Original Article

Estimating Public Willingness to Fund Nongame Conservation Through State Tax Initiatives

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ABSTRACT Nongame conservation is insufficiently funded at local, national, and global levels. Despite campaigns and reforms over the past 30 years in the United States, adequate and consistent federal funding has failed to materialize and shifted the focus to state-level initiatives. We surveyed North Carolina residents during April–May 2010, to assess public willingness to fund nongame conservation, preferred nongame conservation funding mechanisms, and key predictors of support for nongame funding. We estimated a model of willingness-to-pay (WTP) using interval-censored data modeling and compared models using the Akaike Information Criterion. The mean WTP was US$98.80/year/household when respondents were allowed to choose their own tax vehicle, thus removing any payment vehicle bias; an additional sales tax on outdoor recreation equipment was the most preferred funding mechanism. In a follow-up question, respondents indicated a mean WTP of US$32.92/employed adult (equivalent to about $65/household) annually via a flat income tax. The importance of nongame conservation to respondents, frequency of watching and/or enjoying wildlife, and education were positively related to WTP, whereas age was negatively related to WTP. Prisons were the most popular source from which to reallocate funds to nongame conservation (48%), and respondents believed an average of US$545,000 should be reallocated. Our findings suggested that while the general public indicated that they valued nongame conservation and were amenable to tax increases or reallocations for nongame conservation, they believed that taxes should be user-based and specialized (e.g., outdoor equipment taxes). These findings highlighted public WTP for nongame conservation even during an economic recession. © 2012 The Wildlife Society.

KEY WORDS contingent valuation method, funding, nongame conservation, North Carolina, willingness-to-pay.

Fish and wildlife conservation is inadequately funded at global, national, and local levels (Hutchins et al. 2009). This funding gap exists despite the fact that the number of wildlife watchers in the United States is rapidly increasing (USDI et al. 2008), which suggests that public interest in nongame species is increasing. Generating consistent funding for nongame conservation has proven particularly difficult (Mangun and Shaw 1984, Loomis and Mangun 1987, IAFWA 1998, Hutchins et al. 2009). It has been estimated that nongame wildlife management at the state level requires almost 10 times the current amount of funding (McKinney

et al. 2005). Budget shortfalls have resulted from increasing responsibilities, rising resource and management costs, and declining traditional funding sources (Jacobson et al. 2007). Further, the number of organizations, agencies, and individuals that require conservation funding has proliferated and, in turn, competition for conservation funds has increased (Hutchins et al. 2009). As the global population continues to expand and urban sprawl encroaches on wildlife habitats (Cieslewicz 2002), significant increases in consistent government funding for wildlife conservation are needed (Hutchins et al. 2009).

State wildlife management agencies in the United States have traditionally been funded through revenues from the sale of hunting and fishing licenses and federal excise taxes on hunting and fishing equipment (Mangun and Shaw 1984, Loomis and Mangun 1987). These taxes include the 11% excise tax on ammunition and firearms created under the

Pittman–Robertson Federal Aid in Wildlife Restoration Act and the 10% federal excise tax on all fishing equipment designated by the Dingell–Johnson Sport Fish Restoration Act (Mangun and Shaw 1984, Loomis and Mangun 1987, DeMillo 1998). Although this funding approach has proven reliable, these funds are typically designated for conservation of game species, with nongame species benefiting only indirectly (Mangun and Shaw 1984, Loomis and Mangun 1987, IAFWA 1998).

Current user-based fees (e.g., equipment taxes) and market methods (e.g., hunting leases) of generating conservation funding for game species have not been harnessed effectively for nongame conservation funding. Nongame conservation benefits the public by generating use value (e.g., birdwatching), option value (e.g., maintaining a species for its genetic information that may be used in the future), existence value (e.g., satisfaction from knowing a species exists), and bequest value (e.g., knowledge that conserving a species today leaves it for future generations; Loomis and White 1996). Although the public benefits from these values, they are not accustomed to paying for them, which makes it challenging to generate revenues from these values. It is therefore important to estimate this public value and identify innovative forms of revenue generation.

