SPLIT-SAMPLE TESTS OF "DON'T KNOW" AND "INDIFFERENT" RESPONSES IN AN ATTRIBUTE BASED CHOICE MODEL

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INTRODUCTION

In surveys eliciting stated preferences, some respondents do not state a preference, opting instead to answer a choice question with a response such as “don’t know”, “not sure”, or “would not vote.” These responses are variants of the “no opinion” responses discussed in more general survey research (Krosnick 2002). Treatment of “no opinion” responses in stated preference studies has largely focused on studies that use the contingent valuation method (CVM). The attribute-based method (ABM), also called choice experiments or stated choice, is a relatively new technique that is related to, and has grown out of, CVM (Holmes and Adamowicz 2003; Foster and Mourato 2003, Louviere et al, 2000). The ABM presents respondents with a set of attributes of a good, where typically one attribute is price. The attributes and prices are varied across respondents. This differs from CVM where typically only price is varied across respondents. Thus ABM allows the researcher to value the implicit price for each attribute, much like a hedonic price study (Holmes and Adamowicz 2003). Both CVM and ABM often involve discrete choice responses, and as a result random utility models can be used in the estimation of both methods. Indeed, CVM may actually be thought of as a special case of the ABM (Boxall et al. 1996).

In many ABM-based studies, respondents have been asked to choose between two or more attribute-price sets. This is similar to the referendum style questions commonly used in CVM, especially in the case where one attribute-price set is treated as a *status*

quo. The National Oceanic and Atmospheric Administration (NOAA) panel recommended including a "no vote" option for binary choice CVM studies (Arrow et al. 1993). While, this recommendation has spawned a growing body of research on how to treat "would not vote" and other types of "no opinion" responses in the CVM literature, the issue has received less attention in ABM studies.

The literature on ABM does contain a related, but logically distinct, strain of research. In some ABM studies, respondents are presented with a choice set that includes several alternatives composed of varied attributes and a "none" alternative (Louviere et al, 2000) or an "opt-out" alternative (Boxall et al. 1996). In the setting of a product choice, the "none" option might be treated as a "don't buy" decision. In a recreational site choice context, the "none" option might represent a no-trip decision or it might represent a trip to a site not included in the choice set (Banzhaf et al. 2001). In other settings, the "none" option may be considered a choice to maintain the status quo. Typically, researchers explicitly model this type of alternative as one of the elements in a multinomial choice model. In contrast, here we consider a distinct issue in ABM in which a failure of respondents to choose an alternative is not a choice for the status quo. Instead, we examine the instance in which respondents' failure to choose one of the ABM alternatives is akin to a "no opinion" response.

There is growing evidence in CVM binary choice literature that "no opinion" responses should not be treated as "for" votes (Groothuis and Whitehead 2002; Caudill and Groothuis 2005; Carson et al. 1998). However, there is not yet agreement as to whether "no opinon" responses should be treated conservatively as "against" votes (Carson et al. 1998; Kronsick 2002), or whether no opinion responses may represent

cognitive difficulties, potentially resulting from an indifference in utility, and therefore should be treated as a truly unique response (Krosnick et al. 2002; Evans et al. 2003; Alberini et al. 2003; Caudill and Groothuis 2005; Champ et al. 2005). Furthermore, even those who believe that no opinion responses should be treated as unique responses largely base their argument on improving econometric efficiency with few arguing that the conservative approach yields inconsistent estimates. Groothuis and Whitehead (2003) observe that treating no opinion responses as unique or "against" votes may depend on whether the study is attempting to measure willingness-to-pay (WTP) or willingness-to-accept (WTA).

Arguments for treating no opinion responses as unique are typically based on Wang's (1997) hypotheses on why a respondent may choose a no opinion response. Wang (1997) posits that there are four general categories of respondents who choose no opinion responses: 1) those who reject the CVM scenario, 2) those who know their preference and decline to answer, 3) those who make an effort and are truly unsure, and 4) those who do not make an effort and are therefore unsure. There is little disagreement that for the first two types of respondents a no opinion response may equal an "against" response.

