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Lakefront Property Owners' Willingness to Accept Easements for Conservation of Water Quality and Habitat

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Key Points:
- Lake shoreline property and owner traits affect probability of enrollment in conservation easements benefitting water quality and habitat
- Littoral and riparian easements are viable options for water quality and habitat conservation, even with no payment for ecosystem services
- Property and owner traits (e.g., large shoreline frontage) can be used to increase conservation easement enrollment and decrease costs

Supporting Information:
- Supporting Information S1

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Abstract Lakes provide valuable ecosystem services such as food, drinking water, and recreation, but shoreline development can degrade riparian habitats and lake ecosystems. Easement contracts for specific property rights can encourage conservation practices for enhanced water quality, fish habitat, and wildlife habitat, yet little is known about the easement market. We surveyed inland lake shoreline property owners in Michigan to assess supply of two conservation easements (in riparian and in littoral zones) and identified property and property owner characteristics influencing potential enrollment. Respondents were significantly less likely to enroll in littoral easements if they indicated there was social pressure for manicured lawns and more likely to enroll if they had more formal education, shoreline frontage, naturally occurring riparian plants, ecological knowledge, or if the lake shoreline was more developed. Enrollment in easements in the riparian zone was significantly less likely if property owners indicated social pressure for manicured lawns, but more likely if they had more formal education, naturally occurring riparian plants, or shoreline frontage. When payments were low ($<$\$1,000 yr^{-1}), marginal gains in enrollment were relatively high. Some respondents may enroll in littoral (29.8% $\pm$ 2.2; mean $\pm$ SE) and riparian (24.4% $\pm$ 2.1) easements even without payment. Estimated mean willingness to accept values were \$1,365 yr^{-1} (littoral) and \$7,298 yr^{-1} (riparian). Targeting high-probability property owners with large shoreline frontages, more formal education, and high riparian plant coverages and conducting education to increase ecological knowledge and change social norms could increase conservation outcomes for water quality and habitat.

1. Introduction

Inland lakes provide valuable ecosystem services to shoreline property owners and to the general public. These services include the provision of clean drinking water and food from fish and wild rice, regulation of flooding and climate, and generation of social, cultural, and economic services such as recreational and aesthetic value (Carson & Mitchell, 1993; Finlayson et al., 2005; Tranvik et al., 2009).

Production of these ecosystem services relies on ecologically functional lakes and watersheds, which are in many cases being degraded by human activities such as agriculture, residential development, and removal of terrestrial and aquatic vegetation that alter aquatic and terrestrial ecosystems. Residential development along lake shorelines in the Upper Midwest United States has increased and is expected to continue increasing in the future (Baker et al., 2008; Peterson et al., 2003; Stedman & Hammer, 2006). As a result of this development, riparian habitats (the land adjacent to a water body) along lake shorelines have been modified to consist of more impervious surfaces (Arnold & Gibbons, 1996), fewer trees, more mowed grass lawns, and fewer native plants (Elias & Meyer, 2003), contributing to water quality declines from nutrient and sediment runoff (Nürnberg & LaZerte, 2004). Furthermore, shoreline development has resulted in changes to littoral habitats (the nearshore waters that are shallow enough to allow plant growth) such as decreases in native plant and large woody habitat abundance due to direct human removal and increases in the number of docks (Radomski et al., 2010). This degradation of riparian and littoral habitat has resulted in declines in abundance of fish (Helmus & Sass 2008), birds (Lindsay et al., 2002; Newbrey et al., 2005), and amphibians (Henning & Remsburg, 2009; Woodford & Meyer, 2003) that rely on these habitats throughout their lives. The increased runoff of nutrients from developed shorelines has also contributed to reduced water quality in lakes through eutrophication (Garrison & Wakeman, 2000; Nürnberg & LaZerte, 2004).

Degradation of riparian and lake ecosystems also influences humans. The recreational value and desirability of lakes is closely tied to water quality, as users prefer to visit, fish, and otherwise use lakes with clearer water (Eiswerth et al., 2008; Keeler et al., 2015; Lupi & Feather, 1998; Ribaudo & Piper, 1991) and are willing to pay for improved water quality (Jordan & Enlnagheeb, 1993; Netusil et al., 2014) and fish habitat (Ekstrand & Loomis, 1975). Lakefront property owners value natural shorelines for their aesthetics (Michael et al., 2000) and shoreline property values increase in more clear lakes (David, 1968; Gibbs & Halstead, 2002; Michael et al., 2000) indicating the shared benefits of natural shorelines to lake users.

While shoreline development can degrade riparian habitats and lake ecosystems, some property management choices made by individual property owners can mitigate the often negative environmental impacts of development. Best management practices such as minimizing impervious surfaces and maintaining vegetation in riparian buffer zones reduce overland runoff, thereby minimizing shoreline property erosion, nutrient loading, and sedimentation in the lake (Carpenter et al., 1998). Further best management practices include providing structural habitats for fishes and other aquatic animals in the littoral zone by allowing aquatic vegetation to grow naturally instead of removing it, not blocking aquatic vegetation growth with mats or benthic barriers, not killing aquatic vegetation with herbicides and by allowing fallen trees from the riparian zone to remain in the lake. By applying best management practices, shoreline property owners can choose to mitigate the adverse impacts to themselves and other lake users that they might otherwise have on the lake.

Natural resource managers, policy makers, and nonprofit organizations can influence property owner decisions regarding riparian and littoral habitats. Regulations limiting the minimum size of a lakeshore property parcel, impervious surface coverage, terrestrial and aquatic vegetation removal, building locations, and placement of docks are common tools used to protect littoral and riparian habitats by state natural resource agencies and local units of government (Jacobson et al., 2016). Another common strategy for increasing use of conservation practices is education and outreach, whereby information is provided with the intent of encouraging shoreline property owners to voluntarily utilize conservation practices due to the benefits such practices would provide such as increased water quality, fish and wildlife habitat, and aesthetic quality. Finally, both governments and nonprofit organizations can use payments to incentivize adoption of conservation practices. For example, land trusts purchase specific rights from property owners through conservation easements, which often require the adoption of various conservation practices. Governments may encourage adoption of conservation practices for lakeshore properties through tax incentives, such as the Shoreline Incentive Program offered by Burnett County, Wisconsin, through which property owners receive an initial payment of US$250 and an annual tax incentive of US$50 to maintain a shoreline buffer with native riparian vegetation (Burnett County, 2017).

Easement and incentive programs are increasingly common tools for encouraging conservation practices on lakeshore properties, yet little is known about the market for adopting these practices. The potential supply of lakeshore property owners willing to enroll in incentive programs to preserve lake ecosystem health using riparian and nearshore easements across a range of financial incentive levels is unknown; and literature estimating the supply does not exist. As a result of this knowledge gap, it is difficult for resource managers, government agencies, and nonprofit organizations to determine the feasibility of conservation easements as a strategy to protect water quality and fish and wildlife habitat.

