

High mobility of Red-throated Divers revealed by satellite telemetry

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Project duration: 2014-11-01 –2018-04-30

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



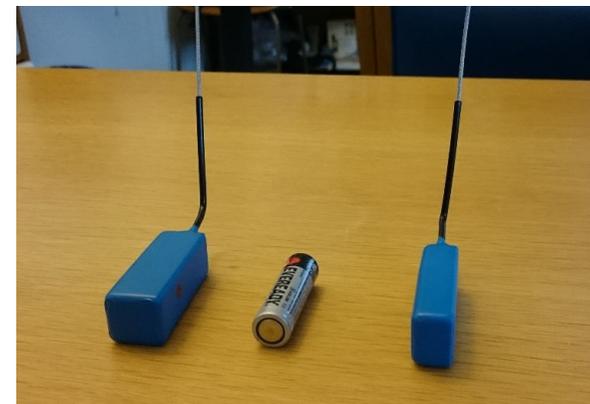
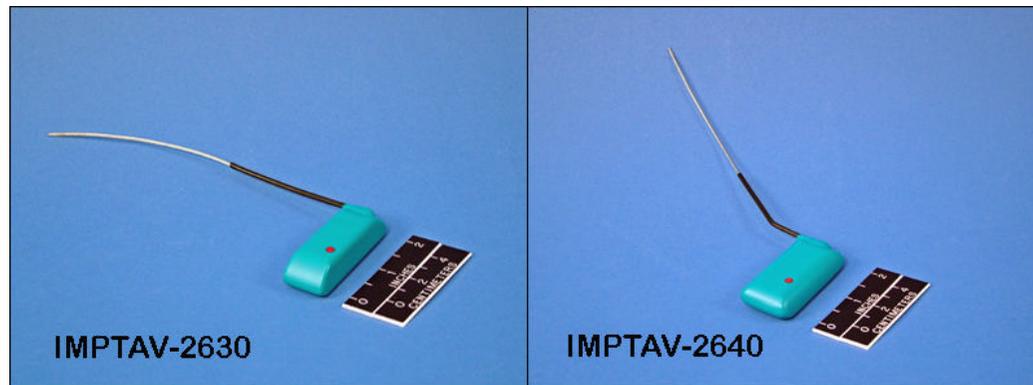
Planning phase: study area

- 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)

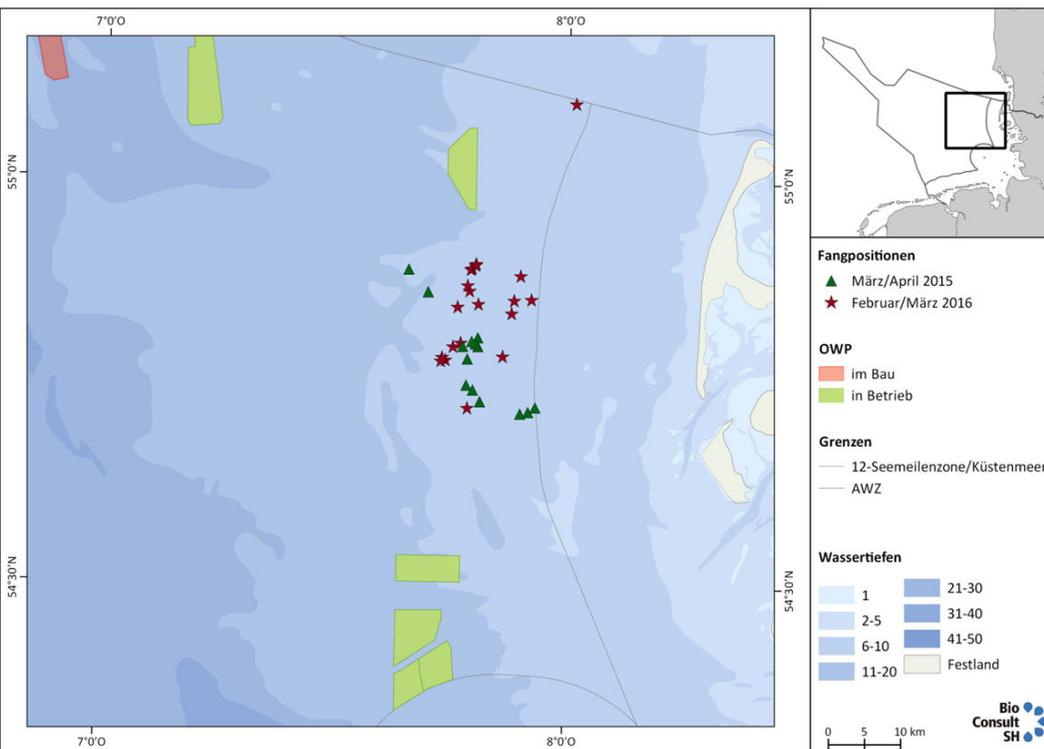


Fieldwork: surgeries



Tagging results thus far

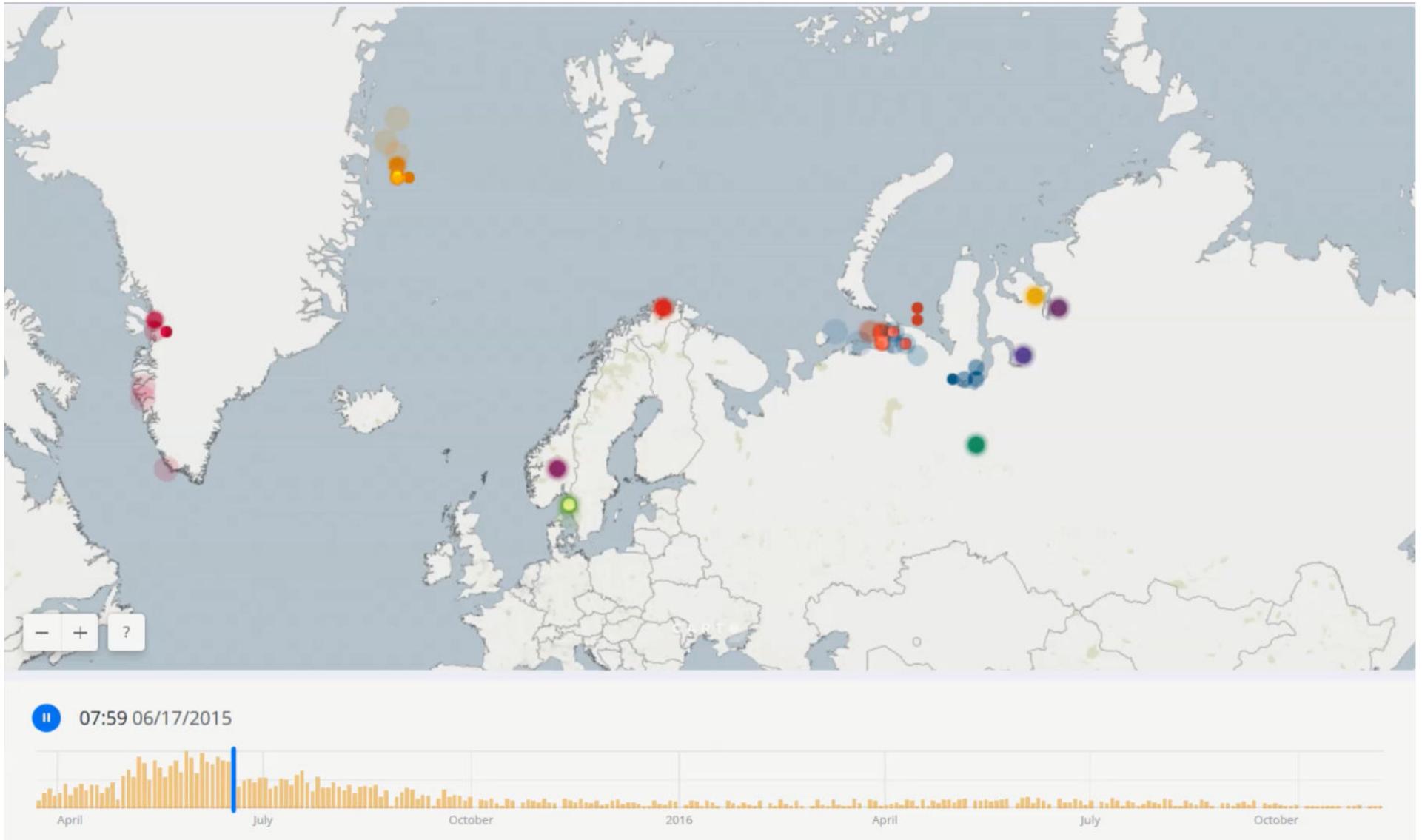
- Spring 2015: 16 divers (13 ♀, 3 ♂)
- Spring 2016: 20 divers (17 ♀, 3 ♂)



