Note: After discussing within their groups, students should present to the class their findings on the strengths and weaknesses of the menhaden fishery in terms of satisfying (or not) each of the Marine Stewardship Council's sustainability principles. Ultimately, students will bring their life experiences to these discussions, so the following is meant to be more as a discussion guide rather than a list of correct and incorrect answers.

Does the Atlantic menhaden fishery satisfy Principle 1: Sustainable target fish stocks?

Potential strengths:

- Over the past couple decades biomass has been increasing because more individuals from the oldest age class are surviving.
- Landings have steadily declined since the early 1990's and a total allowable catch (TAC) limit was established in 2013.

Potential weaknesses:

- Recruitment and abundance have been very low for the past couple decades despite the increase in biomass and decrease in landings.
- Age composition of landings in 2017 was dominated by juvenile fish that did not get a chance to reproduce before being caught. Low recruitment and high catch of juveniles can severely compromise the Atlantic menhaden population.

Does the Atlantic menhaden fishery satisfy Principle 2: Environmental impact of fishing?

Potential strengths:

- There continues to be by catch of primary and secondary species, but at minimal levels.
- Threats to habitat are low considering that there is no overlap between the fishery and critical habitat of endangered species. Furthermore, the gear (purse seine) operates exclusively in the water column, and therefore poses little threat to the seafloor.

Potential weaknesses:

- Historically, there have been some incidents of by catch of endangered, threatened, and protected species. It's difficult to determine the current level of by catch as there have been minimal observation of the fishery in recent years.
- The role of menhaden in the ecosystem is not considered. Specifically, menhaden are forage fish, important for sustaining other predators in the food web. According to MSC's guidelines, in order to be certified as sustainable, the menhaden fishery should not reduce the abundance of other species by more than 70%, so technically it does meet this criteria, but on-going work being done by the Atlantic States Marine Fisheries Commission is still trying to figure out "ecological reference points" as multi-species guidelines.

Does the Atlantic menhaden fishery satisfy Principle 3: Effective management?

Potential strengths:

- Atlantic menhaden are fished predominantly in state waters, and all 15 US Atlantic seaboard states are members of a commission that coordinates management.
- The Virginia Marine Police (the enforcement body active in Virginia, where the Atlantic menhaden reduction fishery is predominantly fishing) reported no citations for Omega Protein from its recent reporting years (2014-2017).

Potential weaknesses:

- In general, the reporting is not easy to interpret. There is a lot of information given about the current federal and state management structure for fisheries in the US but not a lot of clear language about where the Atlantic menhaden fishery and Omega Protein come into this management landscape.
- Although it is not the majority, some commercial fishing of menhaden is occurring in federal waters, and there is no management plan in place for these activities.
- The auditing firm was unable to get any information on Monitoring, Control, and Surveillance related to Omega Protein or the extent to which Omega Protein is participating in the Atlantic menhaden fishery that is operating in federal waters, which are unregulated.