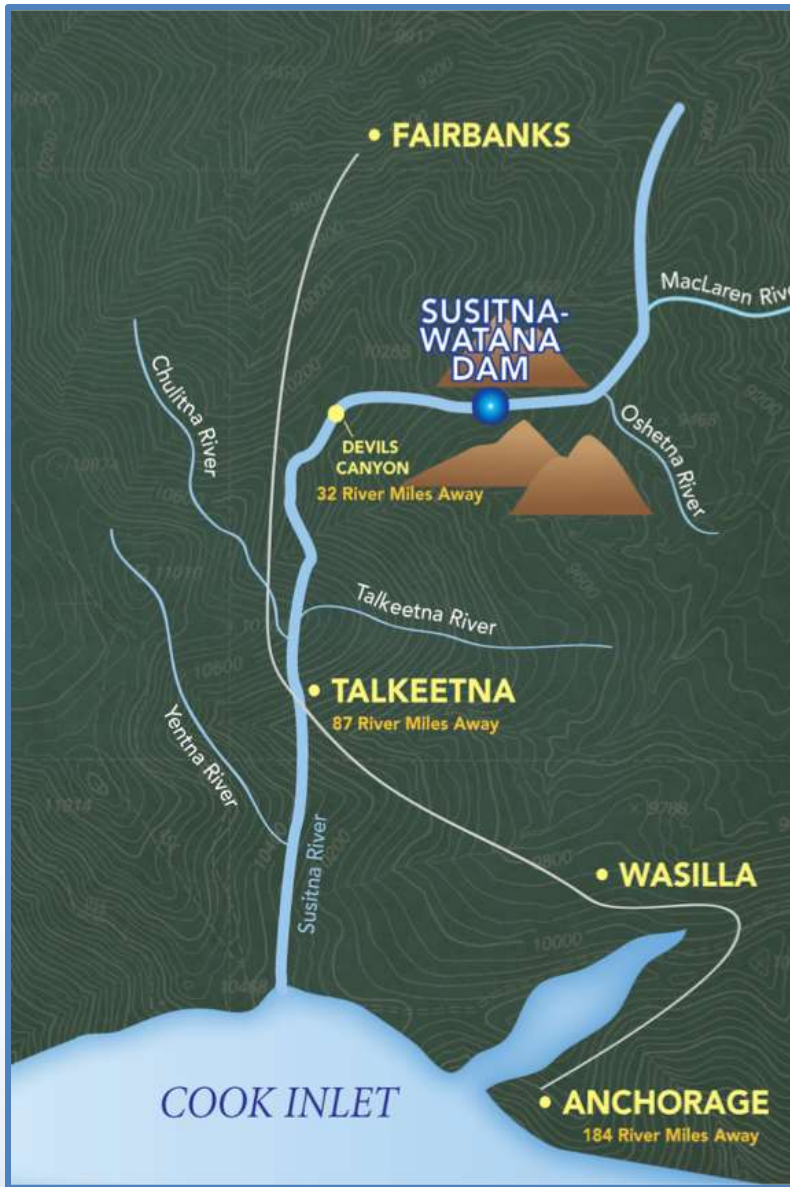


Technical WorkGroup  
Meeting  
*Water Quality Studies*  
***Baseline Monitoring,  
Focus Areas, and  
Modeling***

*September 25, 2013*

Prepared by Tetra Tech, Inc.



# 2013 Water Quality Monitoring Activities Completed

2

- *Baseline Water Quality Study*  
(RSP Section 5.5.4.4)
  - *June – September; monthly monitoring (2<sup>nd</sup> & 3<sup>rd</sup> Quarters)*
- *Water Quality Characterization in Focus Areas*  
(RSP Section 5.5.4.5)
  - *July-August; bi-weekly monitoring (2<sup>nd</sup> Quarter)*
- *Sediment Samples for Mercury/Metals in the Reservoir Area*  
(RSP Section 5.5.4.6)
  - *Sediment collection & fish tissue collection (3<sup>rd</sup> Quarter)*
- *Baseline Metals Levels in Fish Tissue* (RSP Section 5.5.4.7)
  - *Fish tissue collection*
  - *Fur & feathers pending receipt of collection permits*
- *Water Temperature Data Collection* (RSP Section 5.5.4.1)
  - *Lower, Middle, Upper River (all Quarters)*