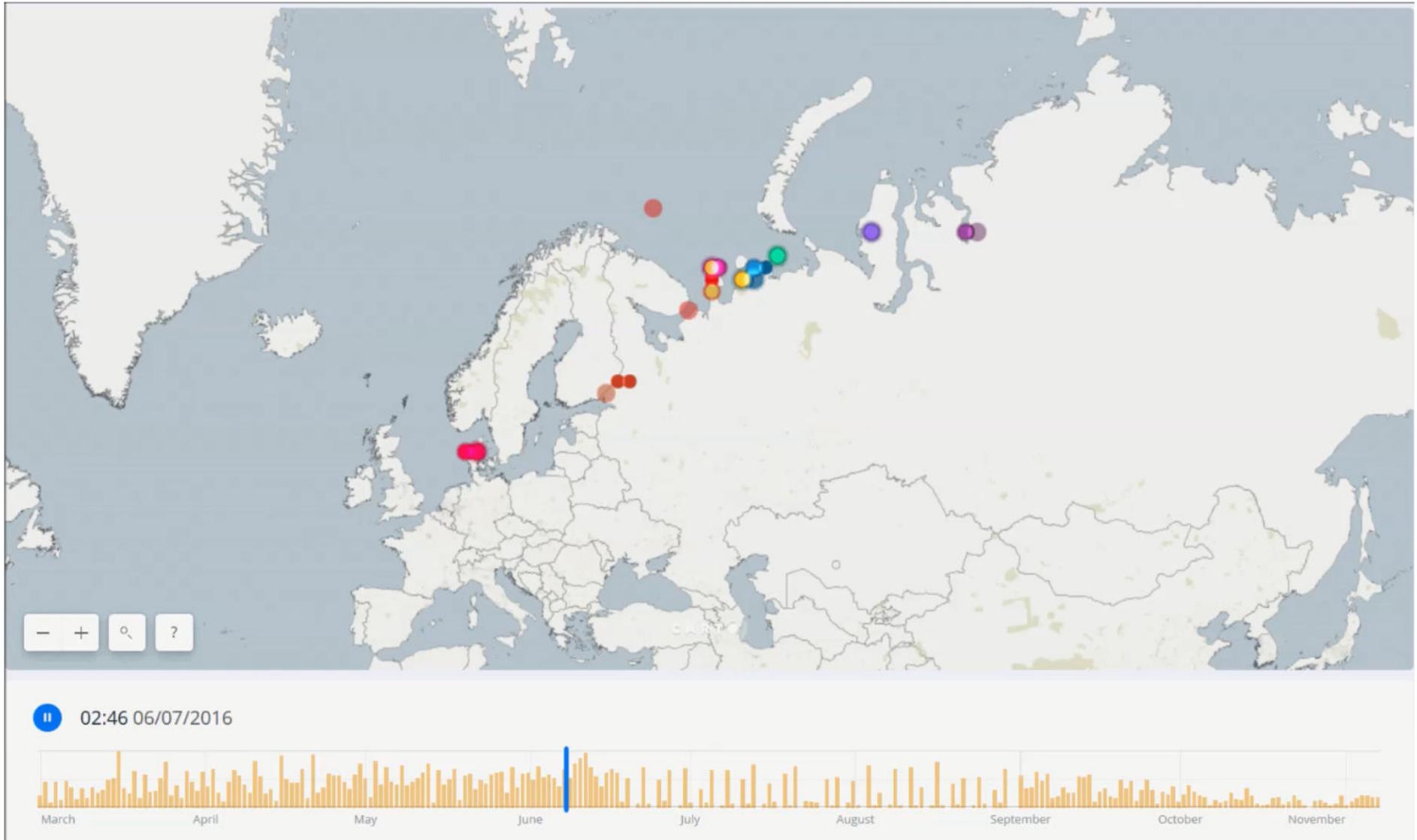
Bird survival & transmitter performance

- 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

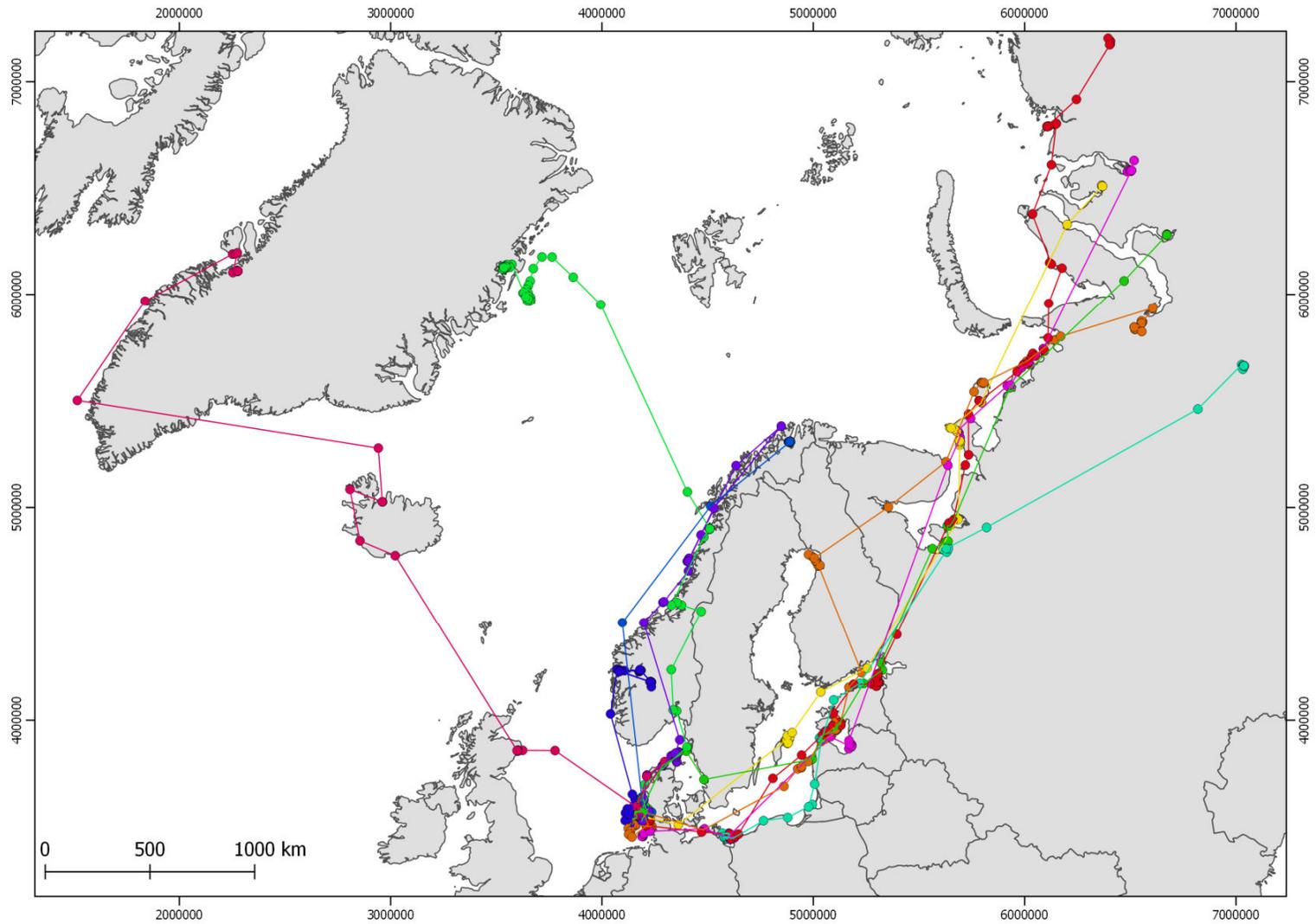
Tracking of birds tagged in 2015 (video)



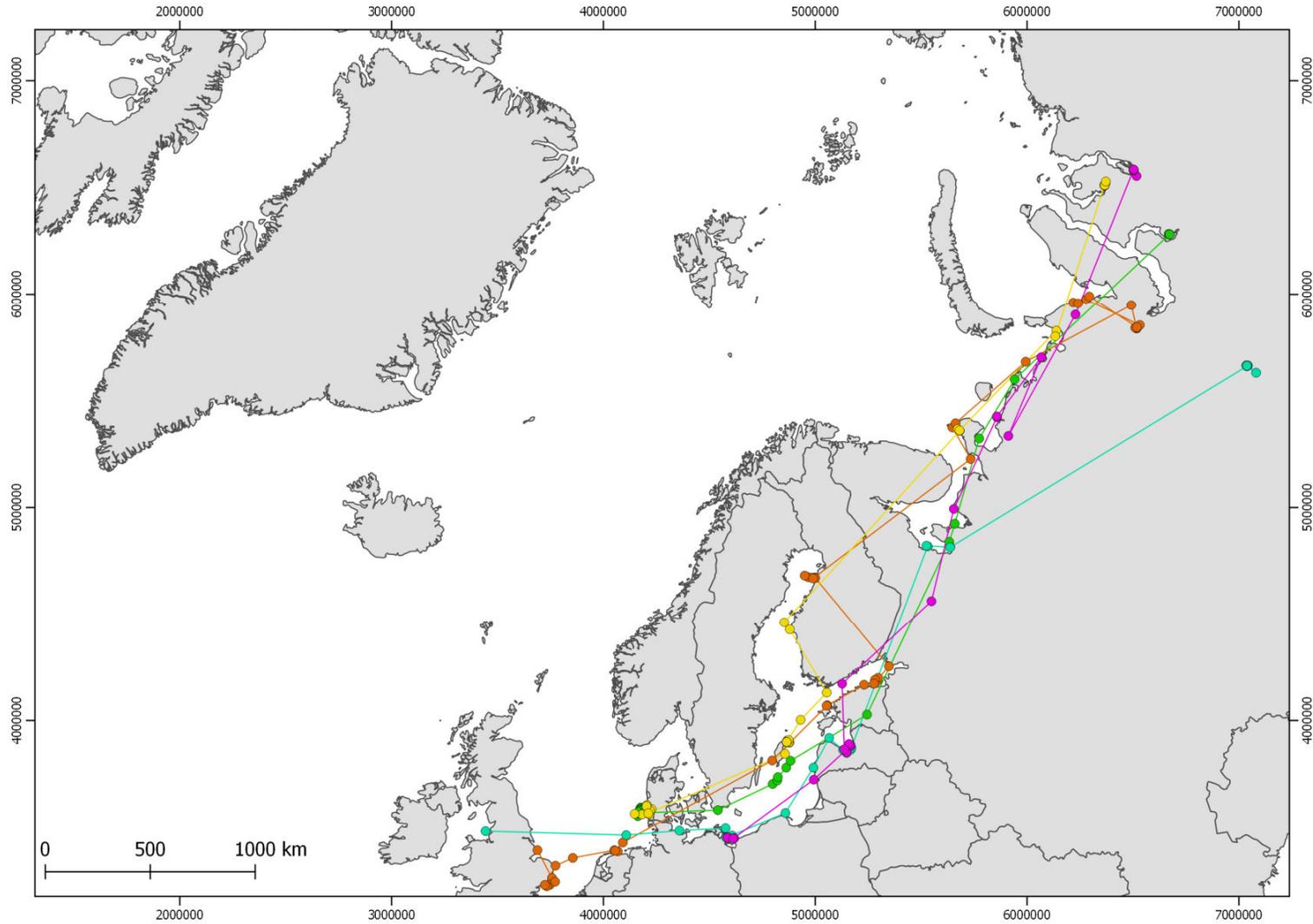
Tracking of birds tagged in 2016 (video)



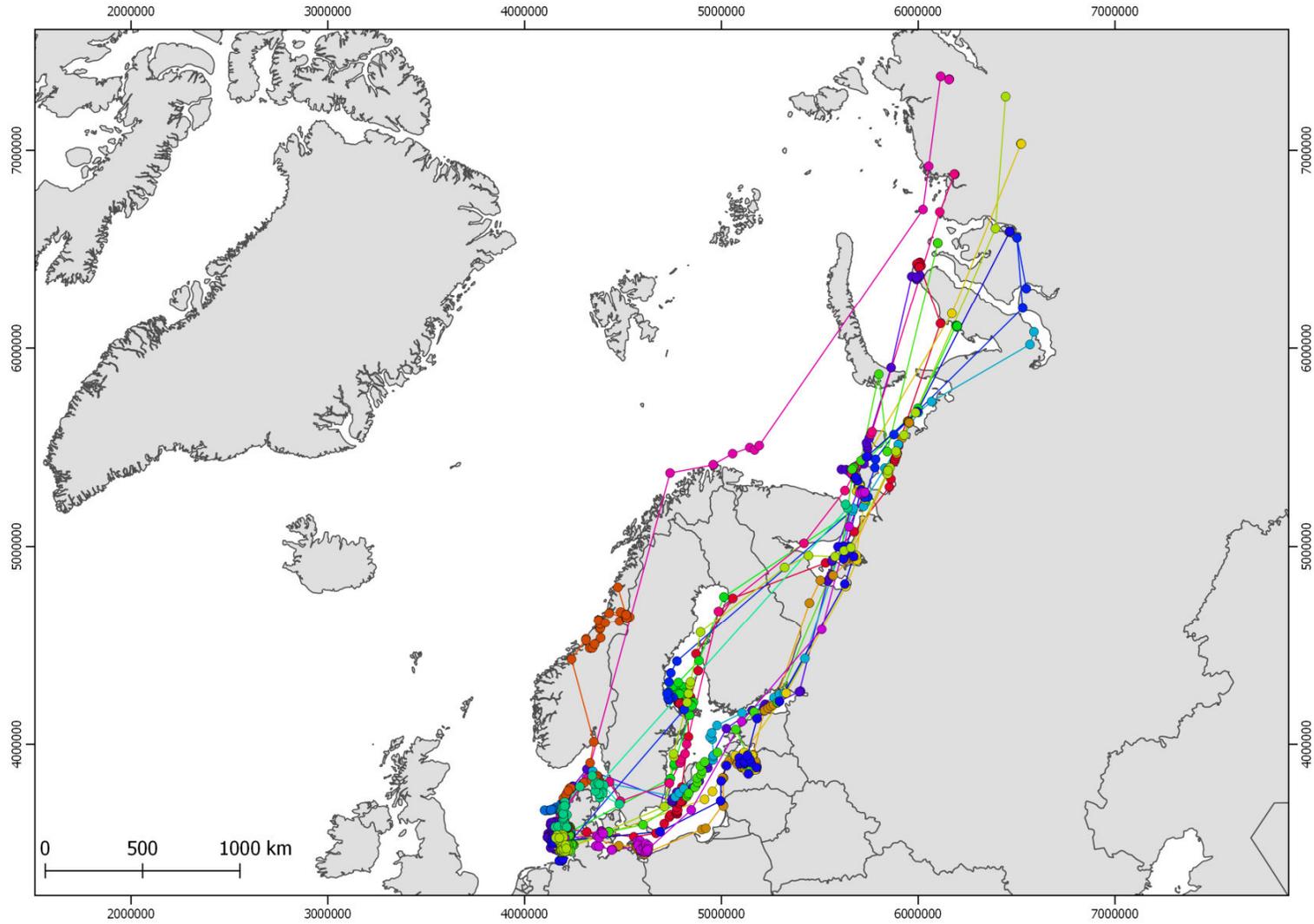
Spring migration of 11 birds tagged in 2015



