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Community acceptance of marine biodiversity offsets in Australia: results from national surveys

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Important Disclaimer

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EXECUTIVE SUMMARY

In Australia policy exists at both Commonwealth and State levels to govern how environmental offsets can be used to provide an avenue for development to proceed while protecting the environment. This policy is largely driven by scientific considerations about what actions can achieve no net loss in environmental condition. A relatively under-researched question is the degree to which the public accepts the use of offsets, and what elements of the policy design may improve or reduce community acceptance.

This report presents the results of two national surveys of the general public, aimed at gauging acceptance of offsets in the marine environment. It does so using a hypothetical development in the north of WA, that requires an offset for it to proceed.

A clear outcome from the study is that respondents prefer to see offsets being implemented close to the location where the impact occurred, and that concern is highest if the offset is based overseas, even though there may be good ecological and economic reasons for that occurring. There is also some evidence of an endowment effect: those who live in WA are particularly sensitive to the offset being moved out of the state, suggesting they want to see local offsets to compensate for local damage.

There is support for using the offset to protect a species other than that directly affected by the development, where that second species is more endangered. The presence of co-benefits to other species is also viewed positively.

Direct offsets are valued more highly than other compensatory measures, and in the case where seagrass is damaged, replanting is preferred to methods that remove other threats to existing seagrass. This suggests that the public cares about how the outcome of no-net-loss is achieved.

There is evidence of some variation in attitudes among people. This study is unique in that it develops an estimate of the degree to which people are prepared to give a "social license to operate" to the industry involved in the development. The lower the SLO, the greater the objection to the development occurring at all. People with a low SLO would rather see the development, and its associated economic benefits, be forgone rather than implemented with an offset.

The outcomes of this project give insights into the degree to which different aspects of offsets are acceptable to the general public. We do not suggest that the evaluation of achieving the ecological outcome of no-net-loss should be delegated to the public. But subject to there being alternative methods of achieving such an outcome, the results presented here could be used to evaluate their comparative acceptability. It also highlights the more general need for industry to sustain public trust in their actions if they are to be supported in their management of their environmental impacts.

1. INTRODUCTION

In an earlier report (Rogers et al 2014) results from a pilot study into the acceptability of offsets in the marine environment were reported. That pilot considered offsets in two ecological contexts (turtles and shorebirds) which allowed a number of different issues to be explored. In particular, the shorebirds study, given the migratory nature of the species selected, allowed consideration of international offsets to address domestic impacts. However, in the nature of pilot studies, there were also some limitations. This document reports the results from 2 national studies that followed on from the pilots, and which extended that work in a number of ways. Of most importance is the use of large national samples (1371 and 1329) as opposed to the earlier Western Australian (WA) sample reported in Rogers et al (2014) or the Queensland sample reported in a complementary study (Jennings et al, 2015). Secondly, questions that emerged from the pilots could be addressed: in the case of the shorebird study the number of birds that were affected in the offset was varied beyond the number that were impacted: this opens up the possibility that there are multipliers that may be applied to the offset e.g. that a less desirable location for the offset may be compensated for by a larger degree of protection. This option was also extended to an alternative species that may have been protected, allowing for the possibility of identifying tradeoffs across species with differing levels of threat (as opposed to a simple binary selection of species being protected, as in the pilots). In the case of the turtle offset, who implements the offset (developer, government agency or third party) was included, to further consider the issue of whether the public is concerned by the means of implementation of the offset, as much as the level of outcomes from the offset. The study also included the possibility of co-benefits for other species.

The policy background to marine offsets is reported elsewhere (Jennings et al 2015), and the technical issues surrounding implementation of choice experiments is well documented, both in NERP Hub reports (e.g. Burton et al 2015, Jennings et al 2015), and in the published literature (e.g. Hensher et al 2015, Bateman et al 2002). These issues are not discussed here. Instead the focus is on the specific implementation of the 2 surveys and presentation of results.

2. COMMUNITY ACCEPTANCE OF OFFSETS RELATED TO SHOREBIRDS

The context for the shorebird offset was a coastal development that would have an impact on a migratory species, the Ruddy Turnstone. Migratory species are automatically an issue of concern under the EPBC Act, and hence any development that caused a threat to them would require the standard sequence of avoidance, mitigation and then offsetting of residual impacts.

The specific context given was an oil and gas development in the north of WA that would have residual impacts on the feeding ground of 1000 birds. The offset was therefore designed to compensate for this loss in feeding area.

The attributes used are largely similar to those used in the pilot, with some additions. They are reported in Table 1 below, along with the levels that each attribute could take.

Table 1 Attributes and levels of the Shorebird study

Attribute	Level	Name
Proportion of direct offsets	50%,60%,70%,80%,90%,100%	Proportion
Location of offset	Western Australia, Northern Territory, New Zealand, China	Loc_WA,Loc_NT, Loc_NZ,Loc_China
Offset implementer	Developer, Government, Third Party	Imp_Dev,Imp_Gov,Imp_3rd
Species protected by offset	Ruddy Turnstone, Eastern Curlew	RT (= if species is Ruddy Turnstone)
Number of birds protected	500$,1000.1500,2000	Birds
Size of development	500 jobs, 1000 jobs	Jobs

$ a level of 500 was only included if the species was the more endangered, but non-impacted, Eastern Curlew as the stated impact is 1000 birds.

The current recommendation is that direct offsets (on-ground interventions aimed at improving the environment supporting the species should be as high as possible, and preferably comprise no less than 90% of the offset. However, in the marine environment that may be difficult, and so the possibility of using other compensatory measures is of interest here. The wording of the survey said that these would consist of research that would improve existing on-ground measures. It was made clear at

all times that the offset would achieve its anticipated outcome: the measures being presented would achieve no net loss in condition of the impacted species. Thus respondents were not asked to make a technical judgement about whether the offset was ecologically feasible, but only on whether it was acceptable to them. In terms of nomenclature, within policy documents form 'other compensatory measures' is used to describe actions other than direct offsets, although the term indirect offsets is used in some jurisdictions (Australian Government, 2012). The term "indirect offsets" was used as the label for this type of action in the survey, to make the distinction with direct offsets clearer, and to simplify the language used: that phrase is used in this report to be consistent with the surveys.

Given the migratory nature of the species, it is possible to have an impact on its welfare by intervening at any point in its flyway (Bamford et al 2008). These interventions may not affect the specific individuals affected by the development, but they would achieve the required no-net-loss for the species. It has been suggested that offsets in other regions may be both cheaper and more effective, as damage to other ecological systems may pose greater threats to survival than those in Australia. However, issues of governance and a desire for local solutions to local problems may lead respondents to reject offsets away from the impact site. The 3 non-WA locations chosen have a range of geographical and institutional characteristics that were shown in the pilot to be very influential on choice.

The levels for implementer of the offset are set to include the developer themselves, the government or a third party. It was made clear in the survey that the developer would be responsible for funding the offset, and would remain responsible for it being completed successfully, but that they may wish to subcontract the direct on-ground works to others.

The species protected was either the birds impacted by the development (the Ruddy Turnstone) or a more endangered species, the Eastern Curlew. Currently Commonwealth legislation does not allow the substitution or trading-up of species, but in some jurisdictions the possibility of targeting a more endangered species is allowed, on the basis that the ecological benefit may exceed that which would arise if no-net-loss was achieved for the damaged species. By including this attribute the study can identify consumer preferences for such an option.

A new feature of the current study is the inclusion of the number of birds that may be influenced by the offset. In the pilot, this was set at the number impacted (1000 birds). However, given the negative impact that some attributes may have on choice (e.g. location) it is of interest to see if there is an implied 'multiplier' that would make that location acceptable. This number was varied independently for both species of bird, allowing us to identify a tradeoff across species also.

The attributes were combined into a 3 alterative s-efficient choice set using Ngene (Choicemetrics), and utilizing the parameters estimated from the pilot as priors (Rose and Scarpa, 2009). The design involved 24 choice sets blocked into 4 groups of 6. Each respondent saw only 1 group of six questions. The choice sets also included an opt-out: the possibility of rejecting the offset schemes entirely. This avoids a 'forced

choice' where respondents are required to select an option that they would prefer not to see implemented. This causes issues with measures of economic surplus (which should be unconditional), and may cause issues with respondents rejecting the whole choice framework. In fact, in tests within the pilot, the latter did not seem to be an issue, but the inclusion of an opt-out allows us to explore a further issue: the size of the development causing the residual damage. Rejecting the project as a whole will presumably involve the loss of economic activity that was causing it. We are interested in whether attitudes towards the offset (and in particular the selection of the opt-out) might be influenced by the size of the activity forgone. We defined size by the number of jobs involved. Strictly this was not an attribute of the design, but dealt with in the framing of the scenario, and a split design: respondents were allocated at random to a version with 1000 or 5000 jobs.

There is no personal cost included in the design. Conventionally there is some cost included, so that 'partworths' (or monetary values for changes in attributes) can be calculated. However, in the current context, asking for a personal expenditure to achieve an offset that is a legal requirement was deemed inappropriate, and may well lead to protest behaviour. Some studies (e.g. Burton et al 2012) have used a 'willingness to accept' framework, where additional benefits (in terms of increased public good provision arising from increased company taxation) is used to compensate from reduced environmental outcomes from mine site rehabilitation. However, that is not appropriate in the current context either. However, the main interest of this study is in the tradeoffs across attributes, rather than placing a value on offset outcomes *per se*.

The choice sets were embedded within a larger survey (see Appendix 1) that included questions relating to environmental attitudes, including those towards the oil and gas sector and some standard sociodemographic questions. Summary responses for all questions are reported in the Appendix.

2.1 Implementation

The survey was coded into a web based survey, and an online market research company employed to provide a nationally representative set of respondents. It was completed between 22nd October and 16th November 2014, and a total sample of 1371 respondents completed the survey.

The geographical distribution of respondents is reported in Table 2

Table 2 Geographical distribution of sample:shorebird study (n=1371)

Australian Capital Territory – Canberra	2.48	Australian Capital Territory – regional	-
New South Wales – Sydney	18.89	New South Wales – regional	11.60
Northern Territory – Darwin	0.51	Northern Territory – regional	0.07
Queensland – Brisbane	8.90	Queensland – regional	10.94
South Australia – Adelaide	6.71	South Australia – regional	2.04
Tasmania – Hobart	1.17	Tasmania – regional	1.97
Victoria – Melbourne	19.69	Victoria – regional	6.86
Western Australia – Perth	6.49	Western Australia – regional	1.68

Prior to the survey, only a minority of respondents knew what an offset was 15.9%) while most (47.7%) had only a vague idea. After the exposition of how offsets work, the appropriateness of using offsets was explored (Table 3): having being asked to select the most appropriate response to the statement:

"I think that offsets are an appropriate way for developers to compensate for environmental damage…":

32.75% suggested that offsets should not be used in any situation. Anticipating the choice experiments, it is interesting to compare how these respondents selected alternatives, given they had the option to reject the development and all offset use. Of the 449 who selected this response, only 16% consistently opted out in all 6 choice questions. A remarkable 60% never selected the opt-out in any of the choice sets, preferring to make choices from among the offset packages. This is perhaps a good example of the benefit of framing questions about preferred outcomes within a well specified choice, rather than open ended elicitation of preferences without any consideration of the counterfactual.

Table 3 Attitudes towards offsets as a mechanism: shorebird study.

"… without having to avoid and mitigate the damages first."	11.52
"… only after all possible avoidance and mitigation steps have been taken."	55.73
"… in no situation whatsoever – a development should not be approved if damage cannot be prevented."	32.75

After the description of the direct/indirect offset approaches, respondents were asked how appropriate they thought each was (Table 4). They were also asked to rate their level of confidence in various Government Environmental Departments to deliver their conservation objectives (Table 5).

