ECO 3660 Take Home Final Exam
Whitehead, Fall 2008
Due: Monday, December 15 at 2:30 p.m.

Each student is to work on this report individually (i.e., no collaboration with fellow students).

Whitehead et al. (2008)[1] compare three types of travel cost models using a beach recreation data set for southern North Carolina. In an analysis of the benefits of increased beach width they find plausible and significant willingness-to-pay measures for two of the three approaches examined. A problem for policy application is choosing amongst different willingness-to-pay values. They argue that when estimates from different models yield convergent results (or diverge for known reasons) there is increased confidence in the suitability of estimates for policy analysis. In their application trip predictions from the RP-SP and KT models are convergent valid. Willingness-to-pay values, while similar statistically and in order of magnitude, are economically different. Thus, these models converge in behavior predictions but not in willingness-to-pay estimates.

Considering this research and the following information, conduct a benefit-cost analysis of the recreation impacts of a beach nourishment policy in North Carolina (Figure 1):

- Annual willingness-to-pay (i.e., benefit) for 100 feet of beach width (on average) every 4 years is (assume that each estimate is equally believable):
    - KT model: $309 per household with a standard error of 115
    - RP-SP model: $106 per household with a standard error of 22
- 1.58 million households in the study region
- Cost to replace one foot of eroded beach is $32,000 per mile, beach length is 60 miles (m), policy would add 100 feet of beach width every 4 years (w):
    - Annual Cost: $c = (32{,}000*m*w)/4$
- Based on geological estimates of the nonrenewable beach quality sand resource there is a 70% chance that the annual cost of nourishment is increasing over time:
    - Increasing Annual Cost: $c' = c + c*t*0.40$
- Discount rate: $r = 3.5\%$
- Alternative discount rates: $r = 2\%, 7\%$
- Project time period is $t = 1$ to 30 years

Conduct (a) base case (with middle and expected values), (b) best cast, and (c) worst case analyses. For each of your analyses conduct one sensitivity analysis considering the standard errors of willingness-to-pay (+/- one standard error) and two alternative discount rates (2% or 7%). Write a report explaining all of your net present value (*NPV*) calculations and make sure to include (a) a table summarizing each of your *NPV* calculations (there should be nine total – see Figure 2) and (b) a recommendation about whether the program should be funded.

Submit your spreadsheet with your report via e-mail to whiteheadjc@appstate.edu.

[1] John C. Whitehead, Daniel Phaneuf, Christopher F. Dumas, Jim Herstine, Jeffrey Hill and Bob Buerger, "Convergent Validity of Revealed and Stated Recreation Behavior with Quality Change: A Comparison of Multiple and Single Site Demands," No 07-17, Working Papers from Department of Economics, Appalachian State University, December 2008 <http://econpapers.repec.org/paper/aplwpaper/07-17.htm>

Figure 1. Southern North Carolina Beaches

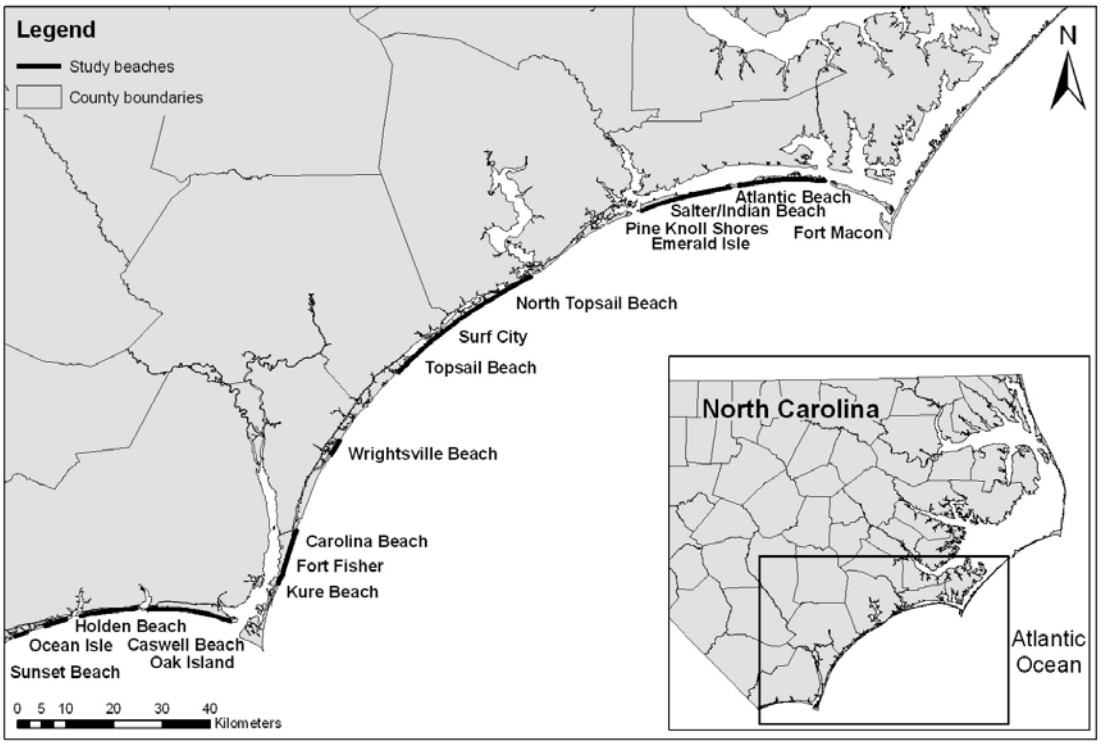

Figure 2. Example Table (hypothetical numbers)

Net Present Value (in millions)

	NPV (r = 3.5%)	NPV* (r = 2%)	NPV* (r = 7%)
Base Case	$200	$100	-$150
Best Case	$400	$600	$300
Worst Case	-$300	-$250	-$700

*NPV is conducted with one sensitivity analysis on benefits.