

ARTICLE

Exploring the Psychological Dimensions of Stewardship in Recreational Fisheries

Adam C. Landon*

Illinois Natural History Survey, 1816 South Oak Street, Mail Code 652, Champaign, Illinois 61820, USA

Gerard T. Kyle

Department of Recreation, Park, and Tourism Sciences, Texas A&M University, 600 John Kimbrough Boulevard, College Station, Texas 77840, USA

Carena J. van Riper

Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana–Champaign, 1102 South Goodwin Avenue, Champaign, Illinois 61801, USA

Michael A. Schuett and Jihee Park

Department of Recreation, Park, and Tourism Sciences, Texas A&M University, 600 John Kimbrough Boulevard, College Station, Texas 77840, USA

Abstract

The sustainability of recreational fisheries is in part dependent on anglers acting as stewards of the resource. However, the psychological attributes that underpin anglers' adoption of voluntarily stewardship behaviors remain largely unknown. In this study, we tested a model of the factors that influence stewardship in the recreational fisheries sector. Specifically, we drew on identity theory to explore the role of one's identification as an angler in shaping moral norms and stewardship behaviors among anglers in Texas. Stewardship behavior was conceptualized along three dimensions related to private-sphere, public-sphere, and social stewardship activities. Data were taken from a statewide, mixed-mode survey of Texas licensed anglers' attitudes, behaviors, and management preferences ($n = 948$). We hypothesized that one's identity as an angler and moral beliefs about acting as a steward of fisheries resources would predict three dimensions of stewardship behavior. Results indicated that one's identity as an angler is associated with normative beliefs and that these two factors have differential effects on engagement in multiple dimensions of stewardship behaviors.

The sustainability of recreational fisheries is in part dependent on anglers acting as stewards of common resources by engaging in behaviors that minimize environmental impacts and improve the conditions of aquatic environments (Arlinghaus et al. 2016; Cooke et al. 2016; Heck et al. 2016). Understanding the mechanisms that

motivate anglers to voluntarily act as stewards and internalize moral beliefs that compel such action will help to promote sustainability (Bruskotter and Fulton 2008; Schultz 2011). Specifically, knowledge of the psychological mechanisms that influence self-regulating stewardship activities can assist managers in developing education and

*Corresponding author: aclandon@illinois.edu
Received October 6, 2017; accepted February 8, 2018

outreach programs that leverage the current ways in which people are interacting with and appreciating aquatic resources as well as foster positive attitudes toward the conservation activities of fisheries management agencies (Seimer and Knuth 2001). Therefore, in this study, we test a psychological model of the factors that influence stewardship behaviors among anglers. We draw on identity theory (Burke 1991; Stryker and Burke 2000; Stets and Biga 2003) to conceptualize the antecedents of stewardship behavior, including one's identification as an angler and moral beliefs about acting as a steward of aquatic resources among recreational anglers in Texas.

Stewardship and Recreational Fisheries

Multiple definitions of environmental stewardship have been proposed in the literature. Barrett (1996:11) defined stewardship as "the careful and responsible management of something entrusted to one's care," while Winthrop (2014:212) suggested that stewardship "refers specifically to the actions intended to promote the appropriate and sustainable use of nature motivated in large part by internalized understandings and values." Thus, for anglers, stewardship is reflected by (1) voluntary behaviors that improve or protect the conditions of fisheries resources and habitats and (2) internalized obligations to promote the care of valued resources. As the Food and Agriculture Organization of the United Nations (FAO 2012:18) stated, aquatic stewardship is "...the internalization of a suitable moral compass guiding thought and action in the recreational fisheries sector." A better understanding of the reasons why anglers are compelled to engage in stewardship behaviors will enable managers to direct "a suitable moral compass" in light of environmental considerations, political dynamics, and stakeholder interests (Seimer and Knuth 2001; Bruskotter and Fulton 2008). Elucidating the psychological antecedents of stewardship behavior is particularly important in the context of recreational fisheries given that angling is one of the main points of interface between the public and aquatic resources (Arlinghaus et al. 2015). Many of the threats posed to aquatic ecosystems are derived from anthropogenic sources, such as climate change, the introduction and spread of nonnative species, habitat loss, and water pollution, among others (Dudgeon et al. 2006; Cooke et al. 2016). Anglers are instrumental in mitigating the effects of these phenomena on fisheries resources and aquatic ecosystems through shifting perspectives of their role in ecosystem-based management, advocacy for aquatic habitats, and the adoption of ethical behaviors and angling practices (Bate 2001; Seimer and Knuth 2001; Arlinghaus et al. 2016).

Given that anglers have an array of experiences and investment in fishing, previous research has positioned them as stewards of the aquatic environment (Granek et al. 2008). However, limited empirical evidence has been

generated to support the notion that anglers voluntarily act as stewards or to identify the mechanisms that motivate self-regulating stewardship behavior (Chipman and Helfrich 1988; Hutt and Bettoli 2007; Beardmore et al. 2011). A small number of studies have examined the psychological dimensions of stewardship in recreational fisheries. Oh and Ditton (2008), for instance, found that more specialized anglers—characterized by styles of angling participation, commitment and involvement in the activity, and centrality of the activity to their lifestyle—were more willing to pay for resource protection. Bruskotter and Fulton (2008) explored the relationship between anglers' value orientations and normative beliefs, or moral obligations, regarding the stewardship of fisheries resources. That study revealed a link between protection-oriented beliefs about fisheries resources and personal norms to act as a steward of fisheries resources and aquatic environments. In a similar vein, Seimer and Knuth (2001) examined the impacts of aquatic stewardship education on young anglers' environmental concern, and they conceptualized three levels of beliefs that underpinned stewardship behavior affecting recreational fisheries. Seimer and Knuth (2001) hypothesized that one's awareness of environmental impacts on fisheries resources, perceived responsibility to act as a steward, and self-efficacy in doing so are related to two dimensions of behavior reflecting individual angling practices and positive actions toward aquatic resources. They found that youth that were more involved in angling exhibited greater concern for aquatic resources and held greater responsibility for acting as a steward.

Beyond these studies, however, there is a paucity of theoretical and empirical research on stewardship in recreational fisheries. The psychological mechanisms that motivate voluntary stewardship actions—or the internalization of moral norms that compel stewardship, for instance—remain understudied. Given past work suggesting that participation, involvement, and specialization in fishing were related to stewardship activity (Seimer and Knuth 2001; Oh and Ditton 2008), exploring the role of one's identification as an angler in shaping stewardship beliefs and behaviors would be a fruitful avenue for further investigation. In particular, identity theory (Stryker and Burke 2000; Burke and Stets 2009) provides a framework for understanding these phenomena.

Conceptual Framework: Identity Theory

Identity theory hypothesizes that one's identity(s) is the primary influence on one's attitudes and behaviors. Burke and Stets (2009:3) defined identity as "the set of meanings that define who one is when one is an occupant of a particular role in society." According to the theory, individuals possess as many identities as they occupy social roles (e.g., mother, student, and angler). Each identity exerts an influence on an individual's evaluation of external stimuli

as a function of that identity's salience and prominence and the individual's commitment to it (Stryker and Burke 2000). Identities are arranged in a hierarchy wherein the most salient identity has the greatest influence on one's evaluative response in a given context (Stryker 1980). Therefore, "angler" as a social role and internalized identity carries with it a set of meanings that influence the way individuals that identify as anglers perceive the world and act within it. The more salient is one's identity as an angler, the greater the influence it may exert on an individual's cognitive, affective, and behavioral evaluation of aquatic resources and on that individual's notions of appropriate modes of conduct as an angler. Individuals differ in the extent to which they are committed to specific identities, including those related to leisure pursuits like angling (Jun et al. 2015). Thus, what it means to be an angler varies from person to person and is referent to the self. Meanings are what individuals perceive to be normative patterns of thought and behavior. Identification with one's role as a participant in a leisure activity is a potentially important antecedent condition leading to the internalization of moral beliefs about stewardship and to voluntary stewardship behaviors that protect and/or enhance the resources that support pursuit of the activity.