Table 4 Appropriateness of offsets to manage environmental impacts: shorebird survey

	Direct	Indirect
Very inappropriate	5.32	5.98
Somewhat inappropriate	5.40	9.04
Neutral	19.18	26.70
Somewhat appropriate	26.99	33.92
Very appropriate	43.11	24.36

Table 5 Confidence in each of the following Government Environment Departments to follow through with its conservation commitments: shorebird survey

	Not at all confident	somewhat not confident	Neutral	Somewhat confident	very confident
WA Government Environment Department	9.77	12.40	36.91	33.11	7.80
NT Government Environment Department	8.39	12.25	39.46	33.19	6.71
New Zealand's Government Environment Department	5.11	8.83	40.48	34.28	11.31
China's Government Environment Department	30.85	23.12	34.50	9.19	2.33

Overall respondents revealed that they thought direct offsets were more appropriate; with 70.1% indicating they were either somewhat or very appropriate, compared with 58.28 for indirect offsets.

Confidence in the appropriate authorities may be a reason for differential preferences for location of the offsets. WA and NT distributions are not significantly different, but the level of confidence in the NZ environment department is higher, while that of China is significantly lower.

An innovation in the pilot study was its focus on the issue of social license to operate (SLO), and how that may affect acceptance of the offset. Essentially, SLO may be viewed as a particular form of attitude, identified through a set of questions specifically designed to gauge acceptance of the activities of the industry (Boutilier and Thomson, 2011). That initial work is published in Richert et al (2015). We repeated the collection of that data in the current survey: a bank of 15 questions relating to the actions of the oil and gas industry and how those are viewed as fulfilling society's needs. Following the results from the pilot, these questions are split into 2 blocks that relate to what we term 'economic legitimacy' and 'social legitimacy'. In the original formulation of the theory of SLO we followed, it was hypothesised that social legitimacy 'follows' economic legitimacy i.e. one may grant an economic SLO before one is prepared to fully accept that a company/industry has its values fully aligned with those of the community.

In line with the pilot, we find that conclusion broadly confirmed. Figure 1 shows a plot of the individual scores for economic legitimacy against social legitimacy (calculated as the average of 4 and 11 of the 15 questions respectively: possible range of scores is 1-5, with 5 representing the highest possible level of SLO). A small amount of jitter is applied to the plot to separate overlying data points.

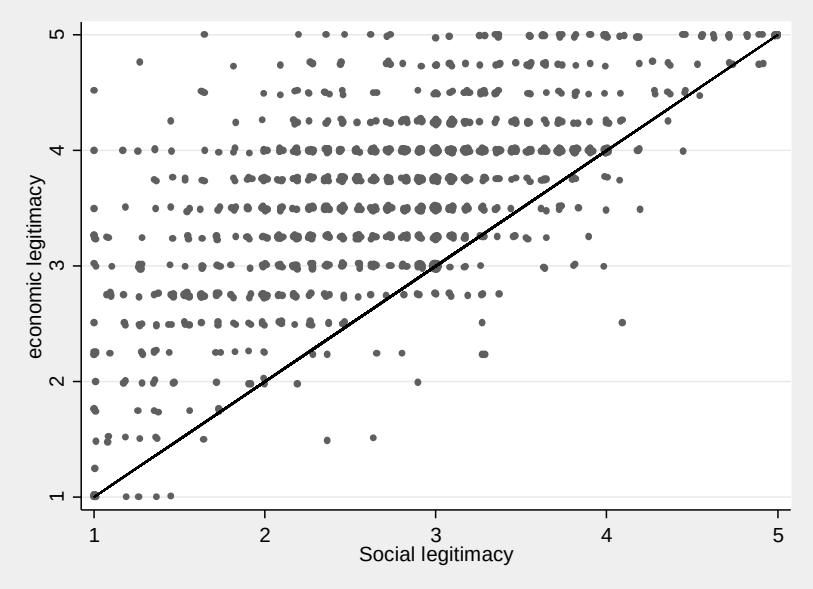

Figure 1 Scatter plot of social and economic legitimacy scores: shorebird survey (n=1112)

What is clear is that for the majority of respondents, their economic SLO is higher than their social SLO for the oil and gas sector.

2.2 Estimation of choice models: shorebird survey

An open issue with the analysis of valuation data is how best to accommodate heterogeneity in preferences across the sample. The most basic model assumes that each alternative within a choice set generates a latent (i.e. unobservable to the analyst) level of utility for the respondent and that utility can be represented by a linear-in-parameters utility function i.e.

$$U_{ij} = \beta X_j + \varepsilon_{ij}$$

where X_j is a vector of attribute that describe alternative j, and β their associated parameters. The term ε_{ij} is a stochastic term that is unobservable to the analyst, but with an assumption about its distribution, the probability individual i selects alternative j from a set can be determined. Homogeneity of preferences implies that the vector of parameters β are the same for all individuals. If this is thought unreasonable, there are 3 main methods of relaxing that assumption: to introduce individual specific covariates that may influence the values of preferences (e.g. age, or the version of a survey seen): to allow the parameters to follow some distribution

and assume that all individuals preferences conform to that distribution (e.g. mixed logit models (Train, 2009)); or latent class analysis where a discrete number of homogeneous classes are identified (see Hensher et al 2015 for further discussion). Here we apply a combination of the first two: introduce individual characteristics, but also allow for some random parameters. Specifically, we assume that the coefficient associated with the alternative specific constant (ASC) can vary across individuals . The ASC captures any effects associated with a labelled alternative, in this case the opt-out. It is likely that there will be some systematic variation in respondent's views on that option, which differ from the other offset options.

Table 5 reports the results from the model that includes both attributes, and interaction variables with attributes. Of note is the fact that the number of jobs involved did not influence choices: it was introduced as an interaction with the opt-out ASC (as it was anticipated that the larger size of the development might have influenced the willingness to not allow the project to proceed) but this was not significant, suggesting that, at least for the scales under consideration, the size of the development is not influencing attitudes towards environmental management. These results show that respondents prefer higher levels of direct offset, that they have a preference for more birds being protected by the offset, and that there is a preference for the Ruddy Turnstone as the species being protected. However, the latter result is muddied by the interaction term between the species and number of birds. The –ve coefficient (-3.3e-4) implies that the marginal value of an additional bird is lower for the Ruddy Turnstone than the Eastern Curlew. The marginal implicit tradeoff for Eastern Curlew and Ruddy Turnstone bird numbers is 1.6:1; one would need 1.6 Ruddy Turnstones protected to equal the value of one Eastern Curlew. Given the fixed effect of preferring Ruddy Turnstones (which one might associate with the fact that it was the affected species) we can identify an 'indifference curve' identifying the set of bird numbers being protected between which a respondent will be indifferent, all other aspects being equal.

This is shown in Figure 2, which reveals that the switch point occurs at 900 birds: less than that and the Ruddy Turnstone is preferred, but above that respondents would accept an offset with fewer Eastern Curlew than Ruddy Turnstones.

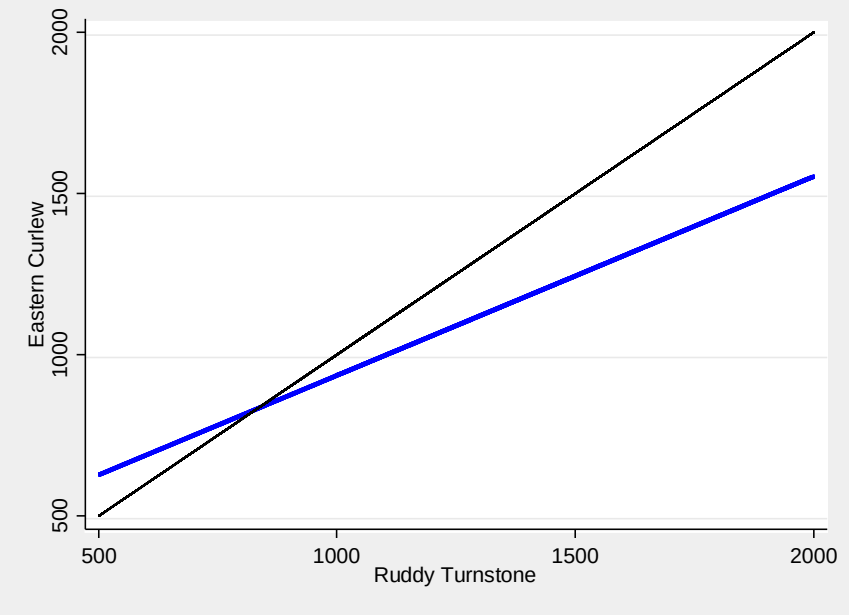

Figure 2 Indifference curve (-----) between Eastern Curlew and Ruddy Turnstone.

The location effects follow those of the pilot: the ranking of preference is WA (where the impact occurs), Northern Territory, New Zealand and then China. The extended national survey allows us to investigate if there an 'own state' preference: interacting location with a dummy variable indicating whether the respondent is resident in WA. This shows that WA residents gain greater disutility from shifting the offset out of the impact state compared to those in other states. Unfortunately the sample of NT respondents is not large enough to estimate a model that would identify if they have greater preferences to bring the offset *to* the NT.

Using the Government as the baseline for implementer, the developer is less preferred, while the third party provider is more preferred. However, interaction terms are introduced between the social licence variables and the developer as implementer of the offset. The expectation is that as the social licence increases, so the developer will be more acceptable to respondents. This is the case for social legitimacy variable, which is positive and significant. The economic legitimacy variable is not. Given the normalization of the social variables (with zero mean and a standard deviation of one) it is seen that those who hold an SLO one SD from the would have an implied marginal utility associated with the Developer being the implementer of +0.02 (-0.19+0.21). This means that this group of the sample are essentially indifferent between the Government and the Developer implementing the offset. Conversely, those who hold lower SLO will be even more averse to an offset implemented by the Developer. The implication is that a relatively small proportion of the sample will prefer the Developer over the Government as the implementer (those at the upper end of the distribution of the social legitimacy SLO).

The SLO variables also influence the estimate of the opt-out ASC: a negative ASC implies a reduced probability of selecting the opt-out. This effect is enhanced for those who hold higher SLO: or conversely, those who hold a low SLO for the oil and

gas industry will tend to select the opt-out option more often. However, the large estimate of the standard deviation of the ASC implies considerable heterogeneity in the sample in addition to that related to the SLO.

Table 6 Estimates of a mixed logit model for the choice experiment data: shorebird survey

	coeff	P>|z|
Percent	0.0044	0.000
RT	0.28	0.007
Birds	8.729e-4	0.000
RTxBirds	-3.3e-4	0.000
Loc_NT	-0.19	0.000
WAxLoc_NT	-0.49	0.000
Loc_NZ	-0.43	0.000
WAxLoc_NZ	-0.62	0.001
Loc_China	-1.13	0.000
Imp_Dev	-0.19	0.000
SLO_Econ x Imp_Dev	-0.05	0.136
SLO_Soc x Imp_Dev	0.21	0.000
Imp_3rd	0.10	3.38
SLO_Econ x SQ	-1.09	0.000
SLO_Soc x SQ	-0.93	0.000
SQ	-2.83	0.000
Std Dev. SQ	3.77	0.00

LL= -9198.1811
Number of choice occasions =8226
Number of individuals =1371

Definition of variables
Percent: percentage of offset delivered as direct
RT: dummy variable identifying Ruddy Turnstone as targeted species base-Eastern Curlew
Birds: number of birds protected
Loc_NT,Loc_NZ,Loc_China: location of offset; base=WA
Imp_Dev,Imp_3rd: implementer of the development, developer or 3rd party. Base-government
SQ: alternative specific dummy identifying the opt-out alternative
SLO_Econ, SLO_Soc: social license to operate variables, normalised so mean=0, SD=1
WA: dummy variable =1 if respondent lives in WA

Although there is no cost attribute in the model, one can still estimate tradeoffs across attributes by using any continuous attribute as a numeriare. Here we select the number of Ruddy Turnstones that arise from the offset. It is important to be

careful on the interpretation of these values as the numeraire used ((bird numbers) has a positive effect on utility (unlike the more normal cost, which will reduce utility as it increases). The interpretation of the resulting "partworths" is the size of the change in the number of birds protected required to exactly compensate for a change in another attribute. A negative value will be associated with a change that respondents value (bird numbers can be reduced) while a positive number implies that the attribute change reduces utility, and more birds are needed to compensate for it.

