Swan Specialist Group Newsletter

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Edited by Eileen C. Rees

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British Airways Assisting Conservation kindly sent out this newsletter

Swan Specialist Group

The Swan Specialist Group consists of scientists and specialists with expertise in swan research, management and conservation, and as such provides advice and technical support to Wetlands International/IUCN-SSC as part of their Waterbird network.

Aims of the Group

* To ensure good communication between swan researchers world-wide, to promote cooperative research and ringing programmes where appropriate, and to improve links and information exchange with other research groups.

* To identify gaps in our knowledge with a view to encouraging new projects in these areas.

* To advise effectively on swan management and conservation issues, especially at an international level.

Structure of the Group

Regional Coordinator (Eurasia):
Eileen C Rees, The Wildfowl & Wetlands Trust, Martin Mere, Burscough, near Ormskirk, Lancashire, L40 0TA, United Kingdom.

Regional Coordinator (Neotropics):
Roberto Schlatter, Instituto do Zoologia, Facultad de Ciencias, Universidad Austral de Chile, Valdiva, Chile.

Regional Coordinator (North America):
Carl D Mitchell, Wrangell-St. Elias National Park and Preserve, PO Box 439, Copper Centre, Alaska 99573, USA.

Trumpeter Swan Coordinator:
Carl D Mitchell, address given above.

Tundra Swan Coordinators:
Roland Limpert, Maryland Department of Natural Resources, Tawes State Office Building B-3, 580 Taylor Avenue, Annapolis, Maryland 21401, USA.
Susan Earnst, Forest & Rangeland Ecosystem Centre - Boise Field Station, 970 Lusk Street, Boise State University, Boise, Idaho 83706, USA.

Whooper Swan Coordinator (Icelandic Population):
Olafur Einarsson, Icelandic Institute of Natural History, Hlemmur 3, PO Box 5320, IS-125 Reykjavik, Iceland.

Whooper Swan Coordinator (Scandinavian/NW Russian Population):
Bjarke Laubek, National Environmental Research Institute, Grenavej 12, Kalo, DK-8410 Ronde, Denmark.

Whooper/Mute Swan Coordinator (Far Eastern Population):
Ma Ming, Xinjiang Institute of Biology, Pedology and Desert Research, Academia Sinica, No. 40 Beijing Road, Urumqi 830011, Xinjiang, People's Republic of China.

Bewick's Swan Coordinator (NW European Population):
Jan Beekman, Netherlands Institute of Ecology, Centre for Limnology, Rijksstraatweg 6, 3631 AC Nieuwersluis, The Netherlands

Bewick's Swan Coordinator (Far Eastern Population): Vacant

Mute Swan Coordinator (Central/Eastern Europe):
Maria Wieloch, Ornithological Society, Nadwislanska 108, 80-680 Gdansk 40, Poland.

Mute Swan Coordinator (UK):
Bert Coleman, 67 Park Lane, Bonehill, Tamworth, Staffordshire, United Kingdom.

Black Swan Coordinator (Australia)
Richard Kingsford, NSW National Parks & Wildlife Service, PO Box 1967, Hurstville 2220, New South Wales, Australia.

Black Swan Coordinator (New Zealand):
Murray Williams, Department of Conservation, PO Box 10-420, Wellington, New Zealand.

Black-necked and Coscoroba Swan Coordinator:
Roberto Schlatter, address given above.

EDITORIAL

Dear Colleagues

Welcome to the sixth edition of the *Swan Specialist Group Newsletter* and thank you for your helpful comments on No. 4 and No. 5. Several SSG members mentioned that they found the list of names, addresses and contact numbers, included in the 5th edition, very useful. I therefore will report any changes of address, and list new members of the group, in this and future editions. With this in mind, please let me know if you change your address or go on to e-mail, so that the SSG database and mailing list can be kept up to date.

Please note that three of our Coordinators have recently changed their addresses. Carl Mitchell (Regional Coordinator for North America and Trumpeter Swan Coordinator) has moved to the U.S. Fish and Wildlife Service, Wrangell-St. Elias National Park and Preserve, PO Box 439, Copper Centre, Alaska 99573, USA (Tel. +1 907 822 7242; Fax +1 907 822 7216; E-mail Carl_Mitchell@nps.gov). Susan Earnst (Tundra Swan Coordinator) is now based at the Forest & Rangeland Ecosystem Centre - Boise Field Station, 970 Lusk Street, Boise State University, Boise, Idaho 83706, USA (Tel. +1 208 331 5209; E-mail searnst@eagle.idbsu.edu). Jan Beekman (Bewick's Swan Coordinator, NW European population) is best contacted at The Netherlands Institute of Ecology, Centre for Limnology, Rijksstraatweg 6, 3631 AC Nieuwersluis, The Netherlands (Tel. +31 294 239300; Fax +31 294 232224; E-mail beekman@cl.nioo.knaw.nl). New SSG members are listed on pages 33-35; further changes of address are given on pages 35-36.

The proceedings of the Anatidae 2000 Conference on the conservation, habitat management and wise use of ducks, geese and swans has now been published as a special edition of *Gibier Faune Sauvage/Game and Wildlife* (Volume 13). Five papers presented in the workshop on swan migrations and populations are included in tome 1 of the journal. Tome 1 also includes papers from the first plenary session (on populations and migrations), the second plenary session (on ecology and population dynamics) and from the duck and goose workshops. For advice on how to obtain copies of the journal, which is published by the Office National de la Chasse, please contact Marcel Birkan (editor), Office National de la Chasse, 85 bis Avenue de Wagram, 75017 Paris, France (Tel +33 1 44 15 17 17; Fax +33 1 47 63 79 13). Abstracts of papers presented at the Swan Workshop and published in *Gibier Faune Sauvage/Game and Wildlife* are included in pages XX-YY of this *Newsletter*.

British Airways Assisting Conservation again has kindly agreed to mail the Newsletter to members of the Swan Specialist Group.

Eileen Rees, SSG Coordinator (Eurasia)

INSTRUCTIONS FOR AUTHORS

The *Swan Specialist Group Newsletter* publishes short papers with original data concerning swan species, progress reports for ongoing projects, recent abstracts, letters (especially requests for information), news items, descriptions of new methodologies, *etc*. Reports/papers should be no longer than 1,500 words, including references and, for preference should be in English, although it may be possible to arrange translation from some other languages. Figures, including maps, should be drawn neatly in black ink, in a form suitable for photocopying. The editor reserves the right to make minor alterations to the text without consulting the author.

Please send your submissions to: Eileen Rees, The Wildfowl & Wetlands Trust, Martin Mere, Burscough, Ormskirk, Lancashire, L40 0TA, United Kingdom. Tel. +44 (0)1704 895181 Fax: +44 (0)1704 892343 E-mail: Eileen.Rees @wwt.org.uk

Submissions for the next edition of the *SSG Newsletter* should be sent to the above address by 31 December 1997.

Readers should note that the opinions expressed in the articles in the *Swan Specialist Group Newsletters* are those of the

authors and do not necessarily represent those of the Coordinators, WWT, Wetlands International or IUCN-SSC.

WETLANDS INTERNATIONAL AND ITS SPECIALIST GROUPS

A note from Wetlands International's Director

I am very pleased to contribute to this third issue of the revived Swan Specialist Group newsletter -it is very encouraging to see the network enlarging so strongly, following the enthusiastic revitalisation of the Group by Eileen Rees, with the support of The Wildfowl & Wetlands Trust. I take this opportunity to inform you of a few issues, regarding the development of Wetlands International as a whole.

Following the establishment of our new name and structure, and the move of our Slimbridge office to Wageningen in The Netherlands, life is at last settling down again - and we are able to focus on programme development, rather than re-structuring and relocation! The move to Wageningen has been a great success and, for an organisation with our name, there can be no other host country more appropriate than The Netherlands.

Of significant interest to our Specialist Groups is the imminent (1 September 1997) appointment of a Science Coordinator, in the office of the International Coordination Unit, here in Wageningen. This post will be responsible for providing assistance for the development and support of all the Specialist Groups. Although called for at the 1995 Board meeting in Malaysia, no budget was allocated for the creation of this post, and we are therefore extremely grateful to English Nature for agreeing to second one of their staff for this position. The secondee, Dr Nick Davidson, will be known to many of you - since he is currently the Liaison Officer between Wetlands International and the Wader Study Group. The aim of this initiative is to implement the Specialist Groups development strategy, which was approved in Malaysia, with a particular focus on greater regionalisation of the groups, as well as interaction between them. I hope you will support Nick in his work in any way you can.

In the next issue, I hope to be able to report on initial progress on the above, as well as other developments, including the development of a Wetlands International Web site.

Michael Moser
International Director

Information from other Wetlands International Specialist Groups

There have been a few changes to the list of Coordinators for other Wetlands International Specialist Groups given in the last edition of the *Newsletter*. In particular, we deeply regret the death of Ted Hollis (Coordinator of the Wetlands, River Basins & Water Resources Management Specialist Group), during the INTECOL Wetlands Conference, held in Australia last September. Wetlands International's Executive Committee have approved a contribution to the "Ted Hollis Scholarship Fund", which is being established by the University College London as an appropriate way to mark Ted's immense contribution to the Geography Department of the University. The scholarship will support a post-graduate student at UCL with a specific interest in wetland hydrology and conservation, and will be targeted at overseas students, preferably from developing countries.

During the Second Meeting of the Executive Committee of Wetlands International, the name change of the Specialist Group on **Ecological Changes in Wetlands** to the **Wetlands Inventory and Monitoring Specialist Group** was approved. The change in name is to reflect an extension of the scope of the group to incorporate wetland inventory activities. The Wetlands Inventory and Monitoring Specialist Group effectively subsumes the role of the Wetland Inventory and Delineation Specialist Group, but the latter was inoperational as both coordinators had stood down.

Jesper Madsen expressed his wish to step down as coordinator of the Goose Specialist Group during the GSG Workshop held at Martin Mere in December 1996. Bart Ebbinge has agreed to undertake the role from autumn 1997 onwards.

A full list of the other Specialist Groups and their Coordinators is given *SSG Newsletter No. 5*. Full details of recently appointed Coordinators, plus changes of address or contact numbers for existing Coordinators are as follows:

Cormorant Specialist Group:

Mennobart VAN EERDEN, Address as before; TEL: +31 320 260915 FAX: +31 320 234300

Diver/Loon Specialist Group:

Joseph KEREKES, Address as before; FAX: +1 902 4264457 E-MAIL: joe.kerekes@ec.gc.ca

Economic Assessment of Wetland Functions & Values Specialist Group:

Fern FILION, Address as before; E-MAIL: Fern.Filion@ec.gc.ca
Rosemary JAMES, Address and contact numbers as before.

Grebe Specialist Group:

Jon FJELDSA, Zoologisk Museum 4 afd, Universitetsparken 15, 2100 Copenhagen O, Denmark. TEL: +45 35 321023 FAX: +45 35 321010 E-MAIL: jfjeldsaa@zmuc.ku.dl

Hunting Specialist Group:

Europe/Africa: Jacques TROUVILLIEZ; Address and contact numbers as before.
Americas: Rollin SPARROWE, Wildlife Management Institute, 1101 14th Street NW, Suite 801, Washington DC 20005, USA; Contact numbers as before

Seaduck Specialist Group:

Stefan PIHL, Address as before; TEL: +45 89201506 FAX: +45 89201515 E-MAIL: sp@dmu.dk

Storks, Ibises and Spoonbills Specialist Group:

New World: Malcolm COULTER; Address and contact numbers as before.
Old World: Koen BROUWER, Dahlialaan 80, 2343 XJ Oegst Geest, The Netherlands; Contact numbers as before.

Threatened Waterfowl Specialist Group

Andy GREEN Estacion Biologica de Donana, Avda. Maria Luisa s/n, Pabellon del Peru, E-41013 Sevilla, Spain. TEL: +34 5 4232340 FAX: +34 5 4621125 E-MAIL: andy@ebd03.ebd.csic.es

Tom ROTHE (N. America), State of Alaska, Department of Fish and Game, Division of Wildlife Conservation, 333 Raspberry Road, Anchorage, Alaska 99518, USA. TEL: +1 907 2672206 FAX: +1 907 2672433 E-MAIL: tomro@fishgame.state.ak.us

Wader Study Group

Nick DAVIDSON, Address as before; E-MAIL: procter@bexwell.dungeon.com

Waterfowl Ecology Specialist Group:

Vacant

Wetland Inventory and Monitoring Specialist Group:

Max FINLAYSON, c/o Alligator Rivers Region, Research Institute, OSS (Office of the Supervising Scientist), Private Mail Bag 2, Jabiru, NT 0886, Australia. TEL: +61 8 89799756 FAX: +61 8 89792149 EMAIL: maxf@erss.erin.gov.au
Luis NARANJO, Departamento de Biologia, Universidad delle Valle, Aparado Aereo 25360, Cali, Columbia; TEL: +57 23392440 FAX: +57 23561344, EMAIL: lnaranjo@biomarina.univalle.edu.co

Wetland Restoration Specialist Group:

Palle UHD JEPSEN, Address as before; E-MAIL puj@ec.gc.dk
Kevin ERWIN, Address and contact numbers as before.

Woodcock and Snipe Specialist Group:

Heribert KALCHREUTER, European Wildlife Research Institute, Saarland University, D-79848 Bonndorf, Glashutte, Germany; Contact numbers as before.

