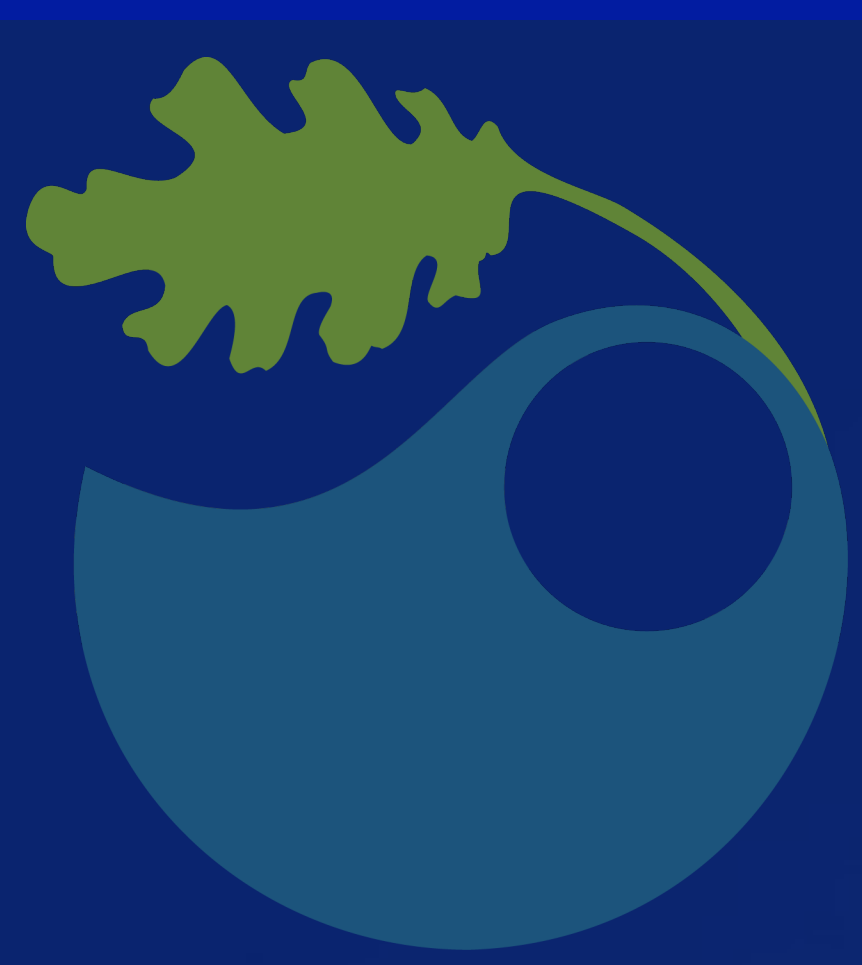




# California Swordfish

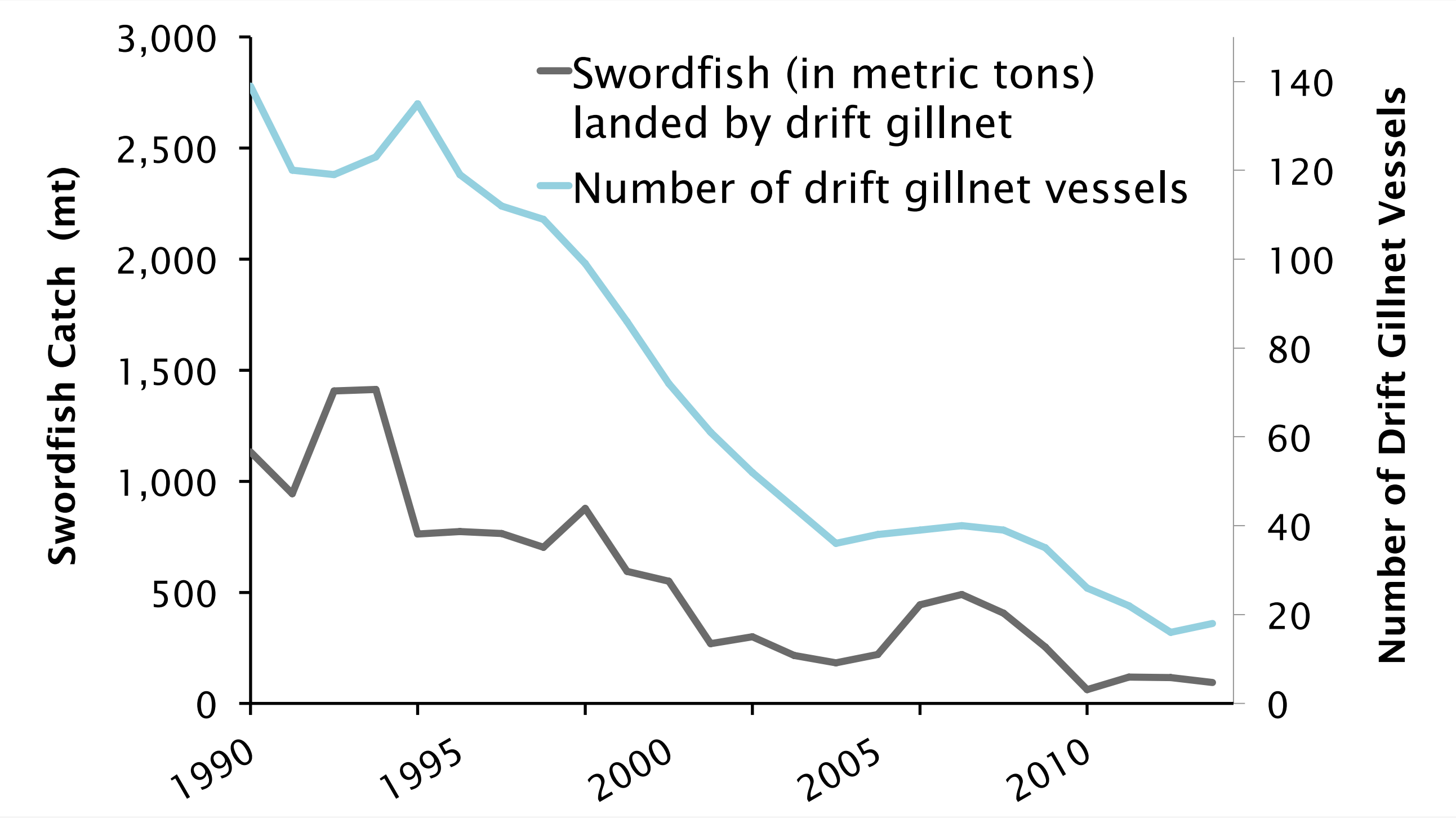
## EVALUATING MANAGEMENT SCENARIOS TO REVITALIZE THE CALIFORNIA COMMERCIAL SWORDFISH FISHERY

