Many studies have shown that both predators, such as tiger sharks, and prey availability for dolphins affect their habitat and population dynamic. In the study, I aim to develop a predator-dolphin-prey model with dolphin being stage structured. The big picture for the model could be something like the following system.

Pred(t+1)=f(Pred(t), D(t))

D(t+1)=g(Pred(t),D(t),Prey(t))

Prey(t+1)=h(D(t), Prey(t), P(t)),

Where Pred(t) represents the density/population of predator of dolphins at time t, D(t) represents the density/population of dolphins at time t and Prey(t) represents the density/population of prey of dolphins at time t. In addition, P(t) is an optional variable which could introduce the effect of environmental factor such as temperature.

Two papers where data and method could be used as a baseline for this study are:

SOPHIA R.-J. JANG and AZMY S. ACKLEH, Discrete-time, discrete stage-structured predator–prey models. Journal of Difference Equations and Applications, Vol. 11, No. 4–5, April 2005, 399–413.

Stolen, Megan K., and Jay Barlow. "A model life table for bottlenose dolphins (Tursiops truncatus) from the Indian River Lagoon System, Florida, USA." *Marine mammal science* 19.4 (2003): 630-649.

Once we have the model set up, we can perform local/global stability analysis if that is feasible using available theories. We could also possibly utilize data from Barataria Bay or Galveston Bay for predators and prey function, use data from literature for dolphin life table parameters to answers some questions of our interest, such as, how are the dolphins in the study area reacting according to this system. (Of course, maybe other more interesting questions based on your knowledge of the dolphins)

Mississippi sound