Name: _____

Lab: Bycatch

(modified from NSTA and Oceana)

Background: Research estimates that as much as 40% of the seafood caught worldwide is discarded (up to two billion pounds annually in the United States), while countless sharks, whales, dolphins, birds, sea turtles, and other animals are unintentionally killed or injured by fishing gear (Kledji, 2014). This capture of non-targeted species—known as bycatch—is a worldwide challenge to maintaining sustainable fisheries and protecting endangered species. Target species are species that the fisher seeks to catch. Non-target species are unwanted species found in the same waters. Bycatch are non-target species caught in the fishing gear

Procedure: You will be engineering a new fishing net to reduce bycatch in our model. The species present in this ecosystem include shrimp (*lentil beans*), squid (lima *beans*), herring (*black beans*), tuna (*marbles*) and dolphins (*ping-pong balls*). Using the materials provided, design a net that will maximize capture of the target species (tuna) and minimize all bycatch. You will have a ten-second fishing season. You must catch at least five tuna to qualify for a win. Record your data in the chart below along with the results of each lab group.

Data:

	A	B	C	D	E	F	G	H	I	
Lab Group	**# of target species (tuna) caught**	**# of nontarget shrimp caught**	**# of nontarget squid caught**	**# of nontarget herring caught**	**# of nontarget dolphin caught**	**total # of non-target species caught *(B+C+D+E)***	**total # of organisms caught *(A+B+C+D+E)***	**% target species caught *(A/G)***	**% non-target species caught *(F/G)***	**Final Score multiply # target (A) by % target (H, as a decimal)**
1										
2										
3										
4										
5										
6										
7										
8										
9										

Analysis Questions:

1. Of the designs demonstrated, which was the most successful and why?

2. Would you consider some non-target species more important to protect than others? Why or why not?

3. Describe the limitations that real engineers would consider in their development of a net that reduced bycatch.

4. Describe roadblocks to the implementation of a new standard in fishing nets that would reduce bycatch.

5. Name three species that are susceptible to bycatch.

6. What is the Magnuson-Stevens Fishery Conservation and Management Act and how does it relate to this activity?

7. What is the difference between Maximum Sustainable Yield and Optimal Yield?

8. How does the harvesting of fish at Maximum Sustainable Yield and Optimal Yield influence long-term populations of those species?