

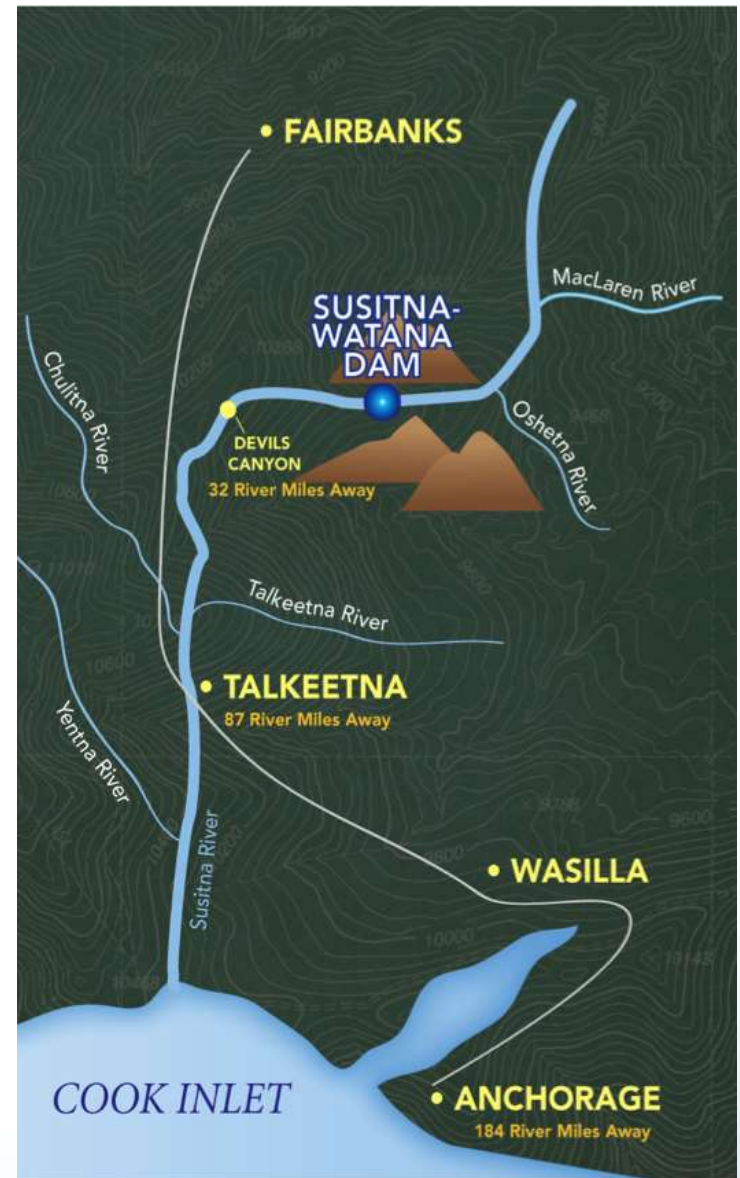
Baseline Water Quality (RSP Section 5.5, 5.6, 5.7)

Technical Work Group Meeting 1st Quarter 2013

March 28, 2012

Prepared by: URS/Tetra Tech

Prepared for: Alaska Energy Authority



Water Quality Meeting Outline

- FERC determination
- Q1 2013 Update
- Results of 2012 Studies
 - Temperature monitoring
 - Met station installation
 - TIR studies
 - Methylmercury sampling
- Harris and Hutchison modeling result
- Possible changes to mercury study



FERC Study Plan Determination

- 5.5, 5.6, and 5.7 on delayed till April 1 pending resolution of focus area study locations



