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Collaboration on Stimulus Funding Applications

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Introduction

In February of 2009, the American Recovery and Reinvestment Act (ARRA) was signed into law.¹ ARRA,² better known as the stimulus bill, was targeted at rebuilding infrastructure and seeding the next generation of economic growth.

The summer months of 2009 have seen a plethora of Funding Opportunity Announcements (“FOAs”) and applications for stimulus money. There have been opportunity announcements by many federal agencies, but the Department of Energy (DOE) has been a front runner in providing stimulus-funding opportunities. Smart Grid investment grants alone offered a potential of \$3.9 billion in matching funds, with the corresponding number of applications for this opportunity far exceeding the available financial support.

Competition for stimulus money has been fierce, with many entities chasing a limited number of dollars. Application processes are complicated and challenging to complete. Skill in addressing all application requirements has been a key differentiator for DOE reviewers in determining whether to approve or reject applications.

Successful candidates have utilized a number of advisors in managing funding, legal, process, and industry issues to provide the ingredients for a winning application. In this regard, collaborative efforts between legal and consulting firms have proven to be very effective in helping applicants produce successful applications.

Ten months after the announcement of the ARRA there remain a number of stimulus opportunities which are accessible until late 2011. Most of these are loan-guarantee opportunities. Loan-guarantee applications are

among the most difficult of all the stimulus-funding requests and as such provide the opportunity for continued collaboration between legal and consulting firms.

This article describes how such collaborative efforts are structured to match specific requirements of the stimulus opportunities in general, with a focus on the loan-guarantee program.

The Loan-guarantee Program

The loan-guarantee program was authorized by Section 1703 of Title XVII of the Energy Policy Act of 2005.³ Title XVII provides broad authority for DOE to guarantee loans that support early commercial use in the U.S. for new or significantly improved technologies in energy projects, subject to a business case that highlights the likelihood for repayment of principal and interest by the borrower.

The loan-guarantee program was targeted for early commercial use only (not energy research, development, and demonstration programs). The principal goals of the program are to encourage commercial use of new or significantly improved energy-related technologies in the United States and to achieve substantial environmental benefits.

Eligible projects included those which “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases” and employ new or significantly improved technologies as compared to technologies in service in the U.S. at the time the guarantee is issued.

In the first solicitation for the program on Dec. 31, 2006, the DOE received 143 pre-applications requesting more than \$27 billion in loan-guarantee protection for project costs estimated at more than \$51 billion. The DOE,

however, has been slow to process applications, with only a few loan-guarantees approved by the spring of 2009.

Since one of the goals of the ARRA was to provide opportunities for funding that will rapidly inject money into the economy, increased funds were authorized and several new FOAs were introduced.

On June 29, 2009, the DOE issued loan-guarantee solicitation announcements to address projects that employ innovative energy efficiency, renewable energy, and advanced transmission and distribution technologies. This solicitation (FOA-140) is funded partly through ARRA under the authority of the newly created Title XVII, Section 1705 of the Energy Policy Act of 2005.

On Oct. 7, 2009, the DOE issued an additional solicitation for loan-guarantee applications under its new Financial Institution Partnership Program (FIPP) for Renewable Energy Generation Projects. Under the solicitation, DOE will guarantee loans made by qualifying financial institutions to commercial generation projects using renewable energy, including hydropower. (FOA-166).

The DOE also promises that a later solicitation will offer loan-guarantees for manufacturing projects related to commercial technologies for renewable energy generation.

FOA-140 and FOA-166 have similar structures in that there are multiple rounds, with two parts per round, various prescribed application fees, and around 100 pages of instructions as well as an assortment of forms that must be processed. These opportunities will remain open through 2011, and the additional solicitation for commercial manufacturing technologies will most likely remain open through this same time frame.

Application Preparation

Applications for FOA-140 and FOA-166 loan-guarantee opportunities are similar. The primary difference is the process for obtaining funding for the portion of the loan that the applicant provides. Loan-guarantees are structured such that the federally guaranteed percentage will not exceed 80 percent of the maximum aggregate principal and interest during the loan term.

FOA-140 requires the project developer to arrange for funding of the 20 percent of project costs funded by the project sponsor or project developer, while FOA-166 requires certified banking institutions to arrange for funding of the 20 percent of project costs funded by the project sponsor or project developer.

The Part I applications for both FOA-140 and FOA-166 have six sections:

- Applicant Information
- Project Description
- Technical Information
- Business Plan
- Financial Plan
- Applicant Certifications and Commitment Letters

All sections are composed as independent files and written in narrative style with no page limits. The Part I application is the decision point for whether DOE will process the Part II application.

DOE criteria for application approval are provided within the FOA, with weightings provided for each of the specified criteria.

The due diligence process is quite involved as DOE has pre-certified law firms, engineering firms, consulting firms, and financial management firms as qualified entities that can review loan-guarantees on behalf of the DOE.

A successful application requires both legal expertise and business acumen to interpret what the law requires and link it to business parameters of the project. Application advisors frequently help the project developer understand the intent of the application language and are involved as intermediaries with third parties needed to provide information for the application.

An application team is comprised of personnel from the client (usually the Loan-guarantee Applicant), and representatives from the consulting and legal firm that are providing assistance to the applicant. There will typically be a lead person from both the consulting firm and the law firm and staff from each entity to address all the application requirements. The team typically consists of 3 to 4 people, with expertise from either the consulting firm or law firm used on an as-needed basis for specific expertise requirements.

DOE Application Guidance

Areas where both consulting and legal skills can make a big difference in the quality of an application are shown in the following table:

General DOE Guidance	Experiential Guidance
All applications must show that a site has been selected and that the applicant has control over the project site through a lease agreement, deed, or option to purchase.	Applicants frequently require assistance by the application team in securing proper documentation, including zoning ordinances, lease or ownership agreements, and assurances that the applicant has taken advantage of state or local benefits for location of the proposed facility.
Applicants must clearly substantiate all sources of equity. This must be documented in the form of an equity-commitment letter submitted with the application. The strongest applications show that equity is readily available at the time of application and will be provided directly by the project sponsor or a combination of the sponsor and committed credit-worthy investors.	Loan-guarantee applicants often struggle to raise debt and equity for their portion of the project (not funded by through the Loan-guarantee Program). The application team frequently has to work closely with the project capital advisor to ensure adequate documentation for a project (e.g., signed letters of commitment). Additionally, this portion of the application frequently requires inquiries with agencies (e.g., S&P) regarding the project financial rating process in Part II of the application.

General DOE Guidance	Experiential Guidance
<p>The application package should contain an interactive financial model that enables lenders to evaluate and validate the prospects for project profitability. The model should have an explanation of assumptions, and should have a structure that allows reviewers to access and stress test the model.</p>	<p>The application team must work closely with project capital advisors to adequately capture information about the project's financial model within the appropriate submission sections. This also requires synchronization of all financial projections in other source documents (for example, private placement memoranda, etc.), with the capital advisor projections.</p>
<p>The application should have a strong contractual foundation for both supply and project off-take, either through commitments with purchasers of the output product in the case of a manufacturing facility, or Purchased Power Agreements in the case of a generating facility.</p>	<p>The application team must work closely with the project developer to ensure that appropriate letters of commitment, memoranda of understanding, Purchased Power Agreements, and other customer documentation are contained in the application.</p>
<p>Projects must display strong engineering, procurement, and construction (EPC) contracts that provide for liquidated damages and performance guarantees, are established with credit-worthy counterparties (preferably those with experience with the applicant technology), and have solid cost estimates, timelines, and procurement channels.</p>	<p>The application team must work closely with the project developer, EPC contractor, and supply chain to ensure that project schedules, material orders, and project off-take agreements are synchronized with the project schedule. The application team must work with the major component designer and supplier to develop energy balances used in the calculation of Greenhouse Gas (GHG) production and GHG avoidance in the operation of the constructed facility. Additionally, the application team must calculate labor-addition benefits during construction and steady-state operations.</p>
<p>Strong applications will demonstrate clear rights to the intellectual property necessary to implement the project, which is especially important for projects employing innovative technologies.</p>	<p>The application team must assist the project developer in clearly explaining and quantifying the technical advantage of the installed technology over that which is in existence.</p>
<p>The applicant should identify available tax and regulatory incentives. Strong applications demonstrate a strategy for monetization of state and federal tax incentives and show the impact of that strategy in the financial model. Appropriate monetization strategies could include off-take agreements for the sale of renewable energy certificates (RECs) and/or confirmed participation of an equity provider with the capacity to make use of tax incentives.</p>	<p>Loan-guarantee applicants frequently are able to take advantage of federal and state production and investment tax credit programs, state and local property tax or special bond agreements, Department of Treasury Advanced Energy Tax Credits, or the Federal Grant in Lieu of PTC program. The application team must be well-versed in legal, financial, and structural issues associated with each applicable program. This type of support strengthens the application in the eyes of the DOE and is of great value to the applicant.</p>
<p>The applicant must provide detailed information on markets and competition, including data to substantiate claims made in the application. Market information will include projected ranges of the product selling price, and the historical and forward-looking market trends as well as an assessment of competitors and the projected impact of new technologies.</p>	<p>The project application team may prepare a detailed market assessment, but the application team usually has to augment this client material and structure it in a form that is compatible with the application requirements.</p>
<p>Applications submitted by project sponsors or proposed borrowers should include a project-specific engineering report. An independent engineer's report should focus on the technology to be employed in the proposed project including siting, process, and mechanics, not simply general information about the technology.</p>	<p>The application team will interface with the project design and engineering firm(s) to ensure required project details are included in the application.</p>
<p>Applications submitted by project sponsors or proposed borrowers satisfy Section 1703 of Title XVII of the Energy Policy Act of 2005. For FOA-140, the applicant must show how technology constitutes a new or significant improvement over existing competing technologies in the commercial marketplace today by demonstrating that the technology provides a cost advantage and/or a meaningful improvement in productivity and value. The project application must also demonstrate how the project reduces or avoids GHG emissions over the life cycle of the project.</p>	<p>The application team typically fills out all the associated forms required for the submission and frequently is the group that calculates GHG reductions in accordance with EPA, ISO 14064, or World Resource Institute standards.</p>

General DOE Guidance	Experiential Guidance
Part II application submissions for either FOA-140 or FOA-166 must fully account for local and state permitting requirements and must submit a preliminary National Energy Policy Act (NEPA) evaluation.	The application team typically fills out all the associated forms required for the submission and frequently is the group that acts as facilitator for the NEPA submission.
Any application submission to the DOE for stimulus funding requires the applicant to perform many administrative functions and comes with special requirements for candidates that actually receive federal funding.	The application team must ensure that the applicant obtains a DUNS number, completes a Central Contractor Registration (CCR), and registers on the Federal communications outlet called "FedConnect." Additionally, the application team must ensure that the applicant is well aware of post-approval requirements for any Federal funding such as compliance with the "Buy American" provisions of ARRA, post-funding tracking and reporting requirements, and Davis-Bacon contractor labor provisions.

Cross-Discipline Teaming

One of the more interesting facets of teaming between consultant firms and legal firms is the breadth of services that can be addressed, which is crucial for any stimulus application, most especially a loan-guarantee submission. In many cases, legal and consulting firms have overlapping fields of expertise in areas of environmental or clean technology, but these firms also have specialty areas such as engineering, tax management, legal-entity structuring, and project management. Commonality is important in building a working team that has a standard lexicon and understanding of the project, but the areas of diversity are equally important to the applicant because they allow access to all areas of expertise through one combined entity. It is the combined knowledge of the consulting/legal partnership that provides the client with the best-value available assistance in completion of a successful loan-guarantee application.

