

Appendix 3A-6: Water Year 2011–2015 Annual Total Phosphorus Criteria Compliance Assessment

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This appendix presents the annual total phosphorous (TP) criteria compliance assessment for Water Years 2011–2015 (WY2011–WY2015) (May 1, 2010–April 30, 2015). **Table 1** highlights data from all individual impacted stations across the Everglades Protection Area (EPA) relative to the 15 microgram ($\mu\text{g/L}$) annual limit. Long-term (i.e., five-year) geometric mean TP concentrations from individual impacted stations are summarized relative to the long-term limit of 10 $\mu\text{g/L}$ in **Table 2**. **Table 3** displays the annual TP criteria compliance for the five-year period within the EPA, which includes Arthur R. Marshall Loxahatchee National Wildlife LNWR [LNWR, also known as Water Conservation Area (WCA-) 1], WCA-2, WCA-3), and Everglades National Park (ENP) (**Figure 1**). **Figure 2** depicts each area's network average geometric mean concentration from WY2005 to the current water year (WY2015) relative to the 11 $\mu\text{g/L}$ annual network limit, and the 10 $\mu\text{g/L}$ five-year, long-term network limit for TP. Annual geometric mean TP concentrations for the current water year (WY2015) are provided in **Figure 3** for each station within its respective area and network (impacted and unimpacted) relative to the 15 $\mu\text{g/L}$ annual limit (note: stations with insufficient data are identified with an asterisk).

Conclusions from these data include the following:

- No impacted stations transitioned from impacted to unimpacted during WY2015.
- Of the 58 TP criterion monitoring network sites, 55 of these had sufficient data to be included in the TP criterion assessment.
- Unimpacted portions of each WCA passed all four parts of the compliance assessment, as expected. Therefore, these areas are in compliance with the 10 $\mu\text{g/L}$ criteria.
- Even though in recent years conditions within the impacted portions of the marsh have improved (**Figure 2**), impacted portions of each WCA failed one or more parts of the criterion assessment. Therefore, these areas exceeded the criteria, as expected.
- For informational purposes, assessment of the ENP stations relative to the TP rule criteria are included in **Table 3** and **Figures 4** and **5**. All stations in the ENP achieved the long-term criterion in every year, with an average geometric mean of 4 $\mu\text{g/L}$ across all stations.
- The increased percent of sites meeting the 10 and 15 $\mu\text{g/L}$ limits observed for WY2015 reflects the continued recovery from recent climatic extremes, improved treatment of the inflows, and overall improvement in phosphorus conditions within the interior marsh due to restoration activities.

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- Twenty-five of the 67 TP rule monitoring locations (including active and inactive locations) experienced statistically significant declining trends between WY2005 and WY2015 (May 1, 2004–April 30, 2015).

ASSESSMENT OF IMPACTED TOTAL PHOSPHORUS RULE STATIONS WITHIN THE EVERGLADES PROTECTION AREA

According to Subparagraph 62-302.540(4)(d)2, Florida Administrative Code (F.A.C.), individual stations in networks shall be deemed to be unimpacted for purposes of determining compliance assessment with the TP rule if the five-year geometric mean is less than or equal to 10 µg/L TP and the annual geometric mean is less than or equal to 15 µg/L TP. Over the past several years, the EPA has experienced significant load reductions as well as decreasing interior concentrations due to upstream treatment and restoration efforts (Julian et al., 2015). As a result, during WY2014 impacted stations transitioned to unimpacted as defined by both long-term geometric mean and annual geometric mean TP. Consequently, these stations will now be assessed each year as part of the unimpacted network of sites.

During WY2015, none of the remaining impacted stations achieved the respective annual or long-term geometric mean limits. Annual geometric mean and long-term geometric mean values are presented in **Tables 1** and **2**.

Table 1. Annual geometric mean TP concentrations ($\mu\text{g/L}$) for individual impacted stations in the EPA identified by the TP rule (Section 62-302.540, F.A.C.).^a

Area	Station	Water Year (May 1–April 30)										
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
LNWR	LOXA101	19	15	-	14	10	13	11	-	18	14	13
	LOXA105	38	15	-	15	11	12	13	17	17	17	13
	LOXA124	30	11	-	13	13	12	10	11	12	13	11
	LOXA130 ^b	27	15	-	11	10	10	10	13	9	8	10
	LOXA137 ^b	23	14	-	9	10	11	11	15	10	9	10
	LOXA140	18	12	-	8	8	11	9	-	10	8	11
	X1	-	-	-	47	-	34	27	38	27	26	21
Z1	-	-	-	96	21	26	33	49	18	23	24	
WCA-2	2AN1	-	-	-	20	14	22	17	14	15	16	15
	404Z1	-	-	-	27	18	21	21	15	33	25	20
	CA223	-	-	-	26	-	21	17	-	17	16	21
	CA224 ^b	-	-	-	8	6	7	6	7	6	6	6
	WCA2F1	72	48	-	34	24	23	19	23	31	23	26
	WCA2F3	-	-	-	19	11	-	-	-	-	-	-
	WCA2F4 ^b	22	12	19	13	11	10	9	10	9	7	9
WCA-3	CA314 ^b	-	-	-	7	4	5	4	6	4	3	4
	CA324	-	-	-	-	11	-	-	-	10	-	-
	CA33 ^b	15	10	18	14	8	9	8	-	9	7	10
	CA35	11	8	-	8	7	-	6	-	-	6	6
	CA36	-	29	30	36	23	24	22	31	32	13	23

a. Blank cells (-) indicate insufficient data to calculate annual geometric mean due to TP rule data screening or samples not being collected due to low water levels. Cells highlighted in green indicate that the annual geometric mean TP concentration for that station and year is ≤ 15 $\mu\text{g/L}$.

b. Station has transitioned from impacted to unimpacted.

Table 2. Long-term (five-year) geometric mean TP concentrations ($\mu\text{g/L}$) for impacted stations identified by the TP rule (Section 62-302.540, F.A.C.).^a

Area	Station	WY2005-WY2009	WY2006-WY2010	WY2007-WY2011	WY2008-WY2012	WY2009-WY2013	WY2010-WY2014	WY2011-WY2015
LNWR	LOXA101	-	-	-	-	-	-	-
	LOXA105	-	-	-	13	14	15	15
	LOXA124	-	-	-	12	12	12	11
	LOXA130 ^b	-	-	-	11	10	10	10
	LOXA137 ^b	-	-	-	11	11	10	10
	LOXA140	-	-	-	-	-	-	-
	X1	-	-	-	-	-	29	27
	Z1	-	-	-	35	26	27	26
WCA-2	2AN1	-	-	-	17	16	17	15
	404Z1	-	-	-	20	21	22	22
	CA223	-	-	-	-	-	-	-
	CA224 ^b	-	-	-	7	6	6	6
	WCA2F1	-	-	-	26	24	24	24
	WCA2F3	-	-	-	-	-	-	-
	WCA2F4 ^b	14	13	12	11	10	9	9
WCA-3	CA314 ^b	-	-	-	5	4	4	4
	CA324	-	-	-	-	-	-	-
	CA33 ^b	12	11	10	-	-	-	-
	CA35	-	-	-	-	-	-	-
	CA36	-	27	25	25	25	23	23

a. Blank cells (-) indicate insufficient data to compute a long-term geometric mean (i.e., missing one or more years). Cells highlighted in green indicate that the long-term geometric mean TP concentration for that station and period is $\leq 10 \mu\text{g/L}$.

b. Station has already transition from impacted to unimpacted.

