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LETTER

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Species' cultural heritage inspires a conservation ethos: The evidence in black and white

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Abstract

Birds feature prominently in the arts and folklore of practically every culture. Yet, in industrialized countries, this rich cultural heritage is largely ignored by conservation biologists. Taking the Eurasian Magpie (*Pica pica*) as a focal species, we conducted a classroom-based survey to test the value of avian cultural heritage for inspiring a conservation ethos among UK schoolchildren, comparing it with the effects of other information types and factors. Although identified effects were not strong, species' cultural heritage was found to be valued and a positive driver of conservation concern—one, we suggest, that has the potential to endure into adulthood when certain other conservation motivations may fail. We therefore encourage its more widespread incorporation into conservation education and outreach programs. Our findings constitute an important "first word" on the potential value of species' cultural heritage for inspiring a lasting conservation ethos.

KEYWORDS

Akaike's information criterion (AIC), birds, conservation, cultural heritage and likeability, ethno-biology, ethno-ornithology, Eurasian magpie (*Pica pica*), public attitudes, species' attractiveness

1 | INTRODUCTION

Birds feature prominently in the arts and folklore of practically every culture in the world (Cocker & Tipling, 2013; Tidemann & Gosler, 2010) and have done throughout history (Serjeantson, 2009). Nevertheless, in industrialized countries, this rich cultural heritage is largely ignored by conservation biologists. This is despite a concern over the declining connection with nature (Pilgrim, Cullen, Smith, & Pretty, 2008), a reliance on securing public awareness and engagement for the success of conservation programs, and the fact that cultural significance is formally recognized as a significant ecosystem service (Ninan, 2009). Effective conservation requires human behavior change (Schultz, 2011), and attitude is among the factors necessary for effecting such change (Heberlein, 2012). Previous studies have demonstrated a positive relationship between people's knowledge of animals and their attitudes toward them (e.g., Kellert, 1993; Melson, 2005; Prokop, Kubiatko, & Fančovičová, 2008). It is possible, therefore, that knowledge of avian cultural heritage—a testament to people's enduring fascination with birds—might positively influence attitudes to avian conservation in industrialized contexts.

Urbanization is a characteristic of industrialized countries and is expected to increase globally in the coming decades.

Currently, 55% of the world's population live in urban areas; this is projected to rise to 68% by 2050 (United Nations, 2018). Among urban residents, children are the least likely to have accumulated a repository of prior knowledge of any species' cultural heritage still in circulation. Furthermore, they are the conservation practitioners and policymakers of the future. For these reasons, we conducted our research with children in the Fifth Grade (i.e., aged 10 and 11) in schools in an urban center in the United Kingdom.

The focal species for our study was the Eurasian magpie (*Pica pica*; hereafter, 'magpie'), a bird steeped in cultural heritage (at least 100 English folk names are recorded for this species, the sixth-highest number of 78 passerine species; Desfayes, 1998). This includes the characterization of magpies as thieves and hoarders, and as harbingers of future fortunes (Cocker & Mabey, 2005; Greenoak, 1997). With their striking black and white plumage and loud, chattering vocalizations, magpies are widely recognized in the United Kingdom where they are extremely numerous having successfully colonized urban environments during the past few decades (Balmer et al., 2013). However, due in part to their depredation of songbird eggs and chicks (Birkhead, 1991), public opinion of the species is markedly divided. Cox and Gaston (2015) found magpies to be among the least popular of garden birds in Southeast England. There is therefore no reason to assume that the species might be expected *a priori* to inspire a conservation ethos.

We surveyed children's attitudes toward magpies after they had received different types of information—cultural, scientific, or both—about the bird. Our objectives were to (1) assess the potential of the species' cultural heritage for inspiring a conservation ethos, (2) determine how this compares with the effect of other information types and factors, and (3) evaluate the importance of cultural perspectives for conservation education and action.

2 | METHODS

2.1 | Study area

The location for our study was Milton Keynes, UK (52°02′N, 00°45′W). Comprising commercial, industrial, residential, and leisure areas—including parks and other green spaces—and associated infrastructure, Milton Keynes is typical of an expanding urban center in an industrialized UK context. Having been formally designated as a "new town" in 1967, when the population was c.60,000, Milton Keynes is now among the fastest growing urban centers in the United Kingdom. By 2015, the population had risen to 261,750—an increase of 336% since 1967—and is expected to reach 308,500 by 2026 (Milton Keynes Council, 2017).

