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Looking to the Future of Wildlife Conservation: Durable Wildlife Policy for the 21st Century

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LOOKING TO THE FUTURE OF CONSERVATION: DURABLE WILDLIFE POLICY FOR THE 21ST CENTURY

By

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Looking to the Future of Wildlife Conservation: Durable Wildlife Policy for the 21st Century

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ABSTRACT

Wildlife conservation in the United States was built by the dollars of consumptive users. Monies from the sale of hunting licenses, as well as excise taxes on firearms, ammunition, and archery tackle through the Pittman-Robertson Federal Aid in Wildlife Restoration Act (PR), currently fuel a complex system of wildlife conservation via multiple levels of government. However, the number of hunters in this country is rapidly declining, the sale of firearms and ammunition is increasingly unrelated to hunting, and contemporary consumers tend to express different values than traditional hunters. These changes pose significant challenges of relevancy and funding to state and federal fish and wildlife agencies charged with wildlife management and conservation. This thesis seeks to contribute to three topics that are relevant to the future of the field of wildlife conservation by clarifying commonly used – but rarely defined – language, analyzing state-specific responses to declines in funding for conservation, and analyzing concerns regarding the North American Model of Wildlife Conservation.

The first chapter of this thesis aims to clarify terms commonly used in scholarship related to the *take* of wildlife to facilitate clear communication. When definitions vary among practitioners and academics, misunderstandings and breakdowns in communication arise. Reconciling distinctions between legal and social licensure facilitates more accurate depictions of *take*. The second chapter catalogues and analyzes dedicated revenue generated for state wildlife agencies via 25 distinct mechanisms and sought to identify factors which influence intrastate diversity in dedicated revenue. The third chapter examines a growing body of literature regarding the North American Model of Wildlife Conservation and finds significant variation in critiques of this concept. I address these concerns in the historical context of the model.

In short, this thesis addresses wildlife communication, the funding model of wildlife conservation, and a model which describes one interpretation of the laws and policies which differentiate wildlife conservation in the United States and Canada from the rest of the world. It is my hope that this work will be of some use to those who seek to conserve wildlife and wild places for future generations.

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This body of work would not have been possible without the love and support of family and friends, and I am profoundly grateful for all of them. I could not have gone through this program and all it entailed without my fiancé Katherine by my side. From the University of Montana-East Lansing (UMEL) campus where we began this endeavor to our home in Missoula, she patiently read countless drafts of this document and is owed more acknowledgements than this section can contain. I can't thank her enough for relocating our lives and careers to Western Montana and am so very excited to continue that life together. My parents have provided decades of unwavering support and opened this world for me. Their careers have taught me the importance of people and the strength of personal and professional networks. Their lives have shown me how to live and work with compassion and integrity. They have always been my biggest supporters and I would not be the person I am today without them.

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"In the end, our greatest threat may not be the scientific illiteracy of the public, but the political illiteracy of scientists" – Gregory van der Vink

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REFLEXIVITY STATEMENT

Several years ago, I co-authored an article titled "The Application of Reflexivity for Conservation Science," which outlines a framework for researchers to situate themselves and their positionality in their work. In the spirit of practicing elements which we suggested, I provide the statement below in reflection of how my own positionality influences me as a scholar and a practitioner.

I would be remiss if I did not acknowledge my position in society, as well as our field. I am not a Person of Color, a woman, or a member of the LGBTQ+ community, nor am I a member of a First Nations/Indigenous group. The privilege I carry as a white man inherently impacts the lenses through which I view the world and inherently bias my role in the research process. I recognize these biases and actively work to learn from scholars who are members of diverse communities to conduct research and other professional endeavors more holistically. The impacts of my position in society certainly extend beyond wildlife research, but these impacts are also part of the traditions and norms of the fields of natural resource management. Beyond these factors, it is important to consider the impacts of my lived experiences in this writing. I am a member of the hunting and angling public and work on behalf of organizations that explicitly work to protect the interests of hunters and anglers. Readers of this work should know this. It has been important for my personal and professional development to reflect on my position in society throughout the process of constructing this thesis.

It is also important for me to intentionally consider the role of the Boone & Crockett Club in providing support for me to do this research and the role that Club staff and regular members have played in this process. I work to remain cognizant of any impacts that this might have on the work that I conduct.

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CHAPTER 1: Reconciling Distinctions Between Legal and Social Licensure Creates More Accurate Depictions of Wildlife *Take*

"The single biggest problem in communication is the illusion that it has taken place"
– George Bernard Shaw

ABSTRACT

The *take* of fauna and flora is of interest to conservationist researchers and policymakers globally. The term *take* broadly refers to the removal of species from their environment by means of capture, collection, or killing. However, variation in the application of terms used to refer to *take* abound creating confusion in science and society alike, hindering effective implementation of policies and clear application of conservation research. Here, we present a conceptual framework to reconcile variation in the use of *take* by focusing on the inherent legal and social dimensions. We clarify the division among terms commonly used in policymaking, popular media, and scientific literature related to *take*. Under this framework, there are several terms to describe varying acts of *take*, each of which includes distinct terms for both the legal and social license. We constructed this conceptual framework by collating existing terms and categorizing them for better clarity and to improve the implementation of policy and research.

INTRODUCTION

The *take* of flora and fauna has important implications for the conservation of biodiversity globally and is integral to wildlife research and policy worldwide. *Take,* however, is an umbrella term encompassing several related terms describing the capturing, killing, or collecting of species (Muth & Bowe 1998). Thus, *take* often refers to the removal of an individual animal from its environment (Serenari & Peterson 2016). Words like harvest, consumptive-use, poaching, and hunting, as well as modifiers of these terms such as "subsistence hunting" or "trophy hunting," are all used to refer to *take*. Thus, forms of *take* can be intentional

or unintentional, legal or illegal, and exhibit substantial variation in social acceptance. However, terms for varying forms of *take* are regularly used interchangeably which can encourage incorrect conflation or the assumption that the words are synonymous (Rizzolo et al. 2017). Consequently, *take* can be readily misconstrued, misused, or comingled with similar, and yet importantly different, terms (Muth & Bowe 1998; Eliason 1999; Serenari & Peterson 2016). Such cases of inconsistent language and confusion are prevalent across the scientific literature and the popular media (Sandbrook et al. 2013). By clarifying *take* and providing terminology inclusive of both legal and social licenses, we establish a foundation for conceptualizing the relationships between these important concepts.

If confusion surrounding *take* persists, there will be effects on conservation policy implementation and on the applicability of research pertaining to *take*. Notably, disconnects in language between research and policy can impede efforts to convert scientific findings into practical management or policy actions. Miscommunication about varying forms of *take* can negatively impact the applicability of research to be applied and effect the implementation of wildlife and natural resource policy. Inconsistent language further widens the research implementation gap between scholars and practitioners (Gray et al. 2020). For example, if a researcher uses the word "hunting" to identify a form of *take* which contributes to the decline of a population of a given species, the manager they are speaking with would identify that the issue in question has to do with the laws and policies which govern that specific form of *take*. However, if that researcher uses the word "hunting" and is actually referring to "poaching," a very different legal license for *take*, then the root of the problem could be entirely different, in this case, likely being non-compliance with regulations or an external motivation which exceeds the penalties put in place by law. If such miscommunication occurs, the solutions developed to

address population decline in this case could be targeted at a tangential issue. However, if a scholar used the words "commercial poaching" to describe the issue in terms of both social and legal licensure, managers and policymakers would have a more immediate understanding of the motivation and legal standing of the issue. The research community could benefit from adopting terminology for *take* from the conceptual framework presented here. Similar situations of miscommunication may occur when language for *take* in statutes, rules, or regulations differs is incongruent with what regulators or enforcement personnel are facing in the field. Using clear language, which incorporates both legal and social licensure, can alleviate these issues.

Considerable progress in standardizing language has been made in the fields of conservation and ecology over time e.g., terms defining habitat; (Hall et al. 1997); bear management strategies; (Hopkins et al. 2010), zoonotic disease mitigation; (Shapiro et al. 2021); and types of poaching; (Muth & Bowe 1998; Eliason 1999; Montgomery 2020). Similar attention now needs to be extended to *take.* Here, we present a novel conceptual framework built by collating and categorizing existing terms relating to *take*. This framework clarifies descriptions of *take* and better equips researchers and policymakers to communicate about this complex topic (Fig. 1). We focus on intentional *take*, using the distinction observed by Stoll (1975) between intentional and unintentional illegal *take*. We organize *take* into a framework which combines legal and social licensure. Legal licensure describes the legality of performing an act of *take* while social licensure describes the motivations of the individual performing said act. Within the framework we present, complete terms for different forms of *take* include both legal and social components.

We apply our framework to terrestrial wildlife; however, we note that the concepts organized herein are widely applicable to all manner of taxa of flora and fauna. We also

acknowledge that the term *take* itself centers this discussion around Western language, particularly that of the United States, and that the concept of *take* may not be universally applicable in non-Western cultures. While different legal or social licenses may be applied in other contexts or vary in translations from English, thoughtfully organizing language to encompass both legal and social dimensions of *take* is universally appropriate (Montgomery et al. 2020a). The common definitions presented in this framework reduce confusion and ambiguity to better facilitate the application of research and the implementation of wildlife policy around issues involving *take*.

SOCIAL LICENSURE

Individuals who *take* wildlife from their environment do so in the context of widely ranging societal values and attitudes (Peterson 2004, Bonner 2008). While the acceptance or denial of a legal license is defined by wildlife governance institutions and granted as licenses, tags, or stamps, social license for *take* is merely descriptive. The term "social license" has been explored throughout the environmental sciences and recently applied to the *take* of wildlife (Wilburn & Wilburn 2011; Darimont et al. 2020). Here, we provide a framework for collating descriptive language of social licensure for varying motivations of *take*. These licenses may not be physically held and are never formally issued, assessed, or denied. Under this framework, social licenses are descriptive of the motivations, or needs fulfilled by, an act of *take* and are the basis by which individuals are judged by society for their actions (Darimont et al. 2020). Need-fulfillment and motivation have been found to be a contributing factor to social acceptance of varying forms of *take* (Duda et al., 2019). We provide the adjectives below as examples of social licenses and describe each by the need fulfilled by, or the motivation for, conducting an act of *take* (Table 1).

While other terms may be used to denote social licensure, these terms represent several primary motivations for, and needs fulfilled by, the *take* of wildlife. If more than one social license might apply, it is most appropriate to apply the social license which describes the most salient motivation for the act of *take.* In applying these terms, certain acts of *take* may fulfill more than one need or be motivated by multiple variables. Determining the primary social license requires a critical examination of the motivations of the person conducting the act of *take*. We recommend applying the social license which best describes the act of *take* and recognize that several competing factors may lead to a confusing social licensing situation.

It is important to note that the language used to describe social licenses may vary in differing contexts. For instance, "bushmeat" may be a colloquial term equal to subsistence social license, "harvest" may refer to subsistence or management social licensure. Acceptance of social licenses may also differ broadly depending on socio-cultural frameworks, especially when these varying frameworks overlap or conflict in differing social, economic, ecological, or political contexts. The relative positionality of the person conducting the act of *take* must also be considered. In short, social licenses are subjective, depending on a variety of factors. For example, perceptions of *take* conducted under a *"*trophy*"* social license may be perceived differently by people in different areas of the world, and at different scales of influence (Batavia et al. 2019; Mkono 2019). Alternatively, certain forms of *take* fulfill traditional, indigenous lifeways which are impossible to replicate otherwise (Bennett et al. 2017; Eichler & Baumeister 2018; Montgomery et al. 2020a). Further, the species of wildlife and the method and manner of *take* may also play a role in the public's interpretation of the appropriateness of social licensure (Montgomery et al. 2020b). Regardless of these variations, it is critical to consider and apply language to describe social licensure when completely describing an act of *take.* In describing an

act of *take*, the social license precedes and modifies the term used to describe the relevant legal license, as described below.

LEGAL LICENSURE

Unlike social licensure, legal licensure determines whether an individual is conducting an act of *take* that is sanctioned under law (Campbell & Mackay 2009). *Take* was legally defined in United States statute under the Lacy Act of 1900, one of the first major federal laws regulating wildlife in that country, however, *take* has been applied widely on a global scale (*16 U.S.C. §§ 3371-3378* 1900). Here *take* was defined in statute as the "capture, killing, or collection" of any animal, fish, or plant (*16 U.S.C. §§ 3371-3378* 1900). This definition has since been expanded, in the context of endangered species to include actions to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" wildlife (*16 U.S.C. §1531* 1973). Legal licenses may be granted to individual people or companies to authorize an act of *take* (e.g., licenses, permits, or stamps) or be promulgated for certain species (e.g., species classified as "pests" or "vermin") (Crowley et al. 2018). Legal licenses may also be differentiated by whether *take* is active or passive, or whether the *take is* lethal or sublethal. Active *take* is conducted directly by the individual conducting an act of *take* (e.g., shooting), whereas passive *take* is conducted via an instrument employed by the person conducting the act (e.g., trapping). Lethal forms of *take* aim to result in the death of the individual species being *taken*, while sublethal *take* does not intend to result in the death of the individual species being *taken*.

All legal *take* occurs within a set of rules and regulations outlined by relevant governing bodies at local, provincial, state, national, and international scales. Alternatively, *take* may be conducted illegally if done by an individual lacking a legal license, of a species not generally

permitted, or in violation of any given set rules or regulations (Stoll 1975). We recognize that enforcement of legal licenses may be variable and are subject to a variety of inherent biases. We organize several legal licenses along the vertical axis of Figure 1. We incorporated several legal licenses into the framework we propose (Table 2). These terms describe the legal licensure for acts of *take*. Individuals who hunt are called "hunters," those who conduct trapping are called "trappers," individuals who poach are called "poachers," and so on.