Table 3. Annual TP criteria compliance assessment in the EPA for the five-year period of WY2011–WY2015.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
LNWR	Impacted	2011	LOXA101	6	11	Pass					
LNWR	Impacted	2011	LOXA130	11	10	Pass					
LNWR	Impacted	2011	LOXA140	7	9	Pass					
LNWR	Impacted	2011	LOXA105	9	13	Pass					
LNWR	Impacted	2011	LOXA137	10	11	Pass					
LNWR	Impacted	2011	Z1	12	33	Fail					
LNWR	Impacted	2011	X1	11	27	Fail					
LNWR	Impacted	2011	LOXA124	10	10	Pass	15	Fail			
LNWR	Impacted	2012	X1	8	38	Fail					
LNWR	Impacted	2012	LOXA105	7	17	Fail					
LNWR	Impacted	2012	LOXA101	4	N/A ^a (14)	N/A					
LNWR	Impacted	2012	LOXA130	8	13	Pass					
LNWR	Impacted	2012	LOXA140	4	N/A (13)	N/A					
LNWR	Impacted	2012	LOXA137	6	15	Pass					
LNWR	Impacted	2012	LOXA124	8	11	Pass					
LNWR	Impacted	2012	Z1	7	49	Fail	24	Fail			
LNWR	Impacted	2013	LOXA105	11	17	Fail					
LNWR	Impacted	2013	LOXA124	12	12	Pass					
LNWR	Impacted	2013	LOXA140	12	10	Pass					
LNWR	Impacted	2013	LOXA137	11	10	Pass					
LNWR	Impacted	2013	Z1	14	18	Fail					
LNWR	Impacted	2013	X1	12	27	Fail					
LNWR	Impacted	2013	LOXA101	11	18	Fail	16	Fail			
LNWR	Impacted	2014	X1	10	26	Fail					
LNWR	Impacted	2014	LOXA105	10	17	Fail					
LNWR	Impacted	2014	Z1	11	23	Fail					
LNWR	Impacted	2014	LOXA124	11	13	Pass					
LNWR	Impacted	2014	LOXA140	12	8	Pass					
LNWR	Impacted	2014	LOXA101	12	14	Pass	17	Fail			
LNWR	Impacted	2015	LOXA101	9	13	Pass					
LNWR	Impacted	2015	LOXA105	8	13	Pass					
LNWR	Impacted	2015	LOXA124	11	11	Pass					
LNWR	Impacted	2015	X1	9	21	Fail					
LNWR	Impacted	2015	LOXA140	10	11	Pass					
LNWR	Impacted	2015	Z1	10	24	Fail	15	Fail	17	Fail	Fail
LNWR	Unimpacted	2011	LOX10	8	6	Pass					
LNWR	Unimpacted	2011	LOX4	8	10	Pass					
LNWR	Unimpacted	2011	LOX13	11	6	Pass					
LNWR	Unimpacted	2011	LOX7	11	7	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
LNWR	Unimpacted	2011	LOX16	12	7	Pass					
LNWR	Unimpacted	2011	LOX11	12	6	Pass					
LNWR	Unimpacted	2011	LOX5	7	7	Pass					
LNWR	Unimpacted	2011	LOX14	12	6	Pass					
LNWR	Unimpacted	2011	LOX8	12	9	Pass					
LNWR	Unimpacted	2011	LOX3	7	6	Pass					
LNWR	Unimpacted	2011	LOX12	12	6	Pass					
LNWR	Unimpacted	2011	LOX6	10	6	Pass					
LNWR	Unimpacted	2011	LOX15	12	6	Pass					
LNWR	Unimpacted	2011	LOX9	8	5	Pass					
LNWR	Unimpacted	2011	X4	11	10	Pass					
LNWR	Unimpacted	2011	LOXA108	7	6	Pass	7	Pass			
LNWR	Unimpacted	2012	LOX10	5	N/A (9)	N/A					
LNWR	Unimpacted	2012	LOX13	6	N/A (7)	N/A					
LNWR	Unimpacted	2012	LOX16	9	8	Pass					
LNWR	Unimpacted	2012	LOX4	8	12	Pass					
LNWR	Unimpacted	2012	LOX5	3	N/A (7)	N/A					
LNWR	Unimpacted	2012	LOX7	9	8	Pass					
LNWR	Unimpacted	2012	LOX8	8	10	Pass					
LNWR	Unimpacted	2012	LOX11	9	7	Pass					
LNWR	Unimpacted	2012	LOX12	10	8	Pass					
LNWR	Unimpacted	2012	LOX14	9	7	Pass					
LNWR	Unimpacted	2012	LOX15	10	7	Pass					
LNWR	Unimpacted	2012	LOX9	5	N/A (7)	N/A					
LNWR	Unimpacted	2012	LOX3	2	N/A (6)	N/A					
LNWR	Unimpacted	2012	X4	9	9	Pass					
LNWR	Unimpacted	2012	LOX6	9	6	Pass					
LNWR	Unimpacted	2012	LOXA108	4	N/A (8)	N/A	8	Pass			
LNWR	Unimpacted	2013	LOX10	11	8	Pass					
LNWR	Unimpacted	2013	LOX4	12	8	Pass					
LNWR	Unimpacted	2013	LOX13	11	6	Pass					
LNWR	Unimpacted	2013	LOX7	12	7	Pass					
LNWR	Unimpacted	2013	LOX16	12	6	Pass					
LNWR	Unimpacted	2013	LOX11	12	6	Pass					
LNWR	Unimpacted	2013	LOX5	10	8	Pass					
LNWR	Unimpacted	2013	LOX14	12	5	Pass					
LNWR	Unimpacted	2013	LOX15	12	6	Pass					
LNWR	Unimpacted	2013	LOX9	12	8	Pass					
LNWR	Unimpacted	2013	LOX3	9	6	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
LNWR	Unimpacted	2013	LOX12	12	6	Pass					
LNWR	Unimpacted	2013	LOX6	12	5	Pass					
LNWR	Unimpacted	2013	LOX8	12	8	Pass					
LNWR	Unimpacted	2013	LOXA130	12	9	Pass					
LNWR	Unimpacted	2013	X4	12	8	Pass					
LNWR	Unimpacted	2013	LOXA108	8	8	Pass	7	Pass			
LNWR	Unimpacted	2014	LOX10	10	6	Pass					
LNWR	Unimpacted	2014	LOX16	12	7	Pass					
LNWR	Unimpacted	2014	LOX4	12	7	Pass					
LNWR	Unimpacted	2014	LOX13	12	7	Pass					
LNWR	Unimpacted	2014	LOX7	12	6	Pass					
LNWR	Unimpacted	2014	LOX15	12	6	Pass					
LNWR	Unimpacted	2014	LOX11	11	5	Pass					
LNWR	Unimpacted	2014	LOX5	9	5	Pass					
LNWR	Unimpacted	2014	LOX12	12	6	Pass					
LNWR	Unimpacted	2014	LOX14	12	6	Pass					
LNWR	Unimpacted	2014	LOX9	12	6	Pass					
LNWR	Unimpacted	2014	LOXA137	12	9	Pass					
LNWR	Unimpacted	2014	LOX3	7	7	Pass					
LNWR	Unimpacted	2014	LOX6	12	5	Pass					
LNWR	Unimpacted	2014	LOXA108	7	8	Pass					
LNWR	Unimpacted	2014	LOX8	12	8	Pass					
LNWR	Unimpacted	2014	X4	12	8	Pass					
LNWR	Unimpacted	2014	LOXA130	12	8	Pass	7	Pass			
LNWR	Unimpacted	2015	LOX4	10	9	Pass					
LNWR	Unimpacted	2015	LOX7	11	8	Pass					
LNWR	Unimpacted	2015	LOX16	12	7	Pass					
LNWR	Unimpacted	2015	LOX11	12	6	Pass					
LNWR	Unimpacted	2015	LOX5	10	8	Pass					
LNWR	Unimpacted	2015	LOX15	11	6	Pass					
LNWR	Unimpacted	2015	LOX10	8	6	Pass					
LNWR	Unimpacted	2015	LOX13	12	6	Pass					
LNWR	Unimpacted	2015	LOX12	12	7	Pass					
LNWR	Unimpacted	2015	LOX6	11	6	Pass					
LNWR	Unimpacted	2015	LOXA108	8	9	Pass					
LNWR	Unimpacted	2015	LOXA137	9	10	Pass					
LNWR	Unimpacted	2015	LOX3	8	8	Pass					
LNWR	Unimpacted	2015	X4	11	8	Pass					
LNWR	Unimpacted	2015	LOX14	12	6	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
LNWR	Unimpacted	2015	LOX9	10	8	Pass					
LNWR	Unimpacted	2015	LOX8	11	9	Pass					
LNWR	Unimpacted	2015	LOXA130	11	10	Pass	8	Pass	7	Pass	Pass
WCA-2	Impacted	2011	2AN1	7	17	Fail					
WCA-2	Impacted	2011	CA224	8	6	Pass					
WCA-2	Impacted	2011	WCA2F1	10	19	Fail					
WCA-2	Impacted	2011	WCA2F4	8	9	Pass					
WCA-2	Impacted	2011	CA223	7	17	Fail					
WCA-2	Impacted	2011	404Z1	9	21	Fail	15	Fail			
WCA-2	Impacted	2012	2AN1	10	14	Pass					
WCA-2	Impacted	2012	WCA2F1	8	23	Fail					
WCA-2	Impacted	2012	404Z1	8	15	Pass					
WCA-2	Impacted	2012	WCA2F4	10	10	Pass					
WCA-2	Impacted	2012	CA223	5	N/A (41)	N/A	16	Fail			
WCA-2	Impacted	2013	WCA2F1	10	31	Fail					
WCA-2	Impacted	2013	2AN1	12	15	Fail					
WCA-2	Impacted	2013	404Z1	7	33	Fail					
WCA-2	Impacted	2013	CA223	11	17	Fail	24	Fail			
WCA-2	Impacted	2014	2AN1	12	16	Fail					
WCA-2	Impacted	2014	CA223	9	16	Fail					
WCA-2	Impacted	2014	WCA2F1	9	23	Fail					
WCA-2	Impacted	2014	404Z1	8	25	Fail	20	Fail			
WCA-2	Impacted	2015	2AN1	10	15	Pass					
WCA-2	Impacted	2015	404Z1	10	20	Fail					
WCA-2	Impacted	2015	CA223	6	21	Fail					
WCA-2	Impacted	2015	WCA2F1	6	26	Fail	20	Fail	19	Fail	Fail
WCA-2	Unimpacted	2011	CA217	11	5	Pass					
WCA-2	Unimpacted	2011	CA26	8	5	Pass					
WCA-2	Unimpacted	2011	U1	11	5	Pass					
WCA-2	Unimpacted	2011	CA222	9	4	Pass					
WCA-2	Unimpacted	2011	WCA2F5	9	5	Pass					
WCA-2	Unimpacted	2011	404C2	4	N/A (7)	N/A					
WCA-2	Unimpacted	2011	U3	10	4	Pass					
WCA-2	Unimpacted	2011	CA29	9	5	Pass	5	Pass			
WCA-2	Unimpacted	2012	CA222	8	4	Pass					
