



# AT RISK: South Carolina's "Isolated" Wetlands

2003 - 2004



Cover Photographs

© David Scott/ Savannah River Ecology Lab: *Marbled salamander, Wood stork, Pine barrens treefrog*

© Bill Lea: *Coastal black bear, Cypress and bladderwort*



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# At Risk:

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## South Carolina's "Isolated" Wetlands

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## INTRODUCTION

Wetlands – areas covered or saturated with water for periods long enough to support plants that thrive in wet soils – are widely recognized as some of nature's most valuable resources.<sup>1</sup> South Carolina is home to a wide array of wetlands, including the namesake Carolina Bays: elliptical, sand-rimmed depressions scattered in parallel alignment across the Coastal Plain.<sup>2</sup> At least 4,000 Carolina Bays once existed in the state, but now fewer than 500 large bays remain relatively undisturbed.<sup>3</sup>



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Meadow beauty.

Bays, like other wetlands, help clean the state's surface waters and recharge its groundwater supplies. They store water in times of drought and reduce the destruction wrought by floods. They are also world-class "hot spots" of biological diversity and serve as critical habitat for rare species. Researchers estimate that the loss of all isolated wetlands in South Carolina could lead to the local extinction of some 20 species of amphibians.<sup>4</sup>

Many of South Carolina's most valuable wetlands are now at risk. For years, wetlands destruction has been limited by the federal Clean Water Act's Section 404 permitting program. Recently, however, federal officials have started to limit the law's reach over so-called "isolated" wetlands – wetlands that lack a constant surface water connection to rivers. If the trend continues, at least 9% of South Carolina's wetlands, or some 312,613 acres of wetlands, will have no federal protection.<sup>5</sup> Among the wetlands left unprotected? The state's Carolina Bays.

The goal of "no net loss" of wetlands was embraced over a decade ago by Governor Carroll Campbell's wetlands forum.<sup>6</sup> Today, achieving "no net loss" in South Carolina depends on the state acting to restore protections that federal officials have withdrawn. This report compiles information about the wetlands currently at risk in South Carolina, the basis and need for state action, and finally the features of effective, as well as ineffective, wetlands permitting programs. The report's goal is to promote public awareness of some of South Carolina's most extraordinary natural resources and the peril they now face. It strives also to point the way towards responsible management, so that future South Carolinians can benefit from the same natural resources that have been passed down through many generations.

What features should a state wetlands program include? Experience in other states, and in the federal program, suggest

*Of the 4,000 Carolina Bays that once existed in South Carolina, fewer than 500 large bays remain undisturbed.*



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Aerial photograph of Flamingo Bay.

that the following must be included for a state program to achieve “no net loss” of wetlands and to restore federal protections that are now going unenforced:

- **Avoidance of Unnecessary Wetlands Destruction.** Experience has shown that wetlands are exceedingly difficult to “create” anew. Accordingly, federal law and many state laws prohibit wetlands impacts unless “no practicable alternative” exists.<sup>7</sup>
- **Inclusion of All Federally Regulated Activities.** The federal definition of regulated activities, adopted at the state level, will provide consistent protection.
- **Use of Existing Mitigation Guidelines.** Compensatory “mitigation” is used to offset unavoidable wetlands impacts. Federal mitigation guidelines already exist for South Carolina. Their use in a state program would avoid inconsistent standards and the need to reinvent the wheel.
- **Respond to Documented Mitigation Failures.** Research has documented serious mitigation pitfalls. Monitoring, concurrency requirements, performance benchmarks, and long-term responsibility are all recommended for meaningful mitigation.
- **Restore Citizen Enforcement.** Federal law allows citizens to enforce wetlands protections where the government fails to do so. This tool is rarely used but is a needed backstop where state enforcement resources are stretched too thin.

Beyond these essential elements, this report also discusses specific pitfalls that can undermine effective protection or even make it impossible. By combining the lessons of practical experience with a growing body of scientific evidence, South Carolina can join other states, including North Carolina and Virginia, in acting to fill the gaps opened in federal protection.



## THE WETLANDS AT RISK

Scientists recognize wetlands as valuable natural resources that should be protected.<sup>8</sup> South Carolina is home to an estimated 4.5 million acres of wetlands, or 12% of wetlands in the southeastern United States.<sup>9</sup> Since colonial times, however, South Carolina has lost 27% to 36% of its original wetlands.<sup>10</sup>



Carolina Bay.

with prevailing southwesterly winds.<sup>13</sup> There is no disagreement, however, as to their unique biological value.

Carolina Bays play host to carnivorous pitcher plants, Venus Flytraps and sundews, and provide unique habitat and refuge for the federally endangered pond spice and Canby's dropwort.<sup>14</sup> Moreover, in large part because they are often free from predatory fish and dragonfly larvae, bays provide critical breeding grounds for a wide array of amphibians, including the federally threatened flatwoods salamander and the rare gopher frog.<sup>15</sup> In a one-year study of two small bays, scientists captured more than 72,000 amphibians moving to or from the water, including nine species of salamanders and 16 species of frogs.<sup>16</sup> Aquatic invertebrate assemblages in Carolina Bays are markedly different from those in nearby permanent ponds and reservoirs, with new species still being discovered.<sup>17</sup>

Although there may once have been many as 4,000 Carolina Bays in South Carolina, no more than 400 to 500 bays bigger than two acres in size remain in a largely undisturbed state.<sup>18</sup> Farming has historically been the predominant land use of bays, but commercial and residential development now pose greater threats, as they do to wetland depressions in many parts of the country.<sup>19</sup>

The federal Clean Water Act's Section 404 permitting program has slowed wetlands losses in the past several decades. Federal officials, however, are rolling back federal protections (see *Faltering Federal Protection*, page 8). At greatest risk are geographically "isolated" wetlands – wetlands that lack a constant obvious surface-water connection to other waters. In South Carolina, these wetlands include Carolina Bays, mountain bogs, seepage pocosins, and pond cypress savannas.

