Assessing Policy Design and Interpretation: An Institutions-Based Analysis in the Context of Aquaculture in Florida and Virginia, United States

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Abstract

Recently in the field of policy studies, there has been a renewed interest in research that connects policy design with broader governance outcomes. As opposed to past studies of policy design that have characterized policies along broad categories of variables, however, recent studies have sought to systematically assess the language of public policies and resultant outcomes. This paper contributes to the existing and emerging literature on policy design by coupling a content analysis of polices governing the aquaculture industry in two U.S. states and interviews with aquaculture community members to understand policy design and perceptions of policy legitimacy, coerciveness, and enforcement.

KEY WORDS: institutional grammar tool, institutional analysis and development framework, Q-Sort, aquaculture, policy design

Introduction

One key facet of governance is designing public policies to shape the behavior of constituents in ways that support the attainment of policy objectives (Robichau & Lynne, 2009). Policies contain carefully crafted directives that, together, specify the array of behavioral opportunities and constraints available to target populations within a particular domain. Thus, through carefully constructed language, they have the potential to profoundly shape individual behavior, and ultimately, the contexts in which they are applied (Bobrow & Dryzek, 1987; Linder & Peters, 1989; Schneider & Ingram, 1997). To truly assess the valence of policies, however, one must gain a comprehensive understanding of not only what they are *intended* to do, but also how individuals interpret them. Equally important is uncovering the types of factors that are most salient in influencing this interpretation. With this in mind, this paper brings together scholarship on policy design and regulatory compliance to answer the following two research questions in the context of aquaculture in Florida and Virginia, United States: (i) *What is the design of policies governing the behavior of aquaculture participants in Florida and Virginia*; and (ii) *What is the relationship between perceptions of policy legitimacy, coerciveness, and enforcement in shaping individuals' interpretations of regulations?*

Much of the policy design scholarship conducted to date has focused either on the types of policies that result in particular contexts (Lowi, 1964; Wilson, 1979) or has examined policy designs along broad categories of variables, such as policy tools, instruments, benefits and burdens, and target populations (Dahl & Lindblom, 1953; Schneider & Ingram, 1997). Recently in the field of policy studies, there has

been a renewed interest in analyzing the characteristics of policy design but with more attention to the specific language used to direct behavior in rule-governed situations (Mondou & Montpetit, 2010; Siddiki, Weible, Basurto, & Calanni, 2011). Assuming that individuals internalize and respond to individual directives rather than general policy characteristics, this paper continues on this recent stream of research. Toward this effort, a content analysis approach for syntactically organizing policy language was applied to code all state-level policies governing the conduct of aquaculture in two U.S. states. These coded data were then paired with data collected through semi-structured interviews involving a Q-Sort exercise with 30 members of the aquaculture community in the study states to better understand policy interpretation.

Aquaculture, defined as "the propagation and rearing of aquatic species in controlled or selected environments" (NOAA, 1980), is an increasingly salient domestic and international policy issue. Though capture fisheries production has plateaued over the last three decades, the aquaculture industry has seen an annual growth rate of 8.3 percent worldwide (NOAA, 2012). According to the U.S. National Oceanic and Atmospheric Administration, this makes it the fastest growing form of food production in the world (NOAA, 2012). Globally, government involvement in aquaculture in the form of economic incentives and regulations has increased in tandem with industry growth (Hishamunda, Bueno, Neil, & Yap, 2009), though there is significant variation between countries in the quantity and design of aquaculture regulations as well as monitoring and enforcement mechanisms to support them (Read & Fernandes, 2003).

In the United States, a high trade deficit and concerns regarding wild fish stocks have spawned governmental interest to encourage the industry's development. Just as observed elsewhere in the world, as the aquaculture industry grows, so too has the number of policies designed to govern it. Aquaculture policy making and regulating in the United States has largely been devolved to the state level. Similar to other U.S. policies designed for natural resource-based industries, aquaculture policies tend to be fairly technical and decentralization of governance mechanisms is common (May, 2005). Such decentralization means that the types of policies and supporting mechanisms vary widely from state to state, as does their receptivity. For example, when new policies are applied in states that have well-established industries, receptivity to them depends, in part, on how consistent they are with industry members' own conceptions concerning how the trade should be conducted. It also depends on how contextually appropriate regulations are perceived as being. Given the transitioning policy landscape pertaining to U.S. aquaculture, it provides an apt context in which to explore questions of policy design and interpretation.

This paper proceeds as follows: the next section provides a brief overview of the relevant, existing literature relating to policy design, legitimacy, coerciveness, and enforcement. Following that, key characteristics of the aquaculture contexts in the study states are described as are theoretically and analytically pertinent. Next I describe the case selection, data collection, and analytical procedures employed, followed by a summary of the research findings around each of the posited research questions and a discussion of these results in relation to the extant literature and the aquaculture case study.

Conceptual Background

Policy Design

Public policy scholars are logically interested in the structure and design of policies and have examined these variably. In recognizing the context-dependent quality of policies, some scholars have identified relationships between policy designs and the political and social dynamics of the environments in which they are applied (Lowi, 1964; May, 1991; Schneider & Ingram, 1997; Wilson, 1979). Other scholars have focused their attention on answering broader societal level questions, such as, what is the relationship between policy design and democracy (Mondou & Montpetit, 2010; Schneider & Ingram, 1997)? Still others' efforts have been aimed at gaining a systematic understanding of the content of policies and uncovering the policy, administrative, and behavioral implications of such (Bardach, 1977; Gormley, 1990; Huber & Shipan, 2002; Linder & Peters, 1989; Schneider & Ingram, 1997, p. 72; Siddiki, Basurto, & Weible, 2012).

Within studies of policy design, to complement existing research, more formal assessments of policy interpretation are required. Such studies are necessary for signaling where one might expect to observe congruencies and discrepancies between how policies are intended to shape behavior on paper and what policy targets do in practice; that is, the de jure and de facto rules that govern behavior (Ananda, Crase, & Pagan, 2006; Ostrom, 2005). To conduct such an assessment, this research pairs a comprehensive study of the design of state-level policies with an exploratory investigation of how individuals within one internationally salient industry context interpret them. For the latter analysis, the focus is specifically on exploring the relationship between perceptions of policy legitimacy, coerciveness, and enforcement in shaping policy interpretation. To identify these factors, the author drew from the policy compliance literature. This literature is considered to be most conceptually and theoretically proximate given that policy interpretation is a logical antecedent to policy response (e.g., compliance) (Ajzen, 1991). This study is considered exploratory given the lack of existing research in public affairs on policy interpretation and/or theories of policy compliance that point to suites of factors that should be analyzed in conjunction.