WCA-2	Unimpacted	2012	U3	9	5	Pass					
WCA-2	Unimpacted	2012	CA217	9	5	Pass					
WCA-2	Unimpacted	2012	CA29	10	5	Pass					
WCA-2	Unimpacted	2012	U1	10	7	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
WCA-2	Unimpacted	2012	CA224	8	7	Pass					
WCA-2	Unimpacted	2012	CA26	9	4	Pass					
WCA-2	Unimpacted	2012	404C2	8	7	Pass					
WCA-2	Unimpacted	2012	WCA2F5	9	6	Pass	6	Pass			
WCA-2	Unimpacted	2013	CA224	11	6	Pass					
WCA-2	Unimpacted	2013	U1	11	6	Pass					
WCA-2	Unimpacted	2013	CA222	12	5	Pass					
WCA-2	Unimpacted	2013	CA29	12	5	Pass					
WCA-2	Unimpacted	2013	404C2	10	7	Pass					
WCA-2	Unimpacted	2013	U3	12	5	Pass					
WCA-2	Unimpacted	2013	CA217	12	5	Pass					
WCA-2	Unimpacted	2013	WCA2F5	12	6	Pass					
WCA-2	Unimpacted	2013	CA26	11	5	Pass					
WCA-2	Unimpacted	2013	WCA2F4	10	9	Pass	6	Pass			
WCA-2	Unimpacted	2014	CA29	12	4	Pass					
WCA-2	Unimpacted	2014	U1	12	5	Pass					
WCA-2	Unimpacted	2014	WCA2F5	12	6	Pass					
WCA-2	Unimpacted	2014	CA26	12	4	Pass					
WCA-2	Unimpacted	2014	404C2	11	6	Pass					
WCA-2	Unimpacted	2014	CA224	12	6	Pass					
WCA-2	Unimpacted	2014	CA217	12	4	Pass					
WCA-2	Unimpacted	2014	WCA2F4	12	7	Pass					
WCA-2	Unimpacted	2014	U3	12	5	Pass					
WCA-2	Unimpacted	2014	CA222	12	5	Pass	5	Pass			
WCA-2	Unimpacted	2015	CA29	11	5	Pass					
WCA-2	Unimpacted	2015	CA217	8	5	Pass					
WCA-2	Unimpacted	2015	WCA2F5	9	6	Pass					
WCA-2	Unimpacted	2015	CA26	11	4	Pass					
WCA-2	Unimpacted	2015	U3	11	5	Pass					
WCA-2	Unimpacted	2015	CA224	9	6	Pass					
WCA-2	Unimpacted	2015	WCA2F4	10	9	Pass					
WCA-2	Unimpacted	2015	404C2	10	7	Pass					
WCA-2	Unimpacted	2015	U1	10	7	Pass					
WCA-2	Unimpacted	2015	CA222	8	5	Pass	6	Pass	6	Pass	Pass
WCA-3	Impacted	2011	CA35	6	N/A (6)	N/A					
WCA-3	Impacted	2011	CA314	10	4	Pass					
WCA-3	Impacted	2011	CA36	9	22	Fail					
WCA-3	Impacted	2011	CA324	4	N/A (10)	N/A	13	Fail			
WCA-3	Impacted	2012	CA35	3	N/A (6)	N/A					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
WCA-3	Impacted	2012	CA324	5	N/A (10)	N/A					
WCA-3	Impacted	2012	CA36	6	31	Fail	31	Fail			
WCA-3	Impacted	2013	CA324	6	10	Pass					
WCA-3	Impacted	2013	CA35	2	N/A (6)	N/A					
WCA-3	Impacted	2013	CA36	8	32	Fail	21	Fail			
WCA-3	Impacted	2014	CA36	7	13	Pass					
WCA-3	Impacted	2014	CA324	5	N/A (8)	N/A					
WCA-3	Impacted	2014	CA35	6	6	Pass	10	Pass			
WCA-3	Impacted	2015	CA324	4	N/A (14)	N/A					
WCA-3	Impacted	2015	CA35	8	6	Pass					
WCA-3	Impacted	2015	CA36	7	23	Fail	15	Fail	16	Fail	Fail
WCA-3	Unimpacted	2011	CA311	10	4	Pass					
WCA-3	Unimpacted	2011	CA3B2	10	3	Pass					
WCA-3	Unimpacted	2011	CA316	10	6	Pass					
WCA-3	Unimpacted	2011	CA39	8	4	Pass					
WCA-3	Unimpacted	2011	CA33	7	8	Pass					
WCA-3	Unimpacted	2011	S345B6	10	3	Pass					
WCA-3	Unimpacted	2011	CA315	11	4	Pass					
WCA-3	Unimpacted	2011	CA319	10	4	Pass					
WCA-3	Unimpacted	2011	3ASMESO	9	4	Pass					
WCA-3	Unimpacted	2011	CA34	8	5	Pass					
WCA-3	Unimpacted	2011	CA325	6	N/A (5)	N/A					
WCA-3	Unimpacted	2011	CA38	8	4	Pass					
WCA-3	Unimpacted	2011	CA32	7	5	Pass					
WCA-3	Unimpacted	2011	CA3B1	9	3	Pass	4	Pass			
WCA-3	Unimpacted	2012	CA32	8	5	Pass					
WCA-3	Unimpacted	2012	CA314	10	6	Pass					
WCA-3	Unimpacted	2012	CA316	8	7	Pass					
WCA-3	Unimpacted	2012	CA39	10	6	Pass					
WCA-3	Unimpacted	2012	CA311	8	5	Pass					
WCA-3	Unimpacted	2012	CA3B2	8	8	Pass					
WCA-3	Unimpacted	2012	S345B6	9	8	Pass					
WCA-3	Unimpacted	2012	CA319	10	6	Pass					
WCA-3	Unimpacted	2012	3ASMESO	9	5	Pass					
WCA-3	Unimpacted	2012	CA325	8	4	Pass					
WCA-3	Unimpacted	2012	CA315	9	5	Pass					
WCA-3	Unimpacted	2012	CA38	6	4	Pass					
WCA-3	Unimpacted	2012	CA33	5	N/A (8)	N/A					
WCA-3	Unimpacted	2012	CA34	7	6	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
WCA-3	Unimpacted	2012	CA3B1	7	3	Pass	6	Pass			
WCA-3	Unimpacted	2013	CA38	10	4	Pass					
WCA-3	Unimpacted	2013	CA316	12	6	Pass					
WCA-3	Unimpacted	2013	CA32	9	5	Pass					
WCA-3	Unimpacted	2013	CA311	12	4	Pass					
WCA-3	Unimpacted	2013	CA3B2	11	6	Pass					
WCA-3	Unimpacted	2013	S345B6	12	5	Pass					
WCA-3	Unimpacted	2013	CA319	12	5	Pass					
WCA-3	Unimpacted	2013	CA33	8	9	Pass					
WCA-3	Unimpacted	2013	CA314	12	4	Pass					
WCA-3	Unimpacted	2013	CA315	12	4	Pass					
WCA-3	Unimpacted	2013	CA3B1	12	3	Pass					
WCA-3	Unimpacted	2013	CA39	12	5	Pass					
WCA-3	Unimpacted	2013	3ASMESO	12	4	Pass					
WCA-3	Unimpacted	2013	CA325	9	5	Pass					
WCA-3	Unimpacted	2013	CA34	10	7	Pass	5	Pass			
WCA-3	Unimpacted	2014	CA315	12	3	Pass					
WCA-3	Unimpacted	2014	CA38	10	4	Pass					
WCA-3	Unimpacted	2014	CA32	8	5	Pass					
WCA-3	Unimpacted	2014	CA3B2	11	3	Pass					
WCA-3	Unimpacted	2014	S345B6	11	3	Pass					
WCA-3	Unimpacted	2014	CA39	10	5	Pass					
WCA-3	Unimpacted	2014	CA311	12	4	Pass					
WCA-3	Unimpacted	2014	CA314	11	3	Pass					
WCA-3	Unimpacted	2014	CA3B1	11	2	Pass					
WCA-3	Unimpacted	2014	CA316	12	6	Pass					
WCA-3	Unimpacted	2014	CA319	11	4	Pass					
WCA-3	Unimpacted	2014	CA33	7	7	Pass					
WCA-3	Unimpacted	2014	CA325	8	3	Pass					
WCA-3	Unimpacted	2014	3ASMESO	11	3	Pass					
WCA-3	Unimpacted	2014	CA34	7	6	Pass	4	Pass			
WCA-3	Unimpacted	2015	CA315	11	4	Pass					
WCA-3	Unimpacted	2015	CA38	9	4	Pass					
WCA-3	Unimpacted	2015	CA314	12	4	Pass					
WCA-3	Unimpacted	2015	CA316	9	6	Pass					
WCA-3	Unimpacted	2015	CA32	6	7	Pass					
WCA-3	Unimpacted	2015	CA311	7	4	Pass					
WCA-3	Unimpacted	2015	CA34	8	5	Pass					
WCA-3	Unimpacted	2015	CA3B1	9	4	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
WCA-3	Unimpacted	2015	S345B6	11	4	Pass					
WCA-3	Unimpacted	2015	CA39	10	5	Pass					
WCA-3	Unimpacted	2015	CA33	7	10	Pass					
WCA-3	Unimpacted	2015	CA3B2	10	4	Pass					
WCA-3	Unimpacted	2015	CA319	10	4	Pass					
WCA-3	Unimpacted	2015	3ASMESO	10	4	Pass					
WCA-3	Unimpacted	2015	CA325	8	4	Pass	5	Pass	5	Pass	Pass
ENP	N/A	2011	EP	9	2	Pass					
ENP	N/A	2011	G-3273	7	4	Pass					
ENP	N/A	2011	P33	10	6	Pass					
ENP	N/A	2011	P34	8	5	Pass					
ENP	N/A	2011	SRS2	10	4	Pass					
ENP	N/A	2011	NE1	10	4	Pass					
ENP	N/A	2011	RG1	8	8	Pass					
ENP	N/A	2011	SRS1C	6	5	Pass					
ENP	N/A	2011	CR2	7	4	Pass					
ENP	N/A	2011	NP201	10	4	Pass					
ENP	N/A	2011	TSB	6	4	Pass					
ENP	N/A	2011	P37	8	3	Pass	4	Pass			
ENP	N/A	2012	P33	10	5	Pass					
ENP	N/A	2012	NP201	9	6	Pass					
ENP	N/A	2012	P34	8	4	Pass					
ENP	N/A	2012	EP	8	3	Pass					
ENP	N/A	2012	G-3273	4	N/A (5)	N/A					
ENP	N/A	2012	RG1	6	6	Pass					
ENP	N/A	2012	SRS2	9	4	Pass					
ENP	N/A	2012	NE1	9	5	Pass					
ENP	N/A	2012	SRS1C	6	7	Pass					
ENP	N/A	2012	P37	6	2	Pass					
ENP	N/A	2012	CR2	7	4	Pass					
ENP	N/A	2012	TSB	5	N/A (4)	N/A	5	Pass			
ENP	N/A	2013	G-3273	8	3	Pass					
ENP	N/A	2013	CR2	9	3	Pass					
ENP	N/A	2013	RG1	8	6	Pass					
ENP	N/A	2013	P34	11	4	Pass					
ENP	N/A	2013	EP	10	2	Pass					
ENP	N/A	2013	NE1	12	4	Pass					
ENP	N/A	2013	SRS1C	9	4	Pass					
ENP	N/A	2013	SRS2	11	4	Pass					

