APPENDIX 1
Public and Peer Review Panel Comments

Appendix 1-2
Comments from the Public and Consultants

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Appendix 1-2a
United States Environmental Protection Agency's Comments and Introduction Letter to Chapters 3 and 4

October 13, 2000

Dr. Garth Redfield, PhD.
SFWMD
3301 Gun Club Road
West Palm Beach, FL 33406

SUBJ: EPA comments on draft 2001 Everglades Consolidated Report

Dear Dr. Redfield:

The purpose of this letter is to provide the Environmental Protection Agency's (EPA) comments on portions of the draft 2001 Everglades Consolidated Report (Report). EPA commends the state in this annual effort. The Consolidated Report provides an excellent summary of where we are in the Everglades restoration process. The comments in this letter are general in nature and are intended to address overriding issues that we believe are important to the review process. Technical comments are provided under separate cover.

As an initial matter, we thought it might be helpful to provide the panel with a brief outline of what the Clean Water Act (CWA) requires in terms of setting a water quality criterion. We recognize the peer review panel's focus is on the science that is presented in the Report, but based on the discussion that took place during last week's public workshop in West Palm Beach, and information in the Report, we thought this background would be helpful to set the stage for the review process. We also wanted to take this opportunity to provide you with the web site address for the work EPA did during the review of the Miccosukee Tribe of Indians of Florida (the Tribe) water quality standards and explain our findings. Finally, we wanted to mention the concerns EPA would have with the concept of attempting to create nutrient-rich features in the oligotrophic Everglades.

CWA Requirements - For total phosphorus, the state is working on the development of the numeric criteria that interprets the existing narrative for Class III waters. However, equally important will be how they measure those criteria such that the entire water body is in compliance with that standard. Under the CWA, a water quality standard (WQS) defines the water quality goals for individual water bodies by designating the use or uses for the water body and by setting narrative and numeric criterion necessary to protect the uses. The state must also ensure that its water quality standards provide for the attainment and maintenance of water quality standards of downstream waters. The WQSs also establish anti-degradation requirements to insure at a minimum that existing water quality uses are maintained.

Under the CWA, absent some form of a moderating provision (e.g. a water quality

variance), WQSs, including numeric criterion, apply to the entire water body and must be met throughout the water body. To measure compliance with the criterion in the water body, a monitoring program should then be designed to insure that the standards are met in all parts of the water body. WQSs also provide the legal basis for control decisions under the CWA such as the establishment of water quality based treatment controls and discharge limits for CWA section 402 permits.

Miccosukee Indian Tribe of Florida Criterion Approval - As noted in the draft Report, EPA approved the Tribe's water quality standards in 1999: (http://www.epa.gov/region4/oeapages/press/miccosuk/miccosuk.htm). These standards included a 10 ppb total phosphorus numeric criterion for certain parts of the Tribe's federal reservation in the Everglades. On Page 3-37 of the draft Report discussing the Central and Southern Everglades, the following statements are made concerning this approval: "However the approval was contingent upon the findings of additional research being conducted in the Everglades. Therefore, the data currently being collected could have implications for both the Department's establishment of a phosphorus criterion for the [Everglades Protection Area] and for the approval status of the Miccosukee's water quality standard." We wanted to take a minute to explain the basis for our approval as it relates to these statements.

In making this approval, EPA reviewed approximately 300 scientific publications that were relevant to the criterion. This scientific information indicated that background total phosphorus concentrations are 5 - 10 ppb and that average phosphorus concentrations greater than 10 ppb have been shown to cause impacts to native Everglades periphyton and communities adapted to low concentrations of phosphorus. EPA therefore concluded that the Tribe's adopted numeric criterion for phosphorus of 10 ppb was not overly protective. By finding the criterion not overly protective, EPA had determined that a long-term average above 10 ppb could not be demonstrated to be protective for these areas of the Everglades.