- 1 "House Passes Stimulus Plan Despite G.O.P. Opposition." *New York Times*. January 29, 2009
- 2 "Deal Struck on \$789 Billion Stimulus." *New York Times*. February 11, 2009
- 3 U.S. Department of Energy, FEDERAL LOAN-GUARANTEES FOR PROJECTS THAT EMPLOY INNOVATIVE ENERGY EFFICIENCY, RENEWABLE ENERGY, AND ADVANCED TRANSMISSION AND DISTRIBUTION TECHNOLOGIES, Reference Number: DE-FOA-0000140, OMB Control Number: 1910-5134
- 4 Ibid.

Professional Announcements

Scott E. Hitch, Angela B. Hitch and Patrick B. Webb have formed the law firm of Hitch & Webb, LLC with offices in Atlanta and Roswell. Their web address is www.hitchwebb.com.

Bob Mowrey, Dave Meezan, Kipp Coddington and Doug Cloud are pleased to announce the formation of Mowrey Meezan Coddington Cloud LLP, with offices in Atlanta and Washington, DC. Their web address is m2c2law.com.

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A Message from the Outgoing Chairman

Now that my term as chair is up, I want to thank everyone for their help in making the section run smoothly and productively over the past year. I had a lot of fun working with the other officers, with Derrick Stanley at the State Bar, and with Steve Harper at ICLE. And I want to congratulate the new team of officers that will be running the section over the next year: Adam Sowatzka, Chair, James Griffin, Chair-elect, Mack McGuffey, Secretary, and Kasey Sturm, Treasurer. They are sure to “raise the bar” over the months to come. During those months I encourage all of you to connect more with the environmental law section. Whether you run for an office, speak at one of our events, write an article for this newsletter, or simply attend a brown bag lunch, we all benefit from your presence.

We have a very talented group of attorneys in this section, many of whom were the pioneers of environmental law. I have noticed that these pioneers are generous in sharing their insights when they are in the midst of the collegial atmosphere of a section event. And, it goes without saying, that any lawyer is much more approachable when you are not staring at him or her from across the negotiating table or from the other side of the aisle in court. I am convinced that two lawyers who know each other well can resolve a dispute for their clients better and more efficiently than two lawyers who are strangers. The section provides a great opportunity to make acquaintances out of those would-be strangers. During the coming year, I hope that you will join in and take full advantage of what Adam, James, Mack, Kasey, Derrick, and Steve serve up.

Finally, I hope that Adam and his team will follow through on one of the goals I had for last year: to replace the section symbol with something that does not resemble a former eastern bloc power plant. With that request, I officially turn over my former responsibilities to Adam. So, please call him with your great ideas on brown bags you want to hold, presentations you want to make, and articles you want to write.

Bill Sapp, Southern Environmental Law Center

A Message from the Editor

We on the Editorial Board of the Newsletter have worked hard this year to serve you. The expansion of the Editorial Board this past year has been a success for the quality of our publication. The secretary now gets the assistance of the six associate editors as well as the other officers in soliciting and editing articles. I particularly want to thank Martin Shelton for being first to volunteer to help last year when I took my turn in editing this publication. As I pass the duties of editing the Newsletter to the new Secretary, Mack McGuffey, I ask you to give him your full support in submitting articles, announcements, and suggestions for the Section.

James B. Griffin

The Newsletter of the Environmental Law Section of the State Bar of Georgia is published two to four times per year

in electronic format. The Newsletter is intended to be useful to the practicing environmental lawyer and to our clients, primarily in Georgia but also to a national and international readership. The editors welcome articles from the breadth of environmental law practice. Articles should be well-written, cited where necessary with endnotes, and formatted according to the Blue Book (17th ed.) for publication in a law review. In particular, please be careful in citing internet sources.

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Freshwater Wetlands: Integrating Science and Policy

by Bruce A. Pruitt, Ph.D., PH, PWS, Principal, Senior Scientist
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Abstract

Despite the importance of wetlands to ecosystems, the destruction of wetlands in the United States has been historically rampant; policies and laws encouraged wetland conversion until less than four decades ago. Nonetheless, as public policy has changed towards wetlands, it is not always well-informed by science. Legislation and regulations for wetland protection have been enacted without the support of sound wetland science, thereby undermining those policies. The ability of wetland owners, practitioners, and regulators to interpret, apply, and enforce wetland laws that are not founded in wetland science is difficult, if not impossible.

In recent years, the importance of wetland ecosystems as a critical component of the natural landscape has been documented by the scientific community and, for the most part, acknowledged by policy makers. Laws and policies are now in place to achieve “no net loss” of wetlands acreage and functions. However, there remain disparities between the science of wetlands and the laws and policies enacted to protect wetlands. Two areas that have received much criticism are compensatory mitigation for wetland losses, which are permitted under § 404 of the Clean Water Act, and the scientific underpinnings and consequences of the U.S. Supreme Court’s decision in *Rapanos v. United States*. Critics of compensatory mitigation claim that this practice has not met (and, some maintain, cannot meet) the “no net loss” goals. *Rapanos* commentators denounce the science purportedly behind the decision and bemoan the uncertainty it creates for all parties involved in wetland permitting and protection.

The objectives of this paper are three-fold: 1) to provide a brief overview of the existing regulations of wetlands, emphasizing compensatory mitigation and the *Rapanos* decision; 2) to analyze the disparities between wetland science and policy and law; and 3) to recommend guidance in regards to integrating science with regulatory policy to resolve these disparities.

Introduction

Wetlands have been described as being “among the most important ecosystems on the Earth.”¹ For most of our nation’s history, however, wetlands were considered wastelands. In the 19th and early 20th centuries, Congress endorsed and funded many efforts to drain, dike, levee, fill, or otherwise alter wetlands.² In fact, Washington, D.C. was built upon the draining and filling of a massive wetland area near the mouth of the Potomac River.³ It is estimated that over 200 million acres of wetlands existed in the lower forty-eight states prior to the European settlers’ arrival in North America. Today, less than half that acreage remains.⁴ In recent years public perception of wetlands has drastically changed. Despite this, hundreds of thousands of acres of wetland impacts are permitted every year.

Wetlands are “areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.”⁵ Wetlands are found along coastlines, in estuaries, along rivers and lakes, in floodplains, and even in isolated pockets not directly hydrologically connected to surface or ground water.⁶ They are critical links between terrestrial and open water habitats including streams, lakes, estuaries, and marine ecosystems.

Freshwater and estuarine wetlands comprise only about 6% of the earth’s surface,⁷ but they provide enormous environmental and economic value. These values are not, however, significant in traditional competitive markets with which most people are familiar; the values “do not accrue to any single market competitor.”⁸ Instead, the public at large benefits from wetland “ecosystem services,” mostly in the form of preventative maintenance.⁹ A healthy wetland system can provide invaluable services at a fraction of the cost of comparable man-made structures. Worldwide, wetlands generate approximately \$4.9 trillion worth of ecological services annually.¹⁰

Wetlands provide significant flood control. They act as “natural sponges,” trapping and slowly releasing rain, snowmelt, surface water, ground water, and floodwaters.¹¹ This kind of flood control is often otherwise supplied by costly dredge operations and levee systems. In addition, coastal wetlands provide a natural, self-maintaining, and self-repairing buffer to catastrophic events such as hurricanes.

Wetlands provide vital and significant improvements in water-quality within the ecosystem.¹² Wetlands absorb and filter pollutants, nutrients, and sediments from upland runoff that would otherwise reach lakes, rivers, and estuaries.¹³ Constructed (i.e., man-made) wetlands can be used to efficiently treat wastewater. In Clayton County, Georgia, a water-treatment system utilizing constructed wetlands reclaims 10 million of the 26 million gallons of water that residents use daily.¹⁴ The cost of systems like that found in Clayton County can be as little as half that of building a conventional wastewater treatment plant.

Wetlands stabilize shorelines and prevent erosion and its negative consequences.¹⁵ Soil erosion causes sedimentation of waterways, for which millions of taxpayer dollars are spent annually to maintain navigability.¹⁶ Erosion causes increased water turbidity, which may necessitate expensive treatments for use in municipal water systems.¹⁷ Erosion damages coastal estuaries, including those which are commercially important to industries such as fishing.¹⁸ Sediments can muddy estuarine waters, preventing sunlight from reaching aquatic vegetation.¹⁹ Excess nutrients, toxins, and pesticides in eroded sediments degrade estuarine water quality.²⁰

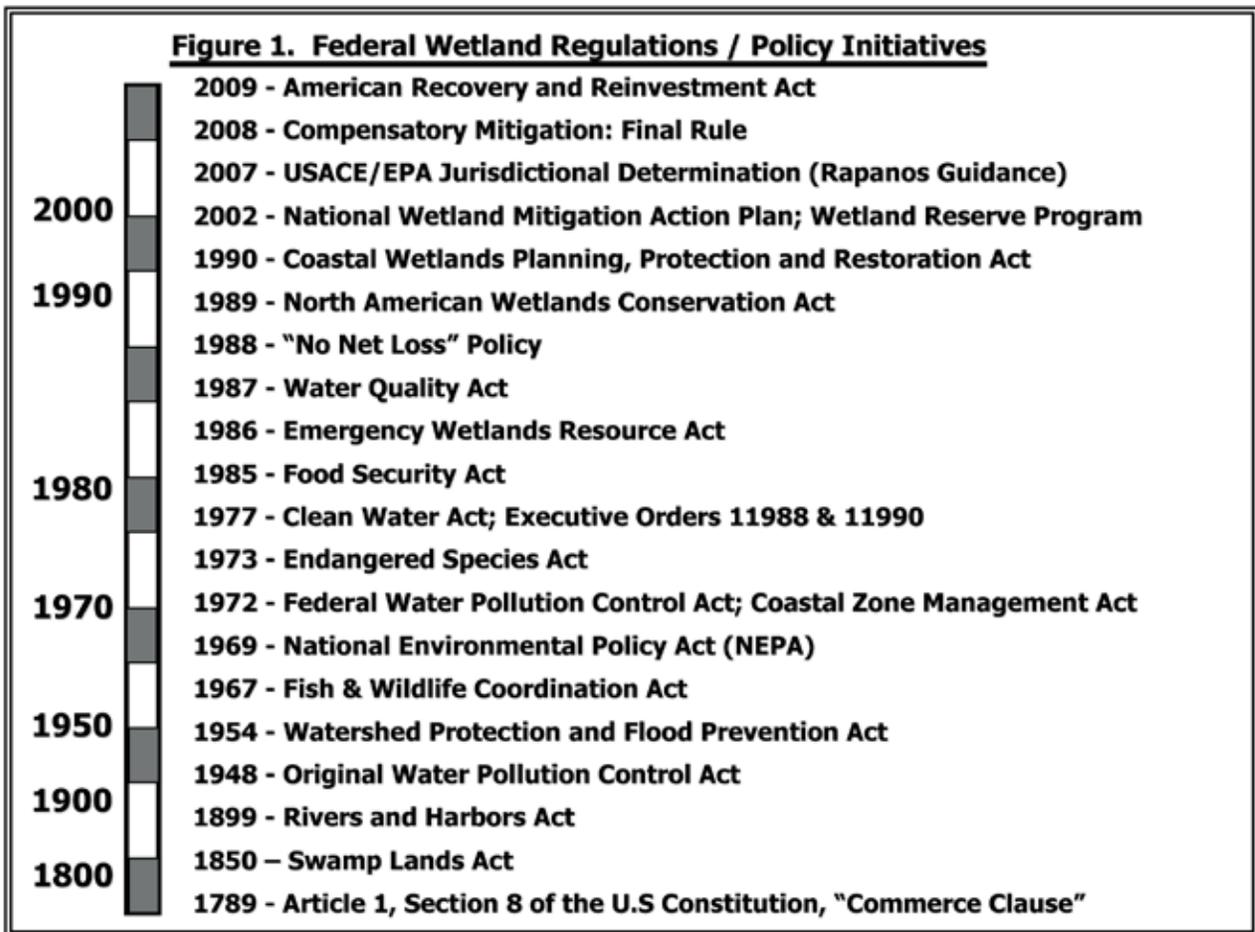
Freshwater and coastal wetlands provide habitats for fish and other wildlife. Wetlands provide spawning and rearing