Kronsnick et al. (2002) present a simpler analysis of why a respondent may choose a no opinion response. They present evidence that often no opinion responses are the result of satisficing, or simply that the "work" involved with answering the question is too great and a no opinion response involves the least work or the lowest risk.[1] Kronsnick et al. (2002) also discuss an alternative hypothesis regarding no opinion

[1] The work requirements may range from physically reading the survey to understanding the question to actually evaluating preferences.

responses; the respondent's optimizing process may result in true indifference making the respondent truly unsure when the choices are "close" in terms of the associated net benefits or welfare yields. Therefore, a respondent may reply with a no opinion response because they are indifferent in a utility sense. However, it is unlikely that there is a clear line between a no opinion response resulting from optimizing and from satisficing since a respondent may begin optimizing, but may "give-up" before reaching true indifference.

More recent investigations by Alberini et al. (2003), Caudill and Groothuis (2005) and Evans et al. (2003) have aimed to improve estimation efficiency through "sorting" no opinion responses, especially focusing on identifying and making use of responses that would fall into Wang's (1997) latter two categories or that may be considered to be cases of optimizing as asserted by Krosnick et al. (2002). However, there has been little effort to sort no opinion responses that result from other phenomena; for example, no opinion responses that result from respondents being unsure due to utility indifference, and no opinion responses that result from respondents that are satisficing. Moreover, all the work to data has been based on ordinal polychrotomous-choice and multi-bounded questions, which introduce other types of difficulties (Vossler and Poe 2005).

There also remains some question about the comparability of ABM studies to CVM studies (Stevens et al. 2000; Foster and Mourato 2003). ABM studies may be cognitively more difficult than CVM studies and ask respondents to explore their preferences in more detail (Stevens et al. 2000). This may result from the explicit substitutes in the ABM format. Furthermore, the multidimensional trade-offs implicit in ABM may result in a larger number of respondents who honestly "don't know" or are closer to indifference relative to CVM. To date, there have been no studies examining

whether reclassifying no opinion responses in ABM as “against” responses, considered a conservative classification in CVM, yields consistent estimates for ABM studies.

This paper presents an examination of two research questions on no opinion responses in ABM studies. First, does recoding no opinion responses as “against” provide consistent estimates when compared to estimates derived from surveys where there is no option of expressing no opinion? Secondly, does offering respondents with two qualitatively different no opinion responses allow expressions of welfare indifference to be sorted from those who do not know for other reasons? This latter issue may be generalizable to CVM because it attempts to distinguish Wang's (1997) third type of response (indifferent or too close to call) from Kronsnick et al.’s (2002) satisficing or other variants of “don’t know.”

SURVEY INFORMATION

A binary choice ABM survey was implemented using a web-based method with a split-sample design for more than 7,500 responses. In addition to the usual experimental design of the attributes, there were four unique versions of the ABM survey that differed in the response options respondents faced for their choice questions. The four sets of response formats were:

(i) “yes”, “no”, “too close to call” (TCC), and “not sure” (all options treatment),

(ii) “yes” and “no” (yes/no treatment),

(iii) “yes”, “no”, and “not sure” (“not sure” treatment), and

(iv) “yes”, “no”, and TCC (TCC treatment).

The TCC response is intended to reflect situations close to indifference. Collectively the "not sure" and TCC responses are referred to as "no-opinion" responses as a shorthand to refer to respondents that did not explicitly choose yes or no in the choice scenario. The surveys that were distributed across the four groups of response categories all utilized the same experimental design for the ABM attributes.

The web-based ABM survey elicited preferences for in-land, freshwater wetland mitigation. The questionnaire was developed using a series of focus groups and pretest interviews (Kaplowitz et al, 2004), and the policy setting and choice questions follow that of the paper instrument discussed in Lupi et al (2002). Each respondent was presented with the characteristics of a common wetland that had already been approved for drainage ("drained wetland") and the characteristics of a wetland being proposed as compensation ("restored wetland") for the wetland to be drained. The attributes for the wetlands presented to respondents were wetland type (wooded, marsh, mixed), size (acres), public access attributes, and habitat attributes (see Appendix for sample choice question). The respondents were then asked, "In your opinion, is the restored wetland good enough to offset the loss of the drained wetland?". Details of web survey design, administration, and general results are reported in Hoehn et al. (2004).

