

This article was downloaded by: [South Dakota State University]

On: 27 May 2014, At: 06:37

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Human Dimensions of Wildlife: An International Journal

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/uhdw20>

Does Age Matter? The Influence of Age on Response Rates in a Mixed-Mode Survey

Larry Gigliotti^a & Alia Dietsch^b

^a U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, Department of Natural Resource Management, South Dakota State University, Brookings, South Dakota, USA

^b Human Dimensions of Natural Resources Department, Colorado State University, Fort Collins, Colorado, USA

Published online: 16 May 2014.

To cite this article: Larry Gigliotti & Alia Dietsch (2014) Does Age Matter? The Influence of Age on Response Rates in a Mixed-Mode Survey, *Human Dimensions of Wildlife: An International Journal*, 19:3, 280-287, DOI: [10.1080/10871209.2014.880137](https://doi.org/10.1080/10871209.2014.880137)

To link to this article: <http://dx.doi.org/10.1080/10871209.2014.880137>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms &

Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

Does Age Matter? The Influence of Age on Response Rates in a Mixed-Mode Survey

LARRY GIGLIOTTI¹ AND ALIA DIETSCH²

¹U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, Department of Natural Resource Management, South Dakota State University, Brookings, South Dakota, USA

²Human Dimensions of Natural Resources Department, Colorado State University, Fort Collins, Colorado, USA

The appeal of cost savings and faster results has fish and wildlife management agencies considering the use of Internet surveys instead of traditional mail surveys to collect information from their constituents. Internet surveys, however, may suffer from differential age-related response rates, potentially producing biased results if certain age groups respond to Internet surveys differently than they do to mail surveys. We examined this concern using data from a mixed-mode angler survey conducted in South Dakota following the 2011 fishing season. Results indicated that young anglers (16–18) had the lowest return rates and senior anglers (65+) had the highest, regardless of survey mode. Despite this consistency in response rates, we note two concerns: (a) lower Internet response rates and (b) different age groups represented by the Internet and mail survey samples differed dramatically. Findings indicate that constituent groups may be represented differently with the use of various survey modes.

Keywords coverage, Internet surveys, mixed-mode surveys, return rates, age, differential response rates

Introduction

Fish and wildlife management agencies are increasingly turning to Internet surveys for collecting human dimensions information from their constituents. The appeal of Internet surveys is based on the potential for cost and time savings. For example, printing costs inherent to mail survey efforts are virtually eliminated, postage costs are no longer applicable, completed survey returns are expedited (Hutchison, Fleischmann, & Johnson, 2001; Kwak & Radler, 2002; Truell, Bartlett, & Alexander, 2002), and data are immediately entered by the respondent (Couper, 2000). These perceived benefits of Internet surveys, however, do not eliminate the possible shortfalls of poor survey design (Sexton, Miller, & Dietsch, 2011). In this article, we suggest that age-related differential response rates can have an impact on management decisions, and should be considered when conducting human dimensions inquiries.

Address correspondence to Larry Gigliotti, U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, South Dakota State University, Department of Natural Resource Management, Box 2140B, SNP 201C, Brookings, SD 57007, USA. E-mail: Larry.Gigliotti@sdstate.edu

The potential for misrepresentative data occurs when different age groups respond to surveys at different rates. Such return rates may be further impacted by particular survey modes (i.e., mail vs. Internet). Shifting to Internet surveys may affect the response rates of older adults differently than the response rates of younger adults (Quinn, 2010). This raises several questions. To what extent does an Internet survey accurately represent different portions of the public? Do different age groups respond to an Internet survey at different rates than they do to a mail survey? Differential age-related response rates are critical to consider since people often participate in activities and have preferences that are consistent with their age. Since public responses are collected in the interest of informing management decisions, it is important to know how well different survey modes represent specific age groups. In light of these concerns, we investigated response rates to a mixed-mode survey (Internet and mail), as well as the efficacy of an Internet survey for representing different age groups within the context of fish and wildlife management.