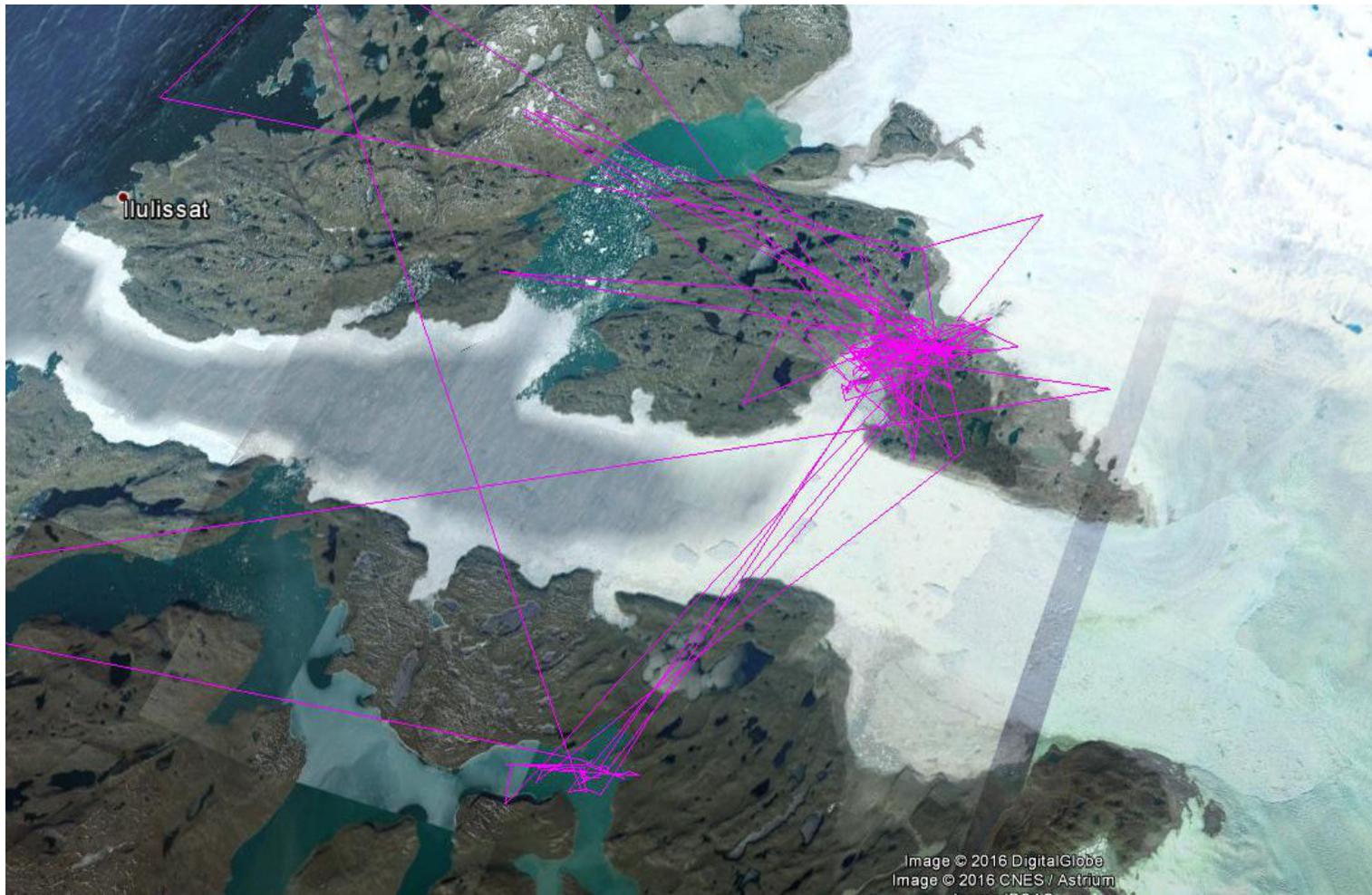
Tracks of 5 birds tagged in 2015 (2nd season)