In the early 1970s, interest emerged in generating funds specifically for nongame wildlife conservation (Loomis and Mangun 1987), but nongovernmental organizations, local governments, and wildlife agency coalitions have struggled to generate consistent nongame funding at the federal level. Several unsuccessful legislative efforts have sought to generate revenues through earmarked taxes. The Fish and Wildlife Conservation Act of 1980 authorized federal funds for developing nongame conservation measures at the state level (16 U.S.C. §§ 2901–2911). This Act initially included an excise tax on bird seed to generate revenues for the conservation of nongame species, which was later eliminated due to a concern the tax would prove unreliable and disproportionally burden the elderly (Loomis and Mangun 1987). Although the Act passed, it provided no long-term funding source. The Conservation and Reinvestment Act (CARA) proposed in 2000 would have provided $3.1 billion (all dollar values in U.S. currency) annually for 15 years for conservation initiatives funded by taxes on federal off-shore oil and natural gas leases (Zanetell and Rassam 2003, Jimenez-Cooper et al. 2005), but it failed to pass in the U.S. Senate. The State Wildlife Grant Program began in 2001 and was celebrated as a successful federal funding initiative for nongame conservation. At its inception, the program allowed states to receive matched federal funds at a 25:75 ratio of state:federal funds, respectively. However these appropriations are subject to political and economic influences; match requirements over the past decade have fluctuated between 25:75, 50:50, and 35:65, which makes long-term planning particularly difficult for state agencies.

As a result of inconsistent federal funding, and resistance to using sportsperson-generated funds for nongame conservation, many states are seeking new ways to generate nongame conservation funding. Nearly all states offer a wildlife specialty license plate (Laband et al. 2009) and a voluntary income tax check-off (Applegate 1984, IAFWA 1998). Both Texas and Virginia have an outdoor recreation equipment sales tax, a lottery tax is used by Arizona and Maine, and Arkansas and Missouri use general sales taxes to fund nongame conservation (McKinney et al. 2005).

To address nongame conservation revenue needs, state governments need information on how much the public is willing to pay and which revenue-generating mechanisms are most likely to be supported by the public. Stated preference methods (Adamowicz et al. 1994), such as contingent valuation, are typically used to determine the public value—or willingness-to-pay (WTP)—for public goods, such as wildlife conservation, that have large nonuse components. In this study, we employed the contingent valuation method (CVM) to assess public WTP for nongame conservation in North Carolina (NC), USA. North Carolina provides a representative case study because, as in many other states, the North Carolina Wildlife Resources Commission (NCWRC) is addressing conservation concerns associated with human population growth coupled with rapid habitat loss and challenges associated with volatile and insufficient funding for nongame conservation (Daley et al. 2004, U.S. Census Bureau 2010). The NCWRC's Wildlife Diversity Program, dedicated to nongame conservation, receives a small allocation from the general state budget annually. Over half (55%) of the Program's revenue comes from federal grants. Nineteen percent of the Wildlife Diversity Program's 2010 revenue was generated by donations from the state income tax check-off, which is subject to annual fluctuations; the total amount donated through the check-off in 2010 decreased by 11% from 2008. In this study, we address 2 research goals: 1) Quantify public value of nongame conservation; and 2) Assess preferences regarding different tax vehicles and variation in WTP across various revenue-generating mechanisms.

METHODS

We used CVM (Loomis and White 1996, Holmes et al. 2004, Fix et al. 2005, Stanley 2005, Martin-Lopez et al. 2008) to assess WTP for nongame conservation among NC residents. Contingent valuation method surveys have been criticized for being susceptible to bias due to nonresponse bias in the survey, the hypothetical nature and particularities of how the contingent valuation question is framed, and strategic behavior by respondents (Mitchell and Carson 1989). We addressed concerns regarding potential biases in several ways. First, we developed our survey instrument through pretesting, including cognitive interviews ($n = 22$), semi-structured interviews with tax opponents ($n = 13$), and expert review ($n = 11$); tax opponents and expert participants were selected by a convenience sample and each group had 100% compliance. We mailed a pretest version of the questionnaire to 225 randomly selected NC residents ($n = 19$). We used these interviews and pretest to determine and correct problems with question comprehension, wording, and skip patterns, and to finalize bid structures for the contingent valuation questions. Second, we assessed and

adjusted for nonresponse bias to our survey using results from a follow-up survey of nonrespondents and information from the U.S. Census Bureau. Third, we asked about WTP in several ways, including whether or not respondents currently donate to the Wildlife Diversity Program through the state income tax check-off, whether and how much they would reallocate from existing state programs to nongame conservation, and whether they would be willing to pay a flat tax per employed adult. Because creating new taxes often meets political and public resistance, we asked several questions to explore opinions about different tax vehicles. In order to remove payment vehicle biases for or against particular types of taxes from our estimate of WTP (Ivehammar 2009, Myerhoff and Liebe 2010), we conditioned that question on the respondents' preferred tax. Fourth, we used the recommended dichotomous choice with a follow-up format for our primary contingent valuation question (Arrow et al. 1993). Fifth, we carefully examined differences in WTP across sub-groups who had been differentially affected by the economic recession that occurred during the study, and who were more or less politically active and therefore likely to be more or less influential in shaping public response to any tax increase.