2.2 | Survey design

We devised a simple questionnaire (Supporting Information Figure S1) to survey schoolchildren's attitudes toward magpies. It consisted of nine questions relating to their perceptions of, and attitudes toward, magpies, and five pertaining to demographic information, including children's links to selected conservation and countryside organizations.

We surveyed 16 classes (age cohorts) of children across 10 randomly selected schools in Milton Keynes. Each school class was randomly assigned to one of four groups that completed the questionnaire immediately after receiving different types of information about magpies as follows: cultural information ('cultural group'); scientific information ('scientific group'); a combination of cultural and scientific information ('dual group'); and no additional information ('control group'). The information was provided on double-sided paper sheets containing text and photographic images (Supporting Information Figures S2–S4). Further details of our survey design and the materials employed are provided in Supporting Information Appendix 1.

2.3 | Survey methods

A single researcher (N.G.H.) conducted the surveys in schools. He explained to each class that he wanted them to complete a simple questionnaire about magpies. He stressed that he was interested in what each child thought about magpies and for this reason asked that the questionnaires be completed in silence. This was to minimize the possibility of discussions between children sitting at the same table resulting in shared (non-independent) responses. In control classes, the questionnaires were then distributed and completed. In classes assigned to the cultural, scientific, and dual information groups, the relevant information sheets were first distributed to the children. N.G.H. then read through the sheet aloud while the children followed on their copies. This was to ensure that every child in the class received the information whatever their individual reading ability. The questionnaires were then distributed for completion. The children were assured that they could raise their hand to ask questions for clarification if necessary. Any such questions were answered either by N.G.H. or by the class teacher, who remained together in the classroom at all times. When all the children had finished, the completed questionnaires were collected by N.G.H. who then thanked the children for their help.

2.4 | Statistical analyses

All statistical analyses were performed in R 3.5.0 (R Core Team, 2018). We adopted an "information theoretic" approach (Burnham & Anderson, 2002) to assess the effect of the different information types on children's attitudes toward magpie conservation. We constructed a Generalized Linear

Mixed Effects Model (GLMM) to fit to survey response data using the lme4 package (Bates, Maechler, Bolker, & Walker, 2015). Recognizing that factors other than information type might have influenced children's responses to survey questions, we included an additional five potential explanatory variables drawn from the data as fixed effects in the GLMM along with information type (having first confirmed the absence of collinearity between the selected variables—see Table S1). The fixed effects included in the GLMM were: information type; previous sighting of wild magpies; liking of magpies; perceived attractiveness of magpies; association with conservation/countryside organizations; and sex of children. Class and school were included as random effects to control for non-independence between children surveyed in the same class and/or school (Harrison et al., 2018). For each survey response under consideration (each of the nine response options to question 8 in Supporting Information Figure S1 were analyzed separately), we submitted the global GLMM (i.e., containing all fixed and random effects) through an automated, all-subsets model selection protocol using the MuMIn package (Bartoń, 2018). Random effects were retained in all models generated by this process. We identified the best (i.e., top ranked) models according to Akaike's information criterion corrected for small sample sizes (AICc), where qualification requires ΔAICc < 2 (Burnham & Anderson, 2002). We also ran null models that retained only the random effects of class and school for each of the survey questions. This enabled us to compare the deviance of the null models with that of the best models in order to determine how much of the variation in survey responses could be attributed to the covariates included in the best models.

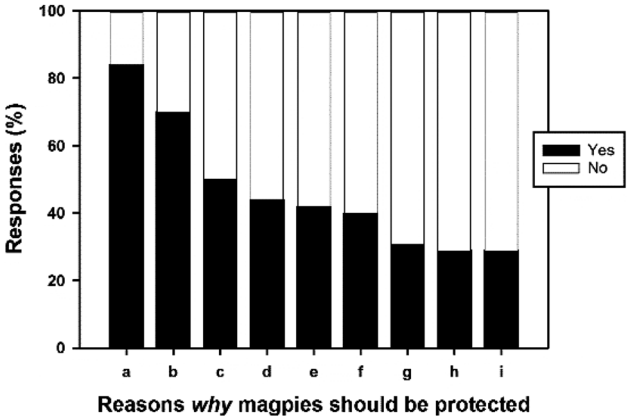

FIGURE 1 Frequency of responses pooled across groups (n = 369) to the question "Why do you think it is important to protect magpies?" (Responses: a, "All birds should be protected"; b, "It is the right thing to do"; c, "It is important that we can learn more about magpies"; d, "Magpies help keep our streets clean and tidy by eating the food we throw away"; e, "Magpies have been important in people's lives and traditions in the past"; f, "The enjoyment people get from seeing magpies"; g, "Some other reason"; h, "Magpies are important in people's lives and traditions today"; and i, "Magpies are attractive birds")