Please note that there has been no change in the addresses or contact numbers for

Coordinators of the Duck Specialist Group, The Education and Public Awareness Specialist Group, The Flamingo Specialist Group, the Heron Specialist Group and the Pelican Specialist Group since this information was circulated the *Swan Specialist Group Newsletter No. 5*.

Atlas of Anatidae Populations in Africa and Western Europe

The *Atlas of Anatidae Populations in Africa and Eurasia* (by D.A. Scott and P.M. Rose) was published by Wetlands International in 1996. The work provides an up to date review of the population status and trends of the Anatidae, reports on current research programmes and assesses the effectiveness of conservation and management techniques and policies. It is therefore a valuable source of information from which to develop global strategies for the conservation, management and wise use of all Anatidae populations.

The publication can be obtained from:
Natural History Book Service Ltd, 2-3 Wills Road, Totnes, Devon, TQ9 5XN, UK (Tel. +44 1803 865913 Fax. +44 1803 865280; E-mail nhbs@nhbs.co.uk):
LIMPBACK for UK£15.00 per copy plus postage/packing (Order #56834)
HARDBACK for UK£20.00 per copy plus postage/packing (Order #63599)
Postage and packing charges vary with destination and with the number of books ordered, but this information can be obtained by contacting the Natural History Book Service at the above address.

LETTERS/REQUESTS FOR INFORMATION

ADDRESSES FOR REPORTING SIGHTINGS OF RINGED WHOOPER AND BEWICK'S SWANS IN NW EUROPE

Compiled by **Bjarke Laubek**, National Environmental Research Institute, Dept. of Coastal Zone Ecology, Grenavej 12, Kalo, 8410 Ronde, Denmark.

Several ringing programmes are underway to determine the European flyways of Whooper Swans *Cygnus cygnus* and Bewick's Swans *Cygnus columbianus bewickii*. The main aims of the studies are to determine migratory routes and to monitor survival rates and individual breeding success. Studies are carried out at several sites along the migratory routes.

If you should see or receive details of a marked Bewick's or Whooper Swan, you are requested to report your sighting to the appropriate person listed below. This will help to speed up the processing of the data and to reduce the likelihood of data being lost. For each sighting, please report: ring number, date, location, coordinates, presence/absence of mate and/or cygnets (unringed as well as ringed), the number of cygnets in the family group and feeding habitat. Observers will be sent the ringing details and other sightings for each bird reported.

BEWICK'S SWANS

Blue neck-collars

all codes except S01-S19, H01, 001P-100P

Jan H. Beekman
Netherlands Institute of Ecology, Centre for Limnology, Rijksstraatweg 6, 3631 AC Nieuwersluis, The Netherlands

codes S01-S19, H01, 001P-100P

Richard Hearn
The Wildfowl & Wetlands Trust, Slimbridge, Gloucester, GL2 7BT, UK

Yellow neck-collars

all codes

Trinus Haitjema
IT Heechhout 7, 8723 ES Koudum, The Netherlands

Tarsus rings

one tarsus ring with two or three digit inscription

Richard Hearn (address above)

two tarsus rings with one digit inscription on each ring (Note: sometimes one of the rings may be lost)

Trinus Haitjema (address above)

WHOOPER SWANS

All neck-collars (yellow or blue) apart from yellow codes 0R01-0R11

Bjarke Laubek
National Environmental Research Institute, Dept. of Coastal Zone Ecology, Grenavej 12, Kalo, 8410 Ronde, Denmark.

Yellow neck-collars codes 0R01-0R11

Menno Zijlstra
RWS, Directorate Flevoland, PO Box 600, 8200 AP Lelystad, The Netherlands

Tarsus rings

White tarsus rings with black 3 digit codes

Richard Hearn (address above)

Yellow tarsus rings with black 3 digit codes, except for the series H??

Richard Hearn (address above)

Yellow tarsus rings with codes H??

Bjarke Laubek (address above)

Yellow or blue tarsus rings with 4 digit codes

Bjarke Laubek (address above)

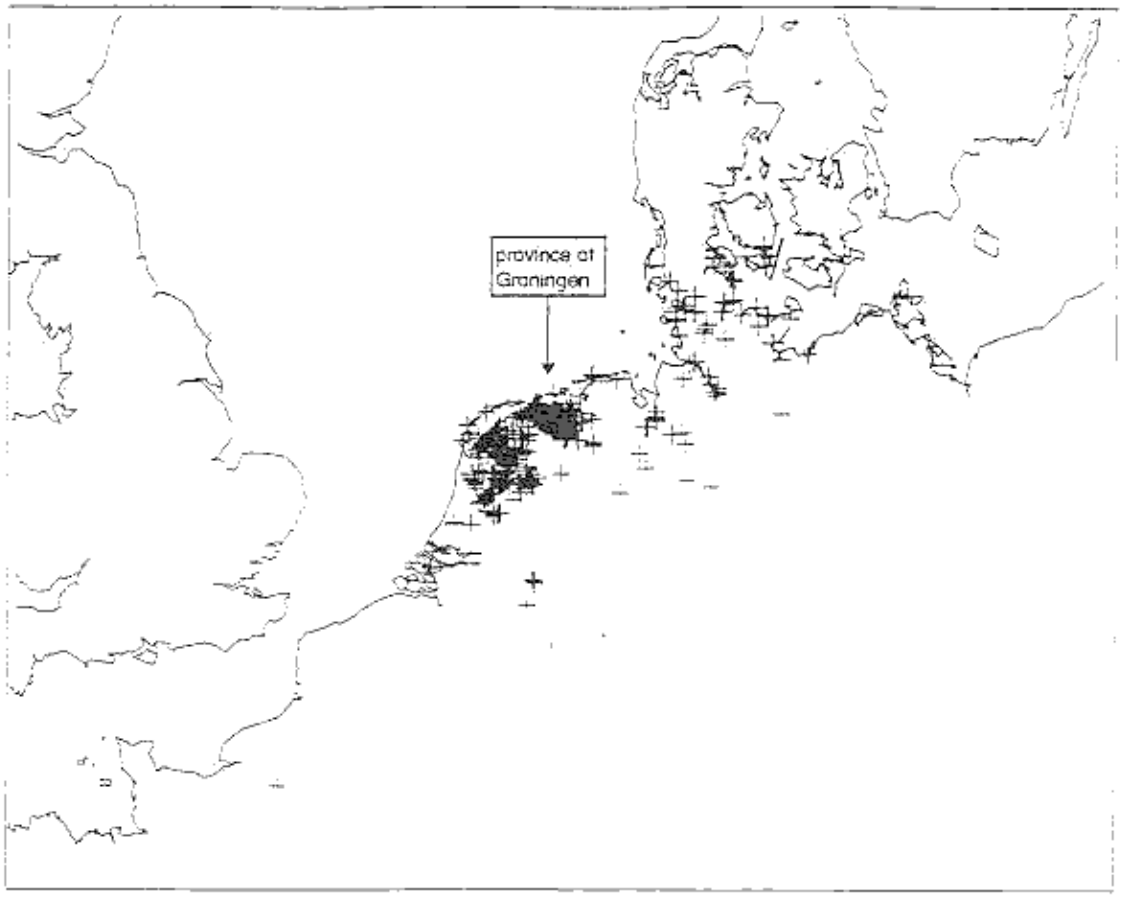
NECK-COLLARED MUTE SWANS FROM THE NETHERLANDS: A CALL FOR OBSERVATIONS

Jan H.Beekman & Richard Ubels
Zoological Laboratory, University of Groningen, P.O.Box 14, 9750 AA Haren, The Netherlands

As part of a long-term study into the population dynamics of Mute Swans in the northern part of The Netherlands, a colour marking scheme was set up in order to study movements of juvenile and subadult birds, from fledging to first breeding. The most important population dynamic parameter to be considered was the rate of emigration of birds from their natal area to breeding locations outside the study area. During the period 1989-1993, 250 Mute Swan cygnets were marked in the province of Groningen with yellow neckcollars, engraved with black codes PC00, PC50-PC99, PE00-PE99 and PH00-PH99. Each year, out of 25 randomly selected broods, a male and a female cygnet were marked with a neckcollar and plastic tarsus ring in addition to the usual metal tarsus ring.

So far, over 90% of all birds marked with neck-collars have been resighted, with some 3300 sightings of neck-collared Mute Swans being reported. Although most observations were from within the study area, or at least from within The Netherlands, *c.* 8% of the observations came from abroad. Groningen Mute Swans were reported from Germany, Denmark and France (see map).

After fledging, birds dispersed over a large area covering the northern parts of The Netherlands and Germany. The two main moulting areas appeared to be Lake IJsselmeer (Netherlands) and the south-western Baltic (northern Germany and south-west Denmark), the first area being about 100 km to the south-west of the natal area and the second roughly 350 km to the north-east. The sightings data indicate differences in the movements of the two sexes, which seem to be related to higher natal philopatry amongst females and more widespread dispersal amongst males (*ie* females breed closer to their natal area than males). A relatively high proportion of males migrate to the north-east (Germany and Denmark) for moulting, whereas females tend to moult closer to their natal area within The Netherlands. After moult, birds generally return to the vicinity of their natal area, although some individuals may stay away for one or more years. Migration of subadult birds between Groningen and moulting areas in the south-west Baltic has occurred in up to six consecutive years to date.



Preliminary results indicate that the number of birds reaching sexual maturity and becoming established as breeding birds, at an age of 3-5 years, is relatively low (= 5%). The losses due to mortality during the first few years are high: we estimate this at about 80-90% until maturity. Most birds reported as breeding birds established territories in their natal area (*ie* Groningen), however, where observation intensity is very high. Only three birds are known to have bred outside the study area to date: two birds nested successfully elsewhere in The Netherlands and another raised a brood in northern France. A fourth bird is thought to be breeding in northern Germany, but its breeding success needs to be confirmed.

We are, of course, extremely keen to know where other neck-collared birds may have started breeding outside Groningen. We therefore urge ornithologists to check Mute Swans for neck-collars and ask them to report their sightings, including date, location, GMT coordinates and details on the social status of the birds observed. Each observer will be sent the ringing details and other sightings of the birds reported. Full details of the study hopefully will then be published with the benefit of additional data.

RUSSIAN SWAN BIBLIOGRAPHY: 1883-1917 PUBLICATIONS

Jevgeni Shergalin, Sopruse pst. 175-58, Tallinn EE0034, Estonia, has kindly offered to continue the Russian Swan Bibliography. Here papers published between 1883 and 1917 are listed in chronological order. These early publications are derived from a compilation by the late Professor A.I. Ivanov from St. Petersburg (then Leningrad) of the "Birds of the USSR", published in the 1970s

to 1980s. Publications after 1945 (to be given in a future edition of the *Swan Specialist Group Newsletter*) will include information in addition to that provided by Professor Ivanov.

Vakulovskiy, N. 1895. Lebedi [Swans]. *Ptitsevodstvo* [*Poultry keeping*], No. 20, pp. 192-193; No. 22, PP. 209-211; No. 23/24. pp. 229-230; No. 32, pp. 299-300; No. 35, pp. 326-327; No. 42, pp. 383-384; No. 45, pp. 447-448.

Alferaki, S.N. 1896. Zametka o lebedyakh (s tablitsei) [Note about Swans (with Table)]. *Priroda i okhota* [*Nature and Hunt*], March, pp. 137-147; 1 page table.

Buturlin, S.A. 1900. Lebedi [Swans]. *Psovaya i ruzheinaya okhota* [*Riding to Hounds and Game Shooting*], Tula. Book 5, pp. 25-50.

Cherepova, V.A. 1909. Chernyi, ili avstralijskiy, lebed (*Cygnus chenopsis atratus*). Akklimatizatsiya ego v Kurskoi gubernii. [Black, or Australian, Swan (*Cygnus chenopsis atratus*). Acclimatization of it in the Kursk Province]. *Nasha ptitsevodcheskaya zhizn* [*Our Poultry Farming Life*], No. 1, pp. 5-6; No. 2, pp. 33-34; No. 3, pp 72-74; No. 8, pp. 238-241.

Cherepova, V.A. 1912. Nemoi lebed', ili lebed'-shipun (*Cygnus olor*). [Mute Swan, or Hissing Swan (*Cygnus olor*)]. *Nasha ptitsevodcheskaya zhizn* [*Our Poultry Farming Life*], No. 1, pp. 5-6; No. 2, pp. 7-8.

Karamzin, A.N. 1912. *Cygnus bewickii* Yarr. i *Grus leucogeranus* Pallas na zimov'ye v vostochnom Zalavkaz'ye. [*Cygnus bewickii* Yarr. and *Grus leucogeranus* Pallas on wintering grounds in the Eastern Trans-Causica]. *Ornitologicheskiy vestnik* [*Ornithological Bulletin*], No. 4., pp. 304-305.

Cherepova, V.A. 1913. Lebed'-klikun, ili muzykal'-nyi (*Cygnus musicus*). [Whooper Swan, or Musical (*Cygnus musicus*) Swan]. *Nasha ptitsevodcheskaya zhizn* [*Our Poultry Farming Life*], No. 12, pp. 432-434.

Dorogostaiskiy, V.Ch. 1913. Kitaiskiy lebed' (*Cygnus davidi* Swinh.) v Sibiri. [Chinese Swan (*Cygnus davidi* Swinh.) in Siberia]. *Ornitologicheskiy vestnik* [*Ornithological Bulletin*], No. 2., pp. 110-112; 1 sheet ill.

