



Original Article

A Comparison of Bird-Feeding Practices in the United States and Canada

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ABSTRACT Millions of Americans and Canadians participate in the feeding of wild birds. We surveyed hobbyists about their bird-feeding experience, and examined demographic and regional differences in responses, to determine the types of bird-feeding practices taking place and to identify themes important for wildlife managers to communicate with people who feed birds. Between autumn 2005 and winter 2008–2009, we recruited a non-random sample from the interested public through both print and electronic media. We had 1,291 individuals from 48 states (USA) and 7 Canadian provinces who completed our mail and website survey. Survey respondents were primarily female (67%) and ≥ 45 years old (77%). Most respondents offered alternative foods in addition to traditional bird seed ($\geq 82\%$) and provided other resources besides food to attract birds ($\geq 75\%$). Our respondents fed birds because it brought nature (84%) and accompanying sound (81%) to the area, as a hobby (79%), and to help the birds (79%). Respondents felt attracting more bird species (69%), a greater number of birds (41%), and no pests (35%) would make their bird-feeding experience more satisfying. Given the interested public's desire to increase bird diversity at their feeders and to help birds, managers have the opportunity to develop messages promoting habitat enhancement in addition to feeding, and provide suggestions for reducing the risk of disease transmission and pest species at feeders. © 2013 The Wildlife Society.

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In 2011, >52 million Americans over the age of 16 fed wild birds or other wildlife around their homes, spending >US\$5 billion on bird food, feeders, baths, houses, and other accessories (U.S. Fish and Wildlife Service 2012). Over 350 species of birds in the United States and Canada have been observed at bird feeders, and dozens of species are regular visitors to supplemental food provided in backyards (Dunn and Tessaglia-Hymes 1999). Given the number of people participating in the hobby, and the diversity of birds using supplemental foods, one would expect that scientifically based recommendations would have been developed for bird feeding and that wildlife managers would have determined the most effective means of communicating with this constituency (McFarlane 1994). On the contrary, the practice of bird feeding remains one of the least studied wildlife-management issues in the United States (see Geis 1980, Brittingham and Temple 1988, Wells et al. 1998, Bontar and Harvey 2008, Robb et al. 2008).

Leisure activities can be divided into three types: casual, project-based, and serious (Stebbins 2009). Casual leisure lasts short periods of time, requires little to no training,

provides instant rewards, and includes activities such as play and entertainment (Stebbins 2009). Project-based leisure also lasts a short duration, and occurs either one time (such as a canoe trip) or involves occasional projects involving multiple components (Stebbins 2009). Serious leisure is a deliberate and continuous engagement in an activity that involves a distinct combination of knowledge, skills, and experiences, and that includes amateurism, volunteering, and hobbies (Stebbins 2009). Wild-bird feeding can be a serious leisure activity for participants, because it can be an active hobby with participants devoting long periods of time and effort to both feed birds and gain the knowledge, training, and skills to enhance their experiences (Stebbins 1982, 2009).

Those who participate in a recreational activity as a form of serious leisure can become more specialized as their skills and knowledge increase and, as a result, their motivations for participating may change (Decker et al. 1980, McFarlane 1994, Hvenegaard 2002, Scott and Thigpen 2003). For example, in studies examining motivations in birders, conservation was found to be a primary motivation for the majority of birders with novice and intermediate birders being most motivated by conservation issues (McFarlane 1994, Hvenegaard 2002). Motivations for participating in wildlife recreation activities have been studied for both consumptive and non-consumptive wildlife, and are often

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grouped into three or four categories: affiliation, achievement, appreciation (Decker and Connelly 1989), and conservation oriented (McFarlane 1994). Affiliation-oriented motivations include joining an activity to personally connect with others involved in the activity; achievement-oriented motivations are associated with successfully accomplishing a particular goal; appreciation-oriented motivations are related to participants feeling a sense of place and reduction in stress when performing the activity; and conservation-oriented motivations involve participants wanting to protect the resources associated with their activity and learn more about them (Decker and Connelly 1989, McFarlane 1994).

Studies of bird watching often combine individuals who are birders (i.e., attempt to identify bird species and maintain a list of bird species they see) with people who feed birds (i.e., providing supplemental food to attract birds to their location). However, birders and people who feed birds may engage in bird watching differently, and distinct skill sets, knowledge, and experiences are necessary to be successful in each hobby. Thus, birders and people who feed birds can participate in their serious leisure differently and may have differing motivations for participating in their respective hobby. For example, birders may engage in activities that allow them to increase the number of species of birds they observe by visiting local and distant natural areas. People who feed birds may be most interested in attracting more birds to their yard by adding additional food and feeder combinations, but may have limited identification skills.

