

Note

26 March 2018

Heather A. Triezenberg¹

Michigan Sea Grant

Department of Fisheries and Wildlife

Michigan State University Extension

1405 S. Harrison Rd. Suite 305

East Lansing, MI 48823 USA

Phone 517/353-5508; Fax: 517/884-8511

vanden64@msu.edu

RH: Triezenberg and Knuth • Anticipating Hunter-Resident Conflicts

Predicting Positive Outcomes for Waterfowl Hunters and Waterfront Residents

HEATHER A. TRIEZENBERG, <xps:span class="xps_endnote">1</xps:span> *Michigan State*

University Extension, Department of Fisheries and Wildlife, Michigan Sea Grant, 1405 S.

Harrison Rd., East Lansing, MI 48823 USA

BARBARA A. KNUTH, *Cornell University, Human Dimensions Research Unit, Department of*

Natural Resources, 501G Day Hall, Ithaca, NY 14850, USA

¹ This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:10.1002/jwmg.21471

ABSTRACT Social conflicts among wildlife stakeholders can suggest possible new directions for wildlife management, including opportunities to expand the base of stakeholders supporting active management. In response to New York State Department of Environmental Conservation information needs, we examined potential conflicts between waterfowl hunters and waterfront residents to understand their attitudes toward hunting along developed waterfronts and how spatial proximity was related to likelihood of waterfowl hunters' experiences of harassment by waterfront residents. We sent mail-back questionnaires to waterfowl hunters ($n = 1,000$) and waterfront residents ($n = 1,000$) near Lake Ontario in the greater-Rochester area of New York, USA. We identified factors predicting acceptance of waterfowl hunting along developed waterfronts. Waterfront residents who knew waterfowl hunters were more supportive of waterfowl hunting than residents who did not know hunters. Hunters who hunted closer to occupied dwellings (e.g., waterfront homes) were more likely to experience harassment from residents than hunters who hunted farther away. Educational communication and policies that address public access, safety, safe distance of hunting from homes, and rules and regulations relating to waterfowl hunting are needed for acceptance of waterfowl hunting along developed waterfronts. Non-hunters who accept hunting activities have the potential to positively affect wildlife management by expanding the base of involved, supportive stakeholders.

KEY WORDS non-hunters, social conflicts, stakeholder support, waterfowl hunters, waterfront residents, wildlife enthusiasts.

Social conflicts among stakeholders in natural resource settings are common. When conflicts occur, they can escalate and their effects can become disruptive (Minnis 2001) or they can become opportunities to implement stakeholder engagement for developing different policies with more acceptable outcomes to a wider base of stakeholders, positively influencing wildlife

management in the long run (Jacobson and Decker 2008, Jacobson et al. 2010). Wildlife management agencies may experience social conflicts in some areas of their states and not others, even though contexts may be similar. Understanding the factors in areas where conflicts have not yet erupted can help state wildlife agencies actively manage effects and engage stakeholders in aspects of wildlife management and hunting. These management strategies can minimize conflicts and broaden the base of stakeholders supporting active management (Riley et al. 2002, Manfredi and Dayer 2004). We examined the potential situation of conflicts between waterfowl hunters and waterfront residents in an area where social conflict had not yet emerged, though characteristics are similar to other locations where conflict had erupted (Triezenberg et al. 2011).

In New York, USA, conflicts between waterfowl hunters and waterfront residents stemming from negative interactions have emerged in recent years, resulting in wildlife stakeholders seeking to develop new policies and practices to reduce negative interactions (Triezenberg et al. 2011). At the same time, management efforts attempted to maintain or expand waterfowl hunter participation and overall support for funding waterfowl conservation via duck stamp purchases (federal and state) and Pittman-Robertson excise tax on firearms and ammunition. In New York, duck stamp sales have generally declined steadily since the early 1970s, mirroring national trends (Fig. 1; U.S. Fish and Wildlife Service [USFWS] 2017). After years of steady declines in nationwide hunting participation, numbers of participants in hunting migratory game birds (e.g., ducks and geese), except for a few terrestrial species (e.g., doves and woodcock), have remained relatively steady from 2001–2011 (USFWS 2014). Waterfowl hunters often operate in heavily human-populated settings. In 2010, 39% of the United States population lived in coastal shoreline counties (\bar{x} density = 174 person/km²; excludes Alaska,

USA), and this population is expected to increase by approximately 10% by 2020 (National Oceanic and Atmospheric Administration [NOAA] 2016). Given steady participation in waterfowl hunting and population pressures in coastal shorelines, managing to prevent conflicts between waterfowl hunters and other groups will remain of interest to state wildlife agencies.

These social and human population trends heavily influenced the changing land uses throughout New York State. Its legislature recognized that special considerations were needed for waterfowl hunting in coastal areas (NY State Department of Environmental Conservation [NYSDEC] 2017). It is safer for waterfowl hunters to hunt from the shore, a boat, or blind and discharge firearms from shore out over open water rather than to discharge from a point in open water towards shoreline. As such, New York State Environmental Conservation Law enables waterfowl hunters to legally hunt migratory game birds on public waterways adjacent to privately owned waterfront properties and discharge firearms at migrating game birds within 152.40 m of occupied dwellings (i.e., homes) with no minimum distance they have to be from that dwelling, as long as no dwelling, person, or livestock is in the site of discharge (§ 11-0931 4(b)4; New York State Laws [NYS Laws] 2016); hunters have been able to do so since at least 1972, when this section of conservation law was added to New York State Code.

