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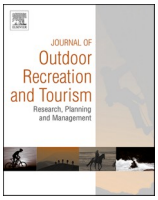

Assessing recreation specialization to guide nature-based tourism development: A hybrid choice model of birder destination preferences

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ABSTRACT

Birding is a growing nature-based tourism activity, and a better understanding of birder preferences could support tourism development and species conservation. Using a hybrid choice modeling approach, we analyzed birding destination preferences and how they vary by recreation specialization. This approach allows a continuum of specialization rather than allocating birders into discrete segments. A sample of 205 birders recruited in the 2017 summer season in Varanger, Norway, completed an online choice experiment with scenarios that included five systematically-varied destination attributes: Birding quality, bird diversity, landscape scenic quality, facilitation (e.g., trails and specialized guides), and a visitor fee. The hybrid choice (HC) model explained preference heterogeneity better than the attributes only multinomial logit (MNL) or random parameters logit (RPL) models. Birding quality, landscape scenery, and a medium level of facilitation were significant predictors in all models, while high bird diversity was significant only in the RPL and HC models. Interaction terms in the HC model indicated that birding quality, bird diversity, and the highest level of facilitation (specialized guides and birding hides) were more important for "more specialized" birders than for "less specialized" birders. Findings allow destinations to target birder segments more deliberately, while also assisting in planning and management decisions.

Management implications: Main drivers of birder destination choice are innate in the natural landscapes and ecosystems; exceptional birding quality and spectacular scenery were the strongest determinants of birding destination choice in our study. More specialized birders place higher priority on bird diversity, and birding facilitation. Less specialized birders might need a larger variety of facilitation and non-birding offers. Our results also indicate that those visiting spectacular but vulnerable nature destinations are willing to pay moderate fees for conservation and management. Fee revenue can fund site hardening facilities and services, allowing for more visitors without increasing pressure on the wildlife.

1. Introduction

Wildlife tourism may affect the wildlife and landscapes on which it depends both positively and negatively, with one positive effect being public and private sector funding for conservation (Buckley et al., 2016; Steven et al., 2017). Funding, tourists and the communities hosting wildlife destinations benefit from better understanding of tourist preferences and associated choices, in the context of birding and other forms of wildlife tourism (Hvenegaard, 2002; Connell, 2009; Li et al., 2019; Steven et al., 2015).

Birding (also known as birdwatching) refers to observing and identifying birds in their native habitats (Şekercioğlu, 2002), while avitourism refers to birding away from one's usual place of residence. Avitourism and other nature-based tourism have been growing, also in Norway and other European countries (Steven et al., 2015; Janeczko et al., 2021; Fredman & Haukeland, 2021). Avitourism is apparently the most popular non-consumptive wildlife tourism activity and provides substantial potential for sustainable tourism (Connell, 2009; Biggs et al., 2011; Li et al., 2013; U.S. Fish & Wildlife Service, n.d.).

Studies have focused on the planning and design of avitourism attractions (Green & Jones, 2010; Kim et al., 2010; Lee et al., 2010; Maple et al., 2010; Puhakka et al., 2011; Vas, 2017), but there are still

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relatively few studies that have assessed the relative importance of destination elements when avitourists choose destinations to visit (Guimarães et al., 2015; Steven et al., 2017).

Birders have been characterized as highly educated, affluent and middle-aged to elderly, with a considerable share being retirees (Connell, 2009; Eubanks et al., 2004; Hvenegaard et al., 1989; Kellert, 1985; Scott & Thigpen, 2003; Steven et al., 2017). Nonetheless, birders are an increasingly heterogeneous tourism segment (Eubanks et al., 2004; Scott & Thigpen, 2003). For example, while nearly all birders "collect" birds to some extent, some birders place particular importance on observation, scientific classification, and learning (Connell, 2009). Birders also differ in their level of experience and involvement in the activity (McFarlane, 1994).

A framework that has been widely applied to describe behavior and preference diversity among outdoor recreationists is recreation specialization. Originally developed in a study of recreational fishers (Bryan, 1977), the concept has been applied to other activities, such as photography, hiking, skiing, and birding. Specialization has been used to explain characteristics such as motivation, trip decision information use, and destination and resource management preferences (Scott & Shafer, 2001). The concept is based on the notion of "leisure careers" (Kelly, 1974; 1977; as cited Manning, 2011), in which recreationists attain specialized knowledge, skills, attitudes and norms through a process of socialization. Though recreation specialization has been applied widely, there is still a gap in understanding its relevance to recreationists' destination choice and product preferences, with previous studies yielding mixed results.

The present study assessed factors affecting destination choices based on a survey of birders recruited at a seabird nesting area in arctic Norway in 2017. It focuses on potential preference heterogeneity, specifically on the effect of birding specialization on these factors. For example, do "more specialized" birders prioritize some destination attributes more or less relative to "less specialized" birders? Discrete choice models are widely used to understand consumer choices in tourism and other fields (e.g. Crouch & Louviere, 2000; Li et al., 2019). E.g., Kemperman (2021) calls for studies using hybrid choice models, that combine discrete choice and structural equation models, enabling deeper understanding of preferences (Ben-Akiva et al., 2002). Here we utilized a hybrid choice model to better understand birders' choices of destination attributes along a continuum of recreational specialization (Harshaw et al., 2021). To our knowledge, this is the first study to use a hybrid choice approach in the context of wildlife destination choice and recreation specialization. Thus, this study illustrates a relatively novel technique while contributing to conceptual and applied knowledge, in the context of birding and wildlife tourism more broadly.

1.1. Birder destination choice

The literature on birder preferences with a focus on destination development and opportunities for conservation is limited (Steven et al., 2015). Extant literature indicates that some destination factors seem to be particularly important when birders decide where to travel, with most factors falling into the categories of attractions, accessibility, or amenities. Based on blog entries from 10 different birding blog sites and five countries, Vas (2017) found that birds were the most important characteristic of a birding destination, but other important factors included destination accessibility, guiding, accommodations, transportation, price, non-bird attraction and activities, and conservation engagement. Among birders in Australia, Green and Jones (2010) likewise found that factors such as guiding, access, hides, and conservation measures were important (see also Chen & Chen, 2015; Puhakka et al., 2011).

