# LIFE Limosa Schleswig-Holstein 2013-2022 Final report

Ole Thorup

Field studies in 2022 in selected project areas
on breeding conditions and numbers
of ruff *Calidris pugnax* and dunlin *C. alpina*

---

Overview of results from field studies 2013-2022
on breeding conditions and numbers
of ruff *Calidris pugnax* and dunlin *C. alpina*

LIFE LIMOSA

NATURA 2000

# Content:

# Introduction

Ruff and Baltic dunlin are two of the rarest and most threatened breeding bird species in Germany, and both are red listed as critically endangered (‘*vom Aussterben bedroht*’) in the most recent red lists for Schleswig-Holstein and Germany (Kieckbusch et al. 2021, Ryslavy et al. 2020). In contrast to most other endangered bird species, the level of knowledge of the two species is low, and at the time of the start of the LIFE Limosa project it had for years even been questioned, whether the two species were breeders in Schleswig-Holstein any longer (LANU 2008, Knief et al. 2010).

There are no monitoring programmes in Schleswig-Holstein directed specifically at ruff or dunlin, and the two species are covered in their key areas by observing presence or absence in pre-described periods during multispecies mappings, only (e. g. Hälterlein et al. 1995). Additional observations of breeding behaviour are collected unsystematically. Furthermore, ruffs have a prolonged breeding season with a peak in incubation and chick rearing after the period when most other meadowbirds are being surveyed (e. g. Thorup 2016), their behaviour in the breeding season during the egg and chick phases is very discrete apart from a short period during the early chick rearing, and they tend to breed away from the highest concentrations of other – more conspicuous – meadowbirds. Hence, there is not collected sufficient information from the standard monitoring programmes to evaluate the population status or to identify the exact breeding sites including nest and chick rearing areas, crucial information in order to safeguard proper management in the core breeding areas of the two species.

Because it is very time consuming to verify breeding of ruffs in the quite extensive areas with potential breeding habitat by identifying females with nesting behaviour, the monitoring programmes in Schleswig-Holstein (as well as e. g. in Denmark and southern Sweden) rely on additional observations of ruffs present in the central breeding season. The relevance of such observations is primarily based on the assumption that there is a strong correlation between the presence of ruffs in the period between the northward migration ends and the return of the southward migrants starts, and the numbers of ruffs that are actually breeding. In the Wadden Sea of Schleswig-Holstein this period is approximately 20 May-8 June in males, and 20 May-16 June in females like it is found in Denmark (Thorup et al. 2018). As ruffs are rarely seen in this period away from sites with apparently suitable breeding habitat for the species, the special ruff inventories performed within the LIFE Limosa project will also collect information that may verify or disprove this assumption and thereby make it possible qualitatively to improve future monitoring of ruff populations.

As part of the LIFE Limosa project in Schleswig-Holstein, more detailed knowledge about breeding of the two species was collected, in order to obtain better knowledge of their population status and to understand and thereby improve their breeding conditions. In the first project years, extensive surveys directed at finding breeding ruffs and dunlins were performed in proper habitat in all project sites, whereby a quite precise picture was obtained about the breeding distribution of the two species. In the recent breeding seasons, some project areas have been selected where field studies could obtain important knowledge about specific demands that the two species could have to their breeding areas and thereby making use of this knowledge to improve breeding conditions in the project sites and elsewhere.

In the first part of this report, results from the field studies in the breeding season 2022 are described in more details. In the second part, a summary is given of the field work and the results from the work on ruffs and dunlins performed within the LIFE Limosa project during the project years 2013-2022.

# Numbers of breeding ruffs in the project sites 2022

Table 1. Breeding ruffs found in the Life Limosa project sites in the 2022 breeding season.

**Ruff 2022**

| ***Site*** | ***Verified breeders*** | | ***Probable breeders*** | | ***Birds attempting to breed*** | | ***Population 'guestimate'*** |
|---|---|---|---|---|---|---|---|
| | Females with chicks or chick clutch seen | Additional females with nest | Additional females from nest habitat empty nest bowl found | Additional females in nest habitat | Females seen between 20 May and 16 June | Males seen between 20 May and 8 June | |
| Rickelsbüller Koog | 0 | 0 | 0 | n/a | 7 | 10 | 7 |
| Hauke-Haien Koog | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Ockholmer Vordeichung | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Beltringharder Koog, Arlauer Speicherbecken | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Beltringharder Koog, central area | 0 | 0 | 0 | 1 | 1 | 2 | 1 |
| Beltringharder Koog, northern areas | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| Eiderdammflächen, Katinger Watt | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Olversumer Vorland-Grüne Insel | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oldensworter Vorland | 0 | 0 | 0 | 0 | 22 | 2 | 2 |
| Karolinenkoog Vorland | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Meldorfer Speicherkoog - Wöhrdener Loch | 0 | 0 | 0 | 0 | 0 | n/a | 0 |
| Meldorfer Speicherkoog - Odinsloch-Nordkoog West | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Meldorfer Speicherkoog - Nordkoog Ost | 0 | 1 | 0 | 0 | 1 | n/a | 1 |
| Dithmarscher Speicherkoog Süd | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Seether Ostermoor | 0 | 0 | 0 | 0 | 0 | n/a | 0 |
| Alte Sorge Schleife | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Project sites total** | **0** | **1** | **0** | **1** | **32** | **15** | **12** |

| **Observers:** |
|---|
| Jutta Hansen |
| Dagmar Cimiotti, Luis Schmidt |
| Holger Bruns |
| Ole Thorup |
| Ole Thorup, Heike Jeromin |
| Ole Thorup, Volker Salewski |

In 2022 breeding ruffs were counted in the project sites Rickelsbüller Koog, Beltringharder Koog and in the Eider Estuary within the standard counting programmes. Additionally, within the LIFE Limosa project we surveyed ruffs in Wöhrdener Loch and Nordkoog Ost in Meldorfer Speicherkoog, and in the central areas in Dithmarscher Speicherkoog Süd. Furthermore, the potentially most suitable breeding habitats in the Alte Sorge Schleife were visited, and so were the two new polders in Seether Ostermoor and the new polder in Rickelsbüller Koog. These additional surveys were performed on four full days in mid-June.

Altogether, 32 females and a minimum of 15 males were found in the core breeding season in the project sites in 2022 (Table 1). Very unusually, probably due to the very dry spring that created very dry meadows late May, female ruffs flocked well into the 20es of May at a few good feeding spots (e. g. on Oldensworter Vorland and in Margrethe Kog just north of the German-Danish border), where most birds showed no signs of actually breeding at these locations. This is why only two of 22 females at Oldensworter Vorland are estimated to have been local breeders (Table 1).

# Field work in 2022

## Ruffs in the eastern part of Nordkoog in Meldorfer Speicherkoog

Since we discovered that ruffs were breeding here in 2016 including the find of one female with chicks and another with a nest, this part of Meldorfer Speicherkoog, Nordkoog Ost, has disclosed itself as one of the most constant and successful breeding sites for ruff in the international Wadden Sea. This continued in 2022, when one female, most likely with chicks in her nest, was observed at a survey on 13 June. At the first visit she was alarming with the sound used to signal to chicks that they shall hide, at a second visit an hour later she stayed hidden in the vegetation. One to three annual surveys 2016-2022 have revealed, that no matter how dry the season was, at minimum one breeding female could been detected each year. The locations of the found nests and families are shown in figure 1.