Intentional interference or obstruction, or attempted interference with hunting activities are commonly referred to as hunter harassment. Many state laws have hunter harassment provisions addressing this (Michigan State University Animal Legal and Historical Center [MSU] 2017). New York State Environmental Conservation Law prohibits interference with hunters legally engaged in hunting activities (§ 11-0110; NYS Laws 2016). Waterfront residents may object to hunting activities occurring close to their homes, but they have no authority over the activities occurring on public waters. Waterfowl hunting groups in New York state have

equipped members with informational cards containing relevant laws that hunters could distribute to other hunters, waterfront residents, or anyone else interested in or concerned about waterfowl hunting activities.

Understanding stakeholder attitudes and experiences is foundational to reframing potential conflict situations into opportunities to expand the base of stakeholders supporting wildlife management activities. Recreational socialization is a framework that incorporates the role of social relationships of non-hunters with hunters, and considers how these relationships are processed where knowledge, attitudes, and skills, are learned or internalized (Iso-Ahola 1980, Stedman and Decker 1996). A person's previous experience contributes to forming environmental attitudes (Kretser et al. 2008, Siemer et al. 2013). Understanding the experiences and attitudes of stakeholders along developed waterfronts can yield insights into why conflicts may emerge in some places but not in others. Additionally, knowing the factors important in places without much conflict can suggest management and engagement efforts useful for anticipating or reducing conflicts before they develop (Manfredo and Dayer 2004).

Application of experience-attitude and socialization frameworks can help identify the factors that lead to acceptance of hunting occurring in an area, and therefore provide insights into how to expand the base of support for wildlife management while retaining hunters. Recent reviews of hunter recruitment and retention efforts have been expanded to include social habitat (e.g., interactions, habitats, structure) that support hunters and hunting-related activities (Larson 0000-0001-9591-1269 et al. 2014), especially by non-hunters who support hunting (Stedman and Decker 1996). Understanding hunters' experiences and how they relate to hunters' decisions to continue hunting is also an important component of hunter recruitment, retention, and reactivation (Larson et al. 2014, USFWS 2014).

We had 3 objectives for this study. The first was to compare waterfront residents' and waterfowl hunters' attitudes and perceptions toward waterfowl hunting along developed waterfronts. We predicted that waterfowl hunters, regardless of whether they were waterfront residents, would have more accepting attitudes and perceptions toward waterfowl hunting along developed waterfronts than waterfront residents regardless of whether residents knew other waterfowl hunters. The second objective was to determine the influence of spatial proximity of waterfowl hunters to homes in predicting likelihood of hunters being harassed by waterfront residents. We predicted the likelihood of waterfowl hunter harassment while hunting near waterfront homes in New York (dependent variable) would decrease as reported distance to nearest home (independent variable) increased. The third objective was to identify variables predicting waterfront residents' and waterfowl hunters' acceptance of waterfowl hunting along developed waterfronts. Our hypothesis was that factors affecting acceptance of waterfowl hunting along developed waterfronts would differ among residents who do not know waterfowl hunters, residents who know waterfowl hunters but are not hunters themselves, and waterfowl hunters.

STUDY AREA

We conducted our research around the Braddock Bay State Wildlife Management Area (BBSWMA; 43.290699°N, -77.674202°W), Lake Ontario, greater-Rochester, Monroe County, New York, USA. Braddock Bay State Wildlife Management Area is approximately 8.6 km² and another 1.5 km² in the wetland complex leased by the Town of Greece (NSYDEC Braddock Bay 2017). The elevation at the Lake Ontario shoreline was 75 m and the topographic range of the area was 75 m to 150 m (Shanks 1966, Porter et al. 2004). The annual average temperature was -23 °C to 32 °C (National Oceanic and Atmospheric Administration National Weather Service

[NOAA NWS] 2017). Precipitation quantity was approximately evenly distributed throughout the year, with higher frequency in the winter months than summer months (NOAA NWS 2017). An average of 246 cm snowfall accumulated annually and an average precipitation of 83 cm moisture accumulated in this area (Porter et al. 2004). New York State waterfowl hunting seasons for Canada goose season begins in September, and for ducks the season begins in October and lasts through January.

Dominant flora included marsh and aquatic vegetation such as ivy-leaved duckweed (*Lemna trisulca*), water fern (*Azolla caroliniana*), stonewort (*Chara* spp.), yellow pond lily (*Nymphaeaceae variegatus*), tall reed grass (*Phragmites communis*), marsh grass (*Spartina pectinata*), and cranberry (*Vaccinium macrocarpon*; Shanks 1966). The dominant fauna in this area included northern harrier (*Circus hudsonius*), bobolink (*Dolichonyx oryzivorus*), American bittern (*Botaurus lentiginosus*), ducks (family Anatidae), brants (*Branta* spp.), white-tailed deer (*Odocoileus virginianus*), muskrats (*Ondatra zibethicus*), and snapping turtles (*Chelydra serpentina*; NSYDEC Braddock Bay 2017). We selected this area because BBSWMA is managed for migratory birds and is a popular waterfowl hunting and bird-watching destination. In addition to the NYSDEC-owned lands for BBSWMA, development of the waterways included homes on private parcels, a New York State Office of Parks and Recreation marina and day use park, and Betty Point, which was leased to the Town of Greece (NSYDEC Braddock Bay 2017). Since 1980, the Town of Greece and the NYSDEC have operated under an agreement to work to incorporate a variety of interests and coordinate management of this area (NSYDEC Braddock Bay 2017). The wetland complex along the Lake Ontario shoreline is within the Town of Greece, approximately 24 km to the west of Rochester. At the time of the

survey, the Town of Greece had a population density of approximately 879 people/km² (Town of Greece 2010).

