

# Migration pattern and seasonal activity of waders at Draganic fishponds in NW Croatia

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The number and seasonal activity of waders were studied at Draganic fishponds (NW Croatia) from August 1991 to December 1994. A total of 26 wader species were noted. Two species, Lapwing and Little Ringed Plover, were breeding in small numbers and with a low success rate. The only regular wintering species was Green Sandpiper, but present in small numbers. Lapwing and Ruff were the most numerous species during spring migration, whereas Wood Sandpiper, Common Snipe, Lapwing and Dunlin predominated during the autumn migration. Migration patterns differed between years both in timing of migration and number of birds. These differences were mostly a consequence of the different timing and extent of the pond drainage between years.

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## INTRODUCTION

The migration of waders is poorly known in Croatia. In the available literature (reviewed in Kralj 1997), information is scattered, and in most cases species are mentioned without reference to numbers and migration patterns. The only exception is the work of Stipcevic (1997), in which the numbers and pattern of spring migration of waders on the wetlands of the island of Pag in years 1990 and 1991 are given. This research was conducted on the Adriatic coast, but there hasn't been any similar study for the continental part of Croatia. As a result, migration patterns and stopover sites of migrating waders in Croatia have remained unidentified.

Croatian natural wetlands have been devastated, mainly by canalization and drainage, and are nowadays very scarce. Watercourse regulation has been partially or completely carried out at most of the Croatian rivers (11,059 km of watercourses are now regulated). A large proportion of the valleys near the Sava and Drava rivers were once flooded, but today only two large flood-plains remain: Lonjsko polje and Kopacevski rit. So far, in Croatia, a total of 1,118,884 ha have been drained. As a consequence, man-made habitats, especially fishponds, have an increasing importance for migratory waders. In this article we present the results of a study of the numbers and seasonal activity of waders, which was part of research being carried on the complete ornithofauna, conducted between 1991 and 1994 at Draganic fishponds, NW Croatia.

## STUDY AREA

Draganic fishponds are carp ponds situated in the southwest of the Pokupsko basin near Karlovac (NW Croatia, Figure 1). In the Pokupsko basin there are four fishponds with a total area of 1,400 ha of open water (Boliæ 1992). The Draganic fishponds (395 ha) consist of four main compartments and a number of small ponds. The water is about 130 cm deep. The shores are completely covered with vegetation (Reed *Phragmites australis*, Cattail *Typha* sp., Sedge *Carex* sp. etc.), so that a muddy surface (available for feeding of waders) appears only when ponds were drained. The drainage takes place periodically. During the study period, extensive drainage of ponds began in October, when almost all ponds were drained because of fish harvesting. Most of ponds stayed empty during winter and were filled up again in spring. Those that were full in winter were briefly drained and refilled. During June and early July, ponds were mostly full. One of the main ponds and some of the smaller ones were drained from late