Policy Legitimacy

Policy legitimacy is described here as the perceived "appropriateness of the laws or regulations that an authority is enforcing" (Murphy, Tyler, & Curtis, 2009, p. 3). In varying respects, it has been found that policy effectiveness, receptivity, and response are tightly coupled with the degree to which policies are viewed as being appropriately crafted for the contexts in which they are being applied (Jentoft, 2004; Ostrom, 1990, 2005; Young, 2002). Young (2002) uses the concept of institutional fit to explore how governing rules are crafted to address unique context-specific ecosystem challenges. Treating "fit" in broader terms, Ostrom (1990, 2005) looks at the ways in which rules are designed to reflect the local resource, political, and social conditions of rule-governed domains. She draws upon extensive empirical research to show that perceptions of institutional (e.g., policy) appropriateness

along these dimensions is an influential compliance determinant. Similarly, Jentoft (2004) asserts within a fisheries context that when fishers lose the ability to feel morally committed to "values such as honesty and respect for rules" (p. 144), the ascendancy of regulatory over regulated agents begins to diminish, thereby increasing chances of policy noncompliance. Furthermore, where regulating and regulated actors possess disparate beliefs regarding how an industry should be managed, scholars argue that those being governed may question the legitimacy of governing bodies as well as the legitimacy and fairness of the directives themselves (Gezelius, 2003; May, 2005; Ostrom, 1990). This, in turn, may negatively impact compliance levels (Bardach & Kagan, 1982; Levi, 1988; May, 2005, p. 321).

For this research, I adopt Ostrom's (1990) and Murphy et al.'s (2009) conceptualization of policy legitimacy—the extent to which rules are perceived as reflecting the local resource, political, and social conditions of the contexts wherein they are applied. This broad definition is also interpreted in a regulated industry context to include the extent to which policies accurately reflect the scope of activities that policy targets are regularly involved in.

Policy Coerciveness

Another factor bearing significant implications for individuals' policy interpretations is perceptions of policy coerciveness. Policy coerciveness is defined here as the degree to which policies are designed to control the behavior of policy targets, either through the wording of policy directives (e.g., "you must do *x*") or through the imposition of behavioral incentives (e.g., financial or administrative sanctions). Each of these two dimensions of policy coerciveness is described in more detail. First, through carefully crafted language, policies identify behavioral opportunities and constraints by specifying behaviors that are allowed, required, or forbidden within a given context (Hart, 1997; Huber & Shipan, 2002; Ostrom, 2005). With respect to incentives, policies designate sanctions for noncompliance (Hart, 1997). Sometimes these sanctions are explicitly stated within the specific policy being applied. Other times, given the nested nature of policies (Ostrom, 2005), sanctions are implied or carried over from related policies. Policy designers deliberately craft policies to be coercive/noncoercive in ways that best facilitate the achievement of their objectives. Thus, it is critical to assess the degree to which coercive policy language is actually perceived as being such.

Both dimensions of coerciveness described here can be operationalized through linguistic analyses of policy content. For example, the identification of behavioral opportunities and constraints can be assessed by examining the prescriptive operators, or deontics, linked to different policy activities. Commonly observed deontics in policies, include "must," "must not," "may," and "may not," which imply varying degrees of behavioral constraint. Ostensibly, directives containing "may" deontics afford individuals greater freedom in making behavioral choices than directives that contain "must" and "must not" deontics. According to scholars of deontic logic (Beller, 2008; Buccarelli & Johnson-Laird, 2005), directives containing deontics can be either categorical or conditional. In categorical statements, an actor is required (must), forbidden (must not), or permitted (may) to perform an activity without clear exceptions that would modify the applicability of the deontic. In a conditional

deontic statement, a temporal, spatial, or procedural parameter is identified that modifies the applicability of the deontic. For example, the following statement is a categorical directive: "Any person permitted as an oyster aquaculture harvester must possess a permit on his person while harvesting." The same example in conditional form is: "Any person permitted as an oyster aquaculture harvester must possess a permit on his person while harvesting unless that permit is in the possession of a legally permitted oyster aquaculture product owner, and the permitted harvester is harvesting oysters of that oyster aquaculture product owner." In the second example, where the deontic containing directive is conditional, the "must" deontic is modified to "may" deontic under certain circumstances. In general, within a shared linguistic context, scholars have found that individuals have a reasonably high level of deontic competence (Beller, 2008) and perceive differing levels of constraint from must/must not deontics and may/may not deontics. Beyond deontics, another way policy coerciveness is also linguistically determinable is through an examination of the number and types of sanctions associated with noncompliance with policy-directed activities.

Linguistic-based operationalizations (e.g., deontic-based operationalizations) of the concept of policy coerciveness such as those described in the preceding paragraphs represent a slight departure from the extant literature on policy coerciveness. Most of the policy literature on policy coerciveness has offered general definitions of the concept relating it to different types of policy instruments (Lowi, 1972; Macdonald, 2001; Salamon, 2002, p. 25; Woodside, 1986). For example, Lowi (1972) differentiated between policies that seek to control individual behavior directly versus those that seek to control behavior indirectly through the environment. In a similarly general way, Salamon (2002, p. 25) defined coerciveness as: "the extent to which a tool restricts individual or group behavior as opposed to merely encouraging or discouraging it." Rigby (2007) sought to provide a more concrete definition of coerciveness in her study of early childhood education policy. Concrete measures indicating policy coerciveness within her research context included items such as the preservice education required for teachers and requirements regarding teacher–child ratios in childcare centers. Although these measures offer a contribution in their more detailed operationalization of the concept of policy coerciveness, they are limited in the extent to which the measures are transferable to different contexts. That is, they are tied to the substantive context of the research. Linguistic-based approaches are more transferable in that the types of prescriptive operators used across policy contexts are typically comparable. The ability to identify these and policy sanctions is made even easier with the aid of methodological tools designed to deconstruct the language of policies.

It is useful to emphasize the difference between policy coerciveness and policy compliance. Policy coerciveness is a measure of how forcefully—either through language or behavioral incentives—a policy intends to shape individual behavior through the individual directives of which it is comprised (Lamond, 2000). Compliance relates to whether individuals behave in a manner that is consistent with regulatory directives. Although conceptually distinct, clearly, one's internal valuation of regulatory directives vis-à-vis their coerciveness portends resultant compliance behavior. As such, this research is interested in perceptions of policy coerciveness.

Enforcement

Consistent with May and Burby (1998) and May and Winter (1999), regulatory enforcement is defined here to include both regular interaction between regulatory personnel and regulatees as well as the choices made by regulatory authorities regarding the administration of sanctions for noncompliance (May & Winter, 1999, p. 626). Enforcement has the capacity to influence individual responses to regulation by reinforcing, undermining, or otherwise modifying the perceived coerciveness of individual directives (Ostrom, 2005). For example, where regulators enforce weak sanctions when the regulations call for strong ones, the coerciveness of the regulations may be undermined (Hart, 1997). Similarly, regulations can be undermined when regulators adopt lenient interpretations of "must" deontics; that is, when "you must do *x*," is actually enforced as "you may do *x*." The assumption following should not however be that stringent enforcement will always lead to higher compliance. Scholarship that examines the relationship between enforcement and compliance clearly shows that stringent enforcement can lead to lower levels of compliance where it is perceived as being inflexible, inappropriately stringent, or unsympathetic. This type of enforcement is contrasted with "cooperative enforcement," in which regulators adopt a more flexible approach to enforcement (Scholz, 1991).