METHODS

We sent questionnaires to random samples of waterfront residents and waterfowl hunters during the spring 2009 using a modified tailored design method (Dillman et al. 2009). We sent the waterfront resident questionnaire to 1,000 (63%) property owners drawn randomly from the population of property owners ≥ 18 years old who permanently lived on a residential parcel within 0.40 km of BBSWMA wetland complex. We sent the waterfowl hunter questionnaire to a sample of 1,000 (26%) drawn randomly from the population of waterfowl hunters ≥ 18 years old from the ZIP codes 14400–14699, which encompass counties in the greater-Rochester area, who had registered with the Harvest Information Program (HIP), indicating they hunted for ducks, geese, brants, coots (*Fulica* spp.), or snipes (*Gallinago* spp.) the previous season. Two weeks after the final mailing, we completed a telephone survey with mail survey non-respondent waterfront residents ($n = 90$) and waterfowl hunters ($n = 90$). Cornell University Institutional Review Board approved this research (number 0908000566).

Questionnaires to homeowners included a series of statements related to attitudes toward waterfowl hunting. The waterfront resident questionnaire included prior experience items related to familiarity with waterfowl hunters and hunting waterfowl. Potential respondents were asked to indicate their disagreement or agreement with each attitudinal statement using a 5-point Likert scale that also included a separate don't know option.

The waterfowl hunter questionnaire included prior hunting experience items related to proximity of the location of hunting over water in relation to the nearest home and harassment (e.g., intentional interference with someone legally engaged in waterfowl hunting) by residents

of waterfront homes while hunting anywhere in New York state. Both questionnaires included socio-demographic questions that asked for year born, gender, educational attainment, description of community size and population where respondent lives, and household income before taxes. Additionally, we asked respondents to identify which types of recreational activities they participated in during the last 12 months. We asked waterfront residents to identify where they hunt waterfowl if they engage in such activities and if they know other waterfowl hunters. Waterfowl hunters were asked if they had ever been harassed by residents while hunting in front of waterfront homes, if they lived along a waterfront, and how close they hunted to the nearest home. Questionnaire items used only common names and English measurements. Questionnaire development was informed by informal exploratory interviews with the NYSDEC Bureau of Wildlife staff and semi-structured interviews with key stakeholders in case study communities that had conflicts between waterfowl hunters and residents along developed waterways (Triezenberg 2010, Triezenberg et al. 2011). Collaborators with the NYSDEC reviewed the questionnaires for content validity; colleagues at the Human Dimensions Research Unit at Cornell University reviewed the questionnaires for face validity. We made revisions to improve clarity and precision of the final questionnaires.

Analyses generated descriptive statistics (\bar{x} , SD, analysis of variance, χ^2) and binomial logistic regression for predicting hunter harassment while hunting in front of homes. We used 3 linear regression models to predict agreement that most waterfowl hunting in an area is acceptable: for BBSWMA residents who were not waterfowl hunters nor knew other waterfowl hunters, for BBSWMA residents who reported knowing waterfowl hunters but were not waterfowl hunters themselves, and for waterfowl hunters in the greater-Rochester area (Table 3). Variables in these models included attitudes and perceptions about waterfowl hunting,

recreational activities, educational attainment, age, gender, and annual household income before taxes. We used SPSS 16 (SPSS for Windows, Chicago, IL, USA) and Minitab 15 (Minitab, State College, PA, USA) for the analyses presented herein.

RESULTS

We received 480 completed questionnaires from waterfront residents, and after accounting for undeliverables and refusals, our adjusted response rate was 49.4%. Our adjusted response rate for waterfowl hunters was 60.5% ($n = 592$ completed questionnaires). Response rates of 50% are acceptable for mail survey research (Hager et al. 2003). We detected differences between mail survey respondents and non-respondents who completed a short telephone survey for a few variables. Waterfront resident non-respondents exhibited greater agreement (93.2%) than waterfront resident respondents (74.5%; $\chi_1^2 = 10.750$, $P = 0.001$) that hunters should seek the permission of waterfront residents before hunting in front of a home. Waterfowl hunter respondents exhibited greater levels of agreement (75%) than non-respondent waterfowl hunters (65.4%; $\chi_1^2 = 8.394$, $P = 0.004$) with concern about lack of public access opportunities for waterfowl hunting. We did not detect differences for other variables and therefore did not adjust waterfowl hunter or waterfront resident respondent data based upon respondent versus non-respondent differences.

Respondent Socio-Demographics

Nearly all the waterfront resident respondents (97.9%) reported being a permanent resident at the location where they received the questionnaire. The mean number of years residing at the location reported was 21.16 ± 15.14 years (SD). Reported mean age of waterfront resident respondents was 58 ± 13.4 years and 52.7% of them had at least an undergraduate degree. The majority (66.7%) of resident respondents were male.

Mean age of waterfowl hunter respondents was 48 ± 13.4 years and 99.5% of them were male; 42.6% of hunter respondents earned at least an undergraduate degree. The annual median income range reported for waterfront residents and waterfowl hunters was \$60,000–\$79,999; 37.2% of resident respondents and 39.1% of waterfowl hunter respondents reported earning an annual income $< \$59,999$. A small proportion (13.1%) of hunter respondents reported they lived along a waterfront.

