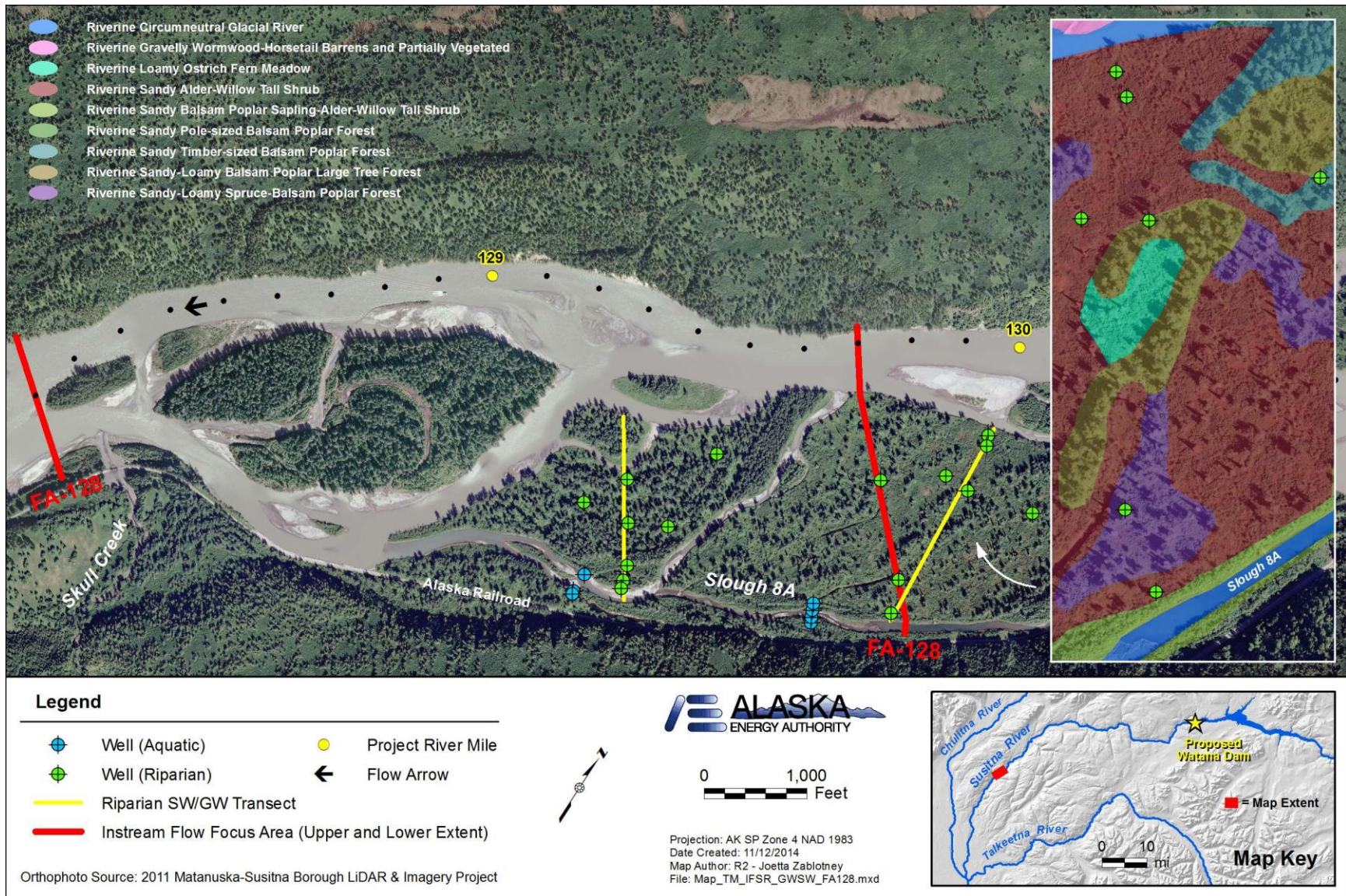


Figure 5. FA-128 (Slough 8A) Riparian and aquatic well locations. Inset: Ecotype overlay of riparian well transect.





