Affordable and Unconventional Clean Water Act Compliance for Willmar, MN: A "Salty Discharge" Case Study Illustrating the Benefits of EPA's Prioritized and Integrated Strategy for Clean Water Act Compliance.

Central States Water Environment Association

89th Annual Meeting | May 17 – 20, 2016

Madison, WI

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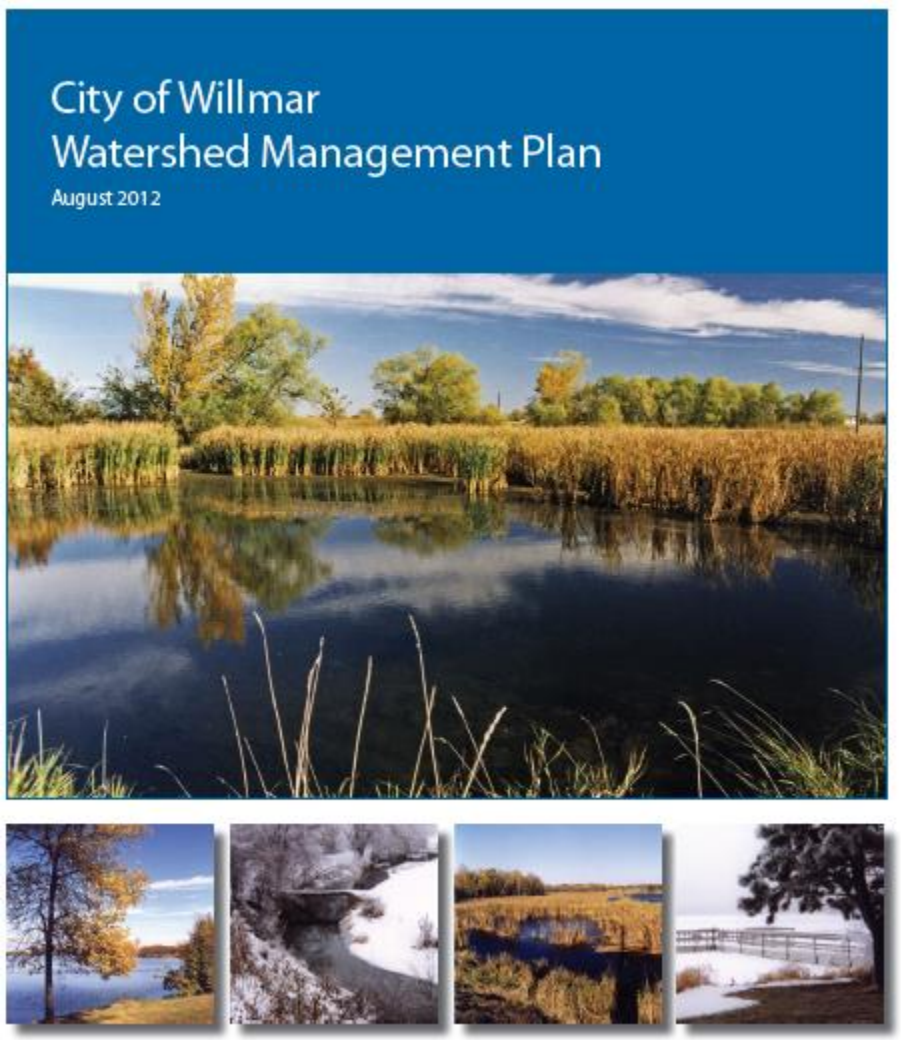
Future Stormwater Perspective

- Comprehensive Watershed Management Plan
  - Implementation program to systematically address important watershed issues and comply with the City's NPDES Phase III MS4 Permit and Storm Water Pollution Prevention Program (SWPPP)
- Community Investment $24M