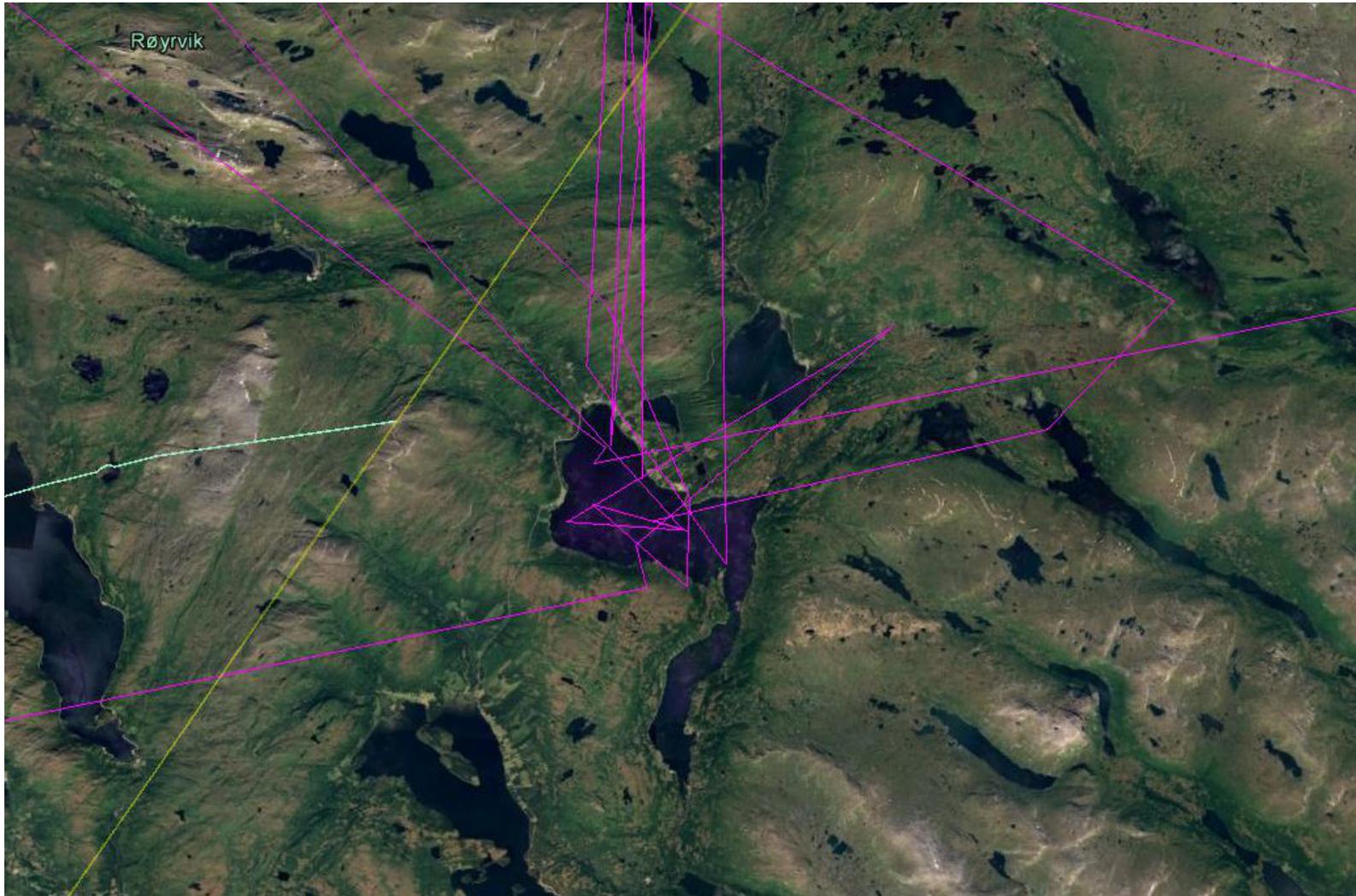
Tracks of 16 birds tagged in 2016



Breeding sites: Greenland



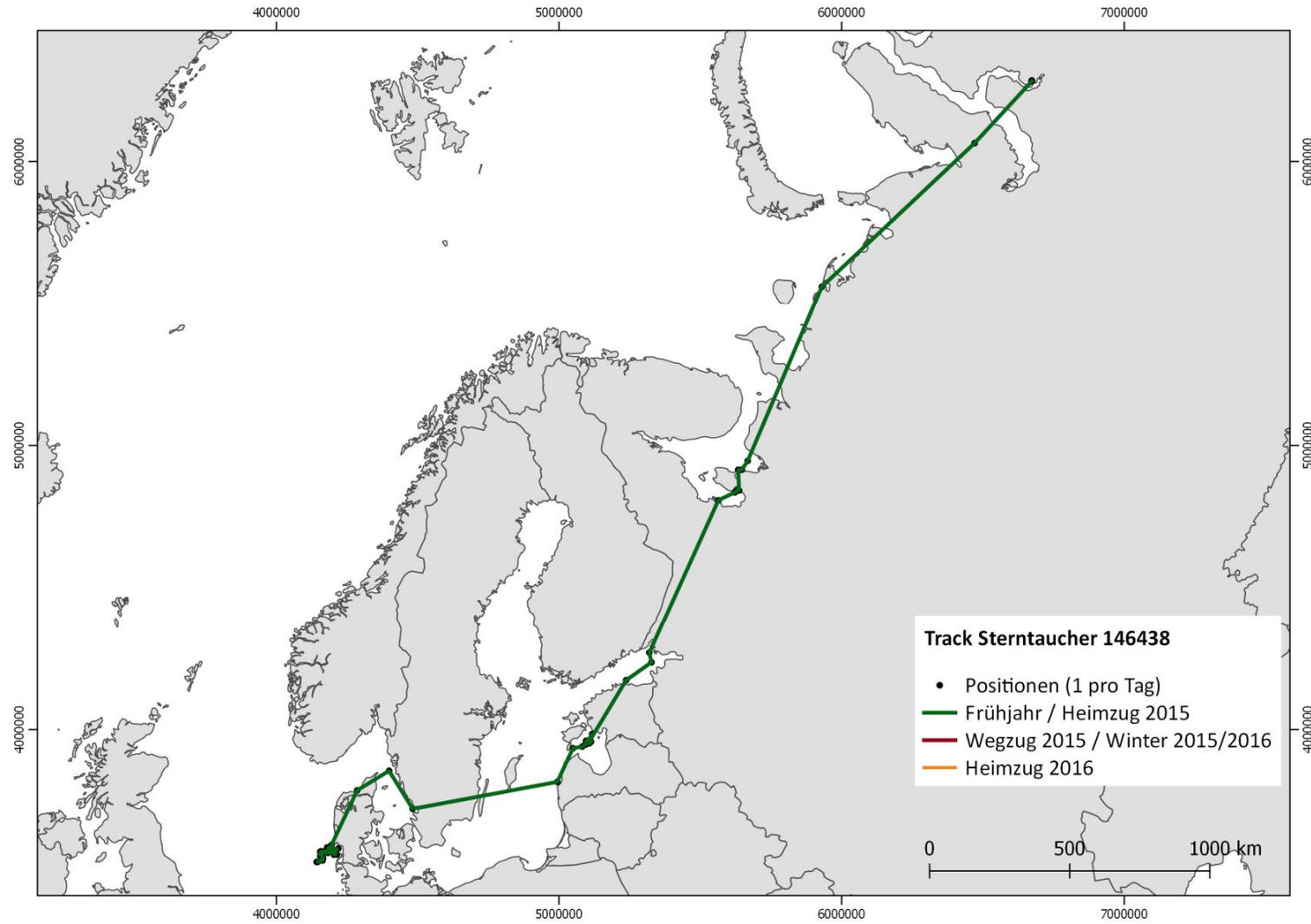
Breeding sites: Norway



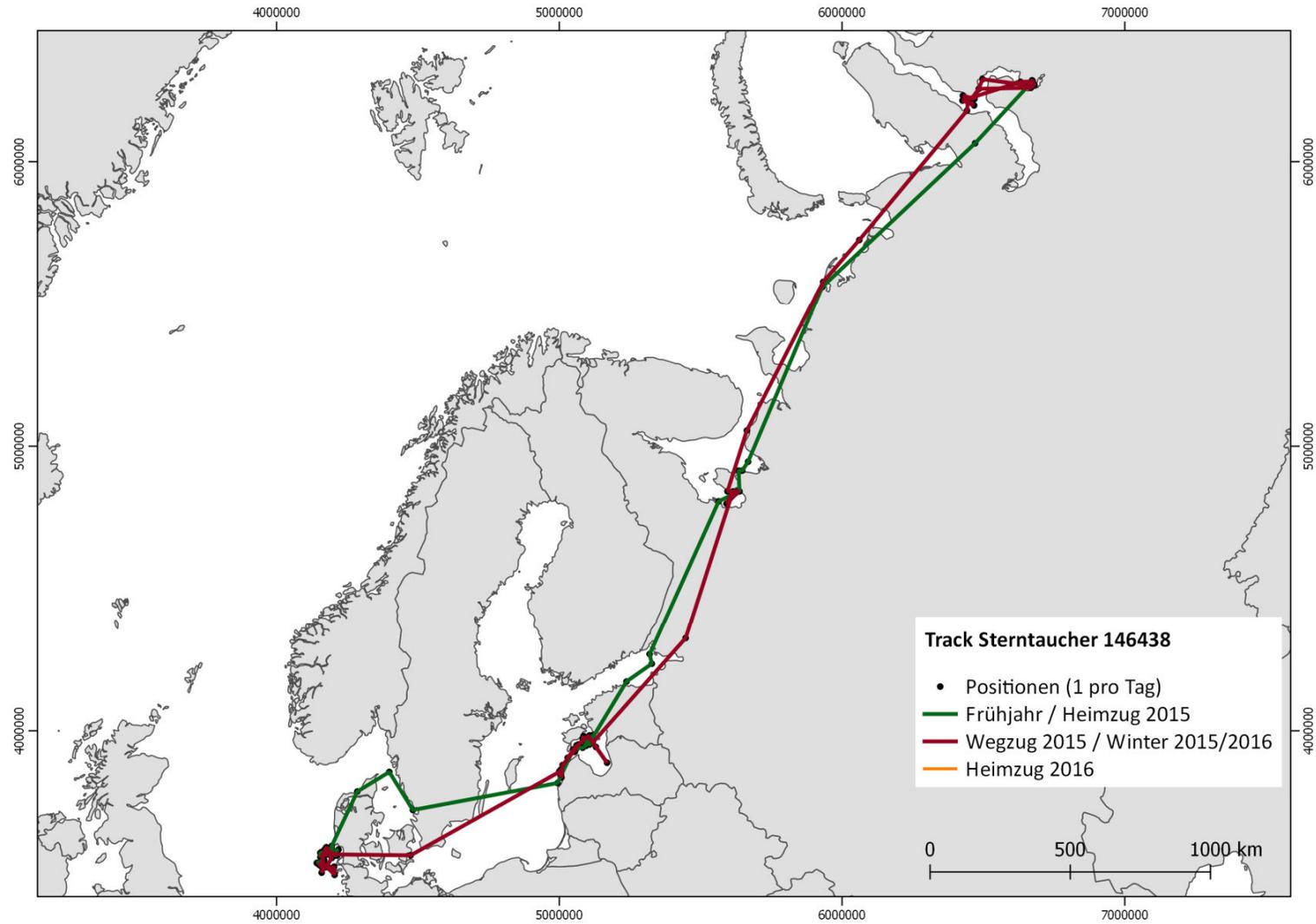
Breeding sites: Russia



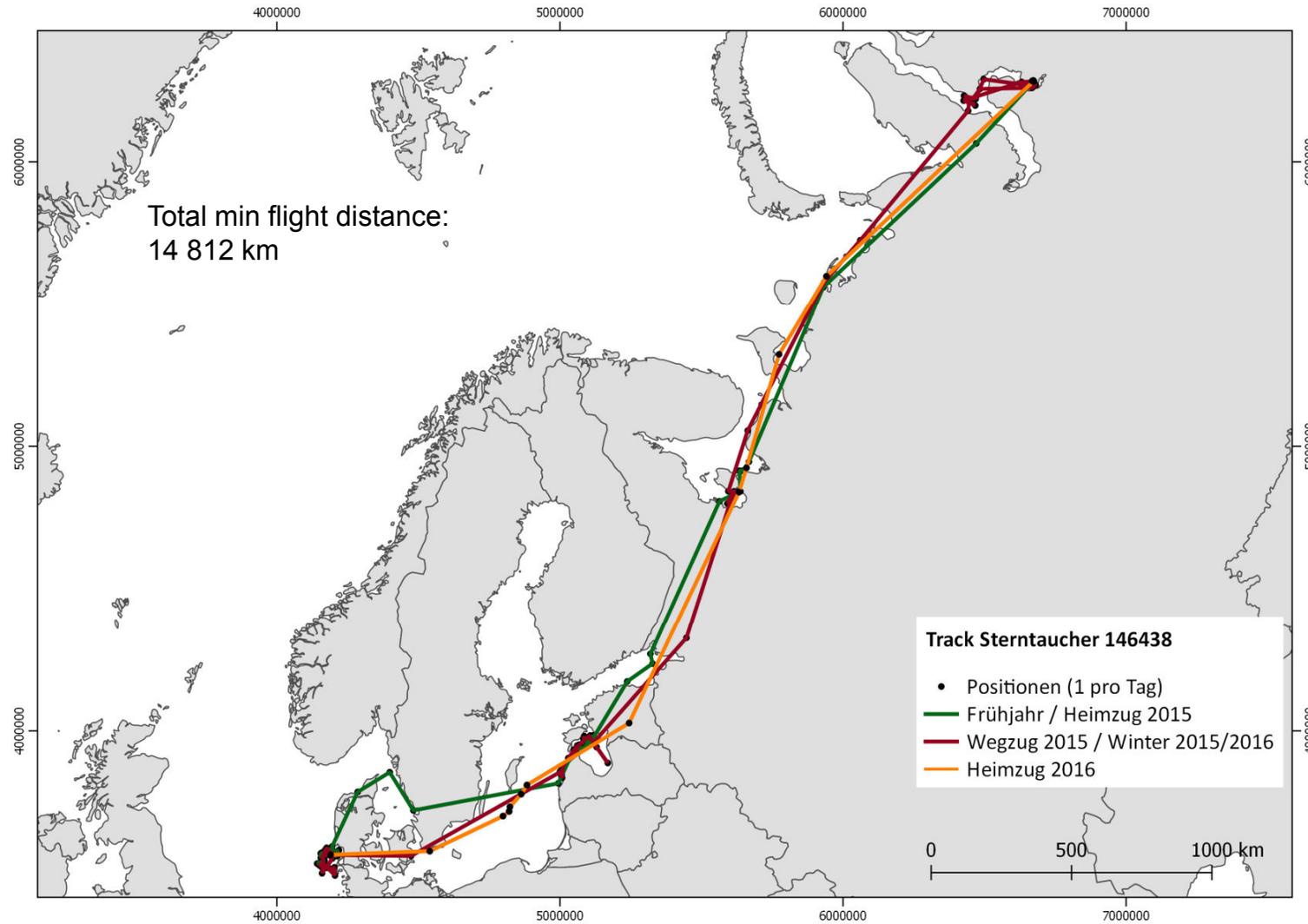
Diver #146438



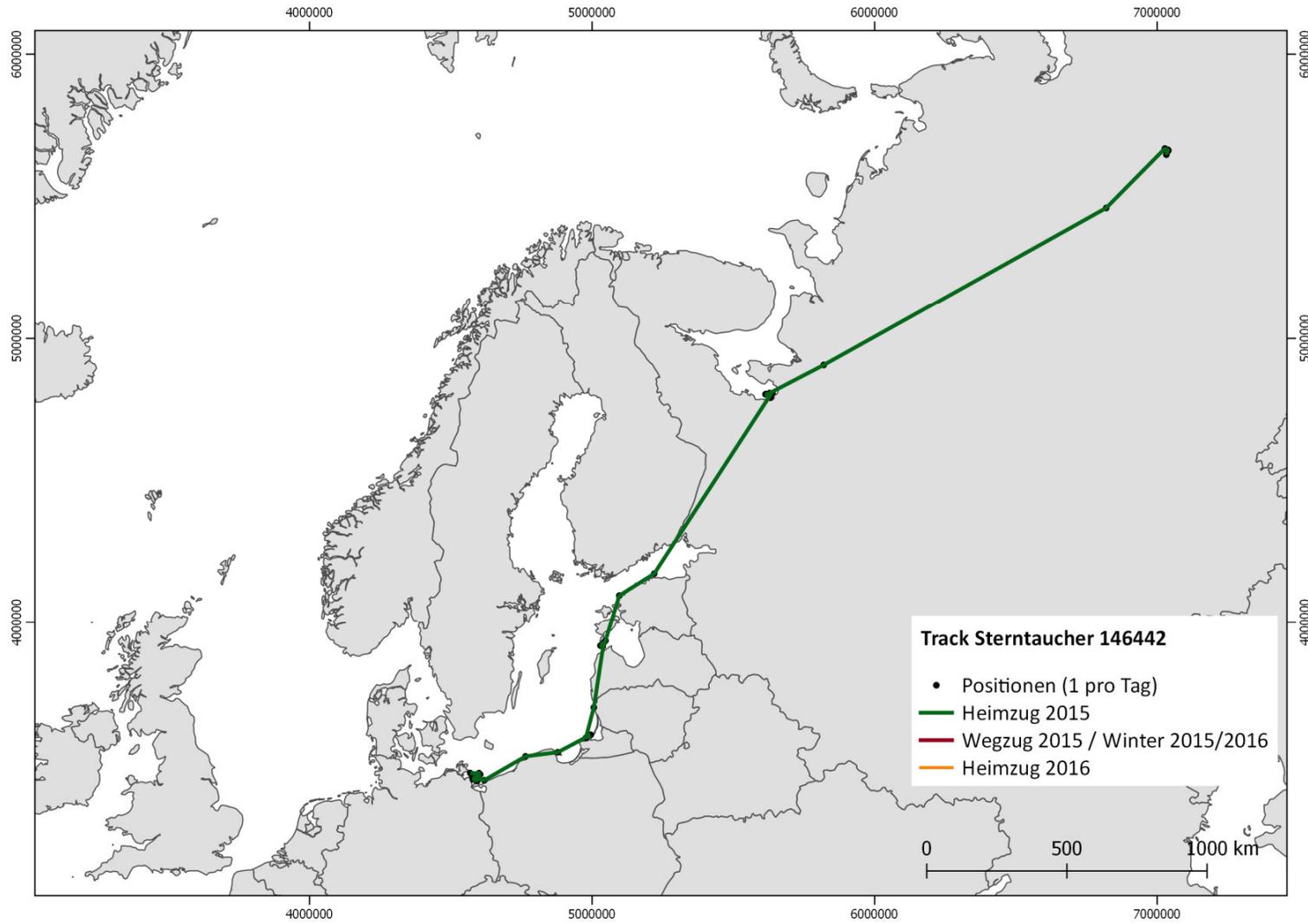
