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Adaptive Regulation for Ecosystem Restoration: A Context for Effective Environmental Permitting

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ADAPTIVE REGULATION FOR ECOSYSTEM RESTORATION: A CONTEXT FOR EFFECTIVE ENVIRONMENTAL PERMITTING

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ABSTRACT

Adaptive Regulation for Ecosystem Restoration: A Context for Effective Environmental Permitting

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This dissertation investigates the regulatory challenges faced by large-scale ecosystem restoration (LSER) projects by exploring the perspectives of practitioners and regulators. Focusing on the federal regulatory permitting process, the study aims to understand its impact on LSER projects and proposes the application of adaptive regulation for improvement. Employing Q methodology, participants expressed their views on 34 statements related to wetland permitting for LSER projects. Factor analysis revealed two distinct perspectives: Factor 1 emphasizes the reorganization of the permitting process within existing regulations, advocating for more documentation and structured processes. Factor 2 highlights the need for restructuring both the permitting process and current regulations, emphasizing ongoing monitoring and specialized processes for LSER projects. Results highlight the participants' perceptions of the permitting process's effects on LSER projects and contribute valuable insights into the complexities of the process, offering implications for policy and practice. The research provides evidence supporting the negative impact of the current regulatory process on LSER projects and advocates for adaptive regulation implementation. This study contributes valuable insights, addressing a literature gap on adaptive regulation specific to wetland permitting for LSER projects, and employs a novel application of using Q-methodology in environmental permitting

in the United States. This dissertation is available in open access at AURA (https://aura.antioch.edu/) and OhioLINK ETD Center (https://etd.ohiolink.edu/etd).

Keywords: LSER, permitting, Q methodology, wetlands

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Abbreviation & Acronyms

AG	Adaptive Governance
AR	Adaptive Regulation
LSER	Large-Scale Ecosystem Restoration
USACE	United States Army Corps of Engineers

Definitions

Adaptive Governance Theory – emphasizes how socioecological systems can adapt to constantly changing conditions where decisions must be made under high uncertainty.

Adaptive Management – A systematic approach to improving resource management by learning from previous management outcomes.

Adaptive Regulation – A Structured regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis.

Concourse – A list reflecting all the potential opinions around the topic of study for a Q methodology study.

Environmental Governance – A set of regulatory processes, mechanisms, and organizations through which political actors, governments, and stakeholders influence environmental actions and outcomes.

Large-Scale Ecosystem Restoration – Restoring natural areas containing scenic, hydrologic, habitat, or other values that need restoration. Includes working on all aspects of restoration simultaneously and comprehensively, landscape-scale restoration.

P-Set – Participants of a Q methodology study.

Q Methodology – Exploratory method that provides a clear and structured approach appropriate for soliciting participants' viewpoints.

Q-Set – The set of statements to be sorted by the participants of a Q methodology study.

Restoration – The process of assisting the recovery of a degraded or damaged ecosystem.

CHAPTER I: INTRODUCTION

Large-scale ecosystem restoration (LSER) is of national importance; the health of these ecosystems provides a portion of the foundation for America's future (Ulrich, 2012). Because of this importance, we must find a more enduring way to regulate LSER programs. Large-scale restoration involving federal, state, and local entities is a partnership approach to planning and implementing land management projects focused primarily on restoring natural ecosystem functions significantly. Examples of LSER include Everglades restoration, Missouri River restoration, and Coastal Louisiana restoration. Ecosystems that require restoration have been degraded, damaged, transformed, or destroyed as the direct or indirect result of human activities and usually do not meet state or federal environmental requirements. Currently, these ecosystems cannot meet the state or federal environmental requirements for water quality, quantity, and flow. Many ecosystems targeted for restoration projects are at least partially publicly owned lands. They are owned by the government at some level, either local, state, federal, or a combination. While these facts are known and documented, the government entities who own and manage the lands frequently do not have adequate funds to address or enforce the environmental legislative requirements actively or to clean up the properties to meet these standards. Once an ecosystem or part of an ecosystem is included in a restoration project, the project must meet environmental requirements, and regulatory permits are required. Before public lands are included in a restoration project, the state or federal government takes limited actions to improve the quality of the ecosystem, even if it is well documented that the area is not meeting regulatory requirements. When these lands are formally identified as a restoration project, then by definition, they are not meeting the regulatory requirements.

Under the current system of federal regulations, LSER projects are classified along a continuum of environmental impact, which complicates the permitting process. Impacts along this continuum can be either positive or negative. During the permitting process, restoration projects are often viewed as having adverse effects; instead of being considered a remedy to environmental concerns, the restoration efforts are viewed as having negative environmental impacts similar to filling a wetland for constructing a building. In most situations, public works and private construction projects are initiated on lands that typically meet environmental requirements. The construction is an ecological impact mitigated as required by regulatory permits to prevent environmental damage to the greatest extent possible. LSER projects aim to return damaged ecological systems to a stable, healthy, and sustainable state, which has positive impacts on the impact continuum discussed above. Based on this definition of large-scale ecosystem restoration projects, holding this class of projects to regulatory standards formulated to address adverse environmental impacts is not logical. Examining and understanding the unique nature of large-scale ecosystem restoration projects would allow regulatory agencies to make more informed decisions when evaluating these projects. These more informed decisions could lead to new rulemaking focused on the specific requirements of ecosystems in need while ensuring the protection of surrounding lands.

A well-thought-out LSER governance system explicitly includes the regulatory system (with effective and organized regulations, policies, and incentives) and is necessary for ecological restoration projects (Petursdottir et al., 2013). Because governance issues can play a role in the success of restoration projects, it is essential to question whether current governance structures are sufficient or if we should pursue new approaches (Guariguata & Brancalion, 2014). This question is crucial because it identifies another layer of uncertainty to the existing uncertainties associated with the outcomes of large-scale ecosystem restoration projects. These uncertainties commonly conflict with the structured, linear, and outcome-focused regulatory permitting process currently in place for LSER projects.

Adaptive governance (AG) techniques can address many of these uncertainties, especially adaptive regulation (AR). According to Bennear and Wiener (2019), adaptive regulation is a structured regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis; I use this definition of AR in my research. AR allows time to learn about the specific environment, its processes, and how it responds to restoration efforts. Including adaptive regulation/governance techniques in the regulatory permitting process can lead to more realistic expectations from regulators and restoration practitioners due to the continuous involvement of all parties during the process. When we have more realistic expectations, we can expect better restoration outcomes and greater information-sharing and learning opportunities. Having the regulators involved throughout the restoration project instead of just at the beginning and end allows for increased opportunities to share information and learning, resulting in more successful restoration outcomes.

Theoretical Framework

My theoretical framework centers around Adaptive Governance Theory. Adaptive governance theory emphasizes how socioecological systems adapt to constantly changing conditions where decisions must be made under high uncertainty (Karpouzoglou et al., 2016). Adaptive governance draws from adaptive management and collaborative ecosystem management, but significant differences exist (Karpouzoglou et al., 2016). AG aims to develop the focus from managing ecosystems towards addressing the complexity of the social context within which people make decisions (Karpouzoglou et al., 2016). The strength of adaptive governance is that it provides a theoretical lens for research that combines the analyses of novel government approaches and concepts such as adaptive capacity, collaboration, scaling, evolving knowledge, and learning feedbacks (Karpouzoglou et al., 2016).

Definition and Central Tenets

Adaptive governance theory is a growing area of scholarship and practice and has spurred much scholarly attention over the past two decades (Koontz et al., 2015; Plummer et al., 2013). One of the main components of adaptive governance theory is experimentation (Plummer et al., 2013). Allowing experimentation is essential for improving environmental governance (van der Molen et al., 2016). Based on these definitions, adaptive governance theory is appropriate to implementing and advancing restoration. One of the primary vital concepts of adaptive governance theory is institutional flexibility (Abrams et al., 2015).

Adaptive governance theory is often defined as a strategy for the governance of environmental systems that face complexity and uncertainty (Plummer et al., 2013). Complex issues and uncertainty surround the majority of ecological management but especially restoration projects. This type of governance links individuals, organizations, agencies, and institutions at multiple organizational levels, similar to collaborative governance, but its focus is on iterative experimentation and learning, and perpetual collaboration (Folke et al., 2005). Adaptive governance theory has distinguished itself by expanding the focus from just the management of ecosystems toward approaches that address the complexity of environmental issues in the broader social context (Karpouzoglou et al., 2016). It is becoming recognized in the restoration field that adaptive forms of experimentation and governance are needed to resolve prolonged resource challenges and to accomplish restoration goals (Gunderson & Light, 2006).

In 2005, Folke et al. outlined four important interacting aspects of adaptive governance in complex social-ecological systems in their paper “Adaptive Governance of Social-Ecological

Systems." This is one of the most cited papers in the field of adaptive governance, and these four aspects have become foundational to the field (Table 1).

Table 1

Four Aspects of Adaptive Governance (Folke et al., 2005)

Aspects of Adaptive Governance	Explanation
Build knowledge and understanding of resource and ecosystem dynamics	Detecting and responding to environmental feedback in a way that contributes to resilience requires ecological knowledge and understanding of the specific ecosystem processes and functions.
Feed ecological knowledge into adaptive management practices	Successful management is characterized by continuous testing, monitoring, and reevaluation to enhance adaptive responses, acknowledging the inherent uncertainty in complex systems.
Support flexible institutions and multilevel governance systems	The adaptive governance framework is organized through adaptive co-management. The dynamic learning characteristic of adaptive management is combined with the multilevel linkage characteristic of co-management.
Deal with external perturbations, uncertainty, and surprise	It is not sufficient for a well-functioning multilevel governance system to be in tune with the dynamics of the ecosystems under management

Adaptive governance of social-ecological systems depends on adaptive institutions; the literature discusses this, but no widely accepted explanation exists (Koontz et al., 2015). There can be a fair amount of confusion when talking about the terminology of adaptive governance, primarily due to a lack of consistency in the language used. There is also a lack of consistency when describing components of adaptive governance. Concepts described as components of adaptive governance by some scholars are included as variables needed to promote adaptive governance by other scholars (Koontz et al., 2015). This confusion adds to misunderstandings associated with adaptive governance and suggests that the theory is inappropriate for real-world application.

In "The Struggle to Govern the Commons," Dietz et al. (2003) proposes the criteria required for adaptive governance. The requirements include comprehensive dialogue between resource users that is layered, redundant, and complex; a mix of institutional types; and institutions designed to facilitate experimentation, learning, and change (Dietz et al., 2003). Another article, "Adaptive Management and Adaptive Governance in the Everglades Ecosystem," published a few years later by Gunderson and Light (2006), outlines the critical factors of adaptive governance as effective leadership, diversity, competency, and timing. The lists of criteria and necessary elements are so different that it is almost impossible to compare them, but it does not mean that they are incompatible.

In "A Decade of Adaptive Governance Scholarship: Synthesis and Future Directions," Chaffin et al. (2014) state that adaptive governance should do five things: provide information (scientific & local); deal with conflict; induce rule compliance; provide infrastructure; and be prepared for change. These five attributes provide the groundwork for adaptive governance. How do we get to a place where these attributes can be implemented when the starting point is at the other end of the spectrum? Chaffin et al. also suggest that Adaptive Governance cannot be reduced to a list of specific prescriptions but is context- and case-dependent and, thus, is a pattern of practices (Chaffin et al., 2014).

Dietz et al. (2003) also mentions the importance of learning as part of adaptive governance theory. In "Adaptive Co-Management and the Paradox of Learning," Armitage et al. (2008) expand on the need for learning and state that it is not enough to say that learning is needed to institute adaptive governance. They indicate that specific attention to learning is required because there are many complex issues and challenges associated with learning in social-ecological systems (Armitage et al., 2008). In most instances, you can link learning, as Dietz et al. (2003) and Armitage et al. (2008) explained, with the experimentation mentioned in the earlier definitions of adaptive governance. Experimentation is an example of learning in the scientific community.

Bridging organizations, enabling legislation, and government policies can also contribute to the success of an adaptive governance framework; governance creates a vision, and management actualizes the vision (Garmestani & Benson, 2013). Bridging organizations also link and facilitate the coordination of tasks, trust building, and social learning required to assist with solving social-ecological problems; they provide expert information and opinions to decision-makers (Kowalski & Jenkins, 2015).

For the purposes of this research, adaptive governance is a governance structure that supports perpetual collaboration, flexible institutions, and experimentation/learning, facilitates the flow of information and ideas through all phases and levels of the project/governance structure, and uses knowledge and understanding of the ecosystem to address uncertainties and outside influences.

Conceptual Framework

The conceptual framework for this research centers around the United States Army Corps of Engineers (USACE) regulatory “404” permit process,[1] which provides the background for discussing large-scale ecosystem restoration efforts. The U.S. Army Corps of Engineers has regulated activities in the nation’s waters since 1890. Until the 1960s, the primary purpose of the

[1] This could be a series of permits, not necessarily one permit.

regulatory program was to protect navigation. Since then, new laws and court decisions have given the Corps the regulatory authority to protect the nation's waters' physical, chemical, and biological integrity. Therefore, the current regulatory program considers the public interest in protecting and using water resources. The following laws define the regulatory authorities and responsibilities of the Corps of Engineers: Section 9 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401) authorizes the Corps to regulate the construction of any dam or dike across navigable waters of the United States. Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) authorizes the Corps to regulate specific structures or work in or affecting navigable waters of the United States. Section 404 of the Clean Water Act (33 U.S.C. 1344) authorizes the Corps to regulate the discharge of dredged or fill material into waters of the United States. Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1413) authorizes the Corps of Engineers to regulate the transportation of dredged material for disposal in the ocean. The Corps also coordinates compliance with related federal laws. These include the National Environmental Policy Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Deepwater Port Act, the Federal Power Act, the Marine Mammal Protection Act, the Wild and Scenic Rivers Act, the National Fishing Enhancement Act, the Magnuson-Stevens Fishery Conversation and Management Act, the National Flood Insurance Act of 1968 (as amended), and Executive Order 11988 on Flood Management.

The 404-permit process consists of multiple steps involving the applicant, the permitting agency, the public and private organizations, and different levels of government. This conceptual framework focuses on the most common authorization from the USACE for large-scale ecosystem restoration projects, which is the standard 404 permit. Three main actions are involved in evaluating individual project-specific applications: pre-application conference; project review; and decision-making (U. S. Army Corps of Engineers, n.d.). Table 2 details the 14-step process that comprises the three main actions the USACE uses to evaluate a typical standard application. It is essential to note the use of the term "typical." The guidance the USACE provides does not define "typical"; therefore, it is difficult for applicants to know if their project will follow the standard application process.

Table 2

USACE Permit Process Steps

Order	Process Step
1	Pre-Application Conference • is not a requirement. • are recommended for large projects. • can be held by request of the applicant. • usually held between the applicant, USACE, and interested resource agencies. The pre-application process intends to: • provide the applicant with a preliminary assessment of the feasibility of the proposed project. • to discuss opportunities to avoid and minimize the impacts of the project. • to inform the applicant of the factors the USACE considers in its decision-making.
2	Applicant submits ENG Form 4345 –Note this is a standard application for all types of projects. The project can be a parking lot or a large-scale ecosystem restoration project; the same information is required.
3	USACE receives an application and assigns the identification number and project manager. – Different USACE districts have different criteria for receiving permit applications. Processing times on average, individual permit decisions are made within two to three months from receipt of a complete application. In emergencies, decisions can be made in a matter of hours or days. Decisions on authorizing activities by general permits are made within three weeks, on average.
4	USACE notifies the applicant if additional information is required. - This step can be repeated multiple times if necessary.

