TEXAS

Texas Results of the

Wildlife Viewer Survey

Enhancing Relevancy and Engaging Support from a Broader Constituency

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Note that significant portions of the regional report (Sinkular et al. 2022), in particular in the background and methods, are replicated verbatim in this report. We do so with permission from all of the regional report authors. In addition, the state reports for this project all use a similar template.

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EXECUTIVE SUMMARY

Background

Wildlife viewing (closely observing, photographing, or feeding wildlife, maintaining plantings or natural areas for the benefit of wildlife, or taking trips to parks or other natural areas to feed, photograph, or observe wildlife) is one of the fastest growing wildlife-related recreation activities in the United States (U.S. Fish and Wildlife Service, 2018). As participation in wildlife viewing continues to grow, so do questions about the characteristics of wildlife viewers and their perceptions of state agencies.

Historically, state fish and wildlife agencies (hereafter, state agencies) have depended on hunters and anglers to fund the agencies' conservation efforts, through a system known as the North American Model of Conservation (Price Tack et al., 2018). In this system, state agencies rely heavily on funds derived from sales taxes on certain sporting equipment and receipts from licenses and permits purchased by hunters, anglers, and trappers to support their operations. In recent years, surveys show a plateau or decline in participation in hunting and angling, while participation in wildlife viewing continues to rapidly grow (U.S. DOI et al., 2016). However, many viewers do not contribute directly to supporting the state agencies responsible for ensuring the sustainability of resources on which their recreational activities depend.

As the number of viewers continues to rise, it is increasingly important that state agencies understand who these wildlife viewers are and their perspectives on and expectations of state agencies and wildlife conservation. Wildlife viewers have the potential to significantly aid state agencies in achieving their conservation goals (AFWA & WMI, 2019) through financial contributions and a range of behaviors. This study of wildlife viewers in Texas, one of 15 states that participated in state-level surveying, represents a key step in implementing the strategies outlined in the Fish and Wildlife Relevancy Roadmap (AFWA & WMI, 2019) by providing the Texas Parks and Wildlife Department (hereafter, TPWD) with information and tools to connect with a broader constituency of wildlife viewers.

Methods

To understand wildlife viewers, our Virginia Tech research team collaborated with the Association of Fish and Wildlife Agencies' (AFWA) Wildlife Viewing and Nature Tourism Working Group (WVNTG) to conduct a multi-state survey of wildlife viewers (i.e., the Wildlife Viewer Survey) in 2021, with additional sampling at the state level in 15 states. A Steering and Executive Committee, which consisted of members of the WVNTG and other state agency representatives, worked closely with us throughout the duration of this project. We also

contracted with Qualtrics to conduct an online survey of wildlife viewers in Texas, which was administered from October 29-December 15, 2021. Survey respondents were compensated by Qualtrics for their participation in the study. For the 15 states with additional sampling, the survey was adapted to be most applicable to each state. All survey respondents resided in Texas for most of the year, were over the age of 18, and reported participating in wildlife viewing (defined as closely observing, photographing, or feeding wildlife, maintaining plantings or habitat for the benefit of wildlife, or taking trips to parks or other natural areas with the purpose of observing, feeding, or photographing wildlife) in the past five years.

The survey questionnaire was informed by the Multi-State Steering and Executive Committees, state agency representatives, and findings from a variety of surveys, including the Virginia Wildlife Recreation Study Report (Grooms et al., 2020), National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (hereafter, National Survey of Wildlife Recreation; U.S. DOI et al., 2016), and a survey conducted by the North American Waterfowl Management Plan (NAWMP) Human Dimensions Working Group (NAWMP, 2021). Respondents answered questions about their wildlife viewing behaviors, identities, preferences, and experience with their state agencies.

To ensure high-quality responses, we incorporated numerous attention check questions and minimum time limits in this survey. We set demographic quotas for survey respondents based on findings from the 2016 National Survey of Wildlife Recreation in an effort to achieve a survey sample that is representative of the wildlife viewing population across Texas in terms of age, education level, and gender (U.S. DOI et al., 2016). For this report, we analyzed survey responses by comparing “consumptive viewers” (those who participated in hunting and/or angling in the past five years) and “nonconsumptive viewers” (those who did not participate in these other recreational activities). We chose to compare consumptive and nonconsumptive viewers’ responses throughout the report because of the focus of this project on expanding relevancy to a broader constituency for state agencies, particularly for those wildlife viewers who are not already engaged in hunting and angling. Analysis consisted of chi-square or t-tests conducted in the Statistical Package for Social Science (SPSS).

Findings

In the following subsections, we review findings for the state of Texas, which consisted of a statewide descriptive analysis and a consumptive versus nonconsumptive comparative analysis based on 1,012 completed survey responses. Our survey examined demographics, behaviors, frequency, and preferences of viewing activities of wildlife viewers in Texas. We also examined Texas wildlife viewers’ current relationships with and preferences for support from TPWD. A little more than half of our survey respondents were consumptive viewers and slightly less than

half were nonconsumptive viewers. Overall, we found that consumptive and nonconsumptive viewers are distinctive groups; consumptive and nonconsumptive viewers have different preferences, behaviors, and levels of participation in wildlife viewing. However, the only demographic differences we identified between consumptive and nonconsumptive viewers were age, gender, and residential location. Generally, we can define consumptive viewers as more active, involved, and specialized than nonconsumptive viewers; consumptive viewers participate in wildlife viewing more, spend more on wildlife viewing, and are more broadly active in wildlife viewing and outdoor recreation. We also found that consumptive viewers tended to have higher levels of experience with, familiarity with, and financial contributions (past, present, and future) to TPWD than nonconsumptive viewers.

Wildlife viewer demographics

Just under three-quarters of all respondents identified as White, and about one quarter identified as another race or ethnicity. Just over half of our respondents reported their total household income as $49,999 or less. Approximately 44% of wildlife viewers surveyed lived in a major city, 22% reported living in a small city, and the remaining 34% reported living in a rural area or small town.

Consumptive and nonconsumptive viewer comparisons

We found no differences in the demographic characteristics of consumptive and nonconsumptive viewers in terms of ethnoracial identity, household income, or education level; however, we did find that consumptive viewers were significantly younger than nonconsumptive viewers. In addition, when analyzing binary gender identity (due to sample size, only binary identity could be evaluated), more consumptive wildlife viewers identified as men and more nonconsumptive wildlife viewers identified as women. Finally, we found that there was a difference in the residential location of consumptive and nonconsumptive wildlife viewers, with a higher percentage of nonconsumptive viewers reporting that they reside in an urban area and a higher percentage of consumptive viewers living in rural areas or small towns.

Wildlife viewing behaviors

Viewing interests and activities

Wildlife viewers most commonly participated in wildlife viewing by visiting parks and natural areas with the purpose of observing, feeding, or photographing wildlife. Two-thirds to three-quarters of wildlife viewers were interested in viewing land mammals and birds, respectively. In addition to visiting parks and other locally-managed areas to view wildlife, many wildlife

viewers participated in viewing at their own home. In a typical year, around half of the survey respondents reported viewing for 30 days or more per year.

Impacts of the COVID-19 pandemic on wildlife viewing

Compared to a typical year, total participation in wildlife viewing declined during the first year of the COVID-19 pandemic for around-the-home viewing (defined as within one mile of their home) and away-from-home viewing (both within Texas and outside of Texas). For the upcoming year at the time of taking the survey (fall 2021), wildlife viewers anticipated spending an amount of time viewing wildlife that was comparable to a typical year. We also asked wildlife viewers how the COVID-19 pandemic impacted their overall participation in wildlife viewing and interpreted these findings using "R3" terminology (recruitment, retention, and reactivation) from the Outdoor Recreation Adoption Model. Over half of wildlife viewers were classified as "retained" meaning the pandemic had no impact on their overall participation in wildlife viewing—they were wildlife viewing prior to the COVID-19 pandemic, and continued wildlife viewing during the pandemic. Next, about one-quarter of wildlife viewers had participated in wildlife viewing prior to the COVID-19 pandemic, but stopped during the pandemic. Over 10% of wildlife viewers were classified as "recruited", meaning that they participated for the first time during the pandemic. Finally, less than 10% of wildlife viewers were classified as "reactivated," meaning that they had participated in wildlife viewing in the past, were not actively participating when the pandemic began, but resumed participation during or after March 2020.

Skill level and support

In terms of expertise as a wildlife viewer, the majority of survey respondents self-identified as beginner, novice, or intermediate level viewers rather than advanced or expert. Less than half of viewers reported having participated in wildlife viewing for roughly more than 20% of their lives. Over half of wildlife viewers own (or have rented or borrowed) specialized equipment for viewing in recent years. Family and friends were the most commonly reported type of social support that influenced viewer participation.

Consumptive and nonconsumptive viewer comparisons

Overall, we found that the wildlife viewing behaviors of consumptive and nonconsumptive viewers tended to be different. In comparison to nonconsumptive viewers, more consumptive viewers participated in the following behaviors: 1) visiting parks and natural areas to observe, feed, or photograph wildlife, 2) photographing or taking pictures of wildlife, 3) closely observing

wildlife or trying to identify unfamiliar types of wildlife, 4) taking trips or outings to any other location to observe, photograph, or feed wildlife, 5) feeding other wildlife, and 6) maintaining plantings or natural areas for the benefit of wildlife. There was no difference in participation between consumptive and nonconsumptive viewers for feeding wild birds. More consumptive viewers were interested in viewing land and marine mammals, reptiles, fish, and amphibians in comparison with nonconsumptive viewers. A higher percentage of nonconsumptive viewers view birds, but the difference was not statistically significant. A similar percentage of consumptive and nonconsumptive viewers are interested in insects. We found no differences between consumptive and nonconsumptive viewers for around-the-home viewing, either generally or in terms of the number of days spent viewing at home. However, nonconsumptive viewers were more likely to report fewer days spent viewing away from home and out of state or country in a typical year and the upcoming year. In addition, more consumptive viewers reported viewing on the property of a friend or family member, other private property, locally-managed lands, state-managed lands, and federally-managed lands. There was no significant difference in the impact of COVID-19 on R3 phases of wildlife viewers between consumptive and nonconsumptive viewers.

In terms of wildlife viewing expertise, we found that more nonconsumptive viewers classified themselves as beginner or novice and more consumptive viewers classified themselves as intermediate or advanced. In addition, we found that well over half of nonconsumptive viewers have spent only 0-20% of their life participating in wildlife viewing, in comparison to less than half of consumptive viewers. More consumptive viewers have owned, borrowed, or rented specialized equipment for wildlife viewing, with less than half of nonconsumptive viewers having done so. Finally, we found that nonconsumptive viewers were more likely to report that they felt no social support at all from family, friends, peers, and mentors.

Conservation behaviors

We investigated the likelihood of wildlife viewers in Texas participating in a number of conservation-related activities, either generally or with/in support of TPWD. Overall, wildlife viewers most often reported being likely to clean up trash or litter or purchase products that benefit wildlife or whose proceeds support conservation. They least often reported being likely to collect data on wildlife or habitat to contribute to science or management or to inform or teach others about wildlife conservation. When comparing wildlife viewers' likelihood to engage in conservation behaviors generally or with/in support of the state agency, wildlife viewers expressed similar likelihood of engaging in conservation behaviors in collaboration with the TPWD in comparison to on their own, with the exceptions of cleaning up trash or litter, for which wildlife viewers were slightly more likely to participate in this behavior independent of

TPWD, and donating money to support wildlife conservation, for which wildlife viewers were slightly more likely to participate in this behavior with or in support of TPWD.

Consumptive and nonconsumptive viewer comparisons

When comparing consumptive and nonconsumptive viewers, we found that more consumptive wildlife viewers reported higher levels of likelihood to participate in all conservation behaviors investigated in this report, both generally and in collaboration with TPWD.

Wildlife viewing barriers

We surveyed wildlife viewers in Texas about a variety of topics that limited their participation in wildlife viewing. Our results indicate that distance to wildlife viewing locations and lack of free time are the greatest barriers, with half or more than half of wildlife viewers reporting *somewhat* to *a great deal* of limitation to their participation. Financial costs and few people to participate in wildlife viewing with were also reported commonly as barriers.

We specifically investigated the degree to which wildlife viewers experience accessibility challenges, which were defined as "[t]he difficulties someone experiences interacting with the physical or social environment when engaging in a meaningful activity such as birding. These may be the result of mobility challenges, blindness or low vision, intellectual or developmental disabilities (including Autism), mental illness, being Deaf or Hard of Hearing or other health concerns" (Birdability, 2021). We found that over one-third of wildlife viewers in Texas experienced *somewhat* to *a great deal of* accessibility challenges when participating in wildlife viewing.

Consumptive and nonconsumptive viewer comparisons

There were six out of 14 barriers with significant differences between consumptive and nonconsumptive viewers. Generally, consumptive viewers were limited to a greater extent than nonconsumptive viewers by financial costs associated with wildlife viewing (although at least half of both groups were limited by this barrier), few people who support their wildlife viewing activities, lack of people to view with, lack of organized opportunities for wildlife viewing, lack of transportation, and crowds in wildlife viewing locations. There were no barriers for which nonconsumptive viewers were limited to a greater extent than consumptive viewers. We also found that consumptive viewers experienced accessibility challenges to a greater extent than nonconsumptive viewers.

Relationships with TPWD

Finally, we explored Texan wildlife viewers' familiarity and experiences with, perceptions and trust of, and financial contributions to TPWD.

Familiarity with TPWD

Over two-thirds of wildlife viewers were *slightly*, *moderately* or *extremely familiar* with TPWD as a whole and 87% of survey respondents had seen the TPWD logo before. However, over one-quarter of wildlife viewers were *not at all familiar* with TPWD staff. The majority of survey respondents in Texas reported that they felt the state agency's level of prioritization of programs and services for wildlife viewing was *about right*, although over one-quarter of respondents felt it was *too low* or *far too low*. Still, survey respondents generally indicated moderate levels of trust in TPWD as an agency and in TPWD staff. Wildlife viewers also scored TPWD moderately, on average, on various facets of trust (capability, benevolence, and integrity).

Experience with TPWD programs and services

Just over one-third of survey respondents had not used or engaged in any TPWD programs and services in the last five years. Of the respondents who had utilized at least one program or service from TPWD in the past five years, they most commonly reported utilizing information, lands, and nature/education/visitor centers provided by TPWD, including information about wildlife and wildlife viewing opportunities in the state. The least used TPWD programs were wildlife festivals or viewing competitions sponsored by TPWD and programs or presentations for groups or clubs.

Financial contributions to TPWD

Only one-quarter of wildlife viewers in Texas had not made any purchases or contributions to TPWD in the past five years. In general, more wildlife viewers had contributed via nonvoluntary mechanisms (e.g., fees, licenses, and required habitat or conservation stamps) than voluntary mechanisms (e.g., donations and voluntarily purchased habitat or conservation stamps) in the past five years. TPWD fishing licenses were the most commonly purchased item. We also examined the likelihood of wildlife viewers to contribute via voluntary and nonvoluntary funding mechanisms in the future. Over two-thirds of survey respondents in Texas indicated that they were *moderately, very, or extremely likely* to contribute via a TPWD lands access pass, permit, or entrance fee in the next five years. In addition, 60% of survey respondents in Texas

indicated that they were *moderately, very, or extremely likely* to purchase any TPWD fishing license in the next five years. This list included items that are currently not available from TPWD. For example, over half of wildlife viewers indicated that they were *moderately*, *very*, or *extremely likely* to purchase a lottery ticket for which the proceeds go to habitat conservation (conventional lottery tickets, not drawn hunts like Big Time Texas Hunts) in the next five years, if they had the opportunity to do so. Additionally, we found that around 60% of wildlife viewers were *moderately, very,* or *extremely likely* to increase their contributions to TPWD if they knew their funds would be used to support conservation of the types of wildlife they like to view, for more opportunities or resources for wildlife viewing, or for conservation of rare or vulnerable species.

Viewing support preferences

To better support wildlife viewers' participation, the most respondents reported that TPWD can provide viewers with more information about wildlife in Texas, more information about where to go to see wildlife, and access to more places to view wildlife. Finally, we found that the most preferred channels of state agency communication for wildlife viewers in Texas were the TPWD website, printed materials (such as brochures and maps), and email updates or e-newsletters.

Consumptive and nonconsumptive viewer comparisons

Broadly, we found that consumptive and nonconsumptive viewers have very different perceptions of and experiences with TPWD. Overall, consumptive viewers were considerably more familiar with and had stronger relationships with TPWD in terms of: utilization of TPWD programs, past and future contributions to TPWD, and interest in receiving wildlife viewing support from TPWD.

In contrast, nonconsumptive viewers were far less familiar with all aspects of TPWD. For example, nonconsumptive viewers were more likely to be *not at all familiar* with state agency lands, programs, staff, and mission than consumptive viewers. Indeed, over one-third of nonconsumptive viewers were *not at all familiar* with TPWD staff.

In addition, nearly 90% of consumptive viewers had seen the TPWD logo before, in comparison with 84% of nonconsumptive viewers. Although we did find some statistically significant differences in our measures of trust in TPWD between consumptive and nonconsumptive viewers, these differences are not necessarily practically significant for management (as both groups still fell near the same level on the scales). Importantly, both consumptive and nonconsumptive viewers have similar, moderate levels of trust in the state agency.

The most sweeping differences between consumptive and nonconsumptive viewers were in their experiences with TPWD programs and financial contributions to TPWD. Nearly half of nonconsumptive viewers, and just over one-quarter of consumptive viewers, had not participated in or used any TPWD programs and services in the last five years. More consumptive viewers had participated in most of the listed programs and services in comparison to nonconsumptive viewers, with the exception of TPWD nature, education, or visitor centers and volunteer opportunities, not related to research or data collection. Consumptive viewers most commonly contributed via the purchase of a fishing license, whereas nonconsumptive viewers most commonly had not contributed via any funding mechanism in the past five years. In addition, for past purchases and contributions, more consumptive viewers had contributed via all nonvoluntary and voluntary funding mechanisms. Over 50% of nonconsumptive viewers reported being *not at all likely* or only *slightly likely* to purchase any nonvoluntary and voluntary funding mechanisms in the next five years, except for TPWD lands access passes/permits/entrance fees and voluntary conservation/habitat stamps, for which their likelihood to contribute was higher. In addition, more nonconsumptive viewers were *not at all likely* to increase their financial contribution to TPWD in the next five years.

We also found that, in general, more consumptive viewers were interested in receiving further support from TPWD for their wildlife viewing activities. Both consumptive and nonconsumptive viewers were interested in more information about wildlife, information about where to go to see wildlife, and access to more places to go wildlife viewing.

Conclusions

The Texas results of the Wildlife Viewer Survey provide a profile of wildlife viewers that can be utilized by TPWD to overcome barriers to broader relevance, public engagement, and support as called for in the Roadmap to Relevancy (AFWA & WMI, 2019). Our profile includes what viewers like to participate in, how they view and trust state agencies, what services and programs they would like the agency to provide, how they most like to support conservation through action or funding, and more.

As TPWD aims to better engage wildlife viewers in Texas, we recommend three priorities to establish a lasting and equitable relationship: 1) provide more wildlife viewing information and access, 2) promote around-the-home viewing opportunities, and 3) develop social support networks for wildlife viewers. If interested in achieving broader relevancy, we recommend that TPWD focus their engagement efforts on wildlife viewers who do not hunt or fish. Support for

this currently underserved group might include resources for around-the-home viewing (especially for birds and land mammals), printed materials showing where to go wildlife viewing, and information on wildlife viewing tailored for beginners. This strategy will additionally serve the established constituency of hunters and anglers that also view wildlife. Finally, we recommend the development of wildlife viewer-specific TPWD contribution mechanisms, with an emphasis on establishing mechanisms appealing to wildlife viewers who do not hunt or fish. Two initial strategies for establishing these mechanisms is by developing a wildlife viewing membership or other program that uses gathered funds for species conservation or developing more opportunities for wildlife viewing and/or developing an online storefront to sell wildlife-viewing specific tangible goods to viewers.

The following report details the methodology, findings, and conclusions from analyses of Texas data from the Wildlife Viewer Survey. Accompanying Appendices contain the survey instrument and supplemental results tables.

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BACKGROUND

Introduction

Across the United States, state fish and wildlife agencies (hereafter, state agencies) are key players in the conservation of wildlife and their habitats (AFWA, 2017). State agencies have legal authority and responsibility to steward wildlife resources as a public trust, in the interest of all current and future members of the public (Organ et al., 2012). To that end, the 50 state agencies manage public lands and waterways, provide technical support for conservation on private lands, conduct wildlife research and monitoring, and govern wildlife harvests and wildlife-associated recreation, among other activities (Organ et al., 2012; AFWA, 2017). Since their inception, the work of many state agencies has been largely funded through the sale of hunting and fishing licenses, boating and shooting permits, and taxes on recreation equipment under a user-pay user-benefit model (Organ et al., 2012). However, a shifting user-base and cultural conditions call for re-examining and possibly revising this model. In particular, declines or stagnation in hunting and angling among an increasingly urbanized population have made it clear that the sustainability of state agencies and their contributions to wildlife conservation is contingent on expanding and diversifying the financial and political support provided by the public (U.S. DOI et al., 2016; AFWA & WMI, 2019). Specifically, agencies face the challenge of maintaining their current supporters while increasing their relevance to and engagement with new and broader constituencies (AFWA & WMI, 2019). These broader constituencies include people in diverse demographic, social, and geographic groups. In addition, this includes recreationists who are invested in wildlife and the outdoors, but may have values, interests, and behaviors that differ from those of the hunting and angling communities that have traditionally been the target audience for agencies (AFWA & WMI, 2019). Central among these nontraditional recreation groups are people who participate in wildlife viewing, one of the fastest growing outdoor recreation activities in the United States (U.S. DOI et al., 2016).

Wildlife Viewers

Wildlife viewing is a broad category of wildlife-associated recreation that includes intentionally observing, photographing, or feeding wildlife, improving or maintaining wildlife habitats, and visiting parks and natural areas for the primary purpose of wildlife viewing (U.S. DOI et al., 2016). As of 2016, over a third of U.S. adults participate in various forms of wildlife viewing, including 14.3 million additional wildlife viewers reported since 2011 (U.S. DOI et al., 2016). From 2011 to 2016, the number of U.S. adults participating in wildlife viewing increased by 14.3 million, or an increase in participation to over one-third of the adult population. Viewers spend nearly $76 billion on their viewing activities annually, including $170 million in access fees for public lands (U.S. DOI et al., 2016). Specifically, in Texas, the 2011 National Survey of Hunting,

Fishing, and Wildlife-Associated Recreation (hereafter, National Survey of Wildlife Recreation) estimated 4.4 million wildlife-watching participants in Texas. In 2011, in-state wildlife-watching expenditures were estimated at $1.8 billion (U.S. DOI et al., 2011).

Birdwatchers and other viewers also directly contribute funds to wildlife and habitat conservation (Fulton et al., 2017). A study in New York State found that people who bird (including those who both hunt and bird) are more likely than non-recreationists and hunters to donate to conservation (Cooper et al., 2015). They are also more likely to participate in pro-environmental behaviors such as conducting habitat enhancement, joining environmental groups, and supporting conservation policy (Cooper et al., 2015). Similar patterns have been seen in Virginia, where recreationists who identify as birders or other viewers (alone or in addition to identifying as hunters and anglers) engage in a range of conservation activities more often than those who only hunt or fish (Grooms et al., 2020). Additionally, wildlife viewing is a means of connecting people to nature and garnering general support for wildlife conservation (Kellert et al., 2017). Wildlife viewers are thus a critical constituency for state fish and wildlife agencies, especially given stable or declining rates of participation in hunting and angling over the past decade (U.S. DOI et al., 2016) and the ongoing need to generate broader support for agency efforts. However, viewers' direct support of wildlife agencies is currently limited. In part, this limited support is due to a lack of dedicated funding streams for wildlife viewers that would parallel the licenses, permits, and excise taxes that connect hunters and anglers to state agencies (Organ et al., 2012). Limited financial support from viewers may also be due to their perceptions that agencies serve them less than hunters and anglers (Grooms et al., 2019). Additionally, birders and other viewers tend to have lower levels of trust in state and federal agencies, relative to other entities (Fulton et al., 2017) and in comparison with hunters and anglers (Grooms et al., 2020).

While wildlife viewers undoubtedly benefit from the work of state agencies through activities such as habitat management and research, as well as established wildlife viewing programs that serve viewers directly, agency relationships with this emerging constituency are still relatively new in some states. The Fish and Wildlife Relevancy Roadmap (hereafter, Relevancy Roadmap) developed by the Association of Fish and Wildlife Agencies (AFWA) and Wildlife Management Institute (WMI) in 2019 identified limited capacity to understand and plan for engagement with new groups as key barriers in the ability of agencies to broaden their public support and serve diverse constituencies (AFWA & WMI 2019). The Relevancy Roadmap articulates a need for "increase[d] acquisition and application of social science information" to address these barriers with "science that is as robust and comprehensive as the ecological information relied upon in the past" (AFWA & WMI, 2019, p. 11). Indeed, important insights about wildlife viewer behaviors and their relationships with agencies have emerged from social science surveys at

both state (e.g., Cooper et al., 2015; Grooms et al., 2020) and national levels (e.g., U.S. DOI et al., 2016; Fulton et al., 2017; NAWMP, 2021). (For a review of the current literature on wildlife viewing, see Sinkular et al., 2021) Nonetheless, key knowledge gaps remain about the activities, experiences, perceptions, needs, and preferences of wildlife viewers across the country–critical information for agencies to become more inclusive of and relevant to wildlife viewers, fulfill their missions and public trust directives, and sustainably advance fish and wildlife conservation for generations to come.

Project Background

A 2021 Multistate Conservation Grant Program (MSCGP) grant was awarded to the Association of Fish and Wildlife Agencies' (AFWA) Education, Outreach & Diversity (EOD) Committee - Wildlife Viewing and Nature Tourism (WVNT) Working Group and Virginia Tech to address barriers to the relevancy and inclusivity of state agencies for wildlife viewers. The project included a synthesis of current literature on the behaviors, interests, experiences, and preferences of wildlife viewers (Sinkular et al., 2021); a national-scale web-based survey (*n* = 4,030) that built upon previous research to deepen understanding of wildlife viewers across all four AFWA regions (West, Midwest, Northeast, and Southeast); and recommendations for improved engagement between state agencies and wildlife viewers, co-produced by the research team and staff from state agencies across the country. State agencies were offered the opportunity to opt in to additional survey data collection and analysis within their state in addition to the regional-level survey data and analysis. State-level sampling provided states with the unique opportunity to have results specific to the wildlife viewing constituencies in their state.

A six-member Executive Committee and a 16-member Steering Committee were established to guide implementation of the project by the Virginia Tech team. The Executive Committee, which included the Chair of the WVNT Working Group and other MSCGP proposal co-authors from five state agencies, provided big-picture, strategic guidance for the project and was also responsible for final decisions on a number of fine-scale details in survey design and administration. The Steering Committee, which included human dimensions, wildlife viewing, and nongame wildlife staff from 11 additional state agencies, participated in routine project meetings, liaised with others in their agencies related to the project, and provided feedback to ensure that the survey would be relevant to wildlife viewers and produce data that meet the needs of state agencies. Each of the states that participated in the state-level surveys participated in the Steering Committee. In doing so, they provided feedback on the design of the survey instrument and the state sampling approach.

About this Report

This report presents analysis of data from the Wildlife Viewer Survey (hereafter, Survey) for the state of Texas and concludes with evidence-based communications and engagement strategies that the Texas Parks and Wildlife Department (hereafter, TPWD) can implement to increase their relevance to wildlife viewers and the participation of wildlife viewers in activities that support agencies' conservation goals. The results and conclusions contained in this report contribute to the implementation of multiple strategies of the Relevancy Roadmap by identifying opportunities to enhance the relevancy of state fish and wildlife agencies to wildlife viewers, particularly those who are not already engaged in hunting and angling, avenues for building partnerships with viewers to support implementation of state conservation plans, and potential strategies for engaging viewers in conservation funding mechanisms (AFWA & WMI, 2019).

METHODS

Survey Instrument

Building upon other national and state-specific survey efforts of wildlife recreationists, and based on input from the Steering Committee and state agency representatives, we first developed the regional survey instrument, which consisted of 117 closed-ended questions about wildlife viewers' recreation and conservation behaviors and relationships with their state wildlife agencies. Initially, the state survey was administered to 125 respondents in the state.

After completing the regional survey, we adapted it for the state of Texas through the addition of survey items about familiarity with TPWD, as well as the removal of survey options which were not applicable to the state for survey items about past behavior (see Appendix A for full survey instrument). For all questions which directly relate to the role of the state wildlife agency, TPWD was directly named.

Survey questions covered wildlife viewers':

- Duration, location, and frequency of participation in wildlife viewing
- Participation in other forms of outdoor recreation
- Level of specialization as a wildlife viewer
- Travel- and equipment-related expenditures for wildlife viewing
- Barriers to and social support for participating in wildlife viewing
- Likelihood of participating in conservation behaviors
- Pattern of participation in wildlife viewing during the COVID-19 pandemic
- Familiarity with, perceptions of, and trust in the state agency
- Experience with agency programs and services
- Past financial contributions to state wildlife agencies
- Likelihood to support agencies financially and through conservation behaviors in the future
- Preferred forms of viewing support and communications from the state agency
- Demographic characteristics

To aid in respondent recall, survey questions about behaviors are usually asked with reference to a distinct period of time (e.g., the past year) (Vaske, 2019, Chapter 4). Due to the impact of the COVID-19 pandemic during the survey administration period and the desire to provide state agencies with information from a less unusual time, we instead asked respondents to reflect on "a typical year," which we defined in the survey instrument as "a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic."

Survey Sampling and Administration

State-level surveys were administered entirely online from October 29-December 15, 2021. All potential survey respondents were identified and recruited through a survey panel administered by Qualtrics, and participants completed the online survey through the Qualtrics platform. When conducted with appropriate methodological decisions, panel surveys have shown to be a valuable tool for conducting online social science research (Wardropper et al., 2021). Panel surveys are a form of internet surveys that consist of sampling respondents from an online group, or panel, and usually provide a small compensation. Attention checks, or quality assurance items (Czeisler et al., 2020), and time limits based on a fraction of the median completion time from pilot samples (Miller et al., 2020), are two tools utilized to increase the quality of response gathered in panel research.

The survey was administered to separate samples in 15 states, with a goal of 1,000 respondents from each state, although Qualtrics provided lower estimates of respondents for several states, the lowest of which being Idaho, with a goal of only 500 respondents (Figure 1).

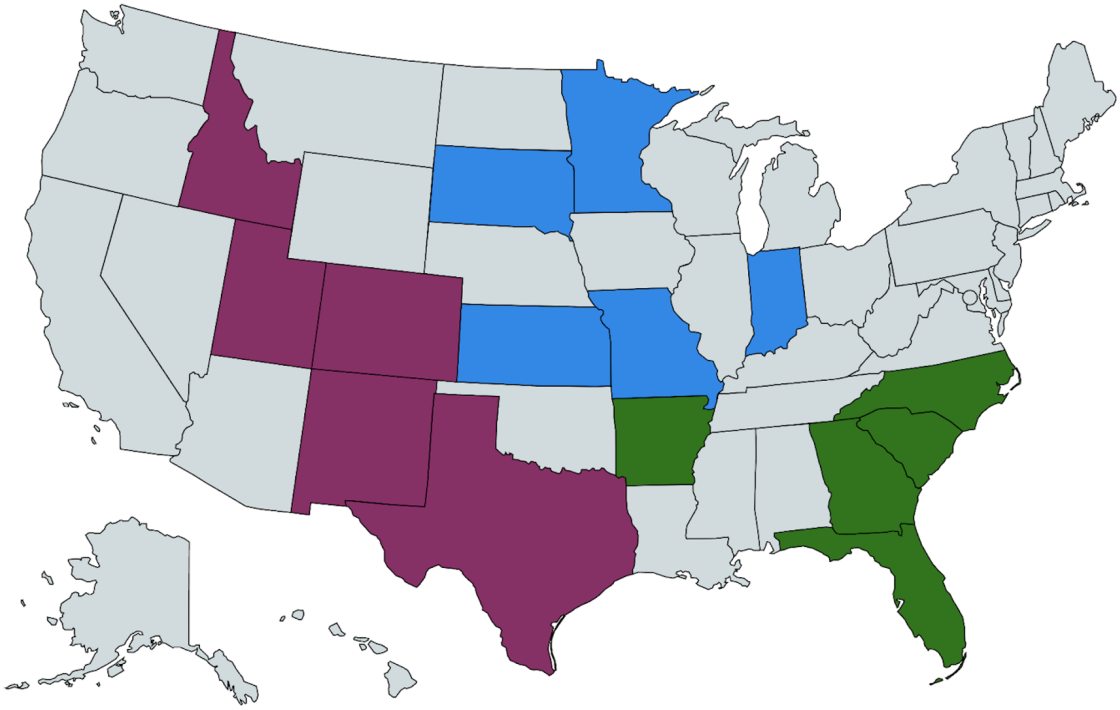

Figure 1: Map of state-level sampling

Map of the United States showing the 15 states that participated in state-level sampling for the Wildlife Viewer Survey. Participating states are colored according to their AFWA region assigned in the regional Wildlife Viewer Survey report (Sinkular et al., 2022).

Eligibility

Respondents were asked to indicate consent to participate in the study at the very beginning of the online survey instrument. Initial survey questions then screened for participant eligibility to participate in the study based on their 1) involvement in wildlife viewing; 2) state of residence; and 3) demographic characteristics such as age, gender, and education level.

Only individuals who had participated in some form of wildlife viewing in the past five years were able to complete the survey. This study did not examine traits of non-wildlife viewers. The survey provided a definition of both "wildlife" and "wildlife viewing" to ensure the inclusion of a broad range of people who participate in various forms of wildlife viewing and the exclusion of those who only observe wildlife incidentally during other outdoor activities. The following definitions were adapted from the 2016 National Survey of Wildlife Recreation (U.S. DOI et al., 2016):

> For this survey, wildlife refers to all animals, such as birds, fish, insects, mammals, amphibians, and reptiles, that are living in natural environments, including in urban and semi-urban places. Wildlife does not include animals living in artificial or captive environments, such as aquariums, zoos, or museums, or domestic animals such as farm animals or pets.
>
> Wildlife viewing refers to intentionally observing, photographing, or feeding wildlife; improving or maintaining wildlife habitat; or visiting parks and natural areas for the primary purpose of wildlife viewing. Wildlife viewing does not include simply noticing wildlife while doing something else, such as gardening, exercising, hunting, or fishing, or intentionally scouting for game.

Participant eligibility was also determined by three broad demographic quotas set to ensure a representative sample of wildlife viewers, while also ensuring we would be able to meet targets for the number of respondents. In our state-level surveys, we set quotas for respondent gender, age, and education based on national-level results of the National Survey of Wildlife Recreation, with some changes to accommodate for lower sample sizes (U.S. DOI et al., 2016). First, we required that each state sample consist of no more than 74% male or 51% female. For the age quota, we defined three broad categories by combining the smaller categories used in the National Survey of Wildlife Recreation (U.S. DOI et al., 2016). We required that no more than 28% and no less than 17% of respondents be between 18 and 34 years old, no more than 41% be between 35 and 54 years old, and no more than 56% be 55 years old or older. Unlike the National Survey of Wildlife Recreation, we did not survey individuals under 18 years of age. Finally, while the National Survey of Wildlife Recreation classified respondent educational

attainment in terms of the number of years of education (e.g., "11 years or less", "12 years", and "1 to 3 years of college"), we set quotas based on degree attainment, consistent with Qualtrics' standard survey methodology for panels, as well as other surveys of wildlife viewers (NAWMP, 2021). For state reports, we required that no more than 48% of respondents have completed a bachelor's or graduate degree.

Data Quality

We implemented a number of measures to maximize the quality of the data generated through the Qualtrics panel, including attention checks and a minimum completion time (following best practices for using survey panels, as described in Wardropper et al., 2021). The survey instrument contained two different kinds of attention checks. First, there were five sets of statements in the survey that were worded as opposites of each other (e.g., "Wildlife viewing has a central role in my life" and "Wildlife viewing is not an important part of my life"). Inconsistent responses to these statements indicated that a respondent may be taking the survey without being thoughtful. For the second kind of attention check, we identified combinations of responses that suggested the respondent was providing bad data (e.g., if a respondent indicated that they participate in "photographing or taking pictures of wildlife" in one question and in a later question responded that they are "not interested in observing, photographing, or feeding wildlife"). Respondents who failed any two attention checks in the survey were eliminated from the final sample (see Appendix B for a full list of attention checks). Finally, we also established a minimum survey completion time in order to remove respondents from the sample that completed the survey so quickly that their responses were unlikely to have been genuine. The minimum completion time was set at 6.35 minutes (or 381 seconds), which was the longest survey duration for the fastest quintile of the 101 respondents in the Qualtrics pilot test of the regional survey.

Data Analysis

In this report, we generally present response frequencies for each survey question from wildlife viewers across the entire state, referred to throughout the report as the "statewide sample", as well as separate response frequencies for "consumptive" and "nonconsumptive" wildlife viewers. Theoretical and applied frameworks both characterize wildlife recreation activities and recreationists by so-called "consumptive" and "nonconsumptive" definitions, based on their use of and impact on wildlife (Tremblay, 2001; Vaske & Roemer, 2013). Within this definition, consumptive activities, such as hunting, fishing, and trapping, generally result in the harvest or catching of species from their habitat, while nonconsumptive activities, such as hiking, birdwatching, and other forms of wildlife viewing, do not (Duffus & Deardon, 1990). We recognize the assignment of recreational activities into these categories is not clear-cut, as

activities traditionally deemed nonconsumptive can also result in substantial negative impacts on wildlife, including mortality (Green & Higginbottom, 2000). Still, we compare consumptive and nonconsumptive viewers' responses throughout the report because of the focus of this project on expanding relevancy to a broader constituency for state agencies. Consumptive wildlife viewers were defined as those who participated in either (or both) hunting and angling as additional forms of outdoor recreation during the past five years. Nonconsumptive wildlife viewers were those without this experience. It is important to note that, due to missing data within the question for which the consumptive and nonconsumptive wildlife viewers were defined, the sample size for the statewide (*n* = 1,012) sample and the consumptive-nonconsumptive sample are slightly different (*n* = 1,011). This difference is visually represented in most figures with hatching on the statewide sample bars or noted in figure captions. We used the Statistical Package for Social Science (SPSS) to produce descriptive statistics for survey questions and to conduct inferential statistical tests (i.e., t-test, chi-square, or ANOVA) to explore differences across consumptive and nonconsumptive wildlife viewers. We considered differences statistically significant with a *p* value of .05 or lower. Results from these tests are described in the Results section and also included in Appendix C.

RESULTS

Survey response

The Texas panel participants for the Wildlife Viewer Survey initiated 1,322 surveys and fully completed 1,012 of these. A total 310 potential survey participants were considered ineligible because they did not complete the survey, did not consent to participate in the study, were under 18 years of age, had not participated in any of the included forms of wildlife viewing in the past five years, failed two attention checks, or completed the survey too quickly. The three demographic quotas that were set (see Methods) were achieved.

Out of 1,012 wildlife viewers, 51% of our sample could be classified as consumptive viewers, meaning that, in addition to wildlife viewing, they reported participating in hunting or fishing in the past five years. Specifically, 30% of wildlife viewers in Texas also fish, 4.4% also hunt, and 17% both hunt and fish. So, 49% of our sample were classified as nonconsumptive viewers, meaning that they did not report participation in hunting or fishing in the past five years.

Survey Quota: Age

We asked respondents to indicate their birth year, with options ranging from 1920 to "After 2003" (i.e., most recent age eligible). Respondents who indicated they were born in 2003 were then asked a follow-up question, "Are you 18 years of age?", in order to account for those who had not yet turned 18 at the time of survey completion.

The reported ages of all respondents in Texas ranged from 18 to 89 (Mean [*M*]= 48, Standard Deviation [*SD*] = 17). Consistent with our established quota, 25% of respondents were between the ages of 18 and 34, 35% were between the ages of 35 and 54, and 40% of respondents were over the age of 55. A t-test indicated that the mean age of consumptive wildlife viewers (*M* = 45, *SD* = 16) was significantly lower (by six years) than the mean age of nonconsumptive wildlife viewers (*M* = 51, *SD* = 18; $t = 5.80$, $df = 991$, $p < .001$; Table 1; Figure 2).

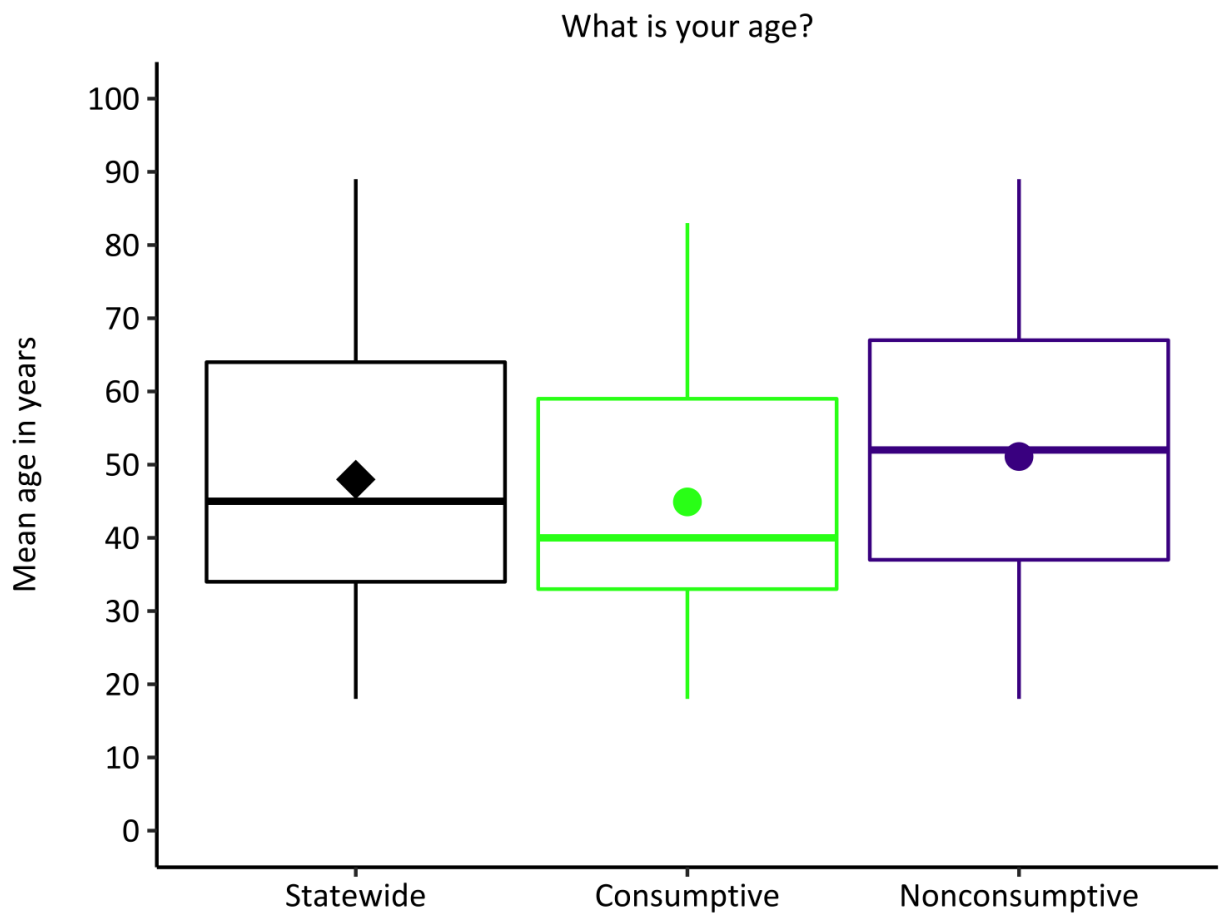

Figure 2: Respondent age

Boxplots (median and interquartile ranges within the boxes) showing the differences in the age of wildlife viewers in Texas across the state (statewide) and for consumptive and nonconsumptive viewers. Points represent the mean age (diamond for statewide group, circles for consumptive and nonconsumptive groups) and whiskers represent the minimum and maximum values for the dataset. A t-test indicated that the mean age of consumptive wildlife viewers was significantly lower than the mean age of nonconsumptive wildlife viewers (Table 1).

Survey Quota: Gender

We provided respondents with five gender-inclusive response options, as suggested by Speil et al. (2019). These options included "man," "woman," "non-binary," "prefer to not disclose," and "prefer to self-describe" accompanied by an open textbox. As described in the Methods, a quota was set only for two gender options (man and woman); other gender identities were not calculated in the gender quotas but were included in the sample of respondents.

Consistent with the quota, 51% of respondents were men and 48% of respondents were women (Figure 3). Only a very small percentage of respondents (0.7%) selected other response

options; 0.4% were non-binary and 0.2% preferred to self-describe their gender using terms such as "Gender fluid." Due to low sample sizes, non-binary and self-describing respondents, as well as any that preferred not to disclose their gender identity (0.1%), were not included in the following gender identity analysis of consumptive and nonconsumptive wildlife viewers. A chi-square test indicated a statistically significant difference in the binary gender identity of consumptive and nonconsumptive wildlife viewers, with a higher percentage of women classified as nonconsumptive viewers ($\chi^2 = 11.10$, $df = 1$, $p < .001$; Table 2; Figure 3).

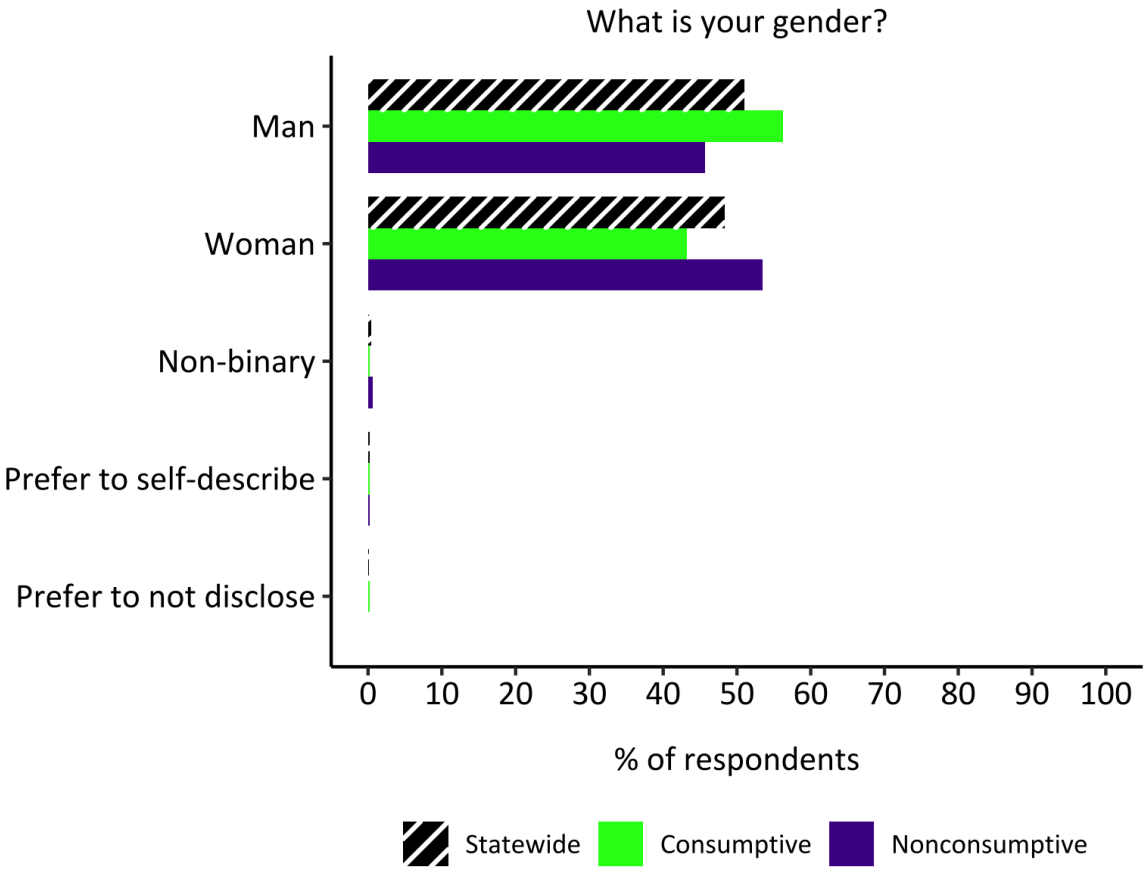

Figure 3: Respondent gender identity

Gender identity of wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated a statistically significant difference in the binary gender identity of consumptive and nonconsumptive wildlife viewers (Table 2). Note that quotas were set for this survey question.

Survey Quota: Education

Although the quota included three categories for educational attainment, we included five response options in order to gain more specific information from respondents. We then collapsed these categories for the calculation of the quota. Consistent with the quota, 18% of respondents had attained four or more years of higher education; 11% of respondents held a

bachelor's degree, and 7.0% of respondents held advanced degrees (e.g., professional, master's, or doctoral degrees). Results showed that 34% of respondents had received a high school diploma, equivalent, or less education. In addition, 31% of respondents had completed some college, and 17% had achieved an associate or technical degree. A chi-square test indicated no statistically significant difference in the level of educational attainment of consumptive and nonconsumptive viewers (Table 3; Figure 4).

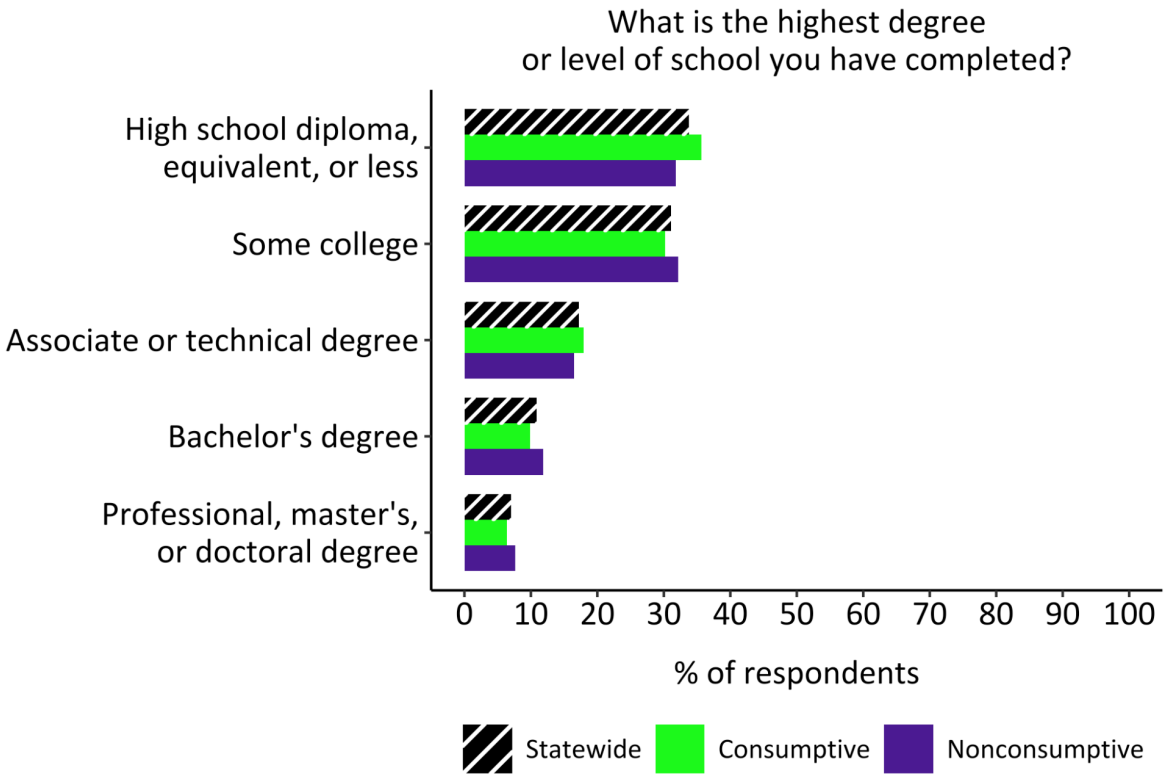

Figure 4: Respondent educational attainment

The highest level of education completed by wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated no statistically significant difference in the education level of consumptive and nonconsumptive wildlife viewers (Table 3).