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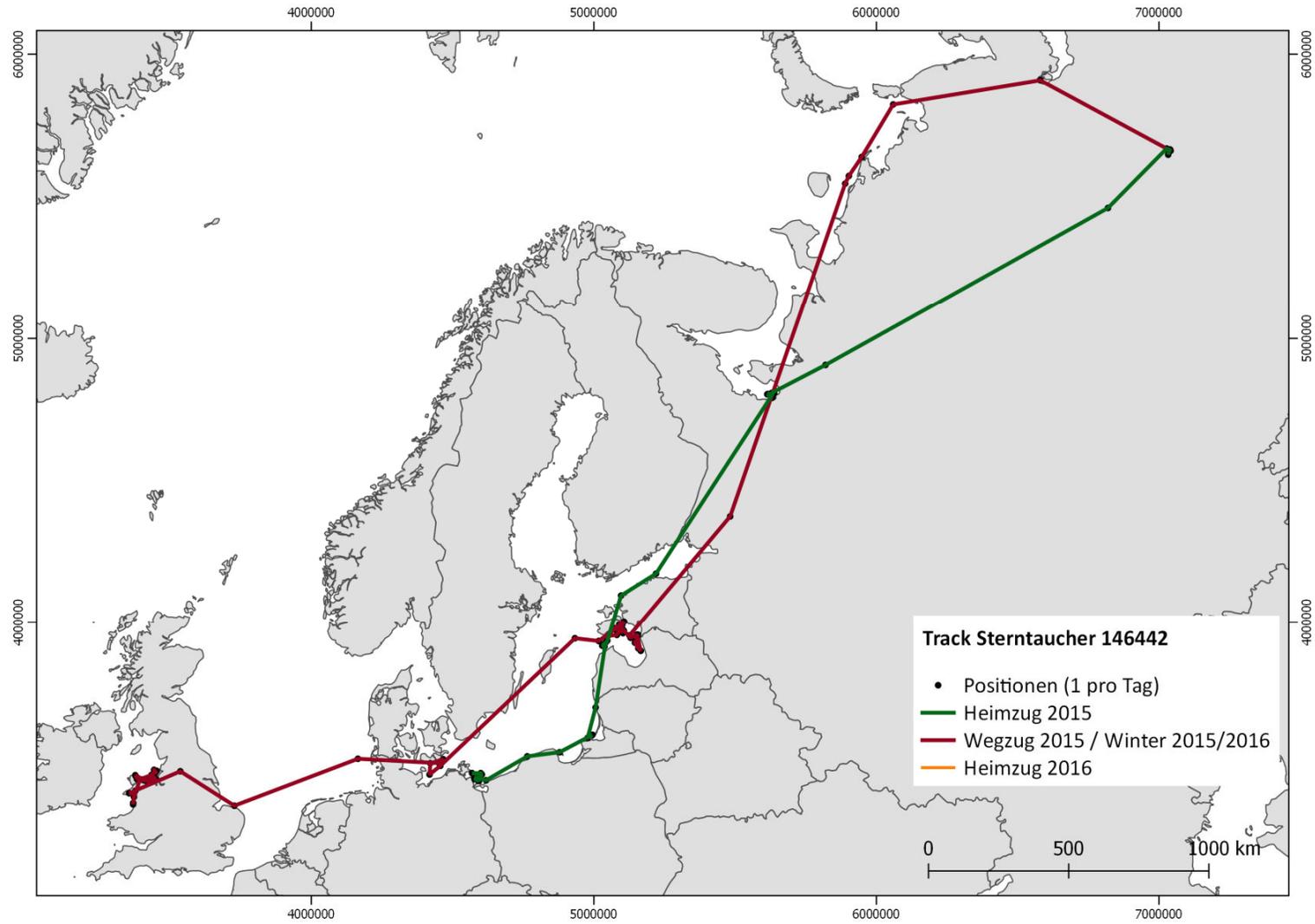
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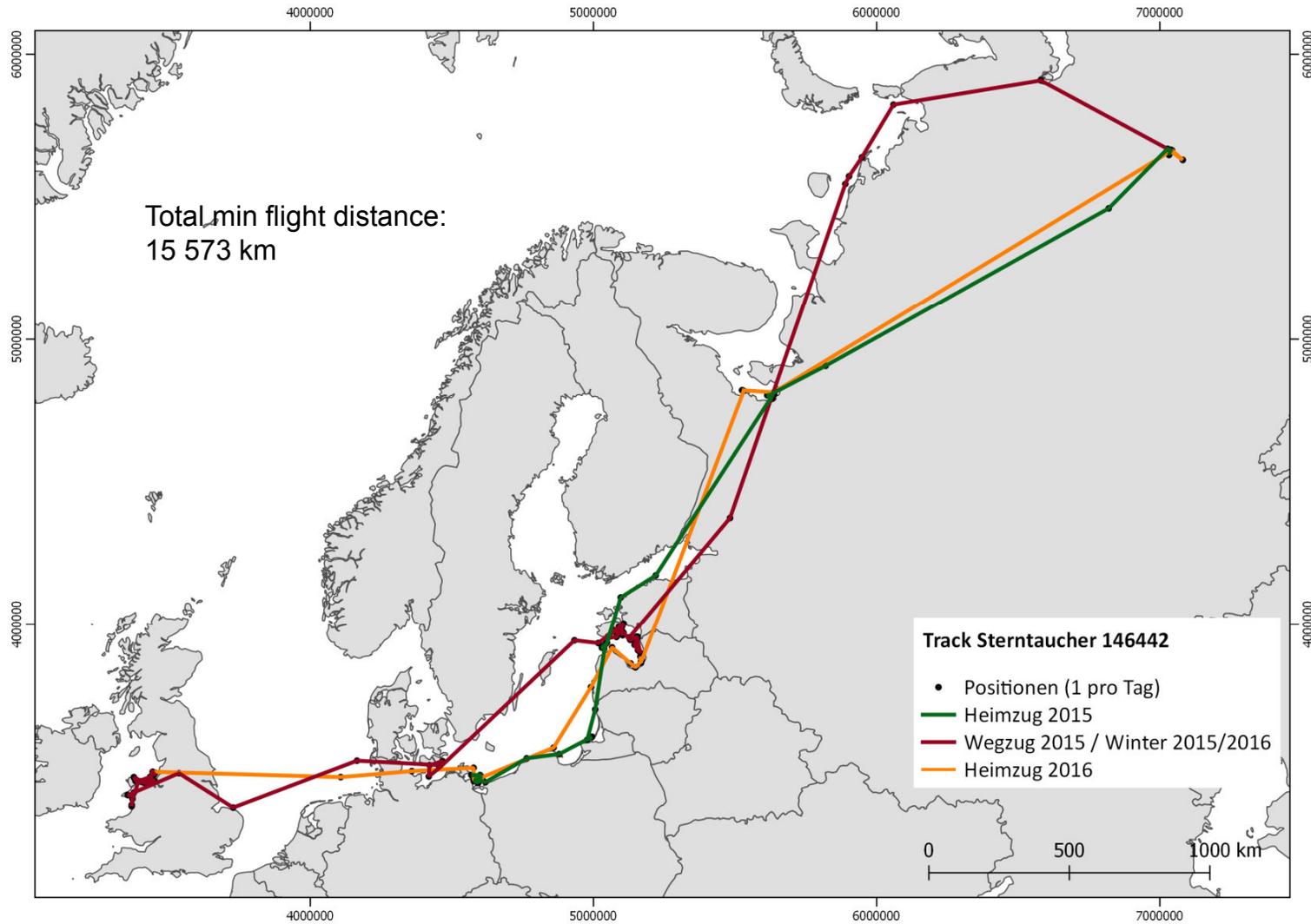
Diver #146442



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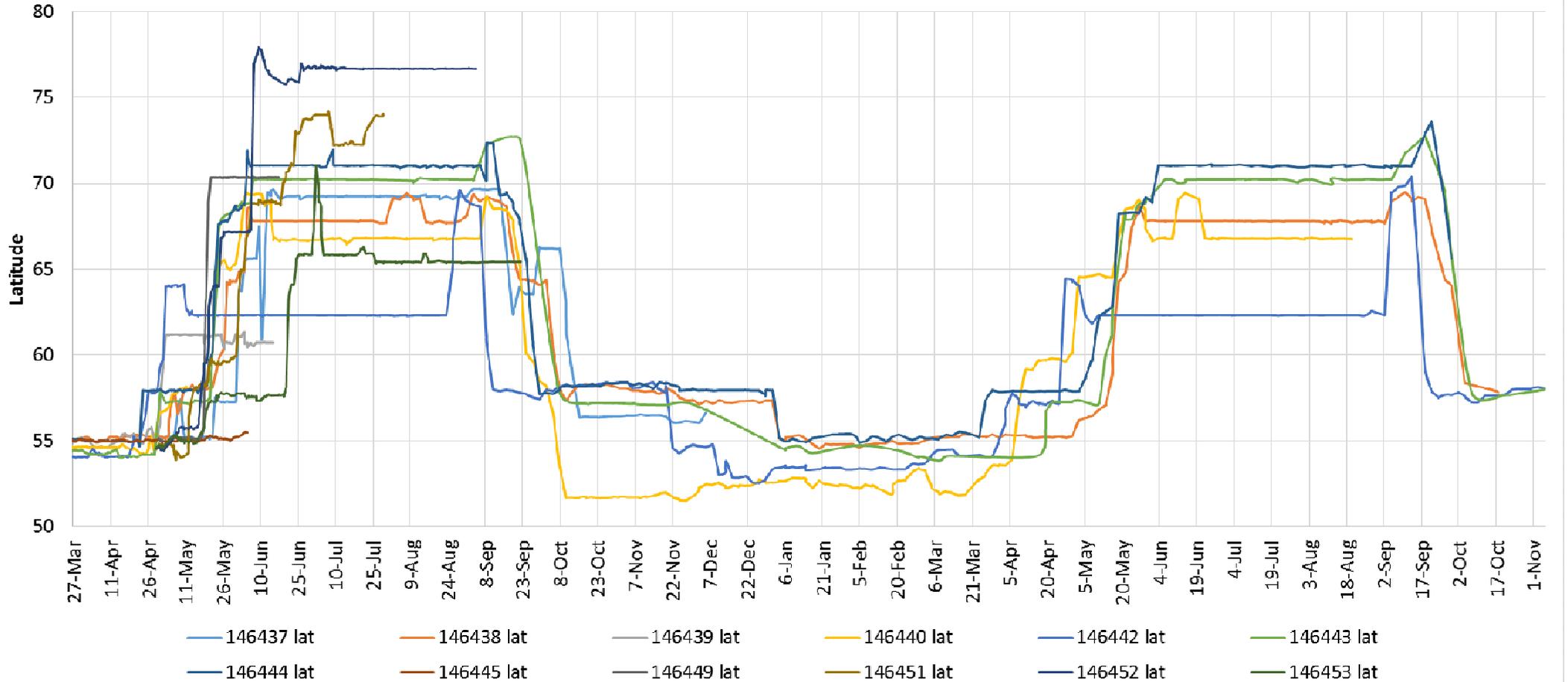


