

## Western Hemisphere Flyways

### Migration of Red Knots in South America 1996-2000: ecological research to support the conservation of the longest bird flights on earth

*A co-operative research and conservation project of the Wader Study Group,  
under auspices of Wetlands for the Americas*

This proposal outlines a co-operative research program investigating the ecology of migration of an extreme long-distance and relatively uncommon migrating shorebird, the Red Knot *Calidris canutus rufa*. This wader connects, in the course of its annual migrations, a limited number of coastal wetlands in South America. The proposed program of work builds on the local expertise and a series of shorebird-benthos research projects already being carried out by a variety of organizations and institutions in Argentina, Uruguay and Brasil.

The three year project (hopefully running from January 1996 through May 1998) aims:

- (1) to further the understanding of the biology of Red Knots in a comparative worldwide framework;
- (2) to bring a common and biologically important theme to the variety of investigations already underway;
- (3) to deliver funds to allow more detailed and higher quality, fieldwork and laboratory analyses;
- (4) to integrate preliminary results in each year of the project; and
- (5) to bring together, in 1999 or 2000, all participants and the digested results in a workshop aiming at a synthesis of achievements.

This should result in a publication in the *International Wader Studies* series, in which new discoveries on the migration, ecology and resource basis of the migration of Red Knots in South America are summarized, and in which the conservation and management implications are outlined. We are currently searching for about \$US 120,000, the greatest portion of which (\$US 90,000 in total, or \$US 30,000 per year) will be devoted to the cost of carrying out fieldwork in various places. The remaining sum will be needed for the workshop, its organization and logistics, and the publication and dissemination of results.

#### INTRODUCTION

The Red Knot *Calidris canutus* is a remarkable shorebird species. They occur throughout the world, usually along coastal shores, where they usually feed on small-hard-shelled molluscs which they ingest whole and crush in their strong muscular gizzard.

Red Knots breed around the North Pole on high arctic tundra, with birds from the different polar regions migrating to different temperate and tropical wintering areas. This substructuring of the world's Red Knots has led to several marked morphological differences, and thus in the recognition of five separate races or subspecies. Red Knots seem to be genetically impoverished as the

result of a population bottleneck at the end of the last Ice Age in the early Holocene (Baker *et al.* 1994). This lack of genetic variability (especially as it relates to issues of disease resistance, immuno-competence) could in principle affect the ability of the species to cope with new environmental stresses.

In order to move between their favourite coastal haunts, Red Knots make the longest non-stop flights known in the avian world (possibly up to 8,000 km). Their migrations have become relatively well described because of a large interest from the amateur ornithological community, often working in collaboration through the international Wader Study Group (WSG). At the same time, the biology of Red Knots has become the focus of professional biological attention at research institutions, their biologists

working in close and productive co-operation with the amateur workers (e.g. Piersma & Davidson 1992).

Red Knots are well recognized as a promising key-species or "vehicle" to make the case for the world-wide conservation of biologically connected coastal wetlands and tundra areas (e.g. Davidson & Stroud 1995).

Of the five recognized subspecies, there are two which spend the non-breeding season in South America. The subspecies *roseolaari* has been described only a decade ago. It breeds in Alaska and on Wrangel Island and may winter in Florida and further south in Central America and north of South America (Piersma & Davidson 1992). The subspecies *rufa* breeds in the Canadian arctic and spends the non-breeding season at the tip of the South American continent, in southern Patagonia and Tierra del Fuego (Morrison & Harrington 1992). This subspecies undertakes the longest overall migration and the longest single flights, and is peculiar in that it migrates from the energetically costly coldness of the Canadian high arctic summer into the cold of the subantarctic.

The overall pattern of the migrations of Red Knots is thus sufficiently well described to allow deeper questions about its migration to be asked; questions which may be critical for the development of sound international management strategies for this and other shorebird species. There are a few ecological characteristics that make Red Knots suitable for large-scale investigations on the causes and consequences of long-distance migration: they usually eat molluscs, about which the critical ecological characteristics (abundance, availability, seasonality) can quite easily be collected. Diet can easily be described from faecal analyses (DeKinga & Piersma 1993) and food intake rates can be measured (Zwarts *et al.* 1992). There is a large background literature from Europe and Africa for comparative purposes, which also allows theoretical explorations into energy expenditure as a function of climate and activity levels (Piersma 1994; Wiersma & Piersma 1994).