Paige Berube | Jennifer Couture | Miguel Gomez | Lexi Journey | Aliya Rubinstein  
Faculty Advisor: Hunter Lenihan



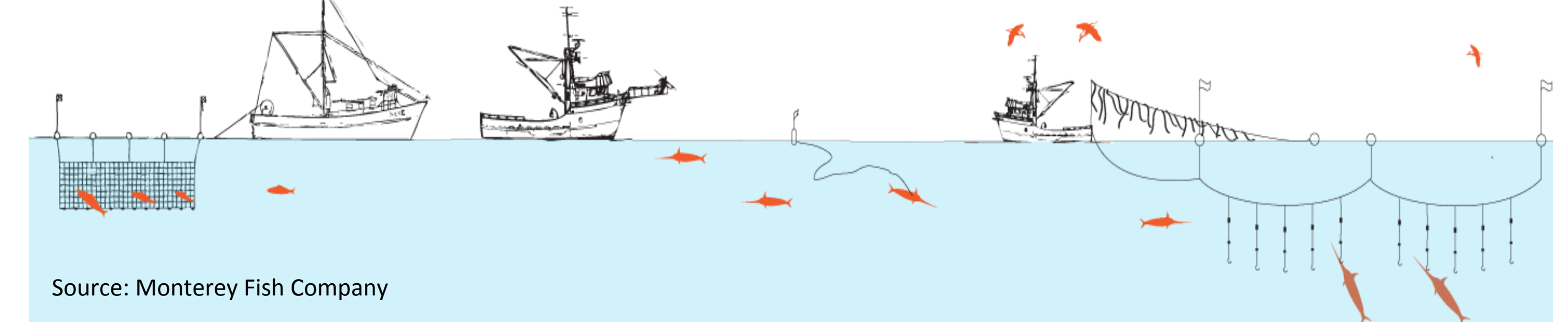
### The California Commercial Swordfish Fishery