The Impact of Age on Survey Response Rates

Some research suggests that older individuals are more likely to respond to survey requests, particularly when those efforts are administered by mail (Angus, Entwistle, Emslie, Walker, & Andrew, 2003; Caan, Hiatt, & Owen, 1991; Lusk, Delclos, Burau, Drawhorn, & Aday, 2007). For example, Harrison, Holt, and Elton (2002) received response rates of 47% for ages 18–45 years, 65% for ages 46–64 years, and 83% for ages ≥ 65 years to a mail survey request. Other researchers have found that response rates begin to drop off as age greatly increases (Cull, O’Conner, Sharp, & Tang, 2005; Goyder, 1986; Herzog & Rogers, 1988; Kaldenberg, Koenig, & Becker, 1994; Moore & Tarnai, 2002). Sheldon, Graham, Potheary, and Rasul (2007) suggested that there may be an interaction effect between age and response rates to mail surveys; their results revealed that the very old (>80 years of age) and younger adults (<36 years of age) tend to be less likely to respond to mail surveys. Differential age-related response rates to Internet surveys should also be considered due to the impact these rates may have on survey results (Kaplowitz, Hadlock, & Levine, 2005; Vaske, 2011). Most research suggested older individuals do not respond to Internet surveys to the same degree as younger individuals (Bech & Kirstensen, 2009; Graefe, Mowen, Covelli, & Trauntvein, 2011; Kaplowitz, et al., 2005).

Survey methodologies that collect information disproportionately among groups of people can result in data that misrepresent the population of interest (Behrens, Freedman, & McGuckin, 2008). Adequate representation of age groups is particularly important when those groups respond differently to what is being measured. In the case of fish and wildlife management, misrepresentation of a population can lead to the wrong conclusions regarding the programs and services managers provide. As an illustration of response variation that might impact such conclusions, Gigliotti (2004, 2007) reported significant differences among holders of various types of fishing licenses (sold by different age-groups) on variables such as fishing participation, annual days fished, perceived fishing quality, and overall satisfaction with the experience. Since license types are sold to specific age groups, differences could be driven by age and age-related characteristics. Management decisions (e.g., increased amenities at a particular lake, decreased number of fishing days) based on survey results that over- or underrepresented particular age groups may misjudge the desired services of their constituents. Researchers conducting human dimensions surveys must consider the impact that differential age-related response rates could have on their management decisions.

Methods

To detect biases due to differential subgroup response rates, the proportion of each subgroup in the population must be known. For example, age-related potential biases could be detected within a population of anglers in South Dakota, because state license types are sold in distinct age-groups. Therefore, we use data from a mixed-method survey of anglers in South Dakota to detect potential differences in response rates for license types (i.e., age groups).

Distribution of Survey

The South Dakota Game, Fish and Parks Department (SDGFP) conducts statewide surveys of anglers to better understand trends in fishing participation and attitudes regarding management of angler issues. To test the efficacy of an Internet versus mail survey for eliciting responses from different age groups, SDGFP conducted a mixed-method survey in 2011. Two types of resident adult (19–64 years of age) angler licenses are available for purchase, while seniors (65+ years of age) and juniors (16–18 years of age) can each purchase only one type of angler license. The survey effort was conducted in three stages. First, an email invitation requesting participation in an Internet survey was sent to all resident anglers supplying an e-mail address in that year's database (Table 1). The e-mail contained a link to an Internet survey hosted by SurveyMonkey, an online survey software company (www.SurveyMonkey.com). Second, a mail survey was sent to a random sample of anglers within the same database who did not supply e-mail addresses ($n = 200$ for each of the four license types). Finally, the same mail survey was sent to a random sample of anglers not responding online (i.e., "Internet non-respondents"; $n = 200$ for each of the four license types). During the 2011 mixed-method survey, the total number of questionnaires mailed was 1,600 and the total number of e-mailed questionnaires was 52,870.

