

# **TRANSLATING SCIENCE INTO LAW: PHOSPHORUS STANDARDS IN THE EVERGLADES**

KEITH RIZZARDI\*

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## I. INTRODUCTION: PHOSPHORUS PROBLEMS IN THE EVERGLADES

Throughout the twentieth century, the United States Army Corps of Engineers (hereinafter the "Corps"), the State of Florida, and the South Florida Water Management District (Water Management District or District), a regional governmental agency serving as local sponsor to the Corps, constructed and operated a

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\* Keith W. Rizzardi (J.D., University of Florida; M.P.A., Florida Atlantic University; B.A., University of Virginia) is an attorney for the South Florida Water Management District, where he practices environmental and administrative law. A certified ecotour guide in Palm Beach County, he has authored numerous articles on the Everglades and the Endangered Species Act and served as a *pro bono* research assistant to the 1998 Florida Constitution Revision Commission. Any opinions expressed in this article are solely the author's and do not reflect the official positions of his employer.

massive network of water management structures throughout southern Florida. The Central and Southern Florida Flood Control Project (C&SF Project), as the system became known, included over 1,200 miles of canals, pump stations, and other structures that drained wetlands and diverted waters to provide flood control and water supply for the people of southern Florida.<sup>1</sup> Unfortunately, the C&SF Project also had significant detrimental effects on the environment, especially to the water quality in the Everglades.

One of the major changes to the Everglades ecosystem involved the levels of phosphorus contained in the watershed,<sup>2</sup> which historically was very low.<sup>3</sup> But the C&SF Project and its accompanying changes to the Florida landscape created new sources of phosphorus, including 700,000 acres of Everglades Agricultural Area (EAA).<sup>4</sup> Once a part of the Everglades, the EAA is now a productive agricultural area whose phosphorus-laden runoff flows south into the remaining Everglades.<sup>5</sup> Similarly, modern urban lands west of Interstate Highway I-95 were once part of the Everglades, but today they are dotted with homes, developments, roads, and golf courses and have become another source of phosphorus for the Everglades.<sup>6</sup>

While the Water Management District was originally created to protect these agricultural and urban areas by operating the federal flood control project,<sup>7</sup> its role dramatically changed over time. By the 1970s, the agency's new responsibilities included the regulation of water quality and water supply and the protection of Florida's wetlands and water resources.<sup>8</sup> But events of the late 1980s and 1990s would add another responsibility to the Water Management District's growing list: Everglades restoration.

#### A. The 1988 Everglades Lawsuit

In 1988, the federal government sued the State of Florida and the Water Management District for the consequences of operating the flood control project that the United States had helped to design

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1. Stephen S. Light & J. Walter Dineen, *Water Control in the Everglades: A Historical Perspective*, in *EVERGLADES: THE ECOSYSTEM AND ITS RESTORATION* 47-84 (Steve Davis & John Ogden eds., 1994).

2. Steven M. Davis, *Phosphorus Inputs and Vegetation Sensitivity in the Everglades*, in *EVERGLADES: THE ECOSYSTEM AND ITS RESTORATION*, *supra* note 1, at 357-78.

3. *DISCOVER A WATERSHED: THE EVERGLADES* 131, (George B. & Sandra C. Robinson et al. eds., The Watercourse 1997).

4. Light & Dineen, *supra* note 1, at 60-61.

5. Davis, *supra* note 2, at 359-66.

6. South Florida Water Management District, *Everglades Stormwater Program: Program Summary*, at 15-21 (Jan. 2000).

7. 1929 Fla. Laws ch. 13711; 1949 Fla. Laws ch. 25214.

8. Florida Water Resources Act of 1972, 1972 Fla. Laws ch. 72-299.

and build.<sup>9</sup> The lawsuit, known as *United States v. South Florida Water Management District*,<sup>10</sup> alleged that state water quality standards were being violated on federal lands because discharges from agricultural and urban areas into the Everglades contained elevated levels of nutrients, particularly phosphorus.<sup>11</sup> The parties recognized that the Everglades was adversely impacted, and that native sawgrass prairies which required low phosphorus inputs were being overtaken by cattail and other vegetation that thrived on elevated phosphorus levels.<sup>12</sup> But the parties simply did not agree on who was responsible for the problem.<sup>13</sup>

### B. The Settlement Agreement and Consent Decree

After two years of intense litigation, Florida Governor Lawton Chiles entered the courtroom in 1991 and announced that the State was willing to settle.<sup>14</sup> The federal lawsuit had forced Florida to confront its water quality problems, and to begin an effort to come into full compliance with the federal Clean Water Act (CWA).<sup>15</sup> Based on the CWA, all states are required to establish a set of state water quality standards, including designated uses for state waterbodies, an anti-degradation policy, and a set of water quality criteria for the various chemical constituents found in the watershed.<sup>16</sup> Florida's existing state water quality criterion for total phosphorus is a narrative standard that requires "no imbalance in

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9. Keith W. Rizzardi, *Alligators and Litigators: A Recent History of Everglades Regulation and Litigation*, 75 FLA. B.J. 18, Mar. 2001 (providing more details on Everglades related litigation).

10. *United States v. South Florida Water Management District*, 922 F.2d 704 (11th Cir. 1991).

11. *United States v. South Florida Water Management District*, Case No. 88-1886-Civ-Hoeveler, Complaint (October 11, 1988).

12. In early proceedings, attorneys for the South Florida Water Management District acknowledged that pollution existed in the Everglades, noting that the state was already undertaking significant pollution planning efforts. See *United States v. South Florida Water Management District*, Case No. 88-1886-Civ-Hoeveler, Transcript of Hearing Proceedings (November 1, 1989).