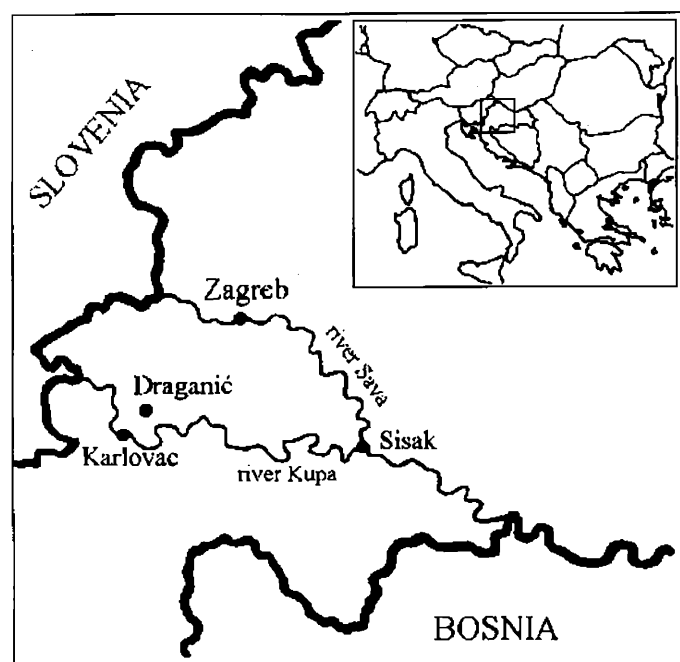


Figure 1 Position of Draganic fishponds in NW Croatia

July until September in most years. This was a general pattern, with significant differences in particular years, as in 1994, when all ponds were full throughout August and September. In early summer, while full, fishponds were mowed because they were completely overgrown by floating and emergent vegetation: Water Chestnut *Trapa natans* and Fringed Water Lily *Nymphoides peltata*.

## METHODS

The Draganic fishponds were visited once per ten-day period (three times per month) from August 1991 to December 1994 (n = 124 visits). The same survey route was taken each time, which allowed us to check all compartments. Each visit started one hour after sunrise and lasted 3–8 hours, depending

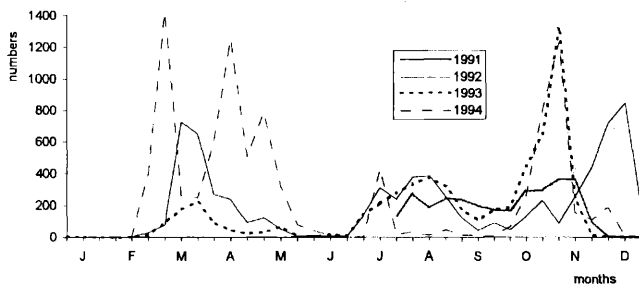


Figure 2 Total numbers of waders at Draganic fishponds per 10-day period from August 1991 to December 1994.

Species	No.	Species	No.
Wood Sandpiper	93	Lapwing	2
Common Snipe	34	Marsh Sandpiper	2
Little Stint	23	Turnstone	2
Ruff	11	Curlew Sandpiper	2
Common Sandpiper	8	Grey Plover	1
Dunlin	8	Ringed Plover	1
Little Ringed Plover	4	Green Sandpiper	1
Redshank	4	Jack Snipe	1
Greenshank	3	Temminck's Stint	1

Table 1. Numbers of ringed waders at Draganic fishponds during autumn migration from 1992 to 1997 (total: 201).

on the season and circumstances. The longest visits, 7–8 hours, were in June and July when a lot of pulli (mostly ducklings, all bird species were counted) staying in well developed vegetation, 5–7 hours during migration period, and 3–4 hours during winter when birds were less numerous and the water was frozen. Apart from regular visits, some data were based on ringing, conducted from July to October between 1992 and 1997 (Table 1) and on irregular visits made after December 1994.

## RESULTS

A total of 26 wader species were recorded during the four years of research. Two species, Lapwing and Little Ringed Plover, were breeding in small numbers. The total number of waders throughout the year (Figure 2) showed that the overall pattern was different each year, both regarding the number of migrating birds and the timing of migration. During spring

migration, the most numerous species were Lapwing and Ruff. The autumn migration was somewhat more consistent between years, and showed two peaks: a smaller one in July and August, consisting mainly of Wood Sandpipers, and less numerous Common Snipes; and a later and longer-lasting peak consisting mainly of Lapwings and less numerous Dunlins.

**Black-winged Stilt *Himantopus himantopus*** was seen seven times, always during the spring migration in April and May. One individual was observed three times, while two, three, four and eight birds were observed only once.

