UNIVERSITY OF WAIKATO

Hamilton
New Zealand

The Value of Native Bird Conservation: A New Zealand Case Study

Pamela Kaval and Matthew Roskruge

Department of Economics

Working Paper in Economics 11/09

November 2009

Corresponding Author

Pamela Kaval
Department of Economics
University of Waikato,
Private Bag 3105,
Hamilton, New Zealand

Fax: +64 (7) 838 4331
Phone : +64 (7) 838 4045
Email: pam98k@yahoo.com; pkaval@mngt.waikato.ac.nz

Abstract

During December 2007 and January 2008, telephone surveys were used to randomly sample Waikato, New Zealand residents. The purpose of the surveys was to determine whether respondents valued native bird conservation programmes in their area. We elicited the contingent valuation approach to determine the value in terms of their willingness-to-pay (WTP) to support regional conservation initiatives aimed at protecting, or restoring, native bird populations. Results indicated that local birdlife was regarded positively by residents and that they were in favour of local conservation and restoration initiatives. 86% of respondents were willing-to-pay an annual addition to their rates (taxes) to support these initiatives. Conservatively, the value of native bird conservation in the region was approximately $13 million (2008 NZ$). Willingness to support these initiatives depended strongly on income, ethnicity and age. The positive WTP for additional regional rates for local birdlife conservation suggests that there could potentially be an underinvestment in birdlife conservation in the Waikato region, and that regional bodies could draw upon local funding, as opposed to relying on central government funding, to support these initiatives.

Keywords

contingent valuation method
endangered species
New Zealand
native birdlife
bird conservation

JEL Classification

Q51; Q57; Q26

Acknowledgements

We would like to thank our 207 survey and pre-test respondents, as well as all authors that responded to our request for bird valuation studies. We would also like to thank the University of Waikato summer research scholarship programme for sponsoring a portion of this project.

1. Introduction

There are approximately 10,000 species of birds alive today, and of those, just over 2,000 are identified as threatened or endangered (Birdlife International, 2006). The conservation and management of bird species is therefore critical if their natural ecology and diversity is to be maintained. This is especially true for New Zealand, where the native bird population is very unique. The country's relative isolation and lack of mammalian fauna has resulted in birdlife becoming prolific and diverse, as bird species adapted to fill the roles normally filled by other animals (Tennyson and Martinson, 2006). However, the adaptations developed by these species have left them vulnerable to predation and competition from introduced mammal species, most significantly human beings. Since people began to reside in New Zealand in the 1300's, 58 bird species, or 26% of the original species, have become extinct (Tennyson and Martinson, 2006; Taylor, 1997). Of the remaining 165 indigenous bird species, a number have suffered significant declines and 42% are threatened with extinction in the foreseeable future (Taylor, 1997; Hitchmough et al., 2005).

Many of these threatened and endangered species require attention in the form of protection, species management and recovery programmes, if we are not to lose them entirely. However, in protecting these species, governments and communities face significant costs that may come in the form of establishing secure environments, removing pest species, and restoring or regenerating native habitats. While the costs of maintaining and preserving bird species can easily be calculated, the monetary benefits are more difficult to ascertain (Rehdanz, 2007).

Some economists have devised methodologies to value the benefits of non-market goods, such as birdwatching (Carson, 2000; Haab and McConnell, 2003). As a result, the potential benefits of birdlife can be separated into two broad forms, use values and non-use values (Stevens et al., 1991; Carson, 2000; Haab and McConnell, 2003). The term 'use value' describes the values derived from direct encounters and activities. In the case of birdlife, use values would include activities such as birdwatching or hunting. In contrast to this, the term 'non-use value' describes the value obtained without the direct use of the birdlife resource, such as existence value or bequest value.

Since the 1980's, several researchers worldwide have attempted to derive both use and non-use values for birds, whether it be for one particular species, such as the whooping crane, or for more general reasons, such as birdwatching or migratory bird protection. In an extensive literature review, we located approximately 30 studies that placed a value specifically on birdlife. This review was aided by two meta-analyses: Flight and Lovell (2002) and Yao and Kaval (2007).[1]

[1] We omitted reviewing bird hunting studies as a vehicle for valuation, since hunting native birds in New Zealand is currently illegal.

Of the valuation literature reviewed, twenty publications were found to value one specific bird species. Of those, eight species were evaluated in multiple studies, or multiple times within a single study that applied different methods; as a result, sixteen species were valued between the studies. A range of vehicles were used to elicit value, including asking respondents for hypothetical one-off donations, tabulating birdwatching trip values and calculating the opportunity costs associated with conservation projects (Table 1).[2]

When studying individual species, the lowest bird value ($3.99) was for an actual one-time donation to help save the red kite population in the United Kingdom (Christie, 2007). In the Christie (2007) study, hypothetical one-time donations were also calculated, revealing that the hypothetical donation ($13.57) was over three times the amount of the actual donation. The highest one-time donation ($633.45) was for the bald eagle in the United States (US) (Swanson, 1993). Since the bald eagle is the national symbol of the US, it may have a higher value than other lesser known US bird species.