13. In hearings before Judge Hoeveler, Water Management District attorneys argued: "They (the federal government and U.S. Army Corps of Engineers) are accusing themselves of violating state law. They are saying that the Corps and the District structures have been operating without state permits . . . We are saying that the Corps has to be on this side of the courtroom. They are a defendant. They give us orders. They have Congressional mandates . . . They may be the most important party in this courtroom." *Id.*

14. "I am ready to stipulate today that that water is dirty . . . I am here, and I brought my sword. I want to find out who I can give that sword to and I want to be able to give that sword and have our troops start the reparation, the clean up . . . let us use our troops to clean up the battlefield now, to make right this water; to make this water clean and not to continue to force us to fight." *Id.* at Transcript of Hearing Proceedings (May 21, 1991).

15. 33 U.S.C. §§ 1251-1387 (1994).

16. 33 U.S.C. § 1313 (1994).

flora or fauna.”<sup>17</sup> Although that narrative approach reflects the reality that appropriate nutrient concentrations vary between ecosystems, it also begs the fundamental question for the Everglades: at what point does “imbalance” begin?

To answer that question, the settling parties and other interest groups began a series of technical mediation and consensus building efforts. The result was a historic Settlement Agreement,<sup>18</sup> which was subsequently adopted in Miami by U.S. District Court Judge Hoeveler in a Consent Decree.<sup>19</sup> In the document, the parties agreed upon certain numeric limitations for phosphorus, which were to be monitored in interior areas of the Everglades.<sup>20</sup> Appendix A established interim and long-term inflow “limits” for Everglades National Park, with long-term limits ranging from an annual average of 8 to 14 parts per billion (ppb) of phosphorus, depending on rainfall volumes. Appendix B established similar interim and long-term limits for the Loxahatchee National Wildlife Refuge, ranging from 8 to 22 ppb, again, depending on rainfall. In addition, the body of the Settlement Agreement required the implementation of a research and monitoring program to formally interpret the state’s existing narrative water quality criterion for phosphorus.<sup>21</sup> According to the judicial order entering the Settlement Agreement as a Consent Decree, these limits would ultimately be accomplished by the state agencies pursuant to their own regulatory authority and responsibilities under state law.<sup>22</sup>

### C. Florida’s Everglades Forever Act

Additional negotiations and consensus-building efforts eventually produced a Statement of Principles that described a comprehensive effort to restore the Everglades.<sup>23</sup> The principles of that document were incorporated into the 1994 Everglades Forever Act (the EFA), which provides direction and funding to the District and Florida Department of Environmental Protection (the Department) for the much of the Everglades restoration effort.<sup>24</sup>

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17. FLA. ADMIN. CODE R. 62-302.530 (2000).

18. *Supra* note 11, at Settlement Agreement (July 11, 1991).

19. *Id.* at Memorandum Opinion and Order Entering Settlement Agreement as Consent Decree (Feb. 24, 1992).

20. *Id.* at Settlement Agreement (July 26, 1991).

21. *Id.* at 8-9.

22. *See supra* note 11, at Memorandum Opinion and Order Entering Settlement Agreement as Consent Decree, at note 19 n. 6.

23. United States Department of the Interior, United States Army Corps of Engineers, South Florida Water Management District, Florida Department of Environmental Protection, United States Sugar Corporation, South Bay Growers, Inc., and Flo-Sun Incorporated, *Statement of Principles* (July 13-14, 1993). *See also* Rizzardi, *supra* note 9, at 22.

24. FLA. STAT. § 373.4592 (2000).

The EFA expanded the scope of the restoration to include state lands in addition to the federal lands, imposed new taxes and regulatory requirements on the agricultural areas upstream of the Everglades, and required the construction of six wetlands, known as Stormwater Treatment Areas, to filter agricultural runoff before it flowed into the Everglades.<sup>25</sup> But the EFA also specifically addressed the issue of phosphorus pollution in the Everglades, stating: “The Legislature finds that waters flowing into the Everglades Protection Area contain excessive levels of phosphorus. A reduction in the levels of phosphorus will benefit the ecology of the Everglades Protection Area.”<sup>26</sup> That language is further supported by Section 4 of the EFA, which specifically requires the Department and District to complete any additional research necessary to “numerically interpret for phosphorus the Class III narrative nutrient criterion necessary to meet water quality standards in the Everglades.”<sup>27</sup> Furthermore, if the phosphorus research and rulemaking effort is not completed in time, the EFA includes a default provision: “The phosphorus criterion shall be 10 parts per billion (ppb) in the Everglades Protection Area in the event the Department does not adopt by rule such criterion by December 31, 2003.”<sup>28</sup> Ultimately, the EFA establishes a goal of full compliance with all water quality standards, including the phosphorus standard, by December 31, 2006.<sup>29</sup>

## II. SCIENCE: RESEARCHING THRESHOLDS FOR PHOSPHORUS IMBALANCE

Since the passage of the EFA, scientists have conducted additional research to identify the appropriate phosphorus threshold – the point at which Everglades flora and fauna experience an imbalance.<sup>30</sup> Data assembled by scientists from the Water Management District, Florida Department of Environmental Protection, and Duke University Wetland Center will define the debate over the appropriate state water quality criterion for

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25. *Id.* § 373.4592(4).

26. *Id.* § 373.4592(1)(d). The Everglades Protection Area is defined to include the remnant areas of the Everglades, including the northern section of the Everglades that is the Loxahatchee National Wildlife Refuge, the middle sections that are known as Water Conservation Areas 2 and 3, and the terminal, southern part of the Everglades that is Everglades National Park. *Id.* § 373.4592(2).

27. *Id.* § 373.4592(4)(e)2.

28. *Id.*

29. *Id.* § 373.4592(10).

30. EFA, FLA. STAT. § 373.4592(4)(e).

phosphorus in the Everglades.<sup>31</sup> But a close look at that data also helps to demonstrate the problem of translating science into law.