This fishery was once economically valuable for the state and profitable for fishermen along the West Coast. However, despite a healthy swordfish stock, the fishery has recently experienced significant declines in participation due to increased regulations that have made fishing less profitable. The resulting decline in domestic swordfish catch combined with the consistently high demand for swordfish in the U.S. has led to an increased reliance on imported swordfish from countries with relatively higher bycatch rates.



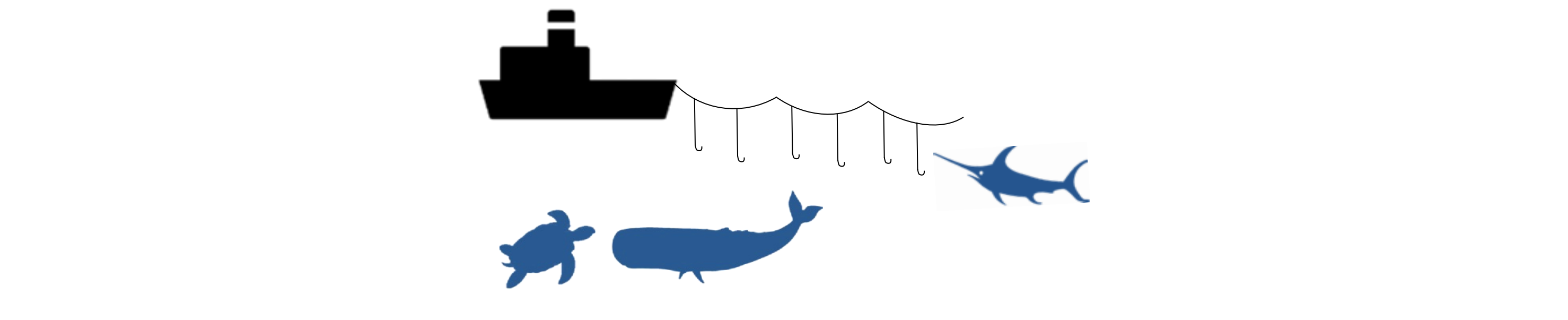
### Swordfish Fishing Gear Types

- Drift Gillnet**
  - An efficient gear type for harvesting swordfish
  - Highly regulated due to concerns over interactions with bycatch species
- Harpoon**
  - No observed bycatch
  - Constrained by weather and swordfish behavior
- Longline**
  - Most prevalent gear type globally
  - Banned in California due to concerns over sea turtle interactions
  - Gear modifications in Hawaii fishery have shown an 86% reduction in the amount of sea turtle interactions



### Global Market Transfer Effect

- Decline in California swordfish fishery effort and catch
- Increased reliance on imported swordfish from foreign countries to meet U.S. demand
- As swordfish imports are from countries with relatively higher bycatch rates, there is a potential unintended consequence of a net increase in bycatch interactions globally

