No. 18-30257

In the United States Court of Appeals for the Fifth Circuit

ATCHAFALAYA BASINKEEPER; LOUISIANA CRAWFISH PRODUCERS ASSOCIATION-WEST; GULF RESTORATION NETWORK; WATERKEEPER ALLIANCE; SIERRA CLUB, and its Delta Chapter,

Plaintiffs-Appellees

v.

UNITED STATES ARMY CORPS OF ENGINEERS,

Defendant-Appellant

BAYOU BRIDGE PIPELINE, L.L.C.; STUPP BROTHERS, INCORPORATED, doing business as Stupp Corporation,

Intervenor Defendants-Appellants

On appeal from the United States District Court for the Middle District of Louisiana, Case No. 3:18-cv-23 (Judge Shelly D. Dick)

Brief of Appellant United States Army Corps of Engineers

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Statement Regarding Oral Argument

The United States requests oral argument because it will help to answer any questions that the Court may have regarding the complex analysis undertaken by the United States Army Corps of Engineers in this case.

Table of Contents

Table of Authorities

CASES

STATUTES

FEDERAL REGULATIONS

OTHER AUTHORITIES

Glossary

EA	Environmental Assessment
EIS	Environmental Impact Statement
FONSI	Finding of No Significant Impact
NEPA	National Environmental Policy Act
LRAM	Louisiana Wetland Rapid Assessment Method

Statement of Jurisdiction

The claims in this case are brought under the National Environmental Policy Act, the Clean Water Act, and the Rivers and Harbors Act of 1899. ROA.43-66. The district court has jurisdiction to hear these claims under "federal question" jurisdiction. 28 U.S.C. § 1331. The district court granted plaintiff-appellee's motion for preliminary injunction in a ruling issued February 27, 2018. ROA.3998-4057. The United States filed a timely notice of appeal of that order on March 30, 2018. This Court has jurisdiction over this appeal of an interlocutory order granting a preliminary injunction under 28 U.S.C. § 1292(a)(1).

Statement of the Issues

1. Did the district court apply the wrong law in holding that the United States Army Corps of Engineers (the "Corps") should have included a detailed discussion of mitigation measures in its environmental assessment, even though the Corps had not made a "mitigated" "finding of no significant impact" ("FONSI")?

2. Did the district court err in holding that the Corps had not adequately explained the mitigation measures required in the subject permit where the record shows that the Corps assessed the impacts of the construction of the subject pipeline on wetlands and then used its "Louisiana Wetlands Rapid Assessment Method" ("LRAM") to determine the appropriate type and amount of mitigation?

3. Did the district court compound that error in also holding that the Corps had failed to consider the cumulative impacts of the permit?

4. Did the district court abuse its discretion by enjoining the construction of a portion of the pipeline when its impact on aquatic functioning will be mitigated and the only error identified by the court was a supposed lack of adequate explanation of the Corps' reasoning?

5. Is the district court's injunction overbroad because it enjoins not only the construction that the court found would cause irreparable harm, but also administrative actions by the Corps?

Statement of the Case

I. The law

A. The Clean Water Act

The Clean Water Act prohibits the discharge of pollutants (including dredged spoil, rock, and sand) into the waters of the United States (including wetlands) from any point source. 33 U.S.C. § 1311(a). Section 404 of the Act, *id.* § 1344, authorizes the Corps to issue permits for the discharge of dredged or fill material when certain conditions are met. *Id*. §§ 1311(a); 1344. Where adverse impacts to aquatic resources from a permitted activity cannot be avoided, permit applicants may be required to provide compensatory mitigation. 33 C.F.R. §§ 332.2 (definition of "compensatory mitigation"), 332.3(a) (general mitigation requirement).

B. The Rivers & Harbors Act of 1899

Section 10 of the Rivers and Harbors Act of 1899 forbids certain activities within the "navigable water of the United States" without the Corps' permission. 33 U.S.C. § 403; *see also* 33 C.F.R. § 322.3(a) (requiring permits under Section 10 for "structures and/or work in or affecting navigable waters of the United States"). For the purposes of Section 10, the Corps' regulations define navigable waters as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce." 33 C.F.R. § 329.4.

Section 14 of the Rivers and Harbors Act of 1899 makes it unlawful for a person to "take possession of or make use of for any purpose, or build upon, alter, deface, destroy, move, injure, . . . or in any manner whatever impair the usefulness of any . . . work built by the United States, . . . in whole or in part, for the preservation and improvement of any of its navigable waters or to prevent floods." 33 U.S.C. § 408(a) ("Section 408"). The Corps "may," however, permit the alteration, permanent occupation, or use of such public works when, in its judgment, such activity (1) "will not impair the usefulness of such work" and (2) "will not be injurious to the public interest." *Id*.

C. The National Environmental Policy Act

The National Environmental Policy Act ("NEPA") is a procedural statute that does not mandate substantive results. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989). NEPA requires federal agencies to prepare a detailed environmental impact statement for "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C). But an agency may prepare a shorter, less-detailed environmental assessment first; if the agency makes a finding of no significant impact ("FONSI") based on that environmental assessment, then it is not required to prepare an environmental impact statement. 40 C.F.R. §§ 1501.3, 1508.9(a). Even if a project would otherwise have significant impacts, an agency may still rely on an environmental assessment (and make a FONSI) if mitigation would render those impacts not "significant." This is known as a "mitigated" FONSI.

II. The facts and the history of the case

On December 14, 2017, the Corps issued a permit under Section 404 of the Clean Water Act, 33 U.S.C. § 1344, and Sections 10 and 14 of the Rivers and Harbors Act, 33 U.S.C. §§ 403, 408, to Bayou Bridge Pipeline, LLC ("Bayou Bridge"). The Corps' authorizations will allow Bayou Bridge to build a 162-mile-long pipeline to convey crude oil from Lake Charles, Louisiana, to terminals near St. James, Louisiana. Because portions of the pipeline will cross the Atchafalaya Basin, the construction of the pipeline—most notably, the discharge of dredge or fill material—will affect wetlands. As part of its responsibilities under the Clean Water Act, the Corps required Bayou Bridge to mitigate those impacts.

On January 11, 2018, the plaintiffs—Atchafalaya Basinkeeper, Louisiana Crawfish Producers Association-West, Gulf Restoration Network, Waterkeeper Alliance, and Sierra Club and its Delta Chapter (collectively, "Basinkeeper")—sued the Corps, seeking to set aside the Corps' action. Bayou Bridge and one of its contractors, Stupp Brothers, Inc., intervened as defendants. On January 29, Basinkeeper sought both a temporary restraining order and a preliminary injunction. The district court denied the temporary restraining order the next day, ruling that Basinkeeper had failed to demonstrate a likelihood of success on the merits. The district court ordered the Corps and Bayou Bridge to file responses to the request for a preliminary injunction on February 2. The court conducted an evidentiary hearing on February 8, heard argument on February 9, and ordered supplemental briefs to be filed by February 12. On February 23, the district court entered a brief order preliminarily enjoining the Corps and Bayou Bridge from taking any action on the project.

On February 27, 2018, the district court issued a written order explaining its rationale and limiting the injunction to the Atchafalaya Basin. ROA.3998-4057. The district court concluded that Basinkeeper was not likely to succeed on most of the issues raised by its preliminary injunction motion. *See, e.g.,* ROA.4015-26 (holding that Basinkeeper was not likely to succeed on its claim that the Corps had failed to analyze the risks of an oil spill). But the district court—based on the limited record before it that could be compiled for the expedited preliminary injunction proceedings—faulted the Corps for its analysis of mitigation and cumulative effects. ROA.4036-48. The court held that Basinkeeper was entitled to a preliminary injunction, regardless of the applicable legal standard. ROA.4041 n.94.

Bayou Bridge appealed and sought a stay from this Court. This Court granted that stay on March 15. Court Order, Doc. No. 00514388428 (Mar. 15, 2018). Judge Clement wrote for the panel, concluding that Bayou Bridge was likely to succeed on its claim that the district court abused its discretion. "Rather than granting a preliminary injunction, the district court should have allowed the case to proceed on the merits and sought additional briefing from the Corps on the limited deficiencies noted in its opinion." *Id.* at 2. Judge Owen concurred and wrote separately, opining that the district court should have remanded to the Corps without vacating the permit if there was a mere failure of explanation and that Bayou Bridge had made a showing that halting construction would be "disruptive." *Id*. at 4. Judge Davis dissented. *Id*. at 5–6.

Summary of Argument

The Corps does not regulate the construction of oil pipelines. Congress has not given it that authority. *See Sierra Club v. U.S. Army Corps of Engineers*, 803 F.3d 31, 33 (D.C. Cir. 2015). Instead, the Corps' role in the Bayou Bridge pipeline was limited: it gave Bayou Bridge permission to cross several federal easements and Corps projects meant to improve the navigability of rivers or to prevent floods. And it granted a permit to Bayou Bridge under Section 404 of the Clean Water Act that will allow Bayou Bridge to discharge some of the dredge and fill created by the construction of this pipeline into the waters of the United States (including wetlands).

The Corps analyzed the potential environmental impacts of these aspects of the pipeline—especially the discharge of fill into wetlands—in great detail in the two environmental assessments that it prepared under NEPA. As part of that analysis, the Corps used a tool that it has developed to protect Louisiana wetlands, the Louisiana Wetlands Rapid Assessment Method ("LRAM"). It found that about 597 acres of wetlands would be affected—about 455 temporarily and about 142 permanently converted from forested wetlands to herbaceous wetlands. The Corps then required Bayou Bridge to buy "credits" from approved mitigation banks that would more than offset that loss of aquatic functioning. As a result, Bayou Bridge was required to protect over 700 acres of wetlands before it could undertake this project.

Basinkeeper brought a host of challenges to the Corps' actions, and the district court rejected nearly all of them. But it did rule that the Corps had failed to sufficiently explain its analysis of this mitigation plan. And it also ruled that the Corps had failed to give enough consideration to "cumulative impacts."

But the district court reached those findings—and granted Basinkeeper's preliminary injunction—in error. On their face, the Corps' environmental assessments explain the Corps' reasoning. If the district court did not see that reasoning, it was only because it did not fully understand either the analytic tool used by the Corps here (the LRAM) or the meaning of the Corps' use of that tool. Rather than enjoining this project, the district court should have sought additional explanation from the Corps (which the Corps would have readily provided) or resolved the case on a fuller administrative record (which would have provided additional detail on the calculations underlying the Corps' analysis). But even without such additional detail, the Corps' path here can "reasonably be discerned" from its environmental assessments (and other publicly-available documents) and should have been upheld. *See Nat'l Ass'n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 658 (2007) (internal quotation marks omitted). For these reasons, the district court's grant of preliminary injunction should be reversed.

Standard of Review

A party seeking a preliminary injunction must demonstrate four elements: (1) that it is likely to succeed on the merits; (2) that it would suffer irreparable injury if the injunction were not granted; (3) that the balance of the equities tips in its favor; and (4) that the public interest would be furthered by the injunction. *Jones v. Tex. Dept. of Crim. Justice*, 880 F.3d 756, 759 (5th Cir. 2018); *see also Winter v. Nat. Res. Def. Council, Inc.*, 555 U.S. 7, 20 (2008). The district court's decision to grant Basinkeeper's motion for injunctive relief, as well as its weighing of the preliminary injunction factors, is reviewed for abuse of discretion, with legal rulings reviewed *de novo* and findings of fact for clear error. *Anderson v. Jackson*, 556 F.3d 351, 360 (5th Cir. 2009).

Argument

I. The district court applied the wrong law by holding the Corps' environmental assessment to the standard for a "mitigated" FONSI.

The district court held that the Corps' "environmental assessment" was inadequate and violated NEPA because it failed to adequately explain the mitigation measures that will be used to offset the adverse environmental effects of the construction of the pipeline. ROA.4041. But the district court misunderstood the role that mitigation played in the Corps' NEPA analysis, and, as a result, it applied the wrong law. In so doing, the court abused its discretion and should be reversed.

NEPA is a procedural statute. It requires a federal agency to prepare a detailed environmental impact statement if its action (or an action that it permits) will have a "significant" impact on the human environment. *See* 42 U.S.C. § 4332(C). On the other hand, if the proposed action will not have a significant impact, then the agency may make a "finding of no significant impact" ("FONSI") after it prepares a more-limited environmental assessment of the action's effects. 40 C.F.R. §§ 1501.3, 1508.9(a).

In either event, because NEPA is procedural, it never *requires* agencies to mitigate adverse environmental effects. *See, e.g., Robertson*, 490 U.S. at 352–53. Importantly, NEPA's requirements here are separate and distinct from the requirements of the Clean Water Act (and its regulations and guidelines), which does require compensatory mitigation in some cases (and which we discuss below).

As a general rule, NEPA does not require environmental assessments to discuss mitigation measures at all. *Akiak Native Cmty. v. U.S. Postal Serv.*, 213 F.3d 1140, 1147 (9th Cir. 2000). The exception to that rule is the so-called "mitigated FONSI." *See generally* Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact, 76 Fed. Reg. 3843 (Jan. 21, 2011). In a "mitigated FONSI," an agency relies on mitigation measures to reduce the potentially significant effects of a proposed action until they are no longer "significant." *Id*. at 3846. A mitigated FONSI enables the agency to comply with NEPA by preparing an environmental assessment instead of a full environmental impact statement, even if the impacts of the unmitigated action would have been significant. *Id*. The Council on Environmental Quality ("CEQ"), which administers NEPA, recommends that environmental assessments for mitigated FONSIs include a discussion of mitigation measures. *Id*. at 3848. This Court has approved the use of mitigated FONSIs. *O'Reilly v. U.S. Army Corps of Engineers*, 477 F.3d 225, 231 (5th Cir. 2007) (citing cases).

The rules governing an agency's use of a "mitigated FONSI" do not apply here, however, because the Corps simply *did not make* a "mitigated FONSI." That is, the Corps never found that the impacts of the construction activities authorized by its permit would be "significant." To the contrary, the Corps found that those impacts were not significant, *even without mitigation*. *See* ROA.1622, 1691-92, 1803, 1841. The Corps reached that conclusion, in part, because the activities authorized by the Corps were designed from the outset to avoid and reduce their potential impacts on the environment (through, for example, the use of "horizontal directional drilling" technology and by siting the pipeline along an existing right-of-way), and because the Corps' authorizations affect only a very small part of the 1.4-million-acre Atchafalaya Basin. *Id*.

Thus, because the Corps did not find that the impacts would be significant "but for" these mitigation measures, the Corps did not need to explain how that mitigation would reduce those impacts below the threshold of NEPA "significance" (and was under no legal obligation to do so). The district court, however, mistook the Corps' FONSI for a "mitigated FONSI," and then held that the Corps had violated NEPA because its "Section 404 [environmental assessment] fails to demonstrate that the chosen mitigation measures effectively address and remediate the adverse impacts *such that a FONSI was proper*." ROA.4041 (emphasis added). That is, the district court found that the environmental assessment failed to show how these mitigation measures would reduce the effects of the authorized discharges from the construction of this pipeline "to a less-than-significant level." *Id*.

This was an abuse of discretion. The Corps' environmental assessment was not required to show how mitigation measures would reduce the effects of the authorized discharges below "significance" because the Corps never concluded that those effects would be "significant" in the first place. The Corps' finding was not a mitigated FONSI, and the district court erred by holding the Corps' environmental assessment to the legal standard for a mitigated FONSI.

In holding that the Corps had violated NEPA, the district court relied heavily on this Court's decision in *O'Reilly v. U.S. Army Corps of Engineers*, 477 F.3d 225 (5th Cir. 2007). *O'Reilly* held that the Corps violated NEPA by relying on a "cursory" discussion of mitigation measures—that failed to explain how those measures would "reduce . . . impacts to a less-than-significant level"—when it issued a "*mitigated FONSI.*" *Id*. at 234 (emphasis added). That holding does not apply here because, as we have explained, this case does not involve a mitigated FONSI, and NEPA does not otherwise require the Corps to discuss mitigation measures in an environmental assessment. Because the district court applied the wrong law, its NEPA holding is also wrong (and necessarily an abuse of discretion), and it should be reversed.

