



# Development of Water Quality Standards for Willard Spur

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## Update on Evaluation of Perry Willard Regional Wastewater Plant Impacts

January 30, 2014

Willard Spur Science Panel



# Key Findings

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- **Outfall ditch did not carry effluent prior to April 2011**
- **Outfall ditch and irrigation ditch have been carrying irrigation return flows**
- **Confirmed that Plant will NOT use outfall ditch in future**
- **Plant will discharge to Tailrace/pasture**





Leased Property

PWRWWTP

Plant Outfall Ditch

Plant Outfall Pipeline

State Park Lagoons

Private Wetlands

Turnout

Willard Bay Outlet Channel

WILLARD BAY  
RESERVOIR



# Summary of Plant Discharge Operations 2011 - 2012

<u>Period of Operation</u>	<u>Discharge Location</u>
April 2011 – July 26, 2012	Outfall ditch
July 27 – 29, 2012	Willard Bay outlet channel
July 30 – October 15, 2012	Outfall ditch
October 16, 2012	Private wetlands
Oct 18 – December 24, 2012	Willard Bay outlet channel
December 24, 2012 – March 27, 2013	Private wetlands
March 27 – July 10, 2013	Willard Bay outlet channel
July 10 – August 22, 2013	Private wetlands
August 22 – October 6, 2013	Willard Bay outlet channel
October 6, 2013 - present	Private wetlands

**Goal for private wetlands is to increase crop yield, reduce soil salinity**

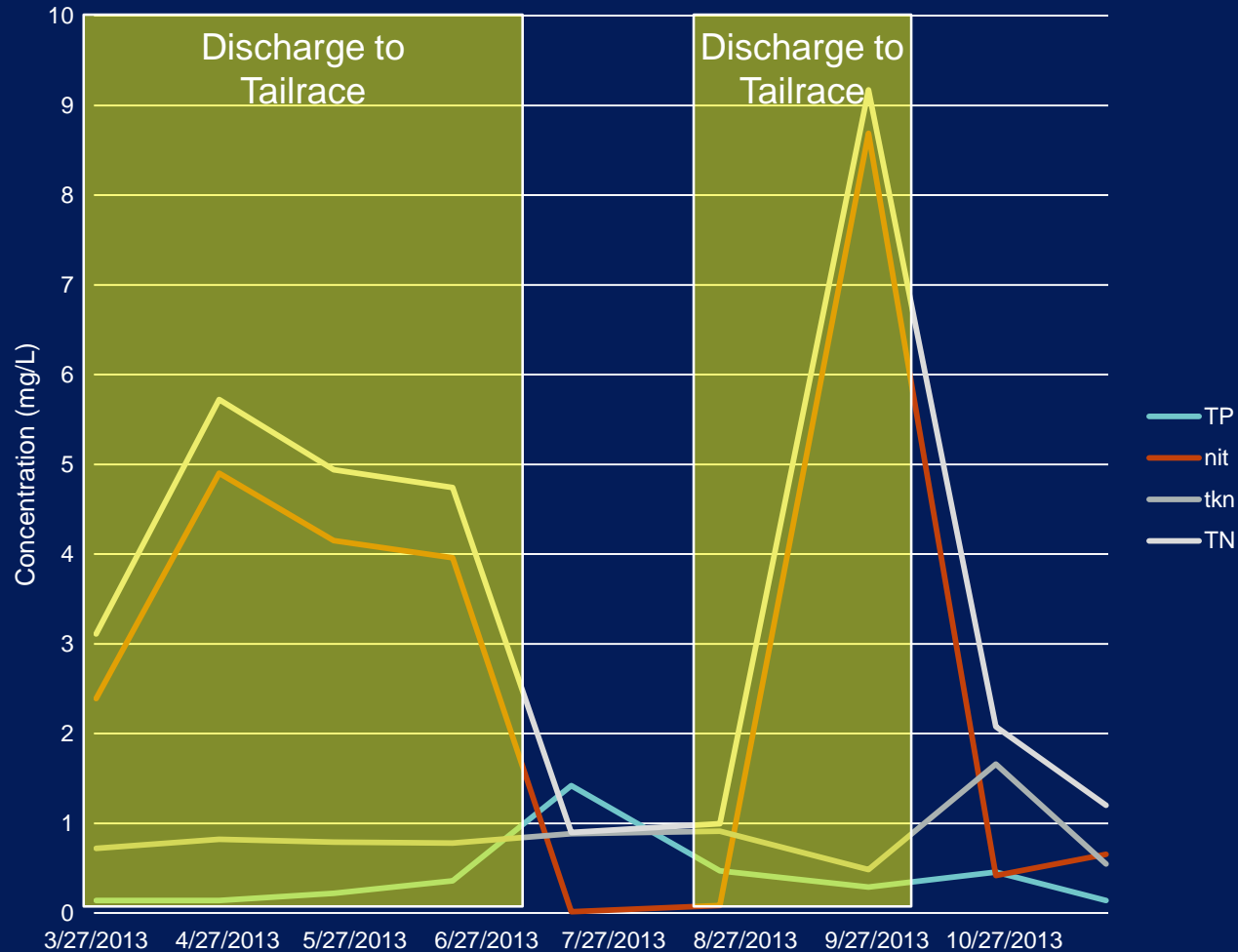
Source: personal communication Jeff Hollingsworth

