Contrasts of Waterfowl Hunter Surveys: Open Web and Random Mail Surveys Produce Similar Policy Results

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Abstract: We conducted random mail and open web surveys of Louisiana waterfowl hunters following the 2011–2012 season, asking identical questions about waterfowl hunting effort, success, satisfaction, proposed regulatory actions, and demographics. We received 1,096 usable responses to our mail survey, and 1,286 usable responses to an on-line survey that was open for anyone to answer. Respondents to the web survey hunted much more, harvested more ducks, and were somewhat younger; but we noted similarities across survey methods in attitudes toward proposed regulatory actions. Using five variables measuring hunter effort, success, satisfaction, and demographics, we were able to correctly classify by survey method 65% of survey respondents, exceeding the 51% standard for predictive accuracy. Five variables measuring attitudes toward proposed regulatory actions were able to correctly classify only 38% of mail survey respondents by survey method, failing to meet the proportional standard for predictive accuracy and confirming no difference in attitudinal responses by survey method. Open web surveys are likely to produce biased results to questions measuring hunter effort and harvest; however, they can produce similar results to random mail surveys on questions addressing proposed regulatory policies. This study adds to a growing body of published literature demonstrating attitudinal variables to be less sensitive to bias. When covering a broad range of issues and widely publicized without pre-survey identification of controversial issues, open web surveys may be an efficient way to obtain stakeholder input on attitudes toward proposed natural resource policy.

Key words: hunter attitudes, Louisiana waterfowl hunters, open web survey, random mail survey, survey method

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Our public seeks increased input into the management of natural resources (Decker et al. 2001, Lord and Cheng 2006). Wildlife commissions and managers utilize commission meetings, public hearings, and advisory boards to obtain public input, but state wildlife agencies rank scientifically designed random surveys as their most important technique for gathering public opinions (Lord and Cheng 2006). At the same time, wildlife managers are facing real constraints in time, manpower, and budgets, resulting in an increased interest in Internet or web survey techniques (Vaske 2008, Fieberg et al. 2010). Such was the case when the U.S. Fish and Wildlife Service granted the State of Louisiana a special waiver to change zones and season splits for the 2012–2013 waterfowl hunting season, but established a deadline that initially created only a 67-day window for public input, analysis, and wildlife commission decision. Given limited funds and a tight deadline, the Louisiana Department of Wildlife and Fisheries (LDWF) elected to commission identical and concurrent random mail and open web surveys to maximize opportunity for public input while preserving scientific integrity. Its objective was to identify preferences of Louisiana resident sportsmen and women who care about waterfowl zones and the timing of season dates and splits (intra-season closure periods).

When properly designed, random mail surveys allow researchers to generalize results from a relatively small number of responses (Schonlau et al. 2002, Vaske 2008, Dillman et al. 2009). Open web surveys are frequently faster and less expensive than mail, phone, or interview surveys (Schonlau et al. 2002, Kiernan et al. 2005, Dillman et al. 2009, Gigliotti 2011). Web surveys, however, are potentially susceptible to bias from several sources as the result of non-random sampling (Duda and Nobile 2010, Vaske et al. 2011). Coverage error can occur if the target population is sampled incompletely, resulting in a loss of information (Vaske 2008, Dillman et al. 2009). Non-response error can occur if survey respondents differ from non-respondents, and low response rates increase the possibility of non-response error (Dillman et al. 2010).

Although conventional wisdom has suggested that web surveys provide inaccurate results, hunter attitudes have been reported to be similar irrespective of mail or web survey methodology (Pe-

terson and Messmer 2010, Cornicelli and Grund 2011, Gigliotti 2011). These studies suggest that broadly focused web surveys may be as useful for investigation of attitudes as conventional random surveys.

Our objective was to compare responses obtained from a random mail survey to those obtained from an open web survey. We address two hypotheses: First, that respondents to a random mail survey will differ from respondents to an open web survey in measures of hunter effort, success, satisfaction, and demographics; and, second, that there will be no difference between respondents to the random mail survey and open web survey in hunter attitudes about proposed regulatory actions.