#### A. South Florida Water Management District's Research

The 2000 Everglades Consolidated Report (2000 ECR), an annually published and peer-reviewed document that reported on the research and permitting requirements of the District and Department, provided a detailed analysis of research data from locations in the Everglades.<sup>32</sup> The 2000 ECR described a nutrient gradient in the Everglades, with the highest concentrations of phosphorus in both the soil and the water column appearing in the northernmost parts of the Everglades and declining at downstream monitoring locations to the south.<sup>33</sup> The peer-reviewed document also described the adverse impacts of phosphorus upon Everglades periphyton communities – floating mats of microalgae and other microscopic life that are fed upon by aquatic organisms that form the base of the Everglades food web.<sup>34</sup> Ultimately, the 2000 ECR concluded that the periphyton communities were very sensitive to the nutrient changes and were affected at locations with elevated soil phosphorus levels and with phosphorus concentrations in the water column exceeding 10 ppb.<sup>35</sup>

#### B. Duke University Wetland Center's Research

Scientists at Duke University made different numerical interpretations of the phosphorus imbalance.<sup>36</sup> In its January 2000 Final Report, the Duke University Wetland Center agreed with District scientists in concept that a nutrient gradient existed in the Everglades and that flora and fauna changed along the gradient, depending upon nutrient levels.<sup>37</sup> However, their conclusions

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31. Although similar research is reportedly underway at Florida International University, only preliminary data has been available and has not been published as of the writing of this article. See Grover Payne, Temperince Bennett, & Kenneth Weaver, *Chapter 3: Ecological Effects of Phosphorus Enrichment in the Everglades*, in SOUTH FLORIDA WATER MANAGEMENT DISTRICT, 2001 EVERGLADES CONSOLIDATED REPORT, at 3-4 (Jan. 1, 2001).

32. See Paul McCormick, Susan Newman, Garry Payne, ShiLi Miao, & Thomas Fontaine, *Chapter 3: Ecological Effects of Phosphorus Enrichment in the Everglades*, in SOUTH FLORIDA WATER MANAGEMENT DISTRICT, EVERGLADES CONSOLIDATED REPORT, Jan. 1, 2000.

33. *Id.* at 3-14 to 3-17.

34. *Id.*; see also Joan Browder, Patrick Gleason, & David Swift, *Periphyton in the Everglades: Spatial Variation, Environmental Correlates, and Ecological Implications*, in EVERGLADES: THE ECOSYSTEM AND ITS RESTORATION, *supra* note 1, at 379-418.

35. See McCormick et al., *supra* note 32, at 3-3.

36. Funding for the Duke University research was provided by the Everglades Agricultural Area Environmental Protection District. Curtis J. Richardson et al., Duke University Wetland Center, *FINAL REPORT The Ecological Basis for a Phosphorus (P) Threshold in the Everglades: Directions for Sustaining Ecosystem Structure and Function* (Jan. 2000).

37. *Id.* at 125-31.

differed from the District's on the point where imbalance occurs. According to Duke University's analysis, maintaining annual average water column TP concentrations in a range from 17-22 ppb would prevent significant alteration of the Everglades periphyton and other algal communities,<sup>38</sup> and a numeric phosphorus concentration of 20ppb would achieve a balance of flora and fauna.<sup>39</sup>

*C. Florida Department of Environmental Protection's Analysis*

The different conclusions reached by the District and Duke University research reports were further analyzed and reported upon by Department staff in the 2001 Everglades Consolidated Report (2001 ECR).<sup>40</sup> After review of the District's data, the Department noted that the reference cites used by the District – the areas least impacted by phosphorus – had annual total phosphorus concentrations ranging from 7.8 to 10.5 ppb in the Loxahatchee National Wildlife Refuge, the northernmost areas of the Everglades.<sup>41</sup> Additional data from Everglades areas to the south indicated total phosphorus concentration ranges for reference sites between 5.9 and 9.1 ppb.<sup>42</sup> Although the chapter acknowledged differences between the District's research data and the Duke University data, it also noted that the Duke University's data represented a small area of measurement and a limited period of time.<sup>43</sup> Those spatial and temporal limitations meant that the University's research was exposed to significantly more variability in phosphorus concentrations,<sup>44</sup> that the Duke University conclusions were probably biased high,<sup>45</sup> and that the District's research was more reliably associated with the biological responses actually observed.<sup>46</sup>

Based on this analysis, the Department's chapter in the 2001 ECR concluded that the default criterion of 10ppb found in the EFA would be protective of the natural flora or fauna in the Refuge and Water Conservation Area 2 without being overly protective or below the natural background levels.<sup>47</sup> The chapter further concluded that the default criterion may not be statistically differentiable from

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38. *Id.* at 148.

39. *Id.* at 150.

40. *See* McCormick et al., *supra* note 32, at 3-47.

41. *Id.*

42. *Id.*

43. *Id.* at 11-14.

44. *Id.* at 13.

45. *Id.* at 13-14.

46. *Id.*

47. *Id.* at 3-47.

alternative numbers that could be identified through further research.<sup>48</sup>

#### *D. Scientific Peer-Review Analysis*

Each year, the Everglades Consolidated Report is subjected to a scientific peer-review process, in accordance with the law.<sup>49</sup> The 2001 ECR was no different. In its Final Report, the scientific peer-review panel addressed the conflicting science on phosphorus threshold concentrations discussed above. While the panel praised the Report as a defensible scientific account of the data<sup>50</sup> that used the best available information,<sup>51</sup> the peer-reviewers also expressed concerns with the analysis used by Duke University, considering it inappropriate for setting a phosphorus criterion.<sup>52</sup> Specifically, the panel noted the absence of spatial and temporal variability in the data and the use of arithmetic averages of data from a limited area instead of geometric averages based upon data from a broader range of areas.<sup>53</sup> However, the panel also noted that the Duke University approach was no less scientifically valid than other approaches and that the District and Department should continue working with Duke University scientists to extract as much value as possible from their research information and to reconcile the different conclusions.<sup>54</sup>

### III. LAW: THE FORMAL ESTABLISHMENT OF EVERGLADES PHOSPHORUS STANDARDS

Eventually, the threshold research described above will be incorporated into state and federal law, although the application of that law will be difficult. Florida law calls for a rulemaking process, while federal law requires approval by the U.S. Environmental Protection Agency (U.S. EPA). Established tribal water quality criterion for phosphorus and the looming potential for litigation further complicate the process.