habitat, protective cover, and food supplies for numerous aquatic species.²¹ Over one-third of threatened and endangered species in the United States live only in wetlands; almost one half use wetlands at some point in their life cycles.²² In fact, wetlands are an essential component of the life cycle of 75 percent of the fish and shellfish harvested for the United States commercial market, and up to 90 percent of fish caught for recreation.²³ As such, the Fish and Wildlife Service has noted that “the importance of both estuarine and freshwater wetlands to fish populations, and sport and commercial fishing, cannot be overemphasized.”²⁴ In the Southeast, almost all of the area’s commercial catch and nearly half of the recreation catch are species that depend on the estuaries-coastal wetland system.²⁵ In Georgia, commercial and recreational fishing contributes approximately \$1.5 billion to the state’s economy each year.²⁶ Likewise, many bird populations feed, nest, and raise their young in wetlands, including ducks, geese, woodpeckers, hawks, wading birds, and many song-birds.²⁷ Coastal and inland wetlands are important for migratory waterfowl, which use wetlands for resting, feeding, breeding, or nesting for at least part of the year.²⁸

Finally, wetlands provide environments conducive for hunting, fishing, hiking, boating, cycling, and other recreational activities. Almost 100 million Americans fish, hunt, birdwatch, or photograph wildlife, and they spend approximately \$59.5 billion on these recreational endeavors annually.²⁹ Painters, writers, photographers, and other artists are inspired by wetlands for their work, thereby bringing the treasures of these unique and fragile habitats to people across the country and around the world.

Despite myriad benefits, wetlands historically have been filled or drained at an alarming rate. When Europeans first settled in what is now the United States in the 1600’s, our future nation contained approximately 221 million acres of wetlands.³⁰ By the mid-1980’s, only about 103 million acres remained.³¹ The displacement of wetlands which began in the eastern United States continued westward as the need for agricultural and silvicultural products increased. Rapid agricultural expansion westward beginning in the mid to late 1800’s resulted in major losses of prairie pothole wetlands of western Minnesota, northern Iowa, and North and South Dakota, as well as the bottom lands wetlands of Missouri and Arkansas, the delta wetlands of Mississippi and Louisiana, and the gulf plains of Texas.³² In the first half of the 20th century, advances in engineering and technology facilitated drainage of wetlands, which was often at least partially subsidized by the federal government. In the 1930’s, engineering services were provided to farmers for substantial drainage, and by the 1940’s the government shared the cost of drainage projects themselves.³³ The projects of the United States Army Corps of Engineers (the “Corps”) and as well as the incentives of federal laws led to the drainage of huge expanses of the Florida Everglades.³⁴ Organized drainage districts were established throughout the country to coordinate efforts at removing surface waters.³⁵

In the mid-20th century, public perception and policy towards wetlands shifted. As the supply of remaining wetlands decreased and the values of wetlands became more widely known, “public attitudes and public policy began to shift from



supporting and subsidizing wetland conversion to promoting wetland conservation and restoration.”³⁶ Despite this, some federal programs continued to support wetland reclamation;³⁷ approximately 460,000 acres of wetlands were lost each year between the mid-1950’s and mid-1970’s.³⁸

I. *Historic and Existing Wetlands Policies and Laws*

The authority to regulate interstate and foreign commerce is granted to Congress in Article 1, Section 8 of the Constitution of the United States.³⁹ Congress’s authority to regulate wetlands is an outgrowth of this commerce clause, because interstate and foreign commerce often are conducted in waters of the United States. Several federal laws dating back to the 19th century effect wetland protection in varying ways and with varying efficacy (**Figure 1**). In 1849, Congress passed the Swamp Lands Act, which eventually granted swamp and overflow lands to 15 states.⁴⁰ The purpose of the Swamp Lands Act was to enable states to reclaim wetlands through levees and draining. The Act eventually resulted in the loss of 64,895,415 acres of wetlands.⁴¹ In Florida alone, the Act accelerated the development of the Everglades by transferring approximately 20 million acres (81,000 km²) of the broad flats of the Everglades to the State of Florida. The provisions of the Swamp Lands Act were not reversed until the Water Pollution Control Act of 1972 (a.k.a., Clean Water Act) and subsequent legislative actions.

Known as the oldest federal “environmental” law in the United States, the Rivers and Harbors Act of 1899, Section 9, prohibits the construction of any bridges, causeways, dams, or dikes over or in navigable waters of the United States until the consent of Congress has been obtained.⁴² In addition, pursuant to Section 10 of the Act, a permit is required to excavate, fill, or alter the course, condition, or capacity of any port, harbor, channel, or other areas with the reach of the Act.⁴³ Consequently, the Rivers and Harbors Act protects streams and wetlands indirectly by limiting activities that alter the reach and circulation of the waters of the United States. However, the Act as amended contains a clause, such that if such structures lie wholly within the limits of a single State, the structure can be constructed following approval by the Secretary of Transportation or by the Chief of Engineers and Secretary of the Army.⁴⁴ The jurisdiction of the Rivers and Harbors Act extends to “navigable waters,” which are defined as waters subject to the ebb and flow of tides and/or waters that are used, have been used, or are susceptible to use as a means to transport interstate or foreign commerce.⁴⁵ Section 13 of the Rivers and Harbors Act, the Refuse Act, made it unlawful to discharge any refuse matter of any kind or description (other than liquids) into any tributary of navigable waters without a permit.⁴⁶ Following the *Rapanos* decision (discussed *infra* Section II), for a water body (stream or wetland) to be considered a federal jurisdictional water, connection between the water body and Section 10 waters must be established.

The late 1960’s and early 1970’s heralded the beginning of an era of federal legislation and policies promoting wetland conservation and restoration.⁴⁷ The Water Pollution Control Act of 1972 was the first incarnation of the Clean Water Act of 1977 (“CWA”), which remains the primary wetland-protection law in the United States today.⁴⁸ The stated objective of the CWA is to

“restore and maintain the chemical, physical and biological integrity of the Nation’s waters.”⁴⁹ Section 404 of the CWA gives the United States Environmental Protection Agency (“EPA”) and the Corps responsibility over so-called “waters of the United States,”⁵⁰ which include certain “jurisdictional” wetlands. The Corps is authorized to issue permits for discharges of dredge or fill material into jurisdictional wetlands, and EPA has the authority to review and veto these permits.

During his 1988 presidential campaign, candidate George H.W. Bush promised a national wetlands policy of “No Net Loss.” This campaign promise was in alignment with a concept developed by the National Wetlands Policy Forum.⁵¹ President Bush announced the adoption of the policy in January of 1989 and declared the goal of achieving “no overall net loss of the nation’s wetlands in terms of both acreage and function.”⁵² The policy’s short-term goal was to eliminate wetland losses in acreage and function, and its long-term goal was to increase them. The primary federal mechanism for achieving the No Net Loss goals has been compensatory mitigation via § 404 permitting.

CWA § 404 does not specifically address wetlands mitigation. Indeed, the words “mitigate” and “mitigation” do not appear in that code section. The CWA does, however, provide implicit authority for the Corps to require applicants to mitigate for wetlands impacts as conditions of their § 404 permits.⁵³ Federal regulations adopted as guidelines to § 404(b)(1) require all applicants (for permits to discharge dredge or fill material into waters of the United States) to first demonstrate that such impacts are unavoidable (i.e., no other “practicable alternatives” to the impact exist).⁵⁴ If there are unavoidable adverse impacts to waters of the United States, including jurisdictional wetlands, the applicant must take steps to minimize them.⁵⁵ Any remaining adverse impacts must be compensated for.⁵⁶

Compensatory mitigation can be accomplished by creating, restoring, enhancing, and (under very limited circumstances) preserving wetlands.⁵⁷ There are several mechanisms for these compensatory mitigation techniques. First, is permittee-responsible mitigation, where the § 404 permittee performs the mitigation after the permit is issued. The permittee is responsible for the implementation and success of the mitigation project, which may occur at the site of the wetland impact or at an off-site location within the same watershed.⁵⁸ The second mechanism is use of a mitigation bank, where a responsible third party which owns or manages a wetland area that has been restored, established, enhanced, or preserved sells wetlands “credits” to those applying for § 404 permits.⁵⁹ The third mechanism for compensatory mitigation is the in-lieu fee option, where a § 404 permittee gives funds to a public agency or non-profit organization which pools financial resources to construct and maintain a mitigation site.⁶⁰ Unlike mitigation banking, mitigation here usually occurs after the permitted impacts.⁶¹

In supporting the goal of “no net loss of wetlands,” the National Wetlands Mitigation Action Plan of 2002 included the following action items: to clarify recent mitigation guidance, to integrate compensatory mitigation into a watershed context, to improve compensatory mitigation accountability, to clarify performance standards, and to improve data collection and availability.⁶² Collaboration between the Corps, EPA, and the

federal departments of Commerce, the Interior, Agriculture, and Transportation was required before the Plan could be fully implemented. On April 10, 2008, EPA and the Corps published the Final Rule for Compensatory Mitigation for Losses of Aquatic Resources (“Mitigation Rule”).⁶³ Until the Mitigation Rule was developed, the Corps relied on informal agency guidelines and memoranda to guide mitigation decisions.⁶⁴ These regulations were developed pursuant to a congressional directive from 2003. The Mitigation Rule establishes a hierarchy of preference for mitigation mechanisms.⁶⁵ Permittees must first attempt to secure appropriate credits from a mitigation bank. If no such credits are available, the next alternative is for the permittee to establish its own mitigation project. The final option is the in-lieu fee alternative. EPA has stated that mitigation banking is the preferred mechanism because banks are the “most reliable form of compensatory mitigation.”⁶⁶

Some of the standards and administrative procedures in the Mitigation Rule were, in part, based on recommendations from a 2001 National Research Council (NRC) report, *Compensating for Wetland Losses Under the Clean Water Act*,⁶⁷ that provided analysis of and recommendations for federal compensatory-mitigation practice. Among other things, the NRC report recommended that compensatory mitigation be based on a “watershed approach.”⁶⁸ The introduction to the Mitigation Rule in the Federal Register states that the 2001 NRC report was “an important resource” in the development of the Mitigation Rule.⁶⁹

As noted above, § 404 permitting is only required for “jurisdictional” waters. Jurisdictional waters are “navigable” waters, though they do not have to be “traditional” navigable waters or those that could be used for waterborne commerce in order to be considered jurisdictional under the CWA.⁷⁰ In 2006, the Supreme Court decided *Rapanos v. United States*,⁷¹ restricting the scope of the Corps’ interpretation of “navigable waters” under the CWA. The case centered around whether wetlands adjacent to tributaries of traditional navigable waters are jurisdictional.⁷² The case was decided 4-1-4, and although Justice Anthony Kennedy was the only justice to sign his concurring opinion, his “significant nexus” test for determining jurisdiction has become either the controlling test or one of two possible tests, depending on the circuit. Justice Kennedy suggested that the Corps develop regulations addressing the significant nexus test, and recommended it:

[I]dentify categories of tributaries that, due to their volume of flow (either annually or on average), their proximity to navigable waters, or other relevant considerations, are significant enough that wetlands adjacent to them are likely, in the majority of cases, to perform important functions for an aquatic system incorporating navigable waters.⁷³

The Corps and EPA jointly issued guidance in December 2008 clarifying what constitutes jurisdictional waters, but fact-specific (case-by-case) analyses are still required for some waters.⁷⁴ This has led to confusion for the courts, the regulators, and the regulated.