Methods

We obtained a list of 2011–2012 Louisiana Harvest Information Program (HIP) registrants from the U.S. Fish and Wildlife Service Division of Migratory Bird Management. Our sampling frame included 73,569 Louisiana resident hunters who purchased a 2011–2012 waterfowl license or held a lifetime, sportsman, or senior license and indicated that they had harvested at least one duck or goose during the prior season.

We conducted the 2012 Survey of Louisiana Waterfowl Hunters using both open web (web survey) and random mail (mail survey) distribution. The four-page survey included 15 questions addressing hunting effort, success, satisfaction, proposed regulatory actions, and demographics. Survey protocols ensured informed consent, anonymity, and confidentiality of responses, and were approved by the LSU AgCenter Institutional Review Board (Protocol Number H12-2).

LSU Mailing Services validated the addresses and mailed a copy of the survey to a geographically stratified sample of 6,400 licensed waterfowl hunters during the first week in March 2012. We stratified the mailing list by randomly selecting 1,600 addresses from each of four zip code regions covering southeast, southwest, central, and north Louisiana to ensure statewide geographic representation. The decision to use a single large mailing, counter to Dillman et al. (2009), was consciously made by the project team in an effort to obtain a large number of responses from each geographic region within a short survey window.

A separate but identical convenience web survey, hosted on the LDWF website, facilitated open-access response. The Louisiana Department of Wildlife and Fisheries provided publicity for the convenience survey using the LDWF website, news releases, newspaper articles, and media interviews of LDWF staff. We also distributed the open web survey by e-mail with an embedded survey link to local leadership of Delta Waterfowl Foundation, the Louisiana Waterfowl Alliance, and Ducks Unlimited, with a request that it be forwarded within their respective state organizations. We limited on-line responses to one per Internet Protocol (IP) address to minimize poll crashing (Dillman et al. 2009). Following a 30-day extension of the decision deadline by the U.S. Fish and Wildlife Service, we collected responses to both surveys through 15 May, 2012.

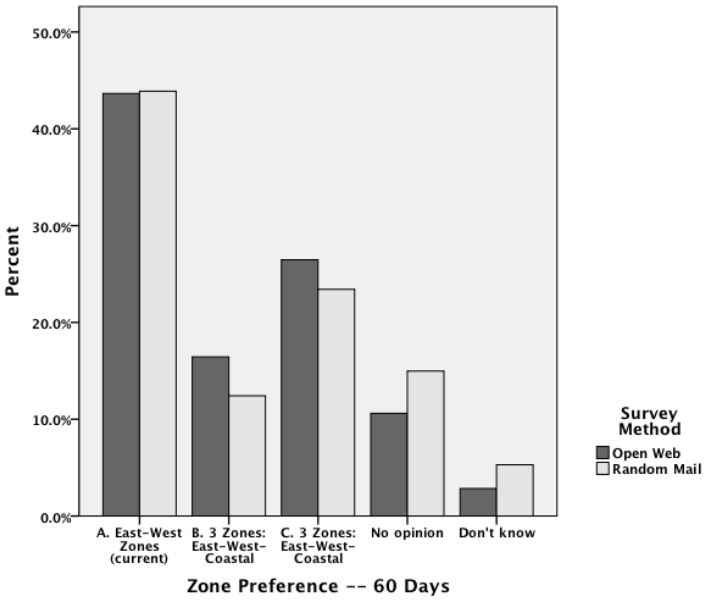

Figure 1. Preferences for zones given a 60-day hunting season by open web and random mail respondents in the 2012 Survey of Louisiana Waterfowl Hunters.