In relation to annual values, Bowker and Stoll (1988) found that the whooping crane was valued less in Texas by residents ($129.41) than by visitors ($203.09). This question was asked of visitors to a wildlife refuge, and therefore, non-Texas visitors may have travelled there specifically to see the whooping crane, as they migrate to Texas for the winter months (Bowker and Stoll, 1988). Local residents, on the other hand, may have come to the area for other reasons, such as boating. Other annual bird species values ranged from $13 for the red cockaded woodpecker in South Carolina (US) (Reaves et al., 1999) to $231 for the spotted owl in the US (Hagen et al., 1992).

In addition to specific bird studies, we were able to locate 17 general bird studies. These general studies investigated the value of migratory bird protection, birdwatching, controlling bird pests and preserving rare bird habitat (Table 2). General bird study valuation questions asked respondents to pay an annual fee, or a per visit cost, such as an entrance fee.

The values in the general studies ranged from $7 annually for an international world value study that surveyed people from 73 countries to determine how they valued the decline of one generic undefined bird species (Rehdanz, 2007) to $2,751/ annually per person to aid in saving rare bird habitat in Costa Rica (Menhaus and Lober, 1995). A study by Kaval and Loomis (2003) presented a meta-analysis of outdoor recreation values. They found eight estimated values for birdwatching in the US from four studies, with a mean consumer surplus value per person per day for birdwatching equalling $44.72 (2007 NZ$).[3]

---

[2] All data has been converted to 2007 NZ$ for comparison purposes, using data conversions from DXtime (EconData, 2008).

[3] To prevent repetition in the tables, we did not list each of the Kaval and Loomis (2003) studies. However, for reference purposes, they included: Eubanks and Stoll, 1999; Fermata, 2000; Shafer et al., 1993; and Wellman and Noble, 1997.

Table 1: Individual Bird Species Valuation Study Results (2007 NZ$)

Author/s	Species valued	Publication year	Study location	Frequency	Value $NZ (2007)
Swanson	Bald Eagle	1993	Washington, US	One-time donation	$633.45
Stevens et al.	Bald Eagle	1991	New England, US	Annually	$48.60
Boyle & Bishop	Bald Eagle	1987	Wisconsin, US	Annually	$38.31
Ojea & Loureiro	Common Murre	2007	Galicia, Spain	Annually	$39.64
Marcus & Matauschek	Corncrake	2005	Germany	Opportunity cost of conservation	$781,317,137.10
Wilson & Tisdell	Golden Shouldered Parrot	2007	Australia	Annually	$96.44
Navrud & Mungatana	Lesser & Greater Flamingos	1994	Lake Nakuru N.P., Kenya	WTP/visit	$52.46
Navrud & Mungatana	Lesser & Greater Flamingos	1994	Lake Nakuru N.P., Kenya	WTA[4]/visit	$206.47
Loomis & Ekstrand	Mexican Spotted Owl & habitat	1997	US	Annually	$75.45
Rubin et al.	Northern Spotted Owl	1991	Washington State, US	Annually	$99.08
Kotchen & Reiling	Peregrine Falcon	2000	Maine US	Annually	$59.50
Reaves et al.	Red Cockaded Woodpecker	1999	South Carolina & US	Annually	$13.52-$16.52
Christie	Red Kite	2007	United Kingdom	Hypothetical one-time donation	$13.57
Christie	Red Kite	2007	United Kingdom	Actual one-time donation	$3.99
MacMillian et al.	Red Kite	2006	Scotland	Annually	$22.61
Fahy & Kerr.	Royal Albatross	1991	New Zealand	Annually (More information provided)	$30.40- $34.46
Fahy & Kerr.	Royal Albatross	1991	New Zealand	Annually (Less information provided)	$25.46- $31.11
Hagen et al.	Spotted Owl	1992	US	Annually	$122.33-$231.11

[4] WTA stands for Willingness-to-Accept, a stated preference methodology.

Table 1: Individual Bird Species Valuation Study Results (2007 NZ$), *continued*

Author/s	Species valued	Publication year	Study location	Frequency	Value $NZ (2007)
Loomis & González-Cabán	Spotted Owl habitat	1998	California & New England	Annually	$101.51
Bowker & Stoll	Whooping Crane	1988	Texas (residents) US	Annually	$129.41
Bowker & Stoll	Whooping Crane	1988	Texas (visitors) US	Annually	$203.09
Stoll & Johnson	Whooping Crane	1984	Texas & US	Not reported	Not reported
MacMillian et al.	Wild Geese	2002	Scotland	One-time donation (Market stall)	$17.83
MacMillian et al.	Wild Geese	2002	Scotland	One-time donation (Survey)	$59.16
Stevens et al.	Wild Turkey	1991	New England, US	Annually	$29.89

Table 2: General Bird Valuation Study Results (2007 NZ$)