Table 7 below reports marginal rates of substitution (MRS) for attributes. For the location variables these represent the rates for people in WA and those not in WA. For the SLO interactions , these represent the change in MRS as the SLO changes by 1.

Table 7 Marginal rates of substitution, using Ruddy Turnstone as the numeraire for the shorebird survey

	coeff	95% CI	
percent	-8	-12	-5
Loc_NT	353	206	500
Loc_NT (WA)	1266	752	1780
Loc_NZ	807	55	1060
Loc_NZ (WA)	1966	1198	2733
Loc_China	2092	163	2521
Loc_China (WA)	3663	2678	4646
Imp_Dev	351	204	499
SLO_Econ x Imp_Dev	100	-33	233
SLO_Soc x Imp_Dev	-392	-547	-237
Imp_3rd	-188	-301	-75

It is important to note that these are the additional birds that must be affected by the offset. So if the default is 1000 birds in an offset in WA, an additional 353 birds would have to be included to compensate for moving the offset to the NT, 807 for NZ and 2092 to compensate the movement to China (i.e. the offset would require a total of 3092 to be seen as equivalent to that in WA). For a resident in WA, these values are much higher: to shift the offset to China an additional 3663 birds must be included in the offset.

Table 7 also shows that a change in implementer from Government to the Developer (for a respondent with mean SLO) would require an additional 351 birds in the offset. Those who hold an SLO relating to social legitimacy that is one standard deviation above the mean would prefer the Developer to undertake the offset: and in fact would be content with a slightly smaller number of birds protected (351-392=41). Although reported, note that the effect of the economic legitimacy SLO is not significantly different from zero. Acceptance of the use of a 3rd party implementer would be feasible with a lower number of birds protected.

3. COMMUNITY ACCEPTANCE OF OFFSETS RELATED TO SEAGRASS

The seagrass offset survey was framed around a coastal development that would have an impact on an area of seagrass, and which as a result would cause the loss of 30 turtles in the area. As turtles are an endangered species this then invokes the need for an offset. Although the species under consideration is the turtle, we focus on direct offsets that restore habitat.

The seagrass survey extended the analysis of the pilot by extending the attributes and framing of the survey in a number of ways. The first was to have two treatments that varied by the type of development that causes the impact. We hypothesised that acceptability for the offset may vary because of this, in the same way that there are differences in values arising from management actions: our interest is not in the outcomes per se but in the causes of the damage and the means to offset them.

We therefore define two treatments: an oil and gas development that causes damage to the seagrass, or a tourism resort. In both cases it was indicated that 1000 jobs would be created by the development. Respondents were randomly assigned to one of these treatments.

The attributes and their levels are given in Table 8 below. It includes the level of direct offsets, but also how that offset is achieved: through replanting seagrass beds, or through managing nutrient flows into other seagrass beds, and hence improving their productivity. Similarly the indirect offset could be achieved either from an education program for visitors, or research that will assist existing management.

As with the shorebird study, the location of the offset was varied: it could either be close to the impact site in the Kimberly, in the Pilbara in WA, which although in the same state is still 800 km south of the impact site, or in Queensland. The implementer of the offset had the same levels as the shorebirds survey: government, the developer or a 3rd party, but with the same assurance that the developer would retain responsibility for ensuring that the offsets were completed successfully. Finally, it was suggested that some offsets might have co-benefits, in that they could improve the status of other species, such as dugong. This was left open as to the level of this attribute, but there is a natural constraint implied by the size of the area of seagrass being replanted.

The attributes were combined into 24 choice sets, each with 3 offset alternatives and an opt-out, using Ngene (Choicemetrics) to deliver an s-efficient design based on the priors obtained from the pilot study.

Table 8 Attributes and levels for the seagrass offset survey

Attribute	Level	Name
Proportion of direct offsets	50%,60%,70%,80%,90%,100%	Proportion
Location of offset	Kimberly, Pilbara, Queensland	Loc_WA,Loc_NT, Loc_NZ,Loc_China
Offset implementer	Developer, Government, Third Party	Imp_Dev,Imp_Gov,Imp_3rd
Direct offset	Replanting seagrass beds, nutrient management	RPlant =1 if replanting,0 otherwise
Indirect offset	Education. Research	ED=1 if education, 0 otherwise.
Co-benefits to other species	Yes, No	CO=1 if yes, 0 otherwise.
Development	Tourism, Oil&gas	Tour=1 if tourism, 0 otherwise.

3.1 Implementation

The survey was coded into a web based survey, and an online market research company employed to provide a nationally representative set of respondents. It was completed from 7th to 1t4h of November 2014, and a total sample of 1329 respondents completed the survey.

The geographical distribution of respondents is reported in Table 9.

Table 9 Geographical distribution of sample, seagrass survey (n=1329)

Australian Capital Territory – Canberra	2.03	Australian Capital Territory – regional	-
New South Wales – Sydney	20.69	New South Wales – regional	10.99
Northern Territory – Darwin	0.45	Northern Territory – regional	0.08
Queensland – Brisbane	9.71	Queensland – regional	8.73
South Australia – Adelaide	7.15	South Australia – regional	1.88
Tasmania – Hobart	0.45	Tasmania – regional	1.28
Victoria – Melbourne	21.75	Victoria – regional	6.92
Western Australia – Perth	6.25	Western Australia – regional	1.66

Prior to the survey, only a minority of respondents knew what on offset was (13.69%) while most (48.83%) had only a vague idea. After the exposition of how offsets work, the appropriateness of using offsets was explored (Table 10): having being asked to select the most appropriate response to the statement:

"I think that offsets are an appropriate way for developers to compensate for environmental damage…":

34.69% suggested that offsets should not be used in any situation. In line with the shorebirds study, of the 461 who selected this response, only 16% consistently opted out in all 6 choice questions. 55% never selected the opt-out in any of the choice sets, preferring to make choices from among the offset packages.

Table 10 Attitudes towards offsets as a mechanism: seagrass survey

. "… without having to avoid and mitigate the damages first."	10.76
"… only after all possible avoidance and mitigation steps have been taken."	54.55
"… in no situation whatsoever – a development should not be approved if damage cannot be prevented."	34.69

After the description of the direct/indirect offset approaches, respondents were asked how appropriate they thought each was (Table 11). They were also asked to rate their level of confidence in various Government Environmental Departments to deliver their conservation objectives (Table 12).

Table 11 Appropriateness of offsets to manage environmental impacts: seagrass survey

	Direct	Indirect
Very inappropriate	4.29	4.14
Somewhat inappropriate	4.21	3.91
Neutral	16.40	17.83
Somewhat appropriate	27.31	29.50
Very appropriate	47.78	44.62

Table 12 Confidence in each of the following Government Environment Departments to follow through with its conservation commitments: seagrass survey

	Not at all confident	somewhat not confident	Neutral	Somewhat confident	very confident
WA Government Environment Department	12.26	12.34	38.60	29.95	6.85
Queensland's Government Environment Department	13.77	14.45	34.69	29.42	7.67
The Australian Commonwealth Government Environment Department	14.52	12.19	34.69	30.78	7.83

In contrast to the shorebird study (where direct offsets were preferred) , respondents revealed that there was little difference in the appropriateness of direct and indirect offsets for seagrass; with 75.09% and 74.12 indicating they were either somewhat or very appropriate. There was also little difference in respondent's the level of confidence in state and commonwealth governments' ability to successfully follow through on their conservation commitments.

The SLO questions were asked in both versions of the seagrass survey, but in the tourism version the wording was modified to reflect the context: e.g. they were asked about the contribution of the tourism industry to achieving Australia's goals.

The mean scores for economic and social SLO for the oil and gas sample are 3.5 and 2.8, while for the tourism sample they are 3.7 and 3.0 respectively. The differences across industries are significant (p=0.000)

Figure 3 reports the scatter diagrams for the two measures, for the two versions of the survey.

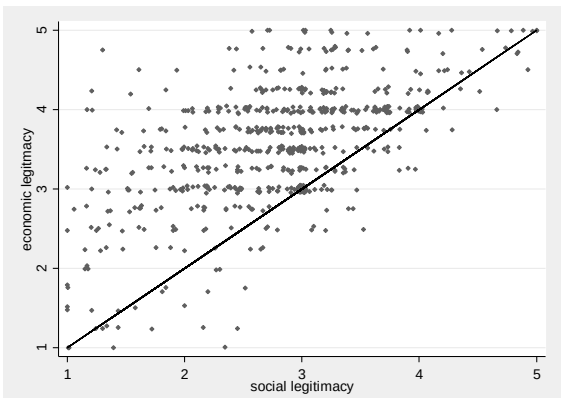

Figure 3a Oil and Gas (n=661)

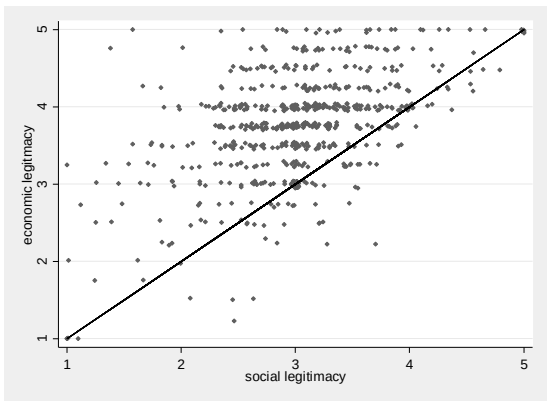

Figure 3b Tourism (n= 668)

Figure 3 Scatter plot of individual social and economic legitimacy scores: shorebird survey

Both show the feature that economic legitimacy is consistently higher then social legitimacy. There is also less variation in SLO for tourism, with a greater concentration in the centre of the distribution (the variance of the economic SLO is 7.6 and 6.8 for the oil and gas and tourism samples respectively).

3.2 Estimation of choice models: seagrass survey

The analysis of the choice experiment data starts with a comparison of a simple attribute-only specification, to test if the two sub-samples can be combined into a single model. Those results (unreported) suggest that there are significant differences in behaviour when the context changes from an oil and gas development to a tourism development. The modelling strategy was then to find the most parsimonious representation of preferences, constraining parameters to be the same where possible, in order to identify which aspects of the choice process have changed.

Table 13 reports the results of this process. It includes significant individual specific characteristics, as well as a random parameter on the opt-out ASC, to allow for individual unobservable heterogeneity with respect to deciding that the development should not go ahead. It should be noted that the form of the indirect offset (education or research) was not significant in any model estimated, and is dropped from the model.