For analysis, we used five questions identifying hunter characteristics for the past waterfowl season (the number of days hunted, the number of waterfowl harvested, overall satisfaction with the season, hunter gender, and hunter age). We used five policy questions identifying hunter attitudes toward potential regulatory actions, addressing the location of waterfowl zones, season dates, youth hunt dates, and preferences for season long or daily lottery hunts on Catahoula Lake (Figures 1–5). We analyzed responses from the mail survey and web survey using binary logistic regression with Wald forward selection (PASW Statistics GradPack 18, IBM SPSS, Hawthorne, New York). Binary logistic regression is designed for analysis of large samples and was used to test the ability of our hunter characteristics and attitudes to predict survey method of respondents (mail or web; Hair et al. 2010). We assessed fit by Nagelkerke R^2 following Vaske (2008), measured the percentage of observations correctly classified, and evaluated predictive accuracy using the proportional chance criterion (C_{PRO}), because group sizes are unequal and we wish to correctly identify respondents in both groups (Hair et al. 2010).

To assess non-response bias, we compared the gender, mean age, age class, and geographic mail zone of our original HIP da-

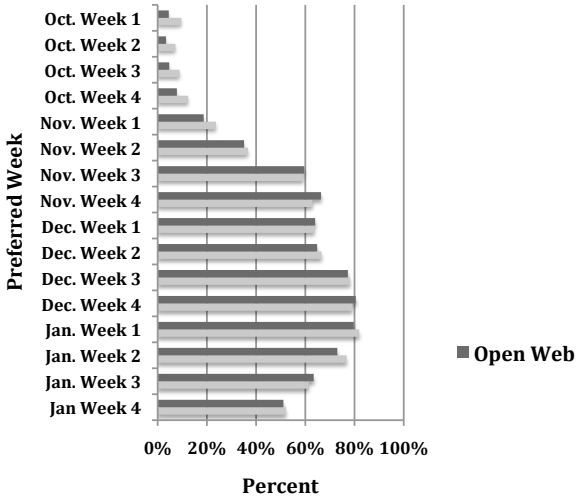

Figure 2. Preferences for season dates by open web and random mail respondents in the 2012 Survey of Louisiana Waterfowl Hunters.

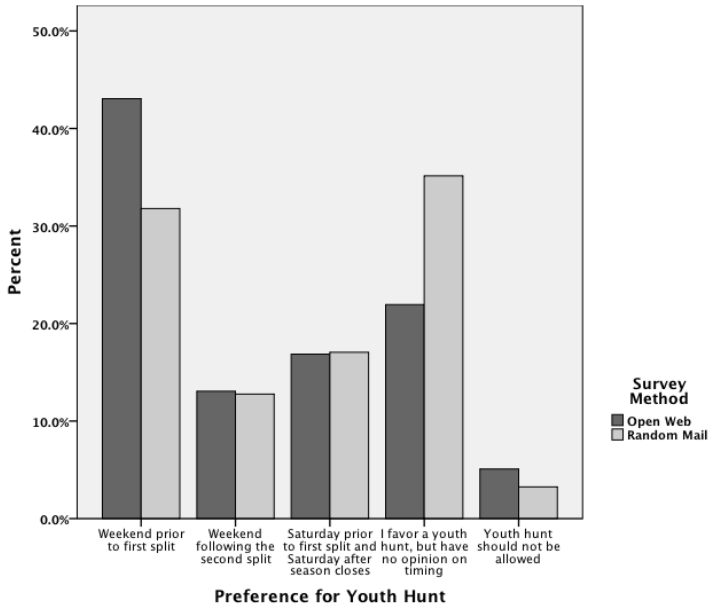

Figure 3. Preferences for timing of youth hunt by open web and random mail respondents in the 2012 Survey of Louisiana Waterfowl Hunters.