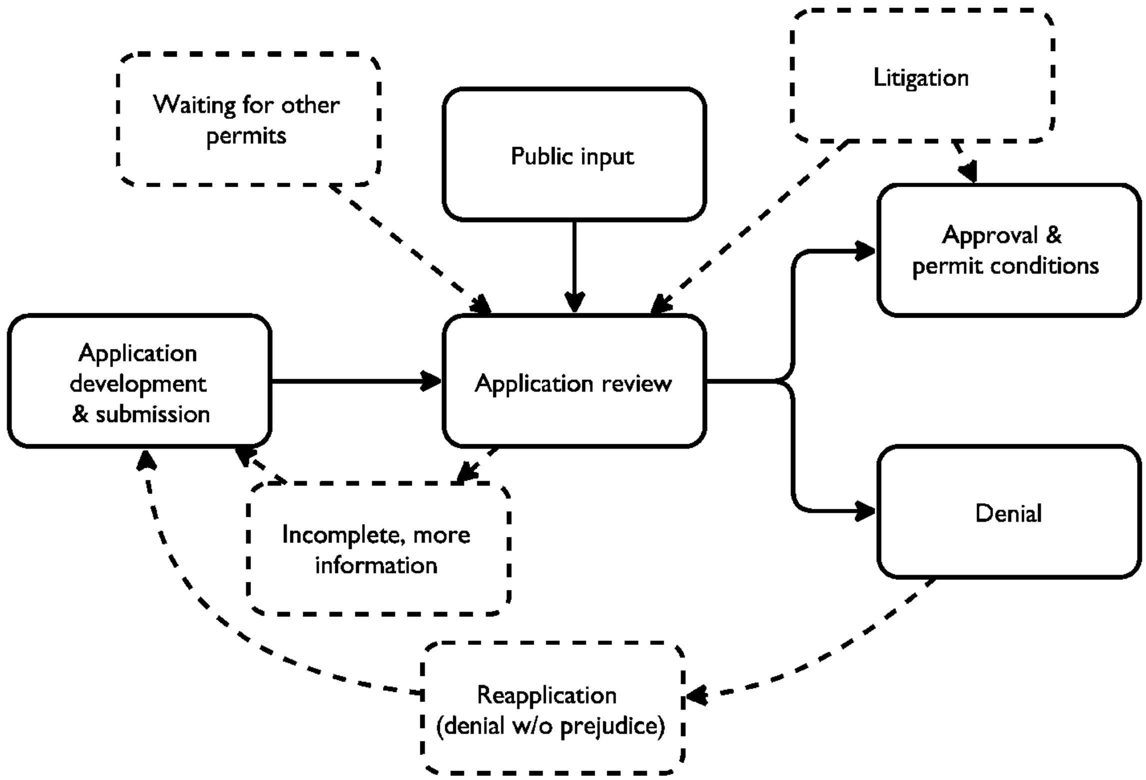
Order	Process Step
5	USACE issues public notice within 15 days of complete application. Public involvement includes public notices and public hearings. The public notice is the primary method of advising all interested parties of a proposal. It is also used to solicit comments and information necessary to evaluate the activity's beneficial and detrimental impacts on the public interest. A public hearing is held when the district engineer determines that a public hearing is necessary to decide on a permit application. A public notice is issued to announce the time and date of the public hearing.
6	Public notice comment period 15-30 days depending upon the activity.
7	Applicant responds to comments received during the public notice.
8	USACE may ask applicant for additional information to assess environmental impacts or resolve public interest concerns; there is no limit on what additional information can be requested.
9	USACE considers all comments and applicants' responses, including any proposed modifications to the project. USACE may discuss modifications with state and federal agencies and interested parties.
10	Public Hearing is held if necessary.
11	USACE conducts public interest review and evaluation, public interest review is the main framework for the overall evaluation of projects. Requires the careful weighing of all public interest factors relevant to each particular permit application. Used to evaluate applications under all authorities administered by the Corps. During the review of a permit application, the Corps evaluates the following public interest review factors: • Conservation • Economics • Aesthetics • General environmental concerns • Wetlands • Historic properties • Fish and wildlife values • Flood hazards • Floodplain values • Land use • Navigation • Shore erosion and accretion • Recreation • Water supply and conservation

Order	Process Step
	• Water quality • Energy needs • Safety • Food and fiber production • Mineral needs • Considerations of property ownership • The needs and welfare of the people guidelines The Section 404(b)(1) guidelines are the criteria used to evaluate discharges of dredged or fill material into waters of the United States, including jurisdictional wetlands, under Section 404 of the Clean Water Act. Also, require the following determinations: (1) the project is the least environmentally damaging practicable alternative, (2) the project will not cause or contribute to the violation of applicable state or Federal laws, such as water quality standards or the Endangered Species Act, (3) the project will not result in significant degradation of waters of the United States, and (4) any appropriate and practicable steps have been taken to minimize the adverse impacts of the project on wetlands and other waters.
12	USACE makes a decision on the permit application and explains the decision in a decision document.
13	If USACE decides to issue a permit, a copy is sent to the applicant for signature, or the permit is denied.
14	If the applicant refuses to sign the permit, or if the permit is denied, the applicant can request an administrative appeal of the decision.

Figure 1 illustrates the typical permitting lifecycle, as defined by Ulibarri et al. (2017). The dotted lines and boxes are potential avenues but will not happen during every permit application process.

Figure 1

Typical Permitting Lifecycle (Ulibarri et al., 2017)



Research Questions

An overhaul of regulations is needed to prevent further hindrance of large-scale ecosystem restoration projects because they do not fit within the current environmental regulatory permitting requirements framework. My research explores the relationship between the current environmental permitting regulations and ecosystem restoration projects, focusing on restoration practitioners' and regulators' viewpoints on how the regulatory permitting process affects large-scale ecosystem restoration projects.

Two overarching questions frame this study:

1. What is the effect of the current federal regulatory permitting process on large-scale ecosystem restoration projects?

2. How can adaptive regulation be applied to improve the regulatory permitting process of large-scale ecosystem restoration projects?

Specific Research Questions

1. What do large-scale ecosystem restoration practitioners and regulators think are the impacts of the regulatory permitting process on restoration projects?
2. What are the benefits and challenges of implementing adaptive regulation in the regulatory permitting process of large-scale ecosystem restoration projects?
3. How can adaptive regulation be implemented best to facilitate the permitting process of large-scale ecosystem restoration projects?

I hypothesize that the implementation of adaptive regulation techniques into the regulatory permitting process of large-scale ecosystem restoration projects will result in less time and money spent on permitting, as well as more realistic outcomes that are not based on expectations set by regulatory requirements but on outcomes that can be achieved and benefit the ecosystem being restored. I examine the range of perspectives by conducting a Q methodology study.

CHAPTER II: LITERATURE REVIEW

The literature review is divided by the research questions they support, including defining restoration, governance, environmental governance, governance structures, governance structures utilized by LSER, the relationship between governance and restoration outcomes, adaptive governance, and adaptive regulation. These topics provide an overview of the information needed to answer my research questions.

What is the Effect of the Current Federal Regulatory Permitting Process on Large-Scale Ecosystem Restoration Projects?

Governance of Large-Scale Ecosystem Restoration Programs

It is important to define several pertinent terms associated with governance, restoration, and LSER. Ensuring terms are used consistently within restoration is paramount. Those terms are restoration, large-scale ecosystem restoration, governance, environmental governance, and ecosystem management. These terms are used inconsistently in the literature, and in some instances interchangeably. Using terms interchangeably or inconsistently adds an unnecessary layer of confusion when discussing complicated scientific ideas. In addition to identifying and defining key terms, I also discuss the relationship between governance and restoration outcomes and the types of governance structures currently utilized by LSER programs.

Restoration Defined

The term "restoration" frequently appears in ecological documents but is poorly defined (Miller & Hobbs, 2007). Some definitions are straightforward-ecosystem restoration refers to activities designed to restore ecosystems to an improved condition (Baird, 2005). Other definitions are more inclusive, stressing that ecosystem restoration includes repairing degraded ecosystems while addressing the related policies, stakeholder groups, and the socioeconomic and political setting (Petursdottir et al., 2013). The debate surrounding the definition of restoration focuses on whether the scientific aspect should be the only focus. There are concerns about science-focused restoration that can be detrimental to other aspects of restoration (Higgs, 2005), (Temperton, 2007). The problem with science-focused restoration is that it can devalue restoration's social dimensions, including public participation.

Therefore I've used the Society of Ecological Restoration definition of restoration as "the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed" (Society of Ecological Restoration, Science & Policy Working Group, 2004). While this definition does not explicitly discuss the social, political, or economic aspects of restoration, I believe these aspects are implied in "the process of assisting" part of the definition. The Society of Ecological Restoration definition also is not limited to a specific list of aspects since it doesn't call them out. Not listing the particular aspects in the definition allows that definition to be flexible and versatile as times and focuses evolve.

Large-Scale Ecosystem Restoration

Ecosystem restoration has become a central activity for natural resource management agencies throughout the United States (Ulrich, 2012). LSER is among the fastest-growing and most challenging fields (Ulrich, 2012). It's a cooperative approach to planning and implementing large-scale projects primarily focused on significantly restoring natural ecosystems (Daoust et al., 2014). There are four key aspects of LSER (Table 3).

Table 3

Key Aspects of Large-Scale of Ecosystem Restoration Projects (Daoust et al., 2014)

Key Aspects	Description
Restoration	Undertake significant restoration of natural ecosystems.
Large-Scale & Long-Term	Identify a long-term vision and practice integrated planning and management across a large contiguous area.
Engagement	Actively seek engagement and participation from a wide range of stakeholders.
Adaptive Management	Adopt an adaptive approach to changing circumstances, new information, and lessons learned.

The degree to which these aspects are present in restoration projects varies. The main challenges for LSER projects:

1. May address complex ecosystems.
2. Must bring together stakeholder interests with little in common to solve problems.
3. Have a flexible definition of restoration.
4. Must achieve goals that consider scientific uncertainty.
5. Acknowledge that funding is unpredictable.
6. Require a governance structure allowing collaboration, learning, and achieving restoration outcomes. (Ulrich, 2012)

Today's large-scale ecosystem restoration issues are multi-jurisdictional, multifaceted, intergenerational, and interconnected. They cannot be adequately solved nor sufficiently understood unless the scientific community embodies a way of thinking, planning, and implementing that additionally and effectively engages these challenges (Daoust et al., 2014).

Governance

In simplest terms, governance is the action or manner of governing. Governance involves more than government agencies; it includes decision-makers at all levels-government, business, property owners, and special interest groups, to name a few. Governance also encompasses the relationships between government and society that include actors from other outside governments in the decision-making processes (Cosens et al., 2018; Jetoo, 2018). The definition of governance I'm using focuses on the relationships between government and society that are needed to make decisions.

Environmental Governance

Environmental governance has been defined in several ways; one definition explains it as a negotiation focused on changes in knowledge, institutions, decision-making, or behaviors related to the environment (Mansourian et al., 2014). It's also a term used to describe human approaches to managing natural resources and systems (UNDP et al., 2003). In short, it's how we make environmental decisions and who is involved in making those decisions (UNDP et al., 2003). It provides a framework for establishing who is responsible for ecological decision-making, how they wield power, and how they are held accountable (UNDP et al., 2003). It also establishes a framework for developing roles and responsibilities.

Lemos and Agrawal (2006) define environmental governance as a set of regulatory processes, mechanisms, and organizations through which political actors influence environmental actions and outcomes. While this definition appears at first glance to be comprehensive, it neglects to include additional stakeholders/actors that play a part in environmental governance. In their article titled, "Environmental Governance," Lemos and Agrawal include other actors such as communities, NGOs, and businesses as integral parts of environmental governance but still exclude them from the basis of their environmental governance definition. It is difficult to find a definition encompassing all aspects of environmental governance because the definition is based partially on each project's unique situation. I use the definition of environmental governance by Lemos and Agrawal (2006) in my research: "a set of regulatory processes, mechanisms, and organizations through which political actors, governments, and stakeholders influence environmental actions and outcomes."

I also include a definition for ecosystem management since the term is often used in the literature related to environmental governance. Ecosystem management integrates goals for management that cover social, economic, and ecological factors (Behnken et al., 2016).

Governance and Restoration Outcomes

Why is it essential to understand the governance of LSER? The types of governance established for LSER have the opportunity to affect restoration outcomes—the need for specific governance that encompasses the principles that are inherent in the restoration process. A well-thought-out governance system with effective and organized regulations, policies, and incentives is necessary for ecological restoration projects (Petursdottir et al., 2013). This statement is even more accurate for LSER projects. Unfortunately, what indicates "good governance" isn't always apparent to managers and scientists dealing with complex, real-world restoration problems (Armitage et al., 2012). Governance and multi-layered management provide a solid framework for conflict resolution between restoration practitioners and stakeholder groups (Memon & Wilson, 2007). Successful restoration projects require interdisciplinary cooperative governance that includes multiple stakeholders' perspectives, ideas, and skills (Guariguata & Brancalion, 2014). One possible way of encouraging effective governance in ecological restoration is to include it in the governance and policy discussion. This introduces practitioners, stakeholders, and the public to the governance and policy platform. Including ecological restoration in the governance and policy discussion also demonstrates the applicability of restoration research to policy issues, conveys restoration findings to policymakers, provides linkages between policy problems and solutions, and includes actionable messages in ecological restoration research (Jørgensen et al., 2014). Policymakers could develop policies incorporating the latest restoration science, include ecological restoration in policy discussions, and use restoration to support specific legislation when possible (Baker et al., 2014; Jørgensen et al., 2014) integrating the perspectives and efforts of policymakers and restoration scientists is the first step in the process of effective restoration governance.

When environmental governance is successful, it can result in an inclusive and productive process that promotes public participation, leading to better-informed and more creative solutions (Gerlak & Heikkila, 2006; Oppenheimer et al., 2015). But, effective governance is challenged by confusion associated with terms and definitions, inconsistent legal frameworks, including federal, state, and local, and overall perception of projects by the public and policymakers (Guariguata & Brancalion, 2014). Literature supports the idea that effective governance can contribute to the success of restoration projects. It is documented that not only is governance a vital factor contributing to the restriction of successful restoration projects, but also ineffective governance can hinder the progress of restoration projects (Mansourian et al., 2014; Petursdottir et al., 2013). It has become evident that many problems associated with restoration have to be attributed to governance failures; this has shifted attention to improving restoration governance in a changing environment (Pahl-Wostl, 2009).

Governance Structures Being Utilized by LSER

There are numerous models of environmental governance. Most environmental governance structures are based on cooperation and polycentricity. Cooperative governance is exactly what it sounds like, multiple entities working together to solve problems. In cooperative governance, the entities work together to define roles and responsibilities and establish processes for setting goals and ensuring accountability (Joyal, n.d.). Polycentric governance is carried out by multiple governing bodies interacting together in a specific arena (Stockholm Resilience Centre, n.d.). Collaborative governance is the primary model of environmental governance implemented in LSER projects. Collaborative governance structures are based on the idea of bringing people together collaboratively in a constructive manner with pertinent information to create practical solutions (Gerlak & Heikkila, 2006). Two restoration projects that are good examples of collaborative governance structures are Coastal Louisiana Restoration and Missouri River Recovery Program (MRRP). MRRP has an implementation committee made up of federal, state, tribal and stakeholder representatives from the Missouri River basin that represent a range of interests. The committee is a collaborative forum for developing shared vision and a comprehensive plan, they provide guidance and recommendations for restoring the habitat of the river's threatened and endangered species while sustaining the river's many uses (Missouri River Recovery Implementation Committee, n.d.). The Coastal Louisiana restoration efforts are governed by the Coastal Protection and Restoration Authority (CPRA). CPRA leads a focused and coordinated effort on the coastal land loss crisis including all stakeholders: government, academia, non-governmental organizations, and citizens (Coastal Protection and Restoration Authority, 2013). CPRA builds inclusive collaborative partnerships to build a sustainable coast that protects communities, critical energy infrastructure, and natural resources (Coastal Protection and Restoration Authority, 2013).

Different perspectives and ideas provide enrichment to the collaborative process. Collaborative decisions are made using multiparty and multi-disciplinary problem-solving (Behnken et al., 2016). When collaborative governance is successful, it can result in an inclusive and productive process that promotes public participation, leading to better-informed and more creative solutions (Gerlak & Heikkila, 2006; Oppenheimer et al., 2015). Gerlak and Heikkila's (2006) idea is based on bringing people together constructively with pertinent information to create practical solutions. Restoration projects need interdisciplinary governance that includes multiple stakeholders' perspectives, ideas, and skills (Guariguata & Brancalion, 2014). Different perspectives and ideas provide enrichment to the collaborative process. Numerous factors contribute to the effectiveness of collaborative governance for ecological restoration. The diversity in background and interests of stakeholders make multiple areas of expertise available for restoration (Brancalion et al., 2013). Collaboration is commended for promoting the involvement of stakeholders, reducing conflict, and providing creative solutions to complex problems (Dutterer & Margerum, 2015). A slightly modified definition of collaborative governance is a governance system where multiple state and non-state representatives act in a formally organized, consensus-oriented, and deliberative collective decision-making process that strives to develop and implement management programs, policies, and plans (de Koning et al., 2017). Collaborative ecosystem management goes beyond "traditional" public involvement (Keough & Blahna, 2006). It happens early in the process before decisions are made, inclusive, interactive, and requires joint decisions (Keough & Blahna, 2006).