Table 3. Continued.

Area	Criterion Network	Water Year	Station	Sample Size	Annual Site Geometric Mean (µg/L)	≤15 µg/L Pass/ Fail	Network Annual Average Geometric Mean (µg/L)	≤11 µg/L Pass/ Fail	Network Five-Year Average Geometric Mean (µg/L)	Network Five-Year Average ≤10 µg/L Pass/ Fail	3 of 5 Year Network Average ≤ 10 µg/L
ENP	N/A	2013	TSB	8	3	Pass					
ENP	N/A	2013	NP201	12	3	Pass					
ENP	N/A	2013	P37	10	2	Pass					
ENP	N/A	2013	P33	12	4	Pass	4	Pass			
ENP	N/A	2014	G-3273	9	3	Pass					
ENP	N/A	2014	NE1	11	4	Pass					
ENP	N/A	2014	EP	11	3	Pass					
ENP	N/A	2014	CR2	9	4	Pass					
ENP	N/A	2014	RG1	9	5	Pass					
ENP	N/A	2014	SRS1B	10	6	Pass					
ENP	N/A	2014	SRS1C	11	5	Pass					
ENP	N/A	2014	SRS2	12	4	Pass					
ENP	N/A	2014	P34	10	3	Pass					
ENP	N/A	2014	P37	10	2	Pass					
ENP	N/A	2014	TSB	9	3	Pass					
ENP	N/A	2014	NP201	11	3	Pass					
ENP	N/A	2014	P33	11	4	Pass	4	Pass			
ENP	N/A	2015	EP	9	3	Pass					
ENP	N/A	2015	NE1	11	5	Pass					
ENP	N/A	2015	SRS1B	5	N/A (8)	N/A					
ENP	N/A	2015	CR2	6	3	Pass					
ENP	N/A	2015	RG1	7	4	Pass					
ENP	N/A	2015	P34	8	4	Pass					
ENP	N/A	2015	P37	8	2	Pass					
ENP	N/A	2015	SRS1C	7	4	Pass					
ENP	N/A	2015	G-3273	6	3	Pass					
ENP	N/A	2015	NP201	9	4	Pass					
ENP	N/A	2015	P33	12	4	Pass					
ENP	N/A	2015	TSB	6	4	Pass					
ENP	N/A	2015	SRS2	11	4	Pass	4	Pass	4	Pass	Pass

