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Travelling birds generate eco-travellers: The economic potential of vagrant birdwatching

Corey T. Callaghan [a], Michael Slater[b], Richard E. Major[a,c], Mark Morrison[d], John M. Martin[a,e], and Richard T. Kingsford[a]

[a]Centre for Ecosystem Science, School of Biological, Earth and Environmental Sciences, UNSW Sydney, Sydney, NSW, Australia; [b]Mohnton, Pennsylvania; [c]Australian Museum Research Institute, Australian Museum, Sydney, NSW, Australia; [d]Faculty of Business, Charles Sturt University, Bathurst, NSW, Australia; [e]Royal Botanic Gardens and Domain Trust, Sydney, NSW, Australia

ABSTRACT

Avitourism is one of the faster growing subsectors of ecotourism, recognized for its economic value. Much of our current understanding of the economic value of avitourism revolves around bird festivals, migration events, or well-known birdwatching sites. Birdwatchers are a diverse group, some of whom competitively seek vagrant birds (i.e., birds outside their normal geographic range). The economic value from these unpredictable and transient birdwatching events remains poorly known. Using the travel cost method in a readily-quantifiable environment, we estimated that a vagrant Black-backed Oriole in Pennsylvania, United States of America, stimulated travel activity valued at about $223,000 USD or about $3,000 per day over 67 days. Some birdwatchers value rare birds, contributing significant time and financial resources to their viewing. Identifying such significant real economic value from avitourism can help to evaluate competing costs in debate over human land-use scenarios.

KEYWORDS

Avitourism; biodiversity; ecosystem service; ecotourism; ecological economics; recreation value

Introduction

Ecotourism is a growing, diverse field (Das & Chatterjee, 2015; Orams, 1995), and fully understanding its positive and negative impacts is critical to future implementation. Ecotourism specifically aimed at birdwatching, or avitourism, is growing fast (Steven, Morrison, & Castley, 2015), potentially generating significant income (Şekercioğlu, 2002). For instance, Point Pelee National Park, Canada generated $USD 3.2 million of local income (Hvenegaard, Butler, & Krystofiak, 1989), while five birdwatching sites in the United States of America (USA) each generated $USD 2.4–$40 million (Şekercioğlu, 2002), and a single stork breeding season in Poland was costed at between $USD 170,000–350,000 (Czajkowski, Giergiczny, Kronenberg, & Tryjanowski, 2014). The former figures are likely to have only increased in recent years, given the increased interest in birdwatching as a hobby (Biggs, Turpie, Fabricius, and Spenceley, 2011). Understanding the patterns and practices of

CONTACT Corey T. Callaghan c.callaghan@unsw.edu.au School of Biological, Earth and Environmental Sciences, University of New South Wales, Centre for Ecosystem Science, Sydney, NSW 2052.

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birdwatchers' travel is critical for estimating the financial benefits of avitourism (Biggs et al., 2011; Steven et al., 2015), especially as the industry continues to expand.

The birdwatching community is diverse, ranging from casual to dedicated participants, with varying levels of experience (Hvenegaard, 2002; McFarlane, 1994; Scott & Thigpen, 2003), and in the United States alone there are estimated be 17.8 million people who partake in the hobby away from their home (USFWS, 2011, p. 36). Birdwatchers contribute to local economies (e.g., Biggs et al., 2011; Hvenegaard et al., 1989; Lawton, 2009; Measells & Grado, 2007), but they can have an impact on avian communities that is potentially positive or negative (e.g., Jones & Nealson, 2005). Most of our current understanding of the economic contribution of birdwatchers is based on birdwatching at specific sites (e.g., Gürlük & Rehber, 2008; Hvenegaard et al., 1989; Kerlinger & Brett, 1995), regions (e.g., Burger, Gochfield, & Niles, 1995; Kim, Keuning, Robertson, & Kleindorfer, 2010), bird festivals (e.g., Isaacs & Chi, 2005; Kim, Scott, Thigpen, & Kim, 1998), or bird-events (e.g., migration: Eubanks, Kerlinger, & Payne, 1993; communal roosting: Clark, 1987; breeding: Czajkowski et al., 2014). No studies have quantified the economic value of birdwatching for an individual bird.

