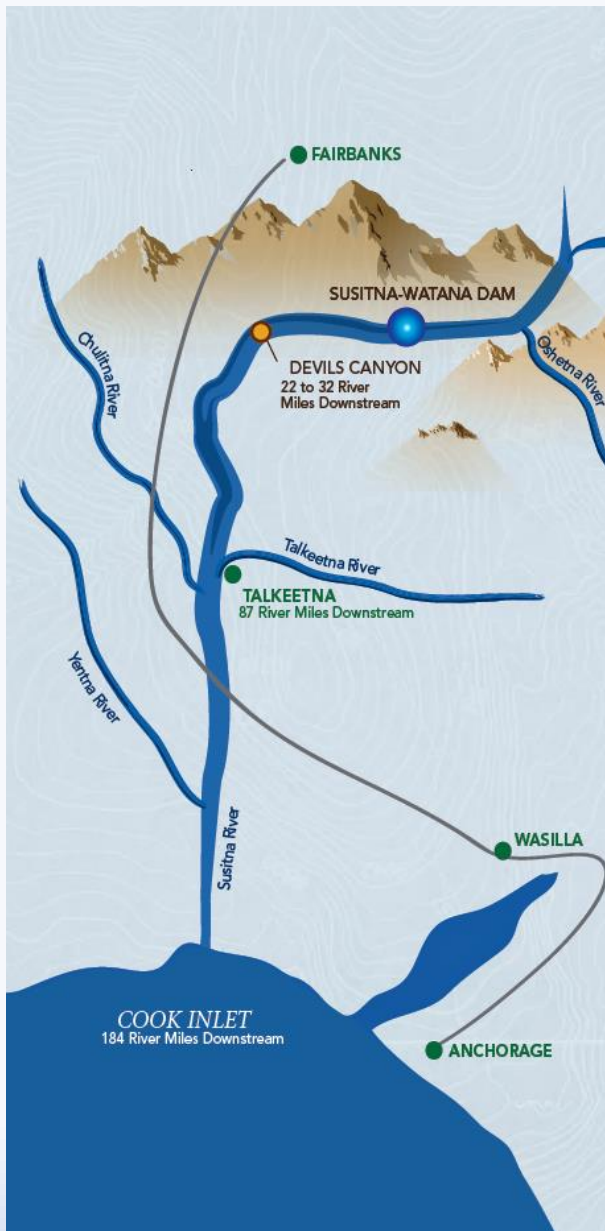


# Initial Study Report Meeting

## *Study 5.5 Baseline Water Quality*

*March 23, 2016*

Prepared by  
URS/Tetra Tech, Inc.



# Study 5.5 Status

- **ISR Documents (ISR Part D, Section 4)**
  - Initial Study Report Parts A, and B (Jun 3, 2014)
  - 2013 and 2014 data and associated DVRs (Nov 14, 2014)
  - Study Completion Report (Nov 2015)
  - ISR Part D (Nov 6, 2015)
  
- **The study has been completed.**

## Study 5.5 Objectives

- Document **historical water quality data** and **combine with data generated from this study**. The combined dataset will be used in the Water Quality Modeling Study (Study 5.6) to predict Project impacts under various operations.
- **Add current stream temperature and meteorological data to the existing data.**
- Develop a monitoring program to adequately **characterize surface water physical, chemical, and bacterial conditions** in the Susitna River **within and downstream of the proposed Project area**
- Measure **baseline metals concentrations in sediment and fish tissue** for comparison to state criteria (Study 5.7).
- Perform thermal infrared imaging remote (TIR) assessment of a portion (between Talkeetna and Devils Canyon) of the Susitna River and use this data to map the groundwater discharge and possible extent of thermal refugia (Study 7.5).

## *Study 5.5 Components*

- Water Temperature Data Collection (ISR Part A, Section 4.1; pg 3)
- Meteorological Data Collection (ISR Part A, Section 4.2; pg 7)
- Baseline Water Quality Monitoring (ISR Part A, Section 4.3; pg 9)
- Focus Area Water Quality Monitoring (ISR Part A, Section 4.4; pg 13)
- Sediment Samples for Mercury/Metals in the Reservoir Area (ISR Part A, Section 4.5; pg 15)
- Baseline Metals Levels in Fish Tissue (ISR Part A, Section 4.6; pg 17)
- Thermal Infrared Remote Sensing (ISR Part A, Section 4.7; pg 17)
- Groundwater Quality in Selected Habitats (ISR Part A, Section 4.8; pg 20)