The recreation specialization literature (Bryan 1977; Scott and Shafer 2001; Jun et al. 2015) has drawn on a number of identity theories to explain heterogeneity in styles of participation, commitment, and identification with leisure pursuits (McIntyre and Pilgram 1992).

In fact, Jun et al. (2015) suggested that one's identity associated with a leisure activity best explained patterns of recreation participation, commitment, and affect toward the activity. In this vein, a number of studies have found that specialization is related to environmental concern, conservation attitudes, and pro-environmental behavior (Oh and Ditton 2008). Generally, this literature has demonstrated that in the context of outdoor pursuits, as specialization (e.g., identification with the activity or dependence on the activity setting) increases, so do environmental concern and pro-environmental intent toward settings where activities occur (Newhouse-Berns and Simpson 2009). The more central a leisure activity is to one's sense of self, the greater is the satisfaction an individual may derive from participation, and the greater is the obligation to participate in a manner that sustains the resource—to the extent that resource supports one's ability to express one's identity (Burke 1991). Therefore, role identities tied to outdoor recreation are positively associated with concern for the environment, as environmental settings and the activities that occur in them are tied to the self (Newhouse-Berns and Simpson 2009).

Jun et al. (2015) hypothesized that specialization and leisure behavior could be explained by the process of

identity verification (Burke 1991). We adopted this approach to explain stewardship behavior in the context of recreational fisheries. According to identity control theory (Burke 1991), behavior is a function of reflected appraisals of environmental conditions and their congruence with one's identity standard. More specifically, individuals act to bring perceptions of the environment in line with their internalized self-meanings (identity standard), verifying aspects of the self through behavior (Burke and Stets 2009). Positive behavior toward a positively evaluated attitude object reflects a positive evaluation of the self (Stets and Biga 2003). Consequently, the more salient is one's identity as an angler, the more likely one is to act positively (engage in stewardship) toward a positively evaluated object (aquatic resources) and to internalize an obligation to do so. Positive emotional states associated with the verification of an identity—and avoidance of negative emotional states associated with incongruence between one's identity standard and perception of the environment—are what motivate behavior (Burke 1991). If individuals associate stewardship with their identity as an angler, it will be reflected in an obligation to act as a steward and engage in stewardship behaviors to the extent that those individuals' identity as an angler is salient.

Moral Obligations, Identity, and Stewardship

A number of studies have found associations among identity, personal norms, and stewardship behaviors (Stets and Biga 2003; Nigbur et al. 2010; Gatersleben et al. 2014). Personal norms—derived from Schwartz's (1977) norm activation theory—reflect a moral obligation to behave in a manner consistent with one's values or the internalized values of a social group (Thøgersen 1996). Personal norms are a way to operationalize moral beliefs about one's behavior as a steward of aquatic ecosystems and are potentially tied to role-related identities. Norm activation theory hypothesizes that personal norms will be activated in a situation when individuals possess an awareness that a threat exists to an object of value (i.e., awareness of consequence) and a responsibility to mitigate that threat (i.e., ascription of responsibility). That is, personal norms will influence behavior when awareness and ascribed responsibility are high. Several scholars have found that identity is related to moral beliefs and that both identity and personal norms influence stewardship behaviors. Nigbur et al. (2010), for instance, found that identity was a predictor of personal norms to recycle, and personal norms and identity were related to intentions to engage in recycling behavior. Similarly, Gatersleben et al. (2014) found that both personal norms related to stewardship and identity as an environmentalist predicted stewardship behaviors. From these findings, we assert that stewardship behavior in recreational fisheries is a function of an internalized obligation to act as a steward in the form of personal norms and the salience of one's identity as an

angler. The more salient is one's identity as an angler, the more likely the individual is to believe that he or she is obligated to protect or enhance fisheries and aquatic resources as well as act in a manner consistent with those obligations. Acting as a steward yields verification of one's identity as an angler and supports the pursuit of angling opportunities through sustainable use of the resource.

Dimensions of Stewardship Behavior

Stewardship behaviors are actions performed with the intent of benefiting and promoting environmental sustainability (Stern 2000). In the context of recreational fisheries, these behaviors can take multiple forms (Seimer and Knuth 2001; Bruskotter and Fulton 2008). Past work in the broader nature conservation literature has identified several dimensions that are germane to understanding heterogeneity in individuals' behavioral engagement in stewardship. Stern (2000), for instance, suggested that such behaviors could be defined in three ways: private-sphere behaviors, public-sphere behaviors, and environmental activism. Private-sphere behaviors refer to actions, conducted in private, that seek to minimize one's individual impacts on nature. In the context of recreational fisheries, these behaviors may include disposing of spent tackle and fishing line in appropriate containers or undertaking precautions to stem the spread of invasive species, among others. Public-sphere behaviors are defined as actions that seek to bring about changes in governance. These behaviors translate directly into the context of fisheries and aquatic ecosystem stewardship. For instance, writing letters to public officials to support fisheries-related conservation or to oppose the alteration of freshwater habitats through hydropower installations (or to seek removal of associated existing infrastructure) are activities that require time and financial commitments from the individual. Other examples of public-sphere behaviors may include signing petitions that support nature conservation and donating to environmental causes (Stern 2000). Thus, these activities are indicative of stewardship broadly, as defined by Winthrop (2014) and FAO (2012).

Previous research has extended Stern's (2000) model to include social interaction as a component of stewardship behavior. Specifically, Larson et al. (2015) suggested that participation in natural resource conservation/preservation organizations and community outreach activities associated with conservation reflected environmental stewardship. Various social activities in the context of recreational fisheries fit this definition of stewardship behavior. For instance, many anglers belong to conservation organizations like Trout Unlimited or the Coastal Conservation Association. Individuals, within the confines of their membership in these organizations, donate significant amounts of time in support of the stewardship of fisheries resources and aquatic environments (Schuett et al. 2014). Drawing on this body of

literature, we conceptualized aquatic stewardship behavior along three dimensions related to private-sphere behavior, public-sphere behavior, and social stewardship.

Hypothesized Model

We hypothesized that the more salient is an individual's identity as an angler, the more likely that individual is to internalize a personal norm to act as a steward of fisheries and aquatic resources (hypothesis 1 [H1]), to possess an awareness of the consequence of his or her actions as a threat to aquatic resources (H2), and to ascribe a personal responsibility to mitigate those actions (H3). (We hypothesized that ascription of responsibility was a direct antecedent to personal norms. However, we were forced to drop this construct from the model after it failed a test of discriminant validity. The results indicated that it was not empirically distinguishable from personal norms.) These two constructs (ascription of responsibility and awareness of consequence), in turn, were hypothesized to influence personal norms following norm activation theory (H4 and H5; Schwartz 1977). Angler identity and personal norms were hypothesized to predict anglers' engagement in three dimensions (public, private, and social) of stewardship behaviors (H6). Last, we hypothesized that the angler identity would exert an indirect effect on behavior through personal norms (H7). All relationships were hypothesized to be of a positive valence. A graphical depiction of the hypothesized model described above, including all model parameters to be estimated, is presented in Figure 1.