Attitudes and Perceptions Toward Waterfowl Hunting

Seventy percent of BBSWMA waterfront resident respondents reported they knew waterfowl hunters, including 7.8% who were waterfowl hunters themselves. Non-hunting BBSWMA waterfront resident respondents, whether they knew waterfowl hunters or not, agreed that most non-hunters do not understand waterfowl hunting (Table 1). Otherwise, BBSWMA resident respondent means differed on all items ($P \leq 0.001$) for attitudes toward waterfowl hunting by whether they knew versus did not know waterfowl hunters (Table 1).

Resident respondents familiar with waterfowl hunters generally exhibited greater acceptance regarding waterfowl hunting and agreement that waterfowl hunting can safely occur any distance from water's edge than resident respondents who were not familiar with waterfowl hunters ($P \leq 0.001$). Braddock Bay State Wildlife Management Area resident respondents who also reported being a waterfowl hunter exhibited similar views as general waterfowl hunter respondents; their mean attitudes toward hunting along developed waterfront homes did not differ.

Predicting Waterfowl Hunter Harassment

Fifty-five percent of waterfowl hunter respondents reported hunting within 152.40 m of homes, including 38.2% who reported homes were < 76.20 m from their hunting locations. Over a

quarter (26.2%) of hunter respondents reported they had been harassed by residents of waterfront homes while waterfowl hunting in New York State. We detected differences in reported harassment at varying distances from homes when waterfowl hunting over water ($\chi^2_3 = 70.90, P \leq 0.001$; Table 2). More than half (52.7%) of respondents who reported hunting <30.48 m from a home reported being harassed compared to only 11.4% reporting being harassed while hunting >152.40 m from homes (Table 2).

The odds of experiencing harassment declined exponentially with increasing distance from waterfront homes while waterfowl hunting over water in New York State. Compared with those who hunted <30.48 m from homes, hunter respondents who reported hunting 30.48–76.20 m from homes were slightly more than half as likely ($\text{Exp}(\beta) = 0.59, P = 0.062$) to report harassment, whereas those who hunted >152.40 m were approximately a tenth ($\text{Exp}(\beta) = 0.12, P \leq 0.001$) as likely to report harassment (Table 2).

Predicting Acceptance of Waterfowl Hunting

Our model of factors related to acceptance of waterfowl hunting along developed waterfronts for BBSWMA residents who neither knew waterfowl hunters nor were waterfowl hunters themselves explained 62.7% of the variance ($R^2 = 0.627$; Table 3). Agreement about allowing hunters to hunt any day of the week during hunting season ($\beta = 0.257, P = 0.03$), concern for lack of public access opportunities for waterfowl hunting ($\beta = 0.218, P = 0.101$), and perception of non-hunters not understanding waterfowl hunting ($\beta = 0.187, P = 0.67$) were all positively related to acceptance of waterfowl hunting in their area. Agreement with the statement “waterfowl hunting begins too early in the morning” ($\beta = -0.376, P = 0.008$) was negatively related to acceptance of waterfowl hunting along developed waterfronts in this area.

Our model determining factors related to acceptance of waterfowl hunting along developed waterfronts for BBSWMA residents who knew waterfowl hunters but were not waterfowl hunters themselves explained 51.7% of the variance ($R^2 = 0.517$; Table 3). Concern for lack of public access opportunities ($\beta = 0.149$, $P = 0.051$), agreement about allowing hunters to hunt any day of the week during hunting season ($\beta = 0.172$, $P = 0.030$), agreement that waterfowl hunting can safely occur any distance from water's edge ($\beta = 0.211$, $P = 0.001$), and perception of non-hunters not understanding waterfowl hunting ($\beta = 0.194$, $P = 0.004$) were all positively related to acceptance of waterfowl hunting in their area. As with the first model, agreement with the statement "waterfowl hunting begins too early in the morning" ($\beta = -0.222$, $P = 0.005$) was negatively related to acceptance of waterfowl hunting along developed waterfronts in this area.

Our model identifying factors related to acceptance of waterfowl hunting along developed waterfronts for waterfowl hunters explained 6.6% of the variance ($R^2 = 0.066$; Table 3). Agreement that waterfowl hunting can safely occur any distance from water's edge ($\beta = 0.079$, $P = 0.095$), participation in non-consumptive wildlife activities ($\beta = 0.086$, $P = 0.062$), and education level ($\beta = 0.159$, $P = 0.001$) were positively related to acceptance of waterfowl hunting in their area. Concern for lack of public access opportunities ($\beta = -0.135$, $P = 0.004$) and agreement that waterfowl hunters should be allowed to hunt any day of the week during the hunting season ($\beta = -0.090$, $P = 0.055$) were negatively related to acceptance of waterfowl hunting in their area.

DISCUSSION

Our study revealed that waterfowl hunters have similar agreement on all attitude and perception statements regardless of whether they live on a waterfront and that these attitudes and

perceptions are different from those of non-hunter waterfront residents. Waterfront residents differed on some attitude and perception statements toward waterfowl hunting along developed waterfronts based on whether they knew waterfowl hunters. All groups agreed that most non-hunters do not understand waterfowl hunting, with agreement strongest among hunters. In our study context, waterfront residents who knew other hunters generally exhibited middle-ground attitudes and perceptions for concern about lack of public access opportunities for waterfowl hunting, understanding of why non-hunters may be bothered from waterfowl hunting, support for allowing hunters to hunt any day of the week during the hunting season, understanding about waterfowl hunting early in the morning, hunting safely any distance from water's edge, and that hunting in an area is acceptable.