Demographics

Race and ethnicity

We provided respondents with a list of eight race or ethnicity options and asked them to select all categories that applied to them. These options were consistent with recommendations from the U.S. Census Bureau, which suggests asking a single question that includes race and ethnicity, rather than a question about race and another about ethnicity, in order to ease respondent burden (Matthews et al., 2015). No quota was set for race and ethnicity, and our

findings of surveyed wildlife viewers skewing toward White were consistent with previous studies (U.S. DOI et al., 2016; Rutter et al., 2021).

While the statewide sample was primarily "White" (73%; including those who identified as White and other races or ethnicities), respondents also identified as Hispanic, Latino, or Spanish (19%), Black or African American (9.1%), American Indian or Alaska Native (4.5%; hereafter, "Indigenous"), and Asian (2.7%). Less than 1% of respondents identified as either "Middle Eastern or North African" or "Native Hawaiian or other Pacific Islander." Only 1.0% identified as "Some other race or ethnicity." In addition, 8.3% of respondents identified with more than one race or ethnicity, which we refer to as "multiracial." Due to low sample sizes for other ethnoracial identities, analysis of these identities for consumptive and nonconsumptive viewers was collapsed into two groups: White-only and Black, Indigenous, and people of color (hereafter, BIPOC). The BIPOC group includes all other ethnoracial identities, including individuals who identified as White and another race or ethnicity. A chi-square test indicated no statistically significant difference in the ethnoracial identities of consumptive and nonconsumptive viewers when comparing between White-only and BIPOC groups (Table 5; Figure 5).

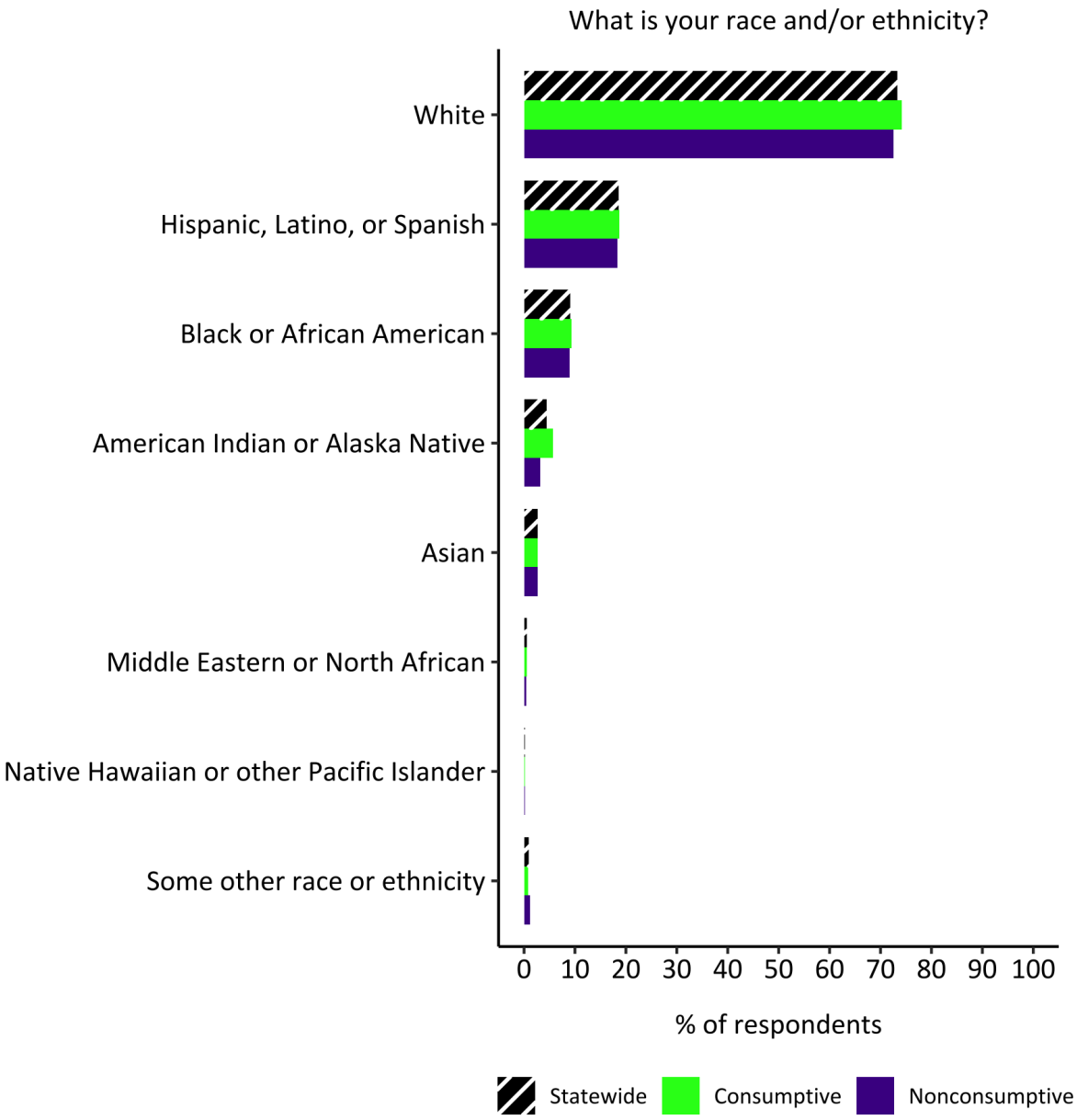

Figure 5: Respondent ethnoracial identity

Ethnoracial identity of wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option to reflect their ethnoracial identity. Due to low sample sizes, analysis of ethnoracial identity for consumptive and nonconsumptive viewers was collapsed into two groups: White-only and BIPOC (Black, Indigenous, and People of Color). A chi-square test indicated no statistically significant difference in the ethnoracial identities of consumptive and nonconsumptive viewers when comparing between White-only and BIPOC groups (Table 5).

Household income

The survey asked respondents to select their total household income from six categories ranging from "Less than $24,999" to "$125,000 or more", with each category increasing by $25,000. In order to ease respondent burden, we reduced these options from the 10 categories presented in the National Survey of Wildlife Recreation, which ranged from "less than $20,000" to "$150,000 or more" (U.S. DOI et al., 2016). A seventh option, listed as "prefer not to answer," was also included and was selected by 3.3% (*n* = 33) of respondents. This group of responses was excluded from the following analysis.

Just over half (52%) of our respondents reported their total household income as $49,999 or less. Just less than one-third of respondents (32%) reported a total household income of $50,000-99,999 and 12% of survey respondents reported a total household income of $100,000 or more. Due to low sample size in the responses of those who participated in wildlife watching from Texas in the 2011 National Survey of Wildlife Recreation, we were unable to compare our results on household income (U.S. DOI et al., 2011). Texas-specific data from the 2016 National Survey of Wildlife Recreation was not collected. We compared the mean income level between consumptive and nonconsumptive wildlife viewers using a chi-square test and found no statistically significant difference (Table 6; Figure 6).

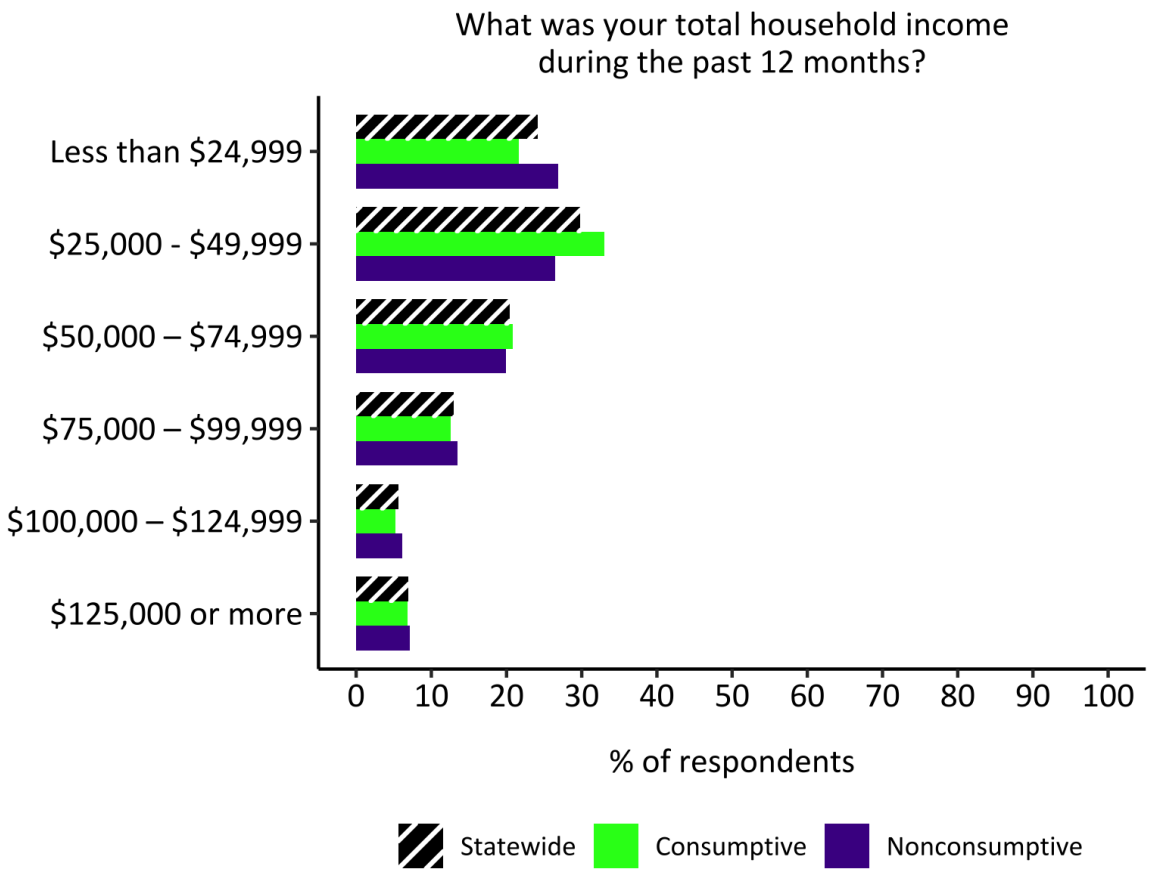

Figure 6: Respondent household income

The total household income range reported by wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated no statistically significant differences in the income levels of consumptive and nonconsumptive wildlife viewers (Table 6).

Residential location

We asked respondents to indicate the size of the area in which they currently live, with the following categories: "Rural area (less than 2,500 people)," "Small town (2,500 - 9,999 people)," "Small city (10,000 - 49,999 people)," or "Urban area (50,000 or more people)." These residential classifications are consistent with the definitions used by the U.S. Census (2010).

Our sample was more rural than that of the Texas sample in the 2011 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation (U.S. DOI et al., 2011), in which 95% of wildlife viewers lived in "Metropolitan Statistical Areas" with populations of 50,000 or more and 49% of wildlife viewers were classified as residing in an area with an urban population density (U.S. DOI et al., 2016). In our survey, 44% of respondents from Texas self-reported living in an area with a population of 50,000 or more, but this was still the largest category in our

sample by far (Table 7; Figure 7). A chi-square test indicated a statistically significant difference in the residential location of consumptive and nonconsumptive wildlife viewers, with a higher percentage of nonconsumptive viewers reporting that they reside in an urban area and a higher percentage of consumptive viewers living in rural areas or small towns (χ^2 = 11.31, *df* = 3, *p* = .01; Table 7; Figure 7).

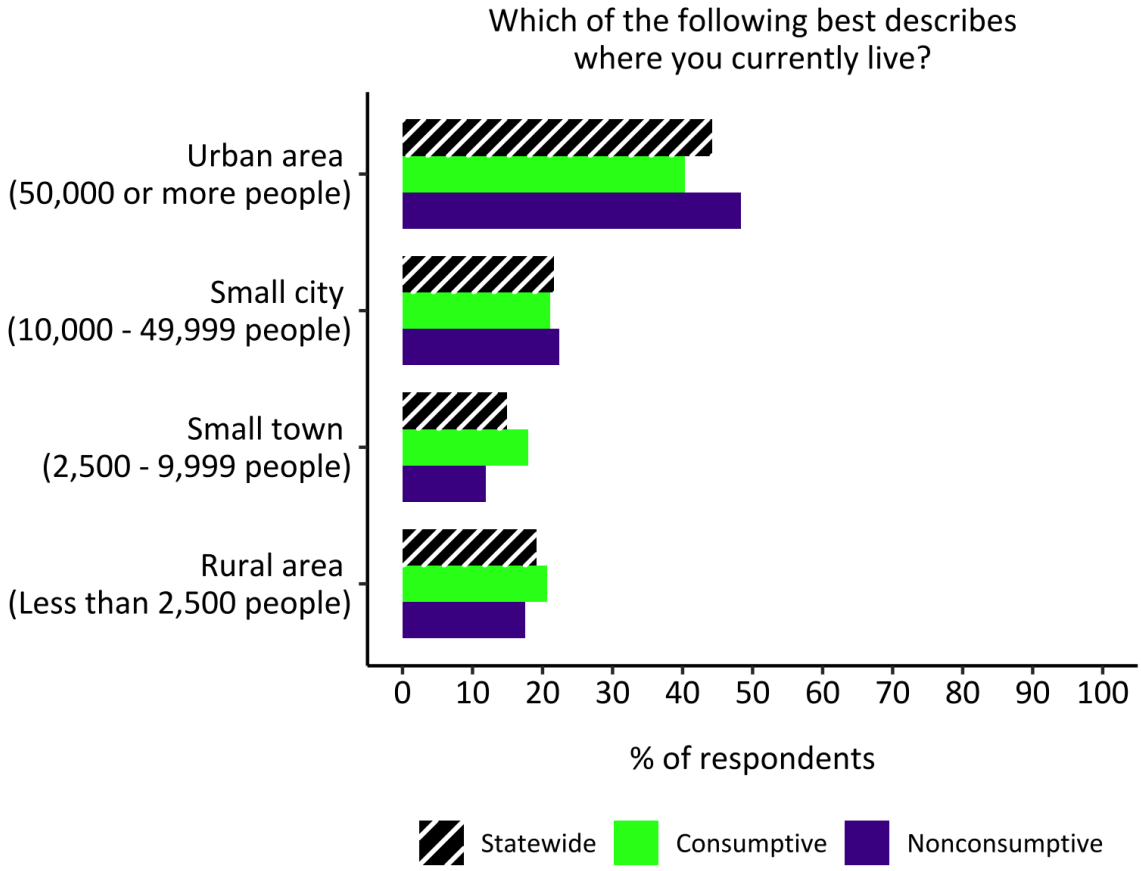

Figure 7: Respondent self-reported size of residential area

The self-reported size of the area in which wildlife viewers in Texas reside for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated a statistically significant difference in the residential location of consumptive and nonconsumptive wildlife viewers (Table 7).

Wildlife viewing behaviors

Forms of wildlife viewing

As described in the Methods, the National Survey of Wildlife Recreation defines wildlife viewing as "closely observing, feeding, and photographing wildlife, visiting parks and natural areas around the home because of wildlife, and maintaining plantings and natural areas around the home for the benefit of wildlife" (U.S. DOI et al., 2016). Under this definition, wildlife viewing

must occur as an intentional objective of the recreational activity; it does not include incidental viewing. The survey noted: “Wildlife viewing does not include simply noticing wildlife while doing something else, such as gardening, exercising, hunting or fishing, or intentionally scouting for game.” Incidental viewing, or observing wildlife while doing other recreational activities, is not considered wildlife viewing under this definition and was thus excluded from this survey effort.

We presented respondents with a list of seven wildlife viewing activities adapted from the National Survey of Wildlife Recreation and asked them to select all activities they participate in during a typical year (i.e., a recent year [within the last five years] that was not impacted by unusual circumstances like the COVID-19 pandemic). For those who started viewing wildlife during the pandemic, we asked them to answer all questions about "a typical year" for the past year. The sum of percentages exceeds 100 because 77% of respondents selected more than one behavior. The two most popular wildlife viewing behaviors amongst respondents in Texas were visiting parks and natural areas to observe, photograph, or feed wildlife (55%) and photographing or taking pictures of wildlife (52%). The next most popular wildlife viewing behavior was feeding wild birds (49%).

Chi-square tests indicated statistically significant differences for most of the wildlife viewing activities between consumptive and nonconsumptive wildlife viewers, with the exception of feeding wild birds. In comparison to nonconsumptive viewers, significantly more consumptive wildlife viewers participated in: 1) visiting parks and natural areas to observe, feed, or photograph wildlife, 2) photographing or taking pictures of wildlife, 3) closely observing wildlife or trying to identify unfamiliar types of wildlife, 4) taking trips or outings to any other location to observe, photograph, or feed wildlife, 5) feeding other wildlife, and 6) maintaining plantings or natural areas for the benefit of wildlife (Figure 8; Table 8).

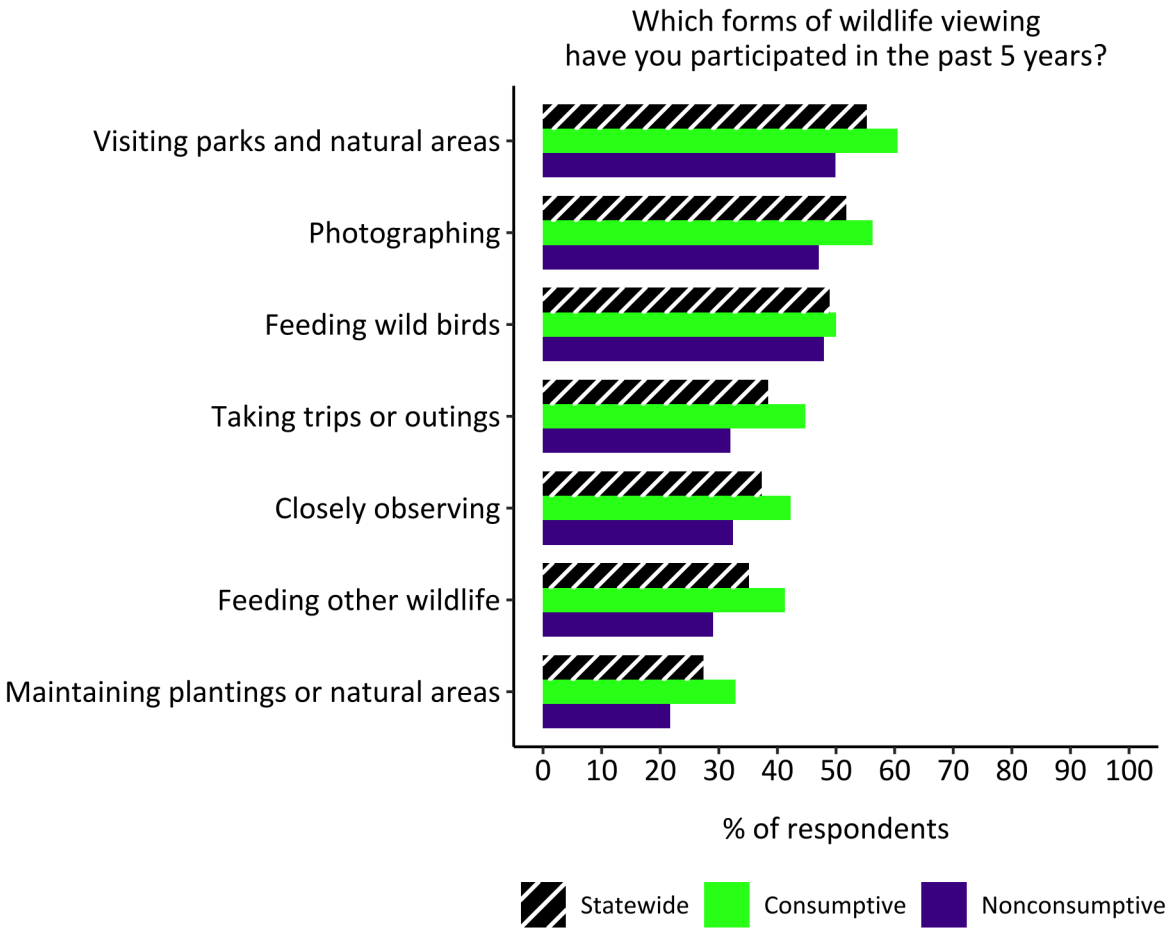

Figure 8: Forms of wildlife viewing

Forms of wildlife viewing that wildlife viewers in Texas reported participating in over the past five years for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option. Chi-square tests indicated statistically significant differences for six wildlife viewing activities between consumptive and nonconsumptive wildlife viewers (Table 8).

Types of wildlife

Based on previous studies, wildlife viewers most commonly view birds, land mammals, and large mammals, including marine mammals. Birds, land mammals, and large mammals are typically the most popular types of wildlife viewed (U.S. DOI et al., 2016; Grooms et al., 2019). We asked wildlife viewers to indicate the types of wildlife they liked to view (which included observing, photographing, or feeding). The list of eight types of wildlife to view was adapted from the Virginia Wildlife Recreation Survey (Grooms et al., 2019) and the National Survey of Wildlife Recreation (U.S. DOI et al., 2016).

Birds were the most popular type of wildlife viewed, with 76% of respondents statewide selecting this response option (because respondents could select more than one item, the sums of all percentages per wildlife type exceed 100). This was followed by land mammals, which was selected by 66% of respondents. The next closest response option was marine mammals, which was only selected by 39% of respondents. The least popular type of wildlife, besides the mutually exclusive response option "other types of wildlife" (0.9% of respondents selected this), was amphibians, with 28% of respondents selecting this response option.

Chi-square tests indicated statistically significant differences in all wildlife type viewing preferences between consumptive and nonconsumptive wildlife viewers with the exception of birds and insects. Consumptive viewers were significantly more likely to report interest in land mammals, marine mammals, reptiles, fish, insects, and amphibians in comparison to nonconsumptive viewers (Table 9; Figure 9).

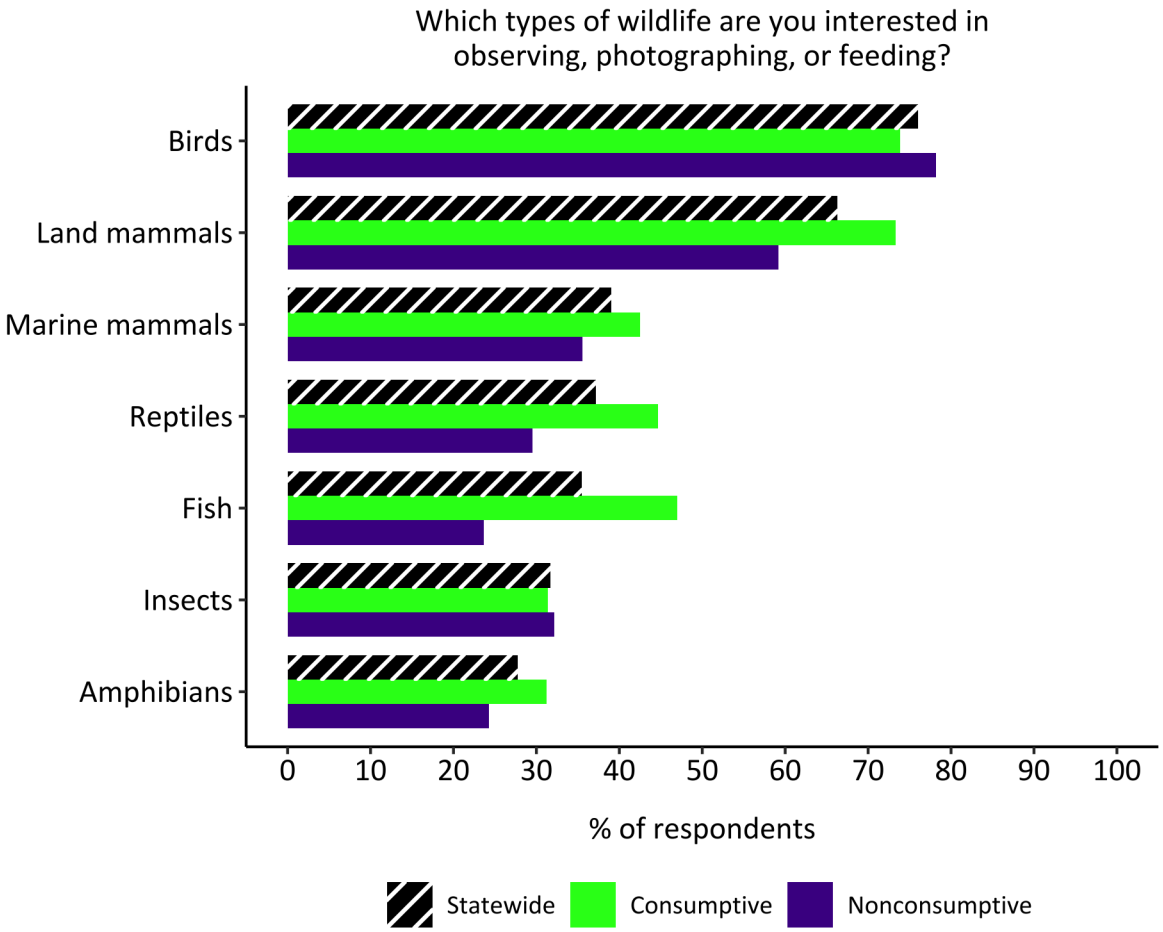

Figure 9: Interest in types of wildlife for wildlife viewing

Types of wildlife that wildlife viewers in Texas reported interest in observing, photographing, or feeding for statewide, consumptive, and nonconsumptive groups. Note that percentages for individual response categories sum to more than 100% because respondents were able to select more than one option. Chi-square tests indicated many statistically significant differences in wildlife type viewing preferences between consumptive and nonconsumptive wildlife viewers; consumptive viewers were significantly more likely to report interest in land mammals, marine mammals, reptiles, fish, and amphibians in comparison to nonconsumptive viewers (Table 9).

Recreational specialization of wildlife viewers

Across diverse forms of outdoor recreation, specialization refers to a continuum of intensity in an individual's interest and involvement in a given activity (Scott & Shafer, 2001). The best approach to measuring specialization is an area of active research and debate among scholars, but there is consensus that specialization is multidimensional, and as such, it is generally measured through multiple questions in survey research, rather than a single item (Needham et al., 2009). Specialization is consistently discussed and measured through three dimensions,

often referred to as affective, behavioral, and cognitive (outlined in more detail below; Needham et al., 2009). We developed a series of survey questions to evaluate each of these dimensions of specialization, drawing on concepts and items from a previous survey of eBird participants conducted by the North American Waterfowl Management Plan (NAWMP) Human Dimensions Working Group (Harshaw et al., 2021) and a survey of anglers conducted by Needham et al. (2009). We present results for these dimensions separately below, as recommended by Lee and Scott (2004), in order to retain insights into each dimension.

Affective specialization

Following Harshaw et al. (2021) and Needham et al. (2009), we assessed the affective dimension of viewers' specialization through the concept of centrality, which reflects how important wildlife viewing is in an individual's life. Respondents were asked to indicate their extent of agreement, on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with three statements: 1) "A lot of my life is organized around wildlife viewing," 2) "Wildlife viewing has a central role in my life," and 3) "Being a wildlife viewer is an important part of who I am." Responses to these three statements, which provide information regarding the centrality of wildlife viewing to an individual's life, comprised a reliable scale (Cronbach's alpha = .83), so we combined these variables by calculating the mean response to these items for an overall centrality measure (Table 10; Figure 10). The mean level of centrality was 3.11 in Texas, indicating that, on average, respondents selected *neither agree nor disagree*. A t-test indicated that the mean measure of centrality of wildlife viewing to an individual's life was significantly higher in consumptive viewers (M = 3.26, SD = 0.95) compared to nonconsumptive viewers (M = 2.95, SD = 1.02; t = -4.91, df = 999, p < .001; Table 10; Figure 10). However, as both mean measures for consumptive and nonconsumptive viewers were about 3, this means that both groups, on average, selected *neither agree nor disagree* for the three statements, which may have little practical relevance for management.

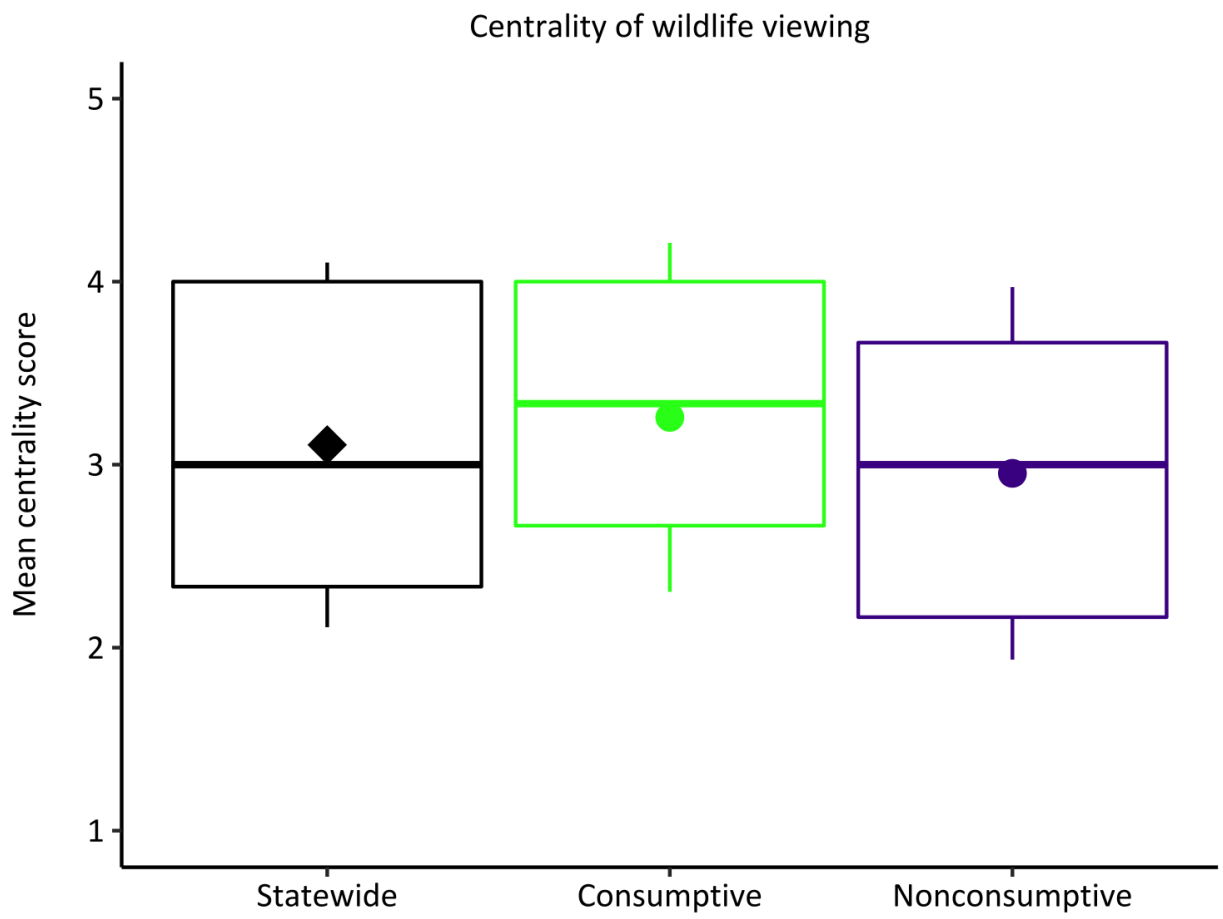

Figure 10: Centrality of wildlife viewing

Boxplots (median and interquartile ranges within the boxes) showing the differences in the measure of centrality of wildlife viewing in the lives of wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. Points represent the mean centrality measure (diamond for statewide group, circles for consumptive and nonconsumptive group) calculated as the mean of respondents' extent of agreement with three statements about the importance of wildlife viewing in their lives on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Whiskers represent the mean ± 1 standard deviation. A t-test indicated that the mean measure of centrality of wildlife viewing to an individual's life was significantly higher in consumptive viewers in comparison to nonconsumptive viewers (Table 10).

Behavioral specialization

We measured the behavioral dimension of specialization through respondents' use of specialized equipment for wildlife viewing and the duration of their experience in wildlife viewing. In Texas, 57% of all wildlife viewers reported owning or renting specialized equipment, such as binoculars, cameras, mobile apps, spotting scopes, field guides, or specialized clothing in the past five years (Figure 11; Table 11). A chi-square test indicated that consumptive wildlife

viewers (65%) were significantly more likely to own or rent specialized equipment for wildlife viewing than nonconsumptive wildlife viewers (48%; $\chi^2 = 32.58$, $df = 1$, $p < .001$; Table 11; Figure 11).

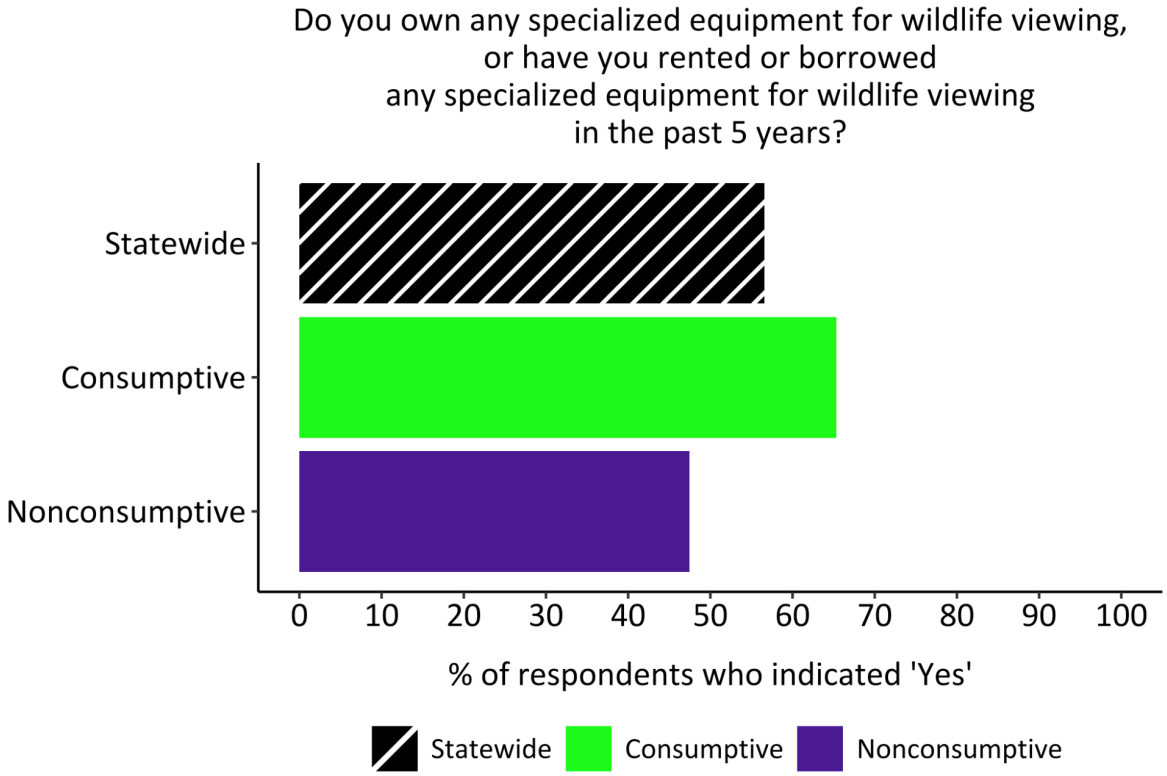

Figure 11: Owning, renting, or borrowing specialized equipment for wildlife viewing

Percent of wildlife viewers in Texas who reported owning, renting, or borrowing specialized equipment for wildlife viewing in the past 5 years for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated that consumptive wildlife viewers were significantly more likely to own or rent specialized equipment for wildlife viewing than nonconsumptive wildlife viewers (Table 11).

As another measure of behavioral specialization, we also asked survey respondents to indicate how many years they had been participating in wildlife viewing and provided response options in five-year categories. To ease respondent burden, we did not present this question to respondents who indicated in a previous question that they had only started viewing during the COVID-19 pandemic. As the COVID-19 pandemic began about 18 months before the survey was administered, we added the 86 wildlife viewers who reported that they started viewing during the pandemic to the 1-5 years category. About 5.7% of viewers in Texas had more than 50 years of wildlife viewing experience (Table 12).

In order to account for the effect of the age of respondents, we roughly estimated the percentage of life during which wildlife viewers had participated in wildlife viewing by creating

five-equally sized categories (1-20%, 21-40%, 41-60%, 61-80%, and 81-100% of life). The majority of wildlife viewers had participated in the activity for less than half their life: 54% reported viewing for one-fifth of their life or less, while 20% reported viewing for one to two-fifths of their life (Figure 12). About 9.5% of respondents had participated in wildlife viewing for close to their entire life (81-100%). A chi-square test indicated a statistically significant difference in this measure of experience as a percentage of life spent viewing when comparing consumptive and nonconsumptive viewers, with over half of nonconsumptive viewers having spent 0-20% of their life so far participating in wildlife viewing (Table 13; Figure 12).

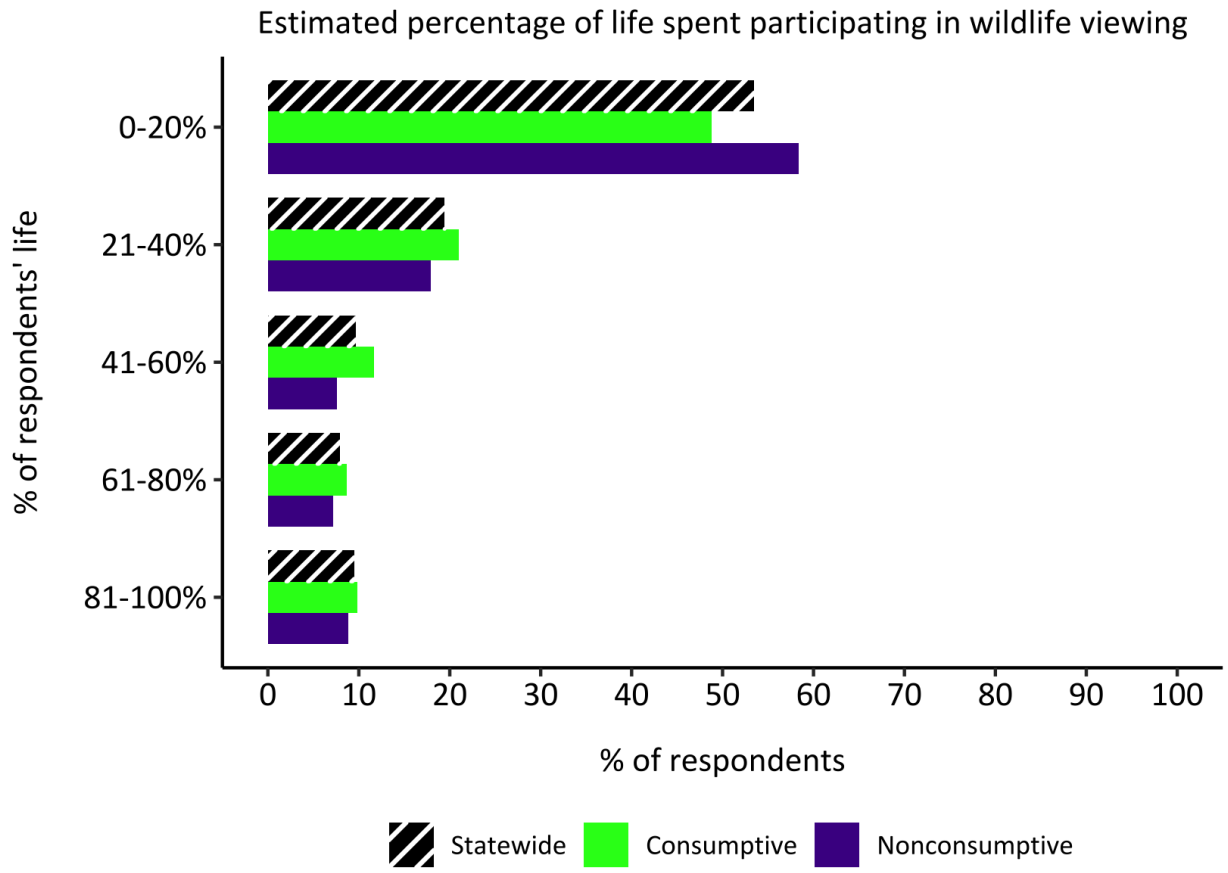

Figure 12: Estimated percentage of life spent viewing

The estimated percentage of life during which wildlife viewers had participated in wildlife viewing in five categories (1-20%, 21-40%, 41-60%, 61-80%, and 81-100% of life) for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated a significant difference in this measure of experience as a percentage of life spent viewing when comparing consumptive and nonconsumptive viewers (Table 13).

Cognitive specialization

Due to the number of diverse activities and types of wildlife that are included under the umbrella of wildlife viewing, we used a single, broad item to measure the cognitive dimension

of specialization through viewers' self-rated level of expertise, ranging from beginner to expert. We asked respondents "How would you rate your skill level in wildlife viewing?" and provided them with five options ranging from "beginner" to "expert." In Texas, 66% of respondents considered themselves beginner or novice wildlife viewers. Over one-quarter of viewers (26%) rated their skill level as intermediate. Only 7.3% of respondents considered themselves to be advanced, and only 0.7% considered themselves to be expert wildlife viewers (Table 14; Figure 13). A chi-square test indicated a statistically significant difference in self-rated expertise levels between consumptive and nonconsumptive wildlife viewers, with the majority of nonconsumptive wildlife viewers rating themselves as beginners (41%) or novices (33%), and fewer consumptive viewers rating themselves as beginners (25%; Table 14; Figure 13).

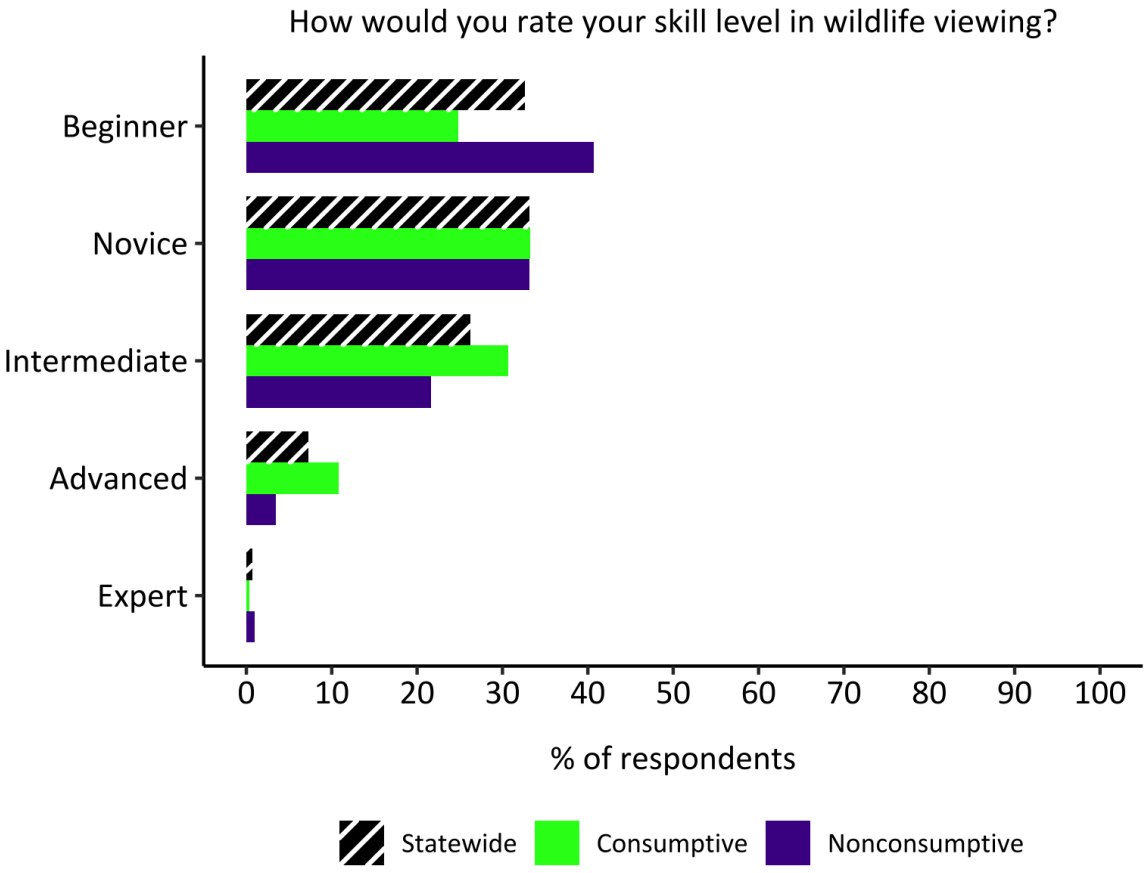

Figure 13: Respondents' self-rate wildlife viewing skill level

Respondents' self-rated level of skill in wildlife viewing for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated a statistically significant difference in self-rated expertise levels between consumptive and nonconsumptive wildlife viewers (Table 14).

COVID-19 impacts on wildlife viewing participation and the R3 Framework

On March 11th, 2020, the World Health Organization declared the COVID-19 virus as a pandemic (Cucinotta & Vanelli, 2020). This pandemic dramatically altered everyday activities worldwide as federal, state, and local governments enacted public health policies to mitigate the spread of this highly contagious virus (Cucinotta & Vanelli, 2020). For example, the COVID-19 pandemic and associated mitigations brought about unprecedented and dynamic changes in outdoor recreation behaviors throughout the country, which we are only beginning to understand. A study by Rice et al. (2020) indicated that, as limitations were instituted on travel on a wide range of scales, participation in outdoor activities declined significantly overall, with disproportionately negative effects for urban residents. However, another study showed slight increases in participation in wildlife viewing and recreation close to home (Hochocka et al., 2021).

For this survey, we examined how COVID-19 affected wildlife viewers and the nature of their participation in wildlife viewing and identified any potential valuable management implications for state fish and wildlife agencies interested in supporting wildlife viewing. We examined participation in wildlife viewing using the Outdoor Recreation Adoption Model (also referred to as the "R3 Framework'' [recruitment, retention, and reactivation]) vis a vis the first year of the pandemic (Byrne & Dunfee, 2018). By comparing the number of days spent viewing in the first year of the COVID-19 pandemic against a typical year, we categorized wildlife viewers into four groups: "churned" (i.e., stopped viewing during the pandemic), retained (i.e., maintained viewing throughout the pandemic), "recruited" (i.e., began wildlife viewing for the first time during the pandemic), and "reactivated" (i.e., had participated in wildlife viewing in the past, were not actively participating when the pandemic began, but resumed participation during or after March 2020).

Over half of respondents in Texas (54%) fell into the "retained" category, meaning the COVID-19 pandemic had no impact on their overall participation in wildlife viewing. The next largest group was the "churned" viewers (24%), meaning that they stopped viewing during the pandemic, followed by "reactivated" viewers (13%), meaning those who resumed participation during or after March 2020. Finally, the smallest proportion of wildlife viewers indicated they were "recruited" (8.5%) or began participating in wildlife viewing for the first time during or after March 2020. A chi-square test indicated no statistically significant difference between consumptive and nonconsumptive viewers' R3 participation categorization (Table 15; Figure

14).

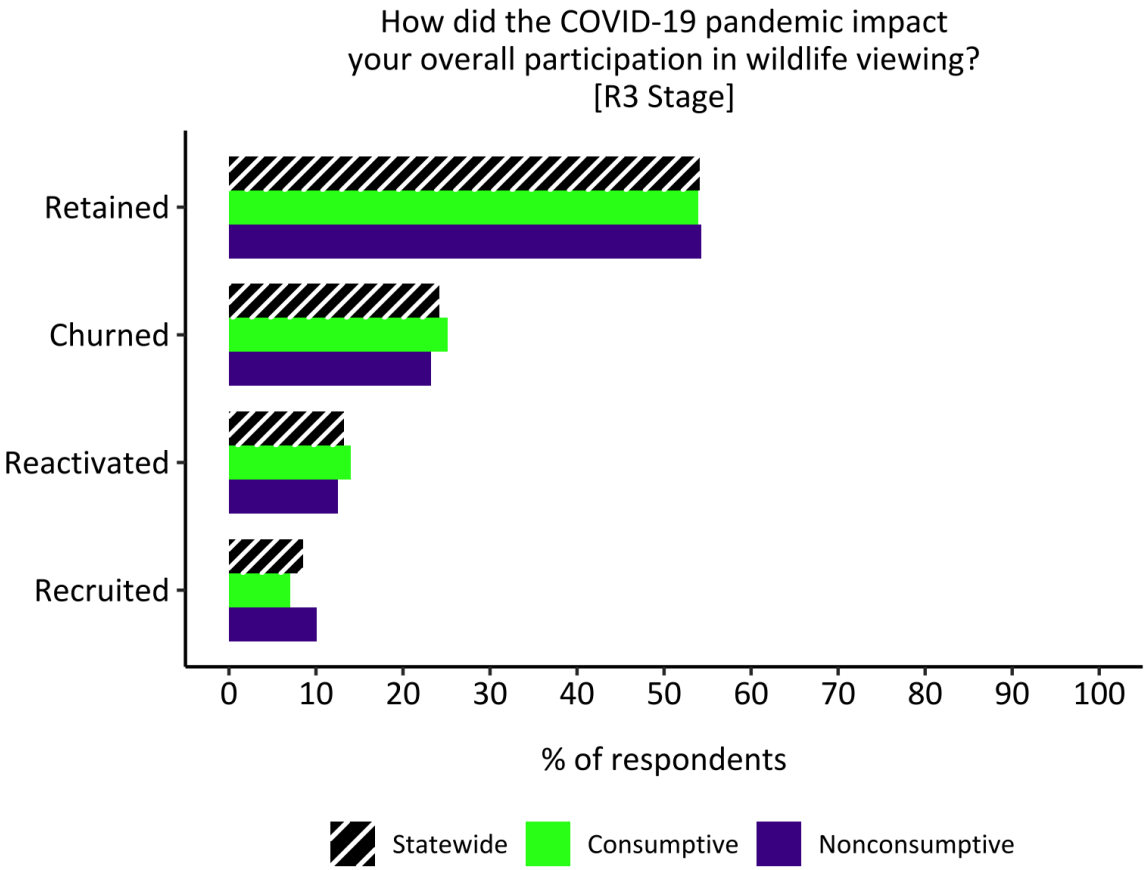

Figure 14: COVID-19 impact on wildlife viewing as R3

Impact of the COVID-19 pandemic on wildlife viewers' overall participation in wildlife viewing for statewide, consumptive, and nonconsumptive groups. Respondents were separated into four groups: retained (maintained throughout the pandemic), churned (stopped viewing during the pandemic), reactivated (had participated in wildlife viewing in the past, were not actively participating when the pandemic began, but resumed participation during or after March 2020), and recruited (began wildlife viewing for the first time during the pandemic). A chi-square test indicated no statistically significant difference in the COVID-19 impact on wildlife viewing participation between consumptive and nonconsumptive viewers.

Time spent wildlife viewing

In this section of the survey, wildlife viewers estimated the number of days they spent wildlife viewing during a typical year, the first year of the COVID-19 pandemic (March 2020 - February 2021), and the number of days that they anticipated wildlife viewing in the upcoming year (the next 12 months from the date of survey completion). Wildlife viewers who indicated they were recruited (see COVID-19 section) during the pandemic were not asked to report the number of days they spent viewing during a typical year, as the first year of the COVID-19 pandemic was assumed to be their only year participating in wildlife viewing. For each time period, we

specified three locations, following the National Survey of Wildlife Recreation's (U.S. DOI et al., 2016) definition of "around the home" ("within one mile of home") and "away from home" ("at least one mile away from home"), the latter of which we further stratified to two locations: "more than one mile away from your home, but within your state" and "outside of your state or outside of the United States." We were interested in this nuance to better understand the impact of the COVID-19 pandemic on travel that occurred for wildlife viewing (Hochachka et al., 2021). For all time periods and locations, we provided respondents with seven time intervals, each 30 days long, and a single option for "0 days" and "211 or more days."

We first reviewed days viewing during a typical year (*n* = 921 around the home, *n* = 917 away from home, and *n* = 916 outside of Texas or the U.S.; Table 16; Figures 15-17). Nearly all respondents (93%) reported participating in wildlife viewing around the home for 1 day or more in a typical year (Table 16; Figure 15). A substantial proportion (16%) reported wildlife viewing around the home for "211 or more days" in a typical year, which approximates to 17 days a month or more. Similar to around the home but a bit lower, 87% of wildlife viewers reported participating in wildlife viewing away from home for 1 day or more during a typical year. Only 2.6% of wildlife viewers spent 211 or more days in a typical year viewing away from home. Of all three wildlife viewing locations, wildlife viewers were less apt to participate in wildlife viewing outside of their state or country in a typical year, but still over half of respondents (54%) participated in wildlife viewing outside their state or country for 1 day or more.