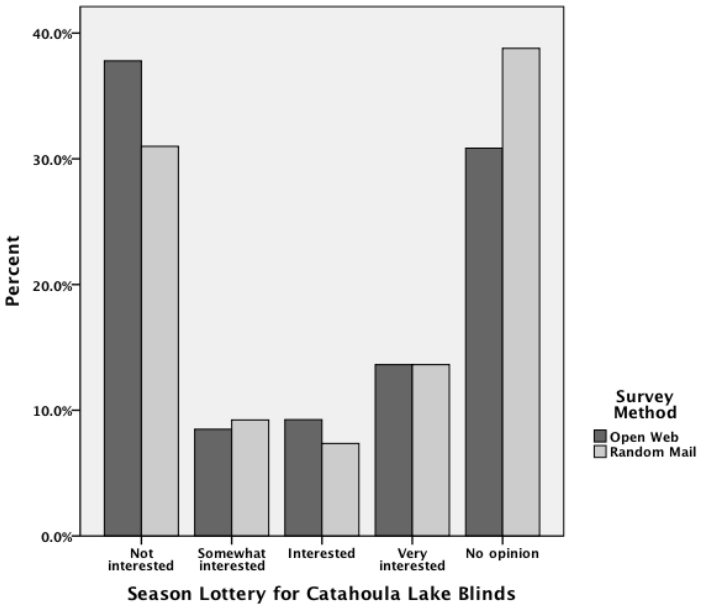

Figure 4. Preferences for season-long duck blind lottery on Catahoula Lake by open web and random mail respondents in the 2012 Survey of Louisiana Waterfowl Hunters.

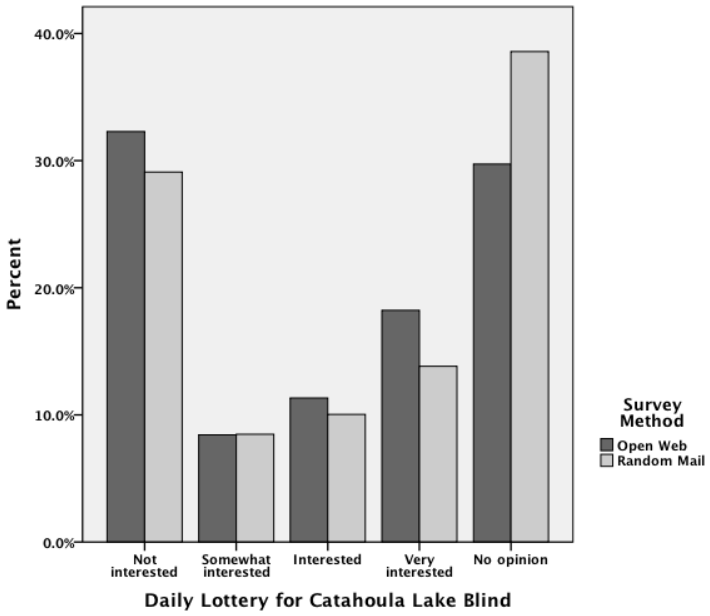

Figure 5. Preferences for daily duck blind lottery on Catahoula Lake by open web and random mail respondents in the 2012 Survey of Louisiana Waterfowl Hunters.

taset, our stratified random mailing list, and respondents to our mail and web surveys. To assess the need for weighting of variables to control for non-response bias, we tested differences in gender, satisfaction, days hunted, and waterfowl harvested by age class using one-way ANOVA (PASW Statistics GradPack 18, IBM SPSS, Hawthorne, New York).

Results

The response rate to our mail survey was 17%, with 1,096 usable responses. We received 1,286 usable responses to the web survey.

Descriptive comparison of five hunter characteristics identified differences between the samples of web and mail survey respondents. Web survey respondents hunted more frequently than mail

survey respondents (23.2 vs. 14.8 days, respectively) and harvested more waterfowl last season (83.0 vs. 42.4, respectively). Web survey respondents and mail survey respondents expressed similar levels of satisfaction with the 2011–2012 waterfowl season, averaging 3.5 on a five-point scale of 1 = Very Dissatisfied to 5 = Very Satisfied. Web survey respondents were more frequently male (98.1% vs. 95.6%), and somewhat younger in age (41.5 vs. 43.4 years).

Statistical analysis of the five hunter characteristics resulted in a significant model ($\chi^2 = 196.8$, $P < 0.001$) with −2 Log likelihood of 2673.4 and a Nagelkerke R^2 of 0.12. The model was able to correctly classify to survey method (web or mail) 64.8% of overall responses, 56.3% of mail responses, and 71.5% of web responses. All three measures exceed proportional chance criterion (C_{PRO}) for predictive accuracy (50.8%). The odds of being a web survey respondent increase by 2.5% for each additional day hunted, increase by 0.5% for each additional waterfowl harvested, and decrease by 0.8% for each additional year in age.