Author/s	Topic valued	Publication year	Study location	Frequency	Value $NZ (2007)
Naidoo & Adamowicz	Avian species diversity	2005	Uganda	Optimal fee per entrance	$129.58
Mortimer et al.	Bird reserve on offshore island	1996	New Zealand	Annually, per household	$46.65
Kellerman et al.	Birds as pest control on coffee plantations	2008	Jamaica	Value of pest reduction by hectare	$69.04-$164.76
Crandall et al.	Birdwatcher spending	1992	Arizona, US	Per Visit	$107.31
Stoll et al.	Maintaining current resource situation	2006	US	Annual net WTP (Only Birdwatchers)	$617.08
Kaval & Loomis	Birdwatching	2003	US	Per Person Per Day	$44.72
La Roche	Birdwatching	2003	US	Per Day (In state resident)	$96.50
La Roche	Birdwatching	2003	US	Per Day (Non-resident state)	$369.44
Hvenegaard et al.	Birdwatching	1989	Canada	Per Person Per Day Birdwatching	$163.00
Wilson & Tisdell	Knowledge of bird species and fund allocation	2005	Australia	Respondents asked to allocate Australian $1000 annual donation between several species	N/A
Menkhaus & Lober	Rare bird habitat	1995	Costa Rica	Average annual per person valuation	$2,751.65
Colby & Smith-Incer	WTP for popular birding reserve	2005	US	Annually	$199.25
Brouwer et al.	WTP Migratory bird protection	2007	Netherlands	Annually	$25.68
Sultatian & Van Beukering	WTP Migratory bird protection	2007	Netherlands	Annual payment (Protection in Europe by Dutch respondents)	$22.13
Sultatian & Van Beukering	WTP Migratory bird protection	2007	Netherlands	Annual payment (Protection in Africa in Europe by Dutch respondents)	$21.56
Redhanz	WTP to prevent decline of one random bird species	2007	International	Annually	$7.78
Clark	WTP to visit popular birdwatching reserve	1987	Canada	Travel-cost	$13.53

The majority of the studies reviewed used the contingent valuation method to derive an estimated value for birdlife. The contingent valuation method is a stated preference methodology that typically asks respondents how much they would be willing-to-pay for a specific non-market good, such as the protection of native birds. Once respondents have revealed their willingness-to-pay (WTP) for a particular item, the results can be aggregated to estimate public WTP and, therefore, estimate the net benefits of the resource (Layman et al., 1996; Gren, 2001; Dalton et al., 1998; Kaval et al., 2007).

In summary, the reviewed literature suggests that birds are an important natural resource and there is a value in preserving them, whether benefits were obtained directly by use and observation, or indirectly.

While a variety of conservation programmes exist in New Zealand with the goal of protecting or increasing native bird populations, there have been few economic studies directly related to birdlife in New Zealand examining the benefits of these projects. These studies include Fahy and Kerr's (1991) study on Albatross (details in Table 1) and Mortimer, Sharp and Craig's (1996) study on offshore islands (details in Table 2). There have also been New Zealand studies valuing recreation and national parks, in general. These studies may have some indirect relationship to New Zealand's birdlife through birdwatching or conservation of habitat, however, birdlife was not the basis of those studies.

As a result of the need for New Zealand bird valuation studies; this study will be making a contribution to the current literature. The main objective of this study was to interview residents in the Waikato Region of New Zealand to better understand the benefits of native bird conservation within the local area, and to contribute to the international body of literature regarding wildlife valuation.

2 . Material and Methods: The Survey Questionnaire

Due to time and funding constraints, the telephone survey format was selected as the preferred method of elicitation for this project. Telephone data was shown by Groves et al. (2001) and Waksberg (1978) to be significantly similar in quality to data collected in face-to-face interviews.

After the original survey was created, a pre-test was conducted to determine if all survey questions were easily understood. Respondents in the pre-test only recommended minor changes to question wording, enabling us to finalize the survey. The final survey was comprised of thirteen questions and was divided into two sections. The first eight questions referred directly to birdlife in the Waikato region, asking questions relating to respondents' experiences and attitudes towards birdlife, as well as whether they would contribute funding

towards bird programmes. The final five questions were demographically related, asking respondents about their age, gender, personal income and ethnicity.

To determine the value of birdlife, we included a non-market contingent valuation question. Non-market valuation techniques are widely used and provide robust results in the estimation of values for a diverse range of subjects. As observed in our literature review of bird studies, the contingent valuation method is currently one of the most commonly employed non-market valuation techniques (Alberini and Kahn 2006; Kaval et al. 2009; Pearce and Turner, 1990; Carson, 2000; Ahmed and Gotoh, 2007). The contingent valuation method involves creating a hypothetical market, or referendum, using a questionnaire, and then allowing the respondent to indicate their WTP for the non-market good in question (Mitchell and Carson, 1989).

The environmental resource under investigation was native birdlife in the Waikato region, and the value of conservation and protection of native New Zealand birds to the local population. Prior to the WTP questions' presentation, respondents were provided with information on an actual conservation programme operating in the Waikato region[5], allowing respondents to familiarise themselves with the topic under investigation. The WTP question was asked in a dichotomous choice format. All respondents were provided the same WTP question, with only the bid amount varying between respondents. Bid amounts were determined during the pre-tests and with information from previous related studies in the region (Yao and Kaval, 2010) and included $1, $10, $30, $50, $100, $200 and $500.