APPLICATIONS OF SOCIAL AND LEGAL LICENSURE

Within this framework of legal and social licenses, an individual who possesses a legal license to actively *take* wildlife, and who acts in accordance with all relevant rules and regulations, is a hunter. This classification of a legal license is codified in laws and regulations. If that hunter is mainly conducting an act of *take* primarily to fulfill the basic need of providing food for themselves or their family, the act of *take* could be described as "subsistence hunting" (Roy 1994). We suggest practitioners use this framework to help carefully craft their language in discussions of *take.* For example, under this framework presented here, the word "subsistence" denotes the social license under which the act of *take* was conducted while the word "hunting" describes the legal licensure, as noted at the intersection of the social and legal licenses in Figure 1. In another instance, an individual who violates a legal rule while conducting an act of *take* is a poacher. If this poacher is conducting an act of *take* for the purpose of obtaining a trophy, they would be committing an act of "trophy poaching" under this framework. Here, "trophy" denotes the social licensure of the act and "poaching" describes the legal licensure, or lack thereof, in this case. While the legality of these acts may not be determined outside of a court of law, the social licensure of these activities is open to be accepted or rejected by any one individual based on their ethical or moral standing. For example, some may view an act of "subsistence poaching" as

more socially acceptable than an act of "commercial poaching." Additional context, such as the positionality of the individual conducting the act, charisma of certain wildlife, the adherence to certain principles of responsible or ethical practice (e.g., *Fair Chase*), or the distribution of animal protein to a local community can alter the acceptability of an act of *take*.

Certain social and legal licenses are commonly combined. For example, permitted *take* of "pests" or "vermin" are, frequently associated with a "categorical" social license – a socialized desire to remove certain species from the landscape because of the harm or perceived harm that that species does to the broader ecosystem or to humans (Crowley et al. 2018). Often, legal licenses are modified to reflect this social desire to remove certain species of wildlife, so these species are broadly permitted for *take* and "categorical killing" becomes a common combination of social and legal licenses (Crowley et al. 2018). Alternatively, certain legal licenses restrict social licenses from being exercised. For example, in the United States, hunters are not permitted to financially benefit from the sale of meat (Geist 1988), making "commercial hunting" of most game species in the U.S. legally impossible, regardless of whether that social license might be accepted by some individuals (Vercauteren et al. 2011).

Perceptions of different social licenses also vary widely depending on broader socio-economic and ecological contexts. In many cases, *take* which is conducted under a social license to fulfill a basic need, such as feeding oneself or one's family/local community, is typically viewed far more favorably by others than those acts of *take* conducted under other motivations (Mkono 2019). For example, 84% of Americans approve of hunting for food, however, only 29% approve of hunting for animal trophies (Duda et al. 2019). However, this statistic is variable among several communities within that country and is sure to be different in communities around the world where issues of *take* are relevant to conservation efforts. When an individual travels to

another country to conduct an act of *take,* they are also perceived differently by both their peers at home and those living in the place where they travel to (Gunn 2001; Batavia et al. 2019; Mkono 2019). Beyond this discussion, there is also a wide range of perceptions relating to varying types of poaching. While all forms of poaching are illegal and punishable by law, there are certain types of poaching that are widely understood, if not accepted (Muth & Bowe 1998; Eliason 1999; Serenari & Peterson 2016). To this end, all else equal, "subsistence poaching," where an individual *takes* wildlife illegally to provide food for their family, is frequently more socially acceptable than "trophy poaching" where a person or group might kill wildlife for a piece of that specific individual animal, like a tusk, horn, feathers, scales, or pelt (Gunn 2001; Duda et al. 2019; Batavia et al. 2019; Mkono 2019). The subjective nature of social licensure, and the innumerable contexts in which it must be considered, must be recognized, and communication adjusted accordingly to encompass this wealth of knowledge (Darimont et al. 2020).

CONCLUSION

In further considering policies and laws surrounding *take*, it is critical to question the impacts of that action on ecological communities, the responsibility of the individuals conducting that act in the context of larger market and societal pressures, and to identify the scale of the effects of certain acts of *take.* To this end, policies governing issues of *take* must also include an acknowledgement of the ownership of wildlife, and who wildlife might be *taken* from. In the United States and other countries which ascribe to a form of public trust doctrine or public trust thinking, intentionally *taken* wildlife are removed both from an ecosystem, but also from communal ownership (Organ et al. 2014a, 2014b; Nie et al. 2020). Monetized legal *take* can be used to generate funding for conservation and wildlife management (Arnett & Southwick 2015).

It is also critical to note that regimes of wildlife ownership differ globally and are underpinned by broader sociopolitical histories, including colonial occupation, subjugation of indigenous peoples to reservation systems, and varying government regimes (Prendergast & Adams 2003; Steinhart 2006; Eichler & Baumeister 2018). Frequently, these systems of ownership and tenure impact the capacity of individuals to gain legal licensure to *take* wildlife resources – or may hamper the widescale acceptance of certain social licenses. It is also critical to consider this framework of terminology for *take* in the context of broader social and cultural dynamics, notably in consideration of access to legal forms of *take* and a broader societal discussion of what motivations for *take* are widely acceptable (Steinhart 2006).

As humans, we maintain complex relationships with wildlife – we utilize several taxa of terrestrial and aquatic wildlife for food, clothing, tools, and other reasons (Pluhar 1988). However, our relationships with wildlife have evolved over time (Kareiva et al. 2011). There are a wide variety of means by which *take* may occur, and an even wider set of terms used to discuss these actions. Each form of legally and socially licensed *take* describes different relationships that people have with wildlife, ranging from the trophy collection of queen conch (*Strombus gigas*) in the Caribbean and the categorical killing of invasive plant species, to the commercial poaching of African elephants (*Loxodonta africana*) and the subsistence trapping of fish. Today, wildlife of all taxa are hunted, poached, killed, trapped, and collected on a global scale. Our ability to conserve biodiversity, maintain resilient ecosystems, and respond to the wicked problems of the discipline of conservation biology depends on our ability to communicate clearly with one another. The framework presented here provides a means to that end. Policy, research, management, and conservation efforts may be clarified by using this framework for completely descriptive forms of *take.*

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TABLES

Table 1. Proposed social licenses for *take*

Social License	Description	Citations
"Trophy"	A social license typically motivated by a desire to procure a piece of an animal for personal display or use. Frequently, trophies themselves are used as a symbol of status or ability.	(Muth & Bowe 1998; Mkono 2019; Montgomery et al. 2020b; Montgomery 2020a)
"Recreational"	A social license typically motivated by a desire to participate in a leisure activity or experience. Many individuals in the United States and Canada conduct acts of *take* under a "recreational" social license.	(Finch et al. 2014; Schroeder et al. 2018).
"Scientific"	A social license typically motivated by an interest in creating new knowledge	(Waugh & Monamy 2016; Fukushima et al. 2021).
"Categorical"	A social license motivated by the classification of certain wildlife species as necessary to *take* when and where they are encountered because of an inherent characteristic or socialization of that species. It is frequently applied to wildlife species which are deemed "undesirable," like certain	(Lukasik 2018; Crowley et al. 2018)

	snakes or rodents Frequently, species being *taken* under a categorical license are considered "pests."	
"Management"	A social license motivated by a desire to manipulate populations of wildlife to produce certain results in a population of wildlife, like increased populations or to produce individuals with certain characteristics.	(Campbell & Mackay 2009; Krausman & Bleich 2013).
"Ceremonial"	A social license motivated by a desire to connect to a place or group of people through tradition. Ceremony may or may not be religiously motivated.	Muth & Bowe 1998; Eliason 1999
"Medicinal"	A social license motivated by the prospects of procuring a product which may be of real or perceived pharmaceutical value to the individual conducting the act of *take* and is not sold for a profit (see e.g., "commercial" social license)	(Muth & Bowe 1998; Montgomery 2020a).
"Retaliatory"	A social license motivated by anger over the transgression of a certain individual of species of wildlife and a real or perceived need to *take* that individual	(Muth & Bowe 1998; Crowley et al. 2018)
"Commercial"	A social license motivated by profit, which will result in the sale of wildlife products	(Glover & Baskett 1984; Muth & Bowe 1998; Eliason 1999).
"Subsistence"	A social license motivated by procuring a wildlife product, typically meats, which is necessary for an individual or an immediate community to survive	(Muth & Bowe 1998; Montgomery 2020a).
"Defense"	A social license motivated by a need to immediately preserve personal safety. Application of this social license typically occurs when an individual is under duress, such as during the act of being attacked by a large carnivore species.	(Muth & Bowe 1998)

Table 2. Proposed legal licenses for *take*

Legal License	**Description**
"Hunting"	A legal license which describes a **lethal**, **active** act of *take* conducted by a **licensed individual** within the bounds and constraints of the license issued by a relevant governing body.
"Killing"	A legal license which describes a **lethal**, **active** act of *take* of a legally **permitted species** by any individual. "Killing" is a typical form of *take* of species sometimes referred to as "pests" or "vermin," which might cause harm to human activities such as agriculture damage or disease spread. "Killing" may describe a legal or illegal act of *take*, however, all illegal "killing" could better be described as "poaching" (see below).

"Capturing"	A legal license which describes an **active or passive**, **sublethal** act of *take* conducted either by a **licensed individual or of a permitted species**. Individual animals that are captured are physically restrained, either by a set mechanical device (e.g., a "live trap") or a tool employed directly by a person (e.g., a net), and may subsequently be released. Capturing wildlife is typically one step in a translocation process.
"Trapping"	A legal license which describes a **passive**, **lethal** act of *take* that involves the use of a set mechanical device (e.g., a snare) by a **licensed individual or of a permitted species**. A trapped animal may be killed immediately by the set device or killed by the individual who employed that device upon discovery of the capture.
"Collecting"	A legal license which describes an **active** act of *take* that may be lethal **or sublethal** and is conducted either by a **licensed individual or of a permitted species**. This form of *take* typically involves species of wildlife that are small, docile, or lack sufficient mobility to be picked up by a human hand. Alternatively, this term may also describe the gathering of a set of individuals of one species for comparison (i.e., creating a "collection").
"Incidental *Take*"	A legal license which is formally defined, in the United States, under Section 10 of the Endangered Species Act as *take* "that results from, but is not the purpose of, carrying out an otherwise lawful activity" (*16 U.S.C. §1531* 1973). Incidental *take* may be legal or illegal, depending on the **issuance of a license to an individual or company or broad/implicit permission** (frequently via a "4(d) rule" in the United States, or by omission if a species lacks legal protections). Incidental take may be **active or passive** and may also be **lethal or sublethal.** An animal *taken* by otherwise legal operation of a wind turbine is an example of incidental *take.*
"Poaching"	A legal license describing an illegal act of *take* – either by an **unlicensed individual, the *take* of an un-permitted species** (including those protected by law), or by an individual who conducts an act of *take* in violation of the rules and regulations outlined by the relevant governing entity (Eliason 1999; Serenari & Peterson 2016). For example, someone who possessed a hunting license, but was attempting to conduct an act of *take* outside of a set season would be in violation of the conditions of that license and would be poaching. Poaching may be **active or passive** and may also be **lethal or sublethal.**

FIGURES

Figure 1.

		Social License														
		Procuring a Rare Trophy	Challenge/ Dominance	Sport or Leisure Activity	Research	Social Conditioning	Manage Populations (Remove low quality individuals or reduce high populations)	Connect to Religion	Connect to Family	Connect to Culture	Use Animal Parts for Medicine	Prevent Threats to Crops/Livestock	Sell Animal Parts Commercially	Use Animals for Food	Protect Self		
		Trophy		Recreation	Scientific	Categorical	Management	Ceremonial			Medicative	Retaliatory	Commercial	Subsistence	Defense	Accidental	Incidental
																Accidental	Incidental
Legal License	Hunting (Active, Lethal)	Trophy Hunting		Recreational Hunting	Scientific Hunting	Categorical Hunting	Management hunting (culling)	Ceremonial Hunting			Medicative Hunting	Retaliatory Hunting	Commercial Hunting	Subsistence Hunting	Defensive Hunting		
	Collecting/Gathering (Active; Lethal or sublethal)	Trophy Collecting		Recreational Collecting	Scientific Collecting	Categorical Collecting	Management Gathering	Ceremonial Gathering			Medicative Gathering		Commercial Gathering	Subsistence Gathering			
	Capturing (Passive; Sublethal)	Trophy Capturing		Recreational Capturing	Scientific Capturing	Categorical Capturing	Management Capturing	Ceremonial Capturing					Commercial Capturing				
	Trapping (Passive; Lethal)	Trophy Trapping		Recreational Trapping	Scientific Trapping	Categorical Trapping	Management Trapping	Ceremonial Trapping			Medicative Trapping	Retaliatory Trapping	Commercial Trapping	Subsistence Trapping			
	Killing (Active; Lethal)	Trophy Killing		Recreational Killing	Scientific Killing	Categorical Killing	Management Killing (Culling)	Ceremonial Killing			Medicative Killing	Retaliatory Killing	Commercial Killing	Subsistence Killing	Defensive Killing		
	Poaching	Trophy Poaching		Recreational Poaching	Scientific Poaching	Categorical Poaching	Management Poaching	Ceremonial Poaching			Medicative Poaching	Retaliatory Poaching	Commercial Poaching	Subsistence Poaching	Defensive Poaching	Accidental Poaching	

CHAPTER 2. Dedicated Revenue Among U.S. State Fish and Wildlife Agencies

"Things simply don't work the way that students are taught in natural resource policy classes…. There is simply no way that scholars of the subject can understand the ad hoc processes that go on within only loosely defined boundaries." – Jack Ward Thomas

ABSTRACT

State fish and wildlife agencies in the U.S. depend on consistent, dedicated revenue to conduct their frontline management and conservation work. However, several of the existing mechanism for providing such dedicated revenue are being challenged. We sought to identify what factors influence dedicated revenue diversity to explain patterns, inform dedicated revenue efforts in other states, and locate system-wide vulnerabilities. To analyze such patterns, we conducted a survey of all U.S. state fish and wildlife agencies and created a nationwide portfolio of dedicated fish and wildlife agency revenues. We catalogued the amount of dedicated revenue generated by 25 policy mechanisms and found that most state-based dedicated revenue derives from three primary sources: *i*) hunting, fishing, and trapping license sales (43%), *ii*) Federal Aid in Wildlife Restoration Grants (18%; i.e., Pittman-Robertson), and *iii*) Federal Aid in Sportfish Restoration Grants (8%; e.g., Dingell-Johnson/Wallop-Breaux). The total amount of revenue deriving from these three sources, however, was variable across states with an average of 64% (SD=16%; range =32%-96%). These three sources made up 69% of state agency's dedicated revenue in FY2019. Recent declines have highlighted the vulnerabilities of overreliance on these few select funding source. Meaningful diversification of dedicated revenue is critical for maintaining the agencies at the front lines of fish and wildlife conservation; however, we did not find non-traditional revenue or dedicated revenue diversity to be associated with factors traditionally believed to influence this process. Here, our findings fail to support the assumption that politics, wildlife values, or demographic factors explain patterns in revenue diversification.

