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Red Dog Mine Annual Meeting

Waste Management Permit No. 0132-BA002

Reclamation Plan Approval F20099958

2010

Agenda



- **Opening Remarks Jack DiMarchi, DNR**
- **Site Overview**
- **Production**
- **Waste Rock Management**
- **Tailings Management**
- **Water Management**
- **Permafrost Monitoring**
- **Biomonitoring**
- **Disturbance and Reclamation**
- **Inert Solid Waste Landfills**
- **Dust Monitoring**
- **Construction Activities**

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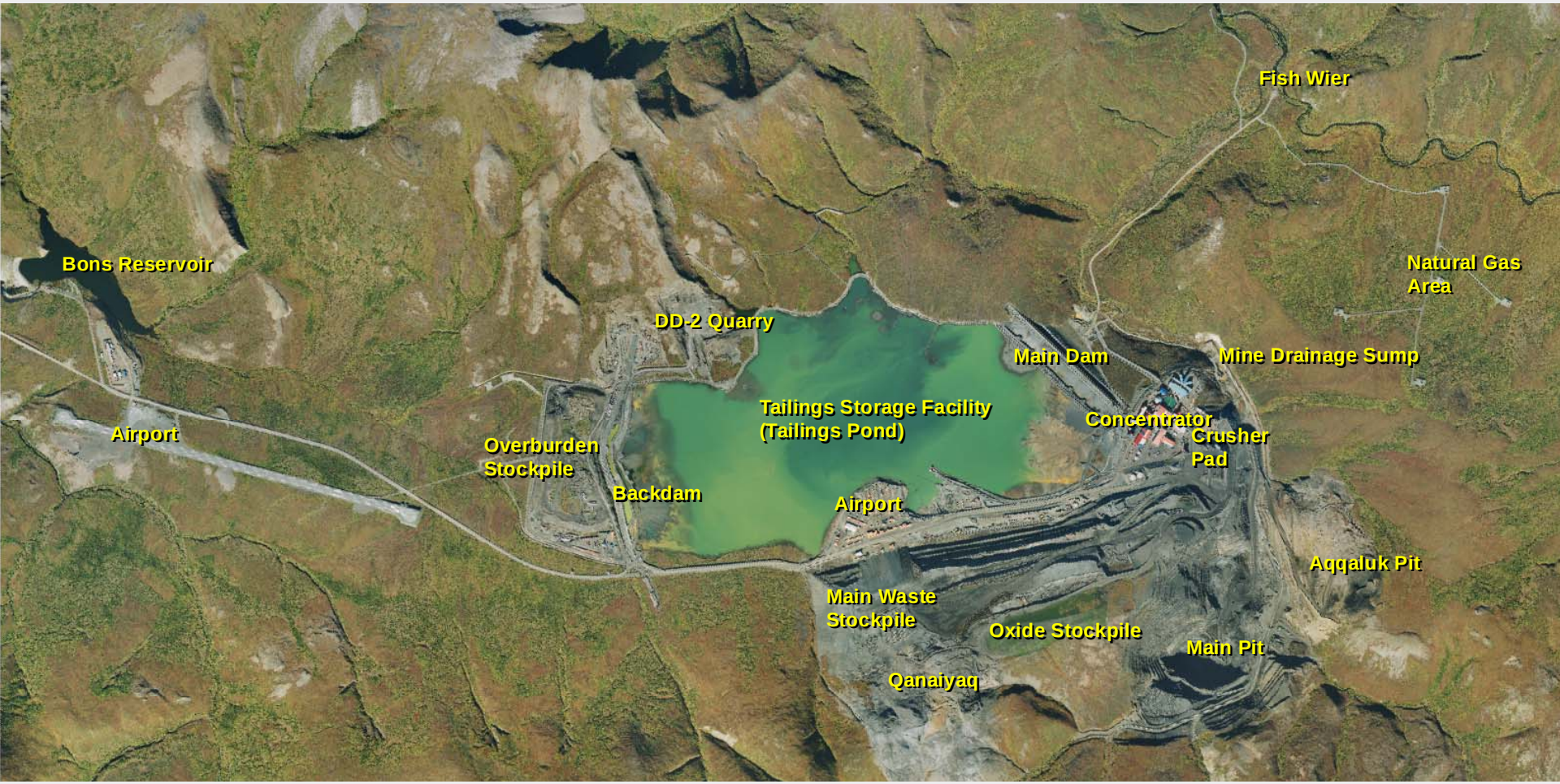
Site Overview





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Aqqaluk Deposit



Stripping of the Aqqaluk Deposit began on May 20, 2010

The first blast occurred on June 8, 2010

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Production



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2010 Production



Mine Production

- Ore Hauled 3,526,200 tonnes
- Waste Rock Hauled 7,705,700 tonnes
- Total 11,231,900 tonnes
- Strip Ratio 2.2

Mill Production

- Ore Milled 3,639,000 tonnes
- Concentrate Production (contained metal)
  - Zinc 538,000 tonnes
  - Lead 109,900 tonnes

Waste Rock Management



Waste Rock Hauled 7,705,700 tonnes

Main Waste Stockpile
6,865,500 tonnes

In pit use / disposal
480,600 tonnes

Construction use
151,300 tonnes

Most Reactive Waste
1,701,200 tonnes
- 2.9% Zn
- 1.7% Pb
- 5.3% Fe

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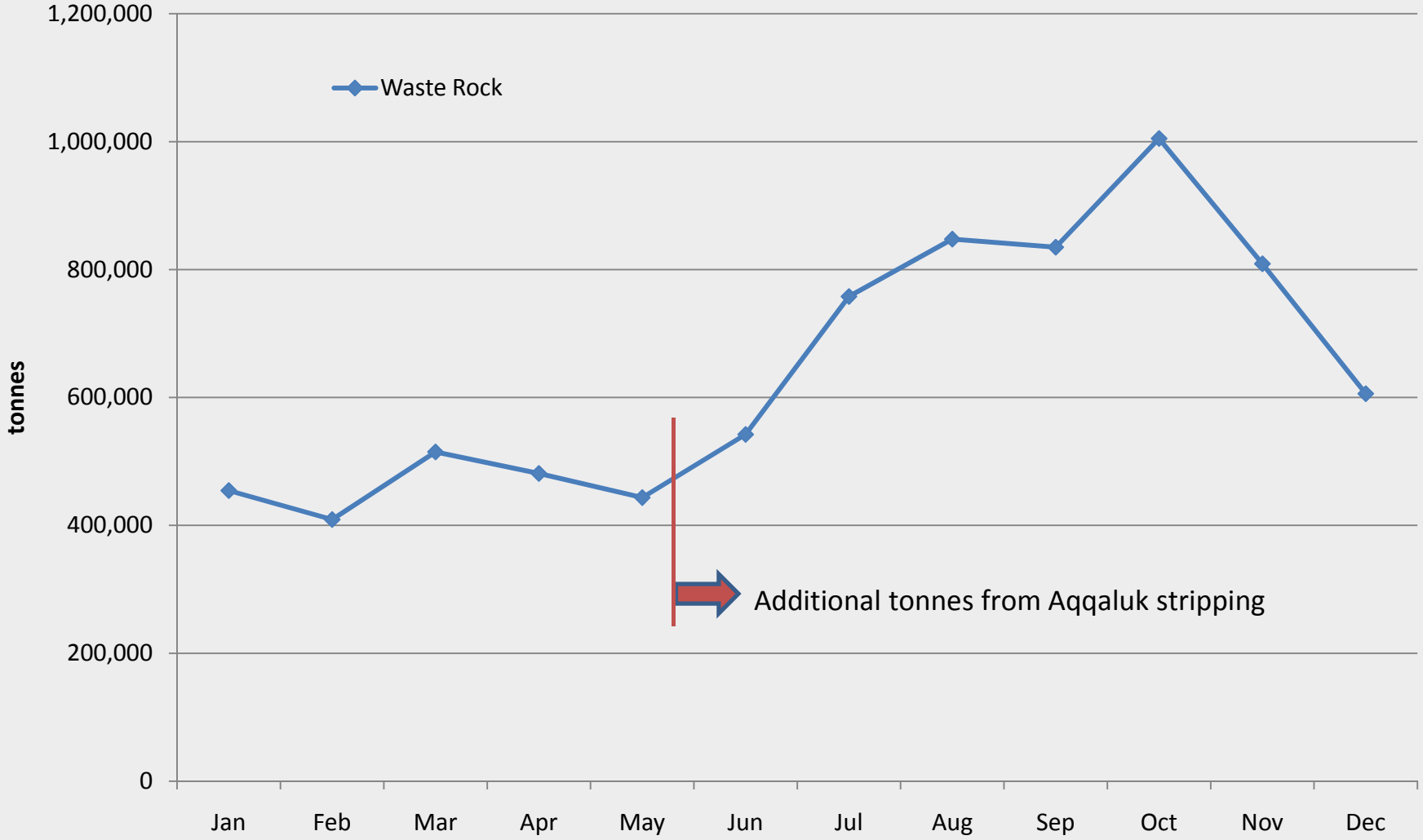
2010 Waste Rock Hauled