The South Carolina Department of Health and Environmental Control ("DHEC") has estimated that anywhere from 312,613 acres to 562,684 acres of South Carolina's wetlands might be treated as "isolated" by federal officials and therefore be unprotected.<sup>11</sup> The best known of these are Carolina Bays, oval depressions with parallel, northwest-to-southeast alignments and sandy rims.<sup>12</sup> Theories abound on how bays originally formed: a meteor shower was long speculated as the cause, but the current consensus supports ancient wave action associated

*Since colonial times, South Carolina has lost 27% to 36% of its original wetlands.*

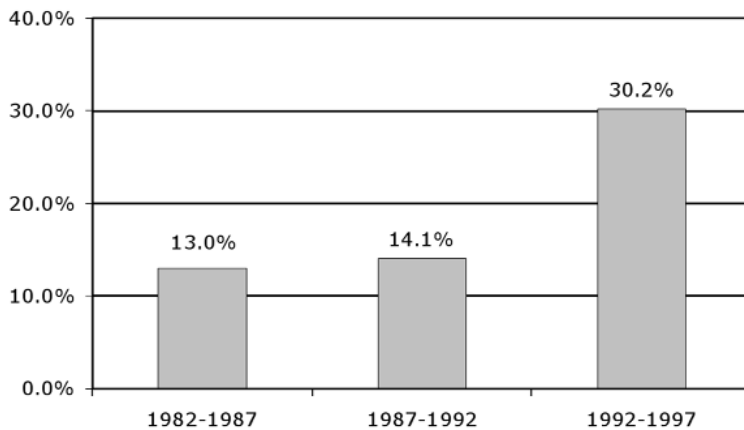


Hooded pitcher plant (*Sarracenia minor*).

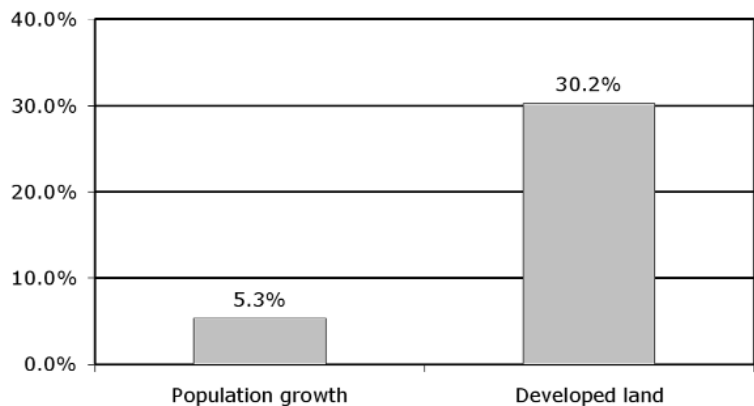
South Carolina is rapidly losing rural land, with pressures increasing to fill and transform geographically isolated wetlands. In a 2002 study, South Carolina ranked sixth in the nation for percentage of rural land converted to developed land, and fourth in land conversion on a per-capita basis.<sup>20</sup> Population growth is part of the cause, especially in coastal areas. In the ten year period between 1990 to 2000, for example, Beaufort's population grew by 39.9%.<sup>21</sup>

Yet South Carolina is converting raw land to a built environment at a rate six times greater than its population growth.<sup>22</sup> The consequences for wetlands and other natural resources are troubling. If left unprotected, the state's remaining wetlands will increasingly be at risk of conversion into non-wetlands, with the cumulative loss of valuable functions mounting every passing year.

**Percent increase in developed land in South Carolina  
1982 - 1997**



**Comparison of Increases in South Carolina Population  
Growth and Developed Land  
1992 - 1997**



Graphs after London, J.B. and N.L. Hill, *Land Conversion in South Carolina: State Makes the Top 10 List*, Jim Self Center on the Future, Clemson University (2000).

## THE FUNCTIONS OF WETLANDS

Why protect South Carolina's remaining wetlands? An extensive body of research shows that wetlands deliver significant resource "bang for the buck." Below are some key functions that wetlands serve, along with information about the value those services can have for the public.

### FLOOD PREVENTION

- DHEC estimates that South Carolina's geographically isolated wetlands store roughly  $4.58 \times 10^{10}$  gallons of water, or 30 times more than Lake Murray ( $1.5 \times 10^9$  gallons).<sup>23</sup>
- Wetlands tend to reduce flood peaks through evapotranspiration, which reduces total runoff volume, and below-ground movement, which slows delivery of and desynchronizes runoff.<sup>24</sup>
- An Illinois State Water Survey Report found that the destruction of 1% of the wetlands in a watershed increases its total flood volume by 7%.<sup>25</sup> A study in the northeastern United States showed that areas with 4% or greater wetland areas had peak flows that were 50% lower than watersheds without wetland areas.<sup>26</sup>
- Flood damages in the United States averaged \$5.5 billion annually between 1992 and 2001.<sup>27</sup> In South Carolina, National Flood Insurance Program claims over the last 25 years have averaged \$16 million per year.<sup>28</sup> Only Texas, Florida, Louisiana, New Jersey, and North Carolina have higher average annual flood insurance claims than South Carolina.<sup>29</sup>

### WATER PURIFICATION

- Nonpoint sources such as stormwater runoff are responsible for most of the nonattainment of classified uses in South Carolina's waters.<sup>30</sup> A leading water quality problem in South Carolina is nutrient over-enrichment ("eutrophication").
- Isolated depressions act as nutrient sinks from a nutrient mass balance perspective,<sup>31</sup> and studies show that runoff from drained wetlands have increased nutrient levels compared to runoff from non-drained sites.<sup>32</sup>
- In addition to recycling nutrients and removing other pollutants, wetlands trap sediments that cause siltation and reduce bacteria levels.<sup>33</sup>
- The most reported cause of surface water impairment in the United States is sedimentation/siltation; in South Carolina, the single greatest cause of impairment is bacteriological contamination (e.g. fecal coliform bacteria).<sup>34</sup>



Algae blooms, such as this one on Lake Greenwood, are caused by nutrient over-enrichment. Intact wetlands regulate watershed nutrient loads.