Understanding of wild-bird feeding as a serious leisure activity will require more information regarding individuals' specific bird-feeding activities, their motivations for participating in the hobby, their difficulties, and their educational needs (McFarlane 1994). To address these information needs, we surveyed the interested public who fed wild birds in the United States and Canada. Our objectives were to better understand how and why people feed birds and whether practices differed based on regional demographics. Using Web-based and mail survey questions, we asked our respondents about their present practices, motives for feeding, species frequenting feeders, and important characteristics of bird-feeding products. We were also interested in learning what factors would enhance the bird-feeding experience and possibly serve as a catalyst for a greater appreciation and understanding of the natural world and engagement in natural resource issues. Collectively, this information could be used by wildlife managers to develop conservation messages that promote sustaining and enhancing avian biodiversity in the backyard while minimizing risks associated with bird feeding, such as disease transmission and attracting nuisance species (McFarlane 1994).

METHODS

We initiated the surveys in autumn 2005 and continued through winter 2008–2009. Individuals who lived in the United States and Canada were able to participate in the

survey. Participants were recruited through newspaper advertisements, press releases and subsequent articles in print media, announcements on listservs, word-of-mouth, and the study's website (www.projectwildbird.org). The questionnaire was primarily administered on the website, but individuals could also mail a hard copy of the completed survey to Millikin University, where data were entered manually.

Respondents were placed into one of six geographic regions defined by the Partners in Flight North American Landbird Conservation Plan: Eastern, Intermountain West, Northern Forest, Pacific, Prairie, and Southwest (Rich et al. 2004). These regions were selected because they contain different communities of birds and other wildlife, and thus, may provide some insight into whether views of bird feeding differ based on the general biological community in which one lives. Participants completed a single questionnaire that asked questions within several general categories: demographic information, current bird-feeding practices, reasons that individuals feed birds and how the bird-feeding experience can be enhanced, what birds visit their feeders and what birds they would like to attract, and what features of bird-feeding products are most important (Supplementary Material, available online at www.onlinelibrary.wiley.com). Answers to questions were primarily response categories, with some questions having an open-ended "other" response in addition to multiple response categories. The survey took approximately 15 min to complete.

Because anyone who accessed the website was able to participate in the survey, respondents cannot be considered a true random sample of the entire population of individuals who feed birds. Rather, our respondents had access to the Internet and were likely among the more committed hobbyists (i.e., they were searching for information about bird feeding and found the website or read an article about the study in a daily newspaper or nature magazine and wanted to participate; e.g., Messmer et al. 1996, 1999). Understanding how dedicated hobbyists participate in the bird-feeding hobby may give us better insight into what practices are most in need of enhancement. For example, if the most ardent hobbyists do not clean their feeders regularly, it is possible that novice hobbyists may not either, particularly if novice hobbyists learn about bird feeding from people who already feed birds.

Because we conducted the survey over a 4-year period, we checked for and removed duplicate responses from participants by checking surveys from individuals with the same last name. Incomplete surveys were not included in our data analysis. Results for each question of the complete surveys were tabulated, and the frequency of each response calculated. To determine whether there were demographic or regional differences, we performed chi-square tests to determine whether the frequency of responses for each question of the survey differed by gender, age group (<15, 15–24, 25–34, 35–44, 45–54, 55–64, and ≥65 yr old), and region (Eastern, Intermountain West, Northern Forest, Pacific, Prairie, and Southwest) for all questions listed

in Supplementary Material (available online at www.onlinelibrary.wiley.com) under the following categories: current bird-feeding practices, reasons that individuals feed birds, and most important features of products. Results were considered significant if $P < 0.05$. Given the large number of survey questions and statistical tests conducted, we were likely to encounter statistically significant results that are not biologically significant. Therefore, we only report significant differences in which the range of responses among genders, age groups, or regions differs by $\geq 10\%$.

RESULTS

One-thousand two-hundred ninety-one participants from 48 states and 7 Canadian provinces completed the questionnaire. An additional 889 individuals turned in incomplete surveys and their responses were not included in the results. Almost twice as many questionnaires were received from the Eastern Region than any other (Table 1). Respondents were largely female (67%) and ≥ 45 years old (77%). Given the fewer number of respondents in the Pacific and Southwest regions, and participants in the <15, 15–24, and 25–34 age groups (i.e., sample sizes <100), we report results but do not provide inferences regarding these groups.

The individuals lived in a wide range of neighborhoods, with 27% indicating they lived in a city or town with a population $\leq 5,000$, 30%: 5,001–25,000; 31%: 25,001–100,000; and 12%: $>100,000$. Respondents indicated they had been feeding wild birds for a mean of 18 years ($SD = 13$, range = 1–60), and a mean of 11 years at their current address ($SD = 9$, range = 0–53). The majority of respondents indicated they could identify $\geq 81\%$ of the common birds found in the yard, but could not identify $>50\%$ of the rare birds (Table 1). However, there was a difference among age groups in self-reported ability to identify rare birds to species with older age groups less likely to identify rare birds (Table 2; $\chi^2 = 37.09$, $df = 18$, $P = 0.01$). No other demographic differences (i.e., gender, age, or region) were found in relation to ability to identify common or rare birds.