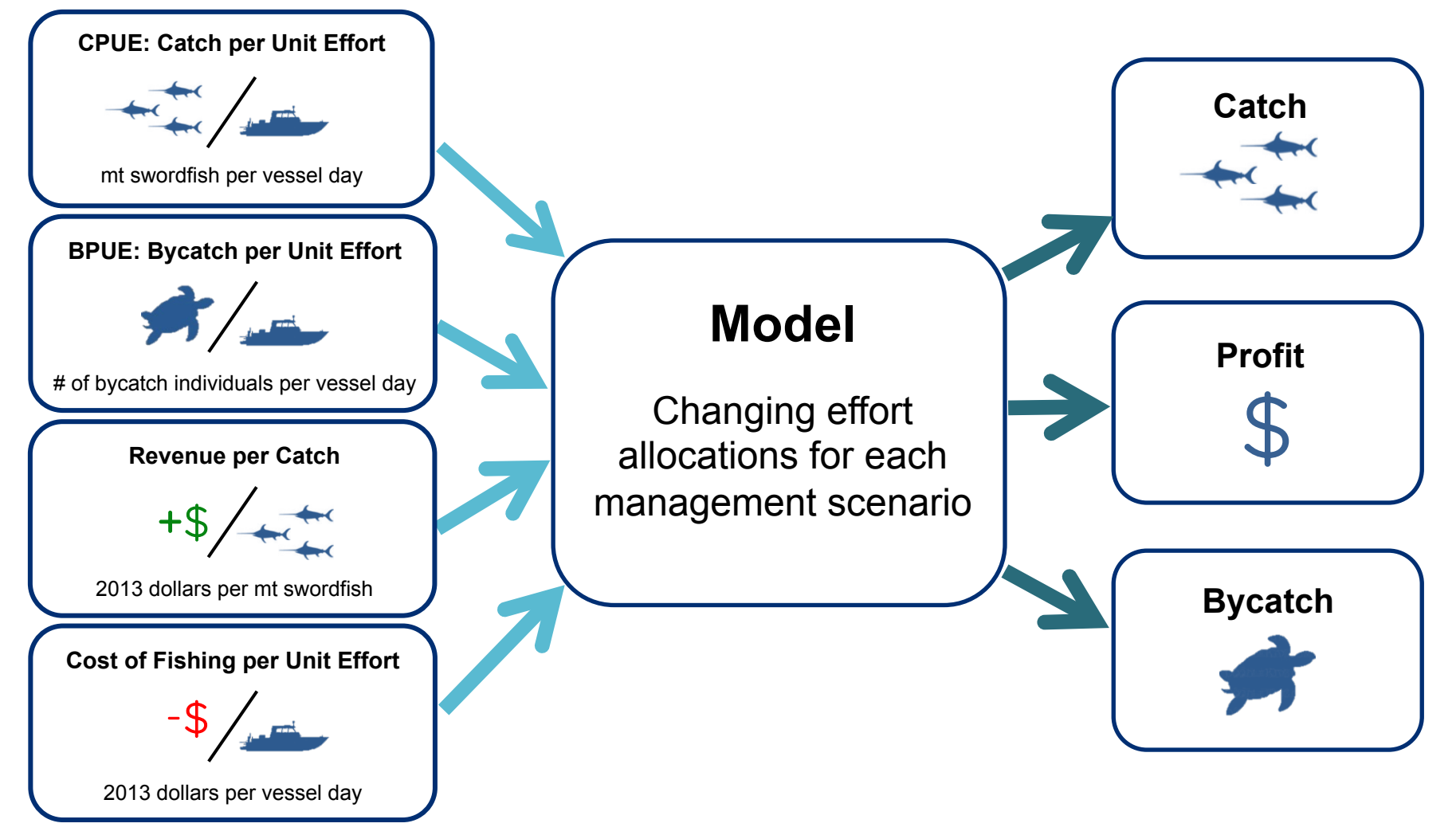


### Project Objective

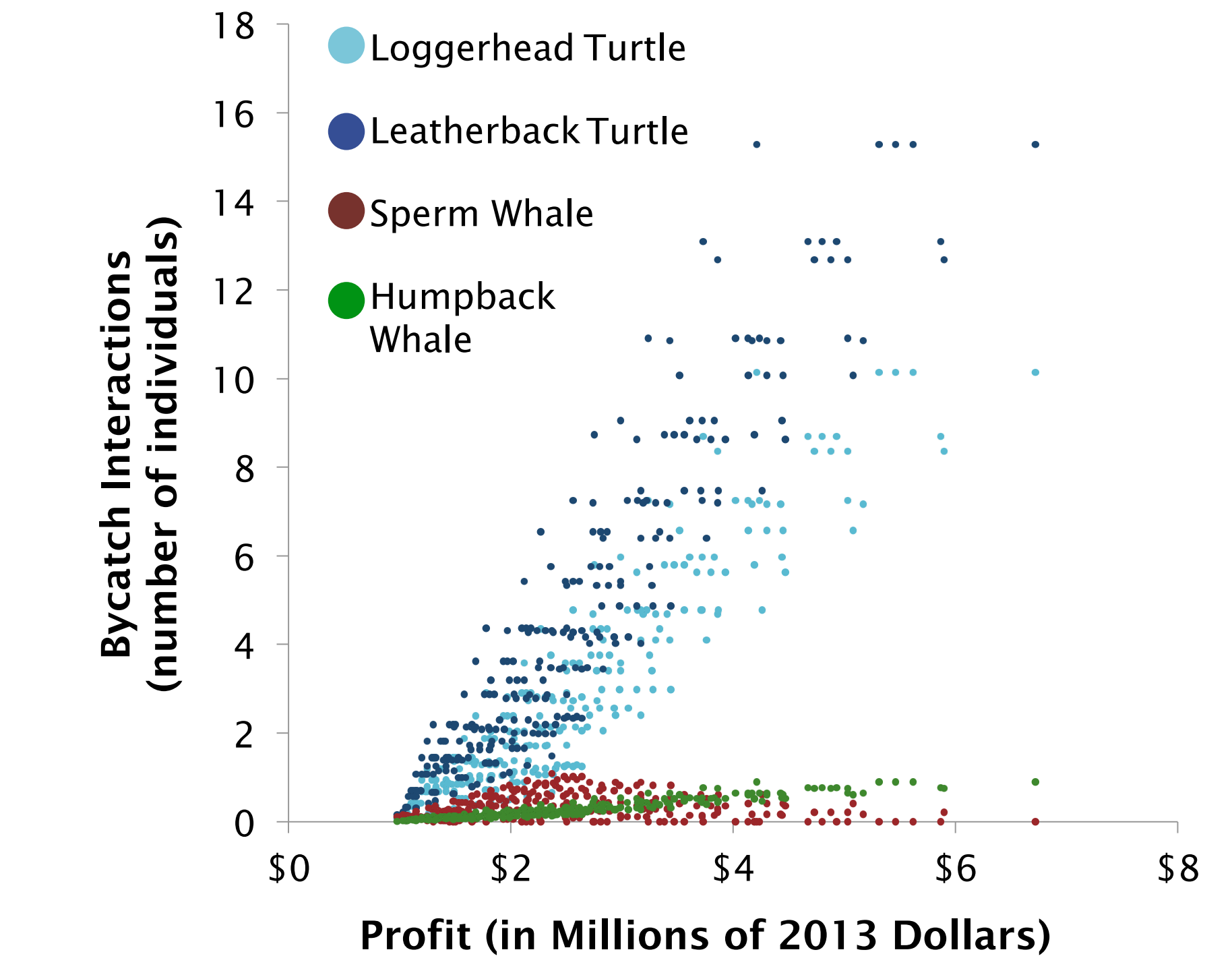
Evaluate different management scenarios to simulate an increase in the domestic California swordfish supply, with the goal of decreasing reliance on foreign swordfish imports in order to decrease the impact to sensitive species on a global scale.

### Evaluation of Management Scenarios

We developed a model to simulate and compare different management scenarios for a productive California commercial swordfish fishery. The management scenarios explored different combinations of the three gear types at various fishing effort allocations and in two areas – inside and outside the Exclusive Economic Zone (EEZ) off of California.