## GROUNDWATER RECHARGE

- In South Carolina, 1.2 million people rely on groundwater and, in 2001, 76 million gallons of groundwater were used in the state.<sup>35</sup> Portions of South Carolina rely on groundwater from the Floridian aquifer system, which contains some of the nation's cleanest water due to filtration through sand and rock, some underlying wetlands.<sup>36</sup>
- The United States Environmental Protection Agency ("EPA") has calculated that draining 80% of a five-acre Florida cypress swamp would reduce area groundwater by 45%.<sup>37</sup>

## HABITAT FOR PLANTS AND WILDLIFE

- At least 36 plants considered rare in South Carolina grow in Carolina Bays.<sup>38</sup> Scientists estimate that more than a third of the rare plant species in the southeast occur in non-alluvial wetlands, including Carolina bays.<sup>39</sup>
- It has been estimated that the loss of all South Carolina isolated wetlands could cause the local extinction of 20 amphibian species. In a one-year study, scientists captured more than 72,000 amphibians moving to or from two small bays, including nine species of salamanders and 16 species of frogs.<sup>40</sup>
- Many U.S. breeding bird populations – including ducks, geese, woodpeckers, hawks, wading birds, and many songbirds – feed, nest, and raise their young in wetlands. Migratory waterfowl use coastal and inland wetlands as resting, feeding, breeding, or nesting grounds for at least part of the year.<sup>41</sup>
- A single isolated wetland may support more than 100 species of aquatic insects, and well over 300 species have been collected.<sup>42</sup>
- In 2001, 45% of South Carolina residents participated in wildlife-related activities, contributing \$1.3 billion to South Carolina's economy.<sup>43</sup>



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The Wood duck (*Aix sponsa*) breeds in South Carolina's isolated wetlands. In 1999, Wood ducks accounted for 36% of the state's overall duck harvest.



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The federally endangered Wood stork (*Mycteria americana*) feeds heavily in Carolina bays.

## SPECIES THAT DEPEND ON SOUTH CAROLINA'S "ISOLATED" WETLANDS

Below are some of the animal species that depend on South Carolina's geographically isolated wetlands. Chamberlain's salamander, on the left, is a newly described species as of 2003. Variable water levels, which control the presence of fish, are especially advantageous to amphibians, which lay their eggs in wetlands.



Marbled salamander  
(*Ambystoma opacum*)



Spotted turtle  
(*Clemmys guttata*)



Black bear  
(*Ursus americanus*)

© BILL LEA



Chamberlain's salamander  
(*Eurycea chamberlaini*)



Spotted salamander  
(*Ambystoma maculatum*)



Tiger salamander  
(*Ambystoma tigrinum*)



Southern chorus frog  
(*Pseudacris nigrita*)



Chicken turtle  
(*Deirochelys reticularia*)



Gopher frog  
(*Rana capito*)



Eastern narrowmouth toad  
(*Gastrophyrne carolinensis*)



Red-spotted newt  
(*Notophthalmus viridescens*)



Barking treefrog  
(*Hyla gratiosa*)



Squirrel treefrog  
(*Hyla squirella*)



Southern leopard frog  
(*Rana utricularia*)



Pine barrens treefrog  
(*Hyla andersonii*)

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## FALTERING FEDERAL PROTECTION

Federal wetlands protection is in flux in two major respects. First is the scope of protected “federal” wetlands themselves. The U.S. Supreme Court’s *SWANCC* decision,<sup>44</sup> rendered in 2001, has been interpreted by some regulators to remove federal jurisdiction over wetlands that lack a constant connection to navigable rivers and lakes. Yet the majority of courts have interpreted *SWANCC* to remove jurisdiction only where its sole basis is the presence of migratory birds.<sup>45</sup> Nevertheless, recent regulatory guidance makes it difficult for federal regulators to protect geographically isolated wetlands, essentially stacking the deck against finding wetlands federally “jurisdictional.”<sup>46</sup>

The second area of flux is the scope of regulated *activities* in wetlands. Some courts have held that redeposit of a small bit of dredged material back to the point of removal is not a regulated “discharge.”<sup>47</sup> Other courts, however, have found that mechanized ditching, clearing, mining, and dredging – activities often undertaken specifically to destroy wetlands – are associated with discharges that require a federal permit.<sup>48</sup> Indeed, current federal regulations recognize the fact that mechanized operations almost always result in regulated discharges.<sup>49</sup> Like the scope of “federal” wetlands, the scope of federally regulated activities is hotly contested, a situation that leaves South Carolina wetlands, and those who disturb them, vulnerable to unpredictable shifts in federal enforcement.