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48. *Id.*

49. See EFA, FLA. STAT. § 373.4592(4)(e) (2000).

50. SOUTH FLORIDA WATER MANAGEMENT DISTRICT, 2001 EVERGLADES CONSOLIDATED REPORT, *Appendix 1-1b Final Report of the Peer-Review Panel Concerning the 2001 Everglades Consolidated Report*, October 23, 2000, at A1-1b-28-29 (Jan. 1, 2001).

51. *Id.*

52. *Id.*

53. *Id.*

54. *Id.* at 26, 28.



*A. State Water Quality Rulemaking and Permitting*

As mentioned above, the EFA established not only a default criterion, but also a specific timeline for completing a rulemaking process pursuant to the Florida Administrative Procedure Act (APA).<sup>55</sup> With the research now complete and in compliance with the EFA's deadlines, the Department is required to file a Notice of Rulemaking on the phosphorus criterion no later than December 31, 2001,<sup>56</sup> and to adopt the criterion by December 31, 2003.<sup>57</sup> Failure to meet that final 2003 deadline will result in establishment of the statutorily-referenced 10 ppb as the default phosphorus criterion, although interested persons may seek a stay of its implementation.<sup>58</sup> However, even if the default criterion were to be established, it would be superseded by any alternative criterion adopted by the Department at some future time.<sup>59</sup>

The rulemaking process, however, may prove burdensome for the Department – or more precisely, the Environmental Regulation Commission (ERC), which is the legally-established standard-setting authority of the Department.<sup>60</sup> In setting standards, such as the numeric phosphorus criterion for the Everglades, the ERC is required to consider scientific and technical validity, economic impacts, and relative risks and benefits to the public and the environment.<sup>61</sup> That analysis will occur through the public process required by the Florida APA, including Notices of Rule Development,<sup>62</sup> rulemaking workshops,<sup>63</sup> rule adoption notices<sup>64</sup> and hearings,<sup>65</sup> and review by the Florida Administrative Procedures Committee.<sup>66</sup>

In addition to following this state-mandated process for establishing a numeric criterion, the ERC and Florida Department of Environmental Protection will also need to consider four other important concepts that are addressed in the EFA, the federal Settlement Agreement, and state and federal water quality law: (1) discharge limitations, (2) moderating provisions, (3) compliance

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55. FLA. STAT. § 120.54 (2000).

56. *Id.* § 373.4592(4)(e)1.

57. *Id.* § 373.4592(4)(e)2.

58. *Id.*

59. *Id.*

60. *Id.* § 403.804.

61. *Id.*

62. *Id.* § 120.54(2)(a).

63. *Id.* § 120.54(2)(c).

64. *Id.* § 120.54(3)(a).

65. *Id.* § 120.54(3)(c).

66. *Id.* § 120.54(3)(e)6.; *Id.* § 120.545.

methodologies, and (4) already impacted areas of the Everglades. Each one of these issues presents potential for litigation.

### 1. Discharge Limitations

Discharge limits are addressed in the EFA, which states that “the Department shall use the best available information to establish relationships between waters discharged to, and result water quality in, the Everglades Protection Area.”<sup>67</sup> Those relationships are then required by law to be used “to establish discharge limits for discharges into the [Everglades Agricultural Area] canals and the Everglades Protection Area necessary to prevent an imbalance in the natural populations of flora and fauna, and to provide a net improvement in areas already impacted.”<sup>68</sup>

Discharge limitations, also known as effluent limitations, are typically required in permits issued in accordance with the Clean Water Act<sup>69</sup> (which would include permits issued by the Florida DEP as the state agency responsible for the federally-delegated National Pollutant Discharge Elimination System permits).<sup>70</sup> For example, a permit condition could state that a permittee may not discharge concentrations of parameter ABC that exceed XYZ parts per billion. In fact, discharge limitations in permits are considered a primary mechanism for controlling discharges of pollutants into downstream receiving water bodies.<sup>71</sup>

### 2. Mixing Zones and Other Moderating Provisions

In some cases, discharge limitations are included in permits, but are accompanied by moderating provisions, such as variances, when supported by specific data. Moderating provisions can be based upon economic factors,<sup>72</sup> site-specific information,<sup>73</sup> or mixing zones,<sup>74</sup> which allow discharges not to meet water quality

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67. *Id.* § 373.4592(4)(e)3.

68. *Id.*

69. 40 C.F.R. § 122.44(d)(vi)(A) (2000).

70. *See* FLA. STAT. § 403.0885.

71. U.S. EPA, NPDES PERMIT WRITER'S MANUAL, *Major Components of a Permit*, at § 3.2. These discharge limitations are typically based upon the lower of two possible limits: best available technology limits or water quality standards. *Id.*; *see also* FLA. ADMIN. CODE R. 62-650.300 (2000).

72. 33 U.S.C. § 1311(c) (1994); 40 C.F.R. § 122.21 (2000); *see also*, FLA. STAT. § 403.201(1)(a) (2000).

73. *See, e.g.*, FLA. ADMIN. CODE R. 62-302.800 (providing for site-specific alternative criteria that can be used in lieu of otherwise applicable state water quality criteria, where justified).

