**Methods**

***Census Surveys***

A suite of fisheries independent monitoring surveys employed by the South Carolina Department of Natural Resources (SCDNR) encounter the blue crab using methods that vary by survey (Table 1). Surveys vary in their gear types, sampling regimes and microhabitats within the estuary. Data from all surveys were subset from statewide to Charleston Harbor watershed (Ashley River, Cooper River, Wando River and Charleston Harbor) sites (Figure ).

*CRMS Harbor Trawl*

Monitoring is been conducted monthly (1980-2018) at four fixed stations in the Ashley River (two stations) and the Charleston Harbor (two stations). Sites are located along the river continuum at a total distance of approximately 20 river km (Fig ). Beginning in 2002, gear type and sample times were standardized to one 6m (headrope length) otter trawl net with 2.54cm stretch mesh and tickler chain towed parallel to the shoreline near low tide for 15 minutes. Trawls prior to 1986 were typically pulled for 30 minutes, with more tow time variation than in later years. All abundances were standardized to 15-minutes using the equation:

Before 2002, 6m (head rope length) otter trawls with 4.76cm stretch mesh nets were towed from July through December. Abundances taken from samples with a 2-net gear designation were standardized to a 1-net configuration using a regression calculation (r2 = 0.59) from an internal SCDNR publication (Wenner et al. 2002):

Crabs were often subsampled prior to 2002, with total abundance numbers for these samples calculated using:

CPUEs from the Harbor Trawl survey could have any of four standardization equations: 1) no standardization (observed abundance), 2) time-standardization to 15-minute tows, 3) weight standardization for sub-samples, or 4) gear standardization to a 2-net to 1-net gear type.

*CRMS Creek Trawl*

***Size and Sexual Maturity Explanatory Variables***

A range of biotic data (size, sex, maturity) are recorded as part of several surveys (Table 1). The CRMS harbor and creek trawl surveys have data on size, sex and maturity. The CRMS Potting survey has data on size and not sexual maturity, as these data are recorded in terms of legal (>127 mm) and sublegal (<127 mm) categories. Gear employed as part of the potting survey (38mm mesh) is size selective, targeting legal-sized crab, and allows easy escape of juveniles who have a length to width ratio of about 1:2 (Tagatz 1968). Size data are recoded as part of the SCECAP suite of surveys, but this survey’s data are rounded to the nearest centimeter in contrast to all other survey size data which are expressed in millimeters. Sexual maturity data are not recorded as part of the SCECAP suite of surveys, although sex data for individuals is recoded. The trammel net survey has no size, sex or maturity data - only total abundance data per net deployment.

Individual crabs were assigned to the following size and sexual maturity categories (Table 1): Size Classes - juvenile (<60mm), subadult (61mm - 126mm), sublegal (<127mm) and adult (>126mm); Sexual maturity classes - mature female, immature female, mature male, and immature male. Sex and maturity were determined by presence of morphological characteristics of the abdomen as observed in situ. Size was determined by measurement of the carapace width in situ, from tip to tip. The juvenile size class of crab (<60mm carapace width) is based-on a trophic level shift in diet occurring in crab >60 mm carapace width (Laughlin 1982; Pattillo et al. 1997). The adult size class used (>127 mm carapace width) represents the legal-size limit for entry into the fishery in South Carolina. All crab with carapace widths between juvenile and adult sizes were considered subadult. Sublegal, when used, includes all crab <127mm.

CPUEs for size and sexual maturity variables were calculated by creating a percentage of total catch of each sexual maturity class for each sampling event (e.g., trawl, trammel set, or pot set). These percentages were then applied to the standardized total CPUE for the sampling event. Sexual maturity CPUE variables are conservative estimates because some individuals were categorized as unidentifiable.