Figure 6. FA-138 (Gold Creek) Riparian and aquatic well locations. Inset: Ecotype overlay of riparian well transect.



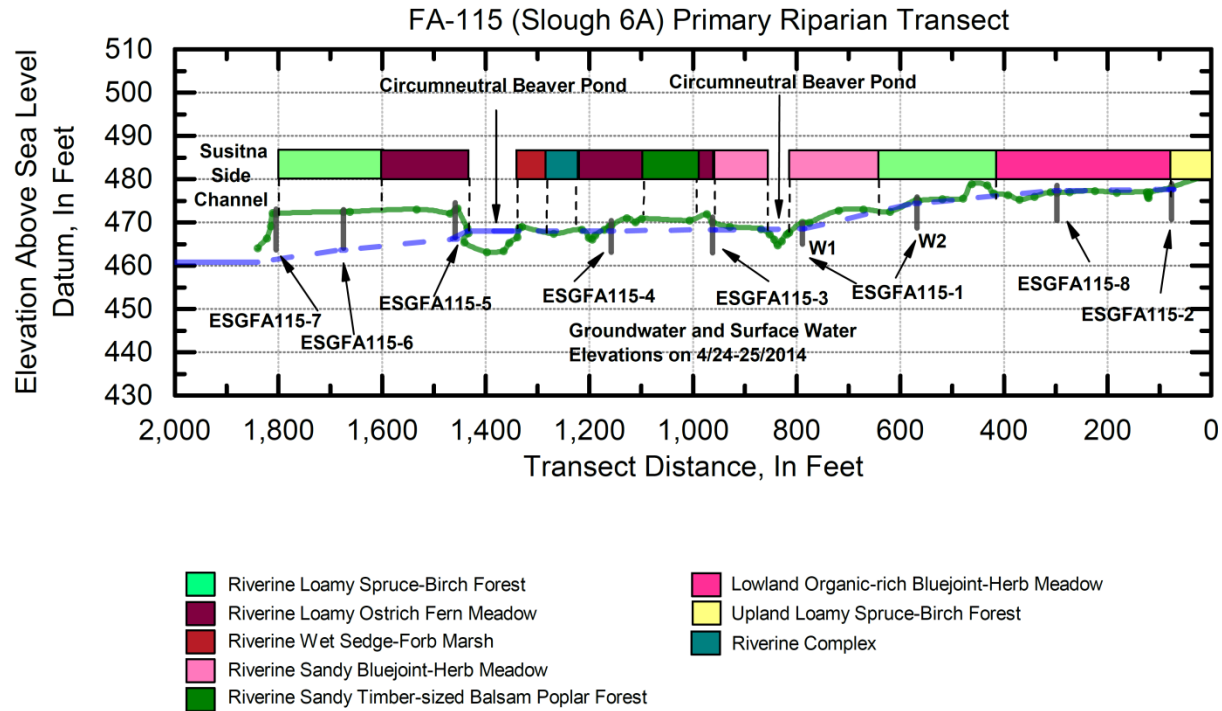
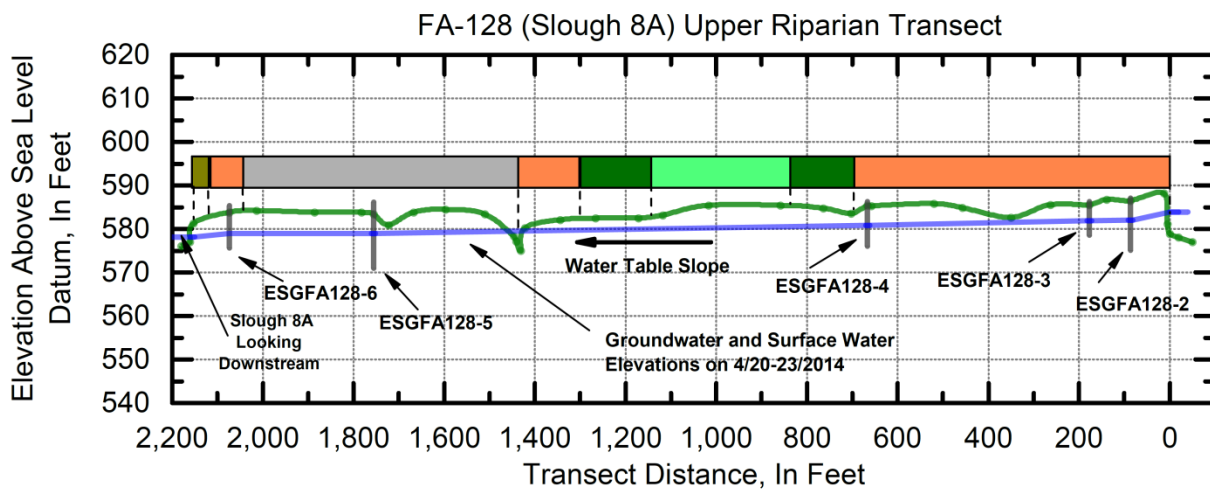