In addition to determining the feasibility of natural lakeshore easements, resource managers, government agencies, and nonprofit organizations considering implementation of this tool require information about how characteristics of property owners and properties affect an individual property owner's probability of enrolling in an easement. Existing research demonstrates that shoreline conservation may be influenced by characteristics of the lakefront property and property owner. For instance, some property owners feel that native vegetation and woody habitat impede recreation, raise safety concerns, and block views of the lake (Jorgensen et al., 2005). Lakefront property owner beliefs about the ability of lakes to withstand shoreline modification, benefit from conservation actions, and the consequences of shoreline development have been reported to be important predictors of conservation actions (Amato et al., 2015; Jorgensen & Stedman, 2006; Shaw et al., 2011). However, the same relationship was not found for formal education (Welle & Hodgson, 2011), potentially because formal education does not necessarily include lessons in ecology. Whereas the number of activities that occur on a shoreline property isn't a good predictor of sense of place (Jorgensen & Stedman, 2006), the amount of time spent on a lakefront property (Jorgensen & Stedman, 2006),

social norms regarding property management (Shaw et al., 2011), and recreation on a lake are directly related to conservation actions such as willingness to make payments to improve water quality (Welle & Hodgson, 2011). However, there is a gap in understanding about how these property and property owner attributes relate to the probability of accepting a payment for a conservation easement on their property.

The goal of this study was to estimate the potential supply of lakeshore property owners willing to enroll in natural shoreline easements and to determine characteristics of properties and property owners that influence the probability of enrollment. We accomplished this goal by conducting a mixed-mode survey of owners of shoreline properties on Michigan's inland lakes to gather data characterizing owners and their properties, modeling these variables' effects on the probabilities of enrolling in littoral and riparian conservation easements, and then estimating the supply of properties for conservation easements based on our models.

2. Methods

2.1. Survey Instrument

We conducted a mixed-mode internet and mail survey of people owning properties on inland lakes in Michigan's Lower Peninsula regarding their willingness to enroll in conservation easements on their property. The survey used a contingent valuation (CV) method to estimate the financial incentives needed by property owners to voluntarily enroll in an easement and the supply of conservation easements on lakefront properties. The CV approach elicits property owners' stated preferences using survey questions and is commonly used to estimate the value of nonmarket goods. The CV method is well-suited to situations where the phenomena of interest cannot be observed from existing behaviors (e.g., the potential supply of easements on lakes currently without easement programs). For these reasons, CV methods are commonly used to estimate the value of nonmarket goods and services (Ekstrand & Loomis, 1975; Jordan & Enlnagheeb, 1993; Shultz & Lindsay, 1990).

We tailored our CV survey questions to Michigan property owners based on state property rights laws for lakes to ensure the plausibility of the survey choice scenario as property owners considered enrollment in an easement (Arrow et al., 1993). In general, shoreline property owners in Michigan have the right to remove riparian and littoral aquatic vegetation on their properties at their discretion and remove deadfall trees from the water in front of their property. Therefore, conservation easements are sometimes used to protect lakeshore habitats by requiring application of best management practices. We used conservation easements as the payment method to elicit shoreline property owners' willingness to accept (WTA) conservation easements for conservation practices to protect and enhance riparian and littoral fish and wildlife habitat and lake water quality.

Our survey estimated WTA values for easements requiring application of conservation practices using separate questions for two different areas of shoreline properties to improve water quality, fish habitat, and wildlife habitat; one easement addressed practices in the riparian zone and the other addressed the littoral zone (Nohner, 2017). We used dichotomous choice questions to elicit WTA, because this survey structure has the best incentive properties to elicit a truthful and accurate response (Boyle, 2003; Haab & McConnell, 2002; Kolstad, 2010); specifically, our dichotomous choice questions provided the respondent an opportunity to receive payment for a good (an easement) at a given price that they could accept or reject as they would in a market. The easements we offered required application of conservation practices on the land and water using fixed zones for water quality and fish and wildlife habitat, which are more easily interpreted, implemented, and enforced than alternatives based on hydrological characteristics such as the depth-to-water index (Tiwari et al., 2016).

A concern with regard to CV methods is hypothetical bias, whereby survey questions that the respondent thinks are only hypothetical will elicit only hypothetical answers that may not correspond to how they would act in a real market (Bohm, 1972; Murphy et al., 2005; Carson et al., 2001). However, if respondents believe that a question is consequential to them (i.e., they believe it could affect the economic utility they gain), economic theory predicts that they will have a strategic incentive to answer truthfully and accurately (Carson & Groves, 2007) and empirical results support this theory (Herriges et al., 2010; Vossler & Evans, 2009). We provided incentive for truthful responses by using statements of consequentiality to minimize hypothetical bias; our consequentiality statement indicated that results from the survey would be "made

available to policymakers and other organizations as a guide for future decisions about incentive programs."

Prior to the CV questions, respondents saw graphics and answered objective questions about the coverage of vegetation their property in the littoral and riparian zones. These questions helped inform respondents about the economic good that the CV questions would later evaluate. The survey also contained a page with interactive questions describing the easement programs in illustration and text. Each CV question appeared on its own page with additional summary information about the good (Nohner, 2017). Introductory information for the littoral easement stated that the "purpose is to improve habitat and increase the numbers of fish and aquatic wildlife; property owners must allow all native plants in the water to grow naturally out 50 feet into the lake (can treat invasive plants); owners must allow any branches that fall in the lake to remain in the lake; and the conditions apply along 50% of the shoreline." The exact wording of the final part of the CV question for the littoral zone was, "Would you accept this voluntary offer of $X per year to allow aquatic plants and fallen tree branches in the water along 50% of your shoreline?" The payment amounts (X) offered in the CV questions were randomly assigned as $100, $500, $1,000, $5,000, and $10,000 and respondents were offered the same payment amount for the littoral and riparian easements. Payments were based on qualitative research and data from our pilot study of shoreline property owners discussed below. Although our approach does mean that there could be an ordering effect, our survey development and pretesting showed that respondents understood the differences between the easements better when the littoral easement was presented first. Our design placed more importance on respondent comprehension than possible survey ordering effects. For the riparian easement, the purpose was "to improve habitat for fish and wildlife to benefit their populations, stabilize your shoreline, and improve water clarity in the lake". Property owners were required to allow all native plants on the land within 50 feet of the shoreline to grow naturally; native grass and shrub seeds as well as tree saplings that a naturalist might grow would be provided for optional planting; property owners were allowed to trim branches above a height of four feet to improve visibility to the lake; and these conditions applied along 50% of the shoreline. The exact wording of the final part of the CV question for the riparian zone was, "Would you accept this voluntary offer of $X per year to allow native plants to grow naturally on the land along 50% of your shoreline?" The survey stressed that the easements were voluntary to distinguish them from other types of easements (e.g., utility easements) which may not be voluntary. As a follow-up to each CV question, we also asked if the respondent would be willing to enroll in such a program, even if there was no payment.

Our pretesting and pilot survey suggests that lakefront property owners understood the programs and did not raise major concerns about the ability of the government to implement such programs. In addition, we asked open-ended follow-up questions after each easement question to determine whether issues of comprehension, trust, or believability affected responses. Specifically, we asked participants, "What were your reasons for answering Question [XX] this way?" We then classified each of these responses as "low confidence in the program," "program is only hypothetical," and "don't understand the question." We found 0, 0, and 6 respondents indicated these reasons, respectively, for the water easement question and 0, 0, and 4 respondents indicated these reasons for the water easement. In most cases, our classifications of a respondent were consistent among the questions (i.e., if a respondent didn't understand the water easement question, they repeated a similar response for the land easement). These six participants represent about 1% of our survey responses, so we are confident that in general our results were not affected by these issues.