Current Bird-Feeding Practices

Our respondents regularly refilled feeders, fed birds during all four seasons, and provided alternative bird foods in addition to bird seed (Table 3). In autumn, older age categories became increasingly likely to feed birds (Table 2; $\chi^2 = 35.92$, $df = 6$, $P < 0.01$). We also found regional differences in the frequency of people feeding birds in the autumn (Table 4; $\chi^2 = 31.36$, $df = 5$, $P < 0.01$).

Although the majority of individuals cleaned feeders at least monthly, the frequency in which individuals cleaned feeders at least yearly (but not less than monthly) varied by region (Table 4; $\chi^2 = 45.97$, $df = 20$, $P < 0.01$). Respondents regularly provided other resources in their yards to attract birds, and we found gender differences in what additional resources individuals were likely to provide. Sixty-six percent of females provided special plantings compared with 55% of males ($\chi^2 = 13.59$, $df = 1$, $P < 0.01$). Similarly, providing special plantings ($\chi^2 = 16.32$, $df = 6$, $P = 0.01$) and water ($\chi^2 = 42.75$, $df = 6$, $P < 0.01$) was

Table 1. Demographics of respondents to a survey investigating the reasons that individuals feed wild birds and how the bird-feeding experience could be better. Results are based on 1,291 respondents in the United States and Canada from autumn 2005 to winter 2008–2009.

Characteristic	N	%
Geographic region		
Eastern	641	50
Intermountain West	116	9
Northern Forest	119	9
Pacific	48	4
Prairie	332	26
Southwest	10	1
No response	25	2
Sex		
Female	866	67
Male	399	31
No response	26	2
Age		
<15	8	1
15–24	20	2
25–34	62	5
35–44	183	14
45–54	390	30
55–64	368	29
≥ 65	236	18
No response	24	2
Ability to identify common birds found in the yard (%)		
<50 of species	136	10
51–80	291	22
81–95	393	30
96–100	464	36
No response	12	1
Ability to identify rare birds found in the yard (%)		
<50 of species	793	61
51–80	299	23
81–95	124	10
96–100	55	4
No response	25	2

greater for older age categories (Table 2). Whether water was used to attract birds also varied by region ($\chi^2 = 19.43$, $df = 5$, $P < 0.01$), with water provisioning ranging from 60% in the Northern Forest to 80% in the Intermountain West (Table 4).

Individuals also engaged in other hobbies that emphasized the natural world, and we found one demographic difference in the hobbies that respondents participated in. Specifically, the percentage of individuals who gardened differed by gender, with 70% of female respondents gardening compared with 60% of males ($\chi^2 = 12.81$, $df = 1$, $P < 0.01$). We found no other demographic differences associated with current bird-feeding practices.

Undesirable Animals

We asked what individuals considered to be the most common “undesirable” animal visiting their bird feeders. Answers included squirrels (Sciuridae; 44%), blackbirds (i.e., brown-headed cowbird [*Molothrus ater*], common grackle [*Quiscalus quiscula*], European starling [*Sturnus vulgaris*], etc., 18%), rats and mice (Muridae; 8%), sparrows (i.e., house sparrow [*Passer domesticus*], 7%), raccoons (*Procyon lotor*; 6%), bears (Ursidae; 2%), deer (Cervidae; 2%), chipmunks (Sciuridae; 1%), opossums (*Didelphis virginiana*; 1%), and other (11%). The “other” responses included outdoor cats

Table 2. Significant differences in responses among age groups to a survey investigating the reasons that individuals feed wild birds, and how the bird-feeding experience could be better. Results are based on 1,291 respondents in the United States and Canada from autumn 2005 to winter 2008–2009.

Statement	Response percent among age groups						
	<15	15–24	25–34	35–44	45–54	55–64	≥65
Ability to identify <50% of rare birds to species	50	45	55	54	61	64	74
Fed birds during the autumn season	75	60	73	79	84	89	92
Provide special plantings for birds	50	40	58	53	63	66	67
Provide water for birds	50	60	60	67	74	82	86
Having a device to discourage undesirable animals is very important	25	35	15	29	33	40	46
Fed birds for therapy relaxation	25	40	57	62	68	73	62
Fed birds to help the birds	88	85	68	75	77	86	81
Fed birds as an educational experience for children	13	10	34	39	21	15	17
Bird-feeding experience would improve with better feeder design	50	35	32	36	33	39	25
Bird-feeding experience would improve with better seed storage products	25	30	11	19	17	16	7
Bird-feeding experience would improve with no pests attracted to feeding	63	30	23	31	34	38	42
Bird-feeding experience would improve by attracting more species of birds	75	70	81	72	64	74	70
Birds eating the seed is an important factor in purchasing seed	75	60	79	79	84	88	90
A feeder resistant to undesirable species is an important factor in purchasing a feeder	75	40	37	46	53	64	61
Feeder set-up includes a pole mount in the yard	25	50	53	55	62	63	64