This study focuses on the characteristics of birding destinations as attractions, which differentiates it from studies focused on broader characteristics such as accommodation and available ancillary services. Studies indicate that bird numbers, species uniqueness and diversity, spectacles such as courtship or large migrations, and likelihood of spotting birds represent important factors affecting birder destination choice (Hvenegaard, 2002; Chen & Chen, 2015; Guimarães et al., 2015; Vas, 2017). However, the importance of each factor may vary across birders. For example, some prioritize seeing rare birds or those they have not seen before (Connell, 2009; Green & Jones, 2010; Booth et al., 2011), while others are more attracted by spectacles or bird abundance and diversity (Hvenegaard, 2002; Stoll et al., 2006).

A choice experiment conducted in Australia and the UK found that number of threatened species, diversity of birds, and number of regionally endemic species were all statistically significant predictors of birding destination choice, however this varied among birders (Steven et al., 2017). In a choice experiment with birders attending a Korean birding festival, Lee et al. (2010) found that both unique and ordinary birds were highly valued; interpretive guides and tours/courses also were important. Lastly, Kolstoe and Cameron (2017) observed the importance of spectacles (showing plumage during courtship) and bird species diversity in their revealed preference travel cost model of destination choice in the US Pacific Northwest.

1.2. Recreation specialization

Recreation specialization was defined by Bryan (1977, p. 175) as "a continuum of behavior from the general to the particular, reflected by equipment and skills used in the sport and activity setting preferences." Scott et al. (2007) summarize the concept as reflecting varying levels of activity attachment on a continuum from "casual" to "committed," with a range of different attitudes, preferences, and behaviors (see also Needham et al., 2013, p. 199). Over the years, researchers have agreed that recreation specialization is a multi-dimensional concept (Kim & Song, 2017; Manning, 2011; Scott & Shafer, 2001). Based on McIntyre and Pigram (1992), Scott and Shafer (2001) proposed a three-dimensional conceptualization comprised of behavior (e.g. participation frequency), skills and knowledge, and commitment (attachment to the activity). Empirically, Scott et al.'s (2005) assessment with birders led to a one-factor-solution, but Lee and Scott (2004) found support for the three-dimensional model among birders.

In applications to birding, several studies have found associations between the degree of specialization and preferred destination characteristics, with most studies finding that bird-related attributes increase in importance as specialization increases in surveyed birders (Cole & Scott, 1999; Hvenegaard, 2002; Martin, 1997; McFarlane, 1994; Scott & Thigpen, 2003). For example, Kim et al. (2010) found the most specialized birders to place the highest importance on seeing a variety of birds, while Scott et al. (2005) found that the most specialized birders had the strongest motivations for seeing as many species as possible. We hypothesize:

H1. The importance of birding quality increases with the increasing level of specialization, where birding quality comprises uniqueness of species, habitat, and/or spectacles.

H2. Particularly, the importance of bird species diversity increases with the increasing level of specialization.

Non-birding related attributes vary in their apparent importance among birders of different specialization. For example, Scott et al. (2005) found that enjoying the sights, smells, and sounds of nature and being outdoors were important across specialization levels but particularly important for the most specialized respondents, even more so than birding related motivations. In some studies, self-guided viewing and interpretive trails, as well as guided tours, appeared to be more important to specialized birders (Martin, 1997; McFarlane & Boxall, 1996). The assumption that non-birding destination attributes were increasingly important among more specialized birders was not supported in Scott and Thigpen's (2003) study. Lower specialization groups assigned more importance to seeing other wildlife, photographing wildlife, and the scenic beauty. In a study by Kim et al. (2010) less specialized

("casual") birders were more likely to indicate importance of the natural environment/scenery/rainforest and walking/hiking trails. Cole and Scott (1999) found that more specialized birders had stronger preferences for low or no development in terms of foot trails, roads, and services; the specialized birders also showed less preference for driving tours to see birds. Scott and Thigpen (2003) found that nature education programs were most important for less specialized ("interested") birders and least important (although still important) for specialized ("skilled") birders. Kim et al. (2010) reported that guiding/interpretation was more important to the less specialized (casual and intermediate) groups than to the more specialized (serious). Based on these literature findings, we hypothesize that:

H3. The importance of scenic landscapes decreases with the increasing level of specialization.

H4. The importance of facilitation features at a birding destination decreases with the increasing level of specialization.

A final element concerns the relationship between recreation specialization and willingness to pay for destination attributes, as well as supporting conservation fees as such. Various studies have found that more specialized birders are less price sensitive with respect to broader quality aspects of their experience (Kellert, 1985; Lee et al., 2010; Maple et al., 2010; Martin, 1997; Vas, 2017). However, McFarlane (1994) found that conservation motives were important across all birder specialization levels, but less important for the most specialized birders. Likewise, Vas (2017, p. 39) found that "[t]he more advanced the birder became the more everything became about the birds and achievement." Hvenegaard (2002) found that advanced birders were more likely than novice birders to be members of a conservation or wildlife group. Although the literature includes somewhat mixed findings in terms of the recreation specialization and commitment to conservation, we hypothesize:

H5. Responsiveness to conservation and maintenance fees at a birding destination decreases with the increasing level of specialization.

We test the hypotheses within a hybrid choice model (Fig. 1). Our model also tests the implied relationships between visitor profile, desired experience, facilitation and support, and willingness to pay for conservation; as part of a non-consumptive wildlife tourism framework (Duffus & Dearden, 1990; Higham, 1998). In our hybrid choice model, birding destination attributes are predicted to affect birders' utility and, ultimately, the choice of visiting a birding destination. In addition, attribute levels are interacted with specialization as predictors of utility and choice. This evaluation provides insight in the field of recreation specialization theory and contributes to the planning and development of birding destinations.

