

THE USE OF SETTLING PONDS OF SUGAR-FACTORIES BY BREEDING AND RESTING WADERS

by F.-U. Schmidt

INTRODUCTION

This note summarises observations made at the two groups of settling ponds between 1970 and 1980. The study areas are Lower Saxony (the Northern part of the Federal Republic of Germany) in the valley of the river Leine between the Solling and the Harz (1142 m) mountains, (Figure 1). The two areas are: Norten-Hardenberg (51°38'N 9°56'E) and Northeim (51°43'N 9°59'E).

Sugar beet *Beta vulgaris* ssp have been grown in the fertile soil of this area since the middle of the 19th century. From October onwards, the beet is harvested and transported to the factories for refining. Close to each factory are 10-15 storage ponds per factory. These ponds are used for the settlement of muds and bio-degradation processes in effluents that result from washing and sugar extraction.

(branched-off system of pipes) into the settling ponds. From October to the following spring, such water is discharged from the factory into the ponds every day. It comes partly from the beet washing. Part is water with chemical residues from the production processes.

The breakdown of organic substances by microorganisms then begins. First the liquid in the ponds turns dark, smells foul and has little oxygen. Some weeks later the first single-celled organisms appear, and from end of April some ponds are full of invertebrate food e.g. chironomid and ceratopogonid (Diptera) larvae, Culicidae, Tipulidae and even Oligochaeta in varying numbers.

Vegetation growth can rapidly encroach towards the middle of the ponds. Because of differing patterns of effluent discharge, adjacent ponds can differ markedly in habitat. One can find ponds with tall shrub vegetation, with a small area of water and a large area of mud, and ponds with less vegetation and a large surface of water up to 40 cm deep side by side.

In summer and early autumn some of these ponds dry up and others become overgrown, but most still retain wet places or water. Thus the settling pond habitat offers a variety of resting places, breeding areas and feeding grounds. These are summarised in Figure 2.

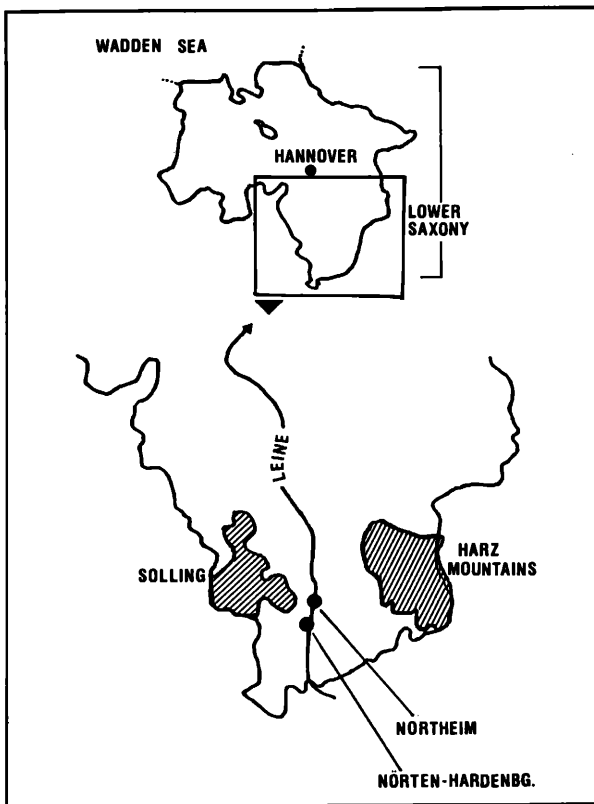


Figure 1. The location of the study areas in Lower Saxony, FRG.

HABITATS

The habitat of the settling ponds changes during the year. In October the sugar beet from surrounding farms start to be harvested and washed at the factory. The muddy water from this washing runs through a manifold

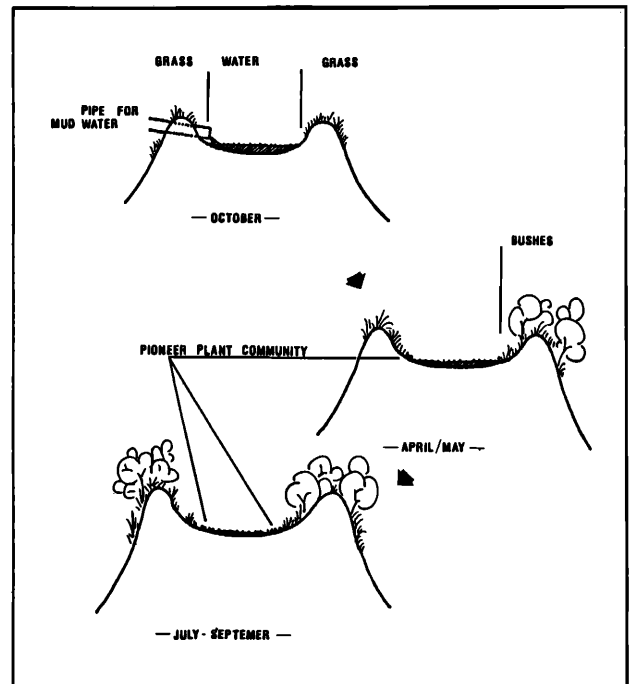


Figure 2. Schematic cross-sections through typical settling ponds. The vertical scale has been exaggerated.

