

Arthur R. Marshall Loxahatchee National Wildlife Refuge Total Phosphorus (TP) Compliance Status

Yellow highlighted and bolded months' geometric means were higher than the long term levels, which became effective on December 31, 2006.

Green highlighted and italicized months' levels were not applicable (N/A) because the average stages were less than 15.42 feet NGVD29.

Month-Year	Average Stage (feet NGVD29)	Long-Term Level (ppb)	TP Geometric Means (ppb)	Stage Data (n)	TP Sample Data (n)
Jan-2007	16.57	9.3	6.9	3	14
Feb-2007	16.34	10.4	6.2	3	13
Mar-2007	16.10	11.8	7.3	3	10
<i>Apr-2007</i>	<i>15.30</i>	<i>N/A</i>	<i>8.0</i>	<i>3</i>	<i>3</i>
<i>May-2007</i>	<i>14.68</i>	<i>N/A</i>	<i>no data</i>	<i>3</i>	<i>0</i>
<i>Jun-2007</i>	<i>15.37</i>	<i>N/A</i>	<i>13.6</i>	<i>3</i>	<i>4</i>
Jul-2007	15.86	13.5	10.4	3	13
Aug-2007	16.33	10.5	10.1	3	13
Sep-2007	16.59	9.2	8.5	3	14
Oct-2007	17.26	7.2	8.4	3	14
Nov-2007	17.19	7.2	7.0	3	14
Dec-2007	16.84	8.2	7.9	3	14
Jan-2008	16.68	8.9	6.3	3	14
Feb-2008	16.55	9.4	7.6	3	14
Mar-2008	16.54	9.4	6.7	3	14
Apr-2008	16.36	10.3	5.8	3	14
May-2008	15.76	14.3	9.1	3	9
Jun-2008	15.68	14.9	8.9	3	8
Jul-2008	16.37	10.3	9.2	3	14
Aug-2008	16.39	10.2	8.6	3	14
Sep-2008	16.81	8.3	7.7	3	14
Oct-2008	17.42	7.2	7.2	3	14
Nov-2008	17.22	7.2	7.4	3	14
Dec-2008	16.96	7.8	6.3	3	14
Jan-2009	16.68	8.8	7.0	3	14
Feb-2009	16.35	10.4	4.7	3	12
Mar-2009	15.86	13.5	7.5	3	9
Apr-2009	15.69	14.9	9.7	3	8
<i>May-2009</i>	<i>15.01</i>	<i>N/A</i>	<i>11.0</i>	<i>3</i>	<i>1</i>
Jun-2009	16.05	12.1	13.2	3	12
Jul-2009	16.47	9.8	7.4	3	14
Aug-2009	16.16	11.5	8.8	3	14
Sep-2009	16.68	8.9	8.1	3	14
Oct-2009	16.86	8.2	7.0	3	14
Nov-2009	16.55	9.4	6.9	3	14
Dec-2009	16.36	10.4	5.8	3	12
Jan-2010	16.68	8.9	5.2	3	14
Feb-2010	16.62	9.1	6.7	3	14
Mar-2010	16.65	9.0	5.9	3	14
Apr-2010	16.51	9.6	7.2	3	14
May-2010	16.35	10.4	7.8	3	14

Inflow TP Loads and Flow-weighted Mean Concentration (FWMC)

TP loads are calculated using "no ratio-adjustment" and "14-day

maximum for auto sampler composite concentration" algorithm.