74. FLA. STAT. § 403.061(11); FLA. ADMIN. CODE R. 62-4.244. Mixing zones generally allow discharges not to meet water quality requirements within a limited, defined region downstream of the discharge point. FLA. ADMIN. CODE R. 62-4.244(1)(a). Notably, the EFA prohibits mixing zones for certain agricultural discharges regulated by best management

requirements within a limited, defined region downstream of the discharge point.<sup>75</sup> Notably, the EFA prohibits mixing zones for certain agricultural discharges regulated by best management practices.<sup>76</sup> Mixing zones are, however, otherwise allowed by law, even in Outstanding Florida Waters such as the Everglades, provided that the discharges are necessary and approved for water management purposes.<sup>77</sup>

### 3. Compliance Methodology

Determining whether compliance with the applicable numeric criterion, discharge limits, and moderating provisions has been achieved will require monitoring at appropriate locations. In the federal Settlement Agreement, specific interior marsh locations and structures were identified for monitoring of phosphorus levels in Loxahatchee National Wildlife Refuge and Everglades National Park.<sup>78</sup> The EFA, in turn, refers to these requirements, stating that “the method for measuring compliance with the phosphorus criterion shall be in a manner consistent with [the Settlement Agreement] that recognizes and provides for the incorporation of relevant research.”<sup>79</sup> Establishment of these monitoring locations, and the overall compliance methodology, is therefore another critical responsibility of the ERC and Department.

### 4. Net Improvement in the Areas Already Impacted

The phrase “net improvement in the areas already impacted” is used twice in the EFA. The first use, as quoted above, is associated with the setting of discharge limits. The EFA’s second use of the phrase is in the context of establishing a method for evaluating compliance. The specific statutory language states that:

compliance with the phosphorus criterion shall be based upon a long-term geometric mean of concentration levels measured at sampling stations recognized from the research to be reasonably representative of receiving waters in the Everglades Protection Area, and so located as to assure that the Everglades Protection Area is not altered so as to

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practices. FLA. STAT. § 373.4592(11)(b). However, mixing zones are otherwise allowed by law, even in Outstanding Florida Waters such as the Everglades, provided that the discharges are necessary and approved for water management purposes. FLA. STAT. § 403.061(11)(b).

75. FLA. ADMIN. CODE R. 62-4.244(1)(a).

76. FLA. STAT. § 373.4592(11)(b).

77. FLA. ADMIN. CODE R. 62-4.244(1)(a); FLA. STAT. § 403.061(11)(b).

78. Settlement Agreement, *supra* note 19, at Appendices A-1 and B-1.

79. FLA. STAT. § 373.4592(4)(e)3.

cause an imbalance in natural populations of flora and fauna and to assure a net improvement in the areas already impacted.<sup>80</sup>

### 5. Potential Litigation

Once the ERC publishes a notice of its proposed rules associated with the EFA, interested persons will have an opportunity to challenge the proposed rule prior to it taking effect.<sup>81</sup> The potential for such challenges, which would be governed by the Florida APA, is obvious, given the conflicting science related to the numeric phosphorus criterion for the Everglades. In that event, the challenger will have the initial burden to prove that the rule is an invalid exercise of delegated legislative authority, and then the Department and ERC will have the burden of proving by a preponderance of the evidence that the proposed rule is not invalid as to the objections raised.<sup>82</sup> If the EFA's default criterion of 10ppb, however, is indeed proposed by the ERC as the new phosphorus criterion, challengers of the proposed rule might have an even more difficult legal burden to meet, since the statutorily-referenced standard of 10ppb may be presumptively valid.<sup>83</sup>

To the extent that the ERC's rulemaking addresses the other issues related to the phosphorus criterion, including discharge limits, moderating provisions, compliance methodologies, and the net improvement requirement, those provisions will also be subject to a rulemaking challenge under the Florida APA. Alternatively, if the Department incorporates these other issues into future agency actions, such as permit issuance, then a Florida APA challenge of the agency action may result. For example, if the criterion is established by rule, but discharge limits and moderating provisions are established in individual permits, then opponents of the agency action would file a rule challenge of the criterion pursuant to Section 120.56, Florida Statutes, and a separate challenge of the permit as an agency decision affecting substantial interests pursuant to Section 120.569, Florida Statutes. But regardless of which mechanism is used, litigation remains an obvious possibility.

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80. *Id.*

81. FLA. STAT. § 120.56.

82. *Id.* § 120.56(2)(a).

83. *See, e.g.,* Department of Children and Family Services v. Natural Parents of J.B., 736 So. 2d 111 (Fla. 4th DCA 1999).

*B. Federal Approval of State Standards*

While Florida law establishes a clear state process for adoption of a numeric phosphorus criterion, the federal Clean Water Act (CWA) provides an additional layer of federal review and approval for all state water quality standards.<sup>84</sup> At least once every three years, each state must submit its water quality standards to the U.S. EPA, including the narrative and numeric water quality criteria.<sup>85</sup> New or revised water quality standards are also submitted for review.<sup>86</sup>

Thus, the U.S. EPA will have an opportunity to review and approve Florida's numeric phosphorus criterion after it is adopted pursuant to the state process. That review will consider five major factors: (1) whether the criterion is consistent with the requirements of the CWA;<sup>87</sup> (2) whether the state adopted a numeric phosphorus criterion<sup>88</sup> that adequately protects the designated use of the Everglades as Class III waterbody<sup>89</sup> for recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife;<sup>90</sup> (3) whether the state followed its legal procedures for adopting the criterion;<sup>91</sup> and (4) whether the criterion meets minimum requirements for all water quality standards,<sup>92</sup> including proper methods and analysis<sup>93</sup> sufficient to protect designated uses<sup>94</sup> and compliance with anti-degradation policies.<sup>95</sup> While those four factors are based upon the federal CWA and its associated regulations, (5) a final factor for the U.S. EPA will be a review of any rules associated with the discharge limitations and the need for net improvement in already impacted areas. The U.S. EPA already noted that the EFA's language regarding net improvement to already-impacted areas has not been reviewed for consistency with the requirements of the Clean Water Act;<sup>96</sup> however, the agency also

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84. Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. § 1313(c) (1994) and 40 C.F.R. § 131 (2000).

85. 33 U.S.C. § 1313(c)(1) (1994); 40 C.F.R. § 123 (2000).

86. 33 U.S.C. § 1313(c)(2) (1994).

87. 40 C.F.R. § 131.5(a)(1) (1994).

88. Note that the EFA defines the "phosphorus criterion" as a numeric interpretation for phosphorus of the Class III narrative nutrient criterion. FLA. STAT. § 373.4592(2)(j).