A further bonus of the migrations of the *rufa* subspecies in South America is the scale of movements through several climatic regions and over large distances even within single countries (Argentina, Brasil). The presence of competent observers along this well defined migration routes make it very attractive to study the ecological causes and consequences of this migration pattern, and the role that the different coastal wetlands in South America fulfil for this species. Since we regard the case of the Red Knot as typical of all other migrating shorebird species, a detailed integrated study of their movements and ecology should yield insights for conservation that extend far beyond this single species.

We propose to make a detailed description of the movements of Red Knots between sites (spatial dynamics and chronology in relation to fuel storage and molt), in conjunction with an elucidation of the resource base (food and feeding). This will enable us to gain an understanding of the constraints on bird movements within the range of available South American wetlands, and yield insights into

the degree of flexibility that these birds may have in their choice of wintering areas. It will also highlight the differential importance of individual sites within the network used. Red Knots may thus provide a key illustration of the critical dependence of migratory waterbirds on chains of high quality sites and their story thus strongly support the conservation of individual sites and series of wetlands - the main objective of the Western Hemisphere Shorebird Reserve Network (WHSRN).

WHSRN, a project of Wetlands for the Americas (WA) works to identify critical wetland stopover sites and bring them into an international network, in which habitat protection is fostered through voluntary commitments to long-term management to benefit shorebirds and many other species. WHSRN also helps in environmental education, research and the "twinning" of geographically distant reserves that host the same species.

## RED KNOTS IN SOUTH AMERICA

The Red Knots that go to South America to survive the northern winter, breed in the Canadian arctic (Morrison & Harrington 1992; Harrington 1995).

They leave these areas in July and early August, and assemble on the western shores of James Bay before moving on to the Maritime Provinces of Canada and the shores of New England, before taking off on a major flight over the Atlantic Ocean to the shores of Surinam. From here they rapidly move on to southernmost South America, south Patagonia and Tierra del Fuego, where they arrive in late October and November. In Tierra del Fuego they first go through a complete body and wing molt, finishing in January, and almost immediately start preparing for their northward migration by molting into a new breeding plumage in February.

Their northward migration begins in mid February. Red Knots have been observed on passage in Argentina at Peninsula Valdés (Morrison & Harrington 1992), coastal sites in Buenos Aires Province (Myers & Myers 1979), Punta Rasa (Blanco *et al.* 1992), and Bahía Samborombón (Vila *et al.* 1994). Only recently has the importance of the region of San Antonio Oeste, in the north-west corner of Golfo San Matías, been recognized (González 1991; González *et al.* MS). Further north, passage birds are seen in the north of Uruguay (Vaz-Ferreira 1961) and in southernmost Brasil (Harrington *et al.* 1986) (e.g. Lagoa do Peixe in Rio Grande do Sul), where they prepare for the big leap northwards, the 5,000-8,000 km long flights over the Amazon Basin and the Gulf of Mexico into Delaware Bay, USA. Here, for three weeks in May, Red Knots feast on the masses of Horseshoe Crab-eggs that accumulate on the beaches, before pushing on to the Canadian arctic breeding grounds in the last days of May.

## SCIENTIFIC AND CONSERVATION INTEREST IN RED KNOTS AND THE WETLANDS THEY VISIT

The following research initiatives have already been carried out, or are in operation, in the region covered by this project:

- (1) The Knot migration project 1990-1992 carried out by Grupo Argentino de Limícolas; (co-ordinated by Patricia M. González, San Antonio Oeste, and Daniel Blanco, Buenos Aires).
- (2) Studies on abundance and distribution of Red Knots in Tierra del Fuego Province, January 1995; (Wetlands for the Americas, Buenos Aires, in co-operation with the provincial government of Tierra del Fuego and partly funded by the Global Environmental Facility of the World Bank).
- (3) Ecology and population genetics of Red Knots in Tierra del Fuego Province, February 1995; (co-ordinated by Allan J. Baker, Royal Ontario Museum, Toronto).
- (4) Studies on food abundance and feeding of Red Knots in the context of the entire annual cycle in Golfo San José, Chubut Province; (Gustavo Pagnoni & Dr Luis Bala, Centro Nacional Patagónico, Puerto Madryn).
- (5) Studies on abundance, food and feeding of Red Knots at San Antonio Oeste, Río Negro Province; (Patricia M. González, Dirección de Fauna de Río Negro, San Antonio Oeste).
- (6) Ecological studies of shorebirds and benthic communities in Samborombón Bay and Mar Chiquita Coastal Lagoon, Buenos Aires Province; (Mariano Martínez & Dr. Oscar Iribarne, Universidad Nacional de Mar del Plata, Mar del Plata).
- (7) Studies on the migration of Red Knots at Punta Rasa, Buenos Aires Province, as well as studies on the local benthic food resources; (co-ordinated by Daniel Blanco, Wetlands for the Americas, Buenos Aires).
- (8) Research on the migration of Red Knots in Lagoa de Peixe, Rio Grande do Sul, since 1984; (Paulo Antas & Inês do Nascimento from CEMAVE, Brasilia, and Brian Harrington and co-workers, Manomet Bird Observatory, Manomet).
- (9) Studies on the migration of Red Knots at Reentrancias Maranhenses, Maranhão; (Antonio Augusto Ferreira Rodrigues, Universidade Federal Do Maranhão, Sao Luís).
- (10) Monitoring Red Knot migration through Brasil by CEMAVE since 1984; (co-ordinated by Inês do Nascimento from CEMAVE, Brasilia).

The following conservation initiatives are underway in areas where studies of the migration of Red Knots are proposed:

- (1) Creation of the Reserva Costa Atlántica de Tierra del Fuego, Argentina by the provincial government of Tierra del Fuego, and recognition as a 'hemispheric site' by WHSRN in December 1992.
- (2) Integrated management project of the Patagonian coast, funded by the Global Environmental Facility of World Bank and implemented by Fundación Patagonia Natural.
- (3) Creation of the Natural Protected Area Bahía de San Antonio by the provincial government of Río Negro in July 1993 and recognition as an 'international site' by WHSRN in August 1993.
- (4) The establishment of a provincial reserve managed by the National Park Administration covering around 10% of the coastal lagoon of Mar Chiquita, Buenos Aires Province. Attempts are made to increase the protection by agreement with the private landowners.
- (5) A few private refuges and a plan for a provincial reserve have or are being established at Punta Rasa, Bahía Samborombón. Also, there is a biological station managed by the Fundación Vida Silvestre Argentina.
- (6) The Buenos Aires Province Government is working to incorporate four coastal wetlands sites into the Ramsar Convention, two of which (Bahía Samborombón and Mar Chiquita coastal lagoon) are important for the Red Knots migration.
- (7) The establishment of a National Park in Lagoa de Peixe, Rio Grande do Sul, in 1986, which was subsequently recognized as an 'international site' by WHSRN in September 1990, and as a Ramsar site in 1993.
- (8) The establishment of an Area of Environmental Protection in Reentrancias Maranhenses, Maranhão, in June of 1991, which was subsequently recognized as an 'hemispheric site' by WHSRN in December 1991.

## PROPOSED RESEARCH SITES AND RESEARCH PARTNERS

- (1) **Río Grande, Tierra del Fuego, Argentina** (M. Silvina Ramirez, Dir. Gral. de Medio Ambiente, Río Grande; Luis G. Benegas, Museo de Cs. Naturales, Munic. de Río Grande; Rubén Manriquez, Dir. Gral. de Medio Ambiente, Ushuaia, Argentina).