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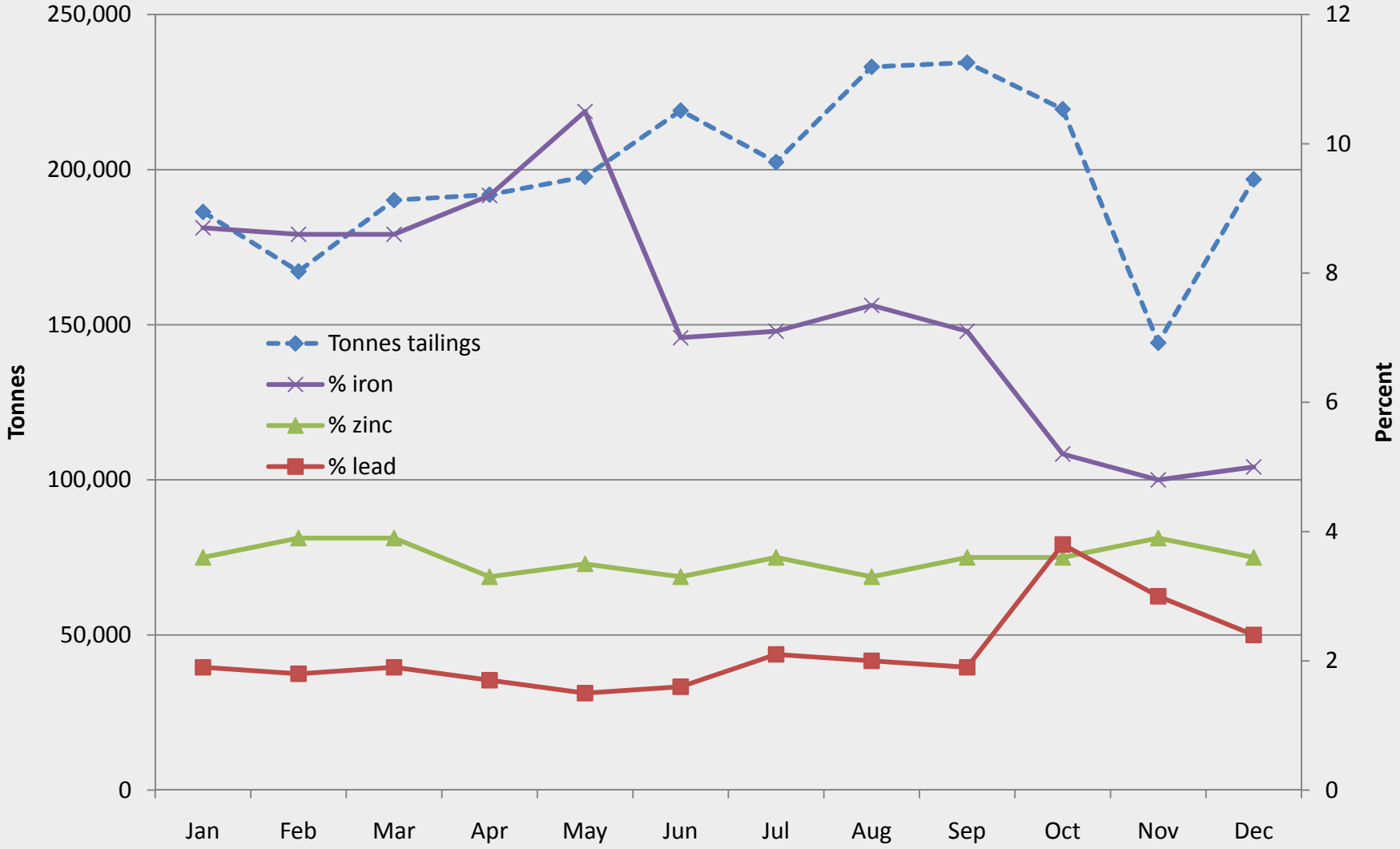
Tailings Management





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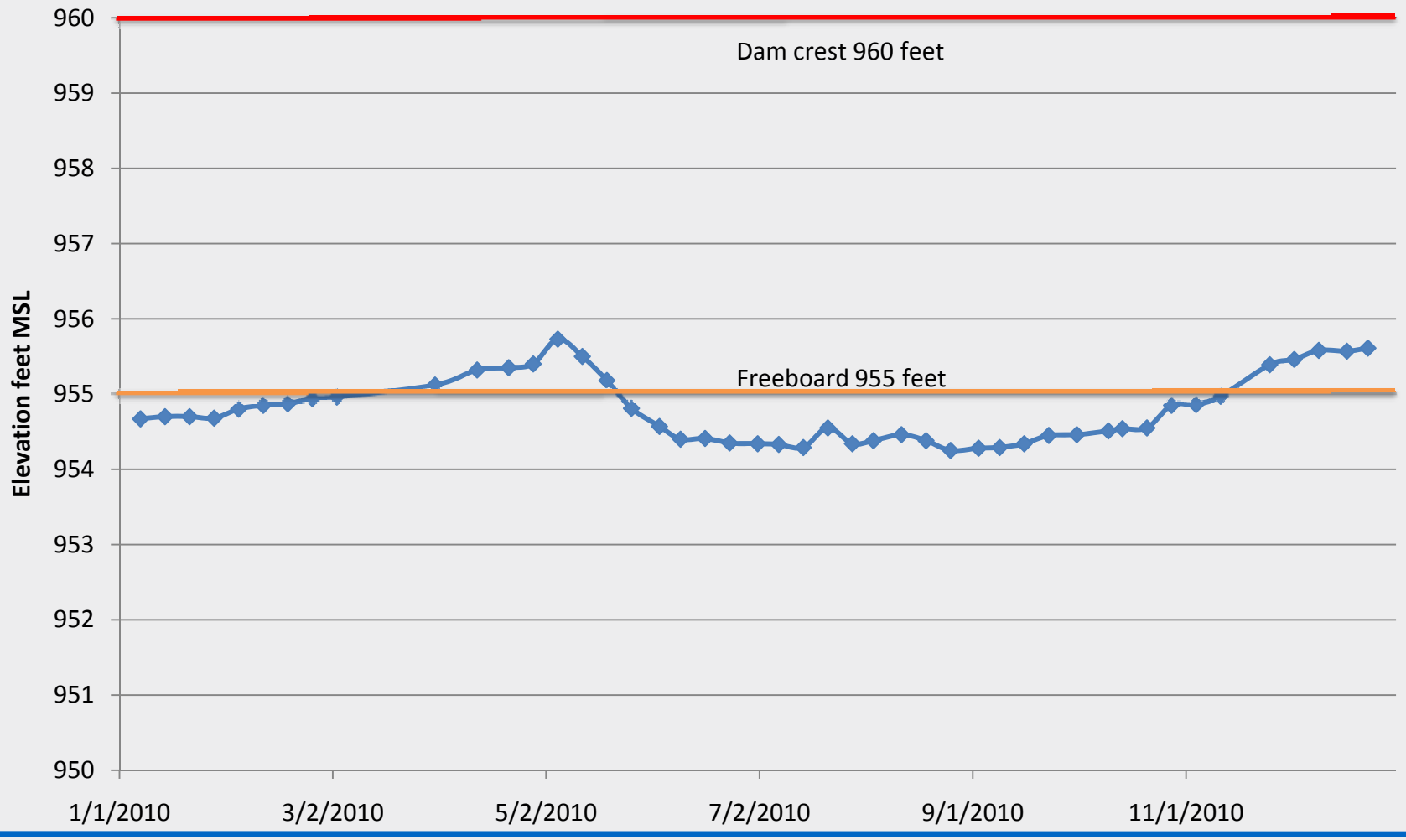
Tailings Pond Water Elevation





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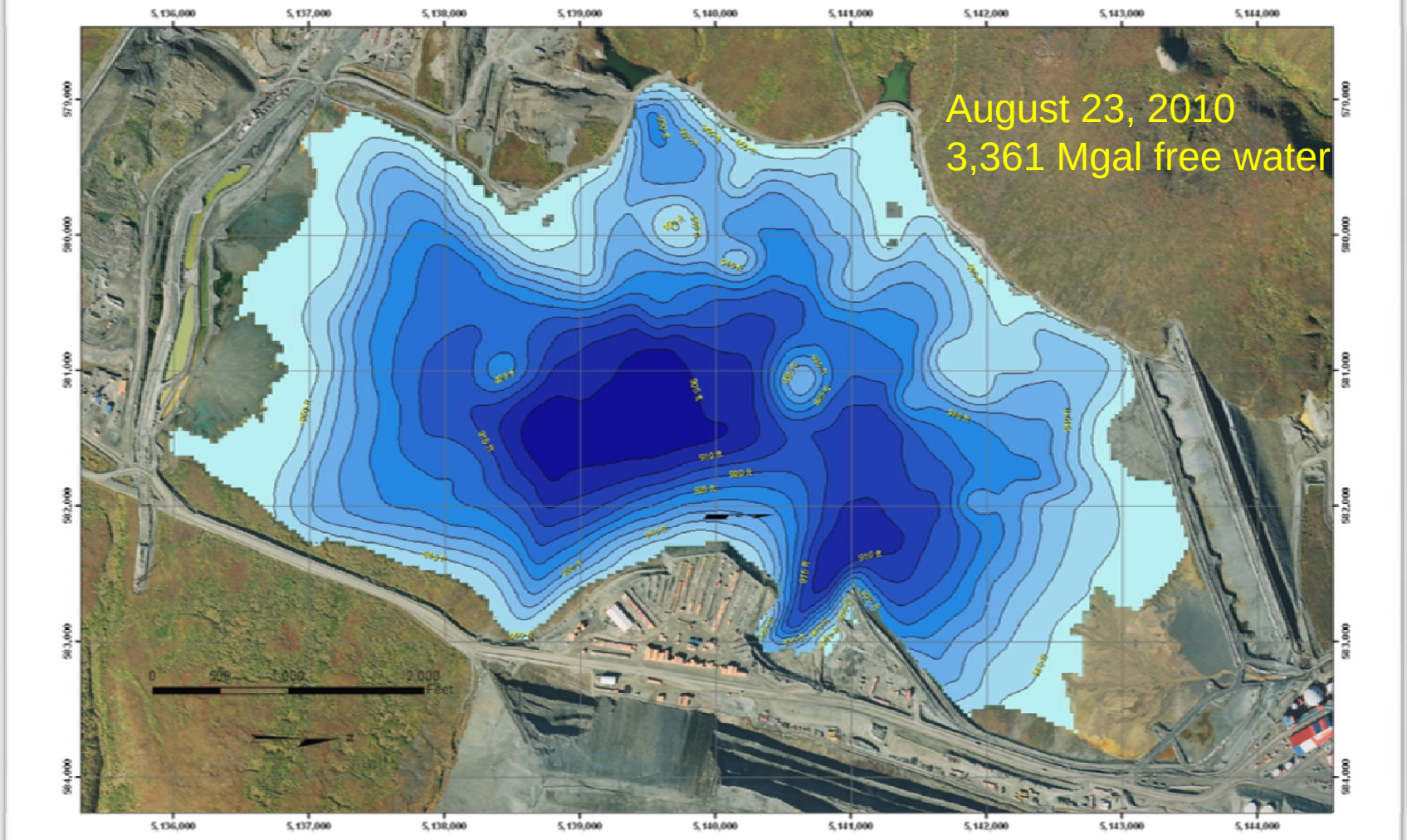
Tailings Pond Bathymetry