The final WTP question was as follows:
If part of your annual rates[6] were dedicated to support a programme to increase native bird populations or reintroduce native birds into the Waikato Region, would you be willing-to-pay an additional $ ___ in your annual rates? Please note that all funding would go towards this programme and not administrative fees.

To analyse the responses to the dichotomous choice WTP question, a logit regression model was employed. The logit model is appropriate, as the dependant variable for this study was in the qualitative "yes/no" format, which can be expressed using the binary coding 0/1. For our model, the dependant variable was $y_{wtp,}$ where $y_{wtp} = 0$ when the respondent *was not* willing-to-pay the requested amount to support the conservation programme and $y_{wtp} = 1$ if the respondent *was* willing-to-pay the bid amount.

The finalized survey was administered during the months of December 2007 and January 2008 to residents of the Waikato region in New Zealand. To construct an appropriate sample for the survey, potential respondents' phone numbers were drawn at random from the

[5] The Maungatautari Ecological Island Trust, website: http://www.maungatrust.org
[6] Rates can also be called property taxes.

White Pages telephone directory for the Waikato Region. Respondents who answered the phone were offered the opportunity to participate in the study, which would take approximately five to ten minutes to complete.

A total of 486 phone numbers were dialled. Of these, 309, or 63.6%, answered their phones and were offered the opportunity to partake in this study. A total of 200 respondents, or 64.7%, of those who answered their phones, agreed to participate in the survey. All respondents who agreed to take part completed the survey (Table 3).

Table 3. Summary of Telephone Survey Sampling Statistics

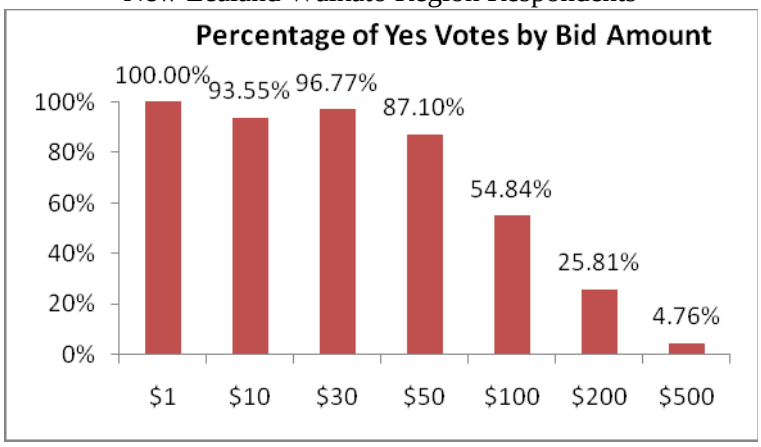
Survey Sample Statistics	Number of Residents	Percentage
Agreed to Participate/Answered the Phone Call	200/309	64.72%
Completed survey/ Agreed to Participate	200/200	100.00%

3. Results

The questions regarding respondents' attitudes and knowledge towards birdlife revealed that 97% enjoyed hearing or seeing birds in their area. 79% of respondents indicated they would be happier with more birds in their local area, although this appeared to be driven by a desire to see a greater variety of species in their local area, particularly natives, which were conspicuous. When details of a particular conservation programme operating in the Waikato were provided to the respondents, 100% indicated that they felt it was a good idea for the Waikato region. A large percentage (61%) of our respondents was female, 45% indicated that they earned between $30,000 NZD and $59,999 NZD annually, and 76% indicated that they were between the ages of 30 and 59.

Our study then asked respondents if they would be willing-to-pay to provide support for bird conservation programmes in the Waikato region. While 69.6% of respondents agreed to pay the amount requested to support the conservation programme, an additional 15.9% indicated they would be willing-to-pay some amount that was less than the bid cost, suggesting that 85.5% of respondents would be willing-to-pay at least some amount towards local birdlife conservation. At the lowest bid amount ($1), 100% of respondents were willing-to-pay for birdlife conservation programmes. At the highest level of $500, only one person indicated that they would be willing-to-pay this amount. Therefore, as the bid amount increased, the percentage of respondents that were willing-to-pay for birdlife conservation programmes decreased (Figure 1).

Figure 1. Willingness-to-Pay for Bird Conservation Programmes by Bid Amount
New Zealand Waikato Region Respondents



A logit regression model was used on the WTP bid for Waikato conservation programmes as a base model (Table 4). The results of the base model revealed that the bid variable was negative and significant at the 99% level. This confirms what we saw in Figure 1, where as the bid amount increased, the number of people willing-to-pay for birdlife conservation programmes decreased.

Table 4. Logit results (base model) of the probability of supporting a programme for native bird conservation in the Waikato Region of New Zealand (WTPBID = the willingness of the respondent to pay for the programme at a particular bid amount).

Variable	Coefficient	Std. Error
C	2.7784	0.3450
WTPBID	-0.0188	0.0028

Note: All variables significant at the 99% level.