The scientific information reviewed indicated that the Tribe's proposed numeric criterion of 10 ppb was protective of the Class III-A designated use and the native Everglades periphyton and macrophytes. Although some data we reviewed identified long-term phosphorus concentrations within the Everglades as low as 5.0 ppb, we found no currently available published scientific information documenting changes in the natural flora or fauna resulting from increasing phosphorus concentrations from 5 ppb to 10 ppb. We then concluded that "recognizing that additional data and information is being collected on the Everglades system by a variety of interested parties, if additional evidence is presented that demonstrates that 10 ppb is not protective of the Class III-A designated use, then the Tribe should revise the 10 ppb standard accordingly."

EPA's approval was not contingent on future research. The Tribe's standards were based on available information, and are approved and fully effective. Of course, as with any state, the Tribe is free to modify the standards in the future, generally through the triennial review process in appropriate circumstances. And, by recognizing that additional information was being

collected, we left the door open for a lower standard and the subsequent modification of the standard. However, based on our review, we could not foresee how a higher number could be protective of the designated use leading to the conclusion that 10 ppb was not "overly protective."

Historic Everglades - EPA read and listened with interest to Tetra Tech's hypothesis on the historic system that existed prior to the creation of the Everglades Agricultural Area and the Water Conservation Areas. Although this historical perspective is interesting, EPA would agree with the draft Report's conclusions that it is doubtful that the historic pond apple areas could ever be recreated in the northern Water Conservation Areas. More importantly, we do not believe this is appropriate. Allowing areas of the historic oligotrophic Everglades to become nutrient-rich and degraded from current conditions is inconsistent with existing state water quality standards and the Clean Water Act's anti-degradation requirements. Areas of the northern Everglades are already impacted from nutrients and the state's Everglades Forever Act requires that the Everglades be restored and protected. We are aware of the state's concern regarding the ultimate choice in restoration technologies. However we would need to understand how the state would justify this approach under the CWA and state law, including the Everglades Forever Act which requires that by 2006, "water delivered to the Everglades Protection Area achieves state water quality standards, including the phosphorus criterion, in all parts of the Everglades Protection Area." (s.373.4592 (10)) However, we think these discussions are premature and agree with the state that additional research needs to be done on the advanced treatment technologies before any conclusions are made. We encourage this research to continue in an expedited manner.

As I noted, we will be providing a more detailed list of technical issues for your review. If you have any questions, please do not hesitate to contact me or Dan Scheidt at 706-355-8724.

Sincerely,

Original signed by

Richard M. Harvey, Director
South Florida Office

Technical comments on September 1, 2000 draft Everglades Consolidated Report

Chapter 3: Ecological Effects of Phosphorus Enrichment in the Everglades

Chapter 4: Status of Water Quality Criteria Compliance in the Everglades Protection Area.

Dan Scheidt
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October 13, 2000
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The draft Everglades Consolidated Report provides timely information about the status of Everglades protection efforts. The authors and contributors are to be commended for their exceptional effort. The following comments are offered.

USEPA REMAP South Florida Ecosystem Assessment Project. Data from this project are extremely useful for describing conditions throughout the Everglades Protection Area (EPA) (chapters 3 and 4) and are relevant to total phosphorus (TP) criterion development (chapter 3). There is a paragraph on page 3-4 describing the U. S. Environmental Protection Agency's South Florida Regional Monitoring and Assessment Project (REMAP). The following statement is made: "Because the sampling methodology entailed random sample locations and no replication, the majority of the REMAP data are unsuitable for criterion development." We disagree. USEPA REMAP projects are being used to establish surface water nutrient criteria in other aquatic systems in the United States. In the Everglades project, the sample area included all of the freshwater EPA. Sample sites are located using a stratified random design that allows probability-based statements to be made. Samples are drawn in direct proportion to their occurrence in the EPA (i.e., the proportion of samples that is drawn from marsh sites dominated by cattail vs. wet prairie vs. sawgrass). The sampling design allows one to make unbiased, quantitative statements with known confidence limits (for example, the proportion of the canal system with TP greater than 50 ug/L, or the proportion of EPA marsh with soil TP greater than concentration x, or the proportion dominated by wet prairie habitat.) The landscape approach provides a consistent EPA-wide context for interpreting localized concentrations or conditions. Broad spatial patterns are identified. Natural and spatial variability can be documented, given an appropriate density and distribution of sampling stations. In addition, associations among indicators of phosphorus enrichment are identified. The data can also provide independent corroboration of results from other reference site approaches such as transects along phosphorus gradients, and experimental approaches.

