Population structure of a Red Sea whale shark aggregation

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Background
The Red Sea has received little study when compared to other areas. This holds true for sharks in general and for whale sharks in particular. The discovery of a seasonal aggregation off the Saudi Arabian coast has made the targeted study of Red Sea whale sharks more feasible. Assessing the size and structure of this aggregation is a first step toward understanding the basin-scale population within the Red Sea and how that population fits into the wider Indian Ocean.

Approach
Photo-ID records were collected from 2010 through 2015. These were analyzed and fit to several population models. The most parsimonious model was then used to describe the aggregation. Demographic data, including the size and sex of individual sharks was collected and compared to reports from other aggregations. Size was visually estimated to the nearest half-meter and sex was determined by the presence or absence of claspers between the pelvic fins.

Results
From 2010 to 2015, 305 encounters with whale sharks were recorded within the aggregation. From these, 267 suitable photos were used to identify 136 individuals. Sharks were divided evenly between the sexes and the distribution of sightings showed no evidence of sexual segregation. All individuals were immature based on size estimates and, in males, juvenile clasper morphology. An open population model was found to best represent the data and estimated a daily abundance between 15 and 34 whale sharks during the aggregation season, with local residence times ranging from 4 to 44 days. Residence times away from Shib Habil ranged from 15 to 156 days with a permanent emigration/mortality rate between 0.07 and 0.58 individuals per year.

Conclusions
These results are broadly similar to those from other aggregations of *R. typus*, although the observed sexual parity and integration found at this site are unique for the species and need further study.

Keywords: aggregation, Red Sea, population modeling