Lost Use-Value from Environmental Injury When Visitation Drops at Undamaged Sites: Reply

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ABSTRACT *Survey responses show that beachgoers at unoiled beaches did not experience a loss in utility, which is consistent with the assumption underlying our proposed correction to welfare calculations at undamaged beaches. English, Tourangeau, and Horsch claim that the government's estimate of loss will still be correct even in this case, but they do not provide support for this assertion. They propose an alternative behavioral model based on unobserved perceptions that can produce any welfare loss ranging from our estimate to the government's estimate. However, the actual welfare loss under this alternative behavioral model cannot be identified empirically.* (JEL D61, D81)

1. Introduction

We are grateful to Eric English, Roger Tourangeau, and Eric Horsch (hereafter ETH) for their comment (2019) on our paper (Glasgow and Train 2018). They raise interesting and important issues that are relevant to the Gulf spill and many other situations. Following ETH's terminology, we call the behavioral specification that the government implemented for the Gulf spill as "the government's model," while recognizing that the work was the output of a team of selected, prominent economists rather than a faceless bureaucracy. And, for convenience, we call the behavioral specification that we specified in our paper, which motivated ETH's comment, as "our model," even though, as we cite in our paper, it arises from other economists' contributions.

2. Did Beachgoers on the Florida Peninsula Suffer a Loss in Utility?

Both our model and the government's model assume that the spill caused a drop in demand for shoreline recreation, leading to lost trips to the beaches in question. The models differ in the treatment of those people who decided to go to an unoiled beach after the spill. Our model assumes that people who go to an unoiled beach experience the beach as undamaged and obtain the same utility as they would have obtained in the absence of the spill. The government's model assumes that the people who go to an unoiled beach may nevertheless perceive or experience the beach as damaged and, thus, obtain less utility at that beach than they would have without the spill.

The beaches on the Florida Peninsula were not oiled: that is not in dispute. The question is: What did beachgoers on the Florida Peninsula perceive after the spill? Did they perceive the beaches to be undamaged, which is consistent with our model; or did they perceive the beaches to be damaged in a way that decreased their utility, as the government's model assumes?

The government conducted several surveys that addressed this question.[1] In these surveys, people were intercepted at selected beach sites after the Gulf spill and were asked a series of questions. In the Shoreline Use Survey, people were asked: "Do you think the condition of this beach is better, worse, or about the same as it was before the spill?" The responses of the 3,606 respondents who were intercepted at Gulf sites on the Florida Peninsula from June 2010 through January 2011 (which is the period the government used for

[1] The survey data have been made available at www.diver.orr.noaa.gov/documents/20233/39128/Rec+Team+Counts+Ground+Databases.zip, and the instruments in section 5.10.3 at www.doi.gov/deepwaterhorizon/adminrecord.

Table 1
Shoreline Use and Fishing Surveys Regarding Condition of the Site

	Responses (percent)		
	Shoreline Use (1)	Supplementary Shoreline Use (2)	Fishing (3)
Better	2.5	4.4	3.5
Worse	1.9	1.7	7.3
About the same	80.1	77.3	69.0
Don't know	15.1	16.6	20.3

losses on the Florida Peninsula) are shown in Table 1, column (1).

Only 1.9% said that beach conditions were worse than before the spill, and more people said conditions were better than said conditions were worse. The "don't know" responses could include people who worried that the water might be contaminated and could not tell, as well as, of course, people who had not previously been to the beach or did not want to hazard an opinion. But even with all the "don't know" responses included in the tabulations, 82.6% of the people said that conditions were the same or better than before the spill. If the "don't know" responses are excluded, 97.8% of people who gave an opinion said that conditions were the same or better.

The government also conducted a Supplementary Shoreline Use Survey that intercepted people earlier in the day (before 10 a.m.) than the original survey. The same question was asked, and the responses of the 2,860 people interviewed on Florida Peninsula sites from June 2010 through January 2011 are shown in Table 1, column (2). Fewer people said "worse" than in the original Shoreline Use Survey. Of the people who gave an opinion, 97.9% said that conditions were the same or better.

One of the government surveys that covered the Florida Peninsula also included a question about enjoyment. In the Fishing Survey, people were asked: "Has the oil spill affected your enjoyment of this site today or has it not affected your enjoyment of this site?" Of the 2,750 respondents at Florida Peninsula sites from June 2010 through January 2011, 96.7% said that their enjoyment was not affected, and only 3.3% said that their enjoyment was affected.

The Fishing Survey also asked about the condition of the site, and those responses are

shown in Table 1, column (3). The share who said that conditions were about the same or better is lower than in the Shoreline Use and Supplementary Shoreline Use Surveys, and yet still 96.7% said their enjoyment was not affected. Interestingly, even the people who said conditions were worse rarely felt that their enjoyment was affected: 78.4% of these people said that their enjoyment was not affected by the spill. And of the people who said they "don't know" about conditions, which could include people worried about unknown contamination, 98.5% said that their enjoyment was not affected, which suggests that few of the "don't know" responses were from beachgoers materially concerned about unobservable contamination.