Defining sediment phosphorus concentrations as indicators of phosphorus-impacted areas: determination of 'threshold' concentrations. Page 3-19. We would like to raise two concerns: a) there is no scientific basis provided for how the 500 mg/kg or 600 mg/kg soil TP

threshold breakpoints were determined, as opposed to other concentrations; b) breakpoints of 500 mg/kg and 600 mg/kg seem to be used interchangeably without explanation; and c) there is no scientific basis provided for applying these same breakpoints to soils throughout all of the Everglades with widely varying bulk density and organic matter.

Last year the Department proposed using sediment total phosphorus (TP), expressed as milligrams total phosphorus per kilogram of sediment, as an indicator of phosphorus enrichment within Water Conservation Area 2A (FDEP, 1999). A sediment TP concentration of 600 mg/kg for the 0-10 cm soil profile was proposed as a basis for separating impacted areas from unimpacted areas (page 6-3). In the September 2000 draft report, the Department further proposes extending this concept to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (chapter 3) and WCA3A (appendix 4-2).

The paragraph on page 3-19 extends the concept to the Arthur R. Marshall Loxahatchee National Wildlife Refuge, with the following statement: "Sediment total phosphorus concentrations of between 500 and 600 mg/kg have frequently been used by researchers to indicate areas of enrichment in the Everglades (Reddy, et al., 1991; Craft and Richardson, 1993)." However, neither of the two reports cited have any mention of sediment contour TP concentrations of 500 mg/kg or 600 mg/kg as indicators of phosphorus enrichment:

> Reddy et al. (1991) reported on soil data collected only from Water Conservation Area 2A. For the 74 stations sampled, bulk density was generally less than 0.1 g/cc (page 2-25). They related three soil TP intervals to macrophytes, with mean soil TP for the 0-10 cm soil profile of 480 mg/kg, 776 mg/kg and 1360 mg/kg for *Cladium*, *Cladium/Typha*, and *Typha*, respectively (page 2-40). They also reported that the only soil TP concentrations across groups that were statistically different were for *Cladium* vs. *Typha*, and for *Cladium/Typha* vs. *Typha*. (The 480 mg/kg group and the 776 mg/kg group were found to be not statistically different.)
>
> Craft and Richardson (1993) sampled 15 cores in enriched or unenriched portions of WCA2A, WCA2B and WCA3A. They reported mean bulk densities of 0.08 – 0.11 g/cc (page 450). They reported soil TP concentrations at unenriched locations of 432-764 mg/kg (page 451).

Others have looked at this issue and found other soil TP concentrations to correlate with the likelihood of cattail presence. Walker and Kadlec (1996) used three soil TP concentrations as thresholds for macrophyte response in WCA2A where bulk densities were about 0.1 g/cc: 610 mg/kg, 870 mg/kg and 990 mg/kg. In the September 2000 draft report, a threshold of 600 mg/kg is depicted for LNWR (pages 3-20 and A4-2-22) and for WCA2A (page A4-2-21), while 500 mg/kg is depicted for WCA3A. For LNWR and WCA2A the location of the 500 mg/kg and 600 mg/kg contours is very close. This is not the case for WCA3A. A technical explanation should be provided for soil TP thresholds in WCA3A (as well as the Park).