Non-hunters who know hunters may be an important component of expanding the base of stakeholder support for wildlife management in 2 ways. First, non-hunters who are familiar with hunters and hunting may be important allies of wildlife managers (Stedman and Decker 1996), and they may be important sources of information about wildlife management, hunters, and the role of hunting in achieving environmental management goals for other non-hunters (e.g., neighbors, friends). Engaging non-hunters who accept hunting within a broad wildlife management framework can help transform the wildlife management institution beyond its iron triangle of resource management agencies, traditional user groups (e.g., hunters), and policy makers that limit access to decision-making (Jacobson et al. 2010) toward developing policies that are reflective of interests and outcomes acceptable to a broader base of stakeholders through collaborative and consensus-building processes (Jacobson and Decker 2008, Decker et al. 2015).

Our research revealed the odds of experiencing harassment declined exponentially with increasing distance from waterfront homes while waterfowl hunting over water in New York

State. Waterfowl hunters who reported hunting 30.48–76.20 m from homes are slightly more than half as likely to experience harassment from waterfront residents than those hunters who reported hunting within 30.48 m of homes. Although New York's exemption to the 152.40-m safety zone law for waterfowl hunters may introduce some conflicts due to hunters discharging firearms in areas closer to homes than in other areas, this exemption may be a reason why waterfowl hunter numbers in New York have remained relatively stable even when steady declines occurred elsewhere (USFWS 2014). Other states may consider revising their minimum distance for discharging a firearm while waterfowl hunting if land use development becomes a limiting factor in the availability of locations for waterfowl hunters and if waterfront residents or other stakeholders would tolerate it.

Waterfowl hunters take many factors into consideration when determining when and where to hunt, and those decisions affect their experiences, hunt quality, success, and overall satisfaction. Although hunting guides and resources often focus on the biological and physical aspects of waterfowl hunting, our research findings suggest communicating with hunters to carefully select hunting locations with consideration of proximity to homes could improve their hunting experiences by avoiding negative interactions with waterfront residents. If waterfowl hunters seek positive hunting experiences, avoiding interactions that lead to negative in-field confrontations may be a way to help create a positive social fabric and support continued hunting participation (Larson et al. 2014). Hunting experiences that include limited negative social interactions with other residents or hunters may positively influence their continued participation in hunting and other wildlife recreation (Stedman and Decker 1996, Enck and Van Den Berg 2007, Larson et al. 2014). These types of policy and educational communications may help achieve hunter retention goals of wildlife management agencies (Larson et al. 2014).

If the goal is to broaden waterfront resident acceptance of waterfowl hunting along developed waterways, sharing information about environmental conservation laws and regulations governing waterfowl hunting, specifically time of day and days of week for hunting, and public access and safety aspects of firearm discharge within proximity to homes would be important topics to address. Encouraging hunters to take into consideration the time of day while waterfowl hunting close to waterfront homes may also be beneficial because waterfront resident agreement that waterfowl hunting begins too early in the morning was negatively related to acceptance of it. Similarly, if the goal is to broaden waterfowl hunter acceptance of waterfowl hunting along developed waterways, sharing information about safety aspects of firearm discharge over water within proximity to homes and examining the lack of public access opportunities and which days of the week waterfowl hunters should be allowed to hunt during the hunting season would be important topics to address.

We initially selected BBSWMA for a study site because we anticipated that conflicts between waterfowl hunters and waterfront residents would likely emerge because of the mixed land use of homes, state wildlife management area, and proximity to urban areas. However, our study results suggest that waterfront residents had a high familiarity with waterfowl hunters, so our research findings may be limited to areas where residents have familiarity with the tradition of waterfowl hunting and hunters. Conflicts may still emerge in other areas where property owners have less familiarity with waterfowl hunting and hunters, which may be the case with conversion of cabins to permanent homes in areas with substantial amenity improvements. At the time of this study, New York had 289,000 seasonal, recreational, and occasional homes (3.6% of total housing units) compared to 4.6 million in United States (3.5% of total housing units; U.S. Census Bureau [USCB] 2018). Maine, Minnesota, South Carolina, Delaware, and Florida have

the highest percent of seasonal housing units (NOAA 2016) and therefore may be areas with the highest likelihood of emergent waterfowl hunter-property owner conflicts. In an era with increased development pressure on coastal areas and redevelopment of waterfront cottages into year-round homes, waterfowl hunters may find it increasingly difficult to find hunting locations. However, if waterfowl hunters can have positive hunting experiences while hunting in relatively highly developed waterfront areas, this may help curb the downward decline in waterfowl hunter participation nationwide.

A long-term commitment to expanding the stakeholder base is needed to transform the wildlife management institution beyond its traditional dependence on hunting-related stakeholders (Jacobson et al. 2010). Wildlife recreationists and hunters are ≥ 4 times as likely as non-recreationists to engage in conservation behaviors (Cooper et al. 2015). Long-term conservation strategies could focus on building the familiarity of non-hunters with hunters and promoting wildlife recreation activities, perhaps in partnership with hunters. Community migratory bird and waterfowl hunting festivals (e.g., <http://www.ptemouillewaterfowlfestival.org>) may be one way to achieve non-hunter familiarity with waterfowl hunting activities.

