Title: Primary Sex Ratios In East and West Coast Loggerhead Southern Subpopulation

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Objective(s) of the Research Project: Our broad project goal is to document loggerhead sex ratios empirically for use in refining population level models for assessing the effects of their variation on population trends. These data provide a second year of sex ratio data for sites that were initially sampled in the 2002 year class.

Progress Summary/Accomplishments:

Overview The 2004 sample sex ratio 7%M:93%F differed from that obtained in 2002 (20%M:80%F).

We collected data on loggerheads hatchling from Southern Florida nesting beaches; these samples represented spatial and temporal differences in loggerhead turtle sex ratios. Hatchlings were collected from three beach sites, Juno Beach and Hutchinson Island on the east coast and Sarasota on the west coast of Florida.

In 2004 the nesting season began last and slowly when a cold water intrusion along the east coast resulted in unseasonably cool waters. Air temperatures and beach temperatures did not appear to be significantly effected. The consequence of this cold water anomaly was that loggerhead nesting was delayed. Once loggerheads began nesting the sands were warmer than in 2002 and 2003. There were proportionally more females found in the sample and by beach in 2004.

No data were collected from Hutchinson Island during the late season due to two hurricanes that made land fall directly over our field sites in September. Sarasota hatchling production was reduced in August or September due to the impact of Hurricane Charlie. We completed sex ratio assessments where possible with nests that were moved into the lab after 2/3rd of incubation was completed so the sex ratios were not affected and before the 2nd hurricane made land fall.

The resulting high sample sex ratio reflects a female bias in 2004 (scaling is incomplete at this time as we await the arrival of the final beach productivity data).

Data from the 2004 year class are included in coded and uncoded from in the included excel spreadsheets.

Scaling sex ratio data. We will follow the same procedures used in 2002-2003 outlined below.

Once we had established the sexes of individuals included in the study (Blair, in prep) we needed to scale up to estimate the sex ratio of hatchlings produced by beach surveyed and by seasonal time period. Our original study design required us to subsample 10 individuals for each of four nests on each beach in each time period. We marked nests to estimate sex ratios across the season. Because nest frequency is approximately normally distributed, we targeted nests around the mean nest date as well as the early and late standard deviation of the historical nesting distribution. So early, mid, and late season nesting represented about the first, second, and third one-third of nesting. This left us with 3 estimates of sex ratio at three points in the season. In

order to estimate the sex ratio of hatchlings produced over the whole season, we calculated the cumulative frequency distribution of total nesting for each beach and overlaid the sex ratio estimates for the dates sampled. We then determined the midpoint date between sample dates and applied the sex ratio estimate to, for example, the early turtles through those eggs laid up to the midpoint date between the early and mid sample (cite the figure from Boca Raton for example) . In this way we can estimate the mean sex ratio produced on each observed beach in each year.

Once we know the sex ratio for each beach. We can use the three seasonal break points in sex ratios for each beach to estimate sex ratios produced in other years. By applying the empirical seasonal break points to the historical nest frequency distribution for each year over a period of years (often 15-20 years) we can estimate the mean and standard deviation of sex ratios produced on each beach and ultimately for each state. In order to estimate the mean and standard deviation of sex ratio for the two regional populations, we take the weighted mean of the sex ratio of hatchlings produced in area. For example the proportion of hatchlings produced in Georgia relative to other states representing Northern loggerheads will vary from year to year, but the weighted average of Georgia, South Carolina, and North Carolina for each year should represent well the overall northern population sex ratio.