Defining sediment phosphorus concentrations as indicators of phosphorus-impacted areas: applicability to different soil types. A related issue is the applicability of these soil TP concentrations, derived from WCA2A and LNWR peat soils with bulk densities consistently measured at about 0.1 g/cc, to WCA3A or the Park where soil type varies widely and bulk densities of 0.2 - 0.4 g/cc are not uncommon. Four figures depicting data from the REMAP project are attached. These figures depict soil bulk density (EPASOILbulkdensity1995-6.tif), percent organic matter (EPASOIL%OM1995-6.tif), TP expressed as mg/kg (EPASOILTPMGKG1995-6.tif), and TP expressed as ug/cc (EPASOILTPGCC1995-6.tif), for the Everglades Protection Area based on 1995-1996 sampling at over 400 locations. Whether there is an association between soil TP and other indicators of enrichment such as cattail presence depends in part upon how the soil TP data are expressed. The September 1999 draft FDEP document on WCA2A TP criterion development states: "It is not suggested that the 600 mg/kg sediment phosphorus isopleth can be used in other regions of the Everglades with different soil types and environmental conditions. The other regions of the Everglades will have to be evaluated independently to determine the most appropriate approach to distinguish between impacted and unimpacted areas." (page 6-4) Such a technical evaluation should be provided for LNWR and WCA3A.

Total phosphorus concentration at proposed WCA2A and LNWR reference sites. Pages 3-36 and 3-43. The text states that the median surface water total phosphorus concentration for the proposed LNWR reference sites is 9.17 ug/L (1996 to 1999). This is compared to 8.58 ug/L for the WCA2A reference sites from 1994 to1998 (page 3-10). This slight variation is explained as probably being due to sampling differences. If the median geometric mean for the LNWR and WCA2A reference sites were recalculated using only the sampling years common to both areas (1996-1998), much of this slight variation would probably disappear.

Determining surface water TP criterion compliance. Chapter 4 and its appendices provide a clear description of how the proposed dissolved oxygen SSAC was derived, where it would be applied, and how compliance would be determined. The report does not contain equal clarity regarding the proposed total phosphorus criterion. It is recognized that the analysis and derivation of numeric TP criteria are still in progress, especially for WCA3A and ENP. The present document provides information on how a criterion for LNWR is derived, but contains no information on where it would be applied, and how compliance would be determined, including proposed statistical methods. These technical details should be included in subsequent technical documents.

Miccosukee Tribe of Indians of Florida's 10 ug/L Total phosphorus criterion. Page 3-37. Mention is made of the USEPA approval of the 10 ug/L TP criterion for the Miccosukee Tribe of Indians of Florida's Federal Reservation within Water Conservation Area 3A. The text states that USEPA's approval "was contingent upon the findings of additional research being conducted in the Everglades." This statement is incorrect. The approval is in effect. If future

scientific information becomes available indicating that the criterion is under protective, then the Tribe can provide such information to USEPA at that time.

New enriched habitats within the Everglades Protection Area. Pages 3-38 and 3-44. The concept of creating new nutrient-rich habitat within the Everglades Protection Area is mentioned. The basis provided is Roy and Gherini (2000), who "hypothesized" (page 28) the existence of a nutrient-rich forested area near Lake Okeechobee decades ago. Their report includes various statements or assumptions that are arguable. Chapter 3 of the draft Consolidated Report embraces the general concept and suggests that "slightly phosphorus enriched areas can be highly productive portions of the system which can provide a more diverse habitat for birds and animals." (page 3-38). "Slightly phosphorus enriched" (sic) is not defined, but should be in terms of a long-term surface water TP concentration. Scientific citations about the Everglades should be provided for the remainder of the statement, especially for the concept of phosphorus enrichment providing a more diverse habitat for Everglades birds and animals. FDEP (1999) argues the opposite, especially with regard to the loss of wet prairie habitat. In addition, does a change in either direction in species number or diversity constitute an imbalance in natural populations of aquatic flora or fauna?

Page 4-7. The location for NP201 is incorrect.