**Avocet *Recurvirostra avosetta*** was noted twice: on August 27th 1991 (5 birds) and November 26th 1993 (1 bird).

**Lapwing *Vanellus vanellus*** bred in small numbers (max 10–15 pairs). The number of pairs and breeding success depended on the number of ponds drained during the breeding period. In the worst years, all clutches were destroyed by the refilling of the ponds, while in years with later filling, a proportion of nests remaining unflooded. Lapwings also bred on the surrounding meadows and ploughed fields, but not in large numbers (max. 10 pairs). The spring migration began in late February and early March (with the exception of 1994, when two birds were recorded in late January) (Figure 3), reaching its peak in early and mid March. In early April, only the breeding birds remained in the area. The autumn migration began in mid October with its peak in early November (in 1993 and 1994), mid November in 1991 and early and mid December in 1992. Maximum numbers during the spring migration differed considerably between years, from 51 in 1993 to 928 in 1994. In the autumn migration maxima were more similar: from 830 to 1,007, with the exception of 1991, when the peak was only 180 birds. The birds observed between early April and mid June were breeders. In late June (when all the ponds were full) birds were not observed. Lapwings present from early and mid July were probably breeders from the fishponds and the surrounding area which returned to the small ponds which were briefly drained in summer. These birds stayed in the area until late August, and they were mostly absent in September (before the beginning of the autumn migration), with the exception of 1991 when they stayed until late September.

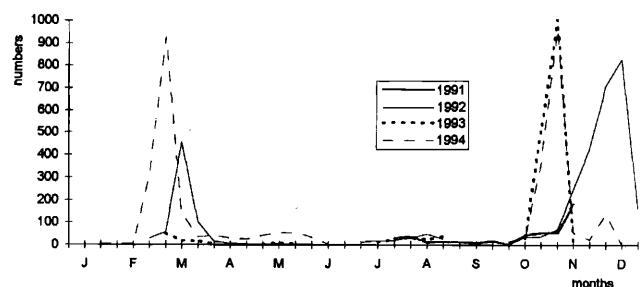


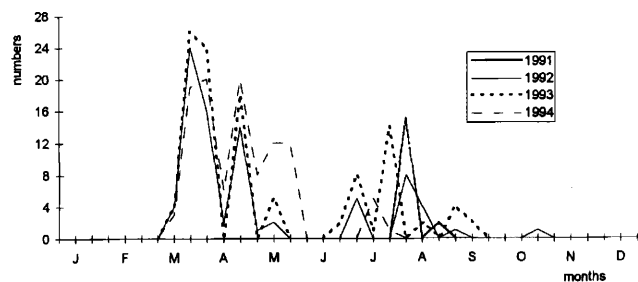
Figure 3 Numbers of Lapwing at Draganic fishponds per 10-day period from August 1991 to December 1994.

**Golden Plover *Pluvialis apricaria*** was observed five times during the autumn migration: once in October (6 on October 18th 1994) and four times in November (1, 2, 5 and 24 birds), with the last observation on November 25th. Probably, birds found migrating through this area are those using "East-West route", from NE Russia through Central Europe to Iberia (Hagemeijer & Blair 1997).

**Grey Plover *Pluvialis squatarola*** was observed irregularly during autumn migration, from mid August to mid November, with the majority of birds being observed from late September onwards. It was most numerous in 1991 (max. 18 birds in October) but during 1994, it wasn't observed at all. Outside this period it was seen only once, one bird on July 6th 1992. Those birds probably belong to the small proportion of the Grey Plover population which migrate via the Mediterranean Flyway (Hagemeijer & Blair 1997).

**Ringed Plover *Charadrius hiaticula*** was present during spring (from early March till mid May) and autumn migration (from early August till mid October), but irregularly and in small numbers ( $\leq 11$ ), although more birds were seen in spring than autumn.

**Little Ringed Plover *Charadrius dubius*** bred in even smaller numbers than Lapwing, with a maximum of five pairs. As it bred later than Lapwing, the refilling of the ponds in spring had even more of a negative impact on the breeding success, with nests being regularly flooded. As a result, during the entire study period, only nests with eggs were noted; pulli were never observed. However, it is possible that some young fledged in some years. The spring migration was regular and the same pattern was repeated every year (Figure 4). First



**Figure 4** Numbers of Little Ringed Plover at Draganic fishponds per 10-day period from August 1991 to December 1994.

birds were always observed in mid March. There were two obvious peaks: the first from late March till early April (max 20–26 birds) and the second in late April (max. 14–20 birds). Birds present during May were mostly or even exclusively breeders. The autumn migration was interrupted, the migrating pattern was not so uniform and birds were less numerous and more irregular. Nevertheless, they reached maximum numbers (5–15 birds) in late July and early August.