II. The Corps sufficiently explained its mitigation decision.

While NEPA does not require mitigation, the Clean Water Act (together with its regulations and guidelines) may require compensatory mitigation for some permits. Section 404 of the Clean Water Act authorizes the Corps to issue permits allowing the "discharge of dredged or fill materials into . . . navigable waters." 33 U.S.C. § 1344(a). The governing regulations allow the Corps to require "compensatory mitigation" to "offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by" such permits. 33 C.F.R. § 332.3(a)(1); *see also id.* § 320.4(r). The Corps'

Section 404(b)(1) guidelines specify when such compensatory mitigation is required. *See* 40 C.F.R. § 230.93; *see generally* 40 C.F.R. Part 230. The purpose of compensatory mitigation is to "replace functional losses to aquatic resources, including wetlands"; unlike NEPA, these regulations do not address broader effects on the environment. *See* 33 C.F.R. § 332.3(a)(1) (requiring mitigation to compensate "for the aquatic resource functions that will be lost as a result of the permitted activity").

Here, the Corps analyzed Bayou Bridge's proposal to ensure that it would, first, avoid potential effects to wetlands; for example, Bayou Bridge agreed to narrow its limited permanent right-of-way from 30 feet to 15 feet to avoid some impacts to wetlands. ROA.1746-47. Then Bayou Bridge further reduced the impacts of the pipeline by, for example, co-locating it with existing utilities through most of the forested areas and by using "horizontal directional drilling" to cross some waters. ROA.1767-68.

The Corps then analyzed the impact of the revised project on wetlands. ROA.1757-62; ROA.1585-87, 1618-22, 1683-84. The Corps found that the entire pipeline would involve the discharge of dredge or fill materials into about 597 acres of wetlands. ROA.1775. Most of those impacts—about 455 acres—would be temporary. *Id*. The rest would be what are called "conversion" impacts; that is, about 142 acres would be permanently "converted" from one type of wetland to another—here, from forested wetlands to herbaceous "scrub shrub" wetlands. *Id*. (Herbaceous wetlands also provide important aquatic functions. ROA.1761.) The authorized discharges for this project do not involve permanently filling wetlands to create new (dry) land, and the Corps concluded that it would not result in *any* permanent loss of wetlands. ROA.1775.

At the center of this litigation, and perhaps of greatest importance to Basinkeeper, the Corps found that discharges during the construction of this pipeline would potentially impact bald cypress/tupelo swamp. ROA.1779-81. Bald cypress/tupelo swamp is one of the specific categories of wetlands that the Corps' New Orleans District uses to analyze the potential effects of all projects in Louisiana. *See, generally*, LRAM Manual ("Exhibit 1") at 6–9, 14–15.[1] These wetland habitat types have been defined by the state's Natural Heritage Program. *Id.* at 6.

The Corps describes bald cypress/tupelo swamp as a "forested, alluvial swamp[] growing on intermittently exposed soils" whose "soils are inundated or saturated by surface water or ground water on a nearly permanent basis

[1] We attach a copy of the LRAM Manual to this brief as Exhibit 1. The LRAM Manual explains the LRAM and how it works in detail. The LRAM Manual was not submitted to the district court, but it is a publicly-available government document, so this Court may take judicial notice of its existence. *See* Louisiana Wetland Rapid Assessment Method for Use Within the Boundaries of the New Orleans District, Interim Version 1.0 ("LRAM Manual"), *available at* http://www.mvn.usace.army.mil/Portals/56/docs/regulatory/Mitigation/Louisiana_Rapid_Assessment_Method_2_26_16.pdf.

The Section 404 environmental assessment explains that LRAM has been subject to public comment during its development. ROA.1736-37. At a minimum, the LRAM shows that the Corps could have provided additional explanation if the district court had allowed additional briefing and a more fulsome development of the record than was possible on the extremely expedited schedule imposed by the court at the preliminary injunction stage. Similarly, the Section 404 environmental assessment also refers to the more detailed calculations set out in the final "Compensatory Mitigation Plan" for the project, *see*, *e.g.*, ROA.1777, which was also not included in the materials provided to the district court at the preliminary injunction stage and which provides further explanation of the Corps' work.

throughout the growing season except during periods of extreme drought." *Id*. It is one kind of "palustrine forested wetland" ("PFO") and differs from other palustrine forested wetlands by the specific species of trees that cover it, namely, bald cypress and tupelo gum trees. *Id*. at 14. The Clean Water Act (together with its regulations and guidelines) focus on the aquatic resource functions of wetlands, and do not give any special preference to bald cypress/tupelo swamp over any other kind of wetlands. *See* ROA.1759-60 (discussing functions of freshwater wetland habitats composed of bottomland hardwoods and cypress).

Most of the impacts of the discharges from the construction of this pipeline on bald cypress/tupelo swamp will be temporary. ROA.1775. But the Corps did find that these discharges will permanently convert about 78 acres of bald cypress/tupelo swamp (designated "PFO2") to herbaceous wetlands. ROA.1776.

The Corps required Bayou Bridge to purchase about 715 acres of wetlands from "mitigation banks" to offset the (mostly temporary) "unavoidable impacts to wetlands that would result from permit issuance." ROA.1777. The Corps' compensatory-mitigation regulations explicitly authorize the use of mitigation banks for such permitted impacts. 33 C.F.R. § 332.3(b)(2) (providing that a "permittee's compensatory mitigation requirements may be met by securing" credits from "an approved mitigation bank."). In fact, the Corps' regulations favor the use of mitigation banks over "permittee-responsible mitigation," like Basinkeeper's proposal to have Bayou

Bridge tear down old spoil banks, because mitigation banks "typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning, and implementation than permittee-responsible mitigation." *Id*. All mitigation banks—including the mitigation banks at issue in this case—are vetted by an interagency review team and subject to public comment before their use is approved. ROA.1736. As part of that public process for approving a mitigation bank, the Corps considers and approves the proposed service area for the mitigation bank, ensuring up front that the improvements that will be made by the bank will compensate for losses within the entire service area of the bank. *Id*.

As part of the mitigation plan at issue here, the Corps required Bayou Bridge to purchase about 138 acres of bald cypress/tupelo swamp from mitigation banks. ROA.1777, 1779. This alone would more than offset the permanent conversion of about 78 acres of bald cypress/tupelo swamp to herbaceous wetlands. But it was not enough to offset all of the temporary effects of the project on bald cypress/tupelo swamp. Unfortunately, no additional acres of bald cypress/tupelo swamp were available for purchase from mitigation banks in the relevant watersheds. ROA.1777-78. Consequently, the Corps allowed Bayou Bridge to compensate for the remaining temporary effects by purchasing about 200 acres of other palustrine forested wetlands (namely, bottomland hardwoods). ROA.1777, 1780.

The Corps explicitly acknowledged this issue in its Section 404 environmental assessment, *id.*, and its regulations authorize such "out-of-kind" compensatory mitigation, 33 C.F.R. § 332.3(e)(2). The environmental assessment also explained that the Corps used the LRAM to determine how many and which types of credits Bayou Bridge had to purchase in order to offset the impacts of its construction of the pipeline to the aquatic functions of the wetlands. ROA.1736, 1777–82.

Finally, the Corps concluded that Bayou Bridge had purchased "[a]ppropriate compensatory mitigation . . . at these [mitigation] banks to offset unavoidable impacts to wetlands that would result from" the issuance of this permit. ROA.1777. The Corps found that "the total . . . credits actually purchased by" Bayou Bridge from mitigation banks "meets or exceeds what is required based on the project's impacts." ROA.1779. The Corps set out a summary of the calculations supporting those conclusions in a table. ROA.1780-81. Importantly, this compensatory mitigation was not required to comply with NEPA, or to support a "mitigated" FONSI, but rather to comply with the Clean Water Act (together with its regulations and guidelines).

The Corps' reasoning—and its documentation of its reasoning—should have been sufficient to withstand judicial review. But instead, the district court wrongly held that

- the Corps had offered no "rational explanation as to how the mitigation choices serve the stated goal of 'replac[ing] lost [aquatic] functions and services," ROA.4034-35;
- the Corps had done "no analysis or consideration . . . of whether a 'preference' for mitigation bank credits was appropriate," ROA.4035;

- the Corps had done "no analysis or consideration . . . of . . . whether the particular mitigation bank credits to be acquired are 'located where it is most likely to successfully replace lost functions and services,'" ROA.4035;
- the Corps had done "no analysis explaining how out-of-kind mitigation addresses [aquatic] functions," ROA.4038;
- "there is not an iota of discussion, analysis, or explanation how [bottomland hardwood] credits mitigate the loss of function and value of the cypress/tupelo swamp impact," ROA.4040; and
- "142 acres of wetlands . . . will be . . . irretrievably lost," ROA.4039.

On the basis of these erroneous findings, the district court held that the Corps' analysis of the mitigation measures was "arbitrary and capricious." But as shown below, the Corps weighed all of these issues and reached rational conclusions that are supported by the record (even the limited record that was before the district court).

Most of the analysis that the district court missed is already "baked in" to the tool that the Corps uses to assess compensatory mitigation in these Louisiana watersheds—the LRAM.[2] The Corps built the LRAM using the best available scientific information and input from the public. *See* Exh. 1 at 47–51; ROA.1736; *see also, e.g.,* ROA.1120–25 (public comments submitted by

[2] Like the LRAM Manual, the LRAM itself is available to the public (as a Microsoft Excel spreadsheet) on the Corps' website. And because the LRAM is an electronic spreadsheet, any member of the public may inspect the values that it assigns to different wetlands and the mechanisms that it uses to calculate compensatory mitigation.

Basinkeeper on the LRAM). It addresses all types of wetlands found in Louisiana, including bald cypress/tupelo swamp and bottomland hardwoods. *Id*. at 6. It uses a "watershed" approach to ensure that mitigation projects are undertaken in the same watershed basin as the project whose impacts they are intended to mitigate. *Id.* at 10. The Corps' regulations encourage the Corps to use this kind of tool to determine compensatory mitigation. 33 C.F.R. § 332.3(f)(1). The Corps' use of the LRAM here is entitled to deference because this is the kind of scientific judgment that Congress has entrusted to the agency. *See Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 377–78 (1989).

The LRAM assigns a numerical value to the wetlands impacted by the Corps' issuance of a permit. Importantly, that value measures not just the acreage affected, but how much the affected wetlands contribute to the aquatic functioning of the watershed. *See* Exh. 1 at 5 (noting that LRAM "infers functional and value output based on its ecological condition."). Indeed, that is the entire purpose of LRAM: it scores the "lost aquatic functions and services" of the affected wetlands and then identifies mitigation banks in the same watershed where credits can be bought to offset that loss.

LRAM scores the impact to the wetlands based on a series of factors, including (1) the number of "acres impacted"; (2) "wetland status" (that is, whether the affected wetlands are rare or difficult to replace); (3) "habitat condition" (whether the affected wetlands are pristine or, for example, overrun by invasive species); (4) "hydrologic condition" (how connected the affected wetlands are to their watershed); (5) "negative influences" (whether the affected wetlands are suffering from negative human influences); and (6) "impact type" (whether the affected wetlands will be lost permanently, partially, or temporarily). *Id*. at 11. The Corps assesses these factors using field data. *Id.* at 13.

Once LRAM has scored the impacts to the affected wetlands, it then identifies a total amount of "credits" that should be bought from approved mitigation banks in the same watershed basin to offset those impacts. The LRAM also includes information on all of the approved wetlands mitigation banks in Louisiana. The benefits of these mitigation banks are determined "by quantifying the aquatic resource restored, established, enhanced, and/or preserved." *Id.* at 34–35. The LRAM generally requires much more compensatory mitigation than other methods, such as the old "an acre for an acre" approach. Through this approach, the LRAM ensures that the higher the quality of the wetlands affected by the project—and the greater their aquatic functions—the more credits that must be purchased from mitigation banks to offset the impact.

The Corps used the LRAM to calculate the compensatory mitigation required to offset the discharges of dredge and fill caused by the construction of the pipeline here. ROA.1686-87, 1777. Table 1 of the Section 404 environmental assessment summarizes the results of the Corps' use of the LRAM. ROA.1779-80. That table identifies both the loss of aquatic functions as assessed by LRAM (in the form of "LRAM Credits Required") and the acres purchased from mitigation banks (in the same watersheds) to offset that loss. ROA.1779-80. The Corps used this process for each and every acre of wetlands affected by the discharges that it authorized for the construction of this pipeline. The Corps' analysis and conclusions are described in its environmental assessments, and much more detail will be provided in the administrative record (which could not be compiled and put before the district court given the very short deadlines that the court set for the hearing on the motion for a preliminary injunction). *See generally* ROA.1686-88, 1777-81.

In total, the Corps found that this project will affect about 597 acres of wetlands (about 455 acres temporarily and about 142 acres permanently converted to herbaceous wetlands). ROA.1775. Using LRAM, the Corps calculated that Bayou Bridge had to purchase a total of about 715 acres of wetlands from mitigation banks in order to offset those impacts on the aquatic functions and services of the affected wetlands. ROA.1777.

It is true that a small amount of this mitigation was "out of kind"; that is, the Corps allowed Bayou Bridge to offset impacts to one kind of palustrine forested wetlands by purchasing palustrine forested wetlands consisting of a different species of trees. Specifically, the discharges authorized for the construction of this pipeline will impact bald cypress/tupelo swamp. ROA.1775. Most of those impacts will be temporary (about 160 acres), but some of those wetlands will be permanently converted from forested wetlands to herbaceous wetlands. *Id*. The Corps required Bayou Bridge to purchase about 138 acres of bald cypress/tupelo swamp from mitigation banks to offset these effects. ROA.1779. That more than compensates for the bald cypress/tupelo swamp that will be permanently converted to scrub shrub wetlands. In fact, Bayou Bridge bought all of the acres of bald cypress/tupelo swamp available from relevant mitigation banks. But there were not enough acres in two of the watersheds to offset all of the temporary effects, and so the Corps allowed Bayou Bridge to purchase about 197 acres of other out-of-kind wetlands (namely, bottomland hardwoods) to offset the remaining temporary effects. ROA.1779-80.

This use of out-of-kind mitigation seems to have troubled the district court, but it was entirely appropriate. The Corps' regulations authorize the use of out-of-kind mitigation when it "will serve the aquatic resource needs of the watershed." 33 C.F.R. § 332.3(e)(2). Moreover, while Basinkeeper and its members may value the aesthetics of cypress trees over the oaks and dogwoods that make up the bottomland hardwoods, the Clean Water Act (together with its regulations and guidelines) does not. Instead, it focuses exclusively on the aquatic functions and services provided by these wetlands. From that perspective, bald cypress/tupelo swamp and bottomland hardwoods are similar; both are palustrine forested wetlands and both serve similar aquatic functions. *See* ROA.1759-61. They differ mainly in that they consist of different species of trees.

Thus, the Corps turned to out-of-kind mitigation here because Bayou Bridge had already bought all of the available acres of bald cypress/tupelo swamp in the mitigation banks in the relevant watersheds. ROA.1777-78 (explaining that "there were not enough in-kind credits to offset the project's impacts to [bald cypress/tupelo swamp] wetlands within both the Atchafalaya River and Terrabonne Basins."). And the Corps then used LRAM to ensure that this out-of-kind mitigation would be sufficient to offset the remaining temporary effects to bald cypress/tupelo swamp.

After carefully walking through the Corps' analysis, it is not difficult to refute the district court's findings against the Corps:

- The district court held that the Corps offered no "rational explanation as to how the mitigation choices serve the stated goal of 'replac[ing] lost [aquatic] functions and services," ROA.4034-35, but that is exactly what the Corps did with LRAM: it scored all of the acres of affected wetlands by the value of their "lost aquatic functions and services" and then required Bayou Bridge to make up for those lost aquatic functions and services by buying an equivalent amount of credits from approved mitigation banks.
- The district court held that the Corps did "no analysis or consideration . . . of whether a 'preference' for mitigation bank credits was appropriate," ROA.4035, but that preference is set out in the Corps' lawful (and unchallenged) compensatory-mitigation regulations, which explain that mitigation banks are preferred because they "typically involve larger, more ecologically valuable parcels, and more rigorous scientific and technical analysis, planning, and implementation than permittee-responsible mitigation." 33 C.F.R. § 332.3(b)(2). Notably,

those regulations also explain that mitigation banks are much preferred over "permittee-responsible mitigation" like Basinkeeper's untested scheme to have Bayou Bridge tear down old spoil banks (itself, an out-of-kind form of mitigation). *Id*.

