

NAVIGATING WETLAND MITIGATION MARKETS: A STUDY OF RISKS FACING ENTREPRENEURS AND REGULATORS

December 2013

Patrick W. Hook* & Spenser T. Shadle**

ABSTRACT

While the use of ecosystem services markets is increasingly discussed as a policy option to protect ecological functions that benefit society, there is limited publicly available information regarding the risks associated with investing in, operating in, and regulating, such markets. In this paper we outline the risks faced both by entrepreneurs who sponsor wetland mitigation banks—the most mature ecosystem services market in the U.S.—and the regulators who oversee them. To identify these risks, as well as their potential mitigants or other strategies to navigate them, we rely upon existing literature and interviews conducted with industry participants, including entrepreneurs, regulators, and consultants. This paper seeks to provide a consolidated list of risks that may help to inform investors' due diligence processes and their understanding of wetland mitigation banking as a real asset, and may serve as a reference for entrepreneurs and regulators who are new to wetland mitigation banking or other more nascent ecosystem services markets featuring similar risks.

Key Words: wetlands banking, wetlands mitigation, ecosystem services markets, environmental markets

ACKNOWLEDGEMENTS

This work was supported by the Sobotka Research Fund through the Yale Center for Business and the Environment. The authors were advised by Professor K. Geert Rouwenhorst, Robert B. and Candice J. Haas Professor of Corporate Finance at Yale School of Management. In addition to drawing from publicly available literature, this paper is largely informed by interviews that the authors conducted with industry participants from November 2011 to August 2013. By request from interviewees, this paper does not attribute insights gained from interviews to specific individuals. See Appendix I for a full list of the individuals interviewed. The authors thank these individuals for their valuable insights that made this paper possible.

* Patrick Hook is a recent Master of Business Administration and Master of Forestry graduate from the Yale School of Management and the Yale School of Forestry & Environmental Studies. Author e-mail address: patrick.hook@aya.yale.edu

** Spenser Shadle is a recent Master of Business Administration and Master of Forestry graduate from the Yale School of Management and the Yale School of Forestry & Environmental Studies. Author e-mail address: spenser.shadle@aya.yale.edu

TABLE OF CONTENTS

1 INTRODUCTION

- 1.1 Overview of ecosystem services
- 1.2 Wetland ecosystem services markets
- 1.3 Understanding risk in wetland mitigation banking

2 ENTREPRENEUR RISKS

2.1 *General risks*

- Large initial capital outlay required in some bank development models
- Loss of key people
- Difficulties deploying committed capital

2.2 *Regulation risks*

- Supply of credits delayed or reduced
- Demand for credits delayed or reduced
- 2008 rule applied unevenly
- Rules change on what must be offset

2.3 *Other industry specific risks*

- Price risk: credit prices deviate from forecast
- Quantity risk: not able to sell all credits or not able to sell on projected schedule
- Forced to sell credits at wrong time
- Entrepreneur does not realize a terminal value upon sale of property

2.4 *Project specific risks*

- Hydrological/biological processes do not perform as planned
- Design or construction errors
- Project management failure
- Damage to site from natural disasters

Table 1 - Summary table of entrepreneur risks and mitigants

3 REGULATOR RISKS

- Inadequate endowment or site protection mechanism for perpetual maintenance of site
- Conflicting easements on property
- Temporal loss of wetlands
- Compensation at the expense of avoidance and minimization

Table 2 - Summary table of regulator risks and mitigants

4. RISKS TO BOTH ENTREPRENEUR AND REGULATOR

- Geographic service area changes, or is not spatially appropriate
- Competitors do not play by the same rules
- Reputation hurt by selling credits to an unpopular development

Table 3 - Summary table of shared risks and mitigants

5. VALUING/MANAGING RISKS FOR ENTREPRENEURS

Minimizing/managing risk

Valuing risk

6. CONCLUSION

Works cited

Appendix I

Acknowledgements

Appendix II

Graphical timeline of entrepreneur risks

Appendix III

Flow chart for source of compensatory mitigation

1 | INTRODUCTION

1.1 | Overview of ecosystem services

Coined first as “environmental services” (Study of Critical Environmental Problems, 1970; Holdren and Ehrlich, 1974) and then “ecosystem services” (Ehrlich and Ehrlich, 1981), the concept of society benefiting from healthy and functioning ecosystems has been developing from as early as 1864, with George Perkins Marsh’s publication of “Man and Nature” (Mooney and Ehrlich, 1997). Since the 1970s, “ecosystem services” have been increasingly acknowledged by the general public and policy makers in the U.S. and abroad. Following this growing recognition, efforts such as the UN Millennium Ecosystem Assessment, initiated in 2001, have sought to show how impacts to ecosystems affect the security, livelihood, health, and relations of society (Millennium Ecosystem Assessment, 2005).

Since the concept of ecosystem services and their ecological value has been refined, there has arisen a more recent interest in placing a monetary value on these same services, so that policymakers can understand the economic significance of inaction or delay in regulation. One seminal and controversial study from 2007 valued 17 ecosystem services across 16 biomes, and derived a total value of \$16 to \$54 trillion per year, with an average of \$33 trillion, as compared to the 2007 US gross national product of \$18 trillion (Costanza et al, 2007).

Policy responses have varied by each ecosystem service. The main responses can be broadly classified as:

- Direct, “command-and-control” regulation that prohibits or places a cap on environmental impacts (Doyle and Womble, 2011).
- “Carrot-and-stick” monetary incentives that feature rewards for lowering impacts or fees for continuing impacts.
- Regulated environmental markets that trade in permits quantifying environmental impacts.

The USDA/NRCS calls this latter regulated market approach “environmental credit trading,” and defines it as a “range of market-like transactions where an entity undertakes an activity that provides environmental benefits in exchange for payment from another” (Kling et al, 2011). Doyle and Womble (2011) further organize such environmental markets into (1) “pollution markets,” in which emissions rights are traded through commoditized units measured in weight or volume, and (2) “ecosystem service markets,” in which an entity improves ecosystem functioning in exchange for credits, which can then be sold to an entity that has negatively impacted equivalent ecosystem functions and is required to provide compensatory mitigation.

Ecosystem services markets are in many cases becoming the preferred method for conserving ecosystem functioning. Through the foundation of existing regulation and the creation of an active market, ecosystem services markets set a price on what was previously considered an environmental externality by creating a scarcity of allowable impacts, thus fulfilling the aforementioned need for placing a value, or price, on ecosystem services. Revenue from the sale of credits has created a diverse and growing industry of entrepreneurs who plan, build, and support environmental impact mitigation, which in turn has formed a new real asset class for investors.

At the same time, the innovation of a market has decreased the need for the direct, “command and control” type of regulation, which is often resource-intensive for regulators (Kling et al, 2011), and has discouraged developers from projects that require more expensive mitigation. Kline et al (2009) summarizes this last point succinctly: “In general, environmental markets do three things. They force a cap on environmental damage. They penalize the most damaging actors by making them purchase damage allowances, and they reward less damaging actors who require fewer damage allowances.”

“In general, environmental markets do three things. They force a cap on environmental damage. They penalize the most damaging actors by making them purchase damage allowances, and they reward less damaging actors who require fewer damage allowances.” (Kline et al, 2009)

The ecosystem services market approach has been applied successfully to mitigate the loss of various ecosystem functions in the U.S., including markets for wetlands, water quality, streams, and species diversity. This paper focuses on wetlands, as wetland mitigation banking is the largest and most mature ecosystem services market. Much of the information and analysis in this white paper, however, can be applied to other ecosystem services markets.

1.2 | Wetland ecosystem services markets

The regulation establishing the importance of wetlands to the ecological and economic health of the U.S. comes from section 404 of the Clean Water Act, which charged the US Army Corps of Engineers (the Corps) with monitoring discharges into, as well as the dredging and filling of, wetlands (Federal Water Pollution Control Act, 1972; Clean Water Act, 1977 as amended). Building on these regulations, President George H.W. Bush and the National Wetlands Policy Forum adopted the goal of “no net loss” of wetlands, which later administrations have supported and strengthened. The result has been a change from 450,000 wetland acres lost per year in the 1970s to 13,800 lost per year from 2004-2009 (Dahl, 2011).

One of the tools available to the Corps is the mandate to approve and oversee wetland mitigation bank projects. Developers may impact wetlands through a number of different projects, including roads and bridges, residential communities, retail stores, utility lines, and gas pipelines. When a developer’s project plan includes impacts that result in a loss of aquatic resource functions and services, the Corps requires the developer to prove that these impacts cannot be completely avoided or at least minimized. If the developer proves that impacts have been avoided and minimized as much as possible, then the Corps quantifies the remaining impact, and makes a decision about what course of action results in the lowest overall environmental loss.

There are three methods of wetland compensatory mitigation that the Corps considers: (1) Permittee-Responsible Mitigation (PRM), (2) In-Lieu Fees (ILF), and (3) wetland mitigation banking. The 2008 Final Compensatory Mitigation Rule (the 2008 Rule), explained in further detail below, includes a “preference hierarchy” which generally prefers mitigation bank credits to ILF and PRM alternatives (Corps, 2008. Compensatory Mitigation Final Rule, supplementary information, p.19613).

When the Corps quantifies the loss from a development project, it determines if the developer’s compensatory mitigation proposal, including the purchase of bank credits, will fully mitigate the loss of aquatic resource functions in the wetland system. A credit equates to a unit of functioning wetland, to be determined by the area, the functional value, and the location of the wetland. The Corps typically requires the mitigation of one to three acres of created or restored wetland in exchange for one acre of original wetland (US Wetland Banking: Market Features & Rules, Ecosystem Marketplace, 2013), though the ratio can be appreciably higher depending on the type and condition of the resource impacted, the nature, duration and intensity of the loss, and the nature of the proposed compensatory mitigation. This creates a demand for credits.