RESPONSE FREQUENCY ANALYSIS

As mentioned above, the survey design incorporated four different sets of response options. Response category statistics for the completed choice questions are presented in table 1.[2] In ABM surveys, there are many experimentally designed

[2] A total of 4,865 responses where received however 1,865 where reserved for later use in assessing the predictions of various models.

combinations of attributes that are presented to respondents. Due to the large sample size, responses were pooled across the versions of the alternative response sets. The response treatment set including all options ("all options") resulted in the highest proportion of "no opinion" responses (25%). Chi-square tests where used to compare the probability of a "no opinion" response across the four different survey response treatments.[3] with results presented in Table 2. The results show that the probability of a "no opinion" response is significantly different when all four response options are presented to respondents as compared to instances in which one type of "no opinion" response is available to respondents. This is true at all common significance levels. It seems clear from these results that respondents are more likely to choose a "no opinion" response option when both the TCC and "not sure" options are available to them as part of their response choice set. A chi-square test comparing the TCC survey option and the "not sure" survey yielded a low p-value (< 0.016). This result suggests that the TCC and "not sure" response options are not viewed as equal response options by respondents, and indicates that the wording of the "no opinion" options may matter.

Carson et al. (1997) used chi-square tests to determine the effect of no opinion responses on the proportion of "yes" and "no" responses in a CVM study. A similar analysis was conducted for the ABM data, and the results are displayed in Table 2. The proportion of "yes" to "no" responses was significantly different, at the 95% confidence level, between surveys that did not allow respondents to express "no opinion" and surveys that offered either TCC or "not sure" as response options. The chi-square analysis of the proportion of responses when both "no opinion" responses were offered

[3] All chi-square tests use the Yates correction, which uses an appropriate correction for variables coming from a binomial distribution (Zar 1996).

(the all options version) against the instances when only “yes” and “no” responses were offered yielded a p-value of 0.07. This p-value implies that the null hypothesis of no significant difference between these two proportions should not be rejected at the 95% confidence level, but may be rejected at the 90% confidence-level. This difference may not be significant at the traditional 95% confidence level but may yield different economic results. That is, the yes’s and no’s from these two groups may produce different estimates of trade-offs.

Further examining the response categories, “no opinion” responses were pooled with “no” responses, and retested against the yes-no ratio from the survey treatment that only allowed “yes” or “no” responses. All chi-square tests for all of these comparisons yielded p-values < 0.05. This result implies that pooling “no opinion” responses with “no” responses, as suggested by Carson et al. (1998), results in significantly different yes-no ratios, in contrast to the findings of Carson et al (1998) for CVM. It remains unclear in the “all options” case where both TCC and “not sure” were presented as response options whether both TCC and “not sure” pulled equally from “yes” and “no” responses.

The distribution of yes-no ratios across response formats that allowed for a “no opinion” response was also tested. The ratio of “yes” to “no” responses did not change significantly when TCC or “not sure” was offered as the “no opinion” response option. The distribution of yes and no responses when both “not sure” and TCC response options where available as response choices was compared to the distribution of yes and no responses when only one “no opinion” response option was presented and were found to be significantly different at the 95% confidence level. That is, when more than one “no

opinion" option was presented to respondents, the proportion of yes and no responses differed significantly.

These results indicate that survey participants may respond to the phrasing, language, or number of "no opinion" response items lending evidence to the hypothesis that various no opinion responses may be unique types of responses. Further, these results suggest that "no opinion" responses do not pull evenly from "yes" and "no" responses and that, unlike Carson et al. (1998) in their CVM study, these responses do not consistently pull from "no" responses. It appears in this instance that no opinion responses pull more heavily from "no" responses– see Table 1. Moreover, "no opinion" responses seem to pull more evenly from "yes" and "no" responses when both TCC and "not sure" are presented as options as opposed to when only one type of no opinion response option is available (Tables 1 and 2). It appears that the marginal impact of adding a second "no opinion" response option is to pull more from "yes" than "no", even when the first "no opinion" response option pulled more from "no" than "yes".