We administered the mail survey to a sample of 3,000 randomly selected residents of NC during April–May 2010. The sample was purchased from Survey Sampling International (Shelton, CT) and achieved approximately 76% coverage of NC households using landline phone records, drivers' license records, and deed records (F. Markowitz, Survey Sampling International, personal communication). Survey administration followed Dillman's Tailored Design Method (Dillman 2007), adapted to more closely follow survey administration methods traditionally used by the NCWRC (Dalrymple et al. 2010). There were 5 mailings that included the first survey packet, reminder postcard, second survey packet, third survey packet, and a final reminder postcard. Each survey packet included a cover letter that explained the survey and a survey booklet with paid return postage printed on the booklet. Respondents were entered into a drawing to win a $300 Visa® (San Francisco, CA) gift card as an incentive to complete the survey.

The final survey instrument consisted of 32 questions that assessed willingness to increase funds through increases in state taxes for nongame conservation using preferred tax sources, willingness to reallocate funds from other sources in the state budget, socio-demographic characteristics, and measures to assess impacts of the current U.S. economy on our results. While many studies that assessed WTP for nongame conservation have focused on specific species (Loomis and White 1996, Stanley 2005, Martin-Lopez et al. 2008), assessing WTP for multiple species simultaneously gives a more accurate perception of public WTP (Loomis and White 1996). Further, focusing WTP studies on specific species risks biases due to preconceived attitudes respondents may hold for an individual species (Martin-Lopez et al. 2008). Accordingly, we designed our survey instrument to measure WTP for the conservation of all nongame species in NC. To test for nonresponse bias, we conducted telephone interviews with 91 randomly selected nonrespondents (55% compliance rate) after the survey process was complete.

To determine respondent opinions on designating the responsibility of funding nongame conservation, respondents were asked to rank on a 7-point Likert scale, where 1 = very unfair and 7 = very fair, a series of 5 statements regarding who should pay for wildlife conservation: users, all taxpayers, or no one (Fig. 1). We measured both the percent of respondents who agreed with each statement (i.e., those who responded with a 5, 6, or 7) and the mean value of agreement selected by respondents (Fig. 1). We also asked respondents to identify how politically active they were on a 5-point scale (1 = very politically active, to 5 = not at all politically active). Respondents were identified as politically active if they self-identified as "very politically active" or "pretty politically active" and as politically inactive if they self-identified as "a little politically active" or "not at all politically active." To determine WTP for increased taxes for nongame conservation, respondents were first given a list of 7 tax vehicles (Table 1) and asked to rate the fairness of increasing each type of tax on a 7-point Likert scale, where 1 = very unfair and 7 = very fair. Respondents were then asked to identify which one of the 7 tax vehicles they would most prefer to be increased to support nongame conservation. We asked respondents to imagine a scenario in which their selected tax was increased to benefit nongame conservation, and then used a dichotomous choice with follow-up bid method to find mean WTP. Using the dichotomous choice with follow-up bid method reduced potential for strategic bias. We allowed respondents to select their preferred tax vehicle because avoiding payment-vehicle bias associated with attitudes about particular taxes was more important in this study than calculating mean WTP for any specific tax type.

We selected 10 independent variables to compare factors that influenced the dollar amount of tax increases respondents were willing to pay. We included variables that assessed how important nongame conservation was to the respondent on a 5-point Likert scale (1 = very unimportant, to 5 = very important), how often respondents watched and/or enjoyed wildlife (1 = never, to 5 = ≥5 times/month), whether they
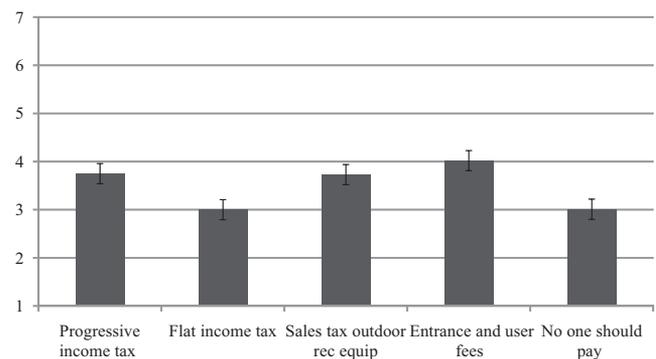

Figure 1. Mean agreement with statements of who should pay for nongame wildlife conservation on a 1–7 Likert scale, where 1 = strongly disagree and 7 = strongly agree, from a 2010 survey of North Carolina (USA) residents.