*It has been estimated that anywhere from 312,613 acres to 562,684 acres of South Carolina’s wetlands might be treated as “isolated” by federal officials and therefore be unprotected.*



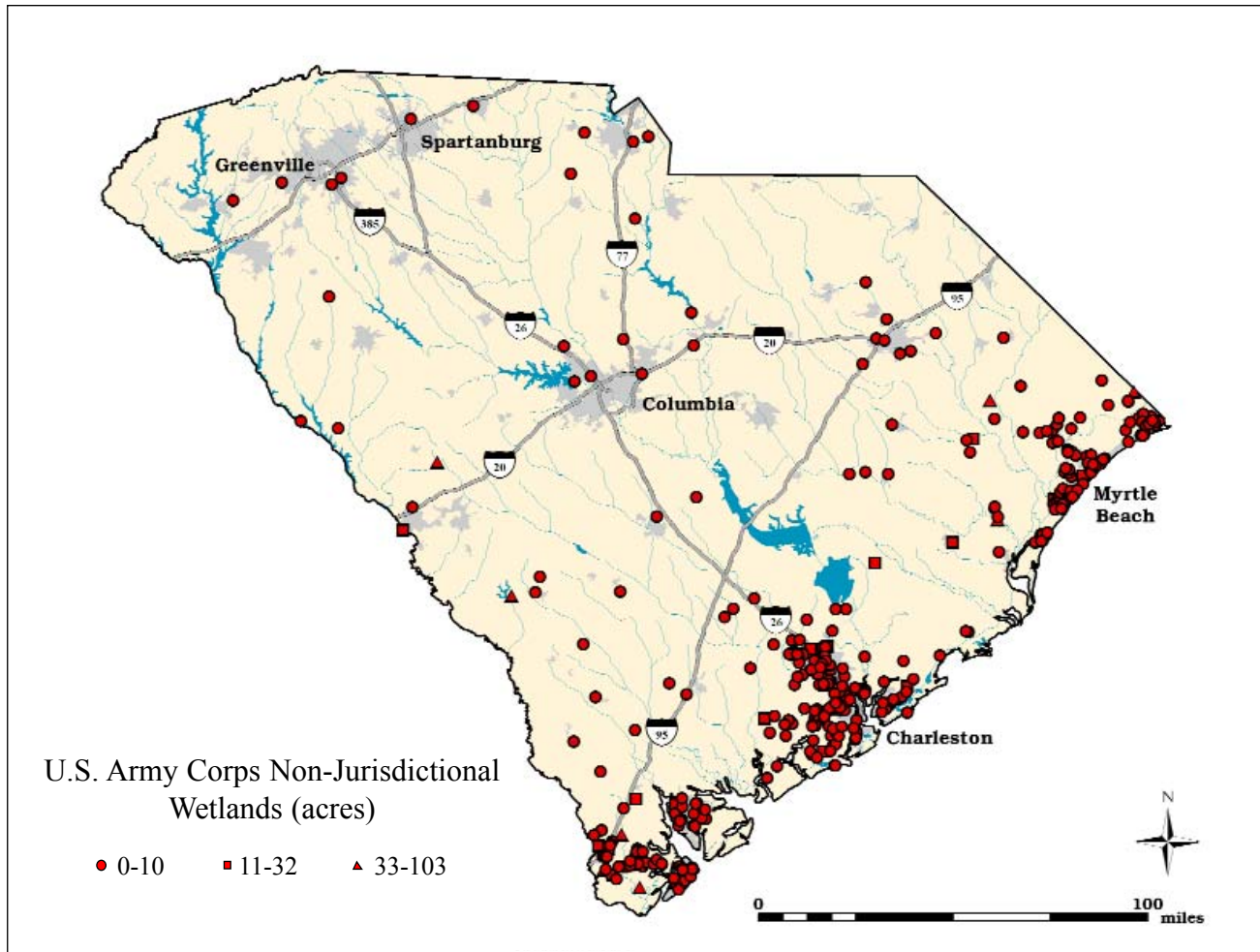
Ditched wetland

© NC DIVISION OF WATER QUALITY

What do federal shifts mean in South Carolina? The map opposite shows the location of the U.S. Corps of Engineers “non-jurisdictional” calls in South Carolina, compiled from information provided to the Southern Environmental Law Center under the Freedom of Information Act. As of spring 2003, the Corps had written-off more than 1,438 acres of South Carolina wetlands as being “isolated.” Some of the wetlands are quite large – one “non-jurisdictional” wetland in Barnwell County spanned 14 acres (609,000 square feet).

The greatest concentrations of federal write-offs are near Beaufort, Charleston and Myrtle Beach, which corresponds to the greatest land-development pressure (wetlands determinations are generally sought by those seeking to develop or sell land). Another segment of the population never bothers to obtain written verification from the Corps, instead just assuming that their wetlands are federally unprotected. Accordingly, the wetland acreage at risk in South Carolina is substantially higher than shown on this map. DHEC has estimated that,

depending on how federal jurisdiction is defined, anywhere from 312,613 acres to 562,684 acres of South Carolina wetlands might be treated by regulators as “non-federal” (9% and 16% of the state’s total wetlands acreage, respectively).<sup>50</sup>



Using information obtained under the Freedom of Information Act, the Southern Environmental Law Center mapped sites where the Charleston District of the U.S. Army Corps of Engineers issued formal declarations that wetlands were not federally protected. Some 1,438 acres of wetlands were declared non-jurisdictional in less than one-and-a-half-years. The state estimates that as many as 562,684 acres of wetlands in South Carolina could be declared non-jurisdictional.

What happens when regulators decide that wetlands are not protected by law? The photograph below, taken in Horry County, shows a mining and stockpiling operation in what were previously intact wetlands. Federal officials failed to require a permit for the 60 or so acres of wetlands impacted by this operation. Remaining wetlands in this area are habitat to rare and threatened species, including the largest remaining population of coastal black bear in the state.

The retreat of federal protection leaves South Carolina wetlands with less protection than was the case even ten years ago. The situation is unlikely to improve without state action.



© SEELC

Regulators failed to require any wetlands permits for this mining and stockpiling operation, which destroyed an estimated 65 acres of Horry County wetlands.