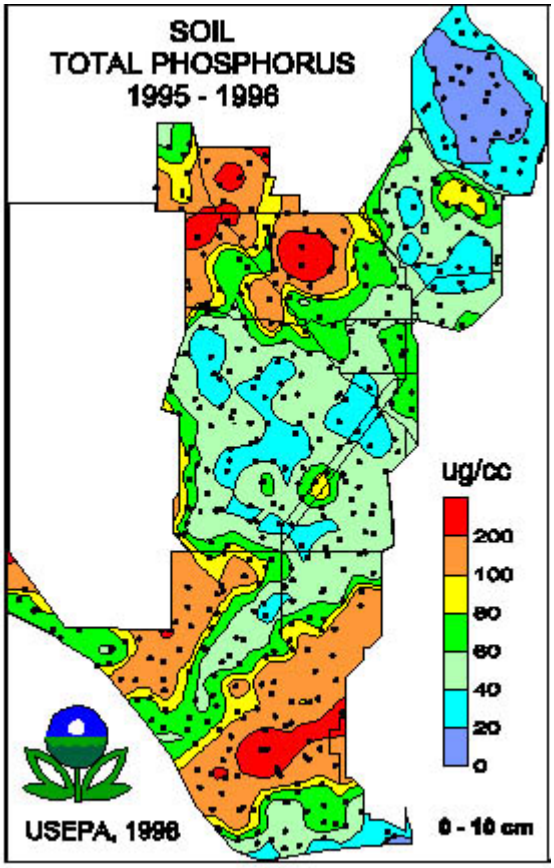
Dissolved Oxygen SSAC. Page 4-15. The text should make it clear that the SSAC was derived from marsh data at open water sloughs or wet prairie sites, as opposed to marsh areas dominated by dense emergent vegetation such as sawgrass or cattail. Also, the text should clarify where the proposed SSAC would be applied. Would the 5.0 mg/L standard still be applied to canals and structures (page 4-17)? Would the SSAC be applied to all marsh habitats, including unenriched sawgrass marshes and enriched cattail marshes?

Specific conductance. Page 4-24 and 4-25. The report documents elevated conductivity values in canals and at marsh sites in close proximity to discharges from the Everglades Agricultural Area into the EPA. It is presumed that this condition is solely due to groundwater influence and the conclusion is made that "this is a man-induced condition that cannot be controlled or abated". Any potential influence of EAA stormwater and land use or of water management practices outside the EPA is ignored. All EPA canals cut into groundwater, yet there is a clear north to south gradient such that conductivity at Park inflows is much lower than Refuge and WCA2A inflows. See USEPA (1998) (cited as Stober, et al., 1998 in Chapter 3) for additional discussion on this point (figure attached: EPASWCOND1995-6.tif). See following comment regarding sulfate.

Sulfate condition in EPA surface water. A section describing sulfate conditions throughout the EPA should be added to Chapter 4. Chapter 7, describing the mercury contamination issue in the Everglades, lays out the concern that increased mercury methylation in the EPA may be due in part to excess sulfate. Any report that describes the condition of the Everglades with regard to water quality conditions, including mercury and phosphorus, should

include a discussion of sulfate. Chapter 4 is limited, in title, to those water quality constituents for which there are water quality criteria. Presumably sulfate is omitted because there are no water quality standards for sulfate. Sulfate data exist for the same stations reported in Chapter 4 for Everglades canal and marsh sites, and for STA inflows and outflows. Dr. William Orem presented sulfur isotope data that indicating that fertilizer in the EAA is a contributor to the elevated sulfate entering the EPA. Pronounced spatial gradients exist, with highly elevated sulfate concentrations at structures that discharge into the EPA. Stober, et al. (1998) documented this pronounced sulfate gradient within the EPA (figure attached: EPASWSO41995-6.tif). A section in the Consolidated Report describing sulfate conditions in the EPA, and potential implications, would be appropriate. In addition, there is a strong correlation between sulfate and conductivity. If some of the excess sulfate in the EPA is attributable to EAA fertilizer applications, then the same must also be true of a portion of the elevated conductivity within the EPA.