People value rare species (Angulo & Courchamp, 2009) and some ecotourism markets concentrate on the viewing of rare species (e.g., Whale Sharks – Rowat & Engelhardt, 2007; Lions – Hemson, Maclennan, Mills, Johnson, & Macdonald, 2009). The degree to which people value rarity is poorly understood and generally lacks economic quantification (Biggs et al., 2011; Booth, Gaston, Evans, & Armsworth, 2011). The relatively few studies of the value of rarity are primarily dependent on estimations using a traditional definition of rarity (i.e., very uncommon, scarce, or infrequently encountered species; e.g., Angulo & Courchamp, 2009; Courchamp et al., 2006; Gault, Meinard, & Courchamp, 2008). While birdwatchers generally value the traditional definition of rarity in their pastime, a specific subset of birdwatchers also significantly value a different type of rarity: a species observed outside its normal geographic range (where it may be abundant; *sensu* Booth et al., 2011)–that is a vagrant. This particular group are specialized and committed (Hvenegaard, 2002; McFarlane, 1994; Scott, Ditton, Stoll, & Eubanks, 2005), representing a small portion of the overall number of birdwatchers, but likely contributing a significant amount of resources as they are the most active and travel the greatest distances to see birds, especially vagrants.

Vagrant birds are frequently encountered in birdwatching and are a major pull-factor of avitourism both at local and national scales (i.e., Booth et al., 2011). For instance, in 2016 in the USA alone, 11 'mega-rarities' (a vagrant of significant rarity) occurred, five of which were first records for the USA (Callaghan et al. in prep). An extreme example of the attraction of vagrant birds comes from the challenge of a 'big year', a competition to see the most bird species in a calendar year within a designated geographic region (e.g., Dooley, 2005; Obmascik, 2004). This competition was sensationalized by a 2011 Hollywood film starring Owen Wilson, Steve Martin, and Jack Black. These 'listers' or 'twitchers' (Booth et al., 2011) often travel great distances, expending significant resources to see rare and/or vagrant birds, often treating birding as a competitive sport (Sheard, 1999), as depicted in the movie. A quick image search for "rare bird twitch" will reveal dozens of online photos filled with throngs of people viewing a single vagrant bird (e.g., Figure 1). However, these

Figure 1. Birdwatchers gathered early in the period of residency of the Black-backed Oriole in Pennsylvania. Photo by Jeffrey Gordon.

events are unpredictable (by definition) and vary in duration (i.e., ranging from hours to months), making them exceedingly difficult to assess on an economic scale. Compounding this problem is the fact that many vagrant birds occur in natural, sometimes remote areas (i.e., parks and wildlife refuges), which makes it difficult to quantify their economic contribution (e.g., number of birdwatchers) to local communities. In one exception, the value of vagrant birds in the United Kingdom was crudely assessed using the number of birdwatchers and the distance they travelled as simple measures of value (Booth et al., 2011).

Importantly, despite the potential positive economic impacts of avitourism and vagrant birds to local economies, this form of ecotourism can have negative environmental effects if tourists are not carefully managed (e.g., Green & Giese, 2004; Klein, Humphrey, & Percival, 1995). This is particularly important because vagrant birds often occur in protected areas, where there is significant potential for recreational disturbance (Gallet, Lemauviel, & Roze, 2004; Reed & Merenlender, 2008; Taylor & Knight, 2003). It is therefore useful to quantify the economic benefits to help evaluate the relative costs and benefits of vagrant birdwatching.

We took advantage of a unique dataset, collected by homeowners who hosted a vagrant Black-backed Oriole (*Icterus abeillei*) in Pennsylvania. We quantified the economic value of this birdwatching event, which attracted 1,824 travellers from around the United States of America. We combined this economic analysis with a quantitative questionnaire addressing the motivation of these eco-tourists, to develop a greater understanding of this largely unstudied tourism phenomenon.

