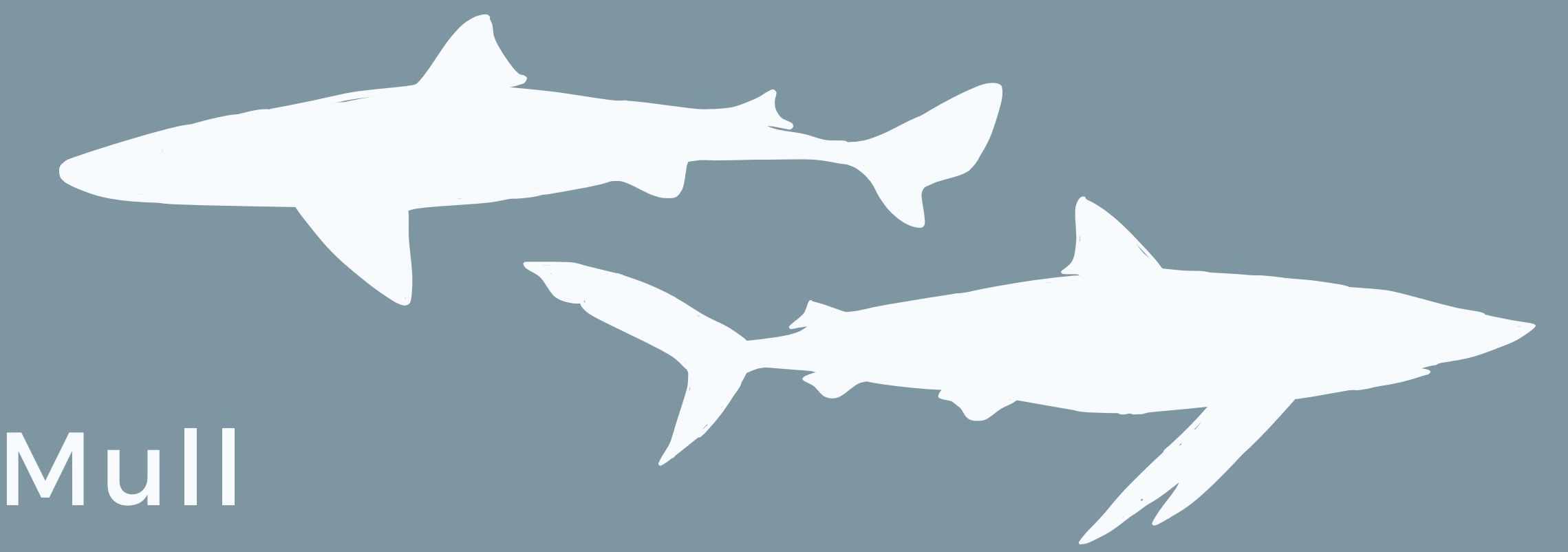


The cost of fishing to extinction: How the price of sharks and rays drive global fisheries



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INTRODUCTION

- 1/3 of sharks and rays are threatened with extinction and this decline has been linked to fishing pressures (2).
- These species are especially vulnerable due to slow life history traits (3).
- Elasmobranchs are used as a resource globally and are fished or retained from bycatch for their commodities (fins, meat, skin and liver oil) depending on the species.
- Historically, it was understood that sharks and rays were caught incidentally, as bycatch and weren't being targeted, despite that, there is increasing demand for many of these species (1).



The aim of this project is to better understand the changes in price and demand, which can help managers and conservationist focus efforts where overexploitation is more probable and where conservation efforts will be most effective.

RESEARCH QUESTIONS

1. How does ex-vessel price vary by country and/or species?
2. Have species specific prices changed over time, indicative of increasing market demand?
3. Do commodity types affect the price?

METHODS

The Global Shark Meat Project at Dalhousie is a multi-year project to characterize international global trade of elasmobranch meat, this project is a subset of the meat project, using price data to analyze this global fishery.



All the data was compiled, filtered and cleaned using R studio to ensure it was complete and identified down to the species level to be used in the Bayesian model.

The predictive Bayesian model was constructed based on the price dynamics, as seen in Figure 1 where each variable is thought to have some influence on price.