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# Tailrace Water Samples (2013)

MZ-TAILRACE



- Can see signature from Plant in tailrace, drops quickly after flow is stopped
- Need to determine what true load to WS is from tailrace

# Key Findings

**TABLE 1**  
**Anticipated Flow Scenarios from Willard Perry Regional Wastewater Treatment Plant**

Scenario	Flow Rate	Timing
Low Flow	0.35 MGD	Perry City only (2010)
Medium Flow	0.60 MGD	Perry and Willard (2011)
Ultimate Flow	2.00 MGD	Maximum Capacity (2030)

Note: values taken from DWQ memorandum dated September 30, 2010

**TABLE 2**  
**Anticipated Scenarios for Effluent Nutrient Characteristics (mg/L) from Willard Perry Regional Wastewater Treatment Plant**

Scenario	TP	TN	NO3	NH4	Notes
Low Levels with Chemical Removal	2.5	10	8	0.1	Levels based on specifications for the STM-Aerotor™
Medium Levels without Chemical Removal	4.0	20	16	1.0	Levels based upon average from four similar UT Plants
High levels - Conservative	5.0	30	24	3.0	

Note: values taken from DWQ memorandum dated September 30, 2010

- Need to update Plant load estimates
- Incorporate evaporation losses and uptake losses for true load to WS



8/19/2013 10:28:00 am

Effluent was discharged to pasture  
from July 10 – August 22

Wet area on Aug 19:  
50-60 acres



Substantial reduction in  
nutrients observed

Google earth

1993

OUT-WB-TAILRACE

Imagery Date: 8/11/2011 lat 41.421477° lon -112.072227° elev 4231 ft eye alt 8867 ft