Methods

Study site and species

The vagrant Black-backed Oriole was initially photographed on January 26th, 2017 visiting a backyard bird feeder in rural Berks County, Pennsylvania, USA. This species is endemic to Mexico, and this record represented only the second occurrence in the United States (ABA Blog, 2017). The previous record (San Diego, California) was rejected by the official listing committee of California, deemed an escapee, rather than a vagrant (ABA Blog, 2017), making this Pennsylvanian individual particularly appealing to many birdwatchers. Its location was advertised seven days later to the birdwatching community, after which birdwatchers travelled to see the bird. Unusually, the homeowners kept a logbook of birdwatchers and their origins (cities and states), until the oriole was last seen on April 10th, 2017.

Data analysis

We estimated the economic value of the event, using the zonal travel cost method (Czajkowski et al., 2014; Morrison, 2009), which identified the travel cost based on the proportion of people visiting a site from different distances. First, we defined 'origin zones', as counties from which visitors originated. For each origin (i.e., city/state combination), we calculated mid-point coordinates (https://www.gps-coordinates.net/), which were then pinned to the midpoint of their county. We then calculated the return distance from each county to the vagrant bird destination. A double log regression model was used to estimate the trip generation function, where the response variable was the number of visitors per 1000 population in each zone, with the travel cost as the explanatory variable. Population data for each county were calculated using the "USA Counties" GIS layer (ESRI, 2017), with travel cost based on the standard cost of operating an automobile (i.e., variable vehicle cost) and the cost of time (McConnell & Strand, 1981). This was set at 0.2369 USD per km (AAA, 2016) and an average speed of 105 km/h was used to calculate time spent for the trip. The opportunity cost of time was valued at half the national hourly wage rate for the United States in February ($13.05; Bureau of Labor Statistics, 2017). We then used hypothetical entry fees ($0–$100, in increments of $10) to determine the number of theoretical visitors at each price. The number of visitors at each price point were used as inputs to calculate a demand curve to estimate the total consumer surplus of the oriole, determined as the area under the curve. Given the debate over the incorporation of the opportunity cost of time into travel cost methods (e.g., McConnell & Strand, 1981), we followed the two most common approaches: 1) incorporating a fraction of the wage rate, and 2) not incorporating time costs (*sensu* Czajkowski et al., 2014).

Quantitative survey data

An anonymous survey, which examined motivation, mode of travel, and actual travel costs was designed in google forms. Questions were developed based on previous surveys (e.g., Czajkowski et al., 2014) and supplemented with our personal extensive insights into birdwatchers' behaviors in relation to chasing vagrant birds. To characterize the frequency of such

birdwatching activity, we asked birdwatchers how often they 'chased' rare birds, defined as species on a state's review list. We assumed that this definition would capture the category of vagrant birds. Because the exact addresses of the birdwatchers who visited the oriole were not known, the survey was distributed through Facebook (including a Facebook page dedicated to the oriole: https://www.facebook.com/groups/1830559317197575/), birdwatching listservs, and by word-of-mouth.

Results

Total economic value

The total economic value of the oriole was ~ $213,000 USD– ~ $223,000 USD, depending on whether we accounted for travel cost. This equated to ~ $3,180 USD–$3,328 USD per day. This was calculated using the travel cost method (see detailed results below) which accounted for ~ $119,000 USD–$129,000 USD. These values were combined with the estimated expenditures of food and accommodation, based on the survey results (see detailed results below). Assuming the 13% response rate of the survey was representative of the entire sample of visitors, input of food expenditure was ~ $51,000 USD while accommodation expenditures were ~ $43,000 USD.

Economic value based on travel cost method

Of the 1,824 people who signed the logbook, 68 entries did not provide their origin and 13 were illegible. Two individuals from the United Kingdom and 15 from Canada were excluded from analysis because of their undue leverage on analyses, given a lack of evidence that they had travelled specifically for the oriole (despite it being accepted that some birdwatchers undertake large-scale migrations). This left 1,726 individuals in our analysis.