Entrepreneurs seek to meet this demand for credits by creating a new wetland, or restoring, enhancing, or preserving an existing wetland (Corps, 2008. Compensatory Mitigation Final Rule, 19594-19705). This compensatory mitigation should occur in advance of the aforementioned project impacts, though

mitigation projects do not always correspond to specific development impacts. In addition to performing physical improvements to the wetland, such as earth moving, tree planting, and invasive species removal, entrepreneurs must receive a Mitigation Banking Instrument (MBI) approved by the Corps in consultation with the Interagency Review Team (IRT), consisting of federal, state, local, and tribal agencies, such as the US Environmental Protection Agency, US Fish and Wildlife Service, and state fish & wildlife organizations.

In order to receive MBI approval, entrepreneurs must provide long-term protection of the mitigation projects, typically through placement of a conservation easement on the property, agree to funding long-term management of the property, meet a variety of other financial and environmental obligations, and negotiate a mutually agreeable geographic service area, which is both small enough to ensure that the restoration project mitigates impacted wetlands from the same watershed, as well as large enough to ensure that entrepreneurs will have at least some demand for the credits that they produce. Perhaps most importantly for the entrepreneur, the MBI also sets the number of credits that each mitigation bank could potentially receive, establishes a credit release schedule based on bank performance and timing, and releases those credits for sale within the service area.

The first such commercial bank application was made in August 1991 (Robertson, 2006), and, according to one Corps official, there were 1209 operational wetland mitigation banks listed in the Corps' Regulatory In Lieu Fee and Bank Information Tracking System (RIBITS) as of August 2013. As of 2009, the global annual value of restored wetland functioning approached \$4 billion, with over 450,000 acres protected each year (Madsen, Carroll, Kandy, and Bennett, 2011).

While the concept behind wetland mitigation banking has remained relatively stable since its conception, regulators made substantial revisions to the underlying practice with the 2008 Rule. Designed to ensure more effective mitigation of impacted wetlands, and improve the efficiency of the review process, the 2008 Rule introduced greater transparency and structure to wetland ecosystem services markets. For example, the 2008 Rule officially favored mitigation banking over PRM and ILF—as mentioned above—and introduced a more disciplined timeline for the review of mitigation bank proposals (Compensatory Mitigation, EPA, 2013).

1.3 | Understanding risk in wetland mitigation banking

While the previous section serves to demonstrate the complexity of approving and operating a wetland mitigation bank, and to give an idea of how many actors are involved in a bank's proper implementation and credit sales in the marketplace, the focus of this paper is on understanding, mitigating, or accounting for the risks encountered in wetland mitigation banking by both entrepreneurs and regulators.

Despite being the largest ecosystem services market in the U.S., as measured by number of projects and total acres, wetland mitigation banking is still immature relative to most industries. Mitigation banking often lacks transparency, can be inefficient, suffers from high transaction costs, and is unknown to most investors. While increasingly sophisticated entrepreneurs have begun to streamline the process and raise substantial comingled funds for new investments, the overall size of the industry can still be too small for some institutional investors, such as large pension funds or university endowments.

Moreover, understanding the value of a particular wetland mitigation project can be difficult for both entrepreneurs and their investors as they seek to perform due diligence. Every watershed is a different size, and has independent regulators acting in different regulatory contexts with varying state and municipal laws. Meanwhile, the demand for credits, and thus credit price, varies based on the number of development projects and the existence of competing mitigation banks.

At the same time, the immaturity of wetland mitigation banking can translate to an attractive rate of return for entrepreneurs who understand the intricacies of the mitigation bank approval process—otherwise known as the entitlement process—as well as the unique characteristics of the different markets. The same can be said for investors; those who are willing to accept the risks involved can identify the best opportunities, minimize downside, and potentially achieve risk-adjusted returns.

While some publications have begun to describe these risks and how to minimize them, this paper draws on existing literature and in-depth interviews with industry participants to enumerate and categorize the most important risks, which are organized into two broad categories: risks faced by entrepreneurs (and, by extension, investors), and risks faced by regulators. Where possible, this paper includes some strategies for entrepreneurs, investors, and regulators to mitigate each risk identified. Where it is not feasible to mitigate risks, Section 5 offers ideas for how to value risk in financial projections.

Unlike many papers treating ecosystem services from an economic, policy, or conservation perspective, this paper is aimed at existing industry participants and potential entrants. While the paper assumes some familiarity with wetland mitigation banking, it will hopefully serve as an overview for new entrepreneurs seeking to enter the industry and as a checklist for investors seeking to perform due diligence on potential investments in the industry.

2 | ENTREPRENEUR RISKS

This section organizes risks faced by entrepreneurs into four broad groups: (1) general risks that are applicable to other asset classes but also important for the mitigation banking industry, (2) regulation risks that are inherent in an industry that relies upon regulation for the establishment of a marketplace, (3) other industry-specific risks that affect all participants, and (4) project-specific risks that pertain to individual mitigation bank sites. See Appendix II for a graphical timeline that illustrates the phases of mitigation bank development during which entrepreneurs may face each of these risks.

2.1 | GENERAL RISKS

While mitigation banking entrepreneurs face many general risks that apply to other asset classes, this paper focuses on three such risks that industry participants identified in interviews: (1) the requirement of a large initial capital outlay, (2) the loss of key people in an industry with few true experts, and (3) difficulties deploying the capital raised in a fund.

Large initial capital outlay required in some bank development models

Typically, the entrepreneur produces mitigation credits by acquiring land, entitling it as a wetland mitigation bank, and receiving credits that can then be sold to developers. This approach often requires a large initial capital outlay that can be as much as 75 to 93 percent of total costs for a bank—including costs for land acquisition, legal work, and bank construction and design—years in advance of realizing any returns (BenDor, Riggsbee, Doyle, 2011). This large initial investment, combined with delayed cash flows, exposes bank entrepreneurs to a longer payback period during which the wetland may fail to function properly, the demand for credits may collapse, or competition may enter the watershed and drive down credit prices, to name a few possibilities.

Mitigants

- Entrepreneurs can partner with land owners to develop a mitigation bank, thus eliminating the large initial capital outlay required for land acquisition. While such a partnership reduces or shares risks associated with starting a mitigation bank, the entrepreneur will also realize lower returns after sharing profits with the landowner.
- Entrepreneurs can structure an option agreement, or long-term purchase contracts, to buy land or secure a mitigation interest (e.g., easement) over a protracted period of time, during which the entrepreneur can seek to permit the mitigation bank and begin to sell credits after recording of a conservation easement or other site protection mechanism. If the permitting process fails, or other risks are realized that cause the bank to fail, the entrepreneur may lose the price paid for the option—or the deposit associated with a long purchase contract—but would avoid the risk of reselling the land at a loss.
- Entrepreneurs can phase bank construction over time, receiving credits as they continue to establish the bank. This delays construction costs and reduces the period of time between upfront expenses and realized revenue.

Loss of key people

The importance of executives, managers, and technical experts—commonly called “key people”—is discussed as a common due diligence concern in private equity investments. However, the risk of losing a key person is especially significant in wetland mitigation: there are few large organizations in the industry, teams are often small, positions are often specialized (into financial and ecological roles, for example), individual responsibility is higher, and regulations and associated practices can vary from state to state. If an expert leaves an entrepreneur’s organization, it may be difficult to find a suitable replacement. Even if one is ultimately found, the resulting delays in project analysis, capital deployment,

or the entitlement process could impede the success of a project and reduce its rate of return. As one entrepreneur explained simply, “a lot comes down to execution and who is on your team.”

The loss of a key person could also create a competitive disadvantage for the entrepreneur. The key person still takes with him or her the knowledge, contacts, and relationships that he or she has formed, even if a non-disclosure agreement is signed. This is particularly of concern in the mitigation banking industry, as the success of projects often hinges on the relationship between entrepreneur and regulator.

Mitigants

- It may be possible to align incentives by giving employees a form of upside that will increase the chances they will remain employed until the completion of a project, or the release of all credits after bank entitlement. An equity stake or a tiered bonus based on credit release milestones are examples of such incentives.

Difficulties deploying committed capital

If an entrepreneur decides to raise a fund or borrow money with the intention of investing, it is not guaranteed that he or she will find suitable projects. There may be few sites that fit the necessary criteria: namely, that they have the ecological capacity to sustain a functioning wetland, are in a watershed or service area with demand for mitigation, and are available.

It may be very challenging to find suitable properties for wetland mitigation banking; if unsuccessful, the entrepreneur risks having to return the committed capital that he or she worked to raise, or failing to generate the expected returns that additional land acquisitions would have contributed.

Mitigants

- Identifying a “pipeline” of properties for potential acquisition, before raising the invested capital to purchase them or secure a mitigation interest in them, is a common way to mitigate this risk in other asset classes, such as real estate or timber. However, given the limited number of properties which fit the criteria for mitigation banking, competition can be fierce and transactions rapid, so it may not be possible to identify properties in advance of raising capital.
- In structuring a fund, entrepreneurs can seek to extend the allowed period between the initial commitment of capital by investors and the calling of capital for potential property acquisitions by entrepreneurs.

2.2 | REGULATION RISKS

The industry’s reliance on regulation drives what are perhaps the most fundamental risks specific to wetland mitigation banking. The primary regulation risks identified by industry participants include: (1) delays or reductions in the supply of credits, (2) delays or reductions in the demand for credits, (3) uneven application of the 2008 Rule, and (4) changes to the definition of what wetland impacts must be offset.