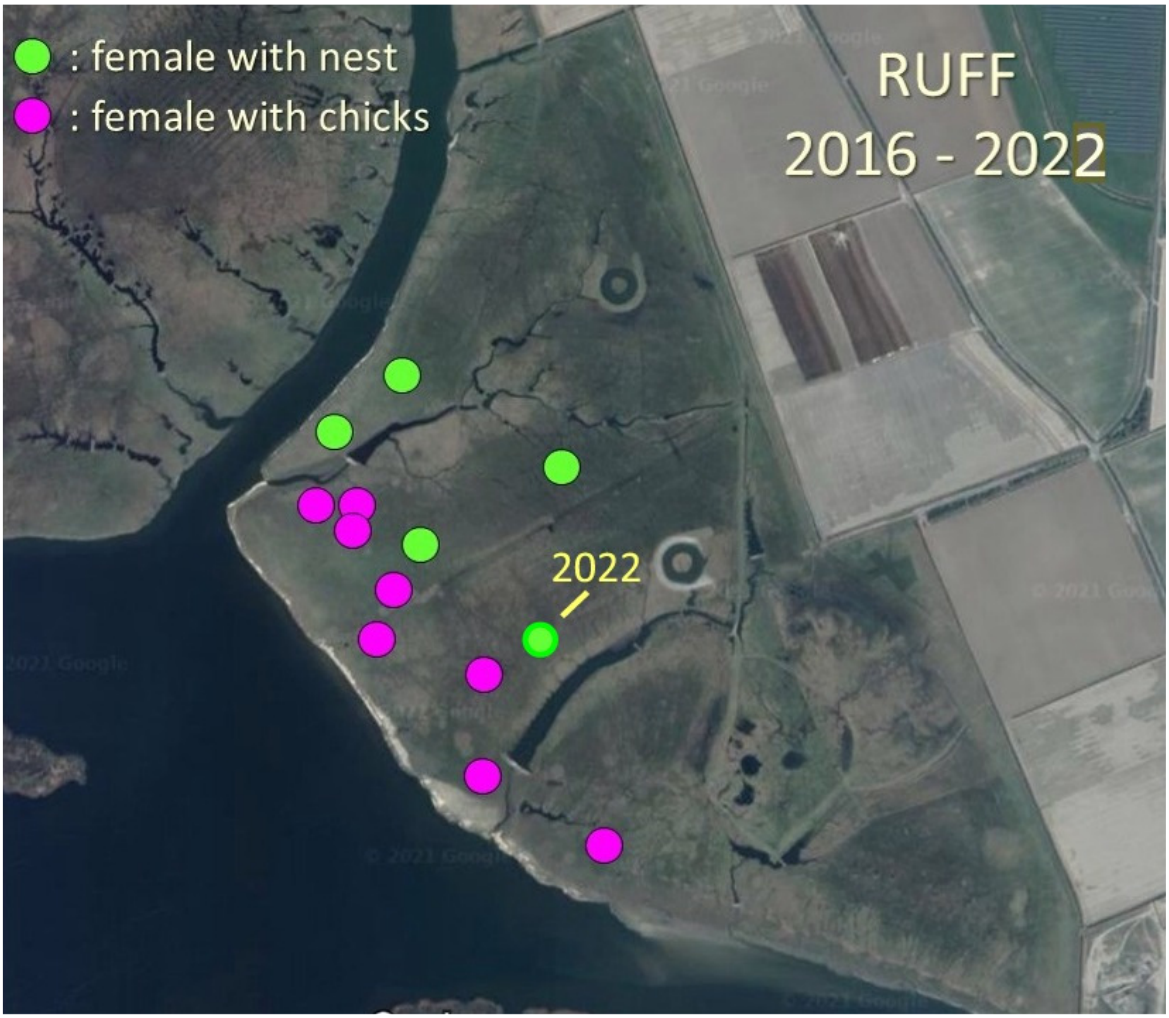


*Figure 1. Locations of found ruff females with a nest and ruff families in Nordkoog Ost in Meldorfer Speicherkoog at annual surveys 2016-2022. One female with a nest apparently with chicks observed in 2022 is specifically indicated.*

## Wöhrdener Loch

A ruff survey was conducted in the meadows in the southern part of the nature reserve Wöhrdener Loch on 13 June. No ruffs were seen. Although there were no breeding ruffs here, quite a few other meadowbirds were observed: 5 families of black-tailed godwit and a flock with 45 birds, 10 families of lapwing and 9 families of redshank plus one redshank flushed from a nest.

## Ruffs in Dithmarscher Speicherkoog Süd

A full day ruff survey was performed on the meadows in the central part of the area on 12 June. These meadows are mown annually after the breeding season. No ruffs were seen in the area, and according to Volker Salewski who visited the site regularly during the entire breeding season, the were no ruff males in the area after 15 May.

The meadows were fairly dry at the day of the survey, and earlier, in late April and most of May, they had been even drier. The meadows were most likely unattractive for ruffs to stay and breed at the time the ruffs had to decide whether to stay or to move on.

## Vegetation development and potential for breeding ruff in the new polder in southern Rickelsbüller Koog

The polder in the southeast corner of Rickelsbüller Koog, constructed as a Life Limosa project action a few years ago, was visited in the afternoon of the 10 June, and suitability of the water table for breeding ruff and Baltic dunlin and for shorebirds in general was evaluated together with an evaluation of whether the vegetation development did create potential nest site habitat for breeding ruffs.

More patches altogether comprising several thousand $m^2$ of grassy vegetation apparently possessing suitable potential nest habitat for ruffs have developed, and at the day of the visit, the water level was sufficiently low not to flood the majority of the potential nest vegetation.

However, no ruffs were observed in the polder nor in the surrounding meadows. Neither were there any Baltic dunlins. One immature plumaged northern dunlin was seen immediately west of the polder.

There were large areas without vegetation, and these areas were covered with shallow water of mostly 5-10 cm depth. Cracks in the mud below the water showed that recently the area had been much drier. The shallow water and the surrounding low vegetation attracted many shorebirds and other waterbirds. Perhaps most importantly, the polder did attract a large number of avocet families as it also did in 2021, and 84 adult avocets alarming for chicks were counted. No doubt many avocet chicks were also present, but the combination of shallow water and open vegetation seemed very favourable for the chicks allowing them to hide away, and only few chicks were actually observed. No less than 18 pairs of redshanks alarmed with chicks inside the polder together with nine pairs of lapwings and two pairs of little ringed plovers with chicks. In addition, two pairs of redshanks were still incubating eggs.

The polder also housed two fairly small colonies black-headed gulls, and in one of them was also one pair of common terns.

## Ruffs in Alte Sorge Schleife

The northern and central meadows were visited 10 June morning and midday. Mid May there had been a flock of feeding and lekking ruffs (Heike Jeromin pers. comm.), but no ruffs were seen on this visit.

At the day of the visit the water level appeared to be very favourable for ruffs: The northernmost polders were partly flooded with patches of open, shallow water, and also the central meadows must have been quite moist as the water level in the ditches was fairly high. Also, the height of the vegetation in many of the hay meadows looked perfect for breeding ruffs.

What do prevent ruffs to stay and breed here, as they did 30-50 years ago? Possible explanations could be: Too much nutrients in the rain and flood water that creates a too dense vegetation for ruff chicks to feed among? Presence of dangerous predators?

Concerning the predator issue, the presence of woodland next to the meadows is far from optimal. Goshawk is an important predator on adult birds the size of a ruff (or black-tailed godwit for that matter; e. g. Nielsen & Drachmann 1999), and there was a pair of goshawks breeding in the woodland fringing the meadows in Alte Sorge Schleife. Aerial food-passing by the pair was seen in the central woodland.

## Ruffs in Seether Ostermoor and the importance for waterbirds of the new polders

The two new polders, constructed as a LIFE Limosa project action, were visited 11 June in the morning. No ruffs were seen, although water table and vegetation appeared favourable for breeding ruffs. There was open shallow water and grassy vegetation in various heights which should allow feeding and nesting of the species.

In contrast to the lack of ruffs, the polders provided a wetland oasis for a lot of other waterbirds. There was a small active colony of black terns with approximately 5 pairs, there were 5 black-tailed godwit families in or adjacent to the polders and one and two fledged juveniles were observed in two of the families. In both polders there was a high concentration of redshank families (around 20 in total) and lapwing families (at least 17 families), several displaying common snipes and in the southern polder a pair of little ringed plovers with chicks.

# Overview of results from field studies 2013-2022 on breeding conditions and numbers of ruffs and dunlins

## Numbers of breeding ruffs and dunlins at the project sites 2013-2022.

Numbers of breeding ruffs and dunlins were counted within standard counting programmes in Rickelsbüller Koog, Beltringharder Koog and the meadowbird sites along the Eider Mündung. These programmes provide the basic breeding numbers at these sites, and the field work within the LIFE Limosa project has only added modest data to numbers from these standard counts.

In other project sites like Meldorfer Speicherkoog, Dithmarscher Speicherkoog, Seether Ostermoor and Alte Sorge Schleife, the LIFE Limosa fieldwork is the primary source of breeding data.

Table 2. Breeding ruffs observed during standard monitoring counts and LIFE Limosa fieldwork combined 2013-2022. The estimated number of breeding females recorded within the project sites is shown together with the number of females, where breeding was verified by a find of a nest with eggs or a female with chicks. The majority of the verified breeders were found during LIFE Limosa field work.

| ***Year*** | ***Population estimate*** | ***Verified breeders*** | |
|---|---|---|---|
| | | Females with chicks or chick clutch seen | Additional females with nest |
| *2013 Project sites total* | *19* | *3* | *3* |
| *2014 Project sites total* | *43* | *6-7* | *2* |
| *2015 Project sites total* | *17+* | *1* | *1* |
| *2016 Project sites total* | *50-52* | *1* | *3-4* |
| *2017 Project sites total* | *31-33* | *5* | *2* |
| *2018 Project sites total* | *60* | *2* | *0-1* |
| *2019 Project sites total* | *27* | *2* | *0* |
| *2020 Project sites total* | *10* | *0* | *0* |
| *2021 Project sites total* | *24* | *1* | *2* |
| *2022 Project sites total* | *12* | *0* | *1* |

The number of breeding ruffs at the project sites fluctuated quite a bit over the project years with peaks in 2014, 2016 and 2018 (Table 2). In Figure 2 the population development in the Schleswig-Holstein project sites is compared with two of the nearest 'populations': the Danish Wadden Sea total and the number of breeding ruffs at the Tipperne nature reserve approximately 115 km north of the German Wadden Sea. The trends in the two Danish populations are different from the trend in Germany: At Tipperne there has been a decline over the ten seasons probably due to more dry meadows and an increase in the number of nests trampled by cattle (Thorup & Bregnballe 2022), whereas in the Danish Wadden Sea numbers increased, primarily due to improved hydrology and better managed late grazing in the two most important breeding sites on Mandø and in Margrethe Kog south (Thorup 2022, Nielsen 2022).