89. The definition of a Class III waterbody, the designated use of the Everglades, is provided in FLA. ADMIN. CODE R. 62-302.400 (2000).

90. 40 C.F.R. § 131.5(a)(2).

91. *Id.* § 131.5(a)(3).

92. *Id.* § 131.5(a)(5) (cross-referencing the minimum requirements in 40 C.F.R. § 131.6).

93. *Id.* § 131.6(b).

94. *Id.* § 131.6(c).

95. *Id.* § 131.6(d).

96. Letter from John H. Hankinson, Jr., Regional Administrator, U.S. EPA, Region 4, to Frank Finch, Executive Director, South Florida Water Management District (Jan. 19, 2001).

acknowledged the possibility of using moderating provisions such as variances or mixing zones in permits related to the Everglades restoration.<sup>97</sup>

Upon completing review of Florida's proposed rules, the U.S. EPA will notify the state of its decision.<sup>98</sup> At that point, interested persons may have a right to seek judicial relief from the U.S. EPA decision pursuant to the Federal Administrative Procedures Act (APA).<sup>99</sup> However, even though the Federal APA empowers courts to hold unlawful and set aside a U.S. EPA agency action that is found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law,<sup>100</sup> the challenger will carry a heavy burden. The U.S. EPA's action on review of a water quality standard will be presumed valid and will be entitled to great deference.<sup>101</sup>

### *C. Influence of Indian Tribes and Tribal Water Quality Standards*

Given the fact that their reservation is adjacent to and within the Everglades, the Miccosukee Tribe of Indians (Miccosukee Tribe) is frequently involved in Everglades restoration issues. In fact, tribal governments can be treated as states under the CWA,<sup>102</sup> and the Miccosukee Tribe has already adopted its own numeric interpretation of the phosphorus criterion in the Everglades – 10 parts per billion.<sup>103</sup> That standard was approved by the U.S. EPA in 1999.<sup>104</sup> However, for some locations associated with the Tribe's agricultural, commercial, and residential developments, the Tribe did not adopt the stringent 10 ppb requirements, adopting instead a narrative criterion for phosphorus.<sup>105</sup> In addition, for all other

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97. *Id.* at 2.

98. 40 C.F.R. § 131.21(a).

99. 5 U.S.C. § 702 (1994).

100. *Id.* § 706(2)(A).

101. *See* Natural Resources Defense Council v. United States EPA, 16 F.3d 1395 (4th Cir. 1993); *see also* Natural Resources Defense Council v. United States EPA, 806 F. Supp. 1263 (E.D. Va. 1992); *see also* Natural Resources Defense Council v. United States EPA, 770 F. Supp. 1093 (E.D. Va. 1991).

102. 33 U.S.C. § 1377(e) (1994); *see also* 40 C.F.R. § 131.8.

103. Miccosukee Environmental Protection Code, Subtitle B: Water Quality Standards for Surface Waters of the Miccosukee Tribe of Indians of Florida, Section 3(N) (Adopted December 19, 1997). Notably, although the Tribe established a 10 ppb limit for most waters on Tribal lands, the Tribe adopted an alternative, less specific standard for lands used for residential, agricultural, and tourism purposes.

104. Letter from John H. Hankinson, Jr., Regional Administrator, U.S. EPA Region 4, to Billy Cypress, Chairman, Miccosukee Tribe of Indians (May 23, 1999).

105. Miccosukee Environmental Protection Code, *supra* note 103, at 22. For these Class III-B waters, the Tribe adopted a narrative standard stating that "nutrients shall not be discharged which result in undesirable aquatic life effects or which result in chronic or acute toxicity to aquatic life." *Id.* at 9.

areas, the strict 10 ppb standard was also accompanied by policies allowing for moderating provisions.<sup>106</sup>

The federal approval of the Miccosukee Tribe's 10 ppb standard raises potential complications for the process of adopting a numeric water quality criterion in Florida. Indeed, in a 2001 letter to the South Florida Water Management District's Executive Director, the U.S. EPA clearly stated that it believed that "adequate information currently exists to set the numeric criterion at 10 ppb."<sup>107</sup> The U.S. EPA's reaffirmation of support for a 10 ppb numeric phosphorus criterion raises an important question: what if the State of Florida adopted a standard less restrictive than 10 ppb? Although some states have adopted standards less stringent than the U.S. EPA's guidelines recommend,<sup>108</sup> in the case of the Everglades phosphorus criterion, such an action would almost certainly trigger a return to the courtroom. If the U.S. EPA approved<sup>109</sup> an alternative phosphorus criterion other than 10 ppb, the Miccosukee Tribe would inevitably challenge that decision, as it has repeatedly filed lawsuits related to the review of state water quality standards for the Everglades under the CWA.<sup>110</sup>

Finally, even if Florida were successful in adopting and obtaining approval of a new numeric criterion for phosphorus in the Everglades other than 10 ppb, the difference between the state's criterion and the Miccosukee Tribe's criterion could create a need for

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106. *Id.* at 24-27 (establishing policies for variances and mixing zones).

107. Letter from John H. Hankinson, *supra* note 96.

108. See *Natural Resources Defense Council v. United States EPA*, 802 F. Supp. 1263 (E.D. Va. 1992), *aff'd* 16 F.3d 1395 (4th Cir. 1993) (holding that EPA approval of state standard less stringent than EPA's recommended standard was not arbitrary and capricious where the state's standard was based upon scientifically-defensible assumptions).

109. Approval of a state's proposed water quality standard is not a rubber stamp. EPA has great authority under the CWA, including the ability to reject a state water quality standard and to even promulgate its own standards when the state refused to modify its standards. See *Mississippi v. Costle*, 625 F.2d 1269, 1275-77 (5th Cir. 1980) (holding that EPA's promulgation of a substitute water quality standard for a state's proposed standard was not a clear error in judgment and was not arbitrary and capricious).