# Study 5.5 Variances

## (ISR Part D, Section 6)

- Water temperature monitoring sensors deployed at 28 of 37 planned sites (RSP Section 5.5.4.1) in 2013 and 36 of 37 sites in 2014.
- Water temperature monitoring ended September 2014 instead of June 2015 because the two previous winter collections yielded the same results in timing of ice cover and ice breakup.
- Minor adjustments to baseline water quality sampling at 3 of the 17 proposed sites (RSP Section 5.5.4.4). Site added at PRM 174.0 to characterize water quality conditions below the dam site.
- When the Susitna River near Cantwell site (PRM 225.5) was not accessible, sampling occurred just upstream of the Oshetna River confluence (PRM 235.2).
- When the Susitna at Watana Dam site (PRM 187.2) was not accessible, sampling occurred just upstream of the Tsusena Creek confluence (PRM 185).
- Winter 2013/2014 baseline water quality sampling occurred January 2014 instead of December 2013.

# Study 5.5 Variances

## (ISR Part D, Section 6)

- Groundwater sampling piezometer wells were originally described for placement at the end of each mainstem transect within each Focus Area. However, the wells had to be relocated to areas where they could be successfully installed and were also more applicable in support of the Instream Flow Study (Study 8.5).
- Sediment samples were collected at 4 of 10 sites (RSP Section 5.5.4.6) in 2013 and the remainder of the sites (Susitna Above Watana Dam, Susitna Below Watana Dam, Fog Creek, Deadman Creek, Watana Creek, and Tsusena Creek) in 2014 due to land access restrictions.
- All sediment samples were collected with hand auger or stainless steel spoon instead of Ekman Dredge or a modified Van Veen grab sampler.
- Rain gauges were installed at ESM-2 and ESM-3 September 2013 and ESM-1 October 2014.
- One of the ESM-1 MET station is continuing operation beyond the planned 2 years.
- Given the lack of horizontal and vertical variability at sample locations, a single grab sample was collected at each transect on 2014.

## **Study 5.5 Variances**

*(ISR Part D, Section 6.2)*

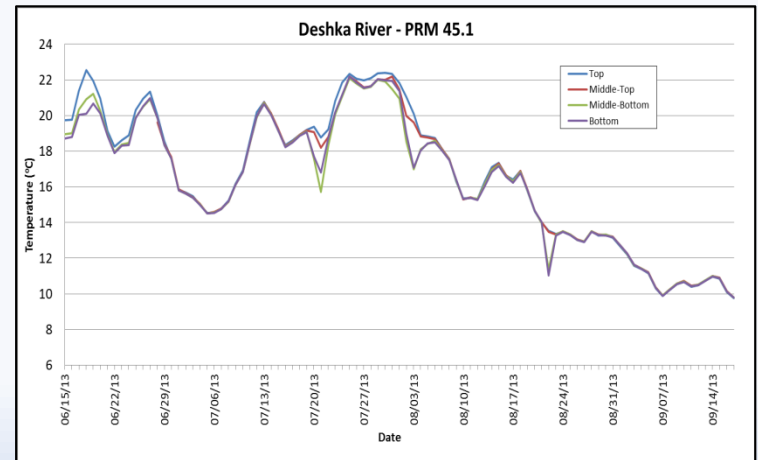
- In 2014, the additional sampling occurred near the surface at 3 locations along each transect in a Focus Area and no samples were collected at depth; additional samples were not collected at groundwater locations or longitudinal profiles bracketing the point sample locations.
- **Clarification to ISR Part D, Section 6.2, page 7, last bullet**  
**In 2014, water samples were collected at point sample locations in Focus Areas**

# Summary of Results

(ISR Part A, Section 5.3 and SCR Section 5.2)

## Continuous Temperature Monitoring (PRM 29.9 to 235.2)

- 16 over-winter sites (2012/2013)
- 28 sites monitored in 2013
- 19 over-winter sites (2013/2014)
- 36 sites monitored in 2014





# Summary of Results

*(ISR Part A, Section 5.3 and SCR Section 5.3)*

## Meteorological Data (2012 to 2015)

- Three stations (September 2012 to October 2013)

Data Collected (ISR Part A, Section 5.3):

Wind vectors, air temperature, relative humidity, sea level pressure, solar radiation, wind direction/velocity

- Three stations (November 2013 to August 2015)  
(SCR Section 5.3)

Data Collected:

Wind vectors, air temperature, relative humidity, sea level pressure, solar radiation, wind direction/velocity, snow depth, precipitation