Historical Wastewater Perspective

2005

- Aging Problematic Facility
- Capacity
- Location
- Odors
- Phosphorus

Historical Wastewater Perspective

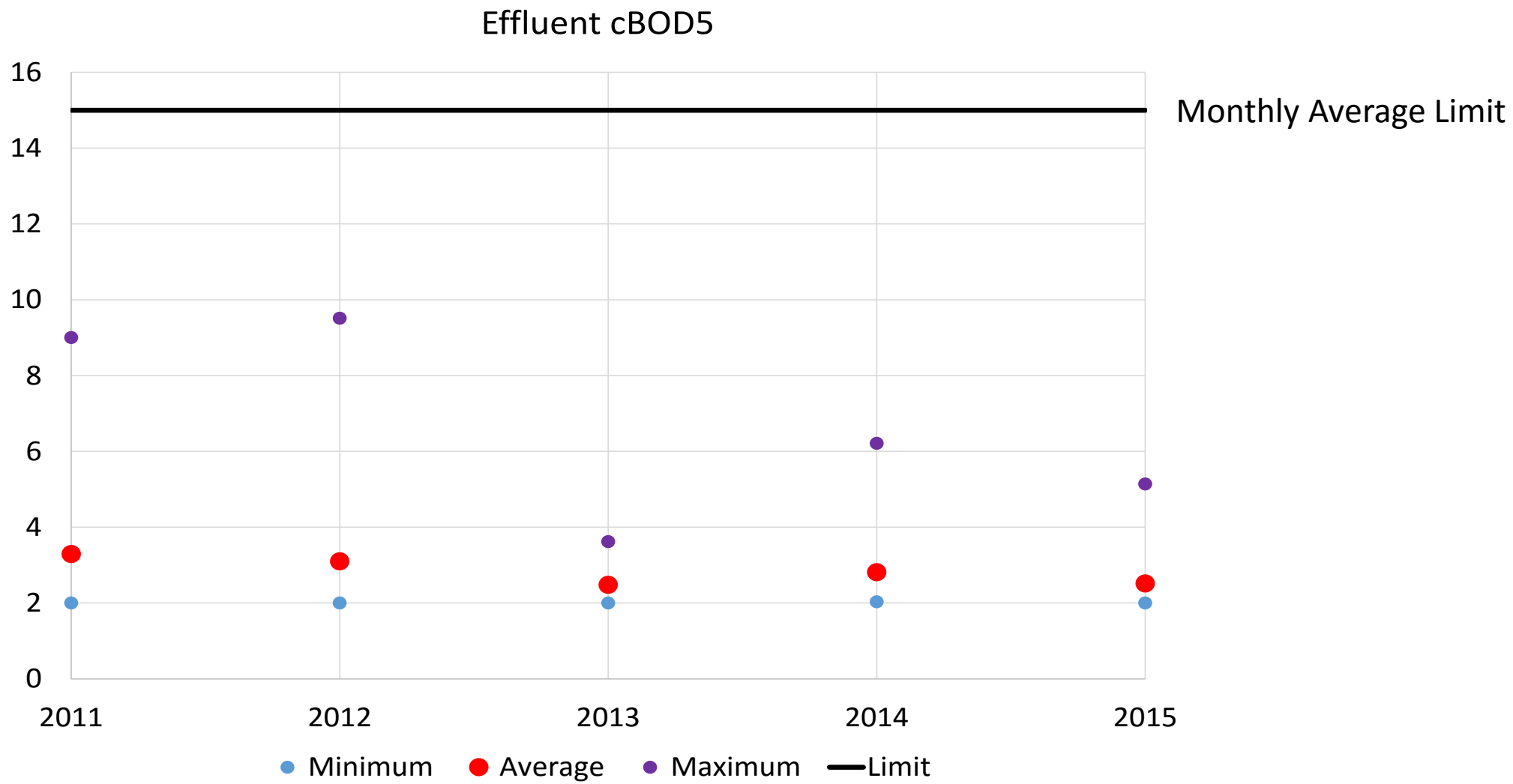
2005

- Aging Problematic Facility
- Capacity
- Location
- Odors
- Phosphorus

2010

- Comprehensive Program
  - Collection system improvements
  - Treatment facility
- Treatment Facility
  - Growth
  - Foreseeable limits: phosphorus
- Community Invested $80M

WRRF Produced Exceptional Effluent Since Commissioning in 2010



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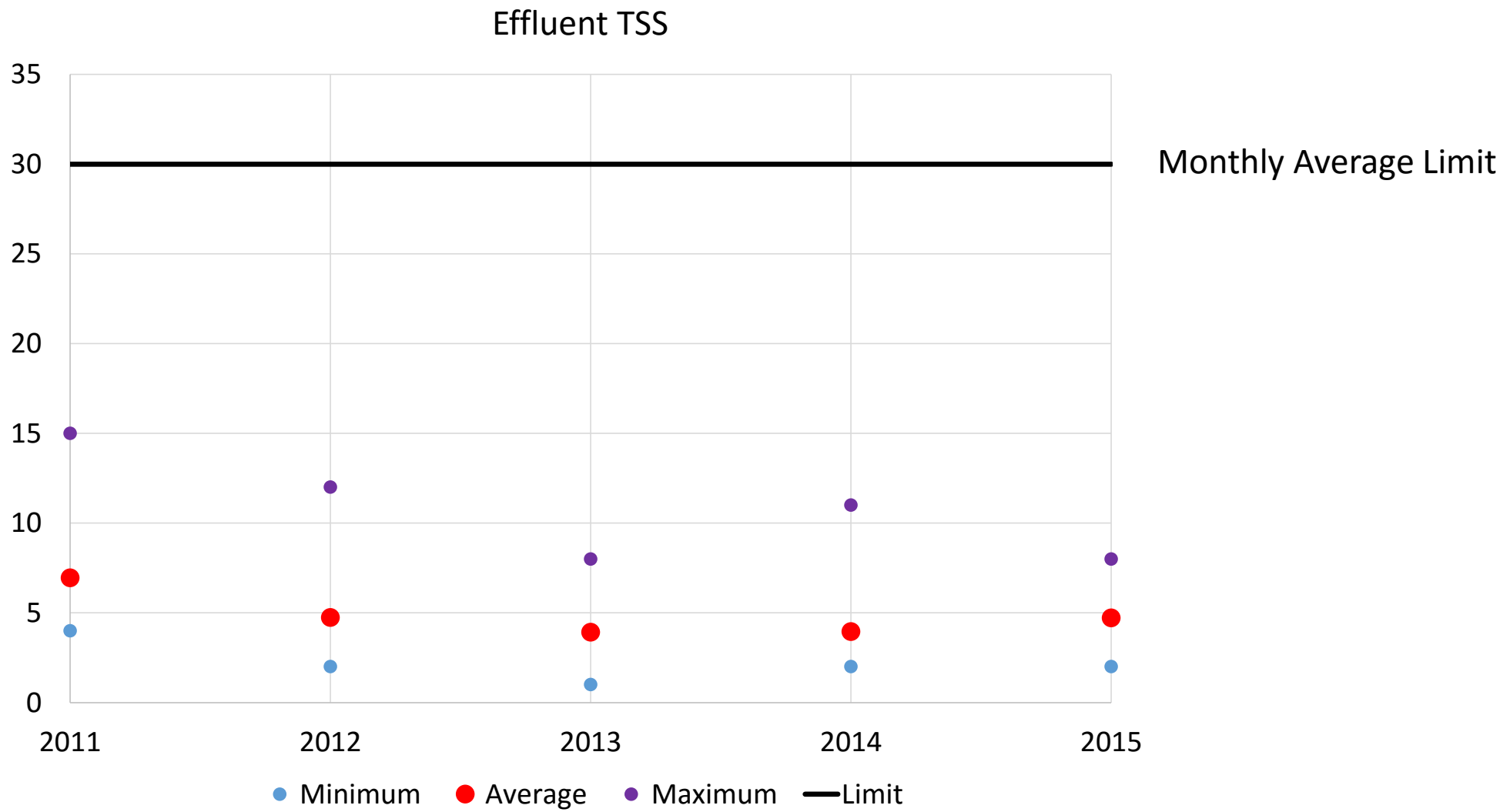