May and Winter (1999) further parse styles of enforcement—rigid vs. cooperative—along two dimensions to relate to different aspects of enforcement: formalism and coercion. According to May and Winter (1999, p. 627): "We define *formalism* as the degree of rigidity in interactions that varies from informal conversations and the influencing of attitudes to rigid application of rules on the part of inspectors. We think of *coercion* as the degree of severity of the threats that inspectors are willing to issue, ranging from not issuing warnings at all to threatening to report or to impose penalties for violations." Enforcement of regulations can vary along these two dimensions; i.e., stringent enforcement along one dimension can differ from stringent enforcement along the other. In either case, individuals' expectations regarding enforcement, in terms of either formalism or coercion, will temper their perceptions of the policies.

Study Setting: Virginia and Florida, United States

This research was conducted in the context of aquaculture in two states, Virginia and Florida, United States. The United States currently produces 9 percent of its seafood consumed while importing 91 percent, resulting in a seafood trade deficit that exceeds 11.2 billion dollars annually (NOAA, 2012). This deficit has prompted federal and state policy makers to encourage the development of a domestic aquaculture industry. The production of aquaculture involves consideration of complex interdependencies among ecological, economic, technical, and social factors (Firestone, Kempton, Krueger, & Loper, 2004), resistance from the public regarding farmed seafood (Amberg & Hall, 2010; Mazur & Curtis, 2006), and numerous concerns about the industry from disease control to degradation of marine ecosystems (Black, 2001; Francik & Hershner, 2003; Mazur & Curtis, 2006; Naylor et al., 2000; Treece, 2002).

In recent decades, both Virginia and Florida have supported active shellfish and finfish aquaculture industries. While both states are generally better known for their shellfish production, Florida has also recently housed a thriving ornamental fish industry. Virginia and Florida share biophysical characteristics making the states amenable to broad-scale shellfish production, though state leasing and siting policies may limit the availability or access to such resources. Both states, for example, have abundant water sources for supporting shellfish aquaculture. In addition to the Chesapeake Bay in Virginia, the state contains a number of estuaries along the Atlantic coast (Luckenbach, O'Beirn, & Taylor, 1999). In Florida, both the Atlantic and Gulf Coasts provide many suitable locations for shellfish production.

The governments of both states have expressed state-level support of aquaculture, touting economic and environmental benefits of shellfish production. This is, no doubt, partly attributed to the fact that aquaculture is a multimillion dollar industry that provides employment opportunities in addition to supporting the state economy. Additionally, the states support aquaculture from an environmental standpoint as shellfish production improves water quality in the areas where it is being conducted, supports local ecosystem diversity, and preserves wildstock (Virginia Marine Resources Commission, 2011). The preservation of wildstock was a primary impetus in both states to grow the aquaculture industry.

In order to facilitate the development of the industry, both states implemented work transition programs for commercial shellfishermen who were encouraged to seek careers in aquaculture. They were provided basic aquaculture training and, in some cases, subsidies to establish shellfish aquaculture operations. In addition to such programs, both Virginia and Florida have created aquaculture opportunity zones in which individuals interested in entering the aquaculture industry may do so with the aid of state subsidies to reduce start-up and input costs. By inviting newcomers to the industry such state-level efforts have contributed to more heterogeneity within traditional aquaculture communities.

Altogether, state support of aquaculture has resulted in the growth of the industry, both in terms of sales and the number of farmers, thereby punctuating positive and negative impacts and eliciting increased attention by policy makers and the general public. To respond to these developments, a variety of regulations have been established in Virginia and Florida to manage the industry. In Virginia, the Virginia Marine Resources Commission is the primary regulating agency charged with implementing and enforcing state-level aquaculture regulations. In Florida, the Division of Aquaculture was established in 1999 within the Department of Agriculture and Consumer Services for this purpose.

Changes in the regulatory environment and industry composition raise important policy design and perception questions in a context like aquaculture wherein strong individual and industry-level best management practices (BMPs) existed long before the introduction of state-level policies, regulating the trade involves nuanced understandings of geographic- and species-specific considerations, concerns over product integrity are paramount, and where reputational concerns is a significant behavioral motivator (Siddiki et al., 2012). Given the presence of all of these characteristics, aquaculture provides an appropriate setting within which to further an understanding of policy design and interpretations.

Methodological Approach

Case Selection

This research involved a two-state, comparative, most similar case study design. A preliminary study was first conducted to select an appropriate sample of study states.[1] Given the questions guiding this research, two states were chosen for the analysis using data from the preliminary study that had reportedly similar political, regulatory, social, community, and industry characteristics, biophysical attributes, and overall levels of policy compliance but differed with regard to the level of stringency (or coerciveness), of state aquaculture policies: Virginia and Florida (please see the Appendix for a listing of theoretically relevant variables upon which the study states were compared). Having similar levels of compliance but differing levels of policy stringency would indicate to the author that aquaculture community members in the two study states differ in the ways they respond to policy coerciveness on paper. The preliminary study data indicated that Virginia's policies are relatively nonstringent as compared with Florida's. In addition to comparability on theoretically important variables, these states were also comparable in terms of the types of aquaculture produced, the presence of both marine and inland aquaculture, and the relative establishment of the aquaculture industry. To corroborate findings from the preliminary study and ensure that the cases were appropriate selections given the analytical objectives of the researcher, informal interviews with three state aquaculture coordinators[2] were conducted.

Data Collection

Data collection for the research reported in this paper was conducted through a content analysis of aquaculture policies and interviews that involved a Q-Sort exercise. For the content analysis, all aquaculture policies, or parts of policies pertaining to aquaculture, from the two study states were coded using the institutional grammar tool (IGT); in Virginia, there were eight such documents, and in Florida, there were four. The IGT (Crawford & Ostrom, 1995, 2005) is a content analysis tool for systematically dissecting the content of institutions (e.g., policies, laws, and regulations) by parsing the individual components that comprise them in accordance with a grammatical syntax. Institutions can be embodied in written form, such as in laws, regulations, or policies, or be reflected in social norms. Regulatory policies are the particular type of institution under consideration in this paper, and the subsequent discussion will use the term "policy(ies)" in place of "institution."

A first step in applying the IGT is deconstructing the policy under consideration into individual institutional statements. Crawford and Ostrom (1995, p. 583) define institutional statements as "the shared linguistic constraint or opportunity that prescribes, permits, or advises actions or outcomes for actors (both individual and corporate)." In other words, these are the individual directives that describe activities that a particular actor is required, permitted, or forbidden to perform within certain conditions and penalties associated with not carrying out the activity as prescribed.