- (2) **Bahía Bustamente and Comodoro Rivadavia, Chubut, Argentina** (Mónica Abril and co-workers, Asoc. Patagónica de Ornitología, Comodoro Rivadavia, Argentina).
- (3) **Península Valdés, Chubut, Argentina** (Gustavo Pagnoni & Luis Bala, Centro Patagónico, Puerto Madryn, Chubut, Argentina).
- (4) **San Antonio Oeste, Golfo San Matías, Río Negro, Argentina** (Patricia M. González & co-workers, Dir. de Fauna de Río Negro; Carolina Belenguer & Pablo Petracci, Grupo Becasa, Bahía Blanca, Argentina).
- (5) **Mar Chiquita coastal lagoon, Buenos Aires Province, Argentina** (Mariano Martínez & Dr Oscar Iribarne, Univ. Nacional de Mar del Plata, Mar del Plata, Argentina).
- (6) **Punta Rasa, Buenos Aires Province, Argentina** (Daniel Blanco, Wetlands for the Americas, Buenos Aires, and co-workers of the Fundación Vida Silvestre Argentina, Buenos Aires, Argentina).
- (7) **Barra del Chuy, Uruguay** (Adrián Stagi & coworkers, GUPECA and Universidad Nacional del Uruguay, Montevideo, Uruguay).
- (8) **Lagoa de Peixe, Rio Grande do Sul, Brasil** (Inês do Nascimento and coworkers, CEMAVE, Brasilia, Brasil).
- (9) **Reentrancias Maranhenses, Maranhão, Brasil** (Antonio Augusto Ferreira Rodrigues, Universidad de Maranhão, Sao Luís, Brasil).

## ORGANISATION

Given the big geographical differences, the various teams will work quite independently, all having their separate goals. Common research methodologies and finances, as well as the bringing together of analysed data for purposes of synthesis, are co-ordinated by Patricia M. González of the Dirección de Fauna de Río Negro in San Antonio Oeste, Argentina. Patricia will make sure that the methodology is sufficiently uniform at sites and that information about problems and progress is exchanged on a regular basis. She will also manage the budget. Patricia is supported by the field groups on one side, and a group of six Councillors (listed below) on the other.

The co-ordination of banding and colour-marking at the different sites, will be undertaken by Inês do Nascimento of CEMAVE in Brasilia, Brasil. CEMAVE will make available their expertise on individual colour banding. Inês will help with the general co-ordination of activities in Brasil. We hope to organize a Workshop in 1999 or 2000 at the Centro Patagónico in Puerto Madryn, Chubut, Argentina with support from Dr Luis Bala and Gustavo Pagnoni of that institution.

## SUPPORTING ORGANISATIONS

- (1) **Wetlands for the Americas/Humedales para las Américas**, through the Western Hemispheric Shorebird Reserve Network, Ottawa, Canada.
- (2) **Manomet Observatory for Conservation Sciences**, Manomet, Mass, U.S.A.
- (3) **Fundación Patagonia Natural**, Puerto Madryn, Chubut, Argentina.
- (4) **Grupo Argentino de Limícolas**, Buenos Aires, Argentina.
- (5) **CEMAVE**, Brasilia, Brasil.
- (6) **ProAves**, Brasilia, Brasil.
- (7) **CWS Latin American Program**, Canadian Wildlife Service, Ottawa, Canada.

## FINANCES

The budget of \$US 20,000 comprises two main items of different temporal priority. The first priority is \$US 90,000 to cover the expenses for fieldwork. The financial requirements for organising the workshop and the publication of the results can be considered in the following years.

- 1) Money for field work by the different groups. The amounts can vary considerably depending on the scale of the work, the frequency of field trips, the distances between field and laboratory sites, and the amount of local support. The total is \$US 90,000 or about \$US 30,000 per year, including the running of the co-ordination in San Antonio Oeste.
- 2) Money for a joint workshop in 1999 including the finances to bring participants together, for organisational arrangements, and for the publication of the results as an issue of the *International Wader Studies*, a refereed new publication series of the international Wader Study Group.

At this moment we are looking for two suitable 'parent organisations' (one non-governmental organisation in Argentina and another in Brasil) through which we can arrange the fundraising and the financial arrangements following from it.

## COUNCILLORS

To support and guide the individual researchers and the project co-ordinators, the following six individuals have agreed to take on responsibility:

Prof. Dr **Allan J. Baker**, Department of Ornithology, Royal Ontario Museum, Toronto, Ontario M5S 2C6 Canada

Prof. Dr **Enrique Bucher**, Universidad de Córdoba / Wetlands for the Americas, C.C. 122, 5000 Córdoba, Argentina.