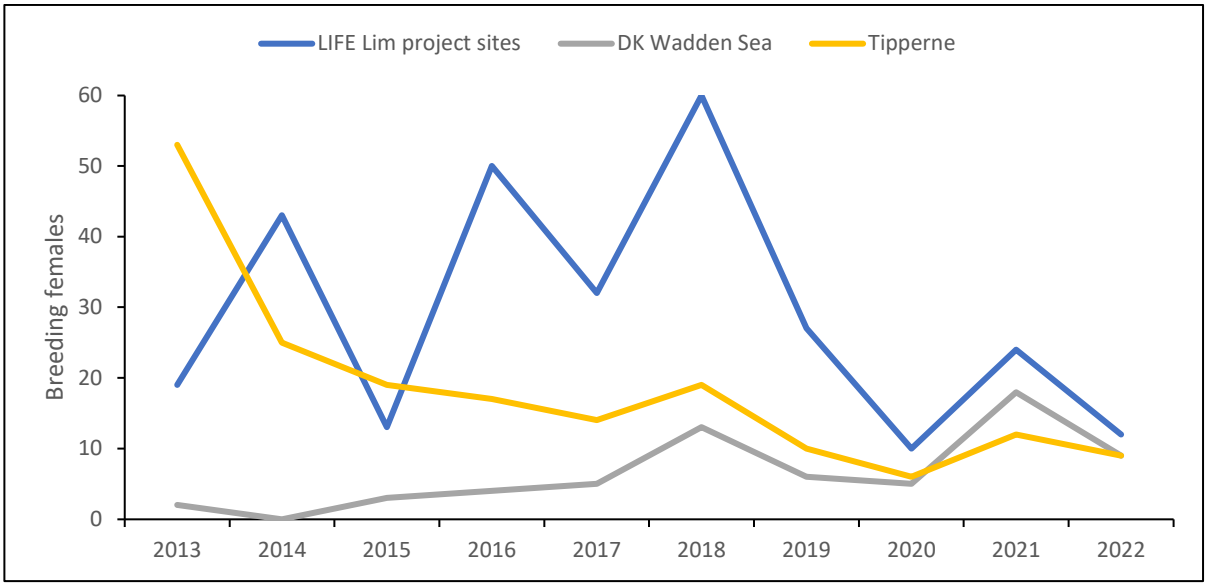


*Figure 2. Numbers of breeding females of ruff in the LIFE Limosa project sites in Schleswig-Holstein, in the Danish Wadden Sea (Thorup et al. 2021, Thorup & Bregnballe 2020 and unpubl.), and at the Tipperne nature reserve in Denmark (Thorup & Bregnballe 2022).*

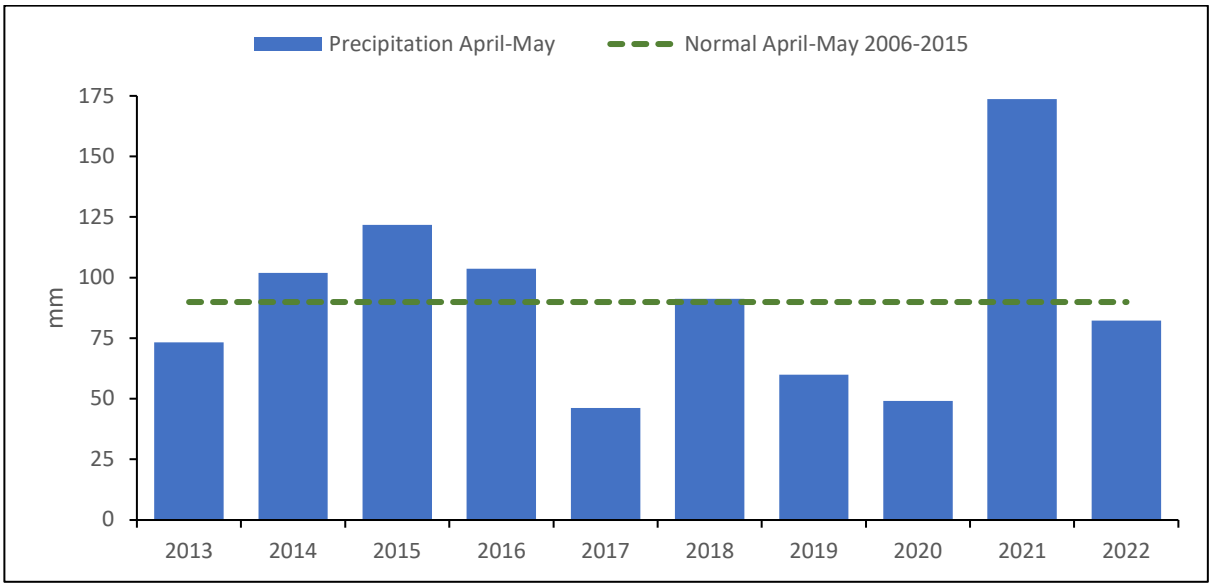


*Figure 3. Precipitation in April and May in the project years 2013-2022 and the April-May 'norm' for 2006-2015 in the Tønder municipality adjacent to Rickelsbüller Koog (DMI 2023).*

Almost all LIFE Limosa project sites with breeding ruffs are within polders with a managed water level. This means that it is usually possible by retention of winter precipitation to maintain a fairly high ground water level during the breeding season in May and June. But spring precipitation still seems to have an important impact on the occurrence of breeding ruffs in the project sites. In Figure 3, the precipitation from April plus May in Tønder municipality (neighbouring Rickelsbüller Koog and the German Wadden Sea) is shown, from the ten project years 2013-2022 as well as the average 2006-2015. The three peak years 2014, 2016 and 2018 all had precipitation above the 'norm'. Three years had a precipitation below 80% of the 'norm': 2017, 2019 and 2020, and in these three years the estimated breeding numbers were on average only 48% of the number of breeders the previous year.

This result points at the fact that it is not necessarily possible to compensate fully for a lack of precipitation in the breeding season by management of the water level, and that possible more frequent very dry springs in the future may reduce the number of years when ruffs will stay and breed. Furthermore, dry springs may additionally delimit the possibilities for the species to breed successfully.

Table 3 shows that the majority (64% of all breeding females) of the breeding ruffs in the project sites were breeding in Rickelsbüller Koog and Beltringharder Koog in 2013-2022.

Table 3. Recorded and estimated breeding females in the ten LIFE Limosa project sites 2013-2022.
- : depicts that breeding ruffs were not particularly searched for on that site in that year, but that the species was not suspected to breed.

| **Ruff population size estimates ('guestimates') in the ten project sites (breeding females)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Project site | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | *SUM* |
| 01 - Rickelsbüller Koog | 3 | 13 | 8 | 18 | 15 | 13 | 18 | 1 | 11 | 7 | *107* |
| 02 - Hauke-Haien Koog | 0 | 4 | ? | 2 | ? | ? | ? | 1 | ? | ? | *7+* |
| 03 - Ockholmer Vorland | - | - | - | - | - | - | - | 1 | - | - | *1* |
| 04 - Beltringharder Koog | 7 | 9 | 6 | 14 | 10 | 13 | 7 | 6 | 7 | 2 | *81* |
| 05 - Speicherkoog Nord | 6 | 7 | ? | 10 | 4 | 4 | 2 | 1 | 4 | 1 | *39* |
| 06 - Speicherkoog Süd | 2 | 3 | ? | 1-2 | 2 | 8 | 0 | 0 | 1 | 0 | *17-18* |
| 07 - Seether Ostermoor | - | - | - | 0-1 | 0 | 0 | 0 | - | 0 | 0 | *0-1* |
| 08 - Alte Sorge Schleife | - | 0 | 0 | 1 | 0 | - | - | - | - | 0 | *1* |
| 09 - Eiderstedt | - | - | - | - | - | - | - | - | - | - | *0* |
| 10 - Eiderästuar | 1 | 7 | 3 | 4 | 0-2 | 22 | 0 | 0 | 1 | 2 | *40-42* |
| Total | 19 | 43 | 17+ | 50-52 | 31-33 | 60 | 27 | 10 | 24 | 12 | *293-297* |

Table 4. Breeding dunlins observed during standard monitoring counts and LIFE Limosa fieldwork combined 2013-2022.