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Mine Water Quality



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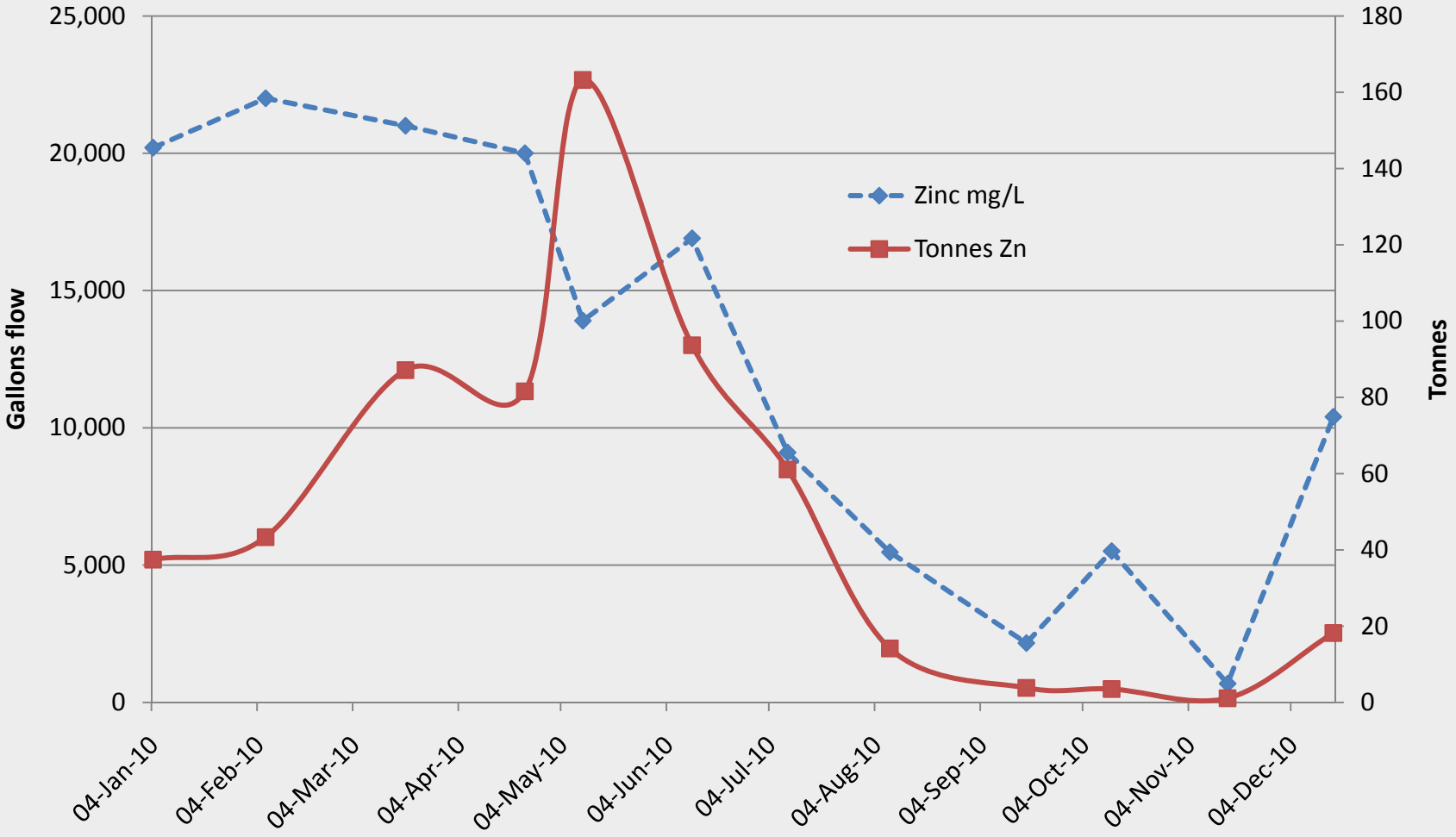
East Sump Zn Concentration & Load





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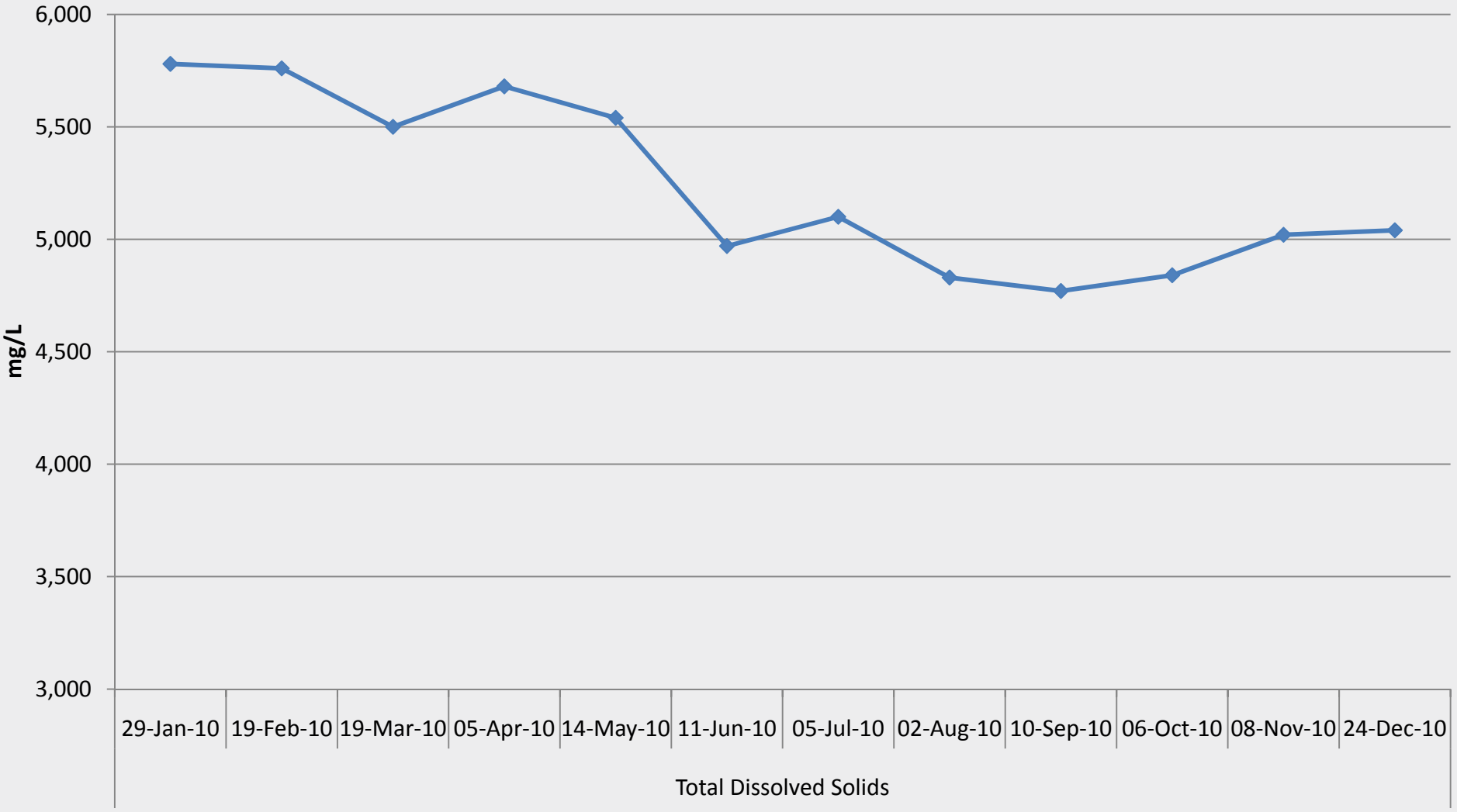
TDS in the Tailings Pond





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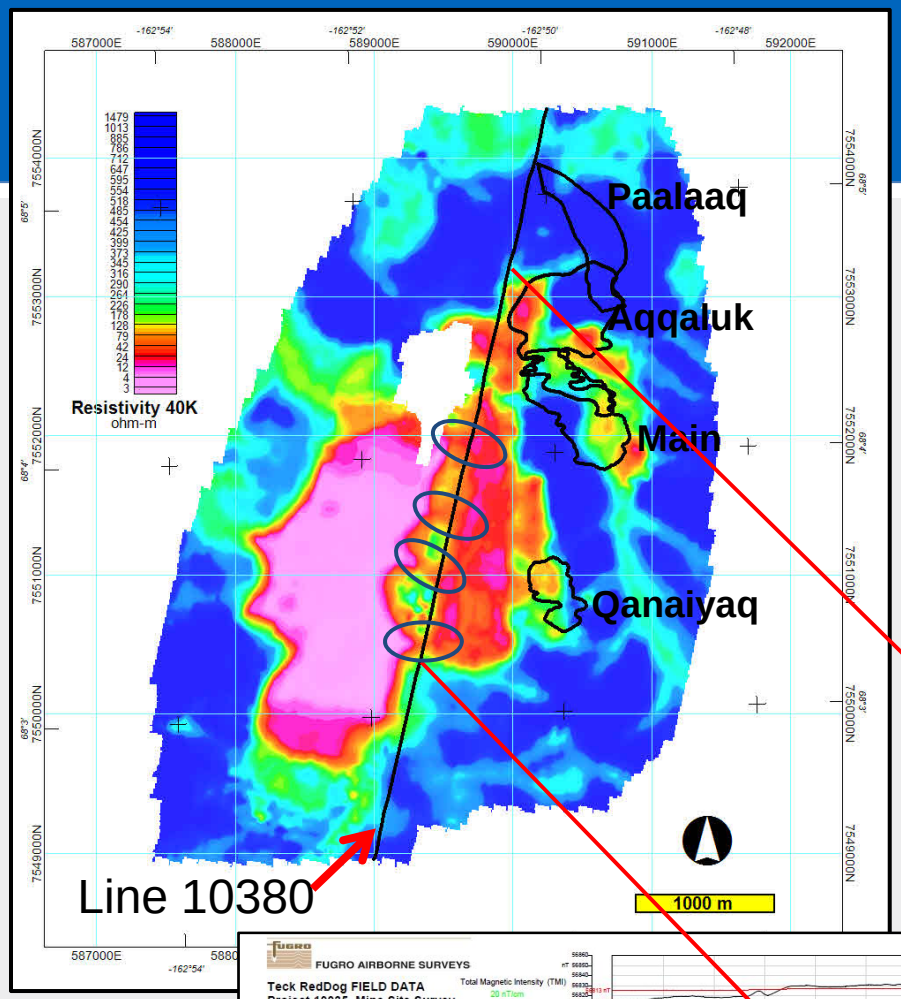
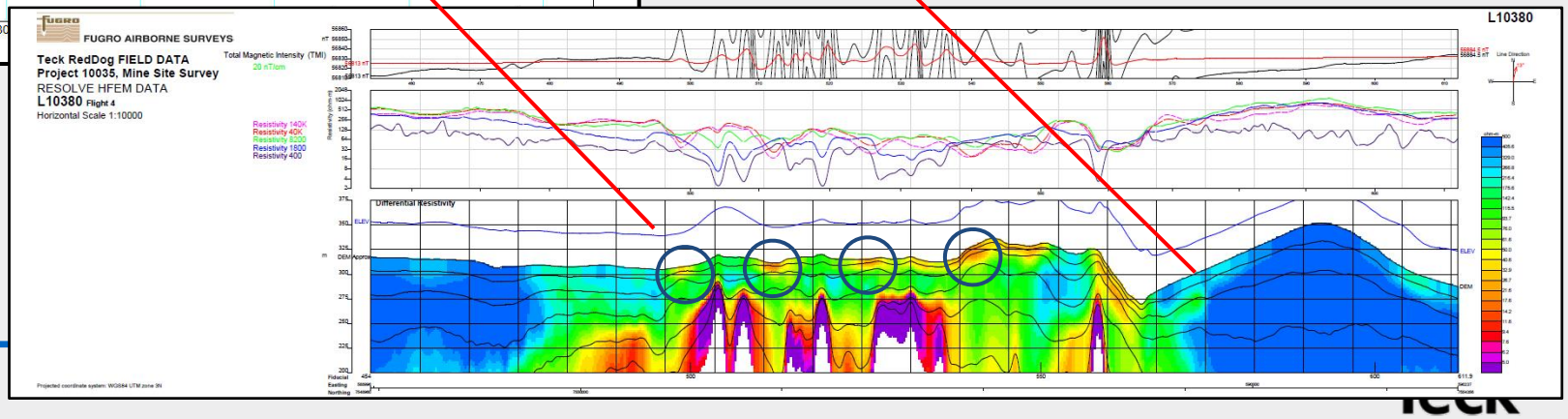


