

Concentrate Management Wetlands



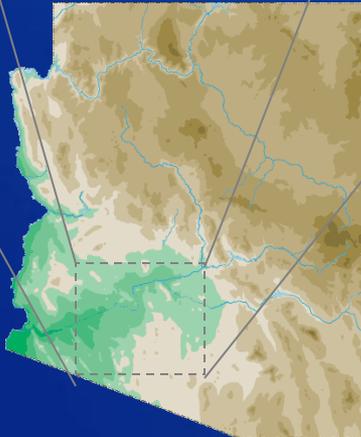
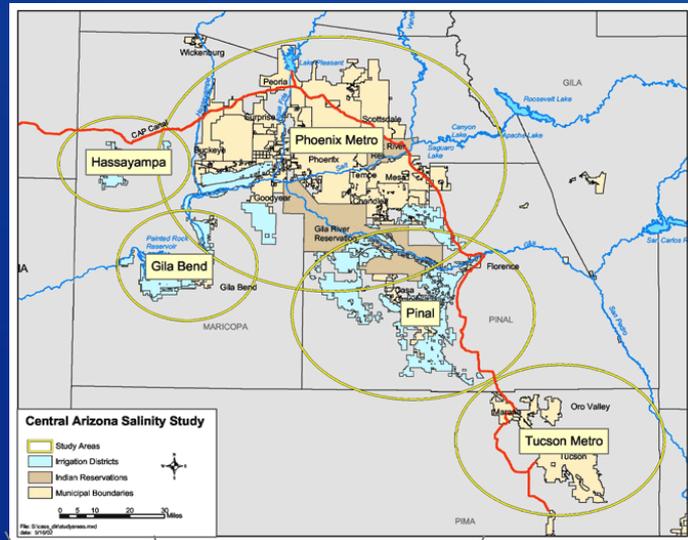
Thomas K. Poulson, P.E.
Bureau of Reclamation

RECLAMATION

Salt - its everywhere...



Central Arizona Salinity Study (CASS)



- Phase 1 (2003)
 - What's the Problem?
- Phase 2 (2006)
 - What's the Solution?

Website: www.usbr.gov/lc/phoenix/programs/cass/cass.html

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Facility	Water Source	Size (mgd)	Concentrate (mgd)
Bullard WC RO	Groundwater	3.50	0.60
Buckeye EDR	Groundwater	0.90	0.14
Lewis Prison EDR	Groundwater	1.80	0.27
Chandler RO	Ind. waste water	1.50	0.23
Scottsdale W.C.	Effluent	27.00	4.05
RainbowValley RO	Groundwater	60.00	9.00
W. Canal Well Field	Groundwater	6.00	0.90
W. Canal WTF RO	Surface/Ground	60.00	9.00
CCWRP RO	Effluent	20.00	3.00
GRIC RO Facility	Groundwater	5.00	0.75
Water Market	Effluent	30.00	4.50
		Total: 215 MGD	Total: 32 MGD