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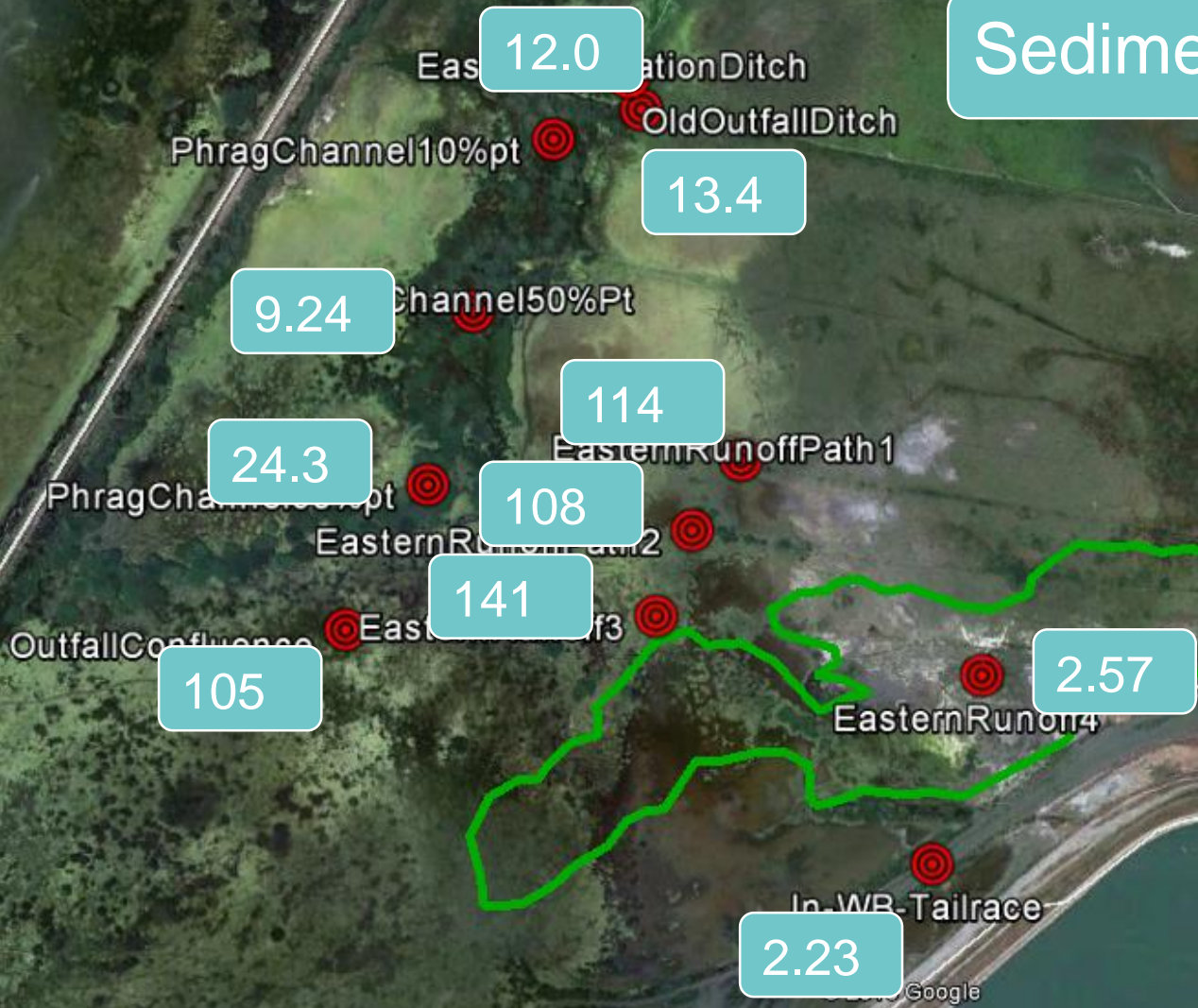
# Key Findings

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- **Soil samples were collected as planned**
- **Clear pattern in salinity/sulfate**
- **Nutrients higher in channels**
- **Deep core planned for 20cm – could only go to 7cm due to hardpan**



