



# Atmospheric Deposition Pail Monitoring System (ADP)

9 July 2013



## Introduction / History

- Snow sampling
  - Started in 2007
  - Limited to winter months
  - Limited to when and where snow is present
- Atmospheric Depositional Pail (ADP)
  - Started in 2011
  - Not limited to winter months
  - Discrete sampling period

# Data

- ADP Data
- Meteorological Data
- Tailings Placement Data

## ADP Data

- Sampling started in January 2011
- 5 sampling sites
- Frequency of collection has been weekly and biweekly
- Samples are filtered then analyzed for Total Lead and Total Zinc

# ADP Locations



# ADP West Sample Site



# ADP Northeast Sample Site



# Meteorological Data

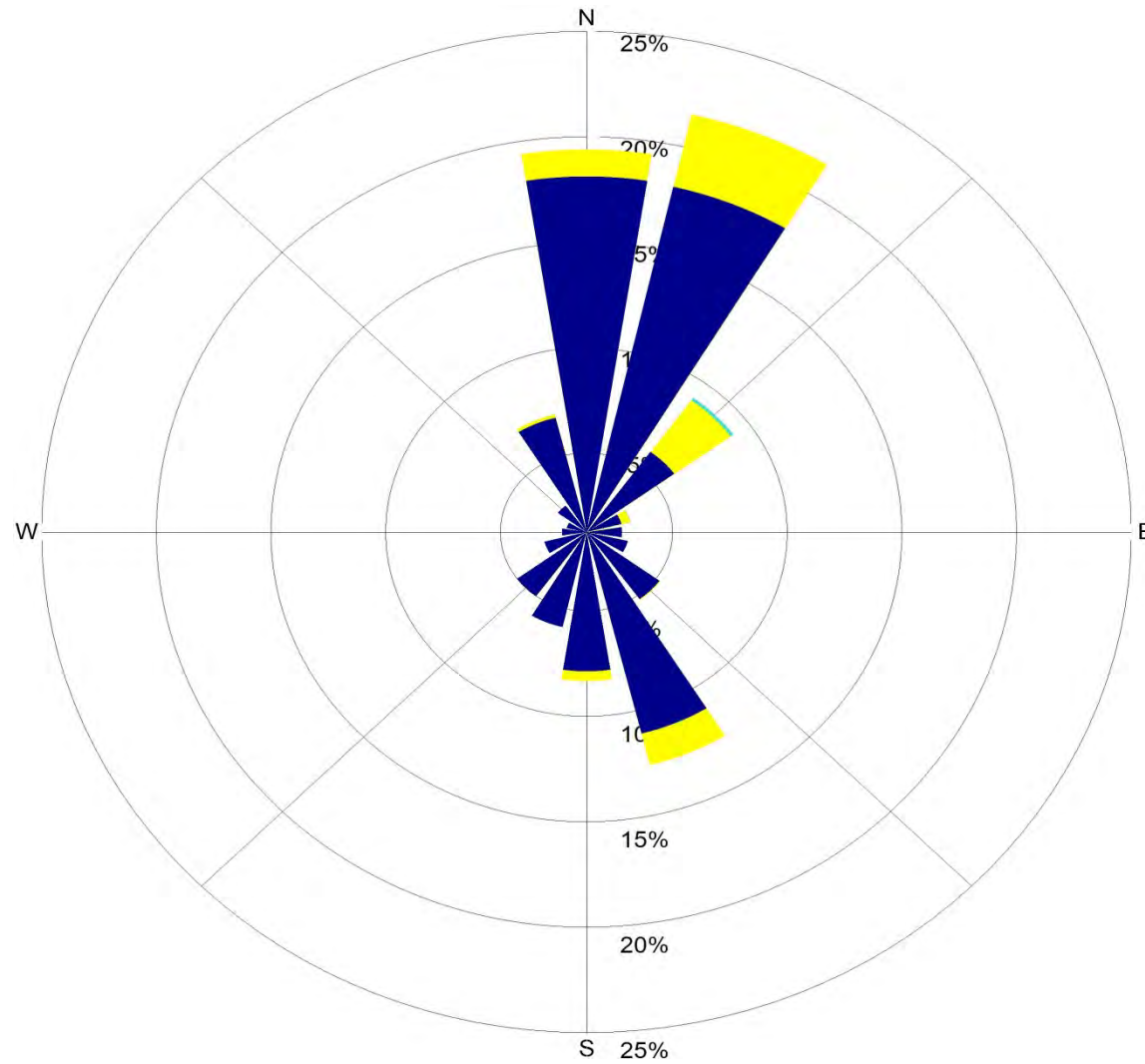
- 10 meter tower located to the southwest of tails
- Parameters monitored
  - Wind Speed
  - Wind Direction
  - Air Temperature
  - Barometric Pressure
  - Relative Humidity
  - Precipitation
- Measurements are totaled/averaged on an hourly basis