There are three potential explanations for the apparent divergence in results from this ABM study and previous CVM studies. First, the underlying ABM study focuses on respondents' WTA compensation (Groothuis and Whitehead 2003) as measured by in-kind trade-offs. Second, there may be something unique to the ABM response format that does not apply to CVM studies. Thirdly, it is possible that the additional "no opinion" response option causes responses to pull more evenly from both "yes" and "no." TCC and "not sure" responses seem to be good substitute responses when only one of the response options is available to respondents. It may be presumed that a TCC response may involve, perhaps, an attempt by respondents to optimize, especially if it is assumed

that this response is indeed qualitatively different from a more general "not sure" response. This is tested later in this paper. Next, we explore possible response category effects of welfare estimates.

EFFECTS ON WELFARE

The wetlands mitigation survey used in this study asked respondents to make an in-kind tradeoff between acres of drained and restored wetlands. In essence, respondents were asked if restoration of a larger wetland would compensate for the loss of an existing wetland. This makes acres of wetlands the unit of currency of the study. Various quality attributes for the wetlands were also included in choice sets, and these act to shift demand for wetland acres. Responses were coded into 11 response variables. These variables included change in wetland acreage (effectively price), dummy variables for capturing changes in wetlands' general vegetative structure, public access, and habitat conditions for amphibians, songbirds, wading birds, and wildlife flowers (changes could be poor to good or good to excellent). In-kind welfare measures can be estimated using random utility theory (Holmes and Adamowicz 2003). A logit model was estimated for each of the four survey response format versions, and parameter ratios were used to calculate the minimum WTA in additional acres of restored wetland per acre of drained wetland (Table 3). Specifically, WTA *ceteris paribus* was found by dividing the constant parameter by the marginal utility of acres. All models fit the data, with log-likelihood ratio tests against a model with a single choice dummy being significant at all common significance levels. The effect of quality attributes on WTA are also included for completeness.

Estimation results can be interpreted as the number of additional acres required to maintain the same level of utility. That is, if the WTA estimate was zero then one acre restored wetland would be adequate compensation for one acre of drained wetland. In cases in which only "yes" and "no" options were presented to respondents, slightly more than two additional acres were required for each acre drained, *ceteris paribus*. In cases in which there were "no opinion" responses, dropping the "no opinion" responses from the analysis yielded WTA estimates that were closer to those derived from the yes/no format than when the various "no opinion" responses were combined with the "no" responses. Within a particular survey treatment, WTA estimates, *ceteris paribus*, were strikingly different when "no opinion" response were pooled with "no" responses as opposed to being dropped. It appears that WTA estimates showed that more than twice as much additional compensation was demanded by respondents when "no opinion" responses were dropped as opposed to pooled as no's in the estimations. In the extreme, when "no opinion" responses from the all response format options were pooled with "no," the estimated model yielded a negative WTA. This occurs because the pooling of all of the "no opinion" responses with "no" responses in the all of the response option formats makes the ratio of "yes" to "no" less than one (table 1). For the survey options providing "no opinion" responses, the WTA was less then that derived from the yes/no format, and the survey version with all four response options yielded the lowest WTA estimate.

If it is assumed that the results from the yes/no survey are the "true" results, then treating "no opinion" responses as "no" votes provides "less consistent" estimates than simply dropping "no opinion" results where respondents do not provide a clear "yes" or "no." Furthermore, in extreme cases, pooling "no opinion" responses with "no"

responses may yield a qualitatively different outcome. The general pattern, with several exceptions, appears to be that the larger estimates of compensation demanded result from ABM surveys that do not provide "no opinion" response options, followed by dropping "no opinion" responses from estimations based on ABM surveys with no opinion response options.

UNDERSTANDING NO OPINION RESPONSES

The evidence presented in the preceding sections of this paper indicates that "no opinion" responses should not be treated as "no" responses. It is also unlikely that they should be treated as "yes" responses. However, "no opinion" responses can make up a substantial portion of survey responses when a no opinion response category is present. In this studies' survey treatment where all response options were available, 25% of the responses were either TCC or "not sure." We have shown that these data can not simply be recoded to "no," but two important questions remain. First, is there evidence that some preference information may be recovered from "no opinion" responses? Second, is there a discernable difference between the responses with a change in wording of "no opinion" responses (i.e., "too close to call" versus "not sure")?