and birds of prey. The most common undesirable animal visiting feeders varied by region (Table 4; $\chi^2 = 191.05$, $df = 45$, $P < 0.01$). Squirrels were the most undesirable animal in all regions, with 51% of respondents indicating that it was most undesirable in the Eastern region compared with 46% in the Northern Forest, 40% in the Prairie, 32% in the Intermountain West, 21% in the Pacific, and 0% in the Southwest. The number of respondents indicating that blackbirds were the most undesirable varied from 30% in the Southwest to 22% in the Prairie, 18% in the Eastern, 13% in the Northern Forest, 11% in the Intermountain West, and 6% in the Pacific region. We found no other demographic differences in what respondents considered to be the most “undesirable” animals.

When asked how important devices for discouraging “undesirable” animals are, 36% of individuals answered very important, 36% important, and 28% not important. Three demographic differences were found. The importance of devices for discouraging undesirable animals was of greater importance for older age groups (Table 2; $\chi^2 = 37.08$, $df = 12$, $P < 0.01$). Regional differences were also found in the importance of devices for discouraging undesirable animals ($\chi^2 = 22.46$, $df = 10$, $P = 0.01$), ranging from 38% of respondents in the Eastern and Prairie regions to 25% in the Northern Forest (Table 4). Finally, 5% of respondents indicated that their state, city, or neighborhood association has discouraged them from feeding birds.

Reasons That Individuals Feed Birds

Most respondents (95%) expressed they had good experiences feeding birds. Individuals feed wild birds for a variety of reasons (Table 3), and we found numerous demographic differences for reasons that individuals feed birds and how the bird-feeding experience can be improved (Table 2). Specifically, the frequency of respondents that indicated they fed birds for therapy and/or relaxation ($\chi^2 = 26.44$, $df = 6$, $P < 0.01$), because they wanted to help the birds ($\chi^2 = 18.03$, $df = 6$, $P = 0.01$), and as an educational experience for children ($\chi^2 = 53.21$, $df = 6$, $P < 0.01$) varied by age group.

There were also regional differences in reasons that people fed birds (Table 4). Specifically, the frequency of people feeding birds because it was a hobby and/or fun ($\chi^2 = 21.13$, $df = 5$, $P < 0.01$), as part of the landscaping ($\chi^2 = 12.12$, $df = 5$, $P = 0.03$), and to maintain a list of bird species seen in the yard ($\chi^2 = 21.04$, $df = 5$, $P < 0.01$) varied by region.

Suggestions for improving the bird-feeding experience varied by age and region. Specifically, the importance of better feeder design (i.e., easier to clean, easier to fill, larger seed capacity; $\chi^2 = 13.79$, $df = 6$, $P = 0.03$), better seed storage products ($\chi^2 = 21.30$, $df = 6$, $P < 0.01$), having no pests attracted to feeding ($\chi^2 = 14.06$, $df = 6$, $P = 0.03$), and attracting more species of birds ($\chi^2 = 13.23$, $df = 6$, $P = 0.04$) varied with age (Table 2). The importance of better feeder design ($\chi^2 = 13.40$, $df = 5$, $P = 0.02$), cleaner seed ($\chi^2 = 17.40$, $df = 5$, $P < 0.01$), not attracting pests ($\chi^2 = 22.21$, $df = 5$, $P < 0.01$), and less mess below the feeders ($\chi^2 = 24.77$, $df = 5$, $P < 0.01$) in improving the bird-feeding experience also varied by region (Table 4). No other demographic differences were found in relation to reasons that individuals fed birds and how the bird-feeding experience could be improved.

Birds Visiting Feeders

When asked what birds visit their feeders, participants listed eight species $\geq 70\%$ of the time, and when asked what birds they would like to attract to their feeders, 12 species were listed $>30\%$ of the time (Table 5). Four species were both regular visitors to feeders and species individuals wanted to attract: American goldfinch (*Carduelis tristis*), black-capped chickadee (*Poecile atricapillus*), downy woodpecker (*Picoides pubescens*), and northern cardinal (*Cardinalis cardinalis*).

