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HARBOUR PORPOISE BEHAVIOUR: GROUP HUNTING AND CONTINUED RESEARCH USING DRONES

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LUND
UNIVERSITY

A COLLABORATIVE EFFORT



Sara Torres Ortiz

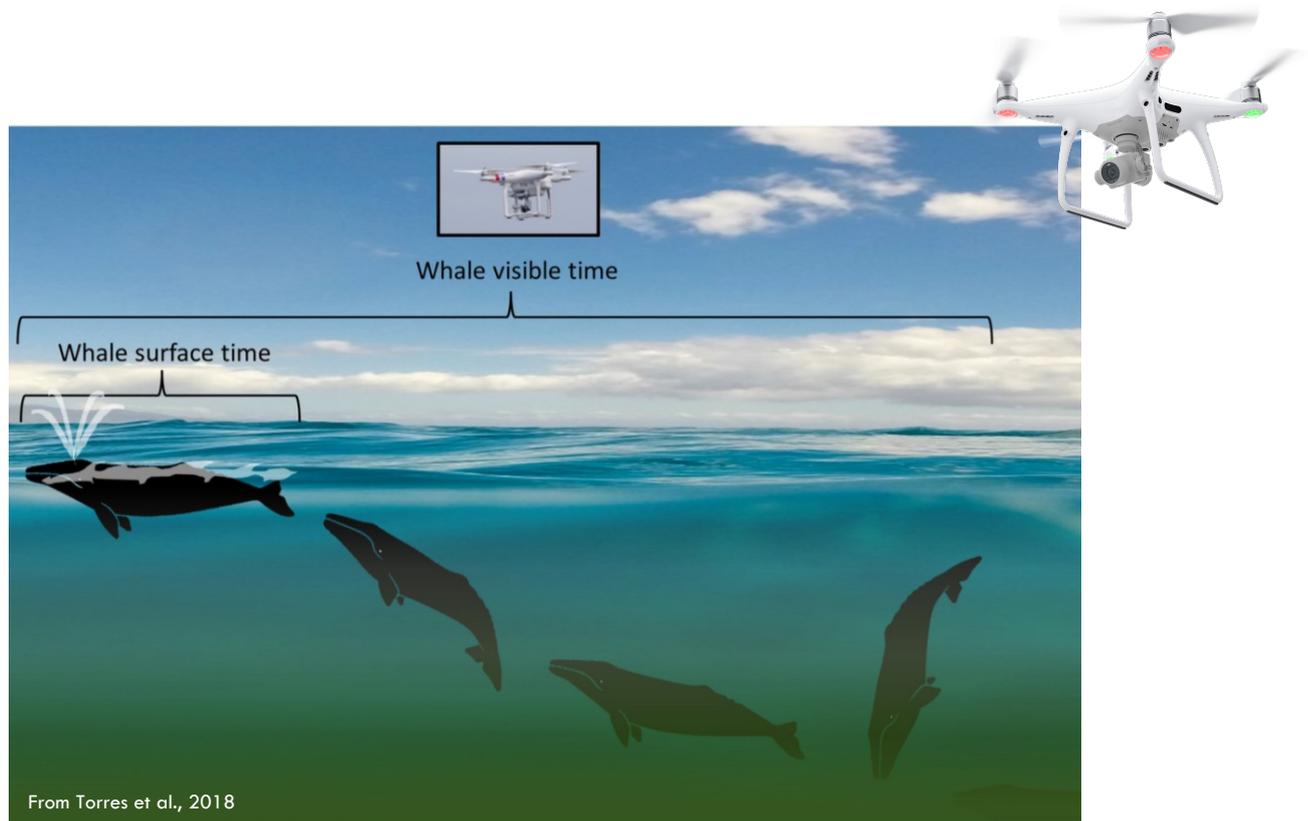


Héloïse Hamel



Magnus Wahlberg

NEW TECHNIQUES – NEW PERSPECTIVES

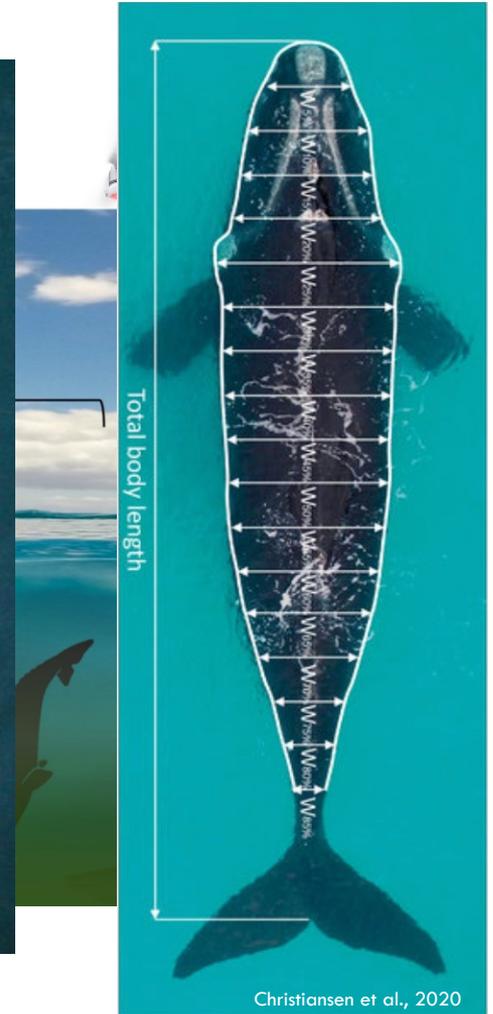
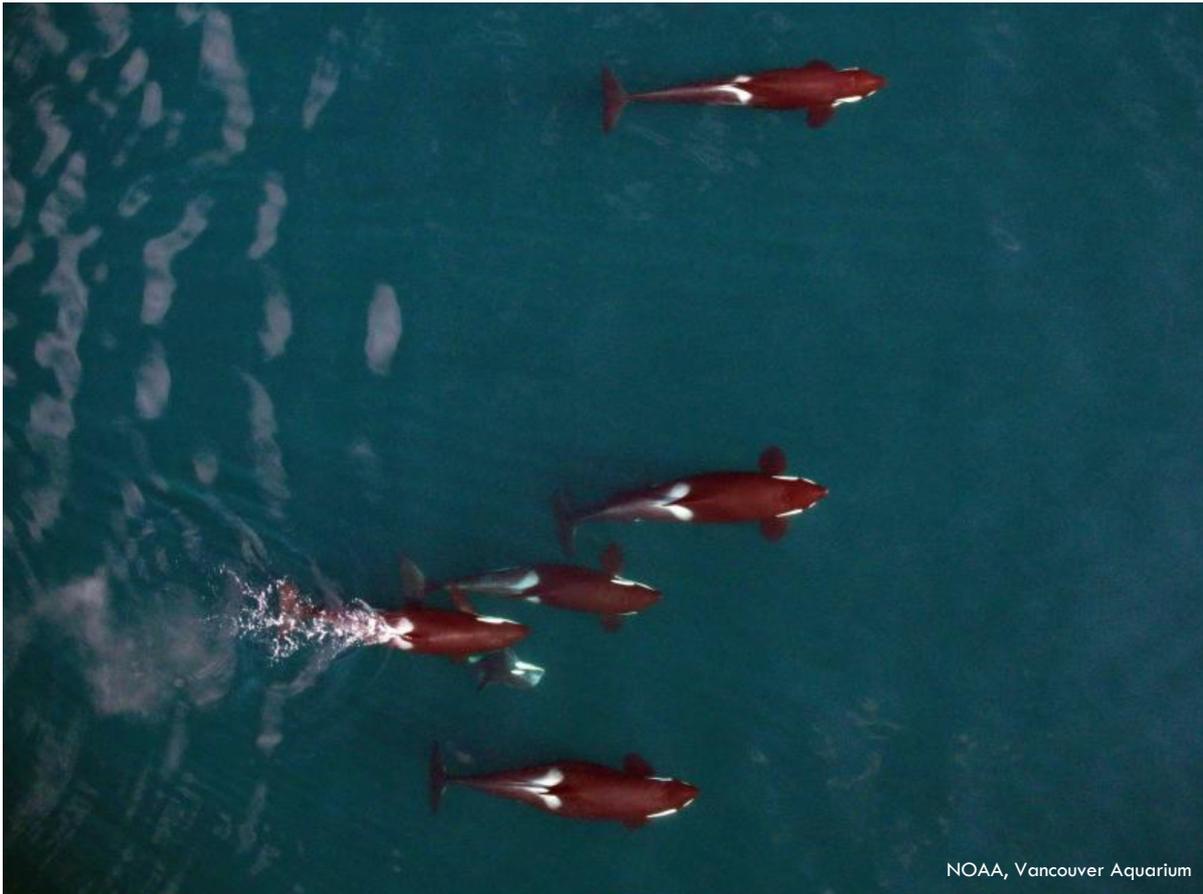