These findings indicate that the vast majority of beachgoers on the Florida Peninsula did not perceive the beaches to be damaged, supporting our approach to handling trips to these sites.[2]

3. Lost Trips by Gulf Region and Distance

ETH disagree with our behavioral interpretation of our welfare calculations and argue

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[2] ETH (2019, 146, 148) say "We agree [with GT] that any correction to welfare estimates should not be applied to people close to shore," and "for reasons that are not clarified in their article, GT introduce this eight-state exemption [states near the Gulf] in their hypothetical scenarios but do not carry it over to their proposed correction of our Deepwater Horizon welfare estimates." We do not believe that the correction "should not be applied to people close to shore." It should be applied to anyone who goes to an unoiled beach and experiences it as not being damaged. Our hypothetical scenarios were based on an available survey of shoreline recreators from non–Gulf adjacent states and were simply meant to illustrate the method, not to imply a constraint on its applicability.

it is negative perception rather than imperfect foreknowledge that leads to lost trips to unoiled beaches. They provide a graph that shows lost trips by distance, separately for the North Gulf and the Florida Peninsula. They argue that the differences between the North Gulf and the Florida Peninsula are too small to be explained by imperfect foreknowledge, given that the North Gulf sites were oiled while the Florida Peninsula sites were not.

However, the North Gulf experienced the same issues, in a more complicated form, as the Florida Peninsula, and the behavior we described for the Florida Peninsula can be expected to occur, to some extent, in the North Gulf. Only about 25% of the North Gulf coastline inspected by the government's cleanup assessment teams ever showed any degree of oiling, and the amount of oiling of the damaged beaches ranged from heavy slicks to trace amounts.[3] Further, many trips to oiled sites in the North Gulf were taken before oil appeared at the site and after cleanup of the site. Thus, the North Gulf does not provide a "control" area for the issues at hand.[4]

ETH also suggest that a behavioral interpretation based on imperfect foreknowledge implies that the number of lost trips should increase with distance from the Gulf shore, which does not occur for the government's estimates of lost trips. They conclude that these lost trips must be due to negative perceptions rather than imperfect foreknowledge. How-

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[3] MC-252 Shoreline Cleanup Assessment Technique (SCAT) Program, 2014, MC-252 SCAT data QA/QC final report, Appendices B and C, available at https://erma.noaa.gov/layerfiles/31005/files/MC-252%20SCAT%20QAQC%20Final%20Report_Dec_2014.pdf. In our paper's hypothetical examples and figure 2 (Glasgow and Train 2018, 91), oiling was aggregated to counties: a county that contained any part of shoreline with any degree of oiling was denoted as an oiled site.

[4] In fact, in the North Gulf, people's uncertainty about when the oiling and clean-up occurred at each site suggests that an opposite correction could be needed for some beachgoers. As we said in our original paper (Glasgow and Train 2018, 96): "People could go to a site expecting it to be the same as usual, only to find that it has been damaged; some of them would not have taken the trip if they had known the conditions. The framework of this paper is also applicable to this latter situation, as well as to more general relations between anticipated and realized utilities. The main challenge is empirical, in identifying expectations and realizations, and their relation to utility."

ever, ETH also state that we should expect a "consistency of preferences across space," which does not occur either: the estimated share of lost trips on the Florida Peninsula for people living within 10 miles of the shore is about half the number estimated for people living 100 to 150 miles from the shore, and about four times the number estimated for people living 1,000 miles or more from the shore. The government's estimates of lost trips by distance do not support either behavioral interpretation over the other.

## 4. Alternative Behavior Based on Perceptions Hypothesized by ETH

Even though our model and the government's model differ only in the treatment of people who go to unoiled beaches, ETH argue that the concern over whether people suffer a loss at unoiled sites is a "red herring." This argument seems to be the central point of their comment: that the government's welfare estimate is still applicable even if the people who went to unoiled beaches did not incur any loss. They say: "If people are responding to perception and some are concerned about using unoiled sites and others are not, then the majority of people who go to the beach may be from the second group and would not be affected. But there would be no reason to adjust welfare estimates in this case. Traditional welfare estimates encompass this situation and do not assume people onsite necessarily suffer a loss" (English, Tourangeau, and Horsch 2019, 148).

Note that the behavioral model ETH describe here is different from the behavioral model used in the government's calculation of welfare loss, which assumes that the utility of each person drops by a constant amount. This drop in utility is calculated by adjusting the alternative specific constant downward until the model predicts the observed number of lost trips at that site.