- The district court held that the Corps failed to consider whether these "particular mitigation bank credits . . . are 'located where it is most likely to successfully replace lost functions and services,'" ROA.4035, but that is exactly what the Corps' mitigation bank approval process does: it ensures that the improvement projects to be undertaken by the bank will mitigate effects in the bank's defined service area.
- The district court held that the Corps did "no analysis explaining how out-of-kind mitigation addresses [aquatic] functions," ROA.4038, but again LRAM scores both the wetlands impacted by the issuance of the permit and the wetlands to be purchased as mitigation (including out-of-kind wetlands) based on their aquatic functions to ensure that the impacts of the project will be offset. And as discussed above, bald cypress/tupelo swamp and bottomland hardwoods are both palustrine forested wetlands that serve similar aquatic functions.
- Similarly, the district court held that "there is not an iota of discussion, analysis, or explanation how [bottomland hardwoods] credits mitigate the loss of function and value of the cypress/tupelo swamp impact." ROA.4040. But again, that is exactly the analysis that the Corps undertook using LRAM for each and every acre of bald cypress/tupelo

swamp habitat impacted by discharges authorized for the construction of the pipeline.

- Finally, the district court held that "142 acres of wetlands . . . will be . . . irretrievably lost," ROA.4039. This is simply untrue; no wetlands will be permanently filled by this project.

The district court reached the wrong conclusions here because it failed to understand the tool—the LRAM—that the Corps used to analyze these issues and to ensure that this mitigation will be effective.[3] The discussion set out above, moreover, is not a "post-hoc rationalization." To the contrary, it is based entirely on the record that was before the district court (most importantly, the Corps' environmental assessments), together with a handful of publicly-available documents (such as the LRAM manual and the Corps' compensatory-mitigation regulations). The Corps' "path" here "may reasonably be discerned" and so the Corps' action should have been upheld by the district court. *See Nat'l Ass'n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 658 (2007) (internal quotation marks omitted).

For all these reasons, the district court abused its discretion in concluding that Basinkeeper was likely to succeed on the merits of its claim regarding mitigation.

[3] Basinkeeper may now argue that the LRAM is defective and that the Corps' conclusions are thus "arbitrary and capricious." But that issue is not before this Court at this time because the district court, having found that the Corps failed to explain itself at all, never reached the merits of the Corps' decision. If Basinkeeper wishes to challenge the LRAM or the Corps' application of the LRAM here, it will have to wait until those issues are first adjudicated by the district court.

III. The district court also misunderstood the Corps' analysis of the cumulative impacts.

NEPA requires agencies to consider the "cumulative impacts" of their actions (and the actions that they permit). 40 C.F.R. § 1508.7. A cumulative impact is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." *Id*. By requiring agencies to consider cumulative impacts, NEPA ensures that a series of "individually minor" actions will not cause a "collectively significant" impact over time that escapes NEPA review. *Id*. Notably, while NEPA requires agencies to consider the cumulative impacts of their actions, it does not require them to mitigate cumulative impacts.

The Corps analyzed the cumulative effects of the discharges authorized for the construction of the pipeline on other past, present, and reasonably-foreseeable future actions. ROA.1678-86, 1762, 1770-76. Those other actions included, for example, the dredging of a 2,000-foot long barge channel, a swamp restoration project, the installation of a pumping station to prevent flooding during storms, and the construction of a propylene pipeline. ROA.1680-81. Importantly, the Corps also considered the effects of other nearby pipelines that have been installed in this area over the past 50 years. ROA.1680. When it authorized the discharges necessary for the construction of this pipeline, the Corps concluded that because of "efforts taken to avoid and minimize effects on the project site wetlands and the mandatory implementation of a mitigation plan that functionally compensates unavoidable remaining impacts," the issuance of these permits "will not result in substantial . . . cumulative adverse impact on the aquatic environment." ROA.1762.[4]

Basinkeeper maintains that old spoil banks—allegedly left over from the digging of old pipeline channels—have harmed the hydrology of the Atchafalaya Basin, and it has urged the Corps to require Bayou Bridge to remove those spoil banks as part of its mitigation plan. *See* ROA.4030. The facts surrounding the creation of these old spoil banks are disputed by the parties, and the Corps has required Bayou Bridge (in the special conditions of its permit) to avoid the creation of any new spoil banks when it undertakes the activities authorized by the permit.

The Corps explored with Bayou Bridge the possibility of removing the old spoil banks. But there are significant practical problems with Basinkeeper's proposal, and it is far from clear whether the watersheds would actually benefit from it: Basinkeeper's proposal has not been subjected to the kind of "rigorous scientific and technical analysis" that the regulations require to ensure that it would "restore an outstanding resource." ROA.6082-84; 33 C.F.R. § 332.3(b)(2). In any event, the Corps' regulations disfavor this kind of

[4] *See also* ROA.1685 ("Due to the mitigation requirement, the abundance of wetland habitat within the cumulative impact area . . . , and the lack of any proposed fill by the requester's preferred alternative, cumulative impacts on wetlands in the requester's preferred alternative area would be negligible."); ROA.1762 ("It is anticipated that through the efforts taken to avoid and minimize the effects on the project site wetlands and the mandatory implementation of a mitigation plan that functionally compensates unavoidable remaining impacts, permit issuance will not result in substantial . . . cumulative adverse impact on the aquatic environment.").

"permittee-responsible mitigation," which is "generally less likely to be a successful source of compensatory mitigation," favoring instead the mitigation banks on which the Corps relied here. 33 C.F.R. §§ 332.3(b)(2), (4); U.S. Army Corps of Engineers, Compensatory Mitigation for Losses of Aquatic Resources, 73 Fed. Reg. 19594, 19606 (Apr. 10, 2008). Ironically, Basinkeeper's proposal would not only require the out-of-kind mitigation to which it now strenuously objects, but it would also rely on Bayou Bridge—which specializes in transporting oil, not rebuilding wetlands—to perform this novel and untested mitigation.

The district court did not take Basinkeeper up on its proposal to force Bayou Bridge to tear down old spoil banks. The court did, however, hold that the Corps had failed to fully consider the cumulative effects of its permit in light of these old spoil banks, and it accused the Corps of taking the "myopic view" that it was "only required to consider the impacts of this singular project." ROA.4048.

This holding and accusation are not supported by the record. The Corps did consider the cumulative effects of the authorized discharges, as documented above. But the Corps rationally concluded that those discharges will not have cumulative effects because their impacts will be mitigated. ROA.1762. Because the authorized discharges will be mitigated, they will not have an *incremental impact*, and therefore cannot have any *cumulative impact*. *See* 40 C.F.R. § 1508.7 (defining cumulative impact as "the impact . . . which results from the *incremental impact* of the action when added to other past, present, and reasonably foreseeable future actions.") (emphasis added). That is, because the impacts here are mitigated, they cannot contribute to a "collectively significant" impact over time. *See, e.g., Nw. Envtl. Advocates v. Nat'l Marine Fisheries Serv.*, 460 F.3d 1125, 1140 (9th Cir. 2006) (holding that an agency was not required to produce a "detailed cataloguing of past project's impact" on salinity where the proposed action would "have virtually no effect on salinity," and thus such a "catalog" would not inform the agency's analysis of the current project).

Ultimately, the district court's holding on cumulative impacts is built on its conclusion that the Corps did not ensure that the mitigation plan would offset the impacts of this permit. ROA.4048. And because the district court was wrong about the mitigation plan, its holding on cumulative effects is also an abuse of discretion and should be reversed.

IV. The district court's finding of "irreparable harm" is built on its other erroneous findings, and its injunction is overbroad.

The Supreme Court held in *Winter v. NRDC,* 555 U.S. at 20, that a court may grant a preliminary injunction only where the plaintiffs have shown a likelihood of irreparable harm. The district court's finding of irreparable harm here was based, in part, on its conclusion that this project "potentially threatens the hydrology of the Basin and poses the threat of destruction of already diminishing wetlands." ROA.4013-14. But those findings were made in error and, without them, the primary basis for the district court's injunction disappears. As such, the district court's grant of the injunction was an abuse of discretion and should be reversed.

Because the Corps' detailed calculations show that the issuance of this permit will not have any unmitigated adverse effects on aquatic functions, the district court also gave short shrift to the other public interest considerations here. Notably, the Corps' approval of the permit serves an important public interest in the development of domestic energy resources, which weighs against the grant of injunctive relief. *See NRDC v. Kempthorne*, 525 F. Supp. 2d 115, 127 (D.D.C. 2007) (denying preliminary injunctive relief, in part because of the harm to the development of domestic energy resources); *N. Slope Borough v. Andrus*, 642 F.2d 589, 594 (D.C. Cir. 1980) (denying injunctive relief after considering the "dual public interests of protecting the environment and enhancing oil-production capacity").

The district court enjoined both the Corps and Bayou Bridge "from taking any further action on the project within the Atchafalaya Basin." ROA.4057. But this broad injunction will not only stop the construction activities that the district court thought might cause irreparable harm; it might also be read to prevent the Corps from taking administrative actions—such as processing modifications to Bayou Bridge's permits to accommodate minor routing changes—that cannot conceivably cause any harm by themselves. The district court abused its discretion by failing to narrowly tailor its injunction to prevent the irreparable harm that it found.

Finally, as we have explained above, the Corps' action here should have been upheld because its reasoning is clear on the face of its environmental assessments, and the district court would have seen that if it had fully understood the role of the LRAM. But even if the district court's adverse findings against the Corps were correct, it still should not have enjoined construction in the Atchafalaya Basin because it only found that the Corps had failed to *explain* itself sufficiently well. It does not follow from that lack of explanation that the issuance of this permit will cause unmitigated adverse impacts to wetlands and that construction should be enjoined. Instead of enjoining the Corps, the district court should have remanded these questions back to the agency for further explanation (which the Corps could have readily provided), or waited for the compilation of the full administrative record (which was, of course, not possible on the expedited schedule set for this motion). Either way, the district court would have received the additional explanation that it sought without enjoining a project that it otherwise concluded was lawful.

Conclusion

The district court's grant of a preliminary injunction should be reversed.

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Certificate of Service

I hereby certify that on April 2, 2018, I electronically filed the foregoing brief with the Clerk of the Court for the United States Court of Appeals for the Fifth Circuit by using the appellate CM/ECF system, which will serve the brief on the other participants in this case.

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**Certificate of Compliance with Length Limits,
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1. This brief complies with the length limit of Federal Rule of Appellate Procedure 32(a)(7)(B)(1) because it contains 7,758 words, as determined by the word-count function of Microsoft Word 2016, excluding the parts of the document exempted by Fed. R. App. P. 32(f) and 5th Cir. R. 32.2.

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5), and the type-style requirements of Federal Rule of Appellate Procedure 32(a)(6), because it has been prepared in a proportionally-spaced typeface, Calisto MT, using Microsoft Word 2016, in 14-point.

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Certificate of Electronic Compliance

I hereby certify that on this 2nd day of April, 2018, the foregoing brief was transmitted to the Clerk of the United States Court of Appeals for the Fifth Circuit through the Court's CM/ECF document filing system. I further certify that: (1) required privacy redactions have been made pursuant to this Court's Rule 25.2.13, (2) the electronic submission is an exact copy of the paper document pursuant to this Court's Rule 25.2.1, and (3) the document has been scanned with Windows Defender Security Center, version 1.263.1955.0, and is free of viruses.

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LOUISIANA WETLAND RAPID ASSESSMENT METHOD FOR USE WITHIN THE BOUNDARIES OF THE NEW ORLEANS DISTRICT INTERIM VERSION 1.0

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TABLE OF CONTENTS

Louisiana Wetlands Rapid Assessment Method

I. Introduction

A. Purpose

The U.S. Army Corps of Engineers (USACE), New Orleans District, Regulatory Branch (CEMVN), has developed this manual to provide a rapid assessment tool for evaluating the compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands. This manual describes the intended use, scope, background, procedures, and guidelines for the Louisiana Wetland Rapid Assessment Method (LRAM). The output from LRAM will be used for calculating unavoidable adverse impacts and compensatory mitigation associated with USACE authorized activities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, and in following the 2008 Final Rule – Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Part 332). The appropriate use of LRAM will provide consistent methods for determining compensatory mitigation requirements and will support the integrity of data collection and comparison.

B. Definitions

The following is a list of key terms defined as appropriate for use within LRAM.

Absolute cover – (used in LRAM related to vegetation sampling) the percentage of the ground surface that is covered by the aerial portions (leaves and stems) of a plant species when viewed from above. Due to overlapping plant canopies, the sum of absolute cover values for all species in a community or stratum may exceed 100 percent.

Aquatic resources – a natural resource that wholly or partially contains water including, but not limited to wetlands, rivers, streams, lakes, channelized waterbodies or estuarine waterbodies.

Buffer - an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands, rivers, streams, lakes, marine, and estuarine systems from disturbances associated with adjacent land uses.

Compensatory mitigation - the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Condition - the relative ability of an aquatic resource to support and maintain a community of organisms having a species composition, diversity, and functional organization comparable to reference aquatic resources in the region.

Credit - a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the accrual or attainment of aquatic functions at a compensatory mitigation site. The measure of aquatic functions is based on the resources restored, established, enhanced, or preserved.

DA - Department of the Army.

Debit - a unit of measure (e.g., a functional or areal measure or other suitable metric) representing the loss of aquatic functions at an impact or project site. The measure of aquatic functions is based on the resources impacted by the authorized activity.

Enhancement - the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation) - the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

Exotic species - A species that is not native to a particular area, but that has been introduced intentionally or accidentally by human actions, and is negatively affecting composition and functionality of native wetland habitats.

Florida Parishes - eight parishes (East Baton Rouge, East Feliciana, Livingston, St. Helena, St. Tammany, Tangipahoa, Washington, and West Feliciana) in the southeastern part of Louisiana on the eastern side of Mississippi River and north of Lake Pontchartrain.

Functions - the physical, chemical, and biological processes that occur in ecosystems.

Hydrologic Unit Code (HUC) - a way of identifying all of the drainage basins in the United States in a nested arrangement developed by the United States Geological Survey (USGS). Drainage basins in the United States have been divided and subdivided at four different levels and each assigned a unique HUC consisting of eight digits based on these four levels. The four levels from largest to smallest are regions, sub-regions, accounting units, and cataloging units.

i-value – values within LRAM associated with the options for each factor related to an impact site

In-kind - a resource of a similar structural and functional type to the impacted resource.

Interagency Review Team (IRT) - an interagency group of federal, tribal, state, and/or local regulatory and resource agency representatives that reviews documentation for, and advises the district engineer on, the establishment and management of a mitigation bank or an in-lieu fee program.

m-value – values within LRAM associated with the options for each factor related to a mitigation site

Mitigation bank - a site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by DA permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor. The operation and use of a mitigation bank are governed by a mitigation banking instrument.

Mitigation Banking Instrument (MBI) - the legal document for the establishment, operation, maintenance and use of a mitigation bank.

Mitigation potential (M) – the summation of m-values in LRAM that provides the credits per acre generated at a mitigation project site.

Off-site - an area that is neither located on the same parcel of land as the impact site, nor on a parcel of land contiguous to the parcel containing the impact site.

On-site - an area located on the same parcel of land as the impact site, or on a parcel of land contiguous to the impact site.

Out-of-kind - a resource of a different structural and functional type from the impacted resource.

Permittee-Responsible Mitigation - an aquatic resource restoration, establishment, enhancement, and/or preservation activity undertaken by the permittee (or an authorized agent or contractor) to provide compensatory mitigation for which the permittee retains full responsibility.

Pine plantation – monoculture stands of pine trees managed for silvicultural purposes. These areas are typically in rows, are burned and or mechanically maintained on a regular basis such that very little midstory or understory plant communities exist.