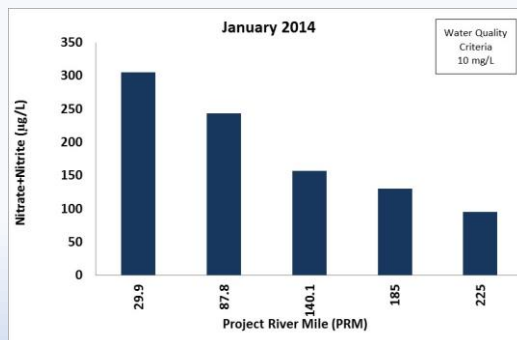
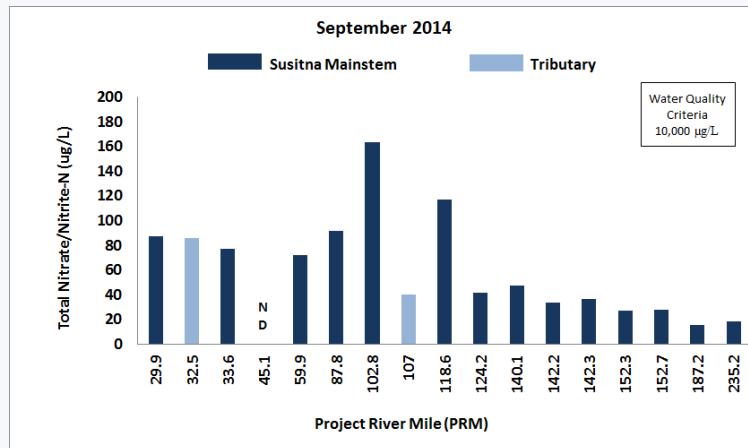
# Summary of Results

(ISR Part A, Section 5.4.1 and SCR Section 5.4)

## Baseline Water Quality Monitoring

### Summer 2013/2014 - 17 Sites

- Field collected data
  - Laboratory Data
    - a. Conventional
    - b. Nutrients
    - c. Metals
    - d. Radionuclides
    - e. Petroleum Hydrocarbons (BETX, PAHs)
- (2014 Lab: nitrate/nitrite, TKN, TP, Al, As, Ba, Fe, Mn, THg)



### Winter 2014 – 5 Sites

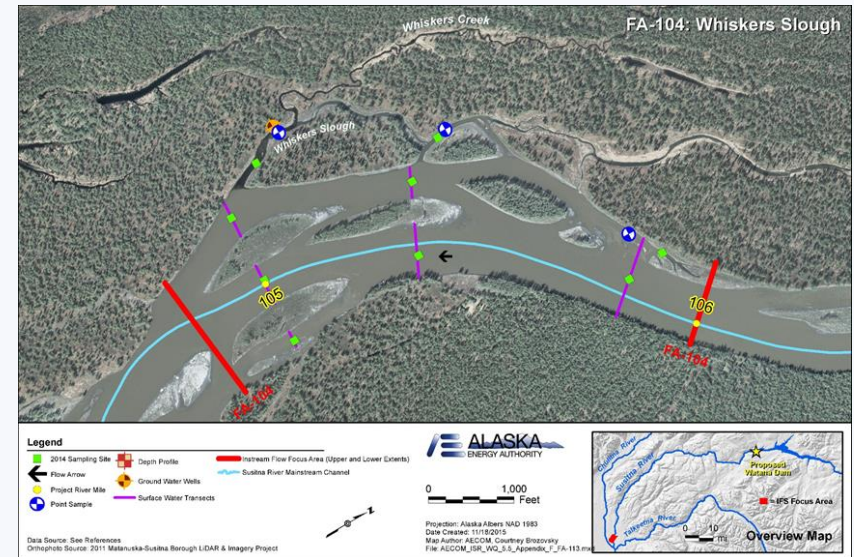
- Field collected data
- Laboratory Data
  - a. Conventional
  - b. Nutrients
  - c. Metals

# Summary of Results

(ISR Part A, Section 5.4.2 and SCR Section 5.5)

## Focus Area Monitoring

- Summer 2013/2014 (7 FAs)  
(2014 Lab: nitrate/nitrite, TKN, TP, Al, As, Ba, Fe, Mn, THg)
- Winter 2014 (3 FAs)
  - FA 104 (Whiskers Slough)
  - FA-128 (Slough 8A)
  - FA-138 (Gold Creek)



Field Data: Temperature, DO, pH, Conductivity, Redox

Lab Data: Nutrients, Turbidity, Metals, Hardness, Organic Carbon

# Summary of Results - Groundwater

(ISR Part A, Section 5.8 and Study 7.5 SIR, Section 5.7)

## Summer 2013 (August/September) (Study 5.5 ISR Part A, Section 5.8)

FA-104 (Whiskers Slough)

FA-113 (Oxbow I)

FA-128 (Slough 8A)

FA-138 (Gold Creek)

Parameters: Temp, pH, DO, Cond, Redox, Turbidity, TP, TKN, Hardness, Total Al, Fe, THg/MeHg

## Winter 2014 (February/March/April) (Study 7.5 SIR, Section 5.7)

FA-104 (Whiskers Slough)