2. Materials and method

2.1. Study area and sampling

The bird cliff island Hornøya is located a short (10 min) boat ride from the town of Vardø in northeastern Norway (70°22′N 31^{0}01′E). The bird cliff, as well as the Varanger region, is subject to growing interest from birders from several European countries. Hornøya is considered the most spectacular birding site in Varanger, with more than 80,000 breeding birds. A range of Arctic seabird species listed on the IUCN Red List nest there, including the common guillemot (*Uria aalge*), Brünnich's guillemot (*Uria lomvia*), black-legged kittiwakes (*Rissa tridactyla*), and Atlantic puffin (*Fratercula arctica*). Registered visitation to Hornøya has increased 75% in recent years, from 1100 in 2012 to 1930 in 2019. Hornøya is protected as a nature reserve, with visitation areas limited to small parts of the island. There is generally no entrance fee for visiting the island, but the boat transportation between Vardø and Hornøya, operated by Vardø Municipality, costs 400 NOK (about 40 euros) for the round-trip. A few tour operators offer additional guiding at the destination, and a few tourists attend more exclusive trips with small boats. The municipal transport service has no linkage to the Hornøya conservation as such; the financing of the nature reserve, including facilities for birders, is provided at the national governmental level.

Data were collected via a small onsite recruitment survey followed by an online survey. In the recruitment survey, birders boating to Hornøya were approached with a short, self-administered form to collect email addresses. From May to August 2017, Vardø harbor service personnel made the recruitment form available to the majority of the 1799 registered visitors to Hornøya. In total, 619 birders completed the form (34% of the registered Hornøya visitors on the municipal boat service that season). In order to expand the sample, a lodging property in the Varanger region also distributed the self-administered form among its guests. This added 29 birders, for a total of 648 birders filling-in the

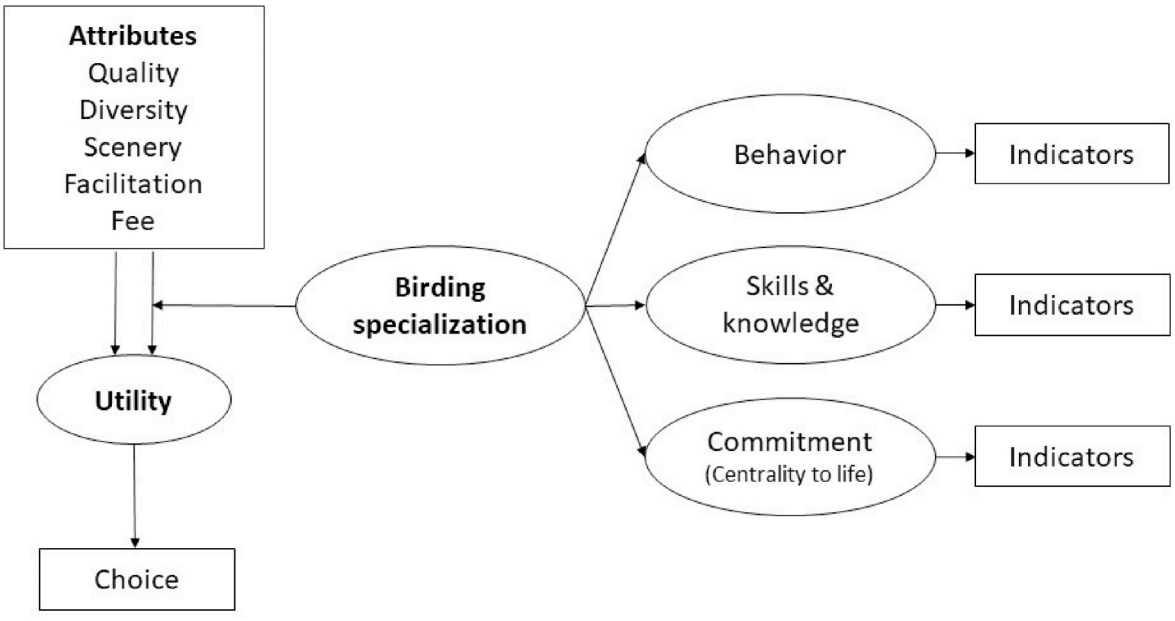

Fig. 1. Hybrid choice model of birder destination preferences.

recruitment form. There is an element of self-selection in the recruitment survey, at the boat as well as at the lodging property. Thus, though a large proportion of Hornøya visitors were included, the recruitment survey was non-probabilistic.

The online survey was developed by the project team and pre-tested with Norwegian university students. It was then pilot-tested in English and Norwegian. About 30 persons in the email sample received the pilot survey, yielding 17 responses. The survey was adjusted based on the pre- and pilot-test results, with the most substantial adjustment being a doubling of the fee in levels 2, 3 and 4. The final survey was sent to 559 email addresses during March and April 2018, with versions available in English, German, Finnish, and Norwegian. As an incentive, respondents that completed the survey were entered into a drawing to win a pair of binoculars valued at approximately 1000 euro. Respondents who only completed the first of two survey parts were eligible to win from a selection of T-shirts and books about Varanger birdlife. Up to five reminders were sent, at varying times of day and days of the week, to invitees who had not completed the survey at the time of each reminder. Adjusting for undeliverables, a total of 521 birders received the invitation, and 248 (48%) completed the survey, although with some item nonresponse. The analysis reported here is based on 205 respondents (820 choice observations) who completed all choice experiment and recreation specialization components.

The recruitment survey included content on gender, age, and country of residence, as well as stated importance of birding trips on a 7-point Likert scale. We compared the sample of 205 completes with the remaining recruitment sample (n = 648–205 = 443). We found no significant differences in average age, nor in the share of female respondents or share of Germans, Austrians and Swiss. Finnish residents represent a higher share in the sample of 205 than in the remaining sample of 443, 36% vs. 10% (Cramer's V, p=<0.001). Norwegian residents represent a lower share in the sample of 205, 17% vs. 25% (Cramer's V, p = 0.013). We found higher stated birding trip importance among the 205 compared to the others (Kendall's tau, p = 0.047). However, the average score on the 7-point Likert scale was high in both groups, 6.06 versus 5.67 (the labels of the end-points, 1 and 7, were "not important" and "very important," respectively).

