Appendix 3A-1: Water Year 2012 Water Quality Monitoring Results

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Table 1 within this appendix provides statistical summaries and excursion criteria (where applicable) for alkalinity, pH, specific conductivity, total iron, turbidity, un-ionized ammonia, and sulfate for each area and class during Water Year 2012 (WY2012) (May 1, 2011-April 30, 2012) within the Everglades Protection Area (EPA) and Everglades National Park (ENP). The EPA includes the Arthur R. Marshall Loxahatchee National Wildlife Refuge [Refuge, also known as Water Conservation Area 1 (WCA-1)] and Water Conservation Areas 2 and 3 (WCA-2 and WCA-3, respectively).

Major findings for these parameters during WY 2012 are as follows:

- Alkalinity
  - Excursion occurred within the Refuge interior at several sampling stations, however alkalinity within the Refuge interior historically is very low due to it rainfall driven hydrology. Therefore the Florida Department of Environmental Protection does not consider this to be a violated of state water quality standards [62-302 Florida Administrative Code (F.A.C.)] of Class III water bodies.
- pH
  - Minimal concern for Refuge inflow, WCA-3 outflow, and ENP inflow.
  - Potential concern for the Refuge interior.
- Specific conductance
  - Minimal concern for the Refuge and WCA-3 outflow.
  - Potential concern for the Refuge rim locations, and WCA-2 inflow and interior.
- All other parameters, areas and classes had no excursions of state water quality standards for class III water bodies.

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Table 1. Summary of water quality monitoring results from Water Year 2012 (May 1, 2011–April 30, 2012). Only water quality variables analyzed during the water year for a given region and site class are included. Excursion categories of concern, potential concern, minimal concern, and no concern are denoted by "C," "PC," "MC," and "NC," respectively. For sulfate, the excursion category is given as "NA" because no numeric criterion applies.

Parameter	Units	Area	Class	Arithmetic Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Minimum	Maximum	N	Percent Exceedance ± 90%CI	Excursion Category
pH, Field	pH Units	ENP	Inflow	7.40	0.32	7.2	7.3	7.5	6.7	9.0	243	0.8 ± 0	MC
pH, Field	pH Units	ENP	Interior	7.60	0.24	7.4	7.6	7.8	7.1	8.1	72	0 ± 0	NC
pH, Field	pH Units	Refuge	Inflow	7.78	0.26	7.6	7.8	7.9	7.1	8.6	256	0.4 ± 0	MC
pH, Field	pH Units	Refuge	Interior	6.56	0.46	6.3	6.6	6.9	5.1	7.7	154	8.4 ± 0	PC
pH, Field	pH Units	Refuge	Outflow	7.82	0.30	7.6	7.8	8.0	7.0	8.4	70	0 ± 0	NC
pH, Field	pH Units	Refuge	Rim	7.64	0.26	7.4	7.6	7.8	7.2	8.2	22	0 ± 0	NC
pH, Field	pH Units	WCA2	Inflow	7.73	0.24	7.6	7.7	7.9	7.2	8.3	131	0 ± 0	NC
pH, Field	pH Units	WCA2	Interior	7.41	0.21	7.2	7.4	7.6	6.8	8.1	104	0 ± 0	NC
pH, Field	pH Units	WCA2	Outflow	7.55	0.27	7.4	7.6	7.8	7.0	8.4	83	0 ± 0	NC
pH, Field	pH Units	WCA3	Inflow	7.59	0.31	7.3	7.6	7.8	6.1	8.2	383	0 ± 0	NC
pH, Field	pH Units	WCA3	Interior	7.26	0.23	7.1	7.2	7.4	6.8	8.0	85	0 ± 0	NC
pH, Field	pH Units	WCA3	Outflow	7.36	0.28	7.2	7.3	7.5	6.7	9.0	212	0.9 ± 0	MC
Specific Conductivity, Field	umhos/cm	ENP	Inflow	479.30	125.33	374.0	504.0	563.0	247.0	787.0	243	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	ENP	Interior	458.85	140.45	365.0	456.0	539.0	197.0	1041.0	67	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	Refuge	Inflow	991.43	264.20	790.5	988.0	1156.3	550.0	1779.0	256	13.7 ± 0	C
Specific Conductivity, Field	umhos/cm	Refuge	Interior	333.85	205.57	157.2	279.2	468.3	92.8	942.0	147	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	Refuge	Outflow	782.22	147.08	670.8	754.0	837.8	571.0	1291.0	70	1.4 ± 0	MC
Specific Conductivity, Field	umhos/cm	Refuge	Rim	878.55	176.19	777.5	837.5	947.0	615.0	1350.0	22	4.5 ± 0	PC
Specific Conductivity, Field	umhos/cm	WCA2	Inflow	927.51	224.21	754.5	901.5	1108.1	554.0	1372.0	130	10 ± 0	PC
Specific Conductivity, Field	umhos/cm	WCA2	Interior	860.17	288.35	627.0	825.0	1104.8	384.0	1748.0	104	8.7 ± 0	PC
Specific Conductivity, Field	umhos/cm	WCA2	Outflow	634.54	150.27	535.3	646.0	771.3	337.0	898.0	84	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	WCA3	Inflow	666.31	136.11	567.0	655.0	774.8	91.4	1039.0	383	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	WCA3	Interior	529.15	182.13	382.0	505.0	639.0	228.0	993.0	85	0 ± 0	NC
Specific Conductivity, Field	umhos/cm	WCA3	Outflow	478.00	182.87	357.5	456.5	575.5	236.0	2159.0	212	0.5 ± 0	MC
Sulfate	mg/L	ENP	Inflow	31.99	23.06	0.5	3.7	8.2	0.1	21.3	24	NA	NA