Analyses

Mean differences in return rates among age groups (reflecting different license-type holders) for each survey wave (Internet only, mail only, and Internet non-respondents), were

Table 1
Resident fishing licenses available from the South Dakota Game, Fish and Parks Department with number of licenses sold in 2011 and number and proportion of anglers supplying an e-mail address

Resident fishing license types	Age group	Number of licenses sold (% of total)	Number supplying an e-mail address (% of total)	Proportion supplying an e-mail address
Adult Annual	19–64	58,031 (46%)	23,600 (36%)	41%
Adult Combination	19–64	43,420 (35%)	31,915 (49%)	74%
Senior Annual	65+	16,172 (13%)	5,262 (8%)	33%
Junior Combination	16–18	7,496 (6%)	3,914 (6%)	52%
Total		125,119	64,691	52%

analyzed using analysis of variance (ANOVA) tests, Levene's test for equality of variances, and Tamhane's T2 post hoc tests. Eta values were used as an indicator of effect size (Cohen, 1988). Chi-square analyses were employed for testing differences in proportions of licenses sold and proportions of survey questionnaires returned, with effect sizes denoted by Cramér's V values.

Results

The percentage of anglers with an e-mail address in the database ranged from 33% (senior anglers) to 74% (Adult Combination license holders) (Table 1). Response rates to the Internet portion of the mixed-mode survey ranged from 15% (young anglers) to 47% (senior anglers) (Table 2). The Internet survey produced a large number of responses ($n = 17,262$); however, the distribution of Internet returns represents a very different proportion of license types compared to the total proportion of license types sold (Figure 1). Chi-square analyses ($\chi^2_{(3, n=143103)} = 5128.17, p < .001, \text{Cramer's } V = .189$) indicated that the Adult Combination license holders were greatly overrepresented in the sample. This is due to Adult Combination license holders having a greater proportion of people with e-mail address in the database *and* their relatively high response rate to the Internet survey. The other three license types were underrepresented, including the Senior Annual license holders. Seniors, who had the highest overall return rate, were not well-represented in the database, likely because senior license holders either do not have e-mail addresses or are not willing to provide them to the SDGFP database.

The mail portion of the mixed-mode survey of anglers was comprised of two separate samples: (a) a sample of anglers without an e-mail address and (b) a sample of non-respondents from the Internet survey. Similar to the Internet portion of the mixed-mode survey, young anglers had the lowest return rates (29% and 30%, respectively) and senior anglers had the highest return rates (70% and 78%, respectively) to both mail survey efforts (Table 2). For all age groups (i.e., the four resident license types), chi-square analyses indicated that the mail survey of anglers achieved higher return rates compared to the Internet survey ($\chi^2_{(3, n=54359)} = 164.15, p < .001, \text{Cramer's } V = .055$) (Figure 2).

Table 2
Mean return rate to the 2011 mixed-mode (Internet and mail) statewide angler survey analyzed by license type

	Resident fishing license types ¹				$F(df)$	p -value	η
	Adult annual	Adult combination	Senior annual	Junior combination			
<i>Internet Survey</i>							
Return Rate	.23 ^a	.39 ^b	.47 ^b	.15 ^a	651.53 (3, 52866)	<.001	.189
<i>Mail Survey of Anglers without Email Addresses</i>							
Return Rate	.37 ^a	.57 ^b	.70 ^b	.29 ^a	28.49 (3, 708)	<.001	.328
<i>Mail Survey of Non-respondents to the Internet Survey</i>							
Return Rate	.37 ^{ab}	.48 ^b	.78 ^c	.30 ^a	41.44 (3, 773)	<.001	.139

¹Means with different superscripts are significant at $p < .05$ based on Tamhane's T2 method (Levene's test for equality of variances was significant at $p < .001$).

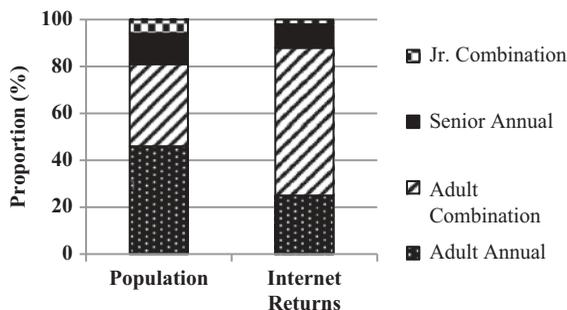


Figure 1. Proportion of each license type in the population compared to the Internet proportion of returns for each license type of the mixed-mode survey conducted in 2011, $\chi^2(3, n = 143,103) = 5128.17, p < .001$, Cramer’s $V = .189$.