METHODS

Data collection and sample characteristics.—Data collection occurred as part of a larger statewide assessment of angler demographics, behaviors, and management preferences. The sample included Texas residents aged 17–65 with freshwater and saltwater angling licenses that were valid during the period September 1, 2014, to August 31, 2015. Of the roughly 2 million licensed resident anglers in the state, 5,000 were randomly selected to receive a questionnaire. Equal numbers of residents with freshwater and saltwater licenses were selected to participate in the study. Data collection followed the tailored design method for mixed-mode surveys (Dillman et al. 2009), with mail-based solicitations including four points of contact. All contacts included a web address (URL) for respondents to complete the questionnaire online; however, in the second and fourth contacts, a hard copy was also provided. Data collection efforts yielded 948 usable, completed questionnaires, for an effective response rate of 21.6% after accounting for nondeliverable contacts. The sample was characterized as being predominantly male (80.1%) and white (91%), with a mean age of 42 years. A test for nonresponse bias was conducted by comparing the

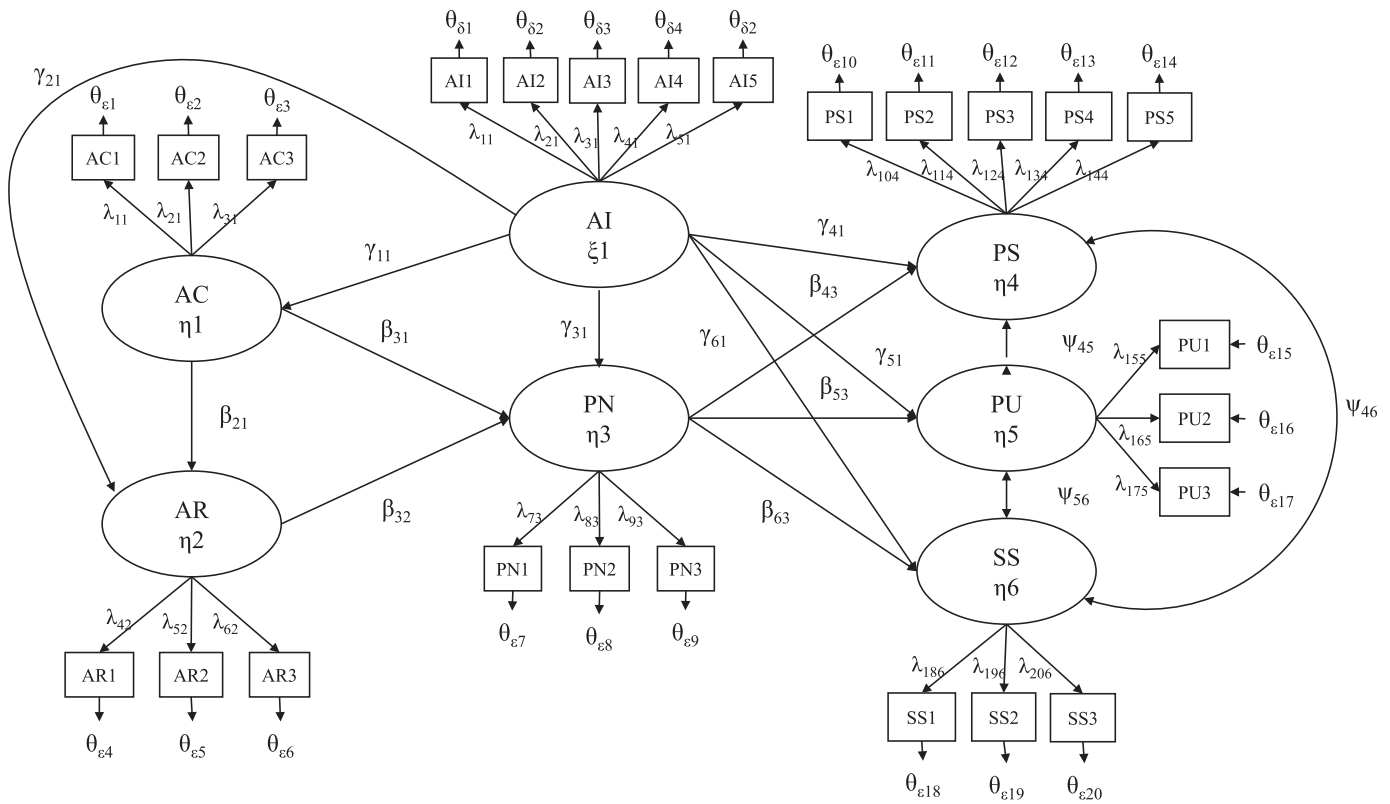


FIGURE 1. Hypothesized model of aquatic ecosystem stewardship (AI = angler identity; AC = awareness of consequence; AR = ascription of responsibility; PN = personal norms; PS = private-sphere behavior; PU = public-sphere behavior; SS = social stewardship behavior); λ = factor loading; θ_{ϵ} = measurement error; ξ = exogenous latent; η = endogenous latent; γ = path from exogenous to endogenous latent; β = path from endogenous to endogenous latent; Ψ = endogenous disturbance.

average age of the respondents to that of the population from which it was drawn. Results indicated that the population (mean age = 42 years) and respondents did not differ in this regard. Ideally, more characteristics would be assessed for determining nonresponse bias; however, age was the only variable that was known for all anglers in the state.

Measures.—Social stewardship and public-sphere behavioral measures were adapted from the scale developed by Larson et al. (2015) and were tailored to reflect the angling-specific context of this study. Public-sphere behaviors were analogous to the environmental citizenship dimension of the Larson et al. (2015) scale. These behaviors tapped the frequency of angler participation in activities seeking to bring about institutional change through political actions in the governance of aquatic and fisheries resources. Social stewardship, referred to as social environmentalism by Larson et al. (2015), included behaviors that sought to engage with one’s peers on issues of aquatic conservation concern; participation in aquatic and fisheries conservation organizations and community organizing around conservation issues are examples of such behaviors. Private-sphere angling behaviors were operationalized

from the Code of Ethical Angling (NOAA 1998), which describes ecologically responsible angling participation. Private-sphere behaviors included catch-and-release activities, avoiding the pollution of waterways, and efforts to stem the spread of aquatic invasive species (Table 1). Behavioral items were measured on a five-point scale ranging from 1 = never to 5 = always, following the stem “Over the last 12 months, how often have you engaged in the following behaviors?” Public-sphere, social stewardship, and private-sphere behaviors were measured with three, three, and four items, respectively. Personal norms were assessed with three items that reflected an internalized obligation to act as a steward of fisheries and aquatic resources. The awareness of consequence construct was operationalized with three items that reflected an awareness that one’s actions could have a negative influence on the health of aquatic ecosystems and that this could negatively influence a valued object. Ascription of responsibility was also measured with three items that reflected an individual’s responsibility to take action to mitigate the negative consequences of his or her actions on a valued object—specifically, fisheries resources and aquatic ecosystems. Personal norms, awareness of consequence, and

TABLE 1. Means (SD in parentheses), factor loadings (λ ; SE in parentheses), and composite reliability (cr; all factor loadings were significant at $P < 0.01$; r = reverse coded for analysis).