3 | RESULTS

3.1 | Demography of participants and their experience and perception of magpies

In total, 418 children (48% girls; 52% boys) were surveyed across the four groups (cultural group, n = 103 children; scientific group, n = 98; dual group, n = 113; control group, n = 104). All children indicated that they lived within the urban area of Milton Keynes. Overall, 87% of children had seen a magpie prior to completing the questionnaire, 79% liked magpies, and 67% regarded them as attractive.

3.2 | Attitudes toward magpie conservation

The vast majority (88%) of children indicated that it was important to protect magpies. Children's support for the different reasons suggested for protecting magpies are illustrated in Figure 1. A total of 64 top-ranked models (i.e., models where ΔAICc < 2) were identified for responses to all survey questions pertaining to the importance of protecting magpies and the reasons for doing so (Table 1). The deviance of the models identified differed most markedly from that of the null model in regard to the question of the importance of protecting magpies, and for responses to the following suggested reasons for magpie conservation: (1) the species' cultural heritage; (2) the enjoyment people derive from seeing magpies; (3) the contemporary cultural importance of magpies; and (4) the attractiveness of the species (see bold text in Table 1). In total, 22 models were identified in relation to these survey responses. Table 2 ranks the fixed effects contained in the GLMM in descending order of the frequency of their inclusion across these 22 models.

Children's sex, their liking for magpies, and regard for their attractiveness featured in all the models identified in relation to the question of whether or not magpies should be protected (Table 1). Information type, however, was not among the drivers of this conservation motivation, support for which was stronger in girls than boys.

Information type was included in all the models identified for protecting magpies on account of the species' cultural heritage (Table 1). Support for this conservation motivation was greatest in children in the cultural group (57%), followed by those in the dual, control, and scientific groups, respectively (Figure 2a). The perceived attractiveness of magpies and schoolchildren's association with conservation/countryside organizations also featured in all the models generated for responses to this survey question.

TABLE 1 Top ranked models (ΔAICc < 2) identified for responses to survey questions pertaining to the importance of protecting magpies and the reasons for doing so. Bold statistical outputs indicate survey questions for which the deviance of the models differed most markedly from that of the null model

			Predictor variables									
Question	**Model**	**df**	**Attractive**	**Sex**	**Like**	**Organization Membership**	**Seen**	**Information type**	**AICc**	**ΔAICc**	**Intercept**	**Deviance**
Do you think it is important to protect magpies?	**M0 (Null)**	**3**							**303.49**	**35.53**	**2.14**	**297.43**
	M1	**6**	✓	✓	✓				**267.96**	**0**	**0.22**	**255.75**
	M2	**7**	✓	✓	✓		✓		**269.83**	**1.87**	**0.45**	**255.56**
	M3	**7**	✓	✓	✓	✓			**269.92**	**1.96**	**0.20**	**255.65**
Magpies should be protected so more can be learned about the species?	M0 (Null)	3							507.90	3.11	–0.08	501.83
	M1	5	✓	✓					504.78	0	–0.21	494.62
	M2	6	✓	✓		✓			505.02	0.24	–0.28	492.79
	M3	6	✓	✓	✓				505.44	0.66	–0.48	493.21
	M4	7	✓	✓	✓	✓			505.92	1.13	–0.52	491.60
	M5	5		✓	✓				506.14	1.36	–0.31	495.98
	M6	8		✓	✓			✓	506.18	1.40	–0.74	489.78
	M7	9	✓	✓	✓			✓	506.31	1.53	–0.84	487.81
	M8	8	✓	✓				✓	506.39	1.60	–0.47	489.99
	M9	9	✓	✓		✓		✓	506.46	1.67	–0.55	487.96
	M10	9		✓	✓	✓		✓	506.49	1.71	–0.79	487.99
	M11	6		✓	✓	✓			506.60	1.81	–0.35	494.36
	M12	10	✓	✓	✓	✓		✓	506.65	1.87	–0.89	486.04
	M13	4	✓						506.70	1.92	–0.39	498.59
Magpies should be protected because it is the right thing to do?	M0 (Null)	3							459.06	4.19	0.83	453.00
	M1	4			✓				456.15	0	0.30	448.04
	M2	5		✓	✓				456.63	0.49	0.46	446.47
	M3	5	✓		✓				456.81	0.66	0.17	446.64
	M4	6	✓	✓	✓				456.85	0.70	0.34	444.62
	M5	5			✓	✓			457.48	1.33	0.34	447.31
	M6	5	✓	✓					457.50	1.36	0.68	447.34
	M7	4	✓						457.97	1.83	0.53	449.87
	M8	6	✓		✓	✓			458.10	1.95	0.21	445.86
	M9	6		✓	✓	✓			458.13	1.98	0.49	445.89