Most people (57%) who visited the site of the vagrant oriole originated from within 100 km, with 28% travelling from within 50 km, 9% travelling > 500 km, and 3% travelling > 1000 km (Figure 2). Numbers of travellers decreased strongly over time, with 48% of trips occurring within the first week (Figure 3), despite the bird's relatively long-term residency of 67 days. In total, the economic value of the vagrant oriole ranged from ~ $119,000 USD–$129,000 USD, or ~ $69–$75 per trip, depending on how we accounted for opportunity cost (Figure 4). Data used to perform the analysis can be downloaded from: https://doi.org/10.5281/zenodo.1008799.

Survey results

There were 235 valid responses to our survey which comprised 13% of the total visitors recorded in the logbook. Of the survey respondents, most (97%) successfully saw the oriole and most (96%) for the first time. Ninety percent of respondents belonged to a local, state, or national bird-conservation based group. Most travellers (85%) made one trip to see the oriole, while 11% travelled twice, and 4% travelled three or more times. Also, most travellers (85%) stated that the oriole was the 'sole reason' for their trip, but 66% of respondents also did additional birdwatching while they were in the area.

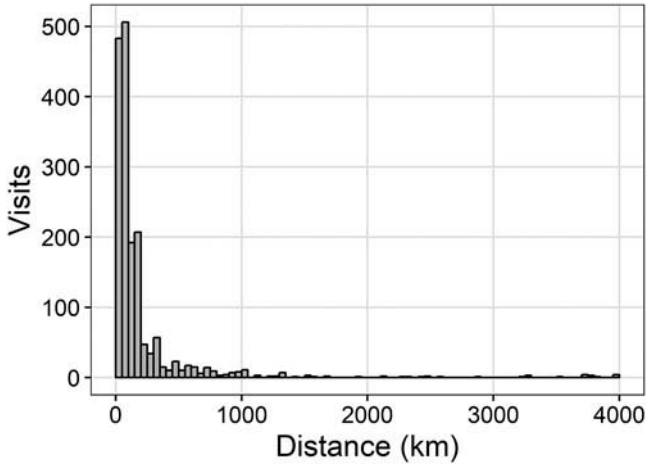

Figure 2. Frequency distribution of one-way distances that bird watchers travelled to view the Black-backed Oriole in Pennsylvania, USA (N = 1,726), based on the great circle distance from the city/state origin they provided in a logbook.

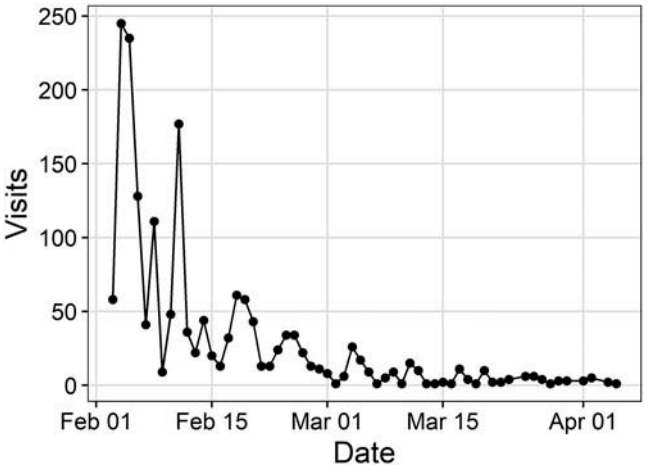

Figure 3. Distribution of visits through time in 2016 in the number of birdwatchers (N = 1,726) travelling to view the Black-backed Oriole over its duration of residency (67 days).