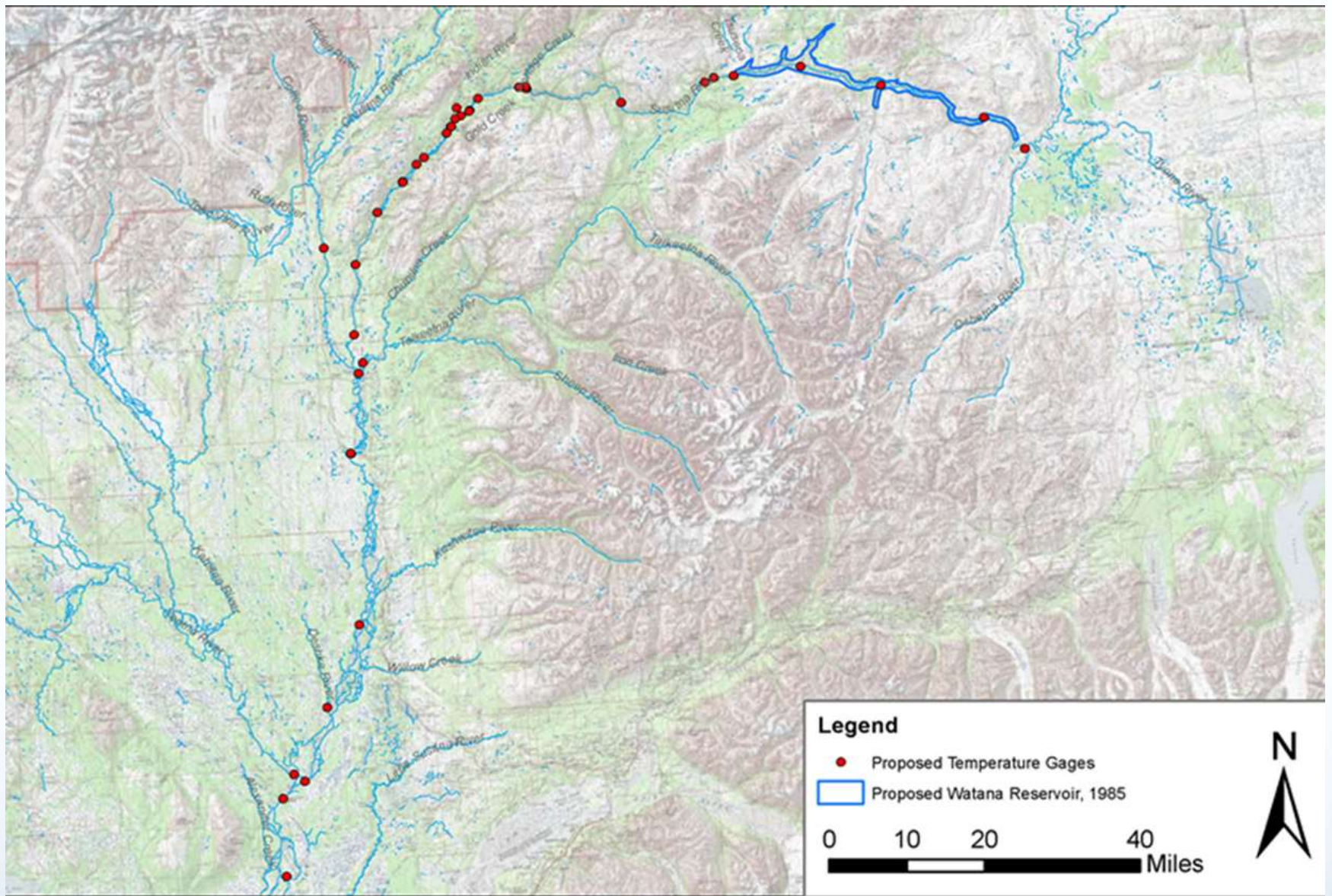
Water Quality Studies Q1 2013

RSP Section	Title	1 st Quarter Activity
5.5	Baseline Water Quality	Preparing for field studies (June 2013) Completed 2012 Water Quality report Completed 2012 TIR report
5.6	Water Quality Modeling	Limited activity until data starts coming in (Q3 2013)
5.7	Mercury Assessment and Potential for Bioaccumulation	Continued literature review Working with ADF&G on obtaining furs during sealing Harris and Hutchison Modeling results

