

What the Evidence Suggests for the Future of Fishing and Hunting License Sales in Wisconsin



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About this Report

As part of the 2015-2017 State Budget, Wisconsin's legislature directed the Department of Natural Resources to consult with stakeholders and prepare a report to the Joint Committee on Finance on a plan to address an imbalance in the state's Fish and Wildlife Account. The department's Social Science Team has gathered, compiled and synthesized social and economic information to help inform the department's efforts in response to this legislative directive. This report is one of a series of documents prepared by the team to provide objective, policy-relevant information. This report presents specific study findings, interprets the information within pertinent contexts, and may identify potentially useful lines of additional inquiry. This report does not, however, include specific recommendations or policy prescriptions.

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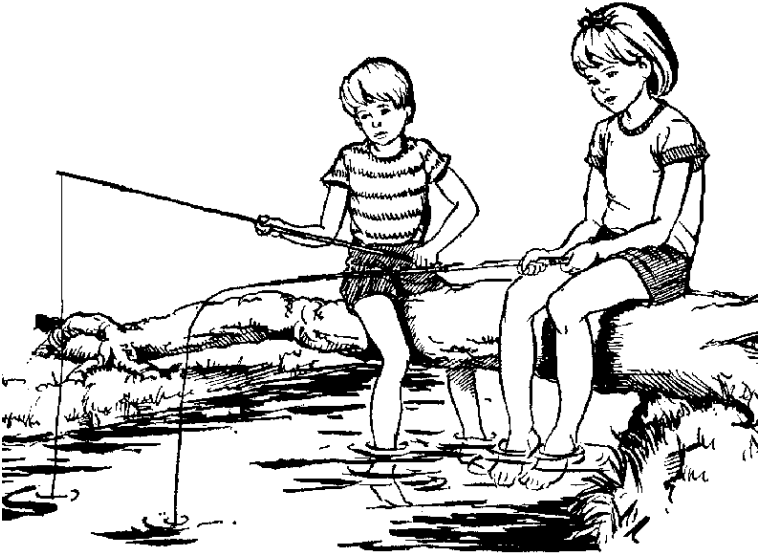
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Abstract

Fishing and hunting have long and deep roots as important economic drivers, leisure pursuits, cultural symbols and personal identities in Wisconsin, but a review of the current participation research and socio-demographic trends suggests each recreation may be on a different trajectory.

Fishing license sales appear stable nationally and have even increased slightly in Wisconsin in recent years. Sales of inland trout stamps have been steady for the past 15 years and Great Lakes trout stamps show an increasing trend. Per capita fishing participation in Wisconsin is currently twice the national average. Current forecasts suggest that the overall number of anglers will increase in the United States through 2060 as a function of overall population increase, but per capita participation rates will decline. Research also indicates that the number of former anglers is far greater than those who buy a license in any given year. This fact suggests there may be opportunities to increase revenue via marketing or other strategies that decrease churn rates among existing anglers.

While there are some challenges to maintaining fishing participation, the number of participants in recreational hunting in the U.S. and in Wisconsin is expected to continue to decline as a result of a nexus of changing cultural, demographic and land use patterns. Hunting participation has been on a four-decade decline nationally in both absolute numbers and on a per-capita basis. Wisconsin seemed somewhat insulated from this national trend until about a decade ago. Gun-deer hunting, the largest revenue generator of hunting license sales, is declining in both the number of participants and in hunter effort statewide. Age and cohort analyses conducted by researchers at the University of Wisconsin-Madison in 2011 predict a 28 percent decline in the number of male gun deer hunters by 2030. Declining participation among adult hunters has and will continue to create cascading effects on efforts to recruit youth into deer hunting. Small game hunting has also declined sharply in Wisconsin, while demand for waterfowl and pheasant hunting remained flat for the past 15 years. Turkey hunting participation grew dramatically during the first decade of the 2000s, but has decreased slightly over the past 5 years.

Sales of Wisconsin's two combination license products—Sports and Conservation Patron licenses—have fallen sharply over the last decade. Our research on CPL holders suggests that declining sales will continue as current customers continue to age. It may be a good time to consider other potential license bundling options that more closely reflect current activity patterns among customers.

Emerging demographic shifts in the state further indicate less demand for all forms of hunting in the coming decades. Meanwhile the combination of urban sprawl, loss of suitable habitat, land parcelization and privatization, and large scale farming operations has reduced the supply of quality hunting access in the state. Efforts to recruit new hunters to replace those dropping out or aging out of the activity face a constellation of challenges that include developing and testing ways to introduce new participants coming from urban backgrounds or from non-hunting families, as well as limits imposed by the availability of hunting access, especially on private lands.

The changing demographic composition of the state's population also will negatively impact demand for fishing, though to a much lesser extent.

Introduction

The diverse responsibilities (e.g., fish, wildlife, forestry, air, water, waste, parks, etc.) assigned to the Wisconsin Department of Natural Resources (Wisconsin DNR) are funded by an equally diverse array of sources which include fees, grants, general purpose tax dollars and donations (Responsive Management 2008). However, when it comes to the management of the state's fish and wildlife resources, nearly 90 percent of the agency's budget comes from two sources, both of which rely on anglers, hunters and trappers. Revenue from the sale of licenses and stamps accounts for the majority of funding available for the conservation and management of fish and wildlife resources in the state, including the management of approximately 600 public properties totaling more than 680,000 acres. The second largest source of funding comes from federal aid associated with excise taxes on the sale of sporting firearms and ammunition (Pittman-Robertson Wildlife Restoration Act) and fishing equipment (Dingell-Johnson Sport Fish Restoration Act). The state's apportionment of these federal dollars is tied in part to the number of fishing, hunting and trapping licenses sold annually. Thus, fish and wildlife conservation in Wisconsin, like in most other states, is perpetuated as a user-pay model (Jacobson et al. 2010).

While hunters and anglers deserve a great deal of credit for the restoration and conservation of many species in the United States (Williams 2010), the user pay model carries with it several disadvantages. Under the current model, there are many non-license buyers who use or benefit from fish and wildlife management but do not contribute financially to the system (what many economists refer to as "free riders") (Holsman and Dunfee 2014, Loomis and Margum 1987). A second drawback is the lack of flexibility to use funds to address ecological priorities that may be perceived by current user groups as not directly related to improving opportunities for hunting and fishing (e.g., projects focused on non-game species) (Holsman and Dunfee 2014, Jacobson et al. 2007). Lastly, and most apropos for the purposes of this report, is that a user pay model depends on sustaining users to remain solvent without curtailing program functions and services. This report provides a comprehensive overview of the current research into participation trends in fishing and hunting, and the major influences on these trends as a way to anticipate challenges to sustaining the current user pay model of fish and wildlife management.

Nationally, concern over future participation in hunting and fishing began to appear in the early 1990s (Dann and Peyton 1996, Murdock et al. 1992, Heberlein 1991), but has taken on much more of a sense of urgency during the last decade. For example, the Council to Advance Hunting and the Shooting Sports and the Wildlife Management Institute recently completed a national plan for recruitment, retention and reactivation (R3) of hunters and shooters that calls upon state agencies, nongovernmental partners and industry to develop more capacity and to become more strategic in the implementation and evaluation of interventions (Frampton and Dunfee 2016). On the fishing side, the Recreational Boating and Fishing Foundation (RBFF) has been very active in conducting market research to better understand the purchasing and participation behavior of anglers in the U.S (<http://www.takemefishing.org/corporate/resource-center/research/>). RBFF is now spearheading a national R3 plan for angling using a similar framework to the R3 Hunting and Shooting National Plan (Byrne 2016).

Current Participation Rates and Trends

Fishing Participation

The most recent national data from the U.S. Fish and Wildlife Service (USFWS) estimated that 33.1 million Americans 16 years of age and older fished in 2011 (USFWS 2012). This represents an 11 percent increase over the number that reported fishing in 2006, and reverses a nearly identical decline in the number of anglers observed between 2001 and 2006 (USFWS 2002, 2007). Overall, about 10 percent of Americans fished in 2014 (American Sport Fishing Association 2015a). Fishing participation nationally has held steady over the past few years and shows slight upticks in both first-time female and youth participants (RBFF and the Outdoor Foundation 2015).