NEW TECHNIQUES — NEW PERSPECTIVES

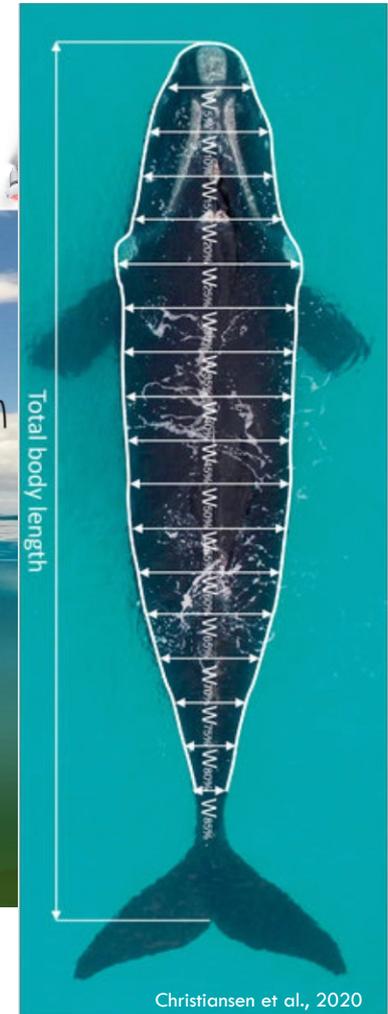


NOAA, Vancouver Aquarium

NEW TECHNIQUES — NEW PERSPECTIVES



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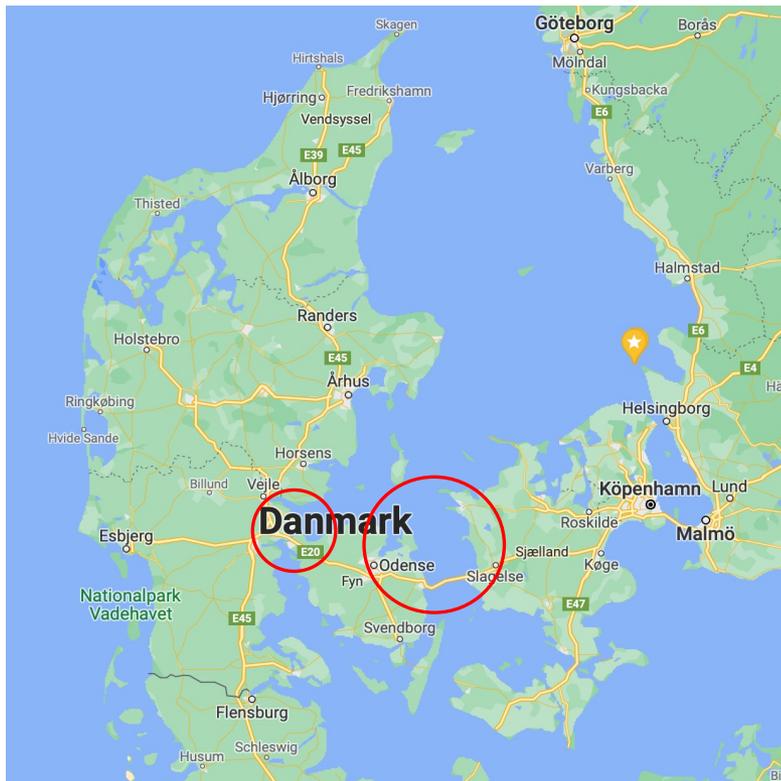
NEW TECHNIQUES — NEW PERSPECTIVES