# Description of Field Sites



**Susitna PRM33.6 – Baseline WQ**



**Susitna PRM59.9 – Baseline WQ**



**Susitna PRM142.2 – Baseline WQ**



**PRM45.1 Deshka River**



**FA-104 Point Sampling Slough**

# Description of Field Work

*Settings from which data was collected in FAs*



**FA-141 Point Sampling slough access**



**FA-138 Slough**



**FA-144 Point Sampling**



**FA-128 Well Sampling**

# Description of Field Work

## *Methods for data collection (Baseline WQ)*



Susitna River at PRM 152.7; collecting water sample



HDPE water collection tube and fish

# Description of Field Work

## *Methods for data collection*



**Susitna River at PRM 124.2; water meter readings**



**Chulitna River at PRM 118.6;  
lowering HDPE tubing for sample collection**



**Susitna River at PRM 107; thermistor download**

# Status of 2013 Data Collection

Project River Mile	Historic River Mile	Description	Baseline Water Quality	Focus Areas	Continuous Temperature
19.9	15.1	Susitna above Alexander Creek			•
29.9	25.8	Susitna Station	•		•
32.5	28.0	Yentna River	•		•
33.6	29.5	Susitna above Yentna	•		•
45.1	40.6	Deshka River	•		•
59.9	55.0	Susitna	•		•
87.8	83.8	Susitna at Parks Highway East	•		•
88.3	83.9	Susitna at Parks Highway West			•
99.2	95.8	LRX 1			•
102.8	97.2	Talkeetna River	•		•
118.6	98.1	Chulitna River	•		•
107.0	103.3	Talkeetna	•	• FA-104	•
106.8	113.0	LRX 18		• FA-113 • FA-115	•
124.2	120.7	Curry Fishwheel Camp	•		•
129.6	126.0	--			•
129.9	126.1	LRX 29			•
132.7	129.2	--		• FA-128	•
134.1	130.8	LRX 35			•
140.0	136.5	Susitna near Gold Creek			•

# Status of 2013 Data Collection

Project River Mile	Historic River Mile	Description	Baseline Water Quality	Focus Areas	Continuous Temperature
140.1	136.8	Gold Creek	●		●
141.0	138.0	--		● FA-138	●
142.2	138.6	Indian River	●		●
142.3	138.7	Susitna above Indian River	●	● FA-141	●
143.6	140.0	--			●
143.6	140.1	LRX 53			●
145.6	142.0	--		● FA-144	
152.2	148.0	Susitna below Portage Creek			
152.3	148.8	Susitna at Portage Creek	●		
152.7	148.8	Susitna above Portage Creek	●		
168.1	165.0	Susitna			
183.1	180.3	Susitna below Tsusena Creek			
184.8	181.3	Tsusena Creek			
187.2	184.5	Susitna at Watana Dam site	● PRM 187.8		
196.8	194.1	Watana Creek			
209.2	206.8	Kosina Creek			
225.5	223.7	Susitna near Cantwell	Site was moved to 235.2 Oshetna River due to access		
235.2	233.4	Oshetna River	●		

NOTE: Sites visited for Baseline Water Quality above PRM 145.6 moved to permitted land access areas.



# Data Management

(Section B.10 from Attachment 5-1 in RSP Section 5.8)

- *Flow of data:*
  - *Step 1. Field Collection*
  - *Step 2. Laboratory Analysis*
  - *Step 3. Lab QA*
  - *Step 4. Database entry*
  - *Step 5. DQO Check*
  - *Step 6. Qualification of Data*
  - *Step 7 Impact on data use & interpretation*
- *Develop assumptions for use in modeling water quality conditions* (Section B.10.1 from Attach. 5-1 in RSP Section 5.8)



# Data Qualification/Clarification

(Section D.1 from Attachment 5-1 in RSP Section 5.8)