In recent years, marketing research has revealed the number of anglers and hunters is dynamic from year to year as a result of individuals that “churn” in and out of participation over time (American Sportfishing Association 2015a, National Shooting Sports Foundation and Southwick and Associates 2010). Therefore, estimates of license numbers in any given year underestimate the number of participants who participate sporadically and whom identify themselves as anglers and hunters. What appear as participation trends (up or down) may reflect changes in rate of churn, changes in the rate at which new initiates are added to an activity, and/or changes in the rate of death or permanent cessation among participants.

According to the American Sportfishing Association, churn rates for anglers may be as high 50 percent overall (Byrne 2016). Churn is even higher (as much as 70 percent) among those buying a fishing license for the first time, females, those living in metropolitan areas and Millennials (American Sport Fishing Association 2015b, Fedler and Ditton 2001). Given these high annual churn rates, the U.S. Fish and Wildlife Service estimates that there may be 124 million Americans aged 16 and older who have fished at some point in their lives (Byrne 2016). Consequently, retention and reactivation strategies that reduce churn may be more apropos for generating license revenue than are recruitment strategies in the short-term.

The U.S. Fish and Wildlife Service (2012) estimated that 938,000 Wisconsin residents 16 and older went fishing in Wisconsin in 2011. The estimated per capita participation rate is approximately 20 percent, twice the national average (RBFF and the Outdoor Foundation 2015). According to Wisconsin DNR internal data, fishing license sales have increased in Wisconsin over the past 15 years (Figure 1 & 2). In 2009, 828,686 annual resident licenses were sold, the high point in recent history; 1.32 million fishing licenses were sold overall in that year (Figure 1). The economic downturn may have played a role in the robust sales in 2009 as research suggests that sales increase during times of unemployment (Responsive Management 2013, Dalrymple et al. 2010). Wisconsin sold over 819,000 resident annual licenses in 2014. That number represents a nine percent increase in sales from 2002. The sale Great Lakes trout stamps have increased 16 percent over the period from 2002 through 2014 (Figure 2). Sales of inland trout stamps have been stable over the same time period.

