High mobility of Red-throated Divers revealed by satellite telemetry

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Funding:

Outline of the presentation

• Planning the study: study area, bird capture logistics, transmitter choice

• Fieldwork: catching birds, transmitter deployment

• Data collected thus far

• Bird movements during the annual cycle

• Use of different country EEZs by divers
Planning phase: study area

- From earlier studies and investigations related to offshore wind energy developments it has been known that eastern coast of the North Sea supports high numbers of divers, particularly in spring.

- Divers in the German Bight are most abundant offshore, beyond territorial waters (>12 nm).

- Thus the occurrence of birds defined that we need to catch them where they are most abundant.

- The North Sea is stormy during most of the days and offshore captures determined that we need to use a large ship that would be safe and could launch a small dinghy for capture operations.

- The project targets to fit 45 Red-throated Divers with implantable transmitters in the course of three winter seasons.
Planning phase: transmitter choice

- Diving birds do not tolerate external devices put on their plumage, thus the only choices are implantable transmitters or small data loggers that could be attached to birds’ foot.

- Data loggers were rejected as they require recapturing the same individual, which is not feasible when focusing on wintering birds. Also, their spatial precision (± 100 km) is insufficient for our study.

- Argos-based implantable transmitters were selected as being the only option, although precision of their positions varies from ±200 m to 1.5 km and more depending on position quality class.

- No manufacturer offers implantable GPS transmitters that deliver data using Argos or other satellite systems. Implantable GPS-GSM transmitters is a risky option for diver study in the German Bight as most of the time the birds stay offshore, outside of GSM connection range.
Fieldwork: bird captures
Fieldwork: bird captures (video)
Fieldwork: surgeries
Tagging results thus far

- Spring 2015: 16 divers (13 ♀, 3 ♂)
- Spring 2016: 20 divers (17 ♀, 3 ♂)

Bird survival & transmitter performance

- Tagged in 2015 (16 birds):
  - 5 confirmed mortalities (3 early, 2 late)
  - 3 bird transmitting until now
  - several premature transmitter shutdowns

- Tagged in 2016 (20 birds):
  - 3 confirmed mortalities (2 early, 1 late)
  - 6 transmitting until now
  - Premature transmitter shutdowns
Tracking of birds tagged in 2015 (video)
Tracking of birds tagged in 2016 (video)
Spring migration of 11 birds tagged in 2015
Tracks of 5 birds tagged in 2015 (2nd season)
Breeding sites: Greenland
Breeding sites: Norway
Breeding sites: Russia
Diver #146438

Track Sterntaucher 146438
- Positionen (1 pro Tag)
- Frühjahr / Heimzug 2015
- Heimzug 2016
Diver #146438
Diver #146438

Total min flight distance: 14,812 km
Diver #146442
Diver #146442

- Positionen (1 pro Tag)
- Heimzug 2015
- Heimzug 2016
Total min flight distance: 15,573 km
Migration timing

Latitudinal movements of divers tagged in spring 2015
Migration timing

Longitudinal movements of divers tagged in spring 2015
Heat-map of distribution patterns (video)
Divers are very international birds
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Probability of divers occurrence in EEZs

Day of year

Germany
Denmark
Divers are very international birds

Germany
Denmark
Sweden
Divers are very international birds.

Probability of divers occurrence in EEZs

Day of year

Germany
Denmark
Sweden
Estonia
Divers are very international birds

Germany
Denmark
Sweden
Estonia
Finland
Divers are very international birds

Probability of divers occurrence in EEZs

- Germany
- Denmark
- Sweden
- Estonia
- Finland
- Latvia
Divers are very international birds

Probability of divers occurrence in EEZs

Germany
Denmark
Sweden
Estonia
Finland
Latvia
Russia
What did we learn?

• Red-throated Divers using German Bight are truly international birds occurring in several countries during the annual cycle

• These bird originate (breed) from an extensive area spanning half of the globe: from eastern Taymyr to western Greenland

• They undertake long seasonal migrations of up to 5000 km one way

• Breeding areas are diverse from open lake-tundra to mountain lakes to near glacier lands

• Different birds have very individual movement patterns during the non-breeding season, usually using several distinct areas

• At individual level there seem to be high spatial and temporal fidelity

• Seasonal migrations are highly synchronous among the birds
Thank you!

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