In theory and by definition, collaborative processes share power and responsibilities and make joint decisions amongst stakeholders. There is always one agency, usually a government agency, responsible for making the final decisions. An example of this is found in "Analyzing Collaborative Governance through Social Network Analysis: A Case Study of River Management along the Waal River in the Netherlands"; Fliervoet et al. (2016) discuss the government's role in collaborative governance. Their results found that while the different groups interested in Waal River are connected, the governmental organizations still control and occupy central positions in the network. The data they collected challenges the assumed shift from hierarchical, command, and control government to collaborative governance (Fliervoet et al., 2016). What the data ultimately show is that there is a collaboration between the different interested groups. However, there is also still a significant amount of hierarchical government involved. Fliervoet et al. propose two exciting questions that warrant additional research: (a) is it necessarily bad that there is still a significant amount of hierarchical government involved in the collaborative process; and (b) can or should the hybrid collaborative/hierarchical process could be any different?

Factors that limit the success of collaboration include fragmentation of ownership and responsibility for the management among the various organizations (Behnken et al., 2016). There is also debate about the effectiveness of collaborative governance for restoration projects. Some critics believe collaborative governance in restoration projects has been inadequate. One example of this criticism states that restoration by committee or collaboration usually results in projects that are either less successful than expected or over-designed by engineers (Mitsch, 2014). Collaborative governance has recently garnered criticism, suggesting it produces the lowest common denominator responses and suboptimum out comes (Dutterer & Margerum, 2015). Another aspect affecting collaborative environmental governance is the devolution of decision-making authority (Behnken et al., 2016). This is caused by lower administrative levels implementing responsibilities.

Collaborative governance is particularly challenging because the structure is based on poor policies and legislation (Mansourian et al., 2014). It is my experience that governance structures without a strong base of common policies and legislation are prone to be ineffective. While having multiple stakeholders is a necessary part of collaborative governance, having those various stakeholders is often responsible for complicating effective governance (Gerlak & Heikkila, 2006; Mansourian et al., 2014). Conflicting agency goals and missions, stringent administrative and legal procedures, and limited financial resources contribute to ineffective collaborative governance (Gerlak & Heikkila, 2006). There is a debate about the effectiveness of collaborative governance within the environmental arena, especially regarding ecosystem restoration programs (Gerlak & Heikkila, 2006). Because governance issues can play a role in the success of restoration projects, It's essential to question whether the current governance structures are sufficient or if we should pursue new approaches (Guariguata & Brancalion, 2014). In most instances, collaboration isn't enough, and a transition to adaptive governance is needed. Adaptive governance moves beyond public involvement to clearly address uncertainties while incorporating a diversity of knowledge and institutions across scales to enhance ecosystem management (Behnken et al., 2016).

One of the main differences between collaborative governance and adaptive governance lies in the bodies of literature in which they are often discussed or advanced. Collaborative governance is discussed most often in public policy literature and mainly focuses on how to bring state and non-state entities together on policy and management decisions. Adaptive

Governance is most often discussed in natural resource literature and focuses on more diverse actors across multiple scales making decisions about dynamic changing systems (Brown et al., 2016).

The Need for a New Approach–Impediments to LSER

The impediments to conducting effective LSER outline the need for a new approach to implementing LSER. The main topics include current regulations, lack of information and understanding, lack of guidance for practitioners, current regulations do not use the latest science, efficient and effective environmental permitting process, and confusion in terminology.

Current Regulations Anticipate Results

Wetland regulations often mandate specific results and require projects to achieve those results (Owen, 2009). In the case of ecological restoration projects, it is not always possible for the results mandated by wetland regulations to be achieved (Smith & Fernald, 2006).

It is difficult to take an ecosystem needing restoration and ensure it will meet all the regulatory requirements during the restoration process. For example, during the Picayune Strand project when the three large canals were being plugged in preparation for the return of overland sheet flow the project area wasn't meeting all of the environmental requirements. Some believe there is the possibility that restoration projects will cause negative impacts and, therefore, should follow and meet all regulatory requirements (Buckley & Crone, 2008). Even though this possibility exists, it is unlikely that the negative impacts would outweigh the benefits of the restoration project. However, it is possible there could be specific areas that have net negative impacts. In addition, some large-scale ecosystem restoration projects must make trade-off decisions. Trade-offs occur when the provision of one ecosystem services is reduced to increase the use of another (Rodriguez et al., 2006).

Lack of Information and Understanding

State and federal government agencies spend millions annually on LSER projects. Many of these projects are delayed for extended periods while agency policy and regulatory decisions are made, which can further impair ecosystem function and restoration. There are costs associated with these delays, but there are also costs associated with providing the information necessary to make informed regulatory decisions. Environmental policies and regulations assume that information is easy to find and inexpensive to obtain, but it is neither (Karkkainen, 2008). Because there are so many uncertainties associated with ecological restoration projects, regulators require increasingly more documentation and information before making regulatory decisions. This is a problem for restoration projects because these actions drive up the cost of already expensive projects.

Lack of Guidance for Practitioners

Restoration is a practitioner-focused field relying on scientifically based fieldwork and analysis with collaborative decision making. This is due to the uniqueness of restoration projects, which makes them different from other scientific endeavors. Because of this individuality, there is a need for procedural guidance for restoration practitioners. The adaptive governance body of literature lacks this guidance, and therefore the theory is disjointed from the practice. We need to understand the core issues in the adaptive governance and management discourse, so it is adequately addressed in a manner suitable for the practitioner community (Hill Clarvis et al., 2014). In "Science Driven Restoration: A Square Grid on a Round Earth?" Cabin (2007) captures the essence of how a collaboration between science and restoration should function. Understanding when academic science can directly assist restoration projects and practitioners could lead to better science, better restoration, and better. During my time working in the restoration field, it is evident that practitioners need to be included in the process.

Environmental Laws and Regulations Do Not Incorporate the Latest Science

Environmental regulations have not fully utilized the plethora of scientific ideas and data developed worldwide (Angelo, 2008). The gap between research and the implementation of findings is vast. Practitioners in the field do not often have the luxury of being able to test hypotheses during real-world applications. Usually, there are budget and schedule constraints that prevent the use of experimental data.

There are numerous federal requirements for assessing the environmental impact of federally funded projects. Most LSER projects are partially, if not entirely, federally funded and therefore must fulfill multiple federal requirements. The National Environmental Policy Act (NEPA) is a primary policy regulation used to evaluate the environmental impacts of federally funded projects. NEPA has three different levels of review and implementation: Categorical Exclusions (CX); Environmental Assessments (EA); and Environmental Impact Statements (EIS). CXs are projects that are excluded from NEPA analysis. Each federal agency has a list of CXs for work/projects that are common to the agency and have been evaluated for environmental concerns. EAs are conducted when the agency responsible for the work is unsure whether the impacts associated with the project will be significant. EISs are conducted when there is the knowledge that the impacts associated with a project will be significant. NEPA was developed to evaluate new projects and is generally effective in fulfilling its goal of avoiding environmental degradation related to those projects (Smith & Fernald, 2006). It is more difficult to apply NEPA to restoration projects because of the challenges of evaluating the impacts of the restoration process on a degraded ecosystem. The NEPA analysis includes both positive and negative impacts. Again, we find ourselves asking if the actions taken to restore an ecosystem should be considered impacts. This is one example of how environmental laws and regulations don't incorporate the latest science. Another example is the wetlands environmental permitting process. The wetland permitting process was established to offset the impacts to wetlands. The process hasn't changed in years and doesn't take the latest science into consideration. The literature supports the idea that an inquiry about transitioning from adaptive governance to adaptive regulation is warranted.

Efficient Environmental Permitting Processes

In the article "A Framework for Building Efficient Environmental Permitting Processes," Ulibarri et al. (2017) indicated that there are substantial areas where data are lacking associated with permitting. Interviews with participants involved in current permitting processes revealed elements contributing to permit decision delays (Ulibarri et al., 2017). This study focused on thirteen interviews associated with four water projects within the State of California. All four were environmentally beneficial projects building/restoring marshes, habitats, or wetlands. The authors determined that even though the permitting process in these cases is essential for protecting the environment and mitigating impacts on endangered species, the regulatory environmental permitting process is widely recognized as inefficient and marred with delays (Ulibarri et al., 2017).

Any new construction proposal requires authorization in the form of environmental permits. Permits play a significant role in regulating ecological impacts, and they contribute to preventing harmful projects from going forward and setting limits on potential project damages (Ulibarri et al., 2017). Even though there is debate about whether permits are the most effective way to ensure environmental protection, they remain an essential and widely used regulatory tool for holding projects accountable for ecological impacts (Ulibarri et al., 2017). At the same time, it is recognized that permitting processes are prone to inefficiencies. Permits often take much longer to be issued than the agency timelines outline. Permitting delays can drive up the staff, resources, and transaction costs for both the applicant and the permitting agency and postpone the realization of the project's social, economic, or environmental benefits (Ulibarri et al., 2017). The delay is more prevalent in complex tasks and projects with innovative approaches. Despite the role permitting plays in environmental regulation, there is minimal research or theory regarding the efficiency and efficacy of permitting processes (Ulibarri et al., 2017). Inefficiencies in the permitting process cause negative consequences for all parties involved-the permitting agency, the project developer, and the public. Permitting efficiency is intricately intertwined with effectiveness, i.e., the extent to which issued permits adequately meet agency mandates and protect the resource under its jurisdiction (Ulibarri et al., 2017).

There are substantial areas in the policy arena where little is known about permitting (Ulibarri et al., 2017). The permit process in California is recognized to have particularly extreme levels of delay (Ulibarri et al., 2017), which are related to the interactions between environmental activism, innovation, and regulatory inflexibility. This is important because the State of California is seen as an innovator where new policies and technologies are often adopted by other states and at the national level (Ulibarri et al., 2017).

Several factors affect the efficiency of each phase of the permitting process: regulatory regime-which is defined as characteristics of the regulatory setting; application process-the actual requirements of the application development, submission, and review; political, social, and environmental context-the location in which the project is being developed and permitted; project characteristics-what type of project is being permitted and the resources it affects; and organizational features-this includes the culture, practices, knowledge, and resources held by the permitting agencies and the applicant. To make the permitting process more efficient without sacrificing effectiveness, we should focus on reducing uncertainty, lowering transaction costs, and improving negotiation and compromise. Adaptive regulation, which is a subset of adaptive governance, has the potential to address all the efficient concerns.

Confusion in Terminology

Ecological restoration projects often use terms that are technical and specific to restoration science, which can confuse a restoration project's true goal. For collaboration to work and restoration to succeed, a new kind of language is needed, one that more clearly communicates the intended purpose of ecological restoration (Collins & Brown, 2008). LSER projects are a unique class of projects that do not always fit within the current framework of environmental regulations (Smith & Fernald, 2006).

Confusion in the terminology of adaptive governance is a big challenge to implementing adaptive governance in the field. If we can't be consistent with the language, how can we ensure we consistently implement adaptive governance techniques in our restoration projects? This does not mean we should have a prescribed or uniform approach to adaptive governance implementation; it does mean we should at least all speak the same language, so our comparisons have relevant meaning. Until practitioners, researchers, and policy creators use consistent terminology, efficient and effective implementation of adaptive governance will continue to be hindered.

In "Disentangling Scale Approaches in Governance Research: Comparing Monocentric, Multilevel and Adaptive Governance," Termeer et al. (2010) use the terms adaptive management and adaptive governance interchangeably. Specifically, they say that adaptive management has evolved into a broader interdisciplinary field known as adaptive governance. I can't entirely agree with this concept. Adaptive management and adaptive governance are separate yet related concepts, especially as related to ecosystem restoration. Restoration practitioners have used the term adaptive management for a long time (Daoust et al., 2014). In ecosystem restoration, adaptive management focuses on developing a structured method to address uncertainties, test hypotheses, and connect science and decision-making (Daoust et al., 2014). The adaptive management process allows for adjustments to be made throughout the implementation of the restoration, which overall improves the probability of success (Daoust et al., 2014). To this point, the discussion has been about implementing adaptive management under existing regulatory structures and organizational structures that are interagency and complicated (Daoust et al., 2014). It is time to find a different approach to adaptive management.

Adaptive governance draws inspiration from the theoretical lens of adaptive management and collaborative ecosystem management, but it's also different from both (Karpouzoglou et al., 2016). It's distinguishing itself by expanding the focus from just the management of ecosystems toward approaches that address the complexity of environmental issues in the broader social context (Karpouzoglou et al., 2016). In a way, adaptive governance depends on adaptive management (Garmestani & Benson, 2013). It is set up to address the adaptive management of problems in multiple domains (Gunderson & Light, 2006). In a perfect world, governance would create a vision, and management would make that vision a reality (Garmestani & Benson, 2013). Adaptive governance provides a set of composite policies and solutions that integrate responses from different domains (Gunderson & Light, 2006).

Using the terms adaptive governance and adaptive management interchangeably is not only misleading, but it is also incorrect. Adaptive management and adaptive governance are related yet separate concepts. The restoration field has used adaptive management for many years, but there is still confusion amongst some practitioners (Daoust et al., 2014). I spoke with several restoration practitioners and was surprised to hear about the interchangeable use of adaptive governance and adaptive management. After further discussion, it became apparent that these practitioners used adaptive management as an all-encompassing term, including the concepts usually identified with adaptive governance. As a part of adaptive governance, adaptive management continuously monitors to gain knowledge and improve strategies for complex social-ecological systems (van Buuren et al., 2015). This type of process is based on learning and experimentation. Adaptive governance also uses adaptive management as the mechanism for learning and experimentation.

Adaptive Governance vs. Adaptive Management

This section discusses the differences between adaptive governance and adaptive management, including how they are portrayed in the LSER literature. It is essential to differentiate between the two terms; they are not interchangeable. Adaptive management is defined as a framework including a flexible decision-making process for the ongoing acquisition of knowledge through monitoring and evaluation, leading to continuous improvements (Nagarkar & Raulund-Rasmussen, 2016). In "What's New in Adaptive Management and Restoration of Coast and Estuaries," Zedler (2017) describes the type of governance structure needed for successful adaptive management. Zedler explains that the governance structure should facilitate the flow of scientific information and ideas in all phases. In addition to the flow of scientific knowledge in all project phases, the information should flow in all directions. This means information and ideas should be developed and shared with all participants. One of the things adaptive governance seeks to address are the legal and institutional system limitations

(DeCaro et al., 2017). The concept of adaptive management has a significant body of literature, but there is very little agreement on its definition. In 2012 a research article looked at more than 100 publications on adaptive management and found that 50% did not define the term (Hasselman, 2017).

Multiple definitions address adaptive management. In some instances, adaptive management is considered an environmental management approach based on learning by doing. In these situations, uncertainty, incomplete knowledge, and complexity of the problem are acknowledged, and the prescribed management actions are considered experiments (West et al., 2016). One of the main focuses of adaptive management is to enhance the resilience and flexibility of management systems to cope with uncertainty (Akamani, 2016).

There are two primary forms of adaptive management. Passive adaptive management uses historical data to develop a hypothesis and implement a preferred action. Active adaptive management defines competing ideas about the anticipated impacts of the management activities and designs management experiments to test the hypotheses (Nagarkar & Raulund-Rasmussen, 2016). In most instances, the generic term adaptive management explains both types.

How Can Adaptive Regulation be Applied to Improve the Regulatory Permitting Process for Large-Scale Ecosystem Restoration Projects?

Adaptive Regulation

Adaptive governance/regulation is a growing area of scholarship and practice that has spurred scholarly attention over the past two decades (Koontz et al., 2015 Plummer et al., 2013). One of the main attributes of adaptive governance/regulation is experimentation.

