

# ABSTRACTS OF WADER THESES

compiled by ROB ROBINSON

As a means of disseminating information about important new wader studies well in advance of formal publication, this series features abstracts from recent wader theses (bachelors, masters and doctoral). Thesis authors are invited to submit abstracts to Rob Robinson, BTO, The Nunnery, Thetford, Norfolk IP24 2PU, UK. [rob.robinson@bto.org](mailto:rob.robinson@bto.org) or the Editor.

## Demography and behavior of Western Sandpipers (*Calidris mauri*) breeding on the Yukon-Kuskokwim River Delta, Alaska

(2006, Ph.D. thesis, Virginia Polytechnic Institute and State University, United States)

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I conducted demographic and behavioral studies of Western Sandpipers *Calidris mauri* breeding on the Yukon-Kuskokwim River Delta, Alaska (1998–2005).

In Chapter 1, I estimate apparent annual survival (product of true survival and site fidelity) while correcting for the probability of encounter for 237 males and 296 females. Overall return rates (individuals returned to the site in a subsequent season) were lower for females (40%) than males (65%), as was apparent annual survival ( $\pm$ SE, females =  $0.65 \pm 0.05$ , males =  $0.78 \pm 0.03$ ), and encounter rate (females =  $0.51 \pm 0.07$ , males =  $0.74 \pm 0.04$ ).

In Chapter 2, I examine the effects of mate and site fidelity on nesting success (N = 430 nests). Annual divorce rate ranged between 37–83%, with 17–63% of pairs reuniting annually. Reuniting pairs initiated clutches earlier than newly formed pairs, and clutches that were initiated early in the season had higher nest success rates compared to late-season nests. When I controlled for clutch-initiation date, nests tended by individuals with prior breeding-site experience had higher daily survival rates compared to birds breeding at the site for the first time. The effect of site experience was

greater for males than females.

In Chapter 3, I report that Western Sandpipers exhibited aggregated breeding behavior on a 36 ha plot. Breeding aggregations occurred when dominant and/or older individuals excluded younger, subordinate individuals from preferred habitat. The pattern of habitat occupancy conformed to an ideal despotic distribution with aggregated nesting birds in less preferred habitat experiencing lower reproductive success.

In Chapter 4, I describe and demonstrate the form and function of parent–chick communication in the Western Sandpiper. Through experimental playback of adult vocalizations to chicks in the field, I demonstrated: (1) chicks respond to the alarm call by vocalizing relatively less often and moving away from the signal source, (2) chicks respond to the gather call by vocalizing relatively more often and moving toward the signal source, (3) and chicks respond to the freeze call by vocalizing relatively less often and crouching motionless on the substrate for extended periods of time. I also describe two distinct chick vocalizations (chick-contact and chick-alarm calls).

## Molecular ecology of the Kentish Plover *Charadrius alexandrinus*

(2008, Ph.D. thesis, University of Bath, UK)

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Molecular ecology has already provided profound insights into the behaviour, ecology and systematics of organisms improving our understanding of the relationship between genetic variation and biodiversity. The objectives of my Ph.D. were to develop new genetic markers and use these markers to address fundamental issues in evolutionary biology using shorebirds as model organisms. Shorebirds are part of the ancient avian *Charadriiformes* order and are characterised by extraordinary ecological and behavioural diversity. However, due to the lack of appropriate genetic markers the molecular ecology of many shorebirds has not been investigated previously. Therefore, first, I developed polymorphic microsatellite markers from genomic libraries for a behaviourally diverse shorebird, the Kentish Plover *Charadrius alexandrinus*. Second, using the genomic databases I expanded this work to develop further markers that cannot only be used in the Kentish Plover, but also in a large number of other shorebird species. Third, I investigated

population differentiation and genetic diversity of Eurasian and American Kentish Plover populations using the newly developed microsatellite markers and further mitochondrial markers.

The genetic differences between Eurasian and American populations that are mirrored by phenotypic differences call for a reconsideration of the current taxonomic status of the species; Eurasian and American populations should be recognised as belonging to two separate species.

Finally, I asked how genetic diversity influences the fitness of precocial Kentish Plover young. I found that survival of chicks until fledging was associated with genetic diversity (measured as heterozygosity) at three of eleven marker loci. Genetic diversity at one marker locus had a positive effect on survival whilst it had negative effects at two loci.

The results of my Ph.D. have raised many new questions and I propose promising lines of enquiry that need to be explored in the future.

**The arctic pulse: timing of breeding in long-distance migrant shorebirds**

(2007, Ph.D. Thesis, University of Groningen, The Netherlands)

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Many shorebird species are long-distance migrants: they spend the winter in temperate or tropical areas and migrate north in spring to breed in the Arctic. The Arctic summer is short and is characterized by a cold climate and extreme, large, short-term fluctuations in weather. Additionally the main food supply for both parents and chicks (surface dwelling arthropods) shows a strong seasonal pattern and a strong day-to-day variation related to weather. Therefore timing of breeding can have a major influence on breeding success.

To investigate what factors influence the timing of breeding my colleagues and I measured seasonal patterns in food availability and energetic demands and the performance of parents and young (energy expenditure, condition, growth and time available for foraging) throughout the season.

We found that the growth rate of chicks depends on the weather, but also that early-born chicks grow better than chicks born later. Within the three years of this research, chicks hatched relatively late compared to the peak in food supply. From the chicks' point of view, parents started breeding too late. The decision of when to breed may not only

be strongly shaped by the chicks' needs, but also by the energetic requirements of the parents during the incubation and chick-rearing phases. The adults arrive on the tundra after a long non-stop flight with a limited amount of body reserves, which allows survival for at most a few days in case the tundra is still snow-covered. Therefore arriving too early may entail the risk of starvation. Birds also need time to replenish their reserves to produce the eggs. Besides, they also have to be able to find enough food during breeding. This is especially so for species in which one parent incubates the eggs alone, without the help of a partner. They have to divide their time between incubating the eggs and feeding. For them the incubation period is energetically more stressful than the period after the chicks are born. For species that share incubation duties this balance is different. This probably explains why single-parent breeding species arrive later on the tundra and also breed later than biparental species. Influenced by recent climate change the peak in food supply seems to be advancing and with that also the best moment to lay eggs.

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