The survey included questions about shoreline property owners' environmental attitudes, ecological knowledge, and formal education background that may explain variation in WTA based upon these characteristics. Previous research has indicated that greater ecological knowledge may relate to a greater likelihood of conserving native vegetation on shoreline properties (Jorgensen & Stedman, 2006). Four separate questions on our survey asked respondents to rate on a 5-point Likert scale their agreement with statements that how they maintain their shoreline property affects the number of fish, the water quality, and the amount of wildlife in and around their lake, with those that strongly disagreed (coded as 1) having low knowledge and those that strongly agreed (5) having high knowledge. Each property owner's average response across these statements was used as an index of ecological knowledge. We asked respondents what their highest level of education was among the following categories and converted responses to years: some high school (10 years), high school graduate (12 years); Associate's degree (14 years); Bachelor's degree (16 years); Master's degree (18 years); and beyond a Master's degree (20 years).

As social norms such as mowing the lawn and maintaining certain landscaping aesthetics may also predict conservation actions (Shaw et al., 2011), we asked shoreline property owners to respond whether they agree with a statement that "it is important to me that my neighbors maintain a manicured lawn and shoreline." We used this response as an indicator of a social norm held by the respondent, and measured the response on a Likert scale from 5 (strongly agree) to 1 (strongly disagree).

The easements proposed to shoreline property owners may be interpreted as limits on their rights to manage their property in a way that allows them to derive utility from the property through recreational activities and other uses. We asked respondents to indicate which of nine ways their household used the land on their shoreline property (i.e., bird or wildlife watching; campfire; eating or cooking outdoors; hunting; landscaping or gardening; recreational equipment storage; relaxation; yard games/children playing; and other) and which of nine ways they used the water and shoreline of their property (i.e., boat storage or access; boating or motorized watersports; fishing; hunting; nonmotorized water activities; swimming; view of the lake; wildlife viewing; and other). We summed the number of uses for water and for land and used this as an equally weighted indicator of the number of each property owner's uses for the land and water.

In addition to the indices of land and water use, we also created an index of the amount of time that owners and their guests spent at the property the prior year. To do this, respondents indicated the frequency of visits per year (never, 0 day; rarely, 1–5 days; occasionally, 6–30 days; and commonly, $>$30 days) by people in six categories (you??; spouse or partner; other immediate family; other relatives; friends; and renters); the number of people in each category was not included. These number-of-day values were summed across all categories to create an estimate of time spent at the property. The survey also contained a question about the number of times owners fished in their lake during 2014 (including from a boat, shoreline, or otherwise). While recall bias may have affected these recreational and time use answers, the indices serve as relative measures of activity and are thus useful in our statistical models predicting willingness to accept conservation easements.

In addition to survey questions focusing on property owner characteristics, we also used the survey to collect information about characteristics of the property to assess whether property attributes influenced willingness to participate in conservation easements. Property owners provided estimates of the percent coverage of trees, shrubs, uncut grass, wetland plants, mowed grass, and areas with no plants in the riparian area (within 50 feet of the shoreline); we calculated the percent naturally occurring vegetation coverage by dividing the summed tree, shrub, uncut grass, and wetland plants by the sum of the areas with vegetation coverage responses.

Invasive aquatic plant species are common in Michigan's inland lakes, and management to remove them occurs throughout the state. When invasive species, commonly aquatic plants, are present, property owners may perceive them to be a nuisance and remove them, thus being less willing to enter into an agreement that they perceive limits their invasive plant management options. Although our proposed littoral easement specifically allowed for removal of invasive species, we included the presence of invasive species in the lake in our WTA models to test whether their presence still affected probability of accepting the easement. We asked shoreline property owners whether invasive species were present in their lake, with responses being interpreted as an index of the probability of presence for "yes" (1), "no" (0), and "I don't know" (0.5) responses.

The size of the shoreline property is also likely to impact the utility that shoreline property owners perceive they are losing when entering either the proposed littoral or riparian easement. The survey included a question assessing an easily reported metric of property size, shoreline frontage, which is the length of shoreline on the property. Focus groups and cognitive interviews (Kaplowitz et al., 2004) showed that shoreline property owners almost always know this distance due to the high property values associated with shoreline frontage, and frontage response categories (0–15, 15–30, 30–61, and $>$61 months) were selected to achieve a roughly equal distribution of shoreline frontages based on data from our pilot study described below. We asked survey respondents their income, but we did not include it in the models because we received 10% item nonresponse to this question; moreover, models run with missing incomes imputed by the mean had little effect on key results such as mean WTA or the marginal effects for payment or frontage.

In addition to gaining information about the shoreline properties of respondents through the survey, we also used publicly available data to characterize their properties. To determine the proximity between

owners' permanent and lake addresses where the two differ, we calculated the driving distance between the mailing address listed in each recipient's tax records and the coordinates of the random point used to select their shoreline property for the survey. Driving distances were calculated using Google Maps (Google, Mountain View, California, 2015) and Macro Recorder 5.8.0.0 (Jitbit Software, Edinburgh, United Kingdom, 2011).

The willingness of property owners to enroll in conservation easements may also be related to the extent to which the shoreline has been developed on their lake. We calculated riparian land cover development at the whole-lake scale to determine whether probability of enrollment was affected by development. We used the most recent National Land Cover Dataset (*NLCD*; Homer et al., 2015) to estimate the proportion of each lake's shoreline classified in developed categories (low, medium, or high intensity developed, open space, barren land, cultivated crops, and pasture or hay). For this purpose, shoreline land cover was defined as the 30 $\times$ 30 m pixels adjacent to the lake in the NLCD; this is the smallest resolution available and is similar to the recommended 30.5 m building setback recommended by the Michigan Department of Environmental Quality (MDEQ, 2015).

The survey was pretested in accordance with recommendations from Dillman et al. (2007) by six groups: professionals experienced in survey design (6 individuals), resource managers that may use the information (5), two lakeshore property owner focus groups (22), individual cognitive interviews with lakeshore property owners (7), and a pilot survey (269). During the pretesting, we evaluated performance against Fowler's (1995) criteria that the survey was consistently understood and that respondents were able to answer the survey questions as well as the additional criterion that the economic good in question, the conservation easement, was clearly described and identified (Carson et al., 2003). After each pretest, the survey was modified to address any deficiencies in the criteria above; deficiencies were identified through direct feedback and observations of confusion or inability to answer. The survey was reviewed by researchers familiar with survey design and by managers with the Michigan Department of Environmental Quality and the Department of Natural Resources. Following these reviews, a focus group with 12 lakeshore property owners from across the study region was conducted by participants taking the survey individually and then discussing the survey as a group. Then we held one-on-one cognitive interviews (Kaplowitz et al., 2004) with seven lakeshore property owners on 75 ha Park Lake in Bath, MI, which in the southern region of the state. Next, we used a focus group of 10 property owners on a lake near Fountain, MI, which is in the northern region of the study to improve representation of geographically diverse lakeshore properties and minimize potential bias. Finally, a web-based pilot survey that also allowed open-ended comments about the survey was sent to members of 10 organizations of lakefront property owners (i.e., lake associations) across the state that provided a total of 269 responses. These pilot survey respondents answered littoral and riparian conservation easement CV questions over a range (\$100–\$20,000 yr^{-1}) of payments, and the distribution of responses informed selection of payment levels for the final survey.