MIGRATION

Due to the annual cycle of the settling ponds the pattern of spring and autumn use of ponds by waders differs markedly. Poor food supply, and the rapid migration to their breeding grounds in northern regions, results in few waders using the ponds during spring migration. In contrast, during autumn most of the ponds provide food for adult and juvenile waders on their way to southern wintering places. The duration of autumn passage resting period is considerably longer than of spring passage. The period of use in autumn is limited partly by the beginning of the manufacturing process of the sugar-factory. Highest numbers of species, and individuals, of waders occur during autumn (see Figure 3). The typical inland-migrating species that occur on the ponds are Common Sandpiper *Actitis hypoleucos*, Lapwing *Vanellus vanellus*, Wood Sandpiper *Tringa glareola*, Green Sandpiper *Tringa ochropus*, Redshank *Tringa totanus*, Ruff *Philomachus pugnax*, Snipe *Gallinago gallinago*, Jack Snipe *Lymnocyrtes minimus* and Little Ringed Plover *Charadrius dubius*. The *Calidris* sandpipers occur mainly in autumn, and regularly include Dunlin *Calidris alpina*, Temminck's Stint *Calidris temminckii*, Little Stint *Calidris minuta* and Curlew Sandpiper *Calidris ferruginea*.

The considerable attraction of these ponds for migrating waders is shown also by the occurrence of a wide range of other species including Oystercatcher *Haematopus ostralegus*, Kentish Plover *Charadrius alexandrinus*, Avocet *Recurvirostra avosetta*, Turnstone *Arenaria interpres*, Sanderling *Calidris alba*, Grey Phalarope *Phalaropus fulicarius* and Red-necked Phalarope *Phalaropus lobatus*.

It is likely that weather conditions (such as strong winds) increase the numbers of coastal migrating waders from the Wadden Sea that are seen inland. The Woodcock *Scolopax rusticola* breeds locally, but seldom uses the ponds: it is as rare a visitor as Avocets and Sanderlings.

BREEDING

In contrast to the 34 species that occur on migration, only two waders breed, on dry or drained ponds. The Little Ringed Plover makes shallow scrapes on dry mud from mid-March to mid-April, but only on ponds which are free from vegetation and give good visibility. The Lapwing breeds irregularly on the ponds, probably because the neighbourhood has more suitable breeding areas on meadows and fields. Generally the numbers of breeding waders are small in relation to the size of the whole area and the total number of migrating waders.

WADERS USING THE PONDS

Below I summarise the use of the settling ponds by each wader species.

Oystercatcher *Haematopus ostralegus*

A rare visitor at various times of the year, has a short resting period.

Lapwing *Vanellus vanellus*

A common visitor in numbers of 50 to 600 individuals on the ponds and nearby, and large numbers of juveniles in August and September. Breeding pairs: in Norten-Hardenberg 10-15, in Northeim 4-8 each year.

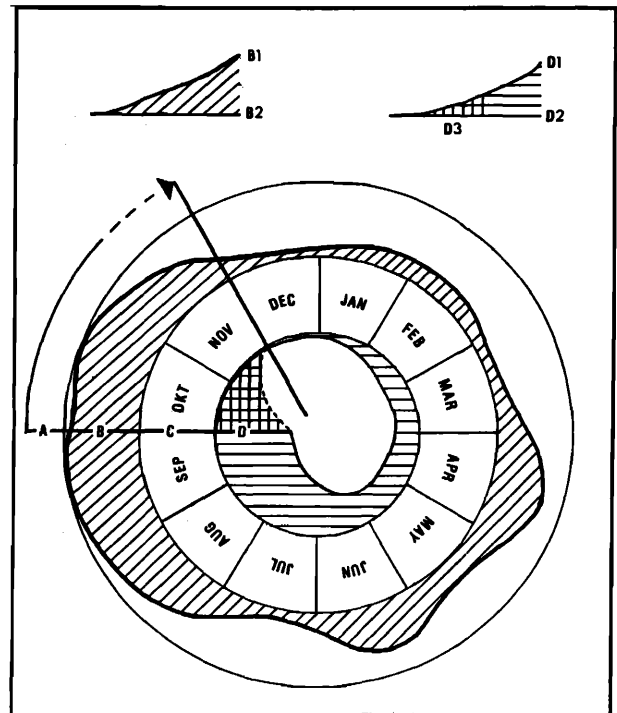


Figure 3. Seasonal patterns of environmental factors and the annual periodicity of inland migrating waders on two storage-pond systems between 1970-1980, a schematic and smoothed diagram. The scale is read along a radius. A = period of harvesting sugar beet periods; B = migration of waders (number of individuals), B1 Large numbers of individuals, B2 small numbers of individuals; C = months, D = food availability (chiefly aquatic invertebrates), D1 food abundant, D2 food scarce, D3 during the harvest of sugar beet, some ponds are filled with muddy water: no food is available to waders in these ponds.