The logit results easily allow us to calculate the median WTP value by dividing the coefficient for the constant term by the bid coefficient (Hanemann, 1984; 1989). The median value was $147.79 (2008 NZ$). Some researchers have indicated that the linear model overestimates the actual WTP values. As a result, two other approaches are commonly used to calculate median values. These approaches include the exponential logistic model and the Turnbull approach (Haab and McConnell, 2003; Cooper, 2002). However, Kaval (2009) has shown that by scaling the median value obtained with the linear logistic model either by the response rate or the List and Gallet (2001) estimate of 1.28, similar results will be revealed to the exponential and Turnbull approaches. Scaling by the response rate is a simple calculation. In our study, the response rate was 64.72%. Scaling the median value by this response rate yields $95.65, which we believe is the true median value.

The List and Gallet (2001) value was calculated with a meta-analysis to determine the amount to scale a result by to eliminate the hypothetical bias. After reviewing all the studies they could find, they calculated an average and determined that the original value should be divided by 1.28. If we do this, we obtain $115.46, which is higher than our scaled value of $95.65.[7]

The total WTP by Waikato residents can be obtained by multiplying the median WTP estimate by the number of households in the Waikato region. There are concerns with this approach, as the ability to generalize from the sample mean to the population mean is affected by the external validity of the sample. As this study was conducted using random telephone numbers obtained through the Waikato telephone listings, there are some concerns with external validity. By using telephone survey methodology, households without telephone access are therefore excluded from the sample. In the case of the Waikato region, 11.25% of households indicated they did not have access to fixed land lines (Statistics New Zealand, 2006). Additionally, households with unlisted numbers were also excluded from the sample. To form an estimate of the regions WTP for birdlife conservation, we will assume that households without fixed land lines and unlisted numbers do not vary in any systematic fashion, such that they do not represent a different population from that of the general Waikato Region.

Statistics New Zealand (2006) reported that there were 138,333 households located in the Waikato region. If we multiply this value by our conservative estimate of $95.65, we determine that the total WTP for the Waikato Region is $13,231,551, or approximately $13 million (Table 5).

Table 5. Willingness to Pay Estimates for Bird Conservation Programmes in the Waikato Region of New Zealand

Conservative Estimate (Annual Value per Household)	Total Value of Conservation for all Households in the Waikato Region
$95.65 (2007 NZD)	$13,231,551

Once we obtained our base results, we then delved more deeply into the data to determine which variables had an effect on the WTP by using a multivariate linear logistic model. Results revealed the variables affecting WTP included the bid amount, age, income, ethnicity, and how they felt about more birds in their area. Again, WTP decreased as the bid amount increased. As a respondent increased in age or had a higher income, their WTP also increased. While New Zealand is composed of people from many ethnic origins, by far the most common are those of European descent and those of Maori descent. In this model, we

[7] Our calculation for the exponential median value was $115.98, which was very close to the List and Gallet (2001) modification ($115.46), again confirming the results of Kaval (2009).

found that those of European descent had a higher WTP than those of Maori descent.[8] This was a surprising result as traditional Maori values place a strong emphasis on the value of native flora and fauna (Taiepa, 2004; Posey, 2002). The last variable of significance was More Happy, simply saying that people that felt they would be happier if there were more birds in the area were willing-to-pay more for programmes to increase bird populations than those that did not. A complete summary of the regression results is presented in Table 6.

Table 6. Logit results of the probability of supporting a programme for native bird conservation in the Waikato Region of New Zealand

Variable	Coefficient	Std. Error
C	0.0228	0.8616
BID AMOUNT	-0.0218	0.0035
AGE	0.5181	0.2881
INCOME	0.9755	0.3330
EUROPEAN	0.9870	0.5712
MORE HAPPY	0.9937	0.5731
FEMALE*	-0.7742	0.5274

*Not significant at the 90% level.

Description of Variables in the Analysis

WTP	Dummy coefficient equal to 1 if the respondent indicated they were willing-to-pay for a programme to increase native bird populations or reintroduce native birds into the Waikato Region of New Zealand at the bid amount they were provided in their survey, otherwise equal to 0.
Bid Amount	The bid amount (Range $1-$500)
Age	Categorical data related to age, with older respondents in higher categories.
Income	Categorical data relating to the income category respondents indicated they belonged to. Higher category indicates higher income.
Urban	Dummy coefficient equal to 1 if the respondent indicated they lived in a rural area, otherwise equal to 0.
European	Dummy coefficient equal to 1 if the respondent indicated they identified primarily with a European ethnicity, otherwise equal to 0. Most respondents were of European descent (84.1%). There were only 3 other categories within the original ethnicity category: Maori, Asian and Other. Maori descent respondents consisted of 12.1% of the sample, while Asian was 1.9% and Other was 1.9%.
More Happy	Dummy coefficient equal to 1 if the respondent felt they would be happier if there were more birds in the area in which they lived.
Female	Dummy coefficient equal to 1 if the respondent was female.

[8] To confirm this, we also ran the multivariate logistic regression with Maori as a dummy variable instead of European. The Maori variable was statistically significant and revealed that the Maori population was less willing-to-pay for a bird conservation programme than a non-Maori.