2.2. Survey Population

Our survey targeted heads of households for properties on inland lakes of Michigan's Lower Peninsula. We generated random geographic locations along the shoreline of all inland lakes greater than 4 ha using the National Hydrography Dataset Plus Version 2 (US Environmental Protection Agency (USEPA) and US Geological Survey (USGS) 2012) and ArcGIS version 10.2 (Environmental Systems Research Institute, Redlands, California, 2016). We conducted a stratified random sample of these points to identify potential sample sites to send surveys; the strata were by county with number of sample sites drawn in proportion to the length of shoreline in that county. We then used publicly available, spatial data sets of property parcels provided by counties to acquire mailing addresses for lakefront property owners at each sample site (Figure 1). Next, we created a potential sample of 1,101 lakeshore property owner addresses by overlaying the sampling points and parcel databases. After checking addresses against a National Change of Address (NCOA) database for bad/insufficient address, we removed 10 potential addresses, resulting in a sample of 1,091 presumed shoreline property owners in our study region.

2.3. Survey Implementation

A survey invitation with each respondent's unique internet address and a \$1 bill as incentive was mailed to lake shoreline property owners 12 August 2015, followed by two reminder postcards on 19 August and 16 September 2015 (see supporting information). All survey mailings were conducted using precanceled

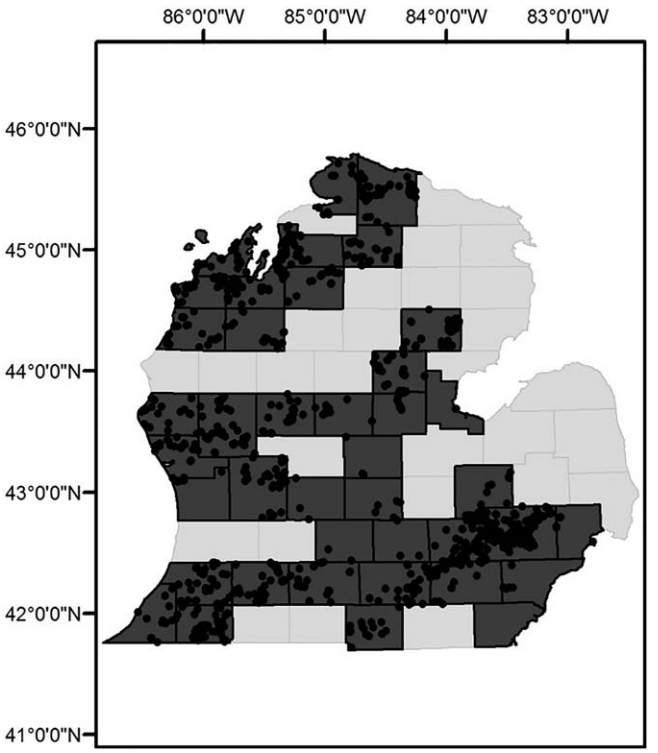

Figure 1. Michigan counties where sampling was possible (dark grey) or impossible (light grey) based upon existence of publicly available parcel data and locations of lakefront properties surveyed (points). Density of surveyed lakefront properties was proportional to the length of shorelines on lakes greater than 4 ha in each county across the landscape.

stamps at a nonprofit rate, therefore we did not receive any returned mail and could not estimate the number of incorrect or unoccupied addresses which may have been ineligible for the study; as a consequence, our survey response rate is a lower bound response rate. A paper copy of the survey with a postage-paid return envelope was mailed 6 October 2015 to addresses from which a response had not yet been received, and the survey was closed 31 December 2015.

2.4. Statistical Model

We used two separate random utility models (Haab & McConnell, 2002) to estimate the probability of respondents accepting the littoral and riparian conservation easements we proposed. Random utility models are based upon the logic that utility derived from a dichotomous choice is a function of the choice's attributes (e.g., easement requirements, financial incentives) and the desire of the respondent to maximize their utility. The model is based upon the premise that the probability of a "yes" response to the offer is the probability the respondent thinks they are better off accepting the agreement and the incentive payment, where α is a vector of parameter coefficients, z_j is a vector of attributes of the respondent and their property, β is a coefficient for the natural logarithm of the payment, t_j is the easement payment amount, and ε_j is random error (Haab & McConnell, 2002):

$$\mathrm{P}(yes_j) = \mathrm{P}(\alpha z_j + \beta \ln t_j + \varepsilon_j > 0) \quad (1)$$

We used a single-bounded approach to minimize concerns regarding bias associated with multiple-bounded approaches (Haab & McConnell, 2002; Whitehead, 2002). Applying this model to our data, we fitted a logit regression (per Haab & McConnell, 2002) predicting the probability of a "yes" response:

$$\mathrm{P}(yes_j) = \left(1 + e^{-(\alpha z_j + \beta \ln t_j)}\right)^{-1} \quad (2)$$

We tested the hypotheses that each parameter influenced probability of enrollment in a conservation program based upon parameter estimates for β and each parameter in α. All hypothesis tests were considered statistically significant at $P < 0.05$. We used parameters recovered from the logit models to estimate mean WTA values according to Haab and McConnell (2002), which represent the mean value at which respondents would receive equal utility rejecting or accepting the offer.

Table 1
Mean Values (SD) for Survey Variables Reported by Shoreline Property Owners in Michigan's Lower Peninsula That Responded to At Least One Easement Question (n = 445)

Variable	Mean (SD)
Distance from permanent address (km)	141.7 (367.1)
Ecological knowledge (very low = 1 to very high =5)	4.05 (0.81)
Education (years)	15.8 (2.5)
Invasive species (present = 1, absent=0, don't know = 0.5)	0.68 (0.36)
Lakeshore development (percent developed or agriculture)	29.3 (21.6)
Natural plants in riparian buffer (percent coverage)	56.2 (32.4)
Number of land uses (0–9)	3.99 (1.85)
Number of water uses (0–9)	4.96 (1.67)
Respondent's fishing trips (number/yr)	10.6 (10.2)
Shoreline frontage (m)	40.6 (16.6)
Social pressure (low = 1 to high =5)	2.91 (1.26)
Time spent (person days/yr)	97.7 (33.3)

3. Results

3.1. Descriptive Statistics

We mailed survey invitations to a total of 1,091 NCOA-verified addresses and received 528 unique survey responses (Nohner et al., 2017). After removing duplicates (19) and refusals (1), we calculated a response rate (*RR2*; AAPOR, 2008) of 48.4%. Response rates did not differ significantly between property owners by latitude, longitude, or lake size. These models were estimated using all surveys in which respondents answered the questions for the independent variables as well as the littoral easement (439 surveys) or land easement (432) questions.

Mean coefficient values describing shoreline properties and property owners are provided for property owners that completed both littoral and riparian easement questions (Table 1). While the average respondent's permanent address was over 120 km from their lake property, 57.3% lived less than 10 km from their lakefront property.

The average education of respondents was greater than 15 years (some college education). Invasive plant species were commonly reported, with 255 (50%) property owners reporting invasive plant species were present in their lake, 168 (33%) reporting they were absent, and 82 (16%) that did not know. Respondents reported that the average riparian buffer on their properties and the littoral zone adjacent to their properties were slightly more than half covered by naturally occurring plants. Property owners that agreed that it was "important to me that my neighbors maintain a manicured lawn and shoreline" reported a significantly greater ($P < 0.005$) proportion of their lawns were mowed (62% ± 36; mean ± SD) than those that disagreed with the statement (28% ± 32). Similarly, property owners agreeing with the importance of neighbors' manicured shorelines reported significantly ($P < 0.0005$) lower coverages of aquatic plants (44% ± 26) in the littoral zone than those that disagreed with the statement (58% ± 30). On average, property owners used their lake properties primarily for four activities on the land and six in the water, with the most common land activities being relaxation (86%), eating and cooking (62%), campfires (60%), children playing (59%), and gardening (57%), and the most common activities involving the water being enjoying the view (93%), wildlife watching (86%), swimming (73%), fishing (70%), and operating nonmotorized (72%) or motorized (61%) watercraft.