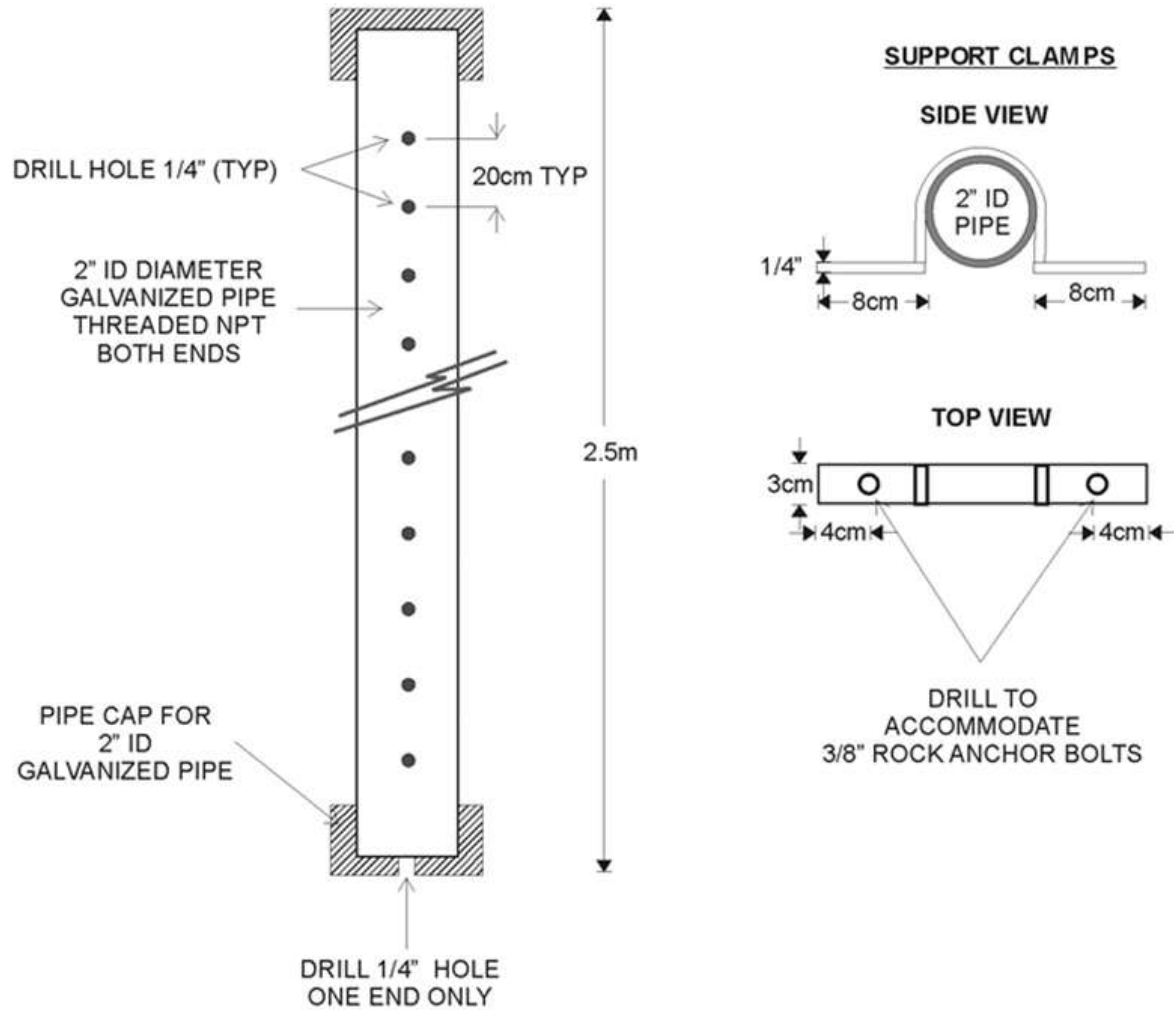
Temperature monitoring

- 33 of 37 locations installed
- Issues at some stations due to flooding, access
- Remaining locations will be added next summer
- Three types of installation (bank mounted, summer buoy, winter buoy)

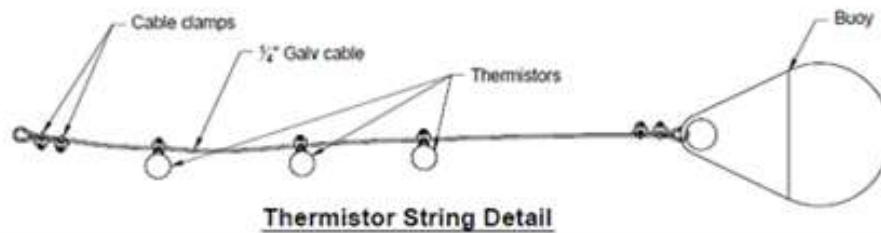
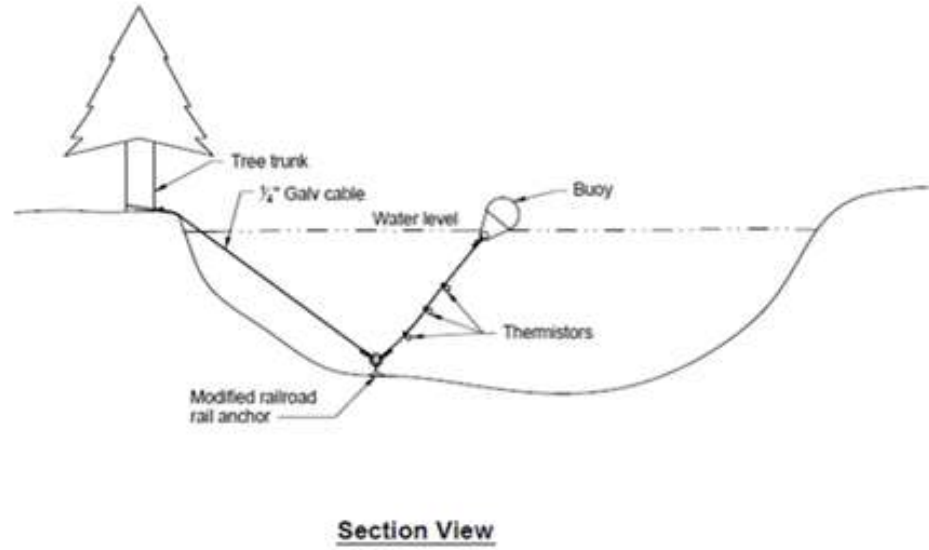
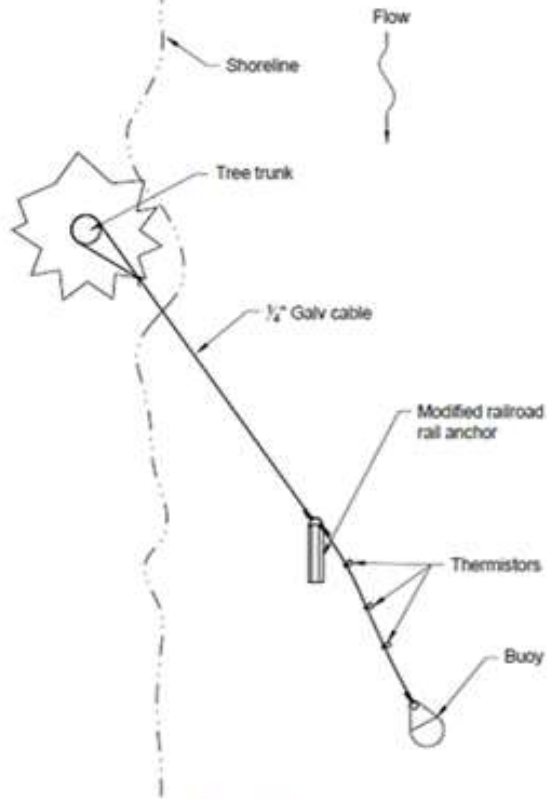