Supply of credits delayed or reduced

Delayed entitlement process

Perhaps one of the greatest risks for a mitigation bank entrepreneur is the risk of delays in the entitlement process. A slower entitlement process delays revenues while legal and planning expenses may increase, thus further reducing returns. As one industry consultant claimed, the risk of a long delay in entitlement is the “biggest factor for why there are not more [mitigation] bankers out there.” This risk may be of particular concern to entrepreneurs if the reasons for entitlement delays are beyond the entrepreneur’s control. As BenDor and Riggsbee (2011) found in a survey of industry participants, one of

the leading drivers for “reductions in financial risk” for entrepreneurs was attributed to “predictable timelines for bank approvals and credit releases.”

A major related concern could be if an entrepreneur values and then purchases a property based on the assumption of successful entitlement. In the event of failed entitlement, the entrepreneur may be left with an “illiquid asset,” in that he or she is unable to sell what other land buyers may view as a marginal property with little value beyond its potential for mitigation banking. As one industry consultant succinctly summarized: “if you bought a swamp hoping to sell it as a mitigation bank, you’re out of luck and you own a swamp.”

Reduction of anticipated credits issued to entrepreneur

In addition to delays in receiving credits, a perhaps greater risk is receiving fewer entitled credits than projected. The number of credits received is, of course, the primary driver of revenue for the entrepreneur, so even a small change in credit volume can vastly decrease the investment’s rate of return.

Mitigants

- Putting a “bow on the package” during the entitlement process—including the submission of a very clear, organized, and well-designed restoration plan—can accelerate the regulator’s review process. Given that several industry participants cited delayed permitting as a major risk, such relationships can serve as important advantages to entrepreneurs.
- In advance of the entitlement process, entrepreneurs can request that the district regulator provide clear, transparent agreements specifying requirements for credit releases; otherwise, delays can result from a disagreement over ambiguous requirements for mitigation bank entitlement.

Demand for credits delayed or reduced

Delayed permitting process

In addition to influencing supply of mitigation credits, regulators also influence demand for those credits. While demand for credits is fundamentally driven by macroeconomic factors that are beyond the regulator’s control—such as housing starts and infrastructure development—the Corps ultimately enforces the Clean Water Act by permitting development impacts and requiring compensatory mitigation. Some districts have taken steps to expedite the permitting process, but a, slow, lax, or non-existent enforcement of this permitting by other districts may affect the demand for credits and thus an entrepreneur’s credit sales schedule. Such a delay in credit sales will reduce the mitigation bank’s rate of return. Even if a Corps district office is diligent in enforcing the rules and permitting of wetland impacts, a delay may be out of its control, especially in the case of agency budget constraints or cases brought to court.

Reduction of anticipated credits required by developer

A related risk is that the Corps requires fewer credits from a permitted developer than the entrepreneur forecasted. This action by the regulator directly reduces the demand available relative to the entrepreneur’s projections, which can significantly reduce the mitigation banks’ sales volume and thus rate of return.

Mitigants

- Entrepreneurs can target investments in those Corps districts that have demonstrated a strong track record for efficient and timely permitting of development impacts, as well as a consistent enforcement of the 2008 Rule’s preference for compensatory mitigation.
- Identifying service areas with development projects that have already begun or completed the permitting process can help entrepreneurs to more accurately forecast credit demand volumes.

2008 Rule applied unevenly

The 2008 Rule has been cited by many as instrumental for the industry's increased sophistication and standardization, particularly regarding the hierarchical preference for mitigation banking over ILF and PRM alternatives. While the 2008 Rule thus favors mitigation banking, some industry participants perceive that the rule has not been enforced evenly across the country, leading them to consider this unevenness in application "by far the biggest risk" in wetland mitigation banking. Though regulators argue that there has been a "considerable effort to educate all Corps staff and the public in order to ensure that all forms of mitigation are held to equivalent standards," at least the perception of unevenness persists in the industry.

This heterogeneity in regulator behavior stems in part from the Corps being organized into regional districts with a significant level of autonomy (BenDor, Riggsbee, Doyle, 2011). For example, the interagency review team, led by a Corps district representative, makes decisions assigning geographic service areas to entrepreneurs on a regional, district, or site-specific basis (Doyle and Womble, 2012).

In some cases, the Corps can allow or even prefer PRM or ILF alternatives over mitigation banking (Maryland ES Working Group, 2011), price ILF alternatives lower than mitigation, or assign a higher offset ratio—requiring more compensatory mitigation acres for one acre of lost wetland—for mitigation banks than PRM or ILF compensatory projects (Maryland ES Working Group, 2011). One regulator responded to this critique by explaining that "ILF credit prices should reflect the full-cost of implementing appropriate compensatory mitigation" and that the ILFs issued prior to the 2008 Rule are "not authorized to function as an ILF [that provides] compensatory mitigation required by Corps permits." Bendor and Riggsbee (2011) argue that even if the Corps still prefers mitigation banking, the preference can be a soft one, leading to situations where mitigation banks are disadvantaged relative to PRM or ILF alternatives.

While an unfavorable interpretation of the 2008 Rule in a given service area will not likely be applied retroactively to existing banks, any changes could affect the supply and demand relationship for credits, and through that, prices (Doyle and Womble, 2012). In other words, the bank itself may not be in jeopardy, but its financial returns may be.

Mitigants

- Entrepreneurs may target only those districts with a strong track record of preferring mitigation banking to ILF or PRM. Of course, a tradeoff may exist, as a district with a favorable regulatory environment will likely attract more entrepreneurs and thus increase competition.
- Lobbying the Corps to favor mitigation banking or require a higher mitigation-to-impact credit ratio for ILF and PRM may give mitigation banking the preference that the 2008 Rule intended.
- While unlikely feasible, entrepreneurs may lobby the Corps for a federal, rather than a regionally-managed, mitigation program, enabling entrepreneurs to scale operations more easily across regions (BenDor, Riggsbee, 2011).

Rules change on what must be offset

Given that demand for wetland mitigation credits relies on underlying regulation through the Clean Water Act, judicial decisions can directly influence demand by changing the types of development impacts on wetlands that require credits. Entrepreneurs thus face the risk that, should regulations be changed or interpreted differently from what the entrepreneur expected when entering the market, the volume of credits demanded could change significantly.

An example of such a change in the regulations that fundamentally drive credit demand is a 2001 U.S. Supreme Court case regarding wetland banking in the Chicago area: *Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers*. The SWANCC case's final ruling by the U.S.

Supreme Court concluded that development impacts to “hydrologically-isolated” wetlands do not require issuance of Corps permits or associated mitigation. As a result, developers in such isolated waters no longer needed mitigation credits, and thus entrepreneurs saw an immediate decline in credit demand. According to Robertson (2006), “the direct effect of SWANCC was to produce a gross income decline of 46.1% among Chicago bankers between 2000 and 2011.” Further, Gardner (2011) claims that some bankers in the region “saw the demand for their credits immediately drop nearly in half.” While Robertson (2006) found that no banks ultimately failed or went bankrupt, this dramatic change in prices, in direct response to changes in rule interpretations by courts, illustrates the risk that entrepreneurs face in a market in which the existence of the good sold relies entirely on the presence of regulation. According to one industry expert, “this is one of the main ways regulators [can] kill markets.”

Mitigants

- As wetland mitigation banking matures, major policy changes—including rules on what must be offset—may be less likely to occur. As one regulator suggested, “we likely will not see a rule as dramatic as the 2008 Rule again.”
- Since major federal-level policy changes may be unlikely, entrepreneurs can diversify their investments across regions so as to limit the impact of state- or municipal-level policy changes.

2.3 | OTHER INDUSTRY-SPECIFIC RISKS

While regulation risks are perhaps the most fundamental industry specific risks, there are four additional risks related primarily to the sale of mitigation banking credits. These include: (1) deviation from forecasted credit prices, (2) the inability to sell all credits on a desired schedule, (3) incorrect timing of credit sales, and (4) forecasted but unrealized terminal value for a property.

Price risk: credit prices deviate from forecast

Despite being firmly established with a strong track record, wetland mitigation banking still exhibits many qualities of a nascent market. One such quality, among the greatest risks facing an entrepreneur, is that the credit price is difficult to ascertain in the present, and nearly impossible to accurately forecast for the future. Even more challenging is a market in which the entrepreneur is the first to enter. Any of these obstacles could cause the entrepreneur to forecast prices incorrectly, leading to a significant discrepancy between projected and realized returns.

Only direct participants know current credit prices in a given service area. Different service areas have different markets and often differences in costs of implementation, including differences in availability of suitable sites and land acquisition prices. Knowing the credit price or implementation costs in one area does not give an accurate indication of the prices and costs in another. Credits prices in the present can be estimated through due diligence efforts, such as relying on relationships with industry participants in a given region. However, most credit releases, and subsequent credit sales, take place years after the initial investment has been made—while an entrepreneur may be able to ascertain the regional price of a credit when he or she makes the initial investment for a mitigation bank, he or she still has to attempt to accurately forecast the price of a credit in the future once the bank has been entitled.

Where an entrepreneur is the first to enter, there are no existing credit prices to estimate. Instead, he or she must derive a price based on developers’ willingness to pay, the cost structure of the development, the construction and administrative costs to produce a credit, and the developers’ alternatives (PRM and/or ILF).

Changes in credit demand

Factors such as home sale prices, population density, existing wetland acreage, and anticipated infrastructure needs are liable to change at any time (Cragg, Polek, and Polasky, 2011), and slight

macroeconomic changes can dramatically shift wetland credit prices. This price forecasting risk exists across many other industries, but it is especially present in wetland mitigation banking, where there are fewer transactions upon which to base prices, and where the good being sold lacks uniformity. A wetland credit can command a much higher price near a large city—where few wetlands remain and open land is scarce—than it can in a rural area with a relatively intact system of wetlands, and few competing demands for real estate. It stands to reason, then, that a rapidly expanding metropolis or scrapped plans to build a highway could drastically shift credit prices over a 10- or 15-year period.