A second step in applying the IGT is further parsing institutional statements into words or phrases using a grammatical syntax based on the part of the statement

they represent. The six syntactic categories included under the IGT include the: (i) Attribute [A], the actor to whom the statement applies; (ii) oBject[3] [B], the animate or inanimate receiver of action within the statement; (iii) Deontic [D], the prescriptive operator that indicates whether the focal action of the statement may, must, or must not be performed; (iv) aIm [I], the action of the statement; (v) Condition [C], the temporal, spatial, or procedural boundaries of the action; and (vi) Or else [O], the punitive sanction associated with not carrying out the statement directive as prescribed. At a minimum, institutional statements must contain an Attribute, an aIm, and a Condition. The following statement would be dissected using the IGT as follows: "Any person violating any provision of this chapter [pertaining to restrictions on shellfish harvesting] [*Attribute*] shall [*Deontic*] destroy [*aIm*] all shellfish in his possession [*oBject*] in the presence of a Marine Police Officer [*Condition*]." One can analyze IGT-coded data by aggregating data within and across individual grammatical components to gain a detailed understanding of the document being examined.

Following a coding of aquaculture policies in accordance with the IGT, a test of intercoder reliability was conducted in which an additional person other than the author coded one of the aquaculture policies from Virginia in entirety—the Virginia Enclosures Rule. The Enclosures Rule contains 63, or 5 percent, of the total statements coded between Virginia and Florida policies. The coding for each syntactic element per institutional statement between the author and this person's coding was compared to assess the degree of agreement. The goal was greater than 80 percent agreement among coders across syntactic components. For each of the components, the following percentage agreement was observed between the two coders: Attribute (95 percent), oBject (83 percent), Deontic (94 percent), aIm (95 percent), Condition (79 percent), and Or else (97 percent). The lowest agreement was observed for oBjects and Conditions. These results from the intercoder reliability test are consistent with Siddiki et al. (2011) and Basurto, Kingsley, McQueen, Smith, and Weible's (2010) in which the authors observed lowest agreement on Conditions (Siddiki et al. agreement on Conditions = 80 percent; Basurto et al. = 67 percent). After Conditions, Siddiki et al. observed lowest agreement on oBjects (Siddiki et al. agreement on oBjects = 86 percent; Basurto et al. = N/A).[4]

The coding exercise was conducted primarily to gain a thorough understanding of the policies' content. Aggregated Deontic and Or else data were used to assess the degree of policy coerciveness "on paper" (which contrasts to perceptions of policy coerciveness examined in the interviews). Modal Attributes (i.e., individual or corporate actors occurring most frequently in the policies) were identified to understand the primary policy targets. Examples of modal Attributes from the policies included aquaculture producers, aquaculture processors and handlers, and the Marine Resources Commission. Finally, coded data also served as a basis for interview questions and the Q-Sort exercise.

As a second step in the data collection process, interviews with 30 members of the aquaculture communities of the two study states were conducted (15 per state). The interviews consisted of two parts. In the first part, the researcher conducted a semi-structured interview using a predesigned protocol. A modified random sampling procedure was used to select aquaculturist interview participants in Florida. In the absence of a publically available directory of Florida aquaculturists,

a regulatory official provided the author with a demographically representative list (with respect to the composition of the industry) of 50 aquaculture producers and processors/handlers to contact for participation in the study. From this list, ten individuals were randomly selected and agreed to participate. Those contacted expressed varying degrees of familiarity with the state regulators. Random sampling is an advantageous sampling method as it minimizes the potential for sampling bias. Thus, the author sought to use this approach within the data availability limitations. Beyond attenuating sample bias potential, a modified random sampling procedure (as opposed to a purposive sampling procedure) was appropriate because the author was not interested in interviewing a subgroup among the population of aquaculturists in the state. The regulations selected for analysis in this research are applicable to the entire population of Florida aquaculturists. The remaining five interviewees in Florida were regulators. Regulators were included in the interview sample because they are also subject to state aquaculture regulations, and thus it was considered valuable to collect information regarding their policy perceptions and compliance.

For Virginia, the researcher randomly selected 13 participants from an online directory of Virginia aquaculture producers. The remaining two interviewees in Virginia were regulators. As was the case in Florida, a random sampling technique was considered suitable given the lack of analytical emphasis on any particular population subgroup. The final sample of interview participants across the two states consisted of 18 shellfish producers, seven regulatory officials, two ornamental fish producers, two aquaculture processor/handler and ornamental fish producers, and one shellfish and finfish producer. All of these categories of actors are governed by the same set of aquaculture regulations; in other words, separate regulations do not exist for different categories of actors.

The interview protocol used for the semi-structured portion of the interviews was designed to collect information regarding perceptions of policy design, policy history and context, and perceptions of policy effectiveness. To connect the interview with coded data, the policy design questions were constructed in accordance with IGT syntactic components. These questions are provided below. The Attribute and oBject/aIm questions were used to capture perceptions of policy legitimacy. The Deontic and Or else questions were used to capture perceptions of policy coerciveness and enforcement. Condition questions were used to shed additional light on deontic interpretations.

Attribute [A]	You are one of the people most often referred to in this legislation. Does this accurately reflect your level of involvement in the aquaculture industry?
oBject [B]/aIm [I]	You are/are not listed is relation to many "items." For example [oBject 1, oBject 2, and so on]. How do you think this reflects the scope of activities that you are involved in on a daily basis?
Deontic [D]	Some of the prescribed processes assigned to you in the legislation include [X]. How do you interpret different prescriptive operators [may/may not/must/must not] in relation to these?
Condition [C]	How do prescribed Conditions influence how you interpret prescriptive operators?
Or else [O]	I noticed there [are/are not] a lot of sanctions described in the legislation for instances in which compliance is not achieved. Why do you think this is the case? How do you feel about the current level of stringency of state aquaculture regulations? Who holds you accountable [people, organizations, and so on] for performing duties as prescribed in this regulation?

The interview protocol was pretested (as was the Q-Sort approach described below) among eight aquaculture farmers and/or regulatory officials in Colorado. The pretest results affirmed the validity of protocol questions. Prior to conducting the interviews, the author compiled and familiarized herself with all institutional statements related to the different modal Attributes (i.e., policy targets) so that interview questions could be well tailored to the person being interviewed.

In the second part of the interviews, study participants were asked to participate in a modified, structured Q-Sort exercise. The Q-Sort is a methodological technique that allows study participants to subjectively sort a preselected set of statements into a set of categories designated by the researcher (McKeown & Thomas, 1988). Sample statements can be chosen following an unstructured or structured approach. In the structured approach, the researcher chooses the statements that will be sorted based on prior collected information, such as through preliminary interviews or from the examination of existing documents.

The Q-Sort exercise was used as another means to capture policy interpretation but with more of an emphasis on understanding what policy targets actually do. As such, data obtained therefrom were used to complement other data from the interviews concerning policy interpretations. For the Q-Sort exercise, each participant was given a set of 20 cards containing institutional statements that describe activities that relate to his/her position in relation to aquaculture, as prescribed in the policy documents analyzed. However, missing from the card was the Deontic associated with the activity identified in the institutional statement. For example, one of the statements applying to Virginia aquaculture producers was the following: "Aquaculture producers must submit a monthly harvest report to the Commission [Virginia Marine Resources Commission] no later than the fifth of the following month." The Q-card that was given to the interviewee for this statement only read: "Submit a monthly harvest report to the Commission." The interviewee was asked if he/she "must," "must not," "may," or "may not" perform the activity described on the card based on what he/she actually does (i.e., not what the interviewee knows or thinks the policies say). As each card was placed into a Deontic category, the author asked the participant to explain the placement of statements. For example, "why did you place card X in Deontic category A?" In addition to capturing more detailed responses, this question also helped the author affirm that the exercise was understood correctly.