**Black-tailed Godwit *Limosa limosa*** was occasionally present in small numbers ( $\leq 23$ ) during spring (from late February till mid April) and autumn migration (from late June till mid September although, like Ringed Plovers, more were seen in spring).

**Bar-tailed Godwit *Limosa lapponica*** was observed only in autumn 1991, when three birds stayed in the fishponds from September 20th till October 17th.

**Curlew *Numenius arquata*** was observed during autumn migration, but irregularly and in small numbers ( $\leq 18$ ). They were also seen in winter on a few occasions, and two specimens stayed in the area during the whole winter in 1994/95. During spring migration, they were seen only once, two birds on April 8th 1993.

**Spotted Redshank *Tringa erythropus*** was present during the spring and autumn migration in some years being quite numerous (Table 2). The spring migration was relatively short, mostly taking place in early and mid April (with first birds in late March, and last in late May). Autumn migration was prolonged (from late June till mid November) and birds were more irregular.

**Redshank *Tringa totanus*** was present during spring (from mid March till late May) and autumn migration (mid June till mid October), but irregularly and in small numbers (max. 6 birds). One bird, ringed at the fishponds on July 25th 1995 was found the same year on September 6th in Valle Figheri near Venice, Italy.

**Marsh Sandpiper *Tringa stagnatilis*** was recorded five times. It was seen only once during spring migration, twelve birds on April 6th 1994. It was observed four times during autumn migration, between July 14th and August 22nd: twice in 1994 (one and two birds) while two birds were ringed in two subsequent years (one in 1995 and one in 1996).

**Table 2.** Numbers of Spotted Redshank at Draganic fishponds per ten-day period during spring and autumn migration from August 1991 to December 1994.

	Spring migration				Autumn migration						
	M.	April		May	J.	July	August	September		October	Nov.
1991							9 8	7			
1992	5	9 9				4		6		4	
1993		6 2			5 1		3	2 25	28 34 30	2	
1994		17 93 100	7 1			4	2			11	1

**Greenshank *Tringa nebularia*** was regular during the spring (from late March till late May), with peak numbers in April (max. 0–43) and during the autumn migration (from late June till late October), with peak numbers usually in July and August (max. 13–29). It was irregular only during the autumn migration in 1994, when all ponds were full during the main migration period.

**Green Sandpiper *Tringa ochropus*** was regular during spring migration, mostly from mid March to early April (first birds appeared in late February, and the last in early May). Timing of spring migration is in accordance with that in Mediterranean part of Croatia (Stipcevic 1998), which is about two weeks earlier than in Fennoscandia (Hagemeijer & Blair 1997). Maximum, 7–26 birds, depending on the year, occurred in late March. It was more irregular and less numerous during the autumn migration (from late July till mid September). Outside that period it was seen only once, one bird on June 22nd 1994. The maximum was 3–12 birds, depending on the year. It was the only wader species that regularly overwintered on the fishponds. The wintering population appeared during October, reaching its peak in late November and early December (max 7 birds). Only 1–3 birds were seen from December till early February (the period when ponds were mostly frozen). They probably stayed on rivers, canals and streams that did not freeze.

**Wood Sandpiper *Tringa glareola*** was the most regular and the most numerous of all the *Tringa* species (Figure 5). The main period of the spring migration lasted from early April till mid May (the earliest birds arrived on March 5th 1992, and the last stayed until June 3rd 1994). The maximum was 45–103, depending on the year. The autumn migration began in late June, and its main period ended in early September. The last birds were observed on November 25th 1992. The maximum was between 171 and 284. One bird ringed at the fishponds on August 3rd 1993 was recovered in the same place after 20 days.