3.2. Demographic Influences on WTA

We developed two different logit models predicting the probability of a respondent accepting the littoral or the riparian easements to test whether respondents' personal and property characteristics were related to their probability of participating in these conservation programs.

We created the logit model predicting probability of littoral easement enrollment using 12 parameters describing respondents and their properties in addition to parameters on the payment offer and intercept (Table 2). The parameter on the natural log of the payment, ln(payment), was positive and significant ($P < 0.0005$) indicating that higher easement payments increased enrollment. Respondents were significantly less likely to accept the littoral easement if they felt it was important to their neighbors that they maintain a manicured lawn (social pressure). They were more likely to accept the littoral easement if they had more education, larger shoreline frontage, more natural plants in the riparian buffer, greater ecological knowledge, or if they lived on a lake with more developed or agricultural shoreline land cover. Because the scales of the variables were different, we multiplied the magnitude of the coefficients by the average values in the data to determine relative importance. The statistically significant variables predicting littoral

Table 2
Model Coefficients (SE) for the Littoral Easement and Riparian Easement Logistic Regression Models Predicting the Probability of a Respondent Accepting the Easement Based upon Characteristics of the Respondent and Their Lakeshore Property

Variables	Water easement	Land easement
Model variables		
Intercept	−8.057 (1.338)***	−6.524 (1.376)**
ln(payment)	0.483 (0.076)***	0.343 (0.078)***
Distance from permanent address (km)	-1.01×10^{-4} (3.57×10^{-4})	-4.57×10^{-4} (4.00×10^{-4})
Ecological knowledge (very low = 1 to very high =5)	0.543 (0.149)***	0.241 (0.153)
Education (years)	0.096 (0.048)*	0.115 (0.051)*
Invasive species (present = 1, absent=0, don't know = 0.5)	−0.180 (0.315)	0.349 (0.348)
Lakeshore development (percent developed or agriculture)	0.014 (0.006)*	0.003 (0.006)
Natural plants in riparian buffer (percent coverage)	0.012 (0.004)**	0.020 (0.005)***
Number of land uses (0–9)	0.028 (0.077)	0.079 (0.080)
Number of water uses (0–9)	0.007 (0.086)	−0.0752 (0.093)
Respondent's fishing trips (number/yr)	0.013 (0.012)	0.004 (0.013)
Shoreline frontage (m)	0.026 (0.007)***	0.027 (0.008)***
Social pressure (low = 1 to high =5)	−0.321 (0.104)**	−0.435 (0.109)***
Time spent (person days/yr)	−0.005 (0.004)	−0.005 (0.004)
Model summary statistics		
Log-likelihood	−240.377	−219.131
Number of observations	439	432
Pseudo R^2	0.252	0.280

Note. Statistically significant differences from zero are denoted by *$P < 0.05$, **$P < 0.01$, and ***$P < 0.0005$.

easement enrollment, in decreasing order of importance were ecological knowledge, education, shoreline frontage, social pressure, natural plants in riparian buffer, and degree of lakeshore development. In candidate models where water uses, land uses, fishing trips, and social pressure were removed, the sign and significance of coefficients did not change for any variable except lakeshore development, which was no longer statistically significant, suggesting that the model was robust to potentially endogenous variables.

In the logit model predicting probability of riparian easement enrollment, the parameter on ln(payment) was positive and significant ($P < 0.0005$) indicating that higher easement payments would increase enrollment. Respondents were significantly less likely to accept the riparian easement if they described social pressure for manicured lawns, but were more likely to accept the easement if they had more education, more natural plants in their riparian buffer, or more shoreline frontage (Table 2). The statistically significant variables predicting riparian easement enrollment listed by decreasing order of importance were education, social pressure, natural plants in the riparian buffer, and shoreline frontage. In candidate models where water uses, land uses, fishing trips, and social pressure were removed, the sign and significance of coefficients were the same for all variables, suggesting that the model was robust to potentially endogenous variables. The only exception was ecological knowledge, which in the alternative specifications showed evidence for a statistically significant positive relationship with enrollment and thus may be correlated with an underlying, unmeasured variable.

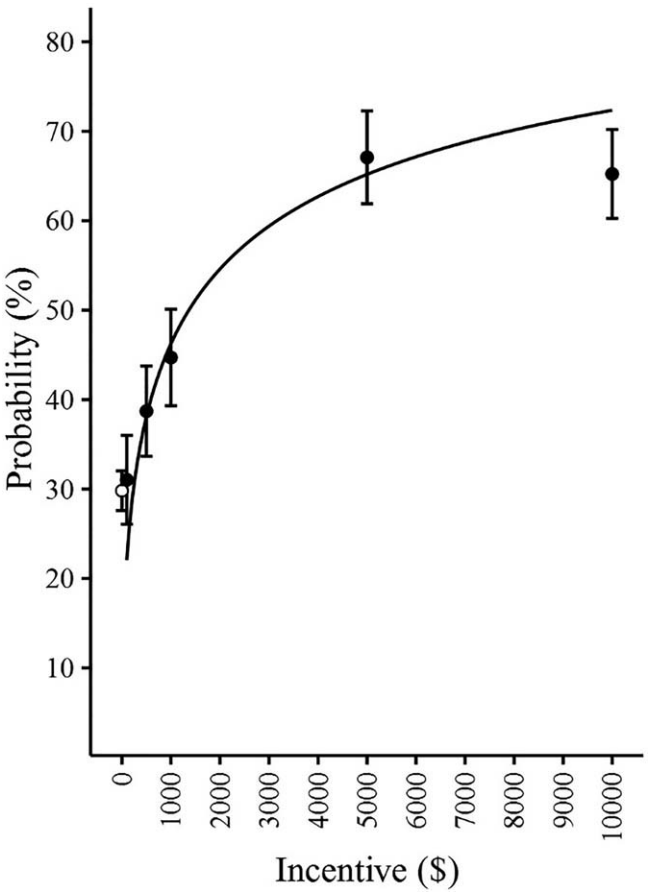

Figure 2. Estimated probabilities of a shoreline property owner accepting the littoral easement. The line indicates modeled probabilities for an average property owner based upon logistic regression results across the range of payments ($100–$10,000 yr^{-1}) offered in the survey, solid black points indicate the proportion (±SE) of easement offers accepted in the survey at each payment level, and the hollow point indicates the proportion (±SE) of respondents indicating that they would voluntarily enter the easement without incentive.

We also considered alternate models specified with only observable variables (shoreline frontage, lakeshore development, natural vegetation, and distance from permanent address as the latter could be observed by accessing public property tax records). The results of the observable-only models showed very similar patterns for coefficient signs and significance, and the resulting marginal effects were not significantly different than in our full models.