(Continues)

TABLE 1 (Continued)

Question	Model	df	Predictor variables						AICc	ΔAICc	Intercept	Deviance
			Attractive	Sex	Like	Organization Membership	Seen	Information type				
Magpies should be protected because of their cultural heritage?	**M0 (Null)**	**3**							**508.17**	**15.13**	**–0.31**	**502.11**
	M1	**8**	✓			✓		✓	**493.05**	**0**	**–1.00**	**476.65**
	M2	**9**	✓			✓	✓	✓	**493.56**	**0.51**	**–1.36**	**475.06**
	M3	**9**	✓		✓	✓		✓	**494.81**	**1.76**	**–1.12**	**476.30**
Magpies should be protected because people enjoy seeing them?	**M0 (Null)**	**3**							**500.48**	**11.12**	**–0.43**	**494.41**
	M1	**9**	✓		✓	✓		✓	**489.35**	**0**	**–1.19**	**470.85**
	M2	**8**	✓			✓		✓	**490.33**	**0.98**	**–0.78**	**473.93**
	M3	**8**	✓		✓			✓	**490.35**	**1.00**	**–1.11**	**473.95**
	M4	**6**	✓		✓	✓			**490.56**	**1.21**	**–1.52**	**478.33**
	M5	**10**	✓		✓	✓	✓	✓	**490.86**	**1.51**	**–1.42**	**470.24**
	M6	**10**	✓	✓	✓	✓		✓	**491.07**	**1.72**	**–1.12**	**470.46**
	M7	**5**	✓		✓				**491.27**	**1.91**	**–1.44**	**481.10**
Magpies should be protected because they help keep streets clean and tidy?	M0 (Null)	3							507.01	1.35	–0.26	500.95
	M1	5		✓	✓				505.66	0	–0.45	495.49
	M2	4		✓					505.79	0.13	–0.07	497.68
	M3	4			✓				506.57	0.91	–0.66	498.46
	M4	5		✓		✓			507.02	1.36	–0.12	496.86
	M5	6	✓	✓	✓				507.04	1.38	–0.37	494.81
	M6	6		✓	✓	✓			507.15	1.49	–0.48	494.92
	M7	6		✓	✓		✓		507.53	1.87	–0.58	495.30
	M8	5	✓		✓				507.53	1.88	–0.55	497.37

(Continues)

TABLE 1 (Continued)