**Common Sandpiper *Actitis hypoleucos*** was mostly irregular and occurred in low numbers (<15 birds) during the spring migration (from early April till mid May), and also occurring

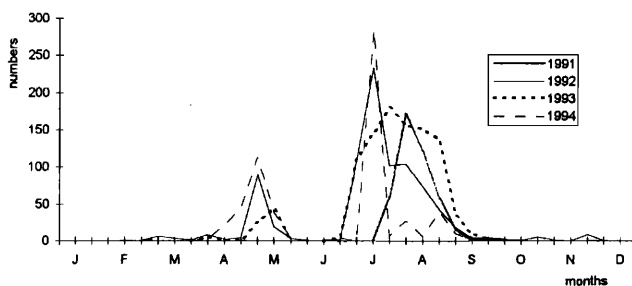


Figure 5 Numbers of Wood Sandpiper at Draganic fishponds per 10-day period from August 1991 to December 1994.

in low numbers (<10 birds) but a bit more regular in autumn (mostly from mid July till mid September). It was seen only once outside of period shown in the table, two birds on November 23rd 1994. It was never found during winter.

**Turnstone *Arenaria interpres*** was recorded only twice: three birds were seen in the area on August 23rd and 24th 1993 (one of them was ringed), and yet another bird was ringed on August 22nd 1996.

**Common Snipe *Gallinago gallinago*** was regular during the spring migration, from early March till mid April (Figure 6). The maximum numbers were between 36–83. The main period of the autumn migration began in late July (the earliest birds arrived on 6th July 1992) and lasted until late November. The autumn migration showed two obvious peaks: the first one from mid August till mid September (depending on the year), with maxima of 119–197, and the second from mid October till mid November, with maxima of 58–294. The first peak was not observed in 1994, because all ponds were full in this period. Common Snipes were observed wintering only in 1992/93 (3–13 birds in December and one in January). Timing of spring migration is in accordance with that given by Hagemeijer & Blair (1997), but autumn migration is somewhat longer (till late November), with peak still in November, when birds from the Central Europe are already reaching their winter grounds.

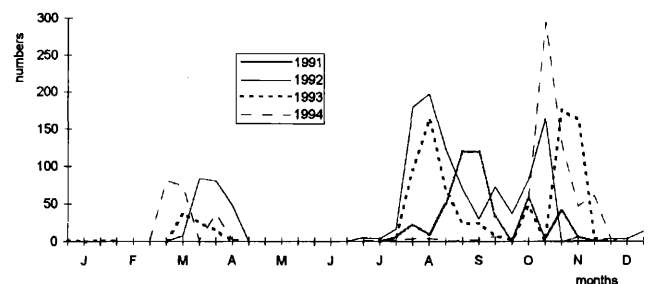


Figure 6 Numbers of Common Snipe at Draganic fishponds per 10-day period from August 1991 to December 1994.

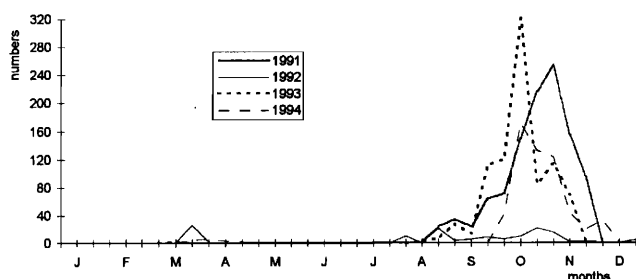
**Jack Snipe *Lymnocyrtus minimus*** was noted once, on October 18th 1997, when one bird was ringed. Probably it arrived more often during the autumn migration, but this species is difficult to detect because of its cryptic coloration and behaviour.

**Sanderling *Calidris alba*** was seen only once, on May 14th 1993, when three birds were observed.

**Little Stint *Calidris minuta*** was scarce during the spring migration, with only seven observations. They occurred in small numbers, with the exception of a flock of 182 birds observed on May 16th 1994. They were a bit more regular and numerous in autumn when up to 41 were observed at one time.

**Temminck's Stint** *Calidris temminckii* was noted only five times, from late July until early September. One to three birds were seen on each occasion except August 25th 1992 when 12 birds were observed. On August 23rd 1993 one bird was caught at the fishponds, which had been ringed on July 20th 1989 at the mouth of the river Vistula in Poland.