a. N/A – not applicable

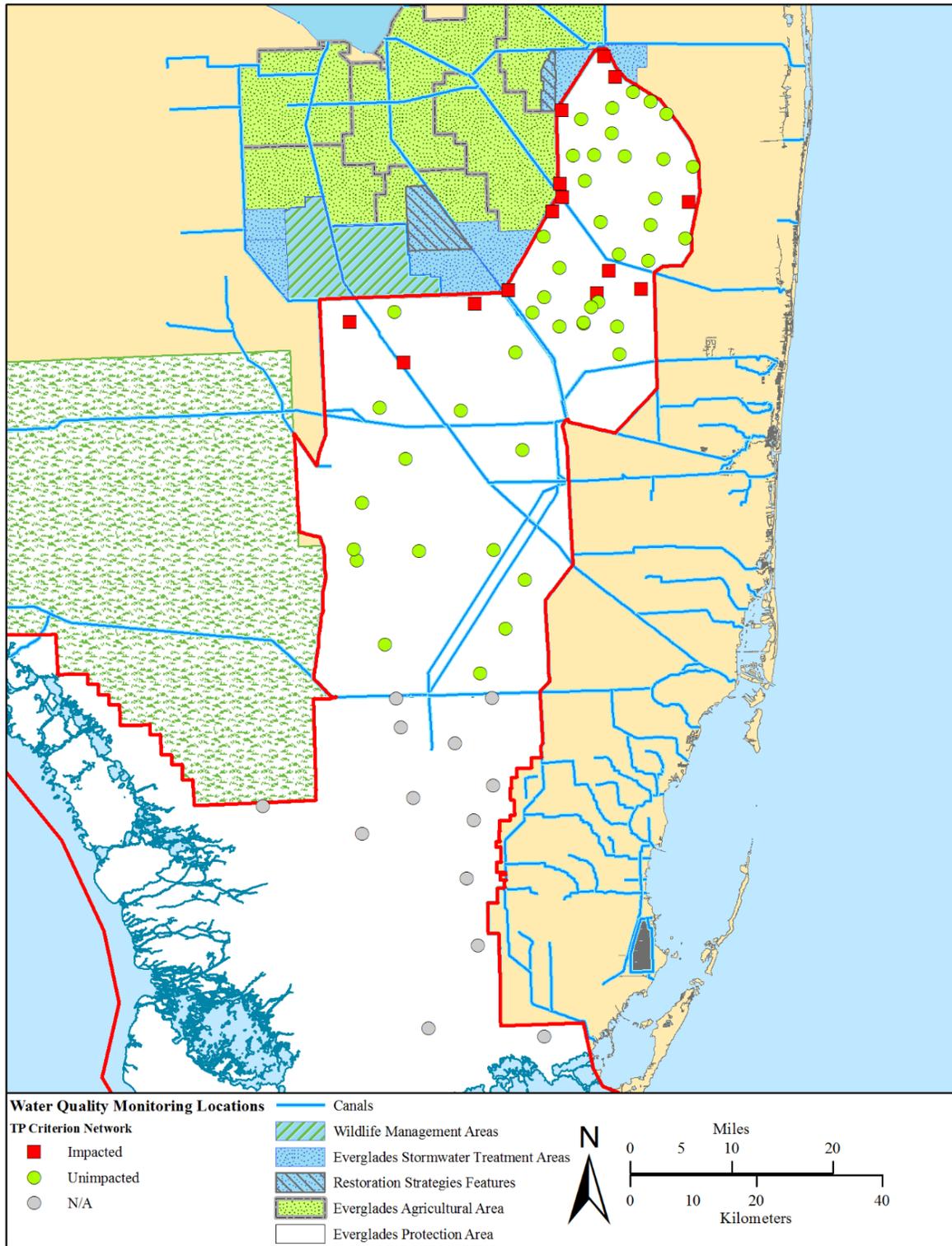


Figure 1. Location of TP rule monitoring stations in the EPA and their respective classifications used in WY2011–WY2015 evaluations. [Note: N/A – not applicable.]