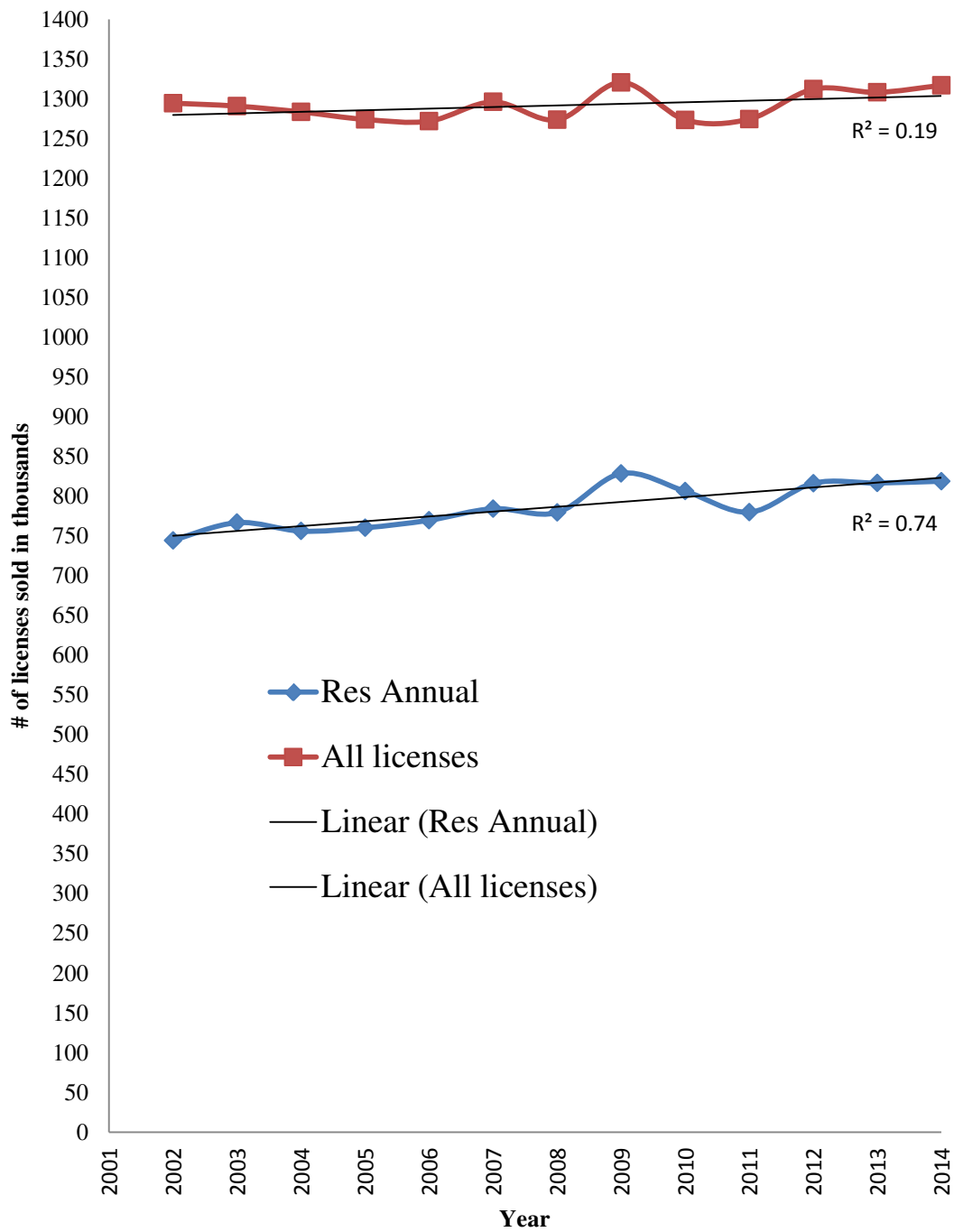


Figure 1. *Fishing licenses sales in Wisconsin, 2002-2104.*

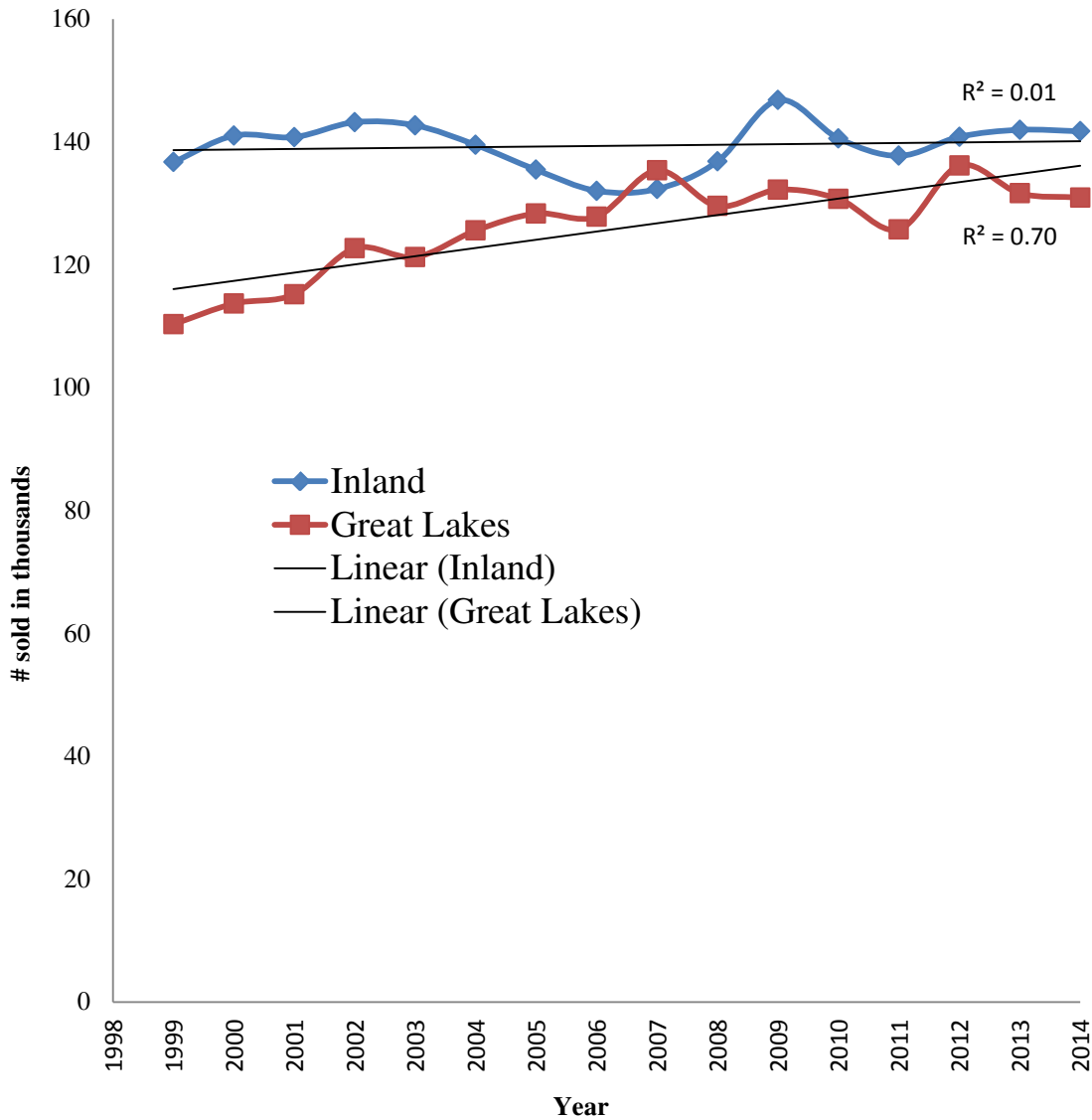


Figure 2. Trout stamp sales in Wisconsin, 1999-2014.

Recreation demand models suggest that population increases in the U.S. will drive a slight increase in the total number of anglers, but per-capita participation in fishing is anticipated to decline by about 9 percent by the year 2060 (Cordell 2012). Specific forecasts for Wisconsin are not available. However, there is also concern that fishing participation may decline because of the general trend of younger people spending less time outdoors (Bruskotter and Fulton 2013, Twenge et al. 2012, Pergams and Zaradic 2008). In general, research suggests that Millennials who do fish may be less committed to fishing than previous generations based on the frequencies in which they renew their fishing licenses (American Sport Fishing Association 2016).

Hunting Participation

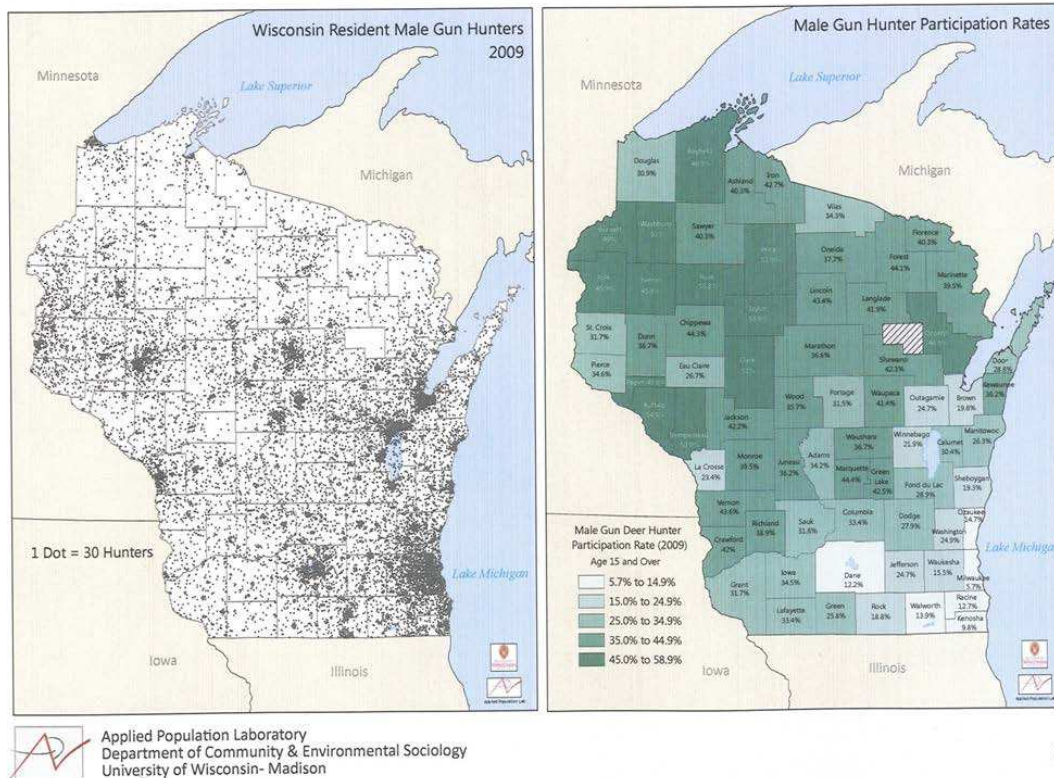
The estimated number of hunters aged 16 and older in the United States was 13.7 million in 2011, an apparent 9 percent increase from the 12.5 million reported in 2006 (USFWS 2012). This marked the first increase in the number of participants in hunting after a four decade decline from the high-water mark of 19 million hunters in 1975. While this increase provides some reason for optimism that perhaps efforts to recruit and retain new hunters may be yielding returns, it also generated enough skepticism for the Association of Fish and Wildlife Agencies to award a multistate grant to further investigate the validity of the observed increase (American Sport Fishing Association et al. 2013). Follow-up investigation of license sales revealed variation in states with increasing and decreasing trends during the 2006-2011 time period, with Wisconsin showing reduced sales.

The current per capita rate of hunting participation is 6 percent in the U.S. The number of people who self-identify as hunters is considered to be much higher than the number who actually purchase a license in any given year and includes “hunter associates” (people who provide social support to hunters), as well as lapsed hunters (Brown et al. 2000). A national study in 2010 estimated that nearly 22 percent of state resident hunters “churn” in and out of the license pool each year and that only 35 percent of state resident hunters purchase a license in five consecutive years (NSSF and Southwick 2010).

The U.S. Fish and Wildlife Service (2012) estimates that 762,000 residents 16 and older participated in some form of hunting in Wisconsin in 2011. The estimated per capita participation rate is approximately 15 percent (Holsman et al. 2014a), but varies widely across the state. For example, nearly half of all males over the age of 12 participated in gun deer hunting in 2009 in Price County, compared with less than 6% of males living in Milwaukee County (Winkler and Kaz 2011). The paradox of rural-urban effects on hunting participation is that participation rates are highest in rural counties yet most hunters in Wisconsin currently live in metropolitan areas where population centers occur (Figure 3).

Deer hunting with a firearm leads sales of all hunting authorizations (including Sportsman and Conservation Patron licenses) in Wisconsin. It is estimated that 92 percent of hunting license customers purchase a gun-deer license in any given year in our state (Holsman 2013b). We have estimated our churn rate for gun deer licenses to be approximately 28 percent, slightly higher than the national average (Wisconsin DNR licensing data).





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Figure 3. Male deer hunter residence by county (a) and county resident rate of deer hunting by males (b) in 2009 (reproduced from Winkler and Kaz 2011).

Gun-deer license sales in Wisconsin peaked in 1999 when 694,712 (resident and non-resident) individuals purchased an authorization. In 2015, 613,165 gun-deer licenses were sold, a one percent increase from the previous year, but a 12 percent decline from 1999. Gun-deer license sales declined by about 10 percent in 2002 as a result of hunter concern over the safety of venison consumption following the discovery of chronic wasting disease (CWD) in southern Wisconsin (Lyon and Vaske 2010, Heberlein and Stedman 2009, Needham et al. 2004) (Figure 4). In the next few years, license sales recovered about half of those losses as hunters gained experience with CWD and perceived risks declined (Cooney and Holsman 2010). The general decline in gun deer license sales continued again beginning in 2009 and was influenced by hunter dissatisfaction with deer sightings, frustration over regulations promoting antlerless harvests, declining access to private lands and perceived lack of quality of opportunities available on state public land (Holsman 2012). Meanwhile, archery deer license sales showed a 25 percent increase between 1999 and 2014, with most of that increase occurring prior to the elimination of age/disability requirements for crossbows in 2013. This large increase offset drops in gun deer license such that total deer licenses sold appear flat during the past 15-year period. The increase in archery licenses is generally considered to reflect more existing (gun) deer hunters taking up archery than the creation of new customers.