Changes in credit supply

Just as credit prices are subject to shifts in demand, they are also driven by available credit supply. While this is true for many industries, wetland mitigation banking is particularly unique in that new supplies of credits are not always made public or known to competing entrepreneurs. The national database of projects, RIBITS, can take up to 24 months to publicly list new mitigation bank projects. This is long enough for a competitor to enter the market with a different credit price, giving the entrepreneur little option for proactively responding to competing supply. One regulator indicated that the Corps is working to reduce such a delay in entering the most current mitigation bank information into RIBITS.

Mitigants

- A number of experts interviewed mentioned that Freedom of Information Act (FOIA) requests are a possibility for obtaining regional market data, though often with the caveats that some districts do not keep up-to-date, accurate records, do not track credit prices at all, or and maintain that credit prices are confidential, and thus not subject to FOIA requests.
- The National Mitigation Banking Association could begin collecting pooled, anonymous data from its members that all participants could access, similar to the data provided by the National Council of Real Estate Investment Fiduciaries (NCREIF).
- Experience in a region can be enough to give the entrepreneur an idea about what current prices are. If the entrepreneur is new to a region, he or she can seek to perform thorough due diligence, or try to derive credit prices from the anticipated cost of producing a credit.
- A relationship with regulators or a strong network in the industry can sometimes produce this type of information, if it is available and ethically sourced.
- Building barriers to entry by investing heavily in a region can work to limit the risk of low credit prices resulting from excess supply. As with any portfolio, however, the lack of regional diversification can be a significant liability. Moreover, non-industry players can enter with much lower barriers if they already own the land and have local contacts.
- A mitigant to the risk of forecasting future prices incorrectly is to pre-sell credits in advance of project development and entitlement. As one regulator indicated, while such pre-selling occurs, regulators have no influence on the practice, as any risk of the bank failing entitlement that would thus negate any pre-sold credits, is borne by entrepreneurs and buyers of advance credits.
- One regulator indicated that entrepreneurs can also review ILF project details in the same watershed to estimate credit prices, as ILF projects are required to publish a fee schedule that may approximate regional credit prices.

Quantity risk: not able to sell all credits or not able to sell on projected schedule

Even if entrepreneurs receive all expected credits for an entitled wetland bank, and receive them on time, the risk remains that they will not be able to sell all credits. This risk is influenced by both credit demand and supply in a given service area; if there is insufficient demand or excess supply, entrepreneurs may not be able to sell their inventory credits at all, no matter how low they set the price.

An entrepreneur effectively “exits” an investment in a wetland bank by selling all credits or selling an entitled bank with credits still available for sale. If such a quantity risk exists, an entrepreneur may face

an “exit risk” in that there could be no opportunity to realize the value of credits remaining in an entitled bank. As one industry consultant contends, having credits sit on the shelf with no demand is “one of the biggest risks” faced by banking entrepreneurs.

Mitigants

- Entrepreneurs will mostly tend to invest in projects where credit demand projections are sufficient to justify the investment (Shabman & Scodari, 2004). Further, Shabman and Scodari (2004) contend that, before seeking entitlement, prospective entrepreneurs will identify sources of demand—“prospective applicants for fill permits”—in specific service areas. Summarizing this mitigant, one entrepreneur stated that a common strategy is to identify (1) what development projects are planned and have funds available, (2) what projects are planned but not yet funded, and (3) what share of that demand can be captured by the entrepreneur.
- Entrepreneurs are also likely to target service areas in which there are diverse sources of demand—relying on a single source of demand could allow a large-scale credit buyer to “dictate below-market prices” or could leave the entrepreneur relying too heavily on a single, potentially uncertain, development project to actually be implemented (Doyle and Womble, 2012).

Forced to sell credits at wrong time

Even with existing demand for credits, an entrepreneur may be forced to sell credits at a disadvantageous time, when credit prices are lower than they may be in the future. Such an early disposition of credits could be a result of funding structure. Assume, for example, that the entrepreneur structured a private equity-like fund with a ten-year fund life and possible two-year fund extension. If the entrepreneur still held credits at the end of this fund, he or she may be obligated to sell the credits, or the entire entitled bank, at a lower price because of requirements to provide a financial exit for the fund’s investors.

Another reason an entrepreneur may have to sell credits at an inopportune time, resulting in lower prices received for credits, could be because of a need for cash to continue to operate the wetland bank, or to service debt. As one industry consultant explains, the challenge of such a private-equity model fund is that the entrepreneur could be “stuck well beyond the two-year [extension] at the end of the fund” if the entrepreneur attempts to avoid selling credits at a time when prices are low and demand is limited.

Mitigant

- Educating the investor about the potential challenges associated with mitigation banking could result in a longer fund extension period, allowing a longer period of time for later credit sales.

Entrepreneur does not realize a terminal value upon sale of property

Unlike other natural resource properties, such as timberland or agriculture, it is possible for land to effectively lose all of its underlying value when encumbered with a wetland mitigation bank, which typically restricts development or resource extraction. One risk associated with such an asset characteristic is that entrepreneurs may project a terminal value—the price at which they can resell the property—and then fail to find an interested buyer once the bank has sold all of its credits and features encumbrances that could limit any alternative use of the property in the future. This risk is exacerbated by the fact that entrepreneurs have to finance long-term management of the property—another future expense that the entrepreneur could fail to project accurately upon initial investment.

Mitigant

- As both industry consultants and entrepreneurs have indicated, it is often best practice to omit or dramatically discount a terminal value in financial projections, allowing for any realized terminal value that may occur to serve as an unanticipated, “bonus” source of income.

2.4 | PROJECT SPECIFIC RISKS

Each project has a unique set of physical, biological, and ecological characteristics, and comes with its own set of challenges. As such, there are risks specific to each mitigation bank project site, which include: (1) unplanned performance of ecological processes, (2) incorrect bank design or construction, (3) project management failures, and (4) site damage due to natural disasters.

Hydrological/biological processes do not perform as planned

One of the clearest risks is that the wetland does not perform as planned. A wetland is a notoriously complex system, and man-made versions are far from foolproof. If the hydrological or biological functions do not materialize either on the projected timescale or at all, then the entrepreneur risks earning fewer credits than anticipated, or having to return already-sold credits.

Mitigant

- Thorough planning using professional consultants and engineers with proven track records can help to mitigate this risk. However, there is always an inherent uncertainty in natural processes which makes precise forecasting impossible.

Design or construction errors

Errors in engineering, planting, or some other aspect of the restoration design of the site could destine the project for failure from the outset. Even if the plan is well designed, it is not guaranteed that the execution will work as planned; trees could be planted at the wrong time of year, the trees could be in a weakened condition from transportation, certain species may be unsuitable for the site, or an invasive species might dominate the site again. These failures in design or execution may result in unplanned or increased remediation expenses—such as re-engineering the site or replanting the site—in order to receive all credits as planned. Such failures could also result in delayed entitlement, which exacerbates the risks in delayed credit supply and being forced to sell credits at the wrong time, as discussed above.

Mitigant

- Working with a reputable environmental consultant with experience in the region could reduce the probability of failure in both design and implementation.

Project management failure

Entrepreneurs may fail to satisfy all requirements associated with a specific project. If so, they risk incurring unplanned expenses, or failing to receive credits on the timeline and/or at the volume that they initially forecasted. Examples of the many requirements that entrepreneurs may not understand fully, and thus fail to meet, include the submission of monitoring reports, the posting of financial assurances during the entitlement phase, and the establishment of adequate funding for the project's long-term management.

Mitigant

- Entrepreneurs can seek to hire and retain staff with a track record of understanding and meeting all entitlement requirements to limit this risk.

Damage to site from natural disasters

Wetland mitigation banks, and their proper ecological functioning, are subject to failures as a result of weather events, such as extreme wind, flooding, and ice, as well as other disturbances such as fire, pests, and disease. While a mitigation banking instrument may stipulate that unforeseen natural disasters do not affect the entitlement of the bank, such damage may cause significant delays (e.g., in completing a functional baseline assessment) that could result in further entitlement delays and additional bank assessment costs. One industry expert suggested that “no one actually knows what would happen” in the

event of natural disasters, while one regulator suggested that regulators may “release fewer credits until regulators have a better eye” on how the site’s ecological functions were affected.

Mitigants

- Entrepreneurs can seek to ensure unambiguous language in the mitigation banking instrument that specifies how the bank’s credit supply will be affected in the event of natural disasters.

Table 1 | SUMMARY TABLE OF ENTREPRENEUR RISKS AND MITIGANTS

	ENTREPRENEUR RISKS	MITIGANTS
General risks	Large initial capital outlay	<ul style="list-style-type: none"> ▪ Partner with existing landowner ▪ Option agreement/long-term purchase contract ▪ Phase bank construction costs over time
	Loss of key people	<ul style="list-style-type: none"> ▪ Align incentives with equity ownership
	Difficulties deploying committed capital	<ul style="list-style-type: none"> ▪ Identify acquisition pipeline in advance of fund raise ▪ Negotiate for extended deployment period in fund terms
Regulation risks	Supply of credits delayed or reduced	<ul style="list-style-type: none"> ▪ "Bow on package" for entitlement application ▪ Ensure clear, unambiguous entitlement requirements in advance of project implementation
	Demand for credits delayed or reduced	<ul style="list-style-type: none"> ▪ Target Corps districts with strong track record for preference of mitigation banking and efficient/timely permitting of development impacts ▪ Identify service areas with development projects that have already begun or completed permitting
	2008 Rule applied unevenly	<ul style="list-style-type: none"> ▪ Target districts favorable to MBI ▪ Lobby for enforcement of 2008 Rule preference of banks ▪ Lobby for federal, rather than district-level, mitigation program
	Regulator changes rules on what must be offset	<ul style="list-style-type: none"> ▪ Major rule changes less likely to now occur ▪ Diversify across regions to limit impact of state- or municipal-level policy changes
Other industry specific	Credit prices deviate from forecast	<ul style="list-style-type: none"> ▪ FOIA requests ▪ Previous experience in region ▪ Establish working relationship with regulator or a strong regional network with other industry participant ▪ Dominate supply in targeted regions to discourage market entrance by competitors ▪ Pre-sell credits in advance of bank completion ▪ Review publicly available ILF fee schedule to estimate bank credit prices
	Not able to sell credits on schedule or at all	<ul style="list-style-type: none"> ▪ Target regions where strong credit demand appears certain ▪ Target regions with diverse credit demand sources
	Forced to sell credits at wrong time	<ul style="list-style-type: none"> ▪ Negotiate terms with investor to allow for fund extensions in the event of disadvantageous market timing
	No realization of terminal value upon exit	<ul style="list-style-type: none"> ▪ Omit or dramatically discount terminal value in financial projections
Project specific risks	Ecological processes do not perform	<ul style="list-style-type: none"> ▪ Rely upon professional consultants/engineers with proven track record
	Design/construction errors	<ul style="list-style-type: none"> ▪ Rely upon professional consultants/engineers with proven track record
	Project management failure	<ul style="list-style-type: none"> ▪ Rely on staff with track record for understanding and meeting all entitlement requirements
	Damage from natural disasters	<ul style="list-style-type: none"> ▪ Attempt to include stipulations in MBI that limit impact on bank entitlement process