# Meteorological Station Location



# Predominant wind direction



**0.0 - 4.0 mph**

**4.0 - 7.4 mph**

**7.4 - 12 mph**

## Tailings Placement Data

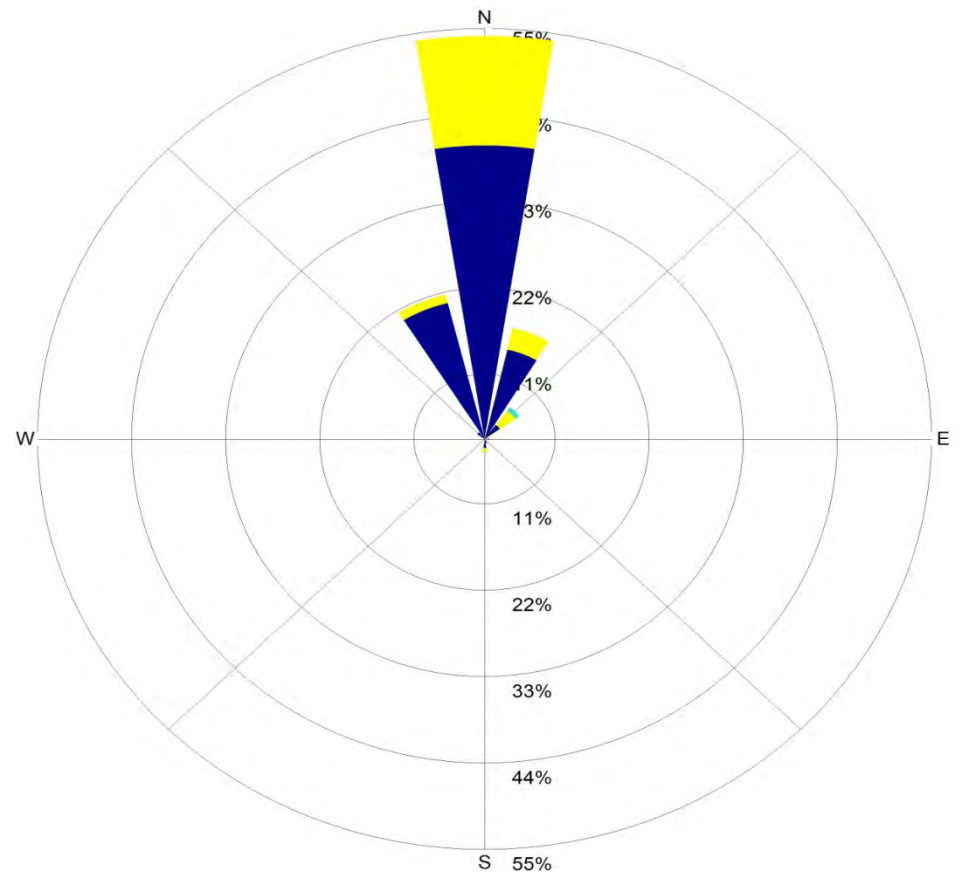
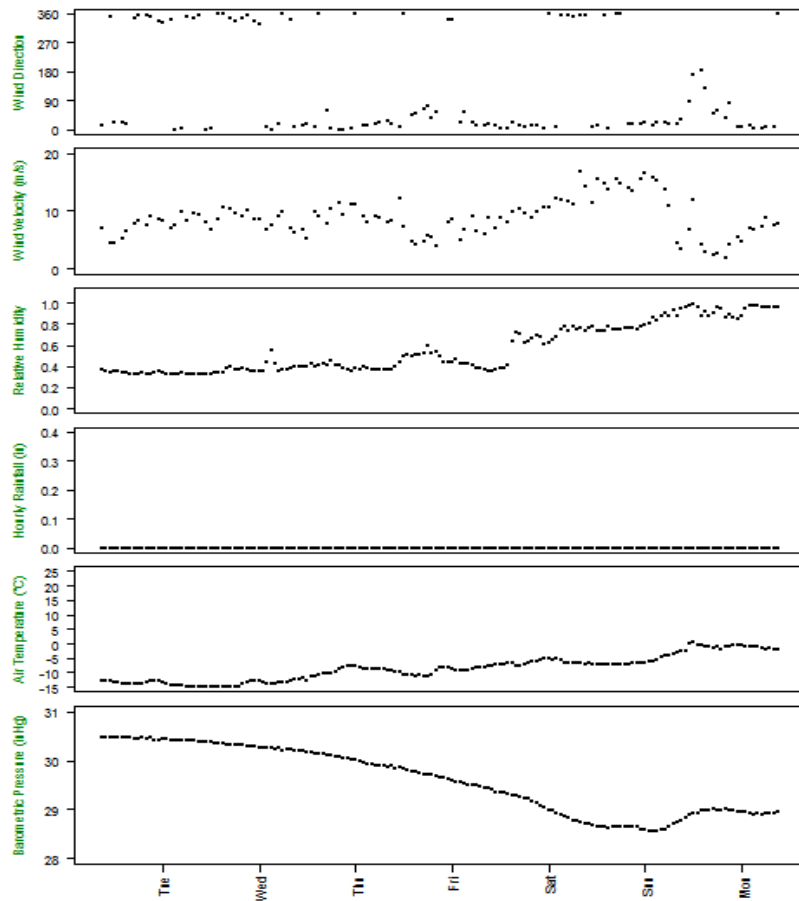
- Surface operations maintains a record of the amount of tails place and also which cells they were placed in.