# Sediment Salinity (dS/m)

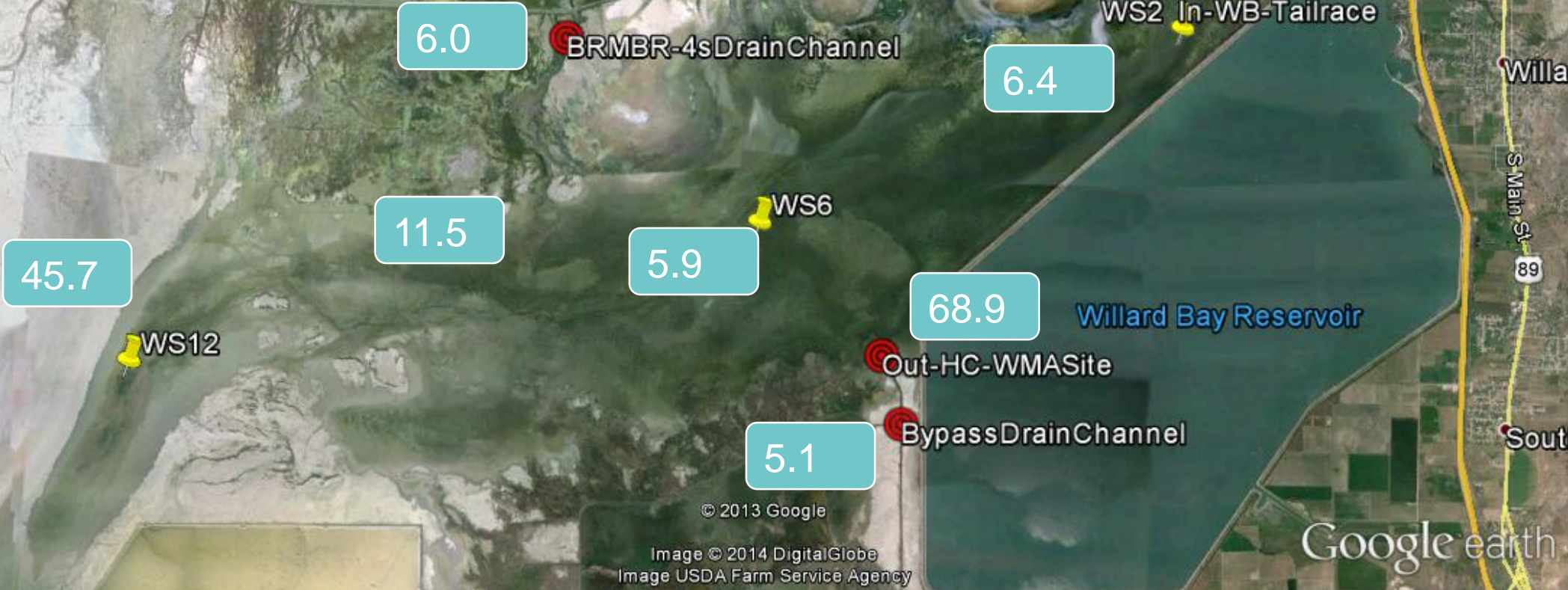


1993

Imagery Date: 8/11/2011 lat 41.423728° lon -112.071997° elev 4227 ft eye alt 11917 ft