The Clean Water Restoration Act (CWRA) was introduced to Congress in 2007 and reintroduced in 2009,⁷⁵ though its passage is not certain. The purpose of the Act is to amend the Water Pollution Control Act to clarify the jurisdiction of the United

States over waters of the United States. Under the proposal, Section 502 of the Water Pollution Control Act would be amended by redefining waters of the United States as “all waters subject to the ebb and flow of the tide, the territorial seas, and all interstate and intrastate waters and their tributaries, including lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, and all impoundments of the foregoing, to the fullest extent that these waters, or activities affecting these waters, are subject to the legislative power of Congress under the Constitution.”⁷⁷

Presently, the State of Georgia has not enacted any wetland-protection regulations specific to activities involving the filling and dredging of non-Section 10 wetlands or freshwater wetlands. Only two states, New Jersey and Michigan, have developed wetland-protection programs for non-Section 10 navigable waters. Similar to most states, Georgia relies on Section 404 of the CWA administered by the Corps to protect freshwater jurisdictional wetlands. Two regulatory tools are currently used in Georgia to protect wetlands as well: the Coastal Marshlands Protection Act of 1970 and Section 401 of the federal CWA (**Figure 2**).⁷⁷

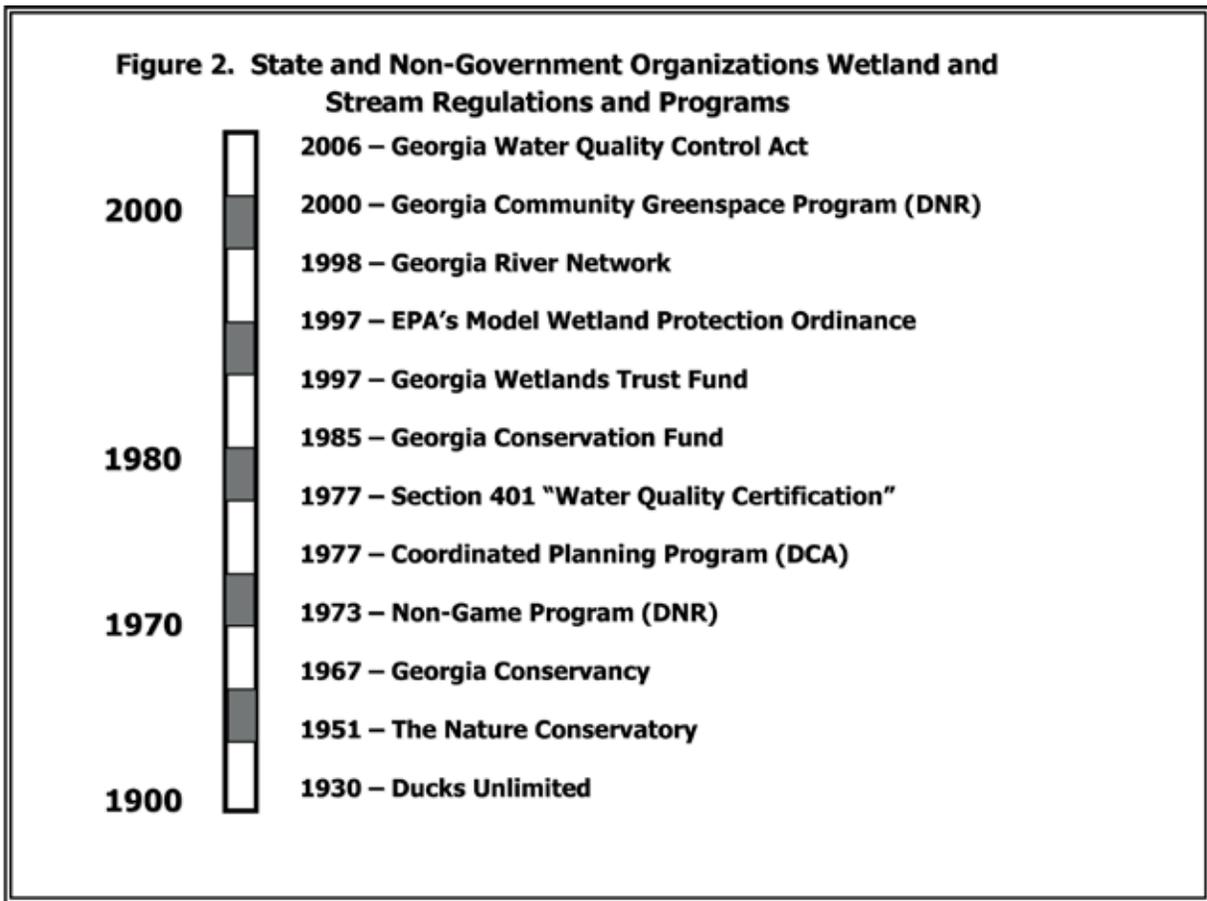
II. Disparities Between Scientific Findings and Policies and Laws

Over the past several decades, regulatory agencies and wetland scientists have devoted considerable time and resources toward the development of policies and strategies that protect wetland ecosystems.⁷⁸ Nonetheless, there still exists a disparity between wetlands science and policy. At times, science fails to provide the information needed to establish or amend policies. At other times, policies are inconsistent with scientific conclusions. Science does not always survive the political process.

Compensatory Mitigation

Although the No Net Loss policy has led to wetland-preservation efforts separate from those required under CWA § 404 regulations,⁷⁹ recent attempts at reaching the No Net Loss goals have focused on § 404 compensatory mitigation.⁸⁰ The policies and standards governing compensatory mitigation have, however, provided much fodder for those who believe that wetlands policy and science are detached.⁸¹

The central criticism of compensatory mitigation is that wetlands restored or created pursuant to § 404 permits are rarely of the same quality or provide the same level of services as their natural counterparts.⁸² Detractors point to studies showing high levels of failure in compensatory mitigation projects.⁸³ A 2008 review of studies concerning administrative (i.e., permit compliance) and ecological performance of mitigation sites found that, due to failures in both areas, compensatory mitigation is failing to ensure no net loss of wetland acreages and functions.⁸⁴ This report found “compensatory wetland projects fail to replace lost wetland acres and functions even more often than they fail in their administrative performance,” and that “permit compliance has been shown to be a poor indicator of whether or not mitigation projects are adequately replacing the appropriate habitat types and ecological functions of wetlands.”⁸⁵ Studies like this suggest that, in the game of compensatory mitigation, we may be trading John Smoltz for Doyle Alexander.⁸⁶



Although § 404 compensatory mitigation has been in place since the 1980's, studies of its success in implementation have been very slow in coming. By the early 1990's, thousands of § 404 permits had been issued allowing trade-offs between constructed and mature wetlands, though ecologists had not published any relevant studies comparing the two.⁸⁷ The lack of relevant research sometimes allowed "monumental... losses in social values that might have been derived from wetlands under a more ecologically informed policy."⁸⁸ Moreover, ecologists were and are often hesitant to include or consider social values in their studies.⁸⁹ This is particularly true for economic valuations, but in the case of wetlands, "it is unimaginable that a few vague references to 'public goods' such as water purification, fish and shellfish incubation, etc. could overcome the effects of commercial and economic pressures that derive from unquestioned benefits of wetland conversion."⁹⁰ To date, linkages between economic and ecological models have not been firmly established.

The Corps's new Mitigation Rule as mentioned above purports to address most of the criticisms of compensatory mitigation, including the views of the inadequacy of restored or created wetlands. In fact, the introduction to the Mitigation Rule notes that "there are compensatory mitigation projects that do not fully succeed in replacing the functions and services of aquatic resources that are lost or altered as a result of permitted activities."⁹¹ But the introduction also maintains that the Mitigation Rule incorporates recommendations which will "improve compensatory mitigation practices."⁹² These include "focusing on effective site selection at a landscape and watershed scale, requiring enforceable permit conditions (including ecological performance standards), requiring

monitoring of compensatory mitigation, and undertaking adaptive management to help ensure success."⁹³

Despite the Corps' assurances that compensatory mitigation would improve under the Mitigation Rule, any improvements are inconsistent at best. Despite the adoption of the Mitigation Rule, the Corps sometimes fails to fully incorporate key recommendations from independent, highly-regarded scientific studies. The Corps, perhaps because of its concerns with administrative ease and the need to balance competing interests, sometimes fails to require a plan of compensatory mitigation of wetlands that actually works.

For instance, the 2001 NRC report contained as one of its key recommendations that individual permit decisions for compensatory mitigation be conducted according to a "watershed approach."⁹⁴ The NRC report maintained that a watershed approach to compensatory mitigation would work best if mitigation decisions took into account the "influence of landscape setting on ecological function."⁹⁵ It noted that ecological functions of a restored or created wetland did not just depend on its design and hydroperiod (the period of time during which it is covered with water), but also on its "local setting or context."⁹⁶ The local setting or context of a wetlands is best surmised through watershed assessments and plans.⁹⁷ In a separate forum, one of the committee members stated the notion much more succinctly, saying that "without a watershed plan, there is no watershed approach."⁹⁸

The NRC report recognized, however, that few communities actually have watershed plans. It suggested that, in the absence of a watershed plan, an alternate approach would be a "process that

engages community and multiple agency input supported by a panel of wetland experts from the scientific community who are familiar with the watersheds in question. This process could be an addition to an ongoing program, might operate at a state or a substate level, and could be led by federal, state, or local regulatory staff.⁹⁹

The Mitigation Rule does advocate for the use of a watershed approach to compensatory mitigation. Some commentators note, however, that the approach contained in the rule falls short of what the NRC report recommended. The Mitigation Rule states:

The district engineer must use a watershed approach to establish compensatory mitigation requirements in [USACE] permits to the extent appropriate and practicable. Where a watershed plan is available, the district engineer will determine whether the plan is appropriate for use in the watershed approach for compensatory mitigation. In cases where the district engineer determines that an appropriate watershed plan is available, the watershed approach should be based on that plan. Where no such plan is available, the watershed approach should be based on information provided by the project sponsor or available from other sources. The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites.¹⁰⁰

Critics of the Corps' watershed approach emphasize that under this method a "project-by-project analysis of mitigation" may be allowed that "need not look at the entire watershed and its needs."¹⁰¹ In addition, they decry the fact that, in absence of a watershed plan, regulators are encouraged to rely on information provided by the applicant, especially because the Mitigation Rule also states that "applicants are not required to incur substantial costs to provide information for the watershed approach."¹⁰² The lack of a threshold for local information about a watershed "almost certainly guarantees a great number of mitigation decisions purported to be based on the 'watershed approach' will in practice be based on nothing approaching the rigorous, comprehensive, and scientifically supported plans envisioned by the NRC."¹⁰³ According to these critics, the watershed approach to compensatory mitigation is a clear example of policymakers failing to abide by sound scientific recommendations.