Due to low group size for each category for consumptive and nonconsumptive viewers, statistical testing was done by comparing "0 days," "1-30 days," and "> 30 days" per year. First, a chi-square with three categories ("0 days," "1-30 days," and "> 30 days") indicated no statistically significant difference in time spent viewing around the home in a typical year between consumptive and nonconsumptive viewers (Table 17; Figure 15). The second chi-square test indicated that there was a statistically significant difference in away-from-home viewing in a typical year for consumptive and nonconsumptive viewers, with more consumptive viewers spending more than 30 days viewing away from home (Table 17; Figure 16). Finally, the third chi-square test indicated that there was a statistically significant difference in out-of-state-or-country viewing in a typical year for consumptive and nonconsumptive viewers, with more nonconsumptive viewers spending zero days viewing outside of Texas or the U.S. (Table 17; Figure 17).

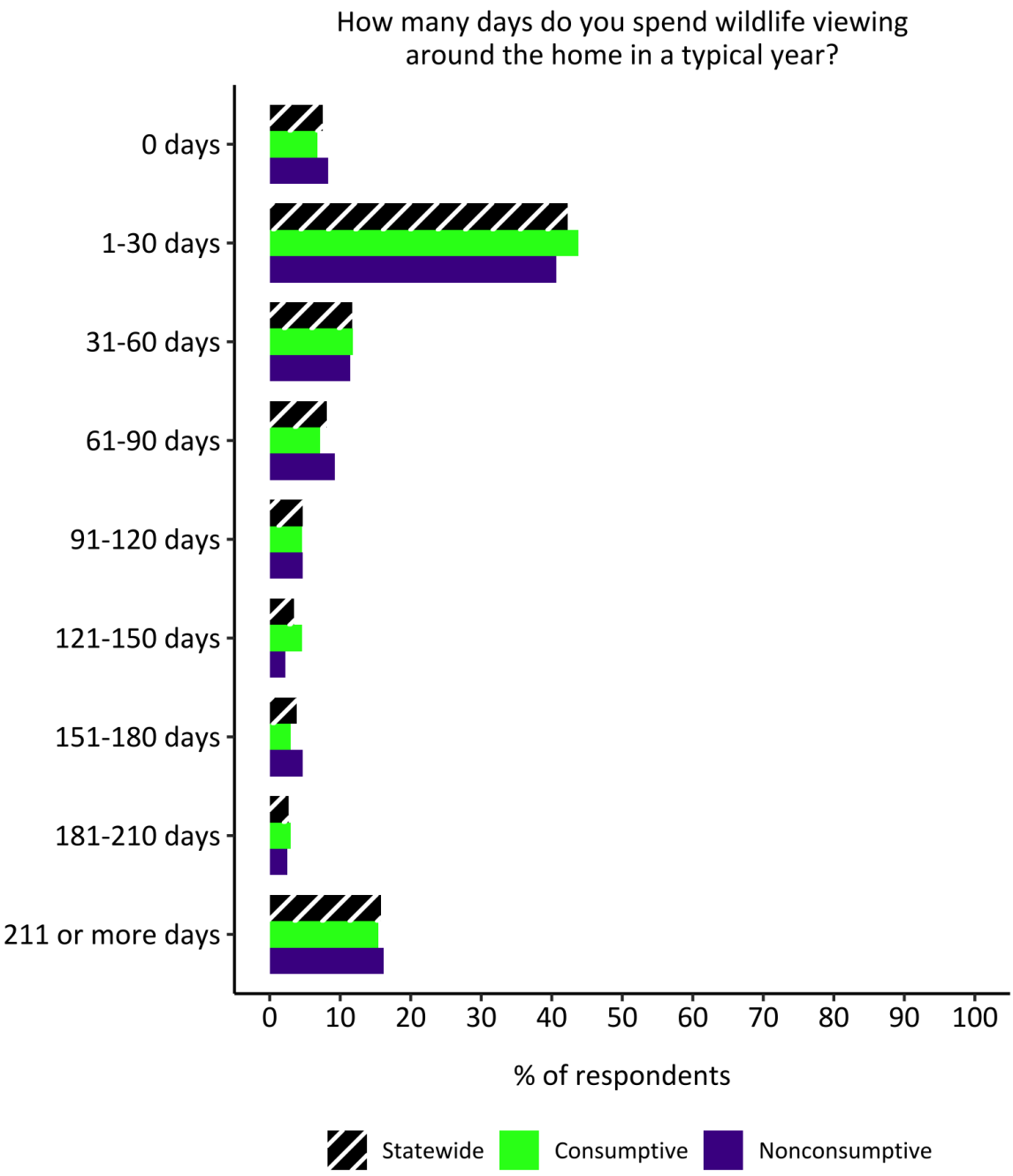

Figure 15: Days spent viewing around the home in a typical year

Days wildlife viewers in Texas reported spending wildlife viewing around the home during a typical year for statewide, consumptive, and nonconsumptive groups. Typical year response omits wildlife viewers who began participating in wildlife viewing during the pandemic, as they had not yet viewed wildlife in a typical year. A chi-square run with only three categories ("0 days", "1-30 days", and "> 30 days"), due to low sample sizes, indicated no statistically significant difference in time spent viewing around the home in a typical year between consumptive and nonconsumptive viewers (Table 17).

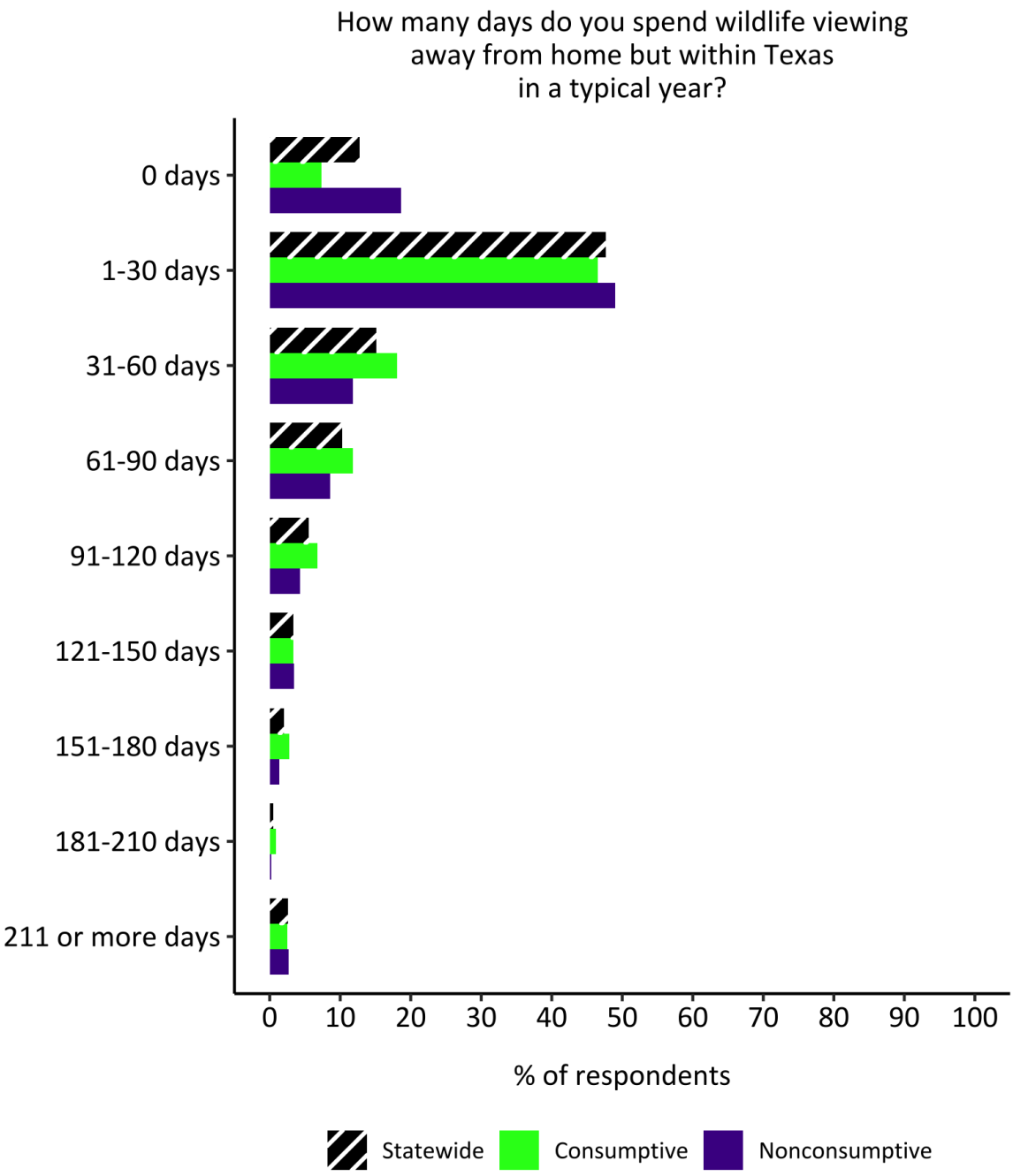

Figure 16: Days spent viewing away from home in a typical year

Days wildlife viewers in Texas reported spending wildlife viewing away from home, but within Texas, during a typical year for statewide, consumptive, and nonconsumptive groups. Typical year response omits wildlife viewers who began participating in wildlife viewing during the pandemic, as they had not yet viewed in a typical year. A chi-square test indicated that there was a statistically significant difference in away-from-home viewing in a typical year for consumptive and nonconsumptive viewers (Table 17).

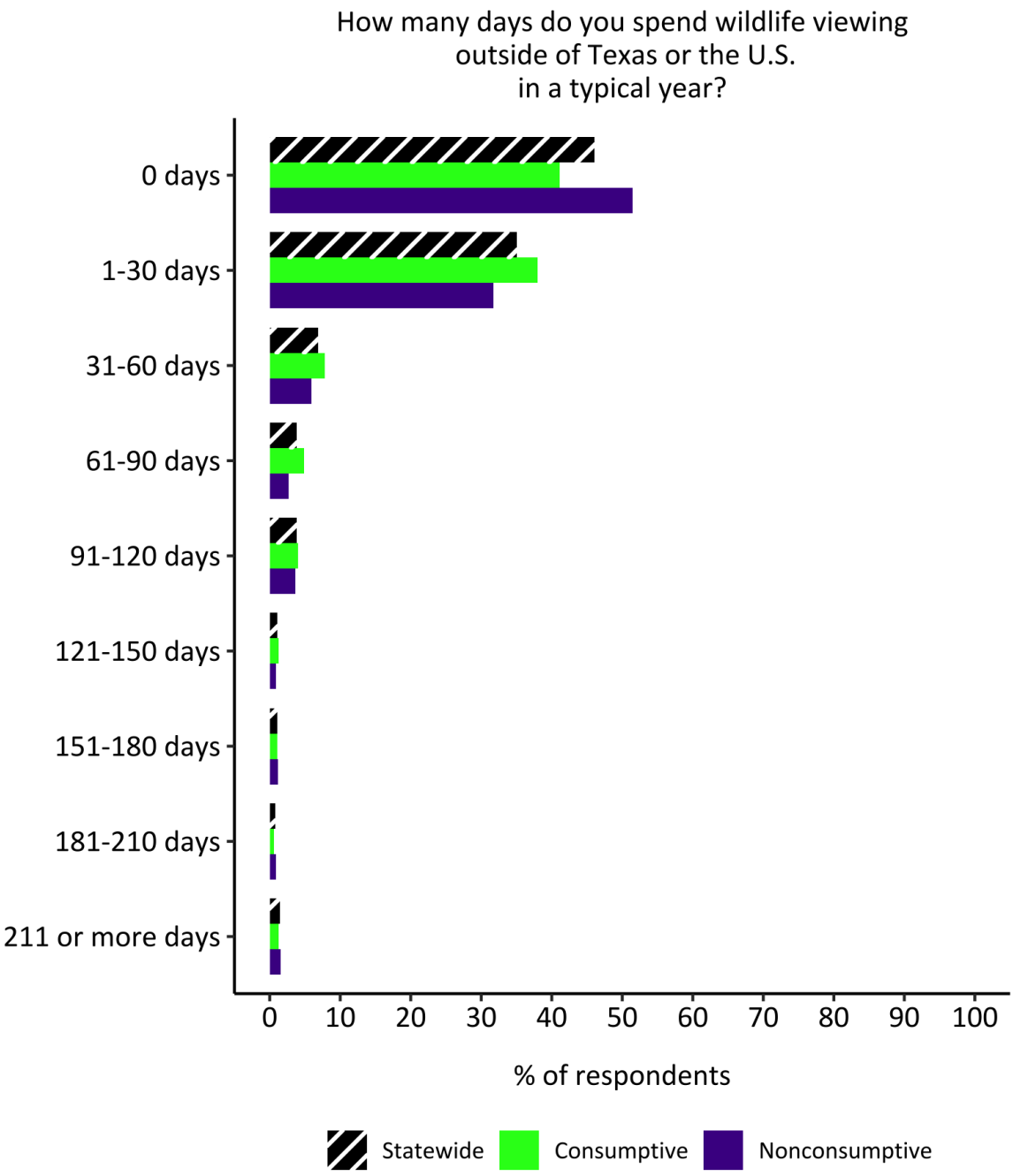

Figure 17: Days spent viewing out of state or U.S. in a typical year

Days wildlife viewers in Texas reported spending wildlife viewing outside of Texas or the U.S. during a typical year for statewide, consumptive, and nonconsumptive groups. Typical year response omits wildlife viewers who began participating in wildlife viewing during the pandemic, as they had not yet viewed wildlife in a typical year. A chi-square test indicated that there was a statistically significant difference in out-of-state-or-country viewing in a typical year for consumptive and nonconsumptive viewers (Table 17).

Next, we reviewed days spent viewing during the first year of the COVID-19 pandemic (*n* = 1,010 around the home, *n* = 1,002 away from home, and *n* = 1,000 outside state or country; Table 16; Figure 18-20). Slightly less respondents (85%) reported participating in wildlife viewing around the home for one day or more in the first year of the COVID-19 pandemic in comparison to a typical year (93%). Just 14% of survey respondents reported participation in wildlife viewing around the home for 211 or more days during the first year of the COVID-19 pandemic. Participation in away from home (74% of respondents participated for one day or more) viewing also decreased slightly in comparison to a typical year (87%). Only 2.1% of respondents reported participation in wildlife viewing away from home for 211 or more days during the first year of the COVID-19 pandemic. Finally, much less than half of respondents (37%) reported participating in wildlife viewing out-of-state-or-country during the first year of the COVID-19 pandemic, a considerable decrease in comparison to a typical year (54%).

The chi-square tests for the first year of the pandemic indicated similar patterns for statistical significance as a typical year, except for out-of-state viewing. The first chi-square test indicated that there was no statistically significant difference in time spent viewing around the home in a typical year between consumptive and nonconsumptive viewers (Table 17; Figure 18). The second chi-square test indicated that there was a statistically significant difference in away-from-home viewing during the first year of the pandemic for consumptive and nonconsumptive viewers, with more consumptive viewers spending more than 30 days viewing away from home and more nonconsumptive viewers spending zero days away from home (Table 17; Figure 19). Finally, the third chi-square test indicated that there was no statistically significant difference in out-of-state-or-country viewing during the first year of the pandemic for consumptive and nonconsumptive viewers (Table 17; Figure 20).

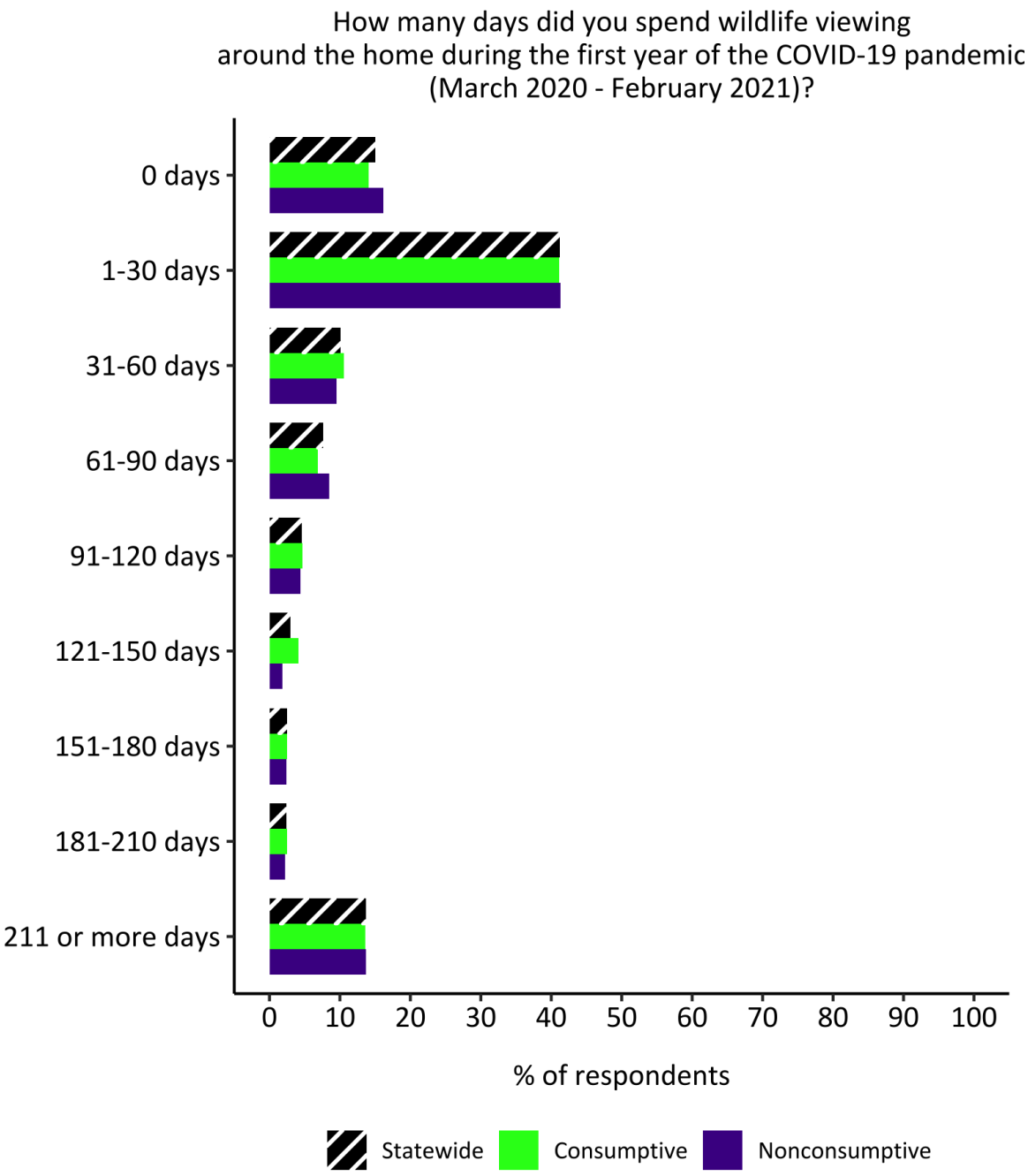

Figure 18: Days spent viewing around the home in first year of COVID-19 pandemic

Days wildlife viewers in Texas reported spending wildlife viewing around the home during the first year of the pandemic (March 2020-February 2021) for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with only three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated no statistically significant difference in time spent viewing around the home during the first year of the pandemic between consumptive and nonconsumptive viewers (Table 17).

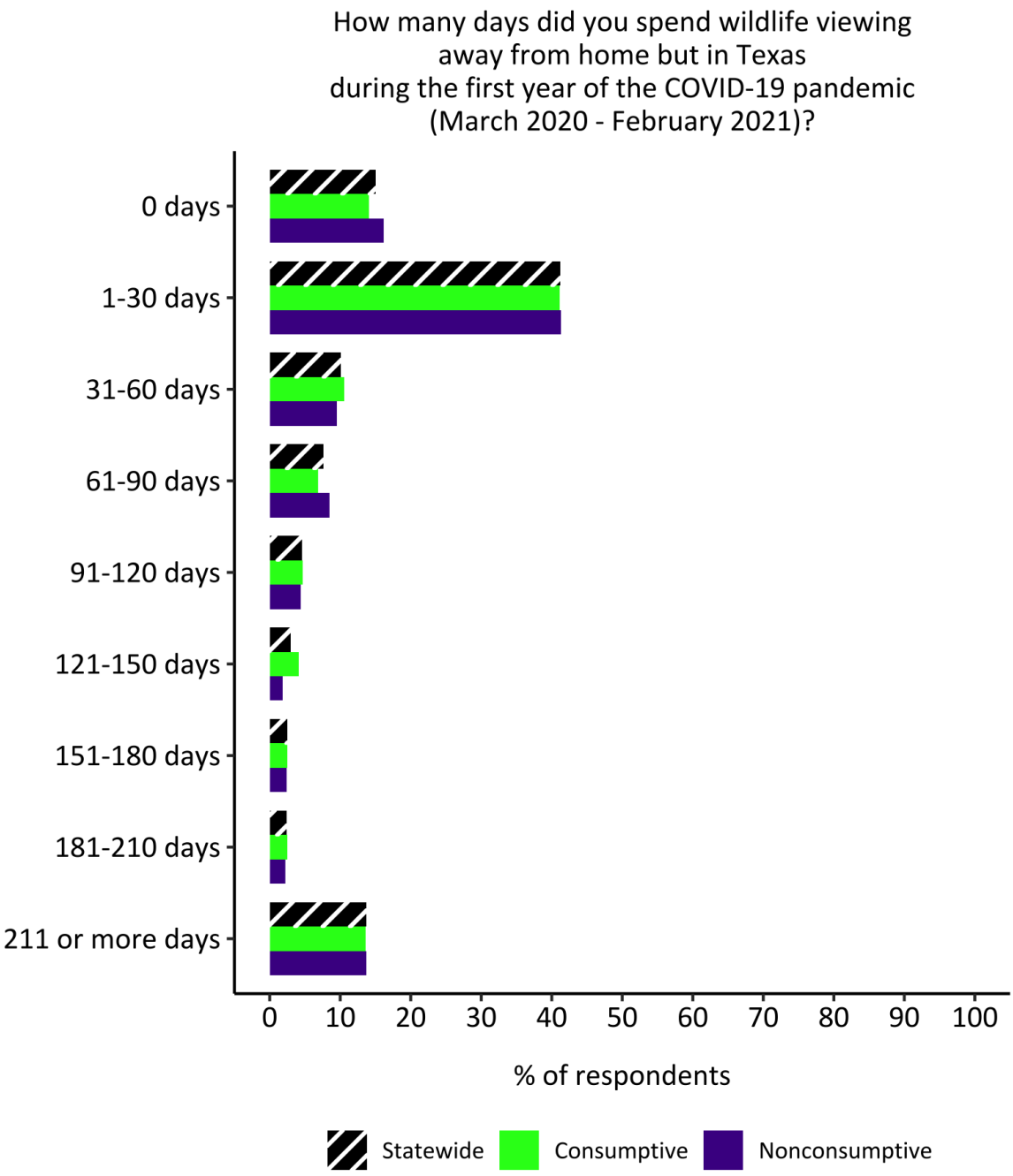

Figure 19: Days spent viewing away from home in first year of COVID-19 pandemic

Days wildlife viewers in Texas reported spending wildlife viewing away from home but within Texas during the first year of the pandemic (March 2020-February 2021) for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with only three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated that there was a statistically significant difference in away-from-home viewing during the first year of the pandemic for consumptive and nonconsumptive viewers (Table 17).

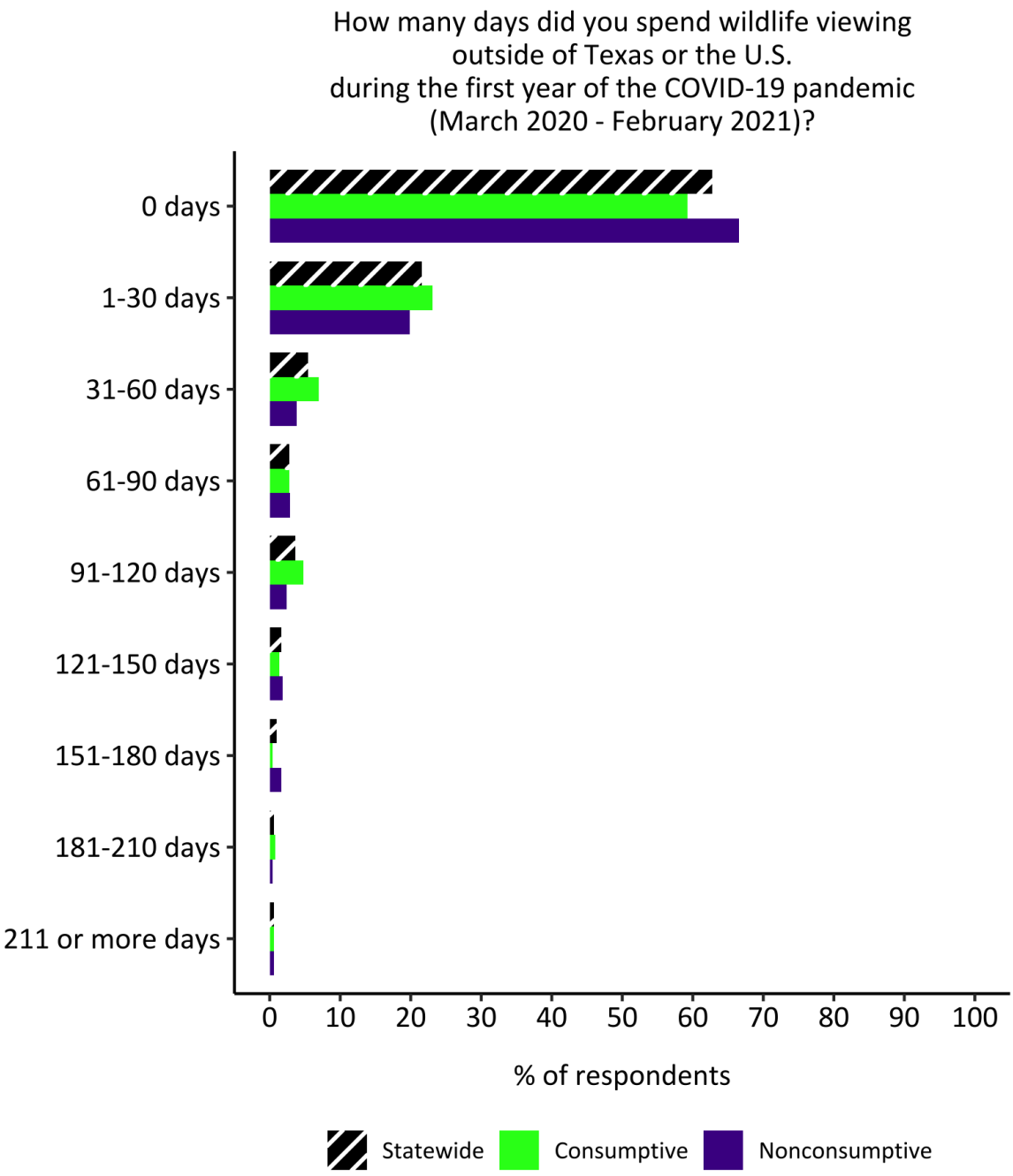

Figure 20: Days spent viewing out of state or U.S. in first year of COVID-19 pandemic

Days wildlife viewers in Texas reported spending wildlife viewing outside of Texas or the U.S. during the first year of the pandemic (March 2020-February 2021) for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with only three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated no statistically significant difference in time spent out-of-state-or-country viewing the first year of the pandemic between consumptive and nonconsumptive viewers (Table 17).

Finally, we asked respondents about days they anticipate viewing in the three locations during the next year (*n* = 1,009 around the home, *n* = 1,001 away from home, and *n* = 993 outside state or country; Table 16; Figures 21-23). Anticipated viewing was higher in all three locations when compared to the first year of the pandemic and was much closer to values reported during a typical year. Similarly to a typical year, 91% of respondents anticipated spending one or more days viewing around the home and 85% anticipated spending one or more days viewing away from home. We also note an increase in anticipated participation outside of state or country compared to the first year of the COVID-19 pandemic, with 52% of respondents saying they anticipated spending one or more days viewing outside of their state or country.

The chi-square tests for anticipated time spent viewing in the upcoming year indicated the same levels of statistical significance as those for a typical year. First, a chi-square with three categories ("0 days," "1-30 days," and "> 30 days") indicated no statistically significant difference in the expected time spent viewing around the home in the upcoming year between consumptive and nonconsumptive viewers (Table 17; Figure 21). The second chi-square test indicated that there was a statistically significant difference in expected away-from-home viewing in the upcoming year for consumptive and nonconsumptive viewers, with more consumptive viewers expecting to spend more than 30 days viewing away from home (Table 17; Figure 22). Finally, the third chi-square test indicated that there was a statistically significant difference in out-of-state-or-country viewing in a typical year for consumptive and nonconsumptive viewers, with more nonconsumptive viewers expecting to spend zero days viewing outside of Texas or the U.S. (Table 17; Figure 23).

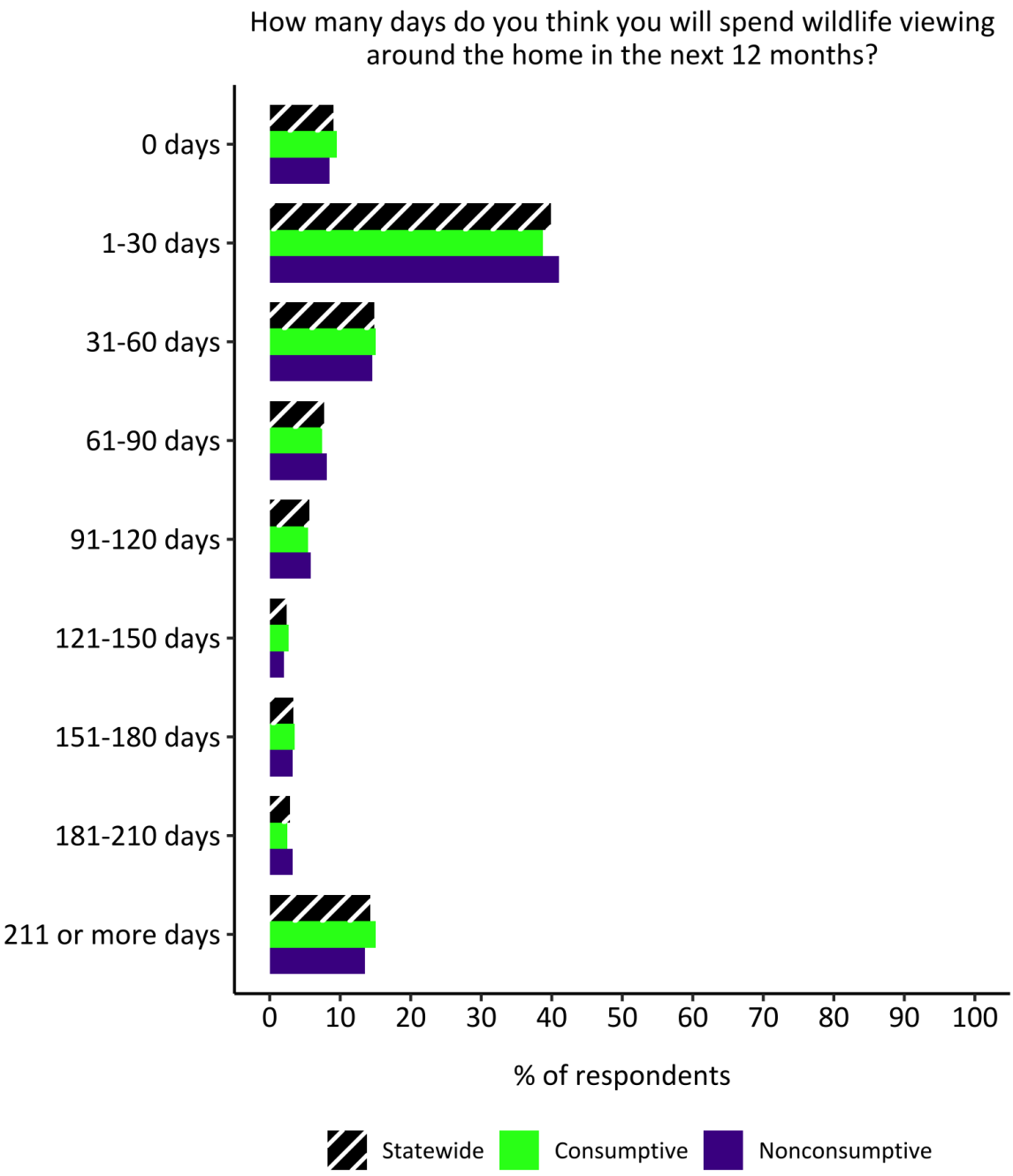

Figure 21: Days anticipated spent viewing around the home in the upcoming year

Days wildlife viewers in Texas anticipated spending wildlife viewing around the home in the upcoming year for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated no statistically significant difference in time spent viewing around the home in the upcoming year between consumptive and nonconsumptive viewers (Table 17).

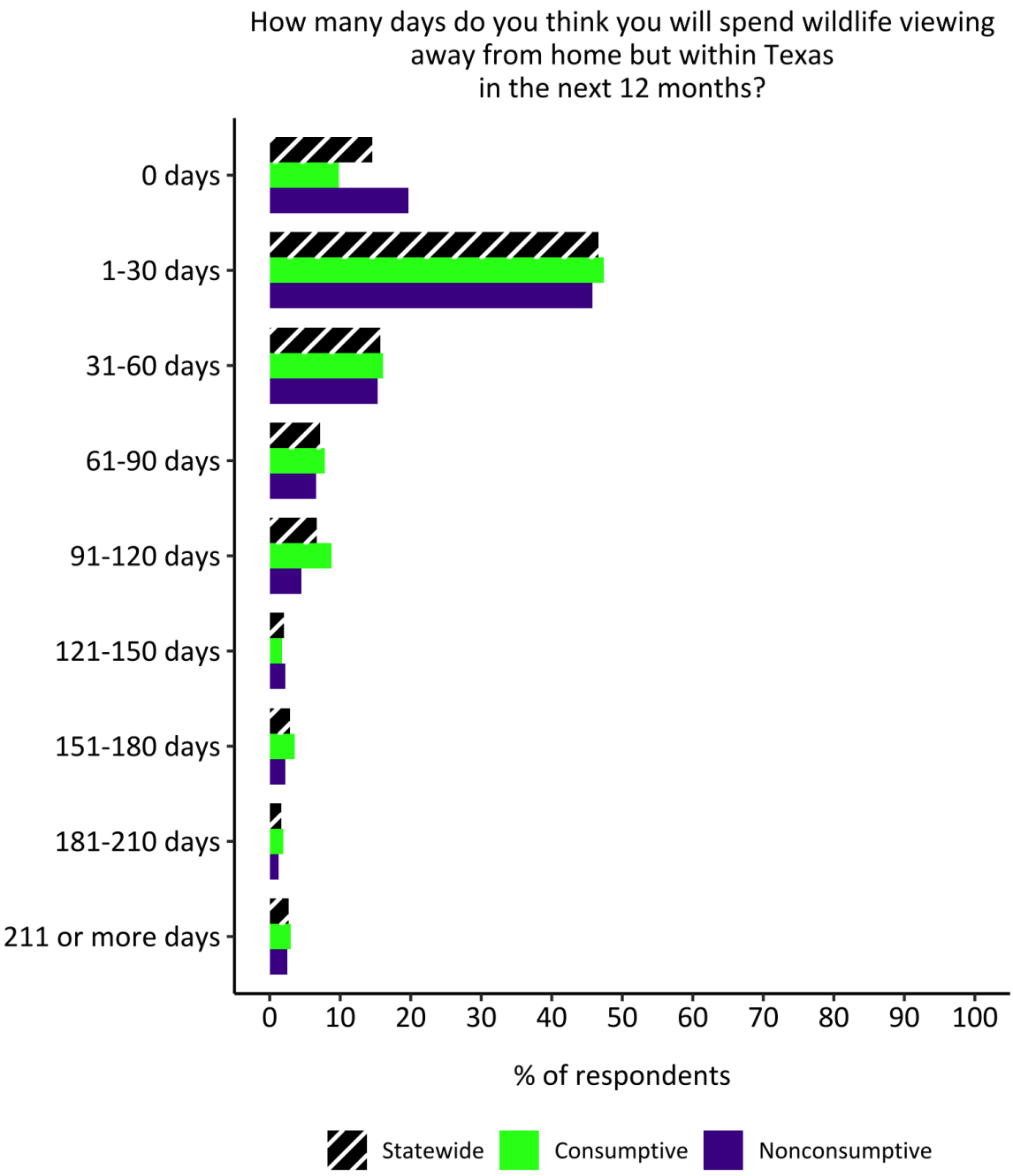

Figure 22: Days anticipated spent viewing away from home in the upcoming year

Days wildlife viewers in Texas anticipated spending wildlife viewing away from home but within Texas in the upcoming year for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with only three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated that there were statistically significant differences in away-from-home viewing in the upcoming year for consumptive and nonconsumptive viewers (Table 17).

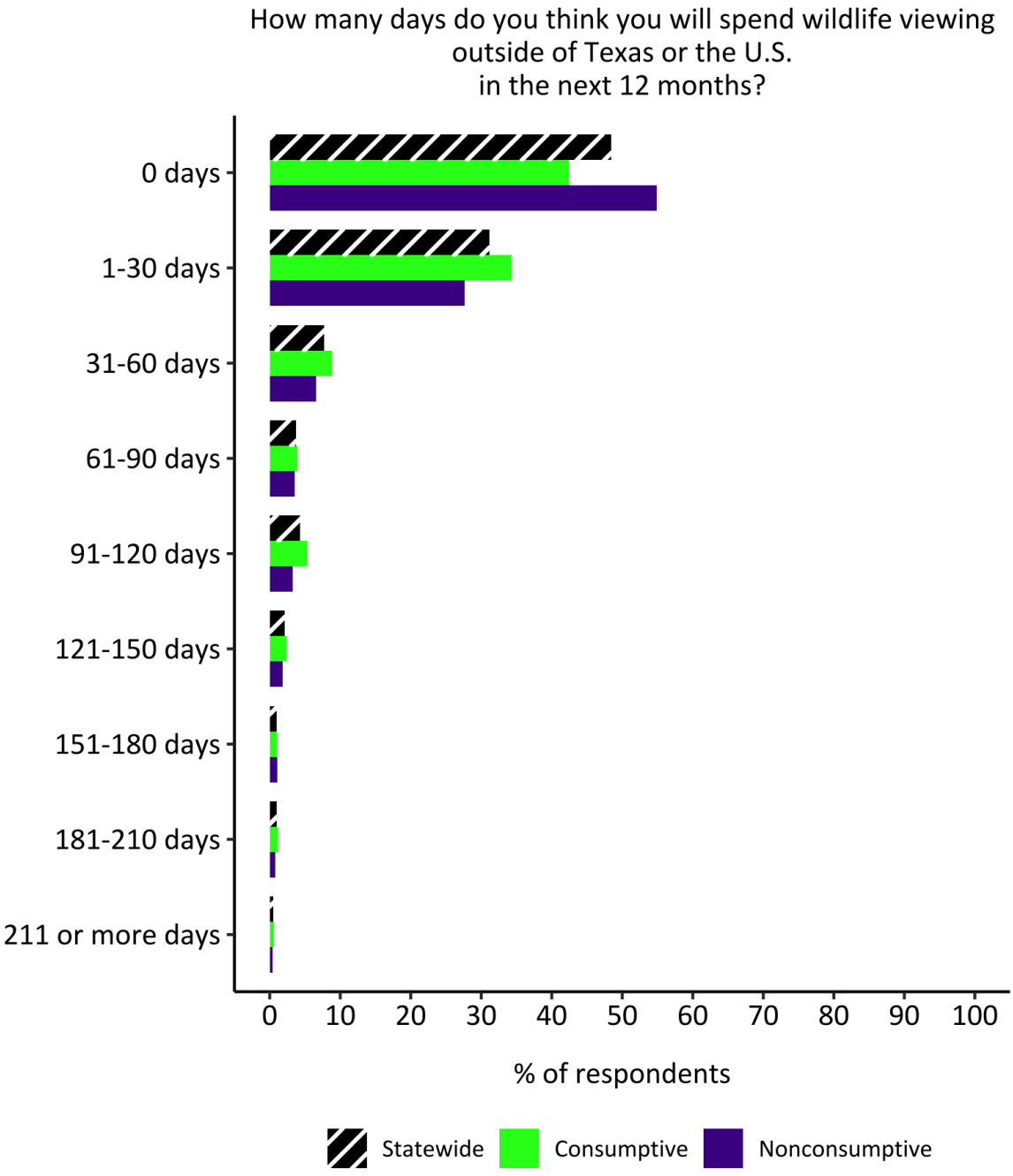

Figure 23: Days anticipated spent viewing out of state or U.S. in the upcoming year

Days wildlife viewers in Texas anticipated spending wildlife viewing outside of Texas or the U.S. in the upcoming year for statewide, consumptive, and nonconsumptive groups. This includes wildlife viewers who began participating in wildlife viewing during the pandemic. A chi-square run with only three categories ("0 days," "1-30 days," and "> 30 days"), due to low sample sizes, indicated that there was a statistically significant difference in time spent viewing around the home in the upcoming year between consumptive and nonconsumptive viewers (Table 17).

Wildlife viewing location

In addition to understanding around-the-home, away-from-home, and out-of-state viewing, we further examined the land ownership status of locations where respondents participate in wildlife viewing within Texas. Wildlife viewing takes place across all land ownership statuses: from state and privately-owned land (Bensen, 2001) to federally-owned land (Abrams et al., 2020), with vastly different managerial implications for each setting. We asked respondents: "In a typical year, in which locations do you participate in wildlife viewing in Texas?" This question was adapted from the Virginia Wildlife Recreation Survey (Grooms et al., 2019) to include options more applicable to the state setting. A list of seven locations was provided, featuring a mix of public, private, and tribal lands. In addition, an option reading: "I am unsure who owns or manages the areas where I participate in wildlife viewing" (7.7% of respondents selected this) was also provided. Finally, a mutually exclusive option reading: "I do not participate in wildlife viewing in any of the above locations" (1.4% of respondents selected this) was also provided.

About 75% of respondents reported viewing in more than one location (Table 18; Figure 24). Respondents most commonly reported wildlife viewing at their own home or property (71%), followed by locally-managed areas (53%), such as town or county parks, trails, or open spaces. Over half (51%) of wildlife viewers in Texas also utilized state-managed areas, such as state parks, forests, boat landings, fishing areas, conservation areas, or Wildlife Management Areas. The least common location for wildlife viewing was tribal lands (5.1%).

Statistical tests indicated several statistically significant differences between consumptive and nonconsumptive wildlife viewers for where they viewed wildlife. First, a t-test indicated that the mean number of wildlife viewing locations for consumptive (M = 3.17, SD = 1.62) wildlife viewers was significantly higher than nonconsumptive viewers (M = 2.55, SD = 1.44; t = -6.41, df = 989, p < .001). Second, chi-square tests indicated that significantly more consumptive viewers participated than nonconsumptive viewers in wildlife viewing on the property of a friend or family member, other private property, locally-managed lands, state-managed lands, and federally-managed lands (such as National Parks, National Wildlife Refuges, Bureau of Land Management Land, Waterfowl Production Areas, or National Forests; Table 18; Figure 24).

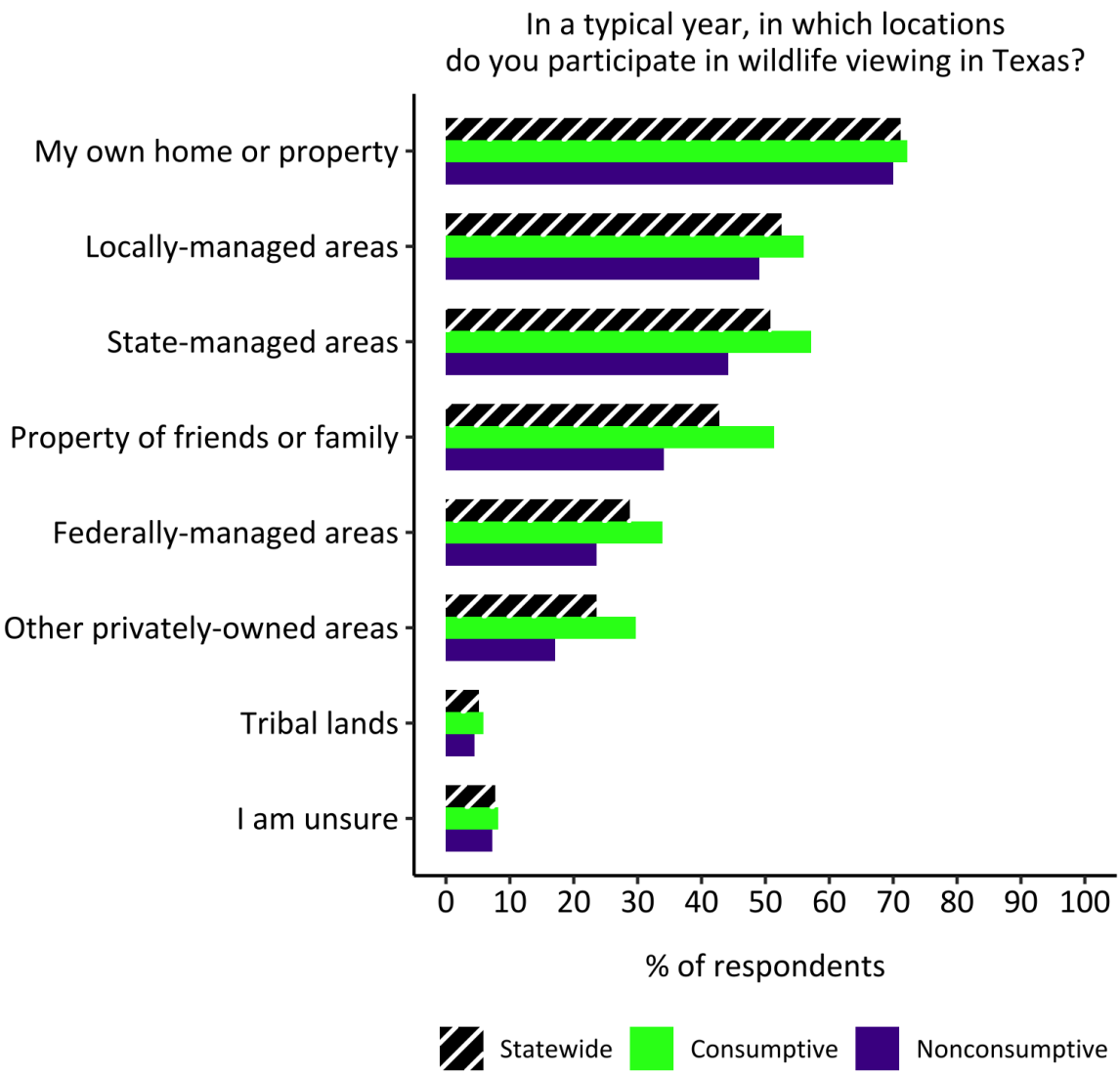

Figure 24: Wildlife viewing locations

Locations wildlife viewers in Texas reported participating in wildlife viewing in a typical year for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option. A chi-square test across regions revealed a number of statistically significant differences. Chi-square tests indicated that significantly more consumptive than nonconsumptive viewers participated in wildlife viewing on the property of a friend or family member, other private property, locally-managed lands, state-managed lands, and federally-managed lands (Table 18).

Wildlife viewing-related expenditures

Wildlife viewing-related expenditures generate significant economic activity; the National Survey of Wildlife Recreation valued wildlife viewing-related expenditures at $75.9 billion in 2016. This 2016 survey also assessed wildlife viewers' trip-related expenses (food and lodging, transportation, and other trip costs), equipment expenditures (wildlife-watching equipment,

auxiliary equipment, and special equipment), and total other expenses (land leasing and owning, plantings, membership dues and contributions, magazines, books, and DVDs; U.S. DOI et al., 2016). To ease respondent burden, we collapsed the National Survey of Wildlife Recreation categories into two: trip-related costs and all other wildlife viewing expenses and equipment. We provided respondents with a drop-down box consisting of 12 equal-sized ($50 increments) options informed by the range of responses in the National Survey of Wildlife Recreation.

Over half (53%) of survey respondents reported spending $100 or less on wildlife viewing trip-related costs annually. Just less than one-fifth (19%) of respondents reported spending no money on trip-related costs annually, and only 6.8% of respondents reported spending $501 or more on trip-related costs annually.

A chi-square test indicated that wildlife viewing-related expenditures varied significantly when comparing consumptive and nonconsumptive wildlife viewers. Over one-quarter (27%) of nonconsumptive viewers reported spending $0 annually on trip-related expenses, more than two times as many in comparison to consumptive viewers (12%) (Table 19; Figure 25).

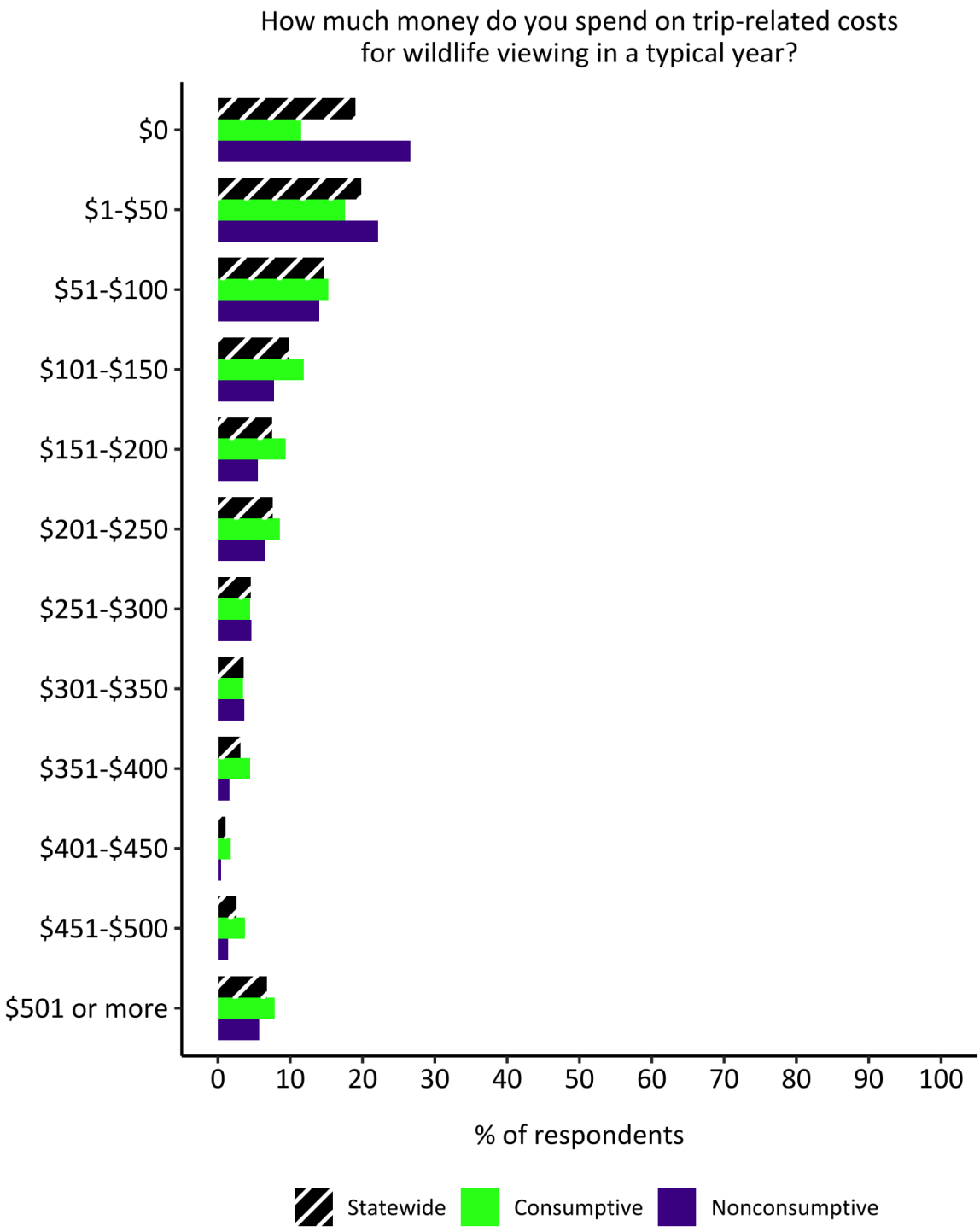

Figure 25: Trip-related wildlife viewing expenditures

Trip-related expenditures for wildlife viewing in a typical year reported by wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. A chi-square test indicated that wildlife viewing trip-related expenditures varied significantly when comparing consumptive and nonconsumptive wildlife viewers (Table 19).