Figure 7. FA-115 (Slough 6A) Primary riparian well transect with ecotype overlay, well locations, and groundwater and surface water.



**NOTE: DRAFT - Some WL Measurements Not Final Yet**

Figure 8. FA-128 (Slough 8A) Upper riparian well transect with ecotype overlay, well locations, and groundwater and surface water.

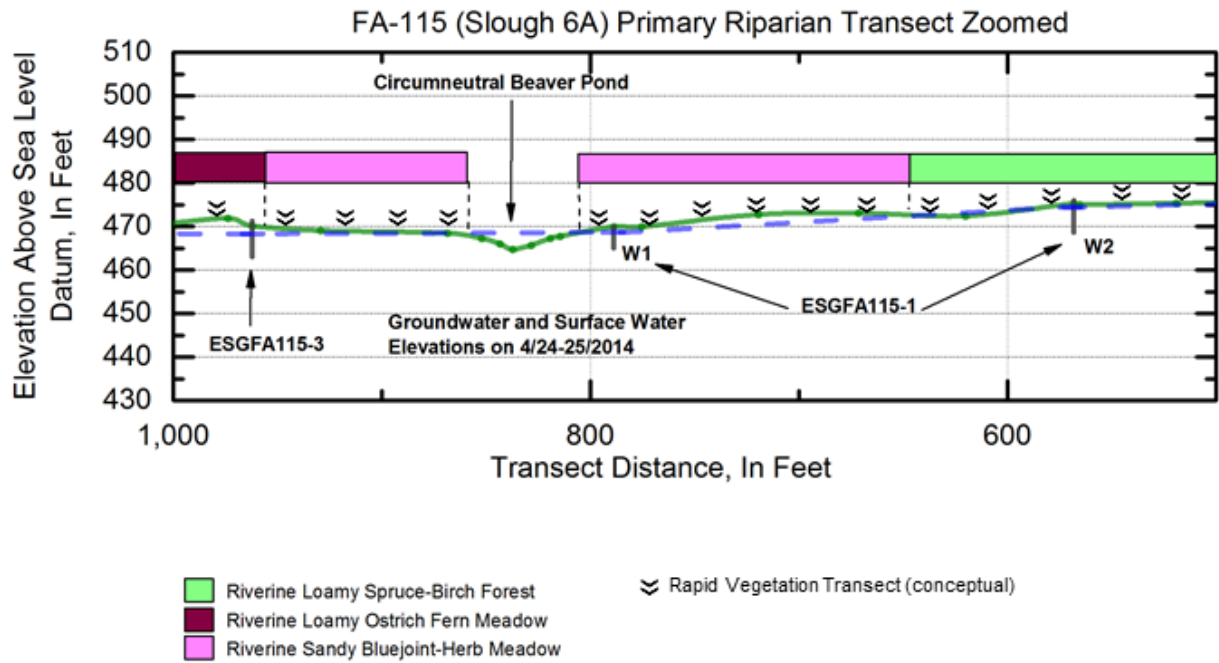


Figure 9. FA-115 (Slough 6A) Primary riparian transect with ecotypes and rapid vegetation transect (RVT) locations.