Future research could examine the extent to which waterfront residents are wildlife recreationists or demonstrate motivations for supporting waterfowl hunting, wildlife management, and collaborative solutions to conflict management. Participatory geographic information systems or engagement-based scenario planning may be 2 techniques to involve stakeholders in conflict management. If fine-scale coupling of waterfowl hunter users and waterfront residents is needed, waterfowl hunter data collection may be improved through

intercept surveys of waterfowl hunters who use specific areas rather than sampling from HIP registrant ZIP codes.

MANAGEMENT IMPLICATIONS

Managing the effects from stakeholder social interactions will be an increasingly important component of natural resources management, especially in coastal areas that experience increasing population growth. Anticipating negative interactions among stakeholders and adapting potential conflict situations into stakeholder engagement opportunities will expand the base of stakeholders supporting waterfowl hunting and wildlife management. Education communication and policies that address public access, safety, safe distance of hunting from homes, and rules and regulations relating to waterfowl hunting are needed for acceptance of waterfowl hunting along developed waterfronts.

ACKNOWLEDGMENTS

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the United States Department of Agriculture (USDA). We thank our colleagues in the Human Dimensions Research Unit at Cornell University and at Michigan State University for their thoughtful critiques of this manuscript. This research was developed in collaboration with the NYSDEC to address information needs resulting from recent public issues involving conflicts between waterfowl hunters and waterfront residents in several communities. Funding for this project was provided by New York Federal Aid in Wildlife Restoration Grant WE-173-G. This research was also supported in part by the Cornell University Agricultural Experiment Station federal formula funds, Project NYC-147433, received from Cooperative State Research, Education and Extension Service.

LITERATURE CITED

- Cooper, C., L. Larson, A. Dayer, R. Stedman, and D. J. Decker. 2015. Are wildlife recreationists conservationists? Linking hunting, birdwatching, and pro-environmental behavior. *Journal of Wildlife Management* 79:446–457.
- Decker, D. J., A. B. Forstchen, E. F. Pomeranz, C. A. Smith, S. J. Riley, C. A. Jacobson, J. F. Oregon, and G. R. Batcheller. 2015. Stakeholder engagement in wildlife management: Does the public trust doctrine imply limits? *Journal of Wildlife Management* 79:174–179.
- Dillman, D. A., J. D. Smyth, and L. M. Christian. 2009. *Internet, mail, and mixed-mode surveys: the tailored design method*. Third edition. John Wiley & Sons, Hoboken, New Jersey, USA.
- Enck, J. W., and H. A. Van Den Berg. 2007. *Developing a conceptual model of duck hunters' experiences to help task forces understand reasons underlying preferences for season dates*. Cornell University Human Dimensions Research Unit, Ithaca, New York, USA.
- Hager, M.A., S. Wilson, T. H. Pollak, and P. M. Rooney. 2003. Response rates for mail surveys of nonprofit organizations: a review and empirical test. *Nonprofit and Volunteer Sector Quarterly* 32:252–267.
- Iso-Ahola, S. E. 1980. *The social psychology of leisure and recreation*. William C Brown Publishers, Dubuque, Iowa, USA.
- Jacobson, C., and D. Decker. 2008. Governance of state wildlife management: reform and revive or resist and retrench? *Society and Natural Resources* 21:441–448.

- Jacobson, C. A., J. F. Organ, D. J. Decker, G. R. Batcheller, and L. Carpenter. 2010. A conservation institution for the 21st century: implications for state wildlife agencies. *Journal of Wildlife Management* 74:203–209.
- Kretser, H. E., P. J. Sullivan, and B. A. Knuth. 2008. Housing density as an indicator of spatial patterns of reported human-wildlife interactions in Northern New York. *Landscape and Urban Planning* 84:282–292.
- Larson, L. R., R. C. Stedman, D. J. Decker, W. F. Siemer, and M. S. Baumer. 2014. Exploring the social habitat for hunting: toward a comprehensive framework for understanding hunter recruitment and retention. *Human Dimensions of Wildlife* 19:105–122.
- Manfredo, M. J., and A. A. Dayer. 2004. Concepts for exploring the social aspects of human–wildlife conflict in a global context. *Human Dimensions of Wildlife* 9:1–20.
- Michigan State University Animal Legal and Historical Center [MSU]. 2017. Hunter harassment. <<https://www.animallaw.info/topics/hunter-harassment>>. Accessed 19 Dec 2017.
- Minnis, D. L. 2001. Issue management: part and parcel of wildlife management. *Wildlife Society Bulletin* 29:988–994.
- National Oceanic and Atmospheric Administration National Weather Service [NOAA NWS]. 2017. Rochester climate narrative. <<http://www.weather.gov/buf/ROCclifo#>>. Accessed 18 Dec 2017.
- National Oceanic and Atmospheric Administration State of the Coast [NOAA]. 2016. National population report: population trends from 1970 to 2020. U.S. Department of Commerce, U.S. Department of Interior, and U.S. Census Bureau, Washington, D.C., USA. <<http://oceanservice.noaa.gov/facts/coastal-population-report.pdf>>. Accessed 8 Nov 2016.