Table 13 Estimates of a mixed logit model for the choice experiment data: seagrass survey

	Oil&Gas		Tourism	
	coeff	P>|z|	coeff	P>|z|
Percent	**0.017**	**0.000**	**0.017**	**0.000**
RPlant	0.166	0.000	0.329	0.000
Co	0.635	0.000	0.518	0.000
Loc_Pilb	0.009	0.833	-0.122	0.006
Loc_Qu	-0.116	0.033	-0.291	0.000
WA x Loc_Pilb	**0.027**	**0.805**	**0.027**	**0.805**
WA x Loc_Qu	**-0.597**	**0.000**	**-0.597**	**0.000**
Imp_dev	**-0.272**	**0.000**	**-0.272**	**0.000**
Imp_3rd	**0.056**	**0.067**	**0.056**	**0.067**
Slo_Soc x Imp_Dev	**0.088**	**0.005**	**0.088**	**0.005**
Slo_Econ x SQ	-1.359	0.000	-0.590	0.004
Slo_Soc x SQ	**-0.955**	**0.000**	**-0.955**	**0.000**
SQ	-2.32	0.000	-1.291	0.000
SQ St Dev	**3.737**	**0.000**	**3.737**	**0.000**

LL=-09217.21
Choice occasions =31896
Individuals =1329

Definition of variables
Percent: percentage of offset delivered as direct
RPlant: dummy variable for method used for direct offset =1 if seagrass replanting; base=nutrient control
Co: if co-benefits are achieved =1 if yes
Loc_Pilb,Loc_QU: location of offset; base=Kimberley
Imp_Dev,Imp_3rd: implementer of the development, Developer or 3rd party. Base-government
SQ: alternative specific dummy identifying the opt-out alternative
SLO_Econ, SLO_Soc: social license to operate variables, normalised so mean=0, SD=1
WA: dummy variable =1 if respondent lives in WA

Parameters on bold are constrained to be the same for both surveys. All other parameters are significantly different between samples.

Ignoring for the moment the differences due to industry, some broad generalizations can be made. Respondents prefer higher levels of direct offset, and for the offset to be achieved by replanting seagrass rather than nutrient management. Placing the offset in Queensland reduces utility for all respondents, but there is an additional effect if the respondent lives in WA: moving the offset out of state seems particularly pernicious. There was no equivalent effect identified for Queensland respondents

placing a higher value on the offset in Queensland, suggesting that this may be an 'endowment' effect: moving the remediation away from a region where the damage done imposes utility losses for those in the region, but there is no equivalent gain for those who are gaining ecological outcomes. The ranking of preferred implementer of the offset is a 3rd party, the government and lastly the developer, but the attitude towards the developer is moderated by the social legitimacy SLO score: those who have a high SLO find the developer more acceptable, but not to the point where they are preferred over the government. Higher levels of both measures of SLO lead to a lower tendency to select the opt-out, no-development alternative.

In terms of differences between samples: when the context is tourism, seagrass replanting is relatively highly valued, and moving the offset away from the Kimberly causes greater losses in utility. Those in the tourism sample also have a higher tendency to select the opt-out, and are less sensitive to levels of SLO in that regard. One could summarise these results as suggesting that when the context is a tourism development, respondents prefer to see more focused, local offsets, with a higher tendency to reject development in total if the offset does not meet expectations: they could be characterised as being less flexible in what they will accept as an offset package.

One can re-interpret these results in terms of marginal rates of substitution, using the percent of direct offset as the numerator, as it is the only continuous attribute in the model. Again, note that given the numerator is associated with a positively valued attribute, a positive value implies the increase in the direct offset needed to compensate for an adverse change. Table 14 reports these results.

Table 14 Marginal rates of substitution among attributes: seagrass survey

	Oil&Gas			Tourism		
	Partworth	95% CI		Partworth	95% CI	
RPlant	-9	-14	-5	-19	-14	-24
Co	-36	-42	-30	-30	-24	-35
Loc_Pilb	-1	-6	4	7	-12	2
Loc_Qu	7	1	13	16	23	10
Loc_Pilb (WA)	-2	-15	10	5	-7	18
Loc_Qu (WA)	41	23	58	51	33	69
Imp_dev	**16**	**20**	**11**	**16**	**20**	**11**
Imp_3rd	**-3**	**-7**	**0**	**-3**	**7**	**0**
Slo_Soc x Imp_Dev	**-5**	**-9**	**-1**	**-5**	**-9**	**-1**

It is important to note that these are the additional percentages of direct offset actions in the offset package to leave utility unchanged. So if the comparator is a scheme that has 100% direct offset (and 0% indirect) and no co-benefits, the introduction of co-benefits would allow the level of direct offsets to be reduced to64% for oil&gas (70% for Tourism), and respondents would see them as equivalent (e.g they are willing to 'pay' 36(30) percentage points in direct offset to obtain the co-benefits). A movement of the location of the offset from WA to Queensland would require an improvement in the proportion of direct offsets in the package: either 7 or 16 percentage points for those outside of WA. However, those in WA

would require an offset that contains 34 percentage points more direct offsetting actions if the offset was located in Queensland compared to one located at the impacted site, if the development was oil and gas based, and 51% more if its tourism based.

The logical limit on the attribute levels: the percentage direct cannot exceed 100%, places some limits on the ability to construct equivalent offsets in different locations: if the proposal is to have an offset package with 70% direct offset, in WA, it's impossible to make a Queensland offset look attractive to a WA resident using the proportion of direct offset alone: one cannot increase the direct offset proportion to 121% (in the case of Tourism). But one can bundle attributes together: if there are no co-benefits in the WA offset, but they are possible in Queensland then the Queensland offset will look attractive: a package of 100% direct offsets in Queensland, with co-benefits, will be more attractive than a 70% direct offsets package, without c-benefits, in WA, even to a WA resident.

4. CONCLUSIONS

This report gives an overview of the design and implementation of the national offsets surveys. By using different contexts of migratory sea birds and seagrass we have been able to explore the publics values relating to a number of issues: the spatial location of offsets, in particular as they relate to offshore offsets; the substitution of the impacted species with a species under greater threat; the balance of direct and indirect offsets, and nature of the actions undertaken in each of these categories; and who is implementing the offset on ground.

We find that in general respondents are prepared to accept offsets as a legitimate mode of action, as revealed by the relatively low levels of serial selection of the op-out/no development alternative. They are also prepared to make trade-offs in the composition of the offset package. Some issues are more challenging: moving the offset inter-state requires higher levels of benefit in some other aspect of the package: moving it internationally, and in particular to China, required substantial multipliers on other attributes.

The study confirmed the value of the SLO measures: both in terms of the relative level of economic and social legitimacy, but also the value in those measures explaining behaviour in the choice experiments.

The data sets represent a rich resource for further analysis, as other aspects of the respondents characteristics that may affect preferences have not been explored here.

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6. APPENDIX 1 COPY OF THE SURVEY AND RESPONSES BY QUESTION

Shorebird Offsets Survey

Below is a word version of the online survey implemented for the shorebird survey. The content is the same, although the visual presentation may vary. It also includes summary values for all answers given.

Community acceptance of marine biodiversity offsets

Thank you for considering participation in this research project, involving completion of an online survey about attitudes towards the environmental management of developments that may occur in the marine environment.

The research project is being conducted by researchers at The University of Western Australia.

You have been selected to participate at random, and your involvement is voluntary. Completion of the questionnaire will take approximately 20 minutes. Continuing to the next screen of the questionnaire will be taken as your consent to participate.

Your responses will be anonymous and will not be used individually. Whilst your participation is voluntary, please be aware that, to guarantee your anonymity, it will not be possible to remove your responses from the database once you have submitted your online survey.

If you have any questions, please feel free to contact me via the ORU email address below: [redacted]

Kind Regards,
Dr. Michael Burton
The School of Agricultural & Resource Economics,
The University of Western Australia,
Crawley WA 6009
Project Reference Number: RA/4/1/6036

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time. In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Research Ethics Office at the University of Western Australia on (08) 6488 3703 or by emailing to hreo-research@uwa.edu.au

Before we begin the survey, please answer these few questions:

IQ1) What is your gender?

❍	Male	48.21%
❍	Female	51.79%

IQ2) Which of the following age groups applies to you?

❍	18-29	15.46%
❍	30-44	31.51%
❍	45-59	27.06%
❍	60-74	19.91%
❍	75+	6.05%

****

IQ3) What is your residential location? (%)

Australian Capital Territory – Canberra	2.48	Australian Capital Territory – regional	-
New South Wales – Sydney	18.89	New South Wales – regional	11.60
Northern Territory – Darwin	0.51	Northern Territory – regional	0.07
Queensland – Brisbane	8.90	Queensland – regional	10.94
South Australia – Adelaide	6.71	South Australia – regional	2.04
Tasmania – Hobart	1.17	Tasmania – regional	1.97
Victoria – Melbourne	19.69	Victoria – regional	6.86
Western Australia – Perth	6.49	Western Australia – regional	1.68

****

MARINE BIODIVERSITY OFFSETS

The purpose of this survey is to determine the Australian community's preferences regarding marine biodiversity offsets. The survey comprises of 4 main parts:

PART 1: You will be given some background information on marine biodiversity offsets.

PART 2: We will describe a development and its impact on the environment. Then, you will be presented with a series of possible offset scenarios. These are questions where you will be asked to consider a set of options that contain different offset strategies from which you choose your most preferred.

PART 3: We will ask your opinion on some environmental issues.

PART 4: We will ask some questions about you, to make sure we have a representative sample of the Australian community.

****

PART 1

Marine Biodiversity is defined as the variability among living organisms in a marine environment.

In other words, it's all of the different species of plant and animal life in the oceans and coastal waters such as mangroves, lagoons, salt marshes, or estuaries.

Offsets are measures that compensate for the adverse impacts of an action on the environment.

In other words, if some sort of development or activity is undertaken that will damage the environment, the developer that is responsible must 'offset' that damage by doing something to protect or conserve the environment in the same proportion.




Images: Green turtle, seals, clown fish - courtesy of the WA Department of Environment & Conservation's Marine Sciences Program; shorebird - courtesy of the CSIRO.

P1Q1) How familiar were you with the notion of an offset before this survey? (%)

I didn't know what an offset was	36.40
I had a vague idea of what an offset was	47.70
I knew what an offset was	15.90

Answer if knew/had an idea of what an offset was in Q1

P1Q2) What type of offsets were you aware of before this survey? (%: n=872)

Carbon offset	54
Biodiversity offset	54
Marine Biodiversity offset	18
Other - please specify	2

P1Q3) Have you previously completed an online survey that has asked you about marine biodiversity offsets? (%)

Yes	SCREENOUT, display message "Thank you for your interest in this survey. We need a certain subset of the population to answer the questions, and don't require your services at this time." + link to reward
No	92.92
Unsure	7.08

****

Offsets implementation

Any activity that might have adverse impacts on the environment must go through a government approval process.

During that process, the developer must demonstrate that they have done absolutely everything possible to:

Step 1: Avoid environmental damages in the first place (example) For example, building in a location where it will not disturb wildlife)
Step 2: Mitigate or repair any damages that can't be avoided (example) For example, treating polluted water before it runs off into the ocean)
Step 3: If there are **remaining damages**, the developer must ***offset*** them.

Overall, the sum of avoidance, mitigation, and offset strategies must lead to **no net**

loss to the environment.

i.e. Step 1 Avoid

\+

Step 2 Mitigate = No net loss to the environment

\+

Step 3 Offset

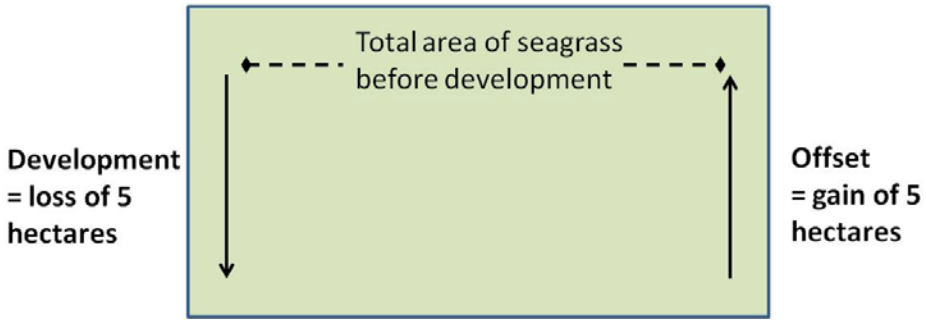
For example, consider a coastal development that, even after avoidance and mitigation, will damage 5 hectares of seagrass. The seagrass is an important habitat for turtles and dugongs, so it must be replaced.

The developer must offset the damage by replanting seagrass and ensuring that an equivalent area of seagrass is available for the turtles and dugongs as there was before the development.