110. In 1995, the Tribe sued the U.S. EPA alleging that the agency had a mandatory duty to review the EFA as a change in Florida's state water quality standards. Although the case was initially dismissed based on EPA's assertion that the EFA did not change state water quality standards, the decision in *Miccosukee Tribe v. United States*, Case No. 95-0533-Civ-Davis (July 26, 1995), was reversed and remanded to the lower court for fact-finding proceedings. *Miccosukee Tribe v. United States*, 105 F.3d 599 (11th Cir. 1997). To facilitate resolution of the matter, EPA did formally review the EFA, and concluded that the state law "did not change the water quality criterion, did not change designated uses of downstream waters, and did not change the state anti-degradation policy." U.S. ENVIRONMENTAL PROTECTION AGENCY, DETERMINATION CONCERNING THE EVERGLADES FOREVER ACT, at 10-14, 29 (Jan. 30, 1998). The lower court rejected that conclusion, holding that because additional water quality measures were not required until 2006, the EFA was a *de facto* suspension of water quality standards and that the EPA analysis was arbitrary and capricious. See *Miccosukee Tribe v. United States*, Case No. 95-0533-Civ-Davis, Omnibus Order at 26-28 (September 11, 1998).

consultation with the U.S. EPA Administrator.<sup>111</sup> The CWA envisioned the potential for “unreasonable consequences” when Indian tribes and states share common watershed boundaries.<sup>112</sup> In those cases, the U.S. EPA Administrator is required to establish a mechanism to resolve the disputes that addresses permit requirements, economic impacts, and present and historical uses of the waters to avoid the unreasonable consequences “in a manner consistent with the objectives” of the CWA.<sup>113</sup>

#### IV. TRANSLATION: THE ROLE OF POLICYMAKERS

By itself, the establishment of a new numeric water quality criterion for phosphorus in the Everglades achieves nothing. Rather, the new criterion represents a restoration objective, and setting that objective requires consideration of four essential policy questions. First, what is restoration – in other words, how high should the goal be set? Second, how to evaluate compliance – must compliance be instantaneous at the point of discharge into the Everglades, or somewhere downstream? Third, who pays – how should economic impacts be considered? Lastly, who cares – who is likely to file suit, and can the legal challenges be withstood? Each of these questions must be resolved through open discussions of matters of science, law, and public policy. The answers to those questions, coupled with the establishment of a numeric phosphorus criterion, will ultimately determine the course of the Everglades restoration.

##### A. *Science and Policy: What is Restoration?*

The term “Everglades restoration” is often used, but ill-defined. What constitutes restoration? Is restoration simply meeting state anti-degradation policies<sup>114</sup> and preventing conditions in the Everglades from getting worse? Is it full compliance with all state water quality standards? Perhaps it is a return to conditions before the 1900s, when the dredging and construction of south Florida’s water management systems first began?

The quality of ecosystems has long been categorized based upon their abundance of nutrients, with low nutrient systems called oligotrophic, moderate nutrient systems called mesotrophic, and higher nutrient systems called eutrophic or hypereutrophic.<sup>115</sup> The

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111. 33 U.S.C. § 1377(e) (1994).

112. *Id.*

113. *Id.*

114. See FLA. ADMIN. CODE, R. 62-4.242 (2000); 40 C.F.R. § 131.12 (2000).

115. Johan U. Grobbelaar & W. Alan House, *Phosphorus as a Limiting Resource in Inland Waters; Interactions with Nitrogen*, in PHOSPHORUS IN THE GLOBAL ENVIRONMENT (Holm



Everglades is well documented as a historically oligotrophic system,<sup>116</sup> a fact that led scientists researching the numeric threshold for phosphorus imbalance to focus primarily upon the sensitive algal communities of the Everglades, especially periphyton. This approach was recommended in the federal Settlement Agreement of the *United States v. SFWMD* lawsuit.<sup>117</sup> But even the Settlement Agreement recognized that there might be “other sensitive indicators of nutrient enrichment.”<sup>118</sup>

As a result, in addition to studying periphyton communities, researchers from the District and Duke University also considered vegetation shifts in the Everglades – such as the shift from sawgrass which generally competes best at lower phosphorus levels, to cattail, a plant that out-competes sawgrass at higher phosphorus concentrations.<sup>119</sup> Despite this common focus, the groups reached different conclusions. Part of that dispute was based on simple differences in scientific and statistical approaches: District scientists looked for the *minimum threshold* level of phosphorus, above which any imbalance in periphyton or sawgrass communities first occurred;<sup>120</sup> whereas Duke University scientists looked for an *ecosystem level threshold* above which there was a high probability that imbalance in flora and fauna occurred.<sup>121</sup>

Notably, some groups even argue that balancing the periphyton or sawgrass communities to maintain an oligotrophic ecosystem is not a proper restoration goal and is an improper basis for establishing a phosphorus criterion for the Everglades. Instead, they argue that higher levels of phosphorus found in mesotrophic or eutrophic ecosystems are actually preferable, despite the Everglades’ historically low nutrient conditions. For example, representatives of the Sugar Cane Growers Cooperative of Florida have argued that northern areas of the Everglades should have higher levels of phosphorus in order to encourage tree islands and create wading bird habitat.<sup>122</sup> Although these assertions were

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Tiessen ed., 1995).

116. Davis, *supra* note 2.

117. See Settlement Agreement, *supra* note 19, at Appendix D-2.

118. *Id.*

119. See McCormick et al., *supra* note 32, at 3-18 to 3-20; see also, Payne et al., *supra* note 31, at 3-31 to 3-35.

120. Payne et al., *supra* note 31, at 3-2, 3-3 and 3-16; see also, McCormick et al., *supra* note 32.

121. Payne et al., *supra* note 31, at 3-2, 3-3, 3-11, and 3-16; see also Richardson, et al., *supra* note 36.

122. Sujoy Roy & Steve Gherini, *An Overview of the Historical Everglades Ecosystem and Implications for Establishing Restoration Goals* (June 2000), in SOUTH FLORIDA WATER MANAGEMENT DISTRICT, 2001 EVERGLADES CONSOLIDATED REPORT, at Appendix 1-2c at 34 (Jan. 1, 2001).

rejected as impractical in the 2001 ECR,<sup>123</sup> they also highlight a fundamental fact: scientific assumptions and policy arguments regarding the definition of restoration will play an important part in the establishment of a numeric criterion for phosphorus.