Ringed Plover *Charadrius hiaticula*

A common visitor in numbers between 2 - 110 in spring, and up to 14 individuals in autumn; probably two separate populations pass through in spring: the first peak is at the end of March (probably chiefly *C.h.hiaticula*), and the second peak is mid- to late May (probably *C.h.tundrae*).

Little Ringed Plover *Charadrius dubius*

A common visitor, in spring 4-6 birds on average, in autumn up to 20 or more; 4-8 breeding pairs in Norten-Hardenberg, 3-7 in Northeim each year.

Kentish Plover *Charadrius alexandrinus*

Very rare visitor on spring migration.

Grey Plover *Pluvialis squatarola*

Irregular visitor, mostly in autumn.

Golden Plover *Pluvialis apricaria*

Irregular visitor in spring and autumn; no more than 10-12 birds on the ponds, but larger flocks (maximum 200+) occur on surrounding meadows.

Turnstone *Arenaria interpres*

Rare visitor in spring and autumn; some remain for long periods (2 - 3 weeks), mostly juvenile birds in spring.

Snipe *Gallinago gallinago*

Common visitor in spring and autumn; a few birds remain throughout mild winters and stay through the summer; now and then display flights seen but no nests found.

Jack Snipe *Lymnocyptes minimus*

Regular visitor in spring and autumn, with a maximum of 16 birds in Northeim and Norten-Hardenberg in 1977.

Woodcock *Scolopax rusticola*

Very rare visitor on settling ponds.

Curlew *Numenius arquata*

Irregular visitor, mostly in autumn, in small numbers.

Whimbrel *Numenius phaeopus*

Very rare visitor on settling ponds.

Black-tailed Godwit *Limosa limosa*

Irregular visitor, mostly in spring, in small numbers.

Bar-tailed Godwit *Limosa lapponica*

Rare visitor on settling ponds.

Spotted Redshank *Tringa erythropus*

Regular visitor in both migration seasons; in spring 1-3 individuals, in autumn up to maximum of 12-15 birds.

Redshank *Tringa totanus*

Common visitor in spring and autumn; in spring a maximum of 12, in autumn 30 or more.

Greenshank *Tringa nebularia*

Common visitor in both migrating periods; like the Redshank mostly in autumn, with up to 21 birds.

Marsh Sandpiper *Tringa stagnatilis*

One observation in 1971 at Northeim.

Green Sandpiper *Tringa ochropus*

Common visitor in spring and autumn; in spring up to 11 birds and in autumn up to 20 birds at any one time; often birds remaining during mild winter periods.

Wood Sandpiper *Tringa glareola*

Common visitor in both seasons; the autumn migration often starts, like that of the Green Sandpiper, at the end of June and there can be up to 110 birds or more.

Common Sandpiper *Tringa hypoleucos*

Common visitor in both seasons; the spring migration ends in June and has up to 8-10 birds; the autumn migration starts in July, has up to 55-70 birds and ends at the end of October; ringing shows that adults migrate early and juveniles later. Some summer observations of non-breeding birds, and in autumn roosting flocks of 20-25 birds.

Little Stint *Calidris minuta*

Regular visitor in small numbers mostly in autumn (up to 50% juveniles or more); a maximum of 56 birds in 1977 in Norten-Hardenberg and more than 70 birds in Northeim, but usually 4-5 birds.

Temminck's Stint *Calidris temminckii*

Regular visitor in small numbers mostly in autumn; during spring migration 1-3 birds (on one occasion in 1977 8 birds) and up to 4 birds in autumn.

Pectoral Sandpiper *Calidris melanotos*

One observation in 1976 of bird in Northeim.

Dunlin *Calidris alpina*

Regular visitor in both migration periods and the most numerous *Calidris* Sandpiper on the storage ponds in spring a maximum of 4-7 birds, but in autumn sometimes more than 50 birds.

Curlew Sandpiper *Calidris ferruginea*

Regular visitor in small numbers, mostly in autumn, with maxima of 4-5 birds.

Knot *Calidris canutus*

One juvenile bird in autumn 1976 in Norten-Hardenberg.

Sanderling *Calidris alba*

Rare visitor in both migration periods.

Broad-billed Sandpiper *Limicola falcinellus*

One observation of 2 birds in 1970 in Norten-Hardenberg.

Ruff *Philomachus pugnax*

Common visitor in both seasons. Seldom more than 15-20 birds; sometimes males with some breeding plumage.

Avocet *Recurvirostra avosetta*

One observation in spring 1970 in Norten-Hardenberg.

Red-necked Phalarope *Phalaropus lobatus*

Irregular visitor mostly in autumn. On one occasion two birds in full breeding plumage in spring.

Grey Phalarope *Phalaropus fulicarius*

Rare visitor mostly in autumn (in winter plumage).

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