Items and constructs	Mean (SD)	λ (SE)
Angler identity (AI; cr = 0.91)		
AI1: Being an angler is an important part of who I am	3.82 (0.97)	0.81 (0.02)
AI2: Angling is something I rarely even think about (r)	1.98 (0.99)	0.74 (0.02)
AI3: I would be at a loss if I were forced to give up angling	3.80 (1.15)	0.66 (0.02)
AI4: Being an angler is about more than going fishing	4.17 (0.89)	0.70 (0.02)
AI5: I have no clear feelings about being an angler (r)	1.98 (0.99)	0.77 (0.02)
Awareness of consequence (AC; cr = 0.83)		
AC1: Human activities have a negative impact on fisheries resources and aquatic ecosystems	3.27 (1.21)	0.64 (0.02)
AC2: Fisheries resources and aquatic ecosystems are threatened by human activities	3.68 (1.00)	0.88 (0.02)
AC3: Human impacts on fisheries resources and aquatic ecosystems are a serious problem	3.54 (1.04)	0.84 (0.02)
Personal norm (PN; cr = 0.97)		
PN1: People like me should do whatever they can to conserve fisheries resources and aquatic ecosystems	4.21 (0.72)	0.81 (0.02)
PN2: I would feel guilty if I didn't do my part to conserve fisheries resources and aquatic ecosystems	3.98 (0.88)	0.81 (0.02)
PN3: I feel morally obliged to try to conserve fisheries resources and aquatic ecosystems	4.00 (0.84)	0.79 (0.02)
Private-sphere behavior (PS; cr = 0.61)		
PS1: Minimized harm to fish when engaging in catch-and-release fisheries	4.75 (0.62)	0.45 (0.04)
PS2: Taken precautionary measures to stop the spread of invasive species	4.08 (1.30)	0.50 (0.05)
PS3: Disposed of trash, including worn lines, leaders, and hooks, in appropriate containers	4.79 (0.52)	0.50 (0.05)
PS4: Avoided spilling pollutants, such as oil and gas, in waterways	4.87 (0.50)	0.44 (0.05)
Public-sphere behavior (PU; cr = 0.72)		
PU1: Contacted a political representative to support fisheries or aquatic conservation-related issues	1.58 (1.06)	0.66 (0.03)
PU2: Donated money to support fisheries or aquatic conservation	2.29 (1.20)	0.63 (0.03)
PU3: Signed a petition about a fisheries or aquatic conservation-related issue	1.51 (0.96)	0.74 (0.02)
Social stewardship behavior (SS; cr = 0.79)		
SS1: Participated as an active member in a fisheries or aquatic conservation organization	1.62 (1.10)	0.68 (0.02)
SS2: Talked to others in my community about fisheries or aquatic conservation-related issues	2.13 (1.19)	0.74 (0.02)
SS3: Worked with others to address fisheries or aquatic conservation-related issues	1.66 (0.99)	0.82 (0.02)

ascription of responsibility items were adapted from Steg and De Groot (2010) and Landon et al. (2017). Responses to items measuring these three constructs were recorded on a five-point Likert-type scale, where 1 = strongly disagree and 5 = strongly agree, with a midpoint of neutral. Angler identity was measured with a five-item scale adapted from Callero (1985). These items were tailored to reflect the angler identity. A full presentation of items measuring each construct as well as item means and SDs can be found in Table 1.

Analysis: structural equation modeling.—We used structural equation modeling (SEM) to test our hypotheses. Structural equation modeling techniques are commonly used in the social sciences to test the causal relationships among latent constructs (Kline 2016). This analytical approach has several characteristics that make it particularly

useful for the current study. First, given that psychological variables cannot be measured directly, alternative methods of observation must be used. Structural equation models allow for the assessment of latent variables, or constructs that cannot be measured directly, through multiple indicators with measurement error. Identity, for instance, is easily recognizable as a real quality but is not possible to measure directly. Second, SEM allows for the simultaneous estimation of relationships among multiple dependent and independent variables. This is important when testing causal relationships that may not hold under alternative methods of analysis, such as ordinary least-squares regression. Last, models tested using SEM techniques are derived from theory; therefore, the extent to which a hypothesized model conforms to the data serves as a test of the theory from which it was derived. Structural equation modeling is an

ideal platform for the testing of theory and theoretical extensions like the ones we are proposing.

Judging the quality of a structural equation model requires attention to two main areas: (1) the extent to which the observed indicators of latent constructs reflect the constructs they were designed to measure (e.g., construct validity) and (2) the extent to which the structural relationships hypothesized to exist among latent constructs conform to the covariance structure of the data (Anderson and Gerbing 1988). Both of these criteria are judged using a suite of tests of the fit of the model (Barrett 2007). Model fit indices assess either the exact fit of the model-implied covariance matrix to the population covariance matrix (i.e., the χ^2 test) or the degree of mis-fit (approximate fit and close fit) of the model to the data. Commonly used measures of close fit and approximate fit include the root mean square error of approximation (RMSEA), comparative fit index (CFI), and the nonnormed fit index (NNFI), among others.

Hu and Bentler (1999) suggested that a good-fitting structural equation model in terms of both measurement and structural relationships is one that (1) indicates no difference in the model-implied and population covariance matrices, as evidenced by a nonstatistically significant χ^2 test; and (2) possesses an RMSEA value of roughly 0.08 or less, a CFI value of 0.95 or greater, and an NNFI value of 0.95 or greater. In practice, tests of exact fit are biased by large samples. In the case of the χ^2 test, small misspecifications may be statistically significant but not theoretically meaningful. Scholars often prefer to examine several model fit indices when judging a structural equation model. For the purposes of this study, we follow the criteria suggested by Hu and Bentler (1999) as noted above.

Construct validity must further be assessed by measuring scale reliability. Reliability refers to the extent to which the items measuring a given construct are correlated. In this study, we used composite reliability (Raykov 1997) rather than Cronbach's alpha to measure scale reliability given that the assumption of tau-equivalency required of Cronbach's alpha is inappropriate with behavioral measures that are not interchangeable (Raykov 2011). Generally, a construct is considered reliable if it possesses a composite reliability score greater than or equal to 0.7.

We conducted our analysis in two steps following the procedure for latent variable modeling as recommended by Anderson and Gerbing (1988). First, we tested the measurement model while allowing the latent constructs to freely covary. Testing the measurement model in this manner allows the researcher to examine both convergent and discriminant validity prior to making claims about the causal relationships between constructs. Second, we tested the structural model while following the hypothesized associations depicted in Figure 1. All models were

estimated using the full-information maximum likelihood estimator in Stata version 14 (StataCorp 2015).

RESULTS

Descriptive results indicated that the prevalence of stewardship behaviors varied across the three dimensions. Anglers reported that they engaged in private-sphere behaviors commonly, whereas social stewardship and public-sphere behaviors were practiced less often (Table 1). Respondents indicated that they possessed relatively strong personal stewardship norms (mean values above 4 on a five-point scale), while the salience of the angler identity was more varied among respondents (Table 1).

Measurement Model

Initial results for the test of the measurement model indicated that the personal norm and ascription of responsibility constructs were highly collinear. Consequently, we performed a χ^2 difference test to explore discriminant validity (e.g., the distinctiveness of the constructs). A measurement model was tested in which the two constructs were allowed to correlate, followed by a second model in which the correlation was constrained to 1.0. The constrained model did not yield a significant reduction in model fit at an α of 0.05. Rather than confound the interpretation of the personal norm construct by collapsing the two dimensions, we chose to drop the ascription of responsibility items from the model.

A subsequent test of the reduced measurement model was revealed to be an adequate fit for the data based on the recommendations of Hu and Bentler (1999). However, an evaluation of item factor loadings (λ) led us to drop the item "kept only fish that you intend to eat," which measured private-sphere behavior, from the model due to a low factor loading ($\lambda < 0.4$; Fornell and Larcker 1981). A final measurement model demonstrated acceptable fit ($\chi^2 = 545.59$, $P < 0.01$, $df = 174$; RMSEA = 0.05; CFI = 0.94; NNFI = 0.92). The hypothesized constructs possessed adequate reliability (composite reliability ≥ 0.70 ; Raykov 1997), except for private-sphere behavior (composite reliability = 0.61), which was marginal. Results of the final measurement model, including standardized λ values, item means, and scale reliability, are presented in Table 1.