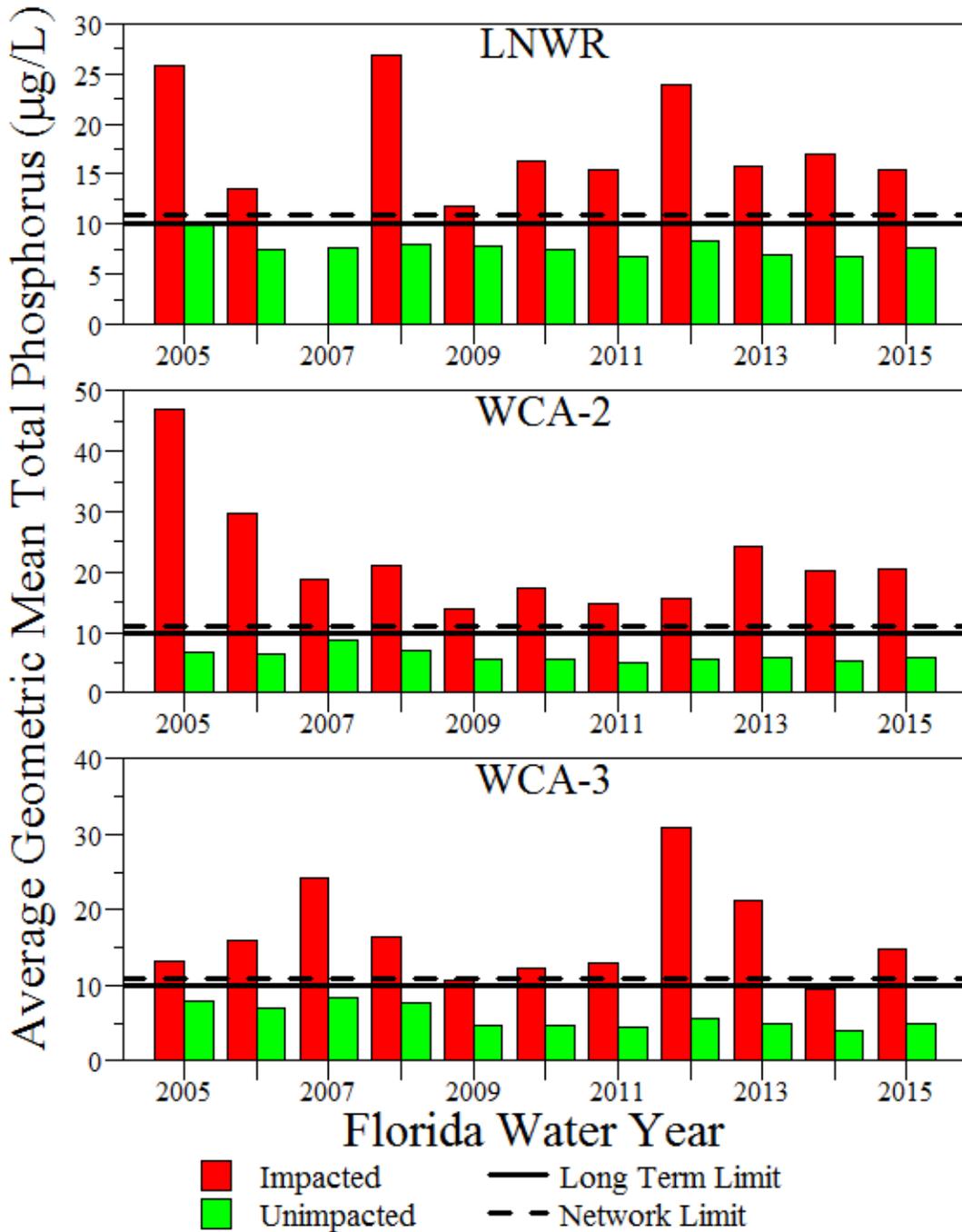


Figure 2. Network (impacted and unimpacted) trends for LNWR (Refuge), WCA-2, and WCA-3 during WY2005–WY2015 relative to the 10 µg/L long-term (five-year) and the 11 µg/L annual network limits for TP. [Note: Due to extreme weather events and drought conditions, a data gap exists for WY2007 within the LNWR.]

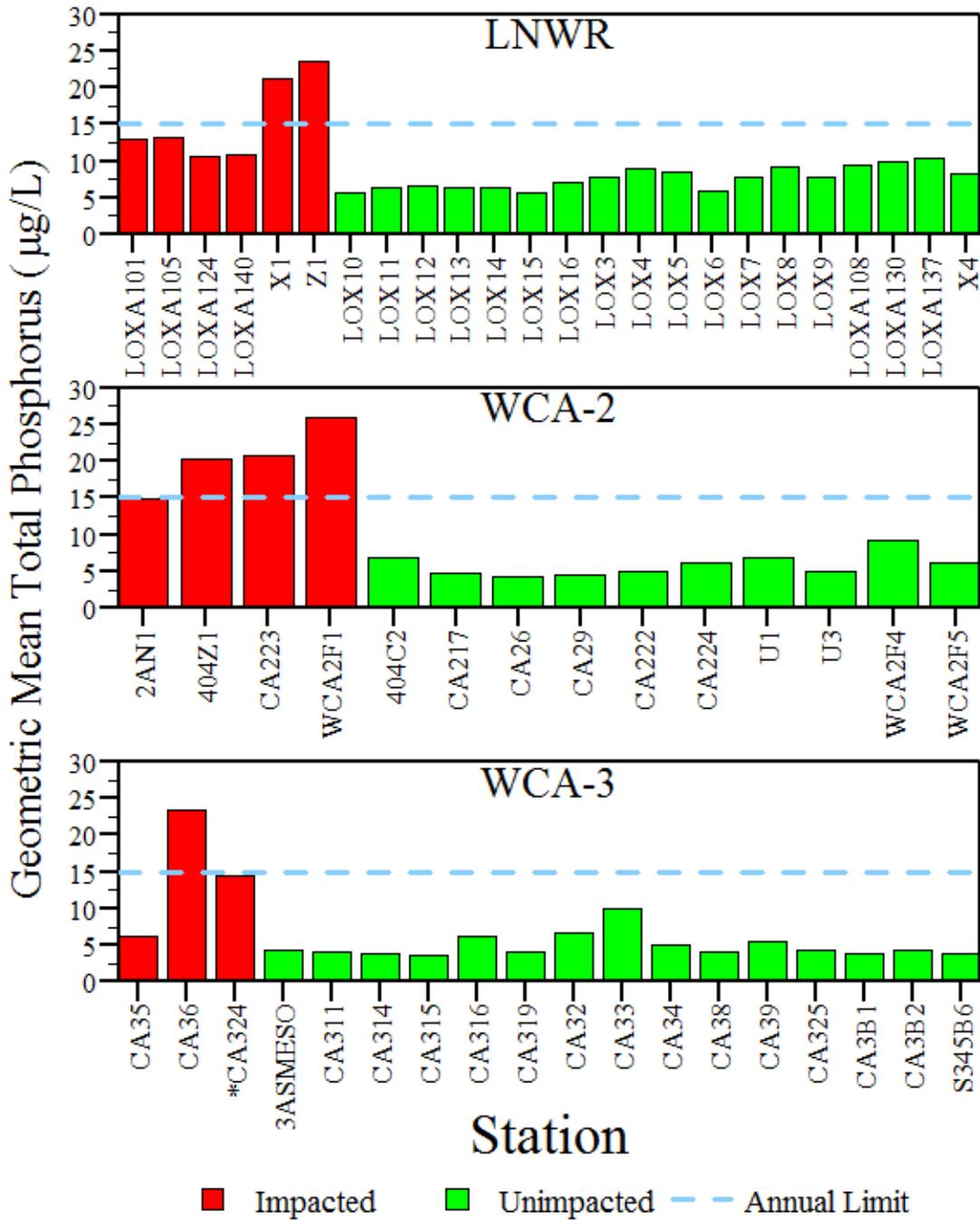


Figure 3. TP geometric mean concentration for each station during WY2015 for the LNWR (Refuge), WCA-2, and WCA-3 relative to the 15 µg/L annual limit. Stations with less than six samples are identified with an asterisk (*).

TOTAL PHOSPHORUS RULE ASSESSMENT – EVERGLADES NATIONAL PARK

As stated in Paragraph 62-302.540(4)(b), F.A.C., achievement of the phosphorus criteria shall be assessed for all water bodies in the EPA, which includes ENP. However, Paragraph 62-302.540(4)(c), F.A.C., also states “Achievement of the phosphorus criterion in the Park shall be based on the methods as set forth in Appendix A of the Settlement Agreement² unless the Settlement Agreement is rescinded or terminated. If the Settlement Agreement is no longer in force, achievement of the criterion shall be determined based on the method provided for the remaining EPA.” The Settlement Agreement remains in force and, therefore, data presented in this appendix for the ENP is for informational purposes only and **Figure 1** indicates that the TP rule status of stations within the ENP is not applicable for compliance purposes. Notably, based on soil TP concentrations and surface water TP concentrations since the inception of the monitoring network within the ENP, all stations have been categorized as unimpacted.

Stations within the ENP network achieved all aspects of the TP rule (**Table 1**) with a steadily declining network average geometric mean TP concentration since WY2005 (**Figure 4**). During WY2015, individual station annual geometric means ranged from 2 µg/L (P37) to 7 µg/L (NE1), with an overall average geometric mean of 4 µg/L (**Figure 5**). This very low average geometric mean TP concentration reflects approximately one-half of the minimal flow-weighted mean concentration used to assess compliance under Appendix A.