3 | REGULATOR RISKS

Just as entrepreneurs face risks that can affect the financial viability of their mitigation banks, regulators such as the Corps face risks that primarily relate to ensuring the ecological integrity of mitigation banking. Should such integrity be lost, mitigation banking could be perceived as a failed tool in the guarantee of “no net loss” of wetlands. Further, as wetland mitigation banking is the most mature ecosystem services market in the U.S., its failure could threaten the advancement of other, more nascent markets. This section identifies four primary risks that regulators may face: (1) an inadequate endowment or site protection mechanism for maintaining the site in perpetuity, (2) conflicting easements on a property, (3) a temporal loss of wetlands, and (4) the preference for compensatory mitigation at the expense of avoidance and minimization.

Inadequate endowment or site protection mechanism for long-term maintenance of site

One of the largest potential risks to the Corps is that the projects it approves have either an inadequate endowment or site protection mechanism that would ensure the permanent or long-term maintenance and protection of the site. The risk is that the property may begin to degrade over time without adequate maintenance, and a sufficient permanent endowment is necessary to perform that maintenance. Examples of maintenance include the replacement of cattle fences and the control of invasive species such as Chinese Tallow or Phragmites. It is the responsibility of the entrepreneur to provide sufficient funding to ensure that the property’s aquatic resources will continue to function even after all credits are released and the entrepreneur has effectively exited from the project.

There have also been instances of inadequate site protection mechanisms that do not legally protect the site’s long-term maintenance. An example of this is the transfer of title to a state agency, which then uses the land in a way that is inconsistent with the intent to provide perpetual compensatory wetland functions and services.

Mitigants

- The Corps can perform analyses in the region to get an accurate idea of the long-term management funding needed to care for nearby properties based on project size, and make sure that enough money exists to account for planned expenses as well as unforeseen future events. An example of a useful tool for analysis of costs is the Property Analysis Record (PAR), developed by the Center for Natural Lands Management for conservation banking, which helps to analyze the characteristics and needs of a project, and estimates administrative, management, and maintenance costs (2004).
- The Corps can specify language in the site protection mechanism limiting land uses that are inconsistent with the site providing compensatory mitigation.

Conflicting easements on property

A risk that can be of significant concern is the presence of existing easements, liens, or other interests (such as mineral or timber interests) on the property of a mitigation bank. Should an easement, lien, or other interest already encumber the property in some way, it can be challenging for the regulator to ensure that the encumbrance does not conflict with the perpetual conservation easement that is required for the entitlement of the mitigation bank.

Subsurface rights, for example, can complicate mitigation bank projects. Regulators have responded by requiring in the MBI that, should the mineral rights be exercised, the entrepreneur may need to provide appropriate offsets. Additionally, regulators indicate that entrepreneurs should work closely with holders of subsurface mineral rights to ensure that there are minimal impacts to the mitigation bank site. They can do this by minimizing the size of the operation’s footprint or by using directional drilling.

An additional concern arises if a property that is proposed as a mitigation bank already has a perpetual conservation easement that restricts development. If such a property is already “protected,” one regulator indicated that it may be “less attractive” to regulators who consider the property for a bank entitlement, in part because the public may see the presence of such a bank as providing no “ecological uplift” or “additionality,” despite the fact that an easement rarely guarantees any hydrological functioning performance standard that is equivalent to that of the lost wetland.

Mitigants

- Regulators can complete a thorough analysis, including a title search, which ensures any existing easements do not conflict with actions required to provide ecological uplift and to conserve the property into perpetuity.
- Favoring sites for mitigation banks that do not already have a conservation easement in place can help to capture the full ecological benefit of mitigation.
- Encourage the mitigation provider to secure those other interests, including through the subordination/subrogation of those other interests to the mitigation interest.

Temporal loss of wetlands

Preference to mitigation banks limits temporal loss

A common issue raised by both entrepreneurs and regulators is the preference to avoid or reduce any “temporal loss” of available functioning wetlands in a given watershed. ILF and PRM projects may not deliver mitigation until after a wetland is negatively impacted. This delay in compensating for lost wetland functions and ecological values after wetland loss has already occurred, and threatens the aforementioned “no net loss” goals. In concept, mitigation banks eliminate this temporal loss by producing additional wetland functions and values in advance of most wetland loss events (BenDor, Riggsbee, Doyle, 2011).

Advance credits can result in temporal loss

While regulators following the 2008 Rule may prefer use of mitigation banks to ILF or PRM alternatives, they still face a risk of temporal loss. In an attempt to ensure the financial viability of mitigation banking, regulators typically issue an initial percentage—often 15 to 30 percent—of the banks’ anticipated credits before completion of a fully ecologically functional mitigation bank. According to a nine-year analysis of credit supply in the Chicago area, the regional market was dominated by “unfinished” credits, with 60 percent of all credits for sale being from “Phase 1” of bank construction, which involves acquisition, bonding and protection of the property but before the wetland hydrology and planting of approved vegetation is completed (Robertson, 2006). Similarly, Gardner (2011) further found that 90 percent of mitigation banks received early credit releases, with, on average, 42 percent of credits being released early. Based on these findings, Gardner (2011) concludes that, “While these early releases were typically contingent on the banker securing rights to and placing a conservation easement on the mitigation site, mitigation banking did not seem to provide functioning mitigation in advance of impacts.”

Mitigants

- Some entrepreneurs argue that a partial issuance of credits at the early stages of a bank is still superior to the greater temporal loss that would occur through ILF and PRM mitigation methods.
- One regulator argued that initially issuing 15 to 20 percent of credits only occurs after a conservation easement and financial assurances are in place, thus insuring that there will still “be a parcel of land that is protected in perpetuity,” regardless of whether the bank ever achieves full entitlement.

Compensation at the expense of avoidance and minimization

For every development with the potential to impact a wetland, the Corps requires developers to prove that the loss has been avoided or minimized to the extent practicable before they consider compensatory

mitigation. With the growth of mitigation banking and the industry that relies on these projects, the concern arises that more compensatory mitigation means a relaxation of the avoidance and minimization prerequisites (Wilkinson et al, 2009). One may speculate that, if compensatory mitigation were not an option, the developer would feel more pressure to leave wetlands intact. Regulators have responded to this by explaining that the permitting process for a developer is not influenced by the entitlement process for a mitigation bank entrepreneur—the two processes are kept entirely separate.

Mitigants

- Both entrepreneurs and regulators agree that this is not a significant issue in practice. Entrepreneurs insist that a developer wishes to avoid or minimize wherever possible, since it is almost always cheaper to change the development’s design where possible rather than purchase the necessary mitigation credits. Moreover, another industry expert noted that entrepreneurs want developers to minimize the damage enough so that PRM is not worth the effort.
- Regulators confirm that the cost of mitigation forces developers to “go back to the drawing board,” or at least consider additional reductions in impacts so as to decrease the amount of compensatory mitigation required.
- When developers insist on compensation, the Corps may become more closely involved so as to identify any missed opportunities for avoidance or minimization.

Table 2 | SUMMARY TABLE OF REGULATOR RISKS AND MITIGANTS

REGULATOR RISKS	MITIGANTS
Inadequate endowment or site protection mechanism	<ul style="list-style-type: none"> ▪ Conduct analyses to accurately estimate required funds for perpetual site maintenance ▪ Specify language in site protection mechanism that limits any conflicting land uses
Conflicting easements on property	<ul style="list-style-type: none"> ▪ Complete thorough analysis of existing easements that may conflict with mitigation bank requirements ▪ Favor new sites for mitigation banks that are not already protected ▪ Secure other potentially conflicting interests
Temporal loss if issue credits in advance	<ul style="list-style-type: none"> ▪ Identify an appropriate initial percentage of credits to issue in first phase of bank that allows financial viability of bank while limiting any damage to ecological integrity of bank ▪ Require a minimum of a conservation easement and financial assurances to be in place before issuing any initial credits
Compensation at expense of avoidance and minimization	<ul style="list-style-type: none"> ▪ Recognized by both entrepreneurs and regulators to be of little concern

4 | RISKS TO BOTH ENTREPRENEUR AND REGULATOR

In addition to the risks that pertain separately to entrepreneurs and regulators, the following risks affect both groups: (1) changes to, or spatially inappropriate determination of, geographic service areas, (2) competition not playing by the same rules, and (3) reputation damage from providing credits to unpopular development projects.