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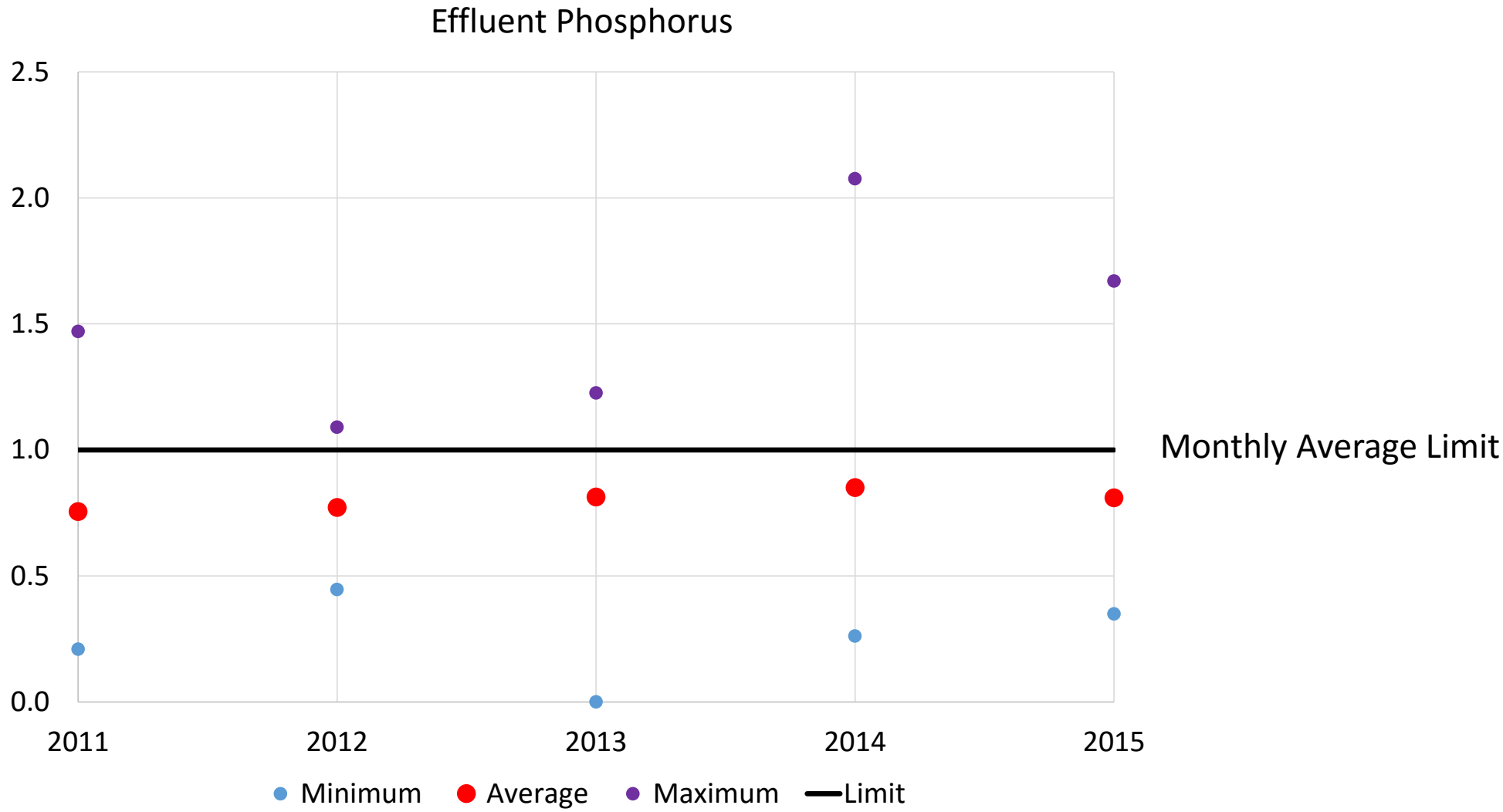


