APPENDIX

Ecosystem Service Valuation

Recreation (hunting and bird watching tourism) is dependent upon the resources in the salt flat and high marsh zones, as this is where the birds forage and reside. We calculated this value similarly in both zones. The bird watching tourism value was taken as the average willingness to pay and consumer surplus per recreation benefits, $3,243.0 ha/yr, a value transferred from three coastal sites in South Texas from Mathis and Matishoff (2004), and thus may represent a small source of error. However, because studies specific to the Galveston Bay area show similar per day per person expenditures (Bell 1997), although without the per hectare estimates that we needed for this analysis, the transfer should be appropriate. Texas hunters spend 2.5 times less than birdwatchers on average (Adams et al. 1997) for a value of $1,297.2 ha/yr. We thus calculate the total for hunting and bird watching tourism as $4,540.2 ha/yr.

The carbon sequestration value was calculated as the average yearly net carbon sequestration or production in a plant community zone, multiplied by the near-future average market cost to sequester carbon, $20 (Department of Energy 2009). Average yearly net carbon was calculated as 60,240 kg C/ha/yr for *Spartina alterniflora* – dominated low marsh and 57,020 kg C/ha/yr for *Spartina patens* – dominated high marsh, with the assumption that this yield is directly transferable from Pezeshki and Delaune (1991) in Louisiana to our site in Texas as the climate, species, and plant community zones are nearly identical. For the seasonally-inundated algal salt flat, we assumed that the average yearly net carbon was -470 kg C/ha/yr, which represents a gross value for an algal mat that subtracts the bacterial respiration (Cammen 1991). This value was transferred from data taken during a summer in New England and thus may represent a potential source of error.

The storm protection value was directly calculated as the avoidance cost value for the vegetated marsh with respect to storms in the Galveston, TX region from historical data; see Costanza et al. (2008) for methodological details. This value was calculated separately for the low marsh and high marsh. Salt flat values were assumed to be 1/ 2.9 of those of the vegetated high marsh, as this is the difference in wave reduction between vegetated and unvegetated areas at the same elevation (Möller et al. 1999). Our assumption for this calculation is that the salt flat zone and the high marsh zone occupy the same general elevation.

For fisheries value, we calculated the average replacement cost value for fishery restoration projects in the Galveston, TX area at $45,012.4 per hectare as based upon Table 7 in Rozas et al. (2005). Since this data source did not present per year estimates, we then calculated the future value at the end of the model runs (year 2095) at a compounded 3% annual rate of accumulation from their current value (2006); this represents the rate at which monetary gains are accumulated (ie, reverse of 'discounting'; National Oceanic and Atmospheric Administration 1999). This is the rate recommended by National Oceanic and Atmospheric Administration for fishery-based restoration values, eg our data source. The resulting annualized value is independent from inflation and remains in 2006 US Dollars.

For property values, we first found the market value for each parcel and attending housing improvement within the study area, using tax appraisal data from Galveston County Appraisal District (2009). We then estimated the value of every square meter (1 x 1 m pixel) within a parcel, as based upon the total value of a parcel and improvement divided by its area. Next, we found the plant community zone that occupied each pixel, and summarized the values from every pixel in the study area according to plant community zone. This allowed us to find the average value for a square meter of the four plant community zones, within our study area. We then converted this average value into hectares. Similar to the fisheries value, we calculated private property accumulation rates following the methodology described above at the 3% rate, as well calculating at the current market 6% rate (Galveston County Appraisal District 2009, Environmental Protection Agency 2000), in order to estimate the effect of property investment relative to ecosystem services. Currently, property values are still increasing in this area as opposed to much of the USA, even after 2008's Hurricane Ike (as caused by lower supply of housing, as well as relatively good economic climate in this area).

We then calculated the total flow of services from each ecosystem by adding the value of each individual service (except for open water, which we calculated as a total as the available literature allowed, yet specifically for the Galveston Bay area, eg Whittington et al. 1994).

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