PRICE DYNAMICS

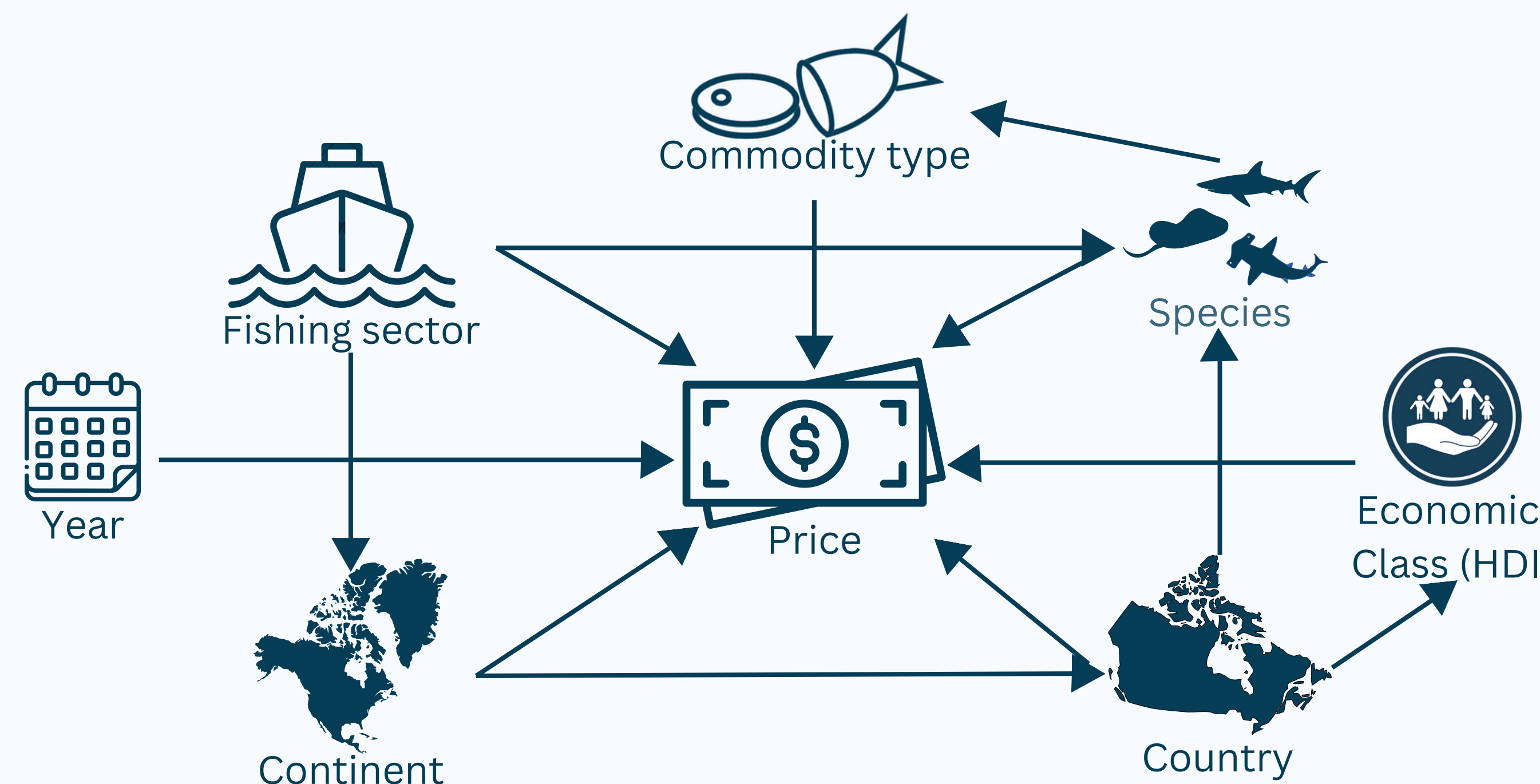


Figure 1 Price structure of global elasmobranch trade, with directional arrows pointing from cause to effect for each variable effecting price.

RESULTS

Focusing on 3 of the 5 most landed elasmobranch species, Figure 2 shows a comparison between these species across the European continent. A general increase in price can be seen since the data started in 1950 for all of these species.