INTRODUCTION

Effective management and conservation of fish and wildlife populations in the United States (U.S.) requires stable, dedicated funding, especially for long-term management efforts (Mangun & Shaw 1984; Mckinney et al. 2005; Echols et al. 2019). Dedicated revenue is funding which is generally not subject to a legislative appropriations process and tends to be generated in predictable amounts year over year, though spending authority may still require approval. Since the 1930s, dedicated revenue for state fish and wildlife agencies has been generated primarily via taxes and fees paid by consumptive wildlife users under what is known as the American system of conservation funding (Williams et al. 2010). However, this system of funding state-based fish and wildlife management and conservation was borne out of an era when wildlife and fish species were declining in the U.S. (Blue Ribbon Panel 2016; Wright 2020). Today, the needs fish and wildlife managers are different. State governments, as well as national leaders, have worked to address these different needs in varying ways, notably by established several distinct mechanisms for generating dedicated revenue (Regan & Williams 2018). However, the extent and magnitude of these mechanisms have never been catalogued, making nation-wide analyses of their drivers impossible.

There are a variety of ways in which U.S. state fish and wildlife agencies may generate dedicated revenue. Under the traditional system of conservation funding in the U.S., hunters, anglers, and trappers are required to purchase licenses from states if they intend to harvest game species (Heffelfinger et al. 2013). The $1.5 billion annually (in FY2019) in revenue generated from the sales of these licenses in each state is then matched with nearly $1 billion annually (in FY2019) in federal grants through the Pittman-Robertson Federal Aid in Wildlife Restoration (Pittman-Robertson) and Dingell-Johnson Federal Aid in Sportfish Restoration (Dingell-

Johnson) grant programs (Regan & Williams 2018). These federal dollars are generated through an excise tax on the sale of firearms, ammunition, and archery equipment for Pittman-Robertson and fishing equipment, tackle, and motor-boat fuel for Dingell-Johnson (and the Aquatic Resources Trust Fund). Collectively, these federal grants are apportioned annually based on total state acreage (inclusive of state water bodies) and numbers of individually licensed hunters or anglers reported to the U.S. Fish and Wildlife Service Wildlife & Sport Fish Restoration (WSFR) grant program. To be eligibility for these WSFR grants, state legislatures must assent to dedicate revenues generated by the sale of hunting, fishing, and trapping licenses to fish and wildlife agencies by removing these revenues from traditional appropriations processes. These funding sources are also accompanied by some restrictions specifying that they must be spent on the conservation of birds, mammals, or fishable taxa, so expenditures are somewhat limited.

While stability in the amount of dedicated revenue is desirable for the states to conserve fish, wildlife, and habitat, traditional dedicated revenue has been generated from a small population of constituents (e.g., hunters, anglers, trappers, recreational shooters), resulting in narrowly focused investments of those funds (Beucler & Servheen 2009; Williams et al. 2010; Huffaker 2013; Serfass et al. 2018; Echols et al. 2019). While this paper does not explore expenditures, it is important to recognize the interconnected nature of revenue generation and spending, and to critically examine who benefits from the work being funded by these dollars. Dedicated funding from hunters, anglers, and trappers, as well as federal grants funded by excise taxes on equipment used by these declining constituent groups, may be vulnerable due to several prevailing trends (Duda et al. 2021). The number of hunters in the U.S. declined from 14.1 million to 11.5 million between 1991 and 2016 (U.S. Fish & Wildlife Service 2016; Price Tack et al. 2018). Excise taxes derived from the sale of firearms and ammunition are increasingly

unrelated to hunting and more related to recreational shooting (Southwick Associates 2017; Duda et al. 2021). Thus, they are vulnerable to being redirected away from wildlife conservation efforts and towards other policy priorities, ranging from shooting sports facilities to urban hospitals that treat victims of firearm violence (Southwick Associates 2017; Duda et al. 2021).

Consequently, there have been several recent attempts to diversify dedicated revenue at the federal level (Regan & Williams 2018). Actions have included the proposed Recovering America's Wildlife Act which, if passed, would provide $1.4 billion in assistance to state fish and wildlife agencies to address wildlife action plans through the WSFR program (Dingell et al. 2021). Other proposals have recommended taxing more and varied equipment for non-consumptive outdoor recreation activities (e.g., field guides, binoculars) under the Pittman-Robertson or Dingell-Johnson programs (Regan & Williams 2018). To date, none of these proposals gained sufficient support to be passed or implemented (Brennan et al. 2019). Meanwhile, several state agencies and legislatures have also made efforts to diversify funding portfolios at the state level by exploring novel mechanisms for generating revenue or by dedicating existing revenue streams. These efforts are critical both to meet ongoing programmatic needs and to continue to match new and existing federal assistance programs.

While federal policymaking is critical to ensuring robust funding for state conservation activities, it is also important and often easier, to diversify agency revenue at the state level (Beis 2005; Mckinney et al. 2005). State-level policy processes are often more navigable than federal processes, however, each state is a distinctive bureaucracy for which there is no prescriptive path. For example, several states have passed legislation and ballot initiatives to provide a greater diversity of funding for their fish and wildlife agencies (e.g., dedicated state sales tax). Fish and wildlife-themed license plates, donation opportunities on annual income tax returns, and public

land resource development have also been used to generate dedicated revenue. While several states have crafted such funding mechanisms to generate revenue for fish and wildlife conservation delivery, there is a lack of clarity in the communication of successful policies among the states (Mckinney et al. 2005). Efforts to diversify state fish and wildlife agency dedicated revenue have focused on challenges to instituting novel funding mechanisms (Jacobson & Decker 2006; Williams et al. 2010; Decker et al. 2017), identifying and describing individual mechanisms applied across a few states (Mckinney et al. 2005), or identifying potential dedicated revenue policies for only one particular state (Connell et al. 2019). No research has catalogued the amount of dedicated agency revenue by source, nor have any studies aimed to determine relevant correlates to revenue diversity. Thus, there was a need to identify and analyze dedicated funding efforts nationwide to determine influential factors in dedicated revenue diversity, inform efforts to diversify dedicated revenue efforts in other states, and locate nationwide vulnerabilities.

We present and analyze the results of a survey of the fish and wildlife agency activity in all 50 states in the United States. These data compose a nation-wide portfolio of dedicated state fish and wildlife agency revenue which identifies the proportion of nationwide dedicated revenue collected from 25 distinct sources. Additionally, we assessed factors which we hypothesized would influence dedicated revenue mechanisms, including political, economic, and demographic variables. We sought to identify correlations between several political, demographic, and geographic factors and measures of total dedicated revenue, non-traditional revenue, and non-traditional revenue diversity by fitting a suite of a priori linear models. These models provided useful information on the factors which do, and do not, impact dedicated

revenue composition at the state level. This led us to seek explanations at finer scales of analysis and to look beyond commonly-held beliefs regarding the drivers of dedicated revenue diversity.

METHODS

In collaboration with the Association of Fish and Wildlife Agencies (AFWA), we surveyed all state fish and wildlife agencies in the U.S. to identify sources and amounts of dedicated revenue during fiscal years (FY) 2018 and 2019. Dedicated revenue is critical for these state agencies because the year-to-year stability of funds provides sufficient stability for the mid- and long-term strategic planning necessary for fish and wildlife conservation work (Regan & Williams 2018). To collect these data, we distributed a survey (see Appendix A) to all 51 state fish and wildlife agency directors via a request from the AFWA President and Executive Director to complete this survey. For the purposes of this research, data was collected at the state level (i.e., the Pennsylvania Fish and Boat Commission and the Pennsylvania Game Commission are combined). Institutional Review Board approval was not deemed necessary for this study, given that these data are public and are not specific to individual people. We chose to collect these data via survey, because they are not frequently made publicly available in a standardized fashion by each state. The survey included questions about the amount of dedicated revenue each state agency recorded from more than 25 sources in FY 2018 and FY 2019 (see Appendix A for survey instrument). We aggregated and summarized revenue data by individual state and region (see Table 1). These include the Northeast Association of Fish and Wildlife Agencies (CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, and WV), the Southeastern Association of Fish and Wildlife Agencies (AL, AR, FL, GA, KT, LA, MS, MO, NC, OK, SC, TN, TX, VA, & WV), the Midwestern Association of Fish and Wildlife Agencies (IL, IN, IA, KS, KT, MI, MN, MO, NE, ND, OH, SD, and WI), and the Western Association of Fish and Wildlife Agencies

(AK, AZ, CA, CO, HI, ID, KS, MT, NE, NV, NM, ND, OK, OR, SD, TX, UT, WA, & WY). Where states are members of more than one region, their revenue was accounted in both regions. Due to privacy considerations, we do not provide state-level revenue data, but instead summarize these data at the national and regional level.

In analyzing these data, we utilized three response variables: total dedicated revenue, non-traditional revenue, and dedicated revenue diversity of state fish and wildlife agencies. We analyzed the FY 2019 values of these response variables, given similarities between the two years of data collected. The amount of total dedicated revenue reported by each state is indicative of the size and extent of the agency. We calculated non-traditional revenue as the proportion of total dedicated revenue not generated from hunting, fishing, and trapping license sales and WSFR (Pittman-Robertson and Dingell-Johnson) funds. We used non-traditional revenue as a proxy for the extent of revenue diversity. We created the dedicated revenue diversity factor by calculating a Shannon-Weaver diversity index of the non-traditional revenue sources as a measure of diversification. This index reflects both the number of revenue mechanisms and the magnitude of revenue generated and is calculated using this equation, where p_i is the amount of dedicated revenue generated by each mechanism divided by the total number of mechanisms (excluding hunting/fishing/trapping licenses and WSFR grants) in each state (Spellerberg & Fedor 2003).

$$NTRH = -\sum[(p_i)\, x \ln(p_i)]$$

Generally, states with only one source of non-traditional revenue would have low dedicated revenue diversity, while states with several of these sources have higher dedicated revenue diversity.

We hypothesized that certain political, economic, and demographic factors would be associated with total dedicated revenue, non-traditional revenue, and dedicated revenue diversity (Table 2). Given connections between traditionalist wildlife values and the American system of conservation funding, we hypothesized that mutualist wildlife values would be associated with higher non-traditional revenue and dedicated revenue diversity (Williams et al. 2010; Manfredo et al. 2017). Traditionalist or utilitarian wildlife values are often held by the consumptive users who underpin the traditional American system of conservation funding, whereas mutualist wildlife values emphasize different connections to nature and are held by a more diverse populace. Given partisan divides over government spending (and therefore revenue generation), we hypothesized that states voting for Al Gore (2000) and Joe Biden (2020) might have higher non-traditional revenue and dedicated revenue diversity, as well (McCright et al. 2014). Noting the factors used to calculate traditional sources of total dedicated revenue (hunting, fishing, and trapping licenses and WSFR grants), we hypothesized that the number of individually licensed hunters and total land area would be positively associated with total dedicated revenue. We also hypothesized that states with greater proportions of federal land and smaller population densities would have higher total dedicated revenue and lower non-traditional revenue and dedicated revenue diversity.

To evaluate these hypothesis, we fit a suite of a priori linear models (Tables 1, 2). Prior to model fitting, we assessed correlation and distribution properties of independent variables (Zuur & Leno 2016). We began this process by assessing the collinearity of each variable (Table 1, Appendix B). To test each hypothesis, we fit a suite of linear models comparing one or more predictor variable to a single response variable. Where two predictor variables were highly correlated (R^2>0.3), we avoided using them in the same model (Appendix B, Table 2).

We used Akaike's Information Criterion (AIC) to understand the support of hypotheses relative to null models. This framework assumes that the relationships between predictor and response variables are linear; that residual errors are normally distributed; that residuals have a constant variance; and that residual error terms are independent. We used diagnostic plots to check the assumption that these relationships are linear and to identify points with excessive model leverage (Arnold 2010).

RESULTS

We received feedback and data from all 50 states in response to our AFWA request to complete this survey. In total, these states reported $3.7 billion in dedicated revenue in FY 2019 from 25 different sources. Measures of central tendency showed that each agency deceived an average of $75.9 million in dedicated revenue annually, a median of $62.6 million, and a standard deviation of $57 million (range=$3.7 million-$241 million in reported dedicated revenue). We calculated the percent of nationwide dedicated revenue being generated by each of 25 distinct mechanisms (Table 3). Hunting, fishing, and trapping license revenue (43%), Pittman-Robertson Federal Aid in Wildlife Restoration (18%) and Dingell-Johnson Federal Aid in Sportfish Restoration grants (8%) made up 69% of dedicated revenue across 50 state fish and wildlife agencies in FY 2019 (SD=16%, range=32%-96%; Table 3).