We also asked wildlife viewers about their other wildlife viewing-related costs, such as binoculars, hiking or boating equipment for viewing, field guides, bird feeders or bird foods, or membership dues for wildlife viewing organizations. Similarly to trip-related costs, more than half of respondents (56%) indicated spending $100 or less on other wildlife viewing-related expenses. One-fifth of respondents reported spending no money annually, with about the same proportion (21%) spending $1-50 in a typical year. Only 5.8% of respondents reported spending $501 or more during a typical year.

Another chi-square test indicated that other wildlife viewing-related expenditures were significantly different between consumptive and nonconsumptive viewers, with far more nonconsumptive viewers spending between $0-50 in comparison to consumptive viewers, whose expenditures were generally higher (Table 20; Figure 26).

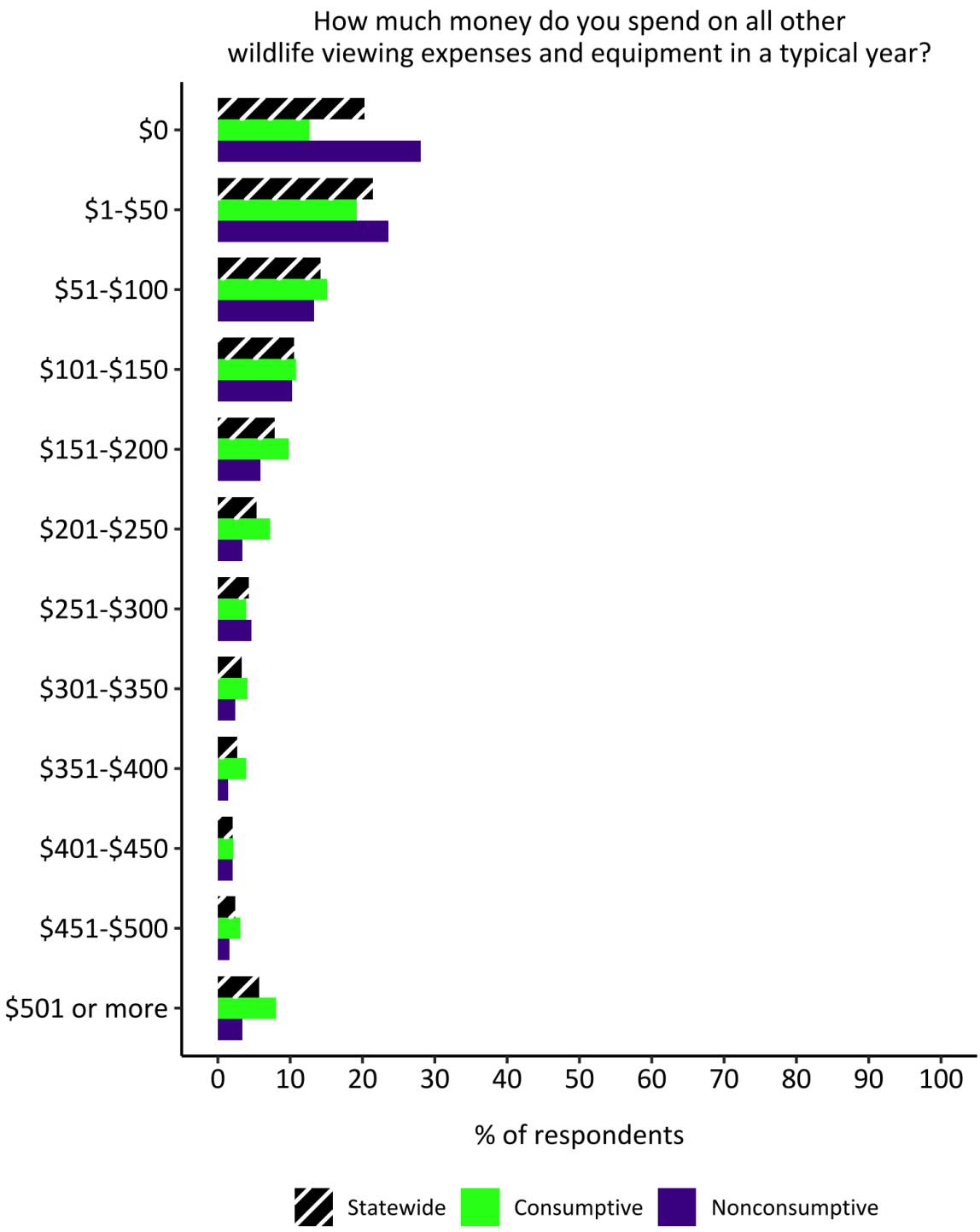

Figure 26: Other wildlife viewing-related expenditures

Other wildlife viewing-related expenditures in a typical year reported by wildlife viewers in Texas for statewide, consumptive. and nonconsumptive groups. A chi-square test indicated that other wildlife viewing-related expenditures varied significantly when comparing consumptive and nonconsumptive wildlife viewers (Table 20).

Other outdoor recreation

Recent research has demonstrated that many wildlife recreationists participate in multiple forms of outdoor recreation that may include both consumptive and nonconsumptive uses of wildlife (Grooms et al., 2019). In order to explore this overlap in recreation participation among wildlife viewers, we asked respondents to indicate which other form(s) of outdoor recreational activity, out of a list of 17 options, they participate in during a typical year besides wildlife viewing. The list of other outdoor recreation activities used in the survey was adapted from the Virginia Wildlife Recreation Survey (Grooms et al., 2019).

Overall in Texas, 84% of viewers indicated that they participate in at least one other form of outdoor recreation. On average, respondents indicated participation in about four other forms of outdoor recreation (M = 4.13, SD = 2.72). Only 7.7% of wildlife viewers did not participate in any other forms of outdoor recreation. Over half of wildlife viewers (54%) reported participating in running, walking, or jogging. Nearly half of wildlife viewers reported participating in camping (48%) and 40% participated in swimming. In Texas, the least popular forms of outdoor recreation among wildlife viewers were winter sports (such as skiing, snowboarding, or snowshoeing; 9.6%), non-motorized boating (such as kayaking or canoeing; 8.0%), and geocaching (7.2%).

As the classification of consumptive and nonconsumptive viewers used throughout this report was generated with the responses from this survey question, additional analyses on differences between consumptive and nonconsumptive viewers could not be performed for hunter-viewers, angler-viewers, or viewers who did not participate in any other forms of outdoor recreation. In Texas, just over half (51.4%) of respondents indicated that they participated in hunting and/or fishing. Specifically, wildlife viewers in Texas fish (30%), hunt (4.4%), and 17% both hunt and fish (meaning 47% total viewers fish and 21% total viewers hunt).

Chi-square tests indicated many statistically significant differences between consumptive and nonconsumptive wildlife viewers, although with low number of respondents for several of the categories for both consumptive and nonconsumptive viewers (Table 21; Figure 27). Significantly more consumptive viewers participated in all other forms of outdoor recreation in comparison to nonconsumptive viewers, except for geocaching and running, jogging, or walking, for which frequencies were not statistically significantly different between viewer categories. In addition, we found that 16% of nonconsumptive viewers did not participate in any of the forms of outdoor recreation listed in our survey, which is more than twice the proportion of all survey respondents (7.7%).

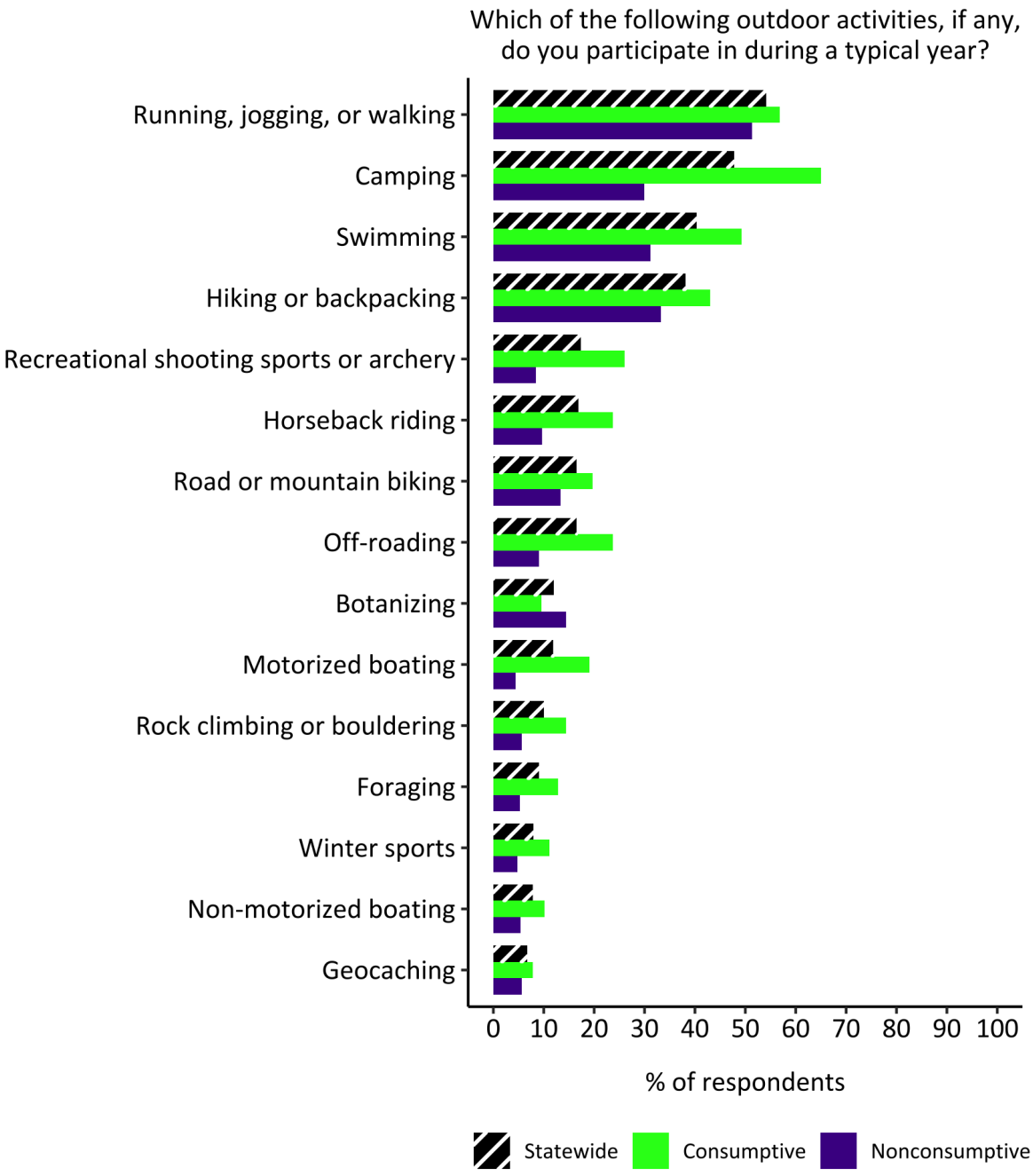

Figure 27: Other outdoor recreation activities

Outdoor activities that wildlife viewers in Texas report participating in during a typical year for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option. Hunting and fishing are omitted from the figure as these activities were used to generate the consumptive and nonconsumptive group definitions and the category for no other activities is excluded since all of these viewers are "nonconsumptive" by default. Chi-square tests indicated statistically significant differences between consumptive and nonconsumptive wildlife viewers for all testable forms of outdoor recreation, except for running, jogging, or walking and geocaching (Table 21).

Conservation behaviors

The literature shows that wildlife viewers, particularly hunter–birdwatchers (similar to our consumptive viewers, which also includes anglers), are more likely to engage in pro-environmental behaviors, or conservation behaviors, than non-wildlife viewers (Cooper et al., 2015). We asked respondents to indicate how likely they would be to participate in seven different conservation behaviors within the next five years, if they had the opportunity to do so. These conservation behaviors were adapted from survey items used by Larson et al. (2015) and were selected to represent each of the four pro-environmental behavior domains identified in that study. Larson et al. (2015) described pro-environmental behaviors in the following four domains: 1) conservation lifestyle, which includes private, household activities with environmental benefits, such as recycling and green consumerism; 2) land stewardship, which involves interaction with local ecosystems to create, manage, or monitor wildlife habitats; 3) social environmentalism, which refers to activities that center on social interaction, such as communicating with or teaching others about the environment or environmental actions; and 4) environmental citizenship, which refers to financial or political contributions to environmental causes through donations, voting, and other forms of advocacy.

Wildlife viewers most often reported being likely to clean up trash or litter, with 57% of respondents selecting that they were *very likely* or *extremely likely* to participate in this conservation behavior (Table 22; Figure 28). Texans were next most likely to participate in purchasing products that benefit wildlife or whose proceeds support conservation, with 35% of respondents selecting that they were *very likely* or *extremely likely* to participate in this conservation behavior. Next, nearly one-third (32%) of respondents reported that they were *very likely* or *extremely likely* to participate in civic engagement (such as voting or advocating) related to wildlife conservation. Respondents least often reported being *very likely* or *extremely likely* to collect data on wildlife or habitats to contribute to science or management (25%) or to inform or teach others about wildlife conservation (23%).

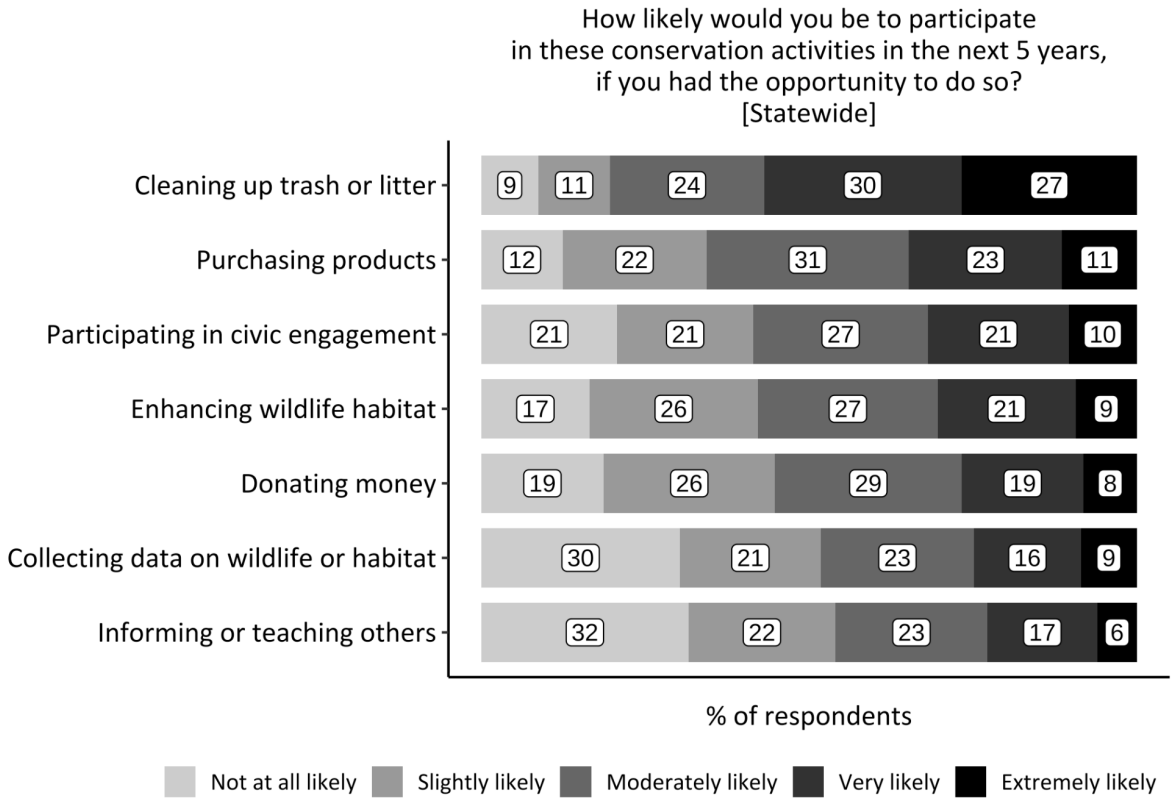

Figure 28: Likelihood of participating in conservation behaviors, statewide sample

Wildlife viewers' reported likelihood of participating in different conservation behaviors at the statewide level in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of gray darkens with increasing likelihood of participation.

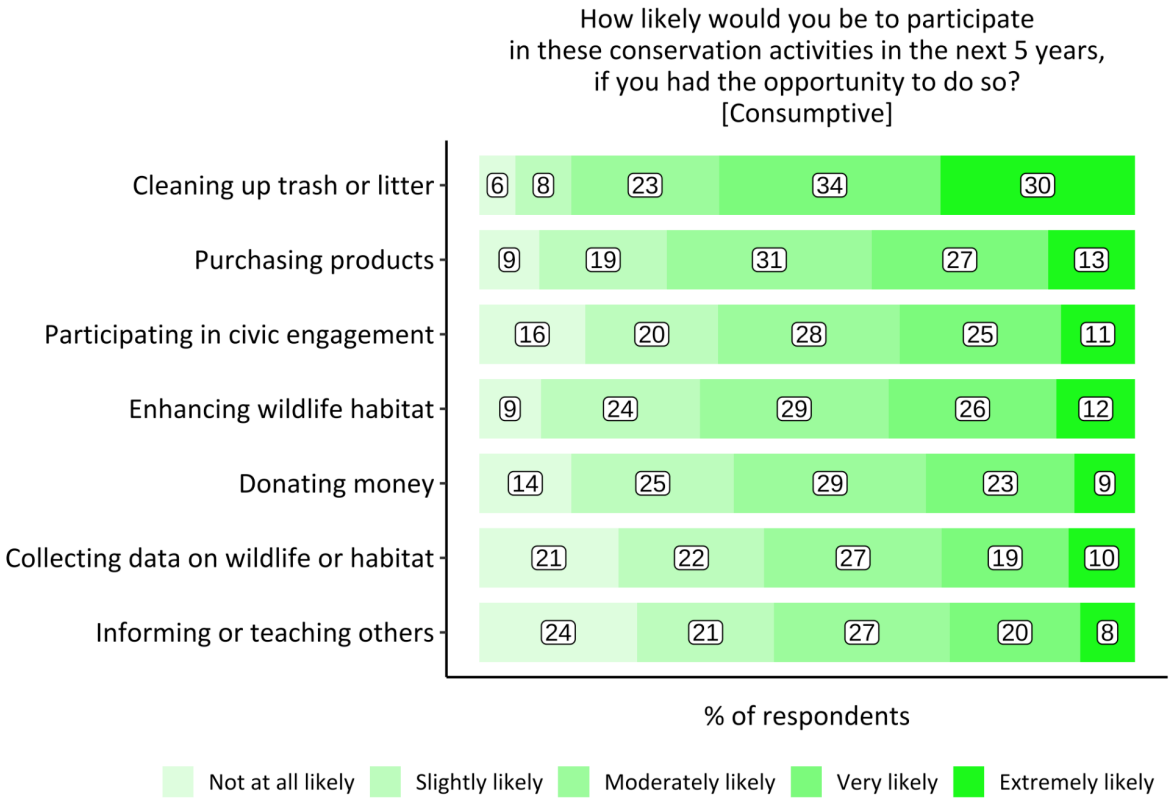

Figure 29: Likelihood of participating in conservation behaviors, consumptive respondents

Consumptive wildlife viewers' reported likelihood of participating in different conservation behaviors in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of green darkens with increasing likelihood of participation.

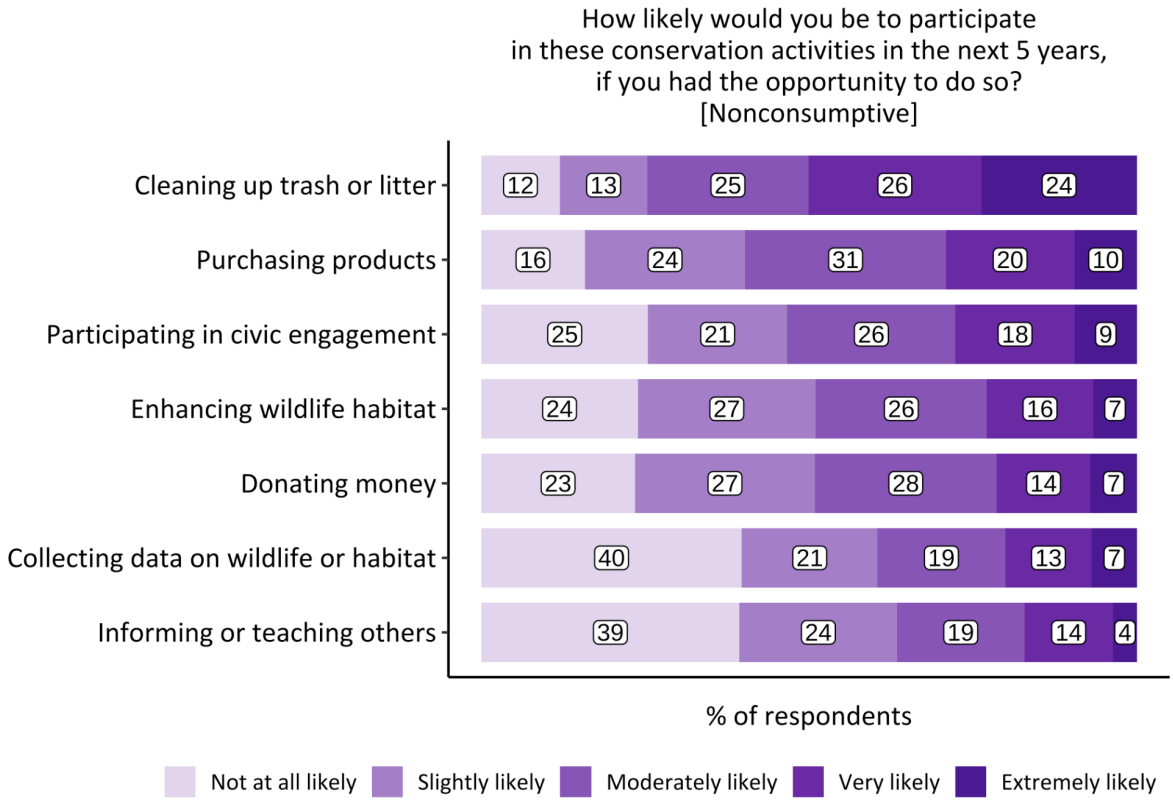

Figure 30: Likelihood of participating in conservation behaviors, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported likelihood of participating in different conservation behaviors in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of purple darkens with increasing likelihood of participation.

We also asked respondents to indicate how likely they would be to participate in these same seven conservation behaviors with or in support of TPWD within the next five years if they had the opportunity to do so. Again, wildlife viewers most often reported being *very likely* or *extremely likely* to clean up trash or litter (55%), purchase products that benefit wildlife or whose proceeds support conservation (35%), or support civic engagement (35%). They least often reported being *very likely* or *extremely likely* to work with or for their state agencies to collect data on wildlife or habitat (27%) or to inform or teach others about wildlife conservation (25%; Table 24; Figure 31).

Response patterns for this question were similar to the likelihood of wildlife viewers to conduct these activities independent of their state agencies, although for cleaning up trash or litter, wildlife viewers were slightly more likely to participate in this behavior independent of TPWD and for donating money to support wildlife conservation, wildlife viewers were slightly more likely to participate in this behavior with or in support of TPWD. Chi-square tests indicated

strong statistically significant differences for consumptive and nonconsumptive viewers for all conservation behaviors listed in the survey, with and without TPWD support. For all conservation behaviors, more consumptive wildlife viewers reported higher levels of likelihood of participating (Table 23; Table 25; Figures 29; Figure 30; Figure 32; Figure 33).

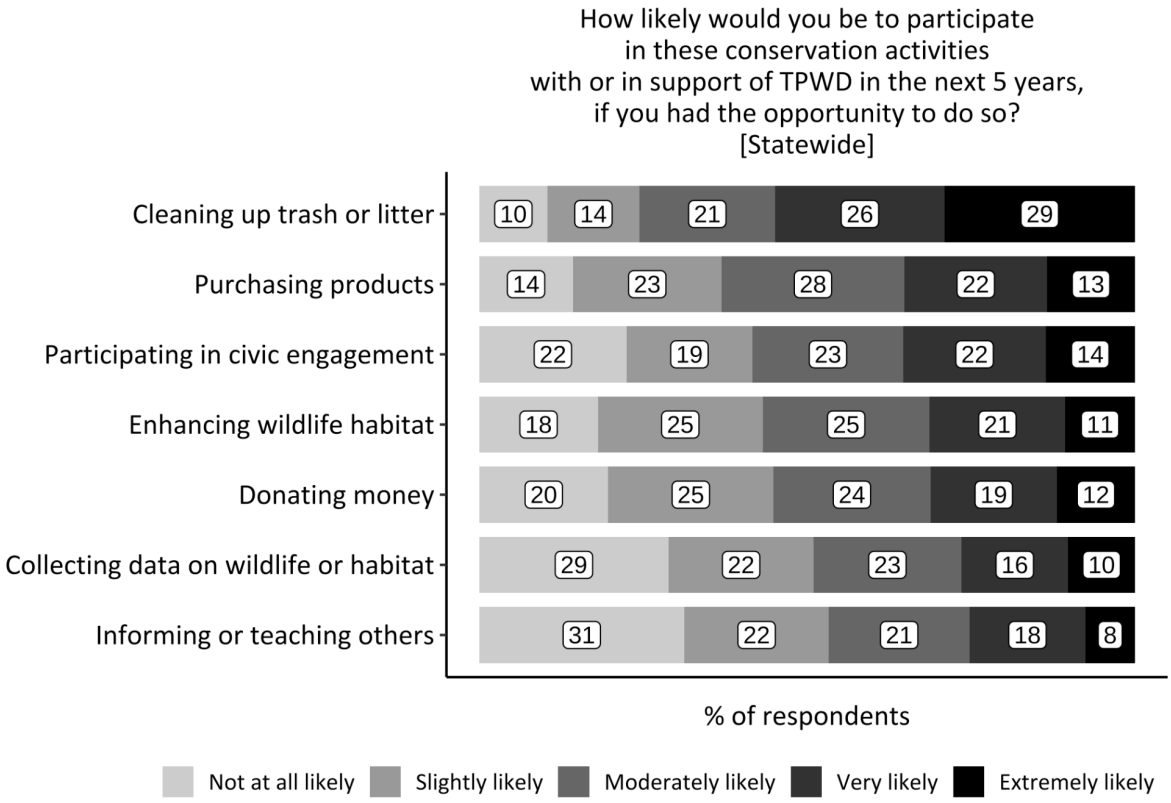

Figure 31: Likelihood of participating in conservation behaviors with or in support of state agency, statewide sample

Wildlife viewers' reported likelihood of participating in different conservation behaviors at the statewide level with or in support of TPWD in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of gray darkens with increasing likelihood of participation.

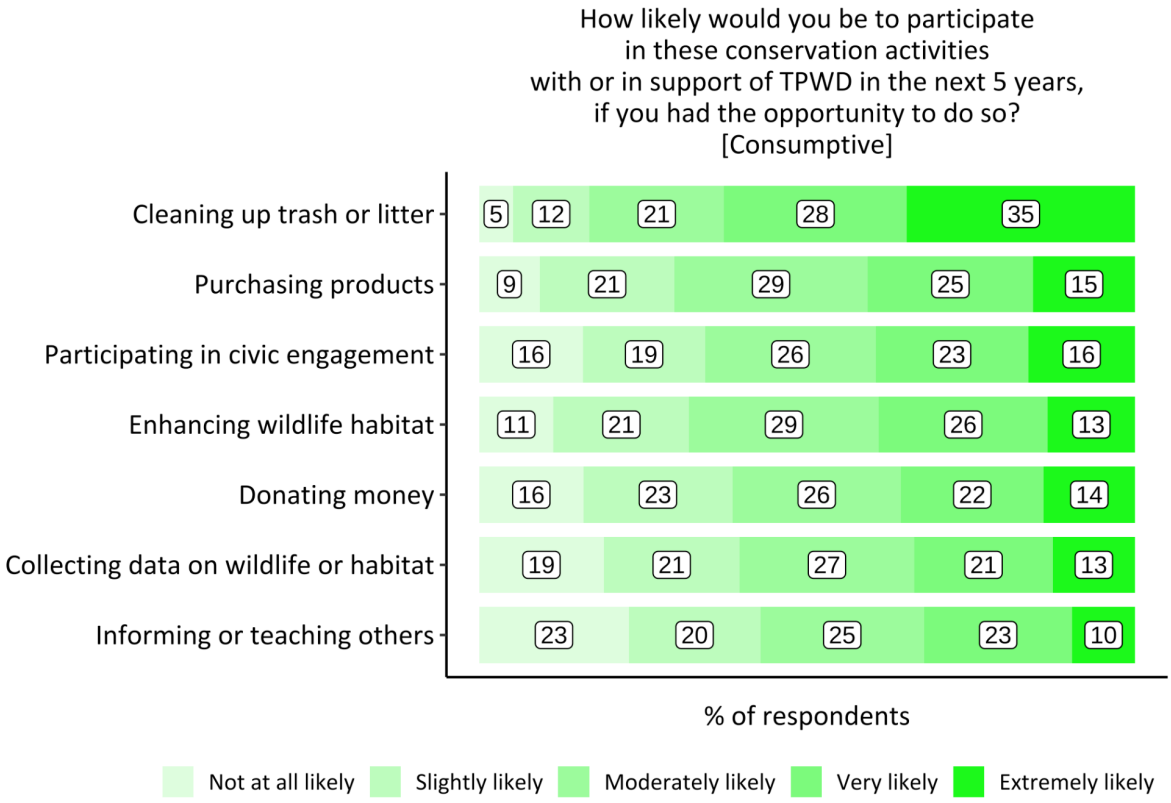

Figure 32: Likelihood of participating in conservation behaviors with or in support of state agency, consumptive respondents

Consumptive wildlife viewers' reported likelihood of participating in different conservation behaviors with or in support of TPWD in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of green darkens with increasing likelihood of participation.

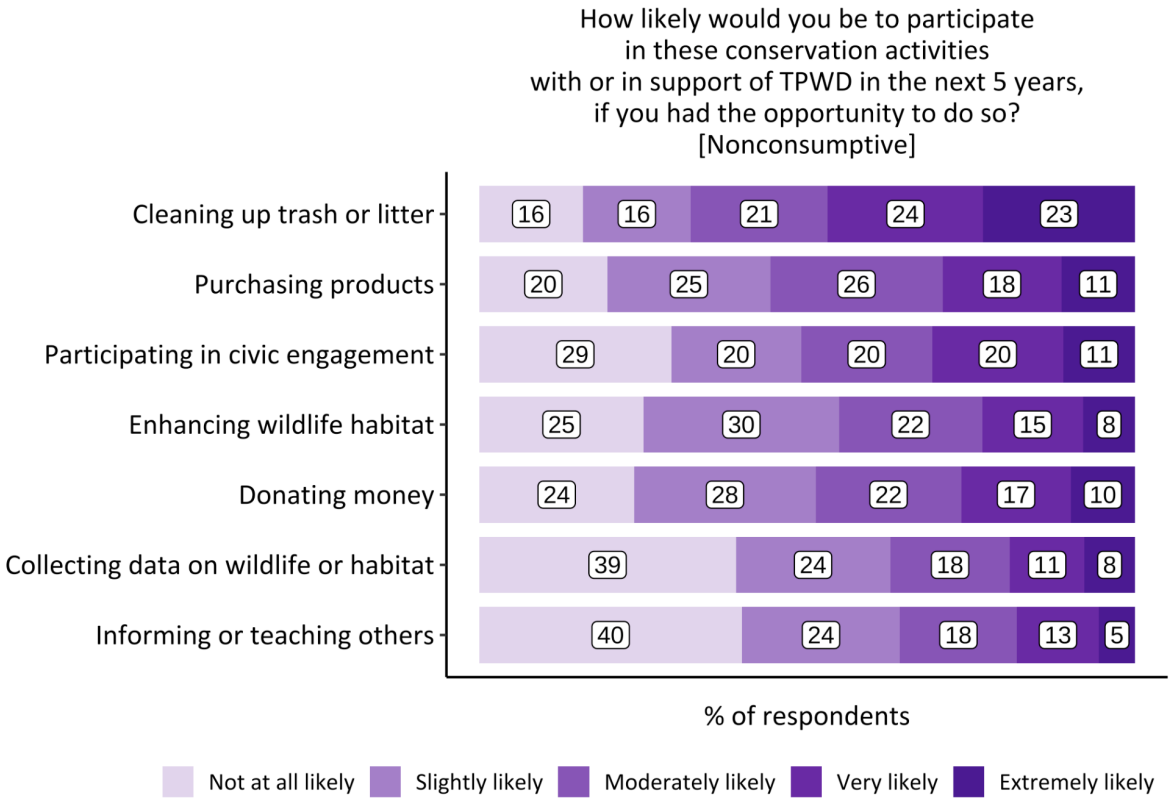

Figure 33: Likelihood of participating in conservation behaviors with or in support of state agency, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported likelihood of participating in different conservation behaviors with or in support of TPWD in the next 5 years, if they had the opportunity to do so. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of purple darkens with increasing likelihood of participation.

Barriers to wildlife viewing

Wildlife viewers experience a variety of barriers to their participation in the activity including but not limited to time, lack of financial or transportation resources, or not knowing where to view wildlife (U.S. DOI et al., 2016; Grooms et al., 2019; NAWMP, 2021). To examine barriers to participation in wildlife viewing, we provided respondents with a list of 14 common barriers and asked them to indicate the extent to which each of the barriers limited their participation in wildlife viewing, with response options ranging from 1 (*not at all*) to 5 (*a great deal*). We adapted the list from the National Survey of Birdwatchers (NAWMP, 2021) with input from our Multi-State Steering Committee.

Our results indicate that distance to high-quality locations for wildlife viewing is the greatest barrier of those examined in this study, with nearly two-thirds (63%) of respondents indicating

that distance limited participation in wildlife viewing *somewhat*, *quite a bit*, or *a great deal*. This was followed by lack of free time (54% limited *somewhat*, *quite a bit*, or *a great deal*) and financial costs associated with wildlife viewing (53% limited *somewhat*, *quite a bit*, or *a great deal*; Table 26; Figure 34). The barrier that limited wildlife viewers in Texas the least was crowds, with 39% of respondents indicating that this barrier limited their participation in wildlife viewing *somewhat*, *quite a bit*, or *a great deal*.

Chi-square tests indicated a few statistically significant differences for consumptive and nonconsumptive wildlife viewers. Generally, consumptive viewers were limited to a greater extent than nonconsumptive viewers by financial costs associated with wildlife viewing, few people who support their wildlife viewing activities, lack of people to view with, lack of organized opportunities for wildlife viewing, lack of transportation, and crowds in wildlife viewing locations. There were no barriers for which nonconsumptive viewers were limited to a greater extent than consumptive viewers (Table 27; Figures 35-36).

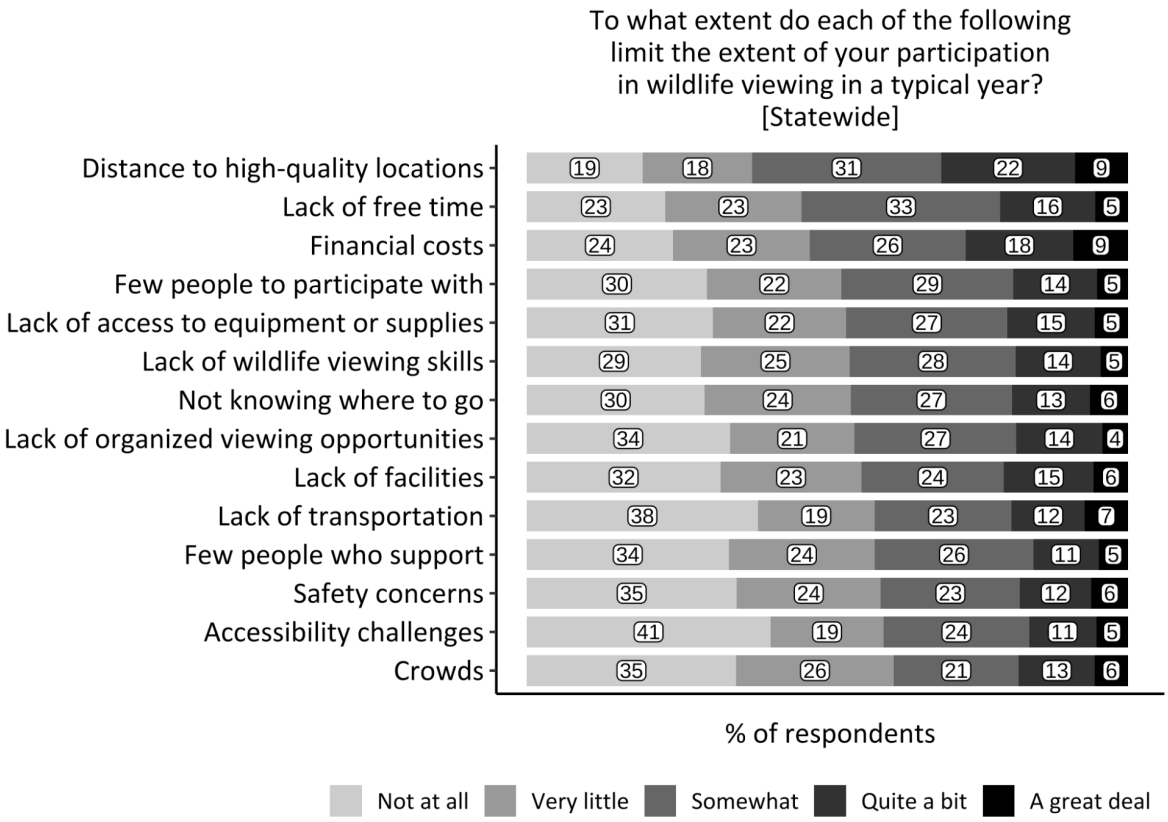

Figure 34: Barriers to wildlife viewing, statewide sample

Wildlife viewers' reported extent to which each of the barriers limited their participation in wildlife viewing at the statewide level. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all* to *a great deal*. The lightest gray boxes represent the viewers that indicated an item as being *not at all* a barrier to their participation; boxes darken as the level of barrier increases.

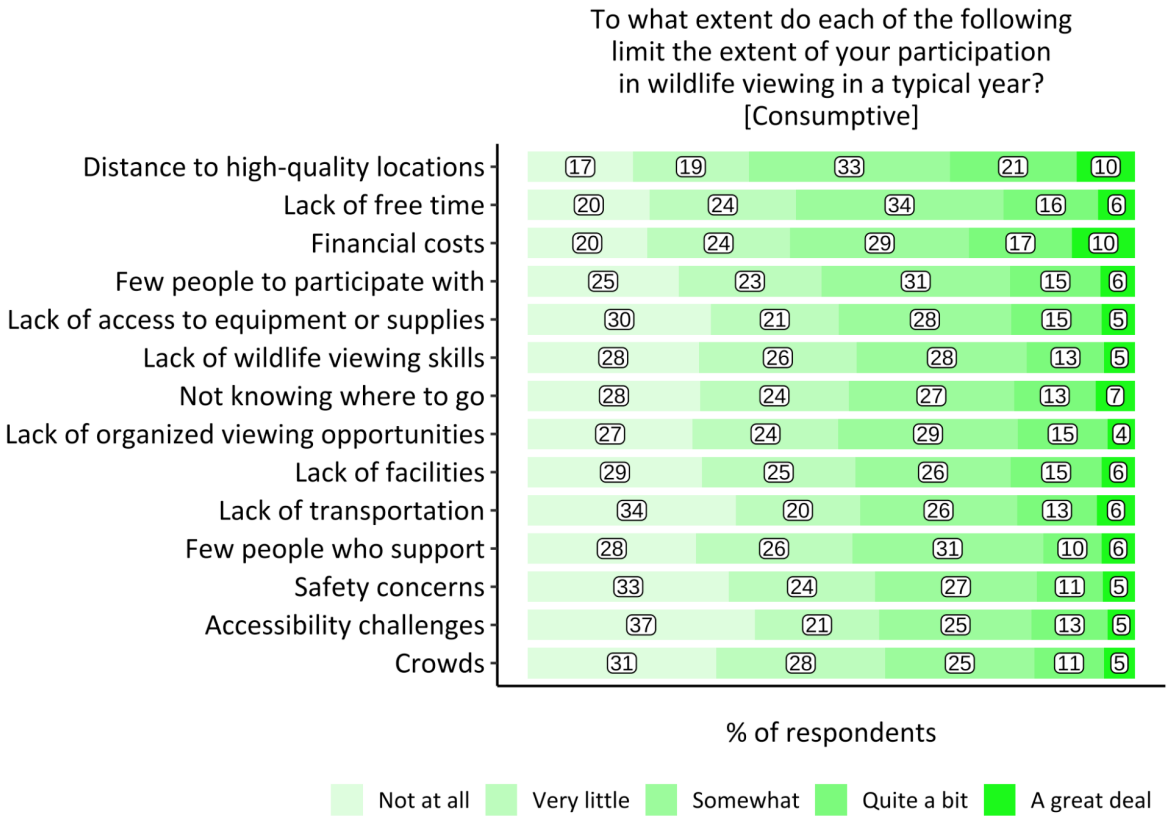

Figure 35: Barriers to wildlife viewing, consumptive respondents

Consumptive wildlife viewers' reported extent to which each of the barriers limited their participation in wildlife viewing. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all* to *a great deal*. The lightest green boxes represent the viewers that indicated an item as being *not at all* a barrier to their participation; boxes darken as the level of barrier increases.

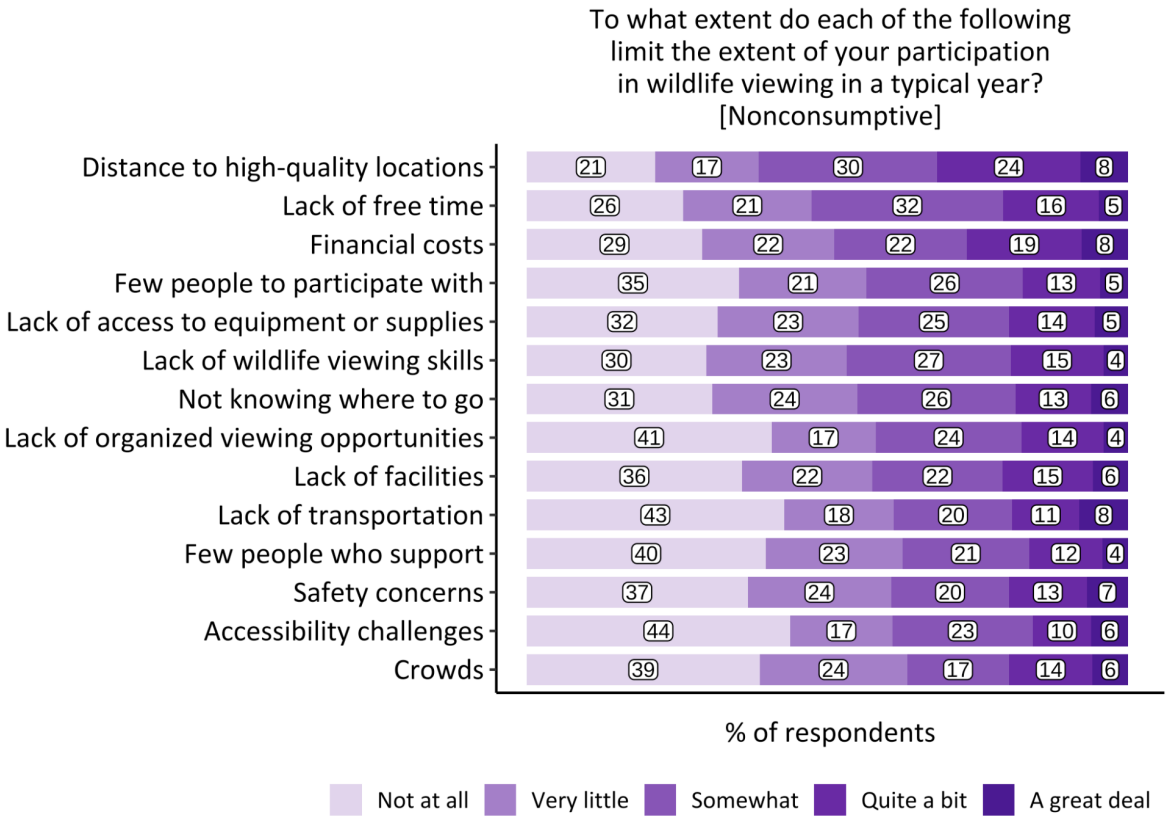

Figure 36: Barriers to wildlife viewing, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported extent to which each of the barriers limited their participation. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all* to *a great deal*. The lightest purple boxes represent the viewers that indicated an item as being *not at all* a barrier to their participation; boxes darken as the level of barrier increases.

Groups that encourage participation in wildlife viewing

Social support, or the resources either perceived or provided by friends, family, mentors, peers, and other groups (Gottlieb & Bergen, 2010), is linked to sustained higher levels of participation in outdoor recreation. For example, birders who have a friend or relative who also birds spend more time birding and have more birding knowledge than those who do not (Schoffman et al. 2015; Rutter et al., 2021). To further understand mechanisms of social support for wildlife viewing, we asked our respondents to what extent family, friends, peers, and mentors encourage their participation, with response options ranging from 1 (*not at all*) to 5 (*a great deal*).

Respondents indicated that family provided the greatest extent of encouragement to participate, with 67% indicating that family members encouraged their wildlife viewing *somewhat*, *quite a bit*, or *a great deal*. This was followed by friends at 56%, peers at 47%, and

mentors at 41%. Respondents relied on social support from mentors the least out of all four groups, with 44% of all respondents indicating that mentors did not encourage their participation at all.

Chi-square tests indicated that the extent to which each social group encouraged respondents' participation in wildlife viewing differed significantly between consumptive and nonconsumptive viewers for all social support groups (Tables 28-31; Figures 38-39). For family, friends, peers, and mentors, more nonconsumptive viewers reported that they felt no social support at all from these groups in comparison to consumptive viewers. Additionally, in all cases, more consumptive viewers reported that they felt that these social groups encouraged their participation in wildlife viewing *quite a bit* and *a great deal*.

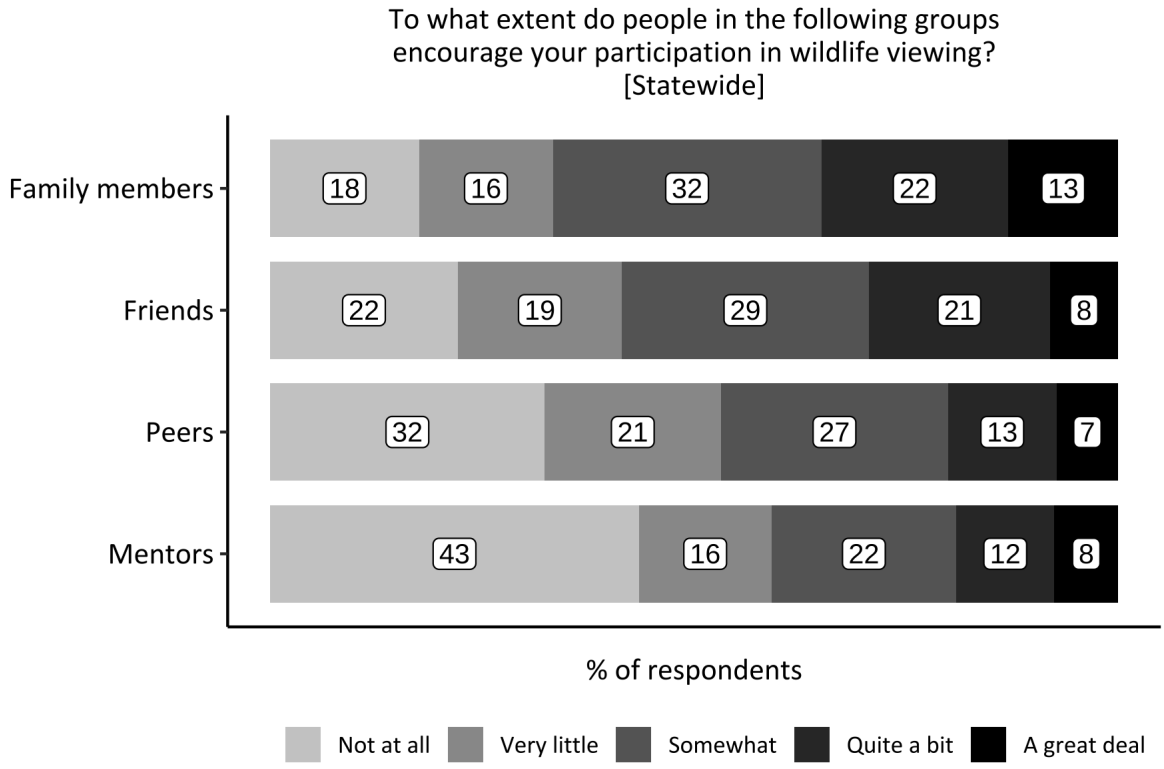

Figure 37: Groups that encourage viewing, statewide sample

The degree to which wildlife viewers at the statewide level feel encouraged to participate in wildlife viewing by four groups of people: family, friends, peers, and mentors. Blocks represent the percentage of respondents who fell into each of the five categories. The lightest shade of gray represents viewers that indicated the least amount of social support: *not at all*; blocks darken with increasing levels of support.

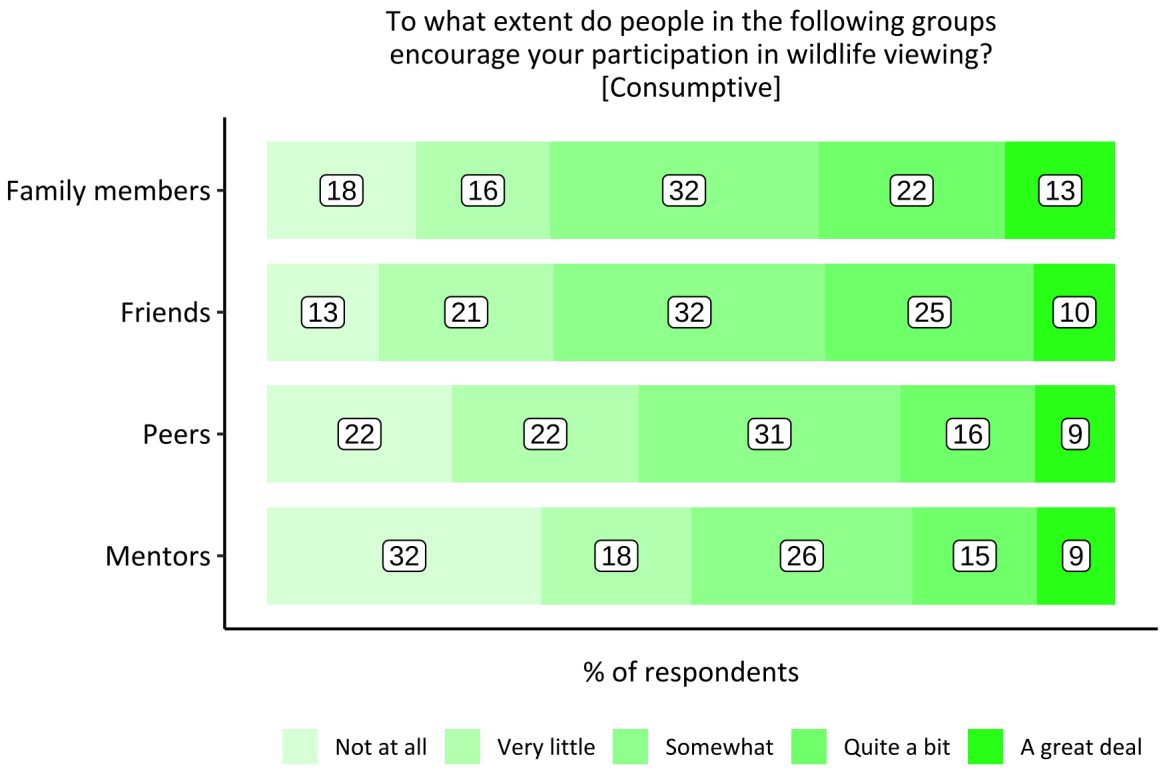

Figure 38: Groups that encourage viewing, consumptive respondents

The degree to which consumptive wildlife viewers in Texas feel encouraged to participate in wildlife viewing by four groups of people: family, friends, peers, and mentors. Blocks represent the percentage of respondents who fell into each of the five categories. The lightest shade of green represents viewers that indicated the least amount of social support: *not at all*; blocks darken with increasing levels of support.