4. Conclusions

Native birdlife in New Zealand has suffered from the effects of habitat destruction and predator introduction. As a result, conservation projects aimed at restoring habitat and conserving endangered bird species have become increasingly important and prominent in New Zealand. However, despite the relatively large amount of funding being invested into birdlife conservation, relatively little understanding exists of the benefits that this conservation provides to the resident population who supports these initiatives indirectly through taxes and regional rates. In this study, we attempted to determine whether people living in the Waikato region of New Zealand were knowledgeable about birdlife and conservation initiatives and if they were willing-to-pay to have these conservation projects in their area, with the aim of seeing an increase in the native birdlife populations in their local region.

Two hundred and seven Waikato residents were surveyed in total. We found that respondents felt positively about the birdlife in their area and 100% supported conservation efforts aimed at increasing native bird populations in the Waikato region. In addition, 85.5% of respondents indicated they would be willing-to-pay some amount to support these projects. The median annual WTP for conservation projects in the Waikato region was $96; this value was particularly sensitive to a respondent's age, income and ethnicity, with higher incomes and older respondents being more likely to accept the WTP amount. Somewhat surprisingly, since traditional Maori values place a strong emphasis on the value of native flora and fauna, those of European descent were willing-to-pay more for native bird conservation programmes than the indigenous Maori population.

In relation to our results, we believe there may currently be an underinvestment in birdlife conservation in the Waikato region. As a result, regional bodies could draw upon local funding, as opposed to relying on central government funding, to support these initiatives.

We recommend future work be conducted in other regions of New Zealand to assist in determining national values for birdlife conservation. In addition, since birdlife seems to carry with it a high value worldwide, it should be considered more highly in policy issues, both locally and globally.

References

Ahmed, S.U., Gotoh, K., 2007. Cost Benefit Analysis of Environmental Goods by Applying the Contingent Valuation Method. Springer, Japan.

Alberini, A., Kahn, J.R., 2006. *Handbook on Contingent Valuation.* Cheltham, U.K.: Edward Elgar Publishing Ltd.

Birdlife International, 2006. *Record Number of Bird Species Heading Towards Extinction.* Accessed 16 February 2008 from http://www.birdlife.org/news/pr/2006/05/redlist.html

Bowker, J.M., Stoll, J.R., 1988. Use of Dichotomous Choice Nonmarket Methods to Value the Whooping Crane. American Journal of Agricultural Economics. Vol. 70, No. 2, pp. 372-381.

Boyle, K., Bishop, R., 1987. Valuing Wildlife in Benefit Cost Analysis: A Case Study Involving Endangered Species. *Water Resource Res.* Vol. 23, pp. 943-950.

Brouwer, R., Beukering, P.V., Sultanian, E., 2007. The Impact of the Bird Flu on Public Willingness-to-pay for the Protection of Migratory Birds. *Ecological Economics.* Vol. 64, pp. 575-585.

Carson, R., 2000. Contingent Valuation: A User's Guide. Environmental Science and Technology. 34(8): 1413-1418.

Christie, M., 2007. An Examination of the Disparity between Hypothetical and Actual Willingness-to-pay Using the Contingent Valuation Method: The Case of Red Kite Conservation in the United Kingdom. *Canadian Journal of Agricultural Economics.* Vol. 55, pp. 159-169.

Clark, W.R., 1987. *Economics and Marketing of 'Canada's Capistrano'*. The Value of Birds. International Council for Bird Preservation Technical Publication 6. Diamond and Filion, eds., 31-48.

Colby, B., Smith-Incer, E., 2005. Visitor Values and Local Economic Impacts of Riparian Habitat Preservation: California's Kern Market River Preserve. *Journal of American Water Resources Association.* Vol. 41, No. 3, pp. 709-718.

Cooper, J.C., 2002. Flexible Functional Form Estimation of Willingness to Pay using Dichotomous Choice Data. Journal of Environmental Economics and Management. 43(2):267-279.

Crandall, K., Leones, J., Colby, B.G., 1992. *Nature Based Tourism and the Economy of Southeastern Arizona: Economic Impacts of Visitation to Ramsey Canyon Preserve and San Pedro Riparian National Conservation Areas.* Tucson: University of Arizona.

Dalton, R.S., Bastian, C.T., Jacobs, J.J., 1998. Estimating the Economic Value of Improved Trout Fishing on Wyoming Streams. North American Journal of Fisheries Management. 18:786-797.

Econdata, 2008. Accessed 4/4/08 from New Zealand Time Series, DXtime 4.1.1.

Eubanks, T., Stoll, J.R., 1999. Avitourism in Texas: Two Studies of Birders in Texas and their Potential Support for the Proposed World Birding Center. Accessed on 25 May 2009. www.fermatainc.com/basic/eco_avitourism.html

Fahy, A.E.C., Kerr, G.N., 1991. *Valuing Non-Market goods.* Unpublished report for the Ministry for the Environment.

Fermata, 2000. Wildlife Associated Recreation on the New Jersey Delaware Bayshore. Delaware Horseshoe Crab and Shorebird Survey.