Rapanos and Hydrologic Connectivity

In May 2007, the Corps and EPA jointly prepared a guidebook entitled *Jurisdictional Determination Form Instructional Guidebook*.¹⁰⁴ The Guidebook was prepared in response to the Supreme Court case *Rapanos v. U.S.*¹⁰⁵ The question for decision in *Rapanos* was whether wetlands located in proximity to nonnavigable tributaries of navigable waters could be regulated under § 404 of the Clean Water Act. In essence, the case was related to establishing hydrologic connection between wetlands and traditional navigable waters. Two tests for connection were set forth by Justice Antonin Scalia and Justice Anthony M. Kennedy, respectively, "relatively permanent waters" and "significant nexus." The Guidebook was revised in December 2008 to clarify what constitutes traditional navigable waters, adjacent wetlands, and relevant reach.¹⁰⁶ The Kennedy Test was grounded

in the components of Section 101 of the CWA by establishing a significant nexus based on the physical, chemical, or biological connection between the wetland and traditional navigable waters.

Applying the Kennedy Test, on Oct. 24, 2007, the 11th Circuit Court of Appeals overturned the Clean Water Act convictions of several individuals for dumping waste water into a stream.¹⁰⁷ The Court ruled that the United States government had not sufficiently demonstrated that the stream had a "significant nexus" to navigable waters to be subject to CWA jurisdiction. As the Court of Appeals recognized, an EPA expert had testified "clearly and unambiguously" at respondents' trial that the tributary into which respondents discharged pollutants, Avondale Creek, flowed year-round and that it fed into traditional navigable waters.¹⁰⁸ That testimony, as well as abundant evidence, overwhelmingly established CWA coverage of the discharges under the standards set forth by Justice Scalia for the four-justice *Rapanos* plurality¹⁰⁹ (and also under the standards proposed by the four dissenting justices.)¹¹⁰ The Court of Appeals did not decide that issue, however, because it held that the *Rapanos* plurality's standard is legally irrelevant and that Justice Kennedy's "significant nexus" standard is the controlling rule of law that lower courts must use in applying the CWA to tributaries of traditional navigable waters.¹¹¹

From the perspectives of stream ecology and hydrology, the interpretation of "significant nexus" by the 11th Circuit Court of Appeals in the *U.S. v. Robison*, as described above, is not supported by science. Any pollutant discharged to a stream may or may not result in a localized and/or downstream adverse affect on stream fauna especially in a perennial stream such as Avondale Creek. Scientific methods may not be sensitive enough to detect short- and long-term impacts, especially in larger streams where the effect is diluted. Nonetheless, under Justice Scalia's standard of "relatively permanent waters" as well as the more inclusive views of the *Rapanos* dissenters, Avondale Creek would be protected under the CWA. *Robison* is a prime example of where science does not support policy and where science lags behind policy.

Prior to *Rapanos*, the limits of jurisdictional, non-tidal waters of the United States were determined by the following criteria:

1. In the absence of adjacent wetlands, the jurisdiction extends to the "ordinary high water mark"; or
2. When adjacent wetlands are present, the jurisdiction extends beyond the "ordinary high water mark" to the limit of the adjacent wetlands; or
3. When the water of the United States consists only of wetlands, the jurisdiction extends to the limit of the wetlands.¹¹²

The term "ordinary high water mark" means that line on the shore established by the fluctuations of water and indicated by physical characteristics, such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas.¹¹³

Consequently, a "cause and effect" or "process and indicator" relationship was established scientifically between the periodicity of stream flow and the "ordinary high water mark." The limits

of jurisdictional, non-tidal waters of the United States were determined by evidence (indicators) of present or past stream flow regardless of the type and extent of impacts from introduced pollutants. In contrast, based on the 11th Circuit of Appeals, it was ruled that waters of the United States were determined by establishing whether the introduction of a pollutant caused a significant impact. Establishment of the periodicity of stream flow (i.e., perennial, intermittent or ephemeral) and the evidence of periodicity was not a consideration in the ruling.

Wetland Hydrology Criteria

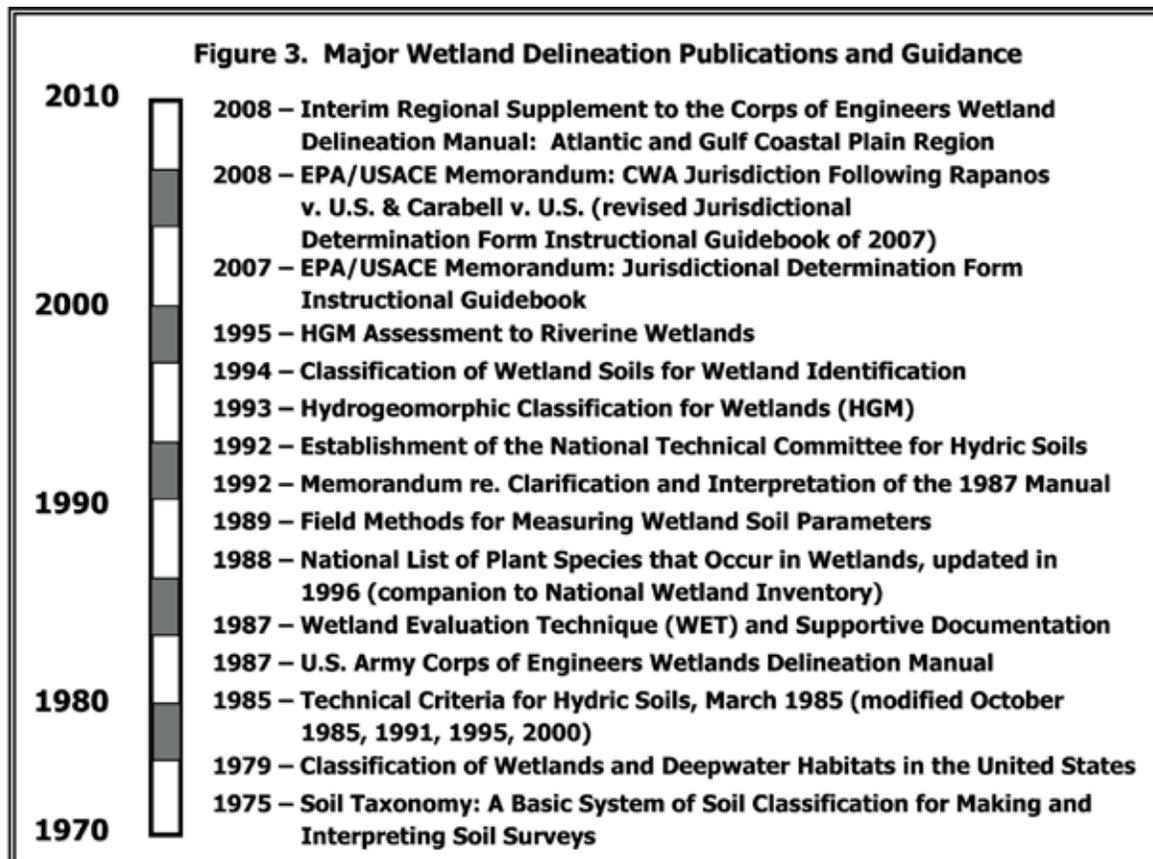
The NRC concluded that “wetland hydrology should be considered to be saturation within 1 foot of the soil surface for 2 weeks or more during the growing season in most years (about every other year on average).”¹¹⁴ In contrast, the Corps set a wetland hydrology threshold at 5% of the growing season in most years.¹¹⁵ Defining growing season has been problematic in itself. Historically, the growing season was based on the frost-free period and was used to define the period when damage to agricultural plants would not likely occur.¹¹⁶ There was no scientific evidence that the frost-free period is applicable to endemic plants, especially wetland plants, since many are capable of growing well before, and sometimes after, the frost-free period. The Corps attempted to clarify this discrepancy by defining the growing season based on local soil survey reports when air temperatures are 28°F or more in at least 5 of 10 years.¹¹⁷ However, according to Pruitt, soil temperatures measured in a southern Piedmont wetland lagged behind air temperature, consequently, the growing season used to establish wetland hydrology can be underestimated.¹¹⁸

Policy and Science Timing

By comparing the time lines of wetland policy (Figure 1) against wetland science (Figure 3), it becomes clear that the enactment of most wetland policies preceded significant wetland guidance documents. Before guidance documents could be provided to the regulators and the regulated, appropriate scientific studies of wetlands and waters of the United States needed to be completed. The author of this paper recalls the problems associated with determining federal jurisdictional wetlands and waters of the United States in 1984. At that time, wetland policy and laws such as the Clean Water Act, the Fish and Wildlife Coordination Act, and the National Environmental Policy Act had been enacted (Figure 1). The Corps wetland manual and supportive guidance such as technical criteria for hydric soils and national list of plants that occur in wetlands had not been published (Figure 3). More importantly, the National Technical Committee for Hydric Soils had not been established to address “problem areas” related to identification of hydric soils in regions dominated by sandy soils.

III. Recommendations for Addressing Segregation of Science and Policy

Until quite recently, wetland policy in the United States focused on encouraging conversion of these ecosystems into something considered more valuable. In the last thirty-odd years, policymakers have begun to appreciate wetlands for their ecological and economic functions. Despite this, many wetland policies remain segregated from sound scientific findings. Although wetland policy has proven very contentious in recent years, there are numerous ways in which gaps between wetlands science and policy can be addressed. Actions



can be taken at national, regional, state, local, and individual levels to facilitate communication between scientists and policymakers, educate policymakers and the general public as to the value of wetlands, show scientists what kinds of research are needed to further policy goals, and shift responsibility for implementation of wetlands policies.

National Action

Regulation of wetlands in the United States is primarily conducted at a federal level through the § 404 permitting regime. Therefore, where possible, national efforts should make wetland policy and science more in line with one another.

NRC Reports

As noted above, commentators claim that policymakers have ignored or discounted recommendations contained in NRC reports. Despite this, NRC should continue to publish reports analyzing the effectiveness of wetland laws, regulations, guidance, and policies. The NRC is an established and well-respected research entity and is able to make effective comments from a national perspective. Regional, state, and local reports are also important, but it is vital to continue to have examination of wetlands policies that is free from regional trends or bias.

Research Addressing Rapanos Uncertainties

If courts and regulators assumed that *Rapanos* would clarify the Corps' jurisdiction over specific wetlands and other waters, they were unfortunately mistaken. The decision was awkwardly split, and Justice Kennedy's significant nexus test (which will often have to be applied on a case-by-case basis) leaves much to be desired for purposes of establishing clear and defensible regulatory and judicial decisions.¹¹⁹

Additional research by wetland scientists would alleviate some of this confusion. Under the significant nexus test, the court determines whether a wetland or other waters "significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters."¹²⁰ Because this analysis will vary depending on what kind of wetland is being considered and where it is located, hydrologic investigations related to connection and periodicity should be conducted across various wetland classes and hydro-physiographies or ecoregions to make decisions regarding § 404 jurisdiction more clear and defensible.