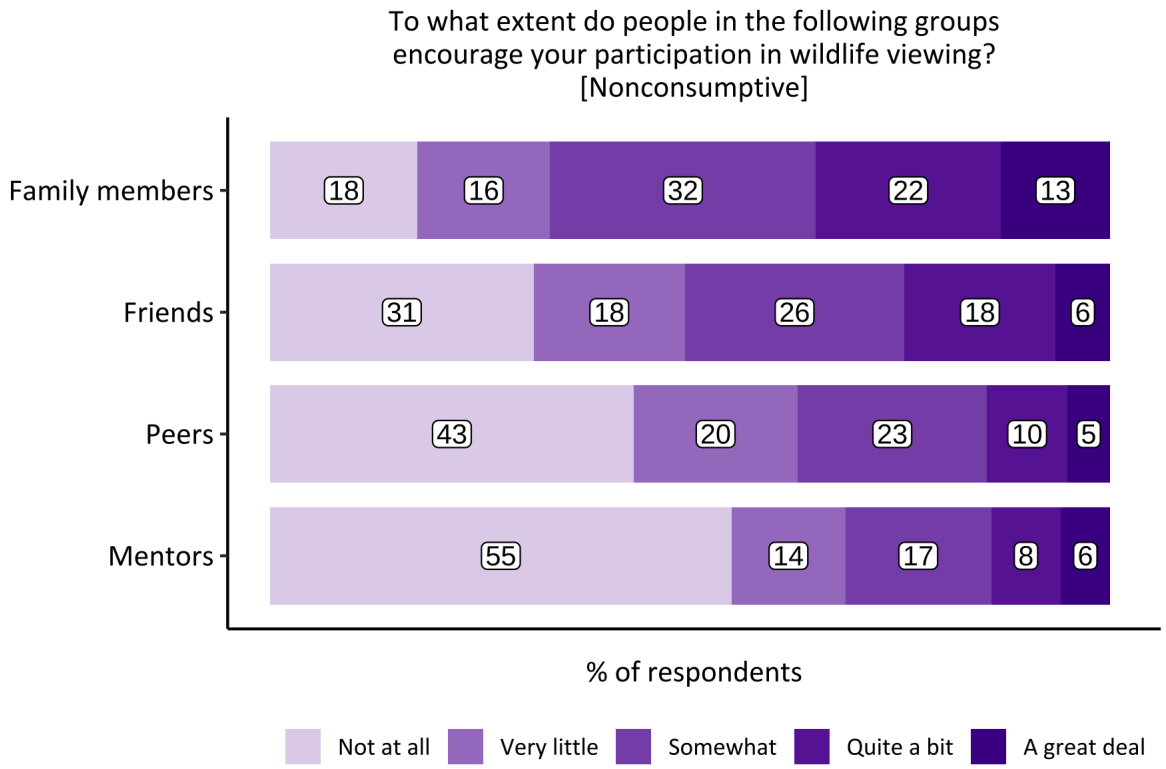

Figure 39: Groups that encourage viewing, nonconsumptive respondents

The degree to which nonconsumptive wildlife viewers in Texas feel encouraged to participate in wildlife viewing by four groups of people: family, friends, peers, and mentors. Blocks represent the percentage of respondents who fell into each of the five categories. The lightest shade of purple represents viewers that indicated the least amount of social support: *not at all*; blocks darken with increasing levels of support.

Accessibility and wildlife viewing

According to the Centers for Disease Control, 26% of American adults experience some type of disability (CDC, 2020). Historically, surveys and planning efforts for wildlife viewing have largely overlooked the needs and concerns of wildlife viewers with disabilities, beyond achieving Americans with Disabilities Act compliance (Williams et al., 2004; Michopoulou et al., 2015). As people with disabilities comprise a significant portion of the adult U.S. population, we considered how this lack of focus on addressing their needs impacts their wildlife viewing experience. To do so, we asked respondents about the extent to which they experience accessibility challenges related to wildlife viewing. We used a definition of the term "accessibility challenges" developed by Birdabilty (Rose & McGregor, 2021). Birdability defines accessibility challenges as:

> The difficulties someone experiences in interacting with or while using the physical or social environment while trying to engage in a meaningful activity (such as wildlife

viewing). This may be a result of a mobility challenge, blindness or low vision, intellectual or developmental disabilities (including Autism), mental illness, being Deaf or Hard of Hearing, or other health concerns.

We found that 36% of wildlife viewers in Texas experience *somewhat*, *quite a bit*, or *a great deal* of accessibility challenges (Table 32; Figure 40). A chi-square test indicated a statistically significant difference in the experience of accessibility challenges for consumptive and nonconsumptive viewers. Specifically, we found that 46% of nonconsumptive viewers did *not at all* experience accessibility challenges, in comparison to 37% of consumptive viewers (χ^2 = 10.98, *df* = 4, *p* = .03, Table 32; Figure 40).

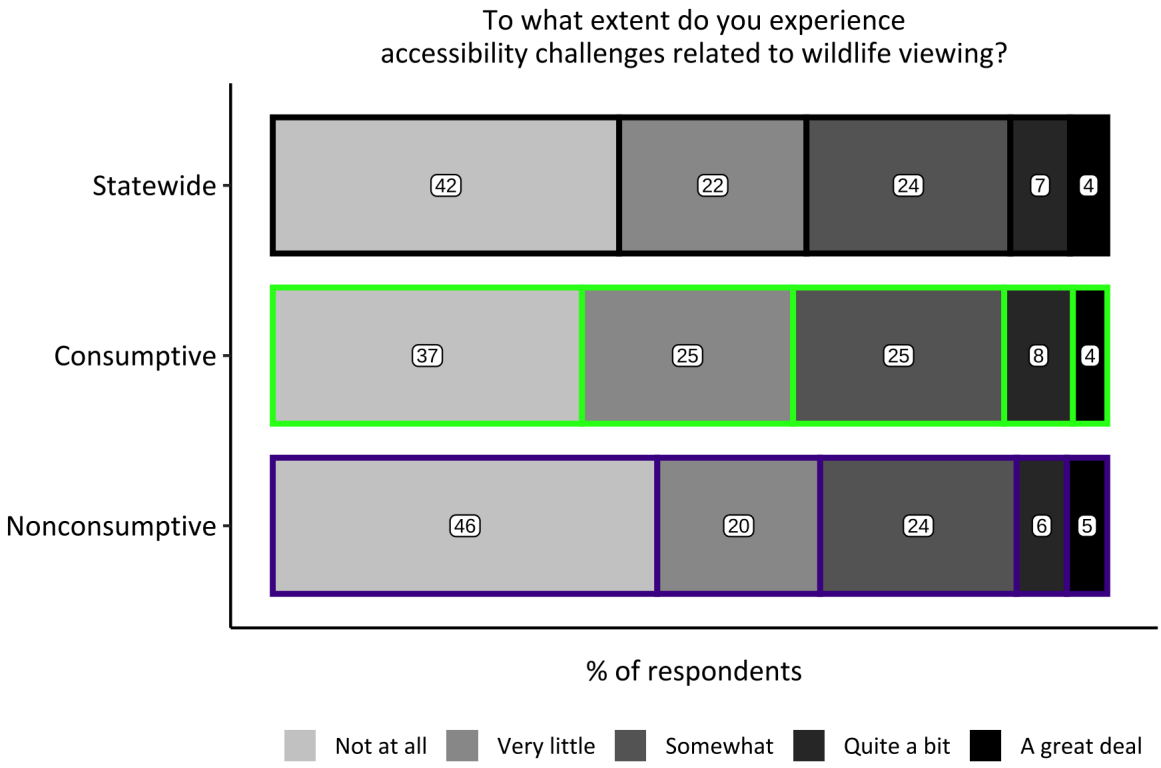

Figure 40: Accessibility challenges and wildlife viewing, all respondents

Wildlife viewers' extent to which they experience accessibility challenges for statewide, consumptive, and nonconsumptive groups. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all* to *a great deal*. A chi-square test indicated a statistically significant difference in the experience of accessibility challenges for consumptive and nonconsumptive viewers (Table 32).

Familiarity

An individual's familiarity with an organization or entity may serve as an indicator of likelihood to contribute financially and a metric of that individual's perception of the entity (Katz, 2017).

As state agencies endeavor to increase their engagement with a broader constituency (AFWA & WMI, 2016), familiarity may serve as an important indicator in measuring viewers' relationships with agencies and likelihood to provide financial support (Katz, 2017; Grooms, 2021). Consumptive viewers, such as hunters and anglers, may have more interaction with state fish and wildlife agencies due to permitting and license regulations (Grooms, 2021).

We utilized a variety of questions to thoroughly examine familiarity. We asked wildlife viewers to indicate their level of familiarity with their state fish and wildlife agency, with five unipolar options ranging from *not at all familiar* to *extremely familiar.* Well over half of wildlife viewers were *slightly* or *moderately familiar* with TPWD (59%). Just 10% of respondents were *extremely familiar* with TPWD and only 6.9% were not familiar with the agency at all (Table 33; Figure 41). A chi-square test indicated a statistically significant difference in familiarity with TPWD across consumptive and nonconsumptive viewers, with more nonconsumptive viewers being *not at all familiar* or only *slightly familiar* with the state agency ($\chi^2 = 79.29$, $df = 4$, $p < .001$; Table 33; Figure 41). About 44% of nonconsumptive viewers were *not at all familiar* or only *slightly familiar* with TPWD, in comparison to just 21% of consumptive viewers (Table 33; Figure 41).

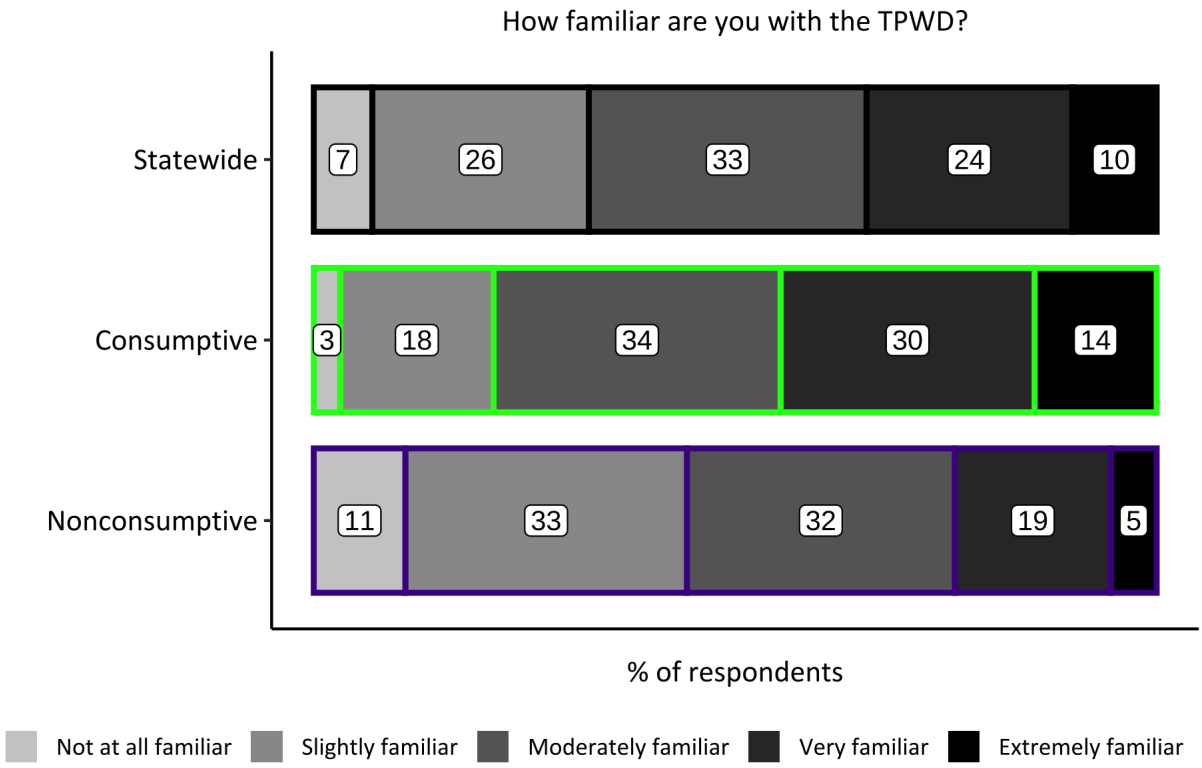

Figure 41: Familiarity with TPWD, all respondents

Wildlife viewers' self-reported level of familiarity with TPWD for statewide, consumptive, and nonconsumptive groups. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all familiar* to *extremely familiar*. A chi-square test indicated a statistically significant difference in familiarity with the TPWD for consumptive and nonconsumptive viewers (Table 33).

Next, we investigated specific aspects of familiarity, including familiarity with TPWD staff, programs, lands, and mission. We found that 28% of respondents reported being *not at all familiar* with TPWD staff. Over half of respondents (52%) reported that they were *slightly* or *moderately* familiar with agency staff, and 19% were *very* or *extremely familiar* with agency staff. Over half of respondents were *slightly* or *moderately familiar* with TPWD programs (57%), mission (52%), or lands (59%; Figure 42). Over half (58%) of respondents were *slightly* or *moderately* familiar with TPWD programs and 17% were *very* or *extremely familiar* (Figure 42).

Chi-square tests indicated highly statistically significant differences in familiarity between consumptive and nonconsumptive viewers for all four aspects of TPWD (Tables 34-37; Figure 42). In all cases, nonconsumptive viewers were more likely to be *not at all familiar* with state agency lands, programs, staff, and mission than consumptive viewers. Indeed, over one-third (37%) of nonconsumptive viewers were *not at all familiar* with TPWD staff.

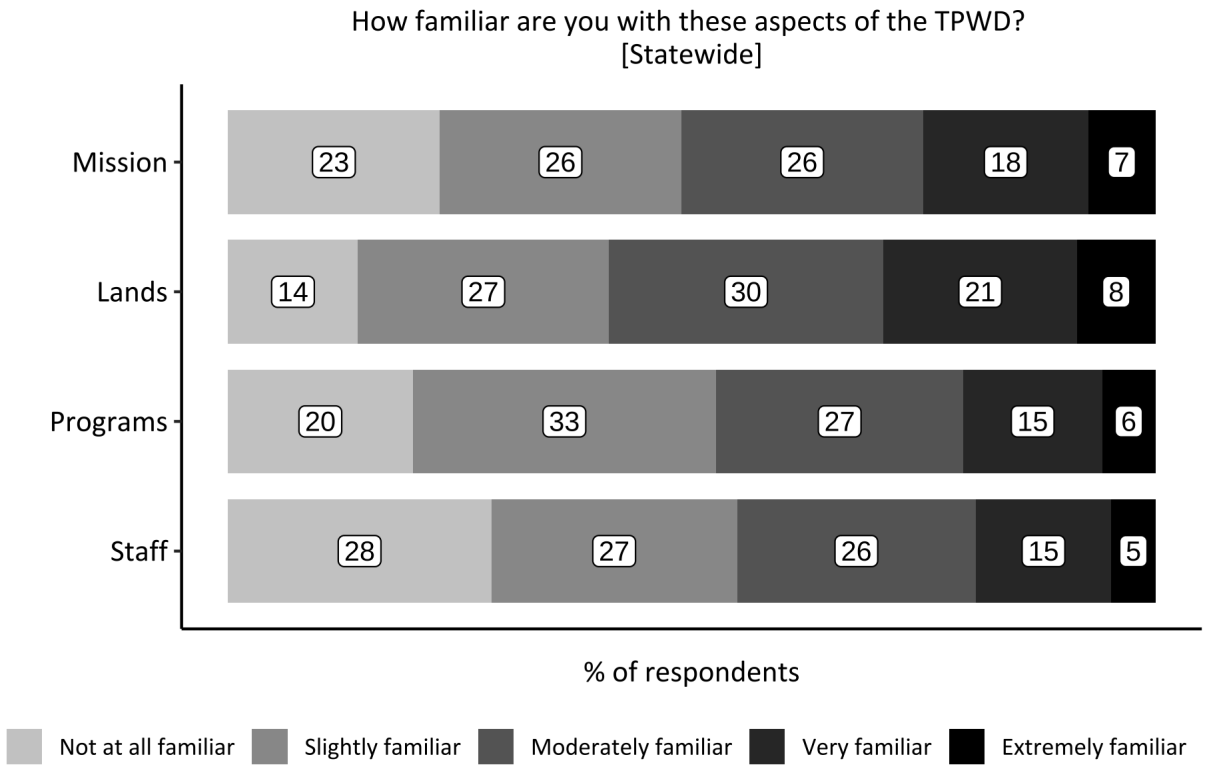

Figure 42: Familiarity with different aspects of TPWD, statewide sample

Wildlife viewers' self-reported level of familiarity with specific aspects of TPWD (mission, lands, programs, and staff) at the statewide level. Blocks represent the percentage of respondents who fell into each of the five categories: *not at all familiar* to *extremely familiar*.

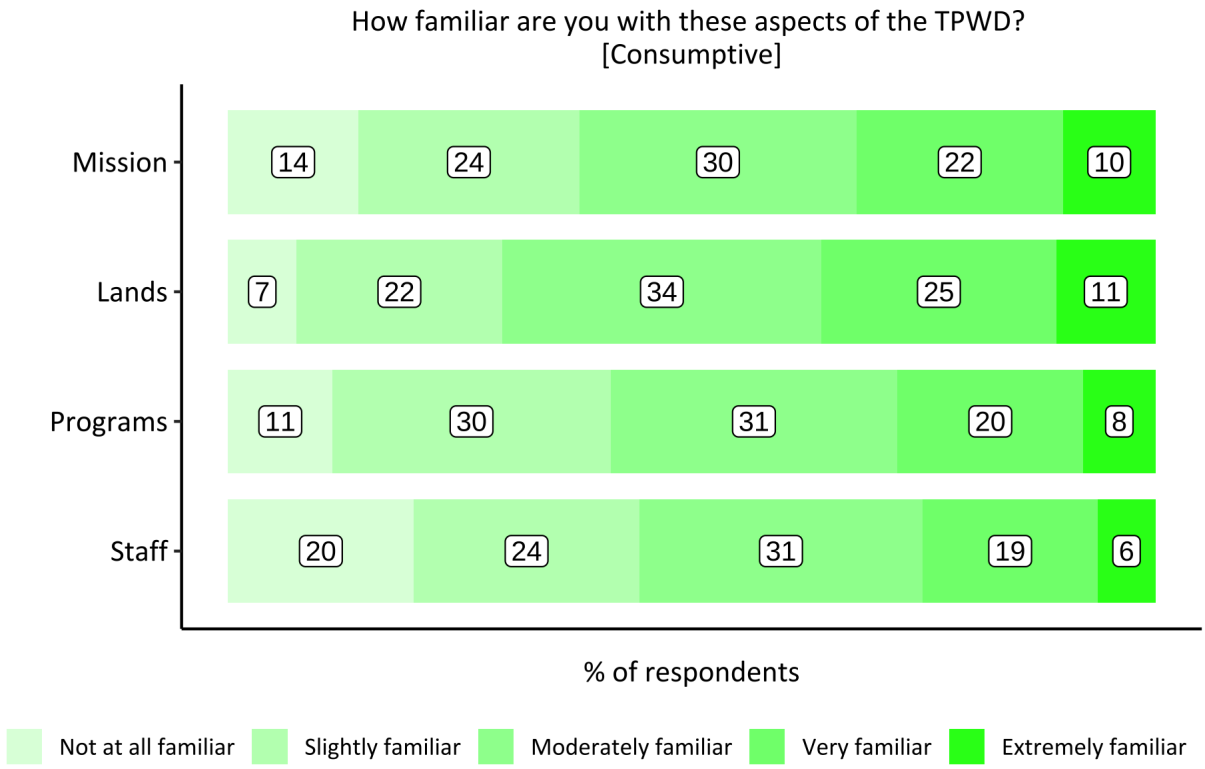

Figure 43: Familiarity with different aspects of TPWD, consumptive respondents

Consumptive wildlife viewers' self-reported level of familiarity with specific aspects of TPWD (mission, lands, programs, and staff). Blocks represent the percentage of respondents who fell into each of the five categories: *not at all familiar* to *extremely familiar*.

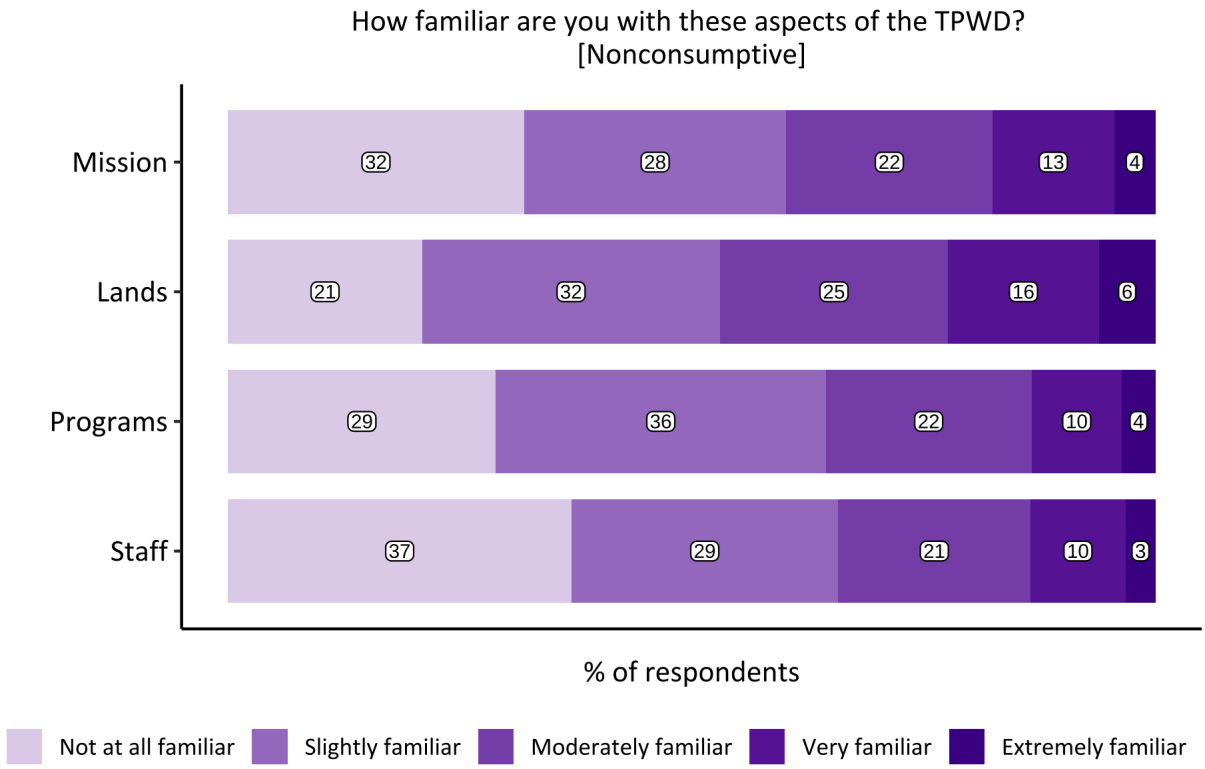

Figure 44: Familiarity with different aspects of TPWD, nonconsumptive respondents

Nonconsumptive wildlife viewers' self-reported level of familiarity with specific aspects of TPWD (mission, lands, programs, and staff). Blocks represent the percentage of respondents who fell into each of the five categories: *not at all familiar* to *extremely familiar*.

As our final measure of familiarity, we utilized a logo recognition question (Van Grinsven & Das, 2016). We asked respondents, "Have you seen this logo before?", accompanied with an image of the Texas TPWD logo. Statewide, 87% of respondents indicated "Yes, I have seen this logo before." A chi-square test indicated that significantly more consumptive viewers (91%) than nonconsumptive viewers (77%) had seen the TPWD logo before, although the majority of both groups recognized the TPWD logo ($\chi^2 = 32.24$, $df = 1$, $p < .001$; Table 38; Figure 45).

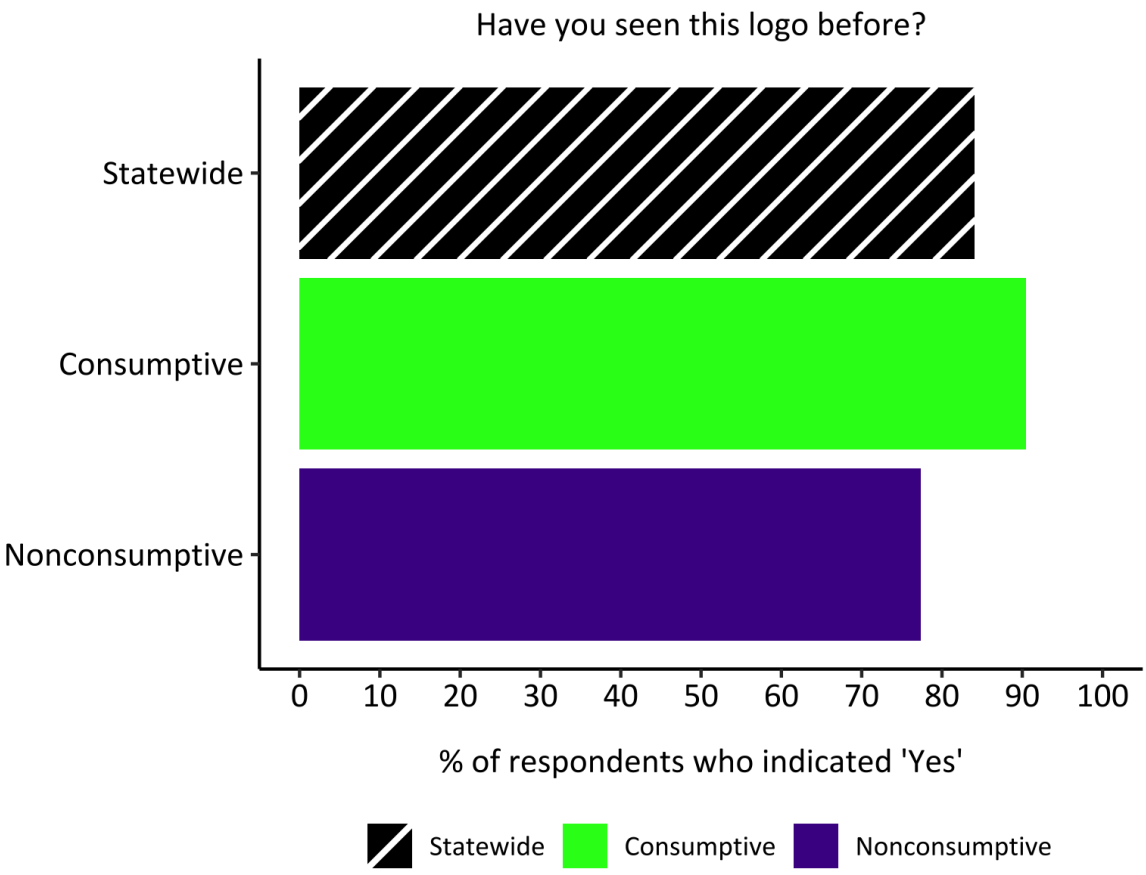

Figure 45: TPWD Logo recognition, all respondents

Wildlife viewers' recognition of the TPWD logo for statewide, consumptive, and nonconsumptive groups. Bars indicate the percentage of respondents who indicated "Yes, I have seen this logo before." A chi-square test indicated that significantly more consumptive viewers than nonconsumptive viewers had seen the TPWD logo before (Table 38).

Perception of state agency prioritization of programs and services for wildlife viewing

To further examine wildlife viewer perceptions of TPWD, we examined viewers' thoughts on TPWD's prioritization of programs and services that support wildlife viewing. In previous research in Virginia, no differences between birder-viewers and hunter-anglers were found when comparing the prioritization of programs and services that support wildlife viewing (Grooms et al., 2021). The majority of both consumptive and nonconsumptive viewers in Virginia felt that the agency was giving about the right level of prioritization to programs and services that support wildlife viewers, followed by about a quarter who thought that it was not high enough (Grooms et al., 2021). In this survey, we evaluated respondents' perceptions of TPWD by examining how wildlife viewers perceive the level of prioritization the state agency places on programs and services that support wildlife viewing. We provided respondents with a

five-point bipolar scale ranging from 1 (*far too low*) to 5 (*far too high*), with *about right* as the middle third option and a sixth option of "I don't have an opinion," which 13% (*n* = 126) of respondents from the state level selected and were treated as missing values in the following analysis.

The majority of respondents in Texas reported that they felt the level of prioritization of programs and services for wildlife viewing was *about right* (65%). Just over one-quarter of respondents (27%) reported the level of prioritization was *too low* or *far too low*, indicating interest in seeing additional efforts from the State of Texas to support wildlife viewing. Only 8.1% of respondents felt that the level of prioritization was *too high* or *far too high*. A chi-square test indicated that the differences between consumptive and nonconsumptive viewers regarding the perceived levels of prioritization of consumptive and nonconsumptive viewers were statistically significant, with a higher percentage of consumptive viewers rating TPWD's prioritization of wildlife viewing programs and services as *about right* and a higher percentage of nonconsumptive viewers deeming the level of prioritization as *too low* (Table 39; Figure 46).

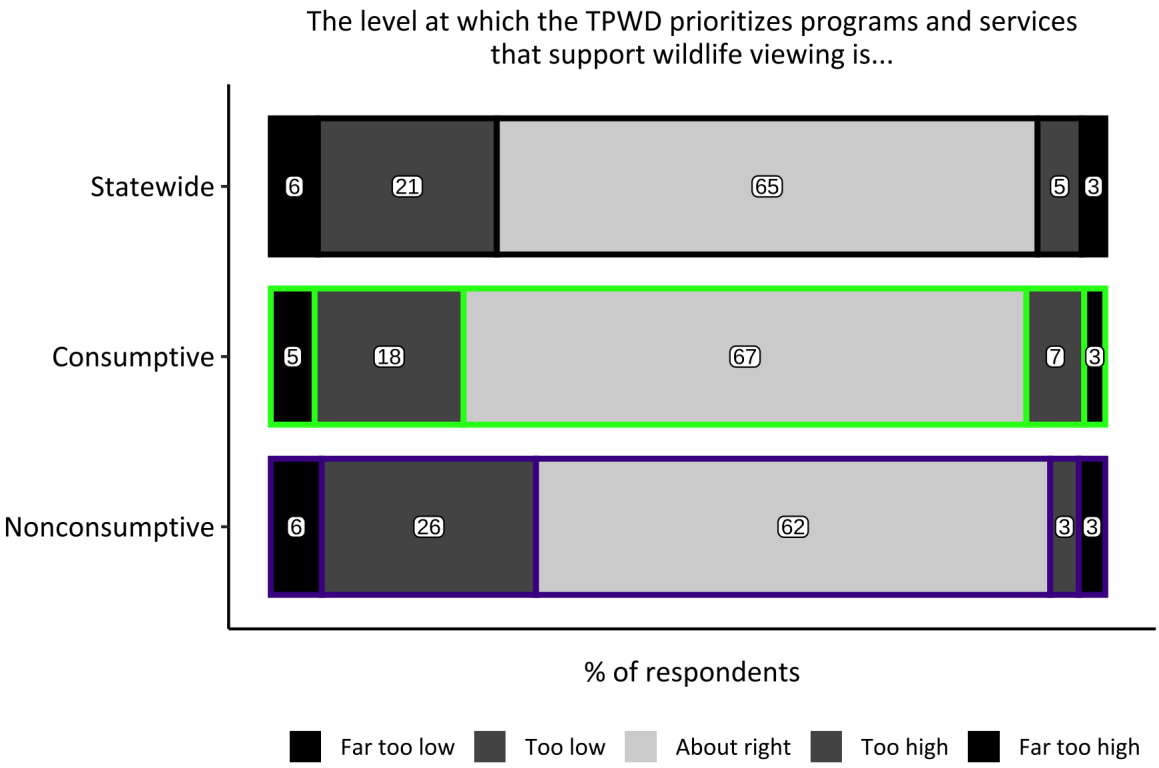

Figure 46: Perception of TPWD prioritization of programs and services for wildlife viewing, all respondents

Wildlife viewers' perception of TPWD's prioritization of programs and services for wildlife viewing for statewide, consumptive, and nonconsumptive groups. Blocks represent the percentage of respondents who fell into each of the five categories: *far too low* to *far too high*. The lightest shade of gray indicates the percentage of respondents who felt the level of prioritization was *about right*. A chi-square test indicated that the differences between consumptive and nonconsumptive viewers regarding the perceived levels of prioritization of viewer programing and services by the state agency was statistically significant (Table 39).

Experiences with state agency programs and services

We further explored wildlife viewer relationships with TPWD by asking about which state agency programs and services, out of a list of nine, they had engaged with in the past five years. This list was modified by state agency representatives from Texas to reflect the items offered by TPWD; live stream wildlife cameras were excluded from the list of response options as this is currently not available. A 10th option, "I have not used or engaged in any of these agency programs and services in the last five years," was provided, which was selected by 36% of all survey respondents in Texas.

Of the remaining 65% of respondents who reported utilizing at least one agency program and service, 27% selected only one response option. Wildlife viewers in Texas most commonly used

TPWD lands (34%). The next most used agency services were information about wildlife in Texas (30%) and TPWD nature, education, or visitor centers (26%). The least used agency programs were wildlife festivals or viewing competitions sponsored by TPWD (8.1%) and programs or presentations for groups or clubs (7.9%).

Chi-square tests indicated statistically significant differences in participation for consumptive and nonconsumptive viewers for most listed agency programs, with the exception of TPWD nature, education, or visitor centers and volunteer opportunities, not related to research or data collection (Table 40; Figure 47). For all other response options, consumptive viewers were more likely to have utilized the agency program or service than nonconsumptive viewers. Notably, 45% of nonconsumptive viewers had no experience with TPWD programs or services in comparison to 27% of consumptive viewers ($\chi^2 = 36.42$, $df = 1$, $p < .001$; Table 40; Figure 47).

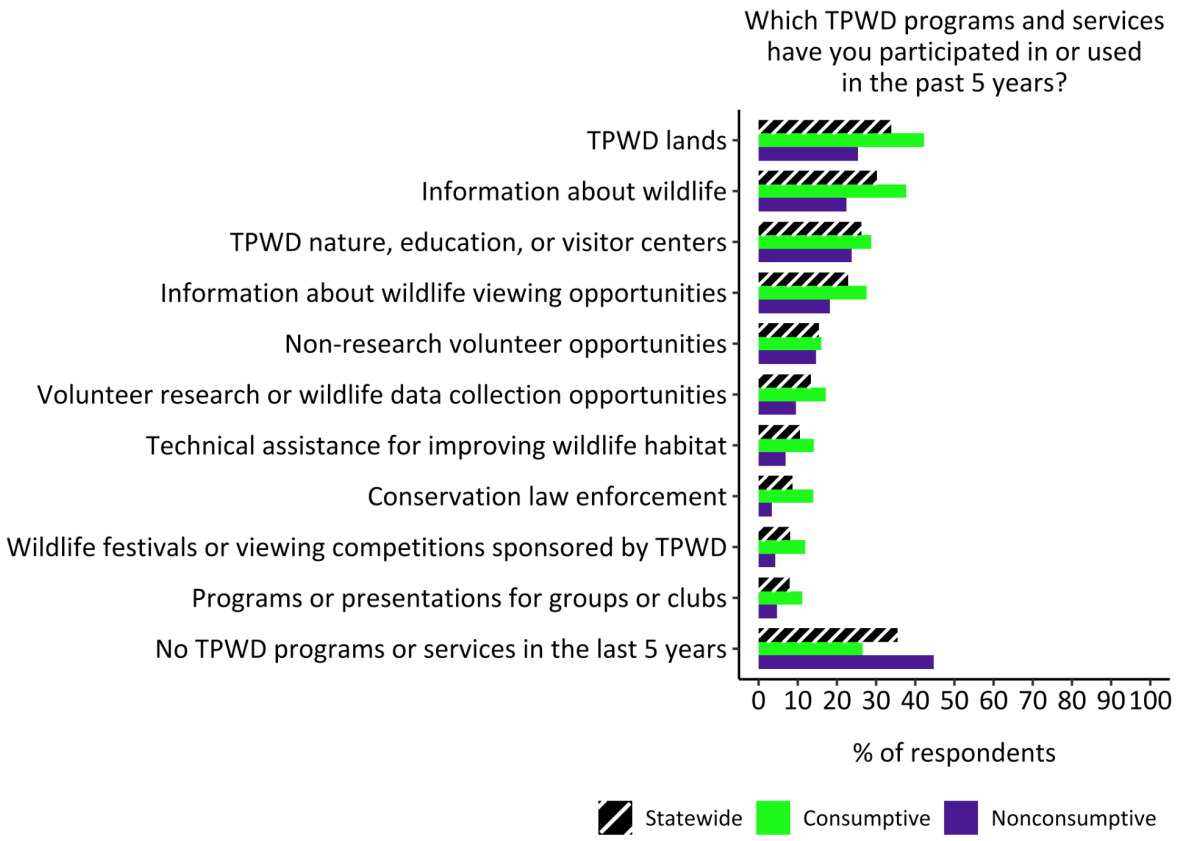

Figure 47: Experience with TPWD programs and services, all respondents

TPWD programs and services utilized by wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option to reflect which programs and services they utilized. Chi-square tests indicated statistically significant differences in participation for consumptive and nonconsumptive viewers for most listed agency programs and services except for TPWD nature, education, or visitor centers and volunteer opportunities, not related to research or data collection (Table 40). In addition, a chi-square test indicated that significantly more nonconsumptive viewers had not participated or engaged in any TPWD programs or services in the past five years.

Programs and services for children and youth

A follow-up question asked wildlife viewers if children or youth in their household had engaged in any TPWD programming, such as school-based programs, camps, or youth and family events. Respondents were provided with three options: “Yes, children or youth in my household have engaged in some of these programs,” “No, children or youth in my household have not engaged in any of these programs,” and “Not applicable.” More than half (51%) of respondents reported the question was not applicable. Under half of respondents (45%) who had youth or children in their household reported them engaging in TPWD programs and services and 55% reported

they had not engaged in any programming (Table 41; Figure 48). A chi-square test indicated that, for respondents with children or youth in their household, consumptive wildlife viewers (51% indicating 'yes' that their children had participated in programs) were significantly more likely to have engaged in TPWD programming compared to nonconsumptive viewers (36% indicating 'yes' for program participation; $\chi^2 = 10.51$, $df = 1$, $p = .001$; Table 41; Figure 48).

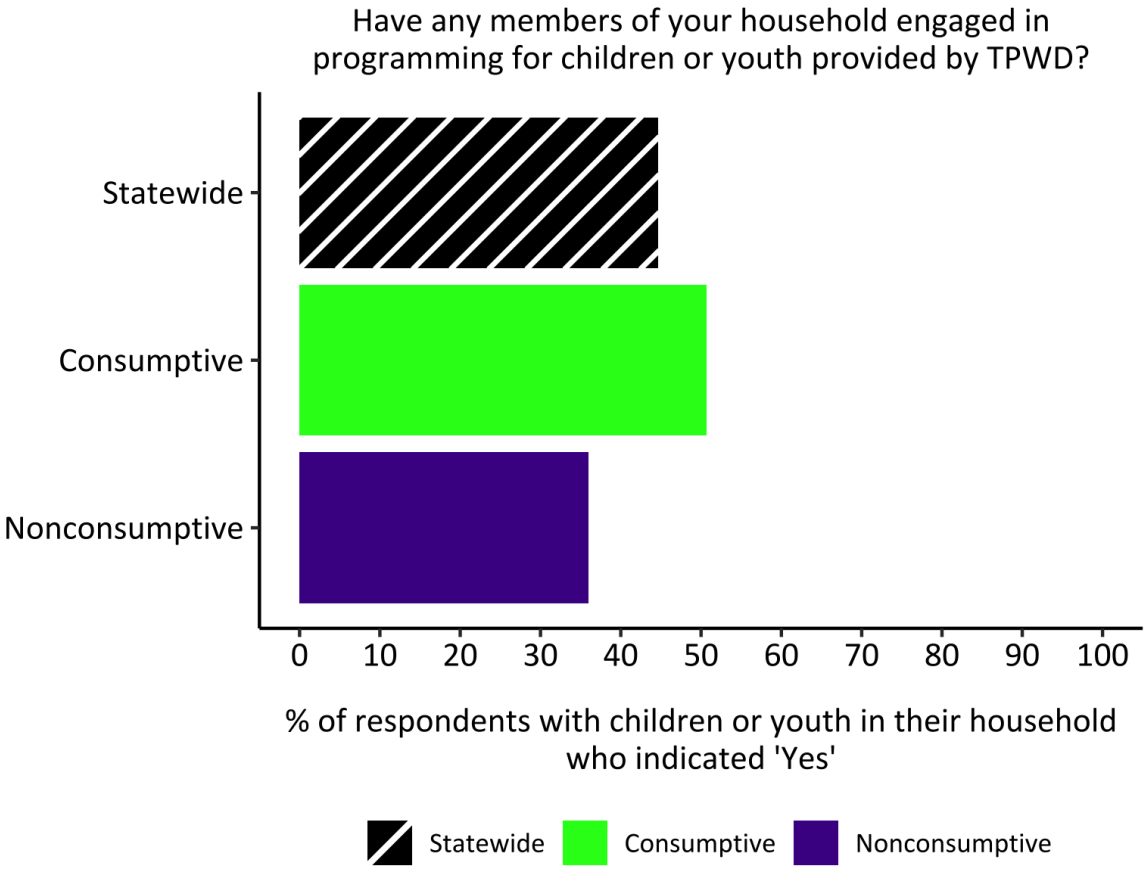

Figure 48: Experience with programs and services for youth, all respondents

Wildlife viewers' engagement with TPWD youth programming for statewide, consumptive, and nonconsumptive groups. Respondents without children or youth in their household are excluded. Bars represent the percentage of respondents with children or youth in their household who indicated "Yes; children or youth in my household have engaged in some of these programs." A chi-square test indicated that, for respondents with children or youth in their household, consumptive wildlife viewers were significantly more likely to have engaged in TPWD programming in comparison to nonconsumptive viewers (Table 41).

Trust

Trust is defined as the willingness to "accept vulnerability to the actions of the trusted party," meaning an individual expects an entity or agency to fulfill a task or action (Gefen, 2002). Past research indicates that Americans are more trusting of their state fish and wildlife agencies than local and federal governments and elected officials (Manfredo et al., 2018). Birders

specifically are twice as trusting of state agencies and federal wildlife and land management agencies than elected officials (NAWMP, 2021).

As an overall measure of trust, we first asked wildlife viewers to indicate their trust in 1) their state agency as an entity and 2) the staff at their state agency. For trust in the state agency as an entity and in state agency staff, we measured trust on a five-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The mean level of trust in the agency was 4.08 ± 0.88, which, on our scale, corresponds to *slightly agree* (4). Similarly, trust in agency staff was 4.04 ± 0.87. When comparing consumptive and nonconsumptive viewers, two t-tests indicated that mean levels of trust in TPWD and TPWD staff were statistically significantly different, with consumptive viewers reporting significantly higher mean levels of trust in both TPWD as an entity and in TPWD staff in comparison to nonconsumptive viewers (Table 42; Figures 49-50).

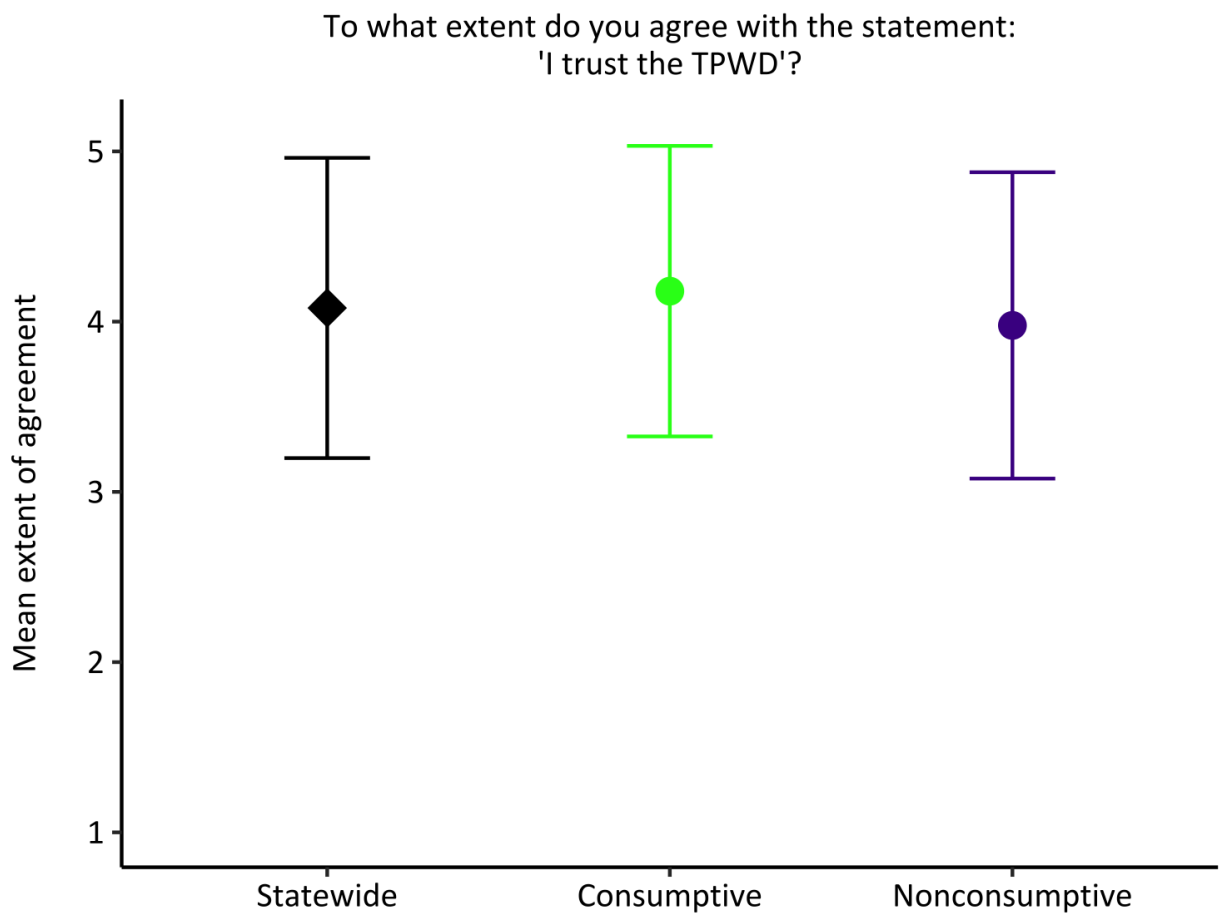

Figure 49: Mean trust in TPWD, all respondents

The mean extent to which wildlife viewers in Texas agree with the statement "I trust the Texas Parks and Wildlife Department" on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Points (diamond for statewide group, circles for consumptive and nonconsumptive group) indicate the mean extent of agreement on a 5-point scale and error bars indicate one standard deviation. A t-test indicated a statistically significant difference in the mean level of trust in TPWD as an entity for consumptive and nonconsumptive wildlife viewers.

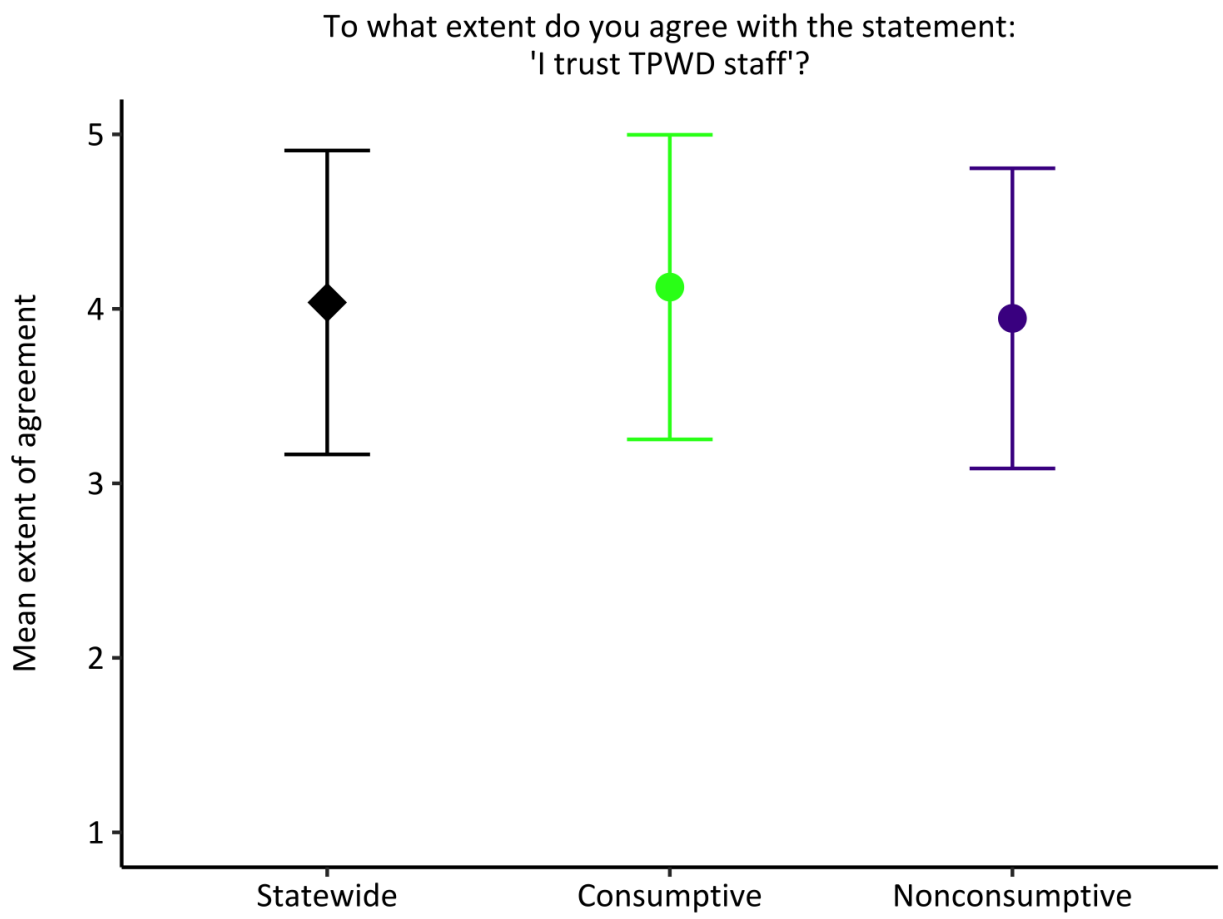

Figure 50: Mean trust in TPWD staff, all respondents

The mean extent to which wildlife viewers in Texas agree with the statement "I trust Texas Parks and Wildlife Department staff" on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Points (diamond for statewide group, circles for consumptive and nonconsumptive group) indicate the mean extent of agreement on a 5-point scale and error bars indicate one standard deviation. A t-test indicated a statistically significant difference in the mean level of trust in TPWD staff for consumptive and nonconsumptive wildlife viewers.

Then we measured three aspects of trust according to Gefen (2002): capability, benevolence, and integrity. In our survey, we included 12 items asking wildlife viewers to indicate "the extent to which they agreed with the following statements." Three of these items were reverse-coded attention checks and removed from analysis. The remaining nine items were dedicated to the three components of the Gefen Trust Framework. The first component, benevolence, included three statements: "I expect that Texas Parks and Wildlife Department intentions are benevolent," "I expect that Texas Parks and Wildlife Department is well meaning," and "I expect that Texas Parks and Wildlife Department has good intentions toward viewers." Benevolence had a mean extent of agreement score of 4.00 ± 0.73 out of 5, which, on our scale,

corresponds to *slightly agree* (4). The second component, capability, included three statements: "Texas Parks and Wildlife Department understands the environment they work in," "Texas Parks and Wildlife Department knows about wildlife viewing," and "Texas Parks and Wildlife Department knows how to support wildlife viewing." Our capability measure had a mean extent of agreement score of 4.07 ± 0.78, which, on our scale, nearly corresponds to *slightly agree* (4). The final component, integrity, included three statements "I do not doubt the honesty of Texas Parks and Wildlife Department," "I expect that Texas Parks and Wildlife Department will keep the promises they make," and "Promises made by Texas Parks and Wildlife Department are likely to be reliable." This item had the lowest mean extent of agreement score of the three Gefen components of trust: 3.35 ± 0.56 which, on our scale, most closely corresponds to *neither agree nor disagree* (3). T-tests indicated only one statistically significant difference in any of the Gefen trust scores when comparing consumptive and nonconsumptive viewers; consumptive viewers had a statistically significantly higher mean measure of our Gefen integrity measure (Table 42; Figures 51-53).