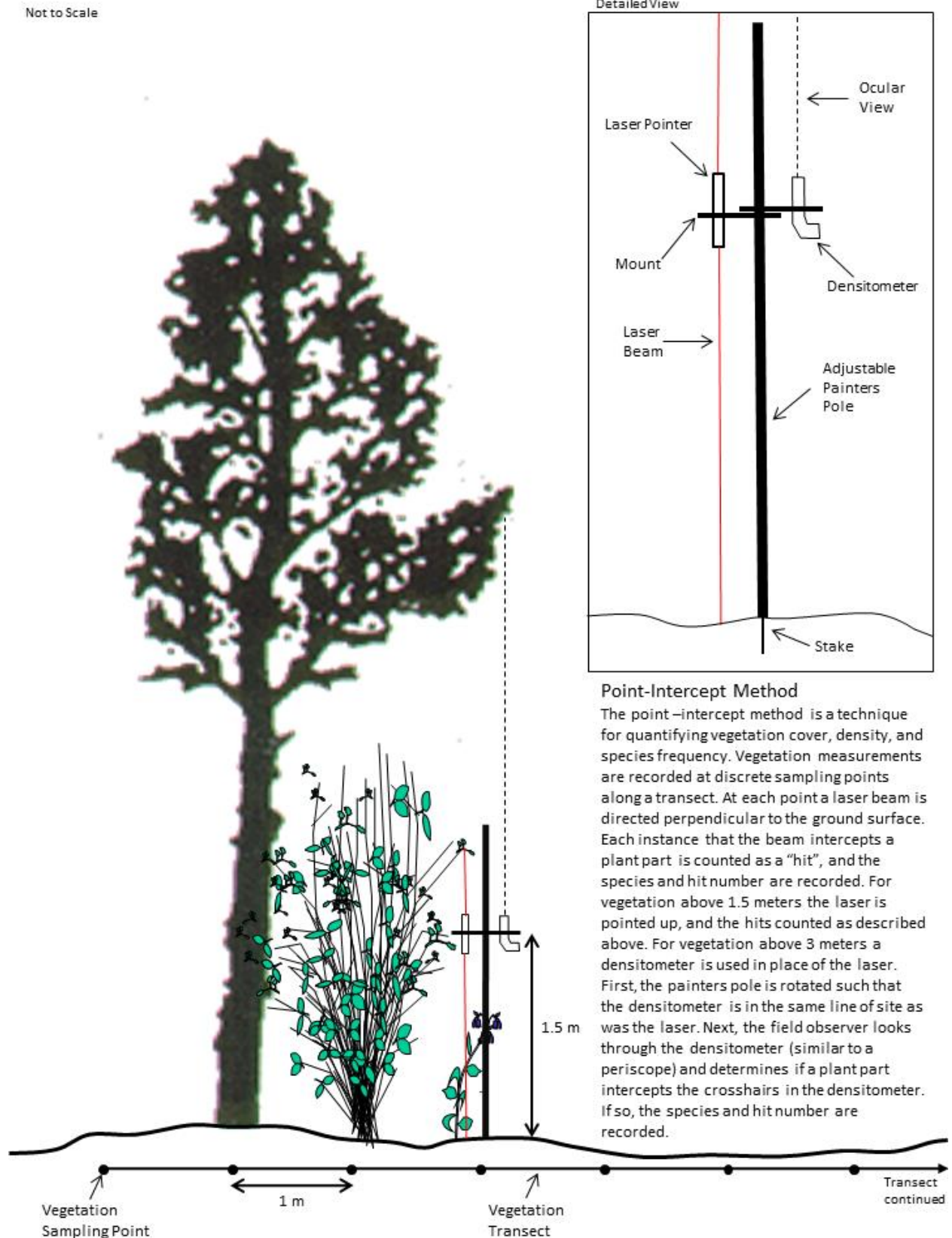


Figure 10. Riparian vegetation transect point-intercept sampling schematic.