To address these questions, we used parameter estimates derived from the simple yes/no model to predict "yes" responses for the data that was held aside or reserved for model assessments (see footnote 2). The 1,865 unused (reserved) responses served as a set of "true" responses for testing purposes and were all from the treatment containing all four response options (all options survey). The model parameters were used to predict the probability of a yes response for the reserved data. If the model has the ability to

dicern yes from no votes, then for respondents that actually answered yes, we would expect the mean predicted probability of a yes to be larger than the mean predicted probability of a yes for those respondents that actually choose no. Further, if respondents chose either TCC or "not sure" as a result of an attempt to optimize but found the welfare yield to be "close" to their level of indifference, then we would expect the mean predicted value associated with TCC and "not sure" responses to be between the mean predicted value associated with "yes" and "no" responses. This is indeed the case as shown in Table 4. For comparison, the weighted mean probability of a yes for respondents actually answering "yes" and "no" was 0.3883, or slightly greater than the means for TCC (0.3017) and "not sure" (0.3612).

To test if these means are significantly different from one another, a single factor ANOVA was used. The group mean square is 18.26 and the error mean square is 0.27 yielding an F-statistic = 68.14 with 3 and 1,852 degrees of freedom, which yields a p-value that is essentially zero. This implies that the mean associated with at least one response type is significantly different from the mean associated with at least one other response type. If the model has predictive power, then it should be expected, that at least "no" and "yes" responses were significantly different.

Tukey tests were used to identify the response options that had significantly different means in a set of *post hoc*, pair-wise comparisons (Zar 1996). Results are presented in table 5. The critical value for the Tukey test with error degrees of freedom of 1,852, and four categories at the 95% confidence level is 3.633. All comparisons yielded a Tukey *q*-statistic greater than the critical value except the "not sure"-TCC comparison (q = 3.3644). The result of this yes-no comparison is reassuring, as we

expect the mean of these two categories to be different. It is also interesting to note, that these results indicate that both "no opinion" responses are significantly different from both "yes" and "no" responses – implying the model has predictive power. This indicates that "no opinion" responses may indeed reflect that "no-choice" respondents are near their utility indifference.

An alternative explanation for the means associated with "no opinion" responses lying near the average of "yes" and "no" responses is that the variance associated with "no opinion" responses is significantly large. However, the ANOVA results show that the means are indeed significantly different. Estimated variances around the estimated means were compared directly using the variance ratio test (Zar 1996). There was a significant difference between the variance associated with the predicted yes probabilities for those actually choosing TCC and the predicted yes probabilities for those actually choosing "not sure" (p-value = 0.007). When the variance associated with TCC responses were compared to the variances associated with the "yes" and "no" responses the p-values were 0.031 and 0.006 respectively, indicating that TCC responses may be more tightly focused than preferences expressed more assuredly as either "yes" or "no" responses (at the 95% confidence level – see standard error estimates in table 4). However, when the estimated variance associated with the predicted yes probabilities for those actually choosing "not sure" where compared to the estimated variances associated with the predicted yes probabilities for those actually choosing "yes" and "no" responses the p-values that resulted were 0.082 and 0.235 respectively, indicating that at the 95% confidence level "not sure" responses are as variable as "yes" and "no" responses. These

results indicate that TCC have the lowest variation. Indeed, this is what should be expected around a true indifference threshold point.

In light of these results, it may be possible to gleam extra information by treating the “no opinion” responses as a unique answer. It is also possible that by including multiple “no opinion” responses, respondents that would otherwise satisfice are forced to examine their preferences, at least enough to choose between TCC and “not sure.”

CONCLUSION

To our knowledge, this paper is the first that explores the treatment of “no opinion” responses in an ABM setting and tries to differentiate between alternative types of no opinion responses. The differences and similarities between ABM and CVM are well documented (Boxall et al. 1996; Holmes and Adamowicz 2003). Research on how to treat no opinion responses in the CVM literature has been advancing since the NOAA commission made its recommendation to include a "no-vote" option. The work presented in this paper provides contrary evidence regarding conventional wisdom that “no opinion” responses should be treated as “no” responses in the CVM literature (Carson et al. 1998).