Table 1. Percent of respondents who selected each tax vehicle as their most preferred, and mean "fairness" of each tax vehicle as a funding source for nongame conservation (where 1 = "very unfair" and 7 = "very fair"), as obtained from a survey of North Carolina (USA) residents, 2010.

Tax type	Percent of respondents who selected tax type as their most preferred for funding nongame conservation	Fairness mean	Fairness SE
Sales tax on outdoor recreation equipment	31	3.99	0.086
Sales tax on alcohol	27	3.97	0.098
Tax on lottery winnings	24	4.16	0.097
General sales tax	7	2.88	0.082
Income tax	6	2.41	0.074
Tax on real estate	3	2.14	0.067
Property tax on cars	1	2.09	0.068

were familiar with the NCWRC's Wildlife Diversity Program before the survey (0 = not familiar, 1 = familiar), and whether they had donated to the income tax check-off before (0 = had not donated, 1 = had donated), with the hypothesis that all 4 of these variables would be positively related to WTP. Manfredo and Haight (1986) found that donors to Oregon's nongame tax check-off were more likely to participate in wildlife watching than nondonors and that they were more cognizant of the tax check-off option advertising than nondonors. Similarly, WTP for conservation of nongame species is likely higher among those that participate in outdoor recreation (Loomis and White 1996). Past contributions to other conservation organizations may predict support for allocating taxes for nongame conservation (Stanley 2005), so we included a binary variable (0 = had not donated, 1 = had donated) to assess whether a respondent had donated to another conservation organization within 12 months prior to our survey.

We predicted that age would be negatively related to WTP for nongame conservation and included it as a continuous variable. Contributors to nongame tax check-offs have been found to be more likely to be 25–39 years old than noncontributors (Moss et al. 1986). Furthermore, Stanley (2005) found that WTP for biodiversity conservation was negatively related to age. We included gender in the models (0 = F, 1 = M) with the prediction that women would hold a higher WTP, because females have been found to be more likely to engage in pro-environmental behavior (Stern et al. 1993, Hunter et al. 2004, Chen et al. 2011). We included education in our models as a binary variable (0 = less than college degree, 1 = college degree or higher) and predicted it would be positively related to WTP. Education has also been found to be positively related to pro-environmental behavior (Scott and Willits 1994, Chen et al. 2011), and contributors to nongame tax check-offs have been found to be more highly educated than noncontributors (Moss et al. 1986). Respondents identified their annual household income as 1 of 9 categories (1 ≤ $14,999, to 9 ≥ $200,000). In our models, we coded each respondent's income as the midpoint of their self-selected income category and reported it in units of $1,000 (e.g., respondents who selected the $50,000–74,999 income bracket were coded as 62.5). We included income in the models with the hypothesis that higher income levels would be associated with higher WTP. Income has been found to be positively related to WTP for biodiversity

conservation (Chen and Jim 2008), and economic theory predicts that WTP for any good or service (holding all else equal) should be positively related to income. We asked respondents whether any member of their household had lost a job due to the current state of the U.S. economy and included this in the model as a binary variable (0 = no job loss, 1 = job loss). Given the occurrence of an economic recession at the time of the survey, we predicted that a loss of a job within the household due to the recession would reduce respondent WTP, even after controlling for income in the past year, because it would increase uncertainty about future income. This finding would also be relevant to times of economic growth, because employed individuals have been found to be more likely to engage in pro-environmental behavior (Chen et al. 2011).

The tax check-off is vital to funding the NC Wildlife Diversity Program, so we wanted to determine WTP for a mandatory tax when filing income taxes rather than an optional donation. We asked respondents whether they would support a flat income tax when filing taxes, with the first value of their dichotomous-choice question as the value of the flat tax. We then asked respondents whether they would support this tax if it were income-based rather than a flat tax.

As a further check on public support for funding nongame conservation, we asked respondents whether they would reallocate funding from other state programs to the NC Wildlife Diversity Program, and if so, how much. To provide context, we first gave respondents an abbreviated version of the state budget. We asked whether the amount designated to the Wildlife Diversity Program was too much, just right, or not enough (Appendix). Those who felt the amount was not enough or were not sure were asked to identify how much should be reallocated to the Program and from which source it should come.