Descriptive comparison of the five questions testing attitudes towards proposed regulatory actions revealed similarity between web survey and mail survey responses. When questioned about geographic zones given the current 60-day season format, 44% of respondents to both surveys preferred the current system of East-West zones (Figure 1). The response ranking second in both surveys was three zones (Option C: East, West, Coastal) divided along major highways (26% of web survey and 23% of mail survey respondents). When presented with options for season dates, over 60% of respondents to both surveys preferred the eight weeks between the fourth week in November and the third week in January, and the distribution of preferred weeks was very similar (Figure 2). When questioned about timing of the youth hunt, respondents who expressed a preference in both surveys most frequently selected the current format of the weekend prior to opening of the first split (43% of web survey and 32% of mail survey respondents), followed by the preference to split the youth hunt between the Saturday prior to the first split and the Saturday following closure of the season (17% of both web survey and mail survey respondents) (Figure 3). When asked about the opportunity to participate in duck blind lotteries on Catahoula Lake for either a season long or daily hunt, the most frequent responses to both surveys were "not interested" or "no opinion" (Figures 4 and 5). With the exception of season dates, for which all respondents expressed an opinion, respondents to the mail survey selected "no opinion" more frequently than respondents to the web survey (17% vs. 11% for zones, 36% vs. 22% for the youth hunt, 40% vs. 31% and 40% vs. 30% for the season-long and daily lotteries at Catahoula Lake, respectively).

Statistical analysis of the five hunter attitudes resulted in a significant model ($\chi^2 = 124.0$, $P < 0.001$) with −2 Log likelihood of 2427.2 and a Nagelkerke R^2 of 0.09. The model was able to correctly classify to survey method (web or mail) 63.6% of overall responses and 82.4% of web responses, but only 38.1% of mail responses, and fails to meet C_{PRO} criterion for predictive accuracy (51.2%) for the mail survey. The odds of being a web survey respondent decrease by 50.7% if "no opinion" was selected for timing of the youth hunt, increase by 115.2% if the first available week was selected for opening of waterfowl season, and increase by 47.1% and 69.4%, respectively, if "interested" or "very interested" was selected for a daily lottery hunt on Catahoula Lake.

Table 1. Comparison of gender, age, age class, and mail zone between the Harvest Information Program (HIP) population, the randomly selected mailing dataset, and mail and web survey respondents to the 2012 Survey of Louisiana Waterfowl Hunters.

Variable	Value	HIP dataset	Mailing dataset	Mail survey	Web survey
Gender (%)	Male	94.8	94.7	95.6	98.1
Age	Mean years	38.4	38.2	43.4	41.5
Age class (%)	16–25	24.3	24.7	15.5	12.0
	26–35	23.2	23.7	15.9	27.2
	36–45	18.4	18.4	16.2	20.0
	46–55	19.2	18.5	25.6	21.2
	56–65	11.9	11.8	20.7	16.0
	> 65	3.0	2.9	6.0	3.5
Mail zone (%)	Southeast	24.3	25.0	27.5	27.8
	Southwest	35.2	25.0	24.7	29.9
	Central	23.9	25.0	24.2	27.0
	North	16.6	25.0	23.7	15.3
Sample	(n)	73,569	6,400	1,096	1,286

A comparison of demographic and geographic variables revealed gender and geographic representation in mail survey respondents that is consistent with our stratified random mailing list, but also a higher mean age and age distribution in mail survey respondents than in the original HIP dataset and stratified random mailing list (Table 1). Mail respondents in age classes 16–25 and 26–35 were underrepresented, and respondents age 46 and over were overrepresented; however, mail survey respondents did not differ by age class in gender ($P = 0.313$), satisfaction ($P = 0.890$), days hunted ($P = 0.827$), or waterfowl harvested ($P = 0.505$). Respondents to our web survey are underrepresented, in comparison to the original HIP dataset and stratified random sample, in age class 16–25 and overrepresented in age class 56–65. Geographic representation of open web respondents more closely resembles the distribution of the original HIP dataset.