3.3. Supply of Shoreline Conservation Easements

We used the logit models to predict the potential supply of shoreline property owners willing to enroll in conservation easements. To graphically assess model fit, we also calculated the proportion of "yes" responses by lakeshore property owners for littoral easements at each payment amount as well as the proportion indicating that they would enroll with no payment (Figure 2). We used the model to estimate the likelihood the average property owner would accept the easement across the range of our bids. The proportion of "yes" responses generally increased monotonically, except for between the $5,000 and $10,000 yr^{-1} estimates, which did not differ significantly. Approximately 29.8% (SE = 2.2) of respondents indicated that they would enroll even without a payment, and 67.1% (5.2) would enroll with a $5,000 yr^{-1} incentive. Many of these respondents cited the value of fish and wildlife habitat, a desire for natural conditions, and the belief that their current property management was already in compliance with the proposed conservation easement. When easement incentives were relatively low (<$1,000 yr^{-1}), the marginal gains in probability of enrollment from an increase in the incentive are very high, meaning additional investments to increase incentives are most efficient when incentives are low and become less influential at higher incentive levels. For example, increasing the incentive from $0 to $1,000 yr^{-1} raises the probability of enrollment from 29.8% (SE = 2.2) to 44.7% (5.4). However, at incentives above $2,000 yr^{-1}, the marginal increases decline as the probability of enrollment begins to plateau around roughly 65%. The predicted probability of enrollment based upon the logit model at average values for each variable shows concurrence between the model predictions and the proportion of "yes" responses

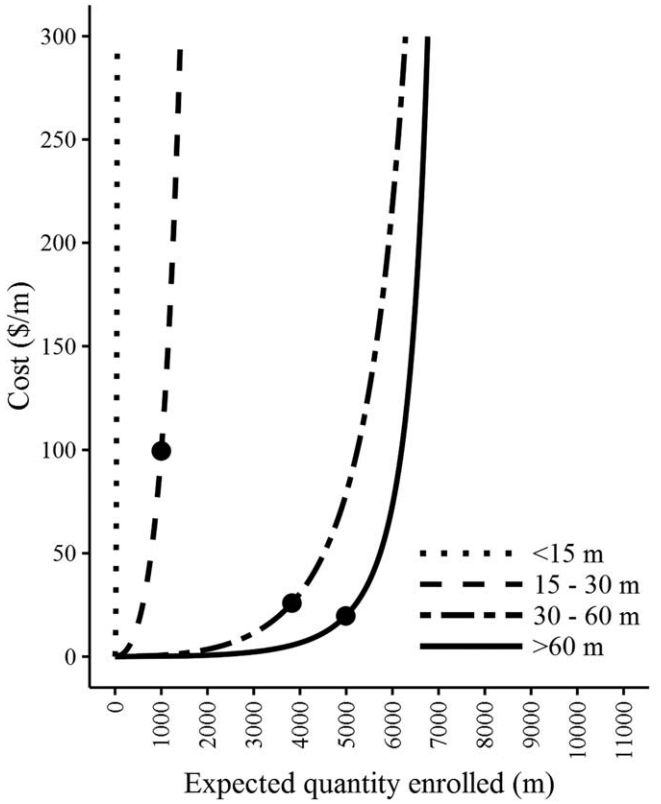

Figure 3. Estimated quantity of shoreline enrolled in a hypothetical littoral easement based upon coefficients from a logit model predicting an average property owners' probability of easement acceptance at frontages of <15, 15–30, 30–60, and >60 months. Estimates are scaled based upon an easement offered to a hypothetical population of 1,000 property owners with differing shoreline frontages. Points represent the predicted quantity of shoreline enrolled when total cost is \$100,000 yr^{-1}.

in the data for each payment amount. The estimated mean WTA for the littoral easement was \$1365.11 yr^{-1}.

To estimate the quantity of littoral zone supplied from properties of different sizes, we used probabilities of enrollment from the logistic regression at average values across all parameters except shoreline frontage; shoreline frontage values were set to each of the four possible responses in the survey. These predictions were then scaled up to a hypothetical 1,000 property owner sample to illustrate the difference in strategies targeting property owners of each frontage size class (Figure 3). Property owners with shoreline frontages greater than 30 m produced much higher enrollment potential than for individuals with properties with less than 30 m of frontage. This difference was driven by increased frontage enrolled for each property owner that accepted the easement as well as by the increased probability that owners of properties with large shoreline frontages were more likely to accept. Quantity enrolled increased most rapidly at low costs per meter of shoreline enrolled. Multiplying the quantity enrolled by the cost per meter in Figure 3 produces the expected total program costs for any expected quantity and size class. If a lake manager was attempting to maximize enrollment with a theoretical \$100,000 yr^{-1} budget for each shoreline frontage size class, this would occur at a cost of \$1249.34 m^{-1} yr^{-1} (expected enrollment = 80 m), \$99.53 m^{-1} yr^{-1} (1,001 m), \$25.90 m^{-1} yr^{-1} (3,826 m), and \$19.69 m^{-1} yr^{-1} (4,990 m) for properties with 0–15 months, 15–30 months, 30–60 months, and >60 months of frontage, respectively. This results in more than a 60-fold increase in enrollment in littoral easement frontage when targeting properties with larger (>60 m) over those with smaller (<15 m) frontages at the same total program cost.

Probability of enrollment was lower in the riparian easement program (Figure 4) than it was in the littoral easement at most payment levels (range of differences = 5.4–20%) except at a payment of \$500 yr^{-1}, where enrollment in the riparian easement was negligibly (1.9%) more likely. A plot of the probability of enrollment at each payment level and when no payment would be offered shows general agreement between survey data and logit model estimates at mean variable values (Figure 4), indicating a good general fit between the model and the data. About 24.4% (SE = 2.1) of respondents indicated that they would enroll with no incentive; many of these respondents cited wildlife habitat, water quality, a desire for natural conditions, and the belief that their current property management was already in compliance with the proposed conservation easement. About 55.2% (5.3) indicated they would enroll with a \$10,000 yr^{-1} incentive. The proportion of respondents accepting the program increased monotonically with increasing incentive payments except for between \$100 yr^{-1} (32.9% ± 5.1) and \$500 yr^{-1} (31.1% ± 4.9) payments, which did not differ from each other significantly. The greatest increases in enrollment were modeled to occur at relatively low incentive levels (e.g., from \$100 yr^{-1} to \$1,000 yr^{-1}). However, the proportion of respondents indicating that they would enroll at \$100 yr^{-1} and \$1,000 yr^{-1} incentive levels only increased from 32.9% (5.1) to 33.3% (5.1), which were not significantly different. This small increase was consistent with the much lower marginal increases in modeled enrollment at low incentive levels for the riparian easement than for those modeled for the littoral easement. Similar to the littoral easement, the slope of riparian easement enrollment probability increased much less at high (\$5,000–\$10,000 yr^{-1}) incentive levels. Estimated mean WTA for the riparian easement was \$7298.13 yr^{-1}.

The predicted quantity of shoreline in riparian easement supplied through an offer to 1,000 hypothetical property owners was plotted for easements targeting the shoreline frontage categories used in the survey (Figure 5). The greatest increase in quantity occurred at low costs (0–50 \$$m^{-1}$ yr^{-1}), and the increase in length of shoreline enrolled decreased as cost increased. For a total budget of \$100,000 yr^{-1}, we predicted that easements targeting properties with 0–15, 15–30, 30–60, and >60 months of frontage would enroll 52,