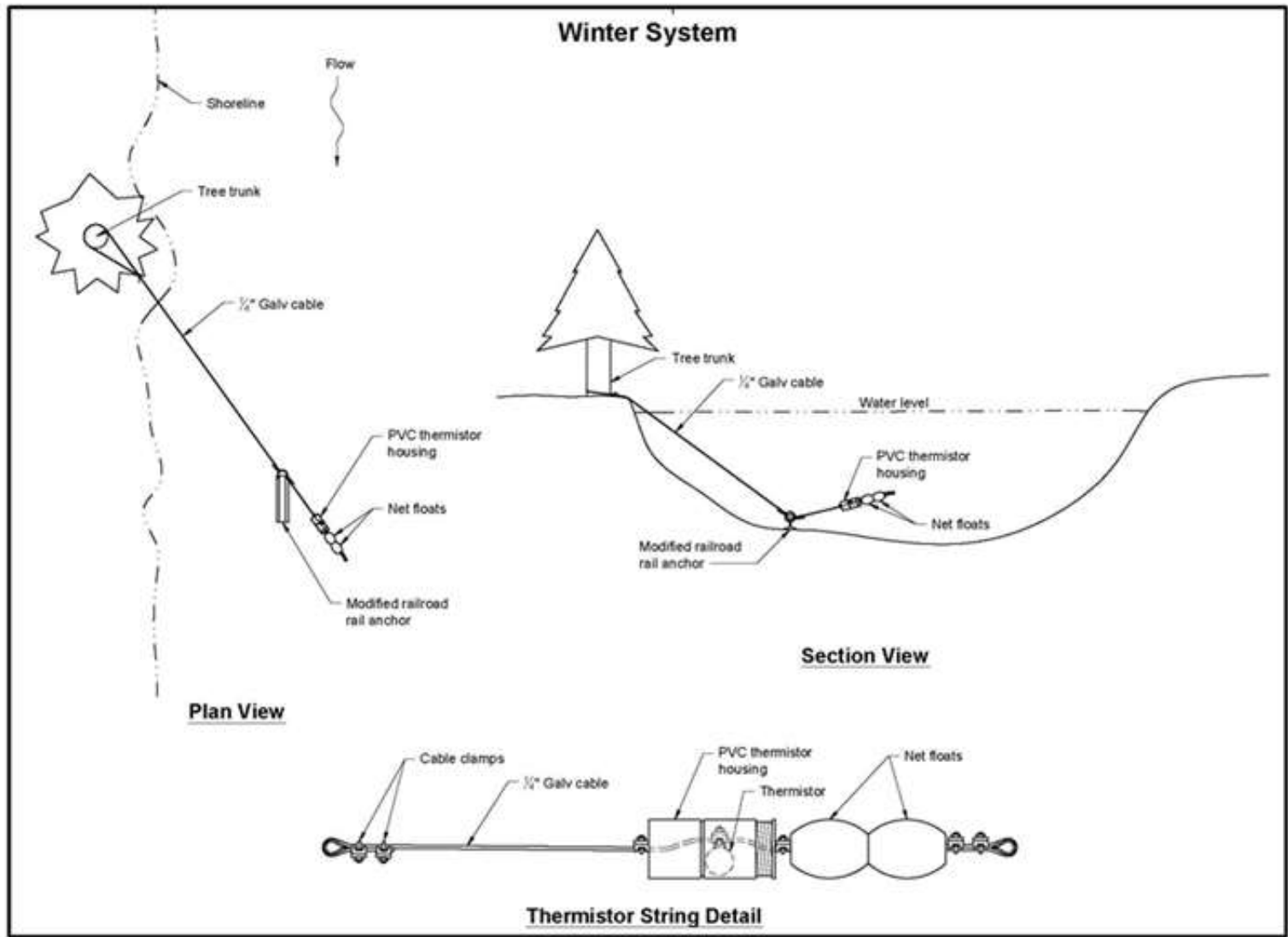


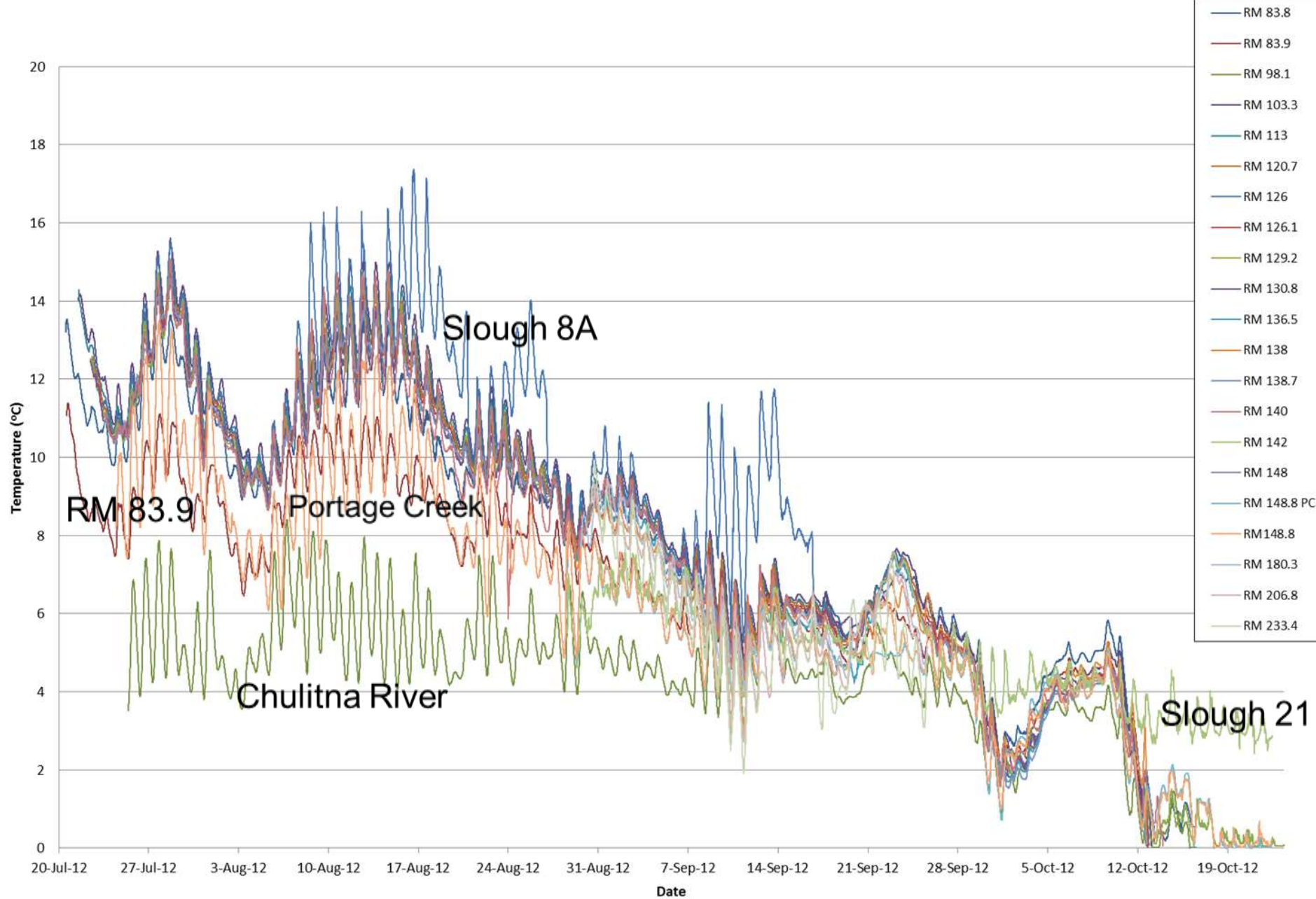
HYDROMETRIC STATION MOUNTING SUPPORT



Summer System







2012 Temperature Monitoring Results

Temperature monitoring

- Temperature data for the different installations (bank mounted and buoy) were largely identical
- Depth at which the thermistor was placed in the river did not result in significant differences in temperature