Preservation - the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment - the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource.

Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Reference aquatic resources - a set of aquatic resources that represent the full range of variability exhibited by a regional class of aquatic resources as a result of natural processes and anthropogenic disturbances.

Rehabilitation - the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Release of credits - a determination by the district engineer, in consultation with the IRT, that credits associated with an approved mitigation plan are available for sale or transfer, or in the case of an in-lieu fee program, for fulfillment of advance credit sales. A proportion of projected credits for a specific mitigation bank or in-lieu fee project may be released upon approval of the mitigation plan, with additional credits released as milestones specified in the credit release schedule are achieved.

Restoration - the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: reestablishment and rehabilitation.

Riparian areas - lands adjacent to streams, rivers, lakes, and estuarine/marine shorelines. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality.

Service area - the geographic area within which impacts can be mitigated at a specific mitigation bank or an in-lieu fee program, as designated in its MBI.

Services - the benefits that human populations receive from functions that occur in ecosystems.

Sponsor - any public or private entity responsible for establishing, and in most circumstances, operating a mitigation bank or in-lieu fee program.

Temporal loss - the time lag between the loss of aquatic resource functions caused by the permitted impacts and the replacement of aquatic resource functions at the compensatory mitigation site.

Watershed - a land area that drains to a common waterbody, such as a stream, lake, estuary, wetland, or ultimately the ocean.

Watershed approach - an analytical process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. It involves consideration of watershed needs, and how locations and types of compensatory mitigation projects address those needs. A landscape perspective is used to identify the types and locations of compensatory mitigation projects that will benefit the watershed and offset losses of aquatic resource functions and services caused by activities authorized by DA permits. The watershed approach may involve consideration of landscape scale, historic and potential aquatic resource conditions, past and projected aquatic resource impacts in the watershed, and terrestrial connections between aquatic resources when determining compensatory mitigation requirements for DA permits.

Watershed basin – a division of basin subsegments developed by the Louisiana Department of Environmental Quality (LDEQ) for utilization in water quality planning, watershed assessment and management tasks.

Watershed plan - a plan developed by federal, tribal, state, and/or local government agencies or appropriate non-governmental organizations, in consultation with relevant stakeholders, for the specific goal of aquatic resource restoration, establishment, enhancement, and preservation. A watershed plan addresses aquatic resource conditions in the watershed, multiple stakeholder interests, and land uses. Watershed plans may also identify priority sites for aquatic resource restoration and protection. Examples of watershed plans include special area management plans, advance identification programs, and wetland management plans.

C. Intended Use

The goal of LRAM is to provide a rapid and repeatable calculation of compensatory mitigation requirements for unavoidable impacts to jurisdictional wetlands that can be completed by users with various backgrounds and limited field data. LRAM does not focus on any specific ecologic function(s) or societal value(s) provided by wetlands, rather it infers functional and value output based on its ecological condition.

LRAM has several applications applicable to the USACE Regulatory Program for CEMVN project managers, permit applicants, and mitigation bank sponsors. LRAM has been developed to assist project managers in efficiently and consistently quantifying adverse impacts associated with permit applications and environmental benefits associated with compensatory mitigation projects. LRAM can also assist applicants in evaluating the scale of compensatory mitigation that would be required by an impact. Sponsors can evaluate a potential mitigation bank site to predict potential mitigation credits available depending upon different restoration/enhancement techniques.

D. Model Development / Justification

LRAM has been established based on ratios for various mitigation types. The factors within LRAM modify the final ratios based on two outputs: (1) the perceived functions and values of an impact site based on its ecological condition with the perceived level of impact to those functions and values and (2) the perceived increase in functions and values of an aquatic resource at a compensatory mitigation project site based on the mitigation type and the inherent value of the mitigation project within its watershed landscape. The following is a table of ratios that have been utilized as a base to develop factor values within LRAM:

Site Quality	Mitigation Type			
	Re-Establishment	Rehabilitation	Enhancement	Preservation
High	2	2.5	4	30
Med	1.5	2	3	20
Low	1	1.5	2	15

As documented in several journals referenced herein, there are both ecological and regulatory justifications for compensatory mitigation requirements above a one to one areal extent (one acre of mitigation for one acre of impact). Studies have shown that successful wetland restoration sites only provide 74% of the biological structure and biogeochemical functions that natural wetland systems provide (Moreno-Mateos et al., 2012). Not included in this 26% loss of functions are additional temporal losses to functional outputs due to time lag in structural restoration versus impact occurrences. The degree of functional loss due to time lag has largely gone unmeasured through scientific study (Robb, 2002). The mitigation type involved also provides justification for ratios above one to one. Although not at optimal levels, wetland functions already exist on rehabilitation and enhancement sites. Therefore, more acreage may be required to account for losses at another site based on the level of functional output.

E. Geographic Scope

LRAM was developed for utilization across all wetland habitat types within the geographic boundaries of the New Orleans District. Specific wetland habitat types that will be included are baldcypress/tupelo swamp, bayhead swamp, bottomland hardwoods, brackish marsh, coastal prairie, flatwood ponds, forested batture, fresh marsh, hardwoods flats, intermediate marsh, pine flatwoods, pine-hardwood flatwoods, pine savannah and saline marsh, all of which are further discussed in Section I.F below.

F. Habitat Descriptions

1. *Specific Habitat Classifications within the Geographic Scope*

The following paragraphs lists each specific wetland habitat type, identified and defined from Louisiana Natural Heritage Program's (LNHP) *The Natural Communities of Louisiana*, 2009, that LRAM can be utilized to assess:

Baldcypress/tupelo swamp - forested, alluvial swamps growing on intermittently exposed soils. The soils are inundated or saturated by surface water or ground water on a nearly permanent basis throughout the growing season except during periods of extreme drought.

Bayhead swamp - extremely variable community ranging from a shrub dominated swamp to a mature swamp forest with evergreen shrubs forming the primary understory and midstory. Although very similar to wooded seeps, the community is well-developed and swamp-like, and occurrences are relatively sizable (typically at least a few acres). Bayhead Swamps occur in the heads of creeks or branches, at the base of slopes, in acid depressions in pine flatwoods, and borders of swamps in north, central, western, and southeastern Louisiana. Soils are usually very acid, sandy in texture, primarily colluvial in origin, and are saturated, inundated, or at least moist throughout the growing season. They are often deep and "mucky".

Bottomland Hardwood forest - a forested, alluvial wetland occupying broad floodplain areas that flank large river systems.

Brackish Marsh – a marsh habitat that is typically located between salt marsh and intermediate marsh with an average salinity of 8 parts per thousand (ppt), although it may occasionally lie adjacent to the Gulf of Mexico. Brackish marsh experiences irregular tidal flooding and is dominated by salt-tolerant grasses. Small pools or ponds may be scattered throughout. Plant diversity and soil organic matter content are higher in brackish marsh than in salt marsh and are typically dominated by *Spartina patens* (wire grass).

Coastal Prairie - This is the prairie region which occurs in southwestern Louisiana. On the south edge of its range, the community may occur on "islands" or "ridges" surrounded by marsh, while on interior portions of its range the community is found on nearly level plains with low local relief and is often associated with convex mounds (hillocks, pimple mounds, or mima mounds) over broad flats, and may be associated with wetlands throughout the range. The region is underlain by an impervious clay pan 6 to 18 inches below the surface that prevents downward percolation of water and inhibits upward movement of capillary water. Soils are typically circum-neutral to alkaline, saturated in winter, and often very dry in late spring and fall. The vegetation is quite diverse and dominated by grasses.

Flatwood Ponds – small, linear or circular depressional emergent wetlands nestled within pine savannah habitat in Western Louisiana. Flatwoods ponds can vary in size from 0.5 acre to 40 acres. The vegetation is dominated by fire dependant facultative wet and obligate grass and sedge species.

Forested batture – a community developed on the slope between the natural levee crest and major streams/rivers. It is a pioneer community which is first to appear on newly formed sand bars and river margins. The area receives sands and silts with each flood. The soils are semi-permanently inundated or saturated. Soil inundation or saturation by surface water or groundwater occurs periodically for a major portion of the growing season.

Fresh Marsh – a marsh habitat that is generally located adjacent to intermediate marsh along the northern most extent of the coastal marshes as well as adjacent to coastal bays where freshwater input is entering the bay. Fresh marsh habitat may contain small, scattered pools or ponds and salinities less than 2 ppt with a typical average around 0.5 –

1.0 ppt. Fresh marsh has the most diverse pant communities, highest wildlife populations and the highest soil organic matter content of any of the marsh types.

Hardwood Flats – a forested wetland that occurs on hydric soils on poorly drained flats and depressions typically not affected by overbank flooding. The topography is flat to gently undulating. Several inches of water may occur on the surface during the winter months with soil saturation continuing into the spring.

Intermediate Marsh – a marsh habitat that typically occurs between brackish marsh and freshwater marsh and rarely can be found adjacent to the Gulf of Mexico. Intermediate marsh has an irregular tidal regime, is oligohaline (salinity of 3 to 10 ppt), and is dominated by narrow-leaved, persistent emergent plant species. Small pools or ponds may be scattered. Plant diversity and soil organic matter content is higher than in brackish marsh. This marsh is characterized by a diversity of species, many of which are found in freshwater marsh and some of which are found in brackish marsh.

Pine flatwoods - habitat occurs primarily in the southern Florida Parishes and southwest Louisiana on essentially flat, low-relief areas with a high water table. They may infrequently occur in central Louisiana. Soils are normally mesic but may be saturated in winter and may become dry in summer. Soils are generally strongly acidic and fine sandy or silty.

Pine-Hardwood Flatwoods - a natural mixed forest community indigenous to the western Florida Parishes in southeast Louisiana. This community occupies poorly drained flats, depressional areas and small drainages that lie in a mosaic with higher, non-wetland areas. Hardwoods usually dominate the forest composition, but spruce pine can dominate areas within the stand.

Pine savannah - floristically rich, herb-dominated wetlands, that are naturally sparsely stocked with Pinus palustris (longleaf pine). They historically dominated the Gulf Coastal Plain flatwood regions of southeast and southwest Louisiana. The term “savannah” is classically used to describe expansive herb-dominated areas with scattered trees. Wet savannas occupy the poorly drained and seasonally saturated/flooded depressional areas and low flats, while the non-wetland flatwoods occupy the better drained slight rises, low ridges and “pimple mounds” (only southwest LA). Pine savannahs are subject to a highly fluctuating water table, from surface saturation/shallow flooding in late fall/winter/early spring to growing-season drought. Soils are hydric, very strongly acidic, nutrient poor, fine sandy loams and silt loams, low in organic matter.

Saline Marsh – a marsh habitat that is typically found adjacent to or at the interface of coastal lands with the open waters of the Gulf of Mexico. Salt marshes are regularly tidally flooded, flat, polyhaline (18 – 30 parts per thousand) areas dominated by salt-tolerant grasses with small pools or ponds scattered throughout. Salt marshes have the lowest plant species diversity (often totally dominated by *Spartina alterniflora*) as well as the lowest soil organic matter content of any of the marsh types. Salt marsh functions as a nitrogen and phosphorus sink, thereby improving the quality of water that passes through it. Salt marsh provides nursery areas for myriads of larval forms of shrimp, crabs, redfish, seatrout, menhadden, etc., and also as important waterfowl habitat.

Small Stream Forest - riparian forests that are relatively narrow occurring along small rivers and large creeks. They are seasonally flooded for brief periods. The percentage of sand, silt, calcareous clay, acidic clay, and organic material in the soil is highly variable (depending on local geology) and has a significant effect on plant species composition. Soils are typically classified as silt-loams.

2. *Mitigation Kind / Habitat Communities*

Following the requirements of 33 CFR Part 332.3(e) and 40 CFR Part 230.93(e), CEMVN compensatory mitigation requirements include in-kind habitat replacement. The focus of in-kind habitat replacement is to assure similar functions and services that are lost at an impact site are gained at a mitigation site. Several of the habitats described in Section I.F.1 above either provide similar wetland functions or naturally exist together as a community (i.e., pine flatwoods, bayhead swamps, pine savanna exist together as a pine/flatwoods savanna community). CEMVN will consider the following as a list of habitats that will be grouped together as in-kind:

- **Bottomland hardwoods** (bottomland hardwoods, hardwood flats, pine-hardwood flatwoods, forested batture, small stream forest)
- **Baldcypress/tupelo swamp**
- **Pine flatwoods/savanna** (bayhead swamp, flatwood ponds, pine flatwoods, pine savanna)
- **Coastal prairie**
- **Fresh/Intermediate marsh** (fresh marsh, intermediate marsh)
- **Brackish/saline marsh** (brackish marsh, saline marsh)

In certain circumstances, impacts will occur to low-quality or artificial wetland habitats such as farmed wetlands or wet emergent pastures which may not fit the definition of habitats listed above. These low-quality habitats at impact sites will be considered in-kind with compensatory mitigation sites with habitat types that are typical of what existed in the region prior to that habitat becoming low quality. Additional detailed descriptions of these situations are found in Section II.B as the ‘Low Quality’ selection for each habitat type. In these situations, the user should utilize additional resources, such as soils data or historical habitat range maps, to determine the habitat that likely existed.

G. Watershed Approach

As required in 33 CFR Part 332.3(c) and 40 CFR Part 230.93(c), CEMVN utilizes a watershed approach to compensatory mitigation. Using the watershed approach, CEMVN analyzes the spatial relationship of an impact and/or mitigation site to other directly abutting or regionally situated aquatic resources. Wetlands that are interconnected by the flow of water and/or the movements of wildlife generally have higher function of ecosystem processes (Collins et al. 2008). In addition, a wetland's proximity to other wetlands and the wetland density (number) in the surrounding area are positively correlated with wetland condition (Fennessy et al. 1998).

For bottomland hardwoods, baldcypress/tupelo swamp, pine/flatwoods savannah, and coastal prairie habitats, CEMVN utilizes the Louisiana watershed basins, as defined by Louisiana Department of Environmental Quality (LDEQ) source data, LOSCO (2004), to define the limits of its watersheds. There are eight watershed basins within CEMVN as recognized by the LDEQ. As such, compensatory mitigation projects should be selected within the same watershed basin of the impact it is intended to mitigate. The major watershed basins and their corresponding 8-digit HUC's are as follows:

Lake Pontchartrain Basin	08070202: Amite River
	08070203: Tickfaw River
	08070204: Lake Maurepas
	08070205: Tangipahoa River
	08090201: Liberty Bayou - Tchefuncta River
	08090202: Lake Pontchartrain
	08090203: Eastern Louisiana Coastal
Mississippi River Basin	08070100: Lower Mississippi River - Baton Rouge
	08070201: Bayou Sara - Thompson Creek
	08090100: Lower Mississippi River - New Orleans
Terrebonne Basin	08070300: Lower Grand River
	08090302: West - Central Louisiana Coastal
Atchafalaya Basin	08080101: Atchafalaya River
Vermilion-Teche Basin	08080102: Bayou Teche
	08080103: Vermilion River
Barataria Basin	08090301: East - Central Louisiana Coastal
Mermentau Basin	08080201: Mermentau Headwaters
	08080202: Mermentau
Calcasieu Basin	08080203: Upper Calcasieu River
	08080204: Whiskey Chitto River
	08080205: West Fork Calcasieu
	08080206: Lower Calcasieu

For fresh/intermediate and brackish/saline marsh impacts, CEMVN utilizes only two service areas, the deltaic and chenier plains. For viewing purposes within LRAM, those service areas are identified without HUC listings. For marsh impacts, the deltaic plain service area includes HUCs 08070204, 08070205, 08090201, 08090203, 08090100, 08090302, 08090301, 08080101, 08080102, and those portions of 08080103 within Iberia Parish while the chenier plain service area includes HUCs 08080202, 08080206, and those portions of 08080103 within Vermilion Parish.