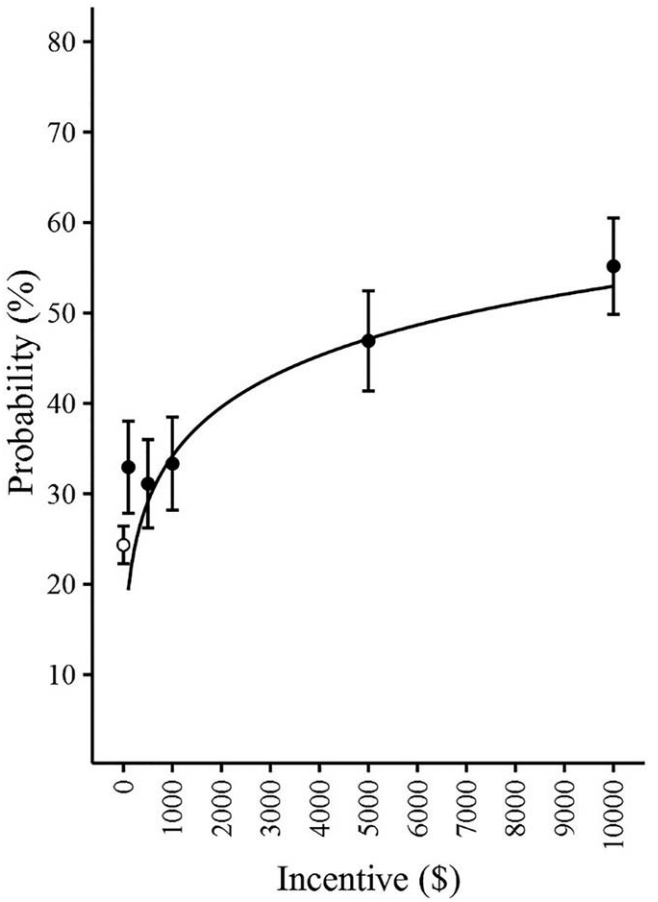

Figure 4. Estimated probabilities of a respondent accepting the riparian easement. The line indicates modeled probabilities for an average property owner based upon logistic regression results across the range of payments ($100–$10,000 yr^{-1}) offered in the survey, solid black points indicate the proportion (±SE) of easement offers accepted in the survey at each payment level, and the hollow point indicates the proportion (± SE) of respondents indicating that they would voluntarily enter the easement without incentive.

648, 3,007, and 4,821 months of shoreline in their riparian easement programs at $1937.01, $153.25, $32.92, and $20.67 m^{-1} yr^{-1}, respectively. This amounts to more than a 90-fold increase in enrollment in riparian easements when targeting land owners whose properties were large (>60 m) compared to those with small (<15 m) frontages at the same total program cost.

4. Discussion

We surveyed inland lake shoreline property owners in Michigan's Lower Peninsula in the broadest geographic assessment of shoreline conservation practices of this demographic to date. Our survey assessed the potential supply of conservation easements in the riparian and littoral zones of inland Michigan lakes, identified characteristics of properties and property owners that influence the probability of conservation easement enrollment, and provides information for managers considering the use of shoreline easements to accomplish conservation objectives.

Shoreline property owners with larger frontages were more likely to accept both the littoral and riparian easements. As shoreline frontage increased, the number of activities on the land and water did not increase; therefore, increased easement acceptance on larger properties was likely due to the ability to conduct desired activities on the portion of the property not affected by the easement. The increased probability of acceptance and the increased shoreline frontage that large (>60 m frontage) properties would commit to the program combined to improve the cost-effectiveness at least 60-fold, which should result in greater environmental benefits from targeting large-property owners for conservation easements. Unlike some characteristics of property owners, shoreline frontage can be readily determined through observation or existing records held by governments, allowing lake managers to target properties with larger frontages first to maximize cost-effectiveness and ecological benefits from conserving more shoreline.

Owners of properties with more riparian plants were also more likely to accept the easement, which is consistent with Jorgensen and Stedman's (2006) finding that property owners were more favorable toward retaining native vegetation if they reported lower development on their properties. The decision of whether to enroll in conservation easements, especially the riparian easement requiring native plants such as native grasses, shrubs, and trees, is potentially caused by underlying, unmeasured variables that influenced past decisions to conserve these riparian plants. However, inclusion of this variable has important consequences for protection of riparian buffers. Protecting existing vegetation does not require soil disturbance and may be able to take advantage of deeper, established root systems providing better soil erosion mitigation in the short term when new plantings would not yet be established, thus providing greater benefits to water quality through mitigated erosion in the short term. Programs can achieve cost-efficiency by targeting properties with existing riparian plants, increasing the likelihood of acceptance. One caveat to this argument is that if properties with more riparian plants are targeted, there may be little benefit to enrolling them in a conservation easement that requires property owners to do what they already are doing (i.e., some properties might offer little additionality); however, the rapid development and changes to land cover on lake shorelines (Baker et al., 2008; Peterson et al., 2003; Stedman & Hammer, 2006) implies that many of these properties with riparian vegetation at present may lose such riparian vegetation in the future. To determine whether properties with riparian vegetation are likely to remove riparian vegetation in the future and are thus worth investment through conservation easements, future research should address the potential for riparian vegetation management to change due to new

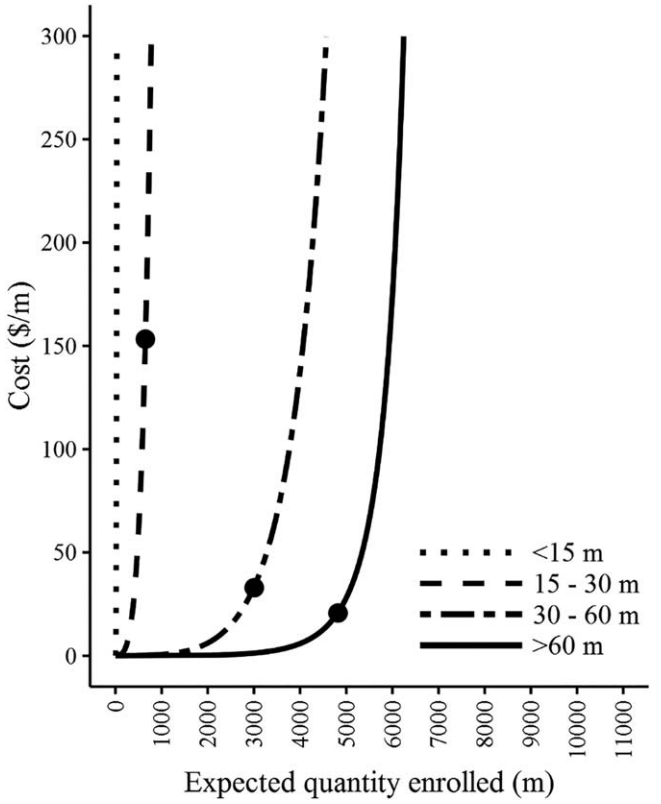

Figure 5. Estimated quantity of shoreline enrolled in a hypothetical riparian easement based upon coefficients from a logit model predicting an average property owners' probability of easement acceptance at shoreline frontages of <15, 15–30, 30–60, and >60 months. Estimates are scaled based upon an easement offered to a hypothetical population of 1,000 property owners with differing shoreline frontages. Points represent the predicted quantity of shoreline enrolled when total cost is \$100,000 yr^{-1}.

ownership, changing preferences, or other reasons. If there is a high risk of vegetation loss from these properties currently applying best management practices, it would increase the benefit of their protection.

We found that shoreline property owners that agreed their neighbors should maintain a manicured lawn had lawns with more mowed grass, littoral zones with fewer aquatic plants, and were less likely to accept the easements in the survey, despite the models accounting for the lack of natural vegetation on respondents' lawns. Shaw et al. (2011) identified subjective norms such as social pressure to be important factors in determining whether participants utilized conservation measures (rain barrels) to benefit water quality in a Wisconsin watershed. Our results extend this pattern of social pressure influencing conservation decisions to riparian and littoral easements, and suggest that a strategy for increased conservation easement acceptance could be to address the social norm that property owners expect and perceive a need for a manicured lawn. For example, the Michigan Natural Shoreline Partnership's Shoreland Stewards Program acknowledges shoreline property owners for applying conservation practices such as vegetated buffers or allowing fallen trees to remain in the water and provides notice to neighbors through yard signs. The yard signs provide recognition and encourage neighbors to apply these practices to benefit water quality and fish and wildlife habitat.