MPCA Issued DRAFT NPDES Permit with

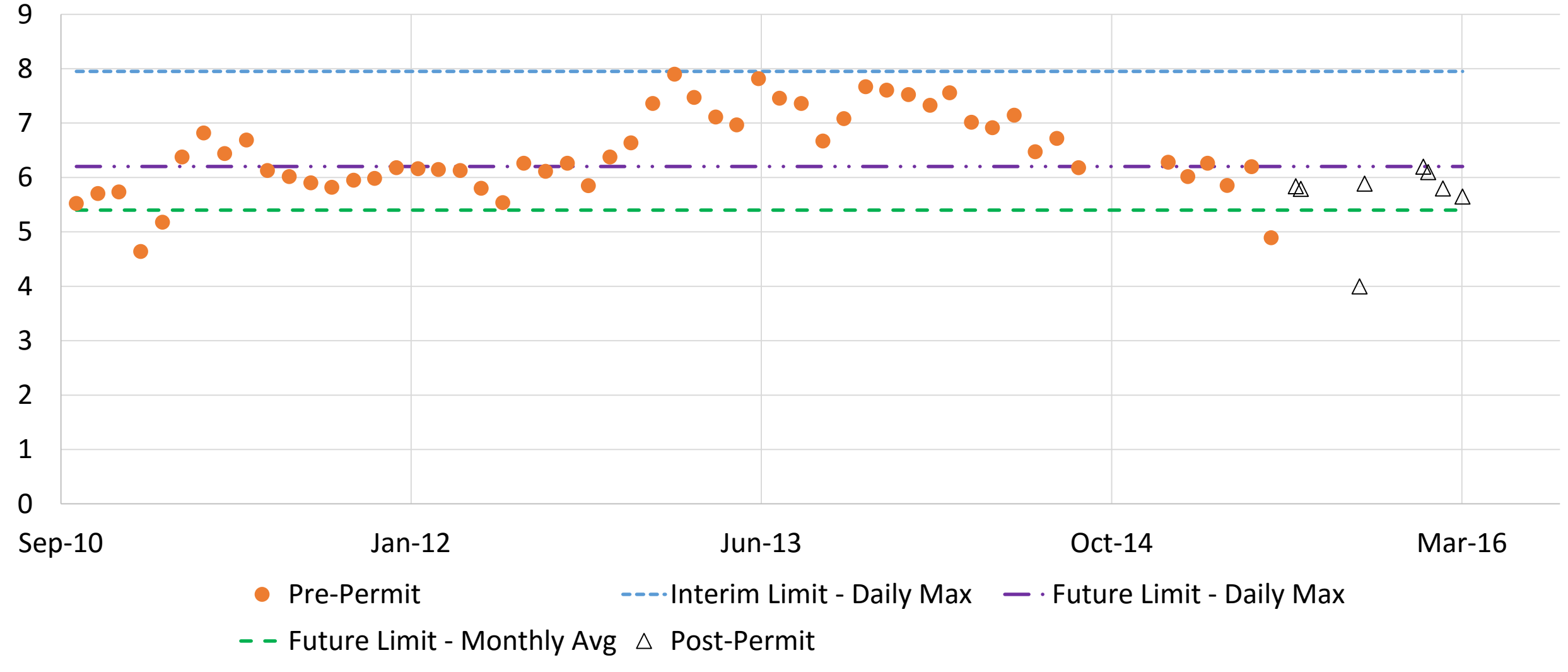
New Limits

Wastewater Discharge Permit Requirements are Unpredictable and Expensive

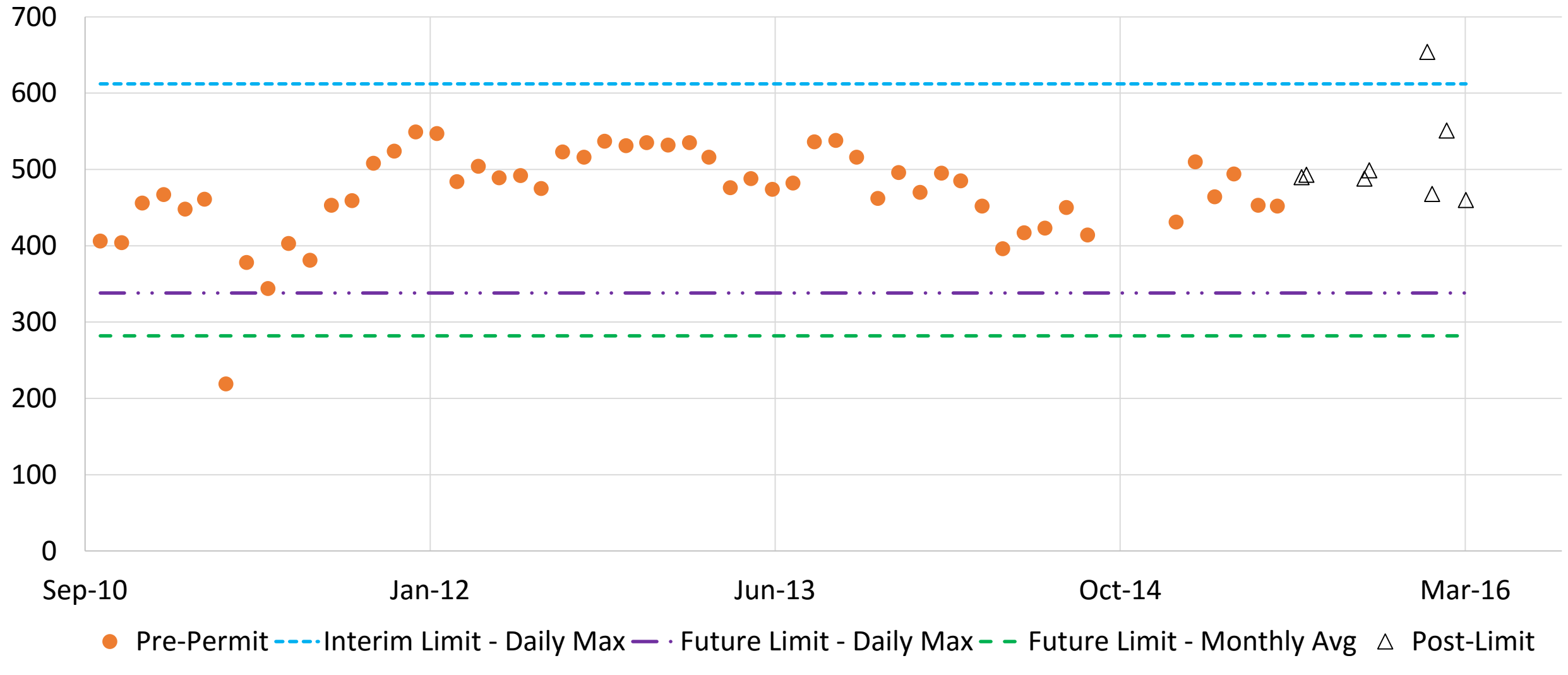
- MPCA Letter April 23, 2013
- Revised Effluent Phosphorus Limit – Compliance Achievable
- New "Salty Discharge" Limits – Compliance NOT Achievable

	Bicarbonates (meq/L)	Chloride (mg/L)	Hardness (mg/L)	TDS (mg/L)	Specific Conductance (µmhos/cm)
Daily Maximum	6	361	556	814	1235
Monthly Average (2x/mo at 1x/qtr)	5	289	521	742	1085

