

### Waterbird breeding on salinas in Ria Formosa, southern Portugal

VERA FONSECA<sup>1</sup>, NUNO GRADE<sup>2</sup> & LUÍS CANCELA DA FONSECA<sup>1,3</sup>

<sup>1</sup> Universidade do Algarve, FCMA, Gambelas-8000 Faro Portugal. [veragfonseca@yahoo.com](mailto:veragfonseca@yahoo.com)

<sup>2</sup> Parque Natural da Ria Formosa (ICN), 8700-305 Olhão, Portugal

<sup>3</sup> IMAR/Laboratório da Guia Estrada do Guincho 2750-642 Cascais Portugal

Keywords: *Himantopus himantopus*, *Recurvirostra avosetta*, *Charadrius alexandrinus*, *Sterna albifrons*, *Tachybaptus ruficollis*, *Anas platyrhynchos*, salt pans, breeding waterbirds, supratidal habitats.

Salinas (saltworks) are particularly important for the estuarine waterbirds that breed in Mediterranean countries, where nesting habitats are often scarce. Here we analyze the use of habitats by waterbirds breeding in a salinas complex on the Ria Formosa in southern Portugal. The results should assist in determining the value of salinas for breeding waterbirds and in drawing up appropriate conservation prescriptions. The species recorded were Black-winged Stilt *Himantopus himantopus*, Pied Avocet *Recurvirostra avosetta*, Kentish Plover *Charadrius alexandrinus*, Little Tern *Sterna albifrons*, Mallard *Anas platyrhynchos* and Little Grebe *Tachybaptus ruficollis*. Our study suggests that each species chooses to use different ponds depending on water level and salinity. Knowledge of such patterns is useful in determining good conservation management.

Salinas are man-made supratidal habitats that may provide suitable habitats for waterbirds to breed and forage (Britton & Johnson 1987, Velasquez & Hockey 1992, Erwin *et al.* 1994). Although they are generally located in estuarine areas, salinas are not influenced by tidal rhythms and the water levels change slowly (Velasquez 1992), making them regular and predictable habitats over time (Masero *et al.* 2000). These features mean that salinas are particularly important for estuarine waterbirds breeding in Mediterranean countries, where alternative breeding habitats are scarce. Despite their value for wildlife, the number of salinas has declined around the Mediterranean in recent decades due to the abandonment of salt production. Moreover there has been a change from traditional to industrial salt extraction methods, which affects their value as habitat for waterbirds. Together, these factors have resulted in a general loss of breeding habitat for estuarine waterbirds and have led to calls for the protection and favourable management of those areas that still provide adequate conditions.

In Portugal, some large salinas remain in the estuaries of the rivers Tagus, Sado and Guadiana, and in Ria de Aveiro and Ria Formosa. As in other Mediterranean countries, salinas have declined in Portugal (Rufino & Neves 1992), and have totally disappeared in some small estuaries such as that of the river Mira. The value of Portuguese salinas for waterbirds has been often demonstrated, both as wintering and breeding habitats (Rufino *et al.* 1984, Bijlsma *et al.* 1985, Batty 1992, Neves & Rufino 1994). However, information on the factors that affect the suitability of these areas as breed-

ing habitats remains scarce. As a consequence, knowledge on how they can best be managed for waterbirds is inadequate. These issues are addressed in the present study, in which we analyse the use of habitats by breeding waterbirds on a salinas complex in southern Portugal.

The study was conducted on the salinas of the Tavira estuary (37°02'N, 7°38'W) in the Ria Formosa wetland, Algarve, southern Portugal. The study area comprises 132 ha where each salina is made up of three sets of pans (for storage, evaporation and crystallization) which are connected through a series of sluices. They differ mainly in their salinity (40‰, 150‰ and 250‰ respectively); water depth (50 cm, 20 cm and 5 cm) and vegetation (dense, moderate and sparse) (Rufino & Neves 1992). This area is subject to increasing human disturbance due to tourism, including the building of resort facilities near the breeding areas.

The waterbirds breeding in the salinas were surveyed twice a week between 30 March and 5 August 1999. The area was divided into nine sectors corresponding to different salinas. Each sector included all of the three different types of saltpan and each was visited by the same observer. The location of all waterbirds that were apparently breeding (i.e. birds with nests, birds using distraction display, etc.) was recorded on maps and the number of individuals in each sector was estimated.