As both Virginia and Florida had multiple policies from which Q-Sort statements were drawn, the number of statements chosen in the Q-Sort sample from each document was proportionate to the number of statements in a particular document relative to the total number of statements across all policy documents for a particular Attribute. To demonstrate this, Table 1 displays how the sample of Q-Sort statements was selected for Florida aquaculture producers. For example, the aquaculture BMPs Rule contained 480 statements in which aquaculture producers was the statement Attribute, accounting for 79 percent of the total statements pertaining to aquaculture producers across all Florida aquaculture regulations. As such, the number of statements to be included from the BMPs in the Q-Sort sample was 20 multiplied by 79 percent, or 16 cards. The statements were selected so as to represent a variety of activities required of aquaculturists and regulators; for example, statements relating to health and sanitation, administrative activities and

Table 1. Sampling of Q-Sort Statements—Florida Aquaculture Producers

	Total No. of Statements in Document	Percentage of Total Statements	No. of Statements Out of Twenty
Revised statute	66	11%	2
Best management practices rule	480	79%	16
Submerged lands rule	61	10%	2
Submerged lands statute	N/A	N/A	N/A
Total	607	100%	20

reporting, importation, and infrastructure placement and design requirements. Such activities are relevant in the day-to-day activities of aquaculture actors. In addition, statements were selected so as to reflect deontic variance (i.e., must, may, must not, and may not statements). The vast majority of interviewees indicated that the selected statements pertain to their regular aquaculture activities.

Results

Results from this study are structured around the two questions guiding this research: (i) What is the design of policies governing the behavior of aquaculture participants in Florida and Virginia; and (ii) what is the relationship between perceptions of policy legitimacy, perceptions of policy coerciveness, and enforcement in shaping individuals' reactions to regulations?

What Is the Design of Policies Governing the Behavior of Aquaculture Participants in Florida and Virginia?

The assessment of policy design was based on the IGT coding of state aquaculture policies in the two study states. Eight regulatory documents were coded for Virginia (n = the number of institutional statements per document): Virginia State Code Ch. 28 relating to aquaculture (n = 82), Virginia State Code Ch. 150 relating to shellfish sanitation (n = 13), Aquaculture Structures Rule (n = 10), Harvest Reporting Rule (n = 32), Enclosures Rule (n = 63), Striped Bass Rule (n = 55), Cobia Rule (n = 16), and the Shellfish Restrictions Rule (n = 32). The modal Attributes (i.e., policy targets occurring most frequently in policy directives) from these regulations included the Virginia Marine Resources Commission (VMRC), aquaculture producers, the Virginia State Legislature, the Graduate Marine Science Consortium, registered commercial fishermen, seafood landing licensees, the Commissioner of Marine Resources, and aquaculture purchasers. Four regulatory documents were coded for Florida: Florida Statute Ch. 597 relating to aquaculture (n = 281), Florida BMPs Rule (n = 544), the Florida Submerged Lands Statute relating to aquaculture (n = 14), and the Florida Submerged Lands Rule (n = 172). The modal Attributes in the legislation included the Florida Department of Agriculture and Consumer Services (FDACS), aquaculture producers, the Florida state legislature, the Florida Aquaculture Coordinating Council, the Florida Fish and Wildlife Conservation Commission, and the Board of Trustees of the Internal Improvement Trust Fund.

With respect to policy coerciveness "on paper," the results from a descriptive analysis of IGT-coded data are provided in Table 2. Again, based on linguistic

Table 2. Policy Coercion Measures from IGT Coding: Summary of Coded Deontic and Or Else Data

Regulation	Total Statements	Deontics (% Total for Each Deontic)					No. of Or Else Statements (% total)	
		May	May Not	Must	Must Not	Should	Implicit	Explicit
Florida								
Florida best management practices rule	544	7	1	100 implicit; 53 explicit	7	7	100	<1
Florida statute chapter 597	281	17	1	100 implicit; 70 explicit	70	7	100	<1
Florida submerged lands rule	172	6	0	76	7	—	—	<1
Florida submerged lands statute	14	29	0	71	0	—	—	0
Total statements	1011	—	—	—	—	—	—	—
Virginia								
Virginia state code/statute Ch. 28	82	16	0	66	12	—	—	<1
Enclosures rule	63	16	0	54	21	—	—	<1
Striped bass	55	13	2	67	16	—	—	<1
Harvest reporting rule	32	7	0	90	10	—	—	28
Shellfish restrictions	32	13	0	72	16	—	—	22
Cobia	16	25	0	56	13	—	—	13
VA code chapter 150	13	8	0	13	8	—	—	0
Aquaculture structures/on-bottom shellfish structures rule	10	10	10	50	30	—	—	0
Total statements	303	—	—	—	—	—	—	—

representation, coerciveness was operationalized in terms of the frequency of different types of Deontics (i.e., prescriptive operators) used in the policy and the number of Or elses (i.e., sanctions for noncompliance) across policy directives. The table differentiates Deontic and Or else statements that were explicitly stated in particular directives versus those that were implicit. In the case of implied Deontics and Or elses, the policy documents contained clauses that indicated that a violation of any of the directives contained therein was subject to legal penalties. In the interpretation of Deontics, this means that all directives contain an implied "must," though the actual statements contain different Deontics. For the Or else category, the interpretation of this is that all statements have an implied sanction for noncompliance. An example of such as clause from the Florida BMP Rule is the following:

> Any person who violates any provision of Chapter 597, F.S. [Florida Statute] or Rule 5L-3 F.A.C. [Best Management Practices Rule], commits a misdemeanor of the first degree and is subject to a suspension or revocation of his or her certificate of registration. The Department may, in lieu of, or in addition to the suspension or revocation, impose on the violator an administrative fine in an amount not to exceed $1,000 per violation per day. First time offenders will receive written notice of the BMP deficiencies and will be given 60 days to comply. Operators not in compliance with BMPs after 60 days will be fined $100–$500 per day per occurrence depending upon the type of violation and circumstances contributing to the violation (Florida Aquaculture Best Management Practices Rule).

