

Species-Specific: Horseshoe Crabs Answer Key

Please note: there are many “correct” answers in marine biology and ecology; these are just some sample answers to the questions for this assignment.

1. There might be more competition for egg-laying sites higher on the shore, because eggs laid there develop quicker. This can be an advantage, allowing these larvae to hatch faster and potentially escape predation by shore-birds and other egg predators.
2. A. Horseshoe crabs can be seen as ecosystem engineers in that their carapaces provide a living environment for a variety of species, from sponges to mussels to snails. However, there will have to be some evidence that the population numbers of these species have changed in the absence of horseshoe crabs in order to demonstrate that they have a large effect on the environment of these other species.

B. Although horseshoe crabs are an important prey source for a number of species, there is no evidence that their importance is disproportionate to their actual numbers, so they are unlikely to be a keystone species. This does not mean that they are less critical as a species; it simply means that their effect does not necessarily exceed what one would expect from their population size.

C. One can argue that horseshoe crabs are a keystone species in relation to humans in so far as they affect biomedical research, because the impact of their blood on this field has been considerable and relates to human health and the prevention of bacterial contamination. However, here too one has to conduct experiments to determine empirically whether their effect is greater than one expects from their population numbers.
3. A large increase in the demand for horseshoe crab blood will result in more horseshoe crab deaths from blood-letting, reducing the overall populations. This will have a negative effect on the populations of the numerous migratory-bird species that depend on horseshoe crab eggs as a source of fuel; it will also lead to a greater drop in the number of loggerhead turtles that prey on horseshoe crab eggs and larvae. Because so many other fish and invertebrate species also eat horseshoe crab eggs and larvae, there might be a drop in the populations of species that prey on those fish and invertebrates as well.



4. It's very likely that this faster-maturing group of horseshoe crabs will increase in numbers, because a faster maturation will reduce the amount of time that young crabs are vulnerable to predation and will also result in a faster overall reproductive cycle, with these crabs producing young sooner than their slower-maturing fellows. However, if faster maturation is paired with some trade-off, such as smaller size at maturity or more frequent molts, then the boom in this population might lead to an overall decrease in horseshoe crab populations, as these crabs might die off (vulnerability during molting) or produce fewer or smaller eggs. This can first lead to an explosion in the population of horseshoe crab predators and then a drop-off in those same populations as the crabs themselves increase and then decrease in numbers.

5. Destruction of tidal flats will destroy the habitat used by juvenile horseshoe crabs. This will affect several years' worth of horseshoe crabs but might not have an enormous effect on populations, since adults live a number of years; if the tidal flats recover in one year, then populations of crabs might not be strongly affected. On the other hand, if the flats are permanently destroyed or ruined for many years, this can result in a precipitous drop in young-crab populations. While adults will continue producing eggs for several years, those larvae will not grow up to be adults, and eventually there will be a large die-off in horseshoe crab populations.