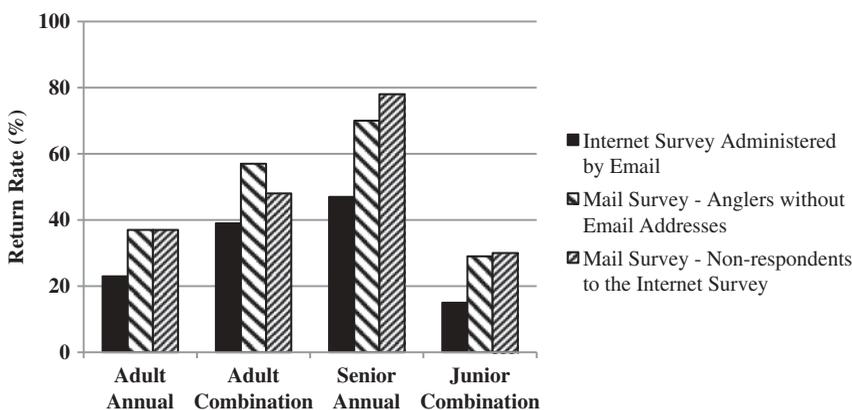


Figure 2. Return rates for each component of the mixed-mode survey of South Dakota anglers by license type conducted in 2011, $\chi^2(3, n = 54,359) = 164.15, p < .001$, Cramer’s $V = .055$.

Discussion

Fish and wildlife managers are increasingly relying on survey collection efforts to obtain information regarding public preferences and experiences. Internet surveys are capable of doing this in a timely and efficient manner, but may also be fraught with biases such as differential age-related response rates. We discuss the implications of our findings in regards to this concern.

Internet surveys have been criticized for the potential of low response rates in comparison to traditional mail survey responses (Couper, Blair, & Triplett, 1999; Duda & Nobile, 2010; Gigliotti, 2011; Nulty, 2008; Vaske, Jacobs, Sijtsma, & Beaman, 2011). We found that response rates to the Internet portion of the mixed-mode survey were significantly lower than responses to the two mail surveys. Although the effect size, as indicated by the eta-value, suggested a “small” effect for this difference in response rates (Cohen, 1988), we highlight this finding because of the large difference in true values of the response rates. For example, younger adults respond to the Internet survey at *half* the rate as they responded to the two mail surveys. Since low response rates can lead to biased results (Brown & Wilkin, 1978; Fisher, 1996), such a finding suggests that an Internet survey may be more likely to underrepresent specific age groups, and likewise, over-represent other age groups. In fact,

we found that the usable returns by license type from the Internet surveys did not come close to matching the proportion of license types actually sold in 2011.

Results from our analyses also indicate that young anglers are the least likely to respond to survey requests; youths had the lowest response rates to the Internet portions of the mixed-mode survey as well as the mail portion. Implementing Internet surveys does not guarantee that younger individuals will be sufficiently represented. Additionally, senior anglers who supplied an e-mail address had the highest response to the Internet survey out of the three age groups. This result suggests that seniors respond to survey requests at a much higher rate than their younger counterparts, *despite survey mode*. In relation to technology, this result indicates that seniors who use the Internet will respond to surveys online, but that there is a large contingent of seniors who prefer not to provide an e-mail address or simply do not have one. Seniors, therefore, were underrepresented in the Internet survey despite their overall high response. This bias toward the small number of seniors supplying an e-mail address could be problematic if those seniors hold different beliefs than seniors who did not supply SDGFP an e-mail address.

Knowing how different groups of people, young and old, feel about the services, programs, and amenities provided by fish and wildlife agencies is critical to the development of successful management strategies. Differential age-related response rates can generate biased data because of the association of age with other survey variables. For example, the rate of fishing participation in 2011 was much higher in an Internet-only survey that underrepresented seniors than the fishing participation rate estimated from a mixed-method survey that had better coverage of seniors (Gigliotti & Henderson, 2012). This rate of fishing participation relates to other parameters such as days of fishing by location, fishing method and species fished, and types and numbers of fish caught and harvested. The Internet-only survey also estimated that 215 thousand walleye were harvested in 2011 compared to an estimated 185 thousand walleye harvested using data corrected for coverage and Internet non-response biases. This 16% difference suggests that fishing harvest rates were overestimated before data were adjusted. If managers had responded to the higher fishing rate by limiting harvest days or catch numbers, they may have created unnecessary conflict with their constituents who desired relatively unimpeded fishing experiences. An understanding of the impact of differential age-related response rates on survey measures and, subsequently, management decisions is vital. Correcting for issues related to differential response rates will require the use of complex mixed-mode survey designs and/or weighting of data (Kalton & Flores-Cervantes, 2003; Vaske, 2008, 2011) but can help to ensure that results are representative of subgroups within a population.