We used SAS 9.2 (SAS Institute, Inc., Cary, NC) to fit our models of WTP increased taxes for nongame conservation. Because WTP is by definition nonnegative and often right-skewed, we used a log-normal distribution to model WTP. Because we used the dichotomous choice with a follow-up bid method, we obtained censored data for each respondent. Instead of observing the exact response from the individual, based on the initial and follow-up bid amounts, we were able to determine an interval for their WTP. For example, if a respondent said yes to an initial bid of $50 but no to a

follow-up bid of $100, WTP was only known to lie in the interval between $50 and $100. We used the LIFEREG procedure in SAS to fit interval-censored regression models. If an individual responded "no" to both bids, we knew the response of interest was smaller than the follow-up bid amount, but was assumed to be no smaller than 0. If an individual responded "yes" to both bids, we had left-censored data with an unknown upper bound. This is a special case of interval censoring handled in the LIFEREG procedure.

We used a backward selection method to find the best models at each level of variable inclusion and then used the Akaike Information Criterion (AIC) to compare models (Burnham and Anderson 2002). We selected the model with smallest AIC value as the best-fit model. To assess nonresponse bias, we compared respondents with nonrespondents in terms of mean age ($T = 1.35; P > 0.05$), perceived importance of nongame conservation ($T = -1.07$, $P > 0.05$), and frequency of watching and/or enjoying wildlife ($T = 1.36, P > 0.05$), and found no statistical differences. We compared the percent of respondents that held a bachelor's degree with census data ($T = -11.42, P < 0.05$). Based on these results, we adjusted our WTP estimate using the mean education level of adults in NC as reported by census data.

RESULTS

After accounting for nondeliverable surveys, we received 598 returned surveys for a response rate of 21%. Our respondents were predominately male (63%), and the mean age of all respondents was 55 years old. The majority of respondents (78%) were Caucasian, and the median income of all respondents was $62,500. Most respondents (70%) felt nongame conservation was "important" or "very important," and 93% of all respondents reported watching and/or enjoying wildlife at least once per year. Twenty-eight percent of respondents were familiar with the tax check-off benefiting the NCWRC Wildlife Diversity Program, and a third (33%) of respondents who were familiar with the tax check-off option reported having made donations via the tax check-off option previously. Forty-four percent of respondents held a bachelor's degree or higher. This is significantly higher than the percent of the NC population which holds a bachelor's degree (23%; U.S. Census Bureau 2010).

When given 5 scenarios regarding who should pay for wildlife conservation, respondents expressed the most support for charging entrance and user fees at outdoor recreation locations (47%, $n = 281$; Fig. 1). Mean support for this option was closely followed by a progressive tax on all tax payers and a sales tax on outdoor recreation equipment, both of which were supported by 41% of respondents ($n = 245$). Few respondents agreed that no one should pay taxes to conserve nongame wildlife (24%, $n = 144$), or that all taxpayers should pay the same amount to conserve nongame wildlife (21%, $n = 126$). Politically active respondents were less likely than the general population to agree with a progressive income tax (35%, $n = 44$), more likely to agree with a flat tax per employed adult (27%, $n = 34$), more likely to agree with a tax on outdoor recreation equipment (44%, $n = 55$), more likely to agree with user fees (51%, $n = 63$), and less likely to agree with the statement "no one should pay for nongame wildlife conservation" (22%, $n = 28$). Respondents rated the fairness of increasing NC income taxes for nongame conservation as 2.41 on a 7-point scale (Table 1, $n = 565$). They gave a higher rating of 3.75 to using a progressive tax for nongame conservation (Fig. 1; $n = 575$). This discrepancy appeared despite the fact that NC's income tax system is progressive.

When asked to rate each tax on a Likert scale, respondents considered a tax on lottery winnings as the fairest funding option, followed closely by a sales tax on outdoor recreation equipment (Table 1). However, when asked which of the 7 tax vehicles they preferred to be increased, a sales tax on outdoor recreation equipment was most commonly selected by respondents (31%, $n = 158$), followed by a sales tax on alcohol (Table 1; 27%, $n = 137$). Politically active respondents selected a tax on lottery winnings as their most preferred tax for increase (35%, $n = 36$), followed by a tax on alcohol (28%, $n = 29$) and a tax on outdoor recreation equipment (22%, $n = 22$; Table 2).