Total Phosphorus conditions. Pages 4-32 and 4-33. Additional detail about how the summary calculations were done would be helpful. Were all of the marsh surface water TP data included in the summary, or were marsh samples that were collected at very shallow water depths excluded? Were all TP data included in the summary for inflow or outflow structures, regardless of flow, or were TP data at structures excluded if there was no discharge at the time that the water sample was collected? Were any of the structure data flow-weighted? If a TP concentration was reported as below the MDL, was the 4 ug/L MDL used in the calculation or was ½ of the MDL used?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1995 - 1996
ug/cc
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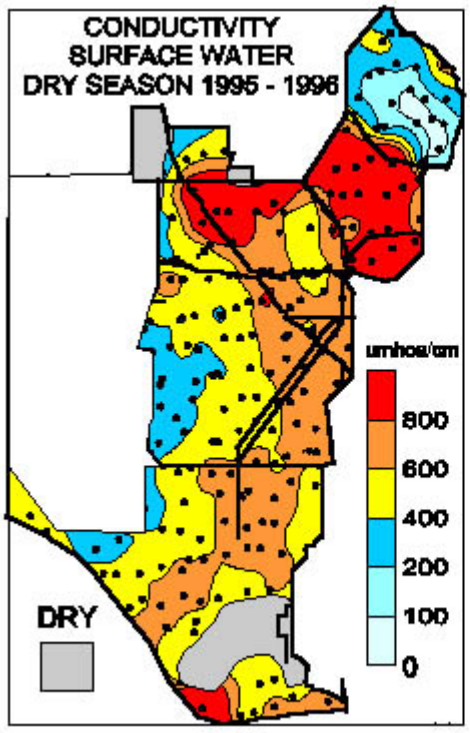
100
80
60
40
20
0
USEPA, 1996
0 - 10 cm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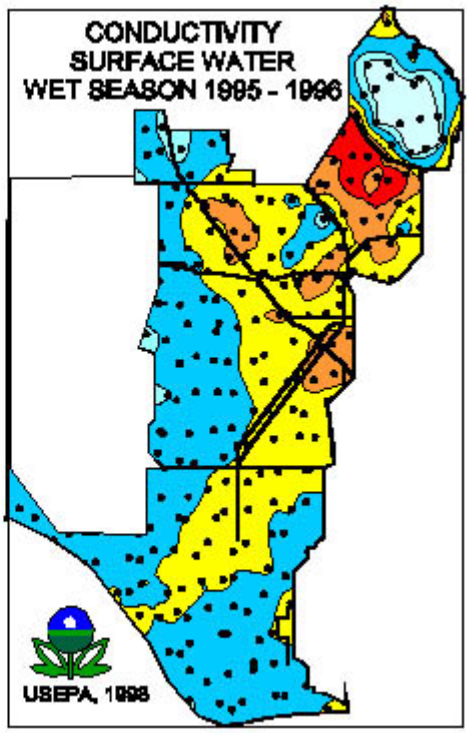
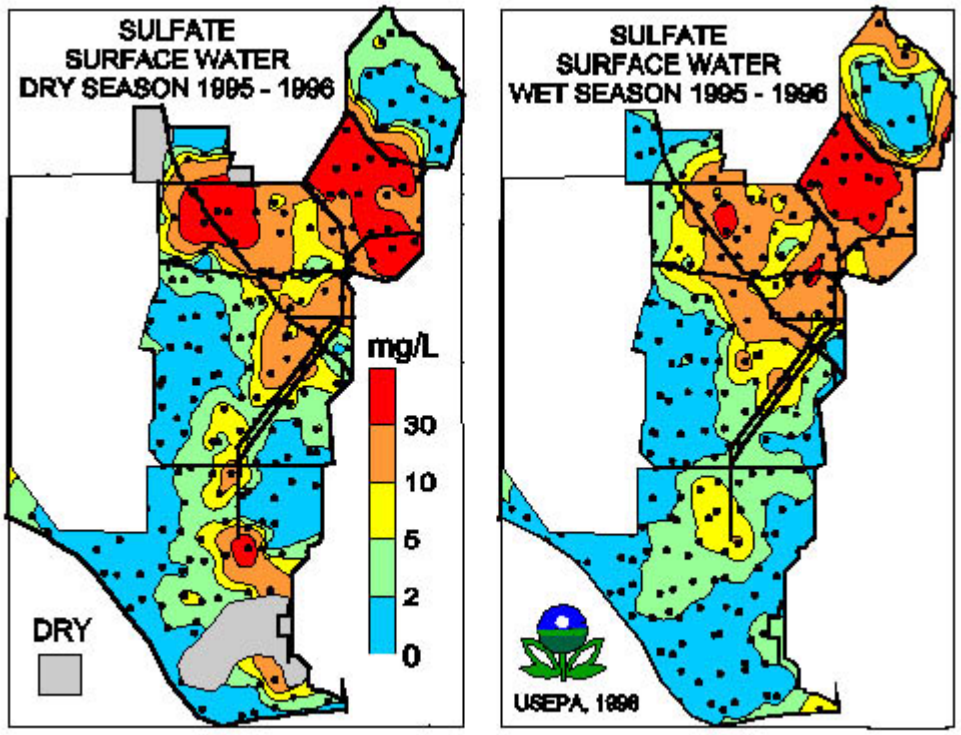
SURFACE WATER
DRY SEASON 1995 - 1996
umhos/cm
800
600
400
200
100
0
DRY


