

Supplementary Material

Using Unoccupied Aerial Systems (UASs) to Determine the Distribution Patterns of Tamanend's Bottlenose Dolphins (*Tursiops erebennus*) Across Varying Salinities in Charleston, South Carolina

Text S1. Historical (2000-2021) salinity data collection in the Upper-Cooper River

Historical salinity data (2000–2021) from the UCR Sites 1 and 2 (USGS station 02172053) were plotted to examine trends over time. Historical salinity data was retrieved from the Coastal Salinity Index (CSI) [55, 56]. The CSI was developed to characterize coastal drought and monitor changing salinity conditions long-term. A 24-month stacked CSI plot was made using the CSI R package (v0.0.1) [57] to analyze trends in saline and fresh conditions at USGS station 02172053 from 2000-2021.

Text S2. Looking at trends in historical salinity concentrations in the Upper-Cooper River from 2000-2021

One potential hypothesis for dolphins to extend their range upriver is that sea level rise due to climate change is creating more suitable habitat for these dolphins. The relative sea level trend is 3.44 mm/year based on monthly sea level data from 1901 to 2022 which is equivalent to a change of 1.13 feet in 100 years [77]. Estuaries are particularly vulnerable to sea level rise in that intrusion of saltwater farther into upper estuarine habitat could occur in these lower elevations [78]. Trends in salinity near the UCR Sites 1 and 2 (USGS Station 02172053) were examined from 2001 to 2021 using data from the CSI (Supplementary Figure S1). The overall mean salinity in this region was approximately 2.1 ppt, with periods of higher-than-average (more saline) salinity conditions between 2007 and 2014, and lower-than-average (fresher) salinity conditions since 2016. The majority of previous dolphin strandings in the UCR and Back River occurred primarily during fresher conditions from 2000-2005 ($n = 8$ strandings), followed by one stranding during more saline conditions in 2011 and two in 2016 after a period of fresher conditions. This suggests that salinity has not been increasing over time in this region, but experiences periodic fluctuations. Changes in salinity levels in this region may not only be from climatic changes, but also because freshwater input into the Cooper River is regulated from the Pinopolis Dam at Lake Moultrie.

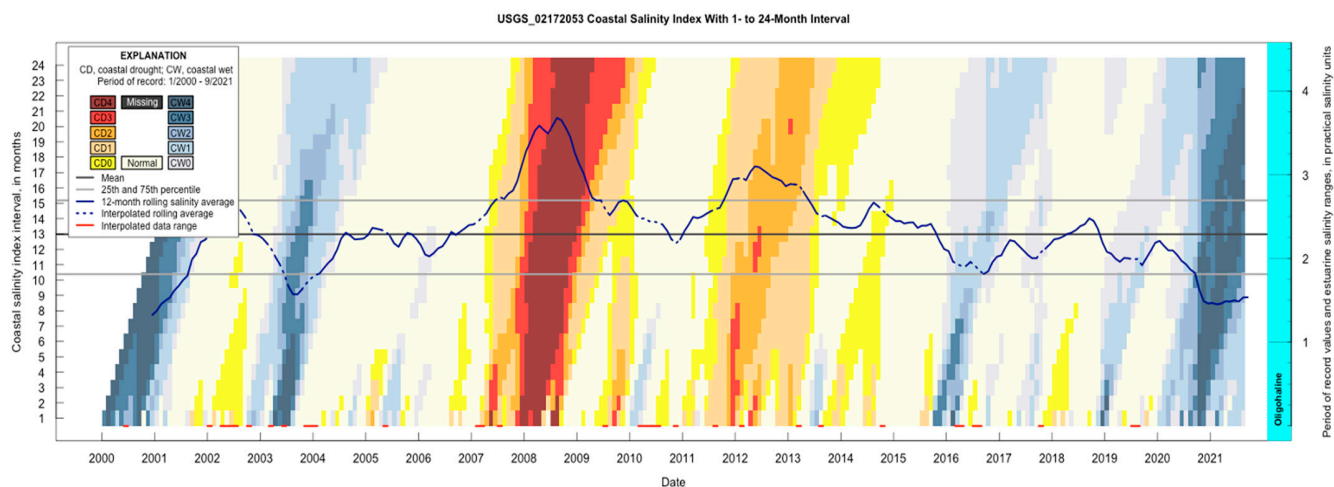


Figure S1. Coastal Salinity Index (CSI) at U.S. Geological Survey (USGS) Station 02172053 Cooper R at Mobay, N Charleston, South Carolina from 2000 to 2021, located near Upper-Cooper River Sites 1 and 2.

Overall station mean (~ 2 parts per thousand; ppt) (middle gray line).

CSI value color ramp: “normal” indicates historical median salinity; positive and negative values represent increasingly fresh and saline conditions, respectively; yellow-dark red shading indicate periods of higher-than-average saline conditions; and blue indicates periods of higher-than-average freshwater conditions.