Six waterbird species were found breeding in the salinas of Tavira in 1999, though only four – Black-winged Stilt, Pied Avocet, Kentish Plover and Little Tern – occurred in appreciable numbers (Table 1). These are the same four species that are the most commonly found breeding in Portuguese salinas generally (Neves & Rufino 1994). All six species bred in both the storage and evaporation pans, with the exception of Mallard and Little Grebe which were only found in the storage pans. No waterbirds were found breeding in the crystallization pans, possibly a consequence of high levels of salinity (and therefore low availability of food), predation risk and disturbance by men working in these pans during summer. All species appeared to prefer larger and more isolated salinas of 15–25 ha instead of smaller ones of 5–8 ha (authors' unpubl. data). Probably this arises because of the birds' need for large, undisturbed, open areas, facilitating less competition for territory and better visibility of approaching predators.

Black-winged Stilts were significantly more abundant in



**Table 1.** Numbers of individual breeding waterbirds (i.e. both sexes combined) using evaporation and storage pans in the Vale Carangueijo-Tavira salt pans, Ria Formosa, southern Portugal between 30 March and 5 August 1999. No breeding waterbirds were observed on crystallization pans (which are shallow (~5cm deep), have high salinity (~250‰) and sparse vegetation).  $\chi^2$  tests show whether, for each species, the numbers using the two habitats are significantly different from equality (d.f. = 1 with Yates correction in each case).

Habitat characteristics	Evaporation pans	Storage pans				
Salinity	~150 ‰	~40 ‰				
Water depth	~20 cm	~50 cm				
Vegetation	moderate	dense				
Species	Count	Count	Total	$\chi^2$	p	
Black-winged Stilt <i>Himantopus himantopus</i>	18	52	70	15.56	<0.01	
Pied Avocet <i>Recurvirostra avosetta</i>	17	30	47	3.06	ns	
Kentish Plover <i>Charadrius alexandrinus</i>	24	18	42	0.88	ns	
Little Tern <i>Sterna albifrons</i>	12	7	19	0.84	ns	
Little Grebe <i>Tachybaptus ruficollis</i>	0	5	5			
Mallard <i>Anas platyrhynchos</i>	0	2	2			
<b>Totals</b>	<b>71</b>	<b>114</b>	<b>185</b>			

storage ponds than in evaporation ponds and there was a similar though not quite significant trend among Pied Avocets (Table 1). Both species nest on the dykes between the pans and their apparent preference for storage pans probably relates to the denser vegetation which helps camouflage their nests (Rufino *et al.* 1984).

Salinas are the most important breeding habitat for Black-winged Stilts in Portugal and support about 70% of the national population (Neves & Rufino 1994). In our study area, they comprised 40% of all breeding waterbirds, another indication of the value of the habitat for stilts.

In contrast to the stilts and avocets, Kentish Plovers and Little Terns occurred more frequently in evaporation ponds, but the differences were not significant (Table 1). Possibly, however, a dataset for a larger area would show that these preferences are significant. If so, the reason could be that their nests are built on semi-open areas (Kentish Plover) or are only partially surrounded by vegetation (Little Tern) (Cramp & Simmons 1983). We also found that these species tend to breed close to one another (authors' unpubl. data). Possibly the reason is that Little Tern eggs are relatively easy for predators to detect (Valle & Scarton 1999). Therefore nesting close to Little Terns could be beneficial to Kentish Plovers if the attention of predators is drawn to Little Tern nests and away from their own.

Although we only found small numbers of breeding Little Grebes and Mallards, it would seem likely that these species have a preference for storage pans because of their deeper water levels and more dense vegetation. Little Grebes usually construct floating nests in quiet areas (Cramp & Simmons

1977), so, with plenty of emergent vegetation and low levels of human disturbance, storage pans would be the most suitable habitat.

Today conservation efforts, must apply the principles of sustainable development in order to have a good chance of success. Since water levels influence the availability of food and safe nesting sites, agreement needs to be established with the salt-producers in order to manage water levels to balance the interests of salt producers as well as birds. This would improve breeding conditions at the salinas and increase breeding success.

Salinas are artificial wetlands and their biological richness disappears quickly in the absence of adequate water management. Particularly when they are located along a heavily developed coastline, as in many parts of southern Portugal, they often become the subject of land speculation, and may be filled and disappear (Sadoul *et al.* 1998).

In this note, we have drawn attention to the valuable role salinas play as breeding habitat for several waterbird species. They deserve careful conservation and further research.

We are grateful to Pedro Beja, Sandra Marques and Macarena Castro for their valuable comments on the manuscript.

**Batty L.** 1992. The wader communities of a saline and an intertidal site on the Ria Formosa, Portugal. *Wader Study Group Bull.* 66: 66–72.