Waters of the United States should be determined scientifically by the periodicity of hydrologic connection to traditional navigable waters. According to the Corps' *Jurisdictional Determination Form Instructional Guidebook*, "[p]rincipal considerations when evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary."¹²¹ Currently, there is uncertainty regarding the determination of the headward extent of waters of the United States based on the volume, duration, and frequency of flow. However, according to the Guidebook, relatively permanent waters ("RPW") are defined as "a tributary that is not a TNW and that typically flows year-round or has continuous flow at least seasonally (e.g., typically 3 months)."¹²² Consequently, the duration of stream flow to meet the minimum requirements of relatively permanent waters is three months and can be measured by scientific

(hydrologic) means.

Research Addressing Compensatory Mitigation

Extensive, continuing research is needed to assess whether compensatory mitigation is meeting the goals of the No Net Loss policy. This research should focus on wetland acreage and function and the long-term stability of restoration sites. Studies which compare the functions and services provided by impact sites to those supplied by the corresponding mitigation site are necessary as are additional empirical studies to show the differences in compensatory mitigation requirements across the Corps' districts. The Mitigation Rule gives significant discretion to district engineers in many areas. Therefore, examinations should concentrate on what different Corps districts typically require for § 404 compensatory mitigation and which requirements perform best at achieving No Net Loss goals. Research should concentrate on how compensatory mitigation practices can be improved to secure the replacement of § 404 permitted impacts to wetland acreage and function.

Mitigation banks need particular attention. The Mitigation Rule established a preference for use of mitigation banks for compensatory mitigation requirements, but stated that the preference for banks was based on "administrative criteria, not ecological criteria."¹²³ While there are few independent studies concerning the ecological performance of mitigation banks, they "have experienced many of the same problems as permittee-responsible mitigation."¹²⁴ Indeed, a study of mitigation banks in Ohio from 2006 found that, out of 12 assessed banks, 3 were "mostly successful," 5 were "successful in some areas but failed in other areas," and 4 were "mostly failed."¹²⁵ This study, which evaluated the banks "using biological, biogeochemical, and hydrologic monitoring techniques developed in earlier studies and part of the State of Ohio's wetland assessment program," is the most detailed and comprehensive study of mitigation banks to date.¹²⁶ Other state environmental agencies, including Georgia DNR, should conduct similar investigations of the success of mitigation banks within their borders. Results of such studies could help policymakers assess the efficacy of current mitigation banking practice in achieving the goals of No Net Loss.

Research Involving Wetlands Services Valuation

More research on the actual valuation of wetland functions and services should be conducted. During the 2007 workshop on *Valuation of Ecological Benefits: Improving the Science Behind Policy Decisions*, several recommendations were presented regarding integration of ecosystem valuations and policy making, as follows:

- Ecological valuations should be measured and balanced with socioeconomic considerations and environmental policy.
- Changes in ecosystem services should be measured, rather than the value of an entire ecosystem.
- The link between economic and ecological models should be established.
- Goods and services provided by ecosystems should be valued based on relative importance to a specific policy decision.
- All relevant impacts and stakeholders in the scope of the valuation should be considered.

- Extrapolations made across space, time, and scale should be scrutinized to improve extending or projecting economic and ecological models both temporally and spatially.¹²⁷

The above recommendations would foster a working relationship between scientists, economists, stakeholders, and decision makers by improved communication.

Research Involving Wetlands Hydrology Criteria

As recommended by the NRC, wetland hydrology criteria should be met by measuring soil saturation or free water in an unlined bore hole or groundwater well within one foot of the soil surface. This criteria would account for the root zone of wetland vegetation that extends below the soil surface and is exposed to saturated conditions. Regional-specific research should focus on the duration of saturation within one foot of the soil surface and the effects on endemic vegetation. Correspondence between duration of saturation and wetland vegetation including unique adaptations to saturated conditions should be explored in more detail across various hydric regimes. Consideration should be given to eliminating the need for establishing a growing season and applying wetland hydrology criteria to a twelve-month period.

Regional Action

Regional Technical Advisory Committees

The Science Advisory Board (SAB) was established in 1978 by the Environmental Research, Development, and Demonstration Act.¹²⁸ SAB is to provide scientific advice as requested by the EPA, the Committee on Environment and Public Works of the U.S. Senate, and three standing committees of the U.S. House of Representatives: Science and Technology, Interstate and Foreign Commerce, and Public Works and Transportation. Recently, SAB has provided review regarding development of numeric nutrient criteria applicable to water quality of streams, lakes, and wetlands. Similar to the SAB but at the state level, the Florida Department of Environmental Protection formed a Technical Advisory Committee which is composed of technical experts from throughout the State of Florida and EPA. Currently, the Technical Advisory Committee convenes frequently to address issues and policies related to water quality.

Such interdisciplinary technical advisory teams with expertise in wetland ecology, watershed hydrology, economics, and environmental law should be assembled within other states to develop and foster a relationship between scientists, economists, and policy makers at the state level. The advisory teams should transcend state and local political boundaries and make recommendations at both the drainage basin and wetland class scales.

State Action

Assumption of §404

Pursuant to the CWA, states are to assume and administer § 404, but the Corps currently administers the program. However, the Corps dredges approximately 250 million cubic yards of maintenance material from United States waterways each year.¹²⁹

Assumption of the program by the states might reduce bias and inconsistencies in enforcement, or the perception thereof. In addition, given the natural variability of wetlands common within state boundaries, state agencies, which have developed natural resource inventories, recognize and are more likely to afford protection of unique natural habitats, including wetlands and streams. Most states have scientists and engineers well-versed in aquatic ecology, hydrology, and water-quality modeling. States also have a better understanding of aquatic ecosystems that are hydrologically unique. For example, subterranean flow (“underground rivers”) is possible in karst geology in states such as Florida. Consequently, the long-term monitoring of streams and wetlands applicable to determining hydrologic connection and significant nexus is possible by the states.

Local Action

In recent years, nonetheless, local governments have played a major role in wetland protection. In most cases, unfunded federal mandates have fallen upon the local governments to enforce the CWA. In other cases, local communities have established expansive ordinances, policies, and non-regulatory programs by their own initiative to protect their valuable resources. In Georgia, local governments derive authority to develop wetland protection programs and ordinances from the home rule authority granted by the state constitution.¹³⁰

Local governments are often well-equipped to promulgate and implement regulations and programs to protect wetland resources within their borders. Local wetland programs allow for meaningful involvement of community members. Public comments solicited as part of a regulatory program may have more influence than they do for § 404 permitting. For non-regulatory programs, the proximity of the natural resource often creates a local constituency for its protection through acquisition. In the case of violations or encroachments, local authorities can respond quickly to prevent the loss of wetlands, which is preferable and cheaper than to restore a damaged wetland.

There are, however, some shortcomings to local wetland protection programs. Chief among these are a lack of resources and expertise. Wetland ecology is a complicated, dynamic science, and it is extremely uncommon for an existing local official to possess expertise in this field. Therefore, making decisions regarding the presence, value of, and acceptable impacts to wetlands may be beyond general community staff. Local governments can, of course, contract with outside consultants for assistance, though they may be expensive.

Ordinances & Policies

Local governments can adopt regulations more strict than the federal and state regulations. Some communities which have such ordinances have also adopted their own “No Net Loss” policies specific to their jurisdictions.¹³¹ An ordinance can be adopted that regulates direct impacts to jurisdictional wetlands¹³² as well as non-jurisdictional wetlands. Unless the state in which the community is located has assumed responsibility for § 404 permitting, any impact to a jurisdictional wetland would still require a § 404 permit. If the goal is to fill in the gaps created by *Rapanos*, an ordinance can

concentrate on impacts to isolated, non-jurisdictional wetlands.¹³³ Wetland-protection components can also be included in other portions of a community's code such as the zoning ordinance, subdivision regulations, critical habitat ordinance, floodplain regulations, and wastewater/septic regulations. Local governments can also institute non-regulatory wetland-protection programs, such as tax incentives, public works projects,¹³⁴ and public education.

Watershed Planning

Federal and state wetland laws generally regulate direct impacts to these ecosystems (i.e., impacts that occur within the wetland itself), but scientific studies show, however, that indirect impacts (such as increased stormwater and pollutants from upland areas, decreased groundwater recharge, and flow constrictions) often significantly affect wetland quality and functions.¹³⁵ Indirect impacts are a result of land-use practices, and are generally not regulated by states and the federal government. Local governments control many land-use practices that can indirectly affect wetlands, such as zoning changes, subdivision development, and stormwater criteria.¹³⁶

In recent years, increasing numbers of local governments have used watershed planning to guide decisions for activities that indirectly impact water quality and quantity. Watershed plans can incorporate wetlands protection so that wetlands are "inventoried, assessed and managed in the context of the entire watershed rather than on a site-by-site basis."¹³⁷ Watershed plans help communities "make better choices on preserving the highest quality wetlands, protecting the most vulnerable wetlands, and finding the best sites for wetland restoration."¹³⁸

As noted by the 2001 NRC report, watershed plans are very beneficial for the success of compensatory mitigation.¹³⁹ Compensatory mitigation is much more likely to replace lost aquatic functions and services if mitigation sites are chosen based on a watershed plan. Although the Corps does not require a watershed plan for compensatory mitigation, the agency will base its "watershed approach" to compensatory mitigation on such a plan if an appropriate one exists.¹⁴⁰ A watershed plan makes it more likely that, at least for § 404 permitted impacts in that watershed, the goal of No Net Loss will be met.

Conclusions

Because of the *Rapanos* decision, the need to develop and foster a strong relationship between science and policy for wetlands is greater than ever. Though on a national scale and across all wetland classes there has recently been a net gain in wetlands, freshwater wetlands continue to be displaced. Choices and trade-offs between wetland conservation and economic development should be based upon the best science available.

Federal and state funding for research should not only focus on recent legislative and court actions, but also on scientific studies related to the functions and services provided by wetlands. In particular, more science needs to support or refute the plurality opinion and the concurrent opinion in *Rapanos*.¹⁴¹ Interdisciplinary technical advisory teams should be fostered between scientists, economists, and policy makers.

Similar to Michigan and New Jersey, Georgia should develop and enact a Wetland Protection Act in regards to freshwater wetland

protection and permitting consistent with the objectives of the CWA. Following development of a state protection and permitting program and approval by the Corps and federal review agencies, the State of Georgia would assume enforcement of § 404 of the CWA for freshwater, non-Section 10 waters including wetlands. The Corps would retain jurisdiction over Section 10, tidal waters, navigable waters, and their adjacent wetlands.

Probably one of the most significant pieces of legislation introduced by Congress is the aforementioned Clean Water Restoration Act of 2007. It would broaden the definition of "jurisdictional waters" from "navigable waters" to "waters of the United States," thereby simplifying the defense of wetlands regulations and integrating science with policy. However, such a broad expansion of jurisdictional wetlands would be far beyond the administrative resources of either the Corps or the EPA and would thus require major changes in enforcement policies.