Structural Model

Following the test of the measurement model, hypothesized relationships among constructs were estimated using SEM. The latent variables for public-sphere, private-sphere, and social stewardship behaviors were regressed on personal norms and angler identity. Personal norms were regressed on awareness of consequence and angler identity, and awareness of consequence was regressed on angler identity. The structural model demonstrated

adequate fit for the data ($\chi^2 = 548.04, P < 0.01, df = 177$; RMSEA = 0.05; CFI = 0.94; NNFI = 0.93). A summary of direct effects is presented in Figure 2. Full modeling results, including SEs, test statistics, indirect effects, and total effects, are provided in Table 2.

We found that as hypothesized, angler identity had a direct effect on personal norms ($\gamma = 0.47, P < 0.01$), public-sphere behavior ($\gamma = 0.13, P = 0.02$), and social stewardship behavior ($\gamma = 0.23, P < 0.01$). Gamma represents the regression coefficient for the relationship between an exogenous latent variable and an endogenous latent variable. Awareness of consequence was a significant predictor of personal norms ($\beta = 0.36, P < 0.01$), and personal norms significantly predicted private-sphere behavior ($\beta = 0.35, P < 0.01$) and social stewardship behavior ($\beta = 0.14, P < 0.01$). Beta represents the regression coefficient for the relationship between two endogenous latent constructs. We did not find support for the hypothesized relationships between angler identity and awareness of consequence, angler identity and private-sphere behavior, or personal norms and public-sphere behavior. Given that the ascription of responsibility construct was not retained in the model, hypothesized relationships between angler identity and ascription of responsibility or between awareness of consequence and ascription

of responsibility were not supported. Angler identity exhibited a significant indirect effect on private-sphere behavior ($\beta = 0.06, P < 0.01$) and social stewardship behavior ($\beta = 0.07, P < 0.01$) through awareness of consequence and personal norms. Awareness of consequence had a significant indirect effect on private-sphere behavior ($\beta = 0.05, P < 0.01$) and social stewardship behavior ($\beta = 0.05, P < 0.01$) through personal norms. It is problematic to ascertain the proportion of the variance explained in an outcome variable as a function of a single independent variable when multiple independent variables are correlated in a structural equation model (Maryuama 1998). We can, however, infer the relative importance of individual independent variables on dependent variables by examining total effects—that is, the sum of the natural direct and indirect effects (Kline 2016). Angler identity exerted the largest total effect on subsequent model constructs, except for private-sphere behavior (Table 2). This finding confirms the main tenets of identity theory, suggesting that identity is the primary driver of social behavior. In the case of private-sphere behavior, however, personal norms exerted the largest total effect, suggesting that other psychological processes might be at play. Awareness of consequence and angler identity accounted for 37% of the variance in personal norms. Personal norms and angler

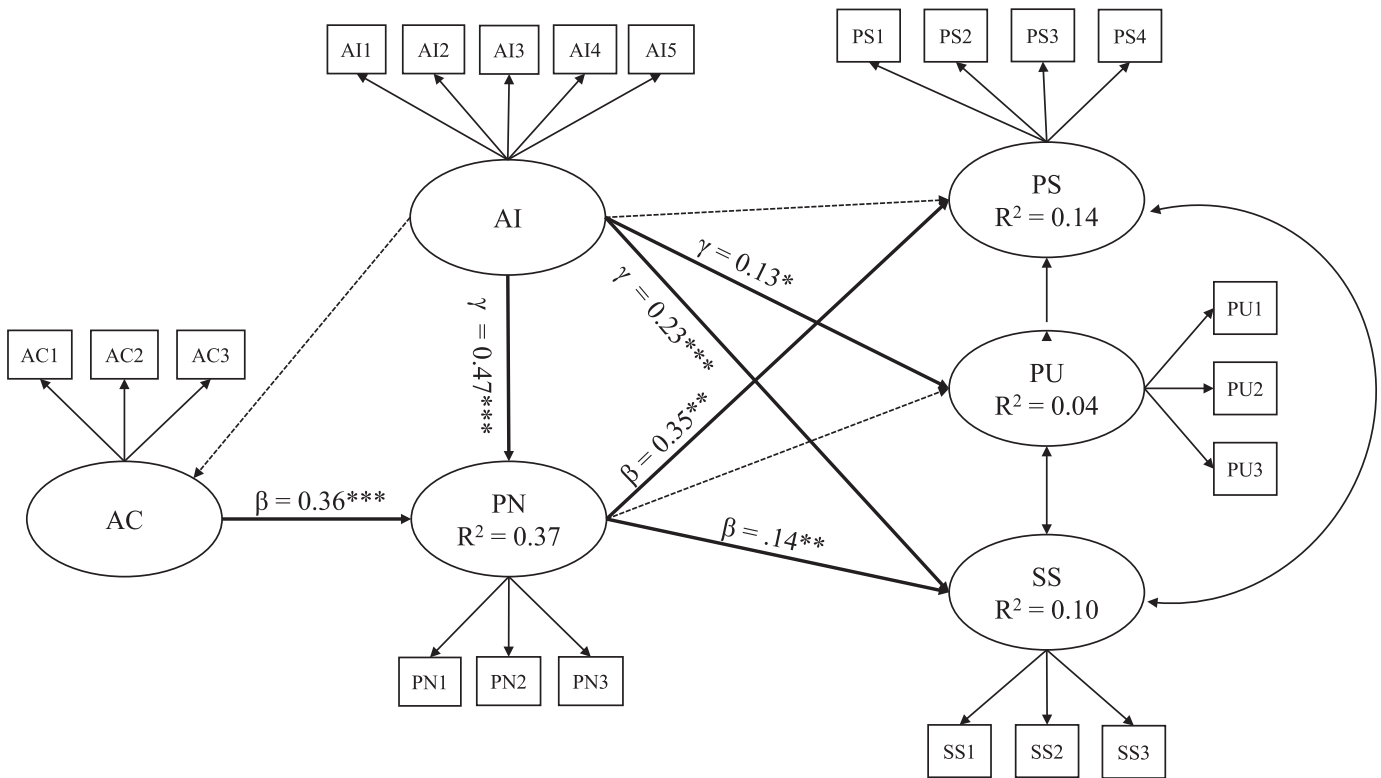


FIGURE 2. Direct effects for the final structural model of aquatic ecosystem stewardship. Standardized path coefficients are reported (AI = angler identity; AC = awareness of consequence; PN = personal norms; PS = private-sphere behavior; PU = public-sphere behavior; SS = social stewardship behavior; γ = path from exogenous to endogenous latent; β = path from endogenous to endogenous latent; * $P \leq 0.05$, ** $P \leq 0.01$, and *** $P \leq 0.001$; dotted lines are not statistically significant at $\alpha = 0.05$).

TABLE 2. Summary of effects for the final structural model of aquatic ecosystem stewardship (* $P \leq 0.05$; ** $P \leq 0.01$; *** $P \leq 0.001$).