Month-Year	Inflow (kac-ft)	TP loads (metric tons)	Inflow FWMC (ppb)
Jan-2007	4	0.2	34
Feb-2007	1.3	0.05	31
Mar-2007	0.6	0.03	44
<i>Apr-2007</i>	<i>0.03</i>	<i>0.002</i>	<i>53</i>
<i>May-2007</i>	<i>0.03</i>	<i>0.003</i>	<i>80</i>
<i>Jun-2007</i>	<i>0.8</i>	<i>0.1</i>	<i>69</i>
Jul-2007	15	0.7	36
Aug-2007	35	2.0	46
Sep-2007	45	2.2	40
Oct-2007	64	3.1	39
Nov-2007	8	0.3	28
Dec-2007	5	0.2	32
Jan-2008	1.0	0.02	20
Feb-2008	24	1.0	33
Mar-2008	31	0.9	24
Apr-2008	15	0.4	22
May-2008	0.4	0.01	23
Jun-2008	30	0.8	21
Jul-2008	57	1.4	19
Aug-2008	127	4.7	30
Sep-2008	70	3.2	37
Oct-2008	43	1.9	36
Nov-2008	2	0.04	19
Dec-2008	4	0.1	15
Jan-2009	0.9	0.02	15
Feb-2009	0.3	0.01	16
Mar-2009	0.01	0.005	304*
Apr-2009	0.3	0.01	24
<i>May-2009</i>	<i>42</i>	<i>3.0</i>	<i>59</i>
Jun-2009	71	5.5	63
Jul-2009	44	2.2	41
Aug-2009	25	1.6	52
Sep-2009	36	1.9	43
Oct-2009	6	0.3	41
Nov-2009	1.0	0.05	38
Dec-2009	12	0.4	29
Jan-2010	4	0.2	36
Feb-2010	5	0.3	49
Mar-2010	53	5.0	76
Apr-2010	10	0.8	59
May-2010	2	0.1	45

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Green highlighted and italicized months' levels were not applicable (N/A) because the average stages were less than 15.42 feet NGVD29.

Month-Year	Average Stage (feet NGVD29)	Long-Term Level (ppb)	TP Geometric Means (ppb)	Stage Data (n)	TP Sample Data (n)
Jun-2010	16.26	10.9	7.3	3	14
Jul-2010	16.29	10.7	6.9	3	14
Aug-2010	16.15	11.6	6.1	3	10
Sep-2010	16.76	8.5	6.5	3	14
Oct-2010	16.99	7.7	6.2	3	14
Nov-2010	16.83	8.2	6.6	3	14
Dec-2010	16.52	9.6	4.0	3	13
Jan-2011	16.29	10.7	5.1	3	10
Feb-2011	16.20	11.3	6.0	3	10
Mar-2011	15.79	14.0	8.1	3	8
Apr-2011	15.53	16.3	11.4	3	7
<i>May-2011</i>	<i>14.87</i>	<i>N/A</i>	<i>no data</i>	<i>3</i>	<i>0</i>
<i>Jun-2011</i>	<i>14.30</i>	<i>N/A</i>	<i>no sampling</i>	<i>3</i>	<i>0</i>
<i>Jul-2011</i>	<i>15.11</i>	<i>N/A</i>	<i>20.2</i>	<i>3</i>	<i>4</i>
Aug-2011	15.53	16.4	11.5	3	8
Sep-2011	15.83	13.8	9.8	3	11
Oct-2011	16.06	12.1	7.4	3	11
Nov-2011	16.59	9.2	7.8	3	14
Dec-2011	16.59	9.2	6.2	3	7
Jan-2012	16.43	10.0	6.0	3	14
Feb-2012	16.23	11.1	7.5	3	13
Mar-2012	15.96	12.8	6.3	3	10
Apr-2012	15.92	13.1	8.1	3	10
May-2012	16.13	11.7	7.2	3	12
Jun-2012	16.14	11.6	7.4	3	14
Jul-2012	16.00	12.5	6.0	3	14
Aug-2012	16.18	11.3	5.5	3	13
Sep-2012	17.38	7.2	7.0	3	14
Oct-2012	17.20	7.2	7.6	3	14
Nov-2012	17.11	7.3	6.1	3	14
Dec-2012	16.82	8.3	6.7	3	14
Jan-2013	16.62	9.1	7.2	3	14
Feb-2013	16.36	10.3	6.7	3	13
Mar-2013	16.42	10.0	5.8	3	14
Apr-2013	16.12	11.7	7.0	3	11
May-2013	16.15	11.5	8.0	3	10
Jun-2013	16.36	10.4	7.8	3	12
Jul-2013	16.48	9.8	6.5	3	14
Aug-2013	16.55	9.4	5.8	3	14
Sep-2013	16.38	10.3	7.0	3	14
Oct-2013	16.83	8.3	6.6	3	14

Inflow TP Loads and Flow-weighted Mean Concentration (FWMC)

TP loads are calculated using "no ratio-adjustment" and "14-day maximum for auto sampler composite concentration" algorithm.