**Bijlsma R.G., P.L. Meininger, M. Rekers, F.E. de Roder, R. Schulting R. & R. Vogel** 1985. Wader counts in the Tejo Estuary near Lisbon and in the Salinas of South Portugal. *Wader Study Group Bull.* 43: 23–24.

**Britton R.H. & A.R. Johnson** 1987. An ecological account of a Mediterranean Salina: the salin the Giraud, Camargue (S. France). *Biological Conservation* 42: 185–230.

**Cramp S. & K.E.L. Simmons (eds)** 1977. *The Birds of the Western Palearctic, I.* Oxford Univ. Press.

**Cramp S. & K.E.L. Simmons (eds)** 1983. *The Birds of the Western Palearctic, III.* Oxford Univ. Press.

**Erwin R.M., J.S. Hatfield, M.A. Howe & S.S. Klugman** 1994. Water bird use of salt marsh ponds created for open marsh water management. *J. Wildlife Management.* 58 (3): 516–524.

**Masero J.A., A. Pérez-Hurtado, M. Castro & G.M. Arroyo.** 2000. Complementary use of intertidal mudflats and adjacent Salinas by foraging waders. *Ardea* 88: 177–191.

**Neves R. & R. Rufino** 1994. Importância ornitológica das Salinas; o caso particular do Estuário do Sado. Estudos de Biologia e Conservação da Natureza. Nº15. ICN – Institute for Nature Conservation, Lisboa.

**Rufino R. & R. Neves** 1992. The effects on wader populations of the conversion of the Salinas into fish farms. IWRB Special Pub. No. 20. Proc. Symp. Managing Mediterranean Wetlands and their birds for the year 2000 and beyond: 177–182.

**Rufino R., A. Araújo, J.P. Pina & P.S. Miranda** 1984. The use of Salinas by waders in the Algarve, south Portugal. *Wader Study Group Bull.* 42: 41–42.

**Sadoul N., Walmsley J. Charpentier B.** 1998. Salinas and nature conservation. Conservation of Mediterranean Wetlands 9. Tour du Valat, Arles (France), 96p.

**Sokal R.R. & F.J. Rohlf** 1995. *Biometry*, 3rd edition. W.H. Freeman, New York.

**Valle R. & F. Scarton** 1999. Habitat selection and nesting association in four species of Charadriiformes in the Po Delta (Italy). *Ardeola* 46: 1–12.

**Velasquez C.R. & P.A.R. Hockey** 1992. The importance of supratidal foraging habitats for waders at a south temperate estuary. *Ardea* 80: 243–253.

**Velasquez C.R.** 1992. Managing artificial salt pans as a water bird habitat: species responses to water level manipulation. *Colonial Waterbirds* 15: 43–55.

\* \* \*



# Is bill length in curlews *Numenius* associated with foraging habitats and diet in non-breeding grounds?

PETER DANN

Department of Zoology, University of Melbourne, Parkville, Victoria, 3052, Australia.  
Present address: Research Group, Phillip Island Nature Park, PO Box 97, Cowes, Phillip Island, Victoria, 3922, Australia. pdann@penguins.org.au

Keywords: curlew, *Numenius*, bill morphology, adaptation.

The eight members of the genus *Numenius* (curlews) show considerable intraspecific and interspecific variation in bill length (Hayman *et al.* 1986) which begs the question “can bill length be related to their respective foraging ecologies either during the breeding or non-breeding periods of their annual cycle?” Here I examine the association between bill length and foraging habitat and diet of *Numenius* curlews during non-breeding periods.

*Numenius* may be partitioned into three main groups on the basis of bill length. The first group comprising two species, *minutus* and *borealis*, which Burton (1986) argues are the ancestral type, has bill lengths of 40–50 mm. Both species in this group feed (or used to feed, *borealis* is thought to be extinct) exclusively in grasslands in the austral summer, *minutus* in NW Australia and *borealis* on the South American pampas respectively (Table 1) (Higgins & Davies 1996, Hayman *et al.* 1986). The second group of three species, *phaeopus*, *tahitiensis* and *tenuirostris*, have intermediate bill lengths of 70–90 mm and feed in both intertidal and coastal grassland areas in their non-breeding period (Hayman *et al.* 1986, Dann 1993, Cramp & Simmons 1983). The third group of three species (*arquata*, *americanus* & *madagascariensis*) have bills ranging from 120–185 mm and are found feeding in intertidal areas and coastal grasslands in non-breeding periods (Table 1) (Cramp & Simmons 1983, Grinnell 1921, Higgins & Davies 1996, Dann 2000). Of these three

species, *madagascariensis* is the least likely to be found feeding in non-tidal habitats in the non-breeding grounds and, in fact, rarely does so.