There are two alternative hypotheses that may be used to explain the results presented here. First, the response format associated with ABM may be different enough so that no opinion responses represent optimizing and not satisficing. This may be because the tabular form lessens the cognitive work asked of the respondent (Viscusi and Magat 1987) and facilitates making tradeoffs (Hoehn et al, 2004). However, it may be

that the results presented here have more to do with the WTA perspective question, supporting Groothuis' and Whitehead's (2003) findings.

Dropping “no opinion” responses appears to yield results most consistent with surveys that do not offer no opinion response options. In this study, as the number of no opinion options increased so too did respondents’ use of those responses, and this resulted in a larger disparity between welfare estimates associated with providing no opinion response options and a simple provision of a yes/no option. It does seem likely that the inclusion of two no opinion responses eliminates many respondents that may be leaning in a given direction, and potentially would have answered "yes" or "no." It is also likely that by adding a second no opinion response option a disproportionate number of would-be "yes" voters switch to one of the no opinion responses (this may be true even if a disproportionate number of would-be "no" voters would choose “no opinion” when only one no opinion option is available). Interestingly, while the second no opinion response option yielded a yes-no ratio most similar to the survey that only allowed for “yes” and “no” responses, it provided the largest difference in WTA estimate. This results seems to present a tradeoff for researchers. If there is a way to recover information from some no opinion responses, then adding an additional response option may be beneficial. However, if no such tool exists then the additional response option may yield welfare estimates that are less consistent with those that would have been calculated had there not been any no opinion response option offered.

In this paper, we provide evidences that when two no opinion response options are used one may be used to express indifference that may have resulted from optimizing (“too close to call”) as opposed to uncertainty that may have resulted from satisficing

("not sure"). Our ability to predict TCC responses with the least variation suggests further potential for tools to be developed to improve estimates that treat TCC responses as a yes-no indifference threshold.

Understanding how to treat response options that allow respondents to express "no opinion" is important to the future development and refinement of stated preference techniques. These techniques are increasingly contributing to our ability to measure preferences for goods and services that have non-use values or potential attributes that extend beyond current conditions. This paper provides a first step in understanding how to treat "no opinion" responses in the ABM format, but more work in this area is still needed. Specific areas of future study include investigating if estimating the probability of a "too close to call" response can be used to estimate indifference and improve the ability to predict choices. However more than anything else, more case studies need to be examined, especially cases involving WTP.

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Table 1. Frequency of responses.

Survey version/ Response treatment		Total responses	# of Yes	# of No	# of TCC	# of Not sure	Proportion “no opinion” (NS + TCC)	Ratio of "yes" to "no"	Ratio of "yes" to "no pooled with no opinion”
All options	i	3000	1401	860	493	246	0.25	1.63	0.88
Yes/No	ii	1586	936	650	0	0	0.00	1.44	-
Unsure (NS)	iii	1619	895	467	0	257	0.16	1.92	1.24
Too close (TCC)	iv	1683	903	458	322	0	0.19	1.97	1.16

Table 2. Chi-square test results.

Probability of an "no opinion" response

comparison	NOT SURE v. TCC	All options v. NOT SURE	All options v. TCC
χ^2 statistic	5.8360	47.1749	18.3050
p-value	0.0157	0.0000	0.0000

The ratio of Yes to No for "no opinion" formats compared to Yes/No

comparison	YES/NO and All options	YES/NO and NOT SURE	YES/NO and TCC
χ^2 statistic	3.2734	13.6764	16.4712
p-value	0.0704	0.0002	0.0000

The ratio of Yes to No with "no opinion" responses compared among "no opinion" formats

comparison	TCC and NOT SURE	NOT SURE and All options	TCC and All options
χ^2 statistic	0.0961	4.9850	6.8678
p-value	0.7566	0.0256	0.0088

The ratio of Yes to No when "no opinion" are pooled with "no"

comparison	YES/NO and All options	YES/NO and NOT SURE	YES/NO and TCC
χ^2 statistic	62.4845	4.4130	9.3238
p-value	0.0000	0.0357	0.0023

Table 3. Welfare estimates representing in-kind acres compensation required to offset wetland loss, all else equal (p → g = poor to good, and g → e = good to excellent).