Since the mid-nineties, numerous scholars have argued that the regulatory process needs to be more adaptive (Bennear & Wiener, 2019). Adaptive Regulation replaces the one-time yes/no regulatory decision with multiple partial sequential decisions informed by monitoring and review (Bennear & Wiener, 2019). Adaptive regulation is “a structured regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis” (Bennear & Wiener, 2019). I employ this definition of adaptive regulation in my research. It is essential to differentiate between Adaptive regulation and Adaptive management, similar to the previous discussion on adaptive governance. Adaptive management is a systematic approach to improving resource management by learning from previous management outcomes (US Department of the Interior, n.d.), while adaptive regulation focuses specifically on the regulation and its adaptiveness. It is the regulation or policy that is adapting over time (Bennear & Wiener, 2019). Another way of describing adaptive regulation is “laws built to learn” (Bennear & Wiener, 2019).

There are four main components of regulation: the regulator, the target, the commands, and the consequences. The literature on regulations has focused on multiple ways to change the standard regulatory framework over time. A typical command and control regulation would consist of a government agency as the regulator, a specified target to reduce some social harm, a command to use a technology or process to meet the target, and a set of inspections, permit conditions, and penalties to ensure compliance. This standard regulatory framework doesn’t fit LSER projects.

This process doesn’t evaluate performance in terms of reducing social harm. Self-regulation and co-regulation are terms used to describe situations in which the industry works collaboratively with the government to develop regulations or where the industry serves as both the regulator and the regulated. Flexible (e.g., ‘adaptive’) regulation allows the regulated community the flexibility to determine how best to meet the target. This flexible, adaptive regulation is a good fit for LSER.

There are multiple variations within adaptive regulation, often referred to as a spectrum of adaptivity (Bennear & Wiener, 2019). The range includes four points: a one-time regulatory decision with no follow-up; a regulatory decision with a single follow-up evaluation; a regulatory decision with data collection and a single follow-up evaluation and a regulatory decision with planned ongoing monitoring, data collection, analysis, and periodic assessment of consequences (Bennear & Wiener, 2019). Discussing the spectrum of adaptivity is essential because it demonstrates that one size of adaptive regulation does not fit all situations. Adaptive regulation, in theory, also is not limited to environmental regulations. It is not specific to any industry or type of regulation. Adaptive regulation can be applied to any regulation genre, from safety regulations to the automobile industry. My research examines adaptive regulation from the perspective of large-scale ecosystem restoration projects. Two types of adaptive regulation are associated with how automatic the adaptations are; discretionary adaptive regulation requires direct action by a regulator, and automated adaptive regulation is established in rulemaking (Bennear & Wiener, 2019).

Benefits

The benefits of adaptive regulation for the environmental field are numerous. Environmental systems are regulated by static rules that do not incorporate the latest science. The introduction of adaptive regulation to the environmental field could be significant, especially in large-scale ecosystem restoration, where the systems are dynamic and complex. Adaptive regulation could also lessen public frustration over outdated and obsolete policies (Bennear & Wiener, 2019). The introduction of adaptive regulations could ease the initial adoption of policies in the future by having built-in time frames to re-evaluate the current policy and allow for policy revisions. There are also drawbacks to implementing adaptive regulations. The costs associated with data collection and the burden on those required to provide the data could be overwhelming (Bennear & Wiener, 2019). The need for common and consistent definitions of restoration and environmental governance is critical now more than ever: adaptive regulation encompasses these definitions and advances.

The Need for Integration of Ecological Restoration and Adaptive Governance/Regulation into Policy

Discussions of adaptive regulation primarily focus on abstract design principles and institutional arrangements suitable for implementation. Because of this, the associations between science and regulation and action/practitioners remain understudied (Wyborn, 2015). Adaptive regulation will not meet its aspirations of responding to social, ecological, and institutional changes unless there are strong connections between knowledge and action and science and policy (Wyborn, 2015). There is a growing need to integrate ecological restoration into legislative, regulatory, and planning frameworks and policies informed by science (Aronson & Alexander, 2013; Jørgensen et al., 2014). This integration aims to foster a connection between researchers and decision-makers on all levels, including local practitioners, regulatory agencies, and policymakers (Jørgensen et al., 2014). Policymakers generally draw on science in three ways: to identify new ideas, to identify solutions to problems, and to support established positions (Jørgensen et al., 2014). The first step in the process is to have policymakers and restoration scientists contribute to integrating ecological restoration into governance and policy. Adaptive regulation can be the framework for adapting policy decisions to the real world (Chaffin et al., 2014). This is also true for LSER.

Applied Use of Adaptive Regulation

Below I discuss adaptive regulation in the context of environmental issues and provide examples of natural resource management and LSER and the risks and opportunities associated with implementing adaptive governance in LSER projects.

Adaptive Regulation & LSER

There is sparse literature on how to apply adaptive regulation, and there is even less guidance on how to apply it to LSER. In this section, I evaluate applied adaptive regulation in other environmental fields and its implications for LSER.

"Barriers to Effective Eutrophication Governance: A Comparison of the Baltic Sea and North American Great Lakes" by Jetoo (2018) is a case study on the barriers to governance; it compares two projects, one in the Baltic Sea and one in the North American Great Lakes. In the article, Jetoo explains that the nature of natural resource management has led to an equally complex governance system, especially in a multilevel governance setting. The three main barriers to governance outlined by Jetoo are inadequate resources, lack of knowledge from other stakeholders, uncertainties, and incomplete information incorporated into models (Jetoo, 2018). At the same time, Jetoo doesn't specifically discuss a governance system that can address the three main barriers. Adaptive governance is a good candidate. As a result of this research, Jetoo offered a recommendation to conduct a thorough review of natural resource regulations that impact governance, focusing on strengthening and streamlining the process (Jetoo, 2018). While the focus of this case study was natural resource management, the three main barriers to governance outlined by Jetoo are also included in the barriers LSER faces. Jetoo's recommendation for a thorough review of regulations is also relevant to LSER.

In “Transforming (perceived) Rigidity in Environmental Law through adaptive governance: A Case of Endangered Species Act Implementation,” (Gosnell et al., 2017) review the Endangered Species Act (ESA) concerning Adaptive Governance/Regulation and discusses a case study of its implementation. The ESA is regularly perceived as a rigid environmental law that is viewed as a barrier to adaptive regulation and incapable of promoting the innovation and creativity required to resolve endangered species issues (Gosnell et al., 2017). Sometimes, the narrow solutions generated by the ESA can trigger innovation. In some cases, the threat of government involvement associated with the ESA can incentivize collaboration between resource users and land managers to prevent additional regulation (Gosnell et al., 2017). Because of this rigidity, there is a need for flexibility and adaptability within the ESA. The overall assessment of the ESA is that it promotes fragmented natural resource management that focuses on single species instead of the entire system. (Gosnell et al., 2017). One of the most common criticisms of the ESA is its lack of an integrated approach to regulation (Gosnell et al., 2017). The wetland permitting process also lacks an integrated approach. Adaptive regulation can be the missing piece of the puzzle that incorporates the integrating into these processes.

CHAPTER III: METHODOLOGICAL FRAMEWORK & APPROACH

This research evaluates practitioners' and permit writers' viewpoints on the effects of the permitting process on large-scale ecosystem restoration projects. Using the Q Methodology, I examine the relationship between large-scale ecosystem restoration projects and the wetland permitting process through the lens of the individual participants. Q methodology provides a clear and structured approach appropriate for soliciting and prioritizing participants' viewpoints on issues (Zabala et al., 2018).

Q Methodology

Q methodology first appeared in 1935 via a letter to the journal *Nature* authored by William Stephenson (Watts & Stenner, 2012). Q methodology is an adaptation of Charles Spearman's method of factor analysis. Factor analysis is a method that aims to reveal patterns of association between a series of measured variables (Watts & Stenner, 2012). R methodology is a generic name for methods that employ tests as variables and operate using people as the sample (Watts & Stenner, 2012). This is the exact opposite of the Q methodology. Q methodology is not a test of difference. It is designed to facilitate the expression of personal viewpoints. While R methodological factor analysis is focused on individual differences, Q methodology can be used as a generic name for any method that inverts the R methodological tradition by employing persons as its variables and tests, traits, or other items as its sample or population (Watts & Stenner, 2012). The sample population of my research are my statements.

Q methodology is also known as by-person factor analysis. It requires a new form of data derived when a sample or population of statements is measured or scaled relatively by a collection of individuals (Watts & Stenner, 2012). The ranking process is carried out from a first-person perspective using a new unit of quantification Stephenson referred to as psycho-logical significance (Watts & Stenner, 2012). This aligns with Stephenson's desire to focus on the whole aspects of people and identify those who resembled one another concerning their personality (Watts & Stenner, 2012). Stephenson told us that subjectivity is a behavior or activity best understood relative to its impact on the immediate environment (Watts & Stenner, 2012). With regards to my study, the subjectivity is the participants' impart on the statements. Performing a Q sort is a way of capturing subjectivity in a reliable and scientific way.

Reliability and validity, as understood in R methodology, do not apply to Q methodology. Q methodology expresses the viewpoints of its participants and therefore it is valid in the context of examining those viewpoints. This can be done by asking multiple participants to sort a set of items from a single, imposed, or primed viewpoint. It is the study of specifics, the viewpoints of specific people, specific groups, or the viewpoints at play within particular institutions.

Q methodology is designed to facilitate the expression of the participants' personal viewpoints rather than to test their differences (Watts & Stenner, 2012). Q methodology is an exploratory method that provides a clear and structured approach appropriate for soliciting participants' viewpoints on issues (Zabala et al., 2018). I suggest that the permitting process is negatively affecting large-scale ecosystem restoration projects. Q methodology allows me to elicit those personal opinions and viewpoints. Simply establishing the existence of a viewpoint can be powerful if it contradicts, undermines, or supports established preconceptions or questions our current treatment or professional practice in relation to that category (Watts & Stenner, 2012). In such cases, a single viewpoint might realign and redefine how we understand and operate (Watts & Stenner, 2012).

A Q study has five stages: research design, data collection, analysis, results, and interpretation (Zabala et al., 2018). Each Q statement is an expression of an individual opinion.

Q participants are people with different opinions and perspectives who are asked to express opinions about the Q statements by sorting them, i.e., “doing a Q sort” (Zabala et al., 2018). These are analyzed using the statistical techniques of correlation and factor analysis to reveal patterns in the way people associate opinions.

The Q method is not the only research technique that can reveal social perspectives. Q methodology fits under the broad umbrella of discourse analysis techniques (Webler et al., 2009). Discourse analysis is a large category of methods used to analyze texts for underlying patterns or meanings (Webler et al., 2009). An advantage the Q method has over other forms of discourse analysis is the direct comparison of participants’ responses (Webler et al., 2009). This direct comparison is available because everyone is reacting to the same set of Q statements, which is not usually the case in other kinds of qualitative discourse analysis (Webler et al., 2009). This is why I chose Q methodology as a primary method for my study.

My original concept was to evaluate how the permitting process could be more accommodating for large-scale ecosystem restoration projects. While developing a strategy to complete the evaluation, I realized I needed additional information from other practitioners and permit writers to have meaningful results. Q methodology allowed me to elicit those personal opinions and viewpoints. Q methodology is designed to facilitate the expression of the participants' viewpoints rather than to test their differences (Watts & Stenner, 2012).

Research Design

This research used the Q method to explore individuals’ perspectives about the relationship between the regulatory permitting process and large-scale ecosystem restoration projects. The terms specific to Q methodology are defined here. The Sorting question is: “What current regulatory process elements in the USA are helpful to achieving timely and effective large-scale ecosystem restoration, and/or what changes could be implemented to enhance the regulatory process?" The scale used is from (6+) strong support for, to (6-) weak or no support for the approach. The first step of the Q method process is to develop a concourse (Watts & Stenner, 2012).

Concourse

A concourse is a list reflecting all the potential opinions around the topic of study for a Q methodology study (Zabala et al., 2018). Items may be drawn from sources such as written material, interviews, or expert consultation (Zabala et al., 2018). For this study, the concourse was based on the literature review I conducted and my discussions with experts in the field. I reviewed 30 articles on multiple aspects of environmental permitting. There isn't much literature on the relationship between ecosystem restoration projects and the wetland permitting process. I was able to identify themes from the entire set of articles that are relevant to ecosystem restoration to include in my discussions with field personnel. Those themes are time to complete the application process, time to receive a permit, additional requests for information, the cost of information, applicability to projects, flexibility, current regulatory framework, up to date science, efficient decision making, delays in issuing permits, cost effective process, and regulatory agencies have adequate resources, expertise, and experience. I lead six individual discussions, three with permit writers and three with practitioners. All six contributors have at minimum 10 years of experience and have worked on at least two restoration projects/permits. During these discussions I gave a short synopsis about the articles I read and the general idea for my research. After all discussions were held, I used the notes to develop 52 statements encompassing the themes from the articles and discussion notes. As a result, these 52 original statements were developed as the concourse (Table 4). The concourse is essential because this is where the Q statements will be selected. Consequently, the researcher's influence is minimized in the act of selecting the statements. Once the concourse is developed the Q-set can be selected.

Table 4

Concourse Statements

Number	Concourse Statements
1	The permitting process for large-scale ecosystem restoration projects is efficient and effective.
2	The permitting process for large-scale ecosystem restoration projects uses the most up to date science.
3	The permitting process for large-scale ecosystem restoration projects is timely.
4	The permitting process for large-scale ecosystem restoration projects supports good restoration outcomes.
5	The permitting process for large-scale ecosystem restoration projects is cost effective.
6	The permitting process for large-scale ecosystem restoration projects could benefit from the principles of adaptive regulation.
7	The use of adaptive regulation could benefit the permitting process of large-scale ecosystem restoration projects.
8	Regulatory agencies have adequate resources available to permit large-scale ecosystem restoration projects.
9	Regulatory agencies have adequate flexibility in the permitting process of large-scale ecosystem restoration projects.
10	Public participation is adequately addressed in the permitting process of large-scale ecosystem restoration projects.
11	Regulatory agencies have the expertise needed to permit large-scale ecosystem restoration projects.
12	Regulatory agencies have the experience needed to permit large-scale ecosystem restoration projects.
13	Environmental laws and requirements that are the basis for the large-scale ecosystem restoration project permitting process are adequate.
14	Decision making is transparent in the large-scale ecosystem restoration project permitting process.
15	Improvements are needed in the permitting process of large-scale ecosystem restoration projects.
16	Large-scale ecosystem restoration projects are unique and complex and require a specialized permitting process.
17	Large-scale ecosystem restoration projects require more flexibility in the permitting process.
18	The permitting process adds to the administrative burden of large-scale ecosystem restoration projects.
19	The thirty-day response timeline applicants must respond to agency requests is beneficial to large-scale ecosystem restoration projects.
20	The time required to get a permit for large-scale ecosystem restoration projects takes too long.
21	The permitting process for large-scale ecosystem restoration projects uses terms interchangeably.
22	The permitting process for large-scale ecosystem restoration projects uses terms inconsistently.
23	Using terms inconsistently or interchangeably within the permitting process of large-scale ecosystem restoration projects adds an additional layer of confusion when discussing complicated scientific ideas.
24	The permitting process for large-scale ecosystem restoration projects should include a definition of restoration.
25	The permitting process for large-scale ecosystem restoration projects has a structure that allows for collaboration, learning and achieving restoration outcomes.
26	The permitting process for large-scale ecosystem restoration projects allows for the scientific uncertainty inherent in these types of projects.