**Dunlin - breeding pairs/territories**

| | | | |
|---|---|---|---|
| *2013 Project sites total* | *2-4* | *2013 Rickelsbüller Koog total* | *2-3* |
| *2014 Project sites total* | *4* | *2014 Rickelsbüller Koog total* | *4* |
| *2015 Project sites total* | *3* | *2015 Rickelsbüller Koog total* | *3* |
| *2016 Project sites total* | *5-6* | *2016 Rickelsbüller Koog total* | *5* |
| *2017 Project sites total* | *7-8* | *2017 Rickelsbüller Koog total* | *5* |
| *2018 Project sites total* | *3-4* | *2018 Rickelsbüller Koog total* | *3* |
| *2019 Project sites total* | *6* | *2019 Rickelsbüller Koog total* | *6* |
| *2020 Project sites total* | *3* | *2020 Rickelsbüller Koog total* | *3* |
| *2021 Project sites total* | *3* | *2021 Rickelsbüller Koog total* | *2* |
| *2022 Project sites total* | *3* | *2022 Rickelsbüller Koog total* | *3* |

The recorded number of breeding pairs of dunlins is shown in table 4. The species was primarily found in Rickelsbüller Koog, but occasionally an additional breeding pair was found in other project sites.

The Baltic dunlin has a predominantly northern distribution, where the northern half of Germany and the Netherlands historically constituted the southernmost distribution of the species. In the south part of the distribution in Westfalen and central Niedersachsen the breeding habitat was heather and moor land (Glutz von Blotzheim et al. 1975). Today, Rickelsbüller Koog together with saltmarshes on western Rømø in Denmark are the south-westernmost regular breeding sites for the species. It is unknown which factors are behind where the southern limit of the distribution is found, but a warming climate may be an additional threat to the species in Germany and southern Denmark in addition to depletion of the favourable breeding habitat.

2013-2022 numbers in Rickelsbüller Koog (and thereby in the Schleswig-Holstein Wadden Sea) have been rather stable. In the same period breeding numbers on Rømø have declined markedly, from 7 pairs in 2013 and 2014 to one pair only in 2022 (Thorup & Bregnballe 2020 and unpublished data).

## Localization of nesting and chick rearing areas by ruffs in Rickelsbüller Koog

Ruffs had been breeding annually in Rickelsbüller Koog for decades at the time of the start of the LIFE Limosa project, but very little was known about precise nesting sites, breeding success and chick rearing areas. The main aim of the LIFE Limosa fieldwork in the area was to supplement the information gathered during the standard counting programme with such extra information.

Although visiting the area on a total of 14 field days in 2013-2022, the surveys were not particularly successful regarding this matter. In these ten years there were only three observations in total indicating nest sites, and no ruffs alarming with chicks were ever registered. 5 June 2013 a female sneaked into a nest tuft in the southeastern part of the site (observed during a standard count), 9 June 2015 a female landed at its nest in the northeastern part of the site in a field with grazing cows and bulls and 30 May 2018 a female was flushed from a possible nest in the new polder (Figure 4).

However, conditions for performing nest searches and chick family searches in the assumed best breeding area in the northeastern part of Rickelsbüller Koog were often poor. Several years, good numbers of cattle were already released before the dates of the visits in late May and early June. These cattle were usually quite curious and followed the observer, and in more occasions, there were also bulls among these grazers. The fields with good breeding habitat for ruffs were quite small, and it was rarely possible to visit these meadows at a sufficient distance to the cattle to avoid the risk, that searching for nests or chicks here would imply a greatly increased risk for loosing such nests or broods due to trampling by cattle. Therefore, under such conditions the meadows were in many cases only surveyed from the distance, which greatly reduces the possibility to detect a nesting or chick rearing ruff.

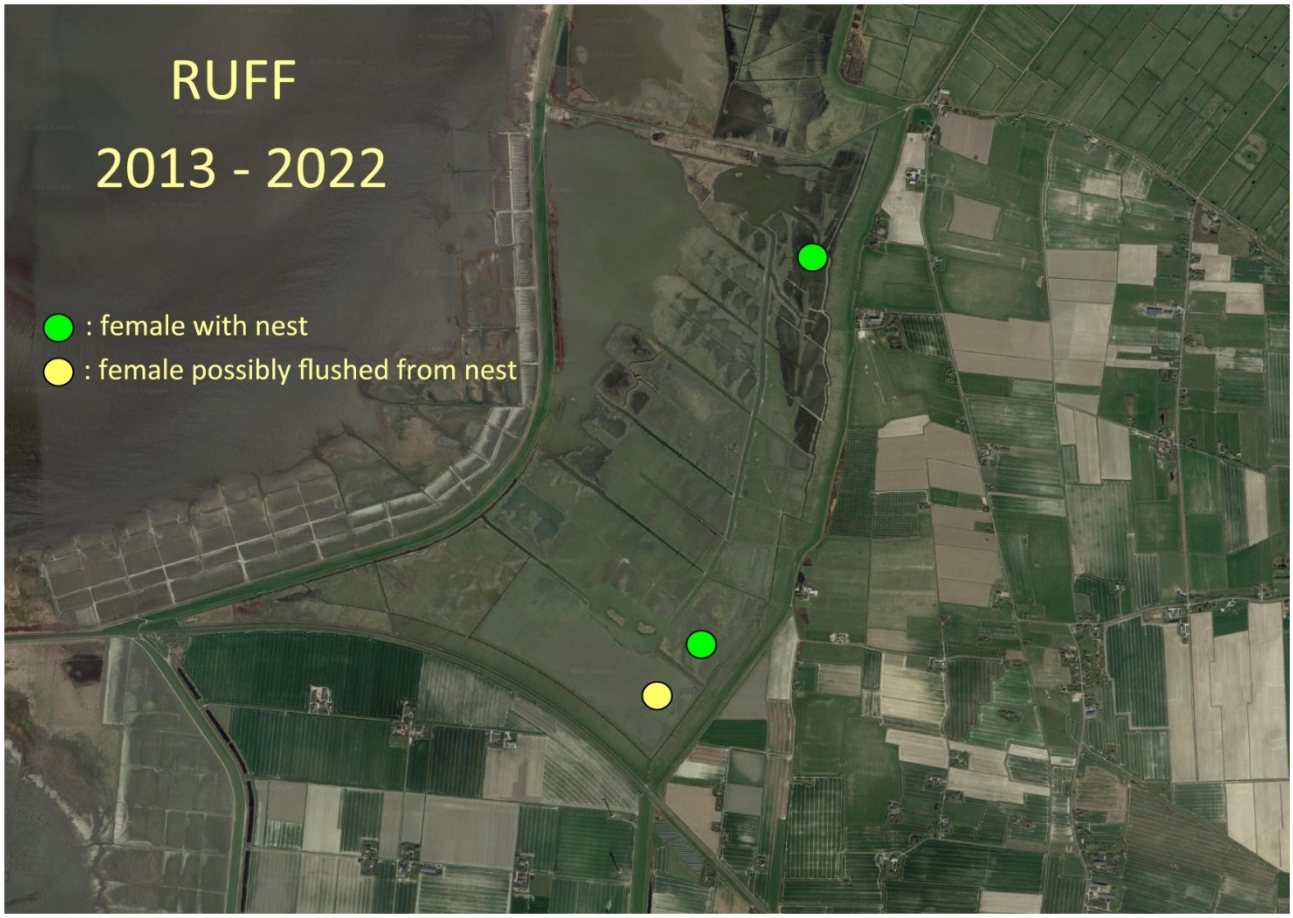


*Figure 4. Locations of found ruff females with a nest or a possible nest in Rickelsbüller Koog 2013-2022.*

## Localization of nesting and chick rearing areas by dunlins in Rickelsbüller Koog

There were intensive searches for nests and chick families of dunlin in all the suitable breeding habitat in Rickelsbüller Koog in 2013-2015 and 2017-2018, but no dunlins showing nesting or chick rearing behaviour were ever observed in the area.

Although 2 to 6 pairs of dunlins were counted annually during the standard monitoring counts (Table 4), in total only two Baltic dunlins were seen (and were also showing breeding behaviour) during the LIFE Limosa fieldwork, both in 2013 (Figure 5). In the remaining years, dunlins were regularly seen and now and then also heard displaying, but in all cases, at closer looks, they were all belonging to the northern, long-billed *alpina* subspecies that does not breed at our latitudes.


*Figure 5. Dunlin nest habitat in Rickelsbüller Koog and territories found 2013-2015 and 2017-2018. Orange double-hatching depicts favourable dunlin nesting habitat mapped in 2015. A similar mapping in 2013 identified almost exactly the same areas as suitable. The red dots mark the only two Baltic dunlins showing breeding behaviour found on a total of seven visits in the breeding season 2013-2015 and 2017-2018: 1) the position of a nervous dunlin in a territory observed 29 May 2013 (interpreted as confirmed breeding), 2) a dunlin flying low after possibly having been flushed from a nest nearby, observed 25 June 2013 (interpreted as possible breeding).*

## Importance of the newly constructed polder in southeast Rickelsbüller Koog for breeding ruff and dunlin and for other shorebirds

A new polder was constructed in the southeast corner of Rickelsbüller Koog in 2016-2017 as a LIFE Limosa project action, and soon this wetland with shallow water became a very attractive feeding site for a large number of shorebirds and dabbling ducks. In addition to frequent visits within the standard monitoring programme, the polder was surveyed as part of the LIFE Limosa fieldwork seven times in six seasons 2017-2022.