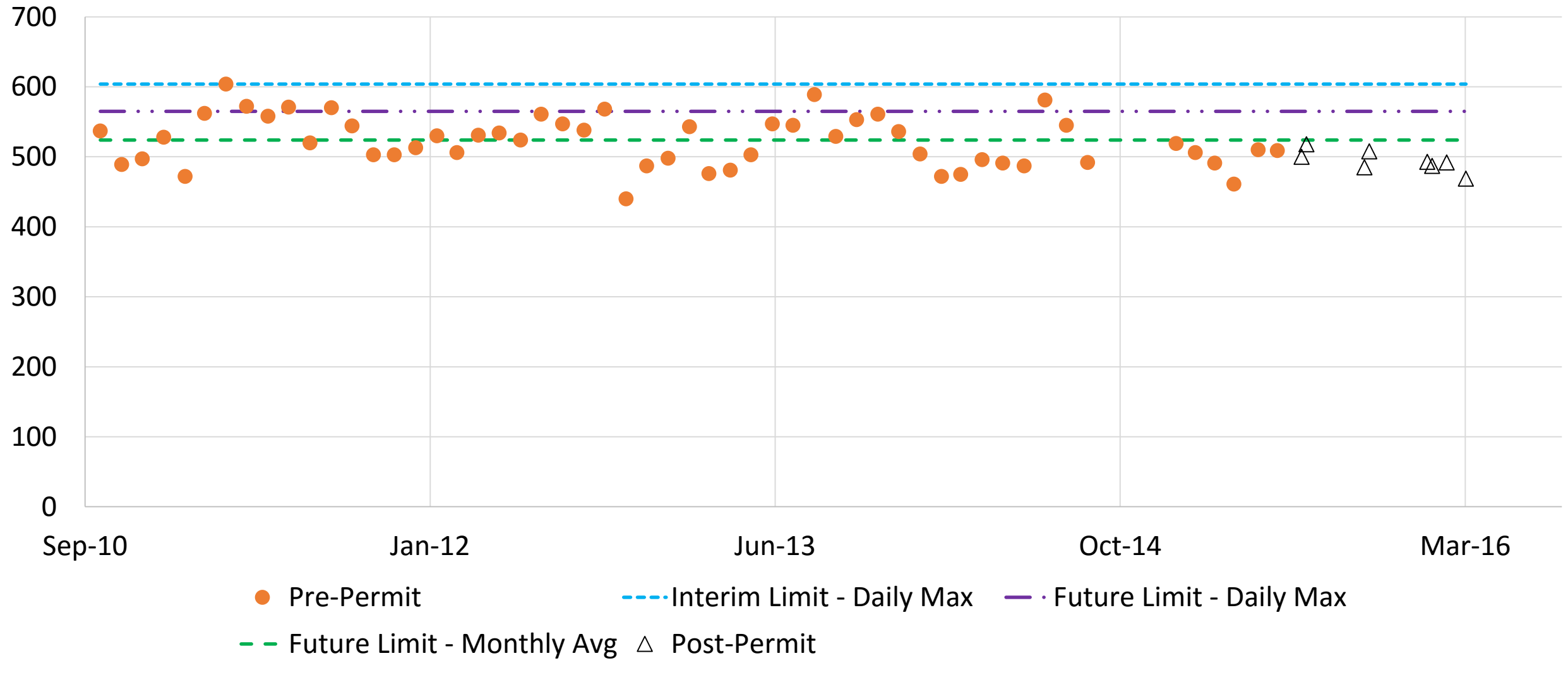
Effluent Bicarbonates (meq/L)



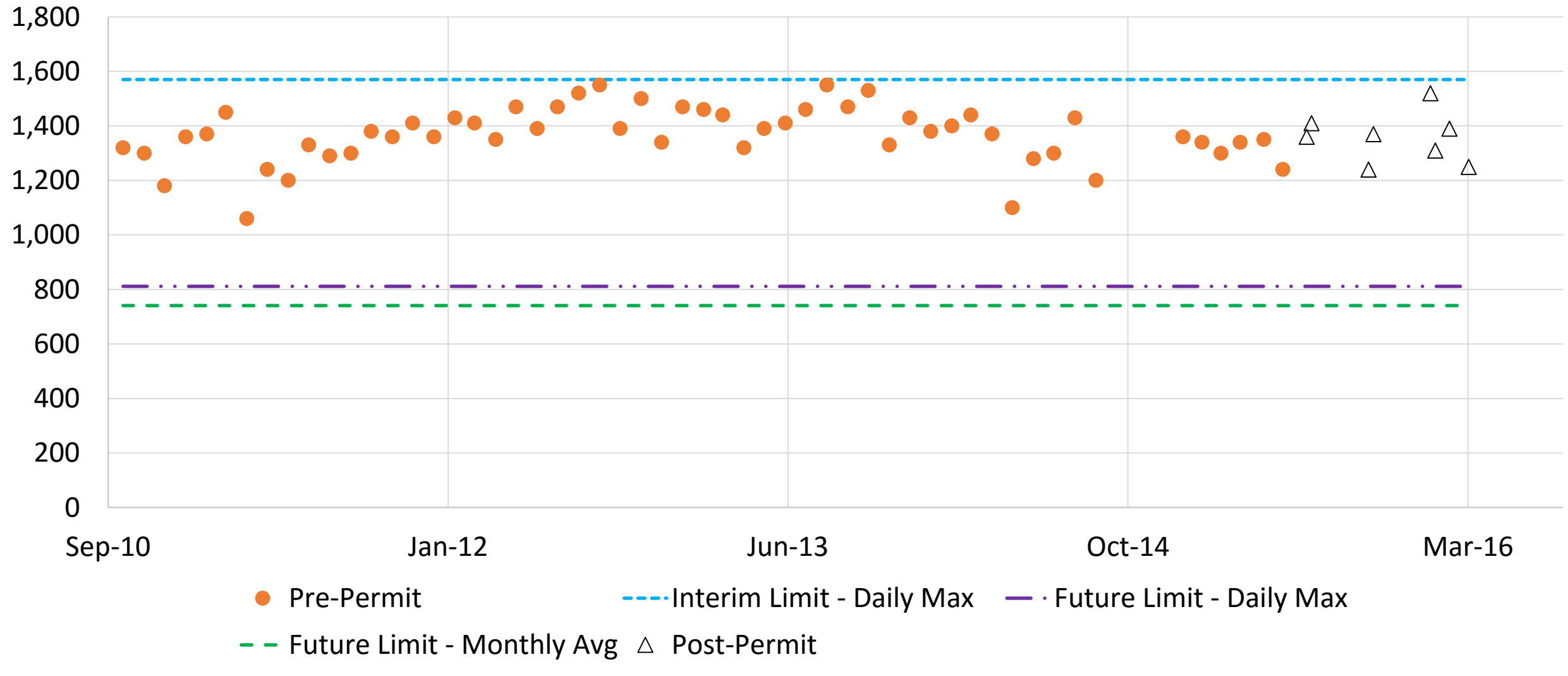
Effluent Chloride (mg/L)