Conditional on revenues being generated through their preferred tax vehicle, the majority of respondents (73%, $n = 424$) were willing to increase their annual taxes to support the Wildlife Diversity Program. Of the 27% unwilling to pay any tax increase to support nongame conservation, 84% ($n = 146$) reported being opposed to any increase in state taxes, regardless of the beneficiary. After adjusting for the education bias, the least-squares mean estimate of mean WTP for increased taxes for nongame conservation was $98.80/year (95% CI = $83.59–$18.55). Mean WTP among nonrespondents was $118.71, which was potentially higher than the survey mean WTP due to social desirability bias (Dillman 2007).

Table 2. Percent of politically active and politically inactive respondents who most preferred each funding source for nongame wildlife conservation, as obtained from a survey of North Carolina (USA) residents, 2010.

Tax vehicle	Percent of politically active respondents who selected tax type as their most preferred	Percent of politically inactive respondents who selected tax type as their most preferred
Sales tax on outdoor recreation equipment	22	33
Sales tax on alcohol	28	26
Tax on lottery winnings	35	22
General sales tax	6	9
Income tax	8	6
Tax on real estate	0	4
Property tax on cars	1	1
	$n = 102$	$n = 241$

Table 3. Models with Δ Akaike Information Criterion (AIC) values <3, that predicted willingness-to-pay for nongame conservation by North Carolina (USA) residents, 2010.

Candidate model	AIC	ΔAIC	Akaike wt	Evidence ratio
(1) Importance of nongame conservation + how often enjoy wildlife + age + education	1,187.455	0.000	0.441	1.000
(2) Importance of nongame conservation + how often enjoy wildlife + age + education + income	1,188.396	0.941	0.269	1.636
(3) Importance of nongame conservation + how often enjoy wildlife + age + education + income + donated to tax check-off before	1,189.486	2.031	0.152	2.895

Evidence supported multiple candidate models for predicting public WTP for increased taxes for nongame conservation (Table 3). The best-fit model included 4 variables: the importance of wildlife conservation to the respondent, how often the respondent watched and/or enjoyed wildlife, age, and education level (Table 4). Because WTP for nongame conservation was modeled on the log scale, coefficients indicated that WTP for nongame conservation increased 1.7 times/unit increase in importance of nongame conservation to the respondent and 1.3 times/unit increase in frequency of watching and/or enjoying wildlife. Those with a bachelor's degree or higher had a 1.5 times higher WTP than those who did not hold a college degree, holding all else equal. Willingness-to-pay decreased by a factor of 0.98 times with each increase of 1 year in age. Although income level was not in the best-fit model, it was positively related to WTP in all candidate models.

Few respondents (28%) supported a flat tax per employed adult for nongame wildlife conservation implemented when filing income taxes. Those who supported it had a mean WTP of $32.92/year. Support (46%) for a progressive income tax was higher than support for a flat tax when filing taxes. When evaluating the current budget allocation to the Wildlife Diversity Program in relation to other state programs (Appendix), 9% of respondents felt it was too much, 19% responded it was just right, 40% reported it was not enough, and 31% did not know. Respondents who allocated more annual funding to nongame conservation allocated an average increase of $545,000 and a median of $250,000 (SD = $1,232,724, inner quartile $100,000–500,000). Prison budgets were reallocated to nongame conservation far more (48%) than the next most favored options (highway fund = 13%, other = 13%). Respondents who selected "other" were given an open-ended option to fill in their own answer; the only repeated responses were reducing government salaries ($n = 10$) and reducing welfare benefits ($n = 6$).

DISCUSSION

Our findings suggest that NC residents support a user-based specialized tax over other options proposed for funding nongame conservation. This may reflect a perceived fairness associated with a user-pays form of taxation (Hutchins et al. 2009). High levels of support for using lottery and alcohol taxes to support nongame conservation may reflect support for using funds from "sin taxes" (Johnson and Meier 1989) to promote public welfare, because these taxes are often used to address costs for other public benefits, including health care and education (Lorenzi 2010). Preferences for these mechanisms may also reflect a strategic desire to shift costs associated with nongame conservation to others. In a previous study that sampled only wildlife recreationalists, respondents preferred general taxes that spread costs across a broad tax base over more specialized taxes to fund nongame conservation (Mangun and Shaw 1984). The discrepancy between our results and those of Mangun and Shaw (1984) may be explained by the broad sample attempting to shift costs onto specialized users in our study, and specialized users attempting to shift costs onto the broader public in the recreationalist study.