Discussion

We are able to report three general findings. First, open web surveys may not produce representative responses to questions

about hunter effort and harvest. We strongly suspect that our web survey respondents were more avid hunters who self-selected to complete the survey because of their strong affinity for waterfowl hunting.

Our second and more important finding was that web and mail survey responses to questions about policy or attitudes about waterfowl hunting were notably similar and would likely lead managers to the same policy conclusions irrespective of survey method. This similarity of attitudinal responses suggests that self-selection in web surveys does not automatically bias attitudinal results. Our findings are consistent with a growing body of literature that suggests that attitudinal variables may be less sensitive to bias, making web based surveys an efficient way to get a large amount of input on questions concerning policy issues (Peterson and Messmer 2010, Cornicelli and Grund 2011, Gigliotti 2011).

Our third finding was that web survey respondents were more likely to have an opinion about policy issues than were mail survey respondents. Wildlife managers should anticipate and pre-determine appropriate interpretation of "no opinion" responses based on survey objective.

Our mail survey response rate of 17% was low, but compares to a 23% response rate in Louisiana to the National Duck Hunter Survey 2005 (National Flyway Council 2006). Low response rates do not automatically inject bias, and high response rates do not automatically reduce the risk of bias (Groves 2006, Groves and Peytcheva 2008). Comparison of demographics between respondents to the mail survey and the original HIP and stratified random mailing datasets identified only small differences in gender and geographic distribution, and only modest differences in average age and age class distribution. Younger hunters may have moved from home, gone to college, or may serve in the military, reducing their ability to respond during the short survey period. The finding of no difference by age class in mail survey variables negated the need to weight mail survey responses by age class to compensate for over or under-representation of age classes in comparison to the overall population.

The use of binary logistic regression to predict survey method facilitates direct interpretation in analysis of large samples. The failure of the model of five policy questions (hunter attitudes) to meet proportional standards for predictive accuracy confirms no meaningful difference in measured attitudes between web and mail survey respondents. The success of the model evaluating effort, satisfaction, and demographics in exceeding proportional standards for predictive accuracy confirms differences in responses by survey method.

We found support for our hypothesis that respondents to a random mail survey will differ from respondents to an open web survey in measures of hunter effort, success, satisfaction, and demographics. We also found support for our hypothesis of no difference in attitudes across survey methods, even though our web survey was not based on a probabilistic sample. We caution that narrowly-focused surveys of attitudes about highly important or controversial issues may produce results confounded by stakeholder bias, especially when the survey topic is disclosed in pre-survey publicity (e.g., Groves and Peytcheva 2008, Duda and Nobile 2010). Stakeholder bias occurs when subgroups promote and self-select into surveys to promote self-interests (Duda and Nobile 2010, Gigliotti 2011).

The pragmatic combination of probabilistic survey methodologies, such as The Tailored Design Method (Dillman et al. 2009) with non-probabilistic methods such as open web surveys offers substantial benefits to researchers, including increased coverage, detail, depth, and, most importantly, generalizability (Johnson and Onwuegbuzie 2004, Onwuegbuzie and Leech 2004, Cresswell 2008). The use of open web surveys increases the opportunity for participation, and may enhance the sense of inclusiveness among stakeholders (Peterson and Messmer 2010, Cornicelli and Grund 2011). Open web surveys can be used to supplement information collected at commission and public meetings, to expand the opportunity for public comment, to identify emerging issues, and to refine management alternatives (Fricker and Schonlau 2002, Cornicelli and Grund 2011). We are not suggesting the discontinuation of scientifically designed random surveys, but open web surveys may be used to complement and supplement random surveys in broad-based investigations of stakeholder attitudes for development of natural resource policy. We urge that future research evaluate type of question as well as survey method in comparisons of scientifically designed random surveys to open web surveys.

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