Kool'-Volkonskiy, I. 1913. Lebedi Novgorodskoi gubernii. [Swans of the Novgorod Province]. *Ornitologicheskiy vestnik* [*Ornithological Bulletin*], No. 2., pp. 110-112; 1 sheet ill.

STATUS REPORTS

INTERNATIONAL CENSUSES OF THE NORTH-WEST EUROPEAN BEWICK'S SWAN POPULATION, JANUARY 1990 AND 1995.

Jan H.Beekman, Netherlands Institute of Ecology, Centre for Limnology, Rijksstraatweg 6, 3631 AC Nieuwersluis, The Netherlands. (e-mail: beekman@cl.nioo.knaw.nl)

Since 1995, Wetlands International's Swan Specialist Group has combined its international Bewick's and Whooper Swan censuses, which are scheduled to take place every five years. Earlier international censuses of Bewick's Swans, made across Europe, were undertaken in January 1984, 1987 and 1990, in order to establish population size and to monitor subsequent changes in numbers. Results of the 1984 and 1987 Bewick's Swan censuses have been published (Beekman *et al.* 1985, Dirksen & Beekman 1991) but results of the 1990 and 1995 censuses, which became available only very recently, will be described and compared with the previous counts. A full analysis of the results is planned, for publication elsewhere; the data given here therefore should be treated as preliminary findings.

Coverage during the 1990 and 1995 censuses was generally excellent, thanks to the efforts of the national coordinators who ensured that most if not all the sites holding Bewick's Swans were counted. Data collected in Ireland in 1990 were thought to be almost complete; those from Denmark in 1990 may be incomplete, due to the fact that no special effort was made to cover all swan sites in that year. However, a comparison of the numbers in Denmark and Ireland in 1990

Table 1. Overview of international census results of the north-west European Bewick's Swan population, January 1984[1], 1987[2], 1990 and 1995 ([1] after Beekman *et al.* 1985, [2] after Dirksen & Beekman 1991).

Country	1984	1987	1990	1995
The Netherlands	8,801	6,650	13,126	19,399
Britain	4,995	8,018	8,754	6,983
N-Ireland	130	107	504	145
Rep. of Ireland	1,114	1,041	1,500+	435
Denmark	427	22	628+	914
Sweden	0	1	1	3
Estonia	-	-	-	31
Latvia	0	1	0	0
Lithuania	1	-	-	-
Poland	5	4	80	12
Fed. Rep. Germany	543	0	739	1,013
Former DDR	135	0	444	105
Belgium	43	120	55	237
France	88	77	-	-
Switzerland	1	5	7	-
Austria	-	-	-	-
Czech Republic	-	-	-	0
Slovakia	-	-	-	0
TOTAL	16,283	16,046	25,838	29,277

with results from other years indicate that the totals do not differ substantially, suggesting that any underestimates in 1990 were not large. Data from France, where a small wintering flock occurs in the Camargue, are lacking for both 1990 and 1995. Also, information from a few Central European countries where very small numbers occur is still missing for 1995. However, additional data is thought unlikely to have a major effect the estimates of population size presented here.

In total, 25,838 Bewick's Swans were counted in 1990, and 29,277 in 1995. The Netherlands, Great Britain and Ireland held over 90% of the total population, with The Netherlands alone holding half to two-thirds of all Bewick's Swans wintering in north-west Europe in these two censuses (see Table 1). These figures are the highest ever counted in Europe, and suggest a dramatic increase in population size of over 70% between 1987 and 1995! Numbers counted in 1984 and 1987 were just over 16,000 birds, and population size was then estimated at around 16-17,000 (Monval & Pirot 1989). The biggest increase in numbers was noticed in The Netherlands, where numbers rose from almost 9,000 in 1984 to over 19,000 in 1995! Thus, the observed increase in population size in north-west Europe can almost entirely be explained by the increase in The Netherlands. This seems to be a genuine increase in numbers, given consistent counting effort in The Netherlands, plus the fact that many new wintering sites have been "colonized" by Bewick's Swans in The Netherlands between the mid-eighties and mid-nineties (Koffijberg *et al.* 1997). The observed increase in population size may perhaps be related to the exceptionally good breeding results of the 1988, 1989 and 1990 seasons with 4,000-5,000 cygnets produced annually (Beekman, unpubl. data).

The results shown here are certainly a reason for careful optimism, since it seems that the north-west European population of Bewick's Swans is slowly creeping out of the vulnerable position it has been occupying due to its small size. However, most birds in the population still rely on very few sites and extremely vulnerable aquatic habitats,

especially during migration, some of which are in urgent need of conservation measures. Moreover, the increase in population size may be due to a few exceptionally good breeding seasons. Breeding success has been extremely low in some recent years (between 1992 and 1996) and the production of young is unlikely to compensate for annual mortality in these seasons. A new census, planned for the year 2000, hopefully will monitor on-going Bewick's Swan population trends.

References:

Beekman J.H., Dirksen S. & Slagboom T.H. 1985. Population size and breeding success of Bewick's Swans wintering in Europe in 1983-4. *Wildfowl* 36: 5-12.

Dirksen S. & Beekman J.H. 1991. Population size, breeding success and distribution of Bewick's Swans *Cygnus columbianus bewickii* wintering in Europe in 1986-87. In: Sears, J. & Bacon, P.J. (eds.). *Proc. 3rd IWRB International Swan Symposium, Oxford 1989. Wildfowl Special Supplement No. 1*: 120-124.

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STATUS OF WHOOPER SWANS IN CHINA: 1996-97

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Recently swans have been much in the news in China:

1. Western China

Ca Dai (1997) gives preliminary results of the Whooper Swan census in the Bayinbuluke Wetland, Tianshan Mountains, which put the summer population at nearly 3,130 birds. Further records showed that nearly 460 individual swans died at Bayinbuluke in April 1996, however, because of severe spring snow storms at the site. Many swans were numb with cold, they failed to find food due to heavy snow cover and abandoned the nests with eggs. Clearly this had a serious effect on the 1996 breeding season.

2. Eastern China

Every year about ten thousand Whooper and Bewick's Swans overwinter along the coastal areas of the eastern provinces, including Shandong, Shanghai, Jiangsu, JJiangxi, etcetera. During the migratory season, the swans were often hunted by peasants. A report from Chian Centre Television News in April 1997, which astonished the country and the rest of the world, showed people teaching tourists how to hunt migrating swans on a lake in Yanqing County, near the capital Beijing (Peking). In January 1997, some men even had the audacity to shoot captive swans in the National Park in Fuzhou City! Hundreds of swans were captured in the field last year, for the city zoo. This is very bad for a population which is declining within China.

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SHORT COMMUNICATIONS ABOUT SWANS WIDESPREAD IN LATVIA

Martin Kalnins, Ormanu iela 14-1, Riga, LV-1002, LATVIA.

Three swan species have been recorded in Latvia: the Mute Swan, the Whooper Swan and the Bewick's Swan. Numbers recorded in winter in recent years are given in Table 1.

Table 1. The number of wintering swans in Latvia, 1990-1995.

Species	1990	1991	1992	1993	1994	1995
Mute Swan	1220	1750	3900	2150	1410	2380
Whooper Swan	24	57	56	45	11	15
Bewick's Swan	0	2	2	3	2	0

The Mute Swan both breeds and winters in Latvia. At present the number of nesting pairs (400-500) in relation to the number of water bodies (>2,000) is very small. There are only two major wintering sites - Lake Leipajas, which receives 1,000-2,000 individuals, and the environs of the city of Riga, which holds 400-600 birds (Table 1).

The Whooper Swan also breeds and winters in Latvia. The number of nesting pairs has been increasing. In the 1992 swan census, 25-30 breeding pairs were recorded, but observations in more recent years indicate that the real number of breeding pairs is higher.

The Bewick's Swan does not breed in Latvia, and occurs irregularly in winter. It can often be observed on passage together with the Whooper Swans.

Swan studies in Latvia up to 1993

Until 1993, Juris Lipsbergs was the only person studying swans in detail in Latvia. Most of his investigations concerned the swans' nesting biology and he wrote his bachelor's thesis on the subject. By 1993 he was also the most active swan ringer in Latvia. Between 1925 and 1993, around 1,000 Mute Swans and two Whooper Swans were ringed in Latvia, most (*c.* 90%) as cygnets. Generally they were caught on large costal lakes, such as Lake Engure and Lake Babite.

Swan studies in Latvia from 1993 to 1995

There is not yet an established swans research group in Latvia, although three to four people are now actively involved in swan studies. This is due in part to a lack of time (since ornithology is mainly a hobby) and to some debate about the direction of the research programme. Nevertheless, several projects are underway, including recording the incidence of the "Polish" morph of Mute Swan, a swan ringing programme and a behavioural study. The Mute Swan is being studied more intensively than the other two species.

Swan ringing programme

Before 1993 wintering Mute Swans had not been ringed or were ringed only in very small numbers in Latvia. From 1993 to 1995 the author and another swan researcher (R. Matrozis) caught and ringed 174 Mute Swans in winter. The total number of swans marked in winter during this period was *c.* 185 birds. More cygnets have also been ringed since 1994. Only two Whooper Swans have been ringed: one cygnet and one adult bird. The author has also ringed a young Bewick's Swan.

Between 1992 and 1995 the author recorded approximately 250 controls: 36 in 1992, 40 in 1994, 112 in 1995 and 62 in 1995. A total of 136 individual birds (rings) have been controlled from the *c.* 250 sightings or recoveries. Results showed that 36 birds had Lithuanian rings, 3 had Polish rings and 97 had Latvian rings. So far the oldest age recorded is of a bird seven years old.

Causes of death

Observations of wintering swans at one of the main wintering sites, the Darzinu/Doles territory, found that flying into high voltage wires is a main cause of death. The wires are in the swans' flight-path as they move about this territory. The author is collecting data on collisions by swans with over-head wires from other parts of Latvia. At one water body the number of dead swans is very high in relation to the small number of wintering swans on this water body, which

may be due to the level of water contamination. Unfortunately some swans are also killed by poachers; the exact numbers are not known but estimates are in the region of 5 to 10 specimens every year. Most swans killed by poachers are taken in winter, when there is a demand for food. Swan hunting has not been recorded during the summer season.

Swan behaviour

Aggressiveness by swans towards humans, and also towards other species, is being investigated. In particular, the behaviour of swans towards humans when the parent birds are still leading and protecting their cygnets is being addressed.

A paper on the "Polish" morph *Cygnus olor immutabilis* of Mute Swan is given separately in this Newsletter.

NEW STUDIES/RESEARCH GROUPS

PLANT-ANIMAL INTERACTIONS: DO SAGO PONDWEED AND BEWICK'S SWANS LIMIT EACH OTHER ALONG THE MIGRATORY FLYWAY OF THE BIRDS?

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The Department of Plant-Animal Interactions was founded in 1994 at the Centre for Limnology, Netherlands Institute of Ecology. This young, dynamic and expanding multi-disciplinary group presently consists of four staff researchers, three PhD students, an average of four undergraduate students and a technical staff of five. The aim of the research group is to study mechanistic and evolutionary aspects of the interaction of selected plant and animal species within the framework of the aquatic ecosystem as a whole. It concentrates primarily on the interaction between Bewick's Swans and Sago Pondweed *Potamogeton pectinatus*, although other combinations of organisms and aquatic habitat settings may become the subject of study. Two different research themes are currently being tackled: (i) Life-history traits of submerged clonal macrophytes in shallow-water ecosystems and (ii) Feeding behaviour of Bewick's Swans and its influence on the population dynamics and structure of submerged macrophyte vegetation. As an example, in the plant oriented work, projects have been initiated on physiological processes controlling phenotypic plasticity in vegetative and sexual reproduction, photosynthesis and growth along latitudinal gradients, environmental and genetic components of variation in phenotypic plasticity, and effects of biological (*eg* waterfowl grazing) and physico-chemical factors on the within and between habitat genetic diversity in aquatic macrophyte populations. In the swan oriented work, projects focus on food intake and digestibility (optimal foraging models), energy expenditure of feeding and locomotion, body reserves dynamics, swan migration, as well as considering Bewick's Swan breeding success and population dynamics. The physiological approach, in particular, may advance our understanding of optimal behaviour and limitations in the swans' annual cycle, which in turn should help to promote the conservation of the species.

The projects mentioned above involve both field studies and laboratory experiments. Field studies are carried out in different European countries (*eg* The Netherlands, Russia, Spain), whereas research facilities at the Centre for Limnology include a mesocosm (where macrophytes can be grown under controlled conditions) and modern, well equipped biochemical laboratories. Six captive Bewick's Swans are kept for experimental work (feeding trials and physiological studies) in a new research facility at the Centre of Terrestrial Ecology in Heteren. The Plant-Animal Interaction Group aims at a broad national and international cooperation and we strongly encourage other research groups and students to participate in joint grant applications and research projects.

As background to the above information, a short presentation concerning our current state of knowledge (upon founding the Department of Plant-Animal Interaction) is given here. The projects described all relate to the association between Bewick's Swans and Sago Pondweed, with the aim of

considering possible reciprocal limitations (and even co-evolution) between the swan and the plant.