## THE STATE'S POWER TO PROTECT SOUTH CAROLINA WETLANDS

In the face of faltering federal protection, can the state of South Carolina do anything to restore protection for its wetlands? Yes. In fact, current law requires the protection of geographically isolated wetlands in South Carolina. Under the state's Pollution Control Act ("PCA"), South Carolina waters are defined to include "marshes," "springs," "wells," "estuaries," and "all other bodies of surface or underground water, natural or artificial, public or private, inland or coastal, fresh or salt" within or bordering the state.<sup>51</sup> DHEC has repeatedly interpreted this broad definition to include wetlands as waters of the state.<sup>52</sup> The agency's interpretation was challenged the early 1990s, but the reviewing court sided with DHEC, holding that the PCA's definition "is sufficiently broad so as to embrace all waters of the state of every character, including wetlands."<sup>53</sup>



© CRAIG TANNER

The PCA makes it unlawful for any person to discharge pollutants into the environment without a permit,<sup>54</sup> and DHEC's regulations specifically prohibit the discharge of pollutants into state waters without a permit.<sup>55</sup> Indeed, existing regulations prohibit the discharge "of fill into waters of the State" unless the activity will "result in enhancement of classified uses with no significant degradation to the aquatic ecosystem or water quality."<sup>56</sup> The regulations further require that aquatic flora and fauna and all existing uses of state waters be protected.<sup>57</sup>

DHEC's regulations define "wetlands" using the federal definition<sup>58</sup> and provide that activities regulated under Section 404 of the federal Clean Water Act are exempt from state permitting requirements.<sup>59</sup> Where an activity is not regulated under Section 404, however, the exemption to state permitting requirements disappears. Thus, state permits are required for discharges into wetlands where federal officials are no longer requiring Section 404 permits, meaning that discharges unaccompanied by state permits are subject to enforcement and penalties under existing state law. This situation, which could expose parties discharging pollutants into "isolated" wetlands to substantial liability, will remain in effect until a wetlands permitting system for non-federal wetlands is established in South Carolina.

There are two routes for implementing wetlands permitting program in South Carolina: the promulgation of administrative regulations or the enactment of a new statute. Wisconsin, Ohio and Virginia have enacted legislation to protect state wetlands in the wake of the *SWANCC* decision, while North Carolina and Indiana have strengthened existing programs through regulation. South Carolina can choose either avenue.

## ELEMENTS OF AN EFFECTIVE STATE WETLAND PROGRAM

Whether South Carolina seeks to restore lost protections by regulation or by statute, experience suggests several key components that a wetlands permitting system should include. These will ensure that state protections are consistent with any federal protections that have been removed.

- **Avoid Wetland Destruction Where Possible.** Avoidance of impacts is the most direct way to achieve “no-net loss” of wetlands. Wetlands occur where they do because of landscape position and local hydrology, a combination of conditions that can be exceedingly difficult to create anew. Federal Clean Water Act regulations consequently prohibit impacts to wetlands unless “no practicable alternative” to impacts exists<sup>60</sup> and further prohibit discharges that “cause or contribute to significant degradation” of waters.<sup>61</sup> Where impacts to wetlands are unavoidable, federal regulations require that such impacts should be minimized.<sup>62</sup>
- **Include All Federally Regulated Activities.** To make coverage consistent for federal and non-federal wetlands, a state program should regulate all wetland-destroying activities that are covered under the federal program. The federal program requires permits for the discharge of fill material and the discharge of dredged material. Adoption of the federal definition of discharge for a state program would minimize inconsistency and uncertainty.
- **Adopt Mitigation Guidelines Already Used for 80% of SC Wetlands.** The Charleston District’s Standard Operating Procedures (“SOP”) for Compensatory Mitigation are currently used to guide mitigation when federal wetlands permits are issued in South Carolina. Since federal permits are required for 80% of the wetlands acreage in the state, the SOP is already being used across South Carolina. Use of these guidelines for geographically isolated wetlands would avoid the need to create a new mitigation program. On the other hand, failure to use the SOP will lead to inconsistent standards being applied across the state and even within the same parcel of land.
- **Respond to the Documented Failures of Weak Mitigation.** The National Research Council of the National Academy of Sciences and others have revealed serious problems with wetlands mitigation nationwide. Monitoring, concurrency requirements, watershed location, performance benchmarks and long-term responsibility – including financial arrangements to guarantee perpetual protection and efficacy of mitigation sites – are needed to ensure that wetlands mitigation does not become an unenforceable “paper” requirement.
- **Restore Citizen Enforcement.** The federal Clean Water Act includes an opportunity for citizens to enforce wetlands permitting requirements where the government fails to do so. Although rarely used, citizen enforcement is an important backstop in an arena where state enforcement resources are often stretched too thin. A state wetland program without citizen enforcement will be weaker than federal protections.

## THE PITFALLS OF POOR PROTECTION

The effectiveness of a state wetlands program will depend on the details of implementation. Proposals must therefore be examined closely with an eye towards their practical effect and likelihood of success (or failure) given several decades of experience nationwide. The previous section discussed elements of an effective program. This section addresses ideas that, while sounding unobjectionable on the surface, pose serious, demonstrated practical problems that can prevent the goal of wetlands protection from being achieved.

- **Exemptions For Entire Classes of Wetlands.** Exemptions remove regulatory control over certain wetlands, or certain activities within wetlands, in effect allowing for uncontrolled wetlands destruction to take place. If not properly limited, exemptions have the potential to be the “exceptions that eat the rule.”