We characterized three economic aspects of respondents' trips (travel, food, and lodging), based on self-estimation responses of the amount of money spent. Respondents estimated an average of $58 (SD = $103; N = 216) on travel per trip. In total, 54% of people car-pooled, with an average of 1.9 people per vehicle (SD = 1.03; range = 1–6). Mostly, they travelled in a private vehicle (96%), but also rental vehicles (2.5%) and aeroplanes (1.6%). They spent an average of $28 (SD = $45; N = 221) on food per trip, with 55% of respondents only dining out, 25% only making their own meals, and 19% doing both. Of those that dined out (N = 176), they did so on average 1.8 times (SD = 1.7). Of the total survey respondents, 16% included an overnight stay, with most (78%) of these staying in a hotel/motel, while some stayed at friends'/relatives' homes

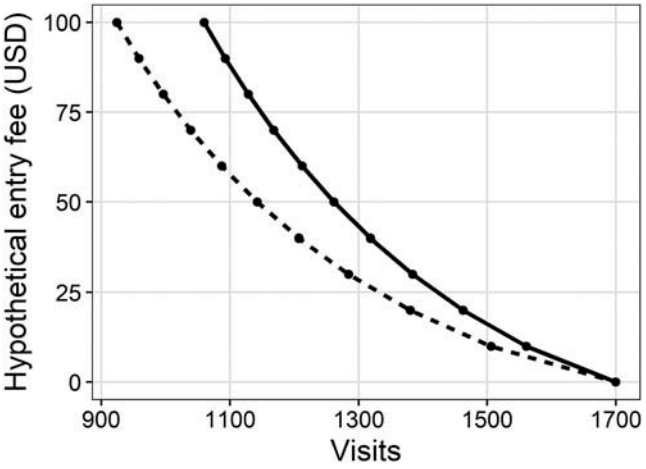

Figure 4. Demand curve calculated using a double-log regression model, excluding (dashed line) and including (solid line) the cost of time. Entry fees were restricted to values between $0 and $100 USD.

(17.1%) and others camped (4.8%). Given the close distance of the majority of visitors (i.e., 57% travelled from within 100 km), we assumed that most visitors undertook day-trips. Of the 32 respondents willing to estimate their accommodation costs, on average they paid $149 per trip (SD = $125; N = 32). Finally, on an annual basis, 44% of respondents (N = 231) chased rare birds 1–3 times, 26% 3–7 times, 10% 7–10 times, 17% more than ten times, and only 3% said they had never previously chased rare birds.

Of note, there were minimal environmental impacts in this case study because the oriole appeared in residential Pennsylvania, and the prime viewing location was a residential driveway (Figure 1) rather than a sensitive habitat that might be vulnerable to trampling.

Discussion

The occurrence of a vagrant oriole in Pennsylvania, USA, stimulated an avitourism event that we conservatively estimated generated expenditure of ~$223,000 USD. This represents considerable economic activity. Further, there was a rapid response (48% of activity in the first week) that is suggestive of an ever-present motivation for this form of avitourism, underlining its consistent importance and contribution to the economy. Moreover, 'twitching' or 'chasing' of rare birds occurs frequently, given that 17% of respondents (N = 235) engaged in this type of travel more than ten times per year. Viewing of vagrant birds thus represents a potentially substantial contribution to the economy. In addition, this economic value remains largely an unrecognized opportunity for the travel industry, and there is considerable scope for development. Further, such economic activity for wildlife needs to be balanced against competing land-use scenarios and often deleterious costs of land-development activities which may destroy such opportunities.

The economic value of this vagrant bird event was probably higher, given the conservative nature of our estimate. For instance, our use of the travel cost method excluded

accommodation costs and additional food expenditures, commonly included when estimating recreation values (Morrison, 2009). Rather, these were estimated through an online questionnaire, which sampled a small and possibly unrepresentative subsample of people who visited the bird. Further, not every birdwatcher who visited the bird would have signed the logbook. There is also a high likelihood that this particular vagrant bird did not attract the maximum number of travellers because a previous occurrence of this species in the USA had been disallowed by the American Birding Association (i.e., the authority verifying vagrant records). Some birdwatchers may have discounted this occurrence due to uncertainty as to whether it too would be declared an escaped cage-bird, rather than a legitimate vagrant.