2.2. Discrete choice experiments

Discrete choice experiments (DCEs) are a type of stated preference method to elicit preferences when data from observed choices do not exist (Johnston et al., 2017). Based on random utility theory (Manski, 1977; McFadden, 1974) and Lancaster's (1966) theory of value, DCEs assume that goods, such as birding destinations, consist of characteristics that people value, and that people try to maximize their utility when deciding between different alternatives of the same type of good. Although based on hypothetical choices, DCEs simulate plausible choices and choice conditions, and they provide an important complement to revealed preference data (Champ et al., 2017; Crouch & Louviere, 2000).

The basic model for multinomial DCE analyses is McFadden's conditional logit or multinomial logit (MNL), which involves assumptions that may not hold when dealing with human behavior (independence of irrelevant alternatives (IIA); independent and identically distributed error terms across observations (IID); and no preference heterogeneity across respondents) (DeBekker-Grob, Ryan, & Gerard, 2012). The random-parameter logit (RPL or mixed logit) model is an extension of MNL that avoids these assumptions. It allows heterogeneous (individual-specific) preferences that follow a specified statistical distribution, such as the normal distribution, but the source of the heterogeneity (e.g., variation in recreation specialization) is not modeled.

Hybrid choice models (HCMs), also known as integrated choice and latent variable (ICLV) models, allow specification of latent variables and interaction with attributes as potential sources of preference heterogeneity (Ben-Akiva et al., 2002). In essence, HCMs combine structural equation modeling and choice components, with simultaneous estimation of measurement and structural models (Hensher et al., 2015), thereby addressing measurement error and endogeneity issues when introducing explanatory variables (Mariel et al., 2021; Mariel and Meyerhoff, 2016).

Due to these qualities and our interest in understanding preference heterogeneity, this study used hybrid choice modeling to analyze responses to the DCE survey task.

The birding destination attributes in the DCE task were developed through a process of literature review and consultation with experts in nature-based tourism and avitourism more specifically. We used five DCE attributes: quality, diversity, scenery, facilitation and fee (Table 1). The first two attributes represent the bird assemblage. While Lee et al. (2010) and Guimarães et al. (2015) used destination-specific bird attributes, our attributes were potentially applicable to various Northern Hemisphere birding destinations. It is difficult to quantify birdwatching quality (Quality). As such we focused on the fundamental aspects of uniqueness in species, habitats, and/or spectacles. The bird species diversity (Diversity) attribute was adapted from Steven et al. (2017), using intervals for number of species likely to be seen at the destination.

The third and fourth attributes represent elements beyond the bird assemblage (Vas, 2017). As with birdwatching quality, the scenic quality of the landscape (Scenery) is difficult to quantify, and simple qualitative categories were used here. Various destination characteristics that may enhance the visitor experience (Facilitation) were specified. Lastly, a conservation and maintenance fee (Fee) attribute was included. We referred to destinations as sites in the information provided to respondents, as we expect lay persons to be more familiar with the term site.

A d-efficient design to allocate attribute levels across alternatives was created using Ngene (Hensher et al., 2015; ChoiceMetrics, 2018). The final design resulted in 24 choice sets (and thus choice tasks) blocked into 6 survey versions, each with 4 randomly-assigned choice sets. Each choice set included three alternatives, with respondents choosing between two birding destination options and a neither option (see Fig. 2 for an example). Each destination option included the attributes with the attribute level specified by the d-efficient design. In analysis, all attributes except for Fee were dummy-coded with Level = 1

Table 1
DCE attributes and attribute levels.

Attributes	Levels and their dummy variable names in parentheses
Quality	The quality of the birdwatching experience, in terms of unique target species, habitats, and/or migration spectacles present. Level 1: Birdwatching of good quality (uncommon target species, habitat and/or birding spectacles) Level 2 (Quality_except): Birdwatching of exceptional quality (unique target species, habitat and/or birding spectacles)
Diversity	Bird diversity, expressed as number of different species. Level 1: Fewer than 15 species Level 2 (Diversity_medium): 15 to 40 species Level 3 (Diversity_high): More than 40 species
Scenery	The scenic quality of the landscape. Level 1: Ordinary landscape Level 2 (Scenery_spect): Highly scenic landscape (spectacular)
Facilitation	The type of visitor facilitation, which includes some combination of a marked trail/path, interpretative signs, birdwatching hides and specialized guides. Level 1: None Level 2 (Facilitation_medium): Trail/path, and signs Level 3 (Facilitation_high): Trail/path, signs, hides, and specialized guides
Fee	The level of a conservation and maintenance fee paid by all visitors, per person per day. Funds will be locally managed and devoted to conserving birds, site maintenance and visitor facilities at the site. Level 1: 0 EUR/0 NOK (no fee) Level 2: 4 EUR/40 NOK Level 3: 10 EUR/100 NOK Level 4: 20 EUR/200 NOK