Consider a permitting exemption for wetlands less than five acres. In South Carolina, such an exemption could allow for the unregulated destruction of most Carolina Bays.<sup>63</sup> Should all five-acre bays and wetlands be written off? Research shows the magnitude of functional loss is not proportional to wetland size,<sup>64</sup> and, in fact, that smaller wetlands have a *greater* proportional power to remove pollutants than large wetlands.<sup>65</sup> Since the federal Section 404 program protects most of the larger, connected wetlands, the focus of a state program will, necessarily, be on smaller, less-connected wetlands. That program will be significantly undercut if exemptions remove coverage for the very wetlands the program is designed to protect.

- **Exemptions for Destructive Activities in Wetlands.** A decision to exempt *activities* responsible for the bulk of wetlands destruction would similarly erode a wetlands program’s ability to achieve its intended purpose. Exemptions for destructive activity must be carefully drawn to ensure that the wholesale loss of wetlands and wetlands functions does not occur. The federal Section 404 program provides exemptions for certain activities, such as forestry and mining, but the exemptions are not open-ended.
- **Naive Over-Reliance On Mitigation.** Mitigation sounds easy: for every wetland damaged, simply create a new one or restore a damaged wetland to replace the lost values. In fact, mitigation involves major practical difficulties due to two central problems. The first is physical: wetlands exist where they do for hydrologic and geologic reasons, the combination of which is difficult to recreate. The second is social: those seeking to impact wetlands have little economic interest in ensuring the long-term success of mitigation projects. The two problems are interrelated because wetlands restoration, if not accompanied by long-term commitment and resources, is much less likely to be effective.

Significant problems with wetlands mitigation were detailed by the National Research Council (“NRC”), a branch of the National Academy of Sciences, in its 2001 publication *Compensating for Wetland Losses Under the Clean Water Act*.<sup>66</sup> The report revealed that “as much as 34% of the mitigation was never installed” as required by permits, and, where it was installed, “mitigation sites are not performing as specified in Corps permits.”<sup>67</sup> Even where mitigation was found to be “performing as specified, many of those sites do not support functions and values equivalent to similar reference sites.”<sup>68</sup> In the end, despite optimistic predictions for mitigation, the NRC expressed well-documented skepticism that mitigation in practice was meeting the “the goal of no net loss for permitted wetlands”<sup>69</sup>

- Failure to Incorporate Mitigation Lessons from the Field.** On the positive side, the NRC made concrete suggestions on how to make mitigation more effective. For example, based on research showing that compliance rates were twice as high when permits contained specific performance conditions compared with those that did not, the NRC recommended that wetland “permits specifying mitigation contain specific language about the expected mitigation outcome.”<sup>70</sup>

Other recommendations include enforceable performance benchmarks and monitoring requirements, as well as measures to ensure that replacement of functions occurs concurrent to impacts rather than long after them. The NRC also recommended the inclusion of provisions to assign long-term legal and financial responsibility for replacement wetlands performance, so that mitigation sites do not become non-performing orphans.

- The Mass Proliferation of Deep Water Ponds.** The NRC noted that while the stable-water pond has come to typify mitigation efforts in many parts of the country, “mitigation projects that stress the wet end of the range will not replace the functions provided by much drier impact sites.”<sup>71</sup> In fact, wetlands designed to maximize the water-treatment function typically become monotypes of invasive species within a few years, even if they are initially planted with multiple species.<sup>72</sup>

By contrast, geographically isolated wetlands such as Carolina Bays range from nearly permanently inundated to frequently dry.<sup>73</sup> It is this variation in hydrologic conditions that promotes rich biological diversity. For example, Carolina Bays are more variable than larger wetlands and more likely to dry temporarily during most years, which lowers the probability that species predatory on amphibians, such as fish and dragonfly larvae, will be present during winter and spring when many amphibians are developing. (Most fish require permanent water systems, whereas dragonfly eggs are laid in water during the warmer months with larvae that persist until the next spring.)<sup>74</sup>

Beyond providing favorable habitat for amphibians, the variable hydrologic conditions that occur in these depressions also contribute to a large diversity of wetland plant communities across the southeastern Coastal Plain landscape and the presence of numerous rare species.<sup>75</sup> It is the combination of large and small depressions, wet and dry years, and long and short hydroperiods that results in a far greater habitat diversity on the landscape than a single type of wetland would provide.<sup>76</sup>



This stable-water pond replaced a natural wetland with variable water levels. Variable hydrology is a key reason that geographically isolated wetlands have far greater habitat diversity than permanent ponds.



## RESOURCES FOR FURTHER INFORMATION



Those interested in learning more about the science and policy of wetlands protection in the United States should consult the following sources.

- Association of State Wetland Managers, [www.aswm.org](http://www.aswm.org)
- U.S. Environmental Protection Agency, [www.epa.gov](http://www.epa.gov)
- Savannah River Ecology Lab, [www.uga.edu/srel/](http://www.uga.edu/srel/)
- National Wildlife Federation, [www.nwf.org](http://www.nwf.org)
- Southern Environmental Law Center, [www.SouthernEnvironment.org](http://www.SouthernEnvironment.org)

In addition, several stories and editorials specific to wetlands protection in South Carolina and the increased risks to South Carolina wetlands in the wake of recent federal developments have appeared in state and national newspapers:

*Developers Rush to Build in Wetlands After Ruling*, USA Today (December 6, 2002)

*Wetlands Protection Sought*, The State (January 26, 2001)

*Protect State's Wetlands*, Charleston Post and Courier (January 16, 2001)

*Council Urges Wetlands Laws*, The Sun News (October 4, 2003)