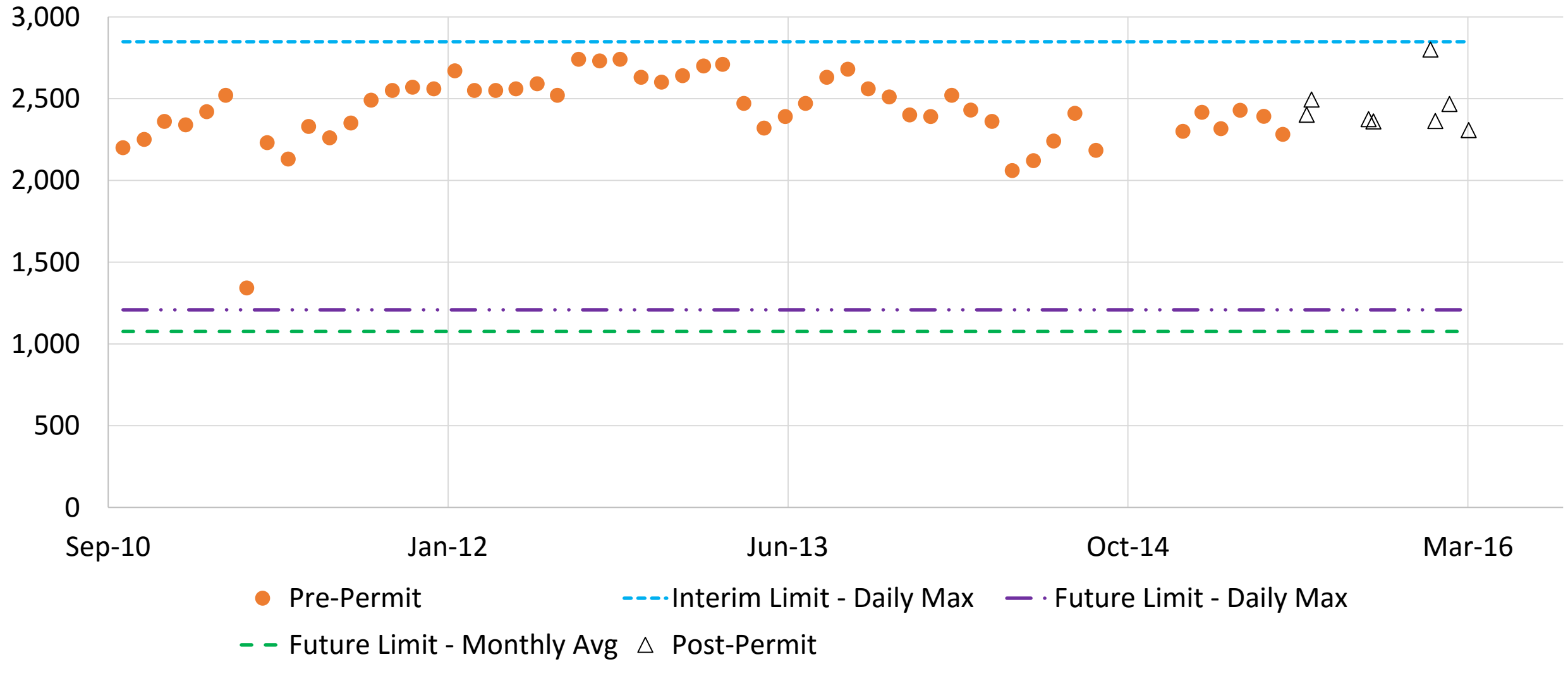
Effluent Hardness (mg/L)



Effluent TDS (mg/L)



Effluent Specific Conductance (µmhos/cm)