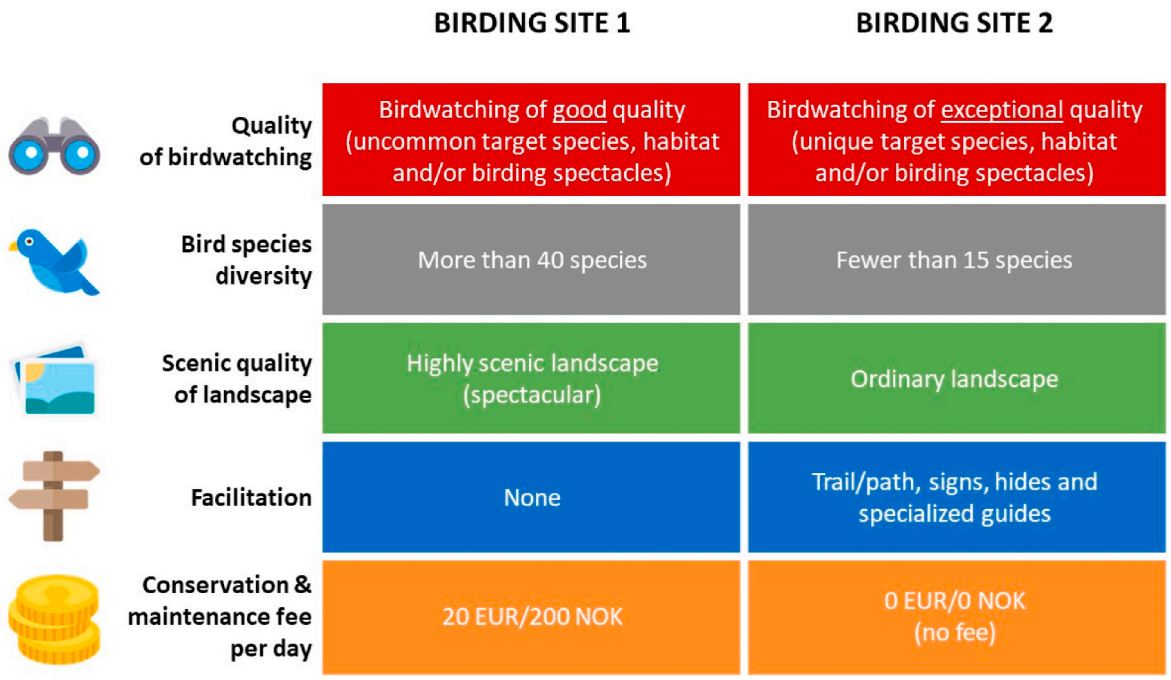

Fig. 2. Example choice task.

serving as the base.

The choice tasks were preceded by introductory wording asking respondents to assume they were deciding where to go during their next birding trip in Northern Europe (see wording in Appendix).

2.3. *Birding specialization*

Birding specialization was assessed based on items from the literature, as shown in Table 2, with items separated into the three dimensions of behavior; skills and knowledge; and commitment (Beardmore et al., 2013; Kim et al., 1997; Lee & Scott, 2004; McFarlane, 2004; Thapa et al., 2006; Won et al., 2008).

Initially, we tried to integrate a (first order) three-dimensional measurement model with the choice model to be able to distinguish the effects of the three distinctive specialization dimensions. However, a test run using the MLF estimator (maximum likelihood with standard error approximation using the first-order derivative) resulted in inflated coefficients and standard errors with unexpected signs which we interpreted as signs of multicollinearity between the three dimensions. The multicollinearity diagnosis was supported by the relatively high correlations between the dimensions. To investigate this further, we estimated different models testing collinearity between each of the three dimensions by including only two of them at a time. It was not possible to localize a single collinearity problem between any of the two of the three dimensions, which lead us to conclude that multicollinearity existed between dimensions and that for our study it was not possible to

Table 2
Birding specialization dimensions, item wording, descriptive statistics and measurement model.

Dimensions	Item wording	Mean	SD	Cronbach's alpha	Unstandardized		Standardized		R^2
					Coeff.	SE	Coeff.	SE	
Behavior by									
Sites	How many birdwatching places did you visit in 2017?	14.40	13.37		1.00[a]		0.76	0.42	0.58
Days	How many days did you go birdwatching in 2017? (Any part of a day counts as a day.)	57.23	54.92		0.43***	0.04	0.79	0.37	0.63
Skills & knowledge by *Objective*				.83					
Species	Approximately how many bird species can you identify by sound?	82.17	88.97		1.00 [a]		0.90	0.18	0.48
Subjective	(Scale 1 = Much lower than average to 7 = Much higher than average)								
Skills	How would you rate your skills in identifying birds compared to other birdwatchers?	4.20	1.49		2.19***	0.21	0.82	0.32	0.82
Knowledge	How would you rate your knowledge about bird management and conservation issues compared to other birdwatchers?	4.47	1.44		1.93***	0.22	0.69	0.52	0.68
Commitment (centrality to life) by				.87					
To what extent do you agree or disagree with these statements? (Scale 1 = Strongly disagree to 7 = Strongly agree)									
Centrality_1	If I stopped birdwatching, I would probably lose touch with a lot of my friends	3.04	1.81		1.00 [a]		0.73	0.46	0.54
Centrality_2	I find that a lot of my life is organized around birdwatching	3.76	1.96		1.45***	0.10	0.98	0.05	0.95
Centrality_3	Others would probably say I spend too much time birdwatching	3.39	1.99		1.19***	0.10	0.79	0.37	0.63
Centrality_4	Other leisure activities don't interest me as much as birdwatching	3.61	1.96		0.98***	0.11	0.66	0.56	0.44
Birding specialization by									
Behavior					1.00 [a]		0.88	0.23	
Skills & knowledge					0.54***	0.08	0.78	0.40	
Commitment (centrality to life)					1.38***	0.17	0.94	0.12	

Note: "Coeff." = coefficient, "SE" = standard error.*** coefficient significant at α = 0.001.[a] Coefficient is fixed; significance is not applicable. Items Days and Species were divided by 100 and Sites was divided by 10 prior to analysis in Mplus to avoid estimation problems.

integrate a first order three-dimensional model of birding specialization.

2.4. Data preparation and analysis

For the measures of the recreation specialization concept that were continuous responses to open questions (sites, days and species, see Table 2), extreme values were identified using SPSS boxplots (Weinberg & Abramowitz, 2008). The SPSS default identification rule was that the value was above the "3rd quartile +3*interquartile range", where the interquartile range is the difference between the 75th and 25th percentile. The extreme outliers were not removed but truncated to the highest non-outlier number.