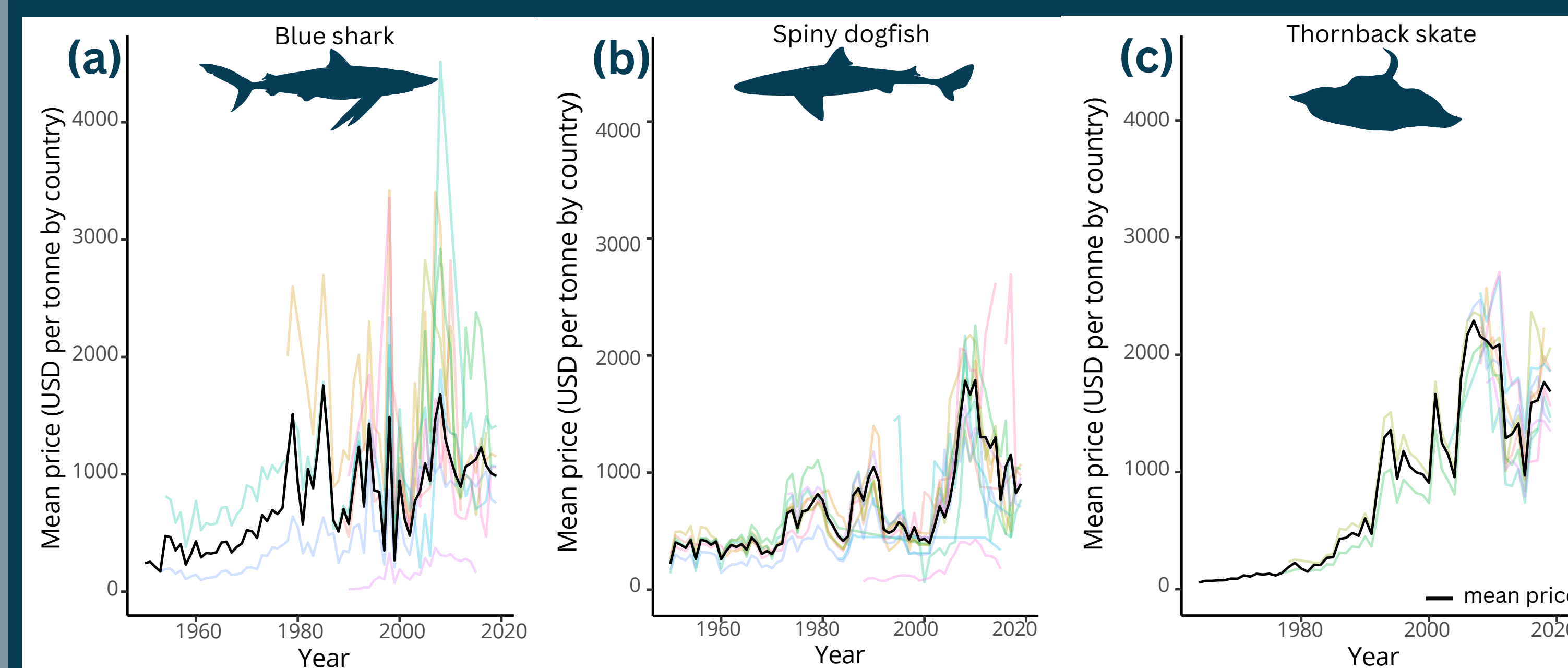


Figure 2 Mean prices (USD per tonne) represented by the black line for Europe and transparent coloured lines for individual countries in Europe for three species, (a) *Prionace glauca* (blue shark), (b) *Squalus acanthias* (spiny dogfish), and (c) *Raja clavata* (thornback ray).

- The price of blue shark follows a general increase in price in the last 20 years with some spikes in certain years showing how the exportation of this species affects its price.
- Spiny dogfish peaks in the late 80's, decreases in price around the year 2000 and then increases in price in 2010.
- Thornback skate shows an obvious increasing trend from the 1950s until the most recent reported data in 2019, with its price almost doubling in the last 20 years.
- When comparing these three species across the European continent, there is an overall upwards trend in price since 1950 when the data starts.
- Thornback skate is fetching the highest mean price overall, between these three species in Europe.

DISCUSSION

Predictive modelling reveals insights into price differences among species and the other six variables, aiding in understanding the key predictors of price.

The price variation across countries for blue shark most likely stem from countries fishing outside their EEZs, often resulting in catch landing at ports closer to the fishing grounds, where prices may differ due to global fluctuations.

The utilization of each species significantly influences its price: Thornback skate is used in Europe for delicacies like skate cakes, spiny dogfish is used in common dishes like fish and chips, and blue shark is frequently exported from Europe for international trade.