Sago Pondweed and Bewick's Swans

Sago Pondweed has a wide distribution ranging from tropical to arctic latitudes. It can form large monospecific stands. The main factor limiting the growth of Sago Pondweed growth identified so far is the amount of light penetrating the water. Wave action is also relevant because it causes physical damage to the plants. A third, hypothesized, factor is waterfowl grazing. In summer and autumn, Sago Pondweed forms dormant tubers in the sediment, from which new plants sprout in the spring. These tubers are rich in carbohydrates that serve as an energy resource for the sprouting plants, but they are also favoured by Bewick's Swans.

Bewick's Swans are arctic-breeding birds of the tundras of northern Russia. One flyway population (25,000-30,000 individuals) winters in western Europe, especially in The Netherlands and Britain. The distance between the breeding and wintering grounds is about 3,500 km and must be covered twice a year. The migration takes roughly 1½ - 2½ months. During the migratory period, both in autumn and to a lesser extend in spring, the birds rely heavily on submerged macrophytes for the energy reserves necessary as fuel for these long-distance flights.

Feeding ecology studies

In October, shortly after arrival from their northern breeding haunts to The Netherlands, large flocks of Bewick's Swans uproot tubers of Sago Pondweed from the sediment. The amount of tubers available is highly variable between years and ranges from 20-50 gram dry weight per m^2. Local variation may even be much larger. During the period that the swans exploit these tubers, the biomass in the tuber bank may be reduced by as much as 80-90%. How, and to what extent, this severe predation of tubers affects plant regrowth in the following season remains to be studied.

On the basis of vegetation maps and detailed tuber sampling, it is possible to predict the carrying capacity of a given lake or sub-areas therein. The observed number of swan-days spent at these sites are well in accordance with the predictions. At tuber biomass levels of 3-8 gram dry weight per m^2, the swans give up exploitation and shift either to other areas or to other food sources. This biomass level is considered to be the lower threshold level below which foraging is no longer profitable for the swans. Thus Sago Pondweed availability may limit the swans' food intake and the rate at which they replenish body stores after migration.

After depleting the tuber bank in a given patch, stand or lake, the swans move to other sites or even to other food resources, such as harvest left-overs of sugarbeet or pasture land (grass). The swans show a distinct preference for Sago tubers, however, upon arrival in The Netherlands.

Timing and energetics of swan migration

To overcome periods of food shortage, or to enable them to undertake prolonged periods of hard work (migration), birds need body reserves. These include both energy and nutrient reserves, which can be viewed as a kind of buffer between intake and expenditure. The Bewick's Swans' migration between arctic Russia and The Netherlands cannot be covered in one non-stop flight, even though the total flying time is estimated at only 50 hours. Bewick's Swans have a stepping-stone migration strategy, flying long distances with intermittent stop-overs along the flyway. Stop-over sites are now known to occur in the Baltic republics and in the White Sea region.

Being a large bird (5-7 kg), the Bewick's Swan has a high energy expenditure during flight. Preliminary calculations show that for each kilometre of flight, one gram of body stores is required. The maximum fuel load for a Bewick's Swan is calculated at 1.24 its own weight (lean mass), *ie* 24% excess weight. Models of flight mechanics predict that this fuel store allows a potential flight range of about 1,450 km, after which the bird has to feed and replenish its fat and nutrient stores before it can resume migration.

Allometric relations between body size and maximal fat deposition rates predict that a Bewick's Swan can put on reserves at about 1% of its lean body mass per day. Thus, an "empty tank" can be refuelled in roughly three weeks (24 days). The maximal flight distance recorded for swans tracked with satellite transmitters between major stop-over sites was 1,050 km.

Does Sago limit swans?

During both autumn (September-October) and spring migrations (April-May), submerged macrophytes are an important food source for the swans. Alternative food sources become more and more scarce with increasing latitude, especially in spring.

Access to Sago tubers, however, is limited; firstly by water depth and ice conditions, and secondly, by the restricted vegetation area wherein Sago grows. Satellite images of major water bodies on the swans' migratory route gave us insight into the occurrence of submerged vegetation (thought to include *Zostera* and *Chara* as well as Sago Pondweed) in shallow waters at these sites, and showed that probably not more than a few hundred km^2 of such vegetation occurs along the flyway. Thus the relatively small size of the Bewick's Swan population may be linked with the restricted availability of Sago Pondweed and other submerged vegetation during migration. Detailed studies at different stop-over sites, concentrating on the phenology of growth of submerged macrophytes and the timing of Sago tuber formation, as well as all aspects of swan utilization, may lead to an understanding of how the birds are energetically limited by their main food plant during migration.

From another perspective, strong reduction of Sago tuber banks by the swans is also expected to affect the plant. Smaller tubers (swans favour large ones) and reduced biomass levels after swan grazing could reduce survival of new sprouts and even complete stands of vegetation, especially in arctic conditions with very low water temperatures and different light regimes. The challenge is to understand how Sago Pondweed serves as a sustainable food source as the swans exploit its tuber banks year after year, and how plant and grazer have evolved side by side.

MUTE SWAN MANAGEMENT

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The Central Science Laboratory (CSL), York, has just started a research project on the management of Mute Swans for the Ministry of Agriculture, Fisheries and Food. The work aims to develop practical, cost-effective and humane methods of reducing swan damage to river vegetation and farmland. This spring, CSL is investigating nest site selection, with a view to providing artificial nest platforms within fisheries. Territory-holding pairs should then exclude flocks of non-breeders which are the cause of complaints by fisheries managers. Next winter CSL will be investigating the use of physical exclusion, scaring and chemical repellents, to reduce swan grazing on crops and improved pasture.

WHOOPER SWANS IN NORTHERN JAPAN

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In October 1996 John Oyvind Albertsen joined Hokkaido University to start his doctorate degree studies on the feeding ecology of Whooper Swans at Lake Akkeshi. Japan receives many wintering Whooper Swans from Russia, with 2-3,000 individuals usually spending the winter at Lake Akkeshi. The study site covers 32 km^2 of estuary, connected to the Pacific Ocean. Water depth is mostly less than 2m, and the estuary is covered by eelgrass *Zostera marina*. Except for an annual winter count, no study has previously been made of waterbirds in this area.

The first winter was spent collecting samples for a stable isotopic investigation of the Lake Akkeshi ecosystem. Blood samples have been collected from nine Whooper Swans caught by hand and net. Only three of these birds were marked (with an aluminium leg-ring, a plastic leg-ring and a neck-collar), because JOA does not yet have a ringing licence. He also joined a ringing group

northeast of Lake Akkeshi, and obtained blood samples from a further 10 Whooper Swans. All 10 birds were marked with leg-rings and neck-collars.

To determine how stable isotopes of carbon and nitrogen are assimilated into the blood, an experiment on captive four Whooper Swans at Kushiro Zoo was commenced. These birds are now feeding on eelgrass collected at Lake Akkeshi.

The main aim of the study is to investigate the feeding ecology of wintering Whooper Swans and the interaction between eelgrass and swans. The food chain will be mapped by investigating the transfer of isotopes from producers to consumers, supported by direct observations of the swans' feeding behaviour and faecal analyses. The isotopic study should indicate whether the swans are feeding on invertebrates, as well as distinguishing between leaves and rhizomes in their diet. JOA is also interested in the feeding habits of Whooper Swans during migration and in the summer season.

PROGRESS REPORTS

NORDIC WHOOPER SWAN PROJECT

Bjarke Laubek, Århus University, Department of Zoology, Universitetsparken, DK-8000 Århus, Denmark.

Over the last five years a number of studies have been conducted on Whooper Swans in the Baltic region. Most effort has been concentrated at Danish wintering sites and on breeding grounds in Finland. The project has been collaborative, involving Danish, Estonian Finnish, Swedish and Icelandic scientists, coordinated by Bjarke Laubek from the National Environmental Research Institute in Denmark.

The main purpose of the project is to gather basic ecological and phenological data, to form the basis of a management plan for the Fenno-Scandian/Western Russian population of this species. The reason why the initiative has been made by the Danish partners is that Whooper Swans, and also Bewick's Swans, have come increasingly into conflict with Danish farmers in the last 20 years, as the birds changed from feeding mainly on lakes and fjords to foraging on winter-green fields. Grazing on oilseed rape *Brassica napus*, in particular, has been a problem. We therefore conducted experiments to determine whether grazing had a negative effect on crop yield in the 1991-92 and 1992-93 seasons. The distribution and phenology of Whooper Swans wintering in Denmark was recorded during monthly counts in the 1991-1993 winter, in order to assess habitat choice. A coordinated census of Whooper Swans wintering on the European mainland in January 1995, made at the same time as a census of the Icelandic population (in Britain, Ireland and Iceland), resulted in the population estimate for the continental birds being almost doubled.

The numbers of Whooper Swans breeding in southern Sweden and Finland have increased substantially in recent decades. As part of the Nordic Whooper Swan Project, new estimates of the Finnish-breeding population are to be made, based on fieldwork carried out in Finland in 1996. In Sweden, a new countrywide census is due to take place in summer 1997.

More than 800 Whooper Swans have been fitted with neckbands - on breeding and moulting grounds in north-east Iceland, at Danish wintering sites and at Finnish breeding grounds - to determine the link between the breeding populations and their wintering areas. The ringing in Finland has taken place in five areas along a north-south transect, running from Pelkosenniemi in the north to Tampere in the south. Resightings of these birds indicate that there is quite a good separation of breeding populations, even in the wintering range. This makes the mechanisms controlling breeding success very interesting, from a management point of view, because understanding these might enable us to predict more accurately the future numbers of birds wintering in different areas, and thus the potential for future crop damage problems.

We have also been studying, therefore, the effects of habitat quality on the reproductive success of Whooper Swans breeding in Finland, by comparing clutch size, cygnet growth rates and survival to the first winter for families from peatlands, poor quality lakes

and richly vegetated lakes. We also wish to see whether there are differences in reproductive success when comparing swans nesting in the south with those nesting in the north. Results clearly show that the productivity of birds breeding north of 66° latitude is very low and that a large proportion of the population breeds only in some years. Most pairs nesting in southern Finland breed successfully each year, however, producing large clutches, and the cygnets have high survival rates. Thus it seems that hunting pressure during the early part of this century, and the resultant tendency for Whooper Swans to breed mainly in the sparsely populated regions of northern Scandinavia until 20-30 years ago, effectively forced the birds to breed in sub-optimal conditions, with a summer too short to enable them to be highly productive.

A number of small projects have been undertaken by students from Aarhus University, Denmark and from Oulu University, Finland, as part of the Nordic Whooper Swan Study. A report describing the results of one of these projects is presented below:

BREEDING BEHAVIOUR OF WHOOPER SWANS IN FINLAND; LATE SUMMER 1996

Bente Hansen, Benny S Mosgaard & Bjarke Laubek, Department of Zoology, Biological Institute, Aarhus University, Universitesparken, 8000 Arhus C, Denmark.

As part of the study of Whooper Swan breeding success, we followed several families during the late summer, to see if there were any behavioural differences for birds on different habitats, which could account for the variation in reproductive success between habitats.

Behavioural data was recorded for Whooper Swan families at four different lakes in northern Finland (at *c.* 65°N) from August to September 1996. Although there was little difference in the behaviour of the male and female parents, there appeared to be a role change connected with the timing of the moult. Generally the non-moulting parent took the leading role in the family, irrespective of the sex of the individual.

Observations showed that most of the time was spent foraging. In particular, cygnets spent a high proportion of their time feeding (52%-74%), significantly more feeding time than recorded for adult birds (27%-51%). The cygnets appeared to be less efficient than adults at dabbling and up-ending, seemingly being less able to hold their breath under water. When dabbling, the average time that the head was under the water was 14 seconds for adults and five seconds for cygnets. Similarly, when up-ending, the average time that an adult swans kept its head under water was 14 seconds, compared with an average of three seconds for the cygnets. Up-ending cygnets also had problems in balancing, often flipping right over.

Watching for predators was the responsibility of the parents rather than the offspring. Keeping alert was the second most common activity of the parents (25%-34% of time) but was only occasionally recorded in the young, who spent about 1% of their time on this activity. Families usually keep very close together. When combining data from all habitat categories, the average distance between adults and their cygnets is *c.* eight swan-lengths, or *c.* five swan-lengths between the cygnets. There is a substantial difference in family cohesion between habitat categories, however, particularly when comparing families in the water/sedge areas with birds on drier land. On water the distance is *c.* 10 swan-lengths between adults and cygnets and *c.* six swan-lengths between cygnets. On land, where families are more at risk from predators, the distances decrease to four swan-lengths between adults and cygnets, or 3 swan-lengths between cygnets. Since most of the lakes are surrounded by forest, the families can be surprised more easily and are therefore more sensitive to hunting and other disturbance from humans when on land. This results in the swans spending most of their time on water during the breeding season. Similarly, after the start of the hunting season (20 August in Finland), the families prefer to forage on or close to water, on water-covered sedges *Carex sp.* or Horsetail *Equisetum fluviatilis* beds, even though swans are not quarry species.