RESOLVE – Fugro Airborne Surveys
Preliminary Results

Plan view:40 kHz Apparent Resistivity

Section Line 10380
Flown along foot of Material Waste Dump
Differential Apparent Resistivity Section



Permafrost Monitoring



Monitoring Program

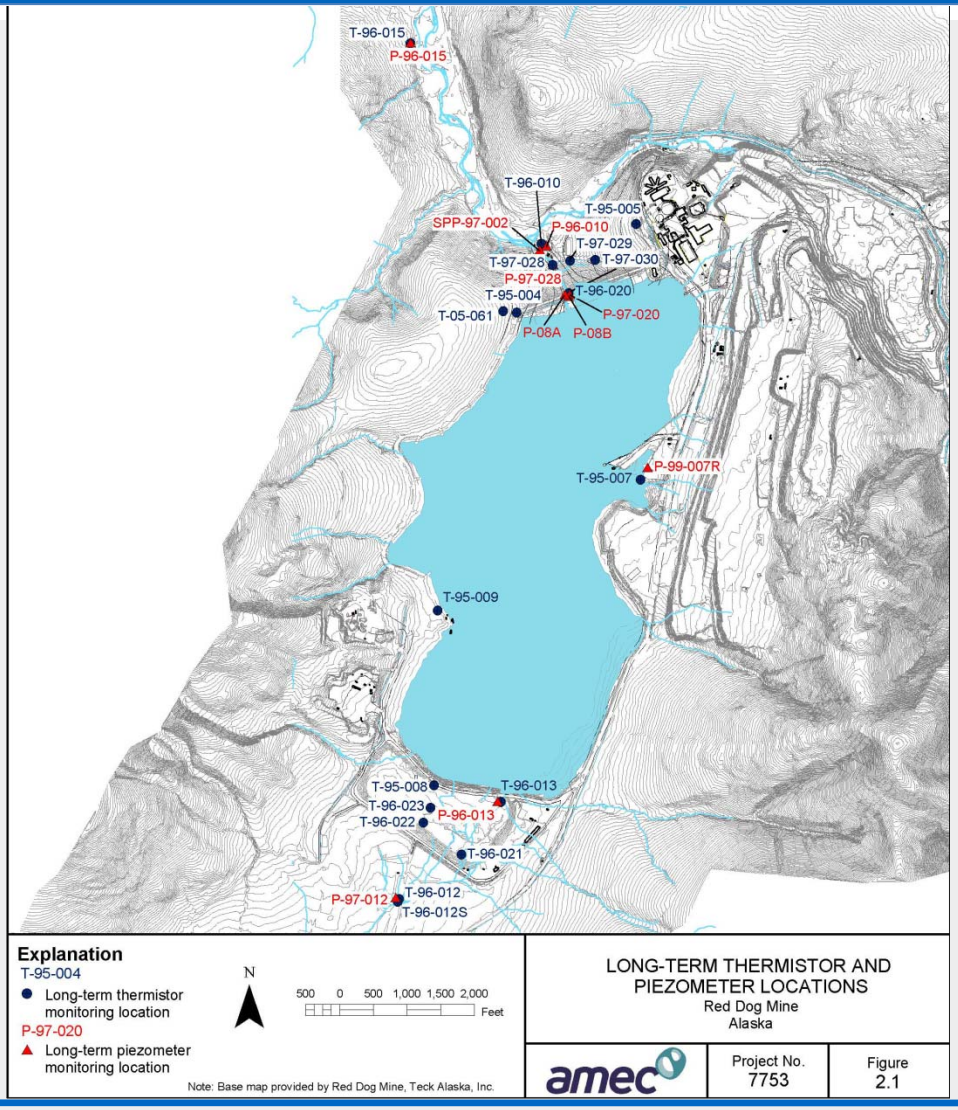
- Quarterly monitoring of 15 key background and dam area thermistors was conducted to assess currently observed trends in temperature changes in the permafrost;
- Quarterly monitoring of 8 key background and dam area piezometers was conducted to assess currently observed water levels and gradients.

2010 Conclusions:

- Subpermafrost groundwater conditions beneath the dam are the same as those noted for background conditions in 1997.
- No vertical flow is occurring from the impoundment into deep groundwater, even though there is a zone where permafrost is absent beneath the impoundment.

Thermistor & Piezometer Locations





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Biomonitoring



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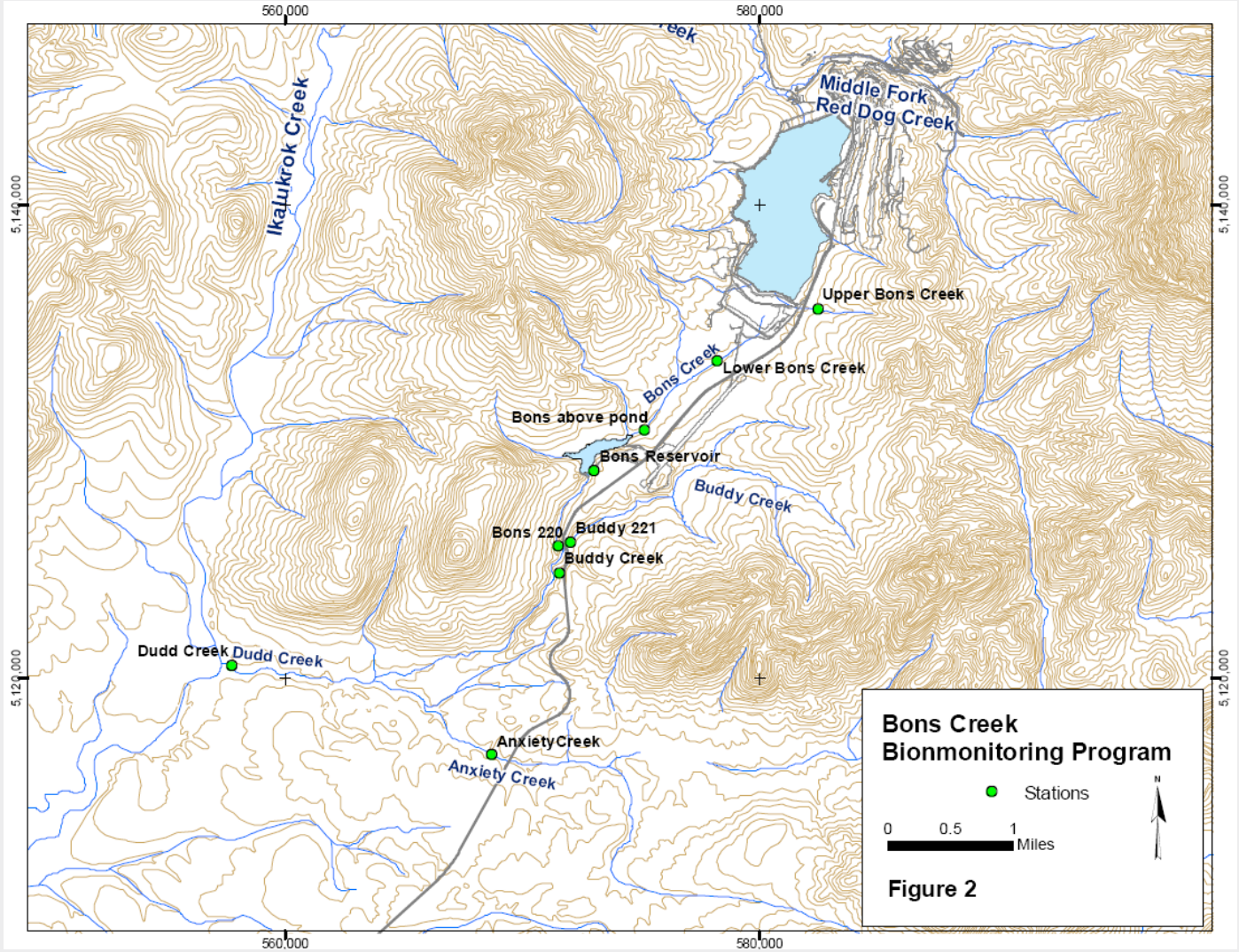
Bons Creek Monitoring Sites





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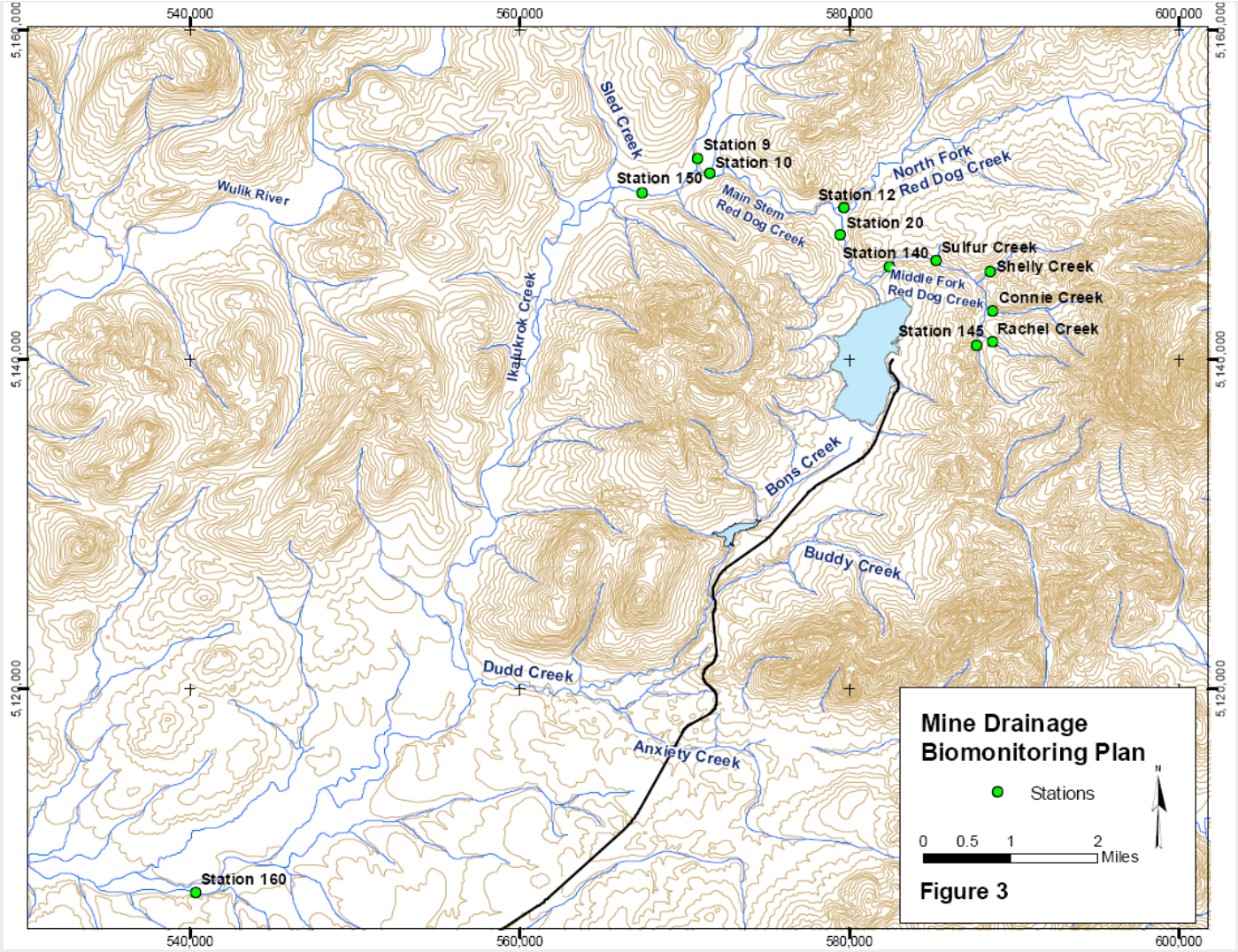
Mine Drainage Monitoring Stations