These three sources, which have traditionally comprised the American system of conservation funding, made up 85% or more of the reported dedicated revenue of nearly half of the states (23 states, 46%). One of most frequent mechanisms that was *not* present in all states was the collection of donations (40 states, 80%), however, in FY 2019 this mechanism generated slightly more than $13 million nationwide (0.36% of nationwide dedicated revenue). The least common mechanism was the collection of dedicated revenue from excise taxes on the sale of

recreational marijuana in California, which generated $25 million from this mechanism in FY 2019 (0.67% of nationwide dedicated revenue). Examining the percent of dedicated revenue generated by each mechanism on a regional basis (Table 4) revealed that dedicated state sales tax revenue was highest in the Southeast, followed closely by the Midwest, which was driven by policy mechanisms in Missouri and Arkansas (Table 4). Northeastern states collected the most dedicated revenue (16% of total regional dedicated revenue) from public land resource development, driven by Pennsylvania and West Virginia (Table 4). Western states were most heavily reliant on traditional sources of revenue, collecting 78% of regional revenue from Pittman-Robertson and Dingell-Johnson grants and hunting, fishing, and trapping licenses (Table 4).

Total dedicated revenue was best explained by a linear model which included total state acreage, number of individually licensed hunters, and population density. Both total state acreage and number of individually licensed hunters had a positive effect on total dedicated revenue (p=0.05 and 0.01, respectively). The effect of population density in the model was driven by two states with high model leverage (Alaska and Texas), however any effect of this variable disappeared when those two states were excluded from the model. Importantly, total state acreage and the number of individually licensed hunters are key variables in WSFR apportionment formulas, which made up 26% of nationwide total dedicated revenue in FY 2019. The number of individually licensed hunters is also strongly, positively associated with hunting, fishing, and trapping license revenue, which made up 43% of nationwide total dedicated revenue in FY 2019, but over 50% of total dedicated revenue in 17 states.

Neither non-traditional revenue nor dedicated revenue diversity were explained by any of the independent variables examined, relative to a null model. Neither statewide political activity

nor wildlife values explained wildlife diversity, suggesting that revenue diversity is non-partisan. Non-traditional revenue and dedicated revenue diversity were also not correlated (R^2 <0.01, Figure 1), indicating that diversification alone does not lead to greater non-traditional income.

DISCUSSION

Nearly all state fish and wildlife agencies are being challenged to adapt to new constituencies (Association of Fish and Wildlife Agencies 2019) while being funded by traditional, consumptive users of fish and wildlife (Jacobson et al. 2010; Decker et al. 2017). Notably, nearly half (n=23) of all state wildlife agencies collect the vast majority (>=85%) of their dedicated revenue from hunting, fishing, and trapping licenses and WSFR grants. Thus, management decisions made in each state are frequently underpinned by issues of the demography, geography, and value orientation of these communities (Jacobson & Decker 2006; Decker et al. 2010; Manfredo et al. 2017, 2020). Traditional consumptive-user communities are frequently male, white, and middle-aged. However, changing dynamics shape the ways in which state fish and wildlife agencies conduct fish and wildlife management, as well as respond to crises like those presented by disease outbreaks or large-scale landscape changes like wildfires (Association of Fish and Wildlife Agencies & The Wildlife Management Institute 2019). The evolution of state agency missions and mandates, shared in part by legislative and administrative policies is complicated by several factors that have been at the center of wildlife management for the last several decades, including but not limited to the recruitment, retention, and reactivation (R3) of hunters and anglers; growing urban-centric constituencies, novel landscape-level planning constructs, One Health initiatives, and the management of large predators. There continue to be difficulties within these agencies during this evolution as policies and practices change to better suit the needs of these new constituencies. However, unlike the variable effects

seen in management decisions, we found that non-traditional revenue and dedicated revenue diversity were not associated with the demographic, geographic, value orientation, and political variables tested here. In working to improve agency relevancy and responsiveness nationwide, it will be critical for agency and legislative leaders to formulate flexible funding policies that meet the individual needs of their state and the diverse constituencies agencies are called to serve. The amount and percent of revenue generated from each source nationwide in FY 2019, as well as the number of states that implemented each revenue mechanism, provides useful insight into the extent and effectiveness of these mechanisms (Table 3, Figure 2).

The data presented here provide important insight into wildlife conservation funding in the United States by providing a broad overview of how states pay for fish and wildlife conservation efforts. Our analyses suggest that the formulas of federal WSFR programs, notably the number of individual hunters in each state and total state acreage, drive total dedicated revenue. Thus, it will be important for state agency leaders to work with federal decisionmakers to alter composition or allocation of total dedicated revenue. This could be done by providing additional federal assistance, such as through the Recovering America's Wildlife Act, or by modifying the WSFR apportionment formulas. However, our analyses failed to support commonly held assumptions regarding the diversification of dedicated agency revenue. The quantitative models for non-traditional revenue and dedicated revenue diversity described here lack explanatory power, suggesting that politics, wildlife values, and economic variables are not strongly associated with non-traditional revenue or dedicated revenue diversity in a predictable manner. This lack of association drives us to examine the innumerable variables that go into policy formulation at the state level that cannot be quantitatively measured. It also suggests that

policymakers ought not be constrained or discouraged by broad, dominant narratives in conservation policymaking.

However, it may prove valuable for state agency and legislative leaders to consider their non-traditional relative to their dedicated revenue diversity as they seek to optimize their dedicated revenue portfolios (Figure 1). States with a high level of diversity in funding mechanisms, but a relatively low proportion of non-traditional revenue, might seek to maximize the potential revenue of existing mechanisms. Strategies for optimizing existing revenue mechanisms might include conducting novel marketing techniques or enhanced communication to better publicize these mechanisms to increase revenue generation (Quesenberry 2020). For example, certain states have purchased targeted social media advertisements during tax season to promote their income tax checkoff. While historic revenue data is not available to assess this specific strategy, these efforts are aimed at optimizing existing revenue generation mechanisms, do not require navigating rigorous policy processes, and have proven successful in private and philanthropic settings (Bhati & McDonnell 2020). States with a high percentage of non-traditional revenue, but a low number of revenue mechanism diversity might consider the vulnerability of the non-traditional revenue mechanisms and whether greater diversity might form a more resilient portfolio of dedicated revenue.

Viewing these revenue mechanisms at the state level rather than at a national scale, may assist in interpreting the data presented here as well. In this vein, qualitative policy formulation models may help to explain patterns in these dedicated revenue mechanisms at the state level and assist in developing additional dedicated revenue opportunities on a state-by-state basis. These models have historically been presented in terms of linear or circular processes, in punctuated stages, or at the convergence of several event streams (Lasswell 1951; Kingdon 1984; Grindle &

Thomas 1991; Meier 1991; Hardee et al. 2004). However, these and more recent models incorporate information on decision-making, cost-benefit analyses, focusing events, popular and professional media coverage, and broader, often partisan, political considerations at the scale of decision-making (Sabatier 1991; Stone 2002; Rawat & Morris 2016; Birkland 2019; Bardach & Patashnik 2020). While neither quantitative nor qualitative data are available at such a scale to analyze nationwide state policy activity, there are several anecdotal examples that might help better explain the political, economic, and ecological contexts in which these policies emerged (Stone 1989).

This quantitative comparison of non-traditional revenue and dedicated revenue diversity, combined with qualitative data from each state, can fully inform the composition of dedicated revenue in each state. For example, the Arkansas Game and Fish Commission was identified as having high non-traditional revenue, but low dedicated revenue diversity, indicating that most dedicated revenue was generated by few sources (Figure 1). In examining Arkansas' dedicated revenue mechanisms, it became clear that the dedicated state sales tax in that state was at the root of this low non-traditional revenue. Given that this mechanism is unique to only a few states, we sought to understand the process by which it was established. Preliminary qualitative research suggested that this mechanism can largely be attributed to a long policy campaign by stakeholders in the state and a media campaign conducted by then-Governor Mike Huckabee. After Missourians elected to dedicate 1/8th of one percent of their sales tax to conservation activities in 1974, Arkansans sought to do the same nearly a decade later (Arkansas Game and Fish Commission 2006). However, efforts to amend the state constitution to add this dedicated revenue stream failed in both 1984 and 1986. It would take another decade for a grassroots movement of stakeholders, and a dedicated media campaign (conducted from the bow of a bass

boat and the back of a jet ski) by the then-governor and his wife to pass this historic proposal in 1996 (Huckabee for President Exploratory Committee n.d.; Arkansas Game and Fish Commission 2006). Causal stories like this one are context-specific, yet they are one of the most helpful means for understanding the emergence of particular policies (Stone 1989). Here, these revenue data may prompt similar questions of why individual states have certain revenue patterns. A closer examination of these mechanisms can lead to a better understanding their unique status, application, and implementation. We encourage state agency and legislative leaders to consider the application of these policy processes in interpreting means by which they can diversify their dedicated revenue portfolios.

States may be able to adopt novel revenue mechanisms in several ways, including by promoting mechanisms that have been successfully employed in other states, advocating for the dedication of existing revenue streams that are currently subject to appropriations, or by acquiring new dedicated revenue as new taxes are added to statewide policies. Opportunities for diversifying funding streams are often limited because it is often difficult for state conservation leaders to obtain new dedicated revenue mechanisms, however, the viability of these opportunities may be informed by causal stories of policy development in other states. Conservation leaders must also be cognizant of the viability of certain revenue generation mechanisms may vary from state to state. Some states, like Colorado, have attempted to bolster the sales of traditional licenses and fees to utilize other resources, like public lands for recreation which had not previously required a license. In this case, public land users were required to purchase a hunting license, regardless of whether or not they intended to hunt. While this approach is aimed at both increasing revenues for the agency and possibly recruit, retain, or reactivate hunters from an existing base of public land users, the results of these advertisements

have yet to be determined. Other states have dedicated a portion of general state sales tax revenues to the state fish and wildlife agency for general operations. These unique funding mechanisms might be transferrable in some cases, or completely incompatible in others. For example, states without a general sales tax are not likely to establish one solely for fish and wildlife conservation. It would be equally difficult for a state like Delaware, with relatively little public land, to implement a policy requiring the purchase of a hunting license to use state wildlife management areas. It is critical to acknowledge these nuances when considering the scope of applicability of these policies, as well as the progressive or regressive nature of these revenue mechanisms in a broader social and political context. As state agencies seek to serve broader constituencies, it will be important to consider the expenditure of this revenue. Future research may explore the effectiveness of individual mechanisms, rather than the composition of mechanisms in each states.

While this is the most complete set of information on dedicated state revenues compiled to date, there are some gaps in these data. Notably, only 46 and 47 states reported more than $0 generated in FY2019 from Pittman-Robertson and Dingell-Johnson grants, respectively, while we know that all 50 states received both grants in that year (Table 3). It is critical to keep these discrepancies in mind in interpreting these data. Further, the expenditure of certain dedicated revenue is often constrained by state law. For example, revenue from boat registration in some cases may only be invested in infrastructure to promote recreational boating, perhaps even exclusively for motorized boating, so agency leaders may be limited in their flexibility to invest these funds. In many cases, these sideboards provide useful checks on the spending of public money, however, they do limit our capacity to interpret and cleanly compare these data from

state to state. Regardless of these constraints, viewing these data in this way provides important insight into challenges and opportunities that state wildlife agencies face nationwide.

CONCLUSION

A decade ago, at the North American Wildlife and Natural Resources Conference, Williams, Decker, & Mahoney (2010, p. 30) said of the American system of conservation funding that "as our profession continues to embark into the 21st century, we are using a conservation model that matured throughout the 19th and 20th centuries." For the last two decades in particular, conversation in the wildlife conservation community has revolved around large-scale solutions for what has been dubbed the 'fish and wildlife crisis' of the 21st century. Solutions, in large part, have revolved around federal initiatives with the potential to transform the discipline of wildlife management (Hanauska-Brown 2018). However, gridlock in federal policymaking has hamstrung efforts to achieve large-scale solutions to this problem. The data presented here can inform state-level efforts to alleviate these issues more rapidly than federal action. However, these solutions require an intimate understanding of state-level policymaking processes and political realities. While Congressional leaders wade through the development of a "once in a generation" investment in wildlife conservation, like the Recovering America's Wildlife Act, conservation leaders have ample opportunities to invest in fish and wildlife at the state level and serve broader constituencies. The data presented here provide opportunities for the cross pollination of ideas to inform future dedicated revenue policy. It is critical for national leaders to gain a comprehensive understanding of where dedicated funding for state fish and wildlife agencies comes from, as well as to identify viable opportunities for future revenue sources. Agency and legislative leaders can use this information, coupled with their understanding of

intrastate political landscapes, to create more financially resilient fish and wildlife agencies that suit the needs of all people and of wildlife.