Question	Model	df	Predictor variables						AICc	ΔAICc	Intercept	Deviance
			Attractive	Sex	Like	Organization Membership	Seen	Information type				
Magpies should be protected because of their contemporary cultural importance?	**M0 (Null)**	**3**							**441.87**	**11.23**	**–0.93**	**435.81**
	M1	**7**	✓	✓		✓	✓		**429.59**	**0**	**–1.02**	**415.28**
	M2	**6**	✓	✓		✓			**430.64**	**1.04**	**–1.57**	**418.41**
	M3	**8**	✓	✓	✓	✓	✓		**431.42**	**1.83**	**–0.89**	**415.02**
	M4	**6**	✓			✓	✓		**431.42**	**1.83**	**–1.25**	**419.19**
Magpies should be protected because they are attractive?	**M0 (Null)**	**3**							**448.84**	**66.51**	**–0.94**	**442.78**
	M1	**4**	✓						**382.33**	**0**	**–3.97**	**374.22**
	M2	**5**	✓			✓			**383.91**	**1.58**	**–4.02**	**373.75**
	M3	**5**	✓				✓		**384.07**	**1.74**	**–4.15**	**373.90**
	M4	**5**	✓		✓				**384.25**	**1.92**	**–3.87**	**374.09**
	M5	**5**	✓	✓					**384.30**	**1.98**	**–3.94**	**374.14**
Magpies should be protected because all birds should be protected?	M0 (Null)	3							336.97	0.27	1.62	330.90
	M1	4		✓					336.69	0	1.42	328.58
	M2	5		✓			✓		337.33	0.63	1.02	327.16
	M3	4					✓		337.84	1.14	1.27	329.73
	M4	5		✓		✓			337.93	1.24	1.35	327.76
	M5	4				✓			337.99	1.29	1.53	329.88
	M6	5		✓	✓				338.08	1.39	1.17	327.91
	M7	4			✓				338.51	1.81	1.41	330.40
	M8	5	✓	✓					338.68	1.99	1.48	328.51
Magpies should be protected for some other reason?	M0 (Null)	3							462.34	0	–0.81	456.27
	M1	4	✓						463.63	1.30	–0.96	455.52
	M2	4		✓					464.14	1.81	–0.86	456.03
	M3	4			✓				464.31	1.98	–0.87	456.20
	M4	4				✓			464.33	2.00	–0.82	456.22

TABLE 2 Fixed effects included in the Generalized Linear Mixed Effects Model (GLMM) ranked in descending order of frequency of appearance across the top ranked models (ΔAICc < 2) identified for responses to survey questions pertaining to the importance of protecting magpies and the following reasons for doing so: (1) the species' cultural heritage; (2) the enjoyment people derive from seeing magpies; (3) the contemporary cultural importance of magpies; and (4) the attractiveness of the species

Effect	Frequency of appearance in models ($n = 22$)
Attractiveness of magpies	22
Association with conservation/countryside organizations	14
Liking for magpies	12
Magpie information type	8
Sex of children	8
Previous sighting of wild magpie(s)	7

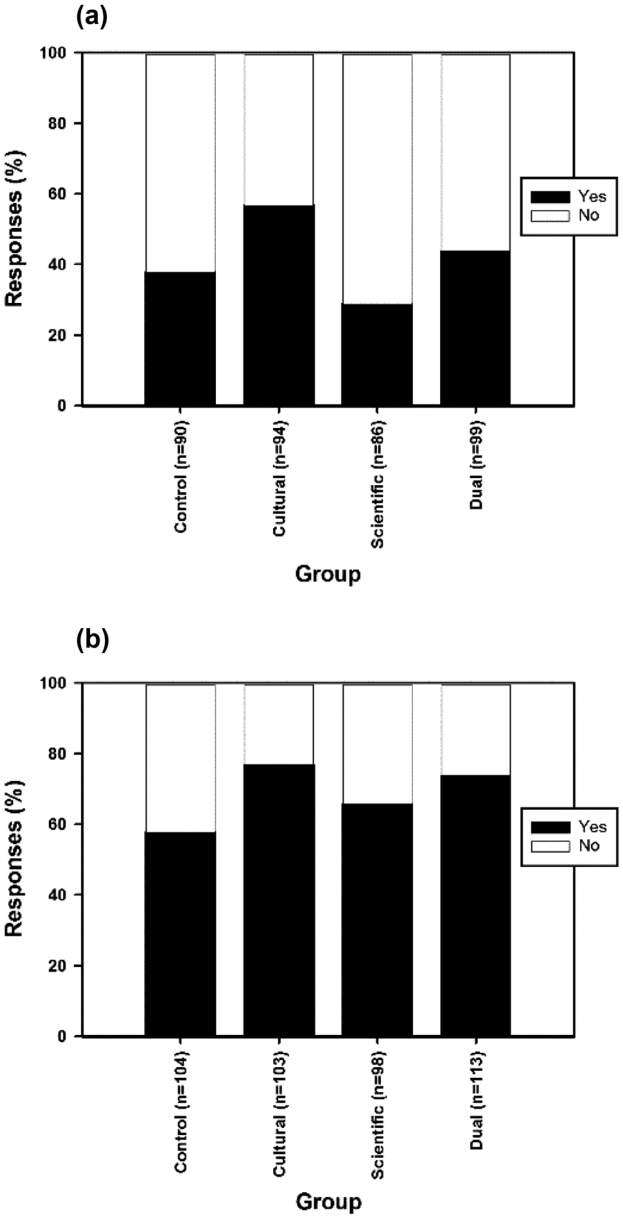

FIGURE 2 Responses by group (n is the number of children) to the (a) suggestion, "Magpies should be protected because they have been important in people's lives and traditions in the past," and (b) question, "Do you think it is important for people today to learn what people in the past thought and believed about magpies?"