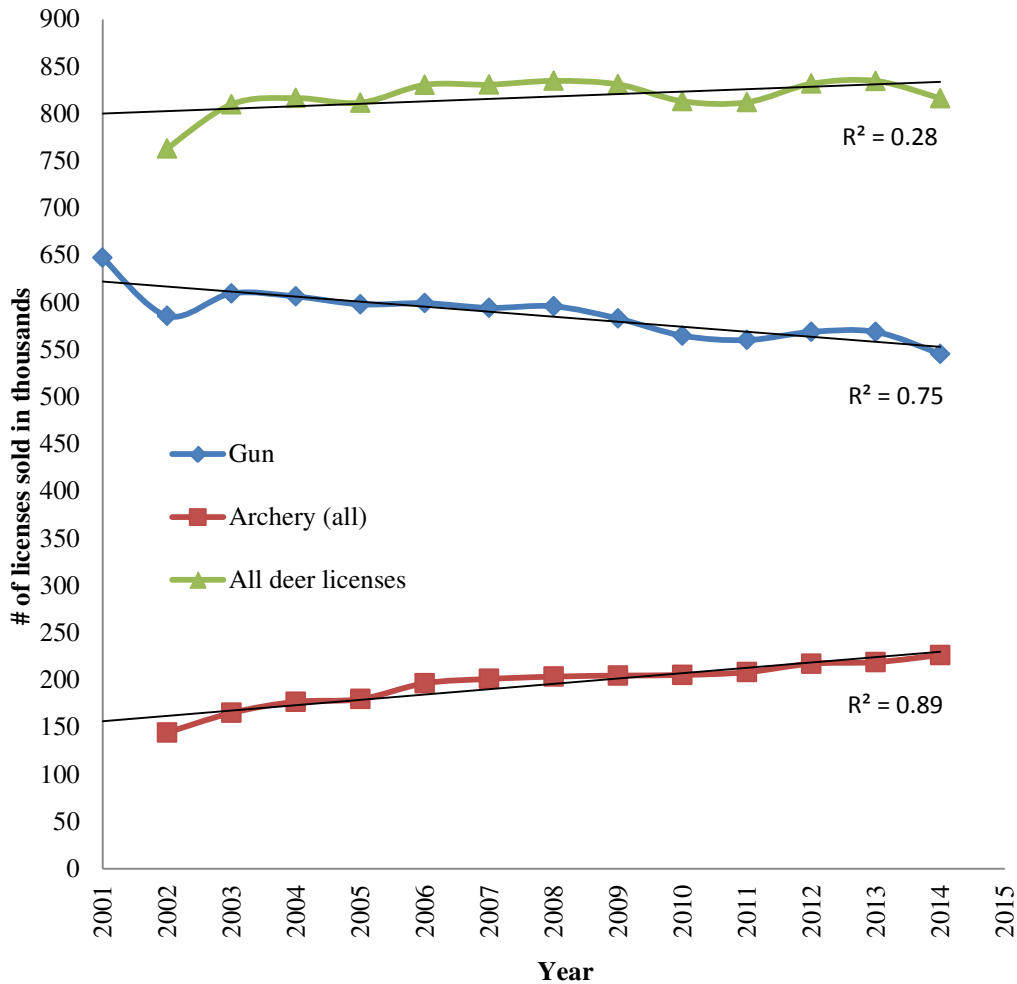


Figure 4. Sale of deer hunting authorizations in Wisconsin, 2002-2015.

Hunting effort—the number of participation days logged by participants—can be a broad indicator for demand (Holsman 2012, Stedman et al. 2008, Weddell et al. 2006). Declining effort may suggest an erosion of avidity for participation among the deer hunter population of the state. Longitudinal data from DNR hunter harvest surveys reveal an overall declining trend in hunter days during the nine day gun-deer season driven primarily by fewer hunters (Figure 5). Average hunter effort has fluctuated over time but has generally been stable (B. Dhuey, Wisconsin DNR, unpub. data). Three of the five deer management regions show declines in hunter effort since 1992. Hunter days also declined 34 percent in the Northern forest over the same time period. Southern region farmland hunters posted 11 percent fewer hunter days in 2013 than 1992, but actually hit their highest level in 2008. Hunter effort has remained relative stable in the Western and Eastern farmland regions (Figure 6). The largest decline in hunter effort has occurred in the Central Forest region where hunter days declined 39 percent since 1992.

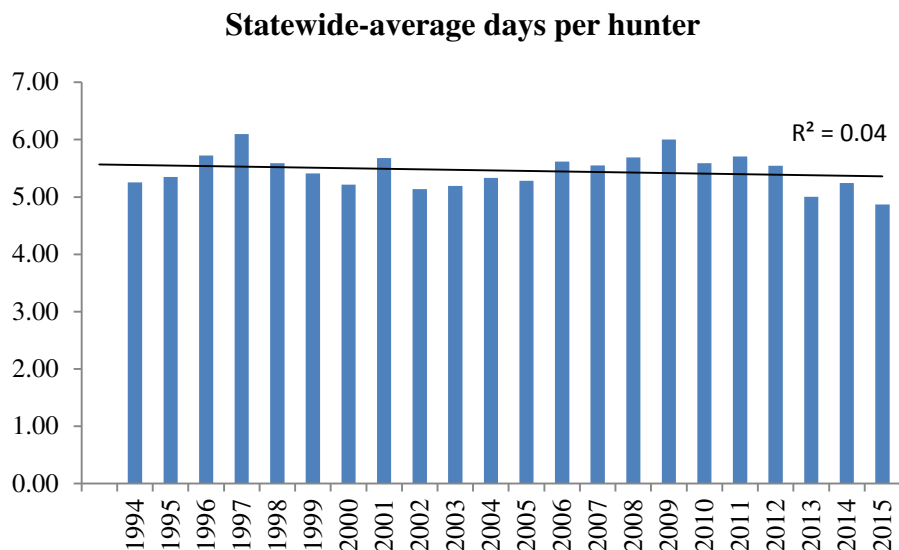
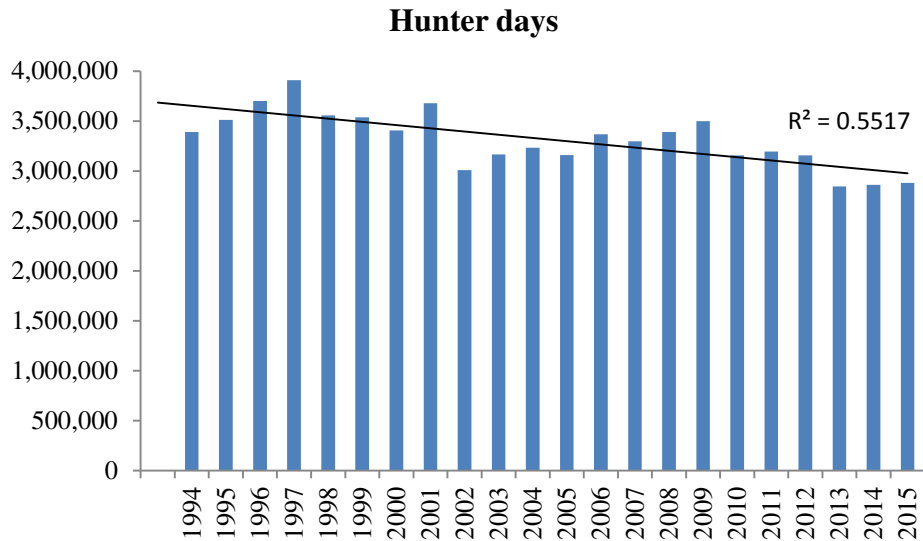


Figure 5. Trends in total hunter effort (hunter days) among Wisconsin gun-deer hunters, 1993-2015.

Purchases of other types of hunting authorizations over the past 15 years suggest shifting patterns of participation that generally indicate a narrowing of the types of hunting that Wisconsin residents do. The largest declines in state license sales observed occur in our two combination packages—Sportsmen and Conservation Patron (Figure 7). Sportsmen license purchases have declined 46 percent since 1999. Sales of resident Conservation Patron licenses have declined 43 percent since peak sales of over 81,000 in 2002. Biennial surveys of Conservation Patron license holders show an increase in average age of customers and also declining participation in small game hunting (Holsman et al. 2014b), trends that portend continuing declines in future sales.