Flight, M., Lovell, S., 2002. *Valuing Avian Pesticide-Risk Reduction. A Survey of Literature on the Value of Birds.* Report developed for U.S. Environmental Protection Agency.

Gren, I.M., 2001. International versus National Actions Against Nitrogen Pollution of the Baltic Sea. Environmental and Resource Economics. 20(1):41-59.

Groves, R.M., Biemer, P.P., Lyberg, L.E., Massey, J.T., Nicholls, W.L., Waksberg, J. (Editors), 2001. *Telephone Survey Methodology*. Toronto, Canada: John Wiley and Sons, INC.

Haab, T.C., McConnell, K.E., 2003. Valuing environmental and natural resources: the econometrics of non-market valuation. New Horizons in Environmental Economics. Edward Elgar, Massachusetts, 326 pp.

Hagen, D.A., Vincent, J.W., Welle, P.G., 1992. Benefits of Preserving Old-Growth forests and the spotted Owl. *Contemporary Policy Issues*. Vol. 10, pp 13-26

Hanemann, W.M., 1984. Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses. *American Journal of Agricultural Economics. Vol.* 66, pp 332-341.

Hanemann, W.M., 1989. Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses: Reply. *American Journal of Agricultural Economics.* Vol. 71(4), pp 1057-1061.

Hitchmough, R., Bull, L., Cromarty, P., 2005. *New Zealand Threat Classification System Lists.* Wellington: Science and Technical Publishing. Department of Conservation.

Hvenegaard, G.T., Butler, J.R., Krystofiak, D.K., 1989. Economic values of bird watching at Point Pelee National Park, Canada. *Wildlife Society Bulletin* Vol. 17, No. 4, pp 526-531.

Kaval, P., 2009. Economic Valuation Strategies for Biodiversity Policy: An Environment Waikato Training Workshop. A Report Prepared for *AgResearch* as part of a FRST Funded Project entitled "Improved Policy Interventions for Encouraging the Voluntary Use by Landowners of Practices Protecting and Enhancing Biodiversity." 15 pages.

Kaval, P., Loomis, J., 2003. *Updated Outdoor Recreation Use with Emphasis on National Park Recreation.* Fort Collins: Colorado State University. 48 pages.

Kaval, P., Loomis, J., Seidl, A., 2007. Willingness-to-pay for prescribed fire in the Colorado (US) wildland urban interface. *Forest Policy and Economics Journal*. 9:928-937.

Kaval, P., Stithou, M., Scarpa, R., 2009. Social Values of biodiversity Conservation for the Endangered Loggerhead turtle and Monk Seal. International Journal of Ecological Economics and Statistics. 14(9):67-76.

Kellermann, J., Johnson, M., Stercho, A., Hackett., S., 2008. "Ecological and Economic Services Provided by Birds on Jamaican Blue Mountain Coffee Farms," *Conservation Biology*, Vol. 22, No. 5, pp. 1177-1185.

Kotchen, M.J., Reiling, S.D., 2000. Environmental Attitudes, Motivations, and Contingent valuation of non-use values: A case study involving Endangered Species. *Ecological Economics.* Vol. 32, pp. 93-107.

La Roche, G.P., 2003. *Birding in the United States: A Demographic and Economic Analysis. Addendum to the 2001 National Survey of Fishing, Hunting and Wildlife Associated Recreation. Report 2001-1*. Washington D.C., U.S. Fish and Wildlife Service.

Layman, R.C., Boyce, J.R., Criddle, K.R., 1996. Economic Valuation of the Chinook Salmon Sport Fishery on the Gulkane River, Alaska, under Current and Alternative Management Plans. Land Economics. 72(1):113-128.

List, J.A., Gallet, C.A., 2001. What Experimental Protocol Influence Disparities Between Actual and Hypothetical Stated Values? *Environmental and Resource Economics.* 20(3):241-254

Loomis, J., Ekstrand, E., 1997. Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple Bound Contingent Valuation Survey. *Journal of Agriculture and Resource Economics.* Vol. 22, No. 2, pp 356-366.

Loomis, J.B., González-Cabán, A., 1998. A Willingness-to-Pay Function for Protecting Acres of Spotted Owl Habitat from Fire. *Ecological Economics.* Vol. 25, pp. 315-322

Macmillian, D.C., Philip, L., Hanley, N., Alvarez-Farizo, B., 2002. Valuing the Non-Market Benefits of Wild Goose Conservation: A Comparison of Interview and Group-Based Approaches. *Ecological Economics.* Vol. 43, pp. 49-59.

Marcus, J., Matauschek, J.M., 2005. The Impact of Endangered Species Law on the Real Estate with Cost-Benefit Analysis: The Case of the Corncrake in Hamburg/ Germany. *German Working Papers in Economics and Law.* Vol. 2005, paper 7

Menkhaus, S., Lober, D.J., 1995. International Ecotourism and the Valuation of Tropical Rainforests in Costa Rica. *Journal of Environmental Management.* Vol. 47, pp. 1-10.

Mitchell, R., Carson, R., 1989. Using Surveys to Value Public Goods: *The Contingent Valuation Method*. Washington, D.C.: Resources for the Future.