For each of the Florida aquaculture policies at least 70 percent of the total number of statements contained "must" Deontics. The percentage of "must" statements in the Virginia regulations varied widely from 13 percent to 90 percent (VA Code Ch. 150 = 13 percent, Aquaculture Structures Rule = 50 percent, Enclosures Rule = 54 percent, Cobia Rule = 56 percent, VA Code Ch. 28 = 66 percent, Striped Bass Rule = 67 percent, Shellfish Restrictions Rule = 72 percent, Harvest

Reporting Rule = 90 percent). The highest number of "must" statements was observed in the Harvest Reporting and Shellfish Restrictions Rule. Both of these policies pertain to health and sanitation aspects of aquaculture production. Given the potential gravity of violating the directives contained in such policies, it is unsurprising that they contain stringent Deontics. Interestingly, although "must not" statements did not represent a significant portion of the total statements in either state, there were markedly more "must not" statements across the Virginia policies than across the Florida policies. In Virginia, the percentage of "must not" statements per document ranged from 8 percent to 30 percent (VA Code Ch. 150 = 8 percent, Harvest Reporting Rule = 10 percent, VA Code Ch. 28 = 12 percent, Cobia Rule = 13 percent, Shellfish Restrictions Rule = 16 percent, Striped Bass Rule = 16 percent, Enclosures Rule = 21 percent, Aquaculture Structures Rule = 30 percent), whereas in Florida the percentage of "must not" statements ranged from 0 percent to 7 percent (FL Submerged Lands Statute = 0 percent, FL Statute Ch. 597 = 7 percent, FL BMP Rule = 7 percent, FL Submerged Lands Rule = 7 percent). Given, however, that "must not" statements did not comprise a significant proportion of overall statements, Florida is still considered to have more stringent regulations based on the high presence of "must" statements.

Because the interviewee sample included both regulators and farmers, the author also sought to determine if there were any discernible differences between policy directives targeted at aquaculturists and those targeted at regulators, with respect to coerciveness on paper. An analysis of Attribute and Deontic data revealed that there were no marked differences in either state in Deontic use depending on who is the modal Attribute across the two states' regulations. That is, a higher or lesser degree of Deontic coerciveness was not evident for documents aimed at different types of actors (e.g., regulating agency versus aquaculturists). In Florida, for example, "must" Deontics were applied just as frequently to the FDACS in Ch. 597 of the State's Statute as they were to aquaculturists in the BMP Rule. If one considers the explicit use of "must" Deontics in these two documents, statements pertaining to the FDACS contained more Deontics. Similarly, in Virginia, there were no major differences between type of Deontic used and primary Attribute. The only regulation from Virginia in which aquaculturists are not the primary Attribute is the Virginia State Code. In this document, the VMRC is the primary Attribute, appearing in 26 percent of the total statements, and aquaculturists are the second most frequently occurring Attribute, appearing in 24 percent of the total statements. In the entire document, 66 percent of the statements contain must Deontics; 26 percent of linked to the VMRC and 16 percent of which are linked to aquaculturists. In all of the other regulations from Virginia, aquaculturists are the primary Attribute and the majority of statements contain "must" Deontics.

What Is the Relationship between Perceptions of Policy Legitimacy, Perceptions of Policy Coerciveness, and Enforcement in Shaping Individuals' Reactions to Regulations?

Perceptions of policy legitimacy were obtained using Attribute, aIm (i.e., activity), and oBject (receiver of activity) questions in the semi-structured portion of the interviews. These questions focused mainly on obtaining perceptions relating to

whether the role of target populations was accurately reflected in the policies (Attribute) and whether the activities assigned to individual Attributes in the policies accurately represent the scope of their daily activities (oBject/aIm). By and large, interviewees across the two states indicated that modal Attributes from the policies were also those who are most involved in their respective aquaculture industries. In Virginia, many interviewees commented that the one important entity not included in the policies is the State Health Department. The Virginia State Health Department tends to handle matters pertaining to consumer and product safety (e.g., health and sanitation), though some health and sanitation regulations are also handled through the VMRC. Virginia interviewees indicated that they felt regulations were adequately broad in scope (i.e., appropriately reflect the array of activities in which policy target populations are regularly engaged), though some said that certain policy directives are more or less applicable in different geographical or species contexts. Interviewees also cited several issues they felt were inappropriately dealt with in the policies, including those relating to temperature controls in aquaculture transport, leasing, aquaculture opportunity zones, and taxes.

In Florida, several interviewees commented that the role of State Water Management Districts and the Department of Environmental Protection is not reflected in the policies. State Water Management Districts provide well permits to aquaculture producers and dictate how much water they are allowed to use in their operations. Similar to Virginia, Florida interviewees also commented that regulations cover the full scope of their aquaculture activities. A frequently observed comment by interviewees was that it is important for policies to be broad in scope in order to effectively capture the nuances of aquaculture production.

More interesting results, however, concerned how perceptions of policy legitimacy tempered perceptions of policy coerciveness. Perceptions of policy coerciveness were assessed using Deontic and Or else questions from the semi-structured part of the interviews. The Condition (i.e., temporal, spatial, and/or procedural boundaries of an activity) question was also used to collect additional insight regarding Deontic interpretations. Thus, together, these questions focused mainly on capturing how individuals interpret different types of prescriptive operators or Deontics (must, must not, may, and may not); how temporal, spatial, and procedural conditions affect Deontic interpretation; and whether policies are perceived as being appropriately stringent (Or else). In both states, less than half of all interviewees reported a strict interpretation of Deontics. In Virginia, many interviewees stated that they adhere to those Deontics that make sense to them, are appropriate in the context of their aquaculture operation, or are perceived as being good for their product.

However, there were several issues that interviewees described as having little room for interpretation, regardless of perceptions of legitimacy. For example, in Virginia, several interviewees commented on the inappropriateness of new temperature control regulations, but further explained that one had to follow the letter of the law when it came to directives pertaining to such. Other such issues included health and sanitation and aquaculture product tracking. In Florida, these issues were water impacts, health, wetlands, and non-native species. The following comments by Florida interviewees—one aquaculture producer and one regulator official—speak to this point:

> Regulations are pretty flexible. There are times when the "must" is counter-productive as there might be a better way to do something. There are some regulations, though, where there is more rigidity. For example, water regulations. You must hold water back in ditches before discharging. . . Other areas for which there is less flexibility in interpretation include pesticide use and record keeping. (Interviewee ID: 018—Aquaculture Producer)

> There are three areas that are most consequential and where "musts" are the most important—wetlands, water impacts, and non-native species—areas relating to preventing negative environmental impacts. There is more leniency in enforcing those aspects of the regulations that pertain to business practices. (Interviewee ID: 013—Regulator)

Interviewees in both states reported that temporal, spatial, and procedural conditions are important for specifying the applicability of policy directives in different contexts or situations. Similar to comments made in response to the scope-related question (i.e., oBject/aIm question), many interviewees across both states said that such details are necessary given that aquaculture production is site and species sensitive.