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(Notes)

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- 2 ECOLOGY OF FRESHWATER AND ESTUARINE WETLANDS 313 (Darold P. Batzer & Rebecca R. Sharitz eds., 2006); see also JAMES E. KUNDELL & S. WESLEY WOOLF, GEORGIA WETLANDS: TRENDS AND POLICY OPTIONS 7 (1986).
- 3 ECOLOGY OF FRESHWATER AND ESTUARINE WETLANDS, *supra* note 2, at 313.
- 4 See CONG. RESEARCH SERV., AGRICULTURE: A GLOSSARY OF TERMS, PROGRAMS, AND LAWS 185 (Jasper Womach, Coordinator, 2005 ed.), available at <http://www.ncseonline.org/NLE/CRSreports/05jun/97-905.pdf>.
- 5 OFFICE OF WATER & OFFICE OF WETLANDS, OCEANS, AND WATERSHEDS, U.S. ENVTL. PROT. AGENCY, AMERICA'S WETLANDS: OUR VITAL LINK BETWEEN LAND AND WATER 1 (1995), available at <http://www.epa.gov/owow/wetlands/vital/wetlands.pdf> [hereinafter AMERICA'S WETLANDS]. Federal regulations developed pursuant to the Clean Water Act define wetlands as "[t]hose 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." 40 C.F.R. § 232.2(r) (2008).
- 6 Bruce A. Pruitt, Hydrologic and Soil Conditions Across Hydrogeomorphic Settings (August, 2001) (unpublished Ph.D. dissertation, University of Georgia) (on file at <http://www.galileo.usg.edu/scholar/databases/getd/?Welcome>).
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- 8 KUNDELL & WOOLF, *supra* note 2, at 7.
- 9 *Id.*
- 10 Robert Costanza et al., The Value of the World's Ecosystem Services and Natural Capital, NATURE, May 15, 1997, at 4 tbl. 2, available at http://www.esd.ornl.gov/benefits_conference/nature_paper.pdf.
- 11 AMERICA'S WETLANDS, *supra* note 5, at 8.
- 12 A 1990 study conducted in the Congaree Bottomland Hardwood Swamp in

- South Carolina, estimated that this swamp's capacity for annual pollutant removal is equal to that of a \$5 million wastewater treatment plant. Environmental Protection Agency, Wetlands and People, <http://www.epa.gov/owow/wetlands/vital/people.html>. In Georgia, a study of the Alcovy River's bottomland forested wetlands showed that they significantly improved water quality which had been severely degraded by human and chicken waste. The water pollution control value of the 2,300 acre swamp was estimated at \$1 million annually. KUNDELL & WOLFF, supra note 2, at 9.
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- 24 THOMAS E. DAHL, U.S. FISH & WILDLIFE SERV., STATUS AND TRENDS OF WETLANDS IN THE CONTERMINOUS UNITED STATES 1998-2004, at 48 (2006), available at http://www.fws.gov/wetlands/_documents/gSandT/NationalReports/StatusTrendsWetlandsConterminousUS1998to2004.pdf.
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- 26 Robin Hill, Ga. Dep't of Natural Res., Georgia Gov. says "Go Fish," ESPN news story Jan. 4, 2008, <http://sports.espn.go.com/outdoors/fishing/news/story?id=3179590>.
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- 33 Id. at 8.
- 34 See, e.g., Sugar Act of 1934, Pub. L. No. 213, 48 Stat. 670 (1934).
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- 39 U.S. CONST. art. 1, § 8.
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- 44 33 U.S.C. § 401 (2008).
- 45 33 C.F.R. § 329.4 (2009).
- 46 33 U.S.C. § 407 (2008).
- 47 See the Endangered Species Act of 1973, 16 U.S.C. § 1531 et seq. (2005), prohibiting the taking, killing or disturbance of any endangered or threatened animal, which may apply to protect wetland-dependent plant and animal species; the Flood Disaster Protection Act of 1973, 42 U.S.C. § 4001 et seq. (2007), which provides federal flood insurance to states that discourage development in floodplains; the Food Security Act of 1985, 16 U.S.C. §§ 3801-3862 (2008), commonly known as the "Swampbuster" provisions, which prohibit farmers who have converted wetlands to farmland from receiving federal price supports, loans, crop insurance, or disaster payments; the Emergency Wetlands Resources Act of 1986, 16 U.S.C. §§ 3901-3932 (2008), which allows the government to purchase wetlands and funded the USFWS National Wetlands Inventory mapping project; the Coastal Wetlands Planning, Protection and Restoration Act of 1990, 16 U.S.C. §§ 3951-3956 (2009), which provides federal cost-sharing for projects designed to restore coastal wetlands; and the Food, Agriculture, Conservation and Trade Act of 1996, 7 U.S.C. § 1438 et seq. (2008), which established a government program to purchase easements on wetlands.
- 48 33 U.S.C. § 1251 et seq. (2008).
- 49 33 U.S.C. § 1251 (2009).
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- 51 See CONG. RESEARCH SERV., supra note 4, at 185.
- 52 See JULIA M. SIBBING, NAT'L WILDLIFE FED'N, NOWHERE NEAR NO-NET-LOSS 1 (2004), available at <http://www.nwf.org/wildlife/pdfs/NowhereNearNoNetLoss.pdf>.
- 53 See NAT'L RESEARCH COUNCIL, COMPENSATING FOR WETLANDS LOSSES UNDER THE CLEAN WATER ACT 64 (2001).
- 54 40 C.F.R. 230.10 (a) (2008).
- 55 40 C.F.R. 230.10 (d) (2008).
- 56 MEMORANDUM OF AGREEMENT BETWEEN THE DEPARTMENT OF THE ARMY AND THE ENVIRONMENTAL PROTECTION AGENCY: THE DETERMINATION OF MITIGATION UNDER THE CLEAN WATER ACT SECTION 404(b)(1) GUIDELINES § II.C. (Feb. 8, 1990), available at <http://www.epa.gov/owow/wetlands/regs/mitigate.html>.
- 57 See U.S. ENVTL. PROT. AGENCY, WETLANDS COMPENSATORY MITIGATION 1, available at <http://www.epa.gov/owow/wetlands/pdf/CMitigation.pdf> [hereinafter WETLANDS COMPENSATORY MITIGATION].
- 58 Id. at 2.
- 59 See generally OFFICE OF WETLANDS, OCEANS, AND WATERSHEDS, U.S. ENVTL. PROT. AGENCY, MITIGATION BANKING FACTSHEET: WHAT IS A MITIGATION BANK?, available at <http://www.epa.gov/owow/wetlands/facts/fact16.html> [hereinafter MITIGATION BANKING FACTSHEET].
- 60 WETLANDS COMPENSATORY MITIGATION, supra note 57, at 2.
- 61 Id.
- 62 NATIONAL WETLANDS MITIGATION ACTION PLAN (Dec. 24, 2002), available at <http://www.mitigationactionplan.gov/map1226withsign.pdf>.
- 63 The Rule's effective date was June 9, 2008. Final Compensatory Mitigation Rule, 73 Fed. Reg. 19,594 (Apr. 10, 2008).
- 64 James Murphy et al., New Mitigation Rule Promises More of the Same: Why the New Corps and EPA Mitigation Rule will Fail to Protect our Aquatic Resources Adequately, 38 STETSON L. REV. 311, 316 (2009).
- 65 33 C.F.R. § 332.3(b) (2008); 40 C.F.R. § 330(b) (2008).
- 66 MITIGATION BANKING FACTSHEET, supra note 59.
- 67 See generally, NAT'L RESEARCH COUNCIL, COMPENSATING FOR WETLANDS LOSSES, supra note 53.
- 68 Id. at 3-5.
- 69 Final Compensatory Mitigation Rule, 73 Fed. Reg. 19,594, 19,595. The preamble to the proposed Mitigation Rule, published in the Federal Register in 2006, noted that the Corps "considered the findings and recommendations" of the 2001 NRC report. 71 Fed. Reg. 15,520, 15,521 (Mar. 28, 2006).
- 70 See William Sapp et al., The Float a Boat Test: How to Use it to Advantage in This Post-Rapanos World, 38 ENVTL. L. REP., NEWS & ANALYSIS 10439, 10441 (2008).
- 71 Rapanos v. United States, 547 U.S. 715 (2006).