Hence there is some association between the relative lengths of bill in *Numenius* and foraging habitat in non-breeding periods (Table 1). Not surprisingly there are corresponding associations between bill length (and foraging habitat) and diet in non-breeding periods. The shorter-billed species are obligate grassland feeders in the austral summer eating mainly insects and seeds. The intermediate group frequent both coastal grasslands and intertidal habitats and consume insects in grasslands and crustaceans and molluscs in intertidal areas. The three species in the longer-billed group are either facultative grassland and intertidal feeders (*arquata* & *americanus*) or obligate intertidal feeders (*madagascariensis*). The longer-billed group feeds on crabs, shrimps, polychaetes and molluscs in intertidal habitats or, in the case of *arquata* & *americanus*, on insects or oligochaetes in grasslands. Davidson *et al.* (1986) noted that shorter bill length seemed to be associated with foraging on grasslands for two species (*minutus* and *borealis*) and also for males of one species (*arquata*). Townsend (1981) showed that it was mainly male (shorter billed sex) *arquata* that moved from mudflats to forage on pastures as temperatures fell in autumn.

Whether a relationship between morphology and foraging behaviour is adaptive can be assessed only if the evolution

**Table 1.** The bill lengths and reported diets of the eight species of *Numenius*.

Species	Bill length (mm) Male±s.d.	Bill length (mm) Female±s.d.	Diet in non-breeding period	Source
Little Curlew <i>N. minutus</i>	41.9±2.4	44.5±2.3	insects, berries and seeds <sup>h</sup>	Higgins & Davies 1996, <sup>h</sup> Jessop 2003
Eskimo Curlew <i>N. borealis</i>	42–60 <sup>a</sup>		insects <sup>b</sup> , berries	<sup>a</sup> Hayman <i>et al.</i> 1986, <sup>b</sup> Murphy 1936
Whimbrel <i>N. phaeopus</i>	76.5±3.8 78.6±3.1	84.6±3.6 <sup>j</sup> 86.9±3.9 <sup>k</sup>	molluscs, crustaceans <sup>j</sup> , insects and berries <sup>k</sup>	<sup>j</sup> Dann 1993, <sup>k</sup> Cramp & Simmons 1983
Bristle-thighed Curlew <i>N. tahitiensis</i>	85.5±10.5	90	vegetable matter, crustaceans, insects	Hayman <i>et al.</i> 1986
Slender-billed Curlew <i>N. tenuirostris</i>	72.9±2.6	89.9±4.7	polychaetes, crabs, molluscs, insects	Cramp & Simmons 1983
Eurasian Curlew <i>N. arquata</i>	121±6.6	153±7.3,	polychaetes, crabs, molluscs, insects and oligochaetes	Cramp & Simmons 1983
Long-billed Curlew <i>N. americanus</i>	132.9±3.6 <sup>c,1</sup> (s.e.)	175.8±6.1 <sup>c,1</sup> (s.e.)	crabs, shrimps, molluscs, oligochaetes, insects and berries <sup>d</sup>	<sup>c</sup> Grinnell 1921, <sup>d</sup> Wickersham 1902, <sup>d</sup> Del Hoyo <i>et al.</i> 1996, <sup>1</sup> Allen 1980
Eastern Curlew <i>N. madagascariensis</i>	150.9±7.2 <sup>f</sup> 153.0±8.1 <sup>1</sup>	183.6±8.8 <sup>f</sup> 183.1±9.7 <sup>1</sup>	crabs, shrimps <sup>e</sup> , polychaetes <sup>g</sup>	<sup>e</sup> Dann 2000, <sup>f</sup> Barter 1990, <sup>g</sup> Taylor & Mackay 1999, <sup>1</sup> Rogers 1995



of morphological traits has occurred in parallel with behavioural traits (Brooks & McLennan 1991) and this can be achieved only within a phylogenetic framework (Losos & Miles 1994). The trend within *Numenius* of increasing bill length with decreasing reliance on "surface feeding or pecking" in grasslands and increasing importance of "probing" in intertidal areas suggests that long bills are an adaptation to exploiting deeply burrowing prey in soft sediments. It parallels a phylogenetic trend noted by Barbosa & Moreno (1999) for several other groups of waders whereby longer bills appear adaptively coupled to the use of a tactile foraging strategy and shorter bills to a visual strategy. The functional requirements of a tactile foraging strategy are: a high penetration capacity and a high examination capacity (i.e. remote touch system) (Zweers 1991, Zweers & Gerritsen 1997, Zweers & Van den Berge 1997). Unfortunately, there are no studies of the remote touch capacity of *madagascariensis* (the longest-billed species) available.