*B. Law and Policy: How to Evaluate Compliance?*

In accordance with the Everglades Forever Act, District scientists have spent millions of dollars finding ways to optimize performance of the existing wetland marshes known as Stormwater Treatment Areas (STAs) and researching additional advanced treatment technologies capable of reaching low levels of phosphorus.<sup>124</sup> The research has focused particularly on “green” technologies to supplement the effectiveness of the STAs.<sup>125</sup> Prospective technologies include submerged aquatic vegetation or periphyton-dominated systems.<sup>126</sup> In the 2001 Everglades Consolidated Report, however, the Florida DEP acknowledged the potential limitations of these technologies, stating that “the use of more favored green technologies will result in small areas downstream of discharge locations that have [phosphorus] concentrations above 10ppb.”<sup>127</sup>

This sentence in the 2001 ECR highlights another essential policy issue related to the phosphorus criterion that must be resolved: how will compliance be determined? Must the numeric criterion be met at the very moment waters pass into the Everglades, known as the “end of the pipe” approach? Alternatively, will the measurement be made at some locations downstream, based upon implementation of appropriate moderating provisions, such as mixing zones?<sup>128</sup> Finally, how frequently must the numeric criterion be met – at all times, or on an annual average? Resolution of these matters will again require a careful balancing of many factors.

*C. Pure Policy: Who Pays? Who Cares?*

The final factor that cannot be ignored in the debate over the establishment of a numeric criterion for phosphorus in the

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123. Payne et al., *supra* note 31, at 3-42.

124. See Gregory Coffelt, Jana Newmann, et al., *Chapter 8: Advanced Treatment Technologies for Treating Stormwater Discharges Into Everglades Protection Area*, in SOUTH FLORIDA WATER MANAGEMENT DISTRICT, 2001 EVERGLADES CONSOLIDATED REPORT (Jan. 1, 2001).

125. *Id.*

126. *Id.*

127. Payne et al., *supra* note 31, at 3-42. In a January 19, 2001 letter, however, the United States EPA Regional Administrator expressed concern about allowing discharges into the Everglades “at levels higher than the numeric criterion to technically be in compliance.” Letter from Hankinson, *supra* note 96, at 2. However, EPA also acknowledged that not enough research had been completed to draw any conclusions. *Id.* at 3.

128. See *supra* notes 75-79 and accompanying text.

Everglades is a reality of interest group politics. Many organizations have a stake in the Everglades restoration effort – including the agricultural groups who are concerned about economic impacts of increased taxes and regulatory burdens; conservation groups who are concerned with environmental protection issues; and even urban organizations and local governments whose discharges of stormwater into the Everglades could also be affected. For some of these groups, money is critical factor. Notably, however, while the Florida Environmental Regulatory Commission is explicitly required to consider economic issues,<sup>129</sup> the U.S. EPA is prohibited from doing so.<sup>130</sup> The potential for litigation – and its accompanying costs – is also likely to be an important policy issue considered during the development of a numeric phosphorus criterion for the Everglades.

#### V. CONCLUSION: A CALL FOR CONSENSUS

Many lawyers have experienced cases involving dueling experts – a common demonstration of the challenges presented by the intersection of science and law. In the case of the Everglades restoration, those common challenges are compounded by the uncommon complexity of the subject matter, the related state, federal and tribal laws, and the influence of policy issues and interest group politics upon the process.

Inevitably, the adoption of a numeric phosphorus water quality criterion – and any associated discharge limits, moderating provisions, or compliance methodology – will produce disagreements. Some interest groups will argue that what is done is not enough; others will argue that it is too much. Notably, even the legislature's default provision creating a 10 ppb phosphorus criterion if an alternative criterion is not established is subject to legal challenges and judicial intervention.<sup>131</sup> But a return to the courtroom is an obvious and unwelcome possibility that could halt the progress, at enormous expense. That possibility should alert all parties to the need for caution when the science of phosphorus thresholds is translated into law.

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129. FLA. STAT. § 403.804(1) (2000).

130. *See* *Mississippi v. Costle*, 625 F.2d 1269, 1275-77 (5th Cir. 1980) (EPA's refusal to consider economic factors in rejecting state's proposed water quality standard was not arbitrary and capricious and did not exceed authority of the Clean Water Act); *see also* *Whitman v. American Trucking Ass'n.*, 531 U.S. 457, 467 (2001) (EPA could not consider implementation costs when setting air quality standards).

131. In the event that the 10ppb default phosphorus criterion were to take effect, a petition for a writ of mandamus could be filed to compel the Florida Department of Environmental Protection to establish an appropriate criterion by rule, and the 10 ppb criterion could be stayed by the Leon County court upon a demonstration of irreparable harm. FLA. STAT. § 373.4592(4)(e)2.

Doubt grows with knowledge.<sup>132</sup> As knowledge of the Everglades ecosystem expands, so does the potential for doubt, and with it, the potential for litigation. As a result, consensus should remain the primary goal of all the parties, enabling the Everglades restoration effort to continue. After all, the State of Florida and the United States Congress pledged \$8 billion dollars for Everglades restoration, not for the payment of attorney's fees.<sup>133</sup>

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132. Johann Wolfgang von Goethe, *quoted in*, THE QUOTABLE LAWYER 87 (David Shrager & Elizabeth Frost, eds., 1986).

133. See Water Resources Development Act of 2000, Pub. L. No. 106-541, § 601 (2000); also John J. Fumero & Keith W. Rizzardi, *The Everglades Ecosystem: From Engineering to Litigation to Consensus-Based Restoration*, 13 ST. THOMAS. L. REV. 667 (2001).