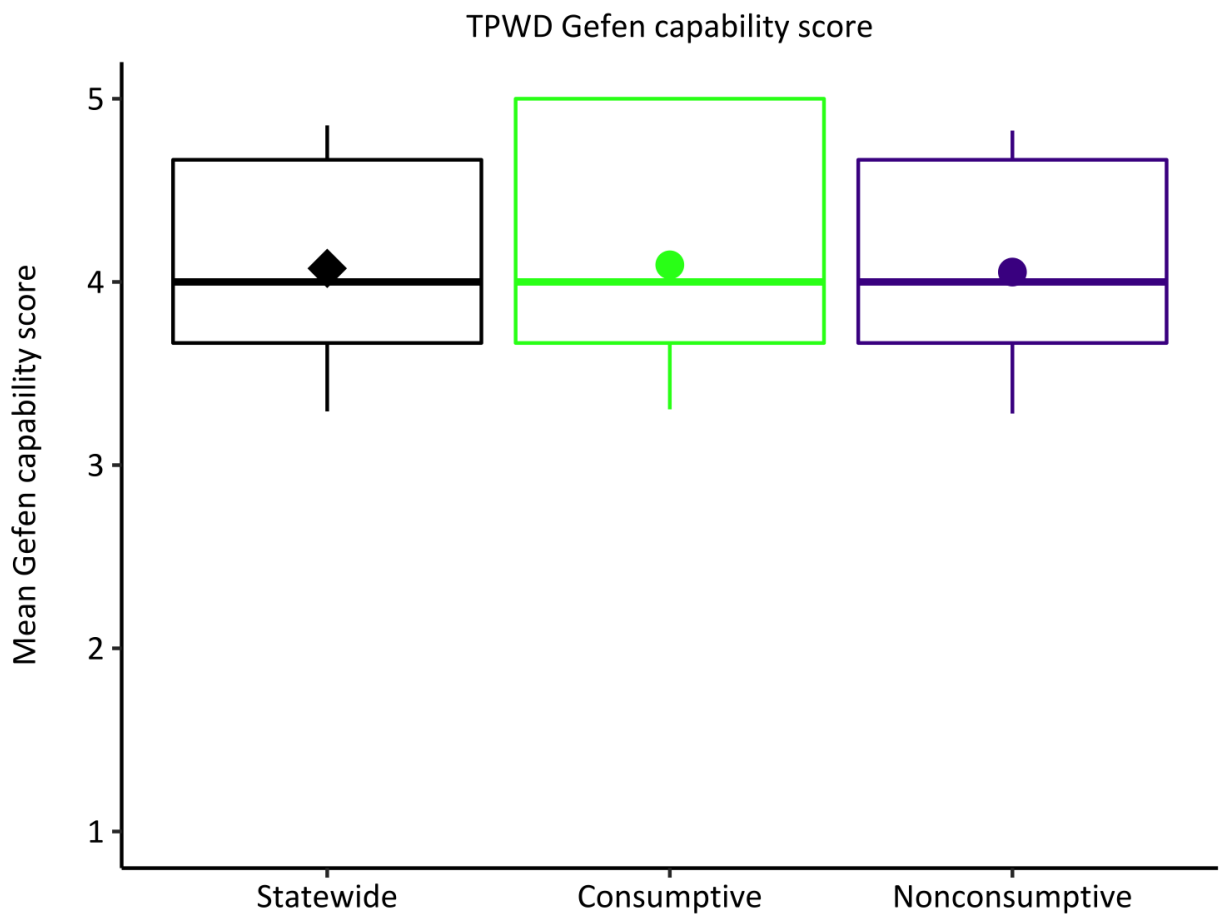

Figure 51: Gefen benevolence score, all respondents

Boxplots (median and interquartile ranges within the boxes) showing the differences in wildlife viewers' mean Gefen benevolence score on a 5-point scale. Points represent the mean Gefen benevolence measure (diamond for statewide group, circles for consumptive and nonconsumptive groups) calculated as the mean of respondents' extent of agreement with three statements about the benevolence of the state agency on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). A t-test indicated no statistically significant difference between the Gefen benevolence scores of consumptive and nonconsumptive viewers (Table 42).

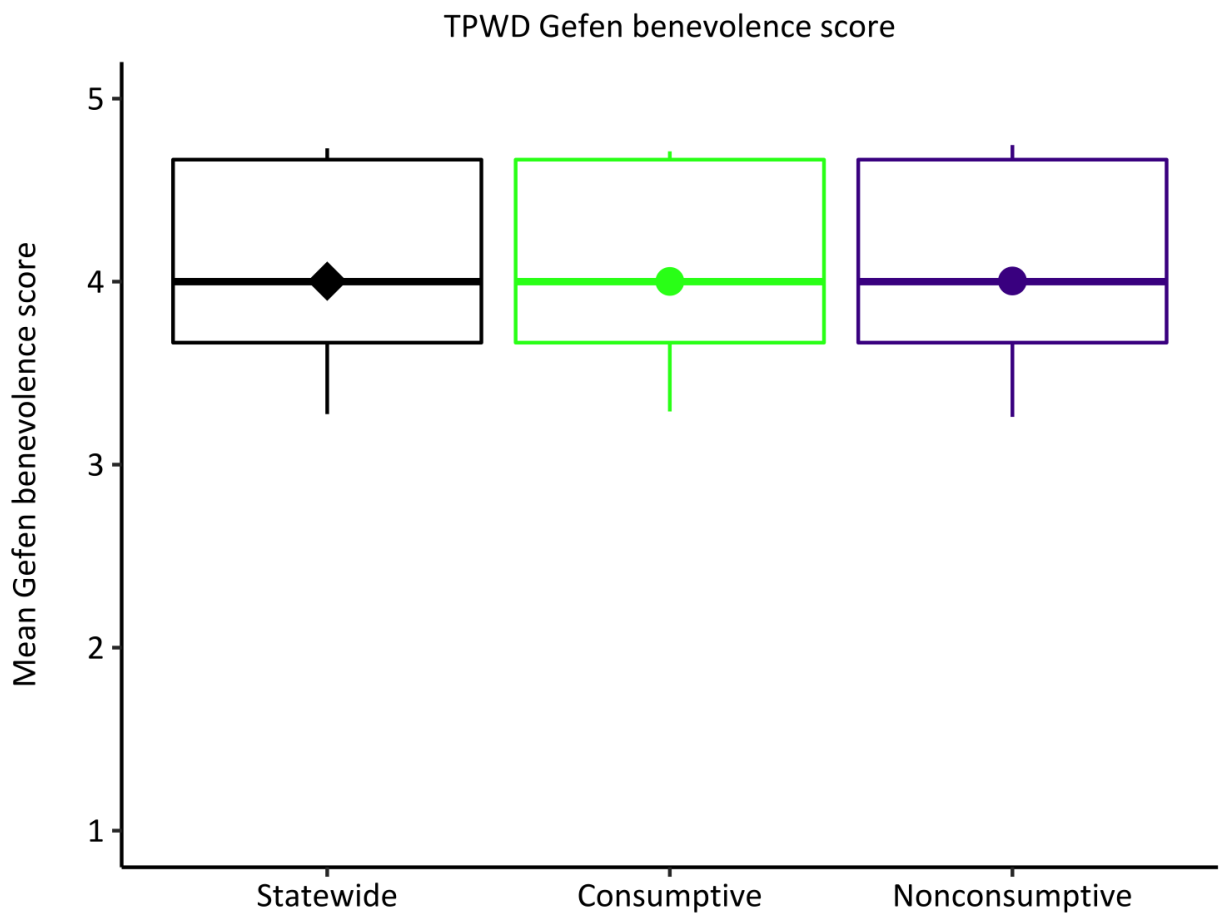

Figure 52: Gefen capability score, all respondents

Boxplots (median and interquartile ranges within the boxes) showing the differences in wildlife viewers' mean Gefen capability score on a 5-point scale. Points represent the mean Gefen capability measure (diamond for statewide group, circles for consumptive and nonconsumptive groups) calculated as the mean of respondents' extent of agreement with three statements about the capability of the state agency on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). A t-test indicated no statistically significant difference between the Gefen capability scores of consumptive and nonconsumptive viewers (Table 42).

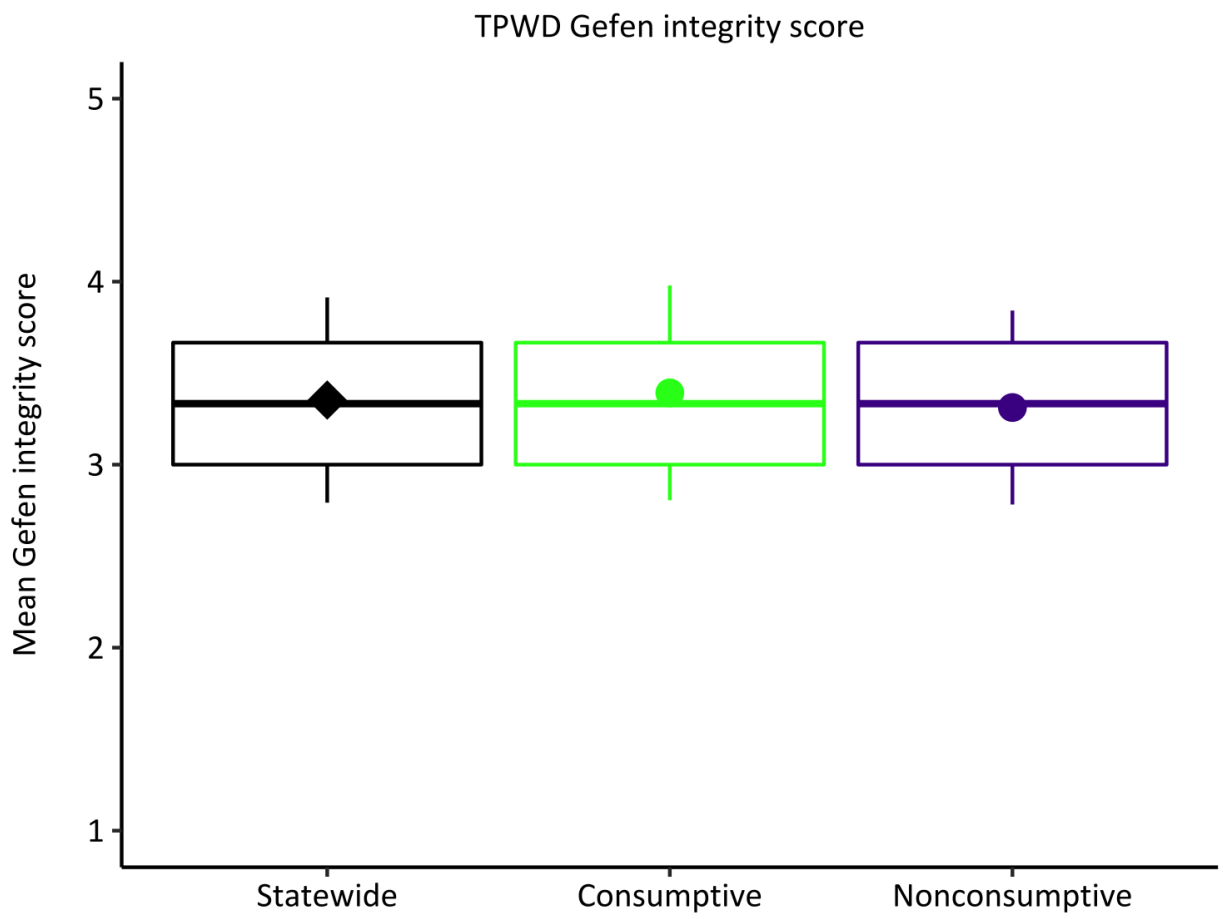

Figure 53: Gefen integrity score, all respondents

Boxplots (median and interquartile ranges within the boxes) showing the differences in wildlife viewers' mean Gefen integrity score on a 5-point scale. Points represent the mean Gefen integrity measure (diamond for statewide group, circles for consumptive and nonconsumptive groups) calculated as the mean of respondents' extent of agreement with three statements about the integrity of the state agency on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). A t-test indicated a statistically significant difference between the Gefen integrity scores of consumptive and nonconsumptive viewers (Table 42).

Past purchases and contributions

State agencies are closely tied to their constituency for funding to support programming and conservation (Grooms et al., 2021). State agencies have relied, and many still rely, heavily on hunters and anglers to support these efforts, through the North American Model of Conservation (Price Tack et al., 2015). As participation in wildlife viewing continues to grow, it is important to understand the mechanisms viewers use to financially support state agencies, as they may be different from those used by the traditional hunter and angler constituency. In this section of the survey, we asked viewers how they had financially contributed to their state fish

and wildlife agencies, listing a variety of potential expenditures or purchases. The literature shows that wildlife viewers are both conservationists (Cooper et al., 2015) and interested in supporting their state agencies financially; however, few funding avenues exist for wildlife viewers to contribute directly to state agencies (Grooms et al., 2021).

We developed a list of 8 potential purchases or contributions and asked wildlife viewers to select all that they made in the last five years. Based on feedback from TPWD, we excluded four possible options that were not available in Texas: a lottery ticket for which the proceeds go to conservation (conventional lottery tickets, not drawn hunts like Big Time Texas Hunts), a conservation or habitat stamp voluntarily purchased independent of a hunting license, a voluntary donation of a portion of state income tax return to TPWD, and virtual products (such as podcasts, e-books, and other online materials). Due to a programming error, conservation or wildlife license plates were not included in the list despite being currently available in Texas. In our nationwide survey sample of wildlife viewers, we found that 6.7% of respondents in Texas (n = 253) reported that they had purchased a conservation license plate in the past five years. A 9th, mutually exclusive option, "I have not made any of these purchases or contributions" was also provided, which 25% of respondents selected (Table 43). A chi-square test indicated that significantly far more nonconsumptive viewers (41%) had not made any purchases or contributions in the past five years in comparison to consumptive viewers (8.4%; χ^2 = 147.16, df = 1, p < .001; Table 43). For analysis purposes, we further split the contributions into voluntary (contributions made as more of a donation) and nonvoluntary (contributions required in order to receive access to an area or activity; as in Grooms et al., 2021). Understanding preferences towards voluntary and nonvoluntary funding mechanisms may aid state agencies in developing targeted strategies for increasing contributions from wildlife viewers.

First, we examined what nonvoluntary funding mechanisms wildlife viewers utilized. The highest proportion of wildlife viewers reported contributing through any TPWD fishing license (44%). This pattern did not hold for consumptive and nonconsumptive viewers; for nonconsumptive viewers, a TPWD lands access pass, permit, or entrance fee was the top nonvoluntary item. Just less than 25% of wildlife viewers had purchased any TPWD hunting license in the past five years. The least used nonvoluntary funding mechanism was a TPWD conservation or habitat stamp required with purchase of a hunting license (14%). Chi-square tests indicated highly statistically significant differences when comparing all past nonvoluntary purchases or contributions of consumptive and nonconsumptive viewers, with more consumptive viewers purchasing any item than nonconsumptive viewers (Table 43; Figure 54).

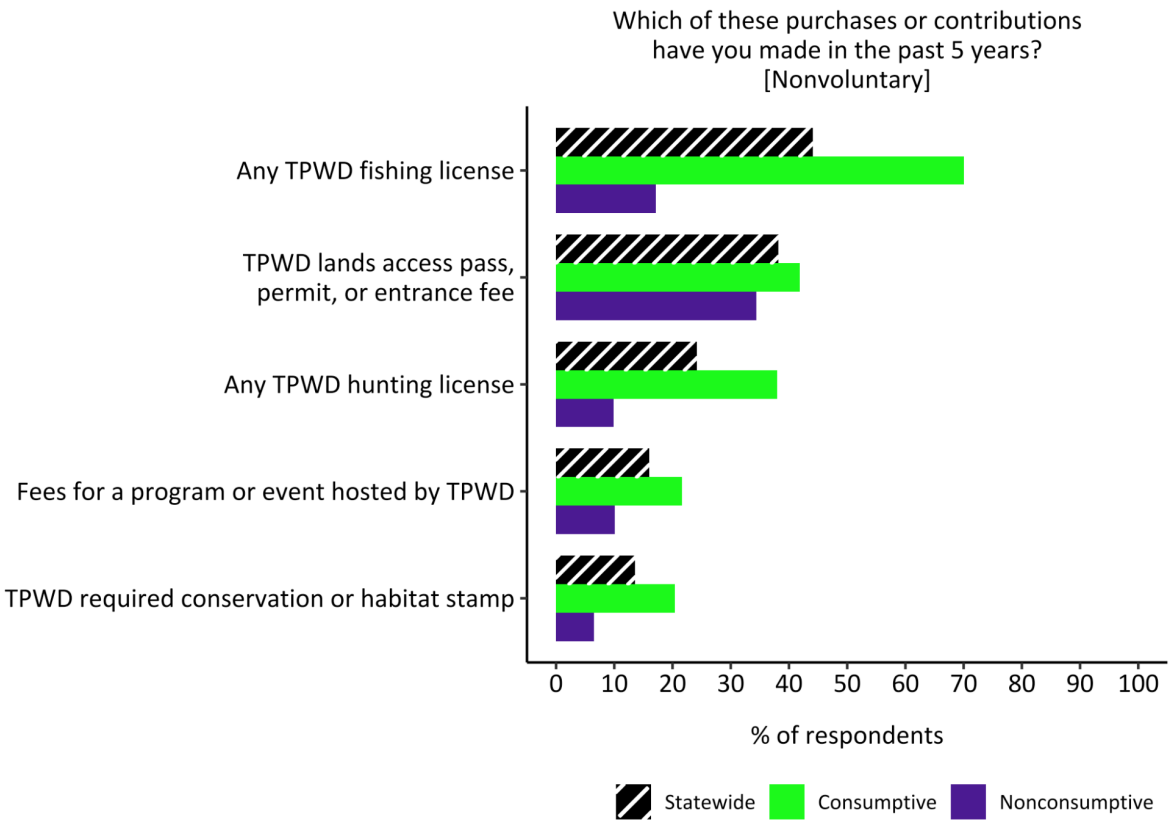

Figure 54: Past nonvoluntary financial contributions to TPWD, all respondents

Nonvoluntary purchases or contributions made towards TPWD in the past five years by wildlife viewers in Texas in statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option to reflect their contributions. Chi-square tests indicated statistically significant differences when comparing all past nonvoluntary purchases or contributions of consumptive and nonconsumptive viewers (Table 43).

Next, we examined voluntary mechanisms of contributions. Overall, wildlife viewers in Texas were much less likely to have contributed to their agencies via voluntary mechanisms than nonvoluntary mechanisms**.** For example, just 19% of wildlife viewers reported contributing through the most common voluntary mechanism, which was tangible products from TPWD (such as books, maps, and other merchandise). Wildlife viewers least commonly reported contributing to their state agency through donations of land to TPWD through a conservation easement (14%). Like nonvoluntary mechanisms, chi-square tests indicated significant differences for all voluntary mechanisms, with more consumptive viewers purchasing any item over nonconsumptive viewers (Table 43; Figure 55).

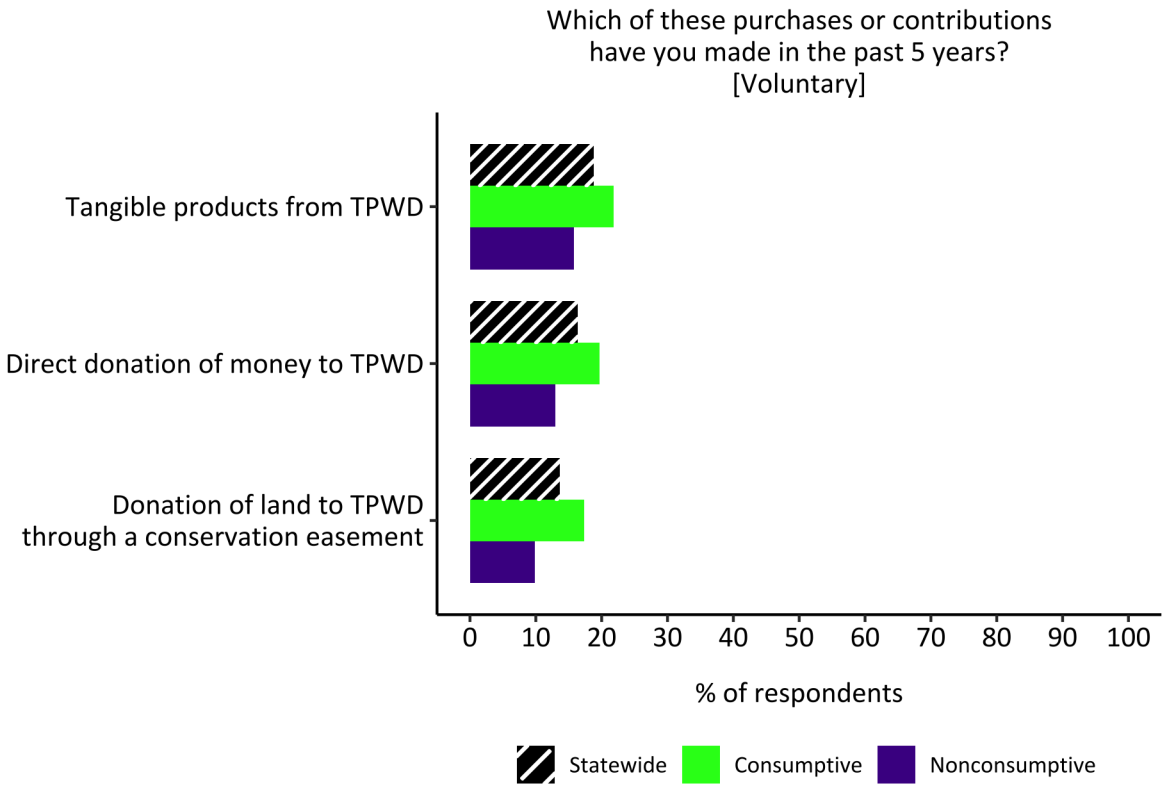

Figure 55: Past voluntary contributions to TPWD, all respondents

Voluntary purchases or contributions made towards TPWD in the past five years by wildlife viewers in Texas in statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option to reflect their contributions. Chi-square tests indicated highly statistically significant differences when comparing all past voluntary purchases or contributions of consumptive and nonconsumptive viewers (Table 43).

Lifetime hunting and fishing licenses

If a respondent indicated that they had purchased any hunting or fishing license, we used display logic to ask the question, "Have you purchased a lifetime hunting or fishing license?" Of the respondents in Texas who indicated purchasing a hunting or fishing license (*n* = 499), 30% indicated purchasing a lifetime hunting or fishing license. A chi-square test indicated no statistically significant difference when comparing responses of consumptive and nonconsumptive viewers who had purchased hunting and fishing licenses (Table 44; Figure 56).

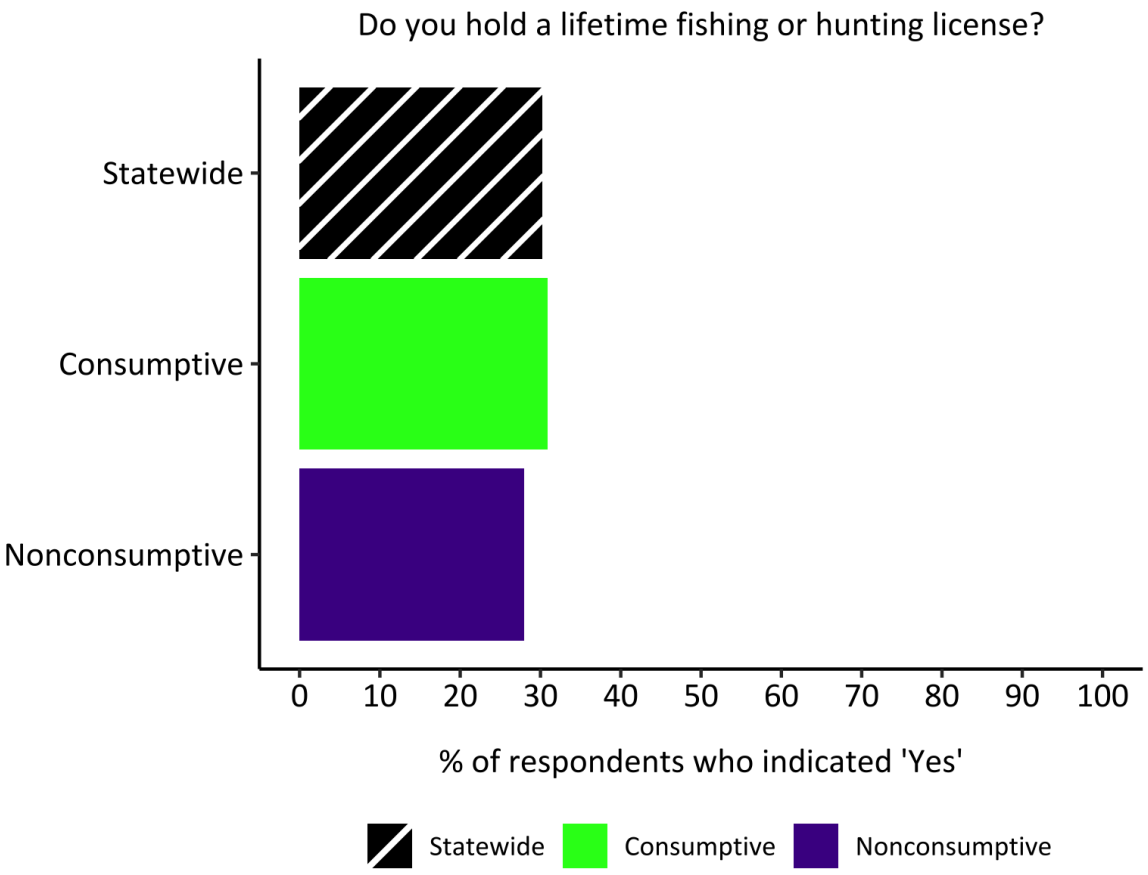

Figure 56: Lifetime hunting and fishing license, all respondents

Wildlife viewers in Texas who indicated purchasing a hunting or fishing license (*n* = 499) that hold a lifetime license for statewide, consumptive, and -nonconsumptive groups. Bars represent the percentage of respondents who have purchased a hunting or fishing license in the past five years that indicated "Yes, I have a lifetime fishing or hunting license." A chi-square test indicated no statistically significant difference when comparing responses of consumptive and nonconsumptive viewers who had purchased hunting and fishing licenses (Table 44).

Future purchases and contributions

Next, we assessed the likelihood of respondents making any of the following purchases or expenditures in the upcoming five years with the question, "How likely are you to make the following purchases or contributions in the next 5 years, assuming these options are available in Texas?" The question was similar to the previous item about past purchases, with the modification to a unipolar scale from 1 (*not at all likely*) to 5 (*extremely likely*). In addition, the hidden response options from the previous section (a lottery ticket for which the proceeds go to conservation, a conservation or habitat stamp voluntarily purchased independent of a hunting license, a voluntary donation of a portion of state income tax return to TPWD, and

virtual products) were included in this question in order to gauge wildlife viewers' likelihood to purchase these currently unavailable items if they were made available in the future.

First, we examined wildlife viewers' likelihood to financially contribute to TPWD via nonvoluntary funding mechanisms in the next five years. About 68% of respondents in Texas were *moderately, very, or extremely likely* to purchase a TPWD lands access pass, permit, or entrance fee. Following close behind, well over half of respondents (61%) in Texas indicated that they were *moderately, very, or extremely likely* to purchase a fishing license in the next five years. The least popular nonvoluntary financial mechanisms were hunting licenses, both still with 43% of respondents indicating that they were *moderately, very, or extremely likely* to purchase a hunting license or TPWD required conservation or habitat stamp in the next five years. Chi-square tests indicated statistically significant differences in the likelihood to contribute to TPWD financially in the future when comparing consumptive and nonconsumptive viewers for all nonvoluntary funding mechanisms, with far more nonconsumptive viewers indicating that they were *not at all likely* to purchase or contribute via any item (Table 46; Figure 59). For example, over half of nonconsumptive viewers reported that they were *not at all likely* to purchase any TPWD hunting license (62%) or TPWD required conservation or habitat stamp (58%; Table 46; Figure 59).

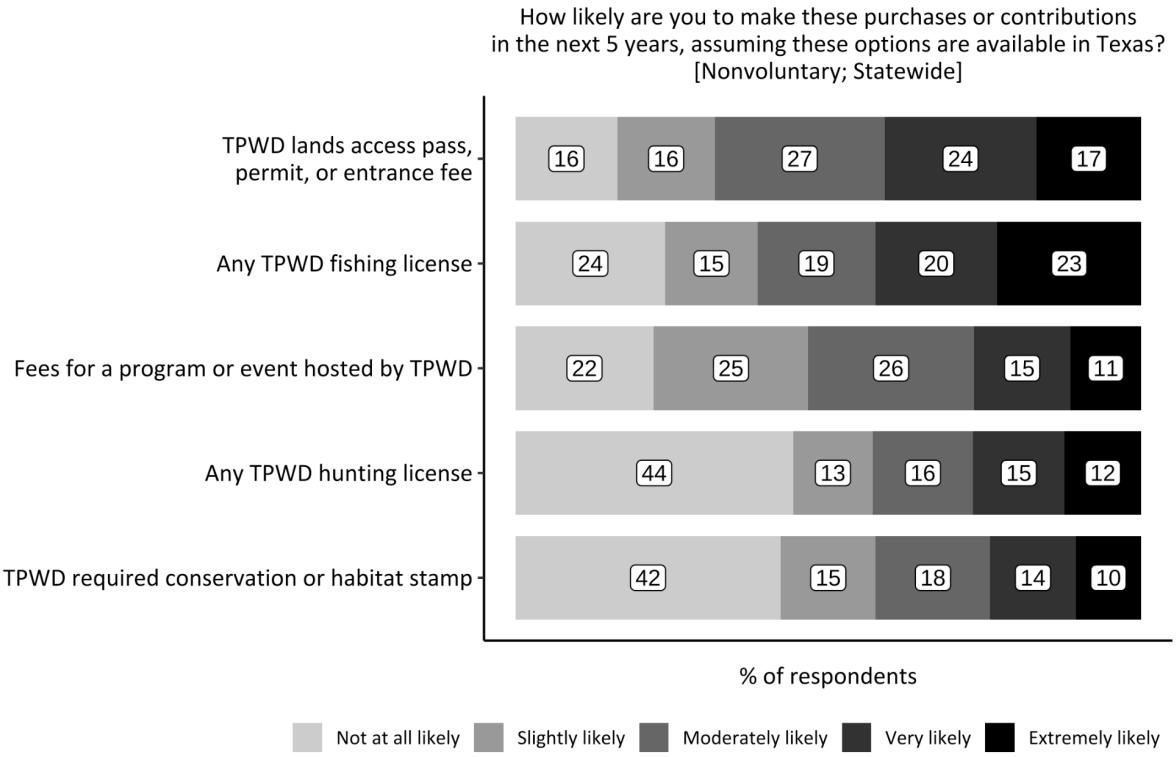

Figure 57: Likelihood of future nonvoluntary contributions, statewide sample

Wildlife viewers' reported likelihood of making nonvoluntary purchases or contributions at the statewide level in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at likely* to *extremely likely*. The shade of gray darkens with increasing likelihood to purchase or contribute to TPWD via nonvoluntary funding mechanisms.

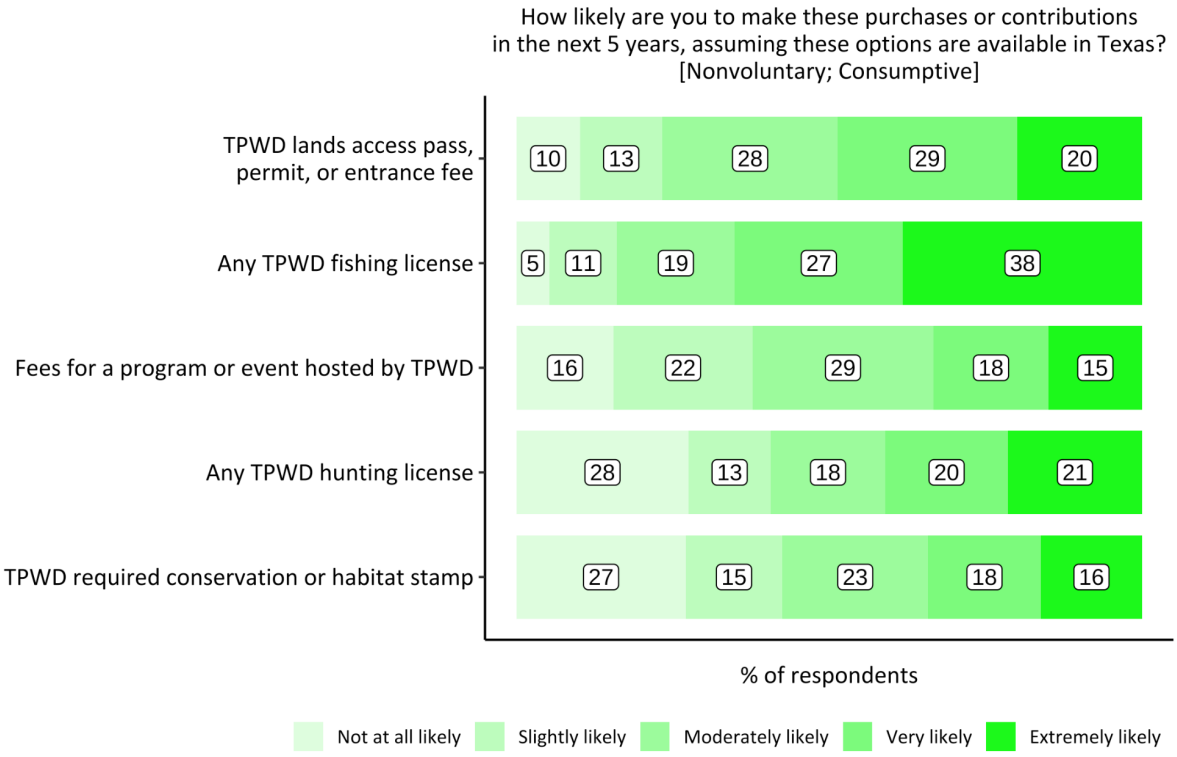

Figure 58: Likelihood of future nonvoluntary contributions, consumptive respondents

Consumptive wildlife viewers' reported likelihood of making nonvoluntary purchases or contributions in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of green darkens with increasing likelihood to purchase or contribute to TPWD via nonvoluntary funding mechanisms.

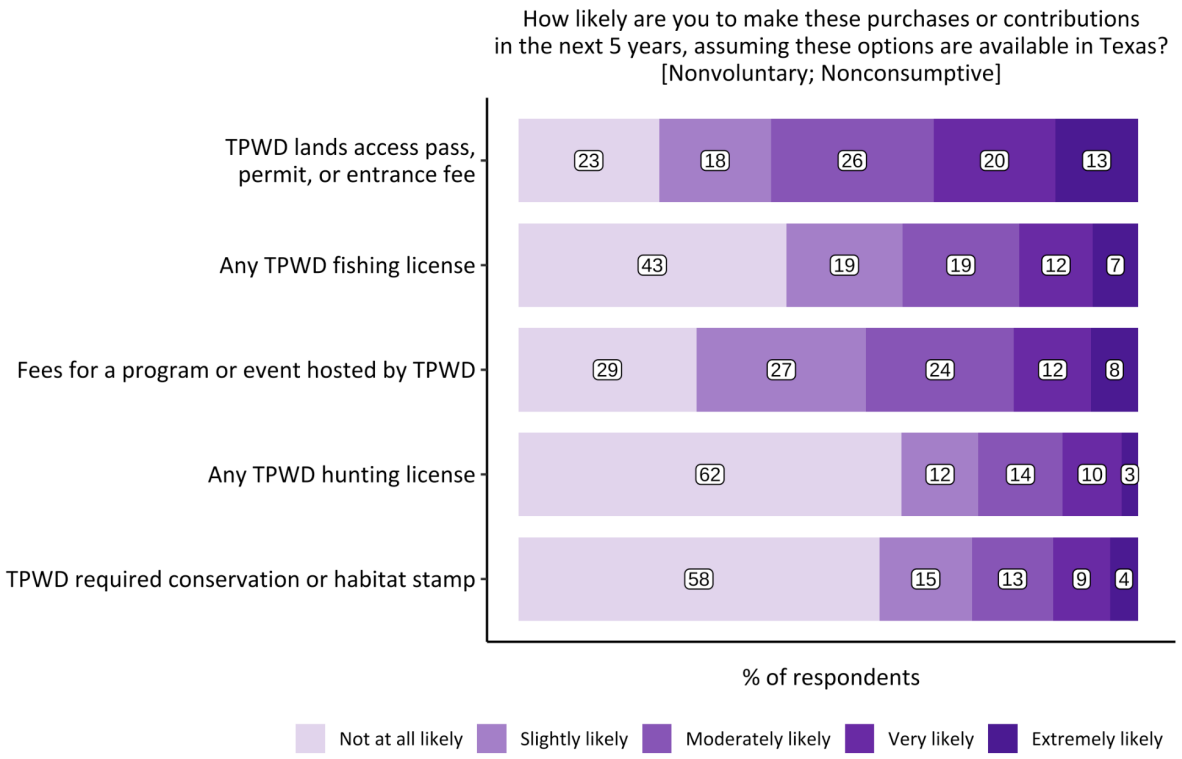

Figure 59: Likelihood of future nonvoluntary contributions, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported likelihood of making nonvoluntary purchases or contributions in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of purple darkens with increasing likelihood to purchase or contribute to TPWD via nonvoluntary funding mechanisms.

We also examined wildlife viewers' likelihood to financially contribute to TPWD via voluntary funding mechanisms in the next five years. The top voluntary contribution in Texas was tangible products such as books, maps, and other merchandise; 61% of survey respondents indicated that they were *moderately, very,* or *extremely likely* to purchase these in the next 5 years. Following closely behind, 52% of survey respondents indicated that they were *moderately, very,* or *extremely likely* to purchase a lottery ticket for which the proceeds go to conservation (conventional lottery tickets, not drawn hunts like Big Time Texas Hunts), an item which is currently not available from TPWD. Texans expressed the least interest in donating land to TPWD through a conservation easement, with 47% of respondents indicating they were *not at all likely* to contribute in this manner in the next five years. Statewide, Texans were nearly equally likely to contribute via a TPWD voluntary conservation or habitat stamp (an option currently not available in Texas; 40% of respondents were *moderately, very,* or *extremely likely* to purchase) as a they were to contribute via a required TPWD conservation or habitat stamp (43% of respondents were *slightly, moderately, very,* or *extremely likely* to purchase). As with nonvoluntary funding mechanisms, chi-square tests indicated highly statistically significant

differences in the likelihood to contribute to TPWD financially in the future when comparing consumptive and nonconsumptive viewers for all voluntary funding mechanisms, with far more nonconsumptive viewers indicating that they were *not at all likely* to purchase or contribute via any item (Table 46; Figure 62).

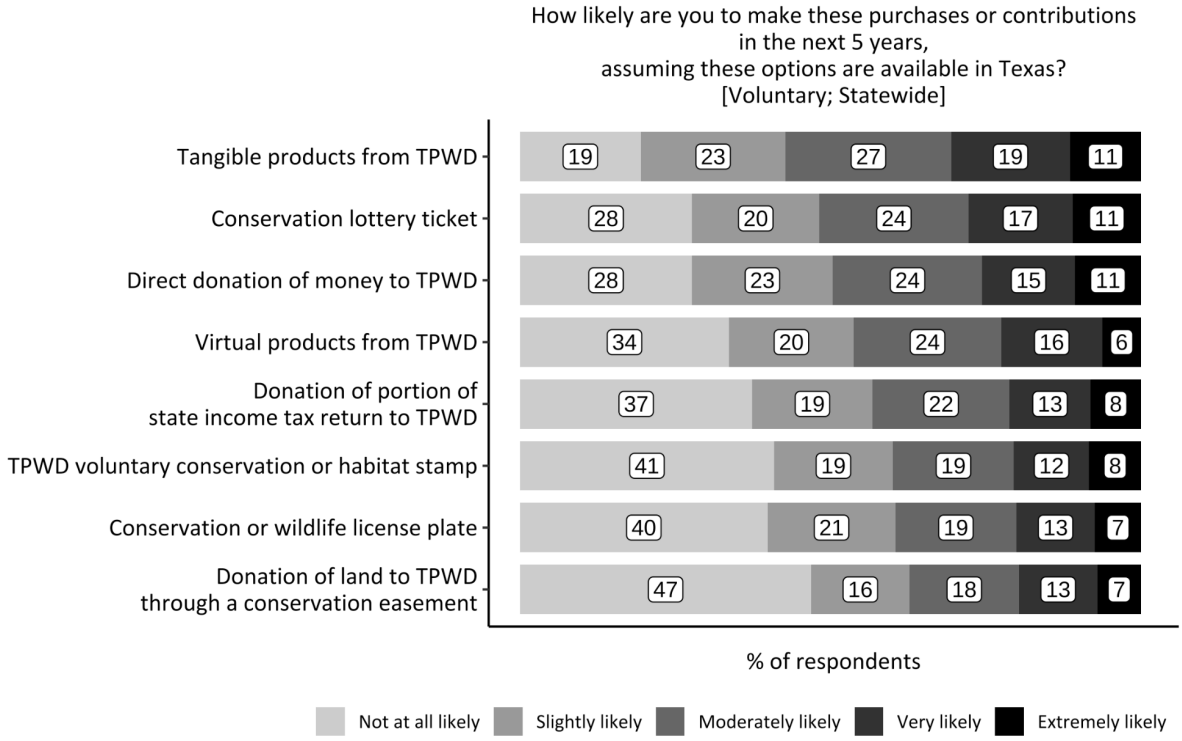

Figure 60: Likelihood of future voluntary contributions, statewide sample

Wildlife viewers' reported likelihood of making voluntary purchases or contributions at the statewide level in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at likely* to *extremely likely*. The shade of gray darkens with increasing likelihood to purchase or contribute to TPWD via voluntary funding mechanisms.

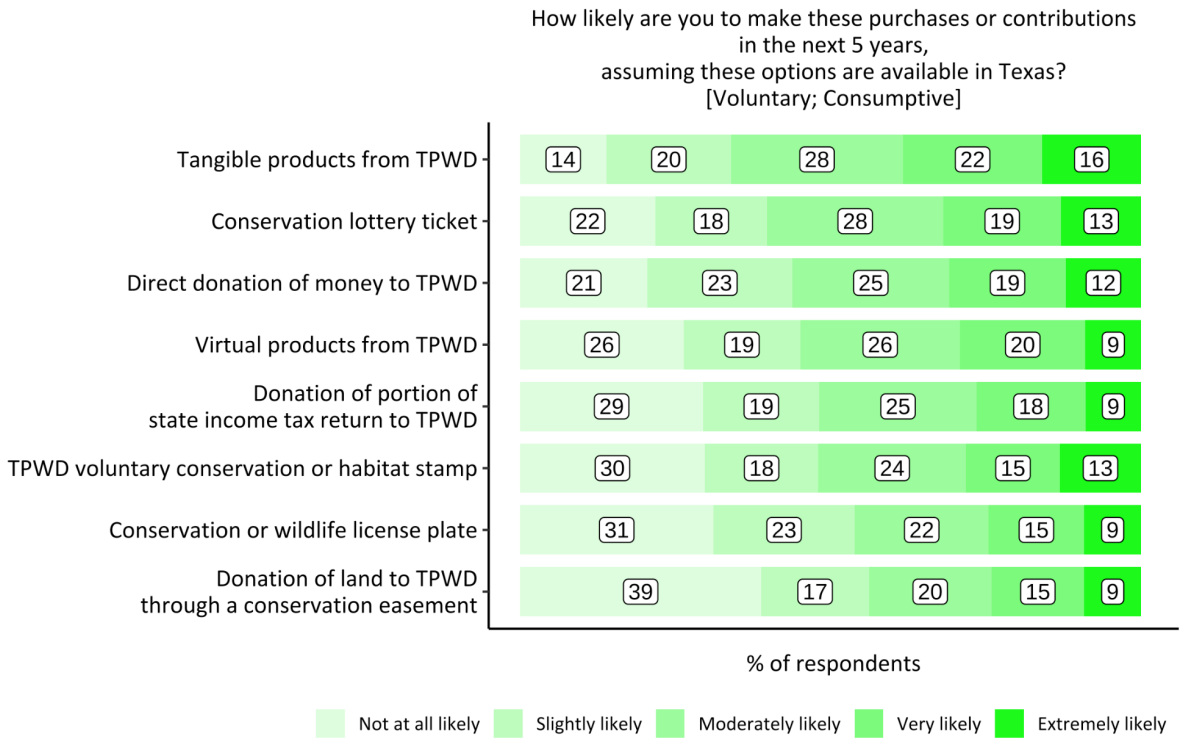

Figure 61: Likelihood of future voluntary contributions, consumptive respondents

Consumptive wildlife viewers' reported likelihood of making voluntary purchases or contributions in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of green darkens with increasing likelihood to purchase or contribute to TPWD via voluntary funding mechanisms.

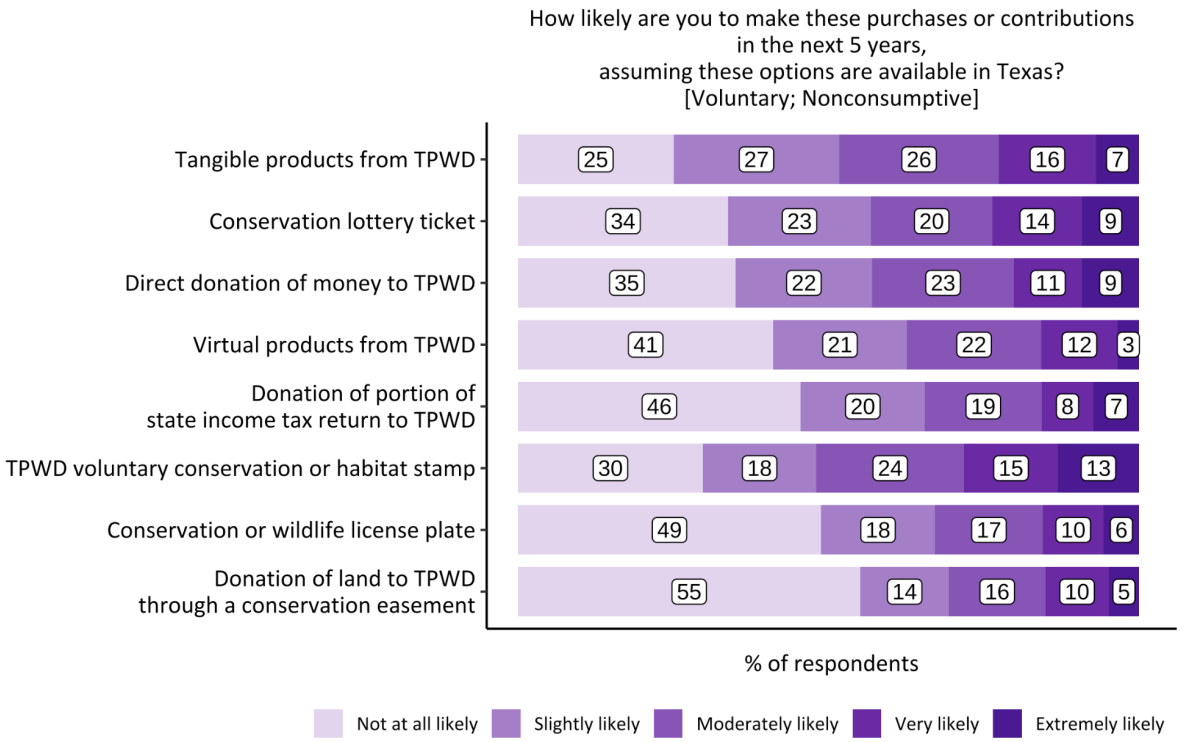

Figure 62: Likelihood of future voluntary contributions, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported likelihood of making voluntary purchases or contributions in the next 5 years, assuming all options are available in Texas. Each block represents the percentage of respondents who fell into each of the five categories: *not at all likely* to *extremely likely*. The shade of purple darkens with increasing likelihood to purchase or contribute to TPWD via voluntary funding mechanisms.

Encouraging additional financial support

Wildlife viewers have expectations for how state agencies use their funds (Grooms et al., 2020). In this section, we further investigate those expectations. We asked, "How likely would you be to provide more financial support than you currently do to the Texas Parks and Wildlife Department, if your contributions were used in the following ways?" We provided respondents with a list of seven potential mechanisms for agencies utilizing their funds. The 5-point scale for respondent answers ranged from 1 (*not at all likely*) to 5 (*extremely likely*).

In Texas, respondents indicated that they were most likely to provide additional financial support to TPWD if their contributions were used to support conservation of the types of wildlife they like to view (62% *moderately*, *very*, or *extremely likely*), more opportunities or resources for wildlife viewing (62% *moderately*, *very*, or *extremely likely*), and conservation of rare or vulnerable species (60% *moderately*, *very*, or *extremely likely*). The least popular response option was if viewers' contributions were matched with funding from a different source (57% *moderately*, *very*, or *extremely likely*).

Chi-square tests indicated highly statistically significant differences in the likelihood of consumptive and nonconsumptive viewers to provide additional financial support, with nonconsumptive viewers consistently reporting, more than consumptive users, that they were *not at all likely* to provide more support given any of the various possible uses of their contributions (Table 48; Figures 63-65).

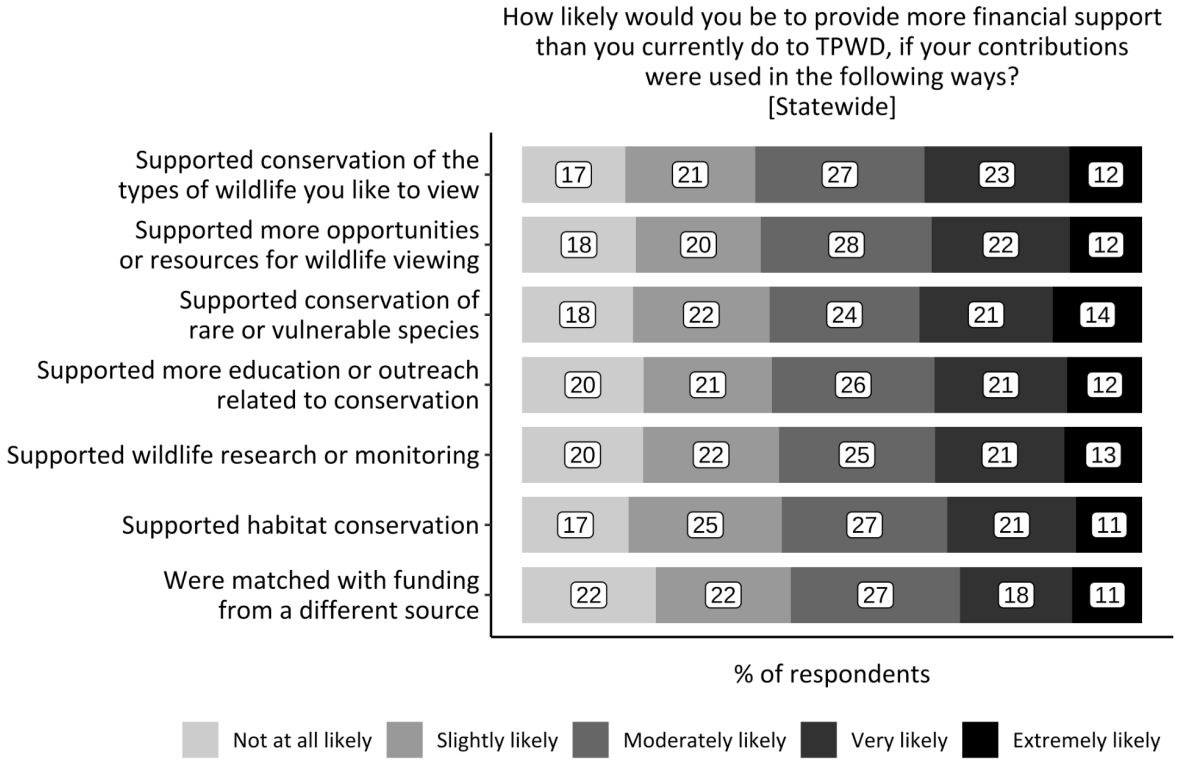

Figure 63: Encouraging additional support, statewide sample

Wildlife viewers' reported likelihood of providing more financial support than they currently do to TPWD, at the statewide level, if their contributions were used in various ways. Each block represents the percentage of respondents who fell into each of the five categories: *not at likely* to *extremely likely*. The shade of gray darkens with increasing likelihood to provide additional financial support to TPWD, given these potential uses of funds.