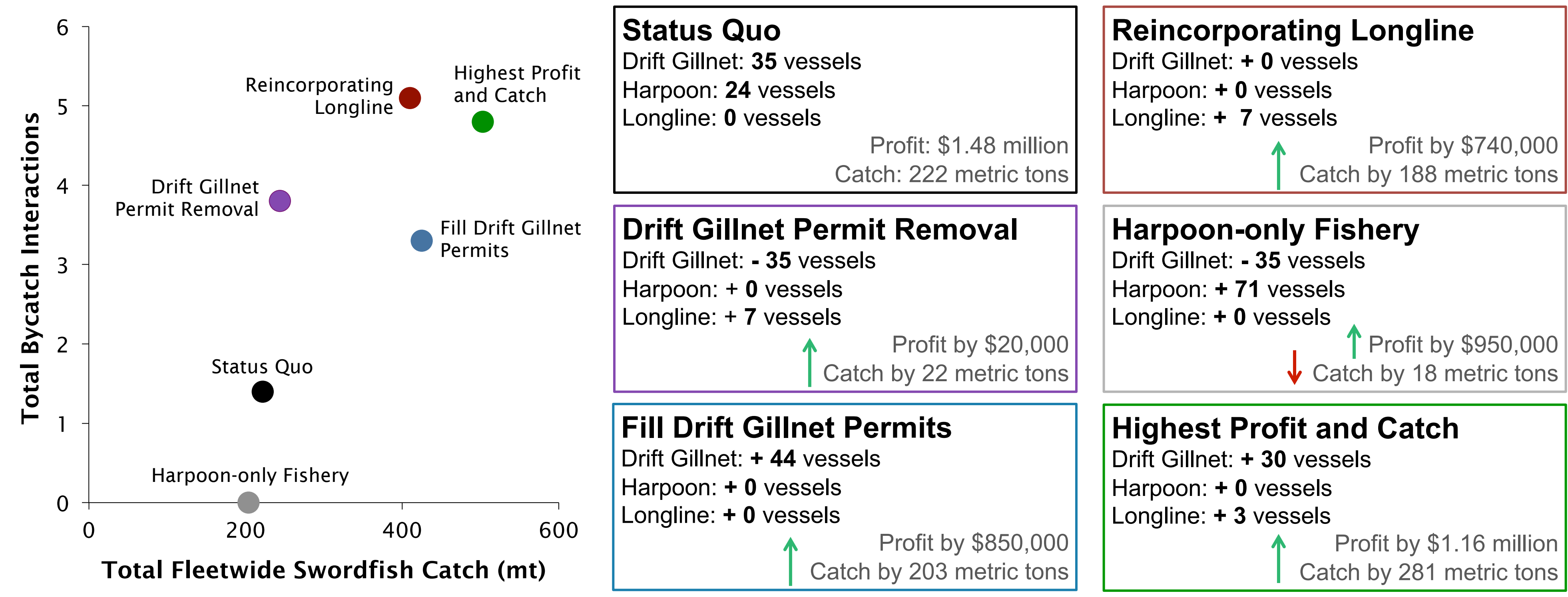


**Q1** What are the resulting swordfish catch, profit, and bycatch interactions of feasible management scenarios?



- 252 management scenarios were evaluated.
- In our analysis, "bycatch" refers to incidental interactions with non-market, protected species, specifically loggerhead sea turtle, leatherback sea turtle, humpback whale, and sperm whale.
- The number of humpback and sperm whale interactions was significantly lower than loggerhead and leatherback sea turtle interactions.

**Q2** Which of the most relevant management scenarios increase the total swordfish catch and profit under the proposed bycatch hard cap?