The government's calculation of welfare loss for a single site is demonstrated in Figure 1, panel A. In this simple example we assume demand is linear, travel cost is C, and demand drops from D^0 to D^1 in the aftermath of a spill.

Figure 1

Welfare Loss under Linear Demand and Alternative Surplus for Lost Trips: A. Lost Trips Occurred among
People with Lowest Surplus; B. Lost Trips Occurred among People with Highest Surplus
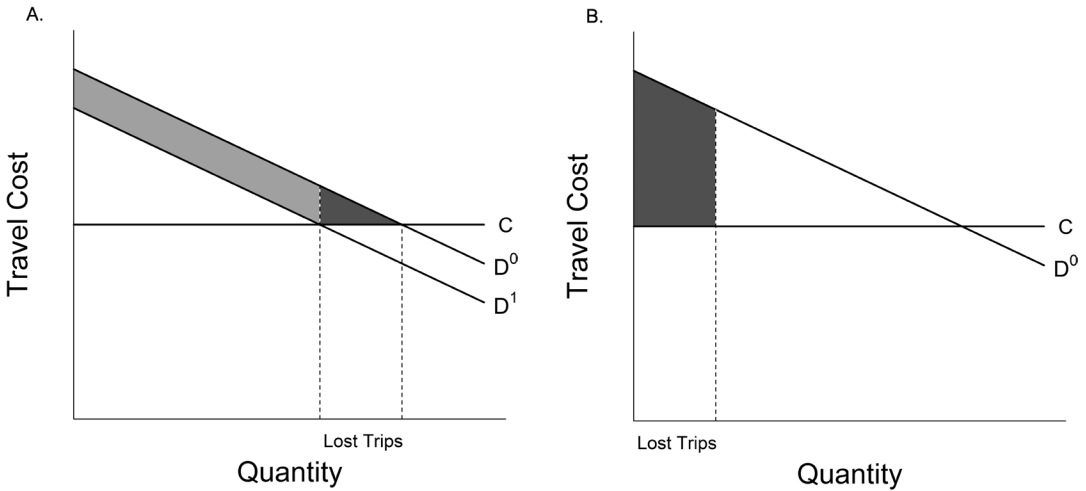
The dark gray shaded area is the lost surplus due to the marginal consumers who did not take trips to the beach they otherwise would have taken, while the light gray shaded area is the lost surplus due to the inframarginal consumers who visited the beach but found it damaged in some way. The government's estimate of lost welfare is the sum of the light gray and dark gray shaded areas.

For undamaged beaches, our model corrects the government's welfare estimate by adding back the surplus for the inframarginal consumers who were not harmed. Our estimate of welfare loss at undamaged beaches is thus the dark gray shaded area alone.

ETH's claim that no such adjustment is needed, even when the people who visited the beach were not affected, suggests that they think some other behavioral model is at work. Under this alternative behavioral model, any welfare loss will be predominantly or completely due to concerned people who stayed away from the beach. The magnitude of the welfare loss thus depends on which people were concerned.

One extreme possibility is that the concerned people who stayed away from the beach were those who would have obtained the greatest surplus in the absence of the spill. This situation is depicted in Figure 1, panel B,

with the loss in surplus shaded in dark gray. For the same number of lost trips, and under linear demand, the dark grey shaded area in panel B is equivalent to the sum of the light gray and dark gray shaded areas in panel A. That is, if we assume all lost trips were from those people with the highest surplus, this welfare loss under this alternative behavioral model is equivalent to the government's welfare loss calculation.

Another extreme possibility is that the concerned people who stayed away from the beach were those who would have obtained the least surplus in the absence of the spill. In this case, the lost surplus is the dark gray shaded area in panel A. That is, if we assume all lost trips were from those people with the lowest surplus, this welfare loss is equivalent to that we would obtain using our formula for welfare loss.

Of course, if the concerned people are distributed between these two extremes, then the welfare loss under this alternative behavioral model will fall somewhere between the government's estimate and the estimate that would be produced by our formula. We are not aware of any empirical information that would allow us to distinguish these possibilities and thus produce an identifiable welfare estimate under this alternative behavioral

model. The issue becomes even more complicated once we move away from linear demand to the logit models actually used to calculate welfare loss in this case.

But there is an even bigger issue at play here: if perceptions are unrelated to physical reality, as ETH suggest about perceptions related to the spill, then the use of any particular formula for welfare loss necessarily becomes arbitrary: perceptions, and hence behavior and welfare, can take any form. In contrast, the behavior hypothesized in our paper arises from rational consumer behavior based on the anticipated and actual states of the physical world, both at the time of the decision to travel and when at the beach.

References

English, Eric, Roger Tourangeau, and Eric Horsch. 2019. "Lost Use-Value from Environmental Injury When Visitation Drops at Undamaged Sites: Comment." *Land Economics* 95 (1): 146–151.

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