Mortimer, R., Sharp, B., Craig, J., 1996. Assessing the Conservation Value of New Zealand's Offshore Islands. *Conservation Biology*. Vol. 10, No. 1, pp. 25-29.

Naido, R., Adamowicz, W.L., 2005. Economic Benefits of Biodiversity Exceed Costs of Conservation at an African Rainforest Reserve. *Proceedings of the National Academy of Sciences.* Vol. 102, No. 46, pp. 16712-16716.

Navrud, S., Mungatana, E.D., 1994. Environmental Valuation in Developing Countries: The Recreational Value of wildlife Viewing. *Ecological Economics.* Vol. 11, pp. 135-151.

Ojea, E., Loureiro, M.L., 2007. Altruistic, Egoistic and Biospheric Values in Willingness-to-pay for Wildlife. *Ecological Economics.* Vol. 63, pp. 807-814.

Park, T, Loomis, J.B., Creel, M., 1991. Confidence interval for evaluating benefit estimates from dichotomous choice contingent valuation studies. Land Economics 67, 64-73.

Pearce, D.W., Turner, R.K., 1990. Economics *of Natural Resources and the Environment*. Essex: Pearson Education Limited.

Posey, D.A., 2002. Commodification of the Sacred through Intellectual Property Rights. Journal of Ethnopharmacology. 83(1-2):3-12.

Reaves, D.W., Kramer, R.A., Holmes, T.P., 1999. Does Question Format Matter? Valuing an Endangered Species. *Environmental and Resource Economics.* Vol. 14, pp. 365-383.

Rehdanz, K., 2007. *Species Diversity and Human Well-being: A Spatial Econometric Approach.* Research Unit Sustainability and Global Change Working Paper #FNU-151. Hamburg University and Centre for Marine and Atmospheric Science.

Rubin, J., Helfand, G., Loomis, J., 1991. A Benefit-Cost Analysis of the Northern Spotted Owl. *Journal of Forestry.* Vol. 12, pp. 25-30.

Saris, W.E., Gallhofer, I.N., 2007. *Design, Evaluation and Analysis of Questionnaires for Survey Research.* New Jersey: Wiley Interscience.

Shafer, E.L., Carlline, R. Guldin, R.W. and Cordell, H.K., 1993. Economic Amenity Values of Wildlife: Six Case Studies in Pennsylvania. Environmental Management. 17(5):669-682.

Statistics New Zealand, 2009. Accessed on 25 May 2009 www.stats.govt.nz.

Stevens, T.H., Echeverria, J., Glass, R.J., Hager, T., More, T.A., 1991. Measuring the Existence Value of Wildlife: What do CVM Estimates Really Show? *Land Economics.* Vol. 67, No. 4. pp 390-400.

Stoll, J.R., Johnson, L.A. 1984. Concepts of Value, Nonmarket Valuation and the Case of the Whooping Crane. *Transactions of the North American Wildlife and Natural Resources Conference* Vol. 49, pp 382-393.

Stoll, J.R., Dittion, R.B., Eubanks, T.L., 2006. Platte River Birding and the Spring Migration: Humans, Value, and Unique Ecological Resources. *Human Dimensions of Wildlife.* Vol. 11, pp. 241-254.

Sultatian, E., Van Beukering, P.J.H., 2007. Economics of Migratory Birds. Poverty Reduction and Environmental Management Working Paper.

Swanson. C., 1993. *Economics of Non-Game Management: Bald Eagles on the Skagit River Bald Eagle Natural Area, Washington.* PhD dissertation, Department of Agricultural Economics, Ohio State University.

Taylor, R., 1997. *The State of New Zealand's Environment 1997.* The Ministry for the Environment: Wellington, New Zealand.

Tennyson, A., Martinson, P., 2006. *Extinct Birds of New Zealand.* Te Papa Press: Wellington, New Zealand.

Taiepa, T., 2004. Weaving our stories worldwide: an indigenous approach to global economics and ecology. Ethnobotany Research and Applications. 2:93-99.

Waksberg, J., 1978. Sampling Methods for Random Digit Dialling. *Journal of the Statistical Association.* 73(361): 40-46.

Wellman, K.F., Noble B., 1997. Selected Recreational Values of the Corpus Christi Bay National Estuary Program Study Area. Publication CCBNEP-18. Corpus Christi, TX.

Wilson, C., Tisdell, C., 2005. Knowledge of Birds and Willingness to Support their Conservation: An Australian Case Study. *Bird Conservation International.* Vol. 15, pp. 225-235.

Wilson, C., Tisdell, C., 2007. How Knowledge Affects Payment to Conserve an Endangered Bird. *Contemporary Economic Policy.* Vol. 25, No. 2, pp. 226-237.

Yao, R., Kaval, P., 2010. 'Valuing Biodiversity Enhancement in New Zealand.' *International Journal of Ecological Economics and Statistics*. 16(W10): 26-42.

Yao, R. and Kaval, P., 2007. *Non Market Valuation in New Zealand, 1974 through 2005.* Department of Economics Working Paper Series #07/17. Waikato University School of Management, Hamilton, New Zealand.