Goodyear's Concentrate Problem

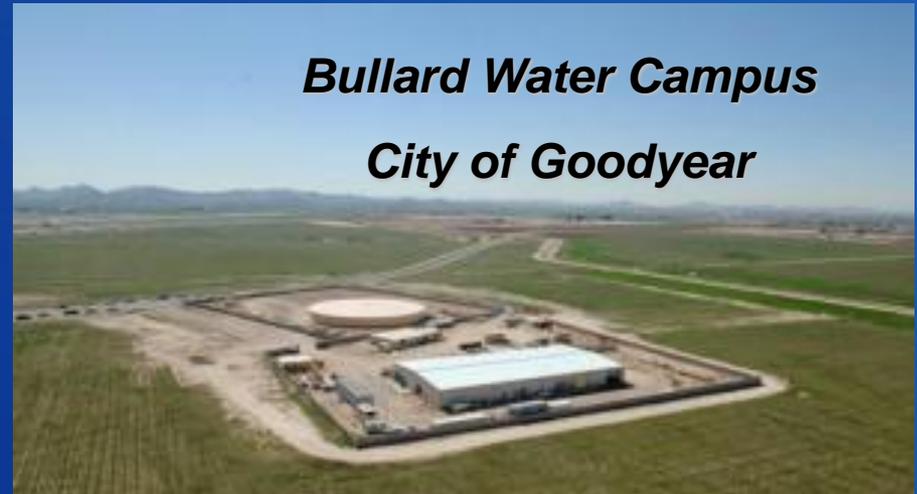


0.5 mgd Brine

8,070 mg/L TDS



3.5 mgd of RO capacity



Bullard Water Campus

City of Goodyear

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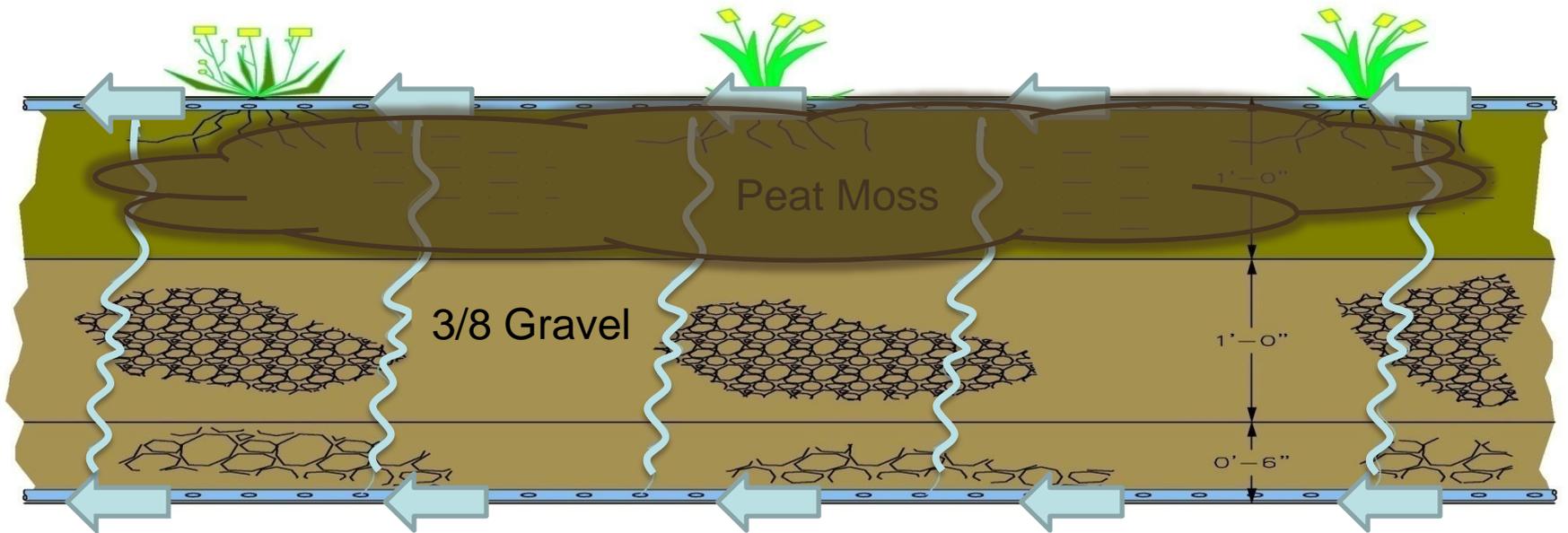
Wetlands Concentrate Management Pilot Project