Dependent variable	Independent variable	β	SE	z -value	R^2
Direct effects					
Awareness of consequence	Angler identity	0.04	0.04	0.91	0.00
Personal norm	Awareness of consequence	0.36***	0.03	10.49	0.37
	Angler identity	0.47***	0.03	14.49	
Private-sphere behavior	Personal norm	0.35**	0.06	5.78	0.14
	Angler identity	0.04	0.06	0.69	
Public-sphere behavior	Personal norm	0.09	0.05	1.70	0.04
	Angler identity	0.13*	0.05	2.42	
Social stewardship	Personal norm	0.14**	0.05	2.87	0.10
	Angler identity	0.23***	0.05	4.64	
Indirect effects					
Personal norm	Angler identity	0.01	0.01	0.91	
Private-sphere behavior	Angler identity	0.06***	0.01	4.45	
	Awareness of consequence	0.05***	0.01	4.26	
Public-sphere behavior	Angler identity	0.03	0.02	1.66	
	Awareness of consequence	0.04	0.00	1.68	
Social stewardship	Angler identity	0.07**	0.02	2.78	
	Awareness of consequence	0.05**	0.02	2.71	
Total effects					
Personal norm	Angler identity	0.36***	0.01	11.33	
	Awareness of consequence	0.28***	0.03	8.82	
Private-sphere behavior	Angler identity	0.08***	0.02	3.52	
	Awareness of consequence	0.05***	0.01	4.26	
Public-sphere behavior	Personal norm	0.17***	0.03	4.75	
	Angler identity	0.15***	0.04	3.83	
Social stewardship	Awareness of consequence	0.03	0.02	1.66	
	Personal norm	0.11	0.06	1.69	
	Angler identity	0.28***	0.04	6.68	
	Awareness of consequence	0.05**	0.02	2.71	
	Personal norm	0.18**	0.06	2.82	

identity explained 14, 4, and 10% of the variance in private-sphere, public-sphere, and social stewardship behaviors, respectively.

DISCUSSION

The results of this investigation shed light on the psychological mechanisms that motivated self-regulating stewardship behaviors among recreational anglers. Following identity theory (Burke 1991; Burke and Stets 2009), we hypothesized that the salience of one's identity as an angler was the primary driver of engagement in fisheries-related stewardship behaviors and the internalization of moral normative beliefs about acting as a steward of fisheries and aquatic resources. Our results generally confirmed these hypotheses. Specifically, the more salient was the angler identity, the more inclined anglers were to express an obligation to act as stewards of fisheries and

aquatic resources and, in turn, to more frequently engage in stewardship behaviors. Moreover, our results drew on one dimension of specialization—that is, one's identity in relation to the activity—to explain voluntary engagement in stewardship behaviors. These findings are reinforced by previous studies conducted by Oh and Ditton (2008), who found that aspects of recreation specialization in the context of fisheries were related to willingness to pay for resource protection, and by Seimer and Knuth (2001), who demonstrated that greater involvement in fishing was related to greater environmental concern. The outdoor recreation literature suggests that participation in outdoor recreation is a correlate of environmental concern (Dunlap and Heffernan 1975). Our findings also demonstrate that identity and personal normative beliefs related to one's role as a participant in the activity underpinned behaviors toward valued resources that support continued involvement.

Stewardship Behavior

We observed differences in the effects of personal norms and angler identity on the three hypothesized dimensions of stewardship behavior relevant for sustaining recreational fisheries. These results provide support for the growing understanding that stewardship behavior is a multidimensional construct influenced by different sets of costs, benefits, facilitating conditions, constraints, and motivational processes among anglers. Building on previous research (Stern 2000; Larson et al. 2015), personal norm was hypothesized to influence three types of behaviors that spanned private, public, and social realms. Results showed the strongest support for personal norms as a predictor of private-sphere behaviors. This is consistent with past work drawing on the norm activation model (Schwartz 1977) that has explored the social psychological antecedents of behavior. For instance, Guagnano et al. (1995) demonstrated support for the relationship between personal norms regarding recycling and participation in a household recycling program, which is indicative of private-sphere consumer behavior. However, angler identity was indirectly related to private-sphere behavior through personal norms. This finding suggests that identification as an angler is an important antecedent to the internalization of moral beliefs about ethical angling behavior and that those beliefs ultimately influence anglers' private-sphere stewardship activities. Additionally, these results suggest that identifying as an angler is not a sufficient condition leading to engagement in stewardship in every context; rather, those individuals that identify as anglers and have internalized an obligation to engage in stewardship are most likely to do so.

Modeling results did not reveal a statistically significant relationship between personal norms and public-sphere behavior. This suggests that although anglers may internalize an obligation to steward aquatic resources, that obligation does not necessarily manifest in political action intended to change fisheries governance. Identity, however, was found to be directly related to public-sphere stewardship behaviors, suggesting that different motivational processes may underpin these domains of behavior. Public-sphere behaviors, in the context of a role that one identifies with, may not relate to moral concerns but rather may be influenced by role-related expectations associated with one's social group. Personal norm and angler identity were both significantly related, albeit weakly, to engagement in social stewardship behaviors. These findings suggest that social interaction focused on fisheries and aquatic conservation was an outcome of both an internalized obligation to steward aquatic resources and the salience of the angler identity. This finding is consistent with identity theory, which posits that self-meanings are developed through social interaction (Hogg et al. 1995). The more strongly one internalizes a given identity, the more likely that

individual will be to seek social relationships that are associated with it—in this case, social relationships that support the stewardship of fisheries and aquatic resources.

The model developed for this study explained a modest amount of variance in stewardship behavior, indicating that other factors are likely at play. It could be that socio-structural variables, such as gender, income, and age, were relevant in explaining stewardship behaviors (Tarrant and Cordell 1997). Future research should examine the potential role of these variables in explaining behavioral patterns, especially given the pressing need to understand how anglers are engaging with fishery resources (Ward et al. 2013; Arlinghaus et al. 2016; Heck et al. 2016). Similarly, identities are arranged in a hierarchy; consequently, other identities may influence stewardship (Burke and Stets 2009). The environmentalist identity, for instance, has been shown to influence general environmental behaviors (Stets and Biga 2003) and may be relevant in the context of this study. There may also be constraints that impinge on the attitude-behavior relationship and prevent engagement in stewardship among fisheries stakeholders (Yoon et al. 2013). Although the respondents included in this study identified strongly with their roles as anglers and indicated that they possessed a personal norm to act as stewards, these constructs may not have resulted in engagement in stewardship behaviors due to a variety of subjective (knowledge and skills) and objective (lack of time or money) constraints (Sutton and Tobin 2011). Further exploration of the role of constraints to stewardship behavior in the context of recreational fisheries would be a promising avenue for future research. Other constructs that tap aspects of involvement in the activity may account for variation in behavior. For instance, indicators of specialization, including commitment and centrality, are related to leisure identities (Jun et al. 2015) and may account for behavioral engagement in stewardship.

Fostering Stewardship in Recreational Fisheries

Encouraging the adoption of self-regulating stewardship behaviors will enhance the sustainability of recreational fisheries. Given the historical challenges associated with enforcing regulations in recreational fisheries, which stem from the diverse points of access and large numbers of users (Cooke et al. 2013), the answer to the question "Why do some people voluntarily engage in stewardship?" is particularly important for management (Bruskotter and Fulton 2008). Our results revealed two main points of leverage. Identification as an angler was demonstrated to exert an influence on the internalization of personal norms to act as a steward and on two dimensions of stewardship activity. Understanding the progression that leads anglers to identify with the activity may yield recommendations for outreach and education programs intended to foster stewardship. Identity theory (Burke and Stets 2009) suggests that identities are tied to

social networks, and meanings are constructed through social interaction. Exploring how different angler groups construct meanings associated with their roles may reveal patterns that shed light on why some are compelled to act as stewards, while others are not.

Funding for fisheries management activities has fallen in many western nations, and the importance of individual anglers and organizations involved in management activities has increased (Schuett et al. 2014). Therefore, a populace of anglers that are capable of self-regulating their behavior and that are engaged in and supportive of management will become increasingly important. Identification as an angler may be a pivotal characteristic for discussion about more sustainable management of threatened resources. Given that awareness of consequence was found to predict personal norms, which are a direct antecedent to behavior, increasing awareness of the potential negative impacts of fishing participation (and other activities) on aquatic environments can lead to the activation of moral norms that compel stewardship. Although developing stewardship and fostering ethical angling practices may be easier said than done, findings from this study provide initial evidence of the factors influencing individual decisions. Seimer and Knuth (2001) suggested that mentored formative experiences among youth may socialize them into the sport of fishing and therefore lead to the development of a stewardship ethos among activity participants. Our results parallel those findings.