Month-Year	Inflow (kac-ft)	TP loads (metric tons)	Inflow FWMC (ppb)
Jun-2010	30	1.2	32
Jul-2010	19	0.6	25
Aug-2010	37	1.0	22
Sep-2010	39	1.0	20
Oct-2010	7	0.2	18
Nov-2010	0.8	0.01	15
Dec-2010	0.3	0.01	19
Jan-2011	7	0.3	32
Feb-2011	3	0.1	23
Mar-2011	3	0.1	31
Apr-2011	4	0.2	32
<i>May-2011</i>	<i>5</i>	<i>0.1</i>	<i>21</i>
<i>Jun-2011</i>	<i>2</i>	<i>0.1</i>	<i>21</i>
<i>Jul-2011</i>	<i>31</i>	<i>1.1</i>	<i>30</i>
Aug-2011	21	0.5	20
Sep-2011	27	0.6	19
Oct-2011	36	0.9	20
Nov-2011	34	0.7	18
Dec-2011	4	0.1	24
Jan-2012	0.5	0.02	31
Feb-2012	1.5	0.1	30
Mar-2012	6	0.2	31
Apr-2012	3	0.1	28
May-2012	20	0.7	27
Jun-2012	31	0.8	22
Jul-2012	19	0.3	15
Aug-2012	100	9.0	72
Sep-2012	121	9.1	61
Oct-2012	30	1.2	32
Nov-2012	2	0.1	28
Dec-2012	9	0.7	65
Jan-2013	1.4	0.1	51
Feb-2013	19	1.2	51
Mar-2013	6	0.5	66
Apr-2013	7	0.3	36
May-2013	14	0.5	33
Jun-2013	106	9.0	69
Jul-2013	86	2.4	22
Aug-2013	20	0.9	34
Sep-2013	56	2.3	34
Oct-2013	42	1.3	25

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Month-Year	Average Stage (feet NGVD29)	Long-Term Level (ppb)	TP Geometric Means (ppb)	Stage Data (n)	TP Sample Data (n)
Nov-2013	16.62	9.1	5.6	3	14
Dec-2013	16.63	9.1	4.4	3	13
Jan-2014	16.41	10.1	5.2	3	12
Feb-2014	16.61	9.1	7.4	3	14
Mar-2014	16.49	9.7	6.1	3	14
Apr-2014	16.23	11.0	6.1	3	12
May-2014	15.79	14.1	8.1	3	9
Jun-2014	15.56	16.0	6.6	3	6
Jul-2014	16.19	11.3	7.7	3	12
Aug-2014	16.48	9.8	7.4	3	14
Sep-2014	16.40	10.1	7.2	3	14
Oct-2014	17.34	7.2	7.9	3	14
Nov-2014	17.10	7.3	6.0	3	14
Dec-2014	17.01	7.6	5.6	3	14
Jan-2015	16.92	7.9	8.1	3	14
Feb-2015	16.67	8.9	5.5	3	14
Mar-2015	16.57	9.3	7.0	3	14
Apr-2015	16.25	11.0	7.6	3	12
May-2015	15.91	13.1	8.2	3	10
Jun-2015	15.65	15.3	9.7	3	5
<i>Jul-2015</i>	<i>15.19</i>	<i>NA</i>	<i>18.0</i>	<i>3</i>	<i>2</i>
Aug-2015	15.78	14.1	12.3	3	8
Sep-2015	16.23	11.1	10.9	3	14
Oct-2015	16.92	7.9	7.4	3	14
Nov-2015	17.00	7.7	6.3	3	14
Dec-2015*	17.00 (17.02)	7.7 (7.6)	6.1 (5.9)	3	12 (14)
Jan-2016	17.15	7.2	6.5	3	14
Feb-2016	17.30	7.2	5.3	3	14
Mar-2016	16.82	8.3	6.0	3	14
Apr-2016	16.36	10.3	6.9	3	14
May-2016	15.96	12.7	8.8	3	9
Jun-2016	15.97	12.7	7.2	3	9
Jul-2016	16.07	12.0	7.1	3	13
Aug-2016	15.92	13.1	6.6	3	6
Sep-2016	16.62	9.1	7.3	3	14
Oct-2016	16.96	7.8	6.1	3	14
Nov-2016	16.78	8.4	6.9	3	14
Dec-2016	16.64	9.0	5.6	3	14
Jan-2017	16.57	9.3	7.1	3	13
Feb-2017	16.52	9.6	4.4	3	13
Mar-2017	16.28	10.8	5.7	3	12