The results from the interviews also indicated that enforcement practices temper perceptions of policy coerciveness. Again, enforcement was assessed using responses to one of the Or else questions. Consistent with responses to the Deontic question, interviewees from Florida indicated that while state aquaculture policies would be characterized as relatively coercive on paper, in reality enforcement of them is relatively lenient. Using May and Winter's (1999) categorization, lenient enforcement was reported on both "formal," or rigid application, and "coercion," or sanction administration (May & Winter, 1999) dimensions. Relating to "formal" enforcement, several interviewees commented that the FDACS purposefully allowed for flexibility in the policies by designing them to be "goal oriented rather than process oriented" (Interviewee IDs: 019, 021, and 022). Though the policies themselves would seem to imply otherwise, one Florida aquaculture producer commented, "DACS [Division of Aquaculture and Consumer Services] has an end result that they want to achieve and there is some wiggle room for producers in getting to these end results" (Interviewee ID: 019). A regulatory representative confirmed these sentiments relating to "coercion" enforcement by commenting that penalties are infrequently administered in instances of noncompliance. Instead, the regulators seek to work with aquaculture producers when noncompliance is observed instead of administering a penalty outright. Linking enforcement style to policy legitimacy, one DACS regulatory official offered the following concerning the distinctiveness of policy design in the aquaculture context:

> The situation is that there are a lot of small farms in FL that are located in very different geographical locations. The Agency allows flexibility [in interpretation of regulations] because otherwise the agency would need to write many more regulations in order to cater to the diverse circumstances of aquaculture producers. This would just be way too complicated. (Interviewee ID: 022)

In contrast, in Virginia, both aquaculturists and regulators reported strict enforcement on the "coercion," or sanctioning, dimension. One regulatory official stated that misdemeanors and felonies are commonly administered in cases of noncompliance. As such, the findings reveal an interesting, and unanticipated finding; whereas Florida regulations are more stringent on paper, they are leniently enforced in reality. Moreover, although Virginia regulations are relatively nonstringent on paper, they are stringently enforced.

Table 3. Summary of Q-Sort Results

	Virginia	Florida	Total	Issues with Most Disagreement with Policies (VA)	Issues with Most Disagreement with Policies (FL)
Must	80%	77%	79%	Few issues with high disagreement	Treatment and retaining of effluent
Must not	34%	69%	50%	Use of hydraulic dredge, extending structures higher than 12 inches, placement of temporary protective enclosures	Discharge of effluent into wetlands
May	39%	41%	40%	Placement of temporary enclosures	Treatment and discharge of effluent
May not	25%	52%	38%	Effects on navigation from aquaculture activities	Discharge of effluent, sale and transfer of Atlantic Sturgeon, medication use for extra-label purposes

Data obtained through the Q-Sort exercise were used to complement other interview data collected to understand policy interpretation but with more of an emphasis on getting a better understanding of what policy targets are actually doing (i.e., how their interpretations manifest in practice). Table 3 displays the results from this Q-Sort exercise; specifically, agreement between prescribed Deontics associated with policy statements and Deontics selected by interview participants associated with policy directives. "Agreement" means that an interviewee placed the statement in a Deontic category in a manner that matched the form of the directive in the policy document. To remind, interviewees were asked to select the Deontic category for individual statements that best reflected what they actually do rather than what they think or know the regulation says.

Average agreement varied widely: in Florida from 41 percent to 77 percent and in Virginia from 25 percent to 80 percent. The findings from the Q-Sort exercise show that agreement was highest for "must" statements (average agreement = 79 percent) and lowest for "may" (average agreement = 40 percent) and "may not" statements (average agreement = 38 percent). Such findings indicate that, consistent with the Deontic reasoning literature, individuals are attuned to the more constraining nature of obliging than permissible Deontics, and this is reportedly reflected in their behavioral response. Virginia and Florida differed in levels of agreement relating to "must not" statements, with much higher disagreement being observed in Virginia.

More interesting perhaps is the substantive topics on which there was more or less agreement. Table 3 also displays the issues on which there was the least amount of agreement on Deontics. In Virginia, the most disagreement was observed on issues pertaining to the use of hydraulic dredges (must not), infrastructure design (must not), placement of temporary protective enclosures (must not and may), and navigation (may not). In explaining their placement of Q-cards, interviewees expressed mixed remarks relating to the use of hydraulic dredges indicating a high degree of ambiguity regarding this directive. Regarding directives pertaining to temporary protective enclosures and navigation, several interviewees commented on the inapplicability of such directives. In particular, several interviewees challenged a directive that forbids the placement of enclosures upon submerged aquatic vegetation saying that shellfish actually help this type of vegetation (Interviewee IDs: 007, 008, 010, and 011). Furthermore, one interviewee commented that some

of the statements relating to enclosures and navigation are only applicable in certain geographic areas (Interviewee ID: 008).

In Florida, most disagreement was observed, across all four Deontic categories, regarding treatment and discharge of effluent, particularly in wetlands. Regarding this type of directive, some farmers commented that aquaculture waste does not actually pose significant detriment to the environment (Interviewee IDs: 015 and 020). Several farmers commented that there is ambiguity in the definition of a wetland in the regulations and/or the enforcement of the directive. For example, one farmer commented, "The definition of a wetland is vague. It is difficult to know if something is actually a wetland" (Interviewee ID: 015). Another said, "This rule is currently handled subjectively but will probably be more defined in the future" (Interviewee ID: 020). In the "may not" category, the sale and transfer of Atlantic sturgeon and use of medications for extra label purposes were also issues on which high discrepancy was noted. Regarding the inappropriateness of the medication rule, one farmer commented, "It is very expensive for the aquaculture industry to get a label to define a product as specific to aquaculture purposes. The industry is too small to afford such costs. So, sometimes [we] use products for extra label use. For example, it might be a product that is meant for another animal but works for aquaculture" (Interviewee ID: 018). Another interviewee commented, "Some drugs are not always effective as they are prescribed to be used" (Interviewee ID: 020).

Discussion of Results and Conclusions

Effective governance ultimately hinges on how individuals interpret and respond to policy directives (Robichau & Lynne, 2009; Tyler, 2006). As such, this research was focused, first, on gaining a systematic understanding of policy design and, second, assessing individuals' perceptions of policy legitimacy, coerciveness, and enforcement and the relationships between these factors. Overall, the results suggest that (i) perceptions of regulatory coerciveness depend, in large part, on the substantive focus of individual directives; (ii) lenient enforcement of regulations—on both "formal" and "coercion" dimensions (May & Winter, 1999)—leads to more relaxed interpretations of directives; and (iii) perceptions of policy legitimacy temper perceptions of policy coerciveness, but only sometimes. Several interviewees who participated in the study commented that they are less likely to follow regulatory directives exactly if they are perceived as being inappropriate. Many of these same interviewees commented, however, that there are certain directives that must be strictly followed even if they question their legitimacy.

In order to fully interpret the findings from this research, it is important to also note how they reflect peculiarities of the aquaculture context. By and large, aquaculturists have an incentive to comply voluntarily with regulatory policies—especially those that are meant to protect consumers' health or the industry at large. This is reflected in the comments of aquaculturists who expressed strict Deontic interpretations when it comes to policy directives relating to health and sanitation. This sentiment is reflected in one Virginia aquaculture producer's comments: "When it comes to expectations to be penalized for non-compliance, it depends on the regulations. No one wants to do anything that would compromise the quality or

safety of the product—a better, safer product benefits everybody; temperature controls are a pain, but at the end of the day, they are good thing" (Interviewee ID: 008).