Davidson *et al.* (1986) have argued that strong selection for bill length in curlews operates on the non-breeding grounds while Hale (1980) maintains that studies of morphological characters indicate that the breeding season is when competition for resources among waders is greatest. The evidence within *Numenius* supports the idea that longer bills are associated with a predominately tactile feeding strategy during non-breeding periods and thus supports the proposal of Davidson *et al.* (1986). There is a clear greater dependence on soft sediment burrowing prey in the longer-billed species which is most pronounced in *madagascariensis* (Eastern Curlew), the species with arguably the greatest sediment penetration capacity of any wader. Whether or not the available evidence supports the idea that this is an adaptation to increase their access to burrowing benthic prey in non-breeding areas remains equivocal but highly suggestive.

I would like to thank Angus Martin and Graeme Watson, for their advice and encouragement. Iain Taylor, Alex Hartman, Ros Jessop and Peter Collins kindly commented on a draft of this paper. I am also grateful to Belinda Gillies, Walter Boles and Glenn Ingram for permission to examine the museum specimens of Eastern Curlew in their care.

- Allen, J. N.** 1980. *The Ecology and behaviour of the Long-billed Curlew in southeastern Washington*. Wildlife Monographs No. 73.
- Barbosa, A. & Moreno, E.** 1999. Hindlimb morphology and locomotion performance in waders. An evolutionary approach. *Biol. J. Linn. Soc.* 67: 130–39.
- Barter, M.** 1990. Morphometrics of the Eastern Curlew. *Stilt* 16: 36–42.

- Brooks, D. R. & McLennan, D. H.** 1991. *Phylogeny, ecology and behaviour*. University of Chicago Press, Chicago.
- Burton, P. J. K.** 1986. Curlews' bills: some anatomical notes. *Bird Study* 33: 70.
- Cramp, S. & Simmons, K. E. L.** 1983 *The Birds of the Western Palearctic*. Vol. III. Oxford University Press, Oxford
- Dann, P.** 1993. Abundance, diet and feeding behaviour of the Whimbrel *Numenius phaeopus variegatus* in Rhyll Inlet, Victoria. *Corella* 17: 52–57.
- Dann, P.** 2000. The ecology of birds frequenting intertidal habitats in Western Port, Victoria. Unpublished PhD thesis. Pp 231.
- Dann, P.** (in review). Diet and prey selection of non-breeding Eastern Curlew *Numenius madagascariensis* in southern Australia.
- Davidson, N. C., Townsend, D. J., Pienkowski, M. W. & Speakman, J. R.** 1986. Why do curlews *Numenius* have decurved bills? *Bird Study* 33: 61–69.
- Del Hoyo, J., Elliott, A. & Sargital, J.** 1996. *Handbook of the Birds of the World, Vol. 3. Hoatzin to auks*. Lynx Edicions, Barcelona.
- Grinnell, J.** 1921. Concerning the status of the supposed two races of the Long-billed Curlew. *Condor* 23: 21–27.
- Hale, W. G.** 1980. *Waders*. Collins, London.
- Hayman, P., Marchant, J. & Prater, T.** 1986. *Shorebirds: An identification guide to the waders of the world*. Croom Helm, London.
- Higgins, P. & Davies, S. J. J. F.** 1996. *The Handbook of Australian, New Zealand and Antarctic Birds*. Vol. 3. Oxford University Press, Melbourne.
- Jessop, A.** Gut analysis of five wader species collected from the NW of Western Australia. *Stilt* 43: 3–13.
- Losos, J. B. & Miles, D. B.** 1994. Adaptation, constraint and the comparative method: Phylogenetic issues and methods. In Wainwright, P. C. and Reilly, S. M. (eds.) *Ecological morphology: Integrative organismal biology*. University of Chicago Press, Chicago.
- Murphy, R. C.** 1936. *Oceanic birds of South America*. Vol 1. American Museum of Natural History, New York.
- Rogers, K. G.** 1995. Eastern Curlew biometrics: based on bivariate separation of the sexes. *Stilt* 26: 23–34.
- Taylor, I. A. & Mackay, M. F.** 1997. *The effects of the "Iron Baron" oil spill on shorebirds in the Tamar Estuary*. Johnstone Centre Report No 110. Charles Sturt University, Albury, New South Wales.
- Townsend, D. J.** 1981. The importance of field feeding to the survival of wintering male and female Curlews *Numenius arquata* on the Tees estuary. In *Feeding and Survival Strategies of Estuarine Organisms*. Eds. N. V. Jones and W. J. Wolff. Pp 261–273. Plenum Press, New York.
- Wickersham, C. W.** 1902. Sickie-billed Curlew. *Auk* 19: 353–356.
- Zweers, G. A.** 1991. Pathways and space for evolution of feeding mechanisms in birds. In Dudley, C. (ed.) *The Unity of Evolutionary Biology*. pp. 530–547. Discoroides Press, Portland, Oregon.
- Zweers, G. A. & Gerritsen, A. F. C.** 1997. Transitions from pecking to probing mechanisms in waders. *Neth. J. Zool.* 47: 161–208.
- Zweers, G. A. & Van den Berge, J. C.** 1997. Evolutionary transitions in the trophic system of the wader-waterfowl complex. *Neth. J. Zool.* 47: 255–287.

