

Whale population recovery and forage fish in a Northeast Pacific ecosystem

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Introduction

- some whales feed largely on forage fish
- individual masses, metabolic rates high
- exert top-down control when abundant?
- consequences of depletion & recovery?



Whales and herring

recovering humpback whales, few herring

- Haida Gwaii, W Vancouver Island (BC)
- Lynn Canal, Prince William Sound (AK)

causal link between these trends?

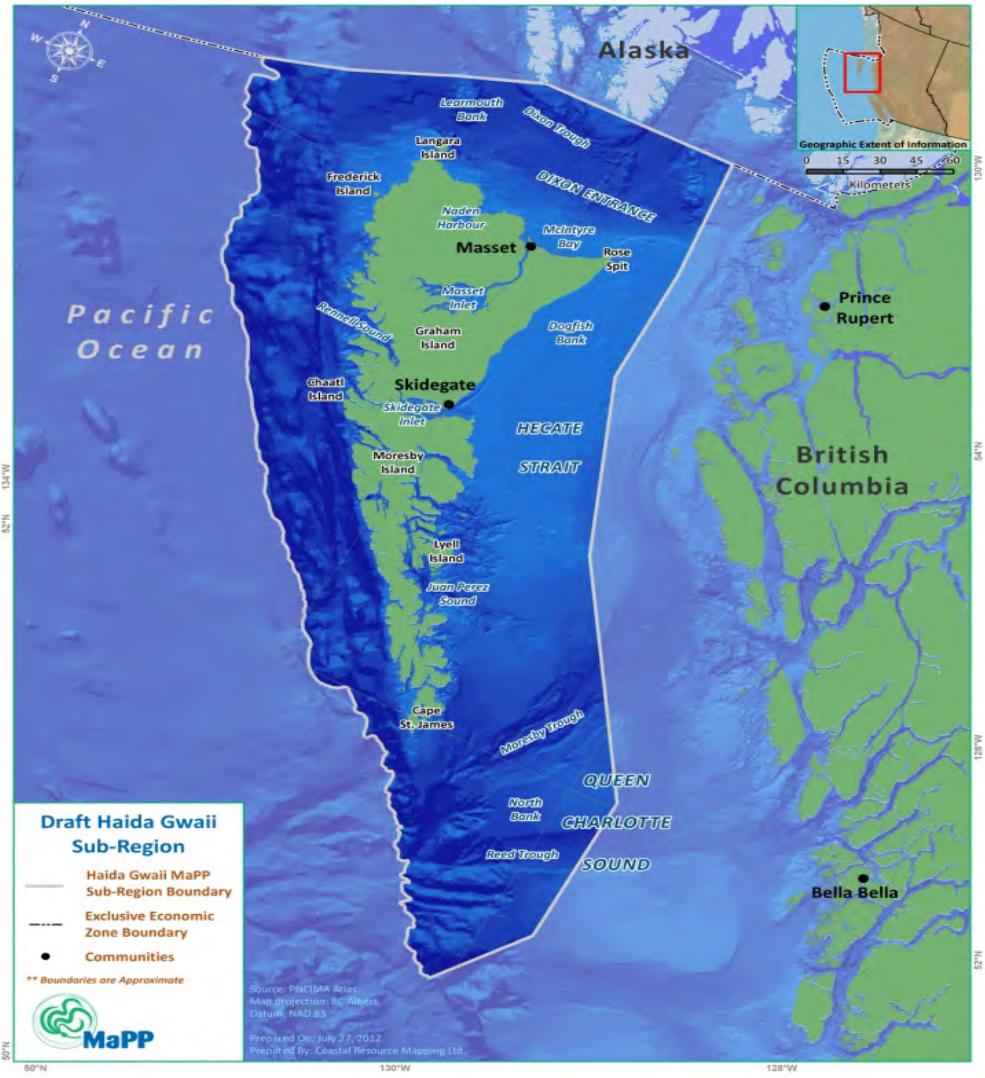


Research question

How will Northeast Pacific whale population recovery affect:

- 1) forage fish?
- 2) other predators?
- 3) local fisheries?