FA-113 (Oxbow I)

FA-128 (Slough 8A)

FA-138 (Gold Creek)

Parameters: Temp, pH, DO, Cond, Redox, Turbidity, SRP, TP, TKN, Ammonia, Nitrate/Nitrite  
Hardness, TOC/DOC, Al, Fe, THg/MeHg

# Summary of Results

(ISR Part A, Section 5.5; SCR Section 5.6; Study 5.7 SIR Section 5.7)

## Sediment and Sediment Porewater Samples

(ISR Part A, Section 5.5 & SCR Section 5.6)

2013 – 4 sites (above Watana Dam site)

2014 – 6 sites (above and below Watana Dam site)

Sediment: TOC, Al, As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Se, Zn, Sediment Size, Total Solids

Pore Water: Hardness, Alkalinity, DOC, Al, As, Cd, Ca, Cu, Fe, Pb, Mg, Hg, Ni, Se, Zn

## Fish Tissue – 2013

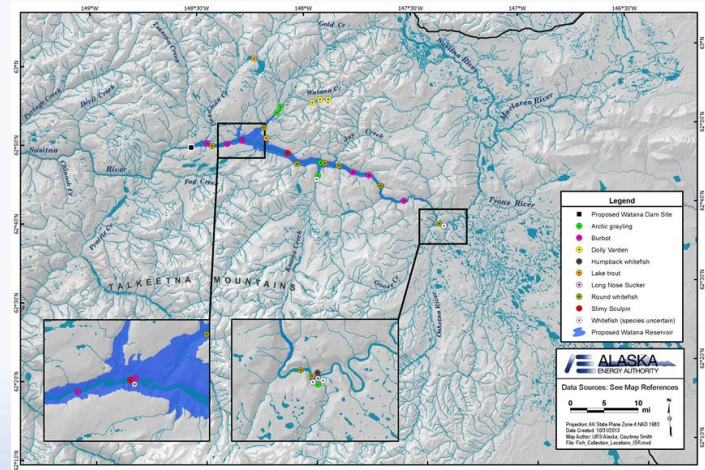
(Study 5.7 SIR, Section 5.7)

Tissue Analysis: Total Mercury, Methyl Mercury

(dry weight & wet weight), % Solids

Fish Morphometrics: Length, Weight, Estimated

Age



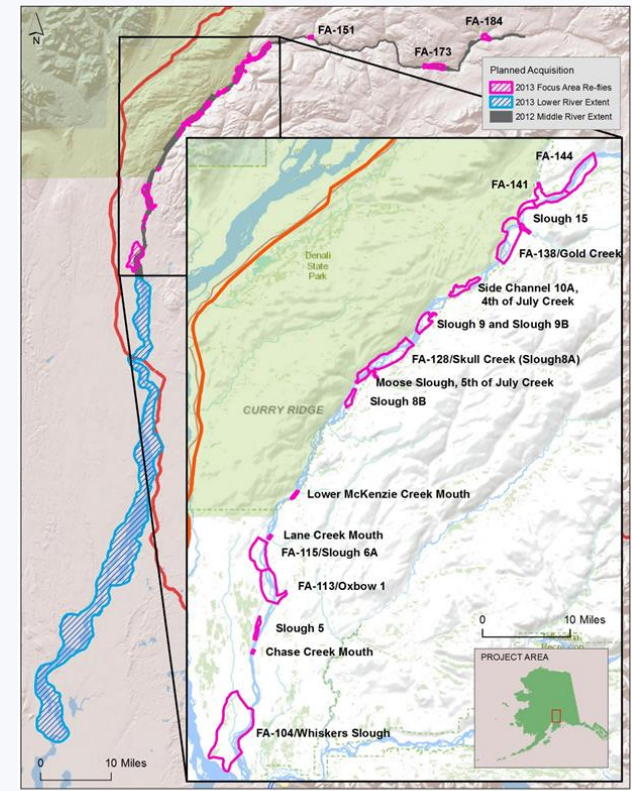


# Summary of Results

(ISR Part A, Section 5.7 and Appendix J)

## Thermal Infrared Remote Sensing

- 10 Focus Areas
- 9 additional areas of interest along the Middle Susitna River
- 73% of the Lower River
  - Maid Lake to Chulitna River



Service Layer Credits: Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, and the GIS User Community

## *AEA Proposed Modifications*

AEA plans no future modifications of the methods for this study, as this study is now complete.

## *Steps to Complete Study*

AEA has met all study objectives of the FERC-approved Study Plan.

AEA has completed this study.



## *Licensing Participants Proposed Modifications to Study 5.5 and results reported in SCR Study 5.5?*

- Agencies
- CIRWG members and Ahtna
- Public