## Visual Analysis of Data Collected

- Data was combined into graphs over the length of the sample period.
  - These graphs were visually analyzed for patterns that may lead to dusting events.
  - These initial analyses were conducted 'blind'.
- When patterns were identified they were compared to loading monitored during the same time frame.
  - Loading was typical higher during these periods.

# Visual Analysis of Data Collected

28 Meteorological Conditions from 2012-01-16 to 2012-01-23

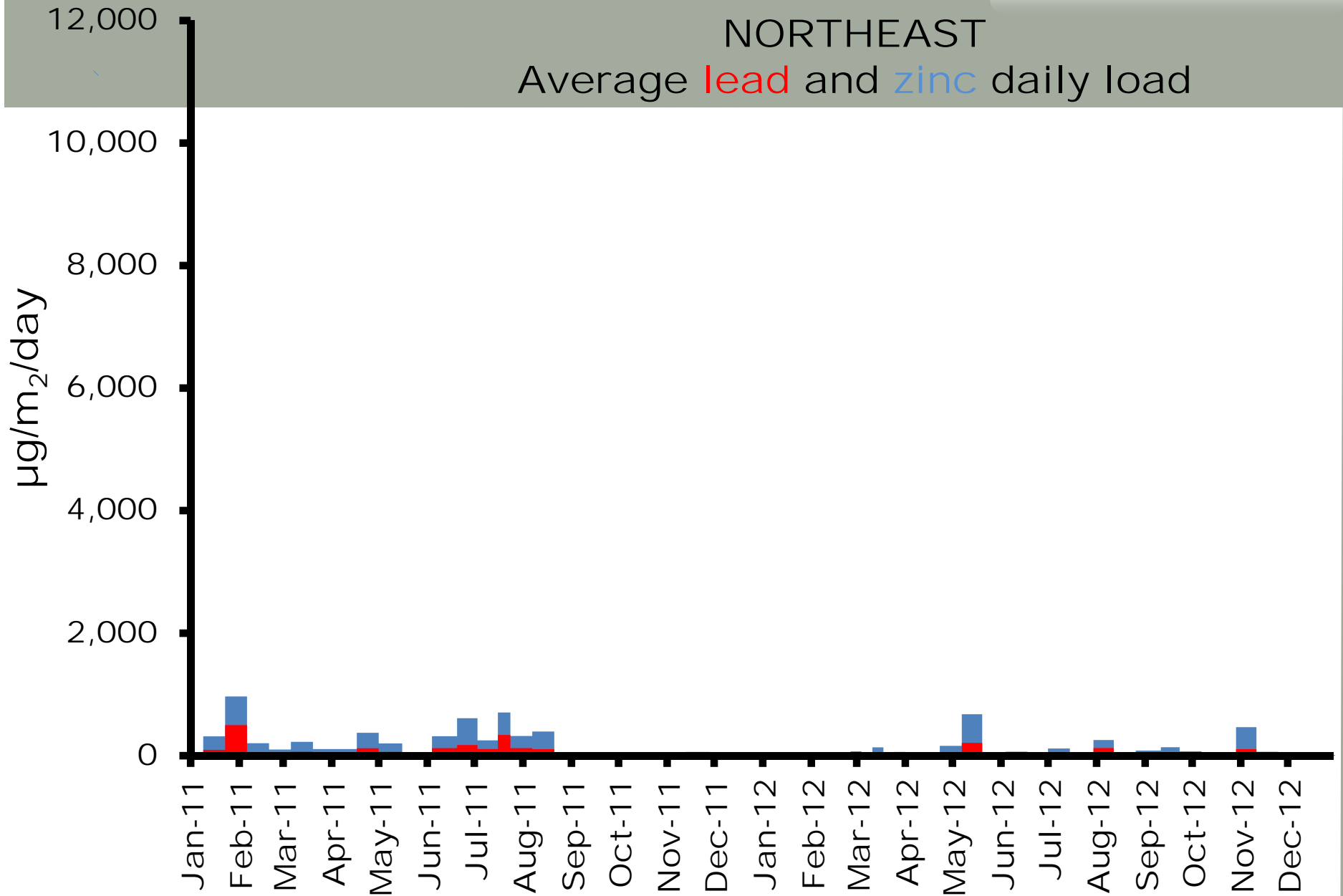


# ADP Loading Results



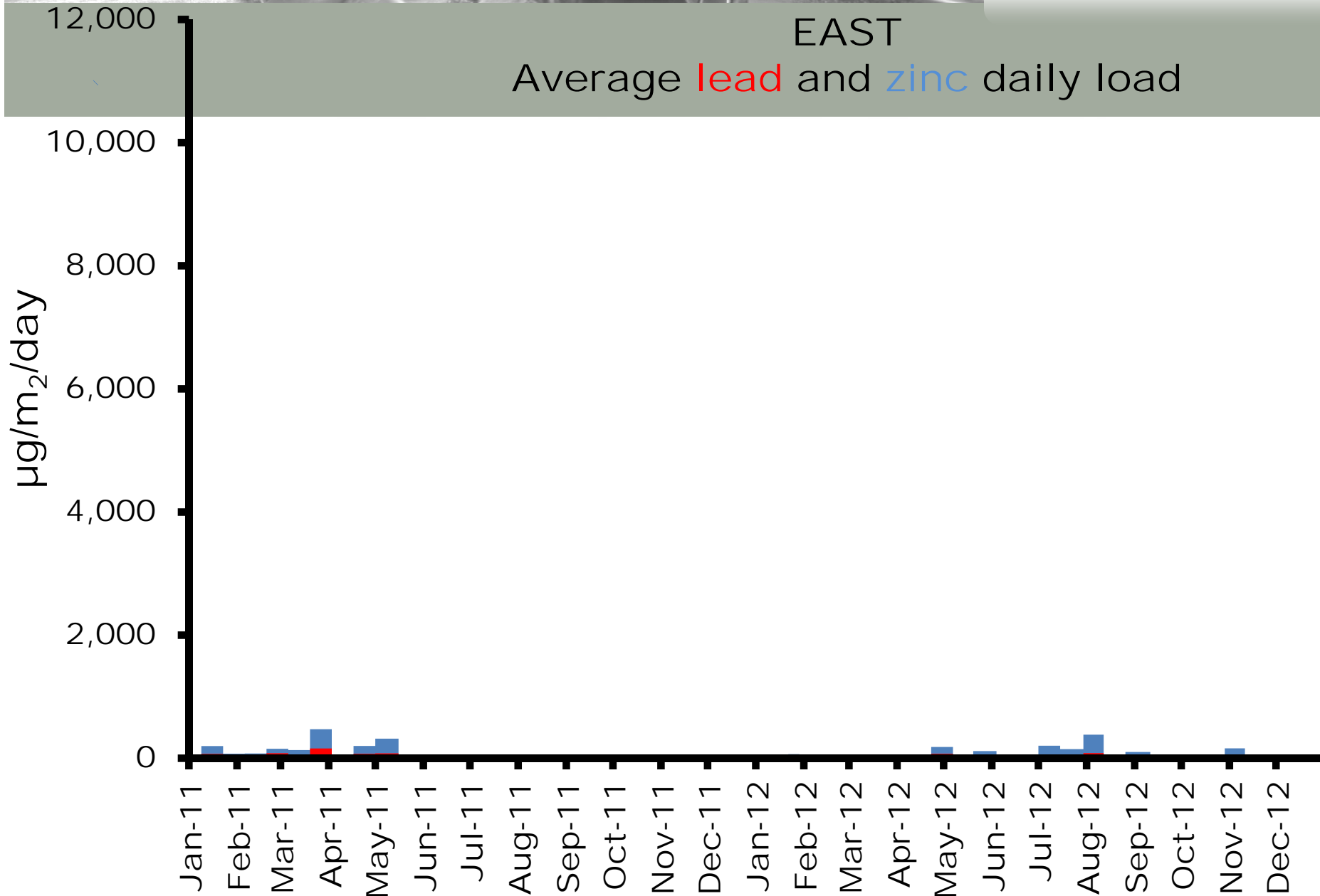
# NORTHEAST

Average **lead** and **zinc** daily load



# EAST

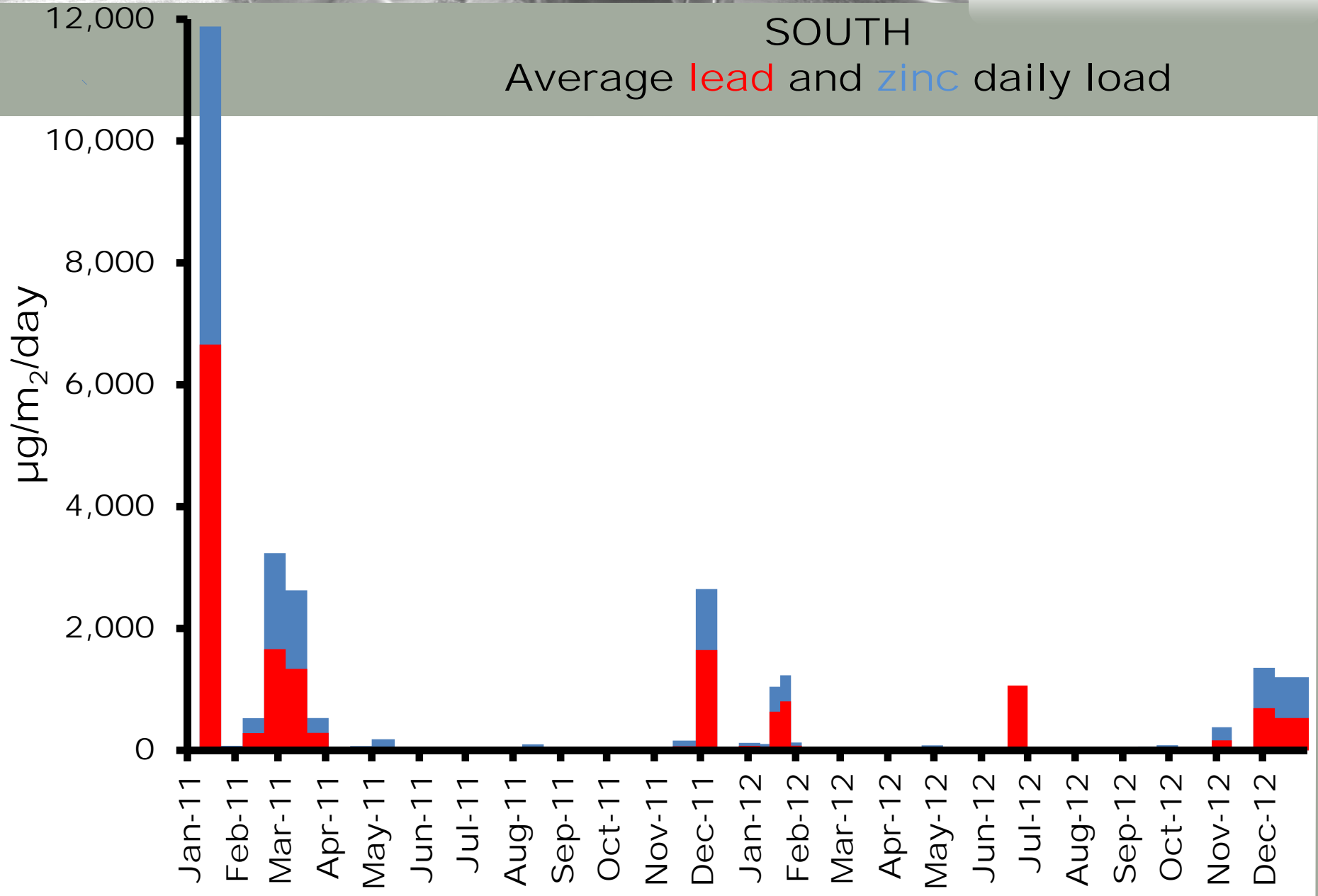
Average **lead** and **zinc** daily load