**Pablo Canevari**, Wetlands for the Americas (WA), Monroe 2142, (1428) Capital Federal, Argentina.

Dr **Gonzalo Castro**, World Wide Fund for Nature (WWF), 1250 Twenty-Fourth St., NW Washington, D.C. 20037-1175, U.S.A.

**Brian A. Harrington**, Manomet Observatory for Conservation Sciences, P.O.Box 1770, Manomet, Massachusetts 02345, U.S.A.

Dr **Theunis Piersma**, Wader Study Group (WSG) and Netherlands Institute for Sea Research (NIOZ), c/o P.O. Box 59, 1790 AB Den Burg, Texel, The Netherlands.

## REFERENCES

- Baker, A.J., Piersma, T. & Rosenmeier, L. 1994. Unraveling the intraspecific phylogeography of Knots *Calidris canutus*: a progress report on the search for genetic markers. *J. Ornithol.* 135: 599-608.
- Blanco, D.E., Pugnali, G.D. & Rodríguez Goñi, H. 1992. La importancia de Punta Rasa, Peña de Buenos Aires, en la migración del chorlo rojizo, *Calidris canutus*. *El Hornero* 3: 203-206.
- Davidson, N.C. & Stroud, D.A. 1995. Conserving international coastal habitat networks on migratory waterfowl flyways. *J. Coast. Conserv.*: in press.
- Dekinga, A. & Piersma, T. 1993. Reconstructing diet composition on the basis of faeces in a mollusc-eating wader, the Knot *Calidris canutus*. *Bird Study* 40: 144-156.
- González, P.M. 1991. *Importancia de la Bahía de San Antonio y zona de influencia en el Golfo San Matías para las comunidades de aves costeras*. Report of the Legislatura de la Provincia de Río Negro, Viedma.
- González, P.M., Piersma, T. & Verkuil, Y. 1995. Food and feeding of Red Knots *Calidris canutus rufa* during northward migration in Golfo San Matías, Argentina. Submitted to *J. Field Ornithol.*
- Harrington, B.A. 1995. *Flight against time. The endless spring and summer of the Red Knot*. WGBH, Boston.
- Harrington, B.A., de Tarso Zuquim Antas, P. & Silva, F. 1986. Northward shorebird migration on the Atlantic coast of southern Brazil. *Vida Silvestre Neotropical* 1: 45-54.
- Morrison, R.I.G. & Harrington, B.A. 1992. The migration system of the Red Knot *Calidris canutus rufa* in the New World. *Wader Study Group Bull.* 64, Suppl.: 71-84.
- Myers, J.P., & Myers, L.P. 1979. Shorebirds of coastal Buenos Aires Province. *Ibis* 121: 186-200.
- Piersma, T. 1994. *Close to the edge. Energetic bottlenecks and the evolution of migratory pathways in Knots*. Uitgeverij Het Open Boek, Den Burg, Texel.
- Piersma, T. & Davidson, N.C. 1992. The migrations and annual cycles of five subspecies of Knots in perspective. *Wader Study Group Bull.* 64, Suppl. 187-197.
- Vaz-Ferreira, R. 1961. Aves nuevas o poco conocidas en la República Oriental del Uruguay. *Com. Zool. Museo Hist. Nat. Montevideo* 92 (V), 76 pp.
- Vila, A.R., Bremer, E.R. & Beade, M.S. 1994. *Censos de chorlos y playeros migratorios en la Bahía de Samborombón, Provincia de Buenos Aires, Argentina*. Boletín Técnico de la Fundación Vida Silvestre Argentina, Buenos Aires.
- Wiersma, P. & T. Piersma. 1994. Effects of microhabitat, flocking, climate and migratory goal on energy expenditure in the annual cycle of Red Knots. *Condor* 96: 257-279.
- Zwarts, L., A.-M. Blomert & J.H. Wanink. 1992. Annual and seasonal variation in the food supply harvestable by Knot *Calidris canutus* staging in the Wadden Sea in late summer. *Mar. Ecol. Prog. Ser.* 83: 129-139.

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