Diver #146442



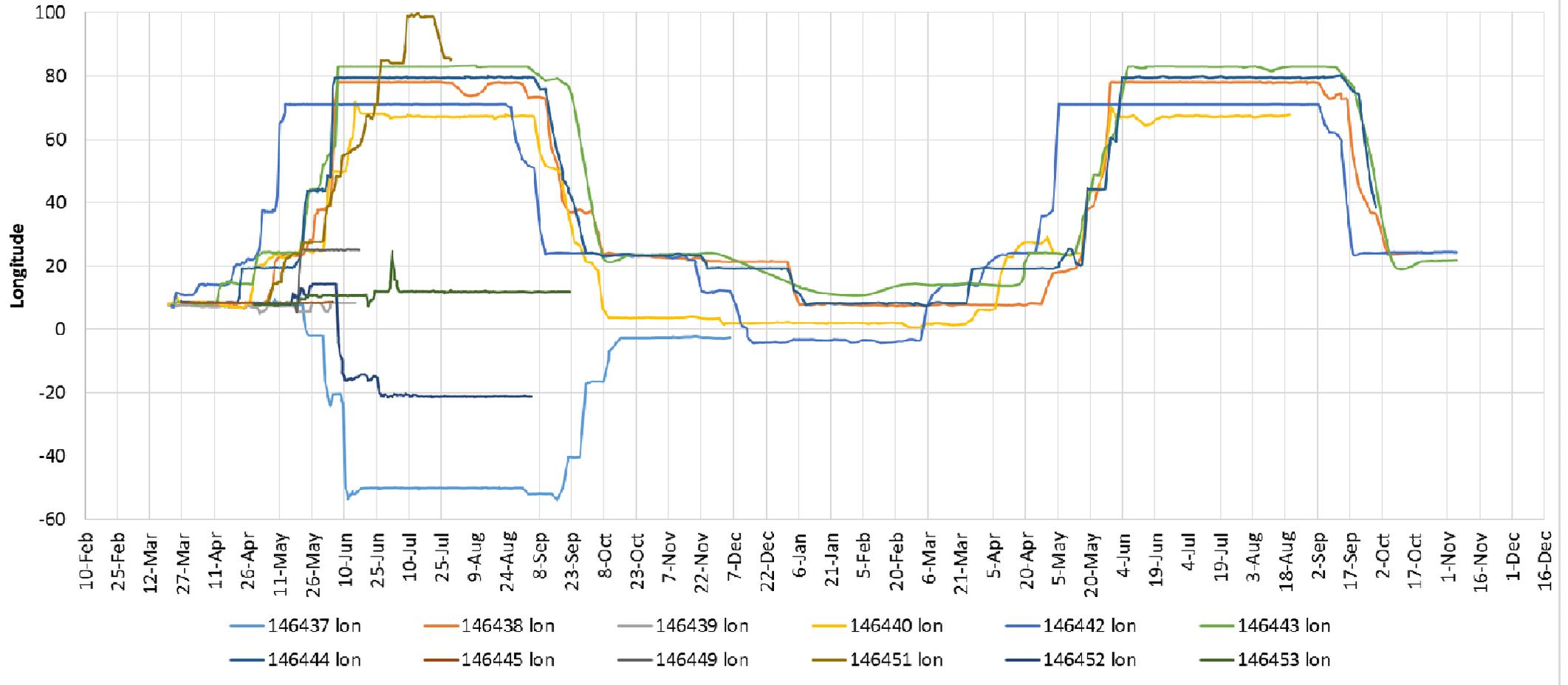
Migration timing

Latitudinal movements of divers tagged in spring 2015

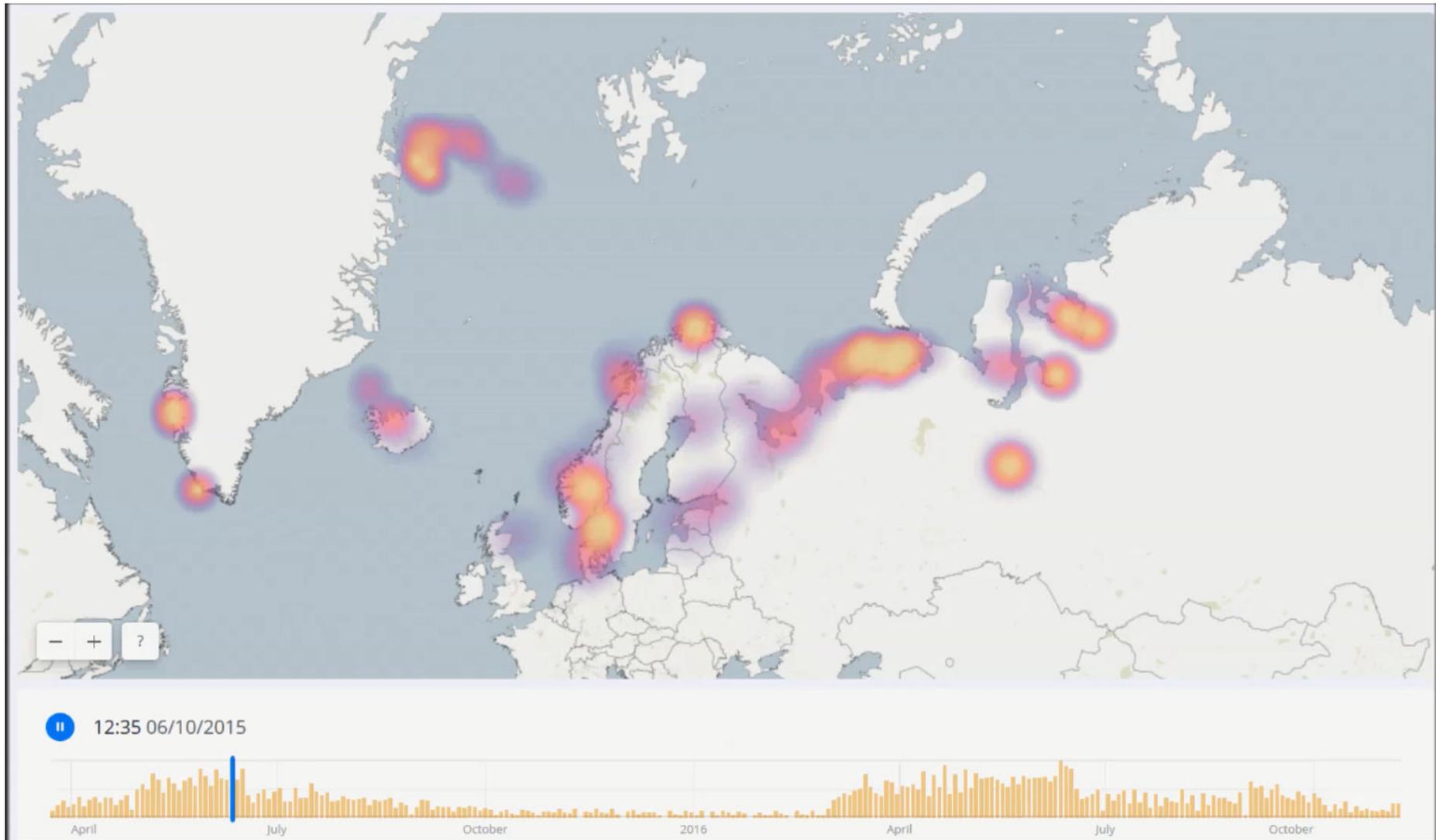


Migration timing

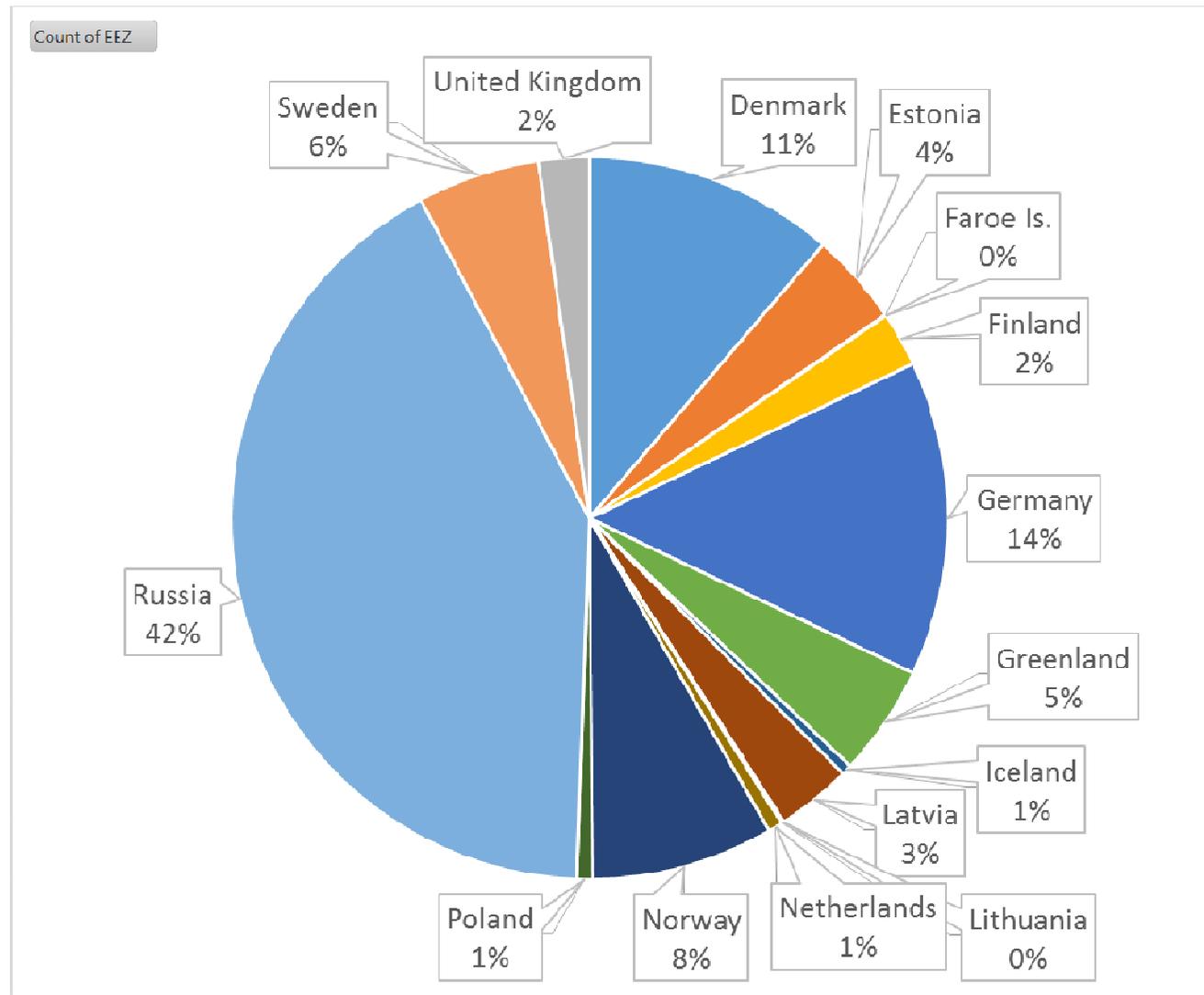
Longitudinal movements of divers tagged in spring 2015



Heat-map of distribution patterns (video)

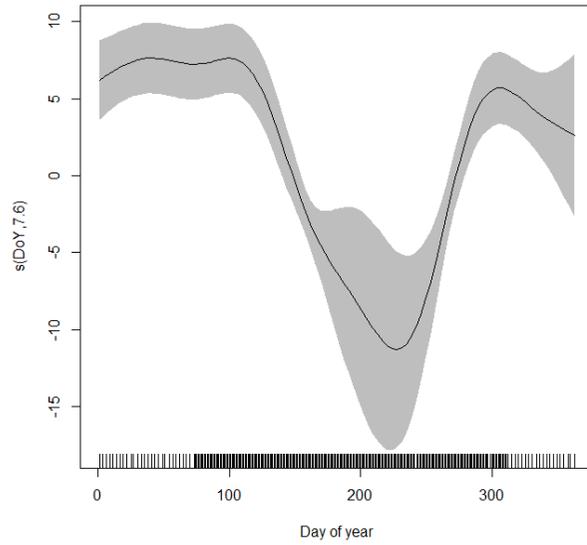


Divers are very international birds

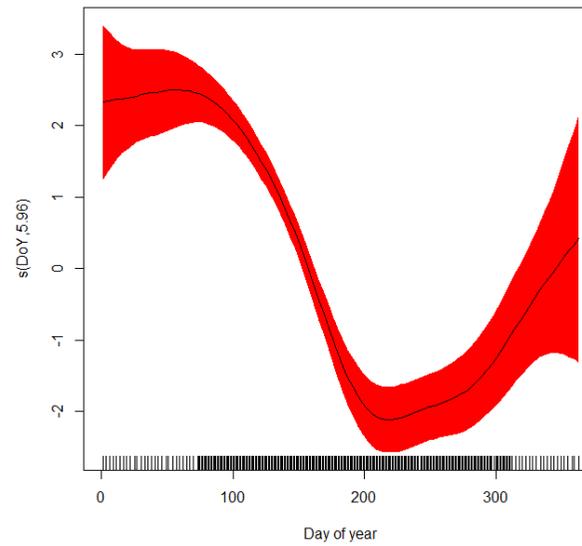


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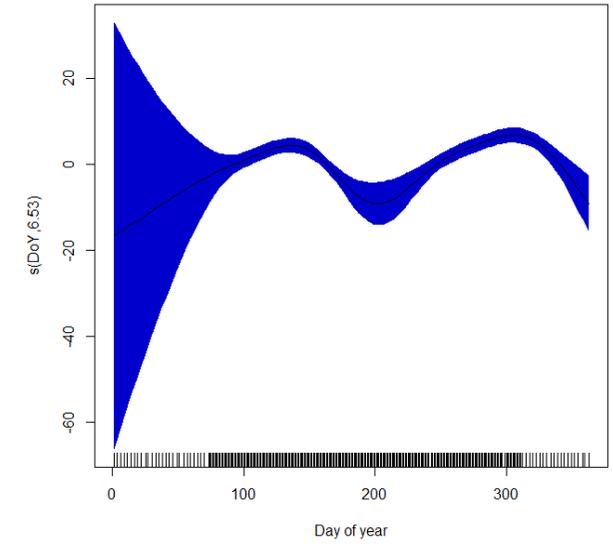
Diver occurrence in German EEZ