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TABLES

Table 1. Variables considered in determining revenue correlates

Variable	Independent/Response	Data Source	Mean	Standard Deviation	Range
FY19 Total Dedicated Revenue (TDR)	Response, modeled with a square root transformation	Summer 2021 State Fish & Wildlife Agency Survey	$75,949,041	$57,745,016	$237,256,080
FY19 proportion NOT Hunt/Fish/Trap+PR+DJ Revenue (proxy for revenue diversity; NTR)	Response, modeled with a logistic regression	Summer 2021 State Fish & Wildlife Agency Survey	$23,244,983	$31,071,632	$140,171,238

Shannon's Diversity Index of revenue NOT generated from Hunt/Fish/Trap+PR+DJ (NTRH)	Response	Summer 2021 State Fish & Wildlife Agency Survey	1.17	0.52	2.0
2019 State Population	Independent	https://www.census.gov/newsroom/press-kits/2019/national-state-estimates.html	6,550,675	7,389,281	38,933,464
2019 State GDP per capita (thousand $)	Independent	https://www.bea.gov/data/gdp/gdp-state	61	11.5	49
Total state acreage	Independent	https://sgp.fas.org/crs/misc/R42346.pdf	45,421,958.4	54,977,311.93	364,804,480
Population Density	Independent	https://sgp.fas.org/crs/misc/R42346.pdf & https://www.census.gov/newsroom/press-kits/2019/national-state-estimates.html	0.313	0.408	1.843
Proportion of Federal Land	Independent	https://sgp.fas.org/crs/misc/R42346.pdf	0.151	0.205	0.798
2019 Individually licensed Hunters	Independent	https://sgp.fas.org/crs/misc/R45667.pdf	310,766	247,694	1,155,016
Proportion of Gore 2000 voters (historical politics)	Independent, correlated with proportion Biden voters, mutualists	https://www.presidency.ucsb.edu/statistics/elections/2000	0.452	0.086	0.347
Proportion of Biden 2020 voters (modern politics)	Independent, correlated with proportion Gore voters	https://www.presidency.ucsb.edu/statistics/elections/2020	0.477	0.104	0.395
Proportion of Individuals with Mutualist Wildlife Values 2018 per Teel & Manfredo	Independent, correlated with Biden voters	https://sites.warnercnr.colostate.edu/wildlifevalues/wp-content/uploads/sites/124/2019/01/AWV-National-Final-Report.pdf	0.318	0.079	0.318

Table 2. *A priori* hypotheses and the models crafted to test them

Hypotheses	**Linear Models**
H1: States with more citizens will have more TDR	TDR ~ State Population + State GDP per Capita + Total State Acreage + Individually Licensed Hunters
H2: States with more land area and individually licensed hunters will have more TDR, per the Pittman-Robertson apportionment formula	
H3: States that have more citizens, higher GDPs, *and* more land area will have more TDR	
H4: States that have more individually licensed hunters will have a lower NTR	NTR ~ Individually Licensed Hunters + Proportion Federal Land
H5: States that have more individually licensed hunters *and* more federal land will have a lower NTR	
H6: States that voted more strongly for Gore in 2000 will have a larger NTR	NTR ~ Proportion Gore 2000 voters*
H7: States that voted more strongly for Biden in 2020 will have a larger NTR	NTR ~ Proportion Biden 2020 voters*
H8: States that have a higher percent of mutualist wildlife values will have a larger NTR	NTR ~ Proportion 2018 Mutualist Wildlife Values*
H4: States that have more individually licensed hunters will have a lower NTRH	NTRH ~ Individually Licensed Hunters + Proportion Federal Land
H5: States that have more individually licensed hunters *and* more federal land will have a lower NTRH	
H6: States that voted more strongly for Gore in 2000 will have a larger NTRH	NTRH ~ Proportion Gore 2000 voters*
H7: States that voted more strongly for Biden in 2020 will have a larger NTR	NTRH ~ Proportion Biden 2020 voters*
H8: States that have a higher percent of mutualist wildlife values will have a larger NTRH	NTRH ~ Proportion 2018 Mutualist Wildlife Values*
* Modeled separately due to covariation between variables	

Table 3. Nationwide dedicated revenue in FY2019 by source

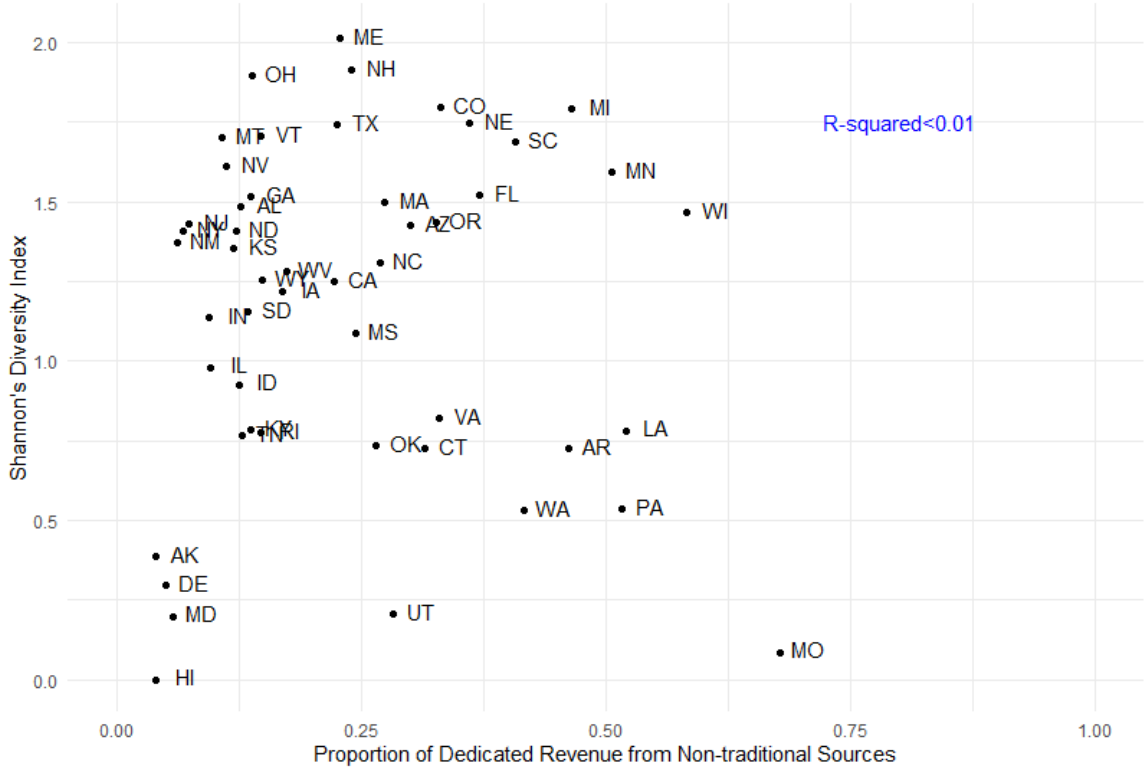
Revenue Source	Dollar Amount	Percent of FY19 Dedicated Revenue	Number of States Reporting >$0 generated in FY2019
Hunting, Fishing & Trapping Licenses	$ 1,595,375,407	42.53%	n=50 (100%)
Pittman-Robertson	$ 678,324,639	18.08%	n=47 (94%)
Dingell-Johnson	$ 315,065,084	8.40%	n=46 (92%)
Public Land Resource Development	$ 201,171,058	5.36%	n=14 (28%)
Dedicated Sales Tax	$ 175,508,765	4.68%	n=5 (10%)
Boat Registration	$ 133,511,924	3.56%	n=33 (66%)
Non-Federal Grants	$ 116,274,818	3.10%	n=24 (48%)
Gas/Fuel Tax	$ 82,803,450	2.21%	n=16 (32%)
Landfill Tipping Fees	$ 73,088,940	1.95%	n=2 (4%)
Off-Road Vehicle/Snowmachine Registration	$ 67,277,605	1.79%	n=15 (30%)
Habitat Stamps	$ 52,808,745	1.41%	n=24 (48%)
State Wildlife Grants	$ 50,462,797	1.35%	n=47 (94%)
Trust Funds	$ 39,422,836	1.05%	n=11 (22%)
State Lottery	$ 34,539,418	0.92%	n=5 (10%)
Marijuana Excise Tax	$ 25,293,000	0.67%	n=1 (2%)
License Plates	$ 23,551,638	0.63%	n=29 (58%)
Land & Water Conservation Fund	$ 21,819,755	0.58%	n=14 (28%)
Endangered Species Act Sec. 6 Grants	$ 16,420,642	0.44%	n=41 (82%)
Donations	$ 13,494,424	0.36%	n=40 (80%)
Wildlife Crime	$ 13,267,579	0.35%	n=41 (82%)
Capital Bonds	$ 10,000,000	0.27%	n=1 (2%)
Real Estate Transfer Fees	$ 7,973,853	0.21%	n=1 (2%)
Income Tax Checkoff	$ 3,148,931	0.08%	n=20 (40%)
Wildlife Viewing Permits	$ 375,169	0.01%	n=6 (12%)
Hotel Tax	$ 33,841	0.00%	n=1 (2%)

Table 4. FY2019 dedicated revenue by source in each region

Revenue Source	Percent of Dedicated Revenue FY19 (Nationwide)	Percent of Dedicated Revenue FY19 (WAFWA)	Percent of Dedicated Revenue FY19 (MAFWA)	Percent of Dedicated Revenue FY19 (NEAFWA)	Percent of Dedicated Revenue FY19 (SEAFWA)
Boat Registration	3.56%	1.96%	3.85%	2.06%	5.70%
Capital Bonds	0.27%	0.64%	0.00%	0.00%	0.00%
Dedicated Sales Tax	4.68%	0.39%	10.45%	3.15%	12.99%
Dingell-Johnson	8.40%	9.97%	6.90%	7.11%	8.01%
Donations	0.36%	0.36%	0.28%	0.16%	0.47%
Endangered Species Act Section 6 Grants	0.44%	0.72%	0.14%	0.10%	0.47%
Gas/Fuel Tax	2.21%	0.15%	4.00%	0.80%	2.16%
Habitat Stamps	1.41%	2.79%	1.00%	0.35%	1.31%
Hotel Tax	0.00%	0.00%	0.00%	0.01%	0.00%
Hunting, Fishing & Trapping Licenses	42.53%	48.82%	36.62%	40.30%	41.79%
Income Tax Checkoff	0.08%	0.07%	0.08%	0.10%	0.06%
Landfill Tipping Fees	1.95%	0.00%	0.68%	0.35%	0.75%
License Plates	0.63%	0.40%	5.96%	0.12%	0.05%
Land & Water Conservation Fund	0.58%	0.89%	0.59%	0.50%	0.69%
Marijuana Excise Tax	0.67%	1.61%	0.00%	0.00%	0.00%
Non-federal Grants	3.10%	5.98%	0.23%	0.07%	1.70%
Off-Road Vehicle/Snowmachine Registration	1.79%	0.75%	4.51%	0.54%	0.03%
Pittman-Robertson	18.08%	19.56%	15.29%	22.88%	16.82%
Public Land Resource Development	5.36%	0.44%	6.69%	16.61%	3.40%
Real Estate Transfer Fees	0.21%	0.00%	0.00%	0.00%	0.61%
State Lottery	0.92%	2.00%	0.16%	0.65%	0.25%
State Wildlife Grants	1.35%	1.29%	0.89%	2.46%	1.28%
Trust Funds	1.05%	0.82%	1.51%	0.91%	1.12%
Wildlife Crime	0.35%	0.37%	0.18%	0.75%	0.33%
Wildlife Viewing Permits	0.01%	0.02%	0.00%	0.01%	0.01%

FIGURES

Figure 1.



CHAPTER 3: A Review of Critiques of the North American Model of Wildlife Conservation

"A model is useful if it allows us to get use out of it."- Edward De Bono

ABSTRACT

The North American Model of Wildlife Conservation (hence "NAM" or "Model") is a set of principles that collectively distinguish wildlife conservation in the United States and Canada from the rest of the world. The NAM was first articulated in 2001, but the laws and policies which underpin the Model largely originated in the late 19th and early 20th centuries. In recent years, the Model has been critiqued by scholars and practitioners of wildlife conservation. Our objective was to identify the breadth of critiques of the NAM, summarize those critiques, and determine how they might inform the future enterprise of wildlife conservation in the United States and Canada. We conducted a comprehensive review of published literature on the Model. In thematically coding these publications (*n*=57), critiques largely fell into three categories: 1) the NAM is missing critical components (16 publications, 28%); 2) the narrative origin of the NAM is biased (17 publications, 30%); or 3) the NAM negatively affects the implementation or formulation of wildlife policy (25 publications, 44%). Several publications reviewed expressed more than one critique. We interpret these critiques relative to commonly accepted definitions of the NAM and offer suggestions for future use and application of the Model.

INTRODUCTION

The North American Model of Wildlife Conservation (hence "NAM" or "Model") has been a focal point of discussion surrounding conservation dialogue in the United States and Canada over the last two decades. While elements of the Model were first described by Geist (1995), the tenets of the NAM were first enumerated by three biologists in Geist et al. (2001). The NAM was intended to be a retrospective view of wildlife laws and policies in the United

States and Canada that distinguished wildlife conservation in those countries from the rest of the world (Geist et al. 2001; Organ 2018). The Model was not intended to be exhaustive or prescriptive (Organ et al. 2012). Organ (2018:126) defines the NAM as "The North American Model of Wildlife Conservation is a set of principles that in their collective application distinguish wildlife conservation in the United States and Canada from other forms worldwide." Mahoney & Geist (2019:1) wrote: "The Model is not an article of constitution. It is an evolved and shared system of conservation laws, principles, institutions, and policies that has enabled the successes of Canada and the United States in the recovery, management, and protection of wildlife and brought them global recognition."

Seven tenets underly the model including: (1) wildlife resources are a public trust; (2) markets for game are eliminated; (3) allocation of wildlife Is by law; (4) wildlife can be killed only for a legitimate purpose; (5) wildlife is considered an international resource; (6) science is the proper tool to discharge wildlife policy; (7) democracy of hunting is standard (Geist et al. 2001). The Model was loosely built from Aldo Leopold's conceptualization of what he called the "[Theodore] Roosevelt Doctrine of Conservation" (Organ et al. 2012; Organ 2018). Leopold outlined this doctrine in his seminal book *Game Management* to include three basic tenets which recognized: (1) "outdoor" resources as one integral whole; (2) "conservation through wise use" as a public responsibility, and ownership as a public trust; and (3) science as a tool for discharging that responsibility (Leopold 1933:17). The Model itself, however articulated, lacks any formal authority. It is not codified in law, it is not a policy, and it is not binding. At its very core, the NAM is a framework, developed by three wildlife scientists for future students of conservation, to articulate some of the key principles which underpin a narrative of wildlife conservation in the United States and Canada.