CONDUCTIVITY
SURFACE WATER
WET SEASON 1995 - 1996
USEPA, 1996


SULFATE
SURFACE WATER
DRY SEASON 1995 - 1996
mg/L
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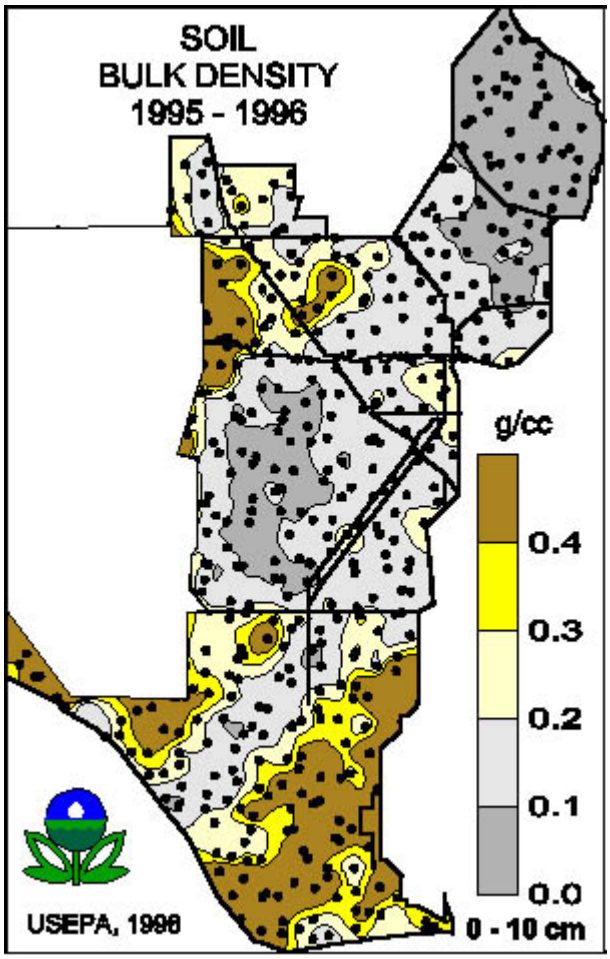
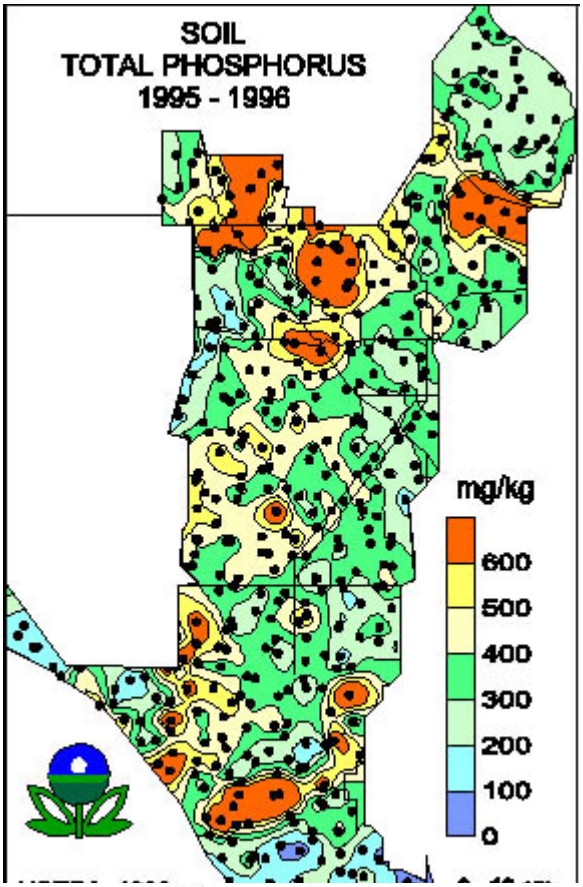
10
5
2
0
DRY
SULFATE
SURFACE WATER
WET SEASON 1995 - 1996
USEPA, 1996