In regard to the question of protecting magpies on account of the enjoyment people obtain from seeing them, both information type and children's association with conservation/countryside organizations featured in all but two of the models identified (Table 1). Children in the dual group (28%) were the least likely to support this conservation motivation, followed by those in the cultural (43%), scientific (44%), and control (46%) groups, respectively. Children's appreciation of the attractiveness of magpies featured in all the models, and their liking for the species in all but one of the models (Table 1). Schoolchildren's perception of the attractiveness of magpies and their association with conservation/countryside organizations featured in all the models identified in relation to protecting the species on account of its contemporary cultural importance (Table 1). Previous sight of a free-living magpie and the sex of children were included in all but one of the models (Table 1). Support for this conservation motivation (which was not driven by information type) was greater in boys than in girls, and in schoolchildren who had not previously seen a free-living magpie.

Schoolchildren's perception of the attractiveness of magpies was the primary driver of support for protecting the species on account of its appearance, being included all the models identified for responses to this survey question (Table 1).

3.3 | Importance attached to magpie cultural heritage information

Learning about magpie cultural heritage was identified as important by 69% of children surveyed. Information type was included in all of the models identified for responses to this question, along with the schoolchildren's liking for magpies (Table 3). The strongest support for this conservation motivation was provided by the cultural group (77%), followed by diminishing support from the dual, scientific, and control groups (Figure 2b). Sex of children was included in all but one of the models, with support for magpie cultural heritage learning greater in girls than in boys.

TABLE 3 Top ranked models (ΔAICc < 2) identified for responses to the survey question, 'Do you think it is important for people today to learn what people in the past thought and believed about magpies?'

Question	Model	df	Predictor variables						AICc	ΔAICc	Intercept	Deviance
			Attractive	Sex	Like	Organization Membership	Seen	Information type				
Do you think it is important to learn what people in the past thought and believed about magpies?	M0 (Null)	3							521.31	6.48	0.82	515.26
	M1	8		✓	✓			✓	514.83	0	−0.33	498.48
	M2	7			✓			✓	515.80	0.97	−0.16	501.53
	M3	9	✓	✓	✓			✓	516.27	1.43	−0.38	497.82
	M4	9		✓	✓	✓		✓	516.47	1.64	−0.36	498.03
	M5	9		✓	✓		✓	✓	516.58	1.75	−0.15	498.14

4 | DISCUSSION

The declining connection with, and salience of, nature for children in industrialized, urban societies (Louv, 2005) have potentially grave implications for the future of conservation because people will not value what they do not know. The prospect of increasing urbanization globally serves only to increase the seriousness of the situation. Conservation biologists working across all taxa in these contexts must therefore urgently find ways of overcoming public inertia and inspiring attitudes that will contribute to effective conservation action. However, while we should not wish to imply that a taxon's cultural significance should equate to its salience for conservation, our findings do suggest—albeit tentatively—that, where it exists, a species' cultural heritage has a part to play in helping practitioners and policymakers gain a "foot in the door" with regard to engaging the public to this end (Dickinson, 2013; Belaire, Westphal, Whelan, & Minor, 2015).

4.1 | Species' cultural heritage and conservation

While we did not find species' cultural heritage to be a factor influencing children's responses to the question of whether or not magpies should be protected, it was found to positively influence support for certain reasons why magpies should be protected (Table 1). Contrary to what might be expected of a generation that spends a decreasing amount of time outdoors engaging with nature in favor of increased hours indoors entertained by a variety of electronic media (Balmford, Clegg, Coulson, & Taylor, 2002; Roberts, Foehr, & Rideout, 2005), we found that schoolchildren exposed to magpie cultural heritage information regarded it as justification for the conservation of the species (Figure 2a). Although the effect identified was weak—the covariates included along with information type in the best models accounting for just 5% of the variation in children's responses (Table 1)—as might be expected from the artificial context of a paper exercise in the classroom, this nevertheless constitutes a purposeful value judgment on the part of the children in relation to the information received. (We did not test their capacity for recalling the information). This, in turn, suggests an attitudinal and motivational function for species' cultural heritage, both of which are essential for effective conservation action (Heberlein, 2012; Schultz, 2011).