Step 1: the developer moves a pipeline so that it doesn't run through the seagrass bed

Step 2: a water treatment plant is used to ensure water runoff from the development is clean

Step 3: some dredging of the seabed is required, so 5 hectares of seagrass will be disturbed
→ an offset is required



In the approval process, any proposed offsets are examined by the government to see whether they offer appropriate compensation for the remaining damages. If the

offsets are not suitable, then the activity or development is not allowed to go ahead.

Note that **offsets are planned for** – in other words, the possibility of damage to the environment is considered before a development is undertaken. The proposed offsets to compensate for those damages are part of the approval process.

Offsets <u>are not</u> the same thing as compensating for unexpected events or accidents, such as oil spills.

P1Q3.) Complete the following statement by selecting the option that most closely reflects your opinion:

"I think that offsets are an appropriate way for developers to compensate for environmental damage…": (%)

"… without having to avoid and mitigate the damages first."	11.52
"… only after all possible avoidance and mitigation steps have been taken."	55.73
"… in no situation whatsoever – a development should not be approved if damage cannot be prevented."	32.75

****

PART 2

Now we'd like you to think about a hypothetical development proposal that will require a marine biodiversity offset:

There is a species of migratory shorebird called the **Ruddy Turnstone** which is protected under Australian legislation.

There are nearly **500,000** Ruddy Turnstones worldwide. Almost 10% of these birds follow a migration pattern where they breed in Siberia, and each year migrate south to feeding grounds in Australia, China and New Zealand.

Ruddy Turnstone (Photo: LT Mike Levine)

P2Q1) Were you aware that some bird species migrate from Northern countries to Australia as part of their life cycle?

Yes	62.22
No	37.78

****

An **oil and gas** exploration and production company is planning to construct and operate a gas plant in the vicinity of a beach along the **Kimberley coast** of Western Australia.

The development will lead to **1000 [5000] new jobs** for Australian workers.

Some environmental impacts can be avoided or mitigated but there are **residual impacts** on the use of the beach as a feeding ground by **1000 Ruddy Turnstones**.

The impacts include artificial lighting and an increase in the number of people using the beach, which will disturb the birds. Frequent disturbance reduces the birds' ability to feed and store energy, leading to a higher mortality rate during their migration north.

The 1000 Ruddy Turnstones won't be able to feed on the beach anymore. The developer will have to **offset** these impacts if the project is to go ahead, to ensure that there is **no net loss to the species**.

P2Q2 Had you heard of the Ruddy Turnstone before?

Yes	8.39
No	91.61

P2Q3 In your opinion, how important is it to protect Ruddy Turnstones?

Very unimportant (1)	10.94
Somewhat Unimportant (3)	7.51
Neither Important nor Unimportant (4)	12.91
Somewhat Important (5)	30.27
Very Important (6)	38.37

P2Q4 Have you ever been bird watching before?

No, Never	57.77

Yes, but only occasionally	37.71
Yes frequently	4.52

****

To offset the environmental impacts, the developer has to consider a number of offset features.

These include:

- What type of offset to use
- The location where the offset will be implemented
- Who will be responsible for implementing the offset
- What bird species the offset should protect
- How many birds should be protected

We will describe each of these over the next few screens.

****

TYPE OF OFFSET

There are two different ways to offset the impacts of the development on the Ruddy

Turnstone: through direct or indirect offsets.

- **Direct offsets** mean that the offset provides protection or conservation through **new on-ground interventions** aimed at improving the environment.

- **Indirect offsets** use **research** to improve **existing on-ground management** techniques of the birds to ensure there is no net loss to the species.

- Direct and Indirect offsets can be used **in combination** to ensure there is **no net loss to the environment**.

  For example, to protect the 1000 birds, we could directly offset for 800 birds (80%), and indirectly offset 200 birds (20%).

The **direct offset** will involve the developer protecting a particular area of beach in order to ensure the survival of the birds.

A suitable substitute beach will be identified:

- At a site that the shorebirds might have used previously, but that has been degraded over time (from other causes not related to the development); and
- That can be made a suitable habitat again for the birds by fencing off an area so that people can't disturb them.

The **indirect offset** would consist of funding a research program aimed at managing existing pressures on the birds more efficiently.

P2Q5) How appropriate do you think it is to use each type of offset in an offset package?

Direct offset:

Very inappropriate	5.32
Somewhat inappropriate	5.40
Neutral	19.18
Somewhat appropriate	26.99
Very appropriate	43.11

Indirect offset:

Very inappropriate	5.98
Somewhat inappropriate	9.04
Neutral	26.70
Somewhat appropriate	33.92
Very appropriate	24.36

****

LOCATION OF THE OFFSET

The offset could be located at a number of sites that are used by the Ruddy Turnstones.

At each of these sites there are degraded beaches where a direct offset could be used, and existing pressures that could be managed by an indirect offset.

The sites include:

- In Western Australia: a few kilometres away from the gas development site.

This site would be used by the **same 1000 Ruddy Turnstones** that are impacted by the development

- In the Northern Territory:

  This site would still protect 1000 Ruddy Turnstones, but **they would not be the same individuals** impacted by the development.

- In New Zealand:

  This site would still protect 1000 Ruddy Turnstones, but **they would not be the same individuals** impacted by the development.

- In China:

  This site would still protect 1000 Ruddy Turnstones. As all Ruddy Turnstones that come from Australia and New-Zealand stop in China, **they can either be the same individuals impacted by the development or other individuals**.

P2Q6) Have you ever visited or lived in:

The Kimberley region in WA	13.49
The Northern Territory	24.80
New Zealand	31.73
China	13.35
None of the above	50.40

P2Q7)) Please rate the confidence that you have in each of the following Government Environment Departments to follow through with its conservation commitments:

	Not at all confident	somewhat not confident	Neutral	Somewhat confident	very confident
WA Government Environment Department	9.77	12.40	36.91	33.11	7.80
NT Government Environment Department	8.39	12.25	39.46	33.19	6.71
New Zealand's Government Environment Department	5.11	8.83	40.48	34.28	11.31
China's Government Environment Department	30.85	23.12	34.50	9.19	2.33

****

WHO IMPLEMENTS THE OFFSET

Different parties could be responsible for implementing the offset.

They include:

- The **development company**:
  The developer could use their own trained staff to implement the offset

- The local **Government Environment Department**:
  The developer could pay a government department to implement the offset on their

behalf.

The Government in the location that the offset takes place would be the one responsible for implementing the offset.

For example, an offset in Western Australia would be implemented by the WA State Government, while an offset in China would be implemented by the Chinese Government.

- An **independent Third Party**:

  The developer could pay an independent company to implement the offset.

  This third party company will have a proven record in implementing other offsets.

Note that, whoever implements the offset, the developer must guarantee that the funds to undertake the offset are available upfront to account for risks such as bankruptcy.

P2Q8.) Please rank these groups in terms of your confidence in their ability to successfully complete an offset program, where 1=most confident and 3=least confident: *(percentage of times the group was ranked at that level)*

	Ranked 1	Ranked 2	Ranked 3
Development Company	24.07	24.95	50.98
Local Government Environment Department	38.37	49.96	11.67
Independent Third Party	37.56	25.09	37.35

****

SPECIES PROTECTED BY THE OFFSET

The developer could propose to protect either the Ruddy Turnstone or another species of migratory shorebird.

Although the Ruddy Turnstone is a protected species, it is not a species at very high risk of extinction given there are nearly 500,000 of them.

Instead of offsetting the impact on the Ruddy Turnstone, the developer could offer to protect a different, but **more endangered species.**

The **Eastern Curlew** is more endangered with a population of only 38,000 worldwide.

As is the case for the Ruddy Turnstone offset, to protect the Eastern Curlew the developer could:

- Use the same types of direct and indirect offsets.
- Locate the offsets on the Kimberley coast in Western Australia, in the Northern Territory or in China. The Eastern Curlew does not migrate to New Zealand, so an offset cannot be located there.
- Implement the offset themselves, or pay a Government Environment Department or Third Party.

Eastern Curlew (Photo: A McDougall, Department of National Parks Recreation, Sport and Racing)

P2Q9.) Had you heard of the Eastern Curlew before?

Yes	23.19
No	76.81

P2Q10.) In your opinion, how important is it to protect Eastern Curlews?

Very unimportant	10.50
Somewhat unimportant	5.54
Neither Important nor Unimportant	13.27
Somewhat important	26.84
Very important	43.84

****

NUMBER OF BIRDS PROTECTED

If the developer is protecting the Ruddy Turnstones, they need to offset for at least 1000 birds, which is the number of birds impacted by the development.

If the developer is protecting the more endangered Eastern Curlew, they need to offset for at least 500 birds.

However, the developer could choose to protect more.

- The number of **Ruddy Turnstones** protected could be **1000, 1500 or 2000**.

- The number of **Eastern Curlews** protected could be **500, 1000, 1500 or 2000**.

****

Please, read the following guidelines before proceeding further:

- You will be presented with 6 possible offset scenarios to compensate for the impact on the birds. Each question should be treated independently.

- In each scenario, you will be shown 3 options that each present a possible offset strategy that the developer is proposing.
  The strategies are characterized by:
  - The proportion of direct and indirect offsets used
  - The location of the offset
  - Who will implement the offset
  - The species protected by the offset
  - How many birds are protected by the offset

- In each case independent scientists have approved the offset strategy and confirmed that it will result in no net loss to the environment. Moreover, each option would have approximately the same cost for the developer.

- A 4th option will also be shown in each scenario, where the development is not permitted to go ahead.

- In each scenario, you will be asked to choose the offset strategy that you most prefer from the 3 available, or, if you don't like any of the strategies, you can choose the 'no development' option.

- In making your decision, remember that the development will create 1000 [5000] new jobs for Australian workers.

- We will be surveying a large number of people to work out the preferences held across the Australian community. The findings that emerge from this study may be used to adapt the current policy regarding the implementation of offsets in Australia.

****

SAMPLE SCENARIO

Below is an example of the type of question you will be presented with (you don't need to answer this one).

When answering the scenarios, don't forget to:

- Consider each option (looking down each column)
- Choose your most preferred option based on the assumption that these are the only options available to you.
- Treat each scenario independently. You don't need to remember or anticipate the choices you make across the six questions.

	Option 1	Option 2	Option 3	Option 4
Proportion of direct and indirect offset	Direct 90% Indirect 10%	Direct 50% Indirect 50%	Direct 70% Indirect 30%	No development (= loss of 1000 new jobs)
Offset location	Western Australia	China	Northern Territory	
Offset implementer	Developer	Government	Third Party	
Species protected	Ruddy Turnstone	Eastern Curlew	Ruddy Turnstone	
Number of birds protected	2000	500	1500	

You will be asked to choose your most preferred of the 4 options.

For example, if you chose Option 1, it would mean that you prefer this offset rather than the offsets provided in Option 2 or Option 3, or No development.

In this example, Option 1 is an offset that:

- Is made up of 90% direct and 10% indirect offsets to achieve no net loss
- Is located in Western Australia, near the development site
- Is implemented by the development company
- Protects 2000 Ruddy Turnstones, which are the species impacted by the development

P2Q11) Consider the following options. Assuming these are the only options available to you, which one would you choose?