SOIL
BULK DENSITY
1995 - 1996
g/cc
0.4
0.3
0.2
0.1
0.0
USEPA, 1996
0 - 10 cm


SOIL
TOTAL PHOSPHORUS
1995 - 1996
mg/kg
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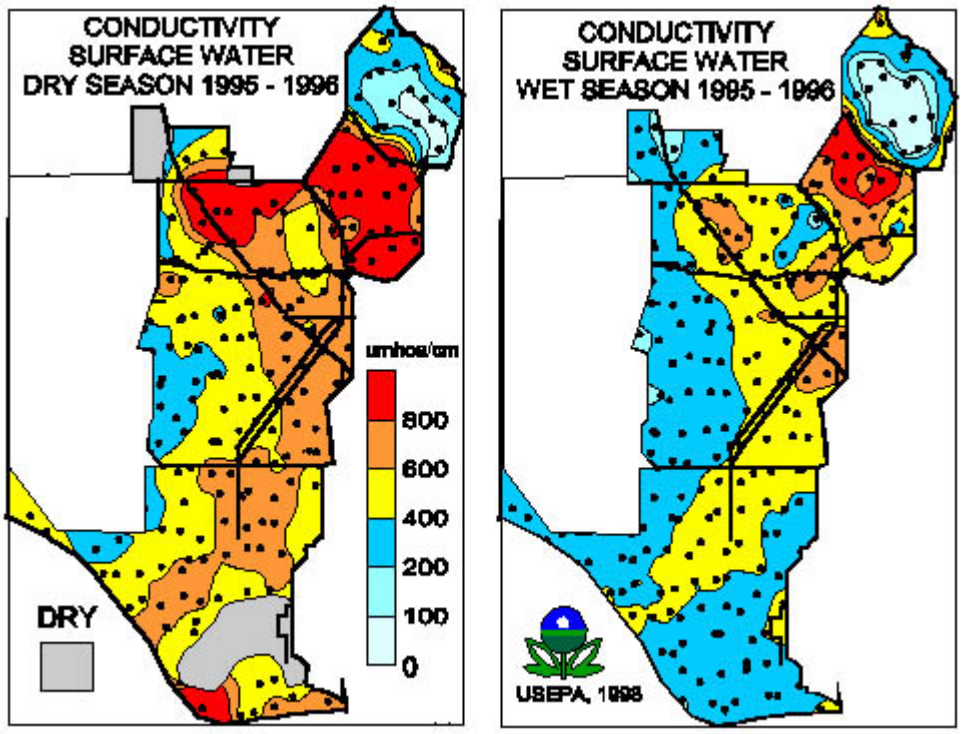
500
400
300
200
100
0


CONDUCTIVITY
SURFACE WATER
DRY SEASON 1995 - 1996
umhos/cm
800
600
400
200
100
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DRY
CONDUCTIVITY
SURFACE WATER
WET SEASON 1995 - 1996
USEPA, 1998