## ENDNOTES

- <sup>1</sup> See Tiner, R.W., *Wetlands of the United States: Current Status and Recent Trends* 3, 13-25 (U.S. Fish and Wildlife Service, 1984)(hereinafter "Wetlands of the United States").
- <sup>2</sup> See *Invertebrates in Freshwater Wetlands of North America: Ecology and Management* 167-71 (D.P. Batzer, R.B. Rader, and S.A. Wissinger, eds. 1999)
- <sup>3</sup> See *id.* at 60-61.
- <sup>4</sup> See *Not Expendable* at 1131-32. D. Scott, Pers. Communication, July 2002.
- <sup>5</sup> DHEC letter to EPA Water Docket #OW-2002-0050, at 2 (April 16, 2003). Note that the 2003 DHEC estimate assumes a total state wetland acreage of 3.5 million acres of wetlands, based on National Wetlands Inventory ("NWI") mapping data.
- <sup>6</sup> 40 CFR 230.10(a).
- <sup>7</sup> Bundy, Report of Governor's Freshwater Wetlands Forum, Jan. 17, 1990, p. 16 (recommending "regulatory program that includes all contiguous and isolated freshwater wetlands of the State [, which] would encompass all of the approximately 4.5 million acres of wetlands of the State.") Similarly, in 1996, the South Carolina Wetlands Steering Committee — comprised of groups representing diverse interests — produced a consensus statement recognizing the "vital ecological and water quality functions" of South Carolina wetlands and agreeing that "conservation of state wetlands is an important state goal." Facilitators' Report for the South Carolina Wetlands Steering Committee Dialogue Process, July 25, 1996, p.4.
- <sup>8</sup> See *Wetlands of the United States*, at 3, 13-25.
- <sup>9</sup> See Hefner, J.M., B.O. Wilen, T.E. Dahl, and W.E. Frayer, *Southeast Wetlands: Status and Trends, Mid-1970s to Mid-1980s* 14 (U.S. Dept. of Int. & U.S. Env. Prot. Agency, 1994)(hereinafter "Southeast Wetlands")(indicating South Carolina had 4.689 million acres of wetlands in the mid-1980s, approximately 11.6 percent of wetlands in the southeast); see also Dahl, T.E., *South Carolina's Wetlands – status and trends 1982-1989* 7 (U.S. Fish and Wildlife Service, 1999)(hereinafter "South Carolina's Wetlands")(indicating 4.105 million acres of wetlands in South Carolina by the end of the 1980s).
- <sup>10</sup> See Dahl, T.E., *Wetland Losses in the United States 1780s to 1980s* 6 (U.S. Fish and Wildlife Service, 1990)(suggesting losses of 27 percent); see also *South Carolina's Wetlands* at 7, 9 (suggesting losses through 1989 of approximately 36 percent).
- <sup>11</sup> DHEC letter to EPA Water Docket #OW-2002-0050, at 2 (April 16, 2003).
- <sup>12</sup> See *Invertebrates in Freshwater Wetlands of North America: Ecology and Management* 167-71 (D.P. Batzer, R.B. Rader, and S.A. Wissinger, eds. 1999).
- <sup>13</sup> Sharitz, Rebecca R., *Carolina Bays Wetlands: Unique Habitats of the Southeastern United States*, WETLANDS, Vol. 23, No. 3, September 2003, pp. 550-562 at 550.
- <sup>14</sup> See S. H. Bennett and Nelson, J.B., *Distribution and Status of Bays in South Carolina* 50-58, 78-88 (S.C. Wildlife and Marine Res. Dept., 1991); S.C. Dept. of Nat. Res., *Advanced Identification of Carolina Bays for South Carolina Wetlands Protection* 7 (1999).
- <sup>15</sup> See *id.* at 67.
- <sup>16</sup> Sharitz at 559.
- <sup>17</sup> *Id.*
- <sup>18</sup> Bennett and Nelson at 60-61.
- <sup>19</sup> Sharitz at 552.
- <sup>20</sup> J. London, N. Hill, *Land Conversion in South Carolina: State Makes The Top Ten List* (Clemson, Strom Thurmond Institute 2002).
- <sup>21</sup> 2002 U.S. Census data, available at [http://www.sccommunityprofiles.org/pdf\\_files/pop\\_facts.pdf](http://www.sccommunityprofiles.org/pdf_files/pop_facts.pdf).
- <sup>22</sup> Business and Economic Review, the University of South Carolina, Darla Moore School of Business (February 2001).
- <sup>23</sup> DHEC letter to EPA Water Docket #OW-2002-0050, at 2 (April 16, 2003).
- <sup>24</sup> Leibowitz, S.G., *Isolated Wetlands and Their Functions: An Ecological Perspective*, WETLANDS, Vol. 23, No. 3, September 2003, pp. 517-531 and 521.
- <sup>25</sup> Demissie, Misganaw, and Khan, *Influence of Wetlands on Streamflow in Illinois*, Illinois State Water Survey Report ISWS CR-561 (cited in <http://www.sierraclub.org/wetlands/reports/flooding/wetlands.asp>).
- <sup>26</sup> National Research Council, *Compensating for Wetland Losses Under the Clean Water Act*, at 48 (Washington: National Academy of Sciences 2001) (hereinafter "Compensating for Wetland Losses").