In 2018 on 31 May one female ruff was flushed, possibly from her nest, and another three females were followed by two males. But this was the only visit on which any of the three project species ruff, dunlin and black-tailed godwit was seen with breeding behaviour in the polder. However, all LIFE Limosa fieldwork took place in the nesting and chick rearing period of the three species, and the polder may have an undetected important function as a pre-breeding feeding site for ruff and black-tailed godwit.

Most likely, the most important function of the polder for the local breeders is the fact that the polder has become an attractive feeding site for avocet families. Second to none, Saltvandssøen just north of the Danish-German border is the most important feeding site for the local breeding population, and here 25-50% of the local breeders (maximum 463 birds) can be seen feeding in the nesting and chick rearing period. But in addition to Saltvandssøen, also this polder in the southeast Rickelsbüller Koog houses good numbers of avocet families when the water table was kept attractively shallow. Such a favourable water table was found in 2018, 2021 and 2022, and in 2021 and 2022 62 and 82 chick-alarming adults were counted inside the polder, respectively. Also, very many families of lapwings and redshanks concentrate in the polder in the chick period together with large numbers of shorebirds on migration, in particular green sandpiper, wood sandpiper and spotted redshank.

## Localization of nesting and chick rearing areas by ruffs in Beltringharder Koog

In the years before the start of the LIFE Limosa project (2004-2012), ruffs were found breeding on the average every second year (Klinner-Hötker & Petersen-Andresen 2012), but hardly anything was known about where the nesting and chick rearing areas of the species were. So, LIFE Limosa fieldwork was primarily directed at supplementing the standard monitoring counting programme with surveys focused on localizing nesting and chick rearing habitat.

In 2013, a female with a nest was found for the first time in the Arlauer Speicherbecken. It was detected 14 June, and the nest was still active 23 June. However, heavy rainfall in the second half of June was suspected to flood the nest 24 or 25 June, and no ruff was present in the area 1 July. In 2014 we were very successful in finding ruffs with nests and chicks: this year three nests were located, and two of these were successful and chicks were subsequently seen; a further two chick families were also registered. In total, eight nests with eggs and five families were found 2013-2022 (Figure 6).

In the project period 2013-2022, ruffs have been breeding much more regularly and in higher numbers than in the previous years (Figure 7). This indicates that breeding conditions have been improved for breeding ruffs by the various LIFE Limosa project actions. Most likely, the vegetation management and hydrology

management have been the key issues for the improvement. Predator control and out-fencing may have been additional causes for the improvement.


*Figure 6. Locations of found female ruffs with nests and chicks 2013-2022 in Beltringharder Koog south of the Lüttmoordamm and in Arlauer Speicherbecken. There were a few observations of breeding ruffs north of the Lüttmoordamm, but breeding here was not verified by nests or chicks.*

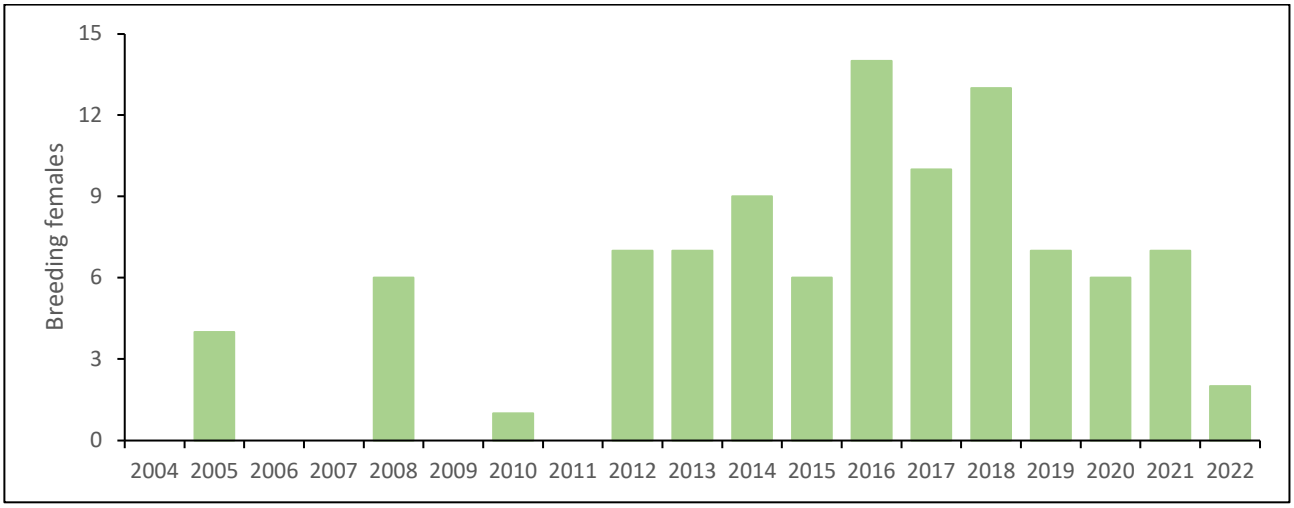


*Figure 7. Numbers of breeding female ruffs in Beltringharder Koog north of the river Arlau 2004-2022 (Klinner-Hötker & Petersen-Andresen 2012, Cimiotti 2021).*

## Ruffs on Oldensworter Vorland

Oldensvorter Vorland was one of the last sites in Schleswig-Holstein with a permanent ruff lek, but when a breeding pair of peregrine falcons moved into a nearby nest box, the ruffs gave up the lek (H. Hötker pers. comm.).

In the LIFE Limosa project period 2013-2022, ruff females were present in the 'core breeding period' 20 May-16 June in a few years only. Most birds were found 21 May 2018 with 20 females together with 14 males on a lek, and on 26 May 2022 when 22 females without breeding behaviour were observed. In 2022 most of the birds were suspected to be nonbreeders in this exceptionally dry spring, when similar nonbreeding flocks were seen in Margrethe Kog just north of the German-Danish border. In 2014, six females were observed 20 May-16 June, whereas in the remaining seven breeding seasons 2013-2022 no breeding females were seen in that period.

In three seasons – 2013, 2014 and 2017 – LIFE Limosa fieldwork supplemented the standard monitoring surveys with an additional survey second half of May-first half of June focused on finding possible nest sites of ruffs. None of the surveys were successful in finding ruffs with nesting behaviour.

## Breeding dunlins and ruffs on Karolinenkoog Vorland

Occasionally, a pair of dunlins or a female of ruff (only once 2013-2022) has been observed on Karolinenkoog Vorland in the breeding season.

In order to identify and map suitable breeding habitat for dunlin, six sites between the B5 Eiderbrücke and the Eidersperrwerk were surveyed 29 May 2015. No breeding dunlins nor ruffs were found on this visit, although several areas with potential dunlin nesting habitat were identified (Figure 8-10).

*Figure 8. Potential dunlin nest habitat 29 May 2015, Dithmarscher Eidervorland W of Karolinenkoog. The yellow cros-shatched areas depict patches with potential for favourable dunlin nest habitat with continued grazing.*


*Figure 9. Dunlin nest habitat and potential nest habitat; Dithmarscher Eidervorland NW of Schülperneuensiel. 1) and 3) mark attractive dunlin nest habitat; 2) attractive dunlin habitat patchier among too high vegetation for the species. 29 May 2015.*


*Figure 10. Potential dunlin nest habitat Dithmarscher Eidervorland 3-4 km east of Eidersperrwerk. The yellow cross-hatched area depicts an area with some potential as nest habitat for dunlin with the right management. However, at the visit 29 May 2015 the area was quite dry, and the grazing was rather patchy with some areas being heavily undergrazed and others being well- to overgrazed.*

## Nordkoog Ost in Meldorfer Speicherkoog as a breeding site for ruff

As mentioned in the first part of this report, ruff breeding has been verified annually in Nordkoog Ost every year specific ruff surveys have been performed in the project period. Such surveys took place 2016-2022.