Number	Concourse Statements
27	The unpredictability of funding is taking into consideration in the large-scale ecosystem restoration permitting process.
28	The permitting process considers the multifaceted, intergenerational components of large-scale ecosystem restoration projects.
29	The decision-making component of the permitting process for large-scale ecosystem restoration projects is efficient.
30	The permitting process for large-scale ecosystem restoration projects assume that requested information is readily available.
31	The permitting process for large-scale ecosystem restoration projects assume that requested information is inexpensive to acquire.
32	The permitting process requires increasingly more documentation and information before regulatory decisions are made.
33	Requiring more documentation during the permitting process of large-scale ecosystem restoration projects drives up the cost.
34	Large-scale ecosystem restoration projects fit within the current regulatory permit process.
35	Technical restoration science specific terminology can cause confusion about restoration project goals, making them more difficult to permit.
36	The large-scale ecosystem restoration project permitting process mandates specific results.
37	Large-scale ecosystem restoration projects should be exempt from the permitting process.
38	The permitting process for large-scale ecosystem restoration takes the gap between research and implementation into account when issuing permits.
39	The large-scale ecosystem restoration project permitting process allows the use of experimental data.
40	Scientific evidence is used in the permitting process of large-scale ecosystem restoration projects.
41	There is data lacking with regards to the efficiency of the permitting process of large-scale ecosystem restoration projects.
42	The large-scale ecosystem restoration project permitting process is prone to inefficiencies.
43	Agency timelines for issuing large-scale ecosystem restoration project permits are accurate.
44	Delays issuing permits for large-scale ecosystem restoration projects drive up the staffing, resources, and transaction costs for both the applicant and the permitting agency.
45	Permitting delays postpone the realization of the large-scale ecosystem restoration projects social and environmental benefits.
46	The permitting delay is more prevalent in complex large-scale ecosystem restoration projects.
47	The permitting delay is more prevalent for projects using innovative approaches.
48	The permitting process of large-scale ecosystem restoration projects would benefit from a structed regulatory process that enables learning and modification of policy over time.
49	The regulatory permitting process of large-scale ecosystem restoration projects should have a one-time regulatory decision with no follow-up.
50	The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with a single follow-up evaluation.
51	The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with data collection and a single follow-up evaluation.
52	The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.

Q-Set

The Q-Set is the set of statements that the participants of a Q methodology study will sort. These statements are used to gauge the participants' thoughts on the relationship between large-scale ecosystem restoration projects and the regulatory permitting process. There are multiple approaches to selecting the Q-set. Items can be categorized according to subtopics, and a balanced number from all subtopics may be chosen (Zabala et al., 2018). Good Q statements should be short stand-alone sentences that are easy to read and understand (Webler et al., 2009). It is vital that the Q statements accurately represent the entire concourse and that each item makes its own contribution to the Q set (Webler et al., 2009). One crucial factor to remember about a Q-method study is that the Q-set is the study sample, not the participants. Because the Q-set is the study sample, it's important to clearly and explicitly select them from the concourse. The process used to determine the Q set is outlined below.

The first step in the process was to separate the concourse statements into categories. The categories I identified were: time; resources; specialized permitting process; adaptive regulation; decision-making; flexibility; and efficiency/effectiveness. Developing the categories and sorting the concourse statements into those categories allowed me to ensure all the topics identified during the concourse development were included. The 52 concourse statements were broken into seven categories as follows (Table 5).

Table 5

Concourse Statement Categories

Category	Number of Concourse Statements
Time	8
Resources	11
Specialized Permitting Process	9
Adaptive Regulation	8
Decision Making	8
Flexibility	3
Efficiency/Effectiveness	5

Each of the 52 concourse statements were evaluated based on whether they supported the sorting question. I placed each statement into three classifications: keep, remove, or combine (Table 6). Statements in the keep group were identified as specific and supported the sorting question, statements in the remove group were either redundant or didn't support the sorting question, and statements in the combine group were combined with another similar statement within the same category to make a complete statement.

Table 6

Concourse Classification

remove	keep	combine

Category	Statements	Notes
Time	1. Agency timelines for issuing large-scale ecosystem restoration project permits are accurate.	Specific, supports sorting question, no change
	2. Delays in issuing permits for large-scale ecosystem restoration projects drives up the staffing, resources, and transaction costs for both the applicant and the permitting agency.	Specific, supports sorting question, no change
	3. Permitting delays postpone the realization of the large-scale ecosystem restoration projects social and environmental benefits.	doesn't support the sorting question, remove
	4. Permitting delays are more prevalent in complex large-scale ecosystem restoration projects.	combine with #5 in the Time category
	5. The permitting delay is more prevalent for projects using innovative approaches.	combine with #4 in the Time category

Category	Statements	Notes
	6. The thirty-day response timeline for applicants to respond to agency requests is beneficial to large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	7. The time required to get a permit for large-scale ecosystem restoration projects takes too long.	Specific, supports sorting question, no change
	8. The permitting process for large-scale ecosystem restoration projects is timely.	redundant, the opposite of #7, remove
Resources	1. The permitting process for large-scale ecosystem restoration projects assumes that requested information is readily available.	combine with #2 in the Resources category
	2. The permitting process for large-scale ecosystem restoration projects assume that requested information is inexpensive to acquire.	combine with #1 in the Resources category
	3. The permitting process requires increasingly more documentation and information before regulatory decisions are made.	Specific, supports sorting question, no change
	4. Requiring more documentation during the permitting process of large-scale ecosystem restoration projects drives up the cost.	doesn't support the sorting question, remove
	5. The unpredictability of funding is taking into consideration in the large-scale ecosystem restoration permitting process.	doesn't support the sorting question, remove
	6. The permitting process adds to the administrative burden of large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	7. Regulatory agencies have the expertise needed to permit large-scale ecosystem restoration projects.	combine with #8 in the Resources category
	8. Regulatory agencies have the experience needed to permit large-scale ecosystem restoration projects.	combine with #7 in the Resources category
	9. Environmental laws and requirements that are the basis for the large-scale ecosystem restoration project permitting process are adequate.	Specific, supports sorting question, no change
	10. Regulatory agencies have adequate resources available to permit large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	11. The permitting process for large-scale ecosystem restoration projects is cost effective.	Specific, supports sorting question, no change
Specialized Permitting Process	1. Large-scale ecosystem restoration projects fit within the current regulatory permit process.	Specific, supports sorting question, no change
	2. Technical restoration science specific terminology can cause confusion about restoration project goals, making them more difficult to permit.	doesn't support the sorting question, remove
	3. The large-scale ecosystem restoration project permitting process mandates specific results.	doesn't support the sorting question, remove
	4. Large-scale ecosystem restoration projects should be exempt from the permitting process.	Specific, supports sorting question, no change
	5. The permitting process for large-scale ecosystem restoration projects uses terms interchangeably.	doesn't support the sorting question, remove

Category	Statements	Notes
	6. The permitting process for large-scale ecosystem restoration projects uses terms inconsistently.	doesn't support the sorting question, remove
	7. Using terms inconsistently or interchangeably within the permitting process of large-scale ecosystem restoration projects adds an additional layer of confusion when discussing complicated scientific ideas.	doesn't support the sorting question, remove
	8. The permitting process for large-scale ecosystem restoration projects should include a definition of restoration.	Specific, supports sorting question, no change
	9. Large-scale ecosystem restoration projects are unique and complex and require a specialized permitting process.	Specific, supports sorting question, no change
Adaptive Regulation	1. The permitting process of large-scale ecosystem restoration projects would benefit from a structed regulatory process that enables learning and modification of policy over time.	Specific, supports sorting question redundant, no change
	2. The regulatory permitting process of large-scale ecosystem restoration projects should have a one-time regulatory decision with no follow-up.	Specific, supports sorting question, no change
	3. The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with a single follow-up evaluation.	Specific, supports sorting question, no change
	4. The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with data collection and a single follow-up evaluation.	Specific, supports sorting question, no change
	5. The regulatory permitting process of large-scale ecosystem restoration projects should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.	Specific, supports sorting question, no change
	6. The permitting process for large-scale ecosystem restoration projects has a structure that allows for collaboration, learning and achieving restoration outcomes.	Specific, supports sorting question, no change
	7. The permitting process for large-scale ecosystem restoration projects could benefit from the principles of adaptive regulation.	Specific, supports sorting question, no change
	8. The use of adaptive regulation could benefit the permitting process of large-scale ecosystem restoration projects.	redundant, the same as #7, remove
Decision Making	1. The permitting process for large-scale ecosystem restoration takes the gap between research and implementation into account when issuing permits.	Specific, supports sorting question, no change
	2. The large-scale ecosystem restoration project permitting process allows the use of experimental data.	Specific, supports sorting question, no change
	3. Scientific evidence is used in the permitting process of large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	4. The permitting process considers the multifaceted, intergenerational components of large-scale ecosystem restoration projects.	doesn't support the sorting question, remove
	5. The decision-making component of the permitting process for large-scale ecosystem restoration projects is efficient.	Combine with #6 in the decision making category

Category	Statements	Notes
	6. Decision making is transparent in the large-scale ecosystem restoration project permitting process.	Combine with #5 in the decision making category
	7. Public participation is adequately addressed in the permitting process of large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	8. The permitting process for large-scale ecosystem restoration projects uses the most up to date science.	Specific, supports sorting question, no change
Flexibility	1. The permitting process for large-scale ecosystem restoration projects allows for the scientific uncertainty inherent in these types of projects.	Specific, supports sorting question, no change
	2. Large-scale ecosystem restoration projects require more flexibility in the permitting process.	redundant, same as #3, remove
	3. Regulatory agencies have adequate flexibility in the permitting process of large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
Efficient/ Effective	1. There is data lacking with regards to the efficiency of the permitting process of large-scale ecosystem restoration projects.	doesn't support the sorting question, remove
	2. The large-scale ecosystem restoration project permitting process is prone to inefficiencies.	opposite of #5 remove
	3. Improvements are needed in the permitting process of large-scale ecosystem restoration projects.	Specific, supports sorting question, no change
	4. The permitting process for large-scale ecosystem restoration projects supports good restoration outcomes.	doesn't support the sorting question, remove
	5. The permitting process for large-scale ecosystem restoration projects is efficient and effective.	Specific, supports sorting question, no change

Once the evaluation was complete, the Q-set was established with 34 statements (Table 7). The P-set, defined below, sorted the established Q-set.

Table 7

Q-set

Number	Statement
1	The permitting process is efficient and effective.
2	Agency timelines for issuing permits are accurate.
3	Interruptions in the permitting process affect the applicant and the permitting agency.
4	Innovative approaches in complex projects result in delays.
5	The thirty-day response timeline for applicants to respond to agency requests is acceptable.
6	The time required to get a permit is acceptable.

Number	Statement
7	The permitting process presumes that requested information is inexpensive to acquire and readily available.
8	The permitting process requires more documentation and information before regulatory decisions are made.
9	The permitting process adds to the administrative burden.
10	Regulatory agencies have the expertise and experience needed to permit projects.
11	Environmental laws and requirements that are the basis for the permitting process are adequate.
12	Regulatory agencies have adequate resources available to permit projects.
13	The permitting process is cost-effective.
14	Fit within the current regulatory permit process.
15	Should be exempt from the permitting process.
16	The permitting process should include a definition of restoration that states that both positive and negative impacts will occur to natural resources and a tradeoff analysis will frequently be required.
17	Are unique and complex and require a specialized permitting process.
18	The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time.
19	The permitting process should have a one-time regulatory decision with no follow-up.
20	The permitting process should have a regulatory decision with a single follow-up evaluation.
21	The permitting process should have a regulatory decision with data collection and a single follow-up evaluation.
22	The permitting process should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.
23	The permitting process has a structure that allows for collaboration, learning and achieving restoration outcomes.
24	The permitting process could benefit from the principles of adaptive regulation.
25	The permitting process takes the gap between research and implementation into account when issuing permits.
26	The permitting process allows the use of experimental data.
27	Scientific evidence is used in the permitting process.
28	The decision-making component of the permitting process is transparent and efficient.
29	Public participation is adequately addressed in the permitting process.
30	The permitting process uses the most up-to-date science.
31	The permitting process allows for trade-off analyses to be performed of positive and negative impacts to natural resources.
32	The permitting process allows for scientific uncertainty.
33	Regulatory agencies have adequate flexibility in the permitting process.
34	The permitting process allows for the inclusion of adaptive management (distinct from adaptive regulation) principles to acquire new knowledge for the verification of decision-making hypotheses.

Participants

The P-set are the participants of a Q methodology study. Participants in Q studies are invited to impose their own personal meanings onto the items in the Q set (Watts & Stenner, 2012). In a Q study, the participants are the variables. Another element of Q studies that differentiates it from most is the idea that larger sample sizes are better. A rule of thumb in Q studies is that the number of participants should be less than the number of items in the Q set (Watts & Stenner, 2012). Q participants are people with different opinions and perspectives who are asked to express views about the Q statements by sorting them, i.e., “doing a Q sort” (Zabala et al., 2018). The sorts are then analyzed using statistical techniques of correlation and factor analysis to reveal patterns in the way people associate opinions.

The sampling for this study is purposive. The P-set was selected from ecosystem restoration project practitioners, permit writers, government regulators, and non-governmental agencies participating in LSER. Because this study is based on the permitting process in the United States of America, the P-set was limited to practitioners and permit writers in the United States who are 18 years of age or above. Participants represent a range of sex, gender, race, and other demographic characteristics, of which there are no limitations. The only inclusion criteria for this project are that participants have experience with ecosystem restoration, permit writing, or United States Army Corps of Engineers regulatory management. Since the pool of participants is relatively small based on the number of large-scale ecosystem restoration projects, and the specifics of the experience required for participation, participants were selected and recruited individually based on the researcher and committees’ knowledge of their expertise. The P-set was 24 for this study. The response rate for this study was 50%, and the P-set conducted a total of 12 sorts. Of the 12 sorts conducted seven were completed by restoration practitioners and five were completed by permit writers.

CHAPTER IV: DATA COLLECTION

The next step in the process is data collection. Data collection is the systematic approach to gathering and measuring information. Administering the Q sort is the method used for data collection.

Administering the Q Sort

The Q-sort Participants received an email inviting them to participate in a Q-sort focusing on restoration practitioners' and permit writers' viewpoints on how the regulatory permitting process affects large-scale ecosystem restoration projects. Once participants clicked on the Q-sort link, they were directed to the online Q-sort (hosted by the Q Method Testing and Inquiry Platform on the University of Wisconsin System). The first page of the website has the consent form, and participants were given the choice to either continue or exit from the Q-sort. Participants are asked to click a box to give their consent. Included in the appendices are the recruitment email, consent form, and instructions and notes to participants. After providing their consent, participants are asked to sort the 34 statements of the Q-set based on their opinions on the effects of the regulatory permitting process on large-scale ecosystem restoration projects. Each participant sorted the statements by moving virtual index cards into place on the distribution table on the website. The scale used for the Q-sort is (+6) strong support for approach/most like how I think to (-6) weak or no support for the approach/least like how I think. All participants sorted the same statements based on their opinions of the effects of the regulatory permitting process on large-scale ecosystem restoration projects. Participants accessed the Q-sort online from an individually generated link and completed it at their convenience on their computers. Figure 5 is the distribution table, the sorting question and the scale used for this Q study. I used a fixed distribution with a shallower distribution, which is good for participant groups that are likely to have expert knowledge about the topic. Once the Q-sorts were complete, the data was downloaded into Excel for data analysis.

CHAPTER V: ANALYSIS

The statistical analysis for a Q-method study needs to go through three methodological transitions (Watts & Stenner, 2012). Those transitions are from Q-sorts to factors via correlation and factor analysis, from factors to factor arrays via the factor exemplifying of Q-sorts, and from factor arrays to factor interpretation via the process of interpretation. I used the Q-dedicated computer package PQMethod to conduct a centroid factor analysis, hand-rotate the factors, and perform the final Q analysis of the rotated factors.

PQMethod

Statistical analysis for this study was performed using the Q-dedicated software PQMethod. The PQMethod is a basic DOS package with straightforward data and item entry (Watts & Stenner, 2012). It offers a choice of factor extraction and rotation methods and provides extensive output files with a wide variety of statistical information (Watts & Stenner, 2012). In this section, I will describe the routines available in PQMethod. The details of the statistical analysis will be discussed in the Analysis chapter. There are eight routines available to run. Routine 1 is called STATES. This option allows for entering and editing the text of the Q-sort statements from your study (Schmolck & Atkinson, 2014). I entered all 34 of my statements into this routine in the order used for my Q-sort project. Routine 2 is QENTER; this routine allows you to enter the data from the q-sorts performed by the participants (Schmolck & Atkinson, 2014). In this routine, I entered the number of statements that were sorted, the scale I used for my sort -6 to +6, the number of columns (13), and the number of rows for each column. Routines 3 QCENT (centroid factor analysis) and 4 QPCA (principal components analysis) are alternative options for extracting factors (Schmolck & Atkinson, 2014). Both centroid factor analysis (CFA) and principal components analysis (PCA) are data reduction techniques that allow for the capture of variance in variables in smaller data sets (Grace-Martin, 2017). I used routine 3 QCENT to perform a centroid factor analysis with the standard seven factors for my study. Routine 5 is QROTATE. This routine allows for the rotation of factors. The first step is to select varimax or hand rotation; I chose hand rotation for my study. When hand rotation is selected a new program PQORT (routine 6) is launched. PQORT allows for easily rotating your factors. Once your factors have been rotated, PQORT will ask if you want to flag your factors. It has an option for the program to “pre-flag” your factors, I selected this option for my study. I then reviewed my factors and flagged two additional items. Once you are done flagging and rotating your factors, QPORT asks which factors you want to write to the output file (Schmolck & Atkinson, 2014). I selected factors one and two for my study. Once your factors are selected the PQORT program closes. Routine 7 is QANALYZE. This routine provides the complete analysis of the q-sorts that were collected (Schmolck & Atkinson, 2014). This last routine, number 8, is the written report generated by PQMethod.