\* \* \*



# Probable first record of a drinking seedsnipe (Family Thinocoridae) in the wild

PIM EDELAAR<sup>1,2</sup>, JULIÁN TORRES DOWDALL<sup>3</sup> & MONICA ABRIL<sup>4</sup>

<sup>1</sup>Centro Nacional Patagonico, Boulevard Brown 3500, U 9120 ACV Puerto Madryn, Argentina.  
graesc@sinectis.com.ar

<sup>2</sup>Dept of Behavioural Biology, Leiden University, The Netherlands. W.M.C.Edelaar@umail.leidenuniv.nl

<sup>3</sup>Centro de Zoología Aplicada, CC 122 (5000), Córdoba, Argentina

<sup>4</sup>Facultad de Ciencias Naturales, Universidad Nacional de La Patagonia San Juan Bosco (9000),  
Comodoro Rivadavia, Argentina

Keywords: Shorebird, wader, *Thinocorus rumicivorus*, drinking.

Seedsnipes (family Thinocoridae, genera *Attagis* and *Thinocorus* with two species each) are strictly vegetarian shorebirds occurring in some of the coldest and driest habitats of southern South America. It has been hypothesised that they retrieve all their water from their food, mostly leaves and buds from (succulent) plants. According to Fjeldså (1996), none of the seedsnipes “are known to drink in natural conditions. However, they may do so in captivity.” In apparent contradiction, he also shows a photograph of a male Grey-breasted seedsnipe *Thinocorus orbignyianus* leaning over at the edge of a pond suggesting that it may have been drinking. Therefore it is not completely sure if drinking in the wild never occurs.

Here we describe an observation of a Least Seedsnipe *Thinocorus rumicivorus* almost certainly drinking. This species is locally common in Argentinean Patagonia (southern South America). On 2 Feb 2005, a flock of 8 Least Seedsnipes was encountered on the shores of Lago Argentino, Santa Cruz Province. It was sunny, about 20°C with a moderate wind (i.e. fairly normal weather for Patagonia at this time of year). The seedsnipes were in close proximity to some Baird’s Sandpipers *Calidris bairdii*, and while we were concentrating on the sandpipers, we noticed that one of the seedsnipes (probably an adult female, based on the brown-striped chest with some black on the lower border) was behaving as if it was drinking. While we watched at a range of 30 m with 10× binoculars, it stood still with its body horizontal, and then slowly and rhythmically alternated the position of its head between the horizontal and a position low to the ground (Fig. 1A). The head was held at its lowest point for a short period and was then raised slowly and at a constant speed. This movement was repeated five or six times,

and then, after some disturbance, three or four times more. As the bird stood between some fairly large stones, it could not be confirmed that its bill actually touched the water. However, from its position, it was clear to us that it had access to water from the lake and we inferred that it had been dipping its bill into the water.

Although what we saw looked very much like drinking, we cannot be absolutely certain that drinking took place. The bill was not seen but only inferred to have reached the water, and no water was seen in or on the bill; neither did we observe clear bill movements or swallowing as often seen in other species when drinking. Moreover during the head-lifting phase the bill did not point upwards, as happens when other species drink.

It is not easy to show with complete certainty that any bird has been drinking. This could be done with captive birds, e.g. by measuring water volumes in the digestive tract or in the external environment before and after apparent drinking, or by showing the ingestion of some kind of external marker in the water. However, such tests are almost impossible in the field. Therefore our observations will have to suffice until perhaps video footage is obtained that shows wild seedsnipe clearly drinking.

The only credible alternative explanation for the behaviour that we observed is that the seedsnipe was eating something. However, eating behaviour is rather different from what we saw. When seedsnipes eat – and we have seen this often – the bill jerks forward quickly to grab an item and then returns with equal speed to its original position (like a chicken pecking grain). Therefore the head is moved forward and backwards, not up and down as in what we infer to be drinking (Fig. 1, A & B).