- 72 Id. at 729.
- 73 Id. at 781.
- 74 Fact-specific analysis is required for “non-navigable tributaries that are not relatively permanent,” “wetlands adjacent to non-navigable tributaries that are not relatively permanent,” and “wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.” U.S. ENVTL. PROT. AGENCY & U.S. ARMY CORPS OF ENG’RS, CLEAN WATER ACT JURISDICTION FOLLOWING THE U.S. SUPREME COURT’S DECISION IN RAPANOS V. UNITED STATES & CARABELL V. UNITED STATES (Dec. 2, 2008), available at http://www.epa.gov/owow/wetlands/pdf/CWA_Jurisdiction_Following_Rapanos120208.pdf [hereinafter CLEAN WATER ACT JURISDICTION FOLLOWING RAPANOS].
- 75 H.R. 2421, 110th Cong., 1st Sess. (2007); reintroduced as S.787, 111th Cong., 1st Sess. (2009).
- 76 S. 787, 111th Cong., 1st Sess. at § 4.
- 77 The jurisdiction of the Coastal Marshlands Protection Act is limited to marshlands, intertidal areas, mudflats, tidal water bottoms, and salt marshes or wetlands that are subject to the ebb and flow of tides. Consequently, freshwater wetlands are not protected under the Act. Section 401 of the CWA, also known as the water-quality certification allows the state to participate in the review of Section 404 applications regarding water quality. Prior to approval of a Section 404 permit by the Corps, a water-quality certification must be issued by the state. Section 401 certification is also required for other federal permits such Section 10 permits under the River and Harbors Act as described above and hydropower licenses permitted by the Federal Energy Regulatory Commission. The State of Georgia also has a non-regulatory program in place that affords some protection to wetlands and stream corridors, namely the Georgia Wetlands Trust Fund. See U.S. Army Corps of Eng’rs, Savannah Dist. & Georgia Land Trust Service Ctr., Agreement Between the Georgia Land Trust Service Center and the U.S. Army Corps of Engineers, Savannah District (July 3, 1997), available at <http://www.sas.usace.army.mil/lntrust.htm>.
- 78 See PAUL R. ADAMUS ET AL., WETLAND EVALUATION TECHNIQUE (WET), VOL. II: METHODOLOGY (1987); PAUL R. ADAMUS & L.T. STOCKWELL, A METHOD FOR WETLANDS FUNCTIONAL ASSESSMENT (1983); FRANKLIN C. DAIBER, ANIMALS OF THE TIDAL MARSH (1981); MARK M. BRINSON ET AL., A GUIDEBOOK FOR APPLICATION OF HYDROGEOMORPHIC ASSESSMENT TO RIVERINE WETLANDS (1995); ENVTL LAB., U.S. ARMY CORPS OF ENG’RS, CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL (1987); A.D. MARBLE, A GUIDE TO WETLAND FUNCTIONAL DESIGN (1992); MITSCH & GOSSELINK, supra note 1; W.S. SIPPLE, WETLAND IDENTIFICATION AND DELINEATION MANUAL (1988).
- 79 See, e.g., Natural Res. Conservation Serv., Wetlands Reserve Program, <http://www.nrcs.usda.gov/programs/wrp/>.
- 80 See NATIONAL WETLANDS MITIGATION ACTION PLAN, supra note 62, at 1 (“The primary purpose of this Action Plan is to further achievement of the goal of no net loss by undertaking a series of actions to improve the ecological performance and results of wetlands compensatory mitigation under the Clean Water Act and related programs.”).
- 81 See generally Murphy et al., supra note 64; SIBBING, supra note 52, at 3-4; R. Eugene Turner, Ann M. Redmond & Joy B. Zelder, Count it by Acre or Function: Mitigation Adds up to Net Loss of Wetlands, 23 NAT’L WETLANDS NEWSL. 16 (2001).
- 82 Turner et al., supra note 81, at 6, 14.
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- 84 Rebecca L. Kihlsinger, Success of Wetland Mitigation Projects, 30 NAT’L WETLANDS NEWSL. 14 (2008), available at <http://www.eli.org/pdf/research/nwn.30.2.kihlsinger.pdf>.
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- 86 In what is considered one of the worst trades in baseball history, the Detroit Tigers in 1987 traded John Smoltz for Doyle Alexander. See Worst Baseball Deadline Trades, ESPN Page 2 (Aug. 8, 2002), <http://sports.espn.go.com/espn/print?id=1414173&type=page2Story>.
- 87 Bryan Norton, Improving Ecological Communication: The Role of Ecologists in Environmental Policy Formation, 8 ECOLOGICAL APPLICATIONS 356 (1998).
- 88 Id. at 350, 356.
- 89 Id. at 356-58.
- 90 Id. at 357.
- 91 Final Compensatory Mitigation Rule, 73 Fed. Reg. 19,594, 19,605.
- 92 Id.
- 93 Id.
- 94 NAT’L RESEARCH COUNCIL, COMPENSATING FOR WETLANDS LOSSES, supra note 53, at 3.
- 95 Id. at 141.
- 96 Id. In a separate article, committee members of the NRC report summarized their concept of a watershed approach: If watershed-management plans were accomplished in advance of permitted damages to wetlands, and if such plans laid out a suite of promising wetland restoration sites, the selection of mitigation sites could facilitate the retention of wetland functions. Then, if mitigation requirements were based on ecological criteria (described attributes of community structure and ecosystem functioning), the likelihood of sustaining wetland functions within sites and watersheds should improve greatly. Turner et al, supra note 81, at 16.
- 97 Watershed assessments characterize a watershed through collection of chemical, biological, and physical information. Modeling is then used to determine effects of various development scenarios. A watershed plan is then developed which incorporates management practices to protect the watershed from adverse impacts.
- 98 Jan Goldman-Carter, Comments Template for Proposed Mitigation Rule, <http://www.cleanwaternet.org/files/Comments%20Template%20for%20Proposed%20Mitigation%20Rule%20final%206%2021%20rev.doc>
- 99 NAT’L RESEARCH COUNCIL, COMPENSATING FOR WETLANDS LOSSES, supra note 53, at 148.
- 100 33 C.F.R. §332.3(c)(1) (2008); 40 C.F.R. §230.93(c)(1) (2008).
- 101 Murphy et al., supra note 64, at 330.
- 102 Final Compensatory Mitigation Rule, 73 Fed. Reg. 19,594, 19,631.
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- 104 U.S. ARMY CORPS OF ENG’RS & U.S. ENVTL. PROT. AGENCY, U.S. ARMY CORPS OF ENGINEERS JURISDICTIONAL DETERMINATION INSTRUCTIONAL GUIDEBOOK (2007), available at http://www.usace.army.mil/CECW/Documents/cecwo/reg/cwa_guide/jd_guidebook_051207final.pdf [hereinafter JURISDICTIONAL GUIDEBOOK].
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- 106 CLEAN WATER ACT JURISDICTION FOLLOWING RAPANOS, supra note 74.
- 107 United States v. Robison, 505 F.3d 1208 (11th Cir. 2007), cert. denied, United States v. McWane, Inc., 129 S.Ct. 627 (2008).
- 108 Id. at 7.
- 109 Rapanos, 547 U.S. at 739,742.
- 110 Id. at 810 (Stevens, J., dissenting).
- 111 Robison, supra note 107, at 20.
- 112 33 C.F.R. Part 328.4 (2008). The last criterion was overturned following the United States Supreme Court decision in Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001) (commonly referred to as the SWANCC decision).
- 113 33 C.F.R. Part 328.3 (2008).
- 114 NAT’L RESEARCH COUNCIL, WETLANDS: CHARACTERISTICS AND BOUNDARIES 105 (1995).
- 115 ARTHUR E. WILLIAMS, U.S. ARMY CORPS OF ENG’RS, U.S. ARMY CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL MODIFICATIONS AND CLARIFICATIONS 2 (1992), available at http://www.saw.usace.army.mil/WETLANDS/Policies/clarif_87_man.pdf.
- 116 RALPH W. TINER, WETLAND INDICATORS: A GUIDE TO WETLAND IDENTIFICATION, DELINEATION, CLASSIFICATION, AND MAPPING 22 (1999).
- 117 WILLIAMS, supra note 115, at 3.
- 118 PRUITT, supra note 6, at 73.
- 119 See Darren Springer, How States Can Help to Resolve the Rapanos/Carabell Dilemma, 21 TULANE ENVTL. L.J. 83, 90-91 (2007) (noting that the decision to decide the significant nexus test on a case-by-case basis could “lead to inconsistent implementation because different parts of the nation are regulated by different agency offices” and that “the lack of a clear and articulated standard from the Court has left lower courts and federal agencies with the task of deciding federal jurisdiction over many wetlands and waters on a case-by-case basis”).
- 120 CLEAN WATER ACT JURISDICTION FOLLOWING RAPANOS, supra note 74, at 3.
- 121 JURISDICTIONAL GUIDEBOOK, supra note 104, at 7.
- 122 Id. at 50 n.6.
- 123 Final Compensatory Mitigation Rule, 73 Fed. Reg. 19,594, 19,605.
- 124 Id. at 19,605–19,606.
- 125 JOHN J. MACK & MICK MICHACCHION, OHIO ENVTL. PROT. AGENCY, AN ECOLOGICAL ASSESSMENT OF OHIO MITIGATION BANKS: VEGETATION, AMPHIBIANS, HYDROLOGY AND SOILS

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- 126 *Id.* at 2.
- 127 Alpha Gamma Technologies, Valuation of Ecological Benefits: Improving the Science Behind Policy Decisions, Proceeding of Workshop Sponsored by the U.S. Environmental Protection Agency's National Center for Environmental Economics and National Center for Environmental Research (2004), available at [http://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0489-02.pdf/\\$file/EE-0489-02.pdf](http://yosemite.epa.gov/ee/epa/erm.nsf/vwAN/EE-0489-02.pdf/$file/EE-0489-02.pdf). AGENCY'S NATIONAL CENTER FOR ENVIRONMENTAL ECONOMICS (NCEE) AND NATIONAL CENTER FOR ENVIRONMENTAL RESEARCH (NCER) Held in Washington, D.C. (2004).
- 128 42 U.S.C. § 4365 (2003).
- 129 U.S. ARMY CORPS OF ENG'RS, A SINGLE-POINT MOORING SYSTEM FOR DIRECT PUMPOUT OF HOPPER DREDGES 1(1992), available at <http://el.erdc.usace.army.mil/elpubs/pdf/drp3-08.pdf>.
- 130 This legislative power allows counties and municipalities to "adopt clearly reasonable ordinances, resolutions, or regulations relating to [their] property, affairs, and local government," so long as they are not preempted by state or federal law. See GA. CONST., art. IX, § 2, para. I. Section 404 of the CWA gives the Army Corps of Engineers authority to regulate the use of certain classes of wetlands. This federal law does not, however, preempt a local government from adopting wetlands protection laws. So long as the local ordinance is at least as stringent as the provisions of the CWA and its accompanying regulations, it is not federally preempted. 33 U.S.C. § 1370 (2003). See also Kim Connolly, Looking to Local Law: Can Local Ordinances Help Protect Isolated Wetlands?, 27 NAT'L WETLANDS NEWSL. 22 (2005), available at <http://www.northinlet.sc.edu/training/media/2008/01-17-08%20Wetlands/Connolly%20Looking%20to%20Local%20Law.pdf> ("Generally, on the federal level, congressional passage of [CWA] section 404 has not 'occupied the field,' and accordingly, most local wetland laws are not preempted. However, if a local government wanted to pass a local law that conflicted with the [CWA] (such as 'no development by a county entity shall require a section 404 permit'), then such a law would be preempted.").
- 131 See, e.g., Lake County Stormwater Mgm't Comm'n, Isolated Waters of Lake County [Illinois], <http://www.lakecountyil.gov/Stormwater/FloodplainStormwaterRegulations/Wetlands/IsolatedWatersofLakeCounty.htm> (describing Lake County's isolated wetlands protection ordinance).
- 132 See, e.g., Medford, MA, Ordinances ch. 87, art. II, § 87-33 (2005) (stating that the jurisdiction of the ordinance includes "any freshwater wetlands," including "vegetated isolated wetlands," regardless of whether the wetlands border surface waters).
- 133 See, e.g., Lake County Stormwater Mgm't Comm'n, *supra* note 131.
- 134 See Paula J. Schauwecker, Shifting the Focus of Wetlands Protection to State and Local Governments, 22 NAT. RESOURCES & ENV'T 1 (2008), available at <http://www.bdlaw.com/assets/attachments/197.pdf>.
- 135 See generally TIFFANY WRIGHT ET AL., CTR. FOR WATERSHED PROT., DIRECT AND INDIRECT IMPACTS OF URBANIZATION ON WETLAND QUALITY (2006), available at <http://www.kaws.org/files/kaws/u2/WetlandsArticle1.pdf>.
- 136 KAREN CAPIELLA ET AL., CTR. FOR WATERSHED PROT., USING LOCAL WATERSHED PLANS TO PROTECT WETLANDS 1 (2006), available at <http://www.northinlet.sc.edu/training/media/resources/Article2Watershed%20Plan%20Protect%20Wetland.pdf>.
- 137 *Id.* at 2.
- 138 *Id.*
- 139 NAT'L RESEARCH COUNCIL, WETLANDS: CHARACTERISTICS AND BOUNDARIES, *supra* note 114, at 141.
- 140 33 C.F.R. §332.3(c)(1) (2008); 40 C.F.R. §230.93(c)(1) (2008).
- 141 Leibowitz recommended the development of two metrics for hydrological permanence (Scalia Test) and significant nexus (Kennedy Test) between non-navigable streams and adjacent wetlands (NNSAW) and Section 10 waters. Scott G. Leibowitz et al., Non-Navigable Streams and Adjacent Wetlands: Addressing Science Needs Following the Supreme Court's "Rapanos" Decision, 6 FRONTIERS IN ECOLOGY & ENV'T 364-371 (2008). In order for this approach to be implemented, a correspondence needs to be developed between NNSAW and wetland classification, such as within hydrogeomorphic class which occur in the same ecoregion. See MARK M. BRINSON, U.S. ARMY CORPS OF ENG'RS, A HYDROGEOMORPHIC CLASSIFICATION FOR WETLANDS (1993), available at <http://el.erdc.usace.army.mil/wetlands/pdfs/wrpde4.pdf>. See James M. Omernik, Ecoregions of the Coterminous United States, 77 ANN. ASS'N AM. GEOGRAPHERS 118-125 (1987).

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