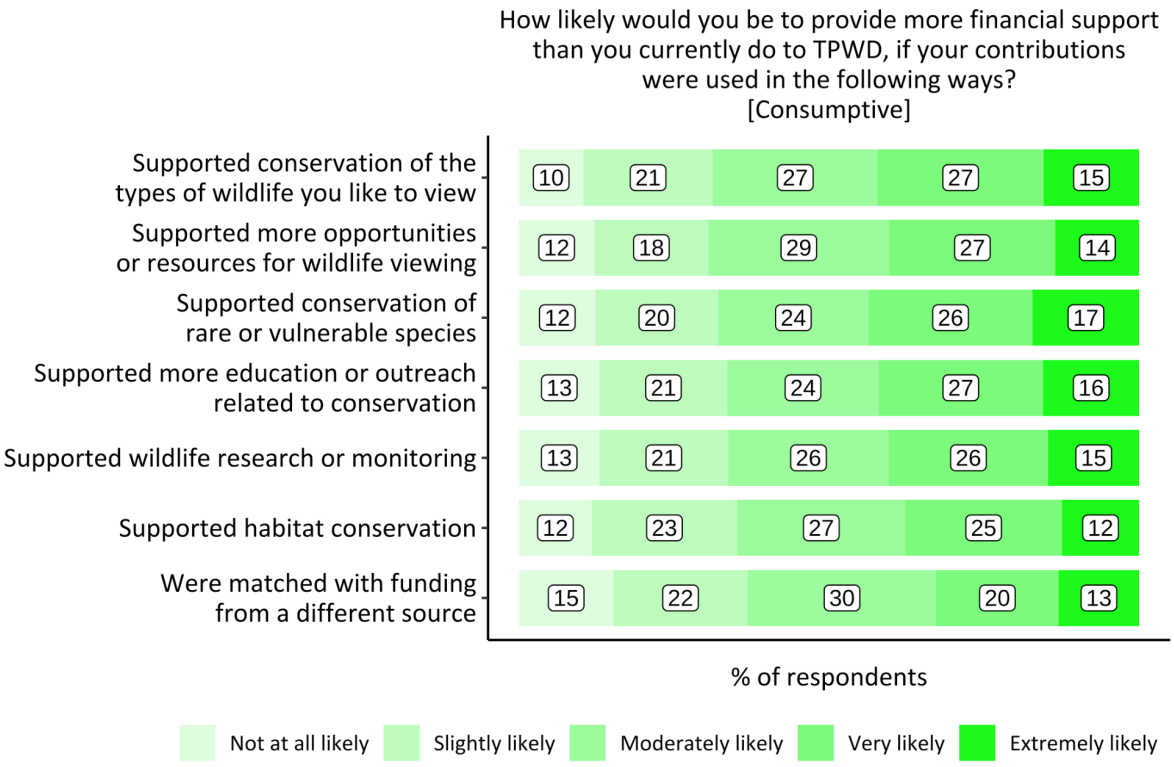

Figure 64: Encouraging additional support, consumptive respondents

Consumptive wildlife viewers' reported likelihood of providing more financial support than they currently do to TPWD, if their contributions were used in various ways. Each block represents the percentage of respondents who fell into each of the five categories: *not at likely* to *extremely likely*. The shade of green darkens with increasing likelihood to provide additional financial support to TPWD, given these potential uses of funds.

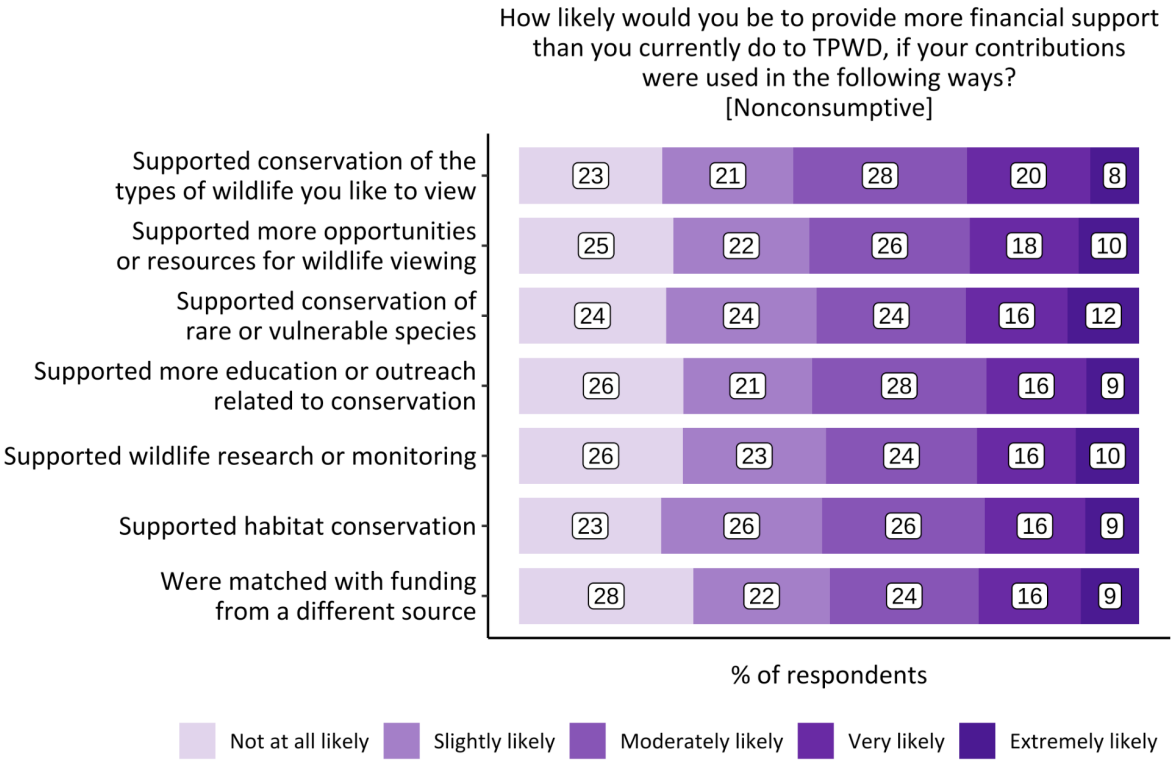

Figure 65: Encouraging additional support, nonconsumptive respondents

Nonconsumptive wildlife viewers' reported likelihood of providing more financial support than they currently do to TPWD, if their contributions were used in various ways. Each block represents the percentage of respondents who fell into each of the five categories: *not at likely* to *extremely likely*. The shade of purple darkens with increasing likelihood to provide additional financial support to TPWD, given these potential uses of funds.

State agency support for wildlife viewing

AFWA's Relevancy Roadmap outlines broad recommendations for state fish and wildlife agencies to engage a broader constituency, including "increased and improved partnering and collaboration to increase engagement with, and service to, a broader constituency" (AFWA, 2016). Understanding what programs and services wildlife viewers prefer enables agencies to identify and prioritize programs to better engage this constituency. In addition, supporting wildlife viewers, through management programs and other changes, may help increase relationships between viewers and agencies (AFWA, 2016; Grooms et al., 2021). To this end, we provided respondents with a list of 17 programs and services that may be available to support wildlife viewing and asked the question, "Which of the following potential programs or services from Texas Parks and Wildlife Department would better support your wildlife viewing activities in Texas?" This list of items was initially developed based on focus groups conducted for a study of wildlife recreationists in Virginia (Grooms et al., 2019), which we then adapted based on feedback from our multi-state Steering Committee including TPWD representatives. An 18th,

mutually exclusive option, "I am not interested in any of these options to support my wildlife viewing activities" (8.6% of respondents selected this option), was also provided.

Statewide, respondents were most interested in receiving more information about wildlife in Texas (46%) and more information about where to go to see wildlife (45%). These response options were followed by access to more places to go wildlife viewing (40%) and more information about how to view various types of wildlife (32%). In addition, respondents were also interested in more information about where and when to view wildlife where there is no hunting (32%), more amenities for wildlife viewing (such as viewing platforms, blinds, or signs; 30%), and more accessible features in wildlife viewing locations (such as paved trails, accessible parking, or tactile signage; 27%). Respondents were least interested in more opportunities to be involved in other volunteer activities not related to research or data collection (5.5%).

Chi-square tests indicated quite a few statistically significant differences when comparing consumptive and nonconsumptive viewers for the additional support items explored in this survey (Table 49; Figure 66). Consumptive viewers were significantly more interested in many more potential programs and services in comparison with nonconsumptive viewers. Significantly more consumptive viewers were interested in the provision of access to more places to go wildlife viewing, more programs to interact with other wildlife viewers, more amenities to support wildlife viewing, more opportunities for youth to learn how to participate in wildlife viewing, more wildlife viewing events or festivals, more programs to improve wildlife viewing skills, more virtual programs for wildlife viewing (such as video classes, online presentations, or wildlife cameras), more training opportunities for wildlife viewing guides or mentors, more accessible features in wildlife viewing locations (such as paved trails, accessible parking, or tactile signage), more opportunities to be involved in volunteer research or wildlife data collection activities, and more agency staff to support wildlife viewing (Table 49; Figure 66). In addition, significantly more nonconsumptive viewers indicated they were not interested in any of the response options provided regarding ways TPWD can support their wildlife viewing activities (12%) in comparison to consumptive viewers (5.8%; Table 49; Figure 66).

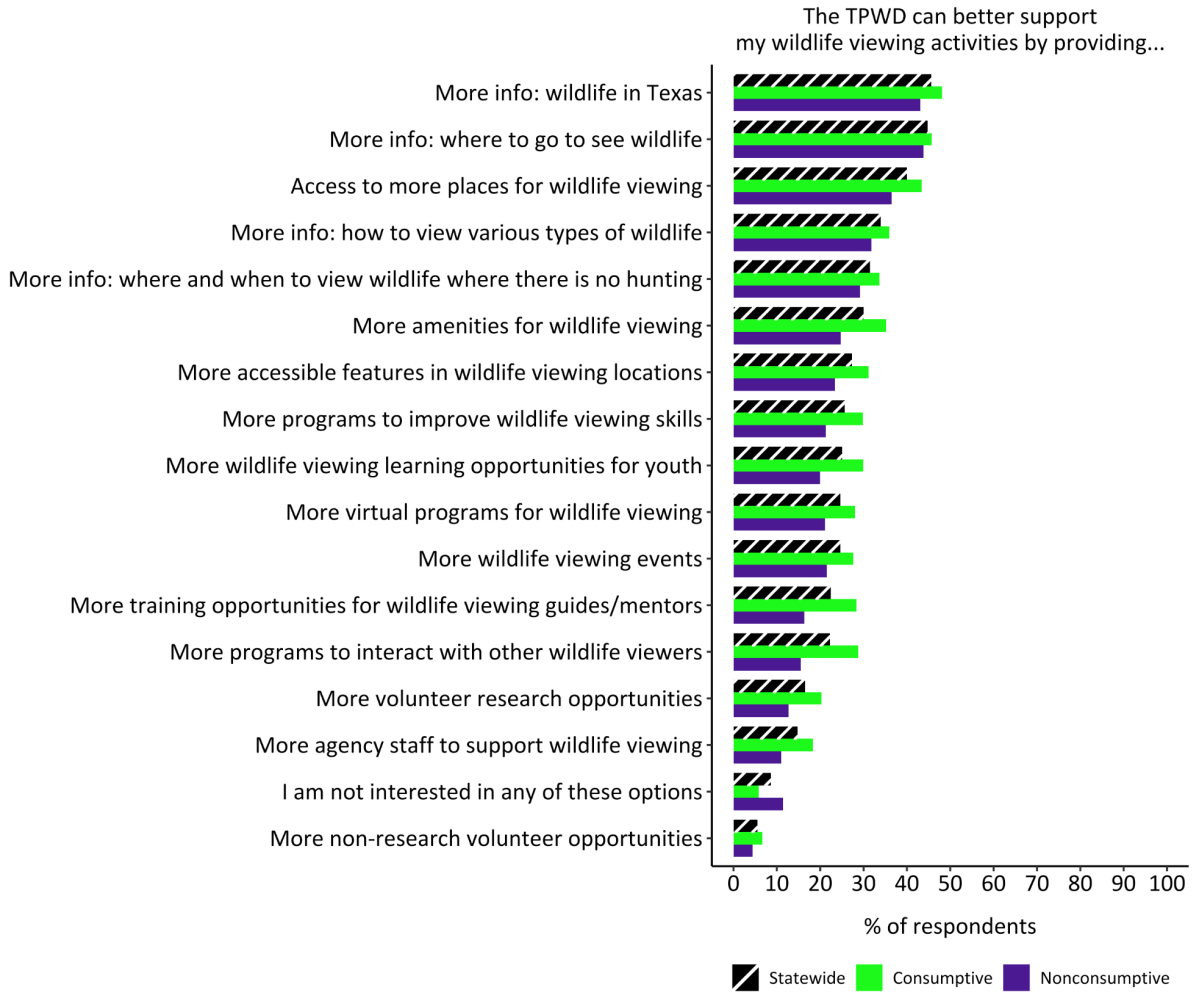

Figure 66: TPWD support for wildlife viewing, all respondents

TPWD programs and services indicated by wildlife viewers that would better support their wildlife viewing activities for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one program or service to reflect their opinion. Chi-square tests indicated that significantly more consumptive viewers were interested in the provision of access to more places to go wildlife viewing, more programs to interact with other wildlife viewers, more amenities to support wildlife viewing, more opportunities for youth to learn how to participate in wildlife viewing, more wildlife viewing events or festivals, more programs to improve wildlife viewing skills, more virtual programs for wildlife viewing, more training opportunities for wildlife viewing guides or mentors, more accessible features in wildlife viewing locations, more opportunities to be involved in volunteer research or wildlife data collection activities, and more agency staff to support wildlife viewing (Table 49). Significantly more nonconsumptive viewers indicated they were not interested in any of the response options provided to support their wildlife viewing activities (Table 49).

Preferred communication

We examined viewers' interest in methods of receiving information from state agencies to understand how TPWD can best communicate with wildlife viewers in Texas about recreation

opportunities and conservation issues. In this question, we provided wildlife viewers with a list of 15 popular virtual and non-virtual communication channels and asked through which, if any, they were interested in receiving information from TPWD. A 16th, mutually exclusive option of, "I would prefer not to receive information from Texas Parks and Wildlife Department" was selected by 6.8% of respondents in Texas (Table 50; Figure 67).

Over half or around half of respondents preferred the TPWD website (58%), printed materials (such as brochures and maps; 52%), and email updates or e-newsletters (50%) as communication channels. Over one-third of respondents expressed interest in receiving communication from Facebook (40%) and mailed newsletters or other subscriptions (35%). The least popular form of state agency communication was podcasts (9.1%). We asked respondents about a variety of social media platforms, including YouTube (32%), Instagram (20%), TikTok (15%), and Twitter (14%), with Facebook being the most popular (40%; Table 50; Figure 67).

Chi-square tests indicated statistically significant differences, in terms of the popularity of state agency communication channels for consumptive and nonconsumptive viewers, for most of our response options. Significantly more consumptive viewers were interested in receiving information from the TPWD website, Facebook, mailed newsletters or other subscriptions, online magazines, Twitter, YouTube, Instagram, TikTok, one-on-one interaction with agency staff, text alerts, blogs, and podcasts. In addition, significantly more nonconsumptive viewers indicated they preferred not to receive information from TPWD (Table 50; Figure 67).

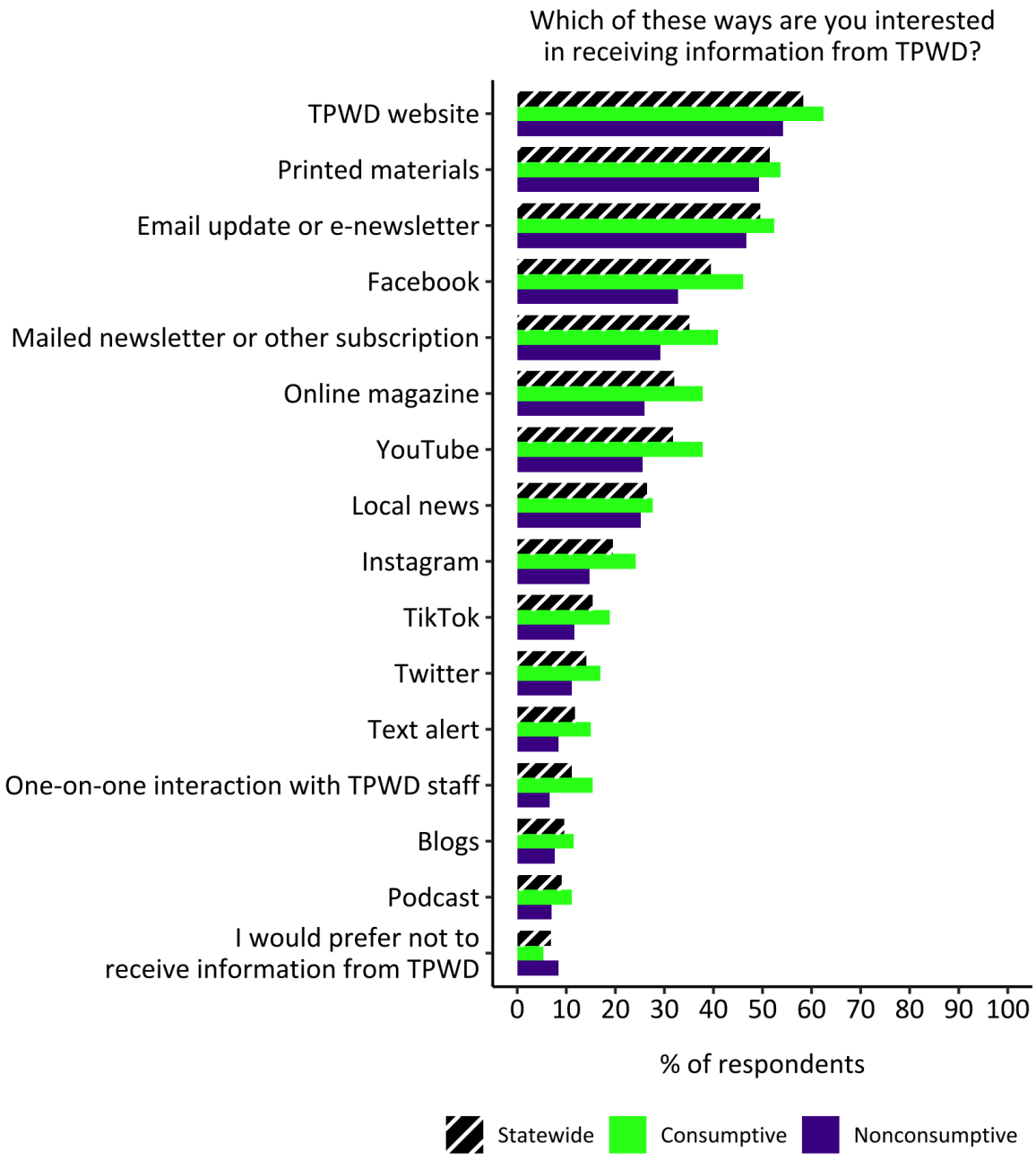

Figure 67: Preferred communication from TPWD, all respondents

Preferred method of communication for TPWD information of wildlife viewers in Texas for statewide, consumptive, and nonconsumptive groups. Note that individual categories sum to more than 100% because respondents were able to select more than one option to reflect their preferred method of communication. Chi-square tests indicated that significantly more consumptive viewers were interested in receiving information from the TPWD website, Facebook, mailed newsletters or other subscriptions, online magazines, Twitter, YouTube, Instagram, TikTok, one-on-one interaction with agency staff, text alerts, blogs, and podcasts. A chi-square test indicated that significantly more nonconsumptive viewers indicated they preferred not to receive information from TPWD (Table 50).

DISCUSSION AND CONCLUSION

The Texas Results of the Wildlife Viewer Survey provides a profile of wildlife viewers that can be utilized by TPWD to overcome barriers to broader relevance, public engagement, and support (AFWA & WMI, 2019). In the following subsections, we apply this profile to discuss how TPWD may best support wildlife viewers in Texas, broaden their relevance to wildlife viewers who do not hunt or fish, and develop financial support opportunities for wildlife viewers.

Supporting wildlife viewers in Texas

We recommend three general approaches to better engage wildlife viewers in Texas and establish a lasting and equitable relationship: 1) provide more wildlife viewing information and access, 2) promote around-the-home viewing opportunities, and 3) develop social support networks for wildlife viewers.

Provide wildlife viewing information and access

Wildlife viewers in Texas were particularly interested in more information on when, where, and how to view wildlife, as well as increased access to wildlife viewing locations. There is an apparent desire for TPWD to play a key role as an information resource on wildlife viewing in Texas, as they have started to do on their website through the Wildlife Viewing page, which provides basic tips for participation, species-specific information, wildlife viewing events, state parks near cities, and the Great Texas Wildlife Trails (https://tpwd.texas.gov/huntwild/wildlife/wildlife-trails/ for more information). Increasing accessibility, expanding awareness, continuing to build out this information (e.g., developing wildlife viewing-specific information for around the home and/or urban areas) could encourage enhanced participation in wildlife viewing in Texas, as most wildlife viewers classify their skill level as beginner to intermediate. Indeed, given the extensive coverage of wildlife trails, the desire for more access to wildlife viewing locations may be due to a lack of awareness of currently available resources. To address the issue of lack of awareness of wildlife viewing information or to distribute more information, wildlife viewers were most interested in receiving such information from TPWD via the TPWD website, printed materials, or email updates. Investing in these communication platforms to reach wildlife viewers would help increase agency relevancy and could help address the needs reported by viewers in this survey. Finally, specific information on bird and mammal viewing opportunities in Texas will appeal to the most wildlife viewers, although all types of wildlife were of interest to at least one-quarter of viewers. Based on the finding that over half of survey respondents report participation in wildlife viewing on state-managed lands, including state parks, these areas may have potential

for development of additional infrastructure to further support access for wildlife viewing and enhanced outreach regarding their value as wildlife viewing areas.

Promote around-the-home viewing opportunities

TPWD may connect with more wildlife viewers if they develop means to serve those who view around their homes, where the majority of viewers participate in viewing. Currently, the agency's backyard viewing activities focus on citizen science projects, the Texas Nature Trackers, but only one-quarter of wildlife viewers reported a strong likelihood to participate in citizen science activities with the agency (https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/texas_nature_trackers/ for more information). Yet, nearly three-quarters of viewers participate around their home and over half of viewers participate in locally-managed areas, like county parks and trails. Further, the predominant barrier to viewing reported by respondents was distance to viewing sites and lack of free time, which could be mitigated by creating and promoting programs that viewers could easily do at or near their homes. One opportunity for growth in around-the-home viewing is for TPWD to expand their encouragement of planting wildlife habitat at home beyond private lands management programs like Pastures For Upland Birds. Additionally, to encourage planting or otherwise creating wildlife habitat at home, information on creating backyard habitat could be added to the "Wildlife Viewing" page of the TPWD website. Perhaps the previous Texas Wildscapes program could be revisited to update the online and printed resources, even if the certification program is not feasible. Importantly, backyard wildlife habitat creation and maintenance provides an opportunity to engage viewers with conservation and the wildlife they appreciate in a new way; compared to other forms of wildlife viewing explored in our survey, fewer wildlife viewers currently participate in establishing or maintaining wildlife habitat.

Develop social support networks for wildlife viewers

Finally, TPWD could develop and increase social support networks for all wildlife viewers, particularly those who have been historically underserved in wildlife recreation and by state and federal fish and wildlife agencies, including Black, Indigenous, and people of color (Flores et al., 2018; Loukaitou-Sideris & Mukhija, 2019; Winter et al., 2019; Sánchez et al., 2020; Thomas et al., 2022). Family and friends were the most commonly reported source of social support that influenced viewer participation. We identify a need for growth in social support from mentors in particular: a role TPWD could potentially fill or foster. Given that 36% of wildlife viewers in Texas experience somewhat to a great deal of accessibility challenges, TPWD could look for opportunities to connect with local organizations dedicated to supporting people living with disabilities, such as Birdability, to collaborate on developing further wildlife viewing opportunities.

Broadening relevance to wildlife viewers who do not hunt or fish

Engaging with nonconsumptive recreationists serves as an opportunity for TPWD to expand their constituency and achieve relevancy goals (AFWA 2016) by connecting with a group not currently involved in hunting and angling and thereby not as closely tied to the agency. Our analysis of consumptive viewers (viewers who also fish or, in fewer cases, also hunt, or both) and nonconsumptive viewers (viewers who do not engage in hunting or fishing) revealed variation in the degree to which wildlife viewers are familiar with TPWD and, possibly as a consequence, differences in wildlife viewers' likelihood to engage with or financially support TPWD. Generally, consumptive viewers in Texas are more active and involved in viewing than nonconsumptive viewers; consumptive viewers participate in wildlife viewing more, spend more on wildlife viewing, and are more broadly active in wildlife viewing and outdoor recreation. Consumptive viewers also tended to have higher levels of experience and familiarity with and financial contributions (past, present, and future) to TPWD than nonconsumptive viewers. Thus, we identify nonconsumptive viewers as a key demographic for which their lack of familiarity with the agency likely drives a lack of connection to TPWD. Increasing familiarity of wildlife viewers with TPWD may also lead to increased interest in participating in conservation behaviors in collaboration with the TPWD and contributing financially to the agency. In addition to a need to increase basic agency familiarity, the provision of services that specifically serve nonconsumptive viewers, including support for around-the-home viewing, information on where to view wildlife, and materials on wildlife viewing tailored for beginners, is an important next step in developing relationships with this currently underserved group.

Benefits to current constituents who also view wildlife

While consumptive and nonconsumptive recreationists are often treated as separate groups, both our findings and research published elsewhere (e.g., Cooper et al., 2015; Grooms et al., 2021) indicate that interest in wildlife viewing is common ground for many wildlife recreationists. Furthermore, over one-quarter of both consumptive and nonconsumptive viewers believe TPWD is not prioritizing programs for wildlife viewers enough. Our findings show that consumptive recreationists desire all forms of support from TPWD related to wildlife viewing programs. In addition, we found that consumptive and nonconsumptive viewers are interested in similar programs, services, and support, with the only differences being consumptive viewers were more enthusiastically interested in all forms of state agency support (most likely due to established viewer-agency relationships from their hunting and angling activities). Thus, we suggest that engaging with and providing further support to nonconsumptive viewers will additionally serve and align with the interests of consumptive viewers.

Developing financial contribution opportunities for wildlife viewers

We found a strong potential for TPWD to engage wildlife viewers in opportunities to contribute financially to the agency. This potential is notable as it may be the case that the sample for this survey had a higher representation of low income viewers as Qualtrics panel surveys can be biased toward lower income respondents interested in the compensation for survey-taking (T. Soule, personal communications, March 30, 2022). Over one-third of wildlife viewers reported moderate to extreme likelihood to contribute via any financial mechanism in the next five years. For example, over half of wildlife viewers reported interest in purchasing tangible products from TPWD (such as books, maps, and other merchandise) in the next five years. This finding highlights the potential opportunity to expand the Texas State Parks online store or create a print-on-demand merchandise store aimed at wildlife viewers where viewers can purchase products beyond licenses, permits, and limited tangible goods. This could also be accomplished by developing print-on-demand products (such as logoed apparel or plushes) and using a third-party, such as Printful, Society6 or Spring, to manage sales and inventory. In addition, over half of wildlife viewers also reported interest in purchasing a lottery ticket for which the proceeds would go to conservation, in the next five years. Notably, the conservation lottery ticket is unavailable from TPWD at this time; the agency may consider supporting development of a lottery fund that contributes to developing wildlife viewing capacity and conservation.

Engaging wildlife viewers who do not hunt or fish in funding conservation

Engaging nonconsumptive viewers in supporting TPWD financially will require re-thinking current funding models. Wildlife viewing does not appear to be a “gateway” to consumptive activities like hunting and fishing, which traditionally fund TPWD, as nonconsumptive viewers expressed little to no interest in supporting most typical/currently available funding mechanisms in the next five years. One option is the development of a wildlife viewer pass or membership similar to the Virginia Department of Wildlife Resources’ “Restore the Wild Membership” (see description in Sinkular et al., 2022). Such a membership could provide wildlife viewers with a specialized access pass that could potentially include benefits such as access to Wildlife Management Areas (Limited Use Permit), a State Park Pass, TP&W magazine subscription, and/or other perks (e.g., merchandise, wildlife viewing equipment, tours of Wildlife Management Areas, etc.), based on purchase level. As nonconsumptive viewers most commonly contributed and were most likely to contribute in the future to the agency through a land access pass, considerable options exist to capitalize on this finding. Wildlife viewer-specific funding mechanisms could provide a way for TPWD to increase their connection with viewers, particularly nonconsumptive viewers. But it is critical to keep in mind that people must feel that the money is going to a good cause–one that they believe in or that will serve their interests. For wildlife viewers in Texas, this means using funds for species-level conservation and

expanding resources for wildlife viewing; viewers were most likely to increase their contributions to TPWD if they knew their funds would be used for the types of wildlife they like to view, more opportunities or resources for wildlife viewing, or the conservation of rare and vulnerable species.

Conclusion

The Texas results of the Wildlife Viewer Survey fill multiple knowledge gaps about wildlife viewers in the state: what they like to participate in, how they view and trust TPWD as a state agency, what services and programs they wish TPWD provided, how they are most likely to support conservation through action and funding, and more. This baseline information can enable TPWD to start building, adapting, or strengthening programming, funding models, communication channels, and other efforts to better connect and interact with wildlife viewers. In turn, these efforts will enable TPWD to become more relevant to a larger constituency than they are currently.

While much work can be done using the data already collected and analyzed in the report, many additional opportunities exist to take this study to the next level through implementing activities at the state level and diving deeper into the data already collected. The WVNT Working Group is poised to support the implementation of these findings. However, the full implementation of the recommendations outlined above will be best realized with a phase 2 multi-state grant, allowing the Working Group and TPWD to continue to work in collaboration with Virginia Tech in implementing survey results.

REFERENCES

Abrams, K. M., Leong, K., Melena, S., & Teel, T. (2020). Encouraging safe wildlife viewing in national parks: Effects of a communication campaign on visitors' behavior. *Environmental Communication*, 14(2), 255-270.

Association of Fish and Wildlife Agencies (AFWA). (2017). The State Conservation Machine. https://www.fishwildlife.org/application/files/3615/1853/8699/The_State_Conservation_Machine-FINAL.pdf

Association of Fish and Wildlife Agencies (AFWA). (2019). Multistate Conservation Grant Program - Background and general information. https://www.fishwildlife.org/afwa-informs/multi-state-conservation-grants-program

Association of Fish and Wildlife Agencies (AFWA) & The Wildlife Management Institute (WMI). (2019). Fish and wildlife relevancy roadmap: Enhanced conservation through broader engagement. In M. Dunfee, A. Forstchen, E. Haubold, M. Humpert, J. Newmark, J. Sumners, & C. Smith (Eds.), Washington D.C., AFWA. 128 Pages.

Benson, D. E. (2001). Wildlife and recreation management on private lands in the United States. *Wildlife Society Bulletin*, 359-371.

Center for Disease Control (CDC). (2020). Disability impacts all of us. *Disability and Health Infographics.* https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html

Cooper, C., Larson, L., Dayer, A., Stedman, R., & Decker, D. (2015). Are wildlife recreationists conservationists? Linking hunting, birdwatching, and pro-environmental behavior. *The Journal of Wildlife Management*, 79(3): 446–457.

Cucinotta, D. & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. *Acta Bio-Medica: Atenei Parmensis*, *91*(1), 157–160.

Czeisler, M. É., Howard, M. E., Robbins, R., Barger, L. K., Facer-Childs, E. R., Rajaratnam, S. M., & Czeisler, C. A. (2020). COVID-19: public compliance with and public support for stay-at-home mitigation strategies. *MedRxiv*.

Duffus, D. A. & Dearden, P. (1990). Non-consumptive wildlife-oriented recreation: A conceptual framework. *Biological Conservation*, 53(3), 213-231.

Fulton, D., Slagle, K., & Raedeke, A. (2017). 2018 NAWMP update: Assessment/Implementation summary. https://nawmp.org/sites/default/files/2018-01/SUMM%20NAWMP%20Bird%20watcher%20Survey%20June%2020%202017_1.pdf

Gefen, D. (2002). Reflections on the dimensions of trust and trustworthiness among online consumers. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *33*(3), 38–53.

Gottlieb, B. H. & Bergen, A. E. (2010). Social support concepts and measures. *Journal of Psychosomatic Research*, 69(5), 511-520.

Green, R. J. & Higginbottom, K. (2000). The effects of non-consumptive wildlife tourism on free-ranging wildlife: a review. *Pacific Conservation Biology*, *6*(3), 183-197.

Grooms, B., Dayer, A. A., & Peele, A. (2019). Wildlife recreationists in Virginia: Focus group results. https://vtechworks.lib.vt.edu/handle/10919/98666.

Grooms, B., Rutter, J., Barnes, J. C., Peele, A., & Dayer, A. A. (2020). Supporting wildlife recreationists in Virginia: Survey report to inform the Virginia Department of Wildlife Resources' Wildlife Viewing Plan. http://hdl.handle.net/10919/101046.

Grooms, B. P. (2021). Exploring wildlife recreationists' conservation behaviors and perceptions of state fish and wildlife agencies to inform conservation engagement and support (Doctoral dissertation, Virginia Tech).

Harshaw, H. W., Cole, N. W., Dayer, A. A., Rutter, J. D., Fulton, D. C., Raedeke, A. H., ... & Duberstein, J. N. (2021). Testing a continuous measure of recreation specialization among birdwatchers. *Human Dimensions of Wildlife*, *26*(5), 472-480.

Hochachka, W. M., Alonso, H., Gutiérrez-Expósito, C., Miller, E., & Johnston, A. (2021). Regional variation in the impacts of the COVID-19 pandemic on the quantity and quality of data collected by the project eBird. *Biological Conservation*, *254*, 108974. https://doi.org/10.1016/j.biocon.2021.108974

Katz, H. (2017). The impact of familiarity and perceived trustworthiness and influence on

donations to nonprofits: An unaided recall study. *Journal of Nonprofit & Public Sector Marketing*, 1–13.

Kellert S. R., Case, D. J., Escher, D. J., Witter, Mikels-Carrasco, J., & Seng, P. T. (2017). The nature of Americans: disconnection and recommendations for reconnection. *The Nature of Americans National Report*. Mishawaka, IN; DJ Case and Associates.

Larson, L. R., Cooper, C. B., Stedman, R. C., Decker, D. J., & Gagnon, R. J. (2018). Place-based pathways to proenvironmental behavior: Empirical evidence for a conservation–recreation model. *Society & Natural Resources*, *31*(8), 871-891.

Lee, J.H. & Scott, D. (2004). Measuring birding specialization: A confirmatory factor analysis. *Leisure Sciences, 26*, 245-260.

Needham, M. D., Sprouse, L. J., & Grimm, K. E. (2009). Testing a self-classification measure of recreation specialization among anglers. *Human Dimensions of Wildlife*, *14*(6), 448-455.

North American Wildfowl Management Plan (NAWMP). (2021). National survey of birdwatchers: Nationwide and flyway comparisons. *Report to the National Flyway Council from the Minnesota Cooperative Fish and Wildlife Research Unit and University of Minnesota*. St. Paul, MN 55108 https://nawmp.org/sites/default/files/2021-03/National%20Birdwatcher%20Survey.pdf

Manfredo, M. J., Sullivan, L., Don Carlos, A. W., Dietsch, A. M., Teel, T. L., Bright, A. D., & Bruskotter, J. (2018). America's wildlife values: The social context of wildlife management in the U.S. national report from the research project entitled "America's Wildlife Values". Fort Collins, CO: Colorado State University.

Maple, L. C., Eagles, P. F., & Rolfe, H. (2010). Birdwatchers' specialisation characteristics and national park tourism planning. *Journal of ecotourism*, *9*(3), 219-238.

Mathews, K., Phelan, J., Jones, N. A., Konya, S., Marks, R., Pratt, B. M., ... & Bentley, M. (2015). National content test: Race and ethnicity analysis report. *U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau*.

Michopoulou, E., Darcy, S., Ambrose, I., & Buhalis, D. (2015). Accessible tourism futures: The world we dream to live in and the opportunities we hope to have. *Journal of Tourism Futures*, *1*(3), 179–188.

https://doi.org/10.1108/JTF-08-2015-0043

Miller, C. A., Guidry, J. P., Dahman, B., & Thomson, M. D. (2020). A tale of two diverse qualtrics samples: information for online survey researchers. *Cancer Epidemiology and Prevention Biomarkers*, *29*(4), 731-735.

Organ, J. F., Geist, V., Mahoney, S. P., Williams, S., Krausman, P. R., … & Decker, D. J. (2012). *The North American Model of Wildlife Conservation*. The Wildlife Society Technical Review 12-04. The Wildlife Society, Bethesda, Maryland, U.S.A. http://wildlife.org/wp-content/uploads/2014/05/North-American-model-of-Wildlife-Conservation.pdf

Pearson, A. R., Schuldt, J. P., Romero-Canyas, R., Ballew, M. T., & Larson-Konar, D. (2018). Diverse segments of the U.S. public underestimate the environmental concerns of minority and low-income Americans. *Proceedings of the National Academy of Sciences*, 115(49), 12429-12434.

Poudel, J., Munn, I. A., & Henderson, J. E. (2017). Economic contributions of wildlife watching recreation expenditures (2006 & 2011) across the U.S. South: An input-output analysis. *Journal of Outdoor Recreation and Tourism*, 17: 93–99. https://www.sciencedirect.com/science/article/pii/S2213078016300457.

Price Tack, J. L., McGowan, C. P., Ditchkoff, S. S., Morse, W. C., & Robinson, O. J. (2018). Managing the vanishing North American hunter: A novel framework to address declines in hunters and hunter-generated conservation funds. *Human Dimensions of Wildlife*, *23*(6), 515–532.

Rice, W. L., Meyer, C., Lawhon, B., Taff, B. D., Mateer, T., Reigner, N., & Newman, P. (2020). The COVID-19 pandemic is changing the way people recreate outdoors: Preliminary report on a national survey of outdoor enthusiasts amid the COVID-19 pandemic [Preprint]. *SocArXiv*.

Robinson, J. C. (2005). Relative prevalence of African Americans among bird watchers. In C. J. Ralph, T. D. Rich (Eds.), Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, 20-24; Asilomar, California, Volume 2 Gen. Tech. Rep. PSW-GTR-191. Albany, CA: U.S. Dept. of Agriculture, Forest Service, Pacific Southwest Research Station: p. 1286-1296.

Rose, V. & McGregor, F. (2021). *Birdability... Because birding is for everyone! Birdability*. https://www.birdability.org

Rutter, J. D., Dayer, A. A., Harshaw, H. W., Cole, N. W., Duberstein, J. N., Fulton, D. C., ... & Schuster, R. M. (2021). Racial, ethnic, and social patterns in the recreation specialization of birdwatchers: An analysis of United States eBird registrants. *Journal of Outdoor Recreation and Tourism*, 35, 100400.

Schoffman, D. E., Kaczynski, A. T., Forthofer, M., Wilcox, S., Hutto, B., Child, S. T., & Hughey, S. M. (2015). Longitudinal associations with changes in outdoor recreation area use for physical activity during a community-based intervention. *Preventive medicine*, 78, 29-32.

Scott, D., & Shafer, C. S. (2001). Recreational specialization: A critical look at the construct. *Journal of Leisure Research*, 33, 319–343.

Sinkular, E. N., Jennings, K. K., & Dayer, A. A. (2021). Multi-State wildlife viewing study: Literature review. https://vtechworks.lib.vt.edu/handle/10919/105661

Sinkular, E.N., Dayer, A.A., Barnes, J.C., Pototsky, P.C., Plante., S.D., Jennings. K.K., and Chaves W.A. 2022. National and Regional Results from the Wildlife Viewer Survey: Enhancing Relevancy and Engaging Support from a Broader Constituency. Virginia Tech; Blacksburg, Virginia.

Spiel, K., Haimson, O. L., & Lottridge, D. (2019). How to do better with gender on surveys: a guide for HCI researchers. *Interactions*, *26*(4), 62-65.

Tremblay, P. (2001). Wildlife tourism consumption: consumptive or non-consumptive?. *The International Journal of Tourism Research*, *3*(1), 81.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, & U.S. Census Bureau. (2011). National survey of fishing, hunting, and wildlife-associated recreation: Texas. https://www2.census.gov/programs-surveys/fhwar/publications/2011/fhw11-tx.pdf

U.S. Department of the Interior (U.S. DOI), et al. (2016). National survey of fishing, hunting, and wildlife-associated recreation. https://www.census.gov/content/dam/Census/library/publications/2018/demo/fhw16-nat.pdf.

U.S. Census Bureau. (2010). Census urban and rural classification and urban area criteria. *Library Catalog: www.census.gov Section: Government*.

U.S. Census Bureau. (2021, August 12). 2020 census statistics highlight local population changes and nation's racial and ethnic diversity [Press release]. https://www.census.gov/newsroom/press-releases/2021/population-changes-nations-diversity.html

Wardropper, C. B., Dayer, A. A., Goebel, M. S., & Martin, V. Y. (2021). Conducting conservation social science surveys online. *Conservation Biology*, *35*(5), 1650-1658.

Williams, R., Vogelsong, H., Green, G., & Cordell, K. (2004). Outdoor recreation participation of people with mobility disabilities: Selected results of the national survey of recreation and the environment. *Journal of Park and Recreation Administration, 2004, Volume 22, No. 2, 84-100*. http://www.fs.usda.gov/treesearch/pubs/21304

Van Grinsven, B., & Das, E. (2016). Logo design in marketing communications: Brand logo complexity moderates exposure effects on brand recognition and brand attitude. *Journal of marketing communications*, *22*(3), 256-270.

Vaske, J. J. (2019). Survey research and analysis. *Sagamore-Venture*. 1807 North Federal Drive, Urbana, IL 61801.

Vaske, J. J., & Roemer, J. M. (2013). Differences in overall satisfaction by consumptive and nonconsumptive recreationists: A comparative analysis of three decades of research. *Human Dimensions of Wildlife*, *18*(3), 159-180.

Zeppel, H., & Muloin, S. (2008). Conservation benefits of interpretation on marine wildlife tours. *Human Dimensions of Wildlife*, *13*(4), 280-294.

APPENDIX A. Survey Instrument

This survey should take you about 15-25 minutes to complete. Your participation in this research study is **voluntary and anonymous**. Your responses will never be presented in a way that they can be connected to your identity. The results of the survey will be published in summary form in reports, graduate theses, and journal articles. Anonymous survey data will be made available to state fish and wildlife agencies and may be archived online in a publicly accessible format. There are **no known risks** associated with this research; there are **no right or wrong answers** to survey questions; and **you can leave the survey at any time**, for any reason.

For questions about this survey, please contact Emily Sinkular at wildlifeviewingsurvey@vt.edu or (540) 358-0346. This research has been approved by Virginia Tech's IRB committee (Protocol #20-1018). If you have any questions or concerns about this study's conduct or your rights as a research subject, you may contact the Virginia Tech IRB at 540-231-3732 or at irb@vt.edu.

Do you consent to participate in this research study?

(Please select one.)

◯ Yes

◯ No

>>

First, we would like to know about your participation in different kinds of wildlife viewing.

In which, if any, of the following forms of **wildlife viewing** have you participated in the past 5 years?

Note: *For this survey,* ***"wildlife"*** *refers to all animals, such as birds, fish, insects, mammals, amphibians, and reptiles, that are living in natural environments, including in urban and semi-urban places. Wildlife does not include animals living in artificial or captive environments, such as aquariums, zoos, or museums, or domestic animals such as farm animals or pets.* ***"Wildlife viewing"*** *refers to intentionally observing, photographing, or feeding wildlife; improving or maintaining wildlife habitat; or visiting parks and natural areas for the primary purpose of wildlife viewing. Wildlife viewing does not include simply noticing wildlife while doing something else, such as gardening, exercising, hunting, or fishing, or intentionally scouting for game.*

(Please select all that apply.)

- ☐ Closely observing wildlife or trying to identify unfamiliar types of wildlife
- ☐ Photographing or taking pictures of wildlife
- ☐ Feeding wild birds
- ☐ Feeding other wildlife
- ☐ Maintaining plantings or natural areas for the benefit of wildlife
- ☐ Visiting parks and natural areas to observe, photograph, or feed wildlife
- ☐ Taking trips or outings to any other location to observe, photograph, or feed wildlife
- ☐ I did not participate in any of these forms of wildlife viewing in the past 5 years.

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

Before we continue with the rest of the survey, we have just a few quick questions about you.

In **what year** were you born?

(Please select your birth year from the drop-down list.)

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Which state do you live in for most of the year?

(Please select a state from the drop-down list.)

What is your **gender**?

(Please select one.)

- ○ Man
- ○ Woman
- ○ Non-binary
- ○ Prefer to not disclose
- ○ Prefer to self-describe

What is the **highest degree or level of school** you have completed?

(Please select one.)

- ◯ High school diploma, equivalent, or less
- ◯ Some college
- ◯ Associate's or technical degree
- ◯ Bachelor's degree
- ◯ Professional, master's or doctoral degree

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

Now, we would like to ask you more about your wildlife viewing activities.

Which of the following **types of wildlife** are you interested in observing, photographing, or feeding?

(Please select all that apply.)

- ☐ **Birds** *(such as songbirds, waterfowl, birds of prey, etc.)*
- ☐ **Insects or spiders** *(such as butterflies, dragonflies, beetles, etc.)*
- ☐ **Amphibians** *(such as frogs, salamanders, etc.)*
- ☐ **Land mammals** *(such as deer, bears, elk, etc.)*

- ☐ **Freshwater or saltwater fish**
  (such as sunfishes, darters, trout, salmon, sea bass, etc.)
- ☐ **Marine mammals**
  (such as whales, seals, dolphins, etc.)
- ☐ **Reptiles**
  (such as turtles, snakes, etc.)
- ☐ ***None of the above**, I am not interested in observing, photographing, or feeding wildlife*
- ☐ **None of the above,** *I am interested in observing, photographing, or feeding other types of wildlife*

How would you **rate your skill level** in wildlife viewing?

(Please select one.)

- ◯ Beginner
- ◯ Novice
- ◯ Intermediate
- ◯ Advanced
- ◯ Expert

Do you own any **specialized equipment** for wildlife viewing *(such as binoculars, cameras, mobile apps, spotting scopes, field guides, or specialized clothing)*, or have you rented or borrowed any specialized equipment for wildlife viewing in the past 5 years?

(Please select one.)

- ◯ Yes
- ◯ No

>>

Next, we would like to know about your expenditures related to wildlife viewing.

How much money do you spend on the following expenses related to wildlife viewing in a typical year?

Note: *Throughout this survey we will ask you about your activities during "a typical year." This is because we recognize that the last year has been unusual due to the COVID-19 pandemic, and this may have impacted your participation in wildlife viewing. By "a typical year," we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic. If you started viewing wildlife during the pandemic, please answer all questions about "a typical year" for the past year.*

(For each expense category below, please select the response that contains your best estimate of how much you typically spend.)

Trip-related costs for wildlife viewing *(such as transportation, lodging, guide fees, or access fees)*

All other wildlife viewing expenses and equipment *(such as binoculars, hiking or boating equipment for viewing, field guides, bird feeders or bird food, or membership dues for wildlife viewing organizations)*

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Now, we would like to know more about the role of wildlife viewing in your life.

To what extent do you **agree or disagree** with the following statements?

(Please select one response per statement.)

To what extent do you **agree or disagree** with the following statements?

(Please select one response per statement.)

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I think of **myself** as a wildlife viewer.	○	○	○	○	○
Being a wildlife viewer is an important part of **who I am**.	○	○	○	○	○
Wildlife viewing has a **central role** in my life.	○	○	○	○	○
A lot of my life is **organized** around wildlife viewing.	○	○	○	○	○
Wildlife viewing is **not an important** part of my life.	○	○	○	○	○
People who **look like me** participate in wildlife viewing.	○	○	○	○	○
I feel **welcome** among other wildlife viewers.	○	○	○	○	○
Being a wildlife viewer is **not a key** part of who I am.	○	○	○	○	○
I **teach** or **mentor** others in wildlife viewing.	○	○	○	○	○
Wildlife viewing is one of the **most enjoyable** activities I do.	○	○	○	○	○

<< >>

We are also interested in your history with wildlife viewing.

How did the **COVID-19 pandemic** impact your overall participation in wildlife viewing?

(Please select one.)

- ○ **No impact;** I was wildlife viewing prior to the COVID-19 pandemic, and I continued wildlife viewing during the pandemic.
- ○ I was wildlife viewing prior to the COVID-19 pandemic, but **I stopped wildlife viewing** during the pandemic.
- ○ While I previously participated in wildlife viewing, I was not currently wildlife viewing when the COVID-19 pandemic started. During the pandemic, I **started wildlife viewing again**.
- ○ I **started wildlife viewing for the first time** during the COVID-19 pandemic.

>>

For about **how many years** have you participated in wildlife viewing?

(Please select the category that contains your best estimate.)

<<

>>

In this section of the survey, we will ask you about how much time you spend wildlife viewing in different locations. The first question asks about the number of days you spend wildlife viewing in *a typical year*. The next two questions ask you about how many days you spent wildlife viewing in the *past year* and how much time you think you will spend wildlife viewing in the *upcoming year*.

First, **how many days** do you spend wildlife viewing in each of the following locations **in a typical year**?

Note: By "a typical year," we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic.

(Please select the response that contains your best estimate for the number of days you spend wildlife viewing in each location. If you do not typically participate in wildlife viewing in these locations, please select 0 days.)

First, **how many days** do you spend wildlife viewing in each of the following locations **in a typical year**?

Note: By "a typical year," we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic.

(Please select the response that contains your best estimate for the number of days you spend wildlife viewing in each location. If you do not typically participate in wildlife viewing in these locations, please select 0 days.)

	0 days	1-30 days	31-60 days	61-90 days	91-120 days	121-150 days	151-180 days	181-210 days	211 or more days
Around or within 1 mile of your home	○	○	○	○	○	○	○	○	○
More than 1 mile away from your home, but within your state	○	○	○	○	○	○	○	○	○
Outside of your state or outside of the United States	○	○	○	○	○	○	○	○	○

How many days did you spend wildlife viewing in each of the following locations **during the first year of the COVID-19 pandemic** (March 2020 - February 2021)?

(Please select the response that contains your best estimate for the number of days you spent wildlife viewing in each location. If you did not participate in wildlife viewing in these locations during the first year of the COVID-19 pandemic, please select 0 days.)

	0 days	1-30 days	31-60 days	61-90 days	91-120 days	121-150 days	151-180 days	181-210 days	211 or more days
Around or within 1 mile of your home	○	○	○	○	○	○	○	○	○
More than 1 mile away from your home, but within your state	○	○	○	○	○	○	○	○	○
Outside of your state or outside of the United States	○	○	○	○	○	○	○	○	○

How many days do you think you will spend wildlife viewing in each of the following locations **in the next 12 months**?

(Please select the response that contains your best estimate for the number of days you expect to spend wildlife viewing in each location. If you do not expect to participate in wildlife viewing in these locations in the upcoming year, please select 0 days.)

	0 days	1-30 days	31-60 days	61-90 days	91-120 days	121-150 days	151-180 days	181-210 days	211 or more days
Around or within 1 mile of your home	○	○	○	○	○	○	○	○	○
More than 1 mile away from your home, but within your state	○	○	○	○	○	○	○	○	○
Outside of your state or outside of the United States	○	○	○	○	○	○	○	○	○

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

Now, we would like to know more about where you participate in wildlife viewing in Texas.

In a typical year, in **which locations** do you participate in wildlife viewing in Texas?

Note: *By "a typical year," we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic.*

(Please select all that apply.)