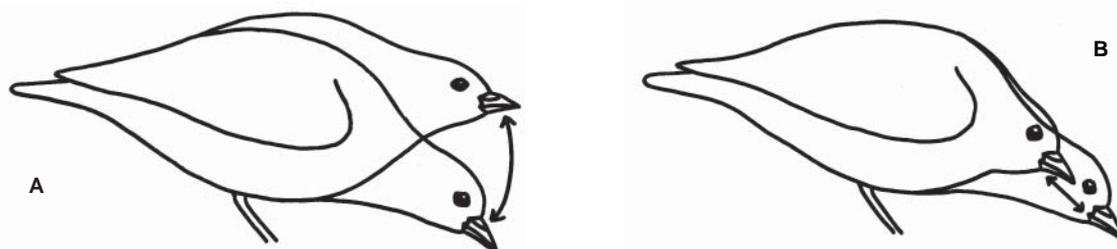


Fig. 1. The actions of a Least Seedsnipe that is (A) (believed to be) drinking or (B) eating.



In eating, pecks may be repeated (such as when a bird is taking different leaves from the same plant), but are not usually rhythmic: some pecks may follow one another quickly, such as when prey items are small, while others only after a pause, such as when larger items are taken that need more than a moment's handling.

Given that the observed behaviour was unlike the normal eating behaviour, that very little food (if any) was present where the bird was seen but water *was* present, and that the behaviour showed similarities to the drinking behaviour of other birds, in our view it is most likely that this particular seedsnipe was drinking. As such, it is the first record of probable drinking in the wild for any species of seedsnipe.

While it is likely that drinking water is normally to be found in the habitats used by seedsnipes, in some circum-

stances it may be unavailable, such as when water is frozen or saline or in times of drought. By virtue of an ability to live on water retrieved from food, seedsnipes are able to occupy habitats in which few other birds could survive. Given that seedsnipes do drink in captivity and apparently also (but probably rarely) in the wild, we suggest that they (or certainly Least Seedsnipes) are opportunistic in their behaviour: they may drink when suitable water is available, but can do without it too.

We are grateful to Joe Jehl and Ricardo Matus for commenting on a draft of this note.

**Fjeldså, J.** 1996. Family Thinocoridae (Seedsnipes). Pp. 538–545, in: Del Hoyo, J., Elliot, A. & Sargatal, J. eds. (1996). *Handbook of the Birds of the World*. Vol. 3. Hoatzin to Auks. Lynx Edicions, Barcelona.

\* \* \*

## Polygyny in American Black Oystercatchers: the better option or the only option?

JULIE A. MORSE

*USGS Alaska Cooperative Fish and Wildlife Research Unit, 209 Irving I Bldg.,  
University of Alaska Fairbanks, Fairbanks, AK 99775. julie.morse@uaf.edu*

Keywords: *Haematopus bachmani*, breeding, polygyny.

Twenty years ago this journal published (Briggs 1984) one of the first observations of polygyny in the Eurasian Oystercatcher *Haematopus ostralegus*. In Europe, researchers have continued to gain insight into this unusual breeding behavior for a typically monogamous species using multiyear studies of colour-banded birds. In the well-studied oystercatcher population at Schiermonnikoog in the Netherlands, only 28 polygynous territories were documented over 14 years of study, involving less than 3% of the breeding females (Heg & van Treuren 1998). Meanwhile the life history of a North American congener, the American Black Oystercatcher *Haematopus bachmani*, has remained comparatively less well known, particularly in Alaska where more than half the population breeds (Andres & Falxa 1995). Here I describe the first observation of polygyny in the American Black Oystercatcher.

I began colour-banding American Black Oystercatchers breeding in Kenai Fjords National Park, Alaska in 2003 as part of a study investigating the effects of recreational disturbance on oystercatcher productivity. Oystercatchers were captured during early incubation at the nest site using noose mats or a dipnet. I marked individuals with unique colour band combinations, and collected a 1 cc blood sample from the wing for DNA-based sex identification (Griffiths *et al.* 1998). Forty-five adults were banded in the first year of study; with the exception of two pairs, at least one member of all pairs breeding in the study area (150 km of shoreline) was banded.