Parameter	Units	Area	Class	Arithmetic Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Minimum	Maximum	N	Percent Exceedance ± 90%CI	Excursion Category
Sulfate	mg/L	ENP	Interior	33.17	23.24	1.1	2.3	5.4	0.1	195.0	56	NA	NA
Sulfate	mg/L	Refuge	Interior	25.85	18.06	0.1	1.1	8.7	0.1	49.3	109	NA	NA
Sulfate	mg/L	Refuge	Outflow	46.40	24.60	35.8	46.9	52.5	17.6	71.5	58	NA	NA
Sulfate	mg/L	Refuge	Inflow	53.75	17.65	39.8	52.2	65.9	27.6	137.0	81	NA	NA
Sulfate	mg/L	WCA2	Outflow	42.84	20.47	11.1	16.5	37.6	4.6	58.5	65	NA	NA
Sulfate	mg/L	WCA2	Interior	45.99	14.62	9.6	30.0	53.5	2.3	78.9	78	NA	NA
Sulfate	mg/L	WCA2	Inflow	50.94	23.50	37.1	45.9	55.8	15.2	90.9	104	NA	NA
Sulfate	mg/L	WCA3	Outflow	32.02	18.09	0.5	5.8	13.5	0.1	75.3	31	NA	NA
Sulfate	mg/L	WCA3	Interior	34.86	22.70	1.8	5.5	17.5	0.1	126.0	67	NA	NA
Sulfate	mg/L	WCA3	Inflow	44.81	13.47	11.6	22.3	39.8	0.1	111.0	102	NA	NA
Total Alkalinity as $CaCO_3$	mg/L	ENP	Interior	143.95	33.12	123.3	143.0	169.8	53.0	232.0	56	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	Refuge	Inflow	203.79	55.67	156.0	206.0	242.0	119.0	355.0	131	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	Refuge	Interior	52.31	32.12	21.8	51.0	76.3	5.0	124.0	78	21.8 ± 0	C
Total Alkalinity as $CaCO_3$	mg/L	Refuge	Outflow	134.05	18.92	118.0	137.0	143.0	107.0	177.0	19	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	WCA2	Inflow	216.83	59.41	166.0	215.0	256.0	120.0	341.0	71	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	WCA2	Interior	180.45	50.44	140.0	172.0	209.5	106.0	320.0	65	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	WCA2	Outflow	152.59	38.50	131.5	159.0	176.0	76.0	221.0	61	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	WCA3	Inflow	177.22	36.10	147.8	176.0	208.3	106.0	259.0	110	0 ± 0	NC
Total Alkalinity as $CaCO_3$	mg/L	WCA3	Interior	157.16	44.61	126.3	153.5	177.8	78.0	274.0	68	0 ± 0	NC
Total Iron	µg/L	Refuge	Interior	94.54	86.18	41.5	78.0	121.0	3.0	387.0	28	0 ± 0	NC
Total Iron	µg/L	Refuge	Outflow	10.00	4.95	5.3	9.5	13.8	4.0	19.0	16	0 ± 0	NC
Total Iron	µg/L	WCA2	Inflow	10.88	6.81	5.3	10.5	13.0	4.0	30.0	16	0 ± 0	NC
Total Iron	µg/L	WCA2	Interior	14.73	9.48	9.0	10.0	23.0	5.0	41.0	15	0 ± 0	NC
Total Iron	µg/L	WCA2	Outflow	15.13	6.75	10.0	14.5	18.5	6.0	27.0	16	0 ± 0	NC
Total Iron	µg/L	WCA3	Inflow	46.08	60.45	10.3	26.0	48.5	6.0	271.0	24	0 ± 0	NC
Total Iron	µg/L	WCA3	Interior	138.18	148.82	34.0	107.0	180.5	19.0	584.0	17	0 ± 0	NC
Turbidity	NTU	ENP	Inflow	2.05	1.88	0.9	1.6	2.2	0.6	9.4	24	0 ± 0	NC
Turbidity	NTU	ENP	Interior	1.00	1.29	0.5	0.7	1.0	0.4	9.8	56	0 ± 0	NC
Turbidity	NTU	Refuge	Inflow	5.30	0.00	0.0	5.3	0.0	5.3	5.3	1	0 ± 0	NC