Overall a sales tax on outdoor recreation equipment was most preferred and, therefore, should generate the least opposition among the general public. However, it is worth noting that 41% of respondents still rated it unfavorably, and politically active respondents were more likely to select sin taxes as their most preferred funding mechanism. Our findings suggest that despite successes in Arizona and Missouri, efforts to generate funding via general sales tax or other broad taxes are unpopular. Explicitly labeling new taxes as "progressive" could increase perceived fairness and potentially

Table 4. Best-fit model that predicted willingness-to-pay for increased taxes for nongame conservation by North Carolina (USA) residents, 2010.

Independent variable	Coeff.	SE	P-value
Importance of nongame conservation[a]	0.537	0.094	0.000
How often watch and/or enjoy wildlife[b]	0.269	0.062	0.000
Age[c]	−0.018	0.005	0.002
Education[d]	0.380	0.151	0.013
Intercept	1.121	0.442	0.003
$n = 471$			

[a] Importance was measured on a Likert scale, where 1 = very unimportant, 5 = very important.
[b] How often watch and/or enjoy wildlife was measured as a Likert scale, where 1 = never, 5 = ≥5 times/month.
[c] Age was measured as a continuous variable in year.
[d] Education was measured as 0 = less than college education, 1 = college education or greater.

garner additional support. Respondents rated increasing NC's current income tax in order to generate funds for nongame wildlife unfavorably on a 7-point scale (2.41), although they were more likely to agree with the principle that all NC tax payers should contribute to conservation of nongame wildlife, in proportion to their income (3.75). North Carolina's income tax is a progressive tax; however, emphasizing the progressive nature of an income tax option appears to have elicited greater support. In sum, our findings suggest that the most politically feasible path toward nongame funding may lie in user-pay models, such as the outdoor recreation equipment taxes of Texas and Virginia, or in directing sin taxes toward nongame conservation based on the rationale that it provides a public benefit. Future studies should carefully consider the role of payment type when determining WTP.

Mean WTP ($98.80) for nongame conservation in NC when respondents were allowed to choose a tax vehicle suggests residents place a higher value on nongame conservation than they would be willing to pay through any single tax vehicle. Mean WTP was substantially higher than the annual WTP for all local endangered species in Orange County, California (Stanley 2005), which was $55.99–67.19 in 2010 dollars (Bureau of Labor Statistics 2010). Willingness-to-pay may have been higher in our study because Stanley's (2005) survey posited increases in income and sales taxes, which we identified as facing broad opposition among our respondents. This is consistent with our finding that respondents were willing to pay less when the tax vehicle was specified as a flat tax per employed individual paid with income taxes. Most WTP research addressing nongame conservation has focused on single species. These studies have generated values ranging from $12.43 to $159.67 in 2010 dollars (Hagen et al. 1992, Cummings et al. 1994, Loomis and White 1996, Bureau of Labor Statistics 2010). The wide range of values is likely related to preconceived attitudes toward specific species (Martin-Lopez et al. 2008). Studying NC nongame species as a whole may have allowed our results to avoid species-specific biases. Willingness-to-pay studies during economic recessions may elicit WTP estimates that are smaller than WTP between recessions (Maria and Loomis 2010). Therefore, our results are potentially an underestimate of WTP during times of economic growth and may receive less political opposition if implemented outside of a recession.

Respondents were willing to provide additional funding for nongame conservation even if it required trade-offs with other critical public services. This suggests that the lack of realistic trade-offs sometimes associated with nonmarket valuation techniques (Mitchell and Carson 1989) was not solely responsible for NC residents' WTP for nongame conservation. Our finding that respondents prefer tax revenues to be reallocated from prisons, however, supports previous research that suggests people have difficulty thinking in terms of causal chains (Vennix 1999). Prisons provided indirect benefits to respondents (e.g., personal safety), while less preferred options (e.g., highway funds, public education) provided more direct benefits that respondents recognized

and were less willing to sacrifice for nongame conservation. Respondents may have chosen to reduce the prison budget because of a perception that the decrease would negatively affect only prisoners, while decreasing other state budget services would affect the general public. When divided by the 3.1 million households in NC (U.S. Census Bureau 2010), the mean amount respondents were willing to reallocate ($545,000) amounts to only $0.18/household. Reallocating this amount from prisons would decrease the prison budget by <1% (Appendix). Thus, respondents were willing to reallocate relatively little from the current state budget, relative to their stated WTP additional taxes. This finding differs from other studies that suggest the compensating budget-reduction method yields similar results to WTP studies (Morrison and MacDonald 2011). Our findings that increased taxes generated substantially greater support than did reallocation suggests that respondents considered their options and were truly willing to pay more in their annual taxes for nongame conservation.