Response options	Yes, No	Yes, No, TCC		Yes, No, Not sure		All options	
Treatment	ii	iv		iii		i	
Answer coding	YES/NO	TCC pooled with No	TCC discarded	Not sure pooled with No	Not sure discarded	no opinions pooled with No	no opinions discarded
WTA all else equal	2.191	0.587	1.930	0.839	1.774	-0.496	1.297
The effect on WTA of							
change of wetland type	-1.474	-1.020	-1.218	-0.917	-0.737	-0.719	-0.730
access	1.074	0.789	0.767	1.143	1.068	0.938	1.203
amphibian habitat from p → g	1.506	0.408	0.535	1.470	1.359	1.226	1.135
song bird habitat from p → g	2.236	0.486	0.632	1.687	1.608	0.934	1.179
wading bird habitat from p → g	1.169	0.955	0.938	1.477	1.506	0.983	1.173
wild flower habitat from p → g	0.316	0.444	0.225	0.613	0.585	0.384	0.277
amphibian habitat from g → e	0.942	0.712	0.540	1.124	0.937	0.918	0.864
song bird habitat from g → e	0.822	0.674	0.402	0.397	0.439	0.824	0.880
wading bird habitat from g → e	1.124	0.516	0.622	0.626	0.644	0.683	0.742
wild flower habitat from g → e	0.548	0.784	0.710	0.793	0.565	0.394	0.384

Table 4. Summary statistics for predicted probability of yes by actual response in the reserved data.

	Actual Response			
	YES	NO	TCC	NOT SURE
Mean	0.5294	0.1257	0.3017	0.3612
Standard deviation	0.5153	0.5370	0.4713	0.5641
Total responses	929	499	305	123

Table 5. Tukey test results. The critical value at the 95% confidence level is 3.633.

Comparison	NO - YES	NO - NOT SURE	NO - TCC	YES - TCC	YES - NOT SURE	NOT SURE - TCC
Difference of means	0.4036	0.2355	0.1760	0.2277	0.1681	0.0595
Standard Error	0.0097	0.0147	0.0129	0.0104	0.0113	0.0177
q-statistic	41.6676	16.0450	13.6307	21.8470	14.8970	3.3644

Appendix. Sample survey.

Wetlands Scorecard #3: How do the Drained and Restored Wetlands Compare?

Wetland Features	Drained Wetland	Restored Wetland
Is it marsh, wooded, or a *mix* of marsh and woods?	Wooded	Mixed
How large is it?	12 acres	24 acres
Is it open to public?	Yes	Yes
Are there trails and nature signs?	No	Yes
How good is the habitat for different species?		
Amphibians and reptiles like frogs and turtles	good	excellent
Small animals like raccoon, opossum, and fox	good	good
Songbirds like warblers, waxwing, and vireo	good	--
Wading birds like sandpiper, heron, or crane	--	excellent
Wild flowers?	good	good

What do the habitat ratings mean?

excellent:	The wetland habitat supports these species in better than average numbers and variety; a casual observer is very *likely to see a variety* of these species.
good:	The wetland habitat supports these species in average numbers and variety; a casual observer is *likely to see a few* of these species.
--	The wetland habitat supports these species in very small numbers or not at all; a trained observer is *unlikely to find any* of these species.

Appendix. Sample survey.

Wetland Case #3

The scorecard on the left page compares the natural features of the drained and restored wetlands.

In your opinion, is the restored wetland good enough to offset the loss of the drained wetland in Case #3? (Circle the letter next to your decision)

a. Yes, the restored wetland offsets the loss of the drained wetland

b. No, the restored wetland does not offset the loss of the drained wetland

c. Too close to call

d. Not sure

The Fine Print:

The drained and filled wetlands...

...are *common* wetland types.

...do *not* contain any rare species or rare habitat.

...are the *same* in terms of features not mentioned in the scorecard.