Most Important Features of Products

Eighty-four percent of respondents indicated that the most important feature in the bird seed used was that birds eat the seed. Other responses included the following: seed is not messy (22%), seed only attracts species I am interested in (19%), seed lasts a long time (16%), and other (9%). In general, as individuals age, a feature of seed that becomes

Table 3. Cumulative results from a survey investigating current bird-feeding practices, reasons that individuals feed wild birds, and how the bird-feeding experience could be better. Results are based on 1,291 respondents in the United States and Canada from autumn 2005 to winter 2008–2009.

Response	%
In addition to bird seed, what alternative bird food do you provide? ^a	
Suet	82
Nectar	73
Fruit	50
Mealworms	27
How often do you refill your feeder?	
At least weekly	57
At least daily	38
At least monthly	5
At least yearly	0
During what seasons of the year do you feed birds? ^a	
Winter	95
Spring	94
Summer	86
Autumn	84
If you do not feed birds in all seasons, why do not you feed birds year round? ^a	
Can find food naturally for some periods	55
Too expensive	11
Not around to watch birds all seasons	5
Too time consuming to maintain feeders	5
Other	24
How often do you clean your feeder?	
At least monthly	37
At least yearly	32
At least weekly	22
Never	8
What else do you do to attract and enjoy birds in your backyard? ^a	
Provide water (i.e., pond, fountain, bird bath)	75
Special plantings (i.e., trees, shrubs, flowers)	62
Have a bird house	61
Other	6
In which of the following hobbies do you participate? ^a	
Gardening and landscaping for wildlife	66
Traveling to natural areas (i.e., refuges, parks)	57
Reading about nature	53
Observation of other wildlife	49
Nature photography	40
Why do you feed birds? ^a	
Brings nature and beauty to the area	84
Enjoy the sound of birds in the yard	81
Hobby and/or fun	79
Want to help the birds	79
Therapy and/or relaxation	65
Learning bird behavior and/or identifying species	61
As part of the landscaping	36
Maintain a list of bird species seen in yard	34
As an educational experience for children	21
Other	10
What could make your bird-feeding experience better? ^a	
Attracting more species of birds	69
Less expensive products	47
Attracting a greater no. of birds	41
No pests attracted to feeding	35
Better feeder design	34
Less mess below the feeder	34
Cleaner seed	24
Better seed storage products	15
Other	5
If you are not having a good experience feeding birds in your yard, what type of frustrations have you had feeding birds? ^a	
Would like to attract more species of birds	23
Attracts pests (i.e., insects, rodents, squirrels, etc.)	18
Attracts undesirable birds	13

Table 3. (Continued)

Response	%
Would like to attract a greater no. of birds	12
Too expensive	10
Feed is messy	5
Birds are messy	4
It is too difficult or inconvenient to clean feeders	3
It is too difficult or inconvenient to fill feeders	1
It is too difficult to purchase feeders and food locally	1
Other	9

^a Respondents checked all that applied.

more important in the seed one chooses is that birds eat the seed (Table 2; $\chi^2 = 24.31$, $df = 6$, $P < 0.01$). The importance of birds eating the seed as a factor in purchasing seed varied by region ($\chi^2 = 21.90$, $df = 5$, $P < 0.01$). It was least important in the Intermountain West (72%) and most important in the Eastern region (88%). Seed not being messy ($\chi^2 = 17.88$, $df = 5$, $P < 0.01$), and only attracting species participants are interested in ($\chi^2 = 21.93$, $df = 5$, $P < 0.01$) also varied by region (Table 4).

When asked what features are most important in the feeders one chooses, the two most popular answers were that birds use the feeder (80%) and that the bird feeder is easy to fill (73%). Other responses included the following: bird feeder is easy to clean (61%), bird feeder is resistant to undesirable species (55%), bird feeder has a large capacity (43%), bird feeder looks nice (33%), and other (7%). The importance of a feeder being resistant to undesirable species varied by age (Table 2; $\chi^2 = 34.34$, $df = 6$, $P < 0.01$) and by region (Table 4; $\chi^2 = 42.56$, $df = 5$, $P < 0.01$). In different regions, the importance of whether birds used the feeder as an important feature of feeders also varied (Table 4; $\chi^2 = 24.34$, $df = 5$, $P < 0.01$).

Feeder set-ups varied among respondents. The most popular set-up for participants was hanging from a hook mounted against a building, from a deck, or extending from a pole (i.e., shepherd's hook) with 61% of respondents having this set-up. This was followed by pole mount in the yard (59%), hanging from a tree or other vegetation (49%), window mount (13%), and other (16%). Feeder set-ups used varied with age (Table 2; $\chi^2 = 16.74$, $df = 6$, $P = 0.01$; with older age groups most likely to have a pole mount) and by region (Table 4; $\chi^2 = 25.91$, $df = 5$, $P < 0.01$). No other demographic differences were found relative to important features of products or feeder set-ups.