The choice models were estimated as follows. Using Nlogit software, we first estimated a simple "attributes only" multinomial logit (MNL) model then evaluated the presence of preference heterogeneity with a random parameter logit (RPL) model. Lastly, a hybrid choice (HC) model was estimated in Mplus using the robust maximum likelihood estimator MLR, 5000 Monte Carlo integration points, and adaptive quadrature integration turned off due to small cluster sizes; clusters were used to account for the panel data, with each respondent completing four choice tasks. For all models, the constant and attribute coefficients were constrained to be equal across the two utility functions representing the two unlabeled alternatives in each choice.

Interaction terms were created between the specialization latent variable and each attribute level dummy variable (as well as the fee variable), with coefficients indicating whether the effect of each attribute level on choice varied across degree of specialization. For example, a positive and significant coefficient on the Quality_except*SPEC variable would indicate that the higher level of birding quality (exceptional relative to the base level of good) had a greater impact on the choices of more specialized birders than on the choices of less specialized birders.

For the final models, all attribute variables were retained even if their coefficients were nonsignificant. Interaction variables were retained only if their coefficients were significant at $\alpha = 0.10$ (Table 5).

3. Results

3.1. Sample description

The average age in the samples was 55. The share of female respondents was 39 percent. 50 percent of the sample had completed more than four years of university studies. The reported monthly mean net income per person was approximately 3400 euros (based on midpoints from intervals). 57 percent were members of a birding organization. Most respondents (83 percent) were international visitors.

On average, respondents had been birding for 23 years; they spent 62 days birding and visited 18 sites in 2017. They indicated being able to identify a mean of 98 bird species by sound and spent around 14,560 euros on their equipment (an estimate influenced by some few "big spenders"). They rated their skills and knowledge relatively as average with means of 4.2 and 4.5, respectively, on the 7 point Likert scale. The composite of their responses to the four items measuring centrality to life (mean = 3.5) indicates moderate commitment to birding for the average participant. Note that these averages correspond with the original responses; after transformation of extreme outliers, descriptive statistics differ slightly for Sites, Days and Species items included in the analyses (Table 2).

3.2. Measurement model

As illustrated in Fig. 1, hybrid choice models integrate choice models and structural equation models. In the present analysis, specialization was modeled as a latent variable with the indicators being the survey items shown in Table 2. Specifically, a second order measurement model was used for specialization (Lee & Scott, 2004). Table 3 presents the correlation matrix for the nine indicators, with all but two correlations above $r = 0.40$.

Table 3
Pearson correlations for specialization indicators.[a].

Variable	1	2	3	4	5	6	7	8
1. Sites								
2. Days	.61							
3. Species	.47	.52						
4. Skills	.43	.47	.61					
5. Knowledge	.41	.45	.53	.76				
6. Centrality_1	.44	.48	.49	.47	.43			
7. Centrality_2	.62	.63	.57	.63	.56	.72		
8. Centrality_3	.43	.51	.48	.49	.46	.56	.77	
9. Centrality_4	.44	.39	.36	.46	.40	.46	.64	.62

[a] All correlations significant at $\alpha = .01$.

Approximate goodness of fit index results from confirmatory factor analysis of the measurement model were variable, indicating an overall moderate fit, but the RMSEA somewhat too high (RMSEA = 0.087 [0.075-0.100], CFI = 0.96, TLI = 0.94, SRMR = 0.04). There were no negative residual variances and convergent validity was satisfactorily indicated by statistically significant factor loadings, inter-item correlations and Cronbach's alpha. R^2 indicated more than 50 per cent of the variance in items was explained by the corresponding factors except for the Species and Centrality_4 items where more than 40% was explained (Table 2). Despite relative high correlations between the factors (r = 0.68 between Behavior and Skills and knowledge, r = 0.73 between Skills and knowledge and Commitment, $r = 0.82$ between Behavior and Commitment), discriminant validity was verified by the square root of the average variance extracted being larger than the squares of the correlations between the three dimensions (Table 4).

3.3. Choice models

The first two choice models included only the attributes as predictors and reflected the basic MNL approach and the RPL extension, which accounts for preference heterogeneity (Table 5). The third model reflected hybrid choice and includes interaction terms to evaluate the effect of specialization on choice. Coefficient signs were consistent across the three models, but with varying degree of statistical significance.

All three models indicate a clear preference for unique birding destinations in terms of species, habitats, and/or spectacles (Quality_except, exceptional quality) relative to the base level of good quality. With respect to bird species diversity, the enhancement from the base of fewer than 15 species to 15 to 40 species (Diversity_medium) was not a significant predictor of choice. Enhancement to more than 40 species (Diversity_high) was nonsignificant in the MNL model and significant in the RPL and HC models. This pattern was consistent with heterogeneity in strength of preference for this level of species diversity. Heterogeneity is indicated by the significance of the Sd_Diversity_high coefficient in the RPL model and the Diversity_high*SPEC coefficient in the HC model. The RPL model indicates the presence of heterogeneity, while the HC model indicates that the heterogeneity is at least partly due to specialization, with more specialized birders placing higher priority than less specialized birders on the presence of more than 40 species (Diversity_high).

In all three models, highly scenic landscape (Scenery_spect) was a significant predictor relative to the base of ordinary landscape. Likewise,

Table 4
Discriminant validity of birding specialization dimensions.

	1	2	3
1. Behavior	**.78**		
2. Skills & knowledge	.46	**.81**	
3. Commitment (centrality to life)	.67	.53	**.80**

Bold diagonal estimates are the square root of the average variance extracted. Off diagonals are the squares of the correlations between the three dimensions.

Table 5
Model results.