Statistic Routines

PQMethod produces a correlation matrix through the intercorrelation of each Q-sort with every other Q-sort in the study (Table 8). Factor analysis identifies patterns of similarity in the Q-sort configurations and in my participants' viewpoints (Watts & Stenner, 2012). Q methodological factors lead us to the key viewpoints that are held in common within my participant group.

Table 8

Correlation Matrix Between Sorts

Sorts	1	2	3	4	5	6	7	8	9	10	11	12
1	100	8	12	28	41	38	41	18	10	24	15	1
2	8	100	12	5	17	5	52	33	-1	29	31	67
3	12	12	100	8	37	21	63	44	1	35	42	10
4	28	5	8	100	71	44	19	41	33	39	-1	15
5	41	17	37	71	100	39	43	44	12	57	14	20
6	38	5	21	44	39	100	25	24	46	42	-3	9
7	41	52	63	19	43	25	100	56	-7	36	47	48
8	18	33	44	41	44	24	56	100	20	54	21	48
9	10	-1	1	33	12	46	-7	20	100	30	19	11
10	24	29	35	39	57	42	36	54	30	100	24	39
11	15	31	42	-1	14	-3	47	21	19	24	100	13
12	1	67	10	15	20	9	48	48	11	39	13	100

Q-sorts to Factors

The 12 Q-sorts were intercorrelated and factor analyzed using the Q-dedicated computer package PQMethod (Schmolck, 2014). Seven factors were extracted, and two of the seven factors were hand rotated. Factors are shared viewpoints (Watts & Stenner, 2012). Factor extraction involves removing individual portions of the common variance from the correlation matrix (Watts & Stenner, 2012). Deciding on the correct number of factors to extract is a complex matter, and the literature suggests that seven is an excellent place to start (Watts & Stenner, 2012). The two rotated factors were selected for rotation because their eigenvalues were greater than 1.00. A factor's eigenvalue clearly indicates the strength and explanatory power of the extracted factor (Watts & Stenner, 2012). The two factors together explained 42% of the study variance. All 12 of the Q-sorts performed by my participants loaded significantly on one of the two factors (Table 9). This process is referred to as factor-defining Q-sorts or factor exemplars. Q-sorts that load significantly on the same factor share a similar sorting pattern (Watts & Stenner, 2012). The seven-factor exemplars of Factor 1 share a distinct viewpoint about the relationship between large-scale ecosystem restoration projects and the permitting process.

Table 9

Factor Matrix with X Indicating a Defining Sort

Q Sort	Factor 1	Factor 2
0ubDm2I6	0.4390 X	0.0111
1Br2qUyZ	0.1852	0.5956 X
3Z4dWXDy	0.3346	0.4138 X
B7L9GVZJ	0.6881 X	-0.2097
d2U0wxQS	0.7612 X	0.054
DfX5pyc2	0.6616 X	-0.2102
j6pmNo4F	0.4523	0.7735 X
JBdewzZR	0.5828 X	0.4326
jIs0gLcP	0.3917 X	-0.1325
jTIZCh13	0.6905 X	0.2406
kgcam3iR	0.2055	0.4141 X
vC7ikdHO	0.2838	0.4978 X

Factors to Factor Arrays

The factor exemplars identified in the previous step are now merged to form a single ideal/typical Q-sort for each factor, called a factor array (Watts & Stenner, 2012). Factor arrays are the best-possible estimate of the viewpoints expressed in the factor (Watts & Stenner, 2012). A factor array is a single Q-sort representing a particular factor's viewpoint. The factor arrays established for this study are provided in Table 10.

Table 10

Factor Arrays

Item Number and Wording	F1	F2
1. The permitting process is efficient and effective.	-3	-2
2. Agency timelines for issuing permits are accurate.	-4	0
3. Interruptions in the permitting process affect the applicant and the permitting agency.	5	4
4. Innovative approaches in complex projects result in delays.	5	5
5. The thirty-day response timeline for applicants to respond to agency requests is acceptable.	-1	2
6. The time required to get a permit is acceptable.	-5	-6
7. The permitting process presumes that requested information is inexpensive to acquire and readily available.	-1	3
8. The permitting process requires more documentation and information before regulatory decisions are made.	6	2
9. The permitting process adds to the administrative burden.	4	0
10. Regulatory agencies have the expertise and experience needed to permit projects.	3	-6
11. Environmental laws and requirements that are the basis for the permitting process are adequate.	3	-3
12. Regulatory agencies have adequate resources available to permit projects.	-6	-5
13. The permitting process is cost-effective.	-4	-3
14. Fit within the current regulatory permit process.	2	1
15. Should be exempt from the permitting process.	-5	-1
16. The permitting process should include a definition of restoration that states that both positive and negative impacts will occur to natural resources and a tradeoff analysis will frequently be required.	1	1
17. Are unique and complex and require a specialized permitting process.	-3	4
18. The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time.	6	6
19. The permitting process should have a one-time regulatory decision with no follow-up.	-6	-1
20. The permitting process should have a regulatory decision with a single follow-up evaluation.	-2	2
21. The permitting process should have a regulatory decision with data collection and a single follow-up evaluation.	0	3
22. The permitting process should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.	0	6
23. The permitting process has a structure that allows for collaboration, learning and achieving restoration outcomes.	1	-4
24. The permitting process could benefit from the principles of adaptive regulation.	4	5
25. The permitting process takes the gap between research and implementation into account when issuing permits.	-2	-5
26. The permitting process allows the use of experimental data.	-3	-3
27. Scientific evidence is used in the permitting process.	1	-1
28. The decision-making component of the permitting process is transparent and efficient.	-1	1
29. Public participation is adequately addressed in the permitting process.	2	3
30. The permitting process uses the most up-to-date science.	0	-2
31. The permitting process allows for trade-off analyses to be performed of positive and negative impacts to natural resources.	2	0
32. The permitting process allows for scientific uncertainty.	-2	0
33. Regulatory agencies have adequate flexibility in the permitting process.	0	-4
34. The permitting process allows for the inclusion of adaptive management (distinct from adaptive regulation) principles to acquire new knowledge for the verification of decision-making hypotheses	3	-2

Factor Arrays to Factor Interpretation

Factor interpretation is the last methodological transition of Q-sort data. Providing a complete and holistic representation of the relevant viewpoints is essential during the interpretation. The methodical approach to factor interpretation should be applied consistently in every factor's context and help the researcher deliver genuinely holistic factor interpretations (Watts & Stenner, 2012). I have briefly described each of the two factors in this section. Factor 1 has an eigenvalue of 3.6450, explaining 26% of the study variance. Seven participants are significantly associated with this factor. Factor 2 has an eigenvalue of 1.3790 and explains 16% of the study variance. Five participants are significantly associated with this factor. The complete interpretation of the emergent factors is provided in the Results section.

CHAPTER VI: RESULTS & INTERPRETATION

In this section I will discuss the results of my research and continue the interpretation of the emergent factors.

Factor Labelling

In the analysis section, I discussed that two-factor arrays were developed using the statistical analysis software the PQMethod. As part of the in-depth factor interpretation, I've labeled each factor array based on the main theme associated with each. Labeling a factor summarizes the shared viewpoints that represent the main theme of the factor. After the initial review, the two-factor arrays appear similar but comprehensive evaluation produced subtle, nuanced differences between the two that are important to discuss. The development of the factor labels is based on evaluating the differences between the two factors, the review of the consensus vs. disagreement table, and the distinguishing statements for factor one table created by PQMethod. The distinguishing statements for factor one table provide all the statistically significant statements at $P < .05$; Items marked with an * indicate significance at $P < .01$.

Assessing the differences between the two factors allowed for the extraction of the nuanced themes for each factor. I specifically focused on the distinguishing statements for factor one (Table 11) and the top five statements with the largest disagreement between the factors from the consensus vs. disagreement table (Table 12). Those statements are 10, 22, 17, 11, and 33. The distinguishing statements for factor one and the consensus vs. disagreement tables are provided below. The top five statements with the largest disagreement are highlighted in grey.

Table 11

Distinguishing Statements for Factor 1

*8. The permitting process requires more documentation and information before regulatory decisions are made.	*21. The permitting process should have a regulatory decision with data collection and a single follow-up evaluation.
*9. The permitting process adds to the administrative burden.	30. The permitting process uses the most up-to-date science.
*11. Environmental laws and requirements that are the basis for the permitting process are adequate.	5. The thirty-day response timeline for applicants to respond to agency requests is acceptable.
*10. Regulatory agencies have the expertise and experience needed to permit projects.	*7. The permitting process presumes that requested information is inexpensive to acquire and readily available.
*34. The permitting process allows for the inclusion of adaptive management (distinct from adaptive regulation) principles to acquire new knowledge for the verification of decision-making hypotheses	*20. The permitting process should have a regulatory decision with a single follow-up evaluation.
*23. The permitting process has a structure that allows for collaboration, learning and achieving restoration outcomes.	*25. The permitting process takes the gap between research and implementation into account when issuing permits.
*33. Regulatory agencies have adequate flexibility in the permitting process.	*17. Are unique and complex and require a specialized permitting process.
*22. The permitting process should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.	*2. Agency timelines for issuing permits are accurate.
*15. Should be exempt from the permitting process.	*19. The permitting process should have a one-time regulatory decision with no follow-up.
12. Regulatory agencies have adequate resources available to permit projects.	

Table 12

Consensus vs. Disagreement Across Factors

Item Number and Wording	Factor Arrays F1	Factor Arrays F2
6. The time required to get a permit is acceptable.	-5	-6
16. The permitting process should include a definition of restoration that states that both positive and negative impacts will occur to natural resources and a tradeoff analysis will frequently be required.	1	1
13. The permitting process is cost-effective.	-4	-3
1. The permitting process is efficient and effective.	-3	-2
3. Interruptions in the permitting process affect the applicant and the permitting agency.	5	4
14. Fit within the current regulatory permit process.	2	1
24. The permitting process could benefit from the principles of adaptive regulation.	4	5
29. Public participation is adequately addressed in the permitting process.	2	3
26. The permitting process allows the use of experimental data.	-3	-3
4. Innovative approaches in complex projects result in delays.	5	5
28. The decision-making component of the permitting process is transparent and efficient.	-1	1
18. The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time.	6	6
32. The permitting process allows for scientific uncertainty.	-2	0
31. The permitting process allows for trade-off analyses to be performed of positive and negative impacts to natural resources.	2	0
27. Scientific evidence is used in the permitting process.	1	-1
30. The permitting process uses the most up-to-date science.	0	-2
5. The thirty-day response timeline for applicants to respond to agency requests is acceptable.	-1	2
12. Regulatory agencies have adequate resources available to permit projects.	-6	-5
25. The permitting process takes the gap between research and implementation into account when issuing permits.	-2	-5
21. The permitting process should have a regulatory decision with data collection and a single follow-up evaluation.	0	3
20. The permitting process should have a regulatory decision with a single follow-up evaluation.	-2	2
7. The permitting process presumes that requested information is inexpensive to acquire and readily available.	-1	3
15. Should be exempt from the permitting process.	-5	-1
9. The permitting process adds to the administrative burden.	4	0
23. The permitting process has a structure that allows for collaboration, learning and achieving restoration outcomes.	1	-4
34. The permitting process allows for the inclusion of adaptive management (distinct from adaptive regulation) principles to acquire new knowledge for the verification of decision-making hypotheses	3	-2
2. Agency timelines for issuing permits are accurate.	-4	0
19. The permitting process should have a one-time regulatory decision with no follow-up.	-6	-1
8. The permitting process requires more documentation and information before regulatory decisions are made.	6	2
33. Regulatory agencies have adequate flexibility in the permitting process.	0	-4
11. Environmental laws and requirements that are the basis for the permitting process are adequate.	3	-3
17. Are unique and complex and require a specialized permitting process.	-3	4
22. The permitting process should have a regulatory decision with planned on going monitoring, data collection, analysis, and periodic evaluation of consequences.	0	6
10. Regulatory agencies have the expertise and experience needed to permit projects.	3	-6

The statement with the largest disagreement between Factors is statement #10 with a nine point difference. Factor 1 ranked it +3 and Factor 2 ranked it -6. A nine-point difference is a significant difference considering the entire scale is a 12-point scale. Statement #10 focuses on the expertise and experience of the regulatory agencies involved in the wetland permitting process of LSER projects. Factor 2 identified statement #10 as one of two statements that they disagreed with the most and it is one of the identifying characteristics of Factor 2. Factor 2 is identifying regulatory expertise and experience as an area of concern with the current permitting process. The statement with the second largest disagreement between Factors is statement #17 with a seven point difference. Factor 1 ranked it a -3 and Factor 2 ranked it +4. Statement #17 states that LSER projects are unique and complex and require a specialized permitting process. Based on the review of the disagreement between Factors so far Factor 2 is starting to develop a theme associated with the current permitting process not being adequate for LSER projects. The third largest disagreement between Factors is a tie, both statement #11 and statement #22 have a six point difference. Factor 1 ranked statement #11 +3 and Factor 2 ranked it -3. Statement #11 states that the environmental laws and requirements that are the basis for the permitting process of LSER are adequate. Factor 1 ranked statement #22 0 and Factor 2 ranked it +6. Statement #22 states that the permitting process should have a regulatory decision with planned ongoing monitoring, data collection, analysis, and periodic review of consequences. This difference continues to highlight a theme of Factor 2 which is the need to restructure the permitting process for LSER projects. The top five statements with the largest disagreement between Factors are closed out with statement #33 with a 4-point difference. Factor 1 ranked 0 and Factor 2 ranked it -4. Statement #33, like statement #10 above, focuses on another aspect of the regulatory agencies involved in the wetland permitting process. Statement #33 states that regulatory agencies have adequate flexibility within the permitting process. Factor 2 has identified the regulatory agency flexibility within the permitting process as an area of concern within the current permitting process. Factor 1 is labeled reorganization of the permitting process for large-scale ecosystem restoration projects within the current regulations. Factor 2 is labeled restructure of the permitting process and current regulations for large-scale ecosystem restoration projects. Seven of the Q-sorts performed by my participants loaded significantly on Factor 1, and five loaded significantly on Factor 2.

I also evaluated the demographic data for the participants that loaded significantly on each factor to assess if the participants' backgrounds had an effect. The experience required to participate in the study is specific. The participants for the study are five women and seven men, but there is a mix of men and women that loaded significantly on each of the factors. Factor one has two women and five men, and factor two has three women and two men. I also evaluated the two factors to see if the difference was based on primary occupation. For my study participants were classified as either permit writers or practitioners. Factor 1 has three permit writers and four practitioners; Factor 2 has two permit writers and 3 practitioners. I could not identify any demographic data that was an indicator for one factor over the other. I attribute this to the small purposive sampling conducted for this study.

Inferences

The data collected on each factor is used to discuss the research questions outlined in the study. Below is an interpretation of the 12 statements ranked +6, +5, +4, and -6, -5, and -4 for each factor.