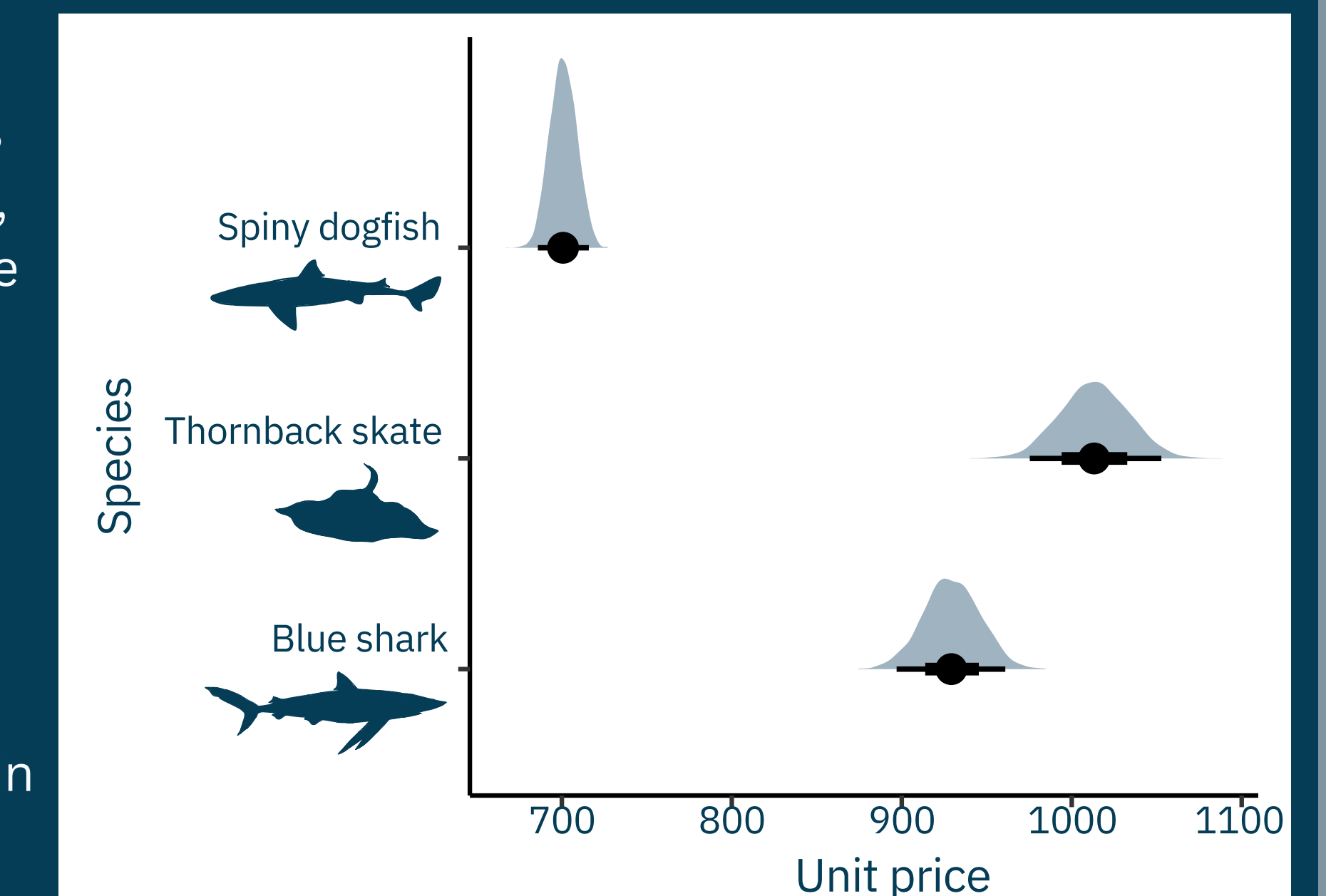


Figure 3 Coefficient estimates and density distributions for the results of a reduced model calculating unit price based on the three focus species, *Prionace glauca* (Blue shark), *Squalus acanthias* (Spiny dogfish) and *Raja clavata* (Thornback skate).

CONCLUSION

1. Despite being the most landed shark globally, prices for blue shark are the most variable
 2. There is more variability where it's being exported to, this plays a role in price since dynamics differ in other parts of the world.
 3. Thornback skate is fetching the highest mean price out of the three species.
 4. This is most likely due to culinary traditions in Europe which has an influence on market stability and prices.
- Commodities are primarily influence by
 - Local patterns of consumption
 - Legal trade regulations
 - Species with multiple exploitable commodities tend to be more valuable
 - Overall, there is an increasing market globally, which could be due to a number of factors (Figure 2).

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REFERENCES