- 27 U.S. Army Corps of Engineers. Available at <http://www.usace.army.mil/inet/functions/cw/cecwe/flood2001/table4.htm>
- 28 Calculated from National Flood Insurance Program statistics. Available at <http://www.fema.gov/nfip/10400212.shtm>
- 29 *Id.*
- 30 DHEC letter to EPA Water Docket #OW-2002-0050, at 2 (April 16, 2003).
- 31 Whigham, D.F. and T.E. Jordan, *Isolated Wetlands and Water Quality*, WETLANDS, Vol. 23, No. 3, September 2003, pp. 541-549 at 543.
- 32 *Id.* at 546.
- 33 *Southeast Wetlands* at 8; *Wetlands of the United States* 18-19; Libes, S., Identification and Mitigation of Non-Point Sources of Fecal Coliform Bacteria and Low Dissolved Oxygen in Kingston Lake and Crabtree Canal (2003) (discussing bacteria removal of constructed wetland).
- 34 [http://oaspub.epa.gov/waters/national\\_rept.control](http://oaspub.epa.gov/waters/national_rept.control); 2002 South Carolina 303(d) List.
- 35 South Carolina Department of Health and Environmental Control, *South Carolina Water Use Report 2001 Summary*. Available at <http://www.scdhec.net/water/pubs/wtruse2001.pdf>
- 36 United States Environmental Protection Agency, William S. Sipple, *Wetland Functions and Values*. Available at <http://www.epa.gov/watertrain/wetlands>
- 37 *Id.*
- 38 Porcher, R.D. and D.A. Rayner, *A Guide to the Wildflowers of South Carolina*, at 45 (USC Press 2001).
- 39 Sharitz at 559.
- 40 *Id.*
- 41 U.S. Environmental Protection Agency. 1995. *America's wetlands: Our vital link between land and water*. Office of Water, Office of Wetlands, Oceans and Watersheds. EPA843-K-95-001.
- 42 Sharitz at 559.
- 43 U.S. Fish and Wildlife Survey of Fishing, Hunting, and Wildlife Associated Recreation (2001). Available at <http://www.census/prod/2002pubs/FHW01.pdf>
- 44 *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) (“SWANCC”).
- 45 *E.g.*, *Treacy v. Newdunn Assoc.*, 344 F.3d 407, 415 (4<sup>th</sup> Cir. Sept. 10, 2003); *United States v. Rapanos*, 339 F.3d 447, 452 (6<sup>th</sup> Cir. August 5, 2003).
- 46 Joint Memorandum Guidance, Advanced Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of Waters of the United States, 68 Fed. Reg. 1991 (January 15, 2003).
- 47 *National Mining Ass'n v. U.S. Army Corps of Engineers*, 145 F.3d 1399, 1404 (D.C. Cir. 1998).
- 48 *E.g.*, *Borden Ranch Partnership v. United States Army Corps of Engineers*, 261 F.3d 810, 815 (9<sup>th</sup> Cir. 2001), *aff'd per curiam*, 537 U.S. 99 (2002) (digging deep trench through wetland discharged pollutants); *Avoyelles Sportsmen's League, Inc. v. Marsh*, 715 F.2d 897, 923 (5<sup>th</sup> Cir. 1983) (holding the word “addition” may be reasonably understood to include “redeposit”).
- 49 See 40 CFR 232.2 (2)(i) (“The Corps and EPA regard the use of mechanized earth-moving equipment to conduct landclearing, ditching, channelization, in-stream mining or other earth-moving activity in waters of the United States as resulting in a discharge of dredged material unless project-specific evidence shows that the activity results in only incidental fallback.”)
- 50 DHEC letter to EPA Water Docket #OW-2002-0050, at 2 (April 16, 2003).
- 51 S.C. Code Ann. § 48-1-10(2) (2001).
- 52 “Wetlands clearly fall within the definition of waters of the state. It is therefore unlawful under the [PCA] to discharge any material into wetlands except in compliance with a DHEC permit.” Letter from General Counsel Carlisle Roberts, Jr. to Senator Robert L. Waldrep (Mar. 1, 2001). See also Knowles, *Wetland Rules and Regulations in South Carolina*, South Carolina Bar Continuing Legal Education 221 (1991); Knowles, *Development of Wetland Classifications and Standards for South Carolina* (S.C.DHEC, Aug. 1991) (DHEC “has a legal opinion that wetlands are included in [the PCA’s definition of waters] because of the listing of marshes and all other bodies of water”).
- 53 Order of Judgment, *GCO Minerals Co. v. S.C. DHEC and S.C. Wildlife Fed'n*, Case No. 93-CP-40-0421, p. 23 (Jan. 19, 1995).
- 54 S.C. Code Ann. § 48-1-90. The Pollution Control Act gives DHEC the power to “abate, control, and prevent pollution,” S.C. Code Ann. § 48-1-20, which includes the “alteration of the chemical, physical, biological and radiological integrity of water.” 25 S.C. Code Ann. Regs. 61-68E.4.a.

<sup>55</sup> 25 S.C. Code Ann. Regs. 61-68E.4.a.

<sup>56</sup> 25 S.C. Code Ann. Regs. 61-68E.8.

<sup>57</sup> 25 S.C. Code Ann. Regs. 61-68D, F.

<sup>58</sup> 25 S.C. Code Ann. Regs. 61-9, § 122.2(b)(95)(Supp. 2001) (Wetlands are those “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.”). See 33 CFR 328.3(b).

<sup>59</sup> 25 S.C. Code Ann. Regs. 61-9.122.3(b).

<sup>60</sup> 40 CFR 230.10(a).

<sup>61</sup> 40 CFR 230.10(c).

<sup>62</sup> 40 CFR 230.10(d) and Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines.

<sup>63</sup> On the Department of Energy’s Savannah River Sits (SRS) on the upper Coastal Plain of South Carolina, 46% of the 371 known Carolina bays or similar wetland depressions are 1.2 ha in size. Sharitz at 552.

<sup>64</sup> Leibowitz at 524.

<sup>65</sup> *Compensating for Wetland Losses* at 37.

<sup>66</sup> *Id.*

<sup>67</sup> *Id.* at 101.

<sup>68</sup> *Id.* at 103.

<sup>69</sup> *Id.* at 3.

<sup>70</sup> *Id.*

<sup>71</sup> *Id.* at 106.

<sup>72</sup> *Id.* at 31.

<sup>73</sup> Sharitz at 550-562.

<sup>74</sup> *Id.* at 555.

<sup>75</sup> *Id.* at 551.

<sup>76</sup> *Id.* at 555.



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