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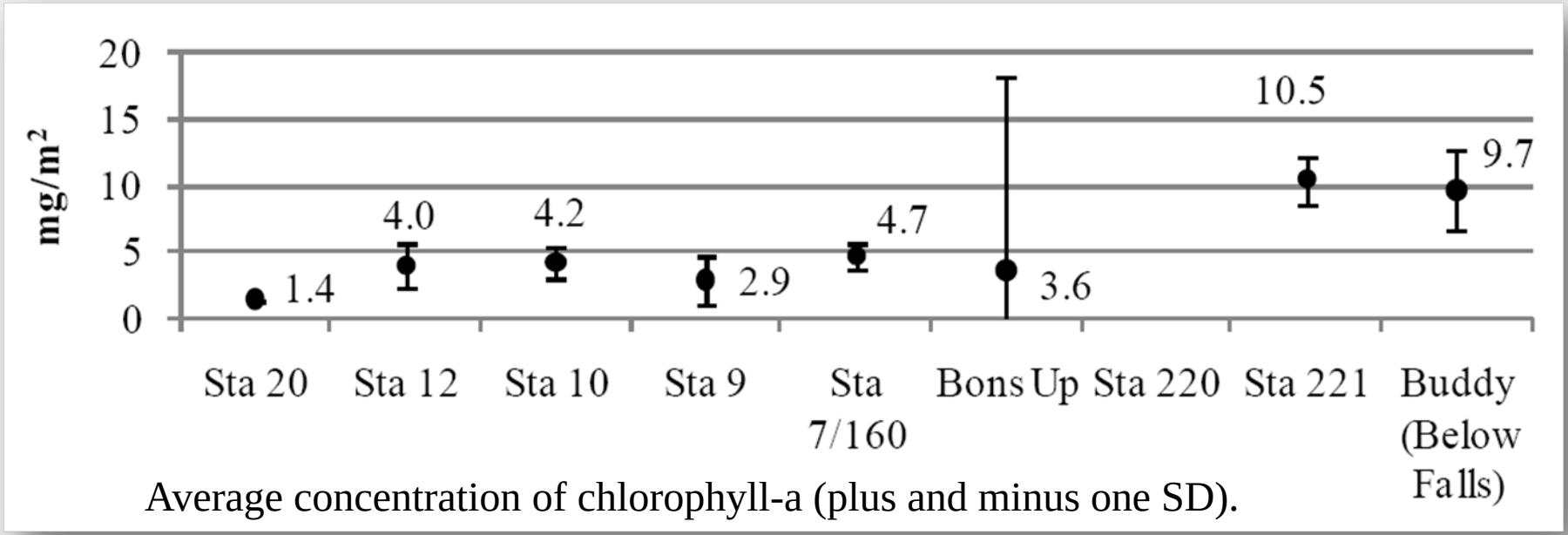
Periphyton, chlorophyll-a 2010



"This pattern is consistent with previous years' data in that periphyton standing crops are higher in the Buddy and Bons Creek and North Fork Red Dog Creek drainages. However, in 2010, chlorophyll-a concentrations were also fairly high in Mainstem Red Dog and Ikalukrok creeks … and were the highest ever seen in Middle Fork Red Dog Creek."



Average concentration of chlorophyll-a (plus and minus one SD).

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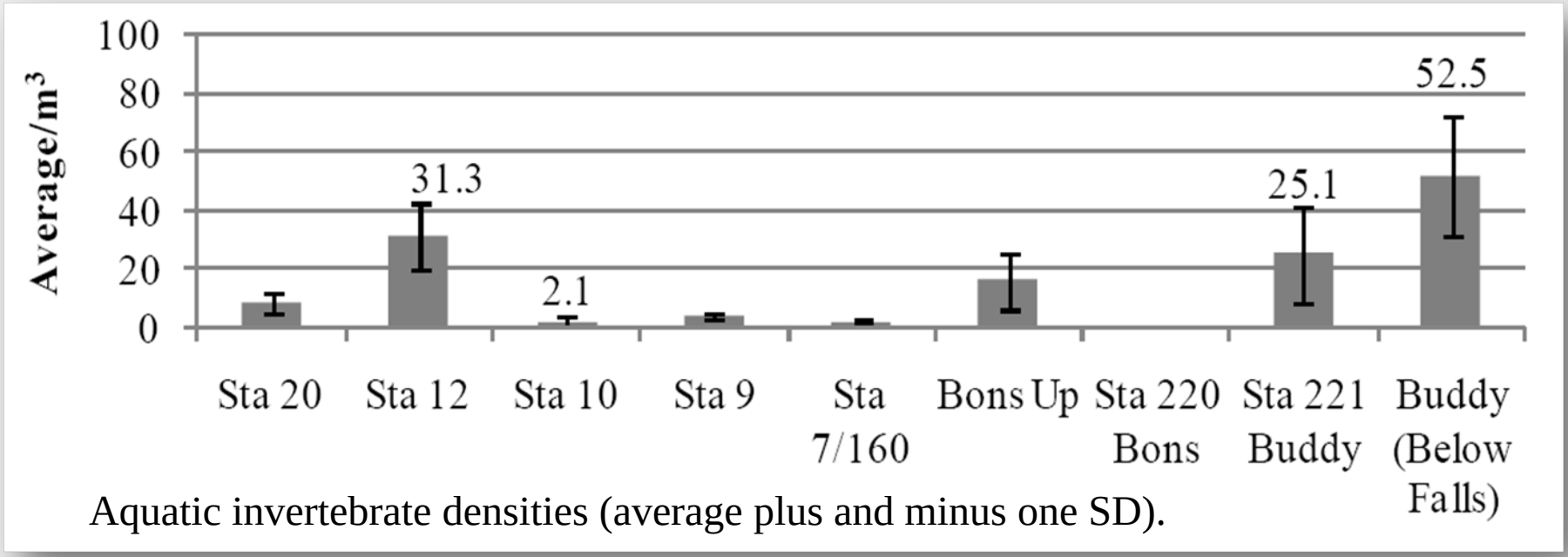
Aquatic Invertebrate Density 2010



"These data continue to follow the same general pattern with higher densities occurring in the Bons and Buddy Creek drainages and in North Fork Red Dog Creek. "

"Aquatic invertebrate densities in Mainstem Red Dog and North Fork Red Dog creeks have been higher in recent years. "



Aquatic invertebrate densities (average plus and minus one SD).

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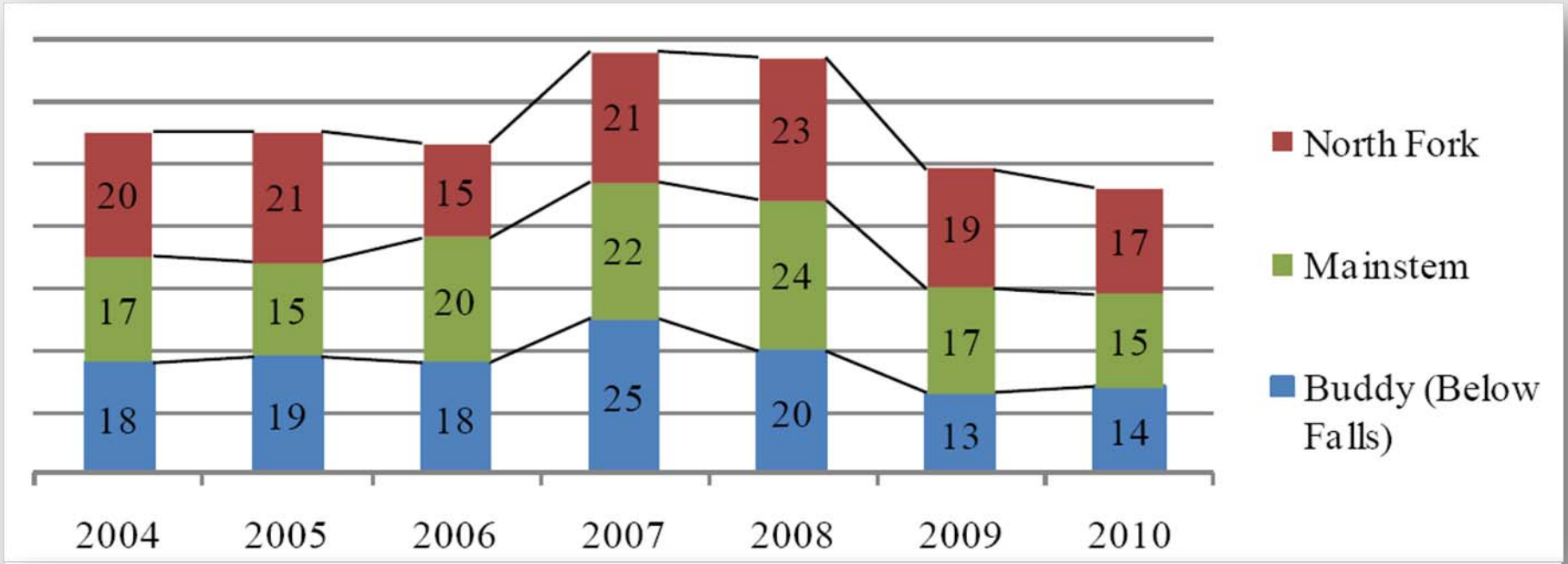
Invertebrate Taxa Richness



"Taxa richness peaked in 2007 but was nearly identical in 2008. Richness varies among sample years and among sample sites. Overall, taxa richness is similar in North Fork Red Dog, Mainstem Red Dog, and Buddy creeks."