Vagrant birdwatching is a unique form of recreational avitourism, and given its unpredictable and ephemeral nature (Booth et al., 2011), it remains difficult to estimate its economic value. Our study relied on a unique circumstance for collecting incidental data (the logbook), which ultimately restricted opportunities for experimental planning. As such, there are some limitations to our study. We were unable to record a higher percentage of survey responses, because we could not survey the visitors directly, nor did we have their specific contact information. We were also unable to confirm the accuracy of the log-book or estimate the number of people who failed to record their visit. These limitations did not allow us to fully estimate the accuracy of the survey results (e.g., accommodation estimates). Lastly, this study represents one individual vagrant bird, of which there are dozens each year (Callaghan et al. in prep), and may not be representative of all vagrant birds.

Future research in this area should involve the preparation of a planned data collection protocol, ready for implementation upon the arrival of a suitable experimental vagrant. Such a protocol would benefit from the collection of data on tourist demographics (i.e., socioeconomic, age, and marital status; Garrod & Willis, 1999) and on the relative importance of factors such as bird 'attractiveness' and 'accessibility'.

Rarity of vagrant birds is an important factor in predicting the number of visitors that travel to view vagrants (Booth et al., 2011), probably flowing through to a positive relationship between economic potential and the rarity of vagrants. The pursuit of identifying, watching, and listing vagrant birds is an important part of the birdwatching hobby. This is evidenced by the summation of these records in bird club newsletters and books describing vagrant bird reports for different geographic regions (e.g., Dymond, Fraser, & Gantlett, 2010; Howell, Lewington, & Russell, 2014). The level of economic value will inevitably depend on ease of travel, a bird's 'attractiveness', overall rarity, duration of the rare bird's presence, and region of the world. All these factors influence the level of interest by the birdwatching community and their motivation to travel.

Birdwatchers tend to be well-educated, wealthy, and committed (Şekercioğlu, 2002), making them viable candidates for developing travel programs with both economically and environmentally beneficial outcomes. Indeed, 90% of our survey respondents were members of a local, state, or national bird group, demonstrating their commitment to the hobby (McFarlane and Boxall, 1996), also contributing ~$2,000 dollars to conservation through donations collected at the vagrant bird event. Specialized, committed, birdwatchers (Hvenegaard, 2002; McFarlane, 1994) were likely the dominant travellers chasing the vagrant oriole, given that almost half of the birdwatchers viewed this bird within the first week. They were evidently not prepared to risk the possibility of the bird moving on while they planned more detailed itineraries. There are many other less-motivated birdwatchers, whose

participation in ecotourism could be increased if suitable opportunities were developed. An estimated 17.8 million people in the USA birdwatch away from their home (United States Fish and Wildlife Service (USFWS), 2011), so there is considerable potential to leverage this enthusiasm for both tourism and ecological benefits (i.e., Orams, 1995).

Conclusion

We have demonstrated substantial economic benefit (~ $213,000 USD– ~ $223,000 USD) in the form of vagrant birdwatching, exemplified by the vagrant Black-backed Oriole in Pennsylvania. In general, land managers and local businesses seldom capitalize on tourism opportunities from vagrant birds (Booth et al., 2011) or bird events (e.g., stork breeding; Czajowski et al., 2014), which clearly exist as exemplified by this case study. Although vagrant bird events are highly unpredictable, their potential economic benefits to local and surrounding economies are certainly exploitable, through capitalizing on this specific subset of birdwatchers. For instance, local restaurants, Bed and Breakfasts and hotels/motels may capitalize on these opportunities through providing unique opportunities to birdwatchers (i.e., local bird tours, selling souvenirs, special discounts for birdwatchers). In addition, vagrant birds offer an opportunity for an ecotourism experience shifted towards improved environmental understanding, conservation attitude change, and ecologically responsible behavior (Orams, 1995, 1997). Furthermore, real economic values need to be incorporated into cost benefit analyses for environmental decisions that affect conservation of organisms and their ecosystems. This study provides a small but valuable piece of economic evidence for policy-makers to incorporate in their assessment of the potential economic value of the environment, including vagrant birds, which are ultimately dependent on the persistence of biodiverse natural habitats.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

ORCID

Corey T. Callaghan http://orcid.org/0000-0003-0415-2709

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