Demographic variables predicting WTP for nongame conservation largely supported the relationships hypothesized in our study. Similar to Stanley (2005), we found a higher WTP among younger stakeholders. The environmental movement took hold in the late 1960s through the 1970s, so today's younger taxpayers have grown-up with environmentally conscious education and a greater awareness of environmental degradation. Similarly, our finding that education is positively related to WTP supported literature on pro-environmental behavior (Scott and Willits 1994, Chen et al. 2011) and demographic influences on nongame tax check-offs (Moss et al. 1986). Those who are more highly educated likely have a better understanding of environmental issues, as well as their own responsibility for environmental protection (Chen et al. 2011). Our findings that the importance of nongame wildlife and frequency of watching and/or enjoying wildlife are positively related to WTP are also consistent with previous literature (Manfredo and Haight 1986, Loomis and White 1996). It is logical that those who value nongame conservation would be more willing to pay for it. This relates to other findings from our study that suggested that the public is most responsive to paying for services from which they perceive a direct benefit.

MANAGEMENT IMPLICATIONS

When state wildlife agencies, such as the NCWRC, seek to increase state tax allocations for nongame wildlife, they need to consider the likely reasons for, and sources of, political and social opposition. Because support for tax increases was greatest among those who felt conservation was important, those who frequently enjoy wildlife, and younger and better-educated taxpayers, proposed taxes should either explicitly place the monetary burden on these groups and/or design educational and promotional materials to mobilize these supporters and educate the public outside of these groups. For example, a tax on outdoor recreation equipment more frequently used by younger constituents (e.g., canoes) would receive higher support than a tax on commodities used by older constituents (e.g., bird seed). In this case, a tax on bird

seed would also face the stigma against taxing seniors that deterred the initial version of the Fish and Wildlife Conservation Act (Loomis and Mangun 1987). If a flat tax was proposed, educational and marketing efforts should be targeted on older or less educated groups. Similarly if a tax is proposed that affects all taxpayers (e.g., increased sales tax), marketing efforts should emphasize the importance of non-game conservation to those who do not participate in wildlife watching. We also found some evidence that the perceived effects of the economic recessions suppressed WTP. Thus, wildlife agencies are likely to obtain the most support for user-pays mechanisms instituted outside of economic recessions. Although context will dictate the appropriate funding vehicle for nongame conservation in each state, all wildlife conservation agencies should consider opportunities to capitalize on the recent increase in nontraditional wildlife recreation by developing a broader constituency.

ACKNOWLEDGMENTS

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Associate Editor: Grado.

Appendix. Questions used to assess respondents' willingness to reallocate funds toward nongame conservation from other state budget services from a 2010 survey of North Carolina (USA) residents

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Currently the state of North Carolina dedicates **$253,000/yr** to the Wildlife Diversity Program, which is **0.000014%** of the state budget. Do you feel this amount is: (*check one*)

      [ ] Too much please **skip to question 14**
      [ ] Just right please **skip to question 14**
      [ ] Not enough please **continue to question 12**
      [ ] Don't know please **continue to question 12**

Imagine that you are in charge of the state budget and can reallocate money from some other service to the Wildlife Diversity Program. **How much** should be reallocated to the Wildlife Diversity Program? $_____ should be added to $253,000

Which service budget should be reduced in order to allocate more funds to the Wildlife Diversity Program? Please circle <u>one</u>:

Public Education	Crime Control & Public Safety
Medical Assistance	Public Parks
Highway Fund	Wastewater Management
Prisons	Other: please specify:_____

Column B lists the amount of state tax dollars dedicated to the service last year. Column C shows the percent of the total state budget.

Column A: Service	Column B: Amount of money allocated to service	Column C: Percent of state budget currently allocated to the service
Public Education (K–12)	$7,947,740,343	38%
Medical Assistance (program for seniors and eligible children)	$3,681,276,113	18%
Highway Fund	$1,683,500,000	8%
Prisons	$1,313,815,477	6%
Crime Control & Public Safety	$32,566,547	2%
Public Parks	$43,617,247	0.0021%
Wastewater Management	$1,750,000	0.000083%
Wildlife Diversity Program	$253,000	0.000014%