- *Describe nutrient and toxics dynamics (auditing lab results)*  
(Section D.2.2 from Attach. 5-1 in RSP Section 5.8)
  - *Do water quality parameters add up?*
  - *Are there unusually low/high concentrations or results?*
  - *Do field technique and lab performance meet expectations?*
  - *Are results within expected range of condition?*  
(from historic data and similar settings)
  - *Identify complexes of parameters that sequester nutrients/toxics.*  
(Fe, Ba, Mn)
- *Validate data prior to use in calibrating the water quality model*  
(Section D.2.2 from Attach. 5-1 in RSP Section 5.8)
  - *Describe complexes that sequester toxics, nutrients, mercury*



# Water Quality Modeling

(RSP 5.6)

- *Preparation of the Modeling Framework*  
(Quarter 3 beginning of calibration)
  - *Parameterization*
  - *Bathymetric & topographic data for reservoir*
  - *Boundary lines (domain) for riverine model*
- *Integration with other modeling efforts*  
(RSP Section 5.6.4.8)
  - *Hydraulic Routing Model input*
  - *Geomorphic Model input*
- *Expected output for WQ Parameters*  
(RSP Section 5.6.4.8.2)
  - *Spatial resolution of Reservoir/Riverine Models*
  - *Definition of resolution & simulations*

# Water Quality Modeling

(RSP Section 5.6)

- *EFDC Modeling Framework (Calibration of model begins in Q4)*  
(RSP Section 5.6.4)
  - *Hydrodynamic model*
  - *Temperature model*
  - *Nutrient cycling model*
  - *Solids and sorptive contaminant and/or metals transport and fate model*
  - *Mercury cycling model*
- *Reservoir and River Models*  
(RSP Section 5.6.4.4)
  - *Three-dimensional reservoir model*
  - *Two-dimensional river model*



# Hydrodynamic Models

*(RSP Section 5.6.4)*

- *Provide advective (physical transport) and turbulent transport for temperature and water quality constituents*
- *Three-dimensional reservoir hydrodynamics*
  - *The only hydrodynamic model of the reservoir*
  - *Historical and projected inflows*
  - *Outflows and consistent inflows from reservoir operations model*



# Model Domain, Spatial Resolution, and Simulation Duration

14

(RSP Section 5.6.4.8)

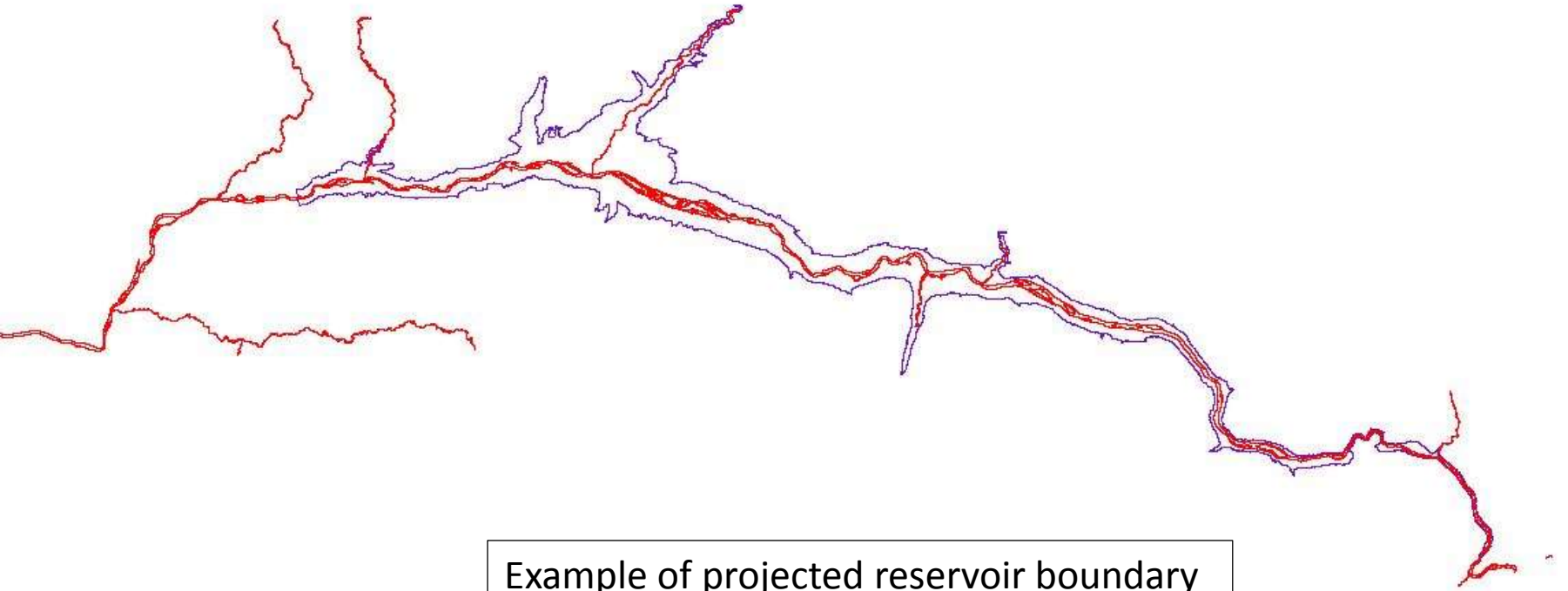
- *Optimize spatial resolution to achieve acceptable run time for annual time scale simulations*
- *Reservoir model domain and resolution*
  - *Reservoir domain well defined*
  - *50 to 150 m lateral resolution*
  - *500 to 1000 m longitudinal resolution*
  - *On the order of 1000 horizontal grid cells*
  - *5 to 15 m vertical resolution*
  - *20 to 40 vertical layers in deepest region*