Inflow TP Loads and Flow-weighted Mean Concentration (FWMC)

TP loads are calculated using "no ratio-adjustment" and "14-day maximum for auto sampler composite concentration" algorithm.

Month-Year	Inflow (kac-ft)	TP loads (metric tons)	Inflow FWMC (ppb)
Nov-2013	4	0.2	51
Dec-2013	7	0.4	40
Jan-2014	9	0.5	44
Feb-2014	32	1.6	40
Mar-2014	3	0.2	42
Apr-2014	2	0.1	42
May-2014	4	0.1	27
Jun-2014	41	1.3	26
Jul-2014	29	0.7	20
Aug-2014	58	1.2	17
Sep-2014	37	0.8	17
Oct-2014	33	0.9	21
Nov-2014	7	0.2	19
Dec-2014	25	0.5	16
Jan-2015	1	0.03	20
Feb-2015	3	0.1	22
Mar-2015	6	0.2	28
Apr-2015	1.5	0.04	24
May-2015	5	0.1	23
Jun-2015	4	0.2	37
<i>Jul-2015</i>	<i>6</i>	<i>0.1</i>	<i>15</i>
Aug-2015	28	0.6	16
Sep-2015	79	1.5	15
Oct-2015	42	0.8	16
Nov-2015	14	0.3	19
Dec-2015	28	0.6	17
Jan-2016	67	3.0	36
Feb-2016	50	3.6	58
Mar-2016	9	0.3	30
Apr-2016	21	0.6	25
May-2016	40	1.3	27
Jun-2016	21	0.6	25
Jul-2016	8	0.2	22
Aug-2016	37	1.1	23
Sep-2016	40	0.9	18
Oct-2016	31	0.7	18
Nov-2016	13	0.2	14
Dec-2016	21	0.4	15
Jan-2017	10	0.3	20
Feb-2017	1.5	0.05	24
Mar-2017	2	0.1	27