{ Insert the 6 choice scenarios}}

Move your mouse over the links below if you want to read the explanations related to the characteristics of the offset strategies:

- Proportion of direct and indirect offset
- Offset location
- Offset implementer
- Species protected
- Number of birds protected

[pop-up boxes with explanations]

****

P2Q12) You always preferred the 'no development' option over the potential offset strategies. Please provide your reason why: (n=89: multiple answers possible. number of responses reported)

I object to the idea of offsetting	4
I need to know more about offsetting before I would feel comfortable deciding on which offset strategies are most suitable	
I don't trust the science underlying the practice of offsetting	
I don't trust the Australian Government to monitor and ensure success of an offset	3
I object to the idea of more coastal development, regardless of whether offsets are used	8
I found the choices difficult or confusing, so I preferred the 'no development' option	2
other	3

**********Next, we have a few questions on what you thought about the offset scenarios

P2Q13) Please indicate how certain you were of the answers you gave in the offset scenarios, from "Not certain at all" (1) to "Very certain" (10)

(1) Not certain at all	1.46
(2)	2.12
(3)	2.41
(4)	4.67
(5)	12.25
(6)	16.85
(7)	20.35
(8)	20.57
(9)	10.14
(10) very certain	9.19

P2Q14) Did you think that the scenarios were confusing to answer?

Yes	34.28
No	65.72

****

P2Q15) What did you think about the information that was provided to describe the

offset strategies?

It was confusing	15.03
I thought the description was inaccurate	4.74
I thought it was an informative and accurate description	55.87
I would have liked more information	24.36

P2Q16) Do you think the features [Pop-up: Proportion of direct/indirect offsets; Location; Implementer; Species protected; Number of birds protected] used to describe the offset strategies were useful to help you make choices when answering the offset scenario questions?

Yes	93.8
No - please explain why not	6.20

****

P2Q17) Please indicate on the following scale how likely you think it is that the results of this study will influence future policy decisions regarding marine offsets in Australia from "Not at all likely" (1) to "Very likely" (10)

(1) Not at all likely l	4.67
(2)	7.15
(3)	6.93
(4)	9.56
(5)	17.14
(6)	17.21
(7)	16.27
(8)	11.96
(9)	5.84
(10) Very likely	3.28

PART 3

Now we'd like to ask some questions about your attitudes towards the environment, the oil and gas sector in Australia, and government management of environmental issues.

	Not at all (1)	Not much (2)	I am not sure (3)	A little (4)	A lot (5)
P3Q1) Are you concerned about environmental problems in general?	2.04	6.35	9.70	37.78	44.13
P3Q2) Are you concerned about marine biodiversity loss?	1.82	5.03	13.27	35.81	44.06
P3Q3) Do you think the oil and gas sector contributes towards marine biodiversity loss?	2.63	4.89	18.75	30.27	43.47
P3Q4) Do you think that the use of marine biodiversity offsets will improve the oil and gas sector's ability to protect marine biodiversity?	5.25	9.19	27.28	38.37	19.91

****

P3Q5) How much do you know about the oil and gas sector in Australia?

I know nothing about it	19.69
I know the names of some of the companies, but not what they do	28.74
I know a little about the activities of the oil and gas sector	45.44
I know a lot about the activities of the oil and gas sector, including how their activities interact with people and with the natural environment	6.13

****

P3Q6) Please state whether you agree/disagree with the following statements:

	Strongly disagree				Strongly agree
	1	2	3	4	5
"Australia can economically benefit from the oil and gas sector"	1.39	2.70	25.38	52.66	17.87
“Australia needs to have the cooperation of the oil and gas sector to achieve the Coutry’s most important goals”	2.26	7.80	29.47	46.83	13.64
“The oil and gas sector does what it says it will do in the media"	9.77	25.38	48.58	13.35	2.92
“I am very satisfied by the oil and gas sector in Australia”	11.09	19.11	49.74	15.97	4.08
“The presence of the oil and gas sector in Australia is a benefit to the Australian population”	3.57	6.57	33.92	43.11	12.84
“The oil and gas sector listens to the Australian population’s concerns"	11.38	28.67	43.40	13.86	2.70
"In the long-term, the oil and gas sector makes a contribution to the well-being of Australia"	5.91	11.45	38.29	36.62	7.73
“The oil and gas sector in Australia treats everyone fairly”	12.55	25.16	46.32	13.20	2.77
“The oil and gas sector respects Australia’s way of doing things”	9.34	21.30	48.8-	17.21	3.36
“The Australian population and the oil and gas sector have a similar vision for the future of Australia”	12.33	23.12	43.62	16.70	4.23
“The oil and gas sector gives more support to those it negatively affects”	9.63	24.65	49.31	13.86	2.55

"The oil and gas sector shares decision-making with the Australian government"	5.18	13.64	47.85	29.25	4.08
"The oil and gas sector takes into account the interests of the Australian population"	11.60	26.62	40.48	18.45	2.84
"The oil and gas sector is concerned about the welfare of the Australian population"	14.22	27.57	38.44	16.05	3.72
"The oil and gas sector openly shares information that is relevant to the Australian population"	13.20	26.26	42.60	14.73	3.21

****

PART 4

Almost finished! In this section of the survey, we will ask some questions about you. The information collected will be kept anonymous.

P4Q1) Do you have any children?

Yes – including children who are still dependent (	29.76
Yes – all children are now independent	33.48
No	36.76

P4Q2) What is your highest level of education?

High school	27.43
Trade/technical certificate or equivalent	30.42
University degree	40.92
I would rather not say	1.24

****

P4Q3) Do you work in any of the following fields?

Environmental management, research or consulting	0.95
Public sector, including Local, State, Territory or Commonwealth governments	7.00
Mining industry, including the oil and gas sector	1.60
Hotel and tourism industry	2.70
None of these fields	88.03

P4Q4) Do you belong to any environmental or conservation groups?

Yes	6.20
No	93.80

P4Q5) What is your gross annual household income before tax?

Under $13,000 (under $250/week)		2.84
$13,000-$25,999	($250-$500/week)	12.98
$26,000 - $41,599	($500-$800/week)	15.17
$41,600 - $62,399	($800-$1200/week)	15.68
$62,400 - $88,399	($1200-$1700/week)	13.06
$88,400 - $129,999	($1700-$2500/week)	15.54
$130,000 - $181,999	($2500-$3500/week)	7.00
$182,000 and over	($3500+/week)	3.50
I would rather not say		14.22

****

Thank you very much for your time! If you have comments you want to make about the survey, or the issues raised in it, please add them below:

7. APPENDIX 2 COPY OF THE SEAGRASS SURVEY AND RESPONSES BY QUESTION

Below is a word version of the online survey implemented for the seagrass survey. The content is the same, although the visual presentation may vary. It also includes summary values for all answers given.

There were two versions of the survey, one that used mining as a context, and the second tourism. The majority of the survey was common, and hence the data is combined. Part 3 contained questions which were context specific. this appendix included responses for the oil and gas development part 3, appendix 7 for the tourism version.

Community acceptance of marine biodiversity offsets

Thank you for considering participation in this research project, involving completion of an online survey about attitudes towards the environmental management of developments that may occur in the marine environment.

The research project is being conducted by researchers at The University of Western Australia.

You have been selected to participate at random, and your involvement is voluntary. Completion of the questionnaire will take approximately 20 minutes. Continuing to the next screen of the questionnaire will be taken as your consent to participate.

Your responses will be anonymous and will not be used individually. Whilst your participation is voluntary, please be aware that, to guarantee your anonymity, it will not be possible to remove your responses from the database once you have submitted your online survey.

If you have any questions, please feel free to contact me via the ORU email address below: [redacted]

Kind Regards,
Dr. Michael Burton
The School of Agricultural & Resource Economics,
The University of Western Australia,
Crawley WA 6009
Project Reference Number: RA/4/1/6036

Approval to conduct this research has been provided by the University of Western Australia, in accordance with its ethics review and approval procedures. Any person considering participation in this research project, or agreeing to participate, may raise any questions or issues with the researchers at any time. In addition, any person not satisfied with the response of researchers may raise ethics issues or concerns, and may make any complaints about this research project by contacting the Human Research Ethics Office at the University of Western Australia on (08) 6488 3703 or by emailing to hreo-research@uwa.edu.au

Before we begin the survey, please answer these few questions:

IQ1) What is your gender?

❍	Male	51.17
❍	Female	48.83

IQ2) Which of the following age groups applies to you?

❍	18-29	16.40
❍	30-44	32.20
❍	45-59	27.31
❍	60-74	19.71
❍	75+	4.36

****

IQ3) What is your residential location? (%)

Australian Capital Territory – Canberra	2.03	Australian Capital Territory – regional	
New South Wales – Sydney	20.69	New South Wales – regional	10.99
Northern Territory – Darwin	0.45	Northern Territory – regional	0.08
Queensland – Brisbane	9.71	Queensland – regional	8.73
South Australia – Adelaide	7.15	South Australia – regional	1.88
Tasmania – Hobart	0.45	Tasmania – regional	1.28
Victoria – Melbourne	21.75	Victoria – regional	6.92
Western Australia – Perth	6.25	Western Australia – regional	1.66

****

MARINE BIODIVERSITY OFFSETS

The purpose of this survey is to determine the Australian community's preferences regarding marine biodiversity offsets. The survey comprises of 4 main parts:

PART 1: You will be given some background information on marine biodiversity offsets.

PART 2: We will describe a development and its impact on the environment. Then, you will be presented with a series of possible offset scenarios. These are questions where you will be asked to consider a set of options that contain different offset strategies from which you choose your most preferred.

PART 3: We will ask your opinion on some environmental issues.

PART 4: We will ask some questions about you, to make sure we have a representative sample of the Australian community.

****

PART 1

Marine Biodiversity is defined as the variability among living organisms in a marine environment.

In other words, it's all of the different species of plant and animal life in the oceans and coastal waters such as mangroves, lagoons, salt marshes, or estuaries.

Offsets are measures that compensate for the adverse impacts of an action on the environment.

In other words, if some sort of development or activity is undertaken that will damage the environment, the developer that is responsible must 'offset' that damage by doing something to protect or conserve the environment in the same proportion.




Images: Green turtle, seals, clown fish - courtesy of the WA Department of Environment & Conservation's Marine Sciences Program; shorebird - courtesy of the CSIRO.

P1Q1) How familiar were you with the notion of an offset before this survey? (%)

I didn't know what an offset was	37.47
I had a vague idea of what an offset was	48.83
I knew what an offset was	13.69

Answer if knew/had an idea of what an offset was in Q1

P1Q2) What type of offsets were you aware of before this survey? (%: n=872)

Carbon offset	85.59
Biodiversity offset	27.57
Marine Biodiversity offset	25.15
Other - please specify	3.20

P1Q3) Have you previously completed an online survey that has asked you about marine biodiversity offsets? (%)

Yes	SCREENOUT, display message "Thank you for your interest in this survey. We need a certain subset of the population to answer the questions, and don't require your services at this time." + link to reward
No	94.21
Unsure	5.79

****

Offsets implementation

Any activity that might have adverse impacts on the environment must go through a government approval process.

During that process, the developer must demonstrate that they have done absolutely everything possible to:

Step 1: Avoid environmental damages in the first place (example) For example, building in a location where it will not disturb wildlife)
Step 2: Mitigate or repair any damages that can't be avoided (example) For example, treating polluted water before it runs off into the ocean)
Step 3: If there are **remaining damages**, the developer must ***offset*** them.

Overall, the sum of avoidance, mitigation, and offset strategies must lead to **no net**

loss to the environment.

i.e. Step 1 Avoid

\+

Step 2 Mitigate = No net loss to the environment

\+

Step 3 Offset

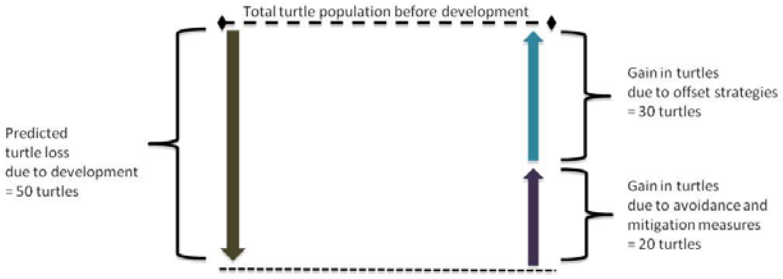
For example, consider a coastal development that, even after avoidance and mitigation, will result in a loss of 30 turtles.