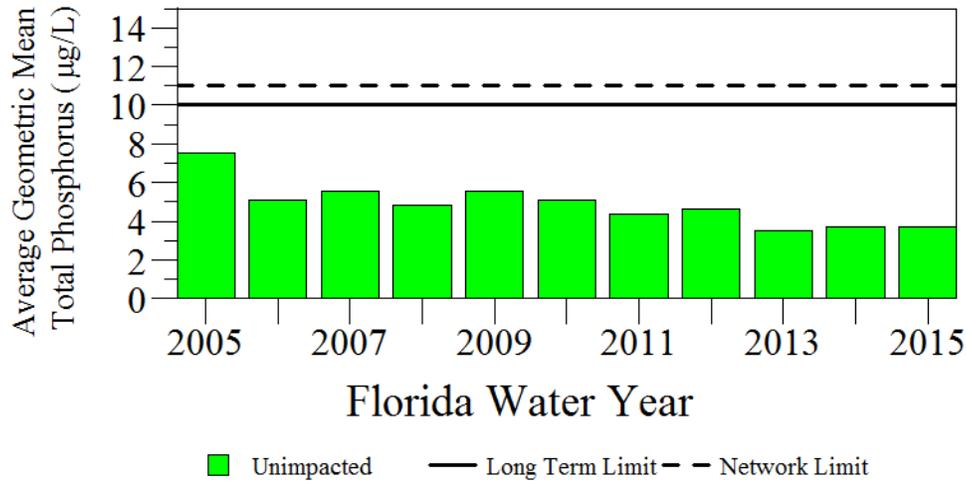


Figure 4. Network trends for ENP during WY2005–WY2015 relative to the 10 µg/L long-term (five-year) and the 11 µg/L annual network limits for TP.

² United States versus South Florida Water Management District. 1988. Case No. 88-1886-CIV-HOEVELER.

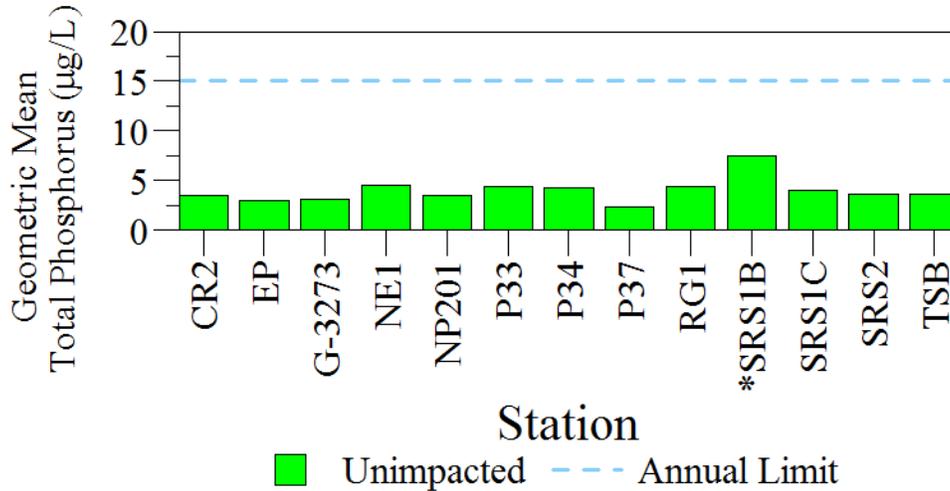


Figure 5. TP geometric mean concentration for each station during WY2015 for ENP relative to the 15 µg/L annual station limit. Stations with less than six samples are identified with an asterisk (*).

TOTAL PHOSPHORUS RULE ASSESSMENT – TRENDS

Since WY2005 (pre-TP rule development, post-stormwater treatment area construction), the TP rule compliance monitoring network monitoring locations have declined in annual geometric mean TP concentrations at a rate of -0.36 ± 0.06 µg/L per water year; 25 out of 67 stations, including current and historic total (37 percent of the entire network), experienced significantly declining trends (**Figure 6**). The remaining 42 stations did not experience statistically significant trends, and no stations experienced significantly increasing trends. The magnitude of change ranged from -2.72 to 0.02 µg/L per water year (**Figure 6**). Only two stations, WCA2F5 and CA222 (both unimpacted stations in WCA-2), experienced slight increases in annual geometric mean TP concentrations throughout the period of record. Furthermore, the remaining impacted stations with the TP rule monitoring network experienced a change of -0.87 ± 0.26 µg/L per water year. A detailed summary of statistical results is presented in **Table 4**.

Based on the reported rates of change in **Table 4** for impacted stations, assuming that trends remain constant and restoration progresses forward, the ability of impacted stations to attain a long-term TP concentration of 10 µg/L could occur anywhere from the next couple of years (i.e., 1 to 2 years) to the next half century (i.e., ~50 years).

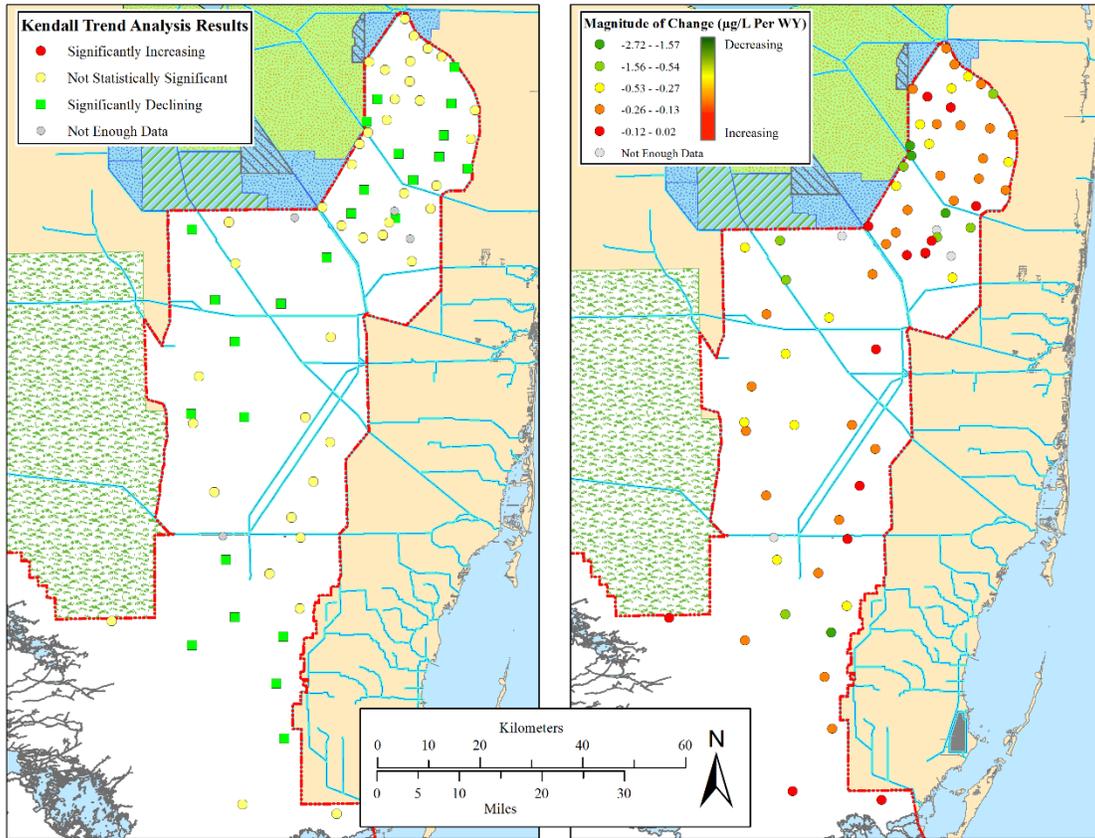


Figure 6. Annual geometric mean TP trend analysis results for data collected at the TP rule compliance monitoring locations between WY2005 and WY2015.

Table 4. Statistical results of annual geometric mean TP trend analysis for data collected at the TP rule compliance monitoring locations between WY2005 and WY2015.