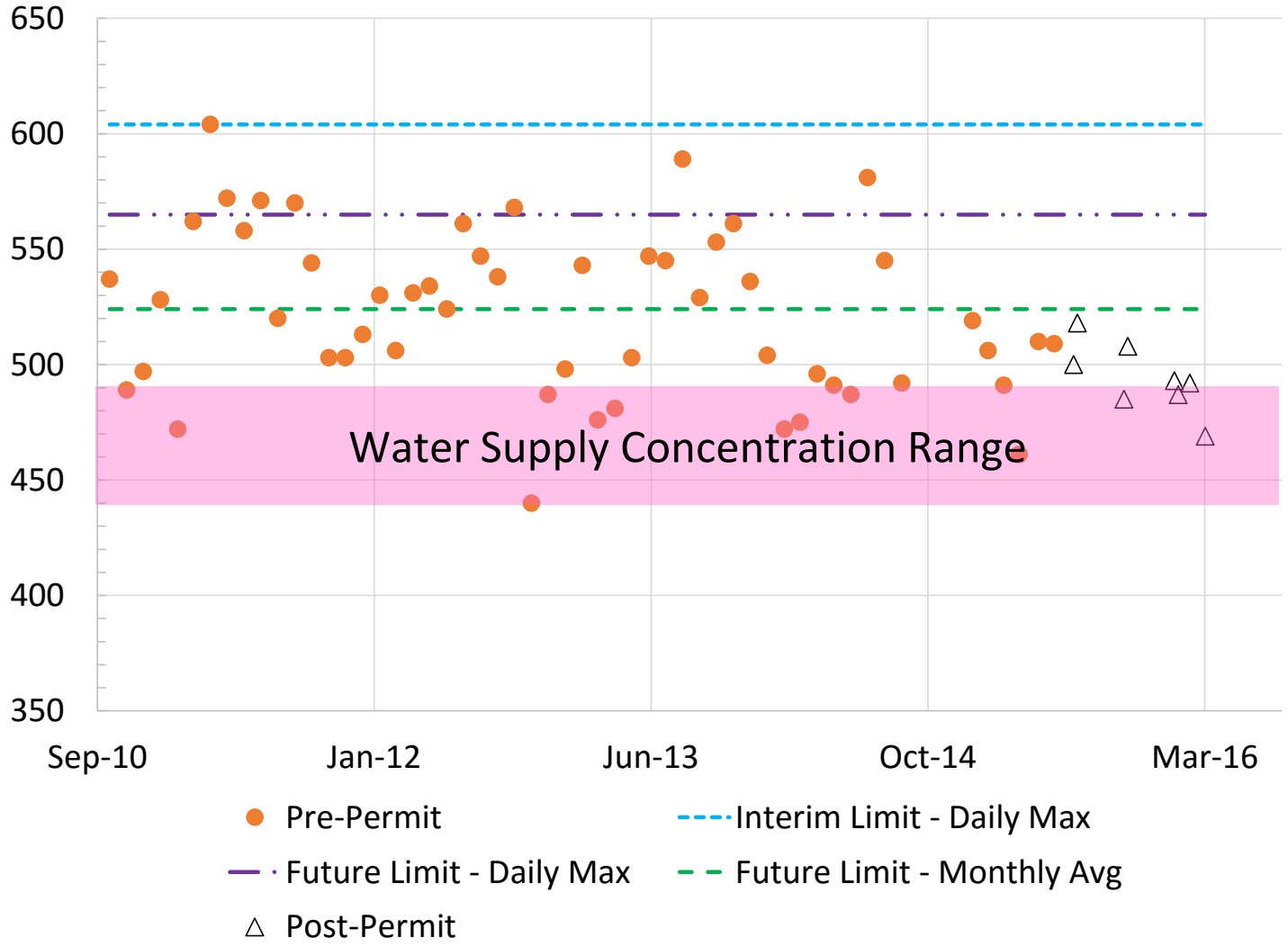
MPCA Asked Willmar to Propose a Wastewater Compliance Schedule for Salty Discharge Compliance

…if a permittee cannot meet the WQBELs established upon issuance of the permit, the MPCA can include a compliance schedule in the permit with an enforceable sequence of actions that lead to compliance with the WQBELs. The schedule must include a date upon which the WWTF will attain compliance with the final limits. If the permittee cannot meet the WQBELs upon permit issuance, the permittee must identify a compliance date that is "as soon as possible."

Compliance Issue Attributed to Source Water Hardness and Point-of-Use

Softening

Source Water High Hardness (mg-CaCO3/L)



Source Reduction by Lime Softening

Estimated Softened Drinking Water and Wastewater Effluent Concentrations with Lime Softening of Raw Drinking Water

Parameter	Raw Drinking Water	Lime Softened Water	Historical Wastewater Effluent	Cl^- and Na^+ Reduction	Estimated Wastewater Effluent	Daily Maximum Limit	Monthly Average Limit
Specific Conductivity, µmhos/cm	860	345	2,470		1,013	1235	1085
Hardness, mg-CaCO3/L	448	120	511		184	556	521
Alkalinity, mg-CaCO3/L*	433	100	383		50	366	305
TDS, mg/L	540	231	1370		679	814	742
Chloride, mg-Cl^-/L	10	10	470	232	238	361	289
Sodium, mg-Na^+/L	0	0		151	138		

Evaluated Potential Compliance Strategies

- Source Reduction Most Cost Effective Technology
  - Lime softening and elimination of point-of-use water softeners

Item	Capital	Annual
Drinking Water Plant – 2000 gpm†	$16,200,000	$1,000,000
Drinking Water Plant – 3000 gpm†	$19,700,000	$1,300,000
Supplemental Alkalinity Storage and Use at WWTF*	$3,000,000	$300,000
Engineering (15%)	$5,800,000	-
Total	$44,700,000	$2,600,000

*Wastewater alkalinity will decrease. Supplemental alkalinity use at WWTF will increase.
†Conceptual cost opinion enclosed

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$80M Recent Wastewater Investment

$24M Future Stormwater Investment

Near-Term Compliance **Unaffordable**

Negotiated an **Affordable** Compliance Schedule

- Employed EPA-Endorsed “Integrated Planning” Strategy
- Clean Water Act Compliance = Wastewater and Stormwater

For communities that have CWA responsibilities for stormwater and the collection and treatment of wastewater, it is entirely appropriate to consider the **financial impacts of investments** they need to make to manage both stormwater and wastewater discharges. – *Assessing Financial Capability for Municipal Clean Water Act Requirements, EPA, January 2013*

Negotiated an **Affordable** Compliance Schedule

- Employed EPA-Endorsed “Integrated Planning” Strategy
- Clean Water Act Compliance = Wastewater and Stormwater

The flexibilities under the CWA, regulations, and EPA policies allow local governments to continue to maintain existing wastewater and stormwater systems while making progress on clean water goals in a manner that is sustainable and **within a community’s financial capability**. – *Assessing Financial Capability for Municipal Clean Water Act Requirements, EPA, January 2013*

Willmar Committed to **Affordable** Compliance

The City of Willmar wants to consider all CWA obligations and use comprehensive Integrated Planning to achieve CWA compliance in an appropriately prioritized manner consistent with their financial capabilities.
– Willmar Response to MPCA, September 2013

EPA Defines Affordable

EPA Financial Impact Categories*

Financial Impact	Cost as % of MHI
Low	< 1%
Mid-Range	1 – 2%
High	>2%

*Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development, EPA, 1997

EPA considers residential costs in excess of 2% MHI as unaffordable. EPA may deem lower %s of MHI unaffordable if a suite of other financial indicators to assess the overall burden to a community are considered (Assessing Financial Capability for Municipal Clean Water Act Requirements, EPA, January 2013).