- Little variation in surface water temperature along the mainstem Susitna River.



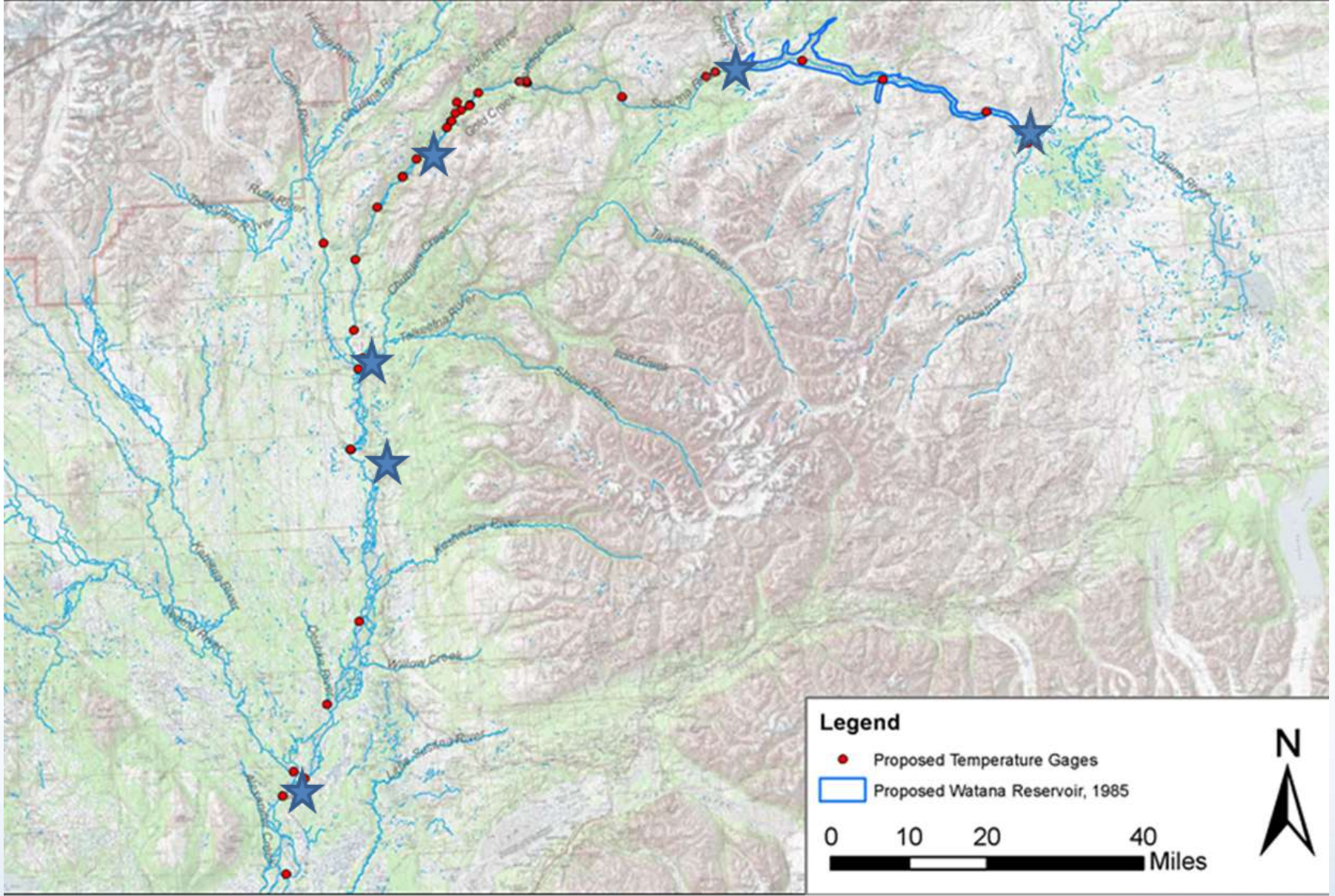
2012 Met Stations

- Six stations total
- 3 new, 3 existing
- Wind speed and direction, temperature, relative humidity, barometric pressure, precipitation, wind gust and direction, solar degree days, snow gauge