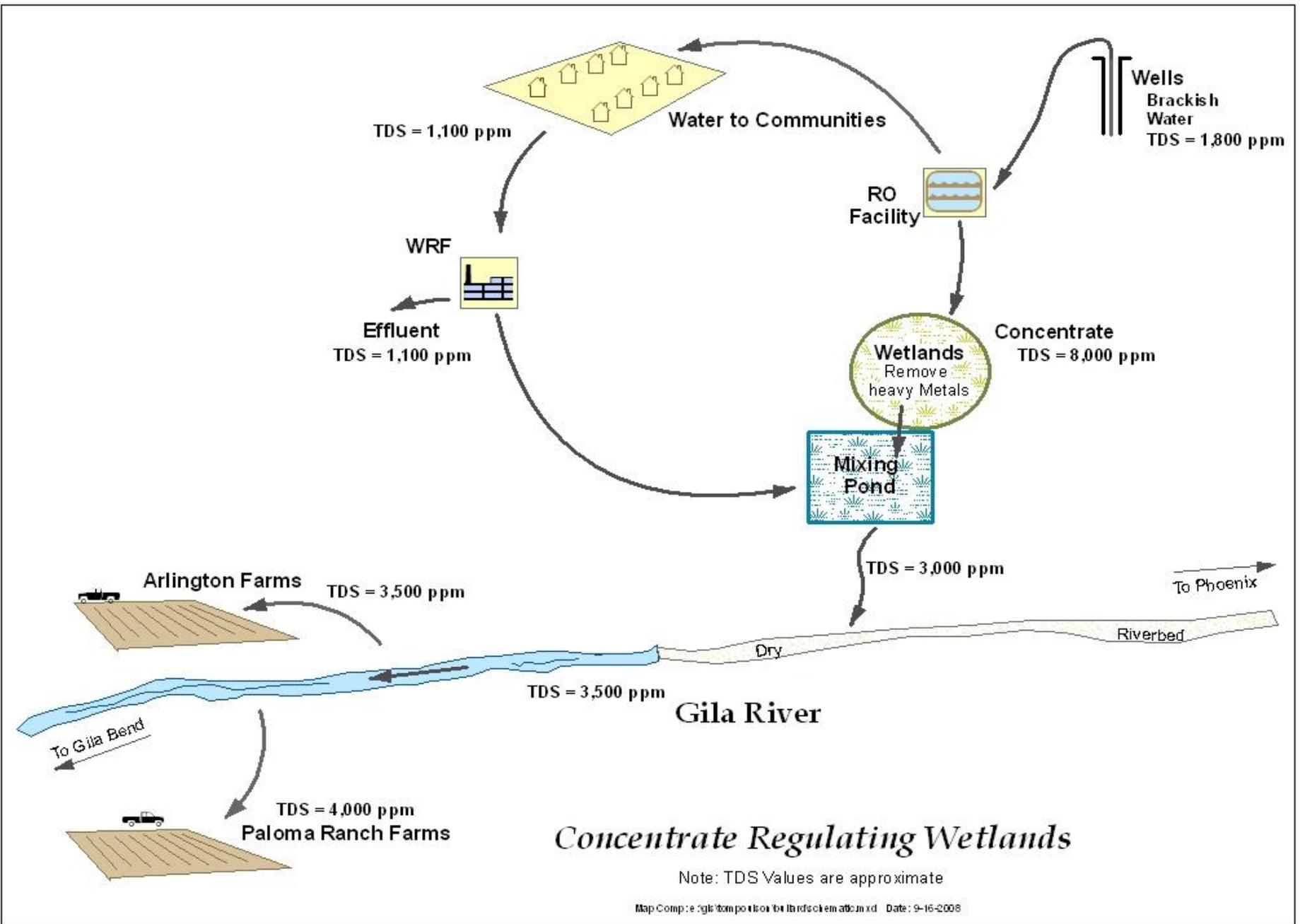


Innovative, green, inexpensive idea
which has many positive benefits
to society and the environment

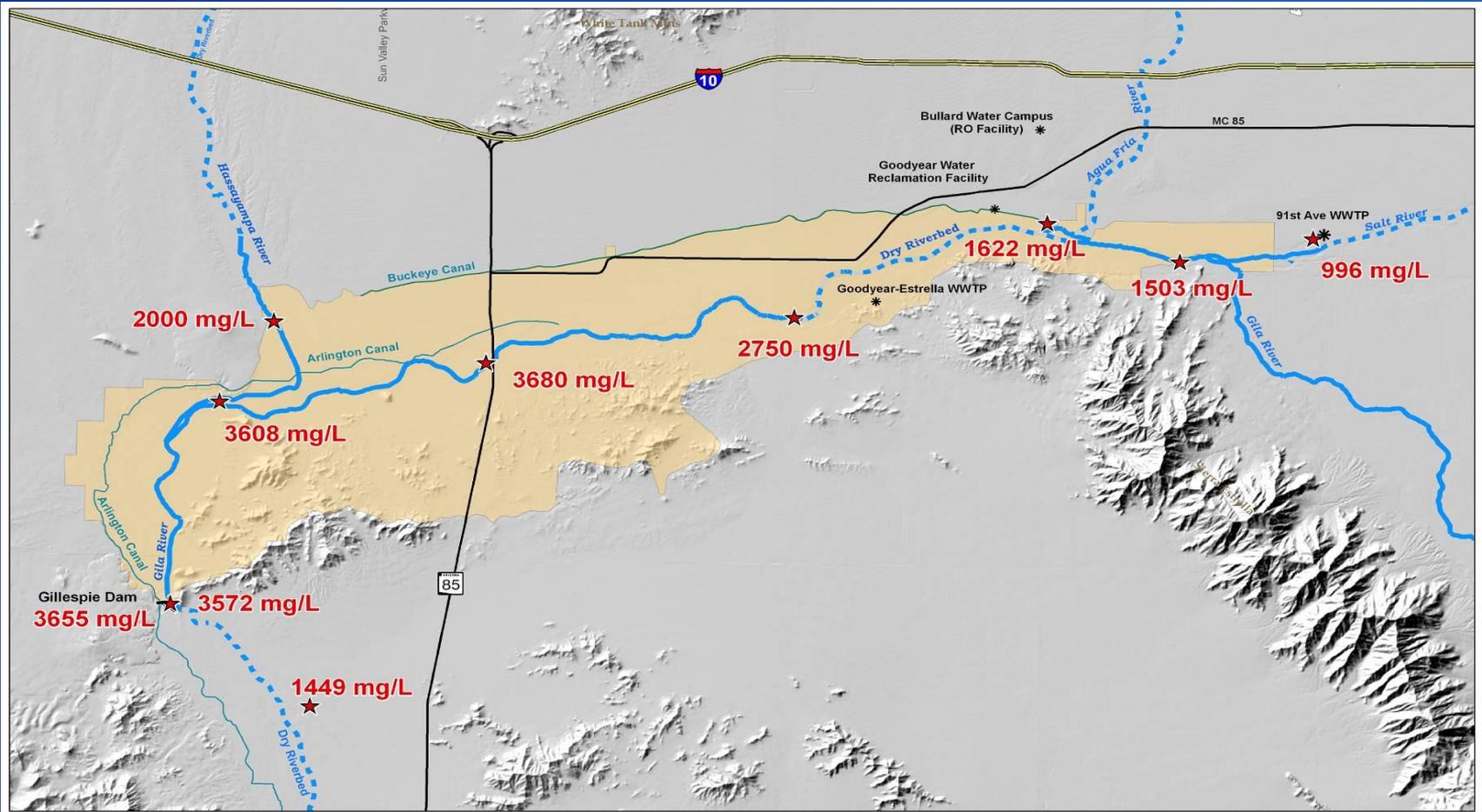
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Vertical Flow Wetlands