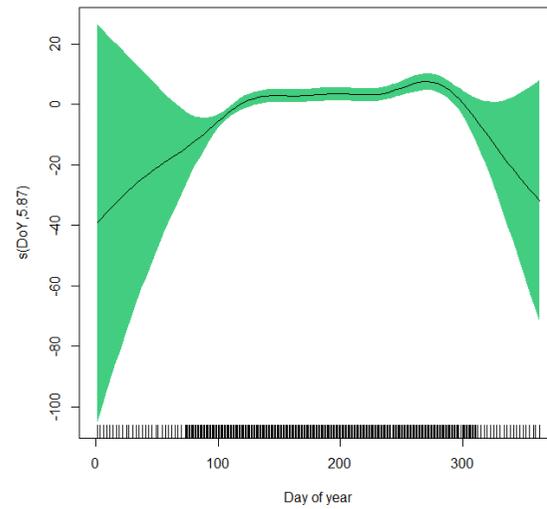
Diver occurrence in Danish EEZ



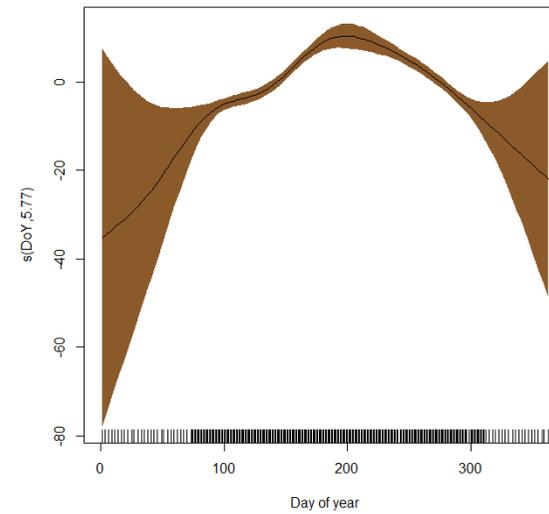
Diver occurrence in Estonian EEZ



Diver occurrence in Norwegian EEZ

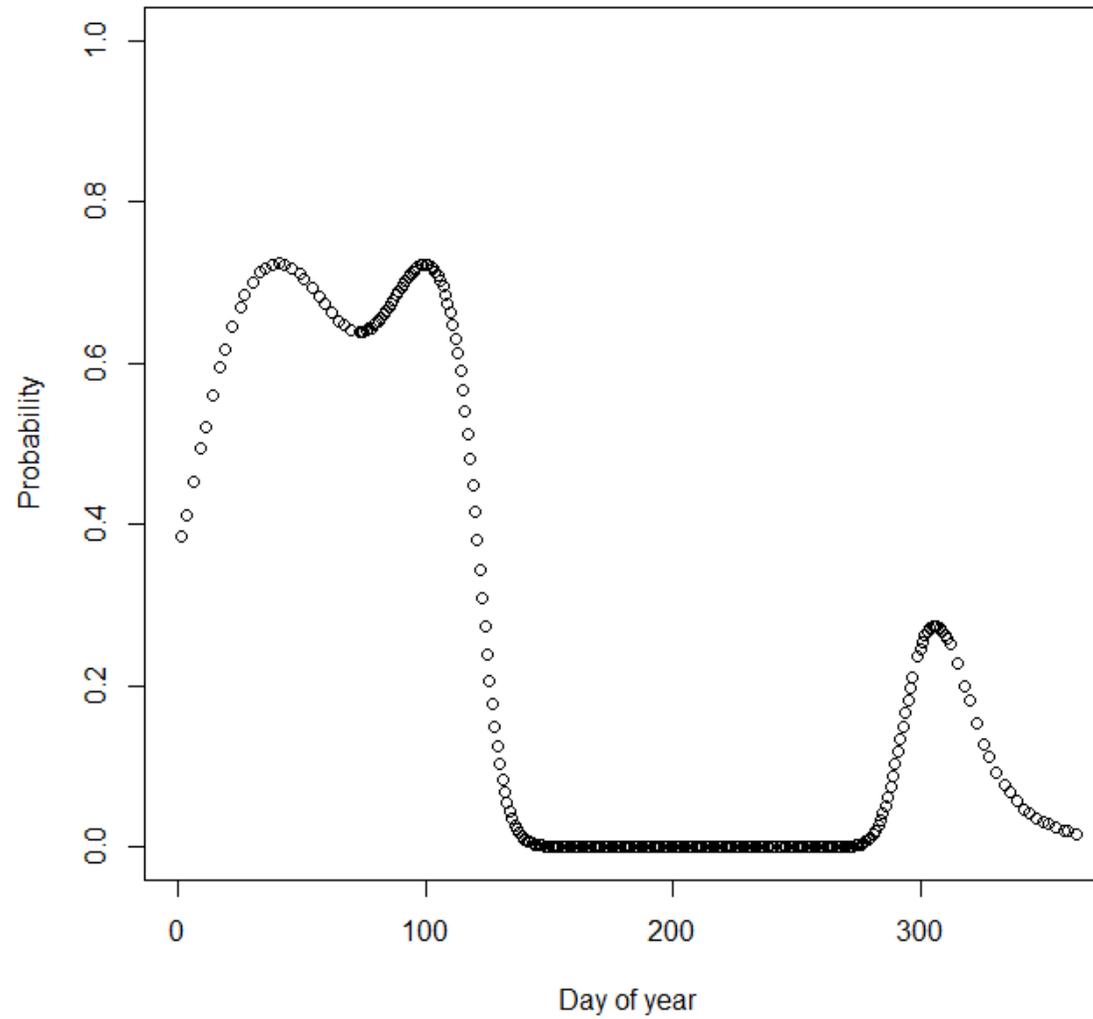


Diver occurrence in Russian EEZ



Divers are very international birds

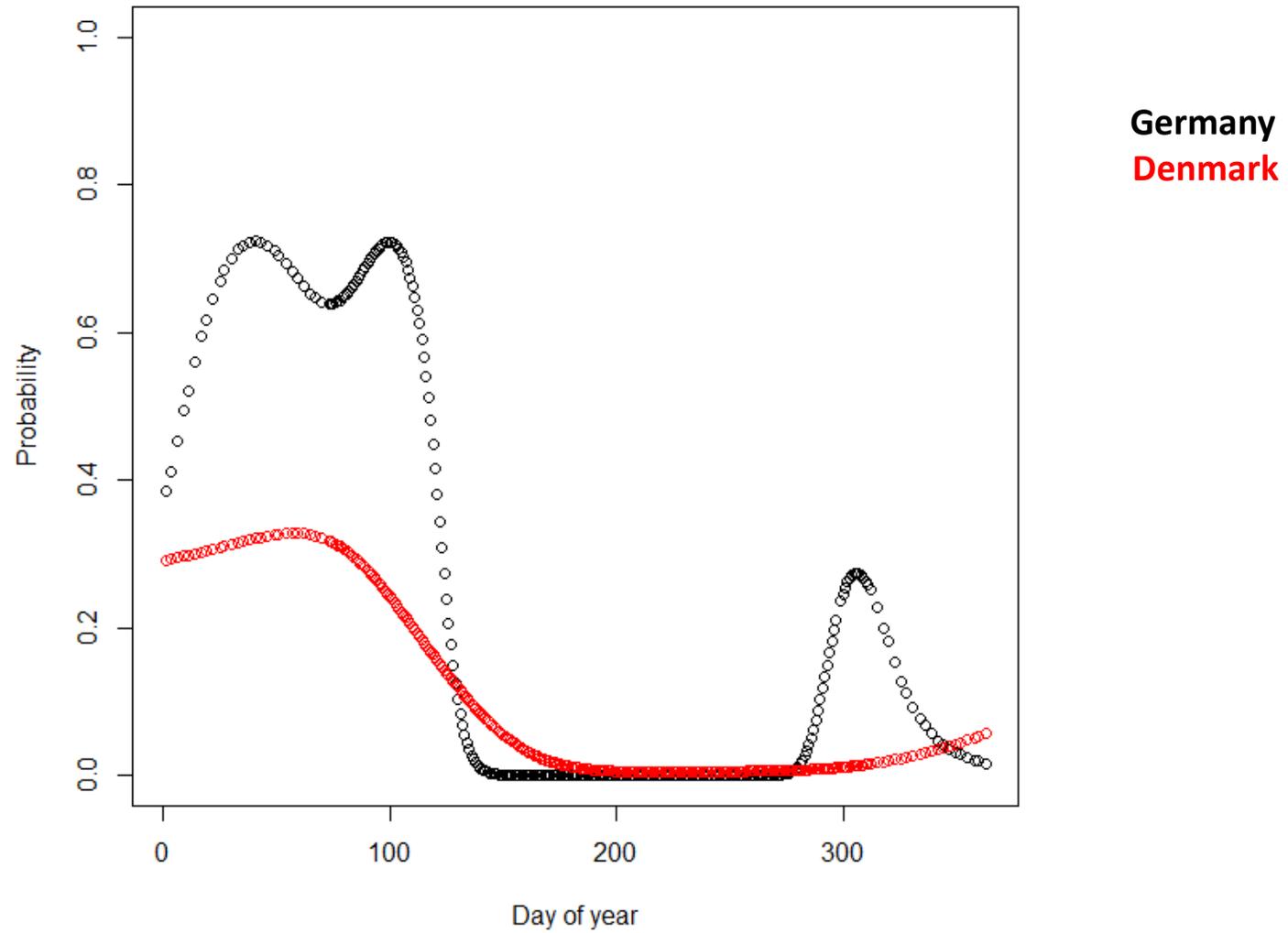
Probability of divers occurrence in EEZs