Met Station example



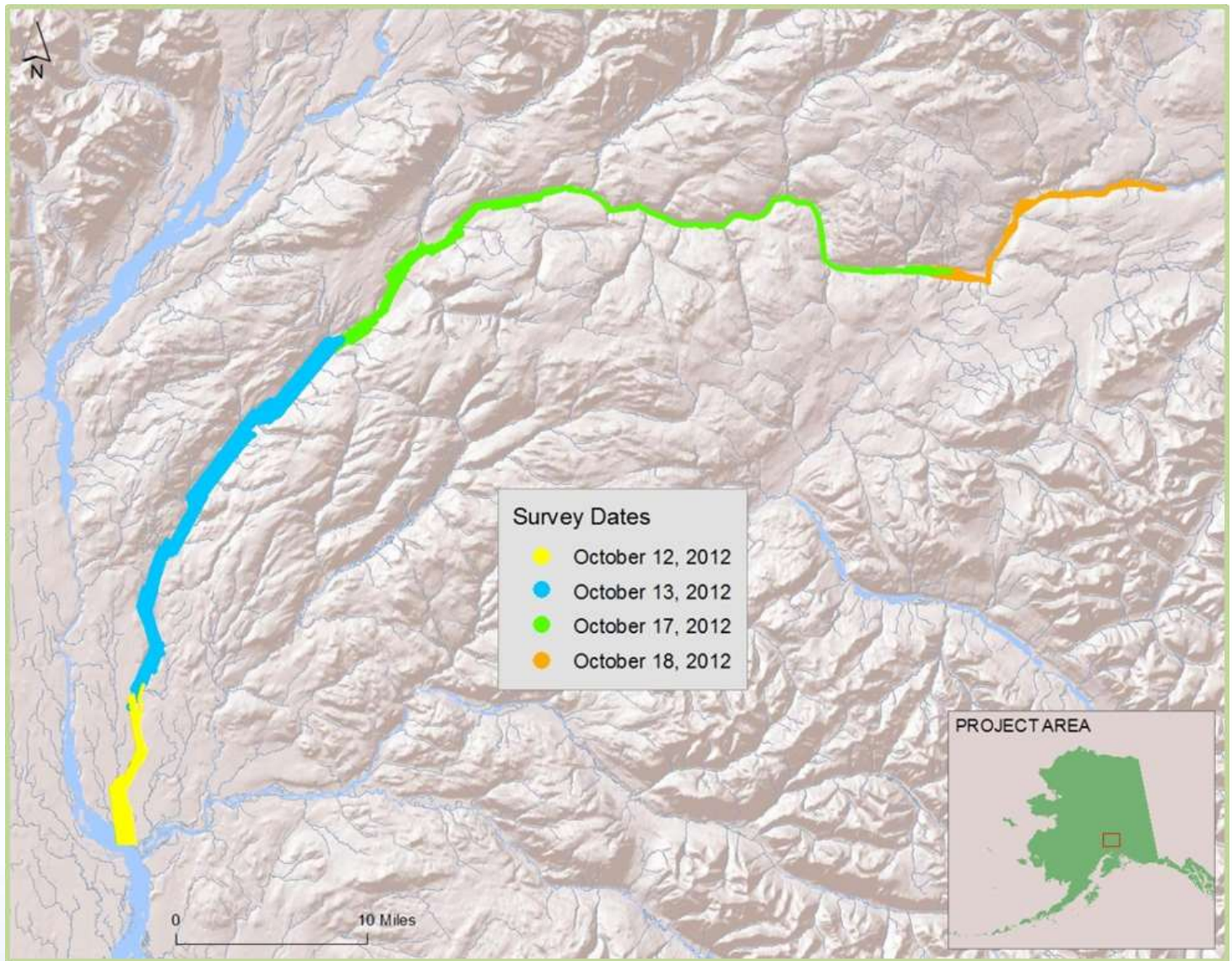


Susitna River Mile	Description	Station Status (New / Existing)	Latitude (Decimal degrees)	Longitude (Decimal degrees)	Date Installed or Modified	Period of record
44.3	Willow Creek	Existing (Willow Airport: NOAA RWIS)	61.7650	-150.0503	N/a	6/05 to present
80.0	Susitna River near Sunshine Gage	Existing (Talkeetna RWIS: Parks Highway @ Talkeetna Rd. MP 98.7)	62.1381	-150.1155	N/a	8/03 to present
97.0	Susitna River at Talkeetna	Existing (Talkeetna Airport: FAA/NOAA Station)	62.3200	-150.0950	N/a	1/05 to present
138.5	Susitna River at Indian River	New	62.7842	-149.6633	09/27/12	09/27/12 to present
184.1	Susitna River at Watana Dam (upland on bench)	New	62.8295	-148.5518	08/29/12	08/29/12 to present
233.4	Susitna River above Oshetna	New	62.6388	-147.3781	09/28/12	09/28/12 to present

2012 TIR Study

- Flew 88 miles of Susitna River from Talkeetna (RM 98) to Deadman Creek (RM 186.6)
- Resolution 2.3 feet (0.7 meters)
- Used sensors in river to calibrate results
- Shows difference between cold surface water and warm groundwater of about 3°C