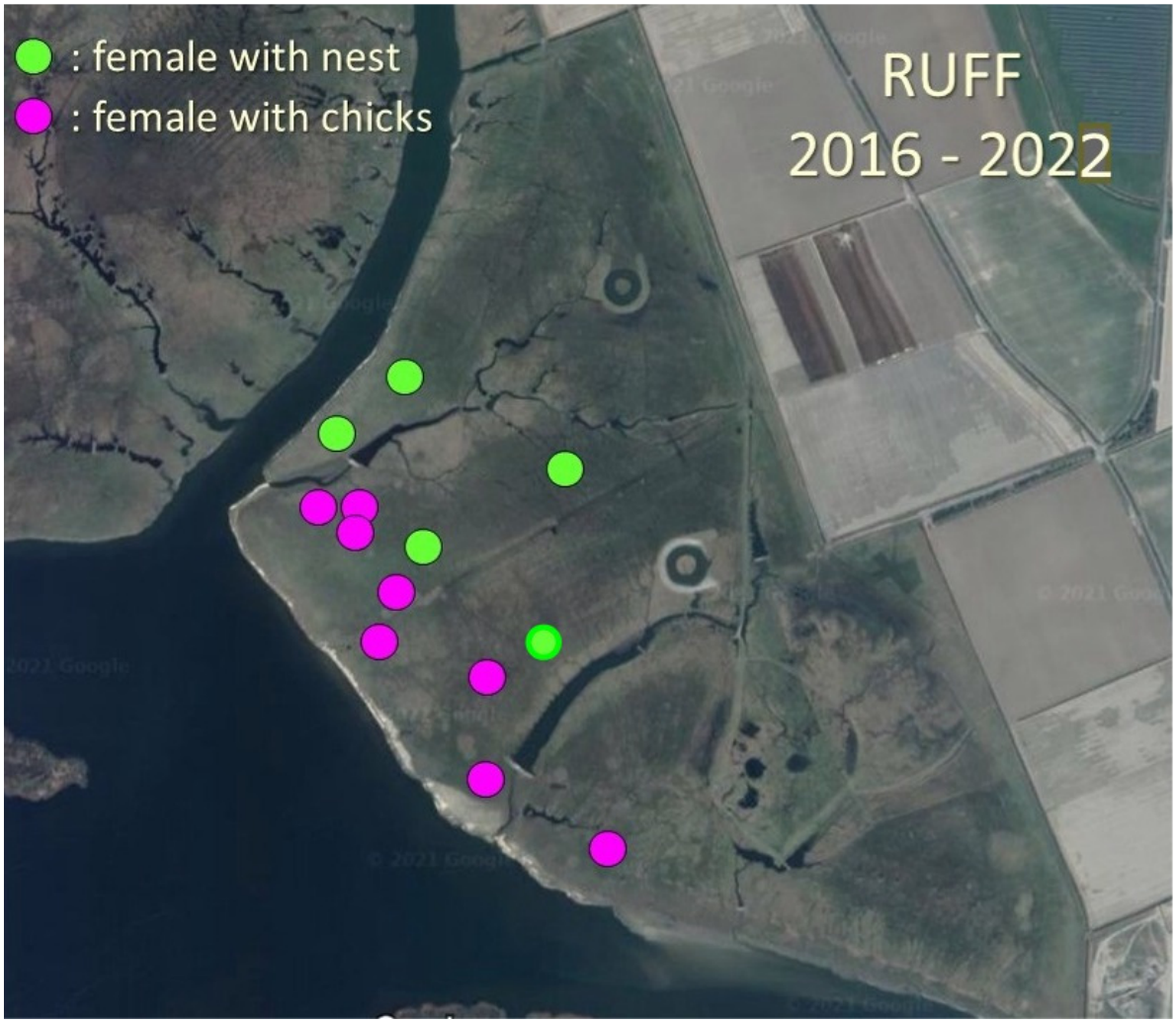


*Figure 11. Observations of breeding ruffs in Nordkoog Ost in Meldorfer Speicherkoog, verified by nest and/or chick alarm behaviour.*

Not many ruff females with chicks have been observed the last decades in the entire international Wadden Sea. In order to illustrate this, only seven ruffs in total were observed with chicks in the Danish Wadden Sea between 1994 and 2022: one in 1994, two in 1997, two in 2003 and two in 2022 (Nielsen 2022, Thorup et al. 2021, Thorup 2022). That nine ruffs have been observed with chicks on ten surveys in Nordkoog Ost in 2016-2022 (Figure 11) is therefore quite exceptional, and points at the fact that Nordkoog Ost today is a key breeding site for the species in the Wadden Sea. It should be mentioned, however, that in general ruffs with chicks will most likely be under-recorded due to the fact that the species breeds so late, that the majority of breeding surveys are undertaken before ruff chicks start hatching.

The management of Nordkoog Ost is in many ways optimal for a meadow bird like ruff. The combined grazing by cattle and sheep takes place most years with a moderate grazing pressure. Together with the mowing of the meadow after the breeding season is over, an open and relative diverse vegetation is created (see photo below), that obviously attracts good numbers of meadowbirds – in addition to ruffs also redshanks, lapwings, black-tailed godwits, avocets and oystercatchers.

Altogether, various actions within the LIFE Limosa project have improved breeding conditions for ruffs in the area. Grazing keeps the vegetation along the fresh water shores at Meldorfer and Wöhrdener Hafenstrom short, and shallow water here makes sure that incubating and chick rearing females always have good feeding opportunities nearby. In addition, blocking of several outlets postpone the drying out of the inland gullies and wetlands. Furthermore, felling of trees and bushes along the edges of the meadows has improved the openness of the area, most likely reducing predation from aerial predators.

*Figure 12. View of the meadows at Nordkoog Ost in Meldorfer Speicherkoog, showing the relatively short and open vegetation with islets of higher vegetation favourable for tuft-breeders like ruffs. An artificial pond with a breeding island for avocets is seen in the background. Photo: Volker Salewski.*

## Wöhrdener Loch in Meldorfer Speicherkoog as breeding site for ruff

As a breeding area for ruff, the nature reserve Wöhrdener Loch north of Nordkoog is apparently more sensitive to changing conditions, e. g. weather patterns than Nordkoog Ost. The area was surveyed in the first project year in 2013, and this year there was a ruff lek in the area with up to 10 displaying males, and five breeding female ruffs were observed of which one was seen with chicks and two with nests. On further surveys once per year 2019-2022 no breeding ruffs were observed here. In 2013 the area was moist or wet in the entire breeding season until at least early July, whereas the area was quite dry in 2019, 2020 and 2022 and also fairly dry at the date of the survey in 2021.

## Ruffs in Dithmarscher Speicherkoog Süd

Specific ruff surveys were performed twice in 2013, three times in 2014 and once annually 2016-2022. At each survey, the central areas were walked through thoroughly, whereas meadows to the north and to the south were visited less systematically. Breeding of ruffs was only verified in the central areas. All verified breeding observations are shown in Figure 13. In five of the nine survey years no breeding was verified: in 2016, 2018, 2019, 2019 and 2022. In two of these years, however, females were observed on the meadows in the core breeding season, and were most likely breeding or attempting to breed: in 2016 one or two and in 2018 eight.

In 2013 and in 2021 one female was observed with a nest. In 2013 the nest was checked after incubation was over, and this nest was unsuccessful due to predation.

In three seasons, females alarming with chicks were observed: in 2013 one, in 2014 two or three and in 2017 two.