Geographic service area changes, or is not spatially appropriate

Beginning as early as 1995, with the creation of the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks, there have been geographic limits for mitigation bank sales (Doyle and Womble, 2012). These bank service areas are proposed by the entrepreneur and approved by the Corps in consultation with the IRT, and ultimately affect the size of the market in a given geographic area, both with respect to the volume of demand and competing supply (BenDor, Riggsbee, Doyle, 2011). A smaller service area, for example, can limit the volume or rate of credits that an entrepreneur may sell because there are not enough credit-demanding development projects in the area (Maryland ES working group, 2011). A regulator may adjust the size of a given service area to strike a balance between a smaller area that eradicates “hot spots”—which may occur if wetland losses are concentrated in one part of a service area and mitigated in another distant part of the area—and a larger area that “includes more market participants” (Doyle and Womble, 2012).

Risk to regulator: service area not spatially appropriate

The 2008 Rule sought to address this challenging trade-off by defining a service area as the “watershed, ecoregion, physiographic province, and/or geographic area in which a bank or in-lieu fee program is authorized to provide.” The rule further specifies that a service area “must be appropriately sized to ensure that the aquatic resources provided will effectively compensate for adverse environmental impacts across the entire service area,” but that economic viability will also be considered (Code of Federal Regulations – 33 CFR 332.8(d)(6)(ii)(A)). The Corps, in consultation with the IRT, either comes up with guidelines in advance, or decides just how big this service area should be for each bank or ILF program.

Beyond primary service areas, entrepreneurs are also allowed to develop banks in secondary and tertiary service areas. Developers purchasing credits from these secondary and tertiary service areas may be required to purchase a multiple of the number of credits (for example, 1.5x or 3x credit ratios, respectively) that they would otherwise would have had to purchase had they acquired credits in the more proximate, primary service area.

The risk faced by the Corps is that a given regional office may not effectively balance ecological and economic considerations. Failing to uphold the ecological soundness of a mitigation bank threatens the fundamental integrity of compensatory mitigation, while failing to ensure financial viability for entrepreneurs risks the loss of market activity.

Further, while regulators may be inclined to minimize the distance between impacts and mitigation by limiting a service area, Doyle (2013) contends that “large geographic service areas provide an incentive for investment in large restoration sites” that may in fact have “greater potential to provide greater ecosystem services than small sites.” This suggests that regulators may want to consider larger service areas for responding to both ecological and economic concerns.

Risk to entrepreneur: service area changes

Should there be ambiguity in the entrepreneur’s and regulator’s understandings of a service area, or should the Corps decide to change a service area size, entrepreneurs can be critically affected. As Amato

(2013) contends, “Early agreement over the extent of the service area prevents a scenario where parties proceed with disparate assumptions over size and location only to discover late in the process, after considerable time and resources have been spent developing the instrument, that they are far from resolution.” As one industry expert explains, “This most often becomes a problem when regulators try to change the rules either during the permitting process, or after [a] permit is issued and [regulators] change the rules but do not appropriately protect legacy banks.” Similarly, another industry consultant claims that such a change in service area is “much more of a risk during the entitlement phase,” as the entrepreneur is not yet “grandfathered” into a given service area and thus can face changes in service area that differ from what the entrepreneur initially projected.

Mitigants

- Mitigation banks may be more spatially appropriate than a PRM alternative. On-site PRM projects can exacerbate the problem of mitigation efforts being unsuitable for the ecological integrity of the watershed, as they often result in a “patchwork” of small compensatory wetlands that may provide less ecological benefit than larger wetland mitigation bank sites, which provide mitigation for multiple development projects.
- Entrepreneurs can lobby for further enforcement of the 2008 Rule, which was largely successful in codifying the process by which a service area is determined; this allows entrepreneurs to more easily predict credit sales in a given area by standardizing service areas and thus easily predict credit sales in a given area (BenDor and Riggsbee, 2011). The 2008 Rule may also help regulators ensure that service areas will not be too large, provided that the local Corps district interprets and applies the rule correctly.
- By allowing existing projects or applicants who have already submitted draft MBIs to be “grandfathered” in the event of a service area change, the Corps avoids the risk of negatively impacting those entrepreneurs who have already made a significant investment.

Competitors do not play by the same rules

Risk to entrepreneur

Competing, bad-acting entrepreneurs can seek an advantage by building an ecologically inferior wetland bank at a lower cost than a better functioning bank in the same regional market. If a competitor is a one-time banker, or a small private landowner without an incentive to maintain a positive, long-term reputation in the industry, then it is conceivable that he or she could cut corners, impacting the long-term ecological functions of the wetland and the watershed.

Risk to regulator

Should regulators make it too easy for entrepreneurs to enter a regional market—by reducing requirements or compliance reviews, for example—there is a risk that mitigation credits could emerge from low quality mitigation banks, thus threatening the ecological integrity of mitigation banking in a region. Such “rubber stamping” of mitigation banking permit requests could attract “fly-by-night” mitigation bankers who enter the market and produce poorly-performing mitigation banks.

An additional, related risk is that established mitigation banks go bankrupt and cannot then complete banks or repair established banks with damaged hydrologic functions. An example is the Woodbury Creek bank in New Jersey, in which the sponsoring entrepreneur failed to deliver the anticipated ecological performance, and the regulator had no recourse to force the entrepreneur to complete the needed remediation (Gardner, 2011). To make matters worse, the regulator may face litigation as a result of such failed banks. As BenDor and Riggsbee (2011) explain, “When regulators issue a section 404 permit and allow impacts to an aquatic resource, they assume a risk of litigation in the event that the impact is not adequately offset by the proposed compensation.”

Mitigants

- According to one regulator, most new mitigation banks are entrepreneurial ventures focused exclusively on securing properties for mitigation banking, rather than a previously common, shorter-term, and smaller “mom and pop” strategy. Entities pursuing this newer strategy—with externally raised capital, longer investment horizons, and larger land acquisitions—may reduce the risk of producing under-performing mitigation banks, as the entrepreneur’s performance track record is critical to their ability to raise additional capital in the future.
- The 2008 Rule has introduced a barrier to entry for new participants, in that it introduces a standardized permitting process that is more complex and costly, including requirements such as financial assurances, statements of qualification, and money set aside for long-term management. These additional requirements may dissuade the “casual opportunists” bankers who could otherwise be a concern for both regulators and those entrepreneurs who “play by the rules.” (BenDor, Riggsbee, 2011).
- It could be beneficial to lobby local regulators to penalize or increase penalties for bad or negligent entrepreneurs.

Reputation hurt by selling credits to an unpopular development

Some developments, such as fuel pipelines or controversial real estate projects, may be viewed as extremely unpopular, whether for political, environmental, or economic reasons. The Corps is bound to ensure that some form of mitigation takes place if these developments cause a loss in aquatic services and functions. If mitigation banking is the method chosen to do this, then entrepreneurs may find themselves selling credits to an unpopular developer.

The risk for both the Corps and entrepreneur is that, by participating in the mitigation process with an unpopular development, both groups could be implicated and suffer a decline in their reputations. If the public were upset enough, they could go so far as to question the ecological integrity of mitigation banking, which could jeopardize entrepreneurs’ social license to operate or harm the legitimacy of the industry itself.

Mitigants

- Most people understand that some form of development is inevitable, and see the “avoid, then minimize, then compensate” sequence as a valid one.
- Even if the public opposes a particular project, most external observers will likely not find regulators, contractors, consultants, and other peripheral parties to be guilty by association.
- New projects can increase the public benefit by providing passive recreation opportunities (i.e. birdwatching) and other amenities, thus counteracting the negative reputational effects

Table 3 | SUMMARY TABLE OF SHARED RISKS AND MITIGANTS

SHARED RISKS	MITIGANTS
Geographic service area changes or not spatially appropriate	<ul style="list-style-type: none"> ▪ Lobby for enforcement of 2008 Rule that standardizes service areas in advance of entitlement or credit selling phases ▪ Ensure clauses exist to grandfather bank should service area change after entitlement secured
Competitors do not play by same rules	<ul style="list-style-type: none"> ▪ New mitigation banks are more sophisticated, raising the bar for successful market entry ▪ Lobby district regulators to enforce 2008 Rule to discourage such "casual opportunists," such as requiring financial assurances, statements of qualification, and performance standards ▪ Lobby district regulators to penalize negligent entrepreneurs
Reputation hurt by selling credits to unpopular source	<ul style="list-style-type: none"> ▪ Articulate to public the benefits of mitigation banking if development is inevitable

5 | VALUING/MANAGING RISKS FOR ENTREPRENEURS

Each of the risks identified in this paper require different responses by entrepreneurs. In addition to the mitigants highlighted after each risk, there are some mitigants that can successfully be minimized or managed. For each risk that cannot be completely avoided or managed, this section offers some strategies for incorporating risk into the project's financial valuation.

Minimizing/managing risk

This paper has included several mitigants that either minimize or manage many of the specific risks associated with wetland mitigation banking. There are additional strategies that simultaneously mitigate multiple risks, such as:

Target regulating districts that favor mitigation banking

As several entrepreneurs noted, strategically establishing banks in favorable regulatory districts helps to ensure that the regulator will be acting in the best interest of the entrepreneur. For example, a favorable district is known to enforce the 2008 Rule "preference hierarchy" favoring MBI over ILF and PRM alternatives. On the demand side, regulators will be more prone to require mitigation banking, thus increasing the overall demand for credits. On the supply side, regulators may be less likely to delay the entitlement process of a mitigation bank, allowing for an improved rate of return.

Build relationships with regulators / respond to regulators' needs

As explained above in addressing the risk of delayed entitlement, building a relationship with the regulator through complete and thorough paperwork and frequent communication can mitigate the risk of delayed entitlement. A good relationship with regulators in many regions can also help entrepreneurs to better forecast credit demand, competing supply, and resulting credit prices. Understanding processes could also potentially facilitate prompt responses to a FOIA request—an important tool in a notoriously opaque industry. Two entrepreneurs independently illustrated the importance of good relations with the regulator by talking about the challenges they face when a regulator leaves their position, which highlights the additional consideration of forming relationships with more than one person at a given Corps district office.