Total Dissolved Solids in the Gila River between 91st Ave and Gillespie Dam



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Gila River Habitat



The Standards are we trying to meet or beat

Standards (effluent dominated waters)							Drinking Water	Gila River
PARAMETER	Aquatic and Wildlife		Human Health		Agricultural		DWS (mg/L)	insitu
	A&Wedw Acute (mg/L)	A&Wedw Chronic (mg/L)	FC (mg/L)	PBC (mg/L)	AgI (mg/L)	AgL (mg/L)		
Arsenic	0.34D	0.15 D	0.08 T	0.03 T	2.00 T	0.20 T	0.01 T	< 0.005
Chlorides								1240
Copper				1.30 T	5.00 T	0.50 T	1.30 T	<0.01
Nitrate				3733			10.00	0.20
Nitrite				233			1.00	<0.10
Selenium		0.002 T	0.66 T	4.66 T	0.02T	0.05T	0.05 T	<0.002
Zinc			5.10 T	280.00 T	10.00 T	25.00 T	2.10 T	<0.06

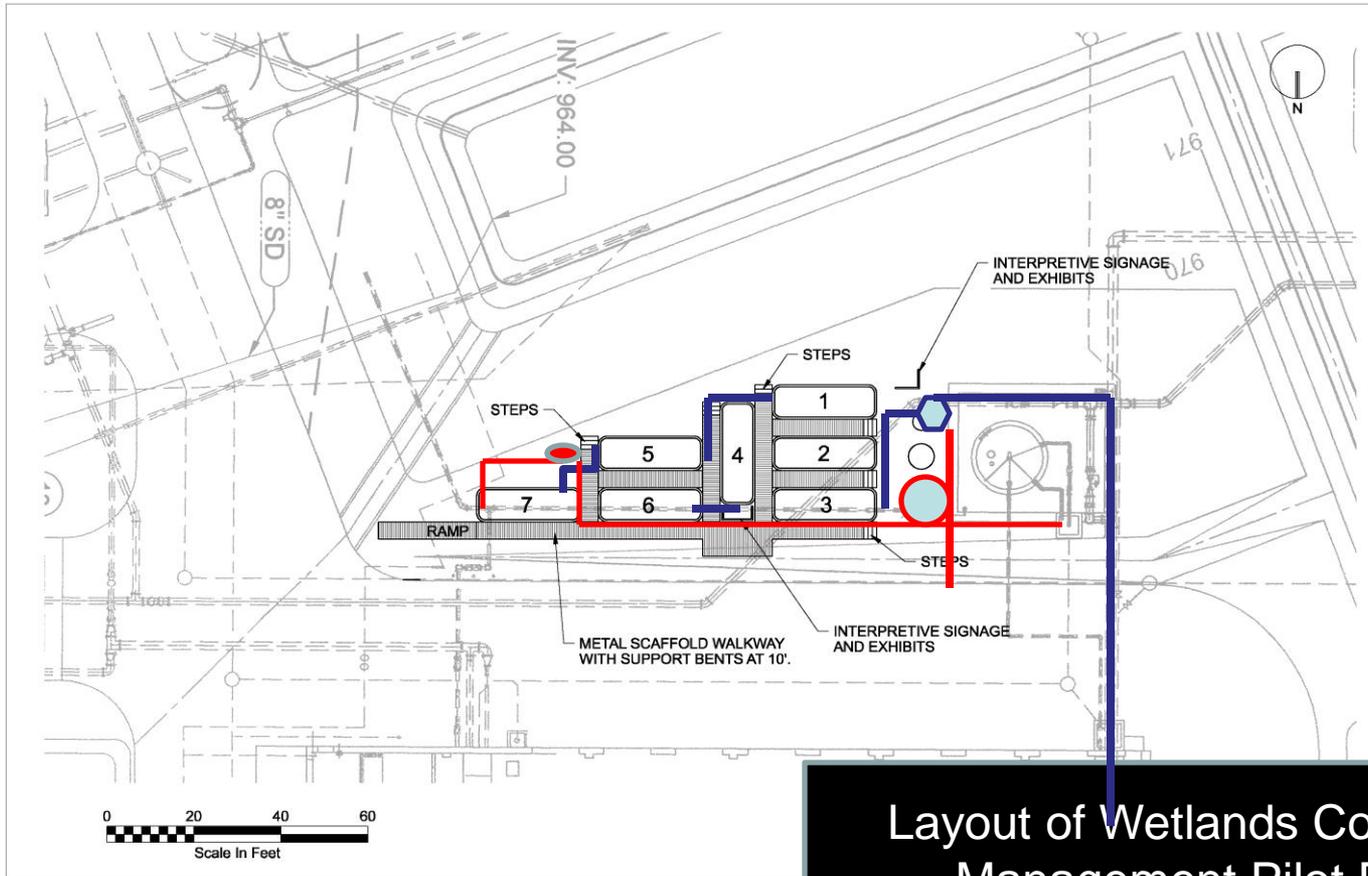
Notes

D= dissolved

T= total recoverable

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Wetlands Concentrate Management Pilot Project