- New York State Department of Environmental Conservation [NYSDEC] 2017. Avoiding conflicts between waterfowl hunters and waterfront property owners homepage. <<http://www.dec.ny.gov/outdoor/94213.html>>. Accessed 31 Mar 2017.
- New York State Department of Environmental Quality Braddock Bay [NYSDEC Braddock Bay]. 2017. Braddock Bay state wildlife management area homepage. <<http://www.dec.ny.gov/outdoor/24428.html>>. Accessed 28 Mar 2017.
- New York State Laws [NYS Laws]. 2016. New York consolidated laws, environmental conservation law homepage. <<http://codes.findlaw.com/ny/environmental-conservation-law/env-sect-11-0931.html>>. Accessed 7 Nov 2016.
- Porter, W. F., H. B. Underwood, and J. L. Woodard. 2004. Movement behavior, dispersal, and the potential for localized management of deer in a suburban environment. *Journal of Wildlife Management* 68:247–256.
- Riley, S. J., D. J. Decker, L. H. Carpenter., J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. *Wildlife Society Bulletin* 30:585–593.
- Shanks, R. E. 1966. An ecological survey of the vegetation of Monroe County, New York. *Proceedings of the Rochester Academy of Sciences* 11:105–255.
- Siemer, W. F., S. A. Jonker, D. J. Decker, and J. F. Organ. 2013. Toward an understanding of beaver management as human and beaver densities increase. *Human-Wildlife Interactions* 7:114–131.
- Stedman, R. C., and D. J. Decker. 1996. Illuminating an overlooked hunting stakeholder group: nonhunters and their interest in hunting. *Human Dimensions of Wildlife* 1:29–41.

Town of Greece. 2010. All about Greece. <<http://greeceny.gov/aboutgreece>> Accessed 10 Apr 2010.

Triezenberg, H. A. 2010. Social networks and collective actions among wildlife management stakeholders: insights from furbearer trapping and waterfowl hunting conflicts in New York State. Dissertation, Cornell University, Ithaca, New York, USA.

Triezenberg, H. A., B. A. Knuth, and Y. C. Yuan. 2011. Evolution of public issues in wildlife management: how social networks and issue frame change through time. *Human Dimensions of Wildlife* 16:381–396.

United States Census Bureau [USCB]. 2018. Housing characteristics: 2010.

<<https://www.census.gov/prod/cen2010/briefs/c2010br-07.pdf>>. Accessed 25 Mar 2018.

United States Fish and Wildlife Service [USFWS]. 2014. 2011 National survey of fishing, hunting, and wildlife-associated recreation: national overview. U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau, Washington, D.C., USA.

<<http://www.census.gov/prod/2012pubs/fhw11-nat.pdf>>. Accessed 07 Nov 2016.

United States Fish and Wildlife Service [UFWFS]. 2017. Migratory Bird Data Center.

<<https://migbirdapps.fws.gov/mbdc/index.html>>. Accessed 31 May 2017.

Associate Editor: Miranda Mockrin.

Figure 1. United States and New York duck stamps data 1934–2011 (U.S. Fish and Wildlife Service 2017).

Author Manuscript

Table 1. Attitudes toward waterfowl hunting along waterfronts developed with homes in New York, USA, 2009, of waterfront resident respondents who did not know waterfowl hunters and were not waterfowl hunters themselves ($n = 126$), waterfront residents who knew waterfowl hunters and were not waterfowl hunters ($n = 264$), waterfront residents who knew waterfowl hunters and were waterfowl hunters themselves ($n = 37$), and waterfowl hunter respondents ($n = 562$). Any 2 means that do not have the same superscript within a row are different at $P \leq 0.05$. Degrees of freedom for all analyses are 3.

		Braddock Bay State Wildlife Management Area waterfront residents			Waterfowl hunters					
		Do not know waterfowl hunters and not a waterfowl hunter $n = 126$	Know waterfowl hunters and not a waterfowl hunter $n = 264$	Know waterfowl hunters and is a waterfowl hunter $n = 37$	$n = 562$					
Attitude statements relating to waterfowl hunting along waterfronts developed with homes.	\bar{x}^a	SD	\bar{x}^a	SD	\bar{x}^a	SD	\bar{x}^a	SD	F	P

I am concerned about a lack of public access opportunities for waterfowl hunting.	1.98 ^A	0.95	2.51 ^B	1.15	4.27 ^C	0.99	4.14 ^C	0.99	250.182	≤0.001
I can understand why non-hunters may be bothered by the noise from waterfowl hunting.	4.13 ^A	1.02	3.82 ^B	1.15	3.32 ^B	0.94	3.38 ^B	1.07	24.167	≤0.001
Waterfowl hunters should be able to hunt any day of the week during the hunting season.	2.47 ^A	1.30	2.99 ^B	1.34	4.57 ^C	0.87	4.61 ^C	0.79	253.446	≤0.001
Waterfowl hunting begins too early in the morning.	3.72 ^A	1.25	2.95 ^B	1.37	1.41 ^C	0.64	1.51 ^C	0.78	238.303	≤0.001
Waterfowl hunting can safely occur any distance from the water's edge.	1.86 ^A	1.05	2.39 ^B	1.29	3.76 ^C	1.30	3.99 ^C	1.10	184.630	≤0.001
Most non-hunters do not understand waterfowl hunting.	3.65 ^A	1.05	3.52 ^A	1.10	4.31 ^B	0.89	4.24 ^B	0.90	39.061	≤0.001
Most waterfowl hunting in my area is acceptable ^b .	2.88 ^A	1.28	3.43 ^B	1.17	3.92 ^C	0.98	3.90 ^C	0.89	39.283	≤0.001

^a 5-point Likert scale with strongly disagree (1), neither agree nor disagree (3), strongly agree (5).

^b For residents, my area was defined as Braddock Bay State Wildlife Management Area (BBSWMA) and for hunters, my area was defined as the greater-Rochester area, which includes BBSWMA.