Conclusion

Surveys are increasingly being used by fish and wildlife agencies to inform their decision-making. These decisions often depend on how well a survey captures the opinions and beliefs of different portions of the public (i.e., age or user groups). We suggest that more attention should be focused on how Internet and mail surveys affect the response rates of various subgroups within a population, particularly because different groups can be mis-represented with the use of certain methods. While the Internet can be used to collect a large number of responses from the public faster and cheaper than a mail survey in many cases, correcting for age-related differential response rate biases are necessary if data are to accurately reflect populations of interest. It is critical that the blame *not* fall on the survey mode, but on methods that may result in over- or underrepresented user groups. For those wanting to capitalize on the benefits of an Internet survey in their human dimensions

inquiries, a survey design using both mail and Internet response options for all participants with an adequately drawn sample may be the best approach.

Note

The use of trade names or products does not constitute endorsement by the U.S. Government.

References

- Angus, V. C., Entwistle, V. A., Emslie, M. J., Walker, K. A., & Andrew, J. E. (2003). The requirement for prior consent to participate on survey response rates: A population-based survey in Grampian. *BMC Health Services Research*, *3*, 1–10.
- Bech, M., & Kristensen, M. B. (2009). Differential response rates in postal and Web-based surveys among older respondents. *Survey Research Methods*, *3*, 1–6.
- Behrens, R., Freedman, M., & McGuckin, N. (2008, May). The challenge of surveying “hard to reach” groups. Paper presented at the 8th International Conference on Survey Methods in Transport: Harmonisation and Data Quality, Annecy, France. Retrieved from <http://www.travelbehavior.us/Nancy-pdfs/The%20Challenge%20of%20Surveying%20Hard%20to%20Reach%20Populations.pdf>
- Brown, T. L., & Wilkins, B. T. (1978). Clues to reasons for nonresponse, and its effect upon variable estimates. *Journal of Leisure Research*, *10*, 226–231.
- Caan, B., Hiatt, R. A., & Owen, A. M. (1991). Mailed dietary surveys: Response rates, error rates, and the effect of omitted food items on nutrient values. *Epidemiology*, *2*, 430–436.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Couper, M. P. (2000). Web surveys: A review of issues and approaches. *The Public Opinion Quarterly*, *64*, 464–494.
- Couper, M. P., Blair, J., & Triplett, T. (1999). A comparison of mail and email for a survey of employees in U.S. statistical agencies. *Journal of Official Statistics*, *15*, 39–56.
- Cull, W. L., O’Connor, K. G., Sharp, S., & Tang, S. F. (2005). Response rates and response bias for 50 surveys of pediatricians. *Health Services Research*, *40*, 213–226.
- Duda, M. D., & Nobile, J. L. (2010). The fallacy of online surveys: No data are better than bad data. *Human Dimensions of Wildlife*, *15*, 55–64.
- Fisher, M. R. (1996). Estimating the effect of nonresponse bias on angler surveys. *Transactions of the American Fisheries Society*, *125*, 118–126.
- Gigliotti, L. M. (2004). *Fishing in South Dakota—2003: Fishing activity, harvest and angler opinion survey* (Report No. HD-6(1)-04.AMS). Pierre, SD: Game, Fish, and Parks Department, Division of Wildlife.
- Gigliotti, L. M. (2007). *Fishing in South Dakota—2006: Special focus on the Black Hills (Annual, combination, senior, & jr. combination licenses)* (Report No. HD-7-07.AMS). Pierre, SD: Game, Fish, and Parks Department, Division of Wildlife.
- Gigliotti, L. M. (2011). Comparison of an Internet versus mail survey: A case study. *Human Dimensions of Wildlife*, *16*, 55–62.
- Gigliotti, L. M., & Henderson, K. (2012). *Fishing in South Dakota—2011: Resident annual fishing licenses. First year progress report: 2012–02*. Brookings, SD: U.S. Geological Survey, South Dakota Cooperative Fish and Wildlife Research Unit, Department of Natural Resource Management, South Dakota State University.
- Goyder, J. (1986). Surveys on surveys: Limitations and potentials. *Public Opinion Quarterly*, *50*, 27–41.
- Graefe, A., Mowen, A., Covelli, E., & Trauntvein, N. (2011). Recreation participation and conservation attitudes: Differences between mail and online respondents in a mixed-mode survey. *Human Dimensions of Wildlife*, *16*, 183–199.