Sara Torres Ortiz,
University of Southern Denmark

STUDY AREA

2015 - ongoing



Sara Torres Ortiz,
University of Southern Denmark

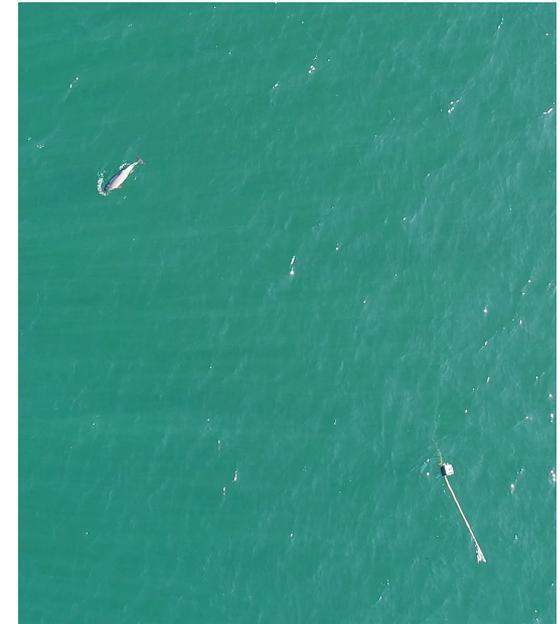
BEHAVIOURAL STUDIES USING DRONES



Impacts from boat traffic
Malou Friis Vittrup (BSc thesis 2018)
& ongoing



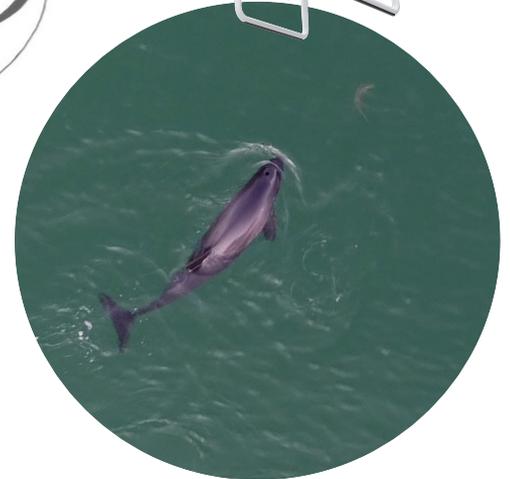
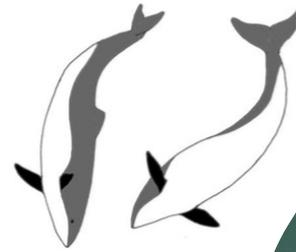
Intraspecific interactions
Daniela Prömper (MSc thesis 2016), Gema Palacino (MSc thesis 2019) & ongoing



Interactions with fishing gear
Dennis Brennecke (PhD student), ongoing

FORAGING TECHNIQUES

CONTEXT DEPENDENT?



COOPERATIVE HUNTING...?



COOPERATIVE HUNTING

Cooperative hunting: individual predators relating in time and space to each other's actions to more efficiently track down and catch prey. Increased fitness by acting together to achieve a common goal.

- Cooperative hunting has been described for more than 40 mammalian and avian species.
- Cooperation is often found in social animals, since sociality provides the mechanisms for cooperation to evolve.