Variable	Attributes only models				Hybrid choice model	
	MNL LL = −692.380		RPL LL = −661.368		HC LL = −3363.285	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Effects of attributes on choice						
Constant	1.57***	0.27	1.43***	0.33	1.60***	0.30
Quality_except	0.34***	0.09	0.53**	0.17	0.35***	0.10
Diversity_medium	0.07	0.16	0.17	0.24	0.11	0.16
Diversity_high	0.29	0.16	0.49*	0.25	0.32*	0.15
Scenery_spect	0.36**	0.12	0.56**	0.21	0.43**	0.13
Facilitation_medium	0.29*	0.13	0.45*	0.19	0.31*	0.13
Facilitation_high	0.17	0.16	0.33	0.23	0.18	0.14
Fee	−0.35	0.67	−0.43	1.01	−0.63	0.71
Sd_Quality_except			1.19***	0.22		
Sd_Diversity_medium			0.34	0.54		
Sd_Diversity_high			0.99**	0.30		
Sd_Scenery_spect			1.56***	0.26		
Sd_Facilitation_medium			0.18	0.39		
Sd_Facilitation_high			0.85*	0.36		
Effects of attribute interactions with birding specialization (SPEC) on choice						
Quality_except*SPEC					0.32**	0.12
Diversity_medium*SPEC					0.41*	0.19
Diversity_high*SPEC					0.42*	0.19
Scenery_spect*SPEC						
Facilitation_medium*SPEC						
Facilitation_high*SPEC					0.27*	0.12
Fee*SPEC						

Note: "Coeff." = coefficient, "SE" = standard error, "LL" = log-likelihood. For variable abbreviations see Table 1. Prefix "Sd_" is used for standard deviation results for random parameters. Blank cells indicate non-significance. Shaded cells indicate components not included in respective models. *, **, ***, coefficient significant at α = 0.05, 0.01 and 0.001, respectively.

respondents preferred the presence of marked trails and interpretive signs (Facilitation_medium) over their absence. However, the presence of marked trails, signs, hides, and specialized guides (Facilitation_high) was not a significant predictor of choice relative to the base of their absence. Lastly, the coefficient on fee was negative, as expected, but it was not significant. This suggests low sensitivity to price, at least in the context of the utilized price range (0–20 euro) and fee purpose (use toward conservation and destination maintenance).

Turning to the hybrid choice model, results indicate that more specialized birders place higher priority than do less specialized birders on quality, diversity, and the highest level of facilitation, which includes trails, signs, hides, and specialized guides. The benefits of the hybrid choice approach can be seen by comparing results between the MNL and HC models. Quality_except was significant in both models, indicating that in general birders prefer exceptional birding quality over good birding quality. The significance of the Quality_except*SPEC interaction in the HC model indicates as hypothesized (H1) that more specialized birders have even stronger preferences than do less specialized birders for exceptional quality. Diversity_medium, Diversity_high, and Facilitation_high were nonsignificant in the MNL model; in the RPL and HC models, only Diversity_high was significant. However, in the HC model the interaction terms with specialization for each of these three individual attribute levels were significant. That indicates, for example, that a medium level of bird diversity (level 2) is not more important than a low level of diversity for birders on average, but it is more important for more specialized birders, which supports our hypothesis (H2). A likelihood ratio test for diversity_medium and diversity_high in the HC model indicated that, as a set, they contributed explanatory power (difference in LL = 6.5, multiplied by two = 13, df = 2, p = 0.002).

Regarding facilitation, birders on average do not prioritize the highest level, but more specialized birders do (contrary to H4). That conclusion is based on the significance of the facilitation_high coefficient in the HC model. A likelihood ratio test for facilitation_medium and facilitation_high combined indicated that, as a set, they did not significantly contribute explanatory power (difference in LL = 2.8, multiplied by two = 5.6, df = 2, p = 0.061).

Such nuances may not be identified in basic MNL models. RPL models may identify the presence of heterogeneity, but they do not identify its source. Results from the present HC model indicate that specialization is a source of heterogeneity, keeping in mind that it is one of potentially multiple sources (e.g., heterogeneity with respect to Scenery_spect is not explained by heterogeneity in specialization). Contrary to our hypotheses, specialization did not interact significantly with the preference for the scenic quality of the landscape (H3) or the conservation and maintenance fee (H5).

With respect to model fit, the log-likelihood (LL) value for the RPL model indicated an improvement over the MNL model, as expected. It is difficult to directly compare model fit for HC models relative to MNL and RPL models, as the additional model variables inflate LL values in HC models. One way to assess HC model fit is to conduct a robust chi-square difference test using LL values. The HC model in Table 5 (LL = −3363.285, SCF = 1.1495, FP = 42) was compared to an equivalent base model but with the path from birding specialization to choice via attribute interactions constrained to zero (LL = −3376.770, SCF = 1.1258, FP = 38), and the difference was significant ($\Delta\chi^2 = 19.62$, df = 4, p = 0.001).

4. Conclusion and implications

Our results contribute to improved conceptual and managerial understanding of the factors affecting birder destination choices. Despite our study presenting findings for a relatively under-examined region (Northern Europe), results for the attributes were broadly consistent with previous findings (Hvenegaard, 2002; Lee et al., 2010; Chen & Chen, 2015; Guimarães et al., 2015; Vas, 2017). As expected, birding quality matters. However, contrary to studies elsewhere, bird species diversity was a less significant predictor of choice (Hvenegaard, 2002; Booth et al., 2011; Kolstoe & Cameron, 2017; Steven et al., 2017). The importance of diversity may be tied to the type of destination, with visitors to Northern European (Arctic) destinations generally expecting

to see less variety in species than visitors to e.g. tropical destinations. In terms of destination marketing and bird assemblage, this may translate into putting more emphasis on the uniqueness of birding at the destination.

The importance of scenery as a predictor of choice may in part be due to the somewhat stark contrast between the two levels, with respondents naturally preferring "spectacular" over "ordinary." However, it may reflect the importance of enjoying the "sights, smells, sounds of nature" that Scott et al. (2005, p. 70) also found to be an important motivation for birders. Such findings are reminders that birding occurs within a broader natural context and may provide benefits beyond observing birds. Destination marketers may consider a holistic perspective that embraces experiential elements that are not strictly birding-related (see also Curtin, 2013).