Aquatic invertebrate taxa richness in North Fork Red Dog, Mainstem Red Dog, and Buddy creeks.

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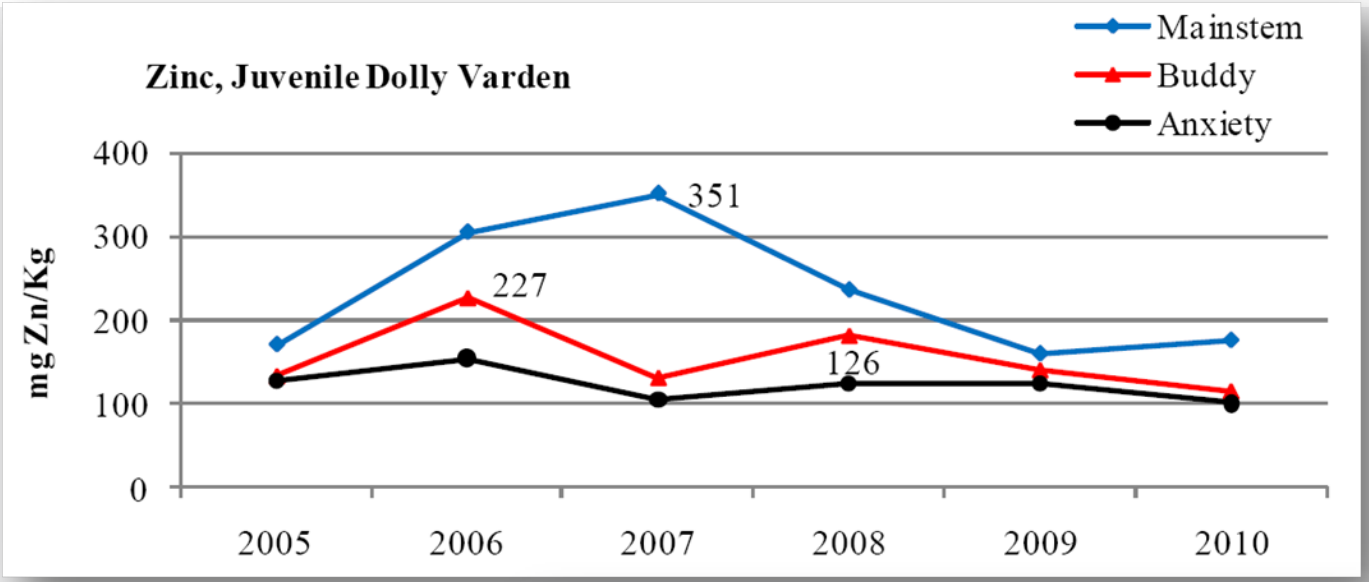
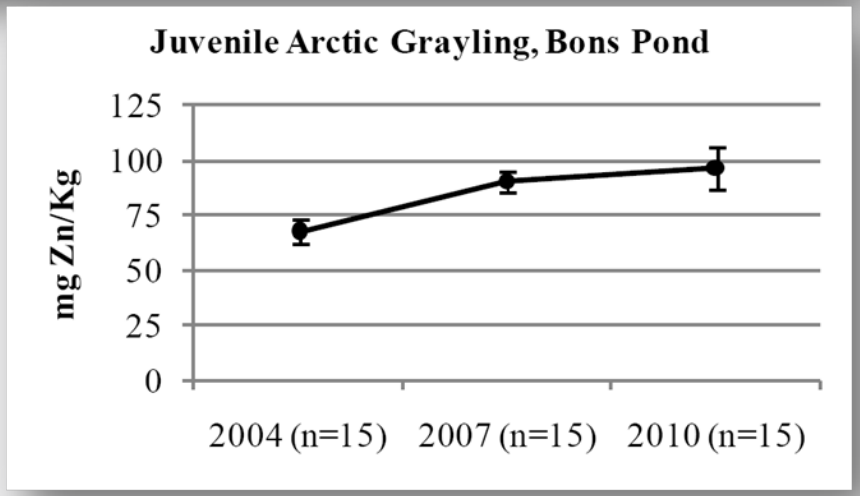
Metals in Fish Tissue





Median Zn concentrations in whole body



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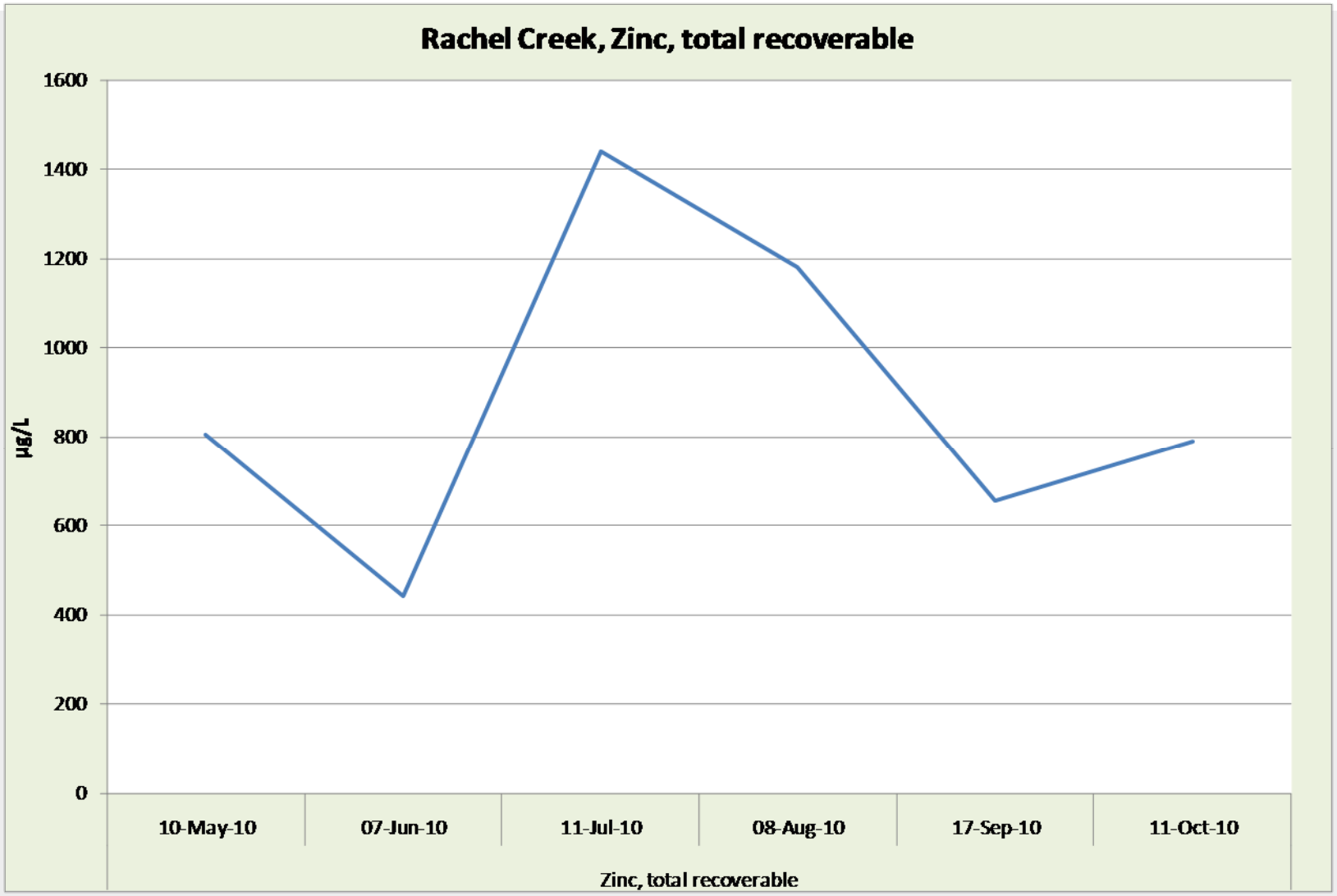
Biomonitoring Water Quality





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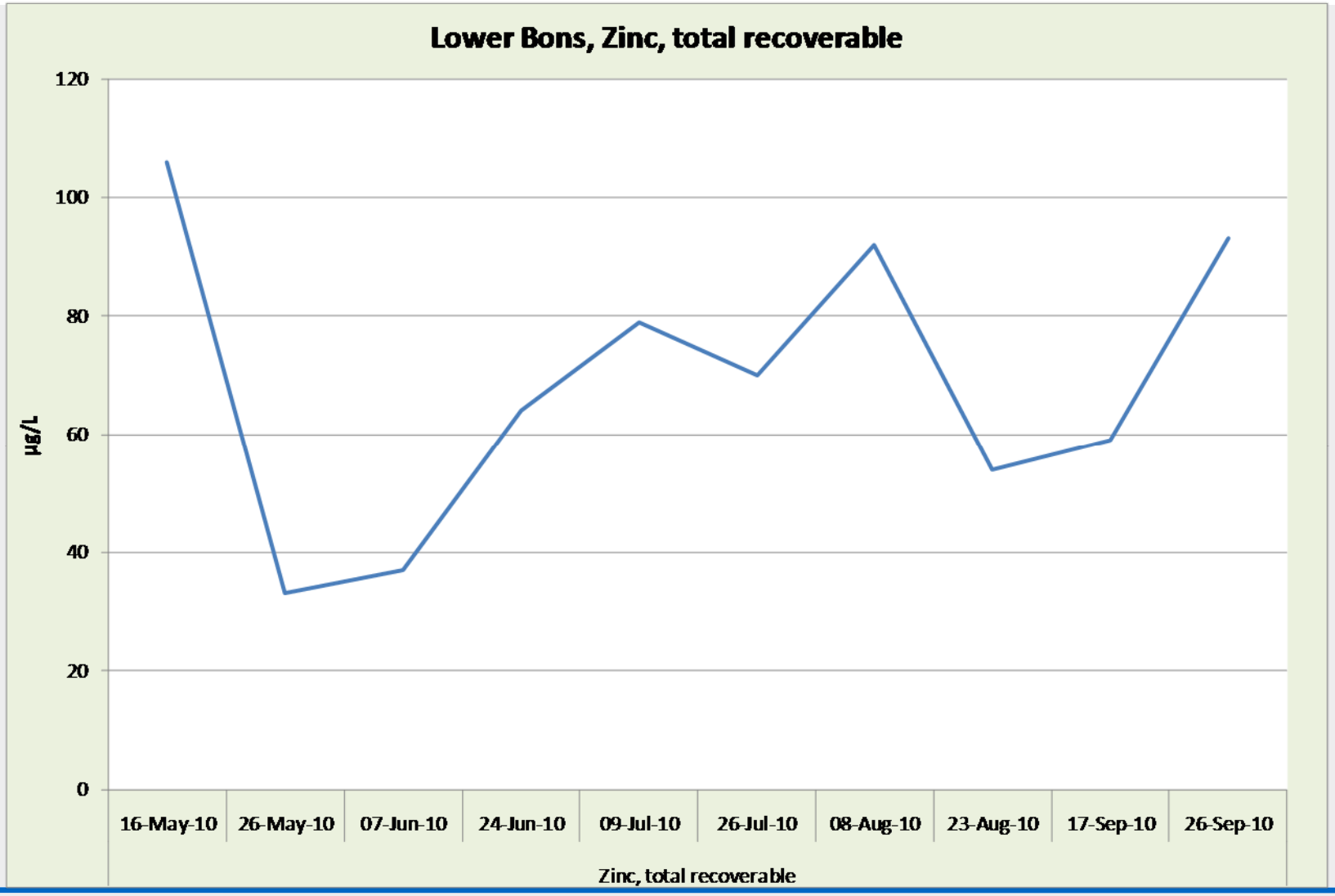
Biomonitoring Water Quality