The developer must offset the damage and ensure the turtle population remains the same size as it was before the development.

Step 1: the developer moves some infrastructure away from a turtle nesting beach

Step 2: polluted water is treated before entering the ocean

Step 3: dredging of the seabed will disturb a large turtle feeding area, with the remaining area unable to support all of the turtles
→ an offset is required



In the approval process, any proposed offsets are examined by the government to see whether they offer appropriate compensation for the remaining damages. If the offsets are not suitable, then the activity or development is not allowed to go ahead.

Note that **offsets are planned for** – in other words, the possibility of damage to the environment is considered before a development is undertaken. The proposed offsets to compensate for those damages are part of the approval process.

Offsets <u>are not</u> the same thing as compensating for unexpected events or accidents, such as oil spills.

P1Q3.) Complete the following statement by selecting the option that most closely reflects your opinion:

"I think that offsets are an appropriate way for developers to compensate for environmental damage…": (%)

"… without having to avoid and mitigate the damages first."	10.76
"… only after all possible avoidance and mitigation steps have been taken."	54.55
"… in no situation whatsoever – a development should not be approved if damage cannot be prevented."	34.69

****

PART 2

Now we'd like you to think about a hypothetical development proposal that will require a marine biodiversity offset:

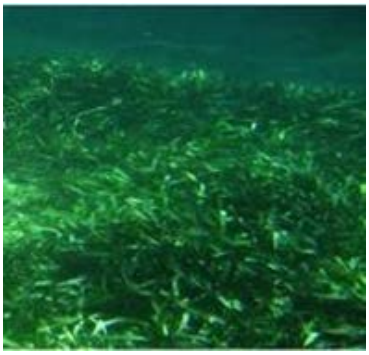
An **oil and gas** exploration and production company is planning to construct and operate a gas plant on the **Kimberley coast** of Western Australia.

The development will lead to **1000 new jobs** for Australian workers.

Some environmental impacts can be avoided or mitigated but there are **residual impacts** on **30 Green Turtles.** This impact will result from disturbing seagrass beds in the area, which are the main food source for the turtles.

Seagrass

Seagrass beds are an important ecosystem for many marine species as they provide food, shelter and a nursery ground. They stabilise the seabed, preventing erosion, and they are major stores for carbon.



Seagrass bed.

Image provided by Department of Environment and Conservation, Government of Western Australia. P2Q1) Were you aware that some bird species migrate from Northern countries to Australia as part of their life cycle?

Green Turtles

Green Turtles are an endangered species and populations are listed as vulnerable in

Australia.

Green Turtle.

Image provided by Department of Environment and Conservation, Government of Western Australia.

Q.) Did you know much about Green Turtles and their protection status before this survey?

No, I did not know much about Green Turtles	59.22
Yes, I knew about Green Turtles, but did not know they were a protected species	19.19
Yes I knew about Green Turtles, and I did know they were a protected species	21.60

Q.) How important do you think it is to protect the Green Turtle?

Very Unimportant	12.64
Somewhat unimportant	3.99
neither important nor unimportant	6.09
somewhat important	24.45
very important	52.82

****

To offset the environmental impacts, the developer has to consider a number of offset features.

These include:

- What type of offset and management activity to use
- The location where the offset will be implemented
- Who will be responsible for implementing the offset
- Whether there are any additional benefits to other animals arising from the offset

We will describe each of these over the next few screens.

****

TYPE OF OFFSET

There are two different ways to offset the impacts of the development on the Green Turtles: through direct or indirect offsets.

- **Direct offsets** mean that the offset provides protection or conservation through **new on-ground interventions** aimed at improving the turtles' environment.

- **Indirect offsets** mean that the offset will improve **existing on-ground management** techniques to provide better protection for the turtles.

- Direct and Indirect offsets can be used **in combination** to ensure there is **no net loss to the environment**.

  For example, to protect the 30 turtles, we could directly offset for 20 turtles, and indirectly offset for 10 turtles.

OFFSET ACTIVITY

Different direct or indirect activities can be used to achieve the offset. Each activity will be equally effective at protecting the Green Turtle species.

For direct offsets, the developer could:

- **Replant seagrass beds**
  Seagrass could be replanted at an appropriate site to provide an equivalent area of feeding ground for the turtles.

- **Reduce nutrient pollution**
  Nutrients enter the ocean from multiple sources (agricultural practices, residential developments, public spaces etc). A reduction will stop the damaging effects it is having on nearby seagrass beds. By controlling nutrient pollution, damaged seagrass sites can return to a functional condition and provide feeding areas for the turtles.

For indirect offsets, the developer could:

- **Implement a research program**
  Research could be undertaken by a leading Australian university. The research would improve existing management of Green Turtles to ensure there is no net loss to the species as a result of the development.

- **Implement a public education program**
  A program could be undertaken to educate local communities and tourists visiting areas where Green Turtles live on how to minimize human impacts on the turtles, such as littering, boating collisions, damaging nesting sites or disturbing female turtles during nesting.

P2Q5) How appropriate do you think it is to use each type of offset in an offset package?

Direct offset:

	very inappropriate	somewhat inappropriate	neutral	somewhat appropriate	very appropriate
Direct offsets that replant seagrass beds	4.29	4.21	16.40	27.31	47.78
Direct offsets that reduce nutrient pollution	4.14	3.91	17.83	29.50	44.62
Indirect offsets using research programs	4.29	6.62	30.02	36.04	23.02
Indirect offsets using education programs	5.42	8.73	27.61	34.46	23.78

****

LOCATION OF THE OFFSET

The offset could be located at a number of sites that have seagrass beds used by Green Turtles.

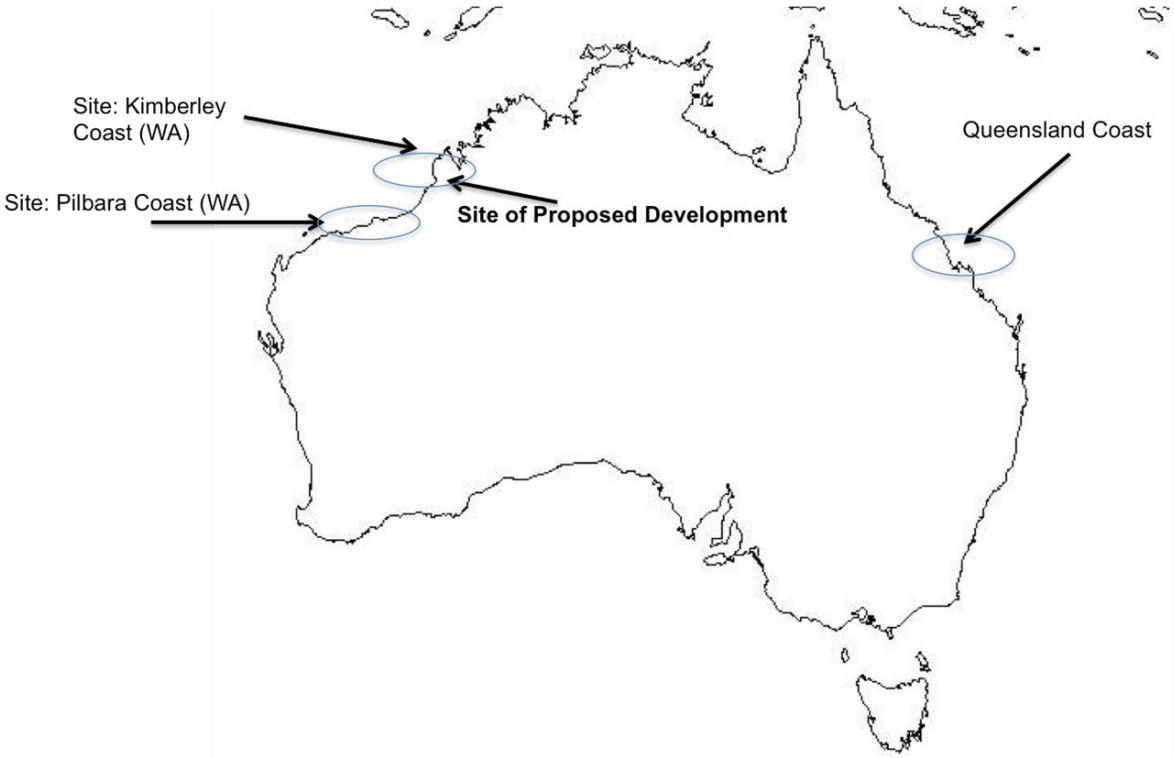
The turtles at these sites could benefit from any of the possible offset activities, including seagrass replanting, reduced nutrient pollution, research to improve management, or education programs to minimize human impacts.

The sites include:

- The Kimberley coast, WA, a few kilometres away from the development site.

- The Pilbara coast, WA, about 800 kilometres south of the development site.

- The Queensland coast, up to 3000 kilometres east of the development site.



P2Q6) Have you ever visited or lived in:

The Kimberley coast	11.66
The Pilbara coast	10.99
The Queensland coast	51.24
None of the above	43.34

P2Q7)) Please rate the confidence that you have in each of the following Government Environment Departments to follow through with its conservation commitments:

	Not at all confident	somewhat not confident	Neutral	Somewhat confident	very confident
WA Government Environment Department	12.26	12.34	38.60	29.95	6.85
Queensland's Government Environment Department	13.77	14.45	34.69	29.42	7.67
The Australian Commonwealth Government Environment Department	14.52	12.19	34.69	30.78	7.83

****

WHO IMPLEMENTS THE OFFSET

Different parties could be responsible for implementing the offset.

They include:

- The **development company**:
  The developer could use their own trained staff to implement the offset

- The local **Government Environment Department**:
  The developer could pay a government department to implement the offset on their behalf.
  The Government in the location that the offset takes place would be the one responsible for implementing the offset.
  For example, an offset in Western Australia would be implemented by the WA State Government, while an offset in China would be implemented by the Chinese Government.

- An **independent Third Party**:
  The developer could pay an independent company to implement the offset.
  This third party company will have a proven record in implementing other offsets.

Note that, whoever implements the offset, the developer must guarantee that the funds to undertake the offset are available upfront to account for risks such as bankruptcy.

P2Q8.) Please rank these groups in terms of your confidence in their ability to successfully complete an offset program, where 1=most confident and 3=least

confident: *(percentage of times the group was ranked at that level)*

	Ranked 1	Ranked 2	Ranked 3
Development Company	23.93	27.92	48.16
Local Government Environment Department	38.15	47.33	14.52
Independent Third Party	37.92	24.76	37.32

****

ADDITIONAL BENEFITS OF THE OFFSET

While protecting the Green Turtles is a requirement of the offset, since they are impacted by the development, in some cases the offset might be located in a place where it can also benefit other marine animals that were not impacted by the development.

For example, dugongs and some fish feed on seagrass, so an offset that improves seagrass habitat for the turtles would also benefit these other animals. Or, educating people about how to behave around turtles in a popular tourist area might also protect any dolphins living in the area.

****

Please, read the following guidelines before proceeding further:

- You will be presented with 6 possible offset scenarios to compensate for the impact on the birds. Each question should be treated independently.

- In each scenario, you will be shown 3 options that each present a possible offset strategy that the developer is proposing.
  The strategies are characterized by:
  - The proportion of direct and indirect offsets used
  - The location of the offset
  - Who will implement the offset
  - Whether other animals will benefit from the offset

- In each case independent scientists have approved the offset strategy and confirmed that it will result in no net loss to the environment. Moreover, each option would have approximately the same cost for the developer.

- A 4th option will also be shown in each scenario, where the development is not permitted to go ahead.

- In each scenario, you will be asked to choose the offset strategy that you most prefer from the 3 available, or, if you don't like any of the strategies, you can choose the 'no development' option.

- In making your decision, remember that the development will create 1000 new jobs for Australian workers.