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Month-Year	Average Stage (feet NGVD29)	Long-Term Level (ppb)	TP Geometric Means (ppb)	Stage Data (n)	TP Sample Data (n)
Apr-2017	16.06	12.1	6.5	3	7
May-2017	16.17	11.4	8.3	3	13
Jun-2017	16.93	7.9	7.9	3	14
Jul-2017	16.40	10.1	7.9	3	13
Aug-2017	16.69	8.8	6.6	3	14
Sep-2017	16.89	8.0	7.5	3	13
Oct-2017	17.50	7.2	7.6	3	14
Nov-2017	17.71	7.2	5.5	3	14
Dec-2017	17.43	7.2	7.2	3	14
Jan-2018	17.12	7.3	4.5	3	14
Feb-2018	16.85	8.2	5.8	3	14
Mar-2018	16.45	9.9	6.0	3	14
Apr-2018	16.00	12.5	9.2	3	9
May-2018	16.13	11.6	6.3	3	9
Jun-2018	16.66	8.9	7.4	3	14
Jul-2018	16.41	10.1	7.5	3	13
Aug-2018	16.27	10.8	7.0	3	12
Sep-2018	16.64	9.0	6.0	3	14
Oct-2018	16.55	9.4	6.2	3	14
Nov-2018	16.47	9.8	7.9	3	12
Dec-2018	16.36	10.4	6.0	3	11
Jan-2019	16.18	11.4	6.1	3	10
Feb-2019	16.62	9.1	9.1	3	14
Mar-2019	16.64	9.0	6.3	3	14
Apr-2019	16.24	11.0	7.4	3	12
May-2019	16.16	11.5	10.4	3	10
Jun-2019	16.04	12.2	8.6	3	9
Jul-2019	16.33	10.5	7.3	3	14
Aug-2019	16.58	9.3	7.1	3	14
Sep-2019	16.61	9.2	7.1	3	14
Oct-2019	16.47	9.8	6.7	3	13
Nov-2019	16.75	8.6	5.6	3	14
Dec-2019	16.59	9.3	5.2	3	14
Jan-2020	16.73	8.7	4.8	3	14
Feb-2020	16.73	8.6	5.8	3	14
Mar-2020	16.66	8.9	5.2	3	14
Apr-2020	16.21	11.2	8.2	3	11
May-2020	15.79	14.0	6.5	3	6
Jun-2020	16.20	11.2	7.9	3	12
Jul-2020	16.15	11.6	6.2	3	12
Aug-2020	16.57	9.3	6.8	3	14

Inflow TP Loads and Flow-weighted Mean Concentration (FWMC)

TP loads are calculated using "no ratio-adjustment" and "14-day maximum for auto sampler composite concentration" algorithm.

Month-Year	Inflow (kac-ft)	TP loads (metric tons)	Inflow FWMC (ppb)
Apr-2017	10	0.4	35
May-2017	26	0.8	26
Jun-2017	123	5.4	36
Jul-2017	7	0.2	28
Aug-2017	11	0.3	23
Sep-2017	70	5.5	63
Oct-2017	105	6.2	48
Nov-2017	28	1.5	43
Dec-2017	6	0.3	34
Jan-2018	3	0.1	25
Feb-2018	4	0.1	22
Mar-2018	6	0.1	18
Apr-2018	10	0.2	17
May-2018	93	4.7	41
Jun-2018	28	1.9	54
Jul-2018	30	1.0	27
Aug-2018	18	0.5	25
Sep-2018	30	0.9	23
Oct-2018	18	0.4	19
Nov-2018	15	0.3	17
Dec-2018	9	0.2	17
Jan-2019	24	1.1	35
Feb-2019	26	1.6	50
Mar-2019	5	0.2	36
Apr-2019	2	0.1	36
May-2019	22	0.8	30
Jun-2019	39	1.1	23
Jul-2019	43	1.1	21
Aug-2019	77	2.8	30
Sep-2019	27	1.2	36
Oct-2019	13	0.4	27
Nov-2019	7	0.1	17
Dec-2019	11	0.3	22
Jan-2020	7	0.2	25
Feb-2020	6	0.2	31
Mar-2020	4	0.1	30
Apr-2020	2	0.1	29
May-2020	40	1.1	23
Jun-2020	72	2.5	28
Jul-2020	47	1.4	24
Aug-2020	73	1.9	21