At the same time, aquaculture is a highly technical trade that requires an astute understanding of the biological dimensions of farming, as well as some understanding of business and policy. As expressed in the interviews, state-level policies, even though comprehensive, simply cannot capture *all* of the geographic- and species-specific considerations relating to aquaculture production, processing/handling, and regulation. Thus, several interviewees admitted to relaxed interpretations of Deontics that they feel are not relevant to their operation. This reality makes it particularly important to assess within this industry context the degree to which the policies are reflecting the least common denominator when it comes to these primary aquaculture processes.

These findings also suggest relevance of this research in the global context, wherein regulatory mechanisms relating to aquaculture can be more or less centralized than in the United States (Rana, 2005). Centralization here refers to the level of government that serves as the locus of policy-making and administrative (i.e., policy-implementation) activity. The European Union, for example, is similar to the United States in terms of development of regulations but maintains a largely centralized regulatory framework in their handling of the industry (Fisheries and Aquaculture Department, 1999). Given the empirically verified importance of reflecting the geographic- and species-specific nuances inherent to aquaculture rearing and husbandry in industry regulations, this research serves as a springboard for a comparative study that examines perceptions of policy legitimacy, coerciveness, and enforcement in countries where a single national policy and agency is used to govern the aquaculture industry in comparison with the United States where aquaculture regulatory responsibilities are devolved to the state level. A higher degree of regulatory centralization could have important ramifications on the scope of activities included with regulations as well as the frequency and stringency of enforcement.

In connection with the broader scholarship on policy design, the characteristics of the U.S. aquaculture context, in particular, make it suitable for addressing a variety of enduring questions relating to policy design. For example, the variation in designs of aquaculture policies across states prompts questions concerning the antecedent organizational and institutional factors and collective decision-making processes that shape their designs. Furthermore, one could employ similar coding techniques as used in this paper to decipher the specific policy instruments incorporated into the design of policies across states as a basis to understand how the use of different instruments to regulate the industry are more or less effective in achieving outcomes of interest (Salamon, 2002). Similarly, one could use these techniques to systematically assess which aspects or components are shared across state policy designs in an effort to uncover instances of policy diffusion (Berry & Berry, 2007).

Finally, it should be noted that despite being tied somewhat to characteristics of the aquaculture context, the lessons learned within this setting are also generalizable to other natural resource-based industries. For example, it is expected that such findings might be transferable to any comparable industry wherein product integrity poses grave implications (e.g., human health impacts), the industry is both

maintained and constrained by the availability of natural resources, there are environmental policies in place targeted at reducing negative externalities, the industry is highly visible or sensitive to public pressure, and/or the regulated trade is highly technical in nature.

Overall, results from this research provide useful insight into the decision-making processes of regulatees. Furthermore, this research suggests that better knowledge of policy interpretation can assist both the policy scholar and practitioner in honing in on the particular aspects of policies that are likely to be met with the most amount of resistance and be least effective. Beyond these general uses, this research also offers two specific contributions to the public policy literature. The first contribution is linking an assessment of policy perceptions with elements of policy design. In doing so, this research builds on recent efforts to more systematically analyze the specific language of policies rather than general characteristics thereof in analyzing how policy design may relate to behavioral outcomes (Mondou & Montpetit, 2010; Siddiki et al., 2011). Pairing the IGT-based content analysis with in-depth interviews helped to gain a comprehensive understanding of policy design and capture nuanced responses concerning how interviewees think and feel about aspects of aquaculture policies across the two study states. The second contribution is the analysis of relationships between policy legitimacy, coerciveness, and enforcement in affecting policy interpretations. Policy interpretation has been understudied in the literature. It is, however, useful because it is considered a logical antecedent to compliance (Ajzen, 1991) and thus can signal the potential for noncompliance and/or implementation challenges. Highlighting the interdependencies between the concepts explored is analytically consistent with the literature on regulatory compliance wherein scholars repeatedly demonstrate that compliance is simultaneously motivated by a diverse array of factors (May, 2005).

Of course, this research is not without limitations. First, what this analysis does not show are motivations relating to factors beyond policy design that can influence how individuals interpret policy directives. For example, this interpretation can be influenced by a wide variety of motivations stemming from their personal experiences and social environments. These include, feeling morally compelled to follow the law, perceiving policy compliance to serve instrumental values, fears of financial penalties, or reputational concerns (Crawford & Ostrom, 1995; Ryan & Deci, 2000). However, attention to these factors is outside of the analytical purview of this particular paper. Second, this research relies on self-reported data. This limitation was overcome somewhat by the fact that the author was able to ask interviewees follow-up questions to assess the validity of their responses. Through this ability, she is confident in the research results.

Given the diversity of motivations that may inform how individuals interpret and respond to policies, a next step in this research is to analyze how motivations stemming from individual and social contexts that, in concert with those factors explored herein, influence behavior. Additionally, future research should involve alternative forms of data collection, such as surveys, to explore causal relationships between the factors explored in this study and how the IGT can be useful in supporting such an effort.

Notes

1 This preliminary study involved interviews with 10 and a survey of 56 state aquaculture coordinator members of the National Association of State Aquaculture Coordinators (NASAC) (response rate = 57 percent). NASAC is an affiliate of the National Association of State Departments of Agriculture. NASAC's primary mission is to assist in the development of the U.S. aquaculture industry by providing resources to state aquaculture representatives. NASAC members are highly knowledgeable concerning regulatory and/or technical matters relating to the aquaculture industry. These individuals are either state aquaculture coordinators or selected to serve as representatives to NASAC either due to their professional position or influence in the respective aquaculture communities. Some states have one representative, whereas others have more. This preliminary study yielded both qualitative and quantitative data, describing perceptions of state regulatory and community characteristics pertaining to regulatory mechanisms and compliance with state level aquaculture regulations in 30 states.

2 These state aquaculture coordinators were members of the National Association of State Aquaculture Coordinators at the time the study was conducted. Again, these individuals are highly knowledgeable concerning regulatory and/or technical matters relating to the aquaculture industry.

3 The original grammar did not include the oBject as an institutional statement component. The oBject was introduced by Siddiki et al. (2011) in an effort to clarify coding guidelines and enhance the applicability of the IGT.

4 At the time that Basurto et al. conducted their coding exercise, the oBject had not yet been introduced into the IGT coding framework. The oBject was introduced by Siddiki et al. (2011).

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Appendix. Case Selection Variables

	Case One: Virginia	Case Two: Florida
Policy characteristics		
• Regulatory stringency	Non-stringent regulations	Very stringent
Political and regulatory factors		
• Regulatory clarity	Very clear regulations	Very clear regulations
• Permitting costs	Inexpensive permits	Inexpensive permits
• Industry involvement in reporting non-compliance	Moderate involvement	Moderate involvement
• Regulatory clarity as a contributor to compliance	Significant contributor	Significant contributor
• Strong penalties as a contributor to compliance	Mild contributor	Mild contributor
• Industry trust of monitoring and enforcement officials as a contributor to compliance	Moderate contributor	Moderate contributor
Social, community, and industry factors		
• Start up costs as a barrier to aquaculture development	Significant barrier	Significant barrier
• Stringent environmental protection regulations and safeguards as a barrier to aquaculture development	Moderate barrier	Moderate barrier