DISCUSSION

The majority of participants in our study were from the Eastern and Prairie regions, a distribution of respondents similar to that of other bird-feeding studies (e.g., Dunn and Tessaglia-Hymes 1999). Our participants were older than the birders surveyed in the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service 2009a). Five percent of our respondents were within the age category 25–34, compared with 13% in

Table 4. Significant differences in responses among geographic regions to a survey investigating the reasons that individuals feed wild birds, and how the bird-feeding experience could be better. Results are based on 1,291 respondents in the United States and Canada from autumn 2005 to winter 2008–2009.

Statement	Response percent among geographic regions ^a					
	EA	IW	NF	P	PR	SO
Fed birds during the autumn season	88	72	74	85	84	100
Cleaned feeders yearly	32	23	31	29	39	0
Provide water for birds	76	80	60	75	79	64
Having a device to discourage undesirable animals is very important	38	30	25	35	38	30
Fed birds as a hobby and/or fun	82	66	75	77	79	100
Fed birds as part of the landscaping	36	46	31	27	37	9
Fed birds to maintain a list of bird species seen in the yard	29	49	36	44	36	27
Bird-feeding experience would improve with better feeder design	35	25	34	19	37	9
Bird-feeding experience would improve with cleaner seed	27	13	18	23	25	0
Bird-feeding experience would improve with no pests attracted to feeding	40	25	26	29	34	9
Bird-feeding experience would improve with less mess below the feeders	35	24	27	58	37	9
Birds eating the seed is an important factor in purchasing seed	88	72	79	81	83	82
Seed not being messy is an important factor in purchasing seed	21	21	13	42	24	18
Seed only attracts species participant is interested in	18	12	15	4	26	18
A feeder resistant to undesirable species is an important factor in purchasing a feeder	63	43	42	40	52	27
Birds using the feeder is an important factor in purchasing a feeder	82	65	74	83	82	64
Feeder set-up includes a pole mount in the yard	56	57	63	54	68	9

^a EA, Eastern; IW, Intermountain West; NF, Northern Forest; P, Pacific; PR, Prairie; SO, Southwest.

the 2006 survey. For the 35–44 age category, we had 14% compared with 23%, 45–54: 30% vs. 25%, and ≥ 55 : 47% vs. 27%. In addition, a greater percentage of our respondents (67%) were female compared with the 2006 survey (54%).

Although our respondents have been feeding birds for two decades, they may not categorize themselves as participating in “birding,” whereby they compile a list of species they have identified (e.g., Cooper and Smith 2010). Thus, respondents in our study could be at a lower stage of birding expertise (Boxall and McFarlane 1993). Combined with the fact that there are approximately twice as many individuals that observe birds around their homes than ≥ 1 mile (1.6 km)

Table 5. Species of birds visiting yards of respondents and species of birds that respondents would like to attract. Results are based on 1,291 respondents in the United States and Canada from autumn 2005 to winter 2008–2009.

Species	%
Bird species visiting feeders	
Mourning dove (<i>Zenaidura macroura</i>)	89
Blue jay (<i>Cyanocitta cristata</i>)	85
American goldfinch (<i>Carduelis tristis</i>)	82
Black-capped chickadee (<i>Poecile atricapillus</i>)	79
Downy woodpecker (<i>Picoides pubescens</i>)	76
Northern cardinal (<i>Cardinalis cardinalis</i>)	76
House finch (<i>Carpodacus mexicanus</i>)	74
House sparrow (<i>Passer domesticus</i>)	74
Species respondents want to attract to feeders	
Baltimore oriole (<i>Icterus galbula</i>)	56
Eastern bluebird (<i>Sialia sialis</i>)	50
Indigo bunting (<i>Passerina cyanea</i>)	50
Ruby-throated hummingbird (<i>Archilochus colubris</i>)	40
American goldfinch	36
Rose-breasted grosbeak (<i>Pheucticus ludovicianus</i>)	34
Purple finch (<i>Carpodacus purpureus</i>)	33
Red-bellied woodpecker (<i>Melanerpes carolinus</i>)	32
Downy woodpecker	31
Evening grosbeak (<i>Coccothraustes vespertinus</i>)	31
Northern cardinal	31
Tufted titmouse (<i>Baeolophus bicolor</i>)	31
Black-capped chickadee	30

from it (U.S. Fish and Wildlife Service 2007), we conclude that people who feed wild birds are not always birders and vice versa, and the components making up these two serious leisure hobbies differ. Consequently, conservation messages aimed toward people who feed birds may have to be more specifically targeted, and should be based on their level of participation in the bird-feeding hobby and their motivations for feeding (e.g., McFarlane 1994, Moore et al. 2008, Sali et al. 2008).