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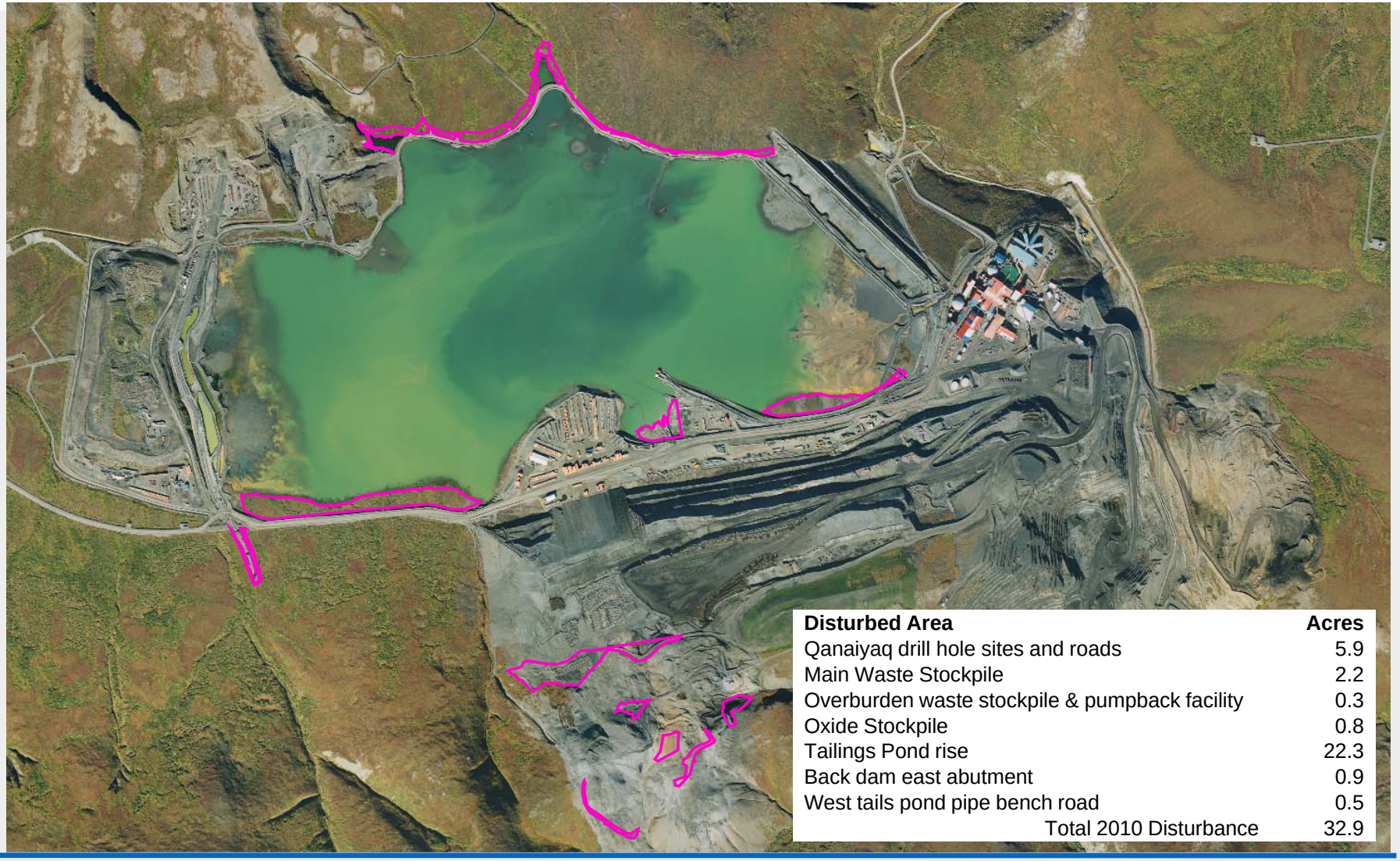
2010 Disturbance and Reclamation





Disturbed Area	Acres
Qanaiyaq drill hole sites and roads	5.9
Main Waste Stockpile	2.2
Overburden waste stockpile & pumpback facility	0.3
Oxide Stockpile	0.8
Tailings Pond rise	22.3
Back dam east abutment	0.9
West tails pond pipe bench road	0.5
Total 2010 Disturbance	32.9

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Main Waste Stockpile Resloping

Oxide Stockpile Reclamation






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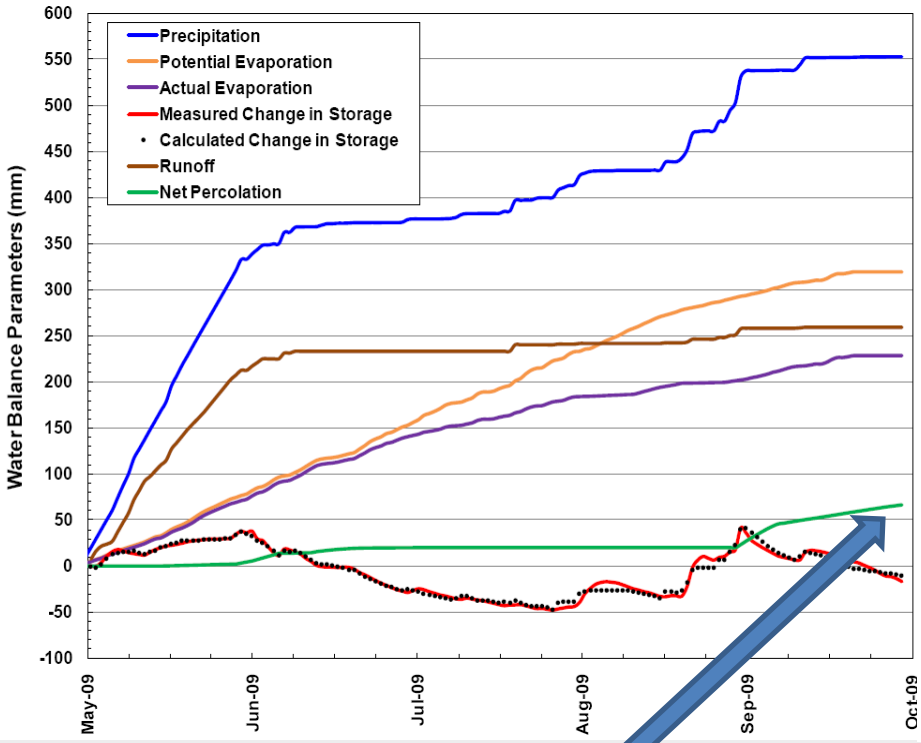
Cumulative water balance fluxes for Oxide Stockpile, West station

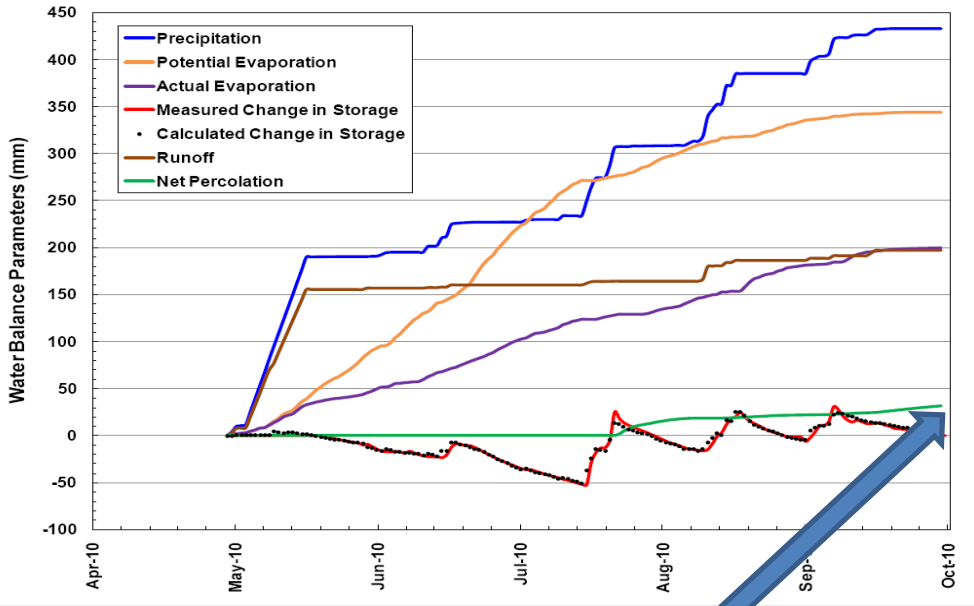


2008-09



Net percolation approximately 16-17% of annual precipitation

2009-10



Net percolation approximately 10-11% of annual precipitation

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Inert Solid Waste Landfills



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Wildlife






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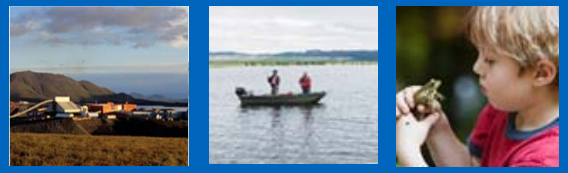
Water Treatment