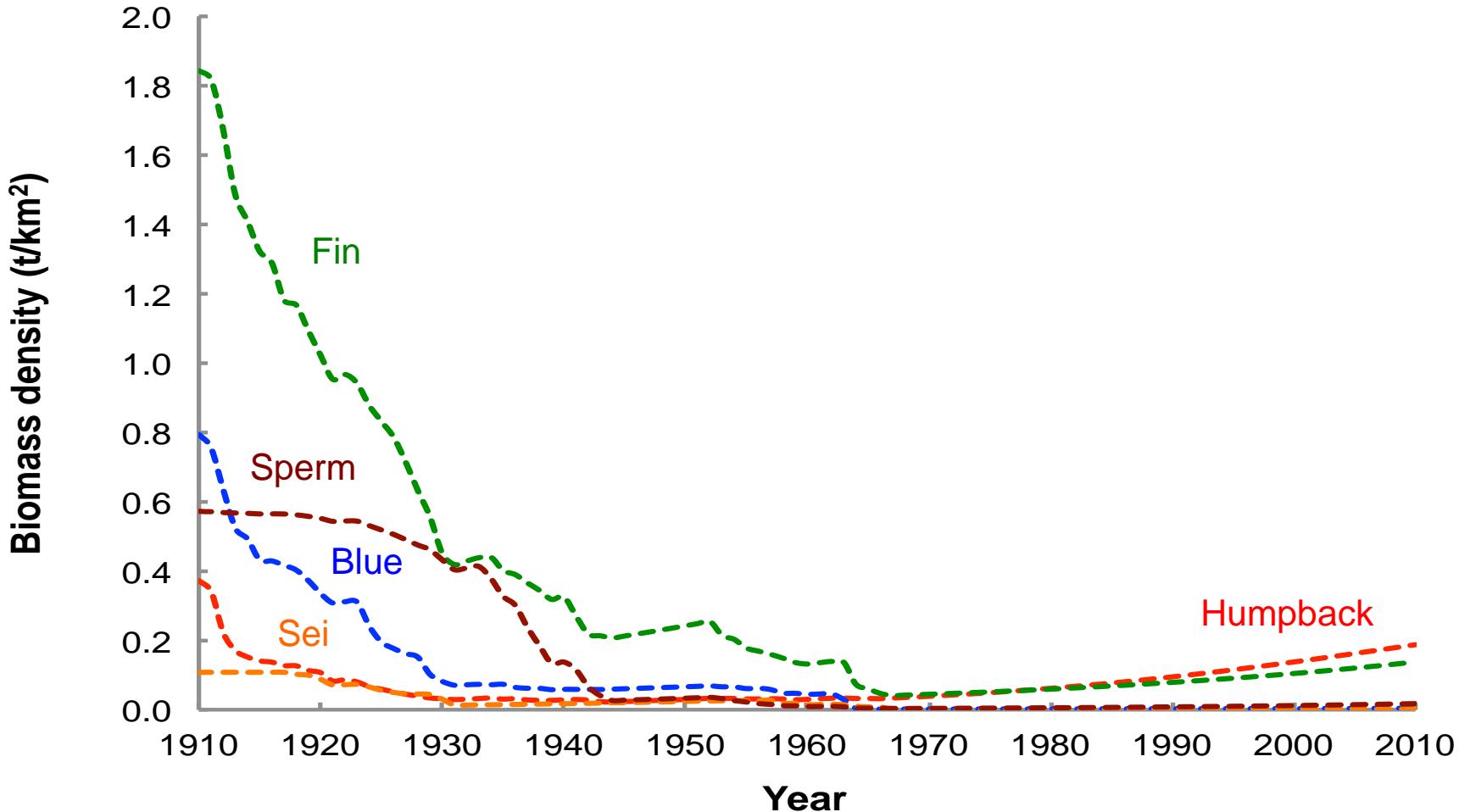


Study area

Whale modelling

- Schaefer model (logistic growth - catch)
- N_0 from: current N, recorded annual catch
- assumed: $N_0 = K$ and r_c species-specific
- output: N_0 estimates and N trajectories