One way for managers to establish effective messages may be to focus on specific species. In addition, messages that connect to reasons that people feed birds may be more effective. Ishigame and Baxter (2007) found that Australians who feed birds want to help wild birds by providing them with food, and to bring birds closer. Thus, reasons that people feed birds and subsequently engage in bird feeding as serious leisure are focused on strengthening the connections between hobbyists and wild birds. Many of the birds that individuals want to attract (e.g., bluebirds [*Sialia* sp.]) have more specific habitat requirements, and educational efforts are needed to promote enhancing habitat for wild birds. These messages may be most effectively directed at females because they were more likely to provide special plantings and participate in gardening, one of the few differences we found between genders.

Among birders, some studies have reported greater proportions of females, while others have reported more males participating (Scott and Thigpen 2003, Cooper and Smith 2010). Even though the gender proportions vary between birding studies, several studies have found that males are more likely to be involved in competitive birding activities, while casual birders are more likely to be females (Hvenegaard 2002, Scott and Thigpen 2003, Cooper and Smith 2010). Cooper and Smith (2010) suggested this trend may not be found across age groups. They found no statistical differences in gender between youth members of the Royal Society for the Protection of Birds in the United Kingdom, or between members of the winning team in the World

Series of Birding youth division (Cooper and Smith 2010). One reason we found limited differences in bird-feeding practices between females and males is that the bird-feeding hobby lacks the competitive elements that the birding hobby has.

McFarlane (1994) found that birders' motivations changed over time, and that based on past experience, economic commitment, and centrality-to-lifestyle, birders could be classified into four groups: casual, novice, intermediate, and advanced. McFarlane (1994) found that birders were less appreciation-oriented (enjoy nature and the outdoors) and more achievement-oriented (meet standard of performance) as one went from being a casual to an advanced birder. Intermediate individuals were conservation-oriented. Given the differences we found among age groups, it is likely that older individuals participate in wild-bird feeding as serious leisure in order to establish a stronger tie with wildlife, while younger individuals have the most potential for further development within the hobby or to explore similar hobbies, such as birding. Because the middle-age groups (25–44) were most likely to feed birds as an educational experience for children, wildlife management messages to be targeted to youth might be best provided through middle-aged groups.

The majority of individuals in our study participated in other activities that engaged them in the natural world, such as travel to natural areas, reading about nature, and observations of other wildlife. Thus, participation in the wild-bird-feeding hobby may be an excellent catalyst for engagement in greater levels of outdoor recreation and greater stewardship of the natural world at a time when levels of some nature-based recreation are reportedly declining (Pergams and Zaradic 2008, U.S. Fish and Wildlife Service 2009*b*). The study we conducted surveyed a group of individuals who would be considered among the most dedicated group of people to feed birds (i.e., were likely to engage in bird feeding as serious leisure). As such, the group we surveyed is unlikely to be fully representative of the millions of people who feed birds; rather, the study reports on the results of individuals who already fed birds and were presumably motivated to further their own bird-feeding experience or help others by participating in the survey. Thus, participants in this study and the subsequent results should be interpreted as coming from the "interested public" (Messmer et al. 1999). Furthermore, we assume that the individuals who viewed the survey and chose not to participate, or individuals who did not complete the entire survey, were a random subset of individuals rather than leading to systematic bias in responses. Notwithstanding the above, we feel the survey results are representative of the interested public, and that these results can provide managers with information about the practices of a group more likely to take action on behalf of a particular cause (Messmer et al. 1999).

MANAGEMENT IMPLICATIONS

With approximately one quarter of the U.S. population over the age of 16 feeding birds or other wildlife, managers have an opportunity to engage a large number of people in wildlife

management issues who may not be engaged otherwise. Such issues can range from recommendations to reduce disease transmission and pest species at feeders to how feeding of wildlife can serve as a conduit for other serious leisure activities that protect wildlife and the natural world. Messages should be conservation-oriented as a result of the large number of people across demographic categories who feed birds because they want to bring nature to the area. Managers also have the opportunity to connect the bird-feeding hobby to the protection of wild birds beyond the backyard. People who feed birds want to help birds, and thus, activities such as purchasing of duck stamps may be an easy way for people who feed birds to protect wildlife. Because people who feed birds and birders can represent two different groups of birdwatchers, managers might consider ways to attract people who feed birds to natural areas. Interpretive centers should consider the establishment of community bird-feeding stations as opportunities for people to see birds and develop programs to view other types of wildlife.