II. Impact Factors

There are five factors which are utilized in LRAM to assess the "Impact Site(s):" Wetland Status, Habitat Condition, Hydrologic Condition, Negative Influences and Impact Type. The below table is a list of each "Impact Site" factor, the options for each factor, and the associated i-values assigned to each option:

Factor	Option	i value
Wetland Status	Rare, Imperiled, Difficult to Replace (RID)	3
	Secure	2
	Degraded	1
Habitat Condition	High	3
	Medium	2
	Low	1
Hydrologic Condition	High	3
	Medium	2
	Low	1
Negative Influences	High	-0.5
	Medium	-0.2
	Low	0
Impact Type	Full/Permanent Loss	3
	Partial/Temporary Loss	0.5

The impact value (I) per acre is calculated by summing all of the i factors listed above ($\sum i = I$). The I is then multiplied by the acreage of an impact project to determine the total number of LRAM debits generated. Detailed discussion of each "Impact Site" factor and their options are discussed below in Sections II.A through II.D.

A. Wetland Status

The wetland status factor considers several conditions of the impacted wetland site and its overall contributions within its watershed. When considering the wetland status factor, the user should consider the rarity of the habitat type within the CEMVN boundary, the difficulty involved in replacement of that habitat and its ecological (habitat and hydrology) connectivity within its watershed. Habitat classification and rarity information were obtained from the *The Natural Communities of Louisiana, (LNHP, 2009)*.

1. *Rare, Imperiled or Difficult to Replace*

Rare, imperiled or difficult to replace (RID) wetland areas are those habitats that are classified by LNHP as rare or imperiled and/or exhibit extreme difficulty in restoration. Imperiled habitats are defined by LNHP (2009) as those which have approximately 20 or less known occurrences and are extremely vulnerable to extirpation. Rare habitats are defined by LNHP (2009) as those which may only be found in a single region within Louisiana or have only up to 100 known occurrences.

Robb (2002) described a conceptual requirement of higher mitigation ratios based on the risk of failure of certain types of restoration projects. These types of projects represent restoration activities which can either be characterized by construction specifications that have a narrow margin of error or those which have inherent difficulty in establishment. Examples of these would include meeting target construction marsh elevations or establishing an emergent coastal prairie ecosystem without an existing seed source.

In addition to those habitats with difficult construction and establishment parameters, habitats defined by LNHP (2009) as Secure and are physically connected to greater than 500 acres of similar wetland habitat are also considered difficult to replace. These wetland areas are given higher values based on landscape principles discussed in Schaffer *et al.* (1992) such as increased species richness within larger blocks of habitat and increased habitat for interior species in one larger block rather than in two disjointed blocks of habitat.

Below is a specific list of habitats that will be considered RID:

- Bayhead swamp
- Brackish marsh
- Coastal Prairie
- Flatwood Ponds
- Fresh marsh
- Hardwood flatwoods
- Intermediate marsh
- Pine flatwoods
- Pine – hardwood flatwoods
- Pine savannah
- Saline marsh
- Small stream forest

2. <u>Secure</u>

Secure wetland areas are those habitats which are defined by the NHP as having over 100 known occurrences across the state of Louisiana and are generally secure in their existence. Below is a specific list of habitats that are considered Secure:

- Baldcypress / tupelo Swamp
- Bottomland hardwoods
- Forested batture

3. *Degraded*

Degraded wetland areas are those sites which lack the physical structure of the wetland habitats defined in Section I.F.1 but still meet the criteria of jurisdictional wetlands. These degraded wetland areas provide minor habitat value for most wildlife and fisheries species throughout most of the year.

- Wet pastures
- Farmed wetlands
- Pine plantations
- Scrub-shrub or forested system with average absolute cover of greater than 50% exotic species

B. Habitat Condition

The habitat condition factor assesses the physical structure of the impacted wetland area. The number of plant strata present influences the richness of the plant community and the diversity of the biotic structure. A more complex biotic structure gives rise to a higher wetland condition (Collins et al. 2008). In addition, the presence of a rich assemblage of native plants generally indicates a healthy condition and optimal functions in a wetland. A rich plant community will generally exhibit a seed bank that can maintain vegetative productivity when environmental conditions fluctuate.

The habitat condition factor requires field data on the plant species that exist on the impacted wetland area. The field data collected during a wetland delineation conducted in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (ERDC, 2010), is typically sufficient to make a selection for the habitat condition factor. To assess habitat condition, the user should acquire a list of species present and the stratum in which those species exist. From this data, habitat condition measurements such as species richness, stratum richness, exotic species presence, and overall structure of the habitat (e.g., emergent, scrub-shrub, forested) can be determined.

The habitat condition factor contains three options of high, medium and low. Specific community parameters for wetland areas of each habitat type are described below. These parameters were developed utilizing literature reviewed as well as field data gathered during model development and testing.

Baldcypress/tupelo swamp

High Condition:

Tree stratum contains more than 50% absolute cover of one or a mixture of both tree stratum species for baldcypress tupelo swamp listed below;
AND,
Shrub stratum does not exceed 50% absolute cover of one or a mixture of the shrub stratum species for baldcypress tupelo swamp listed below.
AND,
Tree and shrub stratum cumulatively contain less than 15% absolute cover exotic plant species.

Medium Condition:

Tree stratum contains 50% or less absolute cover of one or a mixture of both tree stratum species for baldcypress tupelo swamp listed below:
OR:
Shrub stratum exceeds 50% absolute cover of one or a mixture of the shrub stratum species for baldcypress tupelo swamp listed below.
OR:
Tree and shrub stratum cumulatively contain between 15% and 50% absolute cover exotic plant species.

Low Condition:

Tree and shrub stratum cumulatively contain more than 50% absolute cover exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Tree Stratum Species:

Taxodium distichum (baldcypress)
Nyssa aquatica (tupelo gum)

Shrub Stratum Species:

Nyssa biflora (swamp blackgum)
Fraxinus profunda (pumpkin ash)
Fraxinus pennsylvanica (green ash)
Salix nigra (black willow)
Acer rubrum var. *drummondii* (swamp red maple)
Planera aquatica (water elm)
Gleditsia aquatica (water locust)

Itea virginica (Virginia willow)
Cephalanthus occidentalis (buttonbush)

Bayhead swamp

High Condition:
Tree stratum contains more than 50% absolute cover of three or more of the following tree stratum species for bayhead swamps listed below.
AND,
Shrub stratum contains between 20% and 80% absolute cover of one or a mixture of the following shrub stratum species for bayhead swamps listed below.
AND,
Tree and shrub stratum cumulatively contain 15% or less absolute cover exotic plant species.

Medium Condition:
Tree stratum contains more than 50% absolute cover of less than three of the following tree stratum species for bayhead swamps listed below.
OR,
Tree stratum contains 50% or less absolute cover of one or more of the following tree stratum species for bayhead swamps listed below:
OR,
Shrub stratum does not fall within 20% and 80% absolute cover of one or a mixture of the following shrub stratum species for bayhead swamps listed below:
OR:
Tree and shrub stratum cumulatively contain between 15% and 50% absolute cover exotic plant species.

Low Condition:
Tree and shrub stratum cumulatively contain more than 50% absolute cover of exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Tree Stratum Species:

Magnolia virginiana (sweet bay magnolia)
Nyssa biflora (swamp blackgum)
Quercus laurifolia (laurel oak)
Q. nigra (water oak)
Acer rubrum (red maple)
Liquidambar styraciflua. (sweetgum)
Taxodium distichum (baldcypress)
T. ascendens (pondcypress)
Pinus elliottii (slash pine)

P. palustris (longleaf pine),

Shrub Stratum Species:

Persea borbonia (red bay)
Cyrilla racemiflora (swamp titi)
Morella heterophylla (bigleaf wax myrtle)
M. cerifera (wax myrtle)
Ilex glabra (little-leaf gallberry)
I. coriacea (sweet gallberry)
I. opaca (American holly)
Lyonia lucida (fetterbush)
L. ligustrina (fetterbush)
L. racemosa (leucothoe)
Lindera subcoriacea (bog spicebush)
Itea virginica (Virginia willow)
Leucothoe axillaris (leucothoe)
Aronia arbutifolia (red chokeberry)
Viburnum nudum (possum-haw)
Toxicodendron vernix (poison sumac),
Clethra alnifolia (summer sweet)
Alnus serrulata (hazel alder)
Styrax americana (American snowbell)
Rhododendron spp. (wild azalea)
Smilax laurifolia (laurel-leaf greenbrier)
Decumaria barbara (climbing hydrangea)

Bottomland hardwoods

High Condition:
Tree stratum contains more than 50% absolute cover of at least three or more of the following tree stratum species for bottomland hardwoods listed below.
AND,
Shrub stratum does not exceed 50% absolute cover of one or a mixture of the following shrub species for bottomland hardwoods listed below.
AND,
Tree and shrub stratum cumulatively contain 15% or less absolute cover exotic plant species.

Medium Condition:
Tree stratum contains more than 50% absolute cover of less than three of the following tree stratum species for bottomland hardwoods listed below.
OR,
Tree stratum contains 50% or less absolute cover of a mixture of the following tree stratum species for bottomland hardwoods listed below.
OR,

Shrub stratum does exceed 50% absolute cover of one or a mixture of the following shrub species for bottomland hardwoods listed below.
OR,
Tree and shrub stratum cumulatively contain between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Tree and shrub stratum cumulatively contain more than 50% absolute cover exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Tree Stratum Species:

Quercus lyrata (overcup oak)
Q. texana (nuttall oak)
Q. phellos (willow oak)
Q. nigra (water oak)
Q. pagoda (cherrybark oak)
Q. laurifolia (laurel oak)
Q. michauxii (swamp chestnut oak)
Q. virginiana (live oak)
Liquidambar styraciflua (sweetgum)
Gleditsia aquatica (water locust)
Ulmus americana (American elm)
Fraxinus pennsylvanica (green ash)
Acer rubrum (red maple)
A. negundo (box elder)
Cornus foemina (**swamp** dogwood)
C. drummondii (roughleaf dogwood)
Celtis laevigata (hackberry)
Planera aquatica (planertree)
Plantanus occidentalis (American sycamore)
Carya aquatica (water hickory)
C. illinoinensis (sweet pecan)
Diospyros virginiana (persimmon)
Populus deltoides (cottonwood)

Shrub Stratum Species:

Ilex decidua (deciduous holly)
Crataegus sp. (hawthorn)
Arundinaria gigantea (switchcane)
Cephalanthus occidentalis (buttonbush)
Forestiera acuminata (swamp privet)

Morus rubra (red mulberry)

Brackish marsh

The user should note that brackish marsh conditions are described with the terms emergent vegetative cover and do not refer to absolute cover. When measuring emergent vegetative cover in brackish marsh, the user should consider the entire project area when determining emergent vegetative cover, which will typically include a percent of open water and a percent of emergent marsh. While the entire project area should be used to determine emergent vegetative cover, the acreage of open water should not be included in the final acreage of impact to brackish marsh. Detailed examples of these calculations can be found in Section IV.D.

High Condition:
Emergent vegetative cover is greater than 50% and is comprised of the typical common native species found in healthy brackish marshes including any of the plant species below.
AND,
Vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Emergent vegetative cover is between 25% and 50% and is comprised of the typical common native species found in healthy brackish marshes including any of the plant species below:
OR:
Vegetative cover contains between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Emergent vegetative cover is less than 25% and is comprised of the typical common native species found in healthy brackish marshes including any of the plant species below:
OR:
Vegetative cover contains more than 50% absolute cover of exotic plant species.

Plant Species for brackish marsh:

Spartina patens (wire grass)
S. alterniflora (smooth cordgrass)
S. cynosuroides (big cordgrass)
Distichlis spicata (salt grass)
Bacopa monnieri (coastal water hyssop)
Juncus roemerianus (black rush)
Schoenoplectus olneyi (three-cornered grass)
S. robustus (salt marsh bulrush)
Ruppia maritima (widgeon grass)

Eleocharis parvula (dwarf spikesedge)
Paspalum vaginatum (seashore paspalum)

Coastal Prairie

High Condition:
Emergent vegetation cover is greater than 50% absolute cover comprised of any mixture of the plant species for coastal prairie listed below.
AND,
Tree and shrub stratum vegetative cover is less than 25% absolute cover.
AND,
Emergent vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Emergent vegetative cover is 50% or less absolute cover comprised of any mixture of the plant species for coastal prairie listed below.
OR:
Tree and shrub stratum vegetative cover is 25% or more absolute cover.
OR:
Emergent vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Emergent vegetative cover contains more than 50% exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Common herbaceous species include:
Aristida spp. (three-awn grasses)
Paspalum plicatulum (brownseed paspalum)
Paspalum spp. (paspy grasses)
Schizachyrium scoparium (little bluestem)
S. tenerum (slender bluestem)
Andropogon spp. (broomsedges)
Andropogon gerardii (big bluestem)
Eragrostis spp. (love grasses)
Spartina patens (wire grass, near marshes)
Panicum virgatum (switch grass)
Panicum spp. (panic grasses)
Sorghastrum nutans (Indian grass)
Sporobolus spp. (dropseeds)
Tridens spp. (purple-top)
Carex spp. (caric sedges)
Cyperus spp. (umbrella sedges)
Rhynchospora spp. (beaked sedges)

Scleria spp. (nut-rushes)

Common forb (wildflower) species include:
Cacalia ovata (Indian platain)
Helianthus mollis (sunflower)
Liatris spp. (blazing-stars)
Asclepias spp. (milkweeds)
Silphium spp. (rosin-weeds)
Petalostemum spp. (prairie clovers)
Baptisia spp. (indigos)
Amsonia tabernaemontana (blue star)
Rudbeckia spp. (brown-eyed susans)
Euphorbia spp. (spurges)
Euthamia spp. (flat-topped goldenrods)
Hedyotis nigricans (bluets)
Ruellia humilis (wild petunia)
Ludwigia spp. (water primroses)
Coreopsis spp. (tickseeds)
Solidago spp. (goldenrods)
Agalinis spp. (false foxgloves)
Eupatorium spp. (thoroughworts)
Sabatia spp. (rose-gentians)
Polygala spp. (milkworts)
Aletris spp. (colic-roots)
Rhexia spp. (meadow beauties)

Flatwood Ponds

High Condition:
Emergent vegetative cover is at least 85% including any mixture of the plant species for flatwood ponds listed below.
AND,
Vegetative cover contains less than 15% exotic plant species.

Medium Condition:
Emergent vegetative cover is at least 85% and is comprised of less than 42.5% any mixture of the plant species below:
OR,
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Emergent vegetative cover contains more than 50% exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Plant Species for flatwood ponds:
Andropogon glomeratus var. *glaucopsis* (bushy beardgrass)
Aristida palustris (longleaf three-awn grass)
Coreopsis linifolia (tickseed)
Eleocharis tuberculosa (spikerush)
Eriocaulon decangulare (pipewort)
Rhynchospora spp. (beakrushes)
Oxypolis filiformis (hog-fennel)
Gratiola brevifolia (hyssop)
Hypericum galioides (St. John's wort)
Hyptis alata (bitter mint)
Panicum virgatum (switchgrass)
Pluchea rosea (stinkweed)
Polygala ramosa (candyroot)
Proserpinaca pectinata (mermaid-weed)
Hibiscus aculeatus (comfort-root)
Rhexia lutea (meadow beauty)
Amsonia glaberrima (bluestar)
Bacopa caroliniana (blue-hyssop)
Panicum hemitomon (maidencane)
Carex verrucosa
Dichanthelium spp
Hibiscus moscheutos ssp. *Lasiocarpus*
Juncus effuses (soft rush)
Ludwigia pilosa (evening primrose)
Lycopus rubellus (bugleweed)
Sagittaria graminea (arrowhead)

Forested batture

High Condition:
Tree stratum contains more than 50% absolute cover and includes one or any mixture of the tree stratum species for forested batture listed below.
AND,
Vegetative cover contains less than 15% exotic plant species.

Medium Condition:
Tree stratum contains 50% or less absolute cover and includes one or any mixture of the tree stratum species for forested batture listed below.
OR:
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Vegetative cover contains more than 50% exotic plant species.