COLLABORATIVE HUNTING

Collaborative hunting: a more rare and complex form of cooperative behaviour. During collaboration, an individual's actions are different and complementary to other individuals' actions to improve the chances of the group successfully feeding on the same prey resource. The individuals in a group acquire different roles.



Bailey et al. 2013
Packer and Ruttan 1988

"PASSIVE COOPERATION"

Solitary animals usually forage alone. However, they might still aggregate together at the same food source. This is sometimes called **"passive cooperation"**.



HYPOTHESES

Based on the assumptions that harbour porpoises are solitary animals and have a less complex communication system, we hypothesized that:

- (i) most harbour porpoise foraging events would occur with individual animals

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Rejected: Group foraging events were significantly more common than single individual foraging events ($X^2 = 646, p < 0.001$)

HYPOTHESES

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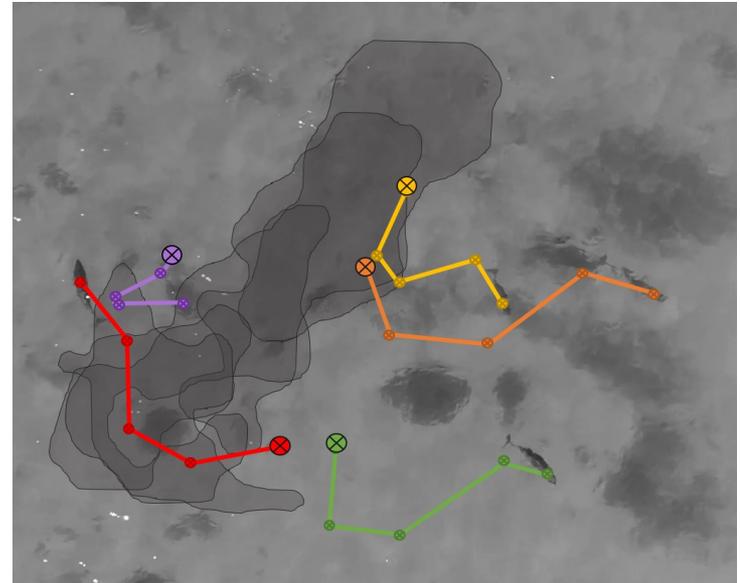
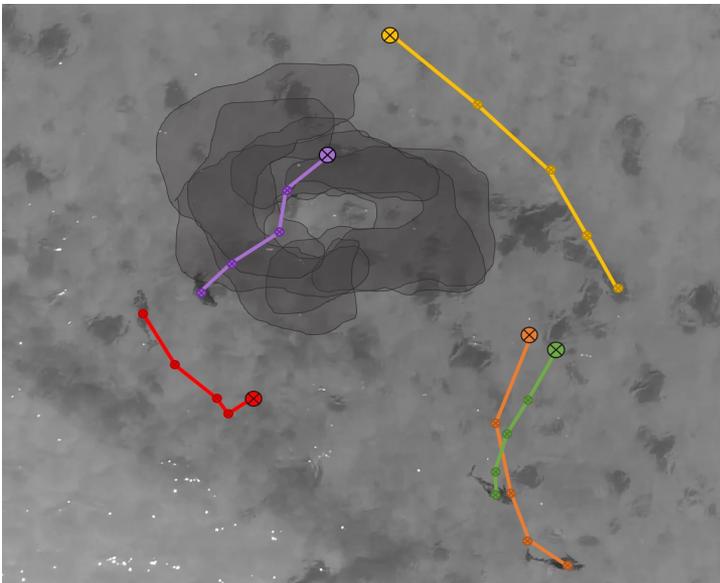
- (i) most harbour porpoise foraging events would occur with individual animals
- (ii) foraging events on schools of fish with more than one harbour porpoise would show unstructured behaviour with no evidence of organization between individuals

VIDEO ANALYSIS

- > 600 videos (44 hrs) from 2018-2019
- Manual analysis to identify all sequences with potential foraging events
 - Date, location, duration, nr of porpoises, behavioural states, prey visibility, prey type, sea bird presence
- Filtering to only include high quality foraging events