Parameter	Units	Area	Class	Arithmetic Mean	Standard Deviation	25th Percentile	Median	75th Percentile	Minimum	Maximum	N	Percent Exceedance ± 90%CI	Excursion Category
Turbidity	NTU	Refuge	Interior	0.75	0.34	0.6	0.7	0.8	0.3	2.3	78	0 ± 0	NC
Turbidity	NTU	Refuge	Outflow	1.65	1.47	0.7	1.1	1.9	0.5	5.7	34	0 ± 0	NC
Turbidity	NTU	WCA2	Inflow	1.26	0.50	0.8	1.2	1.5	0.6	2.7	45	0 ± 0	NC
Turbidity	NTU	WCA2	Interior	0.85	0.55	0.5	0.7	1.0	0.4	3.8	65	0 ± 0	NC
Turbidity	NTU	WCA2	Outflow	1.51	0.78	0.9	1.3	2.0	0.6	3.7	79	0 ± 0	NC
Turbidity	NTU	WCA3	Inflow	1.94	1.03	1.1	1.7	2.5	0.6	5.8	213	0 ± 0	NC
Turbidity	NTU	WCA3	Interior	0.76	0.61	0.5	0.7	0.8	0.4	5.2	68	0 ± 0	NC
Turbidity	NTU	WCA3	Outflow	1.80	1.61	0.8	1.4	2.0	0.4	9.4	39	0 ± 0	NC
Un-ionized Ammonia	µg/L	ENP	Interior	0.00	0.00	0.0	0.0	0.0	0.0	0.0	47	0 ± 0	NC
Un-ionized Ammonia	µg/L	Refuge	Inflow	0.01	0.01	0.0	0.0	0.0	0.0	0.0	84	3.12 ± 5.06	MC
Un-ionized Ammonia	µg/L	Refuge	Interior	0.00	0.00	0.0	0.0	0.0	0.0	0.0	76	0 ± 0	NC
Un-ionized Ammonia	µg/L	Refuge	Outflow	0.00	0.00	0.0	0.0	0.0	0.0	0.0	19	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA2	Inflow	0.00	0.00	0.0	0.0	0.0	0.0	0.0	68	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA2	Interior	0.00	0.00	0.0	0.0	0.0	0.0	0.0	61	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA2	Outflow	0.00	0.00	0.0	0.0	0.0	0.0	0.0	58	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA3	Inflow	0.00	0.00	0.0	0.0	0.0	0.0	0.0	106	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA3	Interior	0.00	0.00	0.0	0.0	0.0	0.0	0.0	68	0 ± 0	NC
Un-ionized Ammonia	µg/L	WCA3	Outflow	0.00	0.00	0.0	0.0	0.0	0.0	0.0	1	0 ± 0	NC

Refuge – Arthur R. Marshall Loxahatchee National Wildlife Refuge

WCA-2 – Water Conservation Area 2

WCA-3 – Water Conservation Area 3

ENP – Everglades National Park

µg/L – micrograms per liter

mg/L – milligrams per liter

$CaCO_3$ – calcium carbonate

NTU – nephelometric turbidity unit

µmhos/cm – micromhos per centimeter