Appendix B: Description of the Kuhn-Tucker Model

As our data are limited to the summer of 2016, we are unable to determine whether sites with zero visitation were not accessed because they had the worst amenities or whether they were not part of the recreational choice set. If it is the case that the choice set only included the 106 sites that were actually visited, the RUM models presented in the original paper are appropriate. In reality the situation may be somewhere between the two extreme cases.

To explore the effect of sites that were not visited in our sample, we run a Kuhn-Tucker (KT) model to estimate the impact of algae and *E. Coli*. The KT model takes into consideration all 185 access points by assuming that both visited and non-visited sites are in each visitors' choice set. Within our study setting there were a total of 106 access points that were visited at least once and 79 that were not. An advantage of the KT model is that it provides consistent estimates when measuring welfare effects in situations with corner solutions (i.e. when some sites in the choice set are not visited). Assuming additively separable preferences, we adopt the following specification of visitors' utility function:

$$U = \sum_{s=1}^{S} \Psi_s \ln(\phi_s x_s + \theta) + \frac{1}{\rho}(y - p'x)^{\rho}$$

$$\Psi_s = e^{c + \varepsilon_s}$$

$$\phi_s = e^{\gamma' q_s}$$

$$\varepsilon_s \sim EV(\mu)$$

$$\rho = 1 - e^{\rho^*}$$

$$\theta = e^{\theta^*}$$

$$\mu = e^{\mu^*}$$

where x is a vector of trips taken to site s. y is the annual income and p is the travel cost. q_s is a vector of site attributes at site s. ε_s captures the unobserved heterogeneity across individuals and

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"The Impacts of Harmful Algal Blooms and *E. coli* on Recreational Behavior in Lake Erie,"
by David Wolf, Wei Chen, Sathya Gopalakrishnan, Timothy Haab, and Allen Klaiber

sites and is assumed to follow the normalized type I extreme value distribution. c, γ, ρ^*, θ^* and μ^* are structural parameters.

The results from the KT model (Table A5) are similar to the results in Table 6, suggesting that the findings are robust and consistent under different assumptions regarding the potential choice set.