Tree Stratum Species:
Salix nigra (black willow)
S. exigua (sandbar willow)
Populus deltoides (cottonwood)
Betula nigra (riverbirch)

Fresh marsh

The user should note that fresh marsh conditions are described with the terms emergent vegetative cover and do not refer to absolute cover. When measuring emergent vegetative cover in fresh marsh, the user should consider the entire project area when determining emergent vegetative cover, which will typically include a percent of open water and a percent of emergent marsh. While the entire project area should be used to determine emergent vegetative cover, the acreage of open water should not be included in the final acreage of impact to fresh marsh. Detailed examples of these calculations can be found in Section IV.D.

High Condition:
Emergent vegetative cover is greater than 50% and is comprised of the typical common native species found in healthy fresh marshes including any of the plant species below.
AND,
Vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Emergent vegetative cover is between 25% and 50% and is comprised of the typical common native species found in healthy fresh marshes including any of the plant species below:
OR:
Vegetative cover contains between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Emergent vegetative cover is less than 25% and is comprised of the typical common native species found in healthy fresh marshes including any of the plant species below:
OR:
Vegetative cover contains more than 50% absolute cover of exotic plant species.

Plant species for fresh marsh:
Panicum hemitomon (maidencane)
Eleocharis spp. (spikesedge)
Sagittaria lancifolia (= *S. falcata*)
Lemna minor (common duckweed)
Alternanthera philoxeroides (alligator weed)
Phragmites communis (roseau cane)
Bacopa monnieri (coastal water hyssop)
Ceratophyllum demursum (coontail)

Cyperus odoratus (fragrant flatsedge)
Eichhornia crassipes (water hyacinth)
Pontederia cordata (pickerelweed)
Peltandra virginica (arrow arum)
Hydrocotyle spp. (pennyworts)
Zizaniopsis miliacea (southern wildrice)
Myriophyllum spp. (water milfoils)
Nymphaea odorata (white waterlilly)
Typha spp. (cattail)
Utricularia spp. (bladderworts)
Vigna luteola (deer pea)

Hardwood flatwoods

High Condition:
Tree stratum contains more than 50% absolute cover of at least three or more of the following tree stratum species for hardwood flatwoods listed below.
AND,
Shrub stratum does not exceed 50% absolute cover of one or a mixture of the following shrub species for hardwood flatwoods listed below.
AND,
Tree and shrub stratum cumulatively contain 15% or less absolute cover exotic plant species.

Medium Condition:
Tree stratum contains more than 50% absolute cover of less than three of the following tree stratum species for hardwood flatwoods listed below.
OR,
Tree stratum contains 50% or less absolute cover of a mixture of the following tree stratum species for hardwood flatwoods listed below.
OR,
Shrub stratum does exceed 50% absolute cover of one or a mixture of the following shrub species for hardwood flatwoods listed below.
OR,
Tree and shrub stratum cumulatively contain between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Vegetative cover contains more than 50% exotic plant species.
OR:
Site exists as a palustrine, emergent wetland utilized as a wet pasture or farmed wetland.

Tree Stratum Species:
Quercus phellos (willow oak)
Q. lyrata (overcup oak)

Q. texana (Nuttall oak)
Fraxinus pennsylvanica (green ash)
Carya ovata (shagbark hickory)
Ulmus americana (American elm)
Ulmus crassifolia (cedar elm)
Celtis laevigata (hackberry)

Shrub Stratum Species:
Ulmus alata (winged elm)
U. crassifolia (cedar elm)
Sabal minor (palmetto)
Ilex decidua (deciduous holly)
Styrax americana (snowbell)
Forestiera acuminata (swamp privet)
Planera aquatica (planertree)

Intermediate marsh

The user should note that intermediate marsh conditions are described with the terms emergent vegetative cover and do not refer to absolute cover. When measuring emergent vegetative cover in intermediate marsh, the user should consider the entire project area when determining emergent vegetative cover, which will typically include a percent of open water and a percent of emergent marsh. While the entire project area should be used to determine emergent vegetative cover, the acreage of open water should not be included in the final acreage of impact to intermediate marsh. Detailed examples of these calculations can be found in Section IV.D.

High Condition:
Emergent vegetative cover is greater than 50% and is comprised of the typical common native species found in healthy intermediate marshes including any of the plant species below.
AND,
Vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Emergent vegetative cover is between 25% and 50% and is comprised of the typical common native species found in healthy intermediate marshes including any of the plant species below:
OR:
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Emergent vegetative cover is less than 25% and is comprised of the typical common native species found in healthy intermediate marshes including any of the plant species below:
OR:

Vegetative cover contains more than 50% exotic plant species.

Plant species for intermediate marsh:
Spartina patens (wire grass)
Phragmites communis (roseau cane)
Sagittaria lancifolia (= *S. falcata*; bulltongue)
Bacopa monnieri (coastal water hyssop)
Eleocharis spp. (spikesedge)
Scirpus olneyi (three-cornered grass)
Scirpus californicus (giant bulrush)
Vigna luteola (deer pea)
Scirpus americanus (common threesquare)
Panicum virgatum (switch grass)
Paspalum vaginatum (seashore paspalum)
Pluchea camphorata (camphor-weed)
Leptochloa fascicularis (bearded sprangletop)
Echinonchloa walteri (walter millet)
Cyperus odoratus (fragrant flatsedge)
Najas guadalupensis (southern naiad)
Alternanthora philoxeroides (alligator weed)
Spartina cynosuroides (big cordgrass)
Spartina spartineae (gulf cordgrass)

Pine flatwoods

High Condition:
Tree stratum contains more than 75% absolute cover of one or a mixture of the Pinus spp. listed below.
AND,
Tree stratum contains no more than 15% absolute cover of one or a mixture of the tree stratum species listed below.
AND,
Vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Tree stratum contains 75% or less absolute cover of one or a mixture of the Pinus spp. listed below:
OR,
Tree stratum contains more than 15% absolute cover of one or a mixture of the tree stratum species listed below:
OR,
Vegetative cover contains between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Tree stratum contains more than 95% absolute cover of one or a mixture of the Pinus spp. listed below (site is managed as a pine plantation):
OR,
Vegetative cover contains more than 50% absolute cover of exotic plant species.

***Pinus* species:**
Pinus palustris (longleaf pine)
P.elliottii (slash pine)
P. taeda (loblolly pine)
P. glabra (spruce pine)

Tree stratum species in pine flatwoods:
Quercus nigra (water oak)
Q. laurifolia (laurel oak)
Magnolia virginiana (sweetbay magnolia)
Acer rubrum (red maple)
Liquidambar styraciflua (sweetgum)
Nyssa sylvatica (blackgum)

Pine–hardwood flatwoods

High Condition:
Tree stratum contains a minimum 90% absolute cover comprised of less than 50% of the Pinus species listed below and no more than 80% of the native hardwoods listed below.
AND,
Shrub stratum does not exceed 50% absolute cover of one or a mixture of the following plant species:
AND,
Vegetative cover contains 15% or less exotic plant species.

Medium Condition:
Tree stratum contains less than 90% absolute cover comprised of more than 45% of the Pinus species listed below and less than 45% of the native hardwoods listed below:
OR,
Shrub stratum does exceed 50% absolute cover of one or a mixture of the following plant species:
OR,
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Tree stratum contains 95% absolute cover of one or a mixture of the Pinus spp. listed below (site is managed as a pine plantation).
OR:
Vegetative cover contains more than 50% absolute cover of exotic plant species.

Tree stratum species in pine-hardwood flatwoods:
Pinus glabra (spruce pine)
P. taeda (loblolly pine)
Acer rubrum (red maple)
Carya glabra (pignut hickory)
Quercus laurifolia (laurel oak)
Q. michauxii (swamp chestnut oak)
Q. nigra (water oak)
Q. pagoda (cherrybark oak)
Q. phellos (willow oak)
Nyssa biflora (swamp blackgum)
N. sylvatica (blackgum)
Liquidambar styraciflua (sweetgum)
Fraxinus caroliniana (Carolina ash)
F. pennsylvanica (green ash)
Fagus grandifolia (American beech)
Magnolia grandiflora (Southern magnolia)

Shrub stratum species in pine-hardwood flatwoods:
Cephalanthus occidentalis (buttonbush)
Cornus foemina (swamp dogwood)
Crataegus opaca (mayhaw)
Arundinaria gigantea (switchcane)
Diospyros virginiana (persimmon)
Ilex decidua (deciduous holly)
I. opaca (American holly)
Itea virginica (Virginia willow)
Morella cerifera (wax myrtle)
Toxicodendron radicans (poison ivy)
Sambucus canadensis (elderberry)
Smilax spp. (greenbriars)
Styrax americanus (snowbell)
Viburnum dentatum (arrowwood)
Vitis rotundifolia (muscadine)
Ampelopsis arborea (peppervine)
Berchemia scandens (rattan vine)
Brunnichia cirrhosa (ladies' eardrops)
Campsis radicans (trumpet creeper)
Sabal minor (dwarf palmetto)

Pine savannah

High Condition:
Tree stratum does not exceed 80% absolute cover of the *Pinus* species listed below.
AND,

Tree and shrub stratum cumulatively contain 15% or less absolute cover of the native hardwoods listed below:
AND,
Herbaceous stratum contains 80% - 100% absolute cover comprised of a mixture of the emergent plant species listed below:
AND,
Vegetative cover contains 15% or less exotic plant species.

Medium Condition:
Tree stratum exceeds 80% absolute cover of the Pinus species listed below.
OR,
Tree and shrub stratum cumulatively contains more than 15% absolute cover of the native hardwoods listed below:
OR,
Herbaceous stratum contains less than 80% absolute cover comprised of a mixture of the plant species listed below.
OR,
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Tree stratum contains 95% absolute cover of one or a mixture of the Pinus spp. listed below (site is managed as a pine plantation):
OR:
Vegetative cover contains more than 50% exotic plant species.

Pinus species:
Pinus palustris (longleaf pine)
P. elliottii (slash pine)

Hardwood species:
Magnolia virginiana (sweet bay)
Nyssa biflora (swamp black gum)
Quercus virginiana (live oak)
Q. marilandica (blackjack oak)
Q. laurifolia (laurel oak)
Cyrilla racemiflora (swamp cyrilla)
Morella spp. (wax myrtles)
Hypericum spp. (St. John's worts)
Styrax americana (littleleaf snowbell)
Taxodium ascendens (pondcypress)

Emergent species in pine savannah:
Andropogon spp. (broomsedges)
Schizachyrium scoparium (little bluestem)
S. tenerum (slender bluestem)
Panicum spp. (panic grasses)
Aristida spp. (three-awn grasses)

Ctenium aromaticum (toothache grass)
Muhlenbergia capillaris (hairawn muhly)
Erianthus spp. (plume-grasses)
Coelorachis spp. (jointgrasses)
Rhynchospora spp. (beak-rushes)
Xyris spp. (yellow-eyed grasses)
Fuirena spp. (umbrella grasses)
Scleria spp. (nut-rushes)
Dichromena latifolia (white top sedge)
Eriocaulon spp. (pipeworts)
Lachnocaulon spp. (bog buttons)
Fimbristylis spp. (fimbry-sedge)
Sarracenia spp. (pitcherplants)
S. psittacina (parrot pitcherplant)
Agalinis spp. (gerardias)
Lobelia spp. (lobelias)
Rhexia spp. (meadow beauties)
Eryngium integrifolium (bog thistle)
Oxypolis filiformis (hog-fennel)
Polygala spp. (milkworts)
Liatris spp. (blazing-stars)
Sabatia spp. (rose-gentians)
Drosera spp. (sundews)
Pinguicula spp. (butterworts)
Utricularia spp. (bladderworts)
Platanthera spp. (fringed-orchids)
lily family (Liliaceae)
Aletris lutea (yellow colic-root)
Tofieldia racemosa (coastal false-asphodel)
sunflower family (Asteraceae)
orchid family (Orchidaceae)
Cleistes bifaria (spreading pogonia)
Lycopodium spp. (club-mosses)

Saline marsh

The user should note that saline marsh conditions are described with the terms emergent vegetative cover and do not refer to absolute cover. When measuring emergent vegetative cover in saline marsh, the user should consider the entire project area when determining emergent vegetative cover, which will typically include a percent of open water and a percent of emergent marsh. While the entire project area should be used to determine emergent vegetative cover, the acreage of open water should not be included in the final acreage of impact to saline marsh. Detailed examples of these calculations can be found in Section IV.D.

High Condition:
Emergent vegetative cover is greater than 50% and is comprised of the typical common native species found in healthy saline marshes including any of the plant species below.
AND,
Vegetative cover contains less than 15% absolute cover of exotic plant species.

Medium Condition:
Emergent vegetative cover is between 25% and 50% and is comprised of the typical common native species found in healthy saline marshes including any of the plant species below:
OR:
Vegetative cover contains between 15% and 50% exotic plant species.

Low Condition:
Emergent vegetative cover is less than 25% and is comprised of the typical common native species found in healthy saline marshes including any of the plant species below:
OR:
Vegetative cover contains more than 50% exotic plant species.

Emergent species in saline marsh:
Spartina alterniflora (smooth cordgrass)
Spartina patens (wire grass)
Distichlis spicata (salt grass)
Juncus roemarianus (black rush)
Batis maritima (salt wort)

Small Stream Forests

High Condition:
Tree stratum contains more than 50% absolute cover of at least three or more of the following tree stratum species for small stream forests listed below.
AND,
Shrub stratum does not exceed 50% absolute cover of one or a mixture of the following shrub species for small stream forests listed below.
AND,
Tree and shrub stratum cumulatively contain 15% or less absolute cover exotic plant species.

Medium Condition:
Tree stratum contains more than 50% absolute cover of less than three of the following tree stratum species for small stream forests listed below.
OR,
Tree stratum contains 50% or less absolute cover of a mixture of the following tree stratum species for small stream forests listed below.
OR,

Shrub stratum does exceed 50% absolute cover of one or a mixture of the following shrub species for small stream forests listed below.
OR,
Tree and shrub stratum cumulatively contain between 15% and 50% absolute cover of exotic plant species.

Low Condition:
Tree and shrub stratum cumulatively contain more than 50% absolute cover exotic plant species.

Tree stratum species:
Magnolia grandiflora (southern magnolia)
Fagus grandifolia (beech)
Nyssa sylvatica (black gum)
Quercus michauxii (swamp white oak)
Q. alba (white oak)
Q. nigra (water oak)
Q. laurifolia (laurel oak)
Q. falcata var. pagodaefolia (cherrybark oak)
Liquidambar styraciflua (sweetgum)
Platanus occidentalis (sycamore)
Acer rubrum (red maple)
Betula nigra (river birch)
Carya ovata (shagbark hickory)
C. cordiformis (bitternut hickory)
Fraxinus americana (white ash)
F. caroliniana (water ash)
Prunus caroliniana (cherry laurel)
Ulmus alata (winged elm)
Liriodendron tulipifera (yellow poplar)
Pinus glabra (spruce pine)
P. taeda (loblolly pine)
Taxodium distichum (bald cypress)

Shrub stratum species:
Halesia diptera (silverbell)
Carpinus caroliniana (ironwood)
Viburnum dentatum (arrow-wood)
Itea virginica (Virginia willow)
Symplocos tinctoria (sweetleaf)
Alnus serrulata (hazel alder)
Rhododendron canescens (wild azalea)
Styrax grandifolia (bigleaf snowbell)
Illicium floridanum (starbush)
Sebastiana fruticosa (sebastian bush)
Cyrilla racemiflora (swamp cyrilla)

Lyonia lucida (fetterbush)
Leucothoe axillaris (leucothoe)
L. racemosa (leucothoe)
Ilex verticillata (winterberry)

C. Hydrologic Condition

The hydrologic condition is a measure of the degree to which an impact site's hydrology is controlled by anthropogenic forces or natural processes. Hydrology is the most important factor in the maintenance of wetland processes (Mitsch and Gosselink 2000) and natural inflows of water to a wetland affect the wetland's ability to perform and maintain its typical functions (Collins et al. 2008). Therefore, anthropogenic alterations to natural hydrology will reduce wetland condition. Natural sources of hydrology include surface water inflow (flooding or runoff), groundwater discharge, and precipitation. Anthropogenic alterations to hydrology include levees, canals/ditches and drainage pumps.