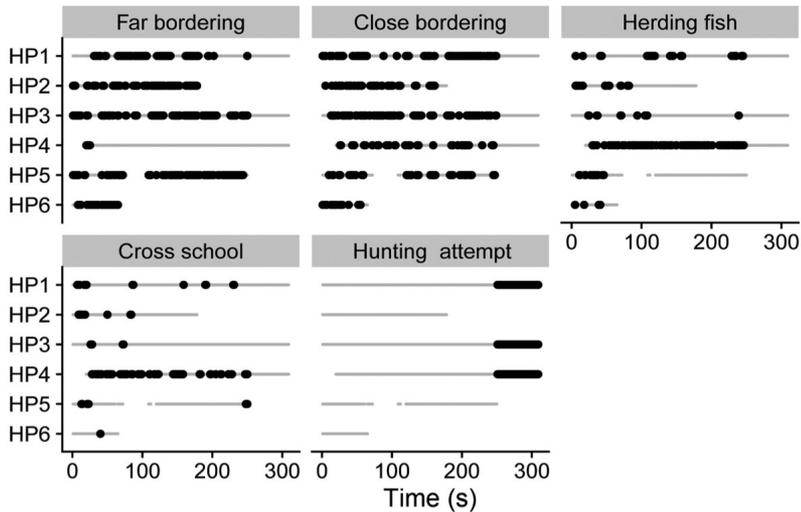
H₂: UNSTRUCTURED HUNTING BEHAVIOUR WITH NO ORGANIZATION BETWEEN INDIVIDUALS

Detailed analysis second by second:
tracking of each individuals' movements in relation to the fish school

