**All Caught Up**

**Overview**

Bycatch is a serious problem for many marine fisheries. In this engineering challenge focused on fisheries and conservation, students learn about bycatch and then design fishing nets that will maximize catch of a target species while minimizing bycatch. We’ll test the nets in a fishing competition, then redesign them to improve performance. Discussion will include examples drawn from fisheries management.

**Alignment with NGSS**

##### Performance Expectations

**HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. *Students will design, test, and redesign fishing nets that minimize bycatch*

**HS-ETS1-2.** Design a solution to a complex real-world problem by breaking it down into smaller more manageable problems that can be solved through engineering*. Students will begin with the larger problem of overfishing, then focus in on the problem of bycatch and design a solution that would minimize bycatch for one specific target fishery species in a controlled model system..*

**HS-ETS1-3.**Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. *The class will evaluate the success of their net designs, and discuss the characteristics of successful and unsuccessful nets. They will also discuss the relevance of the more successful designs to the real-world problem of bycatch, and compare their solutions to known solutions currently in use as part of commercial fishing operations. Finally, they will discuss fisheries management and fishing technology in the context of cultural and economic priorities in fishing communities.*

##### Science and Engineering Practices

**Defining Problems.** *Students be provided with an engineering challenge and materials, and will need to first clearly define the design problem so that they can build a prototype net to test.*

**Developing and Using Models**. *Students will develop and test model fishing nets.*

**Designing Solutions.** *Students will apply scientific principles to design model fishing nets that minimize bycatch.*

##### Crosscutting Concepts

**Influence of Science, Engineering, and Technology on Society and the Natural World.** *Students will explore how net design can help to minimize the impact of bycatch in commercial fishing.*

##### Disciplinary Core Ideas

**ESS3.C Human Impacts on Earth Systems.** *Students will discuss how fishing techniques and fisheries management strategies impact fish populations. They will also discuss the problem of bycatch and design solutions that minimize this problem.*

**ETS1.B Developing Possible Solutions.** *Students will develop solutions, test them, then incorporate what they have learned as they redesign for a new target species and test again.*

**ETS1.C Optimizing the Design Solution.** *Students will work collaboratively to identify the characteristics of successful and unsuccessful designs. They will then have the opportunity to incorporate what they have learned as they redesign for a new target species and test again.*