Interestingly, our results point in the direction of a diluting effect of scientific information on appreciation for cultural heritage information. Magpie cultural heritage was valued most highly by those children exposed only to such information, then by those exposed to a mix of cultural and scientific information, and followed by those who received only scientific information pertaining to the species (Figure 2b). Although the effect identified in our study was again weak

(deviance reduction of best models = 3%; Table 3), this pattern is reflected on a much larger scale by the declining access to, and marginalization of, species cultural heritage information in industrialized countries where conservation policy and practice remain embedded within an almost exclusively bio-scientific paradigm (Gosler, Bhagwat, Harrop, Bonta, & Tidemann, 2013; Jepson & Canney, 2003; Pilgrim et al., 2008). According to our findings, the more species-specific cultural heritage information children are exposed to, the greater might be their appreciation of it. Such information might grow in influence in shaping their attitudes toward conservation as they age. We therefore encourage more widespread inclusion of species' cultural heritage information alongside scientific information in conservation education and outreach programs. In this regard it is worth noting that children provided with a mix of cultural and scientific information about magpies in our study were the least likely to agree that the species should be protected on account of the enjoyment people derive from seeing the birds. Information type and other covariates included in the best models identified for this survey question explained just 5% of the variation in schoolchildren's answers (Table 1). The effect, however, does perhaps signal that children so informed are reluctant to gauge conservation priorities from the arguably somewhat superficial perspective of aesthetics.

Our findings also suggest that a person's association with conservation or countryside organizations indicates a positive attitude toward species conservation. Therefore, the adoption by those organizations of communication strategies that balance bio-scientific with ethno-biological perspectives will, we suggest, enhance the engagement of their members with issues of conservation concern and action. In this way, membership data for such organizations could provide a reliable proxy of the extent to which an active conservation ethos pervades the public mindset. Nevertheless, our results indicate that certain other factors are currently more important to 10- and 11-year-old schoolchildren than species' cultural heritage for inspiring a conservation ethos. Chief among those was the perceived attractiveness of a species (Table 2). This, we suggest, is closely related to a child's liking of a species (i.e., magpies are liked largely on the basis of their appearance). However, as they mature, children will inevitably encounter complex debates surrounding trade-offs in conservation, animal population control, and so on. Exposure to these broader horizons in conservation has the potential to override childhood convictions that a species should be protected on account of its attractiveness and likeability—not least in relation to magpies, arguably the most divisive bird species in Britain! This, we suggest, lends support to our call for the widespread inclusion of species' cultural heritage information in conservation education programs because regard for this has the potential to endure even when these other conservation motivations fail. This is because cultural heritage information often takes the form of stories and rhymes, which appeal to the imagination as well as the intellect (Raines & Isbell, 1994), and because such information indicates that an interest in a species (e.g., magpies) is socially acceptable as part of a bigger "cultural story" involving people and birds that should be continued. Storytelling is already recognized as an effective means of engaging audiences of all ages with issues of conservation concern (Jacobson, McDuff, & Monroe, 2006). We suggest, therefore, that a species' cultural heritage information has the potential to engage adults as well as children in inspiring a lasting conservation ethos.

4.2 | Conclusion

Our findings suggest that species' cultural heritage possesses some potential that could be exploited by conservation biologists as an effective means of inspiring a lasting conservation ethos among urban dwellers in industrialized nations—a prerequisite for effective conservation action. The absence of strong effects identified by our study, along with its spatial and temporal limitations, mean that further studies will be required to determine the transferability of our method and findings across diverse contexts, among different age groups and in relation to other species spanning the spectrum of conservation concern. However, while local contexts for cultural engagement will differ greatly between communities, species, and so on, we suggest that the principal that a culturally contextualized approach to conservation is most likely to succeed should be generally accepted. The possible latent influence of a person's prior exposure to a species' cultural heritage on their attitudes toward that species' conservation is also worthy of investigation. So too is the question of why some species are more culturally salient than others and the implications of this for ethno-biological approaches to conservation education and action. Although our study cannot, therefore, claim to be the last word on the matter, we nevertheless contend that it constitutes a necessary "first word" on the potential value of species' cultural heritage for conservation.

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