Similarly, after controlling for other factors, we found that property owners with higher levels of formal education were more likely to accept to both littoral and riparian easements, and those with greater ecological knowledge were more likely to accept the littoral easement. Previous research has shown a similar increased value of water quality corresponding to formal education level (Jordan & Enlnagheeb, 1993). Shaw et al. (2011) and Stern (2002) found that knowledge of an environmental problem may lead to conservation actions as stakeholders are aware of potential ecological problems, whereas others (McKenzie-Mohr, 2000) argue that knowledge alone may not be enough, since stakeholders must also care about an ecological problem and there may be financial, logistical, or other barriers to them acting to address the problem. Our findings support a correlation between formal and environmental education and conservation action, but do not demonstrate that increases to knowledge and understanding cause increases in conservation actions such as allowing native vegetation to grow naturally or allowing fallen trees to remain in the lake. The discrepancy between knowledge of a conservation problem and taking corresponding action to mitigate the problem is well-studied, but linkages between the two are indirect and complex (Kollmuss & Agyeman, 2002) with some researchers hypothesizing that information will only produce a change if the lack of information is the only impediment to action (Stern, 2002). Given these concerns about the complex relationship between increased knowledge and conservation actions, future research should test the causality of increased ecological knowledge influencing acceptance of conservation easement programs in varying circumstances to determine whether outreach programs increasing ecological knowledge would be cost effective in achieving conservation objectives such as conservation easement enrollment.

Finally, shoreline property owners that lived on lakes with more overall developed or agricultural land cover were more likely to accept the littoral easement. This pattern could be due to an increased perception of the lake's unnatural state in such settings, in which case the knowledge of ecological degradation may spur the desire to participate in conservation programs (Shaw et al., 2011). However, it should be noted that this result was not robust across trial models and may be a result of a different, unmeasured variable such as income or socioeconomic status that could be correlated with characteristics of the lake, property, or owner that are the actual underlying reason for willingness to enroll in a littoral easement.

We did not detect relationships between acceptance of conservation easements and the predictor variables representing number of land or water uses, fishing trips, or time spent at the property. Jorgensen and Stedman (2006) also found that time spent on a lake property and the number of activities that owners participated in were not related to perceptions of native flora or existing development on the property due to complex interactions with other factors affecting the property, the owner's attitudes, and their sense of place.

Conservation easement programs with limited resources should target more willing property owners to increase cost-efficiency for enrollment, assuming properties provide similar ecological benefits. By targeting this demographic, incentive levels can be decreased such that more enrollments are gained for the same total cost. We demonstrated the efficacy of this targeting strategy for properties with the easily observable characteristic of large shoreline frontages, but if possible we also recommend targeting property owners with more ecological knowledge and formal education, those with riparian vegetation already in place, those on lakes with relatively more urban or agricultural shoreline development, and those that do not place importance on social norms for manicured lawns. We further recommend the investigation and potential application of outreach campaigns that increase ecological knowledge in order to potentially increase participation in conservation practices on the shoreline. This strategy will increase the likelihood of enrollment at any given cost to benefit wildlife habitat, fish habitat, and water quality.

There is currently no market for littoral easements on Michigan lakes. However, Burnett County, Wisconsin operates a tax incentive program whereby an initial $250 tax incentive is provided in the first year with $50 tax incentives in each following year in exchange for a permanent covenant that property owners will maintain a 9.14 m (30 foot) riparian vegetation buffer on their properties. While Burnett County does not monitor the program's impact to water quality or fish and wildlife populations, the county considers the program successful in the context of the known negative effects of riparian and littoral habitat degradation to water quality (Nürnberg & LaZerte, 2004), fish (Helmus & Sass, 2008), birds (Lindsay et al., 2002; Newbrey et al., 2005), and amphibians that rely on the habitat throughout their lives (Henning & Remsburg, 2009; Woodford & Meyer, 2003). Of the approximately 80% of eligible property owners that are estimated to be aware of Burnett County's program, the participation rate was estimated at 15% (D. Ferris, personal communication, 2016). This participation rate provides a strong external validation of our results in a real market, because it is almost exactly the rate we would expect if we extrapolate our modeled riparian easement to an annual incentive level of $\$50\ yr^{-1}$, which would predict an overall average participation rate of 16% for lake owners in the Lower Peninsula of Michigan.

Since no real market exists for shoreline easements in Michigan, this study used a contingent valuation approach to estimate WTA and test characteristics of properties and property owners that influence WTA. This approach can lead to WTA estimates that are overestimates of the actual value; in a meta-analysis, Murphy et al. (2005) found that hypothetical bias increased values by a factor of about 1.35, with greater effects for WTA than for willingness to pay (WTP) studies. If this were true, we would have overestimated costs by approximately 35%. However, our use of a policy consequentiality statement may mitigate such bias if property owners thought there was even a very small probability that the survey would be used to inform decisions regarding potential future easement programs (Herriges et al., 2010). Vossler and Evans (2009) provided empirical evidence for this theory when they could not detect elicitation bias for consequential referenda but could detect such bias for purely hypothetical referenda. We are confident that some respondents did believe the survey results would be used to inform policy and thus was policy-consequential, because we received follow-up phone calls from survey recipients expressing interest in the potential program being started in their area. However, other authors have found that payment consequentiality (there is at least a chance that payments are real) is required for eliciting responses similar to a real choice (Liu & Swallow, 2016; Mitani & Flores, 2014). Because our easement was not payment-consequential, our estimates may be biased as discussed above.

Property owners may choose different types of properties on different types of lakes based on heterogeneous preferences for property characteristics. Our models do not explicitly address this potential sorting, although exploratory mixed logit models that we estimated were not able to detect significant heterogeneity. Future research could investigate the potential effect of sorting on WTA more thoroughly.

This study demonstrates the feasibility of no-cost or low-cost easements for protecting riparian and littoral habitats in Lower Peninsula Michigan lakes. If offered to lakefront property owners, our estimates show that

more than one quarter of property owners would be willing to enroll in such programs at no cost to enhance water quality and fish and wildlife habitat. With relatively small incentives of \$100–\$500 yr^{-1} per property owner, an additional 10% of owners are predicted to enroll in the program, improving water quality and fish and wildlife habitat. The easements in this study applied to 50% of each property's shorelines; programs meeting the Michigan Department of Natural Resources' goal of conserving 75% of each shoreline property (O'Neal & Soulliere, 2006) would likely be more expensive or have lower enrollment. Decisions on whether littoral easements, riparian easements, or some combination thereof would be more beneficial depend upon the management objectives and the ecological context of the properties, lakes, and watersheds in question. For example, the Minnesota Department of Natural Resources focuses its shoreline conservation to protect fish habitat on lakes that have watersheds with undeveloped land cover and thus potentially higher water quality (Jacobson et al., 2016). In order to protect water quality and fish and wildlife habitat, we recommend that state and local governments as well as nonprofit organizations consider implementing conservation easements, potentially through expansion of existing shoreland conservation programs that do not currently provide financial incentives or through creation of tax incentives or direct payments in exchange for conservation easements.

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