# Reservoir Modeling Approach

15

(RSP Section 5.6.4.8)



# Model Domain, Spatial Resolution, and Simulation Duration

16

(RSP Section 5.6.4.8)

- *River model domain and resolution*
  - *River domain consistent with routing and geomorphic modeling*
  - *Down stream boundary to be determined by study requirements*
  - *3 to 7 cells laterally in bank in middle river*
  - *Lower river will not attempt to distinguish multiple numerous channels but will use EFDC wetting and drying capabilities*
  - *250 to 1000 m longitudinal resolution*
- *Simulations*
  - *Reservoir projections*
  - *Reservoir models cannot be calibrated*
  - *River model historical simulations for calibration*
  - *River model projections driven by reservoir simulations*

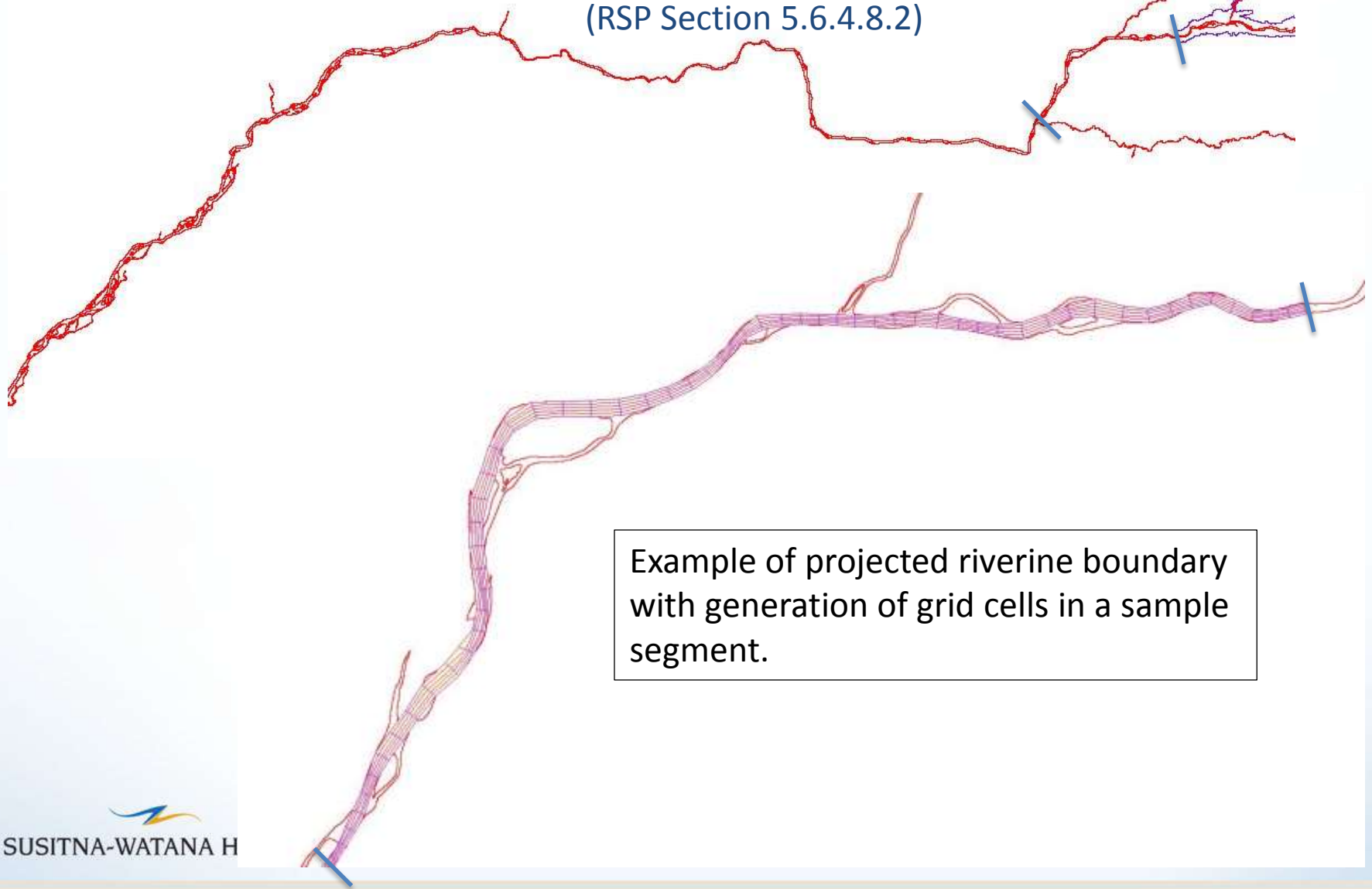




# River Downstream of Reservoir

17

(RSP Section 5.6.4.8.2)



Example of projected riverine boundary with generation of grid cells in a sample segment.

# Q4 2013 Planned Study Activities

(RSP Section 5.5 and RSP Section 5.6)

- **Baseline Water Quality** (Table 5.5-5)
  - Met Station data collection (continuous)
  - Temperature data collection (continuous)
  - Winter baseline water quality sampling
  - Data management and quality assurance evaluation
- **Model Calibration (Water Quality)** (Table 5.6-3)
  - Continue with parameterization