Layout of Wetlands Concentrate Management Pilot Project



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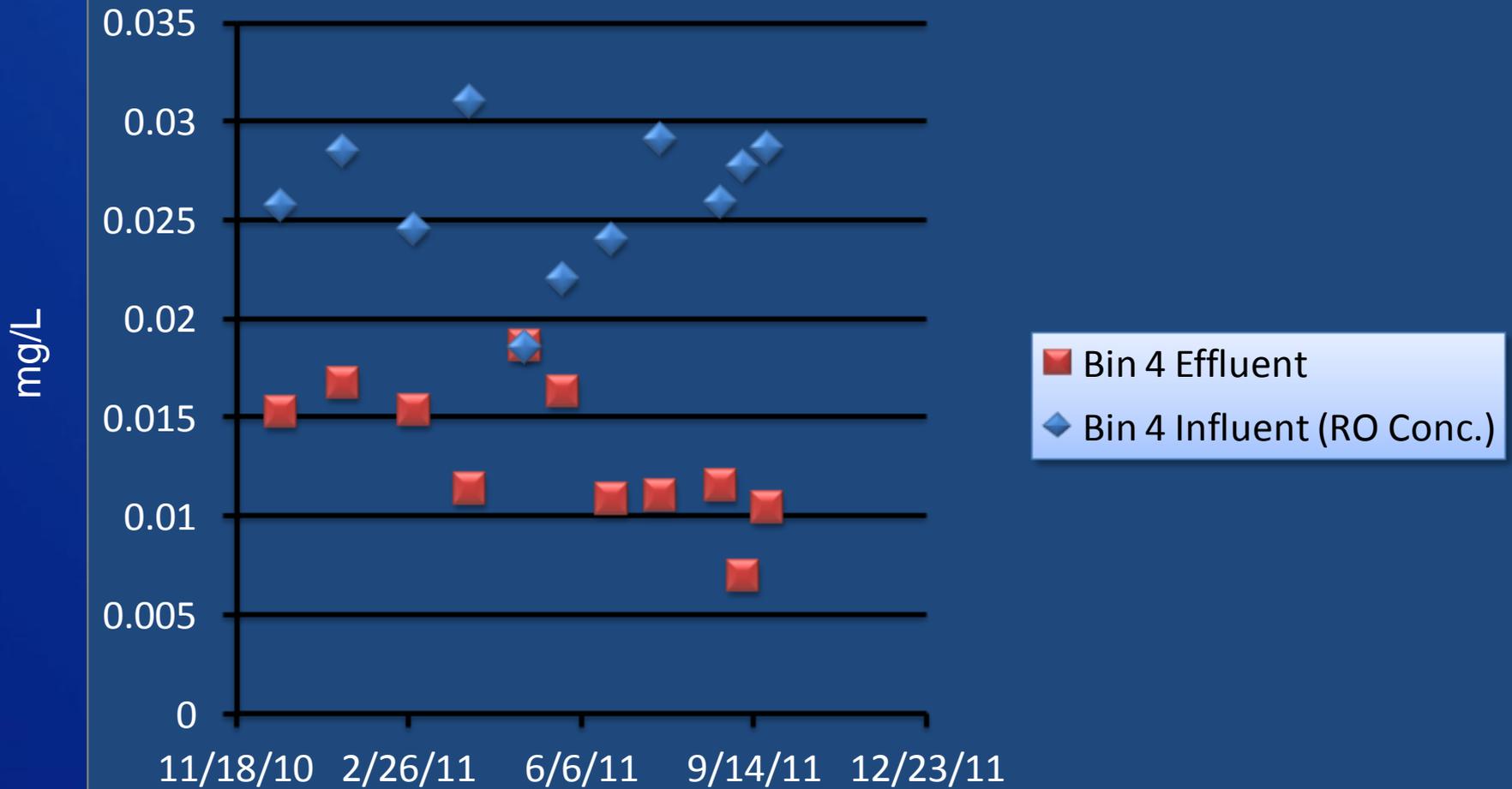
Bin 3 on Planting Day