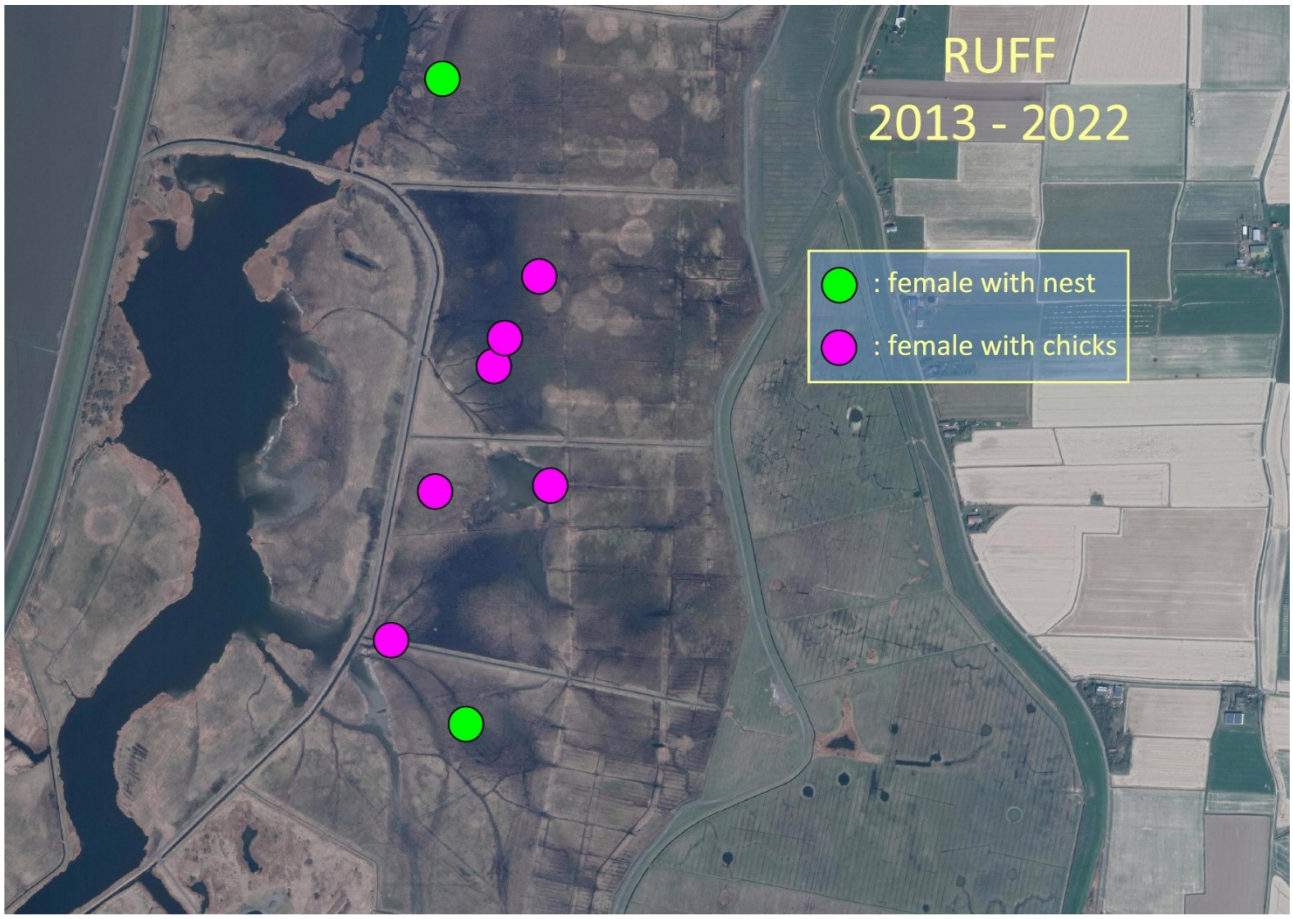


*Figure 13. Locations of females with nests and chick families found in Dithmarscher Speicherkoog Süd 2013-2022. No breeding was verified in areas north and south of the area shown on the aerial map.*

## Alte Sorge Schleife as breeding site for ruff

Habitat and hydrology restoration in the area as LIFE Limosa project actions have provided meadows with an attractive water table and vegetation height for breeding ruffs. In addition, polders constructed in the southern part of the area give feeding opportunities even when there are dry periods in the breeding season.

Nevertheless, on six surveys in the core breeding season of the species in five different seasons only one ruff female was seen on one occasion. This female was seen on 31 May 2016, and this bird was only seen in flight from a feeding site to her presumed nesting site that was never localized.

Ruffs only breed exceptionally nowadays on its former inland breeding sites. As management of the managed meadows seems to be near optimal for the species, limitations may be found at a more overall scale. Rain and flood water may introduce to much nutrients into the meadows, thereby creating a too dense and fast-growing vegetation to be used by feeding ruff chicks. And the landscape may be so fragmented that lethal predators live too close by the meadows, deterring ruffs and other meadowbirds from breeding here.

## Ruffs in Seether Ostermoor

Although Seether Ostermoor was surveyed for ruffs in four different seasons after two polders were constructed as a LIFE Limosa project action, and the visits took place in the core breeding season of the species, ruff was never observed here on these visits. On the other hand, a large array of shorebird and other waterbird species have benefitted from the construction of the polders that function as a magnet for in particular chick families of shorebirds in the late spring/early summer in the otherwise very dry landscape.

There is one possible breeding record of ruff from the site, however. 22 June 2016 a female ruff was flushed at the site. It may have been a migrant bird feeding in a ditch but it cannot be excluded that it was a breeding bird flushed from a nest.

*Figure 14. Ruff female alarming with chicks. An observation of an alarming female ruff is the ultimate indication of management success, often hard to obtain. This picture is not from a LIFE Limosa project site, but from a site in the Danish Wadden Sea (Mandø) with a similarly advanced meadowbird conservation project. However, also in some of the LIFE Limosa project sites ruffs with hatching success have been registered; 21-22 such females in 2013-2022 (Table 2). The site at the picture has a prominent vegetation of the parasitical greater yellow-rattle that reduces growth of grass and reed and keeps a favourable low and open vegetation for ruffs. In 2013 a ruff with chicks was observed in a very similarly looking meadow in Eiderdammflächen, a LIFE Limosa project site. Photo: Jørgen Peter Kjeldsen/ornit.dk*

## Acknowledgements

I thank Volker Salewski for good companionship on surveys over the years. Holger Bruns, Dagmar Cimiotti, Dominic Cimiotti, Niels Damm, Hauke Drews, Anne Evers, Oliver Granke, Jutta Hansen, Hermann Hötker (†), Heike Jeromin, Brigitte Klinner-Hötker (†), Walther Petersen-Andresen, Volker Salewski and Luis Schmidt are thanked for providing unpublished data and other information and for sharing inspirational ideas.

Jørgen Peter Kjeldsen and Volker Salewski are thanked for providing photos.

## References

Cimiotti, D.V. 2021: Ornithologisches Gutachten Nordstrander Bucht/Beltringharder Koog. Ergebnisse aus den Zählgebieten nördlich der Arlau. Jahresbericht 2021. – Integrierte Station Westküste.

DMI 2023: Danmarks Meteorologiske Instituts vejrarkiv. https://www.dmi.dk/vejrarkiv/ (visited January 2023).

Glutz von Blotzheim, U.N, K.M. Bauer & E. Bezzel 1975: Handbuch der Vögel Mitteleuropas. Band 6. – Akademische Verlagsgesellschaft, Wiesbaden.

Hälterlein, B., D. M. Fleet, H. R. Henneberg, T. Mennebäck, L. M. Rasmussen, P. Südbeck, O. Thorup & R. Vogel 1995: Anleitungen zur Brutbestandserfassung von Küstenvögeln in Wattenmeerbereich. – Wadden Sea Ecosystem No. 3, CWSS, TMAG, Joint Monitoring Group for Breeding Birds in the Wadden Sea, Wilhelmshaven.

Kieckbusch, J., B. Hälterlein & B. Koop 2021: Die Brutvögel Schleswig-Holsteins. Rote Liste Band 1 und 2. 6. Fassung. – Schleswig-Holstein. Landesamt für Landwirtschaft, Umwelt und ländliche Räume.

Klinner-Hötker, B. & W. Petersen-Andresen 2012: Ornithologisches Gutachten Nordstrander Bucht/Beltringharder Koog. Ergebnisse aus den Zählgebieten nördlich der Arlau. Jahresbericht 2012. – Integrierte Station Eider – Treene – Sorge und Westküste.

Knief, W., R. K. Berndt, B. Hälterlein, K. Jeromin, J. J. Kieckbusch & B. Koop 2010: Die Brutvögel Schleswig-Holsteins. Rote Liste. – Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein.

LANU 2008: Europäischer Vogelschutz in Schleswig-Holstein. Arten und Schutzgebiete. – Landesamt für Natur und Umwelt des Landes Schleswig-Holstein.

Nielsen, H.H. 2022. Ynglefuglerapport, Margrethe Kog 2022. – Avifauna Consult. https://naturstyrelsen.dk/media/328346/ynglefuglerapport-margrethe-kog-2022_avifaunaconsult.pdf?fbclid=IwAR03u1-EHUXSlMszLCJDxqaoXcLOIiaxCIBQVNmXQ81EI5ak82wJWd7ZfBU

Nielsen, J. T. & J. Drachmann 1999: Prey selection of Goshawks *Accipiter gentilis* during the breeding season in Vendsyssel, Denmark. – Dansk Orn. Foren. Tidsskr. 93: 85-90.

Ryslavy, T., H.-G. Bauer, B. Gerlach, O. Hüppop, J. Stahmer, P. Südbeck & C. Sudfeldt 2020: Rote Liste der Brutvögel Deutschlands 6. Fassung, 30. September 2020 – Berichte zum Vogelschutz 57: 13 – 112.

Thorup, O. 2016: Timing of breeding in Ruff *Philomachus pugnax*: a crucial parameter for management and use of wet grassland in Western Europe. – Wader Study 123(1): 49-58.

Thorup, O. 2022: Overvågning af ynglesucces hos engryle, brushane, stor kobbersneppe og rødben i Mandøs koge i 2022. – Amphi Consult. https://naturfonden.dk/wp-content/uploads/2022/08/Overvaagning-af-engfugles-ynglesucces-paa-Mandoe-2022.pdf

Thorup, O. & T. Bregnballe 2020: Ynglefugle i Vadehavet 2020. – Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi. Fagligt notat nr. 2020|91. https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notatet_2020/N2020_91.pdf

Thorup, O. & T. Bregnballe 2022: Ynglefugle på Tipperne 2022. – Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi. Fagligt notat nr. 2022|86 https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notater_2022/N2022_86.pdf

Thorup, O., Clausen. P. & Bregnballe, T. 2021: Ynglefugle i Vadehavet 1996-2018. Status for 2018 og bestandsudvikling for udvalgte arter. Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi. Teknisk rapport nr. 220. [In Danish] http://dce2.au.dk/pub/TR220.pdf

Thorup, O., V. Salewski & H. Hötker 2018: Kann Phönix aus der Asche steigen? – Kampfläufer brüten in Schleswig-Holstein in überraschend hohen Zahlen. – Berichte zum Vogelschutz 55: 11-19.