SATELLITE TRACKING BEWICK'S SWANS ON SPRING MIGRATION

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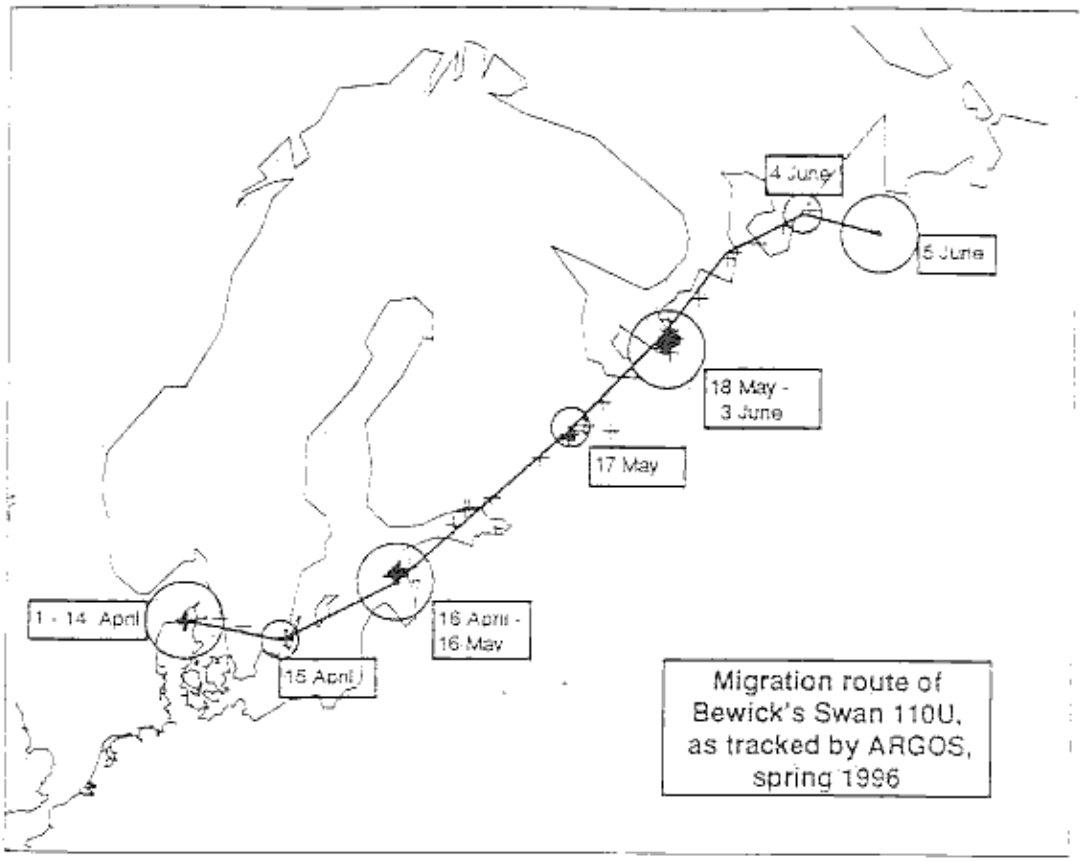
Large birds that undertake long-distance migrations, such as Bewick's Swans, generally have a stepping-stone migration strategy. This means they move between wintering and breeding areas in several flights, with intermittent stop-over periods for feeding. The reason for this is that swans have a high energetic cost of flying, a limited additional mass which they can lift into the air ("fuel" for flying, *ie* fat and protein), and a relatively slow rate of accumulating energy stores prior to departure. These factors limit the potential flight range and migration speed of the swans and all are related to their size. Also, the energetic limitations of migrating may be of vital importance for their survival and breeding success. Perfectly timed arrival is crucial in a somewhat unpredictable, arctic environment, with a summer that by its short duration has a major influence on breeding success.

Bewick's Swans require approximately two and a half months to migrate from wintering sites in The Netherlands to their breeding grounds in northern Russia. They use stop-over sites in Germany and/or Denmark, Estonia and Russia for refuelling for periods of up to four weeks. In Germany and Denmark, their food mainly consists of rape-seed and crop left-overs like potatoes and barley. It was believed that the birds would have to rely on more natural food plants further north due to lack of agricultural activity. Until recently, however, information on stop-over sites further north-east was only sparsely available. It was hypothesized that Bewick's Swans could not fulfil their annual migration without intermittent stops en route to their breeding areas, and that body reserves for egg-laying and incubation were stored at these stop-over sites. So, there is an urgent need to obtain more detailed data about the use of wetlands along the route. This includes timing and duration of staging, feeding ecology, and conservation status (pollution levels, hunting pressure *etc*) of the sites used.

Satellite telemetry can help to elucidate some of our questions on the whereabouts of Bewick's Swans during spring migration and the temporal use of different sites. It can also be used to test predictions about stop-over periods and flight ranges (*cf* Beekman *et al.* 1996a). Once stop-over sites have been discovered, more detailed field studies can commence. In spring 1996, we equipped 10 Bewick's Swans with satellite transmitters in Denmark, in order to track their migration to northern Russia. An important aspect of the study was the use of small barometers built into the transmitters, also used in studies of Whooper Swan migration (*eg* Pennycuick *et al.* 1996). This was done to study flight altitude in relation to wind direction and wind force at different altitudes to determine whether Bewick's Swans selected optimal tail wind conditions, in order to save energy during flight. As an example, an itinerary and map of the tracked route of one of the swans is presented here. Further results will be published elsewhere.

Itinerary for Bewick's Swan 110U

Date	UTC time	Notes
1 April 1996	12 h	14 Bewick's Swans and nine Whooper Swans are captured with canon-nets near Nørrehaine, N-Jutland, Denmark.
2 April 1996		Seven male Bewick's are equipped with satellite transmitters and a blue neck collar. The birds are weighed, measured and their fat reserves estimated. They are released with the other Bewick's on a roost.
8 April 1996	11 h	110U resighted near Limfjorden. The bird looks fine and is feeding.
14 April 1996	07 h	Flying due East across Kattegat to Sweden, altitude < 100m.
	10 h	Increases altitude to 450m across southern Sweden.
	11 h	Lands near Kalmar on Swedish east coast. Swedish ornithologists are asked to look for him.



Date	UTC time	Notes
15 April 1996	16 h	110U is found on a field, where he feeds in a flock of 20 Bewick's.
	19 h	At dusk, a Goshawk is seen to cause disturbance and the flock takes off in a north-easterly direction.
	20 h	ARGOS satellite locates him at 100m altitude over the Baltic Sea.
16 April 1996	05 h	Bird lands in Vaike Vainen Strait, which is rich in aquatic vegetation, when not covered with ice.....
19 April 1996	11 h	Estonian and Dutch ornithologists spot 110U in a flock of 400 birds. Activity concerns mainly sleeping on ice, some feeding in waterholes. Abdominal profile 25. Estonian coastal waters covered with 50 cm of ice! However, the first 2,500 Bewick's arrived during the last two days.
2 May 1996	18 h	Seen again in Vaike Vainen Strait, where a total of 3,500 swans are counted, all feeding on submerged waterplants. Abdominal profile now 43, an estimated fat increase of about 60%.
6 May 1996		Aerial survey by Estonian ornithologists. About 5,000 Bewick's Swans feeding in shallow waters along the west coast of Estonia. Vaike Vainen Strait is the most important site.
14 May 1996		Still large numbers of swans in Vaike Vainen Strait, and 110U also still present.
16 May 1996	13 h	Apparently, the urge to migrate became too strong. Takes off in the direction of the White Sea, flying at 200m over land.
17 May 1996	08 h	Located in the middle of the Finnish Gulf flying at sea level.
	11 h	110U reaches land and climbs to 500 m altitude.
	14 h	Lands briefly at Lake Ladoga before flying on to Lake Onega (at an altitude of 300m) where he lands two hours later.
18 May 1996	14 h	After spending a full day in the lakes north of Lake Onega, 110U flies on to the

Date	UTC time	Notes
8 May 1996	14 h	White Sea. Flying at an altitude of up to 250 m, he alights on the delta of the Dvina River near Archangelsk that evening, close to where a team of our colleagues is studying the foraging behaviour of Bewick's Swans on pondweeds.
3 June 1996	10 h	Having spent most of his time in the delta of the Dvina River, 110U now starts moving north and is resighted by our Dutch colleagues, while feeding on tubers of Sago Pondweed in the shallow fresh waters around the island of Mud'yug in the Dvina Bay.
	20 h	Members of the Dutch team fail to find him in the evening, because he has just departed in a north-easterly direction towards the breeding grounds.
4 June 1996	06 h	Early morning: 110U has stopped at the mouth of Indiga River, on the ice-covered coasts of the Barents Sea, and stays for the rest of the day. However, this is not yet his final destination...
5 June 1996	14 h	Presumably in the morning, 110U takes off from Indiga River and after a relatively short flight reaches the Pechora River near the town of Nar'yan Mar, just south of one of the most important breeding areas for the species. Ice on the river had broken just two days beforehand. Shortly after arrival, the battery of the transmitter expires.

In conclusion, spring migration from Denmark to the breeding grounds took this bird about two months. The journey was made in three major "leaps" of 800-1,200 km each. Two stop-over periods of two to four weeks for refuelling were spent on the west coast of Estonia and in the Dvina delta of the White Sea, respectively, confirming earlier findings that these sites seem to play a vital role for the completion of Bewick's Swan spring migration (Beekman *et al.* 1996a, b). It also seems that shallow fresh water systems are of crucial importance due to extensive submerged vegetation beds, the only food sources available at these sites in early spring. Notable are the short stops in Sweden, Karelia and on the Barents' Sea coast. It is possible that bad weather conditions prevented further flight, but other limiting factors can not be ruled out. For instance, water balance in birds on migration may be relevant; perhaps a swan has to stop to drink after a few hours of flight. This study also shows that satellite tracking may enhance individual studies of birds along their migratory route, given that 110U was spotted by field workers five times at different locations!

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THE MUTE SWANS IN DUBLIN

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I began studying Mute Swans around Dublin in 1983. At that time we thought that the

Irish population was closed. Since then, colour ringing on both sides of the Irish Sea has revealed that there are occasional movements between Ireland and Britain. Nevertheless, Irish swans are fairly isolated. They also live in the mildest climate of the species' range. I included urban and rural areas in the study.

Swans have a curious history in Dublin. They were present in the 18th Century but absent throughout the 19th Century. A pair bred in the county around 1906 and three nest locations are known for the early 1920s. Numbers increased over the next 40 years. There has been a flock in north Dublin since at least 1930. By the end of the 1970s the breeding distribution was broadly similar to that of today.

Dublin swans tend to be older when they start to breed than British ones; 54% had not bred by the age of five years. A shortage of suitable territories may be responsible for this and marginal habitat is much used. The ten "best" territories produced 52% of all the young fledged at 58 nest sites. About 17% of nests are on estuaries and the fledging rate for these is only about 0.6 young per nest, compared with 3.4 young for nests on ponds.

An analysis of 4,473 recorded movements showed that swans move around most in the 18 months after fledging. From the age on two years onwards, as birds begin to acquire territories, they "settle down" and the overall average mobility of cohorts declines with age. Irish swans travel more extensively than do British ones. Our young adults take longer to find territories and it is not surprising that they travel further in doing so.

Most movements (84%) began or ended in a flock. There are annual cycles of movement between the six flock locations in the study area. Moves appear to be triggered by food demands, the need for security during moult and by harassment from pairs trying to set up territories in flock locations.

Collisions in flight caused about one third of recorded deaths. Oil pollution is also a problem. In October 1986, a flock of 52 swans was contaminated with diesel oil. Surviving birds were captured for rehabilitation. They spent an average of 63 days in captivity. The incident showed that it is possible to rehabilitate oiled swans. At least 33 swans (65% of those oiled) were alive in the wild five months after the spillage. The birds did not breed in the year following oiling but subsequently breeding was normal. Lead poisoning, the scourge of swans elsewhere, is not a major problem in Dublin as there is little coarse fishing.

Life expectancy is lower in built-up areas. The increased risk means that territories become vacant more frequently in the city, so the average age of urban breeders is lower than that of rural ones. Curiously, only 18% of ringed females have been recorded dead compared to 26% of males (a highly significant difference). The proportions listed as "dead or missing" are similar, as are the proportions killed in collisions with wires. Why are male casualties more "visible" than female ones? Is it that males tend to die "in public", defending nests, fighting with dogs or other swans, and so attract more attention than do females?

SOUTH AMERICAN SWAN STUDIES

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Several swan projects are underway and progressing in South America. Firstly, the Neotropical Swan Bibliography review is well advanced, needing only some amendments to the discussion for it to be completed. A major project proposal for swan research in Chile is being developed, which would cover the national banding and marking scheme. The aim would be to monitor dispersal patterns, particularly when triggered by regional droughts, and to determine the extent to which individuals (especially non-breeding birds) move from Chile to Argentina and other countries. We hope to arrange a visit by Japanese scientists to help with the technicalities of satellite-tracking for this project. We will also commence a study of the genetic variability of swan populations with a view to describing any regional differences.

A dissertation for a veterinary degree, entitled "Feeding behaviour and foraging capacity of

Black-necked Swans in wetlands near Valdivia" has recently been finished by Pablo Corti. It highlights the importance of this species as a bioindicator of the environmental stability of wetlands and of regional climatic changes. Several behavioural categories were used when monitoring Black-necked Swan activities of which feeding was proportionally the most important. Water levels were found to have a major influence on feeding behaviour. Correlations between water levels, swan numbers, swan distribution and foraging activity were recorded. Black-necked Swans are invariably herbivorous and opportunists. It was shown that when swans feed mainly on the locally dominant *Egeria densa*, they digest a only low proportion of the vegetation and large amounts of food have to be eaten daily. The use of exclosures also showed that swans have a important impact on vegetation biomass, with the biomass of submerged waterplants inside and outside the exclosures differing at statistically significant levels.