Any anthropogenic alterations to regional hydrology may also have an effect on a wetland systems' hydroperiod. The hydroperiod is the duration, frequency, and magnitude of inundation and/or saturation in a wetland. In general, wetlands with greater variation, fluctuation, or pulsing in their hydroperiod also have higher function (Mitsch and Gosselink 2000). In addition, wetlands with seasonal hydroperiods (e.g., more than four weeks in spring and fall) typically have higher plant species diversity than wetlands with temporary hydroperiods (e.g., two to four weeks) which are dominated by facultative species and wetlands with nearly permanent hydroperiods which are dominated by a few obligate species.

1. *<u>High</u>*

Regional and local hydrology are generally unaffected by anthropogenic disturbances or have minor disturbances that could self-restore through natural processes. Such minor disturbances may include logging ruts, shallow bedding activities associated with forestry practices, shallow abandoned ditches, old road beds with shallow ditches or minor earthen dikes that impair flow causing minor ponding or have a minor shadow effect or redirect flow but do not affect water quality or surface water retention time.

2. *<u>Medium</u>*

Regional and local hydrology are impaired by anthropogenic disturbances such that full functional recovery would not occur through natural processes. Hydrologic restoration would require implementation of a restoration plan. Such disturbances include multiple canals with spoil banks higher than tidal reach, areas encompassed by levees with fisheries access through weirs with boat bays, regularly maintained ditches that effectively reduce surface water retention time, is downstream from developed areas where excessive water or water containing high levels of sediments, nutrients, hydrocarbons or other pollutants are directed onto the site affecting surface water quality, or water is directed away from the site by roadway or other earthen embankments reducing the duration that surface water remains on the site.

3. *Low*

Regional and local hydrology are permanently impaired by site or off-site disturbances such that the site no longer performs many of those functions. Functions cannot be restored through on or off site restoration. Such disturbances include areas near major drainage canals or within forced drainage systems that have subsided to such an extent that restoring hydrologic connections to outside wetlands would permanently flood the area or areas encompassed by levees with minimal to no fisheries access due to fixed, slotted or variable crest weir without boat bay, rock weir or flap gated culvert.

D. Negative Influences

This factor refers to anthropogenic influences, which may occur either internally, adjacent to or within the surrounding landscape of the assessed wetland, that have a deleterious effect on wetland functions and condition of a project site. Such negative influences reduce the ability of a restored/enhanced wetland to attain maximum effectiveness in providing wetland functions and services such as wildlife habitat and water quality enhancements. Typical negative influences that are encountered within CEMVN include elevated roads, levees, canals, maintained corridors and commercial, residential or industrial development.

Elevated roads, levees, canals and maintained corridors fragment on-site habitat or create fragments from adjacent habitats (rights-of-way that exist along boundaries). Besides habitat fragmentation, local and regional hydrology can be seriously impacted by high road beds, minimal surface connectivity due to low presence of culverts or poor structural maintenance of existing culverts. Commercial, residential or industrial development can have similar impacts from adjacent and surrounding properties. To assess negative influences on an impact project site in LRAM, the user will consider the degree to which regional and local physical structures fragment habitat and hinder wildlife passage. This focus is backed by studies (Findlay, Houlahan, 1997) which have shown a direct relationship between species richness of taxa with the existence of roads and forest canopy loss (fragmentation).

Low: The project site receives minimal static negative effects from structural alterations (right-of-way, development, etc.).

Typical examples include: No 4-lane or greater highways are directly adjacent to the site. Lightly traveled two lane public road may be situated directly adjacent to no more than one side of the site but does not bisect the site. If a transmission right-of-way traverses the project site, the right-of-way must not be greater than 75’ in width or the habitat must be emergent. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and does not occupy more than 12% of the project site boundary.

Medium: The project site receives more than minimal static negative effects from one structural alteration.

Typical examples include: A 4-lane highway directly adjacent to only one side of the site, or; a single lightly traveled public road or right-of-way greater than 75' in width bisects the site. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and does not occupy more than 25% of the project site boundary.

High: The project site receives more than minimal negative effects from multiple structural alterations.

Typical examples include: Multiple lightly traveled public roads or transmission corridors wider than 75' bisect the project site into more than 2 fragments. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and occupies more than 25% of the project site boundary.

E. Impact Type

The impact type factor is a measure of the permanent, partial or temporary loss of wetland functions and values at the impact site. Permanent impact projects involve those where all wetland functions values are removed completely from the site. Partial impact projects are those that result in the permanent loss of only certain aquatic functions. These projects typically involve the clearing or grading of a forested habitat which result in the conversion to an emergent habitat. Temporary impact projects involve only a temporal loss of aquatic functions. Temporary work areas associated with larger projects (i.e., highway, pipelines, levees, etc.) that will be restored to pre-project elevations following completion of work are examples of temporal losses.

1. *Full/Permanent Loss*

Impact projects which involve the permanent loss of all wetland functions are considered full/permanent loss projects in LRAM. These projects represent the highest impacts types and are given the highest i-value.

2. *Partial/Temporary Loss*

Impact projects which involve the permanent partial loss or the temporary loss of some wetland functions are considered partial/temporary loss projects in LRAM.

III. Mitigation Factors

There are five factors which are utilized in LRAM to assess the "Mitigation Site(s):" Mitigation Type, Management, Negative Influences, Size and Buffer/Upland. The below table is a list of each "Mitigation Site" factor, the options for each factor, and the associated m-values assigned to each option:

Factor	Option	m value
Mitigation Type	Re-Establishment	6
	Rehabilitation	5
	Enhancement	3
	Preservation	0.4
Management	None	0
	Passive	-1
	Active	-2
Negative Influences	Low	0
	Medium	-0.5
	High	-1
Size	> 500 acres	0.5
	500 : 100 acres	0
	< 100 acres	-0.5
Buffer/Upland	None	0
	Buffer/Upland Inclusions	0.2
	Restored Buffer/Uplands	0.5

The mitigation potential (M) per acre is calculated by summing all of the m factors listed above ($\sum m = M$). The M is then multiplied by the acreage of a compensatory mitigation project to determine the total number of LRAM credits generated. Detailed discussion of each “Mitigation Site” factor and their options are discussed below in Sections III.A through III.J.

A. Mitigation Type

The mitigation type factor is identified based on the wetland project type definitions found in 33 CFR 332.2 and 40 CFR Part 230.92. The mitigation type evaluates the net level of functional change to a site associated with the ecological lift provided by the mitigation work plan. The user should note that the amount of work required in a mitigation work plan may not correspond to the amount of credit generated.

Re-establishment (Re-Est). The proposed site is a former wetland having lost the necessary hydrologic component to support hydrophytic vegetation. Potential sites include agricultural areas or maintained pasture areas. The mitigation plan includes the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former wetland.

OR: Site is predominantly open water. Sponsor to deposit dredged material to an elevation conducive to tidal marsh re-establishment, plant dredged material and restore/create small tidal channels for fisheries access.

Rehabilitation (Rehab). The proposed site is a degraded wetland on which most aquatic resource functions have been severely impacted such that it does not exhibit the general characteristics of the target-type ecosystem. Site is farmed wetlands, wet pasture, crawfish pond constructed in former wet areas that have been out of agricultural production for less than five years, and areas with greater than 50% absolute cover of Chinese tallow tree.

Enhancement (Enhance). Proposed site is a wetland that requires modification to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present (i.e., pine plantation conversion back to mixed pine/hardwood system).

Preservation (Preser). Site is a functioning wetland and integral to the functionality of adjacent wetlands or aquatic resources. The project site must be encumbered by a site protection instrument as defined in 33 CFR Part 332. Credit granted should accompany credit generated by re-establishment, rehabilitation or enhancement and will generally be limited to 50% of the total acreage of restoration/enhancement acres for the rest of the project site. Compensatory mitigation projects whose credits are derived solely from preservation will still be considered on a case-by-case basis.

For a project to qualify for preservation credits, it must meet the criteria of 33 CFR Part 332.3, more specifically:

1. The resources to be preserved provide important physical, chemical, or biological functions for the watershed;
2. The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;
3. Preservation is determined by the district engineer to be appropriate and practicable;
4. The resources are under threat of destruction or adverse modifications; and
5. The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).

When selecting Preservation as a mitigation type, no other options (Management, Negative Influences, Size, Buffer/Upland) should be selected in the Workbook. By definition, preservation projects do not decrease or increase wetland area or wetland functions. If a site is allowed to be used for preservation, it is assumed that site provides an acceptable level of wetland functions and services.

B. Project Site Management

The project site management factor refers to the level of maintenance or management that is required to maintain wetland hydrology on the project site.

None: Project site functions in a self sustaining manner without dependence on long-term structural management. Example: internal and external ditches rendered ineffective at onset of project; culverts exist on-site only to improve sheetflow within the project site; short term structural management with definitive time frames defined in an MBI or permittee responsible mitigation plan.

Passive Management: Open culverts, breaches or other passive management structures that are required for habitat restoration and require monitoring and irregular repair or replacement to maintain hydrology from off-site.

Active Management: Tidal exchange or overflow from adjacent waterbody under active management. Gated structures or variable crest weirs that function to regulate water levels and/or salinities working in conjunction with dikes or natural landscape features to effectively manage surface hydrology, i.e., greentree reservoirs, marsh management projects, areas within existing leveed areas.

C. Negative Influences

This factor refers to anthropogenic influences, which may occur either internally, adjacent to or within the surrounding landscape of the assessed wetland, that have a deleterious effect on wetland functions and condition of a project site. Such negative influences reduce the ability of a restored/enhanced wetland to attain maximum effectiveness in providing wetland functions and services such as wildlife habitat and water quality enhancements. Typical negative influences that are encountered within CEMVN include elevated roads, levees, canals, maintained corridors and commercial, residential or industrial development.

Elevated roads, levees, canals and maintained corridors fragment on-site habitat or create fragments from adjacent habitats (rights-of-way that exist along boundaries). Besides habitat fragmentation, local and regional hydrology can be seriously impacted by high road beds, minimal surface connectivity due to low presence of culverts or poor structural maintenance of existing culverts. Commercial, residential or industrial development can have similar impacts from adjacent and surrounding properties. To assess negative influences in LRAM, the user will consider each negative influence’s affect to regional and local physical structure of the habitat type and regional and local hydrologic effects. This focus is backed by studies (Findlay,Houlahan, 1997) which have shown a direct relationship between species richness of taxa with the existence of roads and forest canopy loss (fragmentation).

Low: The project site receives no more than minimal static negative effects from both structural and hydrologic alterations due to anthropogenic influences.

Typical examples include: No 4-lane or greater highways are directly adjacent to the site. Lightly traveled two lane public road may be situated directly adjacent to no more than one side of the site but does not bisect the site. Access roads that exist on-site are at-grade and do not impede surface hydrology. If a transmission right-of-way traverses the project site, the right-of-way must not be greater than 75' in width or the habitat must be emergent. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and does not occupy more than 12% of the project site boundary. No more than 12% of the project site boundary may be bound by a levee.

Medium: The project site receives more than minimal static negative effects from either structural or hydrologic alterations due to anthropogenic influences.

Typical examples include: A 4-lane highway directly adjacent to only one side of the site, or; a single lightly traveled public road or right-of-way greater than 75' in width bisects the site. Access roads that exist on-site are above grade but contain culverts or gaps sufficient to provide near natural levels of surface hydrology. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and does not occupy more than 25% of the project site boundary. No more than 50% of the project site boundary may be bound by a levee.

High: The project site receives more than minimal negative effects from both structural and hydrologic alterations due to anthropogenic influences.

Typical examples include: Multiple lightly traveled public roads or transmission corridors wider than 75' bisect the project site into more than 2 fragments. Commercial, residential or industrial development may exist within one mile radius of the project site boundary and occupies more than 25% of the project site boundary. More than 50% of the project site boundary is bound by a levee.

D. Size

The size factor is measure of the total size of the mitigation project that will be placed under protection of a conservation servitude. The assumption of this factor is that larger tracts are less common, have a greater potential for habitat diversity, provide a greater degree of isolation and thereby offer higher quality habitat than smaller tracts. As stated in Roy et al (2010), although edge habitat produces habitat diversity and are used by many wildlife species, it is important to understand four concepts: 1) wildlife species which thrive in edge habitat are highly mobile and presently occur in substantial numbers, 2) edge habitat is quite available due to continual forest fragmentation from residential and/or commercial development and ongoing timber harvesting, 3) most wildlife species found in "edge" habitat are "generalists" in habitat use and are quite capable of existing in larger tracts, and 4) those species in greatest need of conservation are "specialists" in habitat use and require large forested tracts for maintaining populations.

> 500 – Greater than 500 acres that are contiguous and protected by legal instrument.

500 : 100 – Between 500 and 100 acres that are contiguous and protected by a legal instrument.

Less than 100 - Less than 100 acres that are contiguous and protected by a legal instrument.

E. Buffer and Upland Inclusions

The buffer and upland inclusion factor captures the extent of buffers and upland inclusions provided by the mitigation plan. Buffers provide a reduction on the negative effects of stressors and disturbance on the mitigation project site. Anthropogenic disturbances that occur in uplands adjacent to wetland areas can impact the biological, chemical, and physical processes in a wetland (Castelle et al. 1994). Plant species richness and sedimentation have been shown to be influenced by buffers surrounding wetlands (Houlahan et al. 2006 and Skagen et al. 2008, respectively). Wetland buffers reduce adverse impacts to wetland functions from adjacent development by moderating stormwater runoff, stabilizing soil to prevent erosion, providing habitat for wetland-associated species, reducing direct human impact/access to a wetland, and by filtering suspended solids, nutrients, and toxic substances (Castelle et al. 1992). The buffer width necessary for the protection of wetland condition varies widely depending on the wetland processes requiring protection, intensity of adjacent land use, buffer characteristics, and specific buffer functions required (Castelle et al. 1994). Castelle et al. (1994) and Houlahan et al. (2006) stated that buffer width requirements vary from 100 to 820 feet to provide maximum effectiveness.

The presence of uplands provides an increase in habitat diversity, creates wetland/nonwetland interface and can also buffer effects from external stressors.

Buffers/Upland Inclusion: A minimum buffer of 200 foot corridor along all or the portion of the perimeter of the site which is integral to functionality of adjacent wetlands or aquatic resources and provides a barrier between the site and adjacent properties. OR:
All of the uplands contained within the project site boundary are included under the site protection instrument.

Buffers/Upland Restoration: The project includes habitat restoration of a minimum buffer of a 200 foot corridor along all or a portion of the perimeter of the site which is integral to functionality of adjacent wetlands or aquatic resources and provides a barrier between the site and adjacent properties. OR:

Habitat restoration occurs on all of the uplands contained within the project site boundary and are included under the site protection instrument.

Individual credit acres will not be gained from buffers and upland inclusions. Credits obtained from buffers and upland inclusion will add value to other re-establishment, rehabilitation, enhancement or preservation acres.

IV. Workbook Structure

A. Impact – Mitigation Bank

The first three cells located at the top of the impact worksheet include the CEMVN Account Number, total acres of wetlands impacted, and the watershed basin of the impact. The account number and acres of impact must be typed in by the user. The watershed basin will be selected from the list generated within LRAM. NOTE: The user must select the watershed in order for the list of banks available to populate at the bottom of the worksheet.

There are five impact factors which must be selected to determine the final impact value per acre (I). A selection can be made from a drop down list in the cell for that factor, which subsequently will generate the i-value for that factor in the cell below the drop down list. There are eight columns across the impact worksheet to allow the user to enter several different field conditions. When the user has selected an option for all five impact factors, the acreage of impact must be entered below the I-value for each column. The sum of acreages entered in each column should equal the acreage entered in the single cell at the top of the page. The total I-value is summed in a cell at the bottom, right hand side of the impact worksheet.

Once the user has completed entering the impact factors, mitigation bank options may be selected in the cells below the Impact Factors. Eight columns are provided to allow the user to select several mitigation bank options. As noted above, the watershed basin of impact must be selected in order for the list of banks to populate. The total acres required from each bank will populate at the bottom of each column.