Food web modelling

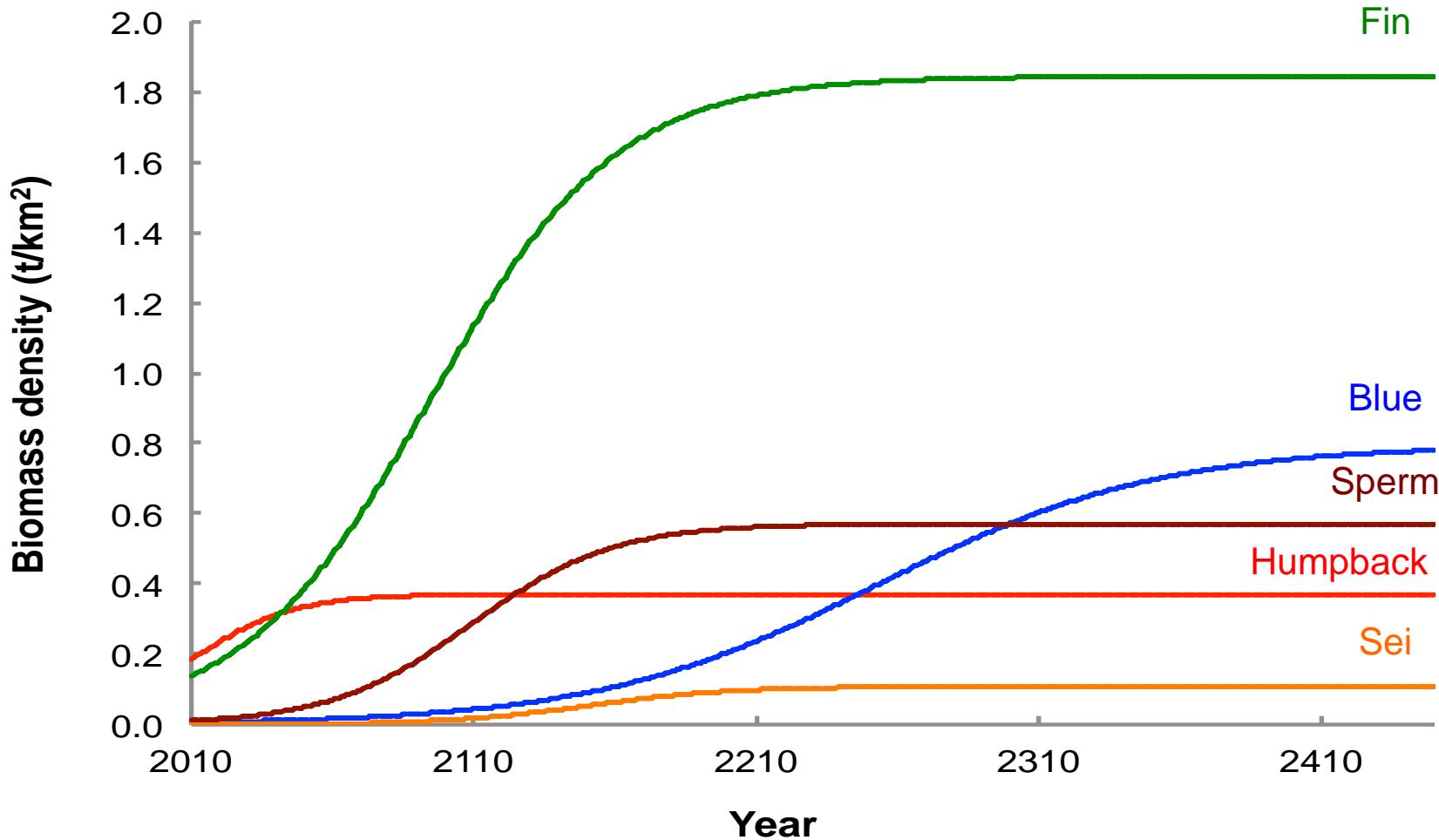
Ecopath with Ecosim (EwE)

- mass balance principle
- Ecopath: static snapshot
- Ecosim: dynamic simulation



Ecopath R&D Consortium





Model runs

- 1) with Monte Carlo sensitivity analysis
- 2) with energy-based model comparison
- 3) with bottom-up forcing simulations