I observed strong site and mate fidelity of American Black Oystercatchers, as have other researchers (Hartwick 1974, Hazlitt & Butler 2001). Forty-three of the 45 banded adults returned to the study area in 2004; most banded pairs ( $n = 11$ ) reunited, and all but two birds used the same nesting territory. Mate switching was observed in two pairs, both of which involved widows (the banded mate was never resighted). Divorce is known to have occurred in only one case where a banded male abandoned his mate and nest during early incubation and paired with a widowed female on her nesting territory 12 km away. This incidence of divorce is similar to the average annual divorce rate of 7.9% observed in Eurasian Oystercatchers (Heg *et al.* 2003).

A polygynous trio was observed in both the 2003 and 2004 breeding seasons. The male of this trio was observed incubating eggs at two nest sites separated by 1.2 km. Throughout both breeding seasons this male was observed incubating and performing territorial displays with the females at the two nest sites. We did not observe any copulation behavior, nor do we have genetic data from the chicks to confirm extra pair copulations, but all three birds were colour banded and sexed making identification of the birds involved unambiguous. Rarely was the trio observed together, and only once was one female observed near the other female's nest site.

In 2003, female one initiated a nest on approximately 10 May and produced one chick that had died by 7 July, approximately 25 days post hatch. The first nest of the second female was initiated on approximately 15 May and was abandoned



by 10 June; she re-nested on 12 July but that clutch was depredated during laying. In 2004, the same two nest sites were used and each female laid only one clutch, both of which failed likely due to avian depredation. The nest of female one was active from 17 to 31 May. Again, the second female initiated a week later; her nest was active from 25 May to 5 June.

This observation represents the “classical” form of polygyny, where two females maintain different territories and lay separate nests; a more “cooperative” form of polygyny has also been observed in Eurasian Oystercatchers where two females lay eggs in the same nest (Heg & van Treuren 1998). The most striking difference between Briggs’ (1984) observation of polygyny and this one is the distance between nest sites; he observed nests of a polygynous trio 1.2 m apart whereas in Kenai Fjords nests were 1.2 km apart. However, breeding densities of American Black Oystercatchers on rocky coastlines in general are much lower than Eurasian Oystercatchers nesting adjacent to a vast mudflat. Probably this arises because of differences in the availability of food resources.

Despite the potential energetic costs incurred by the male in incubating two nests far apart, and the potential cost of lacking an attending mate for both females, this trio was observed in successive years engaging in this unusual behavior. Heg & van Treuren (1998) suggested the most likely explanation for polygyny in the Eurasian Oystercatcher was habitat saturation. Under this scenario, females may use a polygynous territory as a stepping-stone to a higher-quality neighboring territory. Similarly, the better option hypothesis promoted by Ens *et al.* (1993) suggests that divorce in oystercatchers may result from competition for good mates and/or

good territories. The low density of breeding birds at Kenai Fjords (0.26 nests/km) could imply that good breeding habitat is limited. However, it is interesting to note that non-breeding birds were seldom observed in the study area. Thus, in contrast to observations of polygyny in Eurasian Oystercatchers, low density and a potential lack of breeding partners may promote polygyny in American Black Oystercatchers. However with such little data, why polygyny persists in this low-density population remains a source of intrigue and merits further investigation.

I am grateful to Bruno Ens and Bob Gill for commenting on an earlier draft of this note.

- Andres, B. A. & G. A. Falxa.** 1995. Black Oystercatcher (*Haematopus bachmani*) in The Birds of North America No. 155 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and the American Ornithologists’ Union, Washington, D. C. USA.
- Briggs, K.B.** 1984. Repeated polygyny by oystercatchers. *Wader Study Group Bull.* 40: 42–44.
- Ens, B.J., Safriell, U.N., & M.P. Harris.** 1993. Divorce in the long-lived and monogamous oystercatcher: incompatibility or choosing the better option? *Anim. Behav.* 45: 1199–1217.
- Griffiths, R., Double, M.C., Orr, K., & R.J.G. Dawson.** 1998. A DNA test to sex most birds. *Mol. Ecol.* 7: 1071–1075.
- Hartwick, E.B.** 1974. The breeding ecology of the Black Oystercatcher (*Haematopus bachmani* Audubon). *Syesis* 7: 83–92.
- Hazlitt S.L. & R. W. Butler.** 2001. Site fidelity and reproductive success of Black Oystercatchers in British Columbia. *Waterbirds* 24(2): 203–207.
- Heg, D. & R. van Treuren.** 1998. Female-female cooperation in polygynous oystercatchers. *Nature* 391: 687–691.
- Heg, D., Bruinzeel, L.W. & B.J. Ens.** 2003. Fitness consequences of divorce in the oystercatcher, *Haematopus ostralegus*. *Anim. Behav.* 66: 175–184.



A tenacious American Black Oystercatcher incubating a nest on a rocky coastline in Alaska.