Management Implications

Falling rates of recreational fisheries participation have been a concern for agencies that rely on license revenues for management activities (Arlinghaus et al. 2015). The results presented in this paper demonstrate that involvement in angling is a mechanism for the development of normative beliefs about aquatic stewardship that result in positive actions for fisheries resources. The loss of anglers, therefore, is not solely a monetary concern but also represents the loss of a population that has a stake in aquatic resources and actively works to protect them. Education and outreach programs that attempt to connect people to aquatic ecosystems through recreational fisheries are more important now than ever. Changing social and ecological conditions, including population growth, demands for water resources, and climate change, threaten the health of aquatic ecosystems (Bruskotter and Fulton 2008). Anglers can be a voice and advocate for aquatic ecosystems in the face of these drivers of change.

These study findings provide new evidence of the value orientations and identities of anglers that view themselves in a stewardship role of recreational fisheries in various ways. In recent years, many anglers have chosen to be active stewards by volunteering for conservation organizations (Schuett et al. 2014) and citizen science projects

(Vann-Sander et al. 2016). Participation in voluntary activities (e.g., species monitoring or mapping) provides valuable experiences and data for individuals and public agencies. This level of interest can be translated into more conservation action when it is place-based and when knowledge about ecosystems is shared at the local and regional levels (Hyder et al. 2015).

Managers aiming to recruit and educate the future generation of anglers (younger, more diverse) can use these results to design public outreach aligned with anglers' identities. Identifying and engaging individuals in stewardship activities can be particularly challenging for public agencies with limited staff and resources. To reach a wider audience, fisheries agencies and conservation organizations can communicate with vast numbers of individuals through the internet, social media, and social networks (Newman et al. 2017). For example, newsletters can be shared through a smartphone application, and citizen science projects can be promoted through websites to connect individuals with similar interests and generate lasting support for fishery interests. Therefore, learning more about new and existing angler behaviors can help practitioners understand citizens' conservation priorities, improve declining fishing participation, and increase awareness of protecting recreational fisheries resources.

Limitations, Future Research, and Conclusions

Throughout the process of conducting this research, several limitations became apparent. First, our results are drawn from a cross-sectional sample; therefore, the causal inference is limited to theoretically derived associations (Rindfleisch et al. 2008). Future research that considers the development of stewardship activities over time will be better positioned to draw conclusions about the role of identity in shaping long-term conservation outcomes. Second, our sample was limited to anglers in the state of Texas, who may be culturally distinct and not generalizable to broader populations. Applications of this model should be tested in different geographic contexts to strengthen the validity of these results. The extent to which our results can be replicated in different populations is an area ripe for future investigation. Different modes of interaction with fisheries that are more common under different social, ecological, and institutional contexts will likely influence levels of identification, internalization of stewardship norms, and engagement in stewardship behaviors.

This study explores the psychological dimensions of stewardship in recreational fisheries. Past work has identified the relationship between stewardship norms and value orientations (Bruskotter and Fulton 2008) as well as specialization and stewardship behavior (Oh and Ditton 2008). We extend that work to consider the role of identity in the formation of stewardship norms and their influence on multiple dimensions of behavior in recreational fisheries. This represents a first step in exploring the role

of identity in the formation of norms and participation in stewardship activities among anglers. A number of other aspects of identity with respect to angling participation and stewardship remain unexplored. Identity, for instance, develops within a social field. An individual's sense of integration into the community may influence the extent to which that individual internalizes personal norms. Research related to community attachment (Landon et al. 2017) and social identity (De Cremer and Van Vugt 1999) has found that individuals that feel a sense of attachment to the community or that integrate the community into their self-concept are more willing stewards of publicly owned water resources. This may be applicable in recreational contexts as well. Additionally, in this study, we only measured the salience of the angler identity as an antecedent to feelings of moral obligation and stewardship behavior. Identity theory hypothesizes that commitment and prominence are also important components of the self-concept. Measuring these components of identity may enhance the ability of the model to explain behavior and personal norms. A variety of other psychological constructs may lead to the activation of personal norms. The value-belief-norm model (Stern 2000), for instance, extends the norm activation model to include personal values as antecedents to environmentally significant behavior. It is largely unknown how role-related identities interact with value structures to influence the adoption of stewardship behavior.

ACKNOWLEDGMENTS

We thank the Texas Parks and Wildlife Department's Divisions of Inland Fisheries and Coastal Fisheries for funding this research. We also acknowledge Robin Riechers, Ken Kurzawski, John Taylor, Zach Thomas, and Jeremy Leitz for their help in study design and survey administration. There is no conflict of interest declared in this article.

REFERENCES

- Anderson, J. C., and D. W. Gerbing. 1988. Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* 103:411–423.
- Arlinghaus, R., S. J. Cooke, S. G. Sutton, A. J. Danylchuk, W. Potts, K. Friere, J. Alós, E. T. De Silva, and R. Van Anrooy. 2016. Recommendations for the future of recreational fisheries to prepare the social-ecological system to cope with change. *Fisheries Management and Ecology* 23:177–186.
- Arlinghaus, R., R. Tillner, and M. Bork. 2015. Explaining participation rates in recreational fishing across industrialised countries. *Fisheries Management and Ecology* 22:45–55.
- Barrett, C. B. 1996. Fairness, stewardship and sustainable development. *Ecological Economics* 19:11–17.
- Barrett, P. 2007. Structural equation modeling: adjudging model fit. *Personality and Individual Differences* 42:815–824.
- Bate, R. 2001. Saving our streams: the role of the anglers' conservation association in protecting English and Welsh rivers. Institute of Economic Affairs and Profile Books, London.
- Beardmore, B., W. Haider, L. M. Hunt, and R. Arlinghaus. 2011. The importance of trip context for determining primary angler motivations: are more specialized anglers more catch-oriented than previously believed? *North American Journal of Fisheries Management* 31:861–879.
- Bruskotter, J., and D. Fulton. 2008. Minnesota anglers' fisheries-related value orientations and their stewardship of fish resources. *Human Dimensions of Wildlife* 13:207–221.
- Bryan, H. 1977. Leisure value systems and recreation specialization: the case of trout fishermen. *Journal of Leisure Research* 9:174–187.
- Burke, P., and J. Stets. 2009. Identity theory. Oxford University Press, Oxford, New York.
- Burke, P. J. 1991. Identity processes and social stress. *American Sociological Review* 56:836–849.
- Callero, P. L. 1985. Role identity salience. *Social Psychology Quarterly* 48:203–214.
- Chipman, B. D., and L. A. Helfrich. 1988. Recreational specializations and motivations of Virginia river anglers. *North American Journal of Fisheries Management* 8:390–398.
- Cooke, S., E. H. Allison, T. D. Beard, R. Arlinghaus, A. H. Arthington, D. M. Bartley, I. G. Cowx, C. Fuentevilla, N. J. Leonard, K. Lorenzen, A. J. Lynch, V. Nguyen, S.-J. Youn, W. W. Taylor, and R. L. Welcomme. 2016. On the sustainability of inland fisheries: finding a future for the forgotten. *Ambio* 45:753–764.
- Cooke, S., C. Suski, R. Arlinghaus, and A. Danylchuk. 2013. Voluntary institutions and behaviors as alternatives to formal regulations in recreational fisheries management. *Fish and Fisheries* 14:439–457.
- De Cremer, D. E., and M. Van Vugt. 1999. Social identification effects in social dilemmas: a transformation of motives. *European Journal of Social Psychology* 29:871–893.
- Dillman, D., J. D. Smyth, and L. Christian. 2009. Internet, phone, mail and mixed-mode surveys: the tailored design method. Wiley, Hoboken, New Jersey.
- Dudgeon, D., A. Arthington, M. Gessner, and Z.-I. Kawabata. 2006. Freshwater biodiversity: importance, threats, status and conservation challenges. *Biological Reviews* 81:163–182.
- Dunlap, R., and R. Heffernan. 1975. Outdoor recreation and environmental concern: an empirical examination. *Rural Sociology* 40:18–30.
- FAO (Food and Agriculture Organization of the United Nations). 2012. Technical guidelines for responsible fisheries 176. FAO, Rome.
- Fornell, C., and D. F. Larcker. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* 18:39–50.
- Gatersleben, B., N. Murtagh, and W. Abrahamse. 2014. Values, identity and pro-environmental behavior. *Contemporary Social Science* 9:374–392.
- Granek, E. F., E. M. Madin, M. A. Brown, W. Figueira, D. S. Cameron, G. Kristianson, P. de Villers, J. E. Williams, J. Post, S. Zahn, and R. Arlinghaus. 2008. Engaging recreational fishers in management and conservation: global case studies. *Conservation Biology* 22:1125–1134.
- Guagnano, G., P. Stern, and T. Dietz. 1995. Influences on attitude-behavior relationships: a natural experiment with curbside recycling. *Environment and Behavior* 27:699–718.
- Heck, N., R. C. Stedman, and M. Gaden. 2016. Indicators to evaluate the social dimensions of the recreational fishery in the Great Lakes. *North American Journal of Fisheries Management* 36:477–484.
- Hogg, M. A., D. J. Terry, and K. M. White. 1995. A tale of two theories: a critical comparison of identity theory with social identity theory. *Social Psychology Quarterly* 58:255–269.
- Hu, L., and P. M. Bentler. 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling* 6:1–55.