Perhaps the most important development is the recent CMS Technical workshop held at Valdivia, Chile, with participants from Uruguay and Argentina, from the recently entered countries of Peru and Chile, and invited individuals from non-party countries such as Bolivia, Brazil and Paraguay. It was agreed that Brazil would organise its Banding Office to coordinate banding programmes across the southern cone neotropical countries. It is already in contact, through bilateral agreements, with Uruguay, and to some extent with Argentina. The future broad agreement, initially for three years and to be prepared under the CMS umbrella, would also implement banding courses, the training of personnel on these matters and promote the installation of similar banding centres in countries that wish to embark on this programme. Thus the transfer of technical and scientific expertise at a regional level would promote the development of regional banding schemes, of which Black-necked Swans and Coscoroba Swans would act as flag-ship species.

TRUMPETER SWAN RESTORATION IN ONTARIO: 1996

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Since the Ontario restoration programme began in 1982 we have released 164 Trumpeter Swans to the wild, which had been foster raised by Mute Swans, raised by their own captive parents, or hatched in incubators and raised in brooders. In 1993, the first released pair bred in the wild, raising six cygnets. Since then, wild production of Trumpeter Swans in southern Ontario has increased steadily, with two pairs nesting and raising a total of three cygnets in 1994, four pairs raising nine cygnets in 1995 and eight pairs raising 14 cygnets in 1996. Another pair built a nest in 1996 but did not lay any eggs. We started the 1996 season with 27 pairs in the captive breeding stock of which 15 pairs (56%) produced a total of 75 eggs. Four pairs laid two clutches.

PAPERS

AGE DIFFERENTIATION IN THE BLACK-NECKED SWAN *Cygnus melancoryphus*.

Maria Susana Seijas
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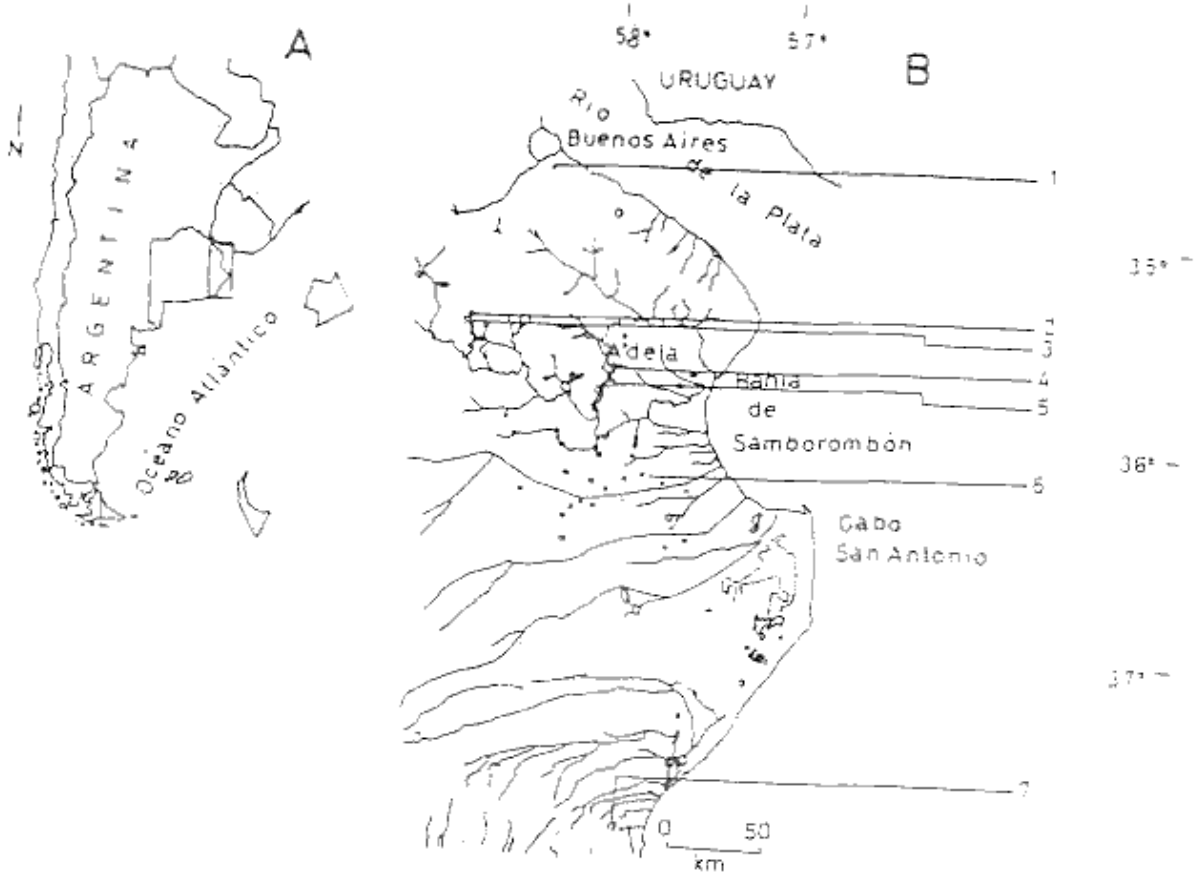
Abstract: Sub-adult Black-necked Swan *Cygnus melancoryphus* may be differentiated from adults by the characteristics and development of the frontal caruncle. There was no evidence for sexual dimorphism in the shape of the frontal caruncle in sub-adult swans, although the frontal caruncle is sexually dimorphic in adults. In the eastern part of Buenos Aires Province (Argentina), sub-adults concentrate at particular sites until they reach sexual maturity.

Introduction

Knowledge of the age ratio and sex ratio for individuals within a population is fundamental for establishing the condition and predicting the future of that population (Larson & Taber 1980). In the Black-necked Swan, there are no criteria which allow clear differentiation between sub-adults and adults, particularly in Argentina where no ringing programmes exist. This paper therefore aims to describe the age spectrum for the species, which is essential for advancing the study of Black-necked Swan populations.

Figure 1. Geographical location (A) and detail of study area (B). Clarification: 1 to 7 = sites visited; for the names see Table 1.



Study Areas and Methods

The study area is situated in the east of the province of Buenos Aires, Argentina, where there are many wetlands and where Black-necked Swans are concentrated in large numbers (Narosky & Di Giacomo 1993, Figure 1). The study period extended from November 1993 to November 1996. The Burro Lagoon situated in Adela was visited monthly; the other sites were visited less regularly (Table 1). Observations were made in the morning, using binoculars, from the shore or by boat. Information recorded included census data, characteristics of individual birds and behavioural activities. Observations were also made in state-owned or private zoos in the Federal Capital and Province of Buenos Aires.

Table 1. Sites visited within the study area and the number of Black-necked Swans counted.

Number	Lagoon	Number of swans	Number of visits	% cover
1.	La Saladita	27-32	2	100
2.	del Monte	0-3	9	100
3.	de las Perdices	0-6	3	20
4.	del Burro	28-563	22	60
5.	Chis-chis	1-54	2	10
6.	La Limpia	66-97	2	100
7.	de los Padres	37	1	100

Swans found dead within the study area (which had died from various causes) were dissected so that the age and sex of the each bird could be determined by examining the cloaca and gonads respectively (Hochbaum

Table 2. Measurements (in mm) of Black-necked Swans.

Note: Data for sub-adults were recorded during the present study; sex was not determined for a further 14 individuals. The data for adult swans are cited from other sources.

(a) SUB-ADULTS

		n	X	SD	Range
Tarsus	Male	6	90.6	2.2	87.7-93.8
	Female	3	84.9	3.9	81.3-89.2
Wing	Male	6	418	9.8	400-430
	Female	3	388	13.1	374-400

(b) ADULTS

		n	X	SD	Range	Source
Tarsus	Male	?	?	?	85.0-88.0	Delacour 1954
	Male	3	?	?	81.0-87.0	Navas 1977
	Female	?	?	?	78.0-80.0	Delacour 1954
	Female	2	81.0	4.2	78.0-84.0	Navas 1977
Wing	Male	?	?	?	435-450	Delacour 1954
	Male	3	?	?	400-420	Navas 1977
	Female	?	?	?	400-415	Delacour 1954
	Female	2	390	0	390-390	Navas 1977

1942, Larson & Taber 1980). The Bursa of Fabricius, a diverticulum of the cloaca present in both males and females, is obvious in first year birds, can usually be seen in two year olds but is not always present by the third year. The internal biochemistry changes rapidly after death, precluding the analysis of cells and tissues. The gonads therefore were evaluated according to size, aspect and shape, but not histologically.

Whenever possible, the following measurements were taken: tarsus length and wing length (cord) according to Baldwin *et al.* (1931).

Results and Discussion

Twenty three individuals, all sub-adults, were dissected. The Bursa of Fabricius was identified in each case. The development or regression of the bursa is a good indicator of age in birds and its regression corresponds to the approach of sexual maturity (Shortt 1943, Hanson 1967). As in other *Anatidae* (Elder 1946, Hohn 1961) the bursa disappears possibly after the age of two years in Black-necked Swans. The gonads, which are very small in swans, were located and the sex identified in only 39.1% of the individuals examined. The characteristics observed in the testicles coincide with those of young male birds in general and those of the ovaries as intermediate between functioning and non-functioning (Goodale 1916, McLeod *et al.* 1964). Only one testicle was measured (16 mm long and 4 mm wide) and ovarian follicles for two ovaries only (1 mm and 3.5 mm) due to the poor state or condition of the other gonads. As in the adults, the sub-adult males were larger than sub-adult females (Table 2).

Externally, all the sub-adults observed (including the 23 individuals found dead) displayed the same characteristics described for adults by Delacour (1954), except that the frontal caruncle which, although red in

colour, was clearly less well developed in the sub-adults. In the sub-adults the frontal caruncles were not sexually dimorphic and two patterns in their shape were recognised:

1. Smooth pattern

This pattern does not display any protuberance or lobe (Figure 2B) and the profile is flat; in this pattern the lobe is just beginning to suggest itself. It is somewhat similar to that of the juveniles (Figure 2A), but red in colour, whereas in juveniles it is orange with greenish tones at the feather-line (Haedo Rossi 1953). This pattern was observed in 17.3% of individuals examined at post-mortem.

2. Simple pattern

This pattern displays a single protuberance or small lobe (Figure 2C), much less prominent than the lobes of the adult; in addition this lobe is always behind the front edge of the nasal aperture. This pattern was observed in 82.6% of the individuals examined at post-mortem.

Apparently these patterns (smooth and simple) are not related to sex, as they were observed without distinction in males (16.6% smooth pattern, 83.3% simple pattern) as in females (33.3% smooth, 66.6% simple). Although it could not be proven, it is probable that the smooth pattern would belong to the younger individuals.

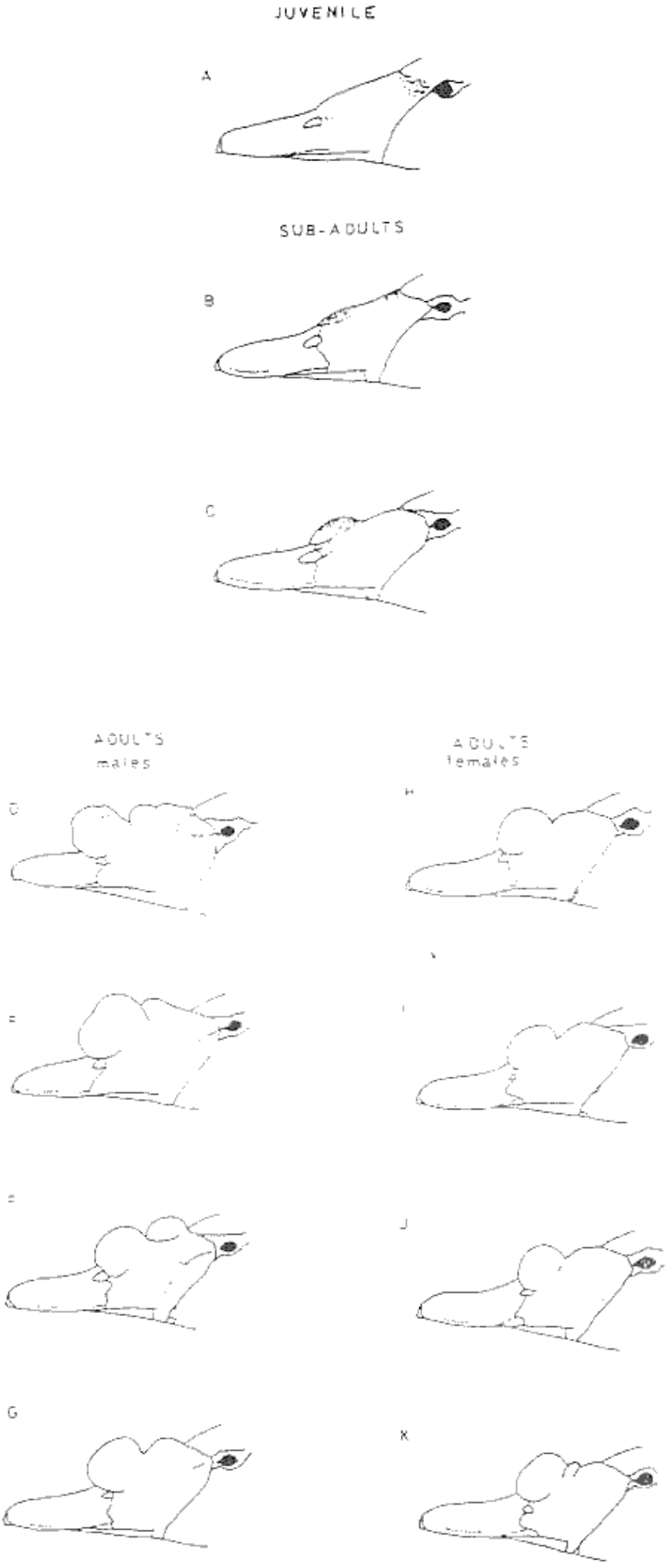
In adults the frontal caruncle is sexually dimorphic. According to Haedo Rossi (1953) the frontal caruncle in males is divided into three lobes (Figure 2D) and in females into two lobes. The adult males observed during the study period (n = 3) displayed a frontal caruncle divided into two lobes (Figures 2E, 2F, 2G) and the adult females (n = 4) displayed a frontal caruncle divided into one or two lobes (Figures 2H, 2I, 2J, 2K). In the males the last lobe is the smallest and reaches to the forehead; in the females, when there are two lobes, the last is also the smallest but never reaches as far as the forehead (Figure 2K). In both sexes the first lobe "falls over" or goes beyond the front edge of the nasal aperture. Figure 3 shows the topography of the frontal caruncle of the Black-necked Swan.