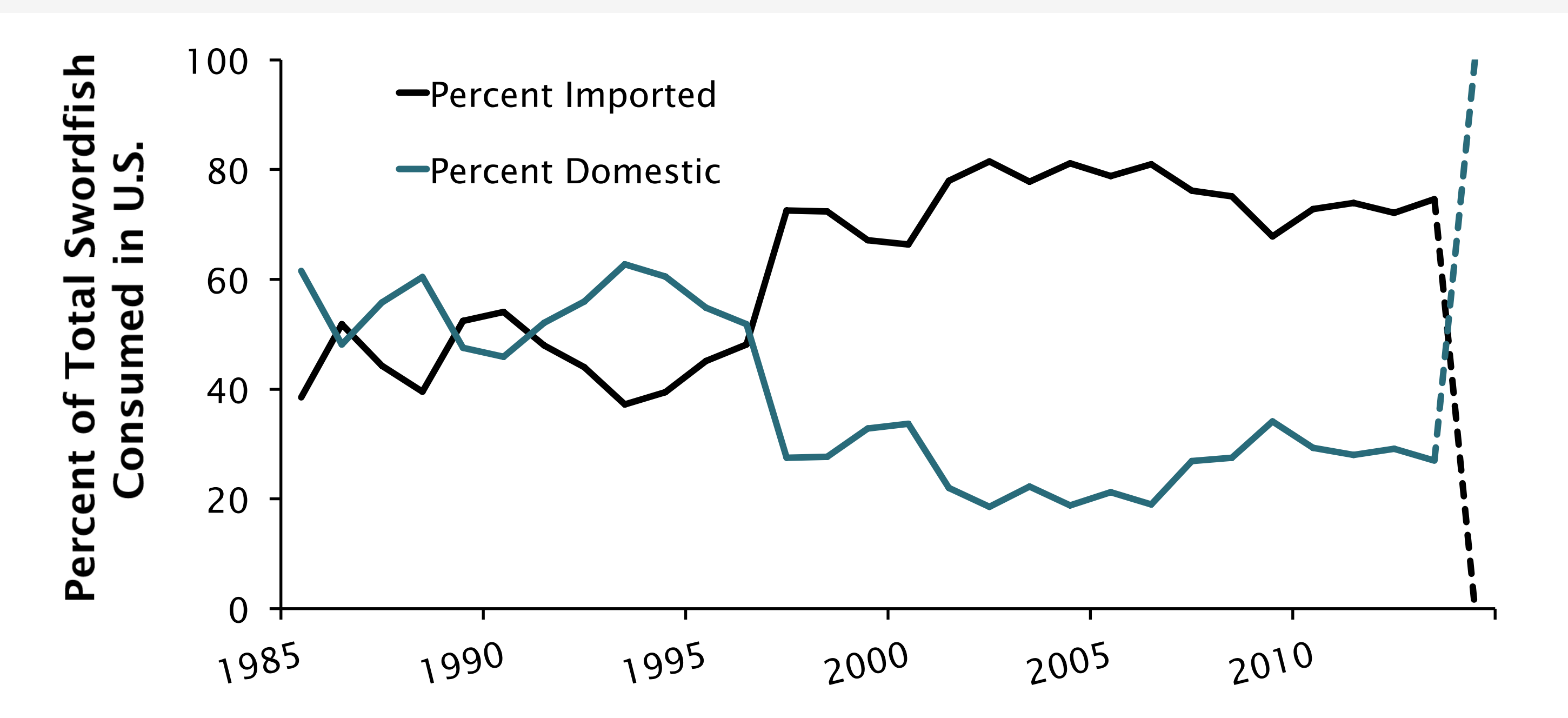


**Q3** Do different bycatch hard caps impact swordfish catch and profit?

Leatherback Sea Turtle Hard Cap	Swordfish Catch (mt)	Profit (U.S. dollars)
2	64	\$260,000
3	99	\$450,000
4	239	\$1,060,000

### Replacing Imports with California Swordfish

A thought experiment was conducted to explore the economic, catch, and bycatch consequences of a complete displacement of imported swordfish with domestically-caught swordfish through an increase in California fishing effort and swordfish supply.



8,919 mt  
\$36 million

Drift gillnet vessels: + 44  
Harpoon vessels: + 71  
Longline vessels: + 267

Reduction in sea turtle interactions  
Loggerhead: 1,921  
Leatherback: 522

### Recommendations to the Management Council

- A fishery with multiple gears would achieve the highest profit and swordfish catch and provide a steady supply of domestically-caught swordfish throughout the year.
- If bycatch hard caps are implemented, the Council should implement hard caps that are (1) based on science and (2) incorporate uncertainty to reduce the risk of high bycatch interactions.
- Attention should be paid to fishery participation and domestic swordfish catch when considering the implementation of bycatch hard caps as an additional regulation.
- Management should consider creating opportunities for local success and pursuing policy and market options such as import bans or marketing harpoon-caught swordfish to reduce reliance on imports and decrease bycatch interactions globally.

### Takeaways

Fisheries managers must take into account the tradeoffs between profit, catch, and bycatch interactions when making decisions regarding the fishery.

Our model may be used as a decision-making tool that can be adapted for other gear types and different effort levels while considering bycatch interactions.

### Acknowledgements

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