The Model has been discussed extensively in the peer-reviewed literature, books, professional forums, and popular outdoor media (Organ 2018). It has been supported by professional conservation organizations as a successful paradigm and articulation of wildlife conservation governance in the U.S. and Canada (Prukop & Regan 2005; Decker et al. 2010; Organ et al. 2012; Willms & Alexander 2014; Organ 2018). However, the Model has been broadly criticized from several angles (Clark & Milloy 2014; Feldpausch-Parker et al. 2017; Peterson & Nelson 2017; Eichler & Baumeister 2018; Serfass et al. 2018). After nearly a decade of ongoing discussion in the natural resource/wildlife conservation field regarding the scope and application of the Public Trust Doctrine (Batcheller et al. 2010; Smith 2011), a White House report on the matter (Mahoney et al. 2008), and several special sessions of the North American Wildlife and Natural Resources Conference (Beucler & Servheen 2009; Decker et al. 2010; Schildwachter 2010; Williams et al. 2010), a committee of The Wildlife Society codified the North American Model of Wildlife Conservation into a technical report (Organ et al. 2012). Most recently, Mahoney & Geist (2019) published an edited volume on the NAM.

Although the Model was not intended to be comprehensive or prescriptive, discussions of the NAM frequently expand into topics beyond the originally intended synthesis of the laws and policies that differentiate wildlife conservation in the U.S. and Canada from the rest of the world (Organ 2018). For example, although the NAM is often associated with the "American System of Conservation Funding" or states having primary jurisdiction over wildlife, the Model itself is distinct (Williams et al. 2010; Spidalieri 2012). Scholars of the NAM argue that the American System of Conservation Funding, whereby hunters fund wildlife conservation work through the purchase of licenses and via excise taxes on firearms, ammunition, and archery tackle, is a mechanism by which the tenets of the Model are implemented but is not inherently a part of the

NAM (Organ 2018). Beucler & Servheen (2008: 173) aptly remind us that "the Model is a governance model; it is not a business model." Further, the principles of the model are not exhaustive and are sometimes inconsistent with nuanced wildlife policy and law (Nie 2004; Adams et al. 2016; Nie et al. 2017). For example, the extent of the Public Trust Doctrine may not be universally applicable (Batcheller et al. 2010; Smith 2011; Nie et al. 2020); *regulated* markets for wildlife can (or could) be effective tools for management or conservation (Vercauteren et al. 2011; Moyle 2013; White et al. 2015); and the capacity of basic scientific research to inform wildlife policy is constrained (Artelle et al. 2018; Mawdsley et al. 2018; Artelle 2019). Here, we synthesize and review these critiques.

In this paper, we synthesize and evaluate published critiques of the Model to distill the key arguments about the NAM. Our motivating research question is: what critiques of the North American Model of Wildlife Conservation have been made in the published literature and how might they inform the future enterprise of wildlife conservation in the United States and Canada?

METHODS

To analyze published statements about the Model, we conducted a literature review of published works which specifically mention the North American Model of Wildlife Conservation. We conducted queries of four separate databases: JSTOR, Web of Science, Google Scholar and EBSCOHost. In each, we searched for book chapters, peer-reviewed journal articles, conference proceedings, reports, and graduate theses/dissertations with titles (all) or abstracts (not available in Google Scholar) that contain the words "North American Model of Wildlife Conservation."

Next, we created a thematic codebook to systematically summarize the critiques in these publications. We began by extracting all statements that included "the North American Model"

or its permutations from a selection of the identified literature (Table 1). We then grouped these statements topically (Table 1). This initial review yielded 36 distinct thematic codes expressing sentiments of support for, criticism of, and commentary on the NAM and its implementation. Many of these themes were present in more than one publication, and many of these publications espoused more than one of these themes. While several of these statements were normative or offered an argument, others were simply descriptive of the Model or the author's understanding of the NAM. For example, these topical categories included elements like "authors mention the Public Trust Doctrine in association with the NAM," "authors argue that the NAM is exclusionary of certain stakeholders or creates conflict among stakeholders," and "authors suggest the NAM stand in contrast to the field of Conservation Biology" (Table 1). We categorized 12 of these 36 total codes as critiques. Using this thematic code, we then systematically coded all publications discovered in our literature review. Our coding of this literature provided a clear qualitative understanding of critiques of the NAM, as well as broader substantive issues that scholars and practitioners found with the Model. By coding these statements for all literature yielded, we quantified the extent of these critiques across the published literature pertaining to the NAM.

RESULTS

Our literature review yielded 57 publications (Appendix C) 13 of which were chapters in Mahoney & Geist (2019). Several publications were framed as direct critiques of the NAM, while others were simply discussions of the Model. We found that critics of the Model typically promote one or more of the following sentiments: 1) the NAM is missing critical components (16 publications, 28%); 2) the narrative origin of the NAM is biased (17 publications, 30%); or 3) the NAM negatively affects the formulation or implementation of wildlife policy (25

publications, 44%) (see Table 1.). Further, 19 (33%) publications suggested that the NAM (or how it is implemented) is flawed, problematic, or in need of revisiting or updating.

16 (28%) publications included one or more arguments that the NAM is missing critical components. These publications suggested that the NAM's geographic scope is not appropriate (5 publications, 9%), the NAM does not adequately synthesize salient wildlife laws or policies (4 publications, 7%), and/or some tenets of the NAM are selectively implemented or are not universally applied (12 publications, 21%). In the 17 (30%) publications suggesting that the narrative origin of the NAM is biased, publications argued that the origin story of the NAM is emblematic of, or perpetuates, a male, hunter-centered narrative in conservation (15 publications, 26%), with others writing that the NAM does not represent or acknowledge Native and Indigenous perspectives or systems of governance (7 publications, 12%), and/or others arguing that the NAM perpetuates settler colonialism (3 publications, 5%). In the 25 (44%) publications suggesting that the NAM negatively affects the formulation or implementation of wildlife policy, authors brought up one or more of six distinct topics. These include the following: the NAM hinders the advancement of novel systems of wildlife management (8 publications; 14%); science does not always inform wildlife policy (7 publications; 12%); the NAM privileges or over-emphasizes (non-market) hunting, frequently giving these interest groups greater power in decision-making (14 publications; 24%); the NAM only serves game species (17 publications; 30%); the NAM is exclusionary of certain stakeholders or creates conflict among stakeholders (14 publications; 25%); and/or that the NAM is, in practice, prescriptive or has prescriptive elements (12 publications; 21%). Examples of these themes are detailed in Table 1.

DISCUSSION

There is tremendous diversity among professionals in wildlife conservation in their interpretation of what the NAM is, what it is not, and what it should be, resulting in substantial confusion and misapplication of the Model. Importantly, the NAM was intended to be a retrospective interpretation of what differentiated the wildlife policies and laws of Canada and the U.S. from those of the rest of the world (Organ 2018). As with other qualitative models, NAM was intended to be a "purposeful representation" (Starfield et al. 1994 p. 206) of the unique system of wildlife governance in the U.S. and Canada. Like any qualitative model, the NAM is one interpretation and is imbued with the experiences, biases, and philosophies of its creators (Starfield 1997). In this case, Mahoney, Geist, and Organ are all white, male, trained biologists and conversations surrounding the Model should acknowledge this important context. Critiquing the Model for failing to fulfill purposes beyond its original creation, including as a prescriptive approach for the future or as an exhaustive list for all wildlife policy differences between the U.S. and Canada and elsewhere, is unrealistic and inappropriate. Many of the critiques analyzed here are simply not congruent with the original intent of the Model; however, they are helpful for understanding the current status of wildlife governance regimes in the U.S. and Canada and informing ways in which the enterprise of wildlife conservation might be improved or expanded.

There remains substantial uncertainty around whether the Model is prescriptive for the formulation of wildlife policy. While Organ (2018) maintains that the model is not prescriptive, others have interpreted the Model to be a template for how wildlife governance ought to look (Peterson & Nelson 2017a; Serfass et al. 2018). Historically, some authors of the Model have written in a way which leads readers to believe that the Model might offer a prescription for how wildlife management might proceed in the future, even suggesting the Model be codified in an

international treaty (Geist & Organ 2004 p. 55). Even if the NAM was not intended to be prescriptive for wildlife policy, the Model plays a significant role in policy formulation, just as historical accounts and theoretical frameworks often influence the creation of laws and regulations (Stone 1989, 2002; Sabatier 1991). For example, a wide range of constituencies employ the Model as an advocacy tool in advancing political agendas and the Model is often invoked during discussions of wildlife policy (Peterson & Nelson 2017). Recently, the Model has been weaponized by several constituencies, ranging from a foil to critique to a codification of principles that must be protected (Serfass et al. 2018). However, these interpretations fail to adequately consider the context in which the Model was built and elevate the construct beyond its original purpose. The Model is, and continues to be, merely one tool for better understanding salient wildlife laws and policies which distinguish the U.S. and Canada from the rest of the world. That is not to say that the NAM construct should never have a role in the policy process; however, invocations of the Model must be done in consideration of the history and context in which it was built. To that end, components of the Model might be used to inform future policies but must not constrain decision-makers from what is necessary to meet the needs of 21st century wildlife and serve broader constituencies.

Several critiques suggest important gaps or vacancies in the policies or laws governing wildlife conservation in the U.S. and Canada, however, in many cases, we do not find these to be substantive critiques of the Model. In our view, these critiques might be better placed on specific laws and policies governing wildlife conservation. For example, it is impossible for a law or policy to "violate" the NAM, as it is merely one representation of laws and policies that differentiate wildlife conservation in the U.S. and Canada from the rest of the world. However, amending a law, changing a regulation, or a novel court ruling may alter the course of the

enterprise of wildlife conservation away from the system of laws and policies that the NAM sought to describe. Such policy changes are perfectly reasonable, often appropriate, and can improve modern wildlife conservation efforts. These are perhaps the most constructive critiques of the NAM, as they hold promising insight into the inequities and considerations that could be considered in future processes for formulating wildlife policy and law. Where critiques suggest that wildlife agencies and commissions are being 'captured' by consumptive interests, they are critiquing the *implementation* of laws, policies, funding mechanisms and other ways wildlife are governed in the U.S. and Canada. Such critiques are helpful because they offer a view of how the field might need to evolve and communicate to meet the needs of 21st century wildlife and wildlife constituencies, however, they should be more accurately framed around the issues to which they pertain. In most cases, critics focus on the implementation and formulation of wildlife policy.

While the Model was not aimed to be a recounting of history, it inherently contains a narrative origin. Critiques aimed at the Model, but regarding the dominant narrative of wildlife conservation, can provide insight into needs for diversity, equity, inclusion, and justice as we move forward in crafting policies, laws, and procedures to govern wildlife. Some publications posit that the origin story of the Model is biased towards white, male hunters (Peterson & Nelson 2017a; Vucetich et al. 2017; Serfass et al. 2018). These arguments are reinforced by numerous historical accounts (Trefethen 1975; Organ et al. 2012). The prevailing narrative describes the societal elites who crafted a system of land and wildlife management laws at the turn of the 19th century that still, by and large, form the policy frameworks under which wildlife is governed to this day. While the narrative that frequently accompanies the Model offers this one presentation of history, some pieces of literature examined appropriately contend that it ignores other relevant

figures and histories of wildlife management in the U.S. and Canada (Peterson & Nelson 2017; Eichler & Baumeister 2018; Serfass et al. 2018; Hessami et al. 2021). We find these critiques to be valid and important to conversations relating to the teaching of histories of wildlife conservation, however, we find them to be incongruent with the purpose and aims of the enumerated tenets of the NAM. Future communication regarding the history of wildlife conservation in North America, within or without mention of the NAM, should more diligently address, amplify, and reconcile the multiple histories of wildlife conservation in these countries. Wildlife conservationists should work to promote and disseminate a more culturally aware and inclusive history of this discipline.

Conversations surrounding efforts to make wildlife conservation a more equitable, inclusive, and diverse field are presently occurring in a widespread movement to assist state fish and wildlife agencies maintain their relevance to the needs and desires of a diverse constituency (Manfredo et al. 2017; Decker et al. 2017). It has become increasingly clear that agency leaders must think critically about the past, present, and future of the fields of fish and wildlife management and conservation to best address the needs of society (Association of Fish and Wildlife Agencies & The Wildlife Management Institute 2019). Current management and conservation activities primarily focus on huntable species and underserve non-game taxa (Williams et al. 2010; Geist & Mahoney 2019; Heffelfinger & Mahoney 2019). Further, agencies are being called to be more relevant and responsive to diverse constituencies, changing their internal policies and practices (Association of Fish and Wildlife Agencies & The Wildlife Management Institute 2019). Making these changes requires a concurrent shift in values, priorities, and mechanisms for stakeholder involvement and engagement (Jacobson & Decker 2006; Jacobson et al. 2010; Manfredo et al. 2017; Decker et al. 2018). It is inevitable that there

will be friction between these changes and the policies governing the status quo, which are enumerated in the NAM (Organ 2018). The Model is a synthesis of the past and may, in part, serve as a foundation for the future. Wildlife conservation practitioners and policymakers will be forced to reckon with these challenges into the future.

Many of these critiques have been accompanied by calls to revise, rethink, or reimagine the NAM. For example, at the 2022 North American Wildlife and Natural Resources Conference, there were at least three distinct sessions dedicated to this end. While these efforts can engender valuable conversations, we suggest that efforts to modify the NAM must be conducted with explicit goals in mind. These purposes may aim to address one or more of the three major categories of critiques identified here (e.g., the NAM is missing critical components, the narrative origin of the NAM is biased, or the NAM negatively affects the implementation or formulation of wildlife policy), or convenors may identify other purposes. While we do not aim to judge which purposes may be valid or invalid, we hope that these efforts are mindful of the history, context, and constraints of the NAM as merely a model for the wildlife conservation policies and practices that differentiate the U.S. and Canada from the rest of the world. We also suggest that energies might be better used to affect change in tangible state or federal wildlife laws and policies in Canada and the U.S., rather than in the theoretical exercise of revisiting or refining the NAM.