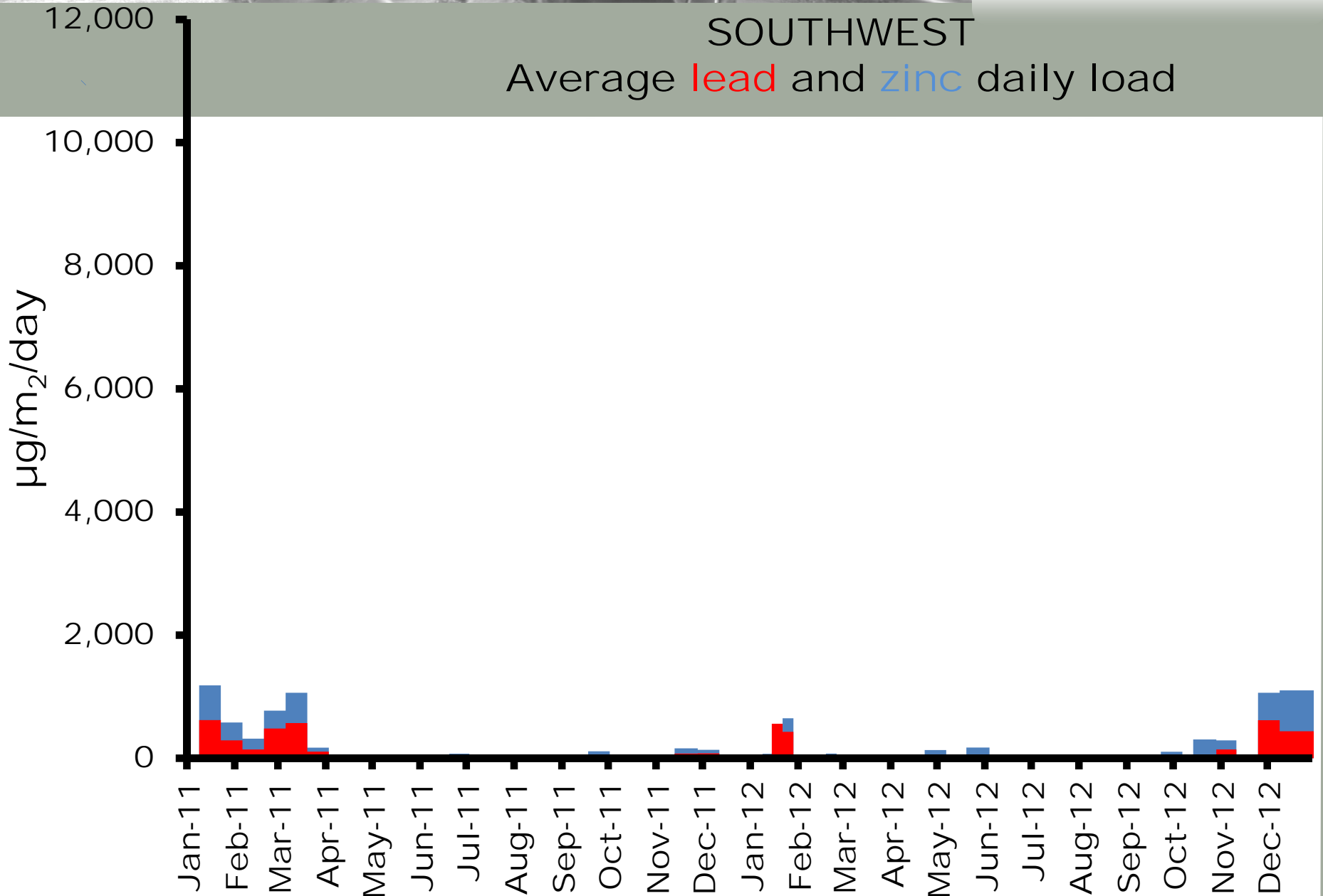
# SOUTH

Average **lead** and **zinc** daily load



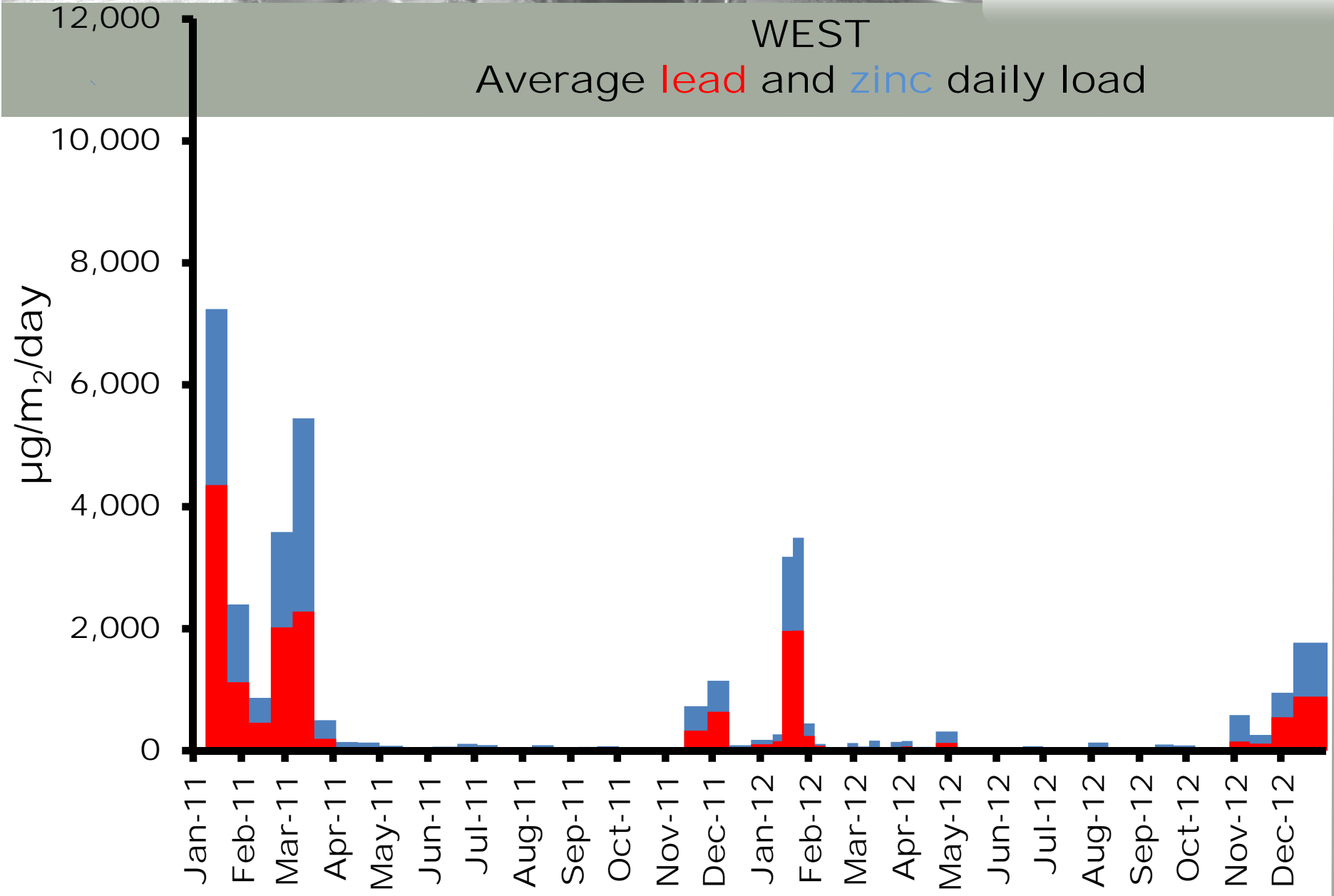
# SOUTHWEST

Average **lead** and **zinc** daily load



# WEST

Average **lead** and **zinc** daily load



# Yearly Data Analysis


<b>Period 1</b>	01/09/2011 through 04/03/2011	<b>140 days</b>	<b>38.4%</b>	<b>95% of deposition</b>
Winter	11/14/2011 through 01/09/2012			
<b>Period 2</b>	04/03/2011 through 11/14/2011	<b>225 days</b>	<b>61.6%</b>	
Spring, Summer, Fall				
	<b>West</b>	<b>Southwest</b>	<b>South</b>	
	Lead	Lead	Lead	
<b>Total 2011</b>	<b>169,704</b> $\mu\text{g}/\text{m}^2/\text{year}$	<b>36,196</b> $\mu\text{g}/\text{m}^2/\text{year}$	<b>172,879</b> $\mu\text{g}/\text{m}^2/\text{year}$	

<b>Period 1</b>	01/09/2012 through 02/06/2012	<b>117 days</b>	<b>32.6%</b>	<b>87% of deposition</b>
Winter	10/15/2012 through 01/02/2013			
<b>Period 2</b>	02/06/2012 through 10/15/2012	<b>242 days</b>	<b>67.4%</b>	
Spring, Summer, Fall				
	<b>West</b>	<b>Southwest</b>	<b>South</b>	
	Lead	Lead	Lead	
<b>Total 2012</b>	<b>72,118</b> $\mu\text{g}/\text{m}^2/\text{year}$	<b>32,809</b> $\mu\text{g}/\text{m}^2/\text{year}$	<b>38,864</b> $\mu\text{g}/\text{m}^2/\text{year}$	

## Analysis of graphs / data

- Wind direction is primarily from the north / northeast during these months.
- Ambient temperature drop below freezing more frequently in 2011 compared to 2012.