Table 2. Waterfowl hunter respondents' ($n = 592$) reported distance to waterfront home when hunting over water, reported harassment by residents of waterfront homes while waterfowl hunting in New York, and logistic regression predicting waterfowl hunter harassment while hunting near waterfront homes in New York, USA, 2009.

	Reported distance to	Reported harassed by		Predicting harassment by residents of waterfront			
	waterfront home	residents of waterfront	homes while waterfowl	homes while waterfowl hunting in New York, USA.			
	when hunting over	hunting in New York, USA ^a		Exp(β)	β	Wald	P
	water (%)	% no	% yes				
Distance							
<30.48 m	17.0	47.3	52.7			61.779***	≤ 0.001
30.48–76.20 m	21.2	60.3	39.7	0.590	-0.527	3.515*	0.061
76.20–152.40 m	17.2	70.2	29.8	0.381	-0.965	9.908***	0.002
>152.40 m	44.7	88.6	11.4	0.116	-2.155	55.662***	≤ 0.001
Constant				1.114	0.108	0.269	0.604
Nagelkerke pseudo R^2					0.178		
% correctly predicted as not harassed					88.9%		
% correctly predicted as harassed					32.5%		

Overall correctly predicted

73.4%

* $P \leq 0.10$, ** $P \leq 0.05$, *** $P \leq 0.01$

^a $\chi^2 = 70.09$, $P \leq 0.001$ comparing reported distance to waterfront home when hunting over water and reported harassment by residents of waterfront homes while waterfowl hunting in New York.

Author Manuscript

Table 3. Standardized coefficients (β) from linear regression models predicting acceptance of waterfowl hunting in residential area for waterfront resident respondents, including non-hunter residents who do not know hunters and are not waterfowl hunters ($n = 126$) and residents who know hunters ($n = 264$), and for waterfowl hunter respondents ($n = 592$), greater-Rochester, New York State, USA, 2009.

Variable	Waterfront residents		Waterfowl hunters			
	Do not know waterfowl hunters and are not a waterfowl hunter $n = 126$		Know waterfowl hunters and are not a waterfowl hunter $n = 264$		$n = 592$	
	β	P	β	P	β	P
I am concerned about a lack of public access opportunities for waterfowl hunting ^a .	0.218*	0.101	0.149**	0.051	-0.135***	0.004
I can understand why non-hunters may be bothered by the noise from waterfowl hunting ^a .	0.000	1.00	-0.081	0.239	0.011	0.818

Waterfowl hunters should be able to hunt any day of the week during the hunting season ^a .	0.257**	0.030	0.172**	0.030	-0.090*	0.055
Waterfowl hunting begins too early in the morning ^a .	-0.376***	0.008	-0.222***	0.005	-0.063	0.175
Waterfowl hunting can safely occur any distance from the water's edge ^a .	-0.058	0.637	0.211***	0.001	0.079*	0.095
Most non-hunters do not understand waterfowl hunting.	0.187*	0.067	0.194***	0.004	-0.011	0.809
Consumptive wildlife activities: No (0), Yes (1)	0.049	0.655	-0.034	0.585	Omitted ^d	
Non-consumptive wildlife activities: No (0), Yes (1)	0.051	0.652	-0.030	0.610	0.086*	0.062
Motorized activities: No (0), Yes (1)	0.069	0.541	-0.059	0.383	0.044	0.340
Non-motorized activities: No (0), Yes (1)	-0.045	0.675	0.031	0.619	0.010	0.836
Extreme activities: No (0), Yes (1)	-0.147	0.186	-0.062	0.320	-0.047	0.318
Age (yr)	0.020	0.864	0.056	0.391	-0.041	0.380
Gender (1 = Male, 2 = Female)	-0.042	0.662	-0.008	0.899	-0.042	0.356
Educational attainment ^b	0.003	0.981	-0.016	0.803	0.159***	0.001
Annual household income before taxes ^c	0.067	0.484	0.093	0.178	-0.038	0.444

Constant	0.148	0.004	≤0.001
	$R^2 = 0.627$	$R^2 = 0.517$	$R^2 = 0.066$
	$F = 5.602$	$F = 10.973$	$F = 2.402$
	$P \leq 0.001$	$P \leq 0.001$	$P = 0.003$
* = $P < 0.10$, ** = $P < 0.05$, *** = $P < 0.01$	df = 15	df = 15	df = 14

^a 5-point Likert scale with strongly disagree (1), neither agree nor disagree (3), strongly agree (5).

^b Levels of attainment: some high school (1), high school diploma or general equivalency diploma (GED) (2), some college or technical school (3), completed an undergraduate degree (4), or completed a postgraduate degree (5).

^c Levels of household income before taxes: ≤\$39,000 (1), \$40,000–\$59,999 (2), \$60,000–\$79,999 (3), \$80,000–\$99,999 (4), \$100,000–\$119,999 (5), and ≥\$120,000 (6).

^d Item omitted from analysis because the sample was waterfowl hunters who all engaged in consumptive activities.

Two sentences summarizing management implications:

Allowing waterfowl hunters to discharge firearms at the water's edge and close to homes may introduce some conflicts but may increase hunting locations and slow the decline in hunter participation. Waterfowl hunters have a role in responsibly choosing hunting sites and waterfront residents who know other waterfowl hunters may be key middle-ground supporters of hunting and active wildlife management.

E-mail: vanden64@msu.edu; Phone: 517-353-5508; Fax: 517-884-8511



Figure 1