Diversify banks

As one industry consultant highlighted, an entrepreneur may diversify project-specific risks by establishing multiple mitigation banks of different sizes, providing different aquatic resources in a variety of watersheds and regions. Service areas with different supply and demand drivers are particularly attractive; examples are areas with rapid urban growth, large-scale transportation projects, or low competitive pressures. Service areas with different regulatory decision makers can also be beneficial in diversifying away from relying on a few key regulator relationships (Guillon, 2012).

Valuing risk

Cash flow scenario analysis

For those risks that cannot be managed or minimized, some entrepreneurs build financial models with multiple assumption scenarios that produce different cash flows. One entrepreneur, for example, uses a Monte Carlo analysis that models scenarios with different "key levers on a deal," such as credit prices and land acquisition costs. Similarly, another entrepreneur models scenarios with probability-weighted cash flows (e.g., 70 percent chance that expected value is \$X and 30 percent chance that expected value is \$Y). Another entrepreneur noted that, given the "lumpy" nature of cash flows associated with mitigation banking—where all credit sales may occur for a few specific sales over the life of the mitigation bank—entrepreneurs can compare models of these cash flow events occurring at varying periods of time. An

additional practice by one entrepreneur is to constantly “re-project” the market by modeling existing properties’ forecasted cash flows every quarter.

Discount rate

While project-specific—“idiosyncratic”—risks are perhaps better modeled through cash flow scenario analyses, some entrepreneurs also attempt to value risks by adjusting discount rates when conducting a net present value analysis. One entrepreneur explained their practice of varying the discount rate that is applied to a mitigation bank project over time, particularly if credit sales are more certain in the initial years of the bank’s existence—necessitating a lower discount rate—and less certain in later years of the bank—necessitating a higher discount rate. Another industry consultant claimed that “Nobody knows what an appropriate discount rate would be” for mitigation banking and that they require some “gut check,” whereas another consultant suggested that “15 to 25 percent” discount rates are typically used.

With respect to “systematic risk”—risk inherent to the entire mitigation banking industry, such as macroeconomic drivers of credit demand like housing starts or infrastructure projects—it is challenging for either entrepreneurs or their investors to value this. Given that no public data on rates of return exist in the industry, there is no possibility for a formal, quantitative calculation, such as through the use of the capital assets pricing model (CAPM), of the “risk premium” that investors may want to know when considering the addition of an investment in mitigation banking to an already diversified portfolio.

6 | CONCLUSION

This paper outlines more than 20 risks facing entrepreneurs and regulators. As in any market, the presence of risk in the wetland mitigation banking market is not inherently negative, so long as returns are adjusted to compensate investors for assuming those risks. Yet, in order for investors consider entering the mitigation banking industry, they must first understand the risks associated with wetland mitigation banking as an asset class.

In response to the limited publicly available discussion or disclosure of the risks associated with the mitigation banking industry, this paper highlights and summarizes the key risks identified by industry participants. These risks are not ranked by their relative order of magnitude or importance, as entrepreneurs have argued that they vary for each property or regulatory district.

While this paper includes some potential methods to manage or value the risks that it identifies, there is still a need for a more formal analysis of best practices for how entrepreneurs and their investors value those risks that are not possible to manage. As Hartwell and Aylward (2009) warn, “It is precisely the inability to calculate and price the risk involved that will make the private sector wary of financing such innovative transactions.” A rigorous quantitative study of pricing risk is not currently feasible, however, given the lack of publicly available market data. BenDor, Riggsbee, and Doyle (2011) summarize a common complaint among those who have attempted to analyze wetland mitigation banking markets: “data for mitigation are notoriously incomplete, and severe data collection and quality issues have hindered past evaluations.”

“It is precisely the inability to calculate and price the risk involved that will make the private sector wary of financing such innovative transactions” (Hartwell and Aylward, 2009)

Though this paper is limited by such lack of data, its contribution to the clarification and enumeration of existing risks may be an early step in helping investors make better valuation decisions. Understanding these risks may also limit investors from excessively penalizing cash flows, which can occur by requiring higher rates of return, when considering an investment in wetland mitigation banking.

As wetland mitigation banking is arguably the most mature of any ecosystem services markets in the U.S., there is an opportunity for the market to pilot more sophisticated methods of understanding, managing, and valuing risks. Once these methods are proven to be successful, the best practices that emerge from wetland mitigation banking could then be applied to other more nascent ecosystem services markets, such as habitat conservation banking and nutrient trading.

WORKS CITED

- Amato, Paul. "Lessons Learned on Setting Service Areas." *National Wetlands Newsletter* 35:2 (2013): 10-11. Print.
- Aylward, Bruce et al. "Financing Ecosystem Service Markets: Issues and Opportunities." *The Institute for Natural Resources*. (2009): 1-25. Print.
- BenDor, Todd K., J. Adam Riggsbee, and Martin Doyle. "Risk and Markets for Ecosystem Services." *Environmental Science and Technology* 45 (2011): 10322-10330. Print.
- BenDor, Todd K., and J. Adam Riggsbee. "A Survey of Entrepreneurial Risk in U.S. Wetland Compensatory Mitigation Markets." *Environmental Science & Policy* 14 (2011): 301-314. Print.
- Clean Water Act of 1972, 33 U.S.C. §1251 et seq. (2002). <<http://epw.senate.gov/water.pdf>>
- "Compensatory Mitigation." EPA. United States Environmental Protection Agency, 2013. Web. 16 Aug. 2013
- "Compensatory Mitigation for Losses of Aquatic Resources," Federal Register: April 10, 2008 (Volume 73, Number 70), Page 19594-19705.
- Corps, 2008. Compensatory Mitigation for Losses of Aquatic Resources: Final Rule, 33 C.F.R. 332.8 (2008).
- Costanza, Robert et al. "The Value of The World's Ecosystem Services and Natural Capital." *Nature* 387 (1997): 253-260. Print.
- Cragg, Michael, Christine Polek, and Stephen Polasky. "Valuing Properties with Wetland Potential." *The Appraisal Journal* (Spring 2011): 126-142. Print
- Dahl, T.E. 2011. *Status and trends of wetlands in the conterminous United States 2004 to 2009*. U.S. Department of the Interior; Fish and Wildlife Service, Washington, D.C. 108 pp.
- Doyle, Martin. "Standards that Matter." *National Wetlands Newsletter* 35:2 (2013): 11-12. Print.
- Ehrlich PR, Ehrlich AH. 1981. *Extinction: The Causes and Consequences of the Disappearance of Species*. New Yorker: Random House.
- "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks." Federal Register: November 28, 1995 (Volume 60, Number 228), Page 58605-58614.
- Gardner, Royal C. *Lawyers, Swamps, and Money: U.S. Wetland Law, Policy, and Politics*. Washington, D.C.: Island Press, 2011. Print.
- Guillon, Ben. "Risk and Investment Decision in Mitigation Banking." National Mitigation and Ecosystem Banking Conference. Sacramento, CA. 9 May 2012
- Holdren, J. and Ehrlich, P., 1974. Human population and the global environment. *American Scientist* 62, 282-292.
- Kline, Jeffrey D., Marisa J. Mazzotta, and Trista M. Patterson. "Toward a Rational Exuberance for Ecosystem Services Markets." *Journal of Forestry* (2009): 204-212. Print.
- Kling, Catherine L., et al. *Natural Resources Credit Trading Reference*. USDA: Natural Resources Conservation Service, Aug. 2011. Web. 16 Aug. 2013.
<http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1045650.pdf>.
- Madsen, Becca, Nathaniel Carroll, Daniel Kandy, and Genevieve Bennett. 2011 Update: State of Biodiversity Markets. Washington, DC: Forest Trends, 2011. Available at:
<http://www.ecosystemmarketplace.com/reports/2011_update_sbdm>
- Maryland Ecosystem Working Group. *Ecosystem Services Working Group Final Report*. Maryland Department of Natural Resources, Oct. 2011. Web. 16 Aug. 2013.
<<http://www.dnr.state.md.us/es/>>
- Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC. Print.
- "Property Analysis Record." *Center for Natural Lands Management*, 2004. Web. 16 Aug. 2013.
- Robertson, Morgan M. "Emerging Ecosystem Service Markets: Trends in a Decade of Entrepreneurial Wetland Banking." *Front Ecol Environ* 4:6 (2006): 297-302. Print.
- Shabman, Leonard, and Paul Scodari. "Past Present, and Future of Wetlands Credit Sales." *Resources for*

the Future Discussion Paper 4-48 (2004): 1-33. Print.

Study of Critical Environmental Problems (SCEP), 1970. *Man's Impact on the Global Environment*. MIT Press, Cambridge, MA.

"US Wetland Banking: Market Features & Rules." *Ecosystem Marketplace*. The Katoomba Group, 2010. Web. 16 Aug. 2013

Wilkinson, Jessica B., et al. "The Next Generation of Mitigation: Linking Current and Future Mitigation Programs with State Wildlife Action Plans and Other State and Regional Plans." *The Nature Conservancy and the Environmental Law Institute*. White Paper, 2009: 1-66. Print.

Womble, Philip, and Martin Doyle. "The Geography of Trading Ecosystem Services: A Case Study of Wetland and Stream Compensatory Mitigation Markets." *Harvard Environmental Law Review* 36 (2012): 229-296. Print.