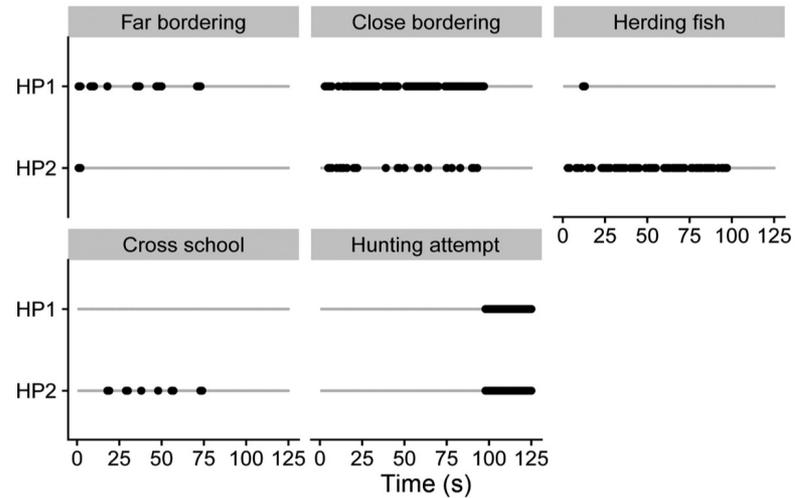


H₂: UNSTRUCTURED HUNTING BEHAVIOUR WITH NO ORGANIZATION BETWEEN INDIVIDUALS

(A) Behaviour over time – Sequence 1



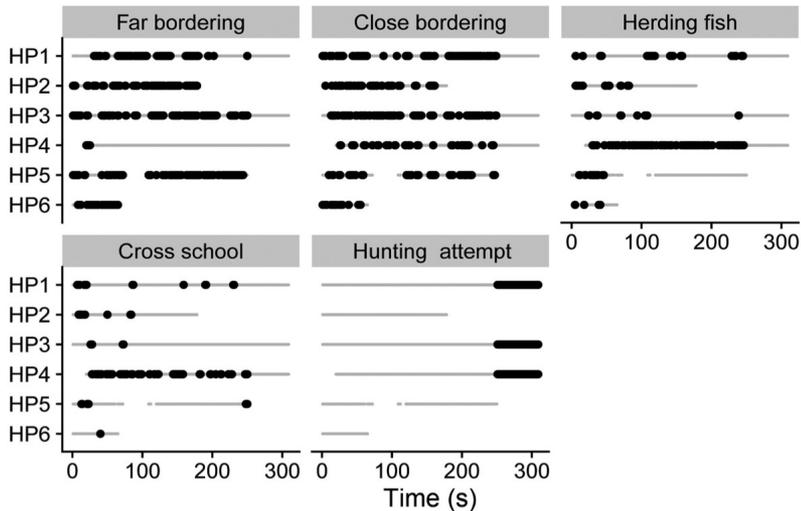
(B) Behaviour over time – Sequence 2



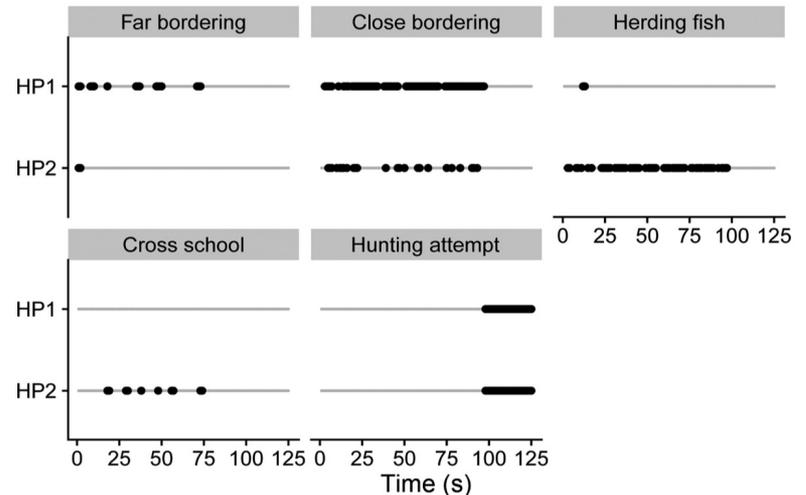
H₂: UNSTRUCTURED HUNTING BEHAVIOUR WITH NO ORGANIZATION BETWEEN INDIVIDUALS

→ REJECTED

(A) Behaviour over time – Sequence 1



(B) Behaviour over time – Sequence 2



Individual porpoises had significant differences in their predominant behaviour (X^2 -tests, $p < 0.001$)

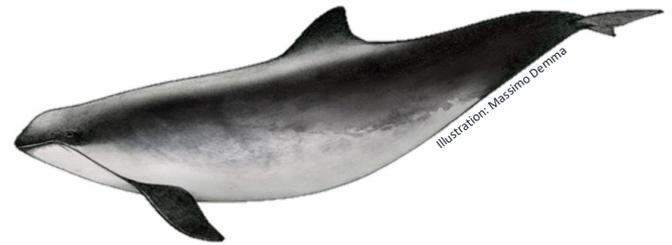
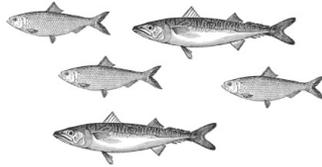
→ Porpoises show **role specialization** when hunting together on schools of fish!

CONCLUSIONS

- New technique – new insights!
- Previously unreported behaviours
- Harbour porpoises capable of sophisticated collaborative hunting with role specialization
- More social than previously thought?
- Opens up for the possibility of collaboration in other seemingly non-social species



CONTRIBUTION TO CONSERVATION



Knowledge of foraging behaviour and interactions with prey are important when working to reduce conflicts with fishing activity and the risk of by-catch

DIET

PREY SPECIES? RELATIVE CONTRIBUTION TO DIET?
DIFFERENCES BETWEEN GROUPS (AGE, SEX, AREA, POPULATIONS)?

- Macroscopic analysis
- Stable isotopes
- eDNA





Thanks!

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**CARL TRYGGERS
STIFTELSE**
FÖR VETENSKAPLIG FORSKNING