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LITERATURE CITED

- Bonter, D. N., and M. G. Harvey. 2008. Winter survey data reveal range-wide decline in evening grosbeak populations. *Condor* 110:376–381.
- Boxall, P. C., and B. L. McFarlane. 1993. Human dimensions of Christmas bird counts: implications for nonconsumptive wildlife recreation programs. *Wildlife Society Bulletin* 21:390–396.
- Brittingham, M. C., and S. A. Temple. 1988. Impacts of supplemental feeding on survival rates of black-capped chickadees. *Ecology* 69:581–589.
- Cooper, C. B., and J. A. Smith. 2010. Gender patterns in bird-related recreation in the USA and UK. *Ecology and Society* 15(4). <<http://www.ecologyandsociety.org/vol15/iss4/art4/>>. Accessed 14 Mar 2011.
- Decker, D. J., T. L. Brown, and R. J. Gutierrez. 1980. Further insights into the multiple-satisfactions approach for hunter management. *Wildlife Society Bulletin* 8:323–331.
- Decker, D. J., and N. A. Connelly. 1989. Motivations for deer hunting: implications for antlerless deer harvest as a management tool. *Wildlife Society Bulletin* 17:455–463.
- Dunn, E. H., and D. L. Tessaglia-Hymes. 1999. *Birds at your feeders*. W. W. Norton & Company, New York, New York, USA.
- Geis, A. D. 1980. Relative attractiveness of different foods at wild bird feeders. U.S. Fish and Wildlife Service, Special Scientific Report no. 233, Washington, D.C., USA.
- Hvenegaard, G. T. 2002. Birder specialization differences in conservation involvement, demographics, and motivations. *Human Dimensions of Wildlife* 7:21–36.
- Ishigame, G., and G. S. Baxter. 2007. Practice and attitudes of suburban and rural dwellers to feeding wild birds in Southeast Queensland, Australia. *Ornithological Science* 6:11–19.

- McFarlane, B. L. 1994. Specialization and motivations of birdwatchers. *Wildlife Society Bulletin* 22:361–370.
- Messmer, T. A., M. W. Brunson, D. Reiter, and D. G. Hewitt. 1999. United States public attitudes regarding predators and their management to enhance avian recruitment. *Wildlife Society Bulletin* 27:75–85.
- Messmer, T. A., C. A. Lively, D. D. MacDonald, and S. A. Schroeder. 1996. Motivating landowners to implement wildlife conservation practices using calendars. *Wildlife Society Bulletin* 24:757–763.
- Moore, R. L., D. Scott, and A. Moore. 2008. Gender-based differences in birdwatcher's participation and commitment. *Human Dimensions of Wildlife* 13:89–101.
- Pergams, O. R. W., and P. A. Zaradic. 2008. Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings of the National Academy of Sciences* 105:2295–2300.
- Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Inigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, and T. C. Will. 2004. Partners in Flight North American landbird conservation plan. Cornell Lab of Ornithology, Ithaca, New York, USA.
- Robb, G. N., R. A. McDonald, D. E. Chamberlain, and S. Bearhop. 2008. Food for thought: supplementary feeding as a driver of ecological change in avian populations. *Frontiers in Ecology and the Environment* 6:476–484.
- Sali, M. J., D. M. Kuehn, and L. Zhang. 2008. Motivations for male and female birdwatchers in New York State. *Human Dimensions of Wildlife* 13:187–200.
- Scott, D., and J. Thigpen. 2003. Understanding the birder as tourist: segmenting visitors to the Texas hummer/bird celebration. *Human Dimensions of Wildlife* 8:199–218.
- Stebbins, R. A. 1982. Serious leisure: a conceptual statement. *Pacific Sociological Review* 25:251–272.
- Stebbins, R. 2009. Serious leisure and work. *Sociology Compass* 3:764–774. <<http://onlinelibrary.wiley.com/doi/10.1111/j.1751-9020.2009.00233.x/pdf>>. Accessed 13 Aug 2012.
- U.S. Fish and Wildlife Service. 2007. 2006 National survey of fishing, hunting, and wildlife-associated recreation. National overview. U.S. Fish and Wildlife Service, Washington, D.C., USA.
- U.S. Fish and Wildlife Service. 2009a. Birding in the United States: a demographic and economic analysis. Addendum to the 2006 national survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C., USA.
- U.S. Fish and Wildlife Service. 2009b. Wildlife watching trends: 1991–2006 a reference report. Addendum to the 2006 national survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service, Washington, D.C., USA.
- U.S. Fish and Wildlife Service. 2012. 2011 National survey of fishing, hunting, and wildlife-associated recreation. National overview. U.S. Fish and Wildlife Service, Washington, D.C., USA.
- Wells, J. V., K. V. Rosenberg, E. H. Dunn, D. L. Tessaglia-Hymes, and A. A. Dhondt. 1998. Feeder counts as indicators of spatial and temporal variation in winter abundance of resident birds. *Journal of Field Ornithology* 69:577–586.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web-site.

Appendix 1. Question categories, questions, and response type of questions used in a survey investigating bird-feeding practices, and how practices vary by gender, age, and geographic region.

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