APPENDIX I | ACKNOWLEDGEMENTS

The authors would like to thank the following individuals for their insights that served to inform the majority of this paper:

Anonymous regulator, Aquatic Scientist, anonymous State Commission on Environmental Quality

Katherine Birnie, Director of Markets, Ecosystem Investment Partners

Eron Bloomgarden, Partner, EKO Asset Management Partners

Stuart DeCew, Program Director, Yale University Center for Business and the Environment

Justin Derby, Scientist, Real Estate & Mitigation Specialist, WRA Environmental Consultants

Bradford Gentry, Professor in the Practice; Co-Director of the Center for Business & the Environment at Yale, Yale School of Forestry and Environmental Studies

Dominick Grant, Investment Associate, Working Lands Investment Partners, LLC

Ben Guillon, Director, Mitigation Banking & Environmental Finance, WRA Environmental Consultants

Katherine Hamilton, Managing Director, Ecosystem Marketplace

Brent Jasper, Fort Worth District Regulatory Project Manager, US Army Corps of Engineers

Charlie Kauss, Principal, ECO-Capital Advisors, LLC

Rebecca Madsen, Project Manager, Electric Power Research Institute

Steve Martin, Environmental Planner, Institute for Water Resources, US Army Corps of Engineers

Geert Rouwenhorst, Robert B. and Candice J. Haas Professor of Corporate Finance; Deputy Director of the Int'l Center for Finance, Yale School of Management

Austin Schell, Principal, Wildlands Engineering, Inc.

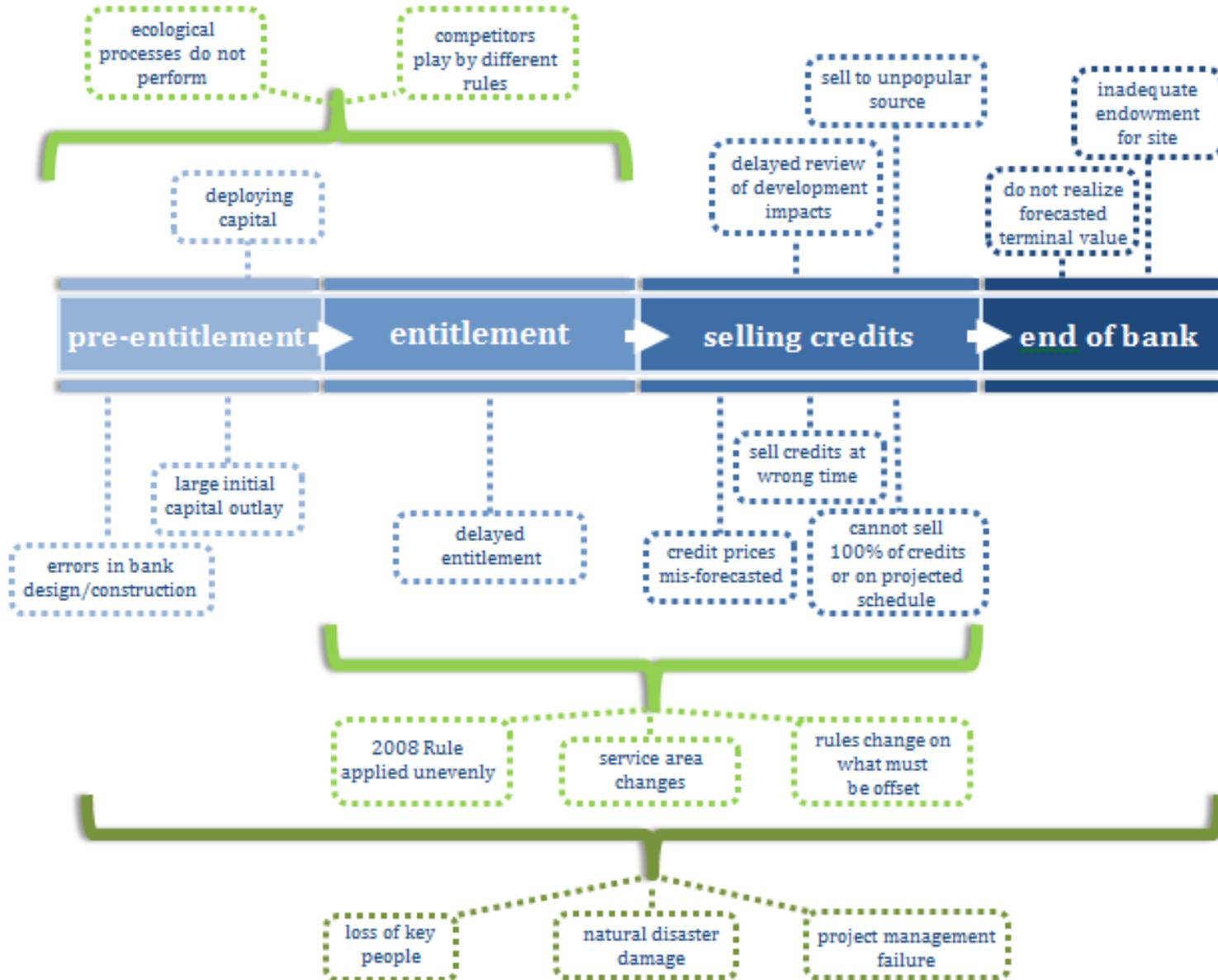
Deborah Spalding, Managing Partner, Working Lands Investment Partners, LLC

Cliff Sunda, Resident Forester, Working Lands Investment Partners, LLC

Charlie Thompson, Principal, ECO-Capital Advisors, LLC

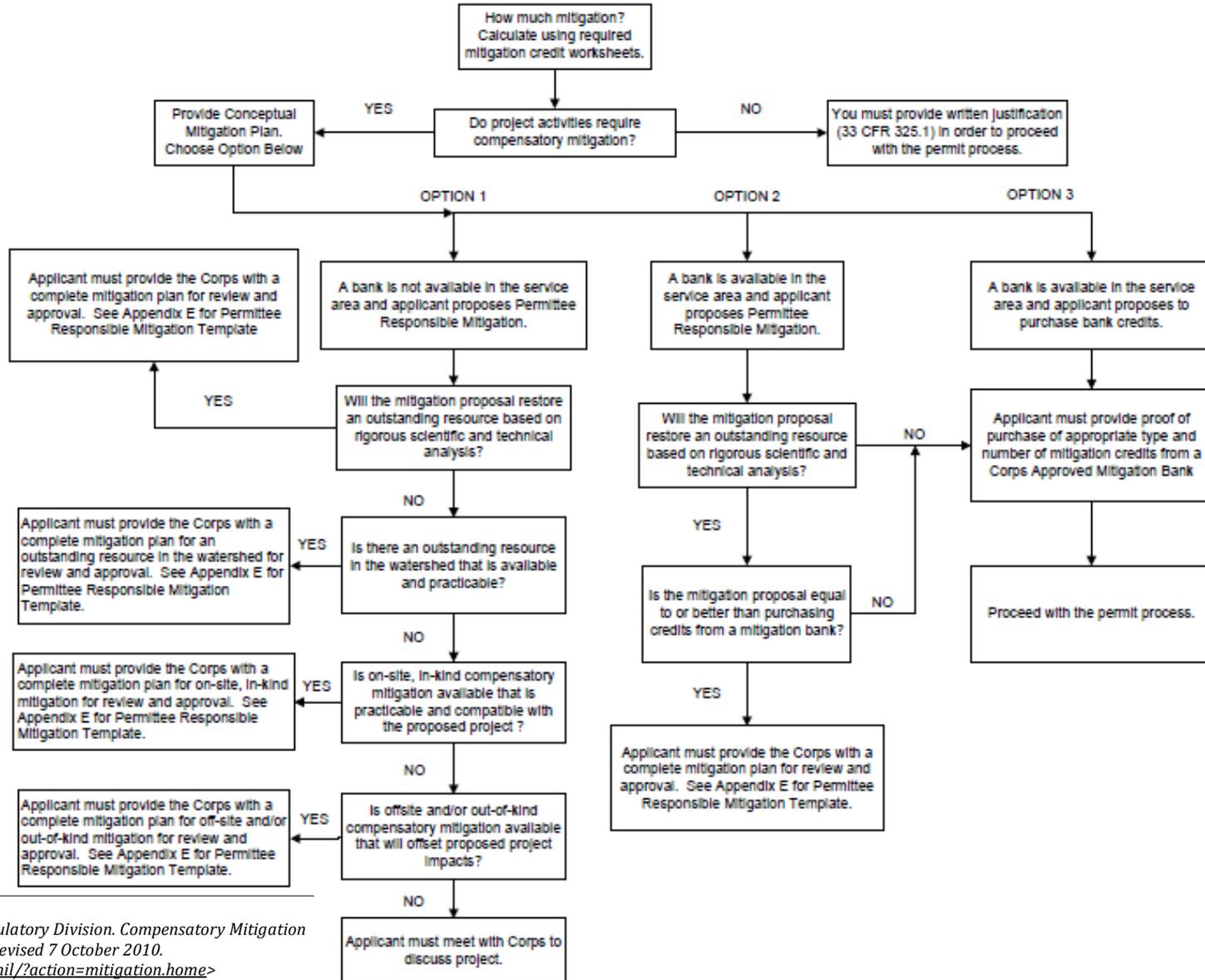
APPENDIX II | GRAPHICAL TIMELINE OF ENTREPRENEUR RISKS

The following timeline organizes those risks that entrepreneurs face, as outlined in this paper.



APPENDIX III | FLOW CHART FOR SOURCE OF COMPENSATORY MITIGATION

The below flow chart is an excerpt from the U.S. Army Corps of Engineers Charleston District Regulatory Division’s 2010 Compensatory Mitigation Guidelines. The chart illustrates the a Corps district’s review process in determining a development project’s compensatory mitigation requirements, and what conditions necessitate the purchasing of credits from a mitigation bank.



Source
USACE, Charleston District Regulatory Division. Compensatory Mitigation
Guidelines. Working draft last revised 7 October 2010.
< <http://www.sac.usace.army.mil/?action=mitigation.home>>