The sub-adults observed throughout the study period (which included almost two breeding seasons) did not behave like breeding adults during the breeding season (July to early January, according to Weller 1967) but appeared to be in "sexual repose". During the breeding season, and throughout the study, there were no records of courtship, breeding pairs or nests, nor of young or juveniles, for the swans being monitored. They were always seen in groups, which varied from seven to 10 individuals to flocks of more than 100 swans, feeding sleeping and preening on the water and, rarely, in rushes and on shore. These observations coincide with those made by Weller (1967) in the study area; he supposed that many of the Black-necked Swans that he observed would be yearlings or two-year old non-breeders, based on the low numbers of nests recorded in proportion to the total population. He observed thousands of swans in Adela, some 150 km north-west of the San Antonio Cape. Something similar occurs in the Uruguayan population (Vaz-Ferreira & Rilla 1991). This phenomenon may be related to the competitive interactions and aggressions associated with the breeding season, which might encourage non-breeders to move to other areas (Schlatter *et al.* 1991), where they would stay until sexual maturity.

Conclusions

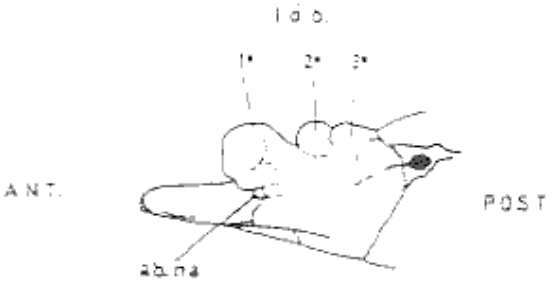
The frontal caruncle in the Black-necked Swan reaches its full development, shape and number of lobes in adults, at three or four years of age (Navas 1977). For this reason, and knowing the close relation between secondary sexual gonad characteristics (Goodale 1916) and the presence of the bursa, one can interpret the under-development of the frontal caruncle as an external manifestation of their immaturity. As a further expression of this, sexual dimorphism is not evident through this structure in sub-adults. The size of the frontal knob is similarly a criteria for determining sex and age in the Mute Swan *Cygnus olor* (Mathiasson 1981, van Dijk & van Eerden 1991).

Figure 2. Frontal caruncles of the Black-necked Swan *Cygnus melancoryphus*. Clarification: A and D = drawings based on photographs by Haedo Rossi (1954).



The sub-adult Black-necked Swans appear to concentrate at particular sites within the study area, waiting for sexual maturity. Certain questions have been raised which will be evaluated in future studies, for example, whether the sub-adults, on reaching sexual maturity, return to the traditional nesting and breeding sites.

Figure 3. Detail of the beak and frontal caruncle area of the Black-necked Swan. lob-lobe; ab.na. = nasal aperture.



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REPORTS OF THE "POLISH" MORPH OF THE MUTE SWAN *Cygnus olor immutabilis* Yarrell IN LATVIA.

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Introduction

The cygnets of Mute Swans are usually grey, but occasionally individuals with white down and feathers are observed. These are cygnets of the "Polish" morph, named *Cygnus immutabilis* by Yarrell (1841), who mistook the white form for a new species. During the first year the swans have white plumage, similar to adult birds, but with yellow-brown or pale-pink feet and a pale-pink bill which are retained into adulthood. Although lacking pigment, the morph is no a true albino because the swans' eyes are not red, just slightly lighter than in normal specimens. The different colour phase is genetically inherited (Munro *et al.* 1968, Lipsbergs 1990).

Results and Discussion

The *immutabilis* morph was discovered for the first time in Latvia during the 1988 breeding season. On 27th June 1988 one white and four grey cygnets were seen in a brood on Lake Babite. A second brood including one white and five grey cygnets was seen on Lake Liepaja on 21st June 1988. On both occasions the adult birds both had normal pigmentation - black (dark) legs and normally bright bills. The *immutabilis* morph at Lake Babite was re-sighted on September 8th 1988. Both white cygnets were ringed (Lipsbergs 1990).

The next record of the *immutabilis* morph was in 1993, when one white and six grey cygnets were observed on Lake Engure, in the Lopsalcers region. The *immutabilis* cygnet was ringed (by R. Matrozis) on 10 June. The family was still present from 19-25 July 1993 (M. Kalnins pers. obs.). The bill and leg colour of the adult swans could not be determined. A second brood, with seven white cygnets, was also reported in 1993, on the northern part of Lake Engure (J. Lipsbergs pers. comm.). On 14 July 1993, J. Lipsbergs observed the third *immutabilis* brood of the year, with seven grey and one white cygnet, on Lake Kanieris.

In 1995 the author observed two broods with *immutabilis* cygnets. On 1 June one white cygnet was caught and ringed in the Lopsalcers region. More white cygnets were present in this brood, but it was impossible to determine the exact number. On 8 June a return visit to the Lopsalcers region found a brood with five white and one grey cygnet. On the same day, the northern part of Lake Engure was also visited and a brood with one white and four grey cygnets was recorded. The white cygnet and two of the grey cygnets were caught and ringed. The adult male had normal colouring, with dark legs and a bright red bill. The female also had a normally bright bill, but it was not possible to see the colour of her legs. A total of 6 Mute Swan broods were seen on 1 June, 7 broods on 8 June and 6 broods on 9 June. Of these 18 broods, in which cygnets were ringed, and a further 10 broods which remained unringed (total = 28 broods) only two broods with *immutabilis* morph cygnets were observed.

On 11 and 12 July 1996 a brood with one white and three grey cygnets was observed at Lake Engure in the Lopsalcers region (M. Kalnins pers. obs.). All cygnets were caught and ringed. The leg colouration was not determined for the parent birds but their bills were normally bright in colour. A total of 13 Mute Swan broods were located and checked on 11 and 12 July 1996. The number of breeding pairs at Lake Engure was lower in 1996 than in other seasons, brood size was smaller than usual, and the cygnets caught in early July 1996 did not differ in age (size) from cygnets caught on 1st June 1995 (approximately 1 month earlier in the year). This may be due to the exceptionally long 1995-96 winter delaying the start of the 1996 breeding season.

It is interesting to note that a brood with at least one white phase (*immutabilis*) cygnet was recorded in the Lopsalcers region of Lake Engure in 1993, 1995 and 1996, and also in the northern part of Lake Engure in 1993 and 1995. Although there is no definite evidence, it seems possible that the same two pairs nested in the Lopsalcers region of Lake Engure and in the northern part of Lake Engure in each of these years, producing *immutabilis* morph cygnets on each occasion.

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MEETINGS/CONFERENCES

BRITISH SWAN STUDY GROUP UPDATE

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Due to the size of the Group, two meetings of the British Swan Study Group were held in 1997. The first was a small meeting of 15 study organisers, which was held at Birmingham on 25 January. The numbers attending this meeting were limited, in an effort to provide a better forum for concentrating on swan research and ringing issues. The size of the traditional March meetings have made it difficult to focus these discussions in the past. The second meeting, held at Slimbridge, Gloucester on 8 March, followed the usual procedure of disseminating information on current swan studies *via* a series of talks.

25 January 1997: During the first meeting, problems associated with the loss of clip rings in long-term studies, and the future use of colour codes and number/letter combinations on darvic (plastic) rings, bearing in mind that only a limited number of codes are now available in the UK, were discussed. Several proposals for joint research projects were also considered and some agreements reached. The possibility of collecting productivity data from all study areas was debated; it was agreed that some simple measures for each study could be collected annually to provide a national picture, which could be compared between years. Due to the different aims and priorities of the various studies, however, only basic data could be collected. Forms were developed to request data for each nest monitored, with columns for habitat, the number of young hatched, the number of young reared and any cause of failure, together with the number of pairs recorded and the total number of birds in the study area. Forms for 1996 have been issued and are gradually being returned.

Moult was also discussed, particularly the possibility of coordinating the collection of moult data across the UK over a period of three weeks in the summer. This data could be used to compare the timing of moult regionally, and to look for other regional variations in moulting patterns. Currently, major round-ups of moulting flocks are made in Montrose (Angus), Berwick upon Tweed (Northumberland), Burton upon Trent (Staffordshire) and Abbotsbury (Dorset). Additional smaller round-ups may occur in Cheshire and mid Wales and it is anticipated that a standard set of measurements will be recorded for all birds or for a sample of birds at each of these catches.

It is to be hoped that the smaller meeting for study organisers will continue in future years.

8 March 1997: The usual British Swan Study Group meeting was well attended with over 70 people present. Bert Coleman spoke about the population increase in Mute Swans in the Midlands and was followed by Eileen Rees talking about habitat selection by Mute, Whooper and Bewick's Swans in the UK. This was followed by Carey Coombes from the Ministry of Agriculture who gave a talk on the research carried out by MAFF (Ministry of Agriculture Fisheries and Food) and ADAS (Agricultural Developments Advisory Service) on the River Avon in Dorset, with particular reference to work done on the damage to *Ranunculus* beds in the river and the effect that this has on fishing. The final major talk was given by Chris Perrins who spoke about the pairing and breeding of Mute Swans at the Abbotsbury colony. The day was completed by a short impromptu presentation by Chris Spray on the work that he and Helen Chisholme have been undertaking on field feeding by swans in the Scottish borders. This was followed by a request from Chris for people to help by sending in information on field feeding by swans in their own study areas elsewhere in the UK. To this end, a proforma for those interested in being involved has been prepared for distribution.

TRUMPETER SWAN SOCIETY CONFERENCES

Carl Mitchell, U.S. Fish & Wildlife Service, Wrangell-St. Elias NP/P, P.O. Box 439, Copper Centre, Alaska 99573, U.S.A.

The 16th Trumpeter Swan Society Conference, with the theme "Restoration in the Heartland" was held in St. Louis, Missouri, USA in February 1997. Presentations included reports on the 1995 census of Trumpeter Swans on Alaskan habitats, the winter range expansion programme for the Rocky Mountain population, the Utah reintroduction programme and on territorial conflict between Trumpeter Swans and Mute Swans in Michigan. Abstracts and full papers will be published in the Conference Proceedings in due course.

The proceedings of the 15th Trumpeter Swan Society Conference, held at Mount Vernon, Washington in February 1995, are now available. The volume includes papers on the status and trends of various Trumpeter Swan populations, on the migration and winter ecology of both Trumpeter and Tundra Swans, and on winter habitat management. It is available for $15 (US), plus shipping, from The Trumpeter Swan Society, 3800 County Road 24, Maple Plain, Minnesota 55359, U.S.A. (Tel +1 612 476 4663).

The next Trumpeter Swan Society Conference is scheduled to be held in the tristate area of North America (definite site to be confirmed) in September 1998. Further information should be available in the next edition of the *SSG Newsletter* early in the New Year.

POLISH SWAN STUDY GROUP

We are delighted to report that the first edition of the Polish Swan Study Group Bulletin was published earlier this year. For further information please contact Maria Wieloch, Stacja Ornitologiczna IE PAN, ul. Nadwislanska 108, 80-680 Gdansk 40, Poland. Tel/Fax: +48 58 380759. E-mail: mwieloch@stornit.gda.pl

RECENT ABSTRACTS

Pairing behaviour in a colony of Mute Swans *Cygnus olor*.

Perrins, C.M. & McCleery, R.H. 1996. *Wildfowl* 47: 31-41.

Abstract: A study was made of the Mute Swans present in the breeding colony at Abbotsbury each summer. A lage number of the birds do not breed. Some of these non-breeders are probably not yet old enough to breed, but others are birds which have bred in earlier years. In years of low nesting numbers, the numbers of birds which have bred, but are not breeding, may exceed the numbers of breeders. When swans take a new mate, due to death or divorce from the previous mate, they tend to chose a mate closer to their own age than would be expected by chance.

An aggression of the Mute Swan *Cygnus olor* male against his own "Polish" morph cygnet.

Dolata, P.T. & Kurzawski, W. 1996. *Preglad Przyrodniczy* VII (I): 86-88.