Factor 1: Reorganization of the Permitting Process within the Current Regulations

The statements ranked +6, +5, and +4 for Factor 1 are listed in Table 13, and the statements ranked -6, -5, and -4 are listed in Table 14. The highlighted items in the tables are found in both Factor 1 and Factor 2. The six statements that were ranked the highest for factor 1 demonstrate that the p-set believes: the permitting process requires more documentation before decisions are made, the permitting process would benefit from a structured process that enables learning and modification of policy over time, innovative approaches result in delays, interruptions in the permitting process affect the applicant and the permitting agency, the permitting process adds to the administrative burden and the permitting process could benefit from the principles of adaptive regulation. The six statements that were ranked the lowest for factor 1 demonstrate that the p-set believes: regulatory agencies don't have adequate resources, the permitting process shouldn't have a one-time regulatory decision with no follow-up, the time required to get a permit is not acceptable, LSER projects should not be exempt from permitting, agency timelines for issuing permits are not accurate and the permitting process is not cost-effective.

Table 13

Factor 1 Statements Ranked +6, +5, +4

#8 The permitting process requires more documentation and information before regulatory decisions are made. 6
#18 The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time. 6
#4 Innovative approaches in complex projects result in delays. 5
#3 Interruptions in the permitting process affect the applicant and the permitting agency.5
#9 The permitting process adds to the administrative burden. 4
#24 The permitting process could benefit from the principles of adaptive regulation. 4

Table 14

Factor 1 Statements Ranked -6, -5, -4

#12 Regulatory agencies have adequate resources available to permit projects. -6
#19 The permitting process should have a one-time regulatory decision with no follow up. -6
#6 The time required to get a permit is acceptable. -5
#15 Should be exempt from the permitting process. -5
#2 Agency timelines for issuing permits are accurate. -4
#13 The permitting process is cost effective. -4

Factor 2: Restructure of the Permitting Process and Current Regulations

The statements ranked +6, +5, and +4 for Factor 2 are listed in Table 15, and the statements ranked -6, -5, and -4 are listed in Table 16. The highlighted items in the tables are found in both Factor 1 and Factor 2. The six statements that were ranked the highest for Factor 2 demonstrate that the p-set believes: the permitting process should have a regulatory decision with planned ongoing monitoring, data collection, analysis, and periodic evaluation of consequences; the permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time, the permitting process could benefit from the principles of adaptive regulation, innovative approaches result in delays, LSER projects are unique and require a specialized permitting process, and interruptions in the permitting process affect the applicant and the permitting agency. The six statements that were ranked the lowest for Factor 2 demonstrate that the p-set believes: regulatory agencies don't have the expertise and experience needed to permit projects, the time required to get a permit is not acceptable, the permitting process doesn't take the gap between research and implementation into account when issuing permits, regulatory agencies don't have adequate resources, regulatory agencies don't have adequate flexibility in the permitting process and the permitting process doesn't have a structure that allows for collaboration, learning, and achieving restoration outcomes.

Table 15

Factor 2 Statements Ranked +6, +5, +4

#22 The permitting process should have a regulatory decision with planned ongoing monitoring, data collection, analysis, and periodic evaluation of consequences. 6
#18 The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time.6
#24 The permitting process could benefit from the principles of adaptive regulation. 5
#4 Innovative approaches in complex projects result in delays.5
#17 Are unique and complex and require a specialized permitting process. 4
#3 Interruptions in the permitting process affect the applicant and the permitting agency.4

Table 16

Factor 2 Statements Ranked -6, -5, -4

#10 Regulatory agencies have the expertise and experience needed to permit projects. -6
#6 The time required to get a permit is acceptable. -6
#25 The permitting process takes the gap between research and implementation into account when issuing permits. -5
#12 Regulatory agencies have adequate resources available to permit projects. -5
#33 Regulatory agencies have adequate flexibility in the permitting process. -4
#23 The permitting process has a structure that allows for collaboration, learning, and achieving restoration outcomes. -4

Research Question Discussion

The two overarching research questions for this study are:

1. What is the effect of the current federal regulatory permitting process on large-scale ecosystem restoration projects?

2. How can adaptive regulation be applied to improve the regulatory permitting process of large-scale ecosystem restoration projects?

In addition to the overarching research questions there are three specific research questions for the study. The specific research questions are:

3. What do large-scale ecosystem restoration practitioners and regulators think are the impacts of the regulatory permitting process on restoration projects?

4. How can adaptive regulation be implemented best to facilitate the permitting process of large-scale ecosystem restoration projects?

5. What are the benefits and challenges of implementing adaptive regulation in the regulatory permitting process of large-scale ecosystem restoration projects?

The results from the Q-sort provided preliminary evidence that can be used to begin to address multiple of the research questions for this study. The p-set for this study was a small group of knowledgeable individuals with a range of perspectives. The inferences that can be made from the gathered data need to be presented with this in mind. Below the data will be used to discuss each research question.

I discuss the data and how within the confines of my study it demonstrates supportive evidence. The statements selected from the highest and lowest ranked statements for each factor provide evidence to address the research questions. Eleven statements were chosen to address research question # 1, and those statements are provided in Table 17.

The first research question to be discussed is research question #1: What is the effect of the current federal regulatory permitting process on large-scale ecosystem restoration projects? The current federal regulatory permitting process is having a negative effect on large-scale ecosystem restoration projects based on the data collected from this study. The 11 statements that were selected to address research question # 1 demonstrate that the p-set believes: the permitting process requires more documentation and information before decisions are made, innovative approaches in complex projects result in delays, interruptions in the permitting process affect the applicant, and the permitting agency, the permitting process adds to the administrative burden, regulatory agencies don't have adequate resources or flexibility to permit projects, regulatory agencies don't have the expertise and experience needed to permit projects, the time to get a permit is unacceptable, the permitting process shouldn't have a one-time regulatory decision with no follow-up like the current system, agency timelines for issuing permits are not accurate and the permitting process is not cost-effective.

Table 17

Statements That Address Research Question 1

#8 The permitting process requires more documentation and information before regulatory decisions are made. 6
#4 Innovative approaches in complex projects result in delays. 5
#3 Interruptions in the permitting process affect the applicant and the permitting agency.5, 4
#9 The permitting process adds to the administrative burden. 4
#12 Regulatory agencies have adequate resources available to permit projects. -6, -5
#10 Regulatory agencies have the expertise and experience needed to permit projects. -6
#6 The time required to get a permit is acceptable. -6, -5
#19 The permitting process should have a one-time regulatory decision with no follow-up. -6
#33 Regulatory agencies have adequate flexibility in the permitting process. -4
#2 Agency timelines for issuing permits are accurate. -4
#13 The permitting process is cost effective. -4

The second question to be discussed is #2: How can adaptive regulation be applied to improve the regulatory permitting process of large-scale ecosystem restoration projects? Two statements were selected to address research question #2. Those statements are provided in Table 18. The two statements chosen to address research question # 2 demonstrate that the p-set supports the statement that: the permitting process could benefit from the principles of adaptive regulation and the permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time, which is the definition of adaptive regulation. Additional discussions about how adaptive regulation could be implemented will be discussed in research questions #4 and #5.

Table 18

Statements That Address Research Question 2

#18 The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time. 6, 6
#24 The permitting process could benefit from the principles of adaptive regulation. 5, 4

The next research question up for discussion is question # 3: What do large-scale ecosystem restoration practitioners and regulators think are the impacts of the regulatory permitting process on restoration projects? This question was not asked verbatim in the p-set, so I've inferred and extrapolated responses from the q-sort data. Six statements were selected to address research question #3 (Table 19). There were three statements that the p-set agreed with those statements are: "the permitting process requires more documentation and information before regulatory decisions are made", "innovative approaches in complex projects result in delays", and "the permitting process adds to the administrative burden". There were also three statements that the p-set disagreed with those statements are the time required to get a permit is acceptable, the permitting process is cost effective, and the permitting process has a structure that allows for collaboration, learning, and achieving restoration outcomes. These statements were selected in support of research question #3 because they reflect the thoughts of the p-set about the effects of the permitting process is having on restoration projects.

Table 19

Statements That Address Research Question 3

#8 The permitting process requires more documentation and information before regulatory decisions are made. +6
#4 Innovative approaches in complex projects result in delays. +5
#9 The permitting process adds to the administrative burden. +4
#6 The time required to get a permit is acceptable. -6, -5
#13 The permitting process is cost effective. -4
#23 The permitting process has a structure that allows for collaboration, learning, and achieving restoration outcomes. -4

Research question #4 is, How can adaptive regulation be implemented best to facilitate the permitting process of large-scale ecosystem restoration projects? The p-set on both Factors agreed that Statement 18 The permitting process would benefit from a structured regulatory process that enables learning and modification of policy over time, was one of two statements they agreed with the most. (+6).

Research question #5 asks, What are the benefits and challenges of implementing adaptive regulation in the regulatory permitting process of large-scale ecosystem restoration projects? The challenges for implementing adaptive regulation in large-scale ecosystem restoration programs are very similar to those associated with social-ecological systems; the principal limitation to implementation makes the difference. The principal limitation to implementing adaptive regulation in LSER programs is the individuality required to conduct ecological restoration. The whole point of restoration is to return a specific ecosystem to a previous healthy state, a highly individualized process. It’s unrealistic to think we can use another project's restoration plan on an ecosystem in a different part of the country; the same is true for adaptive regulation implementation. This supports the idea that there can be no one size fits all approach to implementing adaptive regulation, making the transition much more difficult.

While keeping the overarching principal limitation to implementing adaptive regulation in mind, multiple challenges must be overcome. The four main challenges associated with implementing adaptive regulation in LSER programs are current governance sturcture, current permitting structure, lack of implementation guidance to practitioners, and integration with policy and science. Each of the main challenges will be further discussed below. Until we develop a way to address all the challenges, it will be difficult to implement adaptive regulation in ecosystem restoration programs.

Current Governance Structures & Challenges for Permitting

I've combined the challenges associated with current governance structures and permitting into one section because they have similar drivers and backgrounds in regulatory law. Evidence in the literature supports the idea of a connection between governance and restoration results. The management of the complex relationship between the ecological and social through environmental governance should be of interest to those concerned with sustaining the natural environment (Chaffin et al., 2014). Environmental governance is the link between the social and the ecological and can influence the course of social-ecological systems (Chaffin et al., 2014). One theme consistently present throughout the literature focuses on the need to move away from the current governance structure of socio-ecological systems. These structures are overly rigid and have static approaches to governance. The same concept can be applied to LSER because, in most instances, these two socio-ecological systems and LSER are governed the same way. Research supports the idea that the participatory processes of adaptive regulation are important to overcome the limitations of polycentric governance (Rouillard et al., 2013). To progress in managing dynamic, multi-level, and interconnected socio-ecological systems, we need to develop governance systems that navigate those types of systems (Plummer et al., 2013). These statements by Rouillard et al. (2013) and Plummer et al. (2013) sum up some of the main discussion points about adaptive regulation; the problem is there is limited discussion on how to do it. The risk is completely changing the governance approach for LSER; the opportunity is being able to establish a governance structure that is flexible and is tailored to the specific anticipated outcomes.

Indicators based on our current understanding of LSER show we must incorporate flexibility in environmental policy design (Garmestani & Benson, 2013). Incorporating flexibility is essential in adaptive regulation because the whole premise is based on flexibility inherent in the system. The current system of laws for LSER is based on regulation via a command and control structure (Garmestani & Benson, 2013). In this structure, the current practice for ecosystem restoration projects is for scientists to do the science first or for government agencies to develop the agenda first, then present it to the other participating groups and incorporate these groups into already established frameworks (Folke et al., 2005). This is not an environment conducive to adaptive regulation. Adaptive regulation thrives on experimentation, learning, and bringing together institutions and organizations for collaboration, collective action, and conflict resolution concerning natural resource and ecosystem management (Folke et al., 2005). Many LSER projects try to put some elements of adaptive governance in their design, but it's not always the case. Environmental governance is a system of institutions that includes statutes, regulations, laws, and policies. It also consists of the organizations involved in governing environmental resources and protection, and not surprisingly, there are numerous approaches to accomplishing it (Chaffin et al., 2014). Because of the number of different techniques and the uncertainties that resource managers face, environmental governance systems must be highly adaptive from this point forward (Chaffin et al., 2014). Conditions that support effective governance in systems include resources and use of those resources that can be monitored, verified, and understood at a low cost; moderate rate of change within the system; communities with intimate networks; systems where outsiders can be excluded at a low cost; and support for effective monitoring and enforcement (Chaffin et al., 2014). However, these conditions rarely, if ever, exist simultaneously (Chaffin et al., 2014). Instead, resource governance's reality is based on incomplete and conflicting information and changing values/priorities (Chaffin et al., 2014). Because of this reality, there is a need for a resource governance system that is adaptive and allows the rules to evolve based on feedback from the human and natural elements of the system (Chaffin et al., 2014). All the ideas discussed by Chaffin et al. can equally be applied to LSER.

Adaptive regulation can be applied to laws including LSER laws, but it's not easy. Laws can be flexible regarding LSER, but that flexibility requires regulatory reform at multiple levels (Garmestani & Benson, 2013). It is desirable to have these institutional innovations, but using those techniques in environmental management when dealing with strained systems can be dangerous (Owen, 2009). This can be compounded by ecological uncertainty and restricting environmental laws (Owen, 2009). If that regulatory reform were instituted, it would require changes at all levels, including federal, state, and local requirements. The current process for arriving at prescribed outcomes used by governments and regulated entities is not always open to novel approaches (Garmestani & Benson, 2013). This would have to change to allow adaptive governance to flourish. A bottom-up legal process would have to be instituted instead of the top-down system we currently have for regulatory laws. This type of system can divide environmental problems into different categories (Garmestani & Benson, 2013). If this type of system were implemented, it would allow policymakers to determine which regulatory strategy/strategies are most appropriate and assist with choosing the correct scale (Garmestani & Benson, 2013). The system discussed by Garmestani and Benson is ideal for LSER due to the individual nature of restoration projects. Because of all the changes needed and the fact that it needs to take place on multiple levels, the assumption is that sound environmental governance is not possible in the U.S. under the current system (Garmestani & Benson, 2013). To establish adaptive governance/regulation for a LSER and for it to have the ability to meet its full potential, we need to start from the beginning.

Flexible arrangements can also be used concerning the legal perspective. The flexibility is related to the inherent possibilities built into the rules, procedures, and laws (van Buuren et al., 2015). This flexibility can be encouraged when a law is involved with developing the procedural approach (van Buuren et al., 2015). How is the law involved in developing the procedural approach? Van Buuren et al. explain that rules can impose procedural constraints on administrative decisions because they prescribe how the findings should be made, including which factors should be taken into account and how the impacts should be monitored (van Buuren et al., 2015). In theory, this approach should be easy to implement, but there are concerns about the implementation with LSER projects, which provides another risk and opportunity. Van Buuren et al. description of how flexible arrangements could work within laws would require the entire network of laws involved in directing ecosystem restoration to be rewritten. From their explanation the laws and rules for adaptive governance should be written to cater to each specific project, but that is not how laws and rules are written or implemented in our current system. van Buuren et al. include three barriers to implementing flexible arrangements from a legal perspective, but none of them discuss the complete rewrite of rules and laws that would be needed for LSER projects. The three barriers they include are the need for legal certainty, the need to protect individual rights, and the need to safeguard procedural rights, including juridical protection (van Buuren et al., 2015).

The existing governance structures of ecosystem restoration programs are one of the main challenges of using adaptive regulation. There is tremendous support for flexible governance in the literature; Olsson et al. (2004) discuss the need for flexible governance structures with the ability to respond to feedback required for ecosystems because they are such complex and adaptive systems. A study of adaptive water governance in Scotland found that it may not be enough to ensure collaboration in resource-constrained contexts. The study identified that more formal procedures, including statutory multi-stakeholder groups and political oversight, are needed to help frame and structure the interaction (Rouillard et al., 2013). The current governance structures and permitting frameworks don't have the inherent flexibility to make a transition to adaptive regulation seamless. Laws can be flexible regarding the environmental management of dynamic ecological systems, but that flexibility requires regulatory reform at multiple levels (Garmestani & Benson, 2013).

Lack of Implementation Guidance to Practitioners

During my research on the implementation of adaptive governance, it appears that restoration practitioners are not considered. Whether formal institutions or informal procedures are implementing adaptive governance, the focus ends up being on the concept of adaptive governance and what that means. While these are important aspects of implementing adaptive governance frameworks, we should also investigate what adaptive governance looks like and how practitioners can implement these concepts in the real world. The solution is to understand the core adaptive governance concepts better so they can be adequately explained to the practitioner community (Hill Clarvis et al., 2014). Including the practitioner community in the discussion of how adaptive governance should be implemented is one of the most significant opportunities for LSER and adaptive governance. For my study I'm focusing on the viewpoints of practitioners because they have firsthand experience with the permitting of restoration projects. When implementing a new governance structure, it's essential to get feedback and input from practitioners. Adaptive regulation can provide the framework needed to ensure practitioners are included in the regulatory process.

