Authentic Exploratory Research

Can submarine propeller technology reduce noise pollution on marine mammals?

By: Kennedy Roller

Research Question

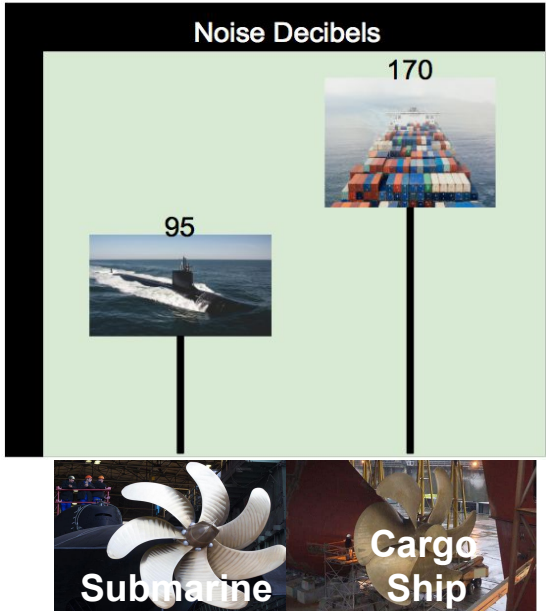
AER

Can submarine propeller technology reduce noise pollution on marine mammals?

Purpose

- Less damage on marine mammals health
- Marine mammals safety

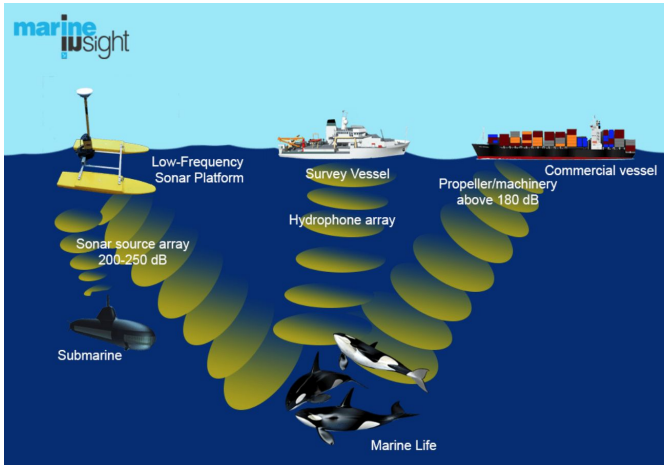
Introduction



Submarine propellers are known to have much **lower cavitation** and are made to **move quietly**.

Marine mammals depend on their hearing for **communicating**, **sensing danger**, **finding a partner**, and **hunting prey**.

Sound events like strandings from naval sonar maneuvers can lead to **damage to the brain**, **lungs**, and **other organs**.



Research Methodologies

AER

1. My main previously existing sources include; **Ocean Service**, **National Parks Service**, and **Ocean Care**.

2. I will be researching the **lower frequency technologies** applied to submarine propellers that are available but **aren't currently being used by shipping companies**.

3. I will **compare the benefits of the technologies** to each other and describe how they are not only better for marine animals but t**heir benefits for shipping companies as a whole**.

4. Why don't they **switch to a better and less dangerous alternative**: is it money or time?

Data and Findings

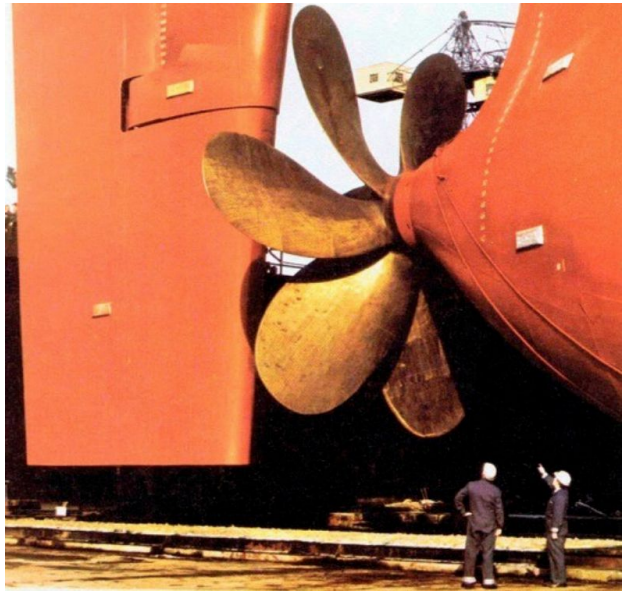
Costs:

New propeller = **$450,000**

3% net change drop

$304 - $340 fuel per tonne

Average length of voyage is **40 to 50** days



The feul cost for each voyage costs between **$12,160 to $17,000**

Shipping companies make an average of **$45,656** annually

Discussion and Analysis (continued)

AER

- Marine mammals can become **ill** to the point of death due to **high calibers** of noise pollution.

- The greatest contribution to vessel noise comes from **propeller cavitation** and **vacuum bubbles** created by the motion of a propellers collapse.

- Industrial ship propellers that have **heavy-cavitation drag more in the water** which causes the propellers to use **more energy to maintain its speed**.

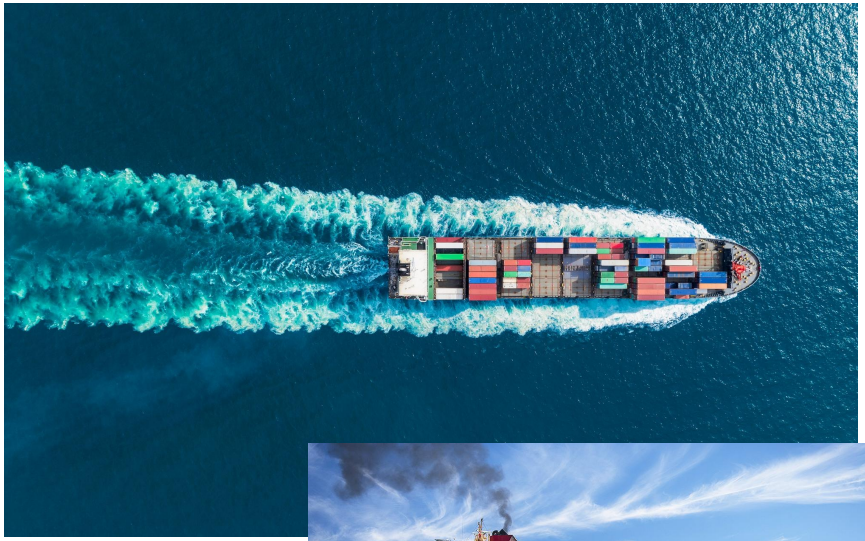
- The **increase in vacuum bubbles** causes **noise blocking for animals** trying to communicate.

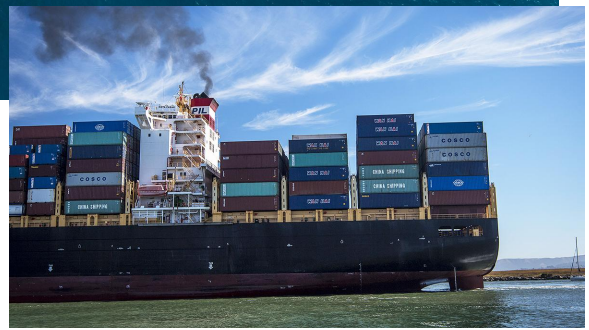
Conclusions, Implications, and Next Steps

My data has proved that it is **not cost beneficial** for any shipping company to alter their ships propellers to aide the effects of their noise pollution.

Economically Cargo ship companies won't be profiting from switching to a quieter propeller but **losing money**.

The amount these shipping companies must spend to maintain one ship is much greater than the amount of money they make for each voyage.





Acknowledgements & References

Special thanks to Michael Gamerl, Chanel Stewart, and Jun Shen for helping make this project possible.