Germany

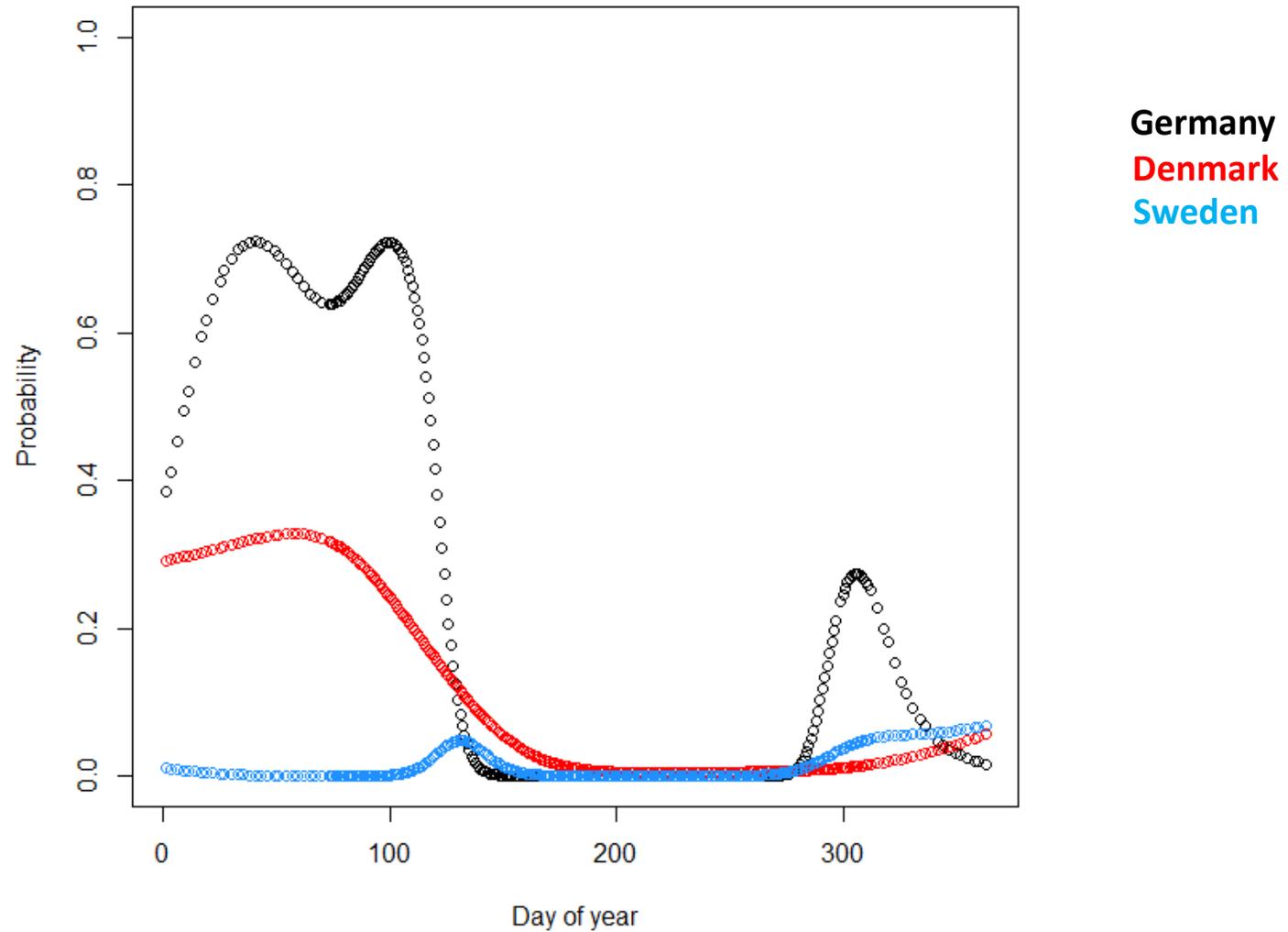
Divers are very international birds

Probability of divers occurrence in EEZs



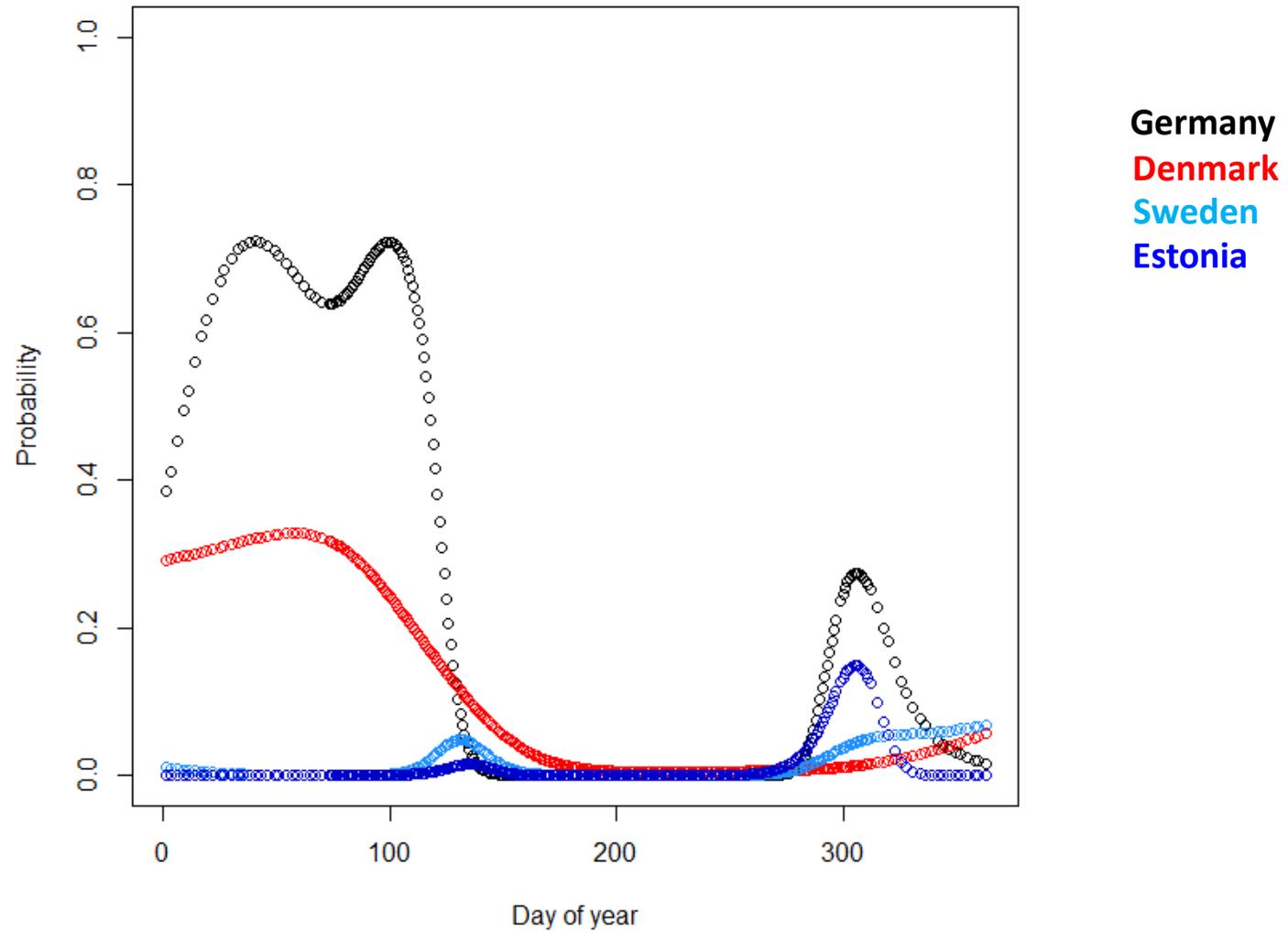
Divers are very international birds

Probability of divers occurrence in EEZs



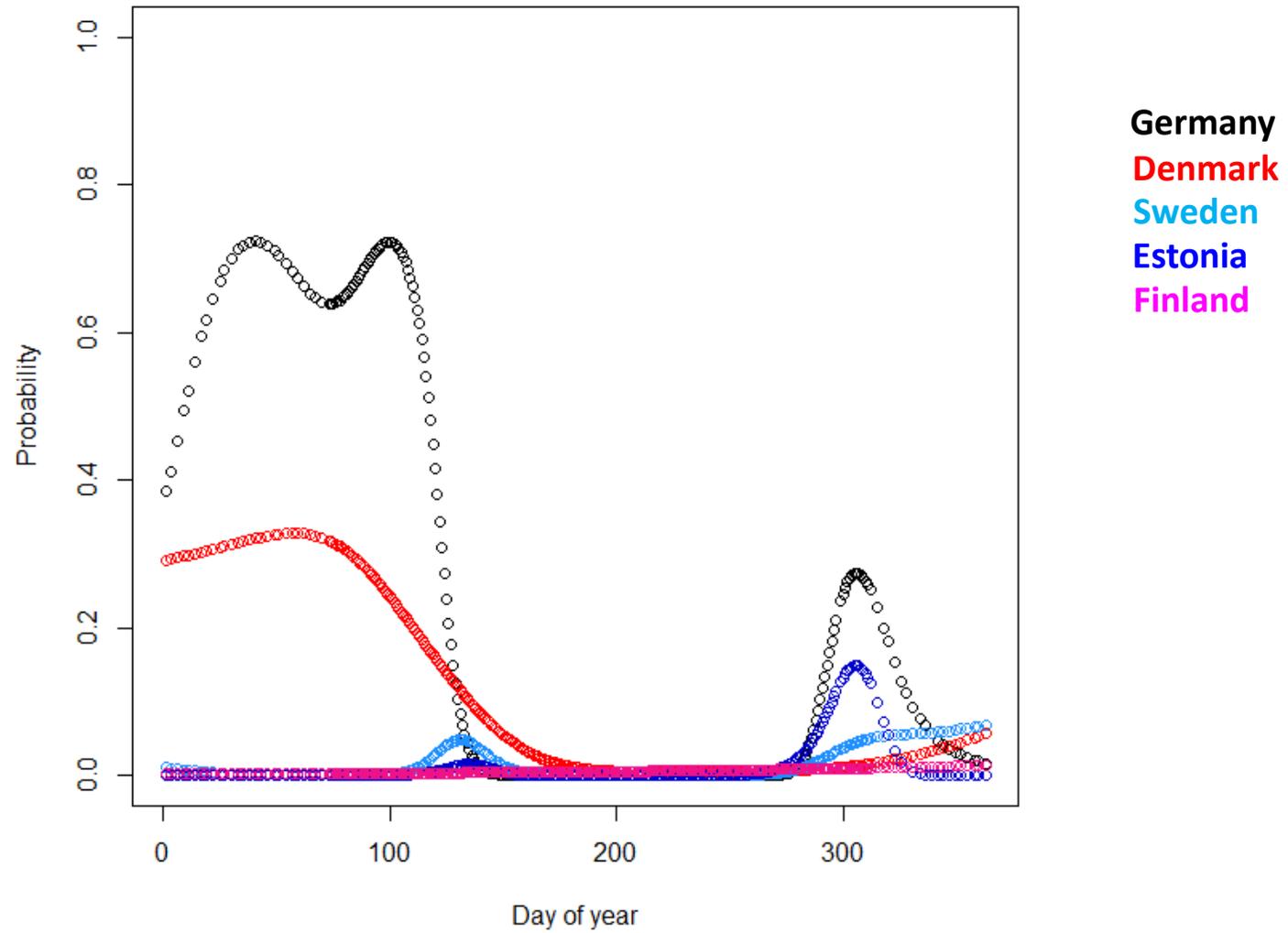
Divers are very international birds

Probability of divers occurrence in EEZs



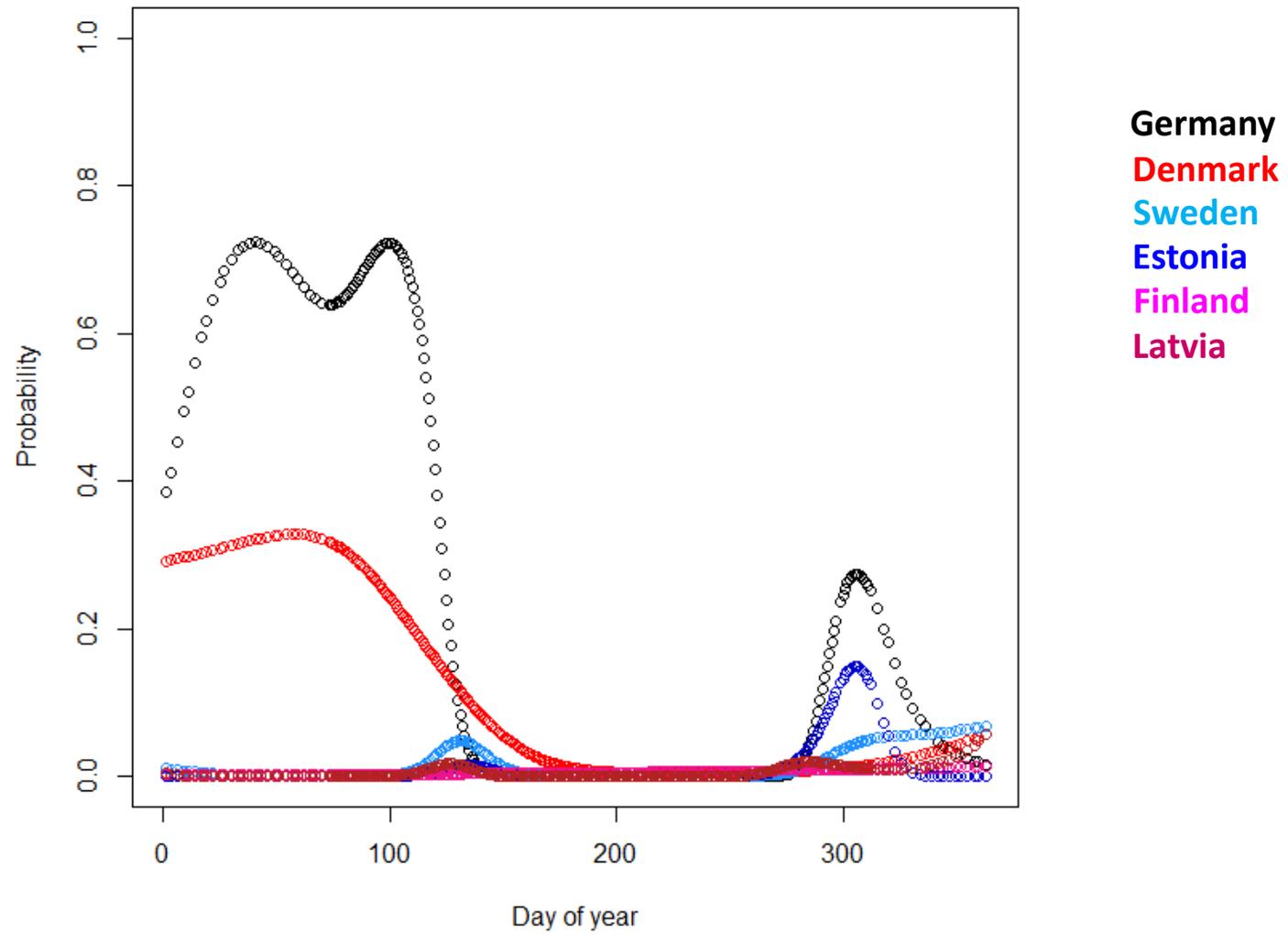
Divers are very international birds

Probability of divers occurrence in EEZs



Divers are very international birds

Probability of divers occurrence in EEZs



What did we learn?

- Red-throated Divers using German Bight are truly international birds occurring in several countries during the annual cycle
- These birds 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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Thomas Mattern
Jorg Welcker

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RV Arctic Hunter