- Harrison, R. A., Holt, D., & Elton, P. J. (2002). Do postage-stamps increase response rates to postal surveys? A randomized controlled trial. *International Journal of Epidemiology*, *31*, 872–874.
- Herzog, A. R., & Rogers, W. L. (1988). Age and response rates to interview survey samples. *Journal of Gerontology*, *43*, S200–S205.
- Hutchison, P. D., Fleischmann, G. M., & Johnson, D. L. (2001). Email surveys: Additional research insights. *The Review of Business Information Systems*, *5*, 37–47.
- Kaldenberg, D. O., Koenig, H. F., & Becker, B. W. (1994). Mail survey response rate patterns in a population of the elderly: Does response deteriorate with age? *The Public Opinion Quarterly*, *58*, 68–76.
- Kalton, G., & Flores-Cervantes, I. (2003). Weighting methods. *Journal of Official Statistics*, *19*, 81–97.
- Kaplowitz, M. D., Hadlock, T. D., & Levine, R. (2005). A comparison of Web and mail survey response rates. *The Public Opinion Quarterly*, *68*, 94–101.
- Kwak, N., & Radler, B. (2002). A comparison between mail and Web surveys: Response pattern, respondent profile, and data quality. *Journal of Official Statistics*, *18*, 257–273.
- Lusk, C., Delclos, G. L., Bura, K., Drawhorn, D. D., & Aday, L. A. (2007). Mail versus Internet surveys: Determinants of method of response preferences among health professionals. *Evaluation and the Health Professions*, *30*, 186–201.
- Moore, D. L., & Tarnai, J. (2002). Evaluating nonresponse error in mail surveys. In R. M. Groves, D. A. Dillman, J. L. Eltinge, & R. J. A. Little (Eds.), *Survey nonresponse* (pp. 197–211). New York: NY: John Wiley & Sons.
- Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment and Evaluation in Higher Education*, *33*, 301–314.
- Quinn, K. (2010). Methodological considerations in surveys of older adults: Technology matters. *International Journal of Emerging Technologies and Society*, *8*, 114–133.
- Sexton, N. R., Miller, H. M., & Dietsch, A. M. (2011). Appropriate uses and considerations for online surveying in human dimensions research. *Human Dimensions of Wildlife*, *16*, 154–163.
- Sheldon, H., Graham, C., Potheary, N., & Rasul, F. (2007). *Increasing response rates amongst black and minority ethnic and seldom heard groups: A review of literature relevant to the national acute patients' survey*. Oxford, UK: Picker Institute Europe. Retrieved from http://www.nhssurveys.org/Filestore/documents/Increasing_response_rates_literature_review.pdf
- Truell, A. D., Bartlett, J. E., II, & Alexander, M. W. (2002). Response rate, speed, and completeness: A comparison of Internet-based and mail surveys. *Behavior Research Methods, Instruments, & Computers*, *34*, 46–49.
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. State College, PA: Venture Publishing.
- Vaske, J. J. (2011). Advantages and disadvantages of Internet surveys: Introduction to the special issue. *Human Dimensions of Wildlife*, *16*, 149–153.
- Vaske, J. J., Jacobs, M. J., Sijtsma, M. T. J., & Beaman, J. (2011). Can weighting compensate for sampling issues in Internet surveys? *Human Dimensions of Wildlife*, *16*, 200–215.