Near-Term Salty Compliance Unaffordable

Estimated Monthly Residential Cost for Near-Term Wastewater and Stormwater Compliance

CWA Compliance Category	Monthly Cost	Notes
Wastewater		
Existing Collection and Treatment – Debt Service	$30.15	1
Existing Collection and Treatment – Annual Operating	$23.59	1
Salty Discharge Compliance – Debt Service	$31.08	1,2,3
Salty Discharge Compliance – Annual Operating	$21.56	1,3
Stormwater		
Watershed Management Program – Debt Service	$14.58	1,2,4
Watershed Management Program – Annual Operating	$1.48	1,4
Total Monthly Cost	$122.44	1
% of Monthly MHI	3.2%	

Notes:
1 – 2013 dollars
2 – Assumes capital cost financed with 20-year municipal bond at 5.5%
3 – Assumes residents pay 55% of total cost.
4 – Residential assessed value = 63% total assessed value. Assumes residents pay 63% of total cost.

Near-Term Salty Compliance Unaffordable

Near-Term Wastewater + Stormwater Program Expensive but Higher Priority

Estimated Monthly Residential Cost: Existing Wastewater Debt and Watershed Management Program Implementation

CWA Compliance Category	Monthly Cost	Notes
Wastewater		
Existing Collection and Treatment – Debt Service	$30.15	1
Existing Collection and Treatment – Annual Operating	$23.59	1
Salty Discharge Compliance – Debt Service	0	
Salty Discharge Compliance – Annual Operating	0	
Stormwater		
Watershed Management Program – Debt Service	$14.58	1,2,4
Watershed Management Program – Annual Operating	$1.48	1,4
Total Monthly Cost	$69.80	1
% of Monthly MHI	1.85%	

Notes:
1 – 2013 dollars
2 – Assumes capital cost financed with 20-year municipal bond at 5.5%
3 – Assumes residents pay 55% of total cost.
4 – Residential assessed value = 63% total assessed value. Assumes residents pay 63% of total cost.

Wastewater + Stormwater Expensive Until WRRF Debt Retired

Salty Compliance Marginally Affordable after WRRF Debt Retired…20 Years in Future

Estimated Monthly Residential Cost: Salty Discharge Compliance after Existing Wastewater Debt Retired and Watershed Management Program Implemented

CWA Compliance Category	Monthly Cost	Notes
Wastewater		
Existing Collection and Treatment – Debt Service	0	
Existing Collection and Treatment – Annual Operating	$23.59	1
Salty Discharge Compliance – Debt Service	$31.08	1,2,3
Salty Discharge Compliance – Annual Operating	$21.56	1,3
Stormwater		
Watershed Management Program – Debt Service	0	
Watershed Management Program – Annual Operating	$1.48	1,4
Total Monthly Cost	$77.71	1
% of Monthly MHI	2.1%	

Notes:
1 – 2013 dollars
2 – Assumes capital cost financed with 20-year municipal bond at 5.5%
3 – Assumes residents pay 55% of total cost.
4 – Residential assessed value = 63% total assessed value. Assumes residents pay 63% of total cost.

Salty Compliance Marginally Affordable After WRRF Debt Retired

MPCA **Agreed** to Extended Compliance Schedule Based on **Affordability**

20-Year Compliance Schedule

- MPCA Agreed to 20-yr Compliance Schedule
- Compliance Schedule Requires Progress and Reporting

Salty Discharge Reduction Plan (SDRP)	Comprehensive Watershed Management Plan (CWMP)
Annual Report	**Annual Report**
5-Year Report	**5-Year Report**

Near Term Compliance Schedule – 2016 SDRP Report

- Develop a Rich Dataset of Influent and Effluent Parameters
- Understand POU Softening Technologies & Optimization Strategies
- Communication with Contributors & Public Education

  - Year 1 Monitor Facility and Water Supply
  - Year 2 Monitor Facility and Water Supply
  - Year 3 Monitor Facility and Water Supply
  - Year 4 Research Point-of-Use Softening Optimization Measures and Alternative Technologies
  - Year 5 Begin Public Education Program

20-Year Compliance Schedule Avoids an Unaffordable Situation for Rate Payers Consistent with EPA Integrated Planning Strategy

Take Homes

- Clean Water Act Compliance = Wastewater + Stormwater
- EPA Requires Affordable Progress to Clean Water Act Compliance
- Wastewater and Stormwater Compliance Costs are Necessary for an Integrated Planning Strategy

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Ashley Hammerbeck
ahammerbeck@donohue-associates.com

MPCA Provided Effluent Limits for the New WRRF

Pollutant or Pollutant Characteristic	Monthly Average Concentration		Monthly Average Mass Loading	
5-d Carbonaceous Biochemical Oxygen Demand	15	mg/L	426 | 939	kg/d | lb/d
Ammonia-Nitrogen	5	mg/L	142 | 1,252[2]	kg/d | lb/d
Total Suspended Solids	30	mg/L	852 | 1,879	kg/d | lb/d
Minimum Dissolved Oxygen (Dec – Mar)	6	mg/L	-	-
Fecal Coliform Bacteria (May – Oct)	200[1]	#/100ML	-	-
Total Phosphorus	1.0	mg/L	22.1 | 49[3]	kg/d | lb/d

[1] Geometric mean

[2] Dec – Mar

[3] Jun - Sep

The WRRF Not Designed to Remove “Salty Parameters”

- Extended Air Activated Sludge
- Chem-P

- No Provisions for Salty Parameters