Contrary to Ditton et al. (1992) who proposed support for conservation increased with increased birding specialization, we found that the willingness to pay a management and conservation fee did not increase with increasing specialization level. In general, we found a lack of price sensitivity (as indicated by coefficient non-significance), independent of the level of specialization. Similar results have been reported by others (Steven et al., 2017) and may have various explanations. The sample was affluent, and the fee levels were modest, with a high of only 20 euros. In hindsight, we should have augmented the scale from the lowest to the highest fee amount even more than we did after recognizing lack of price sensitivity in the pilot. All presented fee levels were substantially less than the 40 euros paid just for the last stage of transport to Hornøya (round trip boat fare from Vardø). Some birders might have found the proposed conservation and maintenance fee to be a positive element in that it would contribute to the preservation and management of nature attractions (McFarlane, 1994; Hvenegaard, 2002; Vas, 2017). From the management perspective, results suggest that similar destinations could introduce fees in this range without substantially affecting visitor numbers; larger fees would be necessary if the goal is to use the price mechanism to reduce visitor numbers for ecological or other reasons (see Wu et al., 2014 for a discussion of pricing policies). It is worth noting that in the Nordic countries the public right of access might pose additional challenges to the introduction of entrance fees in nature areas, including nature reserves (Kaltenborn et al., 2001).

A limitation of our study is the relatively small sample. A large proportion of the birders at Hornøya in 2017 was recruited to the survey, but only a third of the recruited birders (205 respondents) completed the survey, including all destination choice and recreation specialization items. We found that Finnish respondents are overrepresented and Norwegians underrepresented among the 205 that completed the survey. As we account for heterogeneity on a continuum of birding specialization in our HC model, the slightly higher reported importance of birding among respondents in our sample should not impact the interpretation of our results.

A key purpose of the study was to assess the extent to which recreation specialization explains preference heterogeneity. Results show that more specialized birders do place higher priority on the birding attributes, including bird diversity, overall birding quality, and birding facilitation (presence of trails, signs, hides, and specialized guides). Though we used a novel analytical approach, that of a hybrid choice model, and in a novel birding environment, these results are consistent with findings elsewhere (Cole & Scott, 1999; Hvenegaard, 2002; Kim et al., 2010; Martin, 1997; McFarlane, 1994; Scott et al., 2005; Scott & Thigpen, 2003).

Our results indicate that both less specialized and more specialized birders value spectacular landscape scenery, with no heterogeneity across level of specialization. If possible, destination management should provide different facilitation for different types of birders, something that was also indicated by Vas (2017). However, while not necessarily demanding more facilitation, birders might prefer different kinds of experience (Duffus & Dearden, 1990; Higham, 1998). However, decision-makers may find it necessary to increase both birding and non-birding facilitation to manage increasing visitor numbers, although risking a detriment of the experience of more specialized visitors and wildlife itself (Reiertsen et al., 2018).

Our measures of the birding quality and scenery attributes were broad, with the potential for diverse perceptions of meaning across respondents. In addition, our results may be limited by the specific context (e.g., spatial scale, birder population, and season). Replication elsewhere would serve as a reference point for evaluating the present results. One avenue for further research would be to develop more quantitative – or at least more specific – measures of these attributes. We also recommend increasing the ranges of levels of bird diversity as well as the fee, although in both cases realistic ranges are necessarily context-specific. More importantly, there remain opportunities to further develop attributes and levels relating to guiding preferences and other aspects of nature-based attractions.

The specialization measures would benefit from further refinement. For example, though behavior and commitment are presented as separate dimensions, similarity exists in items (e.g., the affective "I spend too much time birdwatching" is closely related to the behavioral number of days spent birdwatching). In addition, the number of items per dimension could be increased, such as by measuring the number of birding trips taken in the previous year for the behavior dimension (see, e.g., Harshaw et al., 2021).

To our knowledge, this is the first study to integrate recreation specialization as a latent variable into discrete choice analysis and study its effects on preferences. In addition, the inclusion of non-birding related destination attributes provided a more holistic view of the demand for birding destinations. In terms of willingness to pay for conservation and maintenance, our research contributes to a knowledge base for the political discourse in Norway and Scandinavia. Within the legal context of public access to uncultivated land, there is a debate in Nordic countries about the possibility of introducing fees for nature-based activities that so far have been free of charge (see, e.g., Øian et al., 2018). Our results indicate that relatively modest conservation and management fees for visiting spectacular but vulnerable nature destinations, like Hornøya, will most probably not deter many potential visitors. Fee revenue could fund site hardening facilities and services such as birding hides, binoculars, rangers, and guides that might allow for more visitors without increasing pressure on the birds and wildlife. Depending on price responsiveness, fees also potentially might be used as a coarse tool to manage visitor numbers.

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CRediT authorship contribution statement

Kathrin Stemmer (formerly Jathe): Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization. **Øystein Aas:** Conceptualization, Methodology, Writing – original draft, Supervision, Funding acquisition. **Knut Veisten:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Supervision. **Kreg Lindberg:** Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Supervision.

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Appendix. scenario introduction wording

Next, we present several hypothetical birding sites that differ in their characteristics. Please treat them as realistic and assume you are deciding where to go during your next birding trip in Northern Europe.

Decisions may be based on many factors, but we are particularly interested in the role of the following characteristics:

- The quality of the birding experience, in terms of unique target species, habitats and/or migration spectacles present.
- Bird diversity, in number of different species.
- The scenic quality of the landscape.
- The type of visitor facilitation, which includes some combination of a marked trail/path, interpretative signs, birding hides and specialized guides.
- The level of a conservation and maintenance fee paid by all visitors, per person per day. Funds will be locally managed and devoted to conserving birds, site maintenance and visitor facilities at the site.

For each of the following four scenarios, please carefully consider the characteristics of birding site 1 and birding site 2.

Assume that these are your only two options at this point. Then indicate whether you would decide to visit site 1 or site 2. If you would not choose either site – for whatever reason – select "Neither option".

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