  - Calibrate internal Hydraulic Routing Model
  - Practice runs with continuous temperature data



# Variations from RSP

19

- *Baseline Water Quality Study*  
(RSP Section 5.5.4.4)
  - *PRM Site 225.5 (Susitna nr Cantwell) moved to PRM 235.2 (Susitna River adjacent Oshetna River) based on helicopter accessibility;*
- *Water Quality Characterization in Focus Areas*  
(RSP Section 5.5.4.5)
  - *Groundwater wells co-located with groundwater studies in select areas (within well clusters);*
  - *Piezometers not at the end of each transect in a Focus Area;*
- *Water Temperature Data Collection*  
(RSP Section 5.5.4.1)
  - *Logging interval from October 2013 through June 2014 will be 30-minutes (instead of 15 minutes);*
  - *2012-2013 winter temperature collection terminated in April 2013; data storage capacity used up with 15-minute logging intervals*



# 2014 Planned Field Data Collection

- *Complete Remaining Monitoring Activity*
  - *Baseline WQ Study (RSP Section 5.5.4.4)*
    - *Visit site locations requiring access permits*
  - *Water Quality Characterization in Focus Areas (RSP Section 5.5.4.5)*
    - *Additional groundwater sampling from wells not yet installed during 2013 field season*
  - *Water Temperature Data Collection/MET Stations (RSP Section 5.5.4.1)*
    - *On-going data collection (3-year effort from 2012)*