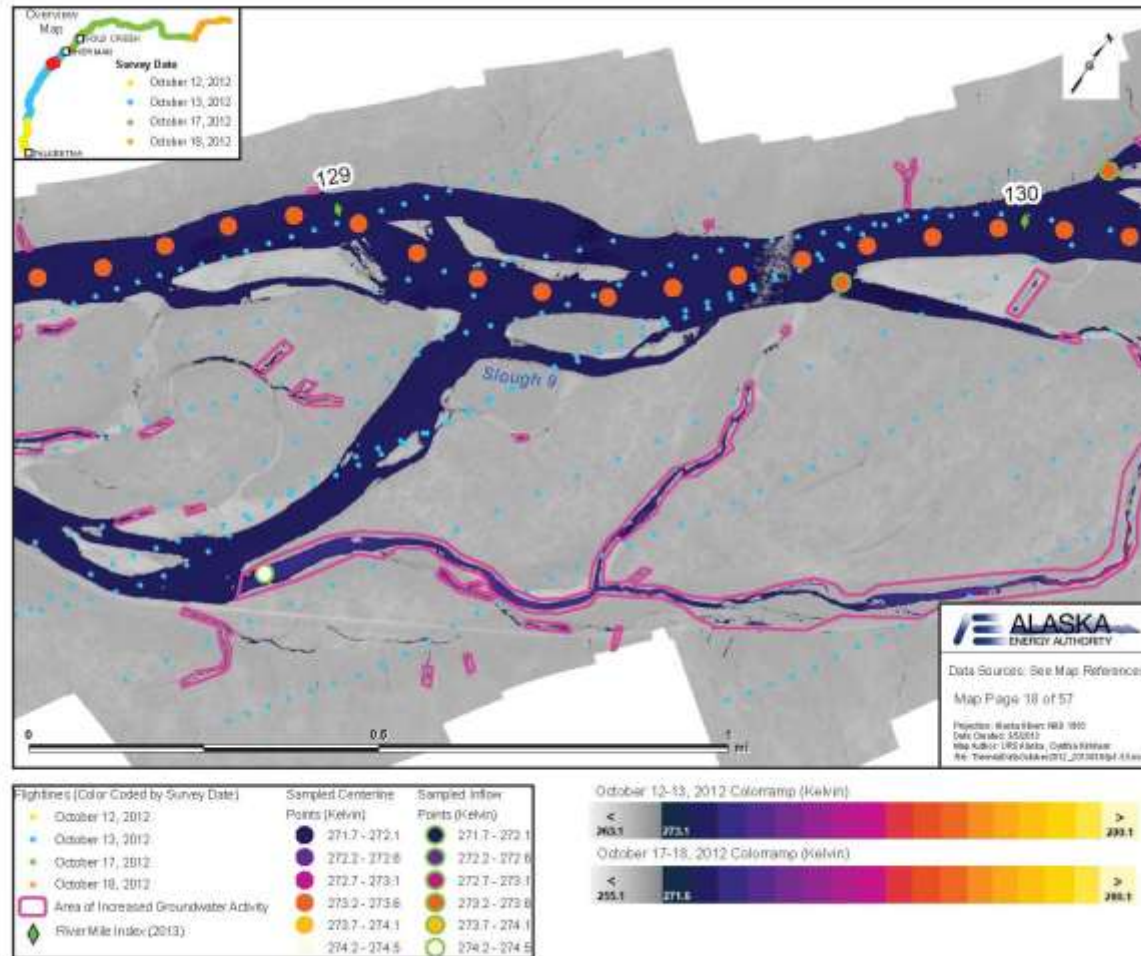


2012 TIR Results

- Over 500 areas of increased groundwater activity
- Temperature difference around 3°C
- The bulk of the groundwater activity (>90 percent) was seen between the Chulitna River and Slough 21 (RM 98-143)