Abstract: On 10 August 1994 a strong aggression of the Mute Swan male (normal form) against his own "*immutabilis*" female two-month cygnet was recorded at Przygodzice fish-ponds (Kalisz voivodship, SE Wielkopolska, Poland). During about four hours the male attacked and attempted to drown his own cygnet. Most probably the young bird was killed or died, because it wasn't observed later. This "Polish" morph cygnet was the only one from six in the family and also among at least 75 cygnets in the 700 ha area of ponds. In 1995 at the same pond, the same (ringed) pair of Mute Swans had eight cygnets - six of normal morph and two of "Polish" morph. In 1995 two "Polish" cygnets were the only two white morphs among at least 63 cygnets on all ponds in the area. In 1985 to 1993 "Polish" morph cygnets were not observed in this area.

The numbers and distribution of swans (*Cygnus sp.*) wintering in Greece.

Handrinos, G. 1996. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 463-476.

Abstract: All three Western Palearctic swan species are winter visitors to Greece, although a feral breeding population of Mute Swans *Cygnus olor* exists in Western Macedonia. The Mute Swan is the commonest of the three. Whooper Swans *C. cygnus*, although regular, occur only in small numbers and the Bewick's Swan *C. columbianus bewickii* is an accidental species. Swans are counted in Greece once a year, in January, during the International Waterfowl Censuses (IWC) of the International Waterfowl and Wetlands Research Bureau (IWRB). Analyses of these counts (1963-1994), presented here for the first time, suggest that the numbers and distribution of all species, but mainly of the Mute Swan, are strongly influenced by weather conditions. In cold winters, Mute and Whooper Swans spread out all over the mainland and most of the larger islands, as far south as Crete. The number of wintering Mute Swans has increased substantially in recent years and they now occur regularly in wetlands where once they were recorded only rarely. The five-year mean, for counts made from 1985-1994, indicates that Greece now holds up to 12% of the regional (Black Sea/Eastern Mediterranean) population (20,000 birds), with two wetlands in Thrace (Evros Delta and the complex of Lake Ismaris) qualifying as sites of international importance for this species. All swan species are protected in Greece, but during cold weather movements (*ie* in 1985, 1993 and 1994) large numbers died of exhaustion, hunting disturbance and illegal shooting.

Landsat satellite images for detection of submerged macrophytes: in search of potential stop-over feeding sites for Bewick's Swans (*Cygnus columbianus bewickii*) along their migratory route.

Beekman, J.H., van Eerden, M.R., Mineyev, Y.N., Luigujoe, L. & Den Hollander, H.J. 1996. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 421-450.

Abstract: Bewick's Swans *Cygnus columbianus bewickii*, rely on the roots and tubers of submerged macrophytes, *eg Potamogeton* species, as an energy rich food source used to build up the necessary body reserves for autumn migration between the breeding grounds in arctic Russia and the wintering grounds in western Europe (distance 3,000-3,500 km). LANDSAT satellite images were used to detect water bodies with abundant submerged vegetation along the flyway of the swans. Of nine sites studied here, five held relatively large areas (10-90 km^2) with submerged macrophytes (vegetation cover 10-75%), although the potential area for these plants (shallow water) was much larger. Four of the sites with abundant aquatic vegetation are known to

hold large numbers of swans during autumn migration, based on recent information. The fifth, marine, water body (Onega Bay, White Sea, Russia), might be a yet undetected stop-over area with vegetation most likely consisting of *Zostera sp.* In the remaining four study sites, no aquatic vegetation could be detected. Except for an image of the Pechora Delta, Russia (LANDSAT-TM, 7 bands), all others were LANDSAT-MSS images (four bands). It is recommended to use LANDSAT-TM or SPOT-XS images for further studies, especially to determine the amount of vegetated area. Recent literature data on swans did reveal three further (major) areas of particular interest. This study supports the view that *Potmogeton* could play an important role with respect to the distribution and numbers of Bewick's Swans during migration. More precise studies into the spatio-temporal distribution of macrophytes, as a food source for waterfowl species, may prove to be a powerful tool for the conservation of a chain of wetlands along the migratory flyways for arctic breeding *Anatidae*.

Migratory tradition in Bewick's Swans (*Cygnus columbianus bewickii*).

Rees, E.C. & Bacon, P.J. 1996. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 407-420.

Abstract: Re-sightings in north-west Europe of Bewick's Swans, *Cygnus columbianus bewickii*, ringed at Slimbridge, Gloucestershire, since the 1966-67 winter, and at other British sites since 1980, were analysed to examine the use of migratory sites by individual birds. A comparison of the migratory routes used by swans marked in different parts of the UK indicated that birds which winter in north-west England and south-west Scotland have a more northerly migratory route than swans which winter in south-west England. Swans marked in south-east England only occasionally extended their range to sites further west. The number of sites visited in the wintering range was affected by the swans' pairing and breeding success; single swans were seen at more sites than paired birds, which in turn were seen at more sites than family parties. A preliminary investigation of the tendency for individuals to use the same staging grounds in successive years indicated that they may be consistent in their use of migratory sites, but more detailed analyses are needed to confirm this point.

Migration and staging of the Bewick's Swan (*Cygnus columbianus bewickii*) in Estonia.

Luigujoe, L., Kuresoo, A., Keskpaik, J., Ader, A. and Leito, A. 1996. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 451-461.

Systematic study of Bewick's Swans *Cygnus columbianus bewickii* on migration has been carried out in Estonia since 1991. The analyses are based mainly on observtions of flocks at stop-over sites. Local movements between different staging areas have been established from sightings of individually marked birds. Maximum numbers of Bewick's Swans at the main spring staging areas in Estonia in 1992-1994 were: Matsalu Bay - 14,500 birds; Parnu Bay and the Parnu rivershed - 7,000; Pandivere region - 1,000; iver Emajogi - 600; Haapsalu Bay - 500; Lake Peipsi and Vaike-Vain Strait - both 500 individuals. The main autumn staging areas were: Matsalu Bay - 3,000; Lake Peipsi - 2,000; Parnu Bay and the Parnu rivershed - 1,000 and Vaike-Vain Strait - 500 individuals. The comparatively short spring migratory period reached its peak in April. The longer autumn migration occurred in two waves during October and November.

Numerical distribution and conservation of Whooper Swans (*Cygnus cygnus*) in China.

Xiaomin, Li. 1996. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 477-486.

Abstract: There are five species of swans in the world. Three of them have been recorded

in China. These are the Whooper Swan, *Cygnus cygnus*, the Whistling Swan, *Cygnus columbianus*, and the Mute Swan *Cygnus olor*. The Whooper Swan is the most famous among these species in China. The Whooper Swan is also a resident bird in China. It breeds in the Xinjiang Ugyur Autonomous Region, the Inner Mongol Autonomous Region, the Heilongjiang Province, *etc*, and winters in the Qinghai, Shandong and Henan Provinces, *etc*, as well as in the lower reaches of the Changjiang River. In the late 1980s and the early 1990s, the total population number of the species in China was estimated at about 5,000 birds in the breeding grounds and 15,000 in the wintering grounds. Higher numbers were found in the 1960s and 1970s. Because of habitat modifications and hunting, the gathering of eggs and nestlings, their population reduced rapidly and the species is now in danger. In order to protect the Whooper Swan, further methods of protection should be applied, such as a better education of the public and more scientific research to establish a baseline for raising and breeding and the development of international cooperation, the creation of more natural reserves in the breeding and wintering grounds. Up to the end of 1993, 34 natural reserves, mainly for Whooper Swans, have been established in China.

Fifty years of swan research by The Wildfowl & Wetlands Trust.

Rees, E.C. & Bowler, J.M. 1996. *Wildfowl* 47: 248-263.

Abstract: The Wildfowl & Wetlands Trust (WWT) has contributed to the conservation of swan species by establishing refuges for the birds in winter, through its research programmes, and by advising others on site management. This paper describes an increase in the number of migratory swans wintering at Slimbridge, Caerlaverock, the Ouse Washes and Martin Mere following the development of WWT Centres at these sites. The build-up in numbers may be due to changing population levels, and to conditions created by WWT. We describe changes in feeding site selection in the last 50 years, and consider the potential for inter-specific competition between Bewick's and Whooper Swans in areas where the two species co-exist. WWT's long-term studies of individual birds, which have provided detailed insight into the swans' life-cycles, are reviewed. The importance of international collaboration for the effective conservation of migratory waterbirds is again emphasised.

Site selection by swans wintering in Britain and Ireland: the importance of habitat and geographic location.

Rees, E.C., Kirby, J.S. and Gilburn, A. 1997. *Ibis* 139: 337-352.

Abstract: Monthly surveys of Bewick's Swans *Cygnus columbianus bewickii*, Whooper Swans *Cygnus cygnus* and Mute Swans *Cygnus olor* in Britain and Ireland were made during the 1990-1991 winter to determine factors affecting the swans' selection of feeding sites. Geographic location and habitat both influenced site selection. Whooper Swans occurred in greatest numbers at sites in Scotland, northeastern England and Northern Ireland, whereas Bewick's Swans had a more southerly distribution, reflecting differences in the migratory routes used by the two species. The resident Mute Swans were more widespread, with large flocks occurring in southeastern England and in parts of Scotland. Whooper and Mute Swans were found mainly on permanent inland waters (68% and 61% respectively), but the majority of Bewick's Swans (60%) were on arable land. The percentage of Bewick's Swan *flocks* found on permanent inland waters (42%) was higher than that found on arable fields (23%), indicating that the large number recorded on arable land was a result of the birds congregating at a comparatively small number of sites. Overall, less than 15% of Whooper Swans and 3% of Mute Swans were on arable crops during the winter, but the largest flocks were associated with arable land for all three species. Thus, although the occurrence of large flocks at particular arable sites may give an impression that swans feed mainly on farmland, the swans are in fact more widely dispersed. Regional variation in the percentage of juveniles present was recorded for all three species. Changes during the winter in the distribution of juveniles, and of the swans as a whole, are considered in relation to food supply and to

migratory routes for the Bewick's and Whooper Swans.

1996-1997 SWAN PUBLICATIONS (excluding papers published in 1996 that were listed in Newsletter No. 5), plus any earlier references missed in previous Newsletters.

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Compton, D. & Link, M. (eds.) *Trumpeter Swan Society Newsletter, Vol. 25, No. 1.* Trumpeter Swan Society, 3800 County Road 24, Maple Plain, Minnesota 55359, USA.

Houston, C.S. & Houston, M.I. 1997. The 19th-Century trade in swan skins and quills. *Blue Jay* 50(1): 24-35.

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None reported

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Cranswick, P.A., Bowler, J.M., Delany, S.N., Einarsson, O., Gardarsson, A., McElwaine, J.G., Merne, O.J., Rees, E.C. & Wells, J.H. 1996. Numbers of Whooper Swans *Cygnus cygnus* in Iceland, Ireland and Britain in January 1995: results of the international Whooper Swan census. *Wildfowl* 47: 17-30.

Einarsson, O. 1996. Breeding biology of the Whooper Swan and factors affecting its breeding success, with notes on its social dynamics and life cycle in the wintering range. PhD thesis, University of Bristol.

Kanai, Y., Sato, F., Ueta, M., Minton, J., Higuchi, H., Soma, M., Mita, N. & Matsui, S. (1997) The migration routes and important rest-sites of Whooper Swans satellite-tracked from northern Japan. *Strix* 15: 1-13.

Xiaomin, LI. 1996. Numerical distribution and conservation of Whooper Swans (*Cygnus cygnus*) in China. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 477-486.

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Beekman, J.H., Berthold, P., Nowak, E. & Querner, U. 1996. Implementation of satellite tracking in studying migration of *Anatidae*: an overview and a case study. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 157-176.

Beekman, J.H., van Eerden, M.R., Mineyev, Y.N., Luigujoe, L. & Den Hollander, H.J. 1996. Landsat satellite images for detection of submerged macrophytes:in search of potential stop-over feeding sites for Bewick's Swans (*Cygnus columbianus bewickii*) along their migratory route. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 421-450.

Bowler, J.M. 1996. Feeding strategies of Bewick's Swans (*Cygnus columbianus bewickii*) in winter. PhD thesis, University of Bristol.

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MUTE SWANS:

Ciaranca, M.A., Allin, C.C. & Jones, G.S. 1997. Mute Swan *Cygnus olor*. In: Poole, A. & Gill, F. (eds) *The Birds of North America* No. 273. 28 pp.

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Zimmer, R., Erdtmann, B., Thomas, W.K. & Quinn, T.W. 1994. Phylogenetic analysis of the *Coscoroba coscoroba* using mitochondrial srDNA gene sequences. *Molecular Phylogenetics and Evolution* 3 (2): 85-91.

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Handrinos, G.I. 1996. The numbers and distribution of swans (*Cygnus* sp.) wintering in Greece. In: Birkan, M., Vessem, J. van, Havet, P., Madsen, J., Trolliet, B. and Moser, M. (eds). *Proceedings of the Anatidae 2000 Conference, Strasbourg, France, 5-9 December 1994. Gibier Faune Sauvage, Game Wildlife* 13: 463-476.

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APPENDIX

(a) New members of the Swan Specialist Group, together with their main research interests.

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(c) Missing SSG Members

The following SSG members have moved and their current addresses are not on record:

1996 Max Ruckstuhl (Switzerland)
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1997 Gunnar God (Norway)
1997 P F Santos (Brazil)
1997 Berend Voslamber (The Netherlands)

Please advise the editor if you are aware of their current addresses and/or research programmes.