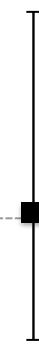
Percentage change



Arrowtooth flounder



Piscivorous seabirds



Small odontocetes



Inshore rockfish



Herring



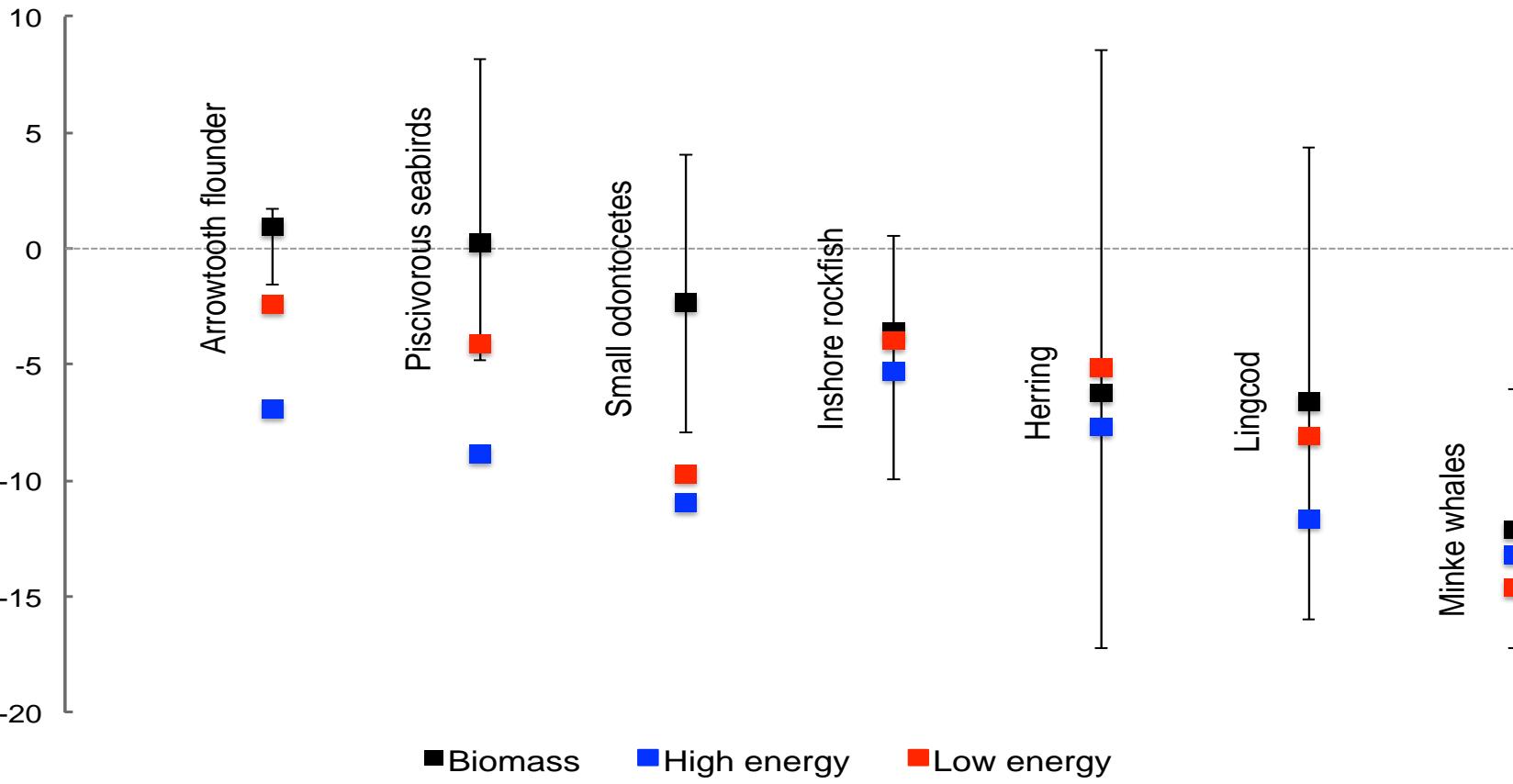
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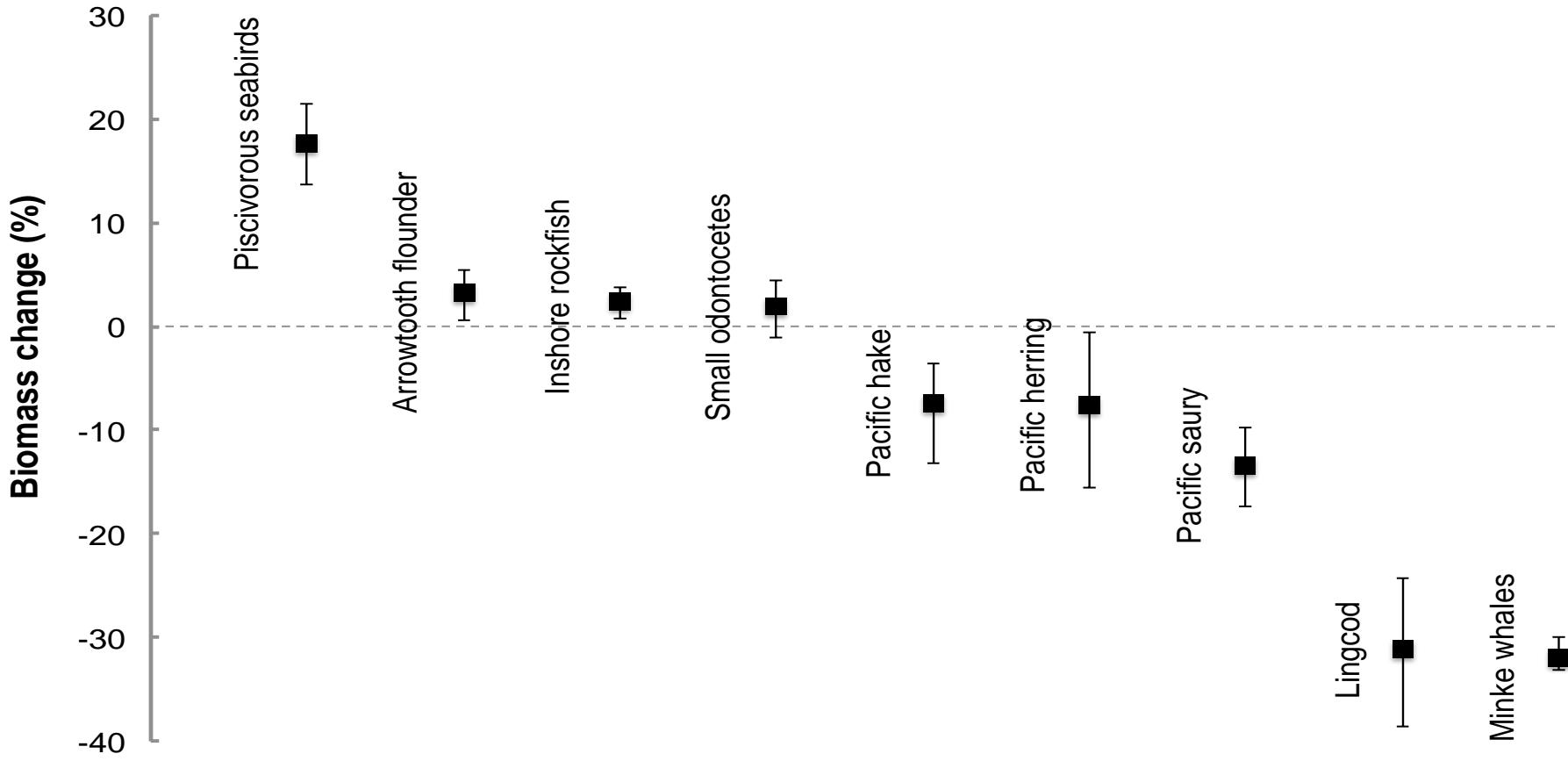


Minke whales



Percentage change





Conclusions

humpback and fin whale recovery may:

- increase predation on herring, saury
- adversely affect some piscivores
- slightly affect some local fisheries

somewhat sensitive to parameter uncertainty



Acknowledgements

- Dr. Villy Christensen
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- Dr. Andrew Trites
- Linda Nichol



***NSERC
CRSNG***



A dramatic photograph of a whale breaching. The whale's dark, textured body is angled upwards, creating a massive splash of white and green water. Its long, ribbed pectoral fin is visible on the right side. Above the whale, a flock of seagulls is captured in flight, their wings spread against a bright, overcast sky. The background consists of choppy, teal-colored ocean waves.

Questions?