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Month-Year	Average Stage (feet NGVD29)	Long-Term Level (ppb)	TP Geometric Means (ppb)	Stage Data (n)	TP Sample Data (n)
Sep-2020	17.19	7.2	7.8	3	14
Oct-2020	17.45	7.2	6.4	3	14
Nov-2020	17.54	7.2	5.3	3	14
Dec-2020	17.39	7.2	5.6	3	14
Jan-2021	17.28	7.2	4.6	3	14
Feb-2021	17.02	7.6	4.7	3	14
Mar-2021	16.78	8.4	6.9	3	14
Apr-2021	16.27	10.8	6.1	3	11
May-2021	16.02	12.4	8.7	3	9
Jun-2021	15.54	16.3	7.6	3	5
Jul-2021	16.00	12.5	11.1	3	8
Aug-2021	16.49	9.7	8.6	3	13
Sep-2021	16.79	8.4	7.0	3	13
Oct-2021	17.30	7.2	6.6	3	14
Nov-2021	17.35	7.2	7.1	3	14
Dec-2021	17.44	7.2	5.3	3	14
Jan-2022	17.32	7.2	5.7	3	14
Feb-2022	17.12	7.3	5.0	3	13
Mar-2022	16.80	8.4	7.3	3	14
Apr-2022	16.31	10.6	7.7	3	13
May-2022	15.89	13.3	9.1	3	7
Jun-2022	16.59	9.3	9.7	3	14
Jul-2022	16.36	10.3	7.6	3	12
Aug-2022	16.56	9.4	6.7	3	13
Sep-2022	16.41	10.1	7.3	3	11
Oct-2022	17.16	7.2	6.5	3	14
Nov-2022	17.20	7.2	6.7	3	14
Dec-2022	17.39	7.2	5.9	3	14
Jan-2023	17.25	7.2	5.5	3	14
Feb-2023	16.95	7.8	5.3	3	14
Mar-2023	16.53	9.5	6.3	3	13
Apr-2023	16.22	11.1	7.9	3	10
May-2023	16.24	11.0	7.1	3	14
Jun-2023	16.30	10.7	6.4	3	14
Jul-2023	16.41	10.1	5.8	3	14
Aug-2023	16.51	9.6	5.5	3	14
Sep-2023	16.82	8.3	5.6	3	14
Oct-2023	17.55	7.2	6.8	3	14
Nov-2023	17.15	7.2	6.3	3	8
Dec-2023	17.29	7.2	6.9	3	14

* December 2015 values for Refuge including resampled data (at LOX14 and LOX15) are presented in parentheses.

Inflow TP Loads and Flow-weighted Mean Concentration (FWMC)

TP loads are calculated using "no ratio-adjustment" and "14-day maximum for auto sampler composite concentration" algorithm.

Month-Year	Inflow (kac-ft)	TP loads (metric tons)	Inflow FWMC (ppb)
Sep-2020	69	2.3	27
Oct-2020	107	6.5	49
Nov-2020	70	6.1	71
Dec-2020	13	0.9	52
Jan-2021	0.9	0.04	33
Feb-2021	1	0.1	38
Mar-2021	1	0.1	43
Apr-2021	7	0.4	42
May-2021	1	0.04	32
Jun-2021	10	0.3	25
Jul-2021	38	1.0	22
Aug-2021	55	1.3	19
Sep-2021	44	1.3	23
Oct-2021	23	0.8	27
Nov-2021	15	0.4	22
Dec-2021	7	0.2	25
Jan-2022	2	0.1	26
Feb-2022	0.4	0.01	23
Mar-2022	1	0.03	32
Apr-2022	0.002	0.00007	26
May-2022	5	0.1	25
Jun-2022	78	2.3	24
Jul-2022	25	0.7	21
Aug-2022	0.3	0.007	19
Sep-2022	56	1.6	22
Oct-2022	42	1.0	20
Nov-2022	30	0.8	21
Dec-2022	9	0.2	21
Jan-2023	1	0.01	19
Feb-2023	2	0.04	18
Mar-2023	0.03	0.001	29
Apr-2023	12	0.34	23
May-2023	18	0.57	25
Jun-2023	45	1.03	19
Jul-2023	44	1.12	21
Aug-2023	60	1.34	18
Sep-2023	33	0.69	17
Oct-2023	27	0.60	18
Nov-2023	18	0.45	20
Dec-2023	31	0.70	19

* March 2009 inflow was too low to calculate inflow FWMC accurately.