Area	Criterion Network	Station	Number of Years	Test Statistic	Kendall's τ -value	ρ -value	Sen's Slope Estimate	Trend Status
LNWR	Impacted	X1	7	2.00	-0.81	<0.05	-2.723	Significantly Declining
LNWR	Impacted	LOXA101	9	13.00	-0.28	0.36	-0.237	Not Statistically Significant
LNWR	Impacted	LOXA105	10	22.00	-0.02	1.00	-0.165	Not Statistically Significant
LNWR	Impacted	LOXA124	10	17.00	-0.24	0.38	-0.321	Not Statistically Significant
LNWR	Impacted	LOXA140	9	15.00	-0.17	0.61	-0.160	Not Statistically Significant
LNWR	Impacted	Z1	8	11.00	-0.21	0.55	-1.576	Not Statistically Significant
LNWR	Unimpacted	LOX10	10	10.00	-0.56	<0.05	-0.303	Significantly Declining
LNWR	Unimpacted	LOX11	11	14.00	-0.49	<0.05	-0.208	Significantly Declining
LNWR	Unimpacted	LOX12	11	14.00	-0.49	<0.05	-0.147	Significantly Declining
LNWR	Unimpacted	LOX13	10	7.00	-0.69	<0.05	-0.177	Significantly Declining
LNWR	Unimpacted	LOX14	11	13.00	-0.53	<0.05	-0.157	Significantly Declining
LNWR	Unimpacted	LOX15	11	5.00	-0.82	<0.05	-0.240	Significantly Declining
LNWR	Unimpacted	LOX16	11	24.00	-0.13	0.65	-0.050	Not Statistically Significant
LNWR	Unimpacted	LOX3	7	5.00	-0.52	0.14	-0.284	Not Statistically Significant
LNWR	Unimpacted	LOX4	11	18.00	-0.35	0.16	-0.138	Not Statistically Significant
LNWR	Unimpacted	LOX5	8	12.00	-0.14	0.72	-0.036	Not Statistically Significant
LNWR	Unimpacted	LOX6	11	17.00	-0.38	0.12	-0.137	Not Statistically Significant
LNWR	Unimpacted	LOX7	11	12.00	-0.56	<0.05	-0.235	Significantly Declining
LNWR	Unimpacted	LOX8	11	20.00	-0.27	0.28	-0.129	Not Statistically Significant
LNWR	Unimpacted	LOX9	10	17.00	-0.24	0.38	-0.131	Not Statistically Significant
LNWR	Unimpacted	X4	8	7.00	-0.50	0.11	-0.301	Not Statistically Significant
LNWR	Unimpacted	LOXA108	8	13.00	-0.07	0.90	-0.048	Not Statistically Significant
LNWR	Unimpacted	LOXA130	10	9.00	-0.60	<0.05	-0.561	Significantly Declining
LNWR	Unimpacted	LOXA137	10	16.00	-0.29	0.29	-0.377	Not Statistically Significant
WCA-2	Impacted	WCA2F1	10	14.00	-0.38	0.16	-2.407	Not Statistically Significant
WCA-2	Impacted	2AN1	8	10.00	-0.29	0.40	-0.610	Not Statistically Significant
WCA-2	Impacted	404Z1	8	13.00	-0.07	0.90	-0.075	Not Statistically Significant
WCA-2	Impacted	CA223	6	4.00	-0.47	0.27	-0.933	Not Statistically Significant
WCA-2	Unimpacted	CA217	8	9.00	-0.36	0.28	-0.128	Not Statistically Significant
WCA-2	Unimpacted	CA26	8	5.00	-0.64	<0.05	-0.163	Significantly Declining
WCA-2	Unimpacted	CA29	11	12.00	-0.56	<0.05	-0.207	Significantly Declining
WCA-2	Unimpacted	U1	8	9.00	-0.36	0.28	-0.281	Not Statistically Significant
WCA-2	Unimpacted	U3	8	12.00	-0.14	0.72	-0.059	Not Statistically Significant
WCA-2	Unimpacted	WCA2F4	11	6.00	-0.78	<0.05	-0.758	Significantly Declining
WCA-2	Unimpacted	WCA2F5	8	15.00	0.07	0.90	0.017	Not Statistically Significant
WCA-2	Unimpacted	404C2	7	4.00	-0.62	0.07	-0.284	Not Statistically Significant
WCA-2	Unimpacted	CA222	8	17.00	0.21	0.55	0.017	Not Statistically Significant

Table 4. Continued.

Area	Criterion Network	Station	Number of Years	Test Statistic	Kendall's τ -value	ρ -value	Sen's Slope Estimate	Trend Status
WCA-2	Unimpacted	CA224	8	10.00	-0.29	0.40	-0.141	Not Statistically Significant
WCA-3	Impacted	CA35	6	1.00	-0.87	<0.05	-0.373	Significantly Declining
WCA-3	Impacted	CA36	10	18.00	-0.20	0.48	-0.815	Not Statistically Significant
WCA-3	Unimpacted	CA311	11	11.00	-0.60	<0.05	-0.273	Significantly Declining
WCA-3	Unimpacted	CA314	8	6.00	-0.57	0.06	-0.244	Not Statistically Significant
WCA-3	Unimpacted	CA315	11	7.00	-0.75	<0.05	-0.453	Significantly Declining
WCA-3	Unimpacted	CA316	11	12.00	-0.56	<0.05	-0.273	Significantly Declining
WCA-3	Unimpacted	CA319	8	7.00	-0.50	0.11	-0.224	Not Statistically Significant
WCA-3	Unimpacted	CA32	11	13.00	-0.53	<0.05	-0.242	Significantly Declining
WCA-3	Unimpacted	CA33	10	12.00	-0.47	0.07	-0.536	Not Statistically Significant
WCA-3	Unimpacted	CA34	11	11.00	-0.60	<0.05	-0.394	Significantly Declining
WCA-3	Unimpacted	CA38	11	13.00	-0.53	<0.05	-0.254	Significantly Declining
WCA-3	Unimpacted	CA39	8	13.00	-0.07	0.90	-0.059	Not Statistically Significant
WCA-3	Unimpacted	3ASMESO	8	12.00	-0.14	0.72	-0.219	Not Statistically Significant
WCA-3	Unimpacted	CA325	7	6.00	-0.43	0.24	-0.195	Not Statistically Significant
WCA-3	Unimpacted	CA3B1	8	6.00	-0.57	0.06	-0.230	Not Statistically Significant
WCA-3	Unimpacted	CA3B2	8	11.00	-0.21	0.55	-0.243	Not Statistically Significant
WCA-3	Unimpacted	S345B6	8	13.00	-0.07	0.90	-0.025	Not Statistically Significant
ENP	N/A ^a	EP	10	18.00	-0.20	0.48	-0.072	Not Statistically Significant
ENP	N/A	NE1	11	17.00	-0.38	0.12	-0.200	Not Statistically Significant
ENP	N/A	NP201	11	10.00	-0.64	<0.05	-0.443	Significantly Declining
ENP	N/A	P33	11	6.00	-0.78	<0.05	-0.546	Significantly Declining
ENP	N/A	P34	10	17.00	-0.24	0.38	-0.080	Not Statistically Significant
ENP	N/A	P37	9	9.00	-0.50	0.08	-0.116	Not Statistically Significant
ENP	N/A	TSB	9	7.00	-0.61	<0.05	-0.221	Significantly Declining
ENP	N/A	CR2	7	3.00	-0.71	<0.05	-0.200	Significantly Declining
ENP	N/A	G-3273	6	3.00	-0.60	0.14	-0.473	Not Statistically Significant
ENP	N/A	RG1	7	0.00	-1.00	<0.05	-1.574	Significantly Declining
ENP	N/A	SRS1C	7	7.00	-0.33	0.38	-0.087	Not Statistically Significant
ENP	N/A	SRS2	8	5.00	-0.64	<0.05	-0.164	Significantly Declining

a. N/A – not applicable.

LITERATURE CITED

Julian, P., G.G. Payne and S.K. Xue. 2015. Chapter 3A: Water Quality in the Everglades Protection Areas. In: *2014 South Florida Environmental Report – Volume I*, South Florida Water Management District, West Palm Beach, FL.