To the right of the Impact worksheet, there are several cells that are grey in color under the title Impact-Bank Workspace. These cells are unprotected and provided as workspace for the user.

B. Mitigation Bank

The first four cells located at the top of the mitigation bank worksheet include the CEMVN Account Number, total acres of wetlands generating credit in the mitigation project, the watershed basin of the mitigation bank and the mitigation bank name. The mitigation bank name, account number and acres of wetlands must be typed in by the user. The total acres of wetlands generating credit should encompass all acres that will be included under a separate mitigation type, which may be re-establishment, rehabilitation, enhancement or preservation acres. The buffers and upland inclusions should not be included in this total acreage. The watershed basin will be selected from the list generated within LRAM.

There are five mitigation factors which must be selected to determine the final mitigation value per acre (M). A selection can be made from a drop down list in the cell for that factor, which subsequently will generate the m-value for that factor in the cell below the drop down list. There are eight columns across the mitigation worksheet to allow the user to enter several different field conditions. When the user has selected an option for all five mitigation factors, the acreage of mitigation must be entered below the M-value for each column. The sum of acreages entered in each column should equal the acreage entered in the single cell at the top of the page. The total M-value is summed in a cell at the bottom, right hand side of the mitigation worksheet.

To the right of the MitBank worksheet, there are several cells that are grey in color under the title MitBank Workspace. These cells are unprotected and provided as workspace for the user.

C. Impact – Permittee Responsible Mitigation Plan

The Impact – Permittee Responsible Mitigation (PRM) Plan worksheet contains both the impact worksheet and mitigation worksheet on one page to allow the user to determine potential PRM requirements. Both worksheets are completed in the same manner as described in Sections IV.A and IV.B above. The worksheet also provides mitigation bank options in the event the PRM does not completely fulfill the permittees mitigation requirements.

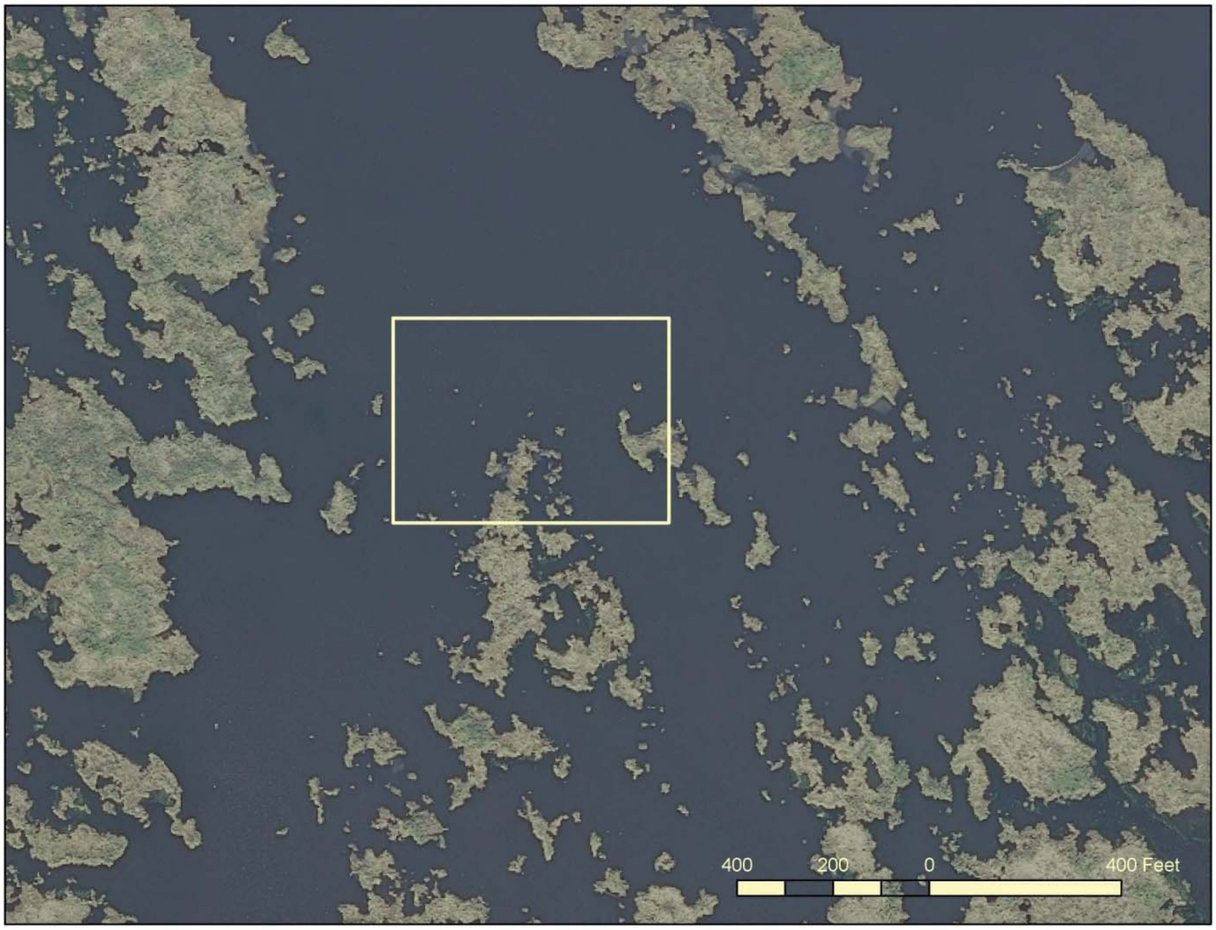
D. Additional Worksheets

LRAM contains two additional worksheets titled ‘Comments’ and ‘BankList.’ The comments worksheet allows the user to type written justification for selections of factors. The BankList worksheet contains a comprehensive list of all the mitigation banks. The banks are ordered under each watershed by habitat type. The LRAM mitigation potential is listed in the far right column.

E. Sample Projects

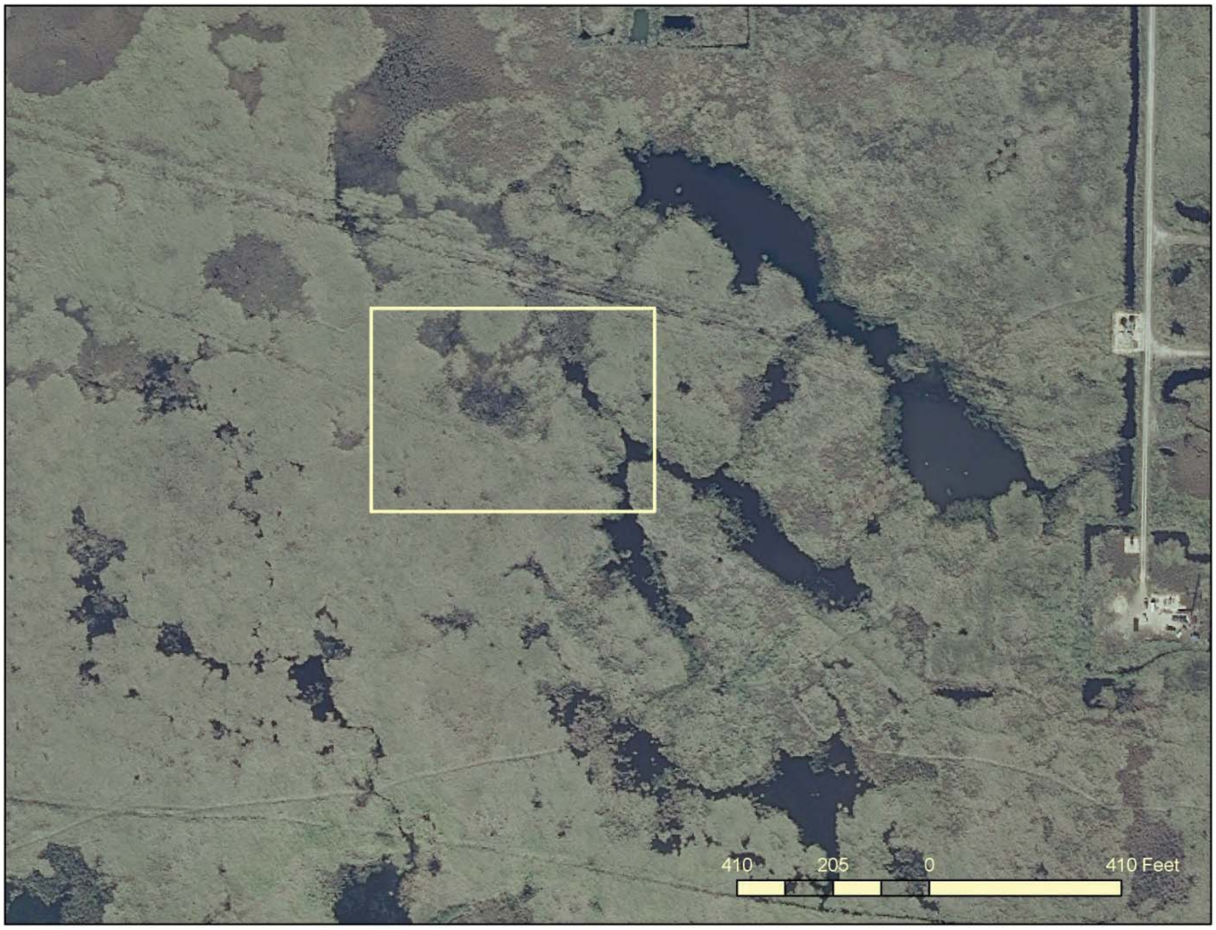
The following aerial photographs are provided as sample project examples to assist the user in understanding selections that would be made for habitat condition in the impact factors. It is assumed in each example that the project area within the box has been determined to be a least damaging alternative that could be authorized with sufficient compensatory mitigation.

Sample 1:



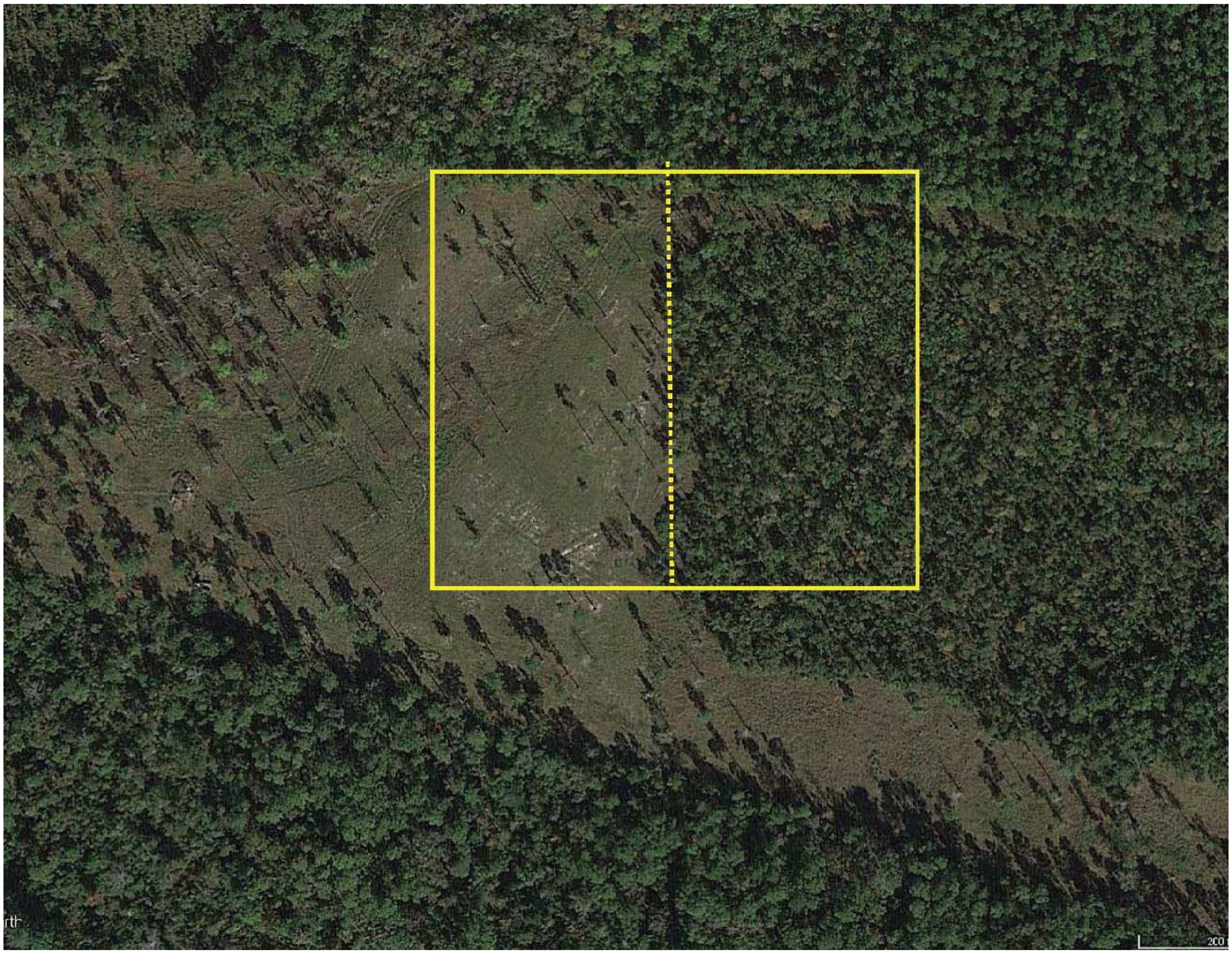
The above photograph represents a brackish marsh scenario. The entire project area encompasses approximately 5.5 acres, with approximately 0.4 acre of brackish marsh. In this scenario, the habitat condition for the project area would be selected as Low, based on the project area containing approximately 7% aerial coverage of emergent vegetation. The acreage of impact that would be assessed as brackish marsh would be 0.4 acre.

Sample 2:



The above photograph represents an intermediate marsh scenario. The entire project area encompasses approximately 5.9 acres, which includes approximately 0.3 acre of open water ponds. In this scenario, the habitat condition for the project area would be selected as High, based on the project area containing approximately 95% aerial coverage of emergent vegetation. The acreage of impact that would be assessed as intermediate marsh would be 5.6 acres.

Sample 3:



The above photograph represents a scenario with two different habitat conditions. The entire project area encompasses approximately 10 acres, which includes approximately 5 acres of pine savannah habitat and 5 acres of pine plantation. For the pine savannah, the habitat condition meets the criteria for High as shown in the wetland determination data form below:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PFS A

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus palustris*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Sapling/Shrub Stratum (Plot size: ______)			
1. *Quercus nigra*	5	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	5	=Total Cover	
50% of total cover: 3		20% of total cover:	1
Herb Stratum (Plot size: ______)			
1. *Andropogon glomeratus*	30	Yes	FACW
2. *Aristida stricta*	30	Yes	FAC
3. *Muhlenbergia capillaris*	10	No	FAC
4. *Rhynchospora baldwinii*	10	No	FACW
5. *Aletris lutea*	5	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	=Total Cover	
50% of total cover: 43		20% of total cover:	17
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	45	x 2 =	90
FAC species	55	x 3 =	165
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100	(A)	255 (E

Prevalence Index = B/A = 2.55

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
_X_ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must b present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) o more in diameter at breast height (DBH), regardless o height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 r tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes _X_ No ___

Remarks: (If observed, list morphological adaptations below.)

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The tree stratum contains 10% absolute cover of longleaf pine, the shrub stratum contains less than 15% of native hardwoods, and the absolute cover of emergent vegetation is 85%.

For the pine plantation area, the habitat condition meets the criteria for low as shown in the wetland determination data form below:

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PFS B

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus taeda*	100	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	=Total Cover	
50% of total cover: 50		20% of total cover:	20

Sapling/Shrub Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Magnolia virginiana*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2

Herb Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Woody Vine Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
		=Total Cover	
50% of total cover:		20% of total cover:	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		320 (B)

Prevalence Index = B/A = 2.91

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (If observed, list morphological adaptations below.)

US Army Corps of Engineers — Atlantic and Gulf Coastal Plain Region – Version 2.0

The pine plantation area contains 100% absolute cover of loblolly pine in the tree stratum.

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