# Sediment Salinity (dS/m)



© 2013 Google

Image © 2014 DigitalGlobe  
Image USDA Farm Service Agency

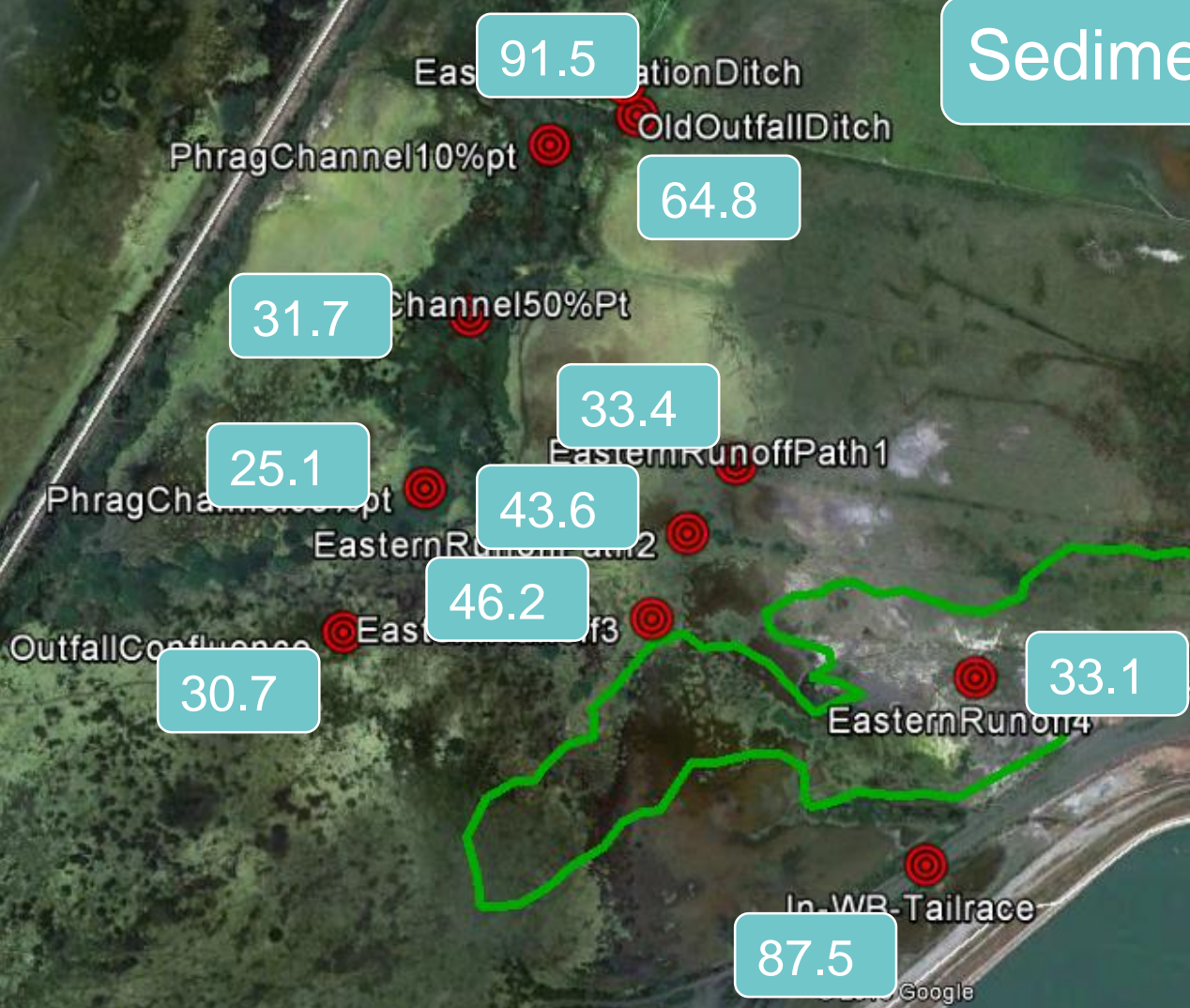
Imagery Date: 6/4/2013 lat 41.398207° lon -112.159431° elev 4209 ft eye alt 12.92 mi

Google earth

OF ENVIRONMENT



# Sediment P (mg/kg)



Google earth

1993

Imagery Date: 8/11/2011 lat 41.423728° lon -112.071997° elev 4227 ft eye alt 11917 ft