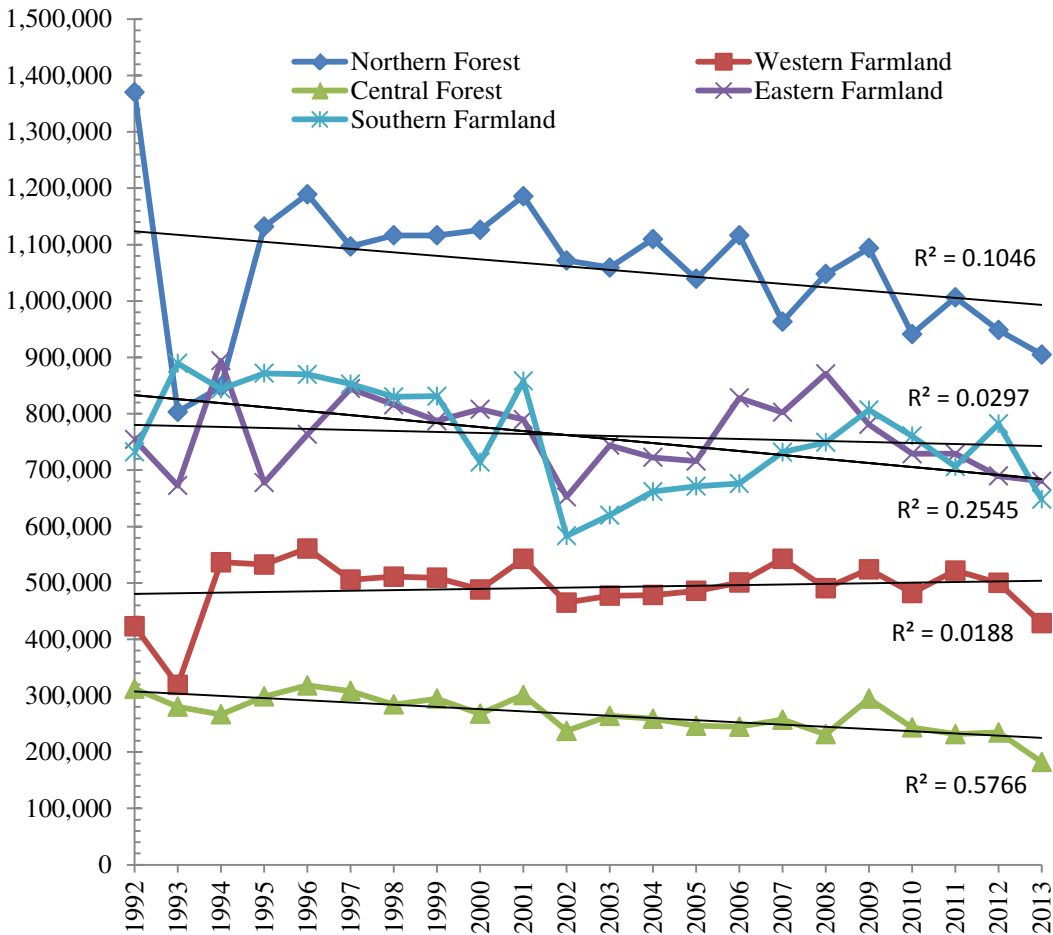


Figure 6. Trends in hunter effort (number of hunter days) during the 9-day gun deer season, by region, 1992-2013.

Declining participation in small game hunting is also reflected in the 15-year trend in sale of small game licenses (Figure 8). Small game license sales have declined 12 percent since 1999 (Figure 8). Estimates generated from annual hunter harvest surveys show sharp declines in the number of hunters pursuing a variety of small game species since 1983 (Figure 9). There were three times as many cottontail rabbit hunters in 1983 and twice as many squirrel hunters as now. Mourning dove hunting which began only a decade ago in Wisconsin has lost half of its initial participants.

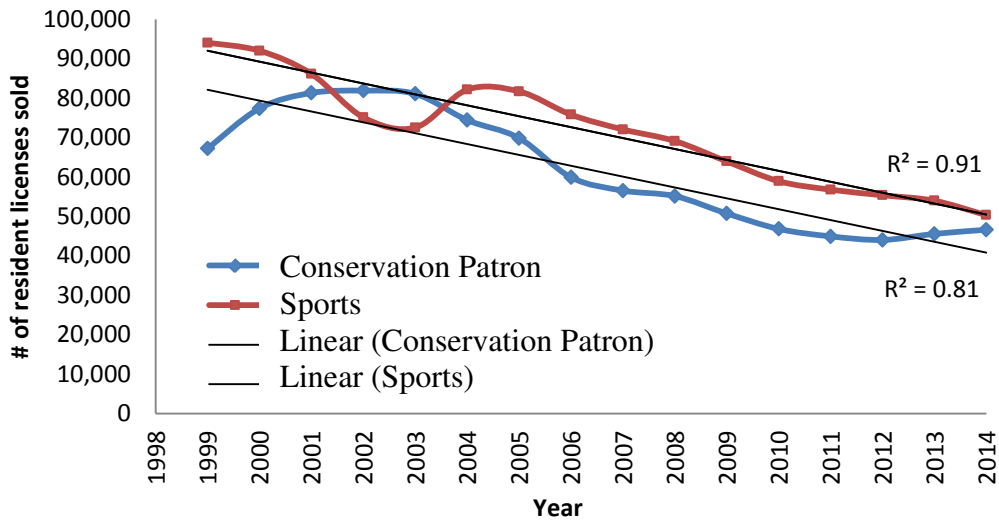


Figure 7. Sales of resident Sports and Conservation Patron licenses, 1999-2014.

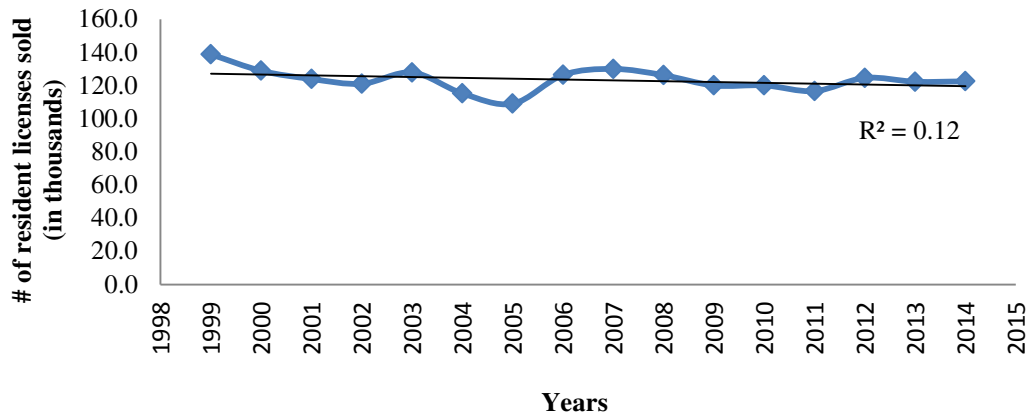


Figure 8. Sales of resident small game hunting licenses, 1999-2014.