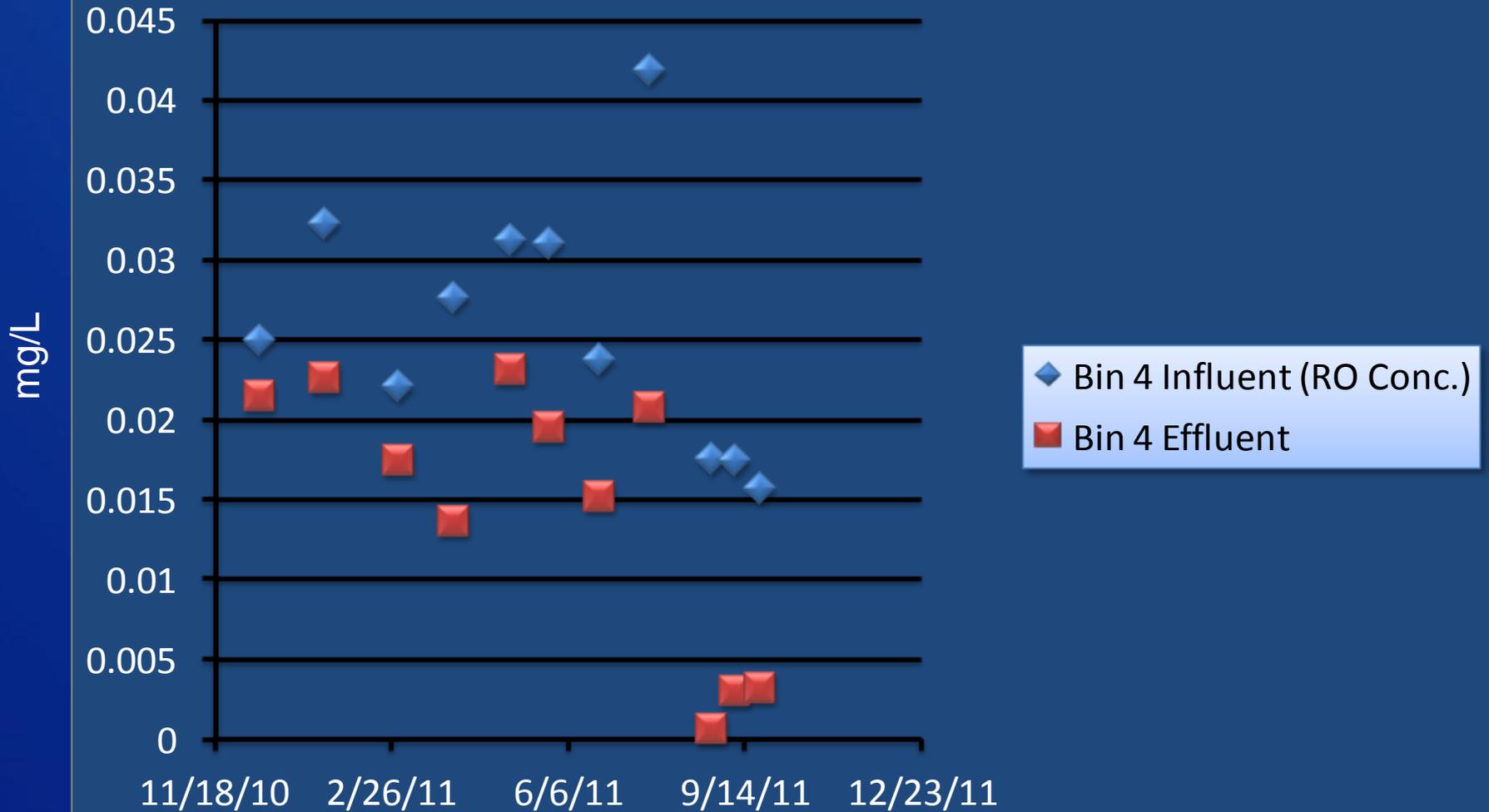
RECLAMATION



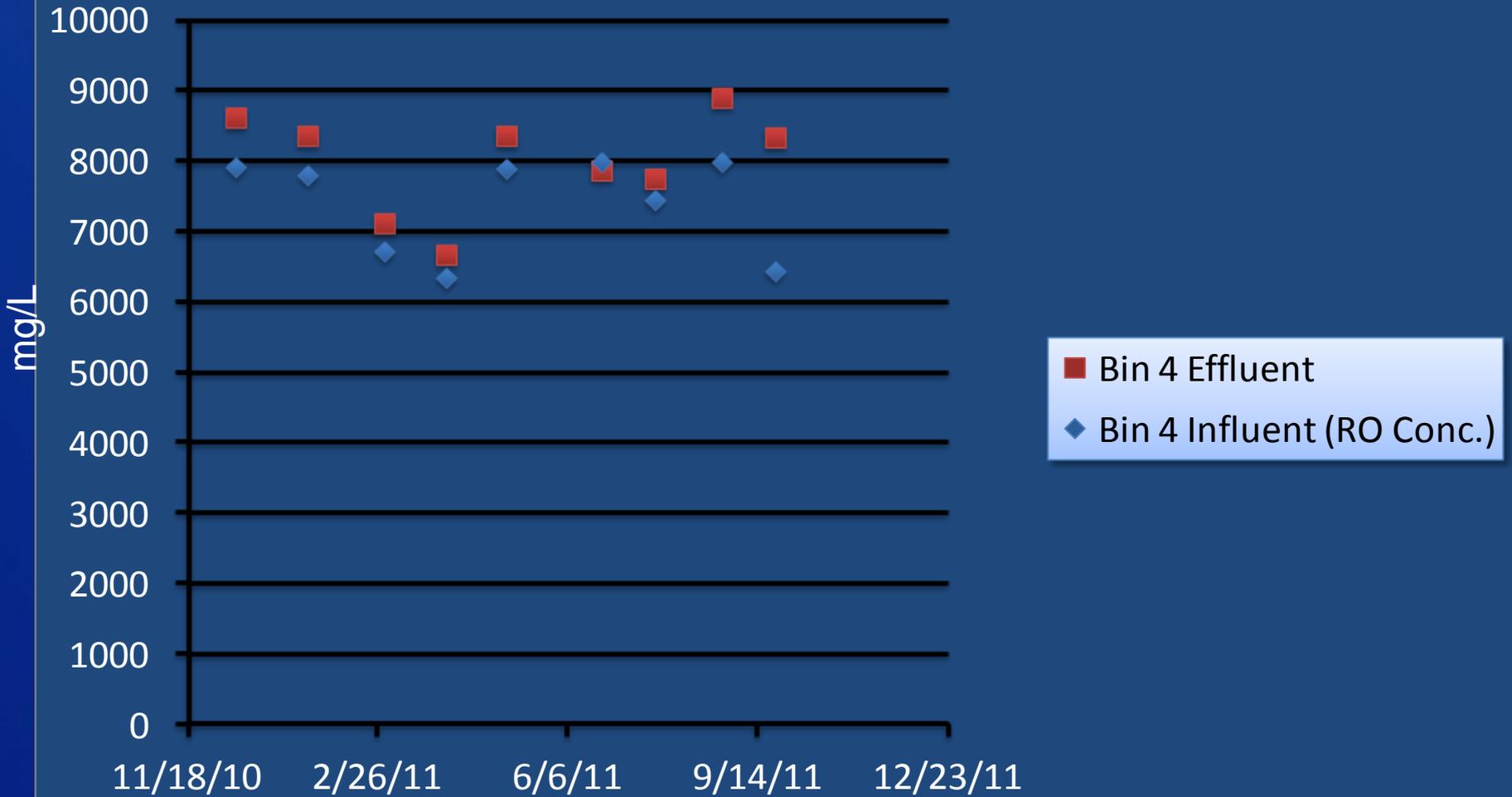
Bin 4 - Arsenic



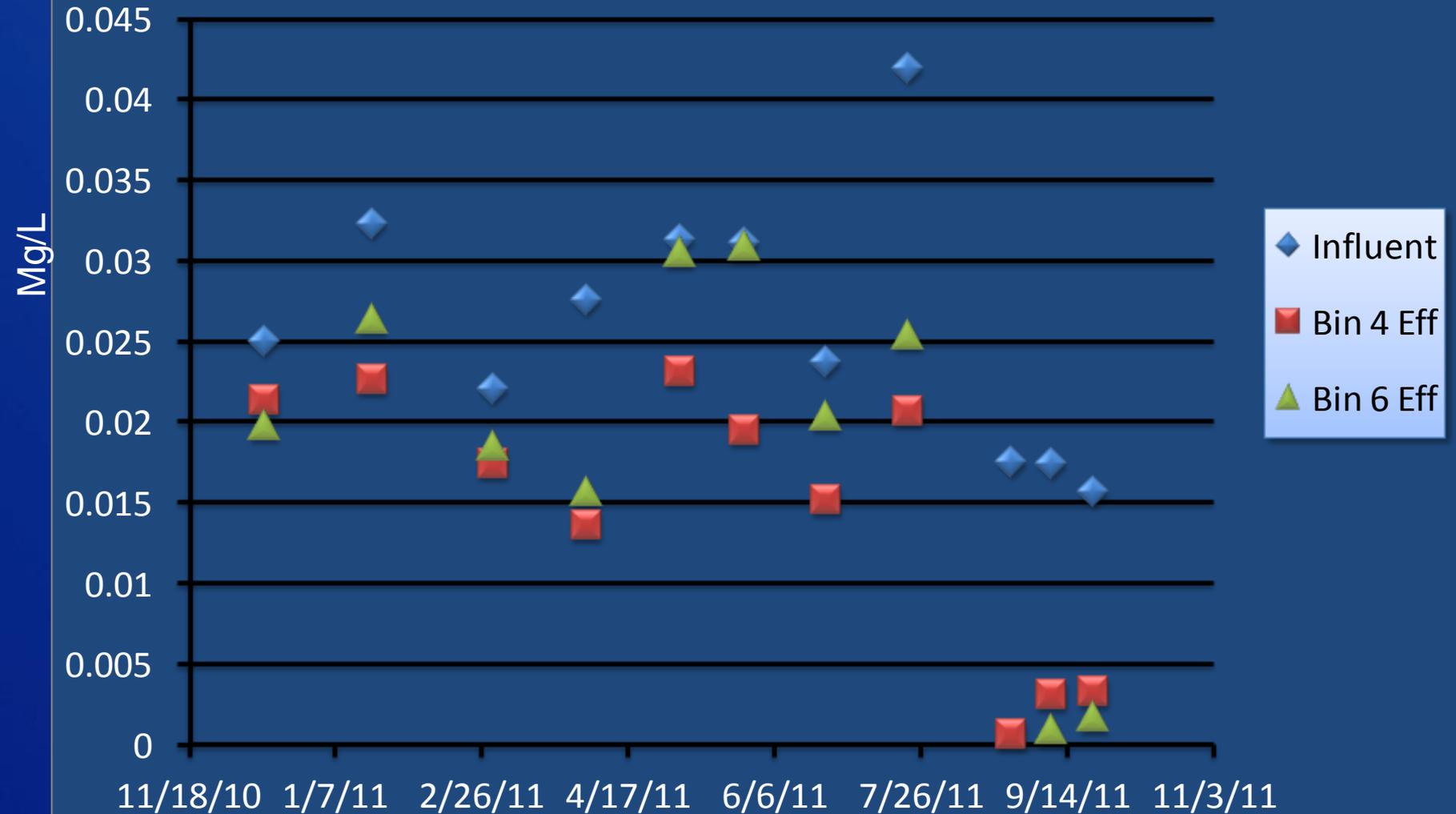
Bin 4 - Selenium



Bin 4 - TDS

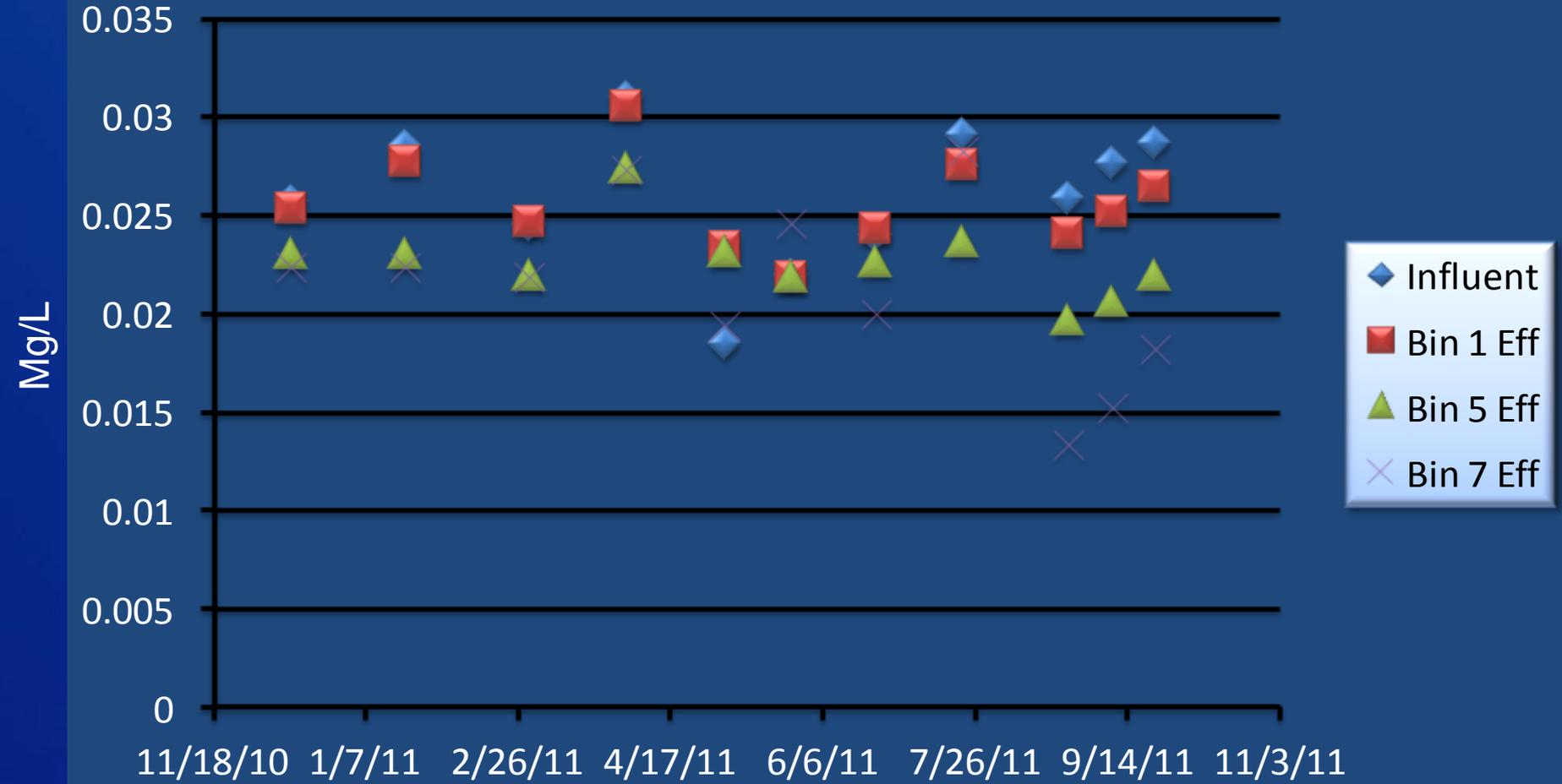


Selenium



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Arsenic



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Whole Effluent Toxicity (WET)

Chlorides are predicted to be approximately 1220 mg/L
Most likely not able to pass WET test

Net Ecological Benefits R18-11-106

Work with ADEQ to implement the Rule

Work with Environmental community

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Plants doing the best in the extreme environment!

1. Salt Grass (thriving)
2. Cattail (dominating in surface water Bin 7)
3. Olney's 3 Square Bull Rush (dominating in peat)

Salt Grass Bin 4



Cattails surface water wetland



Olney's 3 Square Bull Rush





Bin 4 Salt Grass
deeper green

Media: Green Waste



Bin 3 Salt Grass much
more brown

Media: Peat

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Salt build up on surface

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Influent

Bin 4

Bin 6

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Near Future

- Continue operating Pilot
- First year Summary Report
- Decision Point – Go Forward?
- Seek surface discharge & app permit 2012
- Design, construct & operate

Demonstration Project



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Vision !



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Metals Reduction

Metals in the water are removed near Anaerobic zones

Microbes reduce Sulfate (SO_4^{--}) to Hydrogen Sulfide (H_2S)

Metals react with sulfide to form insoluble compounds

Compounds are retained in the wetland sediments

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