CONCLUSION

While critiques have been published in peer-reviewed articles, book chapters, presentations, and popular articles, these commentaries have not been systematically summarized and reviewed. Doing so provides a foundation for wildlife policymaking and future discussion surrounding the Model. In looking toward the future of wildlife conservation in North America,

it is important to critically examine our collective history, as well as the corpus of laws and policies that form the current social, political, economic, and ecological landscapes that frame the field of wildlife conservation. The NAM provides one framework for doing just this. However, it is critical to examine the purpose, history, and context of the formulation of the NAM in using it as a tool for understanding the enterprise of wildlife conservation in the United States and Canada. The Model is, and always will be, a tool for understanding one "set of principles that in their collective application distinguish wildlife conservation in the United States and Canada from other forms worldwide" (Organ 2018, p.126). It is useful insofar as it assists professionals and policymakers in understanding some of the historical successes of the wildlife conservation community.

As a representative model of wildlife governance, differentiating wildlife policy in the U.S. and Canada from the rest of the world, the NAM might naturally evolve with underlying laws, policies, rules, and regulations. Conversely, the NAM and critiques of the Model may motivate changes in the ways that local, state, and federal governments manage and conserve wildlife. The policies and practices enumerated in the Model led to historic successes and it is useful to consider how the Model served us well. However, challenges facing wildlife have changed in the last century. The Model may serve as a guide for the future as the policies and practices of wildlife conservation globally evolve, but also should not constrain policy developments that are necessary for the conservation of 21st-century wildlife and wild places. It is our hope that this review of critiques of the Model provide a foundation of understanding as the field of wildlife conservation in the U.S. and Canada evolves on a path towards more just, more resilient, more responsive, and more relevant systems of governance.

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TABLES

Table 1. Critical thematic codes of the North American Model of Wildlife Conservation organized by category and extent, with examples of language from publications reviewed

Category of Critique	Thematic Code	Number of Articles	Examples
NAM is missing critical components	The NAM's geographic scope is inappropriate	5 (9%)	"I must admit to feeling a bit uncomfortable with this moniker, considering that North America includes Central America, the Caribbean, and Greenland, and is comprised of 46 countries, territories, and dependencies. The model is primarily built around Canadian and U.S. collaboration, and its reach seems to end there." (Beissinger 2021 p. 153)
	The NAM does not adequately synthesize salient laws or policies	4 (7%)	"We argue that the North American Model of Wildlife Conservation (NAM) as currently promoted is an overly narrow construct" (Serfass et al. 2018 p. 101) "Conspicuously missing from the Model, for example, is a principle focused on wildlife habitat, of which federal lands would be of obvious significance" (Nie et al. 2017, p. 812)
	Some tenets of the NAM are selectively implemented (or not universally applied)	12 (21%)	"Others have suggested that the limitations of the NAM have less to do with its structure as its selective implementation…. For example, hunting derbies that promote commercial gains for harvest and occasionally mass killing and nonuse of carcasses are practiced in many North American jurisdictions and violate some of the central tenets of the NAM regarding the legitimate reasons for killing animals." (Hessami et al. 2021)
NAM negatively affects the formulation or implementation of wildlife policy.	The NAM hinders the advancement of novel systems of wildlife management	8 (14%)	"The Model has been overwhelmingly placed on an untouchable pedestal where America seems content to keep pace with its hunter status quo." (Spidalieri 2012 p. 771)
	Science does not always inform wildlife policy (tenet #6)	7 (12%)	"For example, proponents and practitioners of the "North American Model of Wildlife Conservation," which guides hunting policy across much of the United States and Canada, assert that science plays a central role in shaping policy. However, what that means is rarely defined." (Artelle et al. 2018 p. 1)

	The NAM privileges or over-emphasizes (non-market) hunting, frequently giving these interest groups greater power in decision-making	14 (25%)	"Consumptive resource users, most predominantly hunters but also anglers and trappers, serve as central stakeholders to the NAMWC due to philosophical, legal, and economic criteria."(Feldpausch-Parker et al. 2017 p. 34)
	The NAM only serves game species	17 (30%)	"In fact, the increasing number of threatened and endangered species could be viewed as a growing failure of the state game and fish organizations, as well as the overall institution (p.296) of wildlife management and the model itself." (Clark & Milloy 2014, p. 345)
	The NAM is exclusionary of certain stakeholders or creates conflict among stakeholders	14 (25%)	"Along with prioritizing hunted species, the Model has necessarily prioritized the views of consumptive users. Those groups not traditionally engaged in hunting and angling (such as women, some cultural minorities, and appreciable percentages of urban residents) have often been exclude when wildlife policies were being developed, though this is changing."(Mahoney et al. 2019, p. 5)
	The NAM is, in practice, prescriptive or has prescriptive elements	12 (21%)	"The North American Model of Wildlife Conservation (NAM) is a slippery construct, used both to explain how North American wildlife conservation developed and as a prescriptive framework. We argue both applications of the NAM are problematic." (Peterson & Nelson 2017)
The narrative origin of the NAM is biased	The origin story of the NAM is emblematic of, and/or perpetuates, a male, hunter-centered narrative in Conservation	*15 (26%)*	"The Model is portrayed sometimes as a historical narrative and sometimes as an environmental philosophy that ascribes to hunting and trapping a powerful, positive role in conservation." (Vucetich et al. 2017, p. 54)
	The NAM Perpetuates settler colonialism	*3* (5%)	"Though presented as prototypically 'American,' the NAM doctrine perpetuates settler colonialism, excluding Native American people's environmental wisdom from the conservation conversation." (Eichler & Baumeister 2018, p. 76)
	The NAM does not represent or acknowledge Native/Indigenous perspectives or systems of governance	*7* (12%)	"The NAM fails to articulate the legacy, presence, and knowledge of Indigenous Peoples in the discharge of wildlife policy and conservation." (Hessami et al. 2021, p.1290)

APPENDICES

Appendix A. Survey instrument employed in Chapter 2 regarding dedicated state agency revenue

State-Based Conservation Funding - Summer 2021

Start of Block: Introduction

Publicly funded fisheries and wildlife conservation in this country is facing many challenges, created by historical fluctuations in hunting, fishing, and trapping licenses, as well as difficulties in building more holistic systems of federal aid for wildlife restoration. These changes pose significant difficulties in adaptation, relevancy, and funding to manage and conserve the fisheries and wildlife of the United States. Some executive and legislative leaders have responded to these challenges with unique policy mechanisms aimed at improving and diversifying funding streams, however, these funding mechanisms have not been fully catalogued. This survey aims to create such a catalogue. This survey has been developed in collaboration with staff from the Association of Fish and Wildlife Agencies (AFWA) Washington and several agency leaders have been consulted in the creation of this project.

With your help, this project will construct a portfolio of state-based investments in fisheries and wildlife conservation to help facilitate the execution of AFWA's relevancy roadmap and inform possible sources of matching funds, should the Recovering America's Wildlife Act pass. The result of this work will be a clearinghouse of data which researchers, agency staff, legislative and executive leaders, and others may use to answer important questions about the status of state-based conservation funding in this country. Breaking down varying revenue streams by source for each state, and aggregating these data nationwide, will offer a holistic picture of nationwide conservation funding that is currently unavailable. It will also provide for the cross pollination of ideas to inform your future financial planning activities.

Please ensure that the appropriate person on your staff receives and completes this request for information. Your agency CFOs and their financial staff will likely be the best equipped individuals to provide the specific financial data requested. The survey will request financial figures from your agency's dedicated revenue sources over the last three years (FY2018-2019). Completion of this survey should take 25 to 50 minutes, depending on the number of revenue streams you have to report on. Thank you in advance for your assistance and cooperation in this important work. **Aggregated, summary information will be shared publicly and will be sent directly to you in a final report in the coming months. Financial data from individual states will not be released.**

This research is being conducted as a part of Charlie Booher's M.S. thesis work at the University of Montana, under the guidance of Dr. Joshua Millspaugh and AFWA leadership. Should you have any questions or require additional information, please do not hesitate to reach out to Charlie directly at charles.booher@umconnect.umt.edu

Page Break

What is your first name?

_____

What is your last name?

_____

Which state fish and wildlife agency do you represent?

_____

What is your role in this agency?

_____

What is your email address?

_____

End of Block: Introduction

Start of Block: Budget Style

Which of the following best describes your agency's style of budgeting?

- ○ Traditional/Line-item Budgeting
- ○ Priority-Based Budgeting
- ○ Objectives-Based Budgeting
- ○ Performance-Based Budgeting
- ○ Zero-Base Budgeting
- ○ Other _____

End of Block: Budget Style

Start of Block: Traditional Funding Mechanisms

Please record each of the following revenue amounts rounded to the nearest U.S. dollar. Each of the questions will request revenue figures from different sources in the last three fiscal years (FY2018 and 2019).

ge Break

How does your agency organize funds collected from the sale of hunting, fishing, and trapping licenses?

- ○ Hunting, Fishing, and Trapping License Revenues are Collected Separately
- ○ Hunting, Fishing, and Trapping License Revenues are Collected Together
- ○ Fishing License Revenues are Collected Separately; Hunting and Trapping Licenses are Collected Together
- ○ Trapping License Revenues are Collected Separately; Hunting and Fishing Licenses are Collected Together

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Hunting, Fishing, and Trapping License Revenues are Collected Separately

How much revenue did your agency collect from the sale of hunting licenses in fiscal years 2018-2019? Please include big game auction/lottery permits.

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Fishing License Revenues are Collected Separately; Hunting and Trapping Licenses are Collected Together

Or How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Hunting, Fishing, and Trapping License Revenues are Collected Separately

How much revenue did your agency collect from the sale of fishing licenses in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Hunting, Fishing, and Trapping License Revenues are Collected Separately

Or How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Trapping License Revenues are Collected Separately; Hunting and Fishing Licenses are Collected Together

How much revenue did your agency collect from the sale of trapping licenses in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Fishing License Revenues are Collected Separately; Hunting and Trapping Licenses are Collected Together

How much revenue did your agency collect from the sale of hunting and trapping licenses in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Trapping License Revenues are Collected Separately; Hunting and Fishing Licenses are Collected Together

How much revenue did your agency collect from the sale of hunting and fishing licenses in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If How does your agency organize funds collected from the sale of hunting, fishing, and trapping lic... = Hunting, Fishing, and Trapping License Revenues are Collected Together

How much revenue did your agency collect from the sale of hunting, fishing, and trapping licenses in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Does your state conduct lotteries or auctions for big game permits?

- ○ Yes, only lotteries
- ○ Yes, only auctions
- ○ Yes, both lotteries and auctions
- ○ Yes, lotteries, auctions, and another method for allocating permits/tags for big game hunting _____
- ○ No

Display This Question:

If Does your state conduct lotteries or auctions for big game permits? = Yes, only lotteries

Or Does your state conduct lotteries or auctions for big game permits? = Yes, only auctions

Or Does your state conduct lotteries or auctions for big game permits? = Yes, both lotteries and auctions

Or Does your state conduct lotteries or auctions for big game permits? = Yes, lotteries, auctions, and another method for allocating permits/tags for big game hunting

How much revenue did your agency collect from lotteries, auctions, or the other method for allocating big game hunting permits specified above in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

Page Break

How much revenue did your agency collect from penalties/fines related to fish/wildlife crime in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

What, if any, constraints are placed on these funds?

_____

Page Break

How much revenue did your agency collect from fees/taxes associated with off-road vehicles (ORVs) and snowmobiles/snowmachines in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

What, if any, constraints are placed on these funds?

_____

Page Break

How much revenue did your agency collect from the license/registration of boats in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

What, if any, constraints are placed on these funds?

_____

Page Break

How much revenue did your agency collect from the receipt of Pittman-Robertson Federal Aid in Wildlife Restoration grants in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

How much revenue did your agency collect from the receipt of Dingell-Johnson Federal Aid in Sportfish Restoration grants in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

How much revenue did your agency collect from the receipt of State Wildlife Grants in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

How much revenue did your agency collect from the receipt of federal grants under Section 6 of the Endangered Species Act in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

How much revenue did your agency collect from the receipt of federal grants under the Land and Water Conservation Fund in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

End of Block: Traditional Funding Mechanisms

Start of Block: Bond Authority

Does your agency have the authority to issue bonds?

- ○ Yes
- ○ No
- ○ Only for capital improvement projects

Skip To: End of Block If Does your agency have the authority to issue bonds? = No

Skip To: Q90 If Does your agency have the authority to issue bonds? = Only for capital improvement projects

How much money did your agency bring in from non-capital bond issuance in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

How much money did your agency bring in from the issuance of bonds for capital improvement projects in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

End of Block: Bond Authority

Start of Block: Non-Traditional

Does your agency directly collect revenue from the following sources? Please only respond "yes" to revenue sources collected exclusively for your agency, not through the appropriation of general fund dollars.

	Yes	No
Royalties from Natural Resource Development on Agency-Managed Lands (Severance Tax)	○	○
Trust Funds	○	○
Income Tax Checkoffs	○	○
Conservation License Plates	○	○
Donations	○	○
Non-Federal Grants	○	○
Habitat Stamps	○	○
Wildlife Viewing Permits/Passes	○	○
Dedicated Sales Tax	○	○
Marijuana Taxes/Fees	○	○
State Lottery	○	○
Gas/Fuel Taxes	○	○
Hotel/Lodging Taxes	○	○
Restaurant/Meal Tax	○	○
Real Estate Transfer Taxes/Fees	○	○

Landfill Tipping Fees	○	○
Container Tax/Deposit (bottle/can deposits)	○	○
Fees/Taxes on Airline Flight Arrivals/Departures	○	○

Does your agency have a partner foundation? (e.g., Texas Parks & Wildlife Department and the Texas Parks & Wildlife Foundation)

○ Yes

○ No

End of Block: Non-Traditional

Start of Block: Severance Tax/Natural Resource Royalties

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Royalties from Natural Resource Development on Agency-Managed Lands (Severance Tax) [Yes]

Which of the following natural resource development activities generated agency revenue in fiscal years 2018-2019?