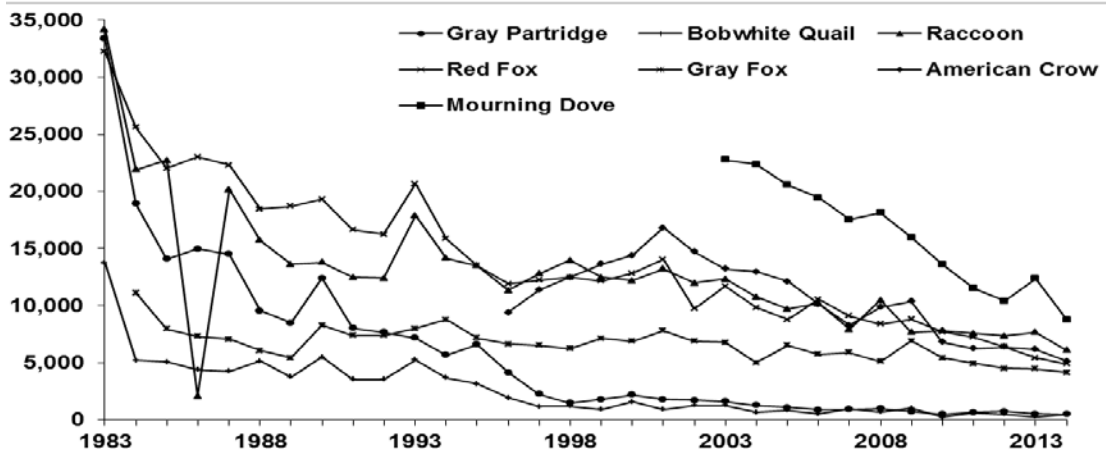
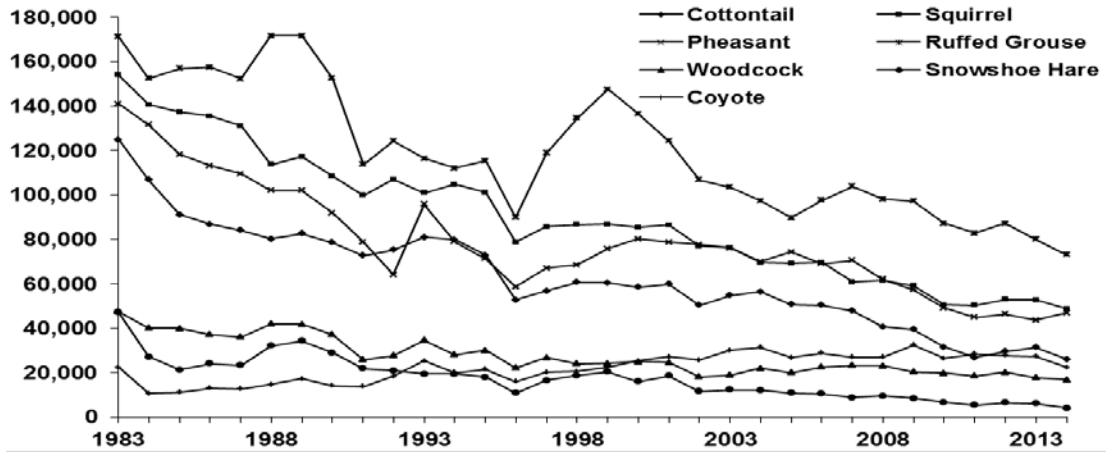


Figure 9. Estimates of total number of Wisconsin hunters who pursued various small game species, 1983-2014 (reproduced from Wisconsin DNR 2016).

Sales of stamps associated with game birds in the state have been stable over the past 15 years (Figure 10). Wild turkey hunting in the state experienced exponential growth in participation during the late 1990s and early 2000s. Turkey stamp sales plateaued in 2009 and have fallen 14 percent since that year. Approximately, 60,000 customers bought waterfowl stamps in 2015, the highest level in 15 years. Pheasant stamp purchases have varied by a few thousand over the past 15 years, but are generally flat.

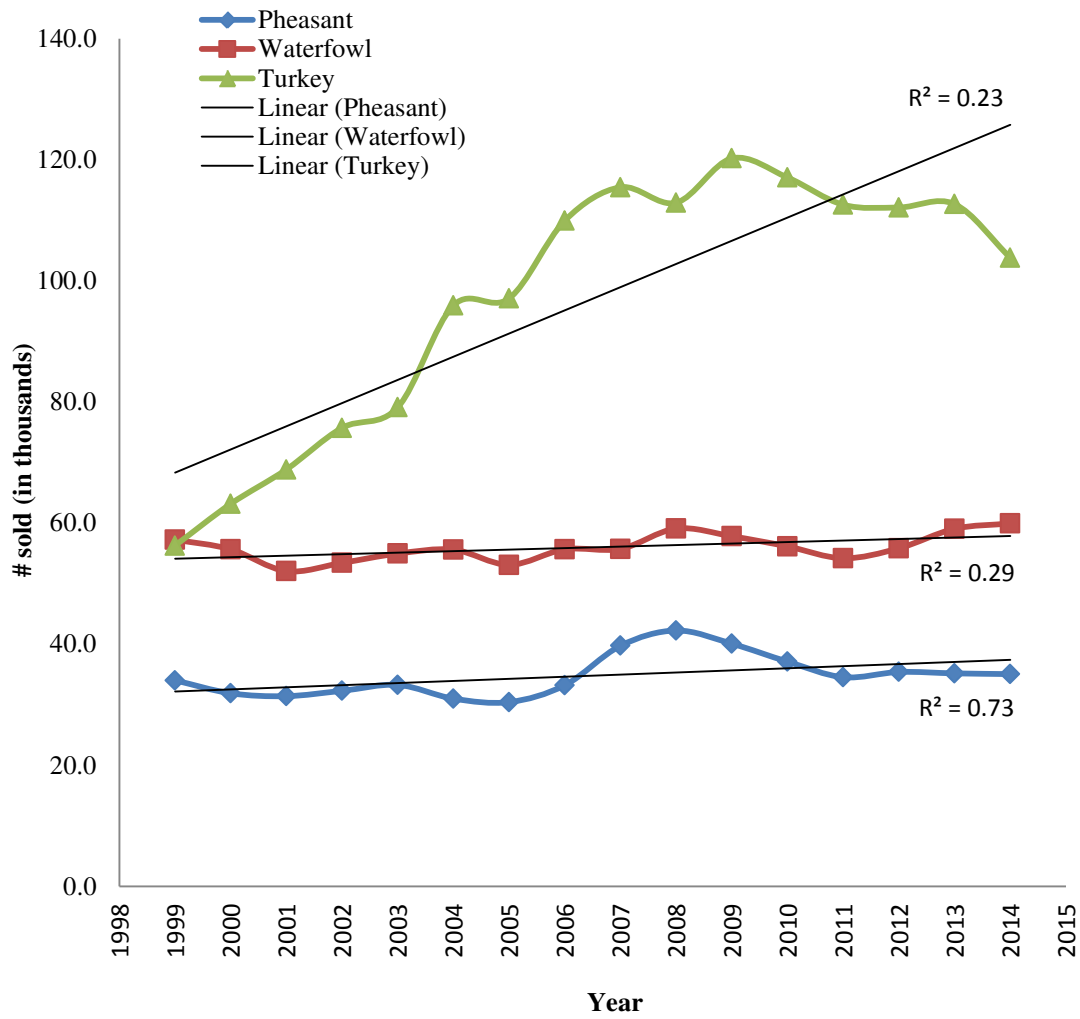


Figure 10. Sales of hunting stamps in Wisconsin, 1999-2014.



Factors Influencing Fishing and Hunting Participation

In the most general terms, research has established the following things to be true for people who choose to participate in hunting and/or fishing. Participants are those who...

- Identify as a “hunter” and/or an “angler” only after a process of multiple opportunities to try out the activities (Byrne 2016, Frampton and Dunfee 2016, Enck et al. 2000).
- Were mentored into the activity by a person or persons who self-identify in that activity.
 - Most often by family (Petchenik 2014, Holsman 2012, Enck et al. 2000, Bissell et al. 1998).
 - Typically before the age of 20 (Petchenik 2014, Norton 2007, Hayslette 2001, Bissell et al. 1998, Duda et al. 1995).
- Master skills to be competent enough to be “successful” to reinforce their interest (Deci and Ryan 2000, Wentz and Seng 2000, Leonard 2007).
- Have supportive social systems to reinforce participation (Frampton and Dunfee 2016).
 - Have family and friends who share interest (Responsive Management/ National Shooting Sports Foundation 2008, Hayslette et al. 2001).
 - Grow up in and/or reside in rural areas (Heberlein et al. 2002, Steadman and Heberlein 2001).
- Are able to negotiate perceived constraints to continued participation (and may experience satisfaction from overcoming constraints) (Kuehn et al. 2012, Schroeder et al. 2012, Weddell et al. 2006, Barro and Manfredi 1996).
- Perceive the value of experience as equal to/or greater than costs—time, money and deferred alternatives— of participation; stated another way, the “product” is worth the “cost” (Petchenik 2014, Holsman 2012).