# Strategies for dust abatement

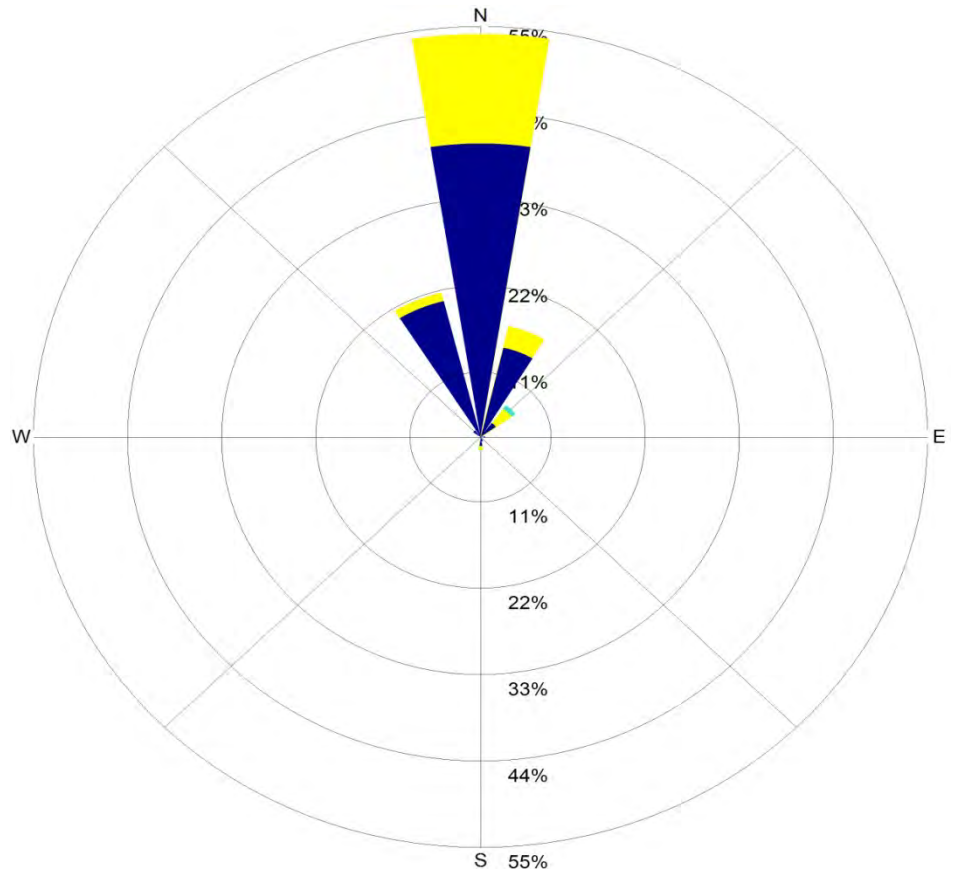
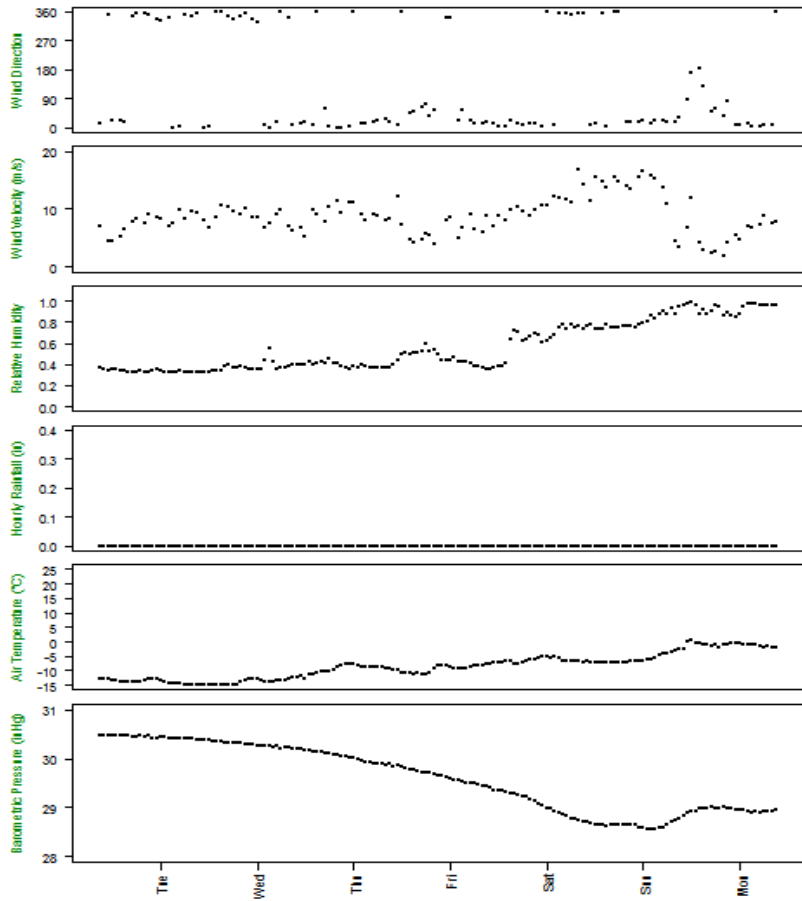
- Physical
    - Snow fence and concrete blocks
    - Snow removal limited to only active areas
    - Interim slopes 'armored' with rock
    - Outer finished slopes hydro-seeded where appropriate
    - Topography / texture
  - Chemical
    - Surface engineering is currently investigating the application of a polymer to the tailings surface
  - Operational
    - Difficult
- 

17 January 2012





28 Meteorological Conditions from 2012-01-16 to 2012-01-23





## Moving Forward

- Continue to use the ADP system to monitor fugitive dust at tails.
- Increase the temporal resolution by using real time electronic nephelometry (data logging).
- Incorporate long term regional forecasts into the operations of the tailings facility (NPDO).