**Dunlin** *Calidris alpina* was irregular and occurred in low numbers during the spring migration (1–5 birds from mid March till mid May) with the exception of March 27th 1992 when 26 birds were observed (Figure 7). The autumn migration began in mid August (the earliest birds arrived in late July), and lasted mostly until late November (the last birds observed in late December). The maximum occurred between mid October and early November and amounted to 170–320 birds, with the exception of 1992 when it was only 21. On September 19th and 20th 1993 one bird was caught at the fishponds, which had been ringed three days earlier, on September 16th 1993 at the mouth of the river Vistula in Poland.



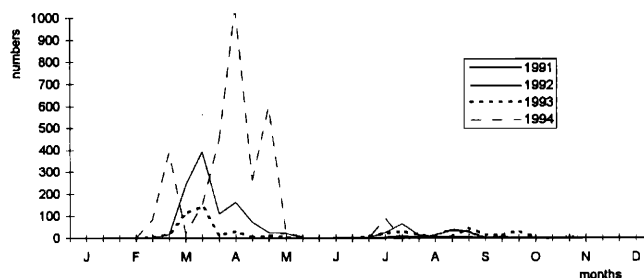
**Figure 7** Numbers of Dunlin at Draganic fishponds per 10-day period from August 1991 to December 1994.

**Curlew Sandpiper** *Calidris ferruginea* was scarce. It was observed only once during spring migration: two birds on May 16th 1994. During autumn migration it was noted four times: twice in late July (one observed on July 23rd 1991 and one ringed on July 25th 1995), and twice in August: three birds on August 6th 1993 and one bird ringed on August 23rd 1993.

**Ruff** *Philomachus pugnax* was regular and numerous during the spring migration, which started in late February and lasted till mid May (last observation on May 22nd 1994) (Figure 8). The maximum was between 145 and 1045 birds, depending on the year. The main autumn migration began in mid July (the earliest birds in late June) and lasted till mid October, with few birds observed until mid December. They were more irregular and less numerous in autumn, with maxima between 38 and 88 birds. The reason of such low numbers in autumn probably lies in the use of a more westerly route during the autumn migration (Hagemeijer & Blair 1997).

## DISCUSSION

During the study period at the Draganic fishponds, all wader species that occurred regularly on migration in inland Croatia



**Figure 8** Numbers of Ruff at Draganic fishponds per 10-day period from August 1991 to December 1994.

were recorded (Kralj 1997) except Woodcock, which was common in the surrounding forests. Some rare species, such as Bar-tailed Godwit and Turnstone were also recorded. As mentioned above, the migration pattern differed between years (Figure 2). For example, the maximum numbers in spring varied from 221 in 1993 to 1,423 in 1994, and in autumn from 365 in 1991 to 1,325 in 1993. Probably, these variations were mostly a consequence of differences in the timing and extent of drainage of the ponds over the years. The most remarkable example was in 1994, when all the ponds were full during the whole of August and September, so practically no migrating waders were observed in that period. A small number of waders (mostly Wood Sandpipers) present on fishponds, were usually resting on floating clumps of mowed decayed vegetation. Since there are another three carp ponds in the Pokupsko basin (the nearest is 7 km and the farthest is 15 km away), birds could easily fly from one to another (which was often observed), and that also could cause the irregularity in migration pattern at Draganic fishponds. Synchronised studies of all four fishponds would probably result in more consistent migration patterns. It is known that migration patterns from a single inland site could reflect the changes in ecological parameters at that particular site, rather than the real migration pattern of a given species in that region (OAG Münster 1987).