Integration with Policy & Science

There is a growing need to integrate ecological restoration into legislative, regulatory, and planning frameworks and policies informed by science (Aronson & Alexander, 2013; Jørgensen et al., 2014). Ecological restoration should draw upon policy analysis and include the study of political science, multilevel governance, institutions, interests, and power relations (Baker et al., 2014). As demonstrated in the literature, ecological restoration is needed in the governance and policy arena, but how this is accomplished is a different question. This integration aims to foster a connection between researchers and decision-makers on all levels, including local practitioners, regulatory agencies, and policymakers (Jørgensen et al., 2014). There are three ways policymakers use science: to identify new ideas, to identify solutions to problems, and to support established positions (Jørgensen et al., 2014). For the combination of these three things to happen, there are actions that need to be taken by both scientists and policymakers to make the integration seamless and beneficial. Scientists could demonstrate the applicability of restoration research to policy issues, convey restoration findings to policymakers, provide linkages between policy problems and solutions and include actionable messages in ecological restoration research (Jørgensen et al., 2014). Policymakers could develop policies incorporating the latest restoration science, include ecological restoration in policy discussions, and use restoration to support specific legislation when possible (Baker et al., 2014; Jørgensen et al., 2014). Having policymakers and restoration scientists contribute to integrating ecological restoration into governance and policy is the first step in the process. Adaptive regulation can be the framework for adapting policy decisions to the real world (Chaffin et al., 2014). This is also true for LSER.

Policymakers are being made aware of the inherent uncertainties associated with adaptive regulation. This is important because they know the need for deliberation when developing and redefining the governance arrangements (Rijke et al., 2012). Environmental issues are complex and consist of problems in several different domains. The domains include policy, social, economic, and ecological. Addressing issues within one of these domains at the expense of the others leads to partial solutions (Gunderson & Light, 2006). The risk of partial solutions is why providing more guidance to practitioners is so important.

A case study about the governance and management dynamics of restoration in Sweden provides an example of how to improve platforms for governance innovation. In "Governance and Management Dynamics of Landscape Restoration at Multiple Scales: Learning from Successful Environmental Managers in Sweden," Dawson et al. (2017) investigate the degree of successful landscape restoration and how that can be used to understand transformation platforms for governance innovation. In their discussion, they indicated that there are only a few cases to choose from and their results should be considered exploratory. Traditionally, natural resource management and restoration governance have consisted of simple linear growth strategies implemented by command and control governance (Dawson et al., 2017). This type of system has failed to account for the unpredictability and uncertainty inherent in complex social-ecological systems (Dawson et al., 2017). The same is true for LSER. The adaptive approach is now seen as a better way to govern these complex systems (Dawson et al., 2017). Dawson et al. conducted interviews in their research, went on guided field trips, and held workshops to collect data. The case studies included Ekoparks, a national-scale forest biodiversity restoration, a regional-scale wetland restoration at Rynningviken, and a local-scale river restoration at Hedstrommen. In each of these cases an unpredicted event provided a window of opportunity for restoration, but this window of opportunity was not enough to make action happen there also needed to be a person/people who had the required knowledge and initiative for the needed transformation to occur (Dawson et al., 2017). The next step in the process was identifying critical challenges facing the governance and management of landscape restoration in Sweden. One challenge identified by the authors was the limited suitability of the institutional and regulatory frameworks being used as drivers for the development of landscape restoration projects (Dawson et al., 2017). For adaptive governance to be implemented, the regulations must be flexible and transparent. The authors identified that the strict regulatory frameworks in Sweden are limiting practitioners' freedom to actively experiment, which is needed in restoration projects (Dawson et al., 2017). The same can be said for the regulatory framework for restoration projects in the United States. When discussing LSER, flexible and transparent regulations must be instituted to move restoration forward in the US. Adaptive regulation sets up the framework for that process.

CHAPTER VII: CONCLUSION

In summary, the data collected within the confines of my study provides preliminary evidence and demonstrates support that the regulatory permitting process is having a negative effect on large-scale ecosystem restoration projects and that adaptive regulation is a good fit for reorganizing the permitting process to enable learning and modification of policy over time. Knowing this information provides a starting point for updating/revising the regulatory permitting process for LSER projects. My findings are relevant to the regulatory community associated with LSER projects. This group includes federal and state agencies, private entities, and public entities. The results are also significant to the field of ecosystem restoration. The data synthesized in this research provides a good starting point for other restoration projects. It can also serve as a lesson-learned document so other ecosystem restoration projects have a road map of what to expect when working with regulatory agencies and making schedules that reflect realistic permitting timeframes. The results of this research also show that there is a need to update regulatory laws and policies and remove regulatory barriers for LSER.

The adaptive regulation literature demonstrates that adaptive regulation as a theory holds wide appeal (Karpouzoglou et al., 2016), and research in this field is increasing every year. This is great for the field of ecosystem restoration. While there are barriers and challenges to implementing adaptive regulation in LSER ecosystem restoration programs, there are also opportunities. As the adaptive regulation field matures and more research extends into the application and real-world implementation of LSER, we can anticipate solutions to those barriers and challenges. Those barriers are the current governance structures of LSER projects, the current permitting process for LSER, a lack of implementation guidance for practitioners and integrating policy and science into the process. Addressing these barriers to implementing adaptive regulation for LSER projects would provide clear pathways to establishing adaptive regulation in the wetland permitting process.

My research identified a gap in the literature. There isn't an abundance of literature on the wetland permitting process and even less on the wetland permitting process specific to LSER projects. I didn't find any adaptive regulation literature addressing the regulatory permitting process of large-scale ecosystem restoration, which supports the idea that my research is filling a gap in the literature. The institutionalization of adaptive regulation would need to include the formalization of networks into organizations, the creation of governance organizations scaled to address the ecological problem specifically, the devolution of the current government authority, and legal reform (Chaffin & Gunderson, 2016).

The recommended approach of using adaptive regulation in the permitting process of LSER would address the uncertainties of the restoration process up front through permit design. It would also provide the opportunity to continually evaluate the progress of the restoration throughout the entire project lifecycle instead of just at the end of the project once it is complete.

CHAPTER VIII: RECOMMENDATIONS

It is hoped that the results of this research will open a dialogue with regulatory agencies involved in the wetland permitting process for LSER. This will be accomplished by a multifaceted approach to recommendations. The first action will be to share the results of the research with my participants and ask them to review and provide feedback about the process. Then I would ask them if they would share the results with any of their coworkers that may have an interest in the study results. As previously established, the participants for this study are all either LSER practitioners or permit writers. This sharing of results will get more exposure not only to my study but also to the concerns associated with LSER and the permitting process. This first step begins the conversation with regulatory agencies, who in most instances don't have the big picture of how the permitting process is affecting LSER projects. The data collected from this study provides some evidence to begin that conversation.

Second, I would like to present my findings at the Society for Ecological Restoration National Conference on Ecosystem Restoration. Presenting a poster at this conference would provide the opportunity to discuss my research and findings with restoration practitioners from across the country and potentially from across the world. Conducting my research provided me the opportunity to explore ecosystem restoration projects and permitting practices in other countries and I think being able to have those conversations with academics and practitioners from across the globe would be worthwhile. While the regulatory processes are not the same, I'm sure there are shared experiences that could be beneficial moving forward.

My research identified two gaps in the literature associated with the wetland permitting process of LSER projects and applying adaptive regulation for LSER projects. Part of sharing the results of my research includes developing two articles and working to have them published. One article is focused on the Q-sort that was conducted and the results of that process. This study employs a novel application of using Q-methodology in environmental permitting in the United States. This will draw attention to the lack of information on the wetland permitting process and how it is affecting LSER projects. The other article focuses on the literature review and the use of adaptive regulation for LSER projects. Adaptive regulation can be applied to any industry or subject matter so being able to expand the literature on the specifics of adaptive regulation and LSER projects could start the conversation in academia and hopefully draw more of an interest from future researchers. A significant portion of preparing the articles will be identifying which journals are suitable for publishing these types of articles.

The Q-sort conducted as part of this research brought to light some of the concerns from practitioners and permit writers about the wetland permitting process of LSER projects. I would like to expand on the original Q-sort especially with the number of participants. Having the completed Q-sort and being able to discuss the findings from it with potential participants will establish a better understanding of what the goal of the expanded Q-sort anticipates. It will provide potential participants with a summary of how the Q-sort process develops and what the results will look like. There was a reluctance from potential participants for the Q-sort I conducted for this research. None of the potential participants had heard of Q methodology and were unsure what the process would produce. There was also a bit of reluctance from current permit writers about how the data was going to be used. Having the results from the original Q-sort and being able to demonstrate how the data were used and what information a Q-method study can generate will alleviate most of the reluctance experienced during the original Q-sort. In addition to expanding the p-set I'd also expand the concourse to have some additional statements about adaptive regulation and how it could be implemented to improve the permitting process.

After conducting the additional Q-sort and analyzing the data I propose using the information to develop a framework for implementing adaptive regulation into the wetland permitting process. Developing a framework for how to implement adaptive regulation would provide a starting point for regulatory agencies to review their processes. The first possible solution is to create entirely new environmental policies and regulations to incorporate adaptive regulation. This solution is time-consuming, expensive, and would require the creation of new Federal laws or significant changes to Federal laws already in place. The recommended solution is to incorporate a phased approach to implementing adaptive regulation for complex LSER projects. This solution allows the regulators and practitioners to work together to fulfill the requirements of the wetland permitting process. Adaptive regulation is a structured process that enables learning and modification of policy over time. A rough outline of what should be included in that framework are established timeframes for data collection and analysis, time for learning and modifying policy or regulatory guidelines. The time spent developing the adaptive regulation plan would allow practitioners to be proactive when it comes to regulatory concerns instead of reactive like the current system. The culmination of all the recommendations is to write a white paper to the USACE with the findings of both Q-sorts, summary of the literature review and a draft of the framework for implementing adaptive regulation into the permitting process.

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APPENDIX A: RECRUITMENT EMAIL

Participation Needed: Relationship between Current Wetland Environmental Permitting Regulations and Large-scale Ecosystem Restoration (LSER) Projects

I am a researcher from Antioch University New England conducting a research study on restoration practitioners' and permit writers' viewpoints on how the wetland permitting process affects LSER projects. I have a Q-Method survey that will take approximately 30 minutes to complete. A Q-Method survey consists of a set of statements that participants sort into an array of columns, demonstrating the way they think about a defined topic. The set of statements is created to represent a range of possible viewpoints on the topic of research. Unlike a standard survey where each question can be answered independently of the other, Q-method makes participants rank the statement relative to each other. You may participate in this study if you have experience associated with ecosystem restoration and/or wetland permitting in the United States.

Your participation in this study is completely voluntary. I'd like to have all responses completed by Monday February 6, 2023. If you have any questions about the research prior to taking part, please contact the principal investigator, Jennifer Auger at [email address].

If you would like to participate in the Q-method survey, please click on the link below and you will be directed to the informed consent page.

Thank you for your participation. [Link to Q-sort]

APPENDIX B: CONSENT FORM

You are being invited to participate in a research study titled. “Adaptive Regulation for Ecosystem Restoration: A Context for Effective Environmental Permitting.” This study is being conducted by Jennifer Auger from Antioch University New England. You were selected to participate in this study because you have experience associated with the wetland permitting process for large-scale ecosystem restoration (LSER) projects, are above the age of 18, and reside in the U.S.

The purpose of this study is to explore the relationship between current wetland environmental permitting regulations and LSER projects, with a focus on restoration practitioners and permit writers’ viewpoints on how the wetland permitting process affects LSER projects. We are interested in hearing your opinions about a wide array of issues and actions related to the wetland permitting process of LSER projects. If you agree to take part in this study, you will be asked to complete an online Q-sort. This Q-sort will ask you to read statements and sort them based on the scale (6+) strong support for/most like I think to (6-) weak or no support for approach/least how I think. The entire Q-sort will take approximately 30 minutes to complete.

You may not directly benefit from this research; however, we hope that your participation in the study may help the research team better understand the relationship between current regulatory wetland permitting processes and LSER projects.

We believe that there are no known risks associated with this research study; however, as with any online activity, the risk of a breach of confidentiality is always possible. To the best of our ability, your answers to this study will remain confidential. We will minimize any risks by never asking for your name or other identifying information. In addition, all data collected as part of this research will be maintained on a password-protected computer.

Your participation in this study is completely voluntary and you can withdraw at any time. If you have questions about this study or if you have a research-related problem, you may contact Jennifer Auger by calling them at XXX-XXX-XXXX or emailing. If you have any questions concerning your rights as a research subject, you may contact IRB institutional review board Chair at AUNE, Dr. Kevin Lyness at [email address] or AU Dean for the School of Environment, Ben Pryor at [email address]

By clicking “I accept” below you are indicating that you are at least 18 years old, have read and understand this consent form, and agree to participate in this research study.

APPENDIX C: INSTRUCTIONS & NOTES FOR PARTICIPANTS

Instructions:

1. Q-TIP generates a random URL for each participant, and researchers send each participant their unique link. This means you do NOT need to register for / log into Q-TIP to complete your sort.
2. As a participant, when you open your unique link, at the top of the page you will see the "stack" of statements the researcher is asking you to sort. You will also see empty spaces in pre-set columns below. Your task is to click each statement and drag it to a spot.
3. Which spot? The columns are laid out on an axis from "weak or no support for approach/least like how I think" to "strong support for approach/most like how I think."
4. You can move statement cards between columns as long as there is space in the target column.
5. If the target column is full, you can move the statement card back to the stack and open up space in the desired column by moving its statement cards around.
6. After you've placed all the statement cards from "weak or no support for approach/least like I think" to "strong support for approach/most like I think", you will be asked to indicate which column of statements you feel the most neutral about (this may or may not be the middle column). You will also be asked to provide written reflections on up to seven of the statements you sorted, this is voluntary.
7. When you are finished, you can click "Save and Exit" and safely close your browser window. Your input (but no identifying information) will be recorded in a secure database accessible only to the researcher.

Notes to Participants:

- Scale (6+) strong support for/most like I think to (6-) weak or no support for approach/least how I think
- All statements should be read in the context of large-scale ecosystem restoration projects.
- Regulatory permitting process = wetlands permitting
- Adaptive Regulation definition - A Structured regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis.

APPENDIX D: DISTRIBUTION TABLE, SORTING QUESTION & SCALE

Sorting Question - What current regulatory process elements are helpful to achieving timely and effective large-scale ecosystem restoration and what changes could be implemented to enhance the regulatory process?

Scale - (+6) strong support for the approach to (-6) weak or no support for the approach

-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6

APPENDIX E: EXTERNAL LINK DISCLAIMER

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Deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce disaster risk.

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APPENDIX F: PERMISSION TO USE FIGURE

Jennifer Auger [redacted]

Permission to Use a Figure

2 messages

Jennifer Auger [redacted] Sat, Jul 8, 2023 at 5:37 PM
To: [redacted]

Hello,

My name is Jennifer Auger, I'm a Ph.D. candidate at Anitoch University New England. My dissertation focuses on the effects of the regulatory permitting process on large-scale ecosystem restoration projects. I read your article *Building Efficient Environmental Permitting Processes* published in January 2017. Your article was fundamental in gathering support for my hypothesis that permitting process is negatively affecting large-scale ecosystem restoration projects. I'm requesting permission to use figure 1 The Permitting Process from your article. Please let me know if I have your permission to use the figure or if you need any additional information from me.

Thank you for your time and consideration.
Jennifer Auger

Nicola Ulibarri [redacted] Tue, Jul 11, 2023 at 7:34 PM
To: Jennifer Auger [redacted]>

Hello Jennifer,

Yes, you have permission to use the figure. It's published with a creative commons CC-BY license, so you are welcome to use the figure (or adapt it) as long as you provide attribution for the original source.

Cheers, and best of luck with your thesis!
Nicola

Nicola Ulibarri
Associate Professor
Department of Urban Planning & Public Policy
University of California, Irvine
[redacted]