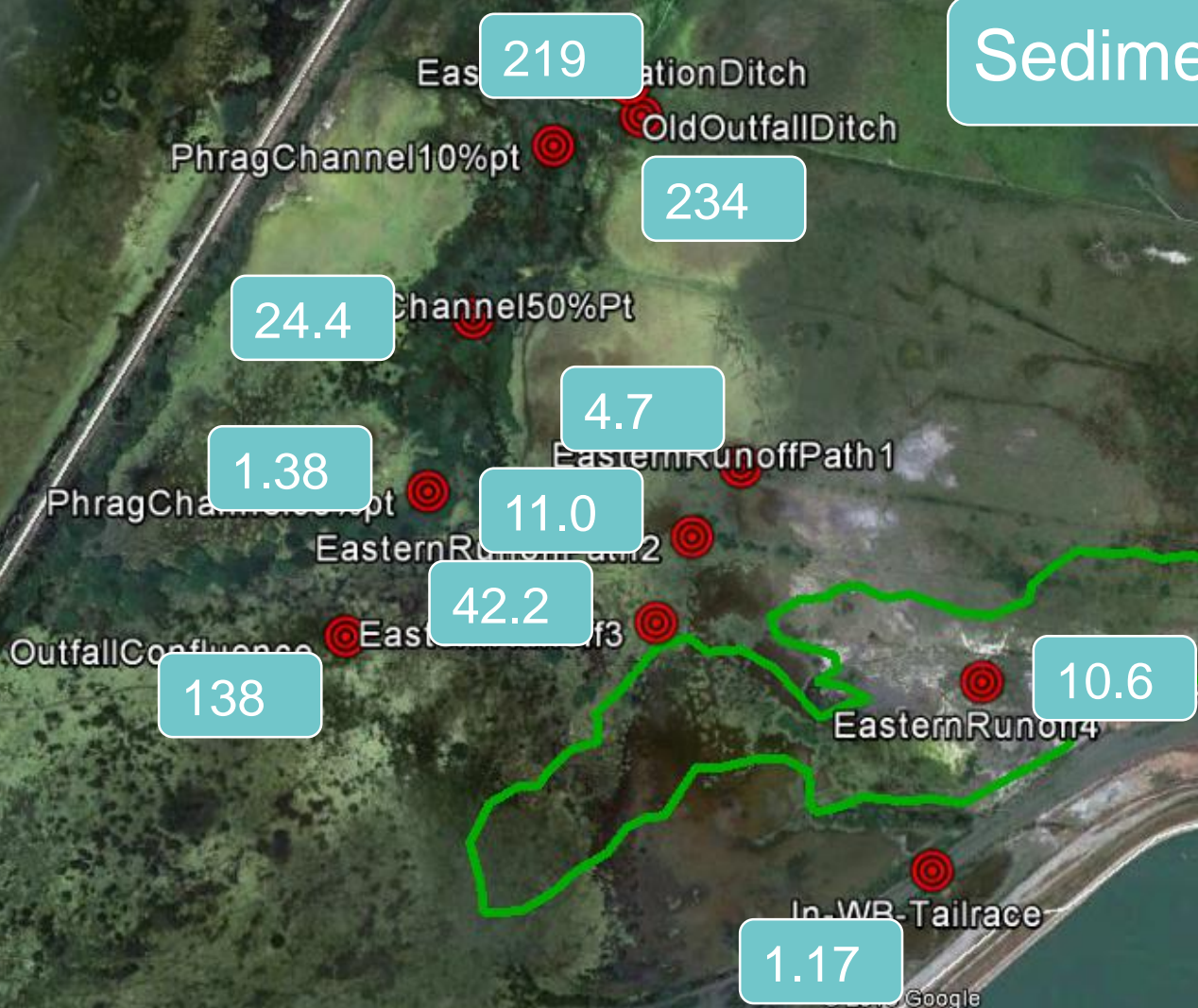
# Sediment P (mg/kg)



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Image USDA Farm Service Agency



# Sediment Nitrate (mg/kg)



1993

Imagery Date: 8/11/2011 lat 41.423728° lon -112.071997° elev 4227 ft eye alt 11917 ft



# Sediment Nitrate (mg/kg)

24.7

0.6

1.5

1.3

0.6

3.0

1.0

WS12

BRMBR-4sDrainChannel

WS6

Out-HC-WMASite

BypassDrainChannel

EastSideIrrigationDitch  
PhragChannel10%pt  
EasternRunoff3  
PhragChannel50%Pt  
EasternRunoff4

WS2 In-WB-Tailrace

Willard Bay Reservoir

© 2013 Google  
Image © 2014 DigitalGlobe  
Image USDA Farm Service Agency

Google earth

Imagery Date: 6/4/2013 lat 41.398207° lon -112.159431° elev 4209 ft eye alt 12.92 mi





# Path Forward

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- **Finalize Plant load estimates**
- **Estimate impact of evapotranspiration on effluent flows**
  - Period where effluent could reach Open water
- **Estimate impact of channel and pasture uptake**
  - Derive estimate of true load to Spur
  - Under what conditions does the tailrace water reach the Spur's open water?
- **Look for extent of impact in data**
- **Look at mixing zone/dilution for various water levels/loads**



Willard Bay

Willard Spur

Willard Bay  
Outlet Channel

Unit 5C  
BRMBR

Phragmites  
Patch

New Outfall  
Pipeline Alignment

Private  
Wetlands

Confluence of Ditches

PWRWWTP

Plant Outfall  
Ditch

Irrigation  
Return  
Ditches

Photo: John Luft/UDWR, July 17, 2012