- [ ] Timber Harvest
- [ ] Grazing
- [ ] Hard-rock Mineral Development (Mining)
- [ ] Coal Mining
- [ ] Oil/Gas Development
- [ ] Renewable Energy Development
- [ ] Other, please describe _____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Timber Harvest

How much revenue did your agency collect from timber harvest in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Timber Harvest

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- ○ Yes
- ○ No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Timber Harvest

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Grazing

How much revenue did your agency collect from grazing in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Grazing

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- ○ Yes
- ○ No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Grazing

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Hard-rock Mineral Development (Mining)

How much revenue did your agency collect from hard-rock mineral development in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Hard-rock Mineral Development (Mining)

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- Yes
- No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Hard-rock Mineral Development (Mining)

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Coal Mining

How much revenue did your agency collect from coal mining in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Coal Mining

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- Yes
- No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Coal Mining

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Oil/Gas Development

How much revenue did your agency collect from oil/gas development in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Oil/Gas Development

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- Yes
- No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Oil/Gas Development

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Renewable Energy Development

How much revenue did your agency collect from renewable energy development in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Renewable Energy Development

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- Yes
- No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Renewable Energy Development

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Other, please describe

How much revenue did your agency collect from another form of natural resource development on agency managed lands in fiscal years 2018-2019? Please describe in the box below.

- ○ Development Activity _____
- ○ FY 2018 _____
- ○ FY 2019 _____

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Other, please describe

Was all or part of this revenue invested in a managed trust fund? Trust fund revenues will be addressed in the following section.

- ○ Yes
- ○ No

Display This Question:

If Which of the following natural resource development activities generated agency revenue in fiscal... = Other, please describe

What, if any, spending constraints are placed on these funds?

_____

End of Block: Severance Tax/Natural Resource Royalties

Start of Block: Trust Funds

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Trust Funds [Yes]

Please record the information below regarding the five largest trust funds under your agency's jurisdiction, including the public name of the funds.

	Principal	Source of Principal	Does this fund still collect non-interest revenue?		What restrictions are placed on expenditures from this account?
	Initial Investment Amount (or investment cap; $)	Initial Revenue Source	Yes	No	Spending restrictions

Trust Fund #1			○	○	
Trust Fund #2			○	○	
Trust Fund #3			○	○	
Trust Fund #4			○	○	
Trust Fund #5			○	○	

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Trust Funds [Yes]

Please record the amount of money (typically interest) moved from the given trust fund to your agency's budget in fiscal years 2018-2019.

	Trust Fund Details	
	FY 2018 Revenue	FY 2019 Revenue

Trust Fund #1		
Trust Fund #2		
Trust Fund #3		
Trust Fund #4		
Trust Fund #5		

End of Block: Trust Funds

Start of Block: Income Tax Checkoff

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Income Tax Checkoffs [Yes]

Please record the different types of income tax checkoffs in the left-most column, and revenues in fiscal years 2018 and 2019 in the designated columns on the right.

	Income Tax Checkoff Revenues	
	FY 2018 Revenue	FY 2019 Revenue

Income Tax Checkoff #1		
Income Tax Checkoff #2		
Income Tax Checkoff #3		
Income Tax Checkoff #4		
Income Tax Checkoff #5		

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Income Tax Checkoffs [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Income Tax Checkoff

Start of Block: Conservation License Plates

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Conservation License Plates [Yes]

Please record the different types of conservation license plates in the left-most column and revenues derived from these sales in fiscal years 2018 and 2019 in the designated columns on the right.

	Conservation License Plate Details	
	FY 2018 Revenue	FY 2019 Revenue
Conservation License Plate #1		
Conservation License Plate #2		
Conservation License Plate #3		
Conservation License Plate #4		
Conservation License Plate #5		

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Conservation License Plates [Yes]

What is the cost associated with the following fees?

- Conservation License Plate Purchase _____
- Conservation License Plate Renewal _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Conservation License Plates [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Conservation License Plates

Start of Block: Donations

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Donations [Yes]

How much revenue did your agency collect from donations in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Donations [Yes]

Which of the following methods were used to solicit donations?

- ☐ Email Solicitation
- ☐ Phone Banking
- ☐ Physical Mail
- ☐ Cash donation boxes at physical agency locations
- ☐ Fundraising events
- ☐ Planned Giving/Estate Planning (Bequeaths)
- ☐ Other _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Donations [Yes]

What, if any, spending constraints are placed on these funds?

_____

Page Break

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Non-Federal Grants [Yes]

How much revenue did your agency collect from non-federal grants in fiscal years 2018-2019?

- FY 2018 _____
- FY 2019 _____

End of Block: Donations

Start of Block: Habitat Stamps

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Habitat Stamps [Yes]

Are habitat conservation stamps required for hunters or anglers in your state?

- Yes
- No
- Sometimes, please describe: _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Habitat Stamps [Yes]

And Are habitat conservation stamps required for hunters or anglers in your state? = Yes

Or Are habitat conservation stamps required for hunters or anglers in your state? = Sometimes, please describe:

Was the revenue derived from the sale of habitat conservation stamps included in the reporting of hunting, fishing, or trapping license revenues above?

- Yes (please enter "hunting," "fishing," or "trapping")
  _____
- No

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Habitat Stamps [Yes]

How much revenue did your agency collect from the sale of habitat conservation stamps in fiscal years 2018-2019?

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Habitat Stamps [Yes]

What is the price of a single habitat conservation stamp?

○ Purchase price _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Habitat Stamps [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Habitat Stamps

Start of Block: Wildlife Viewing Permits

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Wildlife Viewing Permits/Passes [Yes]

Was the revenue derived from the sale of wildlife viewing permits included in the reporting of hunting, fishing, or trapping license revenues above?

- ○ Yes (please enter "hunting," "fishing," or "trapping") _____
- ○ No

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Wildlife Viewing Permits/Passes [Yes]

How much revenue did your agency collect from the sale of wildlife viewing permits in fiscal years 2018-2019?

- ○ FY 2018 _____
- ○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Wildlife Viewing Permits/Passes [Yes]

What is the average price of a single wildlife viewing permit?

- ○ Purchase price _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Wildlife Viewing Permits/Passes [Yes]

Which species are most commonly viewed under a permit of this nature?

_____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Wildlife Viewing Permits/Passes [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Wildlife Viewing Permits

Start of Block: Dedicated Sales Tax

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Dedicated Sales Tax [Yes]

Is your agency's dedicated sales tax derived from a portion of the entire general sales tax or from the sale of certain items?

- General Sales Tax
- Sale of Certain Items

Skip To: Q7 If Is your agency's dedicated sales tax derived from a portion of the entire general sales tax or fr... = General Sales Tax

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Dedicated Sales Tax [Yes]

Which items (or class of items) are subject to your state's dedicated sales tax?

_____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Dedicated Sales Tax [Yes]

How much dedicated state sales tax revenue was collected in fiscal years 2018-2019?

FY 2018 _____

FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Dedicated Sales Tax [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Dedicated Sales Tax

Start of Block: Marijuana

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Marijuana Taxes/Fees [Yes]

How much revenue did your agency collect from taxes/fees associated with the sale of recreational or medicinal marijuana in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

FY 2018 _____

FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Marijuana Taxes/Fees [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Marijuana

Start of Block: Lottery

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = State Lottery [Yes]

How much revenue did your agency collect from state lottery programs in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = State Lottery [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Lottery

Start of Block: Gas Tax

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Gas/Fuel Taxes [Yes]

How much revenue did your agency collect from taxes on the sale of gas/fuel in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Gas/Fuel Taxes [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Gas Tax

Start of Block: Lodging Tax

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Hotel/Lodging Taxes [Yes]

How much revenue did your agency collect from taxes levied on hotels/lodging in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Hotel/Lodging Taxes [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Lodging Tax

Start of Block: Meal Tax

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Restaurant/Meal Tax [Yes]

How much revenue did your agency collect from taxes levied on restaurant meals in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Restaurant/Meal Tax [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Meal Tax

Start of Block: Real Estate Transfer

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Real Estate Transfer Taxes/Fees [Yes]

How much revenue did your agency collect from taxes/fees applied to real estate transfers in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Real Estate Transfer Taxes/Fees [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Real Estate Transfer

Start of Block: Landfill Tipping Fees

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Landfill Tipping Fees [Yes]

How much revenue did your agency collect from landfill tipping fees in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Landfill Tipping Fees [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Landfill Tipping Fees

Start of Block: Container Tax/Deposit

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Container Tax/Deposit (bottle/can deposits) [Yes]

How much revenue did your agency collect from beverage container taxes AND in forfeited container deposits (escheats) in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Container Tax/Deposit (bottle/can deposits) [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Container Tax/Deposit

Start of Block: Airline Flights

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Fees/Taxes on Airline Flight Arrivals/Departures [Yes]

How much revenue did your agency collect from fees/taxes on airline flight arrivals/departures in fiscal years 2018-2019? Please only include monies collected under dedicated revenue streams, not through general fund dollars

○ FY 2018 _____

○ FY 2019 _____

Display This Question:

If Does your agency directly collect revenue from the following sources? Please only respond "yes" t... = Fees/Taxes on Airline Flight Arrivals/Departures [Yes]

What, if any, spending constraints are placed on these funds?

_____

End of Block: Airline Flights

Start of Block: What else?

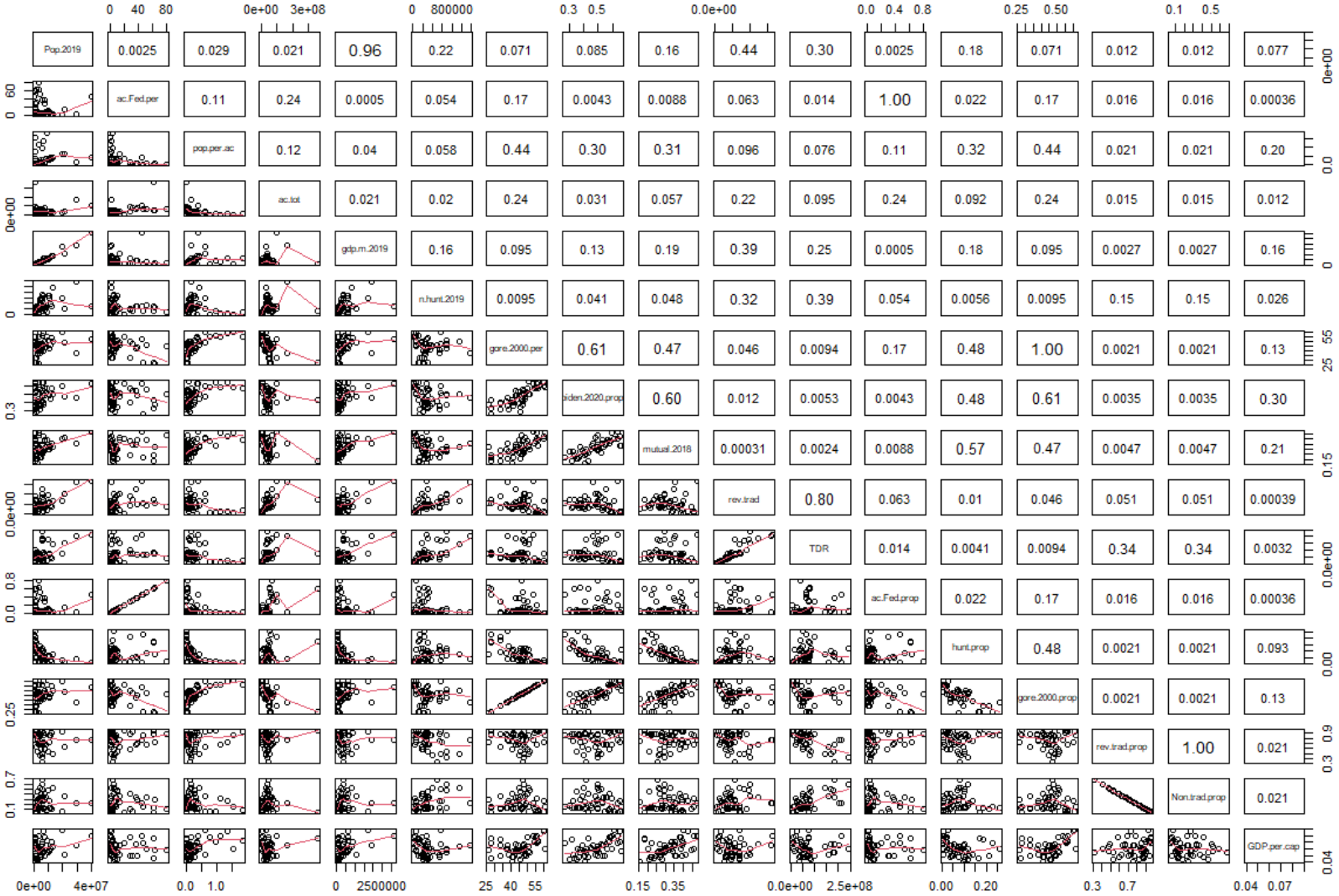
Does your agency derive additional revenues from a funding mechanism not described here, other than state general funds?

_____

What funding mechanisms are being considered by agency leadership or have been proposed by state legislative leaders that were not listed here?

_____

Appendix B. Correlation plot of variables considered in regression analyses on dedicated state agency revenue in Chapter 2. R^2 values are presented in upper right with corresponding scatterplots in lower left.



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