- ☐ My own home or property
- ☐ Property of friends or family
- ☐ Other privately-owned areas *(such as lands owned by land trusts, non-profit organizations, private companies, or individuals)*
- ☐ Locally-managed areas *(such as town or county parks, trails, or open spaces)*
- ☐ State-managed areas *(such as state parks, forests, boat landings, fishing areas, conservation areas, or Wildlife Management Areas)*
- ☐ Federally-managed areas *(such as National Parks, National Wildlife Refuges, Bureau of Land Management Land, Waterfowl Production Areas, or National Forests)*
- ☐ Tribal lands
- ☐ I am unsure who owns or manages the areas where I participate in wildlife viewing.
- ☐ I do not participate in wildlife viewing in any of the above locations.

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH™

Next, we would like to understand the factors that support and limit your participation in wildlife viewing.

To what extent do people in each of the following groups **encourage your participation** in wildlife viewing?

(Please select one response per statement.)

	Not at all	Very little	Somewhat	Quite a bit	A great deal
Family member(s)	○	○	○	○	○
Friend(s)	○	○	○	○	○
Mentor(s)	○	○	○	○	○
Peer(s)	○	○	○	○	○

To what extent do you experience **accessibility challenges** related to wildlife viewing?

Note: *By* ***"Accessibility challenges"*** *we mean the difficulties someone experiences in interacting with or while using the physical or social environment while trying to engage in a meaningful activity (such as wildlife viewing). This may be a result of a mobility challenge, blindness or low vision, intellectual or developmental disabilities (including Autism), mental illness, being Deaf or Hard of Hearing, or other health concerns. (Definition from Birdability.org)*

(Please select one.)

- ◯ Not at all
- ◯ Very little
- ◯ Somewhat
- ◯ Quite a bit
- ◯ A great deal

To what extent do each of the following **limit the extent of your participation** in wildlife viewing in a typical year?

Note: *By* ***"a typical year,"*** *we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic.*

(Please select one response per statement.)

	Not at all	Very little	Somewhat	Quite a bit	A great deal
Lack of **free time** to participate in wildlife viewing	○	○	○	○	○
Few **people who support** your wildlife viewing activities	○	○	○	○	○
Few **people to participate in wildlife viewing with**	○	○	○	○	○
Lack of **organized viewing opportunities** within your community or social groups	○	○	○	○	○
Lack of wildlife viewing **skills**	○	○	○	○	○
Lack of access to **equipment or supplies** for wildlife viewing	○	○	○	○	○
Financial costs associated with wildlife viewing	○	○	○	○	○
Distance to high-quality locations for wildlife viewing	○	○	○	○	○

Not knowing **where to go wildlife viewing**	○	○	○	○	○
Lack of **transportation** to wildlife viewing locations	○	○	○	○	○
Accessibility challenges for yourself or the people you go wildlife viewing with	○	○	○	○	○
Lack of **facilities** at wildlife viewing locations	○	○	○	○	○
Safety concerns when wildlife viewing	○	○	○	○	○
Crowds in wildlife viewing locations	○	○	○	○	○

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FISH AND WILDLIFE CONSERVATION
VIRGINIA TECH

We are also interested in your participation in other kinds of outdoor recreation.

Which of the following **outdoor activities**, if any, do you participate in during a typical year?

Note: *By "a typical year," we mean a recent year (within the last ~5 years) that was not impacted by unusual circumstances like the COVID-19 pandemic.*

(Please select all that apply.)

- ☐ Camping
- ☐ Fishing
- ☐ Horseback riding

- ☐ Winter sports *(such as skiing, snowboarding, or snowshoeing)*
- ☐ Rock climbing or bouldering
- ☐ Foraging *(for wild foods such as mushrooms or berries)*
- ☐ Hunting
- ☐ Swimming
- ☐ Recreational shooting sports or archery
- ☐ Geocaching
- ☐ Hiking or backpacking
- ☐ Off-roading or use of Off Highway Vehicles *(such as ATVs or snowmobiles)*

- ☐ Motorized boating
- ☐ Non-motorized boating *(such as kayaking or canoeing)*
- ☐ Road or mountain biking
- ☐ Running, jogging, or walking
- ☐ I do not participate in any of these activities.
- ☐ Botanizing or viewing wildflowers, other plants, or fungi

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

Now we would like to know more about your interest in participating in wildlife or habitat conservation activities in the future.

How likely would you be to participate in each of the following **conservation activities** in the next 5 years, if you had the opportunity to do so?

(Please select one response per conservation activity.)

	Not at all likely	Slightly likely	Moderately likely	Very likely	Extremely likely
Informing or **teaching** others about wildlife conservation	○	○	○	○	○
Enhancing wildlife habitat *(the place or environment where wildlife live and grow)*	○	○	○	○	○
Participating in **civic engagement** *(such as voting or advocating)* related to wildlife conservation	○	○	○	○	○
Collecting data on wildlife or habitat to contribute to science or management	○	○	○	○	○
Donating money to support wildlife conservation	○	○	○	○	○
Purchasing products that benefit wildlife or whose proceeds support conservation	○	○	○	○	○
Cleaning up trash or litter	○	○	○	○	○

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

In this section of the survey, we would like to know more about your experiences with and thoughts about Texas Parks and Wildlife, the state agency responsible for conserving fish and wildlife and their habitats and managing wildlife-related recreation in Texas, among other things.

How **familiar** are you with Texas Parks and Wildlife?

(Please select one.)

- ○ Not at all familiar
- ○ Slightly familiar
- ○ Moderately familiar
- ○ Very familiar
- ○ Extremely familiar

Now, we would like to know more about your **familiarity** with different aspects of Texas Parks and Wildlife.

(Please select one response per statement.)

	Not at all familiar	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
Texas Parks and Wildlife staff	○	○	○	○	○
Texas Parks and Wildlife programs	○	○	○	○	○
Texas Parks and Wildlife lands	○	○	○	○	○
Texas Parks and Wildlife mission	○	○	○	○	○

Have you seen this **logo** before?

(Please select one.)

○ **Yes**, I have seen this logo before

○ **No**, I have not seen this logo before

<< >>

Regardless of your level of familiarity with Texas Parks and Wildlife, we are interested in your thoughts about **how the agency currently prioritizes** programs and services that support wildlife viewing. Please complete the following statement:

The level at which Texas Parks and Wildlife prioritizes programs and services that support wildlife viewing is...

(Please select one.)

- ○ Far too low
- ○ Too low
- ○ About right
- ○ Too high
- ○ Far too high
- ○ I don't have an opinion.

<< >>

FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

We are also interested in any experiences you may have with the programs and services offered by Texas Parks and Wildlife.

Texas Parks and Wildlife offers a variety of **programs and services** that connect people with wildlife and support wildlife viewing. Which of the following Texas Parks and Wildlife programs and services, if any, have you **participated in or used** in the past 5 years?

(Please select all that apply.)

- ☐ Volunteer research or wildlife data collection opportunities
- ☐ Volunteer opportunities, not related to research or data collection
- ☐ Technical assistance or information about improving wildlife habitat
- ☐ Information about wildlife viewing opportunities in the state
- ☐ Information about wildlife in the state
- ☐ Programs or presentations for groups or clubs
- ☐ Texas Parks and Wildlife lands
- ☐ Texas Parks and Wildlife nature, education, or visitor centers
- ☐ Wildlife festivals or viewing competitions sponsored by Texas Parks and Wildlife
- ☐ Conservation law enforcement
- ☐ I have not used or engaged in any of these agency programs or services in the last 5 years.

Have any members of your household engaged in programming for children or youth provided by Texas Parks and Wildlife *(such as school-based programs, camps, or youth and family events)*?

(Please select one.)

- ◯ **Yes**; children or youth in my household have engaged in some of these programs.
- ◯ **No**; children or youth in my household have not engaged in any of these programs.
- ◯ **Not applicable**; I do not have children or youth in my household.

<< >>

We would also like to understand how Texas Parks and Wildlife can best meet the needs of wildlife viewers.

Which of the following potential programs or services from Texas Parks and Wildlife would better **support your wildlife viewing activities** in Texas?

(Please select all that apply.)

Texas Parks and Wildlife can better support my wildlife viewing activities by providing...

- ☐ More opportunities to be involved in volunteer **research** or wildlife data collection activities
- ☐ More programs to improve wildlife viewing **skills**
- ☐ More **training** opportunities for wildlife viewing guides or mentors
- ☐ More **amenities** for wildlife viewing *(such as viewing platforms, blinds, or signs)*
- ☐ More information about **where** to go to see wildlife
- ☐ More information about **wildlife in Texas**
- ☐ More information about **how** to view various types of wildlife
- ☐ More agency **staff** to support wildlife viewing
- ☐ More information about where and when to view wildlife where there is **no hunting**

- ☐ More **accessible features** in wildlife viewing locations *(such as paved trails, accessible parking, or tactile signage)*
- ☐ More **virtual programs** for wildlife viewing *(such as video classes, online presentations, or wildlife cameras)*
- ☐ Access to more **places** to go wildlife viewing
- ☐ More wildlife viewing **events** *(such as wildlife viewing festivals or competitions)*
- ☐ More opportunities for **youth** to learn how to participate in wildlife viewing
- ☐ More programs to **interact** with other wildlife viewers
- ☐ I am **not interested** in any of these options to support my wildlife viewing activities.
- ☐ More opportunities to be involved in other **volunteer** activities, not related to research or data collection

>>

Now, we would like to know about your past financial support of Texas Parks and Wildlife.

Below are a variety of ways that wildlife conservation and recreation opportunities provided by Texas Parks and Wildlife are *financially* supported by the public in Texas. Which of the following **purchases or contributions**, if any, have you made in the past 5 years?

Note: *Please also select options for which you have ever made a one-time, permanent purchase, such as a lifetime hunting or fishing license.*

(Please select all that apply.)

- ☐ Any Texas hunting license
- ☐ Any Texas fishing license
- ☐ Texas conservation or habitat stamp *required with purchase of a hunting license*
- ☐ Texas Parks and Wildlife lands access pass, permit, or entrance fee
- ☐ Fees for a program or event hosted by Texas Parks and Wildlife
- ☐ Donation of land to Texas Parks and Wildlife through a conservation easement
- ☐ Direct donation of money to Texas Parks and Wildlife
- ☐ Tangible products from Texas Parks and Wildlife *(such as books, maps, and other merchandise)*
- ☐ I have not made any of these purchases or contributions.

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

Now, we would like to know about future purchases or contributions you may make to Texas Parks and Wildlife.

How likely are you to make the following **purchases or contributions** in the next 5 years, assuming these options are available in Texas?

(Please select one response for each type of contribution, regardless of whether or not the option is currently available in Texas.)

	Not at all likely	Slightly likely	Moderately likely	Very likely	Extremely likely
Any Texas hunting license	○	○	○	○	○
Any Texas fishing license	○	○	○	○	○
Texas conservation or habitat stamp *required with purchase of a hunting license*	○	○	○	○	○
Texas conservation or habitat stamp *voluntarily purchased independent of a hunting license*	○	○	○	○	○
Conservation or wildlife license plate	○	○	○	○	○
Texas Parks and Wildlife lands access pass, permit, or entrance fee	○	○	○	○	○
Fees for a program or event hosted by Texas Parks and Wildlife	○	○	○	○	○
Voluntary donation of a portion of state income tax return to Texas Parks and Wildlife	○	○	○	○	○
Donation of land to Texas Parks and Wildlife through a conservation easement	○	○	○	○	○
Direct donation to Texas Parks and Wildlife	○	○	○	○	○
Lottery ticket for which the proceeds go to habitat conservation	○	○	○	○	○

Virtual products from Texas Parks and Wildlife *(such as podcasts, e-books, and other online materials)*	○	○	○	○	○
Physical products from Texas Parks and Wildlife *(such as books, maps, and other merchandise)*	○	○	○	○	○

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

We would like to understand what might encourage you to provide additional financial support to wildlife conservation through Texas Parks and Wildlife.

How likely would you be to provide **more financial support** than you currently do to Texas Parks and Wildlife, if your contributions were used in the following ways?

(Please select one response per statement.)

	Not at all likely	Slightly likely	Moderately likely	Very likely	Extremely likely
Supported **habitat** conservation	○	○	○	○	○
Supported conservation of **rare** or **vulnerable** species	○	○	○	○	○
Supported conservation of the types of **wildlife** you like to view	○	○	○	○	○

Supported more **opportunities** or **resources** for wildlife viewing	○	○	○	○	○
Supported more **education** or **outreach** related to wildlife conservation	○	○	○	○	○
Supported wildlife **research** or **monitoring**	○	○	○	○	○
Were **matched** with funding from a different source	○	○	○	○	○

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

We would also like to know more about your interest in supporting Texas Parks and Wildlife by participating in wildlife or habitat conservation activities in the future.

How likely would you be to participate in each of the following **conservation activities *with or in support of Texas Parks and Wildlife*** in the next 5 years, if you had the opportunity to do so?

(Please select one response per conservation activity.)

	Not at all likely	Slightly likely	Moderately likely	Very likely	Extremely likely
Informing or teaching others about wildlife conservation	○	○	○	○	○
Enhancing wildlife habitat *(the place or environment where wildlife live and grow)*	○	○	○	○	○

Participating in **civic engagement** *(such as voting or advocating)* related to wildlife conservation	○	○	○	○	○
Collecting data on wildlife or habitat to contribute to science or management	○	○	○	○	○
Donating money to support wildlife conservation	○	○	○	○	○
Purchasing products that benefit wildlife or whose proceeds support conservation	○	○	○	○	○
Cleaning up trash or litter	○	○	○	○	○

<< >>

Next, we would like to know more about how you feel about Texas Parks and Wildlife.

To what extent do you agree or disagree with each of the **following statements about Texas Parks and Wildlife**?

(Please select one response per statement.)

	Strongly Disagree	Somewhat Disagree	Neither Disagree nor Agree	Somewhat Agree	Strongly Agree
I **trust** Texas Parks and Wildlife.	○	○	○	○	○
I **trust** the **staff** at Texas Parks and Wildlife.	○	○	○	○	○

I **doubt** the **honesty** of Texas Parks and Wildlife.	○	○	○	○	○
Promises made by Texas Parks and Wildlife are likely to be **reliable**.	○	○	○	○	○
I expect that Texas Parks and Wildlife will **keep promises** they make.	○	○	○	○	○
I **do <u>not</u> doubt** the honesty of Texas Parks and Wildlife.	○	○	○	○	○
I expect that Texas Parks and Wildlife is **well-meaning**.	○	○	○	○	○
I expect that Texas Parks and Wildlife has **good intentions** toward wildlife viewers.	○	○	○	○	○
I expect that Texas Parks and Wildlife's intentions are **benevolent**.	○	○	○	○	○
I **doubt** that Texas Parks and Wildlife is **well-meaning**.	○	○	○	○	○
Texas Parks and Wildlife **knows about** wildlife viewing.	○	○	○	○	○
Texas Parks and Wildlife **understands** the environment they work in.	○	○	○	○	○
Texas Parks and Wildlife knows how to **support** to wildlife viewers.	○	○	○	○	○
Texas Parks and Wildlife **does <u>not</u> know** about wildlife viewing.	○	○	○	○	○

>>

Finally, we would like to learn how Texas Parks and Wildlife can best communicate with wildlife viewers in Texas about recreation opportunities and conservation issues.

Which, if any, of the following ways are you interested in **receiving information** from Texas Parks and Wildlife?

Note: *Your responses are for data collection only. Texas Parks and Wildlife will not receive your specific response nor contact you as a result of this survey.*

(Please select all that apply.)

- ☐ Printed materials *(such as brochures and maps)*
- ☐ Mailed newsletter or other subscription
- ☐ Email update or e-newsletter
- ☐ Online magazine
- ☐ Texas Parks and Wildlife website
- ☐ Local news *(such as television or online or print newspapers)*
- ☐ Blogs
- ☐ Facebook
- ☐ Twitter

- ☐ Tik-Tok
- ☐ Instagram
- ☐ YouTube
- ☐ Podcast
- ☐ Text alert
- ☐ One-on-one interaction with agency staff
- ☐ I would prefer not to receive information from Texas Parks and Wildlife.

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FISH AND WILDLIFE CONSERVATION VIRGINIA TECH

This is the final section of the survey. We have just a few more quick questions about you.

For about how many years total have you lived in Texas?

(Please select the number that's your best estimate of total years you've lived in Texas.)

What is your race and/or ethnicity?

(Please select all that apply.)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic, Latino, or Spanish
- ☐ Middle Eastern or North African
- ☐ Native Hawaiian or other Pacific Islander
- ☐ Some other race or ethnicity
- ☐ White

What was your total household income during the past 12 months?

(Please select one.)

- ○ Less than $24,999
- ○ $25,000 - $49,999
- ○ $50,000 – $74,999
- ○ $75,000 – $99,999
- ○ $100,000 – $124,999
- ○ $125,000 or more
- ○ I prefer not to answer.

What is your five-digit zip code?

Which of the following best describes where you currently live?

(Please select one per statement.)

- ○ Rural area (Less than 2,500 people)
- ○ Small town (2,500 - 9,999 people)
- ○ Small city (10,000 - 49,999 people)
- ○ Urban area (50,000 or more people)

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APPENDIX B. Reverse coded items and attention checks

1. Attention checks for the question, "In which, if any, of the following forms of wildlife viewing have you participated in the past 5 years?"

    a. Respondent selected ["Closely observing wildlife or trying to identify unfamiliar types of wildlife"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]
    OR
    b. Respondent selected ["Photographing or taking pictures of wildlife"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]
    OR
    c. Respondent selected ["Feeding wild birds"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]
    OR
    d. Respondent selected ["Feeding other wildlife"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]
    OR
    e. Respondent selected ["Visiting parks and natural areas to observe, photograph, or feed wildlife"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]
    OR
    f. Respondent selected ["Taking trips or outings to any other location to observe, photograph, or feed wildlife"] AND ["None of the above, I am not interested in observing, photographing, or feeding wildlife"]

2. Attention checks for "Now, we would like to know more about the role of wildlife viewing in your life. To what extent do you agree or disagree with the following statements?"

    a. Respondent selected ["Strongly Agree"] FOR ["Being a wildlife viewer is an important part of who I am" AND "Being a wildlife viewer is not a key part of who I am"]
    OR

b. Respondent selected [“Strongly Disagree”] FOR [“Being a wildlife viewer is an important part of who I am”] AND [“Being a wildlife viewer is not a key part of who I am”]
   OR
c. Respondent selected [“Strongly Agree”] FOR [“Wildlife viewing is not an important part of my life”] AND [“Wildlife viewing has a central role in my life”]
   OR
d. Respondent selected [“Strongly Disagree”] FOR [“Wildlife viewing is not an important part of my life” AND “Wildlife viewing has a central role in my life”]

3. Attention checks for “How many days do you spend wildlife viewing in each of the following locations in a typical year?”

   a. Respondent selected [211 or more days] IS SELECTED FOR [“Outside of your state or the United States”] AND [“More than 1 mile away from your home, but within your state”] OR [“Around or within 1 mile of your home”]

4. Attention checks for “How many days did you spend wildlife viewing in each of the following locations during the first year of the COVID-19 pandemic (March 2020 - February 2021)?”

   a. Respondent selected [211 or more days] IS SELECTED FOR [“Outside of your state or the United States”] AND [“More than 1 mile away from your home, but within your state”] OR [“Around or within 1 mile of your home”]

5. Attention checks for “How many days do you think you will spend wildlife viewing in each of the following locations in the next 12 months?”
   a. Respondent selected [211 or more days] IS SELECTED FOR [“Outside of your state or the United States”] AND [“More than 1 mile away from your home, but within your state”] OR [“Around or within 1 mile of your home”]

6. Attention checks for “Next, we would like to know more about how you feel about the Texas Parks and Wildlife Department. To what extent do you agree or disagree with each of the following statements about the Texas Parks and Wildlife Department?”

   a. Respondent selected [“Strongly Agree”] FOR [“I doubt the honesty of the Texas Parks and Wildlife Department”] AND [“I can count on the Texas Parks and Wildlife Department to be truthful”] OR [“Strongly Disagree”] IS SELECTED FOR

["I doubt the honesty of [State Agency]"] AND ["I can count on [State Agency] to be truthful"]

b. Respondent selected ["Strongly Agree"] FOR ["I expect that [State Agency]'s intentions are benevolent"] AND ["I doubt that [State Agency] is well meaning"] OR ["Strongly Disagree"] FOR ["I expect that [State Agency]'s intentions are benevolent"] AND ["I doubt that [State Agency] is well meaning"]

c. Respondent selected ["Strongly Agree"] FOR ["[State Agency] knows very little about wildlife viewing"] AND ["[State Agency] knows how to support wildlife viewers"] OR ["Strongly Disagree"] FOR ["[State Agency] knows very little about wildlife viewing"] AND ["[State Agency] knows how to support wildlife viewers"]

APPENDIX C. Tables Appendix

Table 1. Age (survey quota)

	Statewide (mean)	Consumptive (mean)	Nonconsumptive (mean)	Significance (t)
Age	47.98	44.91	51.11	**5.80*** **

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 991.30

Table 2. Gender (survey quota)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Man	51.0	56.2	45.7	**11.10*** **
Woman	48.3	43.2	53.5	
Non-binary	0.4	0.2	0.6	
Not Disclose	0.1	0.2	0.0	
Self-Describe	0.2	0.2	0.2	

Note that statistical tests are between consumptive and nonconsumptive groups, with only "man" and "woman" due to low sample size. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 3. Education (survey quota)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Professional, master's or doctoral degree	7.0	6.4	7.6	3.14
Bachelor's degree	10.9	9.9	11.9	
Associate's or technical degree	17.2	17.9	16.5	
Some college	31.1	30.2	32.2	
High school diploma, equivalent, or less	33.8	35.6	31.8	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 4. Race and ethnicity (for descriptive analysis)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)
American Indian or Alaska Native	4.5	5.6	3.2
Asian	2.7	2.7	2.6
Black or African American	9.1	9.3	8.9
Hispanic, Latino, or Spanish	18.5	18.7	18.4
Middle Eastern or North African	0.5	0.6	0.4
Native Hawaiian or other Pacific Islander	0.2	0.2	0.2
White	73.3	74.1	72.5
Some other race or ethnicity	1.0	0.8	1.2

Table 5. Race and ethnicity (for statistical analysis)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
BIPOC	33.8	34.2	33.5	0.06
White	65.9	65.8	66.5	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 6. Household income

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Less than $24,999	24.2	21.6	26.9	6.91
$25,000 - $49,999	29.8	33.0	26.5	
$50,000 – $74,999	20.4	20.8	20.0	
$75,000 – $99,999	13.0	12.6	13.4	
$100,000 – $124,999	5.6	5.2	6.1	
$125,000 or more	7.0	6.8	7.1	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 5

Table 7. Residential location

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Rural area (Less than 2,500 people)	19.1	20.7	17.5	**11.31***
Small town (2,500 - 9,999 people)	15.0	17.9	11.9	
Small city (10,000 - 49,999 people)	21.7	21.1	22.3	
Urban area (50,000 or more people)	44.3	40.4	48.3	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 3

Table 8. Forms of wildlife viewing

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Visiting parks and natural areas to observe, photograph, or feed wildlife	55.2	60.5	49.9	**11.50****
Photographing or taking pictures of wildlife	51.8	56.2	47.1	**8.46****
Feeding wild birds	48.9	50.0	47.9	0.45
Taking trips or outings to any other location to observe, photograph, or feed wildlife	38.4	44.7	32.0	**17.37*****
Closely observing wildlife or trying to identify unfamiliar types of wildlife	37.4	42.2	32.4	**10.42****
Feeding other wildlife	35.2	41.2	29.0	**16.68*****
Maintaining plantings or natural areas for the benefit of wildlife	27.4	32.9	21.7	**15.79*****

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 9. Types of wildlife

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Birds	76.0	73.9	78.2	2.56
Land Mammals	66.3	73.3	59.2	**22.45*** **
Marine Mammals	39.0	42.5	35.6	**5.10***
Reptiles	37.2	44.6	29.5	**24.73*** **
Fish	35.5	47.0	23.6	**59.93*** **
Insects	31.7	31.4	32.1	0.06
Amphibians	27.8	31.2	24.2	**6.06***
Other Wildlife	1.1	1.2	1.0	0.06

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 10. Affective specialization: Centrality scale

Specialization	Statewide (Mean)	Consumptive (Mean)	Nonconsumptive (Mean)	Significance (t)
Centrality	3.11	3.26	2.95	**-4.90*** **

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 988.46

Table 11. Behavioral specialization: specialized equipment

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Yes, I have owned, rented, or borrowed specialized equipment.	56.6	65.3	47.5	**32.58*** **
No, I have not owned, rented, or borrowed specialized equipment.	43.4	34.7	52.5	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 12. Behavioral specialization: years viewing

# of years spent viewing	Statewide (%)	Consumptive (%)	Nonconsumptive (%)
1-5 years	35.2	33.5	37.2
6-10 years	18.4	20.0	16.8
11-15 years	9.4	9.7	9.2
16-20 years	9.0	8.6	9.4
21-25 years	5.4	5.1	5.8
26-30 years	4.8	6.1	3.4
31-35 years	2.8	3.4	2.2
36-40 years	3.6	3.2	4.0
41-45 years	2.1	1.9	2.2
46-50 years	3.5	2.7	4.3
51-55 years	1.3	0.8	1.8
56-60 years	1.7	2.1	1.1
61-65 years	1.2	1.9	0.4
66 or more years	1.5	1.0	2.0

Table 13. Behavioral specialization: estimated experience as percentage of life spent viewing

% of life spent viewing	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
0-20%	53.5	48.8	58.4	
21-40%	19.5	21.0	17.9	
41-60%	9.7	11.7	7.6	**10.45***
61-80%	7.9	8.7	7.2	
81-100%	9.5	9.9	8.9	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 14. Cognitive specialization: self-rated level of expertise

Self-rated skill level	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Beginner	32.6	24.8	40.7	
Novice	33.2	33.3	33.2	
Intermediate	26.2	30.7	21.7	**47.56*** **
Advanced	7.3	10.8	3.4	
Expert	0.7	0.4	1.0	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 15. COVID-19 impacts on wildlife viewing participation and the R3 Framework

R3 Category	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Retained	54.1	53.9	54.2	3.63
Churned	24.1	25.1	23.2	
Reactivated	13.3	14.0	12.5	
Recruited	8.5	7.0	10.1	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 3

Table 16. Time spent wildlife viewing (Statewide)

Statewide				
Year	**Location**	**0 days (%)**	**1 - 30 days (%)**	**> 30 days (%)**
Typical Year	**Around home**	7.5	42.2	50.3
	Away from home	12.8	47.7	39.6
	Outside of state or country	46.1	35.0	18.9
First year of COVID-19 pandemic	**Around home**	15.0	41.2	43.8
	Away from home	25.7	44.5	29.7
	Outside of state or country	62.8	21.6	15.6
Upcoming year	**Around home**	9.0	39.8	51.1
	Away from home	14.6	46.7	38.8
	Outside of state or country	48.4	31.1	20.4

Table 17. Time spent wildlife viewing: Consumptive and nonconsumptive

		C (%)	N (%)	C (%)	N (%)	C (%)	N (%)	
Year	**Location**	**0 days (%)**		**1 - 30 days (%)**		**> 30 days (%)**		**Significance (χ^2)**
Typical year	**Around home**	6.7	8.3	43.8	40.7	49.5	51.0	1.40
	Away from home	7.4	18.6	46.5	49.0	46.1	32.4	**33.68*** **
	Outside of state or country	41.1	51.5	38.0	31.7	20.9	16.8	**9.86** **
First year of COVID-19 pandemic	**Around home**	14.0	16.1	41.1	41.3	44.8	42.5	1.04
	Away from home	21.6	30.1	43.5	45.6	34.9	24.2	**16.97*** **
	Outside of state or country	59.3	66.5	23.1	19.9	17.6	13.6	5.86
Upcoming year	**Around home**	9.6	8.5	38.8	41.0	51.7	50.5	0.69
	Away from home	9.8	19.6	47.4	45.8	42.9	34.6	**21.16*** **
	Outside of state or country	42.4	54.8	34.3	27.6	23.3	17.5	**15.49*** **

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 2

Table 18. Wildlife viewing location

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
My own home or property	71.1	72.2	70.0	0.61
Locally-managed areas	52.5	56.0	49.0	**5.02***
State-managed areas	50.7	57.2	44.2	**17.19*****
Property of friends or family	42.8	51.4	34.1	**30.81*****
Federally-managed areas	28.8	33.9	23.6	**12.96*****
Other private property	23.5	29.8	17.1	**22.35*****
I am unsure	7.7	8.2	7.3	0.30
Tribal lands	5.1	5.8	4.4	1.02

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 19. Wildlife viewing trip-related expenditures

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
$0	19.0	11.5	26.6	**61.76*** **
$1-$50	19.8	17.6	22.2	
$51-$100	14.6	15.2	14.0	
$101-$150	9.9	11.9	7.7	
$151-$200	7.5	9.4	5.5	
$201-$250	7.6	8.6	6.5	
$251-$300	4.6	4.5	4.7	
$301-$350	3.6	3.5	3.7	
$351-$400	3.1	4.5	1.6	
$401-$450	1.1	1.8	0.4	
$451-$500	2.6	3.7	1.4	
$501 or more	6.8	7.8	5.7	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 11

Table 20. Other wildlife viewing-related expenditures

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
$0	20.2	12.7	28.0	**63.87*** **
$1-$50	21.4	19.2	23.6	
$51-$100	14.2	15.1	13.3	
$101-$150	10.5	10.8	10.3	
$151-$200	7.8	9.8	5.8	
$201-$250	5.4	7.2	3.4	
$251-$300	4.3	3.9	4.6	
$301-$350	3.3	4.1	2.4	
$351-$400	2.7	3.9	1.4	
$401-$450	2.1	2.2	2.0	
$451-$500	2.4	3.1	1.6	
$501 or more	5.8	8.0	3.4	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 11

Table 21. Other outdoor recreation

Other Outdoor Recreation	Statewide (% selecting item)	Consumptive (% selecting item)	Nonconsumptive (% selecting item)	Significance (χ^2)
Running, Walking, or Jogging	54.1	56.8	51.3	3.08
Camping	47.8	65.0	30.0	**124.06*** **
Fishing	46.5	NA	NA	NA
Swimming	40.4	49.2	31.2	**34.14*** **
Hiking or Backpacking	38.2	43.0	33.2	**10.28** **
Hunting	21.2	NA	NA	NA
Recreational Shooting	17.4	26.1	8.5	**54.56*** **
Horseback Riding	16.8	23.7	9.7	**35.80*** **
Biking	16.5	19.6	13.3	**7.44** **
Off Highway Vehicles	16.5	23.7	9.1	**39.49*** **
Botanizing	12.0	9.5	14.5	**5.89***
Motorized Boating	11.9	19.1	4.4	**51.77*** **

Climbing	10.1	14.4	5.6	**21.39*** **
Foraging	9.1	12.8	5.2	**17.69*** **
Winter Sports	8.0	11.1	4.8	**13.44*** **
Non-Motorized Boating	7.8	10.1	5.4	**7.70** **
None	7.7	NA	NA	NA
Geocaching	6.7	7.8	5.6	1.86

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 22. Conservation behaviors (general; statewide)

Statewide					
	Not at all likely (%)	**Slightly likely (%)**	**Moderately likely (%)**	**Very likely (%)**	**Extremely likely (%)**
Teaching Others	31.6	22.4	23.2	16.7	6.0
Enhancing Habitat	16.5	25.7	27.5	21.0	9.4
Civic engagement	20.7	20.7	26.7	21.4	10.4
Collecting Data	30.3	21.5	23.4	16.3	8.5
Donating	18.7	26.1	28.5	18.6	8.1
Purchasing products	12.4	21.9	30.9	23.3	11.4
Cleaning up trash	8.7	10.9	23.5	30.1	26.7

Table 23. Conservation behaviors (General; consumptive-nonconsumptive)

	Not at all likely (%)		Slightly likely (%)		Moderately likely (%)		Very likely (%)		Extremely likely (%)		Significance (χ^2)
	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	
Teaching Others	24.1	39.4	20.8	24.0	26.8	19.4	19.8	13.5	8.4	3.6	**41.13*** **
Enhancing Habitat	9.4	23.9	24.3	27.1	28.8	26.1	25.6	16.2	11.9	6.7	**51.47*** **
Civic engagement	16.2	25.5	20.3	21.2	27.7	25.7	24.6	18.2	11.3	9.5	**16.52****
Collecting Data	21.2	39.8	22.2	20.7	27.1	19.5	19.3	13.2	10.1	6.9	**43.79*** **
Donating	14.1	23.4	24.8	27.5	29.3	27.7	22.7	14.3	9.2	7.1	**23.50*** **
Purchasing products	9.2	15.8	19.5	24.5	31.2	30.6	26.9	19.6	13.3	9.5	**20.58*** **
Cleaning up trash	5.5	12.0	8.5	13.4	22.5	24.5	33.8	26.4	29.6	23.7	**25.61*** **

Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 24. Conservation behaviors (With agency support; statewide)

Statewide					
	Not at all likely (%)	**Slightly likely (%)**	**Moderately likely (%)**	**Very likely (%)**	**Extremely likely (%)**
Teaching Others	31.3	22.0	21.4	17.7	7.5
Enhancing Habitat	18.1	25.1	25.4	20.7	10.6
Civic engagement	22.5	19.2	23.1	21.7	13.6
Collecting Data	28.9	22.1	22.5	16.3	10.2
Donating	19.7	25.2	24.0	19.3	11.9
Purchasing products	14.3	22.7	27.9	21.8	13.4
Cleaning up trash	10.4	14.0	20.7	25.8	29.0

Table 25. Conservation behaviors (With agency support; consumptive-nonconsumptive)

	Not at all likely (%)		Slightly likely (%)		Moderately likely (%)		Very likely (%)		Extremely likely (%)		Significance (χ^2)
	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	
Teaching Others	22.8	40.1	20.1	24.1	25.0	17.8	22.6	12.6	9.6	5.5	**51.80*** **
Enhancing Habitat	11.3	25.1	20.7	29.8	28.9	21.9	25.8	15.4	13.3	7.9	**59.46*** **
Civic engagement	15.9	29.3	18.6	19.8	26.0	20.0	23.3	20.0	16.2	10.9	**30.88*** **
Collecting Data	19.0	39.1	20.7	23.5	26.6	18.3	21.1	11.4	12.5	7.7	**64.41*** **
Donating	15.9	23.6	22.7	27.7	25.7	22.2	21.8	16.7	13.9	9.8	**18.27** **
Purchasing products	9.2	19.6	20.6	24.8	29.4	26.3	25.3	18.1	15.5	11.2	**30.93*** **
Cleaning up trash	5.1	15.8	11.7	16.4	20.6	20.9	27.9	23.7	34.8	23.1	**44.79*** **

Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 26. Barriers to wildlife viewing (Statewide)

Statewide					
	Not at all (%)	**Very little (%)**	**Somewhat (%)**	**Quite a bit (%)**	**A great deal (%)**
Lack of free time	23.0	22.7	33.0	15.8	5.5
Few people who support viewing	33.6	24.3	26.3	10.9	4.9
Few people to view with	30.0	22.3	28.6	13.9	5.2
Lack of organized viewing opportunities	33.8	20.7	26.9	14.3	4.3
Lack of viewing skills	29.0	24.7	27.6	14.1	4.6
Lack of access to equipment	31.0	22.2	26.8	14.6	5.5
Financial cost	24.4	22.8	25.8	18.0	9.1
Distance to viewing locations	19.3	18.2	31.4	22.3	8.8
Not knowing where to go viewing	29.6	24.3	26.8	13.0	6.3
Lack of transportation to viewing locations	38.5	19.3	22.8	12.2	7.2
Accessibility challenges	40.5	18.8	24.2	11.2	5.3
Lack of facilities at viewing locations	32.2	23.5	23.7	15.0	5.7
Safety concerns when viewing	34.9	24.0	23.2	11.9	6.1
Crowds in viewing locations	34.8	26.2	20.8	12.7	5.5

Table 27. Barriers to wildlife viewing (Consumptive-nonconsumptive)

	Not at all (%)		Very little (%)		Somewhat (%)		Quite a bit (%)		A great deal (%)		Significance (χ^2)
	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	
Lack of free time	20.1	26.0	24.0	21.4	34.2	31.9	15.6	15.9	6.1	4.8	5.69
Few people who support viewing	27.7	39.8	25.7	22.7	31.4	21.1	9.6	12.2	5.5	4.3	**24.20*** **
Few people to view with	24.9	35.4	23.5	21.1	31.1	26.0	14.9	12.8	5.7	4.7	**13.38***
Lack of organized viewing opportunities	27.1	40.7	24.0	17.3	29.5	24.2	14.8	13.6	4.5	4.1	**22.06**
Lack of viewing skills	28.2	29.9	26.0	23.4	28.0	27.2	12.7	15.4	5.1	4.1	2.91
Lack of access to equipment	30.2	31.8	21.0	23.4	28.4	25.1	14.9	14.3	5.5	5.5	2.01
Financial cost	19.6	29.2	23.6	21.9	29.5	22.1	16.9	19.1	10.4	7.7	**17.63****
Distance to viewing locations	17.3	21.3	19.1	17.3	33.1	29.7	20.9	23.8	9.6	7.9	5.25
Not knowing where to go viewing	28.4	30.8	24.5	24.1	27.2	26.4	13.4	12.6	6.5	6.1	0.78
Lack of transportation to viewing locations	34.3	42.8	20.4	18.3	25.9	19.7	13.1	11.2	6.3	8.1	**11.50***
Accessibility challenges	37.4	43.8	20.5	17.0	25.0	23.3	12.5	9.7	4.5	6.1	7.45
Lack of facilities at	28.7	35.8	25.2	21.7	25.6	21.7	15.0	15.0	5.5	5.9	6.93

viewing locations											
Safety concerns when viewing	33.1	36.8	24.1	23.8	26.6	19.6	10.8	12.9	5.3	6.9	8.19
Crowds in viewing locations	31.0	38.8	27.9	24.5	24.5	16.9	11.5	13.9	5.1	5.9	**13.65****

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 28. Groups that encourage participation in wildlife viewing (Family)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all	17.6	10.7	24.6	
Very little	15.8	15.8	15.7	
Somewhat	31.6	34.2	29.0	**35.93*** **
Quite a bit	22.0	23.8	20.2	
A great deal	13.0	15.4	10.5	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 29. Groups that encourage participation in wildlife viewing (Friends)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all	22.1	13.2	31.4	
Very little	19.3	20.6	18.0	
Somewhat	29.1	32.0	26.1	**49.57*** **
Quite a bit	21.3	24.6	18.0	
A great deal	8.1	9.6	6.5	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 30. Groups that encourage participation in wildlife viewing (Mentors)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all	43.5	32.4	54.9	
Very little	15.6	17.6	13.5	
Somewhat	21.8	26.1	17.4	**53.67*** **
Quite a bit	11.5	14.7	8.3	
A great deal	7.6	9.2	5.9	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 31. Groups that encourage participation in wildlife viewing (Peers)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all	32.4	21.8	43.3	
Very little	20.8	22.0	19.5	
Somewhat	26.8	30.8	22.6	**57.24*** **
Quite a bit	12.8	15.9	9.6	
A great deal	7.3	9.4	5.1	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 32. Accessibility and wildlife viewing

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all	41.5	37.1	46.1	
Very little	22.4	25.3	19.5	
Somewhat	24.4	25.3	23.5	**10.98***
Quite a bit	7.1	8.2	6.0	
A great deal	4.5	4.1	4.8	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 33. Basic agency familiarity

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all familiar	6.9	3.1	10.9	
Slightly familiar	25.7	18.2	33.4	
Moderately familiar	32.9	34.1	31.8	**79.29*** **
Very familiar	24.4	30.1	18.5	
Extremely familiar	10.0	14.5	5.4	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 34. Familiarity with specific state agency characteristics (TPWD staff)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all familiar	28.4	20.0	37.0	
Slightly familiar	26.5	24.3	28.8	
Moderately familiar	25.7	30.5	20.7	**54.65*** **
Very familiar	14.6	18.9	10.3	
Extremely familiar	4.7	6.2	3.2	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 35. Familiarity with specific state agency characteristics (TPWD programs)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all familiar	19.9	11.3	28.9	
Slightly familiar	32.7	30.0	35.6	
Moderately familiar	26.7	30.9	22.2	**74.38*** **
Very familiar	15.0	20.0	9.7	
Extremely familiar	5.7	7.8	3.6	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 36. Familiarity with specific state agency characteristics (TPWD lands)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all familiar	14.0	7.4	20.9	
Slightly familiar	27.0	22.2	32.1	
Moderately familiar	29.6	34.4	24.6	**66.41*** **
Very familiar	20.9	25.3	16.3	
Extremely familiar	8.4	10.7	6.1	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 37. Familiarity with specific state agency characteristics (TPWD mission)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Not at all familiar	22.8	14.1	31.9	
Slightly familiar	26.0	23.8	28.3	
Moderately familiar	26.1	29.9	22.2	**65.09*** **
Very familiar	17.8	22.3	13.1	
Extremely familiar	7.2	10.0	4.4	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 38. Logo familiarity

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Yes, I have seen this logo before	84.0	90.5	77.4	**32.24*** **
No, I have not seen this logo before	16.0	9.5	22.6	

Note that statistical tests are between consumptive and nonconsumptive groups.
Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 39. Perception of state agency prioritization of programs and services for wildlife viewing

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Far too low	5.6	5.3	6.1	
Too low	21.4	17.9	25.7	
About right	64.8	67.4	61.6	**13.14***
Too high	5.3	6.9	3.4	
Far too high	2.8	2.5	3.2	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold. Respondents that indicated 'no opinion' (*n* = 126) for this question were excluded in analysis.
* *p* = .01 - .05
** *p* = .001 - .01
*** *p* < .001
df = 4

Table 40. Experiences with state agency programs

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
No agency programs or services	35.5	26.6	44.8	**36.42*** **
Agency lands	33.9	42.2	25.4	**31.66*** **
Wildlife information	30.2	37.7	22.4	**28.06*** **
Visitor or education centers	26.3	28.7	23.8	3.15
Wildlife viewing opportunities	22.9	27.5	18.1	**12.59*** **
Other volunteer opportunities	15.4	16.0	14.7	0.33
Volunteer data collection	13.4	17.2	9.5	**12.92*** **
Technical assistance or information about habitat	10.5	14.1	6.9	**13.91*** **
Conservation law enforcement	8.7	13.9	3.4	**34.46*** **
Viewing festivals	8.1	11.9	4.2	**19.89*** **
Programs for groups or clubs	7.9	11.1	4.6	**14.55*** **
Livestream wildlife cameras	NA	NA	NA	NA

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 41. Programs and services for children and youth

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Yes, youth have engaged in programming	44.6	50.7	36.0	**10.51****
No, youth have not engaged in programming	55.4	49.3	64.0	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold. Responses indicating no youth or children (statewide *n* = 504) in their household were excluded from analysis.
* *p* = .01 - .05
** *p* = .001 - .01
*** *p* < .001
df = 1

Table 42. Measures of trust in TPWD

	Statewide (Mean)	Consumptive (Mean)	Nonconsumptive (Mean)	Significance (t)
"I trust TPWD"	4.08	4.18	3.98	**-3.65*** **
"I trust TPWD staff"	4.04	4.12	3.95	**-3.28** **
Gefen capability score	4.07	4.09	4.05	-0.80
Gefen benevolence score	4.00	4.00	4.00	0.05
Gefen integrity score	3.35	3.39	3.31	**-2.28***

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
"I trust TPWD" df = 1008
"I trust TPWD staff" df = 1006
Gefen capability score df = 1006
Gefen benevolence score df = 1007
Gefen integrity score df = 1008

Table 43. Past purchases and contributions (nonvoluntary and voluntary)

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Habitat Stamp (Voluntary)	NA	NA	NA	NA
License Plate	NA	NA	NA	NA
Income Tax Donation	NA	NA	NA	NA
Lottery Ticket	NA	NA	NA	NA
Virtual Product	NA	NA	NA	NA
Fishing License	44.1	70.0	17.2	**285.89*** **
Land Access Fee	38.2	41.8	34.3	**5.99***
None	24.5	8.4	41.2	**147.16*** **
Hunting License	24.2	37.9	9.9	**108.13*** **
Tangible Product	18.8	21.8	15.8	**6.00***
Direct Donation	16.4	19.6	12.9	**8.33****
Program Fee	16.0	21.6	10.1	**24.84*** **
Land Donation (Easement)	13.7	17.3	9.9	**11.75*** **
Habitat Stamp (Required)	13.6	20.4	6.5	**41.90*** **

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05

** p = .001 - .01
*** p < .001
df = 1

Table 44. Lifetime fishing or hunting license purchases

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Yes, I have a lifetime fishing or hunting license	30.3	30.9	27.9	0.37
No, I do not have a lifetime fishing or hunting license	69.7	69.1	72.1	

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold. This question was only presented to respondents (*n* = 499) who had indicated they had purchased a fishing or hunting license in the past five years.
* *p* = .01 - .05
** *p* = .001 - .01
*** *p* < .001
df = 1

Table 45. Future purchases and contributions (Statewide)

Statewide					
	Not at all likely (%)	**Slightly likely (%)**	**Moderately likely (%)**	**Very likely (%)**	**Extremely likely (%)**
Habitat Stamp (Required)	42.4	15.2	18.3	13.7	10.5
Hunting License	44.4	12.7	16.0	14.6	12.2
Fishing License	24.0	14.7	18.8	19.5	23.0
Habitat Stamp (Voluntary)	40.9	19.2	19.5	12.1	8.4
License Plate	39.9	20.6	19.5	12.6	7.5
Land Access Fee	16.3	15.5	27.2	24.2	16.7
Program Fee	22.1	24.7	26.4	15.4	11.3
Income Tax Donation	37.4	19.4	22.1	13.0	8.2
Land Donation (Easement)	46.9	15.8	17.6	12.6	7.1
Direct Donation	27.7	22.7	24.1	14.9	10.7
Lottery Ticket	27.7	20.5	24.0	16.8	11.0
Virtual Product	33.6	20.1	23.7	16.3	6.3
Tangible Product	19.4	23.3	26.7	19.1	11.5

Table 46. Future purchases and contributions (Consumptive-nonconsumptive)

	Not at all likely (%)		Slightly likely (%)		Moderately likely (%)		Very likely (%)		Extremely likely (%)		Significance (χ^2)
	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	
Habitat Stamp (Required)	27.1	58.3	15.4	14.9	23.3	13.1	18.0	9.2	16.2	4.5	**118.01*** **
Hunting License	27.5	61.9	13.1	12.4	18.4	13.6	19.5	9.5	21.5	2.6	**160.42*** **
Fishing License	5.3	43.2	10.8	18.8	18.8	18.8	26.9	11.9	38.2	7.3	**295.23*** **
Habitat Stamp (Voluntary)	29.8	52.4	18.3	20.1	23.8	15.0	15.1	9.0	13.1	3.5	**76.05*** **
License Plate	31.1	48.8	22.8	18.4	21.6	17.3	15.4	9.8	9.2	5.7	**33.99*** **
Land Access Fee	10.2	22.7	13.1	18.0	28.0	26.2	28.6	19.7	20.0	13.3	**43.10*** **
Program Fee	15.6	28.8	22.2	27.3	28.9	23.9	18.4	12.4	15.0	7.6	**42.33*** **
Income Tax Donation	29.5	45.5	18.7	20.0	25.3	18.8	17.5	8.4	9.0	7.3	**38.82*** **
Land Donation (Easement)	38.8	55.1	17.3	14.3	19.7	15.5	14.9	10.2	9.2	4.9	**28.73*** **
Direct Donation	20.5	35.0	23.3	22.0	25.3	22.8	18.7	11.0	12.2	9.2	**31.72*** **
Lottery Ticket	21.8	33.8	18.0	23.0	28.3	19.6	19.0	14.5	12.9	9.2	**30.17*** **
Virtual Product	26.3	41.1	18.8	21.5	25.7	21.7	20.2	12.3	9.0	3.5	**40.10*** **
Tangible Product	13.9	25.1	20.1	26.7	27.6	25.7	22.5	15.7	15.9	6.9	**44.32*** **

Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 47. Encouraging additional financial support (Statewide)

Statewide					
	Not at all likely (%)	**Slightly likely (%)**	**Moderately likely (%)**	**Very likely (%)**	**Extremely likely (%)**
Habitat conservation	17.2	24.7	26.7	20.8	10.6
Conservation of rare and vulnerable species	17.9	22.0	24.2	21.5	14.4
Conservation of preferred viewing species	16.6	21.0	27.3	23.4	11.7
Opportunities and resources for wildlife viewing	18.4	20.2	27.5	22.3	11.7
More education or outreach related to conservation	19.6	20.7	26.2	21.4	12.1
Wildlife research or monitoring	19.5	21.9	25.1	20.9	12.5
Funds matched by different source	21.5	21.8	27.3	18.1	11.3

Table 48. Encouraging additional financial support (Consumptive-nonconsumptive)

	Not at all likely (%)		Slightly likely (%)		Moderately likely (%)		Very likely (%)		Extremely likely (%)		Significance (χ^2)
	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	C (%)	NC (%)	
Habitat conservation	11.7	22.9	23.4	26.0	27.1	26.2	25.2	16.2	12.5	8.7	**32.13*** **
Conservation of rare and vulnerable species	12.3	23.7	19.8	24.3	24.3	24.1	26.4	16.4	17.2	11.5	**37.79*** **
Conservation of preferred viewing species	10.4	23.1	20.9	21.1	26.6	28.0	26.8	19.9	15.4	7.9	**42.03*** **
Opportunities and resources for wildlife viewing	12.1	24.8	18.4	22.0	29.2	25.9	26.8	17.5	13.5	9.8	**37.34*** **
More education or outreach related to conservation	13.0	26.5	20.6	20.8	24.4	28.1	26.5	16.1	15.5	8.6	**47.35*** **
Wildlife research or monitoring	12.9	26.4	20.8	23.1	25.9	24.3	25.7	16.0	14.7	10.2	**39.27*** **
Funds matched by different source	15.2	28.1	21.7	22.0	30.4	24.0	19.7	16.4	13.0	9.4	**27.32*** **

Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 4

Table 49. State agency support for wildlife viewing

	Statewide (%)	Consumptive (%)	Nonconsumptive (%)	Significance (χ^2)
Info - about wildlife in the state	45.6	48.1	43.1	2.54
Info - where to view wildlife	44.8	45.7	43.9	0.35
More wildlife viewing locations	40.0	43.4	36.4	**5.11***
Info - how to view	33.9	36.0	31.8	1.99
Info - where to view where there is no hunting	31.5	33.7	29.2	2.36
More wildlife viewing amenities	30.1	35.2	24.7	**13.16****
More accessible features	27.3	31.1	23.3	**7.72****
Programs to improve my viewing skills	25.6	29.8	21.3	**9.44****
More opportunities for youth	25.0	30.0	19.9	**13.58****
Virtual programs	24.6	28.0	21.1	**6.46***
More wildlife viewing events	24.6	27.6	21.5	**5.06***
More training for guides	22.5	28.4	16.3	**21.27****
Programs to interact with other viewers	22.3	28.8	15.5	**25.84****
Volunteer data collection opportunities	16.5	20.2	12.7	**10.47****
More wildlife viewing staff	14.7	18.3	11.1	**10.49****

I am not interested in any of these options.	8.6	5.8	11.5	**10.19****
Other volunteer opportunities	5.5	6.6	4.4	2.31

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1

Table 50. Preferred TPWD communication methods

	Statewide (% selecting item)	Consumptive (% selecting item)	Nonconsumptive (% selecting item)	Significance (χ^2)
Website	58.3	62.4	54.1	**7.07****
Printed Materials	51.5	53.6	49.3	1.88
Email Update	49.6	52.4	46.7	3.35
Facebook	39.5	46.0	32.8	**18.43*****
Mailed Newsletter, Subscription	35.1	40.9	29.2	**15.32*****
Online Magazine	32.0	37.8	26.0	**16.33*****
YouTube	31.8	37.8	25.6	**17.51*****
Local News	26.4	27.7	25.2	0.83
Instagram	19.5	24.2	14.7	**14.46*****
Tik-Tok	15.3	18.9	11.7	**10.18****
Twitter	14.1	17.0	11.1	**7.26****

Text	11.8	15.0	8.5	**10.45****
Staff	11.1	15.4	6.6	**19.65*****
Blogs	9.6	11.5	7.6	**4.32***
Podcast	9.1	11.1	7.0	**5.05***
None	6.8	5.3	8.5	**4.03***

Note that statistical tests are between consumptive and nonconsumptive groups. Statistically significant test values in bold.
* p = .01 - .05
** p = .001 - .01
*** p < .001
df = 1