2012 TIR Results

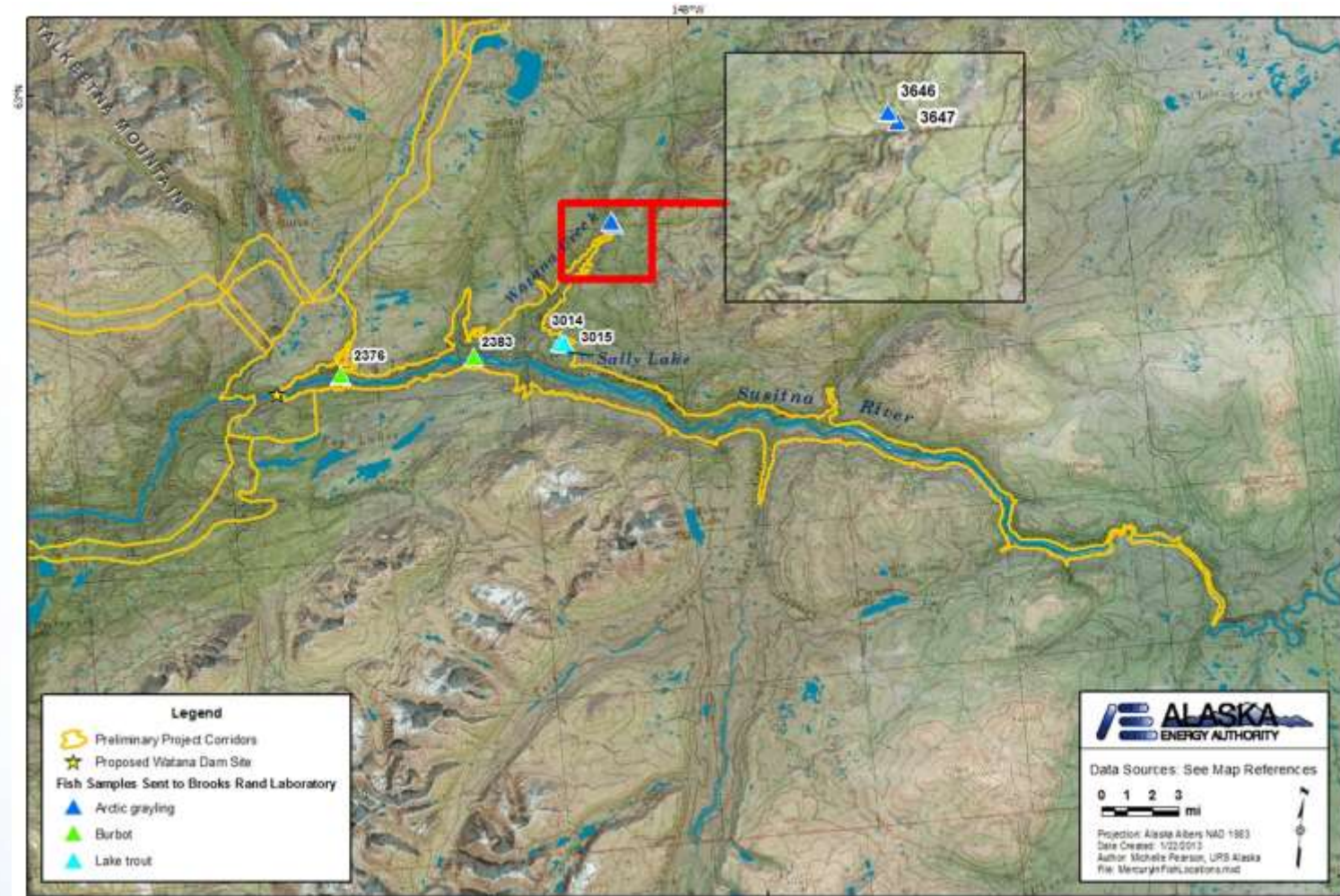


2012 Mercury Study

- Six samples
- Burbot, Lake trout, and Arctic Grayling
- Analyzed for total Hg, MeHg, both wet and dry weight
- Sample loss due to freezer malfunction



2012 Mercury Results



Mercury in fish at Watana

Species	Fish Length (mm)	Fish Weight (gm)	Estimated Age (yr.)	River Mile	Subdrainage	Sample Date	% Total Solids	Total Hg (dry ng/g)	Total Hg (wet ng/g)	Total MeHg (dry ng/g)	Total MeHg (wet ng/g)
Lake trout	510	NM	NM	194.1	Sally Lake	08/03/2012	22.08	912	201	1,000	222
Lake trout	430	NM	NM	194.1	Sally Lake	08/03/2012	28.66	633	181	631	181
Arctic grayling	248	148	4	194.1	Watana Creek	08/11/2012	24.72	78.1	19.3	102	25.1
Arctic grayling	340	385	8	194.1	Watana Creek	08/11/2012	26.54	143	38.1	117	31.0
Burbot	410	NM	4	186.8	Susitna River	08/05/2012	19.85	200	39.6	207	41.1
Burbot	410	NM	5	192.6	Susitna River	08/05/2012	18.56	297	54.7	321	59.5

NM = Not measured.

2012 Mercury Results

- Dry weight results 3-4 times wet weight results (typical)
- Piscivorous adult lake trout showed significantly higher concentrations of methylmercury than non-piscivorous species such as arctic grayling.
- Burbot, while technically piscivorous, can be more of a scavenger than a predator
- Correlation between the age of the fish and mercury concentrations
- Fish from Sally Lake had highest mercury concentration
- Concentrations of total and methylmercury identical (inorganic mercury contribution negligible)
- Data from ADEC suggests that mercury concentrations at the low end of the normal range.



Results for Total Mercury in Fish Tissue Samples (wet, ng/g)

Watana			
Species	No. of Samples	Mean	Standard Deviation (+/-)
Burbot	2	47.2	10.7
Arctic Grayling	2	28.7	13.3
Lake Trout	2	191	14.1
ADEC Susitna Drainage			
Species	No. of Samples	Mean	Standard Deviation (+/-)
Burbot	1	94	NA
Arctic Grayling	18	102	34
Lake Trout	3	380	320
ADEC All Alaska Drainages			
Species	No. of Samples	Mean	Standard Deviation (+/-)
Burbot	27	330	280
Arctic Grayling	44	84	32
Lake Trout	18	300	170
Yukon (Jewett and Duffy, 2007)			
Species	No. of Samples	Mean	Notes
Burbot	13	160	Whole Body, entire basin
Arctic Grayling	4	260	At Andreafsky River

Harris and Hutchison modeling

Facility	Capacity (MW)	Area Flooded (km ²)	Area Total (km ²)	Annual Flow (km ³ /yr.)	Predicted max increase piscivorous fish	Predicted max increase non-piscivorous fish
Susitna-Watana	600	86.74	103.38	7.23	4.10	2.77

Species	Predicted max concentration piscivorous fish (ng/g)	Predicted max concentration non-piscivorous fish (ng/g)
Burbot	194	NA
Grayling	NA	80
Lake Trout	783	NA
ADEC Level (human health)	1,000	1,000

Possible changes to mercury study

- Analyze fish for total mercury only
- Analyze only for wet weight
- Non-lethal sampling for fish tissue. Age fish by weight and length
- Drop/reduce soil and vegetation sampling
 - Not needed for modeling
 - Added to keep open some possible mitigation strategies