- We will be surveying a large number of people to work out the preferences held across the Australian community. The findings that emerge from this study may be used to adapt the current policy regarding the implementation of offsets in Australia.

****

SAMPLE SCENARIO

Below is an example of the type of question you will be presented with (you don't need to answer this one).

When answering the scenarios, don't forget to:

- Consider each option (looking down each column)
- Choose your most preferred option based on the assumption that these are the only options available to you.
- Treat each scenario independently. You don't need to remember or anticipate the choices you make across the six questions.

	Option 1	Option 2	Option 3	Option 4
Proportion of direct and indirect offset activities	Direct 50%: Replanting seagrass beds Indirect 50%: Education program	Direct 90%: Reducing nutrient pollution Indirect 10%: Education program	Direct 70%: Replanting seagrass beds Indirect 30%: Research program	No development (= loss of 1000 new jobs)
Offset location	Kimberley, WA	Queensland	Pilbara, WA	
Offset implementer	Developer	Government	Third Party	
Offset provides benefits to other animals	No	Yes	Yes	

You will be asked to choose your most preferred of the 4 options.

For example, if you chose Option 1, it would mean that you prefer this offset rather than the offsets provided in Option 2 or Option 3, or No development.

In this example, Option 1 is an offset that:

- Is made up of a 50% direct offset that will replant seagrass beds and a 50% indirect offset that will implement a public education program to achieve no net loss
- Is located in the Kimberley region of Western Australia, near the development site
- Is implemented by the development company
- Has no additional benefits to other marine animals.

P2Q11) Consider the following options. Assuming these are the only options available to you, which one would you choose?

{ Insert the 6 choice scenarios}}

Move your mouse over the links below if you want to read the explanations related to the characteristics of the offset strategies:

- Proportion of direct and indirect offset
- Offset location
- Offset implementer
- Benefits to other animals

[pop-up boxes with explanations]

****

P2Q12) You always preferred the 'no development' option over the potential offset strategies. Please provide your reason why: (n=89: multiple answers possible. number of responses reported)

I object to the idea of offsetting	6
I need to know more about offsetting before I would feel comfortable deciding on which offset strategies are most suitable	1
I don't trust the science underlying the practice of offsetting	1
I don't trust the Australian Government to monitor and ensure success of an offset	6
I object to the idea of more coastal development, regardless of whether offsets are used	10
I found the choices difficult or confusing, so I preferred the 'no development' option	2
other	2

****

Next, we have a few questions on what you thought about the offset scenarios

P2Q13) Please indicate how certain you were of the answers you gave in the offset scenarios, from "Not certain at all" (1) to "Very certain" (10)

(1) Not certain at all	0.90
(2)	1.96
(3)	3.09
(4)	4.82
(5)	10.91
(6)	14.22
(7)	23.93
(8)	20.69
(9)	8.80
(10) very certain	10.68

P2Q14) Did you think that the scenarios were confusing to answer?

Yes	33.86
No	66.14

****

P2Q15) What did you think about the information that was provided to describe the offset strategies?

It was confusing	13.62
I thought the description was inaccurate	6.62
I thought it was an informative and accurate description	55.98
I would have liked more information	23.78

P2Q16) Do you think the features [Pop-up: Proportion of direct/indirect offsets; Offset activities; Location; Implementer; Benefits to other animals] used to describe the offset strategies were useful to help you make choices when answering the offset scenario questions?

Yes	92.02
No - please explain why not	7.98

****

P2Q17) Please indicate on the following scale how likely you think it is that the results of this study will influence future policy decisions regarding marine offsets in Australia from "Not at all likely" (1) to "Very likely" (10)

(1) Not at all likely l	4.74
(2)	6.25
(3)	7.00
(4)	8.73
(5)	16.70
(6)	17.38
(7)	16.78
(8)	11.74
(9)	6.32
(10) Very likely	4.36

PART 3 The section reports the summary for those completing the oil and gas version only: n=661. The equivalent section for the tourism survey follow.

Now we'd like to ask some questions about your attitudes towards the environment, the oil and gas sector in Australia, and government management of environmental issues.

	Not at all (1)	Not much (2)	I am not sure (3)	A little (4)	A lot (5)
P3Q1) Are you concerned about environmental problems in general?	1.06	4.24	9.68	39.64	45.39
P3Q2) Are you concerned about marine biodiversity loss?	1.06	4.99	10.89	38.58	44.48
P3Q3) Do you think the oil and gas sector contributes towards marine biodiversity loss?	1.51	5.45	16.79	29.05	47.20
P3Q4) Do you think that the use of marine biodiversity offsets will improve the oil and gas sector's ability to protect marine biodiversity?	6.05	8.62	31.01	32.22	22.09

****

P3Q5) How much do you know about the oil and gas sector in Australia?

I know nothing about it	21.94
I know the names of some of the companies, but not what they do	29.95
I know a little about the activities of the oil and gas sector	43.42
I know a lot about the activities of the oil and gas sector, including how their activities interact with people and with the natural environment	4.69

****

P3Q6) Please state whether you agree/disagree with the following statements:

	Strongly disagree				Strongly agree
	1	2	3	4	5
"Australia can economically benefit from the oil and gas sector"	2.42	3.78	27.53	49.47	16.79
“Australia needs to have the cooperation of the oil and gas sector to achieve the Coutry’s most important goals”	3.03	9.38	29.95	43.72	13.92
“The oil and gas sector does what it says it will do in the media"	8.77	24.21	49.77	13.77	3.48
“I am very satisfied by the oil and gas sector in Australia”	10.74	19.52	50.98	15.58	3.18
“The presence of the oil and gas sector in Australia is a benefit to the Australian population”	3.33	7.41	35.70	42.06	11.50
“The oil and gas sector listens to the Australian population’s concerns"	12.41	28.74	40.39	16.64	1.82
"In the long-term, the oil and gas sector makes a contribution to the well-being of Australia"	5.90	11.50	39.33	36.76	6.51
“The oil and gas sector in Australia treats everyone fairly”	11.20	23.75	47.20	14.37	3.48
“The oil and gas sector respects Australia’s way of doing things”	9.83	21.03	48.71	16.79	3.63
“The Australian population and the oil and gas sector have a similar vision for the future of Australia”	12.10	22.84	46.60	14.67	3.78
“The oil and gas sector gives more support to those it negatively affects”	8.62	21.94	50.98	16.19	2.27

"The oil and gas sector shares decision-making with the Australian government"	4.54	14.37	46.60	29.65	4.84
"The oil and gas sector takes into account the interests of the Australian population"	11.50	23.75	43.57	18.76	2.42
"The oil and gas sector is concerned about the welfare of the Australian population"	13.46	26.17	41.00	16.34	3.03
"The oil and gas sector openly shares information that is relevant to the Australian population"	13.46	25.42	41.60	16.19	3.33

****

PART 4

Almost finished! In this section of the survey, we will ask some questions about you. The information collected will be kept anonymous.

P4Q1) Do you have any children?

Yes – including children who are still dependent (	33.26
Yes – all children are now independent	31.23
No	35.52

P4Q2) What is your highest level of education?

High school	26.19
Trade/technical certificate or equivalent	31.15
University degree	40.93
I would rather not say	1.73

****

P4Q3) Do you work in any of the following fields?

Environmental management, research or consulting	1.28
Public sector, including Local, State, Territory or Commonwealth governments	6.77
Mining industry, including the oil and gas sector	1.66
Hotel and tourism industry	2.40
None of these fields	88.56

P4Q4) Do you belong to any environmental or conservation groups?

Yes	6.92
No	93.08

P4Q5) What is your gross annual household income before tax?

Under $13,000 (under $250/week)		3.31
$13,000-$25,999	($250-$500/week)	12.34
$26,000 - $41,599	($500-$800/week)	14.15
$41,600 - $62,399	($800-$1200/week)	14.67
$62,400 - $88,399	($1200-$1700/week)	14.15
$88,400 - $129,999	($1700-$2500/week)	17.23
$130,000 - $181,999	($2500-$3500/week)	7.60
$182,000 and over	($3500+/week)	3.54
I would rather not say		13.02

****

Thank you very much for your time! If you have comments you want to make about the survey, or the issues raised in it, please add them below:

8. APPENDIX 3 ALTERNATIVE INFORMATION ASSOCIATED WITH TOURISM DEVELOPMENT OPTION WITHIN THE FOR SEAGRASS SURVEY.

The following section reports questions and answers that were specific to the Tourism version of the survey. n=726

Part 2

Now we'd like you to think about a hypothetical development proposal that will require a marine biodiversity offset:

A **major hotel chain** is planning to construct and operate a new resort on the **Kimberley coast** of Western Australia. The resort will include the construction of a marina for guests and tour operators to moor their boats.

P2Q2.) If a major hotel chain built a new resort on the Kimberley coast, how likely would you be to visit the resort?

Very unlikely	34.99
Somewhat unlikely	18.87
Unsure	30.17
Somewhat likely	11.43
Very likely	4.55

PART 3

Now we'd like to ask some questions about your attitudes towards the environment, the hotel and tourism industry in Australia, and government management of environmental issues.

	Not at all (1)	Not much (2)	I am not sure (3)	A little (4)	A lot (5)
P3Q1) Are you concerned about environmental problems in general?	1.65	5.24	12.57	38.62	41.92
P3Q2) Are you concerned about marine biodiversity loss?	1.35	4.19	14.52	37.43	42.51
P3Q3) Do you think the hotel and tourism industry contributes towards marine biodiversity loss?	2.40	8.08	28.59	37.87	23.05
P3Q4) Do you think that the use of marine biodiversity offsets will improve the hotel and tourism industry's ability to protect marine biodiversity?	3.74	9.28	28.29	39.22	19.46

****

P3Q5) How much do you know about the hotel and tourism industry in Australia?

I know nothing about it	16.47
I know the names of some of the companies, but not what they do	36.68
I know a little about the activities of the hotel and tourism industry	42.96
I know a lot about the activities of the hotel and tourism industry, including how their activities interact with people and with the natural environment	3.89

****

P3Q6) Please state whether you agree/disagree with the following statements:

	Strongly disagree				Strongly agree
	1	2	3	4	5
"Australia can economically benefit from the hotel and tourism industry"	1.95	3.44	17.22	54.79	22.60
“Australia needs to have the cooperation of the hotel and tourism industry to achieve the Country’s most important goals”	1.50	7.19	31.44	44.61	15.27
“The hotel and tourism industry does what it says it will do in the media"	4.64	16.92	55.54	19.61	3.29
“I am very satisfied by the hotel and tourism industry in Australia”	3.59	11.83	52.99	26.50	5.09
“The presence of the hotel and tourism industry in Australia is a benefit to the Australian population”	1.65	3.29	24.85	53.44	16.77
“The hotel and tourism industry listens to the Australian population’s concerns"	4.94	18.11	57.34	17.81	1.80
"In the long-term, the hotel and tourism industry makes a contribution to the well-being of Australia"	1.95	5.84	35.93	45.96	10.33
“The hotel and tourism industry in Australia treats everyone fairly”	4.04	18.56	54.49	19.61	3.29
“The hotel and tourism industry respects Australia’s way of doing things”	3.29	12.72	49.25	30.39	4.34
“The Australian population and the hotel and tourism industry have a similar vision for the future of Australia”	3.59	16.62	52.40	22.31	5.09
“The hotel and tourism industry gives more support to those it negatively affects”	4.79	20.36	57.63	14.82	2.40

“The hotel and tourism industry shares decision-making with the Australian government”	2.40	16.47	52.54	25.00	3.59
“The hotel and tourism industry takes into account the interests of the Australian population"	5.09	17.81	49.40	24.25	3.44
“The hotel and tourism industry is concerned about the welfare of the Australian population”	6.44	22.31	49.25	18.71	3.29
“The hotel and tourism industry openly shares information that is relevant to the Australian population”	4.94	18.71	53.44	18.86	4.04

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