According to these results, Draganic fishponds are an important stopover site for migrating Lapwings, Wood Sandpipers, Common Snipes, Dunlins and Ruffs in Croatia. During spring migration, Lapwings and Ruffs dominate. Spring counts at coastal wetlands on the island of Pag (Stipcevic 1998) showed only a partial similarity to Draganic Ruff was the most numerous species at both sites, but Lapwing, which was also common at Draganic was scarce and occurred in low numbers on Pag. On the other hand, Little Stint, which co-dominated on Pag was very irregular and occurred in low numbers at Draganic (except once, when 182 birds were observed). Although it is inappropriate to make any conclusion on the basis of only two studies, Ruffs seemed to use both inland and coastal wetlands in Croatia during the spring migration, while Lapwings prefer inland sites and Little Stints coastal ones. Of the other species observed regularly, both sites had about the same importance during spring migration for Little Ringed Plover, Spotted Redshank, Greenshank and Wood Sandpiper. The Grey Plover and

Redshank preferred coastal wetlands, while the Common Snipe preferred inland ones.

During autumn migration at Draganic fishponds, Wood Sandpipers, Common Snipes, Lapwings and Dunlins dominated. The late Dunlin peak (in September and November) is typical for this species in inland Europe (Cramp 1983). It is interesting to mention the recovery of the first-year Dunlin from September 1993 which was found only three days after it had been ringed at Vistula mouth, Poland. This bird was in a flock of 12, and the whole flock spent two days feeding all the time, so it may be concluded that the distance of 1,005 km in SSW direction was probably flown at once.

Although important for migration of waders (on the Croatian level), Draganic fishponds don't have such general importance for their breeding and wintering. That is because fishponds are filled with water in the breeding season (and are therefore unsuitable for breeding) and in winter both the filled and drained ponds are mostly frozen. Only two species (Lapwing and Little Ringed Plover) breed, both in low numbers and with low success rates. The only regular wintering species was the Green Sandpiper, although also present in low numbers.

## New wader ringing site in Western Ukraine

*Włodzimierz Meissner, Magdalena Remisiewicz & Igor Szydlowski*

Waders using the coast of the Gulf of Gdansk (southern Baltic, Poland) as a resting place continue their migration in three different directions – along the East Atlantic Coastal Flyway, inland to the Mediterranean and over the mainland towards the Black Sea (Gromadzka 1987). The latter two flyways are relatively poorly studied, indeed the course and use of the Black Sea flyway is almost unknown as there are very few ringing stations and recoveries from the Black Sea direction.

The Waterbird Research Group KULING was very interested in the development of wader studies along this flyway because a proportion of the birds ringed by us at Reda mouth migrate to the Black Sea. Filling this gap in knowledge would be possible only by establishment of ringing points in the Dnestr valley, which along with the Vistula–San rivers system, is probably a corridor for waders migrating to the Black Sea. Realisation of this idea was possible thanks to contact with Ukrainian colleagues from the western branch of the Ukrainian Ornithological Society. With the financial and organisational support of KULING, in autumn 1995 they established a wader and passerine ringing site named 'Avosetta' at Cholyni near Lviv (49°54'N, 23°27'E). The ringing station was run by ornithologists from Lviv University with the help of Polish ringers (from Gdansk Ornithological Station) and members of WRG KULING. The first season generated so much enthusiasm amongst Ukrainian ringers that

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the work was continued in 1996, also with some support from KULING.



The ringing site 'Avosetta' is situated at the dumping site of a sulphur extraction factory and covers an area of about 50 ha. The area is divided by dykes into several basins containing open water with muddy banks and shallows which attract feeding waders. A significant proportion of the site is covered by reedbed and also by dry mud with low, sparse vegetation. Catching took place in the period 15th August – 15th September 1995 and 5th August – 6th September 1996. Waders were caught using walk-in traps and mist-nets situated on the muddy banks of one of the ponds. Several mist-nets were also placed in the reed-bed to catch passerines. Apart from catching, counts of waders were also conducted. Counts were made from 15th June to 15th October, twice per five-day period outside the catching period and every day during the catching period.

## PROVISIONAL RESULTS

Results of catching are presented in Table 1. Wood Sandpiper *Tringa glareola* was the most numerous species ringed, although the counts showed that the most numerous species present were Lapwing *Vanellus vanellus* and Curlew *Numenius arquata*, maximum daily numbers of which reached 1,850 and 450 birds respectively.