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

# APPENDIX I

## List of field visits 2013-2022 directed at breeding ruff and dunlin in LIFE Limosa project sites including surveys with mapping of breeders and evaluation of breeding conditions of the two species concerning vegetation and hydrology

| Site | Year | Date | Observers |
|---|---|---|---|
| Rickelsbüller Koog, northeast | 2013 | 29 May | Ole Thorup |
| Rickelsbüller Koog, northeast | 2013 | 25 June | Ole Thorup |
| Rickelsbüller Koog, northeast | 2014 | 26 May | Ole Thorup |
| Rickelsbüller Koog, northeast | 2015 | 8 June | Ole Thorup |
| Rickelsbüller Koog, northeast | 2017 | 30 May | Ole Thorup |
| Rickelsbüller Koog, northeast | 2018 | 30 May | Ole Thorup |
| Rickelsbüller Koog, west | 2013 | 29 May | Ole Thorup |
| Rickelsbüller Koog, west | 2013 | 25 June | Ole Thorup |
| Rickelsbüller Koog, west | 2014 | 26 May | Ole Thorup |
| Rickelsbüller Koog, west | 2015 | 9 June | Ole Thorup |
| Rickelsbüller Koog, west | 2017 | 30 May | Ole Thorup |
| Rickelsbüller Koog, west | 2018 | 31 May | Ole Thorup |
| Rickelsbüller Koog, southeast (new polder area) | 2017 | 16 May | Ole Thorup, LIFE Limosa expert group |
| Rickelsbüller Koog, southeast (new polder area) | 2018 | 31 May | Ole Thorup |
| Rickelsbüller Koog, southeast (new polder area) | 2019 | 29 May | Ole Thorup |
| Rickelsbüller Koog, southeast (new polder area) | 2020 | 12 June | Ole Thorup |
| Rickelsbüller Koog, southeast (new polder area) | 2020 | 2 July | Ole Thorup, Oliver Granke, Wiebke Sach |
| Rickelsbüller Koog, southeast (new polder area) | 2021 | 15 June | Ole Thorup |
| Rickelsbüller Koog, southeast (new polder area) | 2022 | 10 June | Ole Thorup |
| Hauke Haien Koog | 2014 | 30 May | Ole Thorup |
| Hauke Haien Koog | 2014 | 24 June | Ole Thorup |
| Beltringharder Koog, north | 2014 | 24 June | Ole Thorup |
| Beltringharder Koog, north | 2016 | 1 June | Ole Thorup |
| Beltringharder Koog, north | 2017 | 30 May | Ole Thorup |
| Beltringharder Koog, north | 2019 | 9 June | Ole Thorup |
| Beltringharder Koog, central areas | 2013 | 27 May | Ole Thorup |
| Beltringharder Koog, central areas | 2013 | 5 June | Ole Thorup |
| Beltringharder Koog, central areas | 2013 | 13 June | Ole Thorup |
| Beltringharder Koog, central areas | 2013 | 14 June | Ole Thorup |
| Beltringharder Koog, central areas | 2013 | 1 July | Ole Thorup |
| Beltringharder Koog, central areas | 2014 | 30 May | Ole Thorup |
| Beltringharder Koog, central areas | 2016 | 30 May | Ole Thorup |

| Site | Year | Date | Observers |
|---|---|---|---|
| Beltringharder Koog, Arlauer Speicherbecken | 2013 | 14 June | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2013 | 23 June | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2013 | 1 July | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2014 | 30 May | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2014 | 24 June | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2016 | 1 June | Ole Thorup |
| Beltringharder Koog, Arlauer Speicherbecken | 2019 | 12 June | Ole Thorup |
| Oldensworter Vorland | 2013 | 28 May | Ole Thorup |
| Oldensworter Vorland | 2014 | 13 June | Ole Thorup |
| Oldensworter Vorland | 2017 | 18 May | Ole Thorup, LIFE Limosa expert group |
| Katinger Watt-Eiderdammflächen | 2013 | 2 July | Ole Thorup, Holger Bruns |
| Karolinenkoog Vorland | 2015 | 29 May | Ole Thorup |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2013 | 6 June | Ole Thorup |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2013 | 23 June | Ole Thorup |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2013 | 2 July | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2014 | 28 May | Ole Thorup |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2019 | 11 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2020 | 13 June | Ole Thorup, Volker Salewski, Oliver Granke |
| Meldorfer Speicherkoog, Wöhrdener Loch | 2022 | 13 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog west-Odinsloch | 2014 | 28 May | Ole Thorup |
| Meldorfer Speicherkoog, Nordkoog west-Odinsloch | 2016 | 14 June | Ole Thorup |
| Meldorfer Speicherkoog, Nordkoog west-Odinsloch | 2021 | 17 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2016 | 16 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2016 | 7 July | Ole Thorup |
| Meldorfer Speicherkoog, Nordkoog ost | 2016 | 11 July | Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2017 | 12 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2017 | 23 June | Ole Thorup |
| Meldorfer Speicherkoog, Nordkoog ost | 2018 | 15 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2019 | 11 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2019 | 23 June | Ole Thorup |
| Meldorfer Speicherkoog, Nordkoog ost | 2020 | 13 June | Ole Thorup, Volker Salewski, Holger Bruns, Oliver Granke |
| Meldorfer Speicherkoog, Nordkoog ost | 2021 | 17 June | Ole Thorup, Volker Salewski |
| Meldorfer Speicherkoog, Nordkoog ost | 2022 | 13 June | Ole Thorup, Volker Salewski |

| Site | Year | Date | Observers |
|---|---|---|---|
| Dithmarscher Speicherkoog süd | 2013 | 6 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2013 | 23 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2016 | 15 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2017 | 11 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2018 | 14 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2019 | 10 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2020 | 14 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2021 | 16 June | Ole Thorup, Volker Salewski |
| Dithmarscher Speicherkoog süd | 2022 | 12 June | Ole Thorup, Volker Salewski |
| Seether Ostermoor | 2016 | 31 May | Ole Thorup |
| Seether Ostermoor | 2017 | 17 May | Ole Thorup, LIFE Limosa expert group |
| Seether Ostermoor | 2017 | 13 June | Ole Thorup |
| Seether Ostermoor | 2018 | 13 June | Ole Thorup |
| Seether Ostermoor | 2022 | 11 June | Ole Thorup |
| Alte Sorge Schleife | 2014 | 29 May | Ole Thorup |
| Alte Sorge Schleife | 2015 | 27 May | Ole Thorup |
| Alte Sorge Schleife | 2015 | 28 May | Ole Thorup |
| Alte Sorge Schleife | 2016 | 31 May | Ole Thorup |
| Alte Sorge Schleife | 2017 | 17 May | Ole Thorup, LIFE Limosa expert group |
| Alte Sorge Schleife | 2017 | 13 June | Ole Thorup |
| Alte Sorge Schleife | 2022 | 10 June | Ole Thorup |

# APPENDIX II

## Species names in English and German and scientific names / Artennahmen auf Englisch, deutsch und Latein

| **English** | **Deutsch** | ***Scientific name*** |
|---|---|---|
| Avocet | Säbelschnäbler | *Recurvirostra avosetta* |
| Baltic dunlin | Baltische Alpenstrandläufer | *Calidris alpina schinzii* |
| Black-headed gull | Lachmöwe | *Larus ridibundus* |
| Black-tailed godwit | Uferschnepfe | *Limosa limosa* |
| Black tern | Trauerseeschwalbe | *Chlidonias niger* |
| Common snipe | Bekassine | *Gallinago gallinago* |
| Common tern | Flussseeschwalbe | *Sterna hirundo* |
| Dunlin | Alpenstrandläufer | *Calidris alpina* |
| Goshawk | Habicht | *Accipiter gentilis* |
| Greater Yellow-rattle | Grosser Klappertopf | *Rhinanthus angustifolius (serotinus)* |
| Green sandpiper | Waldwasserläufer | *Tringa ochropus* |
| Lapwing | Kiebitz | *Vanellus vanellus* |
| Little ringed plover | Flussregenpfeifer | *Charadrius dubius* |
| Oystercatcher | Austernfischer | *Haematopus ostralegus* |
| Peregrine falcon | Wanderfalke | *Falco peregrinus* |
| Redshank | Rotschenkel | *Tringa totanus* |
| Ruff | Kampfläufer | *Calidris(/Philomachus) pugnax* |
| Spotted redshank | Dunkler Wasserläufer | *Tringa erythropus* |
| Wood sandpiper | Bruchwasserläufer | *Tringa glareola* |