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Water Use and Treatment



Location	Total 2010 Flow Gallons
Bon's Creek Total Flow	143,147,000
Reclaim Flow to Mill	3,507,115,000
WTP #1 Influent from Reclaim	362,604,000
WTP #1 Influent from MWD	1,922,000
WTP #1 Clarifier Underflow Sludge To Tails	7,782,000
WTP #1 Effluent to Sandfilter/Discharge	6,960,000
WTP #2 Influent from Reclaim	1,752,400,000
WTP #2 Sludge Discharge To Tails	58,955,000
SandFilter Effluent Discharged to Red Dog Ck	803,440,000
WTP #3 Influent from MWD	11,898,000
WTP #3 Influent from Mine Water Collection	38,773,000
WTP #3 Total Effluent	97,038,000
Total Treated Water Discharged to Red Dog Creek	810,400,000

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Fugitive Dust



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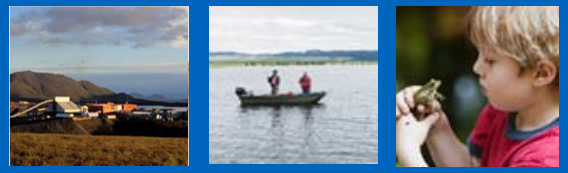
Dust Monitoring

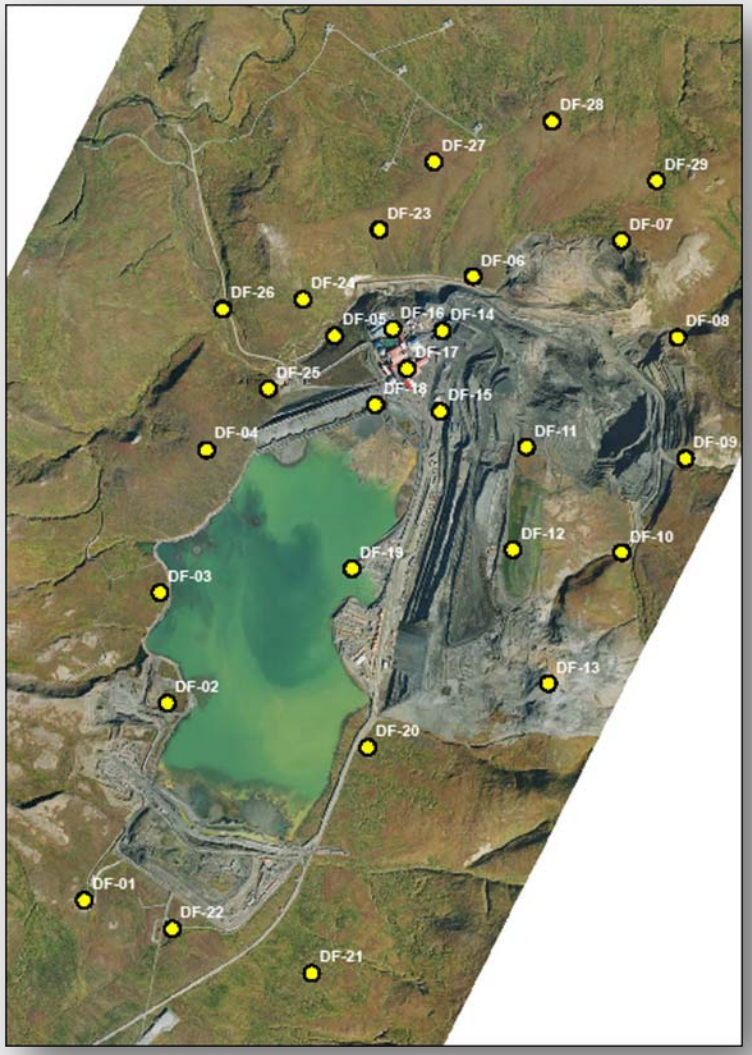


Several monitoring programs are in place to monitor dust levels and deposition

- TEOMs* – real-time dust concentration measurements at PAC and Tailings Dam
  - * Tapered Element Oscillating Microbalance; determines concentration in air by weight and airflow measurements
- Vegetation monitoring – effects of dust deposition on plant communities over time
- Moss studies – quantities of dust deposition over time
- Dustfall jars – rates and quantities of dust deposition over time
- Road surface sampling – deposition and tracking on roadways

Dust Monitoring





- Results of dust monitoring are analyzed to assist with mine air quality evaluations.
- This map shows dustfall jar locations for 2010. Three new jars were added in 2010 north of Aqqaluk.

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Dust Monitoring



	2005	2006	2007	2008	2009	2010
Days with TSP > 150	37	20	19	4.0	18	24
Average TSP	64	45	47	38	50	54
Average MAX TSP	260	180	180	120	180	218
Average Min TSP	9	8	8	6	10	8
Average Std Dev	57	43	40	29	43	46
Days Sampled	340	280	350	290	290	349

- Air monitoring programs allow for tracking and analysis of dust concentrations and effectiveness of dust control measures; and
- Provide information to help with decisions on where dust control improvement efforts should be focused

Vegetation Monitoring



Monitoring of vegetation to assess potential effects from dust deposition

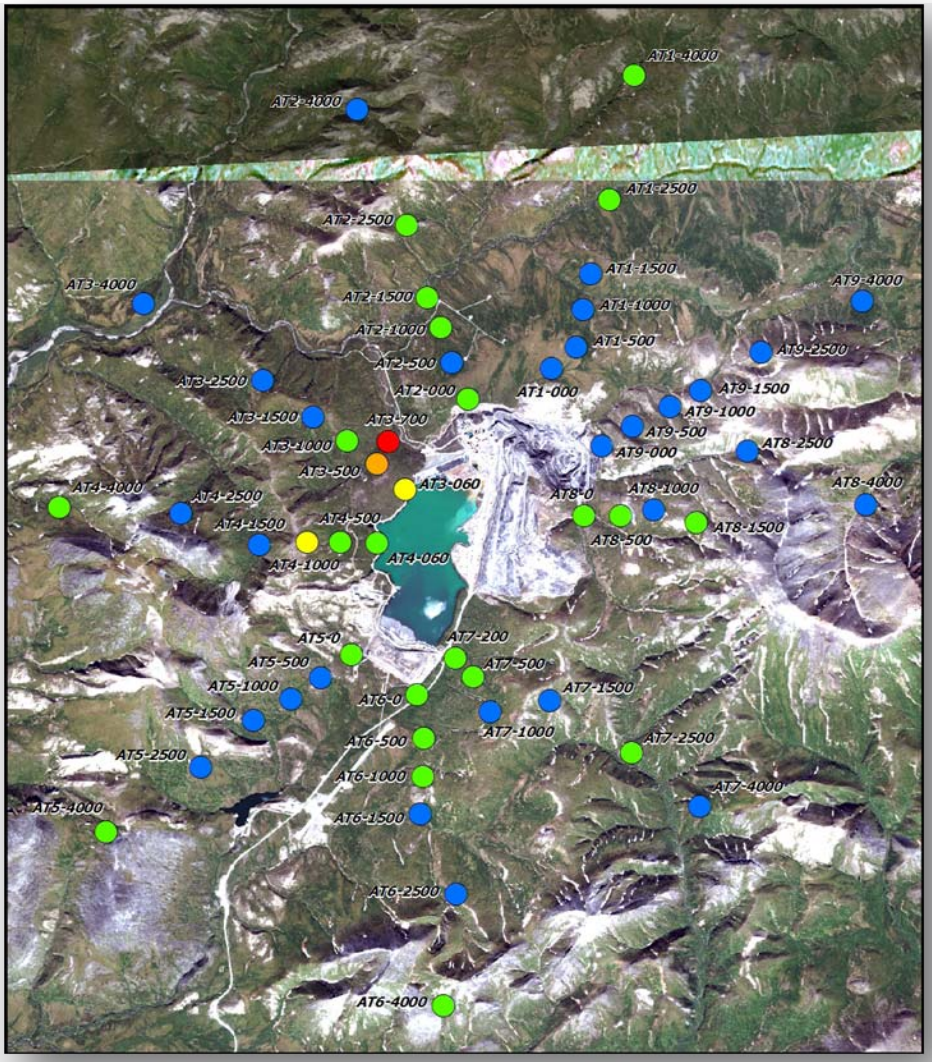
Comprehensive baseline monitoring was conducted in 2010 to facilitate more precise monitoring of dust control efforts over time

- 55 long-term monitoring plots around the mine site
- 4 reference locations (upwind)
  - Moss, lichen & vascular plant cover and composition

Monitoring will continue at 3-year intervals with next study in 2013.

Vegetation Monitoring





2010 baseline vegetation monitoring plots

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Construction Activities



Construction completed in 2010

- **Back Dam curtain wall**
- **Pumped Slurry Stations (Gravity drain conversion)**

Continuing construction

- **Wing Dam**
- **Main Dam lift**

2011 Construction

- **Isa Mill building**

Back Dam Completed in 2010



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Wing Dam Construction



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Gravity Drain Conversion Project



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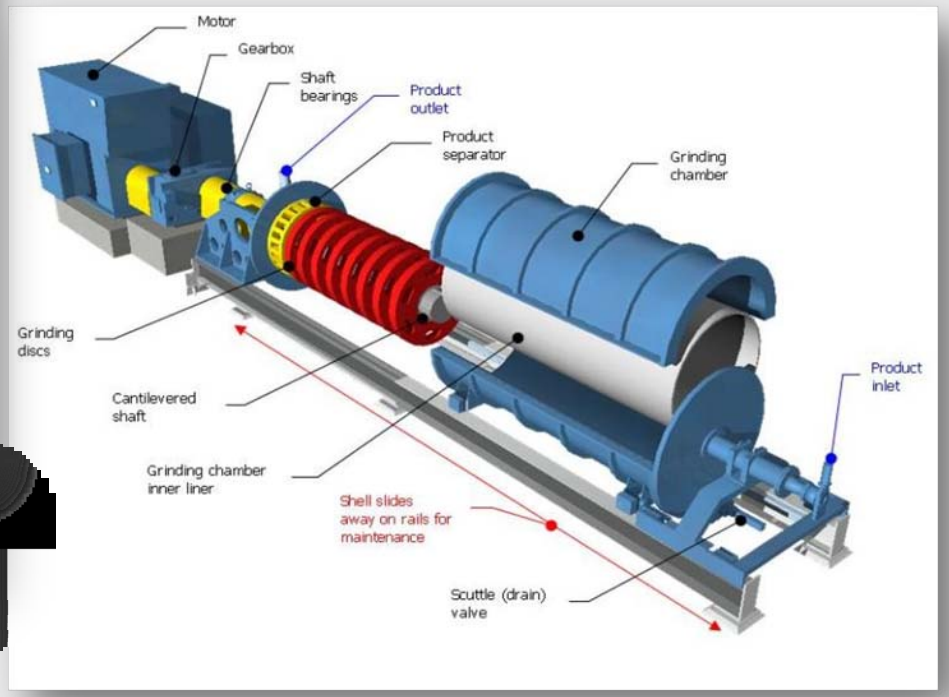
New Construction



- Australia - Prominent hill IsaMill M3,000



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Thank You