- Hutt, C. P., and P. W. Bettoli. 2007. Preferences, specialization, and management attitudes of trout anglers fishing in Tennessee tailwaters. *North American Journal of Fisheries Management* 27:1257–1267.
- Hyder, K., B. Townhill, L. G. Anderson, J. Delany, and J. K. Pinnegar. 2015. Can citizen science contribute to the evidence-base that underpins marine policy? *Marine Policy* 59:112–120.
- Jun, J., G. T. Kyle, A. Graefe, and R. Manning. 2015. An identity-based conceptualization of recreation specialization. *Journal of Leisure Research* 47:425–443.
- Kline, R. 2016. *Principles and practice of structural equation modeling*. Guilford, New York.
- Landon, A. C., G. T. Kyle, and R. A. Kaiser. 2017. An augmented norm activation model: the case of residential outdoor water use. *Society and Natural Resources* 30:903–918.
- Larson, L., R. Stedman, C. Cooper, and D. Decker. 2015. Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology* 43:112–124.
- Maryuama, G. M. 1998. *Basics of structural equation modeling*. SAGE, Thousand Oaks, California.
- McIntyre, N., and J. J. Pilgram. 1992. Recreation specialization reexamined: the case of vehicle-based campers. *Leisure Sciences* 14:3–15.
- Newhouse-Berns, G., and S. Simpson. 2009. Outdoor recreation participation and environmental concern: a research summary. *Journal of Experiential Education* 32:79–91.
- Newman, G., M. Chandler, M. Clyde, B. McGreavy, M. Haklay, H. Ballard, S. Gray, R. Scarpino, R. Hauptfeld, D. Mellor, and J. Gallo. 2017. Leveraging the power of place in citizen science for effective conservation decision making. *Biological Conservation* 208:55–64.
- Nigbur, D., E. Lyons, and D. Uzzell. 2010. Attitudes, norms, identity, and environmental behavior: using an expanded theory of planned behavior to predict participation in a kerbside recycling programme. *British Journal of Social Psychology* 49:259–284.
- NOAA (National Oceanic and Atmospheric Administration). 1998. Recreational fishing; code of angling ethics. *Federal Register* 63:192 (5 October 1998):53353–53354.
- Oh, C., and R. Ditton. 2008. Using recreation specialization to understand conservation support. *Journal of Leisure Research* 40:556–573.
- Raykov, T. 1997. Estimation of composite reliability for congeneric measures. *Applied Psychological Measurement* 21:173–184.
- Raykov, T. 2011. Behavioral scale reliability and measurement invariance evaluation using latent variable modeling. *Behavior Therapy* 35:299–331.
- Rindfleisch, A., A. J. Malter, S. Ganesan, and C. Moorman. 2008. Cross-sectional versus longitudinal survey research: concepts, findings, and guidelines. *Journal of Marketing Research* 45:261–279.
- Schuett, M. A., G. T. Kyle, J. Leitz, K. Kurzawski, and K. Lee. 2014. Anglers' motivations for volunteering with fishing or conservation organizations. *Fisheries* 39:305–311.
- Schultz, P. W. 2011. Conservation means behavior. *Conservation Biology* 25:1080–1083.
- Schwartz, S. 1977. Normative influence on altruism. Pages 221–279 in L. Berkowitz, editor. *Advances in experimental social psychology*. Academic Press, New York.
- Scott, D., and S. Shafer. 2001. Recreation and specialization: a critical look at the construct. *Journal of Leisure Research* 33:319–343.
- Seimer, W. F., and B. Knuth. 2001. Effects of fishing education programs on antecedents of responsible environmental behavior. *Journal of Environmental Education* 32:23–29.
- StataCorp. 2015. *Stata statistical software: release 14*. StataCorp LP, College Station, Texas.
- Steg, L., and J. De Groot. 2010. Explaining prosocial intentions: testing causal relationships in the norm activation model. *British Journal of Social Psychology* 49:725–743.
- Stern, P. C. 2000. Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues* 56:81–97.
- Stets, J., and C. Biga. 2003. Bringing identity theory into environmental sociology. *Sociological Theory* 21:398–423.
- Stryker, S. 1980. *Symbolic interactionism: a social structural version*. Benjamin Cummings, Menlo Park, California.
- Stryker, S., and P. Burke. 2000. The past, present, and future of identity theory. *Social Psychology Quarterly* 63:284–297.
- Sutton, S., and R. Tobin. 2011. Constraints on community engagement with Great Barrier Reef climate change reduction and mitigation. *Global Environmental Change* 21:894–905.
- Tarrant, M. A., and H. K. Cordell. 1997. The effect of respondent characteristics on general environmental attitude-behavior correspondence. *Environment and Behavior* 29:618–637.
- Thøgersen, J. 1996. Recycling and morality: a critical review of the literature. *Environment and Behavior* 28:536–558.
- Vann-Sander, S., J. Clifton, and E. Harvey. 2016. Can citizen science work? Perceptions of the role and utility in a marine policy and management context. *Marine Policy* 72:82–93.
- Ward, H. G. M., M. S. Quinn, and J. R. Post. 2013. Angler characteristics and management implications in a large, multi-stock, spatially structured recreational fishery. *North American Journal of Fisheries Management* 33:576–584.
- Winthrop, R. H. 2014. The strange case of cultural services: limits of the ecosystem services paradigm. *Ecological Economics* 108:208–2014.
- Yoon, J., G. Kyle, C. van Riper, and S. Sutton. 2013. Testing the effects of constraints on climate change-friendly behavior among groups of Australian residents. *Coastal Management* 41:457–469.