Causes of Declining Rates of Participation

There are literally dozens of changing social, cultural and landscape factors that may play some role in undermining participation in hunting, and to a lesser extent fishing, in the United States (Frampton and Dunfee 2016). In trying to identify the primary causes of the decline in hunting and fishing, researchers have generally approached the problem in one of three ways. The most common has been to investigate the perceived constraints to participation. Within this line of research, both personal and activity related barriers have been noted. Among personal constraints, “a lack of time”—often specified as work or family obligations—has been cited as the leading reason for declining effort and license buying among past participants (Holzinger 2009, Miller and Vaske 2003, Pierce et al. 1996, Aas 1995, Backman and Wright 1993). Age and/or declining health are other leading personal constraints, especially for hunting (Petchenik 2014, Shrestha and Burns 2010, Miller and Vaske 2003, Pierce et al. 1996, Aas 1995).

Activity constraints include inherent attributes of the activities themselves that can be difficult to navigate. Without question, the largest activity constraint for hunting is lack of access to desirable lands— those perceived to provide opportunities to see game, hunt safely and hunt with minimal competition (Responsive Management 2010, Montgomery and Blalock 2010, Shrestha and Burns 2010, Miller and Vaske 2003). While it is true that Wisconsin has a plethora of federal, state and county lands open to hunting (as well industrial forests and private land enrolled in the Managed Forest Law), the majority of acreage is located far from urban centers requiring travel time and cost to access it (Haines et al. 2005). We have documented, for example, that the vast majority of deer hunting occurs on private lands (Dhuey and Lohr 2016) and that dissatisfactions with crowding and hunt quality are important determinants for lapse from license purchasing among gun deer hunters (Holsman 2012). Land access for hunting continues to decline from loss of habitat from urban sprawl, conservation of farmland and housing developments; closed access to private lands; private leasing; and perceived crowding on public lands (Holsman 2012, Poudyal et al. 2012, Responsive Management 2010, Poudyal et al. 2008b, Wright et al. 2001, Backman and Wright 1993).

In addition to the generic problem of land access, there appears to be an association between hunting avidity and private land access. Studies have found that hunters without private land access hunt fewer days (Holsman 2012, Stedman and Heberlein 2008, Pierce et al. 1996) and are more likely to churn in and out of participation than those with private land access (Holsman 2012, Miller and Vaske 2003). Leases for access to private land hunting have not yet become as common in Wisconsin as they are in other regions, but where present, obviously contribute to another cited barrier which is the cost of participation (Mehmood et al. 2008, Pierce et al. 1996).

Compared to a generation ago, most huntable private nonindustrial land in Wisconsin is now either closed to access or spoken for by landowners and their friends and family (Petchenik 2009). Initiatives to encourage private land access in Wisconsin have largely been unsuccessful on the scale necessary to meet the demand. Surveys of landowners suggest little opportunity to gain additional private land access for Wisconsin hunters (Petchenik 2009). In the absence of change in the current situation, the amount of private land access for hunting may serve as a limiting factor for reversing declines in hunting participation. Ironically, efforts to introduce new hunters in the state may run counter to efforts to retain existing hunters unless access is increased (Holsman 2012).

Anglers generally do not face access issues in Wisconsin because public access to navigable waters is held in trust in Wisconsin as the right of all citizens whereas most hunting land in the state is privately owned. Public waters available for fishing are also fairly well distributed throughout the state, including close to urban centers, with the possible exception of some of the Driftless Area counties in the southwest region that have trout streams but few inland lakes. While physical access to water is generally secure, the perceived desirability of that access may change in the future if water quality declines (Haines et al. 2005).

Heberlein et al. (2002) modeled hunting participation across two continents and found the percent of land in forest cover was a significant predictor. It may be that forest cover is merely a proxy variable for lack of urbanization which may be the real driver of hunting participation (Poudyal et al. 2008b, Zinn 2003). Not only does urban sprawl reduce hunting access and habitat, it has larger negative influences on hunting and fishing participation in ways that are both proximate and cultural. Urban residents incur greater travel time and expense to access hunting and fishing locations (Poudyal et al. 2012a, Responsive Management and National Shooting Sports Foundation 2008). It is important to note that the negative effect of urbanization on hunting and fishing may be as much one of changes to mindset than barriers imposed by land use (Stedman and Heberlein 2001, Heberlein and Thomson 1996). Hunting and fishing may simply become less salient leisure choices for people living detached “from the land” and for whom there are more accessible alternative entertainment choices than exist in rural areas. Additional studies have suggested that our post-modern urban society has shifted away from utilitarian values regarding fish and wildlife (Manfredo et al. 2003)

In summary, research has documented perceived lack of time, lack of access and declining health as the three most significant constraints to hunting and fishing participation. Urbanization—both as land use description and a phenomenon of cultural transformation—is an important contributor to perceived lack of time and lack of access. Other second-tier constraints that have been reported in the literature include cost (Holsman 2012, Mehmood et al. 2008, Miller and Vaske 2003), regulations (Holsman 2012, Shrestha and Burns 2010, Enck et al. 1993) and lack of game (Holsman 2012, Shrestha and Burns 2010, Miller and Vaske 2003).

The second major line of participation research considers the drivers of consumer demand for an activity. It differs from the constraints model which assumes that people have an interest in the activity but are somehow discouraged from participating. The consumer demand literature places hunting and fishing within the marketplace of available product alternatives recognizing that many people may not be interested in participating. Often this analysis focuses on license price as a driver of demand and sales as reflection of demand (see Beardmore and Harris 2016), but we have found that anglers and hunters generally view license price as only one of the “costs” of participation and that costs are weighed against expected benefits to arrive at expected value (Holsman 2012, Petchenik 2012). One promising new approach called “Tapestries” categorizes lifestyle preferences of people based on a geographic information system (GIS) analysis of the neighborhoods where they reside. Proprietary software predicts the likelihood of purchasing hunting and fishing licenses based on an array of other consumer choices (American Sportfishing Association 2015b, National Shooting Sports Foundation 2015).

A holistic analysis is necessary to consider license price in conjunction with other expected costs and benefits, and also in comparison to other competing sources of entertainment—a topic that returns us to the discussion of “lack of time” (Montgomery and Blalock 2010). While it has often been concluded that people are simply “too busy” to go hunting and fishing, data suggest people’s free time is actually increasing (Aguilar and Hurst 2007). Declining participation in hunting and angling is really the result of more people choosing to do other things with their free time that are perceived to be more enjoyable, allow for more desirable social identities, are more convenient or all of the above (Byrne 2016, Holsman 2012, Backman and Wright 1993). For example, Pergams and Zardonic (2008) note that per capita participation in numerous forms of outdoor recreation began to decline in the early 1980s coinciding with the rise of personal electronic media. About the same time, Louv (2006) coined the phrase “nature-deficit disorder” and noted that children’s free time was being scheduled more by parents, some of whom were fearful of perils of unsupervised play outside, including fear of child abduction. Yet, another researcher (Coakley 2006) has noted that changing social expectations of men as husbands and fathers has resulted in a culture shift where “free” time is devoted to youth sports, band, dance, or other activities perceived by society to be more beneficial to childhood success than outdoor hobbies.

It is not just kids who are not spending time outside. According to *Forbes* magazine (Oestriecher 2015), 57 million adults will invest considerable time and money playing Fantasy Football online this fall, nearly twice the number that will fish and four times the number that will hunt. This example illustrates merely one form of emerging competition faced by state agencies for time and money.

The third major line of research has focused on the impact of changing demographics on hunting and fishing participation (Zinn 2003, Floyd and Lee 2002). Hunters have traditionally been younger, white men originating from rural areas (USFWS 2002, 2007, 2012) (Table 1). For example, 95 percent of our current hunters in the state are Caucasian. Data from the national survey (USFWS 2012) clearly shows that African-Americans, Hispanics and Asian-Americans participate in hunting and fishing at much lower rates than whites do (Table 1). Other demographic segments that hunt and fish at lower rates include people living in large metropolitan areas, women, people older than 64 and those with more education (Table 1). Therefore, increases in any of those demographic segments as a proportion of the population will likely decrease demand for hunting and fishing, unless outreach can alter historical participation rates within those under participating groups.

According to national survey data from 2011, Wisconsin has fairly similar pattern of participation to the nation by demographic groups, although sample sizes are too low in many cases to provide direct comparisons (USFWS 2012). For example, the U.S. Fish and Wildlife Service estimates that 28 percent of males over the age of 16 hunted in Wisconsin in 2011, but estimates for women are not available. Other findings in the report show that Wisconsin’s rural residents are more likely to participate in hunting and fishing than urban residents (USFWS 2012). Nearly all of Wisconsin’s hunters (99%) and anglers (98%) are white according to the national data. Estimates for participation by age are not available for residents under 35 years-old. However, participation rates in hunting decline after age 55 for hunting and increase for fishing after age 65.

Demographic trends indicate that the Wisconsin population is expected to increase in age, decline in the proportion of whites and decline in the proportion of rural residence in the next 20 years (Egan-Robertson 2013). All three of these trends will result in lower participation rates in hunting and fishing, barring some cultural shift in participation among

urbanites or people of non-white ethnicities. There has been a modest increase in hunting license buying by females, but not enough to offset losses among males (Cordell 2012).

Table 1. Demographic characteristics of U.S. anglers and hunters (USFWS 2012).

Demographic segment	Participation rate (%) with U.S. population		% composition within angling/ hunting populations	
	Anglers	Hunters	Anglers	Hunters
Gender				
males	21	11	73	89
females	7	1	27	11
Age				
16-24	22	10	11	12
25-34	15	5	19	15
35-44	15	6	18	18
45-54	16	7	22	23
55-64	15	7	18	21
65 and older	11	4	12	11
Residence				
Large metro area	10	3	38	25
Medium metro area	15	5	21	17
Small metro area	20	11	29	38
Rural	24	18	11	20
Race/Ethnicity				
African American	10	2	7	3
Asian	6	< 1	2	< 1
Hispanic	5	1	5	1
White	16	7	86	94
Education level				
11 years or less	12	5	11	11
12 years	13	6	32	36
1-3 years of college	15	6	26	26
4 years of college	15	6	19	18
5 or more years of college	14	4	12	9

As mentioned previously, hunting participation rates vary widely by county in the state. As an illustration of the impact and interaction of demographics and urbanization on hunting participation in Wisconsin, the social science team ran an analysis using data from 2013 resident gun-deer licenses that tested the relative influences of select demographic, land use (e.g., percent of public land, housing density) and deer herd variables (harvest totals and harvest density) on county deer hunting participation rates. The top three predictors which explained 79 percent of the overall variance were demographic variables. The percentage of residents with college degrees was negatively correlated with hunting. Median age and percentage of Caucasians were both positively correlated with age. All three variables were significant predictors of hunting license sales. The effect of education may really be a result of the concentration of employment opportunities in metropolitan counties. In the analysis, counties with older median ages (e.g., Price, Iron and Forest) had the highest participation rates, but their median age values were at or near 50, still below the threshold at which we would expect age-related declines. Counties with more ethnic diversity (e.g., Dane, Milwaukee and Racine) had much lower participation rates.

The most compelling forecast of hunting license decline is based on a long-term demographic analysis conducted by researchers at the University of Wisconsin-Madison's Applied Population Lab (Winkler and Warnke 2013). That analysis has correctly predicted the most recent declines in deer hunting licenses (Huck and Winkler 2008, Winkler and Warnke 2013). Based on current trends, sales of gun deer licenses are expected to decline an additional 28 percent by the year 2030 (Winkler and Kaz 2011), as the current cohort of baby-boomers age out of hunting. Further, Winkler and Kaz (2011) have shown that much of the current decline is resulting from drop-out among 25-44 year old men which creates cascading effects on recruitment of their children as well. To illustrate what these data forecast, Figure 11 is reproduced from their analysis. The lines represent the percentage of Wisconsin males by age that went gun-deer hunting in each year between 2000 and 2009. Four significant observations can be made from the graph that portends a future collapse in license sales: 1) participation rates across almost all age classes declined in each successive year of the study, 2) age at which participation rates peak increases in each year, a sign of an aging population structure of deer hunters, 3) deer hunting participation rates fall precipitously around age 65 so we can expect natural attrition to occur to reduce the number of hunters, because 4) participation rates among 30-year old males fell by 30 percent in ten years.

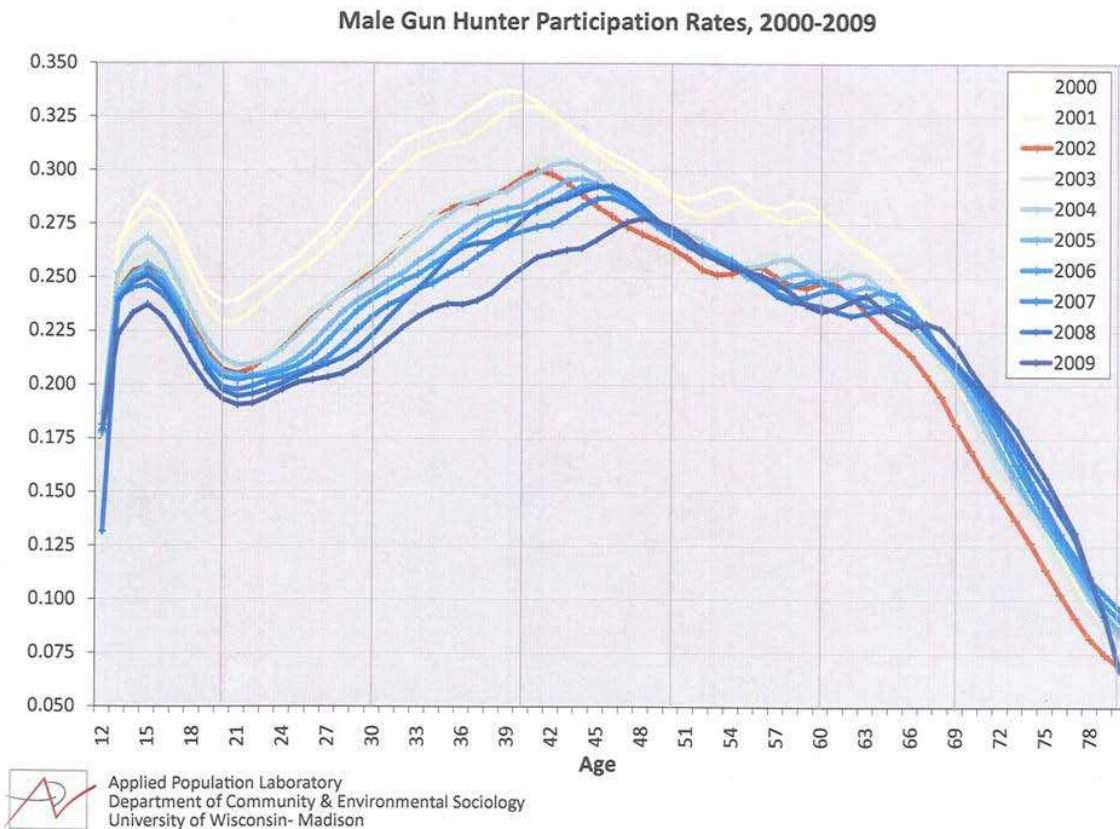


Figure 11. Time series analysis of participation rates by age among male gun deer hunters in Wisconsin, 2000-2009 (reproduced from Winkler and Kaz 2011).

Holsman (2012) conducted focus groups and surveys with lapsed, middle-aged male, gun hunters as a follow-up to identify drivers of trends discovered by the UW Applied Population Lab researchers. That investigation found that dissatisfaction with deer numbers, declining land access, frustration with antlerless harvest and overall cost were the leading influences on desertion. Most of the hunters in the focus groups did not view themselves as having permanently quit deer hunting, but were examples of “lapsed” participants—likely to return when circumstances or perceived opportunities change.

Conclusion

Assuming no changes in fee structures or increasing participation rates within population segments, revenue from the sale of hunting licenses can be expected to continue to decline into the future. Fishing license sales are also expected to decline but with a smaller magnitude than that affecting demand for hunting. Attempts to alter these trends face multiple and interacting forces, many of which will be difficult to affect. In the short term, marketing and outreach that reduces churn may be more efficient than trying to generate new participants in the activities. In the long term, identifying and serving the needs of a more diverse and urban society in Wisconsin may hold the key to funding fish and wildlife conservation. Efforts to recruit new participants in hunting and fishing can transmit heritage values to the next generation, but thus far there is little evidence that such efforts have had any effect on reversing the observed and predicted trends (Frampton and Dunfee 2016).

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