

Technical Support Document:

Summary of the Technical Basis for a Site Specific Alternative Criterion for pH in Pace Swamp, Santa Rosa County



**Prepared by:
Florida Department of Environmental Protection
Water Quality Standards Program**

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Executive Summary

This report was prepared by the Florida Department of Environmental Protection (Department) in support of a petition for a Type II Site Specific Alternative Criterion (SSAC) for pH in Pace Swamp in Santa Rosa County, Florida. The petition for the pH SSAC was made by Pace Water System, Inc., which owns and operates a domestic wastewater facility in Pace, Florida that discharges treated effluent into wetlands (Pace Swamp), which flows into a portion of the Simpson River. The Simpson River, in turn, flows into Escambia Bay. The facility currently discharges approximately one million gallons per day of treated effluent to Pace Swamp, which is approximately 144 acres in size.

Pace Swamp has received treated effluent since 1996. Since that time, the petitioner has not been able to achieve compliance with the effluent limitations for pH. Currently, the petitioner is operating under a Consent Order that sets an interim limit of 6.0-8.5 standard units (s.u.) for pH for its discharge to Pace Swamp. The Department's Consent Order recommended that Pace Water petition for this proposed pH SSAC. The facility itself has conducted extensive water quality, floral, and faunal monitoring since it began operating.

Current Class III water quality criteria for predominantly freshwaters allows pH to vary 1.0 unit above natural background when the natural background is less than a pH of 6 s.u. The effluent limit for pH was set at a range of 4.35 s.u. to 5.35 s.u., based on the receiving wetlands' (Pace Swamp) acidic natural background pH of 4.35 s.u.

Although the petitioner requested an upper pH limit of 8.5 s.u., an analysis of water quality data in Pace Swamp conducted by Department staff indicates an upper limit of 7.0 s.u. would provide the facility with the needed regulatory relief and continue to fully protect the designated use of Pace Swamp. In addition, after discussions with Pace Water, the Simpson River is no longer included in the SSAC request, and the proposed SSAC is limited to the receiving waters of Pace Swamp.

The petitioner's consultant, Wetland Sciences, Inc., conducted biological monitoring of Pace Swamp, comparing it with a nearby control site that was minimally disturbed and unimpacted by Pace Water's discharge. Biological data were compared using the Florida Wetland Condition Index (FWCI) and included quantitative measurements and data analysis for both floral and faunal communities. There was little difference exhibited between Pace Swamp and the control site. Although the FWCI is still under development, it provides a useful metric for comparing the biological health of wetland sites.

The pH SSAC, shown to fully support the Class III designated use, is set with an upper limit of 7.0 s.u. that shall not be exceeded in more than 10 percent of the measurements collected. The proposed SSAC also maintains natural background conditions as a lower limit.

The pH SSAC will apply to Pace Swamp as delineated on the map titled "Pace Swamp pH SSAC Boundary," dated October 2013, which is incorporated by reference. As already discussed, the proposed pH SSAC does not include waters of the Simpson River itself.

1. Introduction and Background Information

1.1 Purpose of Document and Background Information

This report was prepared by the Florida Department of Environmental Protection (Department) in support of a petition for a Type II Site Specific Alternative Criterion (SSAC) for pH in Pace Swamp in Santa Rosa County, Florida. The petition for the pH SSAC was made by Pace Water System, Inc., and was submitted on May 10, 2013. Wastewater from the Pace Water System domestic wastewater treatment facility is discharged via a spreader system (creating sheet flow) into the petitioned waterbody. Pace Swamp has a Class III designated use, which requires the protection of fish consumption, recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The pH criteria currently applicable to Class III freshwaters, including Pace Swamp, under paragraph 62-302.530(51)(c), F.A.C., are as follows:

Parameter	Units	Criteria
(51)(c) pH (Class III Waters)	Standard Units	Shall not vary more than one unit above or below natural background of predominantly fresh waters and coastal waters as defined in paragraph 62-302.520(3)(b), F.A.C. or more than two-tenths unit above or below natural background of open waters as defined in paragraph 62-302.520(3)(f), F.A.C., provided that the pH is not lowered to less than 6 units in predominantly fresh waters, or less than 6.5 units in predominantly marine waters, or raised above 8.5 units. If natural background is less than 6 units, in predominantly fresh waters or 6.5 units in predominantly marine waters, the pH shall not vary below natural background or vary more than one unit above natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit above natural background of open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit below natural background of open waters.

The Department conducted several site visits to Pace Swamp, including one on October 25, 2010 (summary of visit attached as **Appendix A**). The Department conducted a public workshop on November 12, 2013 in Pace, Florida. Several members of the public voiced their support for establishment of the SSAC. One member of the public requested a copy of the petition and supporting document, which were provided. No written comments have been received by any third party.

1.2 Type II SSAC Requirements (Rule 62-302.800, FAC)

A Type II SSAC requires approval by the Florida Environmental Regulation Commission. The petition for rulemaking, including the information, data, and analyses for SSAC development, must demonstrate that an alternative criterion is more appropriate for a specified portion of waters of the state. The petition should include:

- A description of the physical nature of the specified waterbody and the water pollution sources affecting the criterion to be altered.
- A description of the historical and existing water quality of the parameter of concern including, spatial, seasonal, and diurnal variations, and other parameters or conditions which may affect it. Conditions in similar water bodies may be used for comparison.
- A description of the historical and existing biology, including variations, which may be affected by the parameter of concern. Conditions in similar water bodies may be used for comparison.
- A discussion of any impacts of the proposed alternative criteria on the designated use of the waters and adjoining waters.

In addition to the above requirements, Type II SSAC petitions must also include:

- An assessment of aquatic toxicity, except on a showing that no such assessment is relevant to the particular criterion.
- A risk assessment that determines the human exposure and health risk associated with the proposed alternative criterion, except on a showing that no such assessment is relevant to the particular criterion.
- Information indicating that one or more assumptions used in the risk assessment on which the existing criterion is based are inappropriate at the site in question and that the proposed assumptions are more appropriate or that physical or chemical characteristics of the site alter the toxicity or bioavailability of the compound.
- All information required for the Department to complete its economic impact statement for the proposed criterion.

1.3 Description of Pace Swamp

Pace Swamp is located in Santa Rosa County (**Figure 1**). The wetland is a hardwood swamp that comprises a small part of the floodplain wetland of the Simpson River. The Simpson River eventually drains into the Escambia River and is one of a number of tributaries to the Escambia River. Pace Swamp covers approximately 144 acres. The edge of the forested wetland transitions into salt marsh that fringes this part of the Escambia River.

The floodplain forest is dominated by black gum (*Nyssa sylvatica*) and sweet bay magnolia (*Magnolia virginiana*), although there are other canopy trees well-represented, including water hickory (*Carya aquatica*), slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), swamp laurel oak (*Quercus laurifolia*), and pond cypress (*Taxodium*

ascendens) (Wetland Sciences, Inc., 2013). The canopy is largely closed, although Hurricane Ivan (2004) knocked down many trees and created temporary openings in the canopy. The forest is re-growing rapidly, however, and the canopy cover is reasserting itself (**Figure 2**). A healthy understory, including shrubs and herbaceous vegetation, especially several species of ferns, is found throughout the site (**Figure 3**).

Flow from the site is generally west southwest to a healthy saltmarsh that fringes the Simpson River. The site is bounded on both the north and south by similar hardwood swamp floodplains. The facility constructed a long, elevated boardwalk through the center of the swamp (**Figure 4**). Several of the long-term water quality monitoring stations are located just off the boardwalk. The facility discharges treated effluent through a series of diffusers that are distributed along the eastern edge of the wetlands. Effluent exits the diffusers onto riprap and then sheetflows into the wetlands. Within the wetlands, the effluent flow helps to maintain saturated soil conditions. Surface flow typically is expressed as small, shallow channels or seepages with dark, tannic water (**Figure 5**).

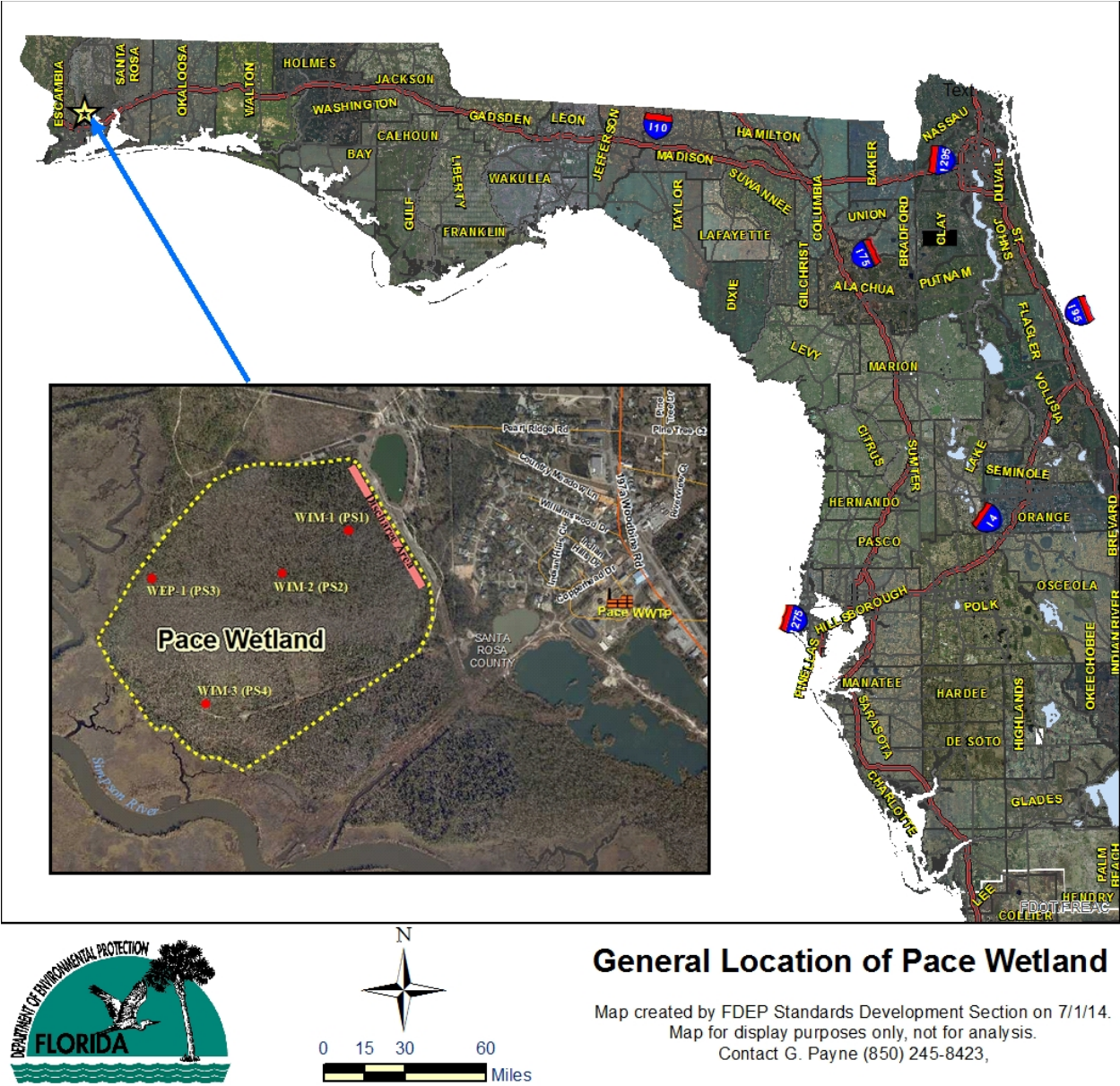


Figure 1. Map showing location of Pace Wetland (Swamp) in Santa Rosa County, Florida.



Figure 2. *Regrowth of forest from effects of Hurricane Ivan (2004).*



Figure 3. *Pace Swamp understory.*



Figure 4. *Boardwalk through Pace Swamp. The boardwalk provides access for monitoring stations as well as site visitors (e.g., Audubon Society field trips).*



Figure 5. *Shallow flow-way through Pace Swamp. Water is dark, stained by tannins.*

2. Results of Biological Sampling

2.1 Historical Biological Sampling

In 1996, Pace Water System, Inc., and its consultant, CH₂MHill, first proposed using Pace Swamp as receiving waters for its effluent as allowed under the wetlands application rules in Chapter 62-611, F.A.C. This rule chapter specifically allows domestic wastewater facilities to use forested wetlands as discharge sites, provided a number of permitting conditions (including extensive biological monitoring) are met. The facility began collecting biological data as part of its baseline study, including benthic macroinvertebrates, mosquitoes, fish, Threatened and Endangered species, herbaceous vegetation, woody vegetation (both canopy and subcanopy), and plant tissue analyses.

The baseline study demonstrated that Pace Swamp was dominated by two canopy species: black gum (*Nyssa sylvatica* var. *biflora*) and sweetbay (*Magnolia virginiana*). No Threatened or Endangered species were found in Pace Swamp during the baseline study, using species listed by the U.S. Fish and Wildlife Service and the Florida Game and Freshwater Fish Commission, as well as those listed by the Florida Natural Areas Inventory.

Once the baseline study was complete, the facility received its domestic wastewater facility permit for discharge to Pace Swamp. This permit required the continuation of qualitative monitoring of woody vegetation, herbaceous vegetation, fish, and Threatened and Endangered species as part of the Department-approved Wetlands Monitoring Plan.

2.2 Recent Biological Sampling

In 2009, Wetland Sciences, Inc. (WSI), was contracted by Pace Water to conduct its biological monitoring. In addition to biological metrics above, WSI also collected data for benthic macroinvertebrates. Pace Swamp is a seasonally-flooded forested wetland, however, and there were periods when sampling sites were dry. WSI added monitoring sites so that there were both test wetlands (receiving Pace Water reclaimed water) and control (reference) wetlands (site unimpacted by Pace Water's discharge, located a mile away). Sites were located in forested wetland systems (**Figure 6**).

WSI found fish populations and assemblages in both test wetland and reference sites to be typical for seasonally-flooded forested wetlands in the Panhandle. Fish populations appear stable and healthy for such systems. Similarly, mosquito populations were stable over the period of record.



Figure 6. *Sampling stations WEP I and WIM II in Pace Swamp.*

WSI conducted two separate vegetation Wetland Condition Index (WCI) studies in October, 2011 and May, 2012. The vegetation WCI is a biological assessment of wetland health, based on the work done by Riess and Brown (2005) at the University of Florida. Riess and Brown also established regional WCI scores, based on unimpacted and relatively unimpacted sites. WSI followed all field Standard Operating Procedures (SOPs) established by the Department. The vegetation WCI is composed of six biological metrics: percent tolerant indicator species, percent sensitive indicator species, percent exotic macrophyte species, average Coefficient of Conservatism score, percent native perennial species, and percent wetland status species. These six metric scores are totaled to derive a final vegetation WCI score. WCI scores decrease with increasing development intensity (i.e., the higher the score, the more unimpacted the site). **Table 1** below (taken from *Application for Site Specific Alternative Criteria for pH in the Simpson River*, Wetland Sciences, Inc., February 2014) shows that the Test Wetland score was 81.52 percent of the regional WCI score, while the Control Wetland score was 85.54 percent of the regional WCI score. Both scores are very close to each other.

Metric	C-1 Oct 2011	C-1 May 2012	C-2 Oct 2011	C-2 May 2012	C-3 Oct 2011	C-3 May 2012	R-1 Oct 2011	R-1 May 2012	R-2 Oct 2011	R-2 May 2012	R-3 Oct 2011	R-3 May 2012
% tolerant	7.09	7.61	7.89	8.12	7.50	9.99	9.99	9.99	7.71	6.62	7.38	7.50
% sensitive	0.01	0.01	0.01	1.77	0.01	2.35	0.01	0.01	0.01	1.83	2.47	2.35
% exotic	5.93	9.98	7.05	5.42	9.98	6.50	9.98	9.98	6.80	9.98	9.98	9.98
Avg CC	5.43	7.06	6.54	4.38	6.59	5.80	6.48	6.48	5.03	5.77	6.80	5.90
% Native Perennial	7.85	10.00	8.58	6.56	10.00	10.00	10.00	6.56	8.43	8.28	10.00	5.87
% Wetland Status	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
FWCI	36.30	44.66	40.08	36.25	44.08	44.64	46.46	43.02	37.99	42.48	46.62	41.59

Mean FWCI Scores Composited for Test Wetland and Reference Wetland:

Test Wetland (Sites C-1, C-2, C-3) 41.00
Reference Wetland (Sites R-1, R-2, R-3) 43.03

% of FWCI Reference Composited for Test Wetland and Reference Wetland:

Test Wetland (Sites C-1, C-2, C-3) 81.52
Reference Wetland (Sites R-1, R-2, R-3) 85.54

Table 1. Final Vegetation Wetland Condition Index Scores, Test Wetland and Reference Wetland, Pace Swamp, Florida (from *Application for Site Specific Alternative Criteria for pH in the Simpson River*, Wetland Sciences, Inc., February 2014). Test Wetland sites: C-1, C-2, C-3. Reference Wetland sites: R-1, R-2, R-3.

WSI also conducted a macroinvertebrate Wetland Condition Index study. Results are limited to October 2012 because site conditions in the reference wetland were unsuitable for macroinvertebrate sampling in the first half of 2013. The macroinvertebrate WCI is a community-based biological assessment of wetland health, using benthic macroinvertebrates. The assessment measures percent tolerant organisms, percent Mollusca, percent scraper organisms, percent sensitive organisms, Florida Index species, and percent Noteridae. The first three metrics increase with increasing development intensity. The latter three metrics show an opposite trend. The six scores are combined for an aggregate final macroinvertebrate WCI score. Final WCI scores decrease with increasing development intensity (i.e., the higher the score, the more unimpacted the site). **Table 2** below (taken from *Application for Site Specific Alternative Criteria for pH in the Simpson River*, Wetland Sciences, Inc., February 2014) shows that the Test Wetland score was 67.88 percent of the regional WCI, while the Reference Wetland score was 60.17 percent of the regional WCI. Again, although the scores are limited to sampling in October 2012, the scores are very similar to each other, with the Test Wetland actually scoring slightly higher than the reference.

Metric	Site C-1 Rep 1	Site C-1 Rep 2	Site C-2 Rep 1	Site C-2 Rep 2	Site C-3 Rep 1	Site C-3 Rep 2	Site R-1 Rep 1	Site R-1 Rep 2	Site R-2 Rep 1	Site R-2 Rep 2	Site R-3 Rep 1	Site R-3 Rep 2
% tolerant	5.32	7.05	9.99	7.65	9.99	9.99	9.99	9.99	9.99	7.33	9.99	9.99
% sensitive	0.02	0.02	2.85	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Florida Index	4.51	0.06	8.27	8.27	4.51	8.27	0.06	4.51	4.51	4.51	0.06	0.06
% Mollusca	0.00	0.00	9.54	7.78	3.18	3.75	0.86	7.87	8.69	8.46	9.51	9.98
% Noteridae	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.89	0.02	0.02	0.02	0.02
% Scraper	9.93	9.93	1.39	0.99	8.22	8.24	0.00	0.00	3.34	3.26	5.56	3.27
FWCI	19.80	17.08	32.06	24.73	25.93	30.29	10.95	23.28	26.56	23.59	25.15	23.33

Mean FWCI Scores Composited for Test Wetland and Reference Wetland:

Test Wetland (Sites C-1, C-2, C-3) 24.98
Reference Wetland (Sites R-1, R-2, R-3) 22.14

% of FWCI Reference Composited for Test Wetland and Reference Wetland:

Test Wetland (Sites C-1, C-2, C-3) 67.88
Reference Wetland (Sites R-1, R-2, R-3) 60.17

Table 2. Final Macroinvertebrate Wetland Condition Index Scores, Test Wetland and Reference Wetland, Pace Swamp, Florida (from *Application for Site Specific Alternative Criteria for pH in the Simpson River*, Wetland Sciences, Inc., February 2014). Test Wetland sites: C-1, C-2, C-3. Reference Wetland sites: R-1, R-2, R-3.

2.3 Summary of Biological Sampling

Both historical and recent biological monitoring demonstrate that Pace Swamp is a healthy forested wetland, showing no signs of degradation from Pace Water's discharge. The forest is healthy and, where Hurricane Ivan damaged the forest in 2004, it has rapidly regenerated with forest species typical of healthy forested wetlands in the Florida Panhandle. Fish populations are stable. Both plant and benthic macroinvertebrate WCI metrics are comparable between wetlands receiving Pace Water's reclaimed water and reference wetlands, located a mile away.

3. Development of SSAC for pH in Pace Swamp

3.1 Data Handling and Preliminary Analyses

Considerable pH data were collected by the staff of the Pace Water System, Inc. (Pace) at four monitoring sites in the Pace wetland (**Figure 7**) from January 2007 through July 2013. During this period, the Pace Water lab maintained certification for a select group of parameters including pH. The four monitoring sites in the Pace Wetland are located in the forested freshwater portion of the wetland. In addition to the data from the wetland, a smaller amount of data was also provided for the Simpson River and the effluent discharge. All of the pH monitoring data and associated QA/QC records provided by Pace were reviewed by DEP staff to assure that the data utilized in the derivation of the pH SSAC were of suitable quality and were collected using appropriate QA/QC methods. Any data flagged as not meeting the required QA/QC standards were omitted prior to analyses.

Preliminary analyses of the data depicted in **Figure 8** revealed two issues with the dataset. First, plotting the data as a time series showed a significant increasing trend in pH over the period of record for all sites. Additionally, **Figure 8** shows that the pH at Station WEP-01 is significantly lower than the other sites in the wetland. Station WEP-01 is an outflow site from the wetland and has apparently been influenced by the Pace discharge to a lesser degree than the other three sites. Since the biological data indicated that all sites in the wetland were comparable and reflected healthy biological communities, data from the WEP-01 site was omitted from the derivation of the proposed SSAC to avoid biasing the result by using a site that is not reflective of other portions of the wetland that are more directly influenced by the discharge. Additionally, to minimize the influence of the increasing trend observed in the pH data over time, the dataset used to derive the SSAC was limited to the period from 2010 through 2013. This period also corresponds to when much of the biological data showing that the wetland was biologically healthy were being collected. As shown in **Figure 9**, the pH values at the three sites in the wetland were consistently slightly below the pH of the discharge.

Since the biological data collected during the 2010 to 2013 period indicated healthy conditions, it can be reasonably concluded that maintaining the pH conditions existing during the period will continue to fully support healthy biological communities in the future. Details concerning the derivation of the proposed pH SSAC are provided in section 3.2.

Initial assessment of the limited data for the Simpson River indicated that the existing pH criteria for Class III waters are being achieved; therefore, no SSAC for the Simpson River itself is warranted at this time. The proposed SSAC will only apply to the forested freshwater portion of the Pace Wetland and not the Simpson River as the original petition requested.

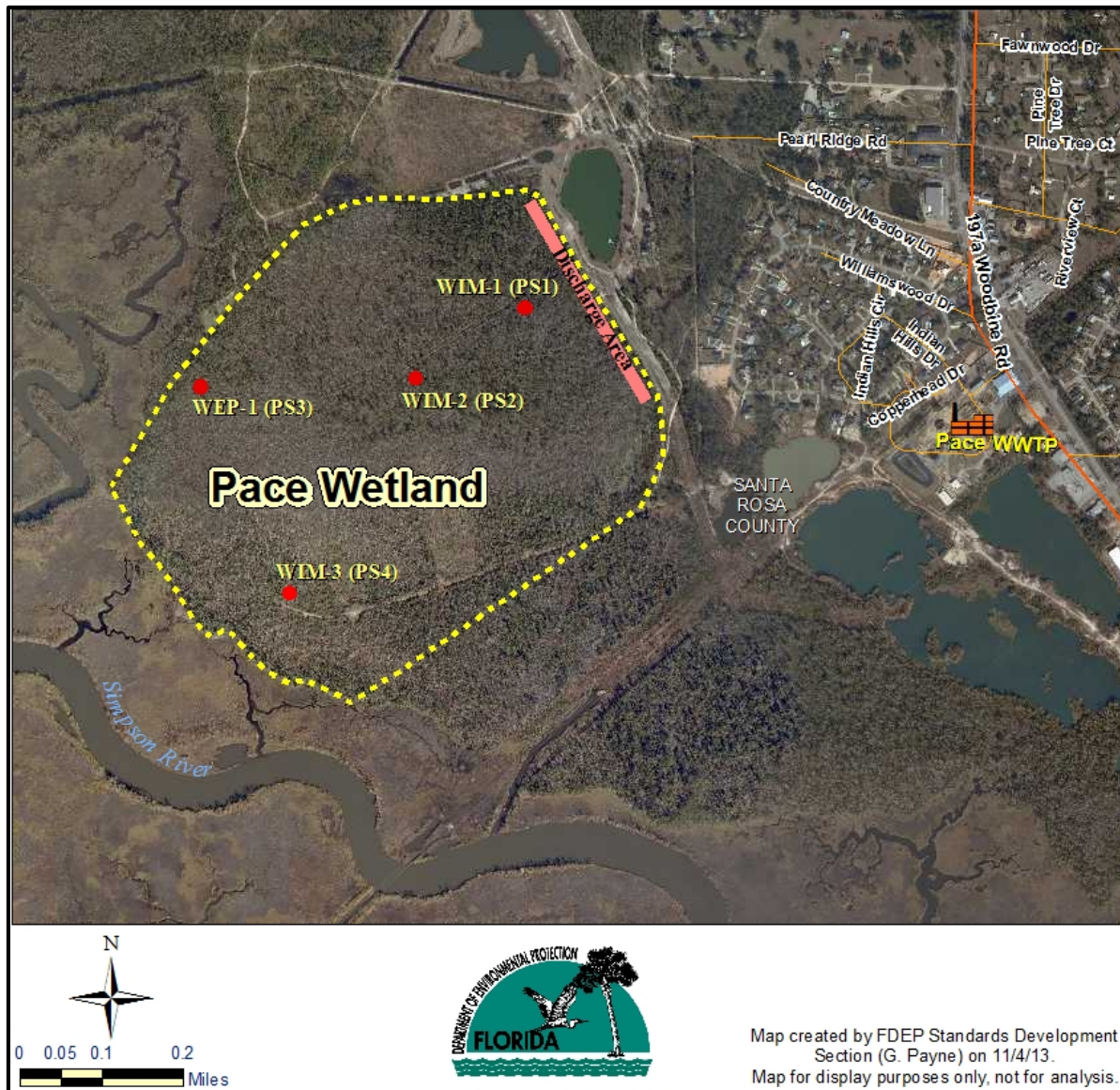


Figure 7. Map showing location of Pace Wetland (Pace Swamp) SSAC area and four monitoring sites.

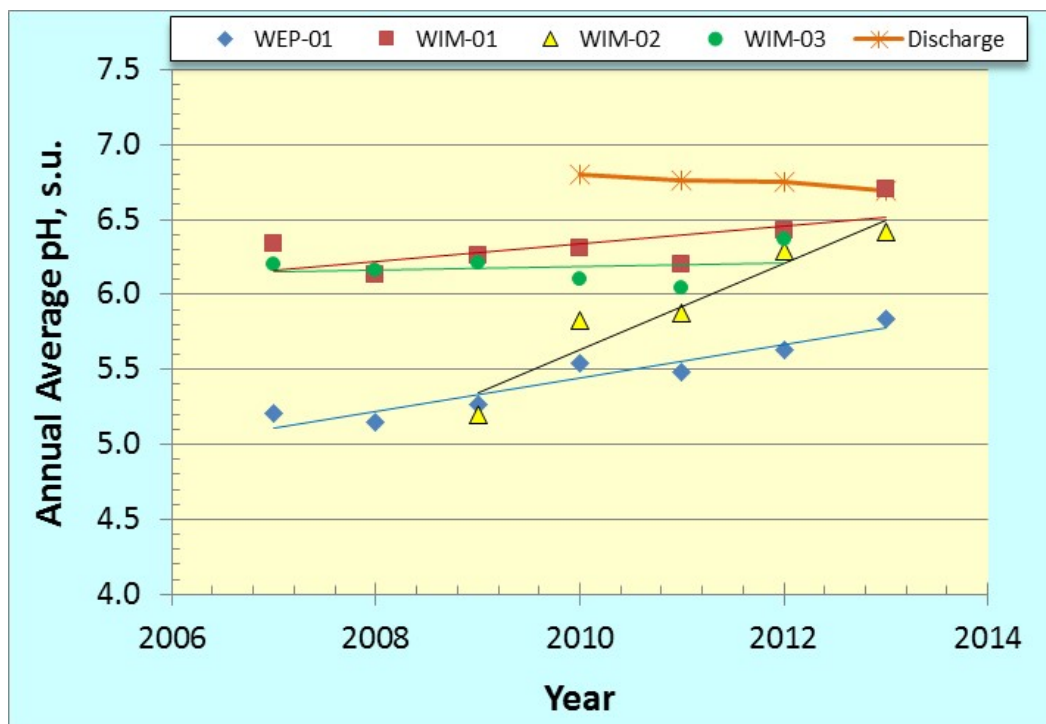


Figure 8. Summary of annual average pH data collected at four sites in Pace Wetland and the Pace Water effluent discharge from 2007 through 2013 showing temporal trend and difference between sites.

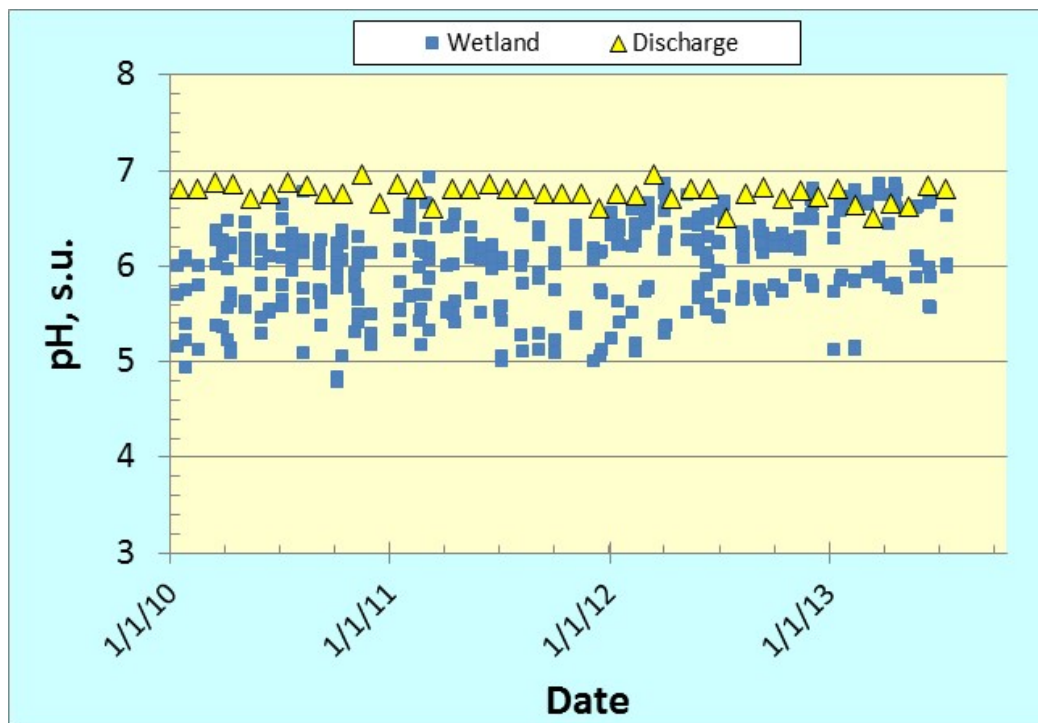


Figure 9. Summary of pH measurements collected at three sites in Pace Wetland (i.e., WIM-01, WIM-02, and WIM-03) and the Pace Water effluent discharge from 2010 through 2013.

3.2 Derivation of Proposed pH SSAC

As described above, the proposed pH SSAC is based on data collected at three sites in the Pace Swamp during the period from 2010 through 2013. During this period, the Pace wetland exhibited pH levels slightly below the pH of the discharge and was shown to support healthy biological communities (Wetland Sciences, Inc., 2013).

To derive the proposed pH SSAC, the annual 90th percentile was calculated for each of the three wetland stations included in the analyses. The annual station 90th percentiles ranged from 6.4 to 7.3 with a mean of 6.7 s.u. (**Table 3**). To account for the natural variability within the wetland, the final proposed SSAC was calculated as the 90th percentile of the annual values, which resulted in a value of 6.98 s.u. (i.e., rounded to 7.0 s.u.). The 90th percentile was calculated based on the mean and standard deviation assuming a normal distribution of the data. The 90th percentile calculated in this manner can provide a more accurate estimate of the true percentile of a population than an estimate based on ranking of a limited subpopulation. In this case the calculated 90th percentile is only slightly higher than the percentile based on ranking (**Table 3**).

The proposed pH SSAC will be applied such that no more than 10 percent of the pH measurements collected within the Pace Wetland SSAC area during any calendar year shall be below 7.0 s.u. The 10 percent allowable exceedance frequency is consistent with the derivation of the SSAC as the 90th percentile of the existing distribution. Approximately 10 percent of the measurements would be expected to be above the 90th percentile under natural conditions, therefore, the allowance of the 10 percent exceedance frequency is expected to minimize Type II errors associated with the use of the 90th percentile.

Even though the pH in the Pace Wetland has increased well above natural background conditions over time due to the effluent discharge, the SSAC will also maintain minimum pH criteria by specifying that the pH in the wetland shall not vary below natural background levels.

Based on the information provided and the analyses performed, a SSAC for pH in the forested freshwater portion of the Pace Wetland is recommended such that the pH shall not exceed 7.0 standard units in more than 10 percent of the measurements collected during any calendar year, nor shall the pH vary below natural background levels.

Table 3. Summary of pH data collected at three sites in Pace Wetland from 2010 through 2013 showing derivation of proposed pH SSAC

Year	WIM-01 Count	WIM-01 90 th Percentile	WIM-02 Count	WIM-02 90 th Percentile	WIM-03 Count	WIM-03 90 th Percentile	Total Count	Annual 90 th Percentile
2010	30	7.26	27	6.45	30	6.38	87	6.80
2011	30	6.60	19	6.42	30	6.41	79	6.50
2012	36	6.66	36	6.57	24	6.70	96	6.65
2013	16	6.83	16	6.85	3 ¹	5.15 ¹	32	6.91
Station	112	6.99	98	6.68	84	6.53	294	6.78

Calculated 90th percentile

6.98

¹ NA = Only 3 pH measurements were available for WIM-03 in 2013 and did not accurately represent typical conditions and were therefore omitted from the analysis.

4. Conclusions and Recommendations

Based on a thorough review of all of the available information, DEP supports the establishment of a Type II SSAC for pH in Pace Swamp. Biological monitoring data indicate a forested hardwood wetland system that is biologically diverse and healthy, fully supporting its Class III designated use. The proposed pH SSAC for Pace Swamp is as follows:

Subsection 62-302.800(6), F.A.C.:

Water Body and Class	Site Specific Alternative Criteria	County(s)
<u>(e) Pace Swamp as delineated on the map titled “Pace Swamp pH SSAC Boundary,” dated July 1, 2014, which is incorporated by reference herein. Copies of this document may be obtained by writing to the Florida Department of Environmental Protection, 2600 Blair Stone Road, MS 6511, Tallahassee, FL 32399-2400. Class III.</u>	<u>pH shall not exceed 7.0 standard units in more than 10 percent of the measurements collected during a calendar year, nor vary below natural background.</u>	<u>Santa Rosa</u>

The pH SSAC applies to Pace Swamp as depicted on the map titled “Pace Swamp pH SSAC Boundary,” dated July 1, 2014, incorporated by reference in Rule 62-302.800, F.A.C.

4.1 Implementation of the SSAC

The 10% exceedance rate allowed for individual measurements is not intended to be compounded with an additional 10% exceedance rate through the use of the binomial assessment methodology applied in Florida’s Impaired Waters Rule (*i.e.*, Paragraphs 62-303.320(1) and 62-303.420(2), F.A.C.).

5. References

- Riess, K.C. and M.T. Brown. 2005. The Florida Wetland Condition Index (FWCI): Developing Biological Indicators for Isolated Depressional Forested Wetlands. Howard T. Odum Center for Wetlands. University of Florida. 168 pp.
- USEPA. 2004. The Ecological Condition of the Pensacola Bay System. Northwest Florida (1994-2001). EPA 620-R—05-002. U.S. Environmental Protection Agency, Office of Research and Development, National Health and Ecological Effects Research Laboratory, Gulf Ecology Division, Gulf Breeze, Florida.
- Wetland Sciences, Inc., 2013. Application for Site Specific Alternative Criteria for pH in the Simpson River. Project No. 2008-222 Report prepared for Pace Water System. 142p.

Appendix A:

Summary of Pace Wetland Reconnaissance Trip

10-25-10

Standards and Assessment Section, Florida Department of Environmental Protection

Department staff (Ken Weaver, Eric Shaw, and Russ Frydenborg) met with staff from the Pace Wastewater Treatment Plant to discuss the requirements for Site Specific Alternative Criteria (SSAC) and the potential design for their pH SSAC study. Staff then visited the area where the wastewater treatment plant (WWTP) effluent is discharged via a series of 1 inch pipes adjacent to the Pace Wetland. Staff conducted a plant identification transect parallel to the discharge zone, approximately 20 into the actual wetland, and made visual observations as described on the physical-chemical data sheet. Taxa observed are shown in Table 1.

Table 1. Taxa observed during reconnaissance.

Taxon	Coefficient of Conservatism Score
<i>Peltandra virginica</i>	7.31
<i>Woodwardia virginica</i>	6.5
<i>Acer rubrum</i>	4.65
<i>Lyonia lucida</i>	7.06
<i>Magnolia virginiana</i> (dominant)	9.44
<i>Myrica cerifera</i>	3.82
<i>Nyssa sylvatica</i> var. <i>biflora</i>	9.04
<i>Toxicodendron radicans</i>	
<i>Ligustrum sinense</i>	
<i>Illicium floridana</i>	
<i>Liriodendron tulipifera</i>	
<i>Scirpus</i> sp.	
<i>Rubus</i> sp.	
<i>Chasmanthium</i> sp.	
<i>Persea palustris</i>	
<i>Rhododendron viscosum</i>	
<i>Quercus nigra</i>	
<i>Chamaecyparis thiododes</i>	

Taxon	Coefficient of Conservatism Score
<i>Juncus effusus</i>	3.25
<i>Osmunda cinnamomea</i>	6.44
<i>Osmunda regalis</i>	8.04
<i>Pinus elliottii</i>	4.21

The swamp system, best described as a mature hardwood swamp, appeared to have no observable adverse effects from the effluent input. There was very little water present except for small, shallow (<0.1 m) pools, excluding the discharge from a borrow pond. The water present was clear and tannic. The diverse plant assemblage was healthy, with no signs of stress. Only one exotic plant (*Ligustrum sinense*) was observed. Periphyton growth was rare, fish were not observed (except near the borrow pond discharge), and iron reducing bacteria were not observed. There was no anthropogenic sediment deposition, sediment oils, abnormal sediment odors, or surface water oils or sheens.

Staff visited several nearby sites to establish a control wetland, but these sites were either less mature (younger trees) or had a different hydrologic regime. Craig Martin, with Wetland Sciences, Inc., was tasked with performing additional site visits in the future to establish a suitable control site.



Figure 1. Discharge spray heads at edge of pace Wetland.



Figure 2. Entrance to Pace Wetland. Adjacent stream consists of water discharged from a borrow lake, not associated with the WWTP effluent. This stream soon is indistinguishable from the wetland (no flow, disjointed pools).



Figure 3. Photos of Pace Wetland approximately 20 m from discharge zone